

*A. S. Aloe Co.*

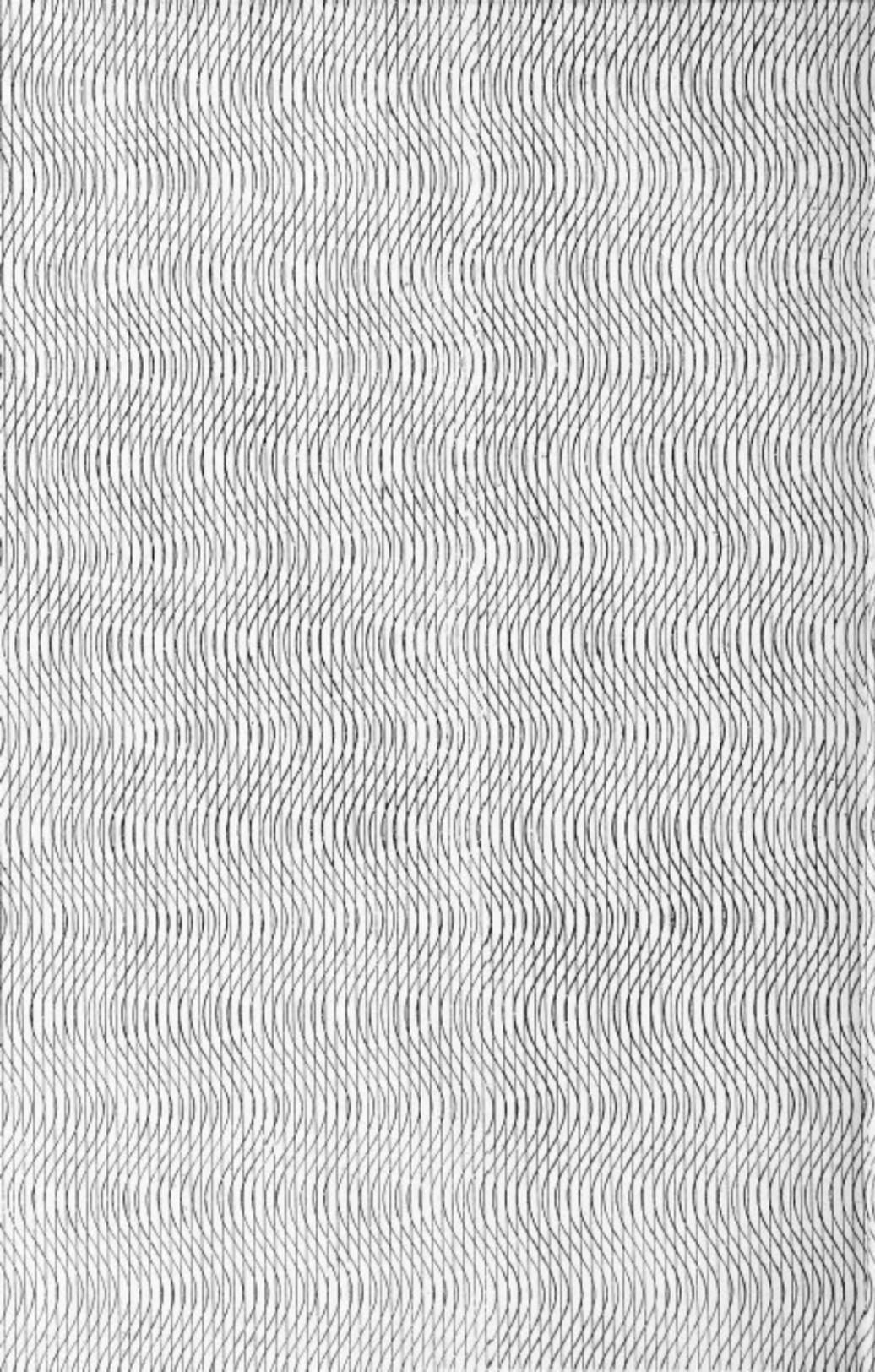
*Mathematical*

*and Engineering*

*Instruments*

*and*  
*Drawing Materials*

*Saint Louis*



# DISCOUNT SHEET.

Approximate discounts from prices contained in the 21st edition of our Mathematical Catalogue.

LIST PRICES AND DISCOUNTS SUBJECT TO CHANGE WITHOUT NOTICE.

## A. S. ALOE COMPANY

Surveying Instruments and Drawing Materials.

513 Olive Street, - ST. LOUIS, MO.

Numbers.	Disct.	Numbers.	Disct.
2000-2026	20	2236 $\frac{1}{2}$	10
2027A-2027E	15	2237 $\frac{1}{2}$ -2239G	Special.
2029	10	2240-2262N	20
2030-2034	15	2263-2263J	Net
2035-2053	20	2263K-2263P	15
2054-2068	20	2264-2281	Net
2071-2103	20	2285-2296	20
2110-2123	15	2296 $\frac{1}{2}$	Net
2129-2136	20	2297-2299	20
2137-2139 extra 5% for cash	15	1360-1385	15
2140 extra 5% for cash	10	2300-2308	5
2141-2141F	15	2309-2309 $\frac{1}{2}$	Net
2142-2164	20	2321-2329 $\frac{1}{2}$	5
2170-2194	20	2329 $\frac{1}{2}$ A-2340	Net
2200-2216 $\frac{3}{4}$	20	2342-2345	5
2217-2222	20	2355-2359	5
2223-2224D	15	2380-2383	5
2225A-2225D	15	2385-2393	Net
2226-2236	20	2396-2404A	5

Numbers.	Disct.	Numbers.	Disct.
2404 $\frac{1}{2}$ -2404 $\frac{3}{4}$	Net	2874-2874B	15
2405-2411E	20	2875-2886	20
2411H	Net	2898-2972	20
2412-2419	20	2973	10
2424 $\frac{1}{2}$ -2424 $\frac{3}{4}$	10	2975-2980	20
2425-2428 $\frac{1}{2}$	20	2982-2983	10
2429-2436	15	2988-3007	20
2437-2438 $\frac{1}{2}$	15	3008-3017	25
2438 $\frac{3}{4}$	5	3020-3048	20
2439-2440A	20	200-381	20
2443 $\frac{1}{2}$ -2449	15	117-155	20
2451-2452F	20	3063-3083	20
2453-2459	10	3085-3088 $\frac{3}{4}$	20
2460-2462 $\frac{1}{2}$	5	3090-3108	20
2475-2511	15	3110-3116	15
2518-2532	15	3120-3122	Net
2537-2551	15	3166-3188	20
2555-2598 $\frac{3}{4}$	20	3190-3191	10
2601-2606	15	3194-3214	20
2607	10	3216-3219	10
2608-2610	15	3220-3233	20
2612-2613	20	3234	Net
2615-2624 $\frac{1}{2}$ C	15	3236-3241	10
2625-2628	15	3242-3242 $\frac{1}{2}$	Net
2634-2659A	20	3243-3339 $\frac{1}{2}$	20
2660A-2660C	Net	3340-3365	20
2661A-2662C	15	3370-3371A	15
2666-2687	20	3375-3379	20
2688-2691	10	3380-3385W	20
2692A-2693C	15	3386-3387G	15
2694-2694D	10	3388H-3389J	20
2705-2749	15	3390	10
2750-2763	20	3391 $\frac{1}{2}$ -3394	20
2764	10	3397-3401	15
2765-2843	20	3410-3447	20
2844-2849C	20	3448-3463	15
2850-2871	25	3465-3466C	20
2872A	15	3475	Net
2873-2873D	20	3483-3489	15

Numbers.	Disct.	Numbers.	Disct.
3490-3508	15	3903A-3911C	20
3509-3546	20	3913-3914K	20
3548-3556G	15	3915-3919N	15
3557-3559	20	3920 $\frac{1}{2}$ -3923 $\frac{1}{2}$	10
3560	10	3924A-3924E	20
3562-3595	15	3924H-3927B	20
3596-3599	20	3928-3928D	15
3600-3604C	15	3930-3961	20
3605-3632	20	3970-3974	20
3635-3650	15	3975-3985 $\frac{1}{2}$	15
3655-3665	20	3987-3990	20
3667-3669 $\frac{1}{2}$	15	3994-4009 $\frac{1}{2}$	15
3671-3700P	20	4010-4018	20
3703-3708	15	4020-4022	20
3709-3711	20	4025-4040	20
3713-3742	20	4059-4063	20
3750-3762	20	4090-4097	15
3780-3812	20	4098-4099	Net
3814-3821 $\frac{3}{4}$	15	4120-4123	15
3823-3829B	20	4130-4139	20
3830-3845	20	4150-4154	Net
3848-3897	15	9100-9115	Special
3900-3902	20	Scientific Books—delivered	Net
3902A-3902M	15		

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TWENTY-FIRST EDITION

ESTABLISHED 50 YEARS

CARNEGIE LIBRARY  
PITTSBURGH, PA!

CATALOGUE AND PRICE LIST

—OF—

Civil Engineers' and Surveyors' Instruments  
Architects' and Draughtsmen's  
Materials and Supplies

BLUE  
AND  
BLACK  
PRINT  
PAPERS



DETAIL  
DRAWING  
AND  
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MANUFACTURERS AND IMPORTERS  
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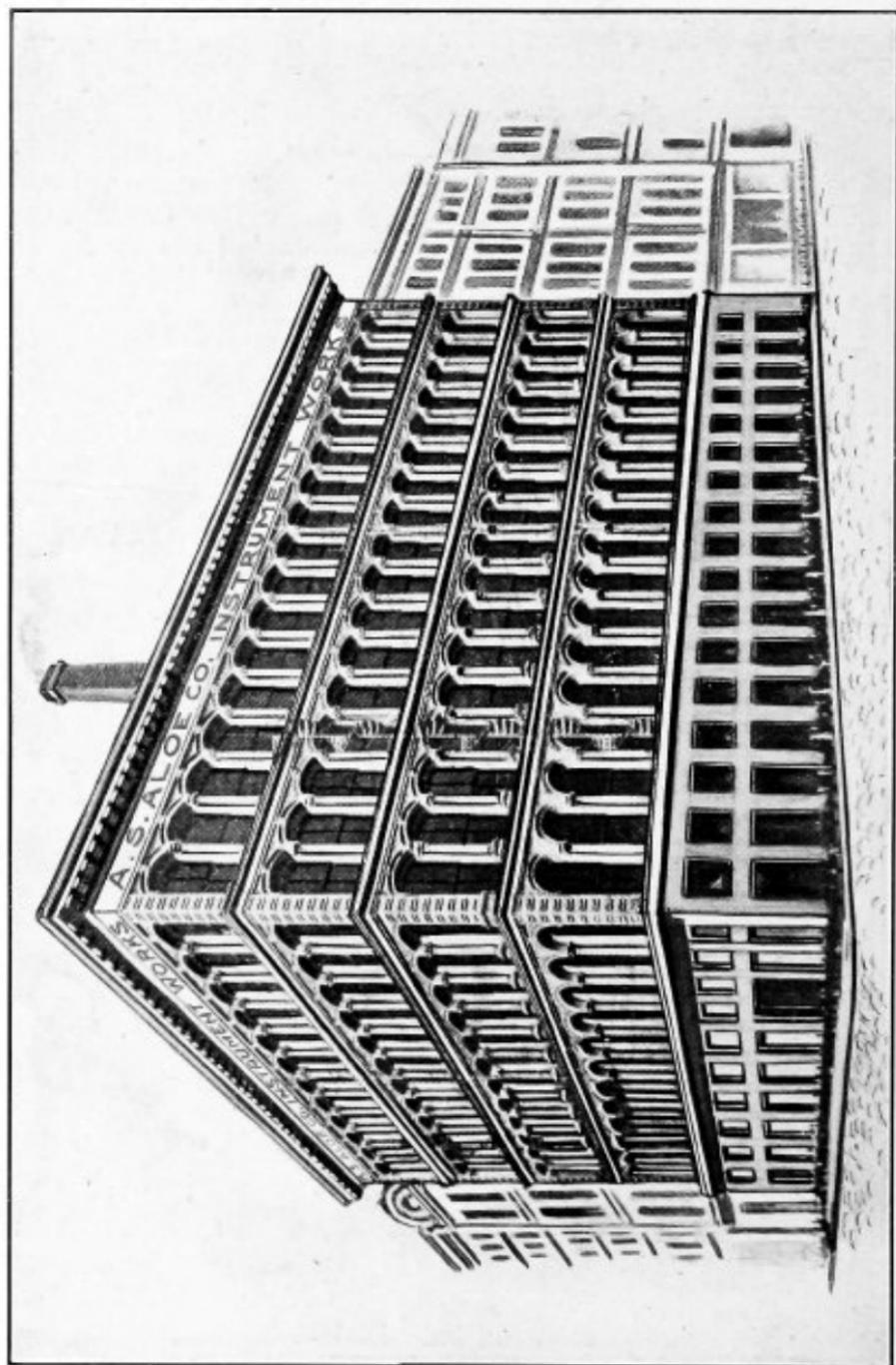
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A. S. ALOE COMPANY

ESTABLISHED IN 1860

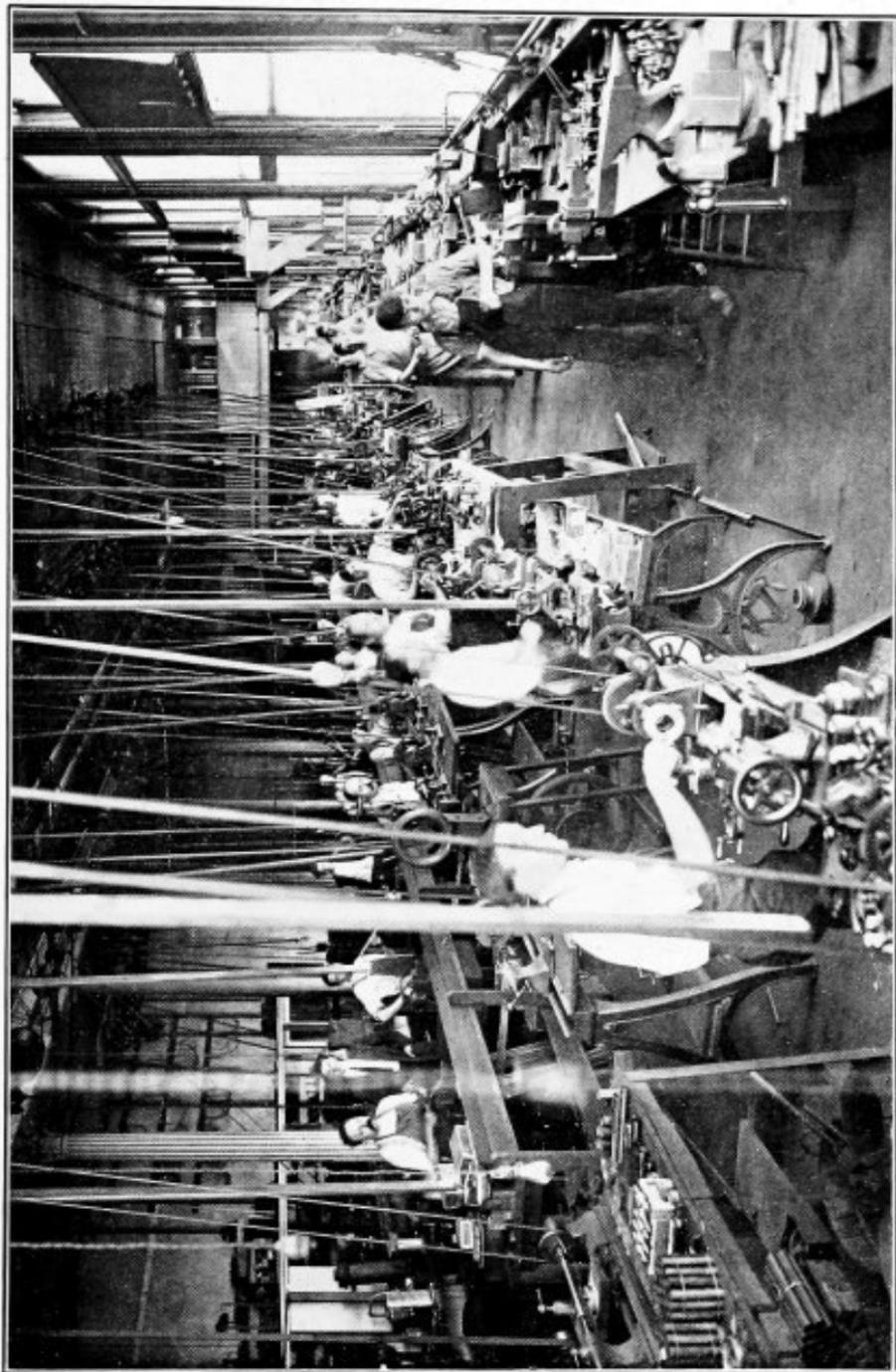
513 Olive Street

3308 ST. LOUIS, MO., U. S. A.

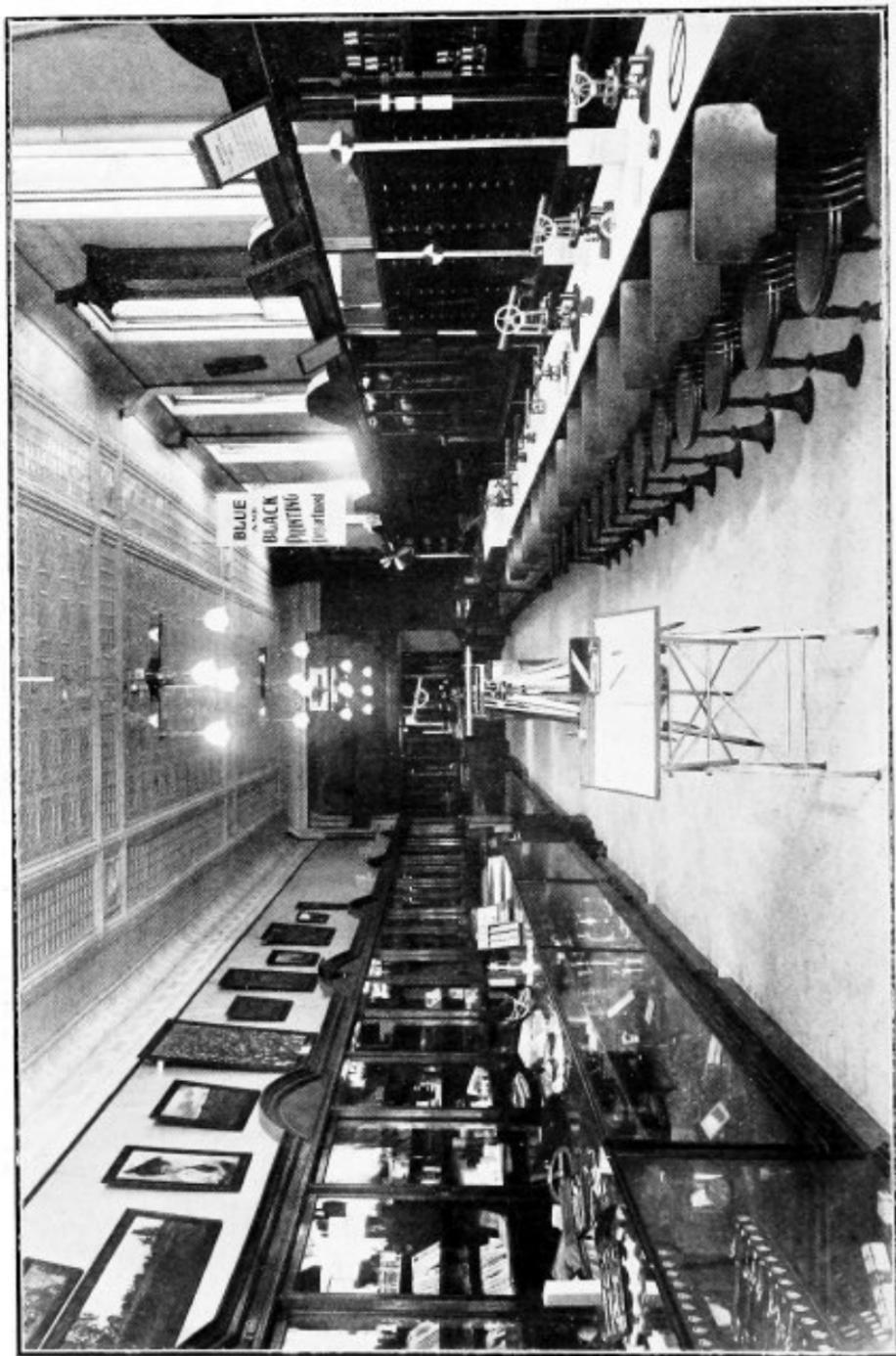


SIZE 140X160, 150,000 SQ. FEET

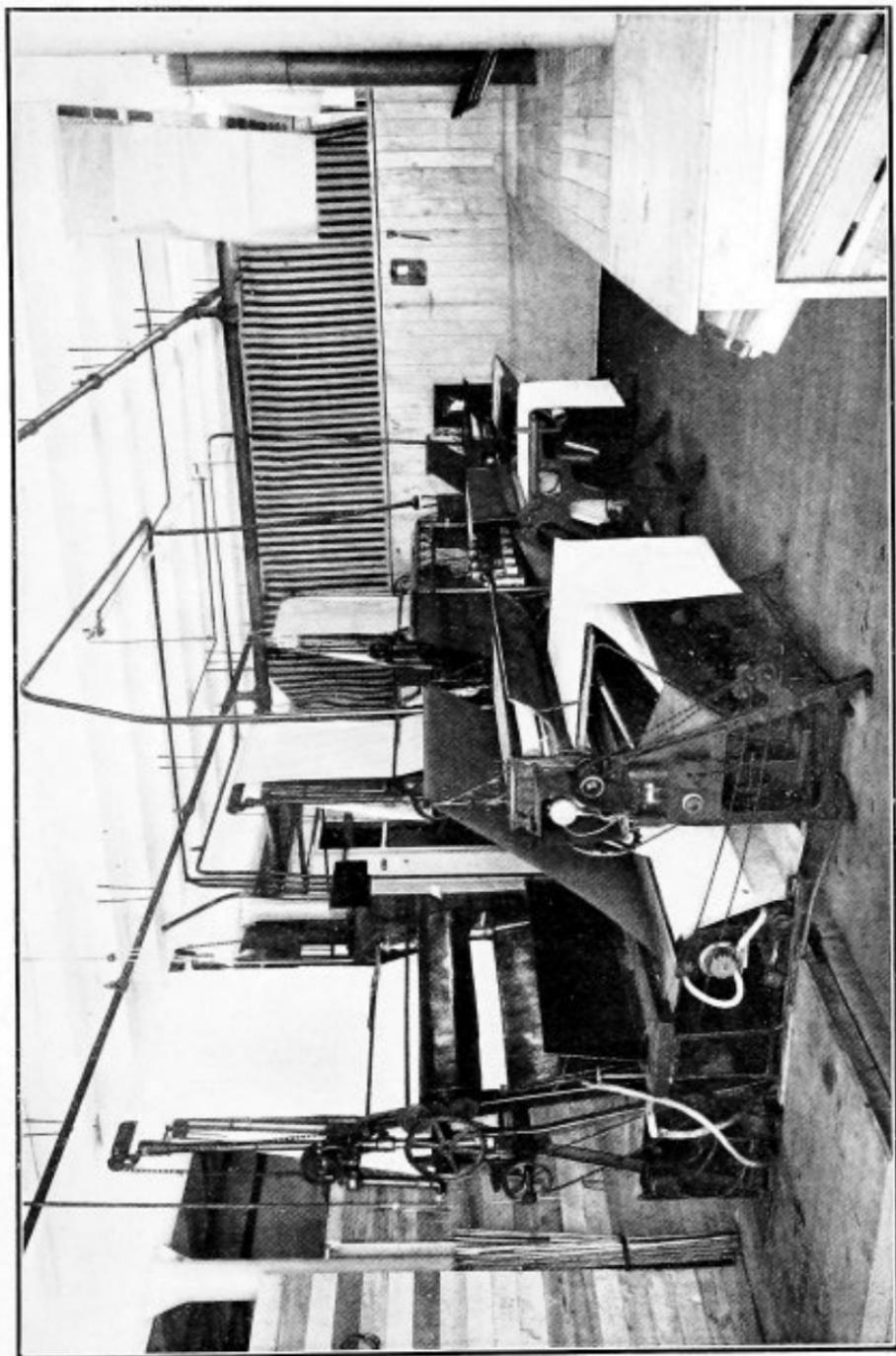
FACTORY OF A. S. ALOE CO. AT ST. LOUIS, MO.



FACTORY INTERIOR, ENGINEERING INSTRUMENT SECTION, ALOE CO.



STORE AND SALESROOM, ALOE CO.



BLUE PRINTING DEPARTMENT.

## FOREWORD.

THE HOUSE OF A. S. ALOE COMPANY is undoubtedly known at this time to every Engineer in the United States either through past dealings or through advertising some specific article of our manufacture.

We recall years ago when we were in preparation of our first catalogue in 1865—it was the subject of much wonder of the trade of the United States, because it was new—because it was an innovation on the old ways of doing business. That book “blazed the way” for all future concerns in our line of trade.

During the preparation of said work, owing to the enormous expense incident to a first volume of this kind, it was freely predicted that the cost of the book would break our Company; but when the book was issued, it was so complete—correct—and so useful—in fact, almost invaluable to the profession—that our business grew by leaps and bounds.

There was no path outlined previously. The facilities for creating a book of that character did not in any sense compare with those of the present day. There were very few persons or firms capable of drawing the pictures, making the wood cuts and electrotypes necessary for the work.

This new catalogue continues the record of the history of our House, and of its progress, in the development of its organization and its facilities, and in the improvement of those of our products which permitted improvement.

Conscious of the standing which more than 50 years of progress and success have given our House, we shall make it our foremost duty to maintain our reputation for the absolute reliability of our goods as well as for strictest fairness and broad good will in our dealings with those who favor us with their patronage.

# A. S. ALOE COMPANY,

ST. LOUIS, MO.

“ESTABLISHED 1860.”

## NOTICE.

### ORDERING.

In making an order give the Catalogue number, and in some instances—like papers—size, thickness, color, etc., or when ordering tapes, length in feet, etc. An omission of any of these important particulars often causes a delay of several days, in order that we may write and find out just what is wanted. If you have had the goods before and wish to order them again, repeat in your order the description of them as given in our bill, or give date of bill.

### SHIPPING DIRECTIONS.

State whether you wish your goods sent by express or freight, and if there is more than one route, designate which you prefer. Small packages or parcels weighing less than 50 to 60 pounds will be forwarded more safely, more expeditiously, and in most instances equally as cheap by express instead of freight.

Freight shipments usually require packing boxes, which will be charged at cost.

Small articles weighing one pound and less can be sent by express, prepaid; or by mail at one cent per ounce, and such charges will be added to the price of the goods. Registering mail matter lessens the risk of loss.

**We cannot be responsible for goods lost or damaged in transmission by mail.**

In all cases where no shipping directions are given, we send goods according to our best judgment.

### REMITTANCES.

Remittances may be made either by bank draft payable to our order, or by post-office money order, or by cash sent by any of the express companies. If cash is forwarded by mail, the letter should be registered. A remittance of **Five Dollars** must accompany the order, if goods are ordered by express, C. O. D., and express charges for collection will be added to the amount of the bill. Collection charges will be saved and goods delivered quicker by remitting in full with order.

### ACCOUNTS.

If you have never had an account with us and wish to order goods, send a remittance with order, or first-class references, to insure prompt attention. Failure to remit or send references compels us to make inquiry as to the responsibility of the party ordering, and delays the shipment of goods until we receive satisfactory information.

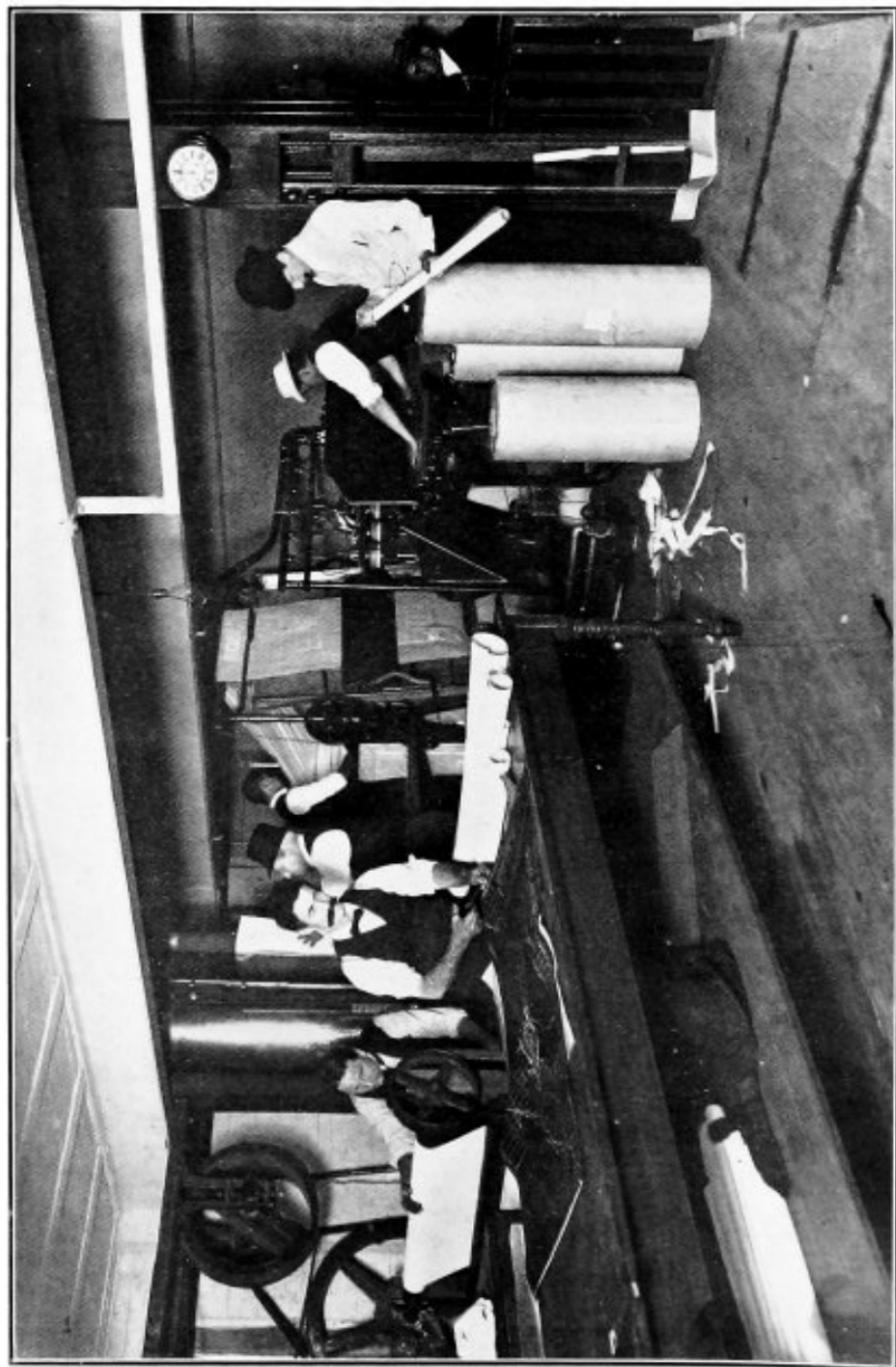
### GUARANTEE.

We guarantee our goods to be exactly as represented, and any article which does not prove entirely satisfactory may be returned to us and will be promptly replaced or money refunded.

Our policy has always been to please our patrons in every respect, believing that a thoroughly satisfied customer is the best advertisement.

Should any cause for complaint arise, prompt notice of same would be greatly appreciated.

**ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.**



BLUE PRINTING DEPARTMENT.

**DRAWING PAPERS.**

In Sheets.

**"WHATMAN'S" HAND-MADE DRAWING PAPERS  
IN SHEETS.**

These Papers are made with three different styles of surfaces.

**HP.** signifies "Hot-Pressed," and has a smooth surface, mostly used for pen and very fine line-drawings.

**CP. or N.** signifies "Cold-Pressed," and has a finely grained surface, used for general purposes and water-color drawings.

**R.** signifies "Rough" (Torchon Paper), and has a coarsely grained surface, used for very bold drawing and water-color painting.

In ordering, please specify which surface is wanted, **HP.**, **CP.**, or **R.**

No.	Size.	Per Sheet.	Per Quire.
2000—Cap	13 x 17 inch	\$0.04	\$ 0.60
2001—Demy	15 x 20 "	.05	.90
2002—Medium	17 x 22 "	.08	1.25
2003—Royal	19 x 24 "	.10	1.60
2004—Super Royal	19 x 27 "	.12	1.90
2005—Imperial	22 x 30 "	.15	2.60
2006—Double Elephant	27 x 40 "	.25	4.80
2007—Antiquarian	31 x 53 "	1.50	27.00

**"WHATMAN'S" EXTRA THICK DRAWING PAPERS.**

No.	Size.	Per Sheet.	Per Quire.
2008—Imperial, 90 lb., HP., N, and R.	22 x 30 inch	\$0.25	\$ 4.75
2009—Imperial, 140 lb., HP., N, and R.	22 x 30 "	.35	6.75
2010—Double Elephant, 210 lbs., N.	26 x 40 "	.65	10.50

For mounted Whatman Paper, see Page 11.

**"EXCELSIOR" DRAWING PAPER IN SHEETS.**

This paper has a slightly grained surface, is suitable for crayon and pencil drawing.

No.	Size.	Per Sheet.	Per Quire.
2011—Cap	14 x 17 inch	\$. . . .	\$0.20
2012—Demy	16 x 21 "	.02	.25
2013—Medium	17 x 22 "	.03	.40
2014—Royal	19 x 24 "	.04	.50
2015—Super Royal	20 x 28 "	.05	.60
2016—Imperial	22 x 30 "	.06	.75
2017—Double Elephant	27 x 40 "	.09	1.50

## DRAWING PAPERS.

In Sheets.

### "RELIABLE" DRAWING PAPER IN SHEETS.

A superior German paper for ordinary drawing and sketching, will stand erasing, has a slightly grained surface and is suitable for crayon, pencil or ink work. It is well adapted for use in colleges and schools.

No.	Size.	Per Sheet.	Per Quire.
2020—Cap	14 x 17 inch.	\$0.02	\$0.30
2021—Demy	16 x 21 "	.03	.45
2022—Medium	17 x 22 "	.04	.65
2023—Royal	19 x 24 "	.05	.75
2024—Super Royal	20 x 28 "	.06	.90
2025—Imperial	22 x 30 "	.08	1.20
2026—Double Elephant	27 x 40 "	.15	2.25

### BOND PAPER.

"Bond" Paper. A very tough and strong paper. Can be used for either drawing or tracing. Will stand folding without tearing.

No.	Size.	Per Quire.	Per Sheet.
2027A—Demy	16 x 21 inch.	\$0.80	\$0.05
2027B—Royal	19 x 24 "	1.00	.07
2027C—Imperial	21 x 33 "	1.50	.10
No.		Per Roll.	Per Yard.
2027D—In rolls of 50 yards, 36 inches wide.		\$4.50	\$0.12
2027E—In rolls of 50 yards, 42 inches wide.		5.00	.15

### ROSS' RELIEF HAND STIPPLE DRAWING PAPERS.

2029- 1—Embossed Fine Stipple, size 14 x 22	sheet,	\$0.50
2029- 2—Embossed Medium Stipple, size 14 x 22	sheet,	.50
2029- 3—Embossed Coarse and Fine Stipple, size 14 x 22	sheet,	.50
2029- 5—Embossed Grain Stipple, size 14 x 22	sheet,	.50
2029- 7—Black Ruling printed on steel, size 14 x 22	sheet,	.50
2029-10—Black Line one way, embossed across, size 14 x 22	sheet,	.50
2029-11—Embossed Cross Lines, size 14 x 22	sheet,	.50
2029-13—Crayon and Stipple, size 14 x 22	sheet,	.50
2029-21—Very Fine Black Lines one way, embossed across	sheet,	.50
2029-25—Printed Cross Hatch, size 14 x 22	sheet,	.50
2029-37—Printed Lines and Crayon, size 14 x 22	sheet,	.50

By rubbing crayon over surface of paper the picture is formed in stipple, in light and shade, at will. High lights are made by erasure.

**BRISTOL BOARDS.****Reynold's White Bristol Board, Smooth Surface.**

No.		2 Sheets.	3 Sheets.	4 Sheets.
2030—Cap	12 1/2 x 15 1/4 inch	per doz., \$0.60	\$0.90	\$1.20
2031—Demy	14 5/8 x 18 1/4 inch	“ .90	1.35	1.80
2032—Medium	16 1/2 x 20 3/4 inch	“ 1.20	1.80	2.40
2033—Royal	18 1/4 x 22 3/8 inch	“ 1.50	2.40	3.10
2034—Imperial	21 1/2 x 28 3/4 inch	per doz.,	6.00	

No.	<b>Illustration and Water Color Boards.</b>			
2035A—Winsor & Newton	Illustration Board, Thin,	20 x 30 inch	each,	\$0.25
2035B—Winsor & Newton	Illustration Board, Thin,	30 x 40 inch	“	.40
2035C—Winsor & Newton	Illustration Board, Thick,	22 x 30 inch	“	.35
2035D—Strathmore	Illustration Board	20 x 30 inch	“	.25
2035E—Strathmore	Illustration Board	30 x 40 inch	“	.50
2036—Whatman C. P.	Water Color Board, Thick,	22 x 30 inch	“	.50

No.	<b>Strathmore Drawing Boards.</b>			
2037A—Strathmore	2-Sheet Drawing Board, Medium or Smooth,	14 1/2 x 23,		
	Per Sheet			\$0.08
2037B—Strathmore	2-Sheet Drawing Board, Medium or Smooth,	23 - x 29,		
	Per Sheet			.15
2038A—Strathmore	3-Sheet Drawing Board, Medium or Smooth,	14 1/2 x 23,		
	Per Sheet			.13
2038B—Strathmore	3-Sheet Drawing Board, Medium or Smooth,	23 - x 29,		
	Per Sheet			.25
2038C—Strathmore	4-Sheet Drawing Board, Medium or Smooth,	14 1/2 x 23,		
	Per Sheet			.16
2038D—Strathmore	4-Sheet Drawing Board, Medium or Smooth,	23 - x 29,		
	Per Sheet			.30
2038E—Strathmore	5-Sheet Drawing Board, Medium or Smooth,	14 1/2 x 23,		
	Per Sheet			.20
2038F—Strathmore	5-Sheet Drawing Board, Medium or Smooth,	23 - x 29,		
	Per Sheet			.38

No.	<b>Charcoal Paper.</b>			
2039A—Strathmore	Charcoal Paper	19 x 25	per quire,	\$0.60
2039B—Michallet	Charcoal Paper	19 x 25	“	.90

**Strathmore Drawing Paper.**

“Strathmore” Drawing Paper. Medium surface. For pen and ink sketching and water-color work. Of excellent erasing properties.

No.			
2039C—Strathmore	Drawing Paper	14 1/2 x 23	per quire, \$0.90
2039D—Strathmore	Drawing Paper	23 - x 29	“ 1.80
2039E—Strathmore	Water Color Paper, Medium or Smooth,	22 x 31	Per quire 2.50
2039F—Strathmore	Water Color Paper, Medium or Smooth,	27 x 40	Per quire 4.75

**Patent Office Bristol Board, Plain.**

No.		Per gross.	Per doz.
2042—10 x 15 inch		\$6.00	\$0.60

**Patent Office Bristol Board, Printed with Border, Etc.**

No.		Per gross.	Per doz.
2043—10 x 15 inch		\$6.90	\$0.75

## TRANSFER PAPERS.

No.	Size.	Per sheet.	Per doz.
2044—Blue, Red, Black, White, Green and Yellow.	17x22	\$0.10	\$1.00

### Rubber Cloth for Wrappers for Drawings or Tracings.

No.		
2045—Roll 24 yards long, 48 inches wide.	per yard,	\$0.45; per roll, \$7.50

## SOLID SKETCH BLOCKS.

Made of best quality **Whatman's Drawing Paper**, in two finishes, viz.: Hot-pressed or smooth, cold-pressed, with slight grain. The paper is so compressed as to form a solid block; by running a knife around the edge, each sheet can be easily separated.

No.		Size.	Unbound.	Bound.
2049	—8vo. Royal	6x 9	\$0.60	\$1.25
2050	—Half "	12x18	1.75	3.00
2051	—8vo. Imperial.	7x10	.80	1.50
2051A	—4to. "	10x14	1.50	2.25
2051B	—Half "	14x20	2.50	3.75



## ADHESIVE MOUNTING AND BINDING TAPE.

This tape is used for stretching drawing paper and for mending blueprints, drawings, etc.

Will not deteriorate with age.

No. 2052—In boxes of 50 feet,  $\frac{3}{4}$ -inch wide, Each .....\$ .25

## FRENCH TRANSPARENT GUMMED PAPER.

On Reels Containing 6 Yards.

The most useful article ever placed on the market. Should be on every desk and in every household. Invaluable for book-keepers, architects, librarians, photographers, bank clerks, lawyers, musicians, etc. Every one will find it excellent for some purpose. It is perfectly transparent, and will not blur or blot when written over with ink. Always convenient. It will repair torn banknotes, manuscripts, blueprints, legal papers, drawings, music, photos, periodicals, etc.

No. 2053—Each	.....	\$0.05
Per dozen	.....	.55



95

**ROLL DRAWING PAPERS.****DETAIL PAPER**

**"Ideal"** Detail Paper. This paper has a pinkish tint which is very agreeable to the eye. It is extremely tough, will not break in folding and stands erasing perfectly. Ground Glass surface. The best Detail Paper in the market.

**In Rolls of about 100 lbs., 13c per lb.**

**IDEAL, MEDIUM WEIGHT.**

No.		36 in.	42 in.	48 in.
2054—Per Roll,	10 yards.....	\$0.90	\$1.00	\$1.15
2055—	" 50 " .....	2.75	3.00	3.25
2056—	" 100 " .....	4.75	5.25	5.75

**IDEAL HEAVY WEIGHT.**

No.		36 in.	42 in.	48 in.
2057—Per Roll,	10 yards.....	\$1.05	\$1.15	\$1.30
2058—	" 50 " .....	3.00	3.25	3.75
2059—	" 100 " .....	5.25	5.75	6.50

**"Apollo"** Detail Papers are made especially for use by the best mill and expert manufacturers in draughting paper. Especial attention has been paid to their erasing qualities. It has a slightly grained surface; it will take India ink and pencil well. We can recommend them as a considerable improvement over the ordinary manila papers.

**In Rolls of about 100 lbs., 12c per lb.**

**APOLLO, LIGHT WEIGHT.**

No.		36 in.	42 in.	48 in.	54 in.
2060—Per Roll,	10 yards.....	\$0.60	\$0.75	\$0.90	\$1.40
2061—	" 50 " .....	2.25	2.50	2.75	3.25
2062—	" 100 " .....	3.75	4.25	4.75	5.75

**APOLLO, MEDIUM WEIGHT.**

No.		36 in.	42 in.	48 in.	54 in.
2063—Per Roll,	10 yards.....	\$0.75	\$0.90	\$1.05	\$1.50
2064—	" 50 " .....	2.50	2.75	3.00	3.75
2065—	" 100 " .....	4.25	4.75	5.25	6.50

**APOLLO, HEAVY WEIGHT.**

No.		36 in.	42 in.	48 in.	54 in.
2066—Per Roll,	10 yards.....	\$0.85	\$1.00	\$1.15	\$1.75
2067—	" 50 " .....	2.75	3.00	3.25	4.25
2068—	" 100 " .....	4.75	5.25	5.75	7.50

Full Rolls only, sold at lb. price. SEND FOR SAMPLES.

## ROLL DRAWING PAPERS.

**"Aplex" Drawing Paper—The Highest Grade Cream Drawing Paper Made.** Its fine color is not only resting to the eye but permits much handling without soiling. This property, in connection with its exceptional strength, fine erasing qualities, and its ability to withstand folding without breaking, has made it a popular paper in large mechanical drafting rooms and engineering offices. This is the cheapest paper that meets all the requirements of a good drawing paper.

**In Rolls, about 40 lbs. to Roll, 29c per lb.**

30, 36, 42 and 58 inches wide.

No.	30 in.	36 in.	42 in.	58 in.
2071—Per Roll, 50 yards.....	\$5 00	\$6 00	\$7 75	\$10 00
2072— " 25 " .....	2 75	3 25	4 00	5 50
2073— " 10 " .....	1 15	1 35	1 75	2 25
2074—Per yard.....	13	15	20	30

### Aplex Drawing Paper in Sheets.

2075 —Royal .....	19x24 inches, per quire, \$1.05;	per sheet, \$0.07
2075a—Imperial .....	22x30 inches, per quire, 1.50;	per sheet, .09
2075b—Atlas .....	24x36 inches, per quire, 2.00;	per sheet, .12
2075c—Double Elephant.....	27x40 inches, per quire, 2.50;	per sheet, .15

**"Peerless" Transparent Drawing and Sketching Paper.** This paper is specially made for sketching, transferring, etc. It is a white paper, sufficiently transparent to be used as a tracing paper for detail drawings. It is strong and tough, stands erasing by rubber and knife, and takes pencil, ink and color well.

No.	36	50	per roll, \$
2077—62 inches wide, 50 yard Rolls.....			3.00
2078—36 " " .....			1.85

**"Reliable,"** a natural white paper, of good quality, with slightly grained surface, suitable for work in ink, color, pencil or crayon. It is used for general office work, preliminary drawings, and to a great extent for school purposes.

**In Rolls, about 35 lbs. to Roll, 36c per lb.**

36, 42, 58 inches wide.

No.	50 Yard Rolls.	25 Yard.	10 Yard.	Per Yd.
2080—36 inches wide.....	\$ 7.00	\$3.75	\$1.60	\$0.20
2081—42 " " .....	8.75	4.50	2.00	.25
2082—58 " " .....	11.00	5.75	3.00	.35

## ROLL DRAWING PAPERS.

**"Anchor."** A very tough and hard natural white paper, matchless for working-drawings used out-of-doors or in the workshop where drawings are subject to rough handling. This paper has a slightly grained surface, similar to Whatman's "Not" and stands erasing to the greatest extent.

**In Rolls, about 35 lbs. to Roll, 45c per lb.**

36, 42, 62, 72 inches wide.

No.		50 yard Rolls.	25 Yard.	10 Yard.	Per Yd.
2086—36 inches wide	.....	\$ 9.00	\$5.00	\$2.10	\$0.25
2087—42 " "	.....	11.00	6.25	2.80	.30
2088—62 " "	.....	16.00	9.00	4.00	.45
2089—72 " "	.....			6.25	.70

Full Rolls only sold at lb. price.

**"Polygon"** Drawing Paper is the best Roll Drawing Paper in the market. We will guarantee it in every particular. These papers have stood every test to which they have been subjected, proving unsurpassed for general work. The color is white, the surface is regularly pebbled, or egg shell surface, and is equally adapted to general drawing in lines, wash or in water colors. They are extremely strong, tearing with difficulty, and standing erasing perfectly.

**In Rolls, about 35 lbs., 48c per lb.**

36, 42, 58 inches wide.

No.			25 Yard.	10 Yard.	Per Yd.
2091—36 inches wide, Medium Rough	.....		\$ 7.00	\$3.00	\$0.33
2092—42 " " " "	.....		8.25	3.50	.36
2093—58 " " " "	.....		10.50	4.50	.48
2094—58 " " " Smooth	.....		10.50	4.50	.48
2095—58 " " " Thick	.....		13.50	5.75	.65
2096—58 " " " Rough	.....		13.50	5.75	.65

**"Super Super,"** slightly smooth surface. This paper is what its name implies, and is made especially for us, and we consider it one of the finest papers that has ever been imported. Its surface cannot be surpassed for fine map, elevation or exhibition drawing. We know of nothing better.

**In Rolls, about 35 lbs., 55c per lb.**

42, 58 inches wide.

No.		25 Yard Rolls	10 Yard.	Per Yd.
2100—42 inches wide	.....	\$10.25	\$4.50	\$0.50
2101—58 " "	.....	12.50	5.50	.60

**"Hammer"** Drawing Paper. A pure white drawing paper which is the nearest approach to hand-made paper ever attained in a roll paper. It is made of the very best stock obtainable, has a cold pressed but somewhat smooth surface and can be used for the same purposes and to the same advantages as the hand-made paper. Of excellent erasing quality, equally well adapted for pencil, ink and color work.

**In Rolls, about 40 lbs., 65c per lb.**

58 inches wide.

No.		Per 25 Yds.	10 Yards.	Yard.
2103—58 inches wide	.....	\$14.20	\$6.00	\$0.70



## TRACING CLOTH. IDEAL TRACING CLOTH.

The "Ideal" Tracing Cloth has been produced to meet a constantly growing demand for a perfect cloth. This fabric is far superior to any other Tracing Cloth now on the market, is extremely transparent and very uniform, and is not greasy or oily as most Tracing Cloths are. It is therefore well adapted for tracings of fine line drawings, and is vastly superior to any other cloth for tracings which are intended for copying by the blue or black process.



In rolls of 24 yards, 18, 21, 30, 36 and 42 in. wide.

No.	18 in.	21 in.	30 in.	36 in.	42 in.
2137—"Ideal"—Per roll.....	\$4.75	\$6.50	\$8.10	\$9.00	\$12.10
Per yard.....	.25	.30	.40	.45	.55

## "KOH-I-NOOR" TRACING CLOTH.



In rolls of 24 yards, 18, 21, 30, 36, 42, 48 and 54 in. wide.

No.	18 in.	21 in.	30 in.	36 in.
2139—Koh-I-Noor—Per roll.....	\$4.75	\$6.50	\$8.10	\$9.00
Per yard.....	.25	.30	.40	.45
No.	42 in.	48 in.	54 in.	
2139—Koh-I-Noor—Per roll.....	\$12.10	\$16.00	\$17.00	
Per yard.....	.55	.80	.85	

## "IMPERIAL" TRACING CLOTH.



In rolls of 24 yards, 18, 21, 30, 36, 42, 48 and 54 in. wide.

No.	18 in.	21 in.	30 in.	36 in.
2140—Imperial—Per roll.....	\$4.75	\$6.50	\$8.10	\$9.00
Per yard.....	.25	.30	.40	.45
No.	42 in.	48 in.	54 in.	
2140—Imperial—Per roll.....	\$12.10	\$16.00	\$17.00	
Per yard.....	.55	.80	.85	

## TRACING CLOTH POWDER.

For removing the oil, grease, etc., from the surface of tracing cloth, thereby causing the ink and color to flow freely.

Directions: Dust a small quantity of the powder over the cloth and rub the entire surface with a handkerchief or piece of linen. None of the powder should remain on the cloth.

No.  
2141—"Ideal" Tracing Cloth Powder in Tin Shakers.....each, \$0.15

## LIQUID TRACING CLOTH CLEANER.

This liquid removes pencil marks, dirt and grease spots, but not any waterproof ink, by moistening the piece of flannel, furnished with each bottle, and rubbing with it gently over the cloth. Tracing cloth will take ink readily after its application.

No.  
2141A—In 2 oz. bottles.....each, \$0.40

## IMPERIAL ERASING FLUID.

For erasing Black or Colored Waterproof Drawing Ink lines and figures without injury to the tracing cloth.

No.  
2141B—In 2oz. bottles, with sponge, cloths and directions for use..each, \$1.00

## TRANSPARENTIZING SOLUTION.

The Universal Transparentizing Solution for drawings or prints will prove an indispensable adjunct in every Drafting Room in the country. It will be found invaluable for transparentizing drawings or tracings, brown or Van Dyke negative or positive prints, and Patent Office, Drawings, Blue Prints on paper or linen, and wherever it is desired to make drawings translucent. It will not injure drawings made with India Ink, pencil or writing ink, and is without any odor.

It will save 50 per cent. of the time in printing, no matter what kind of Photo print is desired.

Its use will not detract from the appearance of the drawing or its strength.

A Drawing treated with the Universal Transparentizing Solution can be corrected or written upon immediately after the work has been done, thus permitting corrections to be made, if desired.

The Universal Solution only requires a trial to prove its merits as a great time saver in the Drafting Room.

No.  
2141C—Price of Universal Transparentizing Solution in gallon cans....\$3.25  
2141D— " " " " " " ½-gallon cans.. 2.25  
2141E— " " " " " " quart cans..... 1.75  
2141F—Sample, 4 oz. bottle, postpaid..... .60

## TRACING PAPER.

### In Rolls.

**"Sandow,"** a Tracing Paper of unsurpassed strength, which cannot turn yellow or brittle with age. Fine blue prints can be obtained from drawings or tracings made on this paper. It has no gloss like similar tracing papers and will, therefore, take pencil as well as ink. Considering width and its superior strength and quality, it is the cheapest Tracing Paper of its kind ever offered.

No.	Per roll
2142—"Sandow" Tracing Paper, in rolls of 20 yards, 42 inches wide....	\$1.50
2142 ½ "Lion," Tracing Paper, very Transparent, 20 yards, 43 inches wide.	1.10

**Aloe,** a new Tracing Paper or Vellum. Very tough and transparent. Absolutely waterproof and is unaffected by atmospheric conditions. Does not deteriorate. Perfectly adapted to ink, crayon or water colors—will not "buckle." Makes perfect solar prints. Several erasures may be made; ink will not spread. Sufficiently strong for all practical use. The best and most economical substitute for tracing linen. Lies flat. Packed in strong tubes for convenience and cleanliness.

2143 —Aloe Tracing Paper, rolls of 20 yards, 36 inch.....	\$4.00
2143A— " " " " " " " " 42 inch.....	5.00

**Onion Skin** Tracing Paper. Glazed surface. Exceedingly transparent and strong paper.

2143 ½—Onion Skin, in rolls of 20 yards, 43 inches wide.....	\$1.25
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2144—"Belgium" Tracing Paper, very transparent, dull surface, 20 yard rolls, 40 inches wide.....	\$2.00
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**"Leather"** Tracing Paper. A Parchment paper introduced by us for the purpose of making original drawings on, from which blue prints can be taken direct. It will stand erasing and considerable rough handling, and is very transparent for tracing.

No.	
2145—Medium, 20 yards, 39 inches wide, per roll.....	\$4.00
2146— " 10 " 39 " " " " " " .....	2.15
2147—Heavy, 20 " 39 " " " " " " " .....	4.25
2148— " 10 " 39 " " " " " " .....	2.25

<b>"Columbia"</b> Tracing Paper. A good, strong paper, very transparent.	
2149—20 yards to roll, 43 inches wide.....	\$2.00

## TRACING PAPER.

### In Rolls.

"Argus" Tracing Paper. Buff color. For detail tracings.

No.		
2150	—100 yard rolls, 48 inches wide.....	\$2.75
2151	—In full rolls, about 100 lbs.....	per lb., .18

"Imperial" Tracing Paper. This paper has a bluish tint, like tracing cloth, is transparent and tough, will take ink without shrinking. Very fine.

No.		
2152	—Medium weight, per roll of 20 yards, 39 inches wide.....	\$3.50
2153	—Heavy " " 20 " 39 " ".....	4.00

"Alta" Tracing Paper. Unglazed. The best for full-size tracing and transferring.

No.		
2154	—In rolls 57 inches wide, 44 yards.....	\$4.00
2155	— " 57 " " 22 ".....	2.25
2155 ½	— " 42 " " 44 ".....	3.50

## TRACING PAPER.

### In Sheets.

"Vegetable," very tough and transparent. The finest tracing paper made. It is a pure vegetable paper of fine hard surface, silky appearance and finish.

No.			
2156	—Cap.....13x17 inches.....	per sheet, \$0.05;	per quire, \$0.90
2157	—Demy.....16x20 inches.....	per sheet, .08;	per quire, 1.20
2158	—Royal.....19x25 inches.....	per sheet, .10;	per quire, 2.00
2159	—Imperial.....22x28 inches.....	per sheet, .15;	per quire, 2.50

"Germania," tough and transparent. A good, strong tracing paper.

No.		
2163	—20x30 inches.....	per sheet, \$0.06; per quire, \$1.00
2164	—30x40 inches.....	per sheet, .12; per quire, 2.00

## IMPROVED SENSITIZED BLUE PRINT PAPERS.

The use of blue print paper has steadily increased in the past ten years, attracting to its manufacture a number of concerns whose sole purpose seems to be not "how good" they can manufacture it, but "how cheap."

Our Blue Process Papers are sensitized in our clean, modern factory devoted exclusively to this purpose. The unprepared stock is purchased in large quantities and thoroughly dried, or "cured," before being prepared for the market.

The coating rooms are equipped with the most up-to-date machinery, accurately adjusted so that every run of paper will be uniformly sensitized.

The formulas are kept at a fixed standard, only the purest chemicals and ingredients being used. The unprepared papers are made especially for sensitizing; in themselves, they must be chemically pure before we could guarantee an absolutely reliable prepared roll.

As the chief quality of a blue print paper lies in its keeping qualities, we devote extraordinary care to the proper drying of our products. All moisture is eradicated by blowers and chemical apparatus, and the rolls are quickly and carefully wrapped and packed for shipment.

We manufacture our Blue Print Papers and Cloths regularly in **three solutions**, as described below, but can also furnish our papers coated with any special solution desired, to meet local conditions as to sun or artificial light.

**REGULAR PRINTING.**—Requiring an exposure of about four minutes in bright sunlight. Best adapted for use during the summer months and for making Blue Line Positive Prints from Negatives. Of unsurpassed keeping qualities and will produce prints of a deep rich color with sharp lines.

**RAPID PRINTING.**—Requiring an exposure of about one minute in bright sunlight. Are invaluable in cloudy weather and are now generally used in place of the Regular solution by those who require prompt results; of first-class printing and keeping qualities.

**ELECTRIC RAPID PRINTING.**—Requiring an exposure of about one-half minute in bright sunlight. On account of the extreme sensitiveness of this solution, it is not recommended for use during the summer months, excepting for printing by **Electric Light**, for which it is especially adapted.

In ordering Blue Print Papers, we request our patrons to please specify whether "Regular," "Rapid" or "Electric Rapid" Printing Paper is desired, thus avoiding any unnecessary delays in filling orders.

All our Sensitized Blue Print Papers are unrivaled for their **rapidity of printing**, richness and **durability of color**, sharpness of lines, strength in water bath and for their superior **keeping qualities**.

**"SATINO" BLUE PRINT PAPER.****Highest Quality.****Prepared Ready for Use.**

We ask the careful attention of engineers, architects and draughtsmen, to the superior quality of our "SATINO" brand of Blue Print Paper. It is especially made for us by the best photographic paper mill in the world. It is higher in price than other papers listed, but gives the best satisfaction in results. We especially recommend the "Satino" brand as the highest grade of chemically pure stock and we will replace any that should be found defective.

**"SATINO," THIN.**

No.	Width, 30 in.	36 in.	42 in.
2200—Prepared.....	Per roll of 10 yards, \$1.50	\$1.75	\$2.00
2201—Prepared.....	Per roll of 50 yards, 6.50	7.50	9.00

**"SATINO," MEDIUM.**

No.	Width, 30 in.	36 in.	42 in.	54 in.
2202—Prepared....	Per roll of 10 yards, \$1.50	\$1.75	\$2.00	\$2.75
2203—Prepared....	Per roll of 50 yards, 6.50	7.50	9.00	11.00

**"SATINO," THICK.**

No.	Width, 30 in.	36 in.	42 in.
2204—Prepared.....	Per roll of 10 yards, \$1.75	\$2.00	\$2.25
2205—Prepared.....	Per roll of 50 yards, 7.50	9.00	10.00

**"PERFECTION" BLUE PRINT PAPER.****First Quality.****Prepared Ready for Use.**

Through a more general introduction of Blue Printing, certain uses for it have been developed, which make it desirable to have a cheaper and yet good paper. In order to meet this demand we are now offering another grade of paper, although not nearly so good as our "Satino," is still equal to the majority of Blue Print Papers now on the market.

**"PERFECTION," THIN.**

No.	Width, 30 in.	36 in.	42 in.
2206—Prepared.....	Per roll of 10 yards, \$0.85	\$0.95	\$1.05
2207—Prepared.....	Per roll of 50 yards, 3.50	4.00	4.50

**"PERFECTION," MEDIUM.**

No.	Width, 30 in.	36 in.	42 in.
2208—Prepared.....	Per roll of 10 yards, \$0.90	\$1.00	\$1.10
2209—Prepared.....	Per roll of 50 yards, 3.75	4.25	4.75

**"PERFECTION," THICK.**

No.	Width, 30 in.	36 in.	42 in.
2210—Prepared.....	Per roll of 10 yards, \$1.00	\$1.15	\$1.25
2211—Prepared.....	Per roll of 50 yards, 4.25	5.00	6.00

**"RELIABLE" BLUE PRINT PAPER.**

Second Quality.

Prepared Ready for Use.

In order to compete with the various cheap grades of Blue Print papers we offer our "Reliable" Brand which will be found the best low priced paper in the market.

Coated with Regular Rapid and Electric Rapid Printing Solution.

Specify when ordering.

**"RELIABLE," THIN.**

No.	Width, 30 in.	36 in.	42 in.
2206 1/2—Prepared.....	Per roll of 10 yards, \$0.55	\$0.65	\$0.75
2207 1/2—Prepared.....	Per roll of 50 yards, 2.25	2.75	3.25

**"RELIABLE," MEDIUM.**

No.	Width, 30 in.	36 in.	42 in.
2208 1/2—Prepared.....	Per roll of 10 yards, \$0.65	\$0.75	\$0.85
2209 1/2—Prepared.....	Per roll of 50 yards, 2.75	3.25	3.75

**"RELIABLE," THICK.**

No.	Width, 30 in.	36 in.	42 in.
2210 1/2—Prepared.....	Per roll of 10 yards, \$0.85	\$0.95	\$1.05
2211 1/2—Prepared.....	Per roll of 50 yards, 3.75	4.25	4.75

**"LINAURA" BLUE PRINT CLOTH.**

Unprepared.

"Linaura," Blue Print Cloth or Fabric. A material of great value for use out or doors, in the rain, on buildings, or as permanent records; will make as good a print as paper, and is invaluable on account of its great strength and durability.

No.		
2211 3/4	—30 inches wide, 10 yard rolls, unprepared.....	\$2.75
2212	—36 inches wide, 10 yard rolls, unprepared.....	3.00
2213	—42 inches wide, 10 yard rolls, unprepared.....	4.20
2213 1/2	—54 inches wide, 10 yard rolls, unprepared.....	5.00

**"LINAURA" BLUE PRINT CLOTH.**

Prepared Ready for Use.

No.		
2214	—30 inches wide, 10 yard rolls, prepared.....	\$3.00
2215	—36 inches wide, 10 yard rolls, prepared.....	3.75
2216	—42 inches wide, 10 yard rolls, prepared.....	4.75
2216 1/2	—54 inches wide, 10 yard rolls, prepared.....	6.50

**BLUE PRINT INTENSIFIER.**

This chemical is especially used for bringing a print to its natural color, when the print is overexposed. It also intensifies the blue and brings out the lines clear and white.

No.		
2216 3/4	—Per pound.....	\$0.60

**BLUE PRINT PAPERS.**

Unprepared.

**"SATINO," MAILING WEIGHT (UNPREPARED).**

**Mailing Blue Process Paper.** The toughest light weight paper for mailing, folding or carrying in the pocket.

No.				
2170—30 inches wide,	50 yard roll.....			\$3.50
2171—36	" 50 "			4.25
2172—42	" 50 "			5.00

**"SATINO," MEDIUM WEIGHT (UNPREPARED).**

No.				
2177—30 inches wide,	50 yard roll.....			\$4.00
2178—36	" 50 "			4.75
2179—42	" 50 "			5.25
2180—54	" 50 "			7.50

**"SATINO," HEAVY WEIGHT (UNPREPARED).**

No.				
2182—30 inches wide,	50 yard roll.....			\$4.75
2183—36	" 50 "			5.50
2184—42	" 50 "			6.25

The "Perfection" Brand of Blue Print Paper, while not as good in quality as our "Satino" Brand, is still equal to the blue print papers quoted by others as best quality.

**"PERFECTION," MAILING WEIGHT (UNPREPARED).**

No.				
2186—30 inches wide,	50 yard roll.....			\$2.25
2187—36	" 50 "			2.75
2188—42	" 50 "			3.25

**"PERFECTION," MEDIUM WEIGHT (UNPREPARED.)**

No.				
2189—30 inches wide,	50 yard roll.....			\$2.50
2190—36	" 50 "			3.00
2191—42	" 50 "			3.50

**"PERFECTION," HEAVY WEIGHT (UNPREPARED).**

No.				
2192—30 inches wide,	50 yard roll.....			\$3.00
2193—36	" 50 "			3.75
2194—42	" 50 "			4.50

## SEPIA SOLAR PAPERS.

### A SUPERIOR BROWN PRINT AND NEGATIVE PAPER, FOR MAKING DARK-BROWN NEGATIVE PRINTS AND BLUE OR BROWN-LINE PRINTS ON PAPER OR CLOTH.

For distinctness of outline, clearness of copy, and permanency of results it is unsurpassed, besides possessing all the following essential qualities: Is easily manipulated. Keeps exceedingly well. Does not become brittle. Prints rapidly. Saves original tracing. Cannot spoil positive prints by over-exposure. Sepia Solar Prints can be added to, colored, or altered, the same as an original drawing.

#### DESCRIPTION.

The thin paper (our No. 2217) is best suited for use as a negative. From this negative, as the original (in place of the tracing), can be produced:

**Blue-line prints on a white background** by printing on regular blue print paper or cloth with an exposure of about 8 minutes in bright sunlight, or on rapid blue print paper or cloth with an exposure of about 4 minutes in bright sunlight.

**Black-line prints on a white background** by printing on our No. 2218 Medium, or No. 2219 Sepia Solar Cloth with an exposure of about 8 minutes in bright sunlight.

Prints made by this process are permanent and will never fade.

No.	Width 30 in.	36 in.	42 in.
2217—Sepia Solar Paper, Thin (for mailing and for negatives), 10-yard rolls.....	\$1.75	\$2.00	\$2.25
2218—Sepia Solar Paper, Medium, 10 yard rolls....	1.75	2.00	2.25
2219—Sepia Solar Cloth, 10 yard rolls.....	4.25	4.75	6.00

Fixing Salt, and full directions furnished with every roll.

2219½—"Sepia Salt." For intensifying and fixing prints.		
Per 4-ounce box.....	\$0.15	Per 1-pound box.....\$0.40

## PERFECTION BLACK PRINT PAPER.

### BLACK LINES ON WHITE GROUND.

**Positive Prints. Water Bath Only. Used the Same as Blue Print Paper.**

We desire to call your attention to our "Perfection" Direct Black Process Paper. This Paper is the only one made that requires no developing bath, as in other Papers of this kind, and is used precisely as Blue Print Paper. The results obtained from this Paper are better than any other, and the "Perfection" Black Print Paper never becomes brittle, before or after printing, as other Black Print Papers do. The lines will come out more distinct, and even the finest mark or shade will show on the print with a wonderful distinctness.

No.	
2220—In rolls of 10 yards, 30 inches wide.....	\$2.25
2221—In rolls of 10 yards, 36 inches wide.....	2.75
2222—In rolls of 10 yards, 42 inches wide.....	3.25

## REPRODUCTION DEPARTMENT.

The most modern Blue Printing Establishment in the West, fully equipped with Electric Blue Print Copiers for making Blue Prints, Brown Prints, Blue Line and Black Line Prints on both paper and cloth.

The fall and winter with its attendant murky and cloudy weather need have no terrors for the architect or engineer.

We can save you all the vexatious delays, the losses of time and money you have experienced in the past, and execute your work promptly the same day as received.

### WE PRINT—RAIN OR SHINE—DAY OR NIGHT

#### PRICE LIST

Blue Prints on Paper.....	per square foot,	\$0.02
Blue Prints on Cloth.....	" " "	.06
Negative (Brown) Prints.....	" " "	.06
Blue Line on White Paper Prints.....	" " "	.03
Blue Line on White Cloth Prints.....	" " "	.08
Black Line on White Paper Prints.....	" " "	.08
Black Line on White Cloth Prints.....	" " "	.15

All prints under 3 square feet charged by the sheet, governed entirely by size of job.

Prints mounted on heavy muslin, hung on rollers, etc., at lowest prices.

#### SYMPATHETIC ERASING FLUID.

For making alterations and additions on blue prints in following colors:  
White, Red or Orange.

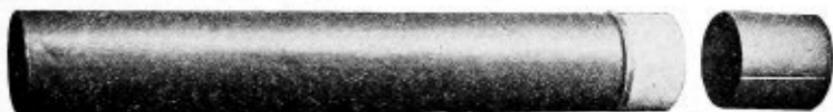
No.	Per bottle.
2219A—Sympathetic Erasing Fluid; Red, White or Orange.....	\$0.20

#### SEPIA ERASING FLUID.

No.	Per bottle.
2219B—Sepia Erasing Fluid, for making alterations on Sepia Prints....	.20

**SPRING CLIPS.**

No.	Per doz.
2223—Spring Clips for clamping prints when drying.....	\$0.25

**TUBES FOR PRESERVING PAPER.**

These tubes are made of tin with well fitting covers and the best and most practical receptacles for keeping cut rolls of blue and black print papers because they exclude both light and moisture, and also well adapted for the safe keeping of valuable plans and tracings.

No.	32 in.	38 in.	44 in.	56 in.
2224—Tubes for Blue Print Paper—				
For 50-yard Rolls.....	\$1.10	\$1.25	\$1.35	\$2.00
2224A—Tubes for Blue Print Paper—				
For 10-yard Rolls.....	.95	1.00	1.15	1.75

**FILING AND TRANSPORTING TUBES.**

Paraffine lined, with closely fitting metal screw caps. Absolutely airtight and moisture-proof. They are stronger than tin tubes and less liable to bend and dent in transit.

Fine for filing or expressing Drawings, Blue Prints, Tracings, etc.:

No.		
2224B—2-inch diameter, 10½ inches long.....	each,	\$0.20
2-inch diameter, 26 or 32 inches long.....	each,	.25
2-inch diameter, 38 or 44 inches long.....	each,	.30
2224C—3-inch diameter, 26 or 32 inches long.....	each,	.30
3-inch diameter, 38 or 44 inches long.....	each,	.35
2224D—4-inch diameter, 26 or 32 inches long.....	each,	.60
4-inch diameter, 38 or 44 inches long.....	each,	.65
4-inch diameter, 49 inches long.....	each,	.75
4-inch diameter, 60 inches long.....	each,	1.00
4-inch diameter, 72 inches long.....	each,	1.25

## "ARCUS" BLUE PRINT FRAMES.

Undoubtedly the Best Frame Made.

Its advantages are: **Great saving in time**, as it can be loaded and unloaded in **one-third of the time** of the old style frame. It gives absolutely **perfect contact** making a good frame for **negative printing**. Is **light in weight** and can be easily handled by a boy.

OPEN FOR LOADING



Figure 1.

ARCUS PRINTING

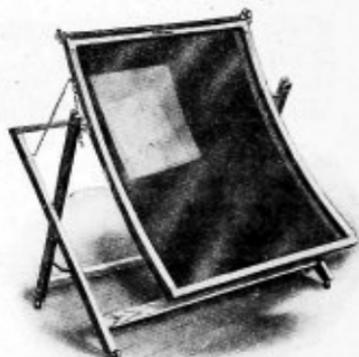


Figure 3.

The Arcus frame consists essentially of a curved glass, over which a piece of canvas is drawn tight by means of a tension arrangement.

Figure 1 shows the ease with which it is possible to load the frame. The tracing and blue print paper being laid on the glass, then the canvas back is buttoned on the steel tension shaft and drawn tight. The whole operation requiring not more than fifteen seconds.

By means of the hand-wheel on the right-hand side the tension is applied and the canvas drawn tight, thus pressing the blueprint paper and tracing to the glass, thereby producing absolutely perfect contact.

After the apparatus is loaded, it is revolved on its axis and held at any angle desired and there secured by a chain fastener. The entire apparatus is then shoved into the sunlight and the printing takes place (Figure 3).

The stand is on rollers and slides without effort.

**"ARCUS" BLUE PRINT FRAMES.**

If the operator wishes to inspect the progress of the printing, he can release by a special device a small flap of canvas at one corner of the frame, without taking the tension off the remainder of the canvas. After inspection the small flap is again buttoned to the shaft and stretched to its original tension. The Arcus is the only frame with this convenient feature.

**Arcus with Flap Open for Inspection.**

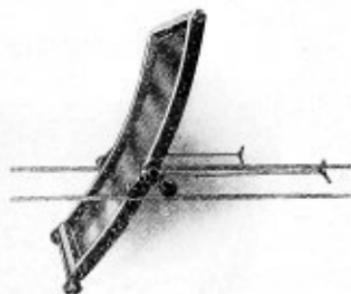


**Figure 4.**

**Showing Arcus on Car for Exposing Outside of Window.**



Showing frame with car in horizontal position.

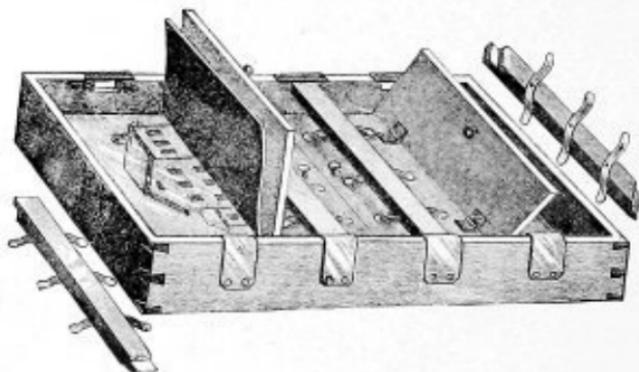


Frame can be clamped in any position desired.

No.		
2225A	Arcus Frame complete, with folding stand, size of glass 30x42 in.	\$35.00
2225B	Arcus Frame as above, size of glass 36x60 in.	45.00
2225C	Arcus Frame complete, with car for exposing outside of window, glass, 30x42 in.	45.00
2225D	Arcus Frame as above, with glass, 36x60 in.	55.00

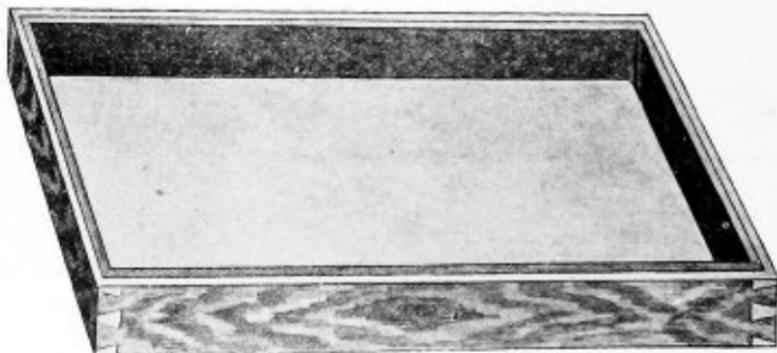
## BLUE PRINT FRAMES.

The Blue Print Frames of our manufacture are made of carefully selected, thoroughly seasoned hard wood and of perfect workmanship, and combine all the latest improvements in blue print frames. They are made to stand exposure to the weather incidental to their use, and are less liable to warp and shrink, and thereby break the glass than any other frame made.



No.	Frames only.	With pad.	With pad and double thick glass.	With pad and polished plate glass.
2226—20 x 24 inches.....	\$ 6.00	\$ 6.75	\$ 7.50	\$ 9.50
2227—24 x 30 inches.....	7.50	8.75	9.50	11.00
2228—28 x 36 inches.....	9.50	11.00	not made.	18.00
2229—30 x 42 inches.....	12.00	13.75	not made.	21.00
2230—36 x 60 inches.....	18.00	21.00	not made.	40.00

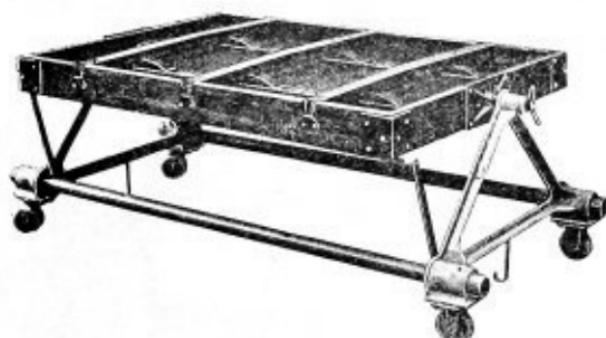
## GALVANIZED IRON BATH TRAYS.



With Drain Pipe, Strong Rim and Wooden Braces.

2231—20 x 24 inches.....	\$3.00
2232—24 x 30 ".....	3.75
2233—30 x 42 ".....	5.00
2234—36 x 60 ".....	6.75

## FRAMES ON WHEEL CARRIAGES.



No. 2234A.

These Carriages are made of iron in a very practical and substantial manner. The Frames are the same as those listed under Nos. 2226 to 2230, but are mounted so that they revolve in the uprights of the carriage and can be clamped in any position to receive the direct rays of the sun. May be used with or without tracks.

## Carriage with Frame Complete.

No.	Inside Dimensions of Frame	Printing Surface	Without Glass or Felt Pad	With Felt Pad	With Felt Pad and Polished Plate Glass
2234A	25 1/2 x 37 1/2 in.	24 x 36 in.	Each, \$30.50	\$31.75	\$38.75
2234B	32 x 44 in.	30 x 42 in.	Each, 34.00	35.75	44.00
2234C	38 x 50 in.	36 x 48 in.	Each, 39.50	41.75	57.50
2234D	38 x 62 in.	36 x 60 in.	Each, 45.00	48.00	67.25
2234E	44 x 62 in.	42 x 60 in.	Each, 48.50	51.80	72.80
2234F	45 x 75 in.	42 x 72 in.	Each, 56.00	60.20	88.00

## FELT PADS FOR BLUE PRINT FRAMES.

We can furnish felt, cut to the following sizes, for blue print frames. This felt is of good quality, and made especially for this purpose, about 1/2 inch in thickness.

No.			
2236 1/2	—20 x 24	..... \$0.85	30 x 42 ..... \$2.00
	24 x 30	..... 1.25	36 x 60 ..... 3.25
	28 x 36	..... 1.50	Other sizes to order.

## IMPROVED BLUE PRINT CARS.

May be used on tracks extending through a doorway or low cut window, or on the roof.

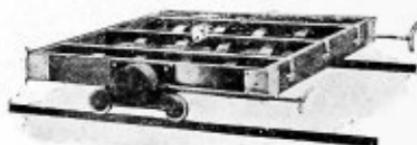


No. 2235  $\frac{1}{2}$ .

No.  
2235  $\frac{1}{2}$ —Is a very convenient apparatus, which can be run on iron tracks; the frame is made to revolve and tilt to any angle, to receive the direct rays of the sun; can be clamped in any position; the frame can be turned over for the insertion of blue print paper. The iron-work is of enamel finish, the wood-work is of oak, highly finished. We recommend this style of car for any size frame up to and including 36x60.

No.  
2235  $\frac{1}{2}$ —Blue Print Car.....\$22.00

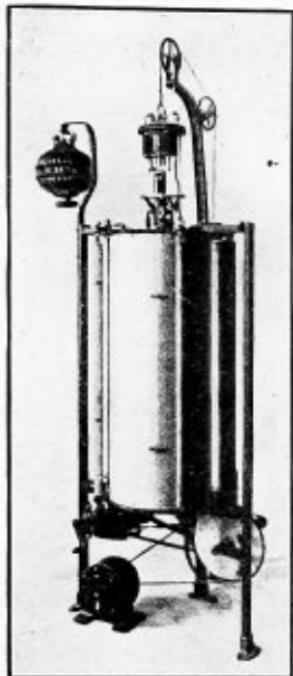
## CAR FOR EXPOSING OUTSIDE OF WINDOW.



No. 2236.

No.  
2236—Is a very convenient apparatus or car running on a track out of the window. It is all iron, handsomely enameled, and is fastened to a permanent blue print frame, allowing the frame to tilt to any angle for proper exposure, and can be turned completely over to allow for the insertion of tracings and blue print paper. A very fine car, many of which are in use.

No.  
2236—Blue Print Car for frames up to and including 36x60.....\$13.00

**SHAW CONTINUOUS BLUE PRINT MACHINE.**

No. 2237½.

**Vertical Feed.**

or girl, therefore, doing away with the expensive expert operator.

**PRINTS ANY LENGTH.**

This machine will strongly recommend itself by the fact that it makes a continuous print of any length, producing no unsightly joints in large drawings, as is the case with the average machine. In making long prints, the paper is mounted on one roller and the tracing on another provided for that purpose and fed into the machine automatically, while a driver roller at the opposite side of the machine collects both paper and tracings. Short prints are fed in one after another at one side of the machine and taken out at the opposite side. While one is being printed, another is coming out or being put in, and no time is lost by putting the prints in and taking them out.

**SPEED SUITABLE FOR ANY PURPOSE.**

The printing speed of the 42-inch machine is 2 feet per minute, using rapid paper. This rate of speed adapts the machine to the Blue print, Brown print, or any chemical printing process and also to tracings of varying density. The speed is instantly adjusted to suit any process by shifting the belt, which is on cone pulleys.

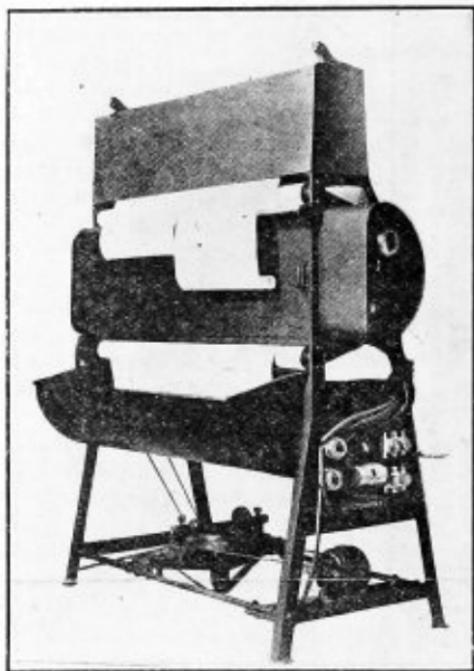
**OCCUPIES SMALL SPACE.**

Of all the many excellent features of the Shaw Machine, the space it occupies when in use is one of the most attractive. It requires only a space 2 feet 6 inches square and head-room of 8 feet, making it especially adapted for small offices where floor space has to be economized. The shipping weight is about 400 pounds.

No.

2237½—Shaw Continuous Blue Print Machine for prints 42-inch wide. \$300.00

## THE SHAW HORIZONTAL CONTINUOUS BLUE PRINT MACHINE.



No. 2238½. Horizontal Feed.

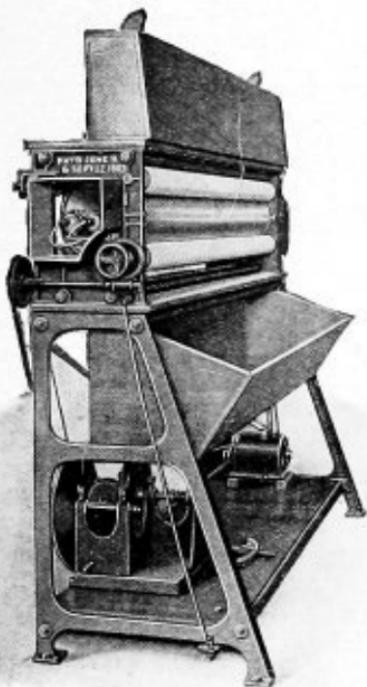
The Shaw Horizontal Feed Continuous Electric Blue Print Machine is an ideal machine, does splendid work, gives perfect contact and is guaranteed to print 25 per cent faster than any machine using two Cooper Hewett Mercury Vapor Lamps. They can be furnished to operate on 110 or 220 volts direct current, for alternating current a special transformer must be used.

As shown in the illustration the paper is carried in a box at top of machine and paper and tracings drop into box after printing. The speed of the machine is changed by moving a lever so that any tracing or paper can be used and run through at the speed which gives the best results. A door is provided in front of the machine for cleaning glass and reflector. The machine is self contained and shipped complete except the lamps, which are sent in a separate crate. The lamps can be put in the machine and connections made by any electrician in a few minutes.

No.  
2238½—Shaw Horizontal Machine for printing 42-inch paper. . . each, \$500.00

## THE REVOLUTE.

### EVERETT-McADAM CONTINUOUS ELECTRIC BLUE PRINT MACHINE.



No. 2239F

direct current and the motor which operates it runs on the same circuit. The lamps require 7 amperes each on 110 volts and the motor 1.8 amperes.

The Everett-McAdam Machine is entirely self-contained and is shipped all set up, except that the lamps and cylinder are packed separately in boxes in the main crate. Any electrician can connect the lamps from instructions sent with the machine.

The space occupied is about 2 x 5 ft. for the 42" machine, and 2 x 6½ ft. for the 54" machine, and since the paper feeds in automatically, it is not necessary to have a large table on which to cut it, as with the old methods of printing.

The machine is driven by a motor through a variable speed device which is operated by moving a convenient lever, so that any tracing or paper can be used and run through at the speed which gives the best results.

No. 2239F—E-M. Blue Print Machine for 42 in. paper. . . . . Each, \$650.00

No. 2239G—E-M. Blue Print Machine for 54 in. paper. . . . . Each, 875.00

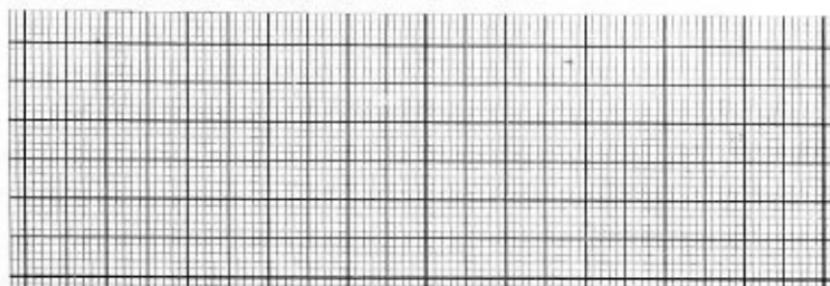
Above prices include packing for shipment.

The cylinder in the Blue Print Machine is 8 inches in diameter and from 3 to 6 inches longer than the width of the paper to be printed. Two mercury vapor lamps, made to order for this machine and double the power of the standard lamp, pass through the center of the cylinder. The light, therefore, strikes the paper perpendicularly on the concave surface and directly through the glass, no light being absorbed by having to pass through so-called "transparent" aprons or belts. This, with the high actinic value of the Mercury Vapor lamps, produces a machine of an absolutely maximum electrical efficiency.

The lamps are no more trouble to maintain than an incandescent lamp, since there are no carbons to renew as in arc lamps.

The machine will run on any

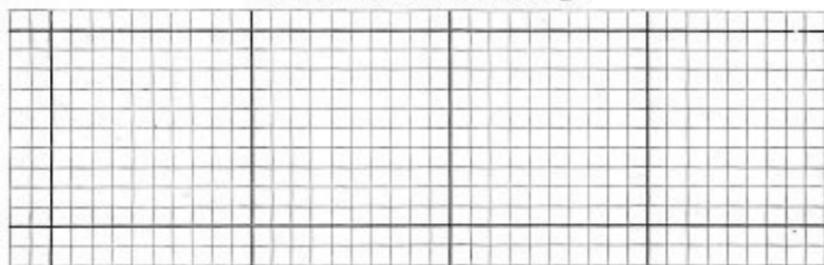


**METRIC PROFILE PAPER.**

No.	Millimeter.	Per roll.	Per yard.
2248	—Millimeter.—50 centimeters wide, orange or green, 50-yard rolls	\$10.00	\$0.24
2249	—Millimeter.—50 centimeters wide, mounted on muslin, orange or green, 20-yard rolls	10.00	.60
2249 ½	—Millimeter.—50 centimeters wide, on transparent paper, orange only, 50-yard rolls	10.00	.24
2249 ¾	—Millimeter.—50 centimeters wide, on tracing cloth, orange only, 20-yard rolls	12.00	.75

**CROSS SECTION PAPER.**

Printed in Green and Orange.

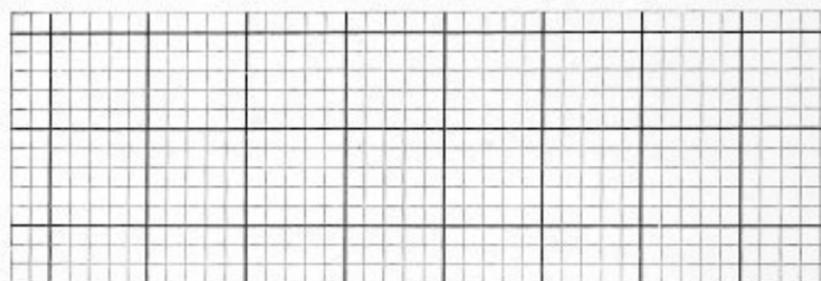


Engraving, 10x10 to 1 inch. Sheets, 18x24 inch.

No.		Per quire.	Per sheet.
2250	—Cross-Section, in sheets, printed in orange or green	\$ 3.00	\$0.15
2251	—Cross-Section, in sheets, transparent paper, in orange only	3.00	.15
		Per roll.	Per yard.
2252	—Continuous, 20 inch wide, in rolls of 50 yards	\$ 9.00	\$0.20
2253	—Continuous, 20 inch wide, in rolls of 20 yards, mounted on cloth	10.00	.60
2254	—Continuous, 20 inch wide, in rolls of 50 yards, transparent paper	9.00	.20
2254 ½	—Continuous, 20 inch wide, in rolls of 20 yards, on tracing cloth	12.00	.70
2254 ¾	—Continuous, 20-inch wide, in rolls of 20 yards on opaque cloth	10.00	.60

## CROSS SECTION PAPER.

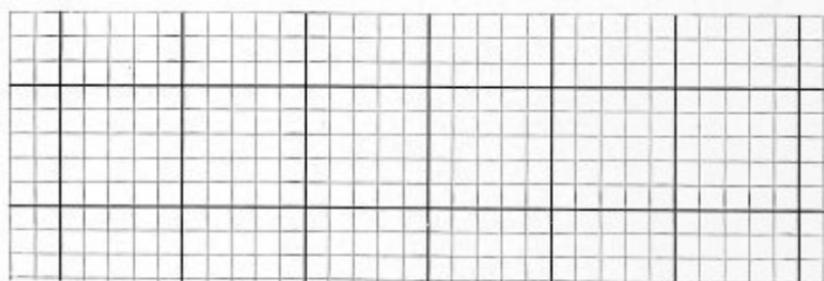
Printed in Green and Orange.



Nos. 2255-2256.

Engraving, 5x5 to  $\frac{1}{2}$  inch. Sheets, 18x24 inch.

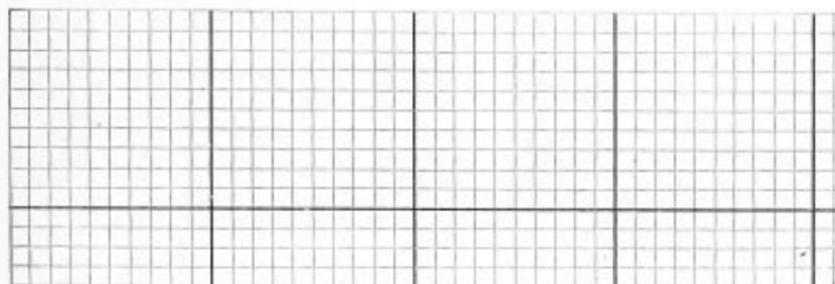
No.	Per Quire	Per Sheet
2255—Cross section in sheets, printed in orange or green . . . . .	\$3.50	\$0.20
2256—Cross section in sheets, transparent paper, orange only . . .	3.50	.20



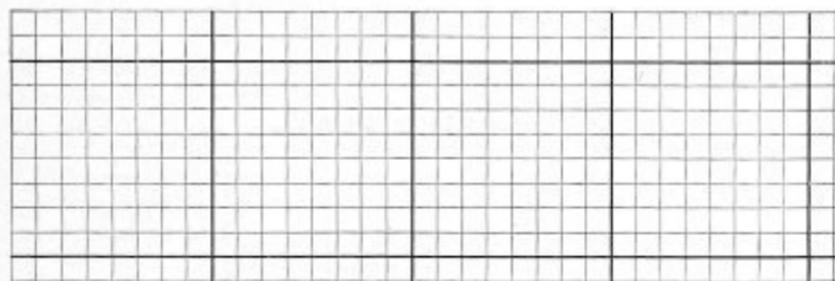
Nos. 2257-2257  $\frac{1}{2}$ .

Engraving, 8x8 to 1 inch. Sheets, 18x24 inch.

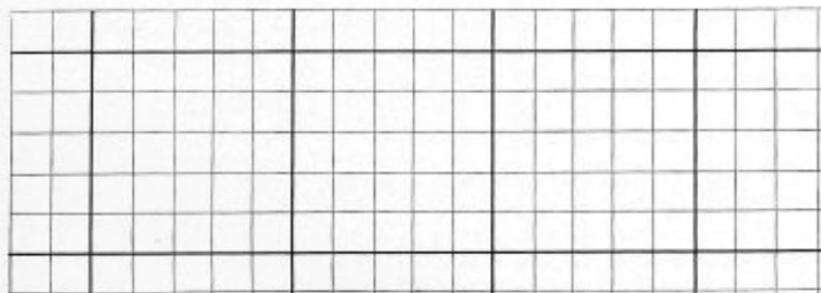
No.	Per Quire	Per Sheet
2257—Cross section in sheets, printed in orange or green . . . . .	\$3.50	\$0.20
2257 $\frac{1}{2}$ —Cross section in sheets, transparent paper, orange only . . . . .	3.50	.20
2258—Cross section in sheets, engraving 16x16 to 1 inch, printed in orange or green . . . . .	3.50	.20
2258 $\frac{1}{2}$ —Cross section in sheets, engraving 16x16 to 1 inch, transparent paper, orange only . . . . .	3.50	.20

**RULED CROSS-SECTION PAPER.****Rulings 10x10 to 1 inch (Sheets only).**

No.  
2259—Sheets 16x21 in., blue ruling: 10x10 to 1 in. . . . . quire, \$1.00; sheet, \$0.05

**Rulings 8x8 to 1 inch.**

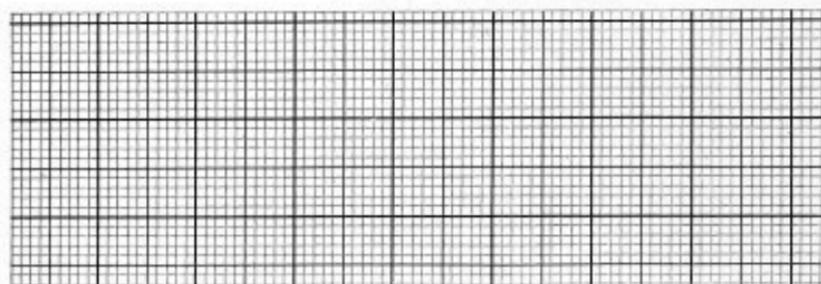
No.  
2260—Sheets, 16x21 in., blue ruling: 8x8 to 1 in. . . . . quire, \$1.00; sheet, \$0.05

**Rulings 5x5 to 1 inch.**

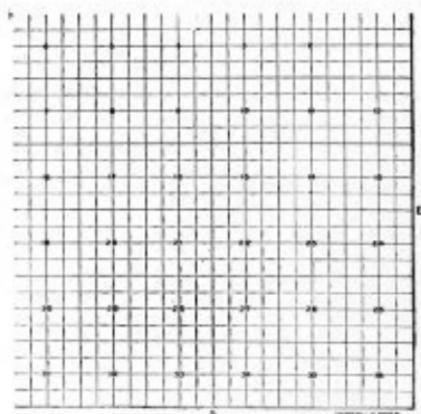
No.  
2261—Sheets, 16x21 in., blue ruling: 5x5 to 1 in. . . . . quire, \$1.00; sheet, \$0.05  
2261 1/2—Sheets, 16x21 in., blue and red ruling, 4x4 to  
1 in. . . . . quire, 1.00; sheet, .05

**CONSTRUCTOR'S CROSS-SECTION PAPERS.**

Small Sheets for Technical Students, Mechanical Engineers, Etc.

10x10 to  $\frac{1}{2}$  inch, every fifth line heavy.

No.		100 Sheets.	Quire.
2262A—Engraving	5x 7 in., on drawing paper, green only . . . .	\$0.90	\$0.25
2262B—Engraving	5x 7 in., on tracing paper, orange only . . . .	.90	.25
2262C—Engraving	8x10 in., on drawing paper, green only . . . .	1.20	.30
2262D—Engraving	8x10 in., on tracing paper, orange only . . . .	1.20	.30
2262E—Engraving	10x15 in., on drawing paper, green only . . . .	2.40	.75
2262F—Engraving	10x15 in., on tracing paper, orange only . . . .	2.40	.75

**TOWNSHIP PLATS.**

No.			Per doz.
2262G—Township Plat, scale $\frac{3}{4}$ -inch to section, sheet	$6\frac{1}{2} \times 7\frac{3}{4}$	.....	\$0.30
2262H—Township Plat, scale 1 -inch to section, sheet	$7 \times 8\frac{1}{2}$	.....	.35
2262 I—Township Plat, scale $1\frac{1}{2}$ -inch to section, sheet	$10\frac{1}{2} \times 13\frac{1}{4}$	.....	.45
2262 J—Township Plat, scale 2 -inch to section, sheet	$14 \times 17$	.....	.65
2262K—Township Plat, scale 2 -inch to section, sheet	$16 \times 21$	.....	.80
2262L—Township Plat, scale $2\frac{1}{2}$ -inch to section, sheet	$18 \times 23$	.....	.85
2262M—Township Plat, scale 3 -inch to section, sheet	$20 \times 28$	.....	2.00
2262N—Township Plat, scale $1\frac{1}{4}$ -inch to section, sheet	$14 \times 17$	.....	
	with two rows of surrounding sections . . . .		.85

**"STANDARD" BLANKS FOR THE BUILDING TRADES.****BLANK FORM SPECIFICATIONS AND REMINDER.**

**For Frame and Brick Buildings, costing from \$500 to \$10,000.**

We call attention to our new and revised blank forms of Specifications and Contracts and other forms, which have been added to our list, and especially to the revision of the Plumbers' Specification Blank, which has been entirely rewritten, and the addition of the Heating and Electric Wiring Specification Blanks which the present requirements demand in the up-to-date building. A thorough revision of the other blank forms of the Specifications, Contracts, Bonds, etc., has been made, so as to meet the requirements of the advanced ideas of the building laws and the new revised State lien laws.

The "Standard" Blank Forms of Specifications consist of 17 different specifications, furnished on 14 sheets. In strong manila cover, containing the following blank forms:

PREAMBLE, MASON'S, CUT STONE, PLASTERERS', CARPENTERS', PLUMBERS',	PAINTERS', GLAZIERS', GASFITTERS', SEWERS, GALVANIZED IRON,	IRON (Structural), HEATING, Steam or Hot Water, HEATING, Furnace, ELECTRIC WIRING,	AGREEMENT between Owner and Contractor (with Bond). CONTRACTORS' STATEMENT.
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Besides the above mentioned forms, attention is called to the useful "Architects' Reminder," printed on inside of cover.

No.	Dozen Sets.	100 Sets.
2263A—"Standard" Specifications; single sets, 25c.....	\$2.50	\$17.50
2263B—Building Contracts.....	.20	1.25
2263C—Building Contracts, with bond.....	.25	1.75
2263D—Contract Between Owner and Architect.....	.25	1.75
2263E—Contractors' Statements.....	.25	1.75
2263F—Mechanics' Lien Notice.....	.25	1.75
2263G—Waiver of Lien.....	.25	1.75
2263H—"Uniform" Building Contracts.....	.30	2.00
2263I—Architect's Certificate Book (100 Blanks).....	Each	\$0.40
2263J—Specification Index. Being a form of specification writing by Frank C. Baldwin, F. A. I. A. For the use of Architects and Builders and consists of a series of cards arranged under different headings, and dealing with all the various items likely to arise in writing specifications for buildings. It consists of 555 (4x6) cards, made to fit Standard card files, with circular of instructions.		

**Cardboard Box, Price \$6.00 Net; Metal Box, Price \$7.75 Net.**

**Blank Cards (for interpolation), 50c per hundred.**

**Typewriter Papers for Specifications, Etc.**

2263K—Onion Skin Bond, white, 8½x13 in., per ream of 500 sheets, in box.....	\$1.75
2263L—Standard Bond, thin, 8½x13 in., per ream of 500 sheets, in box...	1.45
2263M—Standard Bond, medium, 8½x13 in., per ream of 500 sheets, in box.....	1.70

**Sundries.**

2263N—Black Oil Cloth, for covers for drawings, 48 in. wide, per yard....	\$0.45
2263O—Legal Cap Paper, per quire, 30c; per ½ ream, \$2.25; per ream...	4.00
2263P—Gelatine or Glass Paper, in sheets 15¾x23¾ in., medium thick, per sheet.....	.25

**ENGINEERS' FIELD BOOKS,**

These books are made of Extra Heavy White Paper, size  $5\frac{1}{4} \times 8$  inches, are  $1\frac{1}{2}$  Horizontal to 1 Perpendicular; Prismoids 100 feet long; breadth of base, mular Solutions of Right Angles, Oblique Angles and General Trigonometrical

**SAMPLE OF FIELD BOOK HEADING.**

STATION	ALIGNMENT	ELEVATION	GRADE	GRA- DIENT	CUT	FILL	SLOPE DISTANCE	
							LEFT	RIGHT

2285—Field Book,  $5\frac{1}{4} \times 8$  inches.....with Printed Headings.

**SAMPLE OF TRANSIT BOOK HEADING**

STATION	ALIGNMENT	DEFLECTION	REMARKS

2286—Transit Book,  $5\frac{1}{4} \times 8$  inches.....with Printed Headings.

**SAMPLE OF LEVEL BOOK HEADING.**

STATION	INSTRUMENT	FORE SIGHT	INTER- MEDIATE	BACK SIGHT	ELEVATION	GRADE	CUT

2287—Level Book,  $5\frac{1}{4} \times 8$  inches.....with Printed Headings.

**SAMPLE OF CROSS SECTION BOOK HEADING.**

STATION	DISTANCES LEFT							
	80'	70'	60'	50'	40'	30'	20'	10'
	CUT AND FILL							

2288—Cross Section Book,  $5\frac{1}{4} \times 8$  inches.....with Printed Headings.

**WITH PRINTED HEADINGS.**

strongly bound, containing Tables of Excavation and Embankment, Slopes 1 and 10 to 30 feet; height, 1 to 60. Also Trigonometrical and Miscellaneous Formulae, etc.

**FIELD BOOK.**

CUBIC YARDS				REMARKS
EXCAVATION	EMBANKMENT	DITCH	WASTE	

as shown above ..... Each, \$0.70. Per dozen, \$7.50.

**TRANSIT BOOK.**

				TOPOGRAPHY		

as shown above ..... Each, \$0.70. Per dozen, \$7.50.

**LEVEL BOOK.**

FILL	CUBIC YARDS		REMARKS
	EXCAVATION	EMBANKMENT	

as shown above ..... Each, \$0.70. Per dozen, \$7.50.

**CROSS SECTION BOOK.**

Center			DISTANCES RIGHT							
	CUT	FILL	10'	20'	30'	40'	50'	60'	70'	80'

as shown above ..... Each, \$0.70. Per dozen, \$7.50.

## ENGINEERS' FIELD BOOKS. LEVEL BOOKS.

No.

- 2290—Level Book,  $4\frac{1}{2} \times 7\frac{1}{2}$ , smooth paper..... 100 leaves,  
 2291—Level Book,  $4\frac{1}{2} \times 7$ , smooth paper..... 80 leaves,  
 2292—Level Book,  $4 \times 6\frac{1}{2}$ , smooth paper..... 60 leaves.

## TRANSIT BOOKS.

- 2293 —Transit Book,  $4\frac{1}{2} \times 7\frac{1}{2}$ , smooth paper..... 100 leaves,  
 2294 —Transit Book,  $4\frac{1}{2} \times 7$ , smooth paper..... 80 leaves,  
 2295 —Transit Book,  $4 \times 6\frac{1}{2}$ , smooth paper..... 60 leaves,  
 2296 —Field Book,  $4\frac{1}{2} \times 7$ , smooth paper..... 80 leaves,  
 2296  $\frac{1}{2}$ —Hodgman's Surveyors' Field Book, with tables and for county.

## CROSS SECTION BOOKS.

- 2297—Cross Section Book,  $5 \times 7$ , smooth paper..... 80 leaves,  
 2298—Cross Section Book,  $6 \times 10$ , smooth paper..... 80 leaves,  
 2299—Topographical Book,  $5\frac{2}{3} \times 9\frac{3}{4}$ , smooth paper..... 80 leaves.



**ENGINEERS' FIELD BOOKS.**


No. 1360—Field Book,  $4\frac{1}{2} \times 7\frac{1}{2}$  inch.....80 leaves.


No. 1365—Transit Book,  $4\frac{1}{2} \times 7\frac{1}{2}$  inch.....80 leaves.


No. 1370—Level Book  $4\frac{1}{2} \times 7\frac{1}{2}$  inch.....80 leaves.

**SECTION.**

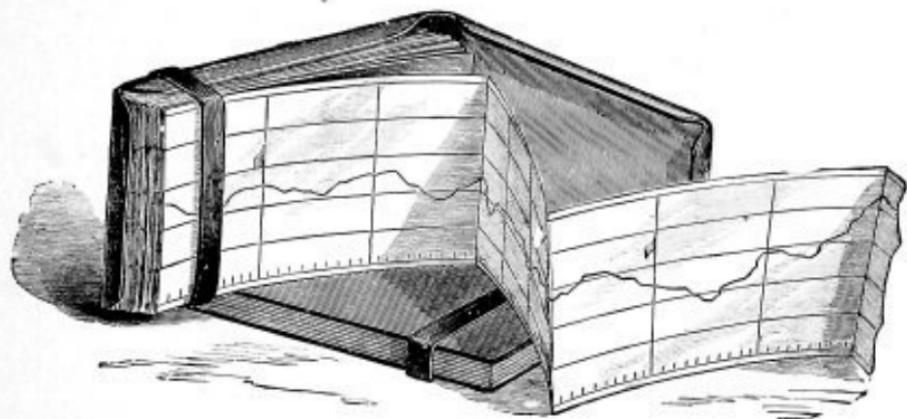
STA.	ELEVA.	GRADE.	CUT OR FILL.		
			LEFT.	C.	RIGHT.

No. 1380—Field Book,  $5\frac{1}{4} \times 8$  inch.....80 leaves. Ruled and printed.





## PROFILE BOOKS.



### Bound in American Russia, with Elastic Band.

These books are folded like a map and take the place of the continuous rolls of profile paper. Mounted on cloth.

Each leaf, or two pages facing, contains 6,000 feet—a "Section" as generally laid out for the construction of a road.

### CONTINUOUS.

No.					
2264—Plate A.	4 Horizontal, 20 Vertical to an inch; 5½ x 8 inches.				
Miles	.....	10	15	25	50 100
Each	.....	\$2.00	\$2.75	\$3.25	\$5.25 \$9.50
2265—Plate B.	4 Horizontal, 30 Vertical to an inch; 4¾ x 8 inches.				
Miles	.....	10	15	25	50 100
Each	.....	\$2.00	\$2.75	\$3.25	\$5.25 \$9.50

### NOT CONTINUOUS.

Each page will contain a profile of 3,000 feet in length, so that each folio will contain an average section of a road, as usually laid out for construction.

No.				
2267—Plate A.	Size of Book 5¾ x 8½ inches. Leaves.	25	50	100
	Bound in Morocco, each.....	\$2.00	\$2.50	\$3.75
2268—Plate B.	Size of Book, 5½ x 9 inches. Leaves.	25	50	100
	Bound in Morocco, each.....	\$2.00	\$2.50	\$3.75

## DUNHAM'S PLAT AND PROFILE BOOKS.

These books are of thin, tough paper, bound in flexible Morocco, and of a size convenient for the pocket (4¼ x 9½ in.). They contain 36 profile pages, plate B, engraving 3¼ x 7½ in., printed in green, and opposite each profile page a blank page with margin, 3½ x 8¼ in., for plats, etc. These books contain also some valuable tables.

No.		
2268A—Dunham's Plat and Profile Books, 36 pages.....	each,	\$1.00
2268B—Dunham's Plat and Profile Books, 90 pages.....	each,	2.00

## Table for Calculating Excavation and Embankment of Regular and Irregular Cross Sections.

BY E. C. RICE, C. E.

### INDEX TO TABLES.

#### CUBIC YARDS

No. 2277.	Breadth of Base.	Slope Horizontal.	Slope Perpendicular.	No. 2277	Breadth of Base.	Slope Horizontal.	Slope Perpendicular.
Table 1.	15 ft.	3 and 2	1	Table 18.	14 ft.	1	1
" 2.	15	2 and 2½	1	" 19.	16	1	1
" 3.	14	2	1	" 20.	18	1	1
" 4.	15	2½	1	" 21.	20	1	1
" 5.	9	1½	1	" 22.	22	1	1
" 6.	10	1½	1	" 23.	24	1	1
" 7.	12	1½	1	" 24.	26	1	1
" 8.	14	1½	1	" 25.	28	1	1
" 9.	15	1½	1	" 26.	30	1	1
" 10.	16	1½	1	" 27.	20	1	1
" 11.	18	1½	1	" 28.	26	1	1
" 12.	20	1½	1	" 29.	30	1	1
" 13.	22	1½	1	" 30.	15	1	1
" 14.	24	1½	1	" 31.	18	1	1
" 15.	26	1½	1	" 32.	20	1	1
" 16.	28	1½	1	" 33.	10	1	1
" 17.	30	1½	1				

#### AREAS.

No. 2278.	Breadth of Base.	Slope Horizontal.	Slope Perpendicular.	No. 2278	Breadth of Base.	Slope Horizontal.	Slope Perpendicular.
Table 1.	15 ft.	3 and 2	1	Table 17.	30 ft.	1½	1
" 2.	15	2 and 2½	1	" 18.	14	1	1
" 3.	14	2	1	" 19.	16	1	1
" 4.	15	2	1	" 20.	18	1	1
" 5.	9	1½	1	" 21.	20	1	1
" 6.	10	1½	1	" 22.	22	1	1
" 7.	12	1½	1	" 23.	24	1	1
" 8.	14	1½	1	" 24.	26	1	1
" 9.	15	1½	1	" 25.	28	1	1
" 10.	16	1½	1	" 26.	30	1	1
" 11.	18	1½	1	" 27.	20	1½	1
" 12.	20	1½	1	" 28.	26	1½	1
" 13.	22	1½	1	" 29.	30	1½	1
" 14.	24	1½	1	" 30.	15	1½	1
" 15.	26	1½	1	" 31.	18	1½	1
" 16.	28	1½	1	" 32.	20	1½	1

#### AREAS OF TRIANGLES.

No. 2279—Table I.....	Slope ½ Horizontal to 1 Perpendicular.....
Table II.....	Slope 1 Horizontal to 1 Perpendicular.....
Table III.....	Slope ½ Horizontal to 1 Perpendicular.....

Price, per Sheet, 25c.

No. 2281—In book form, finely bound, all complete, 12 ½ x 10 inches, 93 pages.	\$7.50
Explanation Tables, 25 Cents each.	

# THE ALOE

## ENGINEERING AND SURVEYING INSTRUMENTS

### PREFACE

For half a century our establishment has been engaged in the manufacture of Mathematical and Engineering Instruments.

For the character of our work we make but one reference—the number of our instruments throughout the country, the number of years they have been in use, and the reputation they have maintained during that time. Some of these instruments, made over fifty years since, are yet in active service, doing accurate work, while cheaper instruments are being discarded after from three to four years' work.

We refer, with pride, to the introduction of our Engineer's Transit, both in its original form, and in the subsequent styles as made by us today. In the earlier days of railroad construction, when transportation was slow and difficult, requiring months for an instrument to reach its destination or to be received back from instrument maker in case of repairs, our Transit was strong, simple, substantial, almost impossible to be placed out of repair. Our later and lighter instruments are replete with every modern improvement, capable of the most delicate and accurate work. From the earliest to the present time, the superiority of our instruments has been unquestioned.

The materials in our instruments, our style and modes of manufacture, have been adopted after trial and test, during past fifty years.

The graduations, the main point of all angular instruments, are, in our instruments, performed under our personal inspection, upon a line of graduating engines, superior to all others in the country.

## **INFORMATION TO PURCHASERS.**

### **GUARANTEE.**

All our instruments are carefully examined and tested before shipment is made, and are always in adjustment and ready for immediate use. They are warranted perfect in all their parts, and in the event of any defect appearing after reasonable use, we agree to repair or replace with a new part, or, if necessary, a new instrument, at once, and without cost, including transportation charges. We consider a defective instrument a much greater injury to ourselves than to the customer.

### **INSTRUMENTS ON TRIAL.**

For the benefit of those unacquainted with the Aloe Instruments and feeling unwilling to purchase without first assuring themselves of the accuracy and finish of the instrument, we will send, upon request, any transit, level or compass of our make to the nearest express station and direct the express agent to deliver the instrument, upon payment of our bill together with express charges, and hold the money on deposit ten days, thus giving the purchaser time to make an examination and give it an actual trial. If not found as represented, the purchaser can return the instrument within the specified time and receive the full amount paid, and direct the instrument returned to us. This privilege applies only to reputable parties, and is granted only upon special request, and holds good only within the United States.

### **PACKING AND TRANSPORTATION.**

In shipping our instruments we in every case carefully pack the inside of the instrument box proper, with tissue paper, thus preventing any danger of any part working loose. The instrument box is then enclosed in an outside packing box of pine, made a trifle larger on all sides to permit the introduction of elastic material, which prevents any jar from affecting the instrument itself. In case of foreign shipment the packing box is lined with tin and is hermetically sealed. Instruments can be sent by express to almost every part of the United States, Mexico and Canada, as regular express agents are located at all important points and are forwarded by stages to the smaller places. The charges are in all cases paid by the purchaser, we guaranteeing their safe arrival to the express terminus, as we hold the express companies responsible for all losses and damage on the way.

**A FEW UNSOLICITED TESTIMONIALS**

Office of Surveyor and Bridge Commissioner for Nodaway County,  
Maryville, Mo., January 3, 1903.

MESSRS. A. S. ALOE, St. Louis, Mo.

Dear Sirs:—Inclosed you will please find check as payment for transit. She is a daisy and don't you forget it. I can recommend your instruments to anyone. I have one of your old time transits in my office, twenty years old, that works good yet.

Yours respectfully,

JAS. K. YOUNG, C. E.,

U. S. DEPARTMENT OF THE INTERIOR, MUSKOGEE, OKLA.  
August 15, 1903.

A. S. ALOE CO., St. Louis, Mo.

Gentlemen:—I am pleased to bear testimony to the excellence of your work as instrument workers.

We have here in our equipment a large number of transits and levels, and none of them are superior to yours in excellence of workmanship and effectiveness in details. In the first work done with the last instrument purchased (your light Field Transit) on an extended survey twelve angles were taken, five instrument points were occupied and straight lines extended over hilly country. Angles were all taken and read on A. & B. verniers. Were then repeated and read on both verniers. Results were perfect. It has been my uniform experience that your instruments are the best.

Yours respectfully,

JOHN G. JOYCE,

Supervising Engineer, Department of Interior.

OFFICE OF COUNTY SURVEYOR, MT. PLEASANT, IA.

A. S. ALOE CO., St. Louis,

May 12, 1906.

Gentlemen:—I am shipping you by Adams Express my level. This is an Aloe instrument that I have been using for thirty-six years without ever having expended before a single dollar upon the repairs of the same, but now I think it is necessary to have you put the instrument in good shape for service and return to me as soon as possible.

I do not think any instrument in the world has ever had the amount of use to which this instrument has been put and lasted for thirty-six years. Certainly this letter should speak volumes as a testimonial of the quality and merit of your goods.

Send when done by Adams Express, C. O. D.

Yours respectfully,

J. A. SCHREINER, County Surveyor.

PENNSYLVANIA LINES WEST OF PITTSBURG.

Office of the Engineer Maintenance of Way.

Fort Wayne, Ind., December 13, 1898.

A. S. ALOE COMPANY.

Gentlemen:—The instruments I ordered some time ago have been received in good condition and I wish to compliment you on your New Model Engineers' Transit; it certainly is as fine as any I have seen and gives splendid and accurate results.

Yours truly,

A. C. HEZLEP, Engineer

WATER COMMISSIONER, CITY OF ST. LOUIS.

Benj. Adkins, C. E., Commissioner.

July 7, 1905.

A. S. ALOE CO., St. Louis.

Gentlemen:—It affords me pleasure to say that my experience with the Aloe Transits and Levels leads me to believe that no better or more satisfactory engineering instruments are made in the world. The Aloe instruments used by me under repeated tests fail to show any errors. The adjustments are simple and easy and the matter of only a few minutes to obtain.

Yours respectfully,

BEN ADKINS, C. E.

U. S. ENGINEER'S OFFICE, MISSISSIPPI RIVER COMMISSION.

December 28, 1899.

A. S. ALOE COMPANY.

Gentlemen:—In regard to the topographical theodolites forwarded this office, the instruments proved in actual field work to meet every expectation. They are admirable topographical instruments. I commend the same.

J. A. OCKERSON, C. E.,  
Mississippi River Commission.

CITY ENGINEER'S OFFICE, SPRINGFIELD, ILL.

April 25, 1906.

A. S. ALOE CO., St. Louis.

Gentlemen:—I am sending you this day, via express, my Aloe Level. This is a very fine instrument and deserves better care, but a run-away has placed it out of commission. Please repair it and return it to me as quickly as possible, as we have constant use for the same and the instrument has given us so much satisfaction that we would really feel lost without it. The instrument is certainly a good one and answers our work admirably.

Thanking you in advance for the quick return of the same, I am,  
Yours truly,

FRANK H. HAMILTON, City Engineer.

FROM JOSEPH DAVIDSON, DISTRICT ENGINEER, ATLANTA, GA.

May 9, 1907.

A. S. ALOE CO., St. Louis.

Gentlemen:—I am using two of the Aloe instruments in our Engineering Department and find them to be splendid instruments and apparently without fault. They have given first class satisfaction and are highly pleased with the same.

Yours very truly,

JOSEPH DAVIDSON, District Engineer,  
Southern Cotton & Oil Co.

GRAND TRUNK RY. SYSTEM, MONTREAL.

March 15, 1906.

A. S. ALOE CO., St. Louis.

Gentlemen:—Our road has purchased twenty of your No. 2304 Transits, with level and vertical arc attached. It is against our policy to give testimonials, but the purchase of the number of instruments above mentioned indicates the attitude of our Engineering Department towards your make of instruments.

Yours truly,

A. BUTZE,  
General Purchasing Agent.

FROM JACOB ORR, CIVIL ENGR., AUBURN, ILL.

September 1, 1906.

A. S. ALOE CO., St. Louis.

Gentlemen:—Received the tripod this morning and thank you for the promptness in exchanging the same.

I desire to inform you that I am especially well pleased with the 18-inch Wye Level purchased from you. The same is the best instrument of its kind I have ever seen in all my experience, which has been rather extensive, and its working qualities are equally as good as its finish and appearance.

Yours very truly,

JACOB ORR, C. E.

Bay City, Texas, July 6, 1905.

MESSRS. A. S. ALOE & CO., St. Louis, Mo.

Dear Sir:—Please send me by express, C. O. D., your New Model Engineers' Wye Level, Catalogue No. 2380 (19th edition), Split Leg Tripod, Also Leveling Rod. I am now using, and have been for a number of years, one of your 18-inch Wye Levels, and can truthfully say it's the best level I ever used. It has been in constant use for a great number of years. Please forward instrument at your earliest convenience.

Yours truly,

J. C. CARRINGTON,  
County Surveyor and Civil Engineer.

FOURCHE RIVER VALLEY & IND. TER. RY. CO., FOURCHE, ARK.

May 20, 1907.

A. S. ALOE CO., St. Louis.

Gentlemen:—I have been using your surveying instruments for a number of years and I feel entirely free to commend the same most highly, and to say that they have always given the very best satisfaction. The transit recently purchased from your company is a beauty. A more perfect working instrument it would be impossible to possess. Yours very truly,

FRANK C. FAUST.

OFFICE OF H. E. FEARNALL, CIVIL ENGR., MILES CITY, MONT.

March 7, 1906.

A. S. ALOE CO., St. Louis.

Gentlemen:—The level and rod that I purchased from you some time ago has proven very satisfactory indeed, and I enclose draft herewith to cover my account. I wish to thank you for the same, and to inform you that the level works most beautifully. The workmanship, finish and simplicity of the same has commended this instrument to my mind as being the best I have ever seen of its kind. I have found it accurate, light, compact and answering all purposes that a Civil Engineer in this country would require.

Again thanking you, I beg to remain,

Yours most respectfully,

H. E. FEARNALL, Civil Engr.

OFFICE OF J. S. SPIKER, CONSULTING AND SANITARY ENGR.,  
VINCENNES, IND.

Sept. 30, 1905.

A. S. ALOE CO., St. Louis.

Gentlemen:—I beg to say that the Aloe instrument that I now own was first sold to the Vincennes University about the Spring of 1888. I subsequently purchased the instrument and have used it ever since, and the same has given entire satisfaction. No better instrument could be desired by any one. To an engineer who understands his business this instrument will appeal, in my judgment, as pre-eminently the best of its kind ever placed upon the market.

I send you today, by U. S. Express, the three extension tripod legs and the tripod head for the transit. Please give the same your prompt attention, as per my previous communication. Yours truly,

J. S. SPIKER, C. E.

OFFICE OF J. C. KELLY, CONSULTING AND SANITARY ENGR.,  
Eagle Lake, Tex., December 10, 1897.

MESSRS. A. S. ALOE CO.

Gentlemen:—I am more than pleased with the Aloe Engineers' Transit, I bought from you some time ago. It is an excellent instrument for all around field work. I have used almost every make of instrument and I consider the Aloe instrument superior to any. The beauty of your transit is that it has all the advantages of the light and heavy instruments, having the long telescope and the 4½-inch needle and 7-inch plate, and being light in weight. Your description in catalogue does not fully cover the ground. One would think that it was a heavy instrument. I was certainly agreeably surprised in that respect. The needle clamp is convenient and the thumb screws on the tripod are a

decided advantage. I have been running some levels for irrigating purposes and find that it does about as well as the average Wye Level, and I know that it can't be beat when it comes to running transit lines. You should tell any one wishing to purchase that it has all the advantages of a light mountain transit, with the big telescope. I know from actual practice that the  $4\frac{1}{2}$ -inch needle does better work than the 5 or 6-inch needles, and holds its magnetism longer. I have worn out the shoulders of about fifty coats packing around the big heavy transits, on surveys, and no end of surplus weight, and when I commenced using the Aloe instrument it was a whole lot lighter, and the same results are obtainable.

Yours truly,

J. C. KELLY,

Civil Engineer.

OFFICE OF CHIEF ENGR., OKLA. CITY RY. CO., OKLA. CITY, OKLA.  
A. S. ALOE CO., St. Louis.

June 29, 1906.

Gentlemen:—Herewith enclosed find order for Engineers' Supplies, which we would like to have sent to us by express as soon as possible.

The Aloe level which we bought from you last spring has proven very satisfactory indeed. I am highly pleased with the same, and beg to add that I have never seen a more simple, perfect and accurate working instrument.

Very truly yours,

W. E. MOORE, Ch. Engr.,

Oklahoma City Railway.

FROM THEO. RAFFA, C. E., 243 WOODWARD AVE., RIDGEWOOD  
HEIGHTS, QUEENES CO., N. Y.

Ridgewood Heights, N. Y., July 21, 1909.

A. S. ALOE CO., St. Louis, Mo.

Gentlemen:—Having used one of your Transits on the Union Pacific R. R. for a great many years, and the same having given entire satisfaction, kindly let me know the lowest price on a complete outfit, Transit, Level, Rods, etc.

In my new position I may be able to throw quite a little business your way, and shall be pleased to do so on account of the high quality you maintain in your instruments.

Yours respectfully,

THEO. RAFFA, C. E.

FROM H. P. FARRAR, C. E., JACKSON, TENN.

A. S. ALOE CO., St. Louis.

May 13, 1907.

Gentlemen:—It affords me pleasure to speak in praise of the Aloe transit I purchased from you. I have found that where a good instrument was required in establishing grades for streets, sidewalks, etc., and in using the level attachment instead of the regular level I have found this instrument simply perfect in all its parts and for all uses where a transit or level was required it comes into perfect adjustment and holds it throughout. However, I would have been disappointed at any other result, as I have used your transits and levels in all lines of work for many years, and the same have always given me the very greatest satisfaction.

Yours respectfully,

H. P. FARRAR, C. E.

OFFICE OF MINING ENGR. ILLINOIS COLLIERIES CO., CHATAM, ILL.

A. S. ALOE CO., St. Louis.

March 18, 1906.

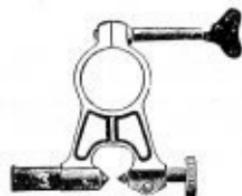
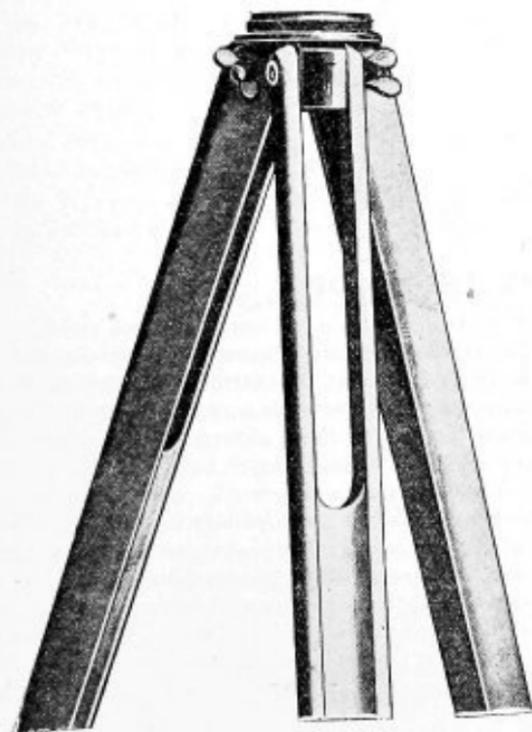
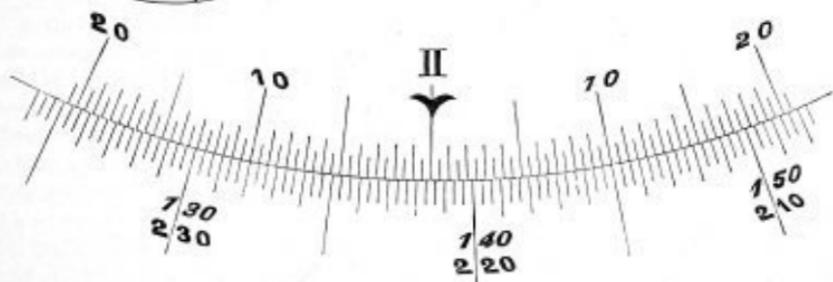
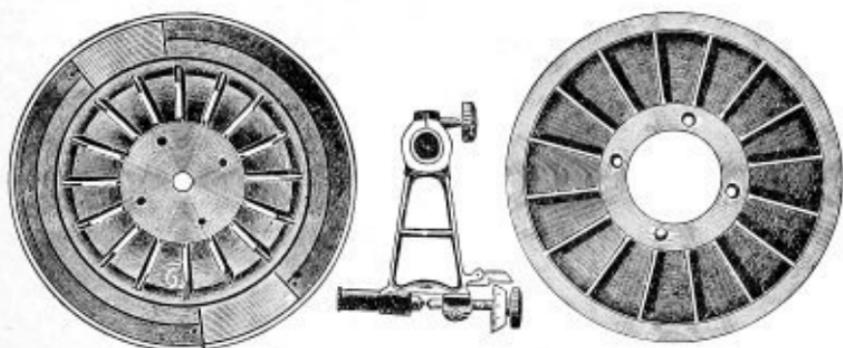
Gentlemen:—The transit you sold me is an honor and a credit to your name. For compactness, accuracy, workmanship and finish it cannot be excelled by any. I must confess that I am astonished, pleased and contented with the instrument which I purchased and the results which it enables me to secure, and I want to commend the Aloe Company to any one wishing to purchase anything in the engineering line.

Yours very respectfully,

W. T. DICKINSON, Mining Engineer.

**PARTS OF SURVEYING INSTRUMENTS,**

Showing method of ribbing, etc., in order to make Instruments light and stiff.



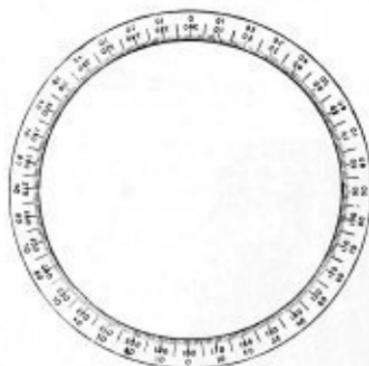
# SPECIAL FEATURES

## OF THE

### ENGINEERING INSTRUMENTS MADE BY ALOE CO.

#### GRADUATION.

This very important part of an instrument we guarantee exact and correctly centered opposite verniers reading the same. The lines are straight, very black and uniform in width. On all transits from Nos. 2300 to 2308 there are two double verniers. The horizontal circle is graduated from 0 to 360 degrees, with two rows of figures running in opposite directions (other forms may be specified if desired), and the verniers are marked A and B. (See illustration. Page 57.) The figures are distinct and clear. The verniers are placed at an angle of 30 degrees, and can be read without changing the position of the engineer after sighting through the telescope. Glass covers protect the limb and verniers from exposure, and to make vernier reading easy we have added ground glass shades which cast a clear light on the verniers in any position. The graduations on our instruments are on brass, silvered, or on solid silver; the smoothness of surface makes the latter preferable, but it adds to the cost of the instrument.



#### THE TELESCOPE.

Particular attention is paid to the selection of lenses for the telescopes of our instruments. The object glasses are perfectly achromatic, well centered and polished as well as entirely free from spherical aberration. Good definition is thus obtained. The eye pieces are also well centered and mounted in the most approved manner. The object glass has a very large aperture and is focussed by rack and pinion, and is so placed on our telescopes as to be more easy of access by either hand than when placed on the side as shown by other makers. The eye piece is focussed by simply turning its head to the right or left in a screw-like manner. By our method of construction we are enabled to guarantee the line of collimation correct for all distances. It is unquestionably a great mistake on the part of the engineer to select a telescope of excessive magnifying power at the expense of light, flatness and size of field of view. In the telescope of our regular transits with an objective  $1\frac{1}{4}$  inch in diameter we obtain a power of 26 diameters, in our regular Wye Levels with objective  $1\frac{3}{8}$  inch in diameter a power of 32 diameters.

## SPIRIT LEVELS.

This important part of an instrument is sometimes treated as of secondary importance, though it is absolutely necessary to pay as much attention to a spirit level as to a telescope or a graduated circle. It is the pioneer that guides the engineer in all his horizontal and vertical measurements. And if the level is not sensitive and quick to respond and is not ground to an even curvature, so that the bubble will travel evenly and the same distance for every minute of arc to the extreme ends of the tube, an otherwise perfect instrument will not work well; whereas with good levels, instrumental errors may be corrected.

The level vials as applied to our instruments are all ground on our new machine, which not only shapes them to a perfect curve of any desired radius, but it also grinds the entire interior surface, making them completely symmetrical.

As to their sensibility, they are carefully selected in accordance with the use of the instrument for which they are intended.

## STADIA WIRES.

Of late years, the introduction of Stadia or Telemeter measurements has, with the aid of more powerful telescopes, met with fair success. Under certain conditions the Stadia will certainly supersede ordinary chaining, especially over rough ground, rivers, streams, etc., and where the distance of vision is not too great, good results may be expected. Adjustable wires being uncertain and subject to disturbance by changes of temperature, we recommend fixed wires, so placed that they will cover an exact space of one foot at 100 feet distance.

The proper starting point for Stadia measurement is a point at a distance in front of the object glass equal to its focal length; this point will be found by measuring the distance from the face of the object glass to the center of the cross-wire screws.

The correct measurement thus found is a constant, and must always be added to the distance of observation.

We make an extra charge of \$3 for the fixed wires, when ordered with the instrument, and \$10 if the telescope is sent us for that purpose.

## GRADIENTER SCREW.

In place of the ordinary tangent screw usually applied to the vertical clamp movement, we can substitute a screw cut with the greatest precision, so that two revolutions shall equal one foot in 100 feet distance. The head of this screw is considerably larger than that of the ordinary tangent screw, and is divided into fifty parts. Thus it follows that one revolution is equal to 50-100 of a foot in 100 feet distance. A small scale attached to the clamp, and divided to correspond to the pitch of the screw, records the number of revolutions made.

With proper care, grades can be established very rapidly, and horizontal distances, vertical angles and difference of level measured accurately.

We consider this attachment as one of great importance and almost indispensable in practical engineering, and we have no doubt that it will be appreciated by engineers when accustomed to its use.

We make an extra charge of \$5.00 for this attachment.

## CLAMP AND TANGENT SCREWS.

The clamps act entirely on the centers, both plates are free from any strain when clamped, and the levels are unaffected. This construction allows the plates to be fitted so closely as to make the entering of dust and grit between them impossible. The tangent screws consist of a single screw, made of Phosphor bronze, and an opposing spiral spring to take up the lost motion. The motion thus produced is perfectly smooth, and will not be destroyed even if the screw should get injured.

The position of the clamp and tangent screws is such that they are very accessible, but still well protected from possible injury. The tangent screw on our Levels is attached to the cross bar, and the clamp revolves with it and is always in the same relative position.

## GENERAL CONSTRUCTION.

In regard to the general construction of our instruments, the dead weight is removed wherever it is shown to be not essential to the stiffness of the instrument; but we have at the same time strengthened the parts most likely to be injured by an accident or fall. Thus the base of the standards, the vernier plate and circle, the parallel plates for leveling screws, the telescope axis, the flanges of centers, cross-bar of level, etc., are made especially rigid and provided with ribs. (See illustrations.) Instead of finishing the smaller pieces of an instrument separately and then joining them with small screws, or solder, each screw or joint being a weak place in an instrument, we have adopted the opposite principle (at an increased expense to us), and aim to unite as many pieces as possible in a single casting which casting, by means of ribs is made as light as consistent with strength.

We also call attention to the exceptionally hard bell-metal used for our centers and telescope axis, which are long and unyielding, and the remaining parts are of a composition metal, which is itself harder than hammered brass, used ordinarily for centers, etc. Experience has proven that soft or hammered yellow brass is unfit for a good field instrument, since it is more liable to fretting and yielding generally, and in the hammered state its unequal expansion and contraction at different temperatures may be so marked as to impair the reliability of the adjustments.

Our form of tripod is shown on page 57.

## THE FINISH.

It is a well-known fact that the black finish has one objection. It absorbs the heat readily, and therefore is apt to expand an instrument unequally, and thereby deranges its adjustments. We therefore consider it necessary to finish certain parts of an instrument in a bright but **not glaring** finish—including the upper plate, the standards and the telescope in the transit; the cross-bar and the telescope in the wye level, etc. All other portions may be finished and bronzed before lacquering. This finish gives a very fine appearance to the whole instrument; it wears better than black, and is in better taste.

Customers desiring to have their instruments finished entirely in bronze, however, can do so by notifying us of their wishes.

## ALOE'S ENGINEERS' TRANSITS.

### DESCRIPTION.

Aloe's Engineers' Transits No. 2300-2307 are the usual size used in all ordinary work. They are designed for high class engineering such as is required in Bridge Building, City and Land Surveying. The diameter of the horizontal limb is seven inches with two double verniers reading to 30 seconds, or single minutes as desired. The verniers on all instruments carried in stock are placed at an angle of 30 degrees to line of sight. The graduation has two rows of figures in opposite directions from 0 to 360 degrees. Verniers and graduation are protected with fine plate glass and to facilitate the reading of the graduations, ground glass shades are placed over the vernier openings. The magnetic needle is  $4\frac{1}{2}$  inches long. Shifting center to set the instrument exactly over a given point. The telescope is  $11\frac{1}{2}$  inches long, is balanced and reverses at both ends with dust proof guard over object slide, and has lenses of the finest quality, accurately centered, having a power of 26 diameters and a very flat field. The Level vials are ground very sensitive. Our new clamp and Tangent movement is a decided improvement over the old style, they clamp directly to the center of the instrument, thereby avoiding all springing and lost motion.

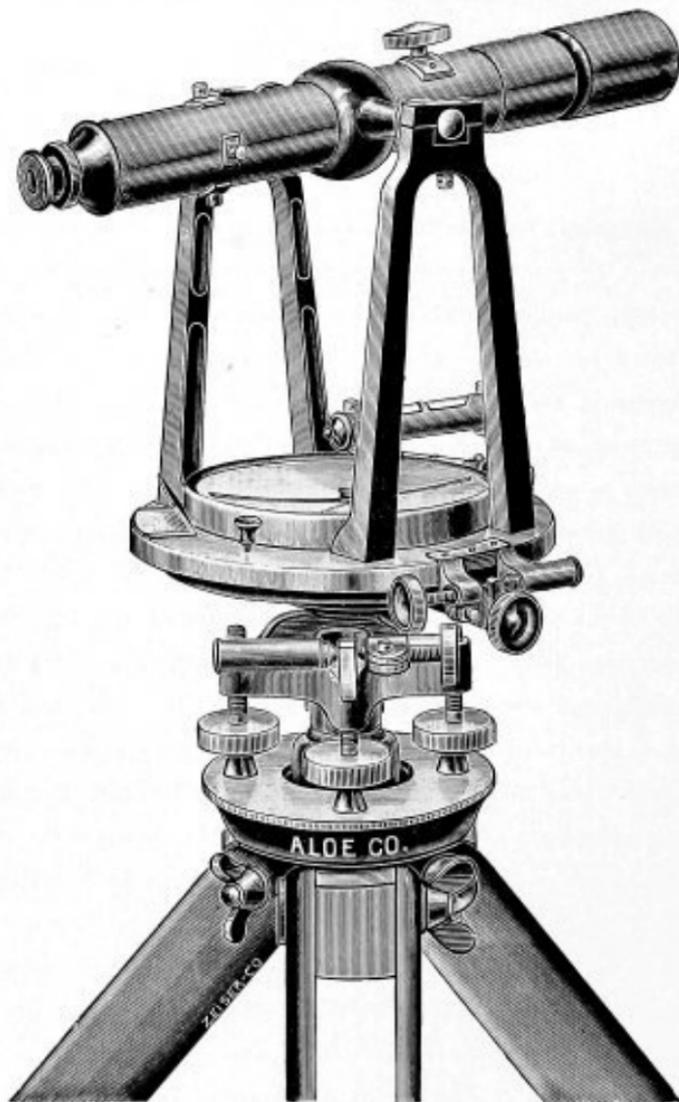
The tripod head as now made by us is one single casting, the lugs are of extra width and are cast hollow with a hub left in the center giving ample bearing for the bolts which fasten the tripod legs.

The legs are made of well seasoned cherry hardwood, the upper portion being split with a tongue inserted at the top to guard against splitting of the leg. THE BOLTS ARE PROVIDED WITH THUMB NUTS. (See illustration, page 57.)

The instrument is securely packed in a nicely finished cherry-wood box, which is provided with a strong leather strap, lock, etc., and contains sunshade, plumb bob, magnifying glass, screw-driver and adjusting pins.

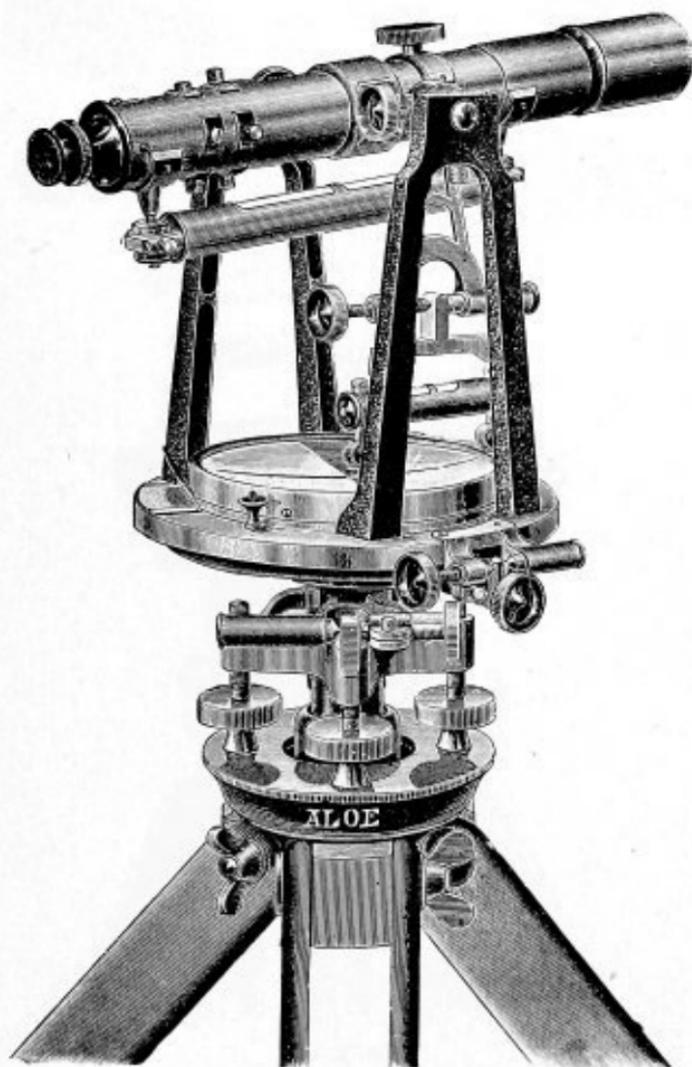
Weight of the Engineers' Transit with tripod complete about 20 pounds.

## ALOE'S ENGINEERS' TRANSIT PLAIN.



No. 2300.

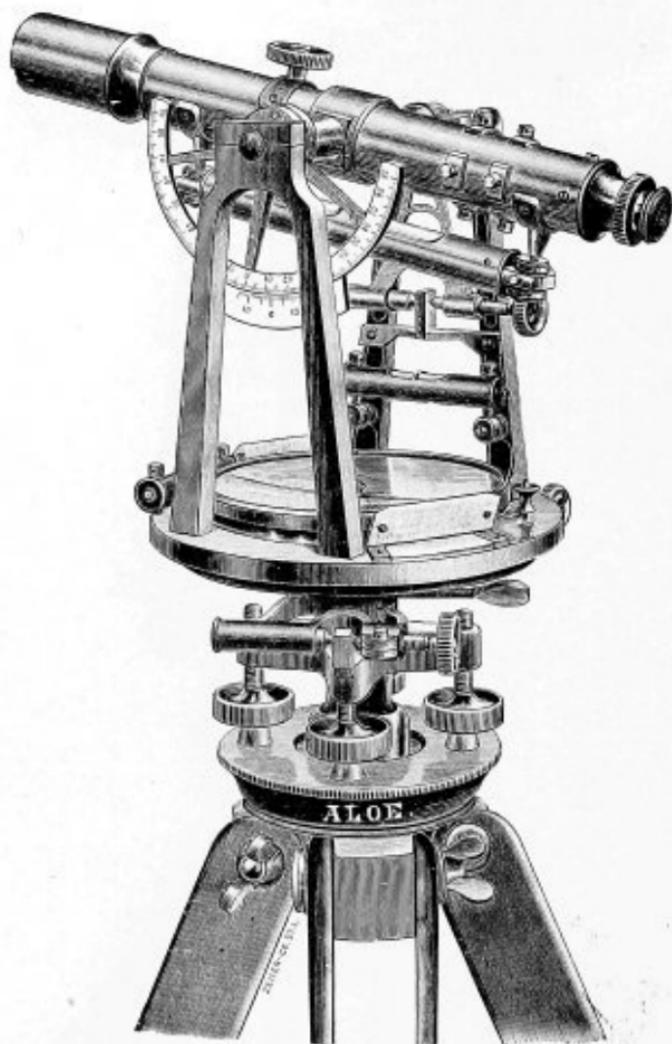
- No.
- 2300—Aloe's Engineers' Plain Transit, as described on page 61, with graduations on brass, silvered, complete in box with Tripod, Plumb-Bob, Sunshade, Screw-Driver, Magnifying glass and Adjusting Pins.....price, \$165 00
- 2301—Aloe's Plain Engineers' Transit, same as No. 2300, but graduation on SOLID silver.....price, 175 00

**ALOE'S ENGINEERS' TRANSIT WITH LEVEL.**

No. 2302.

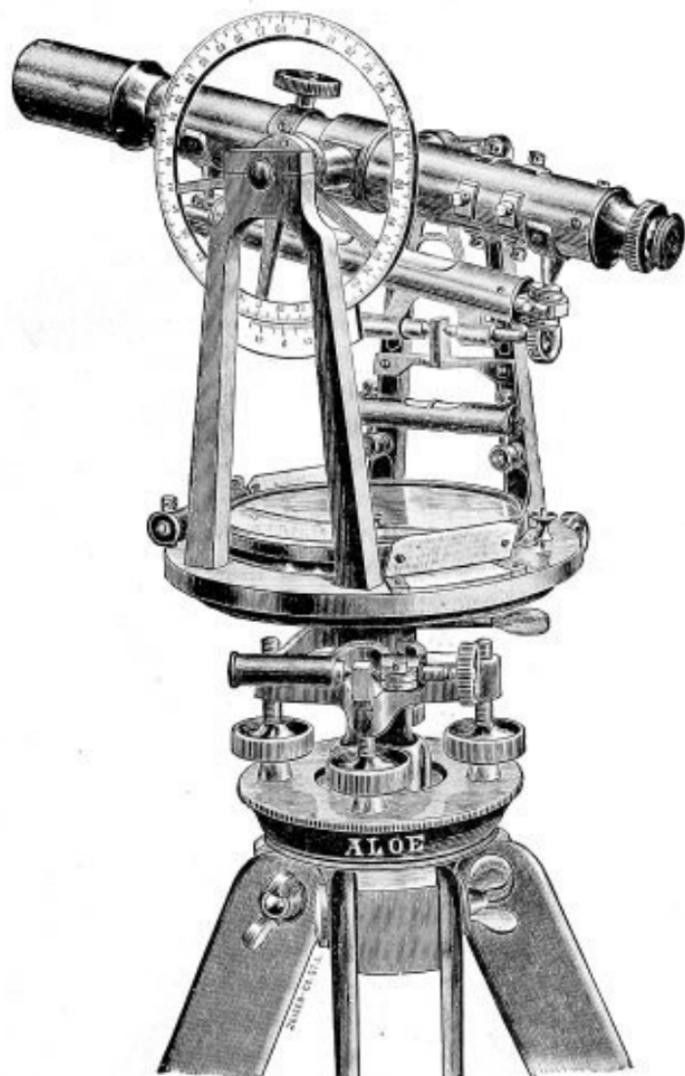
For Description, see page 61.

- No.  
 2302—Aloe's Engineers' Transit, with Level attachment and Clamp and Tangent, graduations on Brass, Silvered, complete in box with Tripod, Plumb-Bob, Sunshade, Magnifying Glass, Screw-Driver and Adjusting Pins.....price, \$175 00  
 2303—Aloe's Engineers' Transit, same as No. 2302, but Graduations in Solid Silver.....price, 185 00

**ALOE'S ENGINEERS' TRANSIT, WITH LEVEL AND ARC.**

No. 2304.

- No.  
 2304—Aloe's Engineers' Transit, with Level and Clamp and Tangent, with five-inch Vertical Arc with Vernier Reading to single minutes, graduations on Brass, Silvered, in Box with Tripod, Plumb-Bob, Sunshade, Magnifying Glass, Screw-Driver and Adjusting Pins.....price, \$185 00
- 2305—Aloe's Engineers' Transit, same as No. 2304, but graduations on Solid Silver.....price, 200 00
- For full description of Transits see pages 56 to 61.

**ALOE'S ENGINEERS' TRANSIT, COMPLETE.**

No. 2306.

- No.
- 2306—Aloe's Engineers' Transit, with Level and Clamp and Tangent, with five-inch Vertical Circle with Vernier Reading to single minutes, graduations on Brass, Silvered, in Box with Tripod, Plumb-Bob, Sunshade, Magnifying Glass, Screw-Driver and Adjusting Pins.....price, \$190 00
- 2307—Aloe's Engineers' Transit, same as No. 2306, but graduations on Solid Silver.....price, 205 00
- For Extra Attachments to Transit see pages 68 to 70-76.

**ALOE'S ENGINEERS' TRANSIT, COMPLETE WITH SOLAR.**No. 2307  $\frac{1}{4}$ .

- No.  
 2307  $\frac{1}{4}$ —Aloe's New Model Engineers' Transit, similar to No.  
 2304, with addition of Saegmueller Solar attachment No.  
 2309 ..... price, \$240 00
- 2307  $\frac{1}{2}$ —Aloe's New Model Engineers' Transit, similar to No.  
 2305, with addition of Saegmueller Solar attachment No.  
 2309 ..... price, 265 00

**ALOE'S TOPOGRAPHICAL THEODOLITE.**No. 2307  $\frac{3}{4}$ .

The above illustration shows a form of Theodolite made by us for the Mississippi River Commission, of this city, as per the specifications of Mr. J. A. Ockerson, Engineer in charge, and is undoubtedly the best form of instrument for this class of work yet made.

**DESCRIPTION.**

Horizontal circle,  $6\frac{1}{4}$  inches (edge of graduation); two double verniers reading to half minutes, placed at an angle of 30 degrees to line of sight; two rows of figures in opposite directions from 0 to 360 degrees; figures on limb and verniers are inclined in the direction they should be read; verniers and graduations are protected with fine plate glass; all graduations on solid silver; magnetic needle  $4\frac{1}{2}$  inches; adjustment for vertical plane of telescope, improved spring tangent screw; improved lower tangent screw; shifting center to set the instrument exactly over a given point. The telescope is provided with exceptionally fine lenses and is  $13\frac{1}{4}$  inches long, the objective having a clear aperture of  $1\frac{5}{16}$  inches, which qualifies it especially for stadia work; the object slide is protected with dust proof guard; the eye piece is inverting and is provided with an improved screw arrangement for the accurate focusing of cross wires; telescope is balanced with sun shade on; spirit levels ground and extra sensitive and are made extra long, being nearly three inches in length. Line of Collimation correct on all distances. This instrument is also provided with long compound centers, adjustable or fixed stadia wires, and 5-inch vertical circle with double verniers divided on solid silver, reading to half minutes. The vernier frame of the vertical circle carries a  $3\frac{1}{2}$ -inch level, by which a complete control of the position of its verniers is assured when vertical angles are measured. The standards on this instrument were  $4\frac{1}{2}$  inches high, but if higher standards were desired it would make no difference in the cost. The leveling screws are made with an adjustment to take up the wear on same. Instrument furnished with split leg tripod; fitted in mahogany box with strap, sun shade, screw-driver, plumb-bob, magnifying glass, adjusting pins, etc. . . . . Price, \$250.00

## ALOE'S TRANSIT THEODOLITE.



No. 2307  $\frac{3}{4}$ -A.

26 dia., showing objects erect, the object slide is provided with dust guard. Extra sensitive level to telescope, improved clamp and tangent screws. The vernier opening can be placed parallel to line of sight, or at right angles as shown in cut. The 5-inch vertical arc is provided with movable vernier and tangent screw.

- No.  
 2307  $\frac{3}{4}$ -A—Transit Theodolite as described and with fixed Stadia wires complete with Box, Tripod, etc. . . . . price, \$250.00  
 2307  $\frac{3}{4}$ -B—Transit Theodolite, same as above but with three leveling screws . . . . . price, 260.00

### Extras to Transit Theodolite.

Full 5 in. Vertical Circle, graduated on silver, reading to minutes. . . . .	\$15.00
Full 5 in. Vertical Circle, double verniers, reading to minutes. . . . .	25.00
Graduation on Horizontal Limb, reading to 20 seconds. . . . .	10.00
Graduation on 7 in. Horizontal Limb, reading to 10 seconds. . . . .	30.00
Reversion Level . . . . .	10.00
Striding Level . . . . .	15.00
Gradienter Screw . . . . .	5.00

This instrument has been designed for the highest class of engineering work, for use where instruments of ordinary construction fail to give satisfaction and where the highest degree of accuracy is desired. The telescope standard is of a new design, it is circular in form and is made of one solid casting, which still preserves the  $4\frac{1}{2}$ -inch compass needle to the instrument.

The uprights are well ribbed, which gives great lateral strength and permits the use of cylindrical bearings for the telescope axis; this assures to the telescope the most perfect motion in the vertical plane. The caps, which hold the telescope axis in its bearings, are provided with an adjusting screw with which the desired amount of friction can be applied so as to hold the telescope in any position, and are also so arranged to exclude all dust from the bearings.

The horizontal circle is  $6\frac{1}{4}$ -inch diameter, is graduated on silver, and is read by two double exactly opposite verniers to 30 seconds. The telescope is  $11\frac{1}{2}$  inches long, object glass  $1\frac{1}{4}$ -inch aperture, magnifying power

**ALOE'S CITY SURVEYORS' THEODOLITE.**

This instrument is a special design for city surveyor's use. Its leading characteristics are that it dispenses with the magnetic needle, which for this class of work is undesirable. The standards are cast in one piece and firmly attached to the alidade. The compactness of this instrument makes it much steadier in the wind and in the jarring of street traffic than it is possible to attain using the ordinary form of separate standards. The graduation of the plate levels represent one minute to one division of arc, the verniers are placed directly in line of sight, the telescope, which is 11 inches long, has a magnifying power of 28 diameters, the leveling attachment has a bubble graduated for 20 seconds for each division. This for sights less than 300 feet gives the nearest hundredth of a foot with certainty. For stadia work the telescope has fixed cross wires reading one per cent. The vernier arm for the vertical arc has a level attached which makes it possible to read the true vertical angle when the plate bubbles are from any cause disturbed.

No. 2307  $\frac{3}{4}$  F.

The graduation on vertical arc reads to single minutes and on horizontal limb, to 30 seconds; the diameter of horizontal limb is 6  $\frac{1}{4}$  inches. The whole instrument is thoroughly ribbed throughout so that while very strong it is not unreasonable heavy, weighing 14  $\frac{1}{2}$  pounds.

No.

2307  $\frac{3}{4}$  F—City Surveyors' Theodolite, complete with Box, Tripod, etc.

price, \$235.00

**Attachments for City Surveyors' Theodolite.**

Oblong compass .....	\$17.50
Adjustable stadia wires .....	7.00
Five-inch vertical circle with two double verniers reading 30"; attached reading glass; graduation well protected.....	17.50
Level attached to arm carrying the two double verniers of vertical circle.	15.00
Striding level bearing on axis.....	17.50
*Six-inch striding level over telescope instead of usual fixed level.....	25.00

\*The striding level over telescope can be attached either when the Telescope is normal or reversed.

## LIGHT MOUNTAIN AND MINING TRANSIT.

This Instrument has all the essential features of our Transit No. 2304. The difference being only in size and weight. It is designed for use where a lighter Instrument is desirable. All the parts are made with as great care as in the larger Instruments, and we can recommend it as a reliable and superior Instrument for the purpose intended.



No. 2308.

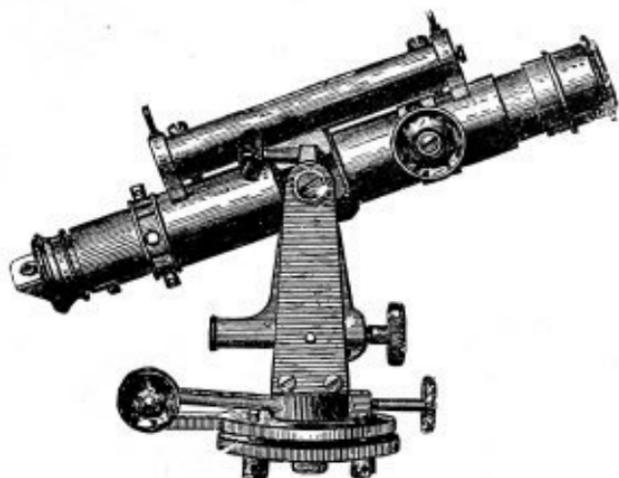
The dimensions are as follows: Horizontal limb, 5 inch, with graduations on Solid Silver, with two double Verniers reading to single minutes; 5 inch Vertical Arc with Clamp and Tangent, Level under Telescope; Magnetic Needle,  $3\frac{3}{4}$  inches long; Telescope, 9 inches, with a power of 20 diameters and an exceedingly flat field; Extension Tripod with Thumb Nuts; weight of Instrument, complete with Tripod about 16 pounds.

- No.  
 2308—Aloe's Mountain and Mining Transit, New Model, as described above (all graduations being on Solid Silver), in box with Plumb-Bob, Sunshade, Screw-Driver, Magnifying Glass and Adjusting Pins . . . . . price, \$200.00  
 2308  $\frac{1}{2}$ —Same as above, but graduations on Brass, silvered. . . . . price, 185.00

### Extras to Mountain and Mining Transit.

- |  |                |
|--|----------------|
| Side or Top Telescope . . . . .  | price, \$30.00 |
| 5-inch Full Vertical Circle, instead of Arc . . . . .                  | price, 5.00    |
| Offsetting arrangement . . . . .                                       | price, 5.00    |
| Stadia Wires, fixed . . . . .  | price, 3.00    |
| Stadia Wires, adjustable . . . . .                                     | price, 10.00   |
| Variation Plate . . . . .  | price, 10.00   |
| Improved Solar Attachment, No. 2309, as described on page 71 . . . . . | price, 50.00   |
| Reflection for Illuminating Cross Wires . . . . .                      | price, 3.50    |

## IMPROVED SOLAR ATTACHMENT.



No. 2309.

No.

2309—Represents the improved solar attachment as now made. It consists essentially of a small telescope and level, the telescope being mounted in standards, in which it can be elevated or depressed. The standard revolves around an axis, called the polar axis, which is fastened to the telescope axis of the transit instrument. The telescope called the "Solar Telescope" can thus be moved in altitude and azimuth. Two pointers attached to the telescope to approximately set the instrument are so adjusted that when the shadow of the one is thrown on the other the sun will appear in the field of view. The attachment can also be used as a vertical sighting telescope. Full directions for using this attachment furnished with each instrument.

No.

2309 —Saegmueller's Improved Solar Attachment.....price, \$50.00  
 2309 ½—Saegmueller's Improved Solar Attachment with Hour Circle..  
 ..... price, 60.00

We furnish other styles of Solar Attachments if desired.

See our list of Technical Works on pages 341 to 372 inclusive. The most complete, up-to-date list published.

## ALOE'S RECONNOISSANCE TRANSIT.

### Our Reconnaissance Transit

Is a light, portable Instrument for work requiring ordinary accuracy, and its price makes it a very popular Instrument.

It has a Needle  $3\frac{1}{2}$  inches long. Limb, 5 inches in diameter, reading by one double Vernier to single minutes. The Vernier is placed at an angle of 20 degrees to facilitate reading. Has our improved Clamp and Tangent to the Limb. The Telescope 9 inches long, has a power of 18 diameters, with long Level



No. 2321.

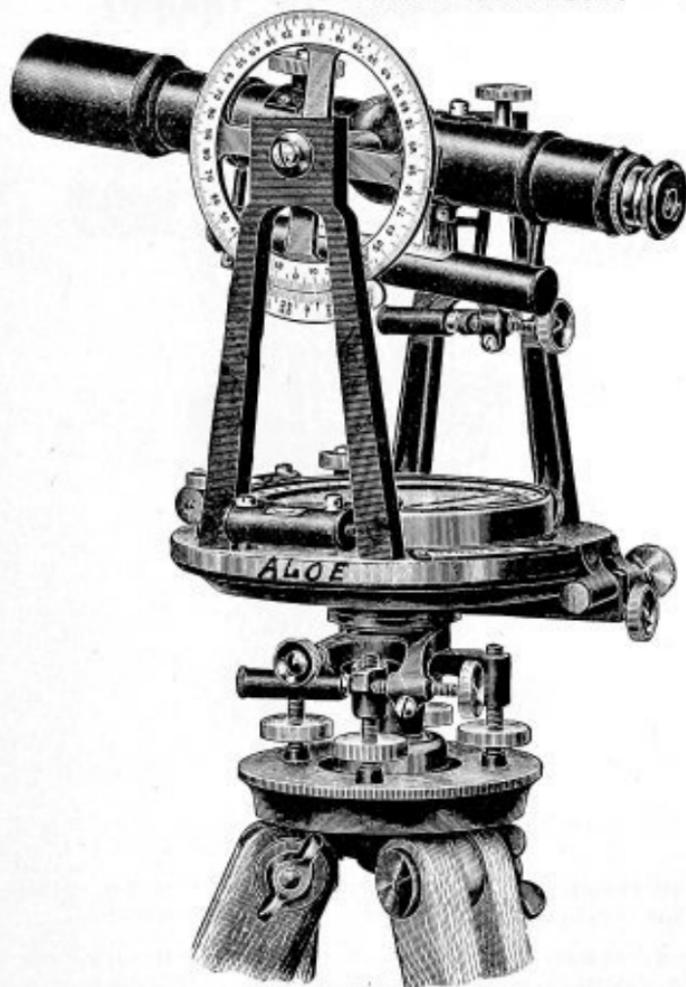
under same, with Vertical Circle reading two minutes, with improved Clamp and Tangent to Axis. The Compass Circle is arranged to set off the variation of the Needle, the movement being made by a pinion. It has a Leveling Head with a shifting center, and with Spring Clamp and Tangent, and the Instrument is set upon our light extension Tripod, the legs of which close up to about three feet long.

The weight of this Transit, without Tripod, is about 8 pounds; with Tripod complete, about 15 pounds.

No.

2321—Aloe's Reconnaissance Transit in box with Tripod—Sun-shade, Plumb-Bob, Magnifying Glass and Adjusting Pins. .price, \$115.00

## ALOE'S SURVEYORS' TRANSIT.

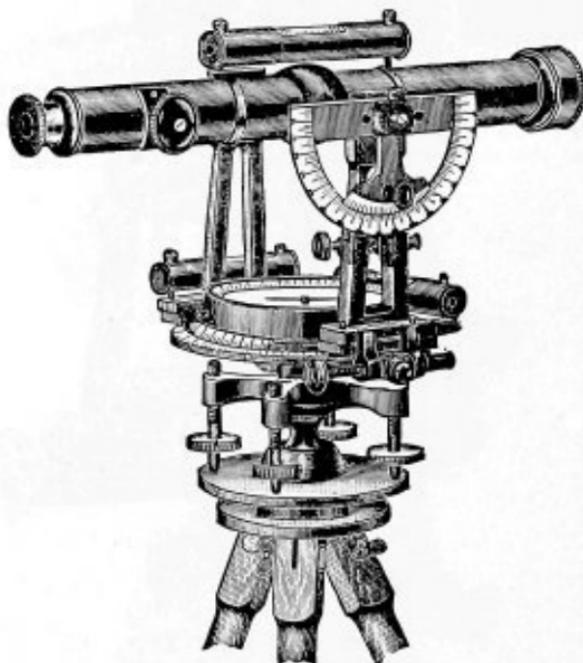


No. 2324.

The Surveyors' Transit has a needle  $4\frac{1}{2}$  inches long. Horizontal limb or plates are 7 inches in diameter with one double Vernier reading to single minutes. The Vernier is placed at an angle of 30 degrees to line of sight. The telescope is  $11\frac{1}{2}$  inches long. The compass circle is graduated to half degrees and has a Vernier for setting off the variation of the needle by Rack and Pinion. The leveling head has shifting center. Instrument has round leg tripod and is fitted in a cherry wood box, with a strong leather strap, lock, etc., and contains Sunshade, Plumb-Bob, Magnifying Glass, Screw-Driver and Adjusting Pins. Weight of Instrument about 14 lbs.

No.		
2322	—Surveyors' Transit Plain Telescope as described . . . . .	price, \$115.00
2323	—Surveyors' Transit with Level attachment and Clamp and Tangent to Telescope . . . . .	price, 130.00
2324	—Surveyors' Transit with Level attachment and Clamp and Tangent and Full Vertical Circle with Vernier reading to one minute . . . . .	price, 145.00

## ALOE'S ARCHITECTS' TRANSIT.



No. 2328.

This Instrument will do all that can be done with the regular Architect Level and has the following advantages over that Instrument.

Having a movable Telescope with Arc and Vernier it allows one to examine the walls of buildings in course of construction. Foundation walls can be leveled. Lines and Levels of a building given, and Vertical as well as Horizontal Angles taken. With this Instrument one can see if the building is on the line with stake tacks furnished by the surveyor. The Transit has also a Compass with a  $2\frac{1}{2}$  inch Needle. The Telescope is 11 inches long, of high power with 4-inch level on same. The Vertical Arc is 4 inches in diameter with the Vernier reading to  $2$  minutes; Clamp and Tangent to Axis of Telescope; Horizontal Circle 5 inches in diameter divided in single degree with Vernier reading to 2 minutes; Compass Box  $3\frac{1}{4}$  inches with Needle  $2\frac{1}{2}$  inches long. The Horizontal Plate is fitted with two Levels at right angles. Instrument packed in polished wood box with Tripod, Sunshade, Plumb-Bob, Screw-Driver and Adjusting Pin.

- No.  
 2327—Aloe's New Architects' Transit complete with Clamp and Tangent to Axis of Telescope.....price, \$70.00  
 2328—Aloe's New Architects' Transit, same as No. 2327, with Clamp and Tangent to Plates.....price, 75.00

## ALOE'S BUILDERS' TRANSIT.



No. 2329.

In the use of the Architects' Level it was often desirable to determine a point in a vertical plane either above or below the object observed, or to determine points on either side and in line with the center of the instrument, more conveniently than could be done with the Architects' Level. To meet this want we devised the Builders' Transit, shown in the cut. It has a telescope nine inches long, with long graduated level, clamp and tangent to the axis, a graduated limb reading by one double vernier to one degree, clamp and tangent movement to both limb and leveling-head, and plain tripod and trivet plate. The limb is figured in one row from 0 to 180 each way. The objective is moved by a rack and pinion and the eyepiece is focused by a spiral movement. In use the instrument is set up either upon the tripod or trivet, and the plate accurately leveled by the two levels shown upon it. The Builders' Transit, complete with tripod, weighs about 13 lbs.

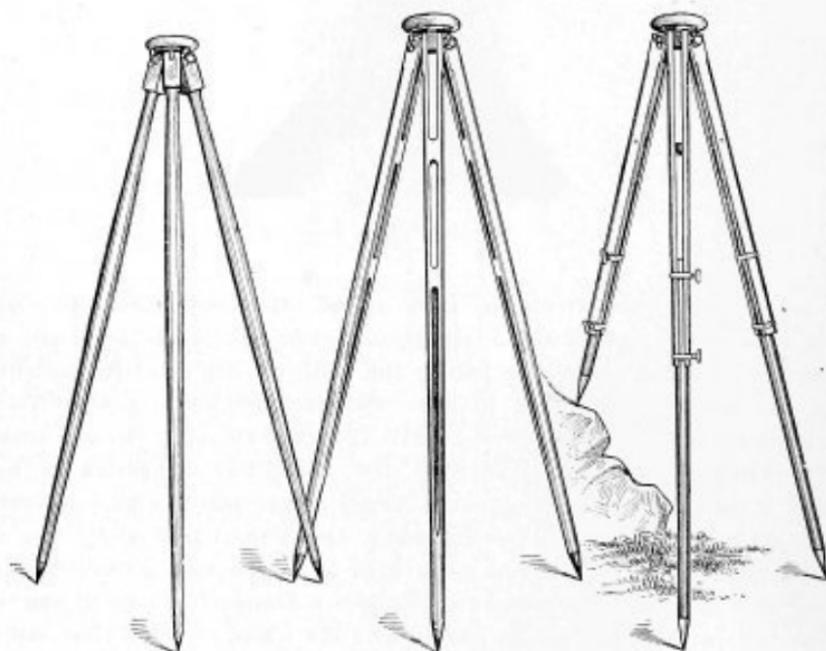
No.

- 2329—Builders' Transit, with level on telescope, clamp and tangent to telescope axis, limb and spindle, and with leveling-screws and tripod, as shown.....price, \$80.00
- 2329 ½—Builders' Transit, same as above, but with Vertical Circle with vernier reading, to two minutes.....price, 90.00

## Extras to Transits.

Graduation on horizontal circle, on solid silver.....	price,	\$10.00
Gradienter attachment .....	price,	5.00
Stadia wires, fixed .....	price,	3.00
Stadia wires, adjustable.....	price,	10.00
Arrangement for offsetting at right angles.....	price,	5.00
Variation plate .....	price,	10.00
Gossamer water proof bag, to cover transit or level.....	price,	1.00
Bottle of fine watch oil to lubricate the centers, etc., of transit....	price,	.25
Quick leveling arrangement .....	price,	10.00
Leather cover over case, to be strapped to the saddle of a horse....	price,	10.00
Reversion Level .....	price,	10.00
Guard for Vertical Circle.....	price,	4.00
Saegmuller Solar Attachment put on Transits.....	price,	50.00

## TRIPODS.



No. 2329 1/2 A

No. 2329 1/2 C.

No. 2329 1/2 D.

No.

2329 1/2 A—Solid Leg Tripod, hardwood, for Levels and Transits... each,	\$10.00
2329 1/2 B—Solid Leg Tripod, hardwood, light, for Architects' Levels... each,	6.00
2329 1/2 C—Split Leg Tripod, hardwood, for Levels and Transits... each,	12.00
2329 1/2 D—Extension Tripod, hardwood, for Levels and Transits... each,	15.00
2329 1/2 F—Solid Leg Tripod for Compasses..... each,	6.00
2329 1/2 H—Jacob Staff for Compasses, Iron Shoe..... each,	1.25

## GURLEY'S TRANSITS.

Manufactured by W. & L. E. Gurley.

We keep in stock the leading and most popular instruments of these well known manufacturers. Any orders for their instruments will be filled without delay. All instruments guaranteed as represented.

For price list of Gurley Levels, see page No. 86.



No. 2331.

No.		
2330	Gurley's Engineers' Transit, two verniers to limb, 5-inch needle, plain telescope . . . . .	price, \$150.00
2331	Gurley's Engineers' Transit, two verniers to limb, 5-inch needle, with level under telescope and clamp and tangent movement to axis of telescope . . . . .	price, 168.00
2332	Gurley's Engineers' Transit, two verniers to limb, five-inch needle with 4½-inch vertical circle on silver, reading with vernier to single minutes, level on telescope with ground bubble and scale, and clamp and tangent movement to axis of telescope . . . . .	price, 180.00
2333	Gurley's Surveyors' Transit, two verniers to limb, 5-inch needle, plain telescope . . . . .	price, 130.00
2334	Gurley's Surveyors' Transit, two verniers to limb, 5-inch needle, with level on telescope and clamp and tangent movement to axis of telescope . . . . .	price, 148.00
2335	Gurley's Surveyors' Transit, 5 or 5½-inch needle, with 4½-inch vertical circle on silver, reading with vernier to single minutes, level on telescope with ground bubble and scale, and clamp and tangent movement to axis of telescope . . . . .	price, 160.00
2336	Gurley's Surveyors' Transit, one vernier to limb, 5-inch needle, plain telescope . . . . .	price, 115.00
2337	Gurley's Surveyors' Transit, one vernier to limb, 5-inch needle, with level on telescope and clamp and tangent movement to axis of telescope . . . . .	price, 135.00
2338	Gurley's Surveyors' Transit, same as 2337 but with addition of 4½-inch vertical circle and vernier . . . . .	price, 145.00
2339	Gurley's Light Mountain Transit, 4-inch needle, magnetic variation plate, two verniers to limb, telescope of finest quality with 4½-inch vertical circle, level on telescope, clamp and tangent to axis of telescope . . . . .	price, 180.00
2340	Gurley's Light Mountain Transit, No. 2339 with Solar Attachment, complete . . . . .	price, 245.00

## THE VERSCHOYLE POCKET TRANSIT

(Patented)



No. 2342.

This Instrument combines the useful features of the Abney Level, Prismatic Compass and Clinometer, and was designed by a mining engineer of practical experience in the use and possible application of the various forms of instruments intended for preliminary survey.

Owing to its novel construction, only one observation is necessary to obtain both the magnetic bearing and the vertical angle of any distant point. It is also specially adapted for use in difficult positions, such as are always liable to occur in filling in the rougher details in a mining survey.

To use the instrument for obtaining horizontal and vertical angles, after freeing the needle and unfolding the arm, grasp the compass box in the left hand, and then with the extended fingers of the right hand lightly grasp the arm and bring the distant target or light to the intersection of the cross lines at the end of the arm. When holding the arm firmly in that position, with the left hand slightly revolve the compass box until the small level bubble is seen through the prism to be at the central mark. The magnetic bearing will now be plainly visible in the prism at the same time that the target is viewed along the sight line, and the angle of depression or elevation is automatically recorded on the vertical arc. Both readings can then be booked at the same time without further observation.

To use the instrument as a clinometer, lay the bottom side of the arm on the object to be observed, and looking through the window at the top of the compass box slightly revolve the box until the small bubble comes to the center. The angle may then be read off the vertical arc.

Should it be necessary to alter the relative position of the divided ring and the magnetic needle, this can be accomplished by removing the cover and altering the position of the needle immediately under the divided ring. Adjustment for magnetic variation may be obtained in this manner, without liability to disturb other adjustment.

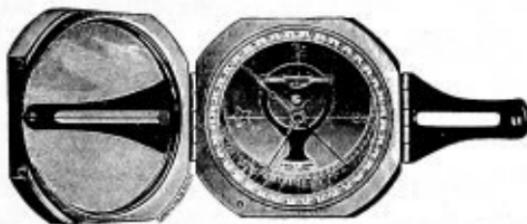
Designed as a thoroughly serviceable instrument, it is constructed to withstand rough usage and is not liable to derangement or deterioration. There are no reflectors or mirrors used other than the prism, which is protected and fastened in a secure manner.

No. 2342—Verschoyle Transit, bronzed brass, 3  $\frac{3}{8}$  in. diam., needle about 2  $\frac{1}{2}$  in., aluminum ring graduated to half degrees, arc giving vertical angles graduated to degrees. Weight of instrument about 15 ounces, in leather sling case. . . . each, \$40 00

No. 2343—Same as 2342 with Block and Angle piece and metal extension tripod. . . . . 50 00

**THE BRUNTON PATENT POCKET TRANSIT.**

Case of Aluminum,  $2\frac{3}{4} \times 2\frac{3}{4} \times 1$  inch. Weight, 8 ounces.



Cut about one-half size.

A complete, accurate and reliable pocket instrument for the taking of topography and preliminary surveys of every description, either on the surface or underground; thus taking the place of a sighting compass, clinometer, prismatic compass and Abney level, and combining them as it does in one light and handy instrument.

No.

2345—Brunton Mine Transit.....each, \$25.00

**REPAIRS OF SURVEYING INSTRUMENTS.**

As our location requires us to repair all the various makes of instruments in the country while Eastern establishments, as a rule, only repair their own, we were obliged to procure all the material, patterns, tools, etc., necessary for these. Having the patterns for all those parts which often want to be replaced when injured by falls, such as the axis to the Telescope, Centers, etc., Object Glasses and Eye-Piece Lenses of any desired focus; Level Vials of every diameter and length; we are prepared to do the work as economically and promptly as the maker himself can do it. By sending their Instruments to us the Western and Southern Engineers, and Surveyors will save several days' time and from two to three dollars expressage.

Repairs to Instruments injured by accident are generally more serious than the Engineer supposes, and usually the cost of these repairs exceed the anticipated amount. There are several reasons for this. Breakage of parts is evident to the Engineer, and he generally attributes the whole cost of repairs to this alone, whereas these evident breaks form the lesser portion of cost, the greater cost being in points only developed by more critical examination, and of which he has no idea. None but those familiar with repairing can realize the time consumed in removing what appears a trivial fault, but which the correct working of Instrument requires to be thoroughly eradicated. When we

## REPAIRS OF SURVEYING INSTRUMENTS.

### CONTINUED.

consider the severe tests to which the various fittings of the Instrument are subjected, by means of the graduations, of the Level, and of the Telescope, the necessity for repair, as near perfection as possible, regardless of time consumed, becomes evident, and the cost of these repairs explained. What may be termed, in contradistinction to the Engineer's adjustment, the Instrument Makers' adjustment, which consists in placing all parts of the Instrument correctly together, so as to work smoothly, detecting any points which may be wrong, seeing that no part is strained, that the Needle, Verniers and Plates are properly centered, etc., cannot be conscientiously and well performed in the Transit under a cost of \$5.00; and in a Level under \$3.00. These are independent of cost of repairs, which are charged according to time consumed.

In course of repairs, points of injury not apparent to the Engineer develop themselves, and those which appeared trifling, because of their minor importance, become serious when the more prominent are corrected; so that it happens that Instruments are frequently sent to be repaired at certain points, and yet when these points are repaired, the Instrument is almost, if not quite, as useless as before. We have adopted, as our rule, to thoroughly examine and repair every Instrument sent, believing it most satisfactory and economical to the Engineer, and feeling assured the result is in all cases beneficial and in the end satisfactory.

We can furnish estimates of cost of repairs, if Instruments are sent us.

Instruments sent for repairs should be carefully packed. They are at times much injured in coming to us for want of this care.

Place in box address of party sending and memoranda of points which engineer considers require attention, though not necessary, may be of advantage. It is advisable to place our name in full; but "Aloe, Instrument Maker, St. Louis," will secure safe arrival.

Tripods need not be sent, unless of a special pattern.

Always send the "Ball Spindle" with Compasses.

For prices on repairs see next page.

## PRICES OF PARTS OF INSTRUMENTS LIABLE TO LOSS OR INJURY.

### FOR TRANSITS.

Needle and Center Pin.....	\$ 3.50
Ground Glass Level Vial, for plate or standard, and setting.....	each, 1.00
Ground Glass Level Vial, brass mounted, complete, for plate or standard .....	each, 3.00
Ground Glass Vial, for telescope, and setting.....	each, 3.00
Cap, for eye piece or object glass.....	each, 1.00
Shade, for object glass.....	1.00
Clamp Screws, for horizontal limb.....	each, 1.00
Tangent Screw, for leveling head.....	2.00
Clamp Screw, for leveling head.....	1.00
Leveling Screw, for leveling head.....	each, 1.75
Eye Piece, complete .....	6.00
Object Glass, complete .....	6.00
Regraduating Compass Circle.....	6.50
Regraduating Horizontal Limb and Verniers of Transit.....	12.00
Regraduating Vertical Limb and Verniers of Transit.....	6.00
Cross Wires .....	2.00
Cross Wires and Diaphragm.....	4.00
Stadia Cross Wires Fixed.....	5.00
Adjusting Pins .....	.10

### FOR Y LEVELS.

Ground Glass Level Vial.....	\$2.00 to \$ 5.00
Cap, for eye piece or object glass.....	each, 1.00
Clamp Screw, for leveling head.....	1.00
Tangent Screw, for leveling head.....	2.00
Leveling Screw, for leveling head.....	2.00
Eye Piece, complete.....	6.00
Object Glass, complete .....	6.00
Cross Wires .....	2.00
Cross Wires and Diaphragm .....	4.00

### FOR SURVEYORS' COMPASSES.

Needle and Center Pin.....	\$ 3.50
Ground Glass Level Vials and setting.....	each, 1.00
Ground Glass Level Vials, brass mounted, complete.....	1.75
Brass Cover, for compass of our make.....	2.00
Outkeeper .....	1.25
Staff Mountings, brass head (without spindle).....	3.00
Staff Mountings, steel point.....	1.00
Ball Spindle, fitted.....	2.00
Compass Sight Vanes .....	each, 3.00
Clamp Screw, for spindle or sight vane.....	.75
Tangent Screw, for moving vernier.....	2.00
Staff Mountings, complete, for pocket compass.....	\$3 90 to 5.00

### MISCELLANEOUS.

Tripod Heads, with bolts, for Engineers' Transit or Level.....	\$ 6.00
Wooden Cap, with brass screw plate, for tripod head.....	1.00
Glass Circle, for compass face.....	.75
Case, with lock and key and leather strap for Transit or Level.....	6.50
Case, with lock and key, and leather strap for Compass.....	5.00

**Repolishing Instruments.**—The cost of repolishing an instrument, involving of course, its complete readjustment, varies with the different kinds, but may be stated generally as follows:

Compasses, from .....	\$ 5.00 to \$10.00
Transits, from.....	15.00 to 25.00
Levels, from .....	12.00 to 18.00

These prices are in addition to the cost of repairs.

No additional charge is made for bronzing or blackening an instrument when repolished.

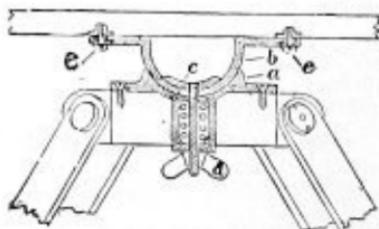
## ALOE'S PLANE TABLE.



No. 2355.

The construction of the socket and tripod head is here shown, in which (a) represents the hemispherical concave metal cup fastened by six screws to the wood top of the tripod, the upper or convex part (b) fitting nicely into the cup and clamped to it at will by the clamping piece (c) and nut (d); a strong spiral spring in the hollow cylinder between (c) and (d), serves to hold two spherical surfaces of the socket together, and allow of the easy movement of the one within the other in the leveling of the table.

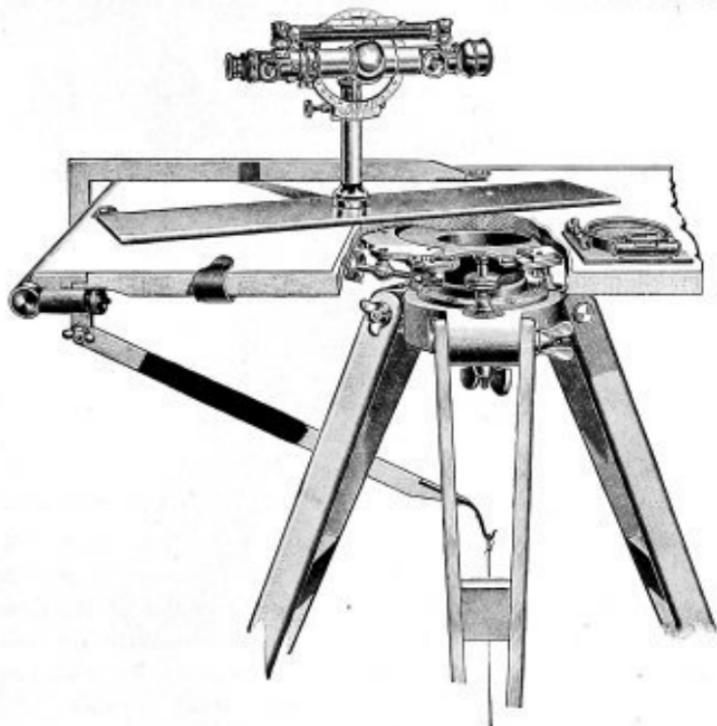
The flange of the socket (b) supports the table and is connected with its under surface by three segments of brass, two of which are shown at (ee); a milled head screw passing through one of these segments serves to clamp the board to the flange at will, thus allowing the Plane Table to be moved horizontally when desired.



- No.  
2355—Plane Table, board 24 x 30 inches, mounted on large tripod, with leveling socket and clamp, and with plumbing bar, plummet, and clamps for paper, combined compass and levels, with square base. Alidade, with telescope 8 inches long, power 20 diameters, with stadia, vertical circle to five minutes, level on telescope, and clamp and tangent, mounted on column as in engraving.....price, \$130.00

**ALOE'S PLANE TABLE.**

- 2356—Plane Table as described under No. 2355, but Alidade has a telescope 11 inches long with stadia,  $4\frac{1}{2}$ -inch vertical circle with vernier to 1 minute, level on telescope, and clamp and tangent on column; power of telescope, 24 diameters ..... price, \$150.00



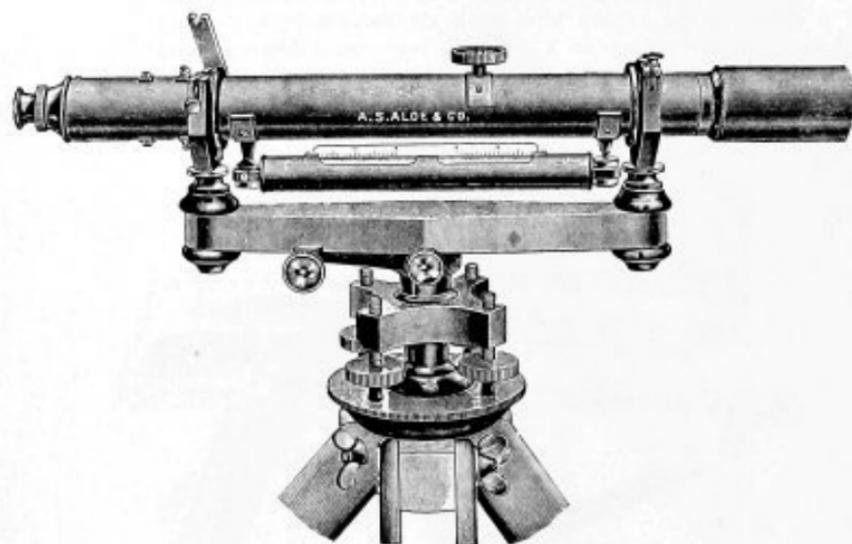
No. 2357.

The engraving shows a modification of the simple Plane Table described on page 82, there being added a tangent movement in Azimuth and three screws for leveling.

The board appears as cut away to show in detail the socket and leveling screws and tangent movement by which, as will be seen, a more delicate adjustment in Azimuth may be obtained than by the simple movement before described.

- No.  
2357—Plane Table, board 24 x 30 inches, mounted on large tripod, with leveling socket and clamp, and with plumbing bar, plummet, and clamps for paper, combined compass and levels with square base, Alidade, with telescope 11 inches long, with stadia,  $4\frac{1}{2}$  inches vertical circle vernier to one minute level on telescope, and clamp and tangent column. Power of telescope, 24 diameters; set of 3 leveling screws and tangent for movement in Azimuth..... price, \$170.00
- 2358—Set of 3 leveling screws to Plane Tables, Nos. 2355 and 2356 ..... price, 10.00
- 2359—Clamp and tangent for movement in Azimuth to Plane Tables, Nos. 2355 and 2356..... price, 10.00

## ALOE'S ENGINEERS' WYE LEVEL.



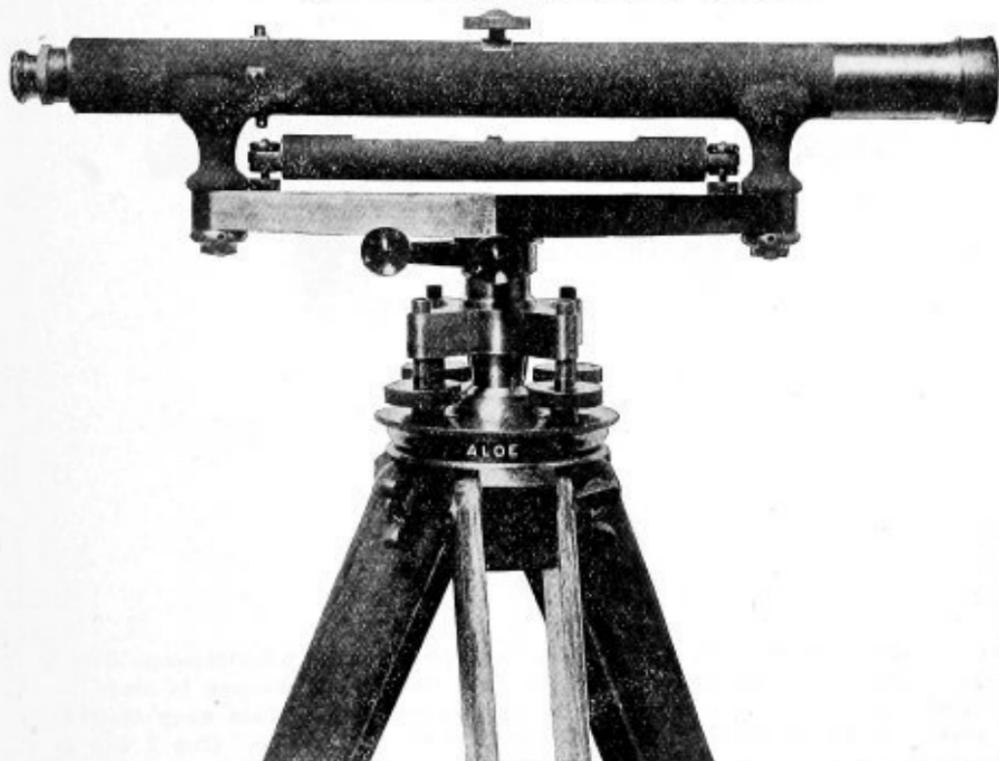
No. 2380.

The illustration given above is that of our 18-inch Engineers' Wye Level, which is provided with a powerful telescope aperture of object glass  $1\frac{3}{8}$  inches in diameter, giving a power of 36 diameters. The eye piece is provided with an improved screw arrangement for the accurate focussing of the cross-hairs. The telescope is provided with an adjustable stop to readily set cross-wires horizontal and perpendicular, line of collimation true on all distances. The telescope is balanced each way from the center when focused to a mean distance, with sunshade attached to it to secure the highest accuracy attainable. The telescope rings and the center are very stout, long and of the hardest bell metal. The wyes are our improved model which will be found the strongest and most convenient made. There being no pins to get lost and the clips cannot possibly get loose. The cross bar is cast hollow and ribbed. The level is 8 inches long and very sensitive. The instrument complete is not separable when put into its box. We believe this to be necessary to protect one of the essential adjustments of the level, the adjustment of the wyes, from needless drangement.

No.	
2380	—Aloe's 18-inch Wye Level, in box, with split leg tripod, sunshade, screw-driver and adjusting pins.....price, \$110.00
2381	—As above, with 20-inch telescope.....price, 112.00
2382	—As above, with 22-inch telescope.....price, 115.00

### Extras to Engineers' Y Level.

Center of instrument made of steel, and hardened.....price,	\$10.00
Stadia Wires, fixed .....	price, 3.00

**ALOE'S ENGINEERS' DUMPY LEVEL.**

No. 2383.

The illustration as shown above represents the style of Dumpy Level as made by us, for general reconnoissance, water-works and railroad engineering. Its compactness and simplicity will secure a better maintainance of its adjustments, and with proper care and thorough adjustments will yield as good results as may be obtained with the regular Wye level. To prevent unnecessary wear upon the centre when carrying on the shoulder, we attach a clamp and tangent movement.

The above instrument shows an erecting telescope 18 inches long; the object glass has an aperture of  $1\frac{3}{8}$  inches, and a magnifying power of 36 diameters. When ordered with an inverting telescope, the same will be 16 inches long and have a power of 40 diameters.

We finish the telescope cloth finish usually, but can finish any style desired, same price.

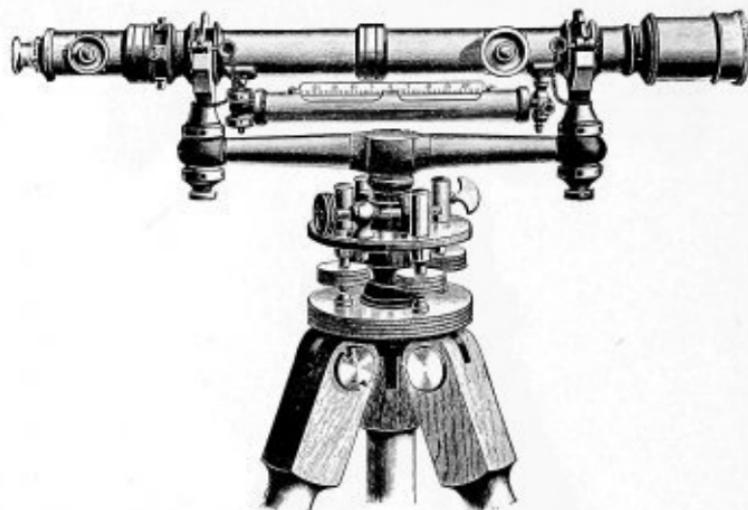
No.  
2383—Engineers' Dumpy Level 18-inch telescope in box with split leg tripod, sunshade, screw-driver and adjusting pins. price, \$110.00

**Extras to Dumpy Level.**

Centre, made of hardened steel .....	\$ 10.00
Fixed stadia wires .....	3.00
Gossamer water-proof cover.....	1.00
Mirror to facilitate the reading of the bubble, without changing the position of the observer.....	10.00

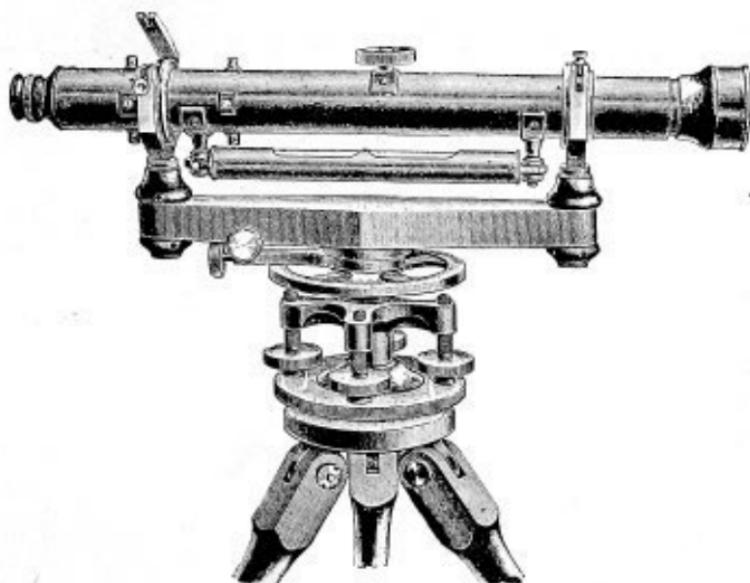
**GURLEY'S ENGINEERS' WYE LEVEL.**

Manufactured by W. &amp; L. E. Gurley.



Y Level, of the most improved form and construction, with telescope either 15, 18, 20 or 22 inches long. In this instrument the telescope is made to revolve readily and truly in the Y's by rings of bell metal, which when desired, may be firmly clamped by the clips and held in any position. One Y clip is furnished with a horizontal stud fitting into a semi-cylindric cut on the flange of the ring of the telescope, insuring the accurate position of the horizontal cross wire. It has a rack and pinion movement to both object and eye glasses, an adjustment for centering the eye piece and another for insuring the accurate projection of the object glass in a straight line. Both of these are completely concealed from observation and disturbance by a thin ring which slides over them. The Y's of this Level are made large and strong, of best bell metal, and each has two nuts, both being adjustable with the ordinary steel pin. The level bar is made round, of fine bronze, and shaped so as to possess the greatest strength in the parts most subject to sudden strain. The leveling plates are the same as those used with the Engineers' Transit. The tangent movement of the leveling head is now made with an opposing spring. Stadia wires are furnished with any of our Y Levels, free of charge, if desired.

No.	
2385	Gurley's Y Level, 15-inch telescope, with round leg tripod . . . \$ 90.00
2386	Gurley's Y Level, 18-inch telescope, with round leg tripod . . . 110.00
2387	Gurley's Y Level, 20-inch telescope, with round leg tripod . . . 110.00
2388	Gurley's Y Level, 22-inch telescope, with round leg tripod . . . 115.00
2389	Gurley's Patent Extension Tripod, instead of regular tripod, extra . . . 5.00
2392	Gurley's Split Leg Tripod, instead of regular tripod, extra . . . . . 5.00
2393	Gurley's Quick Leveling Attachment, when ordered with new instrument, extra . . . . . 6.00

**ALOE DITCHING LEVEL.**

No. 2396.

This new model of Level was designed to meet the demand for a good instrument, low priced, for ordinary work, such as building, draining and ordinary leveling, and has been found to admirably meet the requirements for which it is designed. It is primarily a superior Architect Level, but able to do at the same time very accurate leveling work. It has a telescope 15  $\frac{1}{2}$  inches long, and is provided with four leveling screws with radial clamp and compensating tangent screw. The level vial is 6 inches long; horizontal circle 4  $\frac{1}{4}$  inches in diameter, graduated to single degrees and is read by vernier to five minutes.

No.

- 2396—Aloe's Ditching Level, complete, in box, with tripod, sunshade and adjusting pins.....price, \$ 75.00
- 2398—Aloe's Ditching Level with Compass, complete in box, with tripod, sunshade and adjusting pins.....price, 85.00

For cost of Repairs, see page 81.

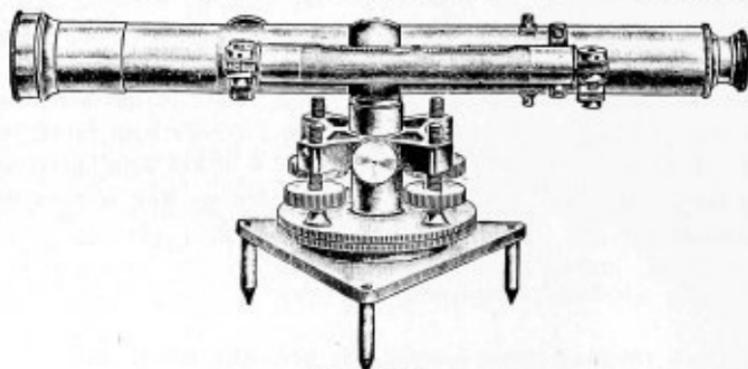
## ALOE'S ARCHITECTS' LEVEL WITH COMPASS.



No. 2399.

Architects' Level with Compass, is similar in construction and size to the Architects' Level No. 2402, but is fitted with a compass with 3-inch needle, so arranged that it adds practically nothing to the weight or bulk, while its value in many kinds of work is obvious.

- No.  
 2399—Architects' Level, with Compass, complete with tripod and trivet .....price, \$60.00  
 2400—Same as No. 2399, but with tangent screw.....price, 65.00

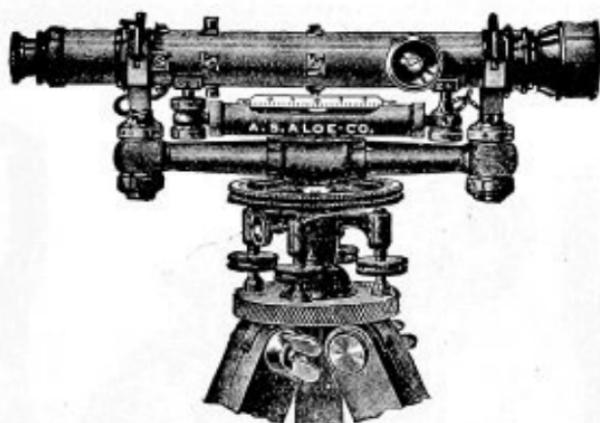


No. 2401.

An excellent instrument for work which does not require great accuracy, such as ditching, draining, road-leveling, etc. **Achromatic terrestrial telescope**, 11 inches long, object-glass  $1\frac{1}{8}$ -inch with rack-movement, spirit level graduated on the glass. The **eye-piece** is adjustable, to focus the cross-hairs. Instrument complete, with metal trivet, plumb-bob, etc., in strong box and hardwood tripod.

- No.  
 2401—Drainage Level, complete.....price, \$35.00

## ALOE'S IMPROVED ARCHITECTS' LEVEL.

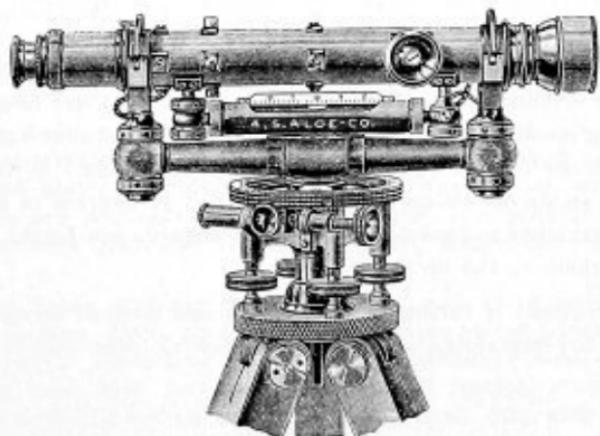


No. 2402.

The above cut illustrates our Architects' Level. It has a telescope 11 inches long, magnifying power 18 dia. and is provided with four leveling screws and clamp to spindle. The horizontal circle is 3 inches in diameter. It is graduated to degrees numbered from 0 to 90 each way, and has a vernier to read to 5 minutes. The telescope is of good definition and is focused by rack and pinion. The eye piece turns in a screw-like manner to enable precise focusing of the cross hairs. The bubble is 5 inches long and is graduated to facilitate leveling up. The instrument packs whole and stands in box erect. The box is provided with leather strap and contains a plumb-bob, adjusting pins, sunshade and metal trivet.

No.

2402—Architects' Level, complete, with tripod and trivet.....price, \$45.00



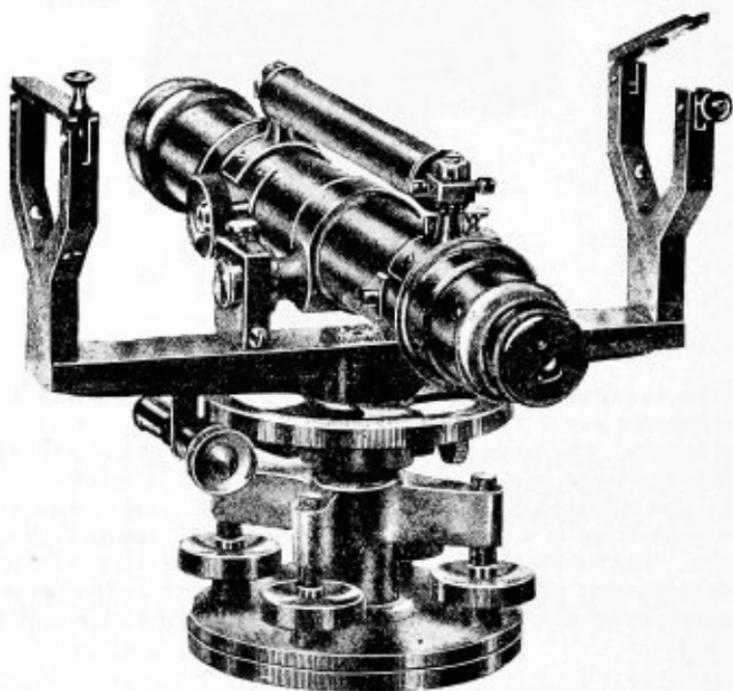
No. 2404.

No.

2404—Architects' Level, with clamp and tangent, complete with tripod and trivet .....price, \$50.00

## CONVERTIBLE ARCHITECTS' LEVEL.

Each Instrument of our make is warranted to be first-class in every particular.



No. 2404A.

No. 2404A. Convertible Architects' Level, in its general construction is similar to our Architects' Level No. 2404, but the level bar is provided with a pair of **folding standards**, and the telescope has a permanent axis with suitable bearings to fit the folding standards for vertical sighting. With this arrangement vertical sights can be taken to the extent of 45 degrees in either direction. When the instrument is used as a level the standards are folded into the recess provided for them in the level bar.

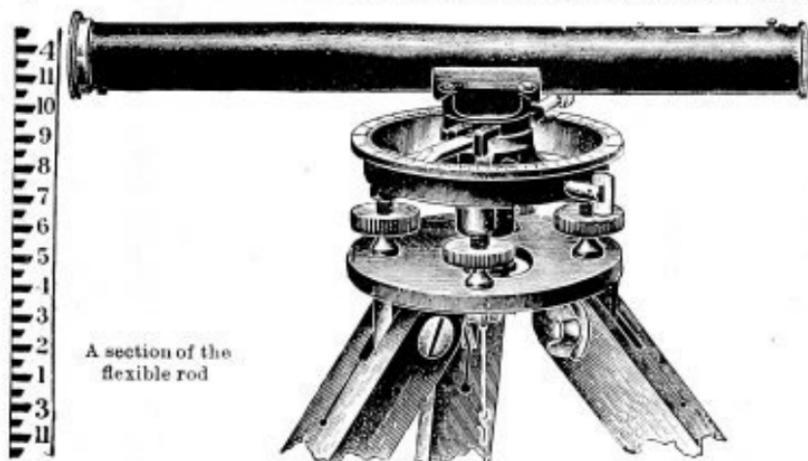
This instrument is furnished with **clamp and tangent screw** and is packed in a suitable box containing metal trivet, adjusting pins, sun-shade and plumb bob.

No.  
2404A—Convertible Architects' Level, complete with tripod box,  
etc. . . . . each, \$60.00

For Architects' Leveling Rods, see Nos. 2410-2411.

**ALOE'S FARM LEVEL.**

An Inexpensive and Useful Instrument for the Farmer, Builder, Roadmaker, Etc.



No. 2404 1/2.

The Farm Level is an instrument for laying out farm lands, draining, ditching, road-making and similar uses which do not require the accuracy of an Engineer's Level nor involve the determining of magnetic bearings. It has a horizontal circle for reading angles with which a reasonably accurate line can be run.

In the Farm Level all parts are of the same relative accuracy and simplicity of construction.

The level vial (bubble) is placed near the eye-end of the instrument for easy observation when reading the leveling rod. The cross-hairs are very distinct and firmly mounted. The centre is provided with a clamp screw. The horizontal circle is of 4 in. diameter, and graduated to degrees, which are read by a movable index (with clamp screw) so that each reading can be taken from 0.

With the level we furnish a flexible leveling rod of prepared weather-proof canvas, 1 1/2-in. wide and 6 ft. long, graduated to quarter-inches, with the foot numbers in red.

The Farm Level will give good results in the hands of users who have had no professional training and who are not familiar with land surveying. Full description and plain directions, free from technical terms, written expressly for those who are not surveyors, are furnished with each level. We make this instrument with plain sighting tube and with magnifying telescope. No.

- 2404 1/2—Farm Level, Sighting Tube 11 inches, with spirit level, pin-hole eyepiece, plain glass front, with cross-hairs, 4-inch horizontal circle graduated to degrees. Instrument complete in wooden case with lock hooks and metal handle, plumb-bob, 6-foot, flexible leveling rod, hardwood tripod, etc., with Directions . . . . . \$ 16.00
- 2404 3/4—Like No. 2404 1/2, but with Telescope, 11 inches, with good lenses, object glass 1 in. shows objects right side up. Complete with plumb-bob, flexible leveling rod, tripod, etc., with Directions. 25.00

## LEVELING RODS AND POLES.



2405.



2406.



2406M.



2408.



2411.



2412

## POCKET LEVELING RODS.



No. 2411A.

**LEVELING RODS AND POLES.**

No.	
2405	<b>New York Rod</b> , Hardwood, light color, divided into feet, 10ths and 100ths, vernier reading to 1000ths, with target, vernier and clamp, 6½ feet, sliding out to 12 feet.....each, \$14.00
2406	<b>Philadelphia Rod</b> , Hardwood, divided into feet, 10ths, and 100ths, vernier reading to 1000ths, with target, vernier and clamp, 7 feet, sliding out to 13 feet.....each, 12.00
2406M	<b>Philadelphia Metric Rod</b> , Hardwood, divided into meters, dm., and cm., vernier reading to mm., with target, vernier and clamp, 2.2 meter, sliding out to 4 meter.....each, 15.00
2408A	<b>Mining Rod</b> , divided into feet, 10ths and 100ths, vernier reading to 1000ths, 3 feet, sliding out to 5 feet.....each, 11.50
2408C	<b>Mining Rod</b> , divided into feet, 10ths and 100ths, vernier reading to 1000ths, 5 feet, sliding out to 9 feet.....each, 12.00
2410	<b>Architect's Rod</b> , Hardwood, light color, divided into feet, 10ths and 100ths, vernier reading to 1000ths, with target vernier and clamp 5½ feet sliding out to 10 feet.....each, 6.00
2411	<b>Architect's Rod</b> , Hardwood, light color, divided into feet, inches and ¼-inches, target, vernier and clamp, 5½ feet, sliding out to 10 feet .....each, 6.00
2411A	<b>Flexible Pocket Leveling Rod</b> , 10 feet long, 3 inches wide, divided like Self-Reading Rod to 10ths and 100ths of a foot; made of pliable, strong, rubber canvas; can be coiled up and carried in pocket; for use, it is fastened to a board or stick with thumb tacks .....each, 3.25
2411B	Same, 12 feet long.....each, 4.00
2411C	Same, 15 feet long.....each, 4.75
2411D	Same, 3 meters long.....each, 4.00
2411E	Same, 4 meters long.....each, 4.75
2411H	<b>Flexible Rod Ribbon</b> , is made of Paper Cloth, 1½ inches wide, any length, from 12 up to 20 feet.....per foot, .08

**RANGING POLES.**

Ranging Poles, of best seasoned wood, octagonal, or round, tapered, painted red and white alternately every foot, with steel pointed shoe.

2412	Eight feet, octagonal or round.....each, \$2.25
2413	Ten feet, octagonal or round.....each, 2.50
2414	Twelve feet, octagonal or round.....each, 2.75

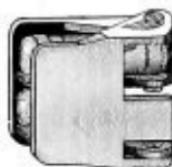
Steel Ranging Poles, ½ in. diameter, turned and hardened points painted red and white alternately every foot.

2415	Six feet long.....each, \$2.75
2416	Eight feet long.....each, 3.00

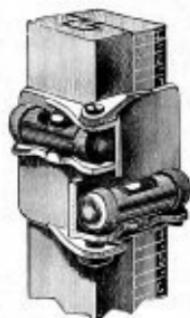
Iron Tubular Ranging Poles, ⅝ in. diameter, painted red and white alternately every foot.

2417	Six feet long.....each, \$2.75
2418	Eight feet long.....each, 3.00
2419	Ten feet long.....each, 3.25

## ROD LEVELS.



Rod Level  
Closed.  
No. 2424 1/2.



Rod Level as applied  
to a rod.



No. 2424 3/4.

No.	
2424 1/2	—Rod Level, for plumbing rod . . . . . each, \$3.00
2424 3/4	—Rod Level, for plumbing rod . . . . . each, 3.00

## PLUMB-BOBS.

All of our Plumb-Bobs have the hardened and tempered tool-steel points.



Short Neck.



Long Neck.

No.	No. 2425.	No. 2425A.
2425	—Brass Plumb-Bob, steel point, screw cap, 6-ounce . . . . . each, \$1.00	
2426	—Brass Plumb-Bob, steel point, screw cap, 8 ounce . . . . . each, 1.25	
2427	—Brass Plumb-Bob, steel point, screw cap, 10 ounce . . . . . each, 1.50	
2428	—Brass Plumb-Bob, steel point, screw cap, 12 ounce . . . . . each, 1.75	
2428 1/2	—Brass Plumb-Bob, steel point, screw cap, 16 ounce . . . . . each, 2.00	
2425A	—Brass Plumb-Bob, steel point, screw cap, 6 ounce . . . . . each, 1.25	
2426B	—Brass Plumb-Bob, steel point, screw cap, 8 ounce . . . . . each, 1.50	
2427C	—Brass Plumb-Bob, steel point, screw cap, 10 ounce . . . . . each, 1.75	
2428D	—Brass Plumb-Bob, steel point, screw cap, 12 ounce . . . . . each, 2.00	
2428 1/2 E	—Brass Plumb-Bob, steel point, screw cap, 16 ounce . . . . . each, 2.25	

We carry Plumb-Bobs weighing up to 5 lbs. in stock.

**PLUMB-BOBS.**

All of our Plumb-Bobs have the hardened and tempered tool-steel points.



No. 2429.



No. 2429 1/2



No. 2430.



No. 2434.

No.

- 2429—Adjustable Plumb-Bob, 10 ounce with reel inside, on which the line is wound and held by friction at any point of its length ..... each, \$2.50
- 2429 1/2—Smith's Plumb-Bob Adjuster, a device designed to be used on engineers' instruments for adjusting the height of plumb-bob ..... each, 1.00

**MERCURY PLUMB-BOBS.**

These plumb-bobs are made of solid steel rod, bored out and filled with mercury. The points are hardened and the bodies and points are ground. The shape and comparatively small diameters render them more convenient than the ordinary plumb-bobs. The 3 1/2 ounce can easily be carried in the vest pocket.

- No.
- 2430—3 1/2 ounce, 4 inches long, 1/2-inch diameter ..... each, \$1.25
- 2431—6 ounce, 4 1/2 inches long, 5/8-inch diameter ..... each, 1.75
- 2432—12 ounce, 5 3/8 inches long, 7/8-inch diameter ..... each, 2.50
- 2433—16 ounce, 6 inches long, 1-inch diameter ..... each, 3.00

**PLUMB-BOB CORD.**

- 2433A—Plumb-Bob Cord, best linen; thin, medium or thick...per yard, \$0.02
- 2433B—Plumb-Bob Cord, best braided silk.....per yard .06

**PLUMMET LAMP.**

(FOR TUNNELING AND MINING).

- 2434—Small, of brass, steel point, 16 ounce ..... each, \$10.00
- 2435—Large, of brass, steel point, 24 ounces ..... each, 12.00
- 2436—Box, with shoulder straps, for pair of Plummet Lamps ..... each, 4.00

**LOCKE'S HAND LEVELS.**

No. 2437.

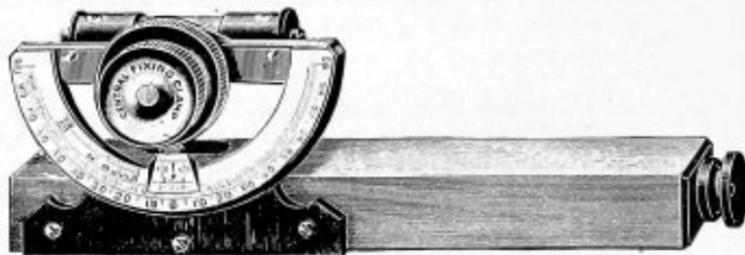
- No.  
 2437 —Locke's Hand Level, German silver, in case.....each, \$7.25  
 2438 —Locke's Hand Level, brass or bronze, in case.....each, 5.00  
 2438A—Locke's Hand Level, nickel plated, in case.....each, 5.25



- No.  
 2438 1/2—Square Hand Level, in leather case.....each, \$4.00

**STADIA HAND LEVEL (TELESCOPIC).**

- No.  
 2438 3/4—Stadia Hand Level, telescope 10 inches, with object glass 1-inch, adjustable eye-piece, stadia hairs reading 1:100, with ball joint and socket. This instrument will be found very useful for preliminary surveys, etc.; weight about 1 1/2 lbs., in leather sling case.....each, \$18.00

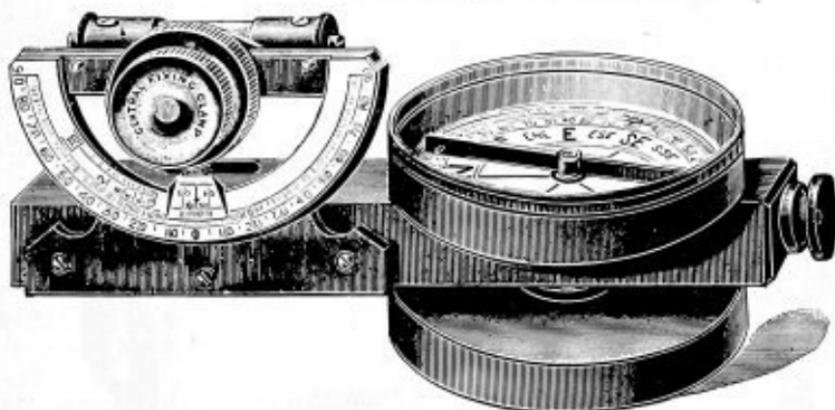
**ABNEY HAND LEVELS.**

No. 2439.

- No.  
 2439—Abney's Reflecting Level or Pocket Altimeter, square bronzed sighting tube 5 inches, vertical arc 1-inch, graduated 90° in each direction to single degrees, folded vernier reading to 5 minutes, scale of grades from 1:1 to 1:10, 1-inch bubble, in leather pocket case.....each, \$13.00

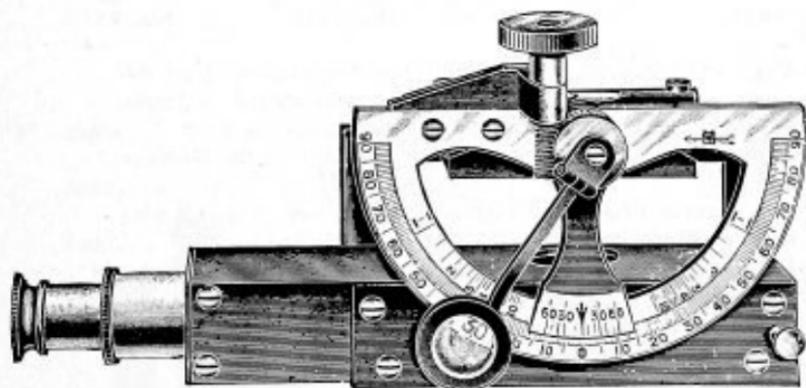
## ABNEY HAND LEVELS AND CLINOMETERS.

These instruments are used for getting the height of buildings, trees, hills, etc., and also for fixing the slopes or gradients of rails for railways, the rise and fall for drainage purposes, and all operations where angular distance or inclination of surface is wanted.



No. 2440.

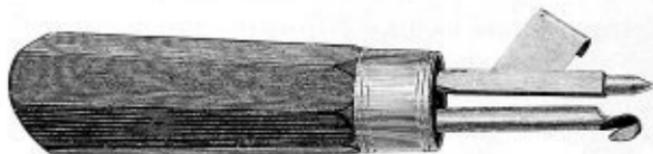
- No.  
2440—Abney's Reflecting Level or Pocket Altimeter, 5 in., with divided arc to show angles, and with bar needle compass and socket for Jacob staff, in case.....each, \$ 18.00



No. 2440A.

- No.  
2440A—Improved Abney Level with rack movement. This instrument has an extra large arc divided  $0^{\circ}$  to  $90^{\circ}$  each way, with vernier reading to 10 minutes, magnifying lens and a double draw telescope, double reading grade scale. By the rack and pinion movement it can be precisely and easily adjusted. In leather sling case.....each, \$ 32.00

## TIMBER SCRIBE



No. 2443 1/2.

No.  
2443 1/2—Timber Scribe or Tree Marker, large size.....each, \$1.25

## ANGLE MIRRORS AND PRISMS.



No. 2444.



No. 2445.



No. 2446.



No. 2447.

No.  
2444—Angle Mirror, with small plumb-bob for angles of 90 degrees. The handle can be detached and stored in frame of instrument. Size of instrument, 3 3/4 x 2 x 1 3/4 -inch.....each, \$ 8.50  
2445—Angle Mirror, plain, for angles of 90 degrees, in Morocco case .....each, 5.00  
2446—Rectangular Prism, for angles of 90 degrees, 2 1/2 x 1 1/4 x 5/8 -inch, in Morocco case .....each, 5.00  
2447—Double Prism, to take angles of 90 and 45 degrees, in Morocco case .....each, 10.00



No. 2448.

No.  
2448—Cross-Staff Head, octagonal, for jacob-staff, in case, 2 1/2 -inch .....each, \$ 3.00  
2449—Cross-Staff with Magnetic Compass, 3 -inch; needle, 1 3/4 -inch, divided to 2 degrees on raised ring.....each, 5.00

**POCKET LEVELS.**

No. 2451.

No.

- 2451—Pocket Levels, brass mounted in metal case, 2-inch, 60c;  
3-inch, 75c; 4-inch, \$1.00; 6-inch, \$1.25; 12-inch.....each, \$ 2.00

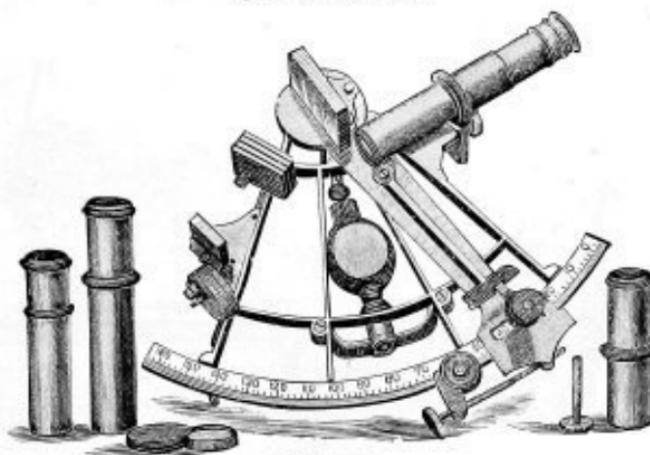
**ADJUSTABLE LEVELS.**

No. 2452.

Pocket Levels mounted in brass with adjusting screws, vials finely ground and very sensitive. In Wood Cases.

No.

- 2452 —Adjustable Level Base, 5-inch; Bubble Tube, 3-inch..each, \$ 3.50  
2452A—Adjustable Level Base, 6-inch; Bubble Tube, 4-inch..each, 4.00  
2452B—Adjustable Level Base, 7-inch; Bubble Tube, 5-inch..each, 4.50  
2452C—Adjustable Level Base, 8-inch; Bubble Tube, 6-inch..each, 5.00  
2452D—Adjustable Level Base, 10-inch; Bubble Tube, 8-inch..each, 6.50  
2452E—Adjustable Level Base, 12-inch; Bubble Tube, 10-inch..each, 8.00  
2452F—Adjustable Level Base, 14-inch; Bubble Tube, 12-inch..each, 10.00

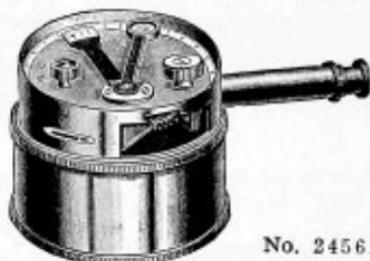
**SEXTANTS.**

No. 2453.

- No.  
2453—Sextant of gun-metal,  $4\frac{1}{2}$  inches radius, arc of 150 degrees graduated on silver to 15 minutes with vernier to 15 seconds, clamp and tangent and magnifier, one terrestrial telescope, one celestial telescope, one sight-tube, six neutral glasses, two mirrors, in mahogany box ..... \$60.00

## SEXTANTS

- No.  
 2454—Sextant of gun-metal,  $6\frac{1}{2}$  inches radius, arc of 150 degrees graduated on silver to 10 minutes with vernier to 10 seconds, clamp and tangent, and magnifier, two celestial telescopes, one terrestrial telescope, one sight-tube, seven neutral glasses, two mirrors, in mahogany box. . . . . \$ 90.00  
 2455—Sextant of gun-metal, superior, 7 inches radius, arc of 150 degrees graduated on silver to 10 minutes with vernier to 10 seconds, clamp and tangent and magnifier, two celestial telescopes, one terrestrial telescope, one sight-tube, seven neutral glasses, two mirrors, in mahogany box. . . . . 115.00

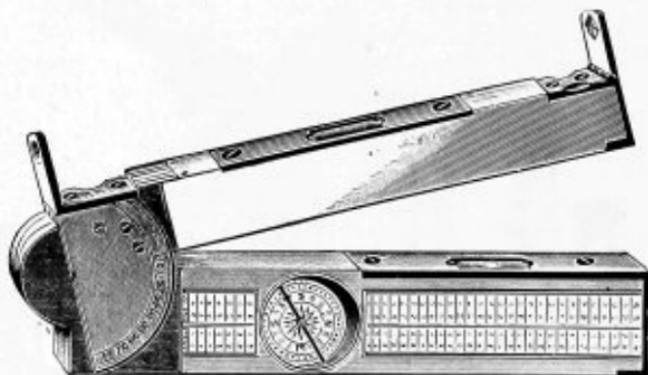


No. 2456

- No.  
 2456—Pocket or Box Sextant, graduated on silver to 30 minutes, vernier reading to 1 minute, with telescope, two neutral glasses, reading lens and tangent adjusting screw; metal box 3 inches diameter,  $1\frac{1}{2}$ -inch high, in leather sling case. . . . . \$40.00

## BOXWOOD CLINOMETER RULES.

This is an exceedingly useful instrument for ascertaining the height of any object at a known distance from the point of observation. Full instructions for use with each instrument.



No. 2459.

- No.  
 2458—Boxwood Clinometer, with two levels, bar needle, compass and inclination scale, 6-inch, with sights, in leather pocket case . . . . . each, \$ 12.00  
 2459—Boxwood Clinometer, with levels, two sights, engine divided, flush vernier, swing compass, bar needle, jeweled cap and stop to needles. . . . . each, 17.00

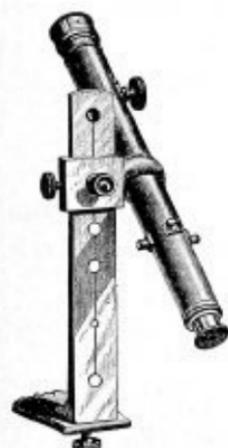
**ALOE'S  
SURVEYORS' VERNIER  
COMPASSES.**



No.	No. 2460.
2460	Vernier Compass, 4-inch needle, two straight levels, jacob-staff mountings, brass cover, out-keeper, vernier for adding or subtracting the magnetic variation of the needle, sights graduated for taking angles of elevation and depression. In box with lock, and strap for carrying . . . . . \$35.00
2461	Vernier Compass, same as above, but with 5-inch needle. . . . . 40.00
2462	Vernier Compass, same as above, but with 6-inch needle. . . . . 45.00

**THE TELESCOPE SIGHT.**

This valuable improvement of the Surveyor's Compass consists of a telescope furnished with the usual crosswires, etc., and attached to a movable band, which, as shown in the engraving, can be slipped over the sight of a compass, clamped at any point desired, and put in adjustment by any person who has a screw-driver and a steel adjusting pin.

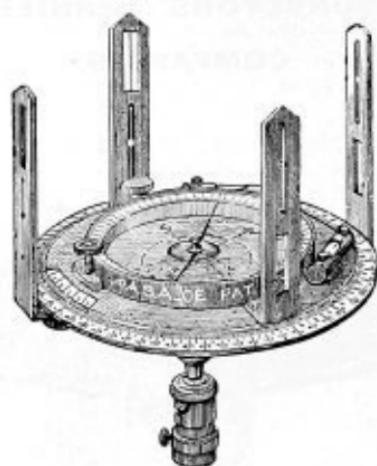


No.	
2463	9-in. Achromatic Telescope, power about 10 diameters . . . . . \$15.00
2464	9-in. Achromatic Telescope, large diameter of object, glass and power about 20 diameters 19.00
2465	Same telescope as No. 2464, but furnished with micrometer or stadia wires for measuring distances . . . . . 23.00

No. 2463.

We add to these telescopic sights the following extras, at prices annexed:

No.	
2466	Vertical Circle, vernier to five minutes. . . . . 5.00
2467	Level on telescope . . . . . 5.00
2468	Clamp and tangent to axis of telescope. . . . . 5.00

**ALOE'S IMPROVED MINERS' COMPASS.**

No. 2462 1/2 A.

Miners' Compass for use below or above ground. It is constructed with two limbs, to one of which the needle box is attached, with sights. The lower limb is divided similar to limb of transit with vernier, with sights attached to said limb. By this means you can run your line without use of needle, overcoming local attraction from rails or other causes, usually causing a great deal of trouble in mine work. The compass has a 4 1/2-inch needle, 8-inch limb and vernier reading to one minute, tripod three feet long, ball socket; packed in a neat box.

No.	
2462 1/2 A	—Miners' Compass, complete, as described above . . . . . price, \$ 55.00
2462 1/2 B	—Miners' Compass, as above, with extension tripod . . . . . price, 60.00
2462 1/2 C	—Miners' Compass, with Leveling Plates, Clamp and Tangent movement, with extension tripod . . . . . price, 75.00

**Extras to Compasses.**

No.	
2469	—Compass Tripod . . . . . \$ 5.00
2470	—Patent Extension Tripod, furnished with any compass . . . . . 12.00
2471	—Compass Tripod, with leveling screws, and clamp and tangent movement . . . . . 18.00

## ALOE'S SURVEYING AND MINING COMPASSES.

Compasses Nos. 2475 to 2478 are of the most practical construction and very carefully and substantially made.



No. 2475.

No.					
2475	—Surveying Vernier Compass, 3½-inch needle, with ruby center and stop, silvered compass box, graduated on raised ring to degrees, variation ring reading to 5 minutes, folding sights, two levels, ball joint and socket for jacob-staff mounting, in polished mahogany case.....each, \$18.00				
2476	—Same as No. 2475, but with light wood tripod.....each, 22.00				
2477	—Surveying Vernier Compass, same as No. 2475, but with 4½-inch needle.....each, 20.00				
2478	—Same as No. 2477, but with light wood tripod.....each, 24.00				
2478A	—Extension tripod of metal, 4 draws opening to 52 inches closing to 15 inches for above instrument.....each, 8.00				
2478B	—Jacob-staff for above instruments.....each, 1.25				
2478C	—Leather Sling Case in place of mahogany case,				
	for Compasses	3	2½	4	4½ in.
	extra each	\$2.00	\$2.25	\$2.50	\$3.00

## SURVEYING COMPASSES. FOLDING SIGHTS.



No. 2479.



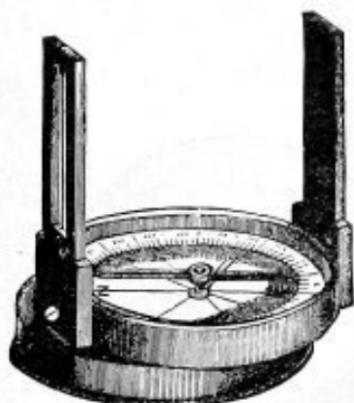
No. 2485.

No.		
2479	—Pocket Surveyors' Compass or Miners' Compass, no vernier, divided to 360 degrees, with folding sights, regular ball and socket, jacob-staff mountings, in Mahogany box, needle 4 inches long .....	each, \$12.50
2480	—Same as No. 2479, needle 3½ inches long.....	each, 11.50
2481	—Same as No. 2479, needle 3 inches long.....	each, 10.50
2482	—Same as No. 2479, needle 2½ inches long.....	each, 9.50
2479½	—Pocket Surveyor's or Miner's Compass, no vernier, divided to 360 degrees, with folding sights, 2 level bubbles inside of compass box, ball and socket, jacob-staff mountings, in mahogany box, needle 4 inches long.....	each, 14.50
2480½	—Same as No. 2479½, needle 3½ inches long.....	each, 13.50
2481½	—Same as No. 2479½, needle 3 inches long.....	each, 12.50
2482½	—Same as No. 2479½, needle 2½ inches long.....	each, 11.50
	—Tripod furnished for any of above compasses of wood....	each 5.00
	—Extension Tripod furnished for any of above compasses of metal .....	each, 8.00
2485	—New Style Pocket Surveyors' Compass, in heavy bronze case, one short and one long sight. This is an extra fine pocket instrument, with a pull-off cover, needle 1½ in. long	6.00
2486	—Same as No. 2485, needle 2½ inches long.....	6.50
2487	—Same as No. 2485, needle 2¾ inches long.....	8.00
2488	—Same as No. 2485, needle 3 inches long.....	9.00
2489	—Same as No. 2485, needle 3½ inches long.....	11.00

## POCKET SURVEYING COMPASSES.



No. 2490.

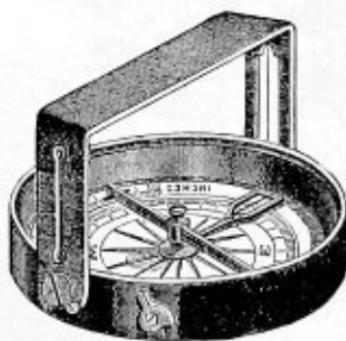


No. 2494.

- No.
- 2490—Pocket Compass with Folding Sights, watch pattern case, nickel plated, jeweled needle with stop. Compass  $1\frac{3}{4}$ -inch in diameter . . . . . each, \$ 4.50
- 2491—Same as No. 2490, compass 2 inches in diameter . . . . . each, 5.00
- 2492—Same as No. 2490, compass  $2\frac{3}{8}$  inches in diameter . . . . . each, 5.50
- 2493—Same as No. 2490, compass  $2\frac{1}{2}$  inches in diameter . . . . . each, 6.00
- 2494—Pocket Compass with folding sights, brass case, pull-off cover, jeweled needle with stop.
- | Diameter— | 2-in.  | $2\frac{1}{2}$ -in. | $2\frac{3}{8}$ -in. | $3\frac{1}{4}$ -in. |
|-----------|--------|---------------------|---------------------|---------------------|
|           | \$4.00 | \$4.50              | \$4.75              | \$5.50              |



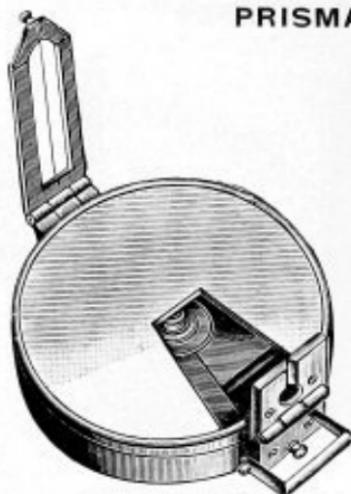
No. 2496. As Clinometer.



No. 2496. As Sight Compass.

- No.
- 2496—Bronzed Sight Compass and Clinometer, metal dial, graduated to 1 degree, edge bar needle with top. The sights are pivoted to the compass box and connected by a cross bar, which is turned down to serve as foot when the instrument is used as Clinometer. The Clinometer gives inclinations in inches per yard and in degrees. Diameter  $2\frac{1}{2}$  inches, in box . . . . . each, \$ 7.00
- 2497—Same as above, diameter 3 inches, in box . . . . . each, 8.50
- 2498—Same as above, diameter 4 inches, in box . . . . . each, 10.00

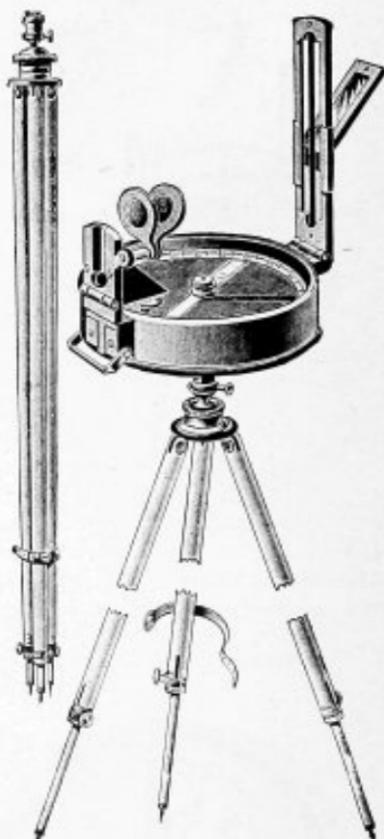
## PRISMATIC COMPASSES.



No. 2504.



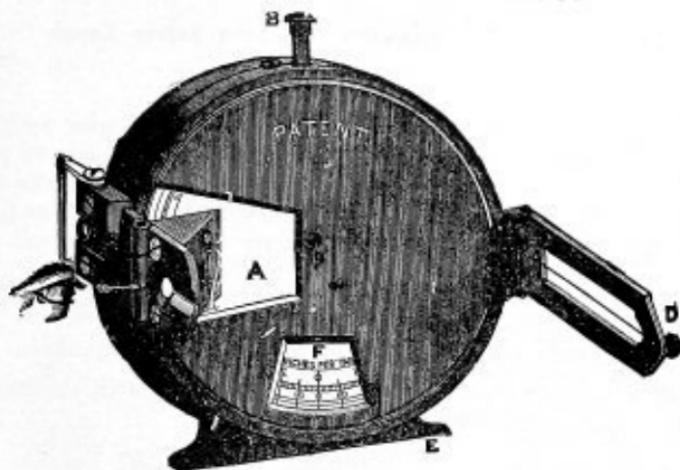
No. 2508.



No. 2507.

- No.
- |  |         |
|--|---------|
| 2501—Prismatic Compass, green card dial, sling case, 2½ inches.....  | \$17.00 |
| 2502—Prismatic Compass, green card dial, sling case, 3 inch.....   | 20.00   |
| 2503—Prismatic Compass, aluminum ring, sling case, 3 inch.....   | 25.00   |
| 2504—Hutchinson's Prismatic Compass, bronzed, of improved pattern, nearly enclosed top, floating card dial, 3 inch, in leather sling case .....  | 19.00   |
| 2505—Same as 2504, 4 inch.....   | 22.00   |
| 2506—Prismatic Compass, complete, with azimuth glasses, consisting of shades and mirrors, with divided aluminum ring, 3-inch, in leather sling case; best quality instrument.....  | 33.00   |
| 2507—Same, with ball and socket joint, mahogany tripod with best brass mountings .....   | 45.00   |
| 2508—2-inch Day and Night Prismatic Compass, with graduated luminous centre to floating card dial, with central movable setting and reading bar, sight vane in lid and case, and inside of lid fitted with a luminous graduated card for map reading and protracting purposes and night marching, in leather sling case..... | 24.00   |

## COMBINED ALTITUDE INSTRUMENT AND PRISMATIC COMPASS.

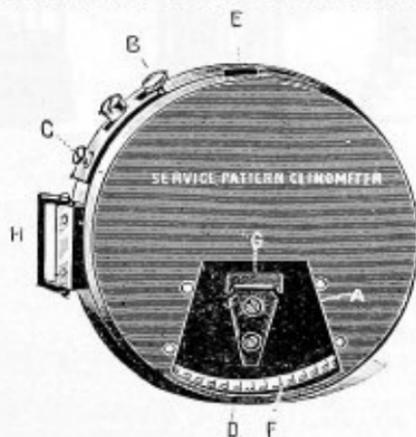


No. 2510.

Combined Prismatic Compass, Clinometer and Altimeter, bronzed, pocket size, dial  $2\frac{3}{4}$ -inch diameter, graduated to  $\frac{1}{2}$  degrees, agate center, automatic stop and spring check; hinged sight-vane with vertical wire. Clinometer and Altimeter formed by sensitive weighted disc,  $2\frac{3}{4}$ -inch diameter, with stop and spring check, giving slopes in inches per yard and in degrees, and angles of elevation or depression in half degrees.

No.  
2510—Combined Prismatic Compass, in leather sling case.....each, \$27.00

## SERVICE PATTERN CLINOMETER.



No. 2511.

No.  
2511—Military Clinometer, bronzed case, 3-inch, for measuring angles of elevation or depression, ivory arc scale held clamped, and by pressing on knob, is released to swing freely. The graduations of the arc are from 0 to 45° in each direction; the red scale denotes elevation, the black scale depression, in leather sling case.....each, \$19.25

**MINERS' SAFETY LAMPS.****Deputy's Improved Safety Lamp.****Instructions.**

- A** To find Gas, shut off the fresh air feed by turning the collar B, at the base of the bonnet, from left to right. The feed will then be solely through the upper intake holes at A. When gas is found, draw down the locking pillar C, when the collar will spring back, and the light be recovered.
- B** No.

2518—Deputy's Improved Safety Lamp, Brass . . . . . \$5.00

2519—Deputy's Improved Safety Lamp, Aluminum . . . . . 6.00

The above lamps can be furnished with the Beard-Mackie Gas Indicator for \$2.00 extra.



No. 2521.



No. 2522.



No. 2524.



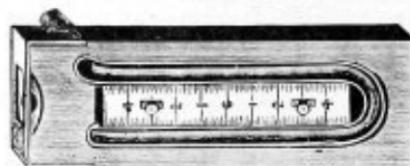
No. 2525.



No. 2528.

No.		
2521—Clanny Lamp . . . . .	each,	\$3.00
2522—Davy Lamp . . . . .	each,	2.50
2524—Marsaut Lamp, with protection over gauze . . . . .	each,	3.75
2525—Muessler Lamp . . . . .	each,	3.25
2527—Bonneted Muessler Lamp . . . . .	each,	3.75
2528—Ashworth-Hepplewhite Gray Lamp, in Brass, \$5.50; Aluminum, ea.,		8.00
2529—Thomas, No. 7. . . . .	each,	4.00

We can furnish all Lamp Parts and Brushes, etc., at short notice.

**MINERS' WATER GAUGE.**

No.		
2530—Water Gauge, with level on top and adjusting scale . . . . .	\$4.50	
2532—Wolpert's Air Tester, for testing the quality of air in habitated apartments . . . . .	4.50	

## MINERS' COMPASS OR DIPPING NEEDLE.



No. 2537.

In the hands of the prospector the Miners' Compass or Dipping Needle proves a serviceable guide to the discovery and location of ore. In this instrument the magnetic needle is carefully balanced upon a horizontal axis within a graduated circle, and in which the needle will be found to assume a position inclined to the horizon. This angle of deviation is called the inclination or dip, and varies in different latitudes, and even at different times in the same place. Hence, in reading the dip for the suspected presence of ore, the observer must not only be governed by his instrument, but must also draw into requisition his knowledge of the general geological formation of the place of his survey; and dependent on his experience, he will be enabled to approximate as to the probable mass and depth of the ore from the surface. When used for tracing ore the observer should hold the ring in his hands and keep the needle north and south, standing with his face to the west. The inclination of the needle as read off on the graduated scale will show the dip. If the compass is held horizontal it serves of course as an ordinary compass.

No.

2537—3-inch Dip Needle Mining Compass in velvet lined case. . . . . \$12.00

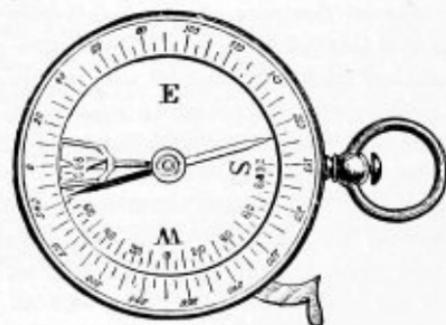
### SUN DIAL COMPASS.



No.

- 2549—1  $\frac{3}{4}$ -inch Silvered Metal Dial Compass, best hardened and tempered edge Bar Needle, jeweled cap and self-acting stop, combined with Sun Dial having adjustable Gnomon. Equation tables in lid ..... \$8.25

### GEOLOGISTS' COMPASSES.



No. 2550.

These compasses are applied to ascertain the angles of "dip" and "strike" in the strata of rock formations. Each instrument is furnished with a clinometer attachment, which consists of a pendulum with index traversing divisions upon the inner compass face, and an armature sliding from within the casing for establishing the base to clinometer.

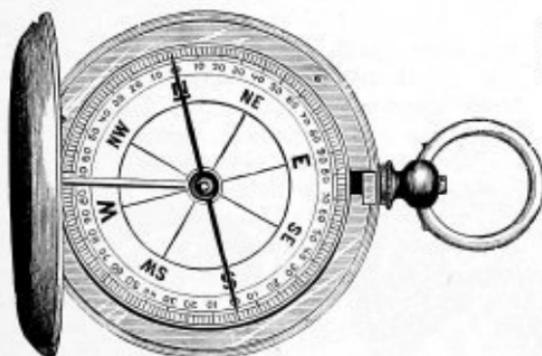
- No.  
2550—Geologists' Compass, open glass face, metal casing, silvered dial with clinometer degrees, and raised compass ring divided from 0 degrees to 360 degrees, agate center and stop needle, 2  $\frac{1}{2}$  inches long, brass case ..... \$3.75  
2551—Same as above, nickel-plated..... 4.00

**MAGNETIC POCKET COMPASSES.**

No. 2555.

No.

2555—Nickel Plated Pocket Compass, as engraving, with cover and stop, 3 inches diameter, engine divided, English bar needle, jeweled center..	\$3.25
2556—Same, 2 1/2-inch diameter.	3.00
2557—Same, 2 1/4-inch diameter.	2.75
2558—Same, 2 -inch diameter.	2.50
2559—Brass Compass, 3-inch diameter, same as No. 2555 .....	3.00
2560—Same, 2 1/2-inch diameter,	2.75
2561—Same, 2 -inch diameter,	2.25

**FINE WATCH PATTERN COMPASSES.**

No. 2562.

No.

2562—Nickel plated, hunter's spring case, hardened edge bar needle, jeweled center, self acting stop, 1 1/2-inch diameter..	\$3.00
2563—Same, 1 3/4-inch diameter .....	3.25
2564—Same, 2-in. diameter	3.50

**NICKEL PLATED, METAL DIAL, HINGE COVER, JEWELLED CAP WITH STOP.**

No. 2567.

No.

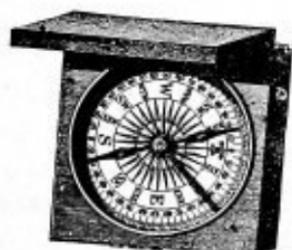
2567—1 1/2-inch diameter, nickel plated.	\$1.75
2568—1 3/4-inch diameter, nickel plated.	2.00
2569—2 -inch diameter, nickel plated.	2.25
2571—1 1/2-inch diameter, brass .....	1.50
2572—1 3/4-inch diameter, brass .....	1.75
2573—2 -inch diameter, brass .....	2.00

**MAGNETIC POCKET COMPASSES.**

No. 2576.

No.

- 2576—Open Face, watch pattern, Roman gilt, frosted, metal dial, finely engraved, jeweled, stem-winding stop, in morocco case, 1 $\frac{5}{8}$ -inch diameter ..... each, \$5.50
- 2576 $\frac{1}{2}$ —Same, 2-inch diameter ..... each, 6.50
- 2577—Open Face, watch pattern, Roman gilt, frosted, Singer's patent day and night pearl dial, jeweled, stem-winding stop, in morocco case, 1 $\frac{5}{8}$ -inch diameter..... each, 6.50
- 2577 $\frac{1}{2}$ —Same, 2-inch diameter. .... each, 7.50

**WOOD CASE COMPASSES.**

No. 2578.

No.

- 2578—Mahogany case, 3x3-inch, card dial, 2-inch needle, with stop, full circle division ..... each, \$1.25
- 2579—Mahogany case, 3x3-inch, metal dial, 2-inch needle, with stop, jeweled, full circle division..... each, 1.50
- 2580—Mahogany case, 3x3-inch, metal dial, 2-inch bar needle, with stop, jeweled, full circle division..... each, 2.25

No.

- 2581—Mahogany case, 3 $\frac{1}{2}$ x3 $\frac{1}{2}$ -inch, metal dial, 2 $\frac{1}{2}$ -inch bar needle, with stop, jeweled, full circle division..... each, 2.50

**U. S. ARMY PATTERN COMPASS.**

No.

- 2583—Military Compass, 3x3-inch, bar needle about 2 $\frac{1}{2}$ -inch, with agate centre and automatic stop, graduated on raised metal ring to degrees. Polished mahogany box with sighting line on inside of cover ..... each, \$4.50

# MAGNETIC POCKET COMPASSES.

## BRASS COMPASSES.



No. 2589.

Pull-off cover, divided to 360 degrees, jeweled needle and stop.

No.

2584—1 ¼-inch diameter . . . . .each, \$1.25

2585—1 ½-inch diameter . . . . .each, 1.50

2586—1 ¾-inch diameter . . . . .each, 1.75

Pull-off cover, no division stop to needle.

No.

2589—1 ¼-inch diameter . . . . .each, \$0.75

2590—1 ½-inch diameter . . . . .each, .90

2591—1 ¾-inch diameter . . . . .each, 1.10



No. 2595.



No. 2596.



No. 2598.

No.

2595 —Pocket Compass, brass, watch pattern, paper dial, 1 ¼-inch. each, \$0.20

2595 ½—Pocket Compass, brass, watch pattern, paper dial, 1 ½-inch. each, .25

2595 ¾—Pocket Compass, brass, watch pattern, paper dial, 1 ¾-inch. each, .30

2596 —Pocket Compass, brass, watch pattern, metal dial, stop to needle, 1 ¾-inch . . . . .each, .55

2596 ½—Pocket Compass, brass, watch pattern, metal dial, stop to needle, 1 ½-inch . . . . .each, .65

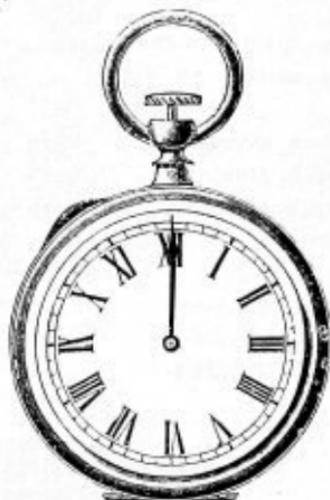
2598 —Pocket Compass, brass, pull-off cover, paper dial, 1 ¼-inch. each, .25

2598 ½—Pocket Compass, brass, pull-off cover, paper dial, 1 ½-inch. each, .30

2598 ¾—Pocket Compass, brass, pull-off cover, paper dial, 1 ¾-inch. each, .35

## PEDOMETERS.

Pedometers indicate the distance walked. The hand advances in proportion to the length of stride, and the instrument is adjustable by an easily accessible screw.



No. 2601.



No. 2602.

No.

- |  |              |
|--|--------------|
| 2601—Pedometer, watch pattern, nickel case, crystal back, registering distances walked to 12 miles.....  | each, \$4.50 |
| 2602—Pedometer, watch pattern, nickel case, crystal back, registering distances walked to 100 miles..... | each, 5.25   |
| 2603—Passometer, watch pattern, nickel case, with 3 hands, registering 25,000 steps .....                | each, 6.00   |
| 2606—American Pedometer, nickel case, registering distances walked to 100 miles .....                    | each, 1.25   |

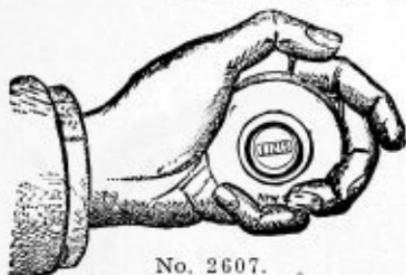


No. 2603.



No. 2606.

## AUTOMATIC OR TALLY REGISTER.



No. 2607.

Shows Method  
of Using.

No. 2607.

No.

- 2607—Automatic Register, for keeping tally, for chaining or measuring, for counting and other purposes; registers to 1000 .....each, \$ 2.50

## MEASURING INSTRUMENTS.



No. 2608.

No.

- 2608—Tally Register, watch pattern register, from 1 to 9999 .....each, \$1.50

## Universal Measuring Instrument.

- 2609—An ingenious little instrument for measuring maps in either miles, versts or kilometers by simply running the instrument over its surface. Handsomely nickel plated, with bone handle, in case, with full and complete instructions ..... \$2.50

- 2610—Similar in construction to the above, and will measure any distance up to 25 feet, the short hand measuring feet, the long hand inches or fractions of an inch. Can be worn as a watch charm. In nickel silver case ..... 2.00

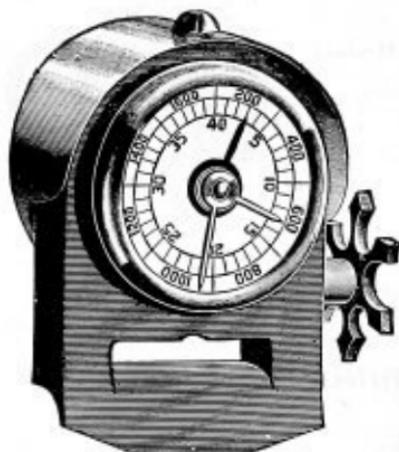


No. 2610.

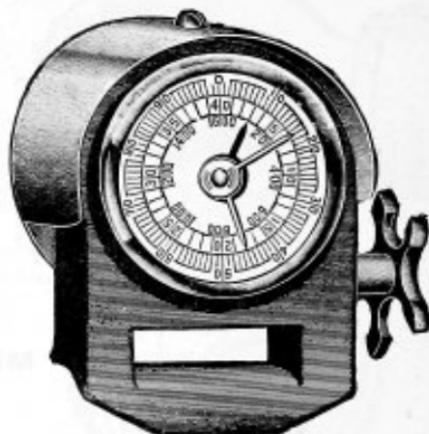


No. 2609.

## IMPROVED BELL ODOMETER.



No. 2612.



No. 2613.

The Bell Odometer is designed to register the distance traveled by vehicles of every description, and rings a small bell as each mile is passed. Keeps a record for 1,600 miles and repeats. It is fastened to the axle and is operated by a steel pin driven in end of hub, or special attachment furnished for wire wheel. These attachments propel the mechanism of the Odometer with each revolution of vehicle wheel.

When a mile has been passed the fact is distinctly announced by one sharp stroke of a small bell in the Odometer. With this exception, the instrument is absolutely noiseless.

Every Odometer is fully warranted. Any instrument that may prove defective in material or construction will be replaced free of charge. Every part is made in duplicate, so that if worn or broken it can be replaced at a trifling expense.

We make Odometers for wheels of any size from 26 to 60 inches diameter, varying every half inch. In sending orders it is necessary to send us the exact diameter of the rear wheel of carriage. Explicit instructions, record cards, and steel pin are sent with each instrument.

No. 2613 records revolutions of vehicle wheels, automobiles, printing presses, punch machines and shaftings. The bell is arranged to strike every 100 revolutions and keep a record for 160,000 revolutions and repeats.

No.		
2612—	Bell Odometer, registers miles and fortieths.....	\$6.50
2613—	Bell Odometer, registers revolutions .....	6.50

## AIRMETERS AND ANEMOMETERS.



No. 2615.

Airmeters and Anemometers are for the measurement of air currents in mines, tunnels, sewers, ventilation of hospitals, public buildings, etc. The indications are obtained by means of a delicately poised fan-wheel, the recordings being commenced by the long or central hand, which traverses the outer circumference of the main dial, showing the passage of 100 feet of air in a complete revolution. The enumeration can be continued to 10,000,000 feet by a series of six dials, but we strongly recommend the 4 dial instrument, reading to 100,000 feet, with our patent zero setting attachment, No. 2616½. A disconnecter projects from the band of instruments so that the mechanism can be thrown in or out of gear at the will of the user.

The usual way of taking a test is to place the instrument in the current in a number of different positions; take the number of feet that have passed during a certain time, for instance, say one minute; then divide the total by the number of readings and obtain the **average**; multiply that by the square of the opening or channel, and the result is the velocity of air, in feet, passing in a given time.

No.

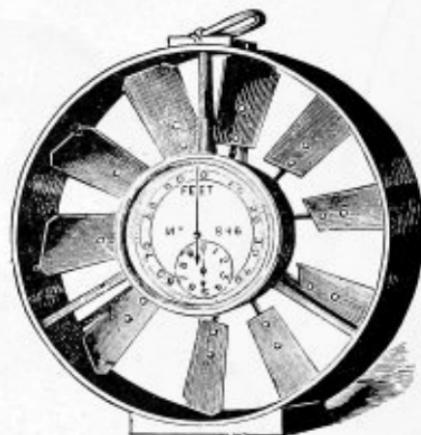
- 2615—The Portable Air Meter, 6 dials, registering 10,000,000 feet, diameter of fan-wheel 2¾ inches, with disconnecter . . . . . \$24.00
- 2616—Same, with the addition of a Standard one minute glass, for timing . . . . . 27.50  
The Timer consists of a sand glass which acts as a stop and also serves to easily compute the time the current takes in passing through the fans.
- 2616½—Portable Air Meter, with disconnecter, 4 dials recording to 100,000 feet, with key for zero setting, in wooden case . . . . each, \$24.00
- 2617½—Same as No. 2616½, but with sand glass timer, in wooden case . . . . . each, 27.50

We have the best facilities for testing and repairing Anemometers.

## BIRAM'S ANEMOMETERS.



No. 2618.



No. 2619.

Each instrument is tested and a chart of corrections supplied.  
Two dial instruments stand pressure to 1,000 feet a minute.  
Four and six dial instruments stand pressure to 3,000 feet a minute.

No.		
2618	—Watch pattern Anemometer, 2 inch, registering to 1,000 feet; nickel plated hunting case, with stop. The two covers when open form a base for the instrument. In silk velvet lined morocco case.	\$30.00
2619	—Biram's Anemometer, 3 in., 2 dials reading to 1,000 feet, morocco case	22.00
2620	—Biram's Anemometer, 4 in., 2 dials reading to 1,000 feet, mahogany case	22.50
2620½	—Biram's Anemometer, 4 in., 4 dials reading to 100,000 ft., mahogany case	23.50
2622	—Biram's Anemometer, 6 in., 2 dials reading to 1,000 ft., mahogany case	26.50
2623	—Biram's Anemometer, 6 in., 4 dials reading to 100,000 ft., mahogany case	28.50
2624	—Biram's Anemometer, 6 in., 6 dials reading to 10,000,000 ft., mahogany case	32.00

We have given attention to the production of Anemometers capable of registering very strong blast currents, and can now supply them to record up to 20,000 feet per minute.

No.		
2624A	—High Speed Anemometer, as above, registering to 200,000 feet, with disconnecter and zero setting attachment, complete in mahogany case	\$45.00

We can furnish above Anemometers with a key setting arrangement to set all the hands on the instrument back to zero before taking a reading.

For instruments with 2 dials, extra	\$2.50
For instruments with 4 dials, extra	3.75
For instruments with 6 dials, extra	5.00

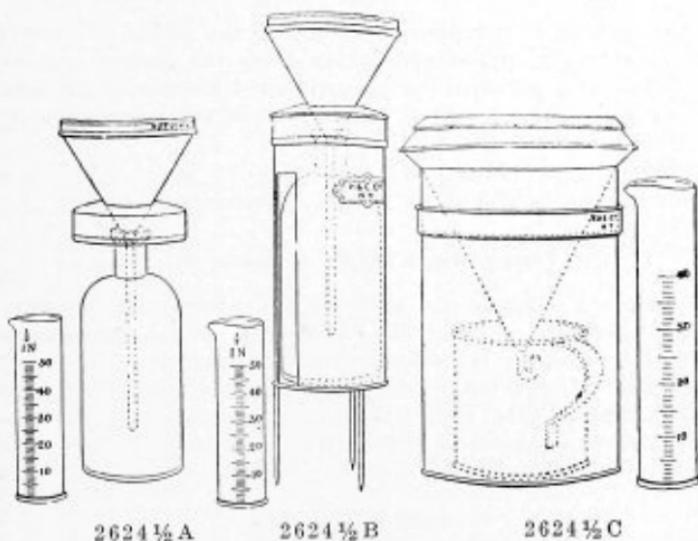
## RAIN GAUGES.



No. 2624 1/2.

No.  
2624 1/2—Registering Rain Gauge, zero-setting, metal case 8 1/2 x 8 1/2 in.  
x 10 1/4 in. high, records up to 12 inches of rainfall by 100ths

inches. The copper receiver is of improved design. . . . . each, \$26.00



2624 1/2 A

2624 1/2 B

2624 1/2 C

- No.  
2624 1/2 A—Rain Gauge, Howard's model, simple construction, with graduate reading to 1/100 in. . . . . each, \$5.00  
2624 1/2 B—Rain Gauge, Symon's model, with prongs to prevent tipping, with graduate reading to 1/100 in. . . . . 6.00  
2624 1/2 C—Rain Gauge, Glaisher's model, a very reliable instrument, with graduate reading to 1/100 in. . . . . 8.50

## ANEROID BAROMETERS.

### Atmospheric Pressure.

The Atmosphere surrounding the Earth may be regarded as an "Ocean" of air, extending upwards from the earth's surface about ten miles above sea level. Its greatest density is nearest to the earth's surface, by reason of having to support the weight of its whole depth; and it gradually becomes less dense as the distance from the earth increases. This law of decrease in pressure being known, is used as a means of measuring the height of hills and mountains.

The Aneroid may be shipped with perfect safety and carried in any position without danger of derangement; it is not at all liable to get out of order, nor is it easily broken.

### To Measure Altitudes without the Altitude Scale.

Generally speaking, the fall of one inch in the Barometer indicates a rise of about 900 feet in elevation:

- 917 feet above sea level the Barometer falls 1 inch.
- 1,860 feet, the Barometer falls 2 inches.
- 2,830 feet, the Barometer falls 3 inches.
- 3,830 feet, the Barometer falls 4 inches.
- 4,861 feet, the Barometer falls 5 inches.

### To Determine the Difference in Height between two given places.

Note the reading of the Aneroid at one of the points of observation, then at the other; subtract the lower reading from the higher and multiply the remainder by 9. This will give the approximate difference of altitude in feet.

For example:—The Aneroid at the summit of a hill indicates 29.90 inches, at its base 30.18 inches:

$$30.18 - 29.90 = 28. \quad 28 \times 9 = 252.$$

The approximate height of the hill is, therefore 252 feet.

### For Temperatures above or below 50° Fahr.

Under ordinary atmospheric pressure the above method will give good results at a temperature of about 50° Fahrenheit. If the temperature be above or below 50° the following corrections should be made:

Add together the degrees of temperatures of the upper and lower stations. If this sum is greater than 100° Fahrenheit, increase the height by 1,1000th part of every degree in excess of 100°. If the sum is lower than 100°, diminish the height by 1,1000th part.

### FOR EXAMPLE.

Barometer reading at lower station, 30.146—500 feet by the scale.

Barometer reading at upper station, 21.01°—10,500 feet by the scale. Reading, by the scale, is 10,000 feet.

Temperature at lower station 60° and at upper 30°, or a total of 90°.

This temperature being 10° less than 100°, the deduction would be 10 feet. Therefore, 10°x10 feet=100, deducted from reading of 10,000 feet = correct height, 9,900 feet.

## TABLE OF ALTITUDES.

At mean Temperature of Atmosphere of 50° Fahrenheit.

Aneroid or Corrected Barometer	Height in Feet								
31.00	0	28.28	2500	25.80	5000	23.54	7500	21.47	10000
30.94	50	28.23	2550	25.75	5050	23.50	7550	21.44	10050
30.88	100	28.18	2600	25.71	5100	23.45	7600	21.40	10100
30.83	150	28.12	2650	25.66	5150	23.41	7650	21.36	10150
30.77	200	28.07	2700	25.61	5200	23.37	7700	21.32	10200
30.71	250	28.02	2750	25.56	5250	23.32	7750	21.28	10250
30.66	300	27.97	2800	25.52	5300	23.28	7800	21.24	10300
30.60	350	27.92	2850	25.47	5350	23.24	7850	21.20	10350
30.54	400	27.87	2900	25.42	5400	23.20	7900	21.16	10400
30.49	450	27.82	2950	25.38	5450	23.15	7950	21.12	10450
30.43	500	27.76	3000	25.33	5500	23.11	8000	21.08	10500
30.38	550	27.71	3050	25.28	5550	23.07	8050	21.05	10550
30.32	600	27.66	3100	25.24	5600	23.03	8100	21.01	10600
30.26	650	27.61	3150	25.19	5650	22.98	8150	20.97	10650
30.21	700	27.56	3200	25.15	5700	22.94	8200	20.93	10700
30.15	750	27.51	3250	25.10	5750	22.90	8250	20.89	10750
30.10	800	27.46	3300	25.05	5800	22.86	8300	20.85	10800
30.04	850	27.41	3350	25.01	5850	22.82	8350	20.82	10850
29.99	900	27.36	3400	24.96	5900	22.77	8400	20.78	10900
29.93	950	27.31	3450	24.92	5950	22.73	8450	20.74	10950
29.88	1000	27.26	3500	24.87	6000	22.69	8500	20.70	11000
29.82	1050	27.21	3550	24.82	6050	22.65	8550	20.66	11050
29.77	1100	27.16	3600	24.78	6100	22.61	8600	20.63	11100
29.71	1150	27.11	3650	24.73	6150	22.57	8650	20.59	11150
29.66	1200	27.06	3700	24.69	6200	22.52	8700	20.55	11200
29.61	1250	27.01	3750	24.64	6250	22.48	8750	20.51	11250
29.55	1300	26.96	3800	24.60	6300	22.44	8800	20.47	11300
29.50	1350	26.91	3850	24.55	6350	22.40	8850	20.44	11350
29.44	1400	26.86	3900	24.51	6400	22.36	8900	20.40	11400
29.39	1450	26.81	3950	24.46	6450	22.32	8950	20.36	11450
29.34	1500	26.76	4000	24.42	6500	22.28	9000	20.32	11500
29.28	1550	26.72	4050	24.37	6550	22.24	9050	20.29	11550
29.23	1600	26.67	4100	24.33	6600	22.20	9100	20.25	11600
29.17	1650	26.62	4150	24.28	6650	22.16	9150	20.21	11650
29.12	1700	26.57	4200	24.24	6700	22.11	9200	20.18	11700
29.07	1750	26.52	4250	24.20	6750	22.07	9250	20.14	11750
29.01	1800	26.47	4300	24.15	6800	22.03	9300	20.10	11800
28.96	1850	26.42	4350	24.11	6850	21.99	9350	20.07	11850
28.91	1900	26.37	4400	24.06	6900	21.95	9400	20.03	11900
28.86	1950	26.33	4450	24.02	6950	21.91	9450	19.99	11950
28.80	2000	26.28	4500	23.97	7000	21.87	9500	19.95	12000
28.75	2050	26.23	4550	23.93	7050	21.83	9550	19.91	12050
28.70	2100	26.18	4600	23.89	7100	21.79	9600	18.87	12100
28.64	2150	26.13	4650	23.84	7150	21.75	9650	17.83	12150
28.59	2200	26.09	4700	23.80	7200	21.71	9700	17.23	12200
28.54	2250	26.04	4750	23.76	7250	21.67	9750		
28.49	2300	25.99	4800	23.71	7300	21.63	9800		
28.43	2350	25.94	4850	23.67	7350	21.59	9850		
28.38	2400	25.89	4900	23.62	7400	21.55	9900		
28.33	2450	25.85	4950	23.58	7450	21.51	9950		

This table is intended more particularly for the graduation of Aneroids with a circle of Measures in Feet concentric with the ordinary circle of Barometric Heights measured in Inches. The circle of feet is to be read off, at the upper and lower stations, by the Index; and the rule for measuring the height will be:—Subtract the reading at the lower station from the reading at the upper station; the difference is the height in feet.

EXAMPLE { Barometer at Upper Station, 23.50 . . . . . 7550 feet  
 " Lower " 24.20 . . . . . 6750 "

Actual Height . . . . . 800 "

## "WATKIN" ANEROID BAROMETER.

The marvelous construction of this new Aneroid has been admitted by every scientific man who has seen it; and its accuracy has not only been submitted to various tests, in which it has worked perfectly, but it is also **GUARANTEED** by the maker. It is made in two sizes, **3 and 4-inch**, either with or without an altitude scale, and is so delicate that a reading can easily be taken **ONE FOOT IN HEIGHT**. Its very open scale renders it particularly suitable for delicate weather observations; and scientists, surveyors and tourists will find it of immense value.

### The Finest Barometer Made.

The Aneroid being put under an air pump or taken up to a mountain, the index, or registering point, in moving back, is gradually drawn **TOWARDS** the center, so that it faithfully follows the **DECREASING** spiral scale; but when the index moves in the opposite direction, the point moves **AWAY** from the center, thus following the **INCREASING** spiral. This is effected by the index or registering point being made to slide in or out so that one end may advance or recede from the center, and thus follow a spiral or other form of scale. Attached to the spindle is a cross-piece in which the index slides, and a hollow drum fixed to the dial plate has a flexible chain or cord wound round it, the ends being fastened to projecting pins riveted to the index. It follows from the construction that if the spindle and the piece attached to it is revolved, one portion of the chain or cord unwraps off the drum, the other being wound on to the same extent, and the index is caused



to slide through the cross-piece, the direction of motion being controlled by the direction in which the spindle is revolved.

In the cut the Aneroid is represented with three concentric circles of scales, with a hand or pointer sufficiently long to extend across them all. In order to show clearly which circle of scales should be read, there is an indicator attached to the movement of the instrument which causes a series of figures (I, II, III, corresponding with the three circles) to be exhibited through an aperture in the dial. For instance, when the instrument is in its normal state the hand will point to the first or outer circle, and the figure I will appear and remain in the aperture until the barometer falls to 28.7, where the break takes place in the circle, as will be seen in the illustration. The hand then takes up the reading on the second circle (where the break appears at 28.7), and figure II replaces figure I in the aperture, remaining there until the barometer falls to 26.5, when the reading is transferred to the third circle and figure III appears in the aperture.

No.	
2625	—3-inch or 4-inch, with altitude scale 5,000 feet, brass case. . . . . \$57.00
2627	—Same as above, altitude scale 10,000 feet, brass case. . . . . 62.50
2628	—Same as above, altitude scale 15,000 feet, brass case. . . . . 67.00
	Aluminum Cases, instead of brass, extra. . . . . 3.00

## ANEROID BAROMETERS.

For Ascertaining Heights and Meteorological Changes.



No. 2635.

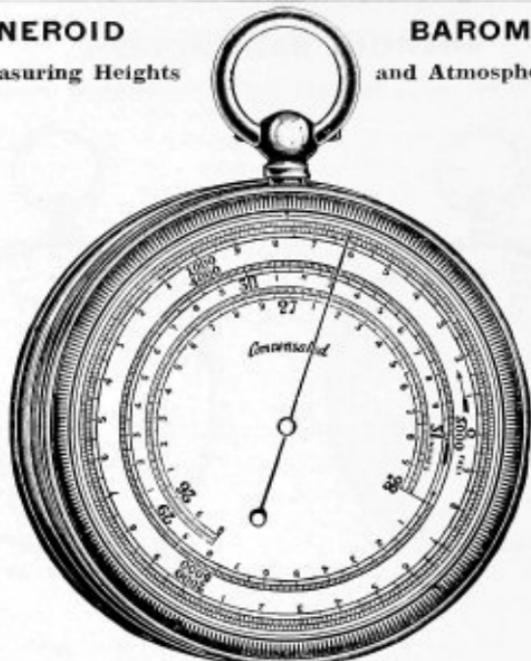


No. 2639A.

- No.
- 2634—Watch pattern, gilt case,  $1\frac{3}{4}$  in. diam., silvered metal dial, revolving altitude scale 8,000 feet, in morocco case.....each, \$13.00
- 2635—Watch pattern, gilt case,  $1\frac{3}{4}$  in. diam., of superior quality, silvered metal dial, revolving altitude scale 8,000 feet, compensated for temperature, in morocco case.....each, 21.00
- 2636—Like No. 2635, but altitude scale 10,000 feet.....each, 22.00
- 2637—Like No. 2635, but altitude scale 12,000 feet.....each, 22.75
- 2638—Like No. 2635, but altitude scale 16,000 feet.....each, 24.50
- 2639—Like No. 2635, but altitude scale 3,000 feet.....each, 23.25
- 2639 $\frac{1}{2}$ —Like No. 2635, but altitude scale 5,000 feet.....each, 22.00
- 2639A—Watch pattern, gilt case,  $1\frac{3}{4}$  in. diameter, superior quality, silvered metal dial with raised ring for divisions and curved thermometer, altitude scale 8,000 feet, with revolving scale....each, 22.50
- 2639B—Watch pattern, gilt case,  $1\frac{3}{4}$  in. diameter, superior quality, silvered metal dial, revolving altitude scale 8,000 feet, detachable bar, needle compass on reverse side, in morocco case.....each, 27.50
- 2639BB—Like No. 2639, but altitude scale 12,000 feet.....each, 29.00
- 2639C—Watch pattern, gilt case,  $1\frac{3}{4}$  in. diameter, altitude scale 8,000 feet, first quality, raised ring for divisions, curved thermometer and full size detachable singer pearl compass on reverse side, each..... 31.75
- 2639D—Watch pattern, nickel spring hunting case,  $1\frac{3}{4}$  in. diameter, silvered metal dial, revolving altitude scale 8,000 feet, compensated for temperature, in morocco case.....each, 21.00

**ANEROID**  
For Measuring Heights

**BAROMETERS**  
and Atmospheric Pressure.



No. 2649A.

2640—Pocket Aneroid 2½-inch diameter, altitude scale 8,000 feet with full size bar needle compass on reverse side, first quality . . . . .	\$29.50
2641—Pocket Aneroid 2½-inch, same as 2640 but altitude scale 16,000 feet . . . . .	33.00
2642—Pocket Aneroid, 2½-inch diameter, altitude scale 3,000 feet, first quality . . . . .	22.50
2643—Pocket Aneroid, 2½-inch diameter, altitude scale 5,000 feet, first quality . . . . .	21.25
2644—Pocket Aneroid, 2½-inch diameter, altitude scale 10,000 feet, first quality . . . . .	21.25
2645—Pocket Aneroid, 2½-inch diameter, altitude scale 12,000 feet, first quality . . . . .	22.25
2646—Pocket Aneroid, 2½-inch diameter, altitude scale 16,000 feet, first quality . . . . .	23.75
2647—Pocket Aneroid 2½-inch diameter, altitude scale 20,000 feet, first quality . . . . .	25.50
2648—Pocket Aneroid, 2½-inch diameter, altitude scale 8,000 feet, first quality, with raised ring for divisions and curved thermometer . .	23.50
2649—Pocket Aneroid, 2½-inch diameter, altitude scale 8,000 feet, first quality, with raised ring for divisions and curved thermometer, with full size bar needle on reverse side . . . . .	33.00
2649A—Pocket pattern, gilt case, 2½-inch diameter, a very portable form of surveying aneroid, no vernier or magnifier being used. The silvered metal dial is arranged to show an altitude scale of 5,000 feet in single 5 feet divisions in a repeating circle of divisions. The outside scale is divided to 10 feet and the scale directly beneath it subdivides it to 5 feet divisions, and by careful reading it is possible to read it even closer, compensated for temperature, in pigskin case . . . . . each,	50.00

**Extras.**

Keyless action to altitude scale additional . . . . .	3.00
Aluminum Cases for Barometers 2634 to 2639 additional . . . . .	2.50
Aluminum Cases for Barometers 2639A to 2639C additional . . . . .	5.80
Aluminum Cases for Barometers 2642 to 2647 additional . . . . .	3.75
Aluminum Cases for Barometers 2640-41-48-49 additional . . . . .	8.25
Leather Sling Cases instead of Morocco cases for 1¾-inch Barometer . .	1.75
Leather Sling Cases instead of Morocco cases for 2½-inch Barometer . .	2.00

**ANEROID BAROMETERS.**

For Surveying and Mining.



No. 2650.

Reading to Single Feet of Altitude Scale.



No. 2652.

Compensated for Temperature.

No.	Each.
2650—Surveying Aneroid, 3-inch diameter, compensated for temperature in bronze metal case, silvered metal dial with Vernier scale moved by rackwork motion, reading lens arranged to traverse the entire circle, altitude scale 6,000 feet, reading by Vernier to 1 foot, in sling leather case.....	\$63.00
2651—Surveying Aneroid, same as above, but altitude scale 10,000 feet, in sling leather case.....	65.00
2652—Surveying Aneroid, same as No. 2650, but altitude scale arranged for mining purposes, 4,000 feet ascent, 2,000 feet descent, in sling leather case.....	63.00
2653—Surveying Aneroid, 5-inch diameter, compensated for temperature in bronze metal case, silvered metal dial with Vernier scale, moved by rackwork motion, reading lens arranged to traverse the entire circle, altitude scale 6,000 feet, reading by Vernier to 1 foot, in sling leather case.....	68.00
2654—Surveying Aneroid, 5-inch, same as No. 2653, but altitude scale to 10,000 feet, in sling leather case.....	70.50
2655—Surveying Aneroid, 5-inch, same as No. 2653, but altitude scale to 20,000 feet, in sling leather case.....	78.00
2656—Surveying Aneroid, 5-inch, same as No. 2653, but altitude scale arranged for mining purposes, 4,000 feet ascent, 2,000 feet descent, in sling leather case.....	68.00
2657—Surveying Aneroid, 5-inch diameter, altitude scale, 8,000 feet, with raised ring for graduations, in morocco case.....	35.00
2658—Surveying Aneroid, 5-inch diameter, same as No. 2657, altitude scale, 12,000 feet.....	37.00
2659—Surveying Aneroid, 5-inch diameter, altitude scale, 8,000 feet, with raised ring for graduations and thermometer attached, in morocco case.....	38.00
2659A—Surveying Aneroid, 5-inch, same as No. 2659, altitude scale, 12,000 feet, morocco case.....	40.00

**Extras.**

Aluminum case for 3-inch Barometer.....	\$ 9.00
Aluminum case for 5-inch Barometer.....	13.00

## BAROGRAPHS.

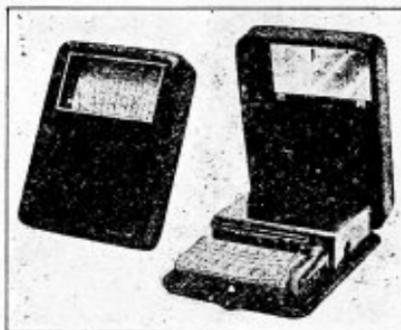
### RECORDING BAROMETERS.

These self-recording Aneroid Barometers are of great advantage in many cases where the bulk and weight of the usual barographs forbid their use.

The Pocket Barograph measures  $4\frac{3}{4} \times 3\frac{3}{8} \times 1\frac{3}{8}$  in. and weighs about one pound. The metal, morocco covered case has a glass inserted in the cover over the chart, for taking readings without opening the case.

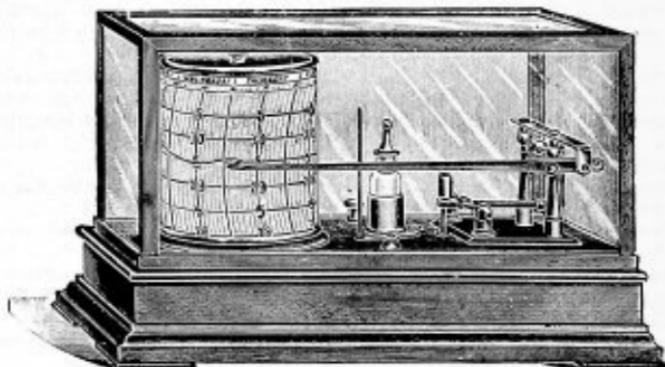
The chart is so ruled that it represents the time by half-hours, for 24 hours, and the pressure in feet of altitude. The pen makes contact every two minutes.

Notwithstanding its small size the Pocket Barograph is a reliable instrument. It also indicates atmospheric changes, like other aneroids.



No. 2660-A.

- No.  
 2660A—Pocket Barograph, compensated for temperature, reading to 4,000 feet, in morocco covered metal Case, bottle of Ink and 50 graduated Charts, with Directions.....each, \$60.00  
 2660B—Like 2660A, but reading to 7,800 feet.....each, 55.00  
 2660C—Like 2660A, but reading to 15,000 feet.....each, 55.00

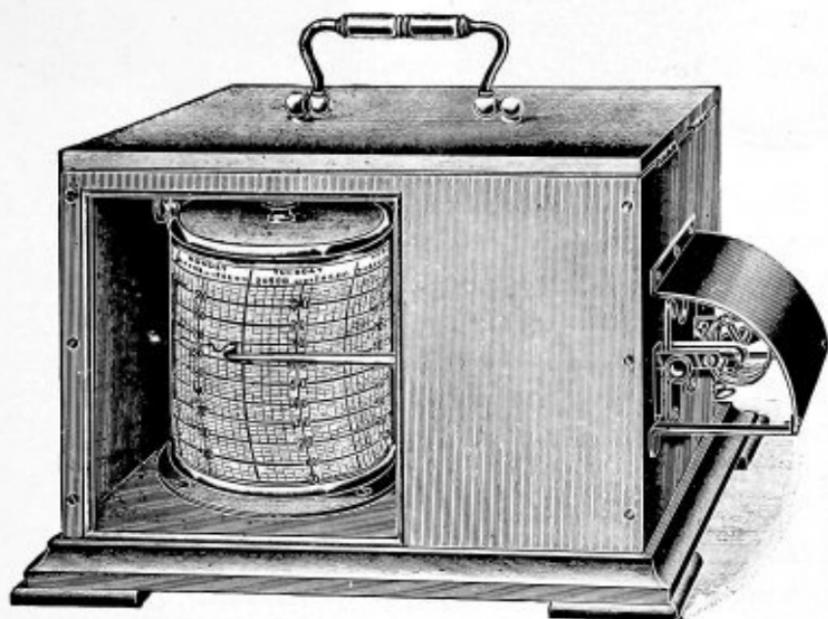


No. 2661-A.

The above illustration shows a new type of Barograph (Recording Barometer), recently patented. The movement is worked by a large vacuum pan concealed in the base of the instrument. It is built in a very simplified form and enables us to place a barograph on the market at a very popular price.

The clock is of the same style and quality as used on our regular instruments. Complete with perforated charts for a year, pen and ink, and mounted in fumed and waxed oak case.

- No.  
 2661A—Barograph, oak case, as above.....each, \$40.00

**THERMOGRAPHS.****RECORDING THERMOMETERS.**

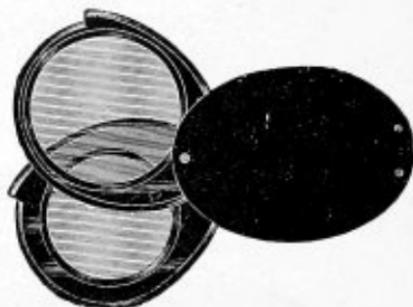
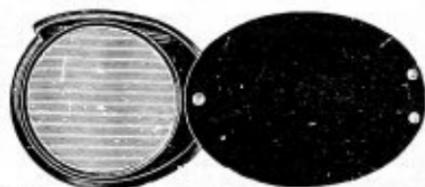
No. 2662A.

**NEW PATTERN THERMOGRAPH, SIMPLIFIED FORM.**

In the above Thermograph or Recording Thermometer the movement consists of a spiral lamina of non-rusting material which is exposed to the atmosphere at the end of the case. It is extremely sensitive, and having no levers in its construction makes it very rigid. It is not affected by vibration, as the pen arm is in direct connection with the coil. It is mounted both in copper and wood cases, very compact and portable.

No.		
2662A	—Thermograph in oak case.....	each, \$40.00
2662B	—Thermograph in copper case.....	each, 43.00
2662C	—Thermograph in copper case, with lock and key, high drum clock, range—50° to +120° F.....	each, 50.00

## POCKET MAGNIFIERS.



No.			
2666	Nickel plated, metal case, folding, 1 lens,	$\frac{3}{8}$ -inch diameter	.....\$ .50
2667	Nickel plated, metal case, folding, 2 lens,	$\frac{3}{8}$ -inch diameter	..... .75
2668	Nickel plated, metal case, folding, 3 lens,	$\frac{3}{8}$ -inch diameter	..... 1.00
2669	Nickel plated, metal case, folding, 1 lens, 1	-inch diameter	..... .60
2670	Nickel plated, metal case, folding, 2 lens, 1	-inch diameter	..... .90
2671	Nickel plated, metal case, folding, 3 lens, 1	-inch diameter	..... 1.15
2672	Nickel plated, metal case, folding, 1 lens, 1	$\frac{1}{4}$ -inch diameter	..... .75
2673	Nickel plated, metal case, folding, 2 lens, 1	$\frac{1}{4}$ -inch diameter	..... 1.00
2674	Nickel plated, metal case, folding, 3 lens, 1	$\frac{1}{4}$ -inch diameter	..... 1.25
2677	Rubber Case, 1 lens, size of glass,	$\frac{3}{8}$ -inch diameter	..... .35
2677	Rubber Case, 1 lens, size of glass, 1	-inch diameter	..... .35
2678	Rubber Case, 1 lens, size of glass, 1	$\frac{1}{4}$ -inch diameter	..... .50
2679	Rubber Case, 1 lens, size of glass, 1	$\frac{1}{2}$ -inch diameter	..... .60
2680	Rubber Case, 1 lens, size of glass, 1	$\frac{3}{4}$ -inch diameter	..... .75
2681	Rubber Case, 1 lens, size of glass, 2	-inch diameter	..... .95
2682	Rubber Case, 2 lens, size of glass,	$\frac{5}{8}$ and $\frac{3}{8}$ -inch diameter	..... .50
2683	Rubber Case, 2 lens, size of glass,	$\frac{7}{8}$ and 1 -inch diameter	..... .60
2684	Rubber Case, 2 lens, size of glass, 1	$\frac{1}{8}$ and 1 $\frac{1}{4}$ -inch diameter	..... .80
2685	Rubber Case, 2 lens, size of glass, 1	$\frac{1}{4}$ and 1 $\frac{1}{2}$ -inch diameter	..... 1.00
2686	Rubber Case, 2 lens, size of glass, 1	$\frac{1}{2}$ and 1 $\frac{3}{4}$ -inch diameter	..... 1.25
2687	Rubber Case, 2 lens, size of glass, 1	$\frac{3}{4}$ and 2 -inch diameter	..... 1.55

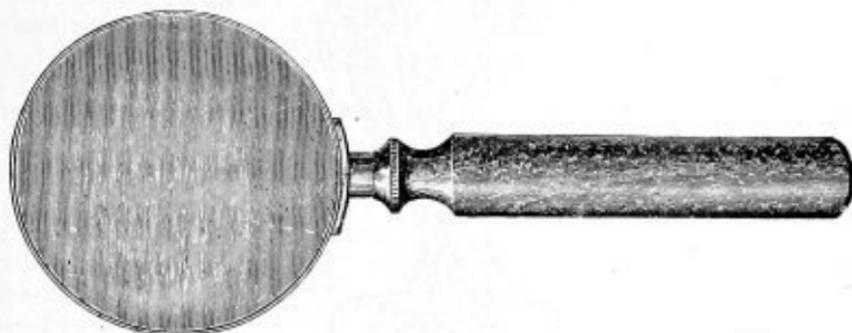
## CODDINGTON MAGNIFIERS.



No.			
2688	$\frac{1}{2}$ -inch diameter	..... each,	\$1.50
2689	$\frac{5}{8}$ -inch diameter	..... each,	1.75
2690	$\frac{3}{4}$ -inch diameter	..... each,	2.00
2691	1-inch diameter	..... each,	2.25

## READING AND PICTURE GLASSES.

First Quality.



Double convex lens, mounted in round nickel-plated metal frames, with polished ebonized handles.

No.		each,	\$
2692A	—22 Lignes, 2 -inch diamter.....		0.60
2692B	—27 Lignes, 2 ½-inch diameter.....		.80
2692C	—33 Lignes, 3 -inch diameter.....		1.00
2692D	—39 Lignes, 3 ½-inch diameter.....		1.50
2692E	—45 Lignes, 4 -inch diameter.....		2.00
2692F	—51 Lignes, 4 ½-inch diameter.....		2.25
2692G	—57 Lignes, 5 -inch diameter.....		2.50
2692H	—60 Lignes, 5 ½-inch diamter.....		3.00
2692 I	—66 Lignes, 6 -inch diameter.....		3.75

Reducing Glasses, mounted in nickel-plated frames, polished wooden handle.

2693A	—2 -inch diameter .....	\$1.10
2693B	—2 ½-inch diameter .....	1.50
2693C	—3 -inch diameter .....	1.80

## HASTINGS' APLANATIC TRIPLET MAGNIFIERS.

After the formula of Prof. Chas. S. Hastings,  
Sheffield Scientific School, Yale University.

These are the best hand magnifiers obtainable anywhere and should be recommended over all others. They are composed of three cemented lenses and are very small and compact. The field embraces a wide angle and the image is sharp and clear to the very edge. The working distance is very large, and the definition is such as to show structure not visible with other magnifiers of equal magnification.

No.		each,	\$
2694	—¼-inch diameter, Hastings' Aplanatic Magnifiers.....		8.50
2694A	—⅜-inch diameter, Hastings' Aplanatic Magnifiers.....		8.75
2694B	—½-inch diameter, Hastings' Aplanatic Magnifiers.....		9.00
2694C	—¾-inch diameter, Hastings' Aplanatic Magnifiers.....		9.25
2694D	—1-inch diameter, Hastings' Aplanatic Magnifiers.....		9.50

**MEASURING CHAINS.**

No. 2723.

**STEEL WIRE CHAINS.**

No.				
2705	—Surveyors' Chain,	2 poles,	33 feet, No. 12 steel wire, oval rings.	\$3.50
2706	—Surveyors' Chain,	4 poles,	66 feet, No. 12 steel wire, oval rings.	6.50
2707	—Engineers' Chain,	50 feet,	50 links, No. 12 steel wire, oval rings.	4.50
2708	—Engineers' Chain,	100 feet,	100 links, No. 12 steel wire, oval rings.	8.00

**METRIC CHAINS.**

No.				
2709	—10 Meters,	50 links,	No. 12 steel wire	\$ 4.00
2710	—10 Meters,	50 links,	No. 12 steel wire, brazed links and rings.	6.00
2711	—20 Meters,	100 links,	No. 12 steel wire	7.00
2712	—20 Meters,	100 links,	No. 12 steel wire, brazed links and rings.	10.50

**STEEL WIRE CHAINS, BRAZED LINKS.**

No.				
2715	—Surveyors' Chains,	33 feet,	No. 12 steel wire, oval rings.	\$ 5.50
2717	—Surveyors' Chains,	66 feet,	No. 12 steel wire, oval rings.	10.00
2720	—Engineers' Chains,	50 feet,	No. 12 steel wire, oval rings.	6.00
2722	—Engineers' Chains,	100 feet,	No. 12 steel wire, oval rings.	11.00
2723	—Engineers' Chains,	100 feet,	No. 11 steel wire, oval rings.	12.00

**STEEL VARA CHAINS.****Mexican Measurement.**

The Spanish or Mexican Vara, which is in very general use in Texas, Mexico, Cuba, and all old Spanish countries, is 33.333 inches long. The chains are made ten, twenty, and thirty varas, each vara being usually divided into three links, including two rings at each end; sometimes, but rarely, the vara is divided into four or five links, but these we only make to order. Three links in stock.

No.			
2725	—10 Vara Chains,	50 links, No. 10 steel wire.....	\$ 3.50
2726	—20 Vara Chains,	100 links, No. 10 steel wire.....	6.50
2727	—30 Vara Chains,	150 links, No. 10 steel wire.....	9.00
2728	—10 Vara Chains,	50 links, No. 10 steel wire, brazed.....	5.50
2729	—20 Vara Chains,	100 links, No. 10 steel wire, brazed.....	10.00
2730	—30 Vara Chains,	150 links, No. 10 steel wire, brazed.....	14.00

**ARROWS OR MARKING PINS.**

No. 2745.



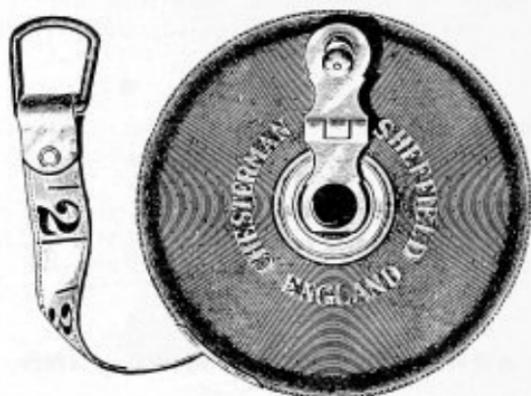
No. 2748.

No.			
2745	—Steel Wire, light,	11 in a set, 14 inches long.....	\$1.00
2746	—Steel Wire, medium,	11 in a set, 14 inches long.....	1.25
2747	—Steel Wire, extra heavy,	11 in a set, 14 inches long.....	1.50
2748	—Steel Wire, heavy,	11 in a set, tapered, 10 inches long.....	1.30
2749	—Steel Wire, heavy,	11 in a set, tapered, 14 inches long.....	1.50

Marking Pins No. 2748-49 are of an entirely new form, having a heavy ring, and tapering from the ring to a point, is a very strong pin, highly polished and will not bend; can be readily used in hard soil. The rings are enameled a bright red—a new feature that will be appreciated. These pins are highly recommended.

## CHESTERMAN'S METALLIC TAPES.

These tapes are made of linen thread, interwoven with fine brass wire, not so liable to stretch as the usual linen tape, and better calculated to withstand the effects of moisture. They are in substantial leather cases.

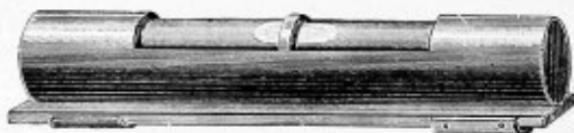


No. 2750.

In ordering all tapes state what division of the foot is required; they are divided in **tenths** of a foot, or **twelfths** of a foot.

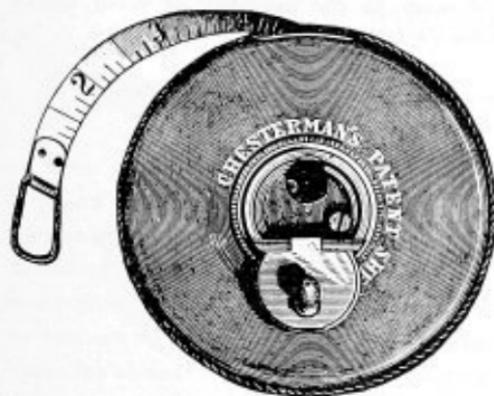
No.			
2750	Metallic Tape Measure,	25 feet long, in 10ths or 12ths...	each, \$1.80
2751	Metallic Tape Measure,	33 feet long, in 10ths or 12ths...	each, 2.10
2752	Metallic Tape Measure,	50 feet long, in 10ths or 12ths...	each, 2.60
2753	Metallic Tape Measure,	66 feet long, in 10ths or 12ths...	each, 3.00
2754	Metallic Tape Measure,	75 feet long, in 10ths or 12ths...	each, 3.30
2755	Metallic Tape Measure,	100 feet long, in 10ths or 12ths...	each, 4.20
2760	50 feet, tape only, no boxes.....		1.50
2763	100 feet, tape only, no boxes.....		3.00

**TAPE**



**LEVEL**

No.			
2764	Length, two and one-half inches. Weight, one ounce. Clamps on tape securely by two springs, as shown; can be attached and detached instantly, and carried in pocket when not in use. It fills a long-felt want and is a remarkably useful addition to every surveyor's outfit.....		price, \$1.50

**CHESTERMAN'S STEEL TAPES.**

No. 2765.

Red Leather Case, Flush Handle, with New Opening Device,

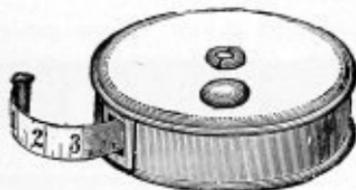
Steel Ribbon  $\frac{3}{8}$  inch wide.

In ordering please state what Graduation is wanted.

No.			
2765—	Steel Tape Measure,	25 feet long, in 10ths or 12ths.....each,	\$ 4.50
2766—	Steel Tape Measure,	33 feet long, in 10ths or 12ths.....each,	5.50
2767—	Steel Tape Measure,	50 feet long, in 10ths or 12ths.....each,	7.20
2768—	Steel Tape Measure,	66 feet long, in 10ths or 12ths.....each,	9.25
2769—	Steel Tape Measure,	75 feet long, in 10ths or 12ths.....each,	10.50
2770—	Steel Tape Measure,	100 feet long, in 10ths or 12ths.....each,	12.80

**POCKET STEEL TAPES.**

German silver case, with spring and stop. Divided in inches and sixteenths one side; millimeters on other.



No. 2783.

No.			
2783—	Pocket Steel Tape, in German Silver case,	3 feet.....each,	\$0.90
2784—	Pocket Steel Tape, in German Silver case,	4 feet.....each,	1.00
2785—	Pocket Steel Tape, in German Silver case,	5 feet.....each,	1.10
2786—	Pocket Steel Tape, in German Silver case,	6 feet.....each,	1.40
2787—	Pocket Steel Tape, in German Silver case,	8 feet.....each,	1.85
2788—	Pocket Steel Tape, in German Silver case,	10 feet.....each,	2.25
2789—	Pocket Steel Tape, in German Silver case,	12 feet.....each,	2.60

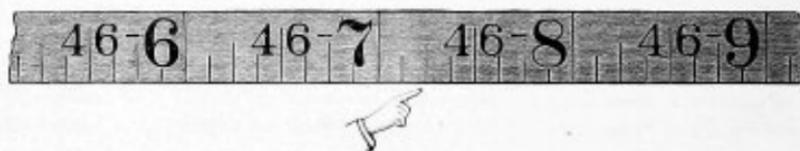
Steel Tapes Repaired at Short Notice.

## SOMETHING ABSOLUTELY NEW.

One of the greatest improvements ever made in the marking of Steel Tapes.  
No searching for foot marks.

Feet and fractions instantly indicated at any part of the Tape.  
Errors and annoyances eliminated; time saved;  
Accuracy insured.

One of the greatest improvements in the marking of Measuring Tapes is embodied in our new idea, which we have termed **Instantaneous Readings**, though the name conveys but a part of its full worth. Our illustration shows at a glance the nature of the improvement to which we refer. Users of long tapes are aware of the inconvenience which arises from the fact that the number of feet is only registered at the end of each twelve inches. When a tape is out some distance and an exact measurement is required, which happens to fall between two foot marks, it is necessary, having ascertained the inches, to go back carefully to discover the last registered foot. The simple innovation now introduced, by which the foot is registered at each inch space, makes it possible to read at a glance, instantly and with no risk of error, the exact measurement at any point. To illustrate: Suppose the total length should fall at 46 feet, 7  $\frac{1}{4}$  inches. The reading would appear thus:



It is read at one glance. One of the common errors is made in reading 11 feet, when the figures for 11 inches immediately precede the figure for 11 feet. No such error in reading can occur with our new markings, as a glance at the following illustration will show.



Those using a tape will save a vast amount of time and insure a greater degree of accuracy in their work by using these markings. We venture to say that after using them for a short time a return to the old style would seem tedious.

We have patents pending for this improvement which cover broadly all its applications, which will fully protect us in the manufacture and sale of same.

Instantaneous readings will hereafter be furnished on our Steel Tapes, numbers 2790 to 2795  $\frac{1}{2}$ , 2804, 2809 to 2812, 2816 to 2821.

## "RIVAL JUNIOR"

## "CHALLENGE JUNIOR"

## STEEL TAPES.



No. 2790.

Nickel plated steel cases, flush folding handle, with  $\frac{1}{4}$ -inch tapes.



No. 2791.

Hard leather cases, nickel plated trimmings, folding flush handle, with  $\frac{1}{4}$ -inch tapes.

Marked feet and 12ths (inches and sixteenths.)	Marked feet, 10ths and 100ths of feet, for Surveyor's use.	Length.	Diameter of Case.	Each.
No. 2790	No. 2790A	25 ft.	2 $\frac{1}{4}$ in.	\$2.50
" 2790B	" 2790C	50 "	2 $\frac{3}{4}$ "	3.00
" 2791	" 2791A	25 "	2 $\frac{1}{4}$ "	3.00
" 2791B	" 2791C	50 "	2 $\frac{7}{8}$ "	3.50
" 2791D	" 2791E	75 "	3 $\frac{1}{8}$ "	4.50
" 2791F	" 2791G	100 "	3 $\frac{3}{4}$ "	6.00

## "RELIABLE JUNIOR."

With double folding flush handle opened by pressing small pin or button on opposite side, hard leather case, nickel plated trimmings. Measurements guaranteed accurate. Tape  $\frac{1}{4}$  inch wide.

A first-class and elegant vest pocket steel tape. 25 feet. Weighs only 3 ounces, 50 feet only 5 ounces complete.

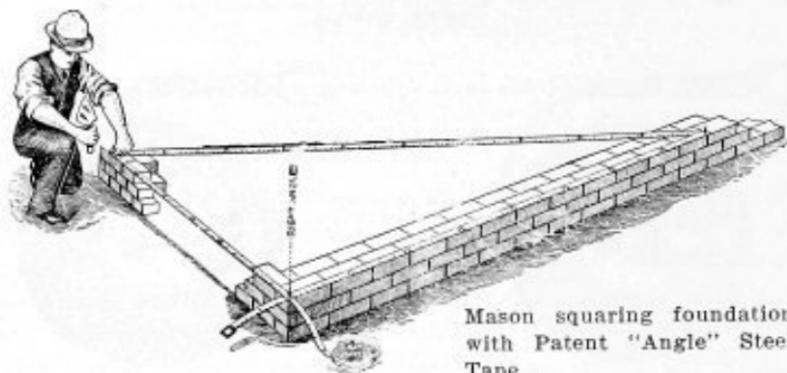
Tapes marked metric measure, one side only, at same price.



No. 2794.

No.			
2794	—Reliable Junior Steel Tape, 50-ft., in 10ths.....	each,	\$5.00
2794 $\frac{1}{2}$	—Reliable Junior Steel Tape, 50-ft., in 12ths.....	each,	5.00
2795	—Reliable Junior Steel Tape, 25-ft., in 10ths.....	each,	4.00
2795 $\frac{1}{2}$	—Reliable Junior Steel Tape, 25-ft., in 12ths.....	each,	4.00

## STEEL TAPE WITH PATENT ANGLE ATTACHMENT.



Mason squaring foundation with Patent "Angle" Steel Tape.

**Steel Tape, with Patent Angle Attachment** is indispensable to every progressive Engineer, Surveyor, Contractor, Mason, Builder, etc. It consists of a strong Steel Tape,  $\frac{3}{8}$ -in. wide, graduated on one side only, into feet, inches and eighths, or feet, 10ths and 100ths, in elegant leather and metal cases. Its accuracy is guaranteed. This tape can be used for **all kinds of measurements** and also for laying out right angles much quicker than by any other method and equally accurate. Its principle is the old trigonometrical formula that 6, 8 and 10 ft. sides of a triangle secure a right angle. This formula is embodied in this tape, by providing it at the 1, 9, 19 and 25 ft. marks with eyelets, the 9 and 19 ft. marks being joints. To use the tape, fasten it at the starting point with a small marking pin or nail through the eyelet at figure 1 on the tape; then fasten it at figure 9 as shown in illustration; place the 25 ft. mark over the starting point and taking hold of the tape at the 19 ft. mark, pull it straight as shown in the cut. You will then have a perfect right angle at the starting point. The advantages of this tape are obvious. A perfect right angle is obtained in a few minutes by **one person**, while the operator is not encumbered with a Surveying instrument or other tools. **The tape is also equal to any other for straight and all kinds of measurements.**

Furnished with elegant hard leather cases, nickel plated trimmings, and tape is three-eighths inch wide, marked one side only in tenths or twelfths. Accuracy guaranteed.

Marked feet and 12ths (inches and eighths)	Marked feet, 10ths and 100ths of feet for Engineer's use	Length	Each
No. 2796A	No. 2796B	25 feet	\$3.50
" 2796C	" 2796D	50 "	4.25
" 2796E	" 2796F	75 "	5.50
" 2796G	" 2796H	100 "	7.00

## LINEN POCKET TAPES.

Our linen tapes must not be confounded with the ordinary cotton pocket tapes. Our tape is a strong, serviceable tape, in nickel-plated case, with spring and stop; divided inches and sixteenths one side, millimeters on other.

No.

2798	—Linen Pocket Tapes, 3 feet.....	\$0.25
2799	—Linen Pocket Tapes, 5 feet.....	.30
2799 ½	—Linen Pocket Tapes, 6 feet.....	.35

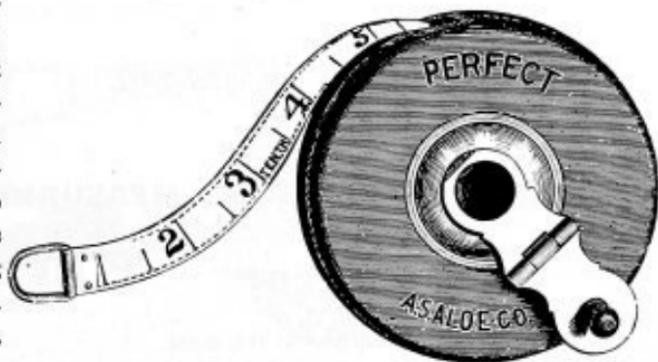


No. 2798.

## "PERFECT" METALLIC TAPES.

The "Perfect" Metallic Tapes, will be found to combine all the good qualities of the best tapes made. We do not hesitate to pronounce the "Perfect" Tape equal to all others.

The "Perfect" Metallic Tapes, 5/8-inch wide, are made of the best linen thread interwoven with wire, and coated with a water-proof preparation to protect the surfaces and prevent stretching as much as possible. Hard leather cases, brass folding handles, and brass trimmings.

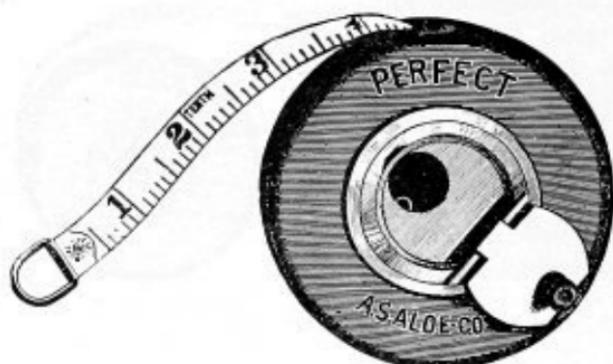


No. 2800.

Specify in ordering if wanted in 10ths or 12ths.

No.	25-ft.	33-ft.	50-ft.	66-ft.	75-ft.	100-ft.	
2800	—10ths or 12ths.....	\$1.35	\$1.75	\$2.00	\$2.50	\$2.65	\$3.25
2800A	—10ths or 12ths, Flush Handle.....	.....	2.35	.....	.....	.....	.....
			10m.	15m.	20m.	25m.	30m.
2800B	—Meters and Centimeters.....	\$2.00	\$2.50	\$2.80	\$3.40	\$3.90	
		25-ft.	33-ft.	50-ft.	66-ft.	75-ft.	100-ft.
2801	—Tapes only, no boxes.....	\$0.75	\$0.90	\$1.10	\$1.40	\$1.65	\$2.00

## "PERFECT" STEEL TAPES.



No. 2802.

The "Perfect" steel Tape is superior to all others. Extraordinary care is exercised in preparing and graduating these tapes and none but the finest grade of steel is used. Absolute accuracy is guaranteed. Tape  $\frac{3}{8}$ -inch, marked either feet 10ths and 100ths or feet, inches and eighths (specify when ordering). Hard leather case, flush handle. Highly recommended.

Specify in ordering if wanted in 10ths or 12ths.

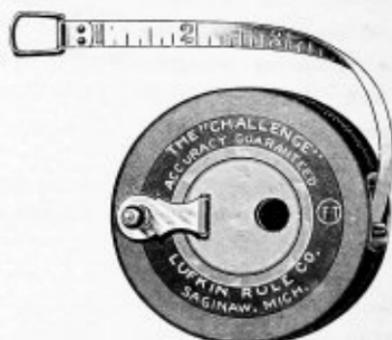
No.	25-ft.	50-ft.	75-ft.	100-ft.
2802—10ths or 12ths.....	\$3.50	\$4.50	\$5.75	\$7.50
	10m. 15m.	20m.	25m.	30m.
2803—Metric measure .....	\$4.25	\$5.00	\$6.00	\$7.00
		\$6.00	\$7.00	\$8.00

## "CHALLENGE" STEEL MEASURING TAPES.

The "Challenge" Tape is one of the most popular tapes, low in price but good value.

Hard leather cases, nickel plated trimmings, flush handle, marked one side only, in tenths or twelfths.

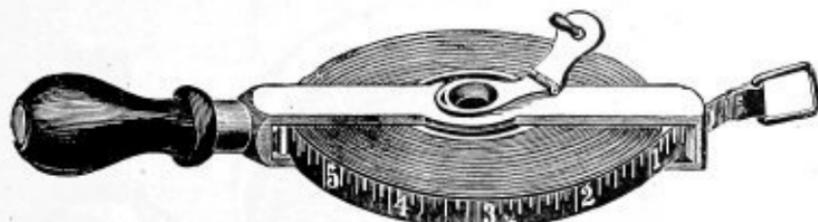
Tape  $\frac{3}{8}$ -inch wide.



No.	25-ft.	50-ft.	70-ft.	100-ft.
2804—10ths or 12ths.....	\$3.25	\$4.00	\$5.25	\$6.75

For tapes marked both sides add 3 cents foot to above prices.

Tapes Repaired at Short Notice.

**"CLEVELAND" STEEL TAPES.**

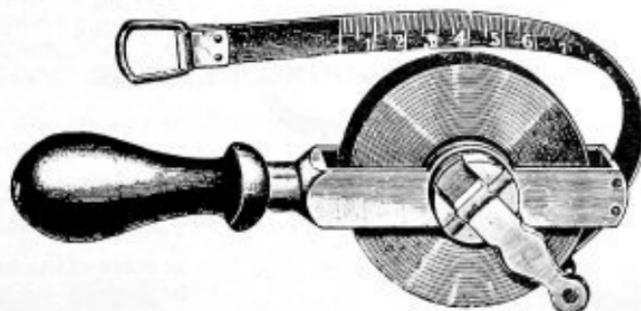
No. 2805.

"Cleveland" Steel Tape,  $\frac{3}{8}$ -inch wide, on patent brass frame, long folding handle, frame and mountings nicely finished. A very strong and serviceable style of tape. Marked either 10ths or 12ths. (Specify when ordering.)

No.	50-ft.	100-ft.	200-ft.	
2805 —In 10ths or 12ths, tape $\frac{3}{8}$ -inch wide.....	\$4.75	\$8.00	\$10.00	
2805A—In 10ths or 12ths, tape $\frac{1}{2}$ -inch wide.....	5.00	9.00	18.00	
	10m.	20m.	30m.	60m.
2806—Metric measure, $\frac{1}{2}$ -inch wide.....	\$6.00	\$7.50	\$10.00	\$20.00

**"STANDARD" STEEL TAPES.**

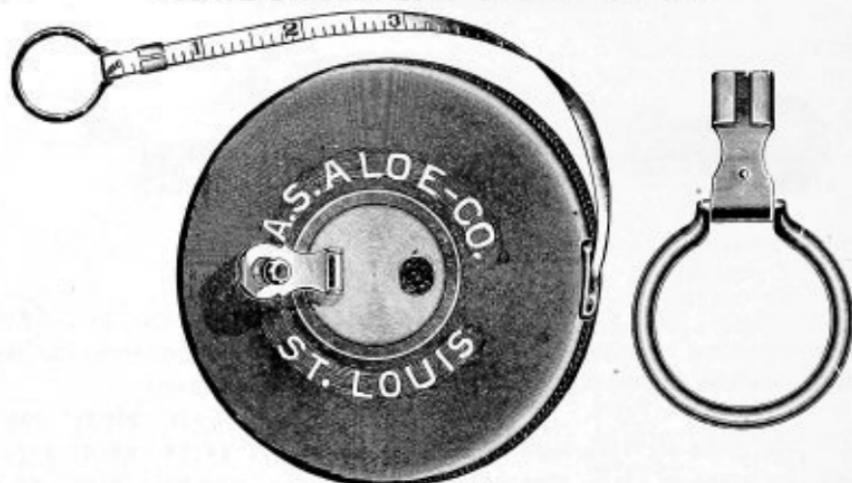
With Locking Handle and Deep Etched Tape.



This Tape which we introduced is the most improved tape on the market, and will outlast any two tapes of any other make. The steel ribbon is etched in the reverse way to that usually employed by tape makers, the etching being cut into the steel where the usual method is to have the etching raised. The advantages of deep etching is that it allows for the tape being cleaned without rubbing off the graduations. The locking handle which folds over the tape enables you to stop the tape at any desired length. This handle, on account of its length, also affords increased winding leverage, which, together with the large knob, makes it especially convenient and easy winding.

No.	50-ft.	100-ft.
2807—Tape $\frac{1}{2}$ -inch wide, divided in 10ths or 12ths.....	\$5.25	\$9.00

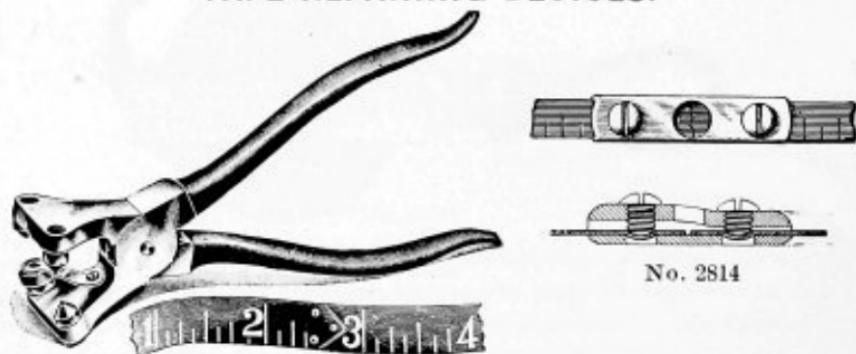
## PAINE'S PATTERN STEEL TAPES.



With  $\frac{1}{4}$  inch tapes; hard leather, steel lined cases, nickel plated trimmings, two detachable rings. The tape can be readily detached from the case, and we furnish an extra ring for the other end. The steel is heavier and stronger than used in the regular steel tapes, and the cases are thinner. Marked on one side in tenths or twelfths. Specify when ordering.

No.	
2809—Steel Tape, $\frac{1}{4}$ -in. wide, in leather case, 50 feet long.....	\$ 6.00
2810—Steel Tape, $\frac{1}{4}$ -in. wide, in leather case, 66 feet long.....	8.00
2811—Steel Tape, $\frac{1}{4}$ -in. wide, in leather case, 75 feet long.....	9.50
2812—Steel Tape, $\frac{1}{4}$ -in. wide, in leather case, 100 feet long.....	12.00

## TAPE REPAIRING DEVICES.



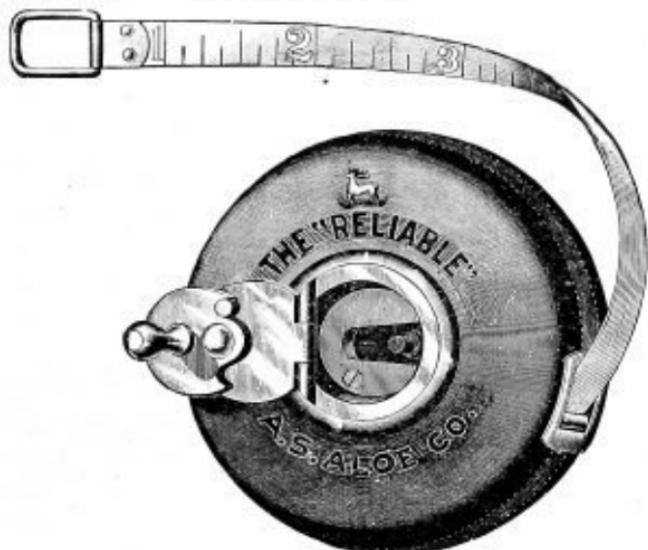
No.	No. 2813	
2813	—Punch and Riveter Outfit, complete with 1,000 eyelets... each,	\$5.00
2813A	—Punch and Riveter Outfit, Tandem style with 1,000 eyelets... each,	5.00
	Extra eyelets for outfit furnished 1,000 in package, two lengths,	
	.....per package,	1.25
2814	—Little Giant Tape Splice, for $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{3}{8}$ , $\frac{1}{2}$ in. Tapes... each,	.35

To repair breaks, insert broken ends; adjust by sight hole and turn down screws. Will not catch on obstructions and will withstand the strongest pull.

In ordering, please mention size wanted.

**"RELIABLE" STEEL TAPES.**

With double folding flush handle, opened by pressing small pin or button on opposite side. Hard leather cases. Nickel-plated trimmings. Measurements guaranteed perfectly accurate. Tape  $\frac{3}{8}$ -inch wide. Divided in 10ths and links or 12ths and links. Specify when ordering.



No. 2816.

No.		
2816—	"Reliable" Steel Tape Measure, 25 feet long.....	\$ 4.50
2817—	"Reliable" Steel Tape Measure, 33 feet long.....	5.20
2818—	"Reliable" Steel Tape Measure, 50 feet long.....	7.20
2819—	"Reliable" Steel Tape Measure, 66 feet long.....	9.20
2820—	"Reliable" Steel Tape Measure, 75 feet long.....	10.40
2821—	"Reliable" Steel Tape Measure, 100 feet long.....	12.80

We can also furnish our "Reliable" Tapes marked feet on one side meters on the other, at an additional cost of 2 cents per foot.

**IDEAL STEEL TAPE WITH LOCKING DEVICE.**

This Tape has the same advantages as our "Standard" Tape No. 2807. The steel ribbon is deep etched, will allow cleaning without removing the graduations, and has a locking handle which permits the tape to be stopped at any point desired. In leather case. Tape  $\frac{1}{2}$ -inch wide. Divided in 10ths or 12ths. Specify when ordering.



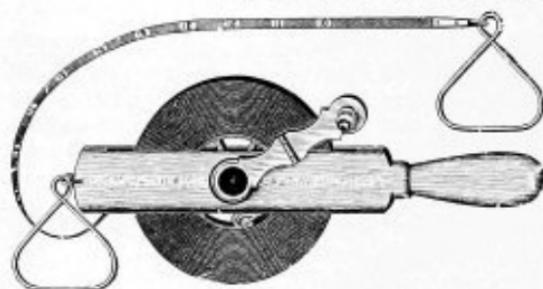
No.		
2842—	Ideal Tape with locking device, 50 feet.....	each, \$5.50
2843—	Ideal Tape with locking device, 100 feet.....	each, 9.00

## EXTRA STRONG AND HEAVY TAPE CHAINS.

These are extra wide, thick and strong, with heavy swivel handles, on our Patent Long Island Reel. They are extensively used where tapes receive the hardest and roughest kind of usage; especially in the mines and mountains. It is almost impossible to break these Tapes unless you use a hammer. They are graduated by brass rivets and figures, exactly the same as our tape chains on our Patent Electric Reel. See page 143.

No.		50 ft.	100 ft.
2844—	Tape $\frac{3}{4}$ -in. wide, every ft. End ft., in 10ths plain . . . . .	\$7.50	\$11.00
2845—	Tape $\frac{3}{4}$ -in. wide, every ft. End ft., in 10ths nickel plated . . .	8.75	12.50
2846—	Tape $\frac{3}{4}$ -in. wide, every ft. End ft., in 10ths aluminum-plated .	9.50	13.50
2847—	Tape $\frac{5}{8}$ -in. wide, every ft. End ft., in 10ths plain . . . . .	6.50	9.50
2848—	Tape $\frac{5}{8}$ -in. wide, every ft. End ft., in 10ths nickel-plated . . .	7.75	11.00
2849—	Tape $\frac{5}{8}$ -in. wide, every ft. End ft., in 10ths aluminum-plated .	8.50	12.00

## SURVEYOR'S CHAIN TAPES.



Patented August 18, 1903.  
No. 2849A.

With heavy  $\frac{1}{4}$ -inch Steel Tapes. Nicely finished hardwood reel, with large metal folding handle and two large detachable rings. Trimmings nicely nickel-plated. The frame and winding apparatus is strong, durable and compact, and can be conveniently carried in the pocket when the tape is in use. The tape can easily be detached from the frame.

These Tapes are made of best quality of tempered steel, with etched graduations at every foot, end feet in 10ths.



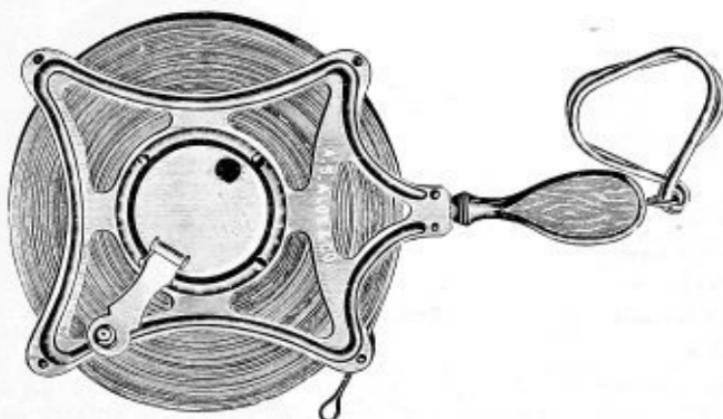
Above illustration shows method of etching used.

No.		
2849A—	100 feet long, graduated, every foot end feet in 10ths. . . . .	each, \$6.00
2849B—	200 feet long, graduated, every foot end feet in 10ths. . . . .	each, 9.00
2849C—	66 feet long, graduated, every link end link in 10ths. . . . .	each, 5.00

Tapes without reels \$2.00 less than with reels. Handles, 50 cents pair.

**IMPROVED STEEL TAPE CHAINS.**

On Brass Reel.



These Tapes are made of superior steel, about  $\frac{1}{4}$ -inch wide, graduated every foot by a brass rivet, end feet in 10ths, and the number of feet is stamped on brass plates every five feet. They are provided with a handy, substantial reel and a pair of round detachable handles. These tapes are not intended to take the place of the finely graduated steel tapes, but are especially designed for convenience and durability to replace the heavy chains in all surveying work. They can be dragged through brush, etc., and if they are plated they do not rust and do not require any oiling or cleaning after being used.

No.	Graduated.	Plain.	Nickel Plated.	Alumi- num Plated.
2850	100 feet long, every foot, end feet in tenths..	\$5.00	\$6.00	\$7.00
2854	66 feet long, every link.....	5.00	6.00	6.50
2857	50 feet long, every foot, end feet in tenths..	4.00	5.00	5.50
2861	33 feet long, every link.....	3.00	4.00	4.50
2862	200 feet long, every foot, end feet in tenths..	7.50	9.00	10.50
2864	40 varas long, every vara, each vara in fifths.	4.00	5.00	6.00
2865	20 varas long, every vara, each vara in fifths.	3.00	4.00	4.50
2866	10 varas long, every vara, each vara in fifths.	2.40	3.00	3.50

**BRIDGE TAPES.**

No.	Plain.	Nickel Plated.	Alumi- num Plated.
2867—300 feet long, graduated every foot, end feet in tenths .....	\$11.50	\$13.50	\$16.50
2869—400 feet long, graduated every foot, end feet in tenths .....	12.50	15.50	18.00
2871—500 feet long, graduated every foot, end feet in tenths .....	16.00	19.00	22.00

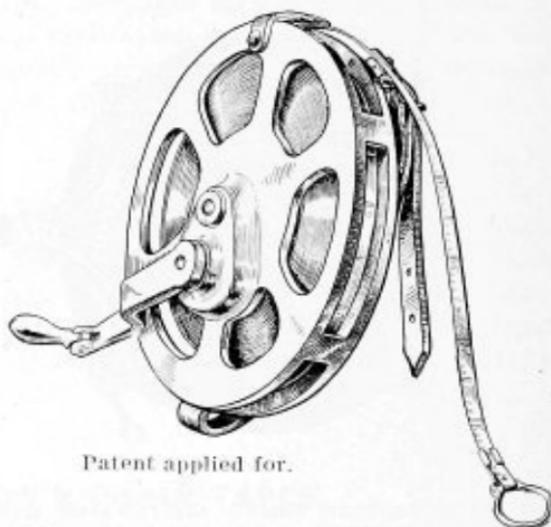
Brass Reel, without tape, \$1.50. Improved Folding Hard Wood Reel, 50c.

Patent Brass Detachable Handles, per pair, 30 cents.

Prices above include our Patent Brass Reel and pair Patent Brass Detachable Handles.

**"IDEAL" TAPE REEL.****The Highest Development in Tape Reel Design.**

A perfect  
Tape-winding  
Machine  
that will save its  
cost in a few days'  
use and make  
chaining a pleasure  
instead of a  
drudgery.



Patent applied for.

**Light, strong, durable and fully guaranteed.****Specifications.**

Diameter,  $5\frac{1}{8}$  inches; weight, 10 ounces; capacity, about 125 feet of tape. Material: Frame, McAdamite Aluminum—the strongest light metal made. Wearing parts, hard steel; handle, bronze.

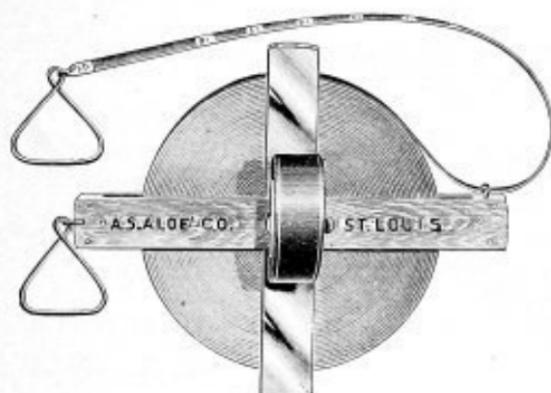
**Advantages Over Old Style Tape Reels.**

High Speed Gear, geared to wind up 100 feet of steel tape in about 12 seconds—one-third the time of the old reels and particularly desirable in city streets to prevent breaking of tape by passing vehicles. Brake for stopping motion of Tape at any point, and holding it rigid, without perceptible effort on the part of the operator. Particularly valuable in winter, as it obviates the necessity of removing gloves. Long winding, flush-folding handle, for making winding easy. Dustproof gear case and automatic cleaning device. Frictionless large-diameter drum and improved arrangement for attaching Tape.

No.  
2872A—Ideal Tape Reel, for 100 ft. Tape.....each, \$6.00

We can furnish any Tape desired on above reel, cost of Tape to be added.

## SURVEYOR'S CHAIN TAPES.



Tape Complete, with Reel.



Reel only, when Folded.

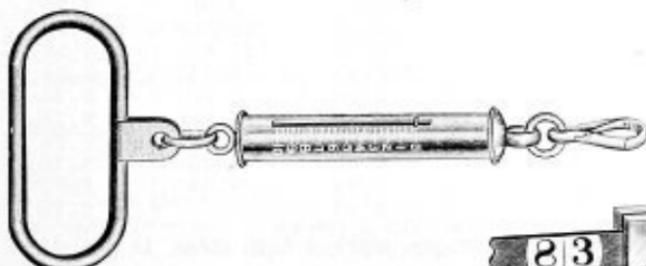
This tape, with detachable rings, is the same as described on page 142, Catalogue No. 2849A, but the reel has steel cross-arms, which keep the tape in place when winding or unwinding. When tape is in use and removed from the reel, the metal cross-arms of the reel fold into the wooden frame, as shown above, so that even the large sizes can be conveniently carried in the pocket. The reel can be firmly held by running the hand through the strong leather loop fastened to the side of the same. THESE REELS ARE ESPECIALLY DESIRABLE FOR THE LARGER TAPES. We can furnish this style tape with tape  $\frac{1}{8}$  of an inch wide at same price.

No.	
2873	—100 feet long, graduated every foot, end feet in 10ths... each, \$ 7.50
2873A	—200 feet long, graduated every foot, end feet in 10ths... each, 10.50
2873B	—300 feet long, graduated every foot, end feet in 10ths... each, 14.00
2873C	—500 feet long, graduated every foot, end feet in 10ths... each, 21.50
2873D	—66 feet long, graduated every link, end link in 10ths... each, 6.50

Tape, no reel, deduct \$3.50 from list price. Handles, 50c pair.

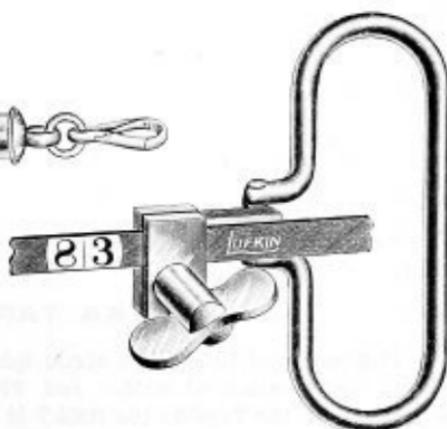
## TENSION HANDLES.

## CLAMP HANDLES.

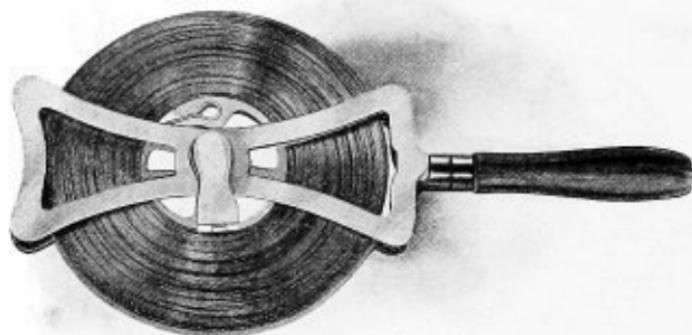


For applying the exact tension at which a steel tape is standard. Brass, nickel plated.

No.	
2874	—Tension Handle, tension up to 20 pounds by half pounds ..... Price each, \$2.50
2874B	—Clamp Handle for attaching to any part of a long steel tape, thus enabling one to adapt it to any desired length. Brass, nicely nickel plated ..... Price each, \$0.75



## CHICAGO [STEEL TAPE.



These Chain Tapes are made of extra tough material, the steel ribbon being about 5/16 in. wide and somewhat heavier than the ordinary Chain Tapes. They are graduated and numbered at every foot on Babbitt Metal, end feet in 10ths, and are plated with white metal to resist rust. The Metric Tapes are graduated every quarter-meter, end meters in decimeters.

On account of the unusual dimensions of this Tape it requires intentional carelessness to break or permanently bend it. They are well adapted for use in mines, and on rough ground the divisions are less liable to injury than rivets or plates. Each Tape is provided with a pair of round detachable metal handles, or rawhide handles will be furnished if desired. The Reel is made of brass, of very substantial construction, with polished wooden handle.

No.	Lengths and Graduations	Without Reel	With Metallic Reel	With Wooden Reel
2875	—100 ft. ....	\$ 3.75	\$ 5.00	\$ 4.50
2876	— 50 ft. ....	3.00	4.25	3.75
2877	—200 ft. ....	6.00	9.00	6.75
2878	—300 ft. ....	8.00	12.00	9.50
2879	—500 ft. ....	13.00	18.00	14.50
2880	—100 link .....	3.00	4.25	3.75
2881	—200 link .....	5.00	7.00	5.75
2882	— 20 meter .....	3.00	4.25	3.75
2883	— 40 meter .....	5.00	7.00	5.75
2884	— 20 vara .....	3.00	4.25	3.75
2885	— 50 vara .....	6.00	9.00	6.75
2886	— 50 link .....	2.00		2.75

Tapes with shoulders, 25c extra. Tapes, marked both sides, 1c per mark extra.

## EUREKA TAPE REPAIRER.

It consists of thin Sheet Metal folded in the shape of a Sleeve and coated with a combination of Solder and Flux so sensitive it will make a perfect adhesion with the Tape by the HEAT of ONE COMMON MATCH.

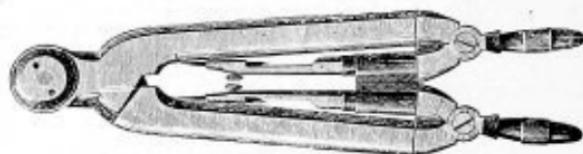
No.  
2887—One Dozen Sleeves, 50c; half dozen..... \$0.30

State Width of Your Tape and if Heavy or Light.



**KERN'S SWISS DRAWING INSTRUMENTS.**

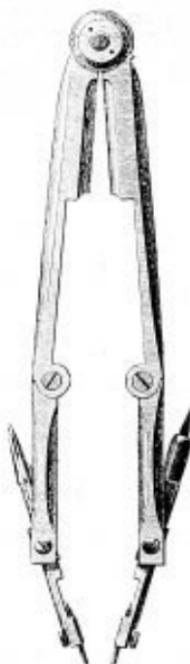
Manufactured by Kern &amp; Co., Aarau, Switzerland.



No. 2911. Folded.



No. 2898.



No. 2910.



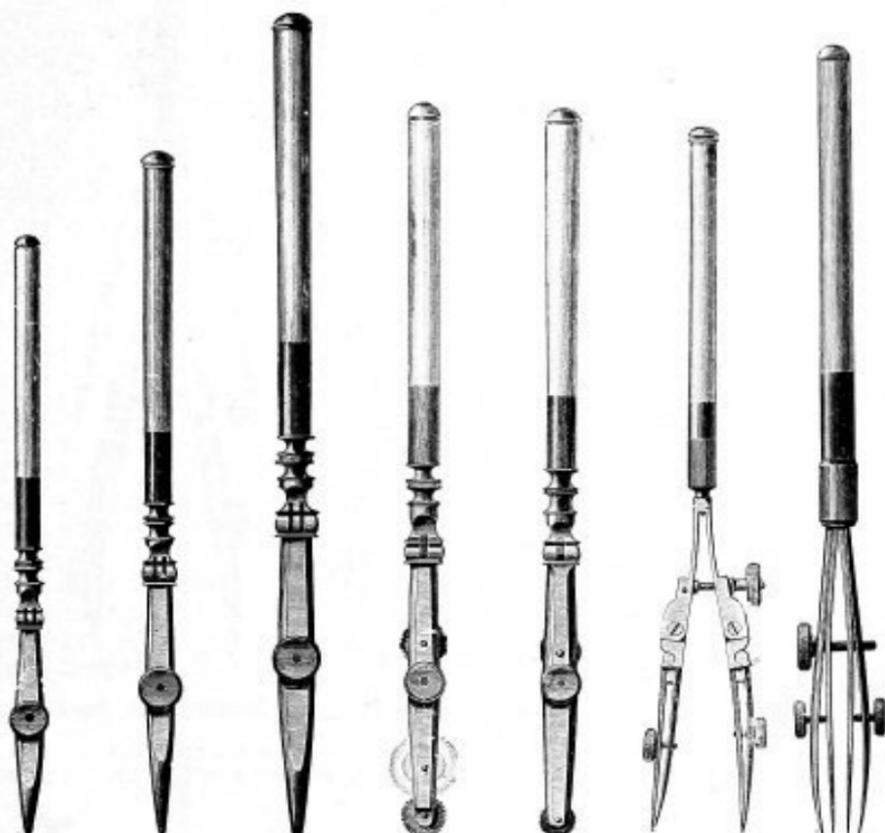
Drawn out for small circles.

No. 2911.

- No.
- 2898—Spring Bow Compasses, with long ivory handle, 2 pen points, pencil and needle points; very desirable for railroad work..... \$7.50
- 2910—Pocket Compasses, with each pair of points revolving upon a pivot in jointed leg, affording the use of 5-inch compasses and dividers, effecting the most compact instrument when folded to 2  $\frac{3}{4}$  inches... 8.00
- 2911—Pocket Compasses, similar to preceding, each pair of points being furnished with handle, thus rendering the use of both 2  $\frac{1}{2}$ -inch bow pen and bow pencil available, as well as providing 5-inch compasses and dividers; instrument 4 inches when folded..... 9.00

## KERN'S SWISS DRAWING INSTRUMENTS

Manufactured by Kern &amp; Co., Aarau, Switzerland.



No. 2912. No. 2913. No. 2914. No. 2915. No. 2916. No. 2918. No. 2919.  
No.

2912—Drawing Pen, 4 ½-inch, with joint and pricker, ivory handle. . . . .	\$1.60
2913—Drawing Pen, 5 ½-inch, with joint and pricker, ivory handle. . . . .	1.80
2914—Drawing Pen, 6 ½-inch, with joint and pricker, ivory handle. . . . .	2.00
2915—Dotting Pen, 6-inch, six wheels, ivory handle. . . . .	3.25
2916—Dotting Pen, 6-inch, improved, six wheels, ivory handle. . . . .	4.00
2917—Railroad Pen, with joints. . . . .	3.25
2918—Railroad Pen, with joints, both pens bent in the same direction. . . . .	3.75
2919—Border Pen, improved 6 ½-inch, for broad lines. . . . .	3.50
2920—Tracer, ivory handle. . . . .	1.00
2921—Pricker, ivory handle. . . . .	1.00
2922—Opisometer, ivory handle, for measuring curved lines. . . . .	2.00

**KERN'S SWISS DRAWING INSTRUMENTS.**

Manufactured by Kern &amp; Co., Aarau, Switzerland.



No. 2923.



No. 2924.



No. 2925

- No.  
 2923—Steel Spring Bow Dividers, 3½-inch, ivory handle, two needle points ..... \$2.75  
 2924—Steel Spring Bow Pencil, 3½-inch, ivory handle, needle point..... 2.75  
 2925—Steel Spring Bow Pen, 3½-inch, ivory handle, needle point..... 2.75



No. 2926.

- No.  
 2926—Spring Bow Pen, adjustable pivot center... \$4.00  
 2927—Spring Bow Pen, adjustable pivot center with pencil point..... 5.00



No. 2927.

## KERN'S SWISS DRAWING INSTRUMENTS.



No. 2930.



No. 2931.



No. 2932.

No.		
2930	—Steel Spacing Dividers, 3 ½ inches long, metal handle.....	\$2.00
2931	—Steel Bow Pencil, 3 ½ inches long, metal handle, patent needle point .....	2.75
2932	—Steel Bow Pen, 3 ½ inches long, metal handle, patent needle point..	2.75
2933	—Steel Spacing Dividers, 4 ½ inches long, metal handle.....	2.50
2934	—Bow Pencil, 4 ½ inches long, metal handle, patent needle point....	3.50
2935	—Bow Pen, 4 ½ inches long, metal handle, patent needle point.....	3.50



No. 2940.



No. 2941.

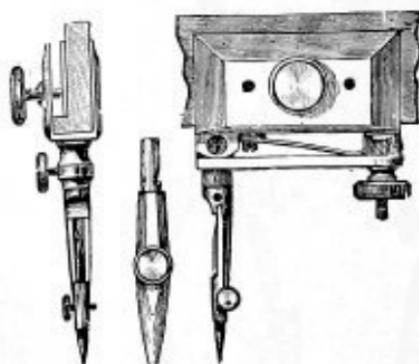


No. 2942.

No.		
2940	—Steel Spacing Divider, 3 ½ inches long, center adjustment.....	\$2.50
2941	—Steel Bow Pencil, 3 ½ in., center adjustment, Patent Needle Point..	3.25
2942	—Steel Bow Pen, 3 ½ in., center adjustment, Patent Needle Point...	3.25

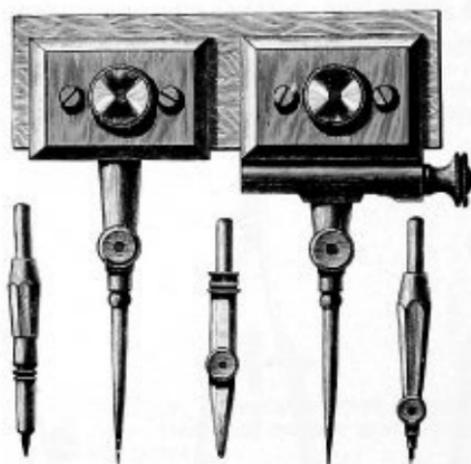
## KERN'S SWISS DRAWING INSTRUMENTS.

Manufactured by Kern & Co., Aarau, Switzerland.



No. 2945.

- No.
- |   |              |
|---|--------------|
| 2945—Beam Compasses, to fit any straight edge, with two needle points exchangeable for lead, and pen point, and micrometer adjustment ..... | each, \$8.25 |
| Morocco Pocket Case, No. 2945.....  | " 1.25       |
| 2945 ½—Wheel attachment for above.....  | " 2.25       |



No. 2946.

- No.
- |  |              |
|--|--------------|
| 2946—Beam Compasses, to fit any straight edge, with two steel points, pencil, pen and needle point and micrometer adjustment ..... | each, \$8.25 |
| Morocco case for No. 2946.....   | " 1.25       |
| 2946 ½—Wheel attachment for above.....   | " 2.25       |

For Beam Compass Bars see page 191.

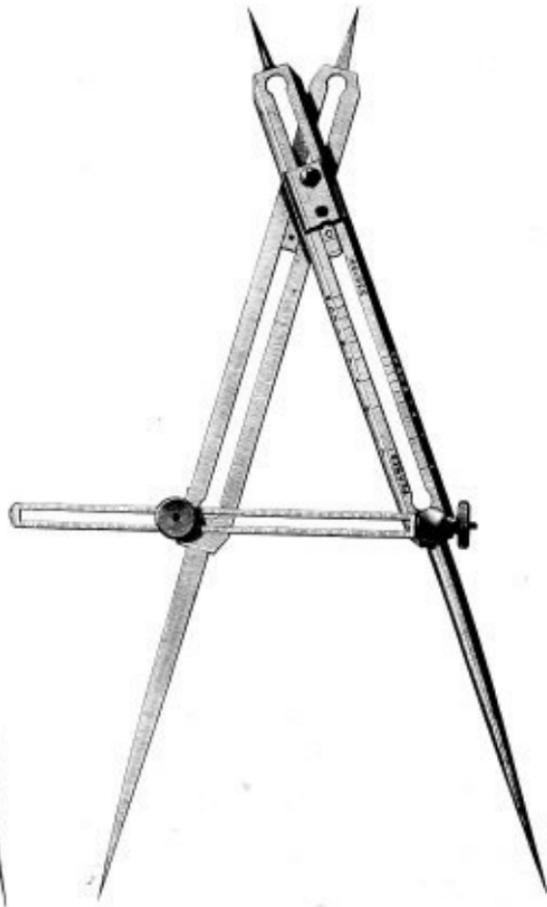
## KERN'S SWISS DRAWING INSTRUMENTS



No. 2947.



No. 2948.



No. 2949.

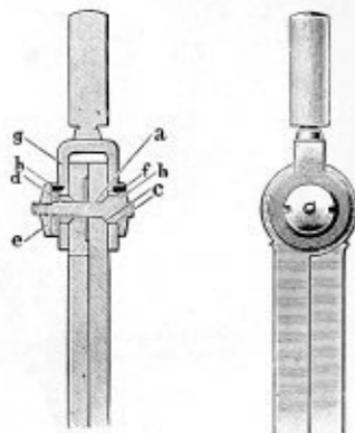
No.			
2947	—Proportional Dividers, finely divided for lines and circles, 7 1/2-inch, in case.....	each,	\$11.00
2947 1/2	—Proportional Dividers, finely divided for lines and circles, 8 1/2-inch, with rack-movement, in case.....	"	13.00
2948	—Proportional Dividers, finely divided for lines and circles, 9-inch, with rack-movement and movable points in case..	"	15.75
2949	—Proportional Dividers, finely divided for lines and circles, 9-inch, with micrometer adjustment, in case.....	"	16.00
2949 1/2	—Proportional Dividers, finely divided for lines, circles, Planes and solids, 9-inch, with micrometer adjustment, in case .....	"	18.00

Below will be found illustrations of the latest improvements in

## KERN'S SWISS DRAWING INSTRUMENTS

### Kern's Patent Improved Pivot Joint.

No lost motion. No more injurious friction screws.



Through the head of the compasses passes a pivot terminating at one end in a disc *b* continued by a cylindrical tapering off piece, *c*. From the other end a hollow piece of similar appearance is drawn over the pivot and the whole is assembled by the nut *e*. In order to avoid the whole pivot turning, when the nut is screwed up, the disc *b* is connected by a pin *f* with the fork *g*. When opening and closing the compasses, to prevent the part *d* from turning and slackening the screw *e*, the part *d* is also connected with a fork *g* by a pin *h*. In this way the compasses can be easily and quickly adjusted with a single screw.

If the compasses are used for a somewhat long time in the same position the nut screw can be slightly tightened, whereby a separate DEVICE FOR LOCKING THE COMPASS LEGS becomes unnecessary. This is the most advantageous as with the locking devices hitherto employed there is the risk of the holes in which the pivot screws work, becoming elongated by the constant pull from the top, whereby the compasses are ruined.

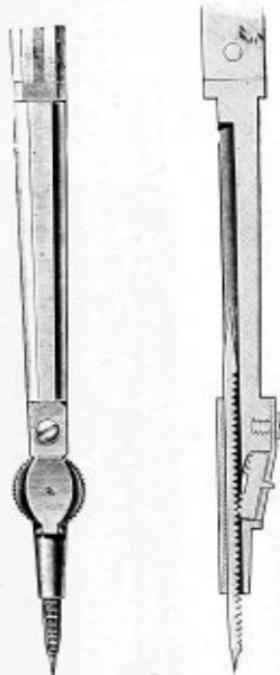
In the pivot-jointed heads hitherto used two pivot screws usually pass through the sides of the fork which carries the handle and press against the same, when tightening up. Notwithstanding that it is sought, by using a thick fork, to obviate the risk of breakage, such a fork loses, however, in the course of time, by reason of the constant pressure, the elasticity necessary for properly closing the compass legs and the fork becomes loose, producing the same effect on the legs of the compasses.

Our movement entirely removes this risk. The fork can now be made considerably thinner and lighter with the result that the whole instrument has a neater appearance.

We may also add that our new compass head can be easily taken to pieces, cleaned and re-oiled.

## KERN'S SWISS DRAWING INSTRUMENTS

### Kern's Patent Needle Point Adjuster.



When describing circles it is essential to adjust the needle point and the pencil or pen point to the same length. For larger circles this is of less importance, but for smaller circles it is indispensable, and hitherto it has been troublesome to obtain an exact adjustment. This exact adjustment is now quickly and accurately obtained by our Needle Point Adjuster with spiral movement.

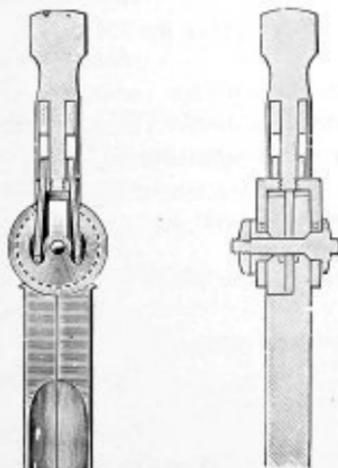
The needle point is toothed and is moved by a small plate, in one surface of which a spiral is cut. This plate is placed on the needle in such a way that the plate engages exactly in 3 teeth and thereby holds the needle exactly in position.

For fine work this micrometer adjustment is unsurpassed.

The advantages of these inventions can be summarized as follows:

1. Unusually fine adjustment.
2. No time lost in adjusting the needle.
3. Impossible to lose the needle or screws.
4. No wear to the needle or other parts, as the needle and spiral are made of hardened steel.

### PATENT STRAIGHTENING DEVICE.

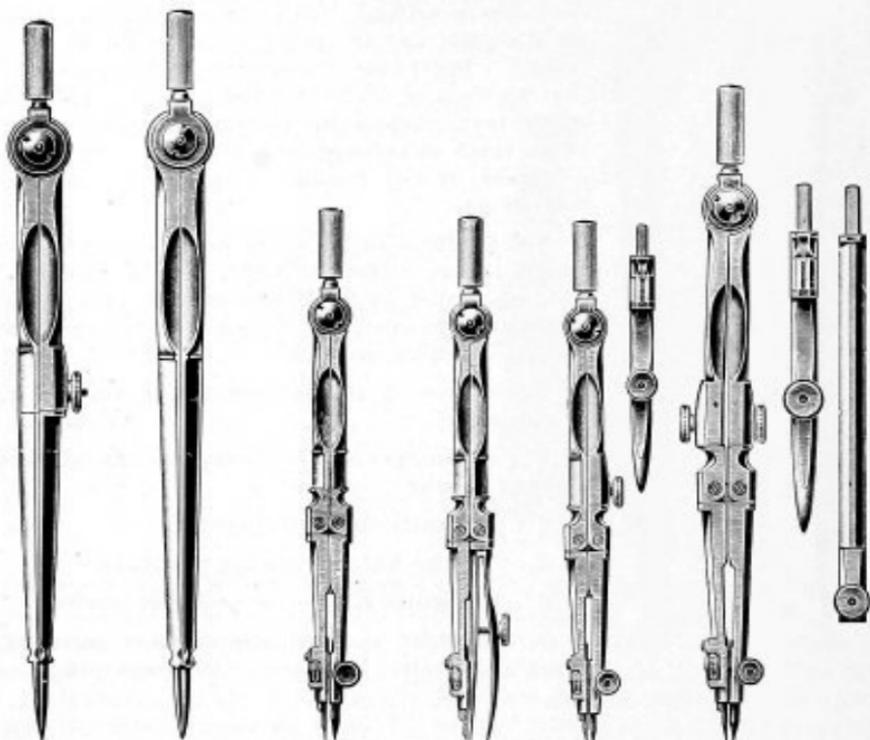


On opening the compasses the handle usually inclines towards one side and has therefore to be held very firmly or after adjustment of the compasses to be brought into the desired upright position for use, which often affects the adjustment of the compasses themselves.

However quickly this operation may be performed it is still a very troublesome one. Our device removes this objection and the compasses are at once ready for use. This device will greatly contribute to the increased use of compasses with handles.

## KERN'S SWISS DRAWING INSTRUMENTS.

**Kern's Patent Pivot Joint with Patent Needle Point and Patent Straightening Device.**



No. 2950      No. 2952.      No. 2954.      No. 2955.      No. 2956.      No. 2957-B.

No.		
2950	Hairspring Dividers, 5-inch pivot joint and straightening device . . . . .	each, \$4.10
2951	Hairspring Dividers, 6-inch, pivot joint and straightening device . . . . .	each, 4.50
2952	Plain Dividers, 5-inch, pivot joint and straightening device. . . . .	each, 3.25
2953	Plain Dividers, 6-inch, pivot joint and straightening device. . . . .	each, 3.75
2954	Compasses, 3 1/2-inch, fixed patent needle and pencil point and straightening device . . . . .	each, 4.75
2955	Compasses, 3 1/2-inch, fixed patent needle and pen point and straightening device . . . . .	each, 4.75
2956	Compasses, 3 1/2-inch, fixed patent needle point, pen and pencil points and straightening device. . . . .	each, 6.00
2957	Compasses, 3 1/2-inch, same as 2956, but has hair spring in divider leg for fine settings, straightening device. . . . .	each, 7.00
2957A	Compasses, 4 1/2-inch, with fixed patent needle point, pen and pencil point and lengthening bar. . . . .	each, 7.25
2957B	Compasses, 4 1/2-inch, same as 2957A, but with hair spring. . . . .	each, 8.25

**KERN'S SWISS DRAWING INSTRUMENTS.**

**Kern's Patent Pivot Joint with Patent Needle Point and Patent Straightening Device.**



No. 2959.

No. 2959A.

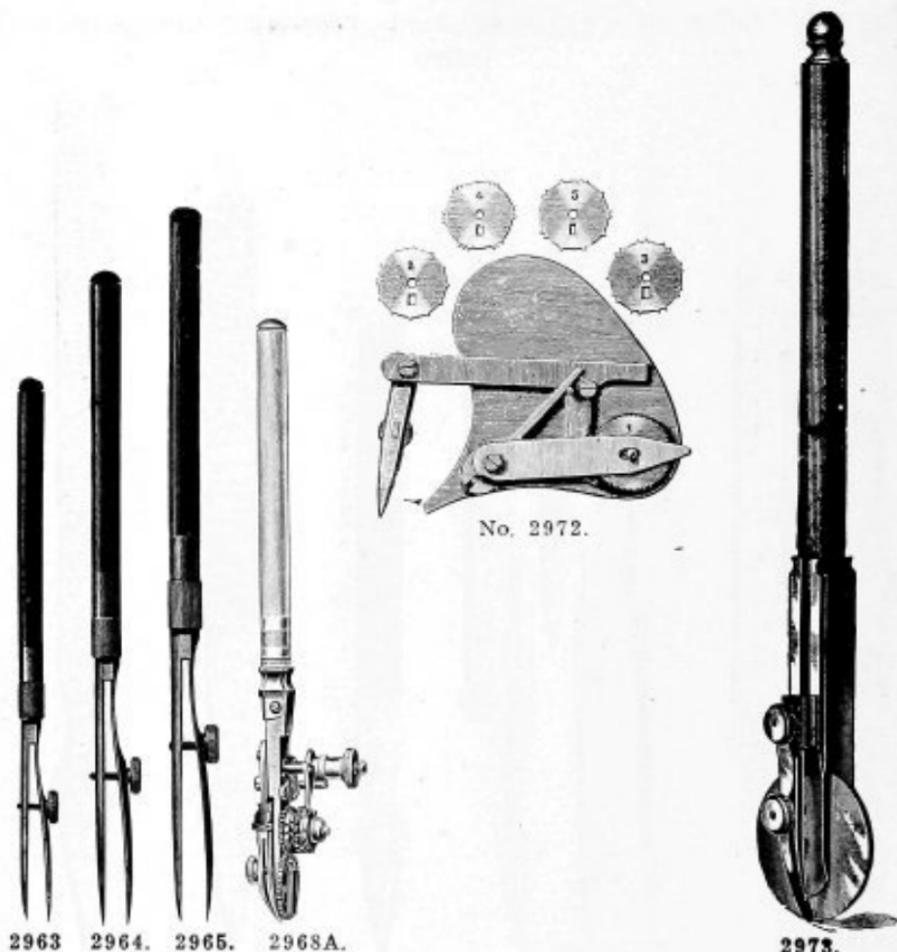
No. 2960.

No. 2961.

No. 2962.

- No.
- 2958 —Compasses, 5 ½-inch, with Kern's Patent Pivot Joint, fixed patent needle point and straightening device, Pen and Pencil Point and Lengthening Bow . . . . . each, \$8.00
- 2959 —Compass, 5 ½-inch, same as 2958, but with hair spring . . . each, 8.75
- 2959A—Compasses, 5 ½-inch, with two steel points, Kern's Patent Pivot Joint, patent needle point, pen and pencil point and lengthening bar and straightening device . . . . . each, 9.00
- 2960 —Swedish Style Ruling Pen, 5-inch upper blade with spring . . each, 1.50
- 2961 —Swedish Style Ruling Pen, 6-inch upper blade with spring . . each, 1.75
- 2962 —Swedish Style Ruling Pen, 7-inch upper blade with spring . . each, 2.00

## KERN'S SWISS DRAWING INSTRUMENTS.

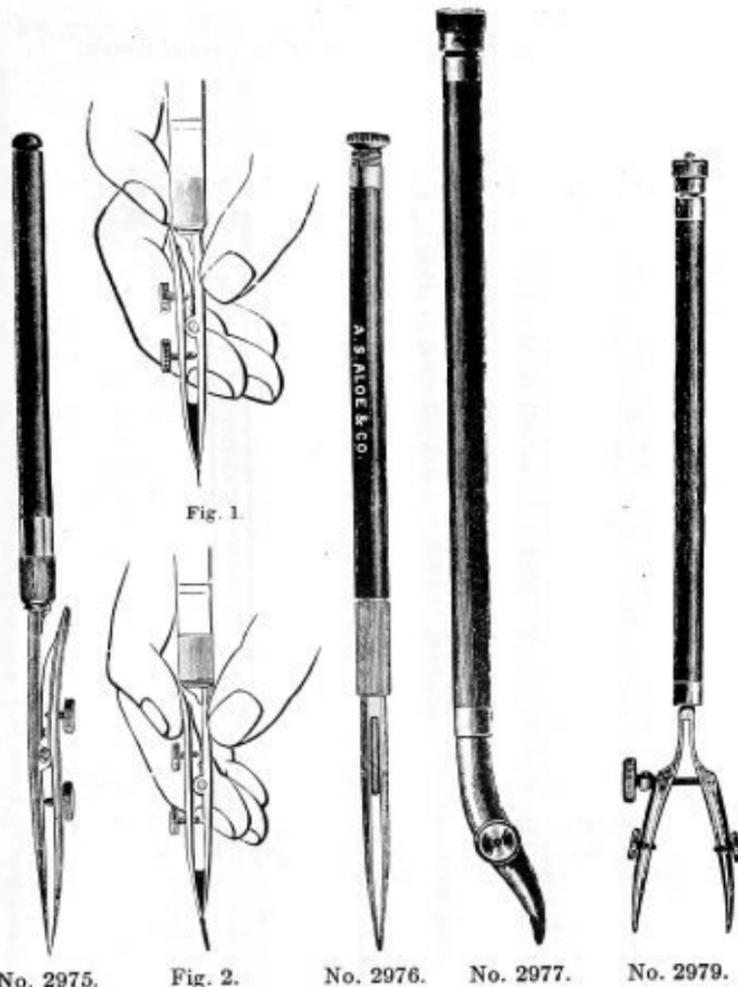


No.	
2963	Drawing Pen, 4 ½-inch, ebony handle, spring on upper blade, each, \$1.15
2964	Drawing Pen, 5 -inch, ebony handle, spring on upper blade, " 1.30
2965	Drawing Pen, 5 ½-inch, ebony handle, spring on upper blade, " 1.45
2968A	Universal Dotting Pen..... " 6.50

The Universal Dotting Pen is unrivaled in operation and beauty of workmanship. Every part is made of rolled German Silver except the pen, which is of tempered steel. No interchange of wheels is necessary to obtain different dotted lines. When another setting is required merely give thumb screw one revolution and the instrument is ready for the new dot.

2972	Dotting Instrument, with three wheels, in case.....each, \$4.50
2973	Knight Dotting Pen, with four wheels.....each, \$5.00

## "PEERLESS" DRAWING INSTRUMENTS.



- No. 2975—Patent Duplex Drawing Pen . . . . . each, \$2.75  
 Fig. 1 represents the manner in which a narrow line is drawn, while Fig. 2 shows the manner of drawing a broad line without changing the adjustment of the pen, which can be set to any desired width.
- No. 2976—Aloe's Universal Ruling Pen . . . . . each, \$1.25  
 This pen can be used either side. Easily sharpened. No screw in the way and is adjusted by a screw in the top of handle.
- No. 2977—Curve Pen Blades, fastened to a rod in a hollow handle, with screw at upper end, to set pen firm or loose to follow smallest curve with precision . . . . . each, \$1.25
- No. 2979—Railroad Pen. The pens are fastened to a rod in a hollow handle, with screw at upper end to set pens firm for straight lines, or loose to follow curved lines. . . . . each, 4.25

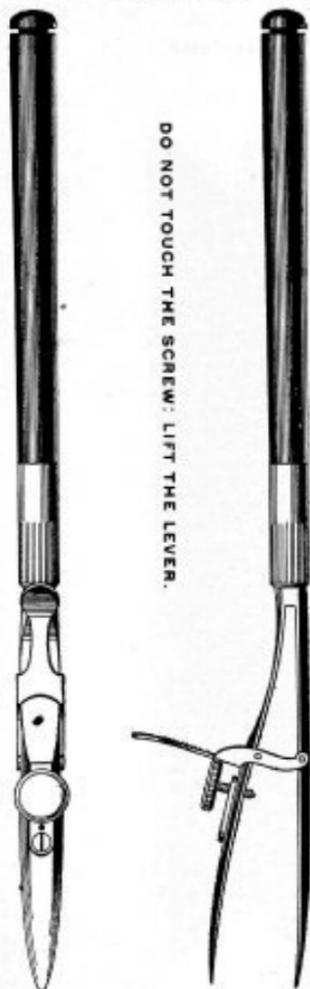
## "HELIX" FOUNTAIN RULING PEN.

An Improvement, Welcome to Every Draughtsman!



This Ruling Pen is constructed so as to overcome each and every inconvenience during its use. No drying of the ink. No soiling of the Pen, the Set-square nor of the fingers; always ready for use. Very easily filled by a small turn to the right side of the screw and a sufficient quantity of ink is drawn into the piston rod. A great deal of time saved.

No.  
2980—Helix Fountain Ruling Pen, with directions.....each, \$2.00

**"PEERLESS" DRAWING INSTRUMENTS.****LEVER RULING PEN.**

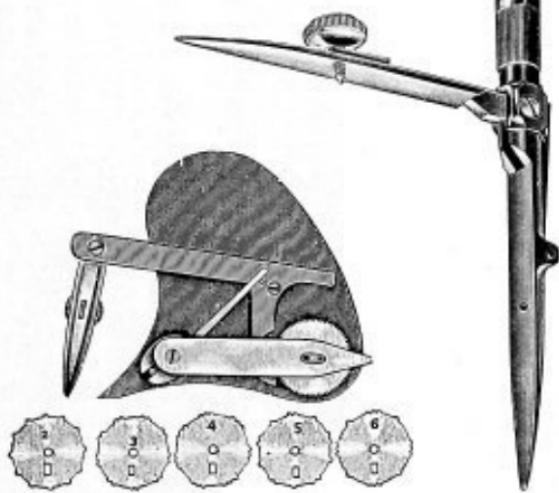
No. 2982.

No. 2982.

**SPRING-HINGE RULING PEN.**

Patent Aug. 9, '92; May 7, '95.

Our Patent Spring-hinge Ruling Pen is so constructed that the blades may be widely separated and thoroughly cleaned, without removing or disturbing the adjusting screw, and again closed to absolutely the same relative position they were in before opening, with the greatest ease and quickness.



No. 2988.

No. 2983.

No.	
2982	Lever Ruling Pens, 5 or 5½-inch.....\$2.75
2983	Spring-hinge Ruling Pen, 5 or 5½-inch..... 3.25

**DOTTING INSTRUMENTS.**

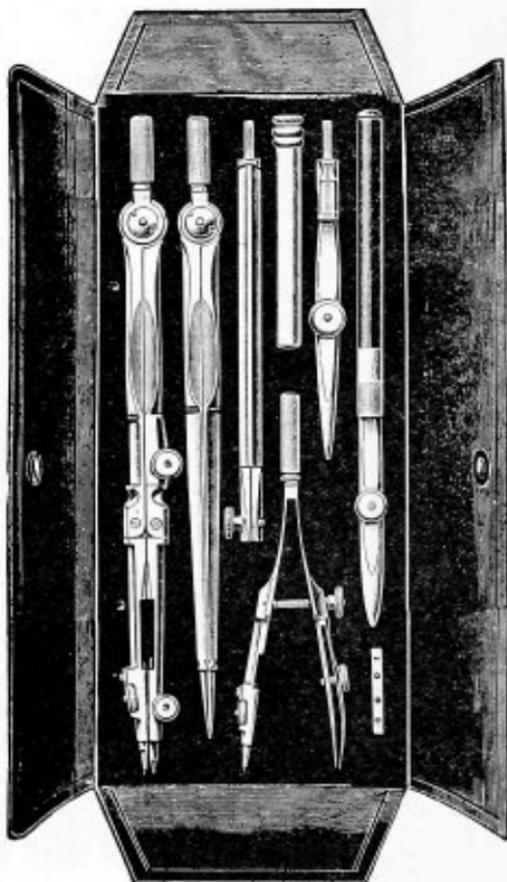
By throwing back the spring the wheels of different patterns are inserted. The wheel is rolled on the edge of a T square or straight edge, and causes the pen, by means of a ratchet wheel, to move up and down.

No.	
2988	Dotting Instrument, with six wheels in case.....\$4.50
2989	Dotting Instrument, with three wheels in case..... 3.50

**KERN'S SWISS DRAWING INSTRUMENTS.**

In Pocket Book Style. Case Lined with Silk Velvet.

Made by Kern & Co., Aarau, Switzerland.



No. 3003.

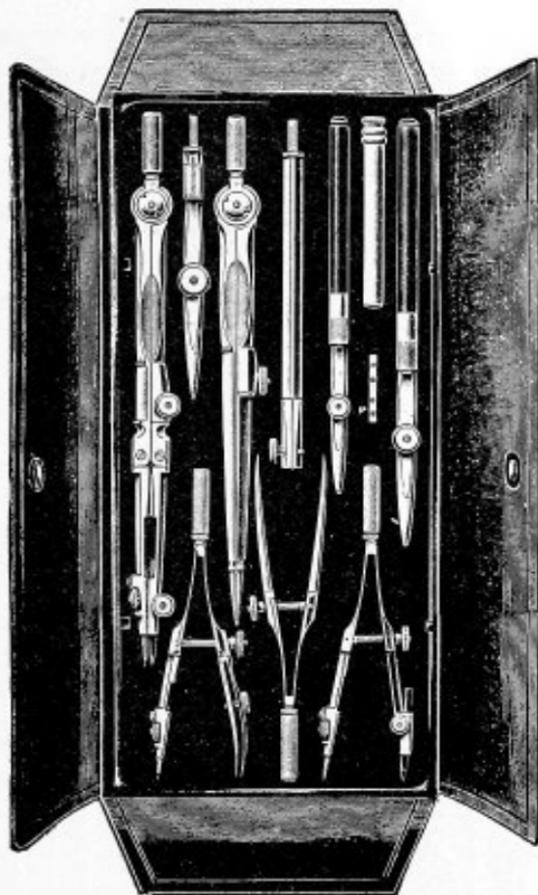
- No.  
 3003—Pocket Book Style Case, containing Compasses, No. 2958, 5 ½-inch, with Patent Pivot Joint and Straightening Device and Fixed Patent Needle Point, Pen and Pencil Point and Lengthening Bar, Divider No. 2952—5-inch with Patent Pivot Joint Bow Pen, No. 2932, with Patent Needle Point. Ruling Pen, No. 2964—5-inch Ebony Handle, Box of Leads and Key. . . . . each, \$18.50

We are prepared to make to order Pocket Cases to suit any special selection of Instruments.

**KERN'S SWISS DRAWING INSTRUMENTS.**

In Pocket Book Style. Cases Lined with Silk Velvet.

Made by Kern & Co., Aarau, Switzerland.



\* No. 3004.

No.

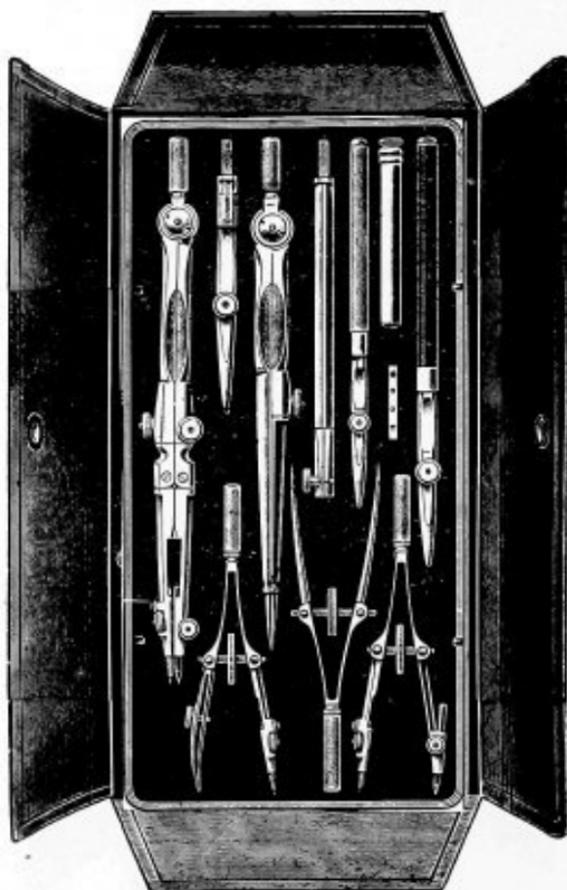
3004—Pocket Book Style Case, containing Compasses, No. 2958, 5 ½-inch, with Patent Pivot Joint and Straightening Device and fixed Patent Needle Point Pen and Pencil Point and Lengthening Bar. Hair Spring Divider, No. 2950, 5-inch, Patent Pivot Joint Bow Spacer 3 ½-inch, 2930. Bow Pencil, 3 ½-inch Patent Needle Point, 2931. Bow Pen, 3 ½-inch, with Patent Needle Point, No. 2932. Ruling Pens, 4 ½ and 5-inch, Nos. 2963 and 2964, with Ebony Handles. Box of Leads, Key, etc.....each, \$26.00

**We repair all makes of Drawing Instruments.**

**KERN'S SWISS DRAWING INSTRUMENTS.**

In Pocket Book Style. Cases Lined with Silk Velvet.

Made by Kern &amp; Co., Aarau, Switzerland.

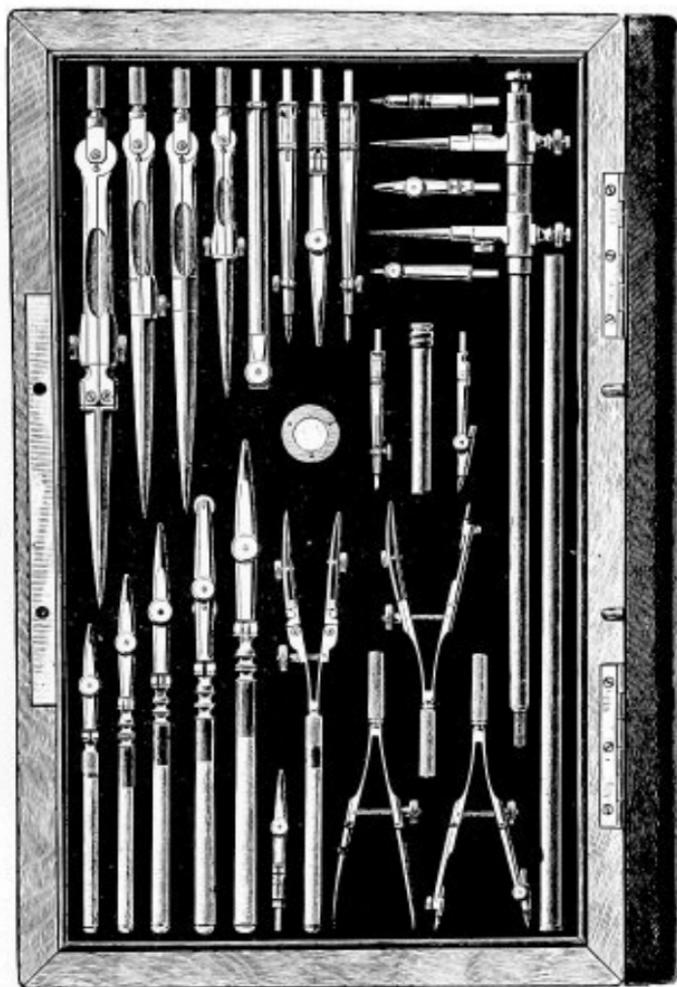


No. 3005.

- No.
- 3005—Pocket Book Style Case, containing Compasses, No. 2959, 5½-inch, with Hair Spring with Patent Pivot Joint and Straightening Device and Fixed Patent Needle Point, Pen and Pencil Point and Lengthening Bar. Hair Spring Divider, No. 2950, 5-inch, with Patent Pivot Joint. Bow Spacer, 3½-inch, with Center Screw, No. 2940. Bow Pencil, 3½-inch, with Center Screw and Patent Needle Point, No. 2941. Bow Pen, 3½-inch, with Center Screw and Patent Needle Point, No. 2942. Drawing Pens, 4½ and 5-inch, Ebony Handle, Nos. 2963 and 2964. Box of Leads, Key, etc.....each, \$28.00
- 3006—Pocket Book Style Case, same as 3005, but has Bow Instruments, Nos. 2930, 2931 and 2932, instead of Nos. 2940, 2941 and 2942 .....each, 27.00

**KERN'S SWISS DRAWING INSTRUMENTS.**

Made by Kern &amp; Co., Aarau, Switzerland.



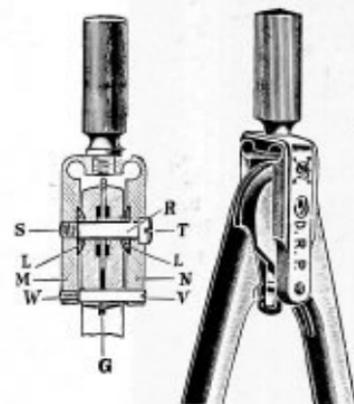
No. 3007.

- No.  
 3007—Polished Wood Case, with lock and tray, containing one each Ruling Pens, 4-inch, 4  $\frac{3}{4}$ -inch, 5  $\frac{1}{2}$ -inch, 6  $\frac{1}{2}$ -inch; Railroad Pen; Dotted Pen with six wheels; Steel Spacing Divider; Steel Bow Pencil; Steel Bow Pen; Compass, 3  $\frac{1}{2}$ -inch with needle point, pen and pencil point; Plain Divider, 5-inch; Hair-spring Divider, 5-inch; Compass, 6  $\frac{1}{2}$ -inch with joint in each leg, pen, pencil, needle point; Lengthening Bar. Tubular Beam Compass, 18-inch, two Bars with two Steel Points, Pen, Pencil and Needle Point. Box of Leads, horn center.....each, \$75.00

## INSTRUMENTS OF PRECISION.

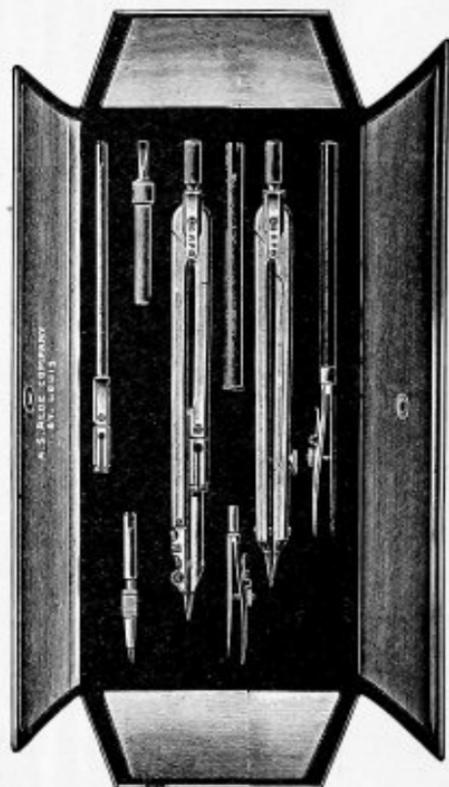
In Pocket Book Style Cases, Lined with Silk Velvet.

The Highest Grade of Instruments.



Showing construction of Joint.

Showing construction of Straightening Device.

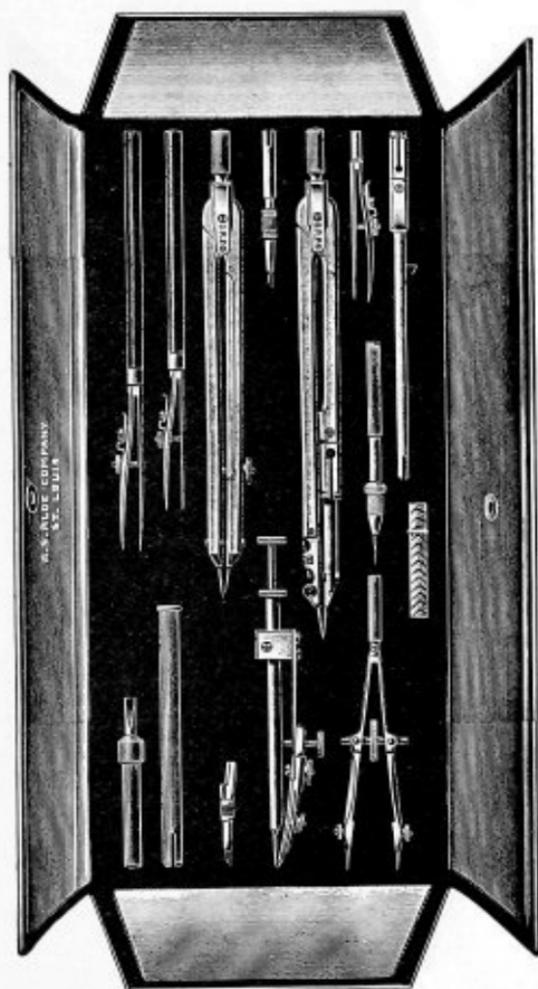


No.

3008—Containing 6-inch Compasses, with Replaceable Needle Points, Patent Joint with Straightening Device, Needle Point with Micrometer Adjustment (see page 175), Pen Point with Lever Attachment, Pencil Point and Lengthening Bar, 5  $\frac{1}{4}$ -inch Hair Spring Divider with Replaceable Steel Points, 5-inch Ruling Pen with Slide Catch Lever. Metal Handle with extra Leads and Screw Driver with extra Needle Points in Handle . . . . . each, \$ 9.50

3009—Containing same as No. 3008, but has in addition Bow Divider, No. 3040; Bow Pencil, No. 3041; Bow Pen, No. 3042 (see page 175), and 4  $\frac{1}{2}$ -inch Ruling Pen with Slide Catch Lever . . . each, 18.00

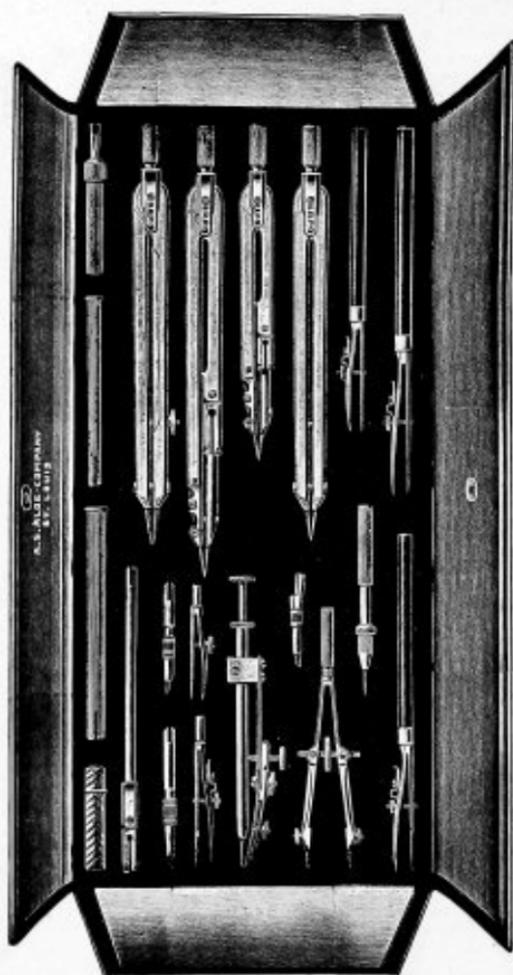
## INSTRUMENTS OF PRECISION.



No.

No. 3010—Containing 6-inch Compasses with Replaceable Needle Points, with Patent Joint with Straightening Device; Needle Point with Micrometer Adjustment (see page 175); Pen Point with Lever Attachment; Pencil Point and Lengthening Bar; 5 3/4-inch Hair Spring Divider with Replaceable Steel Points; Bow Divider, 3 3/4-inch, with two Needle Points, 4 1/2-inch. Self-adjusting Steel Bow Pen with Pencil Points. Ruling Pens, 4 1/2 and 5-inch, with Slide Catch Lever. Combination Screw Driver and Lead Holder. Metal Handle with extra Needle Points.....each, \$18.00

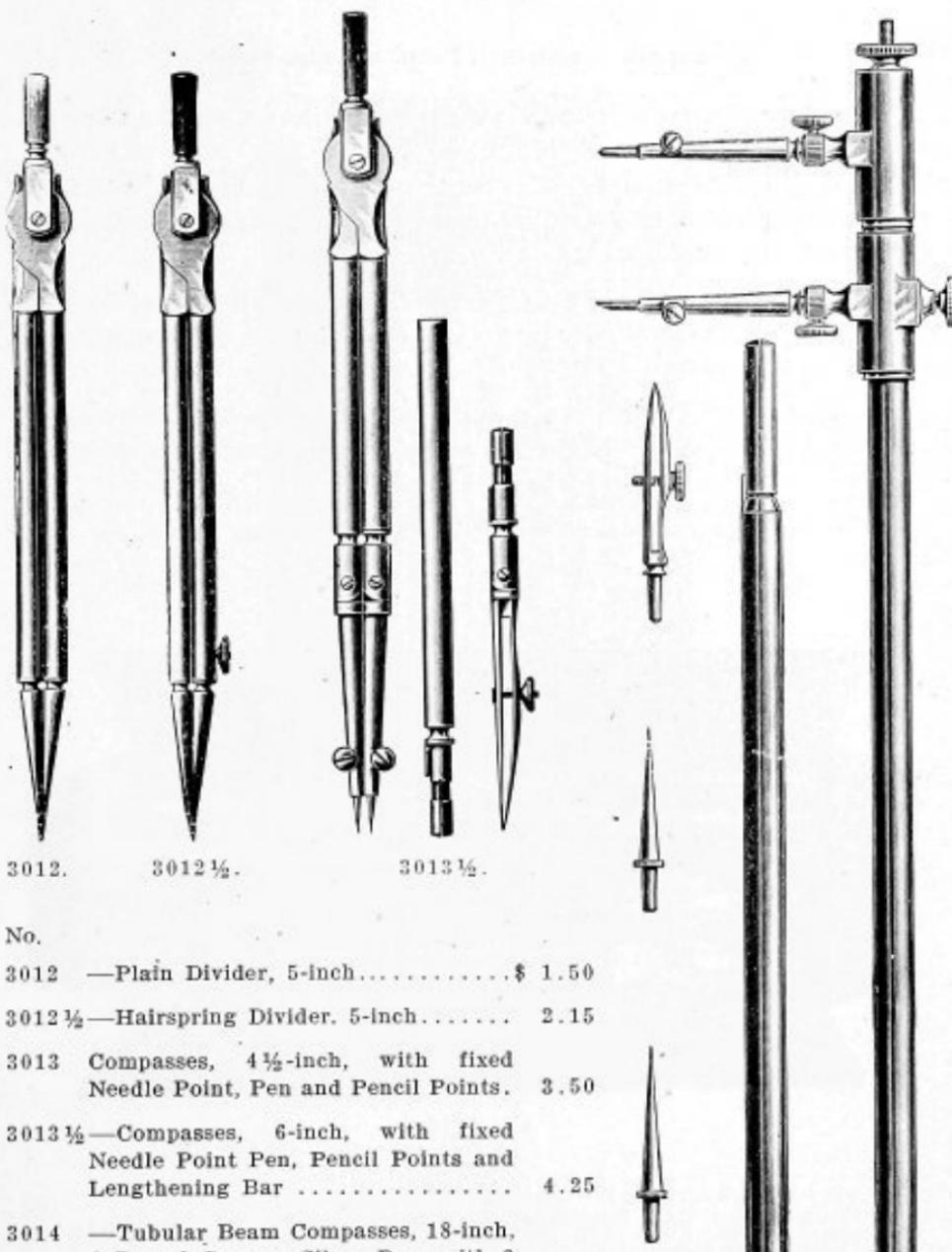
## INSTRUMENTS OF PRECISION.



- No.
- 3011—Containing 6-inch Compasses with Replaceable Needle Points, with Patent Joint with Straightening Device; Needle Point with Micrometer Adjustment (see page 175); Pen Point with Lever Attachment; Pencil Point and Lengthening Bar. 4-inch Compasses, same as above, but without Lengthening Bar. 5  $\frac{3}{4}$ -inch Plain Divider, 5  $\frac{3}{4}$ -inch Hair Spring Divider, both with replaceable Steel Points; Bow Divider, 3  $\frac{3}{4}$ -inch, with two Needle Points. 4  $\frac{1}{2}$ -inch Self-adjusting Bow Pen with Pencil Point. Ruling Pens, 4  $\frac{1}{2}$ , 5, 5  $\frac{1}{2}$ -inch, with Slide Catch Lever. Metal Handle, 2  $\frac{1}{2}$ -inch, with extra Needle Points; Metal Handle, 3-inch, with extra Needle Points, 2  $\frac{1}{2}$ -inch Pricker. Combination Screw Driver and Lead Holder .....each, \$25.00

## "PEERLESS" CYLINDRICAL INSTRUMENTS.

Pivot Joint with Improved Straightening Device. (See Pages 174-175.)



3012.

3012 1/2.

3013 1/2.

3014.

No.

- |          |   |         |
|----------|---|---------|
| 3012     | —Plain Divider, 5-inch.....   | \$ 1.50 |
| 3012 1/2 | —Hairspring Divider. 5-inch.....  | 2.15    |
| 3013     | Compasses, 4 1/2-inch, with fixed<br>Needle Point, Pen and Pencil Points.   | 3.50    |
| 3013 1/2 | —Compasses, 6-inch, with fixed<br>Needle Point Pen, Pencil Points and<br>Lengthening Bar .....  | 4.25    |
| 3014     | —Tubular Beam Compasses, 18-inch,<br>2 Round German Silver Bars with 2<br>Steel Points, Pen, Pencil and Needle<br>Points in case..... | 10.00   |

## "PEERLESS" CYLINDRICAL DRAWING INSTRUMENTS.

### PIVOT JOINT.

**German Silver, with Steel Points and Fine Finish.**

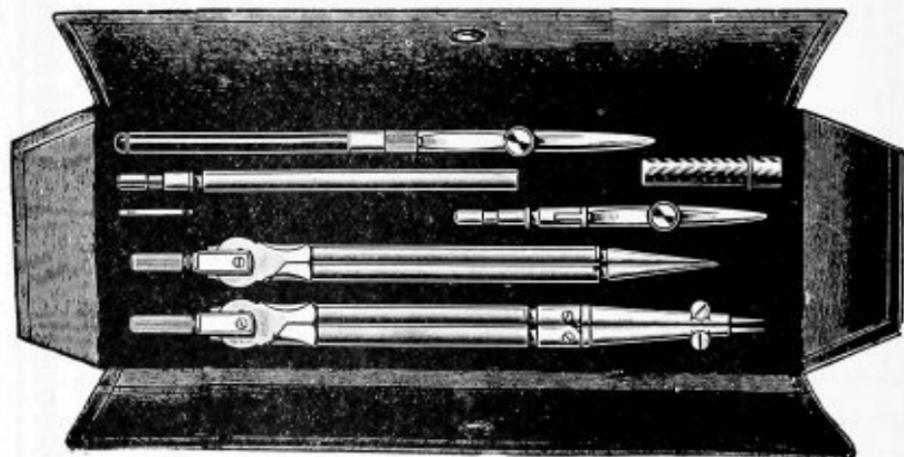
The chief advantages of these instruments, illustrated, are the following, viz.:

The legs of the dividers are cylindrical and can be handled with much more convenience than by the old system with the sharp edges; it can be easily opened and closed with one hand.

The points of the dividers are cone shaped. This form is more agreeable to the eye, in setting the dividers on the drawing surface, as a round point will show an equal surface from all sides.

The absence of screws to hold the different parts of the compasses excludes obstruction to the eye in setting the points, and thus facilitates quick and accurate work.

All these instruments have our improved Straightening Device, see pages 174-175.

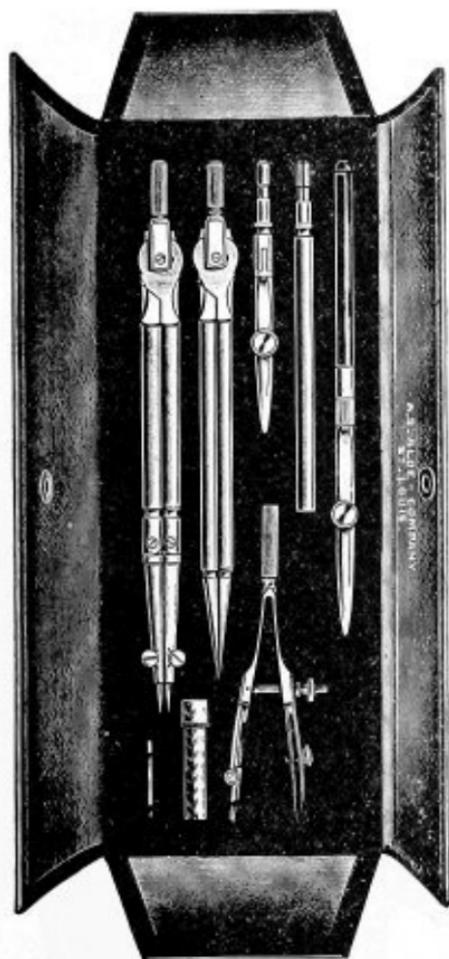


No. 3015.

- No.  
3015—Pocket Book Case containing Compasses, 6-inch, with fixed Needle Point, Pencil, Pen and Lengthening Bar, Pivot Joint; Plain Divider 5½-inch; Ruling Pen 5½-inch, Ebony Handle with Spring Blade . . . . . each, \$7.50

**"PEERLESS" CYLINDRICAL DRAWING INSTRUMENTS.****PIVOT JOINT.**

German Silver, with Steel Points and Fine Finish.

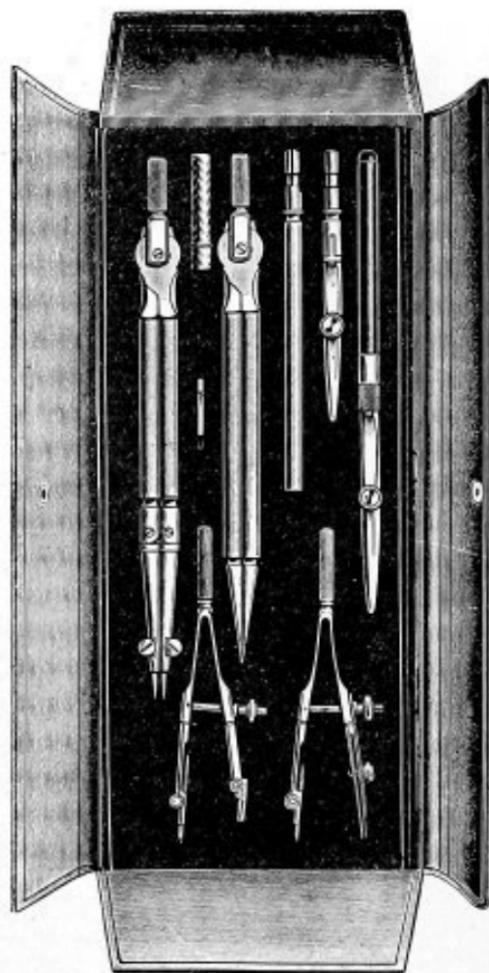


No. 3016.

- No.
- 3016—Pocket Book Case containing Compasses, 6-inch, with fixed Needle Points, Pen, Pencil and Lengthening Bar, Pivot Joint; Plain Divider, 5 1/2-inch; Spring Bow Pen; Ruling Pen, 5 1/2-inch, Ebony Handle with Spring Blade.....each, \$9.00

**"PEERLESS" CYLINDRICAL DRAWING INSTRUMENTS.****PIVOT JOINT.**

German Silver, with Steel Points and Fine Finish.



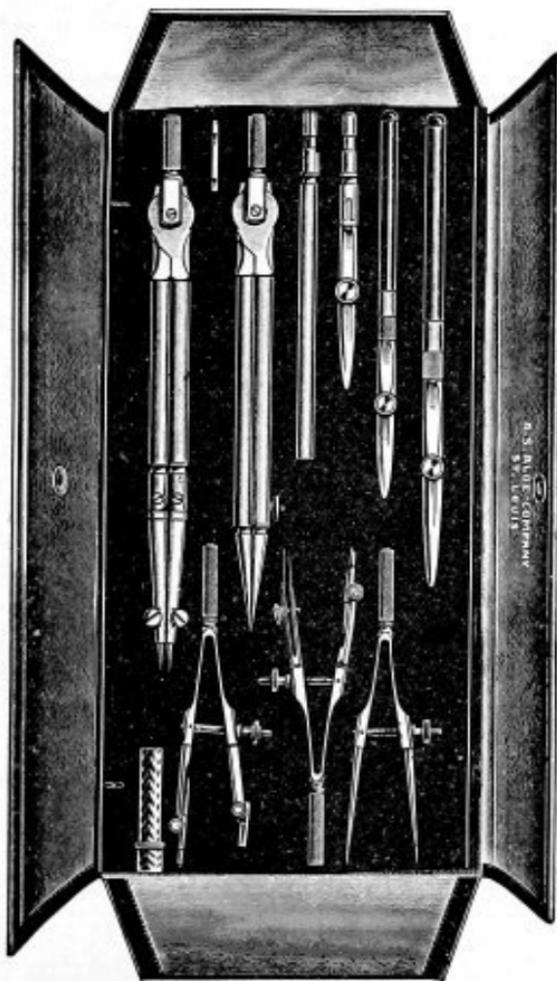
No. 3016 1/2.

No.

3016 1/2—Pocket Book Case containing Compasses, 6-inch, with fixed Needle Point, Pencil, Pen and Lengthening Bar; Pivot Joint Plain Divider, 5 1/2-inch; Bow Pencil, 3 1/2-inch; Bow Pen, 3 1/2-inch; Ruling Pen, 5 1/2-inch; Ebony Handle with Spring Blade. . . . each, \$10.50

**"PEERLESS" CYLINDRICAL DRAWING INSTRUMENTS.  
PIVOT JOINT.**

German Silver, with Steel Points and Fine Finish.



No. 3017.

- No.  
3017—Pocket Book Case containing Compasses, 6-inch, with fixed Needle Point Pencil, Pen and Lengthening Bar; Pivot Joint, Hair-spring Dividers, 5½-inch; Bow Divider, Bow Pen, Bow Pencil, 3½-inch; Ruling Pens, 4½ and 5½-inch; Ebony Handle with Spring Blade .....each, \$12.50

## "UNIVERSITY" DRAWING INSTRUMENTS.

### THE HIGHEST GRADE DRAWING TOOLS.

These instruments are newly designed, and combine in their construction the highest-grade material, skilled workmanship, and patented improvements. They are essentially the instruments for modern draftsmen, and do not carry with their exceptionally high quality a prohibitive price.

The material used is the finest-grade rolled German silver and carefully tempered English tool steel.

They are carefully polished to a sufficient brightness to enable the user to detect flaws or imperfections on the most casual inspection.

They contain no obsolete so-called improvements, but are marvels of grace and symmetry.

They are made in the largest and most modern equipped instrument factory in the world, and are subjected to the most searching examinations and tests for strength, precision, and wear before leaving the factory.

We append a short description of the various patented improvements which are exclusive and valuable features of the University Brand.

### DESCRIPTIONS OF IMPROVEMENTS.

#### The University Improved Pivot Joint.



Full-size Section of Pivot Joint.

In the University Pivot Joint the steel bolt or screw passes through the head, thus minimizing the tendency to spread and eliminating all chances of breaking the arms of the fork.

#### RULING PEN WITH PATENT RELEASE SPRING

U. S. Patent, February 4, 1904. No. 762,848

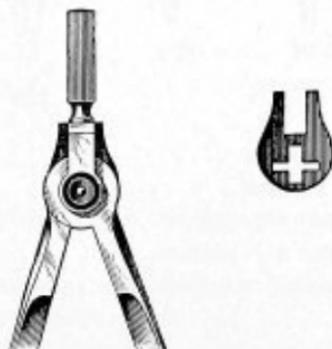


All ruling pens, as well as pen points of this set, are made of one piece of best tempered steel, the upper blade being constructed in the form of a spring, which, on being released, opens wide enough to permit the cleaning of the pen, easily. In order to obtain the former thickness of line after the cleaning of the pen, throw out the release lever on the upper blade—without altering the setscrew—clean the pen, press both blades together and return the release lever to its original position. Thus the pen is easily kept clean and its durability increased, and the draftsman will lose no time in adjusting the pen to the thickness of line as before its cleaning.

**"UNIVERSITY" DRAWING INSTRUMENTS.****HIGHEST GRADE DRAWING TOOLS.****NEEDLE REGULATION BY MICROMETER.****U. S. Patent, January 19, 1904. No. 755,396.**

This Regulator enables the draftsman, on loosening the clamping screw on the needle point of the compass, to move the needle point forwards or backwards at will by simply turning the small nut on the side of the compass leg. One end of the sliding screw moves in a slot in the compass leg, clasping into the notch of the needle point and moving it in or out, according to the way the side nut is turned. When the clamping screw is opened, the needle point can easily be reversed and the other end used. After the needle point has been regulated to the desired position, the clamping screw is tightened and the needle point is ready for use.

Besides saving the draftsman much time, the micrometer regulator will enable him to insert the needle point to a more minute position than he could attain by hand, permitting the compass to draw even the smallest circles.

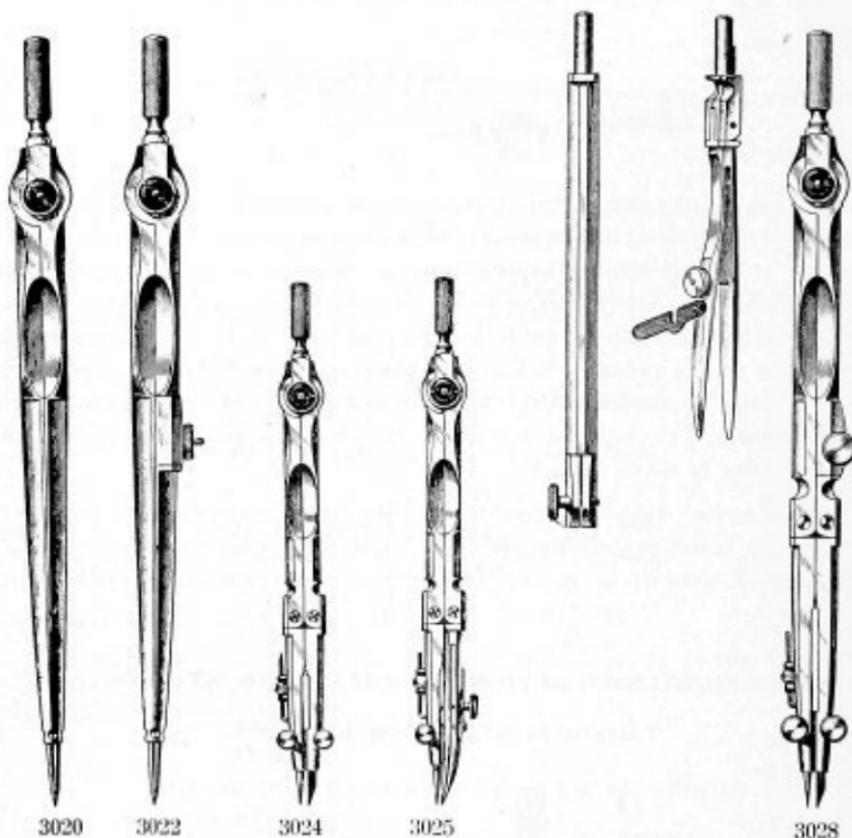
**STRAIGHTENING DEVICE ON COMPASS AND DIVIDERS.****Patented in the U. S., March 17, 1903.**

In order to prevent the compass handle from turning to either side, this improvement keeps the handle always in the center line, thus making it ready for instant use on opening, avoiding any change or correction on the compass after the exact space is once taken.

**"UNIVERSITY" DRAWING INSTRUMENTS.**

HIGHEST GRADE DRAWING TOOLS.

Illustrations Two-Thirds Size.

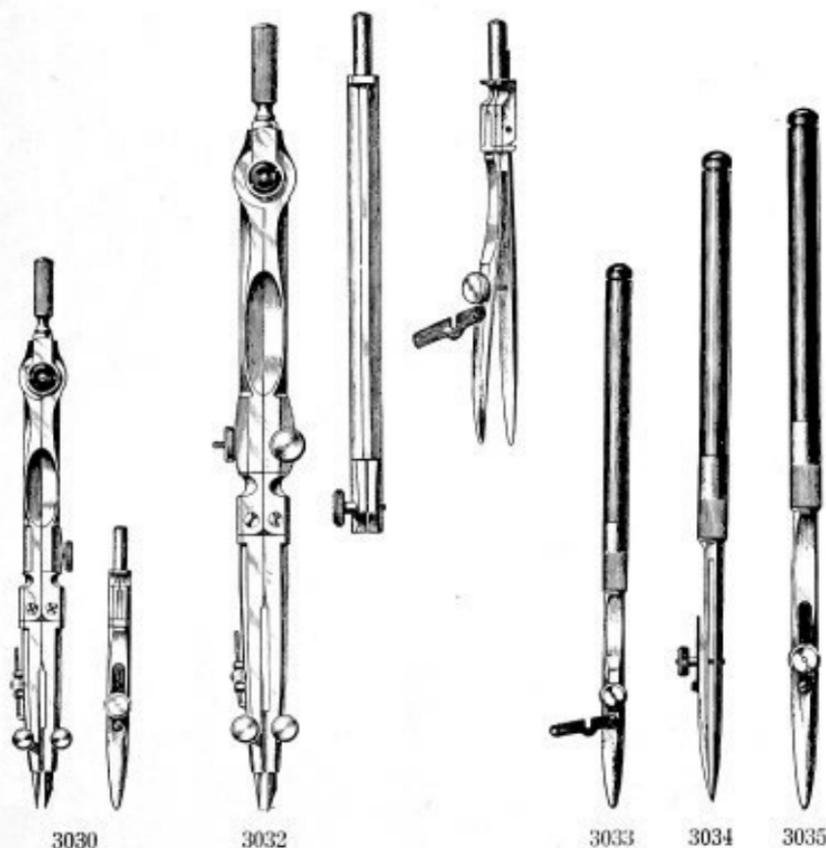


No.		each.	
3020	—Plain Dividers, 4¼ inches.....	\$2.00	
3021	—Plain Dividers, 6 inches.....	2.40	
3022	—Hair-Spring Dividers, 4¼ inches.....	2.60	
3023	—Hair-Spring Dividers, 6 inches.....	3.00	
3024	—Compasses, 4¼ inches, fixed needle and pencil point, pivot joint.....	3.75	
3025	—Compasses, 4¼ inches, fixed needle and pen point, pivot joint.....	3.75	
3028	—Compasses, 6 inches, with fixed needle point, pencil, pen point, and lengthening bar, pivot joint.....	6.00	

All dividers equipped with patent head-straightening device.

**"UNIVERSITY" DRAWING INSTRUMENTS.****HIGHEST GRADE DRAWING TOOLS.**

Illustrations Two-Thirds Size.



No.		
3030	Compasses, 4 $\frac{1}{4}$ inches, fixed needle, pen and pencil point, pivot joint . . . . .	each, \$4.50
3031	Compasses, 4 $\frac{1}{2}$ inches, with fixed needle point, pencil and pen point, and hairspring adjustment. . . . .	each, 5.25
3032	Compasses, 6 inches, with fixed needle point, pencil, pen point, and lengthening bar, pivot joint and hair spring . . . . .	each, 6.75
3033	Ruling Pen, ebony handle, patent release spring, 4 $\frac{1}{4}$ inches, each,,	.90
3034	Ruling Pen, ebony handle, patent release spring, 5 inches, each	.95
3035	Ruling Pen, ebony handle, patent release spring, 5 $\frac{1}{2}$ inches, each	1.00

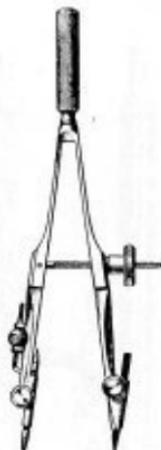
## "UNIVERSITY" DRAWING INSTRUMENTS.

All compasses equipped with patent straightening device. Needle points regulated by patented micrometer adjustment. Pens equipped with patent release spring.

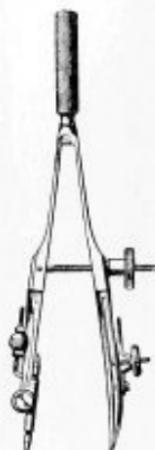
### Illustrations Two-Thirds Size



3036



3037



3038

No.	
3036—Steel Spring Bow-Dividers, 3 ½ inches, metal handle.....	each, \$1.50
3037—Steel Spring Bow-Pencil, 3 ½ inches, metal handle.....	each, 2.00
3038—Steel Spring Bow-Pen, 3 ½ inches, metal handle.....	each, 2.00



3040



3041



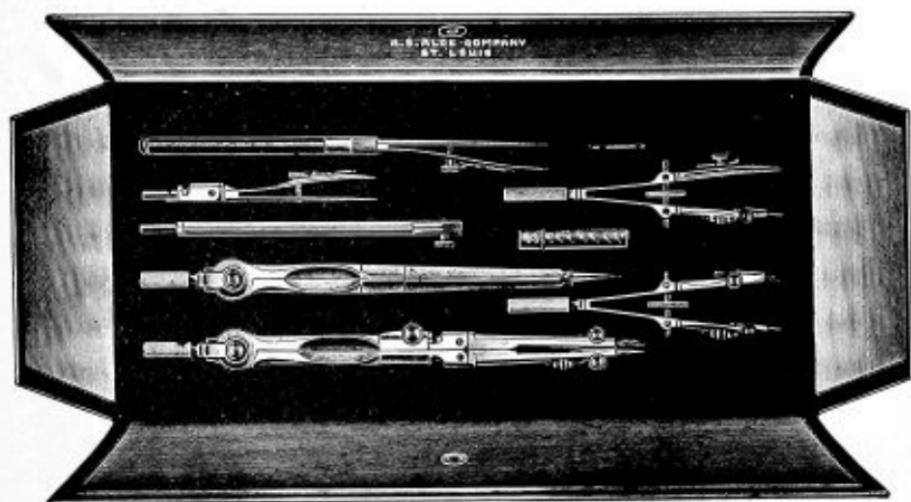
3042

No.	
3040—Steel Spring Bow-Dividers, 3 ½ inches, metal handle.....	each, \$1.75
3041—Steel Spring Bow-Pencil, 3 ½ inches, metal handle.....	each, 2.25
3042—Steel Spring Bow-Pen, 3 ½ inches, metal handle.....	each, 2.25

**"UNIVERSITY" DRAWING INSTRUMENTS.**

THE HIGHEST GRADE DRAWING TOOLS.

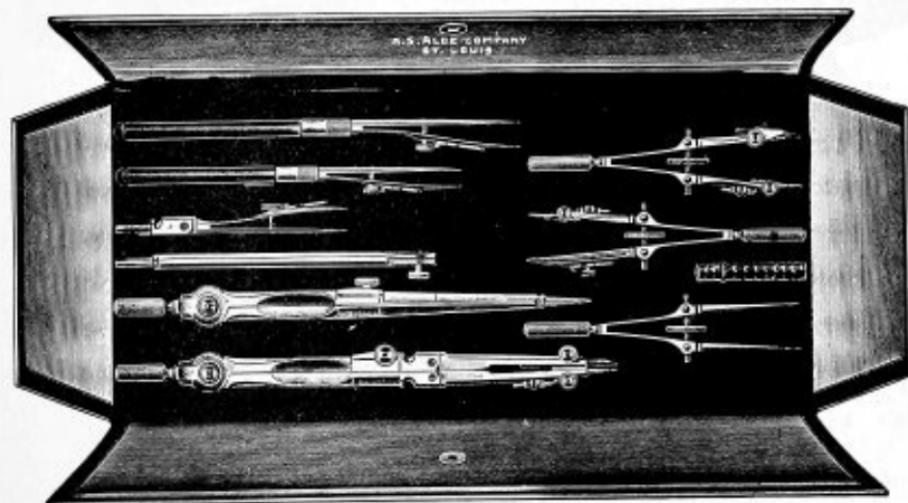
Morocco-Leather, Pocketbook-Style Cases, Chamois Lined.



No. 3043.

No.

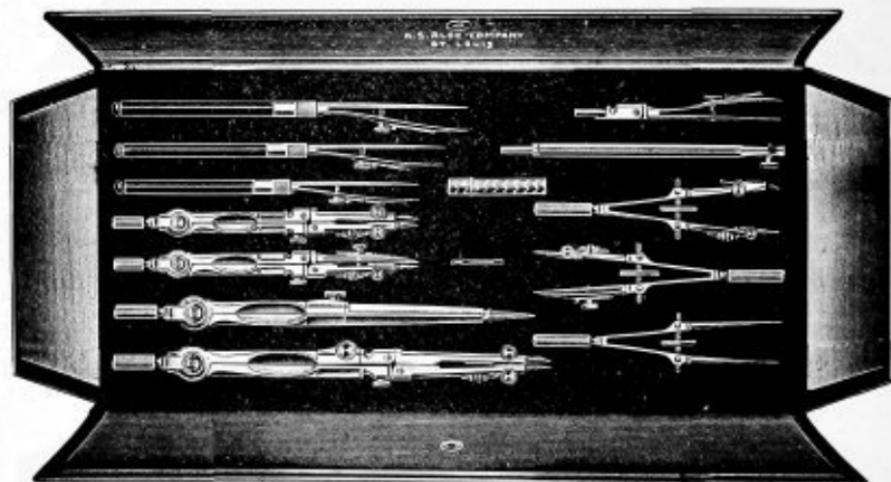
- 3043—Containing Ruling Pen, ebony handle, 5 inches, 3034; Steel-Spring Bow-Pencil,  $3\frac{1}{2}$  inches, metal handle, No. 3041; Steel-Spring Bow-Pen,  $3\frac{1}{2}$  inches, metal handle, 3042; Plain Dividers, 6 inches, 3021; Compass, 6 inches, with fixed needle point, pencil and pen point, and lengthening bar, 3028; Box of Leads. . . . . Per set, \$13.50
- 3044—Containing same as No. 3043, but with Hair-Spring Dividers No. 3023 instead of 3021 Plain Dividers. . . . . Per set, 14.25



No. 3046.

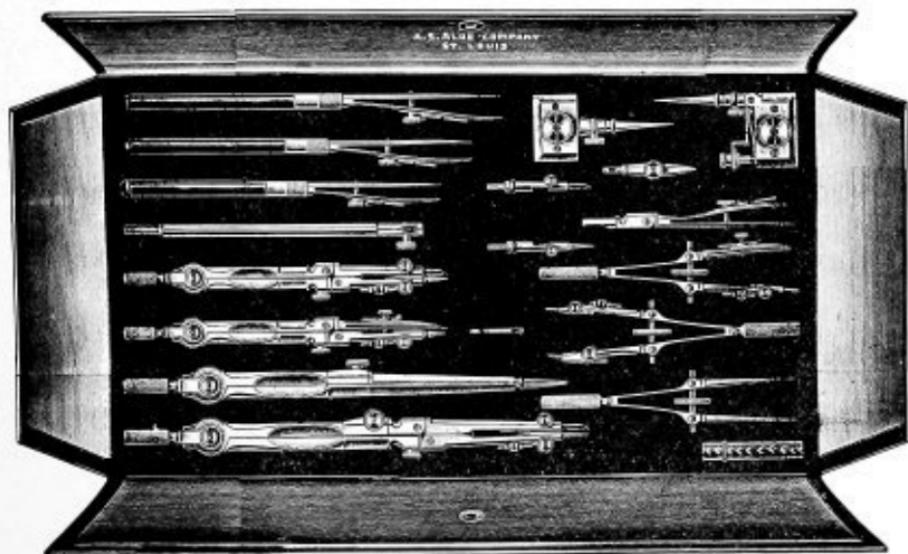
**"UNIVERSITY" DRAWING INSTRUMENTS.****THE HIGHEST GRADE DRAWING TOOLS.****Morocco-Leather, Pocketbook-Style Cases, Chamois Lined.**

- No.  
 3045—Containing Ruling Pen, ebony handle,  $4\frac{1}{4}$  inches, No. 3033; Ruling Pen, ebony handle, 5 inches, No. 3034; Steel-Spring Bow-Dividors,  $3\frac{1}{2}$  inches, metal handle, No. 3040; Steel-Spring Bow-Pencil,  $3\frac{1}{2}$  inches, metal handle, No. 3041; Steel-Spring Bow-Pen,  $3\frac{1}{2}$  inches, metal handle, No. 3042; Plain Dividers, 6 inches, No. 3021; Compass, 6 inches, with fixed needle point, pen and pencil point, and lengthening bar, No. 3028; Box of Leads. . . . Per set, \$18.00
- 3046—Containing same as No. 3045, but with Hair-Spring Dividers, No. 3023 instead of Plain Divider, No. 3021. . . . . Per set, 18.75



No. 3047.

- No.  
 3047—Containing Ruling Pen, ebony handle,  $4\frac{1}{4}$  inches, No. 3033; Ruling Pen, ebony handle, 5 inches, No. 3034; Ruling Pen, ebony handle,  $5\frac{1}{2}$  inches, No. 3035; Steel-Spring Bow-Dividors,  $3\frac{1}{2}$  inches, metal handle, No. 3040; Steel-Spring Bow Pencil,  $3\frac{1}{2}$  inches, metal handle, No. 3041; Steel-Spring Bow-Pen,  $3\frac{1}{2}$  inches, metal handle, No. 3042; Hair Spring Dividers, 6 inches, No. 3023; Compass,  $4\frac{1}{4}$  inches, fixed needle and pencil point, No. 3024; Compass,  $4\frac{1}{4}$  inches, fixed needle and pen point, No. 3025; Compass, 6 inches with Hair-Spring interchangeable pen and pencil point and lengthening bar, No. 3032; Box of Leads. . . . Per set, \$26.50

**"UNIVERSITY" DRAWING INSTRUMENTS.****THE HIGHEST GRADE DRAWING TOOLS****In Improved Morocco-Leather, Pocketbook-Style Cases, Chamois Lined.**

No. 3048.

No.

3048—Containing Ruling Pen, ebony handle, 4 ¼ inches, No. 3033; Ruling Pen, ebony handle, 5 inches, No. 3034; Ruling Pen, ebony handle, 5 ½ inches, No. 3035; Steel-Spring Bow-Dividers, 3 ½ inches, metal handle, No. 3040; Steel-Spring Bow-Pencil, 3 ½ inches, metal handle, No. 3041; Steel-Spring Bow-Pen, 3 ½ inches, metal handle, No. 3042; Hair-Spring Dividers, 6 inches, No. 3023; Compass, 4 ¼ inches, fixed needle and pencil point, No. 3024; Compass, 4 ¼ inches, fixed needle and pen point, No. 3025; Compass, 6 inches with Hair-Spring interchangeable pen and pencil point, and lengthening bar, No. 3032; Minute Beam Compass, with two steel points, pen, pencil and needle point. Box of Leads. . Per set, \$33.00

**We are prepared to make to order Pocket Cases to suit any special selection of instruments.**

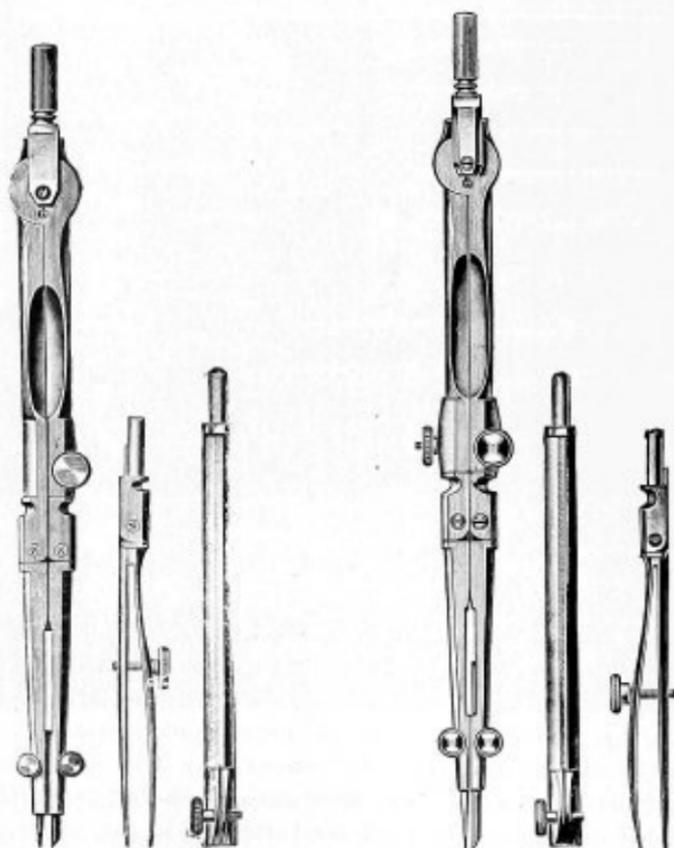
## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.

German Silver with Steel Points.

All Compasses with Straightening Device.

See Page 174.



No. 200

No. 205

- No.
- 200—Compasses, 6-inch, fixed Needle Point and Pen and Pencil Points, and lengthening Bar, Pivot Joint.....each, \$4.00
- 205—Compasses, 6-inch, fixed Needle Point and Hair-Spring and Pencil and Pen Points and Lengthening Bar, Pivot Joint.....each, 4.75

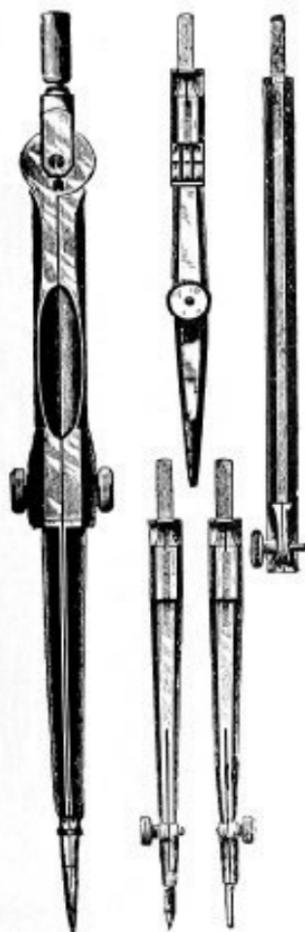
## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.

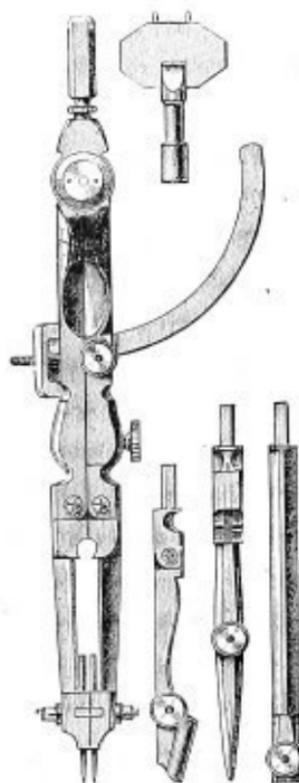
German Silver with Steel Points.

All Compasses with Straightening Device.

See Page 174.



No. 210.



No. 213.

- |     |  |              |
|-----|--|--------------|
| No. |  |              |
| 210 | Compasses, 6-inch, two Plain Points, Pencil, Pen and Needle Points and Lengthening Bar, Pivot Joint.....   | each, \$5.00 |
| 211 | Compasses, 6-inch, two Plain Points with joints in each leg, with Pen, Pencil and Needle Points and Lengthening Bar.....   | each, 5.50   |
| 213 | Dividers 7 inches long, for engravers, with two Steel Points, Pen and Pencil Points and micrometer adjustment for regulating spaces, and wrench (all packed in neat case)..... | 13.00        |

**"IDEAL" DRAWING INSTRUMENTS.**

First Quality German Made Instruments.

All Compasses with Straightening Device.

German Silver and Steel Points.



No. 215.



No. 220.



No. 225.



No. 230.



No. 235.

No.		each,	
215	—Plain Divider, 4-inch, Pivot Joint . . . . .	\$1.25	
216	—Plain Divider, 5-inch, Pivot Joint . . . . .	1.50	
217	—Plain Divider, 6-inch, Pivot Joint . . . . .	1.75	
220	—Hair-spring Divider, 4-inch, Pivot Joint . . . . .	1.75	
221	—Hair-spring Divider, 5-inch, Pivot Joint . . . . .	2.25	
222	—Hair-spring Divider, 6-inch, Pivot Joint . . . . .	2.50	
225	—Compasses, 4-inch, fixed Needle and Pencil Point, Pivot Joint . . . . .	2.75	
230	—Compasses, 4-inch, fixed Needle and Pen Point, Pivot Joint . . . . .	2.75	
235	—Compasses, 4-inch, fixed Needle and Pencil and Pen Points, Pivot Joint . . . . .	3.25	

**"IDEAL" DRAWING INSTRUMENTS.**

First Quality German Made Instruments.

All Compasses with Straightening Device.

German Silver and Steel Points.



No. 240.



No. 270.



No. 290.

- |  |        |
|--|--------|
| 240—Compasses, 4-inch, Pen, Pencil and Needle Points, Pivot Joint..each,   | \$4.00 |
| 270—Spring Dividers, 5 1/2 inches long, with detachable ivory handle, with two Pen Points (with these it can be used as a railroad Pen), Pencil and Needle Points..... | 4.50   |
| 271—Same as No. 270, in fine Morocco case.....   | 5.50   |
| 290—Pocket Divider, 5-inch, with detachable sheath.....  | 1.75   |

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.



No. 295.



No. 296.

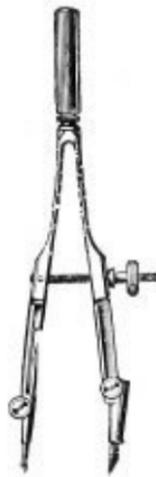


No. 297.

No.	
295—Steel Spring Bow Divider, 2 ½-inch, metal handle.....	each, \$1.00
296—Steel Spring Bow Pencil, 2 ½-inch, metal handle.....	each, 1.25
297—Steel Spring Bow Pen, 2 ½-inch, metal handle.....	each, 1.25
298—Set of Bows, Nos. 295, 296 297, in case.....	each, 4.25



No. 310.



No. 311.



No. 312.

No.	
310—Steel Spring Bow Divider, 3 ½-inch, metal handle.....	each, \$1.00
311—Steel Spring Bow Pencil, 3 ½-inch, metal handle.....	each, 1.25
312—Steel Spring Bow Pen, 3 ½-inch, metal handle.....	each, 1.25
315—Set of Bows, Nos. 310, 311, 312, in case.....	each, 4.25

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.

This new circular spring avoids the often blamed inequality of motion in the old spring bow, securing by all means a perfectly even and uniform motion in each and every width of the compass.



316



317



318

- No.  
 316—Steel Spring Bow Divider, 3 1/2-inch, metal handle.....each, \$1.10  
 317—Steel Spring Bow Pen, 3 1/2-inch, metal handle.....each, 1.35  
 318—Steel Spring Bow Pencil, 3 1/2-inch, metal handle.....each, 1.35



316a



317a



318a

- No.  
 316A—Steel Spring Bow Divider, 3 1/2-inch, metal handle.....each, \$1.40  
 317A—Steel Spring Bow Pen, 3 1/2-inch, metal handle.....each, 1.75  
 318A—Steel Spring Bow Pencil, 3 1/2-inch, metal handle.....each, 1.75

**"IDEAL" DRAWING INSTRUMENTS.**

First Quality German Made Instruments.



No. 320



No. 321



No. 322

No.	
320	—Steel Spring Bow Divider, 3 1/2-inch, metal handle.....each, \$1.25
321	—Steel Spring Bow Pencil, 3 1/2-inch, metal handle.....each, 1.50
322	—Steel Spring Bow Pen, 3 1/2-inch, metal handle.....each, 1.50
325	—Set of Bows, Nos. 320, 321, 322, in case.....each, 5.00



No. 326



No. 327

No.	
326	—Bow Pen, adjustable pivot center.....each, \$1.75
327	—Bow Pen, adjustable pivot center, with pencil point.....each, 2.75

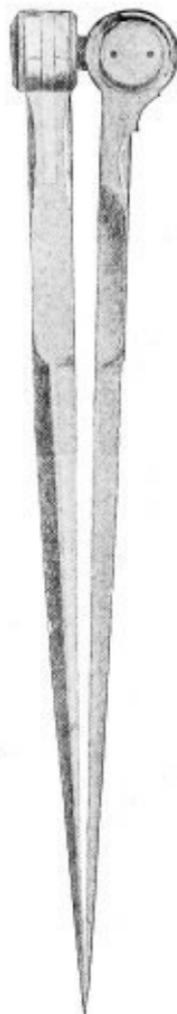
## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.

German Silver with Steel Points.



No. 330.



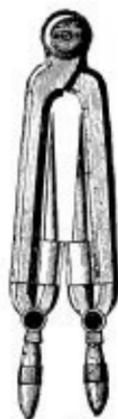
No. 332.



No. 333.



No. 331.



No. 331.

Points Withdrawn.      Folded.

No.		
330	Pocket Folding Compasses, with reversible pen, pencil and needle points .....	each, \$5.75
331	Pocket Pillar Compasses, with handles, pen and pencil points, to draw out, and can be used as small bow instruments.....	each, 8.00
332	Three-Legged Divider .....	each, 3.00
333	Bi-secting Divider, or Divider for reducing half size or increasing .....	each, 2.75

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.



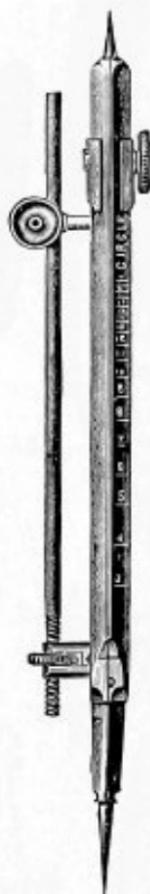
No. 335.



No. 340.



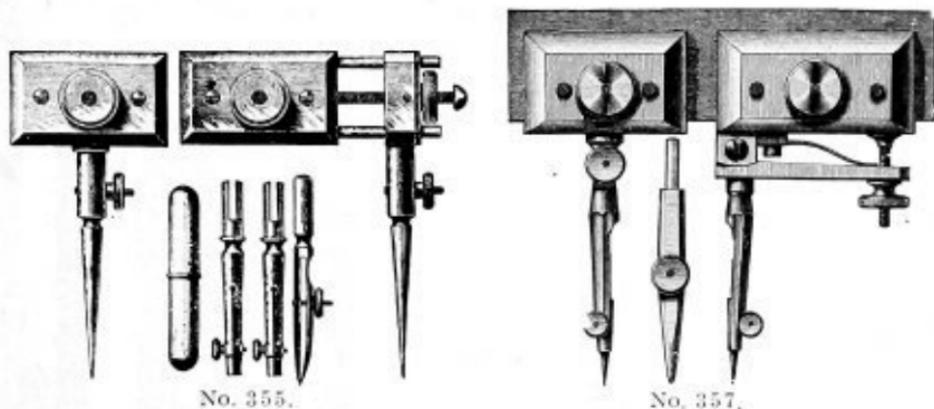
No. 345



No. 350.

- No.
- 335—Proportional Dividers, 6 1/2-inch, graduated for lines, in case . . . each, \$5.00
- 340—Proportional Dividers, 7 1/4-inch, for lines and circles, in case . . . each, 6.50
- 345—Proportional Dividers, 7 1/4-inch, with rack movement, for lines, circles, planes and solids, in case . . . . . each, 10.00
- 350—Proportional Dividers, 9 1/4-inch, with micrometer adjustment for lines and circles, in case . . . . . each, 13.00

## "IDEAL" DRAWING INSTRUMENTS.



No. 355.

No. 357.



No. 360.

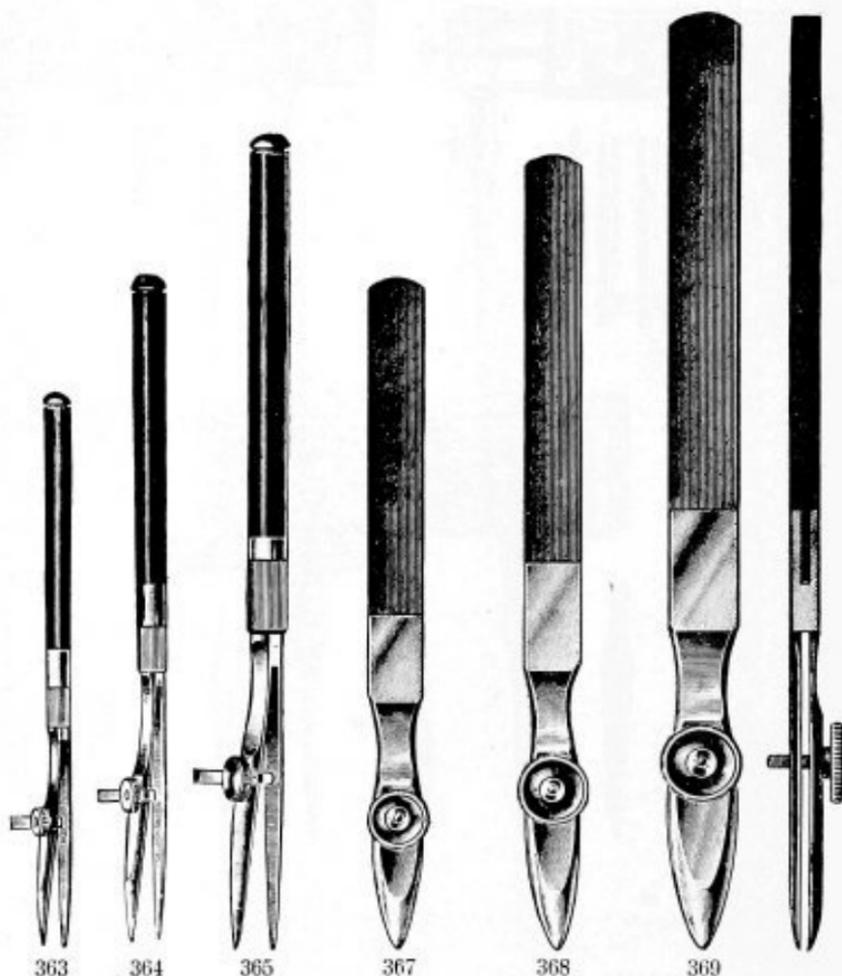
- No.  
 355—Beam Compass, to fit any straight-edge, with two plain points, needle point, pen and pencil points, in Morocco case.....each, \$5.50  
 357—Beam Compasses, to fit any straight-edge, with two needle points, exchangeable for lead, and pen point, and micrometer adjustment, in Morocco case.....each, 6.50  
 360—Beam Compass, to fit any straight-edge, with two plain points, one needle point, pen and pencil points, in Morocco case.....each, 7.00

## BEAM COMPASS BARS.

- No.  
 361—Beam Compass Bars, made of hard wood, 24-inch.....each, \$0.25  
 Beam Compass Bars, made of hard wood, 30-inch.....each, .30  
 Beam Compass Bars, made of hard wood, 36-inch.....each, .35  
 Beam Compass Bars, made of hard wood, 42-inch.....each, .40  
 Beam Compass Bars, made of hard wood, 48-inch.....each, .50  
 Beam Compass Bars, made of hard wood, 60-inch.....each, .65

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.



No.		
363	Ruling Pen, 4½-inch, ebony handle, with lever.....	each, \$0.65
364	Ruling Pen, 5 -inch, ebony handle, with lever.....	each, .70
365	Ruling Pen, 5½-inch, ebony handle, with lever.....	each, .75
367	Swedish Detail Ruling Pen, 5-inch, ebony handle, upper blade with spring, for long lines.....	each, \$0.90
368	Swedish Detail Ruling Pen, 6-inch, ebony handle, upper blade with spring, for long lines.....	each, 1.05
369	Swedish Detail Ruling Pen, 7-inch, ebony handle, upper blade with spring, for long lines.....	each, 1.20

These Pens are adapted for drawing long and heavy lines, and being made to hold much ink, do not require very frequent filling.

Pens carefully dressed and sharpened, each 25 cents.

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.



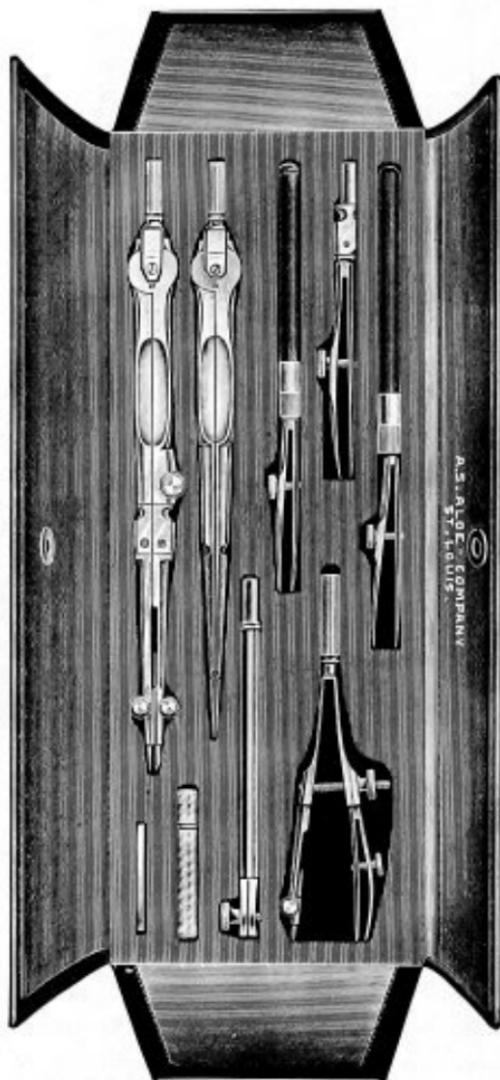
No. 370. No 371. No. 372. No. 375. No. 376. No. 377. No. 378. No. 380.

No.		
370	Ruling Pen, ebony handle with spring, 4 1/2-inch.....	each, \$0.65
371	Ruling Pen, ebony handle with spring, 5 -inch.....	each, .70
372	Ruling Pen, ebony handle with spring, 5 1/2-inch.....	each, .75
375	Ruling Pen, ivory handle, 4-inch.....	each, .75
376	Ruling Pen, ivory handle, with pin, 4 1/2-inch.....	each, .85
377	Ruling Pen, ivory handle, with pin, 5-inch.....	each, .90
378	Ruling Pen, ivory handle, with pin, 6-inch.....	each, 1.00
380	Hatching Pen, three blades of different sizes, in case.....	each, 2.00
381	Hatching Pen, two blades of different sizes, in case.....	each, 1.75

**"IDEAL" DRAWING INSTRUMENTS.**

First Quality German Made Instruments.

In Pocket Book Style Cases, Lined in Green Silk Velvet.



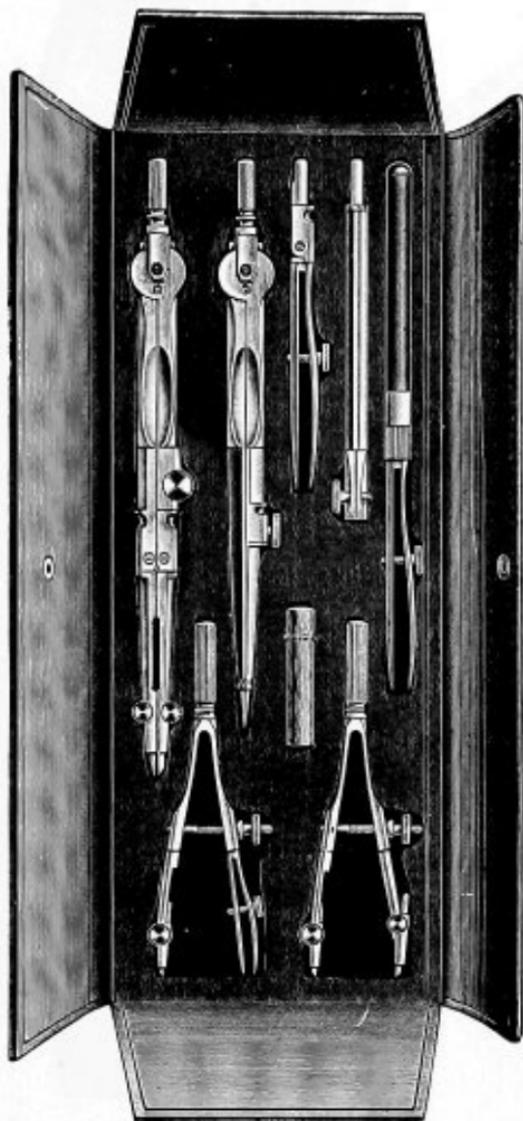
No. 117.

- No.  
 117—Pocket Book style case, containing 6-inch Compass, with straightening device, with fixed Needle Point, Pen with lever and Pencil Point and Lengthening Bar, No. 200; five-inch Plain Divider, No. 216; Bow Pen with lever, 3 ½-inch, No. 312; 4 ½-inch and 5 ½-inch Ruling Pens, Nos. 370 and 372, with spring and lever. Box of Leads ..... Price, \$9.50

**"IDEAL" DRAWING INSTRUMENTS.**

First Quality German Made Instruments.

In Pocket Book Style Cases, Lined with Green Silk Velvet.

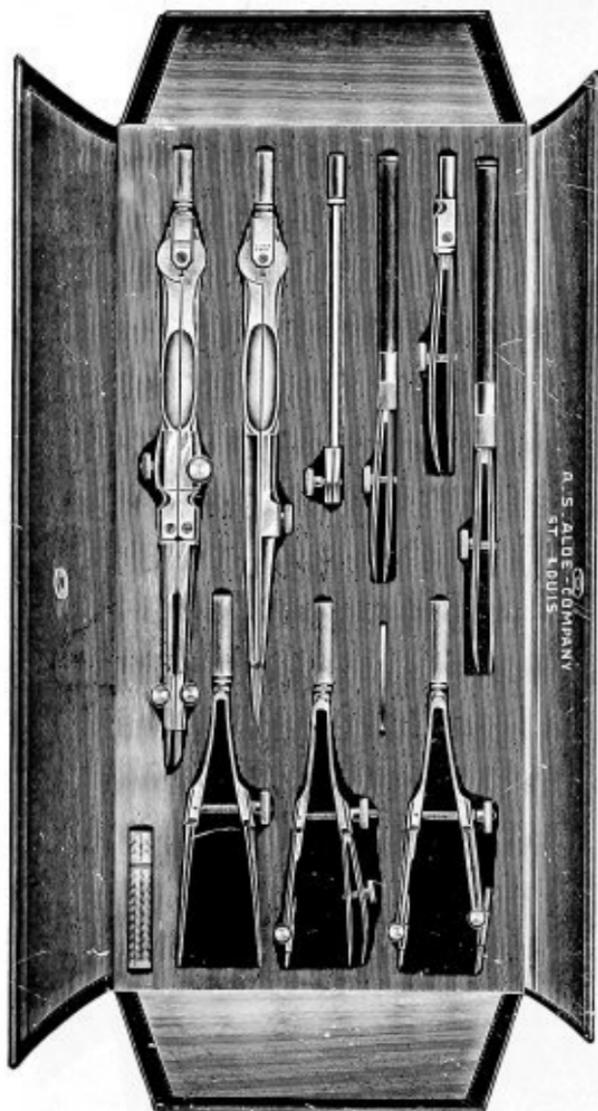


No. 118.

- No.  
 118—Pocket Book style case, containing 6-inch Compasses, with straightening device, with fixed Needle Point, Pen with lever and Pencil Point and Lengthening Bar, No. 200; five-inch Hair-spring Divider, No. 221; 3½-inch Bow Pencil, No. 311; 3½-inch Bow Pen with lever, No. 312; 5½-inch Ruling Pen, No. 372, with spring and lever. Box of leads. . . . . Price, \$11.00

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.



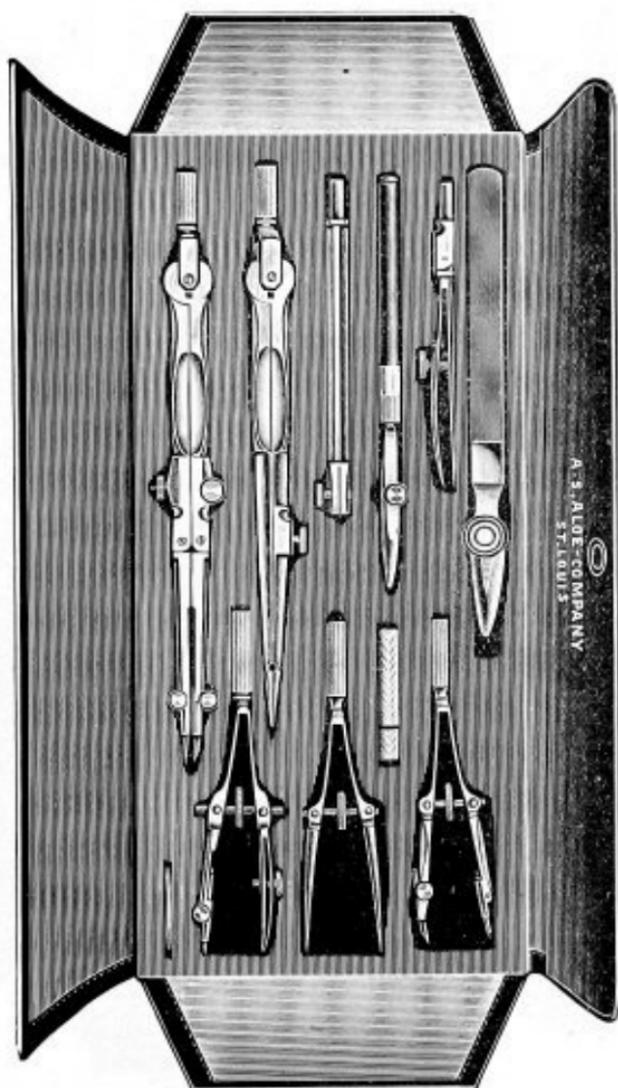
No. 119.

No. 1

119—Pocket Book style case, containing 6-inch Compasses, with straightening device, Hair-spring in leg with fixed Needle Point; Pen with lever, and Pencil Points and Lengthening Bar, No. 205; 5-inch Hair-spring Divider, No. 221; 3½-inch Spacing Divider, No. 310; 3½-inch Bow Pencil, No. 311; 3½-inch Bow Pen with lever, No. 312; 4½ and 5½-inch Ruling Pens, Nos. 370 and 372, with spring and lever and box of leads. . . . . Price, \$13.50

## "IDEAL" DRAWING INSTRUMENTS.

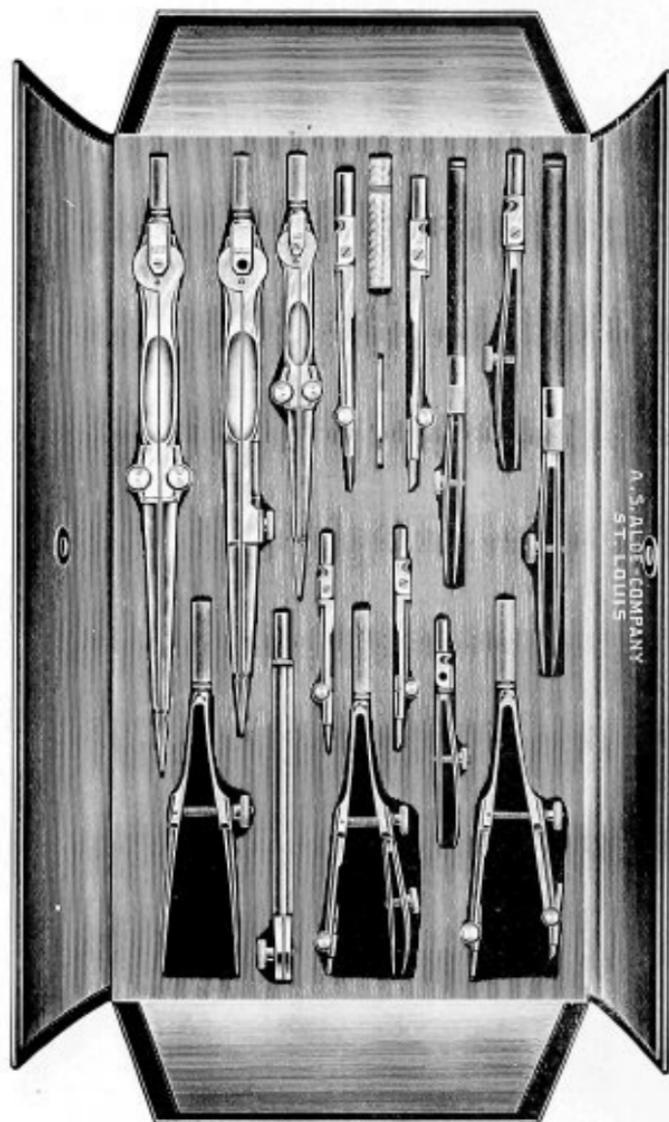
First Quality German Made Instruments.



No. 119 ½.

No.  
119 ½—Pocket Book style case, containing 6-inch Compasses, with straightening device, Hair-spring in leg with fixed Needle Point; Pen with lever and Pencil Points and Lengthening Bar, No. 205; 5-inch Hair-spring Divider, No. 221; 3 ½-inch Spacing Divider, No. 320; 3 ½-inch Bow Pencil, No. 321; 3 ½-inch Bow Pen with lever, No. 322; 5-inch Ruling Pen, No. 371 with spring and lever and Detail Pen, 6-inch, No. 368 with spring. Box of leads. . . . . Price, \$14.50

## "IDEAL" DRAWING INSTRUMENTS.

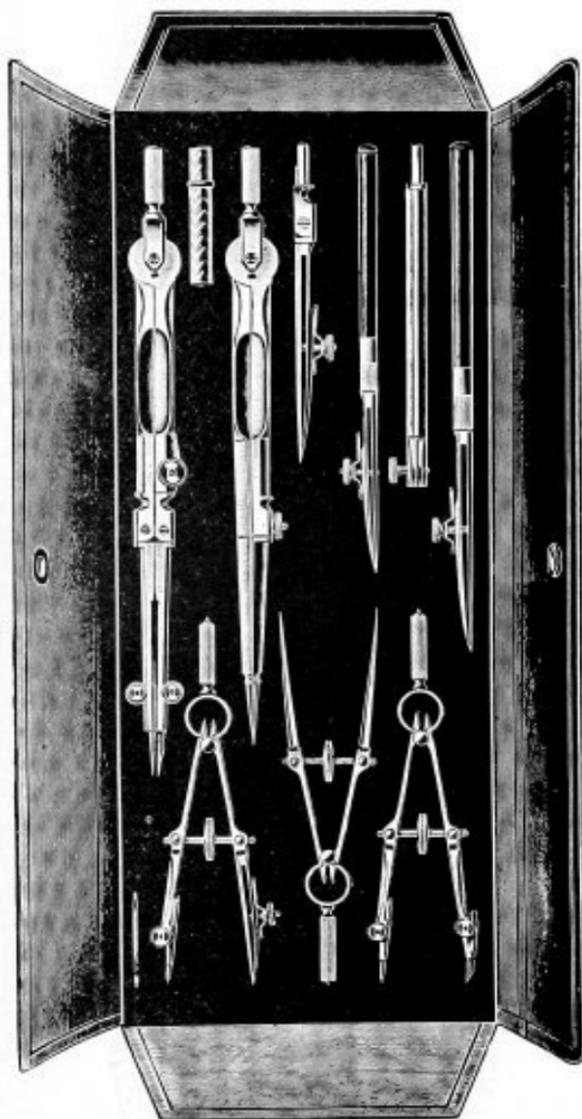


No. 120.

- No.  
 120—Pocket Book style case, containing 6-inch Compasses, with Straightening Device, with two Steel Points, Pen with Lever, Pencil and Needle Points and Lengthening Bar, No. 210; 5-inch Hair-spring Dividers, No. 221; 4-inch Compasses with Straightening Device, with two Steel Points, Pen with Lever, Pencil and Needle Points, No. 240; 3½-inch Spacing Divider, No. 310; 3½-inch Bow Pencil, No. 311; 3½-inch Bow Pen with Lever, No. 312; 4½ and 5½-inch Ruling Pens, Nos. 370 and 372, with Spring and Lever and Box of Leads. . . . Price, \$17.00

**"IDEAL" DRAWING INSTRUMENTS.**

First Quality German Made Instruments.

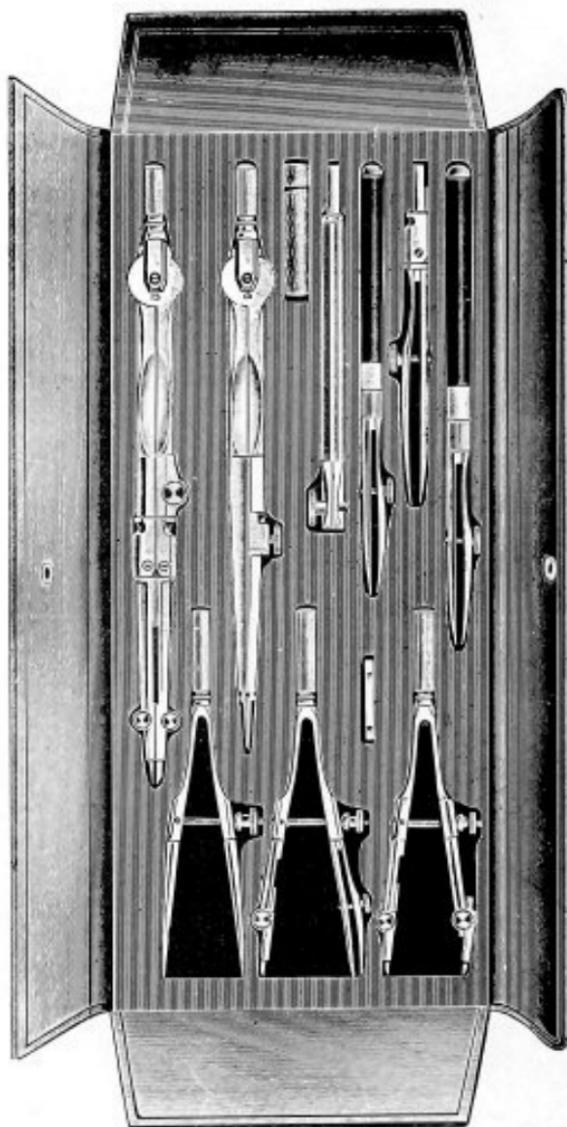


No. 135.

- No.  
 135—Pocket Book style case, containing 6-inch Compasses with straightening device, fixed Needle Point, Pen with lever and Pencil Points and Lengthening Bar, No. 200; 5-inch Hair-spring Divider, No. 221; 3 1/2-inch Spacing Divider, No. 316a; Circular Spring, 3 1/2-inch, Bow Pen, No. 317a with lever, 3 1/2-inch Bow Pencil, No. 318a; 4 1/2 and 5 1/2-inch Ruling Pens with lever, Nos. 363 and 365. Box of leads . . . . . Price, \$13.50

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.

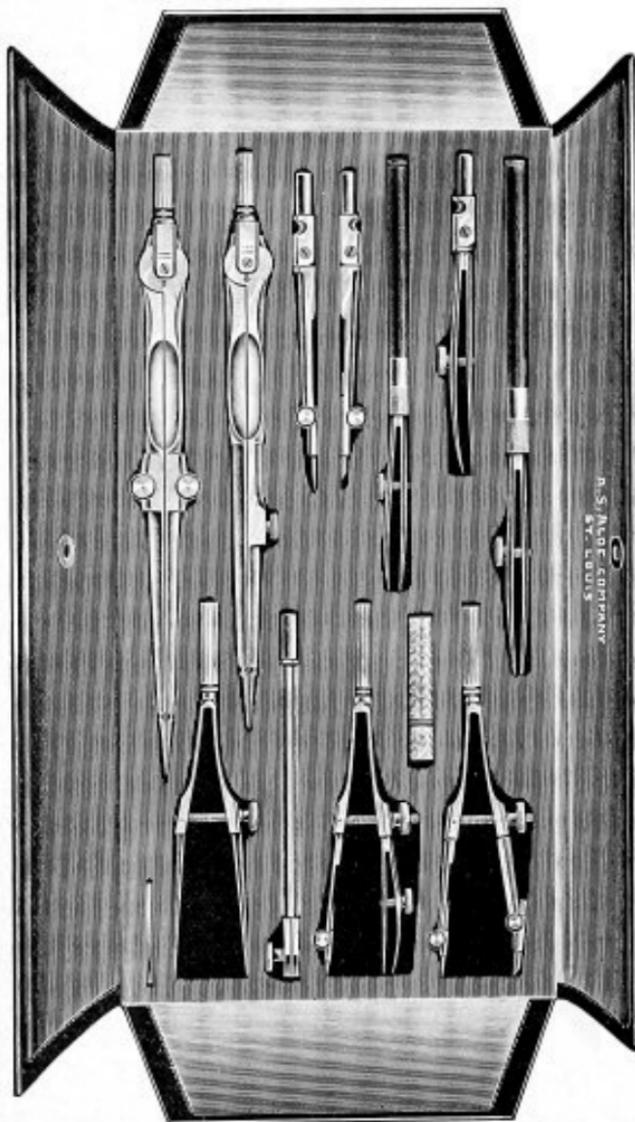


No. 137.

- No.  
 137—Pocket Book style of case, containing 6-inch Compasses, with fixed Needle Point, Pen with lever and Pencil Points and Lengthening Bar, No. 200; 5-inch Hair-spring Divider, No. 221; 3 1/2-inch Spacing Divider, No. 310; 3 1/2-inch Bow Pencil, No. 311; 3 1/2-inch Bow Pen, No. 312; 4 1/2 and 5 1/2-inch Ruling Pens with lever, Nos. 363 and 365 ..... Price, \$12.50

**"IDEAL" DRAWING INSTRUMENTS.**

First Quality German Made Instruments.

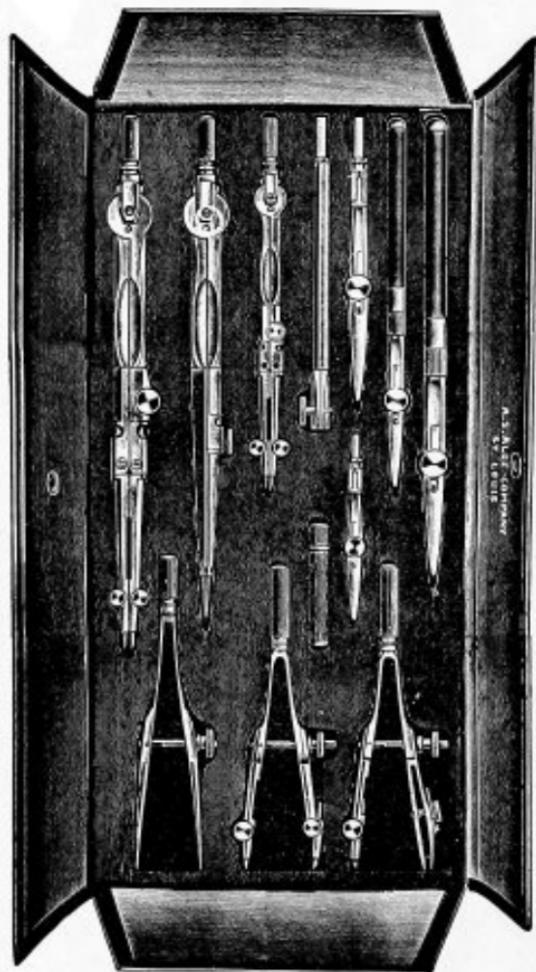


No. 138.

- No. 138—Pocket Book style case, containing 6-inch Compasses, with straightening device, two plain Points, Pen with lever, Pencil and Needle Points and Lengthening Bar, No. 210; 5-inch Hair-spring Divider, No. 221;  $3\frac{1}{2}$ -inch Spacing Dividers, No. 310;  $3\frac{1}{2}$ -inch Bow Pencil, No. 311;  $3\frac{1}{2}$ -inch Bow Pen with lever, No. 312;  $4\frac{1}{2}$  and  $5\frac{1}{2}$ -inch Ruling Pens, Nos. 370 and 372 with spring and lever and box of Leads . . . . . Price, \$13.50

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.



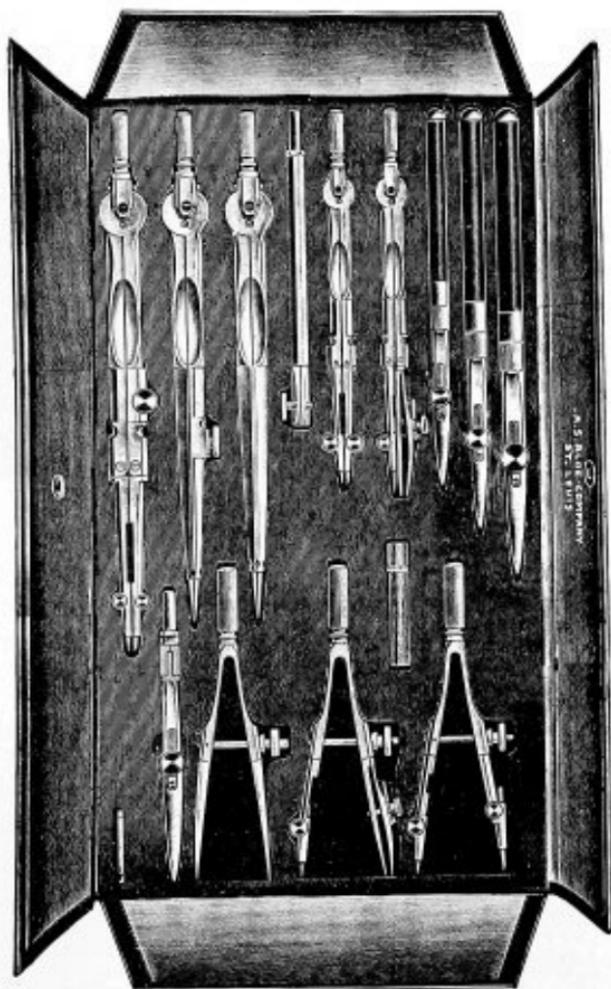
No. 139.

No.

- 139—Pocket Book style case, Containing 6-inch Compasses with straightening device, fixed Needle Point, Pen Point with lever, Pencil Point and Lengthening Bar, No. 200; 5-inch Hair-spring Divider, No. 221; 4-inch Compass with straightening device, fixed Needle Point, Pen Points with lever and Pencil Points, No. 235; 3 1/2-inch Spacing Divider, No. 310; 3 1/2-inch Bow Pencil, No. 311; 3 1/2-inch Bow Pen with lever, No. 312; 4 1/2 and 5 1/2-inch Rulling Pens with spring and lever, ebony handle, box of Leads. . . . . each, \$16.00

## "IDEAL" DRAWING INSTRUMENTS.

First Quality German Made Instruments.



No. 140.

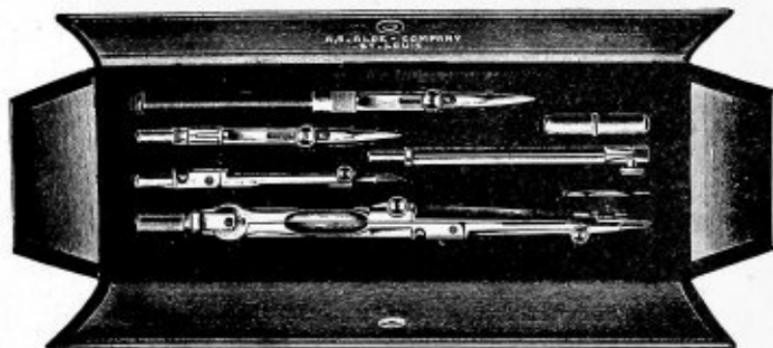
- No.  
 140—Pocket Book Style Case, containing 6-inch Compasses with Straightening Device, Fixed Needle Point, Pen Point with Lever, Pencil Point and Lengthening Bar, No. 200; 5-inch Plain Divider, No. 216; 5-inch Hair-Spring Divider, No. 221; 4-inch Compass with Fixed Needle Point and Pencil Point, No. 225; 4-inch Compass with fixed Needle Point and Pen Point with Lever; 3 1/2-inch Spacing Divider, No. 310; 3 1/2-inch Bow Pen with Lever, No. 312; 4 1/2, 5 and 5 1/2-inch Ruling Pens with Spring and Lever; Ebony Handles; Box of Leads . . . . . each, \$21.00

## "STANDARD" DRAWING INSTRUMENTS.

Second Best Quality German Made Instruments.

German Silver with Steel Points.

In Pocket Book Style Cases, Lined with Blue Velvet.



No. 145.

- No.  
145—Pocket Book Style Case, containing Compasses, 6-inch, with Straightening Device, fixed Needle Point, Pen Point with Lever and Pencil Points and Lengthening Bar, 5-inch Ruling Pen with Spring and Lever, Ebony Handle, Box of Leads. . . . each, \$4.25



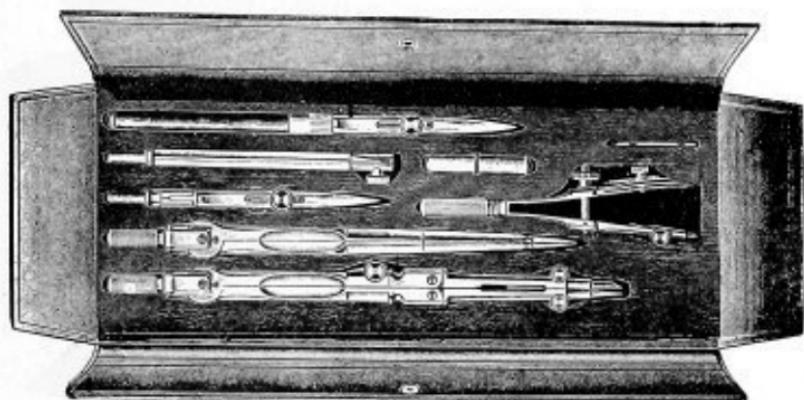
No. 147.

- No.  
147—Pocket Book Style Case, containing Compasses, 6-inch, with Straightening Device, fixed Needle Point, Pen Point with Lever and Pencil Points and Lengthening Bar, 5-inch Plain Divider, 5-inch Ruling Pen with Spring and Lever, Ebony Handle, Box of Leads. . . . . each, \$5.25

**"STANDARD" DRAWING INSTRUMENTS.**

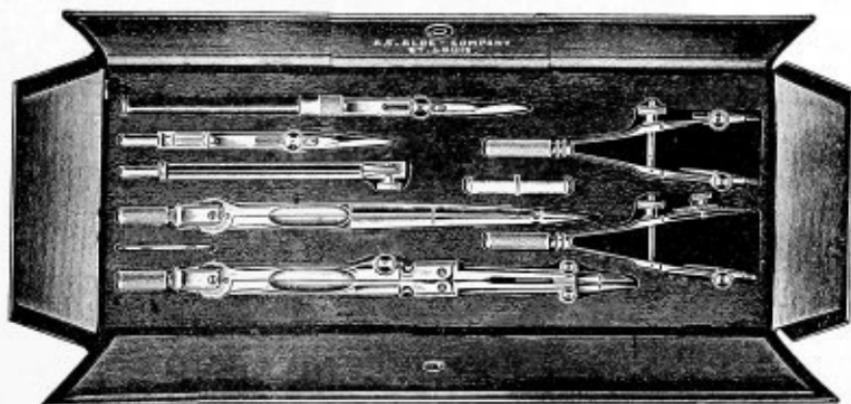
Second Best Quality German Made Instruments.

German Silver with Steel Points.



No. 149.

- No.  
149—Pocket-Book Style Case, containing Compasses, 6-inch, with Straightening Device, fixed Needle Point, Pen Point with Lever and Pencil Points and Lengthening Bar, 5-inch Plain Divider,  $3\frac{1}{2}$ -inch Bow Pen with Lever, 5-inch Ruling Pen with Spring and Lever, Ebony Handle, Box of Leads. . . . . each, \$6.25



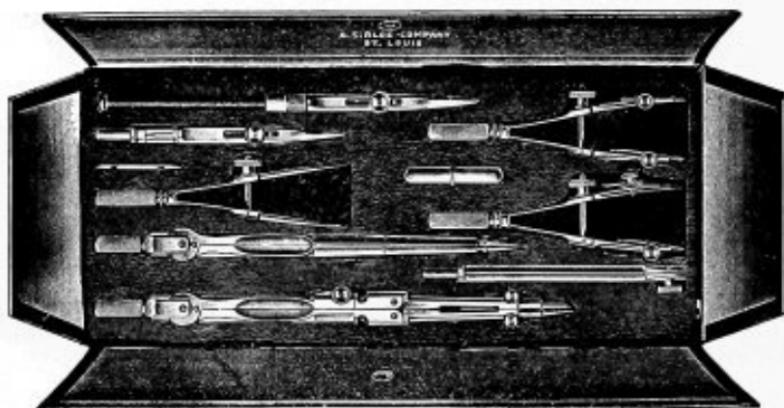
No. 151.

- No.  
151—Pocket Book Style Case, containing Compasses, 6-inch, with Straightening Device, fixed Needle Point, Pen Point with Lever and Pencil Point and Lengthening Bar, 5-inch Plain Divider,  $3\frac{1}{2}$ -inch Bow Pen with Lever,  $3\frac{1}{2}$ -inch Bow Pencil, 5-inch Ruling Pen with Spring and Lever, Ebony Handle, Box of Leads. . . . . each, \$7.25

**"STANDARD" DRAWING INSTRUMENTS.**

Second Best Quality German Made Instruments.

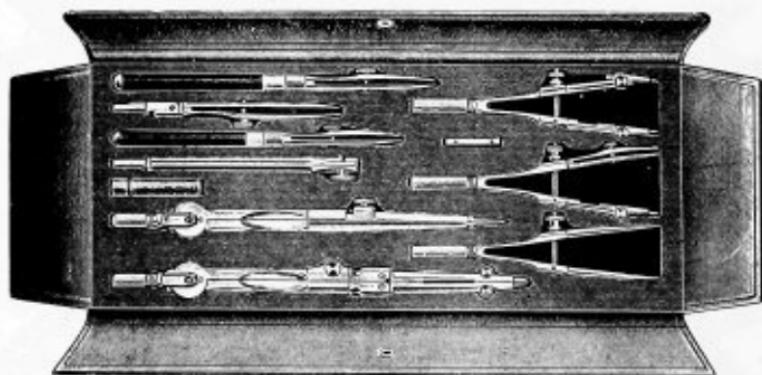
German Silver with Steel Points.



No. 152.

No.

- 152—Pocket Book Style Case, containing Compasses, 6-inch, with Straightening Device, fixed Needle Point, Pen Point with Lever, Pencil Point and Lengthening Bar, 5-inch Plain Divider, 3 ½-inch Spacing Divider, 3 ½-inch Bow Pen with Lever, 3 ½-inch Bow Pencil, 5-inch Ruling Pen with Spring and Lever, Ebony Handle, Box of Leads.....each, \$8.25



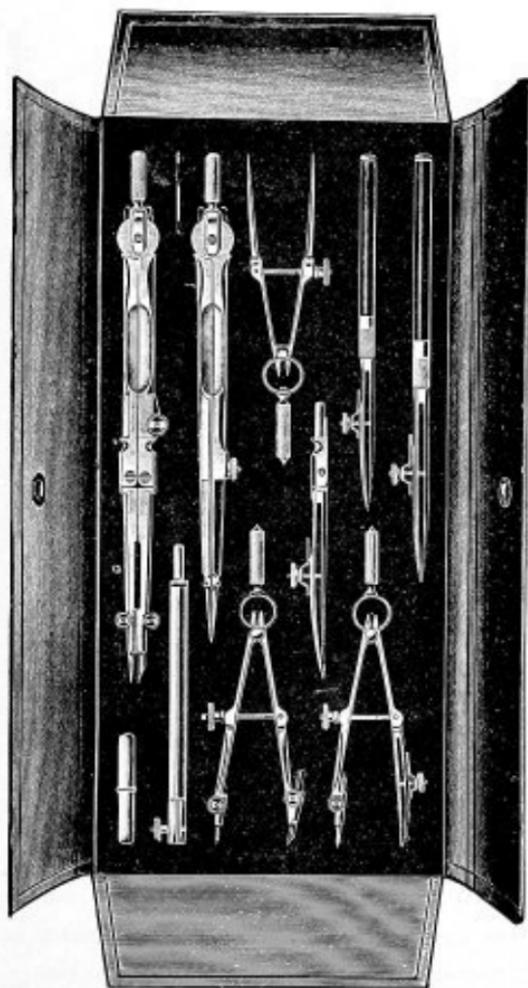
No. 153.

No.

- 153—Pocket Book Style Case, containing Compasses, 6-inch, with Straightening Device, fixed Needle Point, Pen Point with Lever, Pencil Point and Lengthening Bar, 5-inch Hair-Spring Divider, 3 ½-inch Spacing Divider, 3 ½-inch Bow Pen with Lever, 3 ½-inch Bow Pencil, 4 ½ and 5 ½-inch Ruling Pens with Spring and Lever, Ebony Handles, Box of Leads.....each, \$9.50

**STANDARD DRAWING INSTRUMENTS.**

Second Best Quality German Made Instruments.

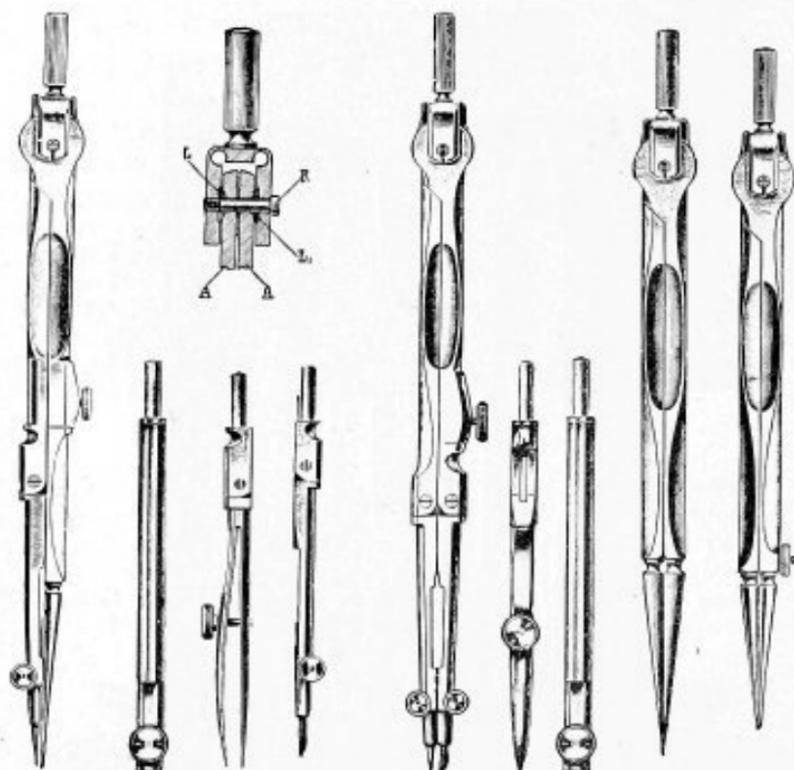


No.

155—Pocket Book style case, containing Compasses, 6-inch with Straightening Device, fixed Needle Point, Pen Point with lever, Pencil Point and Lengthening Bar, 5-inch Hair Spring Divider, 3 1/2-inch Spacing Divider with Circular Spring, 3 1/2-inch Bow Pen with lever and Circular Spring, 3 1/2-inch Bow Pencil with Circular Spring, 4 1/2 and 5 1/2-inch Ruling Pens, with spring and lever, Ebony Handle. Box of Leads.....each, \$10.50

## "VICTOR" GERMAN SILVER INSTRUMENTS.

Third Best Quality German Made Instruments.



No. 3076

No. 3077

No. 3078

No. 3079

This grade of instrument is greatly improved over our former quality, all Compasses having the new improved Pivot Joint, as shown in the illustration. We have also added the straightening device to all Compasses. This makes this line the best offered for the price.

No.		
3076	—6-inch Compass with fixed needle point, steel point, pencil and pen point and lengthening bar.....	each, \$1.90
3077	—6-inch Compass with fixed needle point, pen and pencil points and lengthening bar.....	each, 1.75
3078	—Plain Divider, 5 ½-inch .....	each, .65
3079	—Halfspring Divider, 5 ½-inch.....	each, 1.15

**"VICTOR" DRAWING INSTRUMENTS.**

Third Best Quality German Made Instruments.



No.		
3063	Ruling Pen, 4 1/2-inch, with hinge, bone handle.....	each, \$0.50
3064	Ruling Pen, 5 -inch, with hinge, bone handle.....	each, .55
3065	Ruling Pen, 5 1/2-inch, with hinge, bone handle.....	each, .60
3066	Ruling Pen, 5 1/2-inch, German silver blades, for red ink....	each, .65
3067	Railroad Pen, 5 1/2-inch.....	each, 2.50
3070	Dotting Pen, ebony handle.....	each, 1.00
3073	Ruling Pen, ebony handle with spring, 4 1/2-inch.....	each, .35
3074	Ruling Pen, ebony handle with spring, 5-inch.....	each, .40
3075	Ruling Pen, ebony handle with spring, 5 1/2-inch.....	each, .45

**"VICTOR" GERMAN SILVER INSTRUMENTS.**

Third Best Quality German Made Instruments.



3080.



3080A.

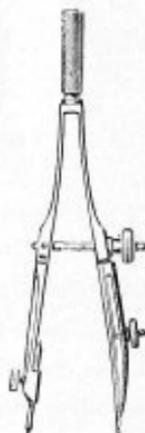


3080B.

No.	
3080	—Steel Spring Bow Divider, 3 1/2-inch, metal handle, circular spring . . . . . each, \$0.80
3080A	—Steel Spring Bow Pen, 3 1/2-inch, metal handle, circular spring . . . . . each, 1.00
3080B	—Steel Spring Bow Pencil, 3 1/2-inch, metal handle, circular spring . . . . . each, 1.00



3081



3082



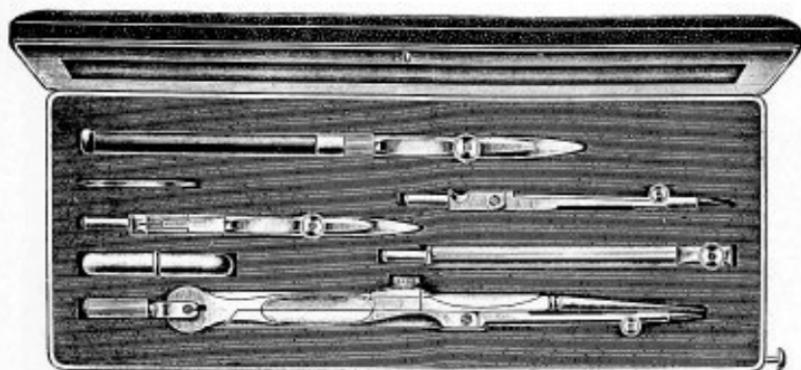
3083

No.	
3081	—Steel Spring Bow Dividers, 3 1/4-inch, metal handle . . . . . each, \$0.55
3082	—Steel Spring Bow Pen, 3 1/4-inch, metal handle . . . . . each, .75
3083	—Steel Spring Bow Pencil, 3 1/4-inch, metal handle . . . . . each, .75

**"VICTOR" GERMAN SILVER INSTRUMENTS.**

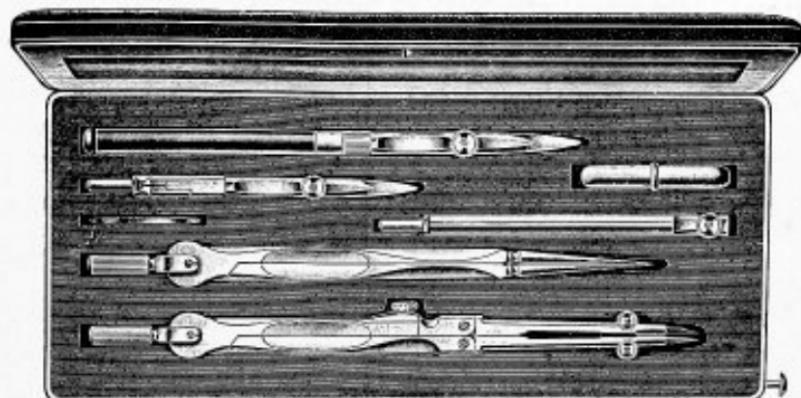
Third Best Quality German Made Instruments.

German Silver with Steel Points.



No. 3085.

- No.  
 3085—Morocco Case, containing Compasses, 5½-inch, with fixed Needle Point, Pen and Pencil Points and Lengthening Bar, No. 3076; 5-inch Ruling Pen with Spring and Ebony Handle, No. 3074; Box of Leads .....each, \$2.75



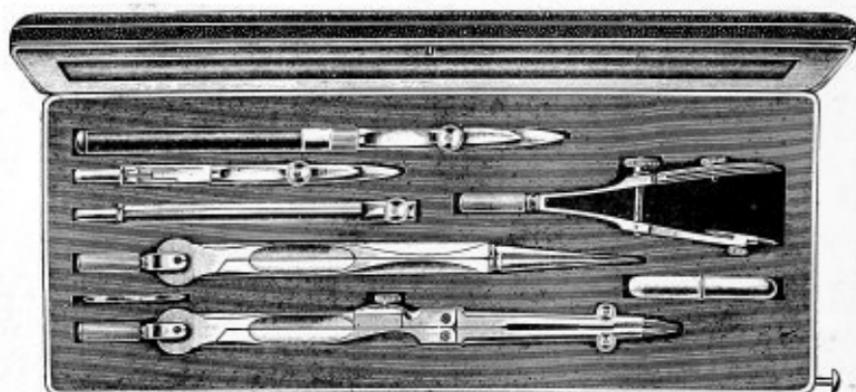
No. 3086.

- No.  
 3086—Morocco Case, containing Compasses, 5½-inch, with fixed Needle Point, Pen and Pencil Points and Lengthening Bar, No. 3077; 5-inch Plain Divider, No. 3078; 5-inch Ruling Pen with Spring and Ebony Handle, No. 3074; Box of Leads.....each, \$3.35

**"VICTOR" GERMAN SILVER INSTRUMENTS.**

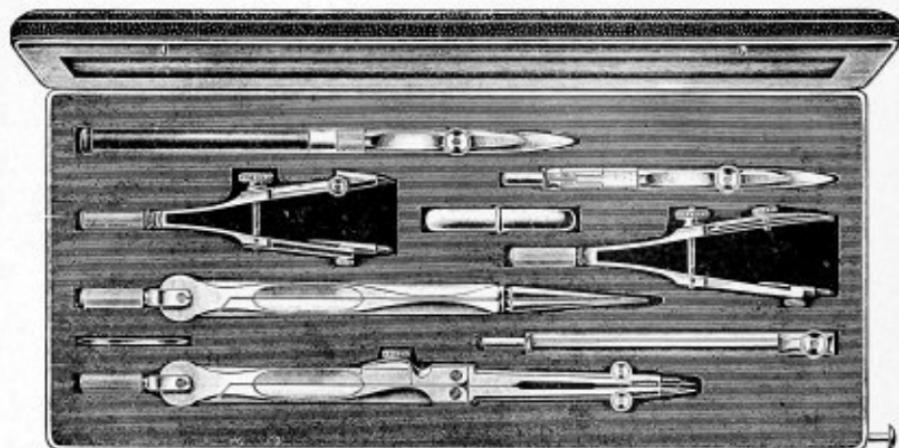
Third Best Quality German Made Instruments.

German Silver with Steel Points.



No. 3087.

- No.  
3087—Morocco Case, containing Compasses, 5 1/2-inch, with fixed Needle Points, Pen, and Pencil Points and Lengthening Bar, No. 3077; 5-inch Plain Divider, No. 3078; 3 1/2-inch Bow Pen, No. 3082; 5-inch Ruling Pen, with Spring and Ebony Handle, No. 3074; Box of Leads . . . . . each, \$4.25



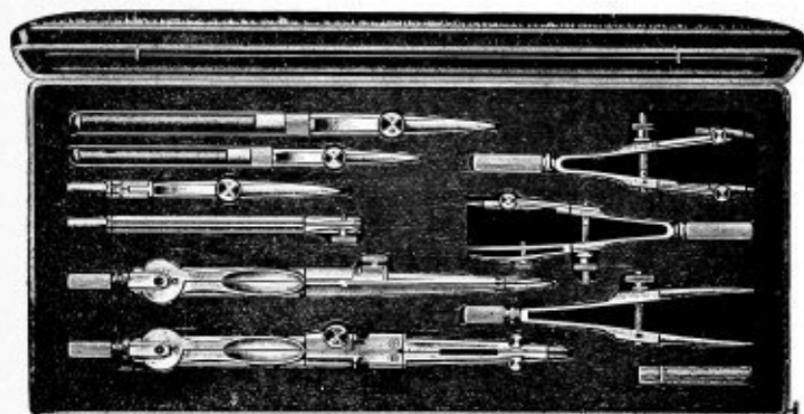
No. 3087 1/2.

- No.  
3087 1/2—Morocco Case, containing Compasses, 5 1/2-inch, with fixed Needle Point, Pen and Pencil Points and Lengthening Bar, No. 3077; 5-inch Plain Divider, No. 3078; 3 1/2-inch Bow Pen, No. 3083; 3 1/2-inch Bow Pencil, No. 3082; 5-inch Ruling Pen with Spring and Ebony Handle, No. 3074; Box of Leads . . . . . each, \$5.00

**"VICTOR" GERMAN SILVER INSTRUMENTS.**

Third Best Quality German Made Instruments.

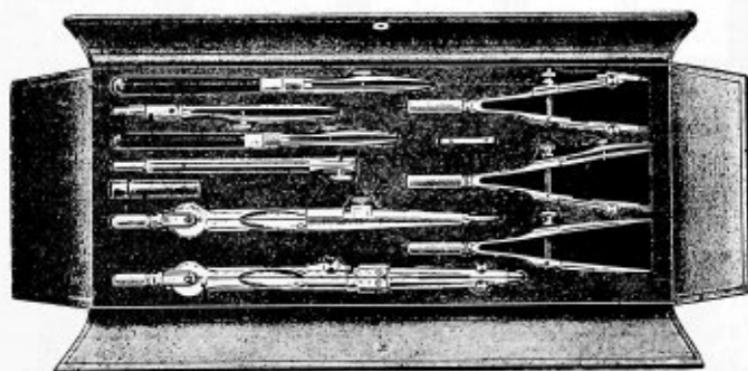
German Silver with Steel Points.



No. 3088.

No.

- 3088—Morocco Case, containing Compasses, 5½-inch, with fixed Needle Point, Pen and Pencil Points and Lengthening Bar, No. 3077; 5-inch Hair Spring Divider, No. 3079; 3½-inch Spacing Divider, No. 3081; 3½-inch Bow Pen, No. 3083; 3½-inch Bow Pencil, No. 3082; 4½ and 5½-inch Ruling Pens with Spring and Ebony Handle, Nos. 3073, 3075; Box of Leads.....each, \$6.50



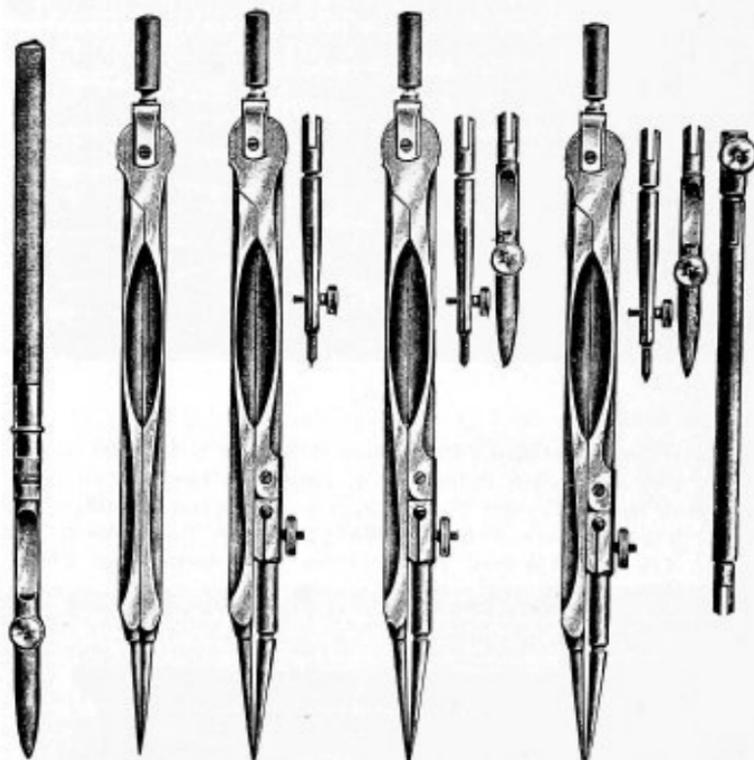
No. 3088½.

- No.  
3088½—Pocket Book style case, containing same assortment as No. 3088 .....each, \$7.50  
3088¾—Pocket Book style case, same as No. 3088½, but has Circular Spring Bow Instruments, Nos. 380, 380a, 380b, instead of regular style Bow Instruments .....each, 7.50

## NICKEL PLATED INSTRUMENTS.

For Elementary School Grades and Beginners.

This line of low-priced instruments is a great improvement over the French brass instruments, and, being nickel plated, they will not rust or tarnish.



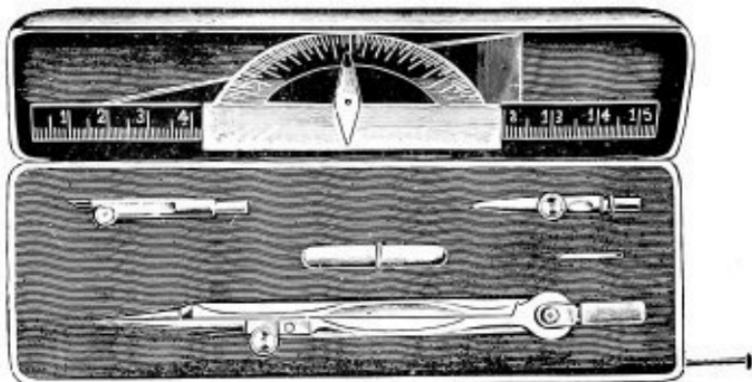
No. 3105. No 3100. No. 3102. No. 3103 No. 3104.

No.			
3100	—Plain Divider, 5 ¼-inch.....	each,	\$0.30
3102	—Compasses, with Pencil Point, 5 ¼-inch.....	each,	.50
3103	—Compasses, with Pen and Pencil Point, 5 ¼-inch.....	each,	.60
3103 ½	—Compasses, with fixed Needle Point Pen and Pencil Point, 5 ¼-inch .....	each,	1.00
3104	—Compasses, with Pen and Pencil Point and Lengthening Bar, 5 ¼-inch .....	each,	.85
3104 ½	—Compasses with fixed Needle Point Pen and Pencil Point and Lengthening Bar, 5 ¼-inch.....	each,	1.10
3105	—Ruling Pen, 5-inch, Ebony Handle.....	each,	.20
3107	—Bow Pen, 3-inch, with Needle Point.....	each,	.55
3108	—Bow Pen, 3-inch, with Needle Point and Pencil Point.....	each,	.70

**NICKEL-PLATED INSTRUMENTS.**

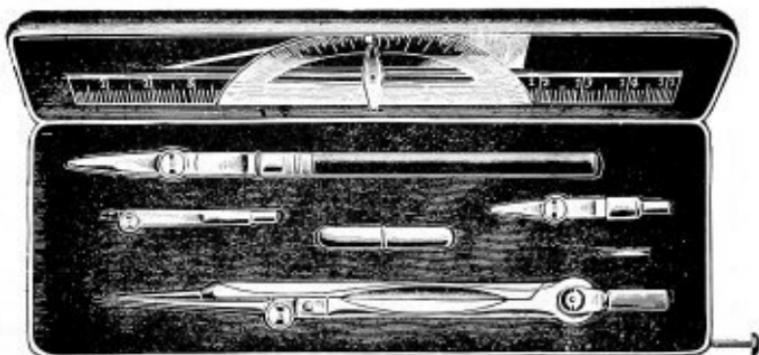
For Elementary Schools and Beginners.

Nickel plated, in flat, rounded wooden cases, velvet lined, and imitation leather covered. Each case contains a box of leads and key for dividers. The pencil parts of the large dividers have the patent lead holder. The dividers are made of the improved pattern, with round points and have straightening device.



No. 3090.

- No.  
3090—Containing Compasses, 5  $\frac{1}{4}$ -inch, with Pen and Pencil Points, Box of Leads and Protractor.....each, \$0.80

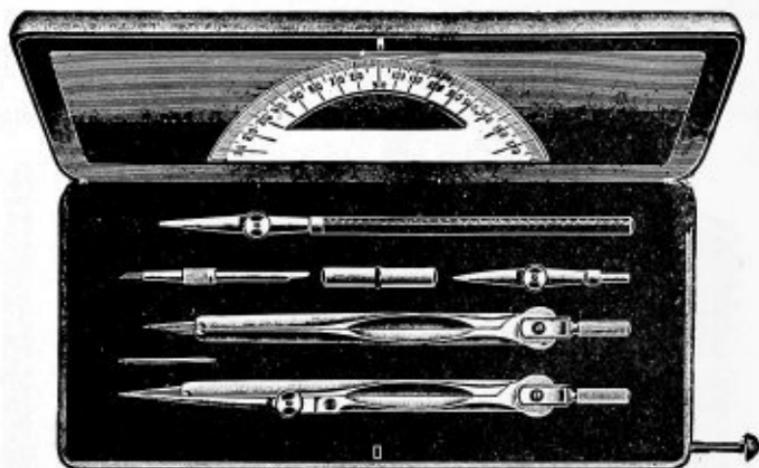


No. 3091.

- No.  
3091—Containing Compasses, 5  $\frac{1}{4}$ -inch, with Pen and Pencil Points, 5-inch Ruling Pen, Box of Leads and Protractor.....each, \$1.00

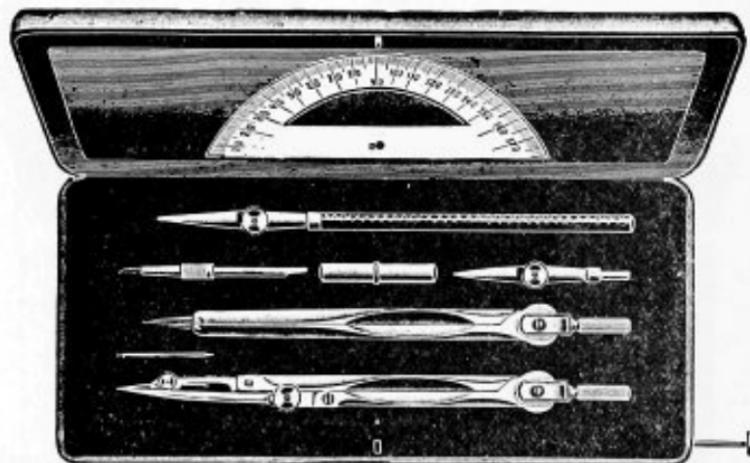
**NICKEL-PLATED INSTRUMENTS.**

For Elementary Schools and Beginners.



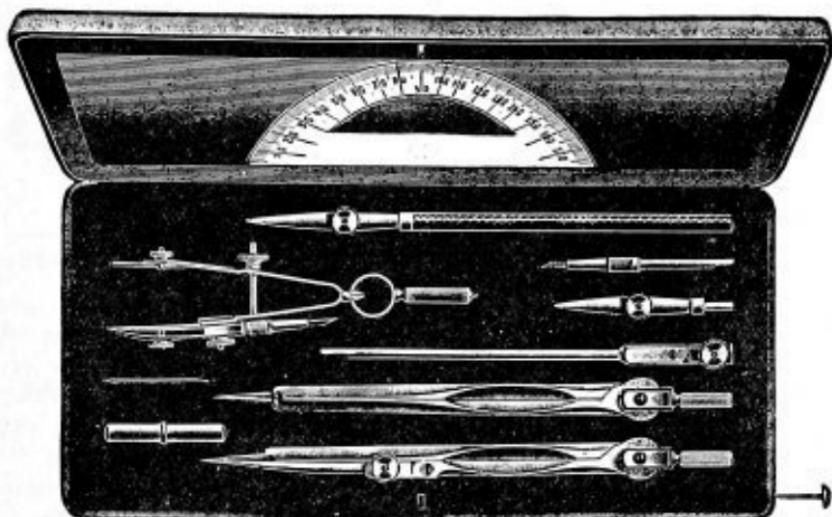
No. 3092.

- No.  
3092—Containing Compasses, 5  $\frac{1}{4}$ -inch, with Pen and Pencil Points, 5-inch Plain Divider, 5-inch Ruling Pen, Box of Leads and Protractor .....each, \$1.50

No. 3092  $\frac{1}{2}$ .

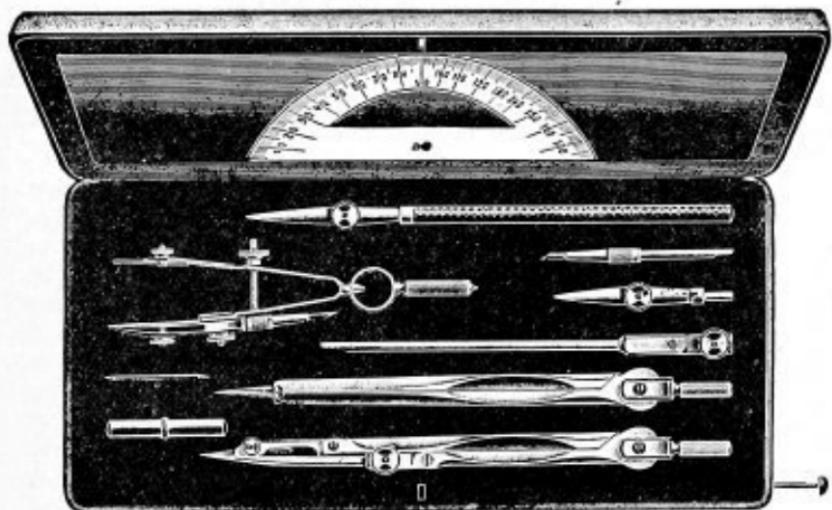
- No.  
3092  $\frac{1}{2}$ —Containing Compasses, 5  $\frac{1}{4}$ -inch, with fixed Needle Point, Pen and Pencil Points, 5-inch Plain Divider, 5-inch Ruling Pen, Box of Leads and Protractor .....each, \$1.85

## NICKEL-PLATED INSTRUMENTS.



No. 3093.

- No. 3093—Containing Compasses, 5¼-inch, with Pen and Pencil Points and Lengthening Bar, 5-inch Plain Divider, 3-inch Bow Pen with Pencil Point, 5-inch Ruling Pen, Box of Leads and Protractor . . . each, \$2.25

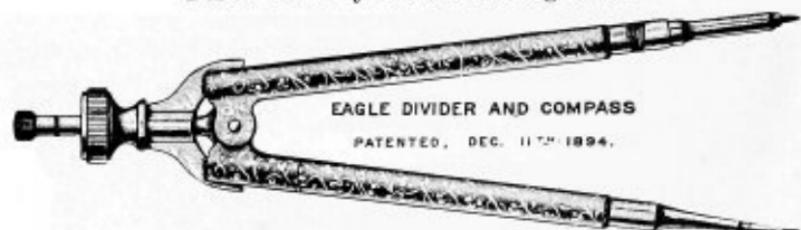


No. 3094.

- No. 3094—Containing Compasses, 5¼-inch, with fixed Needle Point, Pen and Pencil Points and Lengthening Bar, 5-inch Plain Divider, 3-inch Bow Pen with Pencil Point, 5-inch Ruling Pen, Box of Leads and Protractor . . . each, \$2.50

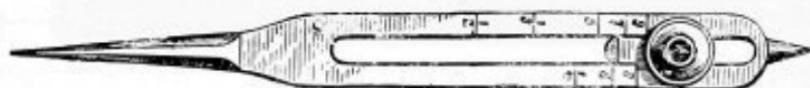
**EAGLE DIVIDER AND COMPASS.**

For Elementary Schools and Beginners.



Packed each in a Box together with a Nickel Box containing Six Refills.

No.  
3110—Compass and Divider.....\$0.25

**BRASS AND GERMAN SILVER PROPORTIONAL DIVIDERS.**

No. 3114.

No.  
3114—German Silver Proportional Divider, 6 1/4-inch, in case.....\$2.50  
3115—Brass Proportional Divider, 6 1/4-inch, in case..... 2.00

**RULING PEN CLEANER.**

A Thoroughly Useful Device.

It consists of several webs of heavy ABSORBENT paper, each permanently separated from the adjoining ones so that it can be readily passed between the points of a ruling pen to absorb and brush the ink therefrom.

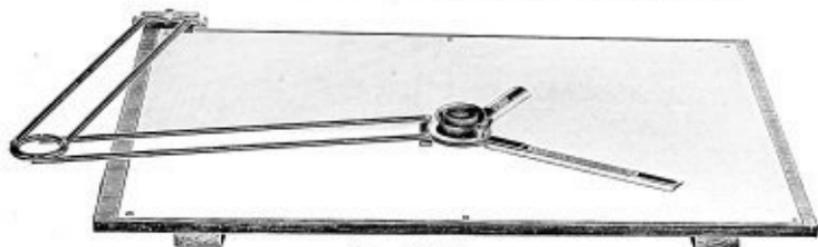
The manner of using is shown in the cut.



No. 3016.

No.  
3016—Per dozen.....\$0.60

## THE UNIVERSAL DRAFTING MACHINE.



No. 3120.

This drafting machine consists of a graduated square having an accurate parallel motion about the drawing-board. The square is adopted because the work in most drawings consists of sets of lines at right angles. Both blades of the square are graduated for drawing and measuring lines at the same time.

The blades of the square chuck into place; interchangeable. Any length and any scale supplied.

A straight edge is provided for inking. It may also be used for long lines. This, however, is not necessary, as lines may be quickly and accurately extended with the square.

The parallel motion is obtained by means of two pivoted parallelograms, which constitute an arm joining the square to the board. This arm is made flexible, allowing the blades to lie flat upon the drawing. It is hinged at the connection to the board, and may be easily lifted out of the way of the paper. It may be readily changed from one board to another. The square is moved about the board as easily as though it were not joined to the arm.

A conveniently adjusted protractor makes the machine universal. It allows the square to be quickly set at any angle. This makes all angular work just as easy, as rapid and as accurate as straight work. Spring stops at 30 degrees, 45 degrees and 60 degrees are provided, allowing the square to be instantly set at these frequent angles.

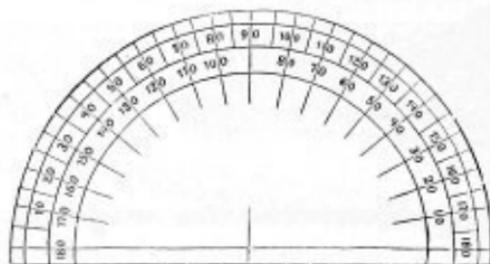
No.

- 3120—Universal Drafting Machine, for drawings up to 18x24 in., with one each 6 and 12 in. White Edge Scales divided  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 in. to the foot, and one each 6 and 12 in. White Edge Scales divided  $\frac{3}{8}$ ,  $\frac{3}{4}$ , 1  $\frac{1}{2}$ , 3 in. to the foot, and one 24 in. ebony lined straight edge for inking .....each, \$30.00
- 3121—Universal Drafting Machine, for drawings up to 30x36 in. with one each 12 and 18 in. White Edge Scales divided  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 in. to the foot and one each 12 and 18 in. White Edge Scales divided  $\frac{3}{8}$ ,  $\frac{3}{4}$ , 1  $\frac{1}{2}$ , 3 in. to the foot, and one 24 in. ebony lined straight edge for inking .....each, 33.00
- 3122—Universal Drafting Machine, for drawings up to 33x42 in., otherwise same as No. 3121.....each, 33.00

The Drawing Board should preferably be 6 to 7 in. longer than the drawing, but when this is not the case, we supply an extension bar for 75 cents.

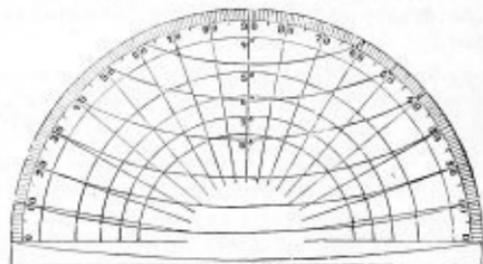
Decimal Scales furnished instead of Duodecimal at the same price.

**Straight Edges and Scales of other material, size or graduation made to order.**

**HORN PROTRACTORS.**

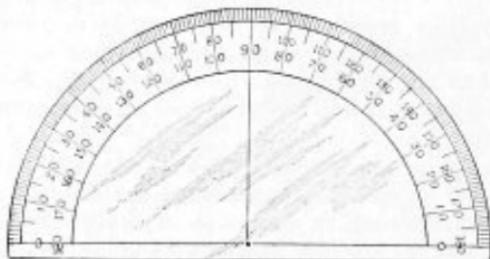
No. 3166.

- No.  
 3166—Half Circle Horn Protractor, 6  $\frac{1}{4}$  inches,  $\frac{1}{2}$  degree.....each, \$0.35  
 3167—Half Circle Horn Protractor, 5  $\frac{1}{4}$  inches,  $\frac{1}{2}$  degree.....each, .25  
 3168—Half Circle Horn Protractor, 4  $\frac{1}{4}$  inches, 1 degree.....each, .15



No. 3173.

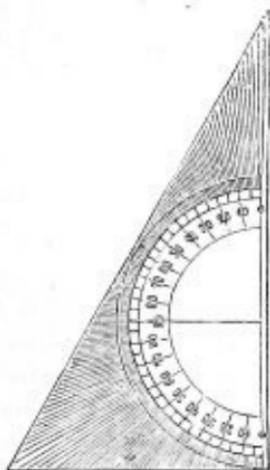
- No.  
 3173 —Railroad Curve Horn Protractor, 8-inch,  $\frac{1}{2}^\circ$  with circular curves  $\frac{1}{2}^\circ$  to  $8^\circ$ , scale 400 feet to inch.....each, \$1.65  
 3173  $\frac{1}{2}$ —Railroad Curve Celluloid Protractor, 8-inch,  $\frac{1}{2}^\circ$  with circular curves  $\frac{1}{2}^\circ$  to  $8^\circ$ , scale 400 feet to inch.....each, 2.75

**TRANSPARENT CELLULOID PROTRACTORS.**

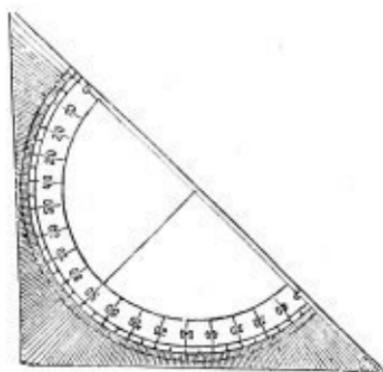
No. 3173A.

- No.  
 3173A—Semi-circular Ambro Protractor, 4 in. diameter,  $\frac{1}{2}^\circ$ .....each, \$0.35  
 3174 —Semi-circular Ambro Protractor, 5 in. diameter,  $\frac{1}{2}^\circ$ .....each, .45  
 3175 —Semi-circular Ambro Protractor, 6 in. diameter,  $\frac{1}{2}^\circ$ .....each, .60  
 3175A—Semi-circular Ambro Protractor, 7 in. diameter,  $\frac{1}{2}^\circ$ .....each, .75  
 3176 —Semi-circular Ambro Protractor, 8 in. diameter,  $\frac{1}{2}^\circ$ .....each, 1.20  
 3177 —Circular Ambro Protractor, 6 in. diameter,  $\frac{1}{2}^\circ$ .....each, 1.50  
 3178 —Circular Ambro Protractor, 8 in. diameter,  $\frac{1}{2}^\circ$ .....each, 2.25

## AMBER TRIANGLE AND PROTRACTOR.



No. 3179.



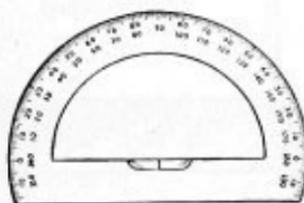
No. 3180.

No.

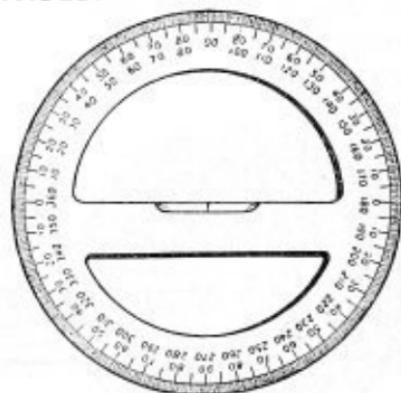
3179	— Amber Triangle Protractor, 30°x60°, 5 in., div. to 1° . . . . .	each, \$0.40
3179A	— Amber Triangle Protractor, 30°x60°, 6 in., div. to 1° . . . . .	.45
3179B	— Amber Triangle Protractor, 30°x60°, 7 in., div. to 1° . . . . .	.65
3180	— Amber Triangle Protractor, 45°, 5 in., div. to 1° . . . . .	.45
3180A	— Amber Triangle Protractor, 45°, 6 in., div. to 1° . . . . .	.65
3180B	— Amber Triangle Protractor, 45°, 7 in., div. to 1° . . . . .	.85

## TRANSPARENT AMBER PROTRACTORS WITH BEVELED EDGES.

ENGINE DIVIDED.



No. 3181A.

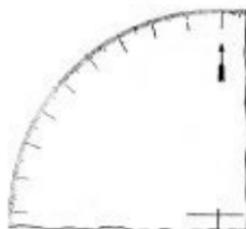


No. 3181C.

No.

3181A	— Semi-circular Amber Protractor, 6 in., beveled edge, 1/2° . . . . .	each, \$2.40
3181B	— Semi-circular Amber Protractor, 8 in., beveled edge, 1/2° . . . . .	3.00
3181C	— Circular Amber Protractor, 6 in., beveled edge, 1/2° . . . . .	3.00
3181D	— Circular Amber Protractor, 8 in., beveled edge, 1/2° . . . . .	3.75
3181E	— Circular Amber Protractor, 10 in., beveled edge, 1/2° . . . . .	4.75

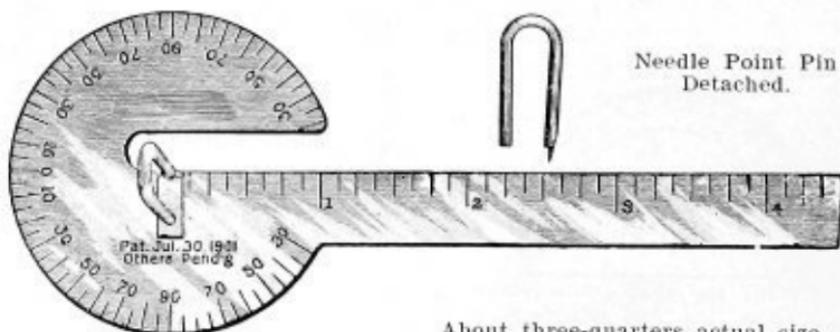
## PAPER PROTRACTORS.



No.		Each.
2182	—Circular Protractor on Tracing Paper, 13-in. diam., $\frac{1}{4}$ degree..	\$0.25
3183	—Circular Protractor on Drawing Paper, 13-in. diam., $\frac{1}{4}$ degree..	.25
3183 $\frac{1}{2}$	—Circular Protractor on Drawing Paper, 8-in. diam., $\frac{1}{2}$ degree..	.15
3184	—Circular Protractor on Bristol Board, 13-in. diam., $\frac{1}{4}$ degree..	.30
3185	—Circular Protractor on Bristol Board, 8-in. diam., $\frac{1}{2}$ degree..	.20
3186	—Circular Protractor on Tracing Cloth, 13-in. diam., $\frac{1}{4}$ degree..	.45
3187	—Circular Protractor Whatman's Drawing Paper, 27x40, Protractor, 13-in. diameter, $\frac{1}{4}$ degree.....	.60
3188	—Semi-circular Protractor on Bristol Board, 5-in., $\frac{1}{2}$ degree.....	.15

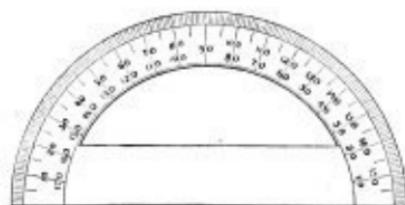
## ALMORTH'S PROTRACTOR.

A very useful Protractor; can be quickly adjusted to any desired angle. The Protractor can be read or set from both sides. Another feature is that any radial line up to  $4\frac{1}{2}$  inches may be drawn without removing the instrument. The center edge of the graduated arm is cut away to allow for width of pencil. The needle point is removed by spreading slightly. The Protractor is made of spring metal and guaranteed accurate.



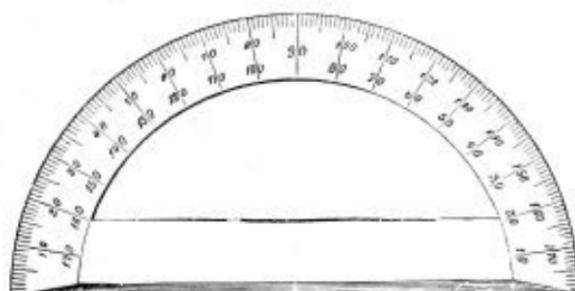
About three-quarters actual size.

No.		
3190	—Almoth Protractor, with needle point.....	each, \$0.65
3191	—Almoth Protractor, with needle point, in leather case.....	each, .80
	Extra Needle Points.....	each, .15

**GERMAN SILVER AND BRASS PROTRACTORS.**

No. 3194.

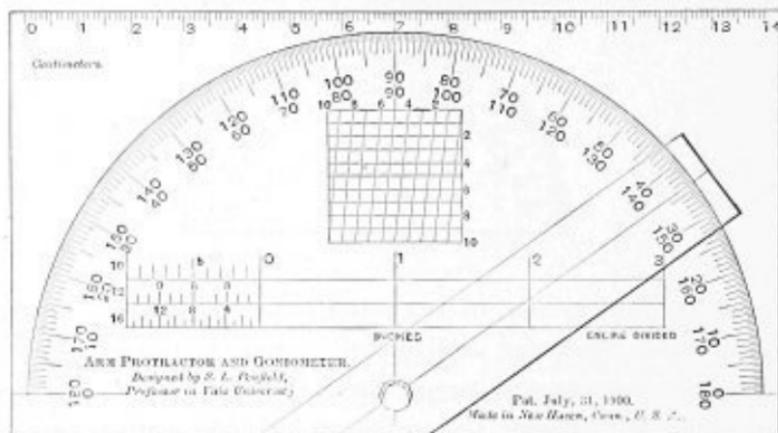
No.	
3194	—Half Circle Protractor, German Silver, 8-inch, $\frac{1}{2}$ degree . . . each, \$1.50
3195	—Half Circle Protractor, German Silver, 7-inch, $\frac{1}{2}$ degree . . . each, 1.20
3196	—Half Circle Protractor, German Silver, 6-inch, $\frac{1}{2}$ degree . . . each, .90
3197	—Half Circle Protractor, German Silver, 5-inch $\frac{1}{2}$ degree . . . each, .75
3198	—Half Circle Protractor, German Silver, 4-inch, 1 degree . . . each, .50
3199	—Half Circle Protractor, Brass, $6\frac{3}{8}$ -inch, $\frac{1}{2}$ degree . . . . . each, .70
3200	—Half Circle Protractor, Brass, $5\frac{1}{8}$ -inch, $\frac{1}{2}$ degree . . . . . each, .50
3201	—Half Circle Protractor, Brass, $4\frac{1}{4}$ -inch, 1 degree . . . . . each, .25
3202	—Half Circle Protractor, Brass, $3\frac{1}{4}$ -inch, 1 degree . . . . . each, .15
3203	—Half Circle Protractor, Brass, $3\frac{1}{4}$ -inch, 1 degree, nickel plated, ea. .10

**SWISS PROTRACTORS OF GERMAN SILVER.**

No. 3211.

No.	
3207	—4-inch, divided to single degrees, center on inner edge . . . . . each, \$2.00
3208	—5-inch, divided to $\frac{1}{2}$ degrees, center on inner edge . . . . . each, 2.50
3209	—6-inch, divided to $\frac{1}{2}$ degree, center on inner edge . . . . . each, 3.00
3210	—6-inch, divided to $\frac{1}{4}$ degrees, center on inner edge . . . . . each, 4.00
3211	—4-inch, divided to single degree, center on outer edge . . . . . each, 1.50
3212	—5-inch, divided to $\frac{1}{2}$ degrees, center on outer edge . . . . . each, 2.00
3213	—6-inch, divided to $\frac{1}{2}$ degrees, center on outer edge . . . . . each, 2.75
3214	—6-inch, divided to $\frac{1}{4}$ degrees, center on outer edge . . . . . each, 3.50

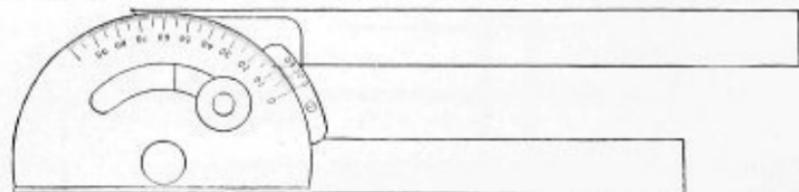
## THE PENFIELD ARM PROTRACTOR.



Two-thirds natural size.

This instrument consists of a graduated semi-circle printed on a card, with an arm of transparent celluloid, swiveled by means of an eyelet at the center of the semi-circle. A fine index-line, scratched on the under side of the celluloid arm parallel to its edges, indicates by its position with reference to the graduation the angle which the arm makes with the base-line of the card. The card is of the best quality, very firm and strong, and capable of withstanding a great deal of wear. The celluloid strips are prepared with much care, the edges being straight, smooth and parallel. The eyelet presents a smooth and large wearing surface, and, the motion of the arm being always slow, the instrument may be used a long time without showing wear at the joint.

No.  
3216—Penfield Arm Protractor.....each, \$0.60

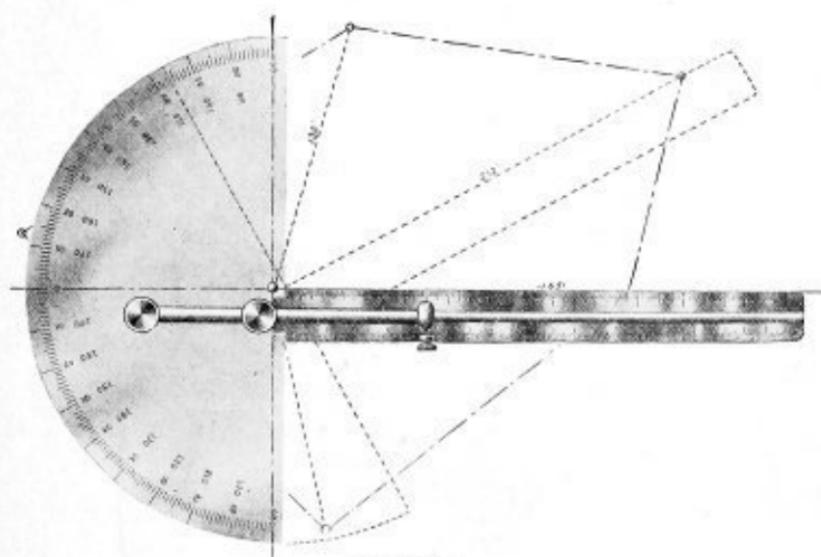


This Protractor has blades about 9 inches long. The arc is of 4 in. diameter, graduated to degrees, with vernier reading to 5 minutes. It has a clamping screw which securely holds the blades at any angle and serves as knob handle.

Either blade can be used in contact with T square, giving any angle and its complement from 0° to 90°.

It forms a perfect adjustable triangle, and is a finely finished, engine divided tool designed for draughtsman's use.

No.  
3217—Draftsman's Limb Protractor, German silver.....each, \$10.00  
3218—Draftsman's Limb Protractor, Steel.....each, 4.00  
Polished Wood Cases for above.....each, 1.00

**THE STADIA PROTRACTOR.****For Rapid Plotting of Stadia Surveys,****Laying Out Cam Work or Polar Co-ordinating in General.**

No. 3219.

A 12-inch transparent protractor, with holes at center to receive a needle point about which it is turned. It has an adjustable hollow bar designed to receive the regular Brown and Sharpe light draftsman's scales, which are interchangeable in it.

The scale is inserted with its zero at protractor center and the whole instrument laid on a base line so that front edge of scale and protractor zero shall cover this line. The scale holder is then clamped in position and the needle point inserted at any given intersection on the base line. The base line thus becomes an index for the transparent protractor and the lineal scale gives the direction and length of radii vectors at once.

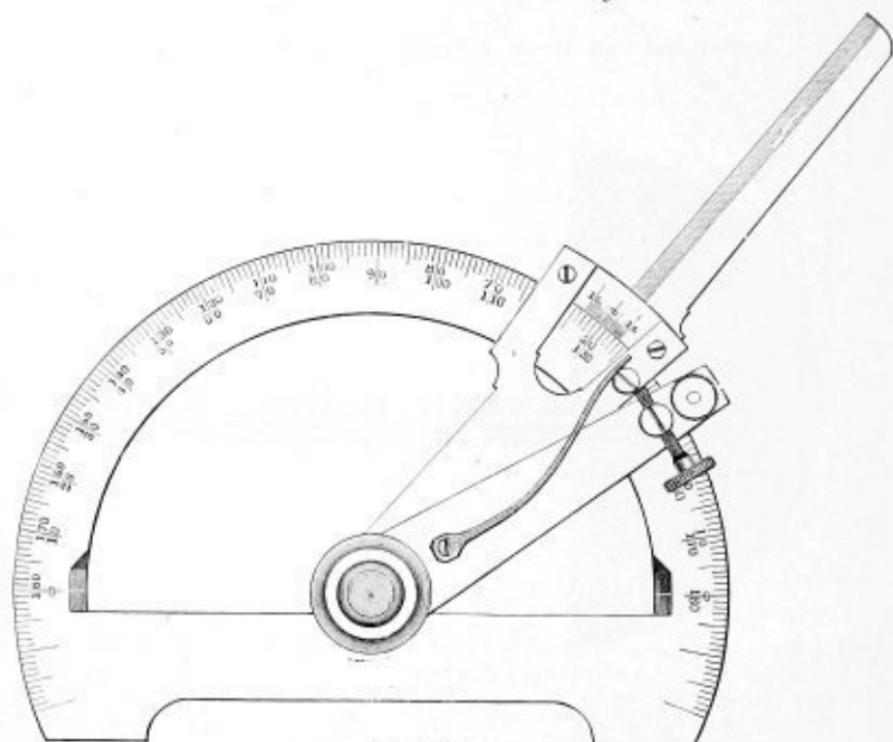
Fractions of a degree are very closely estimated or they may be pricked off on each side of the base line and so serve for all angles.

No.  
3219—Price of instrument without scale .....each, \$5.00

Standard 12-inch scales as per manufacturer's list, \$1.25 each.

## PROTRACTOR.

With Arm Vernier and Micrometer Adjustment.

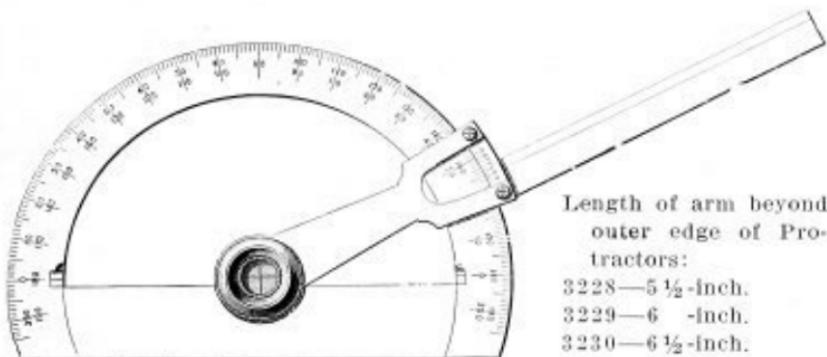


No. 3220.

- No.
- 3220—Protractor,  $\frac{1}{2}$  circle,  $\frac{1}{2}$  degrees, reading to 3 min., 5  $\frac{1}{2}$ -inch . . . \$16.00
- 3221—Protractor,  $\frac{1}{2}$  circle,  $\frac{1}{4}$  degrees, reading to 1 min., 8 -inch . . . 18.00
- 3222—Protractor,  $\frac{1}{2}$  circle,  $\frac{1}{4}$  degrees, reading to 1 min., 10 -inch . . . 21.00
- 3223—Protractor, whole circle,  $\frac{1}{2}$  degrees, reading to 3 min., 5  $\frac{1}{2}$ -inch . . 18.00
- 3224—Protractor, whole circle,  $\frac{1}{4}$  degrees, reading to 1 min., 8 -inch . . 20.00
- 3225—Protractor, whole circle,  $\frac{1}{4}$  degrees, reading to 1 min., 10 -inch . . 24.00
- Morocco Velvet Lined Cases for above protractors, \$3.00 to \$5.00.
- 3226—Three Arm Protractors or Station Pointer, 6  $\frac{1}{2}$ -inch diameter, arms 9-inch long, with extension pieces to lengthen to 17  $\frac{1}{2}$ -inch. Divided  $\frac{1}{2}$  degrees, the two outer arms with verniers reading to 1 minute, with magnifying lens; in polished mahogany case . . each, \$7.00
- 3227—Crozet Protractor, 8-inch, German Silver, divided to  $\frac{1}{4}$  degrees, vernier reading to 1 minute, with tangent screw; in polished mahogany case . . . . . each, 40.00

This is a very practical protractor. It is used along a straight-edge or T square, and angles are set off without bringing the center over the starting point.

## PROTRACTORS WITH ARM AND VERNIER.



No. 3228.

Length of arm beyond  
outer edge of Pro-  
tractors:

3228—5 ½ -inch.

3229—6 -inch.

3230—6 ½ -inch.

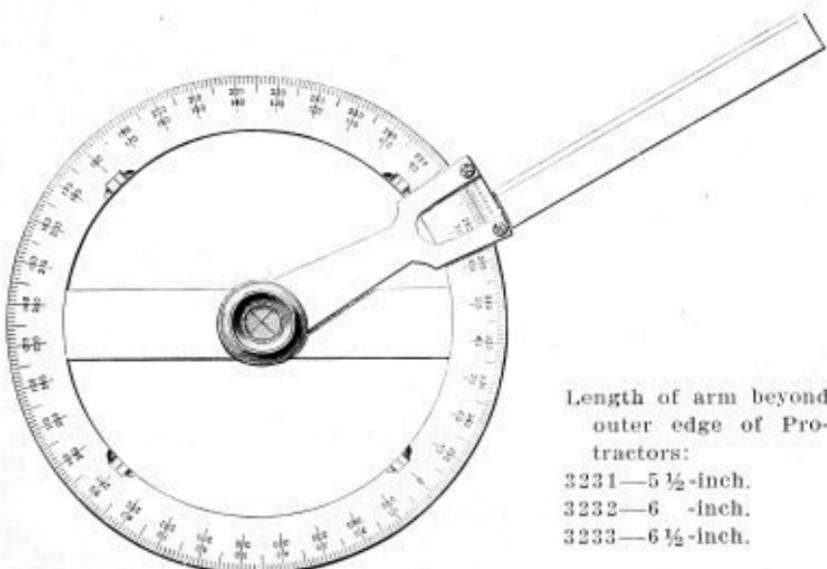
No.

3228—German Silver, 5 ½ in., ½°, Vernier reading to 3". . . . . each, \$10.50

3229—German Silver, 8 in., ¼°, Vernier reading to 1". . . . . each, 14.00

3230—German Silver, 10 in., ¼°, Vernier reading to 1". . . . . each, 17.00

Morocco Silk Velvet Lined Cases for above, \$2.50 to \$3.50.



No. 3231.

Length of arm beyond  
outer edge of Pro-  
tractors:

3231—5 ½ -inch.

3232—6 -inch.

3233—6 ½ -inch.

No.

3231—German Silver, 5 ½ in., ½°, Vernier reading to 3". . . . . each, \$14.00

3232—German Silver, 8 in., ¼°, Vernier reading to 1". . . . . each, 16.00

3233—German Silver, 10 in., ¼°, Vernier reading to 1". . . . . each, 20.00

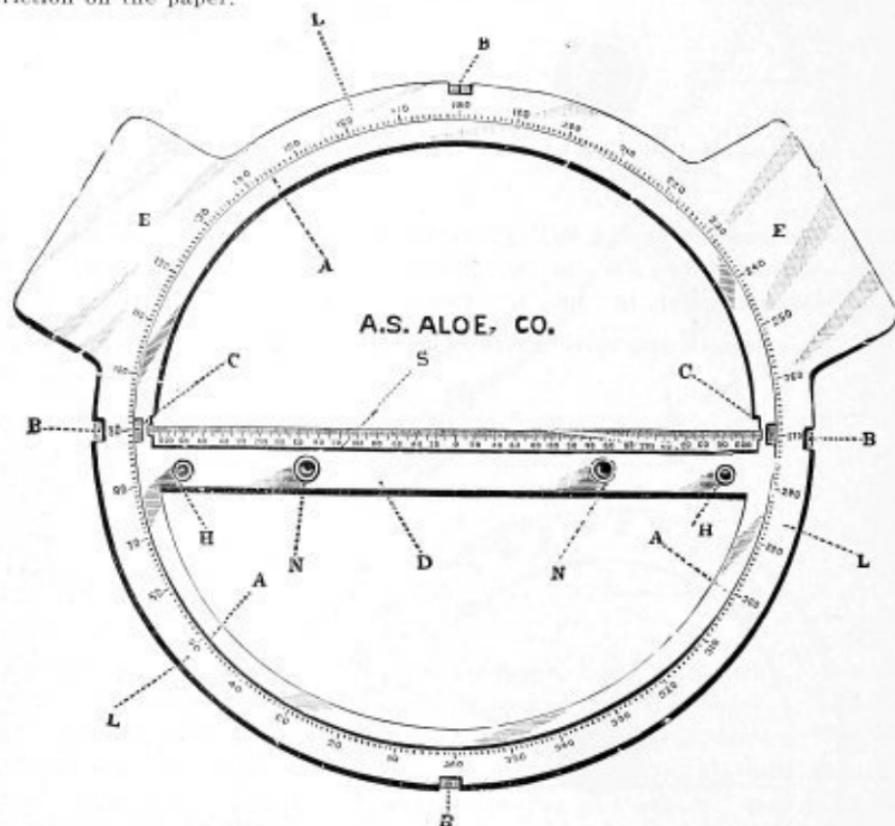
Morocco Silk Velvet Lined Cases for above, \$3.50 to \$4.50.

## COLBY'S TOPOGRAPHICAL PROTRACTOR.

Patented October 3d, 1893.

This instrument can be used for all kinds of protracting, but it is especially designed for plotting notes of surveys made with the stadia.

The limb is graduated from 0° to 360°, 15 minute divisions. Scale on cross-arm has zero mark in center, and is graduated in both directions in any unit desired. The revolving inner circle with the cross-arm is raised to prevent friction on the paper.



- No. 3234—Colby's Protractor, German Silver, Limb 12 in., divided to 15 minutes, Scale graduated as required, in case..... each, \$60.00

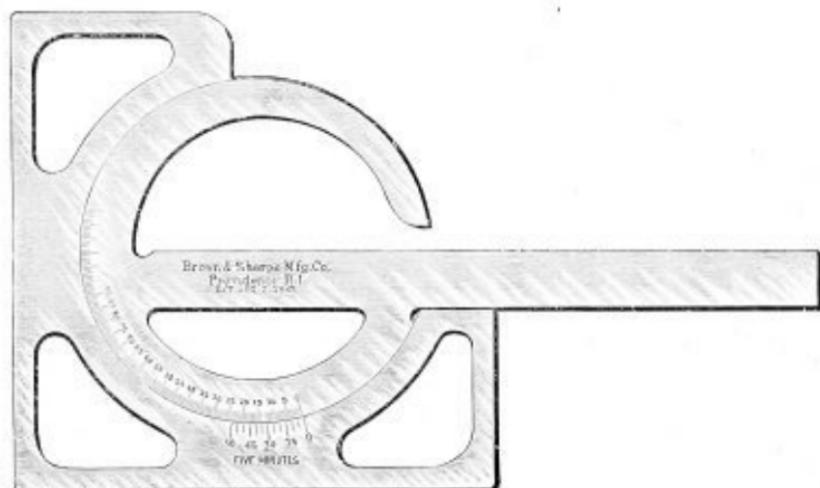
### IVORY AND BOXWOOD PROTRACTORS.

- 3236—Ivory Protractor, 6-inch long, 1 3/4-inch wide, divided whole degrees, 1/4, 1/2, 3/4, 1-inch scale. Scale of chords: 10, 20, 30, 40, 50, 60, 70, 80, 90 parts to inch and diagonal scale ..... \$3.75
- 3237—Ivory Protractor, 6-inch long, 1 3/4-inch wide, divided whole degrees, 1/4, 1/2, 3/4, 1-inch scale. Scale chords: 10, 20, 30, 40, 50, 60, 70, 80, 90 parts to inch and diagonal scale..... 2.50
- 3238—Boxwood Protractor, 6-inch long, 1 3/4-inch wide, scales of 1/4, 1/2, 3/4, 1-inch to the foot, scale of chords, diagonal scales..... .40
- Prices subject to change on account of fluctuation in price of Ivory.

**DRAFTSMAN'S PROTRACTOR.**

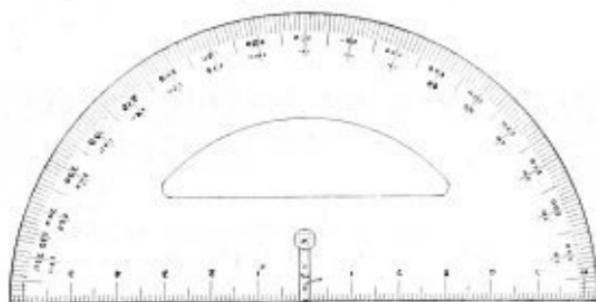
This Protractor is made from sheet steel and has a blade  $8\frac{1}{2}$  inches long. The graduations read to degrees and the vernier reads to five minutes.

There are no projections on either face of the Protractor; and consequently it can be used on either edge of the blade or either side up. This makes it particularly convenient in dividing circles, transferring angles, drawing oblique lines at right angles to each other, or laying off given angles each side of a vertical or horizontal line without changing the setting.



No. 3240.

No.		
3240	Draughtsman's Protractor, Morocco case, velvet lined.....	\$7.75
3241	Draughtsman's Protractor, no case.....	6.50



**Ockerson's Protractor.** This special form of Protractor, has been successfully used on the U. S. Mississippi surveys. It is a semi-circular Protractor provided with a needle pointed pivot at its center and having a straight edge graduated so that distances can be measured off each way from the pivot. The angular deflection is given by the graduated circle reading from a point marked on the paper.

No.		
3242	Ockerson's Protractor, 8-inch German Silver.....each,	\$15.00
3242 1/2	Ockerson's Protractor, 10-inch Celluloid.....each,	9.75

**FLAT BOXWOOD SCALES.**

Machine Divided—U. S. Standard.

The Boxwood Scales manufactured by us, are of the best selected material, of proper width and thickness, and of finest finish. They are superior in quality and accuracy to any others on the market.



No. 3243.

No.		
3243—	Flat Boxwood Scale, 6 -inch, $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{1}{2}$ and 1 inch to the foot..	\$0.40
3244—	Flat Boxwood Scale, 12 -inch, $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{1}{2}$ and 1 inch to the foot..	.65
3245—	Flat Boxwood Scale, 18 -inch, $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{1}{2}$ and 1 inch to the foot..	1.25
3246—	Flat Boxwood Scale, 24 -inch, $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{1}{2}$ and 1 inch to the foot..	1.75
3247—	Flat Boxwood Scale, 12 $\frac{1}{2}$ -inch, $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{1}{2}$ and 1 inch to the foot..	.75
3248—	Flat Boxwood Scale, 6-inch, $\frac{3}{8}$ , $\frac{3}{4}$ , 1 $\frac{1}{2}$ and 3 inches to the foot..	.40
3249—	Flat Boxwood Scale, 12-inch, $\frac{3}{8}$ , $\frac{3}{4}$ , 1 $\frac{1}{2}$ and 3 inches to the foot..	.65
3250—	Flat Boxwood Scale, 18-inch, $\frac{3}{8}$ , $\frac{3}{4}$ , 1 $\frac{1}{2}$ and 3 inches to the foot..	1.25
3251—	Flat Boxwood Scale, 24-inch, $\frac{3}{8}$ , $\frac{3}{4}$ , 1 $\frac{1}{2}$ and 3 inches to the foot..	1.75

**FLAT BOXWOOD SCALES, BEVELED ON BOTH SIDES.**Divided  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1,  $\frac{3}{4}$ ,  $1\frac{1}{2}$  and 3 inches to the foot.

No.		
3252—	Flat Boxwood Scale, 6-inch, both sides beveled and divided....	\$0.75
3253—	Flat Boxwood Scale, 12-inch, both sides beveled and divided....	1.00
3254—	Flat Boxwood Scale, 18-inch, both sides beveled and divided....	1.75
3255—	Flat Boxwood Scale, 24-inch, both sides beveled and divided....	2.50

**FLAT BOXWOOD METRIC SCALES.**

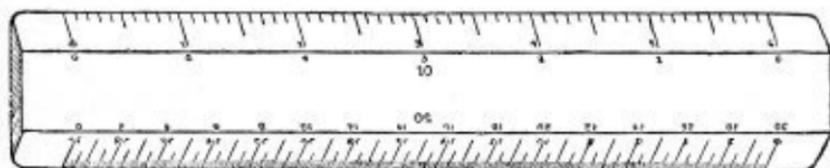
No.		
3256—	Flat Boxwood Scale, 10 c. m. long, divided m. m. and half m. m....	\$0.50
3257—	Flat Boxwood Scale, 20 c. m. long, divided m. m. and half m. m....	.75
3258—	Flat Boxwood Scale, 30 c. m. long, divided m. m. and half m. m....	1.00
3259—	Flat Boxwood Scale, 50 c. m. long, divided m. m. and half m. m....	1.50

**TRIANGULAR METRIC SCALES.**

No.		
3260—	Triangular Boxwood Scale, 20 c. m. long, div. 01, 02, 03, 05, 020, 0125 .....	\$1.00
3261—	Triangular Boxwood Scale, 30 c. m. long, div. 01, 02, 03, 05, 020, 0125 .....	1.25
3262—	Triangular Boxwood Scale, 50 c. m. long, div. 01, 02, 03, 05, 020, 0125 .....	2.75

**FLAT BOXWOOD CHAIN SCALES.**

Machine Divided—U. S. Standard.



No. 3277.

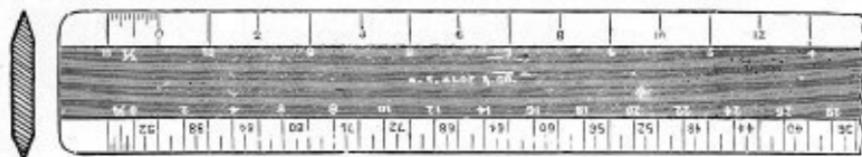
No.

3277—Flat Boxwood Scale, 6-inch, 10x 50 parts to the inch.....	each,	\$0.40
3278—Flat Boxwood Scale, 6-inch, 20x 40 parts to the inch.....	each,	.40
3279—Flat Boxwood Scale, 6-inch, 30x 60 parts to the inch.....	each,	.40
3280—Flat Boxwood Scale, 6-inch, 80x100 parts to the inch.....	each,	.65
3281—Flat Boxwood Scale, 12-inch, 10x 50 parts to the inch.....	each,	.65
3282—Flat Boxwood Scale, 12-inch, 20x 40 parts to the inch.....	each,	.65
3283—Flat Boxwood Scale, 12-inch, 30x 60 parts to the inch.....	each,	.65
3284—Flat Boxwood Scale, 12-inch, 80x100 parts to the inch.....	each,	1.10

**"IDEAL" SCALES BEVELED ON BOTH SIDES.**

These Scales are made of the best seasoned Boxwood. The bevels are lined with Celluloid, resembling Ivory, which will permanently remain white and will not shrink.

The "Ideal" Drafting Scales are a great and decided improvement over all other scales now in use. They combine durability and distinctiveness, and will not tire nor injure the eyes.



No. 3301.

Divided:  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $1 \times \frac{3}{8}$ ,  $\frac{3}{4}$ ,  $1 \frac{1}{2}$ , 3 inches to the foot.

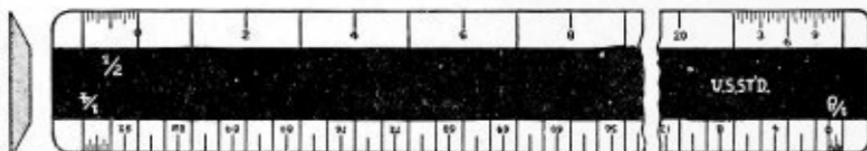
No.

3300—Flat White Edge Scale, 6-inch, both sides beveled and divided, in leather sheath, less than one inch wide; very convenient for the pocket.....	each,	\$1.25
3301—Flat White Edge Scale, 6-inch, both sides beveled and div....	ea.	1.25
3302—Flat White Edge Scale, 12-inch, both sides beveled and div....	ea.	1.90
3303—Flat White Edge Scale, 18-inch, both sides beveled and div....	ea.	3.35
3304—Flat White Edge Scale, 24-inch, both sides beveled and div....	ea.	4.50

## FLAT "IDEAL" SCALES.

These Scales are made of the best seasoned Boxwood. The bevels are lined with Celluloid, resembling Ivory, which will permanently remain white and will not shrink.

The "Ideal" Drafting Scales are a great and decided improvement over all other scales now in use. They combine durability and distinctiveness, and will not tire nor injure the eyes because they are even more distinct and legible than Ivory Scales.



No. 3310.

- No.  
 3310—Flat Ideal Scale, 6 -inch, div.,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 in. to the foot. .ea., \$0.70  
 3311—Flat Ideal Scale, 12 -inch, div.,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 in. to the foot. .ea., 1.10  
 3312—Flat Ideal Scale, 12  $\frac{1}{2}$ -inch, div.,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 in. to the foot. .ea., 1.25  
 Scale No. 3312 has the advantage of covering 100 feet on  $\frac{1}{8}$ -inch, 50 feet on  $\frac{1}{4}$ -inch and 25 feet on  $\frac{1}{2}$ -inch scale.

- No.  
 3313—Flat Ideal Scale, 18-inch, div.  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 in. to the foot. .each, \$2.00  
 3314—Flat Ideal Scale, 24-inch, div.  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 in. to the foot. .each, 2.75  
 3315—Flat Ideal Scale, 6-inch, div.  $\frac{3}{8}$ ,  $\frac{3}{4}$ , 1  $\frac{1}{2}$ , 3 in. to the foot. .each, .70  
 3316—Flat Ideal Scale, 12-inch, div.  $\frac{3}{8}$ ,  $\frac{3}{4}$ , 1  $\frac{1}{2}$ , 3 in. to the foot. .each, 1.10  
 3317—Flat Ideal Scale, 18-inch, div.  $\frac{3}{8}$ ,  $\frac{3}{4}$ , 1  $\frac{1}{2}$ , 3 in. to the foot. .each, 2.00  
 3318—Flat Ideal Scale, 24-inch, div.  $\frac{3}{8}$ ,  $\frac{3}{4}$ , 1  $\frac{1}{2}$ , 3 in. to the foot. .each, 2.75

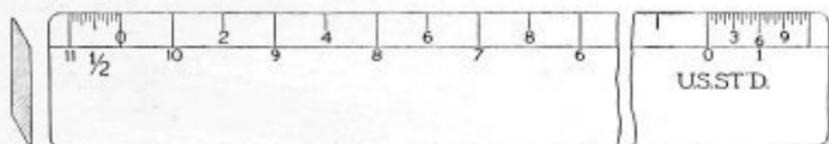


No. 3320.

- No.  
 3320—Flat Ideal Scale, 6-in., div. 10x 50 parts to the inch. . . .each, \$0.70  
 3321—Flat Ideal Scale, 6-in., div. 20x 40 parts to the inch. . . .each, .70  
 3322—Flat Ideal Scale, 6-in., div. 30x 60 parts to the inch. . . .each, .70  
 3323—Flat Ideal Scale, 6-in., div. 80x 100 parts to the inch. . . .each, .90  
 3324—Flat Ideal Scale, 12-in., div. 10x 50 parts to the inch. . . .each, 1.10  
 3325—Flat Ideal Scale, 12-in., div. 20x 40 parts to the inch. . . .each, 1.10  
 3326—Flat Ideal Scale, 12-in., div. 30x 60 parts to the inch. . . .each, 1.10  
 3327—Flat Ideal Scale, 12-in., div. 80x 100 parts to the inch. . . .each, 1.40  
 3328—Flat Ideal Scale, 12-in., div. 100x 500 parts to the foot. . . .each, 1.25  
 3329—Flat Ideal Scale, 12-in., div. 200x 400 parts to the foot. . . .each, 1.25  
 3330—Flat Ideal Scale, 12-in., div. 300x 600 parts to the foot. . . .each, 1.25  
 3331—Flat Ideal Scale, 12-in., div. 800x1000 parts to the foot. . . .each, 1.75

**OPPOSITE BEVEL BOXWOOD AND WHITE EDGE SCALES.**

These Scales are an improvement over the regular flat shape, as they may be picked up more readily, and present but one graduated bevel to the eye when in use.



No. 3243 1/2-3310 1/2.

Divided: 1/8, 1/4 x 1/2, 1 inch to the foot.

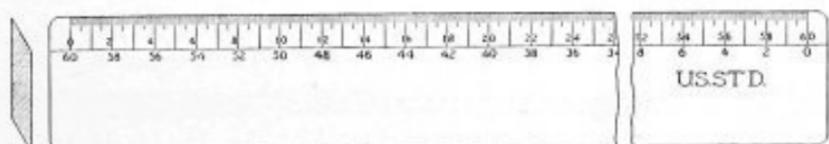
- No.  
 3243 1/2—Opposite Bevel Boxwood Scale, 6 in. . . . . each, \$0.45  
 3244 1/2—Opposite Bevel Boxwood Scale, 12 in. . . . . each, .70  
 3310 1/2—Opposite Bevel White Edge Scale, 6 in. . . . . each, \$0.70  
 3311 1/2—Opposite Bevel White Edge Scale, 12 in. . . . . each, 1.15

Divided: 1/8, 1/4 x 1/2, 1 inch to the foot.

- 3248 1/2—Opposite Bevel Boxwood Scale, 6 in. . . . . each, \$0.45  
 3249 1/2—Opposite Bevel Boxwood Scale, 12 in. . . . . each, .70

Divided: 1/8, 1/4 x 1/2, 3 inches to the foot.

- 3315 1/2—Opposite Bevel White Edge Scale, 6 in. . . . . each, \$0.70  
 3316 1/2—Opposite Bevel White Edge Scale, 12 in. . . . . each, 1.15



No. 3277 1/2-3320 1/2.

Chain Scale.—Divided: 10x50 parts to the inch.

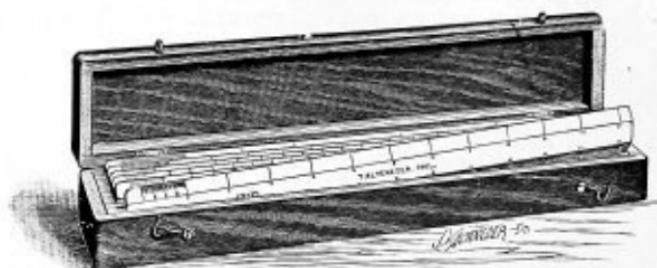
- No.  
 3277 1/2—Opposite Bevel Boxwood Chain Scale, 6 in. . . . . each, \$0.45  
 3281 1/2—Opposite Bevel Boxwood Chain Scale, 12 in. . . . . each, .70

Chain Scale.—Divided: 10x50 parts to the inch.

- 3320 1/2—Opposite Bevel White Edge Chain Scale, 6 in. . . . . each, \$0.70  
 3324 1/2—Opposite Bevel White Edge Chain Scale, 12 in. . . . . each, 1.15

If Special Scales are ordered, a sketch showing divisions and numbering is required, and a remittance covering entire cost, figured at double list price of regular Scales of the same kind.

## FLAT "IDEAL" SCALES IN CASES.



No. 3333.

No.

- 3332—4 White Edge Scales, 12-in, graduated  $\frac{1}{8}$  and  $\frac{1}{4}$ ,  $\frac{3}{8}$  and  $\frac{1}{2}$ ,  $\frac{3}{4}$  and 1,  $1\frac{1}{2}$  and 3 inches to the foot.....\$ 6.00
- 3333—6 White Edge Scales, 12-inch, graduated  $\frac{1}{8}$  and  $\frac{1}{4}$ ,  $\frac{3}{8}$  and  $\frac{1}{2}$ ,  $\frac{3}{4}$  and 1,  $1\frac{1}{2}$  and 3, 2 and 4, 6 and 12 inches to the foot..... 8.50
- 3334—8 White Edge Scales, 12-in, graduated  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{2}$  and 3 inches to the foot..... 11.00
- 3335—12 White Edge Scales, 12-inch, graduated  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{2}$ , 2, 3, 4, 6 and 12 inches to the foot..... 16.00
- 3336—4 White Edge Scales, 12-inch, graduated 10 and 50, 20 and 40, 30 and 60, 80 and 100 parts to the inch..... 6.25
- 3337—8 White Edge Scales, 4 12-inch, graduated 10 and 50, 20 and 40, 30 and 60, 80 and 100 parts to the inch; 4 2-inch Offset Scales to match ..... 10.00
- 3338—6 White Edge Scales, 12-inch, graduated 10, 20, 30, 40, 50 and 60 parts to the inch..... 8.50
- 3339—12 White Edge Scales, 6 12-inch, graduated 10, 20, 30, 40, 50 and 60 parts to the inch; 6 2-inch Offset Scales to match..... 13.50
- 3339 $\frac{1}{2}$ —8 White Edge Scales, 12-inch, graduated 10, 20, 30, 40, 50, 60, 80 and 100 parts to the inch..... 12.00

Sets of any number of Scales, any graduation desired, can be put up to order at the same cost as above.

Sets of any number of Scales, of boxwood or ivory, put up in nicely finished wooden boxes, with any kind of graduation, made to order.

If special Scales are ordered, a sketch showing divisions and numbering is required, and remittance covering entire cost of such Scale.

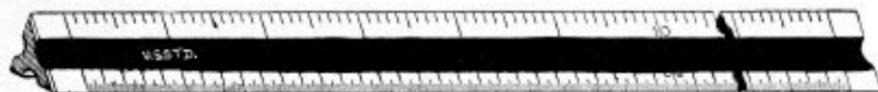
**"IDEAL" TRIANGULAR WHITE EDGE SCALES.****U. S. Standard. Machine Divided.**

Regular Shape.



Relieved Facet Shape.

Our Triangular White Edge Scales are made in two styles—the **Regular** shape and the **Relieved Facet** shape—as shown in illustrations. On the Regular shape Scales the full surface of both facets are in contact with the drawing, affording a greater wearing surface, and will obviously not obliterate the divisions on the edges as quickly as on the Relieved Facet shape. On the latter style, however, the visual angle is such that it affords an easier reading of the scales, and as each style, therefore, has its advantages, we leave the selection to the taste of the purchaser.

**For Civil Engineers and Surveyors.**

No. 3340.

No.	Divided: 10, 20, 30, 40, 50, 60 parts to the inch.	Each.
3340	—Triangular White Edge Chain Scale, 6 in., Regular Shape.....	\$1.25
3341	—Triangular White Edge Chain Scale, 12 in., Regular Shape.....	2.00
3342	—Triangular White Edge Chain Scale, 18 in., Regular Shape.....	4.00
3343	—Triangular White Edge Chain Scale, 24 in., Regular Shape.....	5.75
3340A	—Triangular White Edge Chain Scale, 6 in., Relieved Facet Shape.	1.50
3341A	—Triangular White Edge Chain Scale, 12 in., Relieved Facet Shape.	2.25
3342A	—Triangular White Edge Chain Scale, 18 in., Relieved Facet Shape.	4.25
3343A	—Triangular White Edge Chain Scale, 24 in., Relieved Facet Shape.	6.00
3344	—Triangular White Edge Chain Scale, 12 in., divided: 20, 30, 40, 50, 60, 80 parts to the inch, Regular Shape.....	2.00
3344A	—Triangular Scale, like No. 3344 but Relieved Facet Shape.....	2.25
3344B	—Triangular White Edge Chain Scale, 12 in., divided: 100, 200, 300, 400, 500, 600 parts to the foot, Regular Shape.....	2.25
3344C	—Triangular Scale, like No. 3344B, but Relieved Facet Shape.....	2.50

Triangular Scales with any other divisions made to order,

**For Architects and Mechanical Engineers.**

No. 3345.

No.	(Divided $\frac{3}{32}$ , $\frac{3}{16}$ , $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{3}{8}$ , $\frac{1}{2}$ , $\frac{3}{4}$ , 1, $1\frac{1}{2}$ , 3 in. to the foot, $\frac{1}{8}$ in.)	Each.
3345	—Triangular White Edge Scale, 6 in., Regular Shape.....	\$1.25
3346	—Triangular White Edge Scale, 12 in., Regular Shape.....	2.00
3347	—Triangular White Edge Scale, 18 in., Regular Shape.....	4.00
3348	—Triangular White Edge Scale, 24 in., Regular Shape.....	5.75
3345A	—Triangular White Edge Scale, 6 in., Relieved Facet Shape.....	1.50
3346A	—Triangular White Edge Scale, 12 in., Relieved Facet Shape.....	2.25
3347A	—Triangular White Edge Scale, 18 in., Relieved Facet Shape.....	4.25
3348A	—Triangular White Edge Scale, 24 in., Relieved Facet Shape.....	6.00
	(Divided $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{3}{8}$ , $\frac{1}{2}$ , $\frac{3}{4}$ , 1, $1\frac{1}{2}$ , 2, 3, 4 in. to the foot, $\frac{1}{8}$ in.)	
3346B	—Triangular White Edge Scale, 12 in., Regular Shape.....	\$2.00
3347B	—Triangular White Edge Scale, 18 in., Regular Shape.....	4.00
3348B	—Triangular White Edge Scale, 24 in., Regular Shape.....	5.75
3346C	—Triangular White Edge Scale, 12 in., Relieved Facet Shape.....	2.25
3347C	—Triangular White Edge Scale, 18 in., Relieved Facet Shape.....	4.25
3348C	—Triangular White Edge Scale, 24 in., Relieved Facet Shape.....	6.00

**TRIANGULAR BOXWOOD SCALES.**

For Architects and Mechanical Engineers.

U. S. Standard. Machine Divided.



No. 3351.

Divided:  $\frac{3}{32}$ ,  $\frac{3}{16}$ ,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{5}{16}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$ , 3 in. to the foot,  $\frac{1}{16}$  in.

No.	
3351	—Triangular Boxwood Scale, 6 in. . . . . each, \$0.50
3352	—Triangular Boxwood Scale, 12 in. . . . . each, .70
3354	—Triangular Boxwood Scale, 18 in. . . . . each, 2.15
3355	—Triangular Boxwood Scale, 24 in. . . . . each, 3.65

Divided:  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ , 1,  $1\frac{1}{2}$ , 2, 3, 4 in. to the foot,  $\frac{1}{16}$  in.

3353	—Triangular Boxwood Scale, 12 in. . . . . each, \$0.70
3353A	—Triangular Boxwood Scale, 18 in. . . . . each, 2.15
3353B	—Triangular Boxwood Scale, 24 in. . . . . each, 3.65

For Civil Engineers and Surveyors.



Divided: 10, 20, 30, 40, 50, 60 parts to the inch.

No.	
3356	—Triangular Boxwood Chain Scale, 6 in. . . . . each, \$0.50
3357	—Triangular Boxwood Chain Scale, 12 in. . . . . each, .70
3358	—Triangular Boxwood Chain Scale, 18 in. . . . . each, 2.15
3359	—Triangular Boxwood Chain Scale, 24 in. . . . . each, 3.65

Divided: 20, 30, 40, 50, 60, 80 parts to the inch.

3360	—Triangular Boxwood Chain Scale, 12 in. . . . . each, \$0.75
3360A	—Triangular Boxwood Chain Scale, 18 in. . . . . each, 2.15
3360B	—Triangular Boxwood Chain Scale, 24 in. . . . . each, 3.65
3361	—Triangular Boxwood Chain Scale, 12 in., divided: 100, 200, 300, 400, 500, 600 parts to the foot. . . . . each, 1.00

**TRIANGULAR SCALE GUARD.**

No. 3365.

No.	
3365	—Triangular Scale Guard, nickel plated. . . . . each, \$0.15

**METALLIC TRIANGULAR SCALES.**

Regular Shape.



No. 3370.

- No.
- 3370—Triangular Metallic Scale, Architects', 12 in., divided:  
 $\frac{3}{32}$ ,  $\frac{3}{16}$ ,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{2}$ , 3 in. to the foot,  $\frac{1}{8}$  in. . . . . each, \$2.50
- 3371—Triangular Metallic Chain Scale, Engineers', 12 in., divided:  
 10, 20, 30, 40, 50, 60 parts to the inch. . . . . each, 2.50
- 3372—Triangular Metallic Chain Scale, Engineers', 12 in., divided:  
 20, 30, 40, 50, 60, 80 parts to the inch. . . . . each, 2.50

Relieved Facet Shape.



No. 3371A.

These Metallic Scales, besides having the Relieved Facet shape which affords an easier reading of the scales, have the three fillets colored respectively black, yellow and red, to facilitate finding the required division.

- No.
- 3370A—Improved Triangular Metallic Scale, Architects', 12 in., divided:  
 $\frac{3}{32}$ ,  $\frac{3}{16}$ ,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{2}$ , 3 in. to the foot,  $\frac{1}{8}$  in. . . . . each, \$3.25
- 3371A—Improved Triangular Metallic Scale, Engineers', 12 in., divided:  
 10, 20, 30, 40, 50, 60 parts to the inch. . . . . each, 3.25

**PAPER SCALES.**19 inches long,  $1\frac{3}{4}$  inches wide, Engine Divided.

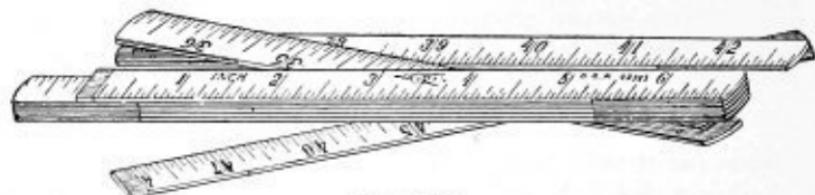
Printed on Bristol Board.

- No.
- 3375—Series A, 6 in set, divided  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{2}$ , 3 inches to the foot . . . . . set, \$1.00
- 3376—Series B, 6 in set, divided  $\frac{3}{32}$ ,  $\frac{1}{8}$ ,  $\frac{3}{16}$ ,  $\frac{5}{16}$ ,  $\frac{3}{8}$ ,  $\frac{7}{8}$ , inch to the foot . . . . . set, 1.00
- 3377—Series C, 6 in set, divided 10, 20, 30, 40, 50, 60 parts per inch. . . . . set, 1.00
- Single Scales, any of the above. . . . . each, .20

**PLOTTING SCALES.**

No. 3378.

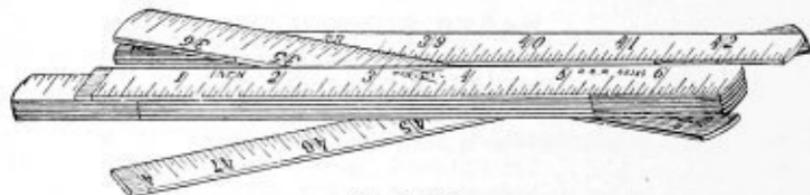
- No.
- 3378—Ivory Plotting Scale, 6-inch. . . . . each, \$1.25
- 3379—Boxwood Plotting Scale, 6-inch. . . . . each, .15

**FOLDING POCKET RULES.**Yellow Finish,  $\frac{3}{8}$ -inch Wide.

No. 3380.

These Pocket Rules are thin and light, and more convenient than the common joint rules. By a peculiar preparation of the wood, shrinkage is entirely prevented. They are perfectly accurate and are provided with ingenious springs which hold the rule in a straight line when open, for easy measurement of horizontal and vertical distances. No visible rivets on the surface to disturb the reading. The ends are provided with brass tips.

No.					
3380	— 2	Pocket Rule, 2-feet,	4-fold, div. 1/16x1/16 in., with spring	.ea.,	\$0.20
3380	— 3	Pocket Rule, 3-feet,	6-fold, div. 1/16x1/16 in., with spring	.ea.,	.25
3380	— 4	Pocket Rule, 4-feet,	8-fold, div. 1/16x1/16 in., with spring	.ea.,	.35
3380	— 5	Pocket Rule, 5-feet,	10-fold, div. 1/16x1/16 in., with spring	.ea.,	.45
3380	— 6	Pocket Rule, 6-feet,	12-fold, div. 1/16x1/16 in., with spring	.ea.,	.55
3380	— 8	Pocket Rule, 8-feet,	16-fold, div. 1/16x1/16 in., with spring	.ea.,	.70
3381	—	Pocket Rule, 4-feet,	8-fold, div. 1/16 x meter, with spring	.ea.,	.35
3382	—	Pocket Rule, 4-feet,	8-fold, div. 1/16 in. x 1/100 of foot with spring	.ea.,	.40

**White Enameled.**

No. 3384.

These Pocket Folding Rules are similar in construction to those listed above, differing only in the finish. They have a white coating which is very durable and resists heat or moisture. The black graduations are more legible than on the yellow rules.

No.					
3384	— 2	Pocket Rule, 2-feet,	4-fold, div. 1/16x1/16 in., with springs	.ea.,	\$0.25
3384	— 3	Pocket Rule, 3-feet,	6-fold, div. 1/16x1/16 in., with springs	.ea.,	.30
3384	— 4	Pocket Rule, 4-feet,	8-fold, div. 1/16x1/16 in., with springs	.ea.,	.40
3384	— 5	Pocket Rule, 5-feet,	10-fold, div. 1/16x1/16 in., with springs	.ea.,	.50
3384	— 6	Pocket Rule, 6-feet,	12-fold, div. 1/16x1/16 in., with springs	.ea.,	.65
3384	— 8	Pocket Rule, 8-feet,	16-fold, div. 1/16x1/16 in., with springs	.ea.,	.85
3384 $\frac{1}{2}$	— 4	Pocket Rule, 4 ft.,	8-fold, div. 1/16x1/100 ft., with springs	.ea.,	.45

**FOLDING POCKET RULES.****Yellow Finish,  $\frac{3}{8}$ -inch Wide.**

No. 3385

The above is intended for a vest pocket rule, the joints being only 4 inches long and  $\frac{3}{8}$ -inch wide. They are just as accurate as the larger rules.

No.	
3385—2,	Pocket Rule, 2-feet, 6-fold, 1/16x1/16 in., with springs. .each, \$0.25
3385—3,	Pocket Rule, 3-feet, 9-fold, 1/16x1/16 in., with springs. .each, .40

**White Enameled.**

3385W—2,	Pocket Rule, 2-feet, 6-fold, 1/16x1/16 in., with springs. .ea., \$0.30
3385W—3,	Pocket Rule, 3-feet, 9-fold, 1/16x1/16 in., with springs. .ea., .45
3385W—4,	Pocket Rule, 4-feet, 12-fold, 1/16x1/16 in., with springs. .ea., .60

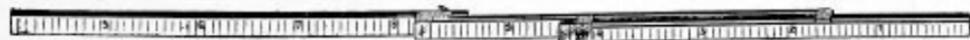
**FOLDING STEEL POCKET RULES.**

All our Steel Rules being made of hardened steel, the corners and edges will not wear off, and the figures and divisions are always plain. They are made of spring steel,  $\frac{3}{8}$ -in. wide, graduated on both sides, and will bend to a 3-inch circle. Can be conveniently carried in the vest pocket.

No.	
3386—1,	Steel Pocket Rule, 1-foot, 4-fold, divided 1/16x1/16 in. .each, \$0.25
3386—2,	Steel Pocket Rule, 2-foot, 8-fold, divided 1/16x1/16 in. .each, .50
3386—3,	Steel Pocket Rule, 3-foot, 12-fold, divided 1/16x1/16 in. .each, .75
	Leather Sheaths for above Rules. . . . .each, .10

**EXTENSION MEASURING RODS.**

Rod in two sections. No. 3387A.

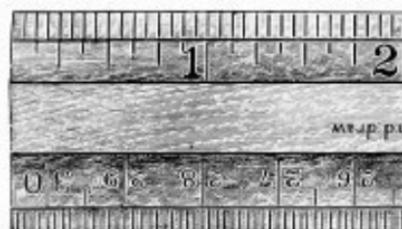


Rod in three sections. No. 3387D.

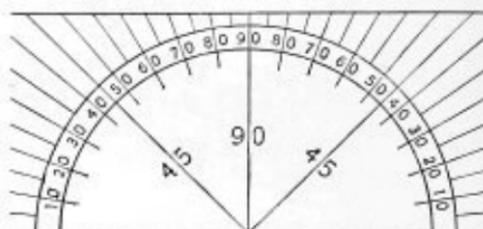
These rods are made in two or three sections, which can be extended, and are held in position by self-acting springs and thumb screws. The graduations are so arranged that the measurements are read on the lower rod.

No.	
3387A—2-fold,	4-feet, extending to 8 feet. . . . .each, \$3.50
3387B—2-fold,	5-feet, extending to 10 feet. . . . .each, 4.00
3387C—2-fold,	6-feet, extending to 12 feet. . . . .each, 5.00
3387D—3-fold,	3-feet, extending to 9 feet. . . . .each, 5.00
3387E—3-fold,	4-feet, extending to 12 feet. . . . .each, 6.00
3387F—3-fold,	5-feet, extending to 15 feet. . . . .each, 7.50
3387G—3-fold,	6-feet, extending to 18 feet. . . . .each, 9.00

## SCHOOL AND DESK RULES.

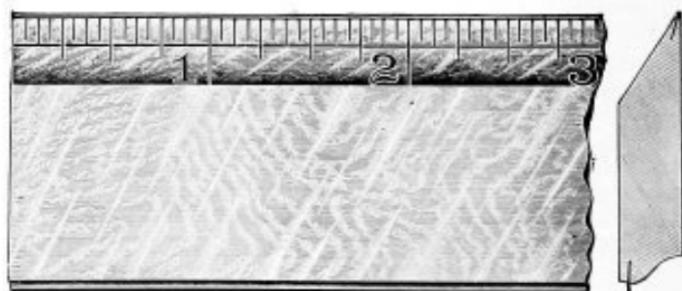


Front of 3388H



Back of 3388H

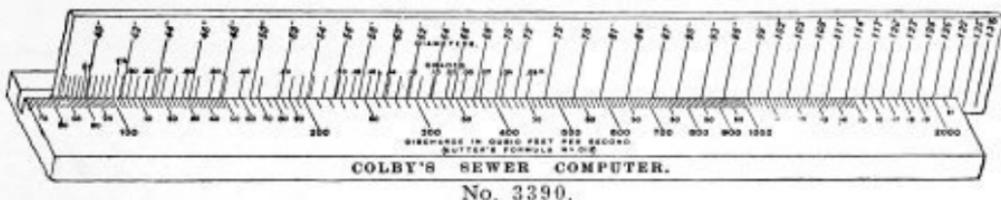
- No. 3388H—12-inch, Maple,  $1\frac{1}{8}$ -inch wide,  $\frac{3}{16}$ -inch thick, double bevel, plain edge, varnished, natural wood color, inch scale divided into sixteenths on one edge, metric scale divided into centimeters and millimeters on the other and protractor scale on back...each, \$0.10
- 3388J—Same as No. 3388H, but with Brass Edge.....each, .20



No. 3388K—3389G.

Hard Maple, selected,  $1\frac{3}{8}$ -inch wide,  $\frac{5}{16}$ -inch thick, beveled, hand rubbed piano finish, boxwood color. Inch scale divided into sixteenths.

- No.
- 3388K—12-inch long, Maple.....each, \$0.20
- 3388L—18-inch long, Maple.....each, .25
- 3388M—18-inch long, Maple.....each, .30
- 3388N—24-inch long, Maple.....each, .35
- 3389D—12-inch long, Boxwood.....each, .35
- 3389E—15-inch long, Boxwood.....each, .45
- 3389F—18-inch long, Boxwood.....each, .55
- 3389G—24-inch long, Boxwood.....each, .65
- 3389H—12-inch Flexible Rule, Maple Boxwood Finish,  $1\frac{3}{8}$ -inch wide,  $\frac{1}{16}$ -inch thick, Double Steel Ruling edge divided in 16ths on both sides, all edges, a fine article.....each, \$0.25
- 3389J—15-inch, same as No. 3389H.....each, .30

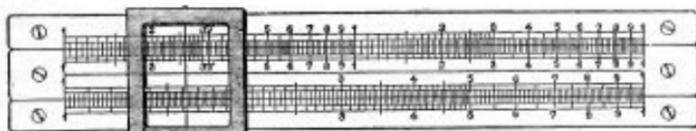
**COLBY'S SEWER COMPUTER.**

No. 3390.

This is a slide rule graduated after Kutter's formula and the values obtained by it are the same as given by that formula, the value of the coefficient "N" being taken at .013. It gives the relations between discharge, diameter and grade for round sewers from 6 inches to 20 feet in diameter and for egg-shaped sewers from 12x18 inches to 12x18 feet, and the grades for either from .05 to 20 per cent. The rule is 20 inches long.

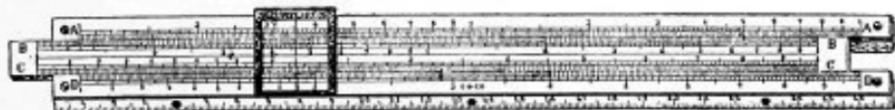
The few directions required are furnished with the rule.

- No.  
3390—Colby's Sewer Computer, hardwood, in case.....each, \$10.00

**"VEST POCKET" SLIDE RULE.**

No. 3391 1/2.

- No.  
3391 1/2—"Vest Pocket" Slide Rule, 5-inch, thin mahogany stock, celluloid facings, narrow and thin for pocket use with glazed aluminum indicator, case and directions.....each, \$2.50

**"PRECISION" ENGINEER'S SLIDE RULE.**

No. 3392.

- No.  
3392—Precision Engineer's Slide Rule (Mannheim) Improved construction, 5-inch divided on white celluloid, aluminum framed glass indicator, case and directions.....each, \$3.50  
3392 1/2—Precision Slide Rule as above, 8-inch long.....each, 4.00  
3393 —Precision Slide Rule as above, 10-inch long.....each, 4.25  
3393 1/2—Precision Slide Rule as above, 15-inch long.....each, 9.50  
3394 —Precision Slide Rule as above, 20-inch long.....each, 12.50

## FABER'S IMPROVED SLIDE RULE.



No. 3397.

The Faber Calculating Rule consists of a stock, or body, about  $10\frac{1}{2}$  inches in length,  $1\frac{1}{4}$  inches in width, and  $\frac{3}{8}$ -inch in thickness; a movable strip or slide inserted into the body, surfaces level, and a runner about an inch square fitted with glass, which, sliding freely the entire length of the instrument, serves to connect the fine graduations of the several scales in body and slide. The rule is made of boxwood, with celluloid facings. A manual or book of instructions of 47 printed pages and 14 diagrams accompanies each rule, explaining the general principles which govern the instrument and furnishing practical illustrations of its usefulness.

No.  
3397—Faber's 10-inch Slide Rule (360) Celluloid Face, with directions.  
.....each, \$3.50

3398—Faber's Slide Rule has received a further improvement by the insertion into its body, lateral to the slide, of a boxwood adjuster, which acts upon the slide like a spring and insures to its movement an even and adequate friction, safeguarded against becoming either excessively tight or excessively loose under changes of temperature and atmospheric humidity.

3398—Faber's 10-inch Slide Rule (365) Improved, divided on celluloid, with directions .....each, 4.00



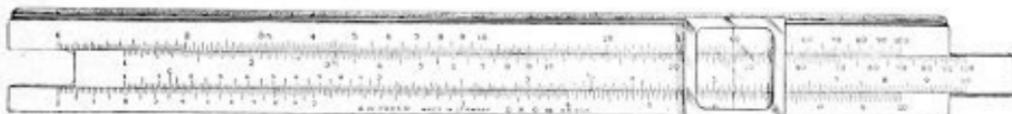
No. 3398A.

The Slide Spring Adjuster, described in connection with No. 3398 above is fitted to all Rules, and in addition to this improvement, the scale has hereafter mentioned been made about  $\frac{1}{8}$ -inch longer at each end, this extra length being provided with the object of affording a firmer hold for the cursor when nearing the extremities of the scales.

The Scales appearing on these Rules are identical, but on Rule 3398A, the spaces between 1 and 2, 2 and 3, 3 and 4, and so on, each one of which is divided into ten parts, are specially marked with the decimals.

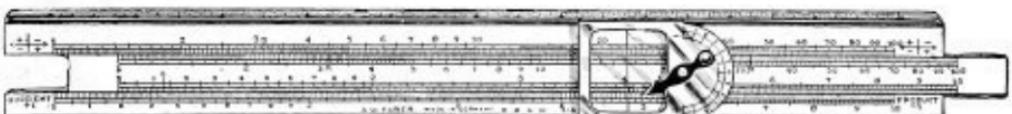
No.  
3398A—Faber's 11-inch Slide Rule (363) Improved, divided on celluloid, with directions .....each, \$4.50

## FABER'S IMPROVED SLIDE RULES.



No. 3398B.

- No.  
 3398B—Faber's 11-inch Slide Rule (364) Improved, is same as No. 3398A, except that these decimals, which by some operators are considered superfluous, have been omitted, with directions. .each, \$4.50  
 3398C—Faber's 6-inch Slide Rule (369), without Slide Spring Adjuster, but divided same as 3398B, with directions. . . . .each, 3.50



No. 3399.

The Sliding Cursor on No. 3399 has been made with a semi-circular projection, as shown in illustration in order to provide a graduated scale, which, as will be seen, is divided into 12 equal parts with the figure O in the centre and graduations to 6 plus and 6 minus respectively, a small indicator being introduced, which can be set to any of these graduations.

This obviates a troublesome difficulty which has previously existed, whereby, during the working of a complicated calculation, results, as they were obtained, had to be entrusted to the memory, whereas by the aid of this new Digit Registering Cursor this difficulty is entirely done away with, and the results are, as they are arrived at, registered by moving the indicator in the required direction.

- No.  
 3399—Faber's 11-inch Slide Rule (367) Improved, with self adjusting slide and Registering Cursor, with directions. . . . .each, \$4.50  
 3400—Faber's 21-inch Slide Rule (380) reads to 4 figures, the scales being twice the length of the 11-inch rule, improved with self adjusting slide and registering Cursor, with directions. . . . .each, 12.00



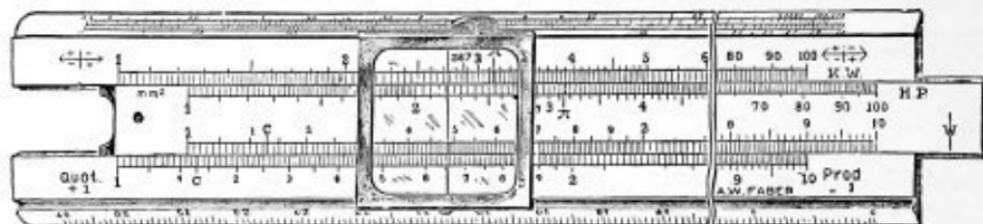
No. 3400.

- 3400—Faber's 11-inch School Slide Rule (361), both edges beveled with celluloid graduation and ordinary Cursor, with directions. .each, \$3.00

This Rule does not have the set of scales on the reverse of the slide for solving trigonometrical problems and logarithms.

## FABER'S IMPROVED SLIDE RULES.

For Electrical and Mechanical Engineers, with Log-Log Scale.



No. 3400B.

The Calculating Rule above illustrated contains a number of small modifications as compared with the standard patterns previously described, and is intended for the use of Electrical and Mechanical Engineers.

All those calculations, however, which can be made with the ordinary form of FABER'S Calculating Rule, can be made with this new Rule, and, in addition, other important calculations can be made.

The only markings which have been omitted from the ordinary form of Rule are the two measuring scales—one on the beveled edge in inches, and the other on the bottom of the groove in centimeters.

The position of the guide groove for the cursor has been slightly altered, and on the left end of the slide a sharp double metal tongue projects, which is used in conjunction with the new scales on the bottom of the groove in the Rule.

The space obtained on the beveled side by removing the measuring scale is occupied by two sets of graduations side by side, the so-called log-log scales. These two sets of graduations form a continuous log-log scale from 1:1 to 100,000. The first or top half runs from 1:1 to 2:9 and the second or lower half from 2:9 to 100,000.

Attached to the cursor on the beveled side of the Rule is a curved metal projection or indicator, the point of which exactly corresponds, and is in a line with the line on the cursor glass. It is by this arrangement that the log-log scales are used in conjunction with the lower scale on the slide.

The measuring scale omitted from the bottom of the groove in the Rule has been replaced by two new sets of logarithmic graduations, which are read by means of the metal indicator attached to the left end of the slide. The upper of the two scales enables the efficiency of dynamos and electric motors to be calculated, or the output in kilowatts, or the effective horse-power, with a given degree of efficiency; and this with a single setting of the slide.

Fuller information will be found in a Circular issued with each Rule.

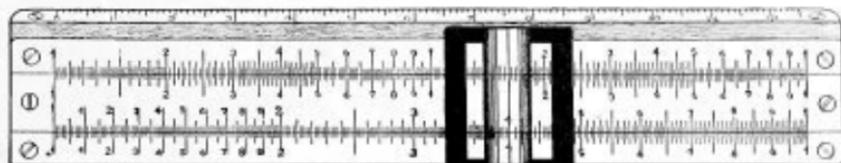
No.

3400B—Faber's 11-inch Slide Rule (368) Improved with self adjusting slide, log-log scales and special cursor, with directions....each, \$5.00

### Sundries for Faber Slide Rules.

Books of Instruction, separately, for Calculating Rules.....	each,	\$0.60
Metal Runners with Glass, for Nos. 3397, 3398a-b-c, 3400a.....	each,	.50
Metal Runners with Glass, for Nos. 3399, 3400, 3400b.....	each,	.65
Sole Leather Case for Calculating Rules, for all rules except 3400.....	each,	1.10

## THE "MIDGET" SLIDE RULE.

No. 3400C. ( $\frac{3}{4}$  natural size.)

The "Midget" Slide Rule combines the accuracy of a regular 10-inch "Precision" Slide Rule with the convenience afforded by its compactness and portability. Although its dimensions are restricted to only  $5\frac{1}{2}$ -inch in length, 1-inch in height and  $\frac{5}{16}$ -inch in thickness, and its weight, including the case, does not exceed  $1\frac{1}{2}$ -oz., it ranks in accuracy and reliability with the larger rules. In the construction of the stock, the same vital improvements are embodied which distinguish our slide rules. The ultimate sub-divisions are as fine as those on the regular 10-inch rule and by means of a powerful, yet compact and convenient magnifying glass their value is easily ascertained with the same percentage of accuracy as can be obtained by the 10-inch rules.

No.

3400C—"Midget" Slide Rule, 5-inch long, built up Mahogany stock, white Celluloid facings, engine divided, improved construction, with magnifier, in sewed leather case with clasp.....each, \$4.50

## "STADIA" SLIDE RULE.

These rules are the same style and graduations as our precision rules on page 241, but with additional scales for calculating Stadia readings.

No.

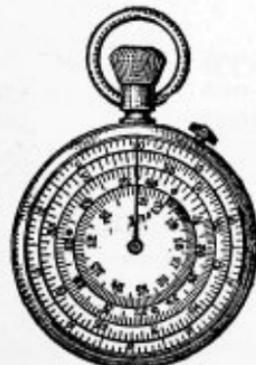
3400F—"Stadia" Slide Rule, 10-inch, built up Mahogany stock, celluloid facings, improved construction, in case.....each, \$6.50

## BOUCHER CALCULATOR.

The Boucher Calculator is made similar to an ordinary stem-winding watch, with glass covered dials back and front. Ratios are set off by means of pointers which, as well as the movable dial, are moved by means of the "stem-winder" key. It is  $2\frac{1}{16}$  inches in diameter by  $\frac{9}{16}$  inches thick, and does not take up more room in the pocket than an ordinary watch.

No.

3401—Boucher Calculator.....each, \$8.50



No. 3401.

**FOLDING PARALLEL RULES.****EBONY FOLDING PARALLEL RULES, BRASS BARS.**

No.	Best quality.
3410—Ebony Parallel Rules, brass bars, 6-inch.....	each, \$0.30
3411—Ebony Parallel Rules, brass bars, 9-inch.....	each, .60
3412—Ebony Parallel Rules, brass bars, 12-inch.....	each, .75
3413—Ebony Parallel Rules, brass bars, 15-inch.....	each, .90
3414—Ebony Parallel Rules, brass bars, 18-inch.....	each, 1.20
3415—Ebony Parallel Rules, brass bars, 24-inch.....	each, 2.10

**RUBBER PARALLEL RULES, NICKEL-PLATED BARS.**

These do not warp by changes of atmosphere.

No.	
3416—Rubber Parallel Rules, nickel-plated bars, 6-inch.....	each, \$0.75
3417—Rubber Parallel Rules, nickel-plated bars, 9-inch.....	each, .90
3418—Rubber Parallel Rules, nickel-plated bars, 12-inch.....	each, 1.20
3419—Rubber Parallel Rules, nickel-plated bars, 15-inch.....	each, 1.50
3420—Rubber Parallel Rules, nickel-plated bars, 18-inch.....	each, 1.75
3421—Rubber Parallel Rules, nickel-plated bars, 24-inch.....	each, 2.40

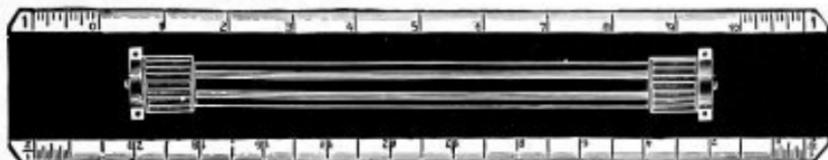
**EBONY ROLLING PARALLEL RULES.**

Nos. 3431-3438.

No.	
3431—Ebony Rolling Parallel Rules, brass mountings, 9-inch... each,	\$2.50
3432—Ebony Rolling Parallel Rules, brass mountings, 12-inch... each,	3.00
3433—Ebony Rolling Parallel Rules, brass mountings, 15-inch... each,	3.50
3434—Ebony Rolling Parallel Rules, brass mountings, 18-inch... each	4.25

**ROLLING PARALLEL RULES, HARD RUBBER.**

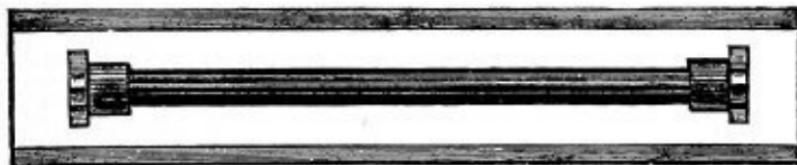
No.	
3435—Rubber Rolling Parallel Rule, nickel-plated mtgs., 9-inch... each,	\$3.25
3436—Rubber Rolling Parallel Rule, nickel-plated mtgs., 12-inch... each,	3.75
3437—Rubber Rolling Parallel Rule, nickel-plated mtgs., 15-inch... each,	4.25
3438—Rubber Rolling Parallel Rule, nickel-plated mtgs., 18-inch... each,	5.00

**ROLLING PARALLEL RULES.**

No. 3445.

No.

- 3445—Boxwood Rolling Parallel Rule, nickel-plated mountings, edges divided on white celluloid,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1-inch to the foot, 12-inch ..... each, \$4.50  
 3446—Same as No. 3445, 15-inch..... each, 5.25  
 3447—Same as No. 3445, 18-inch..... each, 6.00

**METAL ROLLING PARALLEL RULES.**

No. 3448.

No.

- 3448—German Silver Rolling Parallel Rule, 9-inch..... each, \$ 8.50  
 3449—German Silver Rolling Parallel Rule, 12-inch..... each, 10.00  
 3450—German Silver Rolling Parallel Rule, 15-inch..... each, 12.00  
 3451—German Silver Rolling Parallel Rule, 18-inch..... each, 15.00  
 3452—German Silver Rolling Parallel Rule, 24-inch..... each, 20.00  
 3453—Brass Rolling Parallel Rule, 9-inch..... each, 7.00  
 3454—Brass Rolling Parallel Rule, 12-inch..... each, 8.50  
 3455—Brass Rolling Parallel Rule, 15-inch..... each, 9.50  
 3456—Brass Rolling Parallel Rule, 18-inch..... each, 11.50  
 3457—Brass Rolling Parallel Rule, 24-inch..... each, 16.50

Cases for above from 90 cents to \$1.50 each.

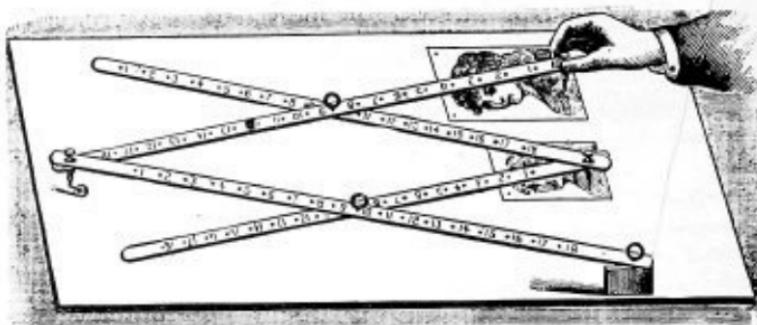
**ALOE'S STANDARD ROLLING PARALLEL RULES.**

No. 3460.

- No.  
 3459—12-inch, in case, Bronze Metal, highest quality.....\$12.00  
 3460—15-inch, in case, Bronze Metal, highest quality..... 15.00  
 3461—18-inch, in case, Bronze Metal, highest quality..... 18.00  
 3462—21-inch, in case, Bronze Metal, highest quality..... 21.00  
 3463—24-inch, in case, Bronze Metal, highest quality..... 24.00

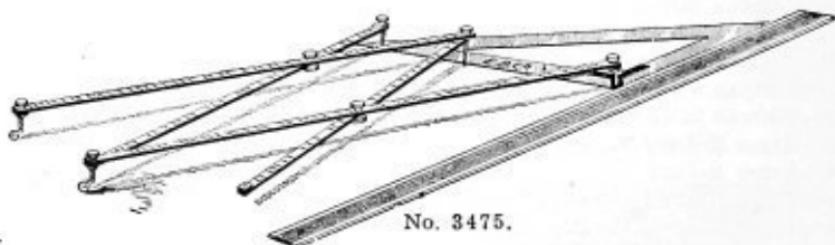
## WOOD PANTOGRAPHS.

For Enlarging and Reducing Drawings.



- No.  
 3465—Heavy mounted, with nickel-plated elbow joint wheel, pencil holder and exchangeable point; finely polished, black figures, arms 21 inches long, in box with directions..... each, \$2.50  
 3466—Brass mounted, with brass elbow joint wheel, pencil holder and movable point; polished, black figures, in box, with directions for using ..... each, 2.00  
 3466A—Brass mounted, same as No. 3466, in every respect, except that it is not polished, in box, with directions for using..... each, 1.50  
 3466B—Brass mounted, same as No. 3466A, except movable point instead of wheel, with directions for using..... each, 1.00  
 3466C—The best Pantograph for the price. It has very neat and substantial trimmings, clean cut figures; a very neat and satisfactory instrument, with directions for using..... each, .50

## THE BOSTON UNIVERSAL PANTOGRAPH.



- No.  
 3475—Boston Universal Pantograph, of German silver, with 18-in. Transparent Ambro Triangle, in box, with directions..... each, \$45.00

The Boston Universal Pantograph has been designed in order to combine, at a reasonable cost, the accuracy of very expensive and intricate instruments with the simplicity and handiness of cheap ones.

The pivotal point is mounted on a celluloid triangle which may be placed anywhere on the most delicate drawing without injuring it, and a few weights will secure its position as well as will the commonly used screws or claws.

The center of the pivot is placed exactly over the right-angled corner of the triangle and can, therefore, easily be marked on the plan, making it possible—

1st. To remove the Pantograph entirely and replace it as often as desired.  
 2d. To change the position of the triangle and still keep the same pivotal point, thus gaining access to that part of the drawing which the triangle may have covered at first, and obtaining a copy of the entire drawing within the sweep of the Pantograph (a circle 8 feet in diameter) without leaving any "bald spots" to be covered separately.

3d. To move the pivotal point from place to place on the plan in the systematic manner and thus reduce or enlarge plans of unlimited size and still get the copy in one piece.

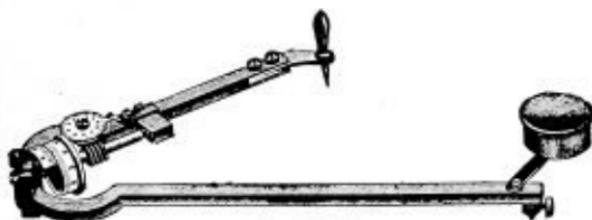
## PLANIMETERS.

These ingeniously devised instruments rank high among the various modern mechanical aids to the calculations and computations necessary in the work of Mechanical, Civil and Naval Engineers.

The Planimeter affords the most simple and convenient method of measuring the area of plain surfaces on drawings and plans. The accuracy of the results which can be obtained, when the instrument is carefully made and properly used, is so great that the Planimeter is now an indispensable aid to a constantly increasing number of the most progressive members of the engineering profession. In cases of irregular surfaces, the results obtained by the planimeter can not be equalled in accuracy by any compass and scale method of mensuration; and the time saved by using the instrument in such cases is very considerable. We carry in stock two types of planimeters, the Polar Planimeter and the Rolling Planimeter.

The Rolling Planimeter differs from the Polar Planimeter, in that it moves on two broad rollers, and not being limited in scope like the Polar Planimeter, a surface of any size can be measured in one operation.

Contrary to the prevalent idea, Planimeters are not difficult to use but are very simple in operation; full directions accompany each one.



No. 3483.

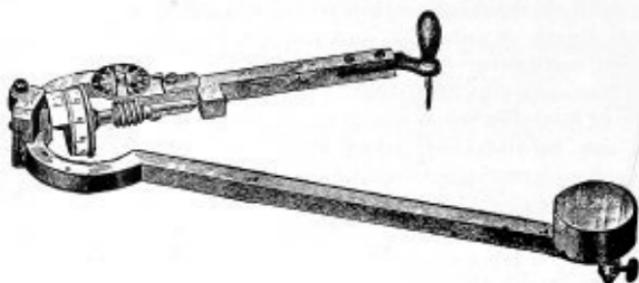
- No.  
3483—Polar Planimeter, German Silver, simplest form. It covers a range up to 10 square inches and by means of vernier can be read to 1/100 of a square inch, with fixed tracer arm, counterweight for needle pole, in case.....each, \$14.75



No. 3484.

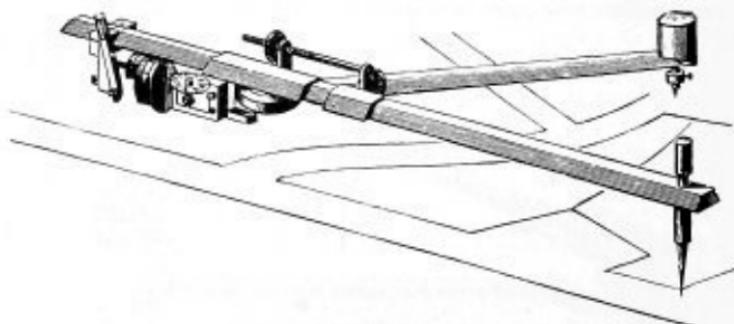
- 3484—Polar Planimeter, German Silver, with fixed tracer arm, counterweight for needle pole, and with horizontal disc registering the revolutions of the measuring roller; for measuring areas up to 100 squares inches.....each, \$16.25

## PLANIMETERS.



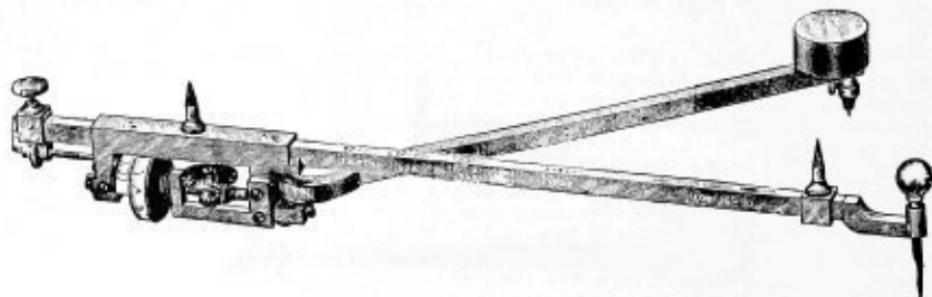
No. 3485.

No.  
3485—Polar Planimeter, German Silver, arranged for measurement of areas in square inches—viz., 10, 1, 1/10, and 1/100 square inches, with directions, in case.....each, \$20.75



No. 3486.

No.  
3486—Polar Planimeter, German Silver, for every kind of measurement, with directions in case.....each, \$27.00

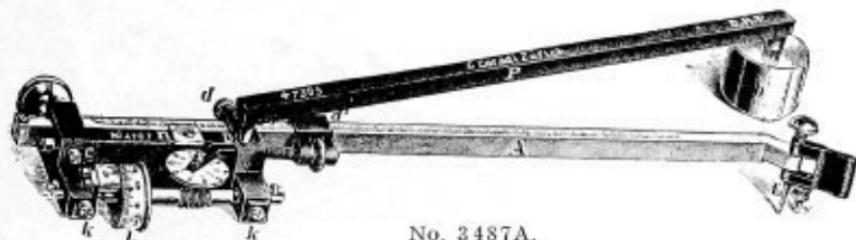


No. 3487.

Illustration one-half size.

No.  
3487—Polar Planimeter, German Silver, for every kind of measurement, with special arrangement for finding rapidly the mean height of indicator diagrams, with directions, in case.....each, 31.00

## PLANIMETERS.

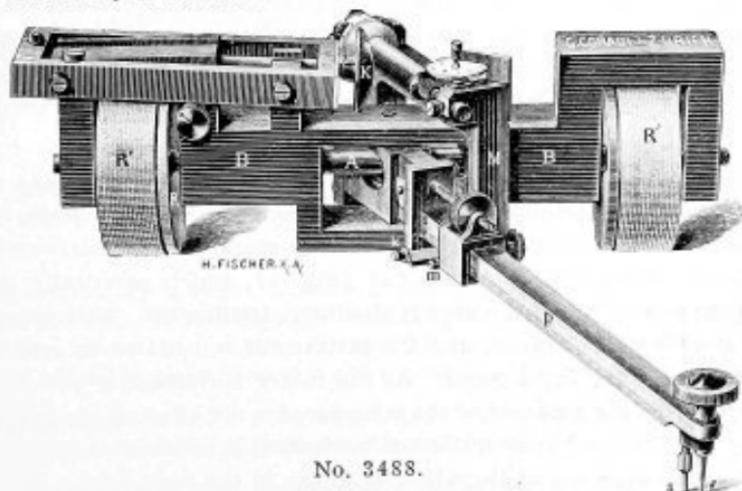


No. 3487A.

- No.  
 3487A—Compensating Planimeter, German Silver and Brass; adjustable tracer arm fully graduated, improved pole-weight; testing rule and table of settings for U. S. Standard measure, with directions, in case.....each, \$36.00  
 3487B—Compensating Planimeter, like No. 3487A, but with adjustable pole-arm, with directions, in case.....each, 47.00

Planimeters No. 3487A-3487B are constructed in a novel manner. Instrument No. 3487A consists of two separate parts: the tracer arm and the carriage with measuring and recording wheels, and the pole-arm having the pole-weight at one end and a steel ball at the other end, which forms a ball joint with the wheel carriage. This construction gives the tracer-arm a motion of 180 degrees right and left, whereas with the usual Planimeters a motion of only about 90 degrees can be obtained. By measuring a diagram with the pole on the left and then again with the pole on the right side of the tracer-arm and taking the mean reading, all instrumental errors are compensated.

Instrument No. 3487B has an adjustable pole-arm bearing index marks for the different settings furnished with the instrument, and can be adjusted so that when the instrument is used with the pole inside of a figure, the constant is a round number 20,000, for any setting. It is used in the same way with the pole inside as with the pole outside, and by tracing the figure with the pole on the right and on the left of tracer-arm and taking the mean reading, large areas can be accurately measured.



No. 3488.

- No.  
 3488—Rolling Ball Planimeter, German Silver and Brass, having tracer arm 11  $\frac{3}{4}$  inches long, which can be increased by a lengthener to 19  $\frac{3}{4}$  inches. Its angular motion is about 90 degrees. The two rollers are made of exactly equal diameters, insuring the motion of the instrument, as a whole, in a straight line. A surface of any length and of a width of 20 inches can be measured with the 19  $\frac{3}{4}$ -inch tracer arm. Instrument complete in morocco case, and complete book of instructions.....each, \$95.00

## IMPROVED WILLIS PLANIMETER.

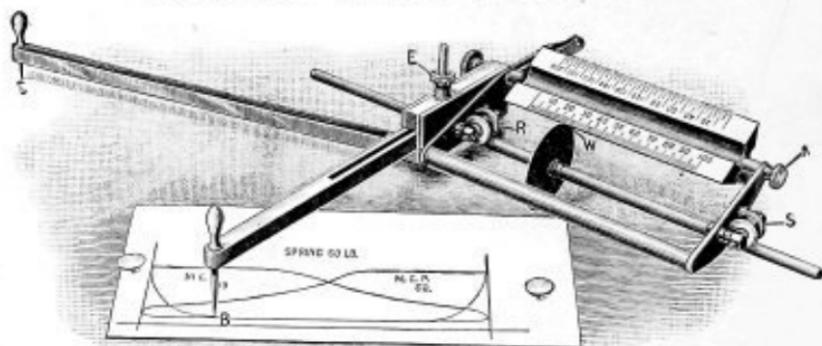


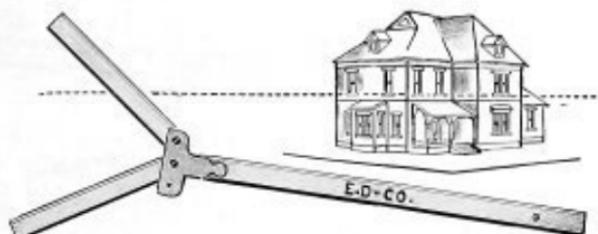
Fig. 1.

Reads M. E. P. direct from Indicator diagram, gives areas of regular or irregular circles or diagrams in square inches, feet and yards without any computation.

The usual planimeter has a recording wheel whose axle is parallel to the tracer bar. This wheel scrapes along the paper for all movements parallel to the tracer bar, and records by rotating all movements perpendicular to it. The instrument to which we call attention acts on an entirely different principle. The wheel (W) figure (1) rolls for all movements parallel to the tracer bar and its steel spindle glides beneath roller for all perpendicular movements. After tracing a figure the result is read from the scale next to the wheel; this scale being triangular, has six graduated edges, any one of which can be brought next to the wheel, thus permitting reading to be taken in the unit best suited to the work.

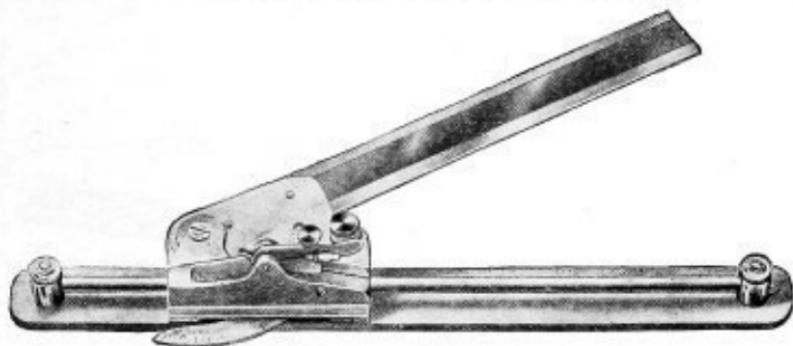
The recording wheel of the improved Willis Planimeter is made of steel and has a sharp edge, which takes firm hold upon the paper or material upon which the instrument is operated, and the long steel shaft of this wheel glides freely beneath the rollers (R) and (S) (Fig. 1), which practically bear the weight of the instrument, and makes it absolutely frictionless. This construction gives great ease of movement, and the instrument is handled as readily on a rough table as on the finest paper. As the rotary movement is not registered, it is apparent that the accuracy of the instrument is not affected by the character of the paper or material upon which the instrument is operated, or by any slight reduction of the diameter of the wheel or injury to the knife edge. This is one of the most important points to be considered in the selection of a Planimeter. The instrument packs neatly in a leather-covered case,  $1\frac{1}{2} \times 3\frac{1}{2} \times 9\frac{1}{2}$ , which can be readily carried in the pocket.

No.  
3489—Willis Improved Planimeter.....each, \$20.00

**PERSPECTIVE LINEADS.**

No. 3490.

- No.
- 3490—Perspective Linead or Centrolinead, maple, brass swivels, with two studs; blade 24-inch, arms 10-inch.....each, \$3.00
- 3491—Same as No. 3490, with blade 30-inch, arms 11-inch.....each, 3.50
- 3492—Same as No. 3490, with blade 36-inch, arms 12-inch.....each, 4.00

**THE RUNDLETT SECTION LINER.**

No. 3495.

The device here described not only makes section lining a rapid and easy operation, but a large class of cylindrical and flat shading may be artistically produced by it with great facility.

Its operation, by a slight downward pressure on the finger lever, is very simple and positive. It acts through reduced motion and grip block to pull the ruler carriage along by uniform or varying steps as desired in response to turning the adjusting screw, and it is not practically affected by wear.

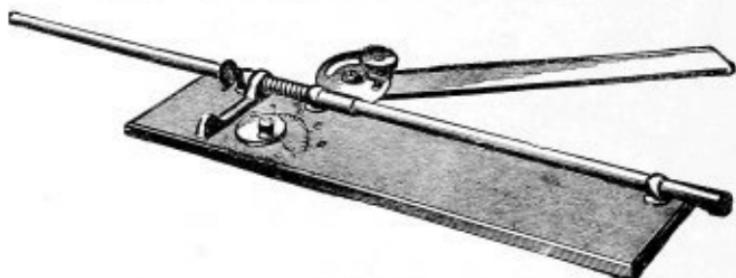
The instrument is made with a mahogany base and plated trimmings, the carriage sliding on a steel rod with adjustable friction.

It is provided with fine needle points projecting from the under surface to locate it on the drawing.

The ruler has transparent celluloid edges about 9 inches long, and may be clamped in any position from 0° to 120°.

- No.
- 3495—Rundlett Section Liner.....each, \$5.00

### THE "SPHINX" SECTION LINER.

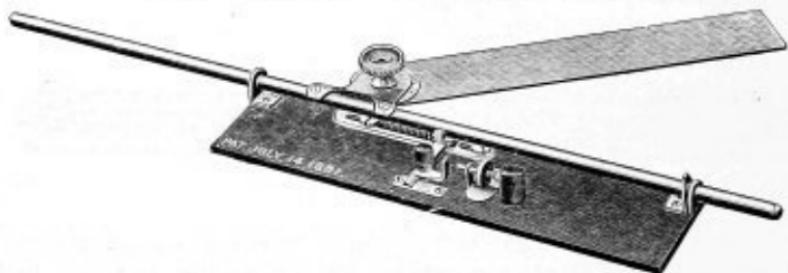


No. 3500.

The "Sphinx" Section Liner is especially adapted for school purposes, pattern, architectural or mechanical sectional drawing. The ready sale with which this instrument has met through the country, proves the appreciation of draughtsmen, who desire an accurate and rapid working, low-priced Section Liner.

- No.  
 3500—Sphinx Improved Section Liner, 7-inch Rule, finished in Natural Wood and Nickel-plated Mountings, in Imitation Morocco Case .....each, \$1.50  
 3501—Sphinx Improved Section Liner, with 7-inch Celluloid Rule...each, 2.00

### THE "TERRY" SECTION LINER.



No. 3507.

#### A Practical Section Liner.

It is superior to all others for the following reasons: It is always ready for work. It does not require practice to use it. It is not tiresome, because of the ease and freedom with which it can be operated. The action is positive and accurate at any speed. Any distance can be worked over without a break, as the base-plate can be shifted either forward or backward without disturbing the ruler. The ruler can also be lifted from the work and again dropped to its former position. The Ruler is transparent, thus allowing the operator to see the lines toward which he is working.

- No.  
 3507—Terry's Section Liner, with 7-inch Mahogany, Celluloid Lined Rule on heavy metal plate, with pins on bottom .....each, \$5.00  
 3508—Terry's Section Liner, with 12-inch Mahogany, Celluloid Lined Rule, with brace attachment.....each, 6.50

**PEARWOOD TRIANGLES.**

These Triangles are made of thoroughly seasoned, guaranteed genuine pear-tree wood; not the so-called pear-wood of other makers. The workmanship is of the best, and with our improved machinery, perfect accuracy is assured.

The size of all Triangles is determined by the length of the catheti. In order to secure a 30°X60° and a 45° Triangle of even size of hypotenuse, order the 45° Triangle about 2 inches shorter than the 30°X60° Triangle.



No. 3510.



No. 3516.

**PEARWOOD TRIANGLES—FRAMED OPEN CENTER.**

30 x 60 Degrees.	
No. 3509	— 5-inch ..... each, \$0.09
3510	— 6-inch ..... each, .10
3511	— 7-inch ..... each, .12
3512	— 8-inch ..... each, .15
3513	— 9-inch ..... each, .18
3513 ½	— 10-inch ..... each, .20
3514	— 11-inch ..... each, .22
3514 ½	— 12-inch ..... each, .25
3515	— 14-inch ..... each, .30

45 x 90 Degrees.	
No. 3516	— 4-inch ..... each, \$0.10
3516 ½	— 5-inch ..... each, .12
3517	— 6-inch ..... each, .15
3518	— 7-inch ..... each, .18
3518 ½	— 8-inch ..... each, .20
3519	— 9-inch ..... each, .22
3519 ½	— 10-inch ..... each, .25
3520	— 11-inch ..... each, .30
3521	— 12-inch ..... each, .35



No. 3525.



No. 3531.

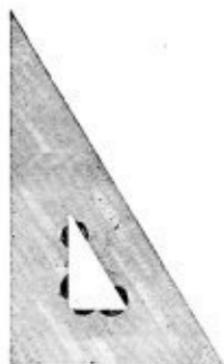
**MAHOGANY TRIANGLES—EBONY LINED.**

30 x 60 Degrees.	
No. 3525	— 7-inch ..... each, \$0.35
3526	— 9-inch ..... each, .40
3527	— 11-inch ..... each, .55
3528	— 14-inch ..... each, .75
3529	— 17-inch ..... each, 1.20
3530	— 20-inch ..... each, 1.50

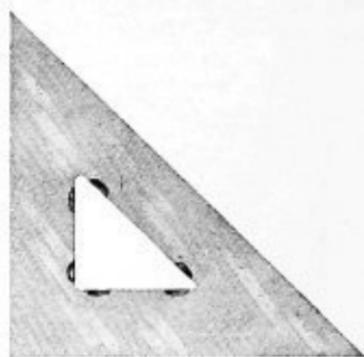
45 x 90 Degrees.	
No. 3531	— 6 -inch ..... each, \$0.35
3532	— 7 ½-inch ..... each, .40
3533	— 9 -inch ..... each, .55
3534	— 11 ½-inch ..... each, .70
3535	— 14 -inch ..... each, 1.20
3536	— 16 -inch ..... each, 1.50

## IMPROVED TRANSPARENT "AMBER" TRIANGLES.

With Bevels on Inner Edges.



No. 3545.



No. 3546.

### Advantages of Transparent "Amber" Triangles.

They will allow of more rapid, accurate work, owing to their transparency, they do not assimilate dust, they are nearly unbreakable, they keep their edges like metal tools; in fact they have every possible advantage over wood and rubber, and the further improvement of bevels on the inner edges from opposite surfaces allows the draftsman to pick up the angle with the finger nail more readily and at the same time doing away with the liability of blurring fresh ink lines.

No.

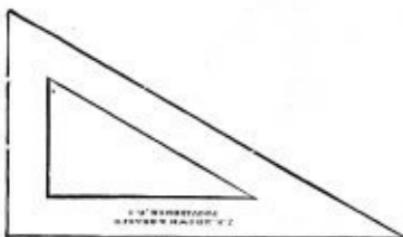
3545—Transparent "Amber" Triangles, 30 x 60 degrees:

Inches,	4	5	6	7	8	9	10	11	12	13	14	15	16	18
Each ..	\$.20	30	35	40	50	60	70	80	90	1.15	1.50	1.75	2.25	2.90

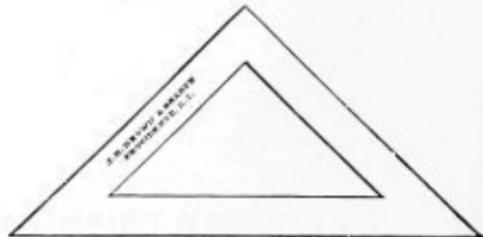
3546—Transparent "Amber" Triangles, 45 degrees:

Inches....	4	5	6	7	8	9	10	11	12	13	14	15	16	18
Each....	\$.30	30	40	50	60	70	90	1 00	1 20	1 50	1 70	2 00	2 50	3 50

## METAL TRIANGLES.



No. 3548.



No. 3549.

No.

3548—Steel Triangles, nickel-plated, open center, 30 x 60 degrees:

Inches .....	6	7	8	10½	15
Each .....	\$3.25	3.75	4.00	4.50	6.50

3549—Steel Triangles, nickel-plated, open center, 45 degrees:

Inches .....	5	6½	8	10	12
Each .....	\$3.25	3.75	4.50	5.50	6.50

## COMBINATION ANGLES, PROTRACTORS.

**Draftsmen's Combination Angles** are adapted to a large range of work, and rapid execution, as compared with the ordinary 45° and 60° triangles which they replace by a single tool.

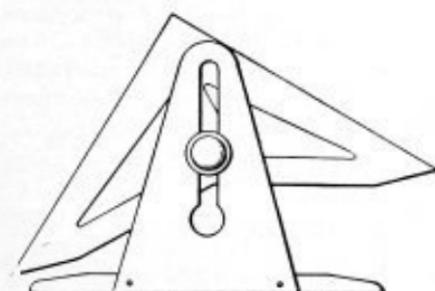
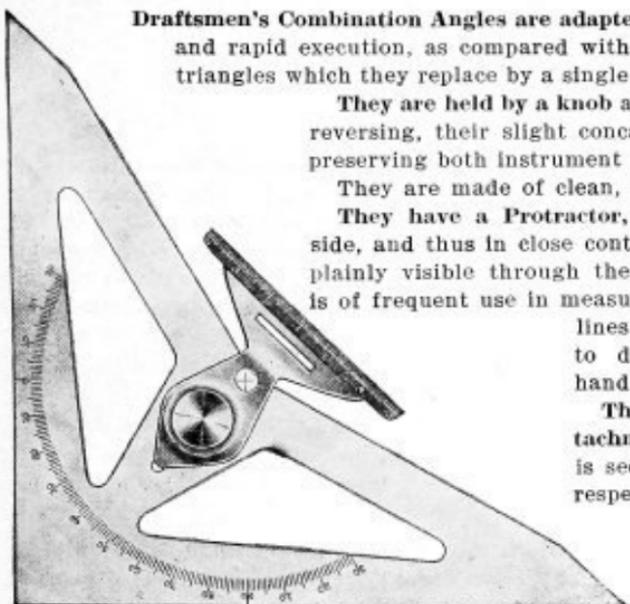
They are held by a knob and serve all angles without reversing, their slight concavity towards the drawing preserving both instrument and work.

They are made of clean, tough transparent pyralin.

They have a Protractor, graduating on the under side, and thus in close contact with the work, though plainly visible through the transparent material. It is of frequent use in measuring or ruling angles from lines on drawings. It reads to degrees and is always at hand.

They also have a **Base Attachment**, to which the triangle is secured in any position with respect to the T square by a slight turn of the knob, that particularly expedites angle work, as compared with the sliding (slipping) triangles often used.

Special projections, girder work, lever mechanism, bevel gearing, cams, etc., afford frequent occasion for its use.



**An important feature is the Scale** on the erasing shield, as shown in the cut. It is instantly placed in horizontal, vertical or angular position, and thus avoids much time consuming interchange of tools.

As it readily covers twice its length about center lines, it serves a large percentage of all scaling, even on full size drawings.

Scales are interchangeable, steel, nickel plated, graduated to 32nds (or to order), and have the edge bent down to meet the paper close for accurate work.

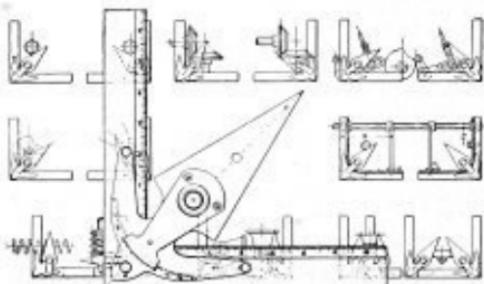
No.	6 in.	7 in.	8 in.	10 in.
3550 — Plain, with knob.....	\$0.75	\$1.15	\$1.00	\$1.25
3550A—Base extra .....	.40	.45	.50	.65
3550B—Erasing Shield .....	.....	.15	.....	.....
3550C—Protractor Graduation .....	.40	.40	.40	.40
3550D—4-inch Steel Scale .....	.....	.45	.....	.....
3550E—Price complete .....	1.50	2.50	1.75	2.25

**NOTE.**—Only the 7 in. size has the internal ruling edges of 5° and 15°.

It is best adapted to the scale and base attachments and to the great majority of drafting on account of rapid and easy manipulation.

## DRAFTSMAN'S UNIVERSAL SQUARE AND PROTRACTOR.

(Patented.)



No. 3551.

This instrument does away with much of that petty distraction of mind and body incidental to the use of the ordinary variety of triangles, protractor plates and measuring scales. Its numerous functions are fully controlled by means of a knob, with the slightest demand on the attention of the operator.

It is made by uniting two arms of transparent pyralin under a metal plate, the latter having a graduated arc and center about which a central tongue swings through an angle of 120°. The vernier reads to 10'.

Angle lines and perpendiculars are thereby ruled with great facility by simply turning the square on opposite edges, as in cam work, bevel gearing, structural designs, fixtures, special projections, level mechanism, strain diagrams, etc.

Quick and accurate measurement along the inner edges of the square is provided for by steel scales, finished in dull nickel, with the edges bent down. This feature is of great advantage over the use of a separate scale on a large class of measurements, enabling the draftsman to dispatch work rapidly. The scales are usually graduated to inches and 32nds, and their range is practically the whole length of the square, from lines scored near the outer ruling edges of the arms. Thus the 9" square measures 9" horizontally and vertically.

The value of this instrument, as a time and nerve saver, may be noted in the following features:

A reliable and adjustable square, large, light and easily manipulated.

Of wide range of service and better than two triangles, a scale and another protractor. It saves moving things.

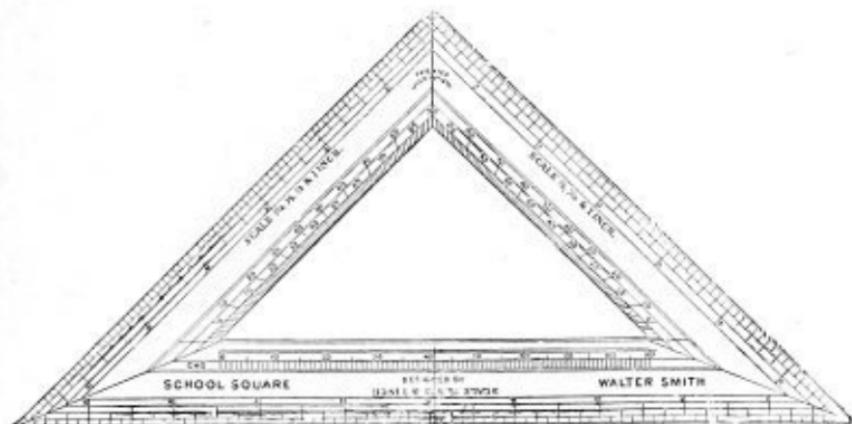
It also saves distribution of dirt on the drawing.

Peculiar adaptation, by means of the direct ruling protractor, to the drawing of special angle work, as rulings at right angles to each other are provided for at one setting, on all parts of the drawing board, by simple movements in conjunction with the T square. Very handy in designing mechanism.

No.	9-inch.	12-inch.
3551 — Square and Protractor.....	\$5 00	\$ 6 00
3551a—Square, without scales.....	3 50	4 75

NOTE:—Instead of the painted tongue, which is particularly adapted for machine designers' use and is long enough for the majority of work, the instrument may be furnished with a parallel edged tongue of 8-inch or 10-inch length at same price, if preferred.

## SCHOOL SQUARES OR TRIANGLES.



No. 3556A.

- No.
- 3556A—Bristol Board Ruler, Scale and Protractor combined, 5-in. .each, \$0.10
- 3556B—Bristol Board Ruler, Scale and Protractor combined, 6-in. .each, .12
- 3556C—Bristol Board Ruler, Scale and Protractor combined, 7-in. .each, .15

## TRANSPARENT CELLULOID STENCILS.



It is desirable to have drawings plainly and uniformly lettered and numbered, and to do this easily and rapidly, a transparent stencil, as shown above, may be used to advantage, either with the brush or by first outlining the figures with a sharp pointed pencil, and afterwards inking them with a pen.

A figure having been made, any other figure of the stencil may be brought alongside of it, the space between the two being readily judged, as the stencil is transparent. Thus any number may be quickly outlined, and afterwards inked in; those portions of the figures necessarily covered by the stencil being so small as to be easily filled in with the pen. The figures or letters may be inked directly from the stencil, by means of a brush, not too much moistened. These stencils are made in five sizes, one style of figure and letter.

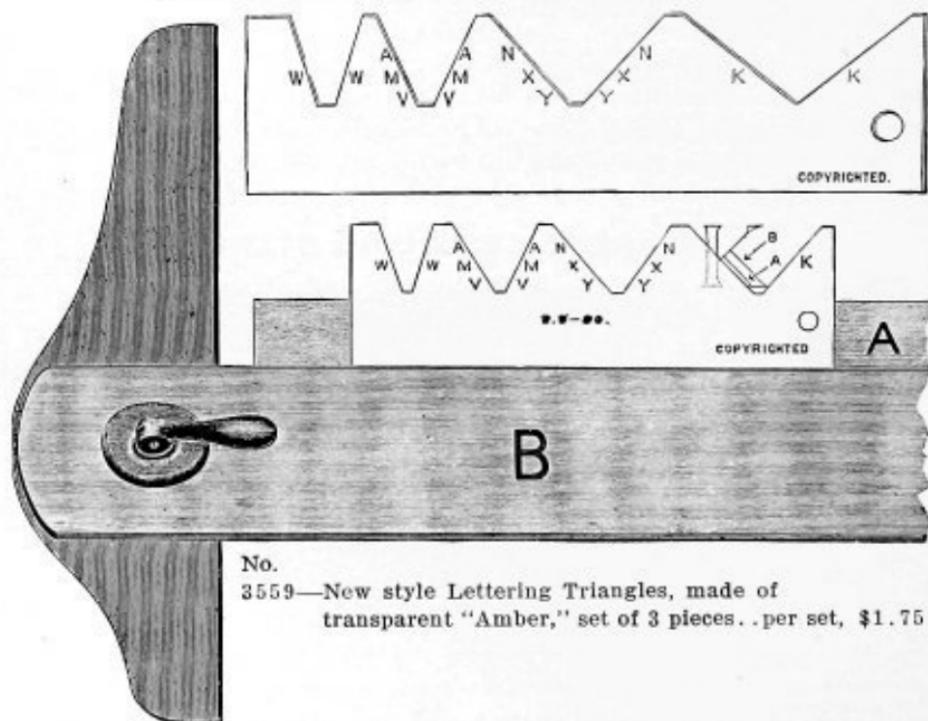
- No.
- 3556D—Celluloid Stencils, Alphabet.  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ -inch high..... \$0.75
- 3556E—Celluloid Stencils, Alphabet.  $\frac{3}{4}$ , 1-inch high..... 1.50
- 3556F—Celluloid Stencils, Figures.  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ -inch high..... .25
- 3556G—Celluloid Stencils, Figures.  $\frac{3}{4}$ , 1-inch high..... .50

## LETTERING TRIANGLES.



- No.  
 3557—Hard Rubber Lettering Triangles, 3 in set, 3½-inch . . . . . per set, \$1.25  
 3558—Transparent “Amber” Lettering Triangles, 3 in set,  
 3½-inch . . . . . per set, 1 50

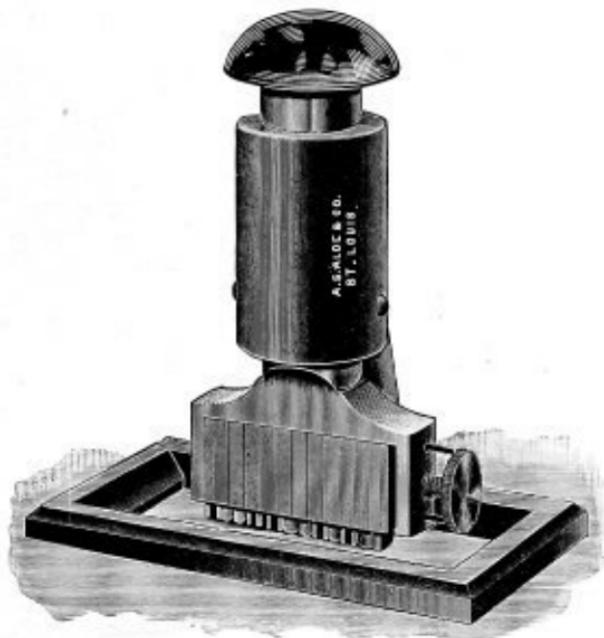
## NEW STYLE LETTERING TRIANGLES.



- No.  
 3559—New style Lettering Triangles, made of  
 transparent “Amber,” set of 3 pieces. . per set, \$1.75

Our new style Lettering Angles facilitate rapid and accurate lettering, because all slopes are in one horizontal line and in equal distance from the T square or straight-edge along which they slide. The old style, No. 3557, required constant moving up and down to accomplish the desired slope. Our new style has the further advantage that it permits of inking the letters without risk of blurring the lines. Put a piece of card-board or blotting paper “A” next to edge of T square “B” and under the lettering angle, thus raising the lettering angle over the drawing paper. In this way you could ink slope “A” of the letter “K,” and while the line is still wet along the angle to draw slope “B” as shown by above cut.

## OCKERSON'S MAP PRINTING AND LETTERING DEVICE.

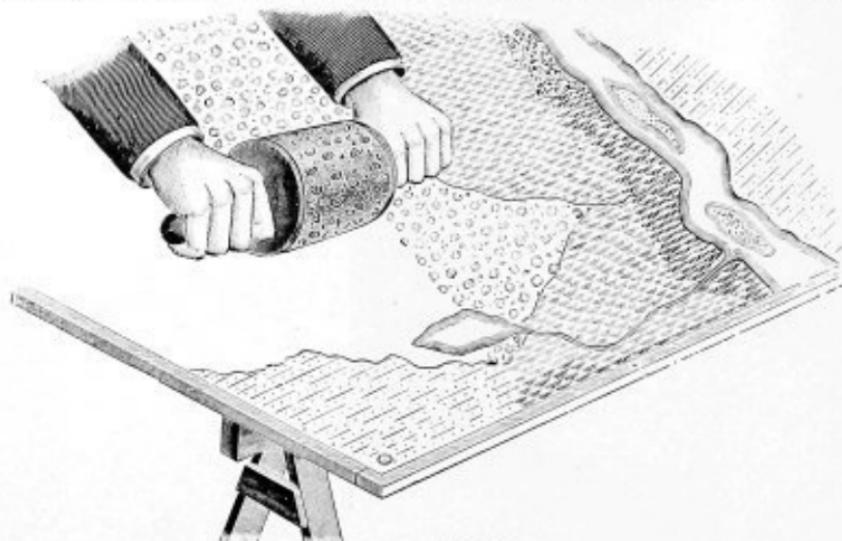


This simple instrument is designed to supersede pen work in all kinds of lettering on plans, drawings and maps. It is indispensable in the office of any engineer, architect or draughtsman who appreciates good work at moderate cost. Every one who has had anything to do with maps or plans knows how easy it is to spoil a good drawing with bad lettering. Experts in lettering are rare, and even with the best workmen the process is exceedingly slow and tedious. With this instrument the novice can do lettering of all kinds, which in quantity and quality will prove satisfactory to the most exacting. It has been adopted on the United States Surveys of the Mississippi and Missouri Rivers and the United States Coast Survey after a most thorough test on a large amount of work, and pen lettering has been almost entirely abandoned. Any style or size of letters or figures, from  $\frac{1}{16}$  of an inch to  $\frac{3}{4}$  of an inch high, may be selected from a catalogue of any type founder containing several hundred different varieties. Words that are frequently repeated, such as "Plan of," "Section of," "Map of," etc., etc., can be prepared on one block, in such form as may be desired. Type-holder is  $2\frac{1}{2}$  inches long.

The cost of type will of course depend on the amount and kind required, and will range from two dollars up. For the largest office a full complement of type would hardly cost as much as the wages of a draughtsman for ten days, while the cost of the entire outfit would be saved in a very short time.

The style of lettering adopted by an individual firm can, by the selection of type, be made to be quite as distinctive as the style of the drawings themselves.

No.  
3560—Lettering Device, with ink roller, plate and ink. . . . . \$20.00

**OCKERSON'S TOPOGRAPHICAL MAPPING DEVICE.**

Patent applied for.

Topographical Mapping Device, showing manner of working, and Map partially finished.

A superior quality of topographical mapping can be easily and cheaply executed by use of our mechanical devices for printing conventional signs on original maps.

It has been adopted and is in constant use on the Topographical and Hydrographical Survey of the Mississippi River now being made by the United States Government, by which over 3,000 square miles have already been mapped on 260 Antiquarian sheets (size 31x53).

The time saved with its use in making drawings of even moderate extent is diminished to a most wonderful extent; the saving in cost is fully 60 to 75 per cent. over that of the old method with the pen. The draughtsman does not need to be a topographical expert, as any one can work the device. Its use secures a uniformity in a series of maps that is almost impossible to obtain even by the most expert draughtsman. A trial on one map will convince the most exacting that it will accomplish what we claim for it, and it is now being rapidly adopted by the engineer officers of the United States Army, who have seen the work it accomplishes. After completion the map made with it is ready for reduction by any of the photographic or other methods.

Attention is also called to the fact that the original map may be transferred directly to the stone and printed without any intermediate steps such as are usually required. This is accomplished by using lithographic transfer ink on the regular transfer paper for the original sheet.

The execution of 36 square inches or more of sand bar, which in the old method by pen must be made dot by dot, can with this device be executed in one minute.

The following signs adopted by the United States Surveys are already in stock and can be supplied on short notice.

Any other sign that may be desired can be made to order.

**For styles, see pages 263-264.**

Samples of Conventional Signs for Original Maps, as printed by

## SIGN PRINTING DEVICE.

Designed and Invented by J. A. Ockerson.



**1**  
Meadow



**2**  
Grass (thin)



**3**  
Grass (heavy)



**4**  
Sage Brush and  
Grass



**5**  
Weeds and Grass



**6**  
Marsh



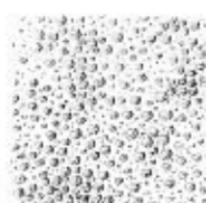
**7**  
Stumps, Trees  
and Grass



**8**  
Trees and Grass  
(heavy)



**9**  
Trees and Grass  
(thin)



**10**  
Brush or Willow



**11**  
Woods (thin)



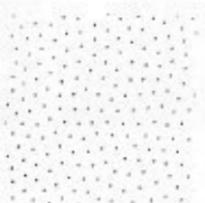
**12**  
Woods (heavy)



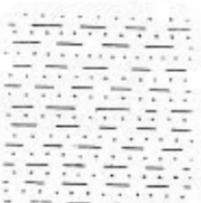
**13**  
Sugar Cane



**14**  
Cotton



**15**  
Sand



**16**  
Cultivated

See Page 264 for Prices.

## SAMPLES OF CONVENTIONAL SIGNS AS PRINTED BY SIGN PRINTING DEVICE.



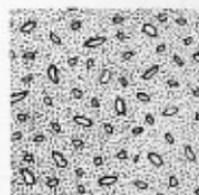
17

Cypress Swamp



18

Cypress



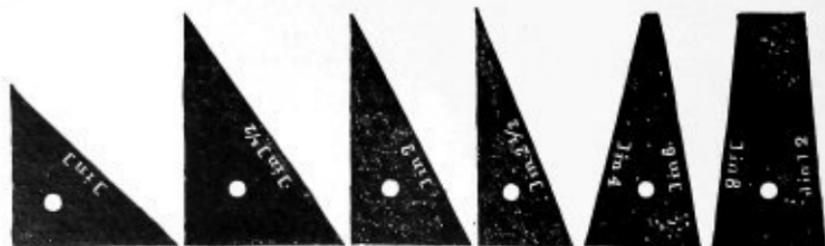
19

Coal

## PRICES OF SIGN PRINTING DEVICE.

One Sign of any style, illustrated from Nos. 1 to 25, on rollers. . . . .	each, \$ 15.00
A set of seven Signs of any design, from Nos. 1 to 25 complete, in box to hold signs, ink plate, ink and a set of universal handles. . . . .	100.00
Any additional Sign, as illustrated, can be included in the above set at additional cost of each. . . . .	15.00
We can make any special Sign required if drawings are furnished us.	
First one, \$35.00; duplicate, \$15.00 each. If we supply the drawing, a cost of \$10.00 to \$20.00 extra, according to the amount of work done on drawing.	
A set of Universal Handles. . . . .	2.50

## ROOF PITCHES AND EMBANKMENT TRIANGLES.



No. 3564.

- No.  
3562—Transparent Amber Roof Pitches, 6 in set, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7. . . . . per set, \$3.00  
3564—Transparent Amber Triangles for Embankments, 8 slopes. . . per set, 4.50

## STANDARD METALLIC RAILROAD CURVES. C



Patented Nov. 21, 1893.

These Curves are made of thickest sheet zinc and are cut by machine, guaranteeing absolute accuracy. The Metallic Curves are cut the same radius on both edges and are carefully beveled on the edges so as to avoid any danger of blotting when used with ink.

Standard Set Metallic Curves, 100 in set, stamped with radius in inches, as follows:

2	4 1/2	7	9 1/2	12	16 1/2	21 1/2	28	38	70
2 1/4	4 3/4	7 1/4	9 3/4	12 1/4	17	22	29	40	80
2 1/2	5	7 1/2	10	12 1/2	17 1/2	22 1/2	30	42	90
2 3/4	5 1/4	7 3/4	10 1/4	13	18	23	31	44	100
3	5 1/2	8	10 1/2	13 1/2	18 1/2	23 1/2	32	46	120
3 1/4	5 3/4	8 1/4	10 3/4	14	19	24	33	48	140
3 1/2	6	8 1/2	11	14 1/2	19 1/2	24 1/2	34	50	160
3 3/4	6 1/4	8 3/4	11 1/4	15	20	25	35	55	200
4	6 1/2	9	11 1/2	15 1/2	20 1/2	26	36	60	240
4 1/4	6 3/4	9 1/4	11 3/4	16	21	27	37	65	300

No.	Per Set
3564 1/2—Per set of 100 Curves, as above.....	\$29.00
3564 1/2 A—Metallic Curves, 75 in set, as selected from list above.....	23.00
3564 1/2 B—Metallic Curves, 50 in set, as selected from list above.....	17.50
3564 1/2 C—Metallic Curves, 25 in set, as selected from list above.....	10.00

## CURVES STAMPED IN DEGREES AND INCHES TO 100-FOOT SCALE.

Standard Set Metallic Curves, 102 in set, as follows:

0° 15' = 229.18	2° = 28.65	4° 10' = 13.75	7° 30' = 7.64	11° 45' = 4.88	17° = 3.38
0° 20' = 171.89	2° 10' = 26.45	4° 15' = 13.48	7° 45' = 7.40	12° = 4.78	17° 30' = 3.29
0° 25' = 137.51	2° 15' = 25.47	4° 20' = 13.23	8° = 7.17	12° 15' = 4.69	18° = 3.20
0° 30' = 114.59	2° 20' = 24.56	4° 30' = 12.74	8° 15' = 6.95	12° 30' = 4.59	18° 30' = 3.11
0° 35' = 98.22	2° 30' = 22.92	4° 40' = 12.28	8° 30' = 6.75	12° 45' = 4.50	19° = 3.03
0° 40' = 85.94	2° 40' = 21.49	4° 45' = 12.07	8° 45' = 6.55	13° = 4.42	19° 30' = 2.95
0° 45' = 76.39	2° 45' = 20.84	4° 50' = 11.86	9° = 6.37	13° 15' = 4.33	20° = 2.88
0° 50' = 68.76	2° 50' = 20.22	5° = 11.46	9° 15' = 6.20	13° 30' = 4.25	21° = 2.74
0° 55' = 62.60	3° = 19.10	5° 15' = 10.92	9° 30' = 6.04	13° 45' = 4.18	22° = 2.62
1° = 57.30	3° 10' = 18.10	5° 30' = 10.42	9° 45' = 5.88	14° = 4.10	23° = 2.51
1° 10' = 49.11	3° 15' = 17.63	5° 45' = 9.97	10° = 5.74	14° 15' = 4.03	24° = 2.40
1° 15' = 45.84	3° 20' = 17.19	6° = 9.55	10° 15' = 5.60	14° 30' = 3.96	25° = 2.31
1° 20' = 42.97	3° 30' = 16.37	6° 15' = 9.17	10° 30' = 5.45	14° 45' = 3.90	26° = 2.22
1° 30' = 38.20	3° 40' = 15.63	6° 30' = 8.82	10° 45' = 5.34	15° = 3.83	27° = 2.14
1° 40' = 34.38	3° 45' = 15.28	6° 45' = 8.49	11° = 5.22	15° 30' = 3.71	28° = 2.07
1° 45' = 32.74	3° 50' = 14.95	7° = 8.19	11° 15' = 5.10	16° = 3.59	29° = 2.00
1° 50' = 31.25	4° = 14.33	7° 15' = 7.91	11° 30' = 4.99	16° 30' = 3.48	30° = 1.93

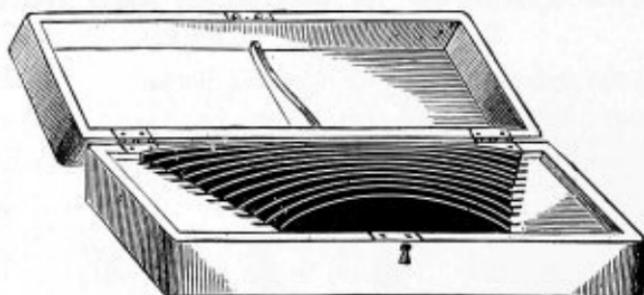
No.	Per Set
3564 3/4 Per set of 102 Curves as above.....	\$31.00
3564 3/4 A—Metallic Curves, 75 in set, as selected from list above.....	\$25.00
3564 3/4 B—Metallic Curves, 50 in set, as selected from list above.....	19.00
3564 3/4 C—Metallic Curves, 25 in set, as selected from list above.....	11.00
Separate Metallic Curves, selected from above lists.....each,	.60

## HARD RUBBER AND TRANSPARENT AMBER RAILROAD CURVES.



No. 3570.

- No.
- 3570—Hard Rubber Railroad Curves, 10 in set, viz.: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120-inch radius, in wooden box . . . . .per set, \$6.50
- 3570A—Transparent Amber Railroad Curves, same as No. 3570 . . .per set, 9.50
- 3571—Hard Rubber Railroad Curves, 17 in set, viz.: 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60-inch radius, in wooden box . . . . .per set, 12.00
- 3571A—Transparent Amber Railroad Curves, same as No. 3571 . . .per set, 15.00
- 3572—Hard Rubber Railroad Curves, 40 in set, 3-120 inch radius, viz.: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 66, 72, 78, 84, 96, 102, 108, 114, 120 inches radius, and 1 curve 1° to 100 feet scale=57.30 inches; 1 curve 2° to 100 feet scale=28.65 inches, in wooden box . . .per set, 25.00
- 3572A—Transparent Amber Railroad Curves, same as No. 3572 . . .per set, 35.00



No. 3575.

- No.
- 3575—Hard Rubber Railroad Curves with Tangent, 55 in set, viz.: 3, 3½, 4, 4½, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 32, 34, 35, 36, 38, 40, 45, 50, 55, 60, 65, 70, 75, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200-inch radius, in wooden box . . . . .per set, \$40.00
- 3575A—Transparent Amber Railroad Curves, same as No. 3575 . . .per set, 55.00
- |  |            |
|--|------------|
| Single Rubber Railroad Curve . . . . .                         | each, .80  |
| Single Rubber Railroad Curve with tangent . . . . .            | each, 1.00 |
| Single Transparent Amber Railroad Curve . . . . .              | each, 1.00 |
| Single Transparent Amber Railroad Curve with tangent . . . . . | each, 1.20 |



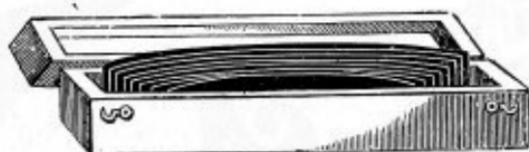
No. 3576.

No.  
3576—Hard Rubber Railroad Curves, with Tangent, 41 in set, marked in degrees and inches to 100 feet scale, viz.:

0°.30' = 114.59 in.	3°.30' = 16.37 in.	6°.00' = 9.55 in.	8°.30' = 6.75 in.
1°.00' = 57.30 "	3°.45' = 15.28 "	6°.15' = 9.17 "	8°.45' = 6.55 "
1°.15' = 45.84 "	4°.00' = 14.33 "	6°.30' = 8.82 "	9°.00' = 6.37 "
1°.30' = 38.20 "	4°.15' = 13.48 "	6°.45' = 8.49 "	9°.15' = 6.20 "
1°.45' = 32.74 "	4°.30' = 12.73 "	7°.00' = 8.19 "	9°.30' = 6.04 "
2°.00' = 28.65 "	4°.45' = 12.07 "	7°.15' = 7.91 "	9°.45' = 5.88 "
2°.15' = 25.47 "	5°.00' = 11.46 "	7°.30' = 7.64 "	10°.00' = 5.74 "
2°.30' = 22.92 "	5°.15' = 10.92 "	7°.45' = 7.40 "	10°.30' = 5.48 "
2°.45' = 20.84 "	5°.30' = 10.42 "	8°.00' = 7.17 "	11°.00' = 5.22 "
3°.00' = 19.10 "	5°.45' = 9.97 "	8°.15' = 6.95 "	11°.30' = 4.99 "
3°.15' = 17.63 "			

No.  
3576—Hard Rubber Curves with Tangent 41 in set as above in wooden box with partition.....per set, \$30.00  
3576A—Transparent Amber Railroad Curves, same as No. 3576..per set, 40.00

## PEARWOOD RAILROAD CURVES.



No. 3580.

No.  
3580—Pearwood Railroad Curves, 10 in set, 12 to 120-inch radius, viz.:  
12, 24, 36, 48, 60, 72, 84, 96, 108, 120-in., in wooden box...per set, \$3.50  
3581—Pearwood Railroad Curves, 17 in set, 12 to 60-inch radius, viz.:  
12, 15, 18, 21, 24, 27, 30, 34, 36, 39, 42, 45, 48, 51, 54, 57,  
60-inch, in wooden box.....per set, 6.00  
3582—Pearwood Railroad Curves, 43 in set, 3 to 200-inch radius, viz.:  
3, 3½, 4, 4½, 5, 5½, 6, 6½, 7, 7½, 8, 8½, 9, 9½, 10, 12, 14, 16,  
18, 20, 22, 24, 27, 30, 33, 36, 39, 42, 48, 54, 60, 66, 72, 78, 84,  
90, 100, 110, 120, 130, 140, 160, 180, 200-inch, in wooden  
box .....per set, 12.00  
Pearwood Railroad Curves of any desired radius cut to order...ea., .60

**SPLINES.**

Nos. 3589-3591.

No.	Size,	24	30	36	42	48	60 inch.
3589—Transparent Amber Splines	each,	\$0.40	.45	.55	.60	.65	
3590—Hard Rubber Splines	.....each,	.30	.35	.40	.50	.60	
3591—Wood Splines	.....each,	.20	.25	.30	.35	.40	.50



No. 3595.

No.	3595—Weights for Splines about 4-lbs.	.....each,	\$0.85
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**COMBINATION CURVES.**

No. 3596



No. 3597



No. 3599

No.	3596—Combination Curve of transparent amber	.....each,	\$1.80
	3597—Combination Curve of transparent amber	.....each,	1.00
	3599—Logarithmic Spiral Curve of transparent amber	.....each,	1.75

## ADJUSTABLE CURVE RULES.

These tools are intended for drawing irregular curves, each tool combines every form of curve in one, and can be instantly adjusted and retained to any form.

No. 3600 is provided with a flexible ruling edge, which is cylindrical in cross section, so that by slightly inclining the pen or pencil, two or more parallel lines can be drawn without moving the ruler.

The ruling edge is held to the required curve by a strip of pure drawn lead, which is covered by sleeves, and slides between two ribbons of tempered steel back of the ruling edge. The lead will last a very long time, and can be replaced if it becomes worn by continued use. An extra lead costs 12 cents.

No. 3601 is provided with a ruling edge consisting of a thin flat band A, of tempered steel; it has sleeves at the back to receive the retaining coil B, this coil holds the ruling edge to any required curve. It consists of a cylinder of pure lead, wound with a plated wire spiral, and is held in place by a set screw at the center of the tool.

The construction of these tools insures a smooth and uniform curve without kinks or breaks.



No. 3600—Adjustable Curve Rule, whole length 14½ inches. . . . . each, \$2.25



No. 3601—Adjustable Curve Rule, whole length 30 inches. . . . . each, \$3.30



No. 3602—Adjustable Curve Rule, whole length 12 inches. . . . . \$1.00

3603—Adjustable Curve Rule, whole length 24 inches. . . . . 1.75



No. 3604. Has two ruling edges, one square, the other round. It can be bent and retained to any shape.

All its exposed surfaces from end to end are of black rubber, with no metallic clips to bunch out the ruling edge.

This tool is very flexible and is considered one of the best Adjustable Curves yet placed on the market.

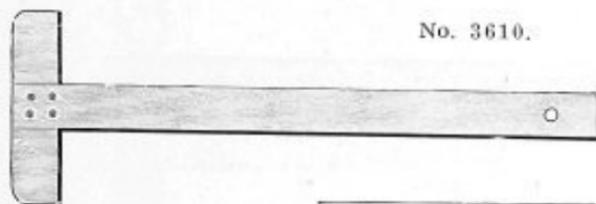
No. 3604—A, Adjustable Curve Rule, whole length 7 inches. . . . . \$0.42  
 3604—B, Adjustable Curve Rule, whole length 15 inches. . . . . .87  
 3604—C, Adjustable Curve Rule, whole length 31 inches. . . . . 1.70

## IRREGULAR CURVES OF PEARWOOD AND TRANSPARENT AMBER.

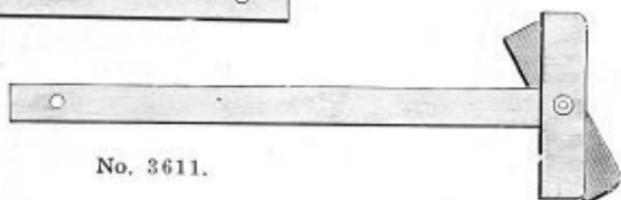


No.													
3605—Pearwood Curves, first quality:													
Number	.....1	2	3	4	5	6	7	8	9	10	11	12	
Each	.....\$0.15	.20	.20	.20	.20	.15	.20	.20	.20	.15	.20	.15	
Number	....13	14	15	16	17	18	19	20	21	22	23	24	25
Each	....\$0.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.30	.30	.35
3607—Transparent "Amber" Curves:													
Number	.....1	2	3	4	5	6	7	8	9	10	11	12	
Each	.....\$0.40	.40	.40	.40	.40	.40	.45	.45	.45	.50	.50	.40	
Number	....13	14	15	16	17	18	19	20	21	22	23	24	25
Each	....\$0.60	.60	.65	.60	.85	.85	.85	.90	.85	.90	.90	1.05	1.50

## T SQUARES.

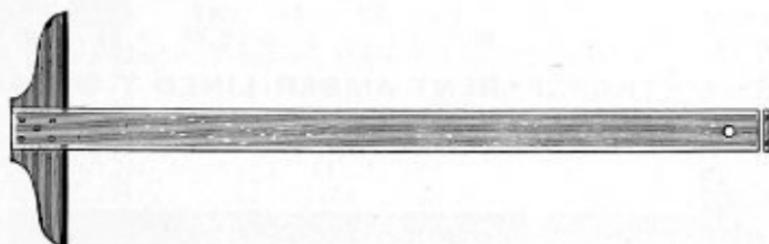


No. 3610.



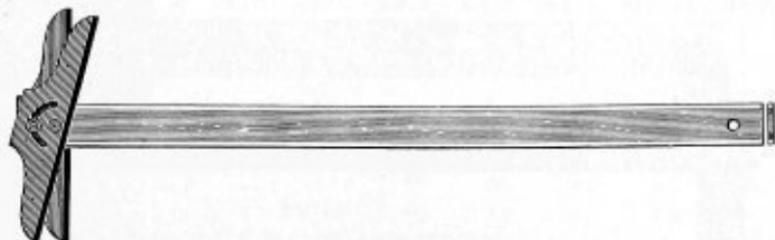
No. 3611.

No.										
3610—	Pearwood, well seasoned, fixed heads, first quality:									
Inches	15	18	21	24	30	36	42	48	60	
Each	\$0.15	.20	.25	.30	.35	.40	.45	.65	1.15	
3611—	Pearwood, shifting head:									
Inches	15	18	21	24	30	36	42	48	60	
Each	\$0.55	.60	.65	.75	.80	.90	1.00	1.20	1.60	



No. 3615.

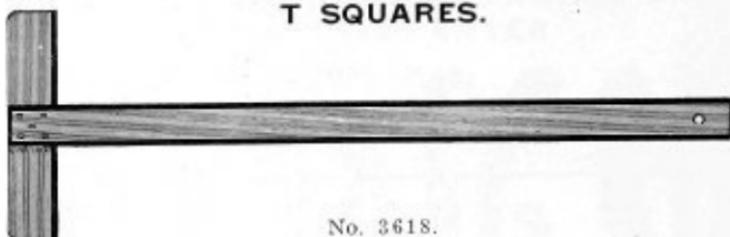
No.										
3615—	Hardwood Lined Blade, black walnut fixed head:									
Inches	24	30	36	42	48	54	60	72		
Each	\$0.70	0.85	1.00	1.20	1.45	1.70	2.25	2.75		



No. 3616.

No.										
3616—	Hardwood lined Blade, black walnut shifting double head, with fine two brass milled head swivels:									
Inches	24	30	36	42	48	54	60	72		
Each	\$1.35	1.50	1.65	1.85	2.10	2.50	3.00	4.00		

## T SQUARES.

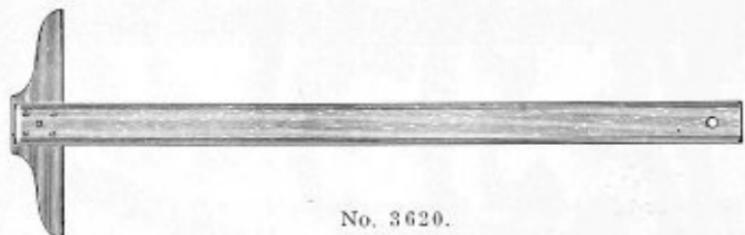


No.	No. 3618.								
3618	—Mahogany head and blade, ebony lined, fixed head:								
Inches	18	24	30	36	42	48	54	60	
Each	\$0.75	0.90	1.10	1.25	1.50	1.75	2.10	2.50	

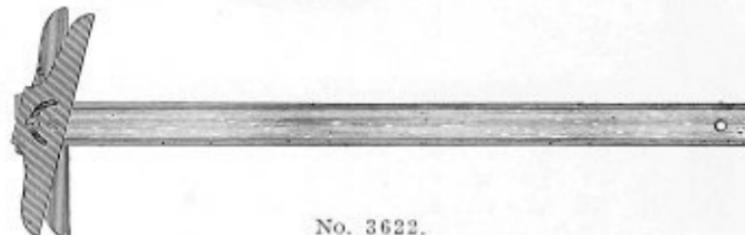


No.	No. 3621.								
3621	—Mahogany head and blade, ebony lined, shifting double head, with two fine brass milled head swivels:								
Inches	24	30	36	42	48	54	60		
Each	\$1.75	2.00	2.25	2.50	2.80	3.25	3.75		

## IMPROVED TRANSPARENT AMBER LINED T SQUARES.



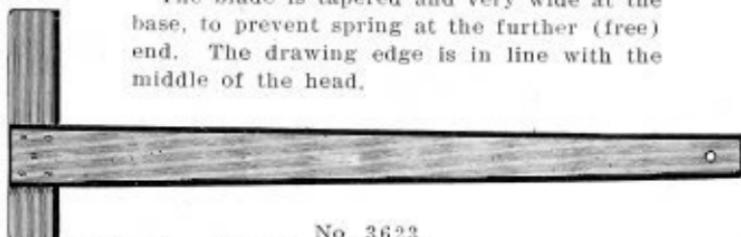
No.	No. 3620.								
3620	—Transparent Amber lined, Maple Blade, Black Walnut fixed Head:								
Size ..	15	18	24	30	36	42	48	54	60 in.
Each	\$1.00	1.10	1.50	1.85	2.15	2.50	3.00	4.00	5.00



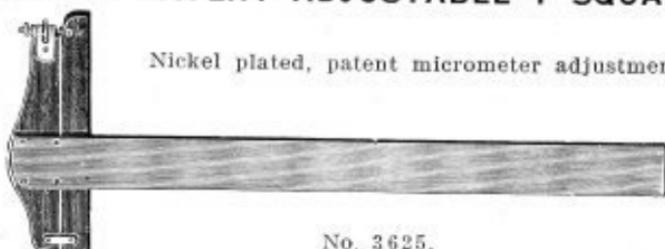
No.	No. 3622.								
3622	—Transparent Amber lined, Maple Blade, Black Walnut Shifting double Head, with two nickel plated milled head swivels. The 18 in. squares have one swivel:								
Size	18	24	30	36	42	48	54	60 in.	
Each	\$1.90	2.45	2.80	3.20	3.60	4.20	5.25	6.25	

**T SQUARES.**

The blade is tapered and very wide at the base, to prevent spring at the further (free) end. The drawing edge is in line with the middle of the head.

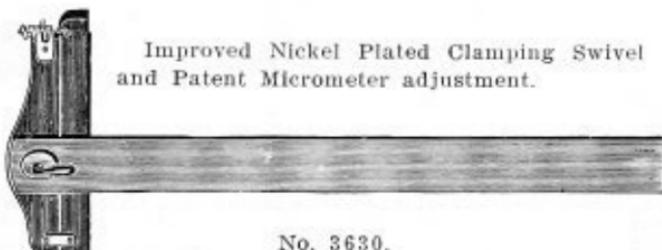


No.	No. 3623.						
3623—Mahogany head and blade, tapered, ebony lined, fixed head:							
Inches .....	30	36	42	48	54		
Each .....	\$1.10	1.25	1.45	1.70	2.00		

**DEANE'S PATENT ADJUSTABLE T SQUARES.**

Nickel plated, patent micrometer adjustment.

No.	No. 3625.						
3625—Deane's Limited T Square, Maple Blade, Walnut Head:							
Inches .....	24	30	36	42	48	54	60
Each .....	\$1.20	1.35	1.50	1.60	1.75	2.25	2.50
3626—Deane's Limited T Square, Ashwood Blade, Maple Lined Walnut Head:							
Inches .....	24	30	36	42	48	54	60
Each .....	\$1.50	1.65	1.75	2.00	2.25	2.50	3.00
3627—Deane's Limited T Square, Mahogany Blade and Head, Ebony Lined:							
Inches .....	24	30	36	42	48	54	60
Each .....	\$1.70	1.95	2.15	2.40	2.65	2.90	3.50



Improved Nickel Plated Clamping Swivel and Patent Micrometer adjustment.

No.	No. 3630.						
3630—Deane's Unlimited T Square, Maple Blade, Walnut Head:							
Inches .....	24	30	36	42	48	54	60
Each .....	\$1.70	1.90	2.10	2.25	2.50	2.75	3.00
3631—Deane's Unlimited T Square, Ashwood Blade, Maple Lined Walnut Head:							
Inches .....	24	30	36	42	48	54	60
Each .....	\$2.15	2.25	2.35	2.50	2.75	3.00	3.50
3632—Deane's Unlimited T Square, Mahogany Head and Blade, Ebony Lined:							
Inches .....	24	30	36	42	48	54	60
Each .....	\$2.50	2.65	2.85	3.10	3.30	3.75	4.25

## PROTRACTOR OR "CLIMAX" T SQUARES.

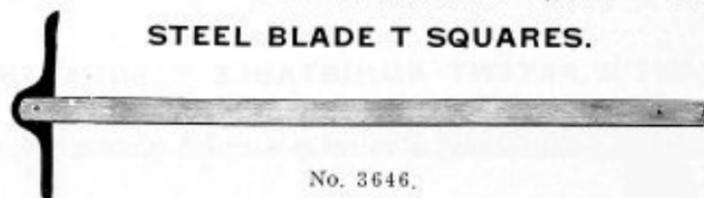


No. No. 3635.

3635—Mahogany, ebony lined blades and head; polished, nickel mountings:

Inches .....	30	36	42
Each .....	\$5.50	6.00	7.00

## STEEL BLADE T SQUARES.



No. 3646.

No. Steel Blade, nickel plated, fixed japanned Iron Head.

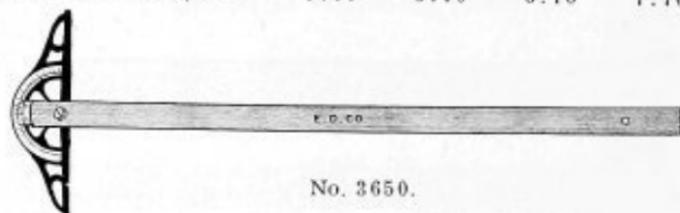
3646—Size .....	18	24	30	36	42	48 in.
Width .....	1 1/4	1 1/4	1 1/2	1 1/2	1 3/4	1 3/4 in.
Thickness .....	1/18	1/18	1/16	1/16	1/14	1/14 in.
Each .....	\$3.00	3.50	4.50	5.50	6.50	8.50



No. 3647.

No. Steel Blade, nickel plated, movable japanned Iron Head.

3647—Size .....	18	24	30	36	42	48 in.
Width .....	1 1/4	1 1/4	1 1/2	1 1/2	1 3/4	1 3/4 in.
Thickness .....	1/18	1/18	1/16	1/16	1/14	1/14 in.
Each .....	\$4.25	5.00	5.70	6.70	7.70	9.75



No. 3650.

Protractor T Square, Steel Blade, nickel plated, shifting Head  
with Protractor divided to half degrees, Vernier  
on end of blade reading to minutes.

No. <span style="float: right;">3650—</span>	Size .....	24	30	36	42 in.
	Width .....	1 1/4	1 1/2	1 1/2	1 3/4 in.
	Thickness .....	1/18	1/16	1/16	1/14 in.
	Each .....	\$8.50	9.50	10.50	11.50

## STRAIGHT-EDGES.



No.

3655—Steel straight-edges, one edge beveled, the other square, nickel-plated:

Inches	18	24	30	36	42	48	60	72
Each	\$1.85	2.85	3.80	4.75	6.20	7.50	10.25	14.00

3656—Steel straight-edges, extra heavy, one edge beveled, the other square, nickel-plated:

Inches	18	24	30	36	42	48	60	72
Each	\$2.00	3.00	4.00	5.00	6.50	8.00	11.00	15.00



3661—Cherry, beveled edge, thick:

Inches	18	24	30	36	42	48
Each	\$0.20	.25	.30	.40	.50	.75



No. 3662.

3662—Hardwood lined, square edges, thin:

Inches	24	30	36	42	48	54	60	72
Each	\$0.35	.45	.60	.75	1.00	1.20	1.50	2.00



No. 3663.

3663—Mahogany, ebony lined, square edges:

Inches	24	30	36	42	48	54	60	72
Each	\$0.50	.60	.80	1.00	1.35	1.60	2.00	2.75

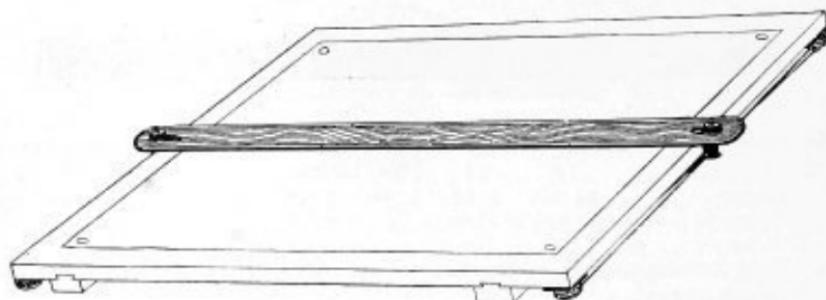


No. 3665.

3665—Transparent "Amber" Lined Straight-Edges, square edges:

Inches	18	24	30	36	42	48
Each	\$0.75	1.00	1.25	1.50	1.80	2.20

## PARALLEL RULING ATTACHMENTS.



No. 3668.

Our Attachments are of simple construction, neat in appearance, consisting of perfectly constructed brass wheels, mounted on plates, with best quality braided silk line or wire, and a perfect clamping device for clamping same to straight edge. They are easily attached to any drawing board having ledges beneath, or on any frame having an opening into which a drawing board can be placed.

We furnish the Attachments with or without Straight Edge.

### Attachments Only.

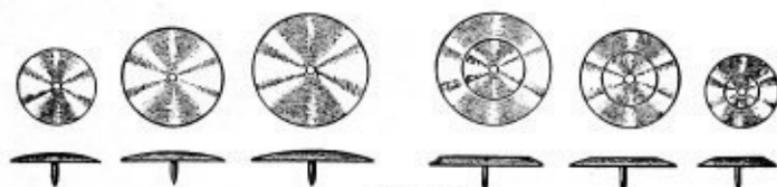
No.		24	31	42	55	60 in. long
3667—	For Drawing Boards.....	24	31	42	55	60 in. long
	Attachments .....	each, \$4.00	4.10	4.25	4.40	4.50

### Straight Edges and Attachments.

No.		24	31	42	55	60 in. long
3668—	For Drawing Boards.....	24	31	42	55	60 in. long
	Attachments with Hardwood					
	Lined Straight Edge...each,	\$4.50	4.90	5.40	6.10	6.75
3669—	Attachments with Mahogany					
	Ebony Lined St. Edge...each,	4.75	5.15	5.75	6.70	7.25
3669½—	Attachments with Transparent					
	Amber Lined St. Edge...each,	5.50	6.00	6.75	8.50	9.50

In ordering Attachments, please state thickness of board and in ordering Straight Edges state exact length of board.

For Drawing Boards see pages 302 to 313.

**THUMB TACKS.**

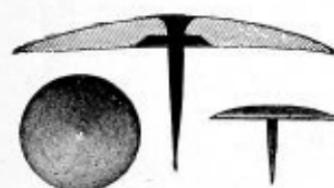
Nos. 3671-3679.

**"ACME" FINE GERMAN SILVER TACKS.**

Steel Points, Screwed in and Riveted.

The "Acme" Thumb Tacks are made by hand with great care. They have best hardened steel pins nicely proportioned in thickness and length, so as not to bend, which are **SCREWED** and riveted into German silver heads with fine thin edges, offering no obstruction to T square or triangle to slide over.

No.	
3671—	German Silver, round head, 7/16-inch diameter . . . . . per doz. \$0.50
3672—	German Silver, round head, 1/2 -inch diameter . . . . . per doz. .60
3673—	German Silver, round head, 9/16-inch diameter . . . . . per doz. .70
3674—	German Silver, round head, 5/8 -inch diameter . . . . . per doz. .80
3676—	German Silver, beveled head, 7/16-inch diameter . . . . . per doz. .50
3677—	German Silver, beveled head, 1/2 -inch diameter . . . . . per doz. .60
3678—	German Silver, beveled head, 9/16-inch diameter . . . . . per doz. .70
3679—	German Silver, beveled head, 5/8 -inch diameter . . . . . per doz. .80

**"PERFECTION" GERMAN SILVER TACKS.**

No. 3680.

The "Perfection" Tack, as shown in the cut, is made on an entirely new principle, preventing as it does, the pin from coming through the head, as the old style riveted head tack was liable to do. The pins are of steel and well made; the heads are German silver, with fine edges. We can recommend them as a good tack at a moderate price.

No.	
3681—	German Silver, round head, 7/16-inch diameter . . . . . per doz. \$0.30
3682—	German Silver, round head, 1/2 -inch diameter . . . . . per doz. .35
3683—	German Silver, round head, 9/16-inch diameter . . . . . per doz. .40
3684—	German Silver, round head, 5/8 -inch diameter . . . . . per doz. .45
3686—	German Silver, beveled head, 7/16-inch diameter . . . . . per doz. .30
3687—	German Silver, beveled head, 1/2 -inch diameter . . . . . per doz. .35
3688—	German Silver, beveled head, 9/16-inch diameter . . . . . per doz. .40
3689—	German Silver, beveled head, 5/8 -inch diameter . . . . . per doz. .45
3692—	Brass, round head, 3/8 -inch diameter . . . . . per doz. .15
3694—	Brass, round head, 1/2 -inch diameter . . . . . per doz. .20
3696—	Brass, round head, 5/8 -inch diameter . . . . . per doz. .25

**STEEL STAMPED TACKS.**

Nos. 3697-3699.

Made of one piece of steel. A portion of the head forming the pin.

No.			
3697—	Round head, 5/16-inch diameter, box of 100,	\$0.40 . . . . .	per doz., \$0.07
3698—	Round head, 3/8-inch diameter, box of 100,	.50 . . . . .	per doz., .08
3699—	Round head, 1/2-inch diameter, box of 100,	.60 . . . . .	per doz., .10
3699 1/2—	Round head, 5/8-inch diameter, box of 100,	.75 . . . . .	per doz., .12

**"SOLIDHED" STEEL THUMB TACKS.**

With strong steel head; pins warranted not to break through; very durable and highly finished.

No.			
3700—	Solidhed Steel, 5/16-inch diam., box of 100,	\$0.55 . . . . .	per doz., \$0.08
3701—	Solidhed Steel, 3/8-inch diam., box of 100,	.65 . . . . .	per doz., .10
3702—	Solidhed Steel, 1/2-inch diam., box of 100,	.75 . . . . .	per doz., .12

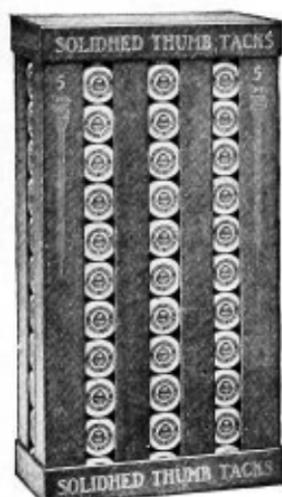
**"SOLIDHED" THUMB TACKS.****Brass and German Silver.**

The "Solidhed" Thumb Tack is strong, because it has a solid head. The head of the pin does not penetrate the top, it is firmly and securely imbedded, making a perfectly solid joint. This method eliminates the danger of injury to the thumb, and prolongs the usefulness of the Tack. Put up 1 dozen on Block, gross boxes.

3700A—	Brass, Round Heads, 3/8-inch diam., gross,	\$1.20 . . . . .	per doz., \$0.12
3701A—	Brass, Round Heads, 1/2-inch diam., gross,	1.50 . . . . .	per doz., .14
3702A—	Brass, Round Heads, 5/8-inch diam., gross,	1.75 . . . . .	per doz., .16
3700B—	German Silver, Round Heads, 3/8-in. diam., gross,	\$1.75, per doz.,	.16
3701B—	German Silver, Round Heads, 1/2-in. diam., g	ross, 2.15, per doz.,	.20
3702B—	German Silver, Round Heads, 5/8-in. diam., gross,	2.60, per doz.,	.25

**'SOLIDHED' THUMB TACKS.**

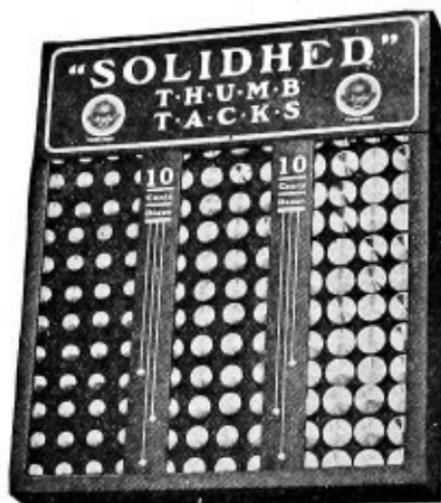
For the convenience of stationers and dealers who carry thumb tacks we are putting up assortments of Tacks in attractive cases, which facilitates the sale of the goods and keeps the stock together.

**Contents**

10 gross  $\frac{3}{8}$ -inch Steel.

The most popular tack for school and low price trade.

No. 3700J—Retail value . . . . \$6.00

**Contents**

12 doz.  $\frac{3}{8}$ -inch Brass.

12 doz.  $\frac{1}{2}$ -inch Brass.

12 doz.  $\frac{5}{8}$ -inch Brass.

No. 3700K—Retail value . . . \$3.60

**Steel, Brass, German Silver and Colors.**

**Contents**

24 doz.  $\frac{5}{8}$ -inch Red, White and Blue.

12 doz.  $\frac{3}{8}$ -inch Red, White and Blue.

12 doz.  $\frac{1}{2}$ -inch German Silver.

12 doz.  $\frac{3}{8}$ -inch Brass.

12 doz.  $\frac{1}{2}$ -inch Brass.

12 doz.  $\frac{5}{8}$ -inch Brass.

12 doz.  $\frac{3}{8}$ -inch Steel.

No. 3700L—Retail value . . . . \$14.40

**Contents**

6 doz.  $\frac{3}{8}$ -inch German Silver, flat.

6 doz.  $\frac{1}{2}$ -inch German Silver, flat.

6 doz.  $\frac{5}{8}$ -inch German Silver, flat.

6 doz.  $\frac{3}{8}$ -inch Brass, flat.

6 doz.  $\frac{1}{2}$ -inch Brass, flat.

6 doz.  $\frac{5}{8}$ -inch Brass, flat.

6 doz.  $\frac{3}{8}$ -inch Brass, bevel.

6 doz.  $\frac{1}{2}$ -inch Brass, bevel.

6 doz.  $\frac{5}{8}$ -inch Brass, bevel.

12 doz.  $\frac{3}{8}$ -inch Steel, flat.

12 doz.  $\frac{7}{16}$ -inch Steel, flat.

12 doz.  $\frac{1}{2}$ -inch Steel, flat.

No. 3700P—Retail value . . . . \$14.42



No. 3700P.

## TACK LIFTERS.



No. 3703.



No. 3704.

- No.  
 3703—Tack Lifter and Paper Knife, nickel-plated, 5  $\frac{3}{4}$ -inch.....each, \$0.20  
 3704—Tack Lifter .....each, .15

## HORN CENTERS.



No. 3705.

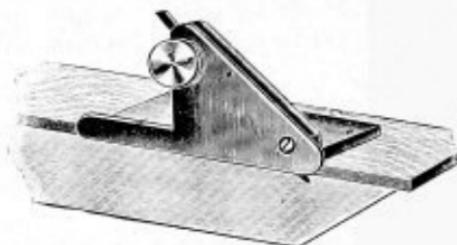


No. 3706.



- No.  
 3705—Horn Center, plain,  $\frac{1}{2}$ -inch diameter.....each, \$0.15  
 3706—Horn Center, plain, with German silver rim,  $\frac{3}{4}$ -inch diam..each, .45

## PAPER CUTTERS.



No. 3707.

- No.  
 3707—Paper Cutter, brass.....each, \$0.50  
 3708—Paper Cutter, nickel-plated.....each, .65

These instruments are used for cutting drawings from the board, also for cutting any kind of paper or bristol board. They can be slid along T-square or straight edge without injuring its edge, and have a thumb-screw adjustment which may be set so as to cut only the thickness of the paper, without marking the drawing board.

## ENGINEERS' STAKE TACKS.



No. 3709C.

A tack of this description furnishes a durable stake or starting point, and assists in quickly and accurately setting the plumb-bob.

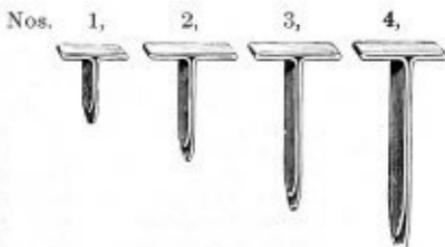
No.

3709A—"Perfection" Engineers' Galvanized Stake Tacks, 5-pound box... \$1.75

3709B—"Perfection" Engineers' Galvanized Stake Tacks, 1-pound box... .40

3709C—"Perfection" Engineers' Galvanized Stake Tacks, box, 2 ounces... .10

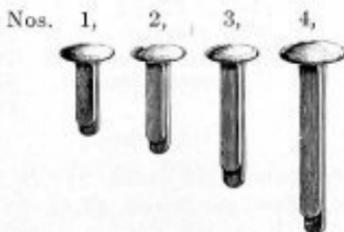
## PAPER FASTENERS.



No.

3710—Paper Fasteners, flat heads:

Number .....	1	2	3	4	5	6
Per box of 100.....	\$0.15	20	25	30	45	55



No.

3711—Paper Fasteners, round heads:

Number .....	1	2	3	4	5	6
Per box of 100.....	\$0.20	25	30	40	55	65

## WINSOR &amp; NEWTON'S WATER COLORS.



Full Pan.



Half Pan.

No.  
**3713** —Whole Pans as listed below, per dozen, \$3.00.....each, **\$0.25**  
**3713 1/2**—Half pans as listed below, per dozen, \$1.65.....each, **.15**

1	Antwerp Blue	16	Emerald Green	30	New Blue
2	Bistre	*17	Flake White	31	Olive Green
3	Blue Black	18	Gamboge	32	Orange Chrome
*4	British Ink	19	Hooker's Green	33	Payne's Grey
5	Brown Ochre		No. 1	34	Prussian Blue
6	Brown Pink	20	Hooker's Green	35	Prussian Green
*7	Bronze		No. 2	36	Raw Sienna
8	Burnt Sienna	21	Indigo	37	Raw Umber
9	Burnt Umber	22	Indian Red	40	Roman Ochre
9 1/2	Charcoal Grey	23	Italian Pink	41	Sap Green
10	Chinese White	24	Ivory Black	42	Terre Verte
10 1/2	Chrome Lemon	*25	King's Yellow	43	Vandyke Brown
11	Chrome Yellow	26	Lamp Black	44	Venetian Red
12	Cologne Earth	27	Light Red	45	Vermilion
14	Deep Chrome	28	Naples Yellow	47	Yellow Lake
15	Dragon's Blood	29	Neutral Tint	48	Yellow Ochre

No.  
**3714** —Whole Pans as listed below, per dozen, \$6.00.....each, **\$0.45**  
**3714 1/2**—Half Pans as listed below, per dozen, \$3.00.....each, **.25**

48 1/2	Alazarin Crimson	52	Crimson Lake	57	Roman Sepia
*49	Black Lead	52 1/2	Indian Yellow	58	Ruben's Madder
50	Brown Madder	54	Mars Yellow	59	Scarlet Lake
50 1/2	Carmine Lake	55	Neutral Orange	60	Scarlet Vermilion
*51	Constant White	55 1/2	Orange Vermillion	61	Sepia
51 1/2	Cerulean Blue	56	Purple Lake	62	Warm Sepia

No.  
**3715** —Whole Pans as listed below, per dozen, \$7.50.....each, **\$0.65**  
**3715 1/2**—Half Pans as listed below, per dozen, \$3.75.....each, **.35**

69	Cadmium Orange	75	Intense Blue	77	Pale Cadmium Yellow
68	Cadmium Yellow	76	Lemon Yellow		
63	Cobalt Blue	87	Mars Orange	77 1/2	Permanent Yellow
63 1/2	Cobalt Green	73	Oxide of Chromium	79	Pure Scarlet
71	French Blue	73 1/2	Permanent Mauve	65	Violet Carmine
74	Indian Purple			81	Viridian

No.  
**3716** —Whole Pans as listed below, per dozen, \$12.75.....each, **\$0.90**  
**3716 1/2**—Half Pans as listed below, per dozen, \$6.38.....each, **.45**

66	Aureolin	85	Field's Orange	82	Purple Madder
91	Aurora Yellow		Vermilion	90	Scarlet Madder
67	Burnt Carmine	86	Madder Carmine	80	Rose Madder
70	Carmine	78	Pink Madder	93	Yellow Carmine
		92	Primrose Aureolin		

**BOURGEOIS' FRENCH WATER COLORS.**

In Glass Pots,

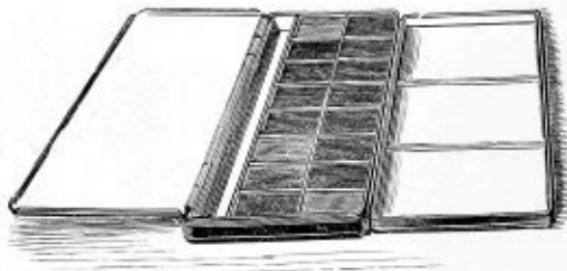


These pots contain more than double the quantity sold in Winsor & Newton's whole pans, at nearly the same price.

They are in a moist state. The artist has but to moisten his brush and slightly rub the colors desired to find that it will readily yield the full richness of its tint.

<b>No. 3718.</b> .....			each, <b>\$0.30</b>
Antwerp Blue,	Gamboge,	Payne's Grey,	
Brown Ochre,	Hooker's Green,	Prussian Blue,	
Burnt Sienna,	Indian Red,	Prussian Green,	
Burnt Umber,	Indigo,	Raw Sienna,	
Chinese White,	Italian Pink,	Raw Umber,	
Chrome Green,	Ivory Black,	Roman Ochre,	
Light Chrome Yellow,	Lamp Black,	Sap Green,	
Medium Chrome Yellow,	Light Red,	Vandyke Brown,	
Deep Chrome Yellow,	Magenta Lake,	Venetian Red,	
Dragon's Blood,	Neutral Tint,	Yellow Ochre,	
Emerald Green,	Olive Green,		
<b>No. 3719.</b> .....			each, <b>\$0.50</b>
Brilliant Yellow,	Light Purple,	Vermillion,	
Celestial Blue,	Luminous Green,	Scarlet Vermillion,	
Crimson Lake,	Sepia,	Light Violet,	
Dark Purple,	Warm Sepia,	Dark Violet,	
<b>No. 3720.</b> .....			each, <b>\$0.75</b>
Brown Madder,	Lacque Ponceau,	Permanent Blue,	
Carthamus Rose,	Mars Brown,	Scarlet Lake,	
Carmine, 2d quality,	Mars Orange,	Turquoise Blue,	
Cerulean,	Mars Violet,	Ultramarine Blue,	
Cypress Green,	Marine Blue,		
<b>No. 3721.</b> .....			each, <b>\$1.00</b>
Cobalt Blue,	Intense Blue,	Lemon Yellow,	
Cadmium Yellow,	Indian Yellow,	Violet Carmine,	
Cadmium Orange,			
<b>No. 3722.</b> .....			each, <b>\$1.25</b>
Carmine, 1st quality,	Rose Madder,	Pure Scarlet,	
No.			
<b>3723</b> —Walnut Boxes for holding 6 pots .....			each, <b>\$0.50</b>
<b>3724</b> —Walnut Boxes for holding 12 pots .....			each, <b>.75</b>

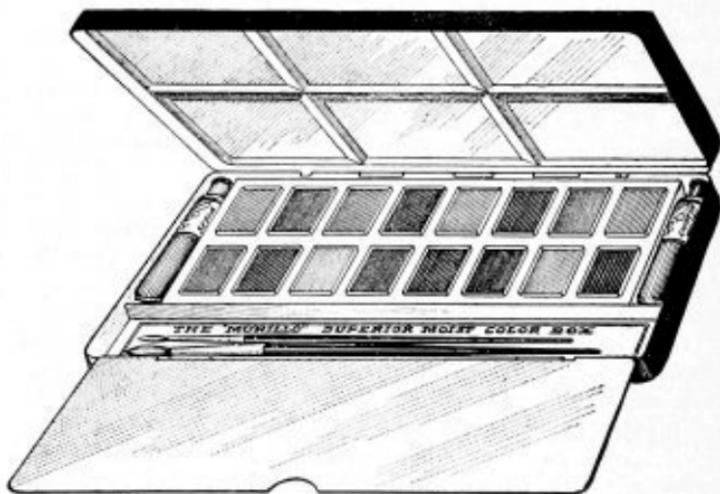
## JAPANNED TIN BOXES FOR MOIST COLORS.



No. 3725.

No.		each,	
3725—	For 6 Whole or 12 Half Pans . . . . .		\$0.80
3726—	For 8 Whole or 16 Half Pans . . . . .		.90
3728—	For 10 Whole or 20 Half Pans . . . . .		1.05
3729—	For 12 Whole or 24 Half Pans . . . . .		1.15
3730—	For 16 Whole or 32 Half Pans . . . . .		1.20
3731—	For 18 Whole or 36 Half Pans . . . . .		1.40
3733—	For 24 Whole or 48 Half Pans . . . . .		1.60

## WATER COLOR BOXES.



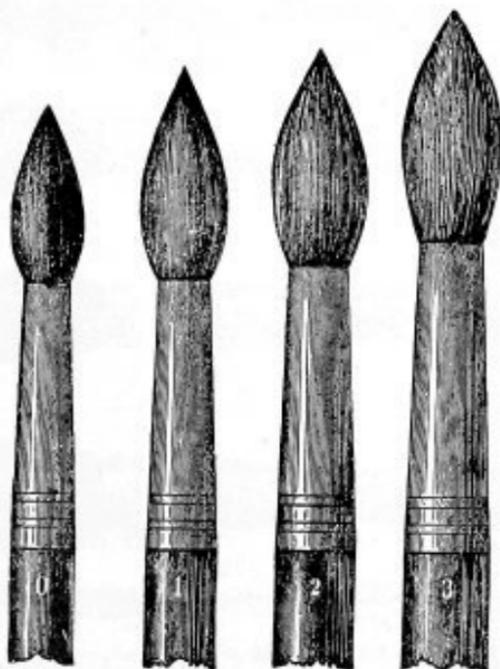
No.		each,	
3740—	Small Murillo Water Color Box, jappaned tin box, $6\frac{1}{2} \times 3\frac{1}{4}$ in., 12 moist colors in metal pans, 1 tube each Chinese White and Sepia, 2 brushes . . . . .		\$0.75
3741—	Murillo Water Color Box, jappaned tin box, $7\frac{1}{2} \times 3\frac{1}{4}$ in., with inside lid, 16 moist colors in metal pans, 1 tube each Chinese White and Sepia, 2 brushes . . . . .		1.00
3742—	Rembrandt Water Color Box, jappaned tin box, $6\frac{1}{4} \times 2\frac{3}{4}$ in., 12 moist colors in metal pans, 2 brushes . . . . .		.50

## CAMEL HAIR BRUSHES.

In Tin  
with Handle:Illustrations  
full size.

No.		Nos.	1	2	3	4	5	6
3750—Camel Hair Brushes.....	Each,	\$0.06	08	08	10	10	12	

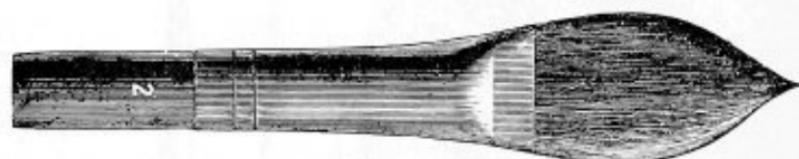
## CAMEL HAIR WASH BRUSHES.



No.				
3754—Camel Hair Sky or Wash Brush, in tin, with polished black handle:	Nos.	0	1	2
	Each	\$0.20	25	30
				35

**ALOE'S CAMEL HAIR SKY BRUSHES.**

Of Siberian Hair, Flat Pointed in Tin, Best Brush for Washing.



No. 3758.

No.				
3758—Nos.	.....	0	1	2
Each	.....	\$0.40	45	50
			60	60

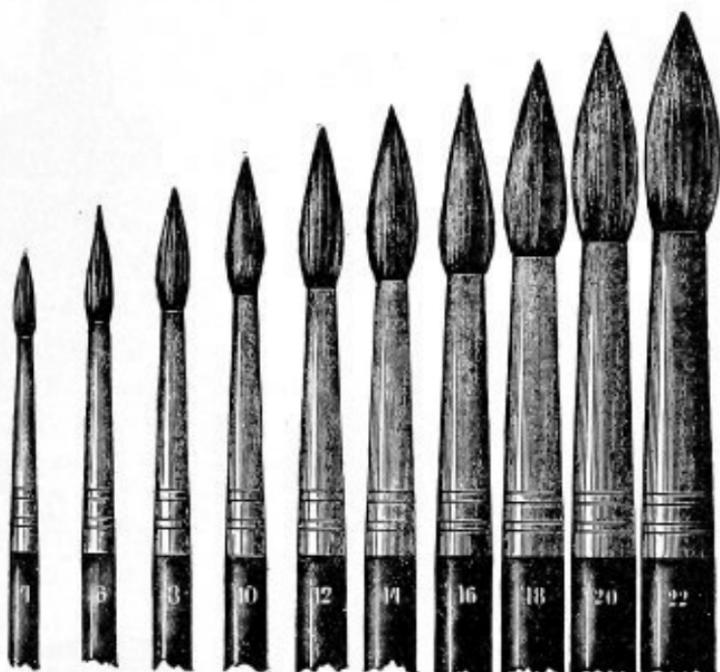
**DOUBLE POINTED CAMEL HAIR WASH BRUSHES.**

No. 3759.

No.				
3759—Camel Hair, in tin, with 2 points:				
Nos.	.....	0	1	2
Each	.....	\$0.45	50	55
3759 1/2—Siberian Hair, in albata, extra quality	.....	55	65	75
			90	90

**SABLE BRUSHES.**

Full Size.



No. 3760.

**BLACK SABLE.**

No.

3760—Black Sable, Round, in Albata, with black handle:

Nos.	1	2	4	6	8	10	12	14	16	18	20	22
Each,	\$0.20	25	30	35	45	55	70	90	1.25	1.75	2.35	3.10

**RED SABLE.**

3761—Red Sable, Round, in Albata, with black handle:

Nos.	1	2	4	6	8	10	12	14	16	18	20	22
Each,	\$0.15	15	20	30	40	50	70	85	1.15	1.45	1.90	2.35

**DOUBLE POINTED RED SABLE.**

No. 3762.

No.

3762—Red Sable, Round, in Albata, with 2 points:

Nos.	1	2
Each	\$1.00	1.25

## WATER COLOR LIQUIDS AND PREPARATIONS.

Winsor & Newton's, in Bottles.



No. 3782.



3794A.

No.	
3780—Asphaltum, liquid.....	each, \$0.30
3781—Carmine.....	each, .30
3782—Chinese White.....	each, .30
3783—Gum Water.....	each, .30
3784—Gold Ink.....	each, .30
3785—Indian Ink, liquid.....	each, .30
3786—Indelible Brown Ink.....	each, .30
3787—Illuminating Body.....	each, .30
3788—Lamp Black, liquid.....	each, .30
3789—Ox Gall, liquid.....	each, .30
3790—Prout's Brown Liquid.....	each, .30
3791—Prussian Blue.....	each, .30
3792—Silver Ink.....	each, .30
3793—Sepia Liquid.....	each, .30
3794—Vermillion.....	each, .30

### Semple's White.

3794A—Semple's White, in jars.....	each, \$0.25
3794B—Semple's White, in ½-lb. jars.....	each, 1.50

### Schoenfeld's Chinese White.

3794C—Schoenfeld Chinese, in jars.....	each, \$0.30
3794E—Holmes' White, in jars.....	each, .25
3794E—Holmes' White, ½-lb. jars.....	each, 1.10



ACTUAL SIZE



**HIGGINS' LIQUID DRAWING INKS.**

No. 3800.

No.	Each.
3795—Higgins' General Black Ink . . . . .	\$0.25
3796—Higgins' Waterproof Violet Ink . . . . .	.25
3797—Higgins' Waterproof Indigo Ink . . . . .	.25
3798—Higgins' Waterproof Vermillion Ink . . . . .	.25
3799—Higgins' Waterproof Brick Red Ink . . . . .	.25
3800—Higgins' Waterproof Black Ink . . . . .	.25
3802—Higgins' Waterproof Scarlet Ink . . . . .	.25
3803—Higgins' Waterproof Orange Ink . . . . .	.25
3804—Higgins' Waterproof Carmine Ink . . . . .	.25
3805—Higgins' Waterproof Green Ink . . . . .	.25
3806—Higgins' Waterproof Yellow Ink . . . . .	.25
3807—Higgins' Waterproof Blue Ink . . . . .	.25
3808—Higgins' Waterproof Brown Ink . . . . .	.25
Any of the above inks in ½-pint bottles . . . . .	2.00
Any of the above inks in 1-pint bottles . . . . .	3.75
Any of the above inks in 1-quart bottles . . . . .	7.00



No. 3810.



No. 3812.

**HIGGINS' ETERNAL INK.**

A fine carbon writing ink for general use. Black when written and eternally remains so. This is a more fluid ink than the engrossing and is better adapted for general writing. It is water-proof.

**HIGGINS' ENGROSSING INK.**

Higgins' Engrossing Ink is a true black, indestructible ink, and is especially adapted for all important writings, records, and for fancy penmanship, card writing, etc.

No.	Per 2-oz. bottle.	Per ½ pint.
3810—Higgins' Black Eternal Ink . . . . .	\$0.10	\$0.35
3812—Higgins' Black Engrossing Ink . . . . .	.20	.60

## DRAFTSMAN'S PEN-FILLING INKSTAND

A base, recessed to receive a standard size (Higgin's type) bottle of drawing ink; a forked brass spring to securely hold the bottle in place; a lever arm, pivoted to the base, having at the one end a dipper and a cover for the bottle, and at the other a rest for the hand. Made of cast iron, japanned. Weight 21 ounces.

It operates with certainty, supplies always the right amount, and the same quantity. Whether the bottle is full or partially emptied the dipper invariably delivers a uniform charge of ink. It positively will not "clog" or refuse to operate. No evaporation, the rubber cap is efficient. Nothing to wear out, noncorrosive. It averts "accidents" as a bottle holder, as its weight prevents readily upsetting. To fill the pen you simply reach for the ink, place hand on the rest to raise the dipper, and the instant the loop is inserted between the blades the pen fills. No wiping after filling. The dipper never fails to place the ink between the blades, and none on the outside. One hand only is used, the other is entirely at liberty to retain its hold of the triangle or tee-square. You can't leave the bottle open. When the hand is taken from the rest the cap automatically closes the bottle.



No.  
3814—Draftsman's Pen Filling Inkstand.....each, \$1.50

## CLOVER INK BOTTLE HOLDER.



Holds Any Drawing Ink Bottle.

The **Clover Ink Stand** is a boon to users of drawing inks, who desire a bottle-holder that is almost impossible to upset or in any way dislodge the bottles held therein.

This **Bottle Holder** adjusts itself to hold the various shapes and sizes of bottles, in which the different manufacturers put up their inks.

The **Clover Ink Stand** can be used with one, two or three bottles of any size, as each bottle is held independently of the others, and by simply opening the clasp spring any of the bottles may be instantly removed.

No.  
3815—Clover Ink Bottle Holder.....each, \$0.50

## THE ALOE BOTTLE-HOLDER.



The utility of the Aloe Holder is apparent from the fact that it absolutely prevents the accidental tipping of ink bottles.

The recess at the edge has a hole for thumb-tack for use on slanting board, to prevent sliding.

The cone shape—rising abruptly from the table—presents a surface upon which paper cannot find lodgment, but instead slides up and over (not under) when it comes in contact.

The bottle projects so that the stopper can be removed when replenishing pen or refilling bottle, in the usual manner, i. e., with the finger and thumb of one hand.

They are handsomely copper oxidized, and will not tarnish.

Diameter  $4\frac{1}{4}$  inches. Height  $1\frac{1}{2}$  inches. Weight 10 ounces.

No.	
3821 $\frac{1}{2}$	—Aloe Bottle Holder, for 1 bottle.....each, \$0.25
3821 $\frac{3}{4}$	—Aloe Bottle Holder, for 2 bottles.....each, .45



## BOURGEOIS' FRENCH LIQUID DRAWING INKS.

A fine drawing ink; flows freely; does not clog the pen.

No.	
3823	—Large size, black.....each, \$0.40
3825	—Medium size, black.....each, .20

No. 2825.

## ALBANINE AND PROCESS BLACK.



3825A.



3825B.

No.

3825A—Albanine, a pure photographic white.....each, \$0.30

3825B—Process Black, a dead black of great density.....each, .30

By the use of these new pigments, Albanine and Process Black, the difficulty hitherto experienced of preserving the true values of the lights in drawings made for process reproduction is entirely obviated.

## LEVISON'S HEKTOGRAPH INKS.



3825F.

No.	1 oz.	2 oz.	Pints.
3825C—Hektograph Ink, Black.....	18	25	200
3825D—Hektograph Ink, Blue.....	18	25	200
3825E—Hektograph Ink, Green.....	18	25	200
3825F—Hektograph Ink, Violet.....	18	25	200
3825G—Hektograph Ink, Red.....	18	25	200

Specify size wanted when ordering.

## "IDEAL" LIQUID WATERPROOF DRAWING INKS.



Our Improved Liquid Waterproof Drawing Inks are made by new processes and formula, the result of a long series of careful scientific experiments. They have stood the most rigid and extended tests and will be found to possess all the desirable features required in a reliable ink for general drafting. They are extremely smooth flowing, contain no chemicals injurious to instruments or drawings, and are kept accurately at a fixed standard of density and quality.

The WATERPROOF BLACK INK is made from the highest grade of pure carbon, of unsurpassed density, flows freely from the pen and even the finest lines produced by it are absolutely opaque. It is perfectly waterproof when dry, so that color washes can be used safely over it.

The COLORED INKS are exceedingly dense, true and brilliant. They can be used for lines or washes, are waterproof when dry and may be thinned with distilled water or mixed with each other to produce other shades.

No.			1 oz.	4 oz.	½ Pt.	Pt.	Qt.
3826M	Ideal Waterproof Black	Ink . . . .	\$0.25	.90	1.60	3.00	5.75
3826N	" " Yellow	" . . . .	.25	.90	1.60	3.00	5.75
3826O	" " Orange	" . . . .	.25	.90	1.60	3.00	5.75
3826P	" " Scarlet	" . . . .	.25	.90	1.60	3.00	5.75
3826R	" " Carmine	" . . . .	.25	.90	1.60	3.00	5.75
3826S	" " Blue	" . . . .	.25	.90	1.60	3.00	5.75
3826T	" " Green	" . . . .	.25	.90	1.60	3.00	5.75
3826V	" " Brown	" . . . .	.25	.90	1.60	3.00	5.75
3826W	" " Brick Red	" . . . .	.25	.90	1.60	3.00	5.75
3826X	" " Vermilion	" . . . .	.25	.90	1.60	3.00	5.75

Specify size wanted when ordering.

**SHO-KARD INK.**

The Letters Shine.

A Water Color for the Brush or Pen.

For Show Card Writing, Price Tickets and Advertising purposes generally; dries with a beautiful gloss. Made in seven colors: Black, blue, violet, green, red, white and yellow.



No.	Per Quart.	Per Pint.	Per ½ Pint.	Per 2 Oz.
3826 ½ A—Black	\$0.75	\$0.40	\$0.25	\$0.10
3826 ½ B—Red	1.00	.60	.40	.15
3826 ½ C—Blue	1.00	.60	.40	.15
3826 ½ D—Green	1.00	.60	.40	.15
3826 ½ E—Violet	1.00	.60	.40	.15
3826 ½ F—Yellow	1.00	.60	.40	.15
3826 ½ G—White	1.00	.60	.40	.15

**SHO-KARD OUTFIT.**

For Students we put up a SHO-KARD OUTFIT consisting of six 2-oz. bottles of ink, one of each color: Red, white, blue, green, violet and black. These colors blended will make any shade desired. One set of 4 brushes and a booklet SHO-KARD and how to use it (which gives full instructions for beginners by an expert). With these instructions and the SHO-KARRD OUTFIT any person can make their own Show Cards or Price Tickets.

No.	
3826 ½ H—Price of Outfit	\$1.50

## PALMER'S PHOTO PASTE.



An extra strong White Paste especially adapted for Mounting Photographs and Maps, Plans and Drawings. Will not discolor anything. It works smoother, sticks quicker, holds tighter than any other Paste on the market. It will not mould or sour and will keep in any climate.

No.		
3826 ½ J	—Palmer's Photo Paste, 4-oz. Jar with Brush.....	\$0.15
3826 ½ K	—Palmer's Photo Paste, 8-oz. Jar with Brush.....	.25
3826 ½ L	—Palmer's Photo Paste, 1 pint Jar with Brush.....	.45
3826 ½ M	—Palmer's Photo Paste, 1 quart Jar with Brush.....	.85
3826 ½ N	—Palmer's Photo Paste, ½ gallon Jar with Brush.....	1.60
3826 ½ O	—Palmer's Photo Paste, 1 gallon Jar with Brush.....	3.00

## LIQUID GLUE.

The strongest adhesive known. Mends everything.



No.		
3826 ½ P	—Liquid Glue, 1-oz. with Brush.....	\$0.10
3826 ½ R	—Liquid Glue, 2-oz. with Brush.....	.20
3826 ½ S	—Liquid Glue, 4-oz. Tin Cans.....	.25
3826 ½ T	—Liquid Glue, 1 pint Tin Cans.....	.60
3826 ½ W	—Liquid Glue, 1 quart Tin Cans.....	1.00

**HIGGINS' DRAWING BOARD PASTE.**

A very tenacious glue-like paste of great strength and body and of very light color, specially adapted for use in libraries and draughting rooms, for repairing and labeling books, mounting paper on the drawing board, etc. An extra strong and choice article for all particular work, and having great holding power on absorbent or fibrous materials.

No.

3827A— 3-ounce Jar.....	each, \$0 15
3827B— 6-ounce Jar.....	each, 25
3827C—14-ounce Jar.....	each, 50

**HIGGINS' PHOTO-MOUNTER.**

**For Mounting Photographs, Drawings, Engravings, Etc.**

A pure white paste, having a beautiful, soft, unctuous consistency peculiar to this article. Is non-fluid at rest, but flows under the movement of the brush and spreads with the greatest smoothness and uniformity. Does not strike through nor cockle the mount; adheres immediately and with great tenacity. Always ready for use and keeps good for any length of time.

No.

3828A 3-ounce Jar.....	each, \$0 15
3828B 6-ounce Jar.....	each, 25
3828C—14-ounce Jar.....	each, 50

**"SECCOTINE."**

An intensely strong cement, which will repair broken articles of china, glass, wood, marble, leather, paper, bone, ivory and even iron.



No.

3829A—Seccotine, small tube.....	each, \$0 15
3829B—Seccotine, large tube.....	each, 25

## CHINESE OR INDIAN INKS.

Imported by us Direct from China.

We offer only fine and extra fine India Inks, we do not sell the imitation; our Inks are adapted for use of Pen or Brush.



Nos. 3830,

3831,

3833,

3834,

3836.

No.		
3830	—First Quality Lion Head, 2½-inch long	each, \$0 15
2831	—First Quality Lion Head, 3¼-inch long	each, 25
3832	—Square Black Gilt Figures, 2½-inch long	each, 30
3833	—Square Black Gilt Figures, Super Super, 2½-inch long	each, 30
3834	—Square Black Gilt Figures, Super Super, 3½-inch long	each, 60
3836	—Red Chinese Ink, 2½-inch long	each, 30
3837	—Blue Chinese Ink, 2½-inch long	each, 30
3838	—Yellow Chinese Ink, 2½-inch long	each, 30

## CHINESE OR INDIAN INKS.

Our Own Direct Importation. Illustrations Full Size.



No. 3840.



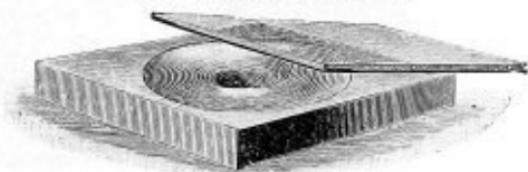
No. 3841.



No. 3842.

No.		
3840	Oblong Black Gilt Figures, 3½ inches long.....	each, \$1 50
3841	Oblong Gilt, Stork, EXTRA FINE, 2½ inches long.....	each, 2 50
3842	Oblong Gilt, EXTRA FINE, 3½ inches long.....	each, 3 00
3843	Oblong Black Gilt Figures, Moon, 4½ inches long.....	each, 4 00
3845	Oblong Black, extra fine, Japanese Ink.....	each, 2 00

The most practical slabs for rubbing up above inks uniformly and quickly are our Improved Ink Slabs Nos. 3848, 3849 and 3860.

**CHINA AND GLASS WARE.****For Inks and Colors.**

No. 3849.

No.		
3848—Oblong Ink Slab, with cover, $2\frac{1}{2} \times 5\frac{1}{4}$ inches.....	\$0	40
3849—Slate Ink Slab, with cover, $3\frac{1}{2}$ inches square.....		40
3850—Slate Ink Slab, with cover, 5 inches square.....		65



No. 3860.

No.		
3860—Ink Saucer of Opal Glass, with ground edges, $3\frac{1}{2}$ inches in diameter....	\$0	50



FIVE CUPS AND COVER.

No. 3865.

**WATER GLASSES.**

No. 3869.

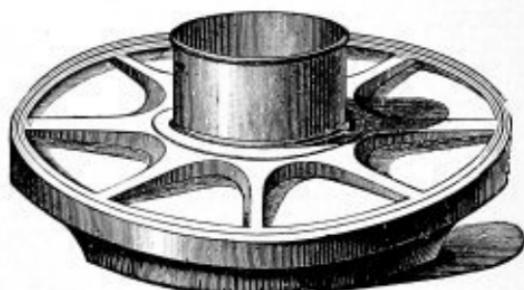
No.		
3865—Nest of Cabinet Saucers, 6 in set, $2\frac{1}{2}$ -inch.....	set,	\$0 50
3866—Nest of Cabinet Saucers, 6 in set, $2\frac{1}{2}$ -inch.....	set,	60
3867—Nest of Cabinet Saucers, 6 in set, $3\frac{1}{4}$ -inch.....	set,	70
3868—Nest of Cabinet Saucers, 6 in set, $3\frac{1}{2}$ -inch.....	set,	80
3869—Artists' Water Glass, $2\frac{1}{2}$ -inch diameter.....	each,	15
3870—Artists' Water Glass, $3\frac{1}{4}$ -inch diameter.....	each,	25

### COLOR SAUCERS.



No. 3880.

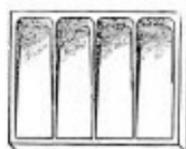
No.		
3880	—2 -inch diameter.....	\$0 07
3881	—2½-inch diameter.....	10
3882	—3 -inch diameter.....	12



No. 3883.

No.		
3883	—Architects' Slant and Basin, with 8 divisions and cup.....	each, \$1 35

### DIVIDED SLANTS AND INK SLABS.



No. 3886.



No. 3888.



No. 3897.

No.		
3886	—4 Divided Slants, 3 x 7½-inch.....	\$0 30
3887	—5 Divided Slants, 2½ x 7½-inch.....	40
3888	—6 Divided Slants, 2½ x 7½-inch.....	45
3891	—India Ink Slab, 3 Wells and Slope, 1½ x 2½-inch.....	15
3892	—India Ink Slab, 3 Wells and Slope, 2 x 3½-inch.....	20
3893	—India Ink Slab, 3 Wells and Slope, 2½ x 4 -inch.....	25
3896	—Well Slab, 3 Wells and 3 Slants, 2½ x 4-inch.....	25
3897	—Well Slab, 5 Wells and 5 Slants, 4 x 7-⅞-inch.....	50

## DRAFTING ROOM FURNITURE.

The development of the making of Modern Drafting Room Furniture is of recent years, but it has made rapid strides and our assortment to-day comprises the latest and most complete line and the most improved designs in **Blue Printing Apparatus, Drawing Tables, Chests of Drawers, Filing Cabinets,** etc., for the Drafting Room.

We maintain our own Wood Factory at Grand Rapids, Michigan, in which all staple articles are manufactured in addition to which we are selling agents for the best and necessary patented articles of Furniture made by other manufacturers.

We "guarantee" every piece of Drafting Room Furniture sold by us as being the best that can be obtained for the price sold. Our connections and our own Factory make us the headquarters of the United States for Drafting Room Furniture for

### PRINT FRAMES

For Sunlight.

### PRINT FRAMES

For Electric Light.

### PRINTING MACHINES

For Electric Light.

### BATH TRAYS

For Blue Printing.

See pages 27 to 34.

**DRAWING BOARDS.**

Made with the utmost care, of selected narrow and thoroughly seasoned strips.



No. 3900.

No.  
3900—Pinewood, with two drawing surfaces and side ledges:

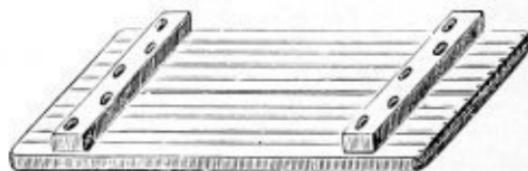
Inches . . . . .	12 x 17	15 x 21	20 x 26	23 x 31	24 x 36
Each . . . . .	\$0 70	1 00	1 25	1 75	2 25



No. 3901.

No.  
3901—Pinewood, with hardwood ledges dovetailed into the board to allow contraction and expansion:

Inches . . . . .	20 x 26	23 x 31	31 x 42	36 x 55	42 x 60
Each . . . . .	\$2 00	2 85	4 25	7 00	8 50



No. 3902.

No.  
3902—Pinewood, with hardwood ledges screwed to the back; the screws pass through the ledges in oblong slots with metal bushings, which allow the screws to move when drawn by the contraction of the board. A series of grooves is sunk in half the thickness of the board over the entire back. To make the working edge smooth, a slip of hardwood is let into the end of the board.

Inches . . . . .	20 x 26	23 x 31	31 x 42	36 x 55	42 x 60	48 x 84
Each . . . . .	\$3 00	4 00	6 25	9 50	11 50	18 50

Drawing Boards of any size and style made to order.

## TRESTLES FOR DRAWING BOARDS.



No.

3902A—Pinewood Trestles, 37-inch high, 40-inch

long for boards 31 x 42 or 33 x 55, per pair. \$3 00

3902B—Pinewood Trestles, 37-inch high, 40-inch

long, with sloping top ledges, per pair. . . . 5 50



No. 3902.

and a rod with a thumb nut on the right hand side, which fastens both sides of the tilting iron at the same time.

No.

3902F—Ideal Drawing Table, 22 x 30 inches, without Cabinet . . . . . \$6 00

3902G—Ideal Drawing Table, 24 x 32 inches, without Cabinet . . . . . 6 50

3902H—Ideal Drawing Table, 32 x 42 inches, without Cabinet . . . . . 8 00

3902K—Ideal Drawing Table, 37 x 48 inches, without Cabinet . . . . . 9 00

We also furnish a nicely finished cabinet which contains two drawers 6 x 20 inches. The upper one 2 inches deep and the lower one 3 inches deep, inside measurement, which makes a convenient tool case, and when the upper drawer is pulled out it can be used as a tray.

No.

3902M—Tool Cabinets for above . . . . . each, \$2 00

## IDEAL DRAWING TABLE.

It is made of all hardwood, and can be raised and lowered from 30 to 40 inches. The standards are slotted and the cross bar has a tenon which runs in the slots. The cross bar has also a hole running through the center and has a rod running clear through which holds on the legs, and when the rod is turned up it holds the table very firm and rigid. The top can be tilted from a vertical to a horizontal position, which is accomplished by wrought metal slides, and there is a cross bar running across with a hole through the center,

## ROLLER TABLE COVERS.

A covering is necessary to protect your drawings on the board, when not in use. We have recently placed on the market a special spring roller, carrying water-proof cover, enclosed in a nicely finished metal case; the whole of which can be readily attached, by means of brackets, at the top of drawing board. This does not interfere with the operator, T square or parallel straight edge.

Made to fit any board.

When ordering specify length and width of board.

Used on Board	Price
30 x 36 in.	\$4.00
32 x 42	4.50
37 x 48	5.00
37 x 60	6.00
42 x 60	6.25
48 x 72	7.50

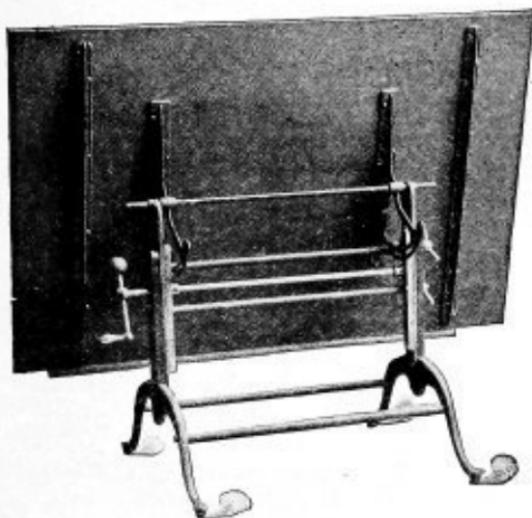
**AJAX ADJUSTABLE DRAWING TABLE.**

No. 3903A.

Made in three sizes and of very simple and durable construction. Board stands 40 inches above floor, and by means of simple device shown in illustration, can be tilted and securely clamped at any angle desired. A hardwood-lined Parallel Ruler is furnished with each table, thus making use of a T-Square unnecessary. Each table is also furnished with adjustable tray. The box attached to trestle will be found very convenient for holding roll drawing papers, tracing cloth, etc.

No.	
3903A—Drawing Table, with Board 31 x 42-inch.....	each, \$18 00
3903B—Drawing Table, with Board 36 x 55-inch.....	each, 22 00
3903C—Drawing Table, with Board 42 x 60-inch.....	each, 25 00

Above Tables, without Parallel Ruler, \$4.00 less.

**"ST. LOUIS" DRAWING TABLE.**

No. 3910.

This is a rigid table of graceful design, and is easy of adjustment, having a tilting movement from horizontal to perpendicular, and can be adjusted in height from 30 to 45 inches, the greatest height of any table made.

The castings are well ribbed and are finished with two coats of black enamel.

The vertical adjustment, however, is accomplished by a rack and pinion movement, operated by a crank as shown in illustration.

Tops made from narrow strips of soft pine.

No.		
3910	—With Board 36 x 48.....	\$28 00
3910A	—With Board 42 x 60.....	32 00
3910B	—With Board 48 x 72.....	35 00
	Stand only, \$22.00. Any size Board to order.	

**"STAR" DRAWING TABLE.**

This table has tilting and vertical adjustment, raising from 30 to 40 inches, operated by a rack and pinion and a foot lever, which can be used as a foot rest. This table has the tube and spring construction which prevents the table from dropping when clamps are released, and also assists the operator to raise the table top. All iron work baked enamel. Tops made from narrow strips of soft pine.



No. 3911.

No.		
3911	—With Board 36 x 48.....	\$40 00
3911A	—With Board 42 x 62.....	42 00
3911B	—With Board 42 x 60.....	44 00
3911C	—With Board 48 x 72.....	48 00
	Stand only, with Cabinet, \$35.00. Any size Board to order.	

## FRY'S PATENT DRAUGHTING TABLES.

The frames are made of BEST QUALITY gray iron, thoroughly braced and bolted together, black enamel finish. There are NO SPRINGS or SET SCREWS to get weak or loose. Top can be adjusted to any angle from a horizontal to a vertical position, without stooping or moving from your seat, and the table is VERY STRONG and STANDS rigid in all positions. All drawing boards are made of 4-inch strips of the best quality Michigan white pine, thoroughly kiln-dried, tongued and grooved, and glued together with hardwood ledges secured to back with heavy SCREWS running in oval slots, with metal bushing. The back is sawed half way through every three or four inches to reduce the warping strength. Side ledges or strips of cherry wood are put on, making a hard, smooth surface for T square to work on. The tops are full inch thick when finished.

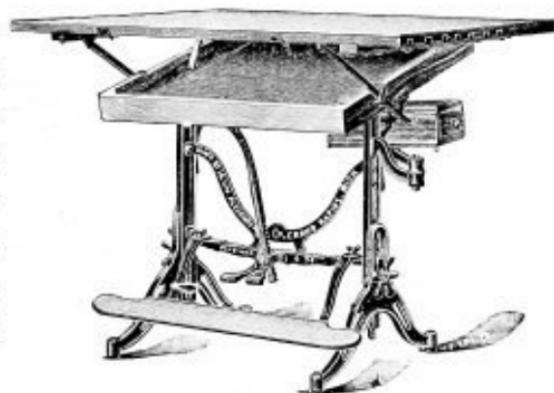


No. 3913.

No.		
3913	—Drawing Table with Board 32 x 42 inches.....	each, \$16 50
3913A	—Drawing Table with Board 37 x 48 inches.....	each, 22 00
3913B	—Drawing Table with Board 37 x 60 inches.....	each, 27 00
3913C	—Drawing Table with Board 40 x 72 inches.....	each, 32 00
3913D	—Drawing Table with Board 42 x 96 inches.....	each, 42 00

## FRY'S PATENT DRAUGHTING TABLE.

This style table is complete with foot rest, swing instrument drawer and sketch box, and has adjustment for attaching to either side; the top can be raised, as shown in cut, without raising frame and is suitable for sketch work, perspective and careful work.



No. 3914.

No.	
3914	—Drawing Table with Board 32 x 42 inches.....each, \$27 00
3914A	—Drawing Table with Board 37 x 48 inches.....each, 32 00
3914B	—Drawing Table with Board 37 x 60 inches.....each, 37 00
3914C	—Drawing Table with Board 40 x 72 inches.....each, 42 00
3914D	—Drawing Table with Board 42 x 92 inches.....each, 52 00

No. 3914F is the same as No. 3914, but has a cabinet or case in the rear of the frame.

The cabinet may be varied in size and shape to suit the individual. Drawer to pull from the right side unless otherwise ordered.



No. 3914F.

No.	
3914F	—Drawing Table with Board 32 x 42 inches.....each, \$34 50
3914G	—Drawing Table with Board 37 x 48 inches.....each, 39 50
3914H	—Drawing Table with Board 37 x 60 inches.....each, 44 50
3914J	—Drawing Table with Board 40 x 72 inches.....each, 49 50
3914K	—Drawing Table with Board 42 x 96 inches.....each, 59 50

## "GEM" ADJUSTABLE AND FOLDING DRAWING TABLE.

A Practical Table Highly Recommended.



Fig. 1—Table Open.

Fig. 2—Table Closed

The Gem Drawing Tables are of simple but very substantial construction. The stand is made of hardwood and the Drawing Board of well seasoned pinewood. Height adjustments from 32 to 42 inches are made by spreading or closing the legs, and the adjustment is held by a pin inserted in holes provided in a cam shaped piece. The board may be tilted and rigidly clamped at any angle. Folds up compactly and occupies a comparatively small space when put away. Each table furnished with drawer.

No.		price,
3915	—Size of board 26 x 32 inches .....	\$10 50
3916	—Size of board 30 x 36 inches .....	13 00
3917	—Size of board 36 x 48 inches .....	15 00
3918	—Size of board 42 x 60 inches .....	17 00
3919	—Size of board 48 x 66 inches .....	20 00

Special Sizes to Order.

## DRAFTSMEN'S STOOLS.



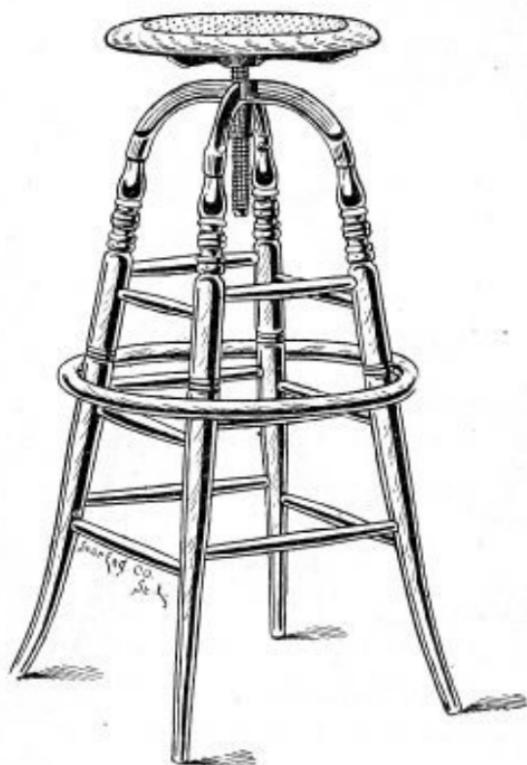
3919A—D



3919E—H

No.		
3919A	Draftsman's Stool, Oak, 24 inches high, wood seat.....	each, \$1 50
3919B	Same as above with Cane Seat.....	each, 1 75
3919C	Draftsman's Stool, Oak, 33 inches high, wood seat.....	each, 1 75
3919D	Same as above with Cane Seat.....	each, 2 00
3919E	Draftsman's Stool, Oak, 27 inches high, with pivot wood seat...each,	3 50
3919F	Same as above with Cane Seat.....	each, 4 00
3919G	Draftsman's Stool, Oak, 33 inches high, with pivot wood seat...each,	3 75
3919H	Same as above, with Cane Seat.....	each, 4 25

## DRAFTSMEN'S STOOLS.



No. 3919 I-J

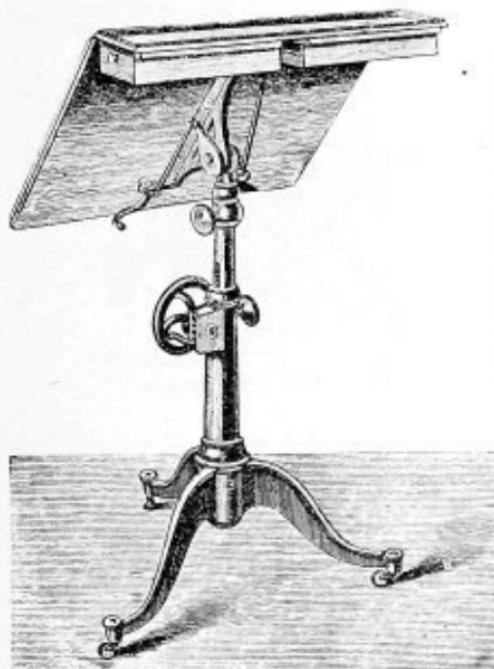


No. 3919K

No.

3919I—Draftsman's Stool, Oak, wood seat, adjustable from 32 to 36 inches, each,	\$4 50
3919J—Same as above, with Cane Seat .....	each, 4 75
3919K—Draftsman's Stool, Golden Oak, polished wood seat, adjustable from 32 to 36 inches .....	each, 6 00
3919L—Same as above, with Cane Seat .....	each, 6 00
3919M—Same as above, with Leather Seat .....	each; 7 00
3919N—Same as above, with Perforated Leather over cane .....	each, 7 50

## VICTOR DRAWING TABLES.

No. 3920 $\frac{1}{2}$ 

Our Victor Drawing Tables are in use in a great many offices and drafting rooms and in colleges and schools of the very highest standing, and they give such perfect satisfaction that we confidently recommend them as the best of all in material, workmanship and practical construction. They are **more rigid** and durable than any other and have valuable improvements which are not found on other tables. Owing to their elegant appearance they are also an ornament to any office, studio or library.

These Tables have a Wheel-lift for raising and lowering the table top. It consists of a rack and pinion movement which is operated by a large wheel and is so simple and easy to operate that a woman or child can handle it.

The adjusting and clamping of the top to any desired slant is done by shifting a lever conveniently placed under the front of the table top, which locks the clamp absolutely.

The tables are provided with casters on two of the legs; the third leg has an iron foot to prevent the table from rolling, except when the iron foot is lifted off the floor.

No.		
3920 $\frac{1}{2}$	—Victor Drawing Table, Oak Top, 21 x 24 inches, with top shelf with two drawers . . . . .	each, \$15 00
3921 $\frac{1}{2}$	—Victor Drawing Table, same as 3920 $\frac{1}{2}$ , but without wheel lift, Oak Top, 22 x 26 inches, with top shelf with two drawers . . . . .	each, 13 00
3922 $\frac{1}{2}$	—Victor Drawing Table with Ash Top, 22 x 24 inches, top shelf, no drawers . . . . .	each, 10 00
3923 $\frac{1}{2}$	—Victor Drawing Table with Ash Top, 22 x 24 inches, without instrument shelf . . . . .	each, 8 50

## CENTURY ADJUSTABLE STEEL TABLES.

Realizing the universal need for a table to embody the characteristics of rigidity, strength, stiffness, minimum weight and neat appearance, we have succeeded in producing from steel one of such practical simplicity, as to be conceded by all the most perfect table for the purpose ever designed. Suitable for drawing room, office, shop, school room and home.



No. 3824A.



No. 3824B, with Tray.

Vertical Adjustment from 28 to 44 inches in height.

### "It Don't Wobble."

Our special system of bracing, together with an even and generous floor bearing of supports, produce a structure which is absolutely rigid for all time.

The weight of a man can be easily supported upon the front edge of the table without the least movement at points of adjustment, or shake of table.

The finish is of aluminum enamel which is not easily defaced.

Extremely light in weight, is readily moved about; can be quickly folded up into minimum space for transportation and storage.

No.	
3924A	—Century Leader with Board 27 x 27 (pine or oak)..... each, \$ 7 50
3924B	—Century Standard with Board 30 x 36 (pine)..... each, 10 50
3924C	—Century Standard with Board 37 x 48 (pine)..... each, 19 00
3924D	—Century Standard with Board 42 x 60 (pine)..... each, 29 00
3924E	—Century Standard with Board 48 x 72 (pine)..... each, 37 00

Adjustable Tray, as shown in illustration, \$2.00 to \$3.00, according to size of table.

Any size top made to order.

## COMBINATION DRAUGHTING TABLES.



Combination Table.  
No. 3924H.



Combination Table—Tilted Backwards.  
No. 3924H.

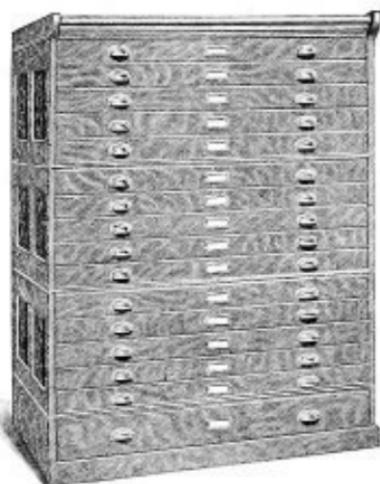
This is a very convenient table and is equipped with Foot Rest, and can be raised and lowered from 35 to 43 inches. The Top can be tilted forward and backward. The Drawer Case on this Table is made of oak with a golden oak rubbed finish, and is substantially put on so as to make a strong and durable Table.

It contains four drawers. The upper drawer which is used for a Tool Drawer is 3 inches deep and is partitioned off. The second and third drawers are 4½ inches deep, and the bottom drawer 5½ inches deep. On the No. 3924H and No. 3924J Tables the drawers are 18 x 28 inches, on the No. 3924K Table the drawers are 18 x 38 inches. The No. 3924L Table has a double set of drawers, four on each side, of the same depth. The drawers are 18 x 24 inches; 18 inches is the width of the drawers, inside measurement.

No.		
3924H	—Combination Table with Board 32 x 42 .....	each, \$33 00
3924J	—Combination Table with Board 37 x 48.....	each, 36 00
3924K	—Combination Table with Board 37 x 60.....	each, 41 00
3924L	—Combination Table with Board 40 x 72.....	each, 50 00

## SECTIONAL FILING CABINETS.

For Filing Drawings, Etc., Flat.



Three Sections, Drawer Base and Top.

We have discovered a finish which is a mineral product which we use to protect the wood from being destroyed by fire, and will protect the drawings longer than any other Cabinet made. There are Cabinets made of steel and which are called fire proof, but they are in no way isolated therefore the fire will destroy the contents much quicker than in a wood Cabinet prepared in the way we are now preparing ours, as wood is a nonconductor of heat whereas a thin metal will heat through in a moment's time, and will burn the contents, while ours will ward off the flames and heat three times as long as any metal cabinet made.

These cabinets are made in sections holding five drawers, each 2 inches deep, inside measurement 32 x 42½ inches. The sections are so constructed that they will fit properly over each other, and have a top and base, so cabinet may be built up to any number of sections.

These cabinets are made of plain oak, golden oak rubbed finish; we also make them of quartered oak if so desired.

All the drawers are fitted with holders in rear to prevent sheets from curling up. All our goods are put up in good workmanship.

Outside Dimensions, per Section: Width, 45½ inches; depth, 34½ inches; height, 14½ inches.

No.		
3925	—Section, five drawers, 32 x 42½ x 2 inches.....	\$19 50
3925A	—Top.....	5 75
3925B	—Base (plain).....	4 50
3925C	—Base (with drawer 5½ inches deep).....	7 50

## COMBINATION FILING CABINETS.



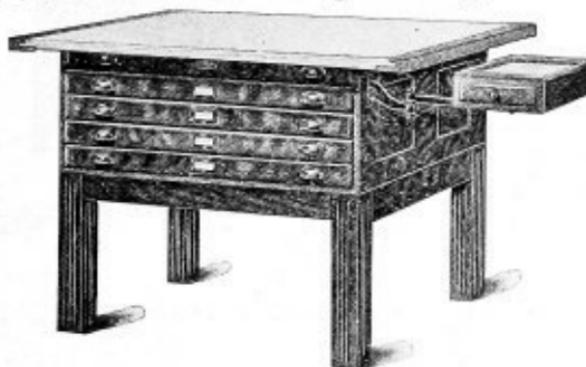
No. 3926.

This combination Filing Cabinet is made of well seasoned oak, golden oak rubbed finish, and is composed of two filing sections, each containing 5 drawers, the inside measurements of which are 32 x 42½ x 2 inches; a base cut out to a sufficient height so as to give foot space, to stand up close, and a swinging arm with tray and drawer. The top is a fine pinewood Drawing Board, so arranged that it can be pulled forward to project about four inches beyond the front edge of the cabinet, can be raised and lowered from 35 to 43 inches on the level, and can be tilted to any angle. The parts are securely fastened together, making a very rigid outfit.

No.

- |       |  |       |         |
|-------|--|-------|---------|
| 3926  | —Combination Filing Cabinet, adjustable top, 37 x 50 inches..... | each, | \$56 50 |
| 3926A | —Combination Filing Cabinet, adjustable top, 37 x 60 inches..... | each, | 60 00   |
| 3926B | —Combination Filing Cabinet, adjustable top, 40 x 72 inches..... | each, | 64 00   |
| 3926C | —Combination Filing Cabinet, flat top, 37 x 50 inches.....       | each, | 48 00   |
| 3926D | —Combination Filing Cabinet, flat top, 37 x 60 inches.....       | each, | 51 00   |
| 3926E | —Combination Filing Cabinet, flat top, 40 x 72 inches.....       | each, | 55 00   |

Nos. 3926C, 3926E have a flat Drawing Board top, as shown in illustration below.



No. 3927.

This Combination Cabinet consists of one filing section containing 5 drawers each 32 x 42½ x 2 inches inside measure, with flat pinewood Drawing Board top which is put on with slides so it can be drawn forward, and a swinging arm with tray and drawer. Is 37½ inches in height, made of well seasoned oak, golden oak rubbed finish, making a very neat, durable and practical outfit.

No.

- |       |  |       |         |
|-------|--|-------|---------|
| 3927  | —Combination Filing Cabinet, flat top, 37 x 50 inches..... | each, | \$31 00 |
| 3927A | —Combination Filing Cabinet, flat top, 37 x 60 inches..... | each, | 34 00   |
| 3927B | —Combination Filing Cabinet, flat top, 40 x 72 inches..... | each, | 38 00   |

**"BURLIN" VERTICAL FILING CABINET.**

(Patented Jan. 4, 1909.)

**For Drawings, Tracings, Blue Prints, Sketches and Maps.**

The "Burlin" Vertical Filing Case is a radical change from any method of filing and indexing heretofore used. It has features combining the best modern methods of recording and indexing with a common sense filing case by which any drawings may be extracted without disturbing the order of the balance, or they may be exposed for examination instantly without changing their position in the file.

Space, convenience, time saving, and the preservation of drawings taken into consideration, the "Burlin" Vertical Filing Case is the cheapest and best system for filing drawings, tracings, blue prints, etc., upon the market.



Fig. 1.

Cabinet Closed—Air tight and dust proof.

The "Burlin" Cabinet stands 46 inches high, 44 inches wide, and 12 inches deep when closed (see Fig. 1) and is constructed with the Athey Dust Proofing method, making it air tight and free from dirt and dust. It contains 20 heavy weight manila pockets or envelopes 36 x 40 inches, having a total capacity of about 850 prints.

Cabinet is constructed of Dried and Seasoned lumber, and will not warp or go to pieces. Made in Yellow Pine natural or stained. In Birch, natural or imitation mahogany finish. Plain or Quarter-sawed Oak in their various finishes, and Solid Mahogany. They are well finished, and an ornament of convenience to any office. See following pages for full description.

## "BURLIN" VERTICAL FILING CABINET.

To extract any print for inspection or reference, raise up the lid, and pull out the top of front. This allows an expansion of six inches to better enable the operator to separate the tops of the pockets for withdrawing the print desired, or lifting out the pocket with its entire contents. After pulling out the top of front, which lets the bottom of front hang free, reach down on either side about half way, and pull the bottom of front out and up. This releases the leg brace which drops down and forms a support for the table (see Fig. 3). This table may be set at any angle desired and used as an easel or drawing board.



Fig. 3.

Cabinet Open—Ready for use.

In lifting out any pocket, grasp both supporting rods at top of desired pocket, raise up and pull toward you on to the table. Then fold back the flap of pocket toward the cabinet. (See Fig. 4.)

**DRAUGHTSMEN'S LEAD PENCILS.**

No. 3930.

The Aloe Detail Pencil is made especially for use by an expert pencil manufacturer, and is of excellent quality and carefully graded, and is recommended as a first-class article, and must not be confounded with the cheap Detail pencils usually sold. They are Hexagon in shape and finished in a light yellow color, and are good value at price sold.

No.

3930—Aloe's Hexagon Detail Pencil, Nos. 1, 2, 3, 4, 5..... per doz., \$0 50

**FABER'S MAROON FINISH POLYGRADE PENCILS.**

No. 3931.

No.

3931—Johann Faber Hexagon Gilt, Nos. 1, 2, 3, 4, 5..... per doz., \$0 60

**FABER'S FINEST SIBERIAN LEAD PENCILS.**

No. 3935.

No.

3935—Johann Faber's Hexagon Siberian Pencils, 6B, 5B, 4B, 3B, 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H..... per doz., \$1 00  
 3936—A. W. Faber's "Castell" Hexagon Pencils 6B to 8H..... per doz., 1 25

**"MONGOL" DRAWING PENCILS.**

The "Mongol" represents all that is good in pencil making from its superb lead to the beautiful yellow polish. Every care has been exercised to make the pencil as perfect as possible.



No. 3937.

- No.  
3937—Mongol Hexagon Drawing Pencil, 6B 3B, 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H..... per doz., \$0 75

**FABER'S LEAD PENCILS.**

No. 3938.

- No.  
3938—Hexagon Tapered Pencil, rubber tipped, Nos. 2 and 3..... per doz., \$0 50



No. 3939.

- No.  
3939—Hexagon. Natural polish, rubber tipped, Nos. 2 and 3..... per doz., \$0 40



No. 3939A.

- No.  
3939A—Hexagon. Yellow Finish, large lead; very soft and black; a good sketching pencil..... per doz., \$0 60



No. 3939B.

- No.  
3939B—Round, Natural Polish, large lead; very soft and black; used by reporters and for general use where a soft pencil is desired.... per doz., \$0 60

## HARDTMUTH'S KOH-I-NOOR PENCILS.



No. 3940.

By a new process of manufacture the graphite assumes a highly compressed form, which secures for it remarkable lasting qualities, the pencil point remaining sharp for a surprisingly long time. For the draftsman and others, where the preservation of a fine point is of importance, the Koh-i-noor Pencils and Leads will be found invaluable.

No.

3940 — Koh-i-noor Pencils, Hexagon, Yellow Polish. In degrees as follows: 3B, 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H, 7H, 8H.....	per doz.,	\$1 25
3940A—4B.....	per doz.,	1 50
3940B—6B, 5B.....	per doz.,	1 80

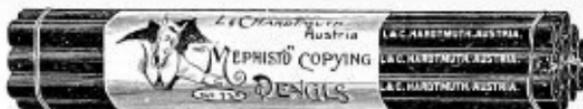


No. 3941.

No.

3941—Koh-i-noor Copying Ink Pencils, Violet, round.....	per doz.,	\$1 25
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## HARDTMUTH'S MEPHISTO PENCILS.



No. 3942½.

No.

3942½A—Mephisto Copying Ink Pencils, No. 73B, Violet, round.....	per doz.,	\$0 75
3942½B—Mephisto Copying Ink Pencils, No. 73B, Blue, round.....	per doz.,	75
3942½C—Mephisto Copying Ink Pencils, No. 73B, Black, round.....	per doz.,	75
3942½D—Mephisto Copying Ink Pencils, No. 73B, Green, round.....	per doz.,	75
3942½E—Mephisto Copying Ink Pencils, No. 73B, Red, round.....	per doz.,	75
3942½F—Mephisto Copying Extra Hard Pencils, No. 73B, Violet, round.....	per doz.,	85
3942½ —Mephisto Copying Red Tip Pencils, No. 77, Violet, round.....	per doz.,	85



3944.

No.

3944—Koh-i-noor Pencil Point Protector.....	each,	\$0 05
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## "KOH-I-NOOR" ARTISTS' PENCILS.

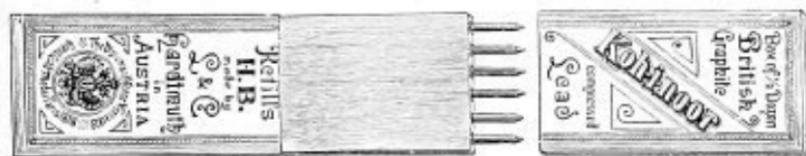


No. 3943A.

No.

- 3943—"Koh-i-noor" Artists' Pencil, movable lead, 3B to 5H, single . . . each, \$0 25  
 3943A—"Koh-i-noor" Artists' Pencil, movable lead, 3B to 5H, double . . . each, 35

## ARTISTS' LEADS.



No. 3943.

No.

- 3943½—"Koh-i-noor" Artists' Leads, 6B to 5H, packed 6 in a box . . . per box., \$0 60



No. 3945.

No.

- 3945—Leads for Artist Pencils, Siberian, 6 in box, 2B to 6H . . . per box, \$0 50; each, \$0 10  
 3946—Leads for Artist Pencils, best, 6 in box., Nos. 1 to 5 per box, 30; each, 05



No. 3947.

No.

- 3947—Artists' Pencil for Adjustable Leads, single point, Siberian . . . each, \$0 25  
 3948—Artists' Pencil for Adjustable Leads, double point, Siberian . . . each, 35

**FABER'S FINEST COLORED PENCILS.**

No. 3950.



No. 3952.

No.	
3949—Faber's Hexagon Carmine Pencils.....	per doz., \$1 00
3950—Faber's Hexagon Blue Pencils.....	per doz., 1 00
3951—Faber's Round Carmine Pencils.....	per doz., 75
3952—Faber's Round Blue Pencils.....	per doz., 75

**DIXON'S SKETCHING CRAYON.**

We believe this Crayon to be superior to anything in the market for like purposes. Its lead is tough and has a deep, rich, black color.

No.	
3957—Dixon's Sketching Crayon.....	per doz., \$0 90; each, \$0 10

**PENCIL POINT PROTECTOR.**

No. 3958.



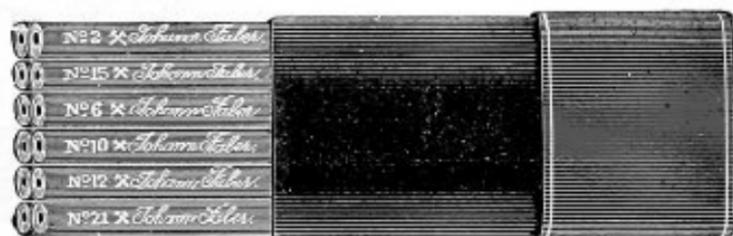
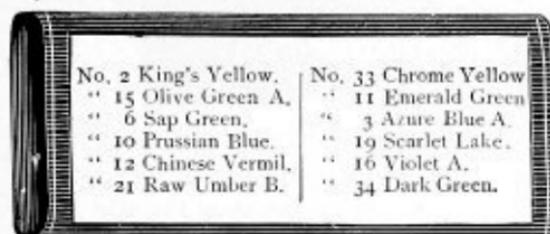
No. 3858A.

No.	
3958 —Faber's Pencil Protector, Hexagon with rubber.....	each, \$0 05
3958A—Faber's Pencil Point Protector, round taper point.....	each, 05

**PENCIL HOLDER.**

No. 3959.

No.	
3959—Pencil Holder, with Brass Screw Socket.....	each, \$0 10

**WAX CRAYONS, OR CRETA LAEVIS PENCILS.****For Coloring Drawings and Details.**

No. 3960A.

No.

- 3960 —Faber's Wax Crayons, in pull-off boxes, 6 assorted colors. . . . .each, \$0 60  
 3960A—Faber's Wax Crayons, in pull-off boxes, 12 assorted colors. . . . .each, 1 00  
 3960B—Faber's Wax Crayons, in pull-off boxes, 18 assorted colors. . . . .each, 1 50  
 3960C—Faber's Wax Crayons, in pull-off boxes, 24 assorted colors. . . . .each, 2 00  
 3960D—Faber's Wax Crayons, in pull-off boxes, 36 assorted colors. . . . .each, 3 00  
 3960E—Faber's Wax Crayons, in pull-off boxes, 48 assorted colors. . . . .each, 4 00

**List of Colors.**

- |                        |                      |                        |
|------------------------|----------------------|------------------------|
| No. 32 Red Ochre.      | No. 18 Ultramarine.  | No. 15 Olive Green A.  |
| No. 7 Yellow Ochre B.  | No. 38 Azure Blue B. | No. 39 Olive Green B.  |
| No. 27 Chrome Green.   | No. 3 Azure Blue A.  | No. 22 Olive Green C.  |
| No. 11 Emerald Green.  | No. 35 Violet B.     | No. 30 Prussian Green. |
| No. 45 Mineral Green.  | No. 16 Violet A.     | No. 13 Blue Green.     |
| No. 6 Sap Green.       | No. 24 Violet C.     | No. 26 Dark Blue.      |
| No. 4 Orange.          | No. 0 Carmine B.     | No. 34 Dark Green.     |
| No. 33 Chrome Yellow.  | No. 37 Grey A.       | No. 10 Prussian Blue.  |
| No. 2 King's Yellow.   | No. 36 Gray B.       | No. 40 Light Red.      |
| No. 47 Naples Yellow.  | No. 9 Dark Brown.    | No. 19 Scarlet Lake.   |
| No. 1 Flake White.     | No. 46 Raw Umber A.  | No. 12 Vermillion.     |
| No. 42 Yellow Ochre A. | No. 21 Raw Umber B.  | No. 23 Brown Red.      |
| No. 41 Flesh Ochre A.  | No. 29 Cassel Earth. | No. 17 Venetian Red.   |
| No. 43 Pink.           | No. 20 Lamp Black.   | No. 25 Raw Sienna.     |
| No. 8 Carmine A.       | No. 28 Olive Brown.  | No. 5 Indian Red.      |
| No. 44 Flesh Color B.  | No. 31 Sepia.        | No. 14 Burnt Sienna.   |

No.

- 3961—Faber's Wax Crayons, any color, per dozen, \$1.00 . . . . .each, \$0 10

**FRANKLIN'S VENETIAN CRAYON.**

No. 3970.

This crayon is hard, a dark red color and especially adapted for Civil Engineers, and Surveyors' use in marking stakes. It does not soil the hands like Kiel.

No.  
3970—Franklin's Venetian Crayon, size and shape of cut . . . . . per doz., \$0 50

**"ST. LOUIS" LUMBER CRAYON.**

No. 3971

This crayon marks bright, water proof and permanent, is hexagon shaped,  $\frac{1}{4}$ -inch in diameter,  $4\frac{1}{4}$  inches long. It is clean to handle and is splendid to write on timber, boards or other rough, hard surfaces.

No.  
3971—Hexagon Lumber Crayon. Black, blue, red and green . . . . . per doz., \$0 75

**DIXON'S LUMBER CRAYON.**

No. 3972.

No.  
3972—Dixon's Lumber Crayons. Red, blue, black, green, white and yellow . . . . . per doz., \$1 10

**CHECKING CRAYON.**

No. 3973.

No.  
3973—Oil Checking Crayon. Black, blue, red and green . . . . . per doz., \$0 30  
3974—Red Kiel, in lumps . . . . . per lb., 20

**PENCIL FILE AND TACK LIFTER.**

No. 3975.

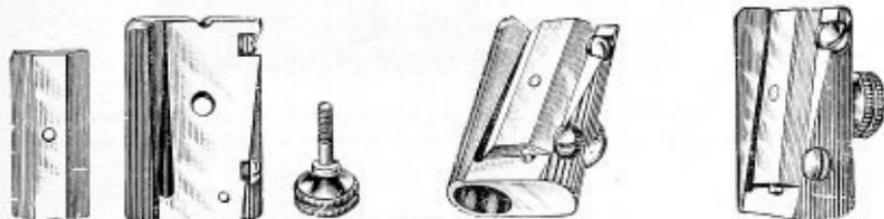
No.  
3975—Steel Pencil Pointer (File) and Tack Lifter, 7 $\frac{1}{4}$  inches..... each, \$0 25

**PENCIL POINTERS.**

No. 3982.

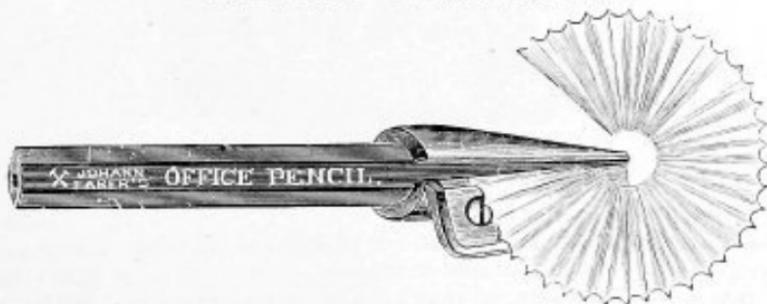
These Pencil Pointers consist of a number of sheets of flint paper made into a block.

No.  
3980—Pencil Pointer with wooden handle, 2 x 2 $\frac{1}{2}$ -inch..... each, \$0 12  
3981—Pencil Pointer with wooden handle, 2 $\frac{1}{2}$  x 4 -inch..... each, 15  
3982—Pencil Pointer with wooden handle, 1 $\frac{1}{4}$  x 4 -inch..... each, 10  
3982 $\frac{1}{2}$ —Pencil Pointer, same as No. 3982, but of Emery paper..... each, 15

**"ACME" PENCIL SHARPENERS.**

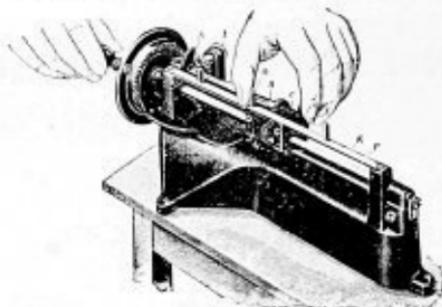
Has double edge blade. When one edge has become dull the blade can be reversed. The blade is held by a thumb screw, which is readily clamped by the fingers. Extra blades sold separately.

No.  
3983—Acme Pencil Sharpener..... each, \$0 25

**"KOSMOS" SHARPENER.**No. 3983 $\frac{1}{2}$ .

No.  
3983 $\frac{1}{2}$ —Kosmos Pencil Sharpener..... each, \$0 15

## PENCIL SHARPENERS.

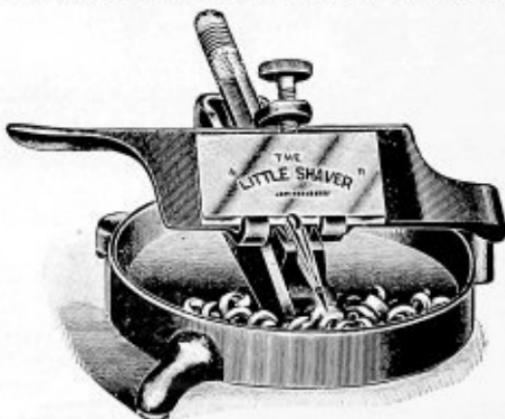


No. 3984—Jupiter Pencil Sharpener..... each, \$7 50

The Jupiter Pencil Sharpener is superior to all others in workmanship and the ease with which it can be operated. The cutting-wheel is made reversible, so that when one side becomes dull the other side may be used, after which a new cutting-wheel can be supplied or the old one sharpened.



No. 3985—Planetary Pencil Sharpener, cast metal, japanned, very durable and is easily operated, makes a perfect point on any size or kind of pencil each, \$4 50



No. 3985½—The Little Shaver Pencil Sharpener..... each, \$1 00

The operation is so easy and natural that it can be used by any one. The cutters are made of the best tool steel obtainable. When dull in one place the cutter may be shifted to a new position, thus using it nearly the entire length, and may be removed and sharpened. The base, which is a receptacle for the chips, rests on rubber tips which will not mar the desk.



For cleaning engravings, drawings, paintings, books and papers. Is soft and entirely free from grit. It wears itself away, but does not mar or scratch the surface of the paper.

No.			
3987	—Art Gum, $1\frac{1}{2}$ x $1\frac{1}{2}$ x $1\frac{1}{2}$ inches	.....	each, \$0 05
3987A	—Art Gum, $2\frac{1}{4}$ x $1\frac{1}{8}$ x $1\frac{1}{8}$ inches	.....	each, 10
3987B	—Art Gum, 3 x 2 x 1 inches	.....	each, 15
3987C	—Art Gum, 3 x 3 x 2 inches	.....	each, 25

### Sponge Rubber.

For Cleaning Drawings.



No.		No. 3989.	
3988	—Sponge Rubber, $1\frac{1}{2}$ x 2 x 1-inch	.....	per piece, \$0 25
3989	—Sponge Rubber, 3 x 2 x 1-inch	.....	per piece, 45
3990	—Sponge Rubber, 4 x 2 x 1-inch	.....	per piece, 55

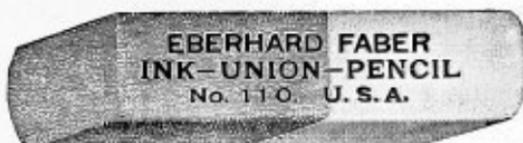
### TYPEWRITER INK ERASERS.



No. 3994.

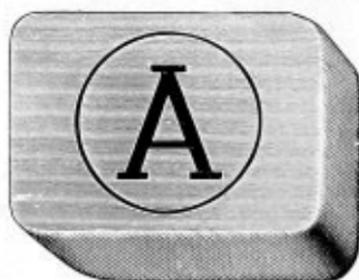


No. 3995.



No. 3997.

No.		No. 3997.	
3994	—Bicycle Typewriter Ink Eraser	.....	each, \$0 05
3995	—Faber Typewriter Ink Eraser, small	.....	each, .05
3996	—Faber Typewriter Ink Eraser, large	.....	each, 10
3997	—Faber, Ink and Pencil Eraser	.....	each, 05

**"PERFECTION" ERASING RUBBER****Something new. The best erasive rubber yet produced.**

The "Perfection" is the highest achievement in the production of Erasive Rubber; it accomplishes its work with the greatest rapidity and ease; does it effectively and cleanly. It is unequalled in its quality as a Paper Cleaner, and its merit above all others is in the fact that it does not affect the surface of the material on which it is used, whether on Tracing Cloth, Drawing, Tracing, or Writing Papers.

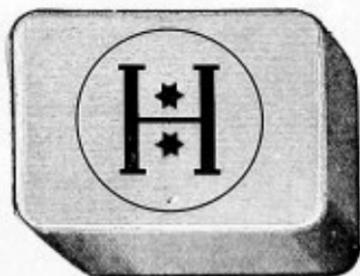
No.

3997A—"Perfection" Erasing Rubber—

Pieces to the box.....	40	30	20	12	8
Per piece.....	\$0 05	07	10	17	25

**HARDTMUTH'S PLIABLE RUBBER.****Made in Gray and Pink Colors.**

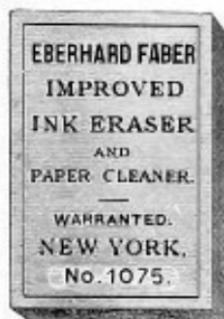
This Rubber is soft and will erase easily and without injury to tracing paper or other delicate drawing material used.



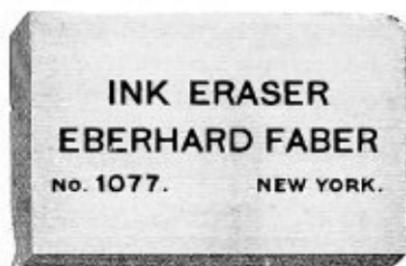
No. 3999.

No.	No. 4	8	12	20	30	40
3999—Hardtmuth's Pliable Rubber, gray.....each,	\$0 60	30	20	12	08	06
3999½—Hardtmuth's Pliable Rubber, pink.....each,	60	30	20	12	08	06

## INK ERASERS.



No. 4002 .



No. 4003.

No.			
4002	—Faber's Ink Eraser, small.....	each,	\$0 05
4003	—Faber's Ink Eraser, large.....	each,	10
4004	—Faber's Ink Eraser...extra large.....	each,	20

## FABER'S KNEADED RUBBER.



No. 4006.

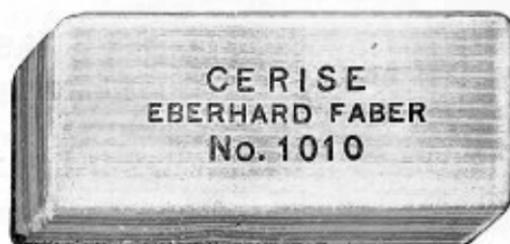
This rubber is very soft and while it removes every vestige of pencil marks, it will not abrade the finest surfaced papers.

No.			
4005	—Kneaded Rubber, small.....	each,	\$0 05
4006	—Kneaded Rubber, large.....	each,	10

## RUBY OR EMERALD ERASER.



No.			
4007	—Faber's Ruby or Emerald Eraser, small.....	each,	\$0 05
4007½	—Faber's Ruby or Emerald Eraser, large.....	each,	10

**"CERISE" ERASING RUBBER.**

No. 4009½.

The Cerise Rubber is a soft, pliable red rubber of finest grade. It erases quickly and effectively and does not injure the surface of the paper.

No.		
4008½	—Cerise Erasing Rubber, small.....	each, \$0 05
4009½	—Cerise Erasing Rubber, large.....	each, 10

**STEEL ERASERS.**

No. 4010.

No.		
4010	—Spear Blade, cocoa handle, 6¼-inch long.....	each, \$0 40
4011	—Spear Blade, ebony handle, 6¼-inch long.....	each, 45
4012	—Spear Blade, ivory handle, 6¼-inch long.....	each, 50

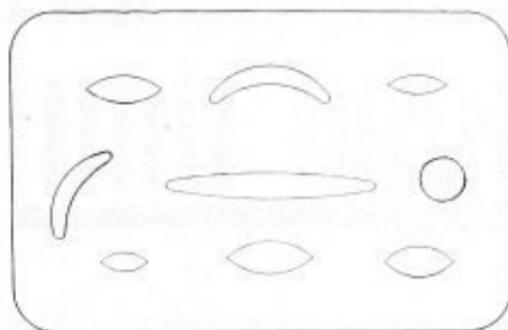


No. 4016.

No.		
4016	—Knife Blade, cocoa handle 6¼-inch long.....	each, \$0 50
4017	—Knife Blade, ebony handle, 6¼-inch long.....	each, 60
4018	—Knife Blade, ivory handle, 6¼-inch long.....	each, 75

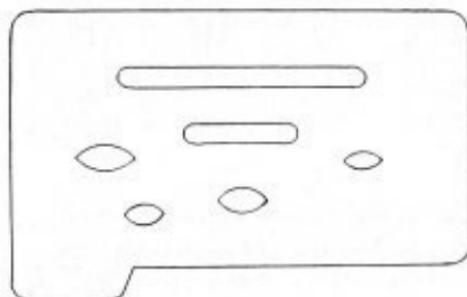
**ERASING SHIELDS.**

Made of thin, flexible metal, or transparent celluloid, with slots and holes of various sizes, so that small erasures can be made on drawings or on typewriting, limited in size to that of the opening on the shield.



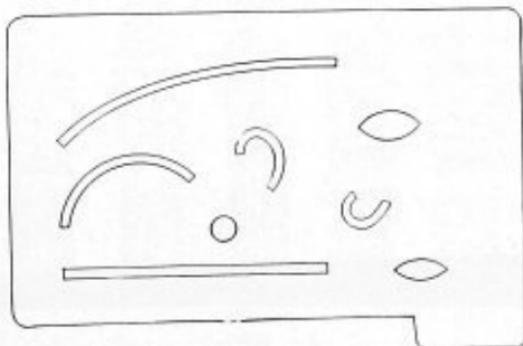
No. 4020.

- No.  
 4020 — Metal Erasing Shields, Nickel-plated,  $2\frac{1}{2} \times 3\frac{1}{4}$ ..... each, \$0 15  
 4020 $\frac{1}{2}$ —Celluloid Erasing Shields,  $2\frac{1}{2} \times 3\frac{1}{4}$ ..... each, 15



No. 4021.

- No.  
 4021—Celluloid Erasing Shields, transparent,  $2\frac{1}{2} \times 4\frac{1}{2}$  inches..... each, \$0 20



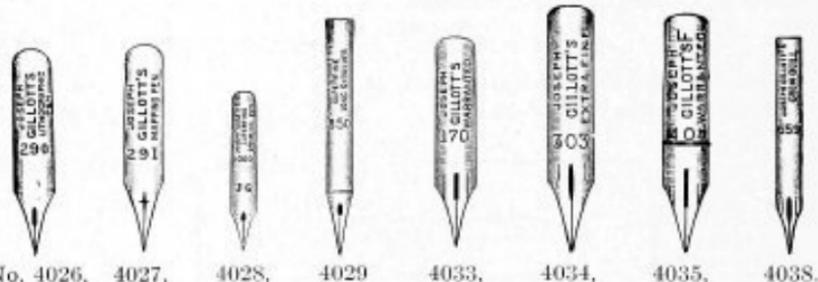
No. 4022.

- No.  
 4022—Celluloid Erasing Shields, transparent,  $3 \times 5$  inches..... each, \$0 25

## STEEL LETTERING AND DRAWING PENS.

(About  $\frac{5}{8}$  Actual Size.)

No. 4025.



No.

4025—Gillott's Crow Quills, pens on card, with holder (659).....	per doz.,	\$0 60
4026—Gillott's Lithographic Pens, on card, with holder (290).....	per doz.,	60
4027—Gillott's Mapping Pens, on card, with holder (291).....	per doz.,	60
4028—Gillott's 1,000 Pens, on card, with holder (1000).....	per doz.,	1 00
4029—Gillott's Crow Quills, long shoulder (850) on card with holder.....	per doz.,	75
4032—Blanz, Pouré & Co.'s Crow Quill on card, holder with each pen.....	per doz.,	40
4033—Gillott's No. 170 Pen.....	per doz.,	10
4034—Gillott's No. 303 Pen.....	per doz.,	15
4035—Gillott's No. 404 Pen.....	per doz.,	10
4036—Gillott's No. 290 Pen.....	per doz.,	50
4037—Gillott's No. 291 Pen.....	per doz.,	50
4038—Gillott's No. 659 Pen.....	per doz.,	50

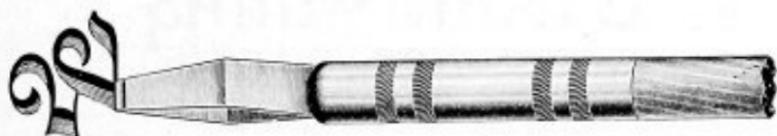


No. 4039.

No.

4039—Improved Crow Quill Pen Holder, ebony.....	each,	\$0 10
4040—Improved Mapping Pen Holder.....	each,	05

## AUTOMATIC SHADING PENS.

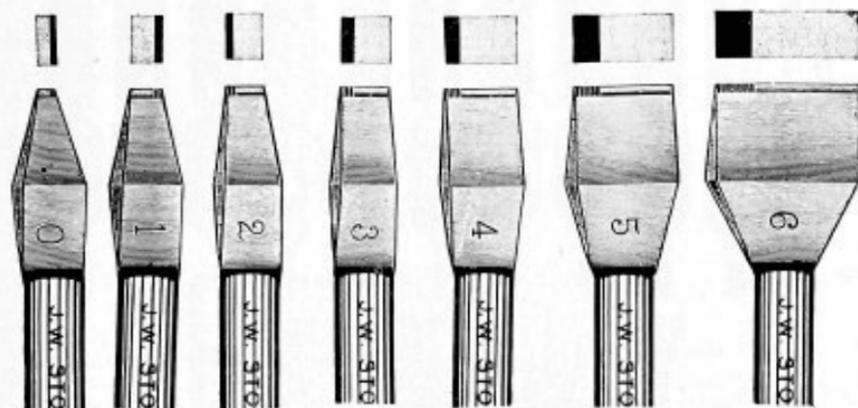


No. 4061.

No.

4059—Copy Book of Automatic Shading Pen Work, with 48 lessons . . . . . each, \$0 50

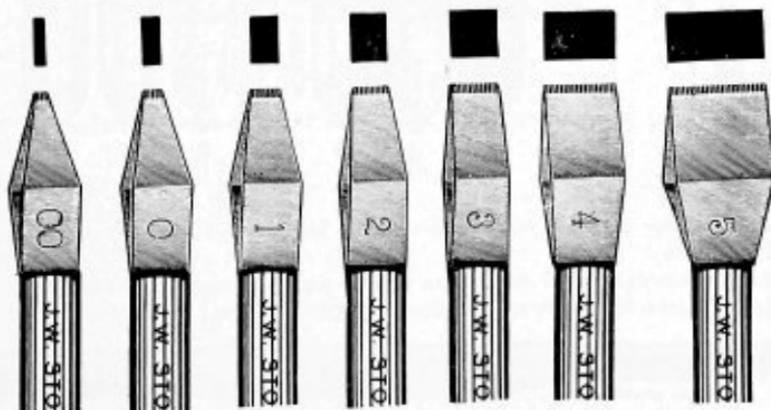
4060—12 Complete Alphabets, in neat case . . . . . each, 1 00



No.

4061—Automatic Shading Pens	No. 0	1	2	3	4	5	6	7	
Width of nib . . . . .	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{7}{8}$	in., each, \$0 15

## AUTOMATIC MARKING PENS.



No.

4061 $\frac{1}{2}$ —Automatic Marking Pens	No. 00	0	1	2	3	4	5	
Width of nib . . . . .	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{1}{2}$	in., each, \$0 15

4063—Shading and Marking Pen Ink, in colors as follows:

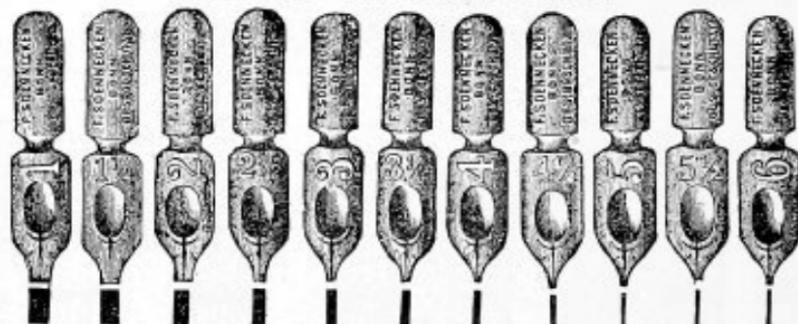
Black, Blue, Green, Purple, Scarlet, Yellow, Orange, Brown, per bottle, 20

# Round Writing

This beautiful style of writing can be easily acquired by self-instruction in a course of ten to twelve hours. Architects, engineers, draughtsmen cannot adopt a finer and more appropriate writing for lettering plans, maps, or other drawings.

Full directions, explaining the system of round writing, giving directions as to how to hold the pen, also examples to copy from, etc., are found in the Methodical Text Book, as listed under No. 4098.

## ROUND WRITING PENS.



No.	No. 4090.	
4090	—Pens, single-pointed, Nos. 1, 1½, 2, 2½, 3, 3½, 4, 5, 6, per ¼ gross .....	\$0 30
	Per gross, any size .....	1 00
4090A	—Assortment of 12 single-pointed pens on card .....	10



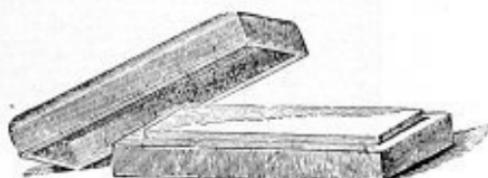
No.	No. 4095.	No. 4091.	
4091	—Pens, double-pointed, Nos. 10, 20, 30, 40, 50, 60, 70, 80, 90, per ¼ gross ..		\$0 75
	Per dozen .....		35
4092	—Sample assortment of single and double-pointed pens, 25 in box .....		35
4095	—Ink Holders, for single and double pens, per box of six, \$0.30 .....		05



No.	No. 4096.	
4096	—Penholder, for round writing pens .....	each, \$0 05
4097	—Double Penholder, for round writing pens .....	each, 05
4098	—Methodical Text Book on round writing .....	80
4099	—Copy Book on round writing .....	45

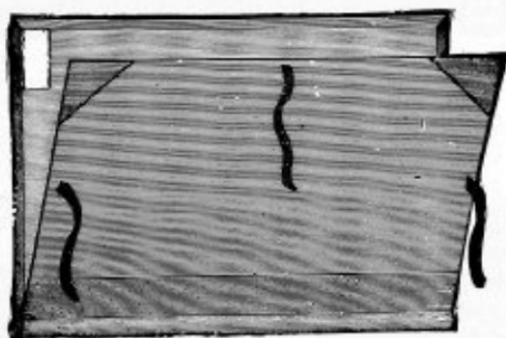
**ARKANSAS OIL STONES.**

No. 4120.



No. 4122.

No.	
4120	—Arkansas Oil Stone, wedge shape, about 1½ x 3-inch.....each, \$0 50
4121	—Arkansas Oil Stone, wedge shape, about 1½ x 4¼-inch.....each, 85
4122	—Arkansas Oil Stone, in case, with cover, 3-inch.....each, 85
4123	—Arkansas Oil Stone, in case, with cover, 5-inch.....each, 2 00

**PORTFOLIOS.**

No. 4130.

**Leather Backs and Corners, Cloth Sides and Flaps.**

No.	
4130	—12 x 16 inches.....each, \$0 90
4131	—17 x 22 inches.....each, 1 40
4132	—19 x 25 inches.....each, 1 75
4133	—23 x 31 inches.....each, 2 50
4134	—27 x 40 inches.....each, 6 00

**Cloth Back and Corners, Paper Sides.**

No.	
4135	—12 x 16 inches.....each, \$0 50
4136	—17 x 22 inches.....each, 70
4137	—19 x 25 inches.....each, 90
4138	—23 x 31 inches.....each, 1 25
4139	—27 x 40 inches.....each, 3 00

## RUBBER BANDS.

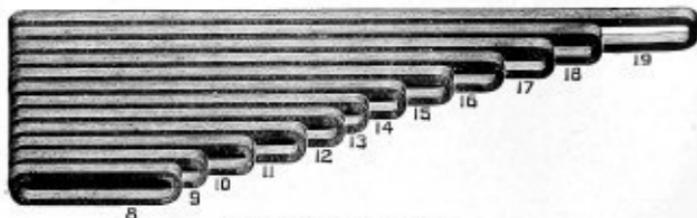


Illustration Full Size.

No.	Number	8	9	10	11	12	13	14	15	16	17	18	19
4150—Width 1-16-in, per gro.	\$0	15	18	20	22	24	27	28	30	35	40	45	50

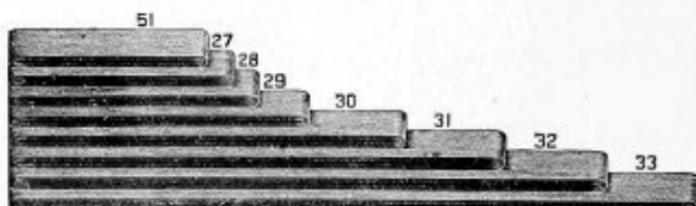
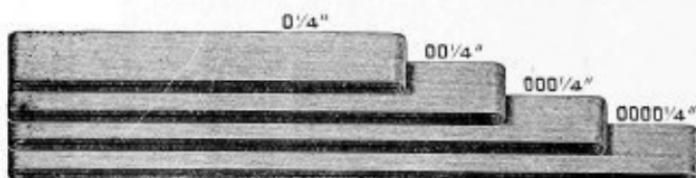


Illustration Full Size.

No.	Number	27	28	29	30	31	32	33
4151—Width $\frac{1}{4}$ -inch, per gross	\$0	50	60	65	70	80	92	1 00



No.	Number	0 $\frac{1}{4}$	00 $\frac{1}{4}$	000 $\frac{1}{4}$	0000 $\frac{1}{4}$
4152—Width $\frac{1}{4}$ -inch, per gross	\$1	00	1 25	1 50	1 75



4153—Rubber Bands, 1 gross assorted sizes, No. 300	each,	\$0 65
4154—Rubber Bands, 1 gross assorted sizes, No. 400	each,	35

Prices on Rubber Bands subject to change.

## LEMAIRE FIELD GLASS



No. 9100.



No. 9110.

**Lemaire, United States Signal Service Field Glass.** Made especially for those desiring a powerful and substantial glass. Oxidized metal mounting, fine leather body, six special high power lenses, with heavy stitched waterproof sole leather case and strap.

No.	Size:	21 Lignes.	24 Lignes.	26 Lignes.
9100—		\$16.00	\$18.00	\$20.00
9101—Same as No. 9100, with twelve lenses....			22.50	25.00
9102—Same as No. 9100, with branches to bend..			22.50	25.00
9103—Same as No. 9101, with branches to bend..			27.50	30.00
9104—Same as No. 9100, mounting of Aluminum....			38.00	40.00

**The Lemaire English Army Field Glass** is one of the most powerful glasses of this construction and will be welcomed by persons who use a field glass frequently, on account of its portability and power, the body being short and compact, the eye pieces extra large, admitting of more light, having a large field and exceedingly high power. Furnished complete in stitched sole leather waterproof case with shoulder strap.

No.	21 Lignes.	24 Lignes.	26 Lignes.
9110—Six lenses .....	\$18.00	\$20.00	\$22.00
9112—With twelve lenses.....	22.00	25.00	27.50
9113—Same as No. 9110, with branches to bend..		24.00	28.00
9114—Same as No. 9112, with branches to bend..		28.00	33.00
9115—Same as No. 9110, Aluminum, very light..		35.00	40.00

## THE GOERTZ TRIEDER BINOCULAR.



The invention of these glasses marks the greatest advance in optical science which has been made in years, affording better illumination, unusual focus, beautiful definition, with large and flat field, together with the increased and truly wonderful stereoscopic solidity gained by placing the object lenses farther apart than heretofore. They are rapidly taking the place of the old style Binoculars. The Trieder Binoculars surpass any glass on the market. They are constructed on an entirely new principle as a field glass, but in reality it is a Kepler telescope with the re-inverting agents for the image. They are more powerful than any other make of glasses, and possess an equal field of view, 8 to 10 times greater magnifying power, or at equal magnifying power 8 to 10 times larger field view.

No.	Linear Magnific'n	Surface Magnific'n	Actual Fld. of View	Sub. Fld. of View	Total Length	Price.
9120.....	3x	9x	13.3 deg.	40 deg.	2½ in.	\$38 00
9125.....	6x	36x	6.7 deg.	40 deg.	3 in.	46 00
9130.....	9x	81x	4.4 deg.	40 deg.	4 in.	54 00
9140.....	12x	144x	3.3 deg.	40 deg.	5 in.	62 00

The above glasses are all furnished with water-proof cases with shoulder strap.

N. B.—Special pamphlet fully describing these special glasses will be sent free on application.

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Same as above, but with plates cloth backed. . . . . 6.50
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- BICKNELL**—Detail, Cottage and Constructive Architecture. Containing 75 large lithographic plates. Published under the direction of A. J. Bicknell. Showing a great variety of Designs for Cornices, Brackets, Windows and Window Caps, Doors, Piazzas, Porches, Bay and Dormer Windows, Observatories, Towers, Chimney Tops, Balconies, Canopies, Scrolls, Gable and Sawed Ornaments, Fences, Stairs, Newels, Architraves, Mantels, Plaster Finish, etc., including 45 Perspectives, Elevations and Plans of Modern Designs for Cottages, with Details, and 18 Elevations of Summer Houses, Villas, Seaside Cottages and Country Houses, together with 14 Designs for Street and Store Fronts, with inside finish for Stores and Banks; also Framing for Dwellings, Barns, Exhibition Buildings, Roofs, Bridges, etc., etc., making in all a Practical Book for Architects, Builders, Carpenters, and all who contemplate building or remodeling wood, stone or brick buildings. One large 4to volume. . . . . 5.00
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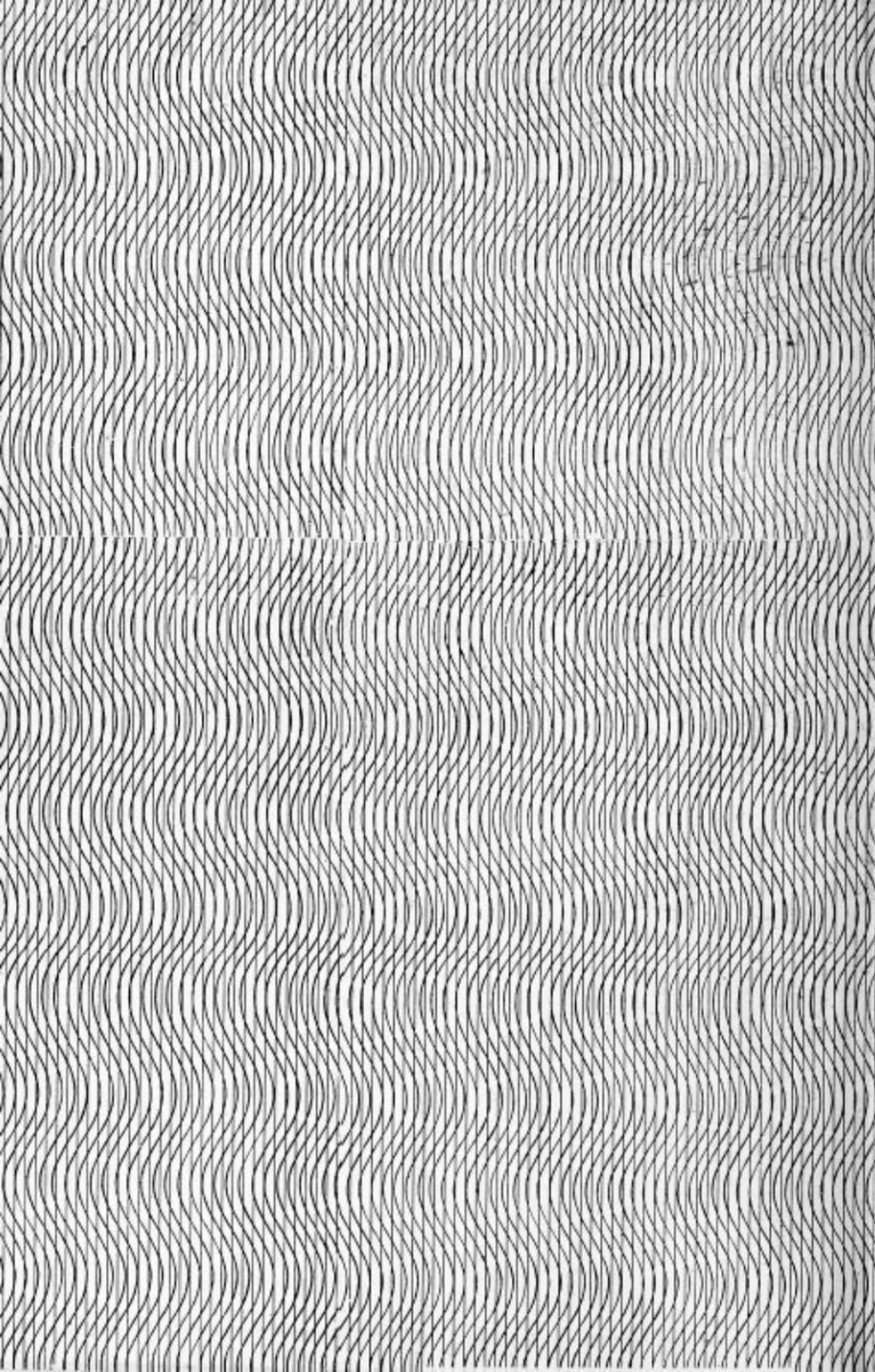
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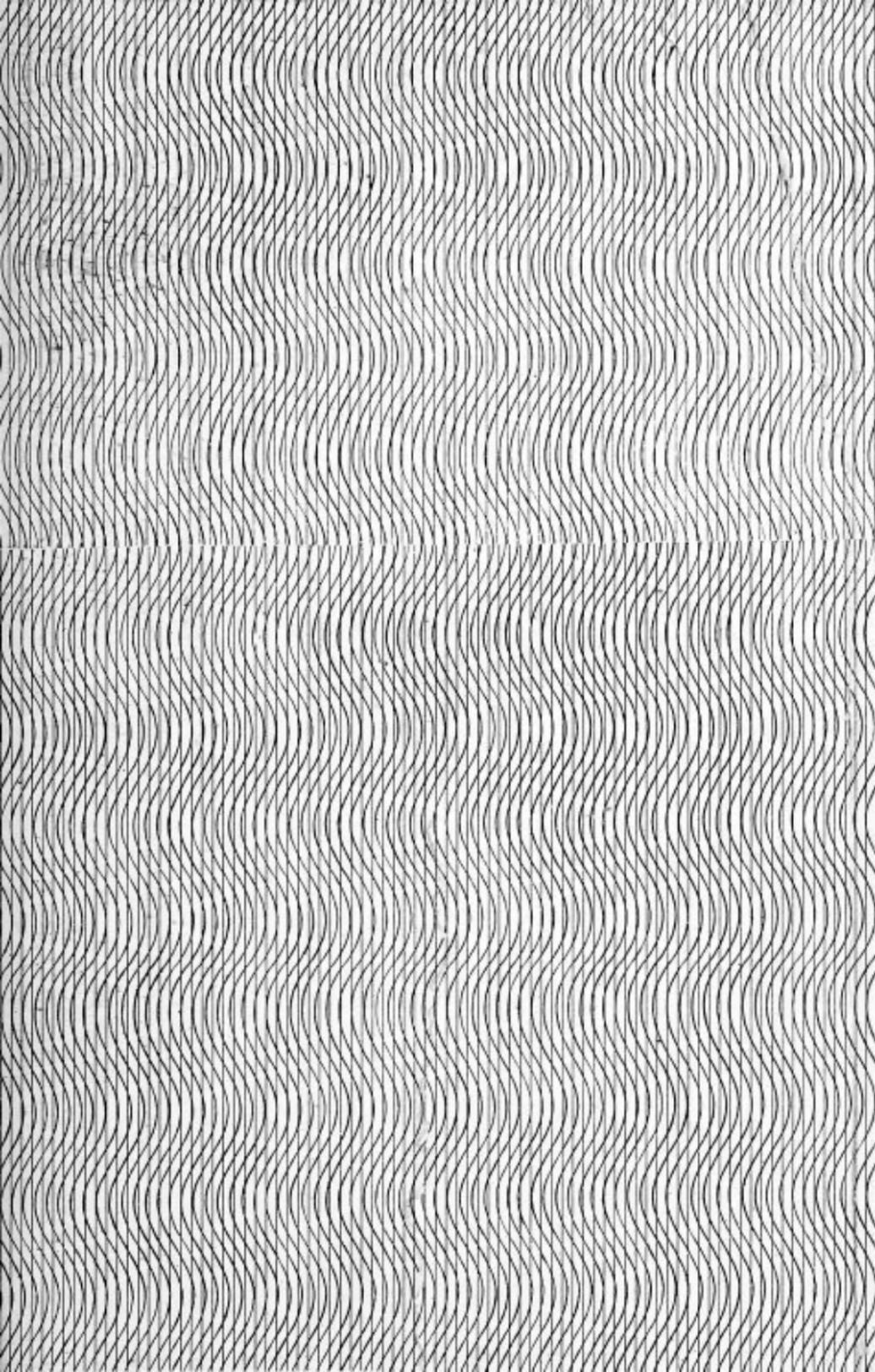
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