

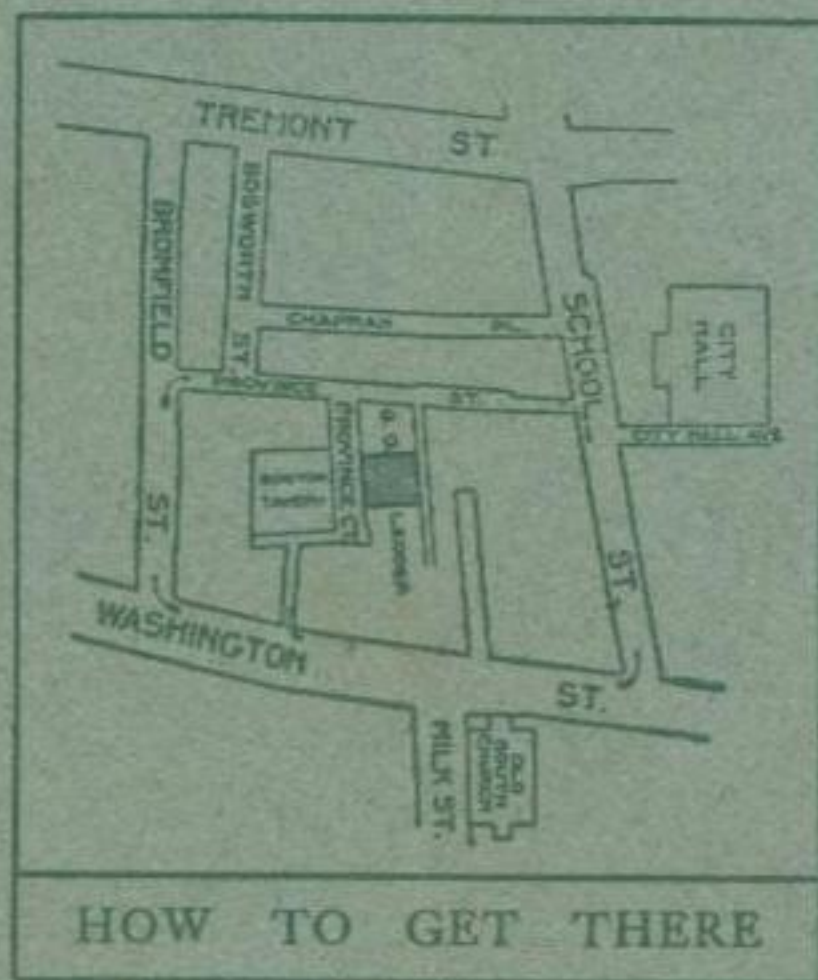
# G. G. Ledder

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## Surveying and Mathematical Instruments



Boston, Massachusetts

7337

SOLE N. E. REPRESENTATIVE OF THE  
BUFF & BUFF MFG. CO.  
JAMAICA PLAIN, MASS.

NEW ENGLAND AGENT FOR  
EUGENE DIETZGEN CO.  
CHICAGO · NEW YORK  
SAN FRANCISCO · NEW ORLEANS

ESTABLISHED 1899

# G. G. LEDDER

Formerly with Buff & Berger

## Surveying Instruments

### Drawing Materials

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ALL APPLIANCES FOR FIELD AND OFFICE

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Repairs of Instruments, Tapes, Drawing Tools, Experimental  
Work, Prompt and Reasonable

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9 PROVINCE COURT  
BOSTON, MASS.

Telephone 4202 Main

# Important Features of our Engineering and Surveying Instruments.

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The transits and levels illustrated and described in the following pages are of the most approved construction. The material employed is the best, the graduation most accurate, the telescope of the finest quality, and the workmanship and finish of the highest order.

## THE GRADUATION.

This is the most important feature in Transit instruments, every precaution is taken with regard to temperature and centering of plates on the dividing engine to obtain the best results.

The lines of graduation are perfectly straight, smooth, uniform in thickness and thoroughly black. With a strong reading glass the verniers graduated to 30" can be easily estimated to 10" by computing the spaces. The numbering of the degrees is from 0 to 360° both ways, the figures inclined in the direction they should be read, but are also made any other style desired by the purchaser. The limb and verniers are exactly in the same plane, which excludes all parallax.

The verniers are marked A and B and read exactly opposite on any part of the circle, and to facilitate the reading of the graduation, ground glass shades are placed over the vernier openings if desired.

## THE TELESCOPE.

Particular attention is paid to the selection of lenses for the telescopes, The object glasses are perfectly achromatic, well centered and of the clearest definition; the eye pieces give a large flat field and good light. The lenses are ground by the very best opticians to a recalculated formula and are mounted in the best possible manner.

## THE COMPASS.

The transit compass is graduated to half degrees and figured to quadrants, although we sometimes are called upon to figure the circle from 0 to 360° especially when the instrument is to be used for

Mine work. It is covered by heavy crystal glass. The form of the needle is the so-called bar needle and is about 3-100" thick and 8-100" deep; the ends form a sharp vertical edge. The center is jewelled and is perfectly balanced on a hardened center-pin. When the needle is not in use it must be lifted from the center by its lever to avoid unnecessary wear.

### **CENTERS.**

It is of equal importance that the centers of the Transits and Levels be made of the proper material and accurately fitted.

The inner centers of the transits are made of bell metal, having long tapers and large substantial flanges. The outer centers are made of phosphor bronze, and are so constructed that the center of gravity is nearer the the tripod head than any other style. Great care and skill is exercised to make the centers fit throughout their length without undue friction, and to have them truly spherical.

The centers of the Engineers' Levels, where the presence of steel or iron is not prohibitory can be made of steel if desired at additional cost.

### **LEVEL VIALS.**

First class levels are essential in a good instrument. The level vials furnished with our instruments are ground to a perfect curve of any desired sensitiveness and are carefully selected in accordance with the use of the instrument for which they are intended.

### **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 almost 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 uniform.

### **CARE OF INSTRUMENTS.**

With proper care high grade instruments will last for very many years. In field use, instruments are necessarily exposed to the heat of the sun, dust and water, which exposure, of course has a tendency to affect the accuracy of the instrument.

A few remarks may not be amiss to further guard against mis-use of the instrument. For instance, when working in the hot sun, the instrument should be provided with a shelter of some sort—an awning or umbrella should be held over it. This precaution will guard against undue expansion and preserve the finer parts of it, such as the telescope slide, the lenses, the centers, the edges of graduation, verniers, etc., therefore manipulating it under an umbrella or shade will insure more accurate results than when carelessly exposed. The best protection for a transit when not in use, is a waterproof silk bag; for levels, a gossamer. The gossamer covers frequently contain sulphur which would blacken the silver limb of a transit.

In cleaning object and eye-piece glasses, use a soft rag or chamois leather. If the glasses should become greasy or very dirty, clean with a rag dipped in alcohol. If dust should settle on the cross wires, take out the eye-piece and object-glass and gently blow through the tube.

It is advisable to look sometimes after the fittings of the tripod legs and shoes. If there is any shake in the legs, or any shoe loose, the instrument cannot be steady. There should be no delay in repairing defects. If an instrument is upset, bending centers and plates *do not turn unnecessarily*, as it will spoil the graduation, but send it to a competent instrument maker immediately.

Always set the tripod legs very firmly upon or in the ground before leveling up.

## REPAIR OF INSTRUMENTS.

Injuries to instruments are sometimes more serious than is at first supposed. Repairs in such cases consume a large amount of time, and the charges seem excessive. When considered, however, that serious injury to the centers alone involves recentering of the graduations and the compass-needle pivot, and the complete readjustment of the whole instrument, the engineer may form a fair idea of the amount of time consumed. It is therefore advisable not to limit the repairs to certain parts, but authorize the maker to put the instrument into *complete and thorough working order*. All modern and well-made instruments can be put again in first class condition.

The transit being more complicated than the level, will cost more to repair. Bent plates can in most cases be repaired unless the graduated edges are badly damaged. The cost of repairs for injured plates, centers and tangent screws, may vary from \$10 to \$30. Regrading and refiguring costs from \$10 to \$20. The cost of cleaning, oiling and adjusting an instrument, from \$5 to \$8. Adjusting and remagnetizing the

needle, \$2. New cap, needle and pivot, \$5. New compass glass, best French crystal, \$1. Small level-vial, \$1.50 Telescope level-vial graduated on the glass, \$3 to \$4.

Repairs of levels vary from \$4 to \$15. Should a new center be required or the telescope be seriously injured, the cost may reach \$25 or \$35. New level-vial, accurately ground, graduated and of any desired sensitiveness, from \$3 to \$5.

The above figures will give an approximate idea of the cost of repairs. All instruments sent to me will be repaired conscientiously, and at prices depending on the amount of time consumed.

### **HOW TO SEND INSTRUMENTS FOR REPAIRS.**

In sending instruments for repairs, pack with the same care as a new one, because careless packing will often cause as much or more injury than the original defects. Place the instrument in its place, having all the parts clamped, and fill the same with some elastic material, such as paper or excelsior cushions. Place the case in a packing box about an inch larger all around, and fill the bottom and sides with the same material. Fix top of the box in such manner that it can be handled by the strap of the instrument case, and mark:—

**THIS SIDE UP — HANDLE WITH GREAT CARE.**

Tripods, unless in need of repairing, should not be sent.

### **SECOND HAND INSTRUMENTS.**

As oftentimes a good second hand instrument may answer all purposes, I have for many years made a specialty of buying, selling, exchanging and renting, all kinds of transits, levels and other surveying implements.

I generally have on hand an assortment of these instruments suitable for engineers, architects and contractors, every one in perfect order and adjustment ready for immediate use. Interested parties will be furnished full information.

### **IMPORTATION.**

For colleges and schools, I can furnish transits, levels and other scientific instruments of American pattern at greatly reduced prices.

### **SPECIAL INSTRUMENTS.**

I am prepared to make special instruments or special parts for any instrument, to order. If such parts deviate from the standard sizes, I

request at all times a drawing or sketch showing and fully explaining the style that is wanted. A sketch is also requested if special figuring of the transit circles and compass is desired.

## REPAIRING OF TAPES AND DRAWING INSTRUMENTS.

I am fully equipped to make, as far as possible, repairs to all steel or metallic tapes and drawing instruments that are out of order, broken or needing new parts.

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# The Buff Precise Engineers' and Surveyors' Transits.

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The Buff instruments represent the highest quality and the latest approved designs, constructed under the personal supervision of Mr. Geo. L. Buff, formerly of Messrs. Buff & Berger. They are especially built for City - Land - Mine - Bridge and Water Works Surveying and guaranteed to do this work with the utmost accuracy and despatch.

The sensitiveness of the Spirit Levels is equal to that of many wye levels. The lens system is entirely recalculated, giving an unsurpassed large and clear field. Verniers are either placed at 90° or 30° to line of sight. Tripods regular split or extension style

The following tables give an oversight of the different standard sizes made.

	Wt.	Dia. of Graduation	Length Needle	Power Erecting Telescope	Power Inverting Telescope
No. 1	14 lbs.	6¼ in.	4½ in.	26.5	29.
1½	12½ "	6¼ "	4½ "	22.5	25.
2	10 "	5½ "	3¾ "	22.5	25.
3	7 "	4½ "	3¼ "	18.	21.
4	5 "	4 "	2¾ "	17.	20.

The Buff Mine Transits are also made in all the above sizes and at same prices as quoted on the regular styles. Improved extension tripod furnished with these instruments, unless otherwise specified. Ends of telescope axis should be ordered threaded and protected by caps so that a side telescope can be attached whenever desired in the future. Cost extra \$4.00.

# Specifications for the Buff Precise Transits.

Graduation, with two double opposite verniers to minutes. Two rows of opposite inclined figures 0-360°. Graduations silvered and covered by crystal plate glass, two ground and graduated sensitive plate levels.

The Telescope, either Erecting or Inverting, is balanced, and reverses at either end; improved eye-piece, unsurpassed large, clear field. Sensitive level bubble to telescope with clamp and tangent. Adjustment for vertical plane of telescope and line of collimation is correct for all distances.

Improved lower and upper spring tangent clamps, shifting center with  $\frac{5}{8}$  inch adjustment.

Long taper centers with wide flanges. Weather-tight compass box. Compass needle is of the latest and preferred form.

Tripod, improved split leg or extension form with thumb-nuts.

Mahogany case is fitted with strap, lock and hooks, and contains plumb-bob, pocket magnifier, sun shade, wrench, screwdriver, etc.

The standards of the Buff transits are cloth finished unless advised to the contrary. See extras.

## PRICE OF EXTRAS TO ENGINEERS' TRANSIT.

If ordered with New Instruments.

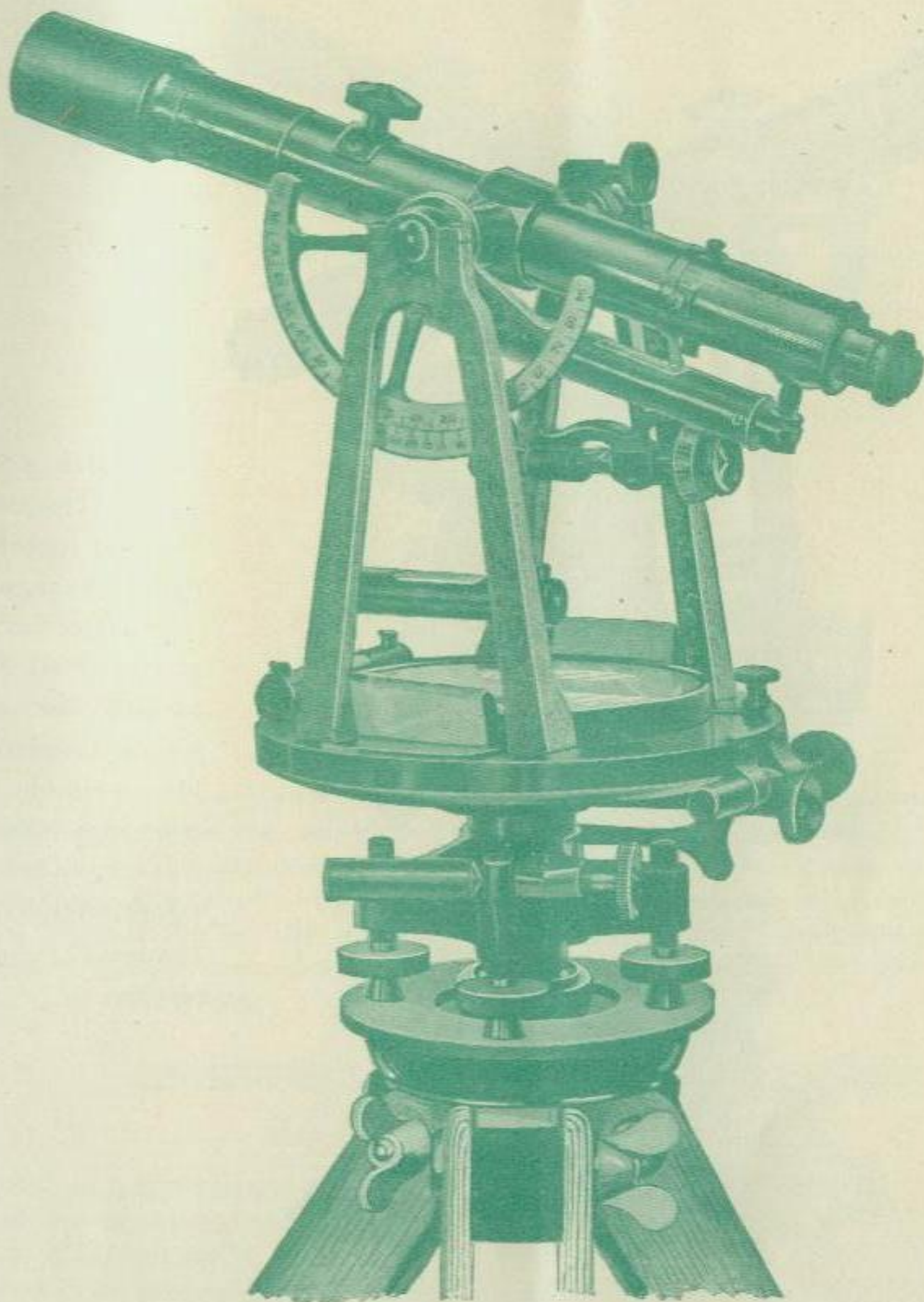
Vertical arc with vernier reading to minutes	\$15.00
Graduation, horizontal circle, solid silver	10.00
"    "    "    reading to 30"	10.00
"    "    "    "    "    20"	20.00
"    full vertical circle, instead of arc	5.00
"    vertical circle, solid silver	5.00
"    "    "    reading to 30"	5.00
Double opposite verniers for vertical circle reading to minutes	20.00
Detachable reading glasses for the vertical arc	8.00
"    "    "    "    "    horizontal verniers	12.00
Standards, finished black or bronze	3.00
"    "    bright	5.00
Extension tripod—wt. 9½ lbs. (or can be ordered instead of stiff leg)	16.00
Ground Glass Shades to vernier	3.00
Gradienter attachment	5.00
Stadia wires, fixed	3.00
Variation plate and ring	10.00
Arrangement for offsetting at right angles	5.00
Aluminum guard to protect vertical circle	4.00
Prism attachable to eye piece	8.00
Large Prism and colored glasses	12.00
Davis' Solar Screen	6.00
Detachable side telescope with counter-poise	35.00
Scott's detachable auxiliary top and side telescope, for either top or side with counter-poise	45.00
Reflector for illuminating cross wires	4.00
Axis threaded to receive Side telescope	4.00
Extra figuring or graduating deviating from standard	1.00
Waterproof bag to cover instrument	.80
Superfine watch oil to lubricate centers	.20
Leather covers over case	9.00 to 12.00
Shoulder straps for same	2.00



# Buff Precise Transit.

(Design patented)

No. 1 B.



## ENGINEER'S AND SURVEYOR'S TRANSIT

Size No. 1. Weight about 14 lbs.

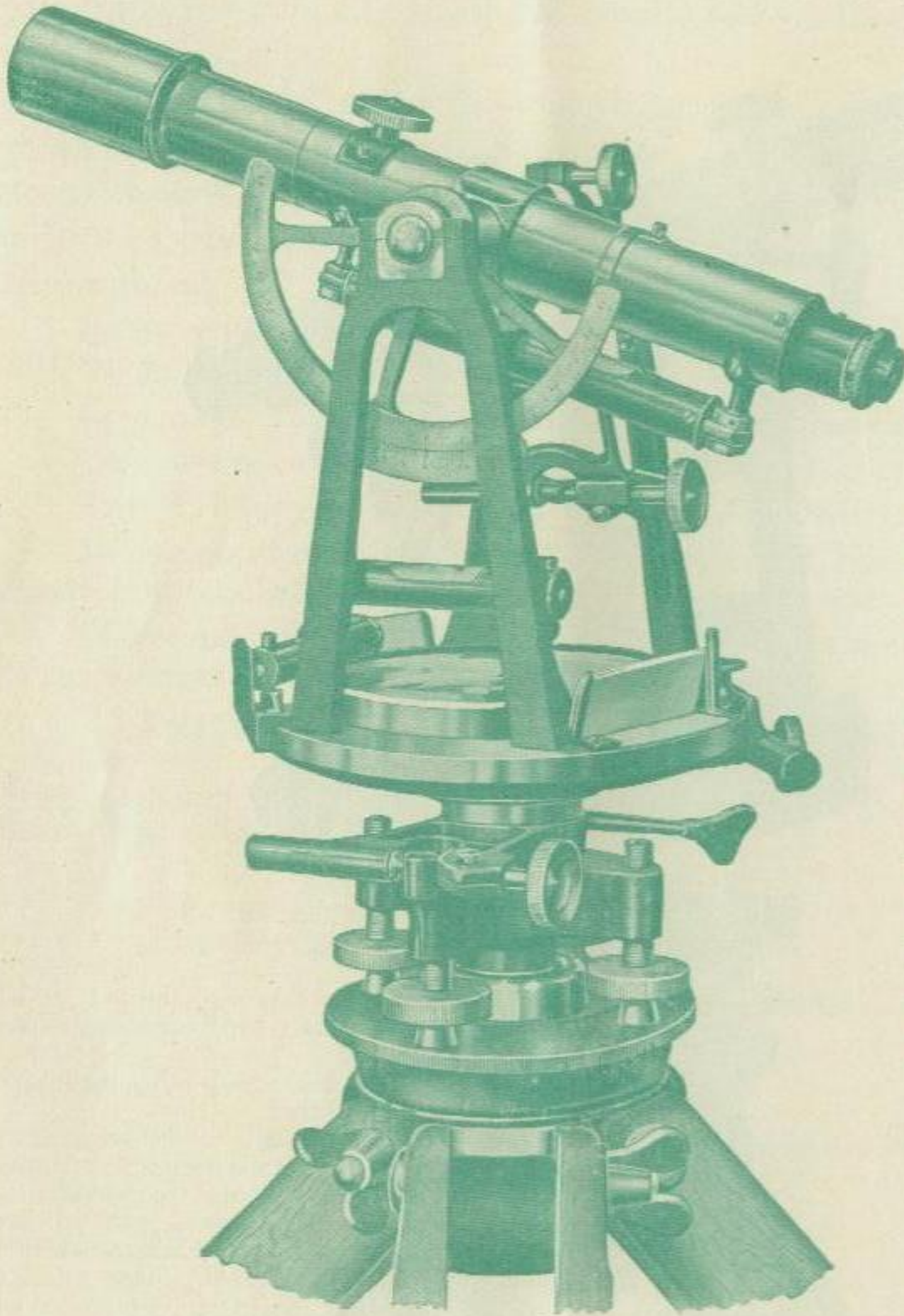
Plain Transit (without level to telescope or arc) . . . . .	\$180.00
No. 1 a (with level and clamp to telescope) . . . . .	210.00
No. 1 b (with level, clamp and arc to telescope) . . . . .	225.00
No. 1 c (with level, clamp, full verticle circle protected by aluminum guard) . . . . .	234.00

For other extras see page 8.

# Buff Precise Transit.

(Design patented)

No. 2 B.



This size of Engineer's Transit in design is identical with the regular larger size, but on account of decreased size and weight is admirably adapted for work of a reliable nature where a lighter weight instrument is desirable.

## ENGINEER'S AND SURVEYOR'S TRANSIT

Size No. 2. Weight about 10 lbs.

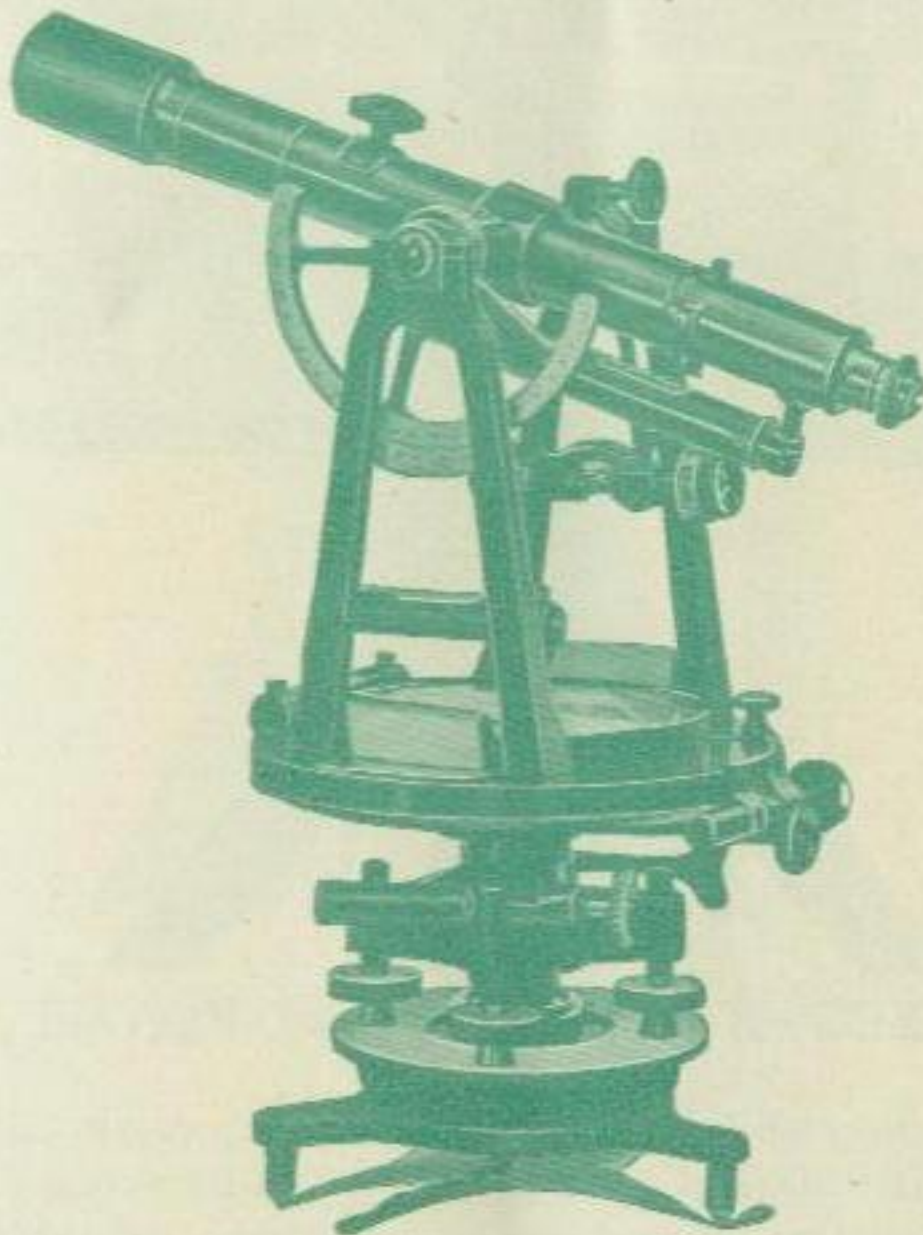
Plain Transit (without level to telescope or arc) . . . . .	\$180.00
No. 2 a (with level attachment to telescope) . . . . .	210.00
No. 2 b (with level attachment to telescope and vertical arc) . . . . .	225.00
No. 2 c (with level attachment to telescope, full vertical circle protected by aluminum guard) . . . . .	234.00

For other extras see page 8.

# No. 3 and No. 4 Buff Engineer's Transits.

(Design patented)

## No. 3 B.



In response to many requests the Buff & Buff Mfg. Co., has introduced the No. 3 size which is larger and somewhat heavier than the No. 4 Buff Transit. This latter proved in many instances not rigid enough and too light in a heavy wind and it can be confidentially pronounced that the No. 3 instrument is the ideal one where moderate weight, but at the same time, accuracy and good results are required. Its compact form recommends it especially to engineers who have to travel extensively with their instruments.

### ENGINEER'S AND SURVEYOR'S TRANSIT

Size No. 3. Weight about 7 lbs.

No. 3 c (with full vertical circle and aluminum guard)	\$224.00
No. 3 b (with vertical arc in place of vertical circle and without aluminum guard)	215.00
No. 3 a (with level, clamps and tangent to telescope only)	195.00
No. 3 Plain transit (without level to telescope or arc)	175.00

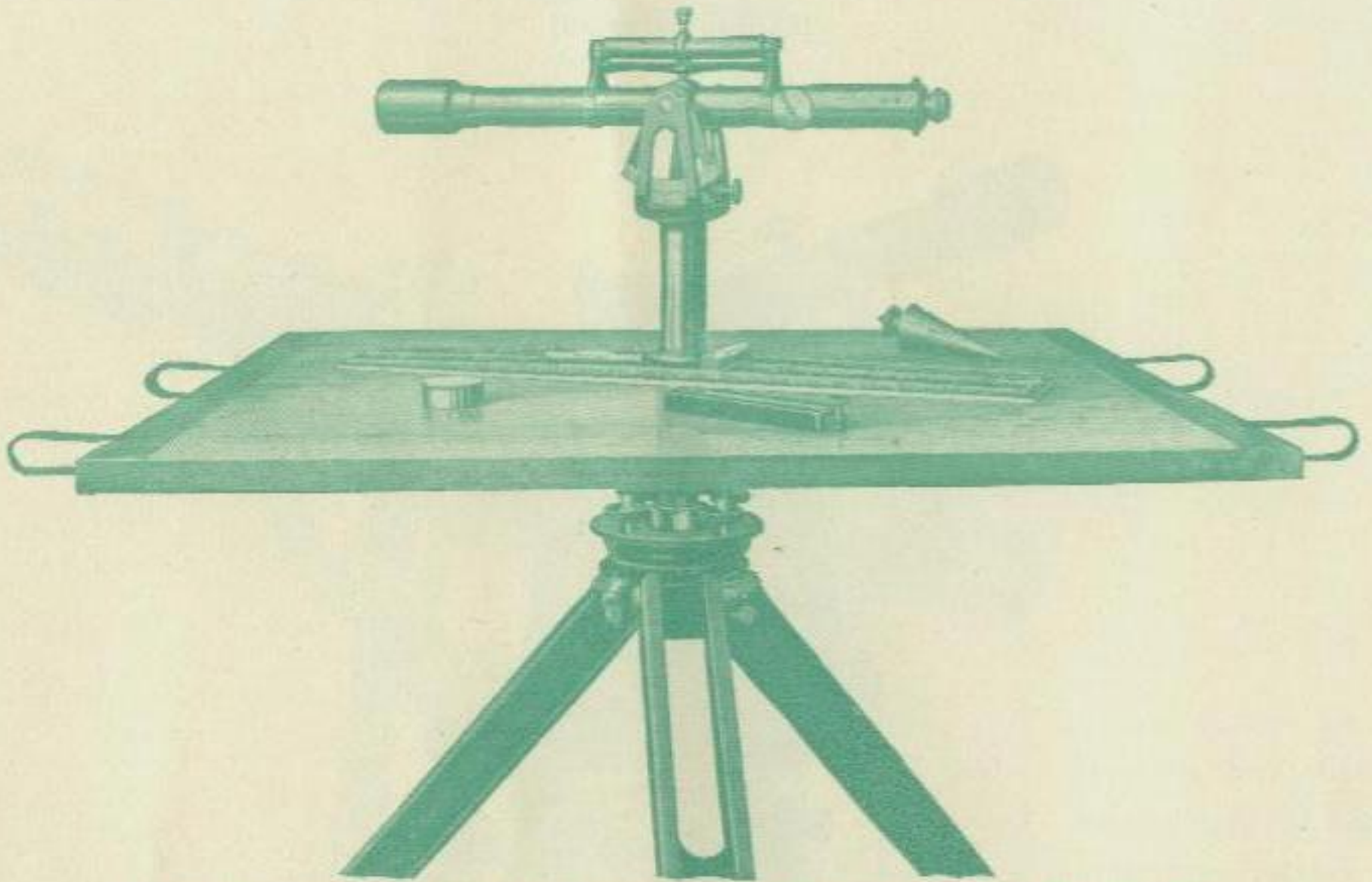
### RECONNOISSANCE TRANSIT

Size No. 4. Weight about 4 3-4 lbs.

No. 4 c (with full vertical circle and aluminum guard)	\$224.00
No. 4 b (with vertical arc in place of vertical circle and without aluminum guard)	215.00

For extras see page 8.

# The Buff Plane Table.



## THE TELESCOPE ALIDADE FOR PLANE TABLE.

### Its construction.

The telescope is the best and most powerful for such work. It has a focal length of 16 inches and aperture of  $1\frac{3}{8}$ " with power of 35 diameter. It is equipped with stadia wires accurately set 1 in 100 and has a vertical arc of 5 inch radius with graduations on edge and read by vernier to single minutes placed so as to be read from eye end. The striding level is long and especially sensitive. The levelling bubbles are fixed to standard and ruler. The latter is arranged in skeleton form 22" long and with fiducial edge true and accurate. Lines can be ruled in the vertical plane of collimation. The adjustment of the line of collimation is made by reversing telescope laterally in its bearings.

Workmanship is of the highest grade, and finish is bright throughout. Price of alidade complete with box-compass, \$150.00. Weight about 7 lbs.

## THE TRIPOD. MOVEMENT AND BOARD.

Our tripod movement is cast in hard composition, and though we can make same in aluminum at some saving of weight, we do not recommend it as better. The general scheme of our improved movement is "a quick leveling arrangement" of two oblique planes, which is more secure, rigid and speedy than the so-called Johnson Type. The points of support for our movement include a larger base and give a stiff support under all conditions of wind pressure.

The method of levelling is instantaneous and the board revolves in a horizontal ring bearing. All movement is clamped securely by but one wing nut of ample size. There is no tangent screw for slow motion as table can be accurately set by hand employing the further edges of the board.

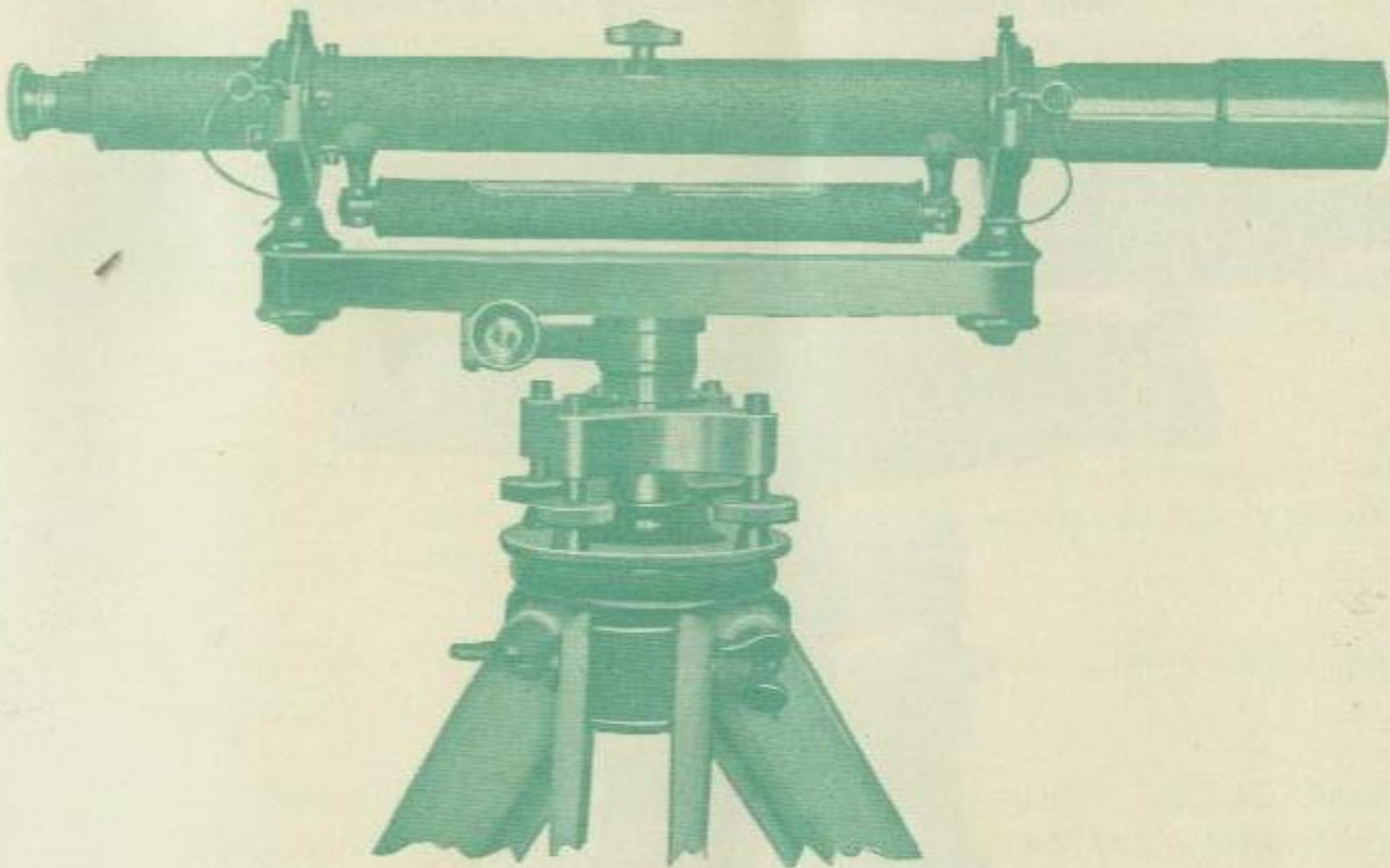
The entire movement, complete with legs, weighs but a pound more than the regular tripod for a transit.

The price complete of tripod and movement, including quick levelling arrangement is \$45.00.

Price of plane table drawing board (24" x 28") \$12.00.

Price of larger tripod and movement (Weight, 19 lbs.) \$70.00.

# Buff Engineers' 14 $\frac{1}{2}$ " and 18" Wye Level.



POWER, 28 AND 36 DIAMETER RESPECTIVELY.

Improved telescope, having extra large objective and giving increased illumination and clearness. Protection to object slide. Erecting or inverting eye-piece, giving large, flat field of view. Phosphor-bronze contact points in wyes for bell-metal collars. Regular bell-metal center in socket of phosphor-bronze. Line of collimation correct for all distances. Instrument finally adjusted to obtain the finest possible results, with sun-shade in position and focused, on mean distance. Complete in mahogany case with straps and hooks, sun-shade, wrench, screw-driver, adjusting pins, etc. Telescope and level tube cloth finished.

Unless otherwise ordered, the sensitiveness of spirit level will be one division of vial equal to 10" of arc.

Net price, \$135.00 and \$140.00 (weight 9 $\frac{1}{2}$  and 11 lbs.) respectively.

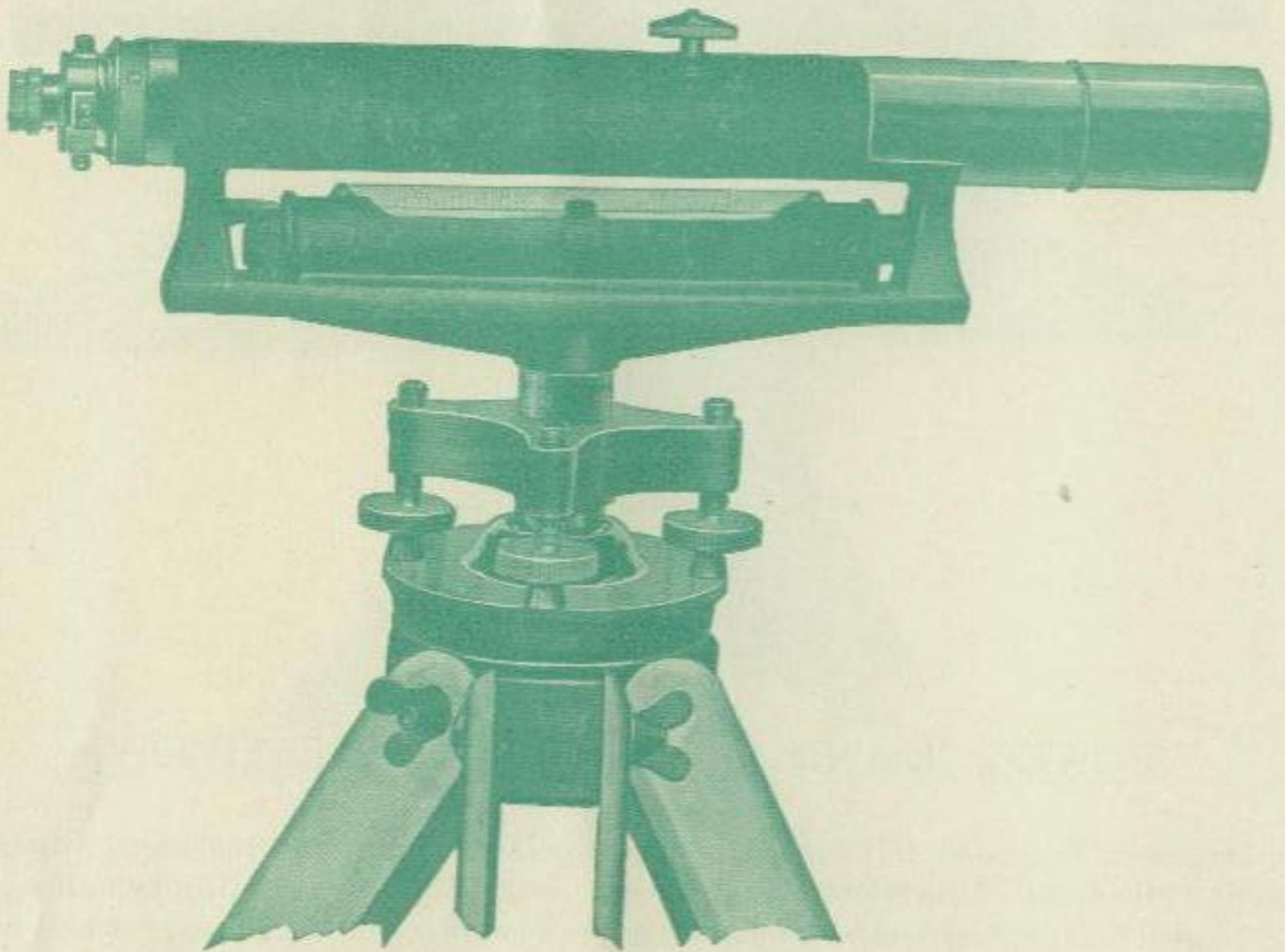
When a specially sensitive spirit level is ordered, *the steel and iron center*, as listed below, is strongly recommended as securing the highest results,—giving the ideal bearing.

## EXTRAS.

Auxiliary micrometer screw for rapid levelling . . . . .	\$18.00
Hardened steel center in phosphor-bronze socket . . . . .	10.00
"    "    "    "    annealed iron    "    . . . . .	10.00
Fixed stadia wires . . . . .	3.00
Extra sun-shade, having smaller aperture for use when light is too bright for accurate work . . . . .	1.50
Metal, silver-plated mirror, jointed arms, to read bubble without changing position . . . . .	10.00
Waterproof bag, of rubber, to protect the level from rain . . . . .	.80
Bottle of superfine watch oil to lubricate the centers . . . . .	.20

# Buff Engineers' Dumpy Level

With either inverting or erecting 17½ inch telescope.



With a dumpy level of improved make, in correct adjustment, equally accurate work can be done as with the Wye level, since the same sensitiveness of level-bubble is put into this instrument as into a regular Wye level with an objective of the same focus and diameter, giving the same power of 35 diameters.

Particularly for work of a rough nature where liability to slight knocks is present (that would seriously injure a Wye level) the dumpy level shows at its best.

Close work can be performed with this level,—and one feels reasonably sure that the adjustments once made, will keep so indefinitely.

Entire instrument is cloth-finished above the leveling screws, including telescope and bubble tube.

The centers of this instrument are of the regular type that are put into transits, being the hardest bell metal and phosphor-bronze, which are most carefully fitted to a true bearing shoulder.

The instrument is packed in mahogany case, with sun-shades, screw-driver, wrench and adjusting pin.

Weight of level, complete, 9½ lbs.

Weight of tripod, regular type, 7 lbs.

Price, complete as above, \$100.00.

The inverting eye-piece in this instrument provides our most ideal telescope for brilliancy and clearness,—power,—36 dia.

For extras see page 13 (Wye levels).

# Buff Current-Meters.

The various types of current-meters — both electrical and mechanical registering, as made by us in the past — have been entirely remodelled and reconstructed and we can now recommend them as being the highest and most accurate instruments ever put on the market.

No. 4. Current-meter with electric register, after Gen. Ellis, embraces a meter applicable to deep-river measurements. In design it is similar to the vanes of the customary wind velocity measuring apparatus.

No. 5. Current-meter, after A. Fteley, embodies an enclosed type of wheel similar to the turbine water-wheel.

No. 7. The latest type of meter, and a successful type for delicate measurements, consists of a propeller form of wheel, and the employment of ball-bearings. Prices and specifications furnished on request.

## FTELEY & STEARNS METER.

This meter was especially designed for observation upon rivers, streams, conduits, etc. The registering apparatus is mechanical, but for lengthy observation we equip it with electric counter. The wheels and mechanism are protected from all obstruction, and are completely encased. The operating cam is thrown in and out of gear by a string, alternate pulls engaging or disengaging the counting wheels.

The electrical connection is made by insulated cable to the commutator of the register wheel. The brush is of fine platinum wire and can be set so as to record whole or half revolutions.

Price of complete Meter No. 5, with complete recording mechanism, and 12' of brass tubing in sections made to screw together, all complete in case, \$150.00

Price of electric counter reading to 999999, with switch, cable and batteries, \$50.00

Three dry cell battery in box with lock and strap . . . . .	\$ 4.00
Three wet " " " " " " " " . . . . .	7.00
Insulated wire, double conductor under one cover, per ft. . . . .	.05
Brass tubing graduated to feet and 10", jointed in 4-foot lengths, per length . . . . .	4.00
Irridium bearings for meter, extra . . . . .	10.00

The use of a good current-meter ensures the accuracy of results so important in conduit and river measurements, and our Fteley & Stearns meter is of the highest grade and guaranteed accurate.

## Gurley's Surveying Instruments

On the following pages are shown the Instruments as made by the well known firm of W. & L. E. Gurley, Troy, N. Y. and most of them I carry in stock ready to use. They are of the latest design, made to my special order, guaranteed to be first class in every respect and every one who will carefully examine these instruments will find the above statement correct.

The Gurley Engineers' and Surveyors' Transits are made in three sizes as follows:—

4 in. needle	weight about	12½ lbs.
4½ " "	" "	14 "
5 " "	" "	16 "

Weight of Tripod from 8 to 10 lbs.

The regular round leg tripod is furnished with all the Gurley transits and levels but a split-leg tripod is strongly recommended with any of these instruments as being lighter and more rigid. This tripod costs \$2.00 extra. An improved extension leg tripod with any of these instruments costs \$5.00 extra.

### SPECIAL INFORMATION FOR THE GURLEY TRANSITS.

A Transit with "plain" telescope is one *without* any attachments or extras, such as the clamp and tangent, vertical circle and level.

Transits Nos. 1 to 105 are furnished with shifting center to the levelling-head, and with a tripod and levelling-screws and clamp and tangent to spindle.

The limbs of Transits, Nos. 1 to 102, are graduated on *sterling silver*. The graduation is to half degrees, and is read by vernier to single minutes. A finer graduation is furnished, if desired, at an extra price. See page 17.

The vertical circles and vertical arcs are also graduated on sterling silver. The circle of 3½-inch diameter is graduated to whole degrees and is read by vernier to 5'. The circle of 4½-inch diameter and the arc of 2½-inch radius are graduated to half degrees and are read by vernier to 1'. The arc of 3-inch radius is graduated to 20' and is read by vernier to 30".



A variation arc furnished with any new Engineers' Transit, Nos. 1 to 16, costs extra \$4.00.

All Transits, Nos. 35 to 102, have a variation arc for setting off the variation of the needle.

Stadia wires are furnished without extra charge if requested when ordering a new Transit, Nos. 1 to 117. When desired, we arrange the stadia wires to disappear, or be out of focus, when the plain cross-wires only are in use.

A dust-guard to the object-glass slide is furnished without charge if requested when ordering a new Transit, Nos. 1 to 90 and 110 to 117; but, if furnished with a new Transit, Nos. 100, 102, the extra cost is \$4.00.

Reflectors to the limb verniers are furnished without charge, if requested, with new Transits Nos. 1 to 90; but if furnished with a new Transit, Nos. 100 and 102, the extra cost is \$2.00

Each Transit is packed in a mahogany case, with lock and leather strap, and has a plummet, reading-glass, adjusting pins, etc.

## ATTACHMENTS AND EXTRAS FOR GURLEY TRANSITS.

Dust-Guard to object-glass slide . . . . .	\$ 4.00
Rack and pinion movement to eye-piece . . . . .	5.00
Sights on telescope with folding joints . . . . .	8.00
Sights on standards at right angles with telescope . . . . .	8.00
Detachable side telescope and counterpoise for vertical sighting . . . . .	25.00
Detachable riding telescope for vertical sighting . . . . .	25.00
Reflector for illuminating cross-wires . . . . .	4.00
Reflector " " " of large Y-level . . . . .	5.00
Diagonal-prism for eyepiece of telescope . . . . .	8.00
Plummet-lamp for mine engineering . . . . .	10.00
Quick-levelling attachment . . . . .	6.00
Graduation of limb to read to 20 or 30 seconds, extra . . . . .	10.00
Graduation of limb to read to 10 seconds, extra . . . . .	30.00
Graduation of 4½ or 5-inch vertical circle to read to 20 or 30 seconds, extra . . . . .	5.00
Solar attachment with declination arc, hour circle and polar-axis, . . . . .	60.00
Solar screen to fit eyepiece of telescope . . . . .	5.00
Striding or adjusting-level . . . . .	3.00

## TRIPODS.

Round leg tripods complete with head . . . . .	\$10.00
Split-leg " " " " . . . . .	12.00
Extension " improved style, complete as above . . . . .	15.00
Round leg tripod for Reconnaissance Transits No. 100 and No. 102 or for Light Surveyor's Compass . . . . .	5.00
Extension tripods for No. 100 and No. 102 or for Light Surveyor's Compass . . . . .	12.00

## Prices for Parts of Instruments.

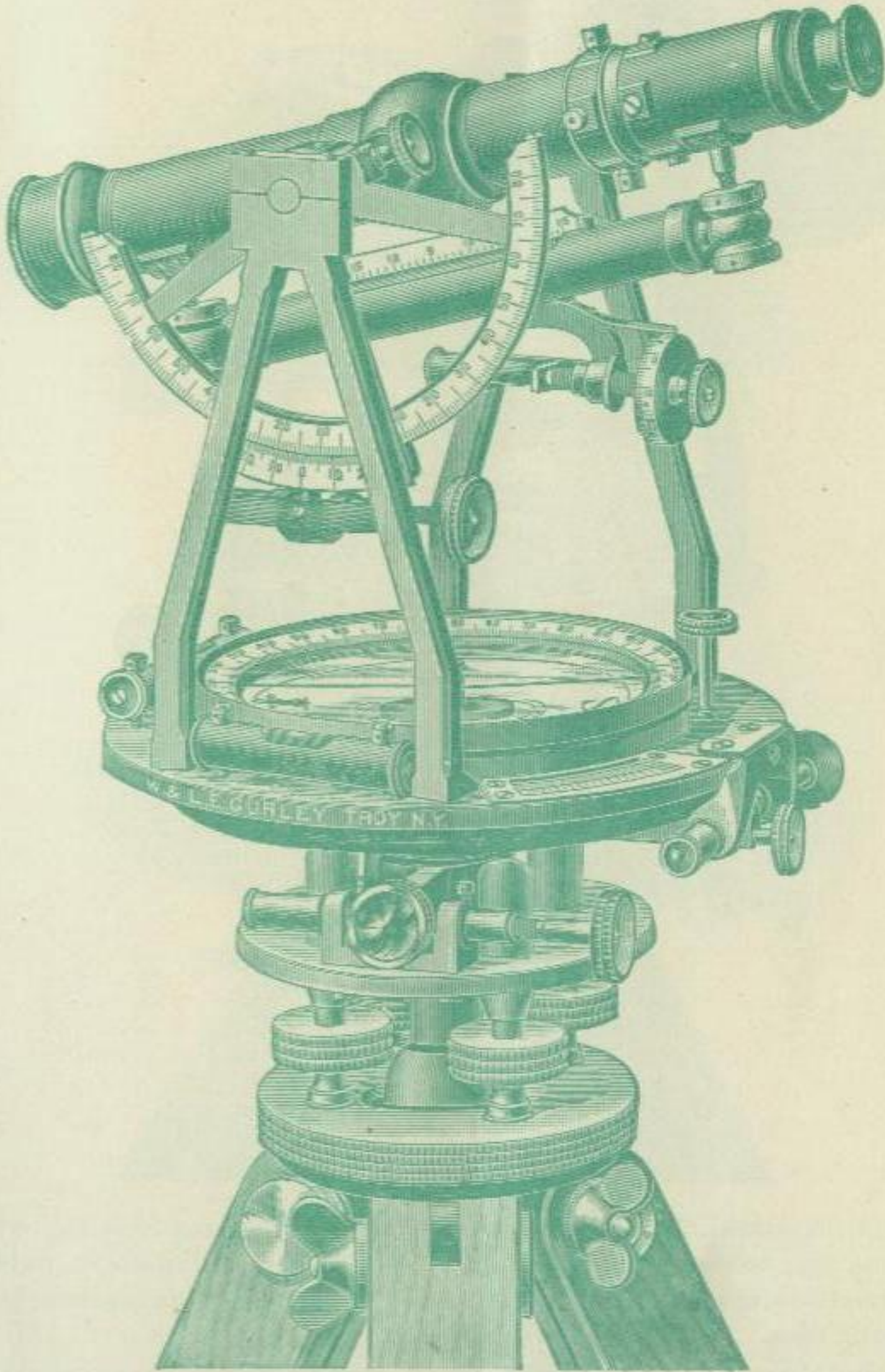
Needle with jeweled-center and center-pin . . . . .	\$ 3.75
Center-pin only . . . . .	.75
Ground glass level-vial for plate or standard, each . . . . .	\$1.00 to 1.50
Ground glass level-vial for telescope, each . . . . .	3.00 to 4.25
Cap for eyepiece or object-glass, each . . . . .	1.25 to 1.50
Shade for object-glass . . . . .	.75
Clamp-screws for horizontal limb, each . . . . .	1.00
Tangent screw for levelling-head . . . . .	\$1.25 to 1.50
Clamp-screw for levelling-head . . . . .	1.00
Levelling-screw for levelling-head, each . . . . .	1.50
Eyepiece complete . . . . .	6.00
Object-glass complete . . . . .	\$6.00 to 8.00
Cross-wires and diaphragm . . . . .	4.00
Cross and stadia wires, fixed, and diaphragm . . . . .	6.00
Mahogany box with lock and strap, and fitted inside . . . . .	\$5.00 to 8.00

### MISCELLANEOUS.

Plain tripod legs only, for Engineers' Transit or Level, per set . . . . .	\$6.00 to \$9.00
Split tripod legs only, for Engineers' Transit or Level, per set . . . . .	\$7.00 to 10.00
Extension tripod legs only, for Engineers' Transit or Level, per set . . . . .	10.00
Clamp-screw and band for extension leg, each . . . . .	1.00
Tripod head only, with bolts and nuts, for Engineers' Transit or level . . . . .	\$6.00 to 7.00
Wooden cap with brass screw-plate, to fit tripod head, each . . . . .	1.75
Brass bolt and nut to fit tripod head, each . . . . .	\$1.00 to 1.25
Metal point or shoe for tripod leg, each . . . . .	\$ .35 to .65
Leather strap to bind tripod legs together, each . . . . .	.25
Leather strap and buckle for Transit or Level box . . . . .	.75
Leather strap and handle for carrying extension tripod . . . . .	.60
Steel screw-driver with wooden handle, each . . . . .	.25
Steel adjusting-pins, each . . . . .	.15
Rubber tips, for bottom of instrument-box, per set . . . . .	.40
Reading-glass, for Transit, each . . . . .	.75
Brass plummet with screw cap, for Transit or Level, each . . . . .	1.80
Waterproof hood, for Transit or Level, each . . . . .	1.00
Chamois skin, large size, best quality, each . . . . .	.65
Clamp with clamp-screw, for New York rod . . . . .	2.50
Clamp with scale and clamp-screw, for Philadelphia rod . . . . .	3.00
Target with clamp screw and spring, for New York or Philadelphia rod . . . . .	4.50

# Gurley's Engineers' Transit

With two double opposite verniers.

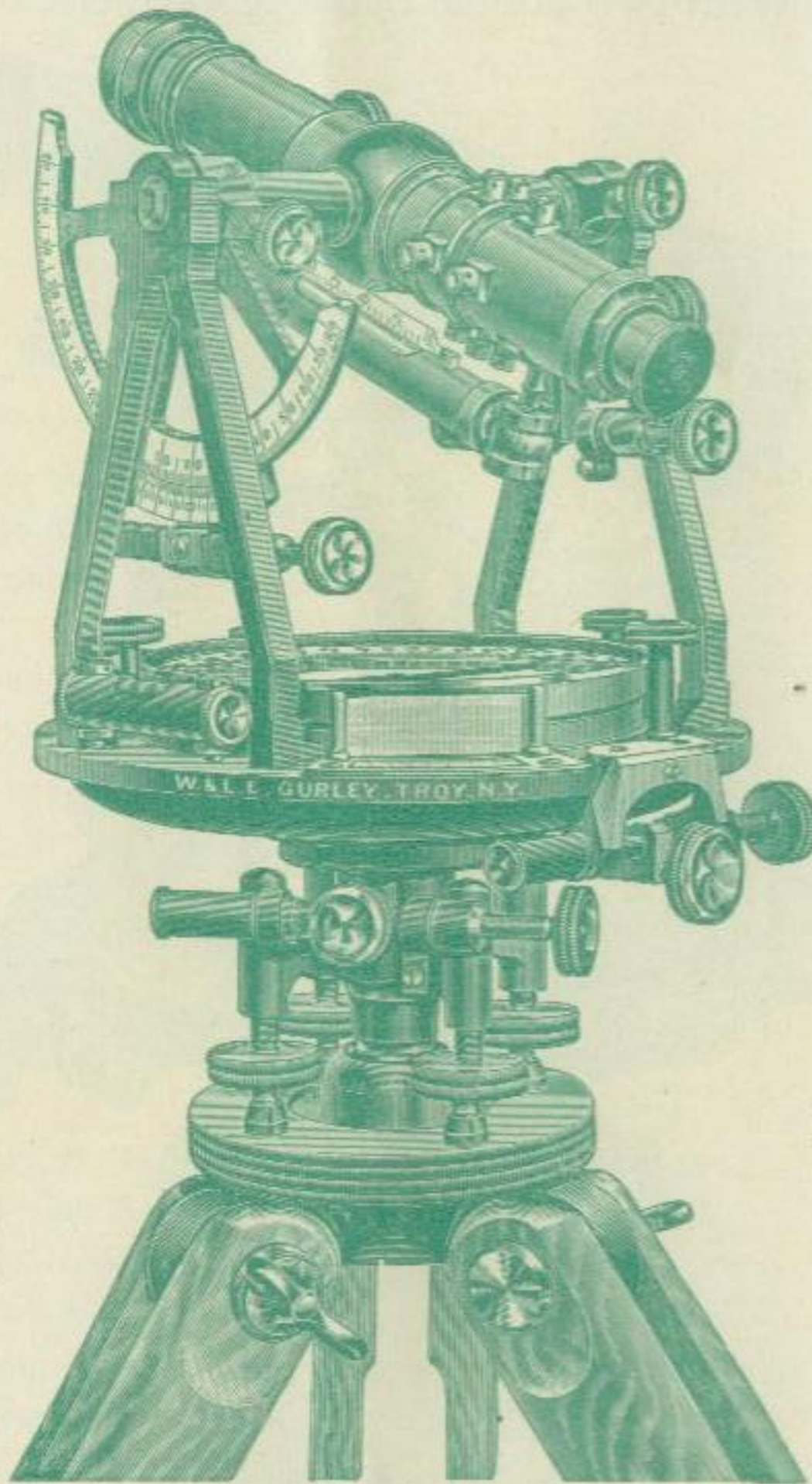


- |  |          |
|--|----------|
| No. 2. Engineers' Transit, two verniers to limb, 4-inch needle, with level, clamp and tangent to telescope axis . . . . .  | \$163.00 |
| No. 3. Engineers' Transit, two verniers to limb, 4-inch needle, with 4½-inch vertical circle, level, clamp and tangent to telescope axis . . . . .   | 175.00   |
| No. 9. Engineers' Transit, two verniers to limb, 4½-inch needle, with vertical arc of 3 inches radius and vernier moved by tangent screw, level, clamp and tangent to telescope axis . . . . . | 186.00   |

Only the sizes most popular are given here, but all others can be supplied at short notice.

For other information, see pages 16, 17, 18.

# Gurley's Light Mountain and Mine Transit.

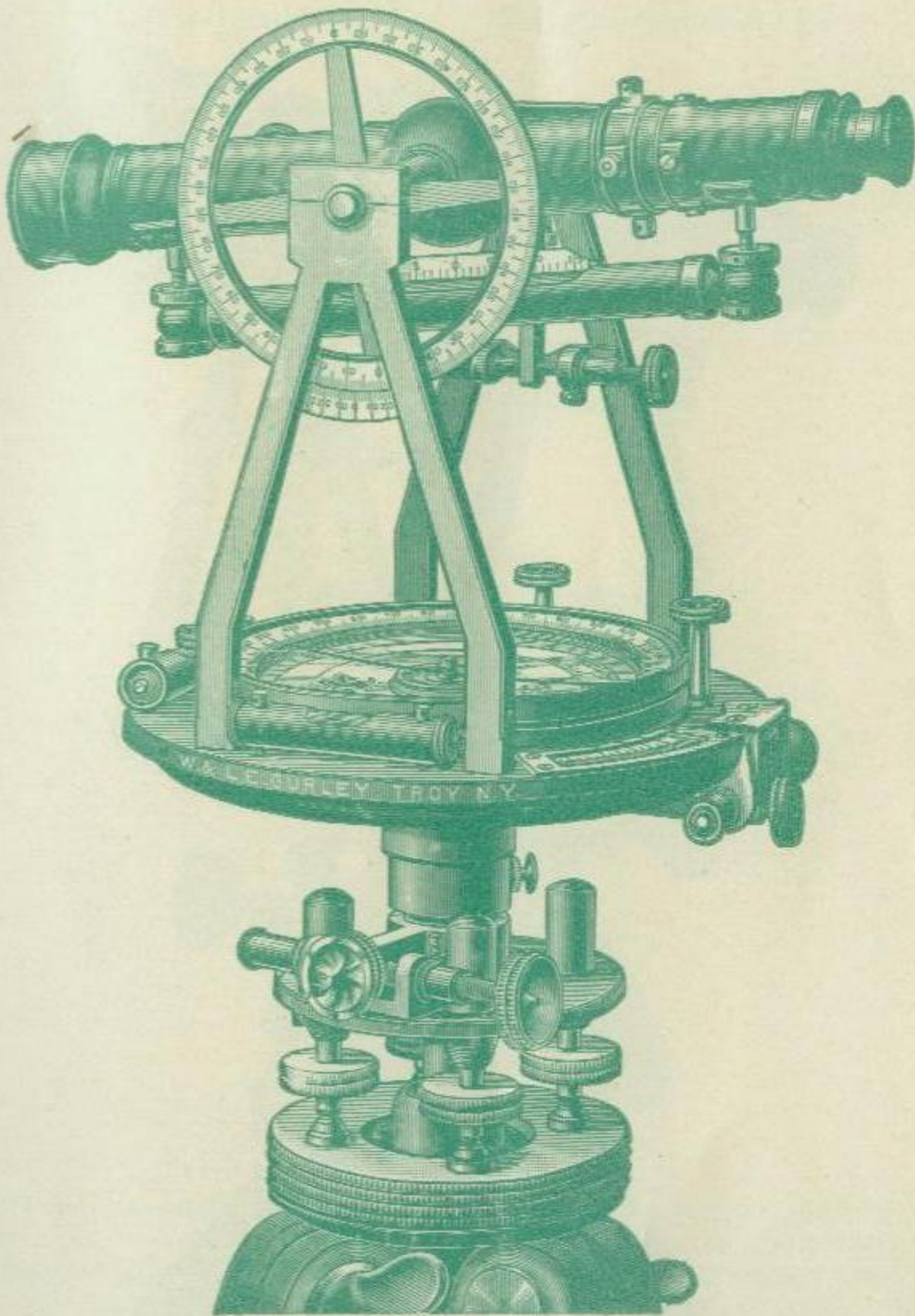


- |  |          |
|--|----------|
| No. 25. Light Mountain Transit, two verniers to limb, 4-inch needle, with variation arc, telescope of finest quality, power 20 diameters, extension tripod shortening to half length. The instrument is packed in a mahogany case. . . . . | \$146.00 |
| No. 26. Light Mountain Transit, with level, clamp and tangent to telescope axis . . . . .  | 164.00   |
| No. 27. Light Mountain Transit, with 4½-inch vertical circle, level, clamp and tangent to telescope axis . . . . .   | 176.00   |
| No. 28. Light Mountain Transit, with vertical arc of 2½ inches radius and vernier moved by tangent screw, level, clamp and tangent to telescope axis . . . . .   | 182.00   |
| No. 29. Light Mountain Transit, with vertical arc of 2½ inches radius and vernier moved by tangent screw, level on telescope and gradienter combined with clamp and tangent . . . . .  | 194.00   |

For other information see pages 16, 17 and 18, and foot note page 19.

# Gurley's Surveyors' Transit

With two double opposite verniers.

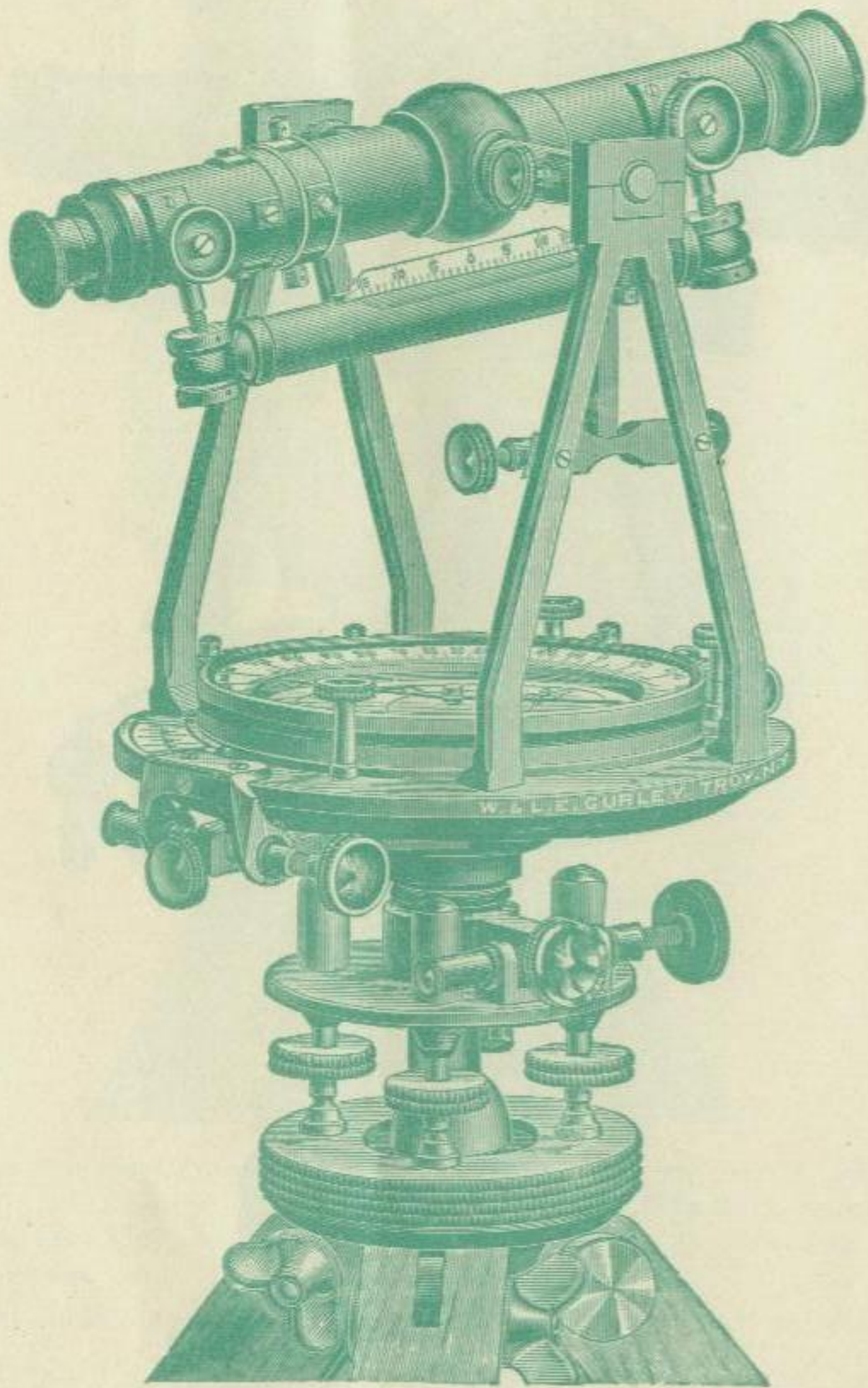


- |   |          |
|---|----------|
| No. 35. Surveyors' Transit, two verniers to limb, 4-inch needle, plain telescope . . . . .  | \$125.00 |
| No. 36. Surveyors' Transit, two verniers to limb, 4-inch needle, with level on telescope and clamp and tangent to telescope axis . . . . .                          | 143.00   |
| No. 37. Surveyors' Transit, two verniers to limb, 4-inch needle, with 4½-inch vertical circle, level on telescope and clamp and tangent to telescope axis . . . . . | 155.00   |

For other information see pages 16, 17 and 18, and foot note page 19.

# Gurley's Surveyors' Transit

With one double vernier placed at 30° to line of sight.



- No. 66. Surveyors' Transit, one vernier to limb, 4-inch needle, with level, clamp and tangent to telescope axis . . . . . \$128.00
- No. 67. Surveyors' Transit, one vernier to limb, 4-inch needle, with 4½-inch vertical circle, level, clamp and tangent to telescope axis . . . . . 140.00

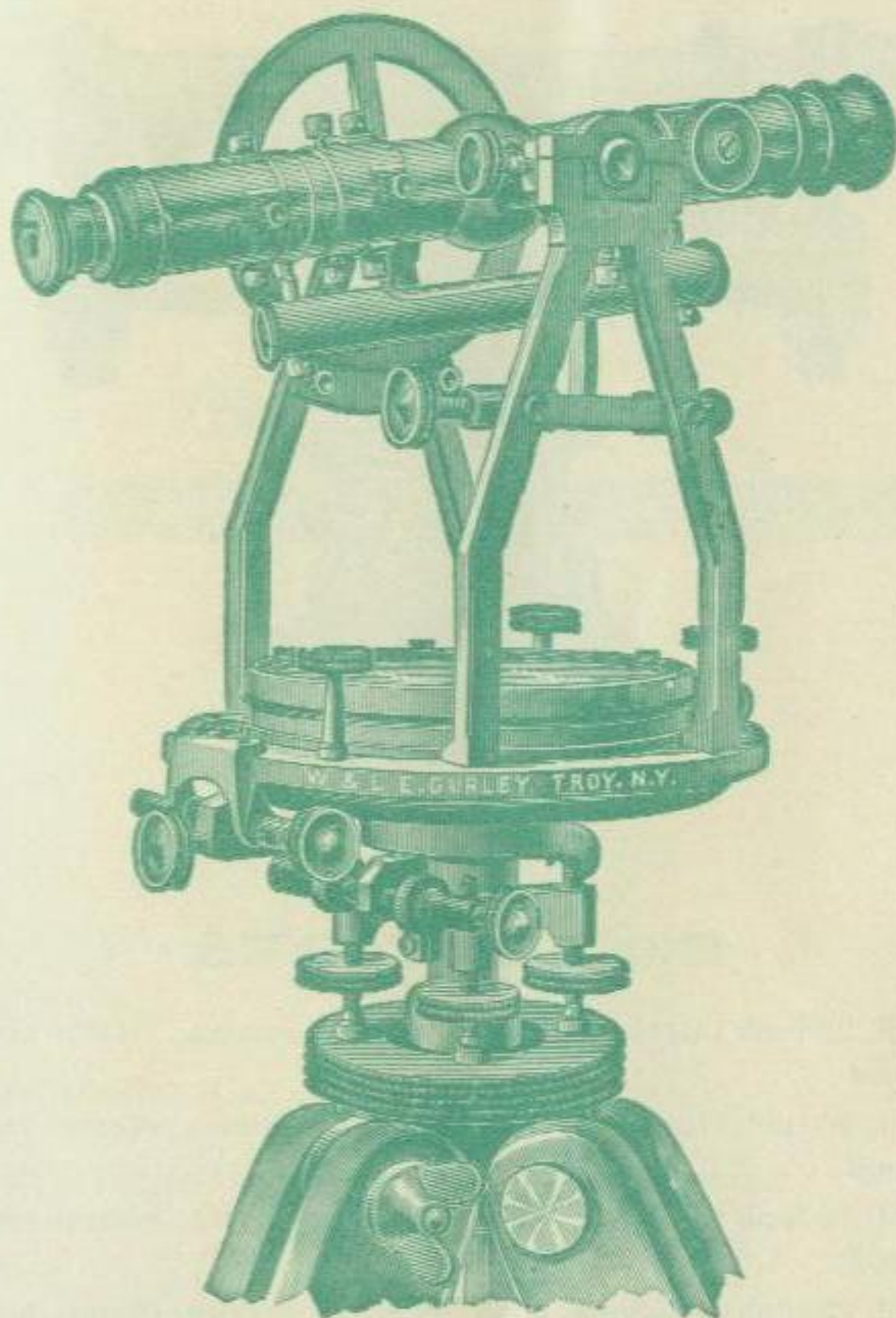
For other information see pages 16, 17 and 18, and foot note page 19.

# Gurley's Reconnaissance Transit

With one double vernier.

Weight of transit about 8 lbs.

Weight of tripod about 7 lbs.



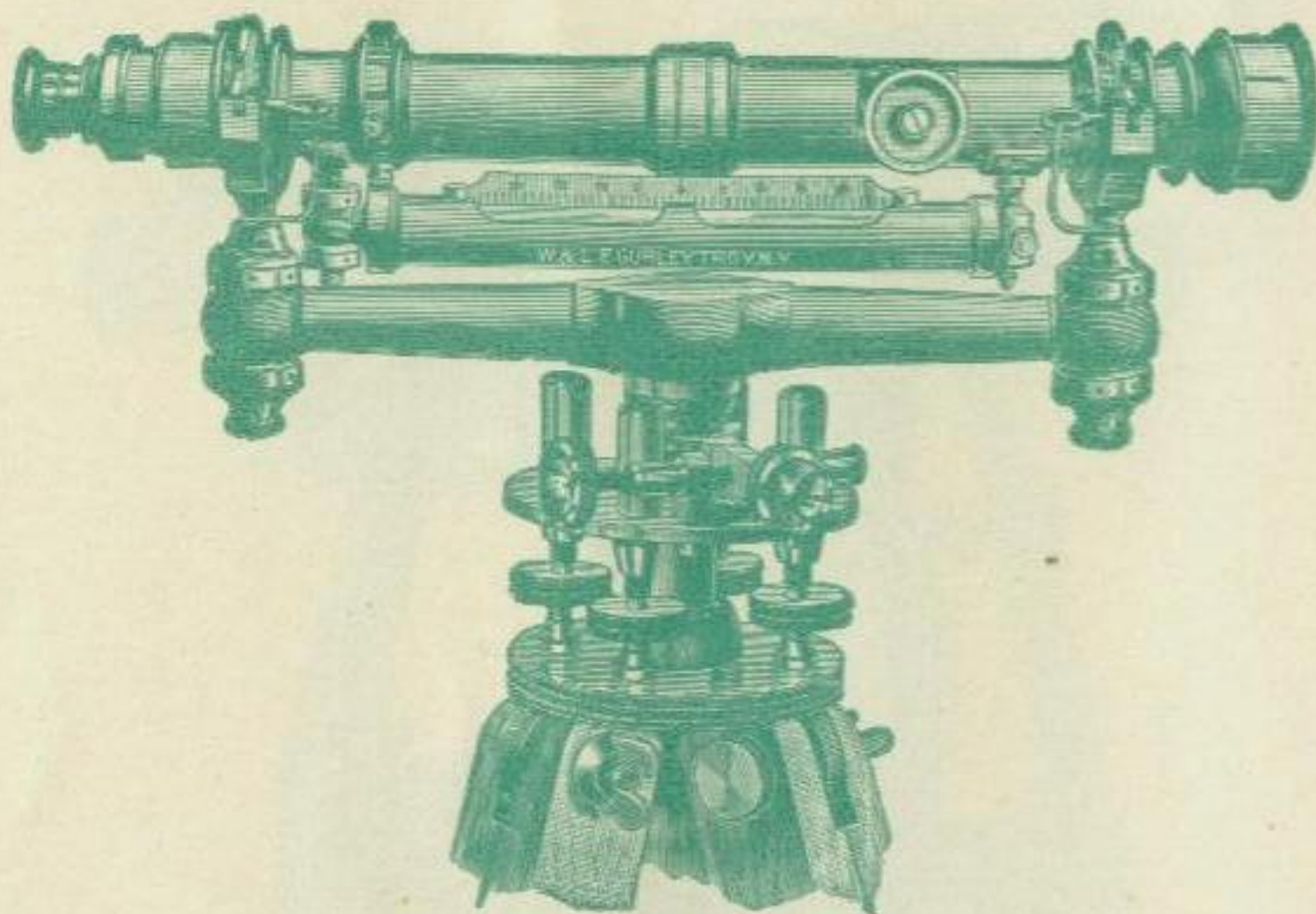
No. 100.

No. 100. Reconnaissance Transit, one vernier to limb, $3\frac{1}{2}$ -inch needle, with $3\frac{1}{2}$ -inch vertical circle and vernier reading to five minutes, level, clamp and tangent to telescope axis, and levelling tripod with extension legs.	\$115.00
No. 102. Reconnaissance Transit, same as No. 100, but with $4\frac{1}{2}$ -inch vertical circle and vernier reading to one minute. . . . .	122.00
Vertical circle may be left off and will reduce the cost of No. 100 . . . . .	10.00
Telescope dust guard, extra . . . . .	4.00
Vernier shade, if desired, at an additional cost of . . . . .	2.00
No charge for stadia wires if ordered with a new instrument.	
All graduations on these instruments are of solid silver.	

For other information see pages 16, 17 and 18.

# Gurley's Wye Levels.

Graduation of level vial direct on the glass instead of on scale as shown in this cut.



## ENGINEERS' Y-LEVELS.

No. 375. Y-Level, 22-inch telescope, with levelling-screws, clamp and tangent and tripod . . . . .	\$115.00
No. 376. Y-Level, 20-inch telescope, with levelling-screws, clamp and tangent and tripod . . . . .	110.00
No. 377. Y-Level, 18-inch telescope, with levelling-screws, clamp and tangent and tripod . . . . .	110.00
No. 378. Y-Level, 15-inch telescope, with levelling-screws, clamp and tangent and tripod . . . . .	90.00

## ARCHITECTS' Y-LEVELS.

No. 380. Architects' Level, 12-inch telescope, with levelling-screws and tripod . . . . .	\$50.00
No. 381. Architects' Level, 12-inch telescope, with levelling-screws, clamp and tangent and tripod . . . . .	65.00

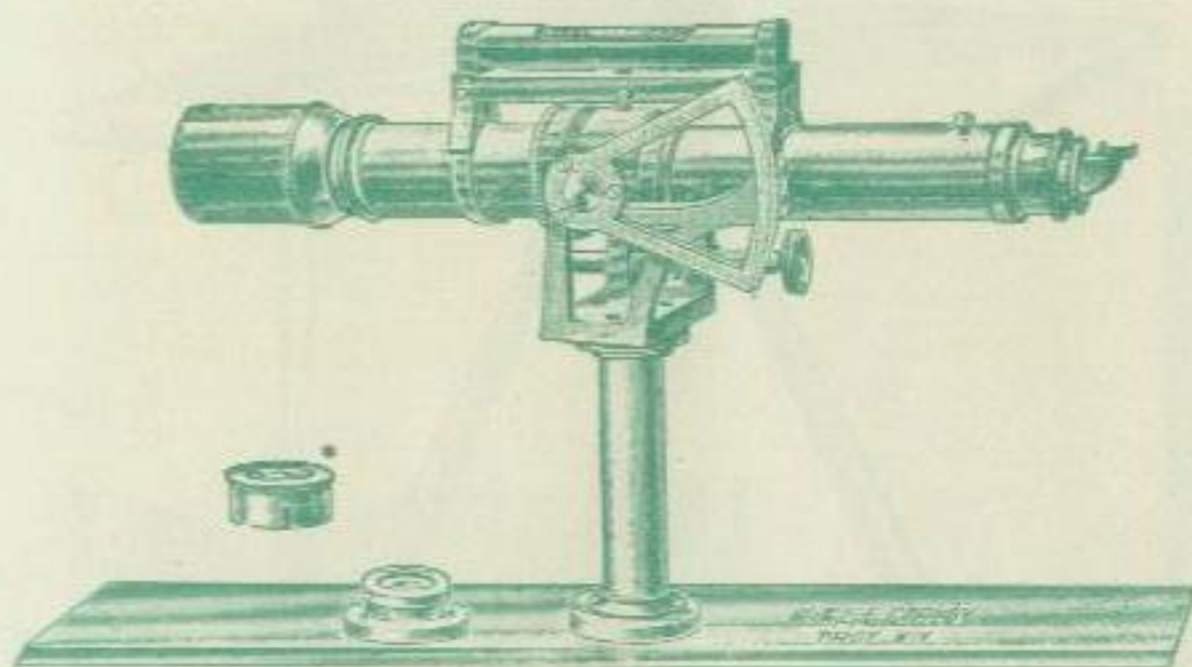
Note.—A compass, without sights and with 3-inch needle, can be attached to the telescopes of these levelling-instruments, and used to obtain the bearing of lines when desired; its extra cost is \$10.00. Stadia wires are furnished with any Y-Level, free of charge, if requested when the instrument is ordered.

For other information see pages 16, 17 and 18.



# Gurley's Plane Tables.

## Geodetic and Coast Survey Pattern.



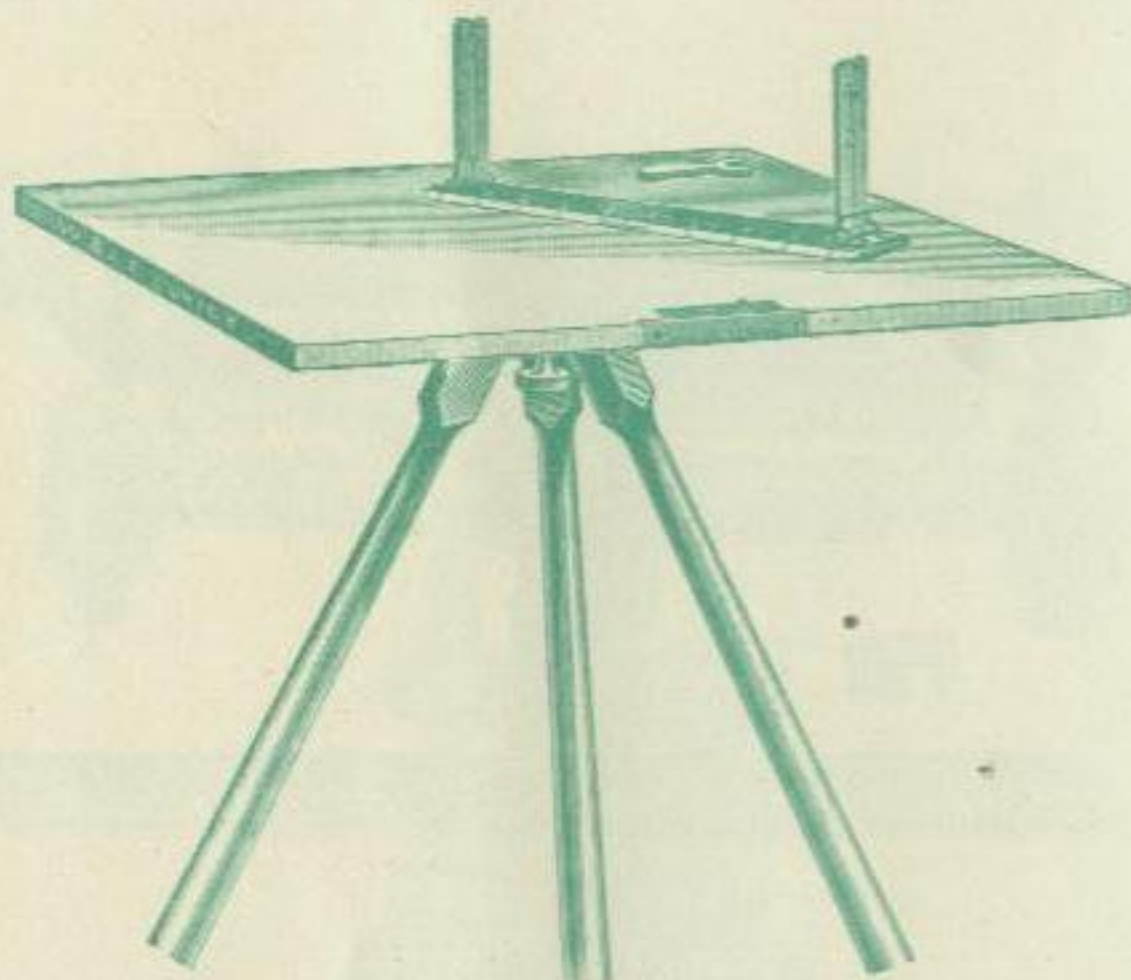
No. 390.

Price of Alidade . . . . .	\$118.00
Plane table board 30 x 24 mounted on Johnson Plane table movement and large tripod . . . . .	50.00
Combined Compass and levels . . . . .	15.00
Prism attachable to eye piece . . . . .	5.00

In the Alidade shown in the cut, the straight edge is eighteen inches long by three inches wide, and carries a telescope eleven inches long with a detachable striding level, vertical arc and axis tangent. For easy adjustment of the line of collimation the telescope can be turned in its axis through 180°. The vertical arc has an edge graduation and can be read by vernier to one minute, *without changing position*. The telescope is made either inverting or erecting, as desired; and when inverting, it is usually fitted with a diagonal prism, with darkner, as shown, which costs \$5.00 extra.

This is the most popular style of Plane Table now in the market.

## Gurley's Traverse Plane Table.



No. 395.

Price as shown . . . . .	\$25.00
If the tripod is wanted with extension legs, add extra . . . . .	5.00

This cut represents a simple form of Plane-Table and Alidade, which is used extensively by the U. S. Geological Survey for traverse work. The board is 15 inches square, and has on the under side a small brass flange, into which the clamp-screw of the tripod head enters and secures the board to the tripod. The Alidade consists of a brass ruler, ten inches long, graduated on the beveled edge to a scale of forty parts to the inch, and having at each end hinged sights which fold close to the surface of the ruler. Inserted in one edge of the board is a small Box-Compass with needle about three inches long.

The tripod legs are attached to a simple head which has a clamping screw passing through its center compressing a concealed spring and holding the board to the tripod head when oriented to position.

The whole, while not capable of as accurate work as the larger Plane-Tables, supplies a light and portable instrument for topography.

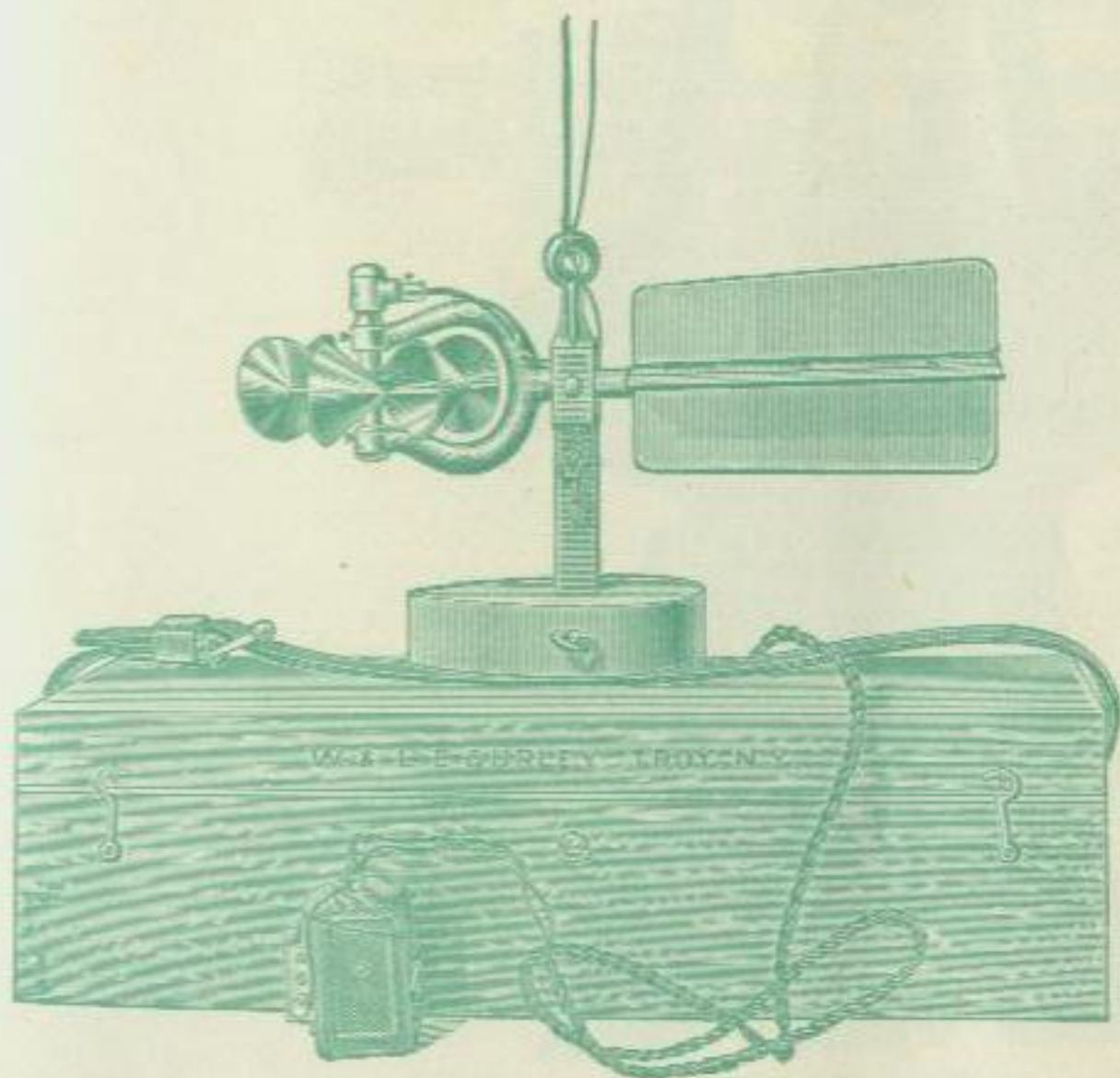
# Gurley's Current Meters.

No. 617. The Price Electric Current Meter for use in small rivers, flues irrigation, etc., complete in box with electric "buzzer" and battery . . . \$60.00

Larger Current Meters made to order according to specifications.

Write for prices.

No. 620. BOYDEN HOOK GAUGE complete, for measuring depth of water flowing over weirs, etc. . . . . \$25.00



No. 617.



No. 620.

The importance of correct hydraulic measurements has brought the Current-Meter into general use, and while our large Current-Meter has long been recognized as standard for observation on large streams, in recent years there has been a demand for a light and serviceable instrument for use in small streams and irrigation or drainage ditches.

For some time, aided by the suggestions of the engineers in charge of the hydrographic work of the United States Geological Survey, we have been perfecting the small Electric Current-Meter shown in the cut. This Meter, while constructed practically along the lines of the large Current-Meter, has the advantage of extreme lightness, weighing only about two pounds.

In use, the Meter is suspended by a cable containing the wires for electrical connection, and is held steady by a lead weight, as shown in the cut.

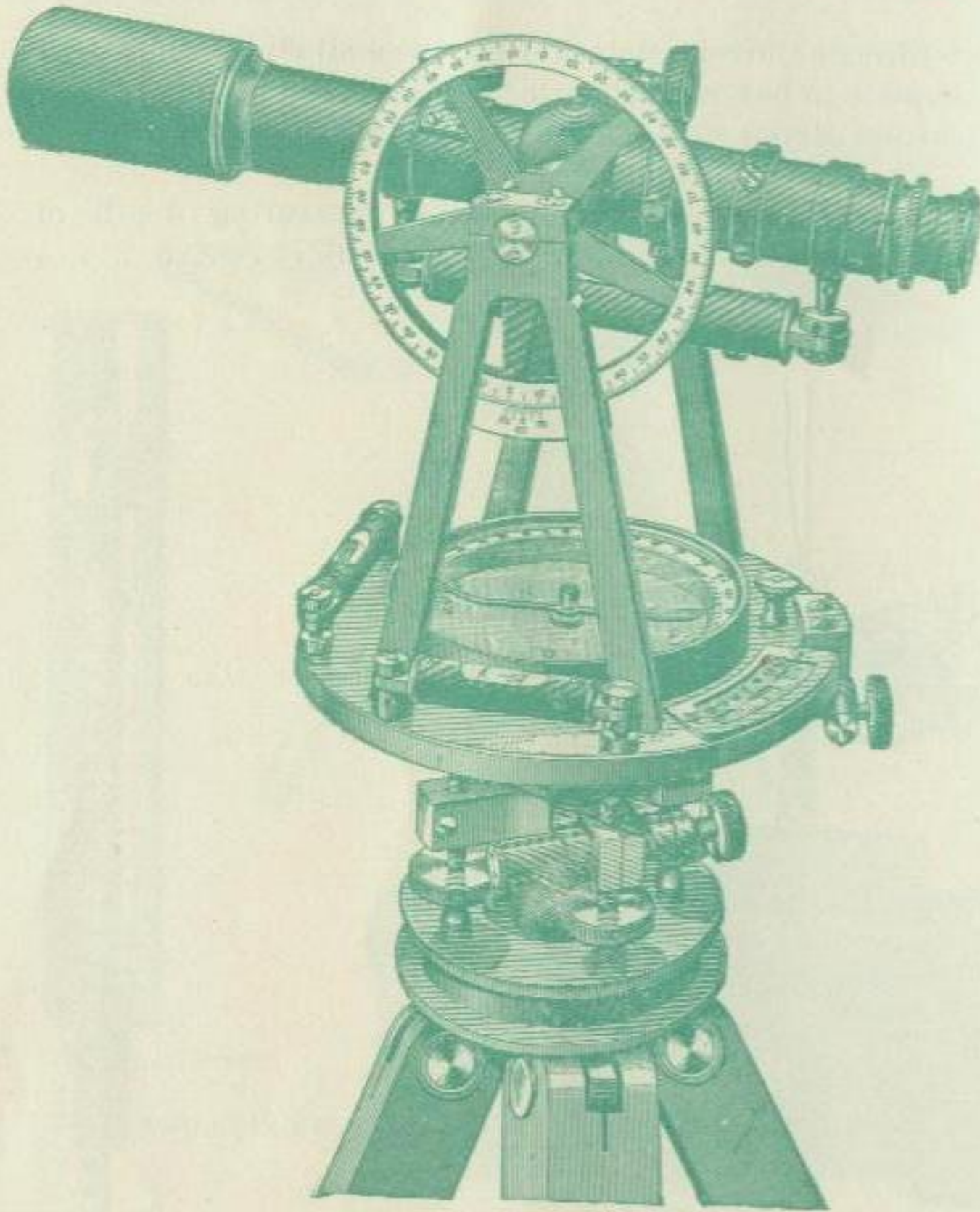
The electric sounder is very simple, consisting of a "buzzer" attached to a small leather case containing a bi-sulphate of mercury battery cell.

Each revolution of the wheel is indicated by a "buzz," the observer being required to count the number in a certain period of time.

The meter is packed in a wooden box, strongly made, and of a capacity sufficient to contain the Meter, lead weight, sounder, wire and other apparatus for the observer.

A table for reducing observations has been prepared which will give correct values within one per cent.

# The Pioneer Reconnaissance Transits.



No. 704.

The following instruments are designed for work where extreme accuracy is not required. They are also recommended to Architects and Builders in taking angles, levelling foundations, examining walls under way of construction, giving lines and levels for buildings; for rapid and preliminary surveying and all such work where a light, portable instrument is desired.

No. 700. Transit with level attachment. Telescope 8½ inches long, with cross-hairs, rack and pinion movement, adjustable eyepiece, 5-inch horizontal limb, divided in half degrees, <i>but with one vernier</i> reading to minutes, 2 bubbles on limb plate, tangent adjustment to plate and telescope. Shifting center. Complete in box with tripod. . . . .	\$ 85.00
No. 702. The same instrument as above, <i>but with compass</i> , 3-inch needle. . . . .	100.00
No. 704. The same instrument as above, but with compass, 3-inch needle, and either with vertical arc or circle read by vernier to 5 minutes. . . . .	115.00
Vertical circle or arc reading to single minutes, extra . . . . .	5.00
Extension tripod instead of regular . . . . .	6.00

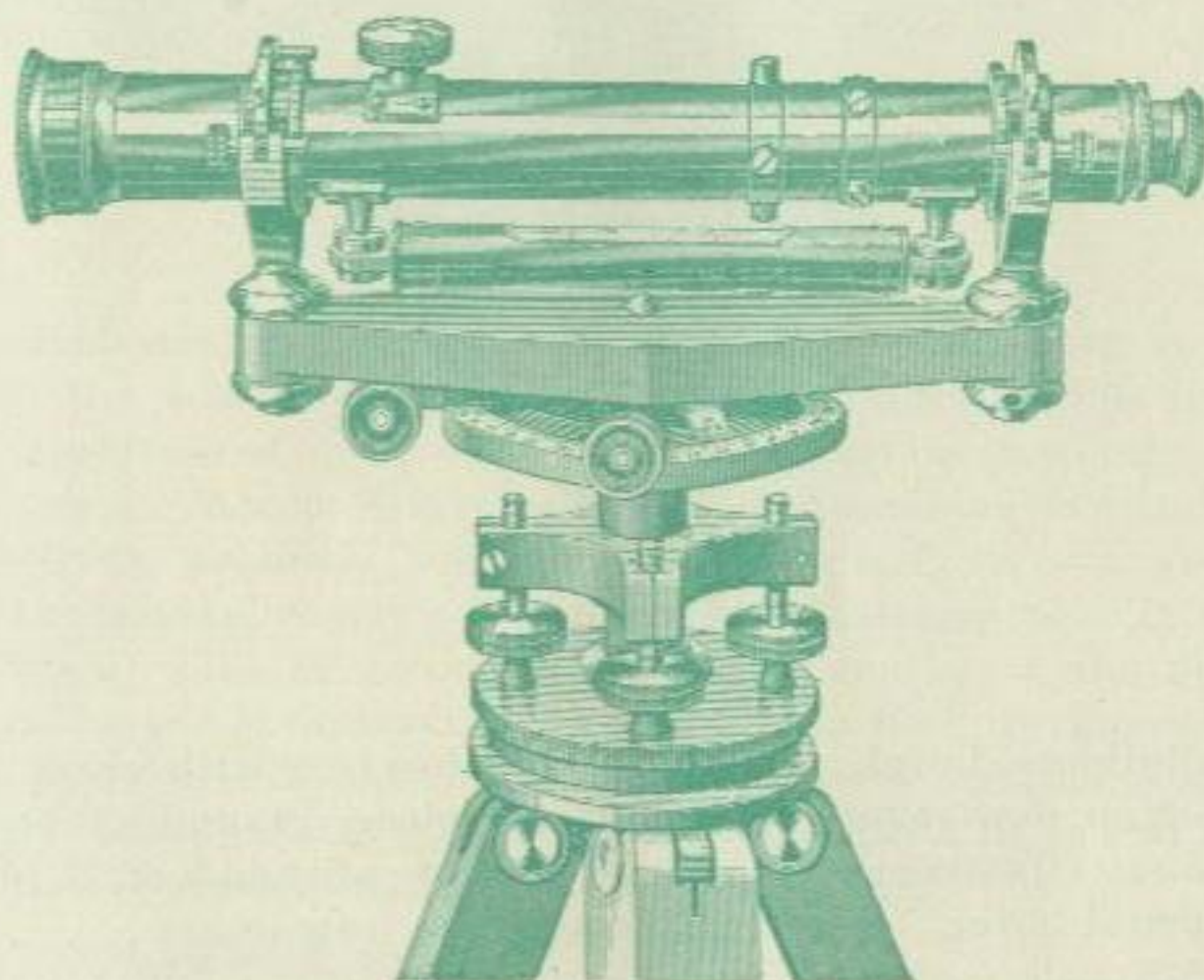
For other extras, see pages 16, 17 and 18.

No. 706. <b>KING'S POCKET TRANSIT.</b> The most complete instrument for preliminary, plain, stadia surveying and landscape work as it can be used also as an alidade for plane table work. Very compact. Price with directions . . . . .	30.00
No. 708. <b>BRUNTON POCKET COMPASS.</b> This pocket instrument takes the place of a Sighting Compass, Clinometer, Prismatic Compass and Abney or Locke's Hand Level. A very handy instrument for preliminary surveying, over 2500 in use. Price with directions . . . . .	25.00

# Architects' and Builders' Y-Level.

Directions how to care for and adjust levels with every instrument

This instrument is especially designed, and recommended to Architects, Builders and Contractors in levelling walls, giving lines and levels for buildings, laying out angles, grading streets, sewers, drains, etc.

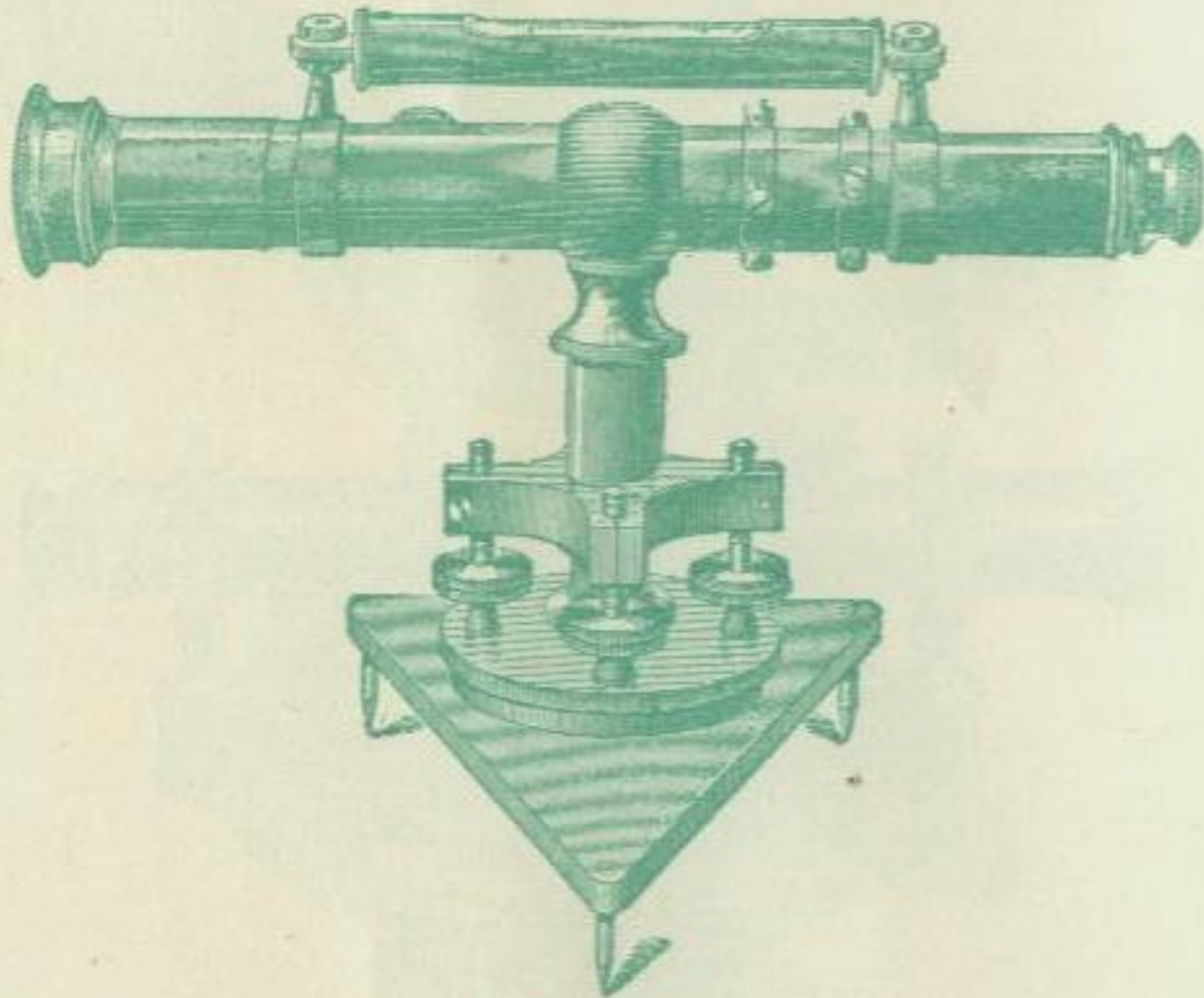


No. 716.

- No. 716. Architects' Y-Level. Telescope 12 inches long, with an adjustable eye-piece for focussing cross hairs, rack and pinion movement for focusing objective, sun shade, sensitive ground and graduated bubble to telescope; horizontal circle, 3 inches, divided to degrees, marked  $0^{\circ}$  to  $90^{\circ}$  each way, reading by a vernier (which is attached to the spindle) to 5'. The horizontal circle is reversible for the purpose of setting the instrument over a given point. The instrument has a *clamp to spindle and tangent adjustment*. Instrument complete, in neat polished box, with lock, key and strap, including plumb-bob, adjusting pins, hardwood tripod and metal trivet . . . . . \$50.00
- No. 718. Architects Y-Level, same as above, but with *compass* divided on raised ring to degrees and improved needle  $2\frac{3}{4}$  inches . . . . . 62.00
- Extension tripod, instead of regular, extra . . . . . 6.00

# Road Builders' Y-Level.

Directions how to care for and adjust levels with every instrument



No. 720.

- |  |         |
|--|---------|
| No. 720. Road Builders' Level. Telescope 12 inches long with cross hairs, rack and pinion movement, adjustable eye-piece, ground bubble with <i>protecting</i> tube. Instrument complete, in neat polished box, hardwood tripod and metal trivet. A well made, accurate instrument . . . . . | \$35.00 |
| No. 722. Same instrument, but with reversible horizontal circle 3 inches divided to degrees, verniers read to 5' . . . . .   | 40.00   |
| Extension tripod, instead of regular, extra . . . . .  | 6.00    |

## FARM LEVEL.

For laying out farm lands, draining, ditching, road making, etc., which do not require great accuracy, nor involve the determining of magnetic bearings.

Center is provided with a clamp-screw. Horizontal circles 4" divided to degrees read by a shifting index (with clamp screw), thus each reading can be read from zero. A weatherproof, flexible rod 1½" wide and 6 feet long divided to ¼ inches furnished with each instrument.

Directions how to use, care for and adjust this level in every box.

- |   |         |
|---|---------|
| No. 723. Farm level, 10" sighting tube, with level vial, pinhole eyepiece, front closed by glass, with cross-wires, 4" horizontal circle graduated to degrees. Complete in box with lock and handle, plumb bob, flexible levelling rod, hardwood tripod, etc. . . . . | \$16.00 |
| No. 725. Like No. 723, but with erecting 10" telescope, good lenses, 1" diameter, complete with all accessories. . . . .  | 25.00   |

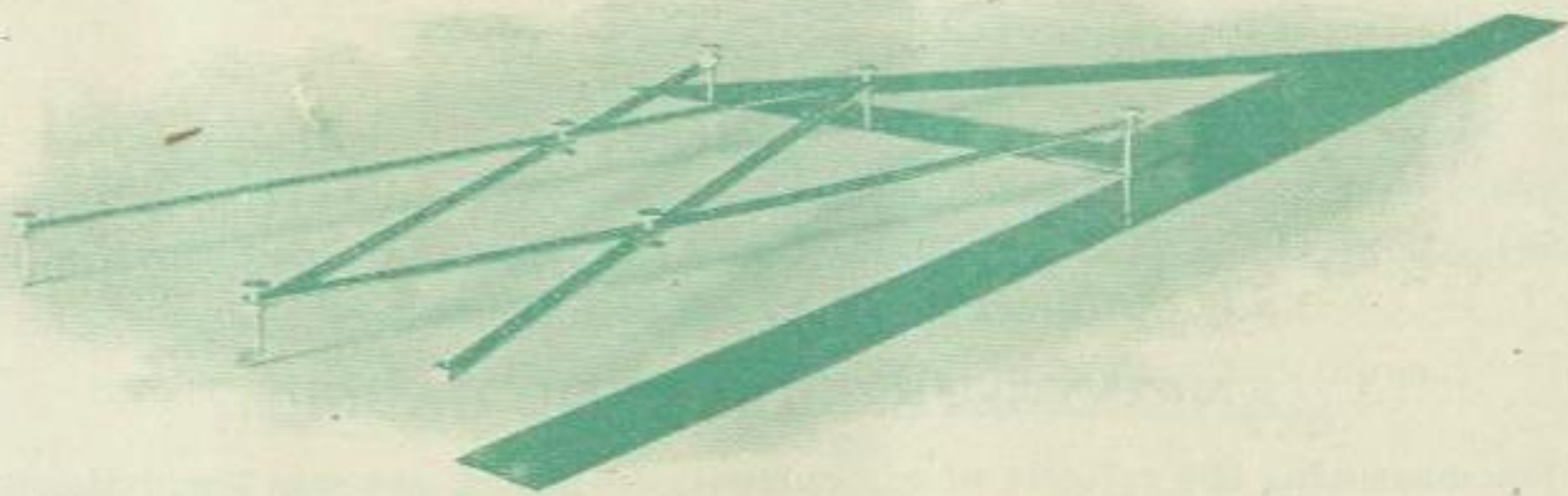
## STADIA HAND LEVEL.

- |   |         |
|---|---------|
| No. 727. Stadia Hand Level, erecting 10" telescope objective 1" diameter with stadia hairs, ball joint and socket, in leather sling case; an ideal instrument for preliminary work. Weight 24 oz. . . . . | \$18.00 |
|---|---------|

# The Boston Universal Pantograph.

(Patent applied for)

Price, complete in box . . . . . \$45.00



No. 750.

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 expectations have been more than fulfilled, inasmuch as the Boston Universal, besides combining the good qualities of former constructions, possesses some new ones peculiarly its own, and furthermore, in reducing and enlarging, covers a field never before attempted. It is of the most simple construction, and, in principle, somewhat similar to the ordinary wooden pantograph, but is made of metal throughout, of the best workmanship, and compares in accuracy with the best instruments at but a fraction of their cost and is mounted on an 18° celluloid triangle. (See cut) Complete in box with handles.

A full descriptive circular will be furnished on request.

WOODEN PANTOGRAPHS, improved style . . . . . \$ 2.00

## PRECISION PLANIMETRE.

No. 754.

Improved Construction of German Silver and Bronzed Brass.

This compensating Planimetre is of new and modern construction, with adjustable tracer arm, fully guaranteed. New form of pole weight: testing rule, and fully rated and provided with table and settings, for standard U. S. measure. Morocco case and complete directions. . . . . \$ 36.00

The tracer arm is fully graduated to admit of finest possible settings so that allowance can be made for shrinkage in drawings. Index marks are also provided for standard settings in U. S. and metric measure. All parts of the planimetre are adjustable and provided with hardened steel set-screws, so that instrumental errors can be corrected.

The new construction of the ball joint, gives the tracer arm a motion of 180° both ways. The range of this instrument is therefore far greater than the usual planimetre which has but 90° motion each way. With this planimetre, too, all the instrumental errors can be compensated by taking the mean of the measurements obtained with the pole on the left and the pole on the right side of the tracer arm.

The tracing point and the pole have both been improved upon, — their construction can be clearly seen in the cut, sent on application.

As these instruments will not only give the area of any figure, but also any multiple of such area and the sum of any number at one operation, they may be used to very great advantage in the calculation of cubical contents.

A treatise for manipulating the planimetre is furnished with each instrument.

## ANEROID SURVEYING BAROMETERS.

For measuring height and atmospheric pressure.

Made by the most reliable English makers and guaranteed to be the best that can be obtained.

All sizes and styles and at very reasonable prices.

Specify from any catalogue.

## PEDOMETERS.

No. 760.	Style I, registering to 10 miles . . . . .	\$ 1.25
764.	" II, " " 100 " . . . . .	2.25

Directions with each instrument.

## ANEMOMETERS OR WIND GAUGES.

For measuring the velocity of air currents in mines, sewers, hospitals, schools and buildings.

Each instrument is tested and has a correction table added showing the amount of air in feet to be added or deducted.

No. 770.	Biram's Anemometer, 2 dials, 4-inch diameter, reading to 1,000 feet with disconnecter, in wooden case, each . . . . .	\$19.00
No. 772.	Birams Anemometer, 2 dials, 6-inch diameter, reading to 1,000 feet, with disconnecter, in wooden case, each . . . . .	21.00
No. 774.	Biram's Anemometer, 4 dials, 6-inch diameter, reading to 100,000 feet, with disconnecter, in wooden case, each . . . . .	27.00
No. 776.	Anemometer, watch pattern, 2-inch registering to 1,000 feet; nickel plated hunting case, with stop. When open the two covers form a base for the instrument, in morroco case, each . . . . .	30.00

## SEXTANTS AND OXTANTS.

Pattern of the Imperial German and Russian Navy. The strongest, most perfect and cheapest in the market. Send for illustrated catalogue. Importation for colleges, duty free, a specialty.

Prices . . . . . \$35.00 to \$90.00

## READING GLASSES.

Reading Glasses, Ivory mounting.

No. 780. 1 inch	No. 782. 1¼ inch	No. 784. 1½ inch
\$0.60	0.90	1.15
No. 786. 2 inch. German silver frame and handle, in leather pocket case . . . \$1.00		

Reading Glasses, Black Vulcanite mounting.

No. 790. 1 inch	No. 793. 1¼ inch	No. 795. 1½ inch
\$0.35	0.55	0.70

## HAND LEVELS.

No. 800.	Locke's Hand Level, bronzed and in leather case . . . . .	\$ 6.00
No. 802.	Locke's Hand Level, German silver and in leather case . . . . .	7.50
No. 804.	Abney's Hand Level and Clinometer combined in leather case . . . . .	13.00

## SPIRIT LEVELS ON METAL BASES.

Used in setting and levelling machinery and other apparatus in factories and laboratories, all sizes, and vials of any specified sensitiveness at very moderate prices.

No. 806. 6-inch base \$4.00	No. 810. 10-inch base \$6.00
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## SPIRIT LEVEL VIALS.

Plain and Graduated.

Guaranteed of superior quality. Any size, graduation and sensitiveness.  
All sizes of reversion levels. Prices moderate.

## PLUMB-BOBS.

Brass with steel point and screw cap, of the most approved taper forms.

Highest grade for transits.

No. 820. 9 oz.  
\$1.50

No. 821. 14 oz.  
1.80

No. 822. 24 oz.  
2.50

Long taper same as above for transits.

No. 826. 4 oz.  
\$0.90

No. 827. 6 oz.  
1.10

No. 828. 8 oz.  
1.25

No. 829. 12 oz.  
1.40

No. 830. 16 oz.  
\$1.60

No. 832. 24 oz.  
2.25

Second grade brass plumb-bobs for tape use with steel point and screw top.

No. 835. 6 oz.  
\$0.30

No. 836. 12 oz.  
0.45

No. 837. 16 oz.  
0.60

Steel, long taper, screw top.

No. 838. 11 oz.  
\$0.90

No. 839. 16 oz.  
1.00

No. 840. 32 oz.  
1.25

Iron, long taper, japaned.

No. 845. 6 oz.  
\$0.15

No. 846. 12 oz.  
0.20

No. 847. 16 oz.  
0.25

Iron, long taper, nickeled.

No. 848. 6 oz.  
\$0.20

No. 850. 16 oz.  
0.30

## PLUMB-BOB CORD. No. 852.

Best braided Irish linen, per yard. No. 1 size, 2c; No. 2 size, 1½c; No. 3 size 1c.

## STAKE TACKS. No. 854.

Galvanized in 2 oz. boxes . . . . .	\$0.15
“ per pound . . . . .	0.60

## TIMBER SCRIBES.

No. 856. Large size, \$1.25.

No. 857. Small Size, \$1.00.

## TALLYING MACHINES. No. 858.

Nickel plated for keeping count by pressing on a lever registering to 999 . . . \$2.25

## LUMBERMAN'S MARKING CRAYONS.

No. 859.	Red or blue, $3\frac{1}{2}$ " long x $\frac{1}{2}$ " square, per doz. . . . .	\$0.70
No. 860.	Red, blue, green, black, $4\frac{1}{2}$ " x $\frac{1}{2}$ " hexagon, highly recommended per doz. . . . .	0.50

## MARKING PINS.

No. 861.	Set of 11, best steel, tapered, 14" long . . . . .	\$1.70
No. 862.	" " 11, " " " 11" " . . . . .	1.50

## RANGING POLES.

No. 870.	Best wood, 6 feet long, octagon, steel shoe . . . . .	\$1.60
No. 871.	" " 8 " " " " " " " " . . . . .	1.80
No. 872.	Steel, 6 feet long, 11-16" diameter . . . . .	2.50
No. 873.	Iron tubular, 6 feet long, 11-16" diameter, steel shoe . . . . .	2.25

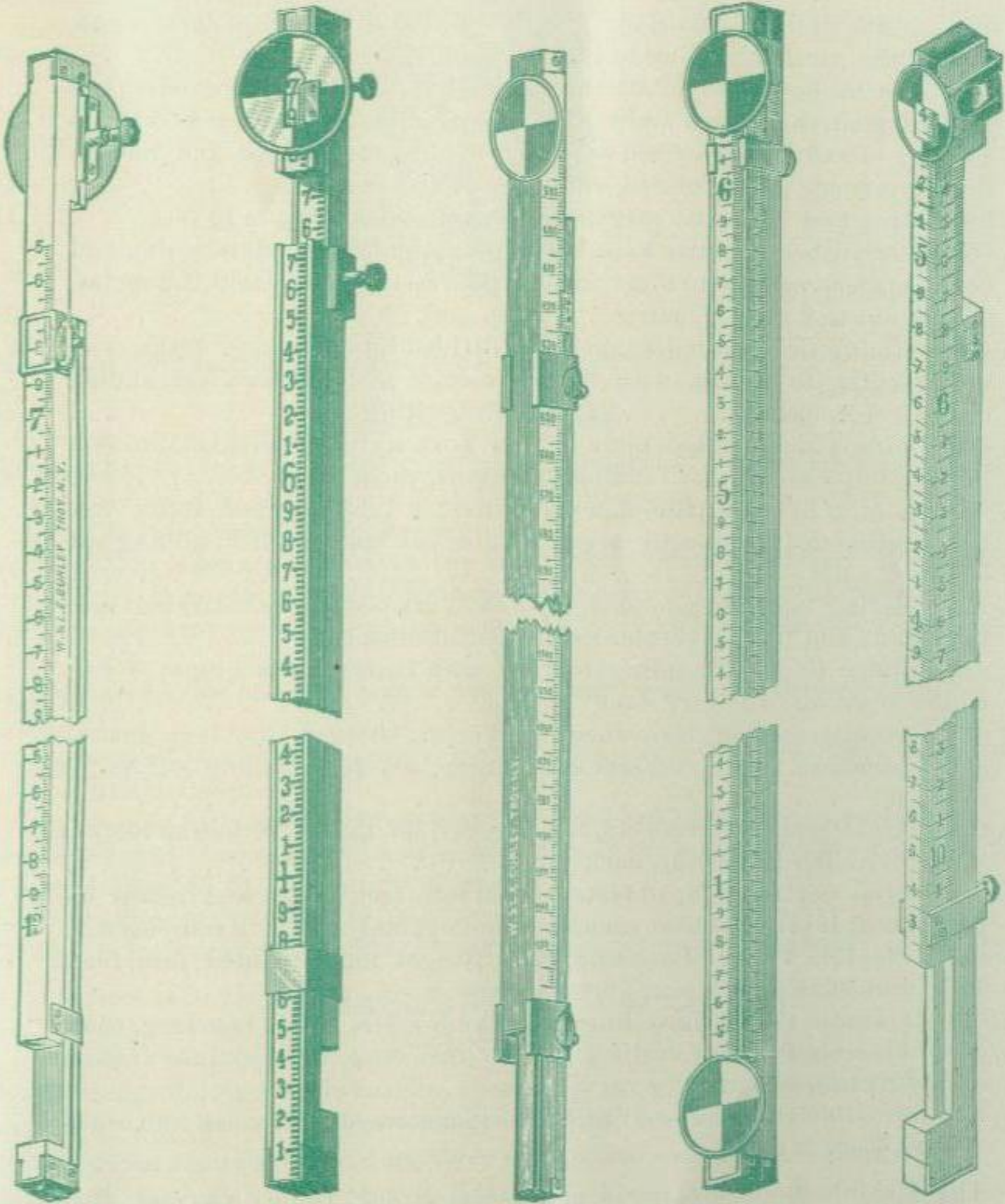
Any other length or size to order.

## MAGNETIC COMPASSES.

No. 840.	Pocket Compass in square mahogany case with cover, stop to needle, metal dial divided to degrees and figured with eight cardinal points, 2-inch needle, agate center . . . . .	\$ 2.25
No. 842.	Military Compass, 3 x 3", $1\frac{3}{4}$ -inch needle with agate center, stop to needle divided to degrees on raised silvered ring. Polished mahogany box, the sides of which serve as fiduciary edges . . . . .	3.00
No. 843.	Combined Brass Sight Compass and Clinometer, $2\frac{1}{2}$ -inch diameter, graduated to degrees, bar needle with agate center and stop, pivoted sights which are turned down to form a base when used as a clinometer . . . . .	7.50
No. 844.	Pocket Compass, watch pattern, nickel plated hunting case with folding sights, bar needle with agate center and stop to needle $2\frac{3}{8}$ -inch . . . . .	5.25
No. 845.	Pocket Vernier Compass, $3\frac{1}{2}$ -inch needle with agate center, folding sights, two levels, with tripod ball and socket joint . . . . .	21.00
No. 846.	The same, but with $4\frac{1}{2}$ -inch needle. Compass packed in mahogany box with lock and strap. (An excellent instrument for preliminary work) . . . . .	23.00
No. 848.	Surveyors' Vernier Compass with 4-inch needle, brass cover, out-keeper, variation of needle can be set very closely, right and left edges of sights are graduated for taking angles ranging about 20 degrees each way with levelling head and extension tripod. Instrument packed in mahogany box. (This instrument is strongly recommended for preliminary and mine surveying) . . . . .	53.00
No. 850.	Hutchinson's Prismatic Compass, bronzed, of improved pattern, 2-inch nearly enclosed top, floating card dial graduated to $\frac{1}{2}$ degrees, agate center, automatic stop and spring check, sight-vane with vertical wire, in morocco case, with directions, each . . . . .	11.00
No. 851.	Hutchinson's Prismatic Compass, 3-inch, in leather sling case, each . . . . .	16.00

# Levelling Rods.

All of the Latest Approved Patterns.



No. 900.

No. 902.

No. 905.

No. 906.

No. 914.

- No. 900. New York Rod, 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, . . . . . \$15.00
- No. 901. Philadelphia Rod, Hardwood, divided into feet and 10ths, vernier reading to 100ths, with target, vernier and clamp, 7 feet, sliding out to 13 feet, each . . . . . 15.00
- No. 902. Philadelphia Rod, like No. 901, but divided into feet, 10ths and 100ths, vernier reading to 1000ths, each . . . . . 15.00

(Continued on page 36.)

## LEVELLING RODS ( Continued )

No. 903.	Light Philadelphia Rod, Hardwood, divided into feet and 10ths, vernier reading to 100ths, with target, vernier and clamp, 6½ feet, sliding out to 12 feet, each . . . . .	14.00
No. 904.	Light Philadelphia Rod, like No. 903, but divided into feet, 10ths, and 100ths, vernier reading to 1000ths, each . . . . .	14.00
No. 905.	Boston Rod, Pool's Pattern. Mabogany, with square wooden target, divided into feet, 10ths and 100ths, and reading by vernier to 1000ths. Graduations on rod are recessed and the clamps and mountings improved. 6 feet closed, sliding to 11 feet, each . . . . .	14.00
No. 906.	Troy Rod, with two targets 6½ feet closed, sliding to 12 feet . . . . .	11.00
No. 907.	Philadelphia Metric Rod, 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
No. 908.	Mining Rod, Philadelphia style, divided into feet and 10ths, vernier reading to 100ths, with target, vernier and clamp, 3 feet, sliding out to 5 feet, each . . . . .	11.40
No. 909.	Mining Rod, Philadelphia or New York style, but divided into feet 10ths and 100ths, vernier reading to 1000ths, each. . . . .	11.40
No. 910.	Mining Rod, Philadelphia style, divided into feet and 10ths, vernier reading to 100ths, with target, vernier and clamp, 5 feet, sliding out to 9 feet, each . . . . .	12.00
No. 911.	Mining Rod, Philadelphia or New York style, but divided into feet, 10ths and 100ths, vernier reading to 1000ths, each . . . . .	12.00
No. 912.	Stadia Rod, self-reading, folding, with strong brass hinge; 6 feet closed, opening to 12 feet, each . . . . .	12.00
No. 913.	Architects' Rod, Hardwood, light color, divided into feet, inches and ⅛-inches, target, vernier and clamp, 5½ feet, sliding out to 10 feet, each . . . . .	6.50
No. 914.	Architects' Rod, like No. 913, but divided in feet, 10ths and 100ths, vernier reading to 1000ths, each . . . . .	6.50
No. 915.	Cross Section Rod, 10 feet, divided into feet, 10ths and 100ths on both sides; level bubble at each end, and opening for the hand, each . . . . .	10.00
No. 916.	Flexible Pocket Levelling Rod, 10 feet long, divided into feet, 10ths and 100ths, each . . . . .	3.25
No. 917.	Flexible Pocket Levelling Rod, like No. 916, but 12 feet long, each . . . . .	4.00
No. 918.	Flexible Pocket Levelling Rod, 12 feet long, divided into inches, and ⅛-inches, each . . . . .	4.00
No. 919.	Flexible Pocket Levelling Rod, 3½ meters long, divided into centimeters, each . . . . .	4.00

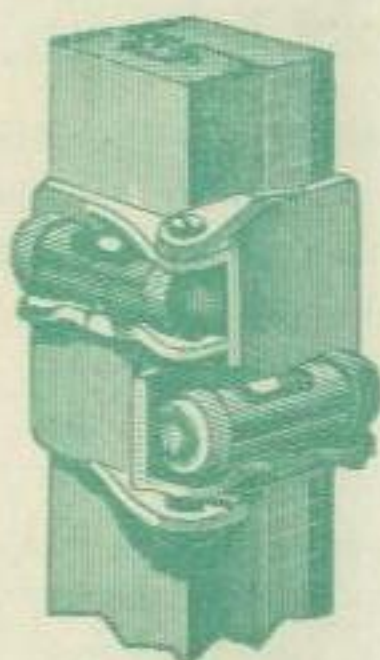
The Flexible Rods are made of pliable, strong, rubber canvass, divided like self-reading rods. Can be coiled up and carried in the pocket. For use, they are fastened to a board or stick with thumb tacks.

## EXTENSION MEASURES.

These Measures are of hardwood with brass trimmings, and are graduated to feet, inches and eighths, or 10ths and 100ths. They are used for measuring floors, walls and windows; also objects which are not accessible for measuring with a tape.

No. 920.	Extension Measure, 2 fold, 4 feet, extending to 8 feet, each . . . . .	\$3.50
921.	" " 2 " 5 " " 10 " " . . . . .	4.00
922.	" " 2 " 6 " " 12 " " . . . . .	5.00

## Rod Levels.



No. 924.

No. 924. Rod level folding up to put in pocket when not in use . . . . . \$ 3.00

## STEEL TAPES.

The standard of measurements of all tapes enumerated and described in this catalogue are furnished by the office of Weights and Measures in Washington and are as near perfect as it is possible to make them.

The Reliable tapes are marked on the back with links and poles. When links are not wanted, they can be supplied marked at every foot instead, at same price.

Tapes marked metric measure, one side only, same price as corresponding lengths in feet.

Tapes marked feet one side, metric measure on the other, add 2 cents per foot to list price.

Tapes marked feet and 12ths one side, feet, 10ths and 100ths on the other, add 2 cents per foot to list price.

Tapes marked feet, inches and sixteenths, add 2 cents per foot to list price.

Tapes marked in consecutive inches, add 3 cents per foot to list price, and I furnish them marked in this way up to 50 feet.

Nickel plating will add 2½ cents per foot.

Always specify whether DECIMAL or INCH graduations are wanted.

### RELIABLE STEEL TAPES.

3-8 inch wide.

With double folding flush handle, opened by pressing small pin or button on opposite side. Hard leather cases. Nickel plated trimmings.

No. 930.	100 ft.,	either 10ths and 100ths or feet inches and 8ths, links on back	\$11.00
931.	75 "	" " " " " " " " " " " "	8.75
932.	50 "	" " " " " " " " " " " "	6.00
933.	25 "	" " " " " " " " " " " "	3.50

### RELIABLE JUNIOR STEEL TAPES.

1-4 inch wide.

A convenient Vest Pocket Steel Tape, 50 feet, weighs only 5 ounces, otherwise exact counterpart of the RELIABLE.

No. 940.	66 feet,	either 10ths and 100ths, or feet, inches and 16ths	. . . . . \$ 5.00
941.	50 "	" " " " " " " " " " " "	. . . . . 4.00
942.	33 "	" " " " " " " " " " " "	. . . . . 3.75
943.	25 "	" " " " " " " " " " " "	. . . . . 3.25

**Engineers' Two Arms  
FRAME STEEL TAPES  
3-8 inch wide.**

Folding, winding handle. Frames and trimmings of brass, nicely nickel-plated, with detachable rosewood handle, and made very strong and serviceable. Tapes can be readily detached from frame and used as a chain.

No. 945.	100 feet, either 10ths and 100ths, or inches and 8ths . . . . .	\$ 10.00
946.	75 " " " " " " " " " " . . . . .	8.00
947.	50 " " " " " " " " " " . . . . .	6.00

**Engineers' Four Arms  
FRAME STEEL TAPES  
1-4 inch wide.**

Otherwise made the same as the above.

No. 948.	100 feet, either 10ths and 100ths, or inches and 8ths . . . . .	\$ 10.00
950.	150 " " " " " " " " " " . . . . .	13.50
952.	200 " " " " " " " " " " . . . . .	17.50
956.	300 " " " " " " " " " " . . . . .	25.00

**Engineers' Paine's Pattern  
STEEL TAPES  
1-4 inch wide**

Hard leather metal lined cases, nickel-plated trimmings, two detachable rings. The tape can be readily detached from the case, and I furnish an extra ring for the other end. The steel ribbon is heavier and stronger than used in the regular steel tapes.

No. 960.	100 feet, either 10ths and 100ths, or inches and 8ths . . . . .	\$ 10.00
962.	50 " " " " " " " " " " . . . . .	6.00

**Engineers' Paine's Pattern  
STEEL TAPES  
1-4 inch wide**

Same as the above, except that the case is entirely of metal.

No. 965.	100 feet, either 10ths and 100ths, or inches and 8ths . . . . .	\$ 9.00
967.	50 " " " " " " " " " " . . . . .	5.00

This Tape is also made with a heavy 3-16 steel line, price same as above.

**RIVAL STEEL TAPES  
3-8 inch wide**

Nickel-plated metal case, edge bound, with heavy nickeled brass rim, flush handle

The "Rival" is the most popular steel tape in the market, as it meets a demand from a large class of users who appreciate the value of a *steel* over the linen wire warp tape. While the price is very low, the tape is in every way first-class. The measurements are guaranteed accurate. The winding drum is large, has a long crank, winds easily, and the handle folds nearly flush with the case.

No. 972.	100 feet, either 10ths and 100ths, or inches and 8ths . . . . .	\$ 8.00
974.	50 " " " " " " " " " " . . . . .	4.50

## CHALLENGE STEEL TAPES

3-8 inch wide

This is a companion to the "Rival," but comes in leather case,—thus making it somewhat lighter.

No. 975.	100 feet,	either 10ths and 100ths, or inches and 8ths . . . . .	\$ 8.50
977.	50 "	" " " " " " " " " " . . . . .	5.00

## SURVEYORS' CHAIN TAPES

Extra Heavy Steel Ribbon

Either 1-4 inch or 1-8 inch wide, as preferred

These tapes are devised to take the place of the old link chain, and are the best in the market. No rivets to mark the graduations — which would weaken it and make it look uneven and clumsy — but instead the graduating is made on a raised, bright surface with the figures deeply etched in, and these always will show up clear and distinct.

Especially recommended for heavy, out-door, railroad and highway work.

### Tapes complete, with Rings and Reel.

No. 6100	100 feet	. . . . .	\$ 7.50
6150	150 "	. . . . .	9.00
6200	200 "	. . . . .	10.50
6300	300 "	. . . . .	14.00
6500	500 "	. . . . .	21.50
6066	100 links	. . . . .	6.50
6132	200 "	. . . . .	8.50
6198	300 "	. . . . .	10.50
6330	500 "	. . . . .	15.50
6082M	25 Meter	. . . . .	7.25
6100M	30 "	. . . . .	8.00
6164M	50 "	. . . . .	11.00
6328M	100 "	. . . . .	18.50
Plain 2 arm, wooden reel only . . . . .			2.00
Patent 4 arm telescoping reel			
best for long tapes only . . . . .			3.50

### Tapes only, with Rings.

No. 06100	100 feet	. . . . .	\$ 4.00
06150	150 "	. . . . .	5.50
06200	200 "	. . . . .	7.00
06300	300 "	. . . . .	10.50
06500	500 "	. . . . .	18.00
06066	100 links	. . . . .	3.00
06132	200 "	. . . . .	5.00
06198	300 "	. . . . .	7.00
06330	500 "	. . . . .	12.00
06082M	25 Meter	. . . . .	3.75
06100M	30 "	. . . . .	4.50
06164M	50 "	. . . . .	7.50
06328M	100 "	. . . . .	15.00
Rings only, per pair . . . . .			.50

## METALLIC TAPES

5-8 inch wide

With patent double folding, flush handle, nicked trimmings, woven linen, with metal warp. In hard leather case. Best in the market.

No. 980.	100 feet,	either 10ths or inches . . . . .	\$ 4.20
981.	50 "	" " " " " " " " " " . . . . .	2.60
982.	25 "	" " " " " " " " " " . . . . .	2.00

## Engineers' POCKET STEEL TAPES

In German Silver Cases with Spring and Stop.

No. 984.	36 inches, $\frac{1}{4}$ inch tape, inches and 16ths one side, feet, 10ths and 100ths of feet other side . . . . .	1.00
No. 985.	72 inches, $\frac{1}{4}$ inch tape, inches and 16ths one side, feet, 10ths and 100ths of feet other side . . . . .	1.25
No. 986.	96 inches, $\frac{1}{4}$ inch tape, inches and 16ths one side, feet, 10ths and 100ths of feet other side . . . . .	2.00
No. 987.	10 feet, 5-16 inch tape, feet, inches and 16ths one side, feet 10ths and 100ths of feet other side . . . . .	2.50
No. 988.	12 feet, 5-16 inch tape, feet, inches and 16ths one side, feet, 10ths and 100ths of feet other side . . . . .	3.00

## CHESTERMAN STEEL TAPES

3-8 inch wide

In Leather Case with patent Flush Handle.

No. 990.	100 feet, either 10ths and 100ths, or inches and 8ths, links on back	\$11.00
991.	50 " " " " " " " " " " " " " " " "	6.00
992.	25 " " " " " " " " " " " " " " " "	4.25

## SUPERIOR STANDARD STEEL CHAIN TAPES

No. 995

These tapes are designed for convenience and durability to take the place of the old chain. On very best blued steel 5-32 to  $\frac{1}{4}$  inch wide. Graduations are made on raised surface of Babbit's metal, especially recommended for underground work.

LENGTH	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
50 feet . . . . .	\$2.00	\$2.50	\$2.50	\$3.25	\$3.25	\$4.00	\$3.25
100 " . . . . .	2.60	3.00	3.00	4.50	4.50	6.00	4.50
200 " . . . . .	4.00	5.00	4.25	7.00	7.00	12.00	7.00
300 " . . . . .	5.50	7.00	7.00	10.00	10.00	—	10.00
Each additional 100 feet . . . . .	2.50	3.00	—	4.00	4.00	—	4.00
" " 50 links . . . . .	2.00	2.25	—	3.25	4.00	—	—
250 " . . . . .	4.50	5.50	—	8.50	—	—	—
500 " . . . . .	8.00	10.00	—	17.00	—	—	—

- No. 1 graduated each 10 feet or links.
- No. 2 " " 5 " "
- No. 3 " " 10 " " first 10 feet in single feet or links.
- No. 4 " " foot or link.
- No. 5 " " foot, first one in 10ths or 12ths.

No. 6 is No. 4 complete with reel and handles.

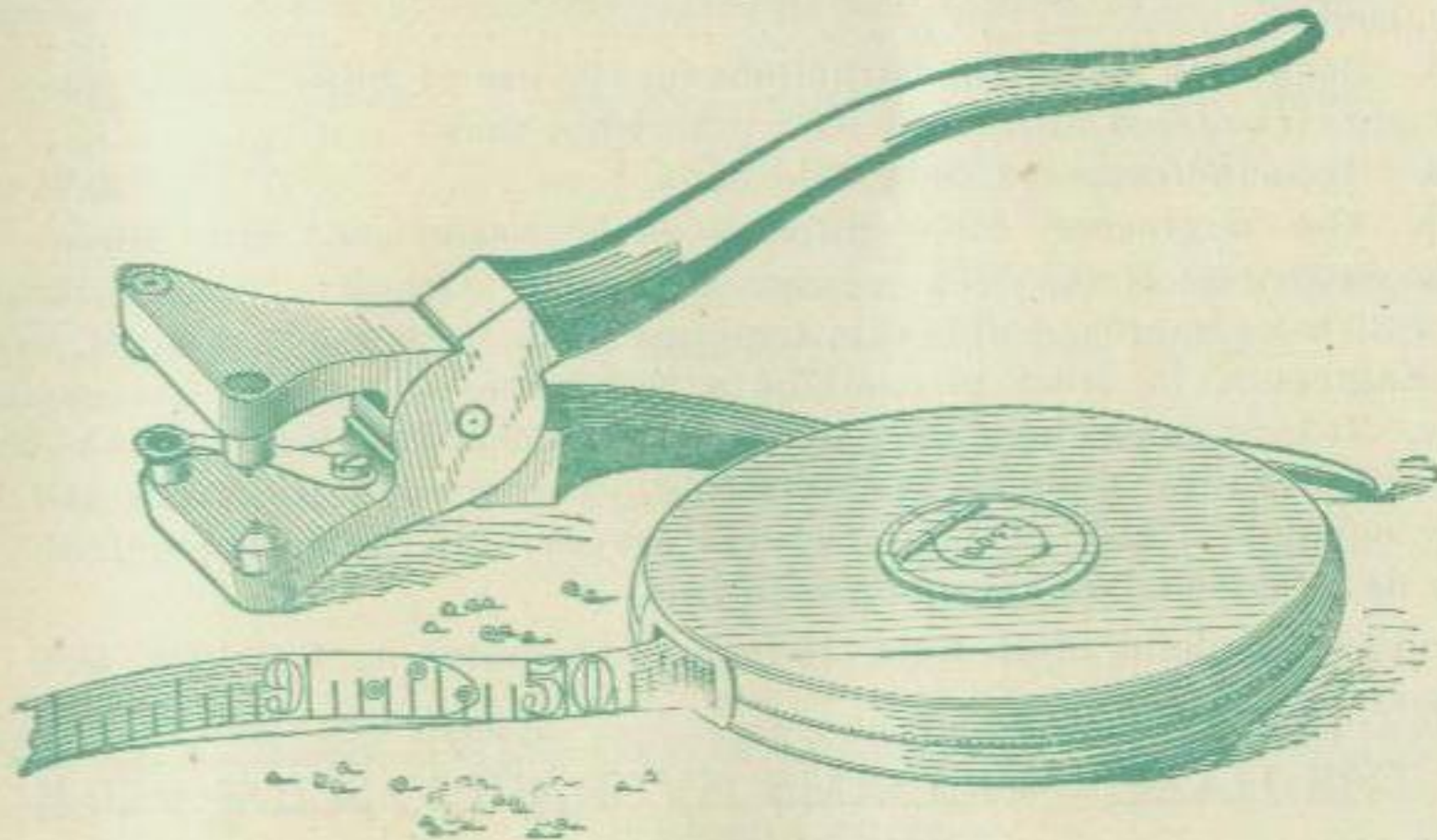
No. 7 has one additional foot beyond zero which is graduated in 1-10 of foot and numbered in opposite direction to tape, so the 1-10 of foot can be read off beyond zero and the full foot at the other end; without reel or handles.

Pair of handles . . . . .	\$ 0.50
Brass reel for 100 foot tape . . . . .	3.00
Brass reel for 300 to 500 foot tape . . . . .	5.00



# Punch and Set

## For Steel Tape Repairing



**No. 996**

This punch cuts a clean hole, 1-16 inch diameter, in steel tapes of the usual thickness, and the eyelet is then inserted and quickly and neatly riveted. The punch is  $7\frac{3}{4}$  inches long.

	Price	Post.
No. 996. Punch and Set combined, for repairing steel tapes . . . . .	\$2.75	\$0.15
No. 998. Eyelets (two lengths), two packages of 500 each length . . .	1.25	.05
Other tape repair sets to order.		

### EXTRAS FOR STEEL TAPES

No. 999. Tape menders for emergency in the field (state size of line) . . . . .		\$ 0.35
No. 1000. Compensating Handles with graduated scale, per pair . . . . .		2.40
No. 1001. Pocket Thermometer, reversible, in mahogany case . . . . .		0.75
No. 1002. Spring Balance with handle and snap . . . . .		2.50
No. 1002L. " " " " " " " and level . . . . .		4.00
No. 1003. A neat and practical devise that can be put on any steel tape so that end of tape will fasten anywhere at exact zero, thus only requiring one person to handle and read tape, price . . . . .		1.00

Any tape not specified, any length and graduation, at low prices.  
Tape repairing a specialty.  
Empty cases for tapes kept in stock.

### SLIDE RULES

Improved pattern, with springs, to give uniform motion at all times

No. 1005. Improved Slide Rule (Mannheim), 5-inch, boxwood, divisions on white ivorine with glass indicator. Printed instructions with each rule, each . . . . .		\$ 4.50
No. 1006. Improved Slide Rule (Mannheim), 10 inch, boxwood, divisions on white ivorine with glass indicator. Printed instructions with each rule, each . . . . .		4.50

(Continued on page 42)

## SLIDE RULES ( Continued )

- No. 1007. Improved Slide Rule (Mannheim), 20-inch, hardwood, divisions on white ivorine with glass indicator. Printed instructions with each rule, each . . . . . \$12.50
- No. 1008. Book with complete instructions for the use of Slide Rules, free of charge if ordered with 1005 - 1007, otherwise, each . . . . . 0.25
- No. 1009. Glass indicator for Slide Rule, each . . . . . \$0.75 to 1.50
- No. 1010. The Engineers' Slide Rule, 24-inch, hardwood, with directions, each . . . . . 6.00
- No. 1010 is an improved slide rule arranged by E. Thatcher and E. M. Schofield, Bridge Engineers, in order to combine a maximum of speed with a maximum of accuracy. It is 24 inches long and comprises two complete rules upon one stick.
- It multiplies three numbers at one setting, gives powers and roots and has an accuracy equal to a 48-inch rule for ordinary work. No runner is required. Directions for using same are engraved on each rule.
- The Favorite Mannheim Slide Rule, 10-inch, made same as No. 1006, but without springs . . . . . \$ 3.00

### THE HAZEN-WILLIAMS HYDRAULIC SLIDE RULE

- No. 1012 10 inches long, improved pattern, directions with every rule . . . \$ 7.00

Recently perfected by Mr. Allen Hazen, M. Am. Soc. C. E., 220 Broadway, New York City, and Professor Gardner S. Williams, M. Am. Soc. C. E., of Cornell University, Ithaca, N. Y., resembles in general form the ordinary slide rule, and is designed to solve various problems involving diameter, hydraulic radius, slope of conduit, velocity, and quantity or discharge. On the reverse side of the rule are a number of handy tables, including velocities and discharge with  $C = 100$  for slopes of 0.1, 1.0, and 10, and diameters 2 to 60 inches; feet of pipe of various diameters in which friction equals velocity head, for  $C = 100$  and for  $C = 130$ ; approximate values of  $C$  for different classes of conduits; and factors for a number of the conversions which the hydraulic engineer is most commonly required to make, such as gallons to cubic feet and to pounds, and metric to English weights and measures. One of the edges of the rule has a scale in inches and the other has a metric scale.

### SPRING FOLDING POCKET RULES

With metal tips,  $\frac{5}{8}$  inch wide, measuring 7 inches when closed, both sides divided inches and 16ths.

Yellow Finish		White Enameled Finish	
No. 1020.	2-feet, 4-fold, each . . . . .	\$0.25	No. 1030. 2-feet, 4-fold, each . . . . . \$0.35
	1021. 3-feet, 6-fold, " . . . . .	.35	1031. 3-feet, 6-fold, " . . . . . .45
	1022. 4-feet, 8-fold, " . . . . .	.50	1032. 4-feet, 8-fold, " . . . . . .60
	1023. 5-feet, 10-fold, " . . . . .	.60	1033. 5-feet, 10-fold, " . . . . . .70
	1024. 6-feet, 12-fold, " . . . . .	.75	1034. 6-feet, 12-fold, " . . . . . .85
	1025. 8-feet, 16-fold, " . . . . .	1.00	1035. 8-feet, 16-fold, " . . . . . 1.15
No. 1036.	4-feet, 8-fold, one side inches and 16ths, other side 10ths and 100ths, white enamel finish, each . . . . .		\$0.75
No. 1038.	4-feet, 8-fold, one side meter, other side inches, yellow finish, each . . . . .		.50
No. 1039.	4-feet, 8-fold, one side meter, other side inches, white enamel finish, each . . . . .		.60
No. 1040.	Boxwood Engineers' Joint Rule, 2-feet, 4-fold, heavy brass-bound, one side inches and 16ths, other side 10ths and 100ths, each . . . . .		.75

## PROTRACTORS

Improved, semi-circular, heavy celluloid protractors with bevelled graduation to lay close to paper, the most practical in the market, reading to half degrees.

No. 1050. 5-inch	No. 1051. 6-inch	No. 1052. 8-inch
\$1.00	1.50	2.00

Improved, heavy, circular, celluloid protractors divided to half degrees, bevelled graduation, the most practical in the market, reading to half degrees.

No. 1054. 6-inch	No. 1056. 8-inch
\$3.00	5.00

## SEMI-CIRCULAR SWISS GERMAN SILVER PROTRACTORS

With Horn Center.

No. 1060.	5½ in., ½°, with long arm and vernier reading to 3 minutes, each	\$11.00
1061.	8 in., ¼°, " " " " " " " 1 " "	14.50
1062.	10 in., ¼°, " " " " " " " 1 " "	18.00
1063.	8 in., ½°, " " " " " " " 1 " "	15.25
1064.	10 in., ½°, " " " " " " " 1 " "	18.25

## CIRCULAR SWISS GERMAN SILVER PROTRACTORS

With Horn Center

No. 1065.	5½ in., ½°, with long arm vernier reading to 3 minutes, each	\$14.00
1066.	8 in., ¼°, " " " " " " " 1 " "	16.25
1067.	10 in., ¼°, " " " " " " " 1 " "	20.00
1068.	8 in., ¼°, " " " " " " " 1 " with clamp screw, micrometer adjusting screw to vernier and magnifying lense, each	23.50

## PAPER PROTRACTORS

No. 1070.	Circular protractor on drawing paper, 8 in. diam., ½°, each	\$0.20
1071.	" " " " " " 14 " " ¼°, " " " "	.30
1072.	" " " Bristol board, 8 " " ½°, " " " "	.20
1073.	" " " " " " 14 " " ¼°, " " " "	.40
1074.	" " " tracing paper, 8 " " ½°, " " " "	.20
1075.	" " " " " " 14 " " ¼°, " " " "	.30

# Drawing Papers in Sheets and Rolls

## Elko Drawing Paper in Sheets

This paper is of good quality, with a fine grain. It is especially adapted for very accurate work, for engineers and in colleges, schools and universities. It takes ink, pencil and color well and stands a great amount of erasing.

No. 1080.	Cap . . . . .	14 x 17 inches . . . . .	Per Quire	\$0.30
1081.	Demy . . . . .	15 x 20 " . . . . .	" "	.45
1083.	Medium . . . . .	17 x 22 " . . . . .	" "	.60
1084.	Royal . . . . .	19 x 24 " . . . . .	" "	.75
1085.	Super Royal . . . . .	19 x 27 " . . . . .	" "	.90
1086.	Imperial . . . . .	22 x 30 " . . . . .	" "	1.15
1087.	Double Elephant . . . . .	26 x 42 " . . . . .	" "	2.25

## Elko Drawing Paper in Rolls

An almost Pure White Paper, with slightly grained surface, and suitable for any work, either in ink, color, pencil or crayon. Especially adapted for engineers, school and college work, and for all technical drawings.

No. 1090.	36 inches wide, 10 yards in roll . . . . .	per roll,	\$1.60
No. 1091.	42 " " 10 " " " . . . . .	" "	1.85
No. 1092.	56 " " 10 " " " . . . . .	" "	2.85
Full rolls of either 36 inch, 42 inch or 56 inch widths, of about 35 to 40 lbs. to the roll . . . . .			per lb. .35

## Perfection Draughting Paper in Rolls

Egg Shell Surface

A most perfect drawing paper and especially designed for engineers, architects and draughtsmen. The paper is made of pure linen and is the very best that can be produced.

No. 1100.	" Perfection," 36 inches wide, in rolls of 10 yards . . . . .	per roll,	\$2.60
1101.	" 42 " " " 10 " " " . . . . .	" "	3.00
1102.	" 58 " " " 10 " " " . . . . .	" "	4.00
Full rolls of either of above widths, of about 35 to 40 lbs to the roll,			" lb. .50

## Buff Detail Paper in Rolls

Medium Thick

This paper is made expressly for drafting purposes, and will stand erasing, and take ink perfectly. It will be found superior to the ordinary paper used for detail work.

No. 1106.	40 inches wide, in rolls of 50 yards . . . . .	per roll,	\$2.50
1106.	48 " " " 50 " . . . . .	" "	2.80
1107.	40 " " " 100 " . . . . .	" "	4.00
1107.	48 " " " 100 " . . . . .	" "	4.65
In rolls of about 100 lbs. . . . .			" lb. .11

( Continued on page 45 )

# Drawing Papers in Sheets and Rolls

(Continued)

## Buffine Detail Drawing Paper in Rolls

Tough, hard, uniform in grain and finish, stands erasing very well and takes ink and water color perfectly. The buff or cream color is agreeable to the eye and permits of handling without soiling.

No. 1110.	36 inches wide, 10 yards in roll	per roll,	\$1.25
1112.	42 " " 10 " " "	" "	1.75
1114.	56 " " 10 " " "	" "	2.25
In full rolls of 30 to 40 lbs.		" lb.	.30

## K. & E. Co. Duplex, Medium, Cream Color, in Rolls

No. 1115

30 inch, rolls weighing 30 to 40 lbs.	per pound,	\$0.29
30 " " " "	" 10 yard roll	1.15
30 " " " "	" yard	.13
36 " " " "	" pound	.29
36 " " " "	" 10 yard roll	1.35
36 " " " "	" yard	.15
42 " " " "	" pound	.20
42 " " " "	" 10 yard roll	1.70
42 " " " "	" yard	.20
56 " " " "	" pound	.29
56 " " " "	" 10 yard roll	2.15
56 " " " "	" yard	.25
62 " " " "	" pound	.29
62 " " " "	" 10 yard roll	2.50
62 " " " "	" yard	.30

## K. & E. Co. Mounted Drawing Papers in Rolls

No. 1116.	" Duplex," 36 inches wide, per 10 yard roll	\$ 5.40	per yard	\$0.70
"	" " 42 " " " "	6.80	" "	.85
"	" " 56 " " " "	9.50	" "	1.20

### MEDIUM

No. 1117.	" Anvil," 36 inches wide, per 10 yard roll	\$ 6.80	per yard	\$0.85
"	" " 42 " " " "	8.20	" "	1.00
"	" " 62 " " " "	13.25	" "	1.60

### THICK

No. 1118.	" Anvil," 62 " " " "	15.00	" "	1.90
"	" " 72 " " " "	18.00	" "	2.30
No. 1119.	"Paragon," 58 inches wide, per 10 yard roll	\$11.40	" "	1.25
"	" " 36 " " " "	7.50	" "	1.00
"	" " 42 " " " "	8.85	" "	1.10
"	" " 58 " " " "	11.75	" "	1.40
"	" " 58 " " " "	13.00	" "	1.60
No. 1120.	Paper Cloth, smooth, 38 in. wide, per 10 yd. roll	4.50	" "	.50

20 yard rolls cost double the price of 10 yard rolls.

# KOH-I-NOOR TRACING OR VELLUM CLOTH

No. 1125

Koh-i-noor, 30 inch	. . . . .	per 24 yard roll, \$ 6.90	per yard, \$0.35
" 36 "	. . . . .	" 7.60	" .45
" 42 "	. . . . .	" 10.50	" .50
" 48 "	. . . . .	" 14.20	" .65
" 54 "	. . . . .	" 15.00	" .75

## TRACING PAPER IN ROLLS

### " Utilitarian " Belgium Tracing Paper

No. 1129. 40 inches wide, 20 yards . . . . . \$1.10

### " Economy " or " Natural " Transparent Sketching Paper

No. 1130. 36 inches wide, in rolls of 50 yards . . . . . per roll, \$2.00  
 " 60 " " " 50 " . . . . . " 3.25

### " Advance " Tracing Paper

No. 1131. 42 inches wide, medium thick, very transparent, per roll of 20 yds. \$1.25

### " Bond " Tracing Paper

No. 1132. 42 inches wide, dull finish, very tough . . . per roll of 20 yards, \$1.50

### " Premier " Tracing Paper

No. 1134. 42 inches wide, dull finish, very tough . . . per roll of 20 yards, \$2.00

## Imported Highest Grade Blue Print Paper

Prepared with either our " REGULAR," " RAPID " or " ELECTRIC RAPID " PRINTING SOLUTION

### No. 1140. MEDIUM THICK

	Width	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yards, prepared,	. . . . .	\$0.87	1.00	1.15	1.75
" 50 " " "	. . . . .	4.10	4.70	5.30	8.00

### No. 1141. THICK

	Width	30 in.	36 in.	42 in.
Per roll of 10 yards, prepared,	. . . . .	\$1.00	1.15	1.30
" 50 " " "	. . . . .	4.75	5.50	6.25

### No. 1142. EXTRA THIN

	Width	30 in.	36 in.	42 in.
Per roll of 10 yards, prepared,	. . . . .	\$0.78	0.90	1.00
" 50 " " "	. . . . .	3.30	3.90	4.50

( Continued on page 47 )

## BLUE PRINT PAPER ( Continued )

### No. 1143. "Parchment." Thin

	Width	24 in.	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yards, prepared, . . . . .		\$0.70	0.84	0.96	1.08	1.65
"    50    "    "    "    . . . . .		3.00	3.60	4.20	4.80	7.10

### No. 1144. "Parchment." Medium Thick

	Width	24 in.	30 in.	36 in.	42 in.
Per roll of 10 yards, prepared, . . . . .		\$0.90	1.10	1.25	1.40
"    50    "    "    "    . . . . .		3.90	4.80	5.60	6.40

### No. 1146. "Parchment." Thick

	Width	30 in.	36 in.	42 in.
Per roll of 10 yards, prepared, . . . . .		\$1.50	1.70	1.90
"    50    "    "    "    . . . . .		6.40	7.50	8.50

### No. 1147. Blue Print Cloth

	Width	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yards, prepared, . . . . .		\$2.90	3.20	4.40	6.00

In ordering, please specify whether the "REGULAR," "RAPID" or "ELECTRIC RAPID" PRINTING SOLUTION is desired.

## Vandyke Solar Paper

The only satisfactory Solar Process Paper in the market for making Dark Brown or Black Negative Prints and Positive Blue or Black Prints on Paper or Cloth.

### Vandyke Solar Paper. Medium Thick

	Width	30 in.	36 in.	42 in.
Per roll of 10 yards, prepared, . . . . .		\$1.80	2.10	2.40

### No. 1150. Vandyke Solar Paper. Thin

For mailing and for negative prints.

	Width	30 in.	36 in.	42 in.
Per roll of 10 yards, prepared, . . . . .		\$1.80	2.10	2.40

### No. 1152. Vandyke Cloth

	Width	30 in.	36 in.	42 in.
Per roll of 10 yards, prepared, . . . . .		\$4.20	4.80	6.00

Fixing salts and full directions with every roll.

### No. 1154 Erasing Fluid

For making erasings and additions to prints, . . . . . per bottle \$0.25

### No. 1156 Spring Clips

For clamping prints while drying . . . . . per dozen \$0.30

### Blue Print Frames, Bath Trays

Any size or style at low prices

## No. 1158 AIR-TIGHT METAL TUBES

Made of tin, with well fitting covers; for keeping cut rolls of prepared Blue print and Vandyke papers dry and dark, and also well adapted for the safe keeping of valuable plans and tracings.

For 50-yard rolls, 31 inches long,						each	\$1.35
" " " 37 " "						"	1.50
" " " 43 " "						"	1.65
For 10-yard rolls, 31 " "						"	1.15
" " " 37 " "						"	1.25
" " " 43 " "						"	1.35

## No. 1160 PASTEBOARD TUBES FOR MAILING

2 in. diameter, 31 inches long						each	\$0.08
2 " " 37 " "						"	.09
2 " " 43 " "						"	.10
2½ " " 31 " "						"	.10
2½ " " 37 " "						"	.12
2½ " " 43 " "						"	.15

## PROFILE AND CROSS SECTION PAPERS

Profile paper, Plate A, 4x20 to the inch, printed in orange or green

No. 1170.	Plate A, 22 in. wide, rolls of 10, 25 or 50 yards	per yard	\$0.24
1171.	" A, 22 in. " mounted on muslin, rolls of 10 yards	"	.70
1172.	" A, 22 in. " printed on tracing paper, orange only	"	.24

Profile paper, Plate B, 4x30 to the inch, printed in orange or green

No. 1173.	Plate B, 22 in. wide, rolls of 10, 25 or 50 yards	per yard	\$0.24
1174.	" B, 22 in. " mounted on muslin rolls of 10 yards	"	.70
1175.	" B, 22 in. " printed on tracing paper, orange only	"	.24

Cross Section paper, printed in green or orange

No. 1180.	Continuous, 20 in. wide, 10x10, in rolls of 10, 25 or 50 yds.	per yd.	\$0.24
1182.	" 20 in. " mounted on muslin in rolls of 10 yds.	"	.70
1184.	" 20 in. " printed on tracing paper, orange only	"	.24
1190.	Sheets, 16x21, <i>Engraved</i> 5x5 to the inch,	per quire	\$3.50
1191.	" 16x21, " 8x8 "	"	3.50
1192.	" 16x21, " 10x10 "	"	3.50
1193.	" 16x21, " 16x16 "	"	3.50
1194.	" 16x21, <i>Ruled</i> in blue, 5x5 to the inch	"	1.00
1195.	" 16x21, " 8x8 "	"	1.00
1196.	" 16x21, " 10x10 "	"	1.00
1198.	" 16x21, topographical paper, ruled in blue and red, 400 feet to one inch	"	1.00



# Field, Transit, Level and Cross Section Books

Leather or Black Linen Binding

No. 1200.	Field book, 4½x7½ in., 80 leaves . . . . .	each \$0.65	per doz. \$6.00
1202.	" 4½x7½ in., 60 " . . . . .	.50	" 5.00
1204.	Transit book, 4½x7½ in., 80 leaves . . . . .	.65	" 6.00
1206.	" 4½x7½ in., 60 " . . . . .	.50	" 5.00
1208.	Level book, 4x6½ in., 80 leaves . . . . .	.65	" 6.00
1210.	" 4x6½ in., 60 " . . . . .	.50	" 5.00
1215.	Cross Section book, 5½x7½ in., 80 leaves . . . . .	.65	" 6.00
1216.	" " 5½x7½ in., 60 " . . . . .	.50	" 5.00

Any other size or style to order.

## Drawing Instruments

I carry in stock a full assortment of the highest grade American, Swiss and German Drawing Instruments, and while I do not list them, they may be ordered from any catalogue on hand, specifying therefrom by number and giving name of maker. I am confident that I can make you very satisfactory prices, although the instruments I carry are the most approved, and such only that will stand the test for many years.

I make a specialty of repairing, grinding and sharpening all kinds of drawing instruments, at prices given below.

Sharpening and polishing ruling pens . . . . .	\$0.25
Grinding ruling pens . . . . .	\$0.25 to .35
Re-tempering ruling pens . . . . .	.15 to .20
Aluminum handles . . . . .	.35
Ebony or ivory handles . . . . .	.25 to .30
New nut and thread for spring bows . . . . .	.50 to .75
New nut for spring bows . . . . .	.25 to .30
New screws for pens and compasses . . . . .	.25 to .35
Joint screws . . . . .	.35 to .45
Shouldered needle points, properly fitted . . . . .	.10 to .15

It is always advisable to order nut and thread where nut is stripped, as there are so many different threads that it is not always possible to fit them properly.

The higher price refers to when a screw is broken off in the female thread, so it has to be drilled out, consuming quite a little time, as will be readily understood.

### Empty Boxes for Drawing Instruments

All prices.

### Drawing Boards and Drawing Tables, Filing Cabinets

Special sizes and styles made to order at low prices.

# Flat Boxwood Scales.

## U. S. Standard. Engine divided

FLAT SCALES, divided  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 inch to the foot.

No.			No.		
1250.	Boxwood, 6 in. . . . .	\$0.40	1300.	Boxwood, white edges, 6 in.	\$0.60
1251.	" 12 in. . . . .	.60	1301.	" " 12 in.	.90
1252.	" 18 in. . . . .	.90	1302.	" " 18 in.	1.80
1253.	" 24 in. . . . .	1.20	1303.	" " 24 in.	2.70

FLAT SCALES, divided  $\frac{3}{8}$ ,  $\frac{3}{4}$ ,  $1\frac{1}{2}$ , 3 inches to the foot.

No.			No.		
1254.	Boxwood, 6 in. . . . .	\$0.40	1304.	Boxwood, white edges, 6 in.	\$0.60
1255.	" 12 in. . . . .	.60	1305.	" " 12 in.	.90
1256.	" 18 in. . . . .	.90	1306.	" " 18 in.	1.80
1257.	" 24 in. . . . .	1.20	1307.	" " 24 in.	2.70

FLAT SCALES, divided on both sides,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 in., x  $\frac{3}{8}$ ,  $\frac{3}{4}$ ,  $1\frac{1}{2}$  and 3 in. to the foot.

No.			No.		
1258.	Boxwood, 6 in. . . . .	\$0.60	1308.	Boxwood, white edges, 6 in.	\$1.00
1259.	" 12 in. . . . .	.90	1309.	" " 12 in.	1.50
1260.	" 18 in. . . . .	1.50	1310.	" " 18 in.	2.75
1261.	" 24 in. . . . .	2.25	1311.	" " 24 in.	3.00

FLAT SCALES, divided in 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch.

No.			No.		
1262.	Boxwood, 6 in., 10x50 . . . . .	\$0.40	1266.	Boxwood, 12 in., 10x50 . . . . .	.60
1263.	" 6 in., 20x40 . . . . .	.40	1267.	" 12 in., 20x40 . . . . .	.60
1264.	" 6 in., 30x60 . . . . .	.40	1268.	" 12 in., 30x60 . . . . .	.60
1265.	" 6 in., 80x100 . . . . .	.60	1269.	" 12 in., 80x100 . . . . .	.90
No. 1312.	Boxwood, white edges, 6 in., 10x50 . . . . .	\$0.60			
1313.	" " 6 in., 20x40 . . . . .	.60			
1314.	" " 6 in., 30x60 . . . . .	.60			
1315.	" " 6 in., 80x100 . . . . .	.90			
1316.	" " 12 in., 10x50 . . . . .	.90			
1317.	" " 12 in., 20x40 . . . . .	.90			
1318.	" " 12 in., 30x60 . . . . .	.90			
1319.	" " 12 in., 80x100 . . . . .	1.50			

FLAT SCALES, divided in decimal parts of feet.

No.			No.		
1270.	Boxwood, 12 in., 100x500 . . . . .	\$0.80	1272.	Boxwood, 12 in., 300x600 . . . . .	.80
1271.	" 12 in., 200x400 . . . . .	.80	1 73.	" 12 in., 800x1000 . . . . .	1.25
No. 1320.	Boxwood, white edges, 12 inches, 100x500 . . . . .	\$1.25			
1321.	" " 12 inches, 200x400 . . . . .	1.25			
1322.	" " 12 inches, 300x600 . . . . .	1.25			
1323.	" " 12 inches, 800x1000 . . . . .	1.75			

### Flat Pocket Scale

No. 1274. Divided on both sides  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 and  $\frac{3}{8}$ ,  $\frac{3}{4}$ ,  $1\frac{1}{2}$ , 3 in. or 10, 20, 30, 60 to the foot, in leather sheath, extra small size, convenient to carry in the vest pocket, Boxwood, white edge, 6 in. . . . . \$1.25

# Triangular Boxwood Scales

U. S. Standard. Engine divided

TRIANGULAR SCALES, divided 3-32, 3-16,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{3}{4}$ ,  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$  and 3 in. to the foot, and one edge 16 to the inch.

No.				No.			
1275.	Boxwood,	6 in.,	. . . . .	\$0.60	1325.	Boxwood, white edges,	6 in. \$1.50
1276.	"	12 in.,	. . . . .	.90	1326.	"	" 12 in. 2.40
1277.	"	18 in.,	. . . . .	2.40	1327.	"	" 18 in. 4.50
1278.	"	24 in.,	. . . . .	4.20	1328.	"	" 24 in. 6.50

TRIANGULAR SCALES, divided  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1,  $\frac{3}{8}$ ,  $\frac{3}{4}$ ,  $1\frac{1}{2}$ , 3, 2 and 4 in. to the foot, and one edge 16 to the inch.

No.				No.			
1279.	Boxwood,	12 in.	. . . . .	\$0.90	1329.	Boxwood, white edges,	12 in. \$2.40
1280.	"	18 in.	. . . . .	2.40	1330.	"	" 18 in. 4.50

TRIANGULAR SCALES, divided 10, 20, 30, 40, 50, 60 parts to the inch.

No.				No.			
1281.	Boxwood,	6 in.	. . . . .	\$0.60	1331.	Boxwood, white edges,	6 in. \$1.50
1282.	"	12 in.	. . . . .	.90	1332.	"	" 12 in. 2.40
1283.	"	18 in.	. . . . .	2.40	1333.	"	" 18 in. 4.50
1284.	"	24 in.	. . . . .	4.20	1334.	"	" 24 in. 6.50

TRIANGULAR SCALES, divided 20, 30, 40, 50, 60, 80 parts to the inch.

No.				No.			
1285.	Boxwood,	6 in.	. . . . .	\$0.80	1287.	Boxwood,	18 in. . . . . 2.40
1286.	"	12 in.	. . . . .	1.00	1288.	"	24 in. . . . . 4.20

No. 1289. Boxwood, 12 inches, divided 100, 200, 300, 400, 500, 600 parts to the foot . . . . . \$1.50

No.				No.			
1335.	Boxwood,	white edges,	6 in. \$1.50	1337.	Boxwood white edges,	18 in. \$4.50	
1336.	"	"	12 in. 2.50	1338.	"	" 24 in. 6.50	

No. 1339. Boxwood, white edges, 12 inches, divided 100, 200, 300, 400, 500, 600 parts to the inch . . . . . \$2.50

## Scale Guard

No. 1340. Scale guard for triangular scales . . . . . \$0.20

# Metal Triangular Scales

U. S. Standard. Engine divided

No. 1350.	Metal triangular scale, 12 inches, same divisions as No. 1279 . . . . .	2.50
1351.	" " " 12 " " " " 1276 . . . . .	2.50
1352.	" " " 12 " " " " 1282 or 1286 . . . . .	2.50

## Improved 6 inch and 12 inch Flat Metal Scales

formed to a bevel at each side,  
dark finish showing white graduations very distinct.

Weight of 12" rule, 3 oz.

No.	Graduated one edge, 16ths, other edge $\frac{1}{8} \times \frac{1}{4}$ to the inch	6" rules	12" rules
No. 1360.	Graduated one edge, 16ths, other edge $\frac{1}{8} \times \frac{1}{4}$ to the inch . . . . .	\$0.75	\$1.00
1361.	" " " $\frac{1}{8} \times \frac{1}{4}$ , " $\frac{1}{2} \times 1$ " . . . . .	.75	1.00
1362.	" " " 10ths, " 50ths of an inch . . . . .	.75	1.00
1363.	" " " 20ths, " 40ths of an inch . . . . .	.75	1.00
1364.	" " " 30ths, " 60ths of an inch . . . . .	.75	1.00

These rules will not warp; will always lay perfectly flat; will not wear out nor chip off; are more convenient and durable; will not shrink; are always absolutely reliable; every rule is guaranteed perfectly accurate.

In ordering, state length wanted.

Special scales divided at short notice and at reasonable rates.

Send sketch if ordering special scales.

## Wooden T Squares

No. 1370. Pearwood, fixed head, extra quality.

Size . . . . .	15	18	24	30	36	42	48 in.
Each . . . . .	\$0.25	.30	.35	.45	.55	.65	.90

No. 1371. Mahogany, Ebony lined blade and fixed head.

Size . . . . .	24	30	36	42	48	54	60 in.
Each . . . . .	\$0.90	1.10	1.30	1.50	1.75	2.10	2.60

No. 1372. Transparent ambro lined, maple blade, black walnut fixed head.

Size . . . . .	18	24	30	36	42	48 in.
Each . . . . .	\$1.10	1.50	1.85	2.15	2.50	3.00

Any other style of T Square made to order at short notice

## Weights for splines

With finger about  $3\frac{1}{2}$  lbs. . . . . \$0.85

## Straight Edges

No. 1380. Maple wood, transparent ambro lined, square edges, grooved joint.

Size . . . . .	18	24	30	36	42	48 in.
Each . . . . .	\$0.75	1.00	1.25	1.50	1.80	2.20

No. 1381. Steel Straight Edges, nickel plated, one edge beveled.

Size . . . . .	15	18	24	30	36	42	48	60	72 in.
Each . . . . .	\$1.75	2.00	3.00	4.00	5.00	6.50	8.00	11.00	15.00

No. 1382. Steel Straight Edges, nickel plated, square edges.

Size . . . . .	15	18	24	30	36	42	48	60	72 in.
Each . . . . .	\$1.25	1.50	2.00	3.00	4.00	5.00	6.00	8.50	12.00

## Improved Transparent Ambro Triangles

No. 1390. Transparent Ambro Triangles, 30°x60°, beveled on inner edges for easily lifting off the paper.

Size	4	5	6	7	8	9	10	11	12	14	16	18 in.
Each	\$0.25	.35	.40	.45	.55	.65	.75	.85	1.00	1.65	2.50	3.30

No. 1391. Transparent Ambro Triangles, 45°, beveled on inner edges for easily lifting off the paper.

Size	3	4	5	6	7	8	9	10	12	14	16 in.
Each	\$0.30	.35	.45	.55	.65	.75	.95	1.10	1.65	2.20	3.15

## Irregular Transparent Ambro Curves

Twenty four different sizes ranging in price from . . . . . \$0.35 to 0.90  
 No. 15 and No. 18, costing 50 cents each, are the standard sizes, giving almost every curve.

No. 1395. Logarithmic spiral curve of transparent ambro, with directions . . . \$1.75

## Solid Steel Capped Head Thumb Tacks

No. 1400.	Round heads, $\frac{3}{8}$ " diameter, per box of 100	\$1.00
1401.	" $\frac{1}{2}$ " " " " " " " " " " " " "	1.20
1402.	German silver flat heads, best quality, 15-32" diameter, per dozen	.35
1403.	German capped steel tacks, 7-16" diameter, per box of 100	.45
1404	" " $\frac{3}{8}$ " " " " " " " " " "	.35

## Pencils

No. 1420.	E. D. Co.'s Detail Drawing Pencils, Nos. 1, 2, 3, 4, 5, per dozen	\$0.35
No. 1421.	E. D. Co.'s Sketching Pencils " " " " " "	.50
No. 1422.	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 dozen	\$1.25
No. 1424.	Hardtmuth's Wax Crayons, in wood: No. 51, Gamboge; No. 52, Orange Chrome; No. 57, Raw Sienna; No. 60, Vandyke Brown; No. 63, Sepia; No. 64, Black; No. 67, Sap Green; No. 71, Light Green; No. 75, Cobalt Blue; No. 78, Dark Blue; No. 80, Violet Carmine; No. 85, Vermilion; No. 87, Rose Madder; No. 94, Yellow, . . . . . Per dozen, \$1.00; Each,	\$0.10

## Rubber Erasers

No. 1430. Viridian rubber, green, oblong, beveled, 3 sizes.

Pieces to the pound	40	20	12
Per piece,	\$0.06	.12	.20
Per pound			\$2.25

No. 1431. Maroon rubber, red, oblong, beveled, 3 sizes.

Pieces to the pound	40	20	12
Per piece	\$0.06	.12	.20
Per pound			\$2.25

No. 1435.	Metal Erasing Shields, nickel plated	Each,	\$0.25
1436.	Celluloid Erasing Shields	"	.25
1437.	Steel Erasers, white bone handle, imported	Per dozen	.60
1438.	Gillot's Crow quill pens with holder	"	.15
1439.	Gillot's Mapping, 303	Per gross, \$1.00	" .10
1440.	" " 404	" 1.00	"

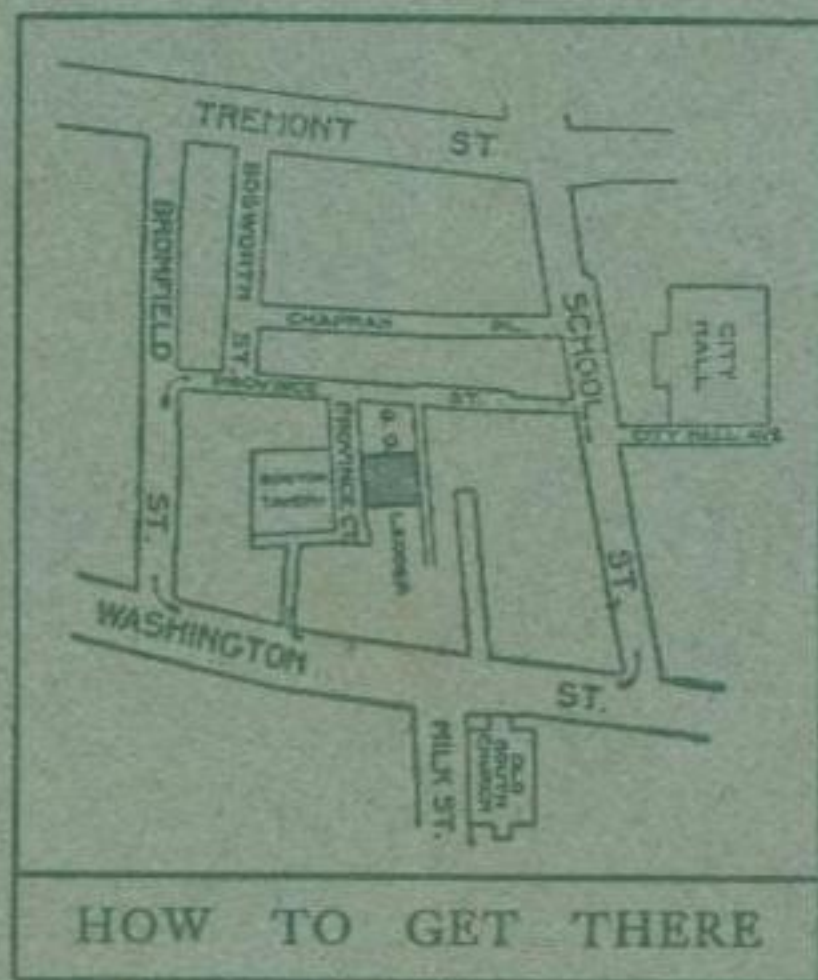
# G. G. Ledder

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## Surveying and Mathematical Instruments



Boston, Massachusetts