

ILLUSTRATED
CATALOGUE AND
PRICE LIST ❁ ❁ ❁

OF THE MOST IMPROVED

ENGINEERING
❁ AND SURVEYING
INSTRUMENTS

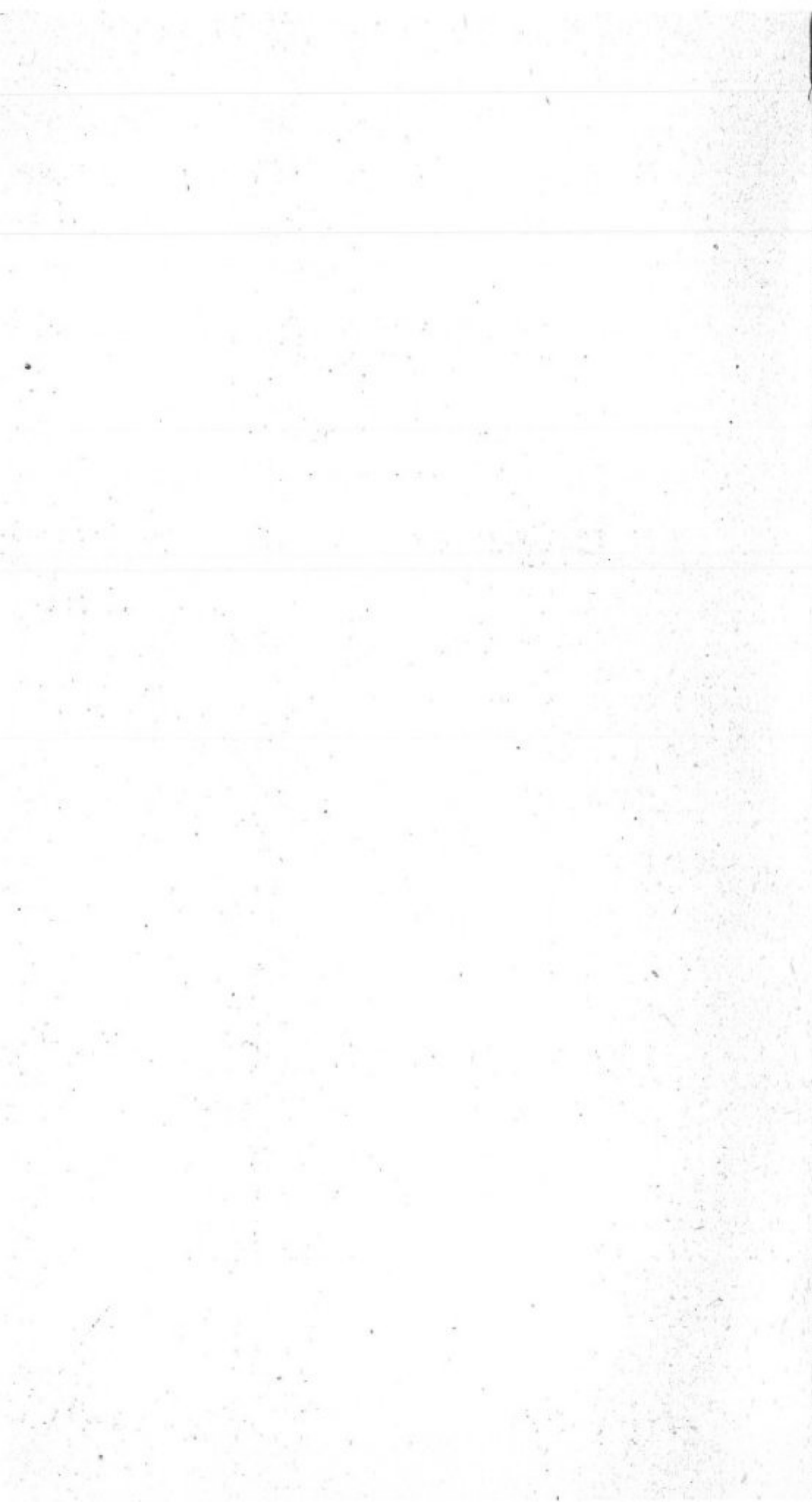
AS MANUFACTURED BY

R. SEELIG,

(Formerly of HEER & SEELIG)

122 & 124 SOUTH CLARK STREET
CHICAGO ILL.

1902



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..TERMS..

The prices in this Catalogue are Net Cash, and no deduction therefrom can be made. Parties unknown to me, when ordering, should give satisfactory reference; otherwise remittance should be made by money order or draft, or goods will be sent C. O. D., expense of collection to be borne by purchaser. Goods sent by mail are likewise at purchaser's risk.

Correspondents are requested to give number of goods as marked in this Catalogue. State and County should distinctly be added to the address; this is very essential and will avoid delays.

...PREFACE....

The catalogue which I herewith present to my many friends and patrons illustrates the many instruments which I manufacture according to my own designs and patterns. I keep on hand a full supply of Engineers' and Surveyors' Instruments; nevertheless, it is always prudent to order as soon as possible to avoid delays caused, perhaps, by the fact that my stock may be exhausted. The illustrations in this catalogue represent the instruments as I manufacture them at the present time, but it is my endeavor to keep pace with the advancement in science and hence improve upon them continually. It is my aim and ambition to rank among those manufacturers who originate and do not copy, and I shall at all times strive to improve whatever I manufacture and thus raise my goods to such a standard as can be equalled, perhaps, by few and excelled by none.

I have been a partner of the firm of Heer & Seelig for nine years and I am successor of the late firm of Seelig & Kandler. In both cases I have managed the shops for manufacturing engineering and surveying instruments. My products will leave nothing to wish for as to finish and accuracy, and will also combine those qualities which make an American instrument so far superior to those of European manufactures—strength and durability with lightness and portability.

My factory is fitted up with the latest improved machinery, run by electric power and operated by skilled workmen. I am thus able to furnish my instruments at reasonable prices that are in keeping with the workmanship, finish and superiority of my work.

Hoping that my endeavors will be appreciated by the trade, I thank those who have patronized me in the past for favors shown me, and solicit a trial from those to whom I am a stranger.

R. SEELIG,

DESCRIPTION

Of the Most Important Features of my Instruments.

THE TELESCOPE is one of the most important parts on engineering and surveying instruments. All lenses are ground by the best optician and thoroughly tested before being applied to the telescope. The objective glass, perfectly achromatic, is made of the celebrated "Jena" glass, which has a greater index of refraction and power of dispersion, consisting of two lenses which are cemented together so as to form one lens only. This method prevents the settling of a film between the lenses. I generally provide the telescopes with erecting eye pieces unless ordered to the contrary. The object glass is focused by rack and pinion, but the eye piece is focused by a screw-like motion arrangement. Particular attention is paid to the fitting of the object slide which fits directly in the main body tube and requires no further adjustment whatever.

THE GRADUATION the lines of my graduations are perfectly straight and uniform in width and thoroughly black.

The vernier on all my transits read to 30 seconds, unless specially ordered. They are placed at an angle of 30° to line of sight.

The numbering of the degrees is from 0° to 360° both ways or from 0° to 360° one way and from 0° to 180° the other way. To distinguish the verniers I mark them A and B. I recommend ground glass, vernier shades to every transit, as this greatly facilitates the reading.

THE CENTRES on my transits and levels are made of hard bell metal and cast in one piece. All centres are turned between dead centres and great care is taken to their respective fittings. Owing to the judicious placing of the centres the limb and vernier plate come nearer to the tripod head than in any other make.

SHIFTING PLATES are provided to every one of my Transits, which permit a precise centering of the instrument over any given point.

THE LEVELING SCREWS are used more than any other part of the instrument, it is evident that they should be very durable. My leveling screws have a very deep thread, are provided with milled finger heads and protected by dust caps.

THE TRIPOD is of the split leg pattern, provided with thumb nuts. The tripod head consists of a single casting, combining the least possible weight with greatest degree of stiffness. For the legs I use well seasoned cherry wood. The shoes are made of cast steel and are pronounced to be the most correctly shaped shoes applied to any tripod made. When the tripod legs are spread apart the points of the shoes stand in a vertical position and greatly add to the stability of the instrument. There are also projections provided to aid in pressing the legs firmly into the ground.

THE COMPASS is either provided with a fixed graduated ring or with the so-called variation plate. The needle is made of the very best steel, hardened all over, and balanced by means of a coil of fine wire attached to the end pointing south. The compass ring is graduated to half degrees and numbered in quadrants from 0° to 90° .

THE TANGENT SCREWS consist of a single casting, provided with a milled finger head; an opposing spiral spring takes up all lost motion. The action of the clamp is entirely free from any strain when clamped and the levels are unaffected. This style tangent screw is the only effective and reliable method, and is endorsed by every engineer who had an opportunity to use it.

CLAMP AND TANGENT SCREW to telescope axis is of a similar design as those used on the lower plates. The clamp is cast in one piece and has two long arms, the screw being fitted to one of these arms and the tangent screw to the other, both spring and tangent screw pressing against the cross piece on the standard, as shown in the engravings.

THE GRADIENTER SCREW as applied to my Engineers' Transit, is of the same construction as the clamp and tangent screw to the telescope axis, differing only in the graduated head which is added to the tangent screw. The thread being cut of such a value so as to cause to move the horizontal cross line of the telescope over a space of $\frac{50}{100}$ of a foot, at a distance of 100 feet, by one revolution of the screw. A graduated scale attached to the clamp serves as a counter for whole revolutions of the grader screw. This attachment is very useful in grading, measuring distances and for measuring small angles.

STADIA WIRES for measuring distances, is a most superior device, especially in topographical work. The work can be performed with great rapidity and the results obtained will be within all practical limits. Fixed stadia wires are always reliable, adjustable wires are insecure, as they may get out of adjustment and furnish results that are far from being correct. The fixed stadia wires that I insert in my instruments will perfectly cover one foot in a 100 feet on any perfect level rod.

THE SPIRIT LEVELS are all accurately ground and thoroughly tested before they are mounted. All my levels are filled with a composition fluid which is less subject to the laws of expansion and contraction, showing more sensitiveness at the same time.

THE FINISH that I apply to my instruments is such as to give every part an elegant appearance as well as to protect them from tarnishing. The larger parts as a general rule are bronzed in a platina solution, the smaller parts are finished bright and well lacquered.

THE REVERSION LEVEL ATTACHMENT is a most excellent and remarkably accurate device. It has been applied to a number of my instruments the last two years, and was very highly commented upon by those who had an occasion to use it. It consists of a level vial having a graduated scale at top and bottom on its exterior surface. The level tube mounting is provided with two openings corresponding to each respective scale. The interior surface is ground to a true shape of a barrel.

The reversion level attachment will be found very useful on both Transit and Wye Level telescope. If attached to a Transit telescope (as shown in No. 7) it will permit to take levels with the telescope in either, reversed or direct position as well as to perform the adjustment without the use of the peg method. Simply bring the bubble in the center of the graduated scale and bisect with the horizontal cross wire some distant object, reverse the telescope and bisect the same object with the horizontal cross wire again, and if the bubble plays in the center of the graduated scale the adjustment is correct, if it shows a deviation adjust half the error by means of the adjusting nuts provided for that purpose on one side of the level tube.

If attached to an engineer's Wye level (as shown in No. 4) it will indicate whether the collars on the telescope are of exactly the same diameter or not, if they are not of the same diameter, which may be due to unequal wear on those places where the rest in the wyes, they will form a cone, and if the level tube is adjusted in the usual manner, by reversing it end for end, the level will be adjusted to the bottom of the cone and not parallel to the line of collimation. To verify the accuracy of the two collars with the reversion level adjust the level by reversing the telescope end for end in the wyes as in an ordinary wye level with a single reading level, after this adjustment and the lateral adjustment is complete rotate the telescope 180° in its wyes if the bubble shows any deviation half the error may be adjusted by means of the adjusting nuts on one side of the level tube provided for that purpose.

GENERAL REMARKS. When examining the cuts illustrating the instruments it will be noticed that it was my endeavor to build my instruments of as few parts as possible, to insure both strength and simplicity. All the important parts are provided with ribs and cast in one piece. Wherever two parts revolve in each other I apply different metals.

THE PACKING OF INSTRUMENTS receives my special attention and every possible precaution is taken to insure the safe arrival of the instrument at its place of destination. When instruments are sent to out-of-town places, I pack them in an extra pine box, large enough to leave space for shavings or other soft packing material. This mode of packing should also be observed when instruments are sent to me for repairs, and a request, "Keed Dry" or "Handle with Care," put on the box or shipping tag.

CARE OF INSTRUMENTS. An instrument properly handled and taken care of can be preserved for many years. In field use the instrument is necessarily exposed to the heat of the sun and to dust and water, which exposure, of course, tends to affect the accuracy of the instrument. I have constructed the instruments so as to give them the greatest protection possible from exposure of this kind, yet a few items may be observed to further guard against abuse of the instrument. For instance, when working in the hot sun the instrument should be provided with a shelter of some sort—an umbrella or a bag thrown over it when not in use. It is very important that the instrument should be protected against undue expansion, to preserve the finer parts of it, such as the telescope slide, the lenses, the centers, the edges of graduation and verniers, etc. While in use, a screen or shade held over it will insure greater permanency of its adjustments and insure more accurate results than when exposed carelessly. The best way to protect a transit is a waterproof silk bag; for levels, a gossamer. The waterproof oiled linen covers frequently contain sulphur, which blackens the silver limb on a transit instrument.

If after the exposure of the instrument in extremely hot or cold weather, it is found that the centres do not revolve as freely as usual, clean them as soon as possible.

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

It is advisable to look sometimes after the fittings of the 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 it unnecessarily, as it will spoil the graduation, but send it to a competent instrument maker immediately.

REPAIR OF INSTRUMENTS. For repairing instruments I possess all the facilities necessary to do the work in the most satisfactory and thorough manner. I have all the patterns, tools and implements required to repair any make of instrument, which is necessary in a city like Chicago, whence instruments are sent from all parts of the United States for repair. I can, therefore, guarantee to do better work than any other concern, and know

that I can save a great many of my customers considerable time and expense by relieving them of the necessity to send their instruments farther away from their homes. When sending instruments for repair it should be distinctly stated what there is to be done to them, or if a thorough overhauling and adjusting is desired. I charge, of course, according to the work done, in all cases, and most all my patrons leave it to me to put instruments in such a condition as their construction will allow to insure their further utility. A great many letters are constantly received asking for estimates for repairs on instruments. To give a precise estimate in such cases is impossible, as the instrument is not at hand. The best way to do is to carefully pack up the instrument and ship it to me. For sake of convenience the tripod may be retained, but always send leveling head. After seeing instrument I can determine what the exact cost will be and act according to the wishes of my patrons. Below follows a price list of sundry parts of instruments. In conclusion, I would remark that the most expensive repairs occur to transits. If these instruments, for instance, are damaged by falling, their repair may require a substitution of new centers, etc., and the cost may vary from \$10.00 to \$30.00, and oftentimes even more. Leveling instruments, as a rule, do not sustain such injuries as to make their repair so costly, an amount of from \$5.00 to \$15.00 being sufficient to cover repairs. When writing for estimate please be sure to always give name of maker of instrument, as this is an essential feature in calculating of same.

Price List of Parts of Instruments

Ground glass level vials, according to size and grade of sensitiveness.	
per inch from.....	\$0.35 to \$0.75
Sunshade for telescope.....	.75
Cap for telescope.....	1.00
Leveling screws, per set, \$5.00; each.....	1.50
Tangent screws, each.....	1.25
Clamp screws, each.....	1.25
Glass cover for compass, from.....	.50 to .75
Compass needle.....	4.00
Center cap and jewel.....	1.50
Center pin.....	.75
Round tripod legs, each.....	1.50
Split tripod legs, per set, \$7.00, each.....	2.50
Protection cap for tripod head, each.....	.75
Bolt with nut for tripod head, each.....	.75
New tripod head, without bolts.....	5.00
Gossamer cover for level or transit.....	1.00

CATALOGUE AND PRICE LIST

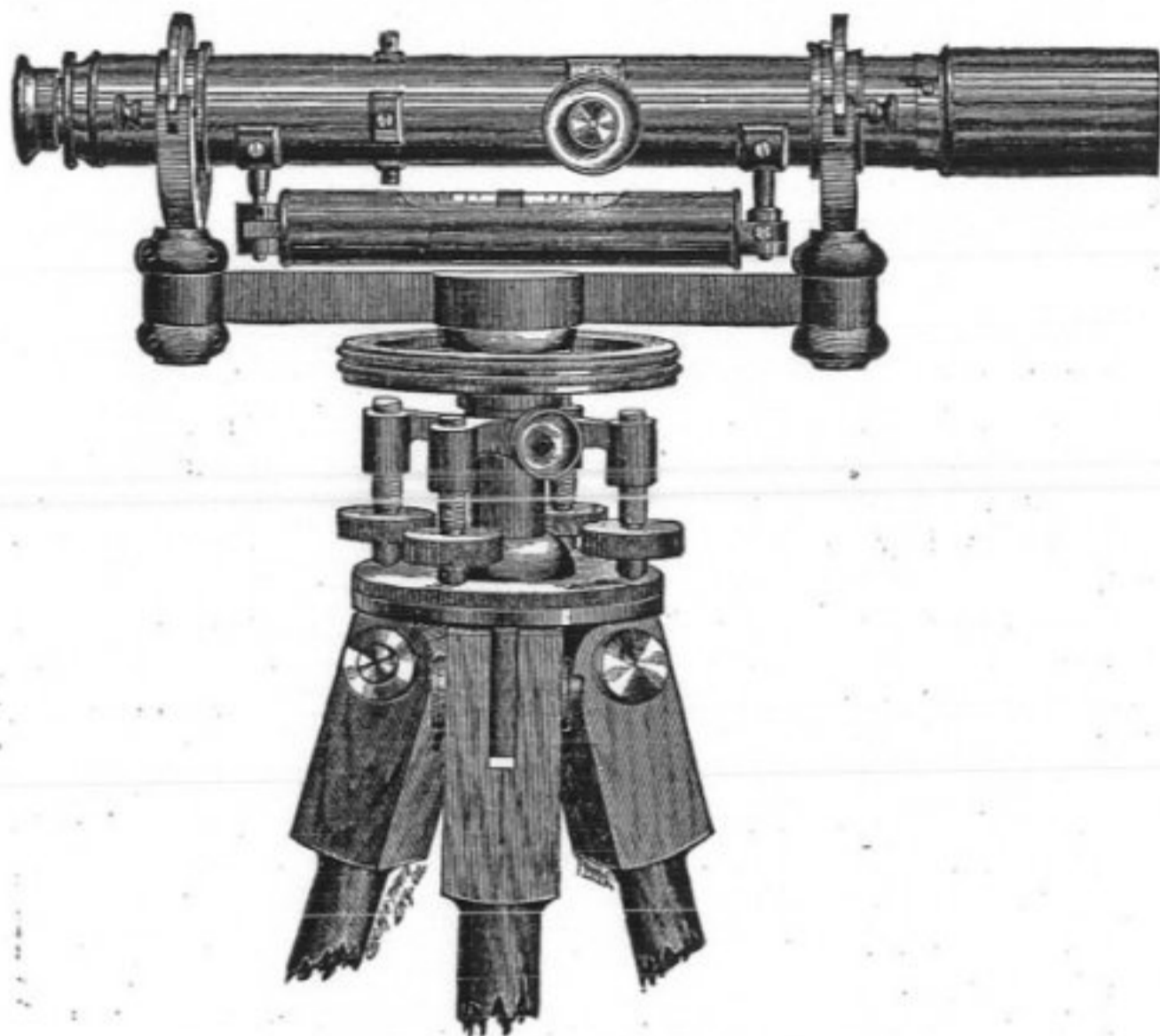
OF THE MOST IMPROVED

Engineering, Surveying and Mining

INSTRUMENTS

AS MANUFACTURED BY

R. SEELIG, ❁ ❁ CHICAGO, ILL.



No. 1

The Builders' and Drainage Level.

(As Manufactured by R. Seelig.)

The telescope is $11\frac{1}{2}$ inches long, magnifying power 18 diameters and shows object erect. The eye piece is focused by a screw like motion arrangement, the object slide by rack and pinion. The horizontal circle is 3 inches in diameter, fitted to the upper end of the socket and turns readily. It is graduated to read degrees, numbered from 0° to 90° each way, or from 0° to 360° , and has a vernier to read five minutes, which follows the movement of the telescope. The level vial is 5 inches long and graduated to facilitate leveling up. It is packed in a cherry wood box which contains besides the instrument a metal trivet, a plumb bob, a sun shade and adjusting pins.

Price as above.....\$50.00

Tripod provided with thumb nuts (unlike as in cut).

No. 2 Engineer's Dumpy Level

This instrument will meet all requirements of the engineering profession for high class work. Its greater compactness renders it especially adaptable for reconnoissance, railroads and water works. Its simplicity permits of higher accuracy while less liable to derangement. In fact the results obtained by a skilled engineer will be fully equal to those of a Wye level.

The telescope ranges from 15 to 18 inches and has a clear aperture of $1\frac{3}{8}$ inches; magnifying power from 25 to 35 diameters. It shows the object erect or inverted according to the order. The object slide is protected by a dust guard and moved by a rack and pinion. The eye piece is focused by a screw-like motion arrangement.

The spirit level is $7\frac{1}{2}$ inches long and provided with a scale divided in tenths of an inch, each part being equal to 15 seconds of arc.

The instrument does not detach from its leveling head.

It is packed in a cherry wood box, containing a sun shade, wrench and adjusting pins.

Weight of instrument, 9 pounds; weight of tripod, $7\frac{1}{2}$ pounds.

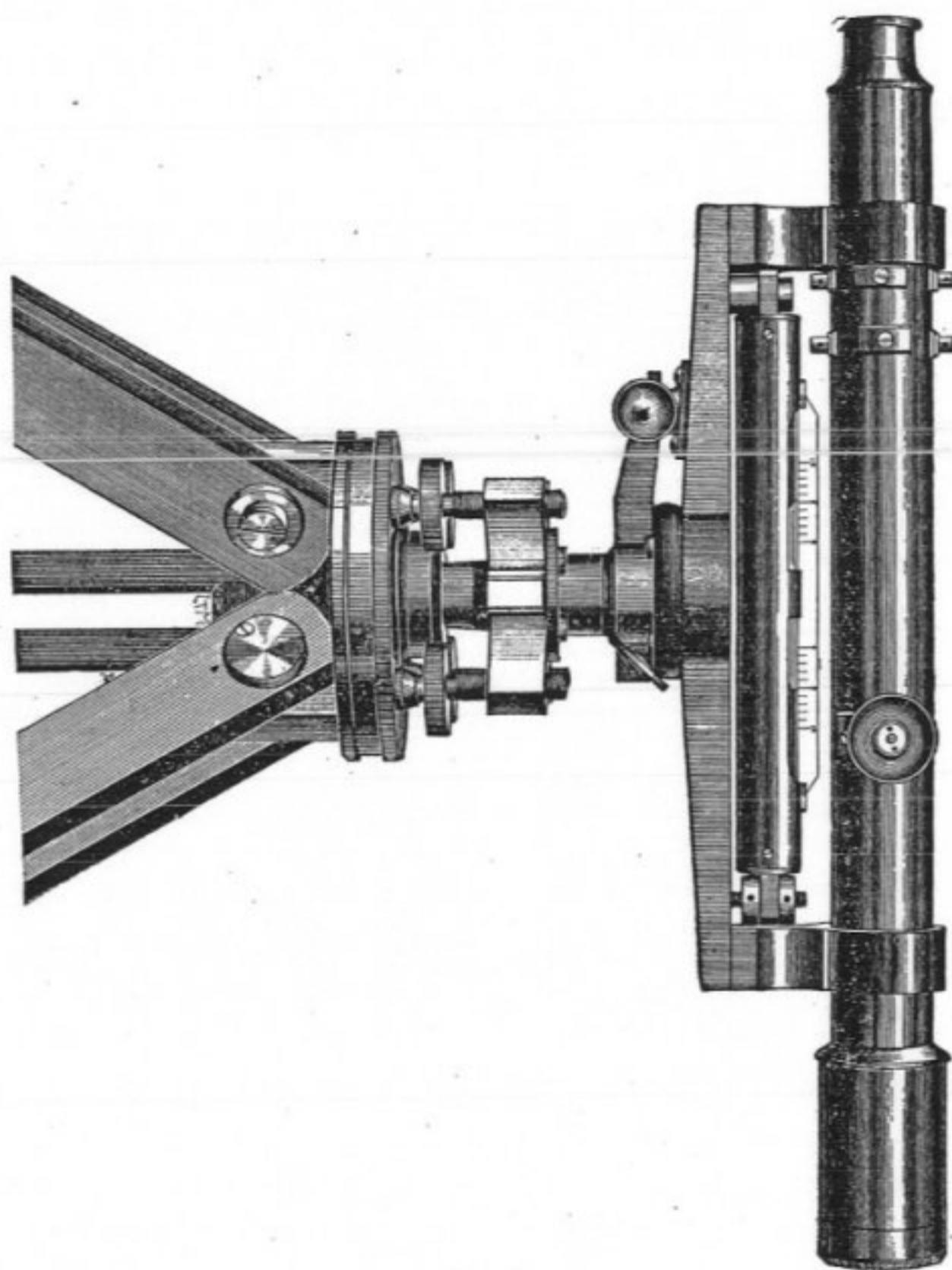
Price as above, with a 15 inch telescope.....\$100.00

EXTRAS.

Instrument with 18 inch telescope.....\$110.00

Fixed Stadia wires..... 3.00

Gossamer waterproof cover..... 1.00



No. 2.

Engineers' Dumpy Level

(As Manufactured by R. Seelig,)

The Tripod provided with thumb nuts and the leveling screws with dust caps, as in No. 8.

No. 3. Engineers' Wye Level.

The most essential points in a level of precision are stability, a powerful telescope and a sensitive bubble; these points were carefully considered and put into practice on my instruments.

The telescope is 18 inches long; the object glass has a clear aperture of $1\frac{3}{8}$ inches; magnifying power 35 diameters. Telescope shows object erect and well defined. For exact focussing of cross wires the eye piece is provided with a screw like motion arrangement. The object slide is provided by a dust guard and moved by rack and pinion. When clips of wyes are closed a vertical stop holds telescope in proper position. The telescope is balanced from center when focused to a mean distance with the sunshade attached. The spirit level is 8 inches long and provided with a graduated scale divided in tenths of an inch, parts being equal to 10 seconds of arc.

The cross bar and leveling plate is cast hollow and provided with ribs; the telescope rings and centers are of hardest metal to prevent wear. The instrument does not detach from its leveling head and is packed whole in an upright position in the box. The box is of cherry wood, nicely finished, and provided with a leather strap, hooks and lock, containing besides the instrument a sunshade, several adjusting pins and wrench.

Weight of instrument 11 pounds; weight of tripod $7\frac{1}{2}$ pounds.

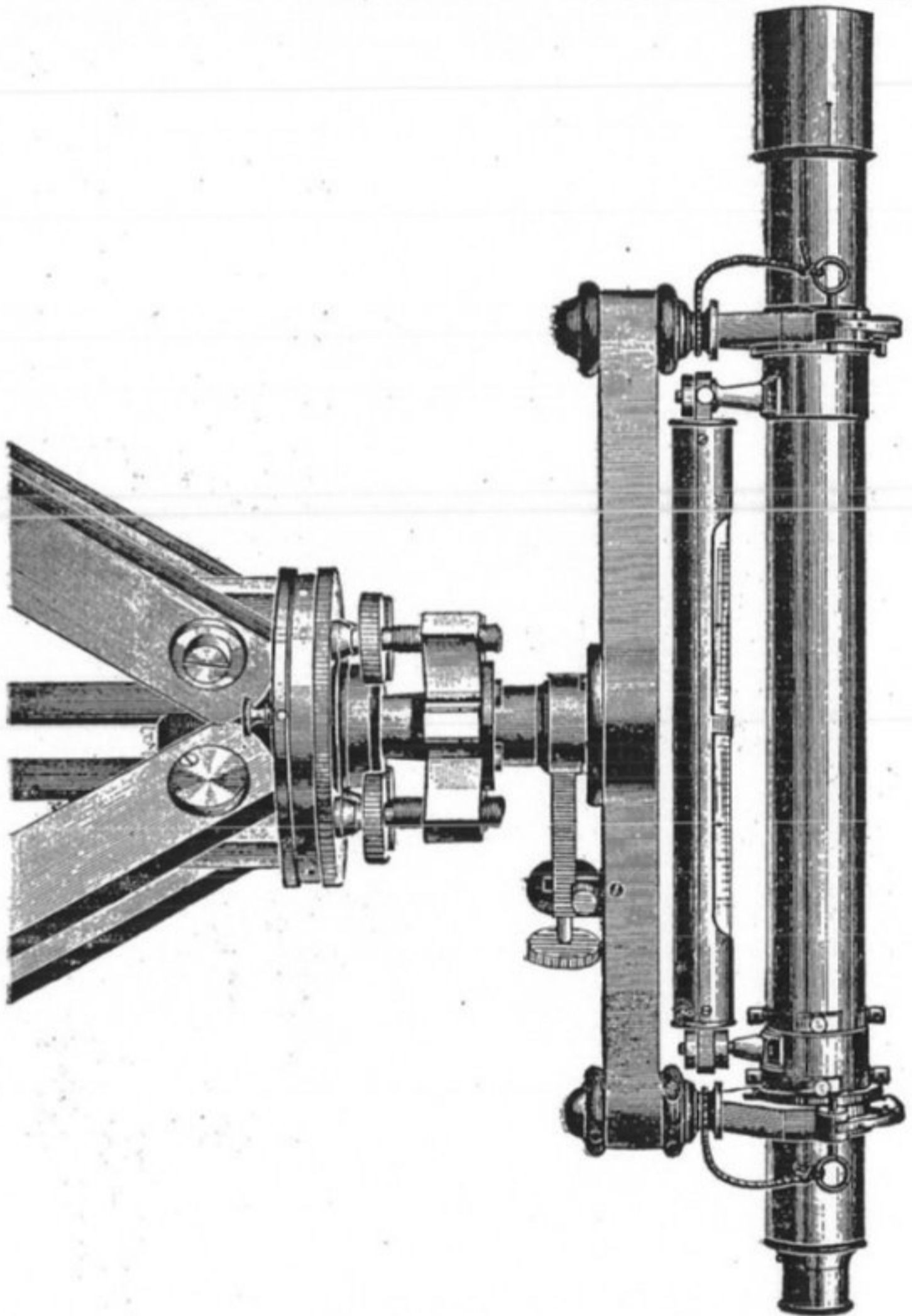
Price.....\$130.00

EXTRAS.

Metal mirror to read bubble from eye end of instrument....\$10.00

Fixed stadia wires..... 3.00

Gossamer waterproof cover..... 1.00

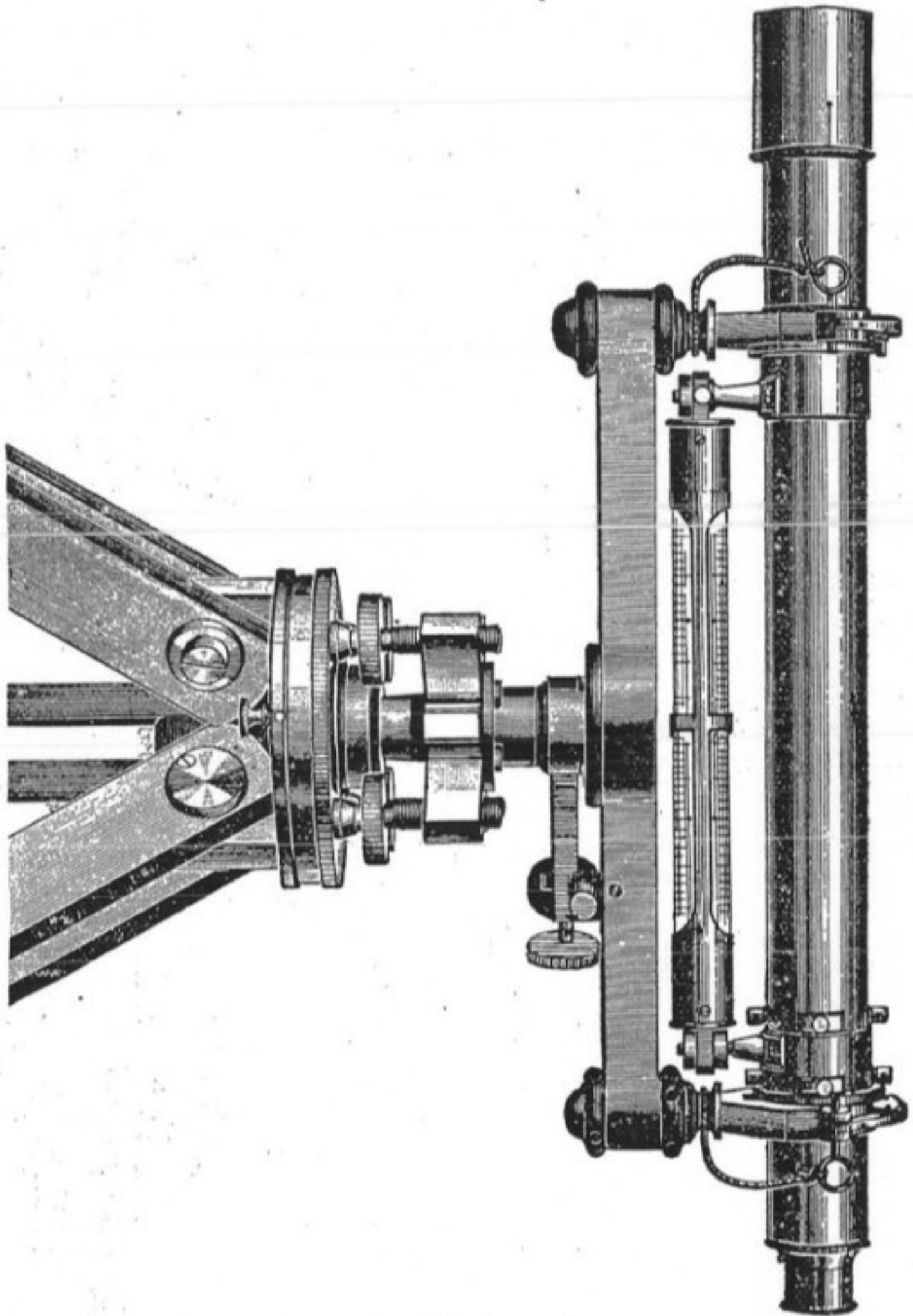


No. 3

Engineers' 18-inch Wye Level

(As Manufactured by R. Seelig,)

Tripod provided with thumb nuts and leveling screws with dust caps, as in No. 8.



No 4

Engineers' 18-inch Wye Level with Reversion Level Attachment.

(As Manufactured by R. Seelig,)

Price.....\$140.00

Tripod provided with thumb nuts and leveling screws with dust caps, as in No. 8.

Engineers' and Surveyors' Transit.

My Transits as shown in the following illustrations will be found to meet the requirements of the highest class of the engineering profession. They are particularly adapted for bridge building, city and land surveying and hydraulic work. The limb is $6\frac{1}{2}$ inch in diameter; double verniers reading either single minutes or 30 seconds according to order. (I also make them to read 20 or 10 seconds). Two rows of figures running from 0° to 360° in opposite directions, or from 0° to 360° one way and from 0° to 180° the other way. The vernier openings are protected with plate glass. The level vials are extra sensitive and divided to allow a precise leveling up. The vernier plate as well as the lower plate is provided with improved spring tangent screws. Shifting centers to set instrument over a given point.

My newly improved telescope is $11\frac{1}{4}$ inches long, has a magnifying power of 25 diameters and shows the object erect (unless ordered to the contrary.) The object glass has a clear aperture of $1\frac{1}{4}$ inches. The eye piece is perfectly achromatic, with large flat field and abundance of light. The line of collimation is correct at all distances. The eye piece is focused by a screw-like motion arrangement, the object slide by rack and pinion. The telescope is balanced when sun shade is attached and reverses at both ends when sun shade is detached. The magnetic needle is $4\frac{1}{2}$ inches long when verniers are parallel to line of sight as shown in No. 5 and 5 inches when verniers are at right angle to line of sight as shown in No. 8.

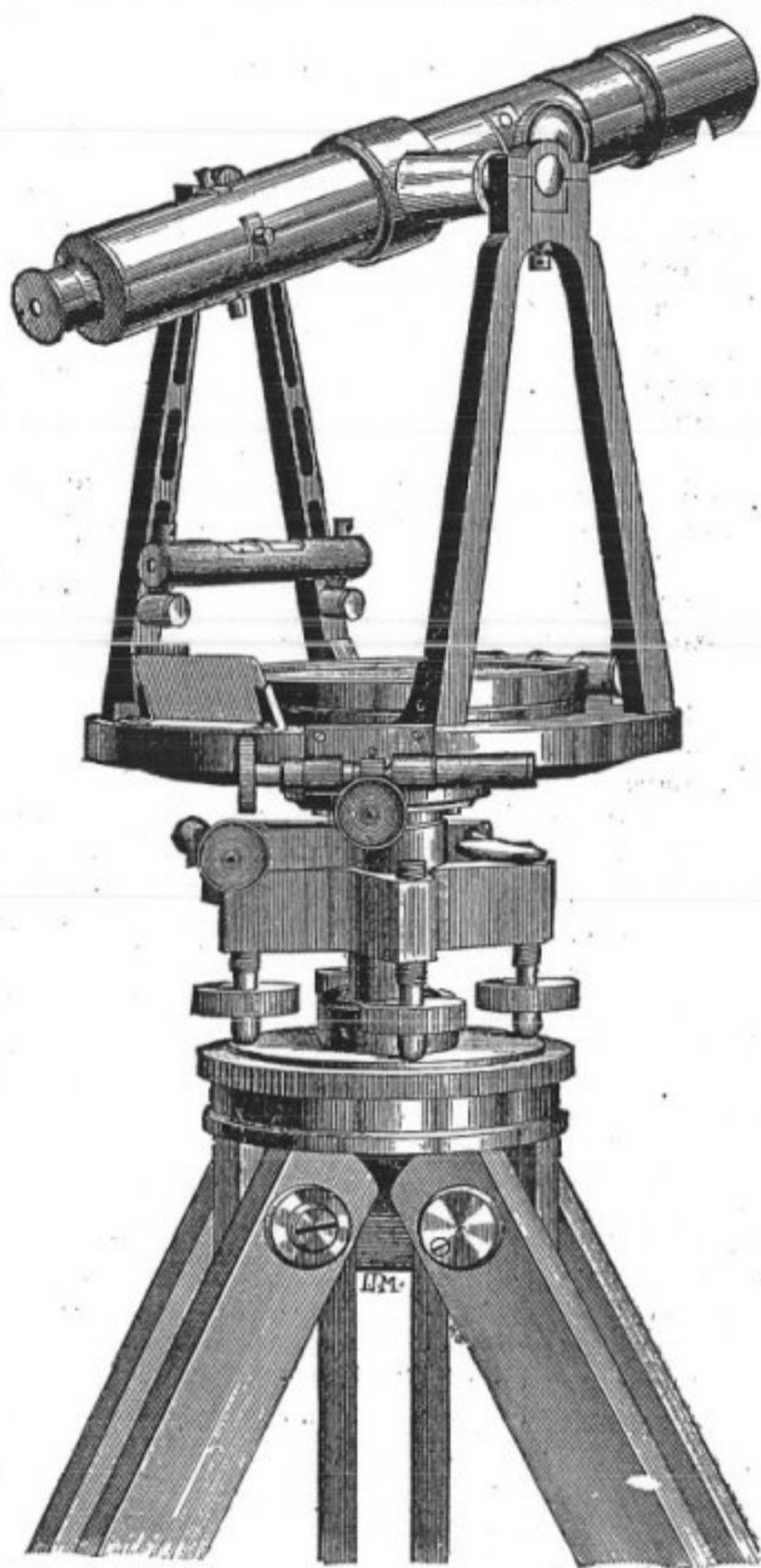
The instrument is packed in a cherry wood box, provided with a leather strap, lock and hooks, and contains besides the instrument a sun shade, plumb bob, a magnifying glass, wrench and several adjusting pins.

Weight of plain instrument, 13 pounds, weight of tripod, $7\frac{1}{2}$ pounds.

Price of plain Transit.....\$175.00

Extras.

Saegmuller Solar attachment	\$50.00
Vertical Circle, 5 inch diameter.....	20.00
Vertical Arc, Graduation on Solid Silver.....	20.00
Level to Telescope and Clamp and Tangent screw.....	20.00
Reversion Level instead of single level.....	10.00
Graduation on Solid Silver.....	10.00
Graduation on Solid Silver and reading to 20 seconds.....	20.00
Graduation on Vertical Circle on Solid Silver.....	5.00
Variation Plate with Pinion movement.....	10.00
Variation Plate with movable compass ring & index point.	5.00
Grandienter Screw.....	4.00
Fixed Stadia Wires.....	3.00
Ground Glass Venier Shades.....	3.00



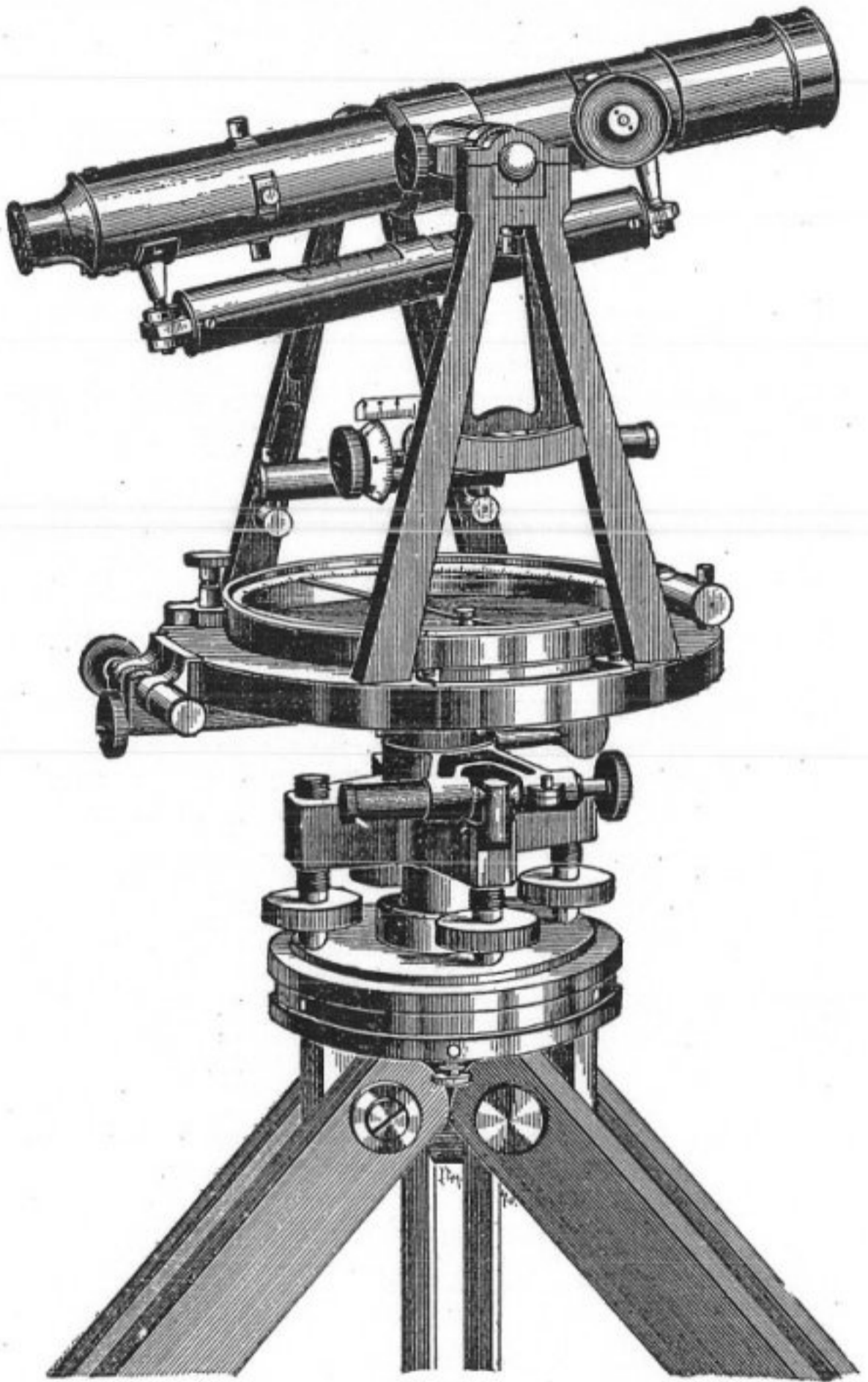
No. 5

Plain Transit.

(As Manufactured by R. Seelig)

Price as above,..... \$175.00

The Tripod is provided with thumb nuts and the leveling screws with dust caps, as shown in No. 8.



No. 6

Engineers' Transit with Level Attachment.

(As Manufactured by R. Seelig.)

Price, as above, with gradienter screw and vernier shades..\$206.00

For description, as well as for extras, see page 17. Tripod provided with thumb nuts and leveling screws with dust caps, as in No. 8.

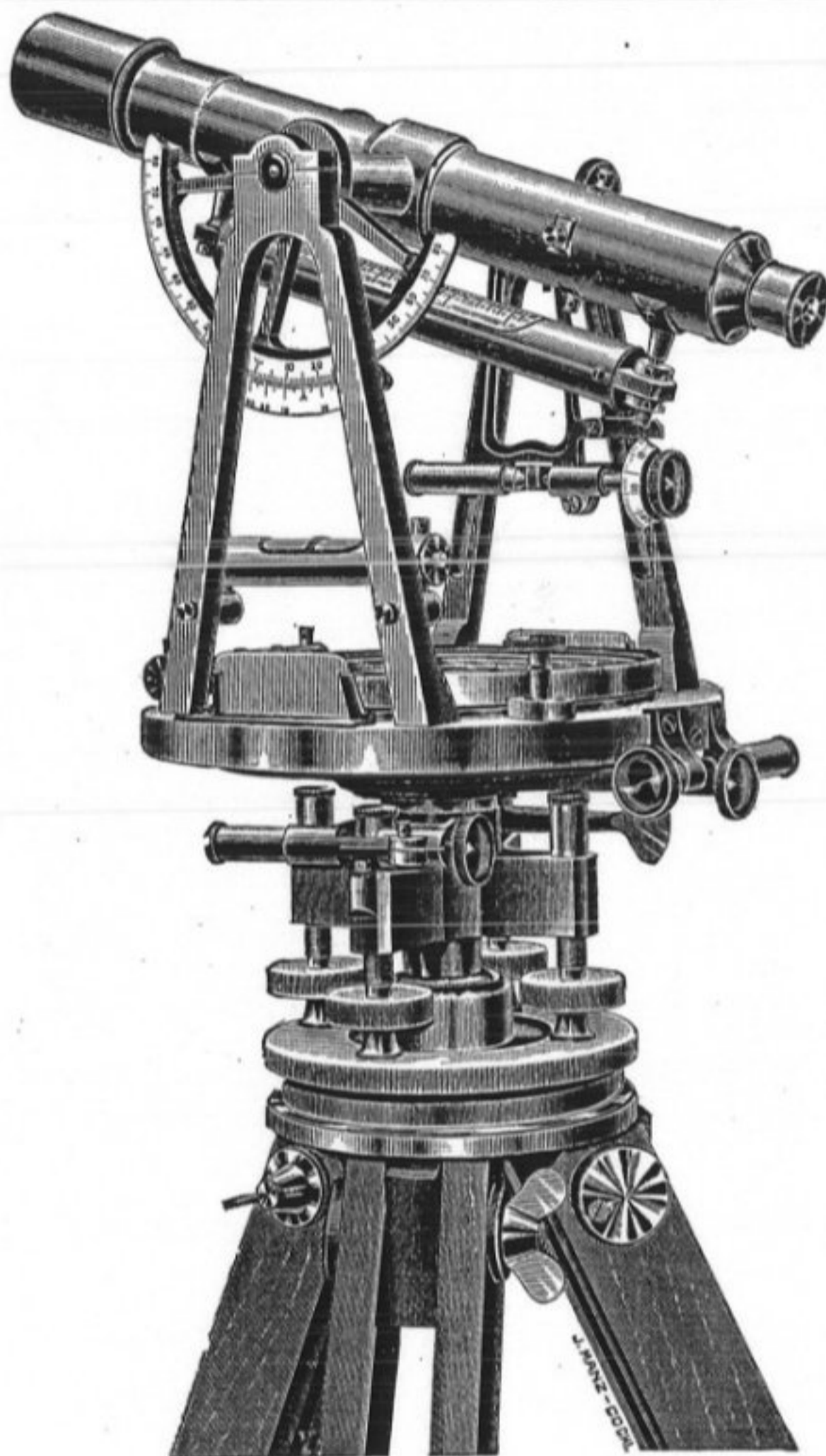


No. 7

Engineers' Transit with Reversion Level Attachment

(As Manufactured by R. Seelig,)

Price, as above.....\$216.00
 For description as well as for extras see page 17.



No. 8

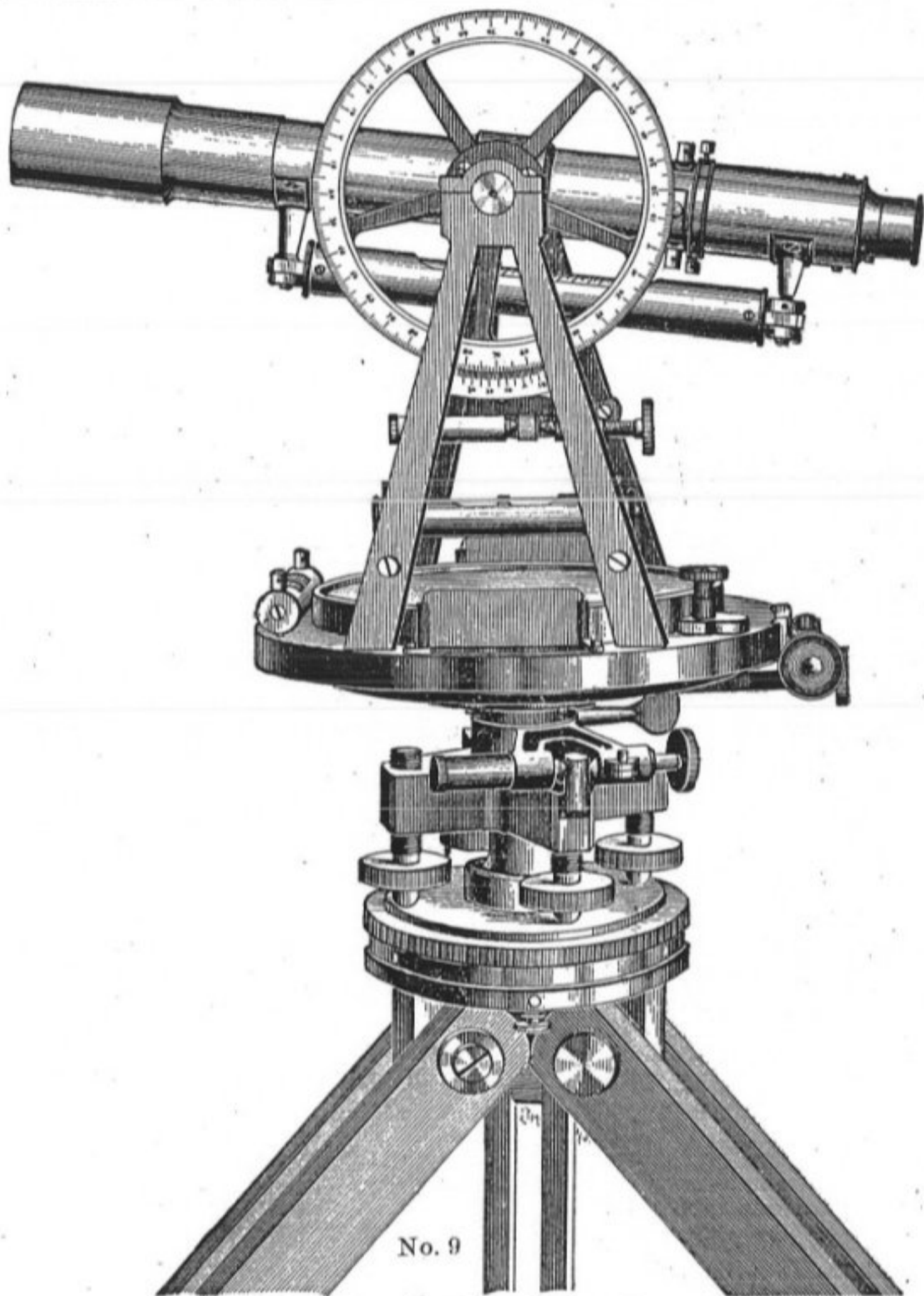
Complete Engineers' Transit.

(As Manufactured by R. Seelig.)

Price, as above, with level attachment, gradienter screw,
vernier shades, vertical arc and fixed stadia wires..... \$226.00

Weight of instrument 14½ pounds.

For description as well as for extras see page 17.



No. 9

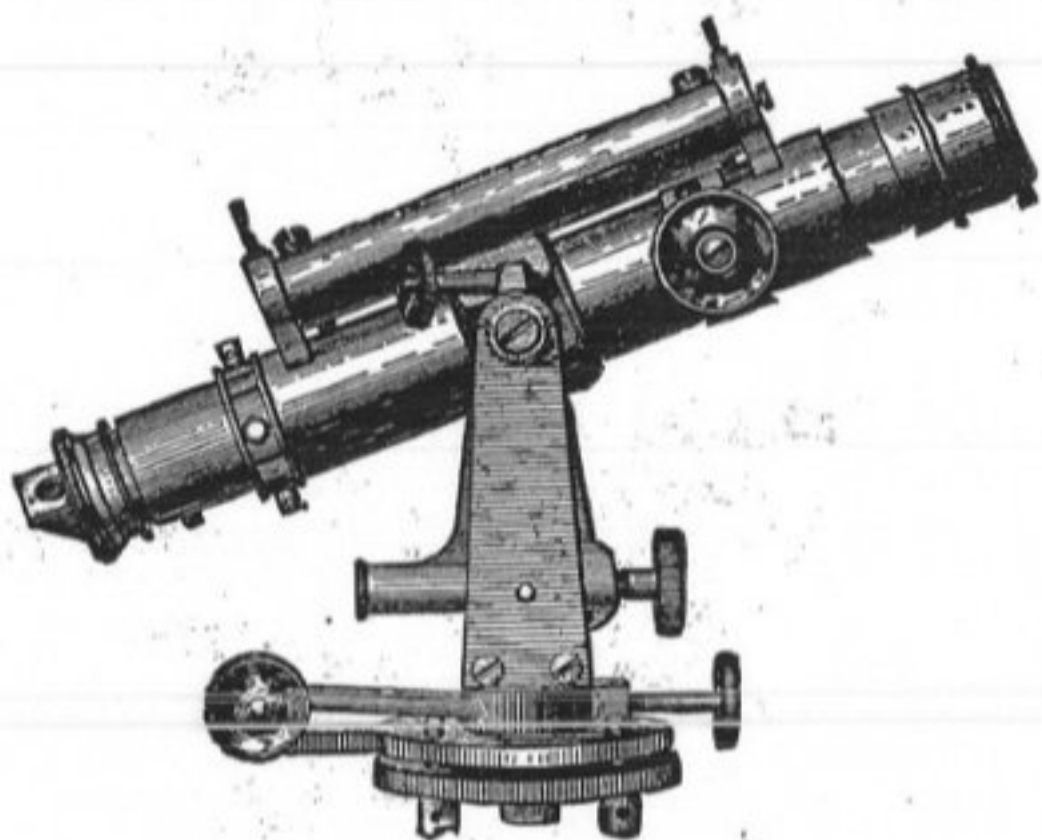
Complete Engineers' Transit.

(As Manufactured by R. Seelig.)

Price, as above, with 5 inch vertical circle graduated on silver,
fixed stadia wires, and ground glass vernier shades... \$226.00

For description, as well as for extras, see page 17. Tripod provided
with thumb nuts and leveling screws with dust caps, as in No. 8.

Improved Saegmuller Solar Attachment.



No 10

The above cut represents the improved Saegmuller Solar Attachment as now made. It consists essentially of a small telescope and level, the telescope being mounted in standards, in which it can be elevated or depressed. The standard revolves around an axis, called the polar axis, which is fastened to the telescope axis of the transit instrument. The telescope called the "Solar Telescope" can thus be moved in altitude and azimuth. Two pointers attached to the telescope to approximately set the instrument are so adjusted that when the shadow of the one is thrown on the other the sun will appear in the field of view.

ADJUSTMENT OF THE APPARATUS

1. The Transit must be in perfect adjustment, especially the levels on the telescope and the plates; the cross axis of the telescope should be exactly horizontal, and the index error of the vertical circle carefully determined.

2. The Polar axis must be at right angles to the line of collimation and horizontal axis of main telescope.

To effect this, level the instrument carefully and bring the bubble of each telescope level to the middle of its scale. Revolve the Solar around its polar axis, and if the bubble remains central the adjustment is complete. If not, correct half the movement by the adjusting screws at the base of the polar axis, and the other half by moving the solar telescope on its horizontal axis.

3. The line of collimation of the solar telescope and the axis of its level must be parallel.

To effect this, bring both telescopes in the same vertical plane and both bubbles to the middle of their scales. Observe a mark through the transit, telescope, and note whether the solar telescope points to a mark above this, equal to the distance between the horizontal axes of the two telescopes. If it does not bisect this mark, move the cross wires by means of the screws until it does. Generally the small level has no adjustments and the parallelism is effected only by moving the cross hairs.

The adjustments of the Transit, and the Solar should be frequently examined, and kept as nearly perfect as possible.

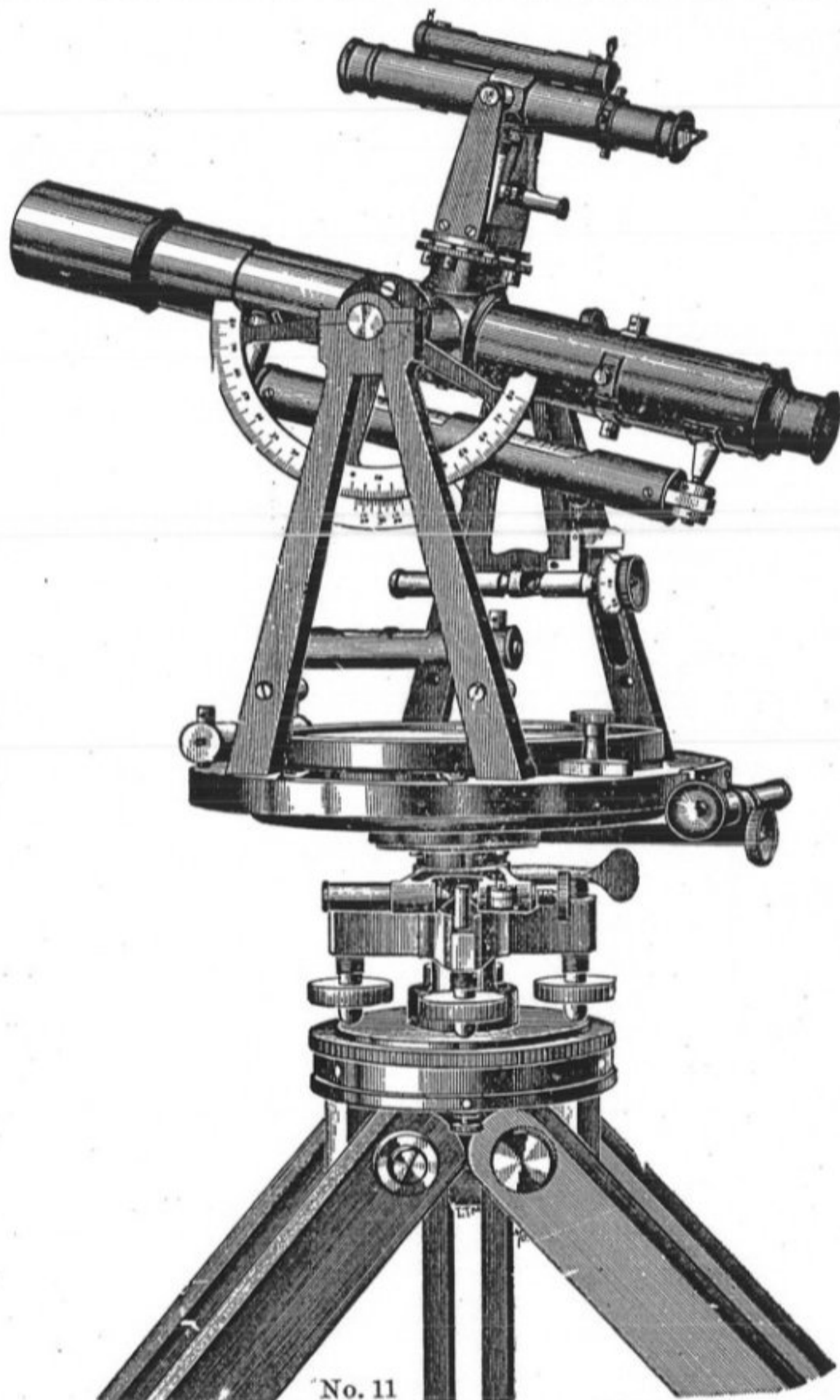
DIRECTIONS FOR USING THE ATTACHMENT.

First. Take the declination of the sun as given in the Nautical Almanac for the given day and correct it for refraction and hourly change. Incline the transit telescope until this amount is indicated by its vertical arc. If the declination of the sun is north, depress it; if south, elevate it. Without disturbing the position of the transit telescope, bring the solar telescope into the vertical plane of the large telescope and to a horizontal position by means of its level. The two telescopes will then form an angle which equals the amount of the declination, and the inclination of the solar telescope to its polar axis will be equal to the polar distance of the sun.

Second. Without disturbing the relative positions of the two telescopes, incline them and set the vernier to the co-latitude of the place.

By moving the transit and the "Solar Attachment" around their respective vertical axes, the image of the sun will be brought into the field of the solar telescope, and after accurately bisecting it the transit telescope must be in the meridian, and the compass-needle indicates its deviation at that place.

Price\$50.00



No. 11

Complete Engineers' and Surveyors' Transit with Solar Attachment

(As Manufactured by R. Seelig,)

Same as No. 8, but provided with Seigmuller's solar attachment.

Price, as above.....\$276.00

Tripod provided with thumb nuts and leveling screws with dust caps, as in No. 8.

Mountain and Mining Transit.

This instrument, as shown in cut, represents the smaller size of transits, generally adopted for underground work as well as for work in mountainous regions. The construction and workmanship is the same as on my large instruments. The horizontal limb is $5\frac{1}{2}$ inches in diameter with two opposite verniers placed either at an angle of 30° or 90° from line of sight, reading either single minutes or $30''$ according to the order; 4-inch magnetic needle; telescope $9\frac{1}{2}$ inches long, aperture $1\frac{1}{8}$ inches and magnifying power 20 diameters, object showing erect or inverted as desired. Object slide, eye piece and leveling screws are provided with dust protectors

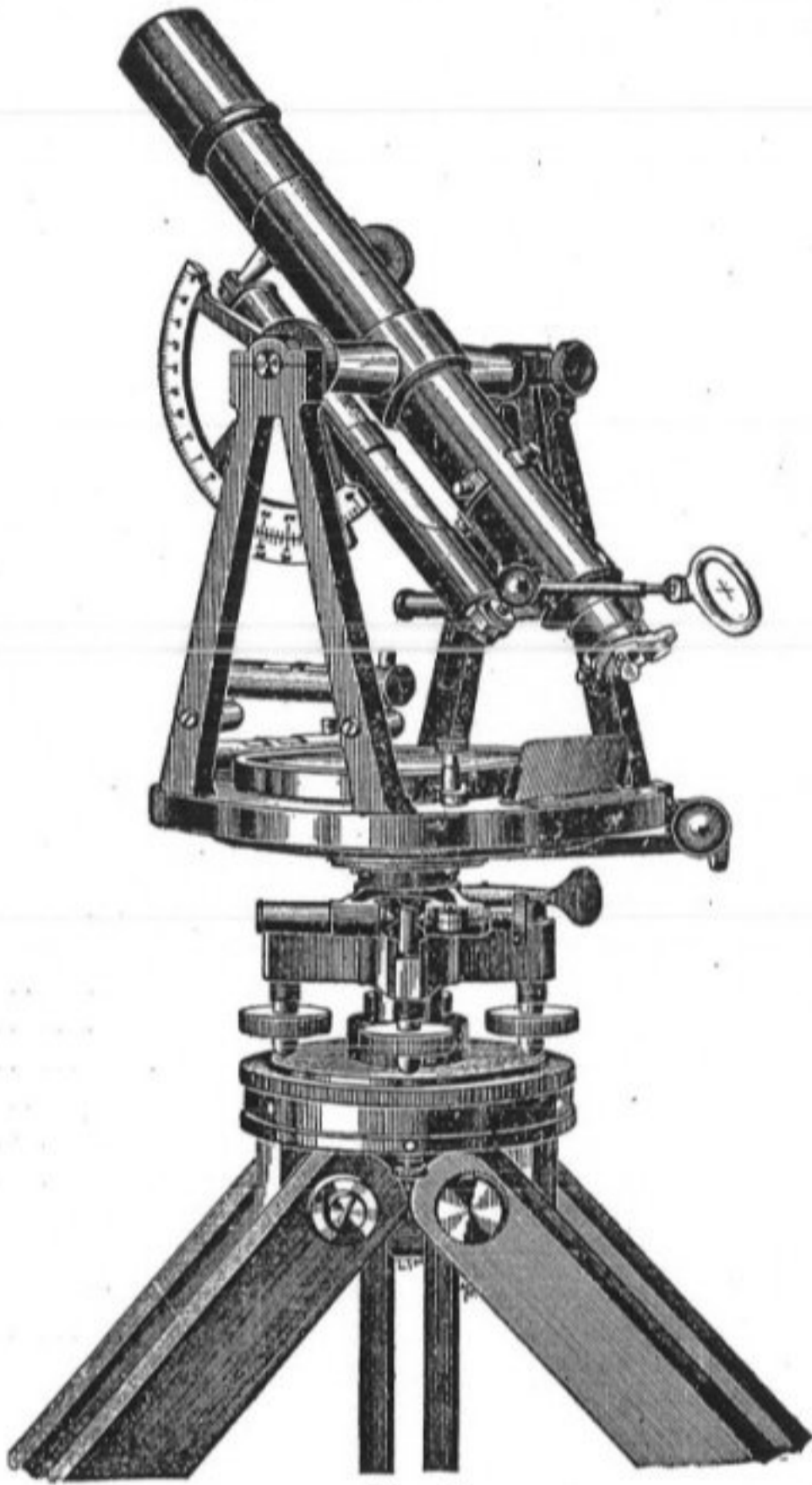
The instrument is packed in a cherry wood box, provided with a leather strap, lock and hooks, and contains besides the instrument a sun shade, plumb bob, a magnifier, wrench and several adjusting pins.

Weight of instrument, 10 pounds; weight of plain tripod, $6\frac{1}{2}$ pounds; weight of extension tripod, $9\frac{1}{2}$ pounds.

Price of plain instrument\$170.00

EXTRAS TO MOUNTAIN AND MINING TRANSIT.

Saegmuller's Solar attachment.....	\$50.00
Davis' Solar attachment with prism and sun shade.....	18.00
Extra side telescope.....	25.00
Level to telescope and clamp and tangent screw.....	20.00
Reversion level instead of single level.....	10.00
Vertical circle, 5-inch diameter.....	20.00
Vertical arc, $2\frac{1}{2}$ inches radius, graduated on silver.....	20.00
Graduation on Solid Silver.....	10.00
Graduation on Solid Silver and reading to 20 seconds.....	20.00
Graduation on Vertical Circle on Solid Silver.....	5.00
Gradienter screw.....	4.00
Fixed stadia wires.....	3.00
Ground glass vernier shades.....	3.00
Variation plate with movable ring and index point.....	5.00
Reflector for illuminating cross wires.....	3.50
Extension tripod legs instead of plain split legs.....	7.50



No. 12

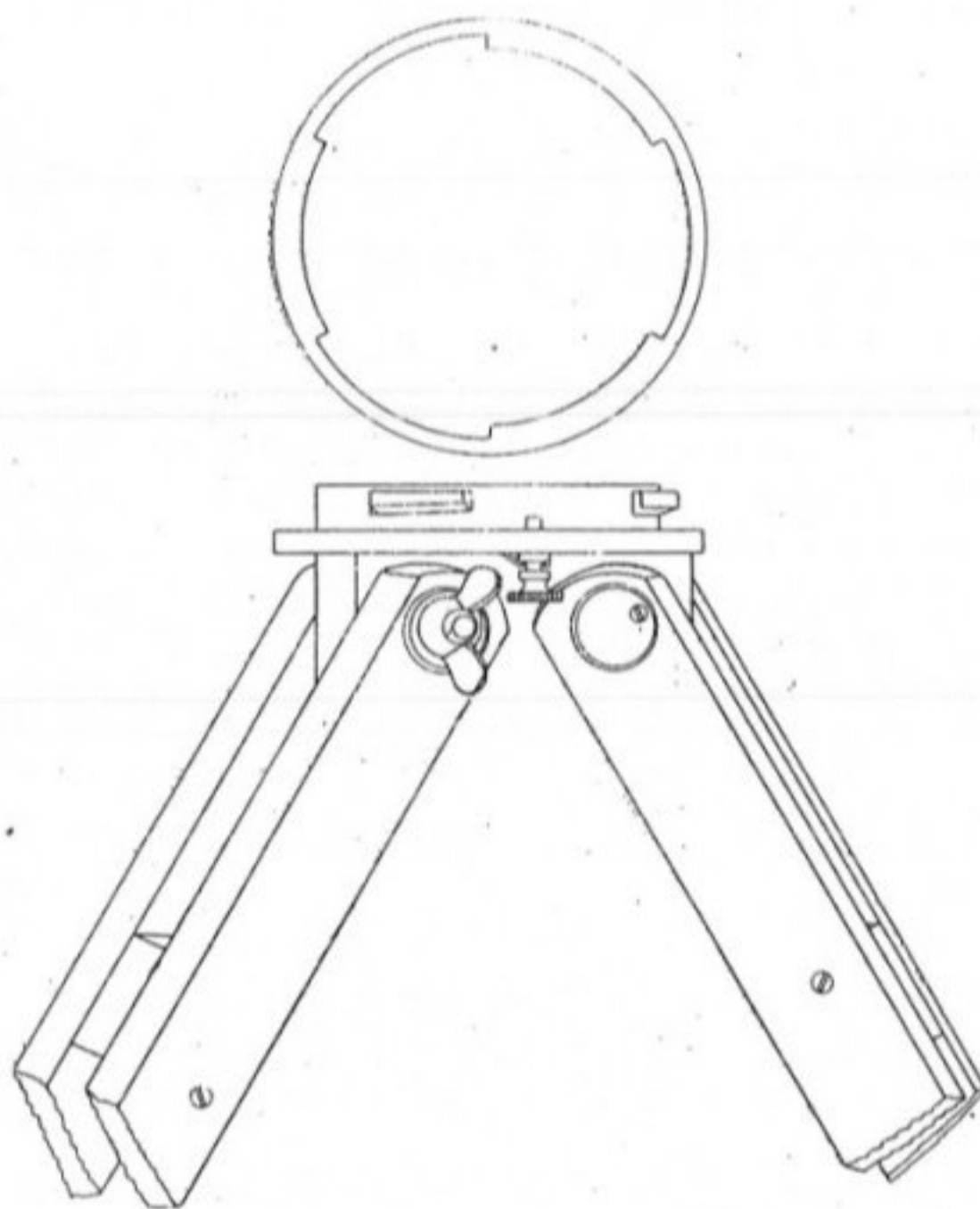
Mountain and Mining Transit.

(As Manufactured by R. Seelig)

Vertical arc, level and clamp to telescope, gradienter screw, fixed stadia wires, and Davis solar attachment.

Price, as above..... \$236.00

(The tripod is provided with thumb nuts and the leveling screws with dust caps, same as in No. 8.)



The Universal Coupling.

The above cut shows the coupling of my manufacture. It is a durable and practical device. One-sixth turn of the base plate will fasten the instrument so that it can not be detached unless the button is pulled. It is used very extensively and can be had on all my new instruments with an additional charge of \$3.00

Ten Inch Repeating Theodolite.

Cut No. 13 represents a 10 inch repeating theodolite, specially adapted for triangulation and astronomical work. The horizontal circle is covered and divided in 10 minute spaces, every degree being numbered, two opposite micrometer microscopes reading single seconds of arc.

The telescope is 24 inches long with 2 inch aperture; magnifying power 45 and 72 diameters, with two Ramsden eye pieces; field illumination through perforated axis, with lamp and lamp stand; chambered 7 inch striding level reading to single seconds.

Packed in two boxes.

Price as above.....\$700.00

No. 13 A. Same as preceding, but instead of two micrometer microscopes, two opposite verniers reading to 10 seconds.

Price.....\$550.00

No. 13 B. Same as No. 10, but also having a 10 inch vertical circle with two micrometer microscopes reading to single seconds and filar micrometer eye piece reading to seconds.

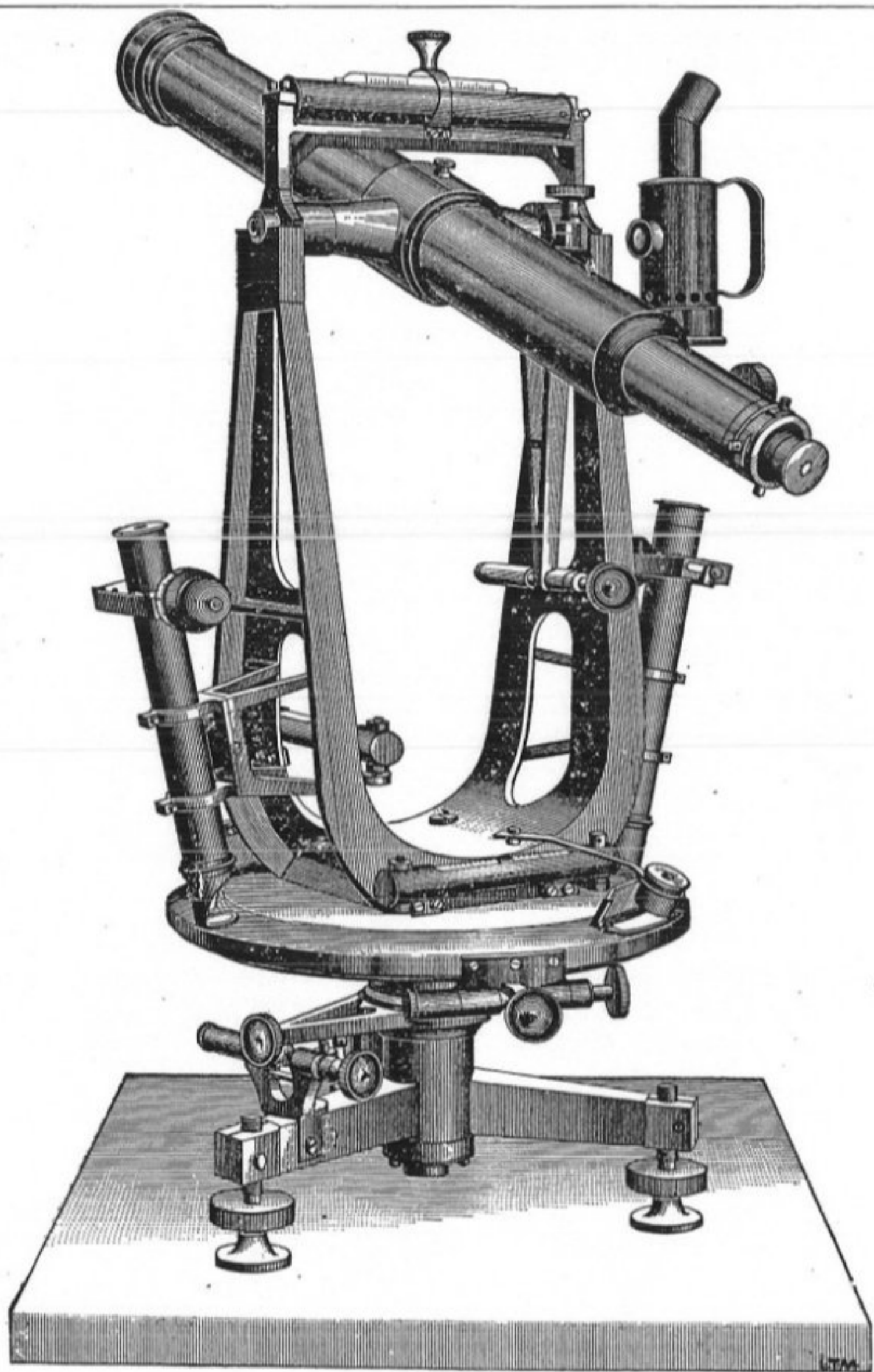
Packed in two boxes.

Price.....\$1,000.00

No. 13 C. Same as No. 10, but provided with an 8 inch vertical circle and two opposite verniers reading 20 seconds, and filar micrometer reading seconds.

Packed in two boxes.

Price.....\$850.00



No 13

Ten Inch Repeating Theodolite.

(As Manufactured by R. Seelig,)

Price, as above.....\$700.00



No. 14

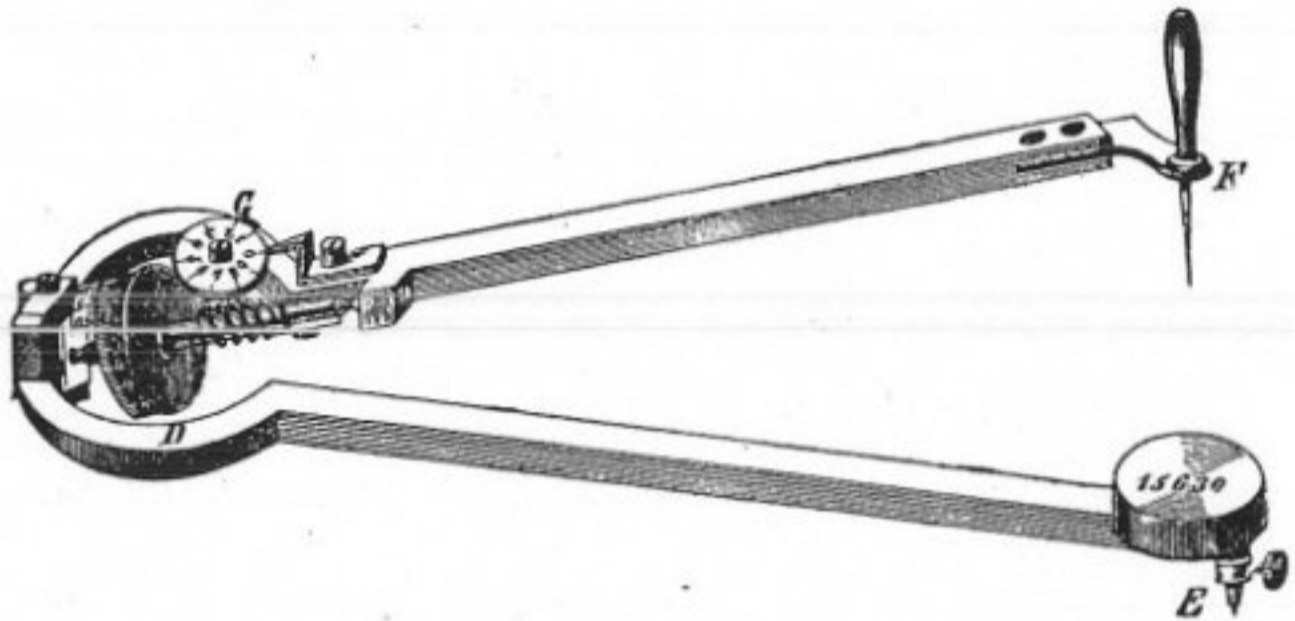
Portable Anemometer or Wind Gauge.

Any air current on the surface of the earth or in mines, etc., can be measured with this instrument. It can be used to measure air currents in hospitals, public buildings, sewers, etc. The instrument is provided with a disconnecter and registers from 1 to 10,000,000 feet. Diameter of fan $2\frac{3}{4}$ inches.

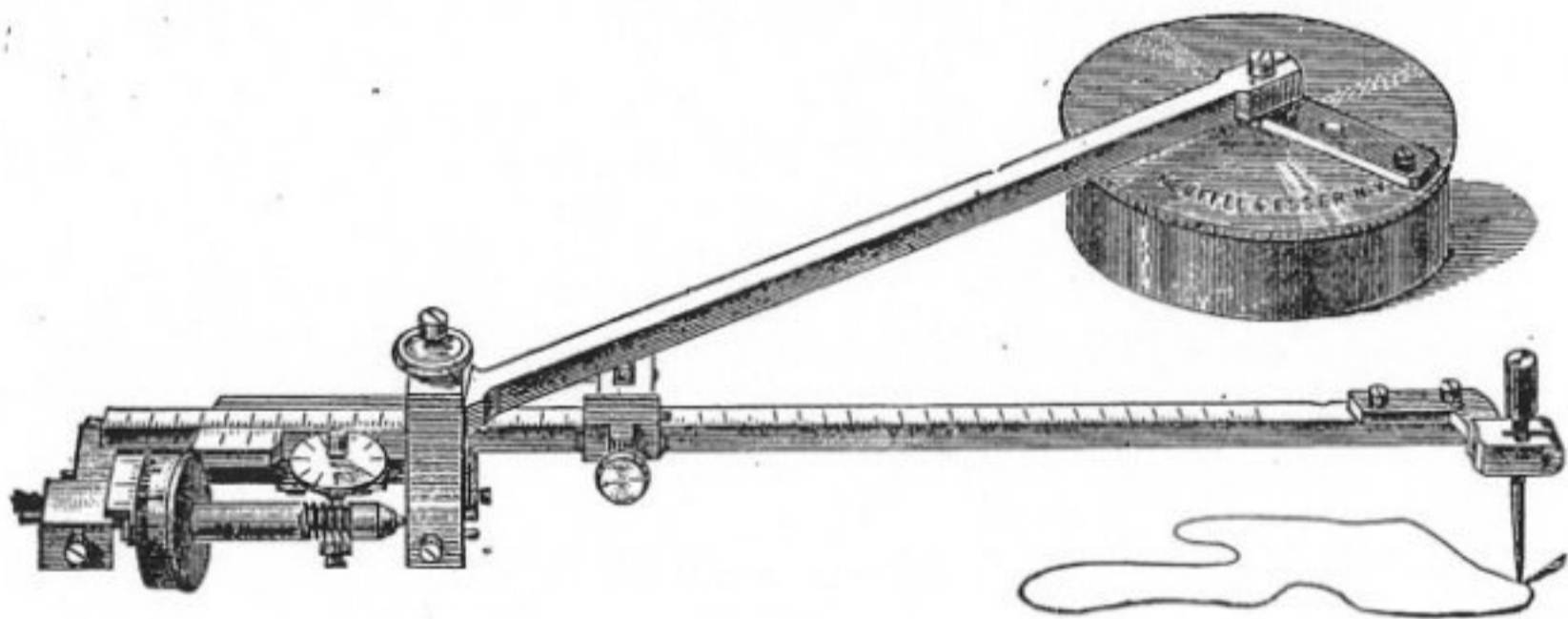
Price, in wooden case.....\$21.75

The Planimeter

This instrument is used extensively in Europe, meeting with great satisfaction. It is a great convenience for all classes of engineers. By simply passing a pointer around the periphery of any figure, no matter how it may be, the area can be found with great rapidity and accuracy. To obtain the area of railroads, profiles, indicator diagrams and lots bounded by creeks or rivers, etc., it will be found a superior device. My planimeters are so graduated as to read either square inches of area, square centimeters of area, or any multiple of these areas. Directions for using it will accompany each instrument.



No. 15



No. 16

No. 15 represents planimeter in a simple form. The figures on the horizontal wheel indicate the tenths. It is superior to those with one wheel only, as it reads to 10, 1, $\frac{1}{10}$ and $\frac{1}{100}$ square inches. This instrument is of value only for steam indicator diagrams.

No. 15. Price, with full directions in box.....\$17.50

No. 16. Polar Planimeter of German Silver, with divided tracer arm, in polished mahogany case..... 33.00

Planimeter No. 16 has the tracer arm divided for nearly its entire length to $\frac{1}{2}$ mm, reading by a vernier to $\frac{1}{20}$ mm. Proportions are either indicated by the scale or read off from proportion marks engraved on tracer arm. The scale with vernier is a valuable aid in adjusting the Planimeter to proportions other than those marked on the instrument. A testing plate for proving its accuracy is furnished with each instrument.



No. 17

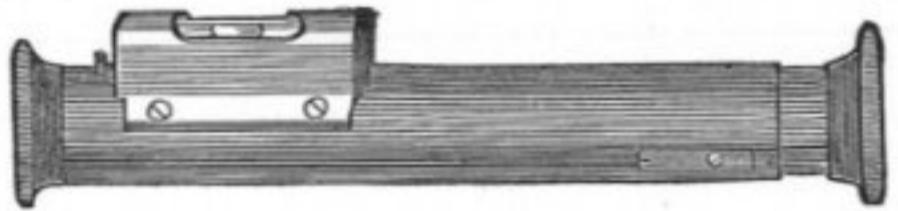
No. 17. Surveying Compass, with 4½ inch needle folding sights, two level bubbles and variation vernier.

Weight 1¾ pounds.

Price.....\$23.00

No. 18 Same as above, but 3½ inch needle.

Price.....\$21.00

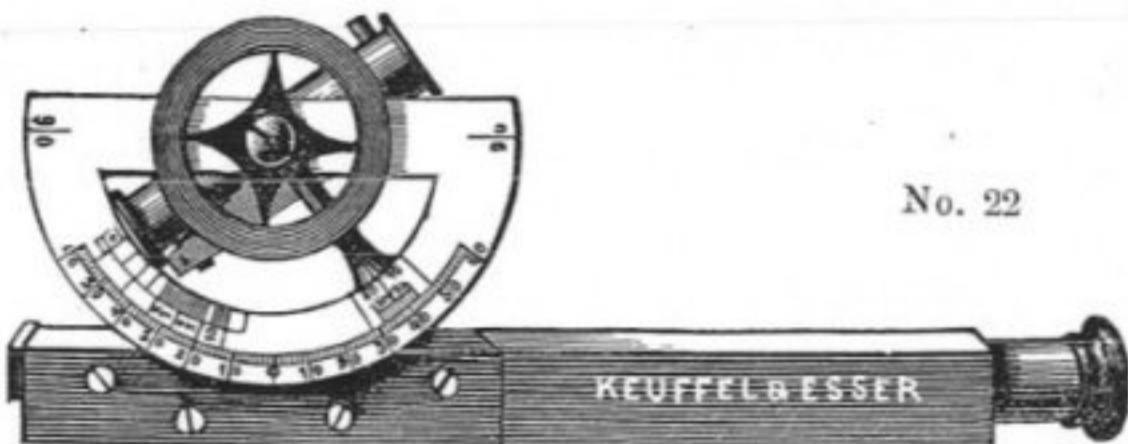


No 19.

No 19. Locke's Hand Level, German silver, in case.....\$8.00

No. 20. Locke's Hand Level, brass, in case..... 7.00

No. 21. Locke's Hand Level, brass, common, in case..... 4.00



No. 22

No. 22 Abney's Level and Clinometer, 5 inch, with divided arc to show gradients, in case\$13.50

No. 23 Same as above, but with compass and socket..... 18.00

Aneroid Barometers.

No. 24 Pocket size, brass case, 2½ inch diameter, silvered metal dial, revolving altitude scale 3,000 feet, compensated for temperature, in morocco case, each.....\$19.50

No. 25 Same as above, altitude scale 6,000 feet..... 18.50

No. 26 Same as above, altitude scale 12,000 feet..... 19.50

No. 27 Same as above, altitude scale 18,000 feet..... 20.50

No. 28 Surveying barometer, brass case, 5 in. diameter, silvered dial, division on raised ring, fixed altitude scale 5,000 feet, vernier scale operated by rack and pinion, reading to 1 foot, compensated for temperature, adjustable reading lens, in leather sling case. Price.....\$50.00

Like No. 28, but altitude scale 14,900 feet..... 70.00

No. 29 Mining barometer, brass case 5 in. diameter, silvered dial, divisions on raised ring, fixed altitude scale 2,000 feet below and 4,000 feet above sea level, vernier scale operated by rack and pinion, reading to 1 foot, compensated for temperature, adjustable reading lens, in leather sling case. Price.....\$50.00

No. 30. New York rod, hardwood, 6½ feet, sliding to 12 feet, with target and clamp, each.....\$15.00

No. 30 A. New York rod, hardwood, Philadelphia pattern, 7 feet sliding out to 12 or 13 feet, with target and clamp, each.....\$15.00

No. 31. Philadelphia self reading rod, hardwood, 7 feet, sliding out to 12 or 13 feet, divided in 100ths, with target and clamp, each,.....\$15.00

No. 32. Same as No 31 but divided into tenths and half tenths, each.....\$15.00

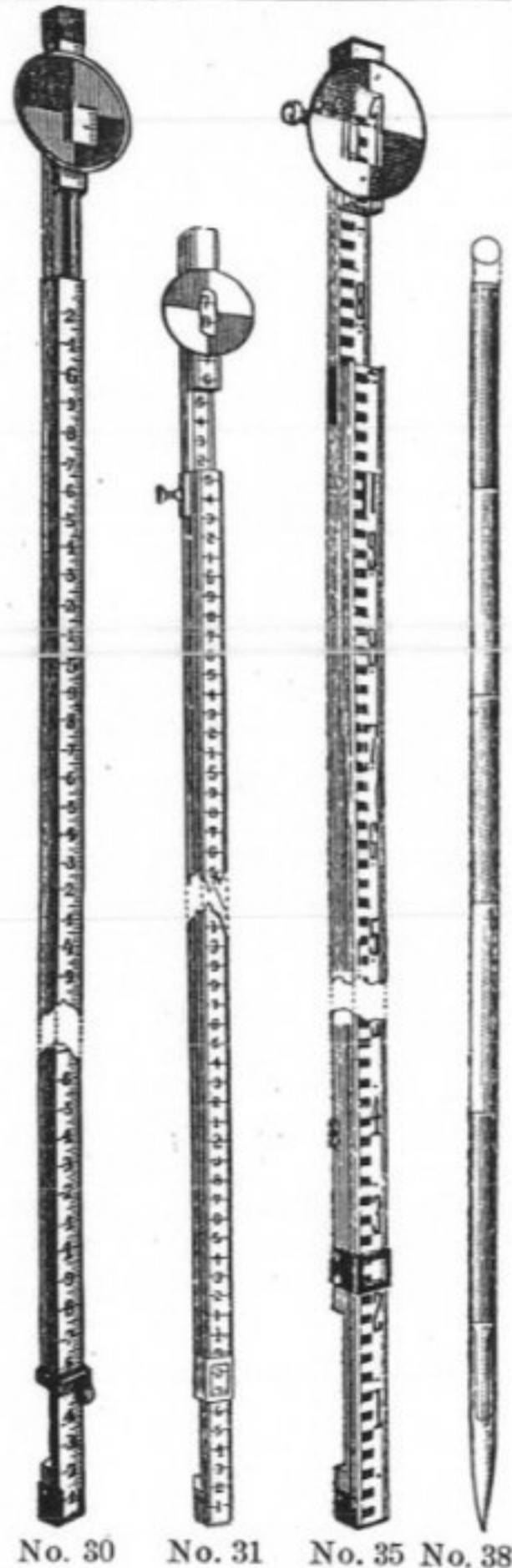
No. 33. Mining rod, Philadelphia pattern, hardwood, 3 feet, sliding out to 5 feet, with target and clamp.....\$13.00

No. 34. Same as No. 33, but five feet, sliding out to 9 feet.....\$14.00

No. 35. Metric rod, Philadelphia pattern, 2.2 meter sliding out to 4 meters each.....\$15.00

No. 36. Architect's rod hardwood, divided into inches and eighths, 5½ feet, sliding out to 10 feet, with target and clamp.....\$6.00

No. 37. Same as No. 36, but divided to tenths of a foot, each.....\$6.00



No. 30 No. 31 No. 35 No. 38

Ranging Poles.

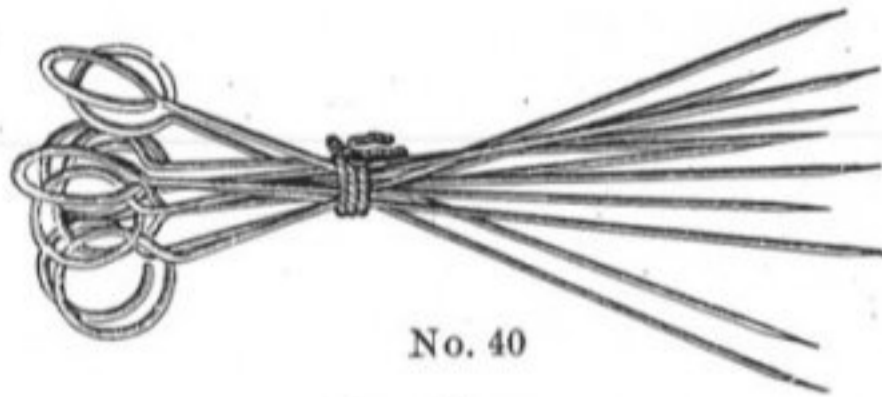
No. 38. Ranging poles, of well seasoned wood, octagonal, divided to feet, painted red and white alternately, with iron shoes.

Price..... 6 feet, \$2.25; 8 feet \$2.50; 10 feet, \$2.75; 12 feet, \$3.00

No 39 Transit poles, steel rod, ½ inch diameter with hardened point, painted red and white, every foot.

Price.....6 feet, \$2.25; 8 feet, \$2.50; 10 feet; \$2.75.

Tubular poles, ⅜ inch diameter same price as No. 39.



No. 40

Steel Arrows

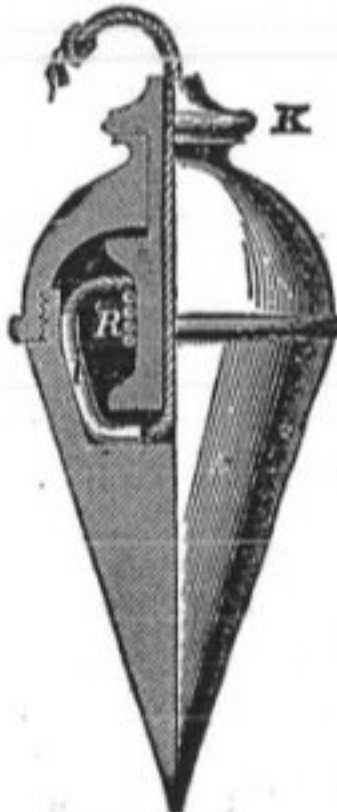
- No. 40 Steel arrows, W. G. 6, 11 in set, 14 inches long, per set.....\$1.50
- No. 41 Steel arrows, W. G. 9, 11 in set, 9 inches long, per set..... 1.00
- No. 42 Brass arrows, W. G. 4, 11 in set, 14 inches long, per set 2.00



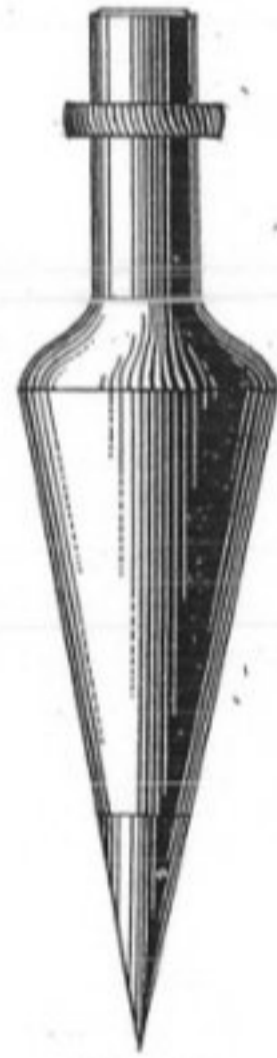
No 43



No. 44

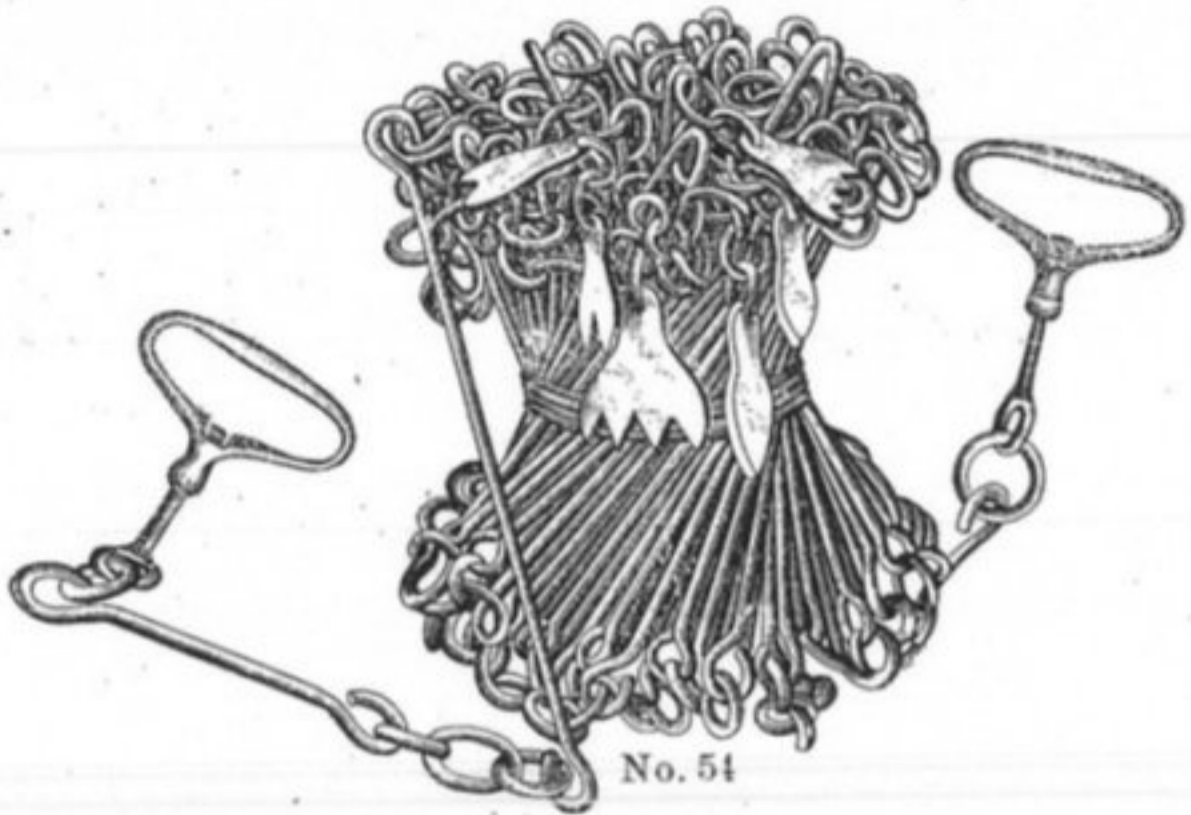


No. 49



No. 45

- No. 43 Brass, Steel pointed, weight 6 oz..... each, \$1 35
- No. 44 " " " " 8 oz..... " 1.50
- No. 45 " " " " 10 oz..... " 1.75
- No. 46 " " " " 12 oz..... " 1.90
- No. 47 " " " " 14 oz..... " 2.00
- No. 48 " " " " 16 oz..... " 2.25
- No. 49 Steel pointed, concealed reel, held by friction in any position..... 2.50
- No. 50 Extra heavy brass plumb bob, with long steel point and screw cap, weight from 4 to 7 pounds. Price \$5.00 and upwards.
- No. 51 Lamp for illuminating cross wires and graduations, nickel plated with ground lens..... each, \$7.00
- No. 52 Small plummet lamp, of brass, steel point 16 oz..... 8.00
- No. 53 Large " " " " " 24 oz..... 10.00



Surveyors' Chains.

No. 54. Steel Chains, brazed links and rings, W. G. 12, with brass handles.

Feet.....	33	66	50	100
Price.....	\$5.50	\$10.00	\$8.00	\$11.50

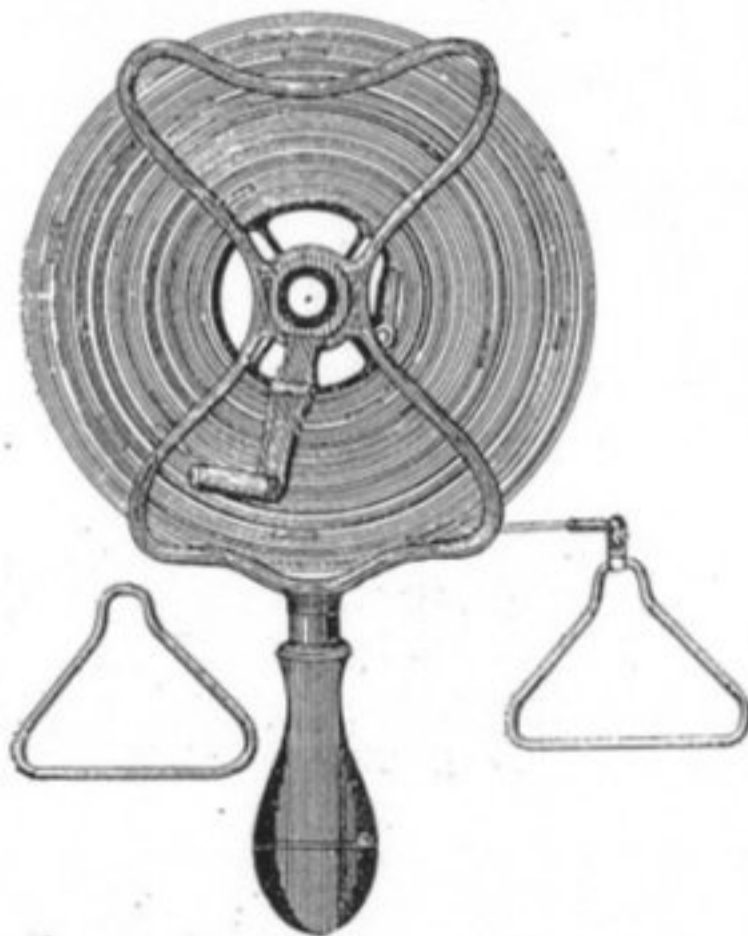
Metric Chains.

No. 55. Steel Chains, brazed links and rings, W. G. 12, with brass handles.

Meter.....	10	15	20	25
Price.....	\$5.50	\$7.50	\$10.00	\$12.50

Standard Band Chain Tapes

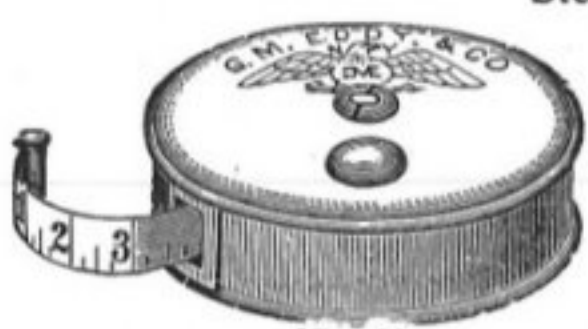
These chain tapes are of my own manufacture and intended to take the place of steel chains where the latter are found to be inconvenient. I would particularly recommend them to railroad engineers and land surveyors. They will stand rough usage and will be found to be a very serviceable tool. These tapes are made of superior steel ribbon, 1/4 inch wide. They are graduated every foot, the first and last foot in tenths and the number of feet stamped on both sides at every five feet. The reel is made of hard brass, very substantial, and the handles on each end of tape are detachable.



No. 57

No. 56.	200 feet long.....	\$7.50
No. 57.	100 " "	5.00
No. 58.	50 " "	3.75
No. 59.	66 " " divided in links.....	4.75

Steel Tape Measures.



No. 60



No. 61

No. 60 Pocket steel tape in German silver case, with spring and stop.

	3	5	6	9	12 ft.
Div. 16ths inch, each	\$1.00	\$1.25	\$1.40	\$1.90	\$2.50
Div. 100ths foot, each			1.60		
Div. 16ths inch and meter	1.10	1.40	1.60	2.20	2.80

No. 61 Pocket steel tape, 25 feet long, in German silver case with flush handle.

Div. 10ths or 12ths. Price	\$4.00
Div. 10ths, 12ths or Meter	4.50

Chesterman's Steel Tapes.

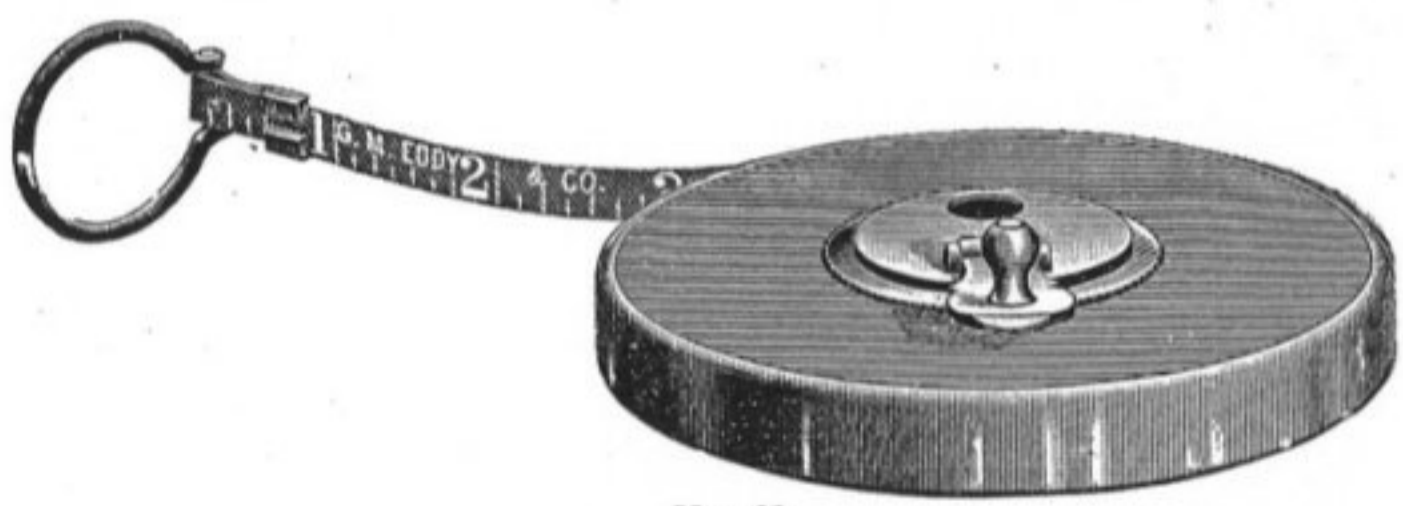


No. 62.

No. 62. In red leather case, with flush handle, divided in 10ths and links, or 12ths and links

25	33	50	66	100 feet.
\$1.80	\$5.50	\$7.00	\$9.00	\$12.50

Paine's Patent Standard Steel Tapes

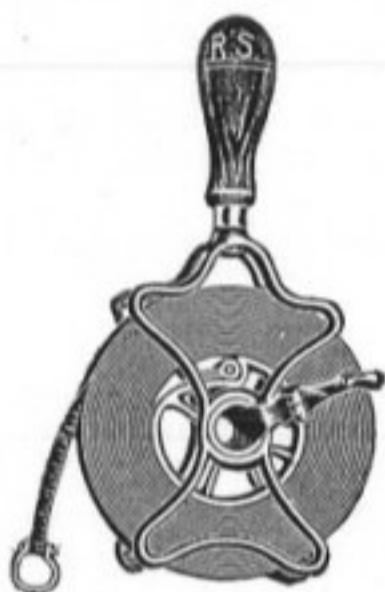


No. 63

No. 63 Iron case, brass bound, morocco covered, improved, detachable handle, steel ribbon, 1/4 inch wide, divided in 10ths or 12ths.

25	38	50	66	75	100 ft.
\$3.50	\$4.50	\$6.00	\$8.00	\$10.00	\$12.00

- No. 64. Graduated compensating handles, per pair.....\$3.00
- No. 65. Pocket thermometers, each..... 1.50
- No. 66. Grunmon's balance and level, each..... 4.00



No. 67

No. 67 In brass reel, folding handle, with two deable handles, steel ribbon, $\frac{1}{4}$ inch wide divided in 10ths or 12ths.

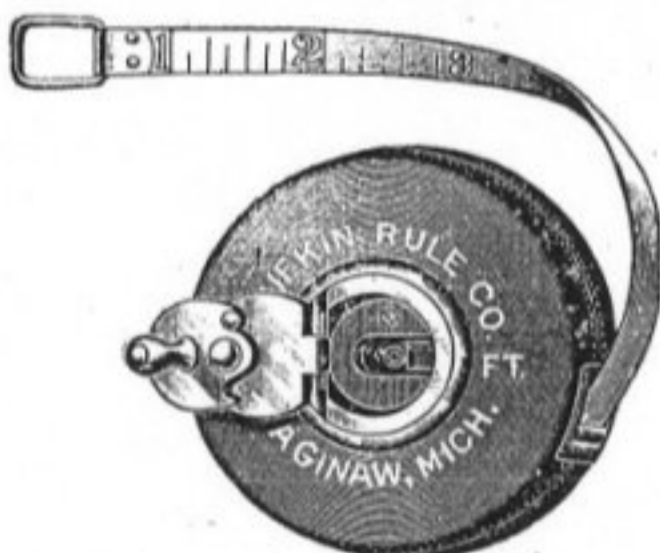
Length	100 feet
Price	\$12.00

Eddy's Friend Standard Steel Tapes.



No. 68 Iron case, leather covered flush handle, steel ribbon $\frac{3}{8}$ inch wide, divided in 10ths or 12ths. 50 feet, \$4.50; 75 feet, \$6.00; 100 feet \$8.00.

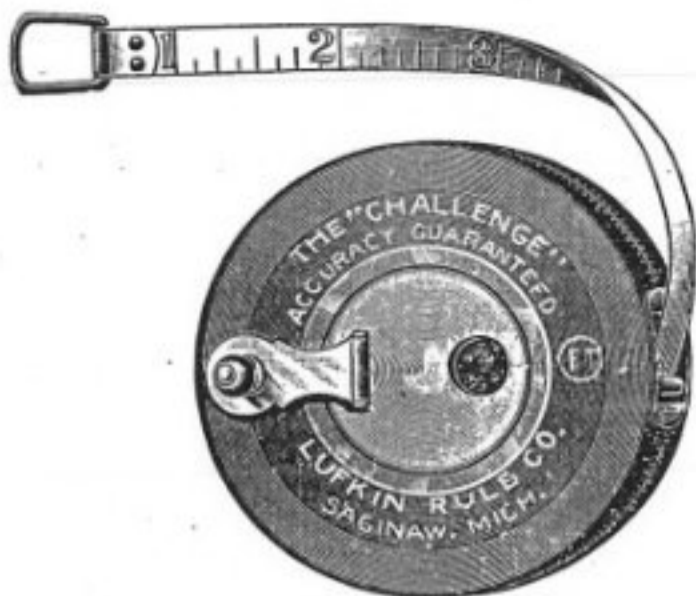
"Reliable" Steel Measuring Tapes.



No. 69

With double folding flush handle, opened by pressing small pin or button on opposite side. Hard leather cases, nickel plated trimmings. Measurements guaranteed perfectly accurate. Marked 10ths and links or 12ths and links. With $\frac{3}{8}$ inch tapes.

Length	25	33	50	66	75	100 feet
Price	\$4.50	\$5.20	\$7.20	\$9.20	\$10.40	\$12.80

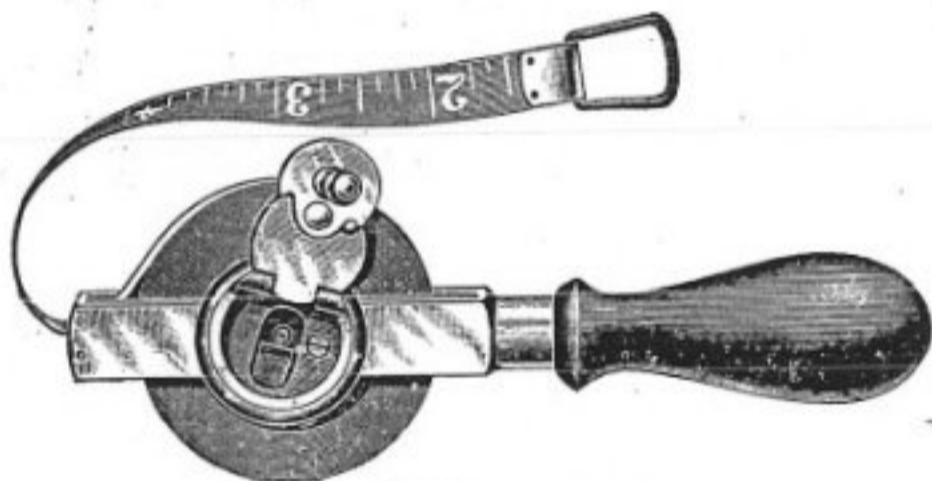


No 70

Hard leather cases, nickel plated trimmings, flush handle, 1/2 inch tape, marked one side only, in 10ths or 12ths.

Length	25	50	75	100 feet
Price	\$3.25	\$4.00	\$5.25	\$6.75

“Reliable” Frame Steel Tapes

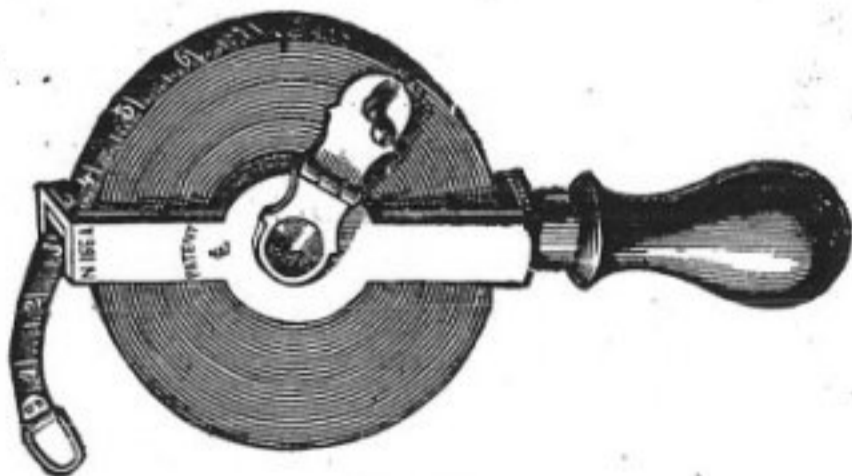


No. 71

Nickel plated brass frames and trimmings and our patent double folding flush handle, opened by pressing small pin or button on opposite side.

Marked either in 10ths or 12ths and links on back.

Length	50	66	75	100 feet
Price	\$7.50	\$9.50	\$11.50	\$13.50



No. 72

No. 72. Steel tape, 1/2 inch wide, on brass reel, divided in tenths or twelfths.

Feet.....	50	100
Price.....	\$6.00	\$12.00

No. 73. Same as No. 72 but ribbon 1/4 inch wide.

Feet.....	50	100
Price.....	\$5.50	\$11.00

Metallic Warp Tapes.

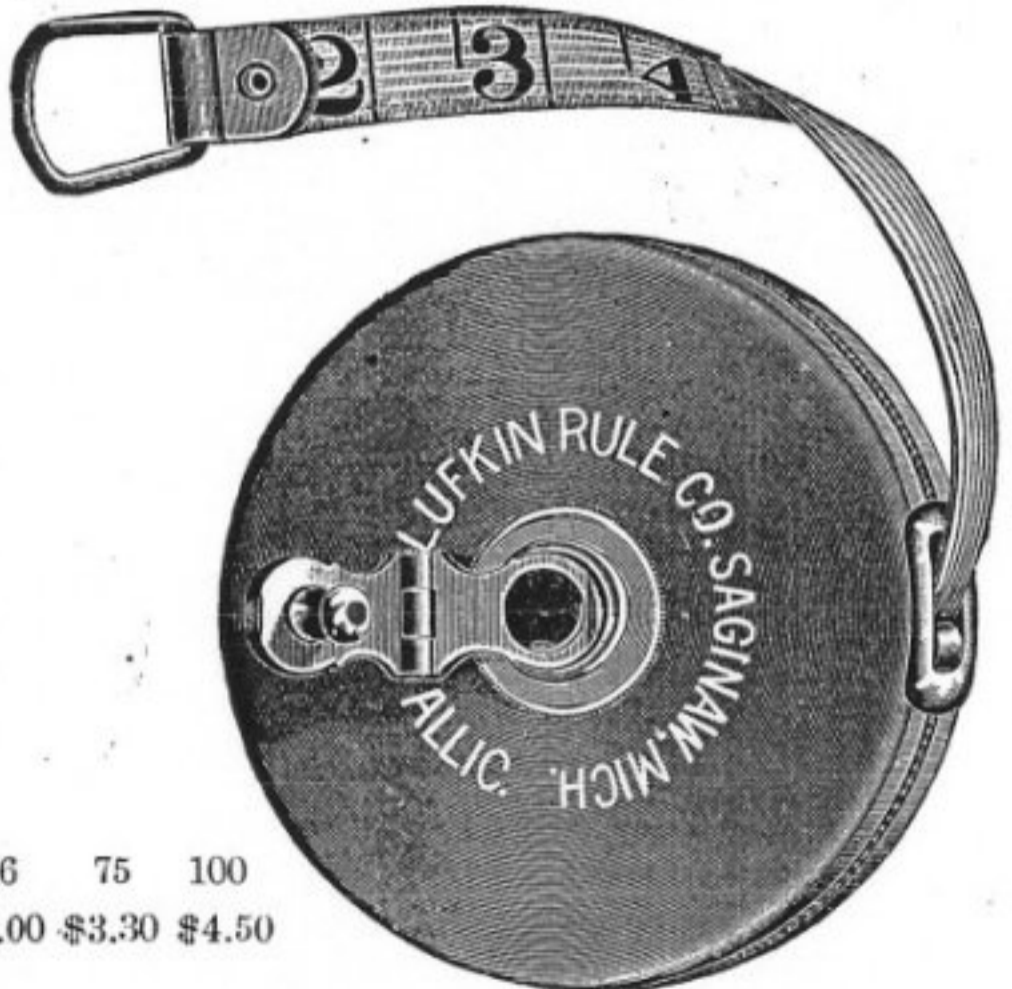
These tapes are made of the best linen tape with wire threads to prevent stretching and by our process of making are always soft and pliable. The ends are reinforced with leather to prevent wearing and all the cases have our new improved flush handle.



No. 73

METALLIC TAPE, $\frac{5}{8}$ INCH WIDE

Feet.....	25	33	40	50	66	75	100
	\$1.80	\$2.00	\$2.25	\$2.50	\$3.00	\$3.50	\$4.00

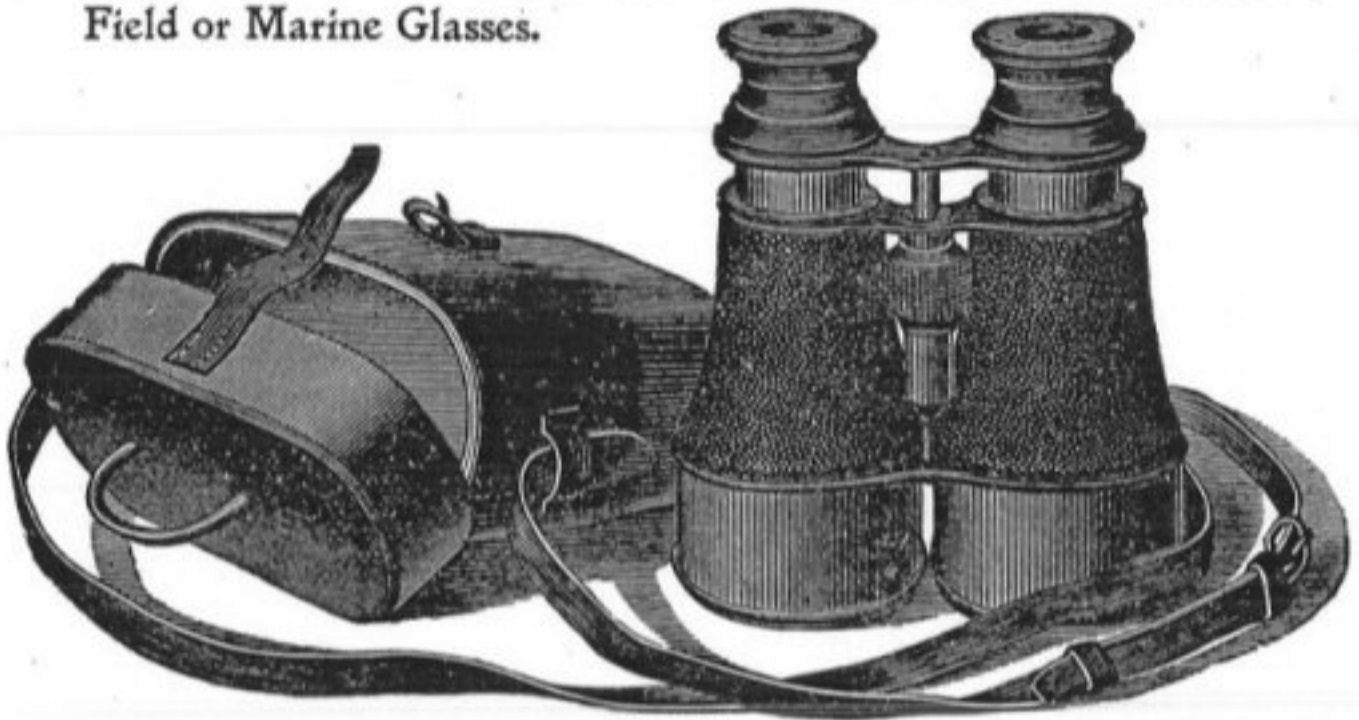


No 74. "Allie" metallic measuring tape, $\frac{5}{8}$ inch wide. made of best woven linen with metallic warp. Hard leather case with folding handle. Divided in tenths or twelfths.

Feet... 25	50	66	75	100
Each..\$1.80	\$2.60	\$3.00	\$3.30	\$4.50

No. 74

Field or Marine Glasses.



No. 75

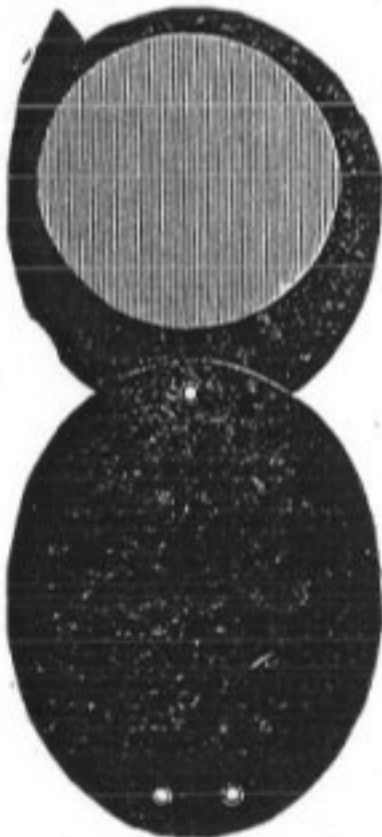
No. 75. Field and marine glasses, 6 lensed, black morocco, stitched, oxidized cross bars, slides and sunshades, in leather case with strap.

Lines	21	24	26
Price	\$15.00	\$18.00	\$20.00

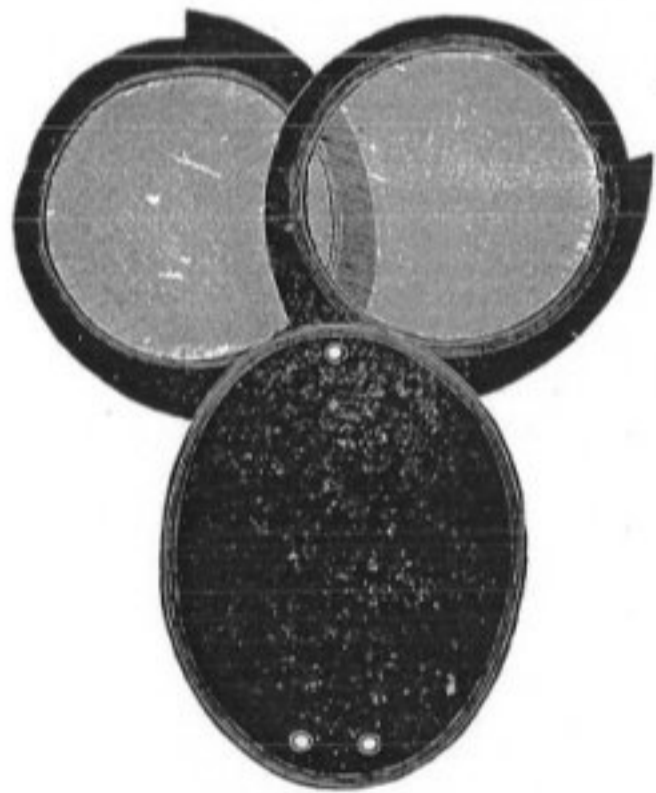
No. 76. Same as No. 73, but with 12 lenses.

Lines	21	24	26
Price	\$18.00	\$20.00	\$22.00

Pocket Magnifiers

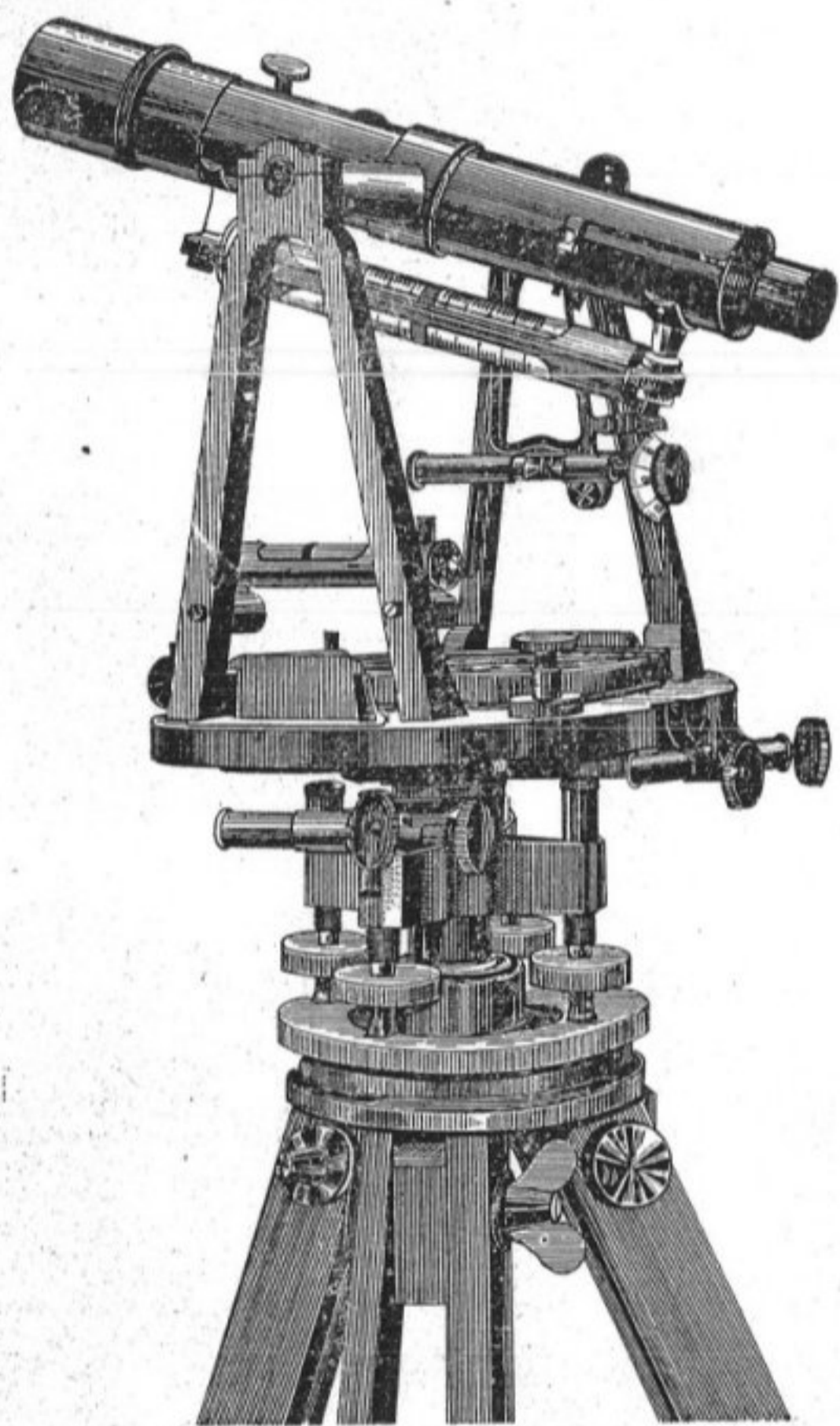


No. 77



No. 80

No. 77	Rubber case, as in cut, size of lens 1 inch diameter.....	\$0.50
No. 78	" " " " " " " 1 1/4 inches diameter.....	.75
No. 79	" " " " " " " 1 1/2 inches diameter.....	1.00
No. 80	" " " " " " " 1 1/8 and 1 1/4 in. diameter.	1.25



Engineer's Transit with Reversion Level Attachment