CIVIL ENGINEERS' AND SURVEYORS' INSTRUMENTS

W. & L. E. GURLEY'S INSTRUMENT MANUFACTORY. ESTABLISHED 1845

1905

W. & L. E. GURLEY

TROY, N. Y., U. S. A.

SPECIAL NOTICE.

We make no charge for **Packing-boxes or Packing,** and our goods are delivered F. O. B. at Troy, N. Y., to the Express Company or freight-house.

We guarantee the **safe arrival of our goods** at the destination indicated at the time of shipment.

All instruments of our own make are examined and tested by us in person, and are sent to the purchaser adjusted and ready for immediate use. When purchased directly of us, they are warranted correct in all their parts—we agreeing in the event of any defect appearing after reasonable use, to repair or replace with new and perfect instruments, promptly at our own cost, express charges included.

When any **articles can be sent safely by mail,** we have printed the cost of postage for same so that, by remitting with the order the cost of the article and postage, the goods can be sent by mail at small expense.

Terms of Payment are uniformly cash, and we have but one price whether ordered in person or by mail. Our prices are as low as instruments of first quality can be made.

Remittances may be made by a cashier's bank draft, payable to our order, or by Express Company or Post-Office money-order payable at Troy, N. Y.

These may be sent by mail with the order for the instrument, and if lost or stolen on the route, can be replaced by a duplicate, obtained as before, and without additional cost.

The customer may also send the money in advance by registered mail, or by the express agent, or, may pay the agent on receipt of the instrument in funds current in New York. Goods ordered for shipment to foreign countries must be paid for in advance of shipment.

Customers ordering instruments and desiring **changes in construction** from our regular patterns, must make a payment in advance when ordering, of fifty per cent. of the price.

The cost of returning the money on bills of amounts under $20, collected by express, will be charged to the customer.

In ordering from this Price-List, please give the Catalogue Number of the goods desired and the date of this Catalogue.

When telegraphing **cable messages** to us, use either the Western Union or the Lieber Code.

ALUMINUM.

Since 1876 we have made Civil Engineers' and Surveyors' Instruments of aluminum, to order only.

The principal advantage which instruments of aluminum have over those of the ordinary metals is their light weight; but as all the bearing parts must be made of bronze, the total weight can be reduced only about fifty per cent.

We finish aluminum instruments in the natural color, and the result is more satisfactory from an artistic standpoint than when an artificial coloring is used, although it entails much extra expense.

We will quote prices on application for any of our instruments of regular pattern, made of aluminum.

ILLUSTRATED CATALOGUE

.:. AND .:.

PRICE-LIST

.:. OF .:.

Civil Engineers' and Surveyors'

INSTRUMENTS,

With Descriptions and Illustrations of Latest Improvements,

MADE AND SOLD BY

W. & L. E. GURLEY,

TROY, N. Y., U. S. A.

ESTABLISHED 1845. INCORPORATED 1900.

JULY, 1905.

This Catalogue is an Abridgment from our Manual and Supersedes all previous Editions.

The prices and numbers have been revised and corrected up-to-date, and agree in most instances with the thirty-seventh edition (revised) of our Manual.

See "Special Notice" on back cover.

INFORMATION TO PURCHASERS.

Selection of Instruments.—The Vernier Compass or Vernier Transit-Compass will be required where the variation of the needle is to be allowed, as in retracing the lines of an old survey, etc.

When, in addition to the variation of the needle, local attraction must be taken into account and the angles taken independently of the needle, an instrument with a graduated limb must be used, and for this purpose the Railroad Compass will be sufficient.

For a mixed practice of general surveying, including farm and city work, the establishment of grades of roads, the running of levels, etc., such an instrument as the Surveyors' Transit, with its various attachments, is amply sufficient.

The various forms of the Engineers' Transit, the Mountain Transit and the Y-Leveling Instruments, are designed for engineering of the highest class.

In the U. S. Public Land surveys, an instrument with the Solar Attachment is required, and the Solar Transit and Solar Compass with telescope attached are usually selected.

In surveys of mining claims, especially in the high elevations of Colorado, and for the surveys of mines in general, the Mountain Transit, with the Solar Attachment and with other extras, has proved a universal favorite.

The various Plane-Table outfits have a recognized utility for topographical and map drawing.

The Current-Meters are almost indispensable in measuring the velocity of the flow of water in harbors, rivers, small streams and irrigation ditches.

The Drainage Level is, we believe, the most simple and efficient instrument designed for laying out drains and similar work.

The Architects' Level and the Builders' Transit are employed in laying out buildings, determining the level of their floors, sills, windows, and the general work of the builder and contractor.

The Explorers' Transit, the Reconnoissance Transit and the various forms of Pocket-Compasses, with or without telescope attachment, are very desirable for a large class of work where extreme lightness and portability are desirable.

Where iron ores are also to be traced, the Miners' Dip-Compass, the Dial Compass and the Pocket Solar Compass are used.

We do not pretend to make any instrument by which veins of gold and silver can be traced, or the presence of those metals detected.

Our instruments are not carried in stock by merchants, and we do not deem it advisable to add to our prices to enable us to give to merchants a large *discount*, which, of course, would be paid by the purchaser.

Trial of Instruments.—If requested to do so, we will send the instrument to the express-station nearest the person giving the order and direct the express agent to collect our bill and hold the money on deposit one or two weeks, until the purchaser shall have had actual trial of its quality.

If not found as represented, he may return the instrument and receive the money paid in full, including express charges, and direct the instrument to be returned to us.

This privilege of trial applies only to our larger Transits, Levels, and Compasses, and is not given unless requested, and is allowed only in the United States.

Extent of our Business.—The manufacture of surveying-instruments has been conducted by us since 1845. Our facilities for manufacturing are far superior to those of any other similar establishment, and thousands of our instruments have been distributed to all parts of the United States, and to Canada, Mexico, Central America, Cuba, South America, Sandwich Islands, China, Japan, Australia, Africa, India and other foreign countries.

Packing, Etc.—Each of our Transits, Levels and Surveyors' Compasses is packed in a well-finished mahogany case, furnished with lock and key and brass hooks, and leather strap for convenience in carrying.

When sent to the purchaser the mahogany cases are carefully inclosed in outside packing-boxes of pine, made a little larger on all sides to receive elastic packing material.

Instruments for Foreign Countries.—Instruments packed for foreign shipment are hermetically sealed in tin cases.

The cash for all orders for foreign shipments by steamship must, in every case, accompany the order; and if it is desired that we attend to the shipment of the instruments, the remittance must be made ten per cent. more than the catalogue price of the instruments if the order amounts to $250 or less, or eight per cent. more than catalogue price if the order amounts to from $300 to $500, or six per cent. more than catalogue price if the order amounts to from $600 to $1,000.

This extra remittance is to cover cost of shipping charges, freight and insurance, which must always be paid in advance on all shipments except those to Canada and some parts of Mexico.

If the amount remitted is more than enough to cover these expenses, any balance will be returned to the purchaser with the receipted bill and bill of lading, unless we are directed to hold it to his credit.

Remittances must be made by bankers' draft on London, England, or on New York City, and such drafts can be purchased in any of the large cities of the countries named.

Repair of Instruments.—Every year we receive a thousand, or more, instruments of our own and others' make sent to us for refitting and repairs.

We advise our customers who have instruments in need of repairs, to send them directly to us, as our facilities enable us to do the work much more economically and promptly than any other maker, however accessible.

They should always be placed in their own boxes, and then enclosed in an outside packing-case, an inch larger in all its dimensions, that the space between the two may be filled with paper wadding, hay or shavings.

The owner's name and address should always appear on the package, and a note specifying the repairs needed should accompany the instrument, and a letter should also be sent by mail to us, giving not only directions as to the repairs, but also stating when the return of the instrument is required, and the precise location to which it should be forwarded. It should also be remembered that **each instrument is made to fit its own spindle,** and no other; and therefore this part, with the parallel plates and leveling-screws, if it has any, should always be sent with it.

The tripod legs and brass head in which they are inserted need never be sent unless in need of repairs.

When requested to do so, we will send an estimate of the cost of the repairs on any instrument sent us, before beginning the work.

SPECIAL NOTICE.

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

The telescopes of all our Transits, Nos. 1 to 17, 25 to 90, and Nos. 110 to 117, are now furnished with rack and pinion movements to both eyepiece and object-glass slides without extra charge.

In Transits Nos. 20, 100, 102 and 105, the object-glass is focused by a rack and pinion and the eyepiece by a spiral movement.

To enable the observer to see objects near the instrument, we have recently introduced an important modification of the telescopes used on Transits Nos. 1 to 117, so that they can be focused on an object at a distance of about four and one-half feet from the instrument.

All of our Transits, Nos. 1 to 105, are furnished with shifting center to the leveling-head, and with a tripod and leveling-screws and clamp and tangent to spindle. Transits Nos. 20, 25 to 31, 100 and 102 have tripods with extension legs. For prices of plain, split-leg and extension tripods, see page 46.

The limbs of all of our 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 23.

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 minutes. 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 minute. The arc of 3-inch radius is graduated to 20 minutes and is read by vernier to 30 seconds.

A variation arc furnished with any new Engineers' Transit, Nos. 1 to 16, costs extra $4.00. See No. 130, page 19.

All of our Transits, Nos. 17, 20, 25 to 102, and 110 to 117, have a variation arc for setting off the variation of the needle.

A leveling-tripod head with plates, leveling-screws and clamp and tangent movement, fitted to Vernier Transits, costs extra $13.00. See No. 176, page 23.

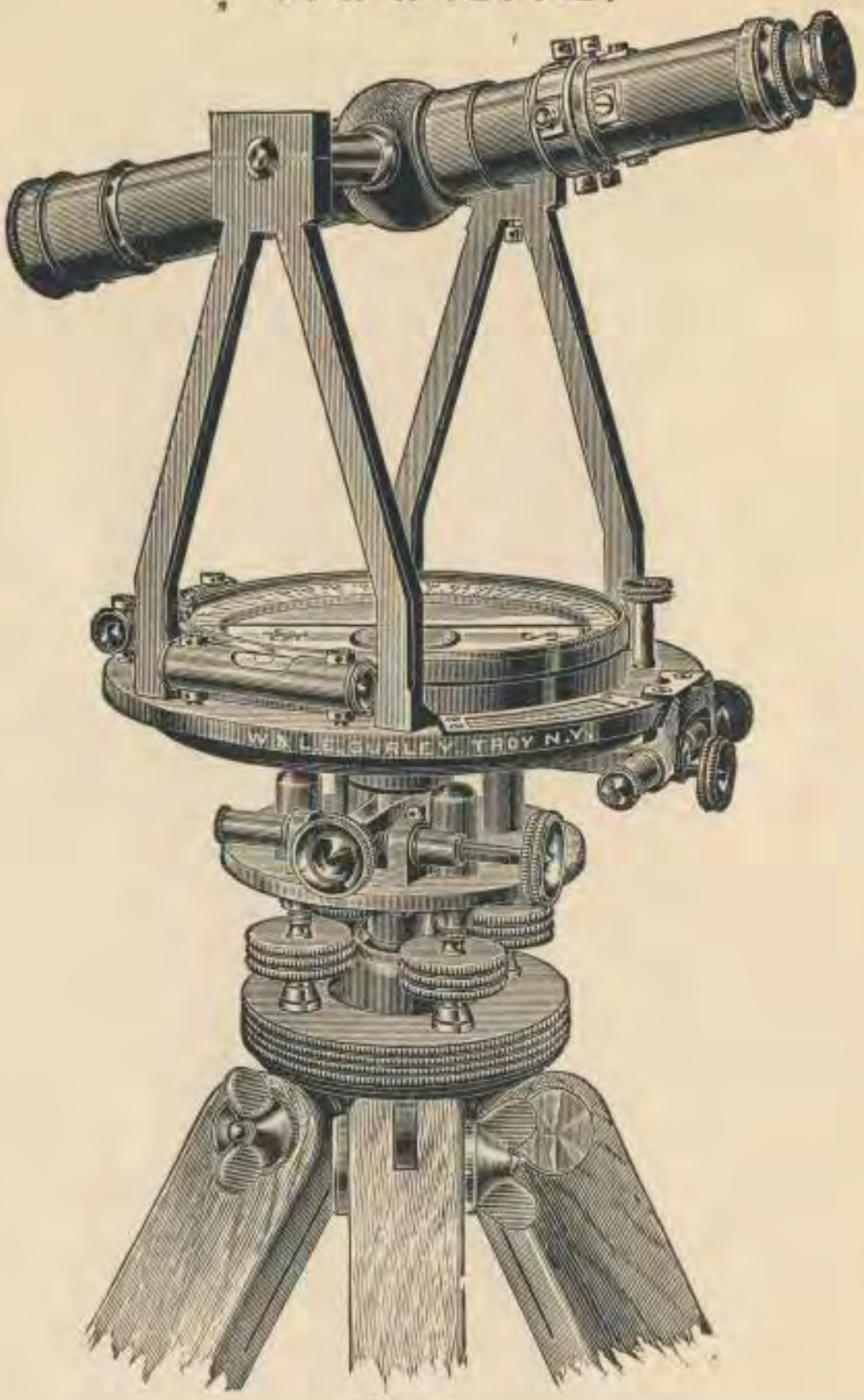
Stadia wires are furnished without extra charge if requested when ordering a new Transit, Nos. 1 to 117. When desired, we arrange the stadia wires to disappear, or be out of focus, when the plain cross-wires only are in use. See pages 19, 21 and 30.

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 and 105, the extra cost is $4.00. See pages 19 and 22.

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 to 102, the extra cost is $1.50. See page 23.

Each Transit is packed in a mahogany case, with lock and leather strap, and has a plummet, reading-glass, adjusting pins, etc. The wood box for the Explorers' Transit is leather covered. The box for the Mountain Transit has an outside sole leather case with shoulder straps.

TRANSITS.



No. 12.

Engineers' Transit, 5-inch needle, plain telescope. Price, $150.00.

ENGINEERS' TRANSIT.

The cut represents our latest greatly improved Engineers' Transit, so generally preferred in railroad practice. It has the two opposite verniers of the limb at an angle of 30° with the telescope and thus in front of the observer, so as to be easily read without a change of position. The limb is figured in two rows, from 0 to 360 and from 0 to 90 each way. The sockets are long and the upper parts of the instrument brought down closely to the leveling head which is itself permanently attached to the centers. The tangent movements have each a single screw with opposing spring and are very sensitive; the clamp to the limb being also attached to the solid center of the instrument instead of the upper plate as heretofore. In the Engineers' Transit the compass-circle is usually solid with the upper plate; when, however, it is required to set off the variation of the needle, the instrument is made with movable compass-circle like that of the Surveyors' Transit. The telescopes of all of our Transits, Nos. 1 to 17, and 25 to 90, are furnished with rack and pinion movements to both eyepiece and object-glass slides.

See notes on page 4.

ENGINEERS' TRANSITS.

No. 16.

Price.....$198.00.

No.		Price.
1.	—Engineers' Transit, two verniers to limb, 4-inch needle, plain telescope.....	$145 00
6.	—Engineers' Transit, two verniers to limb, 4½-inch needle, plain telescope.....	150 00
7.	—Engineers' Transit, two verniers to limb, 4½-inch needle, with level on telescope and clamp and tangent to telescope axis.....	168 00
8.	—Engineers' Transit, two verniers to limb, 4½-inch needle, with 4½-inch vertical circle, level on telescope and clamp and tangent to telescope axis.....	180 00
9.	—Engineers' Transit two verniers to limb, 4½-inch needle, with vertical arc of 3 inches radius and vernier moved by tangent screw, level on telescope and clamp and tangent to telescope axis.....	186 00
12.	—Engineers' Transit, two verniers to limb, 5-inch needle, plain telescope, as shown on page 5.....	150 00
13.	—Engineers' Transit, two verniers to limb, 5-inch needle, with level on telescope and clamp and tangent to telescope axis.....	168 00
14.	—Engineers' Transit, two verniers to limb, 5-inch needle, with 4½-inch vertical circle, level on telescope and clamp and tangent to telescope axis.....	180 00
15.	—Engineers' Transit, two verniers to limb, 5-inch needle, with vertical arc of 3 inches radius and vernier moved by tangent screw, level on telescope and clamp and tangent to telescope axis.....	186 00
16.	—Engineers' Transit, two verniers to limb, 5-inch needle, with vertical arc of 3 inches radius and vernier moved by tangent screw, level on telescope and gradienter combined with clamp and tangent, as shown.....	198 00

See notes on page 4.

ENGINEERS' TRANSIT WITH SOLAR ATTACHMENT.

No. 17.

Engineers' Transit with Solar Attachment. Price, $250.00.

The engraving represents our Engineers' Transit with two verniers to limb, 5-inch needle and attachments of vertical arc of 3 inches radius graduated on silver and reading to thirty seconds, level on telescope, clamp and tangent to axis, and Solar apparatus with declination arc reading to thirty seconds.

The horizontal limb reads to single minutes, and is graduated on sterling silver. The telescope is fitted with stadia wires.

The compass-circle is made movable, with pinion and clamp, for setting off the variation of the needle.

THE SOLAR ATTACHMENT.

In this cut we have a graphic illustration of the Solar Apparatus, the circles shown being intended to represent in miniature those supposed to be drawn upon the concave surface of the heavens.

When the telescope is set horizontal by its spirit-level, the hour-circle will be in the plane of the horizon, the polar axis will point to the zenith, and the zeros of the vertical arc and its vernier will coincide. Now, if we incline the telescope, directed north as shown in the cut, the polar axis will descend from the direction of the zenith. The angle through which it moves, being laid off on the vertical arc, will be the co-latitude of the place where the instrument is supposed to be used, the latitude itself being found by subtracting this number from ninety degrees.

EXPLORERS' TRANSIT.

No. 20.

Price, $165.00

SPECIFICATIONS OF THE EXPLORERS' TRANSIT.

Telescope, 6½ inches long. Dust protector to object-glass slide. Plain cross wires or stadia wires as ordered. Power of telescope, 10. Telescope focuses on an object 3 feet from the center of the instrument.

Level under telescope with ground and graduated vial. Clamp and tangent to axis of telescope. Vertical circle 4 inches in diameter, graduated on silver, figured from 0 to 90 each way and reading by one double vernier to single minutes.

Compass needle 2¾ inches long. Variation arc for setting off the declination of the needle. Horizontal limb 4 inches in diameter across the graduations. Graduations on silver and reading by two double opposite verniers to single minutes. Limb figured from 0 to 180 each way, or special figuring if ordered. Leveling head of ribbed pattern, strongly braced, with shifting center, and leveling screws with dust cover and cup. Regular Engineers' Transit Sockets.

EXPLORERS' TRANSIT.—Continued.

Light wood box, leather covered, with lock, key, and shoulder strap. The box measures about 10¼ inches by 7 inches by 5½ inches outside. The Transit weighs about 5 pounds without the box or tripod. The tripod weighs about 5 pounds. The box weighs about 4 pounds with its packing and accessories. Special Extension Tripod with jointed legs and canvas carrying case. All for $165.00 as described; or, if regular extension tripod only is wanted, deduct $5.00.

The Transit in its box and the tripod with the jointed legs in its case can be packed and carried in an ordinary 24-inch dress-suit case, as shown.

If desired, we can furnish a good leather dress-suit case for $8.00 extra.

LIGHT MOUNTAIN TRANSIT.

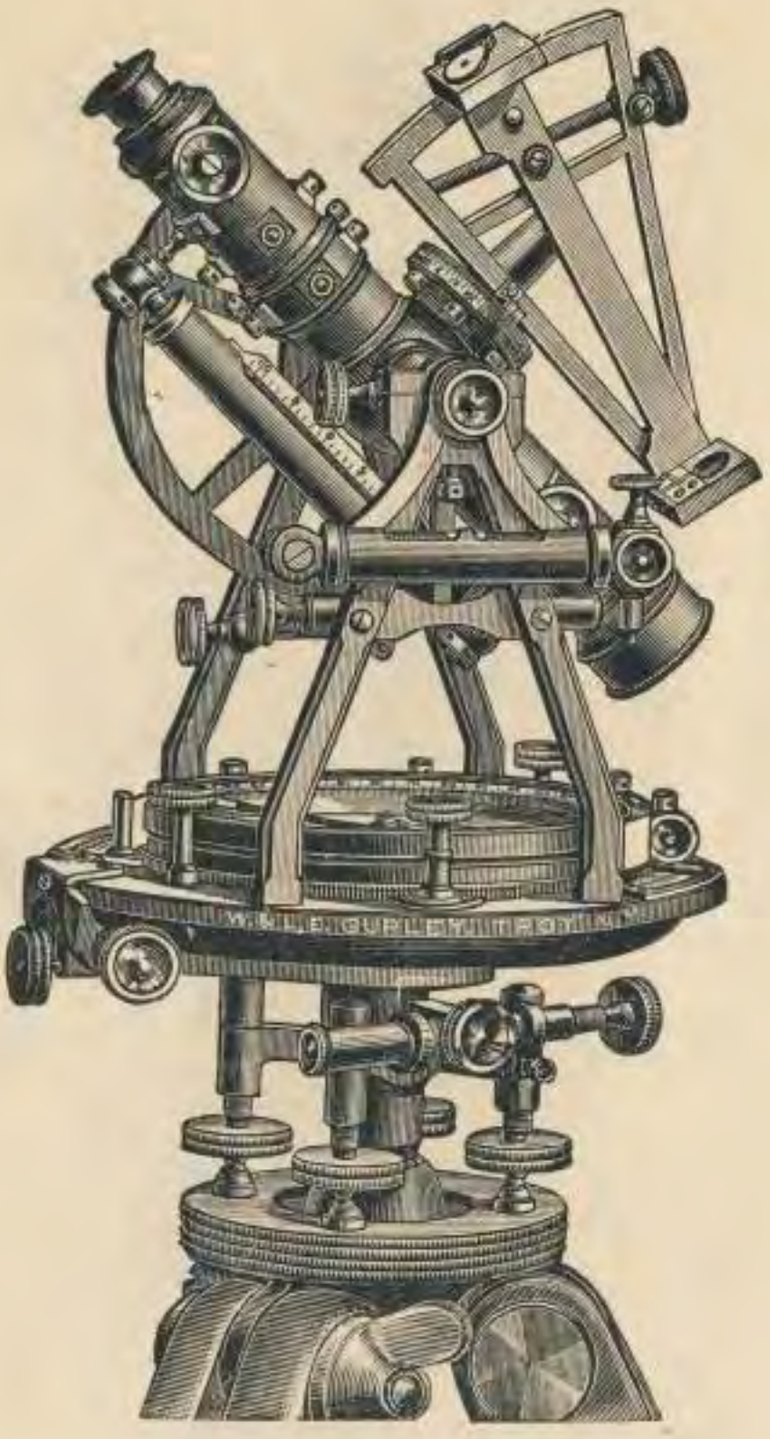
No. 28.

Mountain Transit with vertical arc, level on telescope and clamp and tangent to telescope axis. Price as shown.....$186.00.

This is an extra light Engineers' Transit for mine or mountain use, introduced by us in 1876 to meet a demand for a light transit of the best quality. It has met with a very large sale and been universally approved. This instrument has all our recent improvements in position of verniers, tangent screws, etc., and when ordered with the Solar Attachment, it has also our patent latitude-level, as shown in the cut on page 10. The limb is figured in two rows, from 0 to 360 and from 0 to 90 each way. The horizontal limb, latitude and declination arcs are read by vernier to one minute, and with the hour-circle are all graduated on sterling silver. The telescope is eight inches long and is fitted with stadia wires. We confidently recommend it to all our friends as a Transit of first quality, capable of any work, and especially adapted for mining or mountain surveying where great portability is required.

No.		Price.
25.	—Light Mountain Transit, 4-inch needle, variation arc, two verniers to limb, telescope of finest quality, power twenty diameters, patent extension tripod shortening to half length. The instrument is packed in a mahogany case, covered with a light sole leather case, with straps for "packing." With plain telescope.....	$150 00
26.	—Light Mountain Transit, with level on telescope and clamp and tangent to telescope axis	168 00
27.	—Light Mountain Transit, with 4½-inch vertical circle and vernier reading to one minute, level on telescope and clamp and tangent to telescope axis.....	180 00
28.	—Light Mountain Transit, with vertical arc of 2½ inches radius and vernier reading to one minute, level on telescope and clamp and tangent to telescope axis, as shown	186 00
29.	—Light Mountain Transit, with vertical arc of 2½ inches radius and vernier reading to one minute, level on telescope and gradienter combined with clamp and tangent..	198 00

LIGHT MOUNTAIN TRANSIT WITH SOLAR ATTACHMENT.



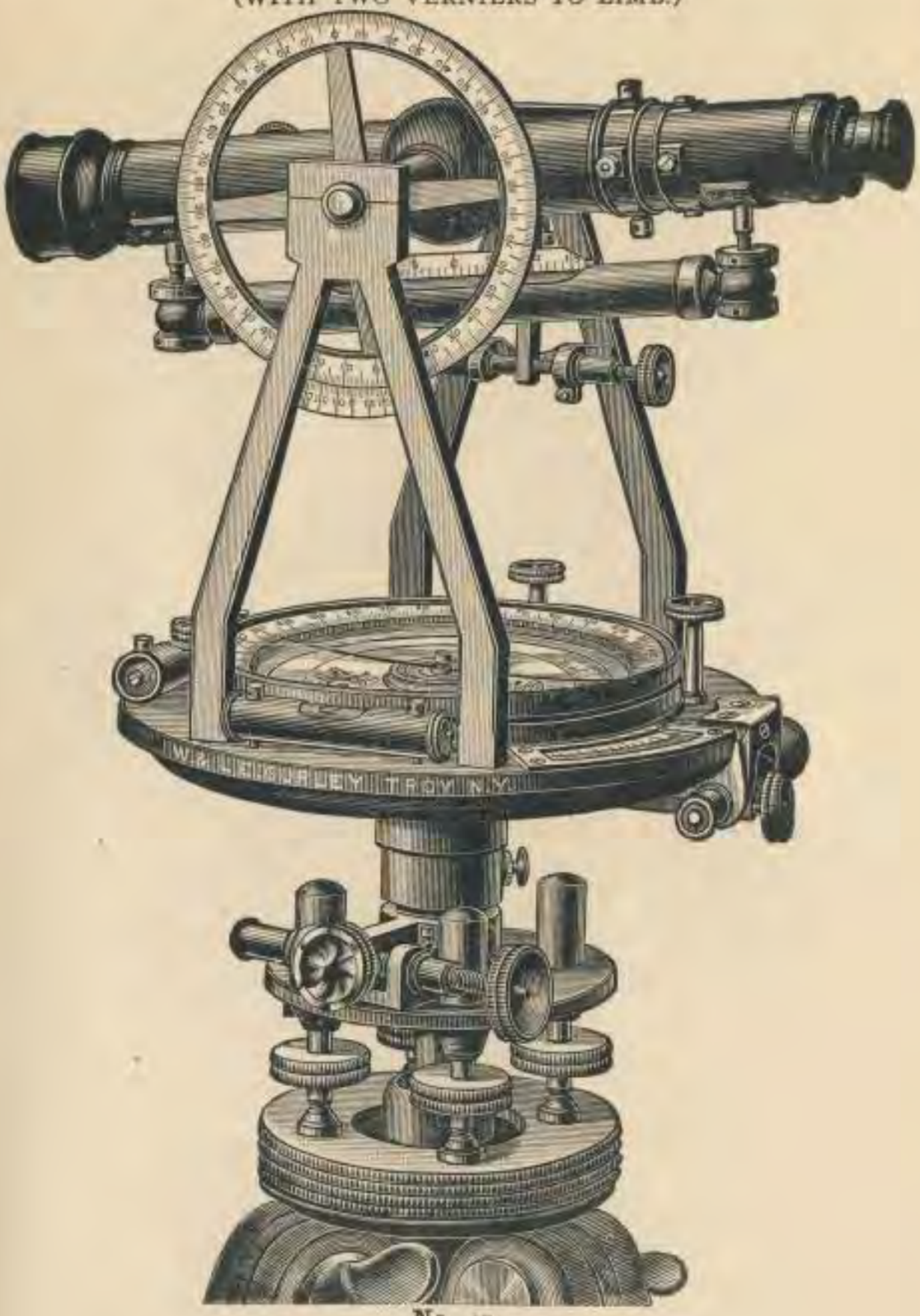
No. 30.

Mountain Solar Transit. Price, $245.00.

No.		Price.
30.	—Light Mountain Transit, with Solar Attachment, vertical arc of 2½ inches radius and reading to one minute, level on telescope and clamp and tangent to telescope axis, complete as shown	$245 00
31.	—Light Mountain Transit, with Solar Attachment, Jones' latitude arc complete, level on telescope and clamp and tangent to telescope axis	300 00

Note.—In Jones' latitude arc the usual vertical arc is omitted, and replaced by a double latitude arc attached to the under side of the telescope. The smaller arc, having its center directly under the cross-bar of the telescope, has an arm with vernier reading the arc to single minutes, and carries also a level-tube open both top and bottom, with a graduated scale over each opening, in order to read the level accurately. The larger arc, with vernier reading to ten seconds, is used in conjunction with the smaller arc to enable the observer to obtain a finer reading.

SURVEYORS' TRANSITS.
(WITH TWO VERNIERS TO LIMB.)



No. 47.

Price.....$160.00.

The Surveyors' Transit has a telescope from ten to eleven inches long. The compass-circle is graduated to half degrees, and is movable for setting off the variation of the needle. The leveling-head is arranged with shifting center, for setting the instrument quickly over a given point without altering the position of the legs. The limb or graduated circle outside the compass-box is provided with two opposite verniers placed in front of the observer, so as to be read without changing his position. The limb is figured in two rows from 0 to 360 and from 0 to 90 each way. The verniers read to single minutes, and the instrument is furnished with all our latest improvements.

No.		Price.
35.	—Surveyors' Transit, 4-inch needle, two verniers to limb, plain telescope.....	$125 00
36.	—Surveyors' Transit, 4-inch needle, with level on telescope and clamp and tangent to telescope axis	143 00
37.	—Surveyors' Transit, 4-inch needle with 4½-inch vertical circle and vernier reading to one minute, level on telescope and clamp and tangent to telescope axis.....	155 00
45.	—Surveyors' Transit, 5-inch needle, two verniers to limb, plain telescope.....	130 00
46.	—Surveyors' Transit, 5-inch needle with level on telescope and clamp and tangent to telescope axis	148 00
47.	—Surveyors' Transit, 5-inch needle, with 4½-inch vertical circle and vernier reading to one minute, level on telescope and clamp and tangent to telescope axis, as shown	160 00
48.	—Surveyors' Transit, 5-inch needle, two verniers to limb, with 4½-inch vertical circle and vernier reading to one minute, level on telescope and gradienter combined with clamp and tangent to telescope axis.....	172 00

See notes on page 4.

SURVEYORS' TRANSIT WITH SOLAR ATTACHMENT.

No. 60.

Price.....$226.00.

The cut represents our Surveyors' Transit, with 5-inch needle, to which is adapted the Solar Attachment with latitude-level, vertical arc of 3 inches radius, level on telescope and clamp and tangent to telescope axis; both the vertical and declination arcs being graduated on silver and reading to thirty seconds. The instrument has shifting center to leveling-head and is furnished either with one vernier to limb, or with two verniers to limb, as may be desired.

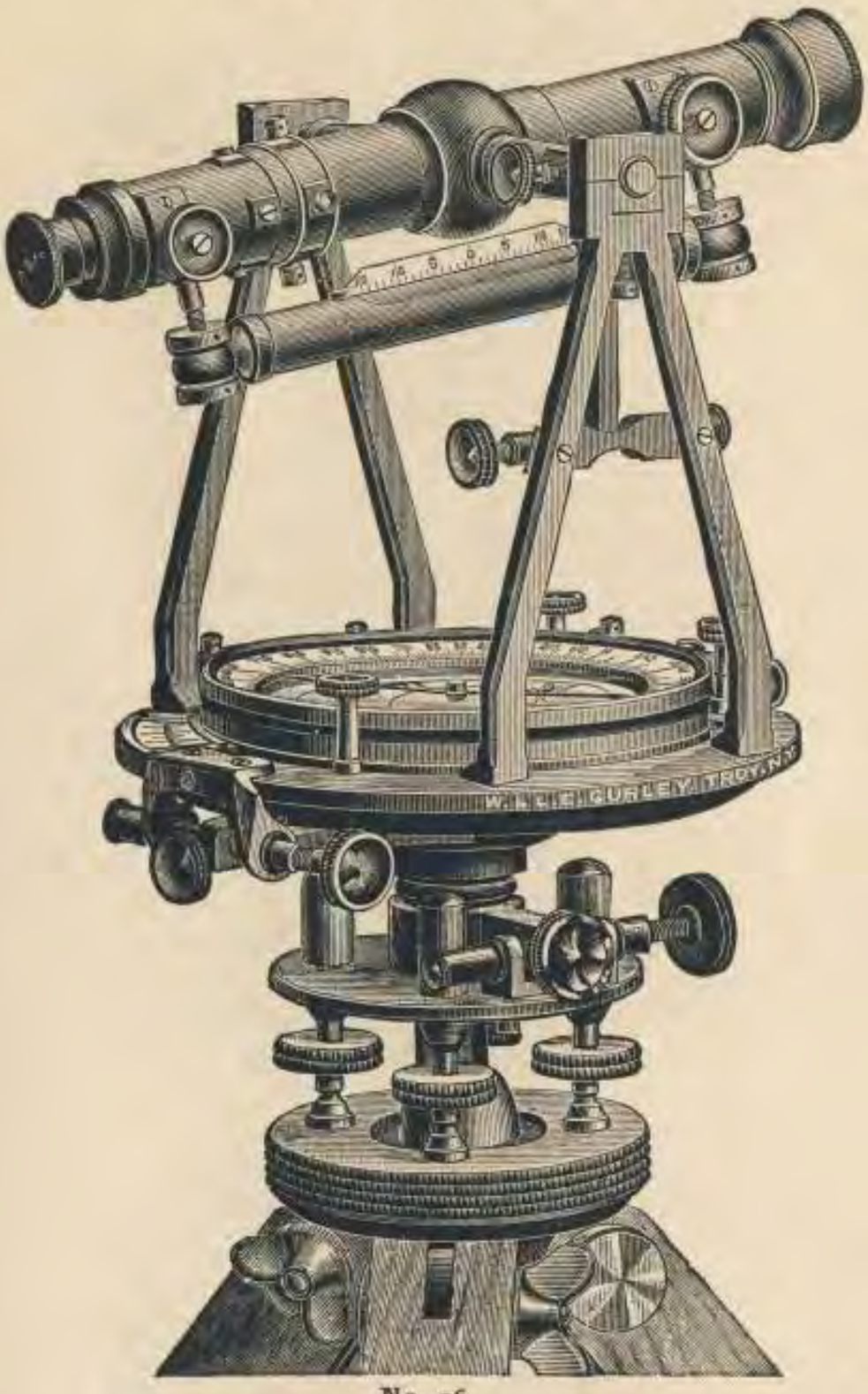
The horizontal limb is graduated on sterling silver and reads to single minutes. The telescope is fitted with stadia wires.

No.		Price.
60.	—Surveyors' Transit, two verniers to limb, 5-inch needle, with Solar Attachment, vertical arc, level on telescope and clamp and tangent to telescope axis.....	$226 00
90.	—Surveyors' Transit, one vernier to limb, 5-inch needle, with Solar Attachment, vertical arc, level on telescope and clamp and tangent to telescope axis.....	211 00

Both styles have been for years in successful use in different parts of the country.

SURVEYORS' TRANSITS.

(WITH ONE VERNIER TO LIMB.)



No. 76.

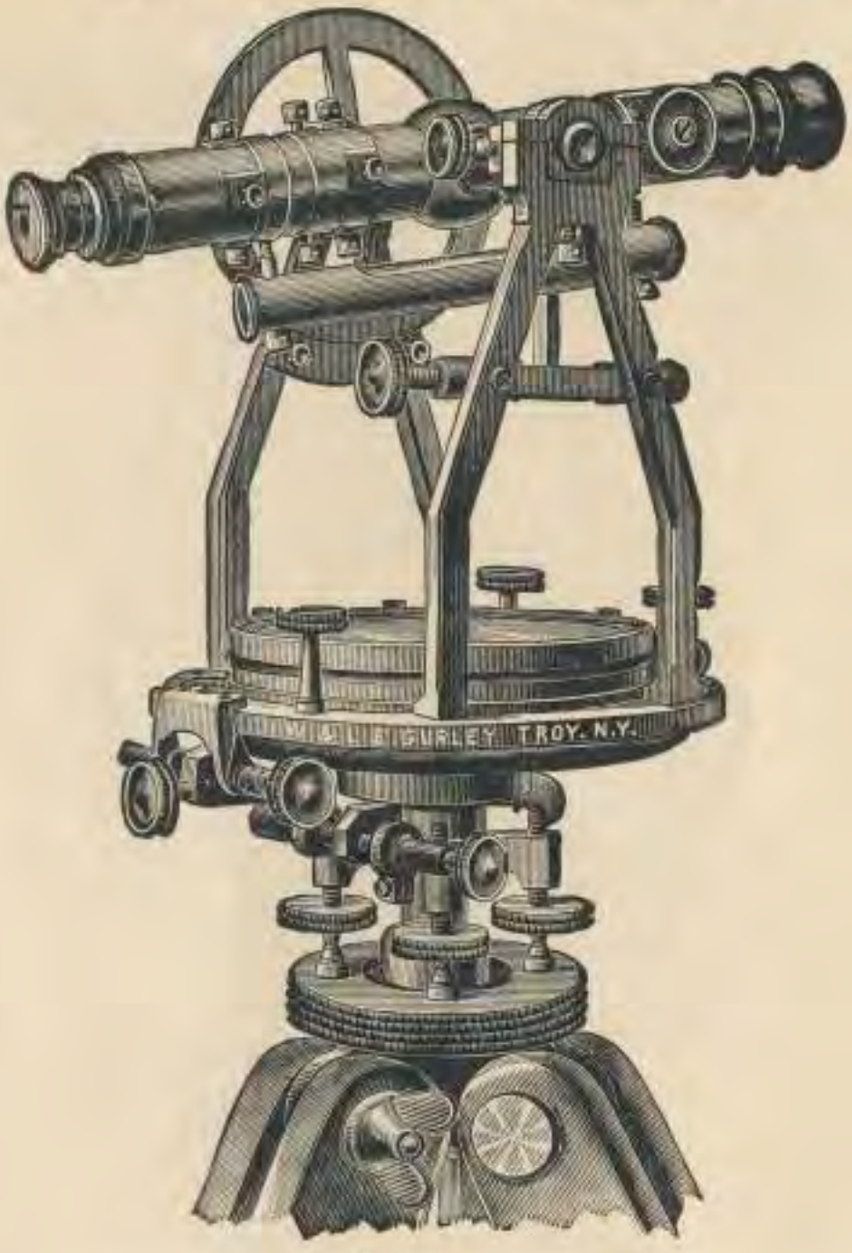
Price.....$133.00.

The Surveyors' Transit has a telescope from ten to eleven inches long. The compass-circle is graduated to half degrees, and is provided with a vernier for setting off the variation of the needle. The leveling-head is arranged with shifting center for setting the instrument quickly over a given point without altering the position of the legs.

The limb is figured 0 to 360 and 0 to 90 each way and is provided with one vernier placed like that of the Engineers' Transit and reads to single minutes. The telescope, as in the other Transits already described, has a rack and pinion movement to both eyepiece and object-glass slides as shown in the cut.

No.		Price.
65.	—Surveyors' Transit, 4-inch needle, one vernier to limb, plain telescope.....	$110 00
66.	—Surveyors' Transit, 4-inch needle, one vernier to limb, with level on telescope and clamp and tangent to telescope axis	128 00
75.	—Surveyors' Transit, 5-inch needle, one vernier to limb, plain telescope.....	115 00
76.	—Surveyors' Transit, 5-inch needle, one vernier to limb, with level on telescope and clamp and tangent to telescope axis, as shown.....	133 00
77.	—Surveyors' Transit, 5-inch needle, same as No. 76, with addition of 4½-inch vertical circle and vernier reading to one minute.....	145 00
78.	—Surveyors' Transit, 5-inch needle, one vernier to limb, with 4½-inch vertical circle and vernier reading to one minute, level on telescope and gradienter combined with clamp and tangent to telescope axis.....	157 00

RECONNOISSANCE TRANSIT.



No. 100.

Price.....$115.00.

In response to a demand for a very light Transit for rapid work, where extreme accuracy is not required, we introduced the Reconnoissance Transit. It has become a very popular instrument. It has a needle of 3½ inches, a limb of 5 inches in diameter, graduated on sterling silver, figured in one row from 0 to 180 each way, reading by one double vernier to single minutes, and is supplied with our new spring tangent movement. The telescope is nine inches long and has a power of from 18 to 20 diameters, and is furnished with stadia wires for measuring distances; it has also a long level to telescope, vertical circle reading to five minutes, and clamp and tangent to axis. The objective is moved by a rack and pinion and the eyepiece is focused by a spiral movement. The compass-circle has a rack and pinion to set off the variation of the needle. The leveling-head has a shifting center, and spring clamp and tangent, and the instrument is set upon our light extension tripod. The weight of this Transit without tripod is about 7¾ lbs.; with tripod complete about 15 lbs.

No.		Price.
100.	—Reconnoissance Transit, one vernier to limb, 3½-inch needle, with 3½-inch vertical circle and vernier reading to five minutes, level on telescope, clamp and tangent to telescope axis, and leveling tripod with extension legs.....	$115 00
102.	—Reconnoissance Transit, same as No. 100, but with 4½-inch vertical circle and vernier reading to one minute.....	122 00

NOTE.—A dust guard to the object-glass slide costs extra, $4.00. Reflector to vernier of limb costs extra, $1.50.

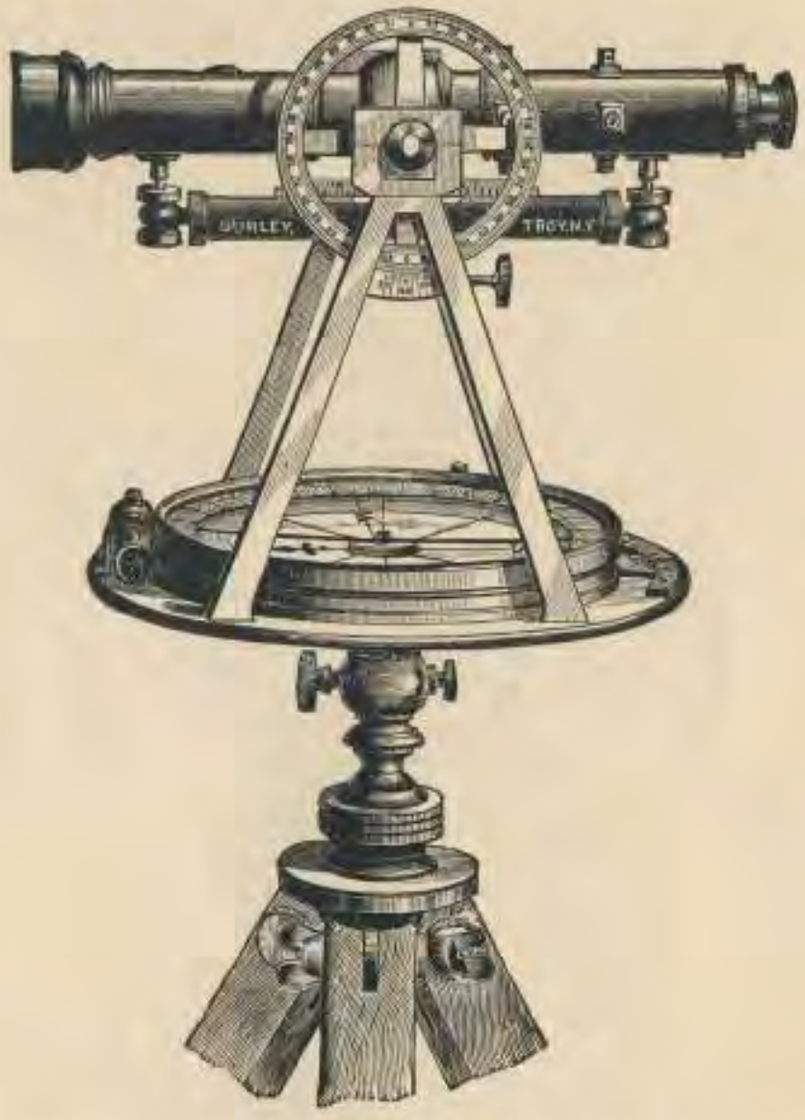
THE BUILDERS' TRANSIT.

No. 105.

Price, as shown,.....$80.00.

In the use of the Architects' Level it was often desirable to determine a point in a vertical plane either above or below the object observed, or to determine points on either side and in line with the center of the instrument, more conveniently than could be done with the Architects' Level. To meet this want we devised the Builders' Transit, shown in the cut. It has a telescope nine inches long, with long graduated level, clamp and tangent to the axis, a graduated limb reading by an index to one degree, clamp and tangent movement to both limb and leveling-head, and plain tripod with trivet plate. The limb is figured in one row from 0 to 180 each way. The objective is moved by a rack and pinion and the eyepiece is focused by a spiral movement. A dust guard to the object-glass slide costs extra, $4.00. Stadia wires are furnished without extra charge if ordered with the Transit. In use the instrument is set up either upon the tripod or trivet, and the plate accurately leveled by the two levels shown upon it. If it is desired to run a level line, the bubble of the telescope level is brought into the center by the clamp and tangent of the axis, in which position the horizontal wire of the telescope will determine a level line when directed to any point in the horizontal plane, as by the telescope of the ordinary level, and any horizontal angle desired may be read off upon the limb. When desired to obtain points in a vertical plane, either above or below a given point (the plates being clamped and the clamp of the axis released), the telescope may be directed either above or below to the place desired. To determine two points in a straight line with the instrument and on either side of its center, direct the telescope to one of the points, then clamp the plates, and the other point may be obtained by reversing the telescope on its axis. The Builders' Transit, complete with tripod, weighs about 13 lbs.

VERNIER TRANSIT-COMPASS.



No. 117.

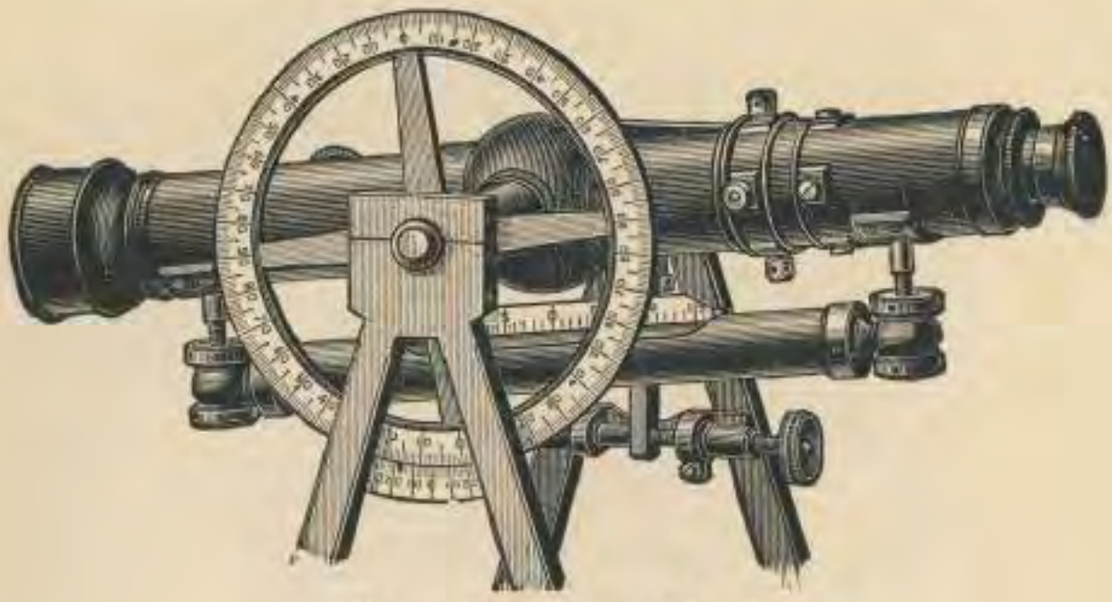
Price as shown, with 6-inch needle and tripod, $101.00.

The Vernier Transit or Transit-Compass has the same general properties as the Vernier Compass, by which horizontal angles are measured by the needle only, but is furnished with a telescope in place of the ordinary sights. The telescope is eleven inches long, and sufficiently powerful to see and set a flag at a distance of two miles on a clear day. It has a rack and pinion movement to both eyepiece and object-glass slide. Stadia wires are furnished without extra charge, if ordered with the Transit. The figure represents the instrument with 6-inch needle; in the smaller size, the vernier of the compass-circle is within the box under the glass, as with that of the Surveyors' Transit. The needle-lifting screw is underneath the plate, but is concealed in the cut. Vernier Transit, No. 117, complete with tripod, weighs about 19 lbs.

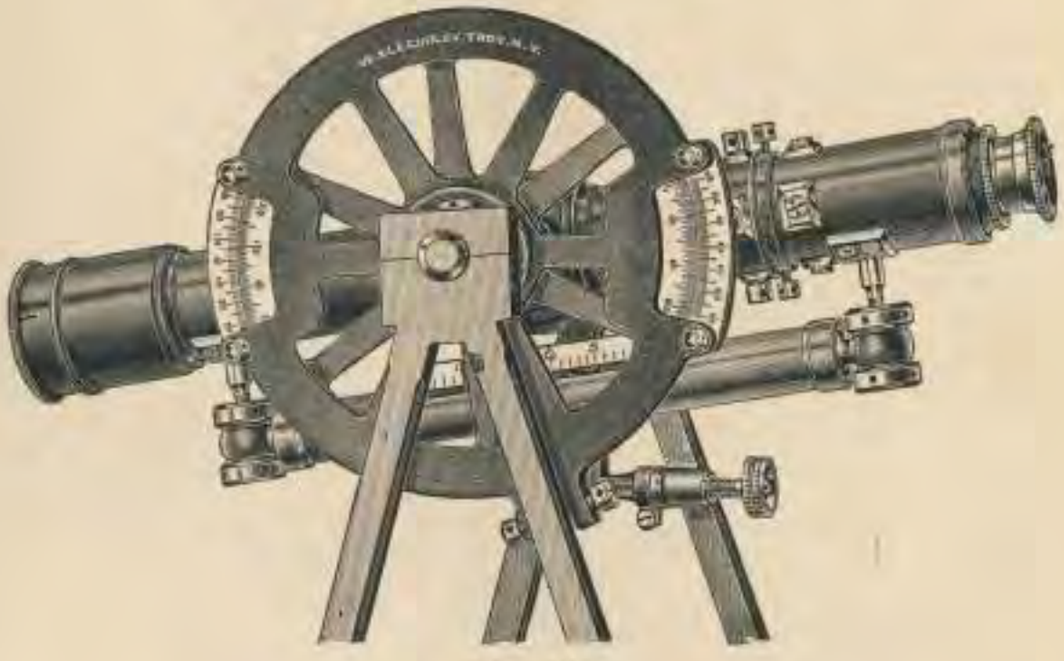
No.		Price.
110.	—Vernier Transit, 5-inch, plain telescope, compass tripod	$ 70 00
111.	—Vernier Transit, 5-inch needle, with level on telescope and clamp and tangent to telescope axis	88 00
112.	—Vernier Transit, 5-inch needle, with 3½-inch vertical circle and vernier to 5 minutes, level on telescope and clamp and tangent to telescope axis	96 00
115.	—Vernier Transit, 6-inch needle, plain telescope, compass tripod	75 00
116.	—Vernier Transit, 6-inch needle, with level on telescope and clamp and tangent to telescope axis	93 00
117.	—Vernier Transit, 6-inch needle, with 3½-inch vertical circle and vernier to 5 minutes, level on telescope and clamp and tangent to telescope axis, as shown	101 00

NOTE.—A leveling-head with clamp and tangent to spindle, for Transits Nos. 110-117, costs extra, $13.00. (See No. 176, page 23.) Extension tripod instead of regular tripod costs extra, $7.00. Split-leg tripod instead of regular tripod costs extra, $5.00.

ATTACHMENTS AND EXTRAS FOR TRANSITS.



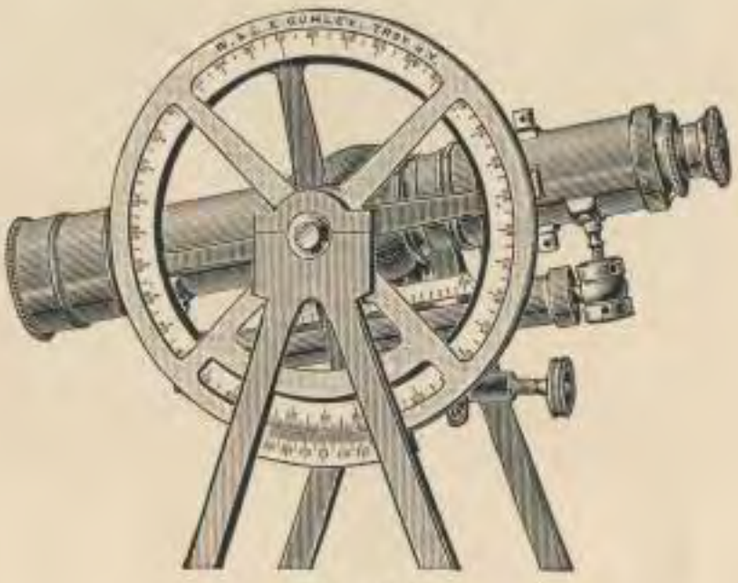
Nos. 136, 137, 145 and 148.



No. 138.

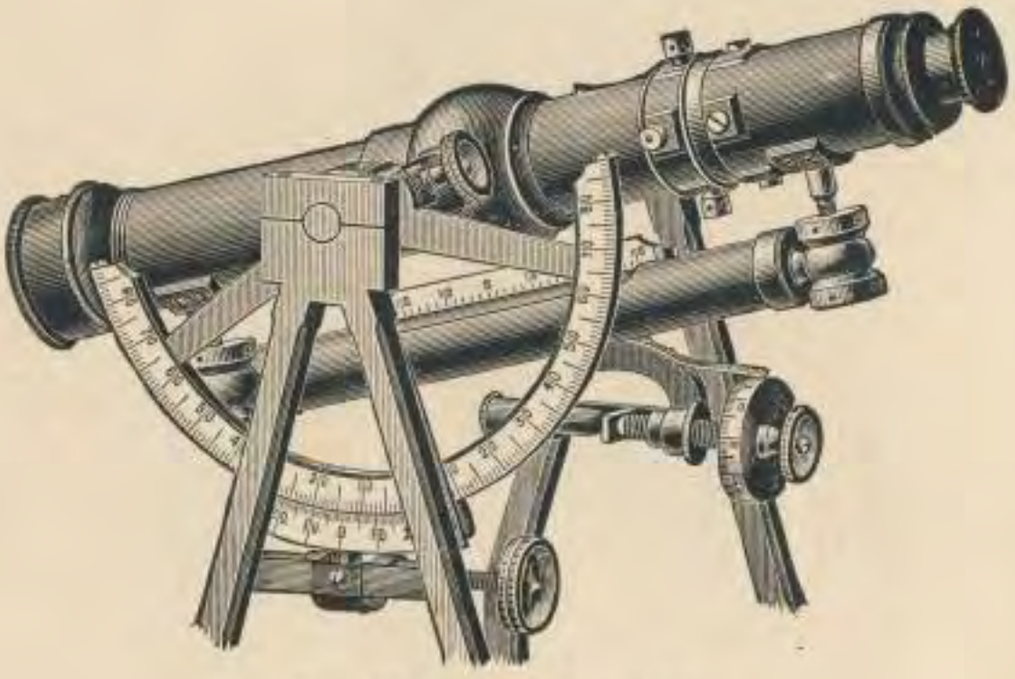
No.		Price.	Post.
130.	—Variation Arc added to any new Engineers' Transit Nos. 1 to 16, if ordered with the Transit	$ 4 00	
131.	—Variation Arc added to Transits when sent for repairs	15 00	
135.	—Vertical Circle, 3½ inches diameter, with vernier to 5 minutes	8 00	$0 15
136.	—Vertical Circle, 4½ inches diameter, with vernier to 1 minute	12 00	20
137.	—Vertical Circle, 5 inches diameter, with vernier to 1 minute	15 00	20
138.	—Vertical Circle, 5 inches diameter, with two opposite double verniers to 1 minute	35 00	35
139.	—Vertical Arc, 2½ inches radius, with vernier to 1 minute moved by tangent screw	18 00	20
140.	—Vertical Arc, 3 inches radius, with vernier to 30 seconds moved by tangent screw	18 00	20
141.	—Aluminum Guard to protect graduations on Vertical Circle	6 00	
145.	—Level on Telescope with ground vial and scale	12 00	25
148.	—Clamp and tangent to telescope axis	6 00	13
150.	—Gradienter combined with clamp and tangent (see pages 20 and 21)	18 00	25
151.	—Platinum Stadia wires, adjustable, and diaphragm	5 00	15
152.	—Platinum Stadia wires, fixed, and diaphragm	7 00	15
154.	—Dust-Guard to object-glass slide	4 00	
155.	—Rack and Pinion movement to eyepiece	5 00	
157.	—Sights on Telescope with folding joints	8 00	
158.	—Sights on Standards at right angles with telescope	8 00	

ATTACHMENTS AND EXTRAS FOR TRANSITS.—Continued



No. 141.

The engraving, No. 141, shows an aluminum guard as applied to the vertical circle to protect the graduations from injury. The extra cost for this attachment is $6.00.

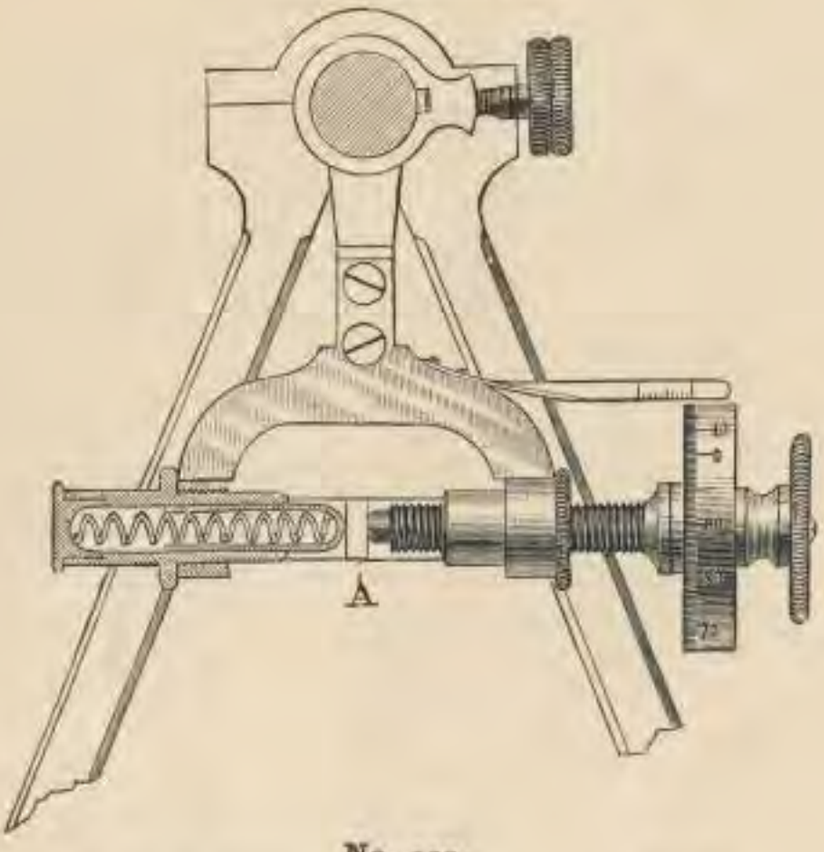


Nos. 139, 140, 145 and 150.

The engraving shows the vertical arc with tangent screw, and the gradienter combined with clamp and tangent. An enlarged view of the gradienter, with description, will be found on page 21.

ATTACHMENTS AND EXTRAS FOR TRANSITS.—Continued.

GRADIENTER.



No. 150.

Price, as shown.....$18.00.

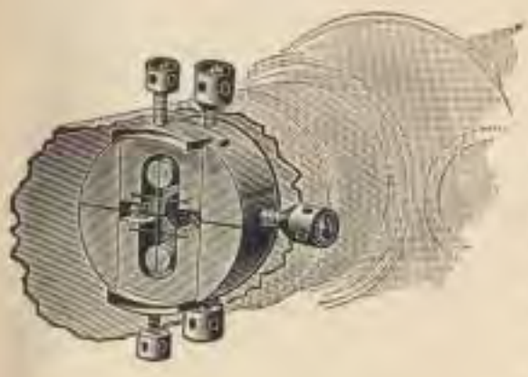
This attachment consists mainly of a screw attached to the semi-circular expanded arm of the ordinary clamp of the telescope axis; the screw is accurately cut to a given number of threads, and passing through a nut in one side of the arm presses against a little stud, *A*, fixed to the inside surface of the right-hand standard.

As the value of the screw-thread is such that a complete revolution will move the horizontal cross-wire of the telescope over a space of one foot on a rod at a distance of one hundred feet, it is clear that when the screw is turned through fifty spaces on the graduated head, the wire will pass over fifty one-hundredths, or one-half a foot on the rod, and so on in the same proportion.

In this way the Gradienter can be used in the measurement of distances.

Grades can also be established, with great facility, as follows: 1st, level the instrument; bring the telescope level to its center by the clamp of the gradienter-screw; move the graduated head until its zero is brought to the edge of the scale; and then turn off as many spaces on the heads as there are hundredths of feet to the hundred in the grade to be established.

STADIA WIRES.

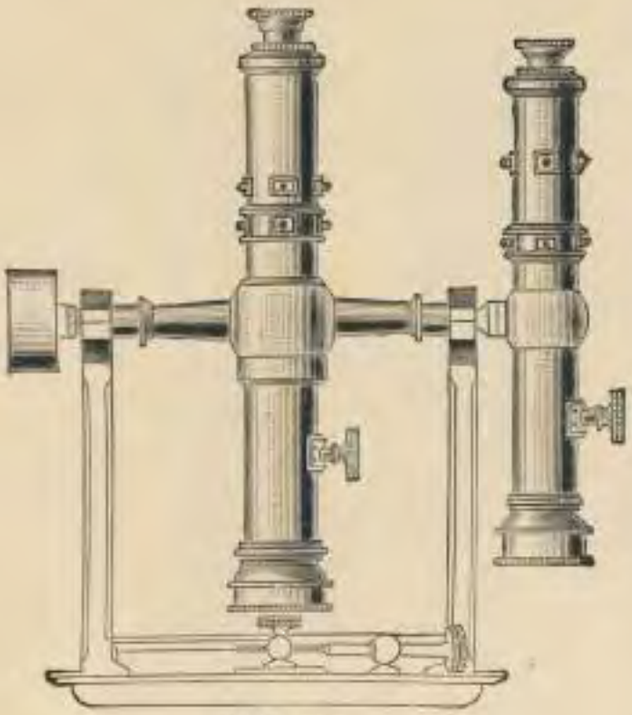


The Stadia, or Micrometer, is a compound cross-wire ring or diaphragm, as shown, having three horizontal wires, of which the middle one is cemented to the ring as usual, while the others are fastened to slides, held apart by springs and actuated by independent screws, by which the distance between the two movable wires can be adjusted to include a given space, as one foot on a rod one hundred feet distant.

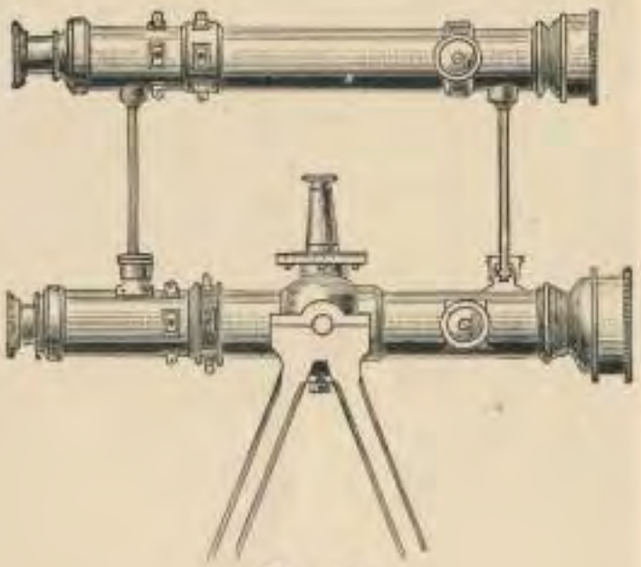
These wires will in the same manner include two feet on a rod two hundred feet distant, or half a foot at a distance of fifty feet, and so on in the same proportion, thus furnishing a means of measuring distances, especially over broken ground , more easily and even more accurately than with a tape or chain. We put stadia wires in our Transit and Y-Level telescopes without extra cost, if requested when the instrument is ordered. (See also pages 4, 19 and 30.)

ATTACHMENTS AND EXTRAS FOR TRANSITS.—Continued.

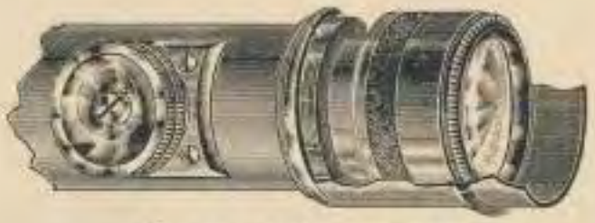
EXTRA TELESCOPES FOR VERTICAL SIGHTING.



No. 160.

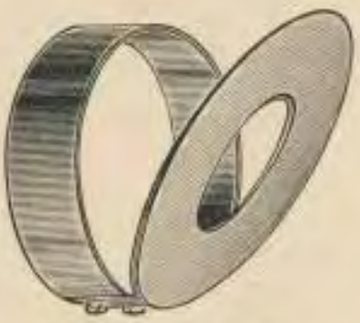


No. 161.

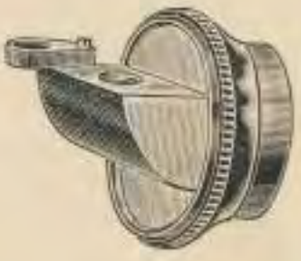


No. 154. DUST-GUARD.

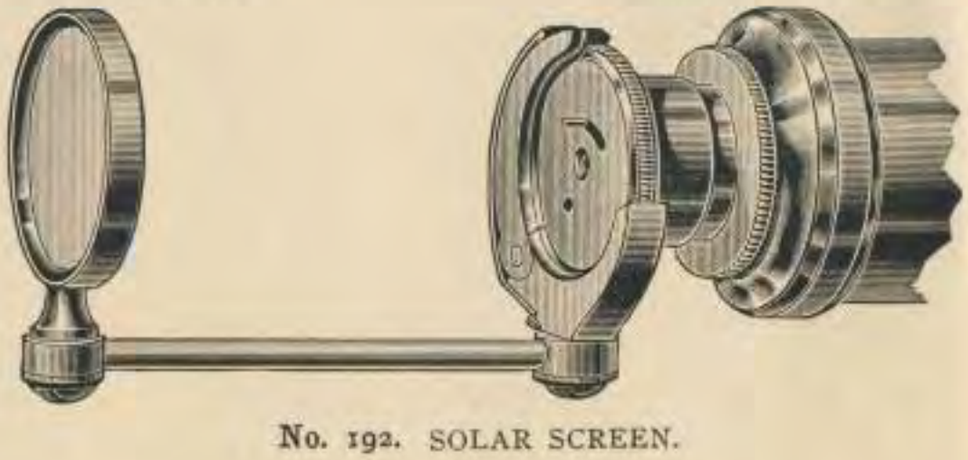
No. 170.
PLUMMET-LAMP



Nos. 165 and 166.
REFLECTOR.

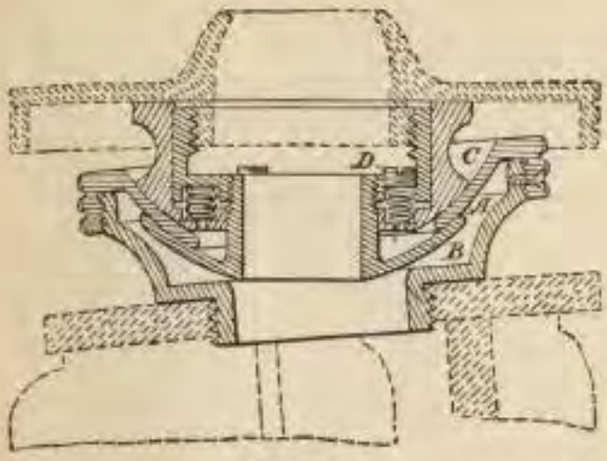


No. 168.
DIAGONAL PRISM.



No. 192. SOLAR SCREEN.

ATTACHMENTS AND EXTRAS FOR TRANSITS.—Continued.



No. 173.
QUICK-LEVELING ATTACHMENT.

Nos. 176 and 242.
LEVELING-HEAD.

No. 196.
STRIDING OR ADJUSTING-LEVEL.

No.		Prices.	Post.
160.	—Detachable Side Telescope and counterpoise, for vertical sighting	$25 00	$0 50
161.	—Detachable Riding Telescope, for vertical sighting	25 00	50
165.	—Silver Reflector for illuminating cross-wires of Transit	4 00	12
166.	—Silver Reflector for illuminating cross-wires of large Y-Level	5 00	12
167.	—White celluloid reflector complete with mountings for horizontal limb, each,	1 50	
168.	—Diagonal Prism for eyepiece of telescope	8 00	12
170.	—Plummet-lamp for Mine-engineering	10 00	35
173.	—Quick-Leveling Attachment	6 00	35
174.	—Quick-Leveling Attachment, if ordered with any new Transit Nos. 1 to 105	5 00	
176.	—Leveling-Head with parallel plates, leveling-screws and clamp and tangent, fitted to Transits Nos. 110 to 117	13 00	
180.	—Attached Magnifiers, with three universal joints, to read verniers, each	5 00	
185.	—Graduation of limb to read to 20 or 30 seconds, extra	10 00	
186.	—Graduation of limb to read to 10 seconds, extra	30 00	
187.	—Graduation of 4½ or 5-inch vertical circle to read to 20 or 30 seconds, extra	5 00	
190.	—Solar Attachment with declination arc, hour-circle and polar axis	60 00	30
192.	—Solar Screen to fit eyepiece of telescope (see page 22)	5 00	12
193.	—Patent Latitude-Level, for use with Solar Transit	6 00	15
195.	—Jones' Latitude Arc, with reversible level. (See note on page 12)	73 00	
196.	—Striding or Adjusting-Level	3 00	15

Note.—For Tripods, see pages 45 and 46. For Leather Cases, see page 47.

ATTACHMENTS AND EXTRAS FOR TRANSITS.—Concluded.

THE SOLAR ATTACHMENT AS APPLIED TO TRANSITS.

No. 190.

The Solar Attachment is essentially the solar apparatus of Burt placed upon the cross-bar of the ordinary Transit, the polar axis being directed above instead of below, as in the Solar Compass. A little disk one and one-half inches in diameter, having a short round pivot projecting above its upper surface, is first securely screwed to the telescope axis. Upon this pivot rests the enlarged base of the polar axis, which is also firmly connected with the disk by four capstan-head screws.

The Hour-Circle surrounding the base of the polar axis is easily movable about it, and can be fastened at any point desired by two flat head screws above. It is graduated to five minutes of time, is figured from I to XII, and is read by an index fixed to the declination arc and moving with it. The Declination Arc is graduated to quarter degrees. On the Mountain Transit it reads by its vernier to single minutes of arc, and on the larger Transits to half minutes of arc, the graduations of both vernier and limb being in the same plane.

The Latitude is set off by means of a large vertical limb figured from the center each way in two rows, from 0 to 80° and from 90° to 10°, the first series being intended for reading vertical angles and the latter series for setting off the latitude.

THE SOLAR COMPASS.

No. 210.

Price as shown, including leveling screws, clamp and tangent to spindle, and tripod.....$210.00.

The Solar Compass, so ingeniously contrived for readily determining a true meridian, or north or south line, came into general use in the surveys of U. S. public lands, the principal lines of which are required to be run with reference to the true meridian.

The arrangement of its sockets and plates is similar to that of the Surveyors' Transit, except that the sight-vanes are attached to the under plate or limb, and this revolves around the upper or vernier plate on which the solar apparatus is placed.

The limb is graduated to half degrees, is figured in two rows from 0 to 360 and 0 to 90 each way, and reads by the two opposite verniers to single minutes.

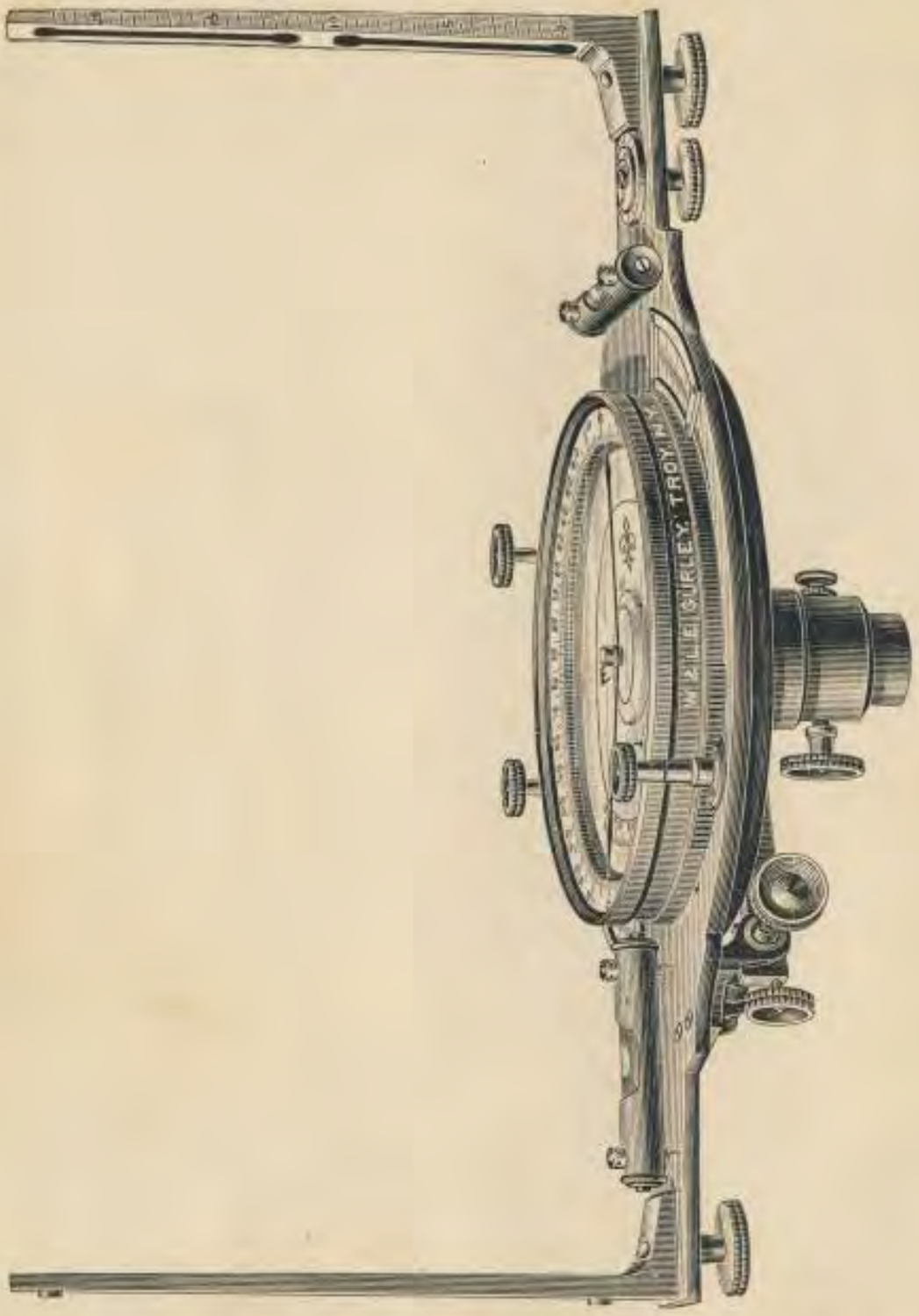
The graduations of the limb and all other arcs of the Solar Compass are made upon sterling silver.

The Solar Apparatus is seen on the upper plate with the needle, and in fact operates as its substitute in the field.

It consists mainly of three arcs of circles, by which can be set off the latitude of a place, the declination of the sun, and the hour of the day.

NOTE.—For several years past the U. S. Land Office has required the principal lines of its surveys to be run with a Solar Telescope Instrument, and for this purpose our Solar Compass, No. 210, with No. 262 Telescope, and our Solar Transits Nos. 17, 30, 31, 60 and 90 have been very generally adopted.

RAILROAD COMPASS.



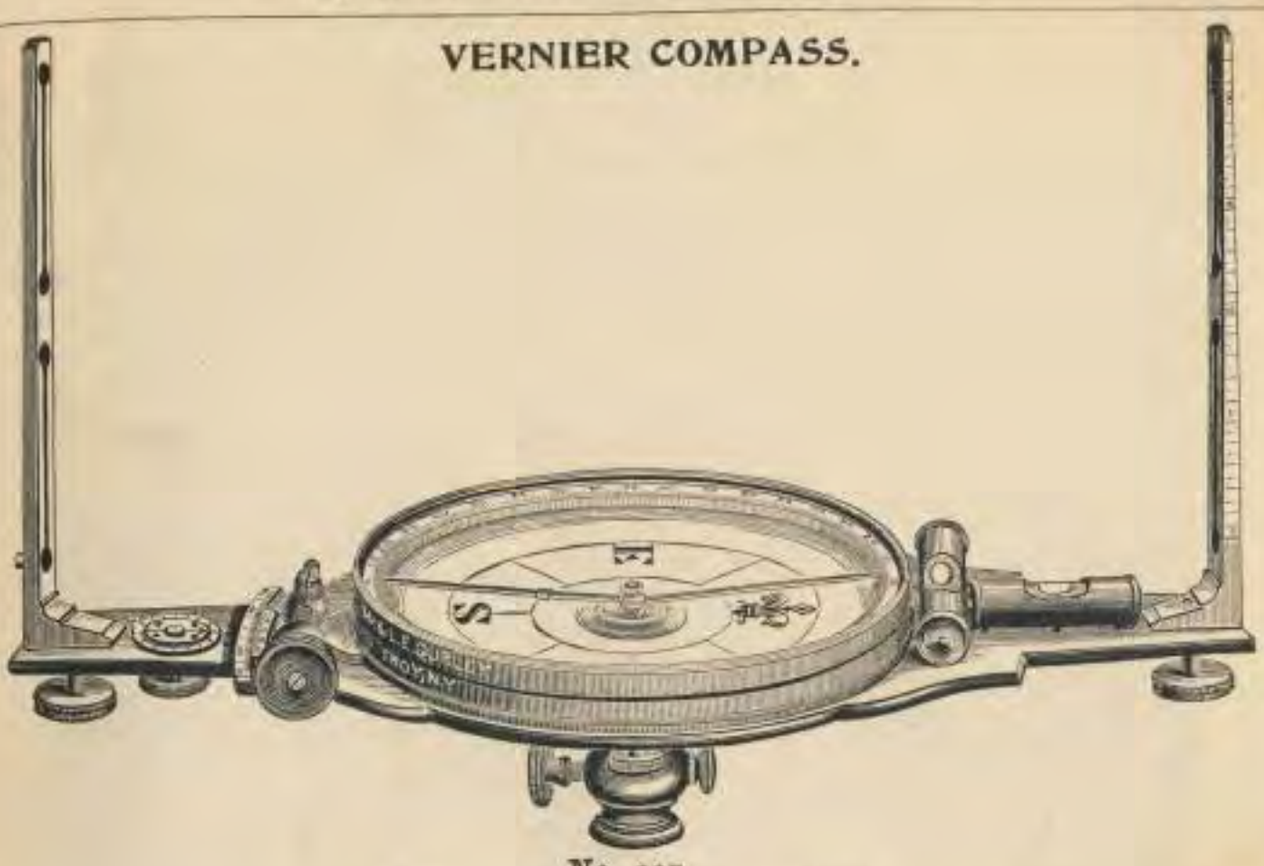
No. 216.
Railroad Compass 5½-inch needle. Price, $75.00.

The Railroad Compass has the main plate, levels, sights and needle, staff mountings, brass cover, outkeeper and vernier for setting off the variation of the needle, of the ordinary Surveyors' Compass, but has also underneath the main plate a graduated circle or limb by which horizontal angles to single minutes can be read independently of the needle. The limb is figured in two rows, from 0 to 360 and from 0 to 90 each way. The verniers are placed in front of the observer, and the tangent movement to limb is made like that of our best Transits. In mahogany box, with lock and strap. These Compasses should always be used on a tripod when practicable. A leveling-head (see No. 176, page 23,) is also a useful adjunct.

Tripods Nos. 415, 420 and 425 are adapted for use with these Compasses.

No.		Price.
215.	—Railroad Compass, 5-inch needle, two verniers to limb with staff mountings.....	$70 00
216.	—Railroad Compass, 5½-inch needle, two verniers to limb, with staff mountings....	75 00
220.	—Railroad Compass, 5½-inch needle, one vernier to limb, with staff mountings....	60 00

VERNIER COMPASS.



No. 227.

Price.....$40.00.

No.		Price.
225.	—Vernier Compass, 4-inch needle with two straight levels, staff mountings, brass cover, outkeeper, variation arc inside the compass-circle for setting off the declination of the needle, sights graduated for taking angles of elevation and depression. In mahogany box with lock, and strap for carrying.....	$30 00
226.	—Vernier Compass, same as above, but with 5-inch needle.....	35 00
227.	—Vernier Compass, same as above, but with 6-inch needle and variation arc outside the compass-circle, as shown.....	40 00

PLAIN COMPASS.

No. 232.

Price.....$35.00.

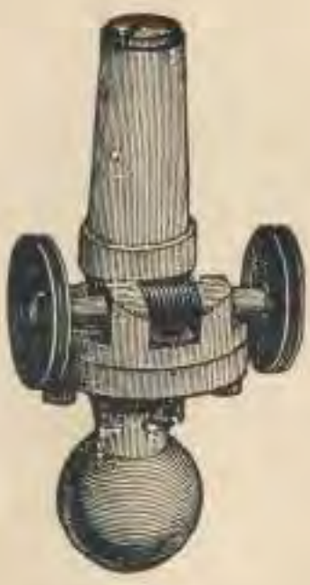
No.		Price.
230.	—Plain Compass, 4-inch needle, two straight levels, staff mountings, brass cover, outkeeper, sights graduated for taking angles of elevation and depression. In mahogany box with lock, and strap for carrying.....	$25 00
231.	—Plain Compass, same as above, but with 5-inch needle.....	30 00
232.	—Plain Compass, same as above, but with 6-inch needle.....	35 00

Note.—A Compass Tripod (our No. 415) will be furnished with any of these Compasses at an extra cost of $5.00; and if the staff mountings are omitted we deduct $2.00.

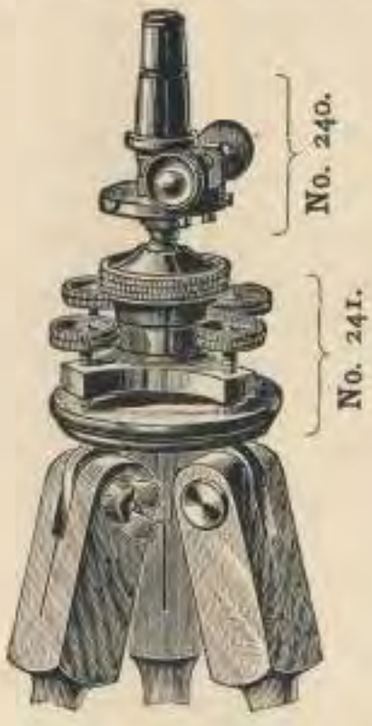
ATTACHMENTS AND EXTRAS FOR COMPASSES.

No.		Price.	Post.
240.—	Compound Tangent Ball-spindle	$ 7 00	$0 30
241.—	**Leveling-Adopter, large size**	7 00	40
242.—	**Leveling-Head with clamp and tangent, (see page 23), fitted to use with tripods Nos. 401, 406, 411, 415, 420 and 425**	13 00	
245.—	**Compass Tripod Mountings, without the legs**	4 00	60

Note.—For Tripods, see pages 45 and 46. For Leather Cases see page 46.



No. 240.



No. 465.

The price of the leveling-adopter, without tripod or ball-spindle, is $7.00; with tripod and compound tangent ball, as shown, $19.00.

Brass Plummets (Plain).

No.			Price.	Post.
450.—	Steel point, screw head,	6 oz.	$1 00	$0 15
452.—	" "	10 oz.	1 50	20
454.—	" "	16 oz.	2 00	25
456.—	" "	24 oz.	2 75	35
458.—	" "	32 oz.	3 50	45
460.—	" "	long neck, 12 oz.	2 00	25

Adjustable Plummets.

These Plummets have a concealed reel, *R*, around which the string is wound by turning the milled head, *K*, on top. The friction upon the reel within will hold the bob at any desired point of the line.

No.		Price.	Post.
465.—	10 oz.	$2 50	$0 20
469.—	30 oz.	5 00	45

THE TELESCOPIC SIGHT. (See page 29).

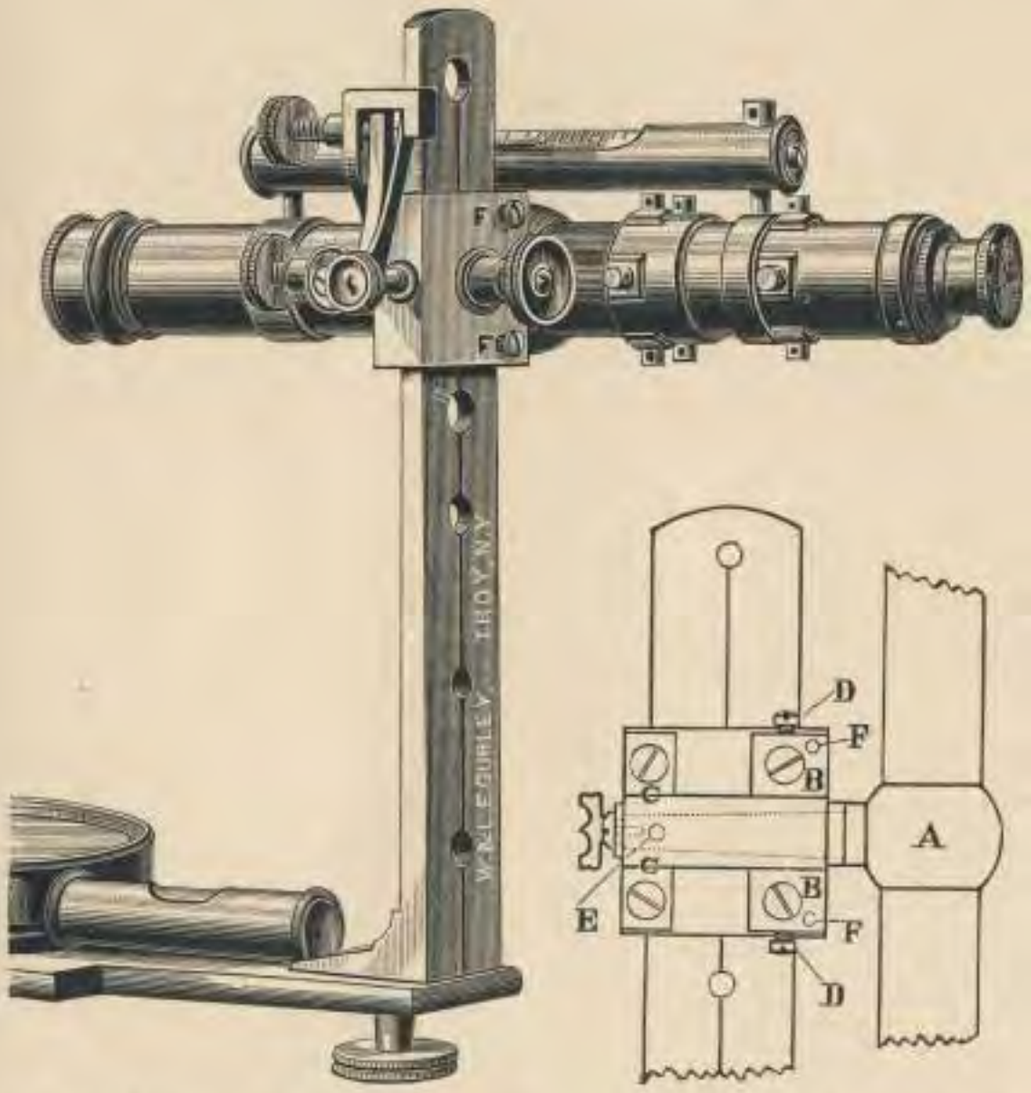
This valuable attachment for the Surveyors' Compass consists of a telescope furnished with the usual cross-wires, etc., and attached to a movable band, which, as shown in the engraving, can be slipped over the sight of a Compass, clamped at any point desired, and put in adjustment by any person who has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

To put this attachment in place, slip the band over the south sight of the Compass, having (as shown in the cut) the telescope at the right-hand and the front clamp-screw on the outer surface of the sight; and place the band as low as will allow the telescope to revolve in either direction without striking the Compass. This place should be marked by a line across the sight, or still better, a screw or pin on the inner surface of the sight, that the band may be set at the same point in subsequent use.

THE TELESCOPIC SIGHT.—Continued.

To fasten the band to the sight, first bring up the clamp-screw in front with a pressure just sufficient to hold the band to its place, then tighten the screw on the left until the band is brought up against the right edge of the sight, and finally tighten the front clamp-screw again, when the fastening will be complete.

To put the telescope in focus, turn the end of the eyepiece back or forth by the thumb and forefinger until by the spiral motion of the tube the cross-wires are brought into distinct view; the object-glass is then moved in either direction by the pinion on the side of the telescope until the object is clearly seen.



Telescope No. 262, with Level, and Clamp and Tangent (Nos. 266 and 267.)

Price, as shown.....$30.00.

Telescopic Sight Attachable to Compass-Sight

No.		Price	Post.
260.	—Achromatic Telescope, 9-inch, power about 12 diameters.....	$15 00	$ 0 45
261.	—Achromatic Telescope, 9-inch, larger object-glass, power about 20 diameters	17 00	45
262.	—Achromatic Telescope, 9-inch, same as No. 261, and with stadia wires..	20 00	50
	We add to the Telescopic Sight the following extras, at prices named:		
265.	—Vertical Circle, with vernier to 5 minutes.....	5 00	
266.	—Level on Telescope, with ground and graduated vial	5 00	
267.	—Clamp and Tangent to telescope axis.....	5 00	
268.	—Offset-Standard with counterpoise, to bring the telescope over the line of zeros	7 50	50

Prices for Parts of Instruments Liable to Loss or Injury.

FOR TRANSITS.

	Price.	Post.
Needle with jeweled center and center-pin	$ 3 00	$0 10
Center-pin only	50	01
Ground glass level-vial for plate or standard, each	35	02
Ground glass level-vial, brass mounted complete, for plate or standard, each	2 00	12
Ground glass level-vial for telescope, each	1 25	12
Cap for eyepiece or object-glass, each	75	03
Shade for object-glass	75	03
Clamp-screws for horizontal limb, each	75	02
Tangent screw for leveling-head	75c to 1 50	11
Clamp-screw for leveling-head	75	03
Leveling-screw for leveling-head, each	$1 00 to 1 50	12
Eyepiece complete	6 00	12
Object-glass complete	6 00	12
Platinum cross-wires and diaphragm	3 00	15
Platinum stadia wires, adjustable, and diaphragm	5 00	15
Platinum stadia wires, fixed, and diaphragm	7 00	15
Mahogany box with lock and strap, and fitted inside, according to size	4 00 to 6 00	

FOR SURVEYORS' COMPASSES.

Needle with jeweled-center and center pin	$ 3 00	$0 10
Center-pin only	50	01
Plain glass level-vials, each	12	02
Plain glass level-vials, brass mounted, complete, each	1 50	12
Ground glass level-vials, each	35	02
Ground glass level-vials, brass mounted complete, each	2 00	12
Brass Cover for Compass of our make	1 00	25
Outkeeper	1 00	11
Glass circle, unmounted, for compass-face	25	15
Wrench for center-pin	10	01
Staff mountings, brass head, without spindle	2 00	25
Staff mountings, steel point	50	18
Ball-spindle fitted to old socket	2 00	30
Compass sight-vanes, each	2 50	20
Clamp screw for spindle or sight-vane	50	03
Tangent screw for moving vernier	1 50	10
Staff mountings complete for Pocket-Compass, small	2 50	15
Staff mountings complete for Pocket-Compass, large	3 50	20
Mahogany box with lock and strap, and fitted inside, according to size	4 00 to 6 00	

FOR Y-LEVELS.

Ground glass level-vial, unmounted for 22-inch Y-Level	1 85	15
Ground glass level-vial, unmounted, for 15-20-inch Y-Level	1 65	15
Ground glass level-vial, extra sensitive (ten seconds in one-tenth of one inch) unmounted, for 18, 20 or 22-inch Y-Level	4 00	15
Ground glass level-vial unmounted, for Architects' Level	90	05
Cap for eyepiece or object-glass, each	75	03
Clamp-screw for leveling-head	75	03
Tangent screw for leveling-head	75c to 1 50	11
Leveling-screw for leveling-head, each	$1 00 to 1 50	12
Eyepiece complete	6 00	12
Object-glass complete	7 00	12
Platinum cross-wires and diaphragm	3 00	15
Platinum stadia wires, adjustable, and diaphragm	5 00	15
Platinum stadia wires, fixed, and diaphragm	7 00	15
Mahogany box with lock and strap, and fitted inside, according to size	$4 50 to 6 00	

MISCELLANEOUS.

Plain tripod legs only, for Engineers' Transit or Level, per set	$5 00	
Split tripod legs only, for Engineers' Transit or Level, per set	7 00	
Extension tripod legs only, for Engineers' Transit or Level, per set	10 00	
Clamp-screw and band for extension leg, each	85	05
Tripod head only, with bolts and nuts, for Engineers' Transit or Level	5 00	50
Wooden cap with brass screwplate, to fit tripod head, each	75	12
Brass bolt and nut to fit tripod head, each	50	05
Metal point or shoe for tripod leg, each	50	05
Shawl-strap (superior) for extension tripod	50	10
Steel screw-driver with wooden handle, each	25	05
Steel adjusting-pins, each	05	01
Rubber tips, for bottom of instrument-box, per set	40	08
Leather strap and buckle for instrument-box	50	10
Reading-glass, for Transit, each	75	02
Brass Plummet with screw cap, for Transit or Level, each	1 50	20
Waterproof hood, for Transit or Level, each	1 00	06
Chamois skin, large size, best quality, each	65	05
Clamp with clamp-screw, for New York rod	2 50	15
Clamp with scale and clamp-screw, for Philadelphia rod	3 00	15
Target with clamp-screw and spring, for New York or Philadelphia rod	4 50	35
Chain handle, with staple and nuts, each	75	08
Chain tallies, per set of 9	50	06

THE POCKET SOLAR COMPASS.

No. 276.

Price, as shown with tripod.....$105.00.

The Pocket Solar Compass has a needle 3 inches long, and a limb of 4½ inches diameter, graduated to half degrees and reading, by its one double vernier, horizontal angles to single minutes.

The limb is figured in one row, 0 to 180 each way.

The arrangement of the plates is similar to that of the large Solar Compass, the under plate carrying the sights revolving around the upper or compass-plate, to which are attached the solar apparatus, levels, etc.; there is also a clamp and tangent movement to the horizontal limb, and another to the whole instrument about its spindle.

The solar apparatus is attached to the upper plate, and consists of the usual *hour, latitude and declination arcs,* marked respectively *A, C,* and *B,* in the cut, with an arm, *FF,* to the last named, carrying the solar lenses and lines as in the larger instruments.

The latitude arc is graduated to half degrees, and reads by its vernier to five minutes. The declination arc is graduated to quarter degrees, and reads by its vernier to single minutes. The hour-arc is graduated on its inner edge into hours and twelfths, or spaces of five minutes of time, the index of the declination arc above easily enabling one to read to single minutes of time.

No.		Price.
275.	—Pocket Solar Compass, with staff mountings	$100 00
276.	—Pocket Solar Compass, with light tripod	105 00
277.	—Pocket Solar Compass, with light extension tripod	110 00
278.	—Pocket Solar Compass, with light extension tripod and leveling plates	120 00
280.	—Side Telescope and Counterpoise fitted to new Pocket Solar Compass	25 00
487.	—Leather Case with Shoulder-strap for Pocket Solar Compass	5 00
488.	—Leather Case with Shoulder-strap for Pocket Solar Compass with telescope and extras	6 00

Note.—The tangent movements of the limb and spindle are now made with an opposing spring, as shown on pages 32 and 33.

POCKET RAILROAD COMPASS.

No. 285.

This instrument is a Railroad Compass in miniature, with one vernier to the limb.

The limb is on the lower plate, is five inches in diameter, and reads to single minutes by the vernier, and is figured in one row, 0 to 180 each way. The needle is 3½ inches long, and its variation can be set off to single minutes, as in the larger instruments.

The Pocket Railroad Compass can be used for a great variety of work, and with light extension tripod is especially adapted for surveys of mines, etc., where angles must be taken independently of the needle.

The sights are made to fold down closely for convenience in packing; they are each made half slit and half hair, so as to take fore and back-sights without turning the instrument.

The price of this little instrument, with staff mountings only, is $40; with light tripod, as shown in the cut, $45; and if with extension tripod, $50.

No.		Price.
285.	Pocket Railroad Compass, one vernier, 3½-inch needle, limb 5 inches diameter with clamp and tangent, folding sights, two levels and staff mountings.....	$40 00

Another form of the Pocket Railroad Compass is our No. 288, (not shown) in which the plates are circular, the sights being screwed to the lower one, the compass-circle above, and turning around the lower plate to set off the variation of the needle.

The limb is underneath the compass-face, and read by one double vernier under the glass to single minutes. There is also a clamp and tangent to the limb.

A clamp and tangent to the spindle is added whenever desired at an additional cost of $5.00.

The sights are made to fold down closely to the glass for convenience in packing; they are each made half slit and half hair, so as to take fore and back-sights without turning the instrument.

No.		Price.
288.	Pocket Railroad Compass, 4½-inch needle, clamp and tangent to limb, limb reading to one minute, folding sights, two levels and staff mountings.....	$33 00

POCKET RAILROAD COMPASS WITH TELESCOPE.

No. 293.

Price, as shown.....$83.00.

In this style of the Pocket Railroad Compass, the plates are circular, the sights being screwed to the lower one, the compass-circle above, and turning around the lower plate to set off the variation of the needle.

The limb underneath the compass-face, but not shown in the cut, is read by one double vernier under the glass to single minutes.

The sights are placed to one side of the line of zeros, and the telescope is thus brought into that line and over the center of the instrument.

No.		Price.
290.	—Pocket Railroad Compass, 4½-inch needle, clamp and tangent to limb, limb reading to one minute, clamp and tangent to main spindle or socket, and fitted with our Telescopic Sight No. 260, with the extras of level, vertical circle to 5 minutes, and clamp and tangent to telescope axis, and with tripod.....	$73 00
291.	—Pocket Railroad Compass, same as No. 290, but with Telescope No. 261.....	75 00
292.	—Pocket Railroad Compass, same as No. 290, but with Telescope No. 262.....	78 00
293.	—Pocket Railroad Compass, same as No. 292, and with leveling-adopter, complete as shown	83 00

Pocket Vernier Compass.

Nos. 300 and 305.

Price as shown, 3½-inch needle, with tripod, $21.00.
If 4½-inch needle, and tripod, $23.00.

Pocket Plain Compass.

Nos. 315 to 319.

No. 327. *a*

THE POCKET VERNIER COMPASS.

This is a most excellent and portable instrument for preliminary work, having a fine needle and also a vernier and clamping nut by which the sights can be placed at an angle with the line of zeros, so as to set off the variation of the needle, as with the Vernier Compass.

The sights are made with a slit in the south vane, and a hair in the north one in the 3½-inch Compass as shown, and half slit and half hair in each sight of the 4½-inch Compass, for readily finding the object; they also fold down to the Compass when it is packed in the case.

The Compass is furnished with staff mountings; often a very light tripod is ordered for it; it has also two levels, and is neatly packed in a mahogany box.

The leveling-adopter shown in No. 327 *a*, for use with the Pocket-Compasses, etc., gives, in connection with the ball, a rapid and accurate means of leveling any of the smaller instruments.

We make two sizes of the Pocket Vernier Compass having needles of 3½ and 4½ inches respectively; both have the compass-circle graduated to half degrees; in the 3½-inch size the variation vernier reads to five minutes; in the 4½-inch size the variation is set off to single minutes. When desired, a rack and pinion movement is supplied, in order to set off the variation more readily, and the extra cost is $4.00.

The 3½-inch Compass weighs about 1¾ lbs; and the 4½-inch Compass about 2¾ lbs.

No.		Price.	Post.
300.	Pocket Vernier Compass, 3½-inch needle, folding sights, two levels and staff mountings	$16 00	$0 60
305.	Pocket Vernier Compass, 4½-inch needle, folding sights, two levels and staff mountings	18 00	90

No.		Price.	Post.
315.	Pocket Plain Compass, 2½-inch needle and folding sights	8 00	25
316.	Pocket Plain Compass, 2½-inch needle, folding sights and staff mountings	10 00	35
317.	Pocket Plain Compass, 3½-inch needle and folding sights	10 00	40
318.	Pocket Plain Compass, 3½-inch needle, folding sights and staff mountings	12 00	50
319.	Pocket Plain Compass, 3½-inch needle, folding sights, two levels and staff mountings	13 50	50

EXTRAS FOR POCKET COMPASSES.

No.		Price.	Post.
325.	Clamp and tangent fitted to ball-spindle of Compasses Nos. 285, 288, 300, 305 and 315 to 319	$5 00	
326.	Rack and Pinion to variation arc of Compasses Nos. 288 to 312	4 00	
327.	Leveling-Adopter, small size	5 00	25
328.	Leveling-Head with parallel plates, leveling-screws and clamp and tangent to spindle	10 00	

Note.—For Tripods, see pages 45 and 46. For Leather Cases, see page 47.

POCKET VERNIER COMPASS WITH TELESCOPE.

No. 312.

Price, complete as shown.....$63.00.

This engraving shows the attachment of our TELESCOPIC SIGHT, with the extras of level, vertical circle to 5′, and clamp and tangent to axis of telescope, to our 4½-inch needle Pocket Vernier Compass—which has also a clamp and tangent to the main spindle or socket.

The sights in such an arrangement are placed at one side, that the telescope may be directly over the center, and in such case the instrument should have a clamp and tangent movement for spindle, as shown in the figure.

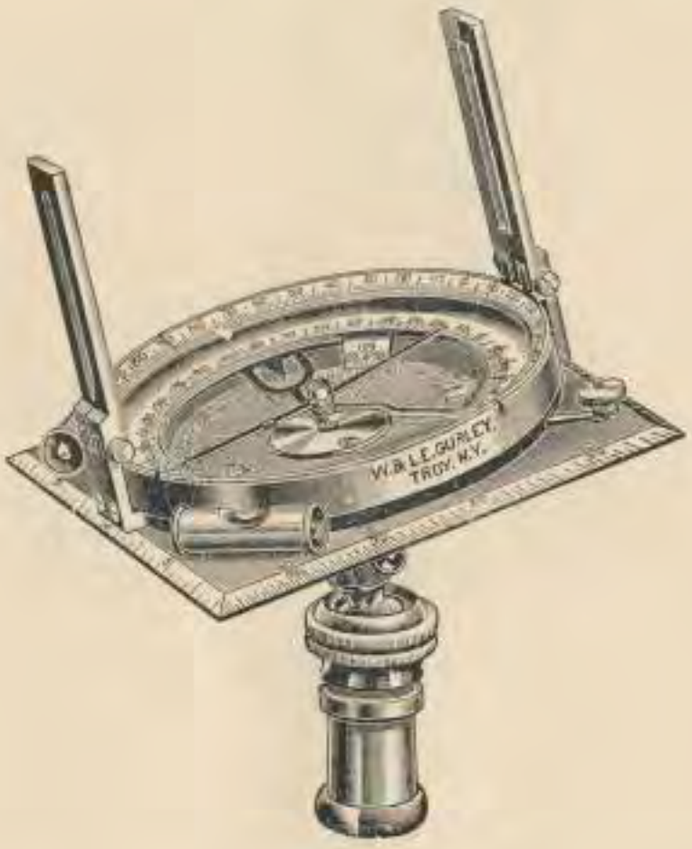
When packed for transportation, the telescope and support are detached from the sights and packed separately in the box.

Staff mountings are also furnished with these Compasses, and a light tripod, as shown, is very generally added.

Thus furnished, this light and popular instrument becomes a Transit-Compass for ordinary land-surveying or reconnoissance, with power to give levels and grades with accuracy sufficient for the common practice of the surveyor.

No.		Price.
310.	—Pocket Vernier Compass, 4½-inch needle, clamp and tangent to main spindle or socket, and fitted with our Telescopic Sight No. 260, with extras of level, vertical circle to 5 minutes and clamp and tangent to telescope axis, and with tripod...	$58 00
311.	—Pocket Vernier Compass, same as No. 310, but with Telescope No. 261.....	60 00
312.	—Pocket Vernier Compass, same as No. 310, but with Telescope No. 262, complete as shown	63 00

GEOLOGISTS' POCKET-COMPASS.



No. 335.

Price, as shown.....$24.00.

We show here a very popular instrument for topographical work and known as the Geologists' Pocket-Compass.

It is made of aluminum to diminish its weight, and has a needle two and five-eighths inches long inclosed with its compass-circle in a circular box set upon a base four inches square, the edges of which are beveled and graduated, two of them for a tangent scale, and the other two with scales of eighths and tenths of inches.

The compass-circle is made movable, and by a vernier attached to it on the inside, the variation of the needle can be set off to five minutes.

On the south side of the compass-face is an arc of 180 degrees, figured on each side of the S or zero line from 0 to 90, the index point—a little pendulum hung from the center-pin—indicating on this arc the angle of slope when the Compass is placed so that it rests on its south edge.

On the outside of the circular box containing the compass-circle is a movable circle, beveled and graduated on its upper edge, and figured from 0 to 90, and having at each quadrant a slit cut for sighting. Two folding sights are attached to the edge of the circular box.

The Compass is supported on a simple ball-spindle and socket with staff mountings, and is packed in a neat mahogany box.

Tripods Nos. 416, 421 and 426 are suitable for use with this Compass. See pages 45 and 46.

THE POCKET CLINOMETER COMPASS.

No. 338.

Price, as shown.....$16.00.

Another form of Pocket-Compass is shown above. It is made of brass and is known as the Pocket Clinometer Compass.

It has a needle 3½ inches long inclosed with its compass-circle in a circular box set upon a base 4½ inches square.

On one edge of this base is erected the rectangular side upon which the Compass may be set in determining grades; the small pendulum swinging from the center-pin designating by its index the degree of slope upon the graduated arc on the compass-face.

Two folding sights are attached to the circular box and two small levels are placed at right angles with each other upon the base.

The compass is supported upon a simple ball-spindle and socket with staff mountings and the instrument is packed in a neat mahogany box.

Tripods Nos. 416, 421 and 426 are suitable for use with this Compass. See pages 45 and 46.

MINERS' DIP-COMPASSES.

FOR TRACING VEINS OF MAGNETIC IRON ORE.

Nos. 340 and 341.
Price, $12.00.

Nos. 344 and 345.
Prices, $12.00 and $15.00.

The Dip-Compasses, two forms of which are shown, consist essentially of a magnetic needle so suspended as to move readily in a vertical direction, the angle of inclination or "dip" being measured upon the graduated rim of the compass-circle.

When in use, the ring or bail is held in the hand, and the compass-box by its own weight takes a vertical position. It must then be held in the plane of the magnetic meridian.

In this position the needle, when unaffected by the attraction of iron, assumes a horizontal line, as shown by the zeros of the circle. When brought over any mass of iron it dips, and thus detects the presence of iron ore with certainty.

If the Miners' Compass, No. 340 or 341, is held horizontal it serves as an ordinary Pocket-Compass, and indicates the magnetic meridian in the plane of which it should be held when used to ascertain the dip of the place where the observation is made.

No.	Price.	Post.
340.—Miners' Dip-Compass, 3-inch needle with stop, glass on both sides, in wood box	$12 00	$0 25
341.—Miners' Dip-Compass, 3-inch needle with stop, glass on both sides, with brass covers	12 00	35
344.—Miners' Dip-Compass, 3-inch Norwegian needle with stop, glass on both sides, with brass covers	12 00	35
345.—Miners' Dip-Compass, 4-inch Norwegian needle with stop, glass on both sides, with brass covers	15 00	50

THE DIAL COMPASS.

No. 348.

Price, as shown, $18.00.

The Dial Compass is extensively used in this country in regions where there is local attraction and it is desirable to have a simple means of determining the meridian independently of the needle.

This can be easily and quickly done by turning the Compass, with dial graduated for the latitude of the place, until the shadow of the string, when the Compass is held level, indicates local time on the dial. The line of sight will then be in the meridian.

Any deflection of the needle from the true meridian will indicate the presence of veins of magnetic iron ore.

This little instrument has a needle two and five-eighths inches long, and with its compass-circle is inclosed in a circular box set upon a brass base four inches square, three edges of which are chamfered and graduated: one on the W-side of the Compass into inches and tenths, the two others into degrees and half degrees, and figured from a center on the southwest corner of the base.

The compass-circle is movable in order to set off the variation of the needle, and has a vernier attached to it on the inside, reading a graduated arc on the face of the Compass to five minutes.

There is also on the south side of the face an arc of 180°, figured from 0 to 90 on each side of the south or zero-line of the face.

A pendulum with index point hung from the center-pin reads this arc, when the Compass is set up vertical on the raised south edge, thus making it a clinometer or slope-measurer.

The sight is hinged so as to fold in packing, but when erect makes taut a fine silk thread attached at one end to the sight and at the other to a brass hour-circle above the compass-glass, at an angle with the plane of the hour-circle equal to that of the latitude of the place where the Compass is used. The hour-circle is graduated for any required latitude, as a sun-dial, the thread serving as a gnomon to give apparent time with the sun.

THE ALUMINUM DIAL COMPASS.

(U. S. Geological Survey Pattern.)

No. 350.

Price, as shown.....$30.00.

We illustrate above an improved form of the Dial Compass, made of aluminum, and differing from our usual pattern in several respects. This new instrument is of the same size and has the same parts as the common Dial Compass, shown on page 39, and in addition has a movable circle graduated on its beveled edge, and at each quadrant there is a slit cut for sighting.

The compass-circle and the movable circle are each graduated to whole degrees and figured from 0 to 90 each way. Three beveled edges of the square base are also graduated and figured like the brass Dial Compass.

An extra open sight is also placed upon the clinometer base, to be used when desired in conjunction with the regular sight.

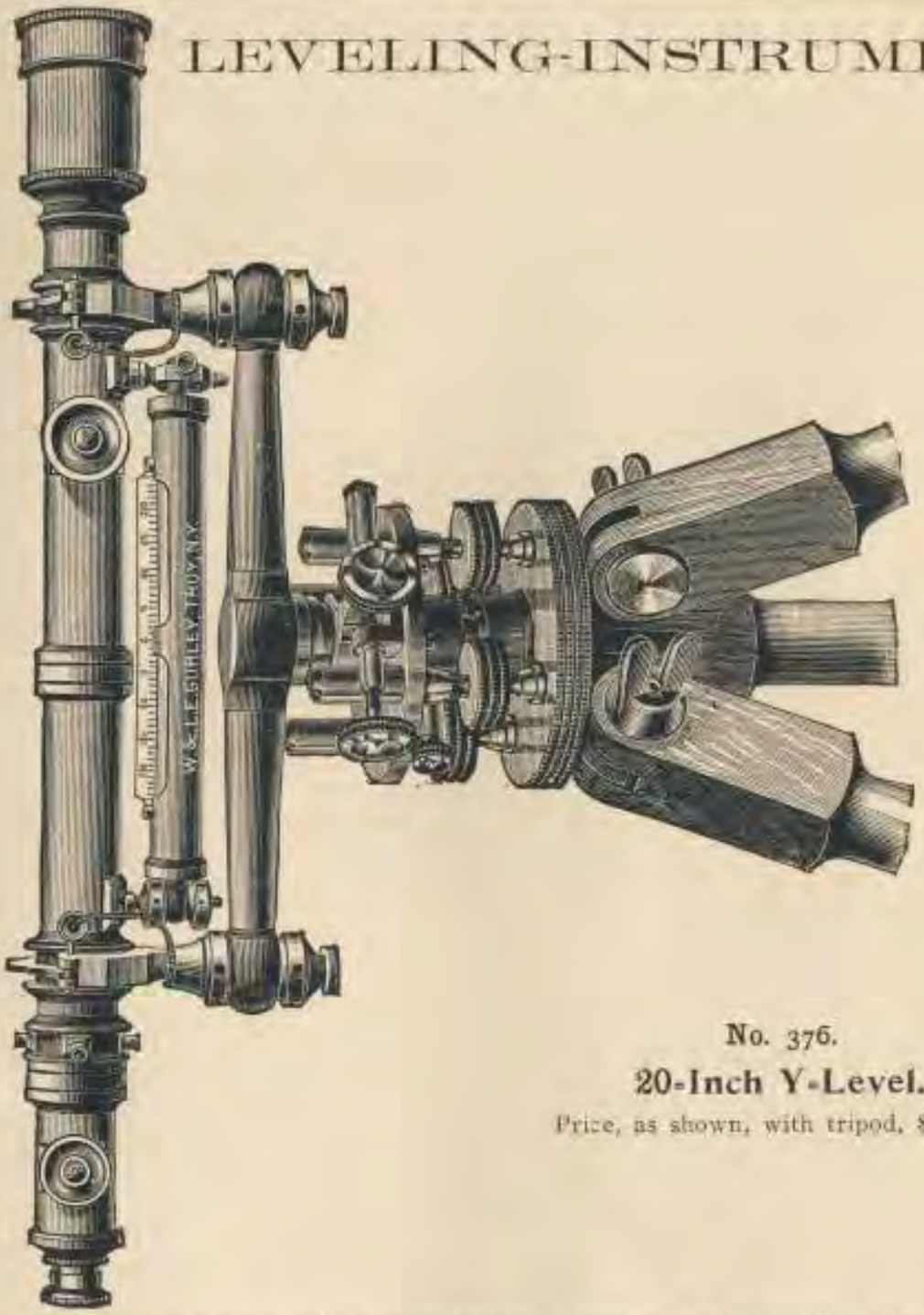
The whole instrument is mounted upon a ball-spindle and socket with staff mountings, and is packed in a neat mahogany box.

PRICES.

No.		Price.	Post.
348.	—Brass Dial Compass, with hour-circle graduated for any latitude as ordered, variation arc, graduated base, one folding sight, two levels and clinometer	$18 00	$0 40
349.	—Dial Compass, same as No. 348, and with staff mountings complete.....	20 50	50
350.	—Aluminum Dial Compass, with hour-circle graduated for any latitude as ordered, graduated base, graduated movable sighting circle, variation arc, one folding sight, one removable sight, two levels, clinometer and staff mountings	30 00	45
	Extra Hour-Circles, graduated for any latitude as ordered, to fit either of these Dial Compasses, each	5 00	12

A light tripod for the Dial Compasses Nos. 349 and 350 costs extra, $5.00.

LEVELING-INSTRUMENTS.



No. 376.

20-Inch Y-Level.

Price, as shown, with tripod, $110.00.

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

A dust guard to the object-glass slide is now furnished free of charge with the 18, 20 and 22-inch Y-Levels.

ENGINEERS' Y-LEVELS.

No.		Price.
375.	—Y-Level, 22-inch telescope, with leveling-screws, clamp and tangent and tripod....	$115 00
376.	—Y-Level, 20-inch telescope, with leveling-screws, clamp and tangent and tripod....	110 00
377.	—Y-Level, 18-inch telescope, with leveling-screws, clamp and tangent and tripod....	110 00
378.	—Y-Level, 15-inch telescope, with leveling-screws, clamp and tangent and tripod....	90 00

Note.—A Horizontal Circle, three and one-half inches in diameter, is fitted, when desired, to the leveling-head of these Y-Levels. The circle is graduated to whole degrees, and is read by vernier to five minutes. The extra cost for this attachment is $15.00.

For special tripods see pages 45 and 46. For Leather Cases see page 47.

LEVELING INSTRUMENTS.—Continued.

No. 378.

Price, as shown with tripod, $90.00.

Our fifteen-inch Level, No. 378, has the same arrangement of sockets, tripod, etc., as the larger Levels, but has no pinion movement to the eyepiece. The shade to the object-glass is removable. The leveling-head remains attached to the spindle, and is packed with it in the box. The instrument is also somewhat smaller and lighter than the other sizes.

THE ARCHITECTS' LEVEL.

No. 380.

Price, as shown, with tripod, $50.00.

The figure represents a Level introduced by us in 1874, and which has since been very largely used by architects, builders and millrights, as well as by engineers and surveyors, in the grading of streets, drains, sewers, etc., in all parts of the country. It has a telescope 12 inches long, furnished with rings and Ys like the larger Levels, and adjusted in the same manner. The leveling-head has the ordinary screws and a clamp to the spindle, but no tangent movement; it has also a horizontal circle of three inches diameter fitted to the upper end of the socket and turning readily upon it. The circle is graduated to degrees, figured from 0 to 90 each way, and is read to five minutes by a vernier which is fixed to the spindle.

Note.—A Compass, without sights and with 3-inch needle, can be attached to the telescopes of any of our Y-Levels, and used to obtain the bearing of lines when desired. Its extra cost is $10.00.

LEVELING-INSTRUMENTS.—Continued.

THE ARCHITECTS' LEVEL.

(With clamp and tangent to the leveling-head).

No. 381.

Price, as shown with tripod, $65.00.

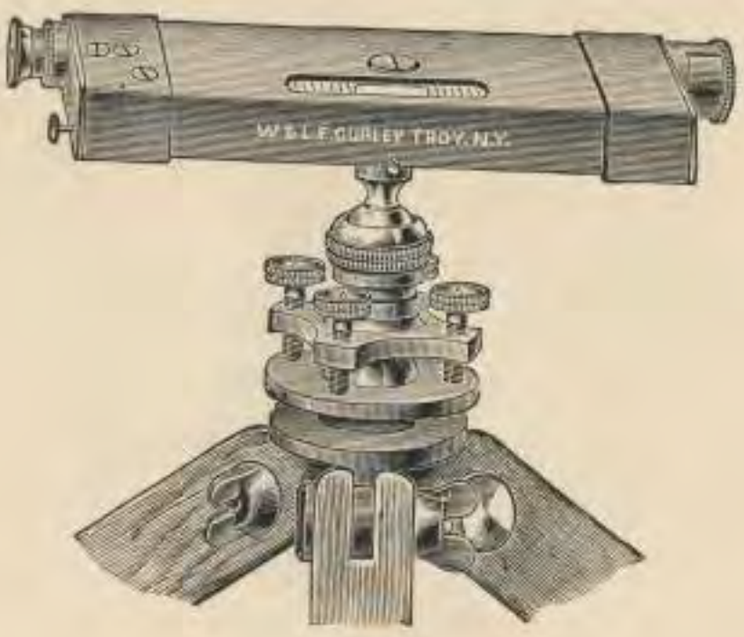
We add to the Architects' Level, when desired, a clamp and tangent movement to the leveling head (as shown in the cut above), so that the instrument can be clamped securely and a movement in a horizontal plane can be made accurately.

The instrument is placed either upon a light tripod as in the figure, or a small triangular plate termed a "trivet," having three sharp steel points by which it is firmly set upon any surface of wood or stone; both tripod and trivet are furnished with the Level. A short piece of tube called a shade is also supplied, to be put on over the object-glass to protect it from the glare of the sun.

The weight of the level, without its tripod, is about 6½ lbs.

We believe that as the Architects' Level shall become more widely known, its extreme cheapness, simplicity, and excellence will create for it, among all intelligent and enterprising Architects, Builders, Millwrights and Farmers, a demand which will constantly increase in all parts of the country.

FARMERS' OR DRAINAGE LEVEL. (New Pattern).



No. 387.

Price, as shown.....$25.00.

The figure represents a Level combining the extremes of simplicity and compactness with real efficiency, and at a very moderate cost. The telescope is about nine inches long and is made especially for this instrument, achromatic, of low but sufficient power, and good light and definition. The cross-wires are fixed in the eyepiece so that they are not easily disturbed. The level, telescope and socket are enclosed and secured in a strong outside case of brass about seven and one-half inches long, two and one-quarter inches wide, and one and one-half inches high.

A ball attachment screws into a spindle that is within the case, and by which it is made approximately level, and then precisely so by the leveling-screws as shown.

When desired the leveling-head can be dispensed with, and the instrument leveled by the ball alone.

The advantage of this Level in the work of the farmer, manufacturer and builder will be apparent on a simple inspection; drains can be located and leveled, the height of springs ascertained, the accurate levels of lines of shafting, floor-timbers, sills, etc., be determined.

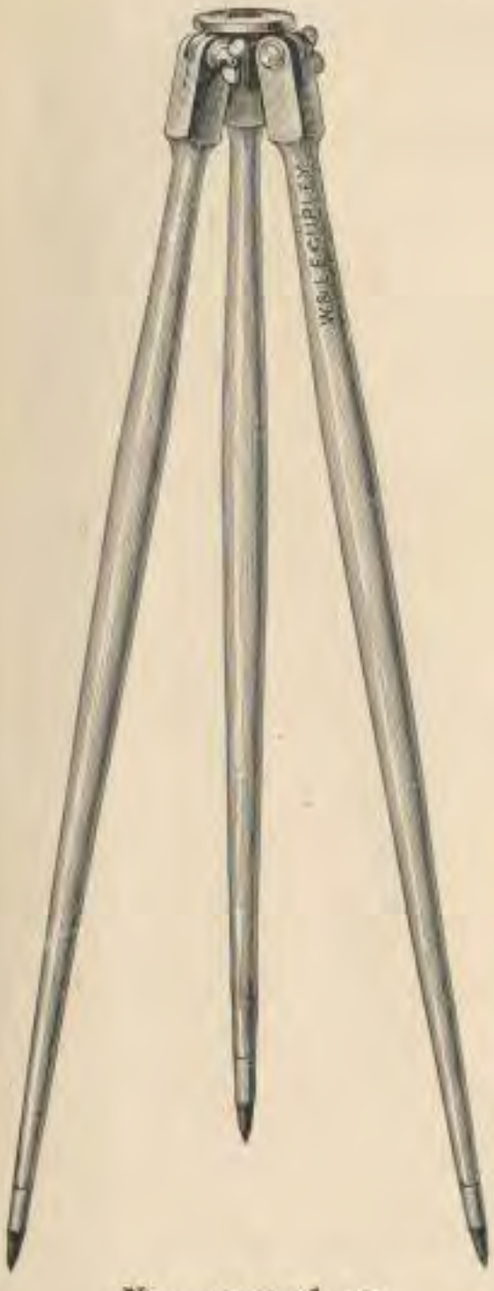
In response to many inquiries and suggestions we now add to the Drainage Level, when desired, a Compass with three-inch needle. This is fitted securely to the upper surface of the case, is removable at pleasure, and while it does not interfere in any way with the reading of the level, it furnishes a ready means of determining the bearings of lines, or measuring angles by the needle.

The instrument, with the staff mountings, adjusting-block and screw-driver, is packed in a neat mahogany box with lock.

No.		Price.
385.	—Drainage Level, with staff mountings	$15 00
386.	—Drainage Level, with staff mountings and tripod	20 00
387.	—Drainage Level, with staff mountings, leveling-screws and tripod	25 00
388.	—Drainage Level, same as No. 387, and with Compass attached	30 00

TRIPODS.

PLAIN TRIPODS.



Nos. 400 and 430.

No. 415.

The legs of all our tripods are about four feet eight inches long from head to point. We make four sizes of tripods with solid legs, as follows:

The heavy tripod, No. 400 has a metal head four and one-quarter inches in diameter, with legs one and three-eighth inches in diameter at the top, one and three-quarters at the swell and one and one-eighth near the point. This is used with the Engineers' Transit and with the larger Y-Levels.

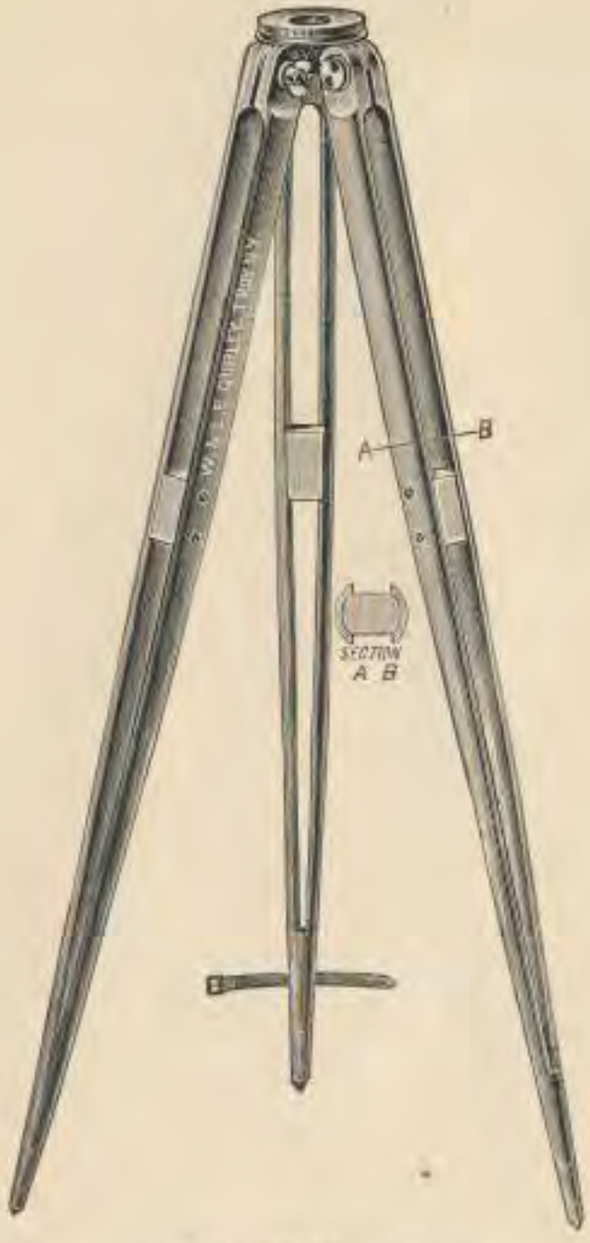
The medium tripod has a head of the same diameter as the former, and legs which are one and one-eighth inches in diameter at the top, one and five-eighths at the swell and one and one-sixteenth near the point. This tripod is used with the Surveyors' Transit, the light Engineers' Transit, and the fifteen-inch Level.

The Compass Tripod, No. 415, has a head about three inches in diameter, and legs which are about one inch in diameter at the top, one and three-eighths at the swell and seven-eighths near the point.

This tripod is used with the various Compasses and with the Vernier Transit-Compass.

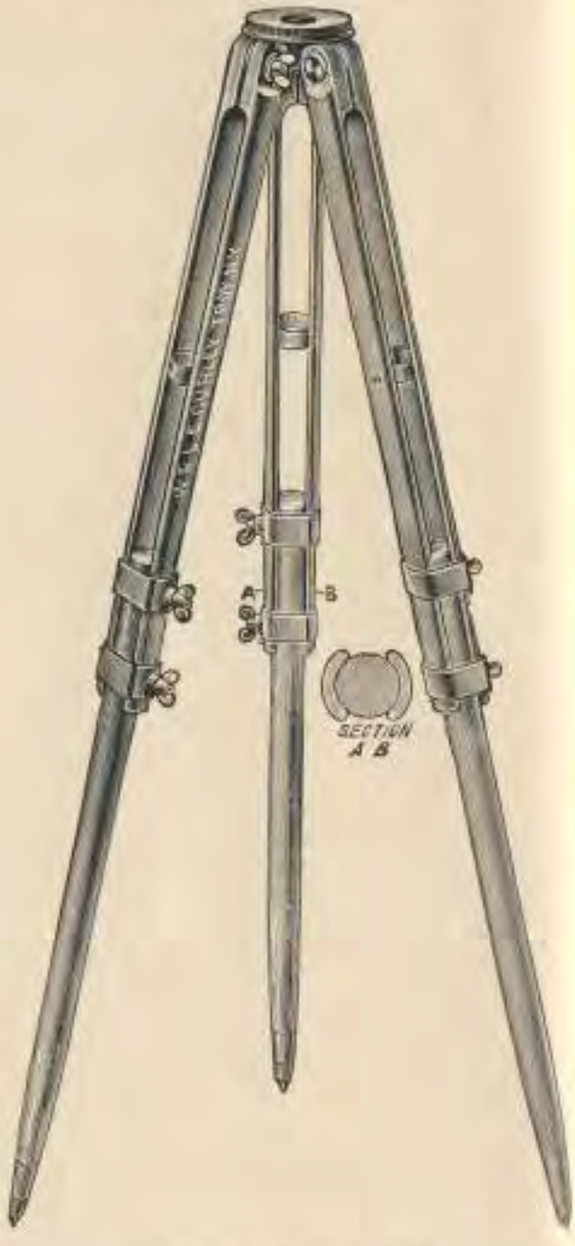
The Tripods for the various Pocket-Compasses and for the Drainage Level are similar to No. 415, but have smaller heads and legs.

SPLIT-LEG TRIPOD.



Nos. 405 and 435.

EXTENSION TRIPOD.



Nos. 410 and 440.

TRANSIT TRIPODS.

No.		Price.
400.	Plain Tripod for Transits Nos. 1 to 17 and 25 to 90	$10 00
401.	Plain Tripod for Transits Nos. 20 and 100 to 117	5 00
405.	Split-Leg Tripod for Transits Nos. 1 to 17 and 25 to 90	12 00
406.	Split-Leg Tripod for Transits Nos. 20 and 100 to 117	10 00
410.	Extension Tripod for Transits Nos. 1 to 17 and 25 to 90	15 00
411.	Extension Tripod for Transits Nos. 20 and 100 to 117	12 00

COMPASS TRIPODS.

No.		Price.
415.	Plain Tripod for Compasses Nos. 215 to 232	$5 00
416.	Plain Tripod for Pocket Compasses Nos. 275 to 319	5 00
420.	Split-Leg Tripod for Compasses Nos. 210 to 232	10 00
421.	Split-Leg Tripod for Pocket-Compasses Nos. 275 to 319	8 00
425.	Extension Tripod for Compasses Nos. 210 to 232	12 00
426.	Extension Tripod for Pocket-Compasses Nos. 275 to 319	10 00

LEVEL TRIPODS.

No.		Price.
430.	Plain Tripod for Levels Nos. 375 to 378	$10 00
431.	Plain Tripod for Levels Nos. 380 to 388	5 00
435.	Split-Leg Tripod for Levels Nos. 375 to 378	12 00
436.	Split-Leg Tripod for Levels Nos. 380 to 388	10 00
440.	Extension Tripod, for Levels Nos. 375 to 378	15 00
441.	Extension Tripod for Levels Nos. 380 and 381	12 00
442.	Extension Tripod for Levels Nos. 385 to 388	10 00

LEATHER CASES AND POUCHES.

We have in our establishment the best facilities for making all kinds of leather work to order, and can promptly furnish anything in the line of cases or pouches for surveying instruments.

The small pouch as shown in the cut furnishes a very convenient method for carrying small Pocket-Compasses without telescopes, as Nos. 288-350.

These pouches are strongly made, furnished with adjustable sling strap, and are so arranged as to hold the Compass and its mountings firmly and protect them from any injury in transportation. The wooden box in which the small Compasses are packed is omitted when the leather *pouch* is used. The leather *cases,* however, are fitted to hold the wooden box containing the instrument, and are used with any Transit, Level or Compass.

SOLE-LEATHER CASES.

TO FIT OUTSIDE THE WOODEN BOX.

No.		Price.
475.	Leather Case and Strap, for Engineers' or Surveyors' Transits, price according to size	$8 00 to $10 00
476.	Leather Case and Strap, for Mountain, Reconnoissance or Builders' Transits	8 00
477.	Leather Case and Strap, for large Solar Compasses	10 00
478.	Leather Case and Strap, for Surveyors' Compasses, Nos. 215 to 232, price according to size	6 00 to 9 00
479.	Leather Case and Strap, for Engineers' Y-Levels, price according to size	8 00 to 10 00
480.	Leather Case and Strap, for Architects' Level	6 00
481.	Leather Case and Strap, for Drainage Level	4 00

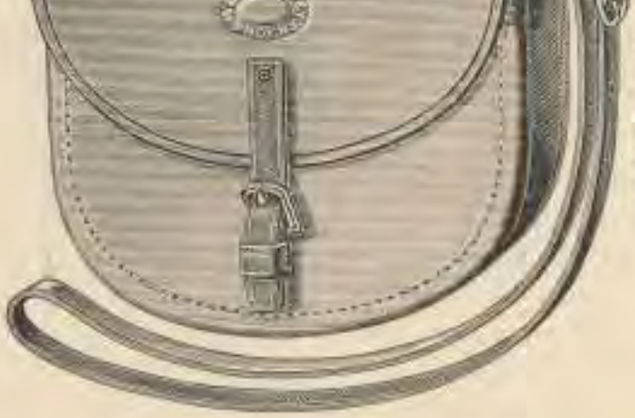
LEATHER CASE AND SHOULDER-STRAP for Pocket Compasses and to fit outside the wooden box. (See style A.)

No.		Price.	Post.
485.	Size for Compasses Nos. 315, 316, 335, 340 to 344, 348 to 350	$2 50	$0 20
486.	Size for Compasses Nos. 300, 317 to 319, 338, 345	3 00	30
487.	Size for Compasses Nos. 275, 285, 288, 305	4 00	50
488.	Size for Compasses Nos. 290 to 293, 310 to 312	6 00	

LEATHER POUCH AND SHOULDER-STRAP, fitted to receive Pocket-Compasses without wooden box. (See style B.)

No.		Price.	Post.
490.	Size for Compasses, Nos 315, 316, 335, 340 to 344, 348 to 350	$2 00	$0 15
491.	Size for Compasses Nos. 300, 317 to 319, 338, 345	2 50	25
492.	Size for Compasses Nos. 288, 305	3 00	35

STYLE—A.

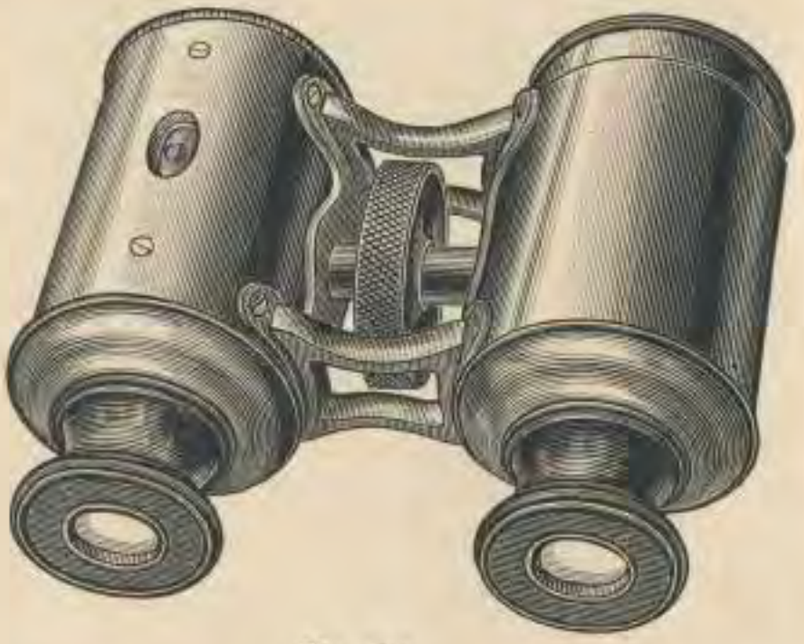


STYLE—B.

NOTE.—We are prepared to make to order Leather Cases and Pouches of any style and size that may be desired; also, Canvas Cases for tripods or leveling-rods.

TELESCOPIC HAND LEVELS.

No. 625.



No. 627.

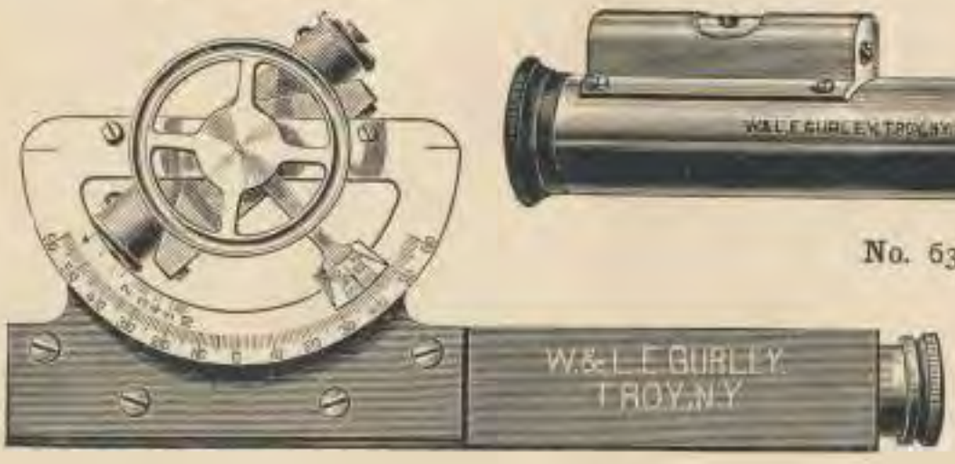
The cuts shown above represent two forms of a telescopic hand-level devised by us, in which, besides the ordinary lenses of an opera-glass, are included a reflecting prism, level-vial, and cross-wire.

When the Hand-Level is held truly horizontal the cross-wire will bisect the bubble, and will also determine the level of any object seen through the telescope; thus securing to the observer a clear view of the object, magnified also by the telescope.

The use of the Binocular Hand-Level gives a clearer view of an object than is possible with a single tube, there being now no light lost by the interference of the prism and level-vial.

No.		Price.	Post.
625.	—Monocular Hand-Level, in case	$12 00	$0 20
627.	—Binocular Hand-Level, in case	15 00	35

THE ABNEY LEVEL AND CLINOMETER.



LOCKE'S HAND-LEVEL.

No. 630.

No. 634.

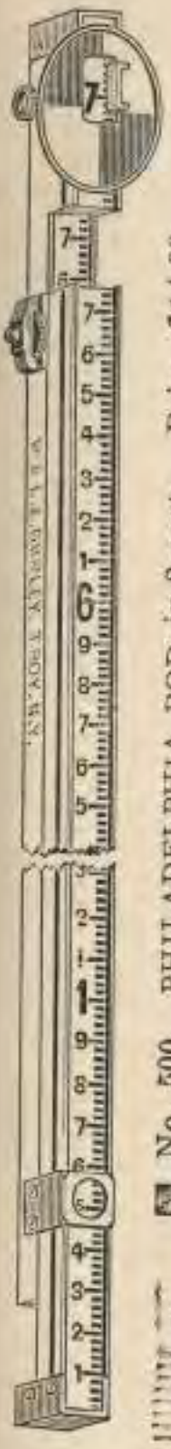
The Abney Level is an English modification of Locke's Hand-Level, combining with it an excellent clinometer as represented in the cut.

Here, when the level is brought to the center by setting the vernier arm to zero on the graduated arc, the bubble is seen through the eyepiece and the level ascertained precisely as with the Locke's Level. And the main tube being square it can be applied to any surface, the inclination of which may be ascertained by bringing the level-bubble into its center, and reading off the angle to five minutes, by the vernier and arc.

The inner and shorter arc indicates the lines of different degrees of slope, the left-hand edge of the vernier being applied to the lines and the bubble brought into the center as usual.

No.		Price.	Post.
630.	—Locke's Hand-Level, nickel-plated, in case	$ 8 00	$0 20
634.	—Abney Level, an improved "Locke's Hand-Level," giving angles of elevation and is also graduated for slopes, as 1 to 1, 2 to 1, etc., in case	13 50	25
636.	—Abney Level, with compass and plain staff socket attached	18 00	30

LEVELING-RODS.

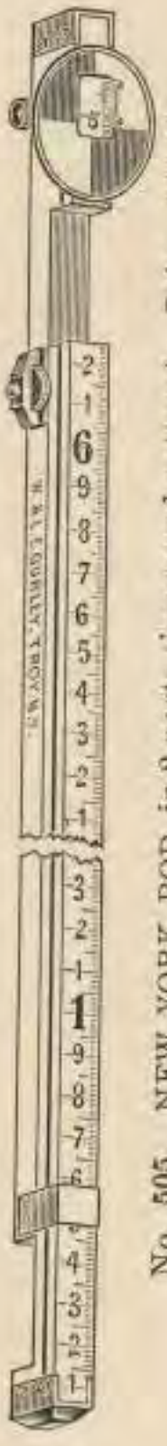


No. 500. PHILADELPHIA ROD, in 2 parts. Price, $14.00.

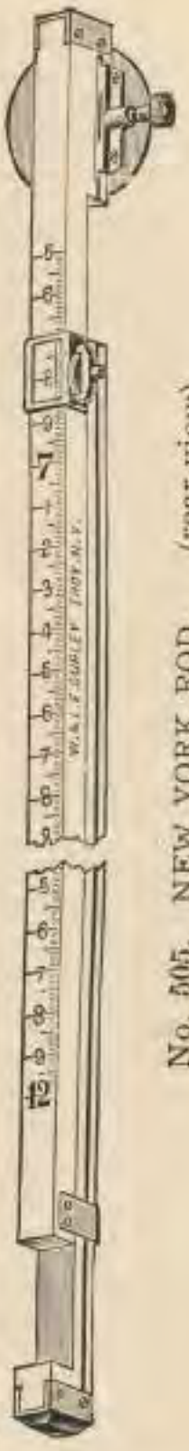
No. 501. PHILADELPHIA ROD, in 3 parts. Price, $18.00.

No. 503. BOSTON ROD. Price, $14 00.

No. 504. TROY ROD. Price, $10.00



No. 505. NEW YORK ROD, in 2 parts (improved pattern). Price, $14.00.

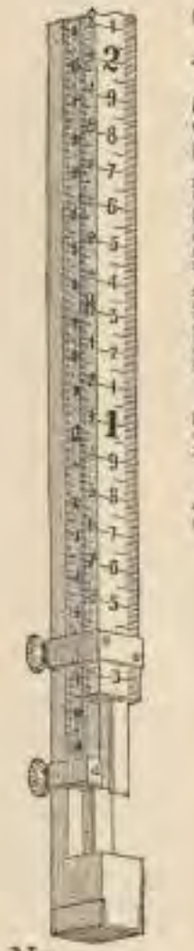


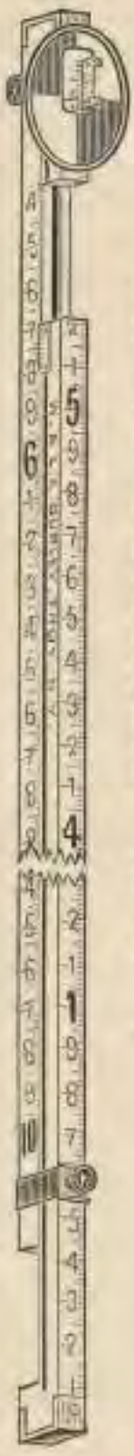
No. 505. NEW YORK ROD. (rear view).

No.		Price.
500.	—Philadelphia Rod, 2 ply, 7 $\frac{5}{10}$ feet closed, sliding to 13 feet, graduated to feet, 10ths and 100ths, with vernier reading to 1000ths.....	$14 00
501.	—Philadelphia Rod, 3 ply, 5 $\frac{5}{10}$ feet closed, sliding to 13 feet, graduated to feet, 10ths and 100ths, with vernier reading to 1000ths.....	18 00
502A.	—Philadelphia Mining Rod, 2 ply, 3 $\frac{3}{10}$ feet closed, sliding to 5 feet, graduated to feet, 10ths and 100ths, with vernier reading to 1000ths	12 00
503.	—Boston Rod, 2 ply, 6 feet closed, sliding to 11 feet, graduated to feet, 10ths and 100ths, with vernier reading to 1000ths.....	14 00

LEVELING-RODS.—Continued.

No. 507. **NEW YORK ROD,** in 3 parts. Price, $18.00.



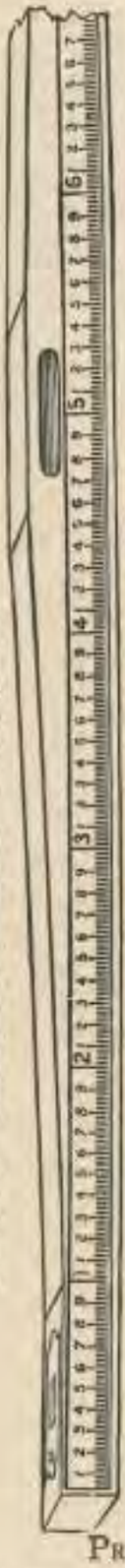


No. 511. **ARCHITECTS' ROD.** Price, $6.00.

No. 512. **MACHINISTS' ROD.** Price, $5.00.

No. 513. **TELEMETER OR STADIA ROD.** Price, $12.00.

No. 515. **TELESCOPIC ROD.** Price, $22.00.



No. 516. **CROSS SECTION-ROD.** Price, $10.00.

No.		Price.
504.	—Troy Rod, 2 ply, 6½ feet closed, sliding to 12 feet, graduated to feet, 10ths and 100ths, with vernier reading to 1000ths.....	$10 00
505.	—New York Rod, 2 ply, $6\frac{5}{10}$ feet closed, sliding to 12 feet, graduated to feet, 10ths and 100ths, with vernier reading to 1000ths.....	14 00
507.	—New York Rod, 3 ply, 5 feet closed, sliding to 12½ feet, graduated to feet, 10ths and 100ths, with vernier reading to 1000ths.....	18 00
509.	—New York Mining Rod, 2 ply, $3\frac{3}{10}$ feet closed, sliding to $5\frac{3}{10}$ feet graduated to feet, 10ths and 100ths, with vernier reading to 1000ths	12 00
510.	—Architects' Rod, 2 ply, 5½ feet closed, sliding to 10 feet, graduated to feet, inches and 16ths.....	6 00
511.	—Architects' Rod, 2 ply, 5½ feet, closed, sliding to 10 feet, graduated to feet, 10ths and 100ths, with vernier reading to 1000ths.....	6 00

LEVELING-RODS—Continued.

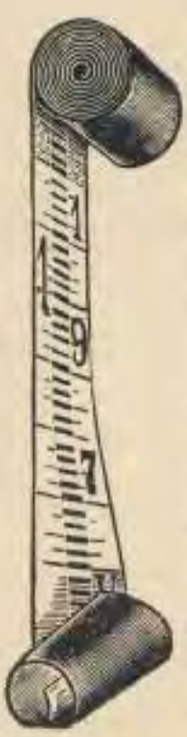
No.		Price.
512.	—Machinists' Rod, one piece, 6½ feet long, for leveling shafting, graduated to feet, inches and 16ths	$5 00
513.	—Telemeter, or Stadia, Rod, without target, hinge joint, 6 feet folded, unfolding to 12 feet, graduated to feet, 10ths and 100ths	12 00
514.	—Telemeter, or Stadia, Rod, without target, hinge joint, 7 feet folded, unfolding to 14 feet, graduated to feet, 10ths and 100ths	13 00
515.	—Telescopic Rod, 3 ply, without target, 5 feet closed, sliding to 14 feet, graduated to feet, 10ths and 100ths	22 00
516.	—Cross Section Rod, one piece, without target, 10 feet long, with level vial at each end, graduated to feet, 10ths and 100ths	10 00

No. 518. PLAIN LEVELING-ROD. Price, $6.00.

Nos. 518B, 519B, 520B, 521B. HINGE JOINT FOR PLAIN RODS.

No. 522-A. PLAIN LEVELING-ROD, in 2 parts. Price, $8.00

No. 524-A. PLAIN LEVELING-ROD, in 4 parts. Price, $10 00.



Nos. 525-A to 528. FLEXIBLE OR POCKET LEVELING ROD. (See page 52).

LEVELING RODS.—Continued.

No.	Price.
518A.—Plain Rod, one piece, without target, 10 feet long, graduated to feet, 10ths and 100ths...	$6 00
518B.—Plain Rod, without target, with hinge joint, 5 feet folded, unfolding to 10 feet, graduated to feet, 10ths and 100ths	8 00
519A.—Plain Rod, one piece, without target, 12 feet long, graduated to feet, 10ths and 100ths	7 00
519B.—Plain Rod, without target, with hinge joint, 6 feet folded, unfolding to 12 feet, graduated to feet, 10ths and 100ths	9 00
520A.—Plain Rod, one piece, without target, 14 feet long, graduated to feet, 10ths and 100ths	8 00
520B.—Plain Rod, without target, with hinge joint, 7 feet folded, unfolding to 14 feet, graduated to feet, 10ths and 100ths	10 00
521B.—Plain Rod, without target, with hinge joint, 8 feet folded, unfolding to 16 feet, graduated to feet, 10ths and 100ths	11 00
522A.—Plain Rod, 2 ply, without target, $5\frac{4}{10}$ feet long, sliding to 10 feet, graduated to feet, 10ths and 100ths	8 00
522B.—Plain Rod, 2 ply, without target, $6\frac{8}{10}$ feet long, sliding to 12 feet, graduated to feet, 10ths and 100ths	9 00
522C.—Plain Rod, 2 ply without target, $7\frac{3}{10}$ feet long, sliding to 14 feet, graduated to feet, 10ths and 100ths	10 00
524A.—Plain Rod, 4 ply, without target, $3\frac{4}{10}$ feet long, sliding to $11\frac{2}{10}$ feet graduated to feet, 10ths and 100ths	10 00

FLEXIBLE OR POCKET LEVELING-RODS.

(Made of canvas, can be coiled up and carried in pocket. In use it is fastened to a board with thumb tacks. (See page 51.)

No.	Price	Post
525A.—Pocket Rod, 8 feet long, graduated to feet, 10ths and 100ths....	$3 00	$0 22
525B.—Pocket Rod, 10 feet long, graduated to feet, 10ths and 100ths..	3 25	25
526A.—Pocket Rod, 12 feet long, graduated to feet, 10ths and 100ths..	4 00	28
526B.—Pocket Rod, 12 feet long, graduated to feet, inches and 8ths....	4 00	28
527.—Pocket Rod, 14 feet long, graduated to feet, 10ths and 100ths....	4 50	30
528.—Pocket Rod, 3½ meters long, graduated to centimeters	4 00	30

COMBINED LEVELING-POLE AND FLAGSTAFF.

No.	Price
530.—Wood Leveling-Pole and Staff, oval, 7 feet long. (See page 53.)	$5 00
531.—Wood Leveling-Pole and Staff, oval, 9 feet long	6 00

WOOD FLAGSTAFFS OR RANGING POLES.

These staffs are graduated into feet, which are painted alternately red and white.

No.	Price
534.—Wood Staff, octagon, 6 feet long, with metal shoe. (See page 53.)	$2 00
535.—Wood Staff, octagon, 8 feet long, with metal shoe	2 25
536.—Wood Staff, octagon, 10 feet long, with metal shoe	2 50

LEVELING-RODS, FLAGSTAFFS, ETC.—Concluded.

No. 530.

No. 534. No. 539.

Nos. 537—A. to 538—B.

No. 545.
ROD-LEVEL.
Price, $3 00.

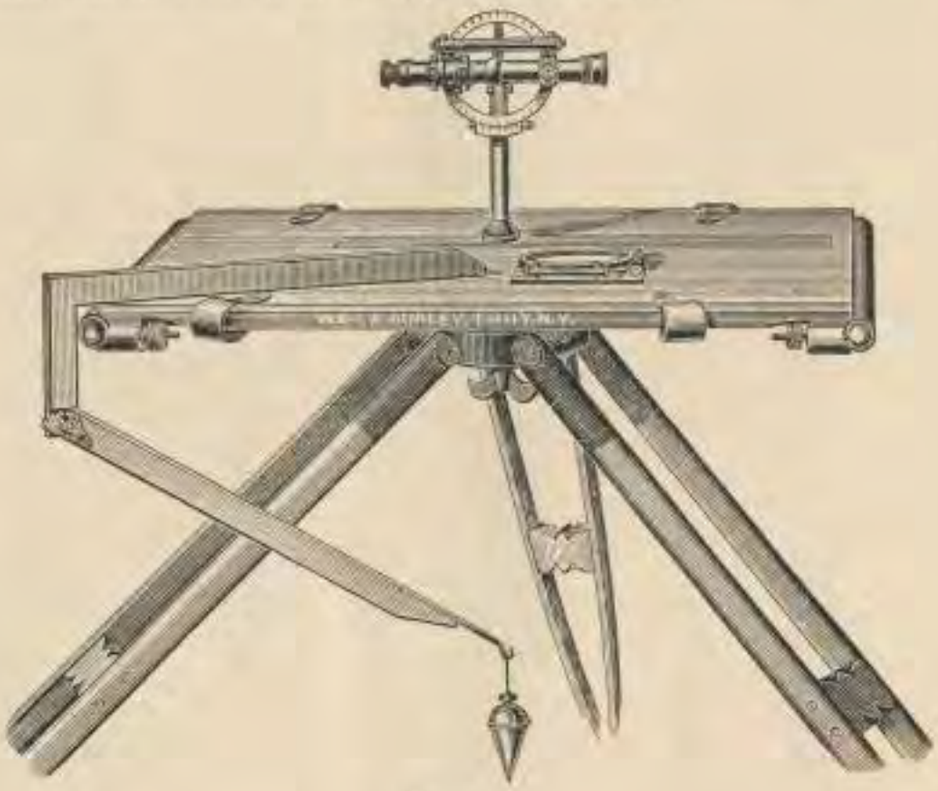
ROD LEVEL.
as applied to a rod.

No.		Price.
537A.—Wood Staff, round, 6 feet long, with one screw-joint		$ 4 50
537B.—Wood Staff, round, 6 feet long, with one screw-joint and with canvas case		7 00
538A.—Wood Staff, round, 9 feet long, with two screw-joints		7 50
538B.—Wood Staff, round, 9 feet long, with two screw-joints and with canvas case		10 50
539.—Iron Aligning or Ranging-Pole, round, 6 feet long, hung in gimbals		4 00
Note—This pole consists of an iron tube, 11-16 of an inch diameter, 6 feet long, and being hung in gimbals always assumes a vertical position.		
541.—Iron Tubular Ranging-Pole, 6 feet long, 13-16 inch diameter		2 75
543.—Iron Tubular Ranging-Pole, 8 feet long, 13-16 inch diameter		3 00
544.—Iron Tubular Ranging-Pole, 10 feet long, 13-16 inch diameter		3 50
Note—Any of the staffs and poles with metric graduations (five to a meter) at same price.		
No.		Price.
545.—Rod-Level, for plumbing a rod or staff	$3 00	$0 15
546.—Circular Rod-Level, with folding joint	3 00	15

THE PLANE-TABLE.

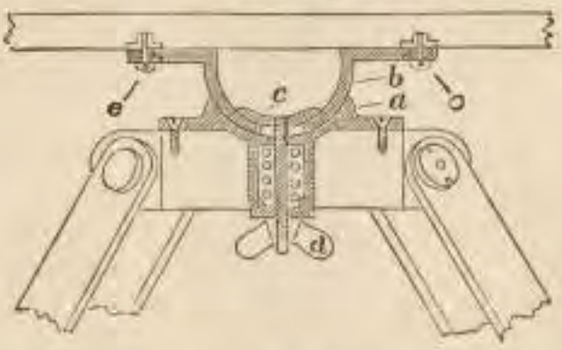
This instrument which has been so largely employed abroad for topographical and map drawing, is now coming into use in our own country, especially in colleges and schools where the study of surveying is pursued.

To further popularize the Plane-Table we have devised a number of different styles, varying mainly in the Alidades furnished with each, and supplying in all the grades an excellent instrument at a very moderate cost.



No. 553.

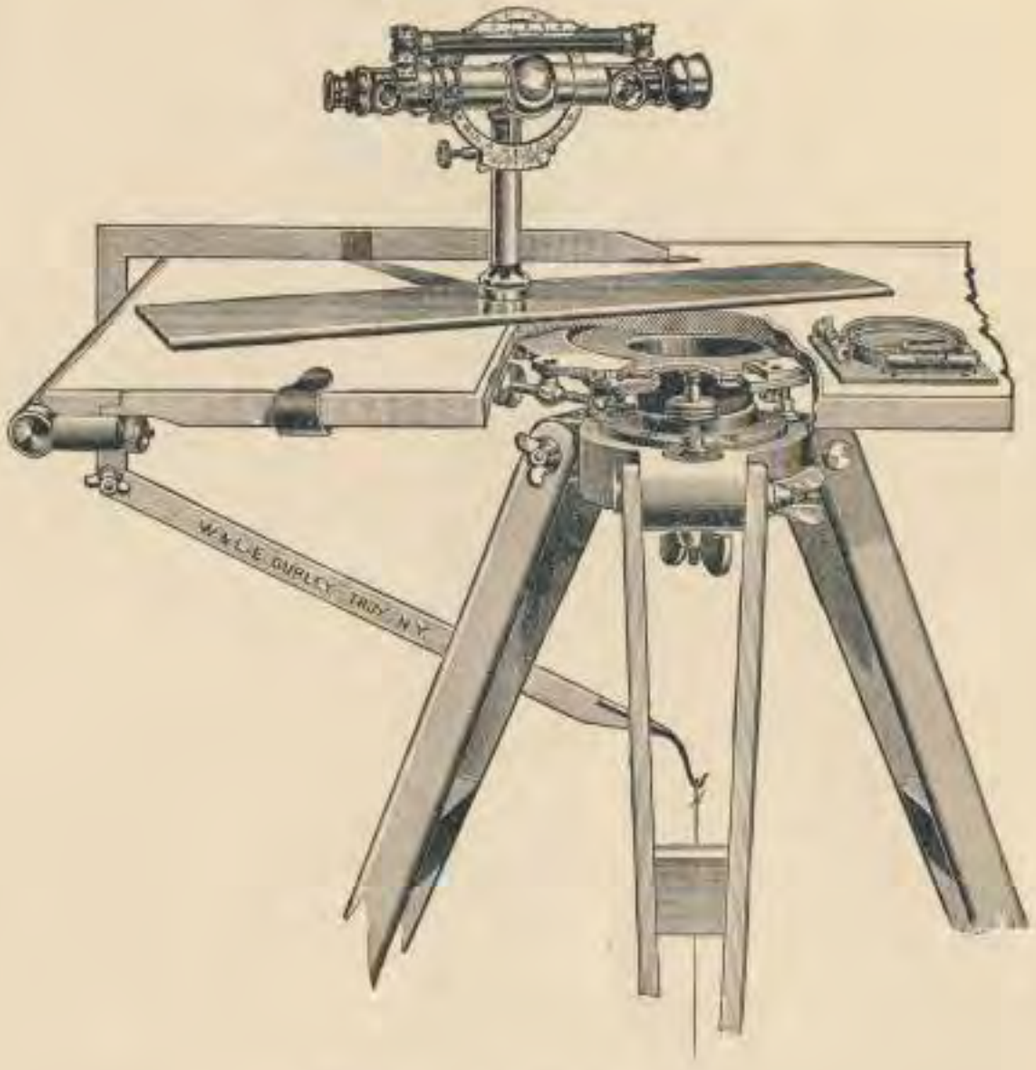
No.		Price.
553.	—Plane-Table, board 30x24 inches, mounted on large tripod, with leveling-socket and clamp, plumbing-arm, plummet and clamps for paper	$45 00
	Combined Compass and levels	15 00
	Alidade, with telescope 9 inches long, power 20 diameters, with stadia, vertical circle to one minute, level on telescope and clamp and tangent, mounted on column, No. 582	70 00
	Price, as shown, total	$130 00



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

The flange of the socket *b* supports the table and is connected with it by three segments of brass, two of which are shown at *e e*. The table can be oriented at will and clamped by a milled head screw passing through one of these segments.

THE PLANE-TABLE.—Continued.



No. 549. Price, $170.00.

Plane-Table with Leveling-Screws and Tangent Movement.

The engraving shows a modification of the simple Plane-Table described on page 54, there being added a tangent movement in azimuth and three screws for leveling. The board appears as cut away to show in detail the socket and leveling-screws and tangent movement by which, as will be seen, a more delicate orienting may be obtained than by the simple movement before described.

In use, the tripod is set up firmly, and the board with the upper half of the spherical socket attached is placed upon the lower half of the socket attached to the tripod, the wing clamping nut being screwed up until the table is secure upon the tripod. The board is then moved by the pressure of the hand, or by the leveling-screws, until the level-bubbles upon the compass-plate will remain in the middle upon any part of the surface. The wing-nut is now screwed up and the board made firm upon the tripod.

Any place on the drawing-board may then be assumed as a starting-point, its position over a given point on the ground being determined by the plumbing-arm and plummet. From the given point on the paper, sights can be taken to different corners of the field, and lines drawn on the paper along the edge of the Alidade. Thus a miniature of the tract can be traced on the paper, the bearing of any

line being ascertained by applying the side of the compass-plate to the edge of the Alidade placed on that line. The table can be oriented, either by the hand on releasing the milled head screw that clamps the flange or by the tangent screw as before described.

The measurement of distances by the stadia wires of the telescope, and of vertical angles by the circle, is effected in the same manner as with the Transit.

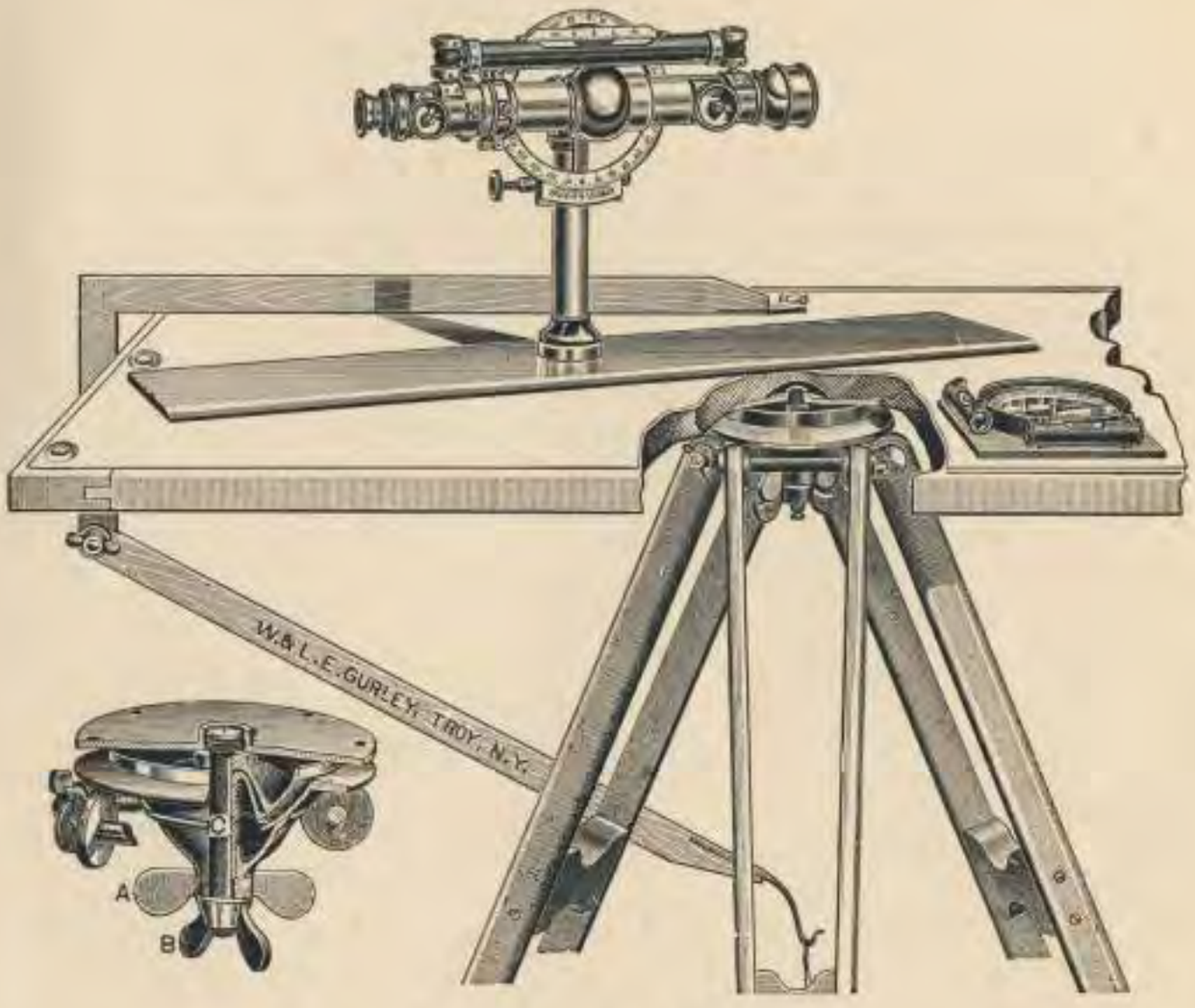
THE PLANE-TABLE.—Continued.

PLANE-TABLE OUTFITS.

No.		PRICE
549.—	Plane-Table, board 30x24 inches, mounted on large tripod, with leveling-socket and clamp, and with plumbing-arm, plummet, and clamps for paper	$ 45 00
	Set of three leveling-screws	10 00
	Clamp and tangent, for movement in azimuth	10 00
	Combined Compass with levels and square base	15 00
	Alidade, with telescope 11 inches long, with stadia, 4½-inch vertical circle to 1 minute, level on telescope and clamp and tangent, on column, power of telescope 24 diameters, No. 583	90 00
	Total, as shown on page 55	$170 00
550.—	Plane-Table, with board, tripod, etc., as described with No. 549	$ 45 00
	Combined Compass with levels and square base	15 00
	Alidade, with telescope 11 inches long, with stadia, 4½-inch vertical circle to 1 minute, level on telescope and clamp and tangent, on column, power of telescope 24 diameters, No. 583	90 00
	Total	$150 00
553.—	Plane-Table, with board, tripod, etc., as described with No. 549	$ 45 00
	Combined Compass with levels and square base	15 00
	Alidade, with telescope 9 inches long, power 20 diameters, with stadia, vertical circle to 1 minute, level on telescope and clamp and tangent, on column, No. 582, see page 54	70 00
	Total	$130 00
556.—	Plane-Table, with board, tripod, etc., as described with No. 549	$ 45 00
	Combined Compass with levels and square base	15 00
	Alidade, with telescopic sight No. 262, with stadia, vertical circle to 5 minutes, level on telescope and clamp and tangent, No. 581	50 00
	Total	$110 00
559.—	Plane-Table, with board, tripod, etc., as described with No. 549	$45 00
	Combined Compass with levels and square base	15 00
	Alidade, with sight-vanes, No. 580	15 00
	Total	$75 00
560.—	Plane-Table, with board, tripod, etc., as described with No. 549	$45 00
563.—	Set of three leveling-screws for Plane-Tables Nos. 550-560, extra	10 00
564.—	Clamp and tangent, for orienting, for Plane-Tables Nos. 550-560, extra	10 00

THE PLANE-TABLE.—Continued.

JOHNSON'S IMPROVED PLANE-TABLE MOVEMENT.



No. 576. Price, $159.00.

The engraving shows what is known as the Johnson Plane-Table Movement, complete with large Alidade, Plumbing-arm and Compass.

The board is shown as cut away, to give a better view of the tripod and movement. In the lower corner is shown the movement alone, with a portion cut away to show the construction.

This movement has been largely used by the topographers of the U. S. Geological Survey.

As shown in the cut, this movement supplies an arrangement whereby the table can be easily made horizontal and then secured by the large wing-nut, A. If desired to orient the board the wing-nut, B, is loosened, leaving the hemispherical surface, bearing the board secured to the flange, free to turn, and it can be clamped at will by screwing up the same nut. This movement as modified in recent years supplies an extremely efficient and portable Plane-Table.

The movement with legs complete weighs about nine pounds. The legs are made of straight-grained second-growth hickory, and the construction of the whole tripod is such as to secure strength and accuracy, and it is capable of standing rough usage without getting out of order.

THE PLANE-TABLE.—Continued.

JOHNSON'S IMPROVED PLANE-TABLE AND EXTRAS.

No.		Price.
570.—	Johnson's Plane-Table Movement and plain tripod..... (If tripod has extension legs, the extra cost is $10.00.)	$35 00
573.—	Drawing-Board, 31x24 inches, with brass screw-plate fitted, and with eight clamp-screws and sockets for paper.....	5 00
574.—	Plumbing-arm and plummet	4 00
575.—	Combined Compass with levels and square base.....	15 00

JOHNSON'S PLANE-TABLE OUTFITS.

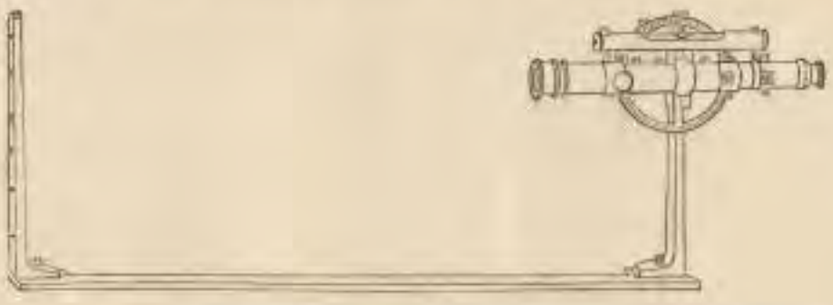
576.—	Johnson's Plane-Table Movement and plain tripod, with drawing-board, 31x24 inches, with brass screw-plate, fitted, and with eight clamp-screws and sockets for paper.....	$40 00
	Plumbing-arm and plummet	4 00
	Combined Compass with levels and square base.....	15 00
	Alidade, with telescope 11 inches long, with stadia, 4½-inch vertical circle to 1 minute, level on telescope and clamp and tangent, on column, power of telescope 24 diameters, No. 583.....	90 00
	Total, as shown on page 57.....	$149 00
577.—	Plane-Table, with plain tripod, board, etc., as described with No. 576.	$40 00
	Plumbing-arm and plummet	4 00
	Combined Compass with levels and square base.....	15 00
	Alidade, with telescope 9 inches long, power 20 diameters, with stadia, vertical circle to 1 minute, level on telescope and clamp and tangent, on column, No. 582.....	70 00
	Total	$129 00
578.—	Plane-Table, with plain tripod, board, etc., as described with No. 576.	$40 00
	Plumbing-arm and plummet	4 00
	Combined Compass with levels and square base.....	15 00
	Alidade, with telescopic sight No. 262, with stadia, vertical circle to 5 minutes, level on telescope and clamp and tangent, No. 581.....	50 00
	Total	$109 00
579.—	Plane-Table, with plain tripod, board, etc., as described with No. 576.	$40 00
	Plumbing-arm and plummet	4 00
	Combined Compass with levels and square base.....	15 00
	Alidade, with sight-vanes, No. 580.....	15 00
	Total	$74 00

THE PLANE-TABLE.—Continued.

THE ALIDADES.

No. 580. Price, $15.00.

The simplest Alidade is shown above and consists of a brass ruler or straight-edge, twenty inches long and about three inches wide, at the ends of which are screwed sight-vanes, like those on the ordinary Compass; one edge of the ruler being chamfered and in line with the slots of the vanes.

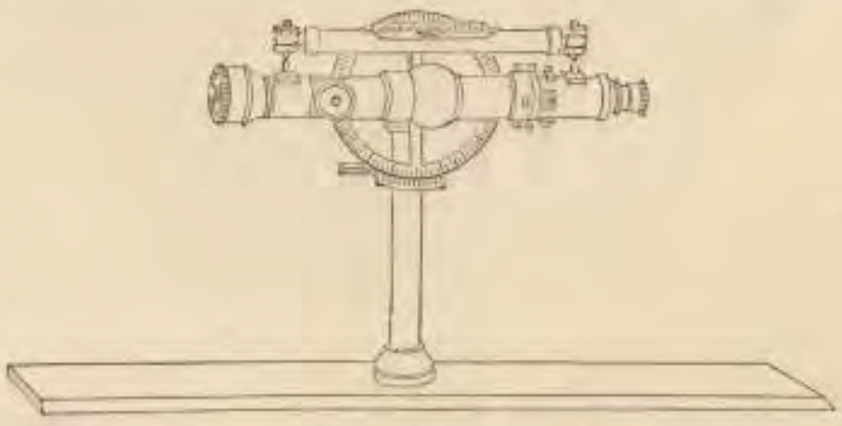


No. 581. Price, $90.00.

No. 581 shows the simple Alidade to which is fitted the telescopic sight, having a level, clamp and tangent, and vertical circle reading to five minutes, attached to the telescope, which is also supplied with stadia wires.

The telescope is placed in line with the fiducial edge.

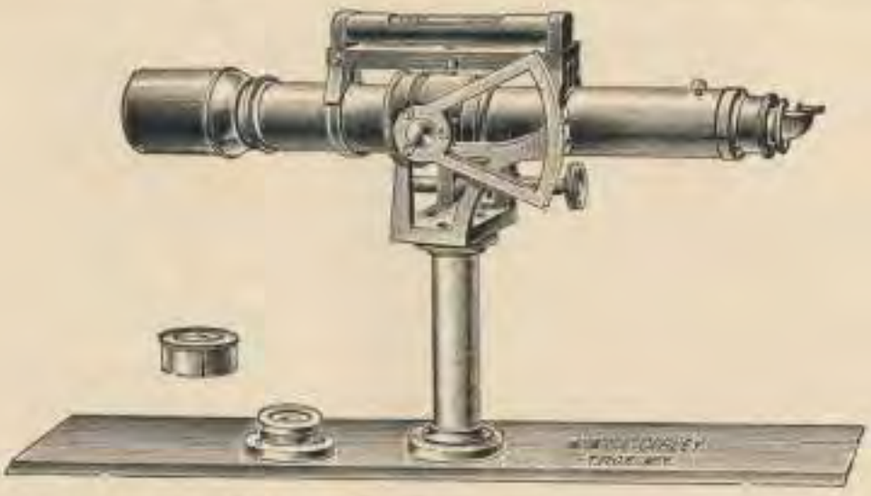
Alidade, No. 582, is shown in the cut of the Plane Table on page 54, the brass ruler being three inches wide. The column supports the telescope with its attachments, the vertical circle being graduated on silver and reading to one minute. The telescope is nine inches long, of a power of 20 diameters, provided with stadia, and adjusted and used like that of the Transit. Price, $70.00.



No. 583. Price, $90.00.

In the Alidade shown in No. 583, the telescope is precisely the same as that used on our best Transits, being also supplied with the level, clamp and tangent, vertical circle on silver reading to one minute, and stadia wires for measuring distances.

It is placed on a brass ruler about four inches wide, and is adjusted and used in the same manner as No. 582, shown on page 54.



584 A.—Price, as shown, with inverting eye-piece..... $118 00
584 B.—Price, as shown, but with erecting eye-piece..... 118 00

In Alidade No. 584, shown in the cut, the blade 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 reads by vernier to one minute; and having its zero at one end, all the angles read are thus positive. The telescope is made either inverting or erecting, as desired, and is fitted with diagonal prism, with darkener, as shown.

THE PLANE-TABLE.—Concluded.

Traverse Plane-Table.

No. 586. Price, as shown, $25.00.

The 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 fifteen 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, beveled and graduated on one edge to a scale of forty parts to the inch, having at each end hinged sights which fold closely to the surface of the ruler. Inserted in one edge of the board is a small box-compass with needle about three inches long.

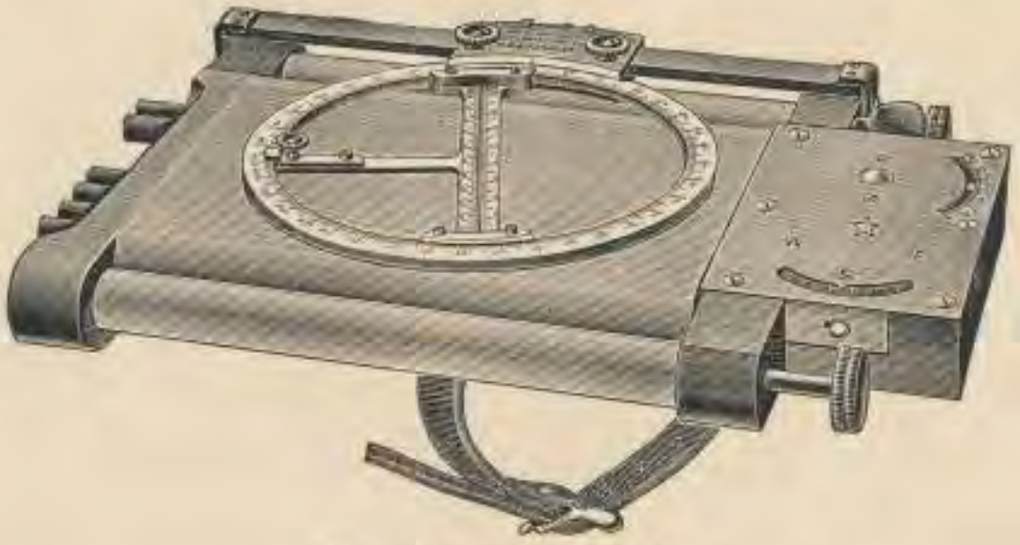
The tripod legs are attached to a simple head which has a clamping screw passing through its center, compressing a concealed spring and holding the board to the tripod head and at the same time allowing it to be oriented.

The whole forms a very effective apparatus for simple Plane-Table work and yet while not capable of as accurate results as the larger Plane-Tables, supplies a light and portable instrument for topographical work.

No.		Price.
586.	Traverse-Table Board, 15x15 inches, with Box Compass let into one edge, Ruler-Alidade with graduated edge and folding sights, and with tripod, complete as shown on page 60	$25 00
	If the tripod has extension legs, add extra $5.00.	
	When desired, we furnish separate parts of this Plane-Table at the following prices:	
587.	Drawing-Board with brass screw-plate, and with tripod head and plain legs	9 00
588.	Box-Compass, rectangular metal case, 3-inch needle	8 00
589.	Ruler-Alidade, 10 inches long, with graduated edge and folding sights, in case	10 00
590.	Pocket Alidade, 6 inches long, with graduated edge and folding sights, in case	7 50
591.	Pocket-Alidade, 7 inches long, with graduated edge, one peep sight and one folding sight, in case	12 00

BATSON SKETCHING CASE. (New Pattern).

(PATENTED.)



No. 595. Price, $30.00.

The engraving shows the Batson Sketching-Case designed for the use of Civil and Military Engineers and Surveyors in reconnoissance and topographical surveys. It was given an extensive and successful trial, in 1898 and 1899, in Cuba and the Philippines, as well as in the United States.

This instrument is a small drawing-board, having upon its upper surface a movable graduated circle, carrying a small alidade with scales, and at one end of the board a compass and clinometer.

The drawing-board is made of wood, and is provided with rollers which carry the paper for recording observations. Friction-brakes hold the rollers, so that the paper is held down snugly to the board and prevented from uncoiling

Six holes at the end of the board opposite the compass afford receptacles for the pencils used in topographical sketching.

The protractor is held in position by a carrier which slides upon a bar attached to the wooden end-pieces as shown. The construction of the carrier allows the protractor to be turned, or, if desired, to be clamped by means of two set-screws.

The protractor can also be lifted to an upright position by pulling back the spring-catch at the end of the carrier-bar.

The alidade turns within the graduated circle, and, with it, forms the protractor.

The paper for use with this instrument is six inches wide, and thirty to forty inches is found to be a convenient length.

BATSON SKETCHING CASE.—Continued.

The Sketching-Case is fitted with a strap for carrying on the forearm, and, if desired, is provided with a short, light staff, or tripod, for use in taking bearings on reference points and on objects which it is desirable to locate with more accuracy than can be done by holding in the hand.

A Sole-Leather Case, having a pocket for the instrument and another for sketches and extra paper, and fitted with lock and shoulder strap, is provided with each instrument.

A full description of the use and adjustments of the Sketching-Case will be mailed on application.

No.		Price.
595.—	Batson Sketching-Case, as shown and with leather case.....	$30 00
	Wooden Staff, about 2 feet long, with steel-pointed shoe, extra.....	1 00
	Plain Tripod, about 3½ feet long, extra.....	3 50

BOYDEN'S HOOK-GAUGE.

This Hook-Gauge is used in determining the depth of water flowing over weirs, etc.

As represented, it has a frame of wood, three feet long and four inches wide, in a rectangular groove of which another piece is made to slide, carrying a metallic scale graduated to feet and hundredths, and figured from zero to two feet and two tenths, as shown.

Connected with the scale is a brass screw passing through a socket fastened to another shorter sliding piece, shown above, which can be clamped at any point on the frame, and the scale with hook moved in either direction by the milled head nut.

There is also a vernier attached to the frame, and movable under the screw heads which secure it, in order to adjust its zero to correspond with the point of the hook. The vernier reads the scale to thousandths of a foot.

The hook is of brass, and has a sharp point which, when raised to the surface of the water at rest, indicates its precise level.

No. 620. Price, $25.00.

CURRENT-METER.

This instrument, now so generally used to ascertain the velocities of currents in harbors, rivers and smaller streams, is shown below, at *A*, in its best and most substantial form.

The wheel of this Meter carries five conical buckets, as shown, so arranged as to feel the force of the slightest current and cause the wheel to revolve.

The ends of the axis of the wheel revolve in bearings contained in air-chambers of metal, which protect them from the water and any gritty matter it may contain and the friction is thus reduced to a minimum and made a constant quantity.

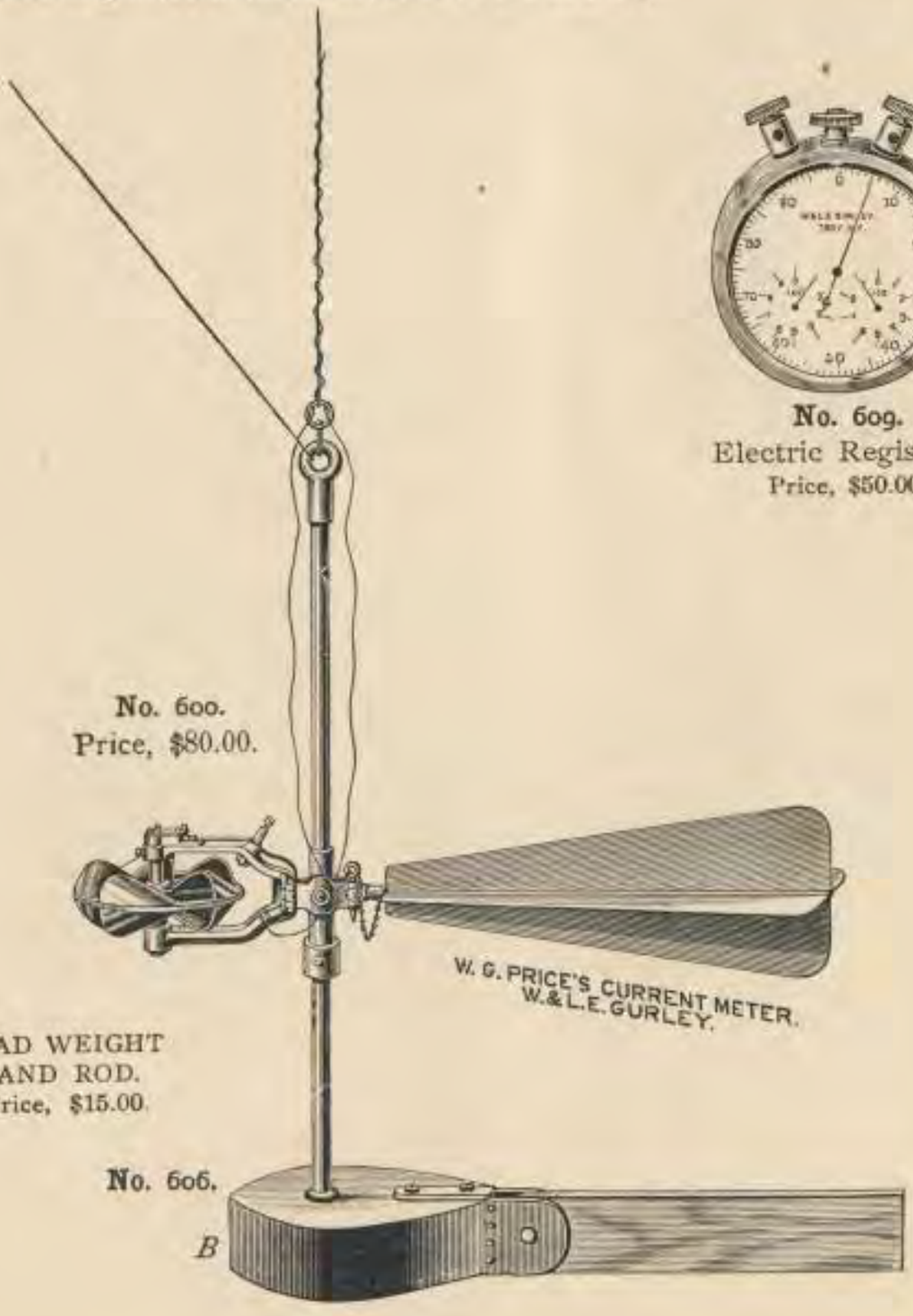
The form of the wheel and buckets is such as to insure great strength, and thus resist injury from driftwood, etc., while, at the same time, it is not liable to obstruction from floating leaves and grass.

The Price Current-Meter is the result of six years' experience in measuring the velocity of water in the Ohio and Mississippi Rivers by different methods, while the inventor was in the employ of the U. S. Engineer Corps.

It is used by the U. S. Engineer Corps, the U. S. Coast and Geodetic Survey, and by hydraulic engineers in different parts of the country.

No. 609.
Electric Register.
Price, $50.00.

No. 600.
Price, $80.00.



LEAD WEIGHT
AND ROD.
Price, $15.00.

No. 606.
B

The weight, No. 606, is of lead and weighs about sixty pounds; it has a rudder of wood, as shown, secured to the weight by brass cheek-pieces, which are also securely fastened to the weight by sockets cast into the lead. The rudder can be set at an angle with the weight, or turned up parallel with the rod, for convenience in transportation.

The weight, *B*, is used only where the Meter is employed in deep water and harbor-surveying, where the currents are very strong.

In shallower water the Meter is suspended upon a brass rod. These rods are each four feet long and can be screwed together when a long length is needed. They are graduated to feet and tenths.

This Meter has a wheel six inches in diameter, and the total length, including the rudder-vane, is about twenty-four and one-half inches. It is adapted for deep water and harbor-surveying, and also for use in smaller rivers and streams, and is used either with or without the weight.

A reduction-table is furnished with each Meter. This table is a mean of several ratings, and will probably give correct velocities within one per cent. for any Meter when in good order. If desired, we will make the rating and computation charging therefor the actual cost which varies from $12 to $13 for each Meter rated.

ELECTRIC REGISTER.

The number of revolutions of the Meter-wheel is recorded by an Electric Register (shown as No. 609) actuated by a battery of three cells.

The electric current proceeding from one pole of the battery is carried by an insulated copper wire down through the trunnion of the Meter, and thence up to the insulated binding-post on the upper arm, as shown in the cut; thence through the contact-breaker, the axis of the wheel, and the lower arm, to the binding-screw shown on that arm; thence by a second copper wire up through the trunnion to one binding-screw of the Register; thence through the Register to the other binding-post; and thence finally by another wire to the other pole of the battery.

The Electric Register is enclosed in a brass case, showing three dials under a glass face, and has an electro-magnet which, when the circuit is made, moves a lever, at the end of which is a pawl carrying forward a ratchet-wheel one tooth at every contact of the current. The large dial is graduated into one hundred spaces and two small dials into ten spaces each, all reading from left to right. The large dial counts each revolution up to one hundred,—the small dial on the right counts one thousand revolutions by each hundred,—and the small dial on the left counts ten thousand revolutions by each thousand,—all indicated by the figuring.

We furnish a wet cell battery to operate the Electric Register. The Battery is composed of three cells enclosed in a neat wooden case, with lock and strap.

THE ACOUSTIC CURRENT-METER.

Designed and Patented by W. G. Price, C. E.

This Current-Meter has a strong wheel composed of six conical shaped cups, bound together by a solid frame, and revolving in a horizontal plane. The wheel is carried on two bearings, which are at the top of deep inverted cups, holding air and oil, so that water and the grit contained in water are at all times excluded.

Just above the upper bearing is a small air-chamber into which the shaft of the wheel extends. The water cannot rise into this air-chamber, as it cannot compress the air sufficiently.

In the air-chamber is a worm on the shaft meshing in a gear which, at every ten revolutions of the shaft, trips a hammer against a diaphragm that forms the top of the air-chamber.

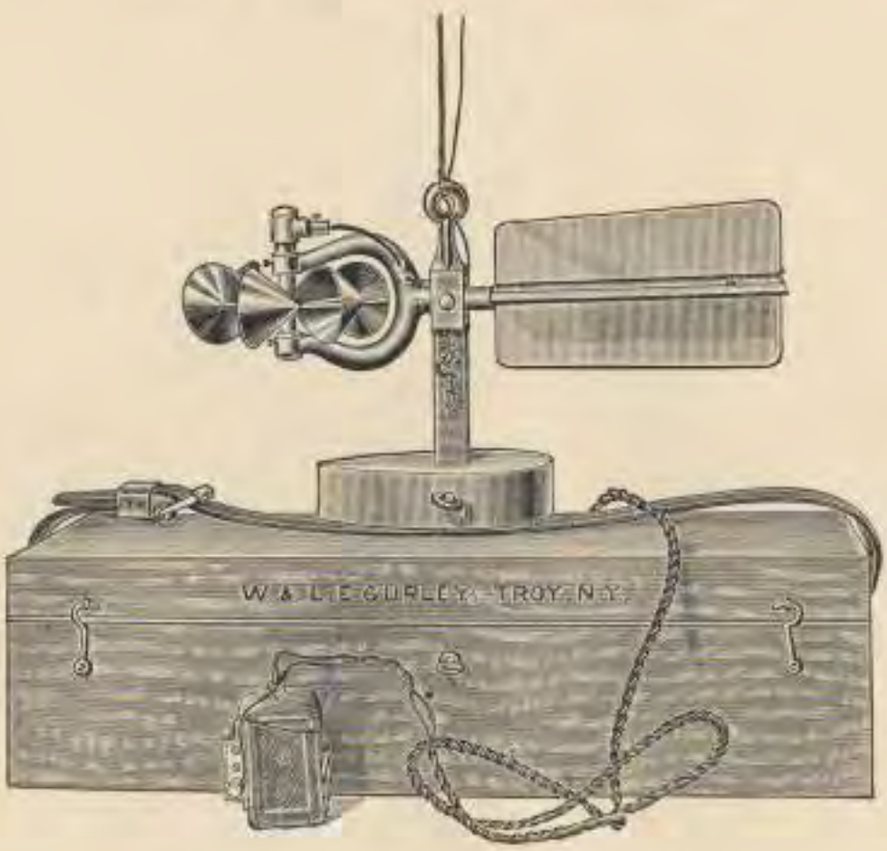
The sound produced by the striking hammer is transmitted through the hollow rod that supports the meter and through a rubber tube to the ear of the observer. The ear-piece is held in place by an elastic band. The rod is in lengths of two feet and is graduated to feet and tenths. The wheel is five inches in diameter and the Meter without the rod weighs about seventeen ounces. This Meter will not change its rating so long as it is well cared for and is not bent out of its original shape. A few drops of thin oil, such as will not become viscid in cold water, should be placed in both bearings every time it is used; also take care that no water or dust gets into the bearings.

Even though the water to be measured carries in suspension a large quantity of silt or other matter, it cannot injure the Meter or change its rating, an advantage which this Meter has over any other instrument of the kind yet devised.

Electric Current-Meter, No. 617,

With Vane and Small Lead Weight.

FOR USE IN SMALL STREAMS.



No. 617. Price, as shown, $60.00.

The importance of correct hydraulic measurements has brought the Current-Meter into general use; and while the Current-Meter No. 600 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.

The small Electric Current-Meter shown in cut, No. 617, while constructed practically along the lines of Current-Meter No. 600, has the advantage of extreme lightness, weighing only about two pounds.

The electrical connection is made in the same manner as is described under Meter No. 600. The Meter is supported in a trunnion, and is free to swing in a vertical plane. The vane is so made that, if desired, it may be taken apart for convenience, in transportation.

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 bisulphate 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.

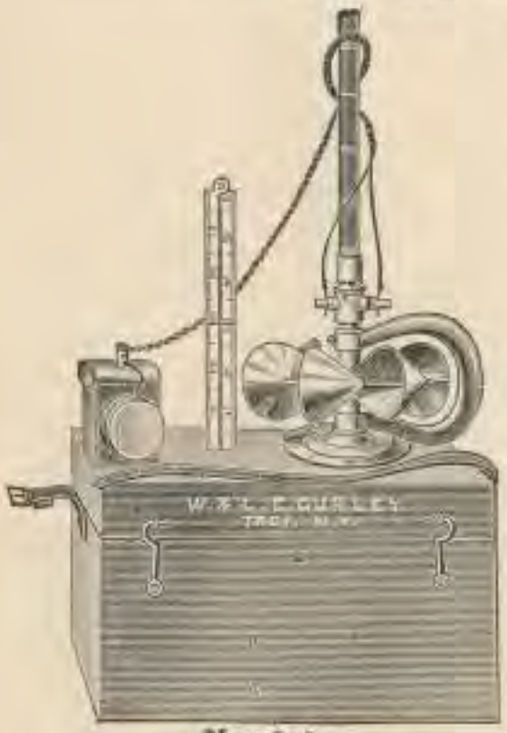
Should the observer require greater accuracy, it is advisable that the individual rating of each Meter be obtained. If desired, we will rate the Meter, furnishing table at a cost of from twelve to thirteen dollars.

The price of the Meter is	$50 00
The price of the lead weight is	2 50
The price of the sounder is	7 50
The price of the Meter, including lead weight and sounder and twenty feet of cable, is	60 00

Extra length of cable, 5 cents per foot.

Electric Current-Meter, Omitting Vane and Lead Weight.

FOR USE IN SHALLOW STREAMS.



No. 618.

Price, complete, $60.00.

A modification of the Electric Current-Meter, No. 617, is shown in Fig. No. 618. The vane, lead weight and supporting cable are omitted. The Meter is mounted on a base as shown, and is provided with two lengths of nickle-plated brass tubing, graduated to feet and tenths up to four feet, and is readily held in position with the base resting on the bed of the stream. The electric sounder with twenty feet of cable and connections are the same as used with Meter No. 617. The Meter and its smaller accessories are packed in a wooden box with lock and strap.

No.		Price.
600.	—Current-Meter for Harbors and Rivers, see page 63	$80 00
604.	—Brass Tubing, graduated to feet and tenths, and jointed in 4-ft. lengths, per length	5 00
606.	—Lead Weight, 60 lbs., with connections, see page 63	15 00
609.	—Electric Register, see pages 63 and 64	50 00
616.	—Acoustic Current-Meter for small streams, see page 64	50 00
612.	—Wet Cell Battery of three cells, in box with lock and strap	7 00
614.	—Insulated Copper Wire for battery (for use with Meter No. 600), per foot	03
617.	—Electric Current-Meter with Vane and Lead Weight for small streams, complete with electric sounder and cable, see page 65. (Extra length of cable, per foot, 5 cts.)	60 00
618.	—Electric Current-Meter with Base (omitting Vane and Lead Weight) for shallow streams, complete with four feet of graduated brass tube and electric sounder, as shown	60 00
619.	—Time-Recorder, open face, nickel case, stem-winder, with fly-back attachment for starting and stopping. Registering minutes, seconds, and fifths of seconds	8 00

NOTE.—Water-Registers, Tide-Gauges, and similar instruments made to order from designs submitted.

CHAINS AND TAPES.

CHAINS.

No.		Price.	Post.
650.—	33 feet, 50 links, oval rings, No. 10 refined iron wire	$2 25	$0 65
651.—	33 feet, 50 links, oval rings, No. 8 refined iron wire	2 50	85
652.—	66 feet, 100 links, oval rings, No. 10 refined iron wire	3 50	1 15
653.—	66 feet, 100 links, oval rings, No. 8 refined iron wire	4 00	1 75
656.—	33 feet, 50 links, oval rings, No. 10 best steel wire	4 00	65
658.—	50 feet, 50 links, oval rings, No. 10 best steel wire	4 75	80
660.—	66 feet, 100 links, oval rings, No. 10 best steel wire	7 00	1 15
662.—	100 feet, 100 links, oval rings, No. 10 best steel wire	8 50	1 50

STEEL BRAZED CHAINS.

No.		Price.	Post.
670.—	33 feet, 50 links, No. 12 tempered steel wire, brazed links and rings	$5 00	$0 45
671.—	50 feet, 50 links, No. 12 tempered steel wire, brazed links and rings	6 00	55
672.—	66 feet, 100 links, No. 12 tempered steel wire, brazed links and rings	9 00	70
673.—	100 feet, 100 links, No. 12 tempered steel wire, brazed links and rings	10 00	1 00

Our steel brazed chains displace the ordinary chains wherever they are tried, on account of superior lightness and strength. They are practically the only chains now used in railroad construction.

GRUMMAN PATENT STEEL CHAINS.

No.		Price.	Post.
680.—	33 feet, 50 links, No. 15 tempered steel wire, weight 1 lb.	$5 00	$0 28
681.—	50 feet, 100 links, No. 15 tempered steel wire, weight 1¼ lbs.	6 00	30
682.—	66 feet, 100 links, No. 15 tempered steel wire, weight 1½ lbs.	9 00	35
683.—	100 feet, 200 links, No. 15 tempered steel wire, weight 2¼ lbs.	11 00	50
685.—	50 feet, 100 links, No. 18 tempered steel wire, with spring-balance, level and thermometer, for very accurate measurements, weight 14½ oz.	15 00	30
688.—	Spring balance, for 10 lbs. strain, with handle and steel snap, to use with chains, Nos. 680 to 683	2 50	15

VARA CHAINS.

No.		Price.	Post.
690.—	10 varas, 50 links, oval rings, No. 10 refined iron wire	$2 25	$0 55
694.—	20 varas, 100 links, oval rings, No. 10 refined iron wire	3 50	1 00
700.—	10 varas, 50 links, oval rings, No. 10 best steel wire	4 00	55
704.—	20 varas, 100 links, oval rings, No. 10 best steel wire	7 00	1 00
708.—	10 varas, 50 links, oval rings, No. 12 tempered steel wire, brazed links and rings	5 00	35
710.—	20 varas, 100 links, oval rings, No. 12 tempered steel wire, brazed links and rings	9 00	65

METER CHAINS.

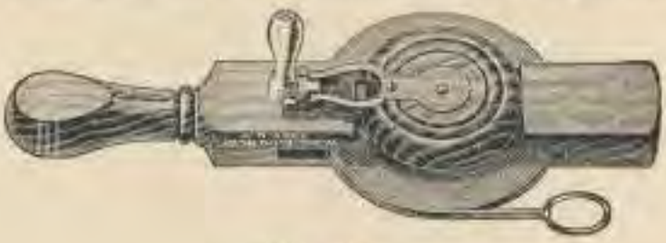
No.		Price.	Post.
715.—	10 meters, 50 links, oval rings, No. 10 refined iron wire	$2 25	$0 65
719.—	20 meters, 100 links, oval rings, No. 10 refined iron wire	3 50	1 15
723.—	10 meters, 50 links, oval rings, No. 10 best steel wire	4 00	65
727.—	20 meters, 100 links, oval rings, No. 10 best steel wire	7 00	1 15
730.—	10 meters, 50 links, oval rings, No. 12 tempered steel wire, brazed links and rings	5 00	45
732.—	20 meters, 100 links, oval rings, No. 12 tempered steel wire, brazed links and rings	9 00	70

MARKING-PINS AND TIMBER SCRIBE.

No.		Price.	Post.
740.—	Set of 11 pins, No. 4 iron wire, 14 inches long	$1 25	$0 50
742.—	Set of 11 pins, No. 6 steel wire, 14 inches long	1 50	40
744.—	Set of 11 pins, No. 6 steel wire weighted, 14 inches long	2 50	1 25
746.—	Set of 11 pins, No. 10 steel wire, 9 inches long, in leather pouch	2 00	25
748.—	Set of 11 pins, No. 4 brass wire, 14 inches long	2 50	50
750.—	Timber-Scribe, for marking trees, posts or boards	1 25	15

STEEL RIBBON CHAIN-TAPES.

¼-inch wide and with handles and simple reel.



No. 760.

No.		Price.	Post.
760.—Steel Ribbon, 33 feet, graduated to fifty links only		$3 50	$0 25
761.—Steel Ribbon, 50 feet, graduated each foot		4 00	30
762.—Steel Ribbon, 66 feet, graduated to one hundred links only		4 50	35
763.—Steel Ribbon, 100 feet, graduated each foot		5 00	40
764.—Steel Ribbon, 100 feet, graduated each foot, (heavy ribbon)		6 00	50
765.—Steel Ribbon, 200 feet, graduated each foot up to 100 feet, and the last 100 feet, graduated each 10 feet		7 50	70
766.—Steel Ribbon, 200 feet graduated each foot, (heavy ribbon)		9 00	
767.—Steel Ribbon, 300 feet, graduated each foot up to 100 feet, and the last 200 feet graduated each 10 feet		10 00	
768.—Steel Ribbon, 300 feet, graduated each foot, (heavy ribbon)		12 00	

The 50, 100, 200 and 300 feet Chain-Tapes also have the first and last foot in 10ths.

STEEL RIBBON BRIDGE-TAPES.

¼-inch wide, and with handles and extra fine reel.

No. 770.

No.		Price.
770.—Steel Ribbon, 300 feet, graduated each 5 feet		$13 00
771.—Steel Ribbon, 400 feet, graduated each 5 feet		15 00
772.—Steel Ribbon, 500 feet, graduated each 5 feet		17 00

These tapes have the first and last 5 feet graduated each foot.

METRIC AND VARA CHAIN-TAPES.

We can furnish steel ribbon tapes Nos. 760 to 772, with metric measure only, marked each meter, and first and last meter marked each decimeter, (omitting the English measure—without extra charge. If graduated with vara measure only, they are marked at each vara with the first and last vara in tenths.

METALLIC TAPES.

Made of linen thread, interwoven with fine brass wire. They are ⅝-inch wide, in leather case, and are graduated in 10ths or 12ths of a foot as desired.

No.		Price.	Post.
780.—Metallic Tape, 33 feet, in 10ths or 12ths, and links		$2 10	$0 18
782.—Metallic Tape, 50 feet, in 10ths or 12ths, and links		2 60	20
783.—Metallic Tape, 66 feet, in 10ths or 12ths, and links		3 00	25
786.—Metallic Tape, 100 feet, in 10ths or 12ths, and links		4 20	30

Note.—We can furnish metallic tapes with metric or vara measure on reverse side, instead of links, at an extra cost of one cent per foot, or with a metric or vara measure only without extra charge.

METALLIC TAPES WITHOUT CASES.

No.		Price.	Post.
791.—Metallic Tape,	50 feet, in 10ths or 12ths, and links, without case	$1 50	$0 15
794.—Metallic Tape,	100 feet, in 10ths or 12ths, and links, without case	2 90	20

STANDARD STEEL TAPES.

American, 3/8-inch wide, in leather case, folding handle.

No.		Price.	Post.
800.—Steel Tape,	25 feet, in 10ths or 12ths, and links	$3 75	$0 15
801.—Steel Tape,	33 feet, in 10ths or 12ths, and links	4 30	18
802.—Steel Tape,	50 feet, in 10ths or 12ths, and links	6 00	20
803.—Steel Tape,	66 feet, in 10ths or 12ths, and links	7 60	23
805.—Steel Tape,	100 feet, in 10ths or 12ths, and links	10 60	30
806.—Steel Tape,	150 feet, in 10ths or 12ths, and links	15 50	45
807.—Steel Tape,	200 feet, in 10ths or 12ths, and links	20 00	60

THE "STAR" STEEL TAPE.

3/8-inch wide, in nickeled brass case, folding handle.

No.		Price.	Post.
810.—"Star" Steel Tape,	50 feet, in 10ths or 12ths, and links	$3 60	$0 20
811.—"Star" Steel Tape,	66 feet, in 10ths or 12ths, and links	4 40	25
813.—"Star" Steel Tape,	100 feet, in 10ths or 12ths, and links	6 40	35

CHESTERMAN'S STEEL TAPES.

3/8-inch wide, in leather case, folding handle.

No.		Price.	Post.
815.—Steel Tape,	33 feet, in 10ths or 12ths, and links	$5 20	$0 18
816.—Steel Tape,	50 feet, in 10ths or 12ths, and links	7 20	20
817.—Steel Tape,	66 feet, in 10ths or 12ths, and links	9 20	23
819.—Steel Tape,	100 feet, in 10ths or 12ths, and links	12 80	30

AMERICAN STEEL TAPES, (Paine's Pattern.)

1/4-inch wide, leather case, folding handle.

No.		Price.	Post.
821.—Steel Tape,	50 feet, in 10ths or 12ths, and links	$6 40	$0 23
822.—Steel Tape,	66 feet, in 10ths or 12ths, and links	8 00	28
824.—Steel Tape,	100 feet, in 10ths or 12ths, and links	12 00	35

AMERICAN STEEL TAPES, (Paine's Pattern.)

1/4-inch wide, in metal case, folding handle.

No.		Price.	Post.
830.—Steel Tape,	25 feet, in 10ths or 12ths, and links	$2 80	$0 15
831.—Steel Tape,	33 feet, in 10ths or 12ths, and links	3 60	18
832.—Steel Tape,	50 feet, in 10ths or 12ths, and links	4 80	23
833.—Steel Tape,	66 feet, in 10ths or 12ths, and links	6 40	28
835.—Steel Tape,	100 feet, in 10ths or 12ths, and links	9 60	35

Tapes Nos. 821 to 835 with metric or vara measure on reverse side, instead of links, at an extra cost of two and one-half cents per foot, or, with metric or vara measure only without extra cost.

EXTRAS FOR PAINE'S PATTERN STEEL TAPES.

No.		Price.	Post.
840.—Compensating Handles,	detachable, with graduated scale, per pair	$2 40	$0 12
841.—Plain Finger-ring Handles,	detachable, each	40	02
843.—Pocket Thermometers,	each	85	15
844.—Spring-Balance with handle and snap		2 50	15
845.—Spring-Balance and Level,	with handle and snap	4 00	15

EXCELSIOR STEEL TAPES.

½-inch wide, on brass frame with folding handle.

No.		Price.	Post.
851.	Excelsior Steel Tape, 50 feet, in 10ths or 12ths, and links	$6 40	$0 25
853.	Excelsior Steel Tape, 100 feet, in 10ths or 12ths, and links	11 50	40
854A.	Excelsior Steel Tape, 150 feet, in 10ths or 12ths, and links	17 00	60
854B.	Excelsior Steel Tape, 200 feet, in 10ths or 12ths, and links	22 00	
855.	Excelsior Steel Tape, 50 feet, in 10ths or 12ths, and meters	7 65	25
858.	Excelsior Steel Tape, 100 feet, in 10ths or 12ths, and meters	14 00	40
859A.	Excelsior Steel Tape, 150 feet, in 10ths or 12ths and meters	20 75	60
859B.	Excelsior Steel Tape, 200 feet, in 10ths or 12ths, and meters	27 00	

In the open frame the tape is not liable to retain moisture and dirt.

NICKEL PLATED TAPES.

When desired, we will nickel-plate our steel tapes, Nos. 800-835 and 850-858, to protect from rust, at the following prices:

Each.	$0.90	1.00	1.50	1.75	1.75	2.00	2.50	3.00	4.00	6.00	
	25	33	50	66	75	100	150	200	300	500	Feet.

POCKET STEEL TAPES.

In German silver cases, with spring and stop.

No.		Price.	Post.
860.	Pocket Steel Tape, 3 feet, in 10ths or 12ths	$1 00	$0 11
863.	Pocket Steel Tape, 6 feet, in 10ths or 12ths	1 40	12
866.	Pocket Steel Tape, 12 feet, in 10ths or 12ths	2 50	15
870.	Pocket Steel Tape, 6 feet, in 10ths one side and 12ths reverse side	1 60	12
873.	Pocket Steel Tape, 12 feet, in 10ths one side and 12ths reverse side	2 80	15
877.	Pocket Steel Tape, 6 feet, in 10ths or 12ths, and meters	1 60	12
879.	Pocket Steel Tape, 12 feet, in 10ths or 12ths, and meters	2 80	15

No. 885.

PUNCH AND RIVETER, FOR REPAIRING TAPE-LINES.

This punch cuts a clean hole, $\frac{1}{10}$-inch diameter, in steel tapes of the usual thickness, and the eyelet is then inserted and quickly and neatly riveted. The punch is 7¼ inches long.

No.		Price.	Post.
885.	Punch and Riveter, with eyelets, for repairing steel tapes	$5 00	$0 30
886.	Extra eyelets (two lengths), two packages of 500 each length	1 25	.05

DRAWING-INSTRUMENTS

No.		Price.	Post.
1003.	Plain Dividers, 5-inch best Swiss	$ 1 75	$0 12
1008.	Hairspring Dividers, 5-inch, best Swiss	2 50	12
1019.	Compass, 3½-inch, with pen, pencil and needle points, best Swiss	5 00	12
1024.	Compass, 6-inch, with pen, pencil and needle points and lengthening bar, best Swiss	6 50	15
1040.	Steelspring Bow-dividers, with needle points, ivory handle, 3½-inch, best Swiss	2 50	10
1041.	Steelspring Bow-pen, with needle point, ivory handle, 3½-inch, best Swiss	2 50	10
1048.	Steelspring Bow-pen, with adjustable point, for small circles, metal handle, 4-inch, best Swiss	3 00	10
1055.	Drawing-Pen, with joint and pin, ivory handle, 4¾-inch, best Swiss	1 25	10
1056.	Drawing-Pen, with joint and pin, ivory handle, 5½-inch, best Swiss	1 40	10
1062.	Railroad Pen, with joints in blades and shanks, ivory handle, 5½-inch, best Swiss	3 00	10
1067.	Beam-Compass Furniture, with two steel points, pen, pencil and needle points, best Swiss, in Morocco case	8 00	20
1075.	Proportional Dividers, 7⅛-inch, divided for lines and circles, best Swiss	9 00	15
1076.	Proportional Dividers, 8¾-inch, divided for lines and circles, and with rack and pinion movement, best Swiss	12 50	18
1086.	Polar Planimeter, capacity 100 square inches. In case with directions, best Swiss	19 00	25
1088.	Polar Planimeter, indicating square inches, square feet and square centimeters. In case, with directions, best Swiss	28 50	35
1090.	Polar Planimeter, with the tracer-arm graduated nearly its entire length and with vernier. Easily adjusted to any desired scale. In case with directions. Superior	33 50	75
1112.	Plain Dividers, pivot joint, 5-inch, best Swiss	2 50	12
1116.	Hairspring Dividers, pivot joint, 5-inch, best Swiss	3 25	12
1122.	Compass, pivot joint, 3½-inch, with fixed needle point, and pen and pencil points, best Swiss	5 00	12
1130.	Compass, pivot joint, 5½-inch, with fixed needle point, pen and pencil points and lengthening bar, best Swiss	6 50	15
1135.	Steelspring Bow-spacer, 3-inch, with metal handle, best Swiss	1 50	10
1137.	Steelspring Bow-pen, 3-inch, with metal handle, best Swiss	2 25	10
1148.	Drawing-pen, with spring blade, ebony handle, 5-inch, best Swiss	1 20	10
1149.	Drawing-Pen, with spring blade, ebony handle, 5½-inch, best Swiss	1 35	10
1172.	Alteneder's Plain Dividers, pivot joint, 5-inch. Superior	2 50	12
1176.	Alteneder's Hairspring Dividers, pivot joint, 5-inch. Superior	4 00	12
1190.	Alteneder's Compass, 5½-inch, with pivot joint, fixed needle point, pen, pencil point and lengthening bar. Superior	7 50	15
1197.	Alteneder's Steelspring Bow-pen, with needle point, metal handle, 3¼-inch. Superior	2 50	10
1206.	Alteneder's Drawing-Pen, with spring blade, ebony handle, 4¼-inch. Superior	1 40	10
1207.	Alteneder's Drawing-Pen, with spring blade, ebony handle, 5-inch. Superior	1 65	10
1237.	Plain Dividers, 5-inch, best German	80	03
1241.	Hairspring Dividers, 5-inch, best German	1 50	11
1247.	Compass, 5½-inch, with pen, pencil and needle points and lengthening bar, best German	3 00	15
1253.	Proportional Dividers, 6½-inch, divided for lines, best German	2 50	15
1259.	Beam-Compass Furniture, with pen, pencil and needle points. In case	6 00	16
1260.	Universal Map-Measurer. The index hand registers inches to miles, or centimeters to kilometers	3 00	12
1268.	Steelspring Bow-pen, ivory handle, 3½-inch, best German	1 25	10
1270.	Morocco Case, containing Steelspring Bow-spacer, Bow-pen and Bow-pencil, best German	4 20	15
1294.	Drawing-Pen, with fine joint, ivory handle, 4½-inch, best German	50	02
1295.	Drawing-Pen, with fine joint, ivory handle, 5-inch, best German	55	03
1299.	Drawing-Pen, with fine joint and pin, ivory handle, 5½-inch, best German	75	03
1305.	Curve-Pen, swivel handle, 5-inch, best German	1 50	10
1307.	Railroad Pen, for parallel lines, 5½-inch, best German	2 25	10
1309.	Detail Drawing-Pen, with broad blades, for border lines, ebony handle, 6¼-inch, best German	1 00	10
1314.	Dotting-Pen, one wheel, ivory handle, 5-inch, best German	1 00	03
1316.	Dotting-Pen, with six wheels, extra fine, in case	3 75	12

CASES OF FINE GERMAN SILVER INSTRUMENTS.

No.		Price.	Post.
1333.	Morocco case, with pair of 5½-inch needle point Compasses with pen and pencil point, pair of 5-inch plain Dividers, Drawing-Pen	$3 50	$0 15
1335.	Same as No. 1333, with addition of lengthening bar and steel points to Dividers	5 00	18
1339.	Morocco case, with pair of 5½-inch Compasses with pen, pencil, needle point and lengthening bar, pair of 5-inch plain Dividers, Bow-pen, Drawing-Pen	6 50	18
1340.	Morocco case, with pair of 5½-inch Compasses with pen, pencil, needle point and lengthening bar, pair of 5-inch plain Dividers, pair of 4-inch Compasses with pen, pencil and needle point, two Drawing-Pens	8 75	20
1341.	Same as No. 1340, with addition of Spring Bow-pen	10 00	20
1345.	Mahogany box, with lock and key and tray, containing 5½-inch Compasses with pen, pencil, needle point and lengthening bar, pair of 5-inch plain Dividers, pair of 5-inch hairspring Dividers, pair of 4-inch Compasses with pen, pencil and needle point, Bow-pen with needle point, two Drawing-Pens	14 50	45

No. 1358.

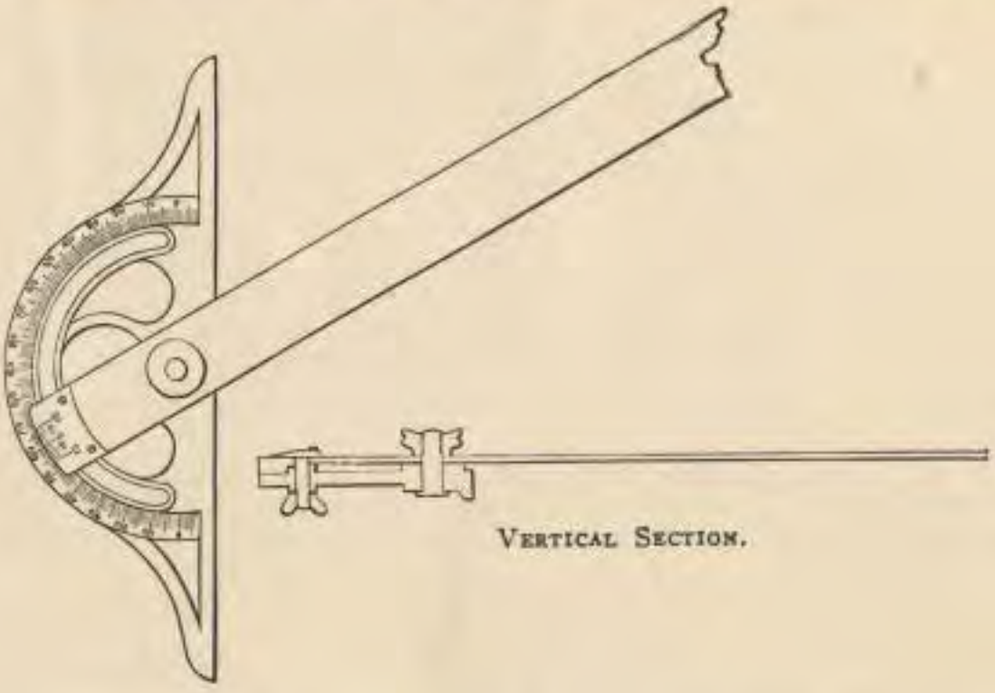
1358.	Morocco case, with Hairspring Dividers, 5-inch; Compasses, 5½-inch, with pivot joint, fixed needle point, pen and pencil point and lengthening bar, Bow-spacer, Bow-pen, Bow-pencil, two Drawing-pens, box of leads	12 50	20
1359.	Folding Pocket Case, containing same instruments as in set No. 1358	13 75	20
1365.	Leather Case, with plain Dividers, 5-inch; Compasses, 5½-inch, with fixed needle point, pen and pencil point and lengthening bar; Drawing-pen; Box of Leads	3 00	13
1367.	Leather Case, with plain Dividers, 5-inch; Compasses, 5½-inch, with fixed needle point, pen and pencil point and lengthening bar; Bow-pen; Drawing-Pen; Box of Leads	4 00	15
1369.	Leather Case, with plain Dividers, 5-inch; Compasses, 5½-inch with pen, pencil and needle point and lengthening bar; Bow-spacer; Bow-pen; Bow-pencil; Drawing-pen; Box of Leads	6 00	18

PROTRACTORS.

No.		Price.	Post.
1441.	Protractor, German silver, half circle, 5-inch, ½ degrees, best Swiss	$2 25	$0 13
1442.	Protractor, German silver, half circle, 6-inch, ½ degrees, best Swiss	2 75	15
1461.	Protractor, German silver, half circle, 8-inch, ¼ degrees, with vernier to one minute, best Swiss	14 00	25
1503.	Protractor, German silver, half circle, 6-inch, ½ degrees, fine	1 00	07
1510.	Protractor, German silver, half circle, 6-inch, ½ degrees, extra fine	1 50	15
1519.	Protractor, brass, half circle, 6-inch, ½ degrees	60	07
1532.	Celluloid Protractor, 6-inch, half circle, beveled edge, ½ degrees	3 00	13
1542.	Protractor, horn, half circle, 6-inch, ½ degrees	30	03
1544.	Protractor, horn, half circle, 8-inch, ½ degrees	60	05
1550.	Railroad Curve-Protractor, of horn, 8-inch, half circle, ½ degrees, having laid off on it curves from ½ degree to 8 degrees, to a scale of 400 feet to the inch	1 60	13

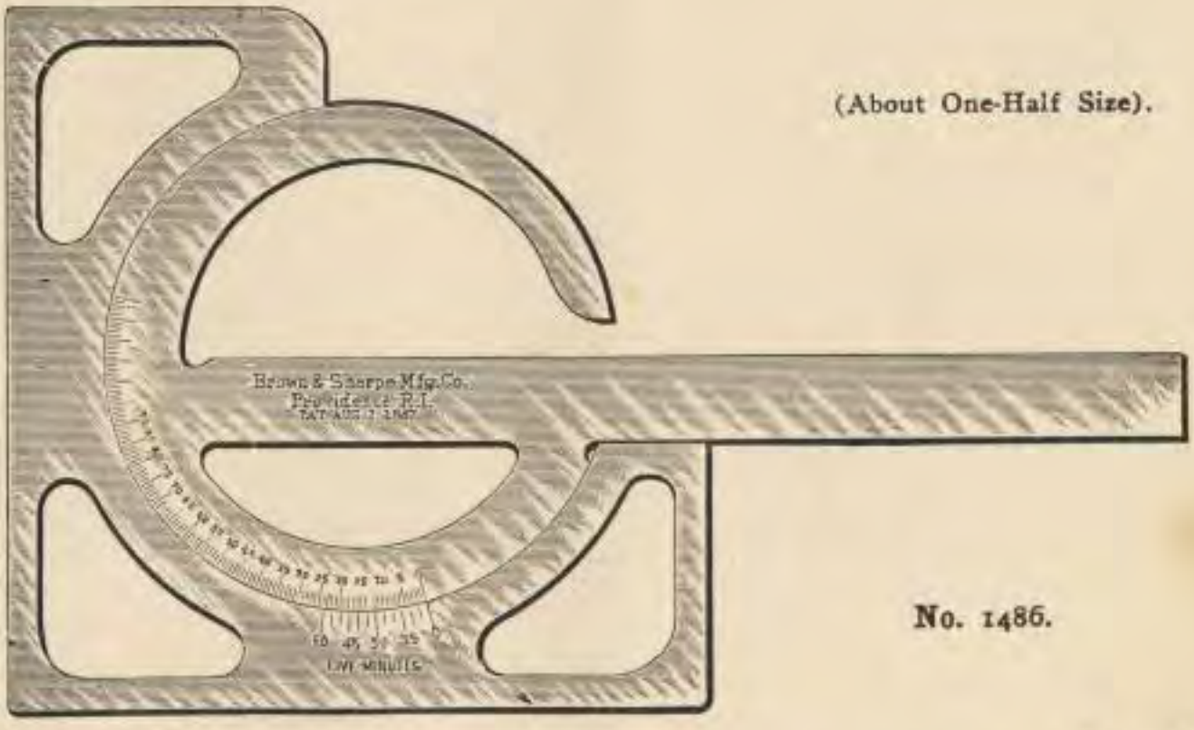
LIMB-PROTRACTORS.

BRONZE HEAD, STEEL BLADE, VERNIER TO ONE MINUTE.



VERTICAL SECTION.

No.		Price.
1480.—Limb-Protractor, ½ degrees, blade 24 inches long, nickel-plated		$ 8 00
1481.—Limb-Protractor, ½ degrees, blade 30 inches long, nickel-plated		8 75
1482.—Limb-Protractor, ½ degrees, blade 36 inches long, nickel-plated		9 50
1483.—Limb-Protractor, ½ degrees, blade 42 inches long, nickel-plated		10 25
1484.—Limb-Protractor, ½ degrees, blade 48 inches long, nickel-plated		11 50



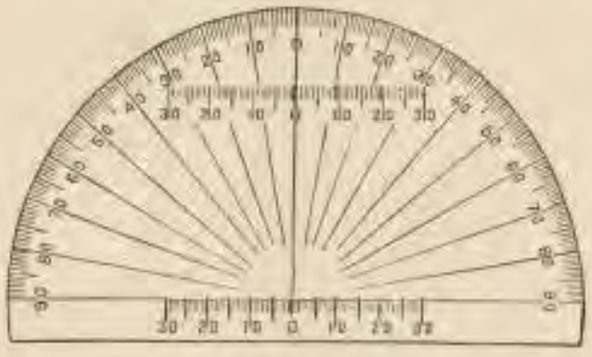
(About One-Half Size).

No. 1486.

No.	Price.	Post.
1486.—Steel Protractor, divided to 1 degree, vernier to 5 minutes, 8½-inch blade. It is used with the T-rule or straight edge. It can be used either side up, and is very handy in dividing circles, transferring angles, laying off angles each side of a line without resetting. In morocco case	$7 75	$0 35

DUFFIELD'S PATENT PROTRACTORS.

Made of transparent celluloid, and with two parallel scales of twenty parts to the inch to enable the zero line to be set parallel to meridian lines drawn on the paper.



No. 1490.

No.		Price.	Post.
1490.	—Protractor, 6 inches diameter, half circle, half degrees	$3 00	$0 12
1492.	—Protractor, 9 inches diameter, half circle, half degrees	3 50	15
1494.	—Protractor, 12 inches diameter, half circle, quarter degrees	4 00	20

SCALES AND RULES.

No.		Price.	Post.
1560.	—Ivory Rectangular Protractor, 6 inches long, 1¾ inches wide, with scales as follows: front side divided around edges from 0 to 180 degrees in single degrees, scales ¼, ½, ¾ and 1 inch to the foot, and scale of chords. Reverse side scales of 30, 35, 40, 45, 50 and 60 parts to the inch, scale of chords and diagonal scale of inches and 1-100ths	$1 50	$0 12
1570.	—Boxwood Rectangular Protractor, 6 inches long, 1¾ inches wide, whole degrees, with scales of ¼, ½, ¾ and 1 inch, scale of chords, and diagonal scale	35	03
1573.	—Ivory Scale, 6-inch with diagonal and chain scales	85	08
1577.	—Boxwood Scale, 6 inches, divided ⅛, ¼, ½, 1 inch to the foot	50	03
1578.	—Boxwood Scale, 12 inches, divided ⅛, ¼, ½, 1-inch to the foot	75	06
1590.	—Boxwood White-Edge Scale, 6-inch, divided ⅛, ¼, ½, 1-inch to the foot	75	03
1591.	—Boxwood White-Edge Scale, 12-inch, divided ⅛, ¼, ½, 1-inch to the foot	1 25	14
1615.	—Boxwood Scale, 6-inch, divided 10 and 50 parts to the inch	50	03
1616.	—Boxwood Scale, 6-inch, divided 20 and 40 parts to the inch	50	03
1618.	—Boxwood Scale, 12-inch, divided 10 and 50 parts to the inch	75	06
1619.	—Boxwood Scale, 12-inch, divided 20 and 40 parts to the inch	75	06
1632.	—Boxwood White-Edge Scale, 12-inch, divided 10 and 50 parts to the inch	1 25	14
1633.	—Boxwood White-Edge Scale, 12-inch divided 20 and 40 parts to the inch	1 25	14
1655.	—Triangular Boxwood Scale, 6-inch, divided ⅛, ¼, ⅜, ½, ¾, 1, 1½, 2, 3 and 4 inches to the foot, and one edge inches and 16ths	60	04
1656.	—Triangular Boxwood Scale, 12-inch, divided ⅛, ¼, ⅜, ½, ¾, 1, 1½, 2, 3 and 4 inches to the foot, and one edge inches and 16ths	1 00	14
1660.	—Triangular Boxwood Scale, 6-inch, divided 10, 20, 30, 40, 50 and 60 parts to the inch	60	04
1661.	—Triangular Boxwood Scale, 12-inch, divided 10, 20, 30, 40, 50 and 60 parts to the inch	1 00	14
1670.	—Triangular Boxwood Scale, 12-inch, divided 100, 200, 300, 400, 500 and 600 parts to the foot	1 50	14
1760.	—Combination Rule, one foot, two fold, boxwood. It combines in itself a Carpenter's Rule, Spirit-Level, Square, Plumb, Bevel, Indicator, Brace-Scale, Drafting-Scale of equal parts, T-Square, Protractor, Right-Angle Triangle, and Parallel Ruler	2 00	15
1762.	—Faber's Improved Calculating-Scale and Slide-Rule, 10½-inch, boxwood, with indicator and directions	3 75	20
1764.	—Engineers' Slide-Rule (Mannheim) 10-inch, boxwood, graduations on celluloid, with indicator and directions	4 50	15
1768.	—Stadia Slide-Rule, 20-inch, divided on white facings. This rule is designed to solve the equations generally used in stadia measurements	12 50	35

STRAIGHT-EDGES AND T-SQUARES.

No.		Price.	Post.
1802.—Steel Straight-Edge, 24-inch.	Plain, $1.50. Nickel-plated	$1 90	$0 24
1803.—Steel Straight-Edge, 30-inch.	Plain, $2.25. Nickel-plated	2 70	30
1811.—Steel Straight-Edge, 24-inch.	One edge beveled. Nickel-plated	3 00	24
1812.—Steel Straight-Edge, 30-inch.	One edge beveled. Nickel-plated	4 00	30
1822.—Mahogany Straight-Edge, 30-inch, amber edges.	One edge beveled	1 25	18
1841.—Hard Rubber Straight-Edge, square edges, 24-inch		75	08
1842.—Hard Rubber Straight-Edge, square edges, 30-inch		1 00	18
1852.—Hardwood Straight-Edge, one edge beveled, 30-inch		40	12
1853.—Hardwood Straight-Edge, one edge beveled 36-inch		45	15
1862.—Mahogany T-Square, 30-inch, with amber edges and fixed head		1 90	45
1863.—Mahogany T-Square, 36-inch, with amber edges and fixed head		2 35	50
1872.—Mahogany T-Square, 30-inch, with amber edges and shifting head		2 60	50
1882.—Rubber Blade T-Square, 30-inch, with hardwood fixed head		1 60	45
1898.—Steel Blade T-Square, 30-inch, with iron head. Nickel-plated		4 50	45
1904.—Steel Blade T-Square, 30-inch, with iron shifting head. Nickel-plated		5 75	55
1911.—Hardwood T-Square, 30-inch, with fixed head		50	45
1919.—Hardwood T-Square, 30-inch, with shifting head		1 00	50
1924.—"R. P. I." Hardwood T-Square, 30-inch, beveled edges, curved head		1 25	45

DRAWING-TABLES AND DRAWING-BOARDS.

No.		Price.
1953.—Drawing-Table, adjustable, ash top 24x22 inches		$8 00
1954.—Drawing-Table, adjustable, ash top, 24x22 inches, and with instrument shelf, 24x7 inches		9 00
1956.—Drawing-Table, adjustable, black walnut top, 26x22 inches, instrument shelf 26x7 inches, two drawers, ornamented stand		12 00
1958.—Drawing-Table, ash top, 26x22 inches, with instrument shelf and two drawers and with folding arm and plain shelf, ornamented stand		17 00

Note.—These Tables are adjustable for horizontal and angular motion and for heights about 30 to 44 inches. The shelves and drawers remain level when the top is inclined. They are mounted on an iron stand with castors.

1962.—Drawing-Board, pinewood, 20x15 inches, tongue and groove ends		75
1964.—Drawing-Board, pinewood, 28x20 inches, tongue and groove ends		1 50
1966.—Drawing-Board, pinewood, 40x28 inches, tongue and groove ends		2 50
1978.—Folding Trestle, hardwood, 37 inches high combined with adjustable Drawing-Board of pinewood, 42x31 inches, and hinged to the Trestle. All folding compactly		13 00
1979.—Folding Trestle and Drawing-Board, same as No. 1978, but with the Drawing-Board 55x33 inches		16 00

SECTION-LINERS.

No.		Price.
2155.—Section-Liner with 12-inch rack and 12-inch blade		$6 50
2156.—Section-Liner with 14-inch rack and 14-inch blade		7 50

Two plain notched wheels are furnished with each instrument for producing 64 and 100 parts to the inch. Extra wheels for either 10, 12, 20, 24, 40, 48 and 50 parts to the inch will be furnished for $1.50 each. These notched wheels when graduated on the face for ruling and measuring combined will cost $2.25 each.

Each of the above Section-Liners is packed in a box with printed directions for use.

No.		Price.	Post.
2168.—Marion's Section-Liner, with 7-inch triangle and 10-inch ruler		$2 00	$0 20
2170.—Standard Section-Liner. Especially adapted for school use and mechanical sectional drawing		1 50	20
2177.—Both's Section-Liner and Scale-Divider, with 14¾-inch base, 9-inch rack, arm 10-inch beyond protractor		12 00	40

TRIANGLES.

No.		Price.	Post.
1984.	Open Steel Triangle, 8-inch, 30x60x90 degrees, nickel-plated	$3 85	$0 20
1992.	Open Steel Triangle, 6½-inch, 45x45x90 degrees, nickel-plated	3 50	18
2004.	Open German Silver Triangle, 8-inch, 30x60x90 degrees	3 00	20
2012.	Open German Silver Triangle, 6-inch, 45x45x90 degrees	2 75	18
2026.	Transparent Amber Triangle, 8-inch, 30x60x90 degrees	55	06
2028.	Transparent Amber Triangle, 10-inch, 30x60x90 degrees	75	08
2038.	Transparent Amber Triangle, 6-inch, 45x45x90 degrees	55	05
2042.	Transparent Amber Triangle, 8-inch, 45x45x90	75	08
2056.	Hard Rubber Triangle, 8-inch, 30x60x90 degrees	45	06
2058.	Hard Rubber Triangle, 10-inch, 30x60x90 degrees	65	08
2060.	Hard Rubber Triangle, 12-inch, 30x60x90 degrees	90	10
2076.	Hard Rubber Triangle, 6-inch, 45x45x90 degrees	45	05
2077.	Hard Rubber Triangle, 7-inch, 45x45x90 degrees	50	07
2078.	Hard Rubber Triangle, 8-inch, 45x45x90 degrees	65	08
2092.	Hardwood Triangle, framed, 6-inch, 30x60x90 degrees	20	04
2094.	Hardwood Triangle, framed, 8-inch, 30x60x90 degrees	25	06
2107.	Hardwood Triangle, framed, 5-inch, 45x45x90 degrees	20	05
2108.	Hardwood Triangle, framed, 6-inch, 45x45x90 degrees	25	05
2140.	Hard Rubber Lettering Triangles for block letters, per set of three	1 35	12
2145.	Hard Rubber Lettering Triangles for shaded letters, per set of three	1 20	12
2147.	Transparent Amber Lettering Templets, per set of three	2 00	15

CURVES.

No.		Price.	Post.
2180.	Rubber Irregular Curves, various patterns.....35c, 40c and	$0 50	$0 05
2182.	Transparent Amber Curves, various patterns.....45c, 60c and	75	05
2184.	Wood Curves, various patterns.....20c, 25c and	35	05
2186.	Adjustable Curve-Ruler, 14½ inches long. This ruler can be adjusted to any form of curve	1 87	15
2190.	Rubber Ellipses, 6 in a set, 2 to 4½-inch, per set	1 50	13
2195.	Wood Ellipses, 10 in a set, 1½ to 6-inch, per set	2 00	16
2211.	Set of 10 Wood Curves, cut to a scale of inches, from 12 to 120 inches radius, varying every 12 inches, in box	3 50	30
2215.	Set of 24 Wood Curves, cut to a scale of inches, from 1½ to 24 inches radius, varying every ½-inch up to 10 inches and then every 2 inches up to 24 inches, in box	8 00	40
2227.	Set of 12 Wood Curves, cut to a scale of 100 feet to the inch, from 1° to 12°, varying every degree, in box	6 00	30
2239.	Set of 20 Wood Curves, cut to a scale of 400 feet to the inch, from 30′ to 10°, varying every 30 minutes, in box	8 00	35

PARALLEL RULERS.

No.		Price.	Post.
2250.	Ebony Parallel Ruler, 6-inch	$0 30	$0 04
2252.	Ebony Parallel Ruler, 12-inch	75	08
2262.	Rubber Parallel Ruler, 12-inch	1 25	16
2271.	Ebony Parallel Ruler, on rollers, 12-inch	3 25	25
2280.	Ebony Parallel Ruler, on rollers 12-inch, with white edges graduated ⅛, ¼, ½ and 1 inch to the foot	5 00	25
2286.	Brass Parallel Ruler, on rollers, 12-inch	8 50	40
2293.	German Silver Parallel Ruler, on rollers, 12-inch	10 00	40

PANTOGRAPHS FOR ENLARGING OR REDUCING DRAWINGS.

No.		Price.	Post.
2300.	Pantograph, hardwood, brass mountings, with arms 21 inches long	$1 75	$0 30
2302.	Pantograph, hardwood, nickel-plated mountings, with arms 18 to 20 inches long	2 50	30
2304.	Pantograph, hardwood, brass mountings, with arms 22 inches long	3 50	
2306.	Pantograph, hardwood, brass mountings, with arms 41 inches long	5 00	

DRAWING-PAPER.*

ARCHITECTS' PAPER FOR PLANS.

WHITE, STRONG, SMOOTH SURFACE.

No.		Price.	Post.
2350.	Medium, 23x18-inch, per sheet, 6 cents; per quire	$1 25	$0 48
2352.	Super Royal, 28x20-inch, per sheet, 8 cents; per quire	1 75	65
2355.	30 inches wide, per roll of 10 yards	1 25	40
2356.	36 inches wide, per roll of 10 yards	1 50	50

WHATMAN'S DRAWING-PAPER.

SELECTED BEST QUALITY, GRAINED SURFACE.

No.		Price.	Post.
2360.	Demy, 20x15-inch, per sheet, 5 cents; per quire	$0 95	$0 28
2361.	Medium, 22x17-inch, per sheet, 7 cents; per quire	1 40	36
2363.	Super Royal, 27x19-inch, per sheet, 10 cents; per quire	2 10	53
2368.	Double Elephant, 40x26-inch, per sheet, 25 cents; per quire	5 75	1 28

DETAIL DRAWING-PAPER, CREAM BUFF TINT.

SUPERIOR QUALITY, IN ROLLS OF ABOUT 40 LBS.

No.		Price.	Post.
2389.	30 inches wide, medium, per pound, 29 cents; per yard	$0 13	$0 10
2390.	36 inches wide, medium, per pound, 29 cents; per yard	15	12
2391.	42 inches wide, medium, per pound, 29 cents; per yard	20	20

BLEACHED MANILLA PAPER.

FOR WORKSHOP DRAWINGS. IN ROLLS OF ABOUT 50 POUNDS.

No.		Price.	Post.
2395.	36 inches wide, medium, per pound, 12 cents; per yard	$0 08	$0 12
2396.	42 inches wide, medium, per pound, 12 cents; per yard	10	14

AMERICAN WHITE ROLL DRAWING-PAPER.

VERY STRONG AND OF EXCELLENT QUALITY, IN ROLLS OF ABOUT 40 POUNDS.

No.		Price.	Post.
2410.	36 inches wide, smooth surface, per pound, 45 cents; per yard	$0 25	$0 12
2411.	42 inches wide, smooth surface, per pound, 45 cents; per yard	30	14
2413.	62 inches wide, smooth surface, per pound, 45 cents; per yard	50	
2414.	72 inches wide, smooth surface, per pound, 50 cents; per yard	70	

BEST EGGSHELL DRAWING-PAPER.

IN ROLLS OF ABOUT 40 POUNDS.

No.		Price.	Post.
2430.	36 inches wide, pebbled surface, per pound, 50 cents; per yard	$0 33	$0 13
2431.	42 inches wide, pebbled surface, per pound, 50 cents; per yard	38	15
2434.	58 inches wide, pebbled surface, per pound, 50 cents; per yard	50	

*Note.—Small quantities of paper must be put on a wooden roller when sent by mail. Several yards can be put on a single roller, with but little extra cost for postage. The pound price for papers Nos. 2389 to 2434 applies only to full rolls.

MOUNTED DRAWING-PAPER.

WHITE, MOUNTED ON MUSLIN, IN ROLLS OF 10 YARDS.

No.		Price.	Post.
2450.	American, 36 inches wide, smooth surface, per roll, $6.65; per yard	$0 85	$0 25
2451.	American, 42 inches wide, smooth surface, per roll, $7.90; per yard	1 00	30
2453.	American, 62 inches wide, smooth surface, per roll, $12.50; per yard	1 60	
2454.	American, 72 inches wide, smooth surface, per roll, $18.00; per yard	2 25	
2460.	Eggshell, 36 inches wide, pebbled surface, per roll, $7.50; per yard	1 00	25
2461.	Eggshell, 42 inches wide, pebbled surface, per roll, $8.85; per yard	1 10	30
2464.	Eggshell, 58 inches wide, pebbled surface, per roll, $12.60; per yard	1 50	

Large pieces for City, County or State Maps, mounted to order.

TRACING-PAPER.

No.		Price.	Post.
2470.	Pellucid, common, 21 inches wide, per yard, 5 cents; per roll of 20 yards	$0 75	$0 18
2472.	Vegetable, 30 inches wide, per yard, 10 cents; per roll of 20 yards	1 50	40
2474.	Bank Note, 36 inches wide, per yard, 10 cents; per roll of 20 yards	1 62	40
2476.	Parchment, 40 inches wide, per yard, 25 cents; per roll of 20 yards	4 00	60
2480.	Vegetable, 25x19 inches, per sheet, 10 cents; per quire	2 00	20
2482.	Flaxine, 31x21 inches, per sheet, 12 cents; per quire	2 50	25
2484.	Bond, 21x16 inches, per sheet, 6 cents; per quire	1 00	20
2486.	Bond, 30x19 inches, per sheet, 8 cents; per quire	1 40	30
2493.	Pounce Powder, in tin shaker, for Tracing-Cloth, each	15	07

TRACING-CLOTH.

FACE GLAZED AND BACK DULL, SUITABLE FOR PENCIL OR INK MARKS.

No.		Price.	Post.
2494.	—Imperial, 18 inches wide, per yard, 22 cents; per roll of 24 yards	$4 00	$0 55
2495.	—Imperial, 30 inches wide, per yard, 35 cents; per roll of 24 yards	6 90	70
2496.	—Imperial, 36 inches wide, per yard, 40 cents; per roll of 24 yards	7 60	1 10
2497.	—Imperial, 42 inches wide, per yard, 55 cents; per roll of 24 yards	10 50	1 25

PREPARED BLUE-PRINT PAPERS.

BEST QUALITY; READY FOR IMMEDIATE USE.

No.		Price.	Post.
2506.	—Sensitized Paper, 24 inches wide, per yard, 15 cents; per roll of 10 yards	$1 00	$0 35
2508.	—Sensitized Paper, 30 inches wide, per yard, 18 cents; per roll of 10 yards	1 50	45
2510.	—Sensitized Paper, 36 inches wide, per yard, 20 cents; per roll of 10 yards	1 65	55
2515.	—White Ink for making alterations on Blue-Prints, per bottle	20	06
2516.	—Red Ink for making alterations on Blue-Prints, per bottle	20	06

PRINT-FRAMES AND BATH-TRAYS.

No.		Price.
2534.	—Print-Frame, complete with Plate-Glass and Cushion, 24x20 inches, each	$10 00
2536.	—Print-Frame, complete with Plate-Glass and Cushion, 30x24 inches, each	12 00
2540.	—Zinc Bath-Tray, for washing copies, 24x20 inches, each	3 75
2542.	—Zinc Bath-Tray, for washing copies, 30x24 inches, each	4 50

PROFILE-PAPER.

PLATE A. RULINGS 4x20 TO THE INCH.

No.		Price.	Post.
2581.	—Plate A, sheet 42x15 inches, per sheet	$0 40	$0 05
2584.	—Plate A, continuous, 20 inches wide, 50 yards in roll, per yard	24	05
2588.	—Plate A, continuous, 20 inches wide, on tracing-paper, per yard	24	05
2589.	—Plate A, continuous, 20 inches wide, on tracing-cloth, per yard	75	08

PLATE B. RULINGS 4x30 TO THE INCH.

2596.	—Plate B, sheet 42x13½ inches, per sheet	40	05
2600.	—Plate B, continuous, 20 inches wide, 50 yards in roll, per yard	24	05
2604.	—Plate B, continuous, 20 inches wide, on tracing-paper, per yard	24	05
2605.	—Plate B, continuous, 20 inches wide, on tracing-cloth, per yard	75	08
2610.	—Metric.—In continuous roll, rulings 50 centimeters wide, in millimeters, with each fifth millimeter, each centimeter, and each decimeter, proportionally heavier than the millimeters, per yard	24	05

CROSS-SECTION PAPERS.

(PRINTED FROM COPPER PLATES.)

No.		Price.	Post.
2620.	—Cross-Section Paper, Plate C, rulings 20x16 inches, 8 feet to inch, per sheet, 20 cents; per quire	$3 50	$0 40
2621.	—Cross-Section Paper, Plate F, rulings 20x16 inches, 10 feet to inch, per sheet, 20 cents; per quire	3 50	40
2622.	—Continuous Cross-Section Paper, Plate F, 20 inches wide, ruled 10 feet to inch, in rolls of 50 yards, per yard	24	05
2623.	—Continuous Cross-Section Paper, Plate F, 20 inches wide, ruled 10 feet to inch on tracing-paper, per yard	24	05
2630.	—Cross-Section Paper, Metric, rulings every millimeter, size of sheet, 50x40 centimeters, per sheet, 20 cents; per quire	3 50	40

The following list of Cross-Section Papers, being ruled, are much cheaper than those printed from copper plates:

2635.	—Ruled Cross-Section Paper, 4 spaces to inch, 21x16 inches, per quire	1 00	35
2636.	—Ruled Cross-Section Paper, 8 spaces to inch, 21x16 inches, per quire	1 00	35
2637.	—Ruled Cross-Section Paper, 10 spaces to inch, 21x16 inches, per quire	1 00	35
2638.	—Ruled Cross-Section Paper, 12 spaces to inch, 21x16 inches, per quire	1 00	35

THUMB-TACKS, ETC.

No.		Price.	Post.
2680.	Brass Thumb-Tacks, round head, ¼-inch diameter, per dozen	$0 10	$0 02
2681.	Brass Thumb-Tacks, round head, ⅜-inch diameter, per dozen	15	02
2682.	Brass Thumb-Tacks, round head, ½-inch diameter, per dozen	25	02
2684.	German Silver Thumb-Tacks, round head, ⅜-inch diameter, per dozen	25	02
2685.	German Silver Thumb-Tacks, round head, ½-inch diameter, per dozen	30	02
2692.	Steel Thumb-Tacks, flat head, ⅜-inch diameter, per dozen	08	02
2694.	Steel Thumb-Tacks, flat head, 9-16-inch diameter, per dozen	12	02
2703.	Brass Paper-Fasteners, prongs ⅝-inch, per dozen	08	02
2710.	Handy Paper-Cutter, for cutting drawings from the board	35	03

CONTINUOUS PROFILE-BOOKS.

Printed on fine paper, mounted on muslin, and bound in book form.

No.		Price.	Post.
2715.	Plate A, 8½x6 inches, profile 12 miles, Morocco binding	$2 00	$0 15
2716.	Plate A, 8½x6 inches, profile 25 miles, Morocco binding	3 25	18
2717.	Plate A, 8½x6 inches, profile 50 miles, Morocco binding	5 25	20
2720.	Plate B, 8x5¼ inches, profile 12 miles, Morocco binding	2 00	13
2721.	Plate B, 8x5¼ inches, profile 25 miles, Morocco binding	3 25	15
2722.	Plate B, 8x5¼ inches, profile 50 miles, Morocco binding	5 25	18

ENGINEERS' BLANK FIELD-BOOKS.

No.		Price.	Post.
2725.	Level-Books, 6¾x4¼ inches, per dozen, $5.00; or single	$0 50	$0 05
2728.	Transit-Books, 6¾x4¼ inches, per dozen, $5.00; or single	50	05
2731.	Record-Books, 6¾x4¼ inches, per dozen, $5.00; or single	50	05
2738.	Cross-Section Books, 6¾x4¼ inches, ruled in 10ths, per dozen, $5.00; or single	50	05
2742.	Cross-Section Books, 8x7 inches, ruled in 10ths, per dozen, $10.00; or single	1 00	15

PENCILS, PENS, RUBBER AND MUCILAGE.

No.		Price.	Post.
2750.	Faber's Hexagon, Siberian, best Drawing-Pencils, Nos. 2B to 8H, per doz.	$1 25	$0 12
2752.	Faber's Hexagon Drawing-Pencils, Nos. 1 to 5, per dozen	75	04
2754.	Faber's Round Drawing-Pencils, Nos. 1 to 4, per dozen	60	04
2758.	Faber's Round, Nos. 2 and 3 Pencils, rubber tip, for office use, per dozen	50	04
2778.	Hardtmuth's Koh-i-noor Pencils, Hexagon H to 8H, per dozen	1 25	12
2785.	Faber's Round, red, blue, green and yellow Pencils, per dozen	75	05
2795.	Venetian Crayons, dark red, for marking stakes per dozen	60	15
2797.	Hexagon Lumber Crayons, red or blue, for marking stakes, per dozen	75	15
2800.	Gillott's Mapping-Pens, per dozen	60	02
2802.	Gillott's Lithographic Crow Quill Pens, per dozen	60	02
2807.	Gillott's Writing-Pens, No. 303, per dozen, 15 cents; per gross	1 40	10
2810.	Falcon Writing-Pens, No. 048, per dozen, 10 cents; per gross	75	04
2820.	Pens for Round-writing, single pointed, Nos. 1 to 6, per dozen	12	02
2826.	Pens for Round-writing, sample box, assorted	35	04
2830.	Text-Book to Round-writing	65	05
2835.	Steel Blade Eraser, cocoa handle	35	03
2840.	Faber's New Pencil-Sharpener, superior	25	03
2852.	Faber's Artists' Rubber, 1¾x1¼-inch	10	02
2864.	Faber's Ink-Eraser, 1½x1-inch	05	01
2880.	Bevel Rubber, green, oblong, No. 40	06	01
2882.	Bevel Rubber, green, oblong, No. 20	12	02
2887.	Hardtmuth's Pliable Rubber, grey, flat, No. 30	10	02
2888.	Hardtmuth's Pliable Rubber, grey, flat, No. 20	15	03
2890.	Multiplex Rubber, oblong, 2x½-inch, superior	10	02
2892.	Multiplex Rubber, oblong, 2¾x¾-inch, superior	25	03
2896.	Sponge Rubber, for cleaning drawings, 2x2x1-inch	30	03
2915.	Drawing-Board Mucilage, superior, 3 ounce jar	15	13
2919.	Taurine Mucilage, fine quality, 4 ounce bottle	20	15
2923.	Photo-Mounter, fine quality, 3 ounce jar	15	13

DRAWING-INKS, COLORS, BRUSHES, ETC.

No.		Price.	Post.
2925.	Higgins' Waterproof Black Ink, per bottle	$0 25	$0 07
2930.	Higgins' Waterproof Carmine Ink, per bottle	25	07
2933.	Higgins' Waterproof Blue Ink, per bottle	25	07
2936.	Higgins' Waterproof Green Ink, per bottle	25	07
2937.	Higgins' Waterproof Yellow Ink, per bottle	25	07
2967.	India Ink, black, super-super, 3x½-inch, per cake	50	03
2970.	India Ink, black, double dragon, fine, 3⅝x⅞-inch, per cake	2 00	12
2980.	India Ink, black, waterproof, fine, 3¾-inch, per cake	1 00	12
2990.	Winsor & Newton's Water-Colors, in china pans, half size, Burnt Umber, Burnt Sienna, Hooker's Green No. 2, Light Red, Payne's Grey, Prussian Blue, Vermilion, Yellow Ochre, each	15	01
2992.	Winsor & Newton's Water-Colors, Crimson Lake, Sepia, each	25	01
2996.	Winsor & Newton's Water-Colors, Carmine, Rose Madder, each	45	01
3020.	Camel Hair Quill Brushes, each.....5c, 6c, 8c and	10	01
3025.	Red Sable Quill Brushes, each.....10c, 12c, 15c, 20c and	25	01
3030.	Camel Hair Brushes, in tin, with handle, each.....10c, 12c and	15	02
3035.	Red Sable Brushes, in Albata, with handle, each..20c, 25c, 35c, 45c and	60	02
3040.	Camel Hair Wash Brushes, in tin, with handle, each.18c, 20c, 25c, 35c and	45	02
3056.	Ink or Color-Slab, 4x2½ inches	25	10
3070.	Ink-Slab, china, with cover, 4½x1¾ inches	35	12
3075.	Nest of 5 Color-Saucers, with a cover, 2⅜-inch diameter	45	10
3076.	Nest of 5 Color Saucers, with a cover, 2⅝-inch diameter	55	13

MAGNIFIERS.

No.		Price.	Post.
3520.	Magnifier, rubber case, double-convex lens, 1-inch diameter	$0 40	$0 02
3522.	Magnifier, rubber case, double-convex lens, 1½-inch diameter	70	03
3542.	Magnifier, white celluloid case, double-convex lens, 1-inch diameter	80	02
3543.	Magnifier, white celluloid case, double-convex lens, 1¼-inch diameter	1 00	03
3546.	Magnifier, aluminum case, double-convex lens, ⅞-inch diameter	90	10
3566.	Coddington Lens, brass mounted, high power	1 00	12
3570.	Coddington Lens, nickeled frame and cover, ½-inch focus, high power.	1 50	12
3575.	Aplanatic Triplet, nickeled frame and cover, ½-inch focus, superior power, 20 times, perfect definition	6 00	12
3585.	Reading-Glass, 2-inch diameter, nickeled frame with handle	80	05
3587.	Reading-Glass, 3-inch diameter, nickeled frame with handle	1 50	15

SPIRIT-LEVELS.

No. 3660.

No.		Price.	Post.
3660.	Pocket Spirit-Level (Gurley, maker), brass mounted, 6-inch long, and adjustable, with ground and graduated level-vial, in case	$3 50	$0 18

No. 3675.

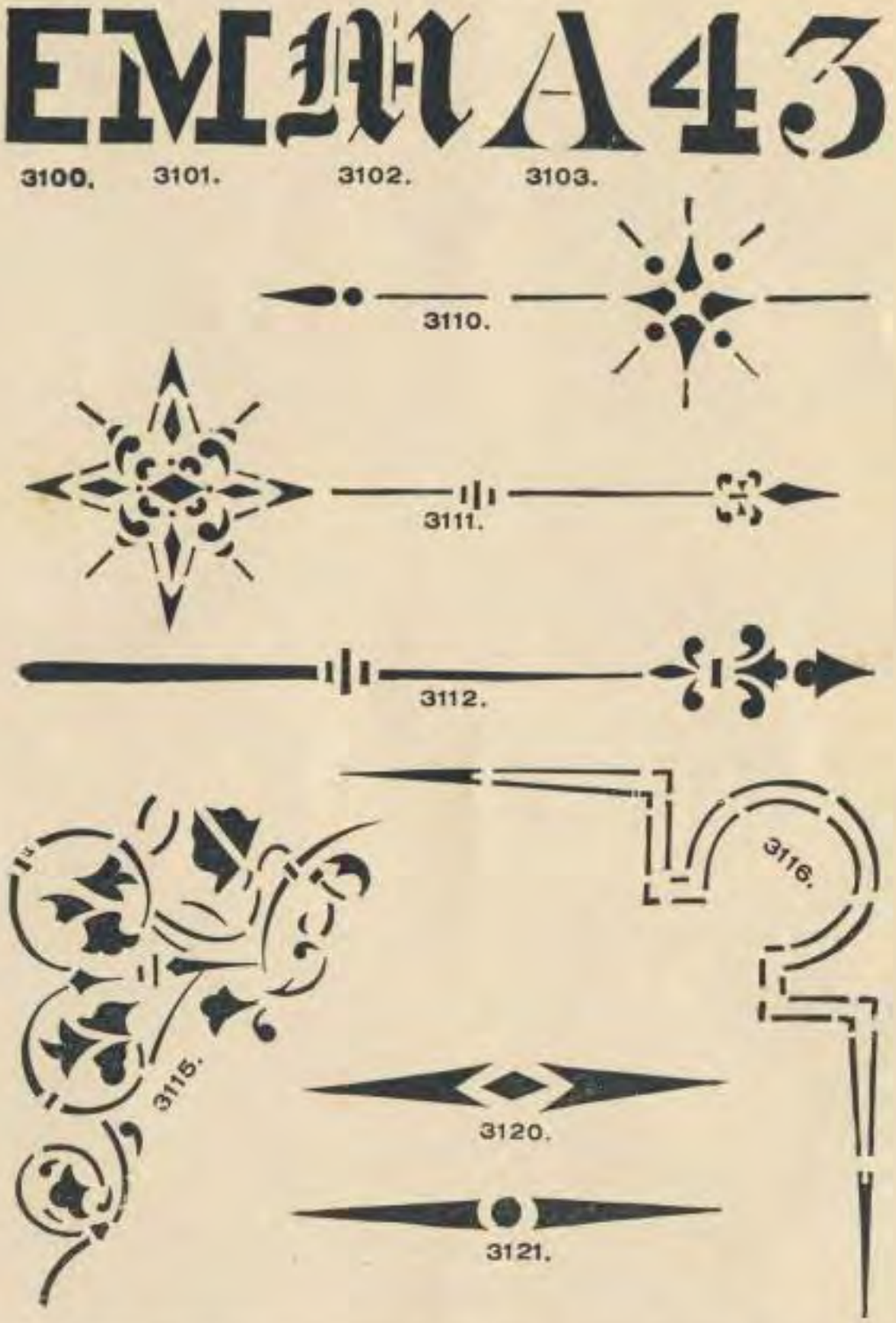
3675.—Ground and Graduated Level-Vials unmounted; 2-inch, 50 cents; 3-inch, 75 cents; 4-inch, $1.05; 5-inch, $1.45; 6-inch, $1.80; 6½-inch, $2.00.

3690.—Ground Level-Vials, not graduated, unmounted; 2-inch, 40 cents; 3-inch, 60 cents; 4-inch, 90 cents; 5-inch, $1.25; 6-inch, $1.50; 7-inch, $1.85.

3710.—Plain Level-Vials, not graduated, unmounted; 2-inch, 12 cents; 3-inch, 15 cents; 4-inch, 20 cents; 5-inch, 35 cents; 6-inch, 50 cents; 7-inch, 75 cents.

Note.—If sent by mail, the postage on unmounted level-vials 2 to 7 inches long, will be 3 cents to 18 cents, according to size. All these level-vials, Nos. 3675, 3690 and 3710, are our own make and each one is carefully tested.

STENCIL-PLATES.



No.	Height of Letters.	¼ in.	⅜ in.	½ in.	⅝ in.	¾ in.	1 in.
3100.—Stencil-Alphabet		$1 00	$1 15	$1 30	$1 50	$1 75	$2 00
3101.—Stencil-Alphabet		1 85	2 00	2 15	2 30	2 50	2 75
3102.—Stencil-Alphabet		4 00	4 15	4 30	4 50	4 75	5 00
3103.—Stencil-Alphabet		1 85	2 00	2 15	2 30	2 50	2 75

A set of Figures to match any of these Alphabets will cost one-third the price of the same style and size of Alphabet.

Postage on each Alphabet	$0 14
Postage on each set of Figures, Nos. 3100, 3101 and 3103	04
Postage on each set of Figures, No. 3102	12

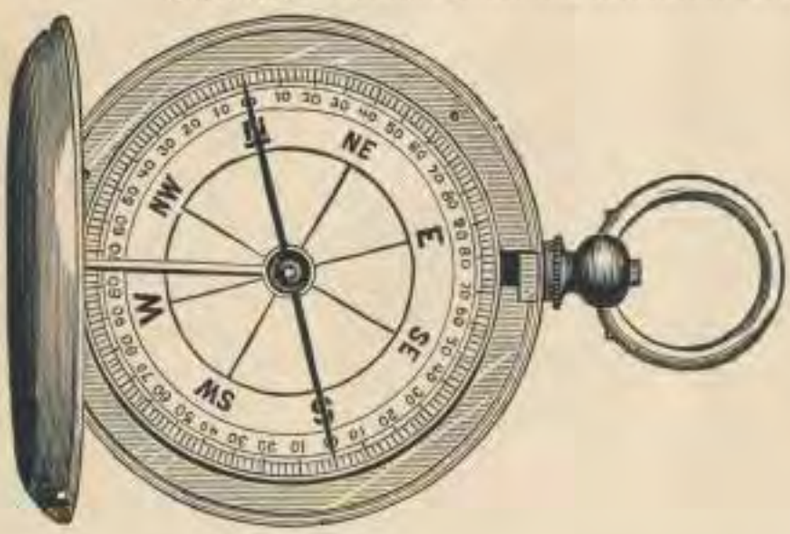
No.	Price.	Post.
3110.—North Point, full size	$0 50	$0 02
3111.—North Point, full size	75	02
3112.—North Point, full size	60	02
3115.—Ornamental Corner, full size	1 00	10
3116.—Ornamental Corner, full size	75	03
3120.—Dasher, full size	25	02
3121.—Dasher, full size	25	02

COMMON POCKET-COMPASSES.

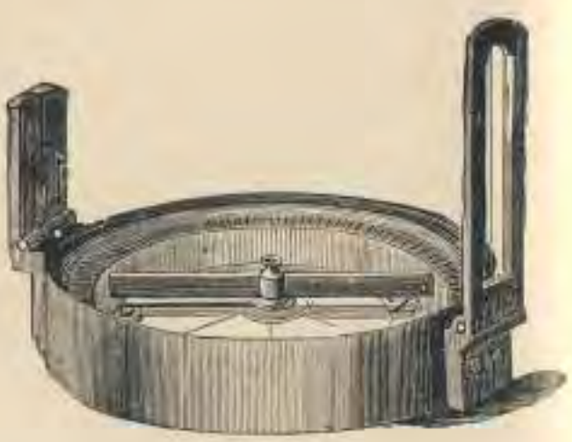
No. 3154.

No. 3160.

No.		Price.	Post.
3154.	—Government Pattern mahogany case, 3 inches square, raised ring, figured 0 to 360, superior needle 2 inches long, with stop, Gurley, maker	$3 50	$0 15
3155.	—Compass same as No. 3154, but 3¾ inches square, and needle 2½ inches long, with stop, figured 0 to 90 each way, Gurley, maker	4 50	18
3160.	—Brass, watch pattern 1½ inches diameter, stop, agate center	85	04
3165.	—Brass, round, 2 inches diameter, with cover, stop, agate center	1 25	12
3166.	—Brass, round, 2½ inches diameter, with cover, stop, agate center (superior)	2 50	14



No. 3175.



No. 3182.

No.		Price.	Post.
3175.	—Pocket-Compass; hunting-case, 1¾ inches diameter, spring-catch, stop, agate center	$3 50	$0 12
3182.	—Pocket-Compass, 2½ inches diameter, with cover, folding sights, stop, agate center	5 50	14
3186.	—Clinometer Compass, 2½ inches diameter, cover, pivoted sights, stop, agate center, morocco case	7 25	15
3188.	—Pocket-Compass, 3⅜ inches diameter, heavy case and cover, 2½-inch needle, stop, agate center, (superior) Gurley, maker	6 00	20
3194.	—Geological Compass, 2¾ inches diameter, and with clinometer	4 25	15
3200.	—Pocket-Compass, hunting-case, 2½ inches diameter, folding sights, stop, agate center	5 00	15
3220.	—Pocket Alt-Azimuth, with Telescope, for travelers and military surveyors. Altitudes, azimuths, compass bearings, clinometer degrees and levels are all obtained by this instrument. Size, 6½x2½x1⅛ inches in case	50 00	40

BRUNTON POCKET-TRANSIT. (Patented.)

No. 3215.

This instrument is designed for civil and mining engineers, mine managers and geologists. Its size and peculiar features adapt it to preliminary surveys, both underground and on the surface, taking topography, geological field work and any purpose for which a light pocket instrument is desirable.

It can be used in place of a Prismatic Compass, Sighting Compass, Clinometer and Abney Level. The case is of aluminum. Size 2¾x2¾x1 inches. Weight 8 ounces. Price, $25.00; or by mail, postpaid, $25.25.

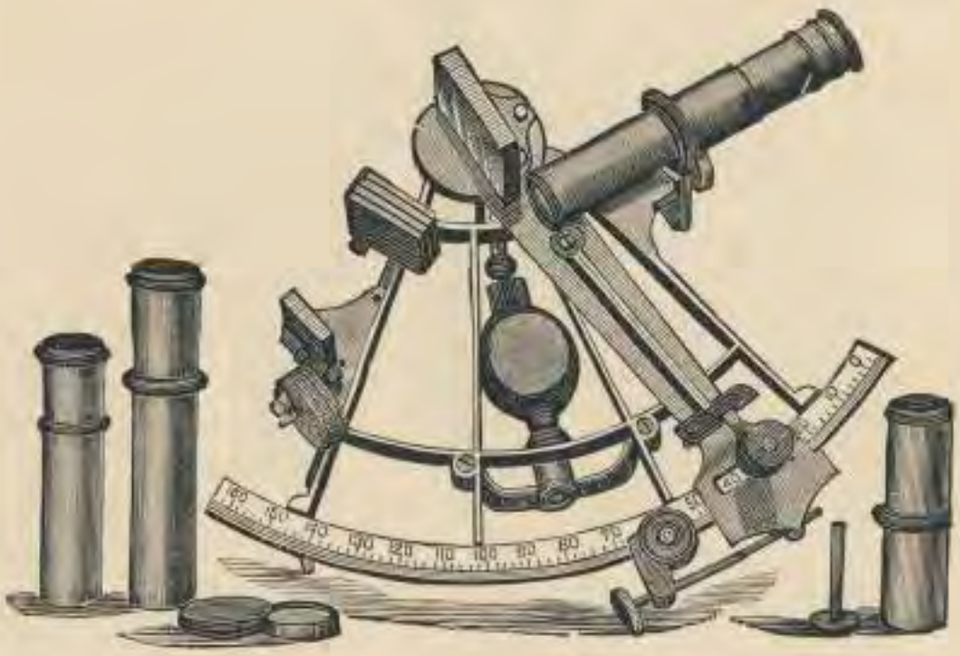
PRISMATIC COMPASSES.

No. 3225.

No. 3228.

No.	Price.	Post.
3225.—Prismatic Compass, 2⅛ inches diameter, hunting-case, folding prism and floating card dial. Can also be used as an ordinary compass.....	$15 00	$0 15
3227.—Prismatic Compass, 3 inches diameter, with floating card dial, folding prism, folding sight, nearly enclosed top, in leather sling case.....	16 00	20
3228.—Prismatic Compass, 3 inches diameter, with floating aluminum ring, folding prism, folding sight, (nearly enclosed top not shown in cut), in leather sling case	20 00	20
3230.—Prismatic Compass, Barker's Patent, 2¾-inch floating dial, agate center with stop, mounted beneath 2¾-inch pendulum dial, graduated for altitudes 0 deg. to 180 deg., also graduated 0 deg. to 90 deg. both ways as clinometer and with scale of rise or fall in inches per yard; folding prism and hair sight, metal case, and in leather sling case.....	27 00	25

SEXTANTS.



No. 3248.

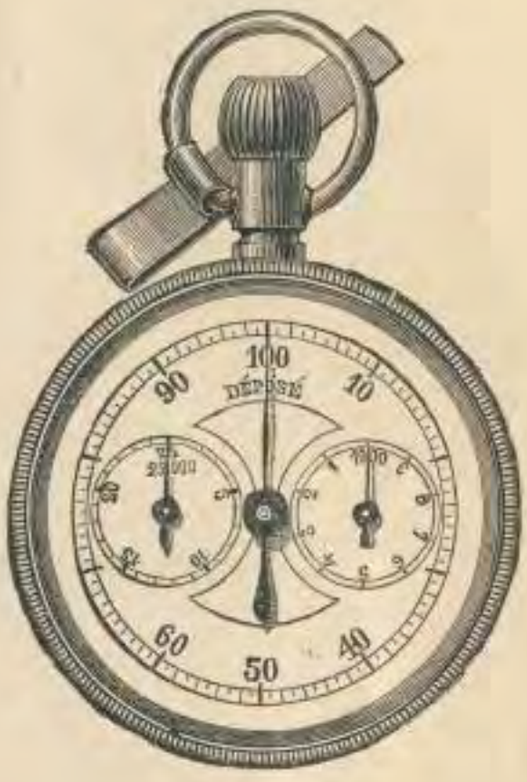
No.		Price.
3240.	Pocket Sextant to ½ degrees, vernier to 1 minute, telescope, two neutral glasses, magnifier, tangent screw, etc. In metal box 3 inches diameter, and in leather sling case	$42 50
3245.	Sextant of gun-metal, 4½ inches radius, arc of 150° to 15 minutes, vernier to 15 seconds, clamp and tangent, magnifier, one terrestrial telescope, one celestial telescope, one sight-tube, six neutral glasses, two mirrors, in mahogany box	50 00
3247.	Sextant of gun-metal, 6½ inches radius, arc of 150° to 10 minutes, vernier to 10 seconds, clamp and tangent, magnifier, two celestial telescopes, one terrestrial telescope, one sight-tube, seven neutral glasses, two mirrors, in mahogany box	80 00
3248.	Sextant of gun-metal, superior, 7 inches radius, arc of 150° to 10 minutes, vernier to 10 seconds, clamp and tangent, magnifier, two celestial telescopes, one terrestrial telescope, one sight-tube, seven neutral glasses, two mirrors, in mahogany box	100 00

ARTIFICIAL HORIZONS, ANGLE-MIRRORS AND PRISMS, SURVEYORS' CROSS-STAFF HEADS.

No.		Price.	Post.
3250.	Artificial Horizon, with black glass plane mounted in brass frame, with three leveling-screws and sensitive level-vial. In wood case	$16 00	$0 30
3252.	Mecurial Horizon, iron trough, iron bottle with screw stopper and funnel cap, glazed metal roof. In wood case	30 00	
3255.	Angle-Mirror, with small plummet, for angles of 90 degrees. In morocco case	7 50	15
3256.	Angle-Mirror, plain, for angles of 90 degrees. In morocco case	5 00	15
3260.	Rectangular Prism, for angles of 90 degrees. In morocco case	5 00	12
3262.	Double Prism, for angles of 90 and 45 degrees. In morocco case	10 00	12
3264.	Penta-Prism Range Finder, brass mounted, in leather case, with directions. Distances up to two miles easily determined	16 00	25
3265.	Surveyor's Cross-Staff Head, for angles of 90 and 45 degrees. Octagonal With staff socket	2 75	30
3267.	Surveyor's Cross-Staff Head, for angles of 90 and 45 degrees. Round. With staff socket and with vertical axis graduated to one degree and vernier to three minutes—with magnetic compass, 2⅛-inch needle	11 50	40

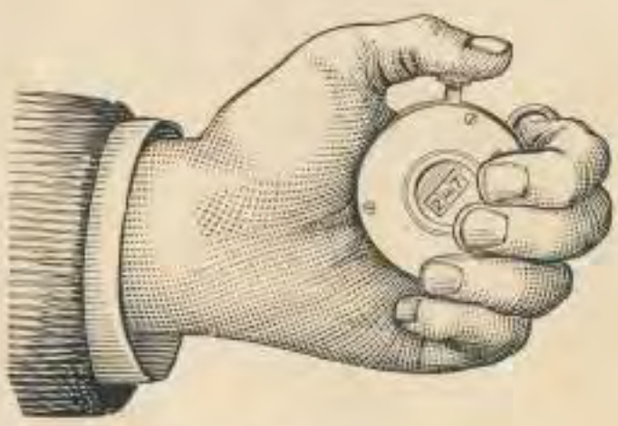
PEDOMETERS AND PASSOMETERS.

No. 3270.



No. 3276.

No.		Price.	Post.
3270.	—Pedometer, registers distance walked up to 12 miles by each ¼ mile.....	$4 50	$0 12
3272.	—Pedometer, registers distance walked up to 50 miles by each 80 yards....	5 25	12
3275.	—Passometer, or Step Counter, registers to 25,000 steps.....	6 00	12
3276.	—Passometer, same as No. 3275, but with stem attachment to set the pointers to zero at will.....	7 50	12



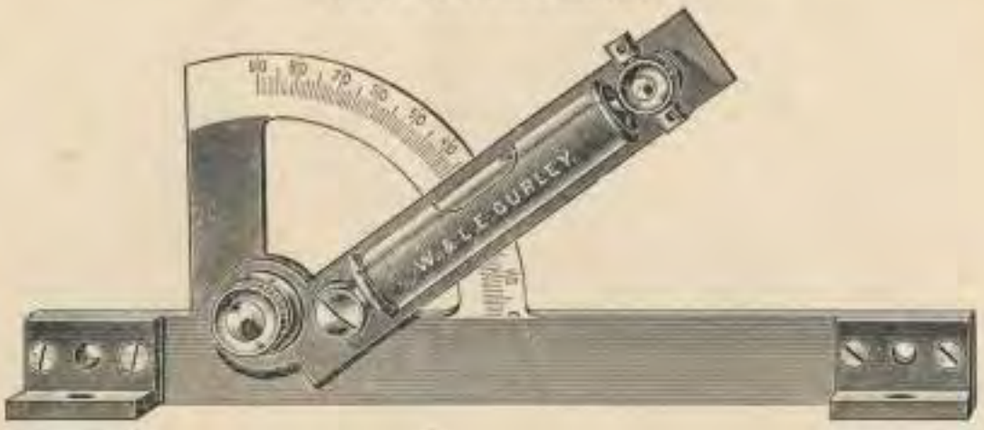
No. 3280.

No. 3282.

No.		Price.	Post.
3280.	—Tally-Register, for surveyors and others; useful in chaining, for counting persons, cattle, coal, wheat, etc. Registers to 999 and can be set to zero at will.....	2 50	$0 15
3282.	—Veeder Odometer, with fixtures for attaching.....	3 50	20

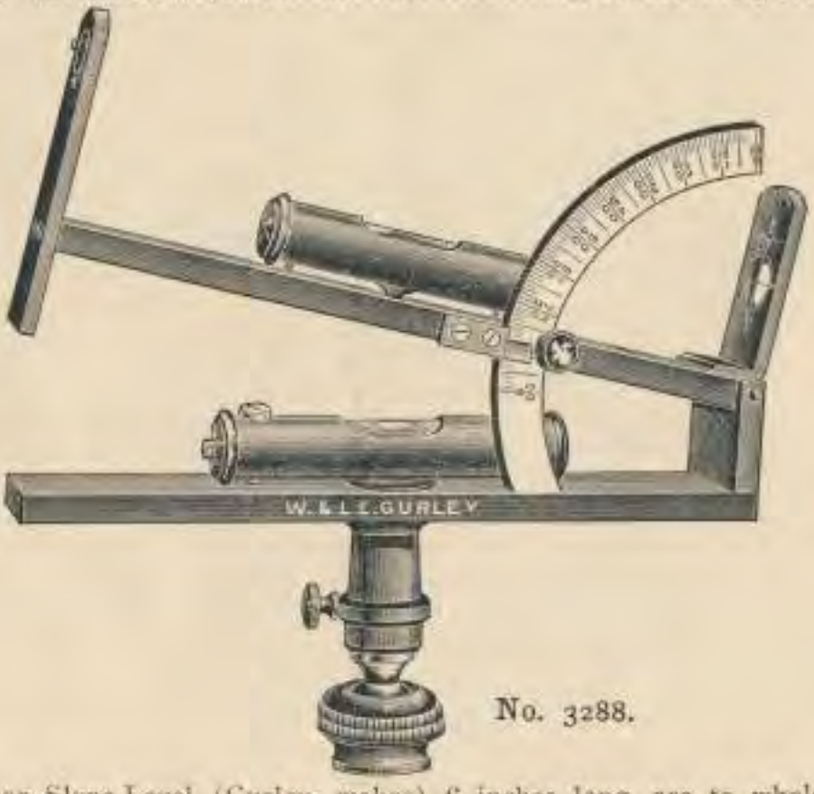
This Odometer registers on the dial every fifth revolution of the carrige wheel.

CLINOMETERS.



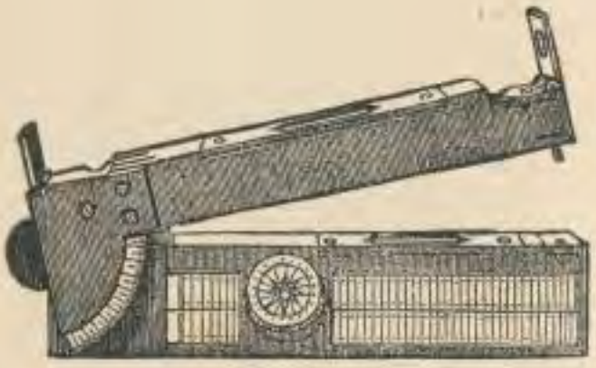
No. 3284.

No.		Price.	Post.
3284.	—Clinometer or Slope-Level (Gurley, maker) 7 inches long, arc to whole degrees, in wood case.....	$8 00	$0 30



No. 3288.

3288.	—Clinometer or Slope-Level (Gurley, maker) 6 inches long, arc to whole degrees, two levels, sights and staff mountings, in wood case.....	16 00	50



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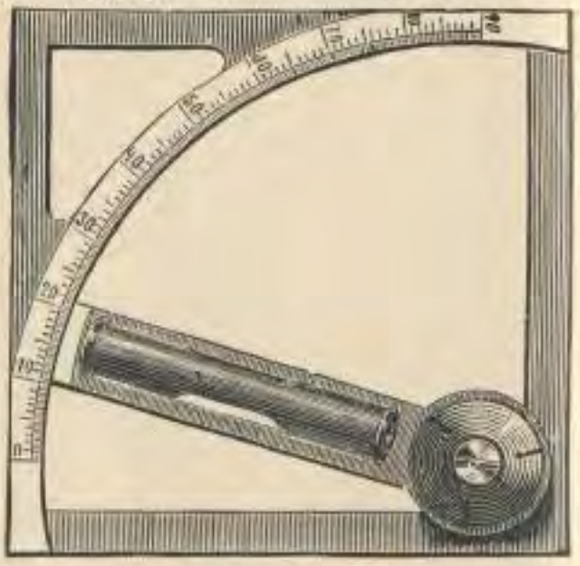


No. 3292.

3290.	—Boxwood Clinometer, 12 inches long, folding to 6 inches, with two levels, compass, inclination scale and folding sights, in leather case.....	12 00	20

The inclination scale gives the value of an angle. The angle ascertained from the graduated arc refers to that degree in the column marked "angle," and another column gives the rise or fall in any given measured distance.

3292.	—Clinometer, brass frame, 4 inches square, arc to whole degrees and vernier to five minutes, in case.....	10 00	40

ANEROID BAROMETERS.

FOR ASCERTAINING HEIGHTS, DIFFERENCES OF LEVEL AND METEOROLOGICAL CHANGES, APPROACH OF STORMS, ETC.

Aneroid Barometers, compensated for temperature, with brass cases and silvered dials, in morocco cases.

No.		Price.	Post.
3300.	Aneroid, 2 inches diameter, altitude scale to 3,000 feet, by each 10 feet...	$18 00	$0 20
3301.	Aneroid, 2 inches diameter, altitude scale to 5,000 feet, by each 20 feet...	17 00	20
3302.	Aneroid, 2 inches diameter, altitude scale to 10,000 feet, by each 50 feet..	18 00	20
3306.	Aneroid, 2¾ inches diameter, altitude scale to 10,000 feet, by each 50 feet, with thermometer, and opposite side with pocket-compass.....	27 00	30
3308.	Aneroid, 2¾ inches diameter, altitude scale to 16,000 feet, by each 50 feet, with thermometer, and opposite side with pocket-compass.....	29 00	30
3310.	Aneroid, 2¾ inches diameter, altitude scale to 3,000 feet, by each 10 feet..	19 00	25
3312.	Aneroid, 2¾ inches diameter, altitude scale to 5,000 feet, by each 20 feet..	18 00	25
3314.	Aneroid, 2¾ inches diameter, altitude scale to 10,000 feet, by each 50 feet.	19 00	25
3316.	Aneroid, 2¾ inches diameter, altitude scale to 16,000 feet, by each 50 feet.	20 00	25
3318.	Aneroid, 2¾ inches diameter, altitude scale to 20,000 feet, by each 100 feet	22 00	25
3322.	Aneroid, 2¾ inches diameter, altitude scale to 10,000 feet, by each 50 feet, and thermometer	22 00	25
3324.	Aneroid, 2¾ inches diameter, altitude scale to 16,000 feet, by each 50 feet, and thermometer	23 00	25
3330.	Metric Aneroid, 2¾ inches diameter, altitude scale to 3,000 meters, reading to 10 meters, and pressure scale reading to 1 millimeter.....	19 00	25
3332.	Metric Aneroid, 2¾ inches diameter, altitude scale to 5,000 meters, reading to 20 meters, and pressure scale reading to 2 millimeters.....	20 00	25
3336.	Plain Aneroid, no altitude scale, 5 inches diameter, with thermometer and open face to show mechanism, for parlor use.....	15 00	
3338.	Plain Aneroid, no altitude scale, 6½ inches diameter and with two thermometers reading to scales of Fahrenheit, Reaumur and Celsius, and open face to show mechanism, for parlor use.....	18 00	

NOTE.—The graduated spaces on the altitude scales of Barometers Nos. 3300 to 3332 can be subdivided by the eye or by using a magnifier and thus obtain a closer reading than advertised.

Barometers Nos. 3306 to 3332, will be furnished with a leather sling case (and omitting the morocco case), at an extra cost of $1.50.

SURVEYING AND MINING ANEROIDS.

BRONZED CASES, SILVERED DIALS WITH REVOLVING MAGNIFIER. COMPENSATED FOR TEMPERATURE. IN LEATHER SLING CASES.

No.		Price.	Post.
3350.	Surveying Aneroid, 3 inches diameter, altitude scale to 6,000 feet, by each 20 feet and by vernier to 2 feet.....	$42 00	$0 40
3352.	Surveying Aneroid, 3 inches diameter, with altitude scale to 10,000 feet, by each 50 feet and by vernier to 5 feet.....	45 00	40
3355.	Mining Aneroid, 3 inches diameter, arranged to register 2,000 feet below sea-level to 4,000 feet above, by each 20 feet, and by vernier to 2 feet....	42 00	40
3360.	Surveying Aneroid, 5 inches diameter, with altitude scale to 5,000 feet, by each 10 feet, and by vernier to 1 foot.....	50 00	
3362.	Surveying Aneroid, 5 inches diameter, with altitude scale to 10,000 feet by each 20 feet, and by vernier to 2 feet.....	52 00	
3364.	Surveying Aneroid, 5 inches diameter, with altitude scale to 15,000 feet by each 20 feet, and by vernier to 2 feet.....	54 00	
3366.	Surveying Aneroid, 5 inches diameter, with altitude scale to 20,000 feet, by each 50 feet, and by vernier to 5 feet.....	57 00	

The Surveying and Mining Aneroid has been constructed especially for the use of Surveyors and Engineers, for ascertaining slight variations in gradients, levels, etc. The Vernier Scale is moved by rack and pinion, and the magnifier facilitates the reading of the vernier.

A Treatise on the Aneroid Barometer; its construction and use. Illustrated. 50 cents.

ANEMOMETERS.

For Measuring the Pressure and Velocity of Currents of Air in Mines and Ventilators, Flues, etc., of Public Buildings.

This instrument placed in a passage of a mine registers automatically the rate at which the air is traveling through it, and a simple observation will detect any slackening of the current arising from obstruction of the ways, or want of attention at the ventilating furnace, or fan-wheel.

Suppose the observation for one minute gives:

Second Reading	525
First Reading	225
	300
Add corrections, say	30
	330

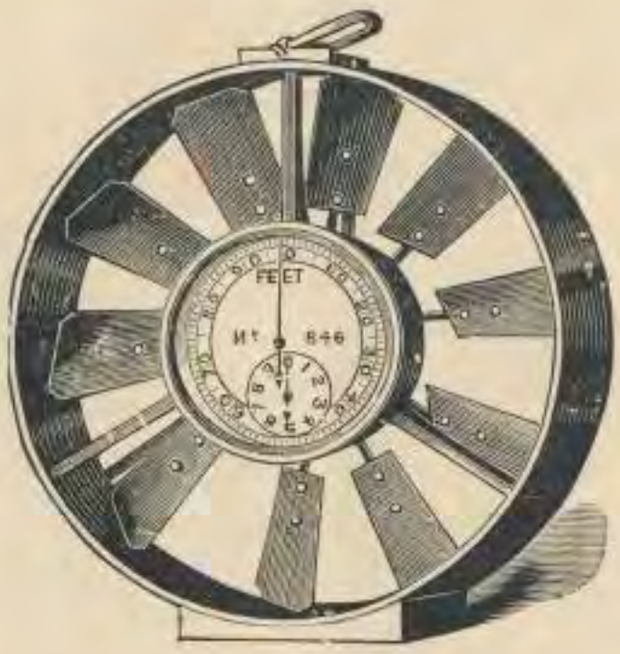
Size of passage in feet, $10 \times 5 = 50$, and multiplied by $330 = 16{,}500$ feet per minute.

The correction added above is the value of the constant friction, which must be found for each machine by actual experiment.

TO FIND THE VELOCITY OF THE AIR IN THE PASSAGE.

Proceed thus:—Suppose the Anemometer indicates 330 feet per minute, $330 \div 88 = 3.75$ or 3¾ miles per hour, 88 being 1-60th of a mile.

To ascertain the force of the air-current, multiply the square of the velocity of the air in feet per second by .0023.



No.		Price.	Post.
3380.	—Biram's Anemometer, 3-in. diam., reading to 1,000 feet, with disconnector..	19 00	$0 30
3382.	—Biram's Anemometer, 4-in. diam., reading to 1,000 feet, with disconnector..	19 00	40
3384.	—Biram's Anemometer, 6-in. diam., reading to 1,000 feet, with disconnector..	20 00	60
3386.	—Biram's Anemometer, 6-in. diam., reading to 100,000 feet, with disconnector	22 00	60
3396.	—Air-Meter, with disconnector, fan-wheel 2¾-inch diameter, two dials reading to 1,000 feet	19 00	35
3397.	—Air-Meter, with disconnector, fan-wheel 2¾-inch diameter, six dials reading to 10,000,000 feet	21 00	35

FIELD-GLASSES AND BINOCULAR TELESCOPES.

The Field-Glasses here described are especially adapted for tourists, engineers, military service or general field use. Some are designated and priced according to the diameter of the object-glasses in French lines, eleven lines being equal to one inch.

No. 3400.

No. 3442 with focusing attachment.

FIELD-GLASS, (Good Quality.)

No.	Price.	Post.
3400.—Body, 4¾ inches long; object-glasses, 21 lines	$7 00	$0 30
3402.—Body, 6¼ inches long; object-glasses, 26 lines	9 00	40

FIELD-GLASS, (Fine Quality.)

3407.—Body, 5⅞ inches long; object-glasses, 24 lines	14 00	45
3408.—Body, 6¼ inches long; object-glasses, 26 lines	15 00	50

JENA FIELD-GLASS, (Superior.)

3410.—Body, 6 inches long; object-glasses, 26 lines	16 00	50
3411.—Body, 5⅝ inches long; object-glasses, 24 lines and with hinge adjustment	18 00	45

U. S. ARMY SIGNAL SERVICE FIELD-GLASS, (Very Superior.)

3413.—Body, 6⅜ inches long; object-glasses, 24 lines	18 00	45
3414.—Body, 6¾ inches long; object-glasses, 26 lines	20 00	50
3416.—Body, 6⅜ inches long; object-glasses, 24 lines and with hinge adjustment	20 00	45

GOERZ-TRIEDER-BINOCULAR, (New Style, Great Power.)

3418.—Trieder-Binocular, No. 30, power 9 times	54 00	35

BUSCH PRISM BINOCULAR, (Superior.)

3421.—Prism Binocular, No. 3, power 9 times, with focusing attachment	45 00	35

RANCHMAN'S GLASS, (Superior.)

3430.—Body, 6⅜ inches long; object glasses, 26 lines	18 00	50

BAUSCH & LOMB-ZEISS STEREO BINOCULAR.

(Latest Style and Superior.)

3442.—Stereo Binocular, No. 8, power 8 times	47 50	35
3443.—Stereo Binocular, No. 12, power 12 times	67 50	40

BAUSCH & LOMB PLAIN BINOCULAR, (Superior Quality.)

3446.—Plain Binocular, No. 8, power 8 times	40 00	35
3447.—Plain Binocular, No. 10½, power 10½ times	48 00	40

Note—If with focusing attachment, for Nos. 3442 to 3447, add $5.00 extra.

ACHROMATIC TELESCOPES.

No. 3475.

No.		Price.	Post.
3475.	Telescope, 3 draws, 15 inches drawn out, 6 inches shut, object-glass 1 inch in diameter, power 13 times	$2 50	$0 20
3476.	Telescope, 3 draws, 16 inches drawn out, 6 inches shut, object-glass 1⅛ inches in diameter, power 16 times	3 50	25
3477.	Telescope, 3 draws, 23 inches drawn out, 8 inches shut, object-glass 1⅜ inches in diameter, power 20 times	5 00	30
3478.	Telescope, 3 draws, 30 inches drawn out, 10 inches shut, object-glass 1⅝ inches in diameter, power 25 times	7 00	40
3479.	Telescope, 4 draws, 37 inches drawn out, 11 inches shut, object-glass 1⅞ inches in diameter, power 35 times	10 00	65
3480.	Telescope, 4 draws, 42 inches drawn out, 11½ inches shut, object-glass 2⅛ inches in diameter, power 40 times	17 00	85
3481.	Telescope, 4 draws, 48 inches drawn out, 13½ inches shut, object-glass 2⅜ inches in diameter, power 50 times	30 00	

TOURISTS' ACHROMATIC TELESCOPES.

No.		Price.	Post.
3485.	Telescope, with brass body covered with morocco, three draws, 17 inches drawn out, 6 inches shut, object-glass 1¼ inches in diameter, sun-shade, leather caps to cover eyepiece and object-glass and with shoulder strap, power 20 times	$8 00	$0 20
3486.	Telescope, same as No. 3485, but is 21 inches drawn out, 7 inches shut, object-glass 1⅝ inches in diameter, power 25 times	11 00	30
3487.	Telescope, same as No. 3485, but is 24 inches drawn out, 9 inches shut, object-glass 1¾ inches in diameter, power 30 times	15 00	40
3488.	Telescope, same as No. 3485, but has four draws, 36 inches drawn out, 10 inches shut, object-glass 2 inches in diameter, power 35 times	22 00	60
3492.	Rifle Spy-Glass, 10¾ inches drawn out, body covered with morocco, object-glass ½ inch in diameter, power 10 times	2 50	15
3494.	Wooden Tripod Stand, with vertical and horizontal motion, upon which to place a telescope; a useful article, as a telescope of much power cannot be held in the hand with sufficient steadiness	5 00	
3496.	Brass Clamp with Gimlet Screw, to fasten a telescope to a post or tree; six sizes to fit telescopes Nos. 3475 to 3488. Price according to size.... ..... $1.50, $2.00, $2.50, $3.00, $4.00 and	5 00	15

ASTRONOMICAL TELESCOPES.

No.		Price.
3502.	Astronomical Telescope, polished brass body, 35 inches long, mounted on brass tripod stand, achromatic object-glass 2¾ inches in diameter, one terrestrial eyepiece, power 50 times, one celestial eyepiece, power 100 times, rack and pinion for focusing. In box with lock	$75 00
3506.	Astronomical Telescope, polished brass body, 35 inches long, rack and pinion for focusing, achromatic object-glass 2½ inches in diameter, terrestrial eyepiece, power 40 times, celestial eyepiece with darkener, power 80 times, wooden tripod with horizontal and vertical motion. In box with lock, for receiving the body and eyepieces	75 00
3508.	Astronomical Telescope, same as No. 3506, but with body 40 inches long, achromatic object-glass 3 inches in diameter, terrestrial eyepiece, power 55 times, celestial eyepiece with darkener, power 110 times. In box with lock	100 00

MISCELLANEOUS.

No.		Price.	Post.
1718.	Flexible Wood Rule, four feet, eight fold, divided to millimeters and 16ths of inches, and with spring joints	$0 50	$0 05
1730.	Thacher's Calculating Instrument, with cylinder 18 inches long. In box with instruction book	35 00	
1743.	Boxwood Rule, two feet, four fold, edge-plates, 8ths, 10ths, 12ths and 16ths of inches, and drafting-scales, and inside beveled edges	50	06
1748.	Ivory Rule, one foot, four fold, edge-plates, 8ths, 10ths, 12ths and 16ths of inches and 100ths of a foot	1 85	12
1755A.	Flexible Wood Rule, four feet, eight fold, divided to 16ths of inches and 100ths of a foot, with spring joints	50	05
1756A.	Flexible Wood Rule, four feet, eight fold, divided to 16ths of inches and with spring joints	50	05
1757A.	Flexible Wood Rule, four feet, eight fold, divided to 16ths and 20ths of inches, and with spring joints	50	05
3766.	Arkansas Oilstone, fine quality, 3-inch, in wood block with cover	75	10
3768.	Arkansas Oilstone, fine quality, 5-inch, in wood block with cover	2 00	25
3775.	Washita Oilstone, 5-inch, in wood block with cover	75	20
3781.	Trammel Points, medium size, No. 2	1 25	20
3854.	Horseshoe Magnet, steel, 4-inch	35	06
3856.	Horseshoe Magnet, steel, 5-inch	50	10
3901.	Thermometer, japanned case, fine, 8-inch	65	12
3903.	Thermometer, japanned case, fine, 10-inch	85	15
3932.	Thermometer, mahogany back, fine, 10-inch	1 35	20
3938.	Pocket Thermometer, in metal tube, nickeled, 5-inch	85	12
3940.	Window Thermometer, plate-glass, 8-inch, with brackets	1 75	25
3952.	Chemical Thermometer, all glass, 60 degrees to 400 degrees, 14-inch	4 50	25
3954.	Chemical Thermometer, all glass, 60 degrees to 500 degrees, 14-inch	5 00	25
3960.	Maximum Registering Thermometer, wood back, 10-inch	2 75	20
3965.	Minimum Registering Thermometer, wood back, 10-inch	2 25	20
3970.	U. S. Weather Bureau set of Maximum and Minimum Thermometers, 12-inch, aluminum back, and mounted together on one wood back	9 50	50
3975.	Hygrometer, with dry and wet bulb thermometers, on wood back, 7-inch	2 50	30
3980.	Smithsonian Rain-Gauge, brass body, reading to 100ths of an inch, with capacity for one inch of rainfall	5 00	
3981.	U. S. Weather Bureau Rain and Snow-Gauge, 8-inch diameter, 25½-inch high, with capacity for two inches of rainfall, and in connection with the overflow the possible capacity of twenty inches rainfall	6 00	

No. 3985.

3985.	Miners' Water Gauge, for ascertaining the ventilating air-pressure spent on airways in mines	3 75	25
3988.	Miners' Safety Lamp (Universal Clanny Lamp)	2 75	
3989.	Miners' Safety Lamp (Davy Lamp)	2 50	
3990.	Hydrometers, for testing Acid, Alkalies, Ammonia, Bark, Beer, Ether, Milk, Molasses, Oil, Petroleum, Salt Brine, Spirits, Syrup, Urine, Vinegar, each	75	10
3995.	Twaddel's Hydrometers, Nos. 1 to 6 with scales respectively 0 to 24, 24 to 48, 48 to 72, 72 to 100, 100 to 134, 134 to 180, each graduation representing five degrees of specific gravity. Each	75	10

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For many years we have made to order special instruments and appliances from plans and specifications submitted to us.

We are also making

Physical and Scientific Instruments

and

Standard Weights and Measures

for

Schools and Colleges as well as for special work.

W. & L. E. GURLEY,

Jan. 1, 1905, purchased the business of

CHARLES WILDER, PETERBORO, N. H.

Established in 1860, and will in connection with their present business, continue the manufacture of

ACCURATE THERMOMETERS

at Troy, N. Y., but under

the name of

CHARLES WILDER COMPANY.

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It gives instructions for the adjustment of instruments and is used as a text-book in many of the Schools and Colleges of the Country.

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