GURLEY

ESTABLISHED

1845

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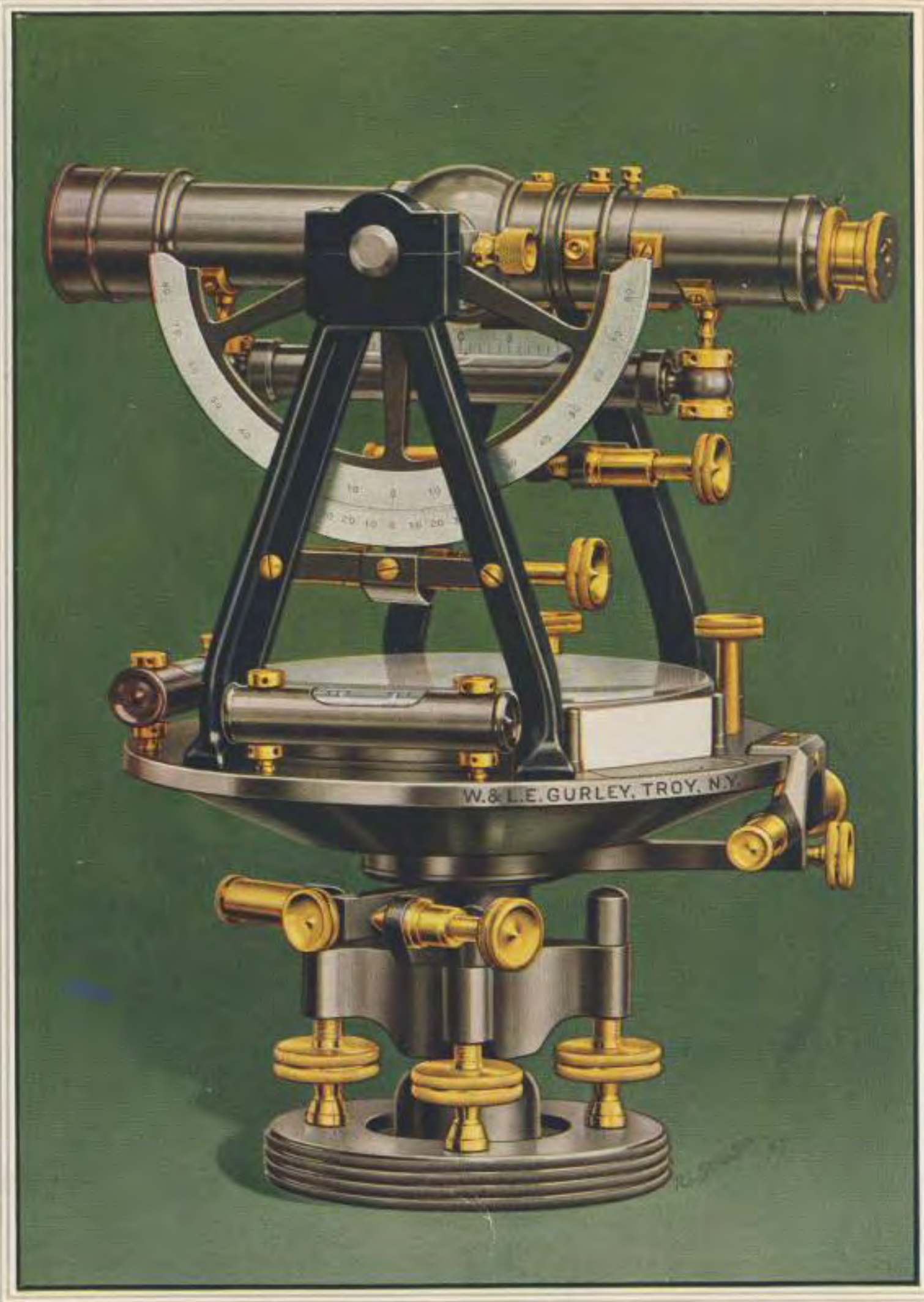

Light Mountain Transit

CATALOGUE

of

Gurley Engineering Instruments

Thirty-first Edition

Commemorating
75th Anniversary

W. & L. E. GURLEY, *Makers*
TROY, N. Y., U. S. A.
BRANCH: SEATTLE, WASH.

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Gurley Factory, Troy, New York

1845 1920

Foreword

THE year 1920 marks the seventy-fifth anniversary of the founding of the House of W. & L. E. Gurley.

Its record during all that time can be likened to the characteristics of a perfect diamond, clean cut, brilliant and without blemish, the result of a policy originated by its founders and continued by their successors.

A correct conception of the requirements of the engineering profession,—high ideals for the equipment which it needs,—a determination to produce only the best,—close adherence to the principles of a square deal;—these are the factors constituting the cardinal lines around which Gurley service revolves, as constant as the compass needle pointing towards the magnetic pole.

Conscious of the ruggedness and dependability of its products and proud of the achievements accomplished by their use, the entire organization of W. & L. E. Gurley is not content with previous records but presses forward with vigor and persistence to meet the increasing and exacting demands of its clients who comprise the most efficient and critical users of engineering instruments and equipment in all quarters of the globe.

W. & L. E. GURLEY
TROY, N. Y.

Arrangement by Catalogue Numbers

GENERAL INFORMATION

Extent of Our Business

For many years our facilities for the manufacture of Engineering and Surveying Instruments have been far superior to those of any other similar establishment in the world. They are being constantly increased by the introduction of new machinery and tools.

We make in our own factory the lenses for the telescopes of our instruments, the platinum filament for the cross wires and stadia wires, the glass vials for the levels, the wooden boxes in which the instruments are carried, the leather cases and straps for these boxes, as well as the castings and all other metal parts of the instruments themselves.

Thousands of our instruments have been distributed to all parts of the United States, Canada, Mexico, Central America, West Indies, South America, China, Japan, Australia, Africa, India and other foreign countries.

Our Guarantee

All instruments of our own make are examined and tested before being shipped, and are sent to the purchaser adjusted, ready for immediate use. They are warranted correct in all their parts—we agreeing in the event of any original defect appearing after reasonable use, to repair or replace with new and perfect instruments, promptly at our own cost express charges included; or we will refund the money and the express charges paid by the purchaser.

It sometimes happens in a business as large and widely extended as ours that instruments reach our customers in bad condition, owing to careless transportation, or to defects escaping the closest scrutiny of our inspectors. We consider the retention of such instruments by the purchaser an injury very much greater to us than to himself. We also consider that a sale is not completed until the purchaser is satisfied in every detail.

Trial of Instruments

If requested to do so, we will ship to the express station nearest the person giving the order and will instruct the express agent to collect the amount of our bill and hold the money three days. This will give the purchaser an opportunity to test the instrument in the field and if it is not found as represented, he may return it to the express agent who will refund the full amount paid, including transportation charges.

This privilege of trial applies only to our large instruments such as Transits, Levels, Compasses, etc., is not given unless requested, and is allowed only in the United States. Privilege of trial is not allowed by the Great Northern or Southern Express Companies. All express companies, however, will allow examination of instruments at their offices, if the shipper requests it for the purchaser.

This Catalogue supersedes all previous editions.
All prices are subject to change without notice.

Ordering

In ordering always give the Catalogue Numbers of the instruments and accessories selected.

If full particulars concerning each item accompany the order, delay will often be avoided, as it will probably be unnecessary for us to write you.

If no shipping directions are given, we will always ship by the quickest and safest method.

When any articles can be sent safely by mail, we have printed the approximate cost of postage so that, by remitting with the order the cost of the article and the postage, the goods can be sent at small expense. Should the amount sent exceed the actual postage, the balance will be returned.

All articles can be insured at an extra cost which varies according to the value of the package. For details see Parcel Post Regulations.

Packing and Delivery

Each of our Transits, Levels and Surveyors Compasses is packed in a well finished mahogany case, furnished with lock and key, and leather strap for convenience in carrying.

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

We make no charge for packing boxes or packing, and our instruments are delivered F. O. B. Troy, N. Y., to the express company or freight house.

Charges for transportation are in all cases to be paid by the purchaser, we guaranteeing the safe arrival of our goods at the destination indicated at the time of shipment.

Terms of Payment

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, and without additional cost.

The customer may also send the money in advance by registered mail, or by the express agent, or instruct us to forward the shipment C. O. D. 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. We pay the express companies' return charges on C. O. D. shipments amounting to $20 and over.

GENERAL INFORMATION

Instruments for Foreign Countries

Instruments packed for foreign shipment which are to have ocean passage are wrapped in waterproof material and enclosed in strong packing boxes which are strengthened and protected by special band wire.

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 consigned to Canada and some parts of Mexico.

If the amount remitted is more than enough to cover these expenses, the 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 bank draft on New York City or London, England, and such drafts can be purchased in any of the large cities of the different countries.

Our registered cable address is "GURLEY, TROY." Use Western Union, A. B. C. Fifth Edition, or Lieber's Codes. *See Private Cable Code on pages 255 to 257.*

Repair of Instruments

Each year we receive hundreds of instruments of our own and other makes 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 economically and promptly.

They should always be placed in their own boxes, and then enclosed in an outside packing case, at least an inch larger in all its dimensions, and the space between the two 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. 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 the leveling head complete (centers and spindle) should always be sent with it.

The tripod legs and brass head in which they are inserted need not be sent unless in need of repairs.

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

Selection of Instruments

For ordinary land surveying, the Vernier Compass is 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 angles taken independently of the needle, an instrument with a graduated limb must be used, and for this purpose the Pocket Compass with Limb is required.

For municipal engineering, railroad and highway construction, bridge building, drainage and irrigation work, selection should be made from our Precise Transits Nos. 6-A to 10-A, 26-A to 29-A, Light Mountain Transits Nos. 26 to 29; and Engineers Wye Levels Nos. 375 to 378.

The Light Mountain Transits (regular and Precise types) are also ideal instruments for surveys of mining claims, especially in high elevations, and for surveys of mines in general.

For United States Public Land Surveys an instrument with the Solar Attachment is required and the Solar Transit is used; see Nos. 30-A, 32-A and 23-A.

No. 18-A "Hell Gate Model" Precise Transit is capable of executing triangulation surveys demanding the highest degree of accuracy and refinement.

The various Plane Table Outfits have a recognized utility for topographical surveys 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 Automatic Water Stage Registers are used for determining the variations in the height or stage of the water in connection with water power development, irrigation investigations and sewage discharge.

The Hook Gage is utilized for ascertaining the depth of water flowing over weirs, etc.

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

GENERAL INFORMATION

The Explorers Transit, the Reconnoissance Transit, the Explorers Level and the various forms of Pocket Compasses, with or without telescope attachment, are designed for preliminary surveys where extreme lightness and portability are required.

When iron ores are to be traced, the Dip Compass and the Dial Compass are used.

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

Instruments Made of Aluminum

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

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 extra expense.

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

Exchanging Old Instruments

Correspondence is solicited relating to exchanging old instruments of our make for those of the latest patterns.

We are constantly making such exchanges to the entire satisfaction of our customers and if the old instruments are salable as second-hand, after being rebuilt and refinished, a liberal allowance is made.

Invitation to Visit Our Factory and Branch

A cordial invitation is extended to our customers to visit our Factory in Troy, N. Y., or our Branch Sales Office in Seattle, Wash. Opportunities are thus had for examining the various instruments we make, and, at Troy, for observing the processes of manufacture. Visitors who call on us are greatly impressed with the size of our establishment and also with the elaborate equipment which is required to produce high grade instruments.

Literature

We publish a variety of attractive circulars containing special information relative to our products. They will be supplied to our correspondents who express an interest in or a desire for some particular instrument.

Copies of our Manuals, Catalogue, Solar Ephemeris and any other literature which we issue can be obtained from our Seattle Branch, as well as from our Main Office in Troy, N. Y.

Gurley Solar Ephemeris

The Solar Ephemeris is published annually. It is an abridgment of the Nautical Almanac, issued by the United States Government, and contains a Table of Mean Refractions in Declination and Tables of Times of Elongation, Culmination and Azimuths of Polaris. It can be conveniently carried in the vest pocket. A copy will be sent postpaid to any engineer or surveyor, on request.

Our Seattle Branch

Empire Building, Seattle, Washington

To serve our Western customers more satisfactorily, we maintain a Branch Sales Office in Seattle.

Customers who are located in the Western States, in Alaska, and in the Western part of Canada, will save time and transportation charges by dealing directly with the Seattle Branch.

A representative stock of completed Gurley Instruments, Accessories and Supplies is maintained and orders will be filled carefully and promptly.

The same attention is given to furnishing information and literature and making quotations as through the Home Office in Troy, N. Y.

Repairing Instruments

Arrangements can be made through our Seattle Branch for repairing and adjusting Engineers and Surveyors Instruments of all makes; also for repairing and regraduating old and worn Leveling and Stadia Rods.

Invitation

A cordial invitation is given our customers and friends to visit the Seattle Branch at any time to examine the latest models of Gurley Instruments and to obtain full information regarding our products.

Gurley Precise Transits

Two Sizes

WE offer to the engineering profession our Precise Transit with One Piece Truss Standard, with the confidence which is born of a sure knowledge of its correctness of design, the honesty of its material and workmanship and its accurate and permanent adjustment. These features have been the foundation qualities of the instruments made by W. & L. E. Gurley during a successful manufacturing experience of seventy-five years.

The new standard is cast of toughest bronze, in one piece, of angle cross section, giving the greatest rigidity with least weight. The principle of diagonal cross bracing is used and the supporting members are carried as far up on the legs as is possible without interfering

Gurley One Piece Truss Standard
Patented July 25, 1916

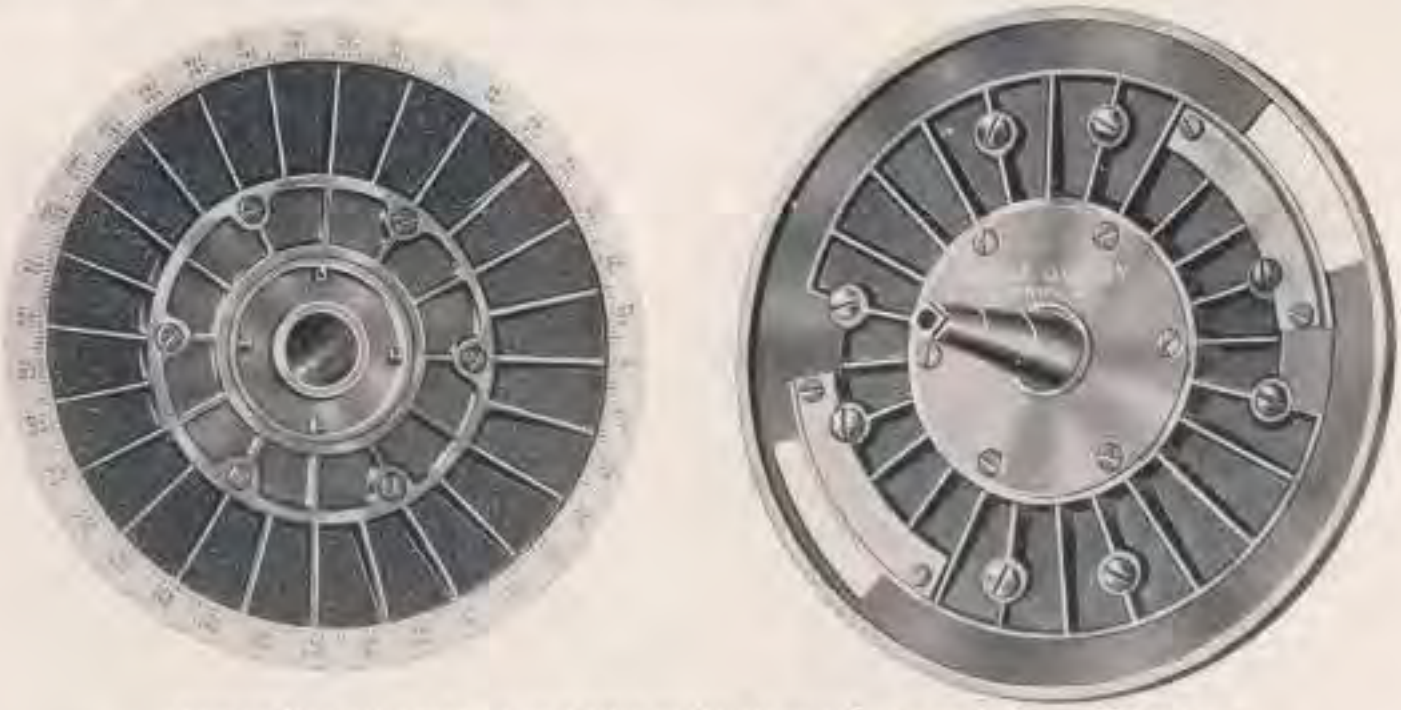
with the use of the instrument. The base is wide and its attachment to the top plate by eight large screws allows the development of the full strength of the deeply ribbed plate for support and reinforcement, making the whole structure mechanically one piece for withstanding stress.

Gurley Precise Transits

Two Sizes

The finish of the standard is a beautiful and very durable morocco, applied directly to the surface of the casting, which thus retains its skin intact. The internal stresses in the casting are relieved by a process of artificial aging in which the standard assumes its permanent shape without any loss in the tenacity of the material.

Another important feature is the design of the horizontal limb. The deep ribs of the top plate make a conical form desirable and this naturally strong shape is also reinforced. The needle lifter is placed above the flange of the spindle so that the entire space between the top plate and the limb is available for strengthening ribs, leaving only a small clearance for free motion.

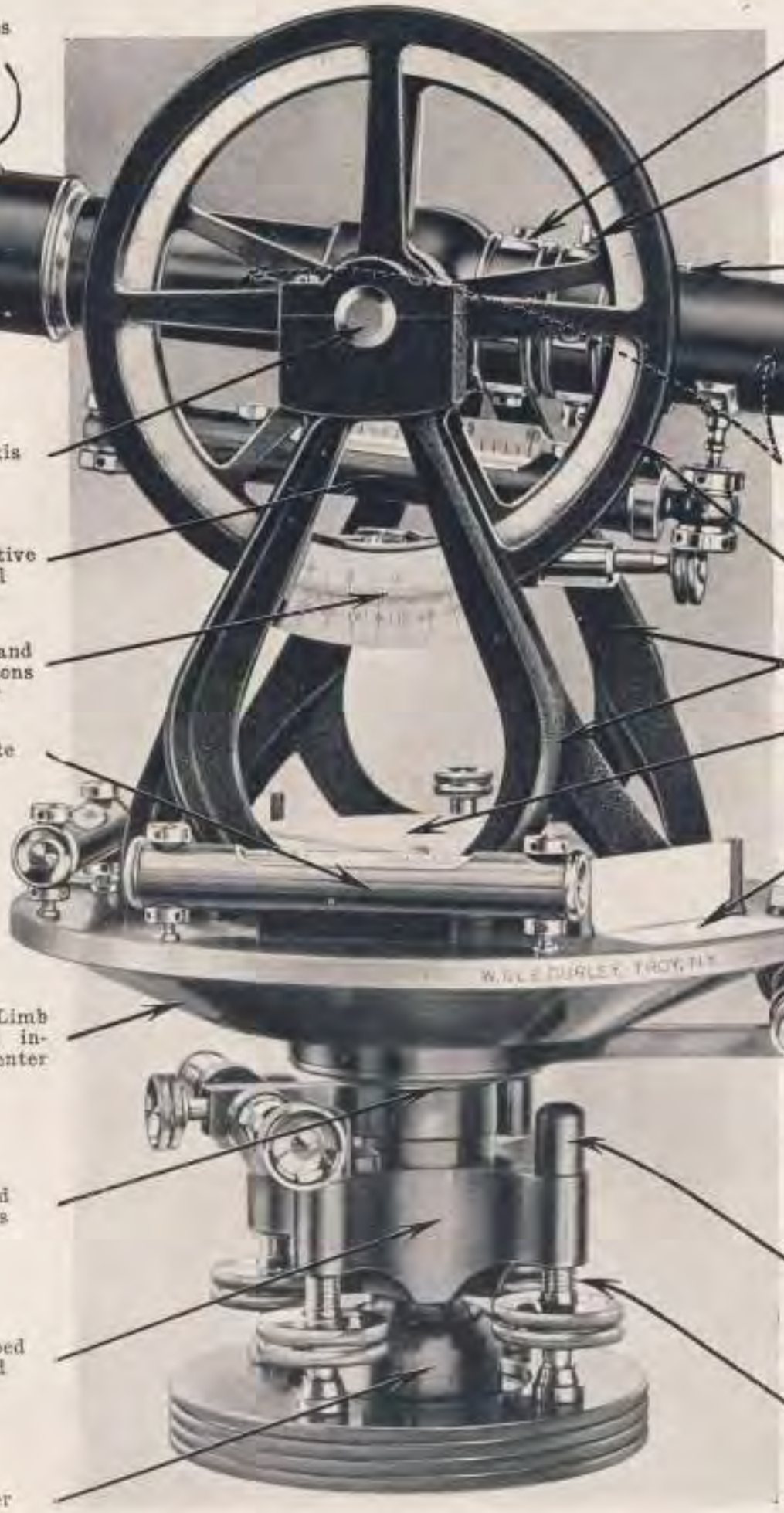


Gurley Radially Ribbed and Dished Limb and Plate, and Tapered Centers

The spindle and socket are of generous diameter and length and have a strong taper. They are of material chosen to give the greatest rigidity and wearing quality and to have practically the same expansion with change in temperature. We have never had a complaint based on cutting or binding of our sockets, even under the most extreme conditions of service.

Too much emphasis cannot be placed on the accuracy and legibility of our graduations and the ease with which they are read. Our graduating engines are of our own design and manufacture and they embody all the latest refinements which are necessary for producing perfect work.

Distinctive Features of Gurley Precise Transits



Telescope reverses at either end

Superior Lenses *Gurley* make

Dust Guard

Multi-grooved Axis Bearings

Extra long, sensitive Telescope Level

Vertical Circle and Vernier, graduations on *sterling silver*

Extra long Plate Level

Strongly ribbed Limb and Plate, depth increasing towards center

Long, compound tapered Centers

Four-screw, ribbed Leveling Head

Shifting Center

Objective Slide Adjusting Screws

Platinum Cross Wires and Stadia Wires

Eyepiece Slide Adjusting Screws

Pinion Movements to Objective and Eyepiece Slides

Detachable Aluminum Guard Morocco finished

Patented One Piece Truss Standard Morocco finished

Water and dust-proof Compass Box

Wide open, dust and water-proof, flush glass Verniers; easy reading graduations on *sterling silver*

Strong Tangent Hanger lapped over on plate

Dust Caps

Substantial, non-fretting Leveling Screws

No. 27-A

5.65″ limb, 3″ needle, 8″ telescope, 20 power, weight 12 lbs., **$280.00**

Gurley Precise Transits

Two Sizes

Specifications of Precise Transits Nos. 6-A to 32-A

	Nos. 6-A to 10-A Engineers Size	Nos. 25-A to 32-A Light Mountain Size
Diameter of Horizontal Limb	6.25 in.	5.65 in.
Length of Needle	3.5 in.	3 in.
Needle Circle graduated to	30 min.	1 deg.
Variation Arc graduated to	30 min.	1 deg.
Variation Arc reads by vernier to	1 min.	5 min.
Length of Telescope	11 in.	8 in.
Power of Telescope	26 diameters	20 diameters
Aperture of Objective	1.19 in.	1 in.
Length of Telescope Level	7.2 in.	5 in.
Tripod, with Cap	No. 405, with split legs	No. 410, with extension legs
Weight of Instrument	15.5 to16.5 lbs.	11 to 13 lbs.
Weight of Instrument including box and accessories	23 to 24 lbs.	20 to 21 lbs.
Weight of Tripod	11 lbs.	10 lbs.
Domestic Shipping Weight, Instrument and Tripod in two boxes, about	75 lbs.	70 lbs.
Export Shipping Weight, about	110 lbs.	100 lbs.

Centers: Compound.

Leveling Head: Arms strongly ribbed, with four leveling screws having dust caps. Clamp and tangent. Shifting center.

Horizontal Limb: Strongly ribbed, depth increasing towards center. Graduated on *sterling silver* to 30 min., reading by two opposite double verniers to 1 min. Figured like Limb IV, see page 42; two rows 0 to 360, reading in opposite directions and inclined in direction of increase. (If specified in the order, will be figured like Limb I: 0 to 90 each way inner row, 0 to 360 outer row.) Verniers at 30 deg. to line of sight; with reflectors.

Plate: Strongly ribbed, depth increasing towards center. Needle circle figured 0 to 90 each way, with beveled plate glass cover, waterproof. Variation arc with pinion movement, and clamp. Flush vernier covers, waterproof. Two graduated plate levels, the one parallel to line of sight of extra length. Clamp and tangent.

Standard: One Piece Truss pattern (patented), with extra wide base. Multi-grooved axis bearings.

Telescope: Balanced; transits either end; center point on top. Erecting eyepiece. Pinion movement to eyepiece and objective slides. *Platinum* cross and fixed stadia wires, ratio 1:100. (Disappearing stadia furnished, if specified in the order.) Dust guard to objective slide, detachable sunshade, and cap. Clamp and tangent to telescope axis.

Telescope Level: With graduations on vial. Middle point of vial is under telescope axis. (Not furnished with Nos. 6-A or 25-A.)

Finish: Bronze; screws and small parts bright. Morocco finish on standard.

Equipment: Mahogany box, with reading glass, 10 oz. plummet, etc.

Tripod: As specified above.

Modifications and Extras for Precise Transits Nos. 6-A to 32-A

Vertical Limb on Transit No. 8-A is a full circle 5 in. in. diameter, and on Nos. 27-A and 32-A is a full circle 4.5 in. in diameter, graduated on *sterling silver* to 30 min. and reads by one double vernier to 1 min.

Vertical Limb on Transits Nos. 9-A and 10-A is an arc of 3 in. radius, and on Transits Nos. 28-A, 29-A and 30-A is an arc of 2.5 in. radius. All arcs are graduated on *sterling silver* to 30 min. and read by one double vernier to 1 min., the vernier movable by tangent screw.

Detachable Aluminum Guard, morocco finished, is regularly furnished with Transits Nos. 8-A, 27-A and 32-A.

A Beaman Stadia Arc attached to Transits Nos. 8-A to 10-A, or 27-A to 32-A, costs $20.00 extra.

Sole Leather Carrying Case (outside dimensions 10 x 9.5 x 14.5 in.) with handle and shoulder straps, to enclose the mahogany box of the Light Mountain sizes, Nos. 25-A to 32-A, costs $20.00 extra.

Sole Leather Carrying Case with handle and shoulder straps, to enclose the mahogany box of the Engineers sizes, Nos. 6-A to 18-A, costs $23.00 extra.

Extension Leg Tripod No. 410 costs $3.00 extra if substituted on Transits Nos. 6-A to 18-A, instead of the split leg pattern. **If Solid Round Leg Tripod No. 400** is substituted, deduct **$3.00.**

If Spit Leg Tripod No. 405 is substituted on Transits Nos. 25-A to 32-A, instead of the extension leg pattern, deduct **$3.00. If Solid Round Leg Tripod No. 400** is substituted, deduct **$6.00.**

See pages 35 to 37 for information about Explorers Precise Transits, Nos. 20-A to 24-A, with limb 4 inches in diameter.

Gurley Precise Transit No. 18-A, mounted on concrete pier, as used at Hell Gate Bridge
See page 22 and 23

Gurley Precise Transits

Two Sizes

Nos. 7-A or 26-A

No. 7-A 6.25 in. limb, 3.5 in. needle, 11 in. telescope, weight 16 lbs. **$262.00**
No. 26-A. 5.65 in. limb, 3 in. needle, 8 in. telescope, weight 11.5 lbs. **257.00**

Attachments: Level on telescope; clamp and tangent to telescope axis.

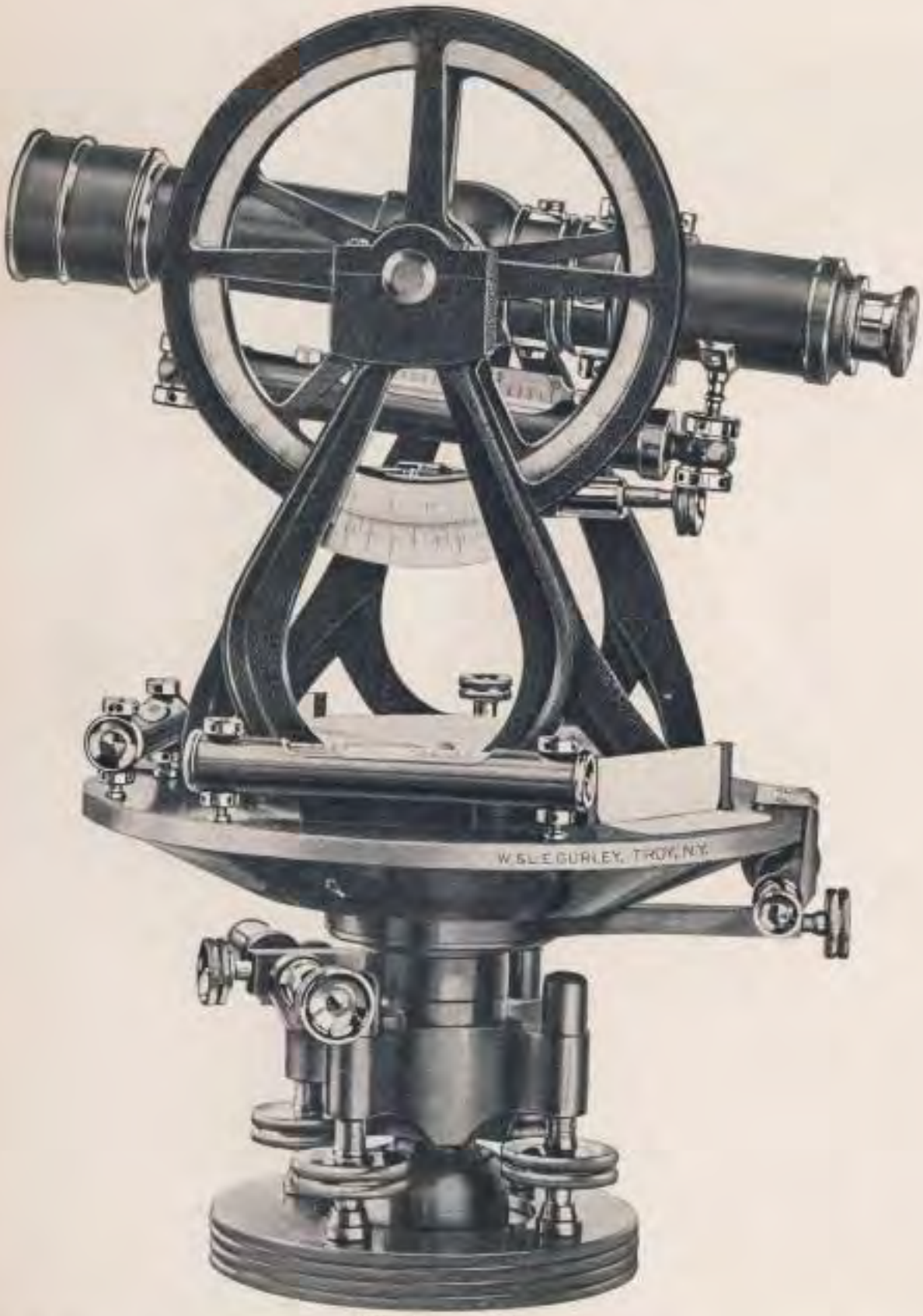
For detailed specifications, see pages 16 and 17.

These Transits will be furnished without the level on telescope but with clamp and tangent to telescope axis, as follows:

No. 6-A 6.25 in. limb, 3.5 in. needle, 11 in. telescope, weight 15.5 lbs. **$247.00**
No. 25-A 5.65 in. limb, 3 in. needle, 8 in. telescope, weight 11 lbs. **242.00**

Gurley Precise Transits

Two Sizes



Nos. 8-A or 27-A

No. 8-A 6.25 in. limb, 3.5 in. needle, 11 in. telescope, weight 16.5 lbs. **$285.00**
No. 27-A 5.65 in. limb, 3 in. needle, 8 in. telescope, weight 12 lbs. **280.00**

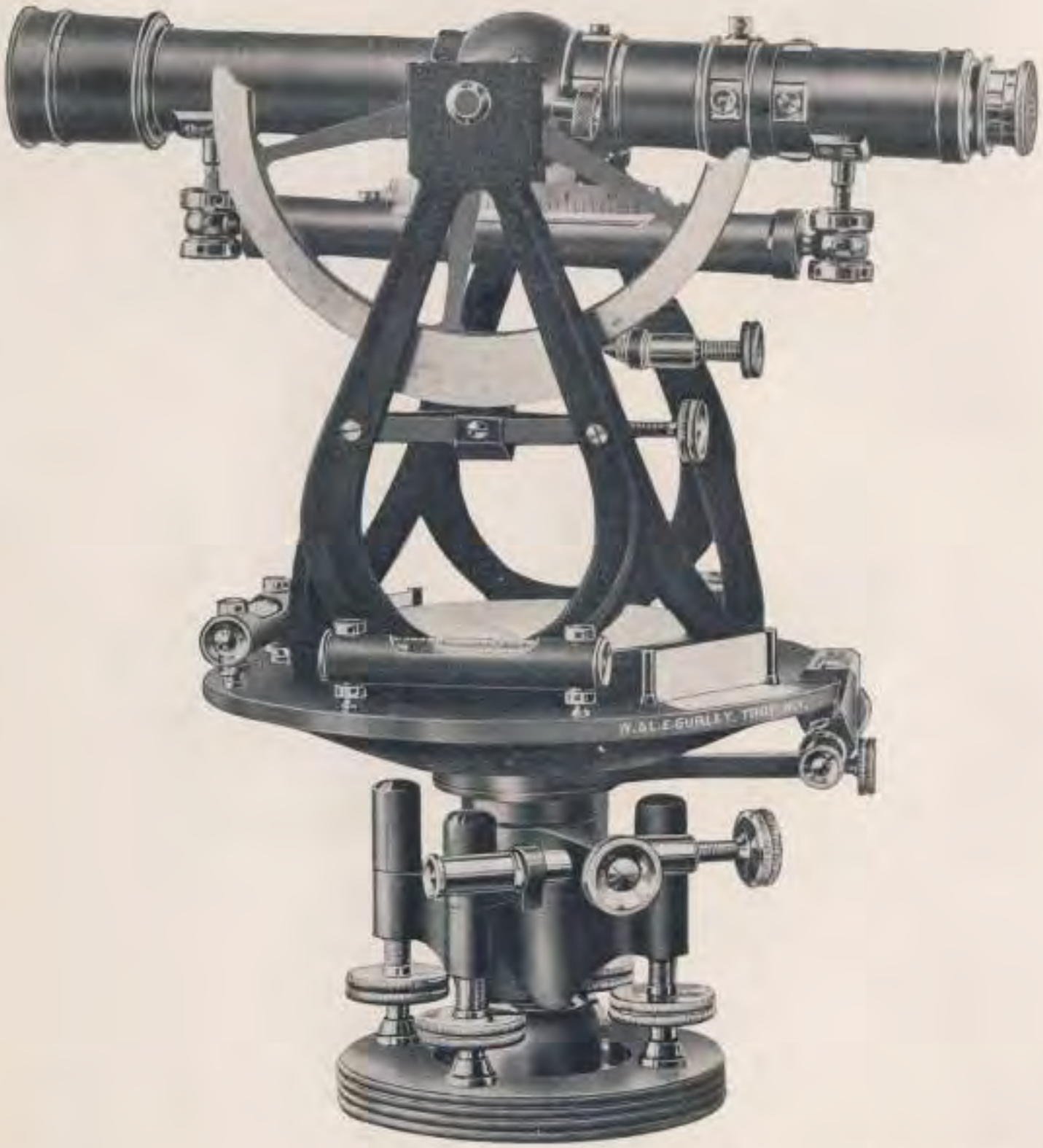
Attachments: Vertical limb, full circle, 5 inches diameter, (4.5 inches diameter on No. 27-A,) reading by vernier to 1 minute; with detachable guard; level on telescope; clamp and tangent to telescope axis.

(If guard is omitted, deduct $8.00.)

For detailed specifications see pages 16 and 17.

Gurley Precise Transits

Two Sizes



Nos. 9-A or 28-A

No. 9-A 6.25 in. limb, 3.5 in. needle, 11 in. telescope, weight 16.5 lbs. **$285.00**
No. 28-A 5.65 in. limb, 3 in. needle, 8 in. telescope, weight 12 lbs. **280.00**

Attachments: Vertical limb, arc of 3 inches radius (2.5 inches radius on No. 28-A), reading by vernier to 1 minute, with vernier movable by tangent screw; level on telescope; clamp and tangent to telescope axis.

For detailed specifications see pages 16 and 17.

Gurley Precise Transits

Two Sizes

Nos. 10-A or 29-A

No. 10-A 6.25 in. limb, 3.5 in. needle, 11 in. telescope, weight 16.5 lbs. **$300.00**
No. 29-A 5.65 in. limb, 3 in. needle, 8 in. telescope, weight 12 lbs. **295.00**

Attachments: Vertical limb, arc of 3 inches radius (2.5 inches radius on No. 29-A), reading by vernier to 1 minute, with vernier movable by tangent screw; level on telescope; gradienter, combined with clamp and tangent to telescope axis.

For detailed specifications see pages 16 and 17.

Hell Gate Bridge Erection Controlled by a Gurley Precise Transit

The bridge of the New York Connecting Railroad over the East River at Hell Gate stands as one of the most notable achievements in bridge engineering in recent years. It is a steel arch of 970 feet span and carries four tracks.

The rapid tidal currents of the river and the necessity of maintaining a free passage for navigation during the construction made the use of false work impossible. The arch was built from the two abutments simultaneously and its successful completion demanded that the ends of the two halves should meet in mid-stream with extreme exactness. This necessitated instrument control of the very highest precision.

The engineers who had this work in charge selected a Gurley Precise Transit and staked their engineering reputation on this choice. Their confidence in the instrument was justified when the cantilever members met within one-quarter of an inch of their predetermined position.

Long base lines lateral to the structure were laid out on both shores. Concrete piers were built at the triangulation points, each pier having a permanent base for the Gurley Precise Transit which governed the work.

Vertical and horizontal angles to 10 seconds were taken to panel points as erection proceeded, the exact position of each point being accurately determined and checked by observations from several stations.

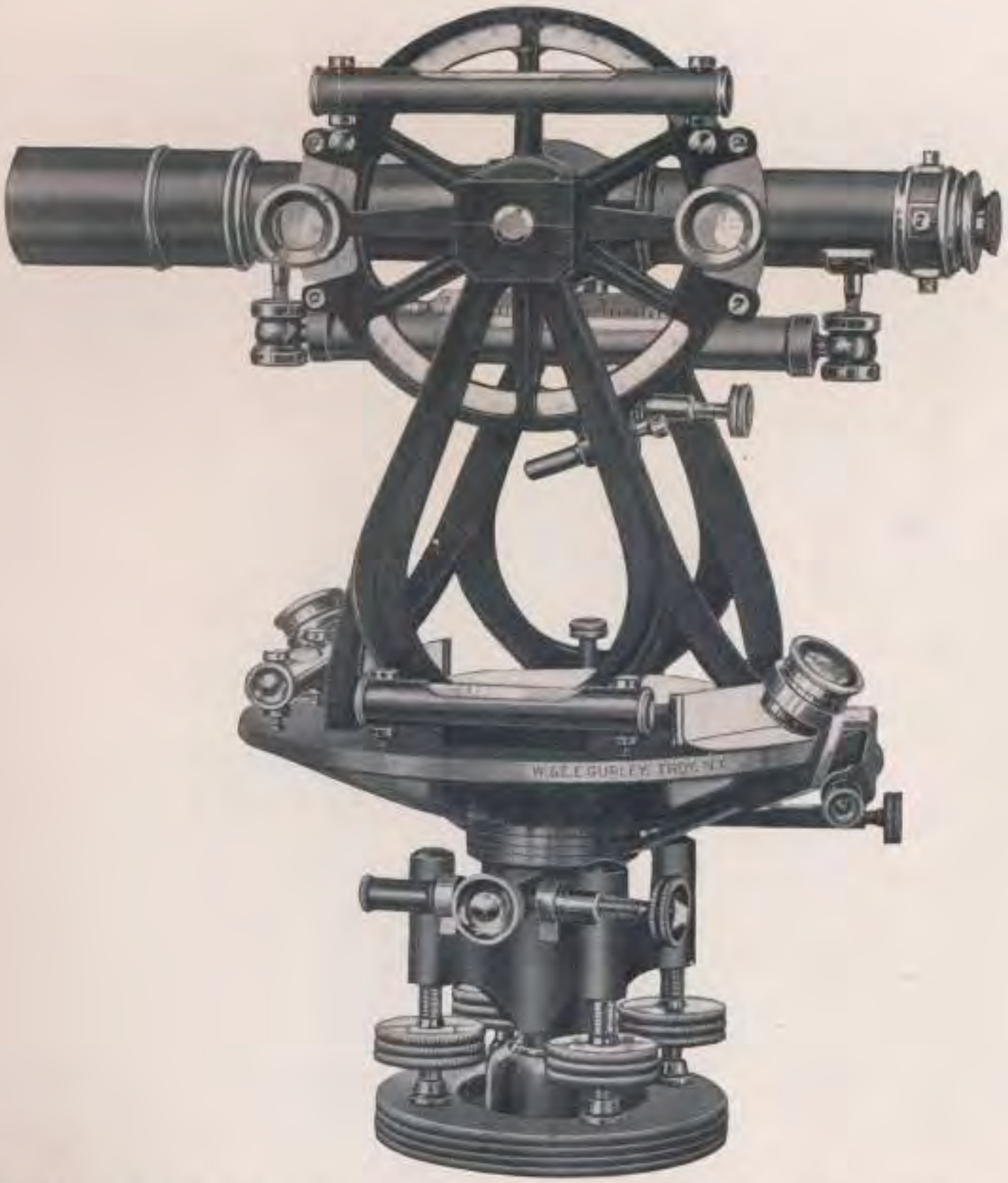
This Transit represents our supreme efforts and is the result of seventy-five years experience in designing and building engineering instruments. It embodies all of the desirable qualities of our regular model Precise Transits and has the added advantages of the special features as shown and described on the opposite page.

Thus it is adapted for triangulation, bridge building, municipal engineering, etc., and for all classes of work demanding the highest degree of accuracy and refinement.

View of Hell Gate Bridge during construction

Gurley Precise Transit

Hell Gate Model



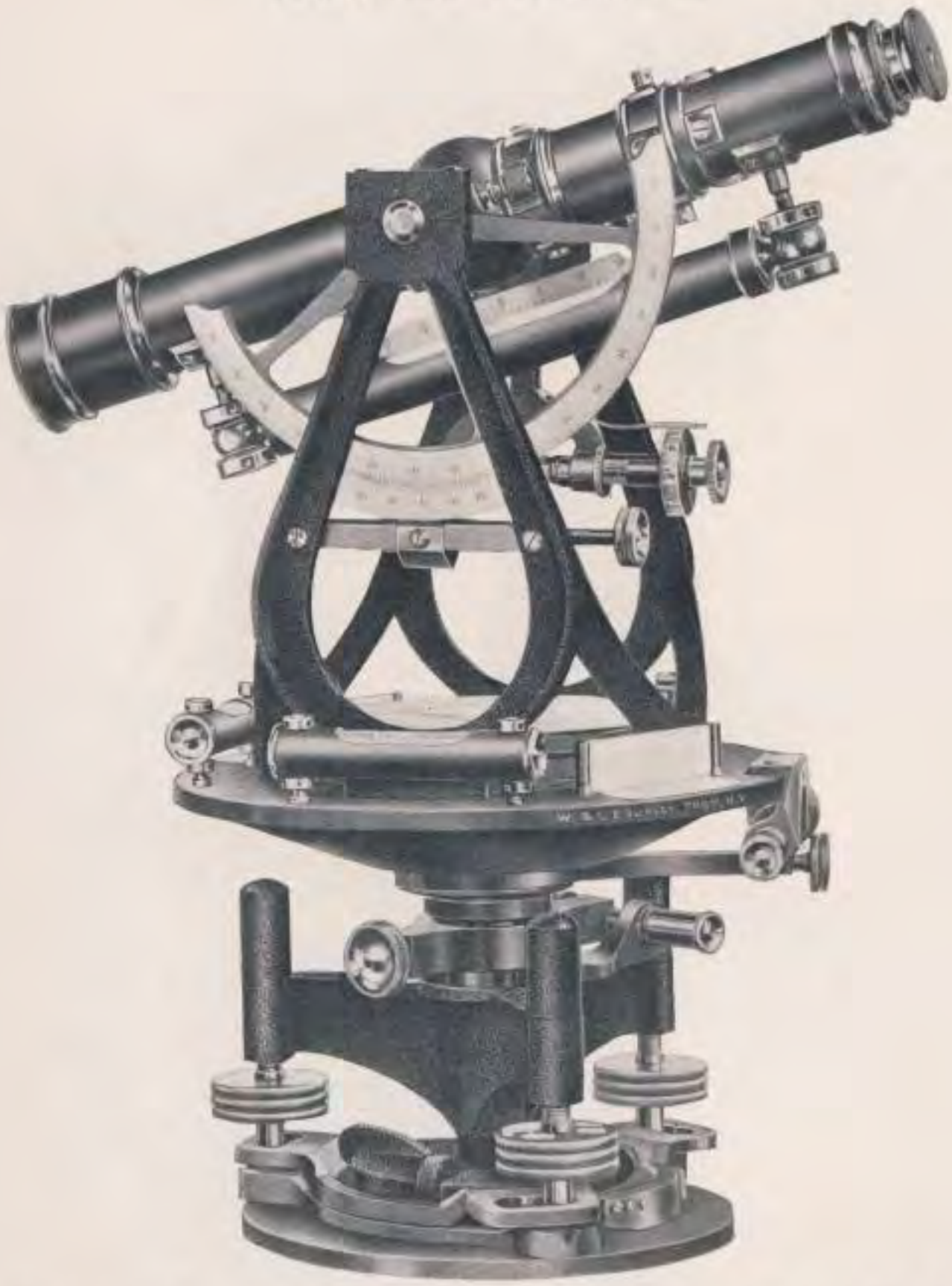
No. 18-A 6.7 in. limb, 3.5 in. needle, 11 in. telescope, weight 19 lbs. . **$475.00**

Excepting the diameter of the horizontal limb, which is 6.7 in. instead of 6.25 in., this Transit is constructed according to the detailed specifications given on pages 16 and 17, with the following special features:

Attachments: Horizontal and vertical limbs graduated to 10 minutes, *each reading by two opposite double verniers to 10 seconds:* attached microscopes to all verniers; guard to vertical limb, with attached level; inverting eyepiece.

Gurley Precise Transit

With Three-Screw Leveling Head



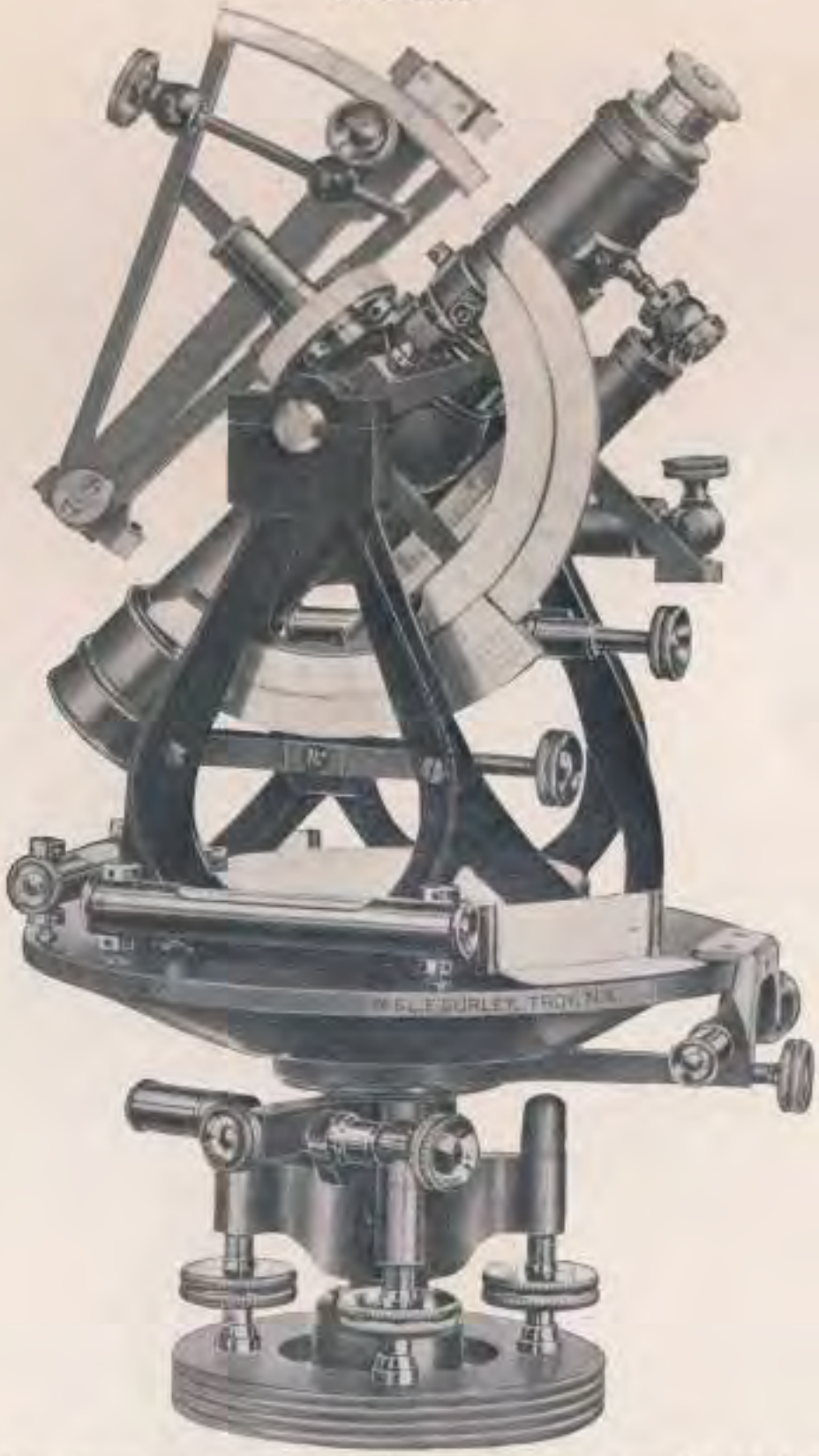
No. 10-A-3 6.25 in. limb, 3.5 in. needle, 11 in. telescope, weight 19 lbs. **$325.00**

For detailed specifications, see Transit No.10-A, as listed on pages 16 and 17.

A Three-Screw Leveling Head, as shown, can be furnished with any new Gurley Transit, if desired, for $25.00 extra. *This leveling head is made to order only.*

Gurley Precise Transits

With Burt Solar Attachment
Two Sizes



No. 30-A 5.65 in. limb, 3 in. needle, 8 in. telescope, weight 12.5 lbs. . . **$360.00**

Attachments: Burt Solar with latitude level; vertical limb, arc of 2.5 inches radius, reading by vernier to 1 minute, with vernier movable by tangent screw; level on telescope; clamp and tangent to telescope axis.

The Burt Solar Attachment, as shown in this illustration, can also be furnished with Precise Transits Nos. 9-A and 10-A, and increases the price of those instruments $80.00.

For description of Burt Solar Attachment, see page 60.
For detailed specifications see pages 16 and 17.

This illustration also shows the Beaman Stadia Arc, the cost of which is not included in the above price. This attachment will be supplied for $20.00 extra.

Gurley Precise Transit

With Telescopic Solar Attachment

U. S. General Land Office and U. S. Forest Service Model

When a continued series of solar observations are to be made, it is often desirable that the main telescope of the transit be used without disturbing the solar apparatus.

The new Gurley Telescopic Solar Attachment meets such requirements, as the main telescope of the transit may be used independently and solar observations taken with no other settings than the hourly change in declination. The instrument is so designed that its adjustments can be accomplished with ease and precision in the field.

As shown in the illustration on the opposite page, the sun is viewed through an auxiliary telescope, a reflector being placed in front of the objective that brings the sun's reflected image to the cross wires.

The solar telescope is mounted on a horizontal axis which is supported by a vertical triangular base fastened to the right hand side of the standard. The solar telescope can be moved about its horizontal axis until it coincides with the polar axis, this position being indicated by the latitude arc attached to it.

The declination arm tilts the mirror at the objective end of the solar telescope, the angle being read on the declination arc attached to its side. Both the latitude arc and the declination arm have clamp and tangent movements for convenience in setting.

Having set the main telescope in the meridian and adjusted the mirror to the proper declination, the course of the sun is followed by rotating the solar telescope in collar bearings about its own axis; an hour circle surrounding the solar telescope indicates the apparent time.

The Gurley Telescopic Solar adds but little weight and when furnished in connection with a Gurley Precise Mountain Transit, with One Piece Truss Standard, is the standard instrument for public land surveys and similar work requiring exceptionally accurate results.

Gurley Precise Transit

With Telescopic Solar Attachment

U. S. General Land Office and U. S. Forest Service Model

No. 32-A 5.65 in. limb, 3 in. needle, 8 in. telescope, weight 13 lbs. . . **$425.00**

Attachments: Telescopic Solar; vertical limb, full circle, 4.5 inches diameter; reading by vernier to 1 minute, with detachable guard; level on telescope; clamp and tangent to telescope axis.

For detailed specifications see pages 16 and 17.

Gurley Light Mountain or Mine Transits

One Size

The first Light Mountain Transit used in this country was designed and made by W. & L. E. Gurley, in 1876. It was instantly adopted by mining engineers who had previously been obliged to use larger and heavier instruments. Since the introduction of the original model many improvements and modifications have been added and now, because of their combined accuracy and portability, they are the most popular transits in use.

Although especially adapted for mine and mountain surveys, they are used extensively for other work, as follows:

Municipal Engineering
Highway Engineering
Railroad Engineering
Bridge Construction
Solar Observations
Forest Surveys

Built with long, compound centers, angle-section standards, and with leveling head, limb and main plate of ribbed construction, we have combined in one instrument accuracy, stability and portability.

Special attention is called to the telescope which, having a power of twenty diameters, brilliant illumination and flat field, is admirably adapted for taking stadia shots.

These Transits are regularly equipped with our improved extension tripod, the legs of which can be lengthened or shortened at will. It is thus adapted for use in mountain surveys, where one or more legs must be shortened, or for use in mines, where a short tripod is often indispensable. The sliding pieces can be turned end for end, the points being thus out of the way and the tripod more easily transported. The tripod when closed is only three feet long and is carried by a leather strap with handle, which is furnished with it.

Gurley Light Mountain Transits may also be had in the Precise type, with One Piece Truss Standard. See Precise Transits Nos. 26-A to 32-A, as illustrated and described on pages 13 to 27.

Sole Leather Carrying Case with shoulder straps, to enclose the mahogany transit box
This case costs $20.00 extra when furnished with Light Mountain
Transits Nos. 25-A to 32-A, or Nos. 25 to 30

Gurley Light Mountain Transits

One Size

No. 26 5.65 in. limb, 4 in. needle, 8 in. telescope, weight 11 lbs. **$237.00**

Attachments: Level on telescope; clamp and tangent to telescope axis.

For detailed specifications, see page 30.

This Transit will be furnished without the level on telescope, but with clamp and tangent to the telescope axis, as follows:

No. 25 5.65 in. limb, 4 in. needle, 8 in. telescope, weight 10.5 lbs. . . **$222.00**

Gurley Light Mountain Transits

One Size

Specifications of Light Mountain Transits Nos. 25 to 30

Centers: Compound.

Leveling Head: Arms strongly ribbed, with four leveling screws having dust caps. Clamp and tangent. Shifting center.

Horizontal Limb: 5.65 in. diameter. Strongly ribbed, depth increasing towards center. Graduated on *sterling silver* to 30 min., reading by two opposite double verniers to 1 min. Figured like Limb I, see page 42: 0 to 90 each way inner row, and 0 to 360 outer row. (If specified in the order, will be figured like Limb IV: two rows 0 to 360 reading in opposite directions and inclined in direction of increase.) Verniers at 30 deg. to line of sight with reflectors.

Plate: Strongly ribbed, depth increasing towards center. 4 in. vertical bar needle, with circle graduated on upper face to 30 min. and figured 0 to 90 each way; graduated on inner edge to degrees, with beveled plate glass cover, water-proof. Variation arc graduated to 30 min. and reading by vernier to 1 min., with pinion movement, and clamp. Flush vernier covers, water-proof. Two graduated plate levels. Clamp and tangent.

Standards: Angle-section, with ample bases. Multi-grooved axis bearings.

Telescope: 8 in. long, power 20 diameters, aperture of objective 1 in. Erecting eyepiece. Balanced; transits either end; center point on top. Pinion movement to eyepiece and objective slides. *Platinum* cross, and stadia wires, ratio 1:100. (Disappearing stadia furnished, if specified in the order.) Dust guard to objective slide, detachable sunshade and cap. Clamp and tangent to telescope axis.

Transits Nos. 25 and 26 are regularly furnished with plain cross wires unless stadia is specified in the order.

Telescope Level: 5 in. long, with graduations on vial. Middle part of vial is under telescope axis. (Not furnished with No. 25.)

Finish: Bronze; screws and small parts bright. Morocco finish on standards.

Equipment: Mahogany box, with reading glass, 10 oz. adjustable plummet, etc.

Tripod: No. 410, with extension legs, cap, and carrying strap; weighs 10 lbs.

Weight: Transit only, about 11.5 lbs.; transit, including box and accessories, about 20 lbs.

Shipping Weight: Transit and tripod, in two boxes, for domestic shipment, about 65 lbs.; for export, about 90 lbs.

Vertical Limb on Transit No. 27 is a full circle 4.5 in. in diameter, graduated on *sterling silver* to 30 min. and reads by one double vernier to 1 min.

Vertical Limb on Transits Nos. 28, 29 and 30 is an arc of 2.5 in. radius, graduated on *sterling silver* to 30 min. and reads by one double vernier to 1 min., the vernier movable by tangent screw.

A Detachable Aluminum Guard, morocco finished, is furnished for the vertical limb of Transit No. 27.

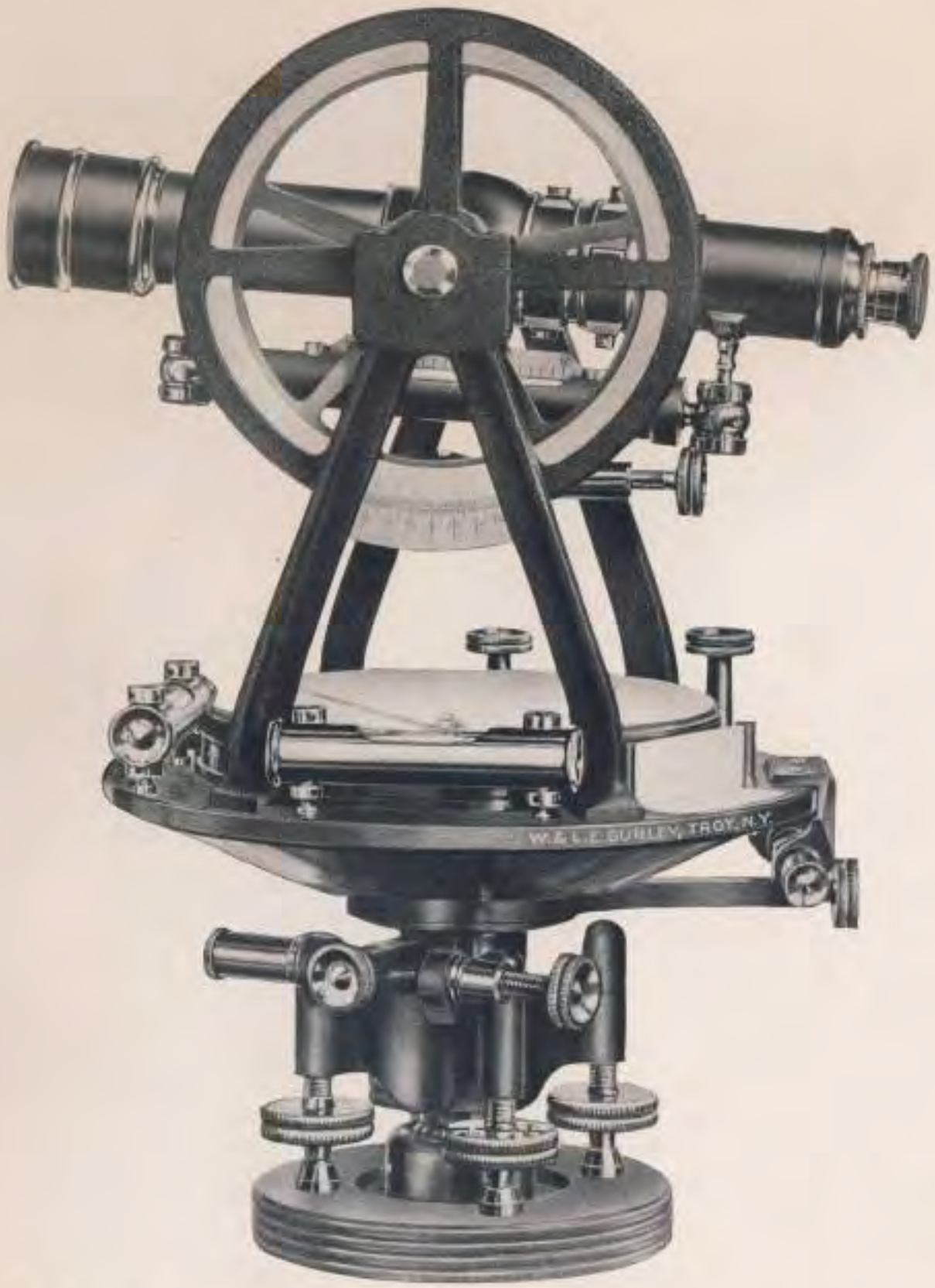
A Beaman Stadia Arc attached to Transits Nos. 27 to 30 costs $20.00 extra.

Sole Leather Carrying Case (outside dimensions 10 x 9.5 x 14.5 in.) with handle and shoulder straps, to enclose the mahogany box, costs $20.00 extra.

If **Split Leg Tripod No. 405** is substituted instead of extension leg pattern, deduct $3.00. If **Solid Round Leg Tripod No. 400** is substituted, deduct $6.00.

Gurley Light Mountain Transits

One Size



No. 27 5.65 in. limb, 4 in. needle, 8 in. telescope, weight 11.5 lbs. . . **$260.00**

Attachments: Vertical limb, full circle, 4.5 inches diameter, reading by vernier to 1 minute, with detachable guard; level on telescope; clamp and tangent to telescope axis.

If guard is omitted, deduct $8.00.

For detailed specifications, see page 30.

Gurley Light Mountain Transits

One Size

The Best Known Transit in America

No. 28 5.65 in. limb, 4 in. needle, 8 in. telescope, weight 11.5 lbs. . . **$260.00**

Attachments: Vertical limb, arc of 2.5 inches radius, reading by vernier to 1 minute, with vernier movable by tangent screw; level on telescope; clamp and tangent to telescope axis.

For detailed specifications, see page 30.

For an illustration of No. 28 Light Mountain Transit, showing its natural finish, see page 2.

Gurley Light Mountain Transits

One Size

No. 29 5.65 in. limb, 4 in. needle, 8 in. telescope, weight 11.5 lbs. . . **$275.00**

Attachments: Vertical limb, arc of 2.5 inches radius, reading by vernier to 1 minute, with vernier movable by tangent screw; level on telescope; gradienter, combined with clamp and tangent to telescope axis.

For detailed specifications see page 30.

Gurley Light Mountain Transit

With Burt Solar Attachment. One Size

No. 30 5.65 in. limb, 4 in. needle, 8 in. telescope, weight 12 lbs... **$340.00**

Attachments: Burt Solar with latitude level; vertical limb, arc of 2.5 inches radius, reading by vernier to 1 minute, with vernier movable by tangent screw; level on telescope; clamp and tangent to telescope axis.

For detailed specifications see page 30.

For description of Burt Solar Attachment see page 60.

Gurley Explorers Precise Transits

One Size

No. 24-A 4 in. limb, 2.13 in. needle, 6.5 in. telescope, weight 6 lbs. . . **$300.00**

Attachments: Vertical limb, full circle, 4 inches diameter, reading by two opposite double verniers to 1 minute, and with a level attached to the guard; level on telescope; clamp and tangent to telescope axis.

For detailed specifications, see page 36.

Gurley Explorers Precise Transits

One Size. The smallest and lightest Gurley Transit
Specifications of Explorers Precise Transits Nos. 20-A to 24-A

Centers: Compound.

Leveling Head: Arms strongly ribbed, with four leveling screws having dust caps. Clamp and tangent. Shifting center.

Horizontal Limb: 4 in. diameter. Strongly ribbed. Graduations on *sterling silver* to 30 min., reading by two opposite double verniers to 1 min. Figured like Limb I, see page 42: 0 to 90 each way inner row, and 0 to 360 outer row. (If specified in the order, will be graduated like Limb IV: two rows 0 to 360, reading in opposite directions and inclined in direction of increase.) Verniers at 30 deg. to line of sight; with reflectors.

Plate: Strongly ribbed. 2.13 in. vertical bar needle, with circle graduated on upper face to degrees and figured 0 to 90 each way, with beveled plate glass cover, waterproof. Variation arc graduated to degrees and reading by vernier to 5 min., with pinion movement. Flush vernier covers, waterproof. Two graduated plate levels. Clamp and tangent.

Standard: One Piece Truss pattern (patented), with extra wide base. Multi-grooved axis bearings.

Telescope: 6.5 in. long, power 16 diameters, aperture of objective 0.7 in. Erecting eyepiece. Balanced; transits either end; center point on top. Pinion movement to objective slide, spiral movement to eyepiece slide. *Platinum* cross, and stadia wires, ratio 1:100. (Disappearing stadia furnished if specified in order.) Dust guard to objective slide, detachable sunshade and cap. Clamp and tangent to telescope axis.

Telescope Level: 3 in. long, graduated on the vial.

Vertical Limb: Full circle, 4 in. diameter, graduated on *sterling silver* to 30 min. and reading by one double vernier to 1 min., with detachable aluminum guard.

Finish: Bronze; screws and small parts bright. Morocco finish on standard.

Equipment: Leather-covered, light mahogany box (outside dimensions 5.5 x 7 x 10.25 in.) with shoulder strap, reading glass, 6 oz. plain plummet, etc.

Tripod: No. 412, with jointed extension legs, cap and canvas carrying case; weighs about 5 lbs.

Transit and tripod can be packed together in an ordinary 24 in. suit case, as shown on page 38.

Weight: Transit only, about 5 lbs.; transit, including box and accessories, about 9 lbs.

Shipping Weight: Transit and tripod, in two boxes, for domestic shipment, about 50 lbs.; for export, about 75 lbs.

No. 20-A	Explorers Precise Transit, complete as specified.....	**$260.00**
No. 21-A	Explorers Precise Transit, same as No. 20-A, except the vertical limb is an arc of 2 in. radius, graduated on *sterling silver* to 30 min. and reads by one double vernier to 1 min.; the vernier movable by tangent screw.	**260.00**
No. 22-A	Explorers Precise Transit, same as No. 21-A, but with addition of gradienter, combined with clamp and tangent to telescope axis	**275.00**
No. 23-A	Explorers Precise Transit, same as No. 21-A, but with addition of Burt Solar Attachment.....	**340.00**
No. 24-A	Explorers Precise Transit, with a two-vernier vertical circle having a level attached to the guard, as illustrated and described on page 35.....	**300.00**

A Beaman Stadia Arc attached to Transits Nos. 20-A, 21-A, 22-A, or 23-A costs $20.00 extra.

Leather Suit Case, 24 in. long, to contain Explorers Transit and jointed extension tripod in canvas case (see page 38,) costs $16.00.

If **Extension Tripod No. 411,** without joints or canvas case, is substituted with the above Explorers Transits instead of the regular Jointed Extension Tripod No. 412, deduct $6.00. However, owing to its length of 38 in. when closed, this tripod cannot be packed in a suit case.

Gurley Explorers Precise Transits

One Size

The smallest and lightest Gurley Transit

No. 20-A 4 in. limb, 2.13 in. needle, 6.5 in. telescope, weight 5 lbs. . **$260.00**

Attachments: Vertical limb, full circle, 4 inches diameter, reading by vernier to 1 minute; level on telescope; clamp and tangent to telescope axis.

The Gurley Explorers Precise Transit is designed to meet the demand for a transit of greatest accuracy with the least possible weight. Similar to our Precise Light Mountain Transit in construction, the instrument itself weighs only about 5 lbs., and when placed in its leather-covered case can be readily packed and carried in a 24 in. dress suit case, together with its special tripod, as shown on page 38. See also Explorers Level, on page 70, and Explorers Alidade, on pages 78 and 79.

Gurley Explorers Precise Transits

One Size

A Gurley Explorers Transit with its special Jointed Extension Tripod, Canvas Carrying Case, and Leather Covered Wooden Box

A Gurley Explorers Transit, with its special Tripod, packed in a dress suit case 24 inches long

Leather Dress Suit Case, 24 in. long..... **$16.00**

Miscellaneous Instrument Parts and Supplies

Liable to Loss or Injury

	Price	Postage
Solid Round Tripod Legs only, for Engineers Transit or Level, per set	$5.75	
Split Tripod Legs only, for Engineers Transit or Level, per set	8.00	
Extension Tripod Legs only, for Engineers Transit or Level, per set	11.50	
Clamp Screw and Band for extension tripod leg, each	1.00	.05
Tripod Head only, with bolts and nuts, for Engineers Transit or Level	5.75	.50
Cap for tripod head, each	1.15	.12
Brass Bolt and Nut to fit tripod head, each	.90	.05
Metal Point or Shoe for tripod leg, each	.60	.05
Shawl Strap (superior), for extension tripod	1.15	.10
Steel Screw Driver with wooden handle, each	.30	.05
Steel Adjusting Pins, each	.05	.01
Steel Adjusting Pins, with eye, for attaching to key ring, each	.15	.02
Rubber Tips, for bottom of instrument box, per set	.60	.08
Leather Strap and Buckle for transit box	.90	.10
Leather Strap and Buckle for level box	1.15	.10
Lock and Key for instrument box	.90	.03
Reading Glass for transit, each	.90	.02
Brass Plummet with screw cap, for transit or level, each	1.75	.20
Waterproof Hood, for transit or level, each	1.15	.06
Clamp with Clamp Screw, for New York Rod	2.90	.15
Clamp with Scale and Clamp Screw, for Philadelphia Rod	3.50	.15
Target with Clamp Screw and Spring, for New York or Philadelphia Rod	5.25	.35
Chain Handle, with staple and nuts, each	.90	.08
Chain Tallies, per set of 9	.60	.06
Instrument Oil, finest grade, small bottle	.40	.05
Camel Hair Brush	1.15	.02

For prices of other Parts, see pages 44, 45, 66, 73 and 95

Gurley Reconnoissance Transits

One Size. One Vernier to Limb

Specifications of Reconnoissance Transit No. 102

Centers: Compound.

Leveling Head: Arms strongly ribbed, with four leveling screws having dust caps. Clamp and tangent. Shifting center.

Horizontal Limb: 5 in. diameter. Strongly ribbed, depth increasing towards center. Graduated on *sterling silver* to 30 min., reading by one double vernier to 1 min. Figured like Limb I, see page 42: 0 to 90 each way inner row, and 0 to 360 outer row. (If specified in the order, will be figured like Limb IV: two rows 0 to 360, reading in opposite directions and inclined in direction of increase.) Vernier at 30 deg. to line of sight.

Plate: Strongly ribbed, depth increasing towards center. 3.5 in. vertical bar needle, with circle graduated on upper face to 30 min. and figured 0 to 90 each way, with beveled plate glass cover, waterproof. Variation arc graduated to 30 min., reading by vernier to 1 min., with pinion movement. Flush vernier cover, waterproof. Two graduated plate levels. Clamp and tangent.

Standards: Angle-section, with ample bases. Multi-grooved axis bearings.

Telescope: 9 in. long, power 18 diameters, aperture of objective 0.69 in. Erecting eyepiece. Balanced; transits either end; center point on top. Pinion movement to objective slide; spiral movement to eyepiece slide. *Platinum* cross, and stadia wires, ratio 1:100. (Disappearing stadia furnished, if specified in the order.) Dust guard to objective slide, detachable sunshade, and cap. Clamp and tangent to telescope axis.

Telescope Level: 4.3 in. long, graduated on the vial.

Vertical Limb: Full circle, 4.5 in. diameter, graduated on *sterling silver* to 30 min. and reading by one double vernier to 1 min.

Finish: Bronze; screws and small parts bright. Morocco finish on standards.

Equipment: Mahogany box, with reading glass, 6 oz. plain plummet, etc.

Tripod: No. 411, with extension legs, cap, and carrying straps; weighs about 8 lbs.

Weight: Transit only, about 8 lbs.; transit, including box and accessories, about 12.5 lbs.

Shipping Weight: Transit and tripod, in two boxes, for domestic shipment, about 50 lbs.; for export, about 75 lbs.

No. 102 **Reconnoissance Transit,** complete as specified..... **$195.00**

No. 103 **Reconnoissance Transit,** same as No. 102, except the vertical limb is an arc of 2.5 in. radius, graduated on *sterling silver* to 30 min. and reads by one double vernier to 1 min., the vernier movable by tangent screw..... **203.00**

Detachable Aluminum Guard to protect the vertical circle on Transit No. 102 costs $8.00 extra.

A Beaman Stadia Arc attached to Transits Nos. 102 or 103 costs $20.00 extra.

A Gradienter, combined with the clamp and tangent to the telescope axis on Nos. 102 or 103, costs $15.00 extra.

Sole Leather Carrying Case with handle and shoulder straps, to enclose the mahogany box, costs $18.00 extra.

If **Split Leg Tripod No. 406** is substituted for the extension leg pattern, deduct $3.00.

A Trivet Plate, to enable setting the instrument upon the walls or girders of a building where it is impossible to use a tripod, costs $2.00 extra.

Gurley Reconnoissance Transits

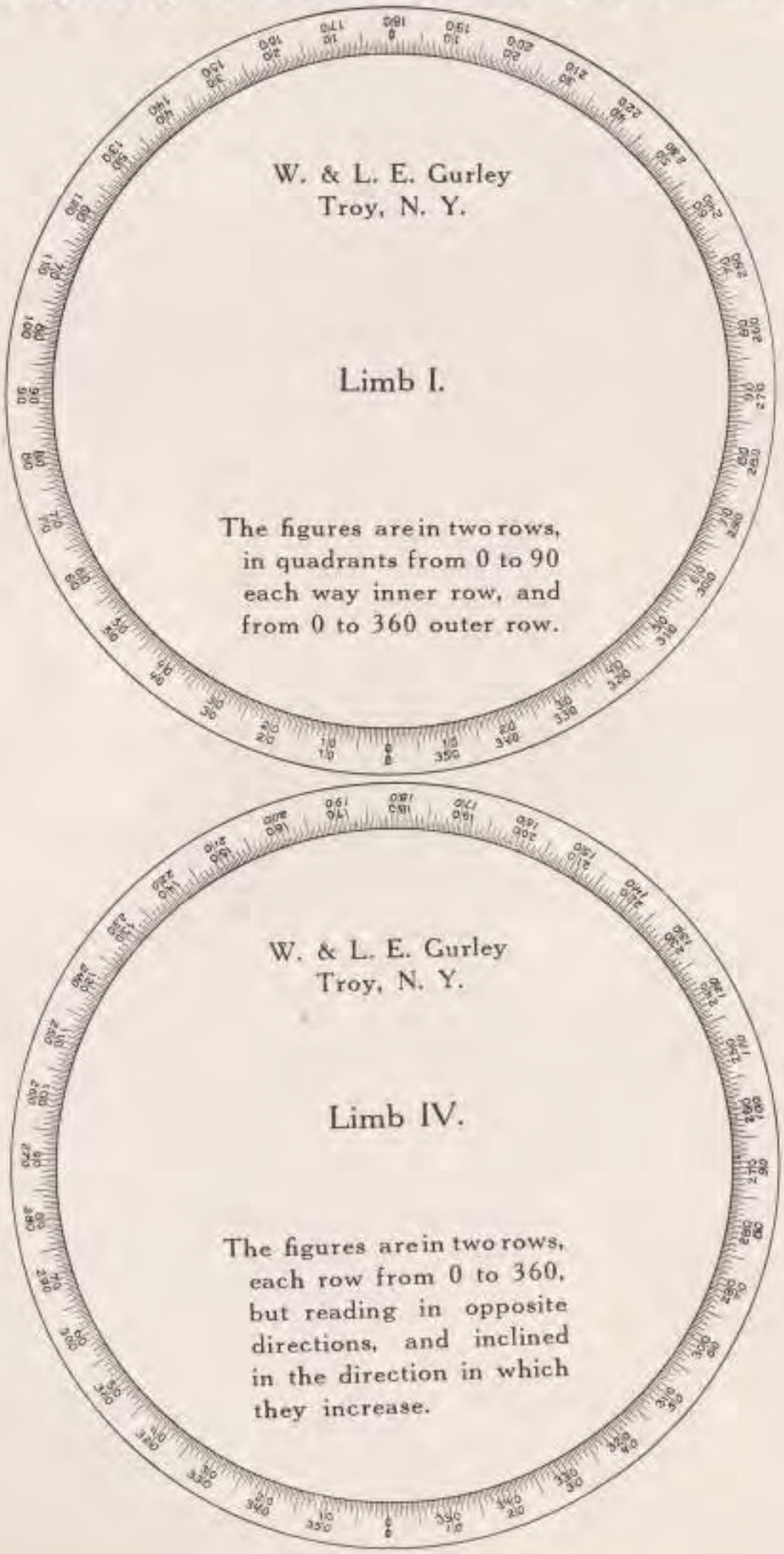
One Size. One Vernier to Limb

No. 102 5 in. limb, 3.5 in. needle, 9 in. telescope, weight 8 lbs.... **$195.00**

The Gurley Reconnoissance Transit meets the demand for a very light instrument for rapid work. Constructed like our Mountain Transits, with long centers and with ribbed leveling head, limb and main plate, and made with the same care as our larger and more expensive patterns, it is recommended as reliable for a great variety of work.

Its accuracy, its convenience in carrying, and its proved ability to stand up satisfactorily under severe use, have made this transit especially popular with Surveyors, Contractors, Road Engineers, Architects and Builders.

Figuring of Limbs of Gurley Transits



Top Plate of Gurley Light Mountain Transit

Note the easy reading verniers, with reflectors. The glasses covering these openings are flush with the plate, thus they are easy to clean and there are no frames or rims to cast shadows or collect dust.

The illustration shows graduations on the face of the needle circle only, but the inner or vertical edge is also graduated to degrees.

All Gurley Transits having compasses are regularly equipped with a variation arc, as shown above.

The position of the levels, at the edge of the plate, insures greater accuracy and they are more accessible than if placed inside the compass.

Centesimal Graduations

If specified in the order, the horizontal or vertical limbs of our Transits will be graduated to 400 grads, with 4 sub-divisions to each grad, and reading by vernier to 100ths of a grad.

Likewise, if specified, needle circles will be graduated to 400 grads, with 2 sub-divisions to each grad.

Attachments and Extras for Gurley Transits

The following prices are for attachments only when furnished with a new instrument.

When fitted to a completed instrument, the cost of alterations must be added to the price of the new parts.

No. 131	Variation Arc added to Transits when sent for repairs	$20.00
No. 135-B	Vertical Circle, 4 in. diameter, with vernier reading to 1 min.	15.00
No. 136	Vertical Circle, 4.5 in. diameter, with vernier reading to 1 minute. (See page 47.)	15.00
No. 137	Vertical Circle, 5 in. diameter, with vernier reading to 1 min.	20.00
No. 138	Vertical Circle, 5 in. diameter, with two opposite double verniers, reading to 1 minute, and with guard. (See page 47.)	46.00
No. 139	Vertical Circle, 4.5 in. diameter, with graduations on edge or rim, protected by a metal guard. Circle graduated to 30 minutes, with vernier reading to 1 minute. (See page 49.)	40.00
No. 139-A	Vertical Arc, 2 in. radius, with vernier reading to 1 minute, movable by tangent screw	23.00
No. 139-B	Vertical Arc, 2.5 in. radius, with vernier reading to 1 minute, movable by tangent screw	23.00
No. 140	Vertical Arc, 3 in. radius, with vernier reading to 1 minute, movable by tangent screw. (See page 48.)	23.00
No. 141	Detachable Aluminum Guard for Vertical Circle. (See page 48.)	8.00
No. 145	Level on Telescope, with ground and graduated vial. (See page 47.)	15.00
No. 146	Level on Telescope, with Reversion Vial. (See page 49.)	22.00
No. 148	Clamp and Tangent to Telescope Axis. (See page 47.)	8.00
No. 149	Beaman Stadia Arc, for Transit having a one-vernier vertical circle or vertical arc. (See pages 52 to 54.)	20.00
No. 149-A	Beaman Stadia Arc, for Transit having a two-vernier vertical circle No. 138	46.00
No. 149-B	Beaman Stadia Arc, for Telescopic Alidades Nos. 592 and 592-A	20.00
No. 149-C	Beaman Stadia Arc with edge graduations, for Telescopic Alidade No. 584-B	40.00
No. 150	Gradienter, combined with Clamp and Tangent. (See pages 48 and 55.)	23.00
No. 151	Platinum Stadia Wires, adjustable, and diaphragm	7.00
No. 152	Platinum Stadia Wires, fixed, and diaphragm	9.00
No. 154	Dust Guard to objective slide. (See page 54.)	6.00
No. 155	Pinion movement to eyepiece slide	7.00
No. 157	Sights on Telescope, with folding joints	10.50
No. 158	Sights on Standards, at right angles with telescope	10.50
No. 160	Detachable Side Telescope and Counterpoise, for vertical sighting. (See page 57.)	33.00
No. 161	Detachable Riding Telescope, for vertical sighting. (See page 57.)	33.00
No. 165	Reflector for illuminating cross wires. (See page 58.)	10.50
No. 166	Reflector for illuminating cross wires of large Wye Level. (See page 58.)	13.00
	The elliptical reflecting pieces on Reflectors Nos. 165 and 166 are of *sterling silver*.	
No. 167	Elbow Eyepiece, in addition to regular eyepiece, and interchangeable	46.00
No. 168	Diagonal Prism for eyepiece of telescope. (See page 58.)	10.50
No. 169	Eyepiece Cap with darkener glass in shutter, for direct solar observations	2.75
No. 170	Plummet Lamp for mine surveying. (See page 59.)	13.00

Attachments and Extras for Gurley Transits

No. 180	Attached Magnifier, with three universal joints, to read verniers. (See page 58.) Each	$7.00
No. 181	Attached Microscopes to read verniers of horizontal limb, as shown with No. 18-A Transit. (See page 23.) Per pair	30.00
No. 182	Attached Microscopes to read verniers of No. 138 vertical limb, as shown with No. 18-A Transit. (See page 23.) Per pair	30.00
No. 185	Graduation of horizontal limb to read to 20 or 30 seconds, extra	10.00
No. 186	Graduation of horizontal limb to read to 10 seconds, extra	30.00
No. 187	Graduation of 4.5 or 5 in. Vertical Circle to read to 20 or 30 seconds, extra	5.00
No. 188	Graduation of No. 138 Vertical Circle to read to 20 or 30 seconds, extra	10.00
No. 189	Graduation of No. 138 Vertical Circle to read to 10 seconds	30.00
No. 190	Burt Solar Attachment, with declination arc, hour circle, polar axis, patent latitude level, adjusting level and adjusting bar. (See page 60.)	80.00
No. 192	Solar Screen, to fit eyepiece of telescope. (See page 59.)	10.50
No. 193	Patent Latitude Level, for use with Burt Solar Transit	8.00
No. 196	Striding or Adjusting Level	7.00
No. 197	Adjusting Bar for Solar Attachment of Transit	2.00

For Tripods, see pages 139 to 141.

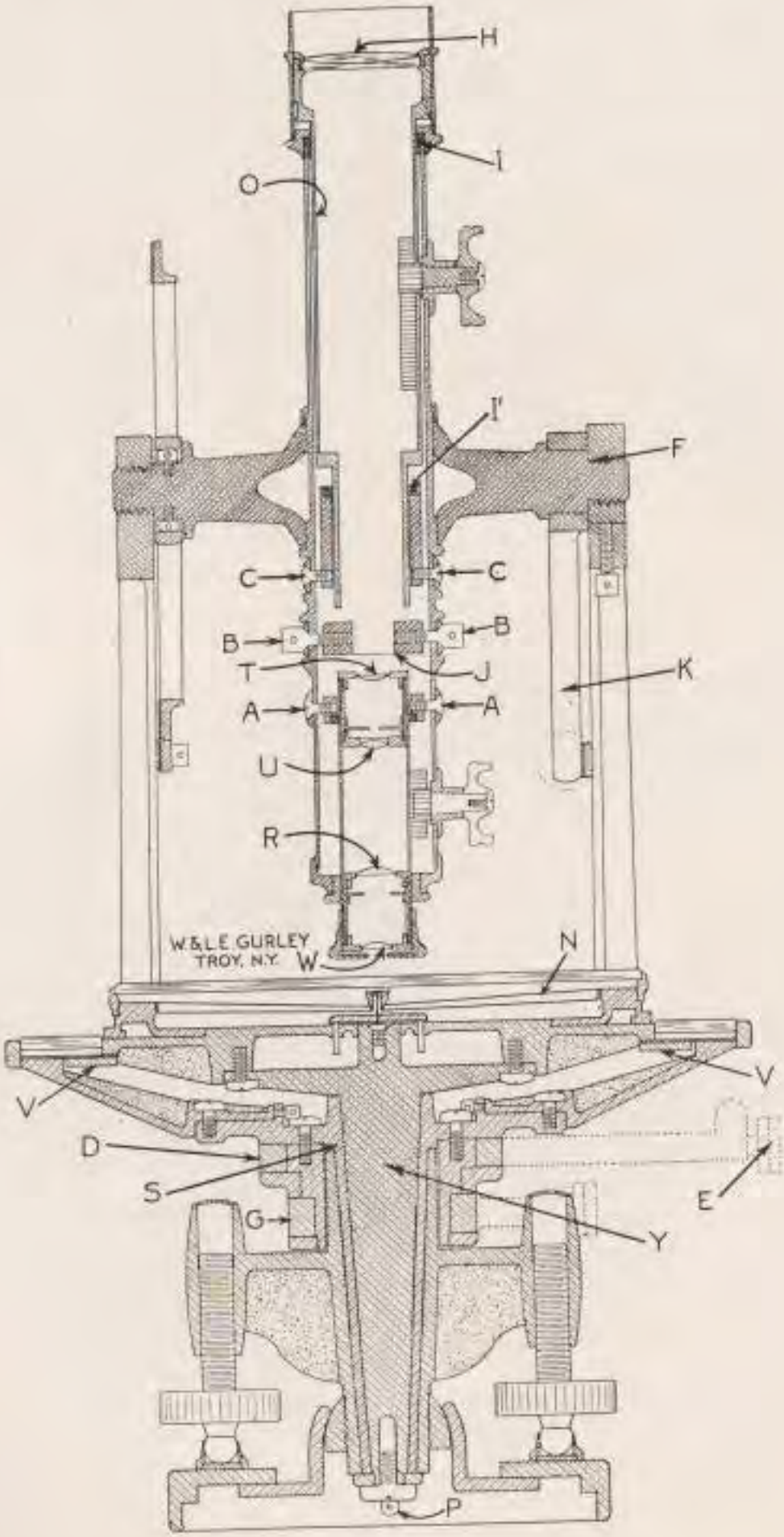
Parts of Gurley Transits Liable to Loss or Injury

For prices of other Parts, see pages 39, 66, 73 and 95

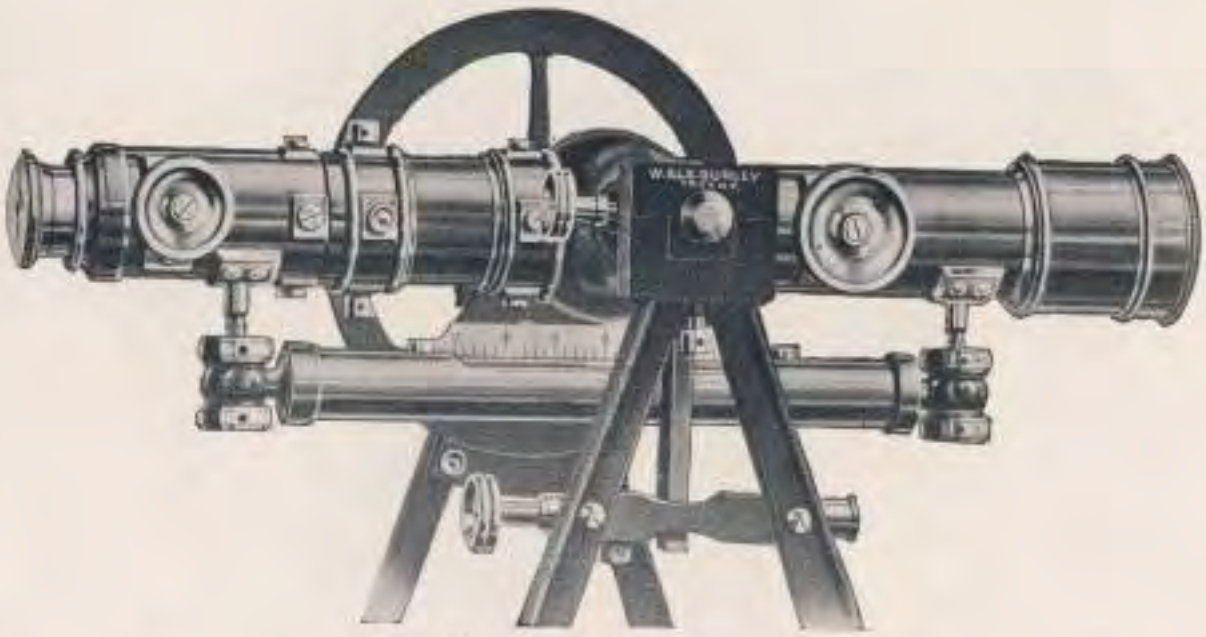
	Price	Postage
Needle with jeweled center and center pin	$4.25	.12
Center Pin only	.60	.01
Ground Glass Level Vials, for plate, each	1.00	.02
Ground Glass Level Vials, brass mounted complete, for plate, each	2.50	.14
Ground Glass Level Vial, for telescope, unmounted, graduated and figured, each	3.00	.14
Ground Glass Level Vial, for telescope, unmounted, not graduated or figured, each	2.50	.14
Cap for eyepiece or object glass, each	.90	.03
Shade for object glass	.90	.03
Clamp Screws for horizontal limb, each	.90	.02
Tangent Screw for leveling head	$0.90 to 1.80	.13
Clamp Screw for leveling head	.90	.03
Leveling Screw for leveling head, each	$1.20 to 1.80	.14
Eyepiece complete, including lenses and settings, and omitting cap	7.25	.14
Object Glass complete	7.25	.14
Platinum Cross Wires and Diaphragm	4.00	.15
Platinum Stadia Wires, adjustable, and diaphragm	7.00	.15
Platinum Stadia Wires, fixed, and diaphragm	9.00	.15
*Mahogany Box with lock and strap, and fitted inside, according to size, **$6.00 to $7.50.**		
Plummet Screw and Chain for bottom of leveling head	.45	.04
Adjusting Pins, each	.05	.01
Adjusting Pins, with eye for attaching to key ring, each	.15	.02
Screwdriver, small size	.30	.04
Screwdriver, large size	.60	.06
Waterproof Hood	1.25	.10
Instrument Oil, finest grade, small bottle	.40	.05

*If box is wanted for a Gurley Transit, specify length of telescope, length of compass needle, height of the instrument from bottom plate of the leveling head to the tops of the standards, and also state whether it has a vertical arc or a full vertical circle. Unless the Transit is sent to us, the new box will be furnished with the packing pieces or blocks not fitted in position.

Sectional View of a Gurley Transit



Attachments and Extras for Gurley Transits



Nos. 136, 145 and 148

Vertical Circle, Level on Telescope, and Clamp and Tangent to Telescope Axis

No. 138

Vertical Circle, with two opposite double verniers

Attachments and Extras for Gurley Transits

No. 141

The illustration shows No. 141 Detachable Aluminum Guard attached to the vertical limb to protect the graduations from injury. It can be removed readily and is regularly supplied with Transits Nos. 8-A, 20-A, 27, 27-A and 32-A. It will be furnished with No. 102 Reconnoissance Transit, see page 41, for **$8.00** extra.

Nos. 140, 145 and 150

The illustration shows No. 140 Vertical Arc with tangent screw, No. 145 Level on Telescope with ground glass vial, and No. 150 Gradienter combined with clamp and tangent to telescope axis. An enlarged view of the Gradienter, with description, will be found on page 55.

Attachments and Extras for Gurley Transits

No. 146

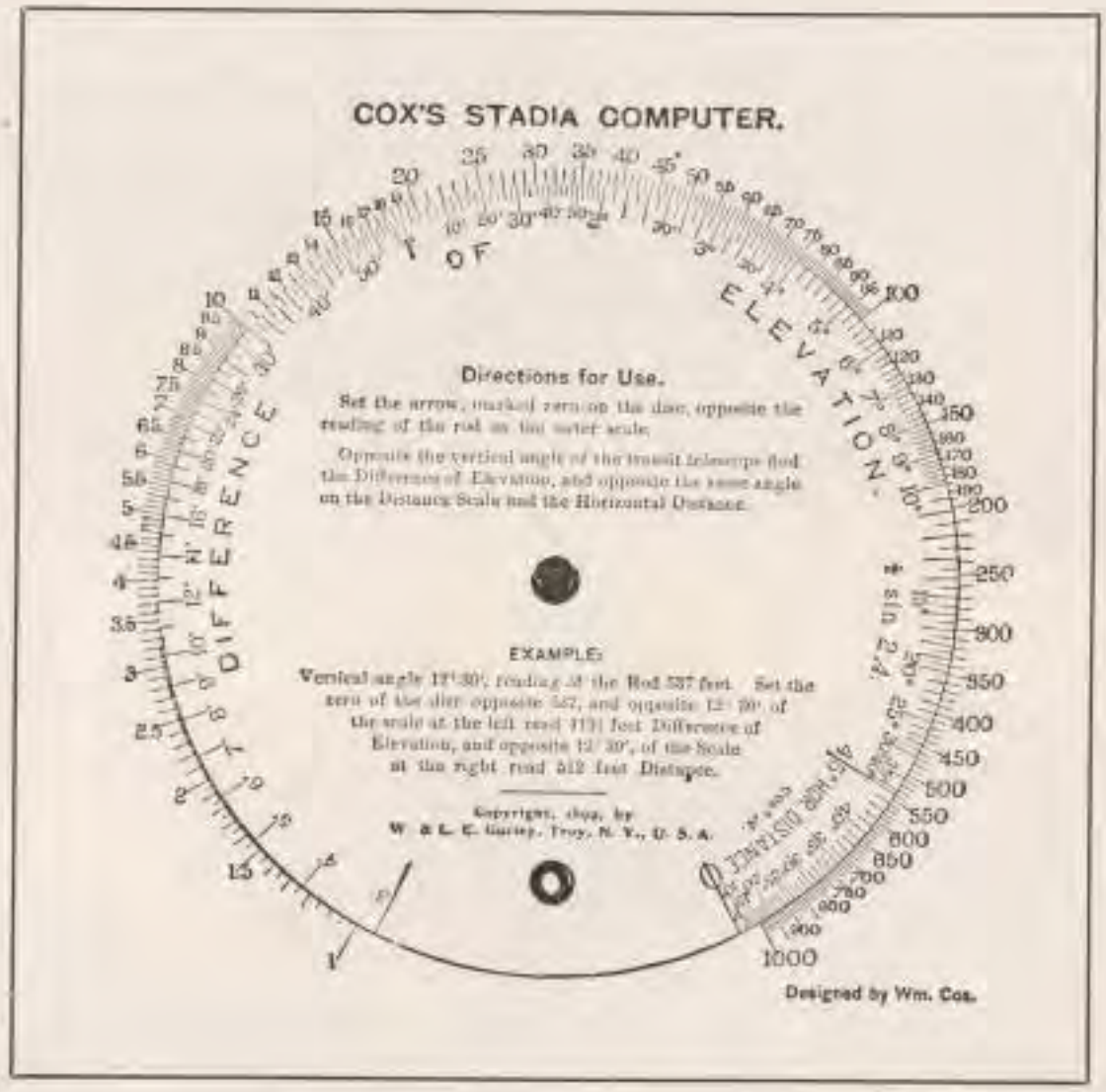
Level on Telescope, with Reversion vial, **$22.00**

No. 139

Vertical Circle, 4.5 inches diameter, with graduations on edge or rim, protected by a metal guard. Circle graduated to 30 minutes, with vernier reading to 1 minute, **$40.00.**

Cox Stadia Computer

A circular slide rule for the reduction of stadia readings, in convenient form for field use



The Cox Stadia Computer is a circular slide rule of about fifteen inches effective length. The fixed outer scale, or base, is graduated to the logarithms of numbers from 1 to 1000. The movable inner disc, concentric with it, is graduated on a portion of its circumference to the logarithms of one half the sine of twice the angles from 3 min. to 45 deg., and inscribed "Difference of Elevation." Another portion of its circumference is graduated to the logarithms of the cosine squared of the angles from 0 to 45 deg., and inscribed "Hor. Distance."

Printed on heavy celluloid, size 5⅞ x 5⅞ inches, suitable for carrying in coat pocket.

Complete explanation sent on request.

Price, postage paid, **75 cents.**

Attachments and Extras for Gurley Transits

Stadia Wires

View of the Telescope of a Gurley Transit

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 the independent screws (s, s), 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 a half 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. When metric measurements are used, the same ratio equals 1 meter to 100 meters.

We regularly furnish stadia wires with every new Transit having a vertical limb. They will be supplied with all other new Transits and with new Engineers Wye Levels without extra charge, if requested when the instrument is ordered. The stadia wires are fixed permanently on the same ring with the cross wires, when desired, or they may be placed so that they are out of focus when cross wires are visible, or vice versa.

We are successfully drawing platinum wires from one eight-thousandths to one fifty-thousandths of an inch in diameter, and are using them in all the telescopes of our instruments. They are opaque, unaffected by moisture, and universally preferred to spider web.

Attachments and Extras for Gurley Transits

Beaman Stadia Arc

A practical attachment for Transits and Telescopic Alidades, simplifying Stadia Surveying and eliminating the use of stadia tables, slide rules or diagrams

Patented March 27, 1906

Manufactured only by W. & L. E. Gurley, Troy, N. Y.

No. 149

Beaman Stadia Arc, attached to the vertical circle of a transit
This attachment does not interfere with the addition of Detachable Guard No. 141

This specially graduated vertical arc was devised and patented by W. M. Beaman, a topographer in the United States Geological Survey, and is now extensively used by that bureau in its topographical surveys. In 1906 we introduced it on our transits and alidades, and because this arc furnishes engineers with a rapid and exact mechanical solution of the stadia problem, the use of the stadia in surveying has been popularized to an appreciable extent.

By the use of this arc precise differences in elevation, and reduced horizontal distances can be determined with great rapidity, and without the intricate calculation heretofore necessary.

The arc is attached to the vertical limb of the transit or alidade, and carries two scales having coincident zero points, marked 0 and 50 respectively, either scale being read by an index common to both. The scale graduations are so spaced and figured as to give simple multiples of the rod interval.

The Beaman Stadia Arc can be used also for metric measurements, as the graduations are based on a ratio of 1 to 100, which is 1 foot to 100 feet, or 1 meter to 100 meters.

Advantages of the Beaman Stadia Arc

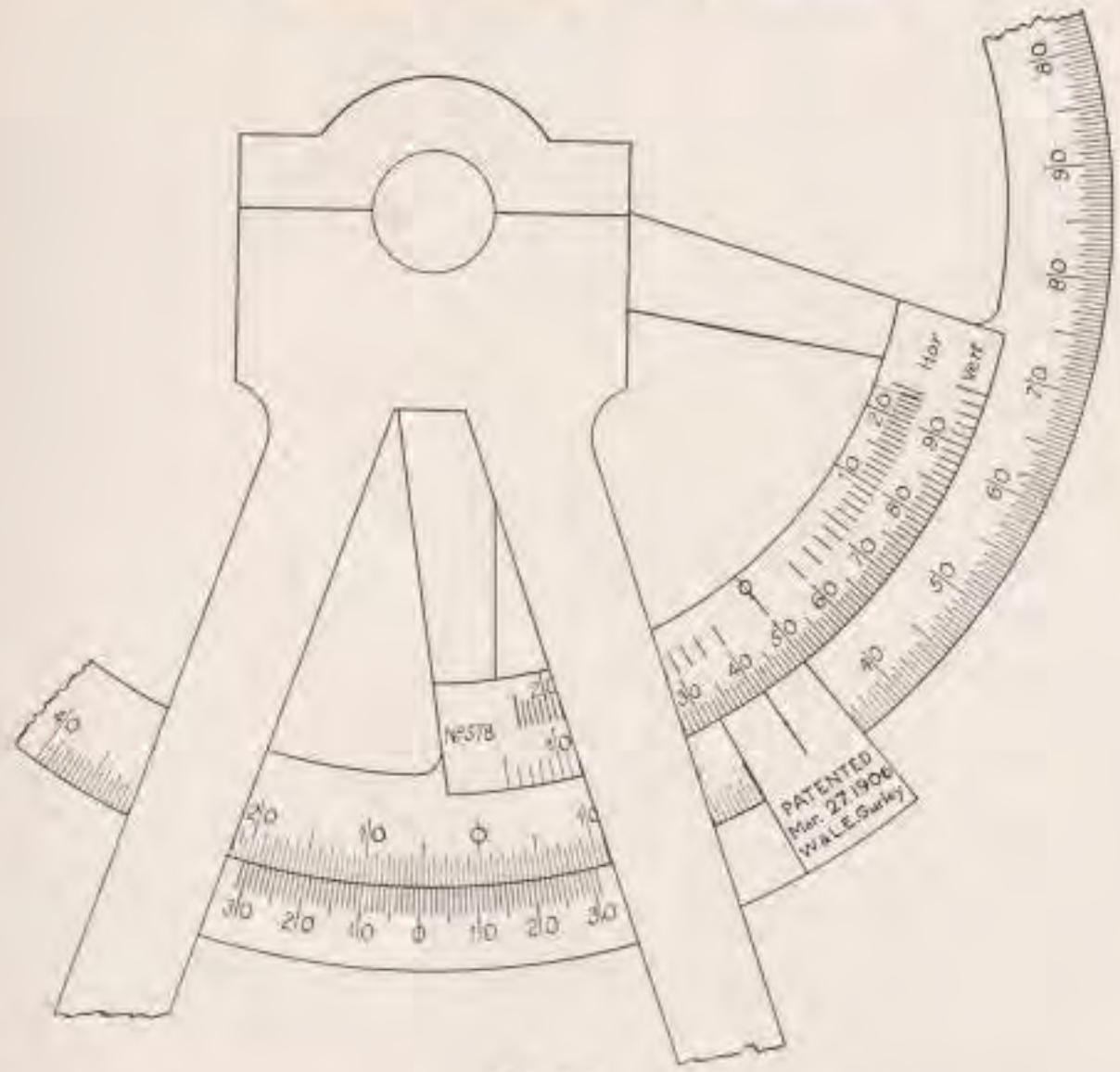
1. The use of stadia tables, slide rules, or diagrams is entirely obviated.
2. There is no vernier or similar contrivance to be read.
3. Final results are obtained in less than one-third the time required by ordinary methods.
4. The accuracy of results is identical with formulæ or table computations, regardless of the angle or distance.
5. The simplicity of the process practically eliminates the chances of error incidental to the use of other methods.

To Obtain Difference in Elevation between Instrument and Rod

The outer scale, marked "Vert.," indicates multiples of the rod interval, for determining differences in elevation between instrument and rod. The zero point of this scale is marked 50, so that a direct scale reading will indicate whether the telescope is elevated or depressed.

Attachments and Extras for Gurley Transits

Beaman Stadia Arc— Continued



No. 149
Enlarged view of graduations of Beaman Stadia Arc, attached to vertical limb of a transit

A unique feature of the use of the multiple scale is that only such inclinations of the telescope are used as will give a whole number scale reading, while the fractional part of the elevation is quickly and accurately determined by the reading of the middle wire on the rod.

To obtain the desired multiple, therefore, sight anywhere on the rod, it does not matter where, so that a whole number reading is obtained on the multiple scale.

Subtract 50 from this scale reading and use the algebraic remainder; e. g., if the Vert. scale reads 56, the multiple is 56—50 = 6. If this scale reads 47, the multiple is 47—50 = —3.

Example: Suppose the observed stadia interval to be 6.40 (640 ft.), and to obtain a whole number for the scale reading, the telescope is inclined so that the multiple scale reads 33, at which setting the middle wire reads 7.30 on the rod.

Then the interval equals 33— 50 = —17

—17 x 6.40 = —108.8

Difference in elevation between instrument and base of rod,

—7.30—108.8 = —116.1 ft.

The negative sign indicates that the point where the rod was held is lower than the instrument.

Attachments and Extras for Gurley Transits

Beaman Stadia Arc—Continued

To Reduce Observed Distance to True Horizontal Distance

The inner scale, marked "Hor.," gives at the same pointing a direct reading of the percentage of correction (always subtractive) necessary to reduce the observed stadia reading (in feet subtended) to the true horizontal distance.

Example: At the above setting the reduction scale would read 3, or 3%.
3% of 640 ft.=19.2 ft.
640—19.2=620.8 ft., the true horizontal distance.

For illustrations of the Beaman Stadia Arc attached to completed instruments, see the following:

Precise Transit No. 30-A, page 25.
Telescopic Alidade No. 584-C, page 76.
Explorers Alidade No. 592-C, page 78.

Prices of the Beaman Stadia Arc

The Beaman Stadia Arc can be supplied with any new transit of our manufacture having a one vernier vertical circle or vertical arc, 4 inches diameter or larger, for $20.00 extra, if ordered with the instrument. When applied to No. 138 two vernier vertical circle, the extra cost is $46.00.

This attachment can also be fitted to an old Transit (or old Alidades Nos. 582, 583, 592, 592-A, 584-A, or 584-B), but the additional cost of alterations and readjusting can only be determined upon examination of the instrument, which must be in our hands for this purpose.

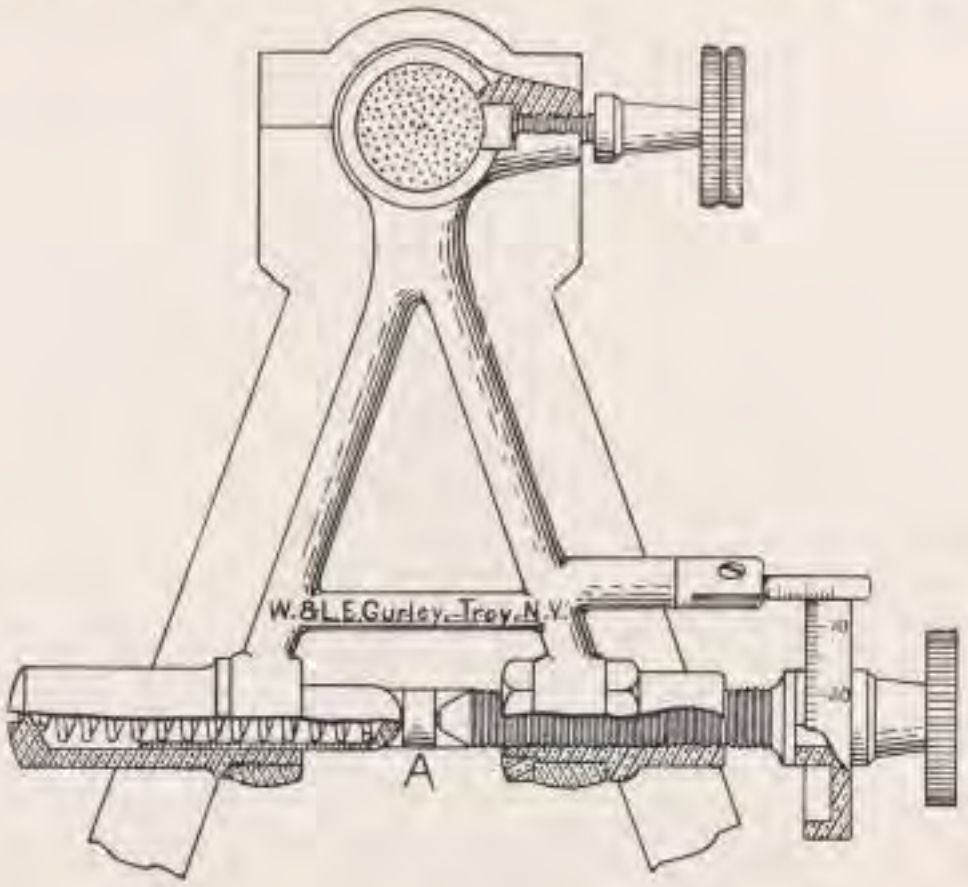
Dust Guard

No. 154
Dust Guard, $6.00

This Guard protects the objective slide and prevents any dust or foreign substance from interfering with its perfect action.

No. 154 Dust Guard..... **$6.00**

Attachments and Extras for Gurley Transits



No. 150
Gradienter, $23.00

This attachment is a modification of the tangent screw attached to the horizontal axis of the telescope, and is used in measuring small vertical angles in terms of their tangents.

It consists of a screw accurately cut to a determined number of threads which, passing through a sleeve nut on one side of the arm, presses against the small stud, A, fixed to the inside surface of the right-hand standard. A drum having a rim of *sterling silver* centered on the micrometer screw, is graduated into 100 equal parts and a short arm carries a small silver scale, graduated to read complete turns of the micrometer screw, which serves as an index to the micrometer drum. Pressing against the opposite side of the stud is an enclosed spiral spring which maintains a positive movement of the Gradienter screw.

In the Gurley Gradienter attachment the value of the screw thread is such that a complete revolution of the screw will move the horizontal cross wire of the telescope over a space of one foot on a rod held at a distance of 100 feet. If the screw is turned through fifty spaces on its graduated head, the wire will pass over fifty one-hundredths, or one-half foot on the rod, and so on in the same proportion. The same ratio applies to metric measurements, 1 meter to 100 meters. Thus the Gradienter can be used in the measurement of distances.

The most important use of the Gradienter is in establishing grades in surveying connected with railroads, streets, highways, sewers, canals, irrigation ditches, etc. The procedure is as follows: First, 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 head as there are hundredths of feet to the hundred in the grade to be established.

The Gradienter drum and the index are graduated on *sterling silver*; thus the graduations are even, distinct and permanent. The entire attachment is of such construction and workmanship that it can be depended upon for accurate work.

See illustrations of Transits Nos. 10-A, 29-A and 29.

No. 150 Gradienter, combined with clamp and tangent to telescope axis **$23.00**

When supplied with any new Transit, which is listed with clamp and tangent movement to telescope axis, the extra cost is $15.00

Attachments and Extras for Gurley Transits

Detachable Telescopes for Vertical Sighting In Mine Surveying

A convenient arrangement for sighting up or down a vertical shaft is shown in No. 160, in which an extra telescope is fitted with a flange and disk connecting it with the axis, so as to make it precisely parallel with the main telescope. A counterpoise, as shown, is fitted to the other end of the axis, and both telescope and counterpoise can be detached and placed in the transit box when not in use.

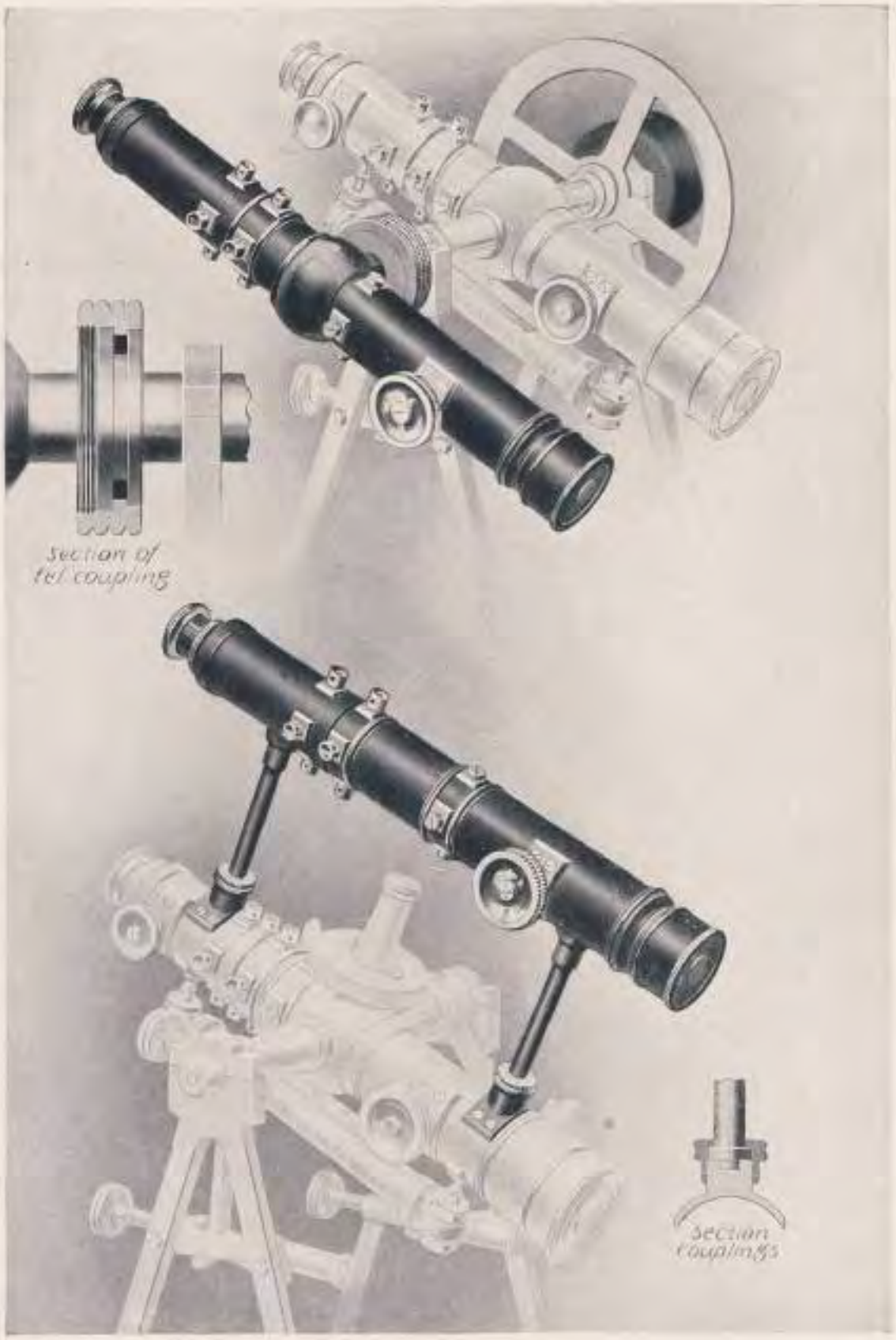
In No. 161 the extra telescope is connected with the main telescope by coupling nuts which fasten it directly over the center of the instrument and allow its ready removal and replacement without disturbing its adjustments. In both arrangements the extra telescope is adjusted to the main telescope of the transit so that the lines of collimation of both are parallel and in the same plane, horizontal in No. 160 and vertical in No. 161; and in both the extra telescope swings over the outside of the transit plates.

Diagonal Prism No. 168 is often used with the extra telescope for greater convenience in sighting. See page 58.

No. 160 Detachable Side Telescope and Counterpoise..... **$33.00**
No. 161 Detachable Riding Telescope..... **33.00**

A Gurley Precise Transit equipped with Detachable Side Telescope No. 160.
View shows instrument set up over a vertical mine shaft and observer using a magnifier to read the vertical limb

Attachments and Extras for Gurley Transits



Nos. 160 and 161
Detachable Telescopes for vertical sighting in mine surveying. Each $33.00

Attachments and Extras for Gurley Transits

Reflector for Cross Wires

No. 165
Reflector, $10.50

The Reflector for Cross Wires, No. 165, consists of an elliptical piece of silver inclined at an angle of 45 deg. with the ring, which is fitted to the objective end of the telescope. The opening in the reflector allows the use of the telescope, while a light held near the inner surface illuminates the cross wires.

No. 165 Reflector for Cross Wires.. **$10.50**

Diagonal Prism

The Diagonal Prism, No. 168, is used when it is necessary to observe greater vertical angles than can be taken with the ordinary telescope. It consists of a prism attached to the cap of the eye-piece, by which the object is presented to the eye when placed at right angles with the telescope. When the telescope is directed to the sun the slide or darkener containing colored glass is moved over the opening.

No. 168 Diagonal Prism.... **$10.50**

No. 168
Diagonal Prism, $10.50

No. 180
Attached Magnifier, $7.00

Attached Magnifiers

Attached Magnifiers are frequently used over the verniers of the horizontal or vertical limb, and are held by a universal three-jointed arm, which allows the lens to be placed over any point of the vernier. The magnifier for the "A" vernier can also be used for reading the vernier of the vertical limb (any style having one vernier.)

No. 180 Attached Magnifier, each.. **$7.00**

Attachments and Extras for Gurley Transits

No. 170
Plummet Lamp, $13.00

Plummet Lamp

The Plummet Lamp, No.170, is a large plummet, of which the upper part is hollow to contain oil. It has a tube for a wick, and an extinguisher.

It is hung in gimbals by chains with a hook, and so always assumes a vertical position, and when suspended from the shifting center of a leveling head it can be easily adjusted over a given point.

These lamps are packed in a wooden case, furnished with a strap to sling over the shoulders. The weight of each lamp is about 1¼ lbs., and either one, two or three may be packed in a single box.

No. 170 Plummet Lamp..... **$13.00**

No. 192
Solar Screen, $10.50

Solar Screen

If desired, we furnish a Solar Screen arranged to clamp to the eyepiece end of the telescope, and detachable at will. On this screen the image of the sun and cross wires can be readily observed, a greater movement of the eyepiece, however, being required.

No. 192 Solar Screen..... **$10.50**

Attachments and Extras for Gurley Transits

No. 190 Burt Solar Attachment as applied to transits. **$80.00**

The Solar Attachment is essentially the solar apparatus of Burt placed upon the cross bar of the ordinary transit. A little disc 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 disc 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 5 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, and reads by vernier to minutes.

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 degrees and from 90 to 10 degrees, the first series being intended for reading vertical angles and the latter series for setting off the latitude.

No. 193 Patent Latitude Level is used for recovering the latitude on a solar transit without referring to the vertical arc, and also for setting the telescope at any desired angle in running grades and similar work.

It consists of a level connected by a short conical socket with the end of the telescope axis, to which it is clamped by a milled head screw, and made adjustable by a tangent screw and spring on the enlarged end of the tube. When the clamp screw is released the level turns vertically upon the axis, and can thus be set at any angle with the telescope, the final adjustment being made by the tangent screw.

The latitude being set off upon the vertical arc as usual, the level is clamped and brought into the middle, as above described.

The telescope may then be released and used in running lines, until it is desired to recover the latitude again. This is easily and accurately done without referring to the vertical arc. The use of the attachment in running any desired grade is readily understood.

This attachment is furnished without extra charge with a new Burt Solar Transit, together with Adjusting Level No. 196 and Adjusting Bar No. 197.

A Worthy Descendant of the Veteran Gurley

"The New Gurley"

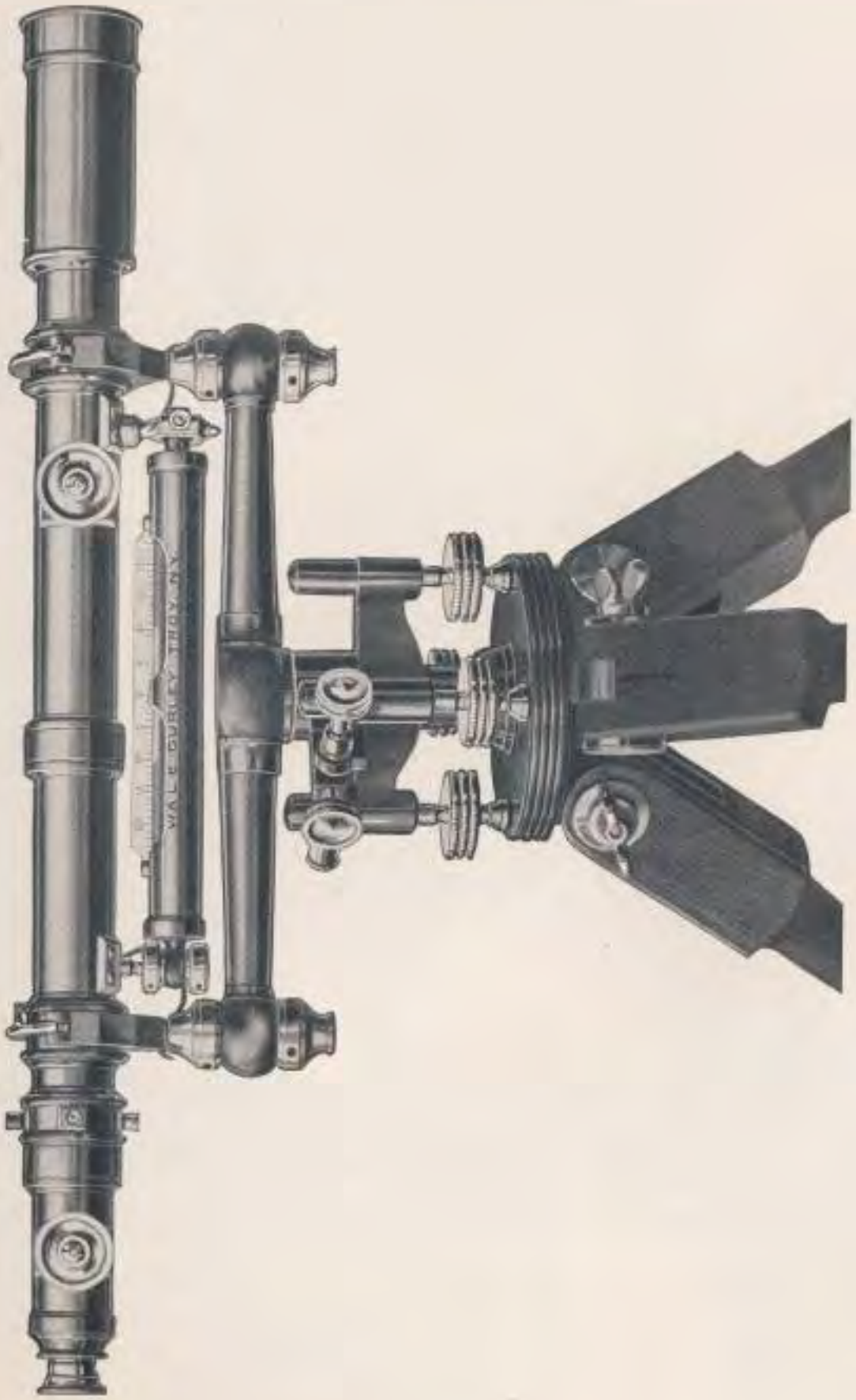
"His Father's Son"

The bright little chap behind the Gurley was busy calculating a deflection angle—just as he watched daddy do many a time.

And this is more than a fanciful photograph. It's a leaf from life—for that Gurley Transit has been forty years on the job, and it's still in use by the County Surveyor stationed at Grand Canyon, Arizona. He sent us the picture of his little "surveyor," and we're glad to show it to you, together with the two generations of Gurley Transits—the grizzled veteran above and the New Gurley which marks the latest advance in instrument construction.

Gurley Engineers Wye Levels

Three Sizes



No. 375 Engineers Wye Level, 22 in. telescope..... $185.00

No. 377 Engineers Wye Level, 18 in. telescope..... 175.00

Gurley Engineers Wye Levels

Three Sizes

The Gurley Engineers Wye Level is so well known that it needs no introduction. Its performance for more than seventy years is the best recommendation any instrument could have. It is the standard with which all other levels are compared.

The quality of the metals used in its construction and the proportion of weight to size produce an instrument which is not excelled for long wearing qualities. We have actual knowledge of Gurley Levels made more than twenty years ago which have not required repairs, although subjected to continuous field service during all that time.

As a type the Gurley Wye Level is preferred on account of its accuracy, durability, ease and permanence of adjustment. These are the features which have made the instrument distinctive since 1845.

Specifications of Engineers Wye Levels Nos. 375, 377 and 378

	No. 375	No. 377	No. 378
Length of Telescope	22 in.	18 in.	15 in.
Power of Telescope	42 diam.	32 diam.	26 diam.
Length of Telescope Level	10.25 in.	8.38 in.	8.38 in.
Least Focussing Distance of Telescope, from center of instrument	12 ft.	8.75 ft.	8.5 ft.
Weight of Instrument	14.5 lbs.	13.25 lbs.	11.5 lbs.
Weight of Instrument, including box and accessories	26 lbs.	22 lbs.	19 lbs.
Shipping Weight, instrument and tripod, in two boxes, for domestic shipment, about	75 lbs.	65 lbs.	60 lbs.
For export, about	110 lbs.	100 lbs.	90 lbs.
Price	**$185.00**	**$175.00**	**$165.00**

Centers: Steel spindle with bronze socket.

Leveling Head: Arms strongly ribbed, with four leveling screws having dust caps. Clamp and tangent.

Bar and Wyes: Bar of bell metal, shaped for greatest strength in the parts most subject to strain. Large, strong wyes with adjustable nuts. One wye clip fitted with stop which maintains cross wires in true horizontal and vertical position.

Telescope: Aperture of objective, 1.38 in. Erecting eyepiece. *Platinum* cross wires. Pinion movement to eyepiece and objective slides. Dust guard to objective slide, detachable sunshade, and cap.

On Level No. 378 the eyepiece slide is focussed by spiral movement, and the objective slide has no dust guard.

Level: Adjustable horizontally and vertically, with graduations on the vial.

Finish: Bronze; screws and small parts bright.

Equipment: Mahogany box with usual accessories.

Tripod: No. 430, with solid round legs, and cap; weighs about 10 lbs.

Gurley Engineers Wye Levels

Three Sizes

No. 378 Engineers Wye Level, 15 in. telescope..... **$165.00**

Attachments and Modifications for Engineers Wye Levels Nos. 375, 377 and 378, when ordered with the instruments, can be supplied as follows:

Stadia Wires of *platinum*, adjustable, disappearing or fixed.....No extra charge

Morocco Finish, on telescope and level tube.....No extra charge

Level Vial, extra sensitive, value ten seconds to one-tenth of an inch (instead of regular vial), extra..... **$7.00**

Pinion Movement to objective slide, for Level No. 378, extra..... **7.00**

Dust Guard to objective slide, for Level No. 378, extra..... **7.00**

Horizontal Limb, full circle, 3.5 in. diameter, graduated to degrees, reading by vernier to 5 minutes, as shown on page 65, extra..... **20.00**

Compass, with needle circle graduated to degrees, needle 3 in. long, with stop. Attached on top of telescope and secured with two clamp screws, as shown on page 65, extra..... **20.00**

Mirror, for observing level bubble from eyepiece end of instrument, as shown on page 65, extra..... **13.00**

Reflector No. 166, for illuminating cross wires. Similar to No. 165, see page 58..... **13.00**

Waterproof Hood, extra..... **1.25**

Extension Leg Tripod No. 440, instead of split leg tripod, extra..... **3.00**

Sole Leather Carrying Case, to enclose mahogany box..... **$20.00 to 24.00**

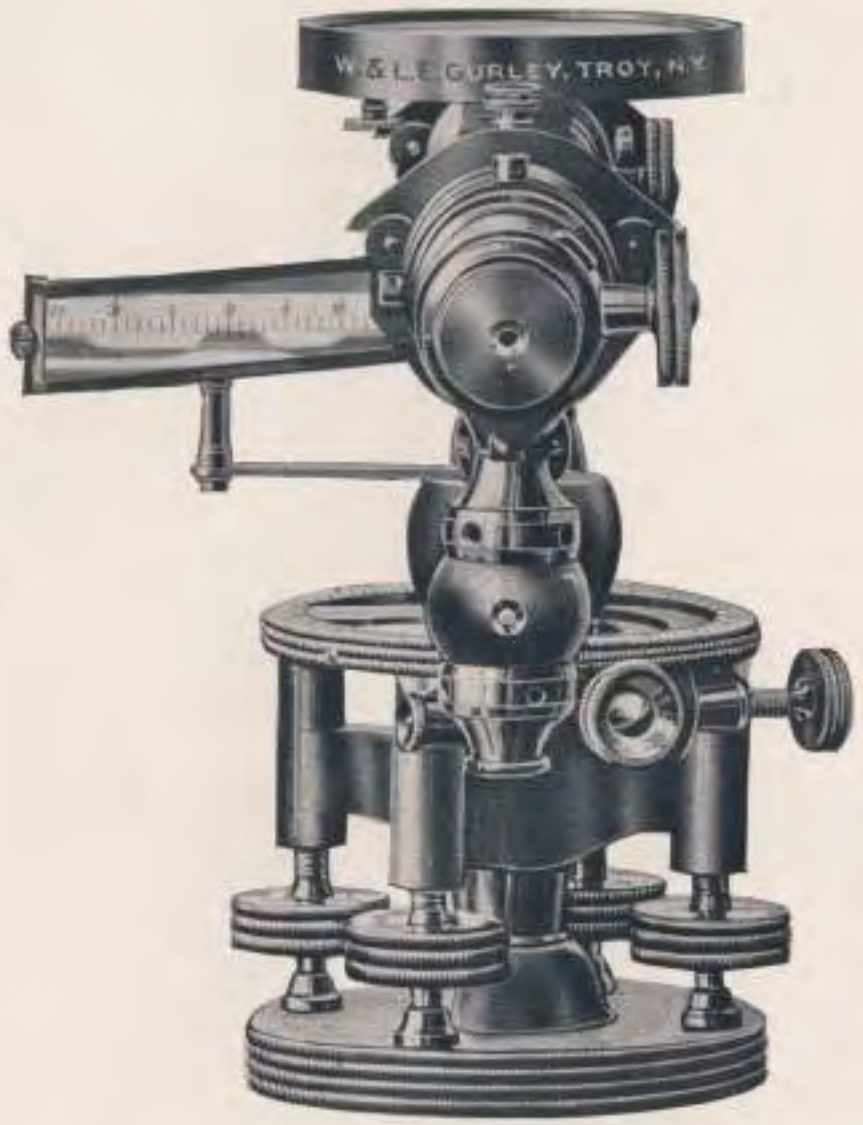
Sole Leather Case, for extension tripod, extra..... **20.00**

Canvas Case with leather mountings, for extension tripod, extra..... **9.00**

Special Outside Packing Box with hinged cover and lock, lined inside with rubber cushions, for convenience in reshipping, extra..... **7.25**

Gurley Engineers Wye Levels

Three Sizes



View of Engineers Wye Level equipped with a Horizontal Circle of 3.5 inches diameter, a Compass having a 3-inch needle, and a Mirror for observing the level bubble. The prices of these extra attachments are given on page 64.

Prices of Parts for Gurley Wye Levels Liable to Loss or Injury

	Price	Postage
Ground Glass Level Vial, unmounted, graduated and figured, for 22-inch Wye Level	$4.50	.25
Ground Glass Level Vial, unmounted, not graduated or figured, for 22-inch Wye Level	4.00	.25
Ground Glass Level Vial, unmounted, graduated and figured, for 15-inch, 18-inch or 20-inch Wye Level	4.00	.20
Ground Glass Level Vial, unmounted, not graduated or figured, for 15-inch, 18-inch or 20-inch Wye Level	3.50	.20
Ground Glass Level Vial, unmounted, extra sensitive (value of each graduation 10 seconds), graduated and figured, for 18-inch, 20-inch or 22-inch Wye Level	10.00	.25
Ground Glass Level Vial, unmounted, extra sensitive (value of each graduation 10 seconds), not graduated or figured, for 18-inch, 20-inch or 22-inch Wye Level	9.50	.25
Ground Glass Level Vial, unmounted, for Architects Level	2.00	.05

NOTE: Whenever possible the metal case or tube should be sent us so that the vial can be properly set. The extra cost is 60 cents.

Cap for eyepiece or object glass, each	.90	.03
Clamp Screw for leveling head	.90	.03
Tangent Screw for leveling head	$1.25 to 1.75	.13
Leveling Screw for leveling head, each	1.25 to 2.50	.14
Eyepiece complete, including lenses and settings, and omitting cap	7.25	.14
Object Glass, complete	8.50	.14
Platinum Cross Wires and Diaphragm	4.00	.15
Platinum Adjustable Stadia Wires, Cross Wires, and Diaphragm	7.00	.15
Platinum Fixed Stadia Wires, Cross Wires, and Diaphragm	9.00	.15

*Mahogany Box with lock and strap, and fitted inside, according to size, **$4.50 to $7.50.**

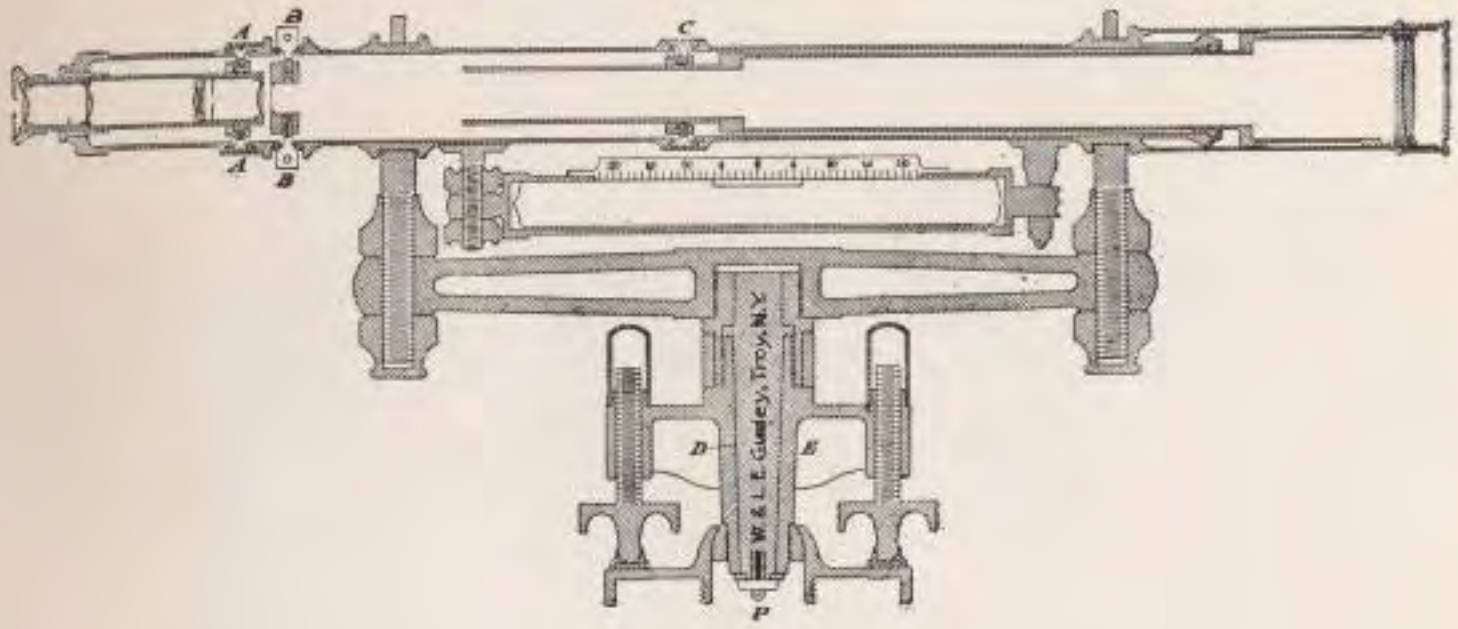
*NOTE: If box is wanted for a Gurley Level, specify the exact length of the telescope when both the eyepiece and the objective slides are not extended; also state the height of the instrument from the bottom plate of the leveling head to the top of the wyes and mention the diameter of the bottom plate of the leveling head. Unless the Level is sent to us, the new box will be furnished with the packing pieces or blocks not fitted in position.

Adjusting Pins, each	.05	.01
Adjusting Pins, with eye for attaching to key ring, each	.15	.02

For Tripods, see pages 139 to 141.

For prices of other Parts, see pages 39, 45, 73 and 95

Sectional View of Gurley Engineers Wye Level



Gurley Explorers Outfit

A No. 20-A Explorers Transit, a No. 384 Explorers Level, and a No. 592-C Explorers Alidade, all packed in a 24-inch suit case, together with one Jointed Extension Tripod with canvas carrying case.

Gurley Architects Level

One Size

Specifications of No. 381

Centers: Long bronze spindle and socket.

Leveling Head: Arms strongly ribbed, with four leveling screws protected from dust. Clamp and tangent.

Bar and Wyes: Bar of bell metal, shaped for greatest strength in the parts most subject to strain. Wyes with adjustable nuts. One wye clip fitted with stop which maintains cross wires in true horizontal and vertical position.

Telescope: 12 inches long, power about 19 diameters, aperture of objective 1.19 in. Erecting eyepiece. *Platinum* cross wires. Pinion movement to objective slide. Spiral movement to eyepiece slide. Detachable sunshade and objective cap. Objects clearly visible 6.5 feet from center of instrument.

Level: With sensitive ground and graduated vial. Adjustable horizontally and vertically.

Circle: 3 in. diameter, graduated to degrees, figured 0 to 90 each way and reading by vernier to 5 min. Vernier attached to spindle. Circle can be revolved independently on friction plate.

Finish: Bronze; screws and small parts bright.

Equipment: Mahogany box, with hinged cover, lock and strap. Accessories of trivet plate, to enable setting the instrument upon the walls or girders of a building, where it is impossible to use a tripod; 6 oz. plain plummet; screw driver and adjusting pins.

Tripod: No. 431, with solid round legs, and protecting cap, weighs about 7.5 lbs.

Weight: Instrument only, about 7 lbs.; with box and accessories, about 12 lbs.

Shipping Weight: Level and tripod, in two boxes, for domestic shipment, about 45 lbs.; for export, about 65 lbs.

No. 381 Architects Level, complete as specified..... **$100.00**

Prices of Attachments and Extras When Ordered with the Instrument

Stadia wires of *Platinum*, adjustable, disappearing or fixed....No extra charge

Pinion Movement to eyepiece..... **$7.00**

Dust Guard to objective slide..... **7.00**

Compass, with full needle circle graduated to whole degrees, figured 0 to 90 each way, needle 3 in. long, with stop. Attached on top of telescope and secured with two clamp screws..... **13.00**

Waterproof Hood..... **1.25**

Split Leg Tripod No. 436, instead of solid round leg tripod..... **3.50**

Extension Leg Tripod No. 441, instead of solid round leg tripod..... **6.50**

Jointed Extension Tripod, instead of solid round leg tripod, with canvas case; 24 in. long when closed..... **16.00**

For Prices of Parts Liable to Loss or Injury, see page 66.

Gurley Architects Level

One Size

No. 381 Architects Level, 12 in. telescope..... **$100.00**

The Gurley Architects Level is extensively used by intelligent and enterprising architects, builders and millrights on construction and building work, as well as by engineers and surveyors in the grading of streets, sewers, irrigation ditches and drains. A constantly growing demand for this instrument has been created by its moderate price, simplicity and excellence.

Gurley Explorers Level

The smallest and lightest Gurley Level
One Size

No. 384 Explorers Level, 6.5 in. telescope..... **$110.00**

A small, light model designed to meet the requirements of engineers for a compact and serviceable level for running preliminary lines in exploration work where it is not convenient to operate a large instrument.

The Explorers Level is a companion instrument to our Explorers Transit and Explorers Alidade, and can be packed with them in an ordinary 24 in. suit case, including one jointed extension tripod, as shown on page 67. Also see pages 35 to 38, and pages 78 and 79.

Specifications of Explorers Level No. 384

Centers: Long bronze spindle and socket, of different degrees of hardness.

Leveling Head: Arms strongly ribbed, with four leveling screws having dust caps. Clamp and tangent.

Telescope: Rigidly and permanently attached to spindle (Dumpy design.) 6.5 in. long, power 16 diameters, aperture of objective 0.7 in. Erecting eyepiece. Pinion movement to objective slide, spiral movement to eyepiece slide. *Platinum*, cross, and stadia wires, ratio 1:100. (Disappearing stadia furnished, if specified in the order.) Dust guard to objective slide, detachable sunshade and cap.

Level: 3 in. long, graduated on the vial. Adjustable vertically.

Finish: Bronze; screws and small parts bright.

Equipment: Leather-covered, light mahogany box (outside dimensions 7.75 x 6 x 4 in.) with shoulder strap, and usual accessories.

Tripod: No. 443, with jointed extension legs, cap, and canvas carrying case. Weighs about 6.5 lbs.

Level and tripod can be packed together in an ordinary 24 in. suit case. See page 67.

Weight: Level only, about 2.75 lbs.; level including box and accessories, about 5 lbs.

Shipping Weight: Level and tripod, in two boxes, for domestic shipment, about 40 lbs.; for export, about 65 lbs.

No. 384 Explorers Level, complete as specified..... **$110.00**

A Special **Aluminum Compass,** with needle 2.5 in. long and circle graduated to degrees will be attached to No. 384 Explorers Level for $32.00 extra, if specified in the order.

Gurley Plane Tables

The plane table method of topographic map making is rapidly increasing in popularity among topographers, geographers, landscape engineers, geologists and others who require accurate maps that can be made easier and quicker than by the usual method of transit survey.

On account of their combined efficiency and portability, the several Gurley Instruments designed especially for this class of work have become standard equipment with the principal users.

The Plane Table is an instrument by means of which points are located in the field by graphic methods on a map, which is fastened to a drawing board supported on a tripod. The most important advantages of the plane table method over other topographic methods, is that all sketching is done in the field, where the topographer can see the form of the ground that he is mapping. He can sketch details at once in their proper position without burdening his memory and without making elaborate notes.

For landscape work, points on a designed map can be transferred to the field. For contour or topographic surveying, the direction of sights can be marked, while the distances, both vertical and horizontal, can be taken by the stadia, and plotted without further notes. For traverse work a smaller board is used with an alidade having slotted sight vanes instead of a telescope.

Johnson Movement: The drawing board is mounted on the tripod by the improved Johnson Movement with ball-and-socket head. Loosening the upper wing nut allows the board to be leveled in any direction by the pressure of the hand and clamped firmly. By loosening the lower wing nut, the board can be oriented about its vertical axis and clamped.

Alidade: The alidade consists of a flat blade on which is supported a telescope with a vertical motion only, and a vertical arc to measure this motion. It can be moved about on the surface of the board as desired. The alidade blade may be beveled on the edge and graduated for a scale. A pencil drawn along the fiducial edge of the blade registers the line. If the points sought are thus lined off and the table set up in another position and oriented parallel to its first position, similar lines drawn in the new position will give intersections that define the location and relation of the points.

Drawing Board: The wooden table is built up to prevent warping. For use in some localities, as the Philippine Islands, cleats are screwed to the underside. The screws pass through the cleats in oblong slots with metal bushings which fit closely under the heads but allow the screws to move freely when drawn by the contraction or expansion of the board, caused by climatic conditions. The paper is held firmly by brass screws passing through the edges of the paper into brass sockets let into and slightly below the surface of the board. This method offers no obstruction to the movement of the alidade about the surface of the board.

Compass: A square brass plate with a compass and spirit levels serve to level the board and if placed against the edge of the alidade blade, will give magnetic bearing. Another form has a trough compass either inserted in the edge of the board or mounted on the alidade blade, and a circular level on the blade.

Plumbing Arm: The plumbing arm, as shown in the figure, has an index at its end that may be brought to a given place on the paper, the plummet hanging below indicating the corresponding point on the ground.

Gurley Plane Tables

No. 570
Johnson Plane Table Movement and Split Leg Tripod, $40.00

The improved form of Johnson Plane Table Movement, as shown above, combines in a most satisfactory manner stability, light weight, and ease of operation. This extremely efficient and portable plane table has been adopted as standard equipment by the U. S. Geological Survey and many of the State Geological departments.

The construction of the Johnson Movement is shown in the insert above. This movement supplies an arrangement whereby the table can be easily made horizontal and then secured by the large upper wing nut, A. To orient the board, the lower wing nut, B, is loosened, leaving the hemispherical surface bearing the board secured to the flange, free to turn, and it can be clamped by screwing up the same nut.

The movement, complete with tripod, weighs about nine pounds. The split tripod legs are made of straight grained, second growth hickory. The construction of the entire tripod insures strength and accuracy, and it is capable of standing rough usage without getting out of order.

Alidades Nos. 584-B, 584-C or 592-C are suitable for use with the Johnson Plane Table.

Johnson Plane Table Movements and Extras

Prices for Separate Parts

No. 570	Johnson Plane Table Movement and split leg tripod	$40.00
No. 570-A	Johnson Plane Table Movement and extension leg tripod	52.00
No. 571	Johnson Plane Table Movement, special light weight model, with special light weight extension leg tripod	45.00
	Canvas Case, leather trimmed, for No. 571	8.00
No. 573	Drawing Board, 31 x 24 in., with brass screw plate fitted, and with eight clamp screws and sockets for paper	8.00
	Canvas-covered Wooden Case for No. 573	7.00
	Flexible Canvas Case with shoulder strap, for No. 573	4.25
	Eggshell Drawing Paper, single mounted, 31 x 24 in., per sheet	1.10
	Eggshell Drawing Paper, double mounted (muslin between), so that drawings can be made on both sides, 31 x 24 in., per sheet	2.25
No. 573-A	Drawing Board, 18 x 24 in., with brass screw plate fitted, and eight clamp screws and sockets for paper	7.00
	Canvas-covered Wooden Case for No. 573-A	5.75
	Flexible Canvas Case with shoulder strap, for No. 573-A	2.75
	Eggshell Drawing Paper, single mounted, 18 x 24 in., per sheet	.70
	Eggshell Drawing Paper, double mounted (muslin between), so that drawings can be made on both sides, 18 x 24 in., per sheet	1.35
	Note: If desired, we can supply a Drawing Board, 20 x 20 in., together with Cases and Paper, for the same prices as listed under No. 573-A.	
No. 573-B	Drawing Board, 15 x 15 in., with brass screw plate fitted and four clamp screws and sockets for paper	5.25
	Flexible Canvas Case with shoulder strap, for No. 573-B	2.25
	Eggshell Drawing Paper, single mounted, 15 x 15 in., per sheet	.45
	Eggshell Drawing Paper, double mounted (muslin between), so that drawings can be made on both sides, 15 x 15 in., per sheet	.90
No. 573-X	Drawing Board, 31 x 24 in., with brass screw plate fitted, and with eight clamp screws and sockets for paper. Especially constructed for use in tropical climates, of heavy stock and with expansion cleats	10.00
	Flexible Canvas Case with shoulder strap, for No. 573-X	7.50
No. 574	Plumbing Arm and 10 oz. plummet	5.75
No. 575	Combined Compass with levels and square base	23.00

For Nos. 570, 570-A or 571

Leather Hood to protect Johnson Tripod Head	2.75
Upper or Lower Wing Nut Clamp Screw, A or B, each	1.45
Keeper Screw, C, each	.20
Bolt with Wing Nut and Washer, for tripod head, each	1.00
Wing Nut for tripod bolt, each	.40
Extra Board Plate, each	3.00
Clamp Screw and Socket for paper, complete, each	.35
Clamp Screw only, each	.20
Socket only, each	.15
Wooden Cap for Johnson Tripods Nos. 570, 570-A or 571	1.15
Split Tripod Legs for No. 570, each	3.00
Extension Tripod Legs for No. 570, each	6.75
Extension Tripod Legs, special light weight model, for No. 571, each	4.75

Gurley Plane Table Outfits

U. S. Geological Survey Standard

No. 576-C
Plane Table Outfit, with Johnson Movement, and No. 584-C Alidade, with Beaman Stadia Arc, $243.00

No. 576-C Plane Table Outfit, consisting of Johnson Movement No. 570, with split leg tripod; Drawing Board No. 573, 31 x 24 in., with brass screw plate fitted, and with eight clamp screws and sockets for paper..... **$48.00**

Flexible Canvas Case with shoulder strap, for No. 573 Drawing Board **4.25**

Plumbing Arm and Plummet, No. 574..... **5.75**

Alidade No. 584-C, with 11 in. telescope, inverting eyepiece with diagonal prism, power about 22 diameters, enlarged objective, 1.38 in. aperture, *platinum* cross wires and stadia wires; detachable striding level with revolving shield; edge graduated vertical arc reading to 1 min., combined with Beaman Stadia Arc; clamp and tangent to telescope axis; blade 18 x 3 in., with left hand edge beveled; circular level, and box compass with 4 in. needle, mounted on blade. In mahogany carrying case. See illustration on page 76.. **185.00**

Complete, as shown above..... **$243.00**

No. 576-B Plane Table Outfit, similar to Outfit No. 576-C, but with Alidade No. 584-B substituted for Alidade No. 584-C..... **$243.00**

For Eggshell Drawing Paper, see page 73.

Topographers at Work

United States Government Topographers of the International Boundary Commission, at work with Gurley Plane Table Outfits. The upper view shows a station along the 141st Meridian, on the Alaskan Boundary Survey; the second view is along the 49th Parallel, at the Summit of the Rocky Mountains, on the United States and Canada Boundary Survey

Gurley Telescopic Alidades

U. S. Geological Survey Standard

No. 584-C
Telescopic Alidade, with detachable Striding Level, edge graduated Vertical Arc combined with Beaman Stadia Arc, Circular Level, and Box Compass, $185.00

Alidade No. 584-C has a brass ruler 18 inches long and 3 inches wide, with the left hand edge beveled. On this blade is mounted a circular spirit level, the glass body of which is hermetically sealed, and which is sensitive enough to permit the plane table to be leveled with sufficient accuracy. Attached also to the ruler is a rectangular box compass having a 4 inch needle, and whose meridian line is parallel to the fiducial edge. If desired, the box compass can be omitted from the blade and be furnished separately for insertion along one edge of the drawing board.

The telescope, which is mounted on a column attached to the ruler, is 11 inches long, and is equipped with an enlarged objective, *platinum* cross wires and stadia wires, and a detachable striding level with revolving shield. The telescope is regularly furnished with an inverting eyepiece, and is fitted with a diagonal prism. (If an erecting eyepiece is desired, it can be had with Alidade No. 584-B, which is otherwise similar to Alidade No. 584-C, except that the telescope does not have an enlarged objective.) For easy adjustment of the line of collimation, the telescope can be revolved on its vertical axis through 180 degrees. The telescope axis is equipped with clamp and tangent movement.

The vertical arc is graduated on *sterling silver* and reads by vernier to 1 minute. As the zero is at one end, all the angles read are positive. The reading of vertical angles is made easier by the arc and vernier being graduated on their edges.

Gurley Telescopic Alidades (continued)

The Beaman Stadia Arc is combined with the edge graduated vertical arc and vernier, thus greatly increasing the usefulness and efficiency of the instrument. This patented attachment, as described on pages 52 to 54, mechanically reduces stadia readings and eliminates the necessity of using stadia tables, slide rules or diagrams. The value of the Beaman Stadia Arc is evidenced by the fact that this attachment is regular equipment on all Alidades used by the U. S. Geological Survey, whose engineers are the largest users of topographic instruments in this country. Many hundreds of these attachments are in use on transits and telescopic alidades and are giving universal satisfaction.

Alidade No. 584-C is standard with the U. S. Geological Survey, which is using large numbers of Gurley Instruments of this pattern. Johnson Plane Table Outfit No. 576-C, as illustrated and described on page 74, is part of its regular equipment and has been developed and improved by co-operation with its engineers.

No. 584-C Telescopic Alidade, with 11 in. telescope, inverting eyepiece with diagonal prism, power about 22 diameters, enlarged objective, 1.38 in. aperture; *platinum* cross wires and stadia wires; detachable striding level with revolving shield; edge graduated vertical arc reading to 1 minute, combined with Beaman Stadia Arc; clamp and tangent to telescope axis; blade 18 x 3 inches, with left hand edge beveled, circular level, and box compass with 4 in. needle, mounted on blade. In mahogany carrying case with leather handles. . **$185.00**

No. 584-B Telescopic Alidade, similar to Alidade No. 584-C, but equipped with an erecting eyepiece, power about 26 diameters, objective 1.19 inches aperture..... **185.00**

A **Gradienter** can be combined with the clamp and tangent movement on Alidades Nos. 584-C or 584-B, at an extra cost of $15.00.

If Alidade No. 584-C or No. 584-B is desired without the Beaman Stadia Arc attachment, deduct $40.00.

No. 585 Box Compass, rectangular metal case, 4 in. needle, for Alidades Nos. 584-B or 584-C..... **11.50**

Striding Level, complete..... **18.00**

Extra Glass Vial only, for Striding Level..... **2.00**

Circular Level, complete..... **6.00**

Extra Glass Vial only, for Circular Level..... **4.00**

Quarter interval wire, midway between upper stadia wire and horizontal cross wire **2.50**

Gurley Explorers Alidade

The smallest and lightest Gurley Telescopic Alidade

No. 592-C
Explorers Alidade, with Gradienter and Beaman Stadia Arc, $140.00

Topographers, geographers, geologists and landscape engineers needing a serviceable, dependable, *light weight* alidade will be interested in this new Gurley pattern.

The Explorers Alidade is a modification of the well known No. 584-C Gurley Alidade, U. S. Geological Survey standard. It is smaller and lighter, yet built with precisely the same care and accuracy.

The majority of these alidades are ordered with the Beaman Stadia Arc, a patented device controlled by us which gives accuracy and speed to stadia surveying that can be obtained by no other method. See pages 52 to 54.

The Gradienter attachment will prove useful in the measurement of distances and the establishment of grades. The Gradienter head and index are graduated on *sterling silver*, thus the graduations are clear, distinct and permanent. The entire attachment is of such construction and workmanship that it can be depended upon for accurate work.

The Explorers Alidade constitutes an appropriate companion to our well known Explorers Transit and Explorers Level, and the three instruments can be packed conveniently in a 24 inch dress suit case, as shown on page 67. Also see pages 35 to 38, and page 70.

In connection with our special light weight Johnson Plane Table Movement No. 571, and either the 15 x 15 inch or the 18 x 24 inch Drawing Board, it provides an outfit for topographical surveying which cannot be excelled for combined accuracy and extreme portability. The Explorers Alidade can also be used successfully with the Traverse Plane Table.

Specifications of Explorers Alidade No. 592-C

Blade: 11 in. long by 2.75 in. wide; right edge beveled and graduated to $\frac{1}{50}$ inch.

Box Compass: 4 in. needle, mounted on blade.

Circular Level: With hermetically sealed vial, mounted on blade.

Telescope: 8 in. long; prismatic eyepiece; power about 13 diameters; aperture of objective 1 in. *Platinum* cross wires, focussed by spiral movement and adjusted by revolution of telescope in axis. *Platinum* stadia wires. Combined dust guard and sun shade, permanently attached to telescope. Pinion movement to objective slide.

Gurley Explorers Alidade

Gradienter: Combined with clamp and tangent movement to telescope axis.
Striding Level: With ground and graduated vial, sensitiveness 90". Can be detached from telescope and parked on blade.
Vertical Arc: 2 in. radius, graduated on *sterling silver* and reading by vernier to 1 min., vernier movable by tangent screw.
Beaman Stadia Arc: Combined with the vertical arc.
Carrying Case: Mahogany box, 3.5 x 3.75 x 10.5 in., with shoulder sling.
Height: 3.4 in. over all.
Weight: 3.25 lbs.; including case, 5 lbs.

No. 592-C Explorers Alidade, as specified, with Gradienter and Beaman Stadia Arc **$140.00**

For Explorers Alidades

Striding Level Vial, sensitiveness 60" or 40"	No extra charge
If the Beaman Stadia Arc is omitted, deduct	**$20.00**
If the Gradienter is omitted, deduct	**8.00**
Special Graduations on Blade, extra	**6.00**
Striding Level, complete	**15.00**
Extra Glass Vial only, for Striding Level	**1.50**
Circular Level, complete	**5.00**
Extra Glass Vial only, for Circular Level	**3.50**
Quarter interval wire, midway between the upper stadia wire and horizontal cross wire	**2.50**

Gurley Explorers Plane Table Outfits

With Johnson Movement

No. 592-D Explorers Plane Table Outfit, consisting of Johnson Movement No. 570, with split leg tripod; Drawing Board No. 573-A, 18 x 24 in., with brass screw plate fitted, and eight clamp screws and sockets for paper.

Flexible Canvas Case with shoulder strap, for No. 573-A Drawing Board.

Explorers Alidade No. 592-C, with Gradienter and Beaman Stadia Arc.

Complete **$190.00**

No. 592-F Explorers Plane Table Outfit, consisting of Johnson Movement No. 571, special light weight model, with special light weight extension leg tripod; Drawing Board No. 573-A, 18 x 24 in., with brass screw plate fitted, and eight clamp screws and sockets for paper.

Flexible Canvas Case with shoulder strap, for No. 573-A Drawing Board.

Explorers Alidade No. 592-C, with Gradienter and Beaman Stadia Arc.

Complete, as shown on page 80..... **195.00**

Gurley Explorers Plane Table Outfits

No. 592-F
Explorers Plane Table Outfit, $195.00
(See page 79)

No. 592-H Explorers Plane Table Outfit, consisting of Johnson Movement No. 571, special light weight model, with special light weight extension leg tripod; Drawing Board No. 573-B, 15 x 15 in., with brass screw plate fitted, and four clamp screws and sockets for paper.

Flexible Canvas Case with shoulder strap, for No. 573-B Drawing Board.

Explorers Alidade No. 592-C, with Gradienter and Beaman Stadia Arc, complete as specified on pages 78 and 79... **$193.00**

Paper for Drawing Boards Nos. 573-A and 573-B

	For No. 573-A 18 x 24 in.	For No. 573-B 15 x 15 in.
Eggshell Drawing Paper, single mounted, per sheet.	**$0.70**	**$0.45**
Eggshell Drawing Paper, double mounted (muslin between), so that drawings can be made on both sides, per sheet.....	**1.35**	**.90**

Gurley on the Job in Alaska

Traverseman of the International Boundary Commission using a Gurley Traverse Plane Table on Alaskan Boundary Maps

Gurley Traverse Plane Table

U. S. Geological Survey Pattern

No. 586
Traverse Plane Table Outfit, $35.00

The illustration No. 586 represents a simple form of plane table and alidade first made by us for the U. S. Geological Survey, and in its present improved form used extensively for traverse work. While not capable of as accurate work as the larger plane tables, it constitutes a light and portable instrument for topography.

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

The board is 15 inches square, and has on its under side a strong brass flange with spring, in which the plunger clamp of the tripod head engages, allowing the board to be clamped or oriented as desired. Small clamp screws with sockets for holding the paper are placed at the corners of the board. Inserted in one edge of the board is a small box compass with needle about 4 inches long.

The alidade consists of a brass ruler 10 inches long, graduated on the beveled edge to a scale of 40 parts to the inch, and having at each end hinged sights which fold close to the surface of the ruler. The alidade is furnished with a leather pouch.

Traverse Plane Table Outfit

No. 586 Traverse Plane Table Outfit, consisting of Traverse Movement No. 587, with solid round tripod legs; No. 573-T Drawing Board, 15 x 15 in., with spring board plate, Box Compass No. 588 inserted in one edge, and four clamp screws and sockets for paper; Ruler Sight Alidade No. 589, with graduated edge, folding sights and leather pouch; complete as shown **$35.00**

Extras for Traverse Plane Table

Extension Leg Tripod, instead of Solid Round Leg Tripod, extra	$5.75
Jointed Extension Leg Tripod, closing to 23 in., with canvas case, instead of Solid Round Leg Tripod, extra	14.50
Flexible Canvas Case with shoulder strap, for Drawing Board No. 573-T, extra	2.25
Eggshell Drawing Paper, single mounted, 15 x 15 in., per sheet	.45
Eggshell Drawing Paper, double mounted (muslin between), so that drawings can be made on both sides, 15 x 15 in., per sheet	.90

Prices for Separate Parts for Traverse Plane Table

Traverse Plane Table Movement, showing the tripod head and legs, the plunger clamp screw, and the improved spring board plate

No. 587	Traverse Plane Table Movement, with solid round leg tripod; Drawing Board, 15 x 15 inches, with spring board plate, and four clamp screws and sockets for paper	$15.00
No. 573-T	Drawing Board, 15 x 15 in., with spring plate fitted, and with four clamp screws and sockets for paper	5.25
No. 588	Box Compass, rectangular metal case, 4 in. needle	9.25
No. 589	Ruler Sight Alidade, 10 in. long, with graduated edge, folding sights and leather pouch	13.75

Prices of Separate Parts for Traverse Plane Table

Spring Plate for Drawing Board, each	$2.25
Center Plunger Clamp Screw, complete, each	2.75
Clamp Screw and Socket for paper, complete, each	.35
Solid Round Tripod Legs, each	1.50
Extension Tripod Legs, each	3.50
Bolt, with wing nut and washer, for tripod head, each	.85
Wing Nut for tripod bolt, each	.40

Gurley Pocket Sight Alidade

No. 590-A
Pocket Sight Alidade, with folding sights, $8.50

Pocket Sight Alidade No. 590-A is 6 inches long and has hinged sights which fold close to the ruler. The beveled edge is graduated the entire length to read 1/10 and 1/20 of a mile for ratios of 1/90,000 and 1/45,000, respectively. The middle part of the edge is further divided to read 1/50 and 1/100 of a mile, respectively, for the same two ratios. A leather case with pencil pockets is furnished.

No. 590-A	Pocket Alidade, 6 in. long, with graduated edge and folding sights, and with leather case having pencil pockets	$8.50
No. 590-B	Extra Folding Sights, for Alidade No. 590-A, per pair	3.75

Beaman Stadia Arc

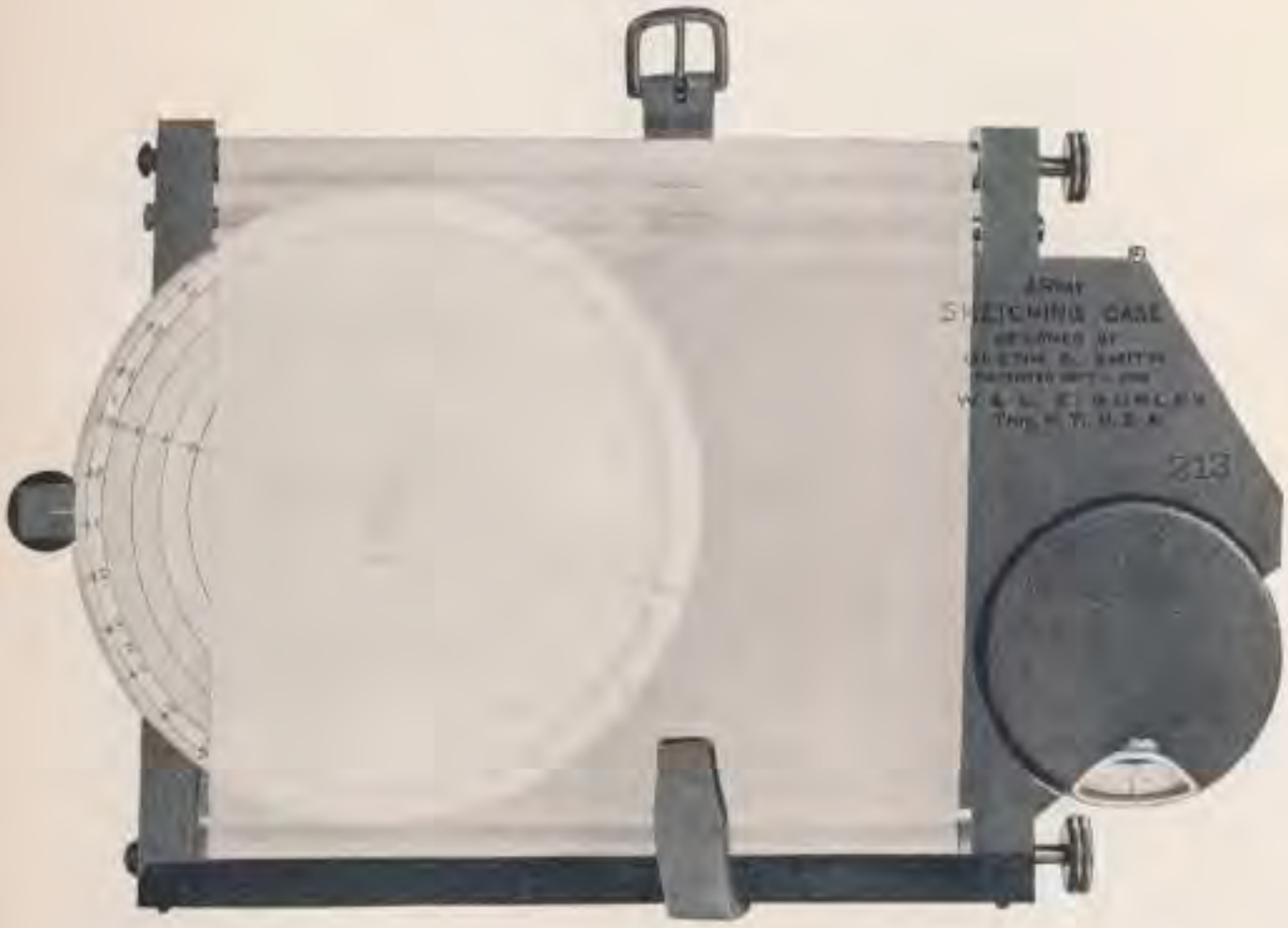
This efficient attachment for Transits and Telescopic Alidades is fully illustrated and described on pages 52 to 54.

Cox Stadia Computer

For a description of this useful device, see page 50.

Army Sketching Case

Glenn S. Smith Patent



No. 594
Army Sketching Case, $25.00
Patented Sept. 1, 1908

Designed by Glenn S. Smith, Topographer, U. S. Geological Survey

This instrument for topographic map making was originally designed especially for the use of U. S. Army Engineers, but since its introduction has been found unusually serviceable for a similar class of work by foresters, geologists, road engineers, timber cruisers and civil engineers.

Several hundreds of these efficient field sketching outfits are being used successfully by officers and men in practically every branch of the Army, by the various Army Service Schools, military academies, militia organizations, civil engineers and surveyors.

In addition to the simplicity and strength of construction, fitting it for general use, *this sketching case possesses a unique feature in that the board does not require to be oriented in taking observations*. So far as we know this is the only practical sketching case on the market having this valuable feature, which makes its operation very simple and rapid. The use of a tripod is unnecessary and there is no complicated protractor to operate. In fact, any one can readily learn to use this instrument after studying the directions carefully.

Army Sketching Case

Construction

The Army Sketching Case consists of a plane table board, 6 x 12 inches, made of seasoned pine with mahogany end pieces. This construction insures a strong, durable board which will not warp nor pull apart under hard service. To the lower right-hand side is attached a compass box with floating dial, 3 inches in diameter, beveled on the edge and graduated into 360 degrees.

A protected opening in the compass box permits the graduated dial to be read either from above or when the board is held level with the eye of the observer.

Rifle sights which are placed in line with the center of the compass and parallel with the edge of the board, are used as an alidade in taking bearings.

On the upper side of the board is mounted a circular plate, 6 inches in diameter, and pivoted at the center. This plate is attached to an L-shaped base at the upper end of which is a cylinder through which passes a rod parallel with and secured to the top of the board.

A metal strip let into a slot in the middle of the board guides the lower edge of the L-shaped base.

Upon the guides as described, the base carrying the circular plate can be moved from side to side over the upper surface of the board and clamped at will by a set screw in the cylinder at the top.

A clamp with index line is so attached to the base that the circular plate mounted upon it may be set at any desired position.

A card of aluminum or celluloid is attached to the circular plate and upon this card a combined protractor and scale are printed.

The protractor is graduated into 360 degrees and the scale consists of a series of equally spaced concentric circles.

Different protractor cards are furnished for the various scales used in map making.

Rollers with friction brakes, attached to two edges of the board, receive the paper and hold it snugly against the surface of the protractor which travels underneath it. An aluminum shield protects the paper and prevents soiling.

To the under side of the board a swiveling strap, with buckle, is attached, by means of which the case can be firmly secured to the observer's arm. There is also a socket by which a tripod or staff may be attached. A simple clinometer attachment for taking slopes is also provided.

As far as possible the metal parts are made of aluminum, so that the case weighs only about two pounds, and they are of dark finish to avoid reflection of sunlight.

Care in the selection of a proper material for use on the case in recording observations is essential to successful operation, and tracing cloth should be avoided as too smooth for the use of a pencil. Vellum tracing paper, which has a slightly roughened surface, little affected by moisture and on which the pencil works well, is recommended. This paper we are prepared to supply at a small cost. We can also furnish translucent celluloid which is more durable and not at all affected by moisture. See price list.

On completion of the survey, the sketch may be taken from the instrument and blue prints made directly from the original.

Detailed directions for using the Army Sketching Case are furnished with each instrument. A descriptive circular containing these instructions will be sent free to any address on request.

Army Sketching Case

A Map made on the Army Sketching Case

Note how successive stations on the line of survey are established by observing the compass bearing and plotting the distance, determined by pacing or any convenient method, by means of the radiating protractor circles, which have a value corresponding to the scale employed. Points lying on either side of the line of survey are located by intersecting bearings taken from two or more observation stations. The observer may occupy any station or point merely by centering the protractor exactly under the corresponding point on the map, and proceeding as usual.

No. 594 Army Sketching Case, Glenn S. Smith patent, with one protractor card as selected, and clinometer attachment. As illustrated **$25.00**

Extra Protractor Cards, each **1.00**

	Distance between each circle
Scale A, 1 inch to 1 mile	132 ft., or $\frac{1}{40}$ mile
*Scale B, 2 inches to 1 mile	66 ft., or $\frac{1}{80}$ mile
Scale C, 3 inches to 1 mile	52.8 ft., or $\frac{1}{100}$ mile
Scale D, 1 to 24,000 and 1 to 48,000	$\frac{1}{100}$ mile and $\frac{1}{50}$ mile
Scale F, 1 to 100,000 Metric	100 meters (10 to 1 kilo)

*Scale B is also suitable for a map scale, 1 inch to 400 feet, each circle representing 10 feet distance.

Flexible Canvas Pouch, with leather shoulder strap **2.25**
Sole Leather Pouch, with shoulder strap **7.00**
Tripod, with solid round legs **4.00**
Staff, 2 ft. long, with metal shoe **1.25**
Vellum Tracing Paper, in rolls, 8 x 36 in., per roll ..... **.10**
Translucent Celluloid, in rolls, 8½ x 50 in., per roll ..... **.75**
Celluloid is more durable than paper and not affected by moisture.

Fiala Scout Sketching Case

For Militiamen, Boy Scouts, Canoeists and Campers

Showing method of using Fiala Scout Sketching Case

The interest in map sketching as practiced by army engineers is increasing, and the necessity for a more general knowledge along these lines is evidenced by the taking up of such work by various organizations of the National Guard.

For convenience in making maps in the field various forms of sketching cases are used, consisting of a small drawing board provided with a magnetic compass, alidade (or scale) with sights, and rollers for carrying a supply of paper. Sketches are made with colored pencils.

With such equipment, topographical maps can be accurately and rapidly made to show the character of the land, whether level or mountainous, fertile or barren; the location of railroads, highways, water courses, and bridges or structures of any kind.

Map making is a very necessary part of a Boy Scout's course in surveying. By means of a sketching case he can make a record of the country traversed on his "hikes," and thus develop his sense of proportion, direction and distance in an instructive and interesting manner. Canoeists and campers also can use a device of this kind to advantage.

The Fiala Scout Sketching Case is a practical instrument in every particular. It was designed and made from suggestions by Mr. Anthony Fiala, the explorer, whose experience in the Arctic regions and with Colonel Roosevelt in South America places him in a position to fully understand the needs of those engaged in outdoor pursuits.

Fiala Scout Sketching Case

No. 596
Fiala Scout Sketching Case, $7.50

Designed along the same general lines as the Army professional model, No. 594, which we have made for a number of years for military topographers and others, the Fiala case is not so elaborate but provides an ideal outfit for simple map making and is valuable for educational purposes.

The Fiala Scout Sketching Case consists of a thoroughly seasoned white pine drawing board, 6 inches long x 5 inches wide, having 5/8 inch diameter rollers at each end which carry a strip of white, strong, smooth-faced architects paper, 5 3/4 x 36 inches. An adjustable device on the rollers holds the paper flat against the board and prevents it from uncoiling. Fitted into the right hand end of the board is a brass compass having a 1 1/2 inch needle with needle stop and slotted revolving cover. Holes bored into the left hand end of the board contain three sketching pencils, black, red and blue. These are held securely by means of a brass spring clip.

A boxwood ruler, 6 inches long, with small brass folding sights at each end, enables the user to establish the bearings of lines. The ruler has a scale of 6 inches to 1 mile on one edge, and 3 inches to 1 mile on the other. Two rubber bands are used to hold the ruler on the paper. The ruler is fastened to one of the roller knobs by a cord and when not in use is securely held against the back of the board by a brass spring clip.

There is a simple form of clinometer for determining angles of slope. The ruler alidade is arranged to swing across the surface of the paper and the angles of slope are read on a scale attached to the left hand edge of the case.

In use the sketching case is fastened to the forearm of the sketcher by a leather strap on the back of the board. It weighs about 30 ounces and measures 9 x 7 3/4 x 1 inch. Packed for parcel post shipment, it weighs 3 pounds.

		Price	Postage
No. 596	Fiala Scout Sketching Case, as shown	**$7.50**	**.25**
	Architects Drawing Paper, in rolls 5 3/4 x 36 in., per roll, postpaid		**.05**

Gurley Vernier Compass

One Size

No. 226 15 in. plate, 5 in. needle, weight 8.75 lbs..... **$65.00**

Needle Circle. The needle circle of the Vernier Compass is movable by pinion in either direction, thus enabling the surveyor to set off the magnetic declination of the needle. The circle is graduated to half degrees on its upper surface, the whole degree marks being also cut down on the inside circumference, and is figured from 0 to 90 on each side of the line of zeros.

Declination Arc and Vernier. The declination arc is graduated to half degrees and reads to 45 degrees each way. The graduations of this arc are read by a vernier, 30 spaces of which correspond with 29 half degrees of the arc. Thus the vernier reads to single minutes and the number of minutes passed over is counted in the direction in which the vernier is moved. The compass face, needle circle, declination arc, and vernier are silvered. The declination arc is within the compass circle.

Levels. The spirit levels are placed at right angles with each other so as to level the plate in all directions, and are balanced upon a pivot under the middle of the tube, so as to be adjustable by a screwdriver.

Needle Lifter. Underneath the main plate is a needle lifting screw which, by moving a concealed spring, raises the needle from the pivot, and thus prevents the blunting of the point in transportation.

When the compass is not in use, it is the practice of many surveyors to let down the needle upon the point of the center pin, and allow it to assume its position in the magnetic meridian, so as to retain its polarity. We advise that after the needle has settled it be raised against the glass in order not to dull the point of the center pin.

Gurley Vernier Compass

One Size

Outkeeper. A small dial plate, having an index turned by a milled head underneath, is used to keep tally in chaining. The dial is figured from 0 to 16, the index being moved one notch for every chain run.

Brass Cover. A brass cover is fitted over the glass of the compass, and serves to protect it from accident, as well as to prevent electric disturbance.

Sights. The sights, or sight vanes, have fine slits cut through nearly their whole length, terminated at intervals by circular apertures, through which the object sighted upon is more readily found.

Tangent Scale. The edges of the north sight of our compasses are graduated to half degrees for angles of elevation and depression, respectively, which are read from corresponding peepholes on the south sight.

The illustration shows the eyepiece and graduations for angles of elevation.

Ball Spindle. The compass is fitted to a spindle made slightly conical, and having on its lower end a ball turned perfectly spherical, and confined in a socket by a pressure so light that the ball can be moved in any direction in leveling the compass. The ball is placed either in the brass head of the staff, or better, in the compass tripod.

Staff Mountings. The staff mountings consist of the brass head already mentioned, and a pointed steel shoe. The staff, to which the mountings should be securely fastened, may be procured from any wheelwright, or provided by the surveyor himself.

Clamp Screw. In the side of the hollow socket of the compass is a screw by which the instrument may be clamped to the spindle in any position.

Spring Catch. Besides the clamp screw there is fitted to the sockets of our compasses a spring catch, which, as soon as the instrument is set upon its spindle, slips into a groove, and thus removes all danger of the instrument falling from the spindle while being carried.

Weight. 8.75 lbs., including the brass head of the staff.

No. 226 Vernier Compass, 15 in. plate, 5 in. needle, two levels, brass cover, outkeeper, staff mountings, and mahogany box with lock and strap..... **$65.00**

Leveling Adopter No. 241, or Leveling Head No. 242, is often used for the more convenient leveling of the compass.

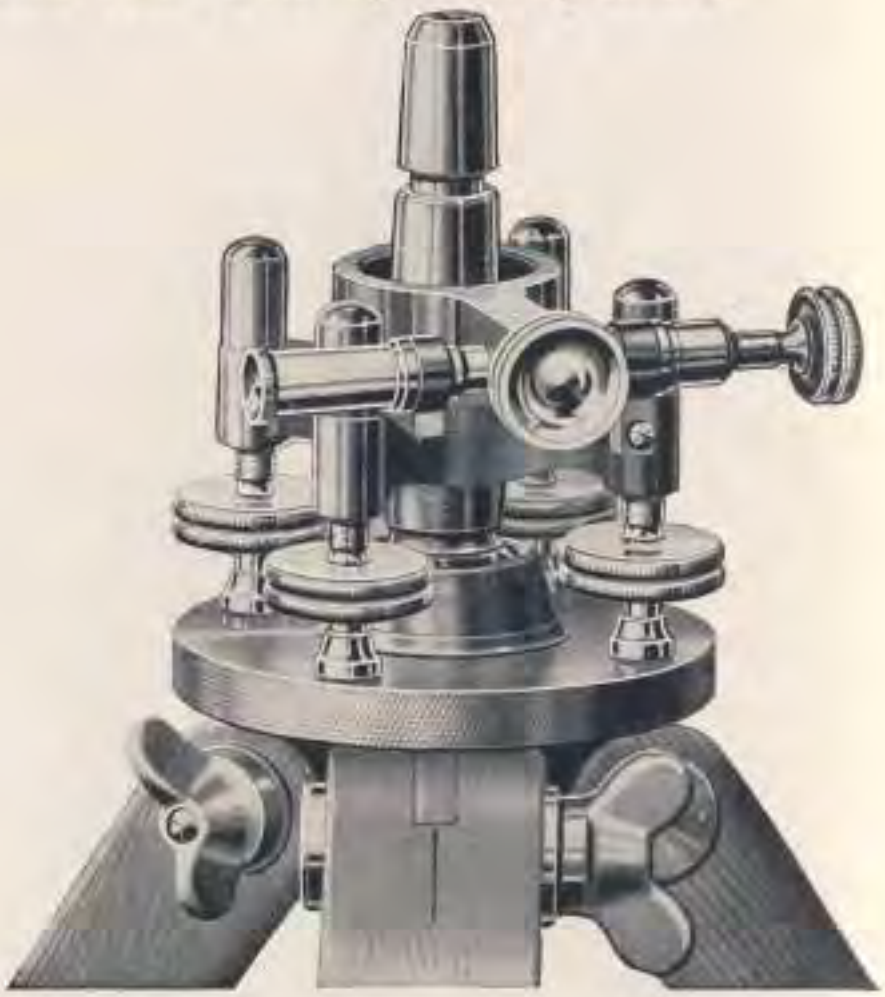
Telescopic Sight No. 262 is often used with the Vernier Compass.

Leather Case No. 478, to fit outside the wooden box, costs $16.00 extra.

For Tripods, see page 95.

Attachments and Extras for Gurley Compasses

No. 241
Leveling Adopter, $10.00



No. 242
Leveling Head, $25.00

For more convenient leveling of the compass, as well as other instruments, we make a Leveling Adopter, No. 241, which is screwed to the top of the tripod like the leveling head. It can be used with a simple ball spindle and can be supplied with Compass No. 226.

The instrument is made approximately level upon the ball and finally made truly horizontal by the leveling screws.

No. 241 Leveling Adopter, large size..... **$10.00**

We also make for use with Compass No. 226 a Leveling Head, No. 242, consisting of arms strongly ribbed with four leveling screws having dust caps, and with clamp and tangent movement.

This Leveling Head furnishes a stable support for the instrument, and affords the same conveniences for leveling and accurate adjustment in azimuth as the leveling heads on transits or levels.

No. 242 Leveling Head, fitted to use with Tripods Nos. 415, 420 and 425, **$25.00**

Attachments and Extras for Gurley Compasses

No. 262

Telescopic Sight, as applied to a Compass Sight, with attached Vertical Circle No. 265, Level on Telescope No. 266 and Clamp and Tangent No. 267. Price, complete, $53.00

This valuable attachment for Vernier Compass No. 226 consists of a telescope furnished with the usual cross wires, etc., and attached to a movable band, which, as shown in the illustration, can be slipped over the sight of a compass, clamped at any point desired, and put in adjustment by any person who has a screwdriver and a steel adjusting pin.

The optical axis of the Telescopic Sight is at one side of the line of sight of the sight vanes, but parallel with it. The difference between a sight taken with the sight vanes and one taken with the telescope is, at a distance of 200 feet, about two minutes; so small that it may be disregarded in any survey made with the magnetic needle. If all the lines are run with the Telescopic Sight, the angles measured will be accurate, as even this slight difference is entirely eliminated.

Advantage of the Telescope

The advantage of the Telescope over the sight vanes is readily apparent. Much longer sights can be taken, either fore or back, and lines run up and down steep hillsides with the same facility as on level ground, and with more accuracy, and with great relief to the eyes of the surveyor, often severely strained by the use of the sight vanes of the compass. Indeed, it may be said that with this simple attachment a compass can be transformed into a transit compass, and the advantages of the telescope brought within the reach of every surveyor at small cost.

Attachments and Extras for Gurley Compasses

Compass fitted with No. 262 Telescopic Sight, mounted on No. 268 Offset Standard with Counterpoise

When desired, the Telescopic Sight may be mounted upon an Offset Standard with Counterpoise, and so arranged that the line of sight is in line with the zeros of the compass circle. When in use this standard, with the telescope attached, is substituted for the south sight of the compass. When furnished with a new instrument the telescope is packed in the box with the compass, but it can be safely sent by mail to any part of the country, packed in a case in which it may be kept when not in use.

The Telescope is about 9 inches long and has a power of 18 to 20 diameters. It is furnished with stadia wires, in addition to plain cross wires.

The attachments of vertical circle, 3 inches in diameter and reading to 5 minutes, level on telescope with graduated vial, and clamp and tangent to axis, may be used with this Telescopic Sight. Whenever the level is used, it is necessary that the clamp and tangent to axis be added.

In the illustrations on pages 93 and 94, Telescopic Sight No. 262, is shown fitted with a vertical circle, a level, and clamp and tangent. For simple sighting the level and circle can, of course, be dispensed with, but in the use of the stadia the tangent movement is desirable.

When measurements are to be recorded in chains and links, the stadia wires should be made to cover one foot at a distance of sixty-six feet; if recorded in feet, the wires should cover one foot at a distance of one hundred feet.

The rod used with the stadia should be graduated to feet and decimals of a foot, and provided with two targets, one being fixed at some definite point, while the other can be moved as the surveyor requires, the distance between the two targets being accurately read off by the vernier of the movable one. A self-reading rod may be used without target for short distances.

In using the stadia, the upper wire is brought by the tangent screw precisely upon the upper or stationary target, while the lower target is moved up or down until the lower wire exactly bisects its center line, when the rod is read and the distance recorded.

Attachments and Extras for Gurley Compasses

No. 262	Telescopic Sight, 9 in. achromatic telescope, power about 20 diameters, with *platinum* cross and stadia wires	$35.00

Extras for Telescopic Sight No. 262

No. 265	Vertical Circle, 3 in. in diameter, reading by vernier to 5 min.	6.00
No. 266	Level on Telescope, with ground and graduated vial	6.00
No. 267	Clamp and Tangent to telescope axis	6.00
No. 268	Offset Standard with Counterpoise, to bring the telescope over the line of zeros	10.00

Prices of Parts for Surveyors Compasses

	Price	Postage
Needle with jeweled center and center pin	$4.00	.12
Center pin only	.60	.01
Ground glass level vials, each	.50	.02
Ground glass level vials, brass mounted, complete, each	2.25	.14
Brass cover for compass of our make	1.15	.25
Outkeeper	1.15	.13
Glass circle, unmounted, old style flat glass, for compass face	.30	.15
Glass circle, unmounted, new style beveled edge plate glass, for compass face	1.75	.15
Wrench for center pin	.15	.01
Staff mountings, brass head, without spindle	2.25	.25
Staff mountings, steel point	.60	.18
Ball spindle fitted to old socket	3.50	.30
Compass sight vanes only, each	2.90	.20
Clamp screw for spindle or sight vane	.60	.03
Staff mountings complete for Pocket Compass, small	2.90	.15
Staff mountings complete for Pocket Compass, large	4.00	.20

Mahogany box with lock and strap, and fitted inside, according to size, **$4.75** to **$7.00**.

Compass Tripods

No. 415	Solid Round Leg Tripod, for Compass No. 226	$8.00
No. 416	Solid Round Leg Tripod, for Compasses Nos. 285, 294, 300, 305, 335 and 350	7.00
No. 420	Split Leg Tripod, for Compass No. 226	12.00
No. 421	Split Leg Tripod, for Compasses Nos. 285, 294, 300, 305, 335 and 350	9.75
No. 425	Extension Leg Tripod, for Compass No. 226	15.00
No. 426	Extension Leg Tripod, for Compasses Nos. 285, 294, 300, 305, 335 and 350	12.00

Sole Leather Cases and Pouches, with Shoulder Straps

Cases to fit outside the wooden box

		Price	Postage
No. 478	Case for Compass No. 226	$16.00	
No. 485	Case for Compasses Nos. 335, 341, 341-A and 350	5.50	.22
No. 486	Case for Compass No. 300	6.00	.32
No. 487	Case for Compasses Nos. 285 and 305	7.00	.50

Pouches fitted to receive Pocket Compasses, without the wooden box

No. 490	Pouch for Compasses Nos. 335, 341, 341-A and 350	$4.75	.18
No. 491	Pouch for Compass No. 300	5.25	.28
No. 492	Pouch for Compass No. 305	6.50	.38

For prices of other Parts, see pages 39, 45 and 73

Gurley Pocket Compass with Limb

One Size

No. 285 5 in. limb, 3.5 in. needle, folding sights, weight 4 lbs..... **$75.00**

The instrument shown is a one vernier Pocket Compass. The limb is 5 inches in diameter, graduated to half degrees, figured like Limb I, see page 42: 0 to 90 each way inner row, and 0 to 360 outer row, and reads by vernier to single minutes.

The needle circle is graduated to half degrees and figured 0 to 90 each way, with a needle 3½ inches long. The magnetic declination can be set off to single minutes.

This instrument has the improved spring tangent, and the vernier is placed at an angle of 30 degrees with the line of sight. The sights fold down closely for convenience in packing, and are each made half slit and half hair, so that fore and back sights may be taken without turning the instrument.

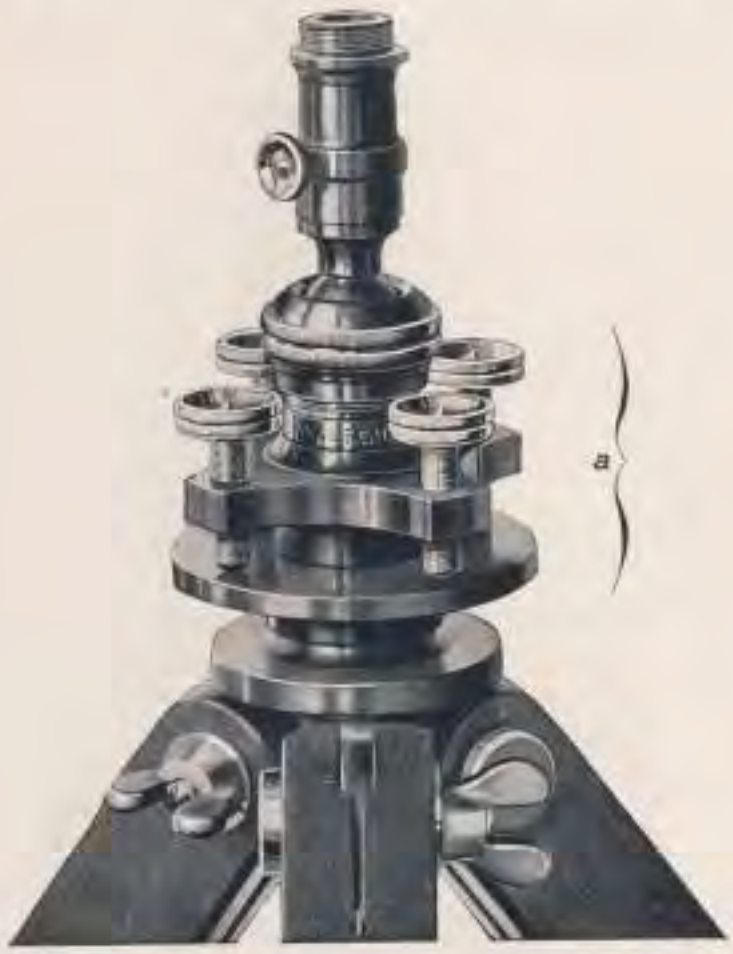
Pocket Compass No. 285 can be used for a great variety of work, and, with light extension tripod, is especially adapted for surveys of mines, where angles must be taken independently of the needle.

The price of this instrument, with staff mountings only, is **$68.00**; with light tripod, as shown in the illustration, **$75.00**; and with extension tripod, **$80.00.**

This Compass cannot be fitted with Telescopic Sight No. 262.

No. 285 Pocket Compass, one vernier to limb, limb 5 in. diameter, reading to 1 min., and with clamp and tangent, 3.5 in. needle, folding sights, two levels, staff mountings, in a mahogany box, and with tripod..... **$75.00**

Extras for Compasses, Nos. 285, 300 and 305



No. 327
Leveling Adopter, $7.50

No. 325 Clamp and Tangent fitted to ball spindle of Compasses Nos. 285, 300 and 305 ..... **$6.00**

No. 326 Rack and Pinion to variation arc, for the accurate setting off of the declination of the needle. Can be added to new Compasses Nos. 294, 300 and 305 ..... **6.00**

No. 327 Leveling Adopter, small size **7.50**

A convenient arrangement is shown in No. 327 at *a*, for use with Pocket Compasses Nos. 285 to 305, affording, in connection with the ball, a rapid and accurate means of leveling. The attachment weighs less than one pound and can be placed on the tripod by merely removing the brass cap. Its value and use are readily apparent.

No. 328 Leveling Head with four leveling screws and clamp and tangent to spindle; for Compass No. 285. This leveling head is the same pattern as supplied with Compass No. 294, see page 99 ..... **$15.00**

For Tripods, see page 95.

For Leather Cases, see page 95.

Gurley Compass with Limb and Telescope

1920 Model **One Size**

Superseding Instruments previously listed as No. 293 and No. 293-A

This instrument is a highly developed form of a Telescope Compass and has the added characteristics of a light weight Transit; thus it can be successfully used for ordinary land surveying, preliminary or reconnoissance surveys, mine surveys, etc., in fact for a variety of work in which rapidity, ease of operation and portability, rather than extreme accuracy, are the essential factors. Engineers and Surveyors, as well as Explorers, will find this instrument a desirable addition to their equipment, enabling them to reserve their valuable Transits for precise work. The needle is of unusual length for such a compact instrument, making it ideal for accurate compass surveys.

Specifications

Centers: Long bronze spindle and socket, of different degrees of hardness.

Leveling Head: Arms strongly ribbed, with four leveling screws having dust caps. Clamp and tangent.

Horizontal Limb and Plate: Limb 4 in. diameter, built inside the needle circle, graduated on *sterling silver* to 30 minutes, reading by one double vernier to one minute; the limb opening and its vernier are under the eyepiece end of telescope. Limb figured like Limb I, see page 42: 0 to 90 each way inner row, and 0 to 360 outer row. Clamp and tangent movement to limb.

Compass needle 4.5 in. long, of horizontal shape; needle circle graduated on a silvered surface to 30 minutes, figured 0 to 90 each way; variation arc on outside, vertical edge of compass box, graduated to 30 minutes, and reading by vernier to one minute. Two right angle levels inside the circle. Selected plate glass over compass face, waterproof.

Telescope: 6.5 in. long, power 16 diameters, aperture of objective 0.7 in., erecting eyepiece. Balanced, transits either end. Pinion movement to objective slide, spiral movement to eyepiece, *platinum* cross, and stadia wires, ratio 1:100. Dust guard to objective slide, detachable sunshade and cap. Clamp and tangent to telescope axis. Telescope is firmly supported by standards which are rigidly attached to main plate, a great improvement over original method of mounting by saddle on folding sights.

Telescope Level: 3 in. long, graduated on the vial.

Vertical Limb: Full circle, 4 in. diameter, figured 0 to 90 each way, graduated on *sterling silver* to 30 minutes, and reading by one double vernier to 1 min.

Finish: Bronze: screws and small parts bright. Morocco finish on standards.

Equipment: Mahogany box, outside dimensions about 8 x 6 x 11 ins., with reading glass, 6 oz. plain plummet, adjusting pins, screw driver, etc.

Tripod: No. 416, with solid round legs; weighs about 4.5 lbs.

Weight: Instrument only, about 7.25 lbs.; including box and accessories, about 11 lbs.

Shipping Weight: Instrument and tripod, in two boxes, for domestic shipment, about 50 lbs.; for export, about 75 lbs.

No. 294 Compass with Limb and Telescope, complete as specified . . . **$150.00**

If **Extension Leg Tripod No. 426** is substituted for the solid round leg pattern, the extra cost is **5.00**

Note: The extension leg tripod is highly recommended, as it allows the instrument to be used conveniently on uneven ground and provides a more portable outfit.

Gurley Compass with Limb and Telescope

1920 Model **One Size**

Superseding Instruments previously listed as No. 293 and No. 293-A

No. 294 4 in. limb, 4.5 in. needle, 6.5 in. telescope, weight 7.25 lbs. . . **$150.00**

Gurley Repair Service

Each year hundreds of Transits, Levels, Alidades, Compasses and other instruments of our own and other makes are sent to us to be overhauled and repaired.

We advise our customers who have instruments in need of repairs to send them directly to us, as our facilities are unequalled for doing high grade repair work economically and promptly.

The instruments should always be placed in their own boxes, and then enclosed in an outside packing case, at least an inch larger in all its dimensions, and the space between the two 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. A letter should also be sent to us by mail 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, the leveling head complete (centers and spindle) should always be sent with it. The tripod legs and brass head in which they are inserted need not be sent, unless in need of repairs.

Our Repair Service includes the furnishing, upon request, of a suitable packing box, for which there is no charge except for transportation. When writing for a box, be sure to specify the outside dimensions of the instrument carrying case, so that the proper size box can be forwarded.

If requested, we will submit an estimate of the cost of the repairs, after examining the instrument, and await your acceptance before starting the work.

Exchanging Old Instruments

Correspondence is solicited relating to exchanging old Gurley instruments for those of the latest patterns.

We are constantly making such exchanges to the entire satisfaction of our customers and if the old instruments are saleable as second-hand, after being rebuilt and refinished, a liberal allowance is made.

Gurley Pocket Vernier Compasses

Without Limb. Two Sizes

No. 300 Pocket Vernier Compass, 3.5 in. needle, weight 1.75 lbs..... **$28.00**
No. 305 Pocket Vernier Compass, 4.5 in. needle, weight 2.75 lbs..... **33.00**

The Pocket Vernier Compass is an excellent and portable instrument for preliminary work, having a fine needle and 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 magnetic declination, as with the large Vernier Compass No. 226.

The instrument has folding sights, two levels and staff mountings, and is packed in a mahogany case.

We make two sizes of the Pocket Vernier Compass, having needles respectively 3.5 and 4.5 inches long. In the smaller instrument the sights have a slit in the south vane and a hair in the north vane, for readily finding an object; but in the larger size the sights are made half slit and half hair. Both sizes have the compass circle graduated to half degrees. In the smaller size the vernier of the variation arc reads to 5 minutes, and in the larger size to single minutes. The instrument may be used, if desired, upon Tripods Nos. 416, 421 or 426. See page 95.

When ordered, a rack movement with pinion is added, by which the magnetic declination may be set off more readily, at an extra cost of $6.00.

When so ordered a Sole Leather Pouch with shoulder strap can be furnished instead of the mahogany box. Pouch No. 491 for Compass No. 300 costs $5.25 extra. Pouch No. 492 for Compass No. 305 costs $6.50 extra.

		Price	Postage
No. 300	Pocket Vernier Compass, 3.5 in. needle, folding sights, two levels and staff mountings.....	**$28.00**	**.70**
No. 305	Pocket Vernier Compass, 4.5 in. needle, folding sights, two levels and staff mountings.....	**33.00**	**1.10**

Gurley Geologists Compass

U. S. Forest Service Standard

This instrument has proved admirably adapted for topographical work, and has been adopted by the U. S. Forest Service for the use of field men in making forest surveys and maps.

It is made of aluminum to secure lightness in weight and has a needle 2⅜ inches long enclosed with its compass circle in a circular box set on a plate 4 inches square. With the improved needle lifter as shown, a water and dust-proof needle box is assured.

The edges of this base are beveled and graduated, two for a tangent scale and two to inch scales. One of these latter is graduated to eighths, each of which represents ten chains, and the other is decimal. The compass circle is made movable, and by a vernier attached to it on the inside the magetic declination may be set off to 5 minutes.

On the under side of the plate is a township plat.

On the south side of the compass is an arc of 180 degrees figured on each side of the 0 line from 0 to 90. A weighted pendulum hung from the center pin indicates, by its pointer 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 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 for sighting.

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

The compass is supported on a simple ball spindle and socket, with staff mountings, and is usually carried in a leather pouch with shoulder and belt straps. Such a pouch can be supplied for $4.75 extra.

The staff cap is slotted to allow vertical angles to be read by means of the pendulum while the compass is on the staff or tripod.

Tripods Nos. 416, 421 and 426 are suitable for use with this compass.

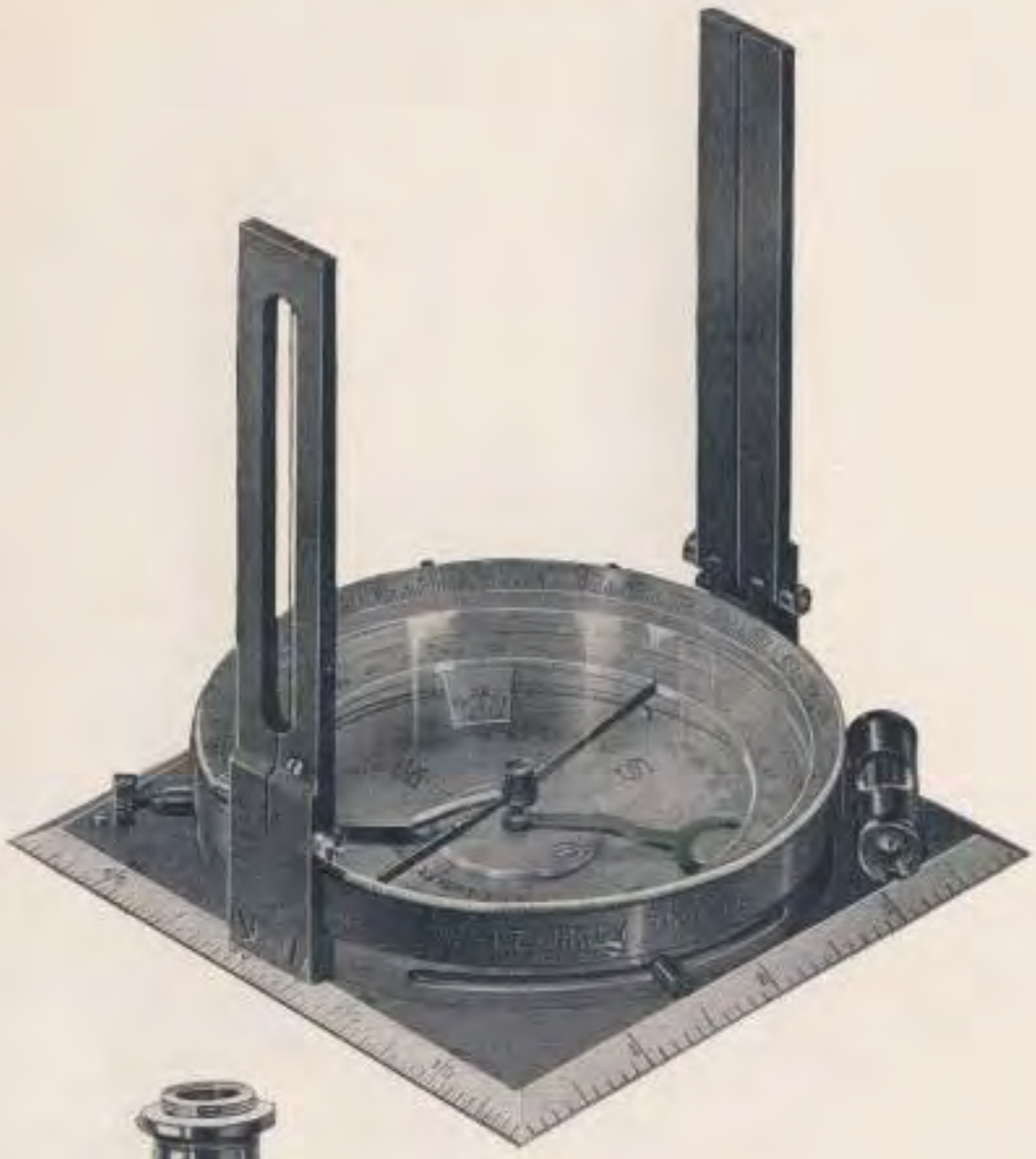
		Price	Postage
No. 335	Geologists Compass (of aluminum), U. S. Forest Service pattern, 2⅜ in. needle, graduated movable sighting circle, graduated base, variation arc, folding sights, two levels, clinometer and staff mountings	$35.00	.35

Extras for No. 335 Geologists Compass

		Price
No. 416	Solid Round Leg Tripod	$7.00
No. 421	Split Leg Tripod	9.75
No. 426	Extension Leg Tripod	12.00
No. 490	Leather Pouch	4.75
	"*Treatise on Practical Field Geology*," by J. H. Farrell, E. M., and A. J. Moses, E. M.	2.50
	"*Instructions for Making Forest Surveys and Maps*," issued by the Forest Service of the U. S. Department of Agriculture; contains suggestions for using these compasses. Pocket size, 85 pages, illustrated and with tables, etc.	.25

Gurley Geologists Compass

U. S. Forest Service Standard



No. 335 Geologists Compass, 2⅝ in. needle..... **$35.00**

Gurley Dip Compasses

No. 341-A Dip Compass, 3 inch needle, and attached level..... **$23.00**

The Dip Compass consists 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 ball is held by the hand, and the compass box by its own weight assumes a vertical position. *It must 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 magnetic iron ore it dips, and thus detects the presence of such ore with certainty.

If Dip Compass No. 341 or No. 341-A 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.

Dip Compasses Nos. 341 and 341-A have a 3 inch needle, provided with a stop which is released by screwing down the clamp in the ball. The new style needle clamp enables the instrument to be held and controlled to the best advantage. The improved form of needle release is positive in action, durable in construction and not liable to injury. The Compasses have the two sides of glass and are furnished with removable brass covers.

Gurley Dip Compasses

In use carefully note the following:

The needle of our Dip Compass is adjusted to read 0 at Troy, N. Y., when held in the plane of the magnetic meridian, but it may read differently in another place.

The readings of these compass needles are always relative and not absolute; therefore, if a needle is held in the plane of the meridian, in a place where it is known that there is no magnetic attraction, and the reading is carefully noted; and the needle is then held in the plane of the meridian where magnetic attraction is suspected, a different reading will show the presence of some magnetic body, whether the needle is, in the first case, perfectly horizontal (reads to zero) or not.

When in use the needle should always be held so that it will swing freely in the plane of the meridian, the stops being drawn entirely out of the way.

When not in use the clamp should be unscrewed so that the needle is securely held.

There is no instrument made which will indicate the presence of gold or silver.

		Price	Postage
No. 341	Dip Compass, 3 in. needle with stop, glass on both sides, and brass covers	**$20.00**	**.35**
No. 341-A	Dip Compass, 3 in. needle with stop, glass on both sides, brass covers, and attached level	**23.00**	**.35**
No. 490	Sole Leather Pouch, with belt loop, for Nos. 341 and 341-A	**4.75**	
	"Location and Examination of Magnetic Ore Deposits by Magnometric Measurements," by Eugene Haanel, Ph. D., Superintendent of Mines, Canada	**1.00**	
	"Treatise on Mine Surveying," by B. H. Brough	**2.50**	
	"Practical Geology" by J. H. Farrel, E. M., and A. J. Moses, E. M.	**2.50**	

Gurley Dial Compass

U. S. Geological Survey Pattern

This instrument has a needle 2⅝ inches long, and with its compass circle is enclosed in a circular box set upon a base 4 inches square, three edges of which are chamfered and graduated, the one on the W side of the compass into inches and tenths and 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 magnetic declination, and has a vernier attached to it on the inside, by which a graduated arc on the face of the compass is read to 5 minutes.

With the improved needle lifter as shown, a water and dust-proof compass box is assured. The staff cap is slotted to allow vertical angles to be read by means of the pendulum while the compass is on the staff or tripod.

There is also on the south side of the face an arc of 180 degrees, 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 to fold in packing, but when erect it makes taut a silk thread, attached at one end to the sight and at the other to an 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 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 thread when the compass is held level indicates local time on the dial. The line of zeros will then be in the meridian. The needle may be set to the meridian by laying off the magnetic declination and any deflection of the needle from the true meridian will indicate the presence of veins of magnetic iron ore.

In addition it has a movable circle graduated on its beveled edge from 0 to 90 degrees. At each quadrant there is a slit for sighting and an open sight is furnished with the compass to be placed upon the clinometer base when desired, and used in connection with the regular sight.

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

Extra hour circles, graduated for any latitude from 20 to 50 degrees, and to fit the same compass, can be furnished.

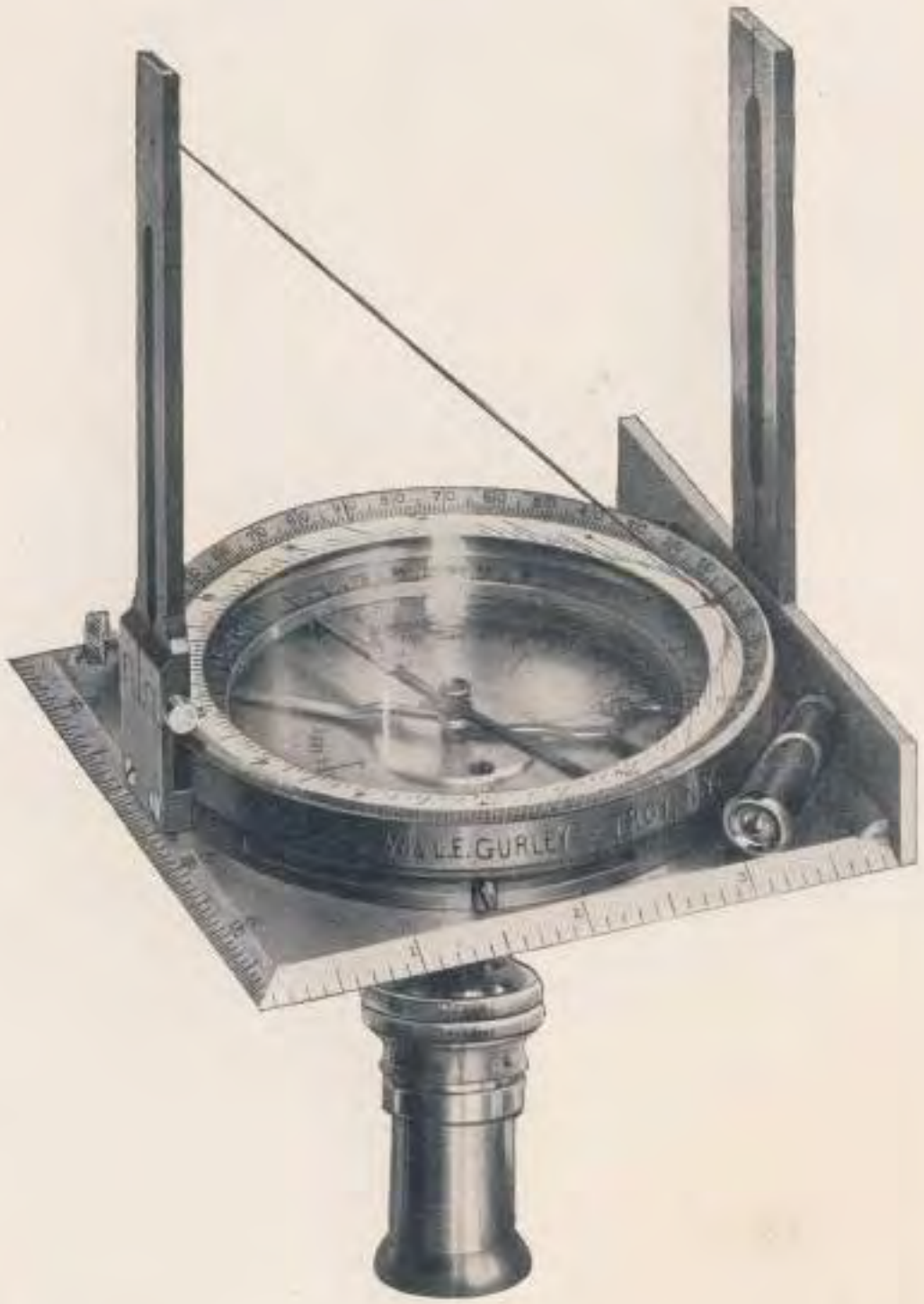
Above 50 degrees latitude, a special sight is necessary, costing $12.00 extra.

A leather pouch with belt loops is sometimes preferred, instead of the mahogany box.

		Price	Postage
No. 350	Dial Compass (of aluminum), 2⅝ in. needle, with hour circle graduated for any latitude between 20 and 50 degrees, as ordered, graduated base, graduated moveable sighting circle, variation arc, one folding sight, one removable sight, two levels, clinometer and staff mountings	$40.00	.45
	Special Sight for latitudes above 50 degrees	12.00	
	Extra Hour Circles, graduated for any latitude between 20 and 50 degrees, to fit Dial Compass, each	6.00	.14
	Light Solid Leg Tripod No. 416	7.00	
	Sole Leather Pouch No. 490, with belt loops and shoulder strap	4.75	

Gurley Dial Compass

U. S. Geological Survey Pattern



No. 350 Dial Compass, 2⅝ in. needle..... **$40.00**

Gurley Wood Box Pocket Compasses

U. S. Government Pattern
For Military Topographers, Foresters, and Timber Cruisers

No. 3154 Wood Box Pocket Compass, 2 in. needle..... **$4.00**

These Compasses, made by W. & L. E. Gurley, are the best instruments of their kind. The dial and needle circle are of white celluloid, on which the graduations appear clear and distinct. A line on the inside of the cover is convenient for sighting.

When the cover is closed the needle is lifted automatically from its center pin and thus the delicate bearings are protected from injury when the instrument is not in use.

Originally designed for military topographers, foresters and timber cruisers, these Compasses are also very popular with tourists and sportsmen who desire a magnetic needle that can be depended upon and one which is mounted in a neat and substantial case.

		Price	Postage
No. 3153	Pocket Compass, mahogany case, 3⅛ in. square by 1⅛ in. deep, needle circle graduated on raised ring to whole degrees and figured 0 to 90 each way. Needle 2 in. long, with jeweled center and automatic stop; hinged cover with clasp. Weight 4 oz.....	**$4.00**	**.15**
No. 3154	Pocket Compass, like No. 3153 but with needle circle figured 0 to 360.....	**4.00**	**.15**
No. 3155	Pocket Compass, like No. 3153 but with mahogany case 3¾ in. square by 1⅛ in. deep, and needle 2½ in. long, needle circle figured 0 to 90 each way. Weight 5 oz.	**5.00**	**.20**
Piano Hinge, full width of cover, instead of the two small hinges, on Nos. 3153, 3154 or 3155, extra.....		**1.00**	
Township Diagram on inside of cover of Nos. 3153, 3154 or 3155, extra		**1.00**	
"Instructons for Making Forest Surveys and Maps," issued by the Forest Service of the U. S. Department of Agriculture; contains suggestions for using these Compasses. Pocket size, 85 pages, illustrated and with tables, etc. Postpaid.....			**.25**
"A Manual for Northern Woodsmen," by Austin Cary, Assistant Professor of Forestry in Harvard University. 16 mo., canvas, illustrations and maps, 250 pages. Postpaid.....		**2.10**	

Pocket Compasses

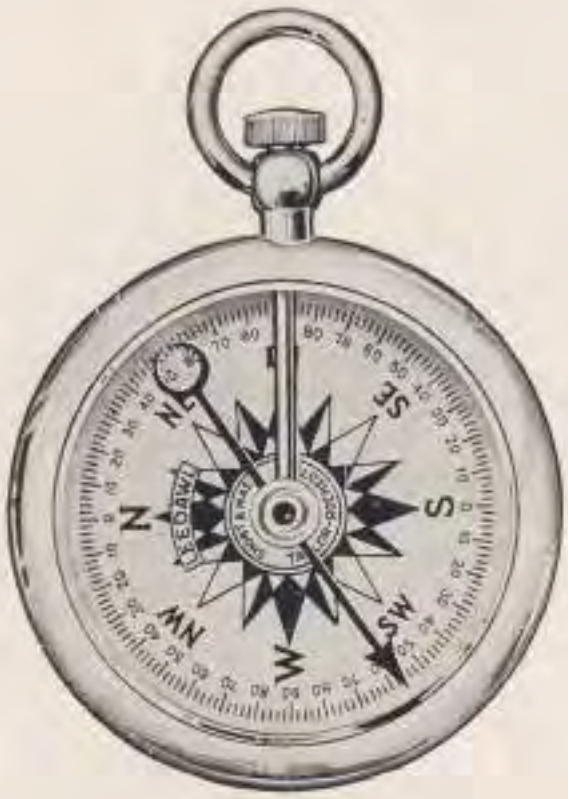
These Compasses are not of our make but they are the best instruments of their kind

See illustrations on page 110

		Price	Postage
No. 3160	"Leedawl," $1\frac{7}{16}$ in. diameter, white metal open face case, with jeweled needle and stop	**$1.00**	**.05**
No. 3161	Brass, round, watch pattern, stop, agate center, 2 in. diameter	**1.00**	**.14**
No. 3166	Brass, round, automatic stop, agate center, $2\frac{1}{2}$ in. diameter, with reversible cover (superior)	**2.50**	**.15**
No. 3168	Brass, round, watch pattern, stop, agate center, $1\frac{1}{2}$ in. diameter, with hinged cover	**1.25**	**.14**
No. 3170	Brass, round, watch pattern, stop, agate center, 2 in. diameter, with hinged cover	**1.50**	**.14**
No. 3175	"Aurapole," $1\frac{7}{16}$ in. diameter, white metal hunting case, thin model, with jeweled needle and stop	**2.50**	**.10**
No. 3176	Pocket Compass, 2 in. diameter, hunting case, spring catch, stop to needle in joint of cover, and bar needle with agate center	**4.00**	**.15**
No. 3182	Pocket Compass, $2\frac{1}{2}$ in. diameter, with cover, folding sights, raised ring, bar needle, with agate center, and stop to needle	**6.00**	**.15**
No. 3200	Pocket Compass, watch pattern, $2\frac{1}{2}$ in. diameter, hunting case, raised ring, agate center, stop to needle, folding sights	**6.00**	**.16**

Pocket Compasses

For description and prices, see page 109



No. 3160

No. 3166

No 3168

No. 3175

Brunton Pocket Transit

No. 3215
Brunton Pocket Transit, as used for taking courses or horizontal angles.
Price **$25.00**

No. 3215
Brunton Pocket Transit, as used on a Tripod for taking vertical angles.
Price complete, **$37.50**

This is a convenient and compact pocket instrument made for preliminary surveying on the surface or underground, by civil and mining engineers, mine managers and geologists. It can be used as a prismatic compass, sighting compass, clinometer and Abney Level.

Used as a hand instrument, sighting and reading are accomplished simultaneously, thereby rendering unnecessary the use of a staff or tripod.

The improved type with folding sight on cover has been adapted to a light camera tripod, which further increases its scope by enabling the running of long tangents by fore and back sighting, independently of the needle.

	Price	Postage
No. 3215 Brunton Pocket Transit. Aluminum case. Size 2¾ x 2¾ x 1 in. Weight 8 oz.	**$25.00**	**.25**
Ball and Socket Tripod Head	**5.50**	
Tubular Extension Tripod	**8.00**	
Plain Leather Case for instrument only	**2.00**	
Leather Case with belt loop for instrument only	**2.25**	
Leather Case with sling strap for instrument only	**2.50**	
Leather Case for instrument, tripod head, and tripod with sling strap	**5.00**	

Gurley Rods

"A Good Rod Speeds the Job"

A good Leveling Rod is as important a part of the essential equipment of every engineer or surveyor as a good Transit or Level. It should, therefore, be selected with equal care, always bearing in mind that a permanently accurate and durable rod cannot be obtained at a low price.

Gurley Rods have steadily grown in favor with discriminating users, whose experience has convinced them that the greatest satisfaction under varying service conditions can be obtained with these rods.

With the intention of having Gurley Rods absolutely the best that can be made, constant study and experiments are carried on and no expense is spared.

What is a Good Rod

A good rod has accurate graduations, retains its straightness, never binds, stands the hard knocks of field use, is easy to read and **stays that way for years.**

Accuracy

As official evidence of the accuracy of Gurley Rods, we are prepared to submit copies of reports made from tests by the United States Bureau of Standards. The rods tested were furnished from our regular stock to the people who secured the certificates; they were not selected for the purpose.

Gurley Rods are used extensively by many departments of the U. S. Government and the most critical work, necessitating the utmost precision, has been performed with rods of our manufacture.

Special Rods

Many engineers need rods of special pattern, graduation or shape adapted to the particular requirements of their practice. We make to order rods of any design and will submit estimates of cost to those who desire them and who furnish us with data showing the details required.

Preparing the Blanks

The first essential in the manufacture of rods is the material, and experience has shown that certain localities produce wood better suited for this purpose than others. Our expert personally examines a large quantity of the lumber and selects only that which straightness of grain and freedom from flaws make fit for our use. The peculiarities of grain and texture that develop in the different woods due to the varying climatic conditions under which they have grown must be kept in mind when making this selection.

The blanks, after having been cut to the desired sizes, are stored and carefully air dried until they are thoroughly seasoned. Any blank that warps in drying is immediately rejected.

The blanks are especially treated to enable the rods to withstand the varying climatic conditions to which they will be subjected. In this process the greatest care and attention are required.

This method of careful preparation and inspection is very expensive, but is justified by the excellence of the finished product.

Graduating

The engine which graduates the rods was invented and made in the Gurley factory, and is the result of years of experience in this special line of work. It is adapted to receive and graduate all kinds of rods accurately in the decimal, fractional or metric system, and in any other system which may be desired for special use.

On Gurley Rods the graduations are not merely painted on the surface, but are impressed into the rod, thus increasing their durability.

Every detail is carefully observed in the graduation of the rod; the engine and the room in which it is used are so arranged that they are kept at a uniform temperature, both winter and summer. The bases from which the graduations are made are linear standards, every division of which has been verified and certified by the highest authority in the world on all matters pertaining to Weights and Measures, the International Bureau of Weights and Measures, Sevres, France.

Finishing

An unusual amount of attention is paid to the finishing of the rods, and materials are used which are made especially for us. A number of coats of preservative varnish are applied and rubbed down thoroughly. Besides being noted for their beautiful finish, Gurley Rods possess unequaled wearing qualities.

Wherever possible, the exterior corners are rounded, making the handling or carrying of the rod more agreeable. With the improved form of clamp, the slide is effectually clamped with but a slight pressure of the screw.

Targets

The targets are stamped from one piece of metal and have a raised perimeter, or rounded rim, which increases the strength and protects the face. The targets are so reinforced that the screws are not liable to bend, and wherever possible the use of nipples is avoided, as they often work loose.

Carrying Cases

To prevent the defacing of the graduations in transportation, a canvas case to hold the rod can be supplied. This case is substantially made of heavy material and is recommended for all rods used in precise leveling.

Repairs and Regraduating

Owing to their durable construction, Gurley Rods can be restored at moderate cost to first class condition for further service, after they have become worn or damaged by excessive use or accident. As this cannot be done with a rod cheaply made, this advantage of a Gurley Rod should be considered when purchasing.

Philadelphia Rods

Philadelphia Rods, with Micrometer Target, Nos. 500 and 500-A

This Rod is made in two parts, each about ¾ inch thick by 1½ inch wide and 7 $\frac{8}{10}$ feet long, the parts connected by two metal sleeves, the upper one of which has a clamp screw for fastening the two parts together when the rod is extended for a higher reading than 7 feet.

Both sides of the back strip and one side of the front are recessed $\frac{1}{10}$ inch below the edges. These surfaces are painted white, graduated into feet, tenths and hundredths of a foot, and the feet and tenths figured. The graduations and figures are slightly impressed on the recessed surfaces, thus increasing their durability.

The front piece reads from the bottom upward to 7 feet, the foot figures being red and the tenths figures black. When the rod is extended to full length the front surface of the rear half reads from 7 to 13 feet, and the whole front of the rod is figured continuously and becomes a self-reading rod, 13 feet long, reading to hundredths of a foot.

The back surface of the rear half is figured from 7 to 13 feet, reading from the top down. It has a vernier scale by which the rod is read to thousandths of a foot as it is extended. The round brass target has a raised perimeter and is printed in white and red quadrants. It has also a vernier scale on its chamfered edge, reading to thousandths of a foot. The target has a micrometer attachment which permits of rapid and accurate setting.

When a level of less than 7 feet is desired, the target is moved up or down the front surface, the rod being closed and clamped; but when a greater height is required the target is fixed at 7 feet and the rear half extended, the vernier scale on the back giving the readings like those of the target to thousandths of a foot.

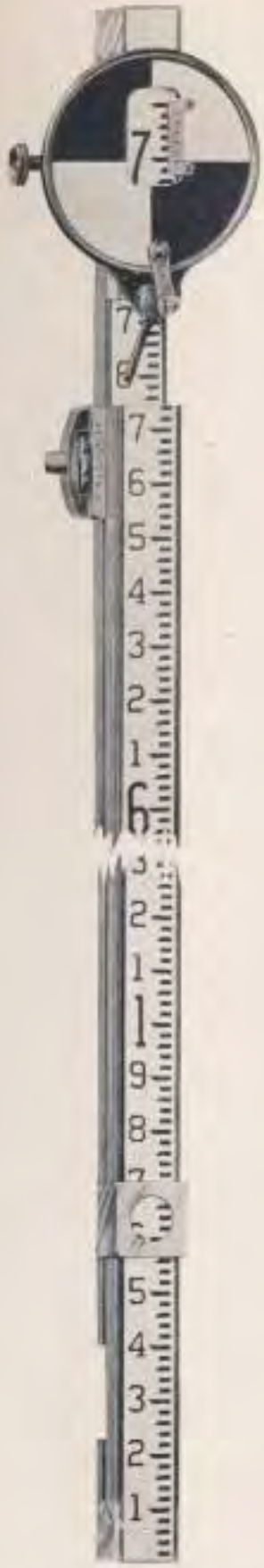
No. 500 Philadelphia Rod, 2 ply, 7 $\frac{8}{10}$ ft. closed, sliding to 13 ft., graduated to feet, 10ths and 100ths, with verniers reading to 1000ths, and with Micrometer target..... **$18.00**

No. 500-A Philadelphia Rod, 2 ply, 6 $\frac{8}{10}$ ft. closed, sliding to 12 ft., graduated to feet, 10ths and 100ths, with verniers reading to 1000ths, and with Micrometer target..... **18.00**

Service Rod, with Oval Target, No. 500-R

The new Service Rod is of the standard Philadelphia type and similar to our No. 500 Rod, but with the following modifications: It is equipped with a die-cast target, oval in form; the clamp screw and fixtures are of cast bronze, the screw being reinforced and protected by a guard and designed for easy clamping, especially when wearing gloves or mittens in cold weather; the finish is not quite so refined as that of our No. 500 Rod, but this new Rod will give the same service which has made all Gurley Rods so popular. In general, the No. 500-R Rod will answer every requirement in point of accuracy and service.

No. 500-R Service Rod, self-reading, 2 ply, 7 $\frac{8}{10}$ ft. closed, sliding to 13 ft., graduated to feet, 10ths and 100ths, with verniers reading to 1000ths, and with oval target..... **$12.50**



No. 500
Philadelphia Rod
with Micrometer Target
2 Ply, $18.00

No. 500-R
Service Rod
with Oval Target
2 Ply, $12.50

No. 500-B
Philadelphia Rod
2 Ply, $16.00
See page 116

No. 500-M
Philadelphia Rod
Metric Graduations
2 Ply, $16.00

Philadelphia Rods (Continued)

Philadelphia Rods, Nos. 500-B, 501 and 501-B

No. 500-B Philadelphia Rod, 2 ply, 7 $\frac{8}{10}$ ft. closed, sliding to 13 ft., graduated to feet, 10ths and half 10ths, with both target and rod reading by natural scales to 100ths; the 10ths figures are 0.06 ft. high **$16.00**

In the illustration on page 115, the half-tenths graduations are not shown.

No. 501 Philadelphia Rod, 3 ply, 5 $\frac{8}{10}$ ft. closed, sliding to 13 ft., graduated to feet, 10ths and 100ths, with verniers reading to 1000ths **22.00**

No. 501-B Special Self-reading Rod, 3 ply, 7 $\frac{8}{10}$ ft. closed, sliding to 20 ft., graduated on four faces to feet and 10ths, and on back of the front section to feet, 10ths and 100ths; also reading by two scales to half-hundredths. With aluminum target and canvas case **25.00**

Philadelphia Mining Rod, No. 502-A

No. 502-A Philadelphia Mining Rod, 2 ply, 3 $\frac{8}{10}$ ft. closed, sliding to 5 ft., graduated to feet, 10ths and 100ths, with vernier reading to 1000ths **14.50**

Note: We are prepared to furnish 2 ply standard Philadelphia Rods like No. 500, or Service Rods like No. 500-R, in special lengths, as follows:

4.3 ft. closed, sliding to 7 ft.

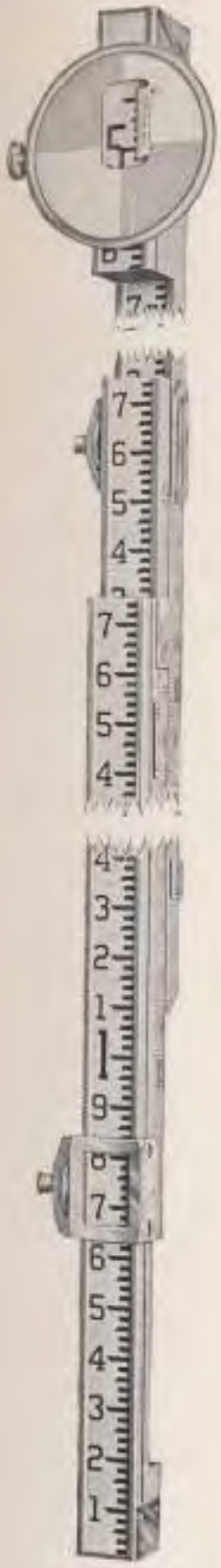
5.3 ft. closed, sliding to 9 ft.

Prices on application.

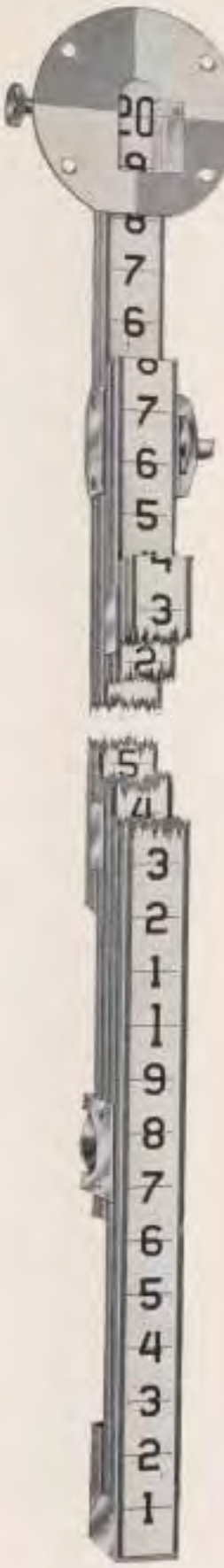
Canvas Cases for Rods Nos. 500, 500-A, 500-R, 500-B and 501 ..... **4.00**

Any of our Leveling Rods made with metric graduations without extra charge

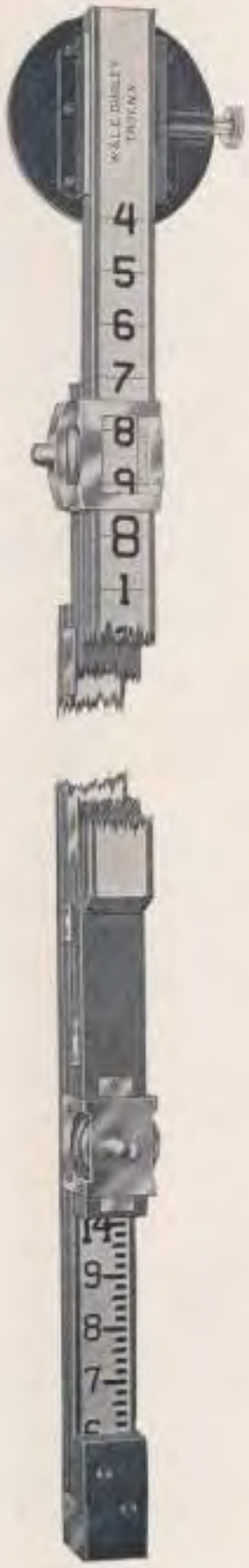
RODS AND TRIPODS



No. 501
Philadelphia Rod
3 Ply, $22.00



No. 501-B
Self-reading Rod
Light 3 Ply, $25.00



Rear View of
Self-reading Rod
No. 501-B

No. 504
Troy Rod, 2 Ply
$12.00
See page 118

Troy Rod, No. 504

The illustration on page 117 represents another form of the sliding leveling rod, called the Troy Rod. This is a self-reading rod up to 6 feet, or it can be read by a vernier on the rear piece to thousandths of a foot.

It has two targets, as shown, both fastened to the front half of the rod, the lower one having its middle line just three-tenths of a foot above the end, and the other target exactly 6 feet above the lower.

There is a clamping piece with screw on the back of the rod, below the upper target, by which the two parts are clamped together when desired.

The face of the front piece is recessed like that of the Philadelphia Rod, painted white, graduated to feet and hundredths, and figured as represented.

The side of the front half is graduated to feet and hundredths, read by a vernier on the top of the rear half to thousandths, and figured from the top downward, beginning with three-tenths, that being the height of the middle line of the lower target.

When a level of less than 6 feet is taken on the rod the observation is made by the lower target, and the reading is direct as given on the side; but when a greater height is taken the upper target is sighted upon, and 6 feet added to the reading on the side, a reading up to 12 feet being thus readily obtained.

No. 504 Troy Rod, 2 ply, 6½ ft. closed, sliding to 12 ft., graduated to feet, 10ths and 100ths, with vernier reading to 1000ths... **$12.00**

New York Rod, No. 505

This Rod is made in two parts, the pieces sliding one from the other, the same end being always held on the ground and the graduations starting from that point.

The graduations are made to tenths and hundredths of a foot, the tenths figures being black, and the feet marked with a large red figure.

The front surface, on which the target moves, reads to 6½ feet. When a greater height is required, the horizontal line of the target is fixed at the highest graduation, and the upper half of the rod carrying the target is moved out of the lower, the reading being now obtained by a vernier on the graduated side, up to an elevation of 12 feet.

The target is round, made of brass with a raised rim to strengthen it and to protect from defacement. It is arranged with an improved clamp, which can be so adjusted as to regulate the friction on the rod, allowing the target to be easily moved up and down or to be clamped by a slight turn of the binding screw.

The face of the target is divided into quadrants by horizontal and vertical diameters, the quadrants being painted alternately white and red, or sometimes white and black.

The opening in the face of the target is nearly two-tenths of a foot long, so that in any position a figure denoting a tenth of a foot can be seen on the surface of the rod.

The vernier on the right edge of the opening is graduated into ten equal spaces corresponding to nine hundredths on the rod, and reads to thousandths of a foot. The graduations start from the horizontal line which separates the colors of the face.

The rod is fitted with an improved clamp similar to that on the target.

No. 505 New York Rod, 2 ply, 6 $\frac{7}{10}$ ft. closed, sliding to 12 ft., graduated to feet, 10ths and 100ths, with vernier reading to 1000ths. **$16.00**

Any of our Leveling Rods made with metric graduations without extra charge

RODS AND TRIPODS

No. 505
New York Rod
2 Ply, $16.00
Front View

Rear View of
New York Rod
No. 505

New York Rod
U. S. Geological
Survey Pattern
$16.00

New York Rod
U. S. Geological
Survey Pattern
$16.00

Architects Rods, Nos. 510 and 511

Architects Rod No. 510 is a very light and simple sliding rod made in two equal parts, each 7/8 inch square, and when closed the rod is about 5 feet 6 inches long.

As shown, the face of the front part and the side of the rear part are graduated to feet, inches and sixteenths, and read by an index on the target and on the side of the rod.

The target is similar to those of the rods already described, and moves on the closed rod when levels of less than 5 feet 5 inches are to be taken.

When a greater height is needed, the target is fixed at the highest graduation, the rear part carried above the front part and clamped by the clamp screw at any point desired, and the height up to 10 feet read off by the index on the side of the lower part.

This rod is especially adapted for use with Architects Level No. 381.

Architects Rod No. 511 is similar to No. 510 except that the face of the front part and the side of the rear part are graduated to feet, tenths, and hundredths, and read by verniers on the target and side to thousandths of a foot.

No. 510 Architects Rod, 2 ply, 5½ ft. closed, sliding to 10 ft., graduated to feet, inches and 16ths **$8.00**

No. 511 Architects Rod, 2 ply, 5½ ft. closed, sliding to 10 ft., graduated to feet, 10ths and 100ths, with verniers reading to 1000ths **8.00**

Telemeter or Stadia Rods, Nos. 513 and 514

This Rod is formed of two pieces of pine, each 2½ inches in width and 6 feet long. The inner surfaces of the rod are recessed and painted white, with graduations in black to feet, tenths and hundredths, the feet figured in red and the tenths in black. The two pieces are connected by strong brass hinges and are folded in transportation. When in use they are opened and are held firmly in line by a sturdy, ribbed metal brace and clamp on the back of the rod.

This is a self-reading rod, and is often used in connection with the stadia to ascertain distances by simple observation, in the same manner as the Philadelphia Rod.

No. 513 Telemeter or Stadia Rod, without target, hinge joint, 6 ft. folded, unfolding to 12 ft., graduated to feet, 10ths and 100ths **$12.00**

No. 514 Telemeter or Stadia Rod, without target, hinge joint, 7 ft. folded, unfolding to 14 ft., graduated to feet, 10ths and 100ths **13.00**

Any of our Leveling Rods made with metric graduations without extra charge

RODS AND TRIPODS

No. 510
Architects Rod
$8.00

No. 513
Telemeter or Stadia
Rod—$12.00

No. 513-M
Telemeter or Stadia Rod
Metric Graduations
$12.00

Enlarged View of
Hinges, Ribbed Brace
and Clamp of Telemeter
Rods, Nos. 513 and 514

Telemeter or Stadia Rods, Nos. 514-B to 514-E

No. 514-B Stadia Rod, one piece, without target, 10 ft. long, 4 in. wide, with brass ends, graduated on recessed face of 3½ in. width to feet, 10ths and 2/100ths..... $10.00

No. 514-C Stadia Rod, similar to No. 514-B, but 12 ft. long..... 12.00

The graduations of Nos. 514-B and 514-C begin at the base and end at the top of the rods. The illustration does not show completed graduations.

No. 514-D Stadia Rod, one piece, without target, 10 ft. long, 3⅛ in. wide, with brass ends, graduated on flat face to feet, 10ths and 2/100ths 7.50

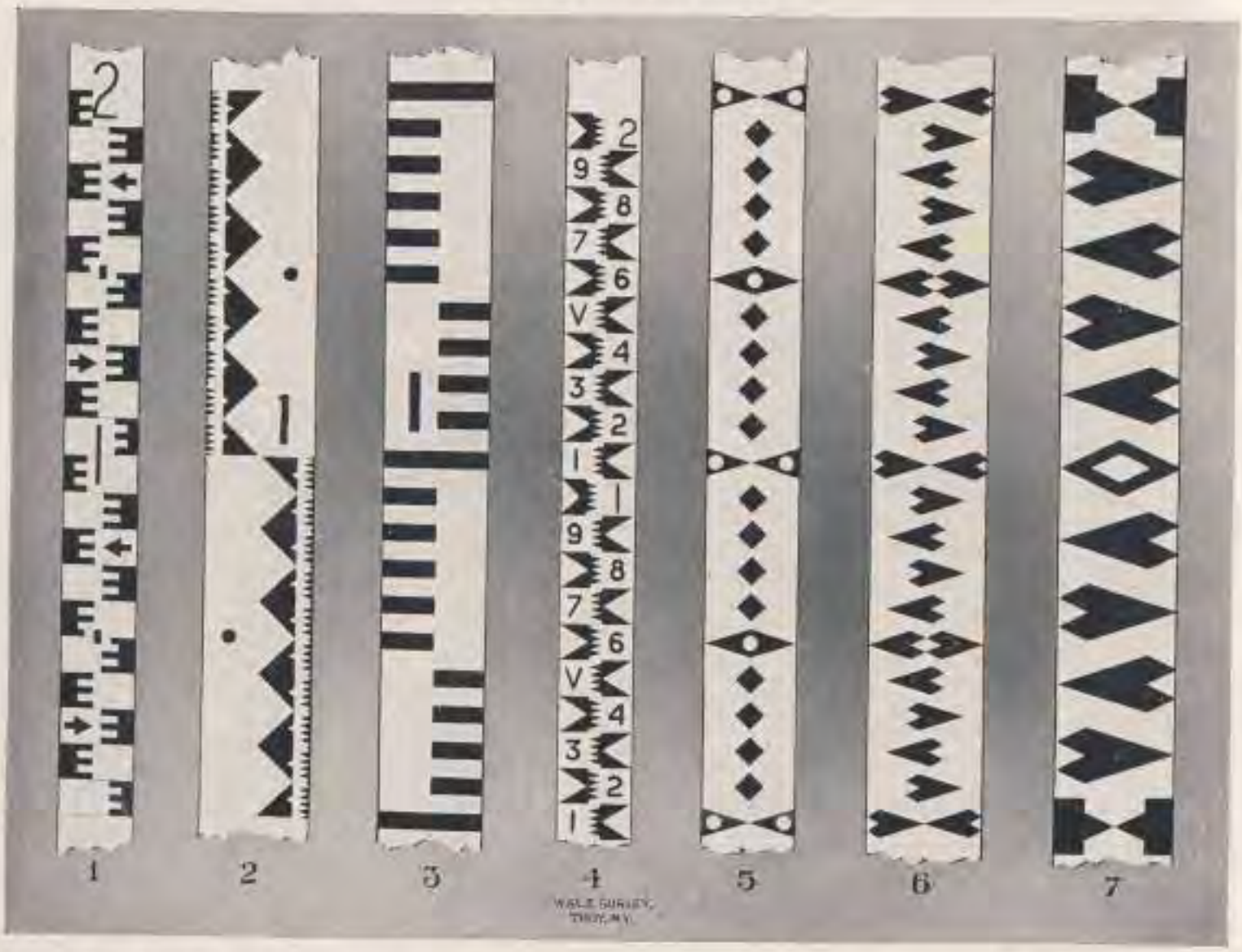
No. 514-E Stadia Rod, similar to No. 514-D, but 12 feet long..... 8.50

Hinge Joint for Stadia Rods Nos. 514-B, 514-C, 514-D or 514-E, to permit folding, extra..... 4.00

Rods Nos. 513 to 514-E can be furnished in any length up to 16 ft. Prices on application.

Specimens of Graduations for Stadia Rods

(Two Foot Sections)



Graduations Nos. 1, 4 and 5 can be furnished on Rods similar to Nos. 514-D and 514-E, having a flat face 3⅛ in. wide. Graduations Nos. 2, 3, 6 and 7 can be furnished on Rods similar to Nos. 514-B and 514-C, having a recessed face 3½ in. wide. Either style can be supplied in any length up to 16 ft. Prices on application.

Value of Specimen Graduations

No. 1 Feet, 10ths and 2/100ths.
No. 2 Feet, 10ths and 100ths.
No. 3 Feet and 10ths.
No. 4 Feet, 10ths and 100ths.
No. 5 Feet and 10ths.
No. 6 Feet, 10ths and 2/100ths.
No. 7 Feet, 2/10ths and 4/100ths.

Any of our Leveling Rods made with metric graduations without extra charge

Stadia Rod
No. 514-B—10 feet, $10.00
No. 514 C—12 feet, 12.00

Stadia Rod
No. 514-D—10 feet, $7.50
No. 514-E—12 feet, 8.50

No. 516
Cross Section Rod
$14.00
See page 124

Telescopic Rod, No. 515

This Rod is so made that the two smaller upper parts slide out of a larger and lower part which answers as a case. When closed, the rod is 5 feet long, and it extends to 14 feet. It is graduated on a recessed face to feet, tenths and hundredths, the graduations being painted and figured like those of the Philadelphia and Telemeter Rods.

No. 515 Telescopic Rod, 3 ply, without target, 5 ft. closed, sliding to 14 ft., graduated to feet, 10ths and 100ths..... **$20.00**

Cross Section Rod, No. 516

This Rod is made of well seasoned pine, and is 10 feet long, with ends 1⅜ inches thick and 2 inches wide. It is about 4 inches thick at the middle, where there is an opening for the hand, as shown. Both sides are graduated on a recessed white surface, the graduations being painted black like those of a leveling rod, and figured from the end of the rod. There is also an adjustable spirit level at each end, as shown in the illustration on page 123.

No. 516 Cross Section Rod, one piece, without target, 10 ft. long, with level at each end, graduated to feet, 10ths and 100ths.... **$14.00**

Gurley Slip-Jointed Leveling Rod, No. 517

1920 Model

No. 517 Slip-Jointed Leveling or Stadia Rod, 12 ft. long, two inch graduated, recessed face, four sections (three slip joints,) graduated in feet, 10ths and 100ths. The joints are secured and released by spring catches. With canvas carrying case **$13.50**

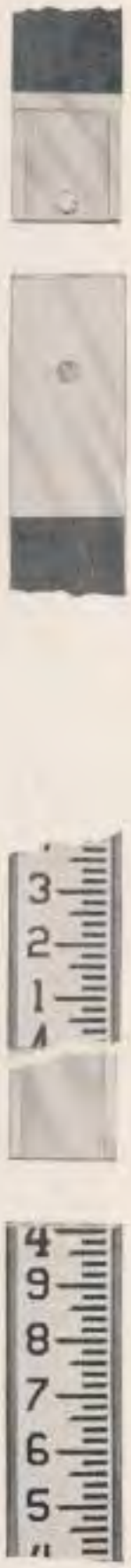
Any of our Leveling Rods made with metric graduations without extra charge

RODS AND TRIPODS

No. 515
Telescopic Rod
$20.00

No. 515-M
Telescopic Rod—$20.00
Metric Graduations

No. 517
Slip-Jointed Rod
12 ft.—$13.50



Front and Rear
Views of No. 517
Slip-Jointed Rod

Plain Leveling Rods, Nos. 518-A to 521-B

One Piece, or with Hinge Joint

A very good self-reading Rod is made of seasoned white pine, recessed and graduated on one face like the Philadelphia Rod. A rib at the back, extending through the length of the rod, gives great rigidity, while it does not materially increase the weight.

This rod is also made with a hinge joint at the middle, as shown below.

No. 518-A Plain Rod, one piece, without target, 10 ft. long, graduated to feet, 10ths and 100ths..... **$6.00**

No. 518-B Plain Rod, without target, hinge joint, 5 ft. folded, unfolding to 10 ft., graduated to feet, 10ths and 100ths..... **9.00**

No. 519-A Plain Rod, one piece, without target, 12 ft. long, graduated to feet, 10ths and 100ths..... **7.00**

No. 519-B Plain Rod, without target, with hinge joint, 6 ft. folded, unfolding to 12 ft., graduated to feet, 10ths and 100ths.... **11.00**

No. 520-A Plain Rod, one piece, without target, 14 ft. long, graduated to feet, 10ths and 100ths..... **8.00**

No. 520-B Plain Rod, without target, with hinge joint, 7 ft. folded, unfolding to 14 ft., graduated to feet, 10ths and 100ths..... **12.00**

No. 521-B Plain Rod, without target, with hinge joint, 8 ft. folded, unfolding to 16 ft., graduated to feet, 10ths and 100ths.... **13.00**

Any of our Leveling Rods made with metric graduations without extra charge

Enlarged View of Hinged Joint used on Rods Nos. 518-B, 519-B, 520-B and 521-B. Note the sturdy construction of the hinges and the manner in which the strong metal brace is anchored into the wooden rib; also the wing nut clamp screw.

RODS AND TRIPODS

No. 518-B
Plain Rod with
Hinge Joint
$9.00

Rear View of Plain Rods Nos.
518-B, 519-B, 520-B, and 521-B,
showing Wooden Rib,
Hinge Joint, Brace
and Clamp Screw

No. 522-A
Plain Rod, 2 Ply
$9.00
See page 128

Enlarged View
of Clamp of
Plain Rods
Nos. 522-A to 522-C

Plain Leveling Rods, Nos. 522-A to 524-A

Sliding Pattern — 2 ply, or 4 Ply

Especially designed for convenience in use and for ease in carrying when traveling.

This light, compact, self-reading rod, without target, is made in two parts, extending to 10, 12 or 14 feet. See Rods Nos. 522-A, B and C. No. 522-A is shown on page 127.

This same pattern of rod is also made in four parts, $3\frac{8}{10}$ feet long when closed, capable of extension to $11\frac{8}{10}$ feet, and reads to hundredths of a foot.

The No. 524-A Rod is usually ordered with a flexible canvas case. This rod is especially popular with engineers who travel by trolley, train, automobile or other conveyance.

A particularly compact and convenient outfit consists of one of these No. 524-A Four Ply Rods, several Jointed Wooden Flagstaffs similar to Nos. 537-A to 538-B, and an Extension Tripod with head adapted for use with the Transit or Level.

No. 522-A Plain Rod, 2 ply, without target, $5\frac{8}{10}$ ft. long, sliding to 10 ft., graduated to feet, 10ths and 100ths..... **$9.00**

No. 522-B Plain Rod, 2 ply, without target, $6\frac{8}{10}$ ft. long, sliding to 12 ft., graduated to feet, 10ths and 100ths..... **10.00**

No. 522-C Plain Rod, 2 ply, without target, $7\frac{8}{10}$ ft. long, sliding to 14 ft., graduated to feet, 10ths and 100ths..... **11.00**

No. 524-A Plain Rod, 4 ply, without target, $3\frac{8}{10}$ ft. long, sliding to $11\frac{8}{10}$ ft., graduated to feet, 10ths and 100ths..... **14.00**

Canvas Case for No. 524-A..... **3.00**

[The No. 524-A Rod, with metric graduations, when extended reads to 3.3 meters and when closed reads to 1 meter. See illustration on page 129.]

Flexible or Pocket Leveling Rods, Nos. 525-B to 528

The flexible self-reading rod shown on the opposite page is a convenient form where extreme accuracy is not essential and where ease in carrying is desirable. It is made of specially prepared canvas, so treated as to insure permanence in length within reasonable limits, and is graduated on its painted surface to feet, tenths, and hundredths, or to special design. In use it is fastened to a board with thumb tacks, and can be rolled up easily and carried in the pocket in the tin case.

		Price	Postage
No. 525-B	Pocket Rod, 10 ft. long, graduated to feet, 10ths and 100ths	**$3.50**	**.25**
No. 526-A	Pocket Rod, 12 ft. long, graduated to feet, 10ths and 100ths	**4.50**	**.28**
No. 526-B	Pocket Rod, 12 ft. long, graduated to feet, inches and 8ths	**4.50**	**.28**
No. 527	Pocket Rod, 14 ft. long, graduated to feet, 10ths and 100ths	**5.50**	**.30**
No. 528	Pocket Rod, 3½ meters long, graduated to centimeters	**4.50**	**.30**

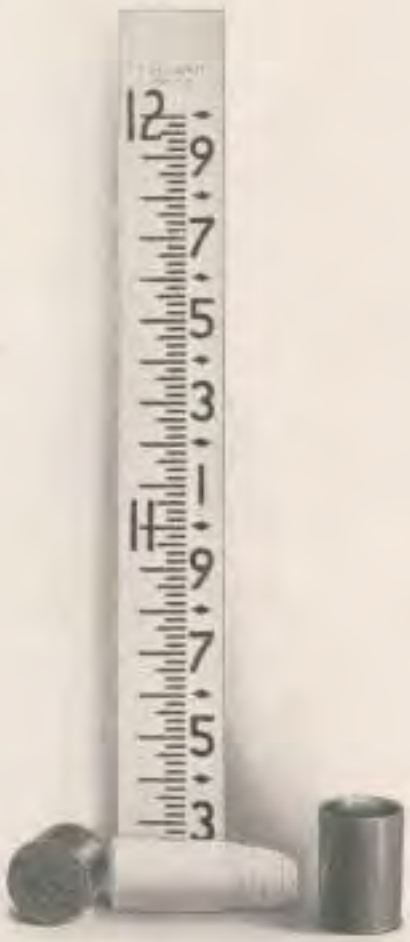
Any of our Leveling Rods made with metric graduations without extra charge

RODS AND TRIPODS

No. 524-A
Plain Leveling
Rod, without
Target, 4 Ply
$14.00

No. 524-A
Plain Leveling
Rod
Metric Graduations
4 Ply, $14.00

Rear View of 4 Ply
Leveling Rod No. 524-A,
showing details of
construction



Nos. 525-B—527
Flexible or Pocket
Leveling Rods
$3.50 to $5.50

No. 528
Flexible Rod
Metric Graduations
$4.50

Combined Leveling Pole and Flagstaff, Nos. 530 and 531

The Leveling Pole, No. 530, is a combination of a plain self-reading rod and a flag pole. It is made with flat face, front and rear, and rounded sides. One face is graduated to feet and hundredths of a foot, while the other face and sides are graduated to feet only and are painted red and white alternately.

The pole is made 7 and 9 feet long, the graduated faces reading to 6 and 8 feet, respectively, and when used as a rod is read as shown in the illustration.

No. 530	Wooden Leveling Pole and Flagstaff, 7 ft. long	$5.00
No. 531	Wooden Leveling Pole and Flagstaff, 9 ft. long	6.00

Wooden Flagstaffs or Ranging Poles, Nos. 534 to 536

Wooden Flagstaffs, or Ranging Poles, Nos. 534 to 536 are made in three sizes and are octagonal in form, tapering from the bottom to the top, and have metal shoes. They are graduated to feet, and painted alternately red and white. When desired they are graduated metrically, five spaces to each meter.

No. 534	Wooden Flagstaff, octagonal, 6 ft. long	$3.00
No. 535	Wooden Flagstaff, octagonal, 8 ft. long	4.00
No. 536	Wooden Flagstaff, octagonal, 10 ft. long	5.00

Screw-Jointed Wooden Flagstaffs, Nos. 537-A to 538-B

Jointed Wooden Flagstaffs Nos. 537-A to 538-B are especially designed for convenience in use and for ease in carrying when traveling. They are about 1 inch in diameter, and are made in equal sections, which are firmly joined together by protected metal screw joints. If desired, a heavy canvas case is furnished to contain the several parts, and to protect them from injury in transportation. See illustration on page 132.

No. 537-A	Jointed Wooden Flagstaff, round, 6 ft. long, in 2 sections	$4.50
No. 537-B	Jointed Wooden Flagstaff, round, 6 ft. long, in 2 sections and with canvas case	7.00
No. 537-C	Jointed Wooden Flagstaff, round, 6 ft. long, in 3 sections	7.00
No. 537-D	Jointed Wooden Flagstaff, round, 6 ft. long, in 3 sections and with canvas case	9.50
No. 538-A	Jointed Wooden Flagstaff, round, 9 ft. long, in 3 sections	7.50
No. 538-B	Jointed Wooden Flagstaff, round, 9 ft. long, in 3 sections and with canvas case	10.50

Iron and Steel Ranging Poles, Nos. 540-A to 544

Ranging Poles Nos. 540-A and 540-B are made in two lengths, of a solid hexagonal steel rod, ½ inch in diameter, are graduated to feet and are painted alternately red and white.

Ranging Poles Nos. 541 to 544 are made of an iron tube, $\frac{3}{8}$ inch in diameter, in three lengths, are graduated to feet and are painted alternately red and white.

No. 540-A	Steel Ranging Pole, solid, hexagonal, 6 ft. long, ½ in. diameter.	$3.25
No. 540-B	Steel Ranging Pole, solid, hexagonal, 8 ft. long, ½ in. diameter.	3.75
No. 541	Iron Tubular Ranging Pole, 6 ft. long, $\frac{3}{8}$ in. diameter	3.00
No. 543	Iron Tubular Ranging Pole, 8 ft. long, $\frac{3}{8}$ in. diameter	3.50
No. 544	Iron Tubular Ranging Pole, 10 ft. long, $\frac{3}{8}$ in. diameter	4.00

Any of the above Staffs and Poles with metric graduations (five to a meter) at same price

RODS AND TRIPODS

Combined Wooden Leveling Pole and Flagstaff, Front View

No. 530 7 feet, $5.00
No. 531 9 feet, 6.00

Nos. 530 and 531 Combined Wooden Leveling Pole and Flagstaff, Rear View

Wooden Flagstaff

No. 534 6 feet, $3.00
No. 535 8 feet, 4.00
No. 536 10 feet, 5.00

Iron Tubular Ranging Pole

No. 541 6 feet, $3.00
No. 543 8 feet, 3.50
No. 544 10 feet, 4.00

Screw-Jointed Wooden Flagstaffs, Nos. 537-A to 538-B

The above illustration shows Flagstaff No. 537-D, 6 feet in length, in 3 sections of 2 feet each, having protected metal screw joints. The heavy canvas case, for protecting the rod from injury in transportation, also is shown. For description and prices, see page 130.

Gurley Rods with Metric Graduations

Besides the usual graduation of leveling rods into feet and parts of a foot, we graduate them, when desired, into meters, decimeters and centimeters, without extra charge.

The scales on the targets and sides of the rods read the centimeters to millimeters on all except the Telemeter, Telescopic and Plain Rods, which have no targets and are read only to centimeters. The New York, Troy and Architects metric rods are graduated, when desired, to read by vernier to one-tenth of a millimeter.

Gurley Precise Leveling Rod, No. 550-R

No. 550-R Gurley Precise Leveling Rod, cross-shape section, graduated on three faces to yards, 10ths and 100ths, reading to 3½ yds., with silver-faced plugs at each half yard. Fitted with wooden handle, thermometer, fixed circular rod level, canvas case, turning point and plate. Packed in a special pine box with hinged cover, handles and lock..... **$85.00**

Any of our Leveling Rods made with metric graduations without extra charge

Molitor Precise Leveling Rod, No. 551-R

No. 551-R Molitor Precise Leveling Rod, T-shape section, 12 ft. long, graduated to feet, 10ths and 100ths, or to millimeters if preferred, and with circular level, two wooden handles, plumbing attachment and plummet, enclosed thermometer, canvas case, and turning point. Packed in special pine box with hinged cover, handles and lock..... **$65.00**

Gurley Self-Reading Tape Leveling Rod, No. 552-R

The Tape Rod is a self-reading rod of decidedly different design from the Philadelphia Rod. It is a wooden rod, made in one piece with a metal roller set in it near each end. Passing over these rollers is a continuous steel band twenty feet long and one-tenth foot wide, on the outside of which, for its entire length, is painted a scale graduated to feet, tenths and half-tenths, with the details of the numbers so designed that readings to the nearest one-hundredth of a foot can readily be made.

It is provided with a clamp so that the metal band, or tape, can be set at any desired reading and held firmly in that position.

Where there are a large number of elevations to be calculated, it will save much time to use a tape rod which is so arranged that no elaborate figuring is required. In this rod, the numbers increase from the top towards the bottom, the opposite way from ordinary rods. The level is set up at a convenient point and the rod held on a bench mark. The tape, or band, on the rod is then moved up or down as directed by the levelman until he reads the feet, tenths and hundredths which are the same as those of the elevation of the benchmark, e. g., if the elevation of the B. M. is 195.62, the tape will be moved until it reads 5.62. If the rod is then held on a point 1.61 feet lower than the bench, the rod-reading will be 4.01, since with this rod the readings decrease as the rod is lowered. The elevation of the point is then 194.01 feet, or sufficiently precise for topographic work, 194.0 feet. In this way the elevations are read directly on the rod to feet and decimals of feet, the tenths and hundredths of feet being supplied mentally. Obviously the only notes kept are the columns of stations and elevations.

No. 552-R Self-Reading Tape Leveling Rod; rod made of pine, 10 ft. 8½ in. long, and graduated on one edge to feet and 10ths. The steel ribbon graduated to feet, 10ths and half-10ths; all graduations on rod and tape are painted..... **$38.00**

Canvas Case for above rod..... **5.00**

Any of our Leveling Rods made with metric graduations without extra charge

RODS AND TRIPODS

No. 551-R
Molitor Precise Rod
Front View
$65.00

Rear View of
No. 551-R
Molitor Precise Rod

No. 552-R
Self-Reading
Tape Leveling Rod,
Front View
$38.00

Side Views of
No. 552-R
Self-Reading
Tape Leveling Rod

Gurley Rod Levels

We make four patterns of Rod Levels for the accurate plumbing of leveling and stadia rods.

No. 545 Rod Level—Folded
For Any Rod
$5.00

No. 545 Rod Level
As applied to a Rod
$5.00

No. 545 is adaptable to any rod. It is held in place by the hand or it may be secured by a string or rubber band snapped over hooks attached to each plate of the level.

	Price	Postage
No. 545 Rod Level, for plumbing any rod	**$5.00**	**.15**

No. 546 Rod Level
For One Piece, or Folding, Rods
$6.00

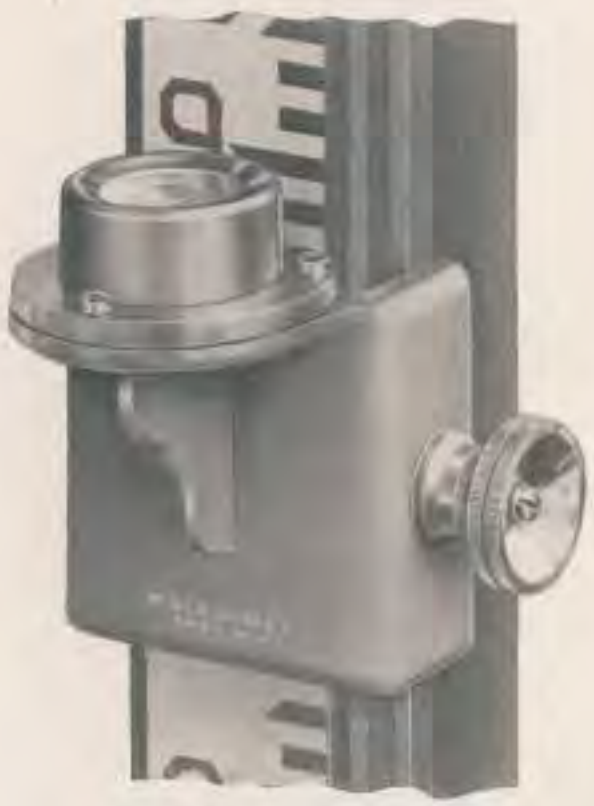
No. 546 has a circular level vial, which folds against the rod when not in use. This level is attached permanently to the rod and cannot be used where there is a target or clamp band to slide past it. It is intended for rods made of one piece, or for those which fold.

	Price	Postage
No. 546 Circular Rod Level, with folding joint.....	**$6.00**	**.15**

Gurley Rod Levels

No. 547 Rod Level
For Precise Rods, $10.00

For use with Precise Rods where greater accuracy and ease of observation are required, we recommend Rod Level No. 547.



No. 548 Rod Level
For Sliding Rods, $13.00

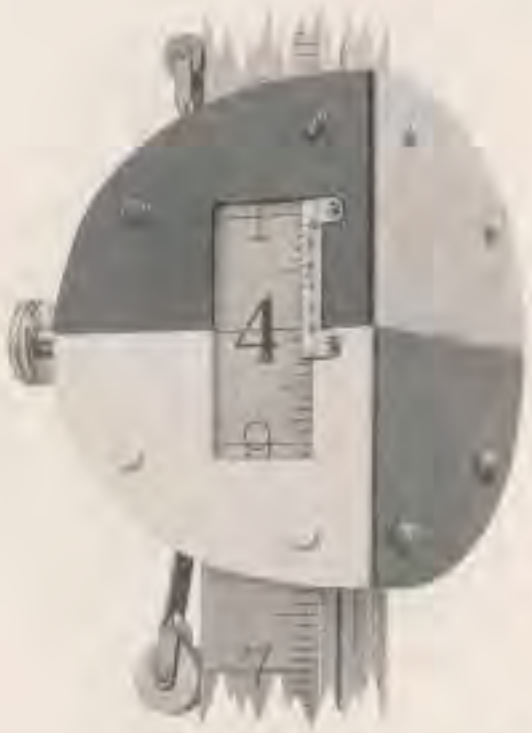
The case, with vial 22 millimeters in diameter, is supported on a bracket which may be securely attached to the rod. Three screws fasten the case to the bracket and provide means of ready adjustment.

		Price	Postage
No. 547	Circular Rod Level for Precise Rods, complete with bracket	$10.00	.25
No. 548	Circular Rod Level, aluminum frame, with clamp, for Rods Nos. 500 to 505	$13.00	.15

No. 548 has an aluminum frame and is made for use on sliding rods such as the Philadelphia, Troy and New York patterns, Nos. 500 to 505.

Note: Rod Levels Nos. 546, 547 and 548 have one-piece hermetically sealed vials which, unless broken, will not leak. This feature overcomes a serious defect in circular levels made of two pieces of glass and which cannot be guaranteed against leakage or evaporation.

Special Targets for Leveling Rods



Angle Target

Angle Micrometer Target

Angle Targets

Angle Targets, as illustrated above, can be supplied with Rods Nos. 500-R, 500-B, 501, 502-A and 505, instead of the regular target, at an extra cost of $1.00.

Micrometer Targets

Micrometer Targets, similar to the target shown with Philadelphia Rod No. 500 on page 115, can be supplied with Rods Nos. 500-R, 500-B, 501, 502-A and 505, instead of the regular target, at an extra cost of $2.00.

Angle Micrometer Targets

Angle Micrometer Targets, as illustrated above, can be supplied with Rods Nos. 500-R, 500-B, 501, 502-A and 505, instead of the regular target, at an extra cost of $3.00.

Leather-trimmed Canvas Cases for Leveling Rods

Canvas Case for Rods Nos. 500, 500-A, 500-R, 500-B, 501, 502-A, 504, or 505 ..... $4.00
Canvas Case for Rod No. 524-A 3.00

Prices will be quoted upon request for Cases for other Rods.

Repairing and Regraduating Rods

Old and worn rods need not be discarded, as they can be repaired and regraduated. We have unequaled facilities and our method is such that when the work is done, the rods are as good for service as they were when new.

The average cost of repainting and regraduating two-ply rods, such as No. 500 and No. 505, varies from $4.50 to $7.00. These figures include new parts such as clamp screws, etc., which are frequently required.

Estimates for repairing other patterns will be submitted upon request.

Rods of special design made to order. Prices will be quoted on receipt of full specifications

Gurley Tripods

Nos. 415 and 416
Solid Round Leg Tripods
For Compasses

Nos. 400 and 430
Solid Round Leg Tripods
For Transits and Levels

Nos. 405 and 435
Split Leg Tripods
For Transits and Levels

Nos. 410 and 440
Extension Leg Tripod
For Transits and Levels

The legs of all Gurley Tripods are made of straight grained hardwood, and are about 4 feet 8 inches long from head to point. The upper part of the leg is flattened and slotted to fit closely on each side of a tenon projecting from the under side of the tripod head, to which it is firmly held by a brass bolt, with large head and thumb nut on opposite sides of the leg. The tripod head is of the best bell metal, the tenons and upper part being cast in one piece and firmly braced together. The legs are round, and taper in each direction toward the head and point. The point or shoe is a tapering brass ferrule, having an iron end. It is cemented and firmly riveted to the wood.

Solid Round Leg Tripods

These are made in three sizes, as follows:

Tripod No. 400, the heavy size, has a metal head 4¼ inches in diameter, with legs 1⅜ inches in diameter at the top, 1¾ inches at the swell and 1⅛ inches near the point. This pattern is suitable for use with the Precise, the Engineers and the Surveyors Transits, and with the Engineers Wye Levels.

Tripod No. 415, the medium size, has a head about 3 inches in diameter, and legs which are about 1 inch in diameter at the top, 1⅜ inches at the swell and ⅞ inch near the point. This tripod is designed for use with Vernier Compass No. 226.

Tripod No. 416, the small size, is for use with Pocket Compasses. It is of the same pattern as No. 415, but has a smaller head and legs. The legs are nearly ¾ inch in diameter at the top and bottom, and 1⅛ inches at the swell.

Split Leg Tripods

The form of the improved Split Leg Tripods, Nos. 405 and 435, is shown in section at A-B in the illustration.

The legs are of straight grained hardwood, combining stiffness and strength with reduced weight, and allowing greater ease in carrying. Several sizes of this tripod are made for use with transits, levels and compasses.

Extension Leg Tripods

Extension Leg Tripods, Nos. 410 and 440, shown in section at A-B, are very popular, as they combine strength and rigidity with light weight and are especially easy and convenient to carry. The shape of the side pieces allows the middle piece to be clamped firmly with the bands and screws, while slight changes in length can be made by twisting the middle piece up or down. In carrying, the points are usually reversed in position, and the total length is reduced to 38 ins.

These tripods are made in several sizes. The large size is used with the large transits and levels, and the medium size with the Light Mountain Transits. A smaller size is used with the smaller transits, Architects Level and large compasses. The smallest size is used with the Pocket Compasses.

For use in mines, which have shallow veins or seams, we are prepared to furnish special extension tripods which have a minimum height of about 22 inches and a maximum height of about 36 inches. The price is the same as for tripods of full size.

Jointed Extension Leg Tripods

Nos. 412 and 443 Jointed Extension Leg Tripods
For Explorers Transits and Levels

For use with Explorers Precise Transits Nos. 20-A to 24-A and Explorers Level No. 384 we furnish a special light weight tripod, each leg of which has a protected metal screw joint. The minimum length when assembled for carrying is only 24 inches, so that it can be packed in an ordinary size suitcase. A leather trimmed canvas carrying case, with handle, is furnished.

Instructions for Ordering Tripods

The majority of the Nos. 400 to 443 include more than one size tripod. For instance, No. 400 covers two sizes; one size for Transits Nos. 6-A to 18-A, and another size for Transits Nos. 25-A to 32-A and Nos. 25 to 30. The price, $12.00, is correct for any size when equipped with solid round legs.

Therefore, when ordering a separate tripod, the customer should always specify the catalogue number of the instrument for which it is intended; also give the inside diameter of the bottom plate of the leveling head. If the instrument is very old, it will be necessary to send us the bottom plate of the leveling head.

If specified in the order, metal spurs will be attached to the legs of any Gurley Tripod, without additional charge.

Transit Tripods

No. 400	Solid Round Leg Tripod, for Transits Nos. 6-A to 32-A (except Nos. 20-A to 24-A)	$12.00
No. 401	Solid Round Leg Tripod, for Transits Nos. 20-A to 24-A and Nos. 102 and 103	8.50
No. 405	Split Leg Tripod, for Transits Nos. 6-A to 32-A (except Nos. 20-A to 24-A)	15.00
No. 406	Split Leg Tripod, for Transits Nos. 20-A to 24-A and Nos. 102 and 103	12.00
No. 410	Extension Leg Tripod, for Transits Nos. 6-A to 32-A (except Nos. 20-A to 24-A)	18.00
No. 411	Extension Leg Tripod, for Transits Nos. 20-A to 24-A and Nos. 102 and 103	15.00
No. 412	Jointed Extension Leg Tripod, with canvas case, for Transits Nos. 20-A to 24-A	21.00

Compass Tripods

No. 415	Solid Round Leg Tripod, for Compass No. 226	8.00
No. 416	Solid Round Leg Tripod, for Compasses Nos. 285, 294, 300, 305, 335 and 350	7.00
No. 420	Split Leg Tripod, for Compass No. 226	12.00
No. 421	Split Leg Tripod, for Compasses Nos. 285, 294, 300, 305, 335 and 350	9.75
No. 425	Extension Leg Tripod, for Compass No. 226	15.00
No. 426	Extension Leg Tripod, for Compasses Nos. 285, 294, 300, 305, 335 and 350	12.00

Level Tripods

No. 430	Solid Round Leg Tripod, for Levels Nos. 375 to 378	12.00
No. 431	Solid Round Leg Tripod, for Level No. 381	8.50
No. 435	Split Leg Tripod, for Levels Nos. 375 to 378	15.00
No. 436	Split Leg Tripod, for Level No. 381	12.00
No. 440	Extension Leg Tripod, for Levels Nos. 375 to 378	18.00
No. 441	Extension Leg Tripod, for Level No. 381	15.00
No. 443	Jointed Extension Leg Tripod, with canvas case, for Level No. 384	21.00

Carrying Cases for Tripods

To protect the tripod in transportation, a carrying case can be furnished. One style of case is substantially made of heavy canvas, with leather trimmings. Another form is made of sole leather, with cap and carrying handle.

No. 494	Leather Case, with cap and carrying handle, for extension tripod	$18.50
No. 496	Canvas Case, with leather trimmings, for solid round leg, or split leg tripod	9.75
No. 497	Canvas Case, with leather trimmings, for extension tripod	8.00

Gurley Current Meters

(Price Patents)

U. S. Geological Survey Standard

For determining the Velocity of the Flow of Water in Harbors, Rivers, Streams, Sewers and Irrigation Ditches

For more than thirty years W. & L. E. Gurley have made Current Meters under the patents of W. G. Price, the Assistant Engineer of the Corps of Engineers, United States Army, who in 1885 devised the initial pattern. The general features are retained in the latest models, although somewhat modified as the result of suggestions from many hydraulic engineers who have had large experience in current meter observation under all conditions of service.

The many hundreds of Gurley Current Meters in use in all parts of the world, their constantly increasing sale and their accuracy and reliability under all conditions, show that they are the standard instruments for the accurate measurement of the velocity of water in streams and open conduits.

A current meter for measuring the velocity of flowing water comprises two essential parts: (a) a wheel arranged so that when suspended in flowing water the pressure of the water against it causes it to revolve; (b) a device for recording or indicating the number of revolutions of this wheel. The relation between the velocity of the moving water and the revolutions of the wheel is determined by rating each meter.

The distinguishing characteristics of a good current meter are (a) simplicity in construction, with no delicate parts which easily get out of order; (b) a small area of resistance to the velocity of the water; (c) a simple and effective device for indicating the number of revolutions of the wheel; and (d) easy adaptability to use under all conditions.

A Current Meter Gaging Station

Advantages of Gurley Current Meters

Reliability in service. Gurley meters have been developed to meet the exacting requirements of field service. The details of construction have been improved from time to time to insure continuous reliability under actual working conditions. They may be depended upon to give accurate results under trying conditions.

Simplicity of design. The details of design are extremely simple. The instrument is self-contained. There are no delicate adjustments required, nor are there any exposed parts to give trouble.

Rigidity of construction. Gurley meters are strongly constructed. They will resist successfully all of the stresses and shocks incident to travel and field service.

Adaptability. Gurley meters are equally well adapted to the measurement of small streams and large rivers. A single meter may be used on both classes of work by simply altering the method of suspension.

Size. The compactness of the Gurley meter is a material advantage. It can be packed when traveling in a box small enough to be carried in a hand bag. Its size is also an advantage in handling when in actual use.

Selecting the Proper Type of Current Meter

The experience of many years has shown that but two patterns of the Gurley meter are needed to adequately meet the requirements of practically all engineers engaged in measuring the flow of water. Accordingly, we have discontinued making the large pattern formerly listed as Meter No. 600, and also two of the smaller patterns, previously listed in different combinations as Meters No. 617, 618, 621 and 624.

We will continue to manufacture only the two standard patterns, namely, Acoustic Meter No. 616, and Electric Meter No. 623. In order, however, to take care of the needs of those engineers accustomed to using the discontinued patterns, we are listing in this edition, under the Catalogue Numbers previously used, Outfits which will serve equally as well, but in which the meter is the No. 623 universal pattern, equipped with the Covert Yoke. By standardizing this meter, the purchaser has the opportunity at any time, by obtaining the necessary accessories, to use either the commutator box indicating single revolutions, or the commutator box indicating penta revolutions; also, to suspend the meter either by cable, or by jointed wading rods. The advantages of this arrangement will be appreciated by all current meter users.

The selection of a meter should be made after consideration has been given to the following factors:

(1) The purpose for which the instrument is to be used.
(2) The manner in which it is supported.
(3) The amount of weight to be used.
(4) The frequency of the revolutions to be indicated.

Gurley Current Meters (Continued)

When it is possible for the observer to approach the stream closely, and to hold the meter in position by means of its suspension rod, especially in channels of small depth, the Acoustic Current Meter, No. 616, is very useful. This meter indicates every tenth revolution.

No. 616
Acoustic Current Meter Outfit, with sleeve-jointed wading rods, rubber tube, ear piece and connection, $60.00
Indicating each tenth revolution

No. 616, the Acoustic Current Meter, is so called because the revolutions of the bucket wheel are indicated by the sound of a hammer striking against a diaphragm, one blow for every 10 revolutions. The indicating mechanism is completely enclosed and thoroughly protected from injury. When in use the meter is held by a sleeve-jointed wading rod, which screws into the frame and in connection with a rubber tube and ear piece attached to it, forms a passage through which the sound of the hammer stroke is transmitted to the ear of the observer. This enables him to count the number of revolutions of the wheel in any given space of time, and they by means of the rating table to ascertain the velocity of flow.

No. 616 Acoustic Current Meter Outfit. Meter indicates *each tenth revolution.* Equipped with rubber tube, ear piece and connection; also two lengths of sleeve-jointed wading rod, graduated to measure 4 ft. from plane of bucket wheel. Wooden box with lock and strap, and including accessories of oil can, wrench, screw driver and extra pivot bearing... **$60.00**

For Accessories and Parts, see pages 149 and 151.

Gurley Current Meters (Continued)

Many observers prefer an electric type of revolution indicator. In some cases it is desirable to have more than one person hear and bear witness to the number of revolutions. For this purpose an electric indicator is preferable. To meet these demands, Electric Meters Nos. 617, 621 and 623 are offered. In all of these patterns, the indicating device is protected from injury by enclosure in the contact chambers, or commutator boxes, and the revolutions of the bucket wheel are indicated by a telephone ear piece, which is generally fastened in a convenient position on the observer's coat.

For work that requires the meter to be suspended by means of a meter cord or cable, Meters Nos. 617 or 621 are available. The contact chamber of Meter No. 617 is arranged to indicate each single revolution of the bucket wheel, while the contact chamber of Meter No. 621, indicates each fifth revolution of the bucket wheel.

These meters are suspended in use by a wire or cable attached to the steel weight hanger which, after passing through the frame, suspends the torpedo-shaped weight necessary to hold the meter in the vertical plane against the current. The vanes on the weight assist in keeping the meter parallel with the direction of the current. The number and position of the weights on the stem or hanger depend upon the conditions under which the measurement is to be made.

A tail, consisting of a stem to which are fastened two vanes (separable in packing), is attached to the frame opposite the bucket wheel and serves the double purpose of balancing the bucket wheel and keeping the meter parallel to the direction of the current.

No. 617 Electric Current Meter Outfit. Meter furnished with one commutator box indicating *each revolution* of the bucket wheel. Covert Yoke, telephone sounder, dry battery, 20 ft. of cable, 6½ pound lead weight and weight hanger. All packed in wooden box with lock, hooks and strap, and including accessories of oil can, wrench, screw driver, extra pivot bearing, binding screws and nipple..... **$80.00**

For Accessories and Parts, see pages 149, 152 and 153.

No. 621 Electric Current Meter Outfit. Meter furnished with one commutator box indicating *each fifth revolution* of the bucket wheel. Covert Yoke, telephone sounder, dry battery, 20 ft. of cable, 6½ pound lead weight and weight hanger. All packed in wooden box with lock, hooks and strap, and including accessories of oil can, wrench, screw driver, extra pivot bearing, binding screws and nipple..... **80.00**

For Accessories and Parts, see pages 149, 152 and 153.

Gurley Current Meters (Continued)

All of the advantages of the preceding types are combined in Meter No. 623, which can be suspended by cable or by jointed wading rod, and which is equipped with two interchangeable commutator boxes for indicating each revolution, or each fifth revolution, of the bucket wheel.

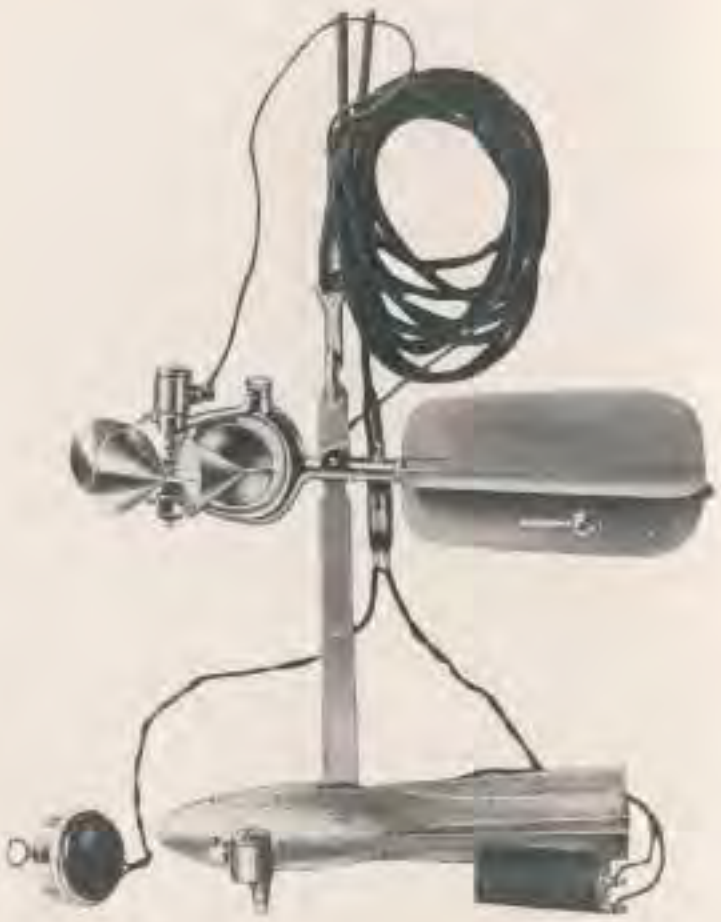
The combination of these features provides an outfit which has been adopted as standard by the most efficient hydraulic engineers. This meter is used extensively by the Water Resources Branch of the United States Geological Survey, the leading organization devoted to the precise measurement of water.

Two contact chambers, one to indicate each revolution, the other each fifth revolution of the bucket wheel, are provided. These contact chambers may be readily interchanged, the only change being in the shaft and consisting of the insertion of a cam on the end of the bucket shaft when a single revolution is to be indicated, or the insertion of a worm when it is desired to indicate every fifth revolution.

No. 623

Electric Current Meter Outfit, *with meter suspended by jointed wading rods*, and with telephone sounder, cable, dry cell battery, and extra commutator box.

Indicating each, or each fifth, revolution



No. 623

Electric Current Meter Outfit, *with meter suspended by cable*, and with telephone sounder, cable, dry cell battery, and extra commutator box, $100.00.

Indicating each, or each fifth, revolution

Gurley Current Meters (Continued)

A screw socket is provided on the frame of Meters Nos. 617, 621 and 623, to receive a series of graduated rods by which any of these meters may be suspended, if desired, instead of by a cable, no change being made in the meter except the removal of the weight and the weight hanger. This device is known as the Covert Yoke, after its designer, Mr. C. C. Covert, of the United States Geological Survey.

By means of a double end hanger, Meters Nos. 617, 621 or 623 can be used with a series of flush jointed wading rods. The hanger holds the frame and bucket wheel on one side, and the vane of the meter on the other side of the rod, as illustrated. The flush joints permit the hanger supporting the meter to be clamped at any required height on the rod.

No. 623 Electric Current Meter Outfit. Meter furnished with two interchangeable commutator boxes, one indicating *each revolution* and the other indicating *each fifth revolution* of the bucket wheel. Covert Yoke, telephone sounder, dry battery, 20 ft. of cable, 6½ pound lead weight, and weight hanger. All packed in wooden box with lock, hooks and strap and including accessories of oil can, wrench, screw driver, extra pivot bearing, binding screws and nipple. **$100.00**

For Accessories and Parts, see pages 149, 152 and 153.

Meters Nos. 617, 621 or 623, attached by a double-end hanger to a flush-jointed wading rod, having a removable base.

Electric Register

No. 609
Electric Register, $25.00

Whenever it is desirable to record the revolutions of the bucket wheel of Meters Nos. 617, 621 and 623, an Electric Register may be substituted for the telephone ear piece ordinarily used.

Electric Register No. 609 has been developed recently by us and is a great improvement over the former pattern. It is suitable for use with current meters or any other intermittent contact device of which a record is desired.

This device consists of a three figure "Veeder" counter operated by an electro-magnet and springs, and is so arranged that the same force acts on the counter regardless of how much current is used. This results in a uniform action and guarantees against any skipping or missing, under widely varying conditions.

This instrument will operate under favorable conditions with one good dry cell, but should have two, as a protection against deterioration of the battery. It requires but 0.31 ampere with two cells, which is a much smaller current than was necessary with the old style register, and which will not burn the current meter contacts.

There are no dials to read, the total result being shown directly by the figures, so that there is small chance of an error in reading.

No. 609 Electric Register **$25.00**

Accessories for Current Meters

For Meter No. 616

Wading Rod, sleeve-jointed and graduated, per 2 ft. length	$3.25
Canvas Case for two, three or four lengths of Rod	4.00
Time Recorder, or Stop Watch, No. 619, open face, nickel case, stem winder, with fly-back attachment for starting and stopping.. Registering minutes, seconds and fifths of seconds	10.00

For Meters Nos. 617, 621 and 623

Extra Cable, per foot	.15
Extra Dry Cell Battery	.35
Extra Lead Weight, 6½ lbs.	4.00
Extra Lead Weight, 10 lbs.	4.60
Extra Lead Weight, 15 lbs.	5.75
Time Recorder, or Stop Watch, No. 619, as described above under Meter No. 616	10.00
Wading Rods, sleeve-jointed and graduated, per 2 ft. length	3.25
Wading Rods, flush-jointed and graduated, for use with double-end Hanger, per 2 ft. length	3.25
Wading Rods, flush-jointed, 4 sections, graduated to measure 8 feet from plane of bucket wheel, @ $3.25 per section	13.00
Double-end Hanger, for use with flush-jointed Rods	3.45
Base, for use with Rod	2.50
Leather Case for rods, base and hanger	12.00
Canvas Case for rods, base and hanger	4.00
Electric Register, No. 609, as described on page 148	25.00

Special Carrying Case of fibre, for Current Meters Nos. 617, 621 or 623, having two compartments, one for meter and the other for lead weight, cable, sounder, etc., as shown	19.25
If the above Special Fibre Case is furnished, instead of the regular wooden box, the extra cost is only	13.50

The removable base for the flush-jointed wading rods used in connection with a double-end hanger, serves to prevent the meter from sinking into the bed of the stream.

The flush-jointed rods will also fit the Covert Yoke of Meters Nos. 617, 621 and 623, and can thus be used for suspending the meter in the manner illustrated on page 146.

The present type of dry battery is suitable for carrying conveniently in the coat or shirt pocket and can be replaced at most electrical supply stores. When this size is not obtainable, the use of any standard six inch dry cell is recommended.

The improved form of connecting block between the cable and telephone receiver has a locking device which prevents the two sections from becoming disconnected accidentally.

A time recorder or stop watch of fine quality will be found desirable in observing the revolutions of the bucket wheel for any given time. No. 619 is recommended.

Manual of Gurley Hydraulic Engineering Instruments

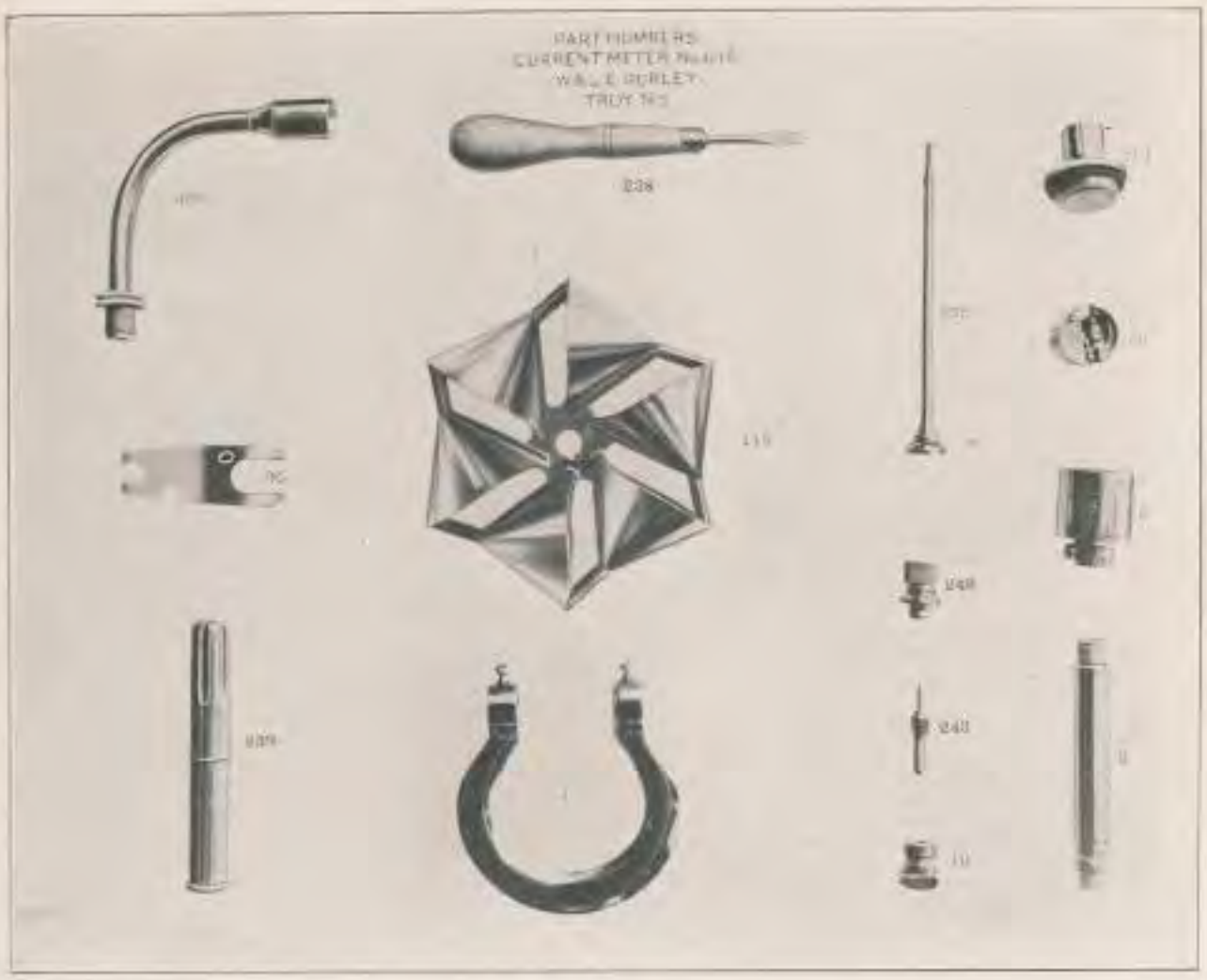
This beautifully illustrated book of 140 pages describes in detail the construction of our Current Meters, Hook Gage and Water Stage Registers.

In addition it contains a great amount of useful information relating to the use and care of the Current Meter and the Hook Gage, and also concerning the installation and operation of Water Stage Registers.

The illustrations have been selected to show the various kinds of current meter rating and gaging stations and the different methods of making current meter measurements under various conditions. Also, to indicate the different types of installations and shelters for Water Stage Registers and the many applications to which Gurley Meters and Registers are adapted in connection with sewers and sewage disposal plants, irrigation, drainage, water supply and hydro-electric developments, stream gaging, harbor investigation and similar projects.

A copy of this Manual is furnished free to purchasers of our Current Meters and Water Stage Registers. To others it will be supplied for the nominal price of fifty cents per copy.

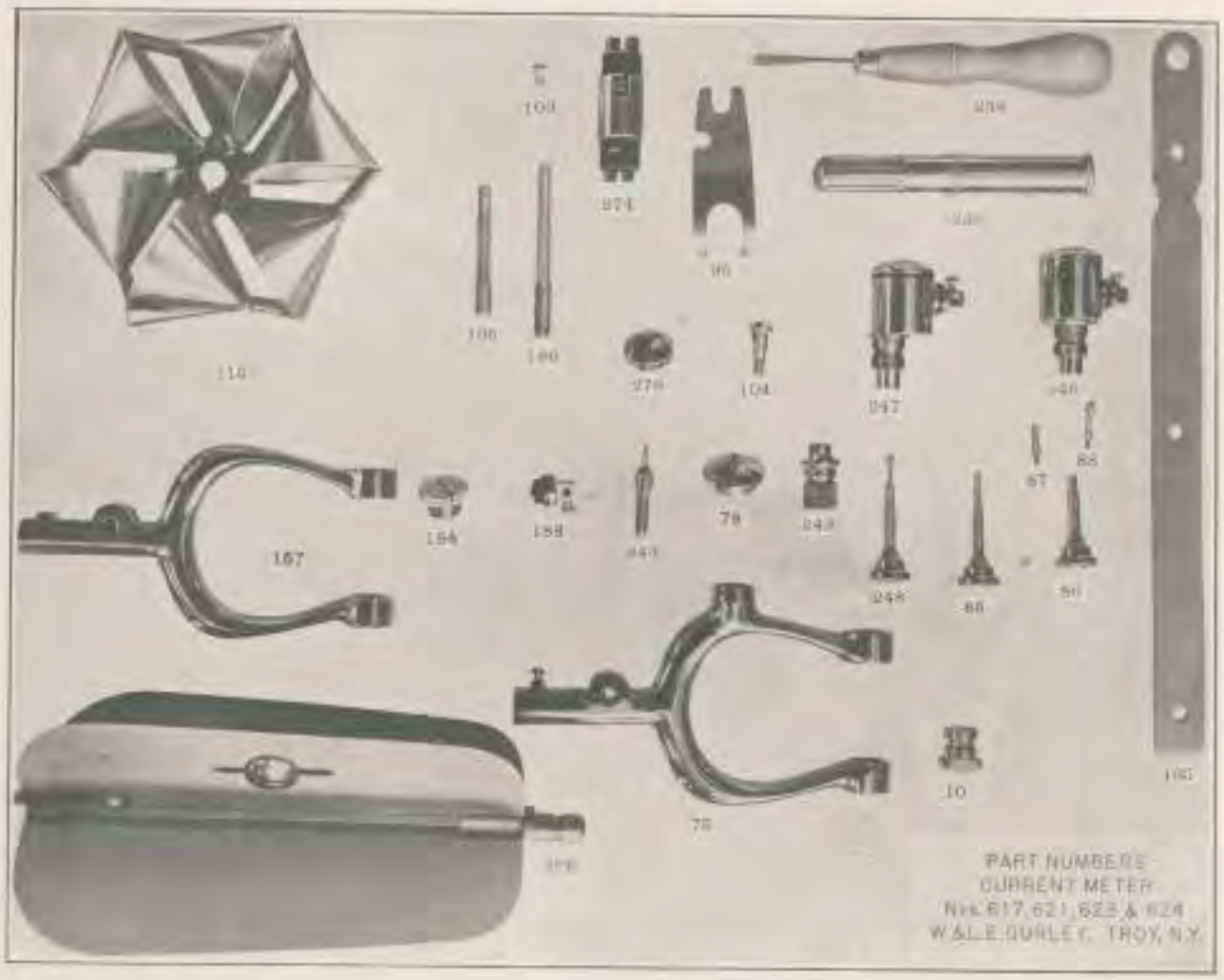
Parts for Current Meter No. 616



When ordering parts, always specify shop numbers

Shop No.	Name of Part	Price
1	Yoke	$12.00
2	Connecting Tube	3.50
3	Commutator Box	5.50
10	Frame Nut	1.25
95	Wrench	1.25
115	Bucket Wheel	12.00
238	Screw Driver	.50
239	Oil Can	.50
243	Pivot with Lock Nut	1.25
249	Bucket Nut and Raising Nut	1.50
252	Goose Neck	6.00
253	Gear, Gear Holder, Grasshopper, etc.	6.00
254	Commutator Box Cap and Diaphragm combined	2.50
255	Shaft	2.50

Parts for Current Meters Nos. 617, 621 and 623



When ordering parts, always specify shop numbers

Shop No.	Name of Part	Price
10	Frame Nut	$1.25
75	Yoke for No. 623	17.00
85	Worm and Shaft	2.50
86	Plain Shaft	1.25
87	Worm	1.25
88	Eccentric	.75
95	Wrench	1.25
103	Weight Hanger	2.50
104	Weight Hanger Screw	.75
105	Weight Pin for 6½ lb. Weight	.50
115	Bucket Wheel	12.00
157	Yoke for No. 617 or 621	14.00
166	Weight Pin for 10 lb. and 15 lb. Weights	.50
184	Frame Cap for No. 623	.75
188	Binding Post complete	1.25
195	Vane or Tail Piece complete	9.00
238	Small Screw Driver	.50
239	Oil Can	.50

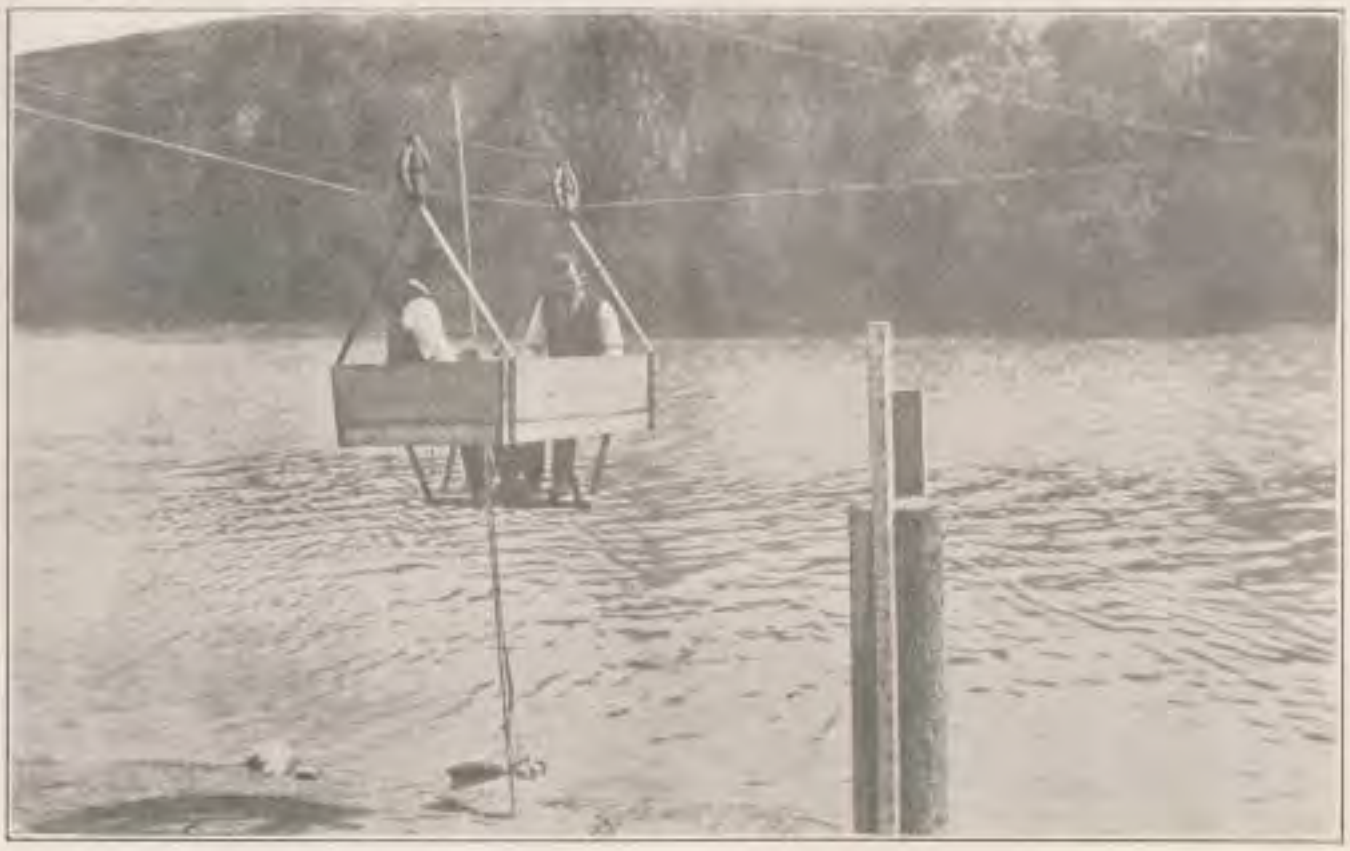
Parts for Current Meters Nos. 617, 621 and 623

(Continued)

Shop No.	Name of Part	Price
243	Pivot with Lock Nut	$1.25
246	Single Revolution Commutator Box complete, for Nos. 617 or 623	15.00
247	Penta or Five Revolution Commutator Box complete, for Nos. 621 or 623	15.00
248	Shaft and Eccentric complete	2.00
249	Bucket Nut and Raising Nut	1.50
274	Connector	.75
278	Balance Weight	1.00
78	Cap for Commutator Box	.75
109	Set Screw, 6 x 32	.05

Rain Gage

See page 202 for illustration, description and price of the U. S. Weather Bureau Standard Rain and Snow Gage, No. 3981.



Canadian Government Engineers using a Gurley Current Meter suspended by jointed wading rod from a Cable Car

Rating Tables for Current Meters

With each meter we furnish a Rating Table which is the mean of the ratings of many different meters, and which will probably give correct values within 1 per cent for any meter of its pattern when in good order.

Occasional ratings vary more than 1 per cent, and in such cases an individual rating table may be prepared.

Individual Rating Table for Current Meters

When litigation is involved, an individual Rating Table may be required and, if requested, we can have any of our meters rated by the United States Bureau of Standards, Washington, D. C., or at the Hydraulic Laboratory of the Rensselaer Polytechnic Institute, Troy, N. Y.

The extra cost is $10.00 for Meters Nos. 616, 617 or 621; and $20.00 for Meter No. 623.

From ten days to two weeks time is required to rate a meter and compute an individual Rating Table.

Record Sheets for Current Meter Notes

Form No. H-325 Discharge Measurement General Data, per 100 sheets..	$1.00
Form No. H-326 Current Meter Notes for Open Streams, per 100 sheets..	1.00
Form No. H-327 Current Meter Notes for Ice-covered Streams, per 100 sheets	1.00
Suitable Canvas-covered Loose-leaf Binder	.75

In practice, about one sheet of Form No. H-325 is used to every three sheets of Forms Nos. H-326 and H-327. Any quantity will be supplied and sample sheets will be submitted upon request. When ordering specify by form numbers.

"River Discharge"

A complete and detailed description of both the use of the Current Meter, Hook Gage and Water Stage Register, and the collection and use of data in regard to the flow of streams.

By J. C. Hoyt and N. C. Grover, Hydraulic Engineers, United States Geological Survey. Cloth, 210 pages, 6 x 9, 39 figures, 11 plates. Fourth Edition. Price, postpaid, $2.50.

No. 628
Hook Gage, $22.00

Gurley Hook Gage

A New and Improved Type — Made Entirely of Metal

This new type of Hook Gage was designed in accordance with suggestions made by Messrs. Metcalf and Eddy, Consulting Hydraulic Engineers, of Boston, Mass., and is a great improvement over other patterns. Its entire arrangement is such that the readings can be taken by the observer with the greatest possible convenience and at some distance from the surface of the stream or ditch being measured. This is often a decided advantage, especially so in the East, where many of the streams are contaminated by dye stuffs and other undesirable material, rendering it unpleasant for the observer to get too close to the water.

The Hook Gage is made entirely of metal and is nickel-plated throughout. The tube is regularly made to read to 2.2 feet but may be made longer if desired. It is graduated to feet, tenths and hundredths, and is read to thousandths by a vernier which is capable of fine adjustment by means of a slow motion screw. Elongated holes in the base furnish means for bolting the gage to the side of the flume. The hook is adjustable within the tube and allows for a movement of 12 inches independent of the gage, thus permitting it to be set accurately to the exact surface of the water.

To Use the Gurley Hook Gage

The hook gage is used in a box attached to a flume at any convenient point near the weir, the water from the flume being conveyed to the box by rubber or lead pipes, thus indicating the precise level of the water in the flume, the surface of the water in the box being at rest.

When the depth of the water passing over a weir is required, the exact level of the crest of the weir should be taken by a leveling instrument and rod, and marked by a line drawn in the still water box at the surface of the water. The scale of the gage being previously set at zero with the vernier, the base is fastened to the box above the water in a vertical position and at such a height that the point of the hook is at the same level as the crest of the weir, the precise point being secured by moving the hook in the tube. The point of the hook will of course be under water and level with the crest of the weir.

The depth of water flowing over the weir is the distance between the point of the hook in the position named and the exact surface of the water. To ascertain this, the hook is raised by turning the milled head nut until the point of the hook, appearing a little above the surface, causes a distortion in the reflection of the light from the surface of the water. A slight movement of the hook in the opposite direction will cause the distortion to disappear, and will indicate the surface with precision. The reading of the scale will then give the depth of water passing over the weir, in thousandths of a foot.

It will be understood from the illustration that the longer movements of the scale are made by loosening the large clamp screw and sliding the graduated tube through the frame, the finer adjustments being made by the milled nut.

No. 628 Hook Gage **$22.00**

The Use of Water Stage Registers

The growing importance of water power development, the great possibilities for its use in irrigation and the many other ways in which this great gift of nature may be employed in the service of man, have made more essential, as in recent years its value has been better appreciated, the accurate determination of the volume of water in streams available for such use.

The energy of some of the foremost engineers in the world has been enlisted in the work, and both methods and appliances have been perfected as the result of experience.

For many years Gurley Current Meters have been in use in all parts of the world and are considered standard in determining the velocity of the flow of water in streams.

The discharge of a stream is usually ascertained by a comparison of gage heights with a rating table of the discharge of the stream at varying heights, compiled from a series of current meter observations.

The greatest error in these estimates is due to inaccurate determination of the gage heights, ordinarily secured from a few observations taken during the day, or even more infrequently.

It has been found that on many streams there is a considerable daily fluctuation due to natural or artificial control, making it impossible to obtain accurate gage heights without the use of an automatic register which will record the height of water at regular intervals during the entire twenty-four hours, or over a longer period of time.

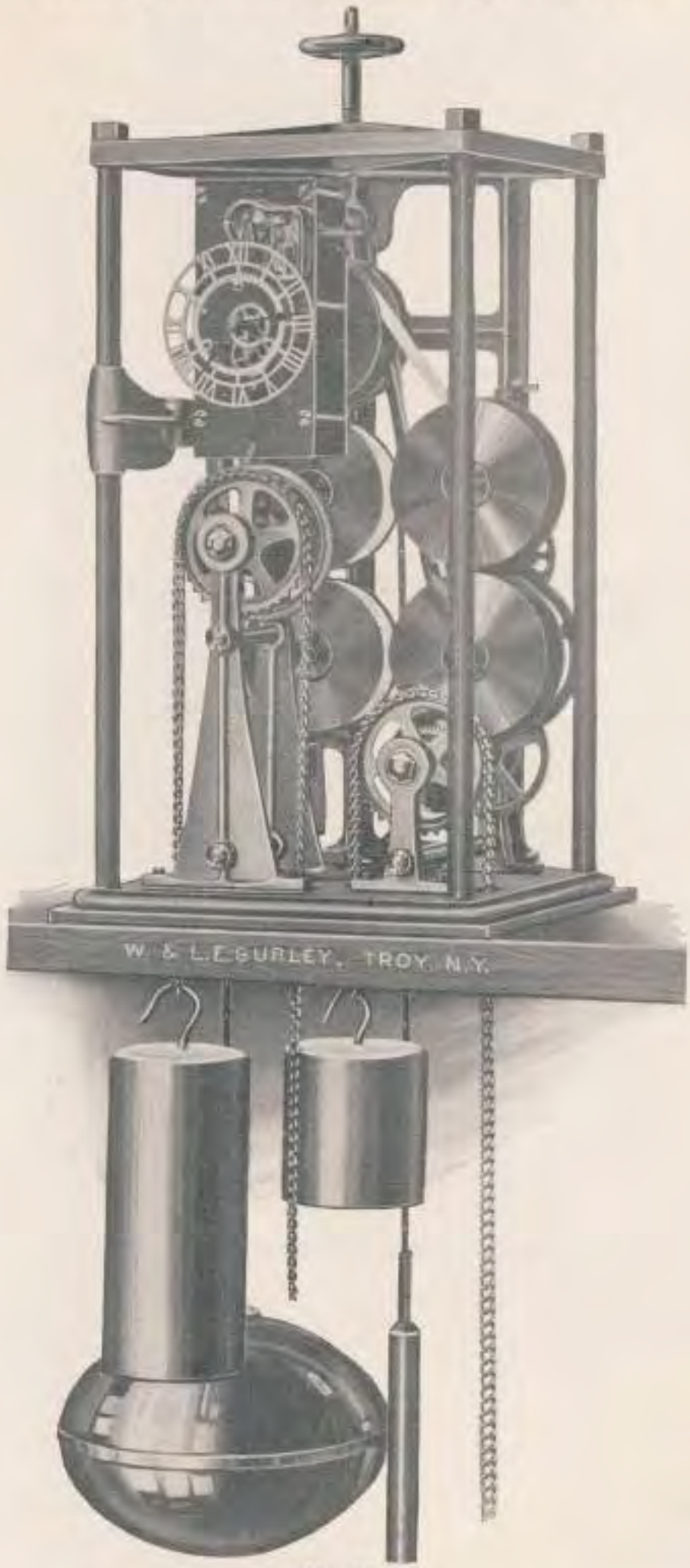
In the endeavor to produce instruments satisfactory for such purposes, we have for several years been engaged in designing Water Stage Registers by which the varying height of water in streams may be gaged and a dependable continuous record be obtained.

As a result of our efforts, coupled with the suggestions made by eminent engineers, familiar with the problems involved, we have produced several patterns of Water Stage Registers which are satisfactorily meeting the demands of the service for reliable instruments giving accurate and uniform records.

Automatic Water Stage Registers are divided into two classes — those making a printed record, and those making a graphic record. In the first type a printed record of the height and time is made, while in the second type the record is traced by a pen or pencil on the surface of a paper sheet, moving in harmony with the time and height.

The first type of register is designed to give printed records of the rise and fall of water continuously for a long period of time, and is especially adapted for stations where it is impractical or impossible, by reason of inaccessibility, for the observer to visit the station for long intervals of time and where the record to be of service should be continuous.

Gurley Printing Water Stage Register



No. 630
Printing Water Stage Register, $350.00
Front view, showing clock, float and weights

Gurley Printing Water Stage Register

Range, 0 to 36.99 feet without repeating.

Prints at 15, 30, or 60 minute intervals.

The time that the clock will run depends upon the depth of the well.

The fall of the clock weight is 1½ inches per day.

Patented January 10, 1911

The difficulty of scaling with precision the records made by a graphic register, the tendency of the paper to be affected by moisture or other causes, and the limited time for which the record can be taken, have led to our introducing a register which prints on a continuous paper strip, at intervals of 15, 30 or 60 minutes, the height of the water in feet and hundredths of a foot for a period of time dependent on the range of fall allowed the driving weights, which move at the rate of 1½ inches for a period of 24 hours.

Section of Paper Tape, showing Printed Record made on a No. 630 Printing Register

This register is the result of years of study and experiment, and is made in the best manner and of the best material, has had the original inspection and approval of some of the most eminent hydraulic engineers, and has been tested under severe conditions of actual service with most satisfactory results. We, therefore, have no hesitation in recommending its use to all who require accuracy and efficiency in water measurements.

Construction

By reference to the illustrations, a clear idea can be gained of the mechanical construction of the register.

An iron base about 14 inches square, at either corner of which is an iron rod approximately 21 inches long supporting an iron top, forms a frame for the register. On the base are also erected the standards which support the recording mechanism, the spools for holding the paper and carbon ribbon and the driving mechanism.

The recording mechanism consists of three parallel type wheels, on the faces of which are raised figures and divisions indicating respectively the period of time from one to twelve hours at intervals of 15, 30 or 60 minutes, as desired, the number of feet from 0 to 36, and the hundredths of a foot.

Gurley Printing Water Stage Register

The type wheel indicating time is controlled by a weight driven clock of finest construction, with full jeweled escapement and compensated to endure variations of climate without variation in its regular operation.

The two type wheels indicating heights of water are moved by a sprocket wheel connected to the float and counterweight by a perforated metal band, so that any change in the height of water is immediately indicated by a corresponding movement of the type wheels.

Four reels mounted on the main standard of the instrument carry and receive the paper strip with its carbon backing on which the record is made, and which passes over the type wheels, and is held taut by the tension of a weight on the receiving reel.

Three weighted hammers, pivoted on a shaft and with cushioned faces opposite the center of the type wheels, are controlled in their action by a saw-toothed cam, moved by the clock in such a manner that at intervals of 15, 30 or 60 minutes the hammers are released and strike a blow on the type wheels, thus making on the tape covering them an imprint of the indicated time, and height of water.

The large diameter of the copper float, 10 inches, enables it to respond immediately to any variations in the height of the water, the slightest change being recorded. Its size and shape render it extremely sensitive, and the top is rounded so that foreign matter cannot lodge on it and change the degree of immersion.

The frame and mechanism as above described are in use covered by a metal hood, fitting tightly at the bottom in a rubber gasket and having at the top a clamp nut which may be secured by a lock, preventing removal of case by unauthorized persons. A glass-covered opening allows an easy reading of the clock, which may be wound from the outside at such intervals as required without the removal of the case or disturbance of the instrument.

Gurley Printing Water Stage Register

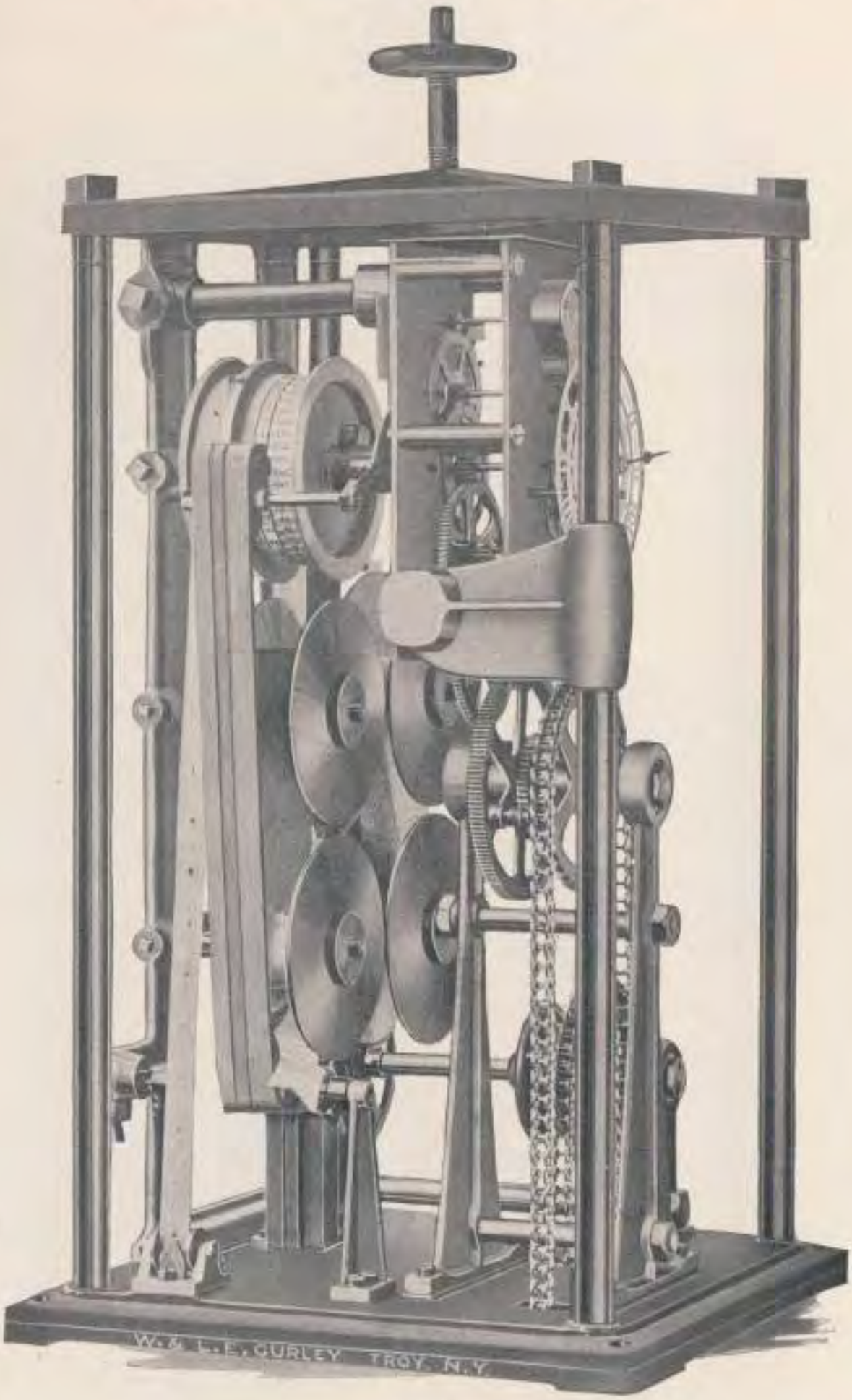
No. 632
Tape Reel, for use with No. 630 Printing Register, $25.00

For convenience in handling and examining records on the printed tape, a Tape Reel is provided, as shown above. The tape is wound upon a storage spool, or may be passed from one spool to another over a table, under a thin plate through an opening in which the figures on the tape may be observed, and such notations as are desired made upon it while it is wound from one spool to the other.

Price List

No. 630	Printing Water Stage Register, range 36.99 ft. without repeating; prints at 15-minute intervals; complete with paper ribbon and carbon paper for one year's record; metal protecting cover with lock, 1 float and 1 counterweight, 2 weights, 40 ft. phosphor bronze tape, 1 wrench, 2 screwdrivers, bottle of watch oil and oil pump. Shipping weight 2 boxes, about 275 lbs.	**$350.00**
	Register No. 630 can be modified to print at 30 minute, or 60 minute intervals, if specified, without extra charge.	
	Paper Ribbon for No. 630 Register, per roll	**2.00**
	Carbon Ribbon for No. 630 Register, per roll	**3.25**
	Watch Oil, small bottle	**.75**
No. 632	Tape Reel, for use with No. 630 Register	**25.00**

Gurley Printing Water Stage Register



No. 630
Printing Water Stage Register
Side view, showing paper reels, type wheels and cushioned hammers

Gurley Graphic Water Stage Registers

Normal Vertical Range, 0 to 10 feet

Time Scale, 7 days, 4 days, or 1 day

Patented August 4, 1914

The illustration on page 163 shows an improved Graphic Register having several unique and valuable features. It is of simple construction, with few parts; is designed for easy operation, and adapted for a wide range of conditions. Its construction is such that no lost motion will develop from continuous service and it can be operated with minimum care and expense.

The following vertical scales can be furnished:

0 to 1 foot	0 to 5 feet	0 to 15 feet
0 to 1½ feet	0 to 6 feet	0 to 20 feet
0 to 2 feet	0 to 8 feet	0 to 1½ meters
0 to 3 feet	0 to 10 feet	0 to 3 meters
0 to 4 feet	0 to 12 feet	

A time scale of 1 day, 4 days, or 7 days can be furnished. As the record of stage is made around the cylinder, there is no limit to the number of revolutions possible, and hence to the range of stage. Therefore, it is advisable to use as low a range as possible and obtain a more accurate reading of the water stage. If occasionally the water stage is above the range of the register, no trouble will be experienced in reading the water level.

Advantages of Gurley Graphic Registers

Constancy of performance: These registers have been brought to their present high state of excellence through years of experiment. They have been developed to meet actual field conditions and are performing with satisfaction under a great variety of physical conditions in all parts of the world. Once properly installed they require a minimum of attention.

Low Cost. From the standpoint of maintenance and operation Gurley Water Stage Registers represent the smallest possible permanent investment. First cost is also reduced to a minimum in these gages.

Mechanical excellence. Every part is made of properly selected material finely finished to insure accuracy of operation. The superior mechanical execution is accomplished by expert workmen in a factory that has been producing precision instruments for the past seventy-five years.

Reliability of the time parts. Only properly adapted clocks are used in Gurley Registers. They have properly proportioned springs and the escapement has jeweled bearings to insure uniformity of rate. The time screws that drive the pencil carriage are machined with great accuracy and have no lost motion, thus insuring a uniform movement of the pencil over the record sheet.

Gurley Graphic Water Stage Registers

Normal Range, 0 to 10 feet
Time Scale, 7 days

No. 633
Graphic Water Stage Register—*Spring-driven Clock*, $130.00

Advantages of Gurley Graphic Registers—(Continued)

Unlimited range of stage. The record of stage is made around the cylinder, the time record along its axis, and the cylinder revolves as the stage changes. There is no limit to the number of revolutions possible and hence to the range of stage, while at the same time the movement of the pencil is always in one direction, which assists materially in interpreting the record.

Portability. The light weight of these registers renders them easily portable and hence adapts them to those special hydraulic investigations during which it is necessary to make frequent changes in the position of the register.

Type of record. The hydrograph or curve recording the stage and time is continuous over seven days and presents graphically all of the fluctuations of stage and their time relations. These are shown at a glance by the curve, which is a picture record of conditions. This type of record has many advantages and is especially useful in many situations.

Simplicity of the record. The graphic record is easily interpreted and where desired may be quickly reduced to statistical form.

Precision and convenience in changing record sheets. The record sheets are cut to fit the cylinder closely and the pencil carriage is adjustable, thus insuring an accurate setting of the gage. The gage cylinder is securely locked in place while setting the gage.

The permanency of the setting of the register to the bench mark. The slot which extends through the entire length of the recording cylinder and the two guards that prevent the perforated phosphor bronze band from accidentally slipping over the spines on the sprocket wheel when the record is being taken off, prevent any change or mistake being made by the observer while handling the register, after it has been properly installed by the engineer in charge.

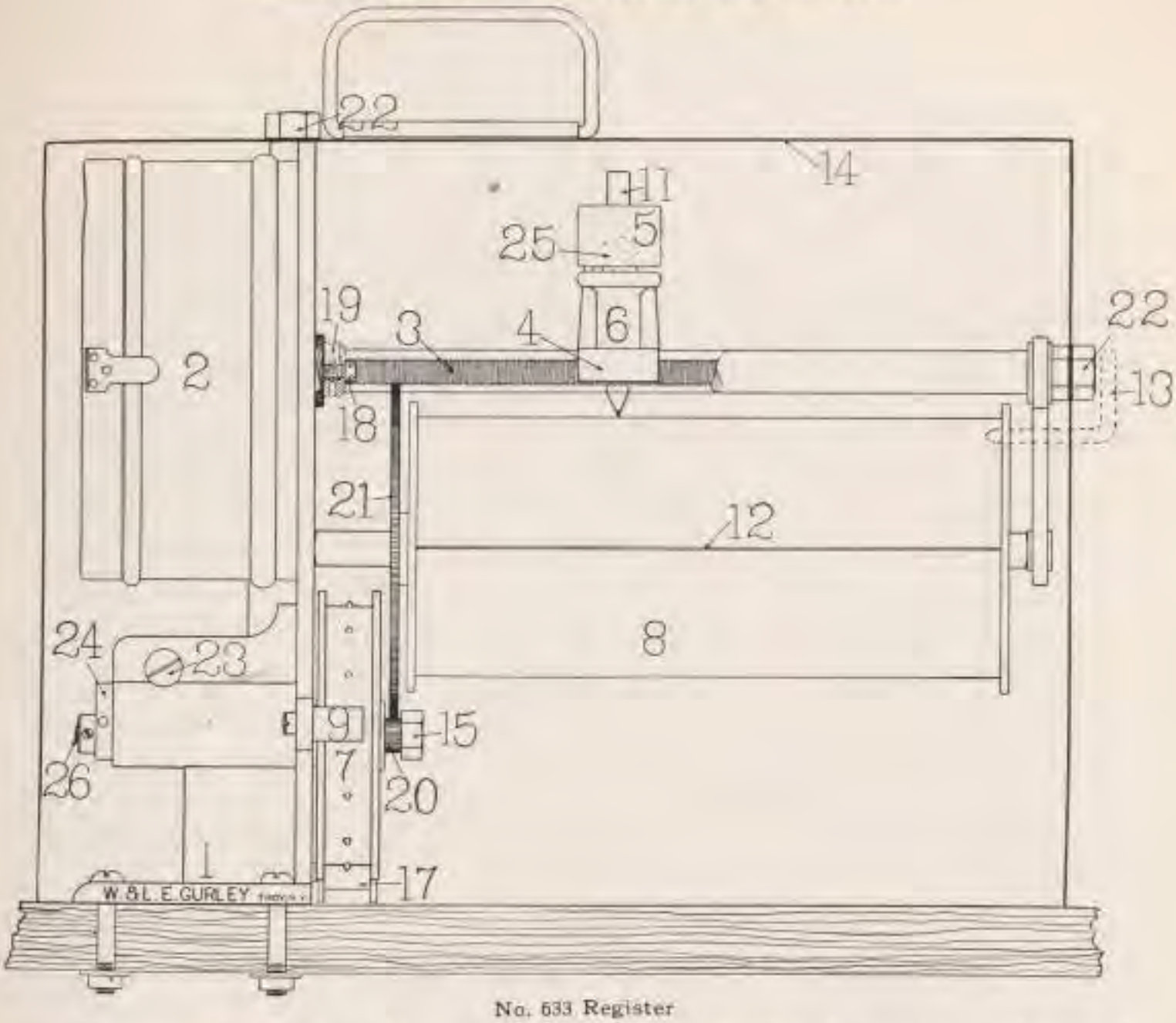
Changing the range of the register. Simplicity in changing two gears to alter the range of the register.

Size of sheets. The record sheets are adapted for convenient filing in standard filing equipment.

Construction of No. 633 Register

The base (1) supports the mechanism of the register. An extra heavy eight-day clock (2) is geared to two time screws (3), which are supported at each end as shown. The clock has two large driving springs and has jeweled bearings on the escapement shaft. Mounted on two screws is the pencil carriage (4) which moves forward without lost motion, in accord with the turning of the clock shaft, and which can be lifted up from one position on the screws and placed in another, if desired. The pencil (11) is held in the pencil holder (5), which is free to move vertically in a cylinder (6) projecting from the upper side of the base of the carriage (4). The pencil holder (5) is set and the pencil clamped with a screw (25), so that the weight of the pencil and holder presses down against the paper.

Gurley Graphic Water Stage Registers



No. 633 Register

The record cylinder (8), on which the paper is placed, is supported at each end as shown. The sprocket wheel (7) is attached to the sprocket wheel shaft (26), and revolves in eccentric bushing (24). The gear (20) is clamped to the sprocket wheel shaft by the nut (15). The gear (21) is clamped to the cylinder (8) by three small screws. Two guards (9 and 10) prevent the band from slipping over the spines on the sprocket wheel. The bolt (13) is used to lock the cylinder, while changing the record sheet. Extending across the face of the record cylinder (8) is a slot (12) which indicates the point of zero gage height on the record cylinder. Idler pulley (17) is used to spread the metal band so that the counterweight will pass the float. There is a gear (19) on the center clock shaft. The capstan head screw (18) is used for clamping the gear (19) to the clock shaft. Three nuts (22) serve to hold the cover on the register. Clamp screw (23) is to clamp the bushing in the base (1).

In the standard register of this type the pencil travels along the cylinder in seven days time (one inch for each day). It is possible, however, to substitute other screws (3) of such a lead that the pencil will move across the cylinder in four days (two inches for each day), or screws that will move the pencil across the cylinder in one day (eight inches per day). Such an arrangement would be very desirable in situations where there are sudden fluctuations in stage.

A float 10 inches in diameter and 3½ inches thick is used. The whole instrument is enclosed in a sheet metal cover (14), 15 inches long, 8¼ inches wide and 11¼ inches high, which makes it waterproof and dustproof.

W. & L. E. GURLEY, TROY, NEW YORK

Price List of Gurley Graphic Registers Nos. 633 and 636

No. 633 Graphic Water Stage Register, spring-driven clock; range, 0 to 10 feet; time scale, 7 days; complete with metal cover, 10 record sheets, 1 float, 1 counterweight, 20 ft. of phosphor bronze tape, and bottle of clock oil. Shipping weight about 75 lbs. **$130.00**

No. 636 Graphic Water Stage Register, weight-driven clock; range, 0 to 10 ft.; time scale, 7 days; complete with metal cover, 10 record sheets, 1 float, 1 counterweight, 20 ft. of phosphor bronze tape, and bottle of clock oil. Shipping weight about 75 lbs. **130.00**

Register No. 633 or Register No. 636 can be modified to give either a 4-day record, or a 1-day record, without extra charge.

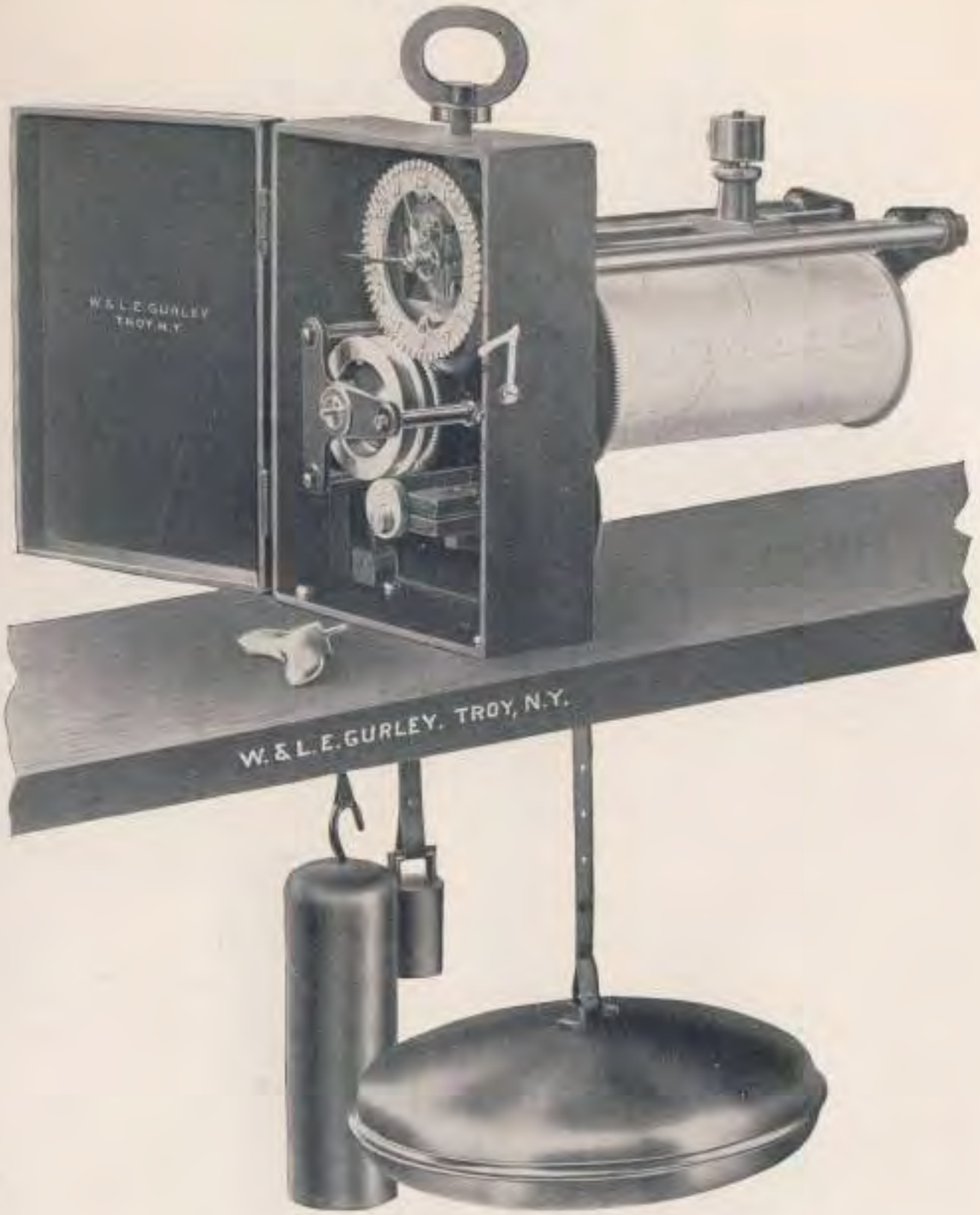
If extra screws, carriages and gears are required, there will be an additional charge, as follows:

2 Screws and Pencil Carriage for the 4-Day Register.....	**12.50**
2 Screws and Pencil Carriage for the 1-Day Register.....	**15.50**
1 Set of Gears, for any range.....	**4.00**
Record Sheets for No. 633 or No. 636 Register, each.....	**.04**
Clock Oil, small bottle.....	**.75**

Gurley Graphic Water Stage Registers

Normal Range, 0 to 10 feet

Time Scale, 7 days



No. 636
Graphic Water Stage Register—*Weight-driven Clock*, $130.00

Register No. 636 is similar to Register No. 633, with the exception of the clock, which is weight-driven, the weights falling at the rate of 10 inches per day.

If this register is set high enough above the water, the pencil can be made to travel across the paper in two weeks, or at the rate of ½ inch per day.

Gurley Graphic Water Stage Registers

Normal Vertical Range, 0 to 1 foot—Natural Scale

Time Scale, 7 Days, 4 Days, or 1 Day

Patented August 4, 1914

This Register may be used as a natural scale graphic register of great accuracy for a normal range of one foot. Multiples thereof are recorded as complete revolutions of the cylinder.

The float furnished with the register is 10 inches in diameter. The power of the weight of a column of water 10 inches in diameter and $\frac{1}{100}$ of a foot high is 5.47 ounces. Thus this float gives great lifting power and corresponding accuracy.

The natural scale register has been designed to meet those requirements which demand a full size record of stage. As usually constructed the time scale is 1 inch per day, but it is possible to arrange special screws to other scales. This register is especially adapted to the measurement of the flow of any liquid over weirs. It will give the height of liquid on the weir with great precision.

For this purpose it is easily applied to

(1) Sewage disposal works,
(2) Sanitary sewers,
(3) Irrigation works,
(4) Venturi flumes.

It is equally well adapted to use

(5) In stream gaging,
(6) On power canals,
(7) On irrigation canals,
(8) On navigation canals,
(9) On drainage canals,
(10) In reservoirs of all kinds,
(11) In measuring flow from pumps, wells, etc.
(12) As a portable gage for use in special studies and investigations.

Its construction is such that no lost motion will develop from continuous service and it can be operated with minimum care and expense. This instrument is a perfect weir gage and has no equal in simplicity of construction, accuracy, ease of operation, and durability.

These Gurley Registers are being used extensively by different departments of the U. S. Government; also by many municipalities in connection with their sewer systems and sewage disposal plants.

Advantages

The advantages of Gurley Graphic Registers, as described on pages 162 and 164, apply also to Registers Nos. 634 and 634-A.

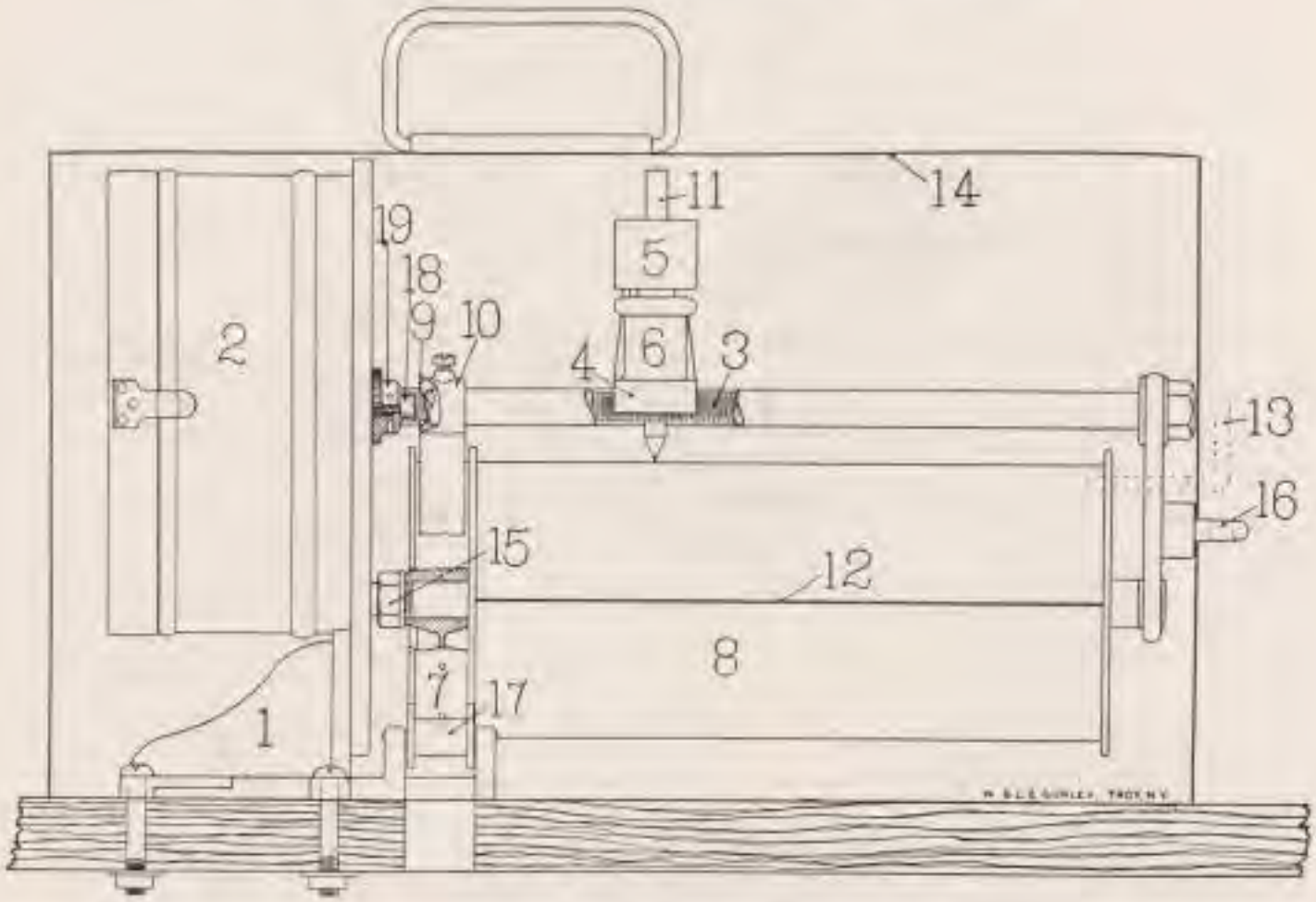
Gurley Graphic Water Stage Registers

Normal Range, 0 to 1 foot—Natural Scale

Time Scale, 7 days

No. 634
Graphic Water Stage Register, $85.00

Gurley Graphic Water Stage Registers



No. 634 Register

Construction

The base (1) supports the mechanism of the register. An extra heavy eight-day clock (2) is geared to two time screws (3) supported at each end, as shown. The clock has two large driving springs and has jeweled bearings on the escapement shaft. Mounted on the two screws is the pencil carriage (6) which moves forward without lost motion, in accord with the turning of the clock shaft, and which can be lifted up from one position on the screws and placed in another, if desired. The pencil (11) is held in a pencil holder (5) which is free to move vertically in a cylinder projecting from the upper side of the base of the carriage (4). The pencil holder (5) is set and clamped with a screw, so that the weight of the pencil and the holder presses down against the paper. The recording cylinder (8), on which the paper is placed, is supported at each end, as shown. The sprocket wheel (7) is movable on the cylinder axis and is clamped to the cylinder (8) by the nut (15). Two guards (9 and 10) prevent the band from slipping over the spines on the sprocket wheel, and bolt (13) is used to lock the cylinder while changing the record sheet. Extending across the face of the recording cylinder (8) is a slot (12), which indicates the point of zero gage height on the record cylinder.

In the standard register of this type the pencil travels along the cylinder in seven days time. It is possible, however, to substitute other screws (3) of such a lead that the pencil would move across the cylinder in either four days or twenty-four hours. Such an arrangement would be very desirable in situations where there are sudden fluctuations in stage.

Gurley Graphic Water Stage Registers

Idler pulleys (17) are to be used when it is necessary to allow the counterweight to pass the float. On the center clock shaft is a gear (19), which is clamped to the shaft by capstan head screw (18).

A float 10 inches in diameter and 3½ inches thick is used. The whole instrument is enclosed in a sheet metal cover (14), 15¾ inches long, 7½ inches wide, and 9 inches high, which makes it waterproof and dustproof. The extension (16) is for locking the cover on the register.

Price List of Gurley Graphic Registers Nos. 634 and 634-A

No. 634 Graphic Water Stage Register, range 0 to 1 foot, natural scale; time scale, 7 days; complete with metal cover, 10 record sheets, 1 float, 1 counterweight, and about 10 ft. of phosphor bronze tape. Shipping weight about 75 lbs. **$85.00**

Register No. 634 can be modified to give either a 4-day record, or a 1-day record, without extra charge. If an extra pencil carriage and set of time screws are required, there will be an additional charge as follows:

For the 4-Day Register..... **12.50**
For the 1-Day Register..... **15.50**

No. 634-A Graphic Water Stage Register; range 0 to 2 feet; time scale, 7 days; complete with metal cover, 10 record sheets, 1 float, 1 counterweight and about 10 ft. of phosphor bronze tape. Shipping weight about 75 lbs..... **100.00**

The sprocket wheel on this register is 2 ft. in circumference, instead of 1 foot, as on No. 634.

Register No. 634-A can be modified to give either a 4-day record, or a 1-day record, without extra charge. If an extra pencil carriage and set of time screws are required, there will be an additional charge as follows:

For the 4-Day Register..... **12.50**
For the 1-Day Register..... **15.50**
Record Sheets for No. 634 Register, each..... **.04**
Record Sheets for No. 634-A Register, each..... **.04**
Clock Oil, in small bottle..... **.75**

Gurley Long Distance Graphic Water Stage Register

In modern hydraulic practice it is often desirable to record or indicate in the office or power house, the water stage at some distant point.

Gurley Long Distance Registers and Indicators are electrically operated and will record or indicate accurately the fluctuations of any liquid level at any distance.

Long Distance Graphic Water Stage Register, showing the Receiver attachment

The Sender, located at the point where the water stage is to be measured, is operated by a float and counterweight similar to those used on our other registers. It is equipped with two electrical contacts, one of which closes for a fraction of a second every time the float rises, the other when the float falls $\frac{1}{20}$ of a foot. These contacts, which were developed in the Gurley factory, have been subjected to tens of thousands of tests with heavy load at 120 volts, without any failure or even a sign of deterioration.

The Receiver consists of one of our No. 633 Graphic Registers, as illustrated on page 163, but modified so that the record cylinder is operated by magnets instead of directly by the float. The drum is turned by means of gears and a ratchet wheel which is operated by two pairs of powerful magnets, one for rising, the other for falling water. The operating arms which are attached to the magnet armatures turn the ratchet wheel one notch each time either magnet is energized. These arms also carry interlocking stops which positively prevent the wheel from turning more than one notch, until the magnet is released and ready for the next step. The rear end of the drum carries a dial and pointer, so that the water stage may be read directly without looking at the chart.

The circuits necessary to connect the Sender and Receiver may consist either of 3 wires or 2 wires and a "ground" return. A satisfactory circuit may be

Gurley Long Distance Graphic Water Stage Register

obtained by leasing a private telephone line of 2 wires. The current required to operate the receiver is 0.1 ampere and this flows through the line for only a fraction of a second when the contact is made. At all other times the circuits are open. The resistance of the coils is 40 ohms. The power may be supplied by dry cells or storage batteries. For long distances it is better to take it from a 110 volt D. C. power or storage battery line, if continuously available throughout the 24 hours of the day. A lamp placed in the circuit will cut down the current to the proper amount, that is, 0.1 ampere. The power may be connected into the circuit at any point in the line.

Float Operated Sender, for Long Distance Graphic Register

Any number of Receivers or Indicators may be used on the circuit for one Sender.

Blue prints showing the necessary wiring connections will be furnished upon request.

Gurley Long Distance Water Stage Indicator

Where a record of the water level is not desired but only an indication of some upstream point, our Long Distance Water Stage Indicator answers the purpose. This operates with the same Sender and circuits described above for the Long Distance Graphic Water Stage Register. Instead of the No. 633 Register, a large dial 12 inches in diameter, with a moving pointer, is operated by electro-magnets and a ratchet wheel, in the same manner as the Long Distance Register. This dial shows the height of the water at the distant gage house, at any instant. A larger dial can be furnished if desired. Prices, which depend upon the size, will be quoted upon application.

Gurley Long Distance Water Stage Indicator

Front and rear views of Receiver with Indicating Dial, of the Long Distance Water Stage Indicator

This Indicator may also be put on the same circuit with a Register. In many cases it will be desirable to have an Indicator in the power plant for the information of the operator, while the Register may be placed in the office of the chief engineer, where the records will be kept and studied.

Detailed information concerning the Long Distance Register and Indicator described above will be furnished upon request.

Gurley Indicating Gage

This simple and accurate Indicating Gage will be found a great help in the checking of gage heights in stilling wells in which automatic recording gages are installed. It can be used also wherever water levels are to be observed.

This instrument is designed to replace the ordinary hook, chain and staff gages where very accurate readings are required. The sprocket wheel is one foot in circumference and is divided into 100 parts, and the feet may be read on the counter up to 100. This gage will be furnished with or without the float.

Price upon application.

Gurley Plummets

Nos. 450 to 458
Plain Plummets

No. 460
Plain Plummet

No. 465 Adjustable Plummet
showing details of
Concealed Reel

Brass Plummets
Plain

		Price	Postage
No. 450	Plummet, screw head, steel point, 6 oz.	$1.50	.15
No. 452	Plummet, screw head, steel point, 10 oz.	2.00	.20
No. 454	Plummet, screw head, steel point, 16 oz.	2.50	.25
No. 456	Plummet, screw head, steel point, 24 oz.	3.50	.35
No. 458	Plummet, screw head, steel point, 32 oz.	4.00	.45
No. 460	Plummet, screw head, steel point, long neck, 12 oz.	2.50	.25

Brass Plummet
Adjustable

This Plummet has a concealed reel, R, around which the string is wound by turning the milled head, K, on top. The friction upon the reel will hold the Plummet at any desired point of the line.

No. 465	Adjustable Plummet, 10 oz.	$3.25	.20

Spads, Stake Tacks, Plummet Cord

No. 471	Iron Spads, for suspending plummets in mines, per 100	2.00	.15
No. 472	Stake Tacks, galvanized, 2 oz. box	.10	.04
No. 473	Stake Tacks, galvanized, 1 lb. box	.55	.20
No. 474	Plummet Cord, braided linen, per 25 yards	.38	.04

Gurley 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 illustration furnishes a very convenient method for carrying small Pocket Compasses without telescopes, as Nos. 300-350.

These pouches are strongly made of the best sole leather, 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, with Shoulder Straps

To fit outside the wooden box

No. 476

Sole Leather Carrying Case, with shoulder straps, enclosing the mahogany transit box

		Price	Postage
No. 475	Case for Engineers or Surveyors Transits.....	**$23.00**	
No. 476	Case for Light Mountain or Reconnoissance Transits..	**20.00**	
No. 478	Case for Compasses Nos. 226 and 227.....	**16.00**	
No. 479	Case for Engineers Wye Levels.....	**$20.00 to 24.00**	
	Price according to size.		
No. 480	Case for Architects Levels.....	**13.00**	
No. 485	Case for Compasses Nos. 335, 341, 341-A and 350...	**5.50**	**.22**
No. 486	Case for Compasses Nos. 300 and 319.....	**6.00**	**.32**
No. 487	Case for Compasses Nos. 285 and 305.....	**7.00**	**.50**

SMALL FIELD INSTRUMENTS & ACCESSORIES

Sole Leather Pouches, with Shoulder Strap

Fitted to receive Pocket Compasses without the wooden box

Nos. 490 to 492

		Price	Postage
No. 490	Pouch for Compasses Nos. 335, 341, 341-A and 350..	**$4.75**	**.18**
No. 491	Pouch for Compasses Nos. 300 and 319.....	**5.25**	**.28**
No. 492	Pouch for Compass No. 305	**6.50**	**.38**

Tripod Cases

No. 494	Leather Case, with cap and carrying handle, for Extension Leg Tripod.....	**16.00**
No. 496	Canvas Case, with leather trimmings, for Solid Round Leg, or Split Leg Tripod.....	**9.00**
No. 497	Canvas Case, with leather trimmings, for Extension Leg Tripod.....	**8.50**

Engineers Leather Field Bag

No. 498

No. 498	Engineers Field Bag, made of heavy sole leather, with two extra pockets and with shoulder strap. Inside measure 9 in. long, 7 in. high, 2½ in. wide.....	**5.50**	**.35**

We make to order Leather Cases and Pouches of any style and size that may be desired, and will quote prices upon receipt of detailed specifications.

Hand Levels

Monocular Hand Level

Made by W. & L. E. Gurley

No. 640
Monocular Hand Level, $20.00

Monocular Hand Level No. 640 consists of a tube to which are fitted lenses, and which also contains a reflecting prism, a cross wire, and a level vial, the latter being seen in the open part of the tube.

The eye lens is composed of two separate pieces, the larger one being the usual concave eye lens and the smaller a segment of a plano convex lens having its focus on a cross wire under the level vial and above the reflecting prism.

The observer holds the tube horizontal with the level opening uppermost, and observes the object to which the instrument is directed, and the position of the level bubble with reference to the cross wire on the under side of the level vial.

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

The hand level is adjusted by sliding the prism tube back and forth until the line given is the same as that given by a Wye Level. The prism in the tube can be reached by removing the cap from the closed end of the tube, and it is clamped by a small screw on the lower side.

		Price	Postage
No. 640	Monocular Hand Level, in morocco case.....	**$20.00**	**.20**

Locke Hand Level

Made by W. & L. E. Gurley

No. 643
Locke Hand Level, $9.25

This especially well made instrument consists of a nickel-plated brass tube about 6 inches long, having a draw to the eyepiece and a level vial on top near the objective end, as shown. There is an opening in the tube beneath, through

which the bubble can be seen, as reflected by a prism immediately under the level vial. Both ends of the tube are closed by discs of plain glass to exclude dust, and there is at the inner end of the sliding or eye tube a semi-circular convex lens, which serves to magnify the level bubble and the cross wire beneath, while it allows the object to be clearly seen through the open half of the tube.

The cross wire is fastened to a frame moving under the level tube, and adjusted to its place by the small screw shown on the end of the level case. The level of any object in line with the eye of the observer is determined by sighting upon it through the tube, and bringing the bubble of the level into a position where it is bisected by the cross wire.

		Price	Postage
No. 643	Locke Hand Level, nickel-plated, with draw to eyepiece, in leather pouch with belt loop.....	**$9.25**	**.20**

Abney Level and Clinometer

No. 646
Abney Level and Clinometer $15.50

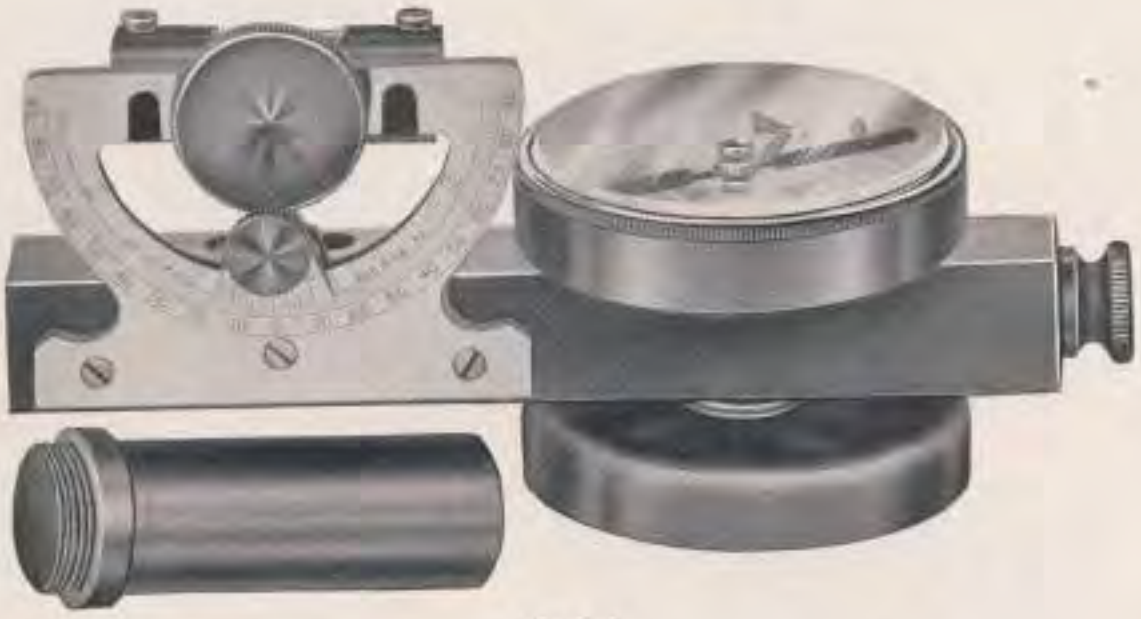
The Abney Level is a modification of the Locke Hand Level, combining with it an excellent clinometer.

The main tube being square, it can be applied to any surface, the inclination of which is ascertained by bringing the level bubble into the middle, and reading off the angle to five minutes by the arc and vernier. When sighted at an object and the bubble brought into the middle, the vertical angle from the height of the eye is indicated. When at zero it indicates a level line.

The inner and shorter arc indicates the lines of different degrees of slope, the left edge of the vernier plate being applied to the lines, and the bubble brought into the middle as usual. When graduated to read percentages of grade, the Abney Level is a serviceable instrument for rapid work in connection with highway construction.

		Price	Postage
No. 646	Abney Level, graduated to degrees to read angles of elevation through 90 deg., vernier reading to 5 min., also to read slopes, as 1 to 1, 2 to 1, etc. In mahogany case.....	**$15.50**	**.25**
No. 646-A	Abney Level, same as No. 646, but with sole-leather pouch having shoulder strap, instead of mahogany case	**17.00**	**.25**
No. 647	Abney Level, graduated to read per cent. of grade. In mahogany case.....	**15.50**	**.25**
No. 647-A	Abney Level, same as No. 647, but with sole leather pouch having shoulder strap, instead of mahogany case	**17.00**	**.25**

Abney Level with Compass



No. 648
Abney Level with Compass, $25.00

		Price	Postage
No. 648	Abney Level with Compass, an improved Locke Hand Level similar to No. 646, and with revolving circular base by means of which horizontal angles can be measured, and plain staff socket, complete in leather pouch with shoulder strap.....	**$25.00**	.30

Stadia Hand Level (Telescopic)

No. 649
Stadia Hand Level, $27.00

		Price	Postage
No. 649	Stadia Hand Level, telescope 10 in., with object glass 1 in., adjustable eyepiece, stadia hairs reading 1 : 100, with ball joint and socket. Useful for preliminary surveys, etc.; weight about 1½ lbs., in leather sling case.....	**$27.00**	.40

Gurley Chains

Iron and Steel Chains

		Price	Postage
No. 650	33 ft., 50 links, oval rings, No. 10 refined iron wire....	$2.50	.65
No. 651	33 ft., 50 links, oval rings, No. 8 refined iron wire....	3.00	.85
No. 652	66 ft., 100 links, oval rings, No. 10 refined iron wire....	4.00	1.15
No. 653	66 ft., 100 links, oval rings, No. 8 refined iron wire....	4.50	1.75
No. 656	33 ft., 50 links, oval rings, No. 10 best steel wire.....	4.50	.65
No. 658	50 ft., 50 links, oval rings, No. 10 best steel wire.....	5.50	.80
No. 662	100 ft., 100 links, oval rings, No. 10 best steel wire.....	9.75	1.50

Brazed Steel Chains

No. 670	33 ft., 50 links, No. 12 tempered steel wire, brazed links and rings	$5.75	.45
No. 671	50 ft., 50 links, No. 12 tempered steel wire, brazed links and rings	7.00	.55
No. 672	66 ft., 100 links, No. 12 tempered steel wire, brazed links and rings	10.50	.70
No. 673	100 ft., 100 links, No. 12 tempered steel wire, brazed links and rings	11.50	1.00

Steel Snaps to make full chains into half chains, without extra charge, if ordered with the chain.

Vara Chains (1 vara=33.333 inches)

No. 690	10 varas, 50 links, oval rings, No. 10 refined iron wire..	$2.50	.55
No. 691	10 varas, 50 links, oval rings, No. 8 refined iron wire..	3.00	.75
No. 694	20 varas, 100 links, oval rings, No. 10 refined iron wire..	4.00	1.00
No. 695	20 varas, 100 links, oval rings, No. 8 refined iron wire..	4.50	1.65
No. 700	10 varas, 50 links, oval rings, No. 10 best steel wire....	4.50	.55
No. 704	20 varas, 100 links, oval rings, No. 10 best steel wire....	8.00	1.00
No. 708	10 varas, 50 links, oval rings, No. 12 tempered steel wire, brazed links and rings.....	5.75	.35
No. 710	20 varas, 100 links, oval rings, No. 12 tempered steel wire, brazed links and rings.....	10.50	.65

Meter Chains (1 meter=39.371 inches)

No. 715	10 meters, 50 links, oval rings, No. 10 refined iron wire.	$2.50	.65
No. 719	20 meters, 100 links, oval rings, No. 10 refined iron wire.	4.00	1.15
No. 723	10 meters, 50 links, oval rings, No. 10 best steel wire...	4.50	.65
No. 730	10 meters, 50 links, oval rings, No. 12 tempered steel wire, brazed links and rings.....	5.75	.45
No. 732	20 meters, 100 links, oval rings, No. 12 tempered steel wire, brazed links and rings.....	10.50	.70

Marking Pins

No. 740	Set of 11 Pins, No. 4 iron wire, nickel-plated, 14 in. long	$1.45	.50
No. 742	Set of 11 Pins, No. 6 steel wire, nickel-plated, 14 in. long	1.75	.40
No. 743	Set of 11 Pins, $\frac{8}{16}$ steel wire, 14 in. long, japanned red and white, alternating each inch. Quickly located in brush or grass.....	2.00	.40
No. 744	Set of 11 Pins, No. 6 steel wire, nickel-plated, weighted, 14 in. long.....	4.00	1.25
No. 748	Set of 11 Pins, No. 4 brass wire, 14 in. long.....	2.90	.50
No. 749	Spring Steel Carrying Ring for marking pins.....	.25	

Timber Scribe

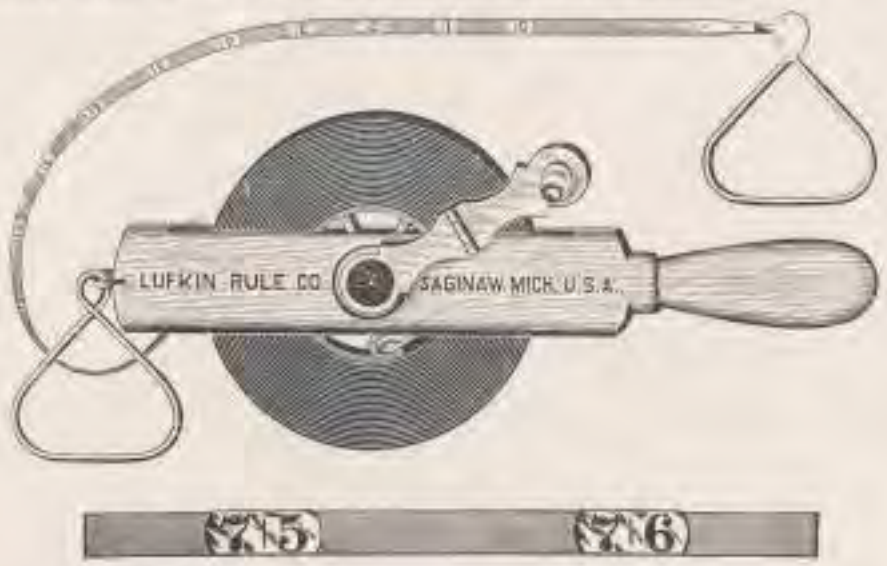
No. 750

		Price	Postage
No. 750	Timber Scribe, for marking trees, posts, or boards....	$1.25	.17

Tapes

Steel Ribbon Chain Tapes

One-quarter inch wide, heavy steel ribbon, deeply etched graduations, large detachable handles and a wooden reel with nickel trimmings.



Nos. 774-779

No. 774	Steel Ribbon, 66 ft., graduated to 100 links.....	$7.00	.40
No. 775	Steel Ribbon, 132 ft., graduated to 200 links.....	10.00	.60
No. 776	Steel Ribbon, 100 ft., graduated each foot	8.50	.50
No. 777	Steel Ribbon, 200 ft., graduated each foot	12.50	
No. 778	Steel Ribbon, 300 ft., graduated each foot	20.50	
No. 779	Steel Ribbon, 500 ft., graduated each foot	31.00	

The 66 and 132 feet tapes have the first and last link in 10ths.
The 100, 200, 300 and 500 feet tapes have the first and last foot in 10ths.

Steel Ribbon Chain Tapes

Metric Measure Only

One-quarter inch wide, heavy steel ribbon, deeply etched graduations, large detachable handles and wooden reel with nickeled trimmings.

M- 20	Steel Ribbon, 20 meters, graduated to decimeters.....	$6.00	.40
M- 25	Steel Ribbon, 25 meters, graduated to decimeters.....	8.00	.45
M- 30	Steel Ribbon, 30 meters, graduated to decimeters.....	9.25	.50
M- 50	Steel Ribbon, 50 meters, graduated to decimeters.....	13.50	.80
M-100	Steel Ribbon, 100 meters, graduated to decimeters.....	24.00	

These tapes have the first meter in centimeters with the first decimeter in millimeters.

Steel Ribbon Chain Tapes

Vara Measure Only

One-quarter inch wide, heavy steel ribbon, deeply etched graduations, large detachable handles and wooden reel with nickeled trimmings.

		Price	Postage
V- 20	Steel Ribbon, 20 varas, graduated to tenths of a vara...	$8.50	.40
V- 30	Steel Ribbon, 30 varas, graduated to tenths of a vara...	10.50	.45
V- 50	Steel Ribbon, 50 varas, graduated to tenths of a vara...	13.50	.60
V-100	Steel Ribbon, 100 varas, graduated to tenths of a vara...	24.00	

Metallic Tapes

Instantaneous Readings

Made of linen thread, interwoven with fine brass wire. They are 5/8 inch wide, and in leather cases. The graduations are in tenths or twelfths of a foot, as desired, on one side, and in links on the reverse side.

Nos. 780-786

		Price	Postage
No. 780	Metallic Tape, 33 ft., in 10ths or 12ths, and links.....	$3.10	.18
No. 782	Metallic Tape, 50 ft., in 10ths or 12ths, and links.....	3.85	.20
No. 783	Metallic Tape, 66 ft., in 10ths or 12ths, and links.....	4.40	.25
No. 786	Metallic Tape, 100 ft., in 10ths or 12ths, and links.....	6.15	.30

Metallic Tapes without Cases

Instantaneous Readings

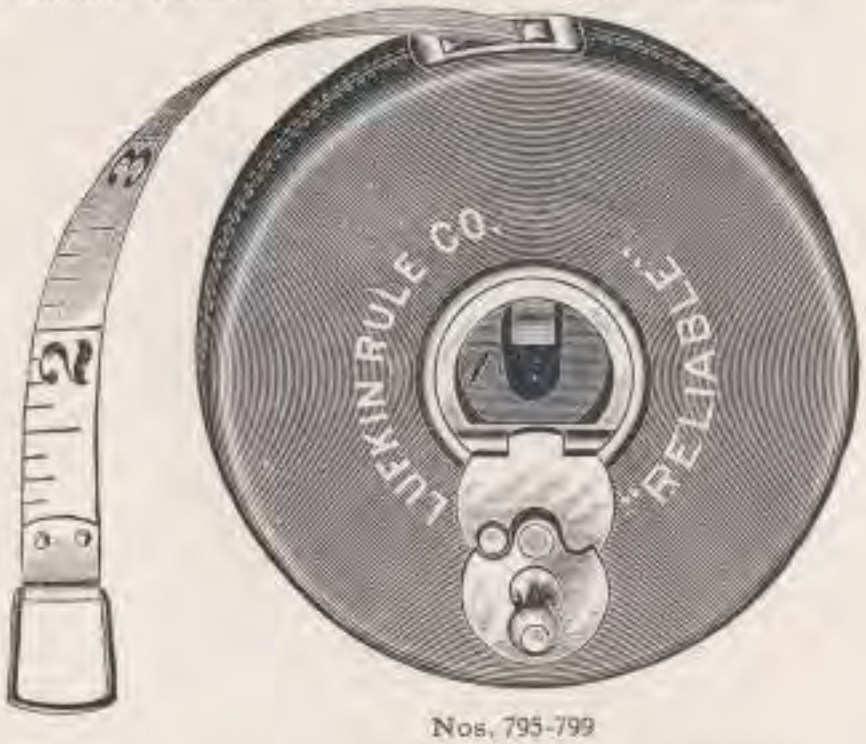
These tapes can be put into the leather cases when the original tape line is worn out.

No. 790	Metallic Tape, 33 ft., in 10ths or 12ths, and links.....	$1.65	.14
No. 791	Metallic Tape, 50 ft., in 10ths or 12ths, and links.....	2.25	.16
No. 792	Metallic Tape, 66 ft., in 10ths or 12ths, and links.....	2.65	.18
No. 794	Metallic Tape, 100 ft., in 10ths or 12ths, and links.....	4.25	.20

We can furnish Metallic Tapes, Nos. 780 to 794, with metric or vara measure on reverse side, instead of links at an extra cost of two cents per foot.

Reliable Steel Tapes (Best Quality) Instantaneous Readings

Three-eights inch wide, in leather case with nickeled trimmings and double folding flush handle opened by pressing on opposite side.



Nos. 795-799

			Price	Postage
No. 795	Steel Tape,	33 ft., in 10ths or 12ths, and links	$6.00	.18
No. 796	Steel Tape,	50 ft., in 10ths or 12ths, and links	8.30	.20
No. 797	Steel Tape,	66 ft., in 10ths or 12ths, and links	10.60	.23
No. 798	Steel Tape,	100 ft., in 10ths or 12ths, and links	14.75	.30
No. 799	Steel Tape,	200 ft., in 10ths or 12ths, and links	27.60	.55

Tapes Nos. 795 to 799 can be furnished with metric or vara measure on reverse side, instead of links, at an extra cost of two cents per foot.

Reliable Junior Steel Tapes, Instantaneous Readings

One-quarter inch wide, in leather case with nickeled trimmings and double folding flush handle opened by pressing on opposite side.

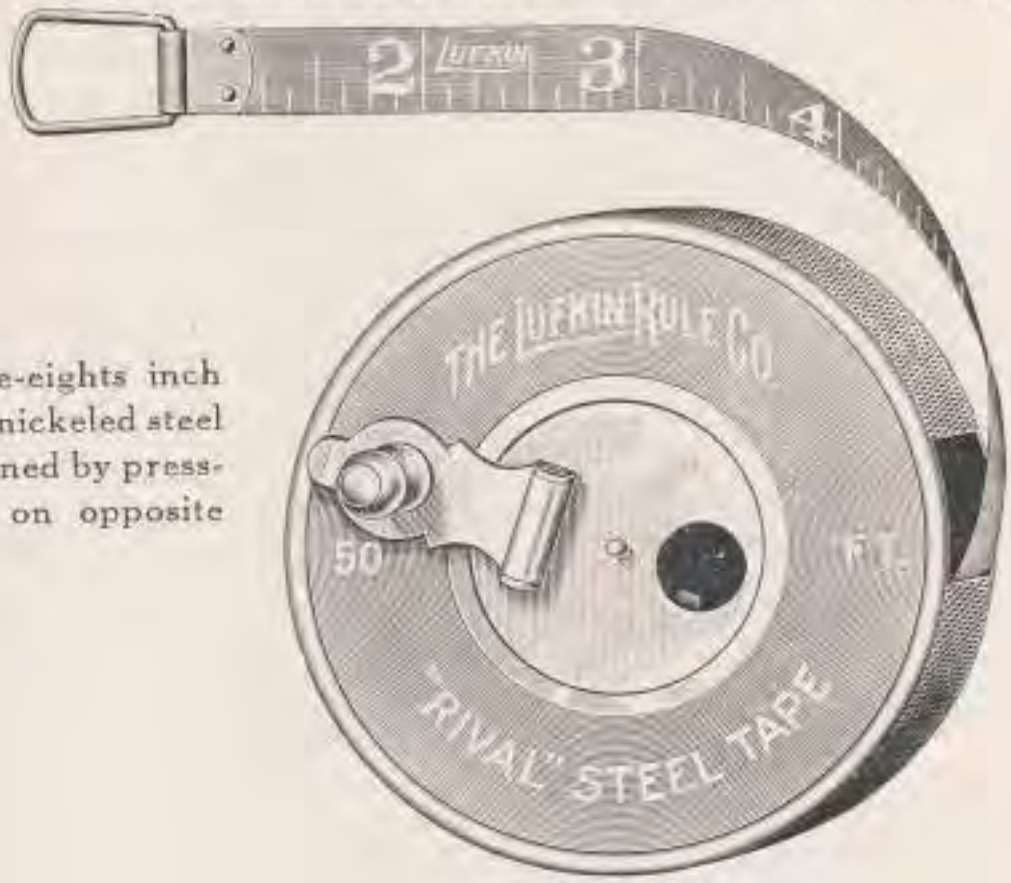
A convenient vest pocket tape, being an exact counterpart of the "Reliable," and not much over one-half its size and weight.

Nos. 800-801

No. 800	Steel Tape,	25 ft., in 10ths or 12ths	$4.75	.15
No. 801	Steel Tape,	50 ft., in 10ths or 12ths	7.25	.20

Tapes Nos. 800 and 801 supplied with vara, metric measure, or links on reverse side, at an extra cost of two cents per foot.

Rival Steel Tapes, Instantaneous Readings



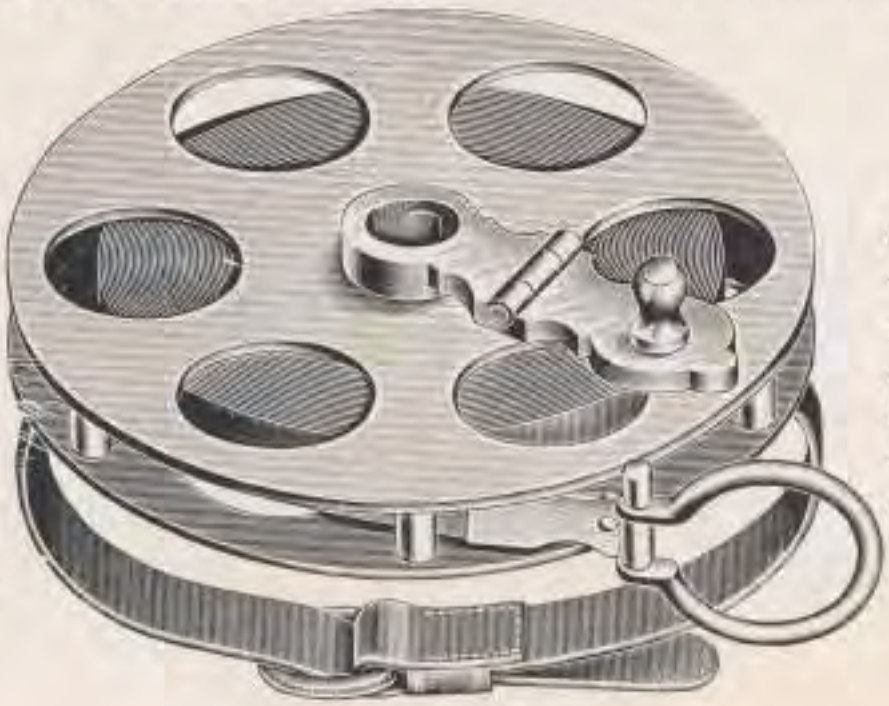
Three-eights inch wide, in nickeled steel case, opened by pressing pin on opposite side.

Nos. 808-813

			Price	Postage
No. 808	Steel Tape,	25 ft., in 10ths or 12ths, and links.....	$4.50	.16
No. 809	Steel Tape,	33 ft., in 10ths or 12ths, and links.....	5.10	.18
No. 810	Steel Tape,	50 ft., in 10ths or 12ths, and links.....	6.15	.20
No. 811	Steel Tape,	66 ft., in 10ths or 12ths, and links.....	7.75	.25
No. 812	Steel Tape,	75 ft., in 10ths or 12ths, and links.....	8.40	.30
No. 813	Steel Tape,	100 ft., in 10ths or 12ths, and links.....	10.85	.35

Wolverine Steel Tapes, Instantaneous Readings

One-quarter inch wide, with open metal reel having folding handle and leather strap on reverse side, by which the tape can be firmly held when winding.



Tapes Nos. 808 to 817 supplied with vara or metric measure on reverse side, instead of links, without extra charge.

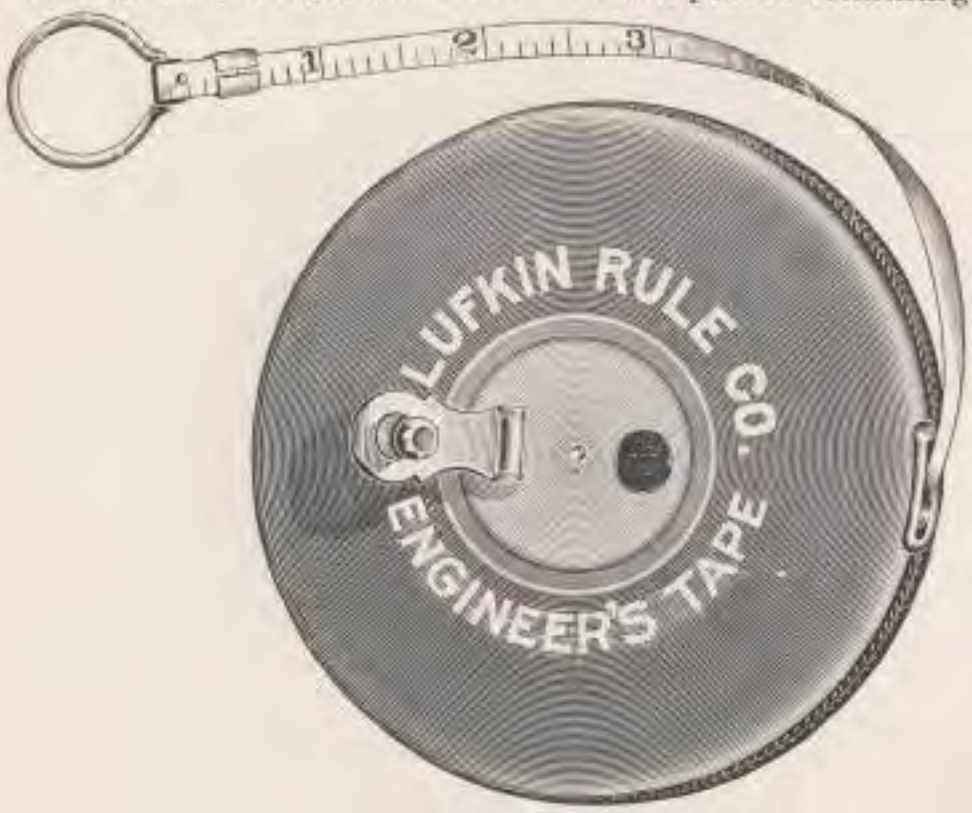
Nos. 814-817

			Price	Postage
No. 814	Steel Tape,	50 ft., in 10ths or 12ths, and links.....	$9.25	.20
No. 815	Steel Tape,	66 ft., in 10ths or 12ths, and links.....	11.40	.25
No. 816	Steel Tape,	75 ft., in 10ths or 12ths, and links.....	12.80	.30
No. 817	Steel Tape,	100 ft., in 10ths or 12ths, and links.....	16.30	.35

Engineers Pattern Steel Tapes (Best Quality)

Instantaneous Readings

One-quarter inch wide, in metal lined hard leather case, folding flush handle, opened by pressing pin on opposite side. Nickel-plated trimmings.



Nos. 820-824

		Price	Postage
No. 820	Steel Tape, 33 ft., in 10ths or 12ths, and links.....	**$6.65**	**.18**
No. 821	Steel Tape, 50 ft., in 10ths or 12ths, and links.....	**7.85**	**.23**
No. 822	Steel Tape, 66 ft., in 10ths or 12ths, and links.....	**10.25**	**.28**
No. 823	Steel Tape, 75 ft., in 10ths or 12ths, and links.....	**11.50**	**.30**
No. 824	Steel Tape, 100 ft., in 10ths or 12ths, and links.....	**14.50**	**.35**

Nos. 830-835

Same Tapes as in Nos. 820-824, but with black enameled steel cases

Engineers Pattern Steel Tapes—(Continued)

		Price	Postage
No. 831	Steel Tape, 33 ft., in 10ths or 12ths, and links.....	$5.35	.18
No. 832	Steel Tape, 50 ft., in 10ths or 12ths, and links.....	6.80	.23
No. 833	Steel Tape, 66 ft., in 10ths or 12ths, and links.....	9.00	.28
No. 834	Steel Tape, 75 ft., in 10ths or 12ths, and links.....	11.25	.30
No. 835	Steel Tape, 100 ft., in 10ths or 12ths, and links.....	13.50	.35

Tapes Nos. 820 to 835 are detachable from their cases and furnished with an extra handle, No. 841, and can be used as a chain tape.

Tapes Nos. 780 to 835 are graduated to feet, tenths and one hundredths of feet, or to feet, inches and eighths of inches, as desired, on one side, and to links and poles, vara or metric, as desired, on reverse side.

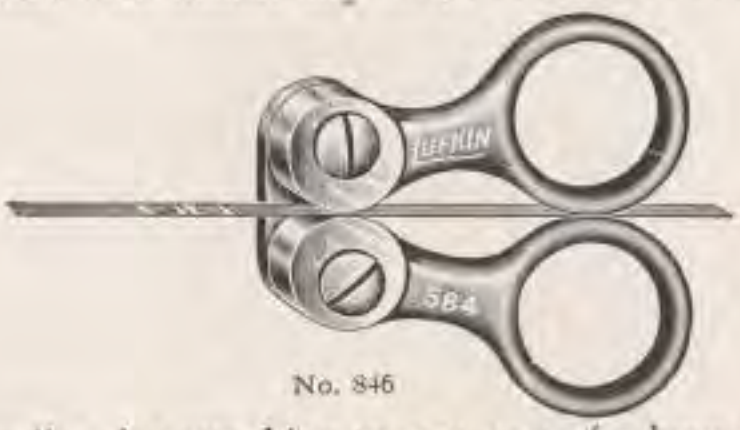
Tapes Nos. 820 to 835, with metric or vara measure on reverse side instead of links, without extra cost.

Extras for Steel Tapes

No. 841	Plain Finger Ring Handles, detachable, 1 in. round, per pair	$0.70	.02
No. 842	Plain Handles, detachable, 3 in. oval, per pair.....	1.40	.05

No. 844

No. 844 Spring Balance, indicating tension up to 20 lbs. by quarter pounds, with handle and snap..... 4.00 .15



No. 846

No. 846 Clamp Handles, for attaching to any part of a long steel tape, thus enabling one to adapt it to any desired length. Brass, nicely nickel-plated. Each..... 2.00 .10

String Level

No. 849

For transferring grades from the Engineers stakes to the construction stakes for the roadway.

No. 849 String Level, 3⅞ inches long, as shown..... 1.25 .10

Extra Wide Steel Tapes

Instantaneous Readings

One-half inch wide, on nickeled brass frame with double folding flush handle opened by pressing on opposite side.

Nos. 850-854-B

		Price	Postage
No. 850	Steel Tape, 33 ft., in 10ths or 12ths, and links	$6.50	.20
No. 851	Steel Tape, 50 ft., in 10ths or 12ths, and links	8.30	.25
No. 852	Steel Tape, 66 ft., in 10ths or 12ths, and links	10.00	.30
No. 853	Steel Tape, 100 ft., in 10ths or 12ths, and links	14.50	.40
No. 854-A	Steel Tape, 150 ft., in 10ths or 12ths, and links	23.25	.60
No. 854-B	Steel Tape, 200 ft., in 10ths or 12ths, and links	29.00	.75

Tapes Nos. 850 to 854-B are graduated to feet, 10ths and 100ths of feet, or to feet, inches and 8ths of inches as desired, on one side and to links and poles, vara or metric, as desired, on reverse side without extra cost.

Pocket Steel Tapes

In German Silver Cases, with spring wind and center stop

Nos. 860-879

No. 860	Pocket Steel Tape, 3 ft., in 10ths or 12ths	$0.80	.13
No. 863	Pocket Steel Tape, 6 ft., in 10ths or 12ths	1.00	.14
No. 866	Pocket Steel Tape, 12 ft., in 10ths or 12ths	3.25	.16
No. 870	Pocket Steel Tape, 6 ft., in 10ths one side and 12ths reverse side	1.25	.14
No. 873	Pocket Steel Tape, 12 ft., in 10ths one side and 12ths reverse side	3.75	.16
No. 875	Pocket Steel Tape, 3 ft., in 10ths or 12ths, and meters	.85	.13
No. 877	Pocket Steel Tape, 6 ft., in 10ths or 12ths, and meters	1.25	.14
No. 879	Pocket Steel Tape, 12 ft., in 10ths or 12ths, and meters	3.75	.16

Punch and Riveter for Repairing Tape Lines

No. 885

This Punch cuts a clean hole in steel tapes of the usual thickness, and the eyelet is then inserted and quickly and neatly riveted. The punch is 7¾ inches long. For the repair of all tapes except heavy ribbon chain tapes.

		Price	Postage
No. 885	Punch and Riveter, with two packages of eyelets.....	**$4.50**	**.30**
No. 886	Extra Eyelets, two lengths, two packages of 500 each length	**1.25**	**.05**

The Eureka Tape Repairer

No. 887

This outfit consists of thin sheet metal sleeves coated with a combination of solder and flux so sensitive that it will make a perfect adhesion with the tape by the heat of a lighted match. The repair can be made in the field in one minute. Complete directions accompany each outfit.

No. 887	Eureka Tape Repair Outfit, complete with		
	One Dozen sleeves.....	**$0.60**	**.05**
	Half-Dozen sleeves.....	**.40**	**.05**

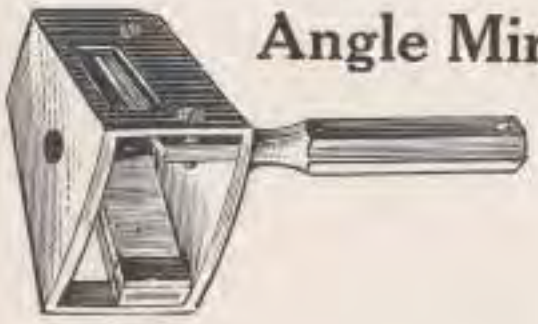
When ordering, be sure to specify width of tape and if heavy or light.

Artificial Horizon

Made by W. & L. E. Gurley

No. 3252 Mercurial Horizon, iron trough, mercury in iron bottle with screw stopper and funnel cap, glazed metal roof. All in mahogany box..... **$35.00**

Angle Mirrors and Prisms



No. 3256

No. 3260

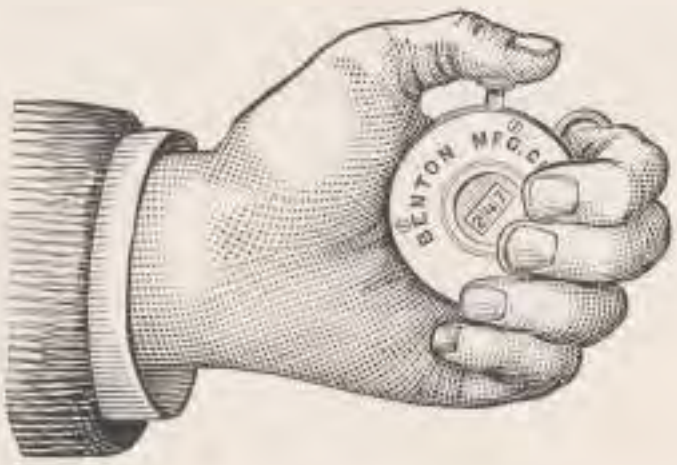
		Price	Postage
No. 3256	Angle Mirror, plain, for angles of 90 deg., in morocco case	**$5.75**	**.15**
No. 3260	Rectangular Prism, for angles of 90 deg., in morocco case	**5.75**	**.12**
No. 3262	Double Prism, to take angles of 90 deg. and 45 deg., in morocco case.....	**11.50**	**.12**

Surveyors Cross Staff Heads

No. 3266	Surveyors Cross Staff Head, for 45 deg. and 90 deg. angles. Octagonal, 3 in. long. With magnetic compass, 1¾ in. needle, and with staff socket.....	**4.75**	**.35**
No. 3267	Surveyors Cross Staff Head, for 45 deg. and 90 deg. angles. Round, 3¾ in. long. With vertical axis graduated to 1 deg. and vernier to 2 min. With magnetic compass, 2⅛ in. needle, and with staff socket	**11.50**	**.40**

No. 3276

Pedometers, Passometers, Tally Registers and Odometers



No. 3280

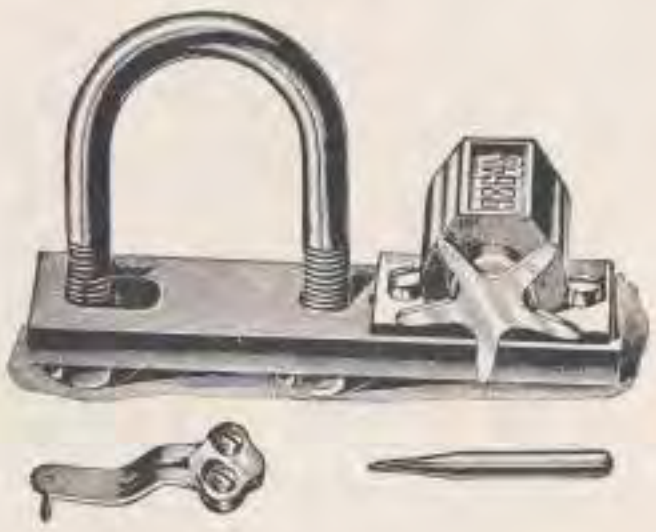
Pedometers, Passometers, Tally Registers and Odometers

		Price	Postage
No. 3270	Pedometer, watch form, with automatic stem attachment to set the pointers to zero. Two dials register distance walked up to 100 miles by each ¼ mile..	$5.25	.14
No. 3276	Passometer, watch form, with automatic stem attachment to set the pointers to zero. Three dials register each step up to 25,000 steps.....	7.00	.14

With the Passometers, the distance walked is computed by multiplyng the number of steps registered by the average length of stride.

No. 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	3.50	.16
No. 3281	Tally Register, same as No. 3280, but registering to 10,000	4.50	.16
No. 3282	Veeder Odometer, or Revolution Counter, with fixtures for attaching	3.50	.18

This Odometer is like the cut of No. 3283 in appearance, but registers on the dial only every fifth revolution of the carriage wheel. To ascertain the distance traveled, multiply the registered number of revolutions by five and that product by the circumference of the wheel. This Odometer can be used with carriage wheels of any diameter.



No. 3283

No. 3283	Veeder Regular Odometer, with fixtures for attaching	$3.50	.18

This Odometer registers the distance traveled in miles and fractions of a mile, and is designed for attaching to left front or left rear axles.

Mention the wheel size of your vehicle when ordering No. 3283.

Aneroid Barometers

No. 3316

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

With the exception of No. 3336 all the Barometers mentioned are furnished with a rating card, showing the result of tests in comparison with our standard mercurial barometer.

A Leather Sling Case for Barometers Nos. 3310 to 3329, and omitting the morocco case, costs extra, $5.00.

"The Aneroid Barometer: Its Construction and Use." A 126 page illustrated treatise by Geo. W. Plympton, C. E.; 16 mo., boards, 11th edition. Price, 50 cents, postpaid.

		Price	Postage
No. 3300	Pocket Aneroid, 1¾ in. diameter, altitude scale to 3,000 ft., by each 10 ft.	**$21.00**	**.20**
No. 3301	Pocket Aneroid, 1¾ in. diameter, altitude scale to 5,000 ft., by each 20 ft.	**20.00**	**.20**
No. 3302	Pocket Aneroid, 1¾ in. diameter, altitude scale to 10,000 ft., by each 100 ft.	**21.00**	**.20**
No. 3303	Pocket Aneroid, 1¾ in. diameter, altitude scale to 16,000 ft., by each 100 ft.	**22.00**	**.20**
No. 3310	Pocket Aneroid, 2½ in. diameter, altitude scale to 3,000 ft., by each 10 ft.	**28.00**	**.25**
No. 3312	Pocket Aneroid, 2½ in. diameter, altitude scale to 5,000 ft., by each 20 ft.	**25.00**	**.25**
No. 3314	Pocket Aneroid, 2½ in. diameter, altitude scale to 10,000 ft., by each 50 ft.	**25.00**	**.25**
No. 3315	Pocket Aneroid, 2½ in. diameter, altitude scale to 12,000 ft., by each 50 ft.	**26.00**	**.25**
No. 3316	Pocket Aneroid, 2½ in. diameter, altitude scale to 16,000 ft., by each 50 ft.	**27.00**	**.25**

Aneroid Barometers

		Price	Postage
No. 3318	Pocket Aneroid, 2½ in. diameter, altitude scale to 20,000 ft., by each 100 ft.	$28.00	.25
No. 3322	Pocket Aneroid, 2½ in. diameter, altitude scale to 10,000 ft., by each 50 ft., and thermometer	28.00	.25
No. 3329	Pocket Metric Aneroid, 2½ in. diameter, altitude scale to 1,500 meters, reading to 5 meters, and pressure scale reading to ½ millimeter	26.00	.25
No. 3330	Pocket Metric Aneroid, 2½ in. diameter, altitude scale to 3,000 meters, reading to 10 meters, and pressure scale reading to 1 millimeter	25.00	.25
No. 3332	Pocket Metric Aneroid, 2½ in. diameter, altitude scale to 5,000 meters, reading to 20 meters, and pressure scale reading to 2 millimeters	28.00	.25
No. 3336	Plain Aneroid, no altitude scale, 5 in. diameter, with thermometer and open face to show mechanism, for parlor use	18.00	.40

Surveying and Mining Aneroids

Bronzed Cases, Silvered Dials, with Revolving Magnifier, Compensated for Temperature, in Leather Sling Cases

No. 3360

The Surveying and Mining Aneroid has been constructed especially for the use of surveyors and engineers, for ascertaining slight variations in gradients, levels, etc., and from its extreme sensitiveness will be found of considerable utility in mining and surveying work generally.

The Vernier Scale is moved by rack and pinion, and the magnifier which rotates on the outer circumference of the instrument facilitates the reading of the vernier.

Three-Inch Aneroids

No. 3350	Surveying Aneroid, altitude scale to 6,000 ft., by each 20 ft., and by vernier to 2 ft.	$69.00	.40
No. 3352	Surveying Aneroid, with altitude scale to 10,000 ft., by each 50 ft., and by vernier to 5 ft.	75.00	.40
No. 3354	Surveying Aneroid, with altitude scale to 16,000 ft., by each 50 ft., and by vernier to 5 ft.	80.50	.40
No. 3355	Mining Aneroid, arranged to register 2,000 ft. below sea level to 4,000 ft. above, by each 20 ft., and by vernier to 2 ft.	69.00	.40

Surveying and Mining Aneroids

Five-Inch Aneroids

No. 3360	Surveying Aneroid, with altitude scale to 5,000 ft., by each 10 ft., and by vernier to 1 ft.	$70.00	.65
No. 3362	Surveying Aneroid, with altitude scale to 10,000 ft., by each 20 ft., and by vernier to 2 ft.	73.00	.65
No. 3364	Surveying Aneroid, with altitude scale to 16,000 ft., by each 20 ft., and by vernier to 2 ft.	75.00	.65
No. 3366	Surveying Aneroid, with altitude scale to 20,000 ft., by each 50 ft., and by vernier to 5 ft.	80.00	.65

To Use the Aneroid with Altitude Scale

Find the height in feet at first station and subtract this from the height in feet at second station. If the mean temperature is greater or less than 50 degrees F., apply correction for temperature as hereafter given.

Example:

Aneroid at Station A, 1,800 ft. Thermometer 50 deg.
Aneroid at Station B, 800 ft. Thermometer 70 deg.

The approximate height is 1,000 feet. A correction of + 20 is therefore applied. The sum of the temperature is 120. This is 20 feet.
The difference of elevation is therefore 1,000 + 20 = 1,020 feet.

To Find the Relative Height of Two Given Places

Take a reading of the Aneroid at first station; subtract from this the reading at second station. The remainder multiplied by 9 will give the difference of altitude in feet, thus:

First Station, 30.20; Second Station, 29.99; 30.20 — 29.99 = .21; .21 × 900 (or 21 × 9) = 189 feet = difference of altitude.

This under ordinary pressures and with a temperature of about 50 degrees F. will give good results. If the temperature is over 70 degrees F. multiply by 10.

The table prepared by Mr. Symons is more strictly accurate:

Mean Temperature	30°	40°	50°	60°	70°	80°
Mean pressure, 27 in.	9.7	9.9	10.1	10.3	10.5	10.8
Mean pressure, 28 in.	9.3	9.5	9.8	10.0	10.2	10.4
Mean pressure, 29 in.	9.0	9.2	9.4	9.6	9.8	10.0
Mean pressure, 30 in.	8.7	8.9	9.1	9.3	9.5	9.7

Roughly speaking, the barometer falls 1 inch for every 900 feet of ascent; or at mean atmospheric pressure in this latitude.

Above sea level 917 feet, the barometer falls . . . . . 1 inch
Above sea level 1,860 feet, the barometer falls . . . . . 2 inches
Above sea level 2,830 feet, the barometer falls . . . . . 3 inches
Above sea level 3,830 feet, the barometer falls . . . . . 4 inches
Above sea level 4,861 feet, the barometer falls . . . . . 5 inches

Anemometers

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

"Birams."—For registering the velocity of currents of air in mines, tunnels, etc., by means of a light fan, the revolutions of which are recorded on a dial in the center of the instrument.

This instrument placed in the 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.

We furnish a rating card with each Anemometer, showing the friction constant to be added in every computation, which is ascertained by us by actual experiment.

No. 3386		Price	Postage
No. 3380	Birams Anemometer, 3 in. diameter, reading to 1,000 ft., with disconnector and zero setting arrangement in case	$25.00	.30
No. 3383	Birams Anemometer, 4 in. diameter, reading to 100,000 ft., with disconnector and zero setting arrangement in case	28.00	.40
No. 3386	Birams Anemometer, 6 in. diameter, reading to 100,000 ft., with disconnector and zero setting arrangement in case	35.00	.60

The Use of the Anemometers

The Anemometer consists of a series of vanes, which revolve with the action of the air current, the number of revolutions, or numbers proportioned to the revolutions, being registered by a pointer on the face of a dial, forming part of the instrument itself. An observer has only to record the position of the several indices at the first observation, by writing the lower of the two figures on the respective circles, between which the index points, in their proper order, and deduct the amount from their position at the second observation, to ascertain the velocity of the air which has passed in the interval. This, multiplied by the area in square feet of the passage where the instrument is placed, will show the number of cubic feet which has passed during the same period.

Thus, suppose the observation of one minute gives:

Second reading	525
First reading	225
	300
Add correction, say	30
	330

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

The correction added above is the value of the constant of 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 ÷ 88 = 3.75 or 3¾ miles per hour, 88 being $\frac{1}{60}$ 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.

Air Meters

No. 3395

The Portable Air Meter is for the measurement of currents of air through mines, tunnels, sewers and the ventilators of hospitals, public buildings, etc. The indications are obtained by means of a delicately poised fan wheel, the recordings being commenced by the long hand, which traverses the extreme outer circumference of the main dial for the passage of 100 feet of air. The enumeration is continued by a series of smaller dials as shown in the illustration. A Disconnector, projecting from the band of the instrument, opposite the fan wheel, serves to throw the mechanism out of gear, and arrest its action, when required. The instrument is packed, with universal jointed socket, in a case about 4 inches square.

		Price	Postage
No. 3394	Portable Air Meter, with fan wheel 2¾ in. diameter, two dials, recording to 1,000 ft., and disconnector. The pointer can be set to zero at will by a setting attachment and key	$30.00	.35
No. 3395	Portable Air Meter, with fan wheel 2¾ in. diameter, four dials, recording to 100,000 ft., and disconnector. The pointer can be set to zero at will by a setting attachment and key	30.00	.35
No. 3397	Portable Air Meter, with fan wheel 2¾ in. diameter, six dials recording to 10,000,000 ft., and disconnector, but without setting attachment	30.00	.35

Prism Binoculars

American Make, Finest Quality

The Prism Binocular, in design and construction, is simple, compact, of light weight and fine finish. It combines large field of view with great magnifying power and clear definition. One eye piece cap is graduated and can be adjusted for normal, near-sighted and far-sighted eyes. The metal body is covered with fine black morocco and each Binocular has a leather case with strap.

Nos. 3458-3461

No.	Magnifying Power	Diameter of Objective	Width of Field 1,000 Yards	Price	Postage
3458	6 x	25 mm.	120 yds.	**$45.00**	.40
3459	6 x	30 mm.	150 yds.	**60.00**	.40
3460	8 x	21 mm.	90 yds.	**50.00**	.45
3461	8 x	25 mm.	115 yds.	**55.00**	.45

Telescopes

Morocco-covered Body and Burnished Draw Tubes

No. 3475

		Price	Postage
No. 3475	Telescope, with 3 draws, 17¼ in. drawn out, 6½ in. shut, objective 1⅛ in. in diameter, power 12 times..	**$5.00**	.20
No. 3477	Telescope, with 3 draws, 23¾ in. drawn out, 8½ in. shut, objective 1½ in. in diameter, power 20 times..	**9.00**	.30
No. 3478	Telescope, with 3 draws, 31 in. drawn out, 10¾ in. shut, objective 1⅝ in. in diameter, power 25 times..	**12.00**	.40
No. 3479	Telescope, with 4 draws, 37 in. drawn out, 11 in. shut, objective 2 in. in diameter, power 30 times.....	**25.00**	.65

Tourist Telescopes

No. 3485

		Price	Postage
No. 3485	Telescope, with oxidized draw tubes and brass body covered with morocco; three draws, 17 in. drawn out, 6 in. shut; objective 1¼ in. in diameter; sun shade; leather caps to cover eyepiece and objective, and shoulder strap. Power 20 times	$17.50	.20
No. 3486	Telescope, same as No. 3485, but is 21 in. drawn out, 7 in. shut; objective 1⅝ in. diameter. Power 25 times	23.00	.30

Pocket Magnifiers

Rubber Case, Oval Form, One Double Convex Lens

		Price	Postage			Price	Postage
No. 3520	1 in.	$0.85	.02	No. 3522	1½ in.	$1.00	.03
No. 3521	1¼ in.	.90	.02	No. 3523	2 in.	1.50	.04

Rubber Case, Oval Form, Two Double Convex Lenses

No. 3526	⅞ and 1 in.	1.65	.03	No. 3528	1¼ and 1½ in.	2.50	.14

Rubber Case, Bellows Form, One Double Convex Lens

No. 3530	¾ in.	.75	.02	No. 3532	1 in.	.90	.02

Rubber Case, Bellows Form, Two Double Convex Lenses

No. 3534	⅝ and ¾ in.	1.00	.03	No. 3536	⅞ and 1 in.	1.50	.03

Rubber Case, Bellows Form, Three Double Convex Lenses

No. 3538	½, ⅝, ¾ in.	2.00	.04	No. 3539	¾, ⅞, 1 in.	2.50	.04

No. 3542	White Celluloid Case, oval form, one ¾ in. double convex lens	1.00	.02
No. 3543	White Celluloid Case, oval form, one 1¼ in. double convex lens	1.25	.12
No. 3550	German Silver Case, oval form, one 1 in. double convex lens	1.00	.04

Pocket Magnifiers

No. 3555

No. 3566

		Price	Postage
No. 3555	Microscope, brass mounted, on three legs, adjustable	$1.00	.05
No. 3566	Coddington Lens, brass mounted, small	1.25	.14
No. 3567	Coddington Lens, brass mounted, medium	1.50	.14
No. 3568	Coddington Lens, brass mounted, large	2.00	.15
No. 3569	Aplanatic Magnifier, high power, and flat field	1.00	.14

No. 3570

No. 3570	Coddington Lens, nickeled frame and cover, ½ in. diameter	$1.50	.14
No. 3571	Coddington Lens, nickeled frame and cover, ¾ in. diameter	1.70	.14
No. 3572	Coddington Lens, nickeled frame and cover, 1 in. diameter	2.00	.15
No. 3575	Aplanatic Triplet, nickeled frame and cover, superior quality, giving perfect definition and flat field, ½ in. focus, power 20 times	6.00	.14
No. 3577	Aplanatic Triplet, nickeled frame and cover, superior quality, giving perfect definition and flat field, 1 in. focus, power 10 times	6.00	.14

Lenses Nos. 3566 to 3577 have extra power and definition for examining minerals, ore, rock, flowers, etc.

Reading and Picture Glasses

Reading Glass, Metal Frame, Double Convex Lens

No. 3585

		Price	Postage
No. 3585	2 in. diam. . .	$1.00	.05
No. 3586	2½ in. diam.	1.20	.06
No. 3587	3 in. diam. . .	1.35	.17
No. 3589	4 in. diam. . .	$2.35	.19
No. 3591	5 in. diam. . .	3.75	.35
No. 3593	6 in. diam. . .	5.00	.40

Pocket Spirit Levels

Made by W. & L. E. Gurley

A superior article, with ground and graduated vial, mounted in brass and adjustable, and in wood case.

No. 3660

		Price	Postage
No. 3660	6 in.	$4.00	.18
No. 3664	10 in.	$6.00	.25

Level Vials, Unmounted

Made by W. & L. E. Gurley

Every Vial Tested

We are prepared to supply unmounted, ground level vials, from 1½ to 7 inches long, with or without graduations, and prices will be submitted upon application. Specify length over all and outside diameter of vials required. We cannot furnish vials smaller than ⅜ inch in diameter.

Steel Magnets

			Price	Postage
No. 3850	2	in.	$0.18	.03
No. 3852	3	in.	.30	.04
No. 3854	4	in.	.50	.06
No. 3856	5	in.	$0.75	.10
No. 3858	6	in.	1.15	.13
No. 3860	7	in.	1.65	.20

Thermometers

Nos. 3935-3936, Open

Nos. 3935-3936, Closed

Portable or Pocket Case, "Open Air" Range

		Price	Postage
	Polished Mahogany or Oak Case, with Reversible Cover		
No. 3935	4 in., Mercury	$3.25	.14
No. 3936	6 in., Mercury	3.50	.16

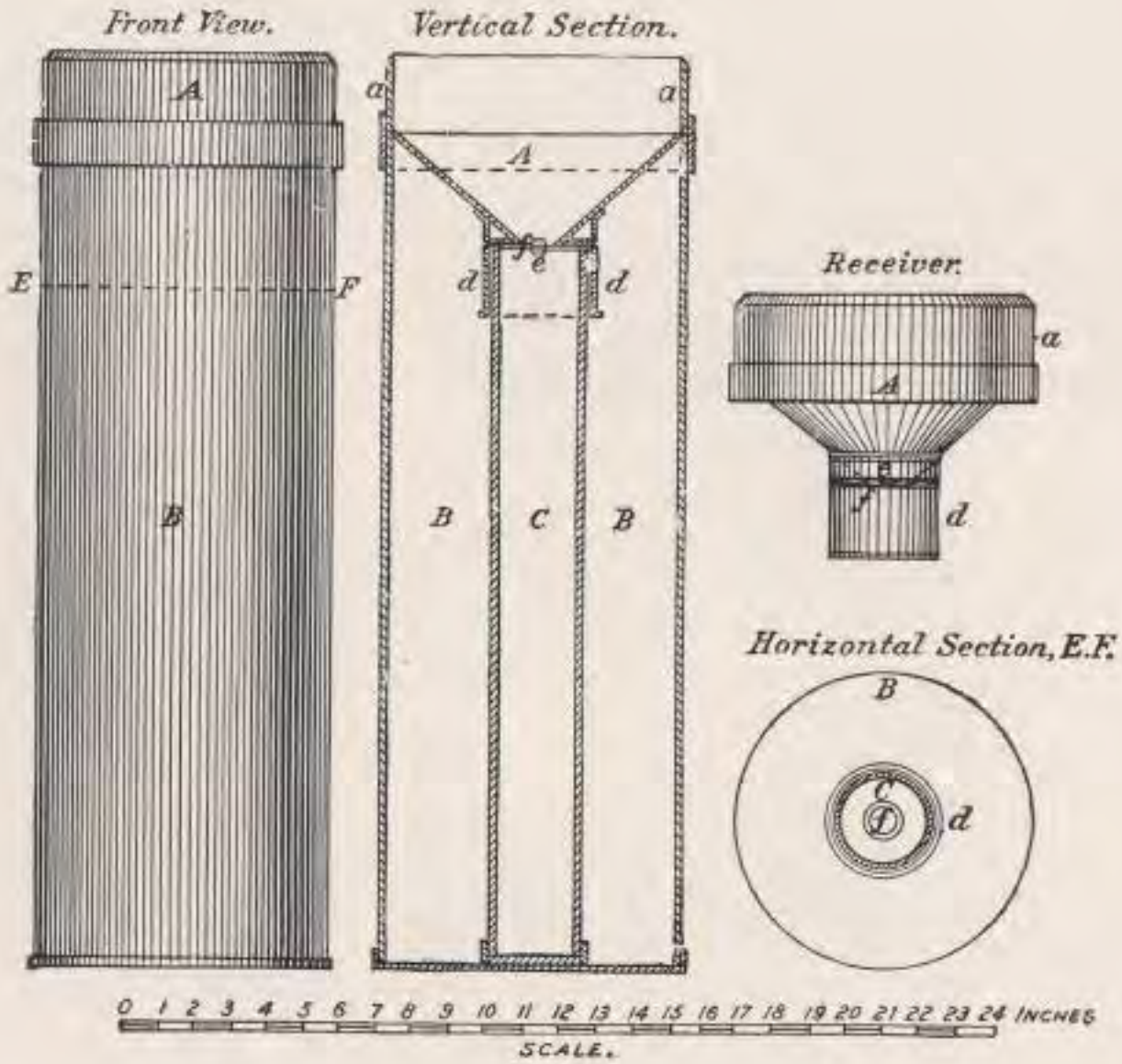
No. 3956

		Price	Postage
No. 3956	Asphalt or Tar Testing Thermometer, for highway engineers and road builders, in nickel-plated case	$5.00	.10
	Extra tube fitted to case	3.00	.10

No. 3970

		Price	Postage
No. 3970	U. S. Weather Bureau Set of Maximum and Minimum Thermometers, 12 in., aluminum scales, mounted together on one wood back	$11.00	.50

Rain Gage



No. 3981

No. 3981 U. S. Weather Bureau Standard Rain and Snow Gage of galvanized iron, 8 in. diameter, 25½ in. high, with measuring stick. The receiver has a capacity of 2 in. of rainfall, and in connection with the overflow the possible capacity is 20 in. of rainfall. The Gage is so adjusted that the reading is magnified 10 times and 1 in. of rainfall actually measures 10 in. on the stick..... **$13.00**

No. 3982 Metal Stand for U. S. Weather Bureau Standard Rain Gauge No. 3981 ..... **5.50**

Drawing Instruments and Office Supplies

General Information

Due to existing unsettled market conditions, many articles of foreign manufacture previously imported by us are now unobtainable. It is necessary, therefore, to discontinue in this Catalogue a number of items listed in previous editions.

All prices are subject to change without notice.

When ordering always state the Catalogue number of each item, and also the edition from which it is taken.

Many of our smaller instruments, such as drawing instruments, pocket compasses, chains, tapes, small packages of paper and parts of large instruments, can be sent by parcel post securely packed.

In all cases where goods are to be sent by mail, the cash for postage, as well as for the goods, must accompany the order.

The approximate postage required is mentioned in the second column. Should the amount sent exceed the actual postage, the balance will be returned.

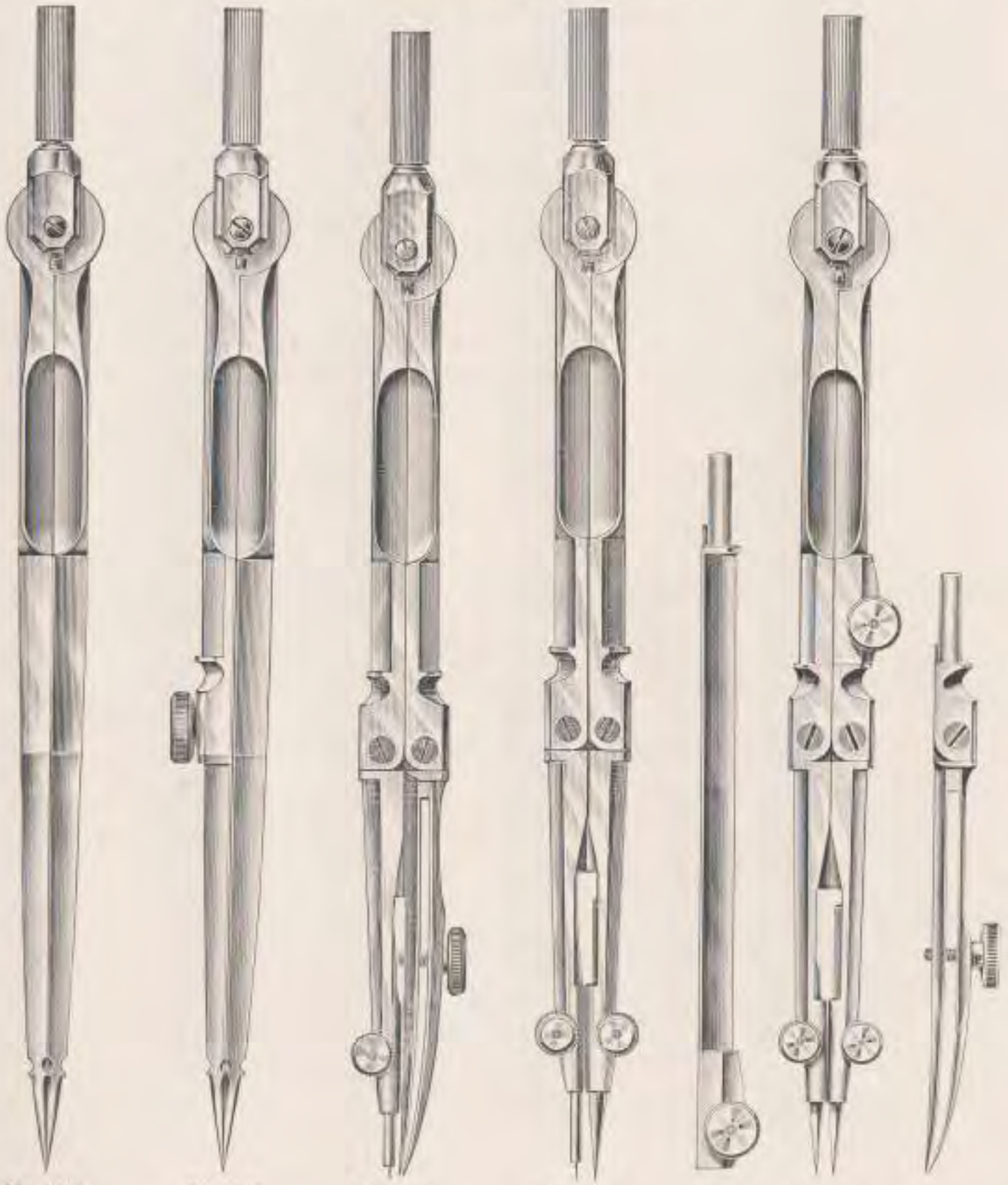
All articles can be insured at an extra cost, which varies according to the value of the package. For details see Parcel Post Regulations.

We guarantee safe delivery to our customers.

For the convenience of our customers, we will furnish any articles which are not on our list, but which are described in the catalogue of any American maker or dealer in mathematical instruments.

Alteneders Patent Joint German Silver and Steel Drawing Instruments

American Make, Finest Quality



No. 1001 No. 1007 No 1017 No. 1018 No. 1023

The excellence of these instruments consists in the joints of the dividers being so constructed as to prevent any irregular motion when the legs are opened or closed, also in the general care with which the instruments are finished. All the pens are well made and pointed.

Alteneders Patent Joint German Silver and Steel Drawing Instruments

		Price	Postage
No. 1000	Plain Dividers, 3½ in.	$3.25	.12
No. 1001	Plain Dividers, 4½ in.	3.50	.14
No. 1002	Plain Dividers, 5 in.	3.50	.14
No. 1006	Hairspring Dividers, 3½ in.	4.00	.12
No. 1007	Hairspring Dividers, 4½ in.	4.25	.14
No. 1008	Hairspring Dividers, 5 in.	4.50	.14
No. 1015	Compasses, 3½ in., with fixed needle and pen points.	5.00	.14
No. 1016	Compasses, 3½ in., with fixed needle and pencil points	5.00	.14
No. 1017	Compasses, 4½ in., with fixed needle and pen points.	6.00	.15
No. 1018	Compasses, 4½ in., with fixed needle and pencil points	6.00	.15
No. 1019	Compasses, 5½ in., with fixed needle and pen points.	7.00	.15
No. 1020	Compasses, 5½ in., with fixed needle and pencil points	7.00	.15
No. 1021	Compasses, 3½ in., with fixed needle point, and pen and pencil points	9.00	.14
No. 1022	Compasses, 3½ in., with fixed needle point, with hairspring, and pen and pencil points.	10.75	.14
No. 1023	Compasses, 4½ in., with fixed needle point, and pen and pencil points and lengthening bar.	10.25	.15
No. 1024	Compasses, 4½ in., with fixed needle point, with hairspring, and pen and pencil points and lengthening bar	12.00	.15
No. 1025	Compasses, 5½ in., with fixed needle point, pen and pencil points and lengthening bar.	10.50	.16
No. 1026	Compasses, 5½ in., with fixed needle point, with hairspring, pen and pencil points and lengthening bar.	12.00	.16
No. 1035	Steelspring Bow Spacer, metal handle, 3¼ in.	3.00	.12
No. 1036	Steelspring Bow Spacer, needle points, metal handle, 3¼ in.	3.50	.12
No. 1037	Steelspring Bow Pen, needle point, metal handle, 3¼ in.	3.50	.12
No. 1038	Steelspring Bow Pencil, needle point, metal handle, 3¼ in.	3.50	.12
No. 1039	4 in. Self-adjusting Needle Point Bow Pen.	5.50	.12
No. 1040	4 in. Self-adjusting Needle Point Bow Pen and Pencil.	7.00	.12
No. 1050	Drawing Pen, with spring blade, ebony handle, 4¼ in.	2.25	.13
No. 1051	Drawing Pen, with spring blade, ebony handle, 5 in.	2.50	.13
No. 1052	Drawing Pen, with spring blade, ebony handle, 5½ in.	3.00	.13
No. 1053	Drawing Pen, 4¼ in., with patent spring hinge, ebony handle	4.00	.13
No. 1054	Drawing Pen, 5 in., with patent spring hinge, ebony handle	4.00	.13
No. 1055	Drawing Pen, 5½ in., with patent spring hinge, ebony handle	4.00	.13
No. 1060	Railroad Pen, ebony handle, 5 in.	5.00	.13
No. 1062	Swivel Curve Pen, spring blade, hollow metal handle.	3.00	.13
No. 1064	Pricker, with removable needle point, ebony handle.	1.50	.12
No. 1066	Tubular Nickel-plated Case, for leads.	.25	.02

Alteneders Patent Joint German Silver and Steel Drawing Instruments

No. 1050

No. 1035

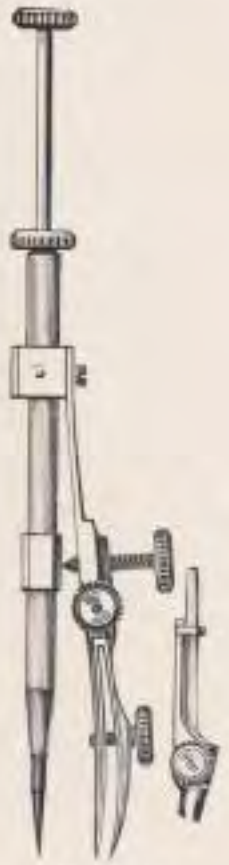
No. 1036

No. 1053

No. 1037

No. 1038

No. 1039



No. 1040

Alteneders Patent Joint Drawing Instruments

In Morocco Case

No. 1077

		Price	Postage
No. 1075	Morocco Case containing: Compasses, No. 1025; Bow Pen, No. 1037; Drawing Pen, No. 1051; Box of Leads.	**$18.50**	**.20**
No. 1077	Morocco Case, containing: Compasses, No. 1025; Bow Pen, No. 1037; Bow Pencil, No. 1038; Drawing Pen, No. 1051; Box of Leads.....	**22.00**	**.22**
No. 1079	Morocco Case, containing: Hairspring Dividers, No. 1008; Compasses, No. 1025; Bow Spacer, No. 1035; Bow Pen, No. 1037; Bow Pencil, No. 1038; Drawing Pens, Nos. 1050 and 1051; Box of Leads.....	**33.00**	**.25**

No. 1079

Alteneders Patent Joint Drawing Instruments

In Morocco Case

		Price	Postage
No. 1081	Morocco Case, containing: Hairspring Dividers, No. 1008; Compasses, No. 1026; Bow Spacer, No. 1035; Bow Pen, No. 1037; Bow Pencil, No. 1038; Drawing Pens, Nos. 1050 and 1051; Box of Leads.....	**$35.00**	**.25**
No. 1083	Morocco Case, containing: Hairspring Dividers, No. 1008; Compasses, Nos. 1021 and 1025; Bow Spacer, No. 1035; Bow Pen, No. 1037; Bow Pencil, No. 1038; Drawing Pens, Nos. 1050 and 1051; Box of Leads	**43.50**	**.30**

No. 1085

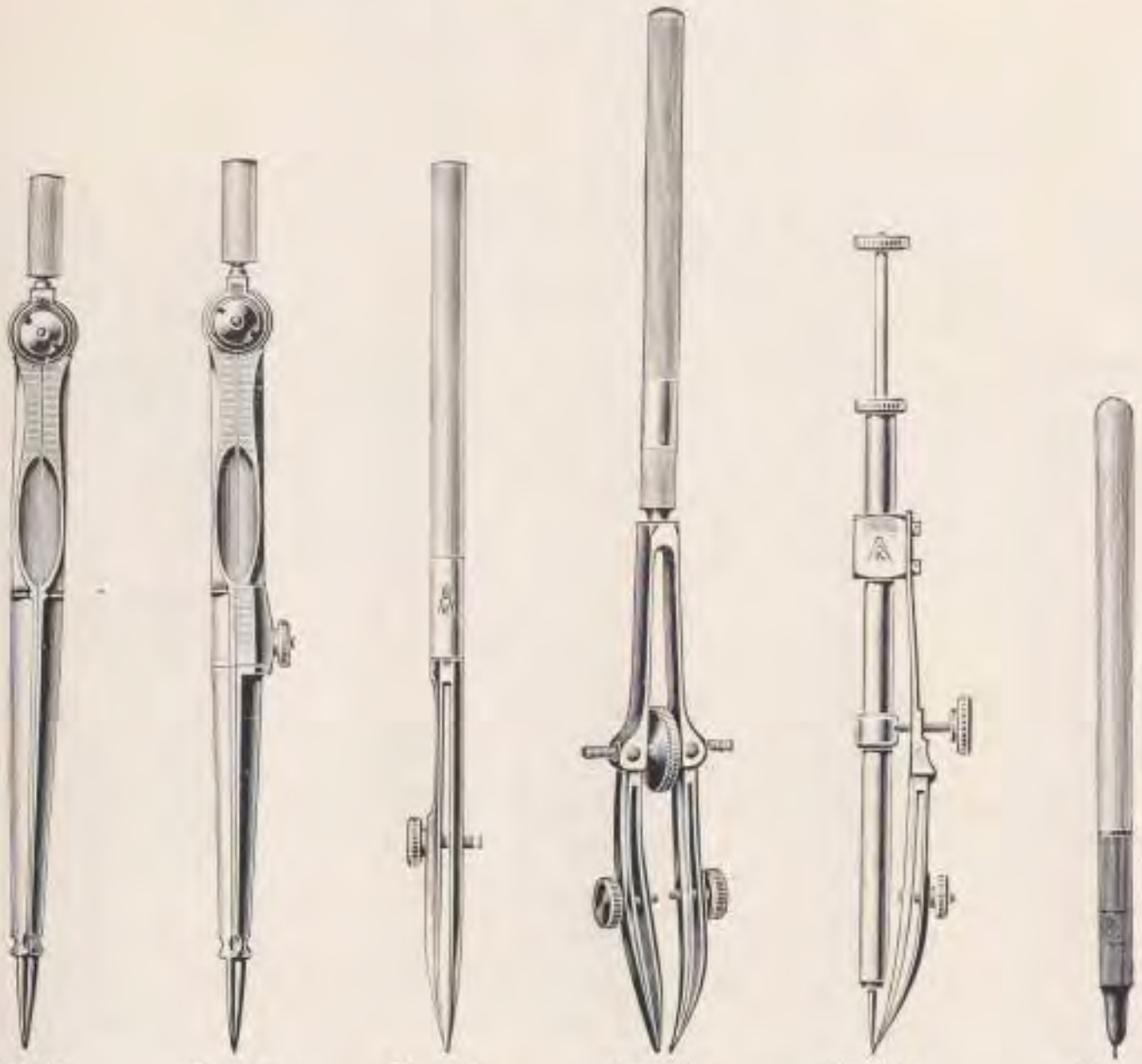
No. 1085	Folding Pocket Case, with flexible flaps and containing same instruments as in Set No. 1079.....	**$34.50**	**.25**
No. 1087	Folding Pocket Case, flexible flaps, containing Hairspring Dividers, No. 1008; Compasses, No. 1026; Bow Spacer, No. 1035; Bow Pen, No. 1037; Bow Pencil, No. 1038; Drawing Pens, Nos. 1050 and 1051; Box of Leads.....	**36.50**	**.25**

Empty Cases for Alteneders Instruments

No. 1090	Empty Folding Pocket Case, with flexible flaps, and fitted to receive from five to twelve pieces of drawing instruments. Price, according to size of case, **$5.00** to **$7.00**; postage.....	**.15** to **.30**

Folding Pocket Cases furnished, instead of the usual morocco cases, with Sets Nos. 1075 to 1083 at an extra cost of **$2.50.**

Superior Swiss Drawing Instruments



No. 1102 No. 1104 No. 1112 No. 1124 No. 1126 No. 1130

		Price	Postage
No. 1100	3½ in. Plain Divider	**$2.00**	**.14**
No. 1102	5 in. Plain Divider	**2.50**	**.14**
No. 1104	5 in. Hairspring Divider	**3.25**	**.14**
No. 1108	5 in. Compasses, with fixed needle point, pen and pencil point and lengthening bar	**6.50**	**.16**
No. 1110	4 in. Drawing Pen, with ebony handle	**1.50**	**.13**
No. 1112	5 in. Drawing Pen, with ebony handle	**1.75**	**.13**
No. 1114	6 in. Drawing Pen, with ebony handle	**2.00**	**.13**
No. 1124	Railroad Pen	**3.50**	**.14**
No. 1126	Rivet Pen for small circles	**4.00**	**.12**
No. 1128	Rivet Pen, with pen and pencil point	**5.00**	**.12**
No. 1130	Pricker	**1.00**	**.12**

Superior Swiss Drawing Instruments

No. 1135

No. 1136

No. 1137

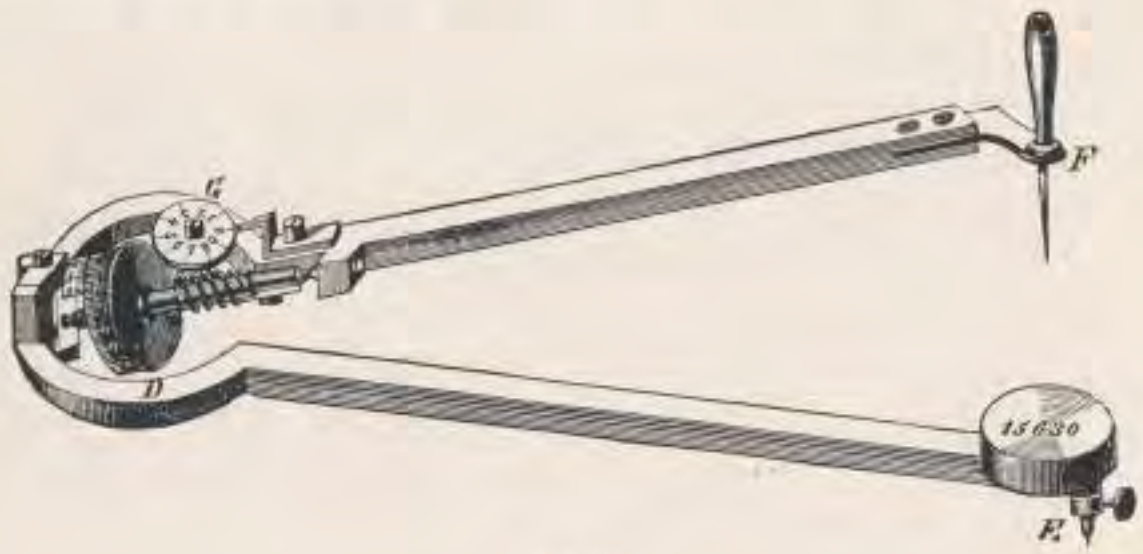
No. 1138

Steelspring Bows with Nut and Bolt Movement

		Price	Postage
No. 1135	Steelspring Bow Divider with plain points.....	$2.00	.12
No. 1136	Steelspring Bow Divider with needle points.....	2.50	.12
No. 1137	Steelspring Bow Divider with needle point.....	3.00	.12
No. 1138	Steelspring Bow Pencil with needle point.....	3.00	.12

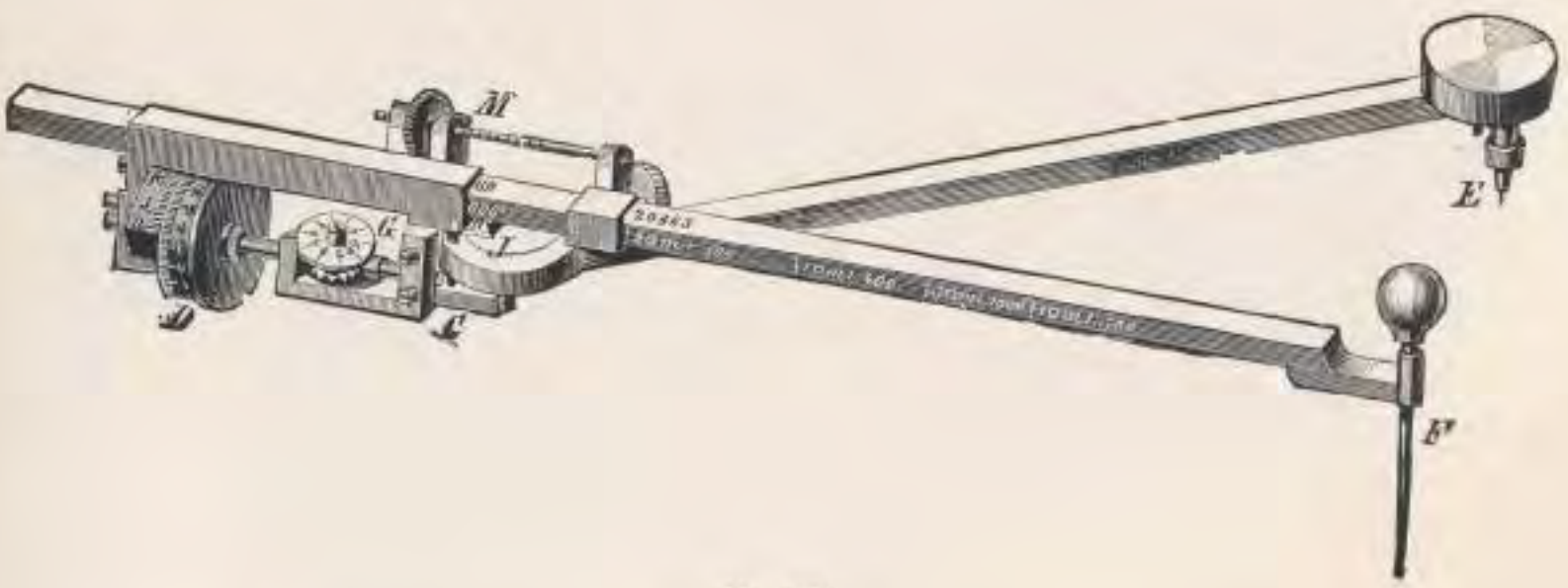
Polar Planimeters

By means of the Polar Planimeter a person can ascertain the area of any planmetrical figure more accurately and in less time than the most experienced mathematician could calculate it.



No. 1093

	Price	Postage
No. 1093 Polar Planimeter, German silver, measuring up to 100 sq. in. Swiss make. In morocco case, with printed directions	$30.00	.25



No. 1094

No. 1094 Polar Planimeter, German silver, measuring up to 450 sq. in., also indicates square feet and square centimeters. Swiss make. In morocco case, with printed directions	$40.00 .35

Polar Planimeters

No. 1095

		Price	Postage
No. 1095	Compensating Planimeter, German silver and brass, best quality, with adjustable tracer arm fully graduated, improved pole weight and testing rule. Can be set for any scale in U. S. Standard or any foreign measurement; with directions, in case.....	**$65.00**	.35

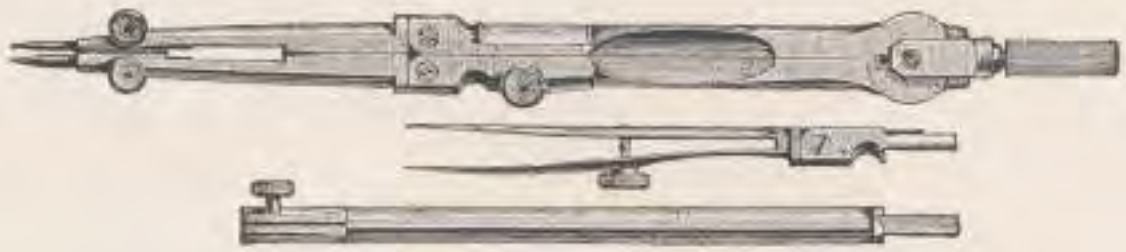
Fine Drawing Instruments

German Silver

		Price	Postage
No. 1203	Plain Dividers, 6 in., pivot joint handle (Superior) . . .	$1.25	.14
No. 1206	Hairspring Dividers, 4¼ in., with handle	1.20	.12
No. 1208	Hairspring Dividers, 6 in., with handle	1.75	.14

No. 1209

No. 1209	Hairspring Dividers, 6 in., pivot joint handle (Superior)	2.00	.14
No. 1213	Three Legged Dividers, 5 in., for taking off three points	2.75	.15
No. 1215	Compasses, 4¼ in., with two steel points, pen, pencil and needle point	2.50	.14
No. 1216	Compasses, 4¼ in., with pivot joint handle, pen, pencil and fixed needle point (Superior)	3.00	.14



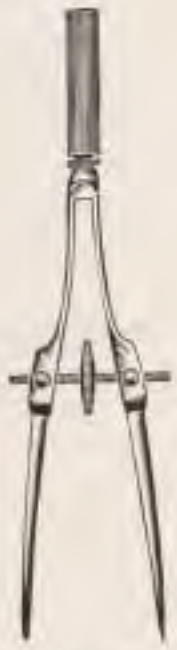
No. 1218

No. 1218	Compasses, 6 in., with pivot joint handle, pen, pencil, fixed needle point and lengthening bar	$4.75	.17
No. 1228	Proportional Dividers, 6½ in., graduated for lines and circles, with two exchangeable and adjustable points, in case. Each	12.50	.17

No. 1248

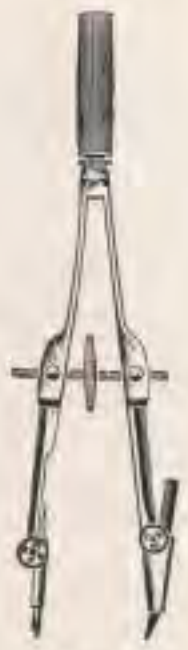
No. 1248	Map Measurer, registers inches to miles and centimeters to kilometers	3.00	.14

Fine Drawing Instruments



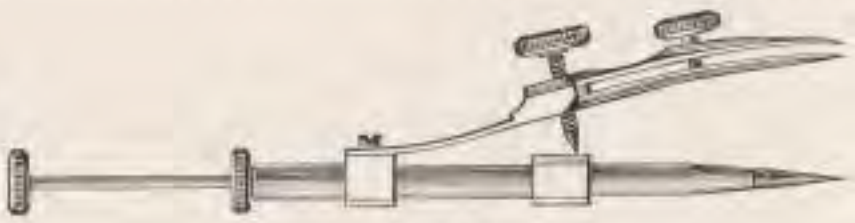
No. 1260

No. 1261



No. 1262

		Price	Postage
No. 1250	Steelspring Bow Spacer, metal handle, 3½ in.	$1.25	.12
No. 1251	Steelspring Bow Pen, metal handle, 3½ in.	1.75	.12
No. 1252	Steelspring Bow Pencil, metal handle, 3½ in.	1.75	.12
No. 1255	Set of three Steel Bows, Nos. 1250, 1251 and 1252, in morocco case.	6.00	.16
No. 1260	Bow Spacer, with wheel adjustment, metal handle, 3½ in.	2.00	.12
No. 1261	Bow Pen, with wheel adjustment, metal handle, 3½ in.	2.50	.12
No. 1262	Bow Pencil, with wheel adjustment, metal handle, 3½ in.	2.50	.12
No. 1265	Set of three Steel Bows, Nos. 1260, 1261 and 1262, in morocco case.	8.00	.17
No. 1268	Spring Bow Pen, with adjustable needle point for small circles	2.50	.12
No. 1270	Spring Bow Pen, with pencil leg and adjustable needle point for small circles.	3.50	.13
No. 1275	Drawing Pen, without joint, ivory handle, 4½ in.	.50	.02
No. 1277	Drawing Pen, without joint, ivory handle, 5½ in.	.60	.03
No. 1280	Drawing Pen, with fine joint, ivory handle, 4½ in.	.70	.02
No. 1281	Drawing Pen, with fine joint, ivory handle, 5 in.	.90	.03
No. 1282	Drawing Pen, with fine joint, ivory handle, 5½ in.	1.00	.03
No. 1285	Drawing Pen, with fine joint and pin, ivory handle, 4½ in.	.90	.02



No. 1268

No. 1280

Fine Drawing Instruments

No. 1300

No. 1303

No. 1308

		Price	Postage
No. 1287	Drawing Pen, with fine joint and pin, ivory handle, 5 in.	**$1.00**	**.03**
No. 1289	Drawing Pen, with fine joint and pin, ivory handle, 5½-6 in.	**1.15**	**.03**
No. 1300	Drawing Pen, without set screw, hollow metal handle, 5½ in.	**1.80**	**.12**
No. 1303	Drawing Pen, Swedish pattern, ebony handle, 5 in.	**.95**	**.03**
No. 1308	Curve Pen, swivel blade, hollow metal handle, 5 in.	**1.85**	**.12**

No. 1314

No. 1321

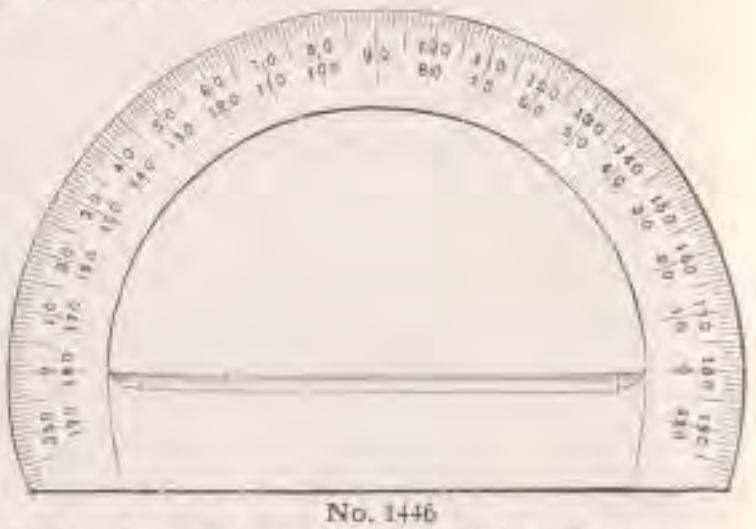
No. 1322

No. 1314	Railroad Pen, with joints, ivory handle, 5½ in.	**$2.75**	**.13**
No. 1321	Railroad Pen and Border Pen to draw two parallel lines of same or different width or one broad line.	**4.00**	**.14**
No. 1322	Dotting Pen, one wheel, ivory handle, 5 in.	**1.25**	**.12**

Protractors

Extra Fine German Silver Protractors

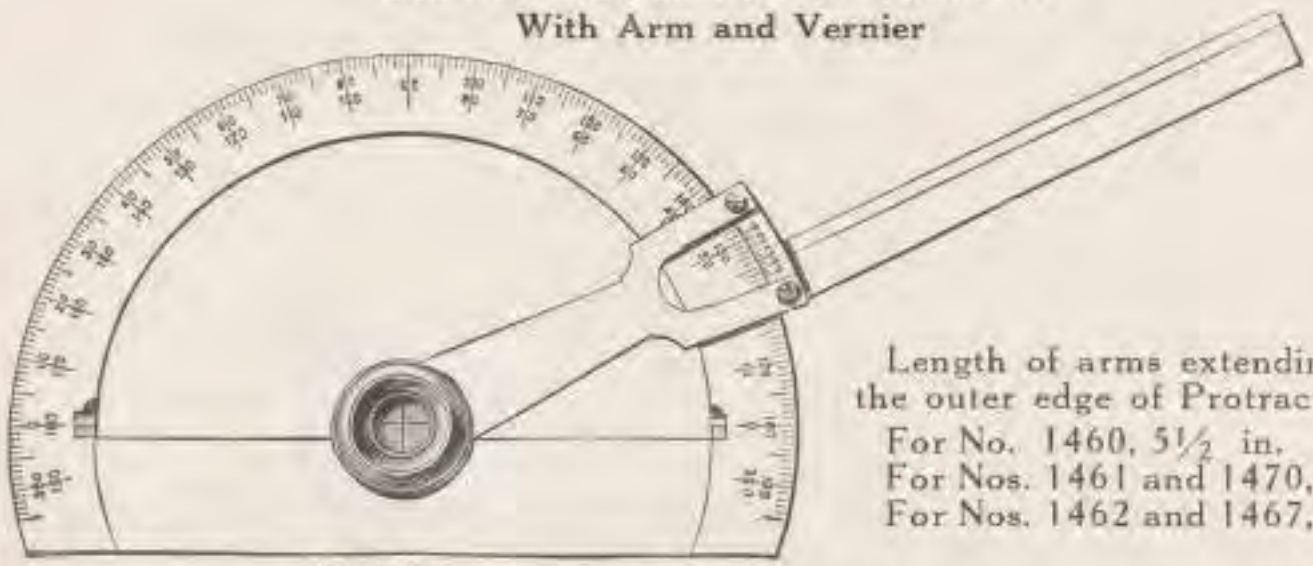
No. 1440



No. 1446

		Price	Postage
No. 1440	Protractor, half circle, 4 in. beveled edge, center on outer edge, divided to 1 deg.	$1.25	.14
No. 1441	Protractor, half circle, 5 in., divided to ½ deg.	2.00	.14
No. 1442	Protractor, half circle, 6 in., divided to ½ deg.	3.00	.16
No. 1443	Protractor, half circle, 6 in., divided to ¼ deg.	3.50	.16
No. 1444	Protractor, half circle, 7 in., divided to ½ deg.	4.00	.16
No. 1445	Protractor, half circle, 5 in., beveled edge, center on inner edge, divided to ½ deg.	2.50	.14
No. 1446	Protractor, half circle, 6 in., divided to ½ deg.	3.50	.16

Extra Fine German Silver Protractors With Arm and Vernier



No. 1461

Length of arms extending over the outer edge of Protractors:
For No. 1460, 5½ in.
For Nos. 1461 and 1470, 6 in.
For Nos. 1462 and 1467, 6½ in.

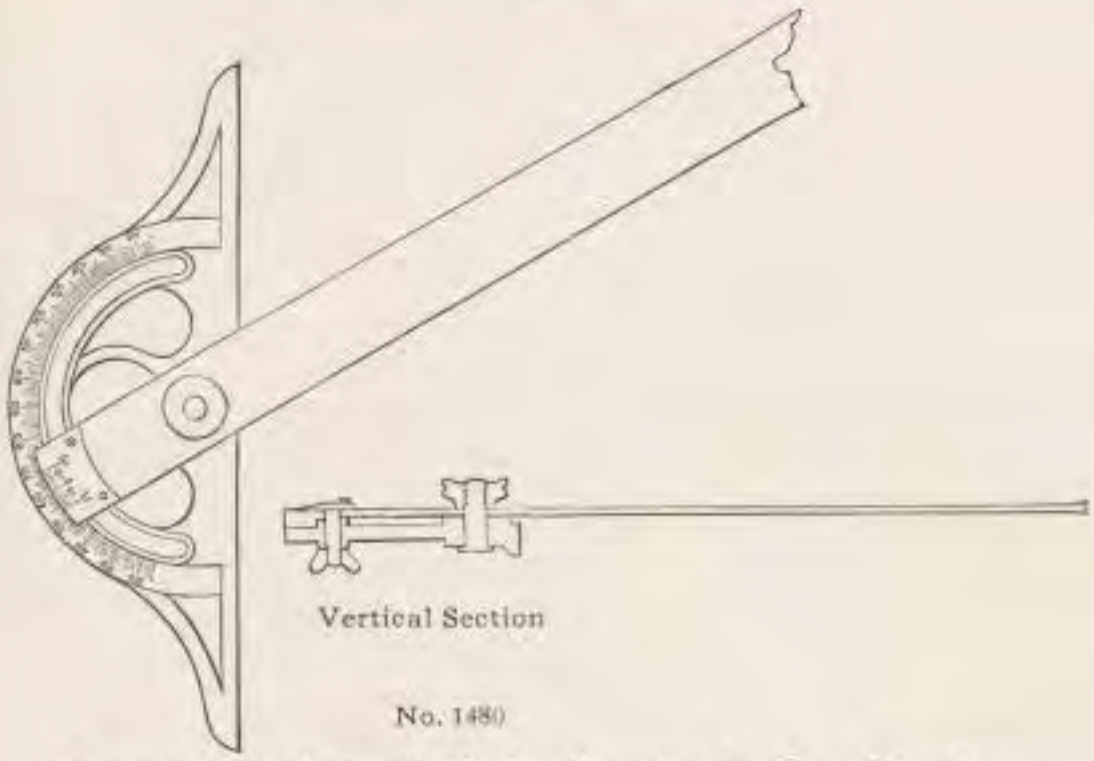
		Price	Postage
No. 1460	Protractor, half circle, 5½ in., with horn center and movable arm, divided to ½ deg., vernier reading to 3 min.	$15.00	.20
No. 1461	Protractor, half circle, 8 in., divided to ¼ deg., vernier to 1 min.	20.00	.25
No. 1462	Protractor, half circle, 10 in., divided to ¼ deg., vernier to 1 min.	22.00	.35
No. 1467	Protractor, whole circle, 10 in., divided to ¼ deg., vernier to 1 min.	23.00	.50
No. 1470	Protractor, whole circle, 8 in., with horn center and movable arm, divided to ¼ deg., vernier to 1 min., with clamp and tangent to arm.	25.00	.25

Mahogany Cases for Protractors

No. 1476	Case for Protractor No. 1460.	3.50	.25
No. 1477	Case for Protractors Nos. 1462 and 1470.	4.00	.35
No. 1478	Case for Protractor No. 1467.	5.00	.45

Protractors

Made by W. & L. E. Gurley



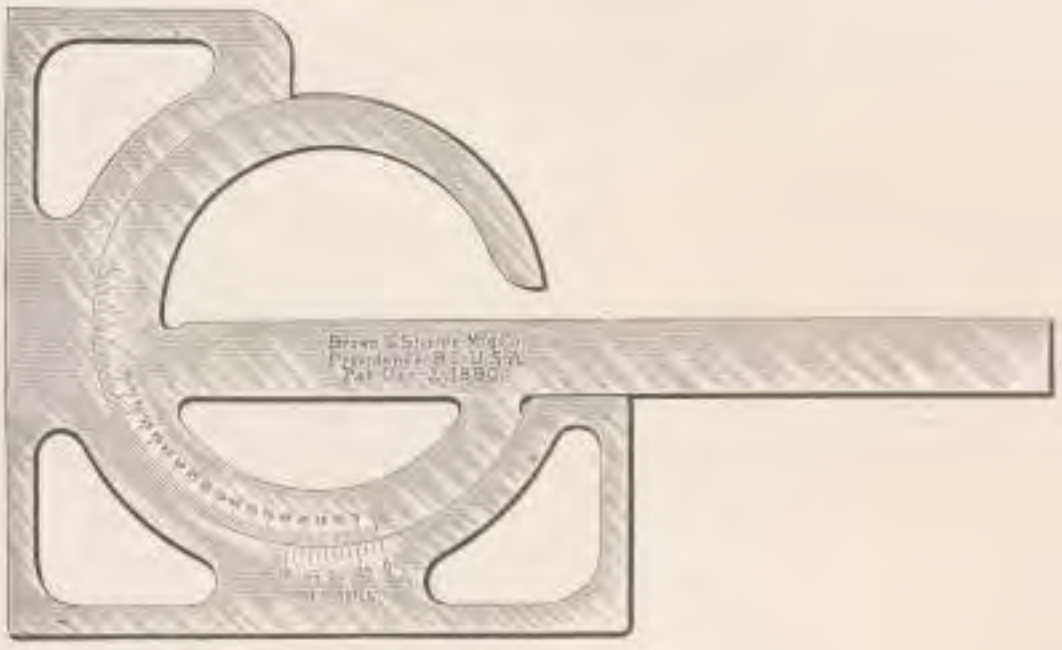
Vertical Section

No. 1480

Bronze Head, Steel Blade, Vernier to One Minute

		Price	Postage
No. 1480	Protractor, with blade 24 in.	**$10.50**	.
No. 1481	Protractor, with blade 30 in.	**11.50**	.
No. 1482	Protractor, with blade 36 in.	**14.00**	.
No. 1483	Protractor, with blade 42 in.	**18.50**	.
No. 1484	Protractor, with blade 48 in.	**21.50**	.

Draftsmans Protractors

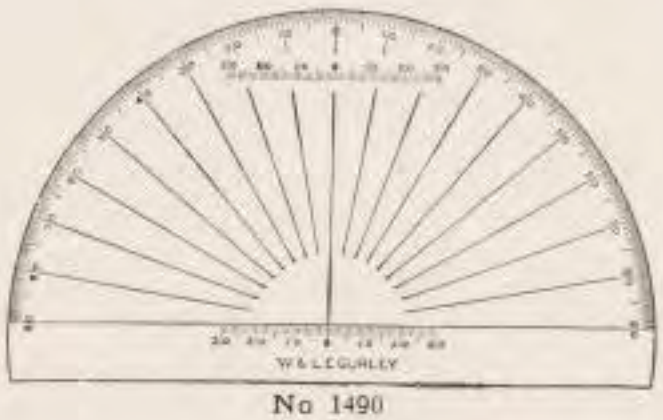


No. 1486

No. 1486 Steel Protractor, divided to 1 deg., vernier to 5 min., 8½ in. blade. It is used with the T rule or straight edge. Very convenient in dividing circles, transferring, angles, laying off angles each side of a line without resetting. In morocco case. . . . . **$10.80** **.35**

Duffield Protractors

Made by W. & L. E. Gurley



No 1490

Made of transparent celluloid, best quality, engine divided, with two parallel scales of twenty parts to the inch, so that the zero line can be set parallel to meridian lines drawn on the paper.

			Price	Postage
No. 1490	Protractor, half circle,	6 in., divided to ½ deg.....	**$3.50**	**.14**
No. 1492	Protractor, half circle,	9 in., divided to ½ deg.....	**4.00**	**.17**
No. 1494	Protractor, half circle,	12 in., divided to ¼ deg.....	**4.60**	**.20**

German Silver Protractors

Flat Edge

		Price	Postage
No. 1500	Protractor, 4 in., half circle, half degrees	$0.50	.03
No. 1502	Protractor, 5 in., half circle, half degrees	.75	.04
No. 1503	Protractor, 6 in., half circle, half degrees	1.00	.06

Brass Protractors

Flat Edge

No. 1516	Protractor, 4¼ in., half circle, whole degrees	.30	.03
No. 1518	Protractor, 5 in., half circle, half degrees	.65	.04
No. 1519	Protractor, 6 in., half circle, half degrees	.80	.06

Transparent Celluloid Protractors

Center at Inner Edge

No. 1532	Protractor, 6 in., half circle, beveled edge, half degrees	3.00	.16
No. 1533	Protractor, 8 in., half circle, beveled edge, half degrees	4.00	.18
No. 1535	Protractor, 6 in., whole circle, beveled edge, half degrees	4.50	.20
No. 1536	Protractor, 8 in., whole circle, beveled edge, half degrees	5.50	.22

Transparent Celluloid Protractors

Flat

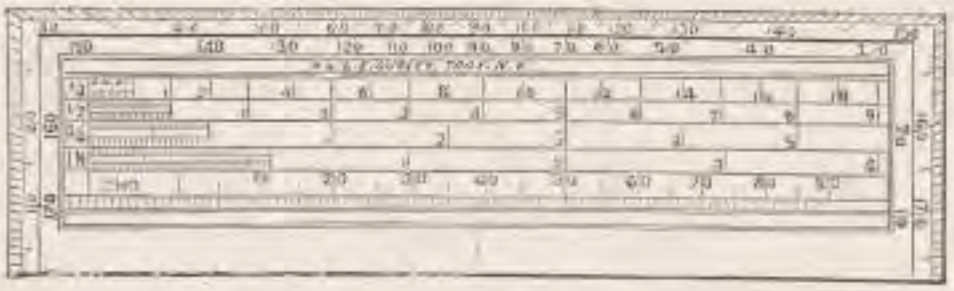
No. 1541C	Protractor, 5 in., half circle, half degrees	.60	.03
No. 1542C	Protractor, 6 in., half circle, half degrees	.75	.04
No. 1543C	Protractor, 7 in., half circle, half degrees	.95	.05
No. 1544C	Protractor, 8 in., half circle, half degrees	1.50	.16
No. 1548C	Protractor, 6 in., whole circle, half degrees	1.85	.16
No. 1549C	Protractor, 8 in., whole circle, half degrees	2.75	.18

Paper Protractors

No. 1552	Protractor, on Bristol Board, 5 in., half circle, half deg.	.10	.02
No. 1553	Protractor, on Bristol Board, 6 in., half circle, half deg.	.15	.02
No. 1554	Protractor, on Bristol Board, 5 in., half circle, half deg. and diagonal scale to inches and 100ths and millimeters	.15	.02
No. 1555	Protractor, on Bristol Board, 8 in., whole circle, half deg.	.20	.04
No. 1556	Protractor, on Bristol Board, 13 in., whole circle, quarter degrees	.40	.07
No. 1558	Protractor, on Drawing Paper, 13 in., whole circle, quarter degrees	.30	.06
No. 1559	Protractor, on Tracing Paper, 13 in., whole circle, quarter degrees	.30	.06

Scales

Ivory Protractor Scales

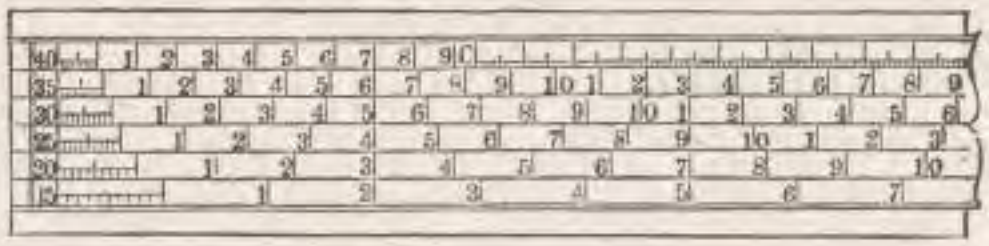


Front View. No. 1560

		Price	Postage
No. 1560	Ivory Rectangular Protractor, 6 in. long, 1¾ in. wide, with scales as follows: Front sides divided around edges from 0 to 180 deg. in single degrees, scales of ¼, ½, ¾ and 1 in. 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 100ths.....	$1.75	.14
No. 1561	Ivory Rectangular Protractor, 6 in. long by 1¾ in. wide, with scales as follows: Front side, the edge divided into single degrees from 0 to 180 deg., scales of ⅛, ¼, ⅜, ½, ⅝, ¾, ⅞ and 1 in. to the foot, and scale of chords. On the reverse side, scales of 30, 35, 40, 45, 50 and 60 parts to the inch, scale of chords and diagonal scale of 100ths.....	2.00	.14

Flat Boxwood and Ivory Scales

No. 1570	Boxwood Protractor, 6 in. long, 1¾ in. wide, divided to whole degrees, with scales ¼, ½, ¾, 1 in., diagonal scale and scale of chords.....	.60	.03
No. 1572	Boxwood Scale, 6 in., diagonal and chain scales.....	.15	.02



No. 1573

No. 1573	Ivory Scale, 6 in., with diagonal and chain scales.....	.85	.03
No. 1577	Boxwood Scale, 6 in., divided ⅛, ¼, ½ and 1 in. to the foot.....	.50	.03

Flat Boxwood and Ivory Scales

No. 1578

		Price	Postage
No. 1578	Boxwood Scale, 12 in., divided 1/8, 1/4, 1/2, 1 in. to the foot	$1.00	.05
No. 1579	Boxwood Scale, 18 in., divided 1/8, 1/4, 1/2, 1 in. to the foot	1.75	.18
No. 1580	Boxwood Scale, 24 in., divided 1/8, 1/4, 1/2, 1 in. to the foot	2.00	.22
No. 1583	Boxwood Scale, 6 in., divided 3/8, 3/4, 1 1/2, 3 in. to the foot	.75	.03
No. 1584	Boxwood Scale, 12 in., divided 3/8, 3/4, 1 1/2, 3 in. to the foot	1.00	.06
No. 1585	Boxwood Scale, 18 in., divided 3/8, 3/4, 1 1/2, 3 in. to the foot	1.75	.18
No. 1586	Boxwood Scale, 24 in., divided 3/8, 3/4, 1 1/2, 3 in. to the foot	2.00	.22
No. 1590	Boxwood White Edge Scale, 6 in., divided 1/8, 1/4, 1/2, 1 in. to the foot	1.00	.03
No. 1592	Boxwood White Edge Scale, 12 in., divided 1/8, 1/4, 1/2, 1 in. to the foot	1.50	.16
No. 1594	Boxwood White Edge Scale, 6 in., divided 3/8, 3/4, 1 1/2, 3 in. to the foot	1.00	.03
No. 1595	Boxwood White Edge Scale, 12 in., divided 3/8, 3/4, 1 1/2, 3 in. to the foot	1.50	.16
No. 1610	Maple School Rule, 12 in., divided 1/16 of an inch	.15	.03
No. 1611	Maple School Rule, 18 in., divided 1/32 of an inch, and with inlaid brass edges	.35	.10
No. 1612	School Rule, 12 in., beveled edges, divided of an inch and millimeters	.25	.05
No. 1613	School Rule, 18 in., beveled edges, divided of an inch and millimeters	.35	.10

Flat Boxwood Chain Scales

No. 1618

No. 1615	Boxwood Scale, 6 in., divided 10 and 50 parts to the in.	.75	.03
No. 1616	Boxwood Scale, 6 in., divided 20 and 40 parts to the in.	.75	.03
No. 1617	Boxwood Scale, 6 in., divided 30 and 60 parts to the in.	.75	.03
No. 1618	Boxwood Scale, 12 in., divided 10 and 50 parts to the in.	1.00	.06

Flat Boxwood Chain Scales

		Price	Postage
No. 1619	Boxwood Scale, 12 in., divided 20 and 40 parts to the in.	$1.00	.06
No. 1620	Boxwood Scale, 12 in., divided 30 and 60 parts to the in.	1.00	.06
No. 1629	Boxwood White Edge Scale, 6 in., divided 10 and 50 parts to the inch	1.00	.03
No. 1630	Boxwood White Edge Scale, 6 in., divided 20 and 40 parts to the inch	1.00	.03
No. 1631	Boxwood White Edge Scale, 6 in., divided 30 and 60 parts to the inch	1.00	.03
No. 1632	Boxwood White Edge Scale, 12 in., divided 10 and 50 parts to the inch	1.50	.16
No. 1633	Boxwood White Edge Scale, 12 in., divided 20 and 40 parts to the inch	1.50	.16
No. 1634	Boxwood White Edge Scale, 12 in., divided 30 and 60 parts to the inch	1.50	.16

Triangular Boxwood Scales

Best Quality, for Architects

No. 1655	Triangular Boxwood Scale, 6 in., divided $\frac{3}{32}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$ and 3 in. to the foot, and one edge inches and 16th	1.00	.04
No. 1656	Triangular Boxwood Scale, 12 in., divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3 and 4 in. to the foot, and one edge inches and 16ths	1.25	.16
No. 1657	Triangular Boxwood Scale, 18 in., divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3 and 4 in. to the foot, and one edge inches and 16ths	2.50	.20
No. 1658	Triangular Boxwood Scale, 24 in., divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3 and 4 in. to the foot, and one edge inches and 16ths	4.25	.25

Triangular Boxwood Chain Scales

Best Quality, for Engineers

No. 1660

		Price	Postage
No. 1660	Triangular Boxwood Scale, 6 in., divided 10, 20, 30, 40, 50 and 60 parts to the inch	$1.00	.04
No. 1661	Triangular Boxwood Scale, 12 in., divided 10, 20, 30, 40, 50 and 60 parts to the inch	1.25	.16
No. 1662	Triangular Boxwood Scale, 18 in., divided 10, 20, 30, 40, 50 and 60 parts to the inch	2.50	.20
No. 1663	Triangular Boxwood Scale, 24 in., divided 10, 20 30, 40, 50 and 60 parts to the inch	4.25	.25
No. 1663	Triangular Boxwood Scale, 12 in., divided 20, 30, 40, 50, 60 and 80 parts to the inch	1.25	.16
No. 1670	Triangular Boxwood Scale, 12 in., divided 100, 200, 300, 400, 500 and 600 parts to the foot	1.50	.16

Triangular Boxwood Scales

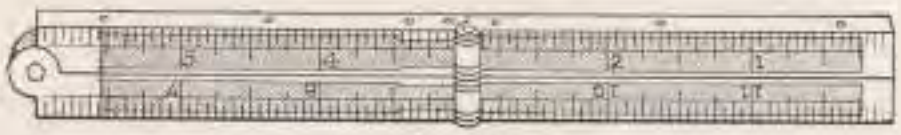
With White Edges

No. 1674	White Edge Scale, 6 in., divided same as No. 1655	1.75	.14
No. 1675	White Edge Scale, 12 in., divided same as No. 1656	3.00	.16
No. 1678	White Edge Scale, 6 in., divided same as No. 1660	1.75	.14
No. 1679	White Edge Scale, 12 in., divided same as No. 1661	3.00	.16
No. 1682	White Edge Scale, 12 in., divided same as No. 1665	3.00	.16
No. 1684	White Edge Scale, 12 in., divided same as No. 1670	3.00	.16
No. 1698	Metal Guard for Triangular Scale (preventing errors)	.20	.02

Metric Scales and Rules

		Price	Postage
No. 1700	Flat Boxwood Scale, 20 centimeters, divided to millimeters and half millimeters	$1.00	.04
No. 1701	Flat Boxwood Scale, 30 centimeters, divided to millimeters and ½ millimeters	1.25	.06
No. 1702	Flat Boxwood Scale, 50 centimeters, divided to millimeters and ½ millimeters	1.75	.18
No. 1703	Flat White Edge Scale, 20 centimeters, divided to millimeters and ½ millimeters	1.25	.14
No. 1704	Flat White Edge Scale, 30 centimeters, divided to millimeters and ½ millimeters	1.50	.16
No. 1706	Triangular Boxwood Scale, 20 centimeters, divided .01, .02, .03, .05, .025, .0125	1.25	.05
No. 1707	Triangular Boxwood Scale, 30 centimeters, divided to .01, .02, .03, .05, .025, .0125	1.50	.16
No. 1710	Triangular Boxwood Scale, 30 centimeters, divided to millimeters and ½ millimeters, also to 10ths, 12ths and 16ths of inches, and 100ths of a foot	2.50	.16
No. 1712	Triangular White Edge Scale, 30 centimeters, divided same as No. 1707	3.00	.16
No. 1714	Triangular White Edge Scale, 30 centimeters, divided same as No. 1710	3.50	.16
No. 1718	Flexible Wood Rule, 4 ft., eight-fold, divided to millimeters and 16ths of inches, spring joints	.35	.05
No. 1719	Flexible Wood Rule, same as No. 1718, and with white enamel finish	.50	.05

Boxwood Rules



No. 1735

No. 1735	Boxwood Rule, 1 ft., four-fold, 8ths and 16ths of inches	.15	.03
No. 1736	Boxwood Rule, 1 ft., four-fold, edge plates, 8ths and 16ths of inches	.20	.03
No. 1737	Boxwood Rule, 1 ft., four-fold, brass edges, bound, 8ths and 16ths of inches	.40	.04
No. 1740	Boxwood Rule, 2 ft., four-fold, 8ths and 16ths of inches	.20	.05
No. 1741	Boxwood Rule, 2 ft., four-fold, edge plates, 8ths, 10ths, 12ths and 16ths of inches, and drafting scales	.35	.05
No. 1742	Boxwood Rule, 2 ft., four-fold, brass edges, bound, 8ths, 10ths, 12ths and 16ths of inches, and drafting scales	.70	.06
No. 1743	Boxwood Rule, 2 ft., four-fold, edge plates, 8ths, 10ths, 12ths and 16ths of inches, and drafting scales, and inside beveled edges	.70	.05
No. 1745	Boxwood Caliper Rule, 1 ft., four-fold, edge plates, 8ths, 10ths, 12ths and 16ths of inches	.70	.04

Ivory Rules

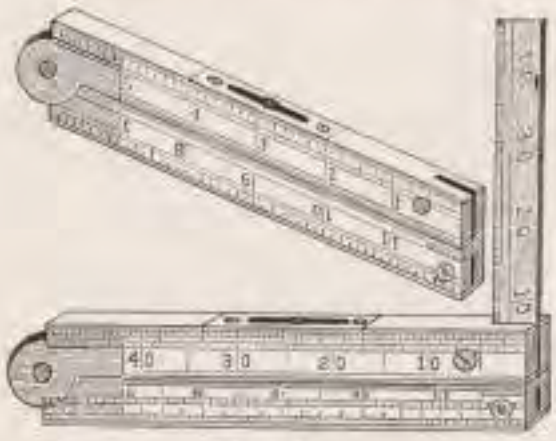
		Price	Postage
No. 1747	Ivory Rule, 1 ft., four-fold, edge plates, 8ths, 10ths, 12ths and 16ths of inches	$2.45	.14
No. 1748	Ivory Rule, 1 ft., four-fold, edge plates, 8ths, 10ths, 12ths and 16ths of inches and 100ths of a foot	3.00	.14
No. 1749	Ivory Rule, 1 ft., four-fold, German silver edges, bound, divided like No. 1747	3.50	.15
No. 1750	Ivory Caliper Rule, 1 ft., four-fold, edge plates, divided like No. 1747	3.75	.15
No. 1751	Ivory Caliper Rule, 1 ft., four-fold, German silver edges, bound, divided like No. 1747	4.65	.15
No. 1753	Ivory Rule, 2 ft., four-fold, edge plates, 8ths, 10ths, 12ths and 16ths of inches, and 100ths of a foot	6.30	.17
No. 1754	Ivory Rule, 2 ft., four-fold, German silver edges, bound, 8ths, 10ths, 12ths and 16ths of inches, and drafting scales	8.00	.18

Flexible Wood Rules

No. 1755A to No. 1757A

No. 1755A	Flexible Wood Rule, yellow finish, 4 ft., eight-fold, divided to 16ths of an inch and 100ths of a foot, with spring joints	.45	.05
No. 1755B	Flexible Wood Rule, same as No. 1755A, and with white enamel finish	.50	.05
No. 1755C	Flexible Wood Rule, yellow finish, 6 ft., twelve-fold, divided same as No. 1755A	.65	.08
No. 1755D	Flexible Wood Rule, same as No. 1755C, and with white enamel finish	.75	.08
No. 1756A	Flexible Wood Rule, yellow finish, 4 ft., eight-fold, divided alike on both sides to 16ths of inches, and with spring joints	.45	.05
No. 1756B	Flexible Wood Rule, same as No. 1756A, and with white enamel finish	.50	.05
No. 1757	Flexible Wood Rule, yellow finish, 6 ft., twelve-fold, divided same as No. 1756A	.65	.05
No. 1757A	Flexible Wood Rule, same as No. 1757, and with white enamel finish	.75	.08

Boxwood Combination Rule



No. 1760

		Price	Postage
No. 1760	Boxwood Combination Rule, 1 ft., two-fold. It combines in itself a Carpenters Rule, Spirit Level, Square, Plumb, Level, Indicator, Brace, Scale, Drafting Scale of equal parts, T Square, Protractor, Right Angle Triangle, etc.	$3.00	.17

Slide Rules

No. 1764B

		Price	Postage
No. 1763	Students Slide Rule, for beginners, 10 in., with indicator and directions	$1.50	.15
No. 1764	Engineers Adjustable Mannheim Slide Rule, 5 in., divided on white facings, with glass indicator and directions	6.50	.10
No. 1764A	Engineers Adjustable Mannheim Slide Rule, 8 in., divided on white facings, with glass indicator and directions	6.70	.15
No. 1764B	Engineers Adjustable Mannheim Slide Rule, 10 in., divided on white facings, with glass indicator and directions	5.50	.15
No. 1764C	Engineers Adjustable Mannheim Slide Rule, 16 in., divided on white facings, with glass indicator and directions	13.50	.30
No. 1764D	Engineers Adjustable Mannheim Slide Rule, 20 in., divided on white facings, with glass indicator and directions	15.50	.35
No. 1764E	Magnifier, in metal frame, fitted for 8 in. Mannheim Slide Rule	2.25	.14
No. 1764F	Magnifier, in metal frame, fitted for 10, 16 and 20 in. Mannheim Slide Rules	2.50	.15

Slide Rules

		Price	Postage
No. 1767	Polyphase Duplex Slide Rule, 10 in., divided on white facings, with glass indicator and both arithmetical and trigonometrical slides and directions.....	$8.00	.20
No. 1767A	Log Log Duplex Rule, adjustable, 10 in., divided on white facings, glass indicator and directions.....	9.50	.20
No. 1767B	Mannheim Polyphase Slide Rule, adjustable, 10 in., divided on white facings, glass indicator and directions	6.00	.15
No. 1768	Stadia Slide Rule, 20 in., divided on white facings. This rule is designed to solve the equations generally used in stadia measurements.....	15.50	.35

Straight Edges

Steel Straight Edges, Nickel-plated

Square Edges

		Price	Postage			Price	Postage
No. 1800	15 in.	$1.40	.17	No. 1804	36 in.	$4.00	.45
No. 1801	18 in.	1.60	.20	No. 1805	42 in.	5.20	.50
No. 1802	24 in.	2.40	.25	No. 1806	48 in.	7.25	.60
No. 1803	30 in.	3.20	.30	No. 1807	60 in.	9.50	.70

Steel Straight Edges, Nickel-plated

One Edge Beveled

		Price	Postage			Price	Postage
No. 1810	18 in.	$2.25	.20	No. 1813	36 in.	$5.50	.45
No. 1811	24 in.	3.35	.25	No. 1814	42 in.	7.15	.50
No. 1812	30 in.	4.40	.30	No. 1815	48 in.	8.80	.60

Mahogany Straight Edges, Amber Lined

Square Edges

No. 1820	18 in.	$0.90	.06	No. 1823	36 in.	$1.90	.25
No. 1821	24 in.	1.10	.18	No. 1824	42 in.	2.50	.30
No. 1822	30 in.	1.25	.20	No. 1825	48 in.	3.00	.35

Mahogany Straight Edges, Ebony Lined

Square Edges

No. 1830	24 in.	$0.50	.08	No. 1833	42 in.	$1.00	.30
No. 1831	30 in.	.60	.10	No. 1834	48 in.	1.35	.35
No. 1832	36 in.	.80	.15	No. 1835	60 in.	2.00	.40

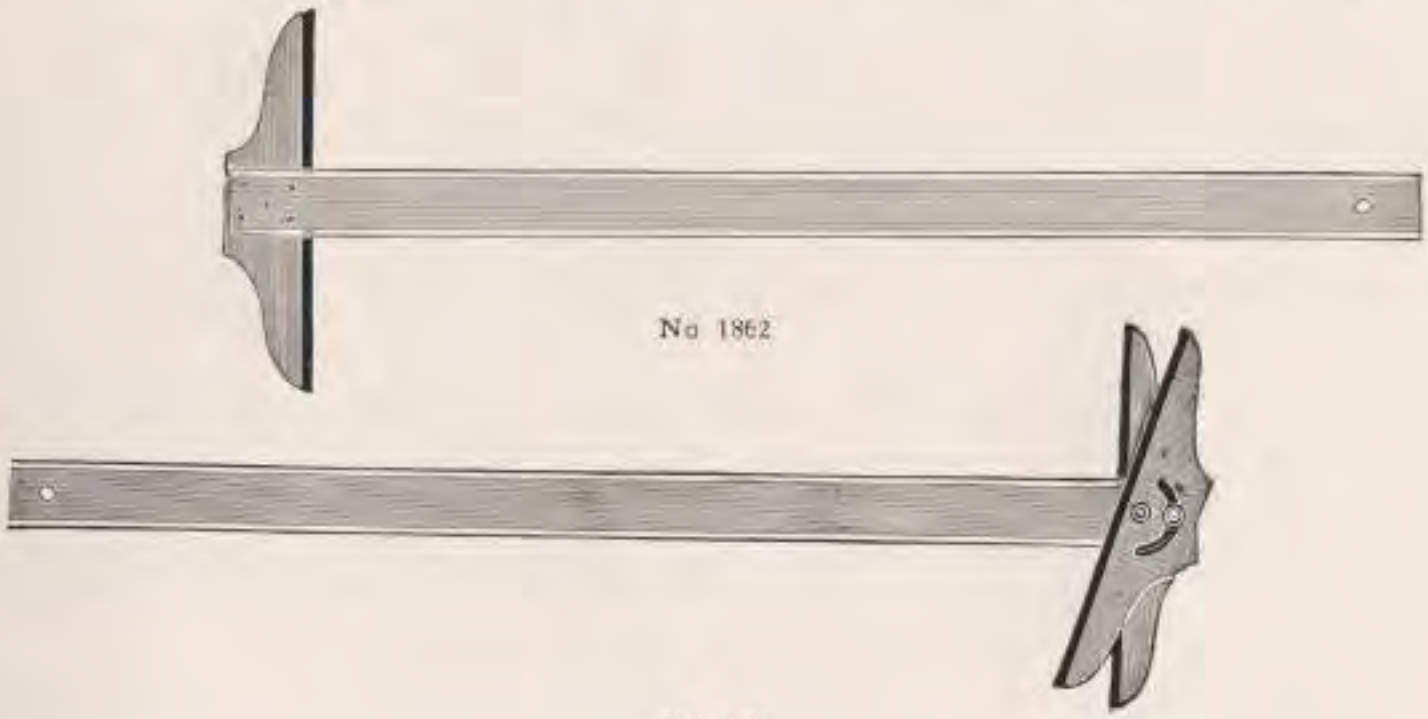
Maple Straight Edges

One Edge Beveled

No. 1850	18 in.	$0.25	.06	No. 1854	42 in.	$0.75	.20
No. 1851	24 in.	.35	.08	No. 1855	48 in.	1.00	.25
No. 1852	30 in.	.40	.10	No. 1856	60 in.	1.50	.40
No. 1853	36 in.	.60	.15	No. 1857	72 in.	2.00	.50

T Squares

Mahogany T Squares, with Amber Edges and Fixed Head



No. 1862

No. 1872

		Price	Postage			Price	Postage
No. 1860	18 in.	$1.10	.25	No. 1863	36 in.	$2.15	
No. 1861	24 in.	1.50	.35	No. 1864	42 in.	2.50	
No. 1862	30 in.	1.85	.45	No. 1865	48 in.	3.00	

Mahogany T Squares, with Amber Edges and Shifting Head

No. 1870	18 in.	$1.90	.30	No. 1873	36 in.	$3.20	
No. 1871	24 in.	2.45	.30	No. 1874	42 in.	3.60	
No. 1872	30 in.	2.80	.50	No. 1875	48 in.	4.20	

Steel Blade T Squares, Nickel-plated, with Fixed Japanned Iron Head

No. 1896	18 in.	$4.50	.35	No. 1898	30 in.	$6.50	.45
No. 1897	24 in.	5.00	.40	No. 1899	36 in.	8.50	

Steel Blade T Squares, Nickel-plated, with Shifting Japanned Iron Head

No. 1902	18 in.	$6.00	.45	No. 1904	30 in.	$8.00	.55
No. 1903	24 in.	6.70	.50	No. 1905	36 in.	9.50	

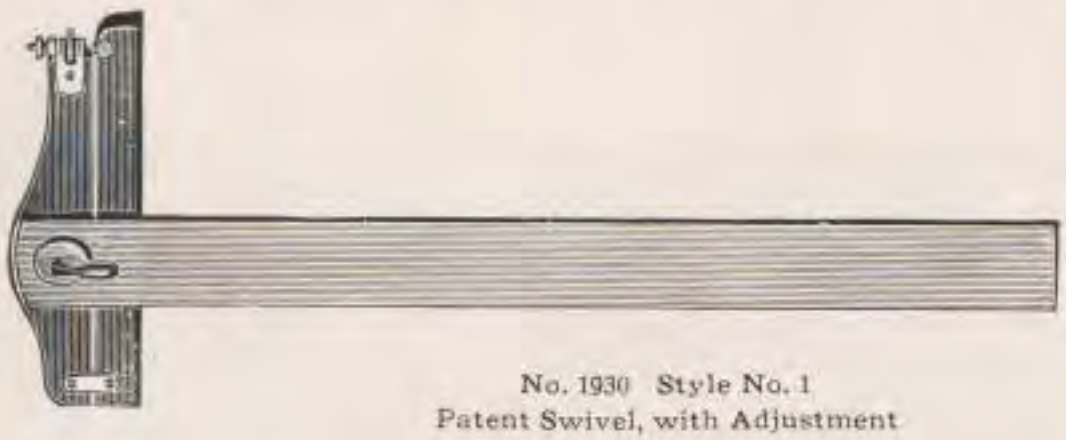
Maple T Squares, Fixed Head

		Price	Postage			Price	Postage
No. 1908	15 in.	$0.25	.15	No. 1911	30 in.	$0.45	.45
No. 1909	20 in.	.30	.25	No. 1912	40 in.	.65	
No. 1910	25 in.	.35	.35	No. 1913	50 in.	1.00	

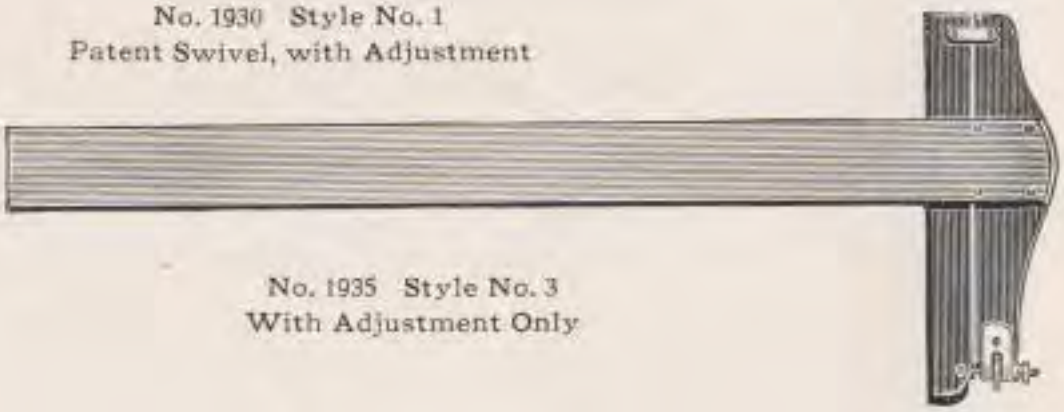
Maple T Squares, Shifting Head

No. 1916	15 in.	$0.75	.20	No. 1919	30 in.	$1.25	.50
No. 1917	20 in.	.85	.30	No. 1920	40 in.	1.50	
No. 1918	25 in.	1.00	.40	No. 1921	50 in.	2.00	

T Squares, with Deanes Patent Swivel and Adjustment



No. 1930 Style No. 1
Patent Swivel, with Adjustment



No. 1935 Style No. 3
With Adjustment Only

Mahogany Blades with Amber Edges

		Price	Postage
No. 1930	24 in., Style No. 1	$3.25	.40
No. 1931	30 in., Style No. 1	3.65	.45
No. 1932	36 in., Style No. 1	4.25	
No. 1935	24 in., Style No. 3	2.75	.38
No. 1936	30 in., Style No. 3	3.25	.43
No. 1937	36 in., Style No. 3	3.75	

Drawing Tables

No. 1947

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 casters.

		Price
No. 1945	Drawing Table, hardwood top, 24 x 22 in.	**$12.00**
No. 1946	Drawing Table, hardwood top, 24 x 22 in., and with instrument shelf, 24 x 7 in.	**14.25**
No. 1947	Drawing Table, hardwood top, 26 x 22 in., instrument shelf, 26 x 7 in., two instrument drawers, ornamented stand	**17.00**
No. 1949	Drawing Table, hardwood top, 26 x 22 in., with instrument shelf and two drawers, and with folding arm and plain shelf, ornamented stand	**22.00**

Worcester Drawing Table

No. 1950

These tables are adjustable for horizontal, angular and vertical movements.

		Price
No. 1950	Drawing Table, with white pine drawing board, 42 x 31 in., and substantial iron stand, adjustable	$48.00
No. 1951	Drawing Table, with white pine drawing board, 55 x 33 in., and substantial iron stand, adjustable	50.00
No. 1952	Drawing Table, with white pine drawing board, 60 x 36 in., with substantial iron stand, adjustable	52.00

Drawing Boards and Trestles

No. 1960	Drawing Board, pinewood, 14 x 10 in.	.75
No. 1962	Drawing Board, pinewood, 21 x 16 in., tongue and groove ends	1.25
No. 1964	Drawing Board, pinewood, 28 x 20 in., tongue and groove ends	1.50
No. 1966	Drawing Board, pinewood, 40 x 28 in., tongue and groove ends	3.50
No. 1967	Drawing Board, best white pine, 55 x 33 in., expansion cleats	14.00
No. 1975	Pinewood Horses, 37 in. high, 35 in. long, with removable sloping ledges. Per pair	8.00
No. 1977	Folding Trestle, hardwood, 37 in. high, 33 in. long, 26 in. wide	12.00

Drawing Boards and Trestles

No. 1978

		Price
No. 1978	Folding Trestle, hardwood, 37 in. high, combined with adjustable Drawing Board of pinewood, 42 x 31 in., and hinged to Trestle. All folding compactly	$16.75
No. 1979	Folding Trestle and Drawing Board, same as No. 1978, but with the Drawing Board 55 x 33 in.	20.00

Drawing Boards and Trestles of any size made to order.

Triangles

Open Center Steel Triangles, Nickel-plated

30° x 60° x 90°

		Price	Postage			Price	Postage
No. 1982	6 in.	$3.50	.15	No. 1986	10 in.	$4.75	.25
No. 1984	8 in.	4.25	.20	No. 1989	15 in.	7.25	.40

Open Center Steel Triangles, Nickel-plated

45° x 45° x 90°

No. 1992	6 in.	$4.00	.18	No. 1996	10 in.	$6.25	.35
No. 1994	8 in.	4.75	.25	No. 1998	12 in.	7.25	.45

Open Center German Silver Triangles

30° x 60° x 90°

No. 2002	5½ in.	$3.00	.15	No. 2006	10 in.	$4.80	.25
No. 2004	8 in.	3.60	.20	No. 2008	12 in.	6.00	.30

45° x 45° x 90°

No. 2012	6 in.	$3.30	.18	No. 2016	10 in.	$6.00	.35
No. 2014	8 in.	4.80	.25	No. 2018	12 in.	7.80	.45

Transparent Amber Triangles

Nos. 2022 to 2034
30° x 60° x 90°

Nos. 2036 to 2048
45° x 45° x 90°

30° x 60° x 90°

		Price	Postage			Price	Postage
No. 2022	4 in.	$0.25	.03	No. 2028	10 in.	$0.75	.08
No. 2024	6 in.	.40	.04	No. 2030	12 in.	1.00	.18
No. 2026	8 in.	.55	.06	No. 2032	14 in.	1.65	.20
				No. 2034	16 in.	2.50	

45° x 45° x 90°

No. 2036	4 in.	$0.35	.04	No. 2042	8 in.	$0.75	.08
No. 2038	6 in.	.55	.05	No. 2044	10 in.	1.10	.18
No. 2040	7 in.	.65	.07	No. 2046	12 in.	1.65	.20
				No. 2048	14 in.	2.25	

Hard Rubber Triangles, Open Center

30° x 60° x 90°

No. 2052	4 in	$0.20	.03	No. 2058	10 in.	$0.65	.08
No. 2054	6 in.	.30	.04	No. 2060	12 in.	.90	.10
No. 2055	7 in.	35	.05	No. 2062	14 in.	1.25	.20
No. 2056	8 in.	.45	.06	No. 2064	16 in.	1.50	.25

45° x 45° x 90°

No. 2074	4 in.	$0.25	.04	No. 2078	8 in.	$0.65	.08
No. 2075	5 in.	.35	.05	No. 2080	10 in.	.95	.10
No. 2076	6 in.	.45	.05	No. 2082	12 in.	1.30	.20
No. 2077	7 in.	.50	.07	No. 2084	14 in.	1.85	.25

Hardwood Triangles, Open Center, Framed

30° x 60° x 90°

No. 2092	6 in.	$0.16	.04	No. 2098	12 in.	$0.30	.10
No. 2094	8 in.	.20	.06	No. 2100	14 in.	.38	.12
No. 2096	10 in.	.25	.08	No. 2102	15 in.	.45	.18

45° x 45° x 90°

No. 2107	5 in.	$0.16	.05	No. 2110	8 in.	$0.24	.08
No. 2108	6 in.	.18	.05	No. 2112	10 in.	.30	.10
No. 2109	7 in.	.21	.08	No. 2114	12 in.	.35	.12

Hardwood Triangles, Plain

30° x 60° x 90°

		Price	Postage			Price	Postage
No. 2120	4 in.	$0.08	.03	No. 2124	8 in.	$0.16	.06
No. 2122	6 in.	.12	.04	No. 2126	10 in.	.20	.08

45° x 45° x 90°

No. 2130	4 in.	$0.10	.04	No. 2132	6 in.	$0.15	.05
No. 2131	5 in.	.12	.05	No. 2134	8 in.	.20	.08

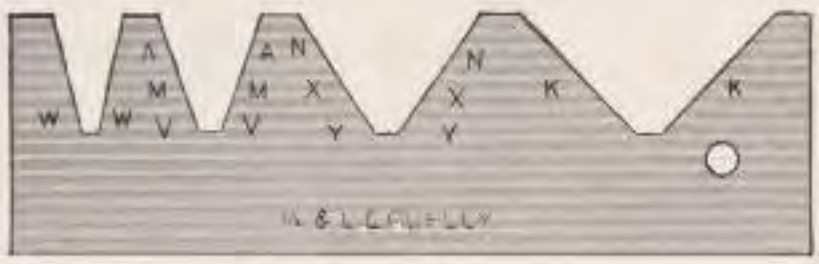
Hard Rubber Lettering Triangles

No. 2140

No. 2140 Lettering Triangles for Block Letters, 3½ in., three in a set. Per set ..... $1.35 .15

No. 2145

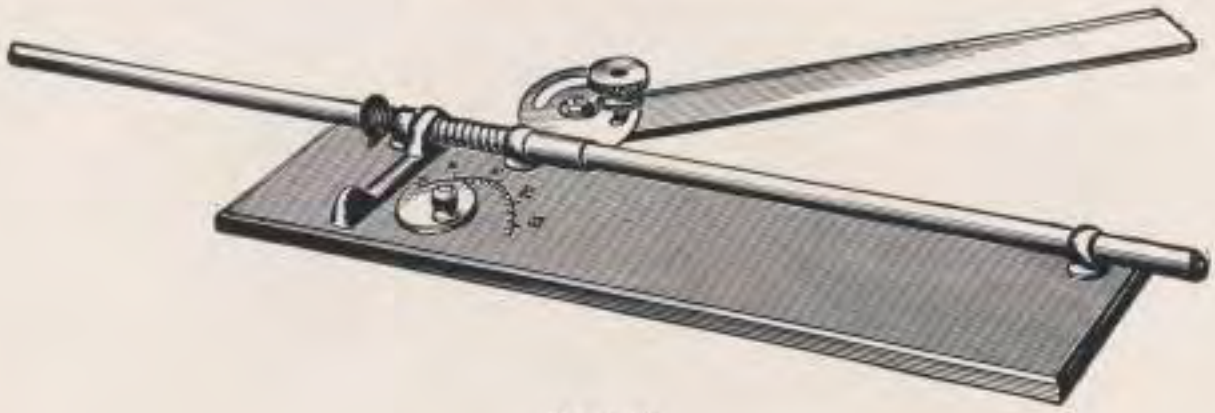
No. 2145 Lettering Triangles for Shaded Letters, 3½ in., three in a set. Per set ..... 1.20 .15



No. 2147

No. 2147 Transparent Amber Lettering Templets, three in a set. Per set ..... 2.00 .17

Section Liners



No. 2170

		Price	Postage
No. 2170	Standard Section Liner with transparent amber blade. Especially adapted for school use and mechanical sectional drawing	$2.25	.20
No. 2171	Section Liner, triangle of transparent amber, straight-edge of boxwood, German silver Mountings, a very reliable and simple instrument. There is hardly any practice required to operate it to perfection. By the 2 scales with verniers, on the metal plates. the distances are regulated to $\frac{1}{100}$ th inch or $\frac{1}{10}$ th millimeter, each	3.50	.20

Irregular Curves of Hard Rubber, Amber and Wood

Nos. 2180, 2182 and 2184

		Price	Postage
No. 2180	Hard Rubber Curves, Nos. 1, 2, 5, 14, 15, 16, 17, 18, 22, 23, 25, and 26. Each	$0.35	.03
	Hard Rubber Curves, Nos. 13, 19, 20 and 21. Each	.45	.03
	Hard Rubber Curves, Nos. 3, 4 and 24. Each	.50	.05
	Hard Rubber Curve, No. 27	.75	.08
	Hard Rubber Curve, No. 28	2.00	.18
No. 2182	Transparent Amber Curves, Nos. 1, 2, 5, 16, 22, 25 and 26. Each	.45	.03
	Transparent Amber Curves, Nos. 3, 4, 13, 19 and 20. Each	.60	.05
	Transparent Amber Curve, No. 24	.75	.05
	Transparent Amber Curve, No. 27	.90	.08
	Transparent Amber Curve, Logarithmic Spiral, No. 29	1.75	.15
No. 2184	Wood Curves, Nos. 1, 5, 21, 25 and 26. Each	.25	.03
	Wood Curves, Nos. 3, 4, 13, 19, 20 and 24. Each	.30	.05
	Wood Curve, No. 27	.35	.08

Adjustable Curve Ruler

No. 2186

These rulers can be instantly adjusted and retained to any form of curve.

This tool is recommended by architects and draftsmen, and meets a long felt want. It is well made, neatly finished and nickel-plated.

		Price	Postage
No. 2186	Adjustable Curve Ruler, 14½ in. long	$2.25	.16
No. 2187	Adjustable Curve Ruler, 30 in. long	3.75	.35

Railroad Curves

Sets Nos. 2210 and 2211 consist of 10 Curves, cut to a scale of inches, from 12 to 120 in. radius, varying every 12 ins.

No. 2210	Rubber Curves, in wood box	$6.50	.30
No. 2211	Wood Curves, in wood box	3.50	.30

Sets Nos. 2214 and 2215 consist of 24 Curves, cut to a scale of inches, from 1½ to 24 in. radius, varying every ½ in. up to 10 in., and then every 2 in. up to 24 in.

No. 2214	Rubber Curves, in wood box	15.00	.40
No. 2215	Wood Curves, in wood box	9.00	.40

Sets Nos. 2218 and 2219 consist of 10 Curves, cut to a scale of 40 ft. to the inch, from 1 deg. to 10 deg., varying every degree.

No. 2218	Rubber Curves, in wood box	6.50	.30
No. 2219	Wood Curves, in wood box	3.50	.30

Sets Nos. 2222 and 2223 consist of 20 curves, cut to a scale of 40 feet to the inch, from 1 deg. to 20 deg., varying every degree.

No. 2222	Rubber Curves, in wood box	12.50	.35
No. 2223	Wood Curves, in wood box	7.50	.35

Sets Nos. 2226 and 2227 consist of 12 Curves, cut to a scale of 100 ft. to the inch, from 1 deg. to 12 deg., varying every degree.

No. 2226	Rubber Curves, in wood box	8.00	.30
No. 2227	Wood Curves, in wood box	5.00	.30

Sets Nos. 2238 and 2239 consist of 20 Curves, cut to a scale of 400 ft. to the in., from 30 min. to 10 deg., varying every 30 min.

No. 2238	Rubber Curves, in wood box	12.50	.35
No. 2239	Wood Curves, in wood box	7.50	.35

Parallel Rules

No. 2250

Ebony Parallel Rules

		Price	Postage			Price	Postage
No. 2250	6 in.	$0.35	.04	No. 2253	15 in.	$1.00	.20
No. 2251	9 in.	.55	.06	No. 2254	18 in.	1.25	.22
No. 2252	12 in.	.75	.08	No. 2255	24 in.	1.75	.25

Black Amber Parallel Rules

No. 2260	6 in.	$0.75	.04	No. 2262	12 in.	$1.25	.18
No. 2261	9 in.	1.00	.06	No. 2263	15 in.	1.50	.20

Ebony Parallel Rules on Rollers

No. 2270	9 in.	$2.75	.20	No. 2272	15 in.	$4.00	.30
No. 2271	12 in.	3.25	.25	No. 2273	18 in.	5.00	.35

Hard Rubber Parallel Rules on Rollers

No. 2275	9 in.	$3.50	.20	No. 2277	15 in.	$5.00	.30
No. 2276	12 in.	4.25	.25	No. 2278	18 in.	6.00	.35

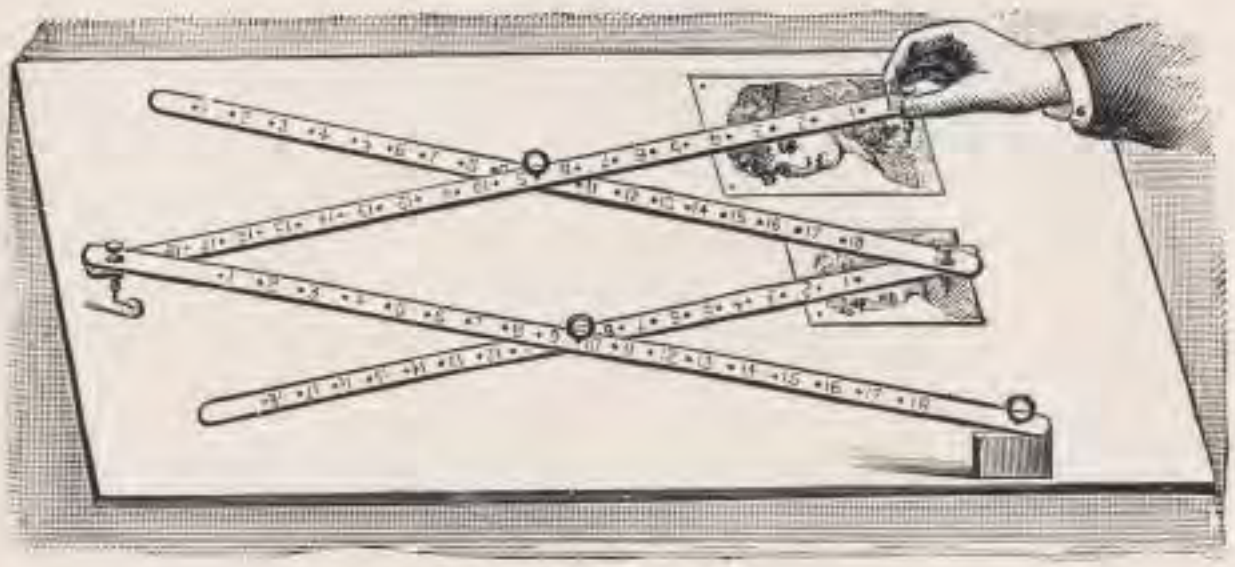
Brass Parallel Rules on Rollers

No. 2286	12 in.	$9.50	.40	No. 2288	18 in.	$14.00

German Silver Parallel Rules on Rollers

No. 2293	12 in.	$15.00	.40	No. 2295	18 in.	$22.00

Pantographs for Enlarging or Reducing Drawings



No. 2300

		Price	Postage
No. 2300	Pantograph, hardwood, nickel-plated mountings, adjustable lead, bars 21 in.; for reducing and enlarging drawings in 25 ratios, 8 : 1 to 1⅛ : 1, in plain box, with directions. Each	$1.50	
No. 2302	Pantograph, polished hardwood, fancy lined, bars 21 in., metal foot; tracer and lead point interchangeable, for reducing and enlarging drawings in 34 ratios, from 8 : 1 to 1⅛ : 1 or vice versa, in plain box, with directions. Each	2.50	
No. 2306	Pantograph, same as No. 2302, but bars 41 in., and joints formed by bolts and thumb nuts. Each	7.00	

Drawing Paper

Note: Small quantities of paper must be rolled on a paste-board tube when sent by mail. Several yards can be sent on a single tube, with but little extra for postage. The pound price for papers Nos. 2389 to 2435 applies only to full rolls.

Architects Paper for Plans

White, Strong, Smooth Surface

No. 2350	Medium, 23 x 18 in., per sheet, 8 cents; per quire	$1.50	.48
No. 2352	Super Royal, 28 x 20 in., per sheet, 10 cents; per quire	2.00	.60
No. 2355	30 in. wide, per roll of 10 yards	1.50	.40
No. 2356	36 in. wide, per roll of 10 yards	1.75	.50
No. 2357	42 in. wide, per roll of 10 yards	2.00	.60

Whatmans White Drawing Paper

Selected, Best Quality, Grained Surface

No. 2360	Demy, 20 x 15 in., per sheet, 9 cents; per quire	$1.70	.28
No. 2361	Medium, 22 x 17 in., per sheet, 12 cents; per quire	2.40	.40
No. 2362	Royal, 24 x 19 in., per sheet, 15 cents; per quire	3.15	.50
No. 2363	Super Royal, 27 x 19 in., per sheet, 19 cents; per quire	3.70	.55
No. 2365	Imperial, 30 x 22 in., per sheet, 26 cents; per quire	5.50	.68
No. 2368	Double Elephant, 40 x 26 inches, per sheet, 50 cents; per quire	10.15	1.38

Whatman's Drawing Paper

Mounted on Muslin

		Price	Postage
No. 2370	Royal, 24 x 19 in., per sheet	$0.65	.10
No. 2372	Imperial, 30 x 22 in., per sheet	1.00	.13
No. 2374	Double Elephant, 40 x 27 in., per sheet	1.75	.18

Bristol Board Drawing Paper

No. 2380	Patent Office Bristol Board, 15 x 10 in., per sheet, 12 cents; per dozen	1.25	.20
No. 2381	Bristol Board, 20 x 15 in., per sheet, 25 cents; per doz.	2.50	.50
No. 2385	Patent Office Bristol Board, printed with border, etc., 15 x 10 in., per sheet, 15 cents; per dozen	1.40	.20

Detail Drawing Paper, Cream Buff Tint

Superior Quality in Rolls of 35 to 40 Pounds

No. 2389	30 in. wide, per pound, 40 cents; per yard	$0.20	.10
No. 2390	36 in. wide, per pound, 40 cents; per yard	.25	.12
No. 2391	42 in. wide, per pound, 40 cents; per yard	.30	.20

Bleached Manila Paper

For Workshop Drawings, Best American Make

In Rolls of About 50 Pounds

No. 2395	36 in. wide, medium, per pound, 20 cents; per yard	$0.15	.12
No. 2396	42 in. wide, medium, per pound, 20 cents; per yard	.18	.14
No. 2397	48 in. wide, medium, per pound, 20 cents; per yard	.20	.20
No. 2398	54 in. wide, medium, per pound, 20 cents; per yard	.25	.25

American White Roll Drawing Paper

Very Strong and of Excellent Quality

In Rolls of About 40 Pounds

No. 2410	36 in. wide, smooth surface, per lb., 65 cents; per yd.	$0.40	.12
No. 2411	42 in. wide, smooth surface, per lb., 65 cents; per yd.	.45	.14
No. 2413	62 in. wide, smooth surface, per lb., 65 cents; per yd.	.70	
No. 2414	72 in. wide, smooth surface, per lb., 65 cents; per yd.	.90	

Excelsior White Roll Drawing Paper

In Rolls of About 40 Pounds

No. 2420	36 in. wide, grained surface, per lb., 50 cents; per yd.	$0.30	.12
No. 2421	42 in. wide, grained surface, per lb., 50 cents; per yd.	.35	.14

Best White Eggshell Drawing Paper

In Rolls of About 40 Pounds

No. 2430	36 in. wide, pebbled surface, per lb., 70 cents; per yd.	$0.50	.13
No. 2431	42 in. wide, pebbled surface, per lb., 70 cents; per yd.	.60	.15
No. 2434	58 in. wide, pebbled surface, per lb., 70 cents; per yd.	.75	
No. 2435	58 in. wide, thick, pebbled surface, per lb., 70 cents; per yd.	.90	

Mounted Drawing Paper

White, Mounted on Muslin. In Rolls of 10 Yards

		Price	Postage
No. 2450	American, 36 in. wide, smooth surface, per roll, $12.00; per yard	$1.35	.25
No. 2451	American, 42 in. wide, smooth surface, per roll, $14.00; per yard	1.75	.30
No. 2453	American, 62 in. wide, smooth surface, per roll, $21.00; per yard	2.65	
No. 2454	American, 72 in. wide, smooth surface, per roll, $25.00; per yard	3.25	
No. 2460	Eggshell, 36 in. wide, pebbled surface, per roll, $14.00; per yard	1.60	.25
No. 2461	Eggshell, 42 in. wide, pebbled surface, per roll, $16.50; per yard	1.85	.30
No. 2463	Eggshell, 58 in. wide, medium thick, pebbled surface, per roll, $23.00 per yard	2.50	
No. 2464	Eggshell, 58 in. wide, thick, pebbled surface, per roll, $25.00; per yard	2.75	
No. 2467	Paper Cloth, 38 in. wide, smooth surface, per yard	1.25	.20

Large pieces for city, county, or state maps, mounted to order.

Tracing Paper

No. 2470	Pellucid, common, 21 in. wide, per yard, 8 cents; per roll of 20 yards	1.25	.18
No. 2471	Pellucid, common, 42 in. wide, per yard, 15 cents; per roll of 20 yards	2.50	.40
No. 2474	Bank Note, 36 in. wide, per yard, 12 cents; per roll of 20 yards	1.62	.40
No. 2475	Bank Note, 42 in. wide, per yard, 15 cents; per roll of 20 yards	2.00	.45
No. 2477A	Vellum, 36 in. wide, per yard, 20 cents; per roll of 20 yards	3.25	.55
No. 2477B	Vellum, 42 in. wide, per yard, 25 cents; per roll of 20 yards	3.50	.65
No. 2479	Manila, common, 48 in. wide, per yard, 7 cents; per roll of 20 yards	1.00	.50
No. 2484	Bond, 21 x 16 in., per sheet, 6 cents; per quire	1.10	.20
No. 2486	Bond, 30 x 19 in., per sheet, 8 cents; per quire	1.40	.30

Imperial Tracing Cloth

In Rolls of 24 Yards. Face Glazed and Back Dull

		Price	Postage
No. 2495	30 in. wide, per yard, .90; per roll	$17.70	.70
No. 2496	36 in. wide, per yard, 1.00; per roll	20.25	
No. 2497	42 in. wide, per yard, 1.30; per roll	26.15	
No. 2498	48 in. wide, per yard, 1.90; per roll	35.80	
No. 2499	54 in. wide, per yard, 2.40; per roll	39.90	
No. 2500	Pounce Powder, in tin shaker, for Tracing Paper or Tracing Cloth, each	.20	.07

Prepared Blue Print Paper

Best Quality

No. 2506 Thin Stock, for Prints that are to be mailed.

Width	24″	30″	36″	42″
10 yard rolls	$0.75	$0.85	$0.90	$1.05
50 yard rolls	3.50	3.85	4.20	4.90

No. 2508 Medium Stock, for regular commercial use.

Width	24″	30″	36″	42″
10 yard rolls	$1.00	$1.10	$1.30	$1.50
50 yard rolls	4.55	4.90	5.95	7.00

No. 2510 Thick Stock.

Width	24″	30″	36″	42″
10 yard rolls	$1.15	$1.35	$1.60	$1.80
50 yard rolls	5.25	6.30	7.35	8.40

The Blue Process of Copying Tracings

Special attention is directed to this easy process of copying tracings, and its great value to all engineers, architects and mechanical draftsmen is fully recognized.

If not convenient to procure a print frame, blue prints can be made readily by following these directions:

1. Provide a flat board as large as the tracing which is to be copied.

2. Lay on this board a cushion or blanket of felt about ¼ in. thick, to give a slightly yielding backing for the paper.

3. Lay on the blanket the prepared paper with the sensitive side uppermost.

4. Lay on this paper the tracing, making it as smooth as possible, so as to insure a perfect contact with the paper.

5. Lay on the tracing a plate of clear glass, which should be heavy enough to press the tracing close down upon the paper. Ordinary plate glass, one-quarter of an inch in thickness, is sufficient.

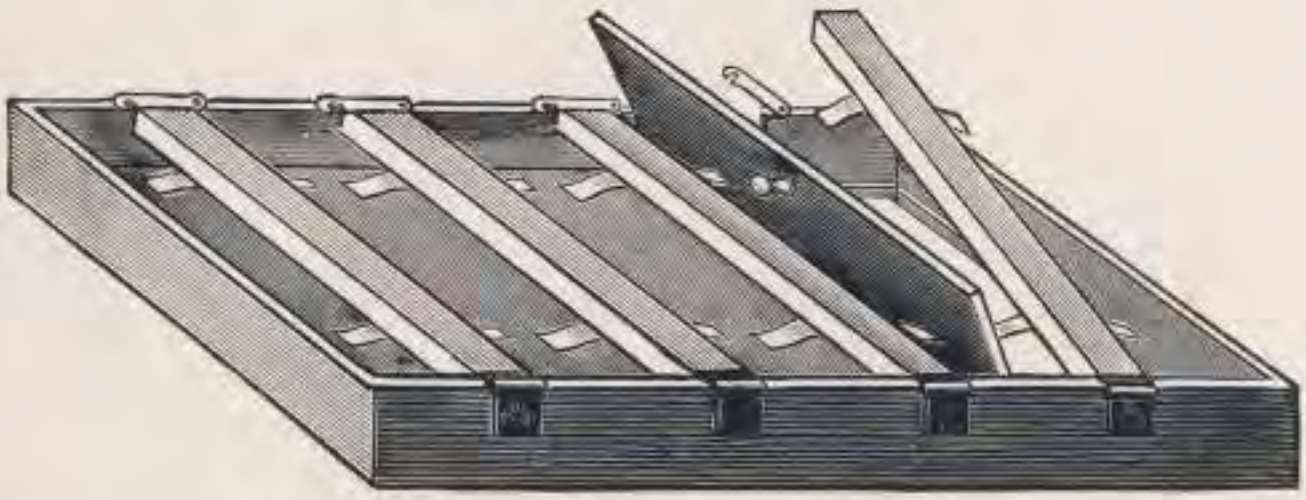
6. Expose the whole to a clear sunlight by pushing it out on a shelf from a window, or in any other convenient way, from four to six minutes (in winter, six to ten minutes). If a clear sky only can be had, the exposure must be continued from twenty to thirty minutes; and under a cloudy sky from sixty to ninety minutes may be needed, the shade depending on the time.

7. Remove the prepared paper and wash it freely for one or two minutes in clear water, and hang it by one corner to dry.

Too light a blue means under exposure, and too dark a blue is over exposure.

Print Frames

Made by W. & L. E. Gurley



No. 2534

		Price
No. 2534	Print Frame, complete with plate glass and cushion, 24 x 20 in., clear exposure	$24.00
No. 2536	Print Frame, complete with plate glass and cushion, 30 x 24 in., clear exposure	35.00
No. 2538	Print Frame, complete with plate glass and cushion, 42 x 30 in., clear exposure	53.00
	Felt, ¼ in. thick, for Print Frames, per square foot	.50

Zinc Bath Trays with Wooden Frames

For Washing Blue Prints in Water Bath
Made by W. & L. E. Gurley

No. 2540	Zinc Bath Tray, for washing copies, 24 x 20 in	$7.00
No. 2542	Zinc Bath Tray, for washing copies, 30 x 24 in	8.00
No. 2544	Zinc Bath Tray, for washing copies, 42 x 30 in	10.50

Tin Tubes with Screw Tops

For Holding Prepared Paper, Tracings, Drawings, Etc.

		Price	Postage
No. 2546	Plain Tin Tube, screw top, 24 x 2¼ in	$1.65	.30
No. 2547	Plain Tin Tube, screw top, 30 x 2¼ in	1.75	.35
No. 2548	Plain Tin Tube, screw top, 36 x 2¼ in	2.00	.40
No. 2549	Plain Tin Tube, screw top, 42 x 2¼ in	2.25	.45

Township Plotting Paper

		Price	Postage
No. 2550	Township Plotting Paper, rulings 6 x 6 in., blocks 1 in. square, per quire	$1.00	.18
No. 2552	Township Plotting Paper, rulings 12 x 12 in., blocks 2 in. square, per quire	2.00	.35
No. 2553	Township Plotting Paper, rulings 18 x 15 in., per quire	3.00	.45

Profile Papers

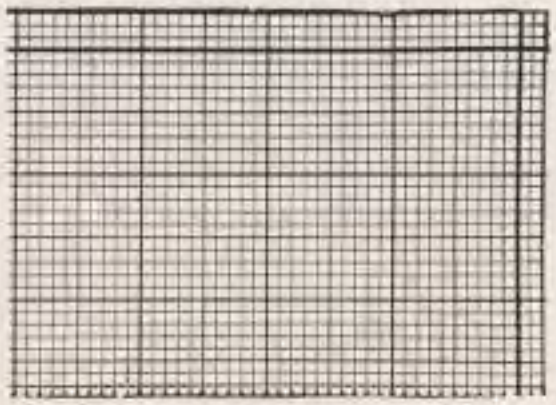
Sheets: Lines printed in green.
Continuous: Lines printed in green or orange.
Continuous on tracing paper or tracing cloth: Lines printed in orange.

No. 2584. Plate A
Rulings 4 x 20 to one inch

No. 2600. Plate B
Rulings 4 x 30 to one inch

No. 2580	Plate A, sheet 42 x 15 in., per quire	$6.00	.75
No. 2581	Plate A, sheet 42 x 15 in., per sheet	.30	.05
No. 2584	Plate A, continuous, 20 in. wide, 50 yd. in roll, per roll $10.00; per yard	.24	.05
No. 2586	Plate A, continuous, 20 in. wide, mounted on muslin, 20 yd. in roll, per roll, $18.50; per yard	1.25	.08
No. 2588	Plate A, continuous, 20 in. wide, on tracing paper, 50 yd. in roll, per roll, $10.00; per yard	.24	.05
No. 2589	Plate A, continuous, 20 in. wide, on tracing cloth, 20 yd. in roll, per roll, $17.75; per yard	1.20	.08
No. 2595	Plate B, sheet 42 x 13½ in., per quire	6.00	.75
No. 2596	Plate B, sheet 42 x 13½ in., per sheet	.30	.05
No. 2600	Plate B, continuous, 20 in. wide, 50 yd. in roll, per roll, $10.00; per yard	.24	.05
No. 2602	Plate B, continuous, 20 in. wide, mounted on muslin, 20 yd. in roll, per roll, $18.50; per yard	1.25	.08
No. 2604	Plate B, continuous, 20 in. wide, on tracing paper, 50 yd. in roll, per roll, $10.00; per yard	.24	.05
No. 2605	Plate B, continuous, 20 in. wide, on tracing cloth, 20 yd. in roll, per roll, $17.75; per yard	1.20	.08

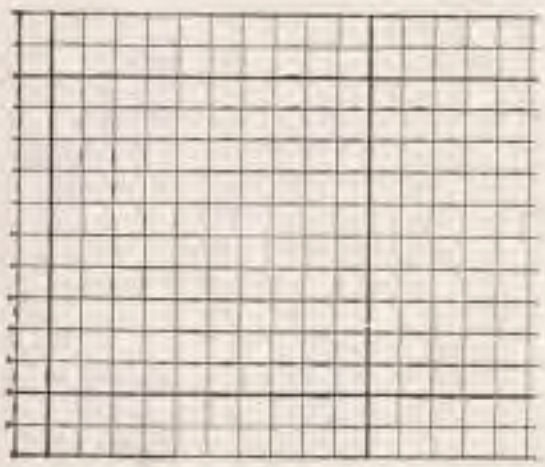
Metric Papers



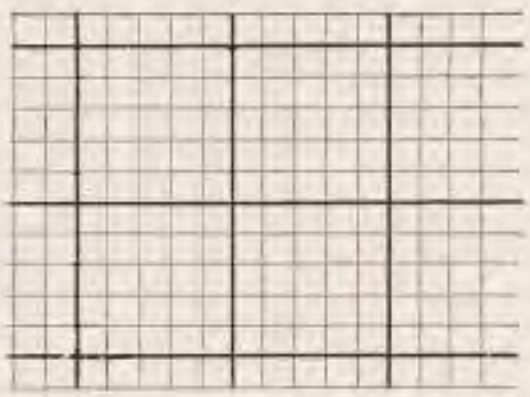
No. 2610

		Price	Postage
No. 2610	Millimeter, sheet 50 x 40 centimeters, rulings every millimeter, per sheet, 20 cents; per quire.....	$3.50	.40
No. 2611	Millimeter, continuous, 50 centimeters wide, ruling in millimeters, in 50 yd. rolls, per roll, $10.00; per yard	.24	.05
No. 2612	Millimeter, continuous, mounted on muslin, 50 centimeters wide, ruling in millimeters, in 20 yd. rolls, per roll, $18.50; per yard.....	1.25	.10
No. 2613	Millimeter, continuous, on tracing paper, 50 centimeters wide, ruling in millimeters, in 50 yd. rolls, per roll, $10.00; per yard.....	.24	.05
No. 2614	Millimeter, continuous, on tracing cloth, 50 centimeters wide, ruling in millimeters, in 20 yd. rolls, per roll, $17.75; per yard.....	1.20	.05

Cross Section Papers



No. 2621
10 x 10 to the inch



No. 2624
5 x 5 to the half inch

Sheets: Lines printed in green.
Continuous: Lines printed in green.
Continuous on tracing paper or tracing cloth: Lines printed in orange.

No. 2620	Cross Section Paper, rulings 20 x 16 in., 8 ft. to inch, per sheet, 20 cents; per quire.....	$3.50	.40
No. 2621	Cross Section Paper, rulings 20 x 16 in., 10 ft. to inch, per sheet, 20 cents; per quire.....	3.50	.40
No. 2622	Continuous Cross Section Paper, 20 in. wide, in rolls of 50 yd., per roll, $10.00; per yard.....	.24	.05
No. 2623A	Continuous Cross Section Paper, 20 in. wide, ruled 10 ft. to inch on tracing paper, in rolls of 50 yd., per roll, $10.00; per yard.....	.24	.05
No. 2623B	Continuous Cross Section Tracing Cloth, 20 in. wide, ruled 10 ft. to inch, in rolls of 20 yd., per roll, $17.75; per yard.....	1.20	.08

Cross Section Papers

		Price	Postage
No. 2624	Cross Section Paper, rulings 20 x 16 in., 10 ft. to inch, every fifth line heavy, per sheet, 20 cents; per quire.	$3.50	.40
No. 2625	Cross Section Paper, rulings 20 x 16 in., ruled 10 ft. to inch on tracing paper, per sheet, 20 cents; per quire	3.50	.25
No. 2626	Cross Section Paper, rulings 20 x 16 in., 16 ft. to inch per sheet, 20 cents; per quire	3.50	.40
No. 2627	Continuous Cross Section Paper, 20 in. wide, ruled 16 ft. to inch, in rolls of 50 yd., per roll $10.00; per yd.	.24	.05

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

No. 2635	Ruled Cross Section Paper, 4 spaces to inch, 21 x 16 in., per quire	1.25	.35
No. 2636	Ruled Cross Section Paper, 8 spaces to inch, 21 x 16 in., per quire	1.25	.35
No. 2637	Ruled Cross Section Paper, 10 spaces to inch, 21 x 16 in., per quire	1.25	.35
No. 2638	Ruled Cross Section Paper, 12 spaces to inch, 21 x 16 in., per quire	1.50	.35

Thumb Tacks, Horn Centers, Etc.

No. 2680	Brass Thumb Tacks, round head, 3/8 in. diameter, per dozen	.10	.02
No. 2682	Brass Thumb Tacks, round head, 1/2 in. diameter, per dozen	.20	.02
No. 2684	German Silver Thumb Tacks, round head, 3/8 in. diameter, per dozen	.25	.02
No. 2685	German Silver Thumb Tacks, round head, 1/2 in. diameter, per dozen	.30	.02
No. 2686	German Silver Thumb Tacks, round head, 5/8 in. diameter, per dozen	.45	.03
No. 2692	Steel Thumb Tacks, common, 3/8 in. diameter, per doz.	.08	.02
No. 2693	Steel Thumb Tacks, common, 3/8 in. diameter, per box of 100	.55	.05
No. 2694	Steel Thumb Tacks, common, 1/10 in. diameter, per doz.	.12	.02
No. 2695	Steel Thumb Tacks, common, 1/10 in. diameter, per box of 100	.80	.06
No. 2700	Thumb Tack Lifter and Paper Knife, nickel-plated	.25	.02
No. 2703	Brass Paper Fasteners, round heads, prongs 1/2 in. per dozen	.05	.02
No. 2705	Brass Paper Fasteners, round heads, prongs, 1/2 in. in box, per 100	.30	.06
No. 2707	Horn Center, plain	.20	.01
No. 2708	Horn Center with German silver rim	.50	.01
No. 2710	Handy Paper Cutter, brass mounted, for cutting drawings from the board	.40	.03

Continuous Profile Books

These books are for field or office purposes, being printed on a tough thick paper, mounted upon a continuous piece of muslin and bound in book form with flexible morocco covers, convenient for the pocket. Each page will contain a profile of three thousand feet in length, so that each two pages facing will contain an average section of six thousand feet for a road as usually laid out for construction. Railroad and other engineers will find them very useful. The rulings correspond to our large profile plates, A and B.

Continuous Profile Books

		Price	Postage
No. 2715	Plate A, about 8½ x 6 in., profile 12 miles.....	$2.50	.16
No. 2716	Plate A, about 8½ x 6 in., profile 25 miles.....	3.50	.18
No. 2717	Plate A, about 8½ x 6 in., profile 50 miles.....	5.50	.22
No. 2718	Plate A, about 8½ x 6 in., profile 100 miles.....	9.50	.28
No. 2720	Plate B, about 8 x 5¼ in., profile 12 miles.....	2.50	.15
No. 2721	Plate B, about 8 x 5¼ in., profile 25 miles.....	3.50	.17
No. 2722	Plate B, about 8 x 5¼ in., profile 50 miles.....	5.50	.20
No. 2723	Plate B, about 8 x 5¼ in., profile 100 miles.....	9.50	.25

Plat and Profile Book

This book is 9½ x 4¼ inches, oblong, with flexible morocco cover, containing 36 profile pages, plate B, and the opposite pages are blank for plats, etc. The book has also valuable tables.

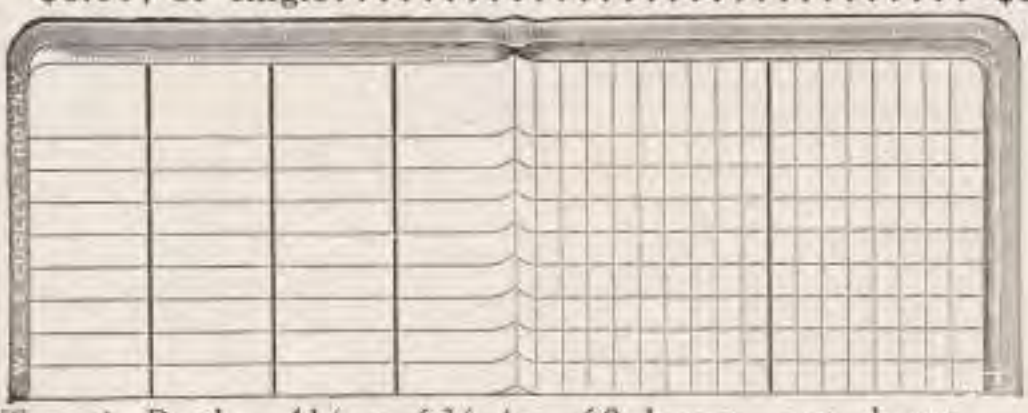
No. 2724A Dunhams Plat and Profile Book..... $1.30 .15

Engineers Blank Field Books

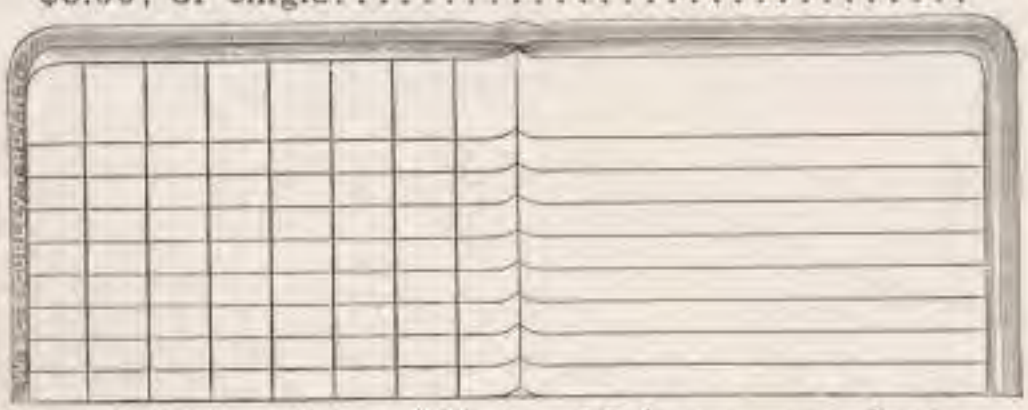
Leather Binding and Rounded Corner

Superior Quality and Very Durable

No. 2725 Level Books, 4¼ x 6¾ in., 60 leaves, per dozen, $8.00; or single..... $0.75 .05



No. 2728 Transit Books, 4¼ x 6¾ in., 60 leaves, per dozen, $8.00; or single..... .75 .05



No. 2731 Record Books, 4¼ x 6¾ in., 60 leaves, per dozen, $8.00; or single..... .75 .05

Engineers Blank Field Books

		Price	Postage
No. 2736	Cross Section Books, 4¼ x 6¾ in., 60 leaves, ruled 5 spaces per inch, per dozen, $8.00; or single.....	$0.75	.05
No. 2738	Cross Section Books, 4¼ x 6¾ in., 60 leaves, ruled 10 spaces per inch, per dozen, $8.00; or single.....	.75	.05
No. 2742	Cross Section Books, 6½ x 8½ in., 80 leaves, ruled 10 spaces per inch, per dozen, $24.60; or single.....	2.10	.08
No. 2744	Earthworks Books, 5 x 7¾ in., 80 leaves, with printed headings and tables for railroad engineers, per doz., $23.40; or single.....	2.00	.18

Lead Pencils

No. 2751	Eldorado Pencils, hexagon, Nos. 2B to 8H. The highest grade drawing pencil, per dozen.....	1.00	.14
No. 2758	Office Pencil, Nos. 2, 3, and 4, with rubber tip, per doz.	.75	.04
No. 2768	Leads, H to 6H, 6 in box. These leads fit the pencil legs of modern drawing compasses; per box.....	.60	.04
No. 2778	Hardtmuths Koh-i-noor Pencils, hexagon, superfine, 2B to 8H, per dozen.....	1.25	.14
No. 2784	Pencil Point Protector, with rubber tip.....	.05	.01

Colored Pencils

No. 2785	Round, Red, Blue, Green and Yellow Pencils, per dozen	1.25	.05
No. 2790	Round, Wax Crayon Pencils, 6 in box, assorted colors, per box.....	.75	.05
No. 2791	Round, Wax Crayon Pencils, 12 in box, assorted colors, per box.....	1.50	.18

Lumber Crayons

For Marking Stakes and Boards

These crayons are superior quality and do not soil the hands.

No. 2795	Lumber Crayons, dark red, per dozen.....	.60	.15
No. 2796	Lumber Crayons, dark blue, per dozen.....	.60	.15
No. 2797	Lumber Crayons, waterproof, best quality, red, blue, black or yellow, per dozen.....	1.20	.15

Steel Lettering and Writing Pens

No. 2800	Gillotts Mapping Pens, per dozen.....	.80	.03
No. 2801	Gillotts Lithographic Pens, per dozen.....	.80	.03
No. 2802	Gillotts Crow Quill Pens, per dozen.....	.80	.03
No. 2806	Gillotts Mapping and Writing Pens, No. 170, per dozen, 15 cents; per gross.....	1.50	.13
No. 2807	Gillotts Mapping and Writing Pens, No. 303, per dozen, 18 cents; per gross.....	1.85	.14
No. 2808	Gillotts Mapping and Writing Pens, No. 404, per dozen, 10 cents; per gross.....	1.00	.14

Round Writing Pens for Ornamental Writing

		Price	Postage
No. 2820	Pens, single pointed, Nos. 1 to 6, assorted, per dozen..	$0.15	.02
No. 2822	Pens, single pointed, Nos. 1 to 6, assorted, per gross..	1.20	.15
No. 2824	Pens, double pointed, Nos. 10, 20 and 30, assorted, per dozen.....	.55	.03
No. 2826	Sample assortment of 25 pens, per box.....	.40	.03
No. 2827	Inkholder, for single pointed round writing pens, per box of 6.....	.30	.03
No. 2828	Penholders for round writing pens, each.....	.15	.02
No. 2830	Textbook to round writing, with full instructions...	.75	.05
No. 2831	Copybook for round writing practice.....	.40	.05

Steel Erasing Knives, Erasing Shields, Pencil Sharpeners and Files

No. 2835	Steel Blade Eraser, cocoa handle.....	.40	.03
No. 2836	Steel Blade Eraser, bone handle.....	.50	.03
No. 2838	Steel Eraser, long knife blade, cocoa handle.....	.50	.03
No. 2839A	Metal Erasing Shield, nickel-plated, 3¾ x 2⅜ in....	.20	.02
No. 2839B	Zylonite Erasing Shield, 4½ x 2½ in.....	.20	.02
No. 2840	Pencil Sharpener, brass with removable steel blade...	.45	.03

No. 2841

No. 2841	"Chicago" Pencil Sharpener. Points standard size pencils and automatically stops cutting when point has been produced. Cutters good for 25,000 pointings. Can be used in any position. Nickel finish..	$2.00	.15
No. 2844	Fine Steel Pencil File, with tack lifter at end.....	.50	.03
No. 2846	Pencil Pointer (a pad of flint paper), 1¼ x 4 in...	.10	.02

Erasing Rubbers

No. 2850	Pliable Artists Rubber, No. 40.....	.06	.01
No. 2852	Pliable Artists Rubber, No. 24.....	.10	.02
No. 2854	Pliable Artists Rubber, No. 16.....	.15	.03
No. 2856	Pliable Artists Rubber, No. 12.....	.20	.03
No. 2858	Kneaded Rubber, 1¾ x 13-16 in.....	.05	.01
No. 2859	Kneaded Rubber, 1⅝ x 1¼ in.....	.10	.02
No. 2861	Circular Ink Eraser.....	.05	.01
No. 2862	Ink Eraser, 1½ x 1 in.....	.05	.01
No. 2864	Ink Eraser, 1⅞ x 1½ in.....	.20	.03
No. 2866	Combined Ink and Pencil Eraser, beveled ends.....	.10	.02

Erasing Rubbers

		Price	Postage
No. 2868	Typewriters Rubber, 3¼ x ⅝ in.	$0.10	.02
No. 2872	Gum, for cleaning drawings, 2¼ x 1⅛ in.	.07	.02
No. 2873	Gum, for cleaning drawings, 2⅞ x 2 in.	.15	.03
No. 2880	Bevel Rubber, green, oblong, No. 48	.05	.01
No. 2881	Bevel Rubber, red, oblong, No. 48	.05	.01
No. 2882	Bevel Rubber, green, oblong, No. 24	.10	.02
No. 2883	Bevel Rubber, red, oblong, No. 24	.10	.02
No. 2884	Bevel Rubber, green, oblong, No. 12	.15	.03
No. 2885	Bevel Rubber, red, oblong, No. 12	.15	.03

Sponge Rubbers

For Cleaning Drawings

No. 2895	Sponge Rubber, 2½ x 1¾ x ⅝ in.	.30	.02
No. 2896	Sponge Rubber, 2 x 2 x 1 in.	.30	.02
No. 2898	Sponge Rubber, 4 x 2 x 1 in.	.75	.04

Higgins Drawing Board Mucilage

No. 2915	Drawing Board Mucilage, fine quality, 3 oz. jar	.20	.13
No. 2916	Drawing Board Mucilage, fine quality, 6 oz. jar	.35	.20
No. 2918	Taurine Mucilage, fine quality, 2 oz. bottle, with brush	.15	.10
No. 2919	Taurine Mucilage, fine quality, 4 oz. bottle, with brush	.25	.15
No. 2920	Taurine Mucilage, fine quality, pt. bottle, without brush	.75	.30

The Drawing Board Mucilage is a semi-fluid paste of great strength.
The Taurine Mucilage is a powerful liquid adhesive.

Drawing Inks

Higgins American Liquid Drawing Inks

		Price
No. 2925	Waterproof Black Ink, small bottle	$0.25
No. 2926	Waterproof Black Ink, 8 oz. bottle	2.00
No. 2928	General Black Ink (not waterproof), small bottle	.25
No. 2929	General Black Ink (not waterproof), 8 oz. bottle	2.00

		Price			Price
No. 2930	Waterproof Carmine	$0.25	No. 2936	Waterproof Green	$0.25
No. 2931	Waterproof Scarlet	.25	No. 2937	Waterproof Yellow	.25
No. 2932	Waterproof Vermilion	.25	No. 2938	Waterproof Brown	.25
No. 2933	Waterproof Blue	.25	No. 2939	Waterproof Orange	.25
No. 2934	Waterproof Indigo	.25	No. 2940	Waterproof Brick Red	.25
No. 2935	Waterproof Violet	.25	No. 2941	Waterproof White	.25

No. 2942	Waterproof Ink, any of the above colors, per 8 oz. bottle	2.00
No. 2943A	Higgins Eternal Black Writing Ink, small bottle	.15

Postage on the above inks, 7 cents each small bottle, and 30 cents each 8 oz. bottle.

Miscellaneous Liquid Drawing Inks

		Price	Postage
No. 2955	Devoes White Ink, per bottle	$0.25	.08
No. 2956	Bourgeois Black India Ink, per bottle	.25	.06

Winsor and Newtons Water Colors

Moist in China Pans

No. 2990 Whole, each, 30 cents; Half, each, 18 cents.

1	Antwerp Blue	20	India Red	33	Prussian Blue
6	Brown Ochre	21	Indigo	34	Prussian Green
8	Burnt Sienna	22	Italian Pink	35	Raw Sienna
9	Burnt Umber	23	Ivory Black	36	Raw Umber
10	Chinese White	26	Light Red	40	Vandyke Brown
11	Chrome Yellow	27	Naples Yellow	41	Venetian Red
12	Deep Chrome	28	Neutral Tint	42	Vermilion
15	Emerald Green	29	New Blue	43	Yellow Lake
17	Gamboge	30	Olive Green	44	Yellow Ochre
18	Hookers Green No.1	31	Orange Chrome		
19	Hookers Green No.2	32	Paynes Gray		

No. 2992 Whole, each, 55 cents; Half, each, 30 cents.

46	Brown Madder	51	Neutral Orange	56	Scarlet Vermilion
47	Cerulean Blue	62	Orange Vermilion	57	Sepia
49	Crimson Lake	52	Purple Lake	58	Warm Sepia
60	Indian Yellow	55	Scarlet Lake		

No. 2994 Whole, each, 80 cents; Half, each, 45 cents.

59	Cobalt Blue	79	Pure Scarlet
61	Lemon Yellow	97	Cobalt Green
63	Violet Carmine		

No. 2996 Whole, each, 1.10 cents; Half, each, 55 cents.

70	Carmine	81	Madder Carmine
78	Pink Madder	82	Purple Madder
80	Rose Madder	90	Scarlet Madder

Postage on Water Colors, 1 cent each.

Empty Japanned Tin Color Boxes

No. 3010	Japanned Box, to hold 6 whole or 12 half pans	$1.25	.06
No. 3011	Japanned Box, to hold 10 whole or 20 half pans	1.60	.17
No. 3012	Japanned Box, to hold 12 whole or 24 half pans	1.75	.18
No. 3013	Japanned Box, to hold 16 whole or 32 half pans	2.10	.20
No. 3014	Japanned Box, to hold 18 whole or 36 half pans	2.25	.22

Water Color Brushes

										Postage
No. 3020	Camel Hair, in quills:									
	Number	1	2	3	4	5	6	7	8	
	Each	$0.05	.05	.06	.06	.08	.08	.10	.10	.01
No. 3030	Camel Hair in tin, with handle:									
	Number		1	2	3	4	5	6		
	Each		$0.06	.08	.08	.10	.10	.12		.02
No. 3035	Red Sable, in Albata, with handle:									
	Number	1	2	3	4	5	6	7	13	14
	Each	$0.20	.25	.35	.45	.55	.65	.75	1.00	1.30	.02-.12
No. 3040	Camel Hair Sky or Wash Brush, in tin, with handle:									
	Number		0	1	2	3	4			
	Each		$0.18	.20	.25	.35	.45			.02
No. 3045	Camel Hair Wash Brushes in tin, with two points:									
	Number		0	1	2	3				
	Each		$0.35	.40	.50	.60				.02

Water Glasses, Ink and Color Slabs and Saucers

		Price	Postage
No. 3050	Artists Water Glass, 2⅜ in.	$0.12	.08
No. 3051	Artists Water Glass, 2¾ in.	.25	.10
No. 3052	Artists Water Glass, 3¼ in.	.45	.10
No. 3054	Ink or Color Slab, 3¾ x 1½ in.	.10	.04
No. 3055	Ink or Color Slab, 3⅝ x 2⅜ in.	.15	.06
No. 3056	Ink or Color Slab, 4 x 2½ in.	.25	.10
No. 3057	Ink or Color Slab, 4½ x 2¾ in.	.30	.15
No. 3065	Slate Ink Slab, 3½ x 3½ in., with glass cover	.35	.15
No. 3067	Opal Glass Ink Saucer, with cover, 3¼ in.	.50	.15
No. 3070	Patent Ink Slab, china, with cover, 4½ x 1¾ in.	.35	.10
No. 3071	Patent Ink Slab, china, with cover, 5¼ x 2⅛ in.	.40	.15
No. 3075	Nest of 5 Saucers and a cover, 2⅜ in., per nest	.55	.15
No. 3076	Nest of 5 Saucers and a cover, 2⅝ in., per nest	.65	.20
No. 3077	Nest of 5 Saucers and a cover, 3¼ in., per nest	.75	.28
No. 3078	Nest of 5 Saucers and a cover, 3¾ in., per nest	.85	.35

Gurley Standard Weights and Measures and Precision Balances

for

Weights and Measures Officials, Railroad Track Scale Inspectors and Industrial Corporations

No. 9570 Precision Balance

Capacity, 50 lbs. in each pan. Sensibility reciprocal, 1 grain at full load.

In addition to the balance illustrated above, we also manufacture Precision Weights and Measures used as official standards. These are of the highest degree of accuracy, and are guaranteed to conform to the specifications of the National Bureau of Standards. A certificate of test from this bureau will be furnished when desired.

We have made official weights and measures for the Bureau of Standards and for practically all of the Departments of Weights and Measures in this country; also for China, the Philippine Islands, Porto Rico and Haiti. We are prepared to furnish weights and measures to conform to the standards of any foreign country.

Gurley Private Cable Code

Cable Address: "*Gurley*"

Use Western Union, Five-Letter Edition; Lieber's; or A. B. C. 5th Edition, Codes

All Numbers are taken from the Gurley Catalogue, Thirty-first Edition

Cat. No.	Description	Code Word
6-A	Precise Transit, Engineers size	Abaab
7-A	Precise Transit, Engineers size	Ababa
8-A	Precise Transit, Engineers size	Ababs
9-A	Precise Transit, Engineers size	Abaca
10-A	Precise Transit, Engineers size	Abacy
10-A-3	Precise Transit, with Three-Screw Leveling Head	Abagn
18-A	Precise Transit, Hell Gate Model	Abago
25-A	Precise Transit, Mountain size	Abaha
26-A	Precise Transit, Mountain size	Abahi
27-A	Precise Transit, Mountain size	Abahl
28-A	Precise Transit, Mountain size	Abahs
29-A	Precise Transit, Mountain size	Abaib
30-A	Precise Transit, Mountain size	Abaig
32-A	Precise Transit, with Telescopic Solar	Abail
20-A	Explorers Precise Transit	Abaek
21-A	Explorers Precise Transit	Abaen
22-A	Explorers Precise Transit	Abaer
23-A	Explorers Precise Transit	Abaet
24-A	Explorers Precise Transit	Abagu
25	Light Mountain or Mine Transit	Atimy
26	Light Mountain or Mine Transit	Atjip
27	Light Mountain or Mine Transit	Atkir
28	Light Mountain or Mine Transit	Atler
29	Light Mountain or Mine Transit	Atmar
30	Light Mountain or Mine Transit	Atnas
102	Reconnoissance Transit	Avseb
103	Reconnoissance Transit	Abaim
	Limb I	Abaip
	Limb IV	Abaiy
131	Variation Arc	Arbuc
135-B	Vertical Circle	Arfen
136	Vertical Circle	Arfid
137	Vertical Circle	Argog
138	Vertical Circle	Arins
139	Vertical Circle	Abajo
139-A	Vertical Arc	Arkal
139-B	Vertical Arc	Arkon
140	Vertical Arc	Arlik
141	Aluminum Guard	Armil
145	Level on Telescope	Arnon
146	Reversion Telescope Level	Arobs
148	Clamp and Tangent	Aroms
149	Beaman Stadia Arc	Arpal
149-A	Beaman Stadia Arc	Abake
149-B	Beaman Stadia Arc	Abaks
149-C	Beaman Stadia Arc	Abaku
150	Gradienter	Arram
151	Stadia Wires, Adjustable	Abald
152	Stadia Wires, Fixed	Abalk
154	Dust Guard	Abalo
155	Pinion Movement	Abalt
157	Sights on Telescope	Arren
158	Sights on Standards	Arrot
160	Detachable Side Telescope and Counterpoise	Arsan
161	Detachable Riding Telescope	Artap
165	Reflector for Transit Cross Wires	Artot
166	Reflector for Level Cross Wires	Arvit
167	Elbow Eyepiece	Abaly
168	Diagonal Prism	Arwet
169	Eyepiece Cap	Abalu

Cat. No.	Description	Code Word
170	Plummet Lamp	Arzuh
180	Attached Magnifier	Asbid
181	Attached Microscopes	Abamo
182	Attached Microscopes	Abams
185	Limb Graduation	Ascog
186	Limb Graduation	Asdig
187	Vertical Circle Graduation	Asels
188	Vertical Circle Graduation	Asgle
189	Vertical Circle Graduation	Abamu
190	Burt Solar Attachment	Ashik
192	Solar Screen	Abana
193	Patent Latitude Level	Asilt
196	Striding Level	Askon
197	Adjusting Bar	Abang
226	Vernier Compass	Agwen
241	Leveling Adopter	Afbir
242	Leveling Head	Afcot
262	Telescopic Sight	Apbat
265	Vertical Circle for No. 262 Telescopic Sight	Apfob
266	Level on Telescope for No. 262 Telescopic Sight	Aphic
267	Clamp and Tangent for No. 262 Telescopic Sight	Aplad
268	Offset Standard and Counterpoise for No. 262 Telescopic Sight	Apost
285	Pocket Compass with Limb	Addip
294	Compass with Limb and Telescope	Abans
300	Pocket Vernier Compass	Afrad
305	Pocket Vernier Compass	Afseg
325	Clamp and Tangent	Agbet
326	Rack and Pinion Movement	Agcat
327	Leveling Adopter	Agdix
328	Leveling Head	Agern
335	Geologists Compass	Afnid
341	Dip Compass	Afkob
341-A	Dip Compass	Aflam
350	Dial Compass	Afirl
375	Engineers Wye Level	Akary
377	Engineers Wye Level	Akdul
378	Engineers Wye Level	Akgun
381	Architects Level	Ajrot
384	Explorers Level	Abaoh
400	Transit Tripod	Axnig
401	Transit Tripod	Axots
405	Transit Tripod	Axrul
408	Transit Tripod	Axtil
410	Transit Tripod	Axvim
411	Transit Tripod	Axyan
412	Transit Tripod	Abaok
415	Compass Tripod	Awact
416	Compass Tripod	Awder
420	Compass Tripod	Awfit
421	Compass Tripod	Awify
425	Compass Tripod	Aworl
426	Compass Tripod	Awrif
430	Level Tripod	Axbar
431	Level Tripod	Axcet
435	Level Tripod	Axdox
436	Level Tripod	Axfoy
440	Level Tripod	axgob
441	Level Tripod	Axhob

Gurley Private Cable Code—(Continued)

Cat. No.	Description	Code Word
443	Level Tripod	Abapa
450	Plain Plummet	Abaph
452	Plain Plummet	Abapt
454	Plain Plummet	Abapy
456	Plain Plummet	Abarb
458	Plain Plummet	Abarc
460	Plain Plummet	Abarf
465	Adjustable Plummet	Abari
471	Iron Spads	Abarm
472	Stake Tacks	Abarp
473	Stake Tacks	Abars
474	Plummet Cord	Abaso
475	Leather Case	Abasp
476	Leather Case	Abast
478	Leather Case	Abasy
479	Leather Case	Abata
480	Leather Case	Abath
485	Leather Case	Abaty
486	Leather Case	Abaud
487	Leather Case	Abaur
490	Leather Pouch	Abaux
491	Leather Pouch	Abauz
492	Leather Pouch	Abauj
494	Tripod Case	Abava
496	Tripod Case	Abavi
497	Tripod Case	Abavy
498	Leather Field Bag	Abawi
	If metric graduations are wanted, specify "METRIC" after the code word for the Rod.	
500	Philadelphia Rod	Albol
500-A	Philadelphia Rod	Abaxo
500-B	Philadelphia Rod	Alcun
500-R	Service Rod	Abayu
501	Philadelphia Rod	Aldon
501-B	Special Self-Reading Rod	Alfop
502-A	Philadelphia Mining Rod	Algor
504	Troy Rod	Alimb
505	New York Rod	Aljer
510	Architects Rod	Alnew
511	Architects Rod	Alond
513	Telemeter Rod	Alrob
514	Telemeter Rod	Alsay
514-B	Stadia Rod	Abaye
514-C	Stadia Rod	Abayr
514-D	Stadia Rod	Abayt
514-E	Stadia Rod	Abaza
515	Telescopic Rod	Altic
516	Cross Section Rod	Alubs
517	Slip-Jointed Rod	Abbej
518-A	Plain Rod	Alvof
518-B	Plain Rod	Alwed
519-A	Plain Rod	Amand
519-B	Plain Rod	Ambin
520-A	Plain Rod	Amcus
520-B	Plain Rod	Amdut
521-B	Plain Rod	Amfis
522-A	Plain Rod	Amgit
522-B	Plain Rod	Amhow
522-C	Plain Rod	Amild
524-A	Plain Rod, 4 ply	Amkoy
525-B	Flexible or Pocket Leveling Rod	Ampod
526-A	Flexible or Pocket Leveling Rod	Amrid
526-B	Flexible or Pocket Leveling Rod	Amsed
527	Flexible or Pocket Leveling Rod	Amtad
528	Flexible or Pocket Leveling Rod	Amudy
530	Combined Leveling Pole and Flagstaff	Akhon
531	Combined Leveling Pole and Flagstaff	Akkip
534	Wood Flagstaff	Abazi
535	Wood Flagstaff	Abazy
536	Wood Flagstaff	Abbac
537-A	Screw-Jointed Wood Flagstaff	Abbaf
537-B	Screw-Jointed Wood Flagstaff	Abbal
537-C	Screw-Jointed Wood Flagstaff	Abbam
537-D	Screw-Jointed Wood Flagstaff	Abbap
538-A	Screw-Jointed Wood Flagstaff	Abbas
538-B	Screw-Jointed Wood Flagstaff	Abbaw
540-A	Steel Ranging Pole	Abbed
540-B	Steel Ranging Pole	Abbeh
541	Iron Tubular Ranging Pole	Abbek
543	Iron Tubular Ranging Pole	Abben
544	Iron Tubular Ranging Pole	Abbet
550-R	Gurley Precise Rod	Abbig
551-R	Molitor Precise Rod	Abbif
552-R	Tape Leveling Rod	Abbic
545	Rod Level	Amnez
546	Rod Level	Amnit
547	Rod Level	Amnor
548	Rod Level	Abbev
570	Johnson Plane Table Movement	Abbil
570-A	Johnson Plane Table Movement	Abbim
571	Johnson Plane Table Movement	Abbip
573	Drawing Board	Abbis
573-A	Drawing Board	Abbiy
573-B	Drawing Board	Abboh
573-T	Drawing Board	Abbot
573-X	Drawing Board	Abbok
574	Plumbing Arm and Plummet	Abbon
575	Combined Compass and Levels	Abbor
576-B	Plane Table Outfit	Abboz
576-C	Plane Table Outfit	Abbud
584-B	Telescopic Alidade	Abbot
584-C	Telescopic Alidade	Abbuk
585	Box Compass	Abome
586	Traverse Plane Table Outfit	Ankud
587	Traverse Plane Table Movement and Drawing Board	Anlic
588	Box Compass	Anmid
589	Ruler Sight Alidade	Anoby
590-A	Pocket Sight Alidade	Anpad
590-B	Pocket Sight Alidade	Anruk
592-C	Explorers Alidade	Abcag
592-D	Explorers Plane Table Outfit	Abcal
592-F	Explorers Plane Table Outfit	Abcam
592-H	Explorers Plane Table Outfit	Abcap
594	Army Sketching Case	Abcas
596	Fiala Scout Sketching Case	Abced
609	Electric Register for Cur. Meters	Acrub
616	Current Meter	Acvod
617	Current Meter	Acwid
619	Time Recorder or Stop Watch	Adaft
621	Current Meter	Adbel
623	Current Meter	Adbot
628	Hook Gage	Abcek
630	Printing Water Stage Register	Anvel
632	Tape Reel	Anwat

Gurley Private Cable Code (Continued)

Cat. No.	Description	Code Word
633	Graphic Water Stage Register	Abcet
634	Graphic Water Stage Register	Abcev
634-A	Graphic Water Stage Register	Abcic
636	Graphic Water Stage Register	Abcif
	Long Distance Register	Abeik
	Long Distance Indicator	Abein
	Indicating Gage	Abeir
640	Monocular Hand Level	Aklut
643	Locke Hand Level	Akpow
646	Abney Hand Level	Aksoy
646-A	Abney Hand Level	Abcil
647	Abney Hand Level	Abcim
647-A	Abney Hand Level	Abcip
648	Abney Level with Compass	Abcuv
649	Stadia Hand Level	Aktye
650	Iron Chain	Abcis
651	Iron Chain	Abciy
652	Iron Chain	Abcod
653	Iron Chain	Abcoh
656	Steel Chain	Abcok
658	Steel Chain	Abcon
662	Steel Chain	Abcox
670	Brazed Steel Chain	Abpit
671	Brazed Steel Chain	Abret
672	Brazed Steel Chain	Absat
673	Brazed Steel Chain	Abtoy
690	Vara Chain	Abcur
691	Vara Chain	Abcut
694	Vara Chain	Abcux
695	Vara Chain	Abcyb
700	Vara Chain	Abcyo
704	Vara Chain	Abcyf
708	Vara Chain	Abcyg
710	Vara Chain	Abcyl
715	Meter Chain	Achul
719	Meter Chain	Acfon
723	Meter Chain	Acily
730	Meter Chain	Acker
732	Meter Chain	Aclar
740	Marking Pins	Abcym
742	Marking Pins	Abcys
743	Marking Pins	Abdah
744	Marking Pins	Abdan
748	Marking Pins	Abdat
749	Marking Pin Carrying Ring	Abdav
750	Timber Scribe	Abdax
774	Steel Ribbon Chain Tape	Abdaz
775	Steel Ribbon Chain Tape	Abdeb
776	Steel Ribbon Chain Tape	Abdec
777	Steel Ribbon Chain Tape	Abdef
778	Steel Ribbon Chain Tape	Abdeg
779	Steel Ribbon Chain Tape	Abdep
M-20	Metric Steel Ribbon Chain Tape	Abdes
M-25	Metric Steel Ribbon Chain Tape	Anper
M-30	Metric Steel Ribbon Chain Tape	Anrot
M-50	Metric Steel Ribbon Chain Tape	Ansub
M-100	Metric Steel Ribbon Chain Tape	Antic
V-20	Vara Steel Ribbon Chain Tape	Abdow
V-30	Vara Steel Ribbon Chain Tape	Abdid
V-50	Vara Steel Ribbon Chain Tape	Abdik
V-100	Vara Steel Ribbon Chain Tape	Abdin
780	Metallic Tape	Abdir
782	Metallic Tape	Abdit
783	Metallic Tape	Abdix
786	Metallic Tape	Abdob
790	Metallic Tape without Case	Abdoc
791	Metallic Tape without Case	Abdof
792	Metallic Tape without Case	Abdog
794	Metallic Tape without Case	Abdol
795	Reliable Steel Tape	Abdom
796	Reliable Steel Tape	Abdop
797	Reliable Steel Tape	Abdos
798	Reliable Steel Tape	Abduc
799	Reliable Steel Tape	Abduf
800	Reliable Junior Steel Tape	Abdug
801	Reliable Junior Steel Tape	Abdul
808	Rival Steel Tape	Abdum
809	Rival Steel Tape	Abdup
810	Rival Steel Tape	Abdus
811	Rival Steel Tape	Abduy
812	Rival Steel Tape	Abdye
813	Rival Steel Tape	Abdyk
814	Wolverine Steel Tape	Abdyr
815	Wolverine Steel Tape	Abdyt
816	Wolverine Steel Tape	Abdyu
817	Wolverine Steel Tape	Abead
820	Engineers Steel Tape	Abeah
821	Engineers Steel Tape	Abeaj
822	Engineers Steel Tape	Abeak
823	Engineers Steel Tape	Abean
824	Engineers Steel Tape	Abear
831	Engineers Steel Tape	Abeat
832	Engineers Steel Tape	Abeax
833	Engineers Steel Tape	Abebe
834	Engineers Steel Tape	Abebo
835	Engineers Steel Tape	Abebu
841	Steel Tape Handles	Abech
842	Steel Tape Handles	Abeco
844	Spring Balance for Tapes	Abect
846	Steel Tape Clamp Handles	Abeda
849	String Level	Abeds
850	Extra Wide Steel Tape	Abedy
851	Extra Wide Steel Tape	Abeeb
852	Extra Wide Steel Tape	Abeec
853	Extra Wide Steel Tape	Abdiz
854-A	Extra Wide Steel Tape	Abeef
854-B	Extra Wide Steel Tape	Abeeg
860	Pocket Steel Tape	Abeel
863	Pocket Steel Tape	Abeem
866	Pocket Steel Tape	Abeep
870	Pocket Steel Tape	Abees
873	Pocket Steel Tape	Abefa
875	Pocket Steel Tape	Abefi
877	Pocket Steel Tape	Abefs
879	Pocket Steel Tape	Abefy
885	Punch and Riveter	Abega
886	Extra Eyelets	Abegi
887	Eureka Tape Outfit	Abegs
3153	Wood Box Pocket Compass	Abegy
3154	Wood Box Pocket Compass	Abeho
3155	Wood Box Pocket Compass	Abeho
3215	Brunton Pocket Transit	Abeht

Our Seattle Branch

Empire Building, Seattle, Washington

To serve our Western customers more satisfactorily, we maintain a Branch Sales Office in Seattle.

Customers who are located in the Western States, in Alaska, and in the Western part of Canada, will save time and transportation charges by dealing directly with the Seattle Branch.

A representative stock of completed Gurley Instruments, Accessories and Supplies is maintained and orders will be filled carefully and promptly.

The same attention is given to furnishing information and literature and making quotations as through the Home Office in Troy, N. Y.

Repairing Instruments

Arrangements can be made through our Seattle Branch for repairing and adjusting Engineers and Surveyors Instruments of all makes; also for repairing and regraduating old and worn Leveling and Stadia Rods.

Invitation

A cordial invitation is given our customers and friends to visit the Seattle Branch at any time to examine the latest models of Gurley Instruments and to obtain full information regarding our products.

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REGAL ART PRESS TROY, N. Y.

ESTABLISHED

1845


GURLEY