Iszard-Warren Co.

THE STERLING WAY TO SUCCESS

PUBLISHED IN THE INTEREST OF

ENGINEERS
SURVEYORS
CONTRACTORS

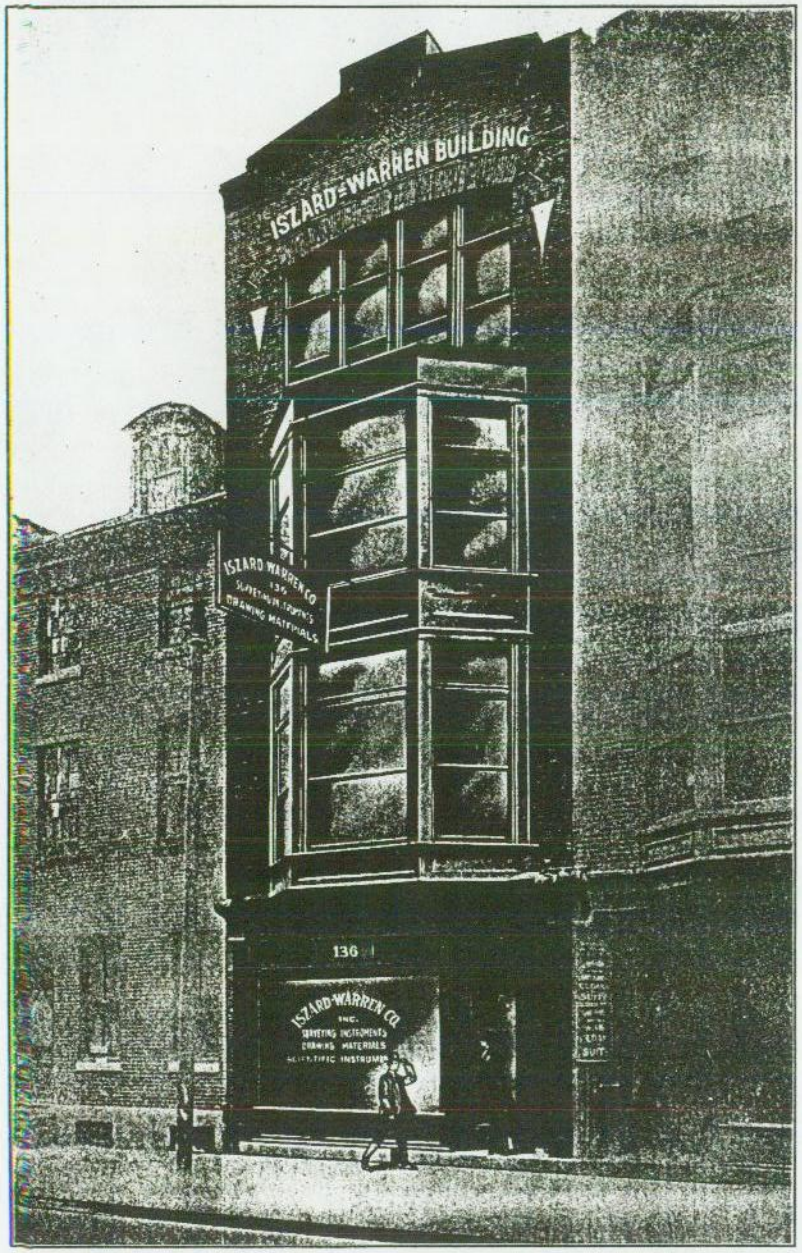
136 No. 12TH ST. PHILA. PA.

AMERICA'S LEADING SURVEYING & SCIENTIFIC INSTRUMENT WORKS

"Sterling"

Quality

The name Sterling when engraved on an Iszard-Warren Co. instrument has the same significance as when stamped on silver.



136 NORTH TWELFTH STREET, PHILADELPHIA, PA.
The home of "Sterling" Surveying Instruments.
Scientific and Precision Instrument Works.

Time Saved Is Money Earned—
Use "Sterling" Transits and Levels and save both.

Look well to the "Sterling Way", for therein lies the opportunity you are seeking —the way to decrease Time, eliminate mistakes and increase efficiency in your work.

We COULD make cheaper Instruments
But we Won't.

We WOULD make them better
But we Can't.

FOREWORD

In placing in your hands this Catalogue, we do so in the belief that its pages contain suggestions and information of value to those who are seeking the shortest way to **high efficiency.**

The advantages to be derived from the possession of a reliable Transit or Level are so apparent to the Engineer, Surveyor and Builder, that no more than passing comment seems necessary.

The "Sterling Way" is pointed out under the three headings

What it is
How to do it
What to do it with

If these pages serve to bring into closer relations the User and the Maker for their mutual benefit, then its message shall have fulfilled the purpose for which it was intended.

Very truly yours,

ISZARD-WARREN CO.

PART I.

"THE STERLING WAY"

WHAT IT IS.

Engineers and Surveyors find that the important points to be considered in selecting Field Instruments are STRENGTH and RIGIDITY of CONSTRUCTION, ACCURACY and LEGIBILITY of the GRADUATIONS, DEFINITION of TELESCOPE and CONVENIENCE in OPERATION.

It has been our aim as manufacturers of Surveying Instruments, to place before the Engineering Profession a line of Instruments as near perfection as skill, long experience and modern machinery can produce. We have made a careful study of the requirements of the various branches of the profession, and have endeavored to carry out the results of our investigation and experience in the various types of instruments produced in our factory, and we believe that to this has been largely due the success attained in establishing for our "STERLING" Transits and Levels the high reputation of world-wide scope they now enjoy.

None but the finest materials that can be procured are used in the construction of "STERLING" Instruments, our castings being supplied by a maker of national reputation, every piece being submitted to a scientific test for tensile strength, before becoming a part of an instrument. Our telescope lenses are made after the formulæ of a celebrated Jena Optician, and the graduating is done on a Dividing Engine built to our special order by the Société Génévoise, of Geneva, Switzerland.

It is our desire that you should see and know "STERLING" instruments, for whilst the catalogue illustrations and descriptions give a general idea of our products, their many features of special advantage are at once apparent when a personal examination and test of the instrument is made. To those who are too far distant to visit our plant we will, under proper conditions, ship for their inspection and trial any instrument designated.

To the Building Contractor.

That the use of a Level or Transit, or both, in Building Construction is an absolute necessity is well known to the experienced Engineer and Builder. It is, however, to the smaller Builder, Superintendent and the Foreman, that we wish to present a few **facts.**

The time has passed when the average Architect or Owner will accept anything but the most accurate work in building construction of any kind. Footings must be laid at exactly the depth called for, floors must be level, lines must be true and at exactly their proper angles, one with another. It is only with scientifically made instruments that such results can be accurately obtained. The uses of these instruments in building work are so numerous that space does not permit us to here enumerate them all.

In foundation work each footing must be laid exactly at its proper depth—one footing may be under an elevator pit, another under a boiler or furnace—and an error of an inch or two might lead to serious trouble at the time of installation. These levels or heights should be determined by the use of an instrument from the bench marks given by the Surveyor or owner.

Again, in estimating excavations or fills, it is a simple matter with the level to take the heights every five or ten feet, and calculate the exact amount of dirt to be removed, preventing costly errors to the Contractor as a result of guessing at the cubic contents. It is the old story over again of those who try to economize by saving a few dollars and eventually losing a few hundred.

In city work the center line for party walls must be accurately laid off from the street line, thus avoiding the possibility of litigation and expense arising from disputes over party lines, or even in extreme cases the tearing down of walls, as in some cases has been done at the order of the Court.

Another important use of the Level is in the setting of window frames and sills, for nothing will catch the eye of a careful Architect more quickly than a slight error in window alignment. Bases for steel columns, in order to be uniformly stressed, must be set absolutely on the horizontal and on the same level. In reinforced concrete construction which is fast replacing all other forms of building, particularly in factory and warehouse work a level is absolutely indispensable. All lines must be true, for there is no opportunity of resetting concrete columns after once being poured and set. Before a concrete floor is poured, the levels over the entire floor must be checked to see that no forms have sagged or bulged, for errors of this kind not only create unsightly ceilings, but cause secondary stresses in the concrete, which have not been calculated nor provided for.

The simplicity with which the "STERLING" Levels are constructed will enable almost anyone to operate them. With a little practice one can give levels as readily as an experienced Engineer. Likewise the adjustments can be made by following rules as found in another part of this Catalogue.

The Transit, while a little more complicated, can also, with a little practice, be used by an inexperienced operator.

Thus we could go on indefinitely with the various uses to which Transits and Levels can be applied in the construction of buildings, etc. Suffice it to say that the contractor who uses reliable Instruments will save himself TIME, DOLLARS and REPUTATION.

PART II.

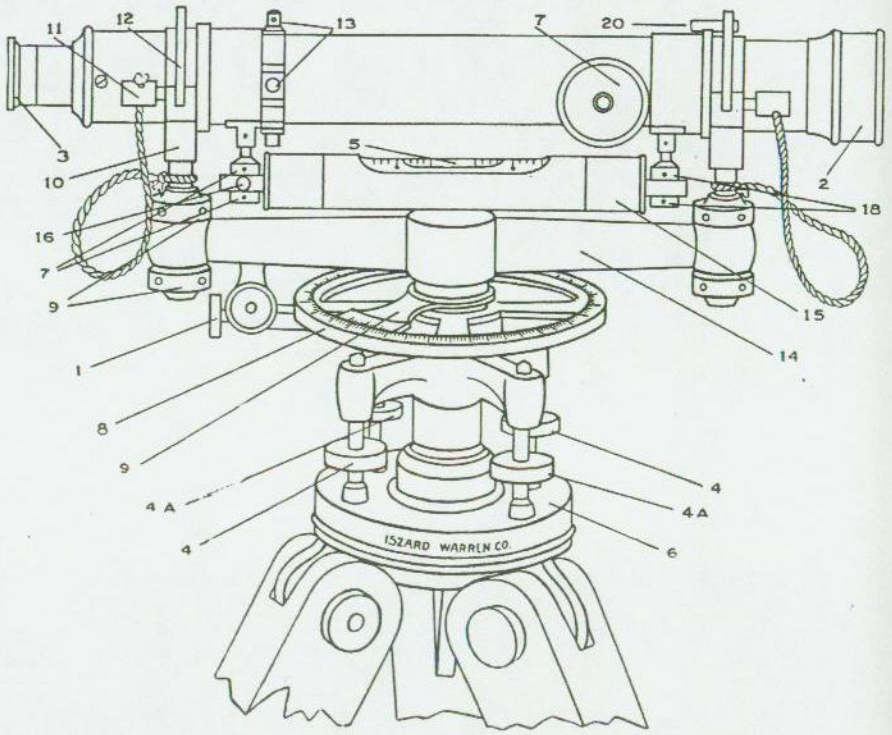
"THE STERLING WAY"

HOW TO DO IT.

Being frequently asked for instructions as to how to use the Builders' Level, and what adjustments are necessary to obtain accurate results, we are induced to publish these brief directions for the guidance of those who have not heretofore had occasion to use the level, and also for those who have hesitated in adopting it in their work, fearing difficulty either in its manipulation or in making the required adjustments.

The subject is divided as follows:—

How to use the Level.
How to test and make the adjustments.
How to use the Transit.
How to test and make the adjustments.



HOW TO USE THE LEVEL.

For the benefit of those who have never tried to use a Transit or a Level, or who have possibly not even seen an Instrument used, these few words of explanation regarding the actual handling of the Instruments are here given.

In the first place, great care should be taken in lifting the Level from the box, not to hit either end of the telescope in so doing. Set the tripod firmly on the ground, separating the legs apart sufficiently to prevent its being easily overturned. Raise the Instrument gently on to the tripod, holding the telescope with the right hand; release the clamp screw (1) (see diagram on previous page), and with the left hand turn the lower half of the instrument until the threads engage and the instrument is screwed securely to the tripod. Remove the cap (2) from the objective (large end of telescope) and while looking through the telescope, turn the small milled head (3) nearest the eye, with a spiral motion until the cross hairs stand out sharp and plain. Next revolve the telescope until it is directly over two of the four leveling screws (4, 4). The level bubble (5) can now be brought to the center of its tube by turning these two screws slowly at the same time, turning both screws in or both screws out as may be required, at the same time keeping them down firmly (but not jammed) against the leveling plate (6). Turn the telescope over the other pair of leveling screws (4-a) and repeat the operation. This will throw the bubble slightly out of center over the first pair of screws; therefore turn the telescope to the first position and center the bubble again as before, continuing the operation alternately over each pair of screws until the bubble stands in the center of the tube whichever direction the telescope is turned.

If the Instrument is in adjustment the line of sight will now be horizontal in any direction; therefore to obtain the difference in level between two points—say on the floor of a building—sight on a rod held over one point and note the reading where the horizontal cross hair cuts the graduation on the rod. Repeat the operation with the rod on the other point and the difference between the two readings will give you the difference in elevation between the two points.

The telescope must be focussed upon the rod or other object sighted, by turning the large focussing screw (7) while looking through the telescope, till the object shows up sharp and plain.

If the elevations of a great many points are to be compared with that of a known point, the rod is held over the known point and the reading taken and added to the known elevation. This gives us the elevation of the line of sight. Each additional reading, subtracted from the "Height of Instrument" as it is called, gives the elevations of the respective points.

In case one of the points cannot be seen by reason of an obstruction between it and the instrument, we must use a "turning point". A firm and smooth place should be selected for this point, obtaining its elevation as described above, then set up the instrument in a new position, where both the point whose elevation is desired, and the turning point, can be seen. Obtain the difference between these elevations in the same manner as before, thus obtaining the new "Height of Instrument" from which the desired result can be obtained.

To measure angles the instrument should be first leveled up as previously described, being sure to set the instrument exactly over the point of intersection. Now sight the first point, clamping the telescope in that position and turn the graduated circle (8) by thumb and finger until its zero coincides with the zero of the vernier (9). Release the

clamp screw (1) which holds the telescope, turning the same until the second point is located. The angle between the two can now be read off from the graduated circle without the necessity for any calculation.

The Convertible or Tilting Attachment is especially valuable where a number of stakes in the same line but at different heights, are to be located. After leveling up the Instrument over the first point, carefully remove the telescope from the wyes (10, 10) and mount it in the Tilting Attachment. Now sight the telescope upon the distant point clamping it in that position, after which, by merely dipping the telescope, the intermediate stakes can be seen and at once located.

In many cases it becomes difficult to use the tripod after the walls of a building have been carried up to a considerable height. In such cases the Instrument is set on the trivet, a small triangular metal plate with steel pins for feet, which replaces the tripod legs. This permits the Instrument to be set upon a window sill, a brick wall or in fact on any convenient surface nearly level. This feature is of great advantage in the setting of floor timbers, window or door sills, in the aligning and leveling of shafting, etc.

These few directions should enable the Builder or Contractor to do all the operations with a Level necessary in construction work.

HOW TO TEST AND MAKE THE ADJUSTMENTS.

Before proceeding to this section, we desire to emphasize the fact that all "STERLING" Transits and Levels are in perfect adjustment ready for use when leaving the Factory, and the adjustments should, therefore, not be touched until it has been positively ascertained that they require correcting. With careful handling and by avoiding unnecessary knocks and jars, the Instrument should retain its adjustments for a period of years, depending also upon the local conditions under which the Instrument is used.

There are three adjustments for the Builders' Level, consequently three tests are required to check the accuracy of the Instrument.

First. The adjustment within the telescope (the intersection of the cross hairs and the mechanical center must coincide).

To make this test, set the instrument up securely, release the telescope clips (12, 12) by removing the small pins (11, 11), permitting the telescope to rotate in its bearings; sight the cross hairs on some well-defined point about 200 feet distant, and rotate the telescope in the wyes (10, 10), noting whether the point observed remains stationary or whether it appears to move. In case there is any deviation during rotation, observe the position of one of the cross hairs in relation to the point bisected. Correction of the error is accomplished in the following manner: The ring which carries the cross hairs is controlled by the capstan head screws (13, 13); select the pair of screws at right angles to the cross hair under observation, loosen one screw slightly with the adjusting pin and gently tighten up the opposite screw to shift the wire until half of the error is taken up, then see that the screws are tightened firmly. The other half of the error is corrected by the leveling screws (4, 4). Repeat this operation until the cross hair revolves correctly and then proceed in exactly the same manner with the other cross hair. In case both hairs should be badly out, it is better to correct them gradually and alternately, rather than to adjust one completely before starting on the other one.

As the objective and eye-piece lenses of all "STERLING" Transits and Levels are mechanically centered, by a special construction, there are no adjustments necessary

in either the object slide or in the eye-piece, their optical and mechanical axes being coincident.

SECOND. The next adjustment is that of the level tube which must be in line with and parallel to the telescope axis. In making this test, set the telescope over either pair of leveling screws and by means of them bring the bubble to the middle of the tube. Clamp the bar (14), release the telescope and rotate it slightly in its wyes so as to swing the tube (15) out from under it. If the bubble remains stationary, this adjustment is perfect. In case it shifts its position, correct one-half of the error by means of the screws (16), one on each side of the tube, first releasing the lock nuts (7, 7), and the other half with the leveling screws. Repeat this operation until the bubble rétains its position when the tube is swung to either side of the telescope. Now with the bubble properly centered carefully lift the telescope from the wyes, turning it end for end and replacing it. If the adjustment is perfect the bubble should center perfectly. In case it is out of center bring it back half of the distance by means of adjusting nuts (18, 18) and the other half with the leveling screws. This operation should be repeated until the telescope can be turned end for end without shifting the bubble.

THIRD. The adjustment of the telescope wyes to bring the telescope parallel with the horizontal bar (14): Level the instrument with the telescope over either pair of screws, turn the instrument on its spindle through 180° over the same pair of leveling screws. If the bubble shifts take up half of the error by means of the capstan head screws (9, 9), and the other half of the error with the leveling screws.

Repeat this operation until the bubble retains its position. The Instrument is now in perfect adjustment.

It will be noticed that there is a small pin (20) on the wye clip, which, fitting into a groove in the telescope collar insures a vertical and horizontal alignment of the cross wires.

HOW TO USE THE TRANSIT.

The setting up of a Transit is somewhat similar to that of a Level, except that in measuring angles the Instrument must be placed directly over a given point. This can be done by hanging a plumb bob on the hook or chain beneath the center of the Instrument. When the Instrument is first set up the plumb bob may not be perfectly over the point, but by loosening the four screws above the tripod the Instrument can be shifted directly over it. The Instrument is then leveled up the same as a Level.

The horizontal plate on which the level is attached has two circular graduated scales; the one, a complete circle, being divided into 360 parts. The other scale, being only a part of a circle, is divided into fractional parts and is called the vernier.

To lay off a given angle, the zero of the graduated circle and vernier are brought together and held there by tightening the plate clamp screw. Now sight the telescope on the point from which an angle is desired, clamp the horizontal plate by means of the lower clamp screw, and release the plate clamp, setting the vernier to the angle desired.

By releasing the magnetic needle in the center of the horizontal plate, the direction of a line with respect to the north and south line can be determined.

The following hints will be found useful in doing good work with a Level or Transit:—

FIRST. Pick out a firm place to set up the Instrument and jam the tripod points firmly into the ground by pushing on each leg in turn, making the top plate as nearly level as possible.

SECOND. Never turn the leveling screws till they jam; if the first precaution is observed this will not happen.

THIRD. If long sights are to be taken, set up as nearly as possible midway between the points to be observed.

FOURTH. If the set-up must be made on a slope, point two legs down the slope for stability.

FIFTH. Keep the cap on the telescope when not in use.

SIXTH. Before removing the Instrument from the tripod preparatory to putting it in its case, turn the leveling screws until the tripod plate and leveling head are approximately parallel, that is, so that each leveling screw projects the same distance above the leveling head. This will enable the Instrument to be more readily unscrewed from the tripod, and also will insure its fitting in the box without straining the center.

HOW TO TEST AND MAKE THE ADJUSTMENTS.

The adjustments of an Engineering Instrument are of two kinds:

FIRST. The maker's adjustments, or those made while the instrument is in process of construction.—Special appliances in the form of collimating telescopes, level triers and other delicate optical and mechanical devices being employed to enable the adjuster to test and rectify the mechanical errors, and consequently secure a grade of accuracy in these adjustments that warrants the high standing our instruments enjoy.

SECOND. The field adjustments, or those which occasionally have to be made or verified by the practical Engineer in the use of the Instrument. Makers, as a matter of course, find it necessary to verify all the field adjustments, and we give them special attention, double checking every operation, thereby insuring the instrument being perfect and ready for immediate use.

The field adjustments may be divided under five classifications:

FIRST. To make the axis of the plate levels perpendicular to the vertical axis of the instrument.

SECOND. To make the line of sight perpendicular to the horizontal axis of the telescope.

THIRD. To make the line of collimation revolve in a vertical plane.

FOURTH. To make the axis of the telescope-level parallel to the line of collimation.

FIFTH. To make the vertical arc or circle read zero when the bubble of the telescope-level is in the centre of its tube.

NOTE: This adjustment is not required when the swinging arc is used in place of vertical circle.

In the Transit Telescopes of our manufacture, absolutely no adjustments are necessary, either in the object-slide or the eye-piece, as we have a special method of centering our lenses so perfectly, and permanently mounting them, that their optical axis coincides with the mechanical axis of the telescope.

FIRST ADJUSTMENT. Set the instrument up rigidly, release the plate clamp screw, and bring the plate levels on a line parallel with or over the two pairs of leveling screws; then by means of the leveling screws, bring both bubbles to the centre of their tubes. Next turn the instrument 180 degrees in azimuth. If the bubbles remain in the centre, the adjustment is perfect, but in case either one shifts its position, correct one-half of the error by means of the leveling screws and the remaining half by means of the adjusting nuts at the ends of the level frames, as follows: First release the lock nuts, then with the adjusting pin gently turn either screw necessary to shift the bubble in either direction, until it comes to the centre of the tube, exercising care to afterward tighten all lock nuts used in this operation. Repeat the operation until the bubbles remain in the centre of their tubes during a complete revolution of the instrument.

SECOND ADJUSTMENT. Having carefully leveled the instrument, select some well defined point and turn the eye piece until the cross wires are sharp and distinct. Note if the vertical wire remains on that point for its entire length while the telescope is moved in altitude. If not, loosen all the capstan head screws (which control the cross hair diaphragm), and turn the ring until correct.

Next clamp the plates and bisect a distant point with the cross wires; then revolve the telescope and sight to a point about the same distance in the opposite direction (the latter point in most cases will have to be placed). Unclamp the plates, and turn instrument 180 degrees in azimuth, and direct again to the point first selected. Clamp the plates and reverse the telescope on its axis, and if second point is now bisected, the adjustment is perfect.

If the point is not bisected, select the pair of capstan screws at right angles to the vertical hair; loosen both screws, and with the adjusting pin gently turn either screw necessary to shift the wire to the right or left until one-quarter of the error is taken up. Again bisect the first point selected, transit and place a new second point. These two points will now remain bisected if the adjustment is correctly made; if not, repeat the operation several times, establishing a new second point each time until the adjustment is perfect.

The horizontal wire should be in the plane of motion of the optical centre of the object glass. To make this adjustment, drive a peg near the instrument and another about 100 yards distant. Place a rod on the pegs and take two readings; turn the instrument 180 degrees in azimuth, transit the telescope and read again. If this reading is not the same as before, correct one-half the error by moving the horizontal wire up or down in the same manner as described in the case of the vertical wire.

THIRD ADJUSTMENT. Level the instrument carefully and sight to some high object, then depress the telescope and note carefully where the intersection of the cross wires cuts the ground. Now turn the instrument through 180 degrees and reverse the telescope; sight again to the same high point, now depress the telescope and sight on the ground. If the same point is bisected, the adjustment is perfect. If not, correct one-half the error by raising or lowering one end of the axle by means of the screw placed in the standard for that purpose, until the line of sight revolves in the true vertical plane.

FOURTH ADJUSTMENT. Set the instrument up on a level piece of ground; carefully level the plates and bring the telescope level to the centre of its scale and clamp the telescope. Place a rod about 300 feet in front of the instrument, and take a reading; turn through 180 degrees in azimuth and bring the bubble to its former position by means of the tangent screw; establish a second point at the same distance as the first, and take a reading of the rod at this point. The difference in the reading is the true difference of level no matter how much the instrument may be out of level.

Next move the transit about 300 feet beyond one of the points, level the instrument as before and read the rod on each of the original points. If the adjustment is correct, the difference of the two readings will be the same as at first. If not, move the telescope by means of its tangent screw until the same difference in the rod readings is obtained as at first. With the telescope in this position, adjust the bubble frame by means of the capstan head nuts at the end of the tube, until the bubble is brought to the centre of the tube. Verify this adjustment by resetting the instrument midway between the two points.

When this adjustment is made, it is well to see that the vernier of the vertical arc (on instruments having the arc permanently fixed to telescope axle), or circle, reads zero when the telescope is level. If it does not, loosen the capstan head screws which fasten the vernier to the standard, and set the zero of the vernier to coincide with the zero of the arc or circle.

FIFTH ADJUSTMENT. Carefully level the instrument; bring the zero of the vertical circle to coincide with the zero of the vernier. Select a point at mean distance, which is cut by the horizontal wire; turn the instrument through 180 degrees in azimuth; reverse the telescope and fix upon the same point. Observe if the zeros again coincide; if so, the adjustment is perfect. If not, loosen the capstan head screws which hold the vernier, and move it over one-half the error. Bring the zeros again in line and proceed as before. The instrument should now be in perfect adjustment.

REPAIRS.

Realizing the inconvenience and loss of time resulting from accidents to Transits or Levels, sometimes causing vexatious delays in bringing to a standstill a large force of workmen, we have inaugurated a special Department in our Factory, for the prompt handling of **repair work,** employing a corps of skilled Instrument Makers, who can in the shortest possible time repair any make of Instrument, the work being guaranteed absolutely.

To further assist those who have had an accident of this kind, we keep on hand a number of reliable second-hand Transits and Levels in perfect adjustment, which we can send out on a moment's notice at a low rental, to be used while the damaged Instrument is being repaired.

We want our Customers to feel that we can be called upon at any time in this capacity, with the assurance that we will do all in our power to help them out, and that our charges for the service will be moderate.

We will now proceed in the next section to give some illustrations and descriptions of the Instruments best adapted for the various lines of work above referred to.

PART III.

"THE STERLING WAY"

WHAT TO DO IT WITH

STERLING SUPERIORITY

Taken from any angle, the following points must be considered in the selection of the proper Transit or Level to fit your requirement, and give you the greatest value for your investment.

1 *Accuracy*
2 *Durability*
3 *Adaptability*
4 *Ease of Operation*
5 *Simplicity of Construction*
6 *Versatility*
7 *Efficiency*
8 *Price*

INFORMATION.

Ordering.

In writing an order give the catalogue number or in case of a telegram or cablegram the code word. Names and addresses should be written with great care and both County and State should be mentioned in giving post office, express or freight address.

Shipping.

It is advisable to make ordinary shipments by express. It is a quick and reliable way and express companies are responsible for damage. Freight shipments require heavy packing cases which will be charged for at cost. Mail packages will be sent at the risk of the purchaser.

Packing.

In shipping our instruments we carefully pack the inside of the instrument box proper, with tissue paper, thus preventing the danger of any part working loose. The instrument box is then enclosed in an outside packing case of pine, made somewhat larger on all sides to permit the use of an elastic material which prevents any jar from affecting the instrument itself. We guarantee the safe arrival to the express terminus as we hold the express companies responsible for all losses and damages in transportation. We advise customers to unpack and examine the instrument either in the express office or in the presence of the agent or delivery man and refuse to accept any damaged goods, as when reported after signing their receipt it is more difficult to establish a claim.

Terms.

Purchasers with whom we have not dealt must send cash with order or give satisfactory reference and it is advisable to send the reference with the order so as to avoid delay through correspondence.

Shipments can be made C. O. D. if a sufficient amount accompanies the order to cover all express charges and the amount remitted will be credited on the bill.

We allow a cash discount of 2 per cent. on all remittances with order, or 1 per cent. ten days; otherwise our bills are positively net and due within thirty days of their date.

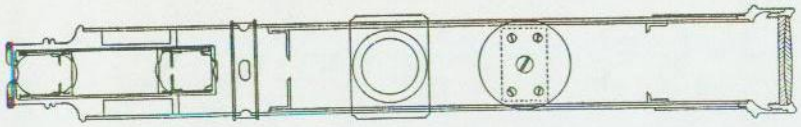
Instruments on Trial.

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

Our Unqualified Guarantee.

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

THE TELESCOPE.



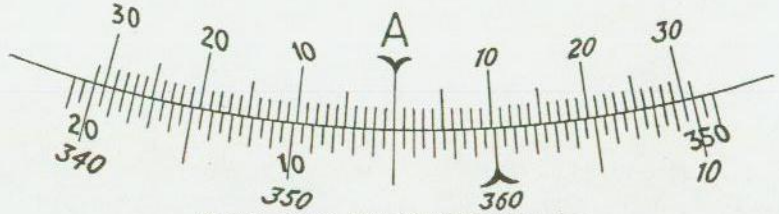
The Telescopes of our Instruments are constructed under the personal supervision of the factory superintendent, and have extraordinary qualities in respect to maximum of power, with a very large flat field and an abundance of light, enabling the engineer to work when the ordinary transit could not be used on account of the reduced light. The objective is an achromatic lens free from spherical and chromatic aberration. The eye-piece is erecting (unless otherwise ordered) composed of four perfectly centered lenses. We furnish our transit telescopes with a magnifying power of from sixteen to thirty diameters, according to the type of instrument and its requirements. The object glass is focussed by means of rack and pinion placed on the side of telescope, however it can be placed on top if preferred by those accustomed to this form of construction. A dust cover or slide protector is put on the object-slide of the telescope to prevent dust or grit from being carried into the tubes. In other words our telescope tubes are dust and moisture proof; a feature appreciated by those having had experience with telescopes not so constructed. The object slide is absolutely parallel to the line of collimation for all distances, eliminating the objectionable adjustable slide. The eye-piece is provided with a special micrometer screw or spiral focussing arrangement giving a movement of the greatest refinement.

The cross wires are made of drawn platinum or of spider web as may be ordered. The latter are recommended as they are less affected by atmospheric changes. We furnish fixed stadia wires (when ordered) without extra charge and set them on the diaphragm of the telescope so that they read 1:100 accurately on any leveling rod. The constant which is to be added to all stadia measurements is noted on a card placed on the inside of the box. We do not recommend the adjustable stadia as this form is so liable to derangement. We, of course, will furnish them when ordered, at the additional charge of $7.00.

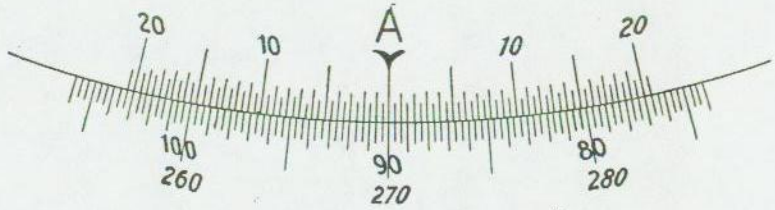
Disappearing stadia is the latest improvement, the wires being so placed as to be out of focus when the cross wires are visible, and vice versa. Many engineers prefer this construction, it being less confusing to the observer and lessening the liability to error. They are furnished when ordered at the additional price of $10.00.

The transit telescopes are perfectly balanced and are reversible at both ends. The telescope axle is of special Bell Metal, having its bearing truly fitted to the standards.

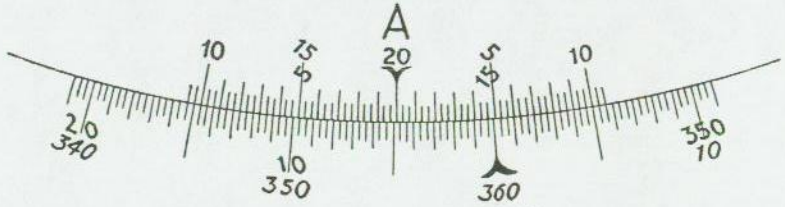
THE GRADUATIONS.



Graduation Reading to Minutes.



Graduation Reading to 30″.



Graduation Reading to 20″.

We feel safe in making the assertion that the graduating of our circles is executed on the finest dividing engine in this country, having had it built to our special order by the Société Génévoise, Geneva, Switzerland, the recognized standard scientific instrument experts of the world.

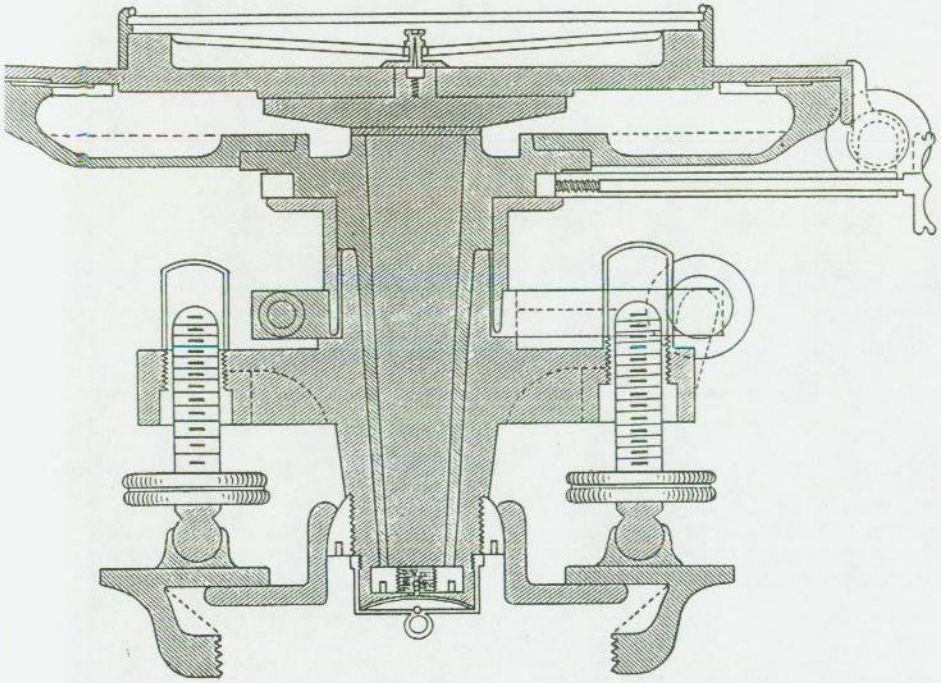
The limb graduations of our Engineers' Transits are cut upon Solid Silver.

The chief advantage of solid silver is that it is possible to cut a very much finer division, the surface remaining bright and easily read.

Our instruments are regularly divided to read to single minutes, but may be furnished when so ordered to read 20 or 30 seconds at an additional cost.

The Horizontal Limb is figured with two rows of numbers 0 to 360 in opposite directions, known as the Transit Circle, the numbers being inclined in the direction they should be read. However, any desired figuring will be furnished upon special order. The Double Compass Circle, figured 0 to 360 in one direction and 0 to 90 each way is preferred by some Engineers. The Verniers are placed at 25 degrees to the line of sight, enabling the observer to readily take the readings without shifting his position. The vernier openings are covered with crystal glass, and on Models 1, 14 and 21 ground glass reflectors are provided for illuminating the divisions.

THE CENTERS AND LEVELING HEAD.

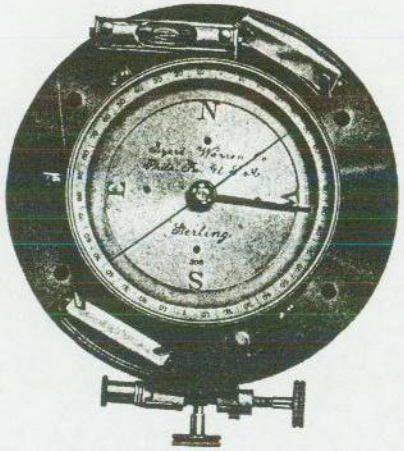


One of the most vital points to be considered in designing Surveying Instruments is the Center and Leveling Head construction. Each part must be so proportioned as to insure for it the greatest strength where it is most required. Too much care cannot be exercised in the selection of metals to prevent undue friction and wear in the moving parts. To accomplish the highest perfection in fitting the Centers and the Plates, Precision Lathes without spindles, known as "dead center" Lathes, are used. In all "STERLING" Transits and Levels, the Centers are of the long taper type, terminating in broad flanges, and are both theoretically and practically correct. The three metals chosen for our Instruments are phosphor bronze, hard red brass, and bell metal, each having for the next respectively the least friction, and the minimum difference of coefficient of expansion and contraction.

In so far as possible the various parts, when of the same metals, are cast from gated patterns, the advantages of this precaution being obvious.

The Leveling Head being made of hard red metal ribbed castings, combines lightness and great strength. The design of our Leveling Heads is a distinctive feature, not only giving the instrument a symmetrical appearance, but giving easy access to the Leveling Screws. Ball jointed caps are fitted on the lower end of all leveling screws, to protect the tripod plate from unnecessary wear. Special attention is given to the alignment of the half ball and leveling screws to insure a uniformly smooth movement of the same. On the higher grade instruments, the leveling screws and tangent screws are of German silver, the tangent screws on all instruments being provided with opposing springs, working in dust proof pistons.

THE COMPASS PLATE.



The Compass Needle is made of special Swedish magnet steel, swinging on a jewelled center, mounted in an aluminum cap and supported by a hardened steel center pin. The needle is carefully balanced and tapered to a fine point, enabling very accurate readings to be taken. The compass circle is graduated to half degrees, figured in quadrants from 0 to 90.

The Variation Arc.

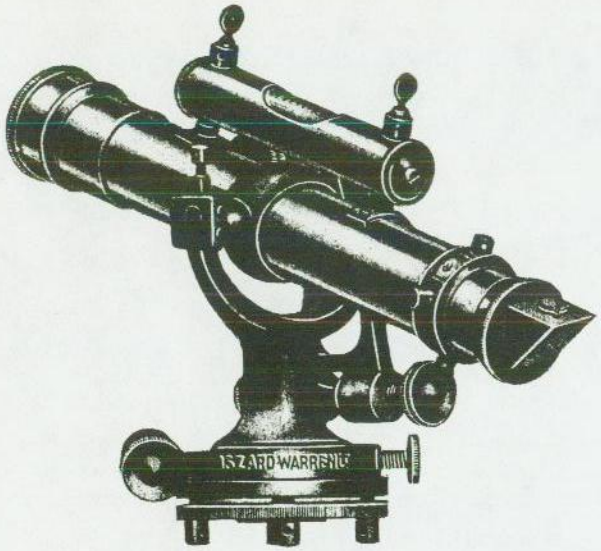
On our Engineers' and Surveyors' Transits an Arc and Vernier for setting off the magnetic variation of the Needle is provided. This feature is especially valuable in checking old surveys.

The Tripod and Carrying Case.

The three forms of tripod legs used on our Instruments, are the solid, split and extension leg types. In the specifications of each instrument will be noted the style of tripod regularly furnished, and on page 50 the prices of the various styles separately are given. A special fine grained white ash, which has the feature of being straight and close grained, permitting of a durable and highly polished finish, is employed. Close attention has been given to so proportioning the tripod leg, as to give the greatest stability and firmest possible support for the Instrument.

The Carrying Cases are of hardwood, highly polished, and all of them are of the top-lid type, which affords a much safer means of support for the Instrument, decreasing the liability to injury in transportation, than with the front door box.

"STERLING" SOLAR ATTACHMENT.



The Solar Attachment consists of a small telescope that is mounted on a horizontal axis, resting upon a standard connected to a circular base. This base forms the socket of the, so called, polar axis and is attachable at its lower extremity to the horizontal axis of the telescope. The solar telescope is thus capable of being turned on its own horizontal axis and on its polar axis. A small level is mounted on top and parallel to the solar telescope.

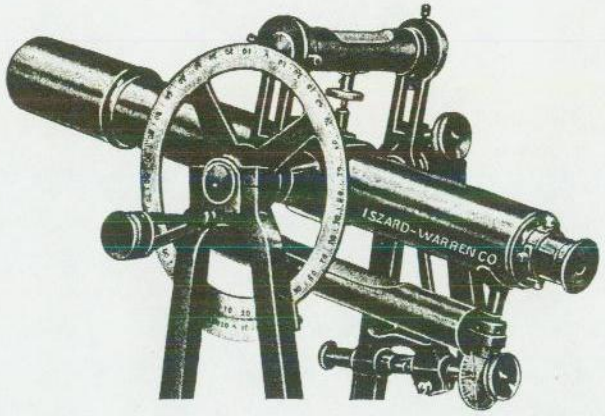
Two pointers or finders are also attached, the sun appearing in the field of view of telescope when the shadow of one of the pointers is thrown on the other.

The solar telescope is provided with a right angle prism for conveniently observing the sun when it is at a high altitude.

This prism is fitted with shade glass for the purpose of reducing the intensity of the solar rays transmitted. Clamp and tangent movements are provided both for the vertical and for the hour angle movement.

Price complete.....$50.00

"STERLING" GRADIENTER ATTACHMENT.



The Gradienter Attachment as supplied by us is guaranteed accurate within one tenth of one per cent. This screw replaces or is substituted for the regular tangent screw to the telescope axis. It is accurately cut and of such a number of threads that one revolution equals one foot to one hundred, or in other words, one revolution of the screw will move the horizontal wire of the telescope over a space of one foot on a rod at a distance of one hundred feet.

The graduated head is divided into 100 equal parts and is movable, so that all readings may start at zero. The silvered scale is graduated to the pitch of the screw, so that by comparing the edge of the head with the scale graduation the number of complete revolutions may easily be determined.

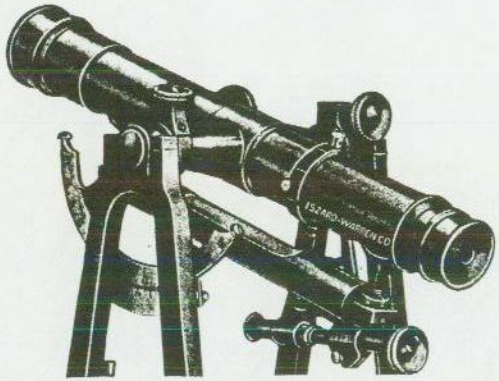
This screw has two chief uses, namely: First—that of establishing grades, and Second—that of measuring distances. Grades may be laid off by first taking the reading of the gradienter when the telescope is level, and then allowing 1 foot per 100 for each division of the graduated head, set off to the desired grade. For instance, to set off a grade of 3.45 feet per 100 feet, it is necessary to move the gradienter 3.45 revolutions of the screw.

A grade may be measured by finding the reading of the gradienter when the telescope is level, and then turning the graduated head until the line of sight points in the proper direction, read the number of revolutions and fraction of a revolution, and this number will be the grade in feet per hundred.

Distances may be measured either, first, by observing the distance on the graduated rod passed over by one revolution of the screw, or, second, by taking an assumed length on the rod and finding the difference of readings for this length. In the latter method, 100 times the assumed length on the rod divided by the difference of readings, equals the distance away from the rod.

Price when furnished with new instruments.....$10.00
Price when added to old instruments or those sent for repairs..... 15.00

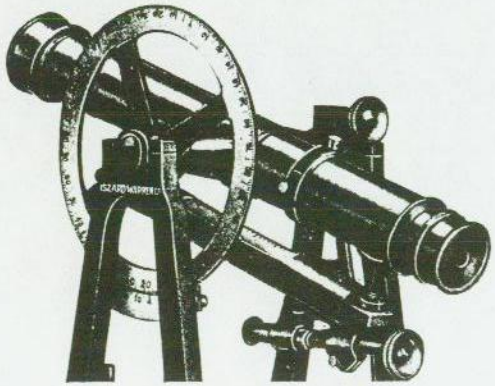
"STERLING" VERTICAL ARC.



The Vertical Arcs are of 2½" radius, and swing freely in bearings on the telescope axle, so that they can be set and clamped at zero, regardless of the position of the telescope. This feature is peculiar to Vertical Arcs of Transits of our make and is of great value to the Engineer.

Price of Vertical Arc when added to plain transits.....$15.00

"STERLING" VERTICAL CIRCLE.



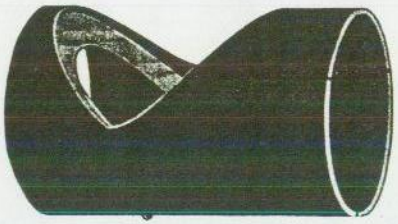
The Vertical Circles are of the same dimensions but are mounted permanently on the telescope axle and read zero when the telescope is level. It revolves truly with the telescope.

Price of Vertical Circle when added to plain transits.....$15.00

It is optional with the purchaser as to whether the transit selected is fitted with the Vertical Circle or Arc.

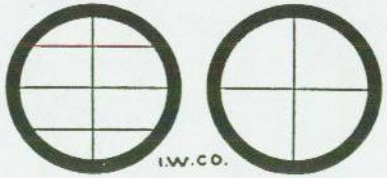
ISZARD-WARREN CO., PHILADELPHIA, PA.

"STERLING" CROSS WIRE REFLECTORS.



For illuminating the cross wires a special reflector shade having a heavily silver plated mirror highly polished is provided. It is made in all sizes to attach to object end of telescope. $4.00

THE STADIA.

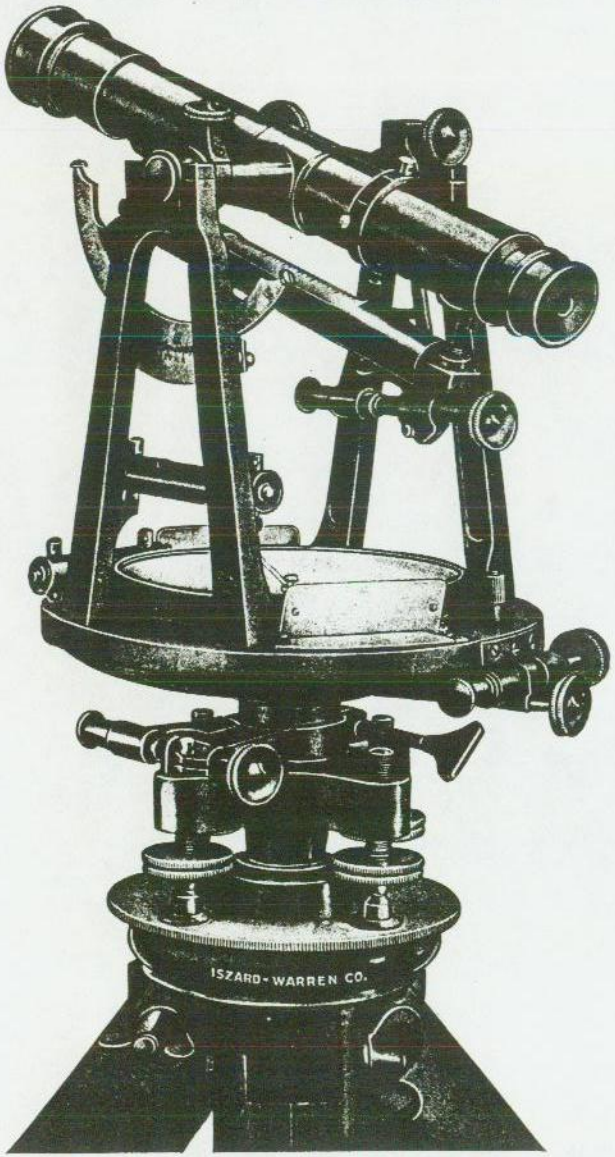


In advocating the stadia wires we do so with the guarantee that we can place fixed stadia wires on the diaphragms of our telescopes so that they will read 1:100 on any accurate leveling rod with an error not exceeding one-tenth of one per cent, having constructed a special mechanical apparatus for this purpose.

We note on a card placed inside of the carrying case the constant which is to be added to all stadia measurements.

Price of fixed stadia wires in any telescope $5.00
Price of adjustable stadia wires in any of our new telescopes $7.00
Price of adjustable stadia wires in any telescope sent for repairs . . $10.00
Price of disappearing stadia wires in any of our new telescopes . . . $10.00
Price of disappearing stadia wires in any telescope sent for repairs . $12.50

"STERLING" PRECISION TRANSIT No. 1.



PRICE AS ILLUSTRATED, $220.00

This Transit represents the highest achievement in Precision Instruments. In accuracy, workmanship, design and grace of finish it is unparalleled. Designed for Municipal Engineering, Tunnel and Bridge Construction, Railroad, Canal and all Precise Surveys.

ISZARD-WARREN CO., PHILADELPHIA, PA.

SPECIFICATIONS.

"STERLING" PRECISION TRANSIT No. 1.

Achromatic telescope 11″ long, Erecting Eye-piece, Object glass aperture 1¼″ with power of 30 diameters, unsurpassed large, clear and flat field; Dust cover to draw tube; Improved rack and pinion movement to object slide. Micrometer screw focussing arrangement to eye-piece. Center point on top of telescope for accurate centering from above.

Sensitive, ground spirit level 6″ long mounted under telescope.

Clamp and opposing spring tangent screw to axle of telescope.

Vertical arc 2½″ radius divided to ½ degrees, with vernier reading to single minutes. Figuring of graduations on arc from 0 to 90 each way from zero.

Horizontal limb (graduated edge) 6½″ diameter, divided to ½ degrees, on solid silver, with two opposite double verniers, reading to one minute, placed at 30 degrees to line of sight. Figuring of graduations in two rows of inclined figures from 0 to 360 degrees in opposite directions.

Verniers fitted with ground glass reflectors and covered with crystal glass.

German silver tangent screws with opposing springs to plate and center clamps. Two sensitive ground and graduated levels, one on plate and one on standard.

Compass needle 4¼″ long of improved form, with jewel bearing, aluminum cap, tempered steel center pin.

Compass Graduations, figured in a single row from 0 to 90 on each side of N. and S.

Long taper compound centers with broad flanges.

Skeleton leveling head, capped and packed German silver leveling screws.

Shifting center with ¾″ adjustment. Screw head tripod plate.

Solid or split leg tripod.

Mahogany top-lid carrying case, provided with strap, lock and hooks, and containing plumb bob, pocket magnifier, sun shade, wrench, screw driver and adjusting pins

Weight of Transit 15 lbs. Weight of Tripod 9 lbs.

No. 1 "Sterling" Precision Transit, as illustrated $220.00

No. 1A "Sterling" Precision Transit, same as No. 1, without Vertical Arc 210.00

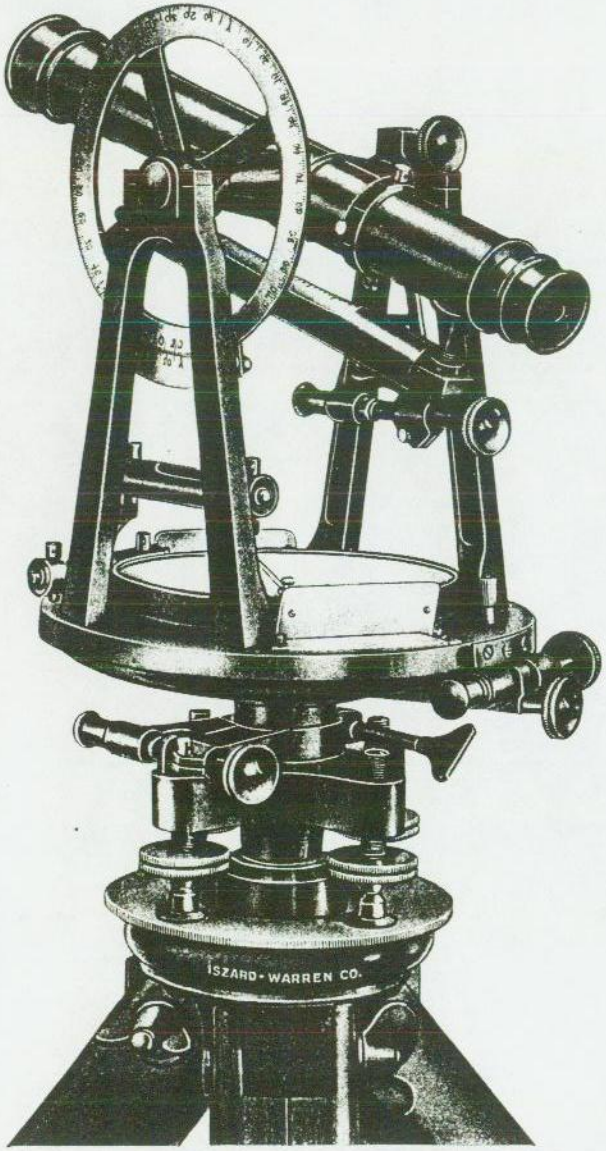
Additional Attachments for No. 1 Transit, see pages 20-23.

Precision Transit fitted with Variation Plate to Compass, add to list price 10.00

Precision Transit having graduations on horizontal limb reading to 30 seconds, add to list price 10.00

Precision Transit having graduations on horizontal limb reading to 20 seconds, add to list price 20.00

"STERLING" ENGINEERS' TRANSIT No. 14.



PRICE AS ILLUSTRATED, $185.00.

This Transit designed for Civil and Railroad Engineers requiring an accurate and substantial instrument that will stand the roughest handling without impairing the adjustments.

ISZARD-WARREN CO., PHILADELPHIA, PA.

SPECIFICATIONS.

"STERLING" ENGINEERS' TRANSIT No. 14.

Achromatic Telescope, 11″ long. Erecting Eye-piece. Object Glass Aperture, 1¼″ with power of 24 diameters, unsurpassed, large, clear and flat field. Improved Rack and Pinion Movement to object slide. Spiral Screw Focussing Arrangement to eye-piece. Center Point on top of telescope for accurate centering from above.

Sensitive Ground Spirit Level, 6″ long, mounted under telescope.

Clamp and Opposing Spring Tangent Screw to axle of telescope.

Vertical Circle, 5″ diameter, with vernier reading to single minutes. Figuring of graduations on circle from 0 to 90 each way from zero.

Horizontal Limb, 6⅝″ diameter, divided on Solid Silver to ½ degrees with two double opposite verniers reading to one minute, placed at 30° to line of sight. Figuring of graduations in two rows of inclined figures 0 to 360° in opposite directions.

Verniers covered with crystal glass and fitted with reflectors.

Tangent Screws with opposing springs to plate and center clamps. Two sensitive ground and graduated levels, one on plate and one on standard.

Compass Needle, 5″ long, of improved form, with jewel bearing, aluminum cap, tempered steel center pin.

Compass Graduations figured in a single row from 0 to 90 on each side of N. and S.

Compass Ring, fitted with variation plate, with clamp.

Long Taper Compound Centers with broad flanges.

Skeleton Leveling Head, capped and packed phosphor bronze leveling screws.

Shifting Center with ¾″ adjustment, screw head tripod plate.

Solid or Split Leg Tripod.

Mahogany Top-lid Carrying Case provided with strap, lock and hooks, containing plumb bob, pocket magnifier, sun shade, wrench, screw driver and adjusting pins.

Weight of transit 16 pounds. Weight of tripod 8 pounds.

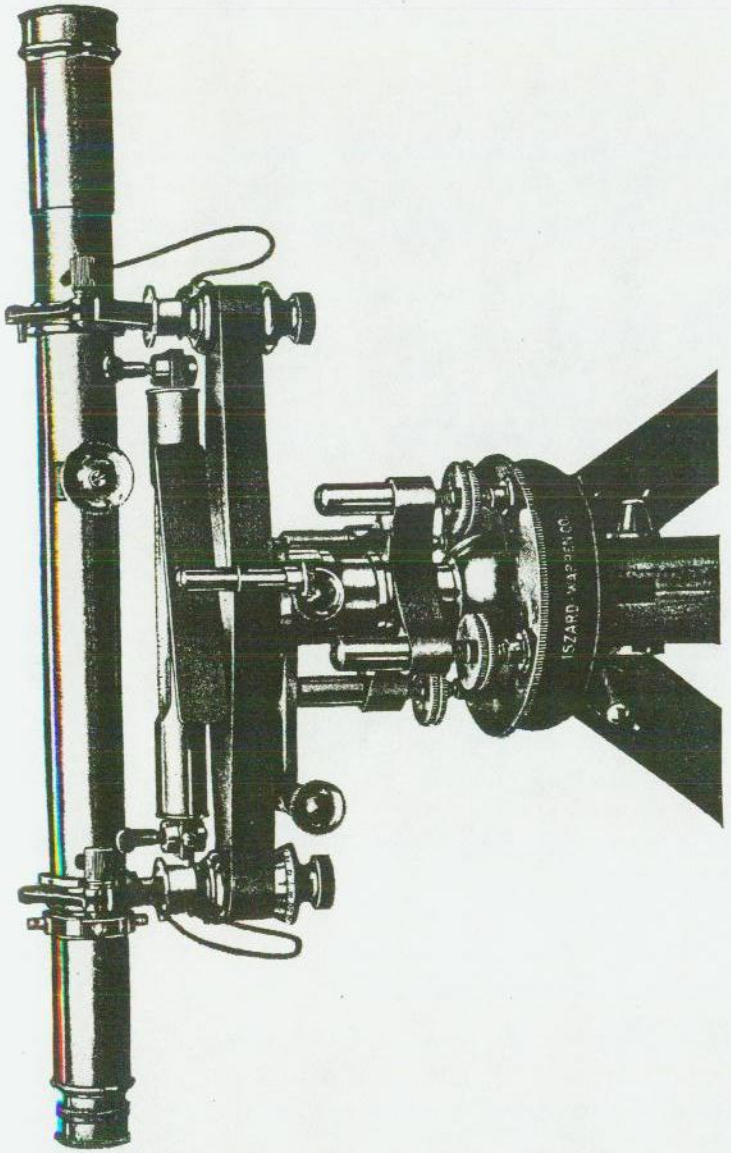
No. 14. "Sterling" Engineers' Transit as illustrated.....$185.00

For additional attachments that may be added to No. 14 Transits, see pages 20-23.

Engineers' Transits having graduations on horizontal limb reading to 30 seconds, add to list price..... 10.00

Engineers' Transits having graduations on horizontal limb reading to 20 seconds, add to list price..... 20.00

"STERLING" ENGINEERS' WYE LEVEL No. 16.



PRICE AS ILLUSTRATED, $130.00

18" High Power Telescope.

This instrument is the most efficient precision level made.

ISZARD-WARREN CO., PHILADELPHIA, PA.

"STERLING" ENGINEERS' WYE LEVEL CONSTRUCTION.

"Sterling" Engineers' Wye Levels are made in three different sizes, having telescopes 18", 20" and 22" in length.

The telescopes are of the same construction as the Engineers' Transit Telescopes before described. The object glass aperture is 1¾" and the magnifying power is from 30 to 40 diameters. The telescope is provided with two bell metal collars 1⅝" in diameter accurately turned and precisely the same diameter, so that when the telescope is revolved in the Wyes the rotation is smooth and absolutely concentric.

The accurately ground spirit level is 8" long and is graduated directly on the glass and the graduations are filled in with a permanent color pigment. This form of construction is far superior to the old style metal scale for reading the position of the bubble.

The Wyes are made of phosphor bronze, and the telescope collar bearing points are provided with a suitable material whereby the telescope is held firmly in the wyes, without the wyes and wye bearings being subject to the slightest strain. The hinged clips of the wyes are accurately mounted and of improved construction. The true horizontal position of the cross wire is provided for by a projection or pin in the clip at the object end of the telescope. This pin rests in a slot in the telescope collar, so that when the clip is locked the telescope cannot turn and the cross wire must be horizontal and remain so.

The level bar is of special formula bronze, heavily ribbed and proportioned so as to have the greatest strength in the parts most subject to strain.

The center is extra long, accurately turned between dead centers, ground by special apparatus and fitted in a socket of phosphor bronze. This construction is of special merit in the small and equal co-efficient of expansion and the freedom from errors due to atmospheric changes and in the minimum co-efficient of friction.

The opposing spring tangent is attached to the level bar, retaining at all times the same relative position to the eye-piece end of telescope.

Skeleton leveling head with capped and packed German silver leveling screws.

The Tripods are the same as furnished with transits and are described on page 50.

The levels are packed upright in the carrying cases and are detachable only at the tripod plate.

No. 16. "Sterling" Engineers' Wye Level, 18" telescope. Weight of level 10½ lbs. Weight of tripod 8 lbs. $110.00

No. 17. "Sterling" Engineers' Wye Level, 20" telescope. Weight of level 11 lbs. Weight of tripod 8 lbs. 115.00

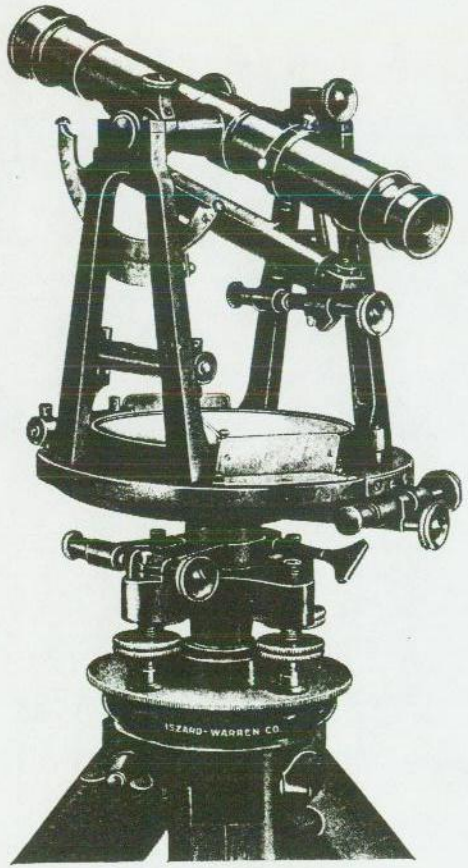
No. 18. "Sterling" Engineers' Wye Level, 22" telescope. Weight of level 11½ lbs. Weight of tripod 8 lbs. 120.00

Micrometer Wye Adjustment, extra 10.00

Silvered mirror for keeping bubble constantly in view of operator, extra .. 10.00

(See illustration on opposite page.)

"STERLING" ENGINEERS' TRANSIT No. 21.



PRICE AS ILLUSTRATED, $150.00.

This Transit is similar in design, accuracy, and workmanship to the Engineers' Transit No. 14 excepting reduced in size and weight. Designed for mountainous or underground mining surveys, also for general engineering where a light weight instrument of accuracy is desired.

ISZARD-WARREN CO., PHILADELPHIA, PA.

SPECIFICATIONS.

"STERLING" ENGINEERS' TRANSIT No. 21.

Achromatic telescope 9″ long. Erecting Eye-piece. Object glass aperture 1⅛″, with power of 24 diameter, unsurpassed large, clear and flat field, Dust cover to draw tube, Improved rack and pinion movement to object slide, spiral screw focussing arrangement to eye-piece. Centre point on top of telescope for accurate centering from above.

Sensitive ground spirit level 5″ long, mounted under telescope.

Clamp and opposing spring tangent screw to axle of telescope.

Vertical arc 2½″ radius, graduated to ½ degrees, with vernier reading to single minutes. Figuring of graduations on arc from 0 to 90 each way from zero.

Horizontal limb (graduated edge) 5⅛″ diameter divided to ½ degrees, with two double opposite verniers reading to one minute, placed at 30 degrees to line of sight. Figuring of graduations in two rows of inclined figures from 0 to 360 degrees in opposite directions.

Verniers fitted with ground glass reflectors and covered with crystal glass.

Tangent screws with opposing springs to plate and centre clamps. Two sensitive ground and graduated levels, one on plate and one on standard.

Compass needle 3½″ long of improved form, with jewel bearing, aluminum cap, tempered steel center pin.

Compass graduations figured in a single row from 0 to 90 on each side of N. and S.

Long taper compound centers with broad flanges.

Skeleton leveling head, capped and packed leveling screws.

Shifting center with ½″ adjustment. Screw head tripod plate.

Split or extension leg maple tripod.

Mahogany top-lid carrying case provided with strap, lock and hooks, and containing plumb bob, pocket magnifier, sun shade, wrench, screw driver and adjusting pins.

Weight of Transit 10 lbs. Weight of Tripod 5 lbs.

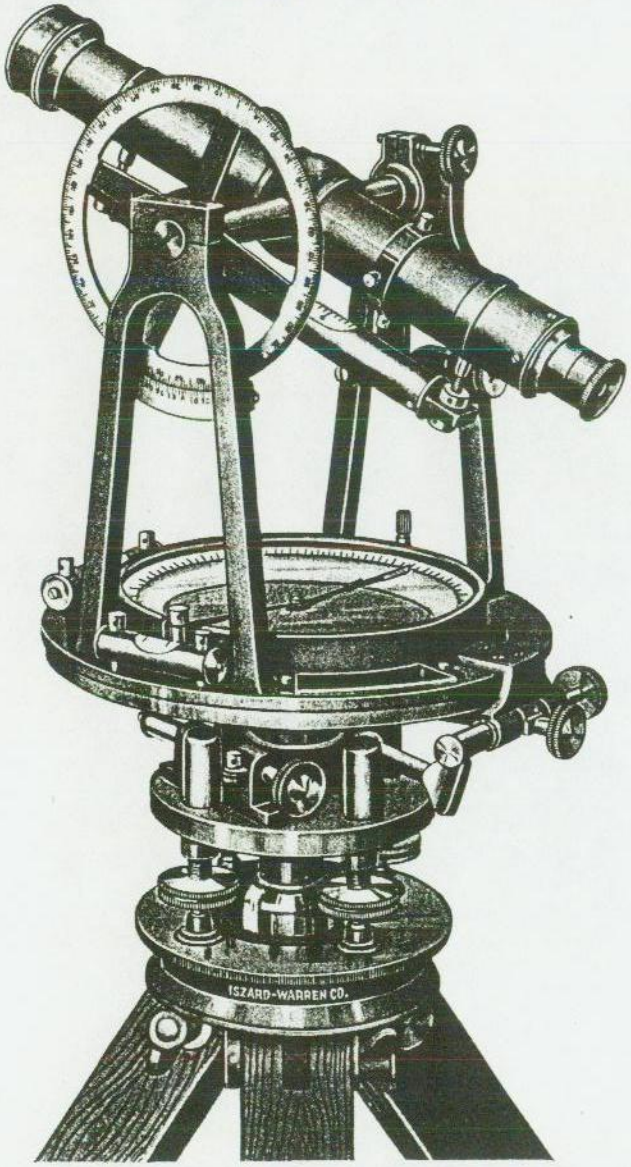
No. 21 "Sterling" Engineers' Transit as illustrated.....$150.00

For additional attachments that may be added to No. 21 Transits, see pages 20 to 23.

Engineers' Transits having graduations on horizontal limb reading to 30 seconds, add to list price..... 10.00

Engineers' Transits having graduations on horizontal limb reading to 20 seconds, add to list price..... 20.00

"STERLING" SURVEYORS' OR CONTRACTORS' TRANSIT No. 25.



PRICE AS ILLUSTRATED, $150.00.

This Transit designed for County Surveyors, Civil Engineers, Educational Institutions and Large Building Contractors requiring an accurate and substantial instrument that will stand the roughest handling without impairing the adjustments.

ISZARD-WARREN CO., PHILADELPHIA, PA.

SPECIFICATIONS.

"STERLING" SURVEYORS' OR CONTRACTORS' TRANSIT No. 25.

Achromatic telescope 11″ long. Erecting Eye-piece. Object glass aperture 1¼″ with power of 24 diameters; unsurpassed large, clear and flat field. Improved rack and pinion movement to object slide. Spiral screw focussing arrangement to eye-piece. Center point on top of telescope for accurate centering from above.

Sensitive ground spirit level 6″ long mounted under telescope.

Clamp and opposing spring tangent screw to axle of telescope.

Vertical circle 5 inch diameter with vernier reading to single minutes. Figuring of graduations on circle from 0 to 90 each way from zero.

Horizontal limb 6⅝″ diameter, divided on Composition Silver to ½ degrees with two double opposite verniers reading to one minute, placed at 30° to line of sight. Figuring of graduations in two rows of inclined figures from 0 to 360° in opposite directions.

Verniers covered with crystal glass.

Tangent screws with opposing springs to plate and center clamps. Two sensitive ground and graduated levels, one on plate and one on standard.

Compass needle 5″ long of improved form, with jewel bearing, aluminum cap, tempered steel center pin.

Compass graduations figured in a single row from 0 to 90 on each side of N. and S.

Compass ring fitted with variation plate, with clamp.

Combination half length taper centers with broad flanges.

Round leveling head, capped and packed phosphor bronze leveling screws.

Shifting center with ¾ inch adjustment, screw head tripod plate.

Solid or split leg tripod.

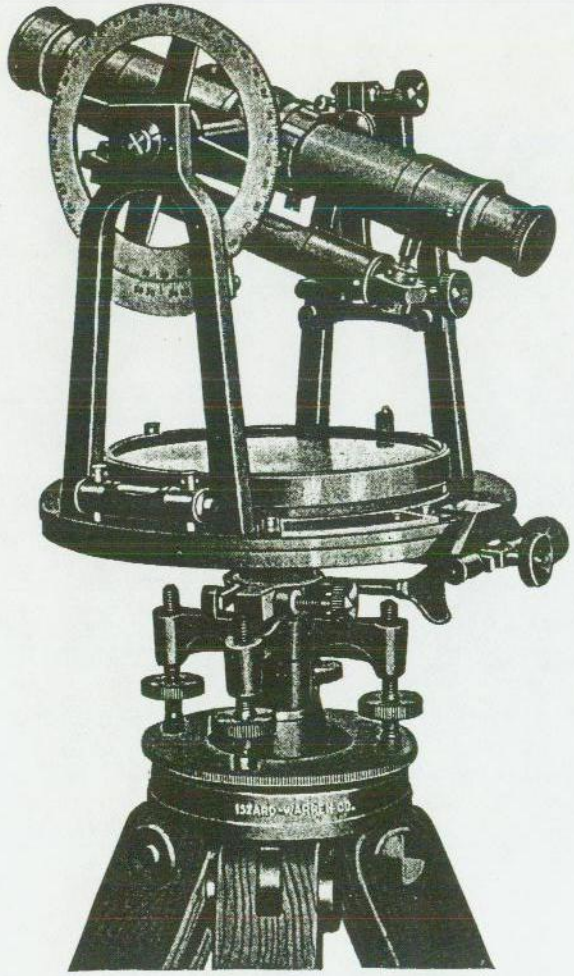
Hardwood top-lid carrying case provided with strap, lock and hooks, and containing plumb bob, pocket magnifier, sun shade, wrench, screw driver and adjusting pins.

Weight of transit 16 pounds. Weight of tripod 8 pounds.

No. 25. "Sterling" Surveyors' Transit as illustrated $150.00

No. 25A. "Sterling" Surveyors' Transit same as No. 25 without Vertical Circle 140.00

"STERLING" RECONNOISSANCE TRANSIT No. 30.



PRICE AS ILLUSTRATED, $115.00.

This Transit designed for Reconnoissance Field Surveys or Mine Developments where extreme precision is not essential.

ISZARD-WARREN CO., PHILADELPHIA, PA.

SPECIFICATIONS.

"STERLING" RECONNOISSANCE TRANSIT No. 30.

Achromatic telescope 9″ long, Erecting Eye-piece, Object glass aperture 1⅛″, with power of 16 diameters, Improved rack and pinion movement to object slide. Spiral screw focussing arrangement to eye-piece. Center point on top of telescope for accurate centering from above.

Sensitive ground spirit level 5″ long mounted under telescope.

Clamp and opposing spring tangent screw to axle of telescope.

Vertical circle 3½″ diameter with vernier reading to five minutes. Figuring of graduations on circle from 0 to 90 each way from zero.

Horizontal limb (graduated edge) 5″ diameter, divided to ½ degrees, with one double vernier reading to one minute, placed at 30 degrees to line of sight. Figuring of graduations in two rows of inclined figures from 0 to 360 degrees.

Verniers covered with crystal glass.

Clamp and opposing spring tangent screw to horizontal limb and centers.

Two sensitive ground spirit levels placed at right angles on horizontal circle.

Compass needle 3½″ long of improved form, with jewel bearing, aluminum cap, tempered steel center pin.

Compass graduations figured in a single row from 0 to 90 on each side of N. and S.

Long taper centers with broad flanges.

Arched leveling head, Phosphor bronze leveling screws.

Shifting center with ½″ adjustment, Screw head tripod plate.

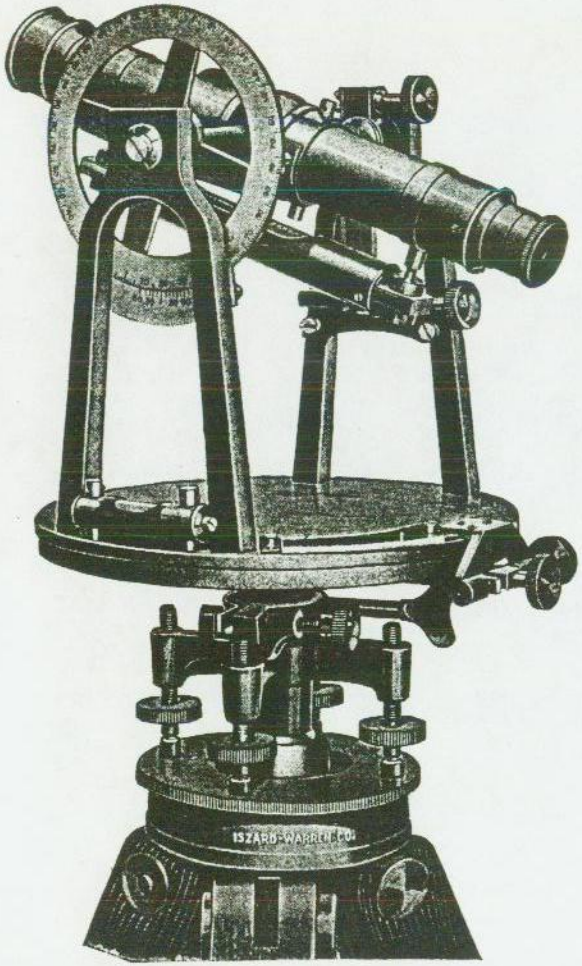
Split leg or extension tripod.

Hardwood top-lid carrying case provided with strap lock and hooks, and containing plumb bob, pocket magnifier, sun shade, wrench, screw driver and adjusting pins.

Weight of Transit 10 lbs. Weight of tripod 5 lbs.

No. 30 Sterling Reconnoissance Transit	$115.00
No. 30A Sterling Reconnoissance Transit, same as above, but omitting vertical circle	110.00
No. 35 "Sterling" Builders' Transit. This instrument is the same as No. 30, except that the compass is omitted (See illustration, page 36).	100.00
No. 35A "Sterling" Builders' Transit, same as above, but without vertical circle	95.00
NOTE: Builders' Transits Nos. 35 and 35A, regularly furnished with solid leg tripod. Extra for split leg tripod, $2.00; extension tripod	5.00

"STERLING" BUILDERS' TRANSIT No. 35.

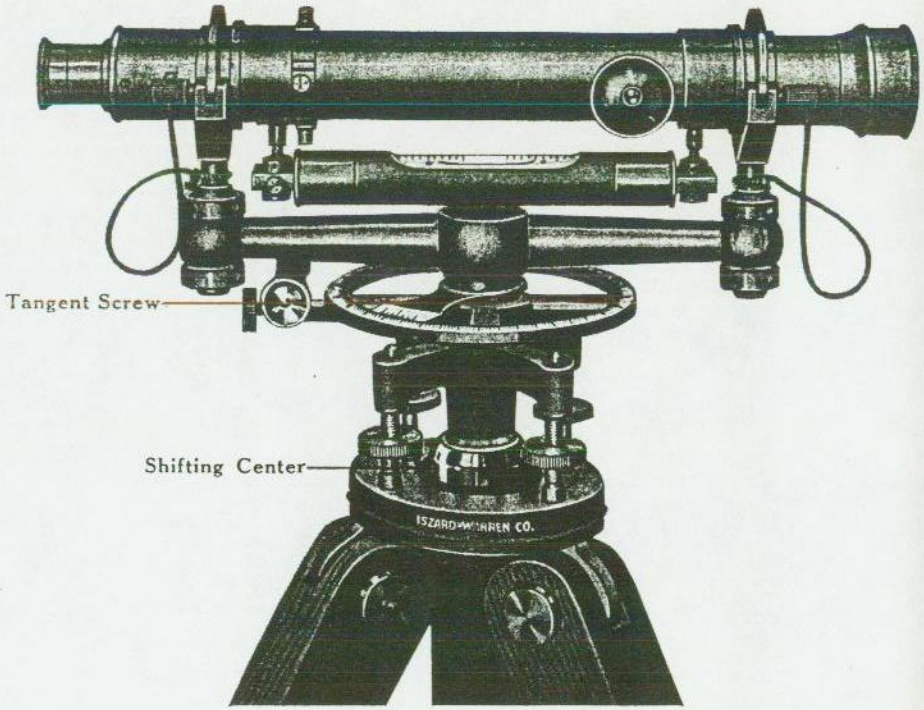


PRICE AS ILLUSTRATED, $100.00.

This Transit is designed for Architects and Building or General Contractors.

ISZARD-WARREN CO., PHILADELPHIA, PA.

"STERLING" ARCHITECTS' AND BUILDERS' LEVEL No. 50.



PRICE AS ILLUSTRATED, $50.00.

The "Sterling" is the only Builders' Level made with a shifting center. This improved feature saves 50% of the time usually required to set the plumb bob over a given point.

(See next page for specifications.)

SPECIFICATIONS.

"STERLING" ARCHITECTS' AND BUILDERS'

LEVEL No. 50.

In designing our "Sterling" Builders' Level No. 50, it has been our aim to place on the market an instrument of the greatest practical value to the Architect, Contractor and Builder, and one whose simplicity and ease of operation would place it within the reach not only of the professional Contractor and Builder, but also those unacquainted with the use of a Level but who, nevertheless, recognize that an instrument of this kind would be of the greatest help to them in laying out and checking their work.

Realizing that on building operations the instrument receives considerable rough handling, we have designed our "Sterling" Builders' Level with an especially strong and compact construction of Center and Bar, resulting in the greatest stability and rigidity, insuring permanence of the adjustments, and the accuracy of the work that can be done with it. These features, combined with a special lens combination of high power, and the general convenience and ease of operation, have placed the "Sterling" Levels in a class by themselves.

Not the least of these improvements is the special construction of the graduated circle, which enables angles to be laid out and measured entirely without calculation. The tangent or slow motion screw attachment to the clamp, adds greatly to the facility with which points can be located or angles measured. The Metal Trivet—a plate with three steel points on which the instrument can be set up when desired, instead of on the tripod—is included with the equipment.

The telescope is 12″ long, achromatic, magnifying power of 25 diameters. The objective is focussed by rack and pinion movement, and the eye-piece by spiral screw adjustment.

The telescope level is 5″ long, ground to an extreme sensitiveness, and graduated.

The wyes supporting the telescope, and the hinged clips and collars are of the same construction as used on our Engineers' Wye Levels.

The leveling head has the long center construction, with large flanges.

Horizontal Circle 4″ in diameter, accurately graduated from 0 to 90° each way from zero, with vernier reading to five minutes.

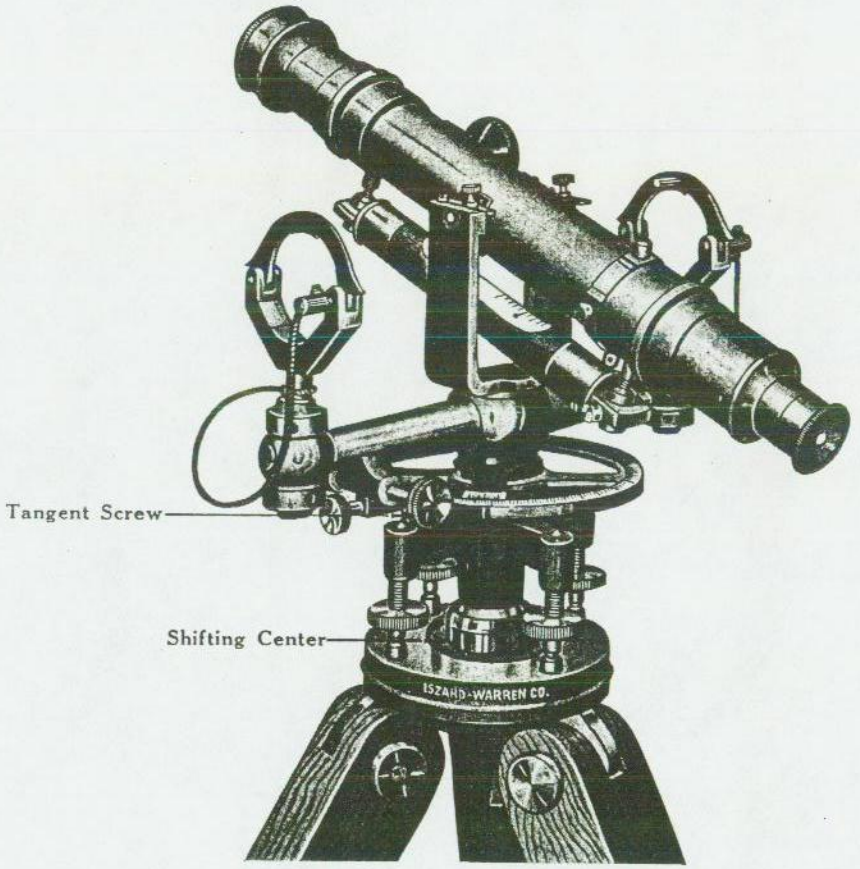
Clamp and Tangent Screw to horizontal motion. Shifting Center with ½″ adjustment.

The Level is furnished in Hardwood Carrying Case, with sun shade, plumb bob, magnifying glass, rain cover, metal trivet, wrench and adjusting pins.

No. 50 "Sterling" Architects' and Builders' Level.....$50.00.

ISZARD-WARREN CO., PHILADELPHIA, PA.

"STERLING" CONVERTIBLE LEVEL No. 55.



Our "Sterling" Convertible Level, as illustrated above, has been designed to fill a long felt want for an inexpensive Instrument, by means of which sights above or below the horizontal could be readily taken.

This instrument is identical with our Level No. 50 with the addition of the small U-shaped standard which is securely attached to the Level bar, and the small trunnions on the telescope by means of which it is mounted in the standards.

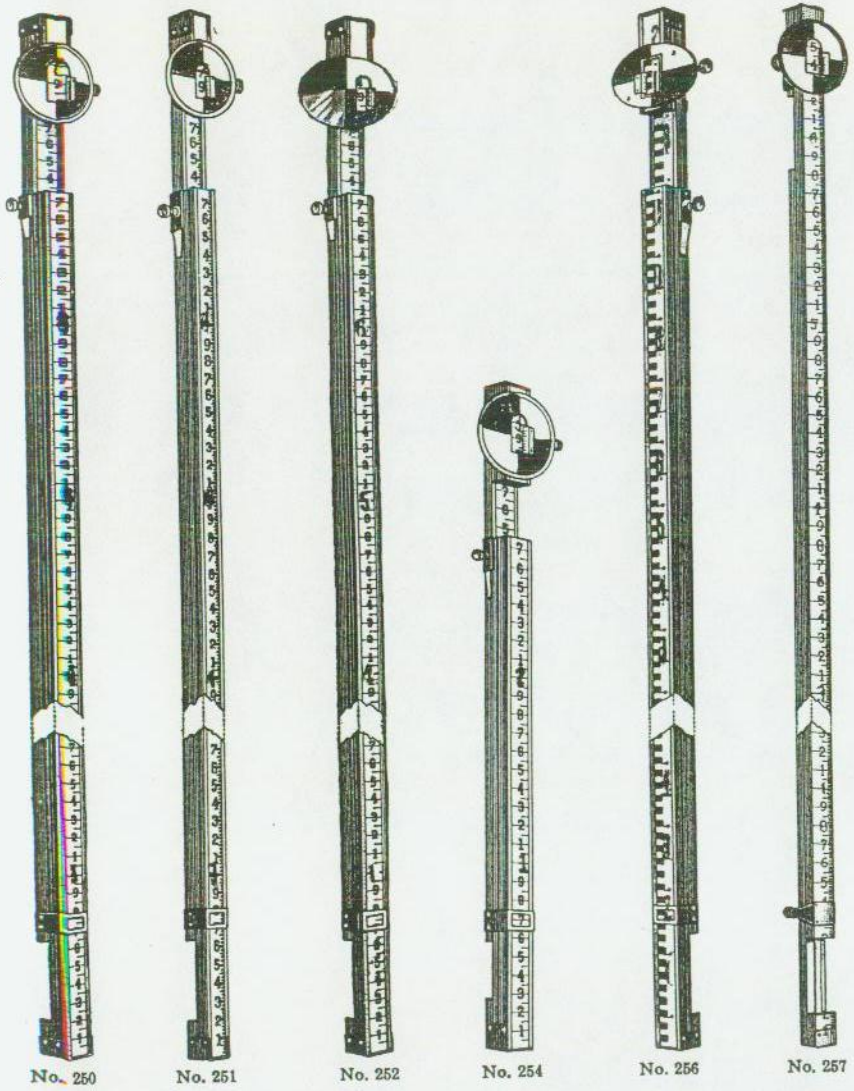
The Instrument can be used as an ordinary Level, and the small standard carried in the pocket to be used only when required, the change requiring only a few seconds. This Level is provided with the tangent or slow motion screw to the plate clamp, also a shifting center, the same as furnished on the No. 50 Level.

With this instrument the vertical lines of foundations, intersections, columns, chimneys, etc., can be accurately checked, often saving costly mistakes and delays. The ease with which the Convertible Attachment is put into place, and the facility with which, by its use, lines of stakes can be accurately located, have made our "STERLING" CONVERTIBLE LEVEL the most valuable addition to the equipment of every up-to-date Builder.

The construction, like that of the No. 50 Level, is re-enforced throughout, making a most reliable, accurate and durable instrument.

No. 55 "Sterling" Convertible Level.....$65.00.

STERLING LEVELING RODS.



No. 250 No. 251 No. 252 No. 254 No. 256 No. 257

ISZARD-WARREN CO., PHILADELPHIA, PA.

STERLING LEVELING RODS.

No. 250. Philadelphia Rod, divided into feet and tenths, verniers reading to 100ths, with target, vernier and clamp, 7 3–10 feet closed, sliding to 13 feet $15.00

No. 251. Philadelphia Rod, divided into feet, tenths and 100ths, vernier reading to 1000ths with target, vernier and clamp, 7 3-10 feet closed, sliding to 13 feet 15.00

No. 252. Light Philadelphia Rod, divided into feet and tenths, vernier reading to 100ths, with target, vernier and clamp, 6½ feet sliding out to 12 feet 14.00

No. 253. Light Philadelphia Rod like No. 252 but divided into feet and tenths and 100ths, vernier reading to 1000ths 14.00

No. 254. Philadelphia Mining Rod, divided into feet and tenths, vernier reading to 100ths, with target, vernier and clamp, 3 feet closed, sliding to 5 feet 12.00

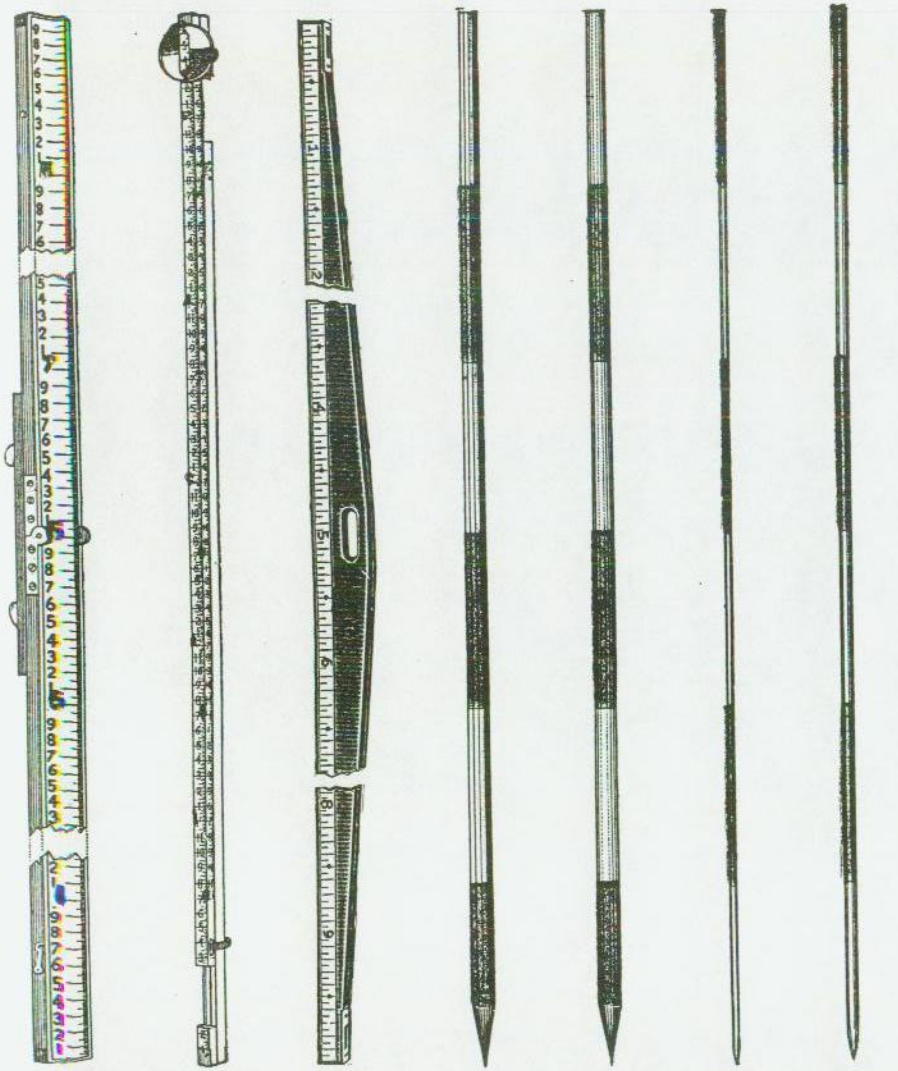
No. 255. Philadelphia Mining Rod like No. 254 but divided into feet, tenths and 100ths, vernier reading to 1000ths 12.00

No. 256. Philadelphia Metric Rod, divided into meters, decimeters and centimeters, vernier reading to millimeters; target, vernier and clamp 15.00

No. 257. New York Rod, divided into feet, tenths and hundredths, vernier reading to thousandths, with target, vernier and clamp, 6 8–10 feet closed, sliding to 12 feet 14.00

No. 259. Boston Rod, divided into feet, tenths and hundredths 14.00

STERLING LEVELING RODS AND POLES.



No. 260 No. 262 No. 263 No. 265 No. 266 No. 267 No. 268

ISZARD-WARREN CO., PHILADELPHIA, PA.

STERLING LEVELING RODS.

No. 260. Stadia Rod, self-reading, folding with strong brass hinge, 6 feet closed, opening to 12 feet $12.00

No. 261. Architects' Rod, divided into feet, tenths and hundredths, vernier reading to thousandths; target, vernier and clamp; 5½ feet closed, sliding to 10 feet 6.00

No. 262. Architects' Rod, divided into feet, inches and eighths; target and clamp; 5½ feet closed, sliding to 10 feet 6.00

No. 263. Cross Section Rod, 10 feet, divided into feet, tenths and hundredths on both sides, level bubble at each end 10.00

RANGING POLES.

No 265. Ranging Poles, of best seasoned wood, octagonal, tapered, painted red and white alternately every foot.

	6 ft.	8 ft.	10 ft.
Each	$ 2.00	2.25	2.50

No. 266. Ranging Poles, of best seasoned wood, round, tapered, painted red and white alternately every foot.

	6 ft.	8 ft.	10 ft.
Each	$ 2.00	2.25	2.50

No. 267. Steel Ranging Poles, ½ in. diameter, turned and hardened points, painted red and white alternately every foot.

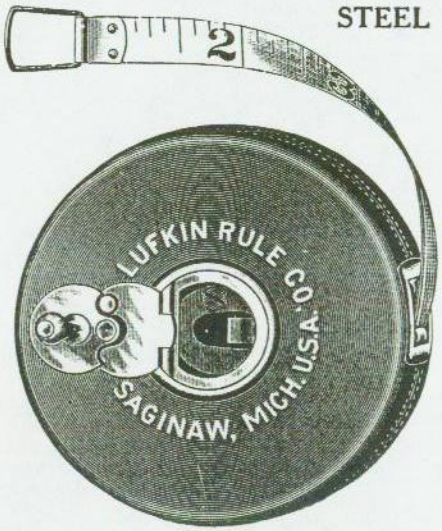
	6 ft.	8 ft.
Each	$ 2.75	3.00

No. 268. Iron Tubular Ranging Poles, ⅝ in. diameter, painted red and white alternately every foot.

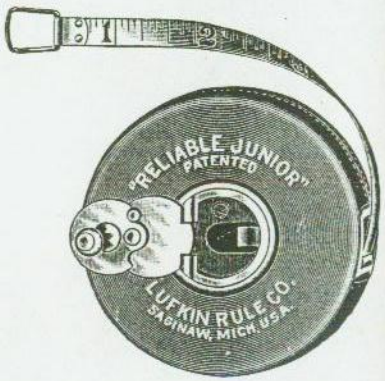
	6 ft.	8 ft.	10 ft.
Each	$ 2.75	3.00	3.50

STEEL TAPES.

(See next page)



No. 282



No. 288

"RELIABLE" STEEL MEASURING TAPES.

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

WITH ⅜ INCH TAPES.

No. 280.	"Reliable" Steel Tape	25 ft. long,	in 10ths or 12ths			each	$ 4.50
No. 281.	do	do.	33	do.	do.	each	5.20
No. 282.	do.	do.	50	do.	do.	each	7.20
No. 283.	do.	do.	66	do.	do.	each	9.20
No. 284.	do.	do.	75	do.	do.	each	10.40
No. 285.	do.	do.	100	do.	do.	each	12.80
No. 286.	do.	do.	200	do.	do.	each	24.00

"RELIABLE JUNIOR" STEEL MEASURING TAPES.

This tape is an exact counterpart of the well known "Reliable," and not much over one-half its size and weight. It is a beautiful piece of workmanship, and although small and light, is constructed in such durable manner, and the steel also of sufficient weight, that with proper care it will wear as long as an ordinary steel tape.

WITH ¼ INCH TAPES.

No. 287.	"Reliable Junior" Steel Tape	25 ft. long,	in 10ths or 12ths			each	$4.00
No. 288.	do.	do.	do.	50	do.	do.	each 5.00

"CHALLENGE" STEEL MEASURING TAPES.

Hard leather cases, nickel plated trimmings, flush handle, ⅜ inch tape, marked one side only, in tenths or twelfths.

No. 292.	"Challenge" Steel Tape	25 ft. long,	in 10ths or 12ths			each	$ 3.25
No. 293.	do.	do.	50	do.	do.	each	4.00
No. 294.	do.	do.	75	do.	do.	each	5.25
No. 295.	do.	do.	100	do.	do.	each	6.75

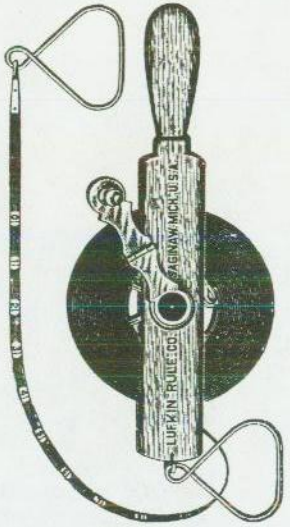
"ENGINEERS' PATTERN" STEEL TAPE.

WITH ¼ INCH HEAVY TAPES.

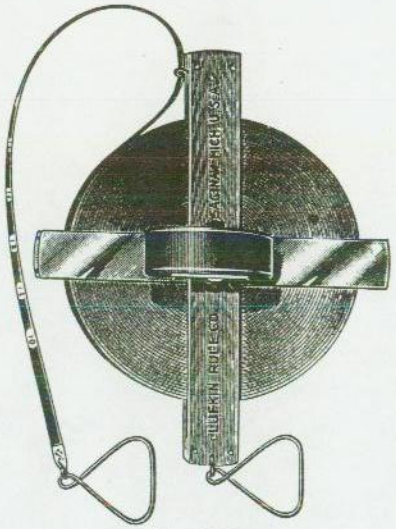
Hard leather, steel lined cases, nickel plated trimmings, two detachable rings. The tape can be readily detached from the case, and we furnish an extra ring for the other end.

No. 296.	"Engineers' Pattern" Steel Tape	33 ft. long	in 10ths or 12ths				each	$ 5.00
No. 297.	do.	do.	do.	50	do.	do.	each	6.00
No. 298.	do.	do.	do.	66	do.	do.	each	8.00
No. 299.	do.	do.	do.	100	do.	do.	each	12.00

SURVEYORS' CHAIN TAPES.



No. 300



No. 309

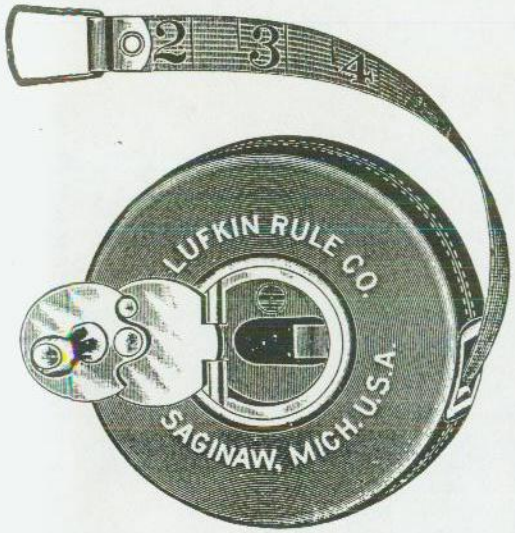
The Surveyors' Chain Tapes here described are made of ¼" selected and carefully tempered steel, and (except Nos. 303 to 305½) are supplied on hardwood reel with long lever folding metal handle, with heavily nickel-plated trimmings. The tape line can be readily detached from the frame, and is supplied with two large and strong detachable handles.

No. 300	Surveyors' Chain Tape	100 ft.	graduated every foot, end feet in 10ths			$6.00
No. 301	" " "	150 ft.	" " " " " " "		...	7.50
No. 302	" " "	200 ft.	" " " " " " "		...	9.00
No. 302½	" " "	300 ft.	" " " " " " "		...	12.50
No. 303	" " "	100 ft.	graduated every foot, end feet in 10ths, without reel		...	4.00
No. 304	" " "	150 ft.	graduated every foot, end feet in 10ths, without reel		...	5.50
No. 305	" " "	200 ft.	graduated every foot, end feet in 10ths, without reel		...	7.00
No. 305½	" " "	300 ft.	graduated every foot, end feet in 10ths, without reel		...	10.50

Tapes Nos. 306 to 310 are the same as described above, but the reel has steel cross-arms (see above illustration) which serve to keep the tape in place when winding or unwinding. The cross-arms, when not in use, fold into the wooden frame, enabling the same to be conveniently carried in the pocket.

No. 306	Surveyors' Chain Tape	100 ft.	graduated every foot, end feet in 10ths			$7.50
No. 307	" " "	150 ft.	" " " " " " "		..	9.00
No. 308	" " "	200 ft.	" " " " " " "		..	10.50
No. 309	" " "	300 ft.	" " " " " " "		..	14.00
No. 310	" " "	500 ft.	" " " " " " "		..	21.50

METALLIC MEASURING TAPES, FLUSH HANDLE.



No. 320

No. 329

With the patent double folding flush handle, Tape ⅝ inch wide made of best woven linen, with metallic warp. Hard leather cases.

No. 315.	Metallic Tape	25 feet long in 10ths or 12ths			$2.10
No. 316.	do.	33	do.	do.	2.40
No. 317.	do.	50	do.	do.	2.90
No. 318.	do.	66	do.	do.	3.30
No. 319.	do.	75	do.	do.	3.60
No. 320.	do.	100	do.	do.	4.50

Metallic Tapes only without cases.

	25	33	50	66	75	100 ft.
No. 327.	$ .90	1.10	1.50	1.80	2.00	2.90

"JUNIOR METALLIC" MEASURING TAPES FLUSH HANDLE.

The "Junior Metallic" is a companion to the popular "Reliable Junior" and is less than one-half the size and weight of a regular Metallic Tape. Width of Tape ⅜ inch.

No. 328.	"Junior Metallic" Tape	25 ft.	long in 10ths or 12ths.			$1.80
No. 329.	do.	do.	50.	do.	do.	2.25

CHESTERMAN'S TAPES.

Chesterman's Metallic Tape Measures.

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

No. 332.	Metallic Tapes,	25 feet long,	in 10ths or 12ths,	each	$1.80
No. 333.	Do.	33	do.	do.	2.10
No. 335.	Do.	50	do.	do.	2.60
No. 336.	Do	66	do.	do.	3.00
No. 338.	Do.	75	do.	do.	3.30
No. 340.	Do.	100	do.	do.	4.20

Chesterman's Metallic Tapes without Boxes.

No. 341.	Metallic Tape,	50 feet long,	in 10ths or 12ths,	each	$1.50
No. 342.	Do.	100	do.	do.	2.90

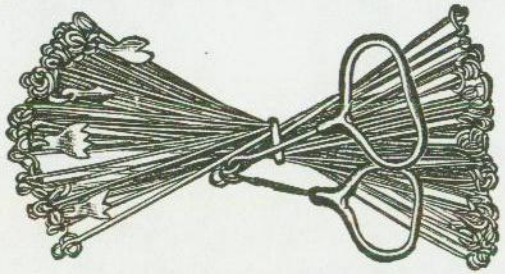
Chesterman's Steel Tape Measures.

With ⅜ inch Tapes.

With flush handle, opened by pressing lip on handle near hinge, hard leather cases, guaranteed accurate, and durable.

No. 343.	Steel Tape,	25 feet long,	in 10ths, or 12ths,	each	$4.50
No. 344.	Do.	33	do.	do.	5.20
No. 346.	Do.	50	do.	do.	7.20
No. 347.	Do.	66	do.	do.	9.20
No. 348.	Do.	75	do.	do.	10.40
No. 349.	Do.	100	do.	do.	12.80

ENGINEERS' AND SURVEYORS' CHAINS.

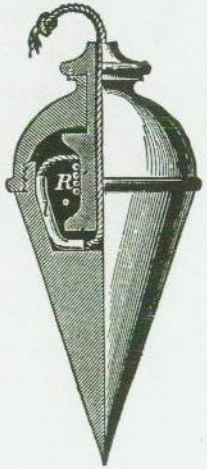


No. 369

No. 363. Surveyors' Iron Chain, W. G. No. 8, 33 feet, oval rings.....$ 2.00
No. 364. Surveyors' Iron Chain, W. G. No. 8, 66 feet, oval rings..... 3.20
No. 365. Engineers' Iron Chain, W. G. No. 8, 50 feet, oval rings..... 2.50
No. 366. Engineers' Iron Chain, W. G. No. 8, 100 feet, oval rings..... 3.50
No. 367. Surveyors' Steel Chain, W. G. No. 12, 33 feet, brazed links and rings. 5.50
No. 368. Surveyors' Steel Chain, W. G. No. 12, 66 feet, brazed links and rings. 10.00
No. 369. Engineers' Steel Chain, W. G. No. 12, 50 feet, brazed links and rings . 6.00
No. 370. Engineers' Steel Chain, W. G. No. 12, 100 feet, brazed links and rings. 11.00

STERLING PLUMB BOBS.

No. 374



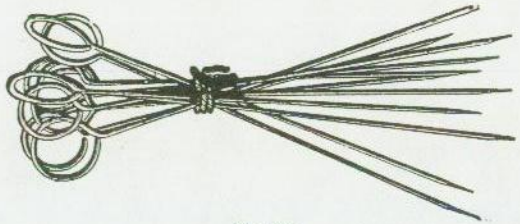
No. 382

No. 383

No. 374. Brass Plumb Bob 6 ounce, steel point.....each $ 1.20
No. 375. do. 8 do. .....each 1.55
No. 376. do. 10 do. .....each 1.80
No. 377. do. 12 do. .....each 2.00
No. 378. do. 16 do. .....each 2.40
No. 379. do. 8 do. long neck.....each 1.75
No. 380. do. 12 do. .....each 2.25
No. 381. do. 16 do. .....each 2.75
No. 382. Adjustable Plumb Bob 10 ounce, concealed reel 2.50
No. 383. Fuller's Patent Plumb Bob, 12 ounce, with adjustable point..... 3.75

ISZARD-WARREN CO., PHILADELPHIA, PA.

ARROWS AND STAKE TACKS.

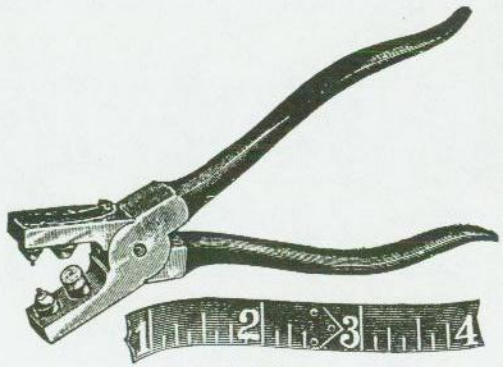


No. 385

No. 388

No. 385. Steel Arrows 11 in set, 15 in. long, W. G. No. 6, per set .....$ 1.50
No. 386. " " 11 " 15 " " " 8, per set 1.20
No. 387. Iron " 11 " 15 " " " 9, per set ..... .75
No. 388. Stake Tacks, Galvanized, per 2 oz. box ..... .15
No. 389. " " " " 1 lb. " ..... .60

STERLING TAPE REPAIR OUTFIT.

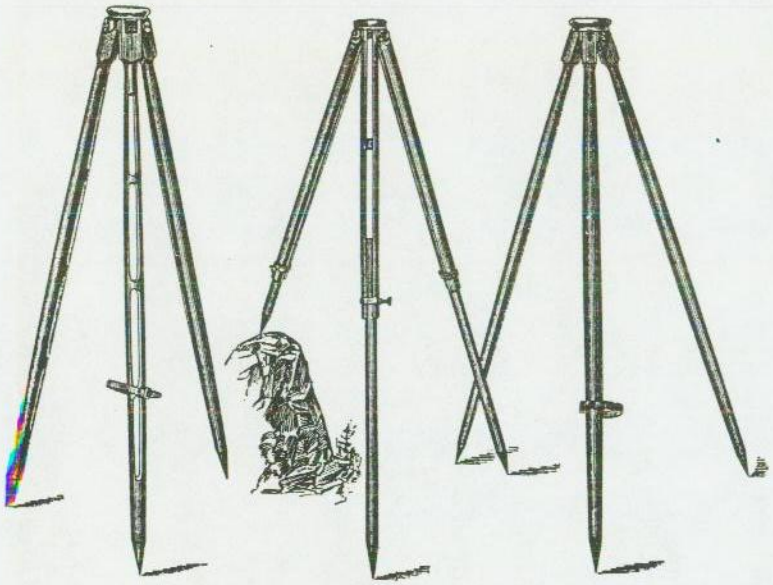


No. 391

This outfit can be carried in instrument box, thus enabling an engineering corps to repair their broken tapes in the field with the loss of but a few minutes time. Cuts a clean hole through two thicknesses of steel tape without drawing the temper. There is no filing required by this method except to round off the corners of the break. The holes can be cut near the ends of the edges of repair without any danger of splitting the tape, thus avoiding any chance of dirt collecting under the splice, cutting the fingers when drawing the tape through the hands or catching in rags, etc., when cleaning.

No. 391. Punch and Riveter Outfit, complete.....each $ 5.00
Extra Eyelets, 1,000 in package, two lengths, per package, ... 1.25

"STERLING" IMPROVED TRIPODS.



The Tripods furnished with our instruments are unique in many respects. The bell metal head holding the three legs is one casting, especially braced, giving unusual strength and rigidity. The legs are made of selected, fine grained white ash, treated with three coats of hard shellac, each rubbed down and dressed in oil, securing an almost indestructible finish. The shoes are of steel suitably pointed, having a projecting spur for the boot in pressing the leg to a firm bearing in the ground.

Three forms are made. The solid leg type, the Split leg and the Extension pattern.

The Engineers' and Surveyors' Transits also all Wye Levels are supplied either with the Solid or Split leg tripods as may be ordered. The Extension legs are furnished at an additional cost of $5.00.

The Builders' Transits and Architects' Levels are always equipped with solid leg tripods, unless extension legs are ordered at the additional cost of $5.00. When sold separately the tripods are furnished at the following prices:

Large size solid leg tripods	$10.00
Large size split leg tripods	12.00
Large size extension leg tripods	15.00
Small size solid leg tripods	7.50
Small size extension leg tripods	12.50

IN CONCLUDING this Catalogue of the "STERLING WAY" we feel that it will not be complete unless we make some brief mention of the fact that in addition to the line of SURVEYING INSTRUMENTS and Supplies herein illustrated and described, we carry a carefully selected stock of all of the usual requirements of the Engineer, Surveyor, Architect and Draughtsman.

We append below a list in brief of a few of the most important of these, which we trust may be a guide to those interested in the same.

FOR THE ENGINEER AND SURVEYOR.

Hand Levels
Compasses
Field Books
Profile Papers
Cross Section Papers
Barometers
Anemometers, etc.

FOR THE ARCHITECT.

Drawing Boards and Tables
Filing Cabinets
Blue Print Frames and Cars
Drawing and Tracing Papers
Folding Pocket Rules, etc.

FOR THE DRAUGHTSMAN.

Planimeters
Parallel Rules
Protractors
Drawing Instruments
Scales
Straight Edges
T–Squares
Triangles
Curves, etc.

Iszard-Warren Co.

CATALOGUE

SCIENTIFIC INSTRUMENTS

FOR

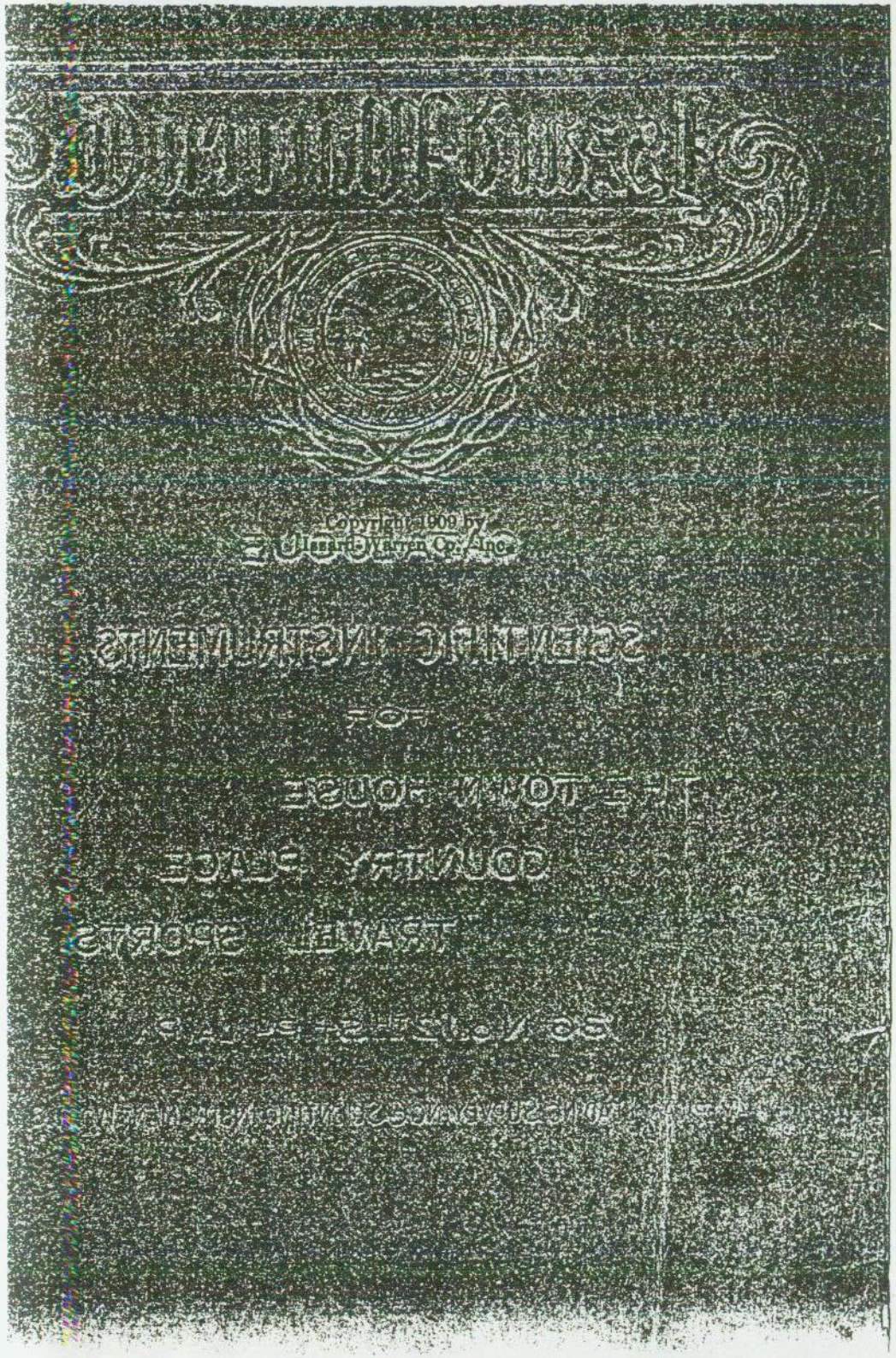
THE TOWN HOUSE

COUNTRY PLACE

TRAVEL AND SPORTS

136 No. 12TH ST. PHILA. PA.

AMERICA'S LEADING SURVEYING & SCIENTIFIC INSTRUMENT WORKS



SUPPLEMENT

TO OUR 225 PAGE

ILLUSTRATED CATALOGUE

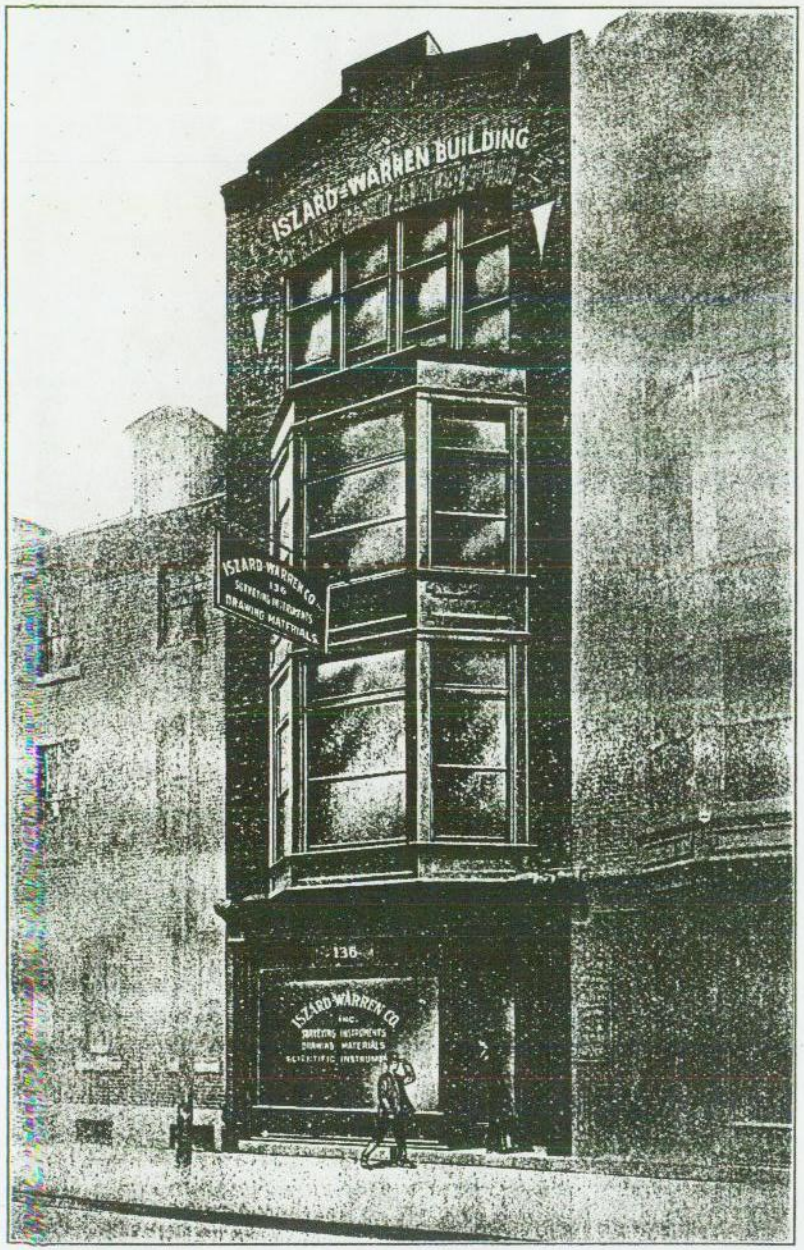
OF

"STERLING" SURVEYING INSTRUMENTS

ENGINEERING AND DRAFTING
MATERIALS

ISZARD-WARREN COMPANY INC.
136 NORTH TWELFTH STREET
PHILADELPHIA, PA.

CHARLES FRANKLIN ISZARD, *President*
J. HENRY WARREN, *Secretary and Treasurer*



136 NORTH TWELFTH STREET, PHILADELPHIA, PA.

The home of "Sterling" Surveying Instruments.
Scientific and Precision Instrument Works.

ANNOUNCEMENT.

In presenting the first edition of our Scientific Instrument Catalogue, we take this opportunity of introducing the Iszard-Warren Co., as makers of the well-known "Sterling" Surveying Instruments.

This catalogue is issued in response to an urgent demand for a strictly Scientific Instrument House in Philadelphia, where those desiring goods of this nature can consult experts and obtain instruments of the highest standard of construction and accuracy.

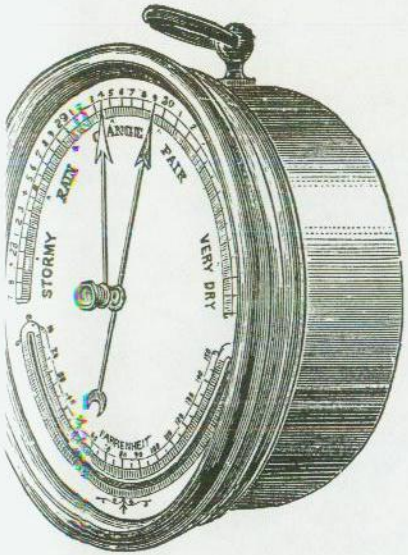
In establishing our business at 136 North 12th Street we have combined our factories, offices and wholesale departments in our new four-story building, all of which we occupy, and have opened a retail department, giving the public the benefit of our manufacturing and importing prices as well as our many years' experience in Scientific Instruments.

We extend a cordial invitation to visit our show rooms and consult us when interested in Optical, Astronomical, Microscopical, Meteorological, Mathematical and Surveying Instruments and Materials.

Very respectfully,
ISZARD-WARREN CO., INC.,
136 North 12th Street,
Philadelphia, Pa.

Contractors to the United States Government.

WEATHER ANEROID BAROMETERS.



No. 393

No. 395

No. 392. Aneroid Barometer, 5″ closed silvered dial, brass case $8.75

No. 393. Aneroid Barometer, 5″ closed silvered dial, with thermometer, brass case 9.75

No. 394. Aneroid Barometer, 5″ open silvered dial, brass case 11.50

No. 395. Aneroid Barometer, 5″ open silvered dial, with thermometer, brass case 12.50

No. 396. Aneroid Barometer, 5″ closed porcelain dial, brass case 6.50

No. 397. Aneroid Barometer, 5″ closed porcelain dial, with thermometer, brass case 7.50

No. 398. Aneroid Barometer, 5″ open porcelain dial, brass case 9.25

No. 399. Aneroid Barometer, 5″ open porcelain dial, with thermometer, brass case 10.25

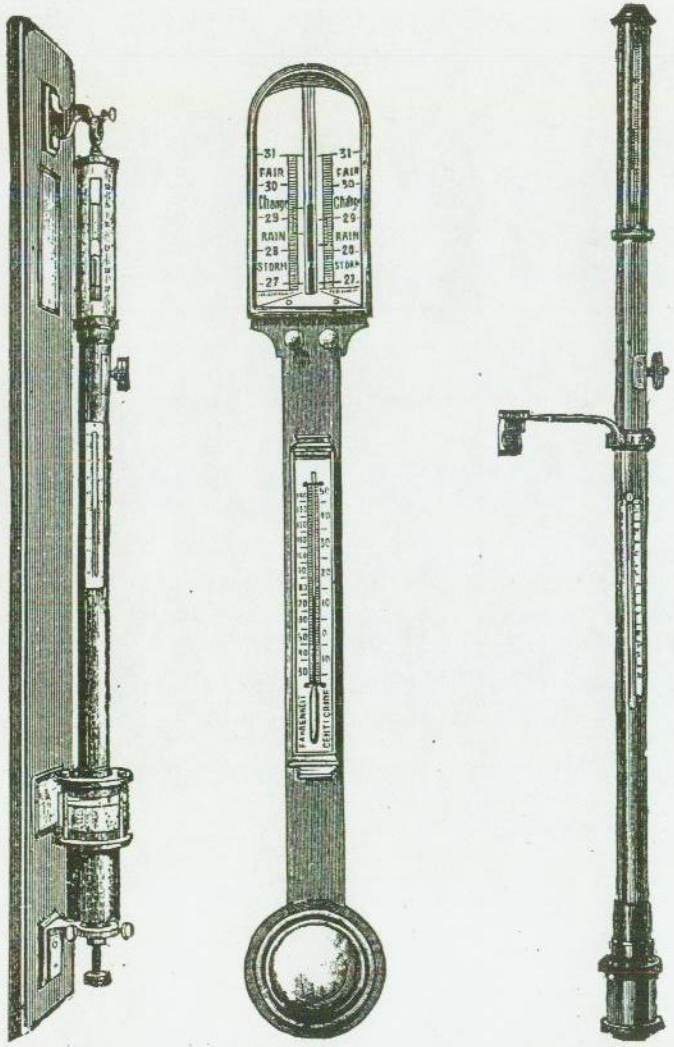
STERLING POCKET ANEROID BAROMETERS.

Compensated and Adjusted for Use.

From its portability, sensitiveness, and the ease with which approximate altitudes may be ascertained, the Aneroid Barometer is very valuable to the Engineer. In preliminary surveys and reconnoissances it has been found extremely useful, and for these purposes it is largely employed. Carrying one of these little instruments, the size of which need not exceed two or three inches in diameter, the Engineer, riding rapidly over a country, can speedily and with ease procure the data for the determination of the line of survey. Holding an Aneroid in his hand, the traveller seated in the railroad car, can mark the changes of elevation as his train moves; the mountain climber can note, step by step, his gain in altitude; and the miner, with the new mining Aneroid, can measure his descent in single feet.

No. 400.	Pocket Aneroid 1¾ diam.,	3,000 ft. by each	10 ft	$19.00
No. 401.	do.	5,000	20 "	18.00
No. 402.	do.	10,000	50 "	17.00
No. 403.	do.	12,000	50 "	18.00
No. 404.	do.	15,000	50 "	19.00
No. 405.	do.	20,000	100 "	21.00
No. 410.	Pocket Aneroid 2½ diam.,	3,000 ft. by each	10 ft.	20.00
No. 411.	do.	5,000	20 "	19.00
No. 412.	do.	10,000	50 "	18.00
No. 413.	do.	12,000	50 "	19.00
No. 414.	do.	15,000	50 "	20.00
No. 415.	do.	20,000	100 "	22.00

MERCURIAL BAROMETERS.

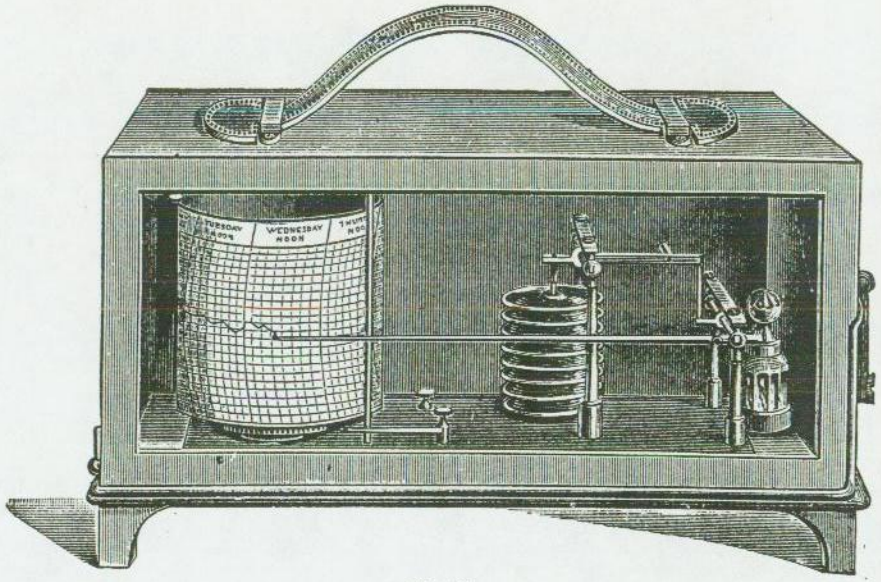


416 417 418

No. 416. Standard Barometer, small size, on mahogany board, .30 inch bore..$74.50
No. 417. Pediment Barometer in oak frame, with thermometer 27.50
No. 418. Marine Barometer, bronzed metal frame, with thermometer..... 41.50

ISZARD-WARREN CO., PHILADELPHIA, PA.

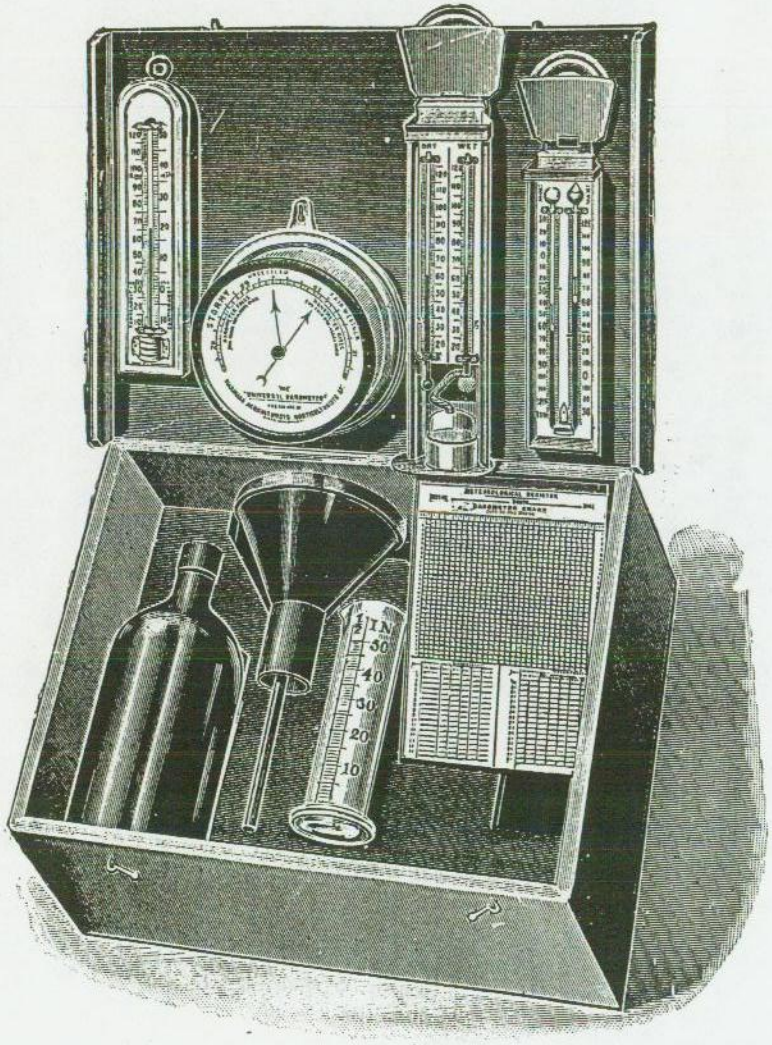
STERLING SELF-RECORDING ANEROID BAROMETER



No 425

No. 425. This Instrument, the latest form of Self-recording Barometer, is remarkable for the simplicity of its construction and the accuracy of its work. It consists of an aneroid barometer, composed of a series of vacuum boxes, the movements of which are transmitted through a simple mechanism to a long lever, terminating in a metallic pen which touches a drum within which is an eight day clock. This drum, around which is wound the record blank, makes one revolution in seven days, so that each diagram forms a complete barometeric record for the week. After winding the clock and setting the barometer, the instrument requires no attention whatever, until the weekly record is finished. The pen retains enough ink to last for several weeks. In mahogany case, with glass front..... $45.00

UNIVERSAL METEOROLOGICAL SET.



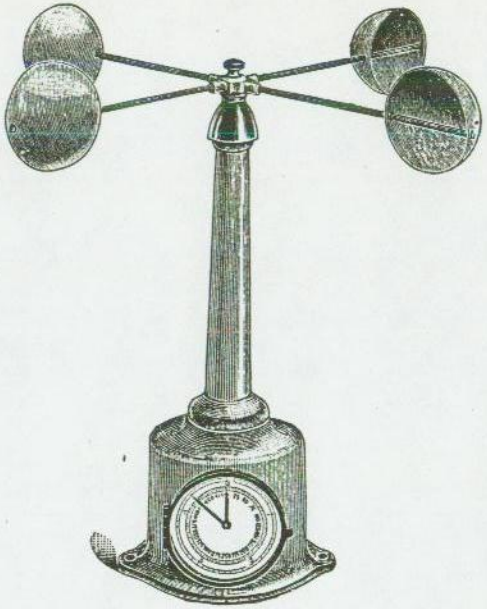
The above combination supplies a long felt want. It is a complete set of meteorological instruments suitable for the beginner, of such quality as will give entire satisfaction. The set comprises a 5″ metal case Universal barometer, 8″ boxwood thermometer with F. and C. scales, 8″ Maximum and Minimum (sixes) thermometer, boxwood scale with a magnet, 8″ Mason's wet and dry bulb hygrometer with boxwood scale and a 5″ japanned Howard's rain gauge, and a record calendar suitable for keeping a record of the instruments described above.

No. 426. Meteorological Set. Packed complete in stained box, each, $18.50

ISZARD-WARREN CO., PHILADELPHIA, PA.

ANEMOMETERS

Or Wind Gauges.



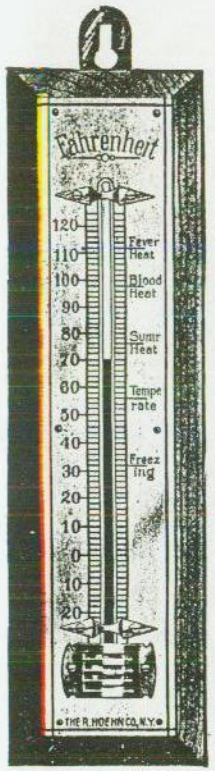
No. 430

For measuring the velocity of air currents in mines, sewers, hospitals, public and private buildings, etc. Each instrument is tested separately, and has a correction table for variations, showing the amount of air, in feet, to be added or subtracted.

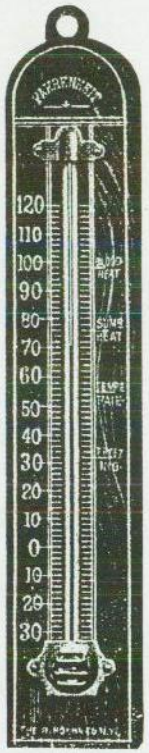
No. 430. Sterling Improved Anemometer.....each $30.00

The four hemispherical cups are set in rotation by the motion of the air and the number of revolutions is recorded by the mechanism in the base of the instrument. The vertical axis communicating the motion of the cups to the recording mechanism runs in ball bearings, which insures a sensitive and delicate movement. The results of observations can be read off on an enameled dial on the face of the base. The outer circle of this dial registers 5 miles by 1–10 mile and the inner one up to 500 miles. The two hands can be set to zero.

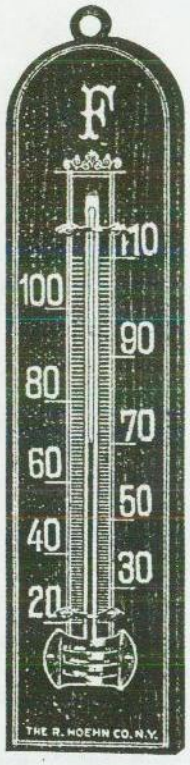
LIBRARY THERMOMETERS.



No. 3000



No. 3003



No. 3006

No. 3000. Thermometer, 8″ long, polished hardwood back, heavy oxidized scale, magnifying lens tube.....each, $0.75

No. 3001. Thermometer, 10″ long, polished hardwood back, heavy oxidized scale, magnifying lens tube.....each, 1.00

No. 3002. Thermometer, 12″ long, polished hardwood back, heavy oxidized scale, magnifying lens tube.....each, 1.25

No. 3003. Thermometer, 6″ long, mahogany finish, hardwood back, white numbers, magnifying lens tube.....each, 1.00

No. 3004. Thermometer, 8″ long, mahogany finish, hardwood back, white numbers, magnifying lens tube.....each, 1.50

No. 3005. Thermometer, 10″ long, mahogany finish, hardwood back, white numbers, magnifying lens tube.....each, 2.00

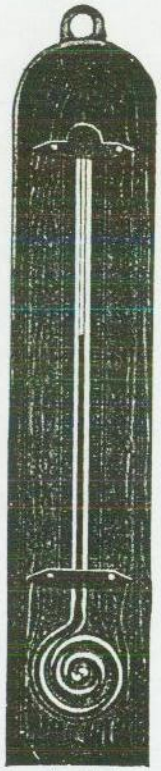
No. 3006. Thermometer, 8″ long, polished boxwood back, heavy silvered scale, magnifying spirit tube.....each, 1.00

No. 3007. Thermometer, 10″ long, polished boxwood back, heavy silvered scale, magnifying spirit tube.....each, 1.50

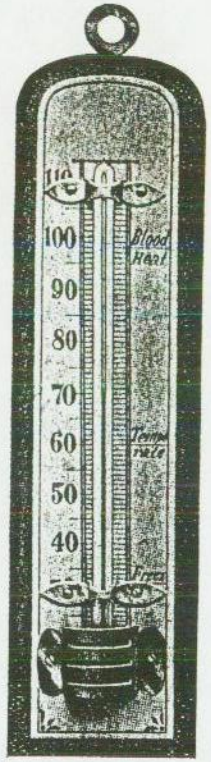
No. 3008. Thermometer, 12″ long, polished boxwood back, heavy silvered scale, magnifying spirit tube.....each, 2.00

ISZARD-WARREN CO., PHILADELPHIA, PA.

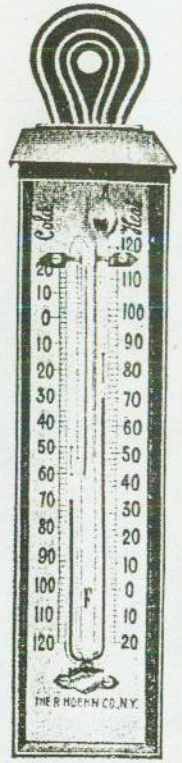
LIBRARY THERMOMETERS.



No. 3010



No. 3015



No. 3018

No. 3010. Thermometer, 8″ long, highly polished boxwood back, beveled edges, magnifying lens tube set in groove.....each, $1.25

No. 3011. Thermometer, 10″ long, highly polished boxwood back, beveled edges, magnifying lens tube set in groove.....each, 1.50

No. 3012. Thermometer, 8″ long, mahogany back, beveled edges, heavy silvered scale, magnifying lens tube.....each, 1.25

No. 3013. Thermometer, 10″ long, mahogany back, beveled edges, heavy silvered scale, magnifying lens tube.....each, 1.50

No. 3014. Thermometer, 12″ long, mahogany back, beveled edges, heavy silvered scale, magnifying lens tube.....each, 2.00

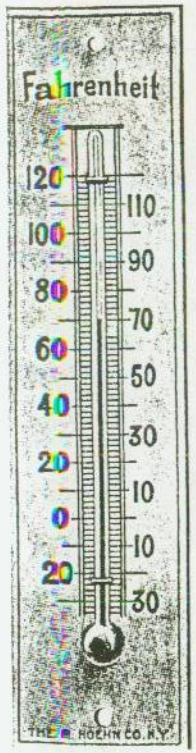
No. 3015. Thermometer, 8″ long, polished ebony back, beveled edges, porcelain scale, magnifying lens tube.....each, 1.50

No. 3016. Thermometer, 10″ long, polished ebony back, beveled edges, porcelain scale, magnifying lens tube.....each, 2.00

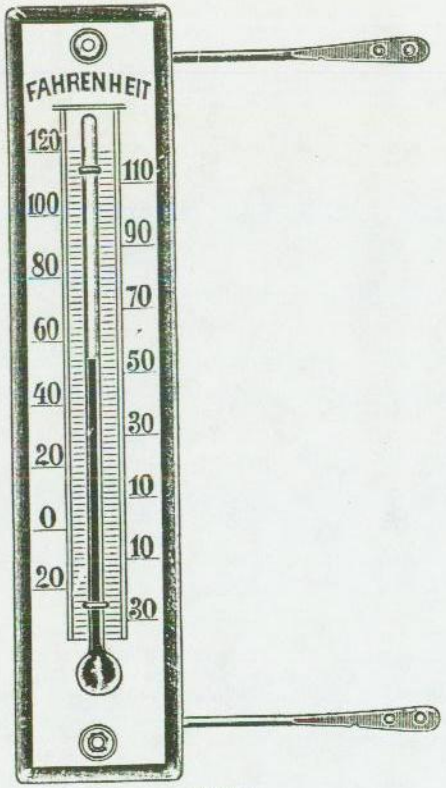
No. 3017. Thermometer, 12″ long, polished ebony back, beveled edges, porcelain scale, magnifying lens tube.....each, 2.50

No. 3018. Self-Registering Thermometer, heavy metal scale, Sixe's principle, white japanned metal case, 10″ long.....each, 4.00

WINDOW THERMOMETERS.



No. 3020

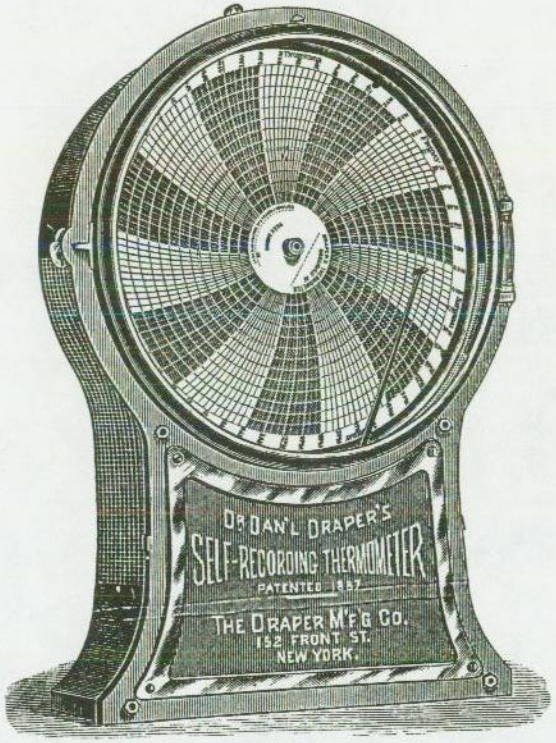


No. 3023

No. 3020.	Window Thermometer, lens tubes, ground face, plain edges, with nickel plated supports, 8″ long	$1.50
No. 3021.	Window Thermometer, same as No. 3020, 10″ long	2.00
No. 3022.	Window Thermometer, same as No. 3020, 12″ long	2.50
No. 3023.	Window Thermometer, lens tubes, heavy plate glass edge, white enamel front, which makes the figures very prominent, 8″ long	1.50
No. 3024.	Window Thermometer, same as No. 3023, 10″ long	2.00
No. 3025.	Window Thermometer, same as No. 3023, 12″ long	2.50
No. 3026.	Window Thermometer, red glass with numbers etched through showing white, 8″ long	3.00
No. 3027.	Window Thermometer, same as No. 3026, 10″ long	3.50
No. 3028.	Self-Registering Window Thermometer, Sixe's principle, on heavy plate glass, 10″ long	4.00

ISZARD-WARREN CO., PHILADELPHIA, PA.

SELF-RECORDING THERMOMETERS.



No. 3030

In this instrument a clock revolves a disc, on which is placed a chart, indicating the hours of the day and days of the week, by radiating divisions, and gives the degrees of temperature, Fahrenheit scale, from 20 degrees below zero to 110 above, by concentric circular divisions. A lever provided with a pen is supported on an axis, carried by the expansion and contraction of bimetallic strips, so that the pen which rests on the chart moves outward and inward from the center, drawing a line on the surface of the chart, showing the temperature at any given time.

All instruments are accurately adjusted and warranted, and are provided with ink, a dropping tube to fill the pen, and twelve charts.

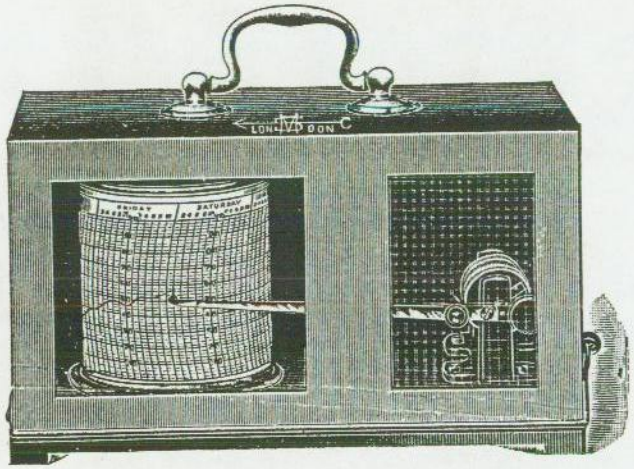
The charts should be changed once a week, which is done by removing the edge from beneath the four projections on the disc, and then drawing it off from the hub; turn the disc until the holes in it correspond in position with the winding holes in the clock case at the rear, then wind both springs of the clock, insert new chart and turn the disc, by the hub, until the radial division corresponding to the day and hour is brought beneath the pen, care being taken not to let the pen drag on the surface of the chart while setting the latter.

With the dropping tube fill the pen, which carries enough ink to last a week.

The thermometer gives a permanent and continuous record of the temperature.

No. 3030.	Self-Recording Thermometer, 14″x20″	$30.00
No. 3031.	Self-Recording Thermometer, 9″x14″	20.00

RECORDING THERMOMETERS AND HYGROMETERS.



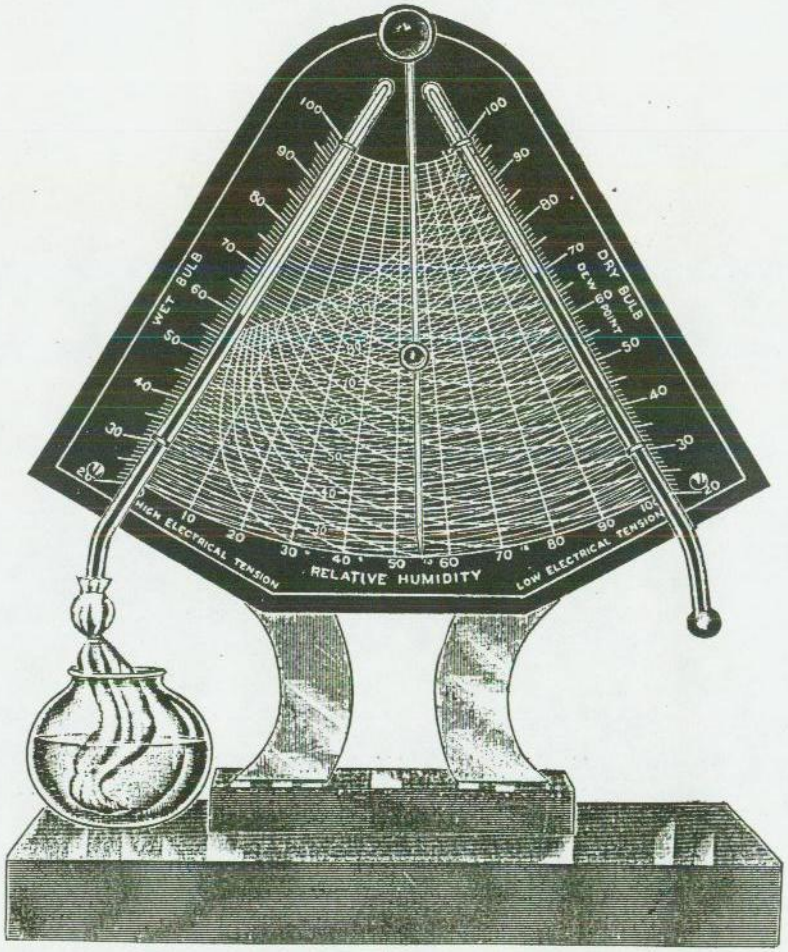
These self-recording instruments have been adopted by the United States Weather Bureau and are warranted reliable and correct. The vital parts of the instrument expand or contract under varying conditions of the atmosphere and impart motion to a multiplying lever, to one end of which a pen is attached, which moves automatically over a graduated paper scale, fastened upon a brass cylinder that revolves upon its axis once every 8 days by means of a very accurate clockwork concealed within the cylinder. Furnished with scales, ink, etc., sufficient for 1 year.

No. 3035. Thermograph or Recording Thermometer, scale reading from 0 to 100 degrees Fahrenheit by 2 degrees, in weather-proof metal case, hinged cover and glass-paneled front $50.00

No. 3040. Hygrograph or Recording Hygrometer, scale from 0 to 100 per cent. moisture by single per cent., in weather-proof metal case, hinged cover and glass-paneled front $60.00

ISZARD-WARREN CO., PHILADELPHIA, PA.

THE "HYGRODEIK."



The Hygrodeik is an improved form of the Mason Hygrometer, consisting of two thermometers (wet and dry bulb) mounted upon the outer edge of a chart, which has been plotted from new and corrected tables prepared under the direction of the United States Weather Bureau.

DIRECTIONS FOR READING THE "HYGRODEIK."

TO FIND THE RELATIVE HUMIDITY.

Swing the index hand to the left of the chart, and adjust the sliding pointer to that degree of the wet bulb Thermometer scale at which the mercury stands. Then swing the index hand to the right, until the sliding pointer intersects the curved line which extends downward to the left from the degree of the dry bulb Thermometer scale indicated by the top of the mercury column in the dry bulb tube. At this intersection the index hand will point to the Relative Humidity on scale at bottom of chart. For example (see illustration); Should the temperature indicated by the wet bulb Thermometer be 60° and that of the dry bulb 70°, the index hand will indicate humidity 5% when the pointer rests on the intersecting lines of 60° and 70°.

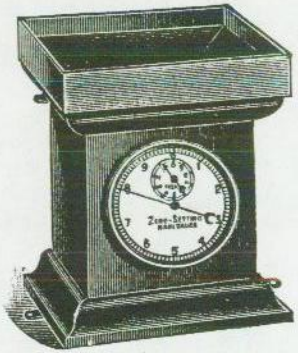
TO FIND THE DEW POINT AND ABSOLUTE AMOUNT IN GRAINS.

Observe the intersection as above, and follow the curved line (passing through it, which runs from the top downward to the right) to the point of contact with the dry bulb scale. The degree (53) at this point on that scale is the dew point required. The figure at the upper end of this line will give the absolute amount of water in grains (4.5 grains) per cubic foot of air.

No. 3045. Hygrodeik, mounted on Japanned iron frame $9.00

RAIN GAUGES.

3050



3060

No. 3050. Howard's Gauge comprising glass bottle with Japanned funnel 5 inch diameter, graduated glass measure, to show .01 of an inch of rainfall $3.00

No. 3055. Howard's Gauge same as No. 3050, copper funnel with brass rim.... $5.00

No. 3060. The Rain Gauge illustrated above is a pattern which is known as the "tilting bucket" rain gauge. No measurement is necessary, as the rain is collected in the 8" receiver and is taken through a small pipe and dropped into one side of a bucket. When a given amount of rain has collected in the bucket (0.01") the weight of the rain on the laden side causes it to overbalance and, by a mechanical arrangement, the hand moves 0.01" at each operation. The rain, still passing through the receiver, is collected in the opposite bucket; when that has received the given amount, the same operation is repeated. Its great advantage is that it is zero setting, and is particularly useful when a person wants to keep a record of rain-fall by the month or week, as by the zero setting device no calculation is necessary. The dial registers 1 inch in 1-100th inch; the second or smaller dial reads upward to 12 inches.

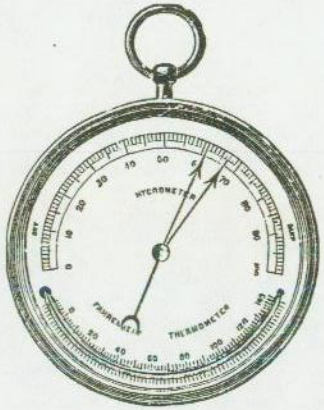
each

No. 3060. Zero-setting Rain Gauge in Japanned Metal Case 10" x 8"..... $30.00

No. 3061. Zero-setting Rain Gauge in Copper Case, 10" x 8"..... 37.00

An advantage which applies to this gauge is that the collecting funnel can be placed at a distance from the gauge, and connected to it by a small pipe, the instrument being placed within a house or shelter.

ISZARD-WARREN CO., PHILADELPHIA, PA.



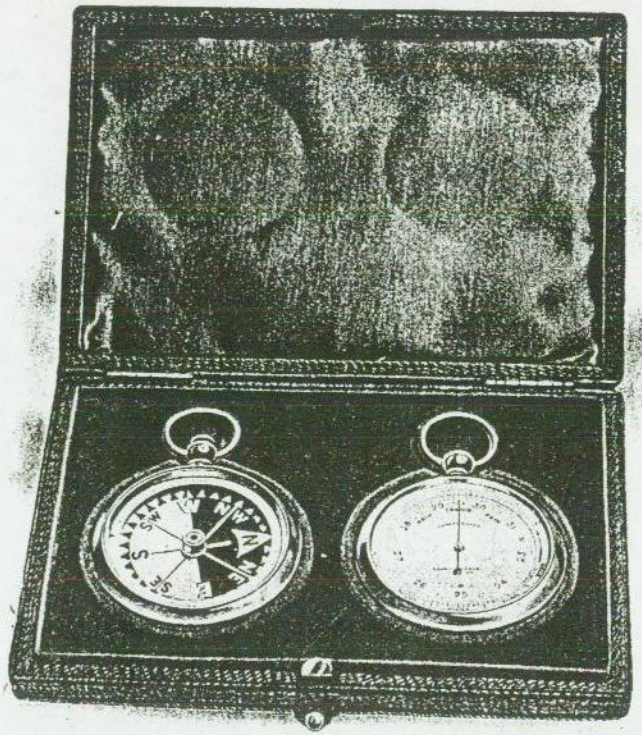
No 3065

HYGROMETERS.

No. 3062. Hygrometer, Nickel Case, 3-inch, paper dial $1.50

No. 3065. Hygrometer, Brass Case, 4-inch, closed, silvered metal dial, with curved Thermometer $0.00

TRAVELING SET.

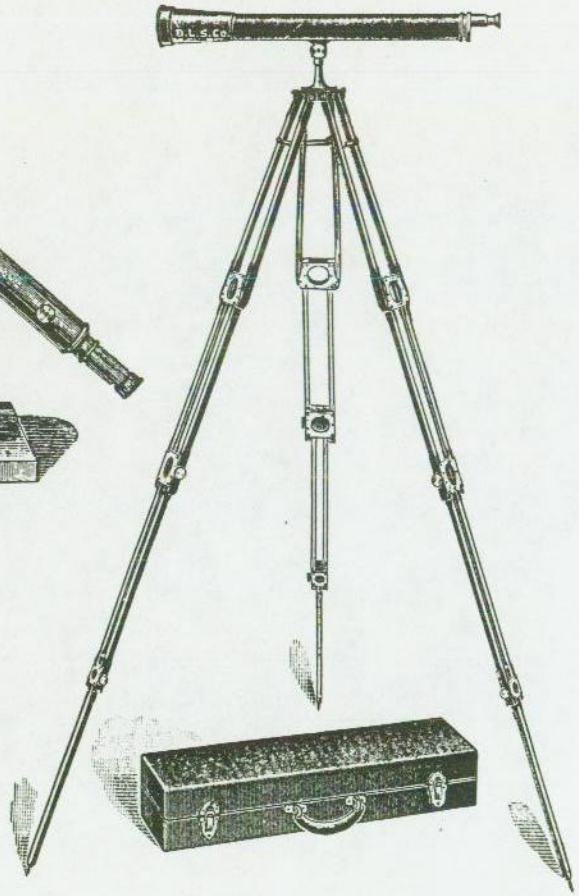


No. 3070. Traveling Set, in compact case, comprising a compensated aneroid to 10,000 ft. and fine compass to match $20.00

OBSERVATION TELESCOPE.

Achromatic and Prismatic

No. 478



No. 480

We recommend these telescopes as a first-class small telescope for both celestial and terrestrial use. The mounting as represented in the cut is polished brass; the stand is furnished with smooth vertical and horizontal movements holding the tube firmly in any position whilst observing.

No. 478. Achromatic Telescope, objective, 2½ inches diameter, terrestrial power; 35 celestial power, 70, in hardwood case..... $50.00

No. 479. Achromatic Telescope, objective 2½ inches diameter, terrestrial power 45; celestial power 90, in hardwood case..... 75.00

No. 480. Observation Telescope of the Prismatic type, objective aperture 2¼ inches and focal length of 24 inches. Two eye pieces are supplied, affording magnifications 24 and 50 diameters. Furnished with Universal extension stand and carrying case..... 80.00

ASTRONOMICAL TELESCOPES.

On Tripod with Alt-azimuth Movement.

The stand is made of polished mahogany, with fine brass mountings and elevating stem, which carries the brass alt-azimuth joint. The body of the telescope is polished brass and lacquered, and furnished with rack and pinion to adjust the focus. The achromatic objectives are A1 in every respect.

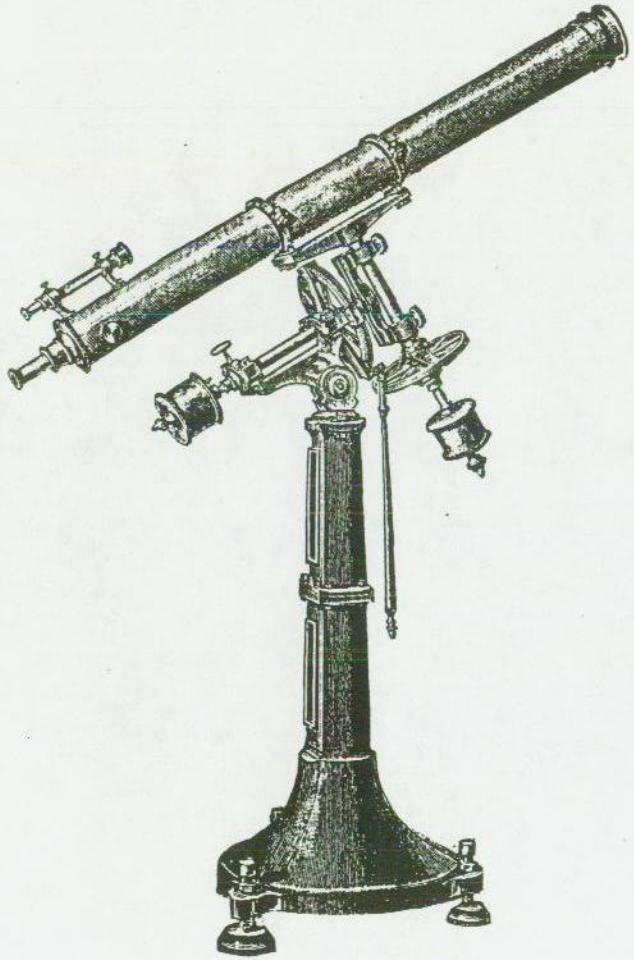
No. 481

No. 481. Astronomical Telescope, 3 inch object lens; polished brass body with rack and pinion focusing adjustment; two eye-pieces: terrestrial power 55 diameters, celestial power 110 diameters, fitted with sun glass. Length closed 39 inches, extended 59 inches; on large oak tripod. In wood box..... $100.00

No. 482. Astronomical Telescope, 3½ inch object lens; polished brass body and cap, with rack and pinion focusing adjustment; finder has one inch object lens. Four eye-pieces: terrestrial powers 60 and 80 diameters, celestial powers 100 and 175 diameters, fitted with sun glass. Length closed 50 inches, extended 70 inches; on mahogany mechanical stand. In wood box with handle, lock and key..... 275.00

No. 483. Astronomical Telescope, 4 inch object lens; polished brass body and cap, with rack and pinion focusing adjustment; finder has one and one-quarter inch object lens. Five eye-pieces: terrestrial powers 70 and 90 diameters, celestial powers 90, 145 and 250 diameters fitted with sun glass. Length closed 56 inches, extended 79 inches; on mahogany mechanical stand. In wood box with handle, lock and key, 450.00

STERLING ASTRONOMICAL TELESCOPES.



The achromatic objectives are of the highest optical properties as regards both color and definition, and are guaranteed equal to the best Munich objectives. Special attention is also given to the correction of the oculars. The finder is a miniature of the telescope.

The Telescope Mounted on Universal Equatorial Stand, complete, with celestial oculars:

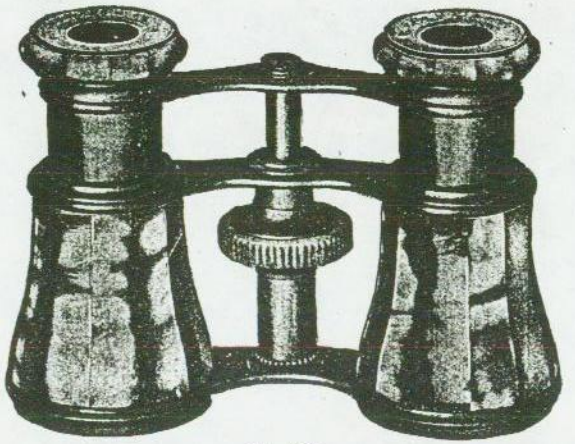
	Clear aperture of Objective.	Number of Oculars.	Powers	Price
No. 384.	3¼ inches,	3 oculars,	55 to 170	$700.00
No. 385.	4 "	4 "	70 to 215	950.00
No. 387.	5 "	4 "	90 to 290	1500.00
No. 388.	6 "	4 "	100 to 350	1750.00

ISZARD-WARREN CO., PHILADELPHIA, PA.

LEMAIRE OPERA GLASSES

No. 2500

		Lignes 13	15
No. 2500.	Black Morocco, Japanned	$6.00	$6.40
2502.	Black Morocco, Japanned Bars, Gilt Mountings and Bands	7.50	8.40
2504.	Black Morocco, Aluminum Frames	12.00	13.00

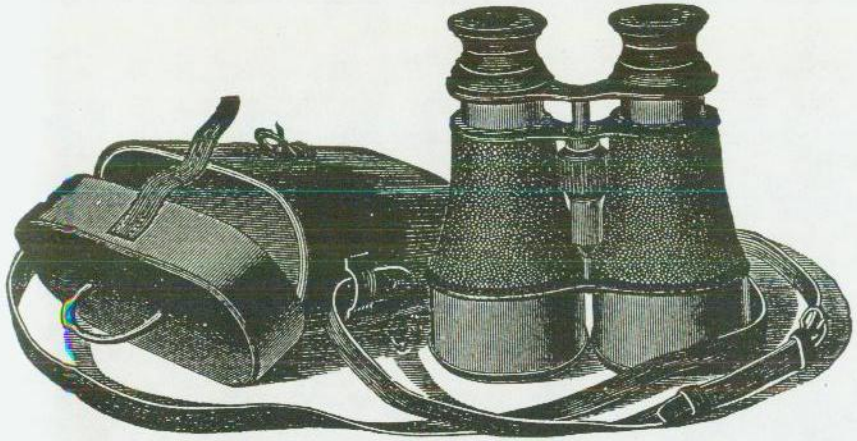


No. 2525

		Lignes 13	15
No. 2525.	White Pearl, Gilt Mounting	$12.40	$13.50
2527.	Oriental Pearl, Gilt Mountings	12.40	13.50
2530.	White Pearl, Pearl Tubes, Gilt Mountings	14.50	15.70
2533.	Oriental Pearl, Pearl Tubes, Gilt Mountings	14.50	15.70

FIELD AND MARINE GLASSES.

Highest Quality.



No. 455

These Glasses are supplied with lenses which have never been equalled in definition, so constructed to meet the requirements of long range purposes, the framework being strong and not liable to get out of adjustment.

No. 452. Lemaire Field and Marine Glass; black, morocco covered, oxidized mountings.

Power lignes	21	24	26
Each	$13.50	$15.75	$17.25

No. 453. Lemaire Field and Marine Glass; black, morroco covered, aluminum mountings.

Power lignes	21	24	26
Each	$25.00	$28.75	$30.00

No. 455. Field and Marine Day Glass, arched cross-bars with sunshades; black morocco covered, oxidized mountings and slides; in leather case with strap.

Power lignes	21	24	26
Each	$11.25	$12.00	$14.00

No. 456. Field and Marine Night Glass, same as No. 455, but power 21 lignes.
Each $12.00

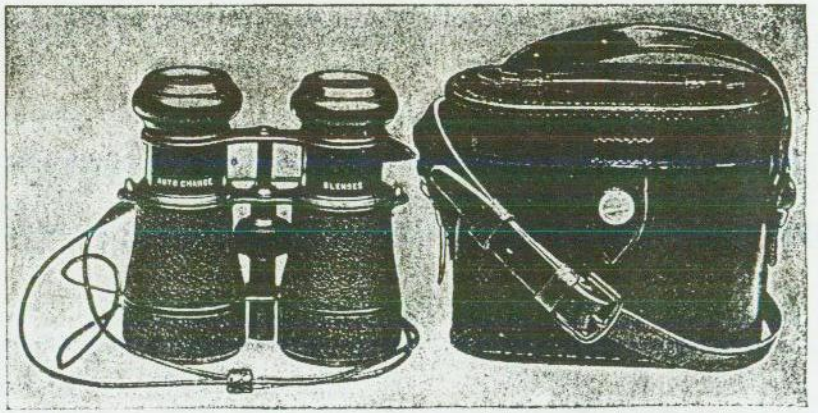
No. 457. Field and Marine Day Glass, same as No. 455, but with aluminum frame, power 24 lignes ..... Each, $16.00

No. 458. Field and Marine Night Glass, same as No. 456, but with aluminum frame, power 21 lignes ..... Each, $17.00

ISZARD-WARREN CO., PHILADELPHIA, PA.

JENA AUTO-CHANGE GLASS.

U. S. Standard.



Many attempts have been made to combine a low and high power glass, but heretofore never successfully. The manufacturer accomplished the change of power by different strengths of eye-pieces, but the size of them had to be cut down to a minimum, the high power eye-piece would not work well with the object glass made for low power; the diaphragm being made for high power, would shut off too much light for the low power, and many other technical reasons combined to make it unsatisfactory.

The change of powers in the Jena Special AUTO CHANGE GLASS is accomplished on entirely different principles. A lens of opposite nature to that of the eye-piece automatically drops into place at the diaphragm when low power is desired, making it a perfect "low power." This also adds to its achromacy, cutting off possible stray rays of light. The change is made by the most simple method possible.

Brass mountings, oxidized, covered with best morocco leather.

Clear aperture of Object Lens	1½ inches
Clear aperature of Eye-piece Lens	1 inch
High Power	5½ diameters
Low Power	3½ diameters
Weight	18 ounces

No. 486. Auto-Change Glass, in sole leather case with carrying strap and leather cord attached to glass $25.00

THE "STERLING" NATURE GLASS.

This glass which is designed especially for Nature Work, being particularly adapted to the observation of birds and field life, combines good power with large field, and great light, and being of light construction, can be held in the hand without fatigue or tremor. By its aid many interesting details of wild life may be followed and studied.

No. 487. Nature Glass in leather carrying case $7.00

STEREO AND PRISM BINOCULARS.

No. 460

Five-Power, Night Marine Glass.—The lenses and prisms are extra large and enable one to see when the light is too faint to use the ordinary glass. It gives excellent results for studying birds and living animals in the shadows of trees and foliage.

Six-Power.—For general field work, races, games, hunting, yachting, etc. It is sufficiently powerful for all ordinary purposes.

Eight-Power.—This is the most generally useful glass for field, military, yachting, touring, racing and similar purposes.

Ten-Power, Day Marine Glass.—This glass is superior in illumination to the eight-power and is especially suitable for observations where very great distances are to be covered.

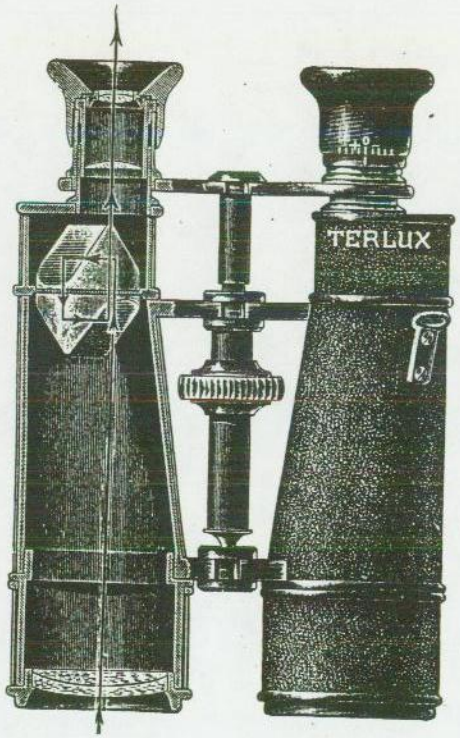
No. 460.	Stereo Binocular	5 power, with focusing attachment		$66.00
No. 461.	do.	6	do.	46.00
No. 462.	do.	8	do.	50.00
No. 463.	do.	10	do.	70.00
No. 464.	do.	12	do.	70.00

Prism Binoculars are surpassed by the stereo only in stereoscopic effect.

No. 465.	Prism Binocular	5½ power, with focusing attachment		$40.00
No. 466.	do.	8	do.	40.00
No. 467.	do.	10½	do.	50.00

ISZARD-WARREN CO., PHILADELPHIA PA.

THE TERLUX PRISM BINOCULAR.

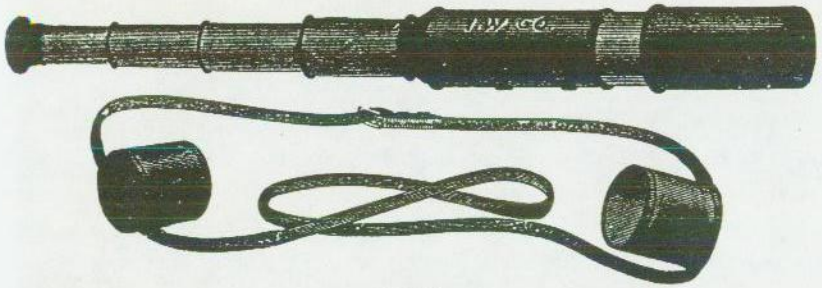


The Terlux Binocular is what its name implies, a glass of three times the illumination of the ordinary prism glass. No detail has been neglected to make it in every respect the superior of every other, and its extra large object glass of 35 m|m (1⅜ inch) clear aperture will allow the use of a high power binocular when under disadvantageous atmospheric conditions, a low power would have to be used.

Body, aluminum with oxidized bars and japanned trimmings, covered with best morocco leather; leather covered sun-shades; eye-piece adjustable for different strength of eyes; adjustment for pupillary distance; Universal Focusing Attachment.

No. 468. Terlux Binocular, Magnification 12 diam. Field of view at 1000 yards, 60 yards. Weight 25 oz. Objective Glass, clear aperture 1⅜ inch. Height 6⅞ inch.....$75.00

STERLING TOURIST AND RANCHMEN'S TELESCOPES.



No. 470

No. 470. Tourist and Ranchmen's Glass, remarkably brilliant and clear field; 4 draws, 36 inches, extended; 9 inches, closed; object-glass, 2 ins. diameter; power, 35 times.
Price $25.00

No. 472. Tourist and Ranchmen's Glass, same style and finish, size as No. 470, 4 draws, 45 inches extended, 12½ inches closed; object-glass, 2⅛ inches in diameter; power 40 times.
Price 30.00

No. 473. Tourist and Ranchmen's Glass, same style and finish as No. 470, 4 draws, 49 inches extended, 13½ inches long when closed; object-glass 2¼ inches diameter, power 45 times.
Price 35.00

MARINE SPYGLASSES.

No. 474 A. Marine Spyglass, single draw, 20½ inches extended, 16 inches closed; object-glass 1¼ inches diameter; power 12 times ..... Each, $15.00

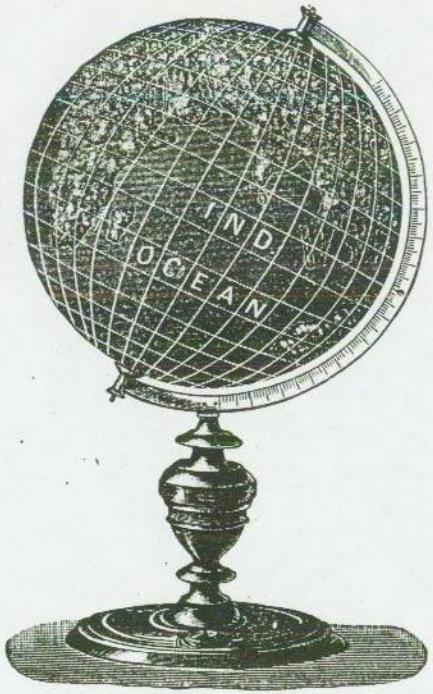
No. 475 A. Quartermasters' Spyglass, single draw; power 14 times ... Each, 20.00

No. 476 A. Quartermasters' Spyglass, same as No. 475 A, but power 21 times ..... Each, 20.00

No. 477 A. Quartermasters' Spyglass, same as No. 475 A, but power 31 times ..... Each, 25.00

ISZARD-WARREN CO., PHILADELPHIA, PA.

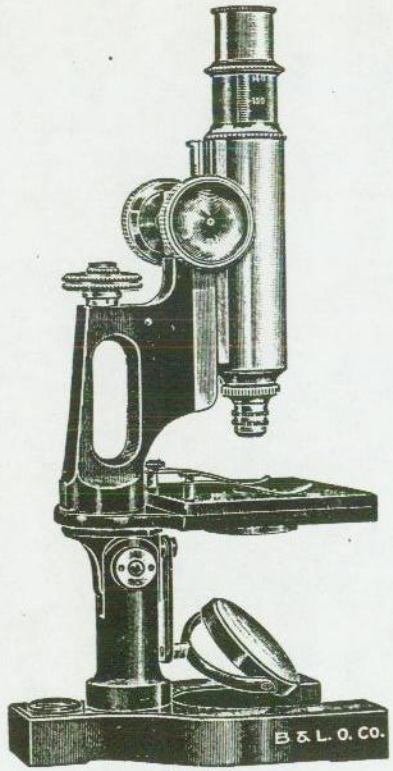
RELIEF GLOBES.



No. 3635

No. 3625. Relief Globe 10 in. showing in relief countries, states, cities, etc. ... $9.00
No. 3630. Relief Globe 13 in. with brass meridian, showing in relief mountains, valleys, rivers, lakes, etc. $15.00
No. 3635. Relief Globe 16 in. with brass meridian, same as No. 3630 ..... $20.00

HOME MICROSCOPE EQUIPMENT.



No. 3636

As a means of wholesome diversion, the Microscope deserves a place in the home. It affords amusement which is instructive, and microscopy may be developed to any desired degree along a variety of interesting lines. In the hands of youth the Microscope develops a broad interest in nature and valuable habits of observation. For the adult, problems are presented the solving of which necessarily take the mind from other things and afford a welcome change.

ISZARD-WARREN CO., PHILADELPHIA, PA.

HOME MICROSCOPE EQUIPMENT.

Since the perfection of the modern microscope, men have become more or less acquainted with millions of organisms which were previously unknown. Problems have arisen upon which men have spent a life of study with unabated interest, and many ordinary things have been found really beautiful in their structure when studied with a microscope. In order to enjoy a closer knowledge of the things making up the world which sustains us, it is not necessary to invest a large sum of money in the apparatus required in research laboratory work.

The Home Microscope is a stand well adapted for general use. It has all the essential movements for observation with low, medium, and high magnifications, while those desiring to follow out some particular line in microscopy can attach all the necessary devices to this stand. A microscope, to be universal in its application, must have a coarse adjustment for rapidly focussing lower power objectives, and a fine adjustment for high magnifications. The Home Microscope has both movements conforming to types which have proven durable, reliable and efficient.

The lenses are of high grade, the objective being a special one of divisible type, giving with the eyepiece, magnifications of thirty and sixty-five diameters. Other eyepieces and other objectives may be used to obtain higher powers.

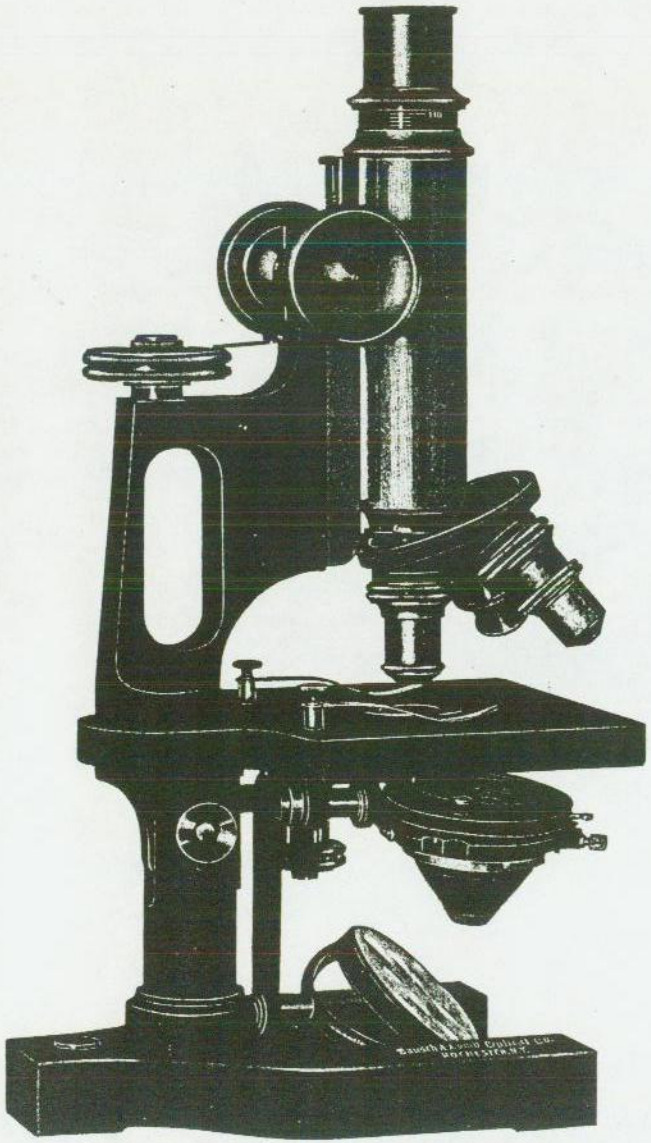
The microscope must not be compared with the toys sometimes offered to those interested in home microscopy. It is a scientific instrument which is used in the foremost universities and colleges, giving satisfaction and approved by many eminent men of science. The microscope with objective and eyepiece is furnished in a mahogany case with lock and key.

The equipment includes the necessary apparatus for making "mounts" as the objects prepared for study are called. A pocket magnifying glass for use in the field when collecting specimens and in mounting them, a dissecting set consisting of needles, forceps, fine scissors and scalpel (fine dissecting knife) in leatherette case, 25 slides (glass plates) and 50 cover glasses, a slide with depressed center, a box in which to keep mounted objects, labels, a tube of balsam, one bottle each of asphaltum, stain, glycerine and xylol, a dropping pipette and a camel's hair brush are included.

There are also 18 interesting mounted objects embracing parts of plants, insects, crystals, etc., and 50 packages of unmounted objects with which to practice. The microscope is accompanied by a booklet concerning its manipulation and care, naming the various parts and giving directions to enable the uninitiated to acquaint themselves with the compound microscope and to prepare a wide variety of objects for study.

No. 3636. Home Microscope Equipment.....$30.00

HIGH GRADE MICROSCOPE.



No. 4002

ISZARD-WARREN CO., PHILADELPHIA, PA.

HIGH GRADE MICROSCOPE.

This Microscope, as will be noted in the illustration, is the Handle Arm model stand, which is and has been for a number of years, more widely used than any other type or make of microscope in the world.

The general specifications are as follows:—

BASE—large and heavy, finished in alcohol-proof black.

PILLAR—finished in alcohol-proof black, and with inclination joint.

ARM—provided with handle, finished in alcohol-proof black.

STAGE—extra large, 90 x 115 mm, with vulcanite top, extending over the entire surface, and with iris diaphragm in the plane of the upper surface. A 100 mm petri dish may be examined conveniently on this stage and the attachable mechanical stage may be instantly applied.

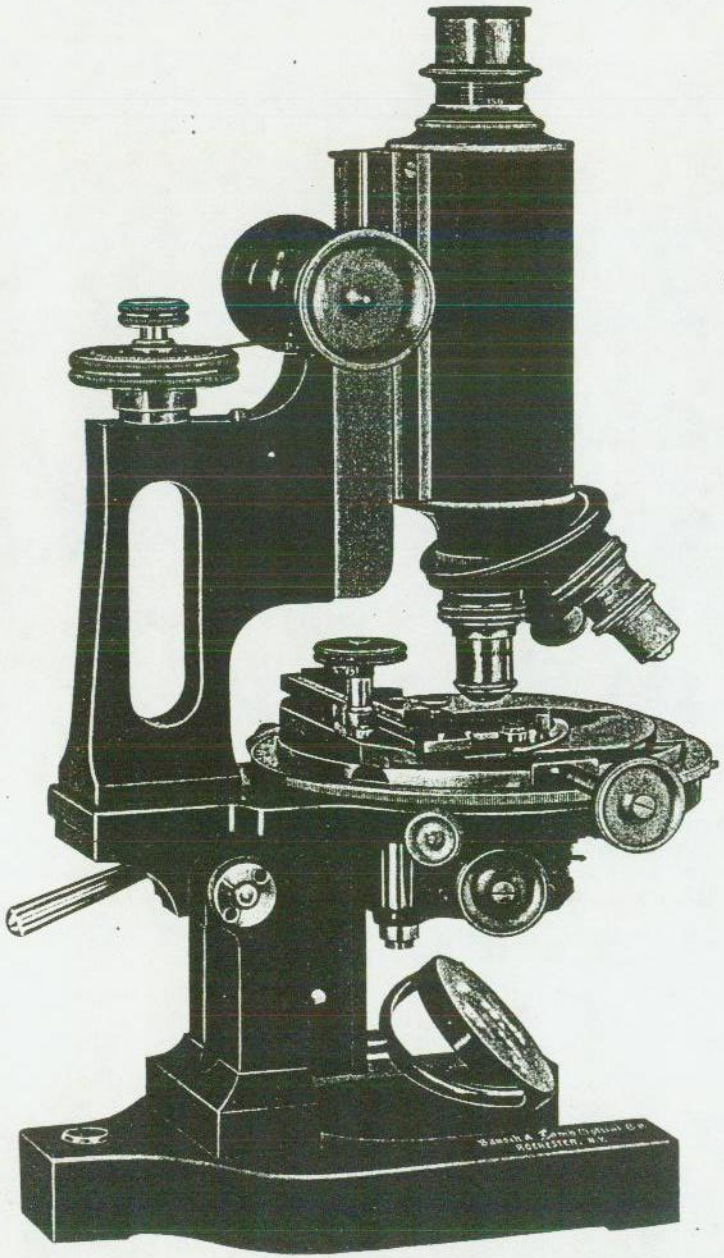
SUB-STAGE—is of a new form, combining all the advantages of the screw sub-stage used on the regular BB microscope and in addition, a swing-out arm, carrying the condenser and lower iris diaphragm, leaving the upper iris diaphragm in position for use.

FINE ADJUSTMENT is of the direct acting lever form, with the micrometer head graduated, each division representing a vertical movement of the tube of .005 mm.

The $\frac{1}{6}$th or 4 mm objective regularly supplied with the outfits is the wide angle objective of 0.85 N.A. Where much work in blood counting by means of the Thoma-Zeiss Haemacytometer is to be done, we recommend the substitution of the special long working distance $\frac{1}{6}$th or 4 mm objective of 0.75 N.A. which has sufficient working distance to permit the use of the thickest cover glass furnished with the Thoma-Zeiss Haemacytometer.

	Objectives		Eyepieces	Nosepiece	Abbe Condenser	Price
	Dry	Oil Immersion				
No. 4000.	$\frac{2}{3}$, $\frac{1}{6}$	.....	2 in., 1 in.	Double	.....	$62.00
No. 4002.	$\frac{2}{3}$, $\frac{1}{6}$	$\frac{1}{12}$, 1.32 N.A.	2 in., 1 in.	Triple	1.20 N.A.	95.00

THE PRECISION MICROSCOPE.



No. 4010

ISZARD-WARREN CO., PHILADELPHIA, PA.

THE PRECISION MICROSCOPE.

The Microscope is the largest and most complete of the entire series, and has been designed for the most critical work, including photo-micrography. The general specifications are as follows:—

BASE—extra large and heavy, finished in alcohol-proof black.

PILLARS—double rectangular cross section, insuring great rigidity. These are also finished in alcohol-proof black.

ARM—of such form as to provide a distance of 75 mm to the optical center, with sufficient room for examination of brain sections.

STAGE—extra large, 125 mm diameter, revolving, with circumference graduated and vernier placed in convenient position.

MECHANICAL STAGE—is convenient in arrangement and of great precision in its movements.

STOPS—are adjustable, to take different size slides.

PLAIN REVOLVING STAGE—with vulcanite surface is supplied at extra cost if desired, to replace the mechanical stage for certain work.

SUB-STAGE—is of the complete form with swing-out condenser and iris diaphragm. The entire sub-stage with its attachments is carried on a solid bar, adjustable vertically by rack and pinion.

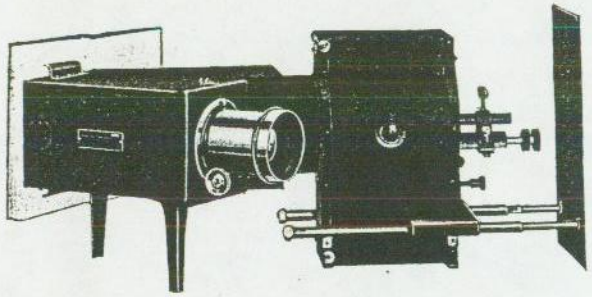
FINE ADJUSTMENT—of the direct acting lever form, giving a vertical movement to the tube of .25 mm to one complete revolution of the micrometer head of fine adjustment.

MICROMETER HEAD—is graduated, each division representing a vertical movement of the tube of .0025 mm.

BODY TUBE—of extra large size, 50 mm diameter; made of aluminum to reduce weight, and finished in alcohol-proof black; for photo-micrography the draw tube may be removed and replaced by a light-tight sleeve, which is to carry long focus objectives.

	Objectives		Eyepieces	Nosepiece	Abbe Condenser	Price
	Dry	Oil Immersion				
No. 4004.	$\frac{2}{3}$, $\frac{1}{6}$	.....	1 in.	.....	1.20 N. A.	$166.00
No. 4006.	$\frac{2}{3}$, $\frac{1}{6}$	.....	1 in.	Double	1.20 N. A.	170.00
No. 4008.	$\frac{2}{3}$, $\frac{1}{6}$	.....	2 in., 1 in.	Double	1.20 N. A.	171.50
No. 4010.	$\frac{2}{3}$, $\frac{1}{6}$	$\frac{1}{12}$, 1.31 N.A.	2 in., 1 in.	Triple	1.20 N. A.	200.00

POST CARD AND PHOTOGRAPH PROJECTOR.



POST CARD AND PHOTOGRAPH PROJECTOR. A high grade optical nstrument for the projection of opaque objects such as photographs, post cards, book illustrations, etc., by reflected light. This apparatus is not a toy but a scientific instrument of precision as used in the leading Universities and Colleges. Photographs, post cards and other illustrations may be brilliantly projected without the trouble and expense of preparation of lantern slides and the instrument provides an unique form of entertainment in the home. May also be arranged at slight expense for use of regular lantern slides. For use only with electric current.

No. 4238. POST CARD AND PHOTOGRAPH PROJECTOR as illustrated, including hand feed electric lamp, condenser system, dark chamber, with book holder, light shield and projection lens of 10 inches equivalent focus $70.00

No. 4450. FIXED RHEOSTAT, 110 volts, 15 amperes $10.00

No. 4252. STAND to carry apparatus..... $16.00

ISZARD-WARREN CO., PHILADELPHIA, PA.

ACHROMATIC TRIPLET MAGNIFIERS.

No. 500

These magnifiers give an absolutely flat field, have long working distance and are possessed of an unusual defining power.

No. 500. Achromatic Triplet, in nickel pocket case, one inch focus, magnifies about ten diameters . . . . . $ 5.00

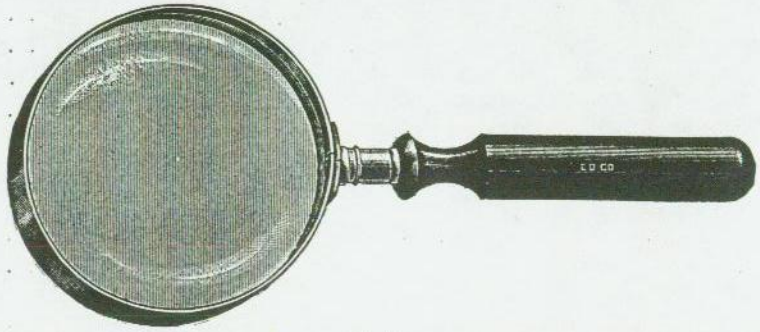
No. 501. Achromatic Triplet, three-quarter-inch focus, magnifies about fourteen diameters 5.00

No. 502. Achromatic Triplet, one-half inch focus, magnifies about twenty diameters 5.00

No. 503. Achromatic Triplet, one-quarter inch focus, magnifies about forty diameters 5.00

READING AND PICTURE GLASSES.

Finest Quality

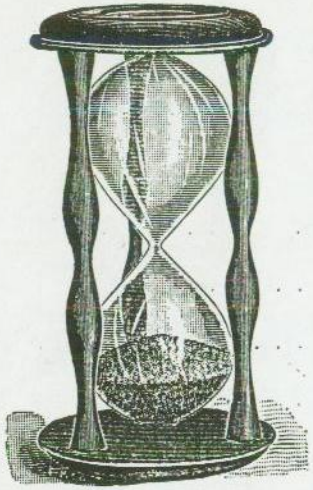


No. 504

No. 504. These Reading and Picture Glasses are of superior magnifying power, and mounted in round nickel-plated frames, with ebony handles.

	1½	2	2½	3	3½	4	4½	5 inches.
Each,	$.55	$.75	$1.15	$1.25	$1.75	$2.20	$3.00	$3.75

STERLING SAND GLASSES.

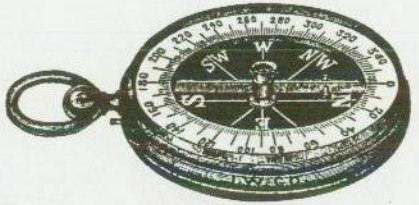


No. 510.	Sand Glass, White Wood,		3 minute	$ .25
No. 511.	Do.	do.	15 do.	.75
No. 512.	Do.	do.	30 do.	1.00
No. 513.	Do.	do	60 do.	1.50
No. 514.	Do.	Rosewood	3 minute	.50
No. 515.	Do.	do.	15 do.	1.00
No. 516.	Do.	do.	30 do.	1.50
No. 517.	Do.	do.	60 do.	2.25

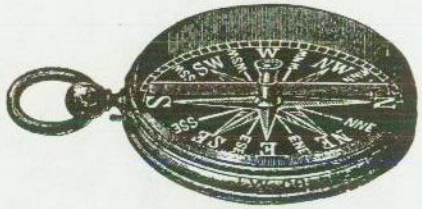
We are prepared to furnish Sand Glasses of other specifications and will gladly submit estimates on request.

ISZARD-WARREN CO., PHILADELPHIA, PA.

POCKET COMPASSES.



No. 100



No. 101

No. 100. Pocket Compass, nickel case, raised ring, agate center, bar needle with stop.

1¼	1½	2 inch diameter.
$2.25	2.50	2.75

No. 101. Pocket Compass, nickel case, engraved dial, agate centre, bar needle with stop.

1¼	1½	2 inch diameter.
$2.50	2.75	3.00

No. 102

No. 103

No. 102 Pocket Compass, nickel hunting case, engraved dial, agate center, bar needle with stop.

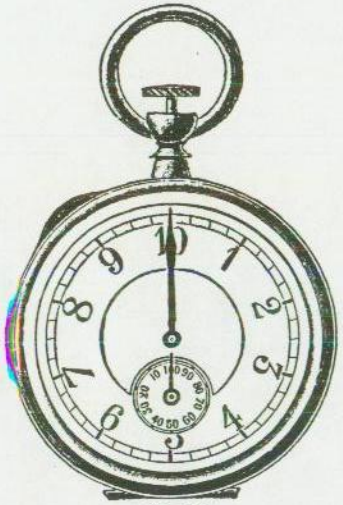
1¼	1½	2 inch diameter.
$3.00	3.50	4.00

No. 103. Pocket Compass, nickel case, pull off cover, raised ring, agate center, bar needle with stop.

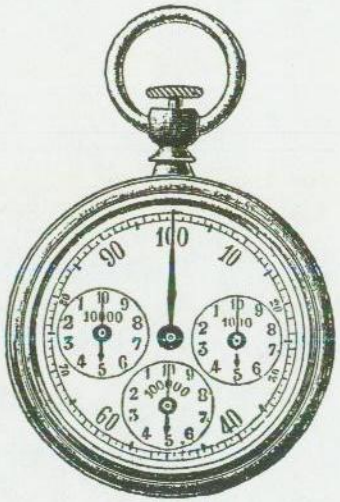
1¼	1½	2 inch diameter.
$2.25	2.50	2.75

The Compasses catalogued by us have been selected with the greatest care and are guaranteed as to accuracy and workmanship.

PEDOMETERS.



No. 231



No. 233

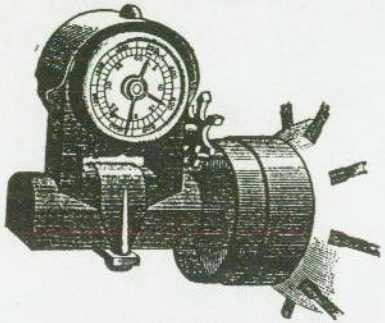
No. 230. Pedometer, watch pattern, nickel case, registering distance walked to 12 miles, with automatic zero setting device.....Each $4.50

No. 231. Pedometer, watch pattern, nickel case, with 2 hands, registering distance walked to 100 miles, with automatic zero setting device..Each 5.25

No. 232. Passometer, watch pattern, nickel case, with 3 hands, registering 100,000 steps, with automatic zero setting device .....Each 6.00

No. 233. Passometer, watch pattern, nickel case, with 4 hands, registering 1,000,000 steps, with automatic zero setting device.....Each 6.50

BELL ODOMETER.



No. 235

No. 235. Improved Bell Odometer, registers distance traveled to 1,600 miles and repeats; rings a small bell as each mile is passed .....Each, 6.00

The Odometer can be used for any kind of vehicle, the illustration shows method of attaching to axle with pin in hub. They are made for wheels of any size from 28 to 54 in., varying every half inch. In ordering it is necessary to state the exact diameter of the rear wheel of carriage, from outside to outside of tire.

ISZARD-WARREN CO., PHILADELPHIA, PA.

SUN DIALS.

Let others tell of storms and showers,
I'll only count your sunny hours.

From these ponderous contrivances to "mark the flight of time" came gradually all the later devices to measure his footsteps to a nicety. Sun Dials, simple and elaborate, became universally employed.

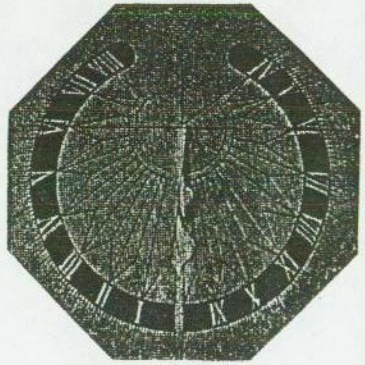
The Romans placed them on their temples, baths, town and country houses, and on their tombs; the Turks on their mosques; the Chinese set them up in every available place; ancient examples were found by early explorers in Mexico and Peru, and these, because mounted on beautiful pillars, were destroyed as savoring of idolatry.

But after the seventeenth century human progress became too rapid for Sun Dials. Grandfathers' clocks and unnumbered millions of ticking timepieces, down to the Nickel "alarm" and the Waterbury watch, were adopted in due order.

The modern, hustling civilization had "no further use" for ancient methods of marking time. Sun Dials were buried in the forgotten past, their construction almost became a lost art.

But not quite. In these enlightened days a great many people of cultivated taste, who possess the means and the leisure to gratify it, find pleasure in reproducing the simple accessories of life in earlier times, and these have discerned in the antique Sun Dial something fine, dignified, and worthy to endure. To them the Sun Dial has irresistibly appealed to be rescued from undeserved oblivion.

5004



5010

No. 5000. Cast Brass Dial, 7¼" Diam.....$5.00
No. 5002. Cast Brass Dial, 9¾" Square 9.00
No. 5004. Cast Brass Dial, 13" Diam. 11.00
No. 5006. Engraved Brass Dial, 10¾" Diam. 18.00
No. 5008. Engraved Brass Dial, 12¾" Square.....22.00
No. 5010. Engraved Brass Dial, 13¾" Diam. 22.00

Designs and Prices of Pedestals submitted on request.

SUNSHINE RECORDER.

This instrument was originally designed in a rough form by J. P. Campbell, Esq., of Kensington, in 1853; the present form of zodiacal belt being the introduction of Professor Stokes, of Cambridge. This belt is divided into three zones of equal width, by two planes, parallel to, and equidistant from the plane of the Equator. Each of these zones is constructed to receive a strip of flat card, which following the curve, may without appreciable error, be taken to represent the respective zone of spherical surface. The middle zone receiving a straight card serves for about a month at each Equinox. The upper and lower zones answer the same purpose for the summer and winter months respectively. When the cards are properly placed within the grooves, their services are always well within the burning power of the sphere. The cards are divided into half-hour spaces, and figured every three hours, and when set to accord with the noon-mark on the belt, constitute the instrument an accurate sun-dial.

INSTRUCTIONS FOR USE.

Select some spot from which a clear view all round the horizon can be obtained between the points of sunrise and sunset at midsummer.

Set the polar axis to the proper latitude by means of the divided limb—and clamp it by the two screws provided for the purpose. Set the instrument as nearly north and south as can be, by using a magnetic compass, making the final accurate adjustment by letting the sun's image at the exact moment of southing fall on the noon-mark on the belt.

Now make the instrument a fixture, insert the proper form of card according to the season, and the instrument is ready to record.

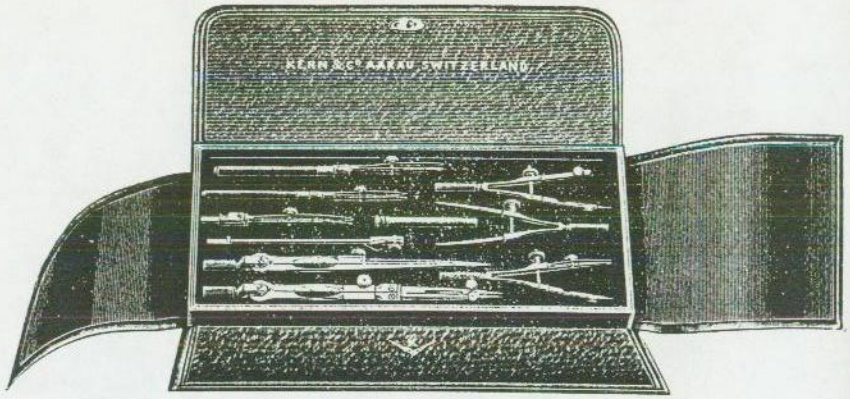
No. 3520. Universal Sunshine Recorder.....$120.00
Cards for one year, viz.; 150 Summer Solstice, 150 Winter Solstice, 100 Equinoctial..... 18.50

No. 3520½. Universal Sunshine Recorder, with metal dial bar needle compass in base 125.00

The Drawing Instruments sold by us are the products of the best makers of Switzerland and Germany and are guaranteed perfect in every detail of construction and are the best obtainable in their respective classes.

KERN'S FIRST QUALITY SWISS.

For University Students.



No. 1030. Morocco Pocket Case containing:
- No. 867. Compass 5½″ long, with fixed needle-point, pen and pencil points, and lengthening bar;
- No. 917. Steel Bow Pen, 3″ long, metal handle, needle-point;
- No. 916. Steel Bow Pencil, 3″ long, metal handle, needle-point;
- No. 950. Drawing Pen 5″ long, ebony handle, spring on upper blade;

Box of Leads and Adjusting Key, per set.....$17.00

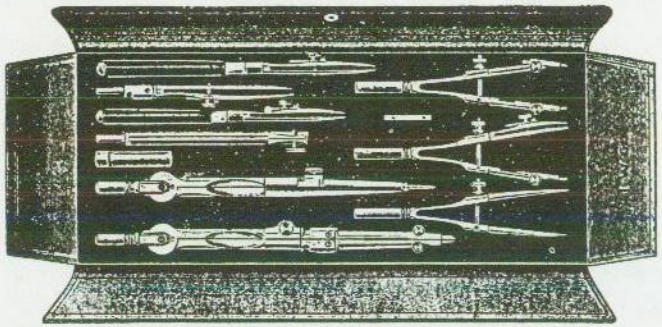
No. 1031. Morocco Pocket Case, containing the same as No. 1030 excepting it has Compass with Hair-spring attachment No. 868...$18.00

No. 1034. Morocco Pocket Case, Chamois Lined.
- No. 867. Compass 5½″ long, with fixed needle-point, pen and pencil points, and lengthening bar;
- No. 866. Hair Spring Dividers, 5″ long;
- No. 915. Steel Spacing Divider, 3″ long, metal handle;
- No. 916. Steel Bow Pen, 3″ long, metal handle, needle-point;
- No. 917. Steel Bow Pencil, 3″ long, metal handle, needle-point;
- No. 950. Drawing Pen, 4½″ long, ebony handle, spring on upper blade;
- No. 950. Drawing Pen, 5″ long, ebony handle, spring on upper blade;

Box of Leads and Adjusting Key .....per set $22.50

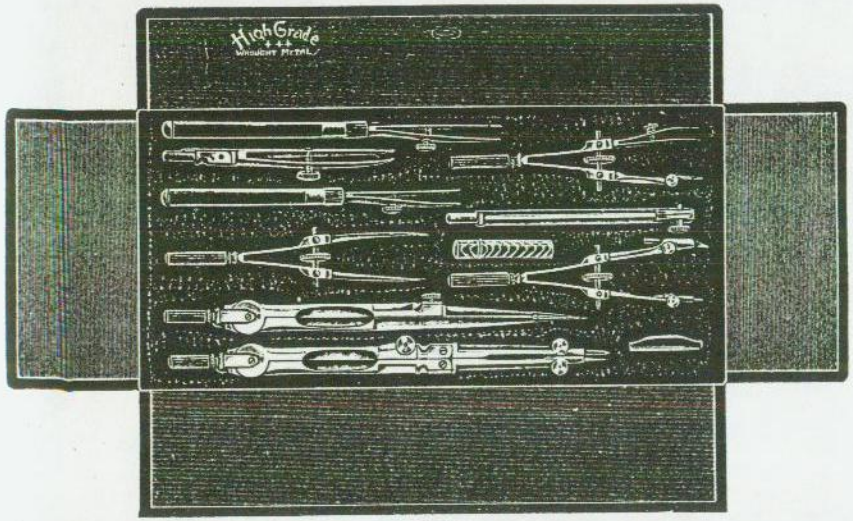
No. 1035. Morocco Pocket Case containing the same as No. 1034 excepting it has Compass with Hair-spring attachment; No. 868, per set,..... $23.50

SCHOENNER'S INSTRUMENTS IN CASES.
"Sterling Quality." Made to Our Special Order.



1042

No. 1042. Folding Pocket Case, Sterling Quality, containing:
- No. 884S. Needle-Point Compass, 5½″ long, with pen and pencil points and lengthening bar;
- No. 882S. Hair-Spring Dividers, 5½″ long;
- No. 925S. Steel Spring Bow Dividers;
- No. 927S. Steel Spring Bow Pen;
- No. 929S. Steel Spring Bow Pencil;
- No. 970S. Drawing Pen, 4½″ long, spring blade;
- No. 970S. Drawing Pen, 5½″ long, spring blade;
- Box of Leads $13.00

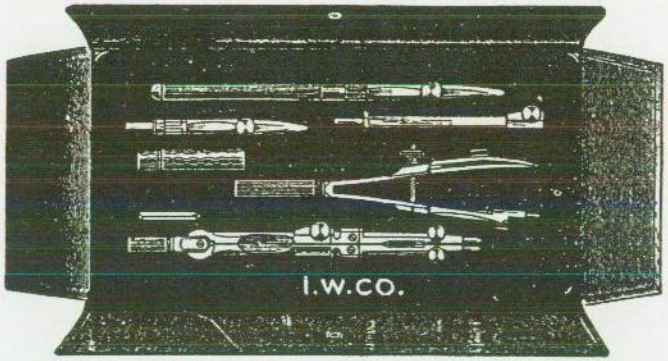


1043

No. 1043. Morocco Folding Pocket Case, Sterling Quality, containing:
- No. 884S. Compass, 5½″ long, with fixed needle-point leg, with pen and pencil points and lengthening bar;
- No. 882S. Hair-Spring Dividers, 5″ long;
- No. 931S.–932S.–933S. Spring Bow Instruments;
- No. 971S. 4½″ and 5″ lever spring blade Ruling Pens;
- Box of Leads, ... $14.50

ISZARD-WARREN CO., PHILADELPHIA, PA.

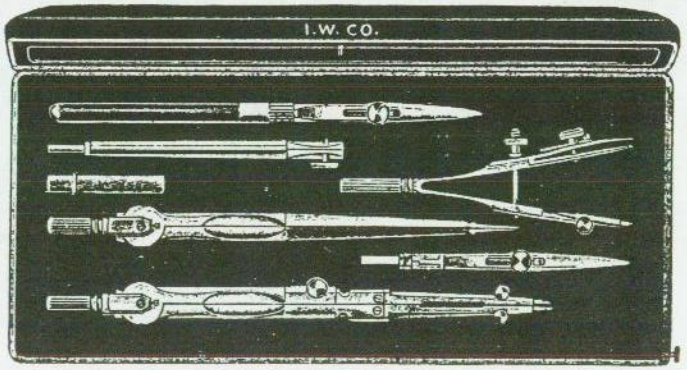
SCHOENNER'S FIRST QUALITY GERMAN.



1051

For Manual Training, High School and Preparatory Students.

No. 1051. Morocco Pocket Case, Silk Velvet Lined.
- No. 884. Needle-Point Compass, 4½″ long, with pen and pencil points and lengthening bar;
- No. 925. Steel Spring Bow Pen;
- No. 971. Drawing Pen, 4½″ long, ebony handle, spring on upper blade;
- Box of Leads $5.50

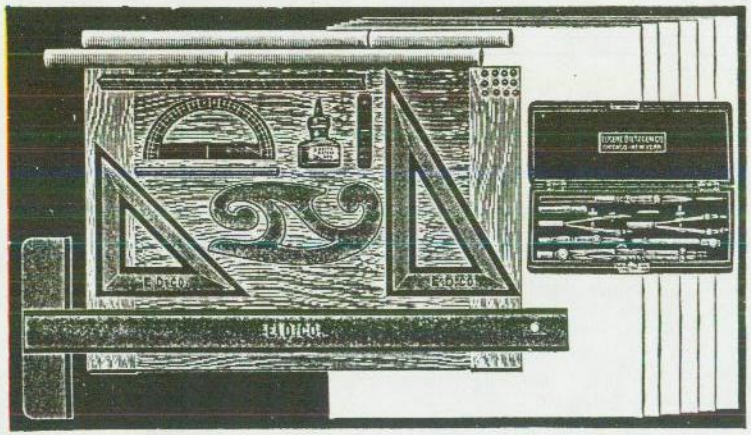


1052

No. 1052. Morocco Case, First Grade, containing:
- No. 884. Needle-Point Compass, 5½″ long, with pen and pencil points and lengthening bar;
- No. 880. Plain Dividers, 5½″ long;
- No. 929. Steel Spring Bow Pen;
- No. 971. Drawing Pen, 5½″ long, ebony handle, spring on upper blade;
- Box of Leads 8.50

No. 1053. Morocco Case, Second Grade, containing same assortment 5.50

STUDENT'S DRAWING OUTFITS.



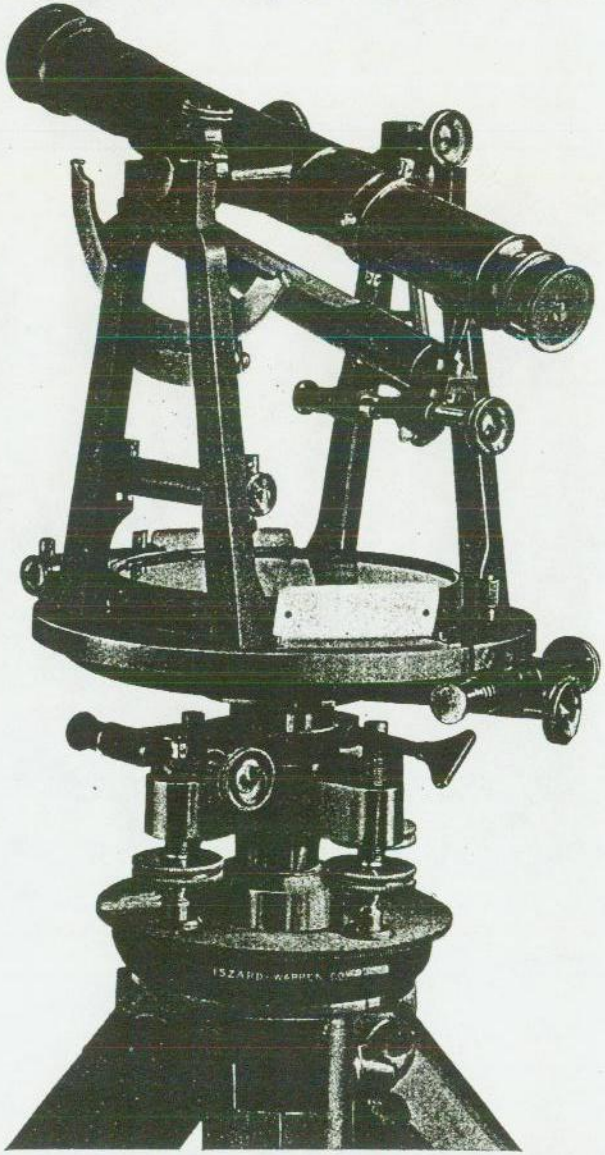
These outfits are intended for students of Schools teaching Mechanics and Engineering. The Instruments are of good quality and serviceable. All the other material is of our regular stock.

No. 1065. Consists of the following:

1 Set Drawing Instruments in morocco case, containing:
No. 970. Ruling Pen, 5½″, with spring and ebony handle.
No. 928. Steel Spring Bow Pencil, 3½″, metal handle.
No. 930. Steel Spring Bow Pen, 3½″, metal handle.
No. 886. Compasses, 6″, with fixed needle-point, pen, pencil point and lengthening bar.
2 extra needle-points, one for Compasses and one for Bow Pencil.
Box with Leads.
1 Drawing Board, 16x22″, selected pine, good ledges.
1 T Square, 24″, mahogany and ebony-lined blade.
1 Protractor, 6″, German silver, engine divided (not stamped).
1 Scale, 12″, triangular, boxwood, best quality.
1 Triangle, 30°x60°, 9″, mahogany, ebony-lined.
1 Triangle, 45°, 7⅞″, mahogany, ebony-lined.
1 Curve, best grade, cherry, No. 16.
1 dozen Steel Tacks, steel capped, thin edges, round tops.
1 Pencil, Koh-i-noor, 4 H.
1 bottle of Ink, Higgins, Waterproof Black.
1 Ink and Pencil Eraser, Faber.
2 sheets Imperial Tracing Cloth, 16x22″.
6 sheets Whatman's Paper, Demy, 15x20″.
Outfit, complete.....Each, $12.00

ISZARD-WARREN CO., PHILADELPHIA, PA

"STERLING" PRECISION TRANSIT No. 1.

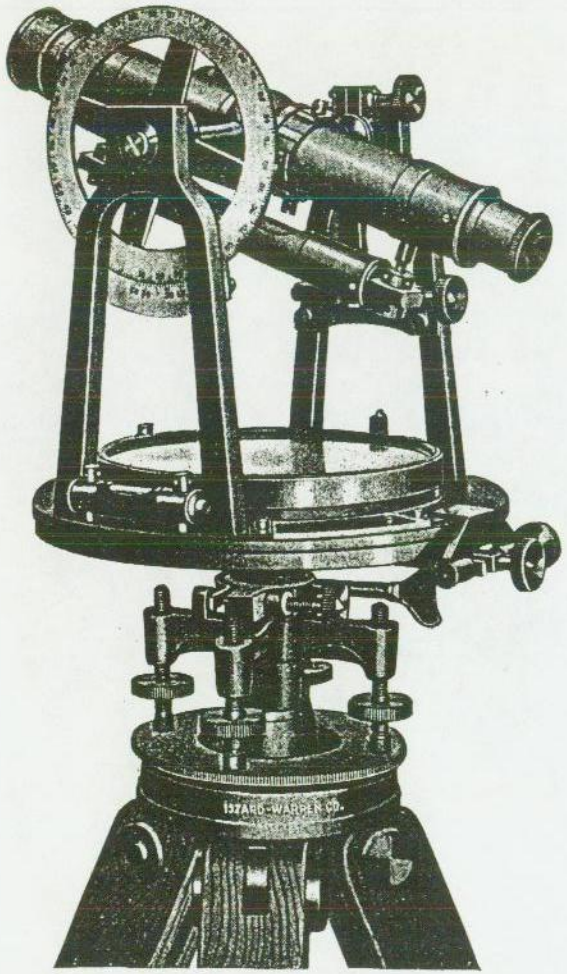


PRICE AS ILLUSTRATED, $210.00 F. O. B. FACTORY.

This Transit represents the highest achievement in Precision Instruments. In accuracy, workmanship, design and grace of finish it is unparalleled. Designed for Municipal Engineering, Tunnel and Bridge Construction, Railroad, Canal and all Precise Surveys.

ACCURACY GUARANTEED. PRECISE WORKMANSHIP.

"STERLING" RECONNOISSANCE No. 15.



PRICE AS ILLUSTRATED. $115.00. F. O. B. FACTORY.

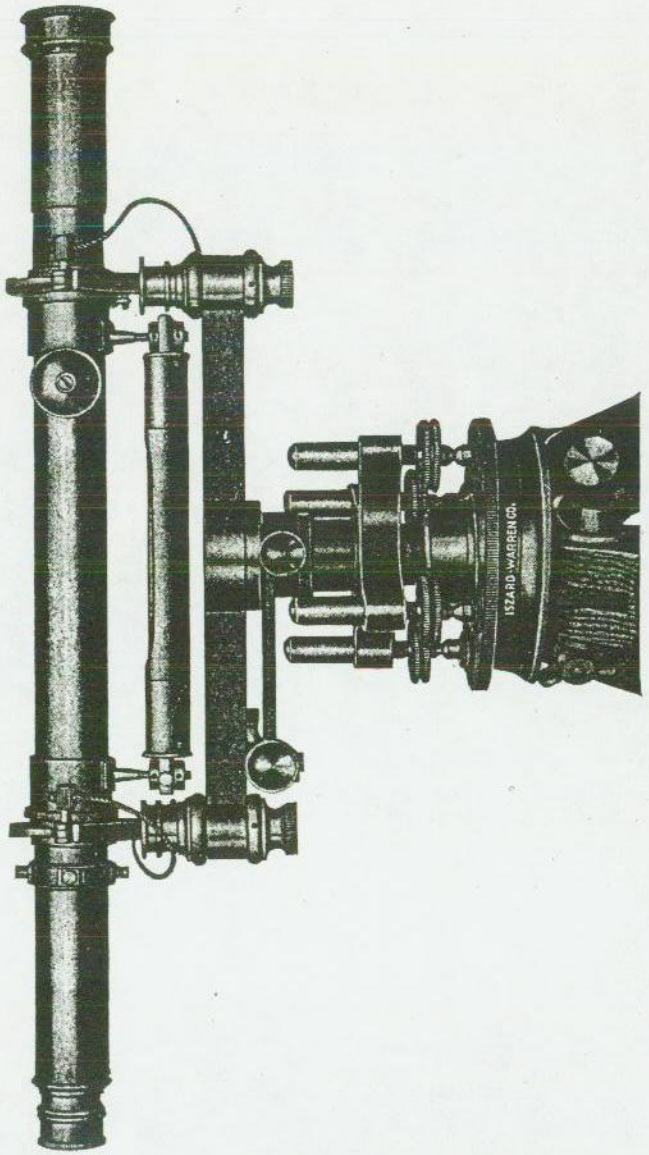
This Transit designed for Reconnaissance Field Surveys or Mine Developments where extreme precision is not essential.

ACCURACY GUARANTEED. HIGH GRADE WORKMANSHIP.

ISZARD-WARREN CO., PHILADELPHIA, PA.

"STERLING" ENGINEERS' WYE LEVEL No. 40.

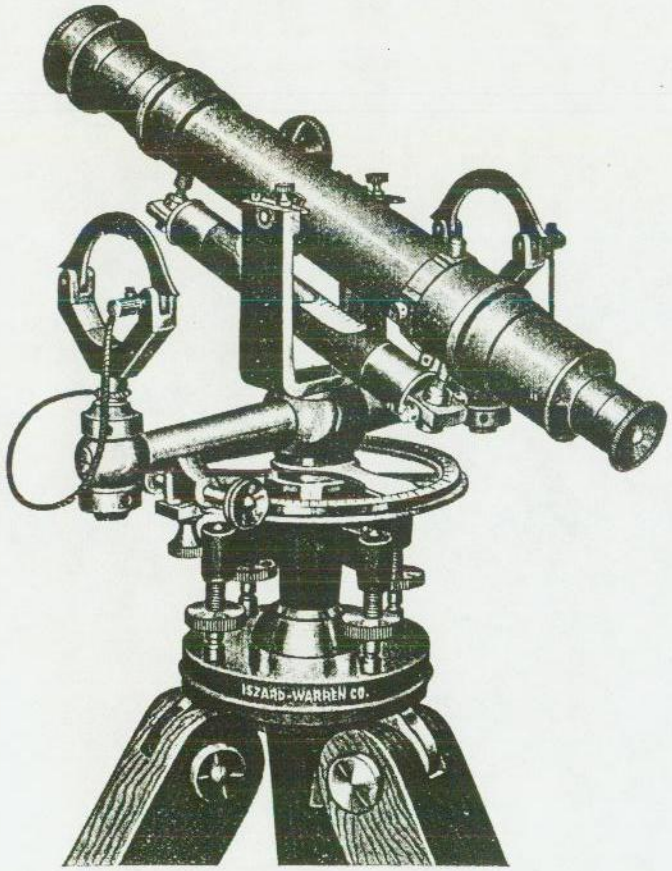
18 or 20 inch Telescope.



PRICE AS ILLUSTRATED, $110.00. F. O. B. FACTORY.

For accuracy, grace of design, this Level is conceeded to be unsurpassed.

"STERLING" TILTING OR CONVERTIBLE LEVEL No. 55.



Our Sterling Tilting or Convertible Level, as illustrated above, has been designed to fill a long felt want among users of Architects' Levels for an inexpensive Instrument, by means of which sights above or below the horizontal could be readily taken.

This Instrument is identical with our Level No. 50 with the addition of the small U-shaped standard which is securely attached to the Level bar, and the small trunions on the telescope by means of which it is mounted in the standards.

The Instrument can be used as an ordinary Level, and the small standard carried in the pocket to be used only when required, the change requiring only a few seconds. This level is provided with the tangent or slow motion screw to the plate clamp, the same as furnished on the No 50 Model.

In setting stakes, lining up pillars, walls or girders it is of inestimable value and its but slightly increased cost virtually converts the Level into a Transit sufficient for usual building purposes.

No. 55. "Sterling" Tilting or Convertible Level.....$65.00
No. 57. "Sterling" Tilting or Convertible Level, same No. 55 without tangent screw 60.00