

THE SURVEYORS' TRANSIT.

(WITH TWO VERNIERS TO THE HORIZONTAL LIMB.)

THE Surveyors' Transit *with two verniers to limb* has essentially the same construction as the Engineers' Transit, but its compass-circle is movable about its center, like that of the Mountain Transit, in order that the variation of the needle may be set off in the surveys of old lines, or in running lines by the true meridian.

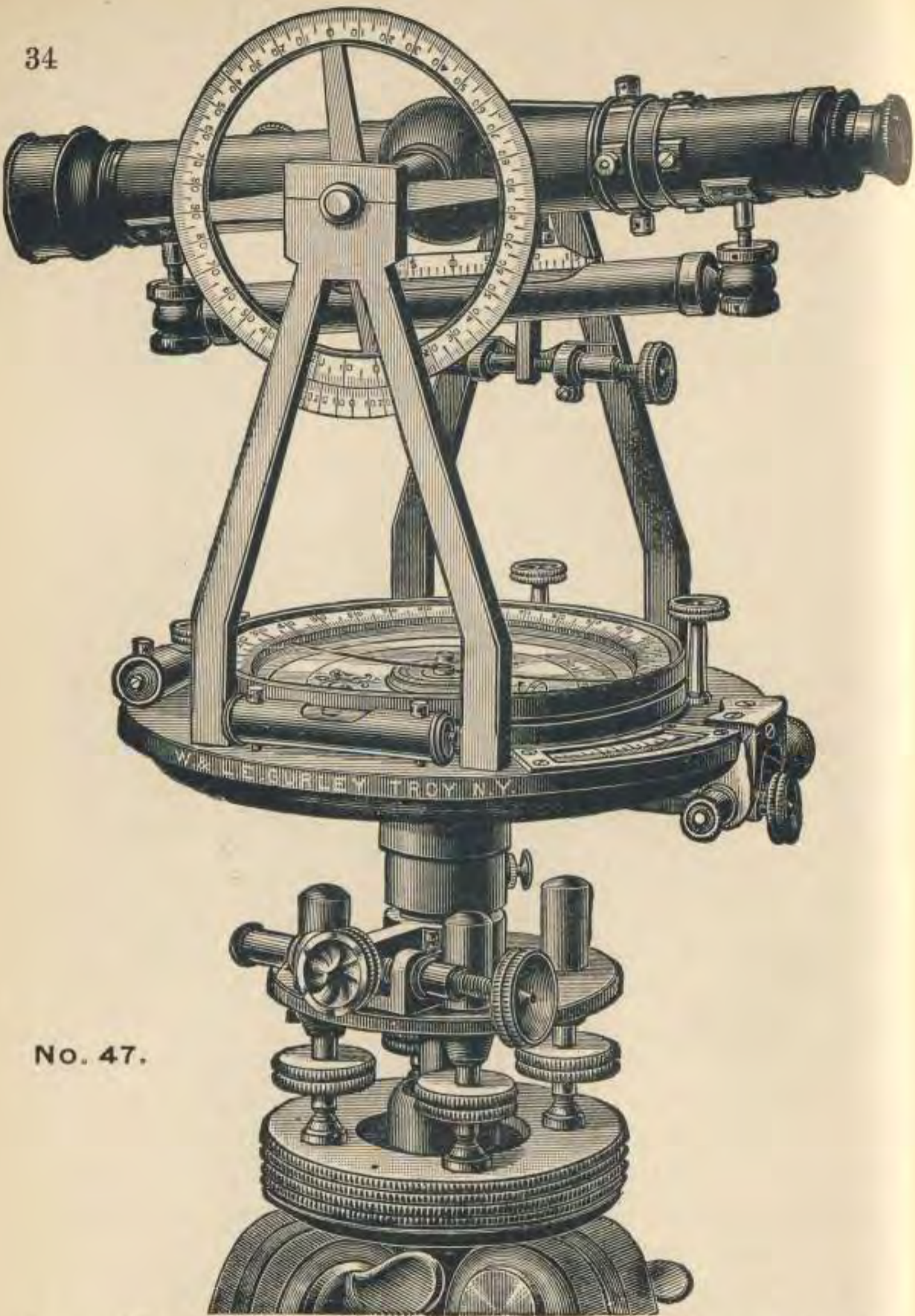
The arrangement of the sockets and leveling-head, however, permits the Surveyors' Transit to be detached from the leveling-head and replaced upon its spindle, when desired, without in any way disturbing its adjustments.

The sectional view, page 35, shows the interior construction of the sockets of the Transit, the manner in which it is detached from its spindle, and the means by which it can be taken apart if desired.

In the figure, the limb, B, is attached to the main socket, C, which is itself carefully fitted to the conical spindle, H, and held in place by the spring-catch, S.

The upper plate, A, carrying the compass-circle, standards, etc., is fastened to the flanges of the socket, K, which is fitted to the upper conical surface of the main socket, C; the weight of all the parts being supported on the small bearings of the end of the socket, as shown, so as to turn with the least possible friction.

A small conical center, in which a strong screw is inserted from below, is brought down firmly upon the upper end of the main socket, C, thus holding the two



No. 47.

Surveyors' Transit, two verniers to limb, 5-inch needle, with $4\frac{1}{2}$ -inch vertical circle and vernier to 1 minute, level on telescope, clamp and tangent to telescope axis, and tripod. Price, \$160.00.

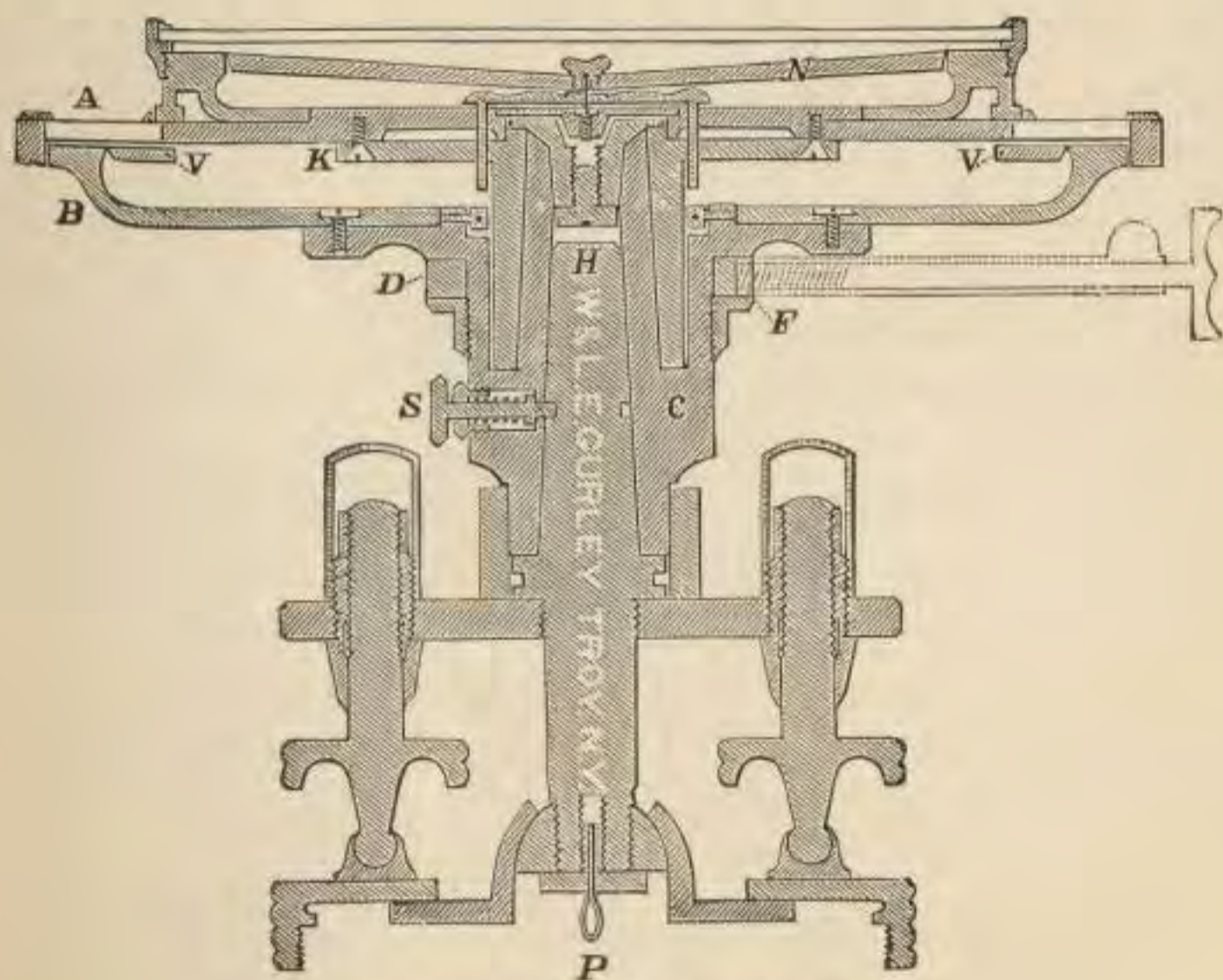
plates of the instrument securely together, and at the same time allowing them to move freely around each other in use.

A disk above the conical center contains the steel center-pin upon which rests the needle, as shown; the disk is fastened to the upper plate by two screws.

The clamp to limb, with clamp-screw, is also shown at D F, attached to the main socket below.

The main socket with all its parts is of the best bell-metal, and is most carefully and thoroughly made, the long bearing of the sockets insuring their firm and easy movement, while at the same time they are entirely out of reach of dust, or other source of wear.

When desired, the whole upper part of the instrument may be taken off from the spindle by pulling out the head



THE SOCKETS AND CIRCULAR PLATES.

of the spring-catch at S, and when replaced will be secured by the self-acting spring of the catch.

The figure also shows the covers of the leveling-screws, the shifting center of the lower leveling-plate, and the screw and loop for the attachment of the plummet

TO TAKE APART THE SURVEYORS' TRANSIT.

When it is necessary to separate the plates of the Transit, proceed as follows (see page 35):

(1) Remove the clamp-screw of the variation arc and take off the head of the pinion, both outside the compass-circle. (2) Unscrew the bezel-ring holding the glass cover of the compass, remove the needle and button beneath it, and take out the two screws, so as to remove the disk. (3) Take the instrument from its spindle, and with a screw-driver take out the screw from the under side of the conical center. (4) Drive out the center from below by a round piece of wood, holding the instrument so that the center will not bruise the circle. (5) Set the instrument again upon its spindle, unscrew the milled head cap from the thimble containing the opposing spring of the tangent movement to limb, take out the three screws which fasten that movement to the upper plate, and the plates can then be separated. To put the Transit together again, proceed exactly the reverse of the operation thus described.

SIZES AND WEIGHTS. The sizes and weights of the Surveyors' Transits with plain telescope, and having two verniers to limb are :

4-in. needle, with leveling-head, but no tripod, about	13 $\frac{3}{4}$ lbs.
5-in. needle, " " " " " "	16 $\frac{1}{2}$ lbs.
5 $\frac{1}{2}$ -in. needle, " " " " " "	17 $\frac{1}{2}$ lbs.

THE SURVEYORS' TRANSIT.

(WITH ONE VERNIER TO THE HORIZONTAL LIMB.)

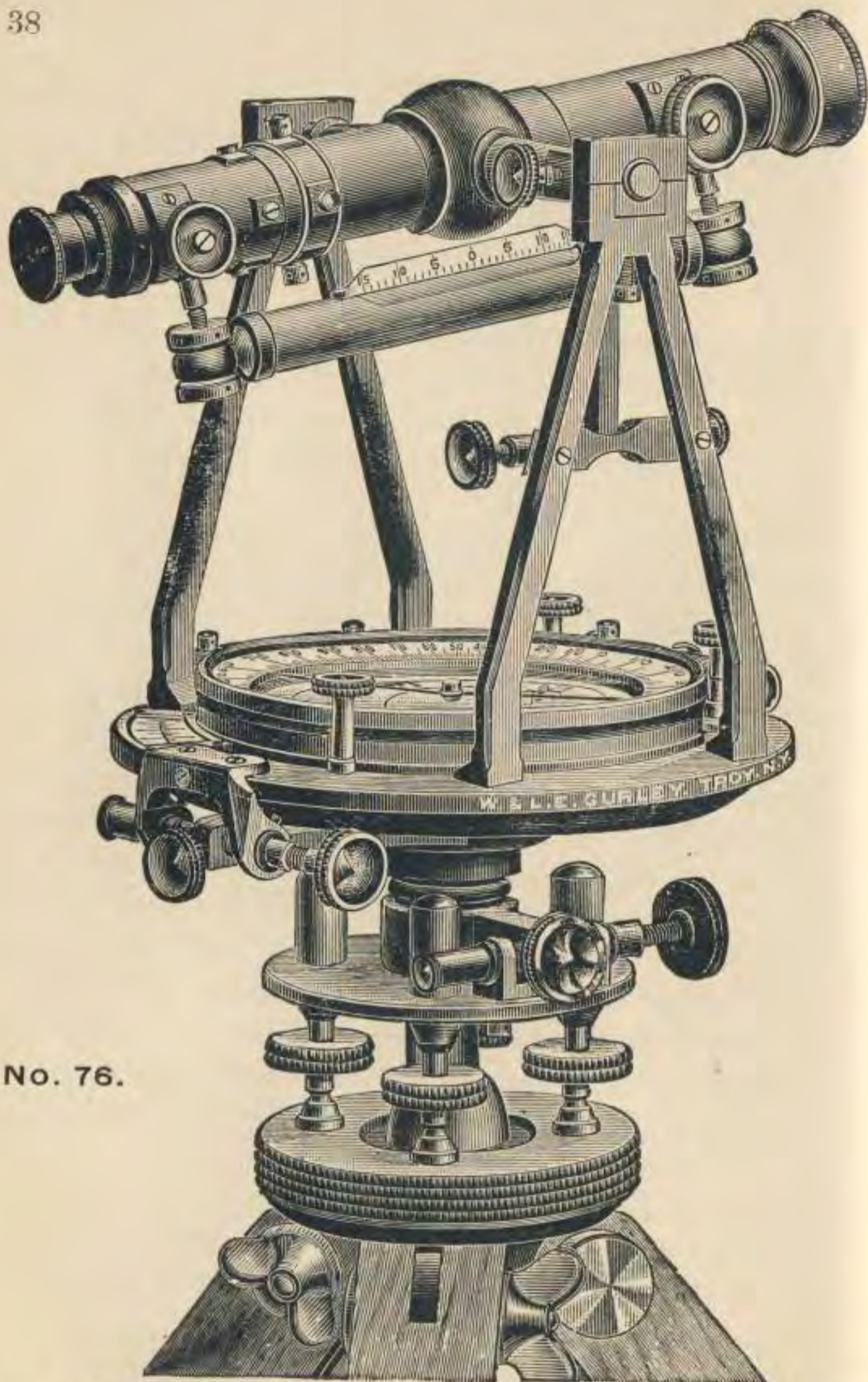
THE Surveyors' Transit *with one vernier to limb* is a modification of the instrument just described, in which there is but one double vernier to limb and a different arrangement of the sockets, as shown in the sectional cut on page 39.

The instrument is more compact and somewhat lighter than that with two verniers, and is furnished at less cost. Its graduations, telescope and attachments are all equal to those of the best Transits; and after an experience of more than thirty years the instrument has proved itself in every way satisfactory for all classes of work.

This instrument may be taken apart by first removing the pinion head and clamp-screw near the compass-circle, then unscrewing the bezel-ring, taking out the needle and button underneath, and next removing the disk in which the center-pin is fixed, by taking out two small screws which confine it. The four screws which hold the washer to the under plate must then be removed, the milled head cap of the tangent opposing spring be unscrewed, and the three screws which secure the tangent support to the upper plate removed; and then the plates can be separated. The several parts are replaced in the reverse order.

The adjustments and use of this instrument are like those of the others already described, and its attachments to the telescope the same, if desired.

It is represented in the cut with a level on telescope and clamp and tangent to telescope axis. (See page 38.)



No. 76.

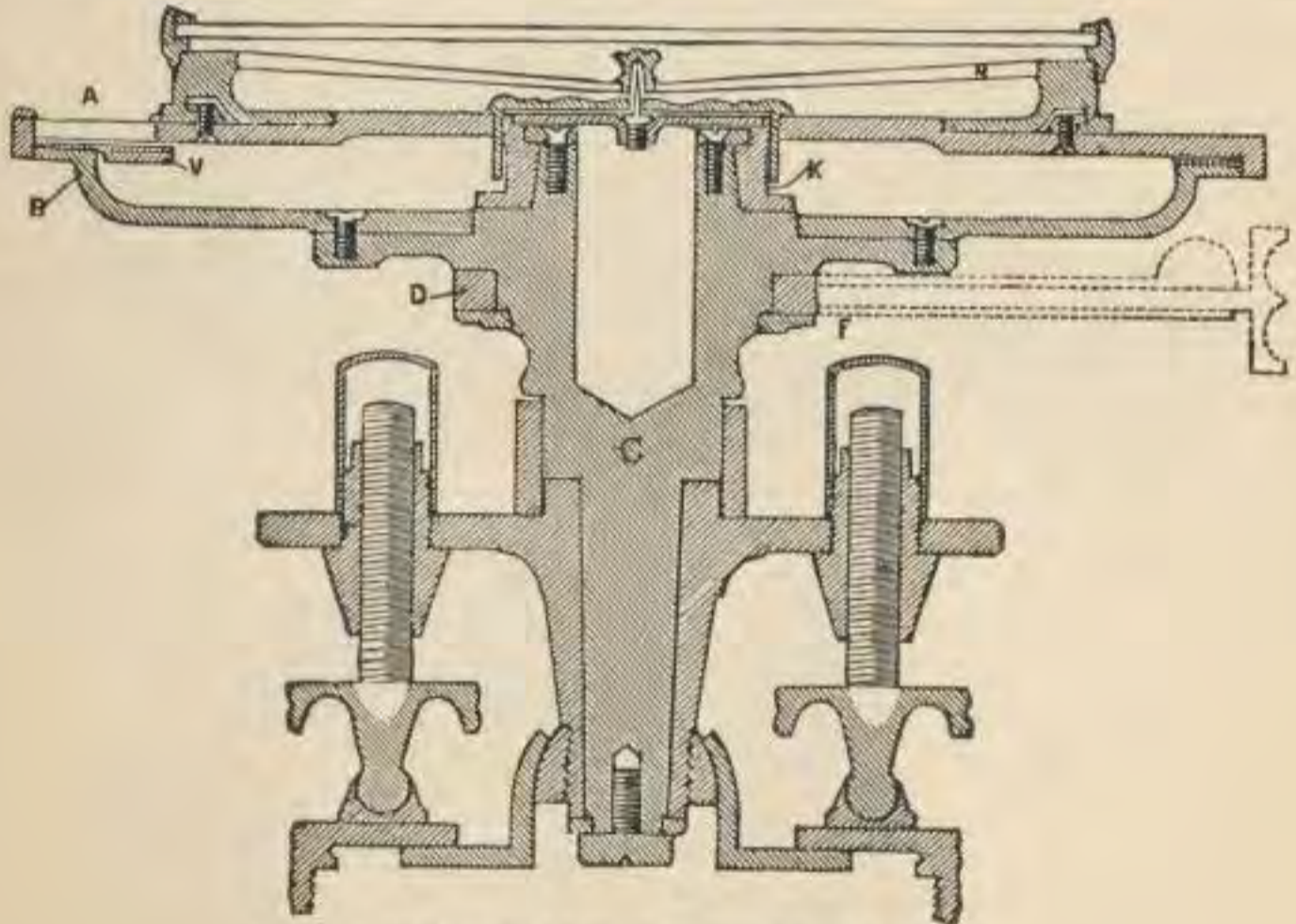
Surveyors' Transit, one vernier to limb, 5-inch needle, with level on telescope, clamp and tangent to telescope axis, and tripod.
Price, \$133.00.

The sectional cut shows the arrangement of the sockets of this instrument. The spindle, C, is fitted to the socket of the leveling-head, as shown, and connected therewith by a screw and washer underneath, as in the figure.

The socket, K, is formed in the metal of the upper plate, a strong washer with four screws, only two of which are seen in the cut, keeping the two plates together, but at the same time allowing them to turn freely around each other.

The clamp to limb, with clamp-screw, is shown in dotted lines at D F, under the plates.

The vernier with the opening above is shown on the left at A. The arrangement of the center-pin, needle, etc., is like that of the Transit with two verniers, but the instrument remains attached to the leveling-head like the Engineers' Transit.



THE SOCKETS AND CIRCULAR PLATES.

SIZES AND WEIGHTS. The sizes and weights of the Surveyors' Transit with plain telescope, and having one vernier to limb are :

4-in. needle, with leveling-head, but no tripod, about	13 lbs.
5-in. needle, " " " " " "	16 lbs.
5½-in. needle, " " " " " "	17 lbs.

SURVEYORS' TRANSIT WITH SOLAR ATTACHMENT.

The engraving on page 41 represents our Surveyors' Transit with five-inch needle, to which is adapted the Solar Attachment with vertical arc, level on telescope, and clamp and tangent to axis of telescope ; both the vertical arc and the arc of the declination arm being graduated on silver and reading by vernier to thirty seconds.

The instrument is furnished with two verniers to limb or with one vernier to limb, as may be desired ; both patterns have shifting center to the leveling-head.

PRICES.

No.		PRICE.
60.	Surveyors' Transit, two verniers to limb, 5-inch needle, with Solar Attachment, vertical arc of 3 inches radius, level on telescope, clamp and tangent to telescope axis, and tripod	\$226.00
90.	Surveyors' Transit, one vernier to limb, 5-inch needle, with Solar Attachment, vertical arc of 3 inches radius, level on telescope, clamp and tangent to telescope axis, and tripod	211.00