

P. FERBER.
TRANSIT.

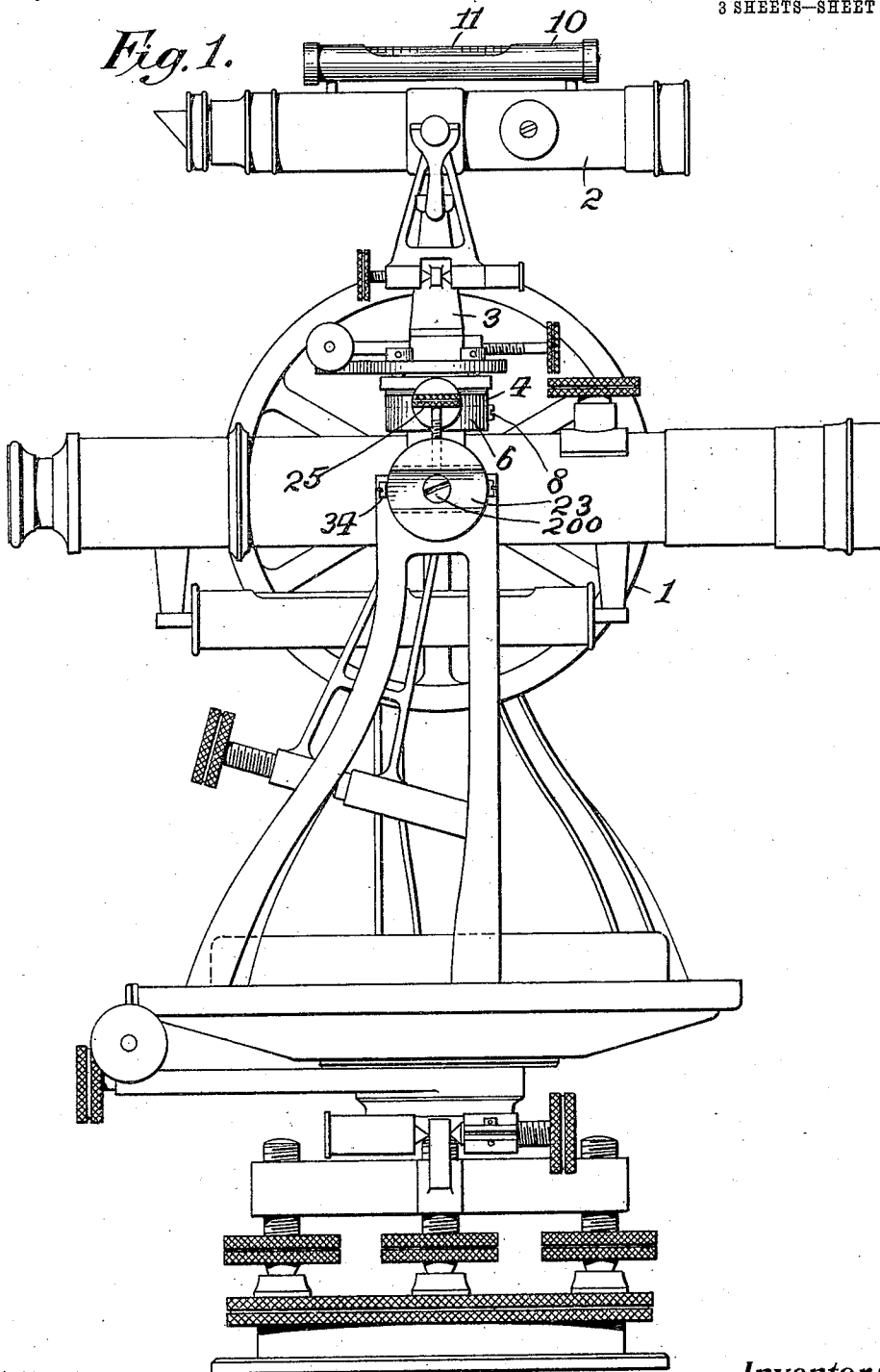
APPLICATION FILED JULY 10, 1908.

933,897.

Patented Sept. 14, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

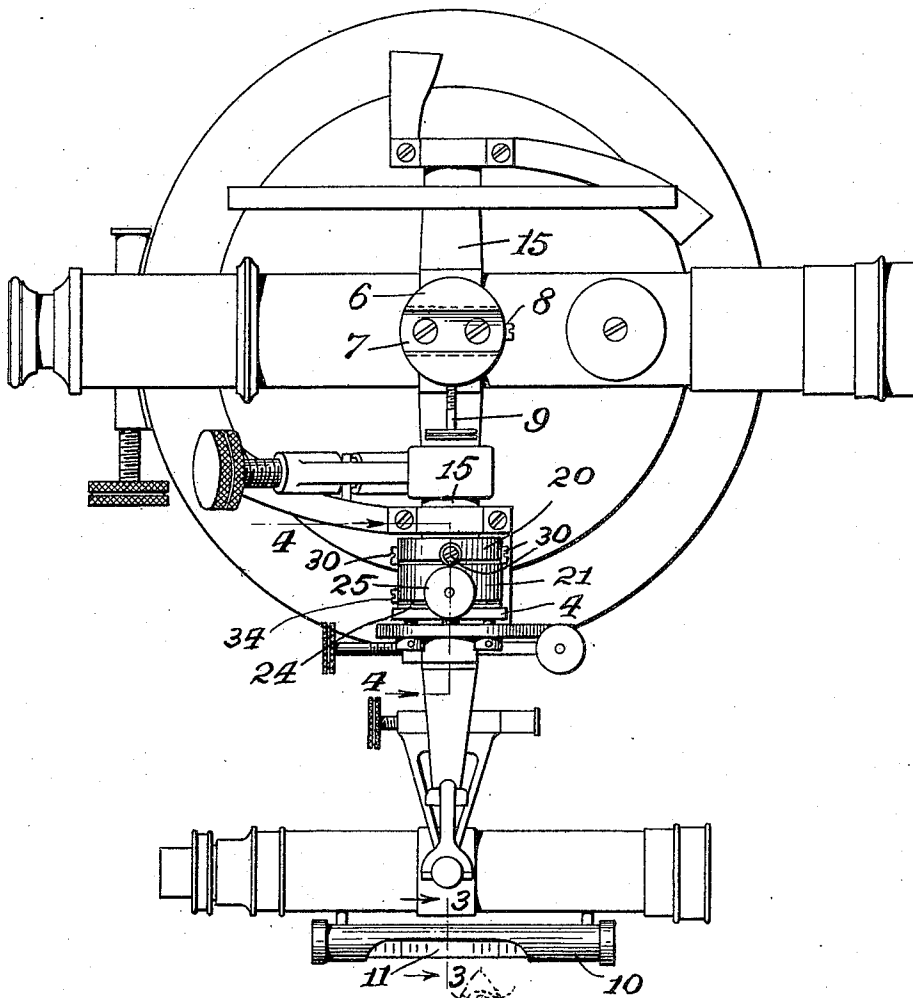
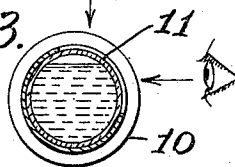


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

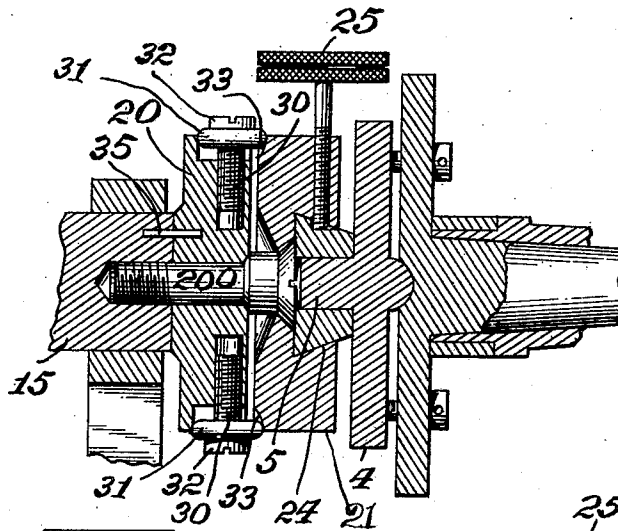


Fig. 5.

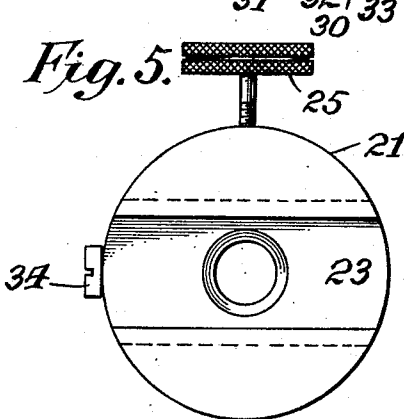


Fig. 6.

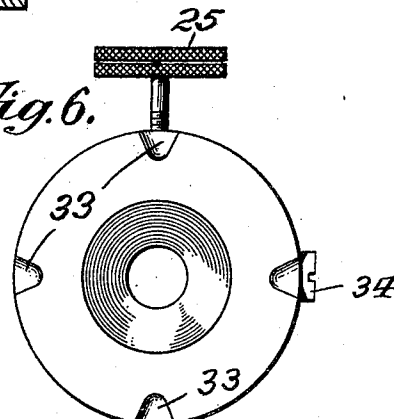


Fig. 7.

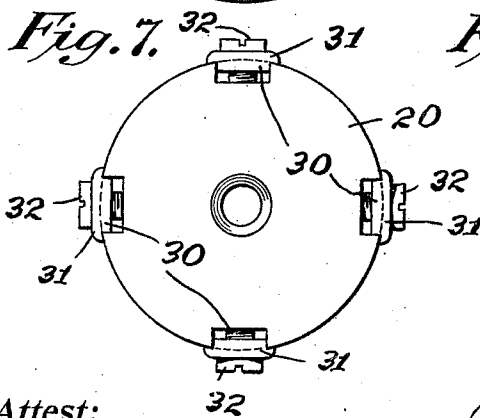
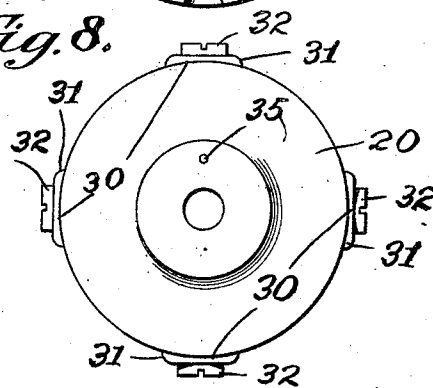


Fig. 8.



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UNITED STATES PATENT OFFICE.

PHILIP FERBER, OF HOBOKEN, NEW JERSEY, ASSIGNOR TO KEUFFEL & ESSER COMPANY, OF HOBOKEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TRANSIT.

933,897.

Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed July 10, 1908. Serial No. 442,817.

To all whom it may concern:

Be it known that I, PHILIP FERBER, a citizen of the United States, and resident of Hoboken, Hudson county, New Jersey, have invented certain new and useful Improvements in Transits, of which the following is a specification.

My invention relates to transits and similar instruments and its novelty consists in the construction and adaptation of the parts, as will be more fully hereinafter pointed out.

In the drawings, Figure 1 is a side elevation of a transit embodying my invention showing the auxiliary telescope arranged above the main telescope. Fig. 2 is a top plan view of the same showing the auxiliary telescope arranged at the side of the main telescope; Fig. 3 is an enlarged sectional detail of the spirit level of the auxiliary telescope; Fig. 4 is an enlarged cross sectional detail on the plane of the line 4—4 in Fig. 2; Figs. 5, 6, 7 and 8 are details of the side holding device of the auxiliary telescope.

In the drawings, 1 is a transit or similar instrument of usual construction except for the detailed novel features hereinafter referred to and it is provided with the usual base, vertical limb, verniers, level, means for adjustment in different directions and the ordinary optical elements.

2 is an auxiliary telescope adapted to be detachably mounted either above or at the side of the main instrument. It comprises an auxiliary frame or support 3 on which the telescope is adapted to turn and terminates at its bottom in a base plate 4 to which is secured a dovetailed shoe 5. This is adapted to move in a support 6 secured above the tube of the main telescope of the transit and which support is provided with a longitudinal slot 7 with overhanging sides adapted closely to embrace the shoe 5. The support is provided with a stop pin 8 to limit the position of the shoe 5 and with a clamping screw 9. The auxiliary telescope when in the position shown in Fig. 1 is provided with a spirit level arranged above it and of peculiar form, comprising a tubular body 10 inclosing a bubble tube, 11 properly graduated. The opening in the tubular body 10 through which to observe the bubble tube, instead of being exactly in the top of the body so that it would be intersected centrally and longi-

tudinally by a vertical diametric plane, is so located that it will be intersected centrally by a diametric plane lying at substantially an angle of forty-five degrees from the vertical, so that if the level is on the top of the auxiliary telescope in the position shown in Fig. 1, the graduations on the tube will be visible and will serve for the adjustment of the instrument in that position while if the level is on the side of the auxiliary telescope as shown in Fig. 2 the graduations on the tube will be equally visible and serve for the adjustment of the instrument while in that position.

Mounted on one end of the axis 15 of the telescope of the transit is a vertical plate 20 adapted to turn with such axis. Secured to it by a centrally arranged screw 200, or in any other suitable manner, is a supporting disk 21 provided with a diametrical slot 23 (adapted to receive the shoe 5 of the base plate 4 of the auxiliary telescope) and having overhanging walls 24 adapted to engage the sides of the shoe and provided with a set screw 25. The plate 20 is provided with a series of radially arranged positioning screws 30, each having an annular flange 31 and a slitted head 32 and arranged at angles of ninety degrees to each other, so that the diametrically arranged pairs are at right angles to each other.

The inner side of the supporting disk 21 is provided with peripheral depressions or notches 33 adapted to engage the annular flanges 31 of the plate 20, and a stop pin or screw 34 serves to limit the movement of the shoe 5 in such base. A small pin 35 projecting inwardly from the surface of the plate 20 serves to fix its position readily with respect to the axis of the transit telescope because such pin fits into a hole in that axis (see Fig. 4).

By the construction described, the instrument may be used for ordinary plane surveying, for solar observation and for mine surveying. The transit is an ordinary surveyor's transit, with vertical limb. Of course the invention is not confined to use with such a transit but it may be very conveniently used therewith. It is of course especially adaptable for plane surveying. When the auxiliary telescope is mounted above the main telescope it is especially use-

ful for a solar observation to determine latitude or time. When the auxiliary telescope is mounted on the end of the axis of the main telescope it is especially useful for mine surveying, for instance, in sighting down a shaft. When the instrument is to be used for the latter purpose the auxiliary telescope is first mounted above the main telescope, the shoe 5 being placed within the slot 7 of the support 6, until it contacts with the stop pin 8 when it is fastened into position by the thumb screw 9. The main telescope is then leveled and the auxiliary telescope is leveled also showing that the instruments are then parallel. The position of the spirit level 10 above the auxiliary telescope is especially convenient for such observation. The auxiliary telescope is then clamped to its frame and the shoe 5 is disengaged from the support 6. The auxiliary telescope is then mounted on the side of the main telescope, the shoe 5 being caused to engage in the slot 23 of the disk 21. It is topped by the pin 34 and secured in position by the set screw 25. It is obvious that the auxiliary telescope must still be parallel with the main telescope provided the notches 33 and the screws 31 register so that it is in a horizontal position, and it is equally obvious that if the screws and notches register so that the telescope is in a vertical position then the instrument will be at a right angle. In other words, means is thus afforded of making a quick adjustment of the auxiliary telescope on the axis of the main telescope so that they will be either parallel or at right angles. After the set screw 25 is clamped of course the two telescopes will move in unison.

It will be observed that the spirit level of the auxiliary telescope is external to the telescope tube when the latter is attached to the axis of the main telescope and that the peculiar oblique position of its glass tubular partition enables it to be used while in such position just as well as when the auxiliary telescope was mounted above but in the same vertical plane as the main telescope.

What I claim as new is:—

1. In an instrument of the kind described, a main telescope, an auxiliary telescope, a slotted support on the body of the main telescope, a second slotted support on its axis and a shoe on the base of the auxiliary telescope adapted to engage either slotted support.

2. In an instrument of the kind described, a main telescope, an auxiliary telescope, a base plate by which the latter may be detachably mounted upon the main telescope, and a spirit level longitudinally arranged alongside of the auxiliary telescope on its side opposite the base plate.

3. In an instrument of the kind described, a main telescope, an auxiliary telescope, a base plate by which the latter may be de-

tachably mounted upon the main telescope, and a spirit level longitudinally arranged alongside of the auxiliary telescope on its side opposite the base plate and which level is provided with means whereby it may be used in two planes at angles of 90° from each other.

4. In an instrument of the kind described, a main telescope, an auxiliary telescope, a base plate by which the latter may be detachably mounted upon the main telescope, and a spirit level longitudinally arranged alongside of the auxiliary telescope on its side opposite the base plate and which level is provided with means whereby it may be used in two planes at angles of 90° from each other.

5. In an instrument of the kind described, a main telescope, an auxiliary telescope, a support on the body of the main telescope provided with a longitudinal slot and a base plate on the auxiliary telescope provided with a shoe adapted to engage in said slot.

6. In an instrument of the kind described, a main telescope, an auxiliary telescope, a support on the body of the main telescope provided with a longitudinal slot and a base plate on the auxiliary telescope provided with a shoe adapted to engage in said slot and means for securing the parts together after such engagement.

7. In an instrument of the kind described, a main telescope, an auxiliary telescope, a support on the axis of the telescope provided with a longitudinal slot and a base plate on the auxiliary telescope provided with a shoe adapted to engage in said slot.

8. In an instrument of the kind described, a main telescope, an auxiliary telescope, a support on the axis of the telescope provided with a longitudinal slot and a base plate on the auxiliary telescope provided with a shoe adapted to engage in said slot and means for securing the parts together after such engagement.

9. In an instrument of the kind described, a main telescope, an auxiliary telescope, a support on the body of the main telescope provided with a longitudinal slot and a base plate on the auxiliary telescope provided with a shoe adapted to engage in said slot, a support on the axis of the main telescope provided with a similar slot adapted to be engaged by the same shoe of the auxiliary telescope base plate.

10. In an instrument of the kind described, a main telescope, a plate mounted on its axis and provided with positioning devices arranged along its vertical and horizontal diameters.

11. In an instrument of the kind described, a main telescope, a plate mounted on its axis and provided with positioning devices arranged along its vertical and horizontal diameters, in combination with a detachable

disk provided with positioning devices adapted to engage the similar devices of the axis plate.

12. In an instrument of the kind described,
5 a main telescope, a plate mounted on its axis and provided with positioning devices arranged along its vertical and horizontal diameters, on its one side and on its other side

with means for receiving and engaging the base of an auxiliary telescope.

Witness my hand this 8th day of July 10
1908, at Hoboken, N. J.

PHILIP FERBER.

Witnesses:

S. J. Cox,

ALAN C. McDONNELL.