No. 790,163. PATENTED MAY 16, 1905.

# W. D. VERSCHOYLE.

## POCKET TRANSIT.

APPLICATION FILED DEC. 2, 1904.

2 SHEETS—SHEET 1.

Fig. 2.

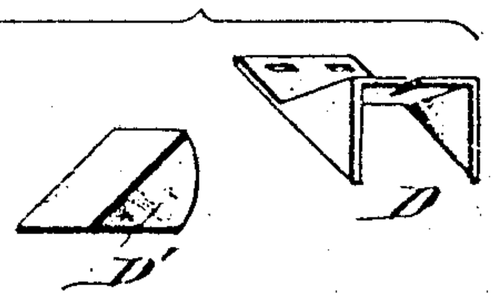



Fig. 1.

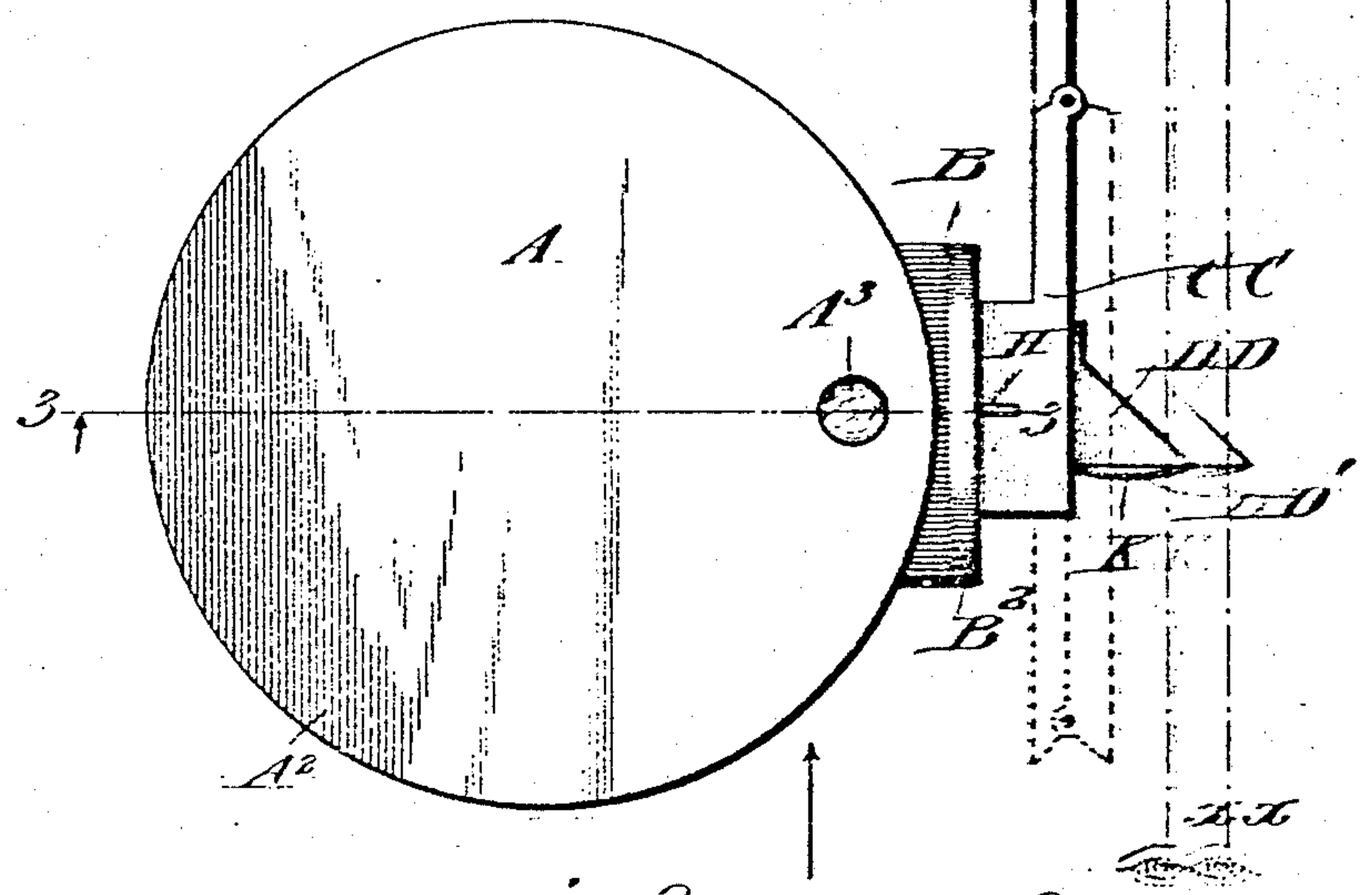



Fig. 4.

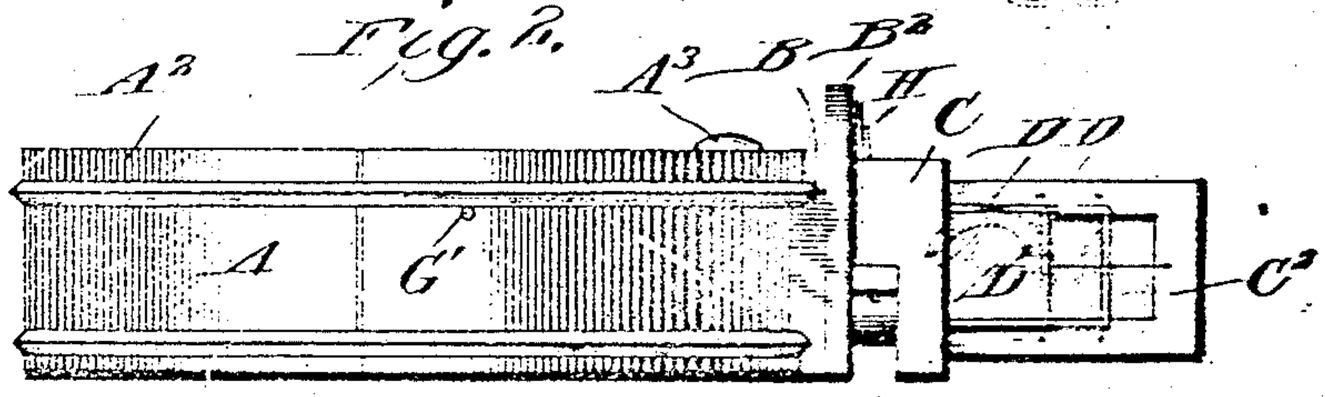



Fig. 3.

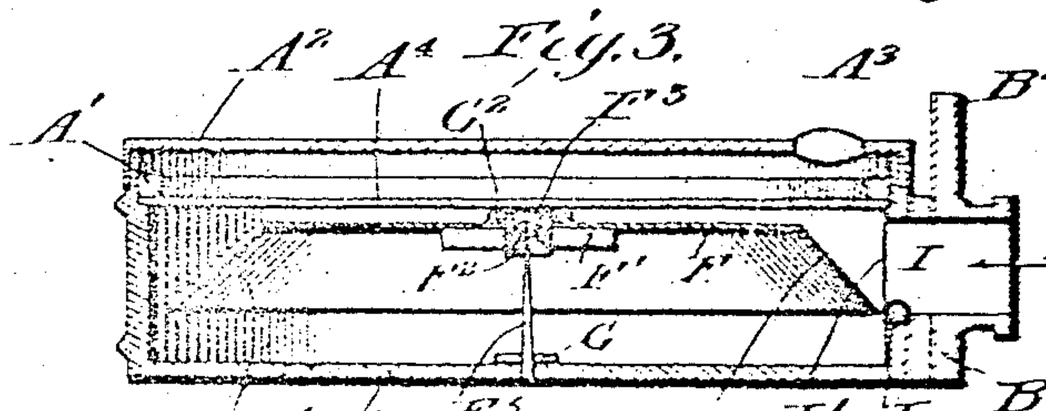
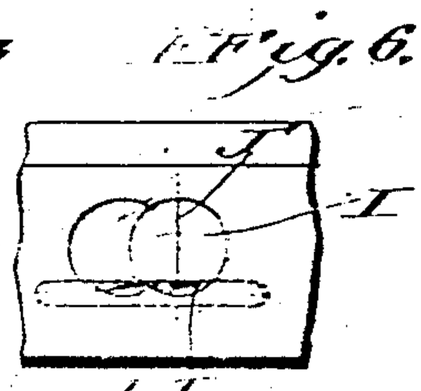



Fig. 6.




WITNESSES: F'1 A.

Fred'k Bradbrook

Edw. W. Byrn

INVENTOR

William D. Verschoyle.

BY Munn & Co.

ATTORNEYS

No. 790,163. PATENTED MAY 16, 1905.

# W. D. VERSCHOYLE.

## POCKET TRANSIT.

APPLICATION FILED DEC. 2, 1904.

2 SHEETS—SHEET 2.

Fig. 1.

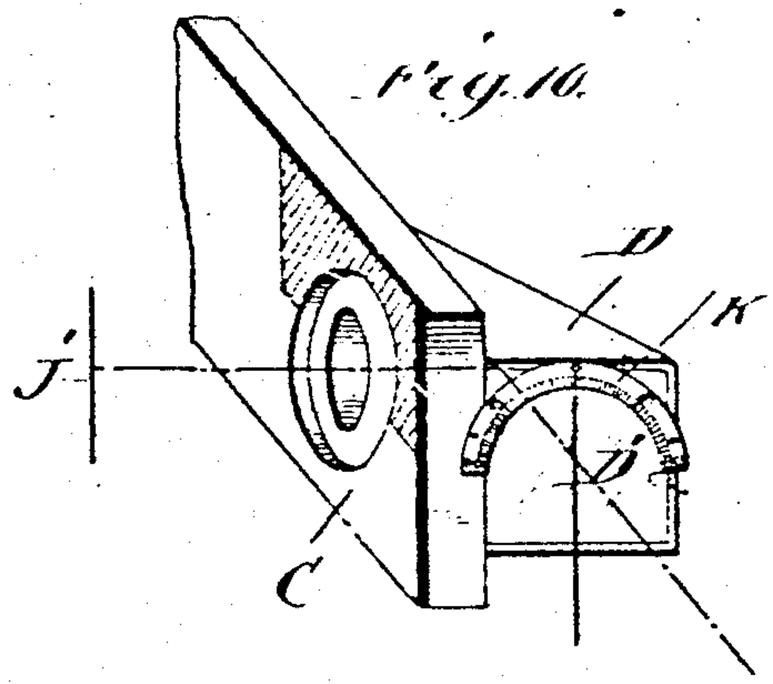



Fig. 1a.

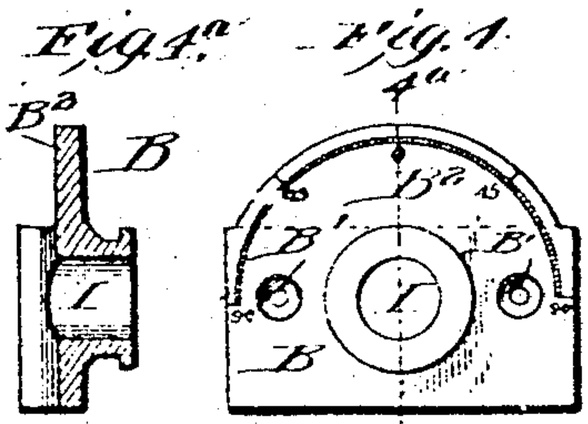



Fig. 1.




Fig. 1c.


Fig. 1b.

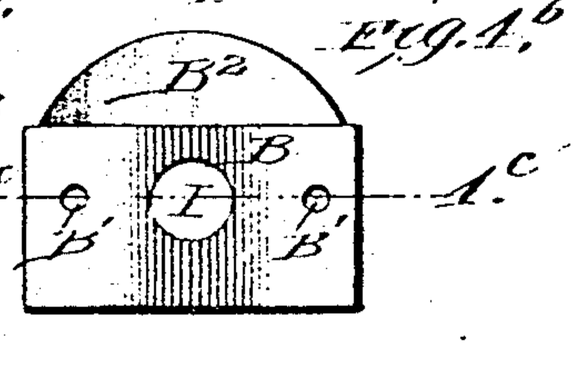



Fig. 3.

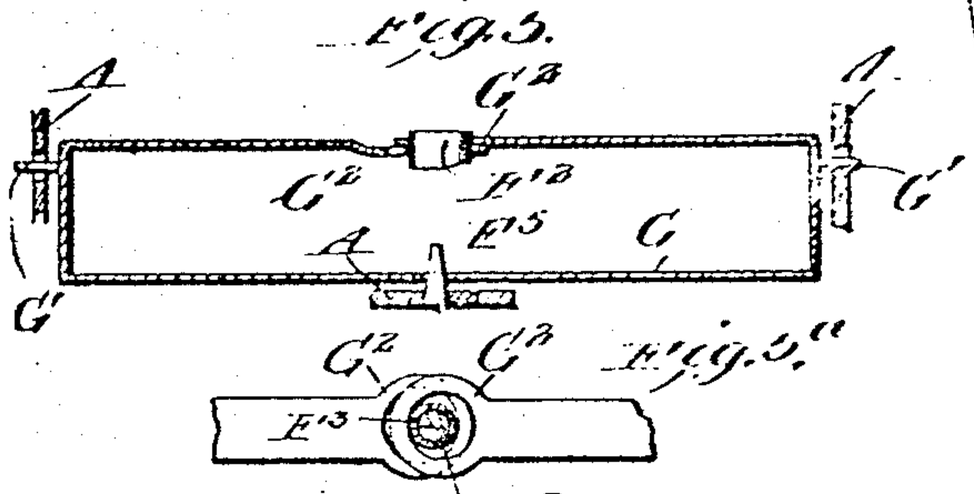



Fig. 7a.

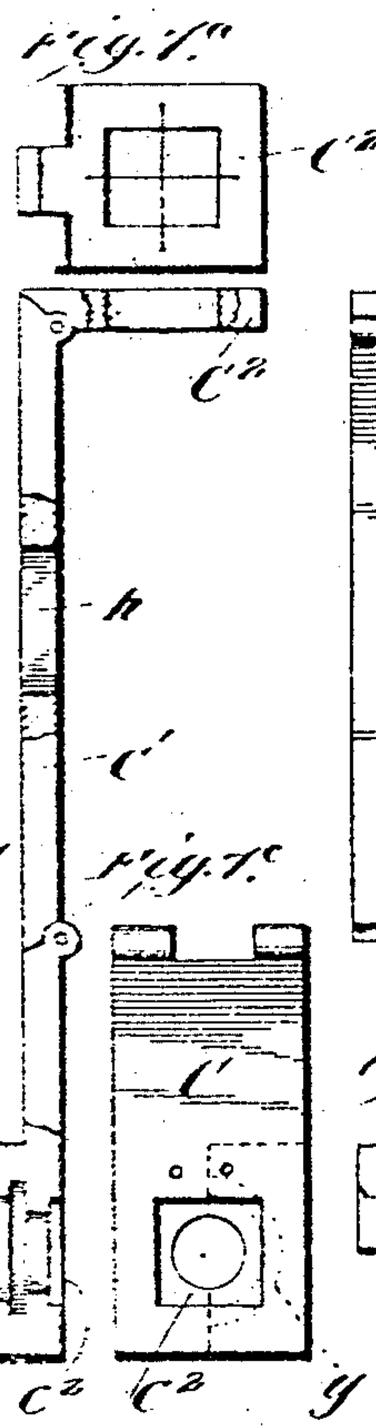



Fig. 7b.

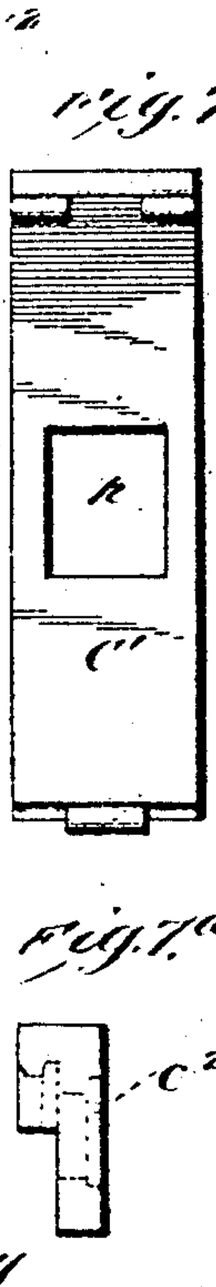



Fig. 7c.

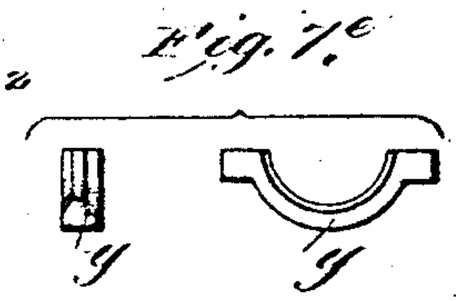
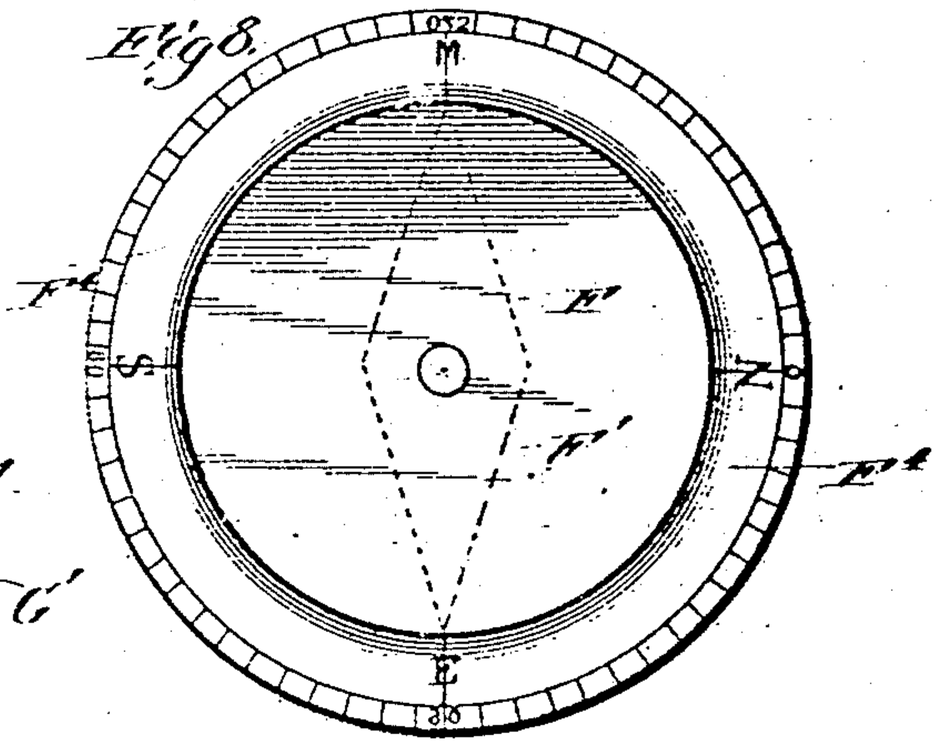



Fig. 8.




WITNESSES:

Fred. D. Bradford

Edw. W. Byrn.

INVENTOR

William D Verschoyle.

BY Munn & Co.

ATTORNEYS

No. 790,163. Patented May 16, 1905.



# UNITED STATES PATENT OFFICE.

WILLIAM D. VERSCHOYLE, OF SEATTLE, WASHINGTON.

## POCKET-TRANSIT.

SPECIFICATION forming part of Letters Patent No. 790,163, dated May 16, 1905.

Application filed December 2, 1904. Serial No. 235,197.

*To all whom it may concern:*

Be it known that I, WILLIAM DENHAM VERSCHOYLE, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Improvement in Pocket-Transits, of which the following is a specification.

My invention is in the nature of a pocket-transit for the use of prospectors, miners, surveyors, mariners, and others, whereby the horizontal magnetic bearing (or angle which lies horizontally between the magnetic meridian and the line intersecting the eye of the observer and any distant object) may be quickly ascertained and whereby also may be ascertained the vertical angle lying vertically between the line joining the horizon to the observer's eye and the line intersecting the observer's eye from a point above or below the horizon, both of said horizontal and vertical angles being observed and read at once in one operation and with great accuracy.

My invention consists in the novel construction and arrangement of the parts of the instrument, which I will now proceed to describe with reference to the drawings, in which—

Figure 1 is a plan view of the entire instrument. Fig. 2 is an edge view of the same looking in the direction of the arrow in Fig. 1. Fig. 3 is a vertical central section on line 3 3 of Fig. 1. Fig. 4 is an outside face view of the swivel-plate. Fig. $4^a$ is a vertical section of the same on line $4^a$ $4^a$. Fig. $4^b$ is a rear or inside view of the swivel-plate, and Fig. $4^c$ is a horizontal section of the same on line $4^c$ $4^c$. Fig. 5 is a sectional view through the case, showing a friction-brake for holding the magnetic needle fixed; and Fig. $5^a$ is a partial top view of the same. Fig. 6 is a view looking through the hollow swivel-plate. Fig. 7 is a top view of the sight-arm. Fig. $7^a$ is a face view of the folding end wing with cross-lines. Fig. $7^b$ is a face view of the middle part of the arm. Fig. $7^c$ is a side view, and Fig. $7^d$ an end view, of the swivel end of the sight-arm; and Fig. $7^e$ shows details of an inclosing yoke for holding the sight-arm on the swivel-plate. Fig. 8 is a top view of a graduated plate bearing the magnetic needle. Fig. 9 shows details of a reflecting-prism and its holder, and Fig. 10 is a perspective view of the face of the prism.

In the drawings, A is the compass-box, which has a detachable cover provided near one edge with a glass lens $A^3$ for focusing the light on a certain point below. Below the detachable cover is a glass face $A^4$, retained by a marginal metal ring A′. This glass face and retaining-ring may, however, be dispensed with.

B, Figs. 4 to $4^c$, is a swivel-plate secured to the edge of the box, as in Fig. 1, and forming a pivot or swiveling center upon which the sight-arm C C′ turns in a vertical plane. This swivel-plate is curved on one side to fit the circle of the box and its outer face lies in a tangential plane. A central hole I, having a flanged and undercut collar, is formed in the swivel-plate, and this hole forms a window through which the readings on a scale within the box may be observed. The swivel-plate is secured to the box by screws through screw-holes B′, and on the upper side of the swivel-plate is constructed a semicircular scale-plate $B^2$, graduated in angular degrees in a vertical plane from zero at the top to ninety degrees at each end, as seen in Fig. 4.

C C′ $C^2$ designate a hinged and folding sight-arm. The inner portion C swivels on the swivel-plate B. The middle portion C′ is jointed to C and has a hole *h* near its middle, and the outer section or wing $C^2$ has a folding knuckle-joint, so that it stands at right angles to the arm C C′, as in Fig. 7, or may be folded inwardly. This wing is a hollow frame with cross wires or hairs, as seen in Fig. $7^a$. The inner section C of the arm has a central hole through it, with a square recess $c^2$ on the outer face. The central hole coincides with the opening I in the swivel-plate, and the square recess $c^2$ receives a glass prism D′, which is retained by a metal hood D, as seen in Figs. 1, 2, and 9. This prism forms a reflector designed to turn a beam of light ninety degrees. The hub portion of arm C is undercut internally to fit and be retained upon the undercut flange of the swivel-plate B, forming a journal, and the hub is held on the swivel-plate journal by means of a detachable yoke *y*, Figs. 2 and $7^e$.

F (see Figs. 3 and 8) is a metal disk having a beveled and dependent edge $F^4$, on which beveled edge is a graduated and figured scale representing all the points of the compass, the figures and letters being inverted (to make the reflection of them upright) and all points, with their usually-accepted representative numerals, being moved around in relation to the magnetic needle ninety degrees in a direction similar to the travel of the hands of a clock. The disk F is attached to and moved by a subjacent magnet F′ by means of a hub $F^2$, having a pivot-jewel $F^3$, mounted upon the pivot-pin $F^5$, so that the disk and magnet are free to rotate together, as seen in Fig. 3. To hold the disk and magnet stationary, a friction-brake is provided, as seen in Figs. 3, 5, and $5^a$. A rectangular spring-frame G has at the top two inwardly-projecting arms arranged diametrically and terminating in loops $G^2$ $G^2$, which embrace the hub $F^2$ of the graduated disk. The expansive tendency of the spring-frame causes the loops $G^2$ to bind and hold the hub $F^2$; but when the disk and magnet are to be released, so as to allow the magnet to adjust itself in exercising its normal functions, the spring-frame G is compressed, so as to slide the upper arms inwardly toward each other. To do this, pins G′ G′ (see Fig. 5) are formed on the ends of the spring-frame and are allowed to project through holes in the box or casing, so that the pins may be pressed inwardly by the thumb and forefinger.

J is a small spirit-level arranged parallel to the right arm in the side of the box A, as seen in Figs. 3 and 6. This spirit-level is retained in place by the swivel-plate B, and the bubble is visible through the orifice I. A hair or wire J′, Fig. 6, or a mark on the glass shows when said bubble is under the central point of the opening I and the compass is level.

H, Figs. 1 and 2, is a pointer attached by screws to the top of the movable sight-arm C and is adapted to traverse the stationary scale $B^2$ on the swivel-plate. This pointer may have a vernier, if desired.

The operation of my transit is as follows: The box A is held horizontal and level, and the eye is sighted along the line *x* in Fig. 1 to bring the edge of prism D′, Fig. 2, and the cross-lines in wing $C^2$ into alinement with the remote object. Light concentrated by lens $A^3$ illumines the edge of the scale $F^4$ immediately opposite the opening I, and the reflection of this reading is by the prism thrown backward at ninety degrees and is visible to the eye at *x*, giving the magnetic bearing in a horizontal plane—that is to say, the magnetic bearing of the line from *x* to the distant object will be represented by the figures appearing in the face of the prism, since this line is parallel to that diameter of the circle which marks the angle in relation to the magnet. At the same time the bubble in the spirit-level J will be also visible in the face of the prism, and when it is under the central mark provided zero on the scale $B^2$ will be at right angles to a horizontal line and the compass will be level, and when the axis of the sight-arm C is raised or depressed the angle through which it is rotated is shown in two ways—first, on scale $B^2$ by the pointer H, and, secondly, by reflection through the prism. This vertical angle when read by reflection through the prism utilizes the hair-line J′ of Fig. 6 in connection with a scale shown in Fig. 10, in which K is a graduated semicircular metal scale of angular degrees figured from zero at the top to ninety degrees at each end and which is attached over the face of the prism. When the sight-arm C is turned through the vertical plane, the reflection of wire J′ is turned through a corresponding angle, which is observed on the scale K. This makes it possible to observe and read off the horizontal and vertical angles of a point at the same time through the prism; but where great accuracy is required the reading of the scale $B^2$ and pointer H with vernier may be made available.

When the instrument is to be folded for the pocket, the wing $C^2$ and part C′ are folded as in dotted lines in Fig. 1, the opening *h* in the part C′ falling over and surrounding the prism and serving in a measure to protect the same.

The face of the prism is preferably made convex, as in Figs. 1 and 9, to magnify the readings.

In my invention it will be seen that as soon as the bubble of the spirit-level comes to rest at the center mark and the needle is at rest in the magnetic meridian and the front cross-wires intersect the object to be observed the work of obtaining both the horizontal and the vertical angles has been completed. This generally requires two instruments—say, a prismatic compass and an Abney level—or if one instrument, such as the Brunton pocket-transit, is used it must be set up twice in two different positions, thus taking twice the time and lessening the accuracy, owing to the improbability of the coincidence of the two lines observed.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A transit instrument, comprising a compass having its magnetic needle attached to and movable with a circular scale, combined with a case and a reflector at the side of the compass to expose the reading of the compass in the direction of the line of sighting substantially as described.

2. A transit instrument, comprising a compass having its magnetic needle attached to and movable with a circular scale, combined with a case having a window at its side, a reflecting-prism located at this window and a sighting-arm substantially as described.

3. A transit instrument, comprising a compass with a tangentially-arranged sighting-arm attached directly to the side of the compass and a reflector at the point of junction of the sighting-arm and compass substantially as described.

4. A transit instrument, comprising a case, a magnetic needle, an attached disk with beveled edge bearing the compass-scale, a tangentially-arranged sighting-arm and a reflector located at the junction of said arm with the case substantially as described.

5. A transit instrument, comprising a case with a hole in its side, a magnetic needle, an attached compass-scale, a light-concentrating lens located above the opening in the case, a tangentially-arranged sighting-arm, and a reflector located at the junction of the said arm with the case substantially as described.

6. A transit instrument, comprising a case with a hole in its side, and a vertical hair-line across the hole, a magnetic needle, an attached compass-scale, a tangentially-arranged sighting-arm, a reflector arranged at the junction of said arm with the case, and a spirit-level located between the compass-scale and the reflector substantially as described.

7. A transit instrument, comprising a compass, a tangentially-arranged sighting-arm having an opening through it at its point of junction with the compass, and a reflector adjusted in front of said opening to reflect at an angle of ninety degrees substantially as and for the purpose described.

8. A transit instrument, comprising a compass, a tangential sighting-arm arranged to swing in a vertical plane, a reflector adjusted at the point of junction between the compass and sighting-arm, and means for noting at one observation both the horizontal angle of the compass-readings and the vertical angle of the elevation or depression substantially as described.

9. A transit instrument, comprising a compass, a tangential sighting-arm arranged to swing in a vertical plane, a reflector located at the junction of the arm and compass, a spirit-level with vertical hair-line located between the compass and the reflector and a circular scale arranged on the observer's side of the reflector substantially as and for the purpose described.

10. A transit instrument, comprising a case, a magnetic needle with attached compass-scale having a projecting hub and a friction-brake bearing on said hub substantially as described.

11. A transit instrument, comprising a case, a magnetic needle with attached compass-scale having a projecting hub, and two perforated spring-arms embracing the hub and having external connections for manual compression to release the frictional contact with the hub substantially as described.

WILLIAM D. VERSCHOYLE.

Witnesses:
BURTON E. BENNETT,
RAY MCKAY.