G. D. VARNEY.

PROTRACTING CIRCUMFERENTER AND THEODOLITE.

No. 3,147. Patented June 24, 1843.

Fig. 1

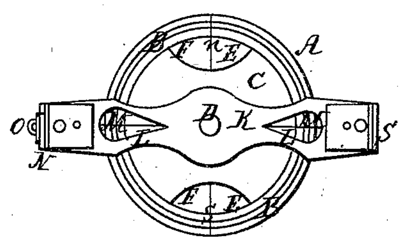


Fig. 2.

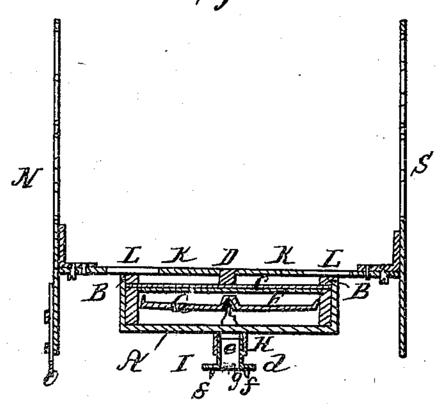


Fig. 3.

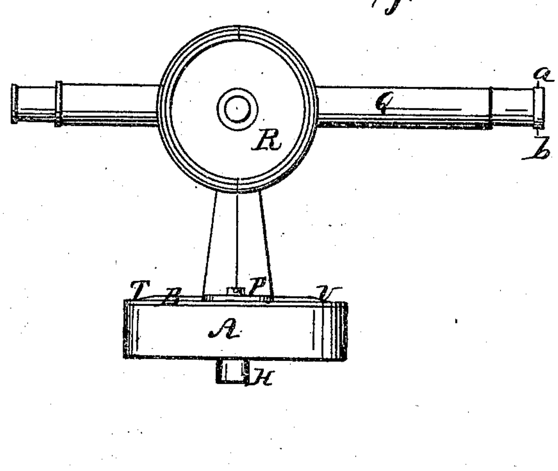
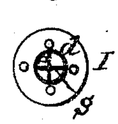


Fig. 4



UNITED STATES PATENT OFFICE.

GEORGE D. VARNEY, OF NEWBURY, MASSACHUSETTS.

SURVEYING INSTRUMENT.

Specification of Letters Patent No. 3,147, dated June 24, 1843.

To all whom it may concern:

Be it known that I, GEORGE D. VARNEY, of Newbury, in the county of Essex and State of Massachusetts, have invented a certain new and useful Surveying Instrument, Which I term a "Protracting Circumferentor or Theodolite," and that the following description and specification of the same, taken in connection with the accompanying drawings, fully and exactly set forth the nature and principles of my improvement, by which it may be distinguished from others of like character.

Figure 1, of the drawings above mentioned represents a top view of a compass box, having the sights of a circumferentor applied to it. Fig. 2, is a vertical and longitudinal section of the same. Fig. 3, is a side elevation of the magnetic needle box, exhibiting the telescope and vertical limb of a theodolite as applied thereon, and Fig. 4, is a top view of the bearing or cross wise center piece which supports the instrument upon the sheet of paper, when it is used for protracting angles.

A Figs. 1, 2, 3, denotes the compass box which is circular and has a divided limb B arranged or formed upon the periphery of its upper surface. It also has a metallic plate C extending across the space within the divided ring B, the said plate C having its upper surface somewhat below that of the divided ring, and also a cylindrical stud D projecting perpendicularly therefrom at its center. Two orifices E, E, of suitable size are cut through the plate C at the zero points of the divided limb as seen in Fig. 1, and a glass plate F is placed directly beneath the plate C and its orifices, through which glass plate and orifices, the north and south extremities of the magnetic needle G Fig. 2, are observed, when the instrument is in use. The upper or lower surface of the glass plate has a diametric line *n s* drawn across it and corresponding with the opposite zero divisions of the circular limb. The magnetic needle traverses upon a suitable pivot arranged within the box A and at the center thereof, and said box has a circular tube H extending from the central part of its lower side by which it is connected to a tripod stand, on which the instrument is to be supported when used in surveying or to the bearing or cross wire center piece I Figs. 2, 4, when the same is employed to protract the angles of a survey. A horizontal bar K traverses upon the upper surface of the divided limb the center of the said bar having a circular hole cut through it, through which the stud D is inserted, and by which the bar is sustained in its correct position. The bar has elongated orifices L, L, formed through it over the divided limb, across the lower sides of which (orifices), wires M, M, are extended on opposite sides of the center of the divided limb, the said wires being in the same straight line, as seen in Fig. 1. Vertical sights N, S, are affixed to the extremities of the bar K, and extend below the same, until they meet the horizontal plane of the lower end of the tube H, one or both of said vertical sights having a small plotting pin O applied to the central part of each of their lower ends, and the said pin being arranged so as to slide freely upward and downward in suitable bearings.

Instead of the horizontal bar and its vertical sights as above described a horizontal index plate P Fig. 3, supporting a telescope Q and vertical divided arch R may be used, the said index plate resting and being sustained upon the top of the plate C, and traversing around upon the circular stud which projects from the center of the plate C. Two index points T, U, or vernier plates are arranged on opposite sides of the plate P as seen in Fig. 3, and one end of the telescope Q should have a metallic point *a*, inserted in and projecting from the central part of the upper side thereof and also another and similar point *b*, extending in a similar manner from its lower side. The telescope should be so arranged in its supports, that the end thereof in which the points *a*, *b*, are affixed, may be revolved in a vertical plane and through an arc of one hundred and eighty degrees or thereabouts, or so as to bring either point *a* or *b* at pleasure in contact with the paper on which angles are to be plotted.

In taking courses with the instrument, the line upon the glass plate, should be brought directly over the magnetic needle or so as to be in the meridian. Then by directing the sights or the telescope upon the line whose bearing is to be ascertained, the angular distance of the same from the meridian will be denoted by the arc of the horizontal graduated limb subtended between one of the indices of the bar K or plate P, and one of the zeros of the divisions. Horizontal angles may also be taken by means of the graduated limb and independent of the needle.

The method of using the instrument as a protractor for plotting the surveyed angles upon the paper on which the plan is to be drawn is as follows: A small circular plate *d*, Figs. 2, 4, has a tube *e* projecting centrally from its upper surface, and several small metallic points *f*, *f*, extending downward from its lower side. It also has a circular aperture formed through its center which in its diameter is equal to that of the interior of the tube, *e*, cross wires *g*, *g*, being arranged within the said aperture, so that thier intersection shall correspond to the center thereof. This last apparatus, which I denominate the bearing or cross wire center piece, is used to support the compass box upon the paper during the operation of protracting the angles. The point of commencement of the plot being determined a meridian line should be drawn through it, and the bearing piece arranged so that the intersection of its wires shall be over the said point. It is then to be pressed down upon the paper, so as to cause the points *f*, *f*, to enter therein. The compass box is next placed upon, and the straight line of the glass plate adjusted in the meridian. Either the sight bar or plate P and telescope is next to be applied to the compass box, with one of the indices thereof adjusted to the division of the graduated limb which denotes the angle or course to be plotted. Then by pressing down upon the paper, either the pin O of the sights, or the end of the telescope in which the point *b* is situated, the required angle will be determined, by the indentation made in the surface of the paper by the pin O or point *b* of the telescope. Thus it will be seen that the instrument serves the double purpose of performing all the ordinary operations of measuring angles in surveying land and of plotting the same upon the paper upon which the plan of the survey is to be drawn.

Having thus explained my invention I shall claim—

1. The particular method of arranging the several parts of the instrument by which magnetic bearings and angular distances of objects apart from each other, may be taken upon one graduated horizontal limb—that is to say, I claim the arrangement of one divided circular ring in direct conjunction with the magnetic needle or compass box placed below the same, and the index bar of the sights or telescope arranged above it, or with respect to it in the manner as described.

2. I also claim the combination of plotting points with the sights or telescope of the index bar or plate; and also the combination, with the compass box, of the cross wire bearing plate for sustaining the instrument on the paper, the whole being arranged and operating substantially as above set forth.

In testimony that the foregoing is a true description of my said invention and improvements I have hereto set my signature this nineteenth day of April in the year eighteen hundred and forty three.

GEO. D. VARNEY.

Witnesses:
R. H. Eddy,
Caleb Eddy.