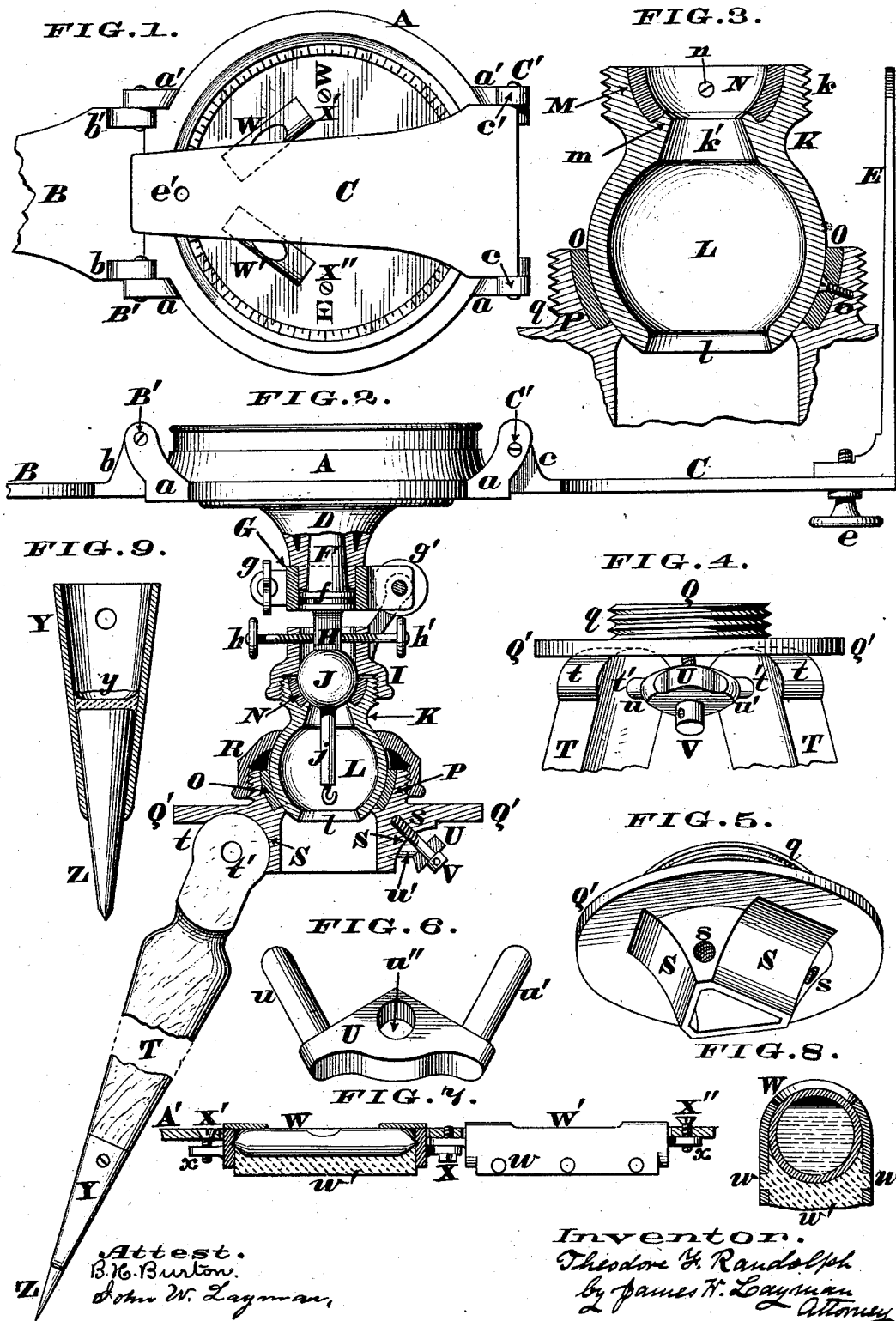


(Model.)

T. F. RANDOLPH.
SURVEYOR'S COMPASS.

No. 282,117.

Patented July 31, 1883.



UNITED STATES PATENT OFFICE.

THEODORE F. RANDOLPH, OF CINCINNATI, OHIO.

SURVEYOR'S COMPASS.

SPECIFICATION forming part of Letters Patent No. 282,117, dated July 31, 1883.

Application filed December 6, 1880. (Model.)

To all whom it may concern:

Be it known that I, THEODORE F. RANDOLPH, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful Improvements in Surveyors' Compasses, of which the following is a specification.

The object of the first part of my improvement is to construct a surveyor's compass in such a manner as to enable it to be carried in a box or other suitable receptacle of the smallest possible dimensions, and this result is accomplished by hinging or otherwise coupling to the compass-plate a pair of plates to whose outer or free ends the sight-vanes are applied with any convenient attachments, said hinged plates being so arranged as to fold, one over the other, on top of the box when not in use, as hereinafter more fully described, and pointed out in the claims.

The second part of my improvement comprises a novel combination of devices whereby the compass is attached to the tripod, the object of said devices being to facilitate the leveling of the instrument, as hereinafter more fully described, and pointed out in the claims.

The third part of my improvement comprises a novel combination of concaved tripod-plate, pintles, and screws for hinging the legs to the instrument, as hereinafter more fully described, and pointed out in the claims.

The fourth part of my improvement consists in providing a dished or concaved leather annulus as a seat for the spherical members wherewith the compass is jointed to the tripod, said annulus being retained in its proper position by suitable shoulders and screws, as hereinafter more fully described, and pointed out in the claims.

The fifth part of my improvement comprises a novel construction of shoe for the legs of the instrument, as hereinafter more fully described, and pointed out in the claims.

In the annexed drawings, Figure 1 is a plan of my instrument, one of the hinged plates being shown folded over on the needle-box. Fig. 2 is a side elevation of the compass, the hinged plates being shown in their open positions, and the tripod-connections being sectioned. Fig. 3 is an enlarged axial section of a portion of said connections. Fig. 4 is a side elevation of the tripod-plate and its pintle attachments.

Fig. 5 is a perspective view of the under side of said plate, the legs being detached therefrom. Fig. 6 is a perspective view of the pintle-plate proper. Fig. 7 is a vertical section of the dial-plate taken longitudinally of the levels, one of said levels being shown in section and the other one in elevation. Fig. 8 is an enlarged transverse section through one of said levels. Fig. 9 is an axial section of one of the tripod-shoes.

A represents any approved form of compass-box, which box is provided with the customary needle, dial-plate, levels, vernier, "outkeeper," &c. Cast with the lower plate of this box, or rigidly secured thereto, are two pairs of ears, *a a'*, to which are pivoted lugs *b b' c c'* of the folding plates *B C*, to whose outer or free ends the sight-vanes *E* may be attached by means of screws *e*, passing through holes *e'* in said plates, or otherwise. The pivots *B' C'* of these plates must not be in the same horizontal plane, but must be so arranged as to allow one plate to fold over on the other—as, for example, the plate *B* over the one *C*, or vice versa. This lower plate, *A*, has an axial socket, *D*, to receive the customary tapering spindle *F*, whose base has a grooved collar, *f*, traversed by one or more pins or screws projecting inwardly from a customary clamping-ring, *G*, which latter is provided with a tightening-screw, *g*, and is shifted by means of a pair of tangent-screws, of which screws one is shown at *g'*. Furthermore, this spindle has a square, *H*, against which impinge the inner ends of four leveling-screws, of which two opposite ones are shown at *h h'*, said screws being tapped in a tubular nut, *I*, that bears against a portion of the upper surface of a solid sphere, *J*, which sphere or ball is preferably cast with said square, although it may be attached thereto. Projecting rigidly from the under side of ball *J* is a stem, *j*, for attachment of the ordinary plumb-line. The nut *I* engages with the male thread *k* of the neck *K* of a hollow sphere or ball, *L*, within which ball the stem *j* is adapted to swing. This neck is chambered at *M* to receive a concave or dished annulus, *N*, composed of leather or equivalent flexible material capable of being readily pressed into the desired shape and of affording the desired frictional bearing on the

exterior of ball J. A shoulder, *m*, at the bottom of this chamber prevents the annulus being forced down into the flaring bore *k'* of the neck, while a screw or other stop, *n*, secures said annulus against rotation. *l* is a circular opening at the bottom of the hollow sphere, which sphere is seated in another dished packing-ring, O, housed within a chamber, P, of the neck Q of a tripod-plate, Q', said neck being threaded externally at *q* to receive a nut R, that grasps the upper surface of the hollow sphere L. *o* is the device that prevents rotation of the lower ring, O. The tripod plate Q' has three concave bearings, S, so disposed as to agree with the customary arrangement of compass-legs, said concavities being about semi-cylindrical, for the purpose of admitting the correspondingly-rounded heads *t* of the tripod-legs T. Of these concave bearings S two are clearly shown in Fig. 5. These heads have axial sockets *t'* to receive the pintles *u u'*, projecting divergently from a plate, U, said plate being pierced at *u''* to receive a screw, V, which latter is tapped into the tripod-plate at *s*. Three plates, similar to the one U, are employed, in order that their six pintles may suffice as pivots for the three legs, said plates being interposed between the heads *t*, as seen in Fig. 4. The glass levels are secured in metal tubes W W', slotted at top and bottom in order that the glass tubes may be inserted at the bottom of the metal ones W W', which are perforated, corrugated, or flanged at *w*, to receive any suitable plastic filling, *w'*, such, for example, as plaster-of-paris. This filling, however, must not be a dark material, but must be of such color as to reflect light upwardly through the glass tube of the level. Projecting from the heads of these tubes are lugs *x*, adapted to receive three screws, X X' X'', of which the central one, X, is tapped into the under side of the dial-plate A', while the two outer screws, X' X'', project through the top of said plate, so as to be readily accessible for adjustment as soon as the cap is removed from the needle-box A. Plate A' is suitably slotted to permit any desired vertical adjustment of said levels.

The shoe of the instrument consists of a tapering sheet-metal ferrule, Y, securely soldered together, and having brazed in it at *y* a conical point, Z, composed of steel or other very hard metal. The point Z is simply dropped into the upper or larger end of ferrule Y, and after it has descended therein as far as it will go the solder or brazing *y* is readily applied through said open end, thereby securing said point immovably in position.

When my instrument is fitted up, the nut R is screwed down with sufficient firmness to cause the hollow sphere L to bear tightly against the elastic dished packing O, so as to prevent any accidental vibration of said sphere, while at the same time it is allowed to yield to a proper exertion of force. The instrument is approximately leveled by turning this ball

L in its bearings, after which act the screws *h h'* are brought in contact with the square H, whose fulcrum is the solid ball J, and by this means the compass is at once leveled with the utmost accuracy, the axis of the spindle F being exactly in line with the plumb, whose chain or other suspender is free to swing within the circular opening *l* of the hollow sphere.

When the surveyor is done with the instrument, the sight-vanes E are detached from their respective plates B C, and the latter is then turned over on the needle-box A, as seen in Fig. 1. The plate B is then turned over on the one C, and the instrument being now unpacked from the spindle, it is at once deposited in the box or other receptacle. When the plates B and C are thus closed, they should be secured together, so as to prevent their opening when the compass is inverted preparatory to being placed in the box. One obvious way of doing this would be to tap suitable holes in said plates and make use of the sight-vane screw *c* as a means of locking together the hinged members B C. It is evident that by thus hinging the plates B C to the plate A, which has applied to it all the necessary compass attachment, the instrument can be packed in the very smallest possible space, which is a great desideratum with surveyors and engineers, who are frequently compelled to carry their compasses many miles on horseback.

The method of anchoring the glass levels within their tubes is another advantage peculiar to my instrument, as a broken glass can readily be replaced with a new one after the plastic filling *w'* has been knocked out, which proceeding can be accomplished in a few minutes. Furthermore, this plaster-of-paris filling serves to reflect light up through the glass level, and thereby renders the bubble more conspicuous. Another advantage is found in the facility with which the levels can be adjusted after the cap has been removed from the box A, as one or two turns of either of the screws X' or X'' will suffice to raise or lower their housings W W', as occasion may require. If at any time the legs T should work loose within the sockets S, the difficulty can be remedied by simply tightening the screws V, while an opposite defect can be overcome by unslacking said screws. Finally, if one of the points Z should break off, the ferrule Y can be unscrewed from the leg, the remaining stump unsoldered and taken out at the larger end of said ferrule and a new point brazed in its place in a very little time.

I claim as my invention—

1. The plates B C, hinged to the compass-plate A, and adapted to fold over the needle-box and over one another in the manner specified, the free ends of said hinged plates having sight-vanes applied to them for the purpose described.

2. The combination of compass-plate A, ears *a a'*, hinged plates B C, lugs *b b' c c'*, and pivots

B' C', one of said pivots being higher than the other for the purpose specified.

3. The combination, in a surveyor's compass, of spindle F, square H, leveling-screws *h h'*, nut I, ball J, and concave annular bearing N, as and for the purpose specified.

4. The combination of dished elastic ring N, concave chamber M, shoulder *m*, and retaining device *n*, as and for the purpose specified.

5. In combination with a tripod-plate, Q', having concave sockets S, the legs T *t t'*, pin-
15 tle-connection U *u u' u''*, and screw V, which latter engages with said plate Q', as herein described, and for the purpose set forth.

6. In a surveyor's instrument, the perforated plate U *u''*, having diverging pintles *u u'*, as herein described, and for the object stated.

7. The combination, in a surveyor's compass, of a pair of level-tubes, W W', provided with lugs *x*, into which are tapped screws X X' X'', the central screw, X, being situated beneath the dial-plate A', while the end screws, X' X'', pass upwardly through said plate, for
25 the purpose specified.

8. The sheet-metal ferrule Y, having the conical steel point Z, brazed therein at Y, for the purpose stated.

In testimony of which invention I hereunto
30 set my hand.

THEODORE F. RANDOLPH.

Witnesses:

JAMES H. LAYMAN,
W. F. BOYD.