



# UNITED STATES PATENT OFFICE.

JUSTUS A. TRAUT, OF NEW BRITAIN, CONNECTICUT.

## LEVEL.

SPECIFICATION forming part of Letters Patent No. 523,021, dated July 17, 1894.

Application filed February 3, 1894. Serial No. 498,989. (No model.)

*To all whom it may concern:*

Be it known that I, JUSTUS A. TRAUT, a citizen of the United States, residing at New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Plumbs or Levels, of which the following is a specification.

This invention relates to plumbs or levels, and to the method or process of manufacturing and of assembling the same.

The principal objects of my present invention are to furnish the plumb or level-stock with a light and efficient bubble-glass case capable of diametrical expansion at one end thereof, but otherwise very rigid or inflexible; to provide means whereby said case may be quickly secured in position in, and locked against longitudinal movement with relation to the stock, and at the same time be capable of lateral movement to facilitate the accurate adjustment thereof with relation to said stock; and to provide an improved method of making or assembling the structure.

In the drawings accompanying and forming a part of this specification, Figure 1 is an edge view of a portion of a plumb-stock embodying my present invention, the cover or face-plate being removed. Fig. 2 is a central vertical section of the same taken in line *a-a*, Fig. 1. Fig. 3 is a view similar to Fig. 1, of the opposite edge of said plumb-stock, the cover or face-plate being removed. Fig. 4 is a top view of the bubble-glass case. Fig. 5 is an end view of the same, looking toward the left hand in Fig. 4. Fig. 6 is an under side view of said bubble-glass case. Fig. 7 is a plan view of the sheet-metal blank from which the bubble-glass case is formed. Fig. 8 is a front view of one of the locking-plates for securing the bubble-glass case in the plumb-stock, said figure showing the bent form of the locking-plate preparatory to its being secured to the plumb-stock in the manner shown in Fig. 2. Fig. 9 is a side elevation drawn in projection with Fig. 8. Fig. 10 is a front view of the locking-plate for the opposite end of said bubble-glass case. Fig. 11 is a sectional view of a portion of the plumb-stock illustrating the manner of securing one of the locking-plates thereto, a set-

ting-punch being shown in dotted lines. Fig. 12 is a side elevation, partially in section, of a portion of a level embodying my invention.

Similar characters designate like parts in all of the figures.

In Fig. 2 of the drawings, I have shown the bubble-glass, its case, and the securing and locking devices applied to one end of an ordinary stock, said bubble-glass and its case being located in a transverse recess formed in said stock, and constituting a plumb-device, whereas in Fig. 12 said parts are shown located in a longitudinal recess formed in a projection midway of the length of the level-stock B and constituting a level-device.

Inasmuch as my improvements are capable of use either as a level, or plumb, I do not limit all of the herein mode to either one of the forms of the invention shown in Figs. 2 or 12.

Briefly stated, the plumb illustrated in Figs. 1, 2 and 3 of the drawings, comprises a stock, B, a bubble-glass case, C, a bubble-glass, D, secured therein, attaching plates, or devices, E and E', for adjustably attaching the case to the stock, and guard-plates or covers, F and F', the construction and organization of which parts will be hereinafter more fully set forth.

The stock B has a bubble-glass and case-receiving bore or chamber, 2, formed transversely therethrough from the side edge *b* to the opposite side edge *b'* of said stock, and will have the usual sight-opening 3, transversely to, and bisecting the bore 2. This case-receiving bore 2 will preferably be of slightly greater diameter than the diameter of the case C to permit the lateral adjustment of said case as desired. The bore 2 will also have a concentric enlargement at each end thereof, as shown at 5 and 6, to form shoulders, 7 and 8, respectively, against which the locking-devices may bear when securing them in place. Covering the ends 5 and 6 of the bore 2 are the plates or caps, F and F', respectively, which in the preferred form thereof herein shown are disk-shaped plates let in to the faces *b* and *b'* of the stock and with their outer faces flush with the stock; said plates being preferably arranged eccentric to the

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bore 2, as clearly shown in Figs. 1 and 3, and being held in place by screws, 9, at one side thereof.

The bubble-glass case is in the nature of a tube divided longitudinally at one side thereof, as shown at 10, Fig. 6, and has an oblong sight-opening, 11, formed in the opposite side thereof midway of the length of said tube; formed midway of the sight-opening 11, at either side thereof, are inwardly-projecting prongs, or sight-points, 12 and 13, whose apexes are in alignment and coincide with a line drawn transversely through the center of said sight-opening, as designated by dotted line *c-c*, Fig. 4. The adjacent side edges 22 and 23 of the tube or case C are oppositely notched near their ends, as shown in Fig. 6, to form openings, 14 and 15, through which the plaster 16 (usually employed for securing the bubble-glass D in said tube) may be inserted, and a lock-notch, 17, is formed in one end of said tube to receive the key, 18, of the locking-device E', as will be hereinafter more fully described.

The tube, or case C, in the form thereof herein shown and just described, is constructed as follows: The oblong rectangular blank A, shown in Fig. 7, is first stamped from a flat sheet of metal of the requisite thickness, said blank being formed to have oppositely-disposed notches 20 and 21 at the opposite side edges 22 and 23, and near each end thereof, as shown, and the centrally-disposed transverse sight-opening 11 with the oppositely-disposed inwardly-projecting sight-points, or prongs 12 and 13, at the side edges thereof, and also having the lock-notch 17 formed at one end thereof midway of the width of said blank. This blank is subsequently bent widthwise around a former to form a tube having its adjacent side edges 22 and 23 slightly remote, as shown in Fig. 6.

The attaching plates E and E', in the form thereof herein shown, consist, each, of a disk shaped plate centrally perforated or recessed as shown at 30 and 30', respectively, and usually having outwardly-projecting peripheral barbs, or prongs, 25 and 26, preferably in alignment one with the other. The body of this plate, or that portion thereof between the base of the barbs or prongs 25 and 26, will, in practice (except when the prongs may be omitted) be fractionally less in diameter than the diameter of the enlarged recesses 5 and 6 formed in the stock. To enable the securing plates to be inserted in the enlarged ends 5 and 6 of the bore 2, so that the apexes of its barbs or prongs will be contiguous to the side wall of said bore, each plate is bowed or bent outwardly at its center, as illustrated in Figs. 8, 9 and 10, so that the distance between the apexes of the two barbs or prongs 25 and 26 of said bowed plate, will be slightly less than the diameter of the enlarged end of the bore 2. One of these plates, herein designated the locking-plate E', will have a substantially circular central opening 30' of sufficient diam-

eter to permit one end of the tube C to be inserted therein, as clearly shown in Figs. 2 and 3 of the drawings. This plate E' will also have an inwardly projecting prong, 18, contiguous to the edge of said opening 30', which prong is in the nature of a locking-key, and is adapted for entering the lock-notch 17 formed in the end of the tube. The other attaching plate has an oblong central opening 30, through which the screw-threaded shank of a screw, 27, may be extended, which screw will, as shown in Fig. 2, be screwed into a plug, 28, secured in the end of the tube, said oblong slot permitting the lateral adjustment of the tube, which will be clearly understood by reference to said figure. When the prongs or barbs are omitted, the plate itself should be slightly longer in a direction transverse to said bend thereof, than the diameter of said enlargements 5 and 6, so as to insure a sufficient engagement of the plate with the stock, when the bent plate is straightened out during the process of assembling the implement.

In assembling the parts, the locking plate E', in its bowed or normal condition, will be set in the enlarged end 6 of the bore or chamber 2 with its prongs or barbs bearing against the shoulder 8 contiguous to the side wall of said bore in the manner shown in Fig. 11 which illustrates the operation of setting and securing said locking-plate, after which the middle portion of said locking-plate will (by means of a suitable setting-punch, H, shown in dotted lines in said Fig. 11) be pressed inward, thus forcing the prongs or barbs outward with relation to the axis of the bore 2 and embedding them in the side wall of the enlarged end 6 of said bore, as shown in Fig. 2 of the drawings; this operation straightens the body of said plate, and leaves the same in condition to receive the end of the case or tube C. After the locking-plate E' is fixed in the manner just described, the tube or case, with the bubble-glass therein, will be inserted into the tube-receiving-bore 2 from the end 5 thereof with its end projected through the opening 30' in the said locking-plate E' with its lock-notch 17 contiguous to, and in engagement with the locking-key 18, after which the securing plate E will be secured in the opposite enlarged end 5 of the bore 2 in the same manner that the locking-plate E' was secured in its recess, the screw 27 is then inserted through the oblong opening 30 in said plate E with its shank screwed into the plug 28 in the end of the tube, after which the tube will be properly adjusted laterally and the screw tightened to firmly clamp the parts in adjusted position. After the parts are so assembled the covers F and F' will then be placed over the ends of the bore 2 and be secured in place by the screws 9.

The method here described of organizing and securing together the several parts of the level, will be readily understood by a comparison of the several figures of the drawings in connection with the preceding description.

Having thus described my invention, I claim—

1. In a plumb or level, the combination with the stock having transversely through the same a bubble-glass-case bore or chamber having a shoulder and an enlarged recess at one end thereof, of the centrally-perforated case-supporting plate set against the shoulder of said bore and within said recess and in rigid engagement with the stock, the bubble-glass-case located in said bore in adjustable connection at one end thereof with said plate, and means for supporting the opposite end of said case, substantially as described.

2. In a level or plumb, the combination with a stock having the bubble-glass-receiving bore or chamber, of centrally-perforated attaching-plates secured, one, at each end of said chamber transversely thereof, and a bubble-glass-carrying case adjustably secured in said chamber between said plates, substantially as described and for the purpose set forth.

3. In a level or plumb, the combination with a stock having the bubble-glass-receiving bore or chamber, of two remotely-disposed transverse plates located in said chamber and having central openings therein, and a tubular bubble-glass-case having one end thereof extended through and supported in the opening in one of said plates, and having the opposite end thereof in bearing-contact with and adjustably secured to the other of said plates, substantially as described and for the purpose set forth.

4. In a level or plumb, the combination with a stock having the bubble-glass-receiving chamber, of two transversely-disposed centrally-perforated plates secured one at each end of said chamber, a bubble-glass-case supported between said plates and having a sight-opening with inwardly projecting prongs or points, and a bubble-glass located in said case contiguous to said prongs, substantially as described.

5. In a level or plumb, in combination, a stock having a bubble-glass-receiving bore therethrough, two transversely disposed centrally-perforated plates secured in said opening, one at either end thereof, a bubble-glass-case pivotally supported at one end in one of said plates, and having a sight-opening with inwardly projecting prongs or points, a bubble-glass located in said case contiguous to said prongs, and means in connection with one end of the case and one of the plates for adjusting the case laterally with relation to said plate, substantially as described.

6. In a level or plumb, a tubular bubble-glass-supporting case open at one side thereof and having a sight-opening with inwardly-projecting prongs or points located centrally with relation to the length thereof, substantially as described and for the purpose set forth.

7. The combination with a stock having the bubble-glass-receiving chamber, of a tubular

bubble-glass-carrying case located in said chamber and having a lock-notch at one end thereof and a sight-opening intermediate to its ends with inwardly-projecting prongs at the center thereof, a locking-plate secured in said chamber transversely thereof and having a locking-prong in engagement with the lock-notch of the case, and means for adjustably supporting the opposite end of said case, substantially as described and for the purpose set forth.

8. In a plumb or level, the combination with a stock having the bubble-glass-receiving chamber formed therein, of two perforated attaching plates secured one at either end of said chamber transversely thereof, a bubble-glass-case having a plug or wall at one end thereof and adjustably secured at this end to one of the attaching plates by means of a screw extended through said plate into said plug or wall, and pivotally supported at its opposite end by the other plate, and means for closing the ends of said chamber, substantially as described.

9. In a plumb or level, the combination with a stock having the bubble-glass-receiving chamber, or bore, enlarged at its ends to form shoulders, of two centrally-perforated attaching plates bearing against said shoulders, and having prongs, or barbs, projected into the walls of said chamber, and a bubble-glass-case pivotally supported at one end in one of said plates and adjustably-secured at its opposite end to the other of said plates, substantially as described.

10. In a level or plumb, the combination with the stock having a bubble-glass-receiving bore, of two remotely disposed centrally-perforated securing-plates having peripheral prongs projected into the walls of said chamber, a bubble-glass-case having one end thereof projected through and in locked engagement with one of said plates, and adjustably connected at its opposite end by means of a screw to the other of said plates, and a bubble-glass located within said case, substantially as described.

11. In a plumb or level of the class specified, the combination with the stock, of the herein-described bubble-glass-case it consisting of a sheet-metal tube divided longitudinally at one side and having opposite to such division a central sight-opening with oppositely-disposed inwardly-projecting prongs, or sight-points, substantially as described.

12. The herein-described bubble-glass case for plumbs or levels, it comprising a longitudinally-divided sheet-metal tube having plaster-receiving openings contiguous to its side edges at either end thereof and having a centrally disposed sight-opening at the opposite side thereof with two oppositely-disposed inwardly-projecting sight-prongs, or points, located centrally of said sight-opening with their apexes in alignment, substantially as described.

13. The herein-described process of secur-

ing bubble-glass-cases in the stocks of levels or plumbs, which consists in first forming a case-receiving bore through said stock and enlarging the ends of said bore diametrically to form shoulders; second, placing outwardly bowed perforated securing plates having peripheral prongs against said shoulders in the bore with the apexes of the prongs contiguous to the wall of said bore, and subsequently pressing the bowed portion of said plates inward against said shoulders and embedding the prongs thereof in the walls of said bore, and next, adjustably securing the bubble-glass-case between and to said plates, substantially as described.

JUSTUS A. TRAUT.

Witnesses:

FRANCIS H. RICHARDS,  
FRED. J. DOLE.