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W. J. GARNER & T. CONNAUGHTON.

PLUMB AND LEVEL.

No. 453,902. Patented June 9, 1891.

Fig. 1.

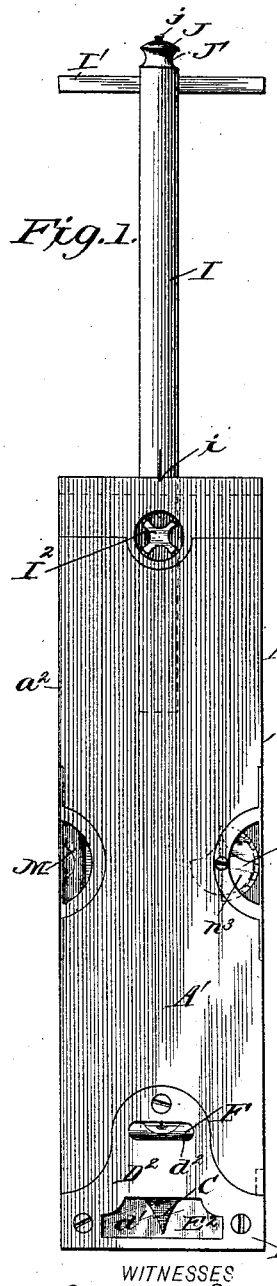


Fig. 2.

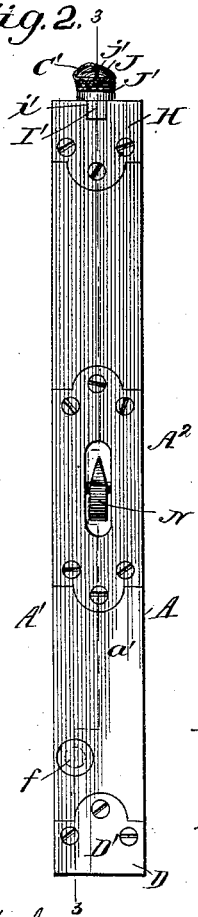


Fig. 3.

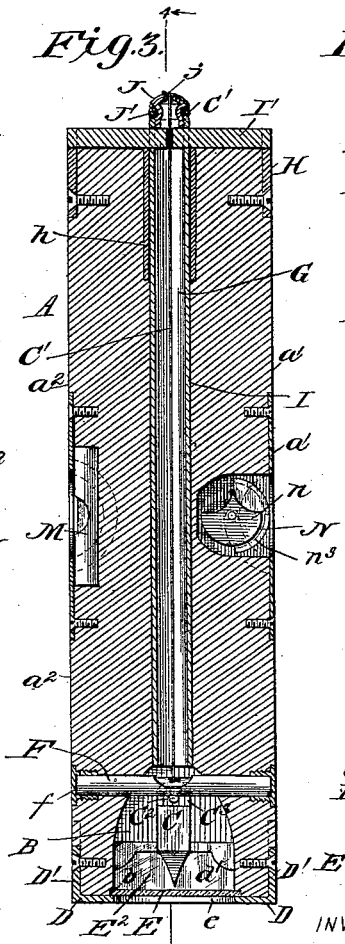
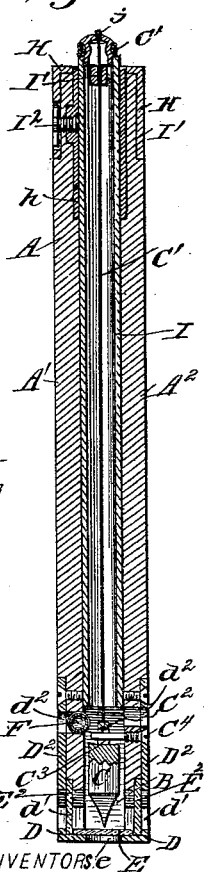


Fig. 4.



WITNESSES

Fred G. Dieterich

P. B. Turpin

INVENTORS

W. J. Garner

T. Connaughton

BY

Munn & Co

ATTORNEYS

Fig. 12.

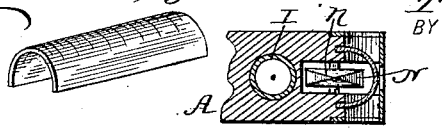


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Fig. 5.

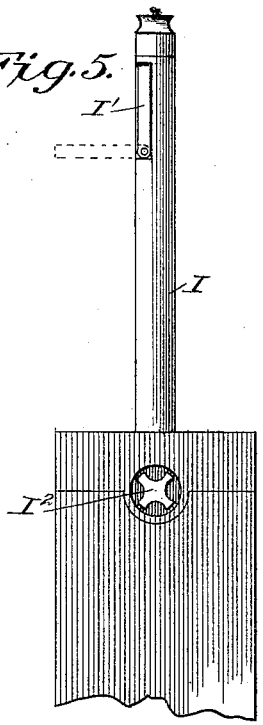


Fig. 6.

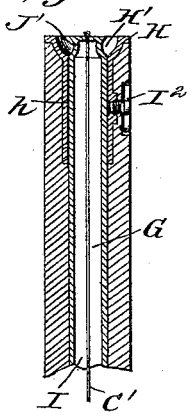


Fig. 7.

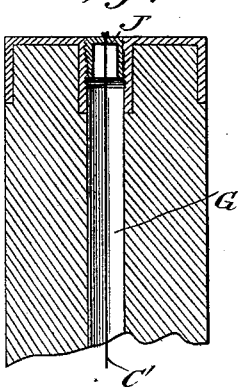


Fig. 8.

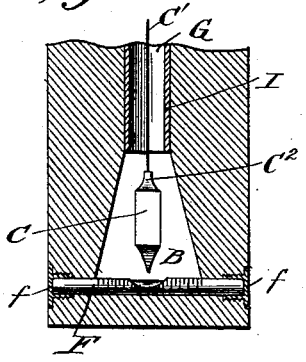
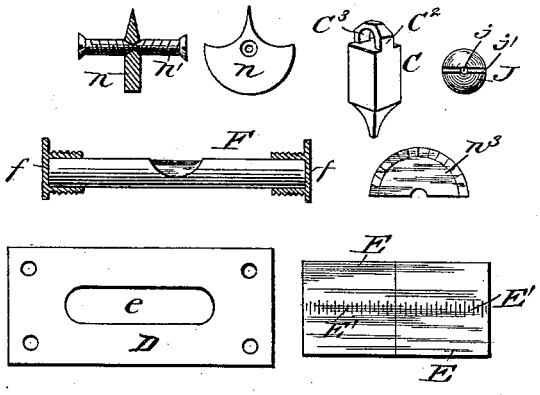
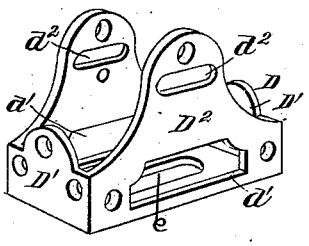


Fig. 9.





WITNESSES:
Fred G. Dieterich
R. B. Turpin.

INVENTOR:
W. J. Garner
T. Connaughton
BY Munn & Co
ATTORNEYS

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PLUMB AND LEVEL.

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Fig. 10.

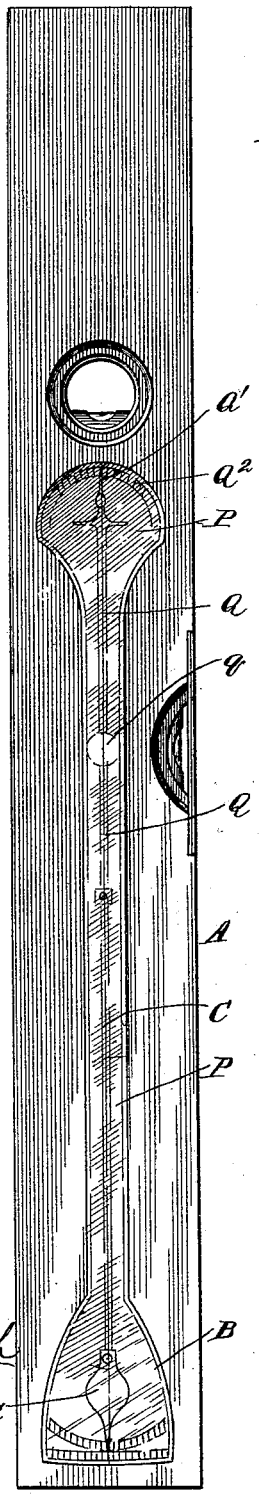
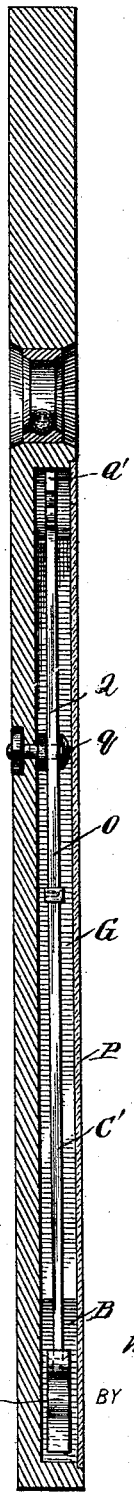


Fig. 11.



WITNESSES:
Fred J. Dieterich
P. B. Turpin.

INVENTOR:
W. J. Garner.
T. Connaughton
BY Munn & Co
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM J. GARNER AND THOMAS CONNAUGHTON, OF LATOURELL FALLS, OREGON.

PLUMB AND LEVEL.

SPECIFICATION forming part of Letters Patent No. 453,902, dated June 9, 1891.

Application filed April 5, 1890. Serial No. 346,754. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM J. GARNER and THOMAS CONNAUGHTON, residing at Latourell Falls, Multnomah county, and State of Oregon, have invented a new and Improved Level, of which the following is a specification.

This invention is an improvement in plumbs and levels; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a face view of the device with the extension raised. Fig. 2 is an edge view thereof with the extension lowered. Fig. 3 is a sectional view on about line 3 3 of Fig. 2. Fig. 4 is a sectional view on about line 4 4 of Fig. 3. Fig. 5 shows a somewhat different construction of extension and arm from that shown in Fig. 1. Fig. 6 shows a somewhat different construction of the top of the stock and of the extension-tube. Fig. 7 shows a different construction for securing the upper end of the bob-cord. Fig. 8 shows a modified arrangement of the lower level. Fig. 9 shows some of the parts in detail, and Figs. 10 and 11 are respectively face and sectional views of a modified construction within some of the broad principles of the invention, and Fig. 12 shows the glass piece formed to provide top and side plates for the weight or bob-points.

The stock A may be of any suitable material, but is preferably of wood, having the straight edges a' a^2 and faces A' A^2. At or near its lower end the stock A is provided with a mortise B, in which plays the plumb-bob C, which bob is inclosed, as presently described, and is suspended on a cord C' or other swinging support, which is also incased or inclosed, such inclosing of the cord or support and bob serving to protect such parts from the influence of the wind, so that the said parts will not be disturbed by the wind when being used in the open air. In Figs. 1, 2, 3, and 4 the mortise B is shown as formed centrally in the lower end of the stock A, and a metal frame D is secured on said end. At its lower end the mortise B is rabbeted at *b* to receive a glass plate E, which is held in place by the frame D, which has it bottom plate formed with an opening *e*, exposing plate E, as will be understood from Figs. 3 and 4. We provide this plate E with graduations E', as shown in Fig. 9.

The frame D has end plates D', which lap against the edges a' a^2 of stock A, and side plates D^2, which lap against the faces A' A^2 of the said stock, such side plates D^2 being provided with openings d' d', through which the bob may be seen through glass E^2, and one of such plates D^2 is formed with an opening d^2, which exposes to view the spirit-level F, which level is set transversely in the stock A in an opening which extends from the face A' of the stock into the mortise B, so that the cord C' may be seen across the level, as will be understood from Fig. 4. We secure the level F removably in position by means of end screw-caps *f*. (Shown in Fig. 3.) The bob C has its lower end pointed, and is provided at its upper end with a handle-like portion C^2, having an opening to facilitate the connection of the cord C'. An opening C^3 is provided, preferably in the handle part C^2, to receive the steadying-rod C^4, which preferably is screw-threaded in the frame D and stock A, and projects into the opening C^3 and serves to permit a limited swinging motion of the bob, and yet prevents the said bob from rotating. This rod C^4 also serves to prevent the bob from breaking the glass panes.

To secure the inclosing of the bob cord or support C', the stock A is provided with a recess to receive the same. This recess G is preferably formed by boring down from the upper end of the stock A until the hole so bored communicates with the mortise B, and the cord connected with the plumb-bob extends up through the recess or channel G and is suitably secured, so that it may swing with the bob. It is preferred to provide a cap-plate H at the top of the bar A, and to provide at the upper end of recess or channel G a guide-sleeve *h*.

An extension I is supported to slide longitudinally in the channel G and sleeve *h*, and is preferably made tubular, as shown, for lightness and strength and to enable the cord C' to be passed up through it. The cord, as

shown, extends up through the tube and is secured to the cap J thereof, such cap being preferably threaded in the tube and having a central opening j for the cord and a cross-slit j', in which the cord may be secured, the cap having a groove or annular depression J', in which the cord C' may be wrapped when the tube is lowered into the stock A, as shown in Figs. 3 and 4, the cord after being so wrapped being secured by pressing it down in nick j'. When the tube is to be raised, the cord is unwrapped and secured by its knot from passing down through opening j. On the tube I and the top of the stock A we provide at i guide-lines, which enable the tube when extended to be set accurately with respect to the stock A.

The extension I is provided with an arm I', the end or ends of which are in line with the edge or edges a' or a^2 of the stock A, so that the device can be used to accurately test a longer surface than when the extension-tube is down in the stock. In the construction shown in Figs. 1, 2, 3, and 4 the arm I' is a bar secured centrally by cap J in a slot in the upper end of the extension-tube and fitting in its lowered position in a groove i' in the upper end of the stock A, while in Fig. 5 the arm I' is hinged at its lower end in a recess in the side of the tube, and may be turned out to a horizontal position, as shown, with its edge in alignment with one of the edges of the stock A, as indicated in dotted lines, Fig. 5. A screw I^2 serves to secure the extension rigidly in any desired position, up or down. It will be noticed that the extension not only increases the length of the surface which may be tested by the device, but also enables the use of a longer suspension-cord when the tube is drawn up, and so increases the accuracy of the testing.

At one edge of the stock A we provide a spirit-level M and at the opposite edge a swinging gravity-level N, comprising a weighted pointer n, pivoted between two screws n', turned into the bar A from opposite sides, such weighted pointer being seated in a mortise in the stock A, which mortise has glass top and side plates $n^2 n^3$, the latter being properly graduated, as will be understood from Figs. 1, 3, and 9.

In Fig. 6 the cap J is shown integral with the tube I, and the plate H is countersunk at H', so that the top of the cap may rest flush with the top of the plate H without preventing winding of cord C' in groove J'.

In Fig. 7 the extension I is omitted and a screw-cap J is provided for securing the upper end of the cord, such cap being adjustable vertically. When the bob swings, by lowering or screwing part J in the frame the swinging motion is stopped. By raising the part J a little it suddenly finds its center point.

In Fig. 8 the level F is arranged below the bob and in position to indicate with reference to the point thereof instead of its cord C', as shown in Fig. 3.

In Figs. 10 and 11 the opening G is formed by mortising in the face of stock A and covering the said mortise by a glass plate P. In such figures, also, the suspension device C' is a bar and is pivotally suspended from the lower end of a lever Q, which is pivoted at q and has at its upper end a pointer Q', which registers along a graduated scale Q^2.

It will be understood that the mortising or boring of the stock A to form the recess G serves when such bar is of wood to in large part avoid the warping of same by exposing its internal as well as its external portions to atmospheric influences.

It may be preferred to use the glass piece shown in Fig. 1 for registration by the point of weight N, and also for bob C, as such construction, being curved in cross-section, serves to provide both top and side plates, and as the said part is made in one piece the graduations can be more easily formed in the top and sides thereof than if the said top and sides were made in separate pieces.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination of the stock, the bob, the level F, supported by the stock and arranged transversely of and adjacent to the bob, and the suspension device connected with the bob and extended upwardly therefrom and secured at a point above the level, all substantially as set forth.

2. The combination of the stock, the bob having an opening C^3, the suspension-cord supporting said bob, and the steadying-rod C^4, projecting into said opening C^3, all substantially as and for the purposes set forth.

3. The combination of the stock A, the swinging gravity-pointer n, fitted in a mortise in the stock, and the glass cover-piece curved in cross-section transversely the direction in which the gravity-pointer swings and fitted over the pointer n, all substantially as and for the purposes set forth.

4. The combination of the stock A, the extension I, movable longitudinally in said stock, the bob, and the suspension device secured to such bob and connected with the extension, substantially as set forth.

5. The combination of the stock A, having mortise B and opening G, the bob and its suspension device, the end frame D, fitted on the lower end of the stock A and having openings e and d', and the glass plates E E^2, all substantially as described, and for the purposes set forth.

6. The combination of the stock A, the extension I, made tubular and fitting and movable longitudinally in said stock, the bob and its suspension device connected with such bob and extended up through and connected with the tube, all substantially as and for the purposes set forth.

7. The combination of the stock A, the extension-tube I, having its cap provided with a groove J', the bob, and the suspension-cord

connected with such extension-tube and arranged to be wrapped in said groove J′ when the tube is lowered, substantially as set forth.

8. The combination of the stock A, the extension I, movable longitudinally and having an arm I′, and the bob and its suspension device, substantially as set forth.

9. The combination of the stock A, the extension I, made tubular, the arm I′, fitted in a slot in said extension I and secured by the cap J thereof, and the bob and its suspension device connected with said tubular extension I, all substantially as and for the purposes set forth.

10. The improved plumb and level, consisting of the stock A, having mortise B and opening G and provided with a groove i' in its upper end, the bottom and side plates E E^2 for mortise B, the frame D, having openings e d', through which to expose plates E E^2, and having an opening d^2, the level F, arranged to show through opening d^2, the extension I, made tubular and sliding in opening G, and the bob C and its suspension device C′, all substantially as and for the purposes set forth.

11. The combination of the extensible support, one or more spirit-levels, and a plumb line and bob, substantially as shown and described.

12. A plumb or level having an extensible support that can be lengthened or shortened, substantially as and for the purpose described.

13. A plumb or level having an extensible support composed of telescopic sections or bars, substantially as described.

WILLIAM J. GARNER.
THOMAS CONNAUGHTON.

Witnesses:
WILLIAM H. FALLIS,
HENRY THOMPSON.