

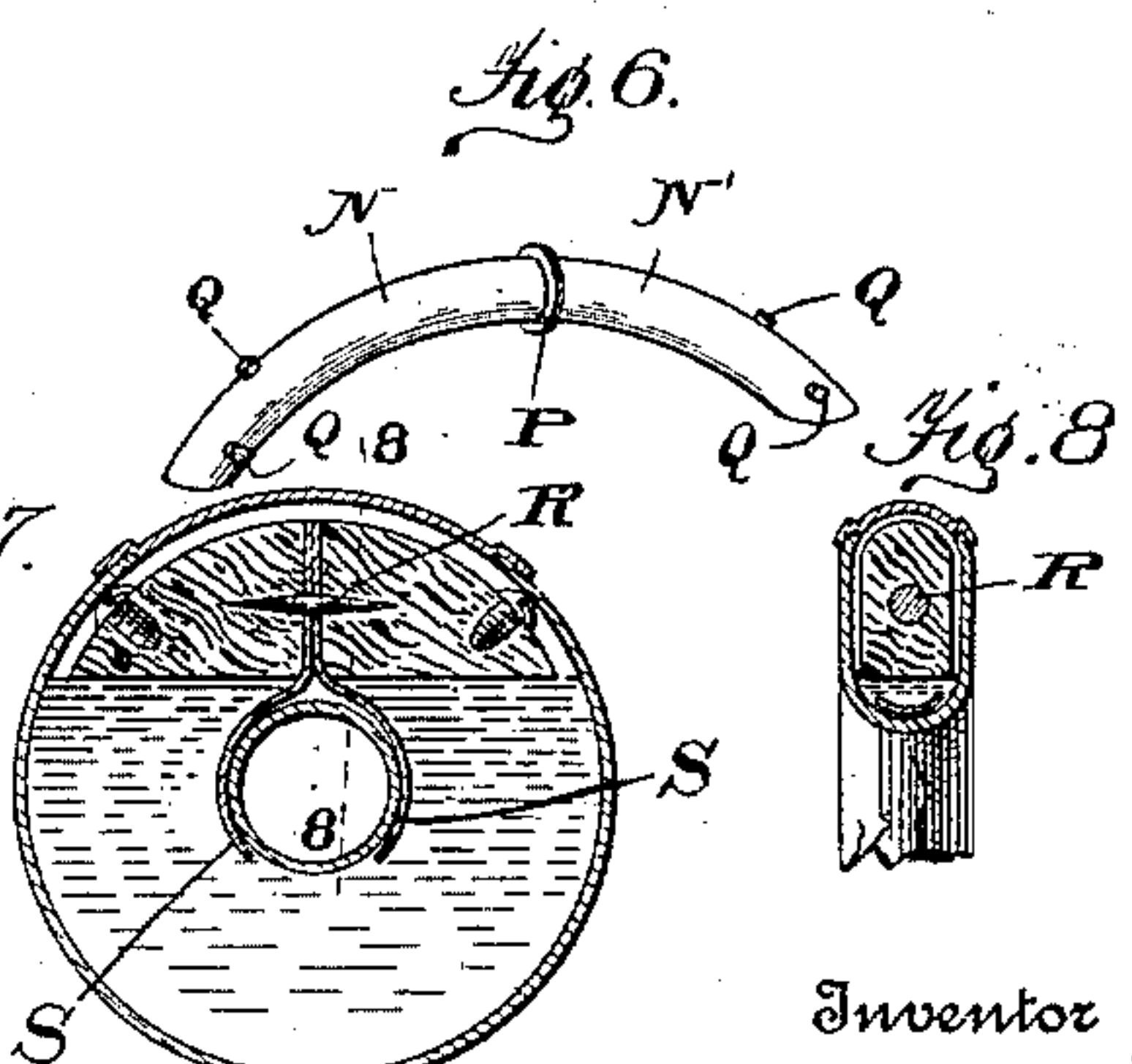
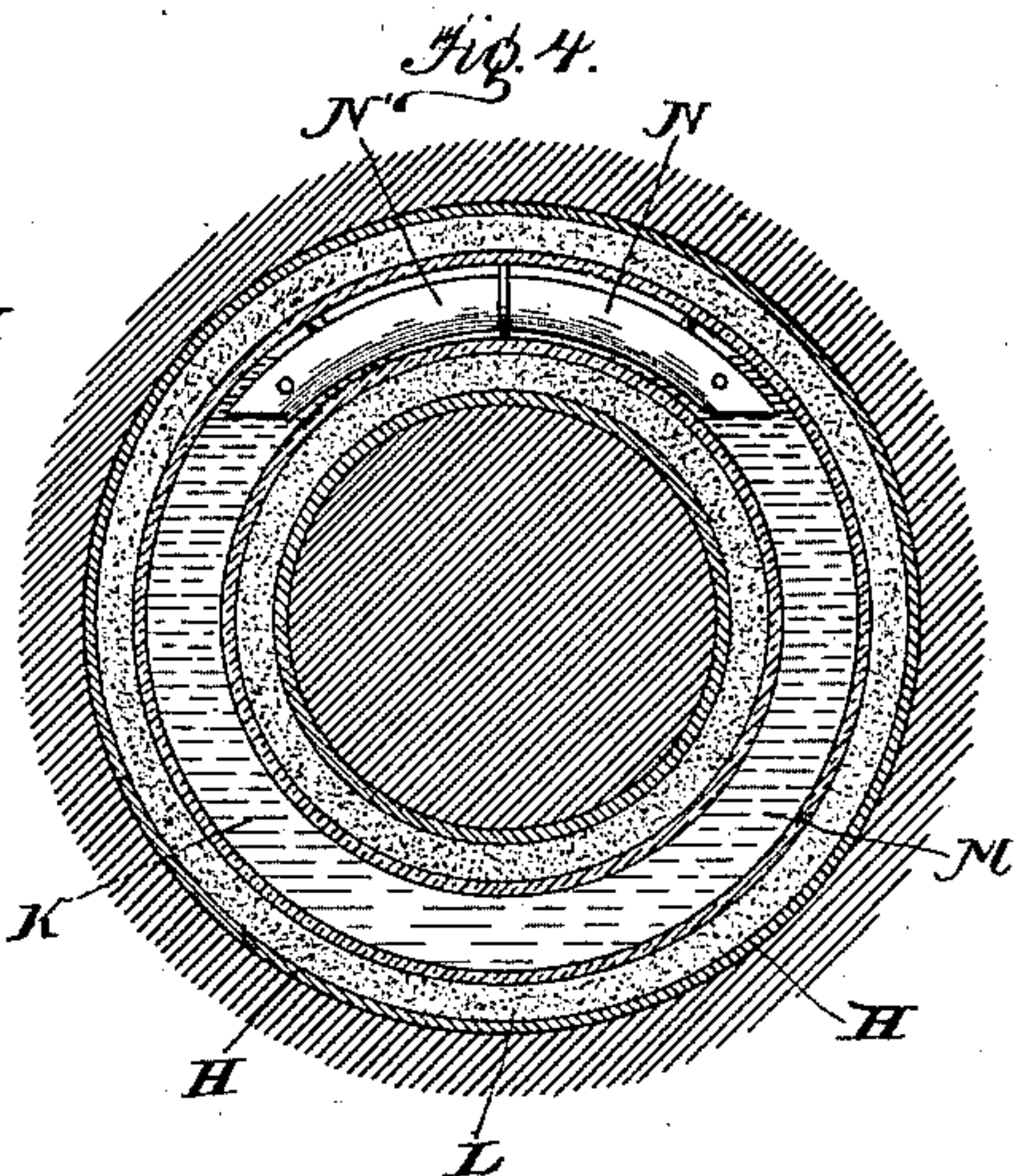
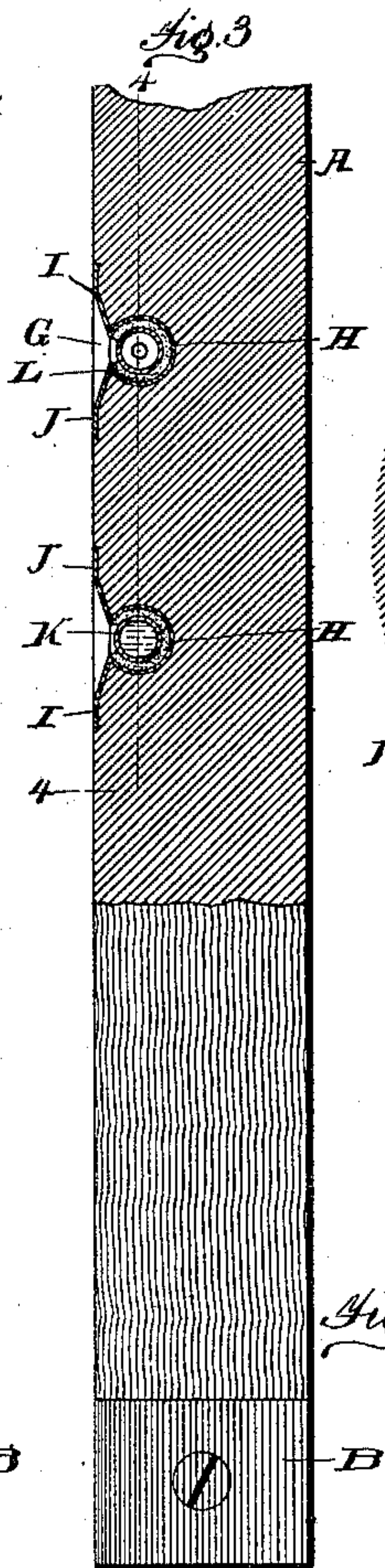
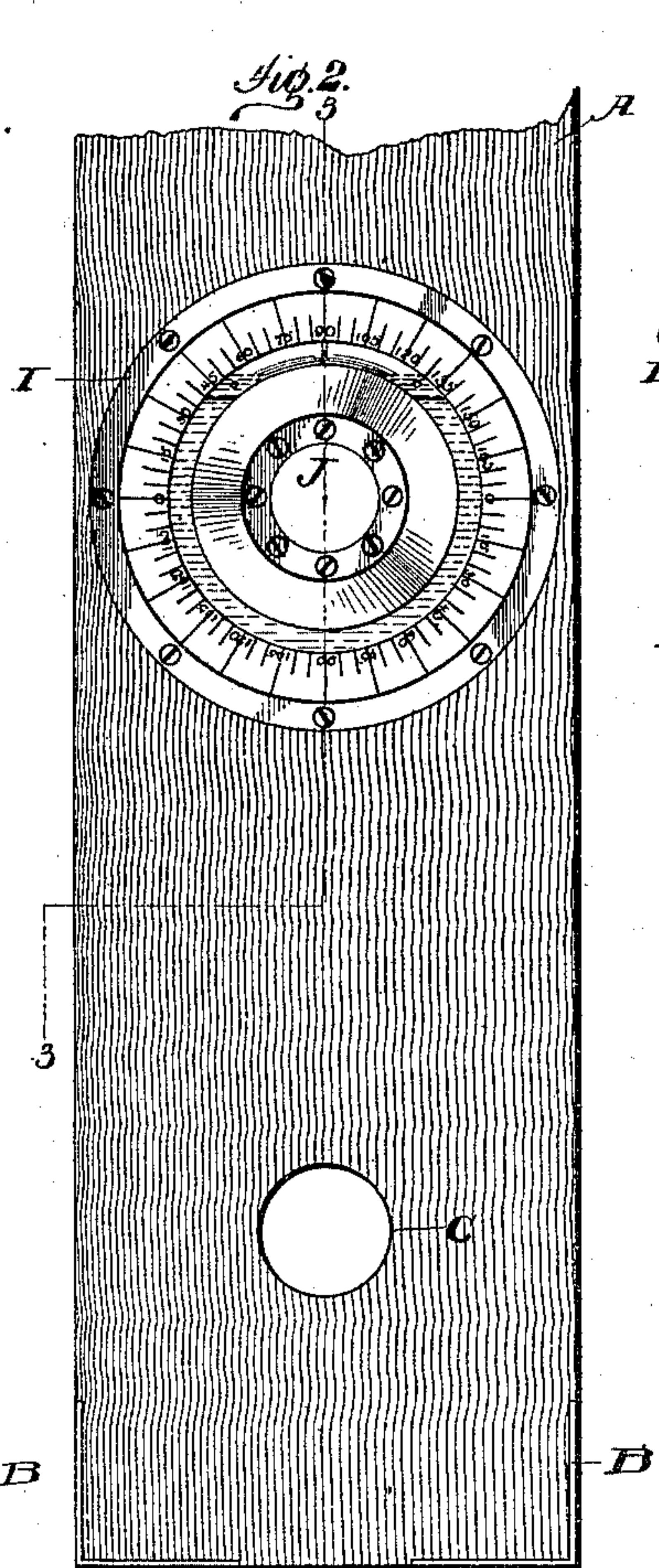
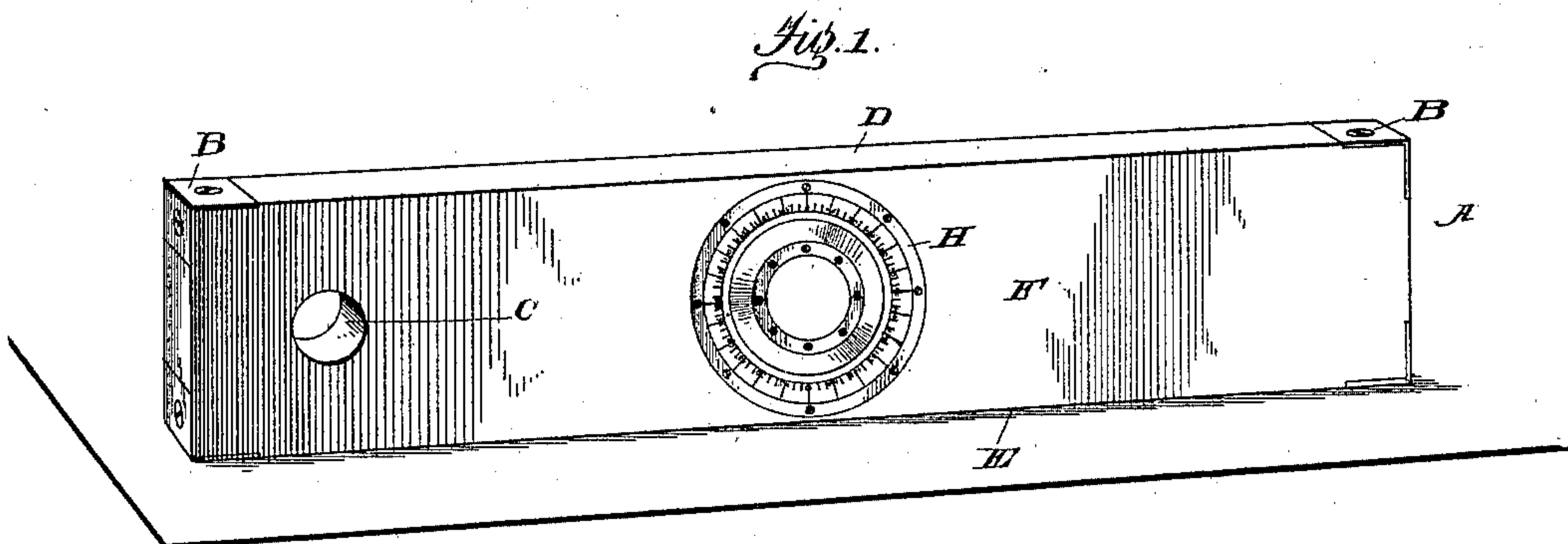
No. 613,160.

Patented Oct. 25, 1898.

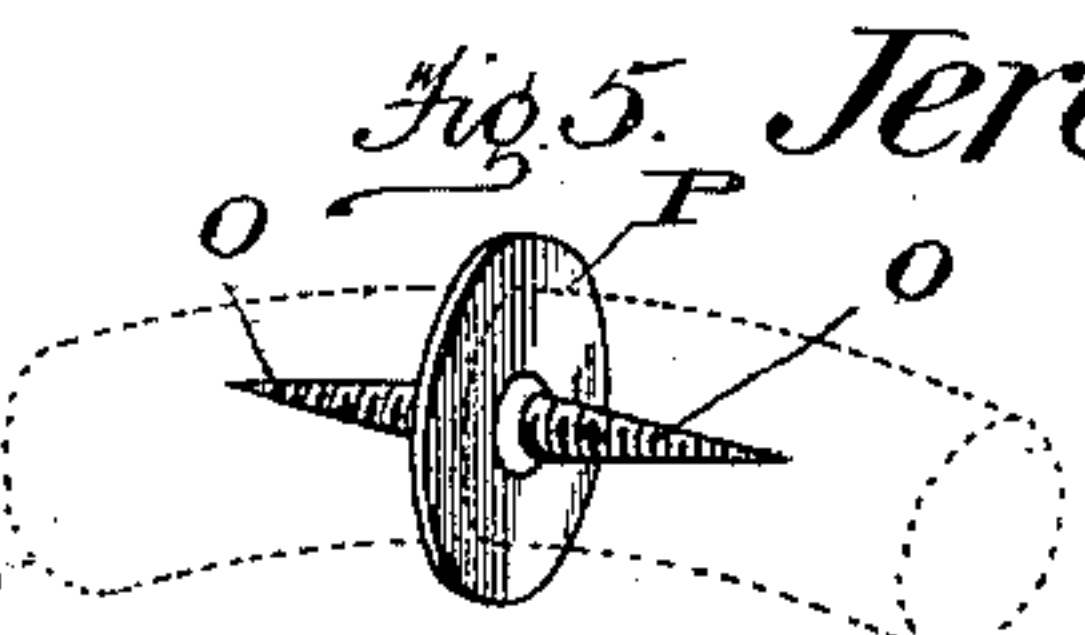
J. J. LANKFORD.  
LEVEL.

(Application filed Sept. 28, 1897.)

(No Model.)



Witnesses  
W. F. Doyle  
Chas. Brock



Jerome Lankford,  
by *Quarles & Co.*  
Attorneys



# UNITED STATES PATENT OFFICE.

JEROME J. LANKFORD, OF ROANOKE, VIRGINIA, ASSIGNOR OF ONE-HALF  
TO J. W. MINICH, OF SAME PLACE.

## LEVEL.

SPECIFICATION forming part of Letters Patent No. 613,160, dated October 25, 1898.

Application filed September 28, 1897. Serial No. 653,319. (No model.)

*To all whom it may concern:*

Be it known that I, JEROME JAMES LANKFORD, residing at Roanoke, in the county of Roanoke and State of Virginia, have invented  
5 a new and useful Plumb-Level, of which the following is a specification.

This invention relates generally to levels, and more particularly to that class of plumb-levels used by builders, contractors, engi-  
10 neers, &c.

The object of my invention is to provide a new form of plumb-level which shall be simple in construction, cheap, durable, and capable of use in many ways impossible with  
15 those heretofore known.

Another object of my invention is to provide a plumb-level with which any degree, grade, level, or pitch that is necessary in constructional work may be secured.

20 A further object of my invention is to provide a plumb-level with an annular glass tube so arranged as to greatly lessen the chances of breakage and with a graduated scale so set in as to protect it from wear and defacement.

25 Another object of my invention is to provide a plumb-level which is so constructed as to be unaffected by the wind and which requires no adjustment, is convenient of application, and always ready for use.

30 With these objects in view my invention consists in the peculiar construction of the various parts and in their novel combination and arrangement, all of which will be fully described in detail, and pointed out in the  
35 claims.

In the drawings forming part of this specification, Figure 1 is a perspective view showing my invention in use. Fig. 2 is a view in elevation, showing my invention in position  
40 to be used as a plumb, the upper portion of the body being broken away. Fig. 3 is a sectional view on the line 3 3 of Fig. 2. Fig. 4 is a sectional view on the line 4 4 of Fig. 3. Fig. 5 is a detail view of the disk and double-  
45 pointed screws for holding the two sections of the cork float together. Fig. 6 is a detail perspective view of the cork float. Fig. 7 is a section on the same plane as Fig. 4 of a modified form of tube. Fig. 8 is a cross-section through the inside of the same on the  
50 dotted line 8 8 of Fig. 7.

Like letters of reference mark the same parts wherever they occur in the various figures of the drawings.

Referring to the drawings by letters, A is 55 the wooden body of the level, which is of the form usually used for that purpose, and, as is usual in levels, it may be provided with protecting corner-plates B and a hole C for convenience in handling. In levels as ordinarily 60 constructed glass tubes containing the liquid have usually been placed in the surface D, while the surface E served as the bottom upon which to rest the level. This arrangement has been found to be open to many serious 65 objections, and to obviate the difficulties encountered in the use of a spirit-level thus constructed has been my principal object in producing my invention. In my level the tube is inserted in the face F. 70

In preparing the wooden body for my level an annular groove is formed in the face F about midway between the ends of the wooden body, said groove being located a slight distance below the surface and communicating 75 therewith through the medium of a wide flaring groove G. Within the annular groove is fixed a metallic lining H, which is shown as nearly cylindrical in cross-section, but may be of any section desired, having its upper 80 face cut away or omitted and being provided with outwardly and inwardly flared metallic plates I and J. Within the annular portion H of this metallic lining is embedded an endless annular glass tube K, circular, flat, an- 85 gular, oval, or elliptic in cross-section, the space between the glass tube and the metallic cylinder H being filled with plastic cement L to properly hold the tube in position.

Within the glass tube is sufficient mercury 90 M to nearly fill it, and floating upon the mercury is a float composed of two pieces N and N' of cork, secured together by means of right and left screws O, projecting from a disk P, as shown in Fig. 5, the disk P being slightly 95 larger in circumference and of a size to snugly fit the interior of the glass tube, whereby it serves to render more sure the movement of the float in the tube and as an indicator in connection with a graduated scale formed 100 upon the metallic plate G. The float is further provided with projecting pins Q of smooth



hard material, such as hard rubber, of which the disk may also be made, to properly regulate the position of the float in the mercury-tube and serve as bearing-points, whereby  
5 much friction is avoided.

The construction and operation of my invention will be readily understood from the foregoing description.

The plastic cement used to embed the glass  
10 will allow for the contraction and expansion of the various parts, and thus prevent the tube from breaking. The provision of the hard-rubber disk and bearing-points serves the double purpose of indicator and as com-  
15 paratively frictionless bearings or points of contact with the interior of the glass tube during the movement of the cork. For convenience in using the level the cork may be painted the color of the mercury in the tube  
20 and the indicator-disk black or some other clearly-contrasting color, whereby it may be more readily observed.

The graduated scale will be marked "zero" at the top and bottom and will range from  
25 that point to ninety degrees on each side, the zero-points also marking one hundred and eighty degrees, or half the circle.

When the instrument is placed upon any surface, with the bottom E resting thereon, as  
30 shown in Fig. 1, the cork float will at once move to the top of the exact perpendicular diameter of the circle inclosed by the tube and will indicate upon the graduated scale the exact degree of inclination of the surface  
35 upon which the level is placed. To sight a grade or incline of any given pitch or rise, it will be only necessary to adjust the level so that the degree of inclination desired will be indicated upon the graduated scale, when  
40 the proper grade can be established in any of the well-known methods. When the level is used as a plumb, as in Fig. 2, the indicator will coincide with the mark on the graduated scale which indicates ninety degrees from the  
45 horizon, or a vertical line. Any variation in the structure against which the plumb is placed from said vertical line will be at once indicated on the graduated scale.

The fragile parts of this instrument are en-  
50 tirely embedded below the surface in such a manner as to be almost absolutely free from any danger of breakage.

The mercury-tube is shown as circular in

cross-section; but it may be of any desired shape—as flat, oval, or elliptic—and I have  
55 found by experiment that a tube formed elliptic in section possesses many advantages, requiring less depth of recess and facilitating the movement of the float.

In Figs. 7 and 8 I have illustrated in ver-  
60 tical longitudinal section a tube of elliptic form in which I embody also a metallic guide for the float, consisting of two fingers S, attached within the cork float by a double-  
65 pointed pin R, the fingers grasping the central portion of the tube and serving to guide the cork float in its movement within the tube.

While I have illustrated and described what I believe to be the best means now known to me  
70 for carrying out my invention, I do not wish to be understood as limiting myself to the exact construction and arrangement shown and described, but hold that such slight changes and variations as might suggest themselves  
75 to the ordinary mechanic would properly fall within the limit and scope of my invention.

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

1. In a level, the combination with the liquid-containing tube, of a float consisting of two sections united by a disk having oppositely-threaded stems engaging the respective  
85 sections, said float carrying guide projections adapted to engage the walls of the tube, substantially as set forth.

2. The level herein described, consisting of a body of wood or other material, provided with an annular groove therein communicat-  
90 ing with one face thereof through the medium of the flaring grooves G, the metallic tube II and flaring plates I and J serving as a metallic lining for said grooves, the plate I being formed as a graduated scale, indicating  
95 degrees, the annular glass tube K embedded in the metallic tube with elastic cement L, and the cork float or indicator within the glass tube, arranged to act in conjunction with the graduated scale, substantially as de-  
100 scribed.

JEROME J. LANKFORD.

Witnesses:

L. B. DEYER,  
R. T. BOSWELL.