J. J. BUNTING.

HYDROSTATIC LEVELING INSTRUMENT.

APPLICATION FILED FEB. 15, 1909.

936,407. Patented Oct. 12, 1909.

Fig. 1.

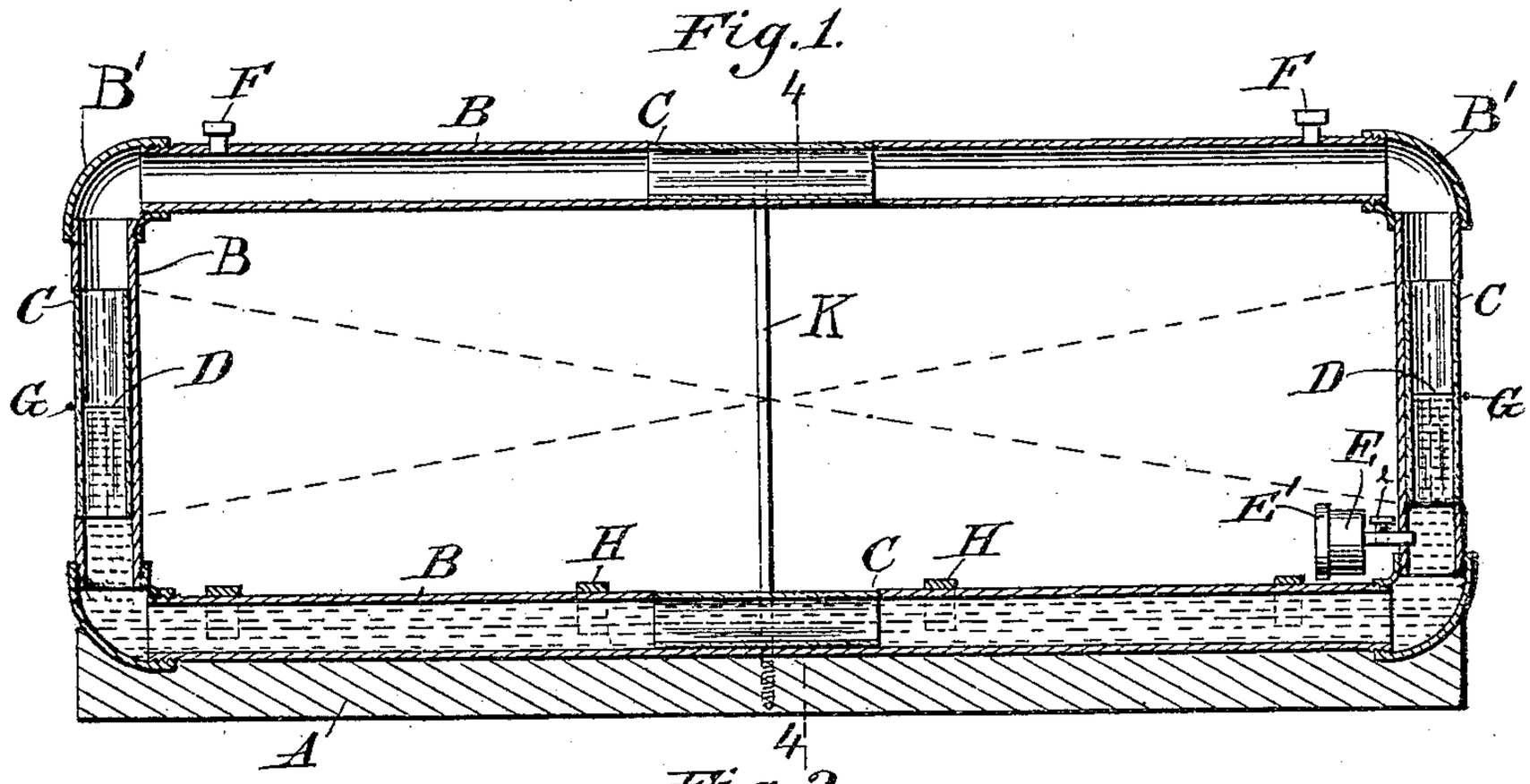


Fig. 2.

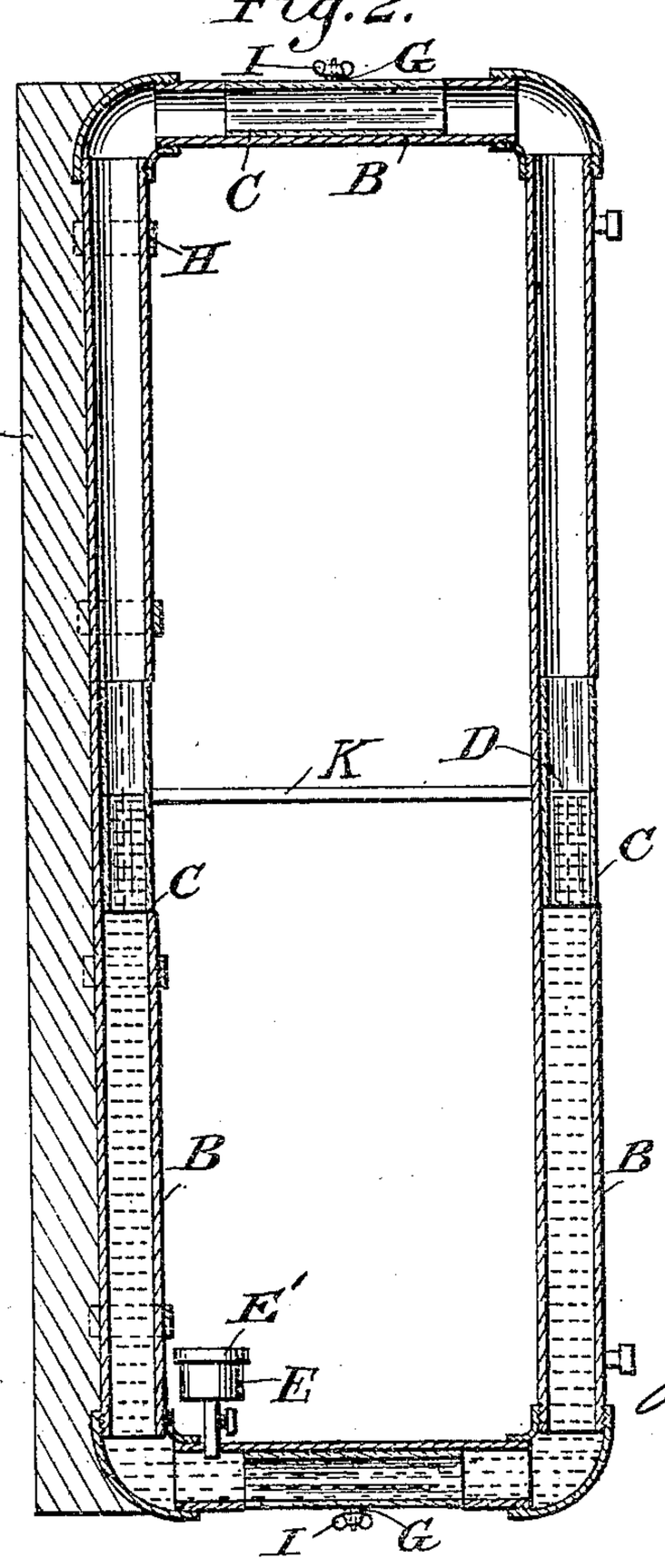


Fig. 3.

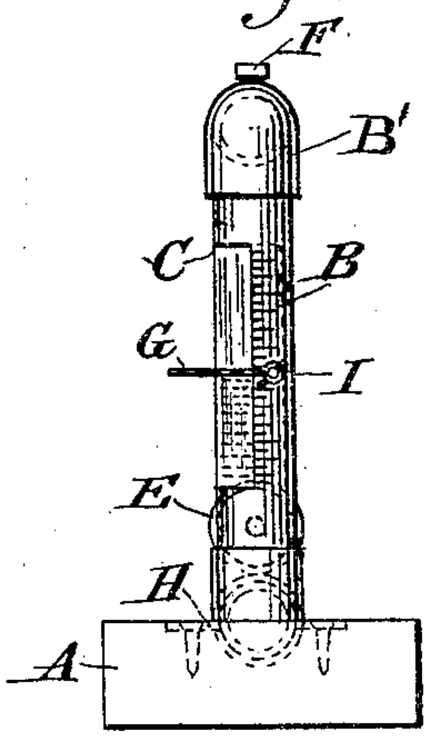


Fig. 4.

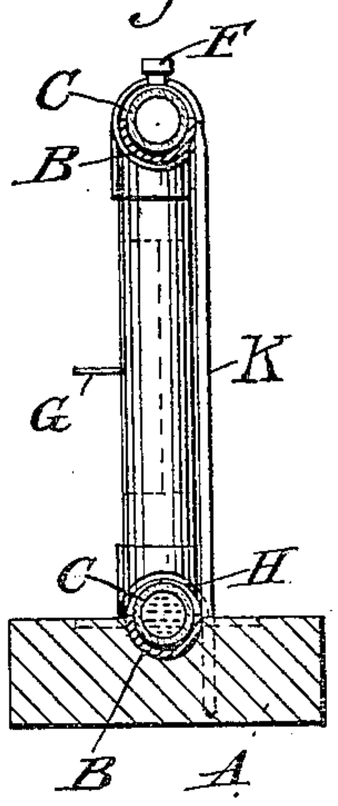
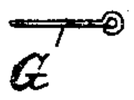


Fig. 5.



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UNITED STATES PATENT OFFICE.

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HYDROSTATIC LEVELING INSTRUMENT.

936,407. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed February 15, 1909. Serial No. 478,136.

To all whom it may concern:

Be it known that I, JOHN JAMES BUNTING, a citizen of the United States, residing at Grandview, in the county of Yakima and State of Washington, have invented certain new and useful Improvements in Hydrostatic Leveling Instruments, of which the following is a specification.

My invention relates to leveling instruments, and more particularly to instruments of this kind which depend for their operation upon the movements of a column of liquid.

One object of the invention is to provide a device of this character which shall be simple, cheap and practical, and which shall be capable of use as both a level and a plumb.

A further object of the invention is to provide, in connection with an instrument of this character, means for adjusting the height of the liquid column so as to bring the same accurately to the zero mark.

With the above and other objects in view, my invention consists in the construction and arrangement of parts hereinafter described, and illustrated in the accompanying drawing, in which,

Figure 1 is a central longitudinal section through my improved instrument, showing the same in the position which it occupies when used as a level. Fig. 2 is a similar view, showing the device in position to be used as a plumb. Fig. 3 is an end view of the instrument. Fig. 4 is a transverse section thereof, taken on the line 4—4 of Fig. 1, and, Fig. 5 is a detached view showing one of the sighting needles.

Referring to the drawings in detail, my improved instrument comprises a base A, preferably formed of wood, in which is cut a longitudinally extending groove. In this groove is seated one of the long sides of a rectangular frame formed of metallic tubes B, connected together at their corners by means of couplings B′ so as to form a continuous passage. The tube B may be held in position on the base A by means of straps H, soldered to the tube. The tube B, at the middle of each side of the rectangle, is partially cut away so as to provide sight openings arranged in pairs. Secured inside of the tube B adjacent each of these openings is a section of glass or other transparent tube C, which serves to close the sight openings and render the tube liquid tight. As shown in Fig. 1, the tube is half filled with a suitably colored liquid forming a column, the ends of which, such as indicated by D, are visible through the glass tubes C set into the sight openings. When the device is used as a level the ends of this column are visible through the sight openings in the short sides of the rectangle, and secured to the tube B at the middle point of each of such sight openings, is a sighting needle G. These needles are preferably detachably secured to the tube, as by means of thumb screws I, and when the instrument is perfectly level these sighting needles are in line with the tops of the liquid column D. When, however, the instrument is placed upon an inclined surface, the column rises in one of the sight openings and sinks in the opposite one, thereby indicating, by means of suitable graduations, the number of degrees by which such surface varies from the horizontal. In determining elevations of distant objects the needles G are sighted at the top or bottom of such object, and the corresponding displacement of the levels of the ends of the column will indicate the elevation in degrees. When used as shown in Fig. 2, for determining the amount of deflection from the vertical, as for instance, in truing up walls, etc., the height of the column is read through the sight openings in the long sides of the rectangle.

A brace K may be provided for supporting the middle of the long side of the tube, and screw plugs F are tapped into the tube at suitable points for the purpose of refilling or cleaning the same.

In order to provide for variations in the height of the column due to changes in temperature, and to other causes, I provide a closed reservoir E, and connect the same with the tube B below the normal level of the liquid therein. The reservoir is therefore constantly filled with liquid. This reservoir may be of any suitable construction, but as shown it is provided with a cap E′ which is screw-threaded on to the reservoir in very much the same manner as is commonly employed in grease cups used for feeding hard lubricants. By turning up the cap E′ more or less, the capacity of the reservoir E can be correspondingly varied, and thus more or less liquid forced from the reservoir into the tube. In this way, the height of the liquid can be accurately ad-

justed, and the ends of the column brought to the zero points on the scale. It will be noted that in both Fig. 1 and Fig. 2 the reservoir E is below the level of the liquid in the tube and is, therefore, always filled. The pipe which leads from the reservoir to the channel of the frame B is provided with a stop-cock *e* which is suitably secured therein and has for its function to regulate or cut off communication between the tube B and said reservoir since there has been found to be a variation in the liquid when the level was laid down, *i. e.* with having the base A placed on edge and the top leg of the rectangle in substantially the same plane.

It will thus be seen that I have provided an instrument which readily lends itself to use both as a plumb and a level, and in which the height of the liquid column may be accurately adjusted, and it is thought that the numerous advantages of my invention will be appreciated by those skilled in the art.

What I claim is:—

A clinometer comprising a continuous metallic tube in the shape of a rectangle, said tube being partially cut away at the middle portion of each of the sides of the rectangle to provide opposite sight openings, sections of glass tubing secured within the metallic tube adjacent such openings to close the same, a liquid column partially filling said tube, the ends of such column being visible through one or the other pair of such sight openings, a reservoir communicating with the tube and adapted to supply liquid to said column, and a stop-cock associated with said reservoir and adapted to regulate or cut off communication between the reservoir and the tube.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN JAMES BUNTING.

Witnesses:
C. D. WALTER,
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