(No Model.)

W. W. LE GRANDE.

LEVELING INSTRUMENT.

No. 277,037. Patented May 8, 1883.

Fig. 1.

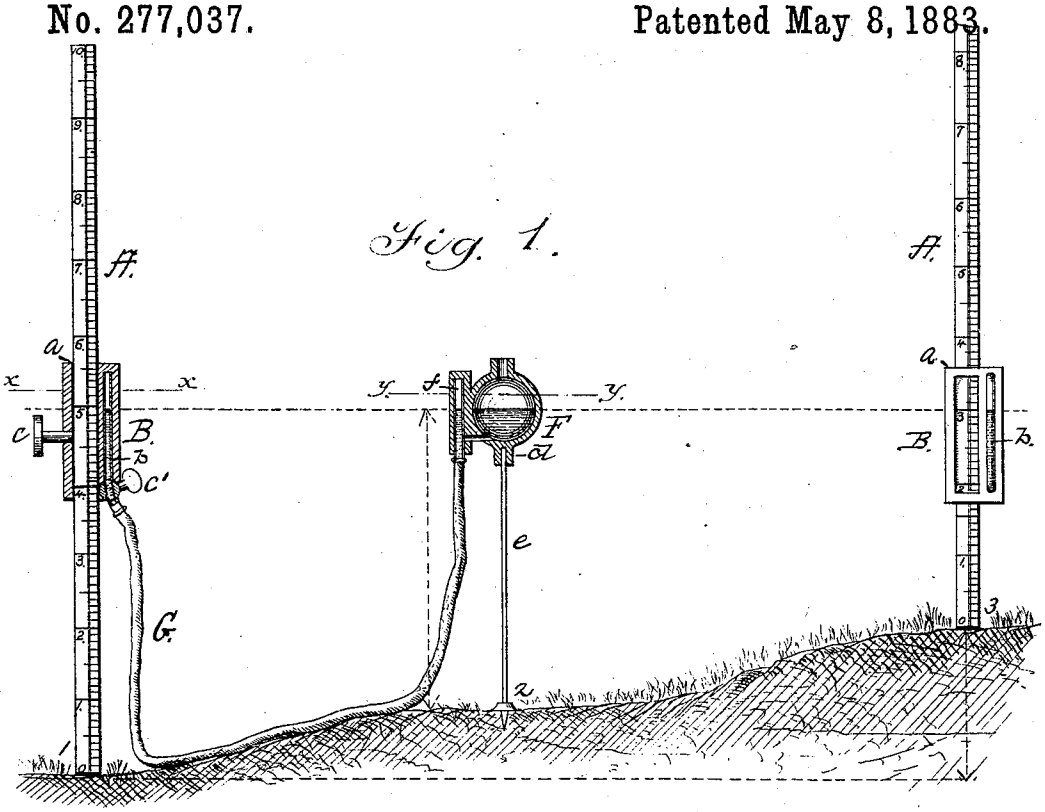


Fig. 2.

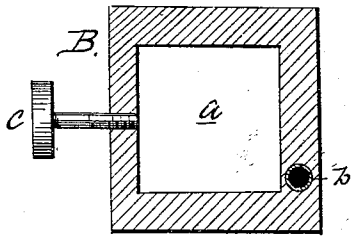
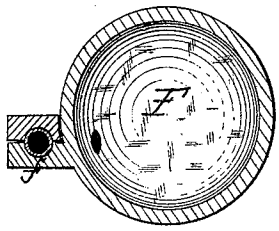


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM W. LE GRANDE, OF LOUISVILLE, KENTUCKY.

LEVELING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 277,037, dated May 8, 1883.

Application filed May 11, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. LE GRANDE, a citizen of the United States of America, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Civil-Engineering and Leveling Instruments, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in that class of leveling-instruments employing liquid, with suitable means for holding the same, for taking levels, establishing grades, and for all purposes where it is necessary to ascertain the difference in altitude of definite points.

My invention consists of a transparent fluid-receptacle formed or provided with means for receiving a staff and a flexible connecting-tube for conducting the fluid, in combination with a leveling slide and staff, as hereinafter set forth.

My invention further consists in the novel arrangement and construction of parts, as will be hereinafter more specifically described.

In the annexed drawings, forming a part of this specification, Figure 1 is a front elevation. Fig. 2 is a transverse sectional view of the slide, taken through the line *x x* of Fig. 1; and Fig. 3 is a transverse sectional view of the fluid-receptacle, taken through the line *y y* of Fig. 1.

The letter A represents an ordinary leveling-rod of any convenient length, and properly and accurately graduated into feet and smaller measurements, as are usually employed, and which may be necessary.

The letter B represents a sliding rest formed with a sleeve, *a*, fitting over the leveling-rod, and provided with a vertical transparent tube, *b*, which is also provided at its lower end with suitable means for connecting the flexible tube hereinafter set forth. This sliding rest is sustained and retained at any desired adjustment by means of the set-screw *c*.

The letter F represents the fluid-receptacle, formed with an open neck for admitting the fluid, and the downward-extending socket *d* for the purpose of setting on and over a substantial staff, *e*, which is set in the ground as a rest for the fluid-receptacle. This fluid-receptacle may be made of glass, and graduated, if desired; but this is not essential. It may be formed or provided with a transparent vertical tube, *f*, in such a manner as to show the height of the fluid in the receptacle. This fluid-receptacle F is of such capacity as to hold more than enough fluid to fill the flexible tubing, in order that it will not be depleted below the lowest graduated line under any circumstances of use, and also in order that any length of the flexible tubing may be used without the trouble of specially regulating the quantity of fluid, it being essential to have the capacity of the receptacle more than enough to supply fluid to fill the flexible tubing under circumstances of taking different altitudes and different surface measurements.

The letter G represents the flexible tube, suitably attached to the lower end of the vertical tube *b* in the slide, and the other end is properly attached to the fluid-receptacle F, substantially as seen in the drawings. This flexible tube may be of any desired length. In practice the fluid is run in the receptacle until it fills the flexible tube and rises in the receptacle to such a height as may be convenient or desired, when a stopper is fixed in the open neck of the receptacle to prevent the loss of the fluid.

In use the staff supporting the fluid is set in the position desired, with the flexible tube connected to the tube in the slide, and the leveling-rod then set at the point next to be leveled, when the slide is run up or down on the rod until the fluid is seen in the transparent tube of the slide, when the exact level line will be indicated on the rod. For example, suppose it be required to ascertain the difference of level between two points, 1 and 3. Set the staff with the fluid-receptacle at 2 and the rod at 1; then run the slide up or down until the fluid rises in the vertical tube and into the level—say five feet; then carry the rod, with the tube, to 3, and repeat the operation, and note the level—say three feet. This from the height at first setting leaves two feet, the depth at 3, and of course the difference in altitude. The connecting flexible tube may be made of any suitable material, and may have attached to it a tape for measuring distances.

When necessary to detach the flexible tube

from the slide, the slide is raised until the fluid falls below the cock c', when it is turned, and thus retains the fluid.

It is obvious that instead of employing the fluid-receptacle F, with supporting-staff, two leveling rods and slides provided with vertical fluid-tubes connected by the flexible tube may be used, and the stations ascertained and indicated substantially as heretofore explained.

A suitable hand-reel may be used for reeling the flexible tube upon; but I prefer a circular rest or holder (not shown) attached to the receptacle for holding the fluid, on which the tube may be coiled by a suitable handle.

Horizontally-projecting sights may be fixed to the slides and fluid-receptacle for taking flying levels, inclinations, &c.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a civil-engineering or leveling instrument, fluid-receptacle F, of large capacity, mounted on a staff, and provided with a flexible tube, as and for the purpose described.

2. The leveling-instrument consisting of the graduated rod A, slide B, with transparent tube and clamping-screw, the liquid-holder F, mounted on staff e, and provided with the transparent tube, and the flexible connecting-tube G, substantially as described.

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

WILLIAM W. LE GRANDE.

Witnesses:
H. S. JONES,
A. E. RUTENBECK.