I. S. WINTER.
Pendulum-Level.

No. 221,380. Patented Nov. 4, 1879.

Fig. 1.

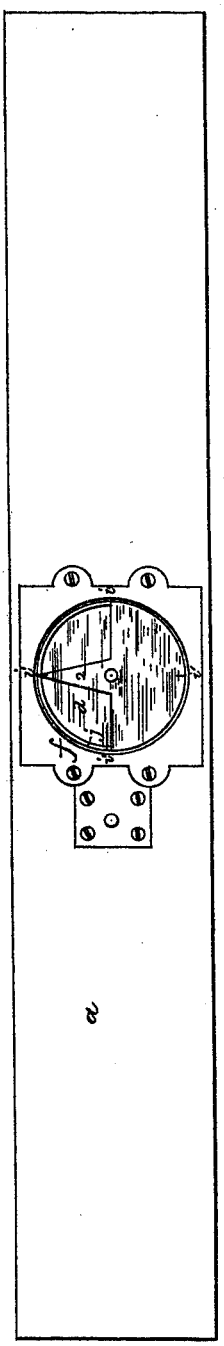


Fig. 2.

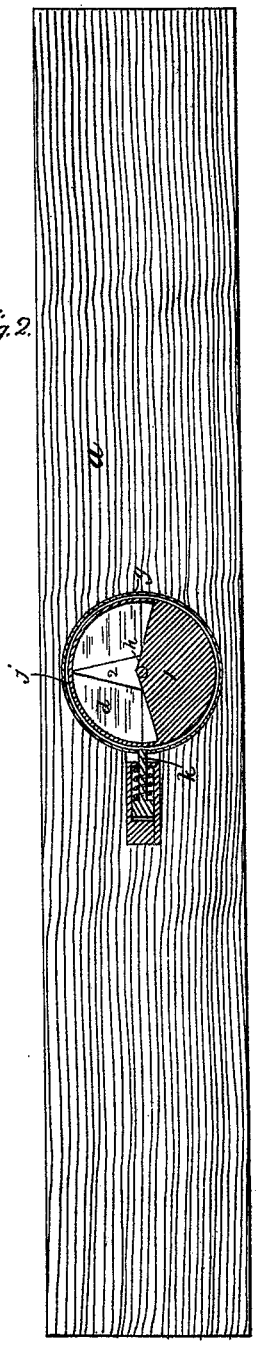
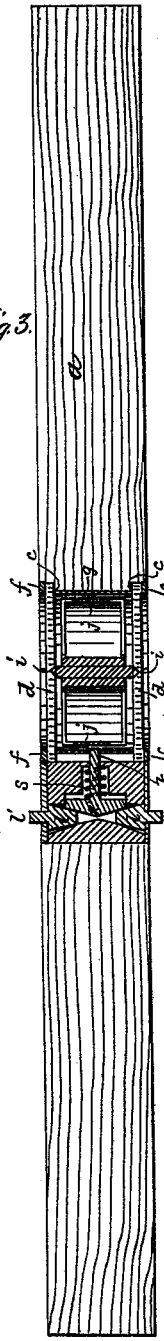
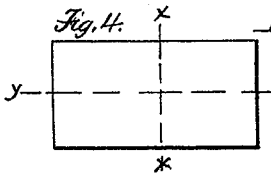


Fig. 3.



Witnesses.
Geo. H. Pierce,
R. L. Perkins

Fig. 4.



Inventor.
I. S. Winter
by Wright Brown
Attys

UNITED STATES PATENT OFFICE.

IGNATIUS S. WINTER, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO ARBEE G. HYDE, OF SAME PLACE.

IMPROVEMENT IN PENDULUM-LEVELS.

Specification forming part of Letters Patent No. **221,380**, dated November 4, 1879; application filed August 7, 1879.

To all whom it may concern:

Be it known that I, IGNATIUS S. WINTER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Plumb-Levels, of which the following is a specification.

This invention relates to plumb-levels, or those in which a pivoted pendulum or weighted finger is substituted for a glass tube containing alcohol and air.

The object of the invention is to provide certain improvements in the construction of a plumb-level, whereby its accuracy, convenience, and durability are increased.

To these ends my invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of a plumb-level embodying my invention. Figs. 2 and 3 represent, respectively, sections on lines *x x* and *y y*, Fig. 4, which represents the end of the level-stock.

Similar letters of reference refer to like parts in all the figures.

In the drawings, *a* represents a level-stock, of the usual form and of any suitable material, preferably wood. In the center of the stock is formed a transverse aperture extending entirely through the stock. This aperture is preferably formed by boring through the stock, and is preferably countersunk or enlarged at its outer ends to form shoulders or bearings *c c*.

d d represent two glass plates which rest on the shoulders *c c*, and entirely cover the ends of the aperture, and convert the latter into a close chamber with transparent sides. The plates *d d* are parallel with each other, and are secured to the stock by metallic marginal frames *f f*, which are screwed to the sides of the stock and project over the margins of the plates. To secure the parallelism of the plates *d d*, I prefer to interpose between them a metallic ring or short cylinder, *g*, which forms a lining for the aperture. The ends of the ring are parallel and project slightly beyond the shoulders *c c*, and form bearings for the inner sides of the plates *d*, said plates being pressed closely against the ends of the ring by the frames *f f*.

By the described construction a glass-sided chamber is formed in the stock, the contents of which can be freely viewed from either side of the stock.

h represents the pendulum or weighted finger, which is composed of a weight, 1, preferably semicircular, and fingers 2, projecting upwardly from the weight, and arranged to assume a vertical position when the weight is at rest. The pendulum *h* is provided with trunnions *i i*, projecting from opposite sides thereof, the weight being mainly on one side of the line of the trunnions.

The glass plates *d* are provided on their inner sides with sockets, which receive the trunnions *i i*, as shown, and permit the pendulum to rotate or vibrate freely, the pendulum being inserted in the chamber before both of the glass plates are applied thereto. The sockets in the glass plates form hard, smooth, and durable bearings for the trunnions of the pendulum, enabling the latter to rotate or vibrate with the least possible friction, and being so hard that they will endure very protracted use without being worn enough to interfere with the operation of the pendulum.

It will be seen that the glass plates not only support the pendulum on both sides, but also protect it from dust, dirt, and moisture, and enable it to be viewed from either side of the stock. The plates are provided with four marks, *i' i' i' i'*, arranged to divide a circle into four equal parts, and indicate, in connection with the pendulum, when the stock is in a horizontal or vertical position. The level is thus adapted to be used with either edge or end uppermost, as will be readily seen.

When the stock is moved suddenly, so as to cause the pendulum to rotate rapidly, it is desirable to arrest the vibrations, so that the pendulum will come quickly to its point of rest. To this end I provide the pendulum with a continuous circular rim, *j*, which is rigidly attached thereto and is concentric with the axial line of the pendulum. I provide the stock with a brake, *k*, adapted to be brought in contact with the rim whenever the operator desires to arrest the vibrations of the pendulum. Said brake is provided with a spring, *s*, to withdraw it from contact with the rim *j*, and with

any suitable means to enable the operator to push it against said rim.

The brake is preferably a rod or pin adapted to slide in an opening in the stock, and provided with a head, k', which has two inclines on one side, as shown in Fig. 3.

The means for pushing the brake against the rim are preferably two wedges, $l\,l$, adapted to slide crosswise of the line of motion of the brake and bearing upon the inclines of the head k'. The wedges have heads $l'\ l'$, which project through the sides of the stock and enable the wedges to be pushed in by the operator. When either or both of the wedges are pushed in they force the brake against the rim, and when said wedges are released the spring s forces the brake and wedges outwardly.

By the employment of the continuous rim j and the brake I am enabled at any time to stop the motion of the pendulum, regardless of the position of the stock.

It will be noticed that this level has no arbitrary base, and that it can be used correctly with any of its edges as a base, the finger indicating with equal exactness in a vertical, horizontal, or intermediate position the level or plane as truly as if an arbitrary base were used.

I claim as my invention—

1. A plumb-level having an apertured stock, by which the indications may be read from both sides thereof, and a weighted index suspended between and supported in sockets in glass sides, in combination with such glass sides inclosing the aperture and forming a dust-tight chamber thereof, substantially as shown and described.

2. The combination of an apertured level-stock, a lining for such aperture, having parallel edges, glass sides to such aperture, retained in parallelism by such lining and exterior confining-plates, and an index or finger suspended between the glass plates, substantially as shown and described.

3. A level having a suspended weighted index or indicating-finger, in combination with a spring-brake and transversely-moving mechanism acting upon said brake to impart to it longitudinal movement, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 4th day of August, 1879.

IGNATIUS S. WINTER.

Witnesses:

C. F. BROWN,

GEO. W. PIERCE.