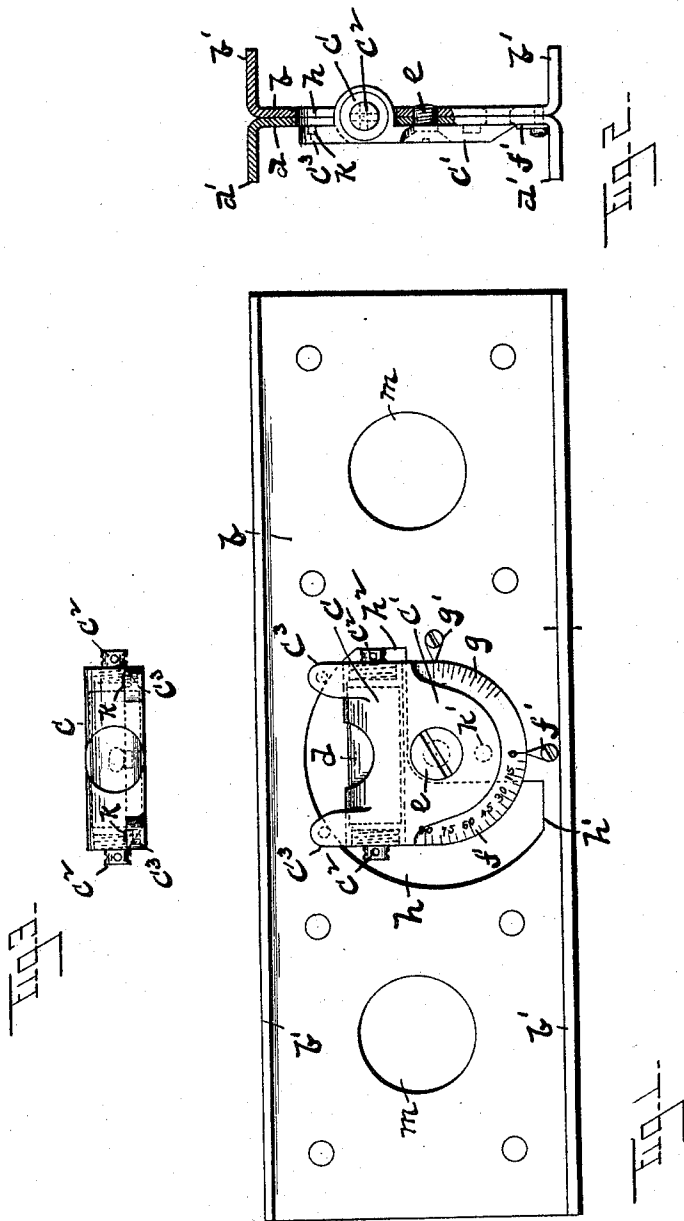


(No Model.)

W. M. MORTON.
INCLINOMETER.

No. 581,938.

Patented May 4, 1897.



WITNESSES:

George E. Hall
J. E. Chapman

INVENTOR
Wm. M. Morton
BY
J. E. Chapman
ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM M. MORTON, OF NEW HAVEN, CONNECTICUT.

INCLINOMETER.

SPECIFICATION forming part of Letters Patent No. 581,938, dated May 4, 1897.

Application filed February 8, 1896. Serial No. 578,478. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. MORTON, a citizen of the United States, residing at New Haven, county of New Haven, and State of Connecticut, have invented a new and useful Improvement in Inclinometers, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

My invention relates to instruments of the spirit-level order for indicating horizontal and vertical surfaces and also surfaces standing at any degree of inclination between the vertical and horizontal; and its object is to provide a simple and comparatively inexpensive form of instrument for this purpose which will possess great strength and durability, will be of comparatively light weight, will have simple but effective means of adjustment for securing perfect accuracy of its indications, and will indicate not only the degree of angularity of an inclined surface, but also the number of inches of rise to the foot of the same.

To these ends my invention consists in the inclinometer constructed and operating as hereinafter fully described, and particularly pointed out in the claims.

Referring to the drawings, in which like letters designate like parts in the several views, Figure 1 is a side view of an inclinometer embodying my invention. Fig. 2 is an end view, partly in cross-section, thereof. Fig. 3 is a plan view of the bubble-glass case detached.

In its preferred form the frame of the instrument devised by me is composed of sheet-steel, and as herein shown it consists of two plates *a b*, placed in contact with each other and riveted together, as shown, said plates terminating at their upper and lower edges in the laterally-bent flanges *a' b'*, which together form the top and bottom of the instrument. The frame thus constructed possesses great strength and rigidity, while being of considerably less weight than those heretofore employed, can be manufactured at a comparatively small cost, and presents a neat and pleasing appearance. Midway between the ends of said frame is located the bubble-glass case *c*, which is of tubular form to receive the bubble-glass *d*, and is provided at

one side thereof with the depending flange *c'*, through a hole in which passes the pivot-screw *e*, by which the case is secured to the frame. The outer edge of said flange *c'* forms the arc of a circle of which said pivot-screw is the center, said edge being preferably beveled, as shown, and upon said flange are formed the series of graduations *f*, indicating, in connection with a stationary pointer *f'* on the frame, degrees of inclination, and also the series of graduations *g*, indicating, in connection with a stationary pointer *g'*, the number of inches of rise to the linear foot, in a manner which will be obvious from an inspection of Fig. 1. The bubble-glass case proper lies within an opening *h* in the frame, the wall of which opening forms a half-circle concentric to the pivot-screw *e* and terminates in the two flat surfaces *h' h''*, which are perpendicular to each other, which surfaces serve as stops to limit the rotary movement of the case *c* in opposite directions. The ends of said case *c* are closed by two screws *c³*, having spanner-holes through the heads thereof, as shown, which screws serve the double function of permitting the removal of a broken bubble-glass from said case and the insertion of a new one by removing the case from the frame and also of accurately adjusting the case at each end of its traverse to cause its indication of horizontal and vertical planes to be exactly true, said screws coacting with the stops *h' h''* to limit the movement of the case in both directions.

The case *c* is preferably provided with the two upwardly-projecting ears or lugs *c³*, located at or near its opposite ends, which lugs bear against the side of the frame at the margin of the opening *h* and serve to steady the movement of the case.

To avoid wear of the parts and to facilitate easy movement of the case, I prefer to locate buffers *k*, of leather or similar material, within recesses in the inner face of said ears or lugs *c³*, as shown in Figs. 2 and 3 and by dotted lines in Fig. 1, and a third buffer *k'* in a similar manner on the inner face of the flange *c'*, (see dotted lines in Fig. 1,) which buffers bear against the side of the frame and secure the results above stated. The frame may be provided with additional openings *m* to decrease its weight, if desired.

The case c being adjusted by means of the screws c^2 to cause the bubble in the glass d to stand exactly at the center of said glass at the two extremities of its movement and the
 5 two pointers f' and g' being set at the zero-point of their respective graduations when the case occupies its "level" position, the instrument is ready for use for all of the purposes for which inclinometers are now used
 10 and also as the ordinary level and plumb.

I do not wish to restrict myself to the use of the bubble-glass case c in connection with the particular form of frame herein shown and described, as it is obvious that various
 15 other forms of sheet-metal and other frames can be used without affecting the action of said case.

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

1. In an inclinometer, the combination with a frame provided with a transverse opening the end walls of which stand at a right angle to each other, of a bubble-glass case projecting laterally within said opening from a support which is pivotally connected to the side of said frame, said case being provided with adjustable contact devices which close the ends thereof and are adapted to engage the
 25 end walls of said opening to limit the movement of the case in opposite directions, substantially as set forth.

2. In an inclinometer, the combination with a frame provided with a transverse opening
 35 the end walls of which stand at a right angle to each other, of a tubular bubble-glass case

located within said opening and having a depending flange by which it is pivotally connected to said frame, said case being provided at each end thereof with a removable screw, which screws make contact with the end walls of the opening in said frame at the two extremities of the movement of the case, substantially as described.

3. In an inclinometer, the combination with a frame composed of two plates of sheet metal riveted together to form the upright portion of the frame and having outwardly-bent flanges at their upper and lower sides to form the top and bottom of the frame respectively, of a bubble-glass case pivotally connected to the upright portion of said frame, and suitable stops on said frame for limiting the movement of said case about its pivotal center to one-fourth of a revolution, substantially as
 55 described.

4. The combination with the frame provided with the opening h terminating at its ends in the horizontal and vertical walls h' h^2 , of the bubble-glass case c projecting within said opening, said case being provided with the depending flange c' which is pivotally connected to the side of said frame at a point to one side of said opening and having the ears or lugs c^3 bearing against the side of said
 65 frame at the margin of said opening, substantially as described.

WILLIAM M. MORTON.

Witnesses:

WM. H. CHAPMAN,
 GEORGE E. HALL.