

PATRICK CLIFFORD

ASSIGNOR TO SELF AND JAMES DOYLE.

IMPROVEMENT IN ADJUSTABLE SPIRIT LEVELS.

PATENTED

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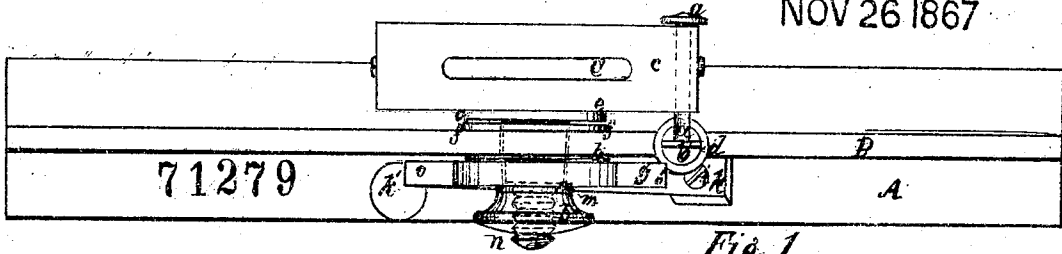


Fig. 1

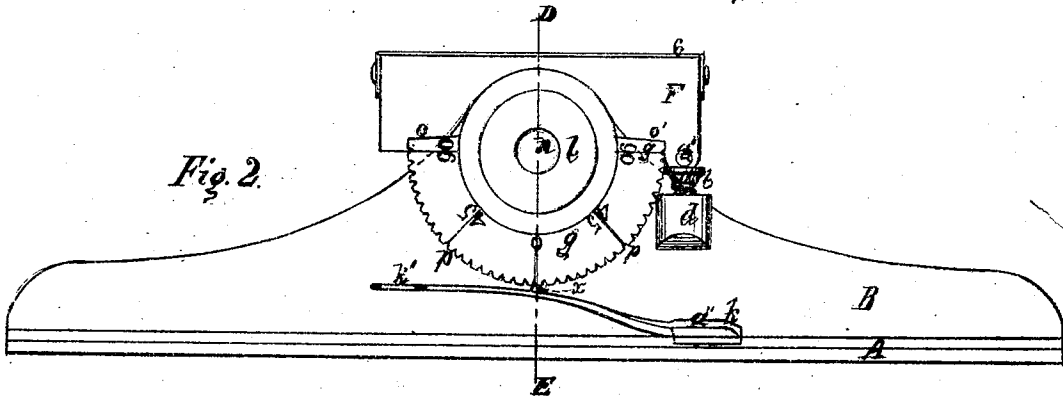


Fig. 2

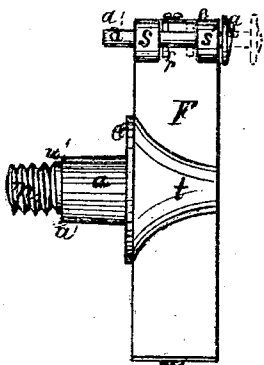


Fig. 3

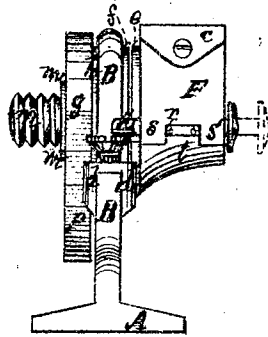


Fig. 4



Fig. 5

Witnesses.  
E. M. Brown  
C. D. Washburn

Patrick Clifford,  
By Buckland & Curtis  
his Attorneys.

Inventor.

# United States Patent Office.

PATRICK CLIFFORD, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND JAMES DOYLE, OF SAME PLACE.

Letters Patent No. 71,279, dated November 26, 1867.

## IMPROVEMENT IN ADJUSTABLE SPIRIT-LEVELS.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, PATRICK CLIFFORD, of Holyoke, in the county of Hampden, and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Adjustable Spirit-Levels; and I do hereby declare that the following is a full and exact description thereof, reference being had to the annexed drawings, making a part of this specification, and to the letters of reference marked thereon, in which—

Figure 1 is a plan of said level.

Figure 2 is a side elevation.

Figure 3 is a bottom plan of the level-case.

Figure 4 is an end elevation of said level.

Figure 5 is a transverse vertical section of the index-plate *g* through line D E, fig. 2.

The nature of my invention relates to certain improvements in adjustable spirit-levels, of the construction described in Letters Patent, granted to me for "improvement in combined level and plumb," No. 65,726, and dated June 11, 1867, in which a spirit-level, mounted in a small metallic case, is attached to a stock of metal or wood in such a manner that the said stock, having the level so attached, may be used as a level, a plumb, or for ascertaining the angles formed by the lines of any surface with the horizon.

My said improvements consist in attaching a graduated semicircular index-plate to the spindle on which the level-case turns; and in certain devices, by means of which the index-plate is retained in any certain position; and also in the construction of an adjusting-pin and screw, and appurtenant parts, by which the index-plate may be correctly set upon the spindle, if accidentally misplaced, or by which the accuracy of its adjustment may be tested at any time.

The construction of my invention is as follows: The stock consists of the straight face-plate A, of suitable length and width, and a flange, B, set at a right angle to A, and of curved outline, as shown. The stock may be constructed of metal or wood, according to the purpose for which it is to be used. The tube or "bubble" of the spirit-level is enclosed in a metallic case, F, and secured by the slotted plate *c*, the slot in which permits an inspection of the glass tube. A circular shoulder, *e*, is cast upon the side of the case F, of the same diameter as the shoulders *f* and *h* on the flange B of the stock. A spindle, *u*, projects at a right angle from the shoulder *e*, and is made slightly conical for a portion of its length to *u'*, and the remainder is turned of smaller diameter and a male-screw thread cut upon it. To strengthen the support of the shoulder and spindle, the curved projection *t* is cast upon the bottom of the level-case. The spindle *u* turns in a bearing in B.

As it is desirable to retain the level-case in any particular position in which it may have been adjusted, I substitute for the index, described in my before-granted Letters Patent, a graduated index-plate, *g*, and retain it in any desired position in its revolution by means of the spring detent *k*, which is fastened to the stock by the screw *i*, and depressed by the thumb-piece *k'*. The outer edge of this index-plate is circular from *o* to *o'*, and the central circular opening is made slightly flaring or conical to fit closely upon the spindle *u*, and turn with it, whenever the plate is forced tightly on the spindle, by turning the nut *l*. The shoulder *m m* (fig. 5) is projected from the index-plate *g*, as a bearing for the nut *l*, and the edge of the nut is milled to enable the operator to grasp it firmly in turning it. The edge of the index-plate is indented by the angular notches *p p* placed closely together in regular order. To insure accuracy of adjustment, all the notches upon the edge of the index-plate are made precisely alike, and the tooth *x* in the detent *k* is made to exactly fit these angular notches, so that the level-case is brought to the same exact position whenever the tooth *x* enters the same notch in the edge of the plate. I consider the angular form of the notches *p p*, and the corresponding shape of the tooth *x* to be a valuable adjunct to this form of level for insuring accuracy. It will be seen that the index-plate is graduated in degrees; but any suitable graduation may be adopted which is applicable to the purpose of the operator, such as a scale for determining the batter of walls and embankments, or any other necessary scales.

As the index-plate may sometimes become loosened or misplaced in the spindle, I employ the following-described construction, which enables the operator to readjust the index-plate on the spindle, or to test the accuracy of its adjustment. The two projections *s s'* are cast upon the bottom of the level-case F, and an

adjusting-pin,  $a'$ , is inserted in bearings formed in  $s s'$ , being thrust forward or drawn back by a head at the end. A small pin,  $r$ , limits the traverse of the adjusting-pin  $a'$ . Upon the flange B of the stock is a projection,  $d$ , in which is a seat for the screw  $b$ . The index-plate is to be set upon the conical spindle in such a position that the bubble indicates correctly a level position of the face of the stock when the tooth  $x$  enters the angular notch immediately beneath  $0^\circ$ , and the index-plate is then forced tightly upon the spindle by turning up the nut  $l$ . Now, when the level-case and the tooth  $x$  are in the position described, if the screw  $b$  be turned upward or downward until the adjusting-pin  $a'$  rests upon the head of the screw, the operator will have a ready means of adjusting the position of the index-plate on the spindle, or of testing its adjustment at any time. The head of the screw  $b$  is, for the time being, a fixed point, and will be likely to remain at the same elevation, while the index-plate is more liable to become misplaced on the spindle. When the pin  $a'$  is not in use for adjustment, it is drawn back to the position shown by the red lines, fig. 4, and does not then interfere with the movement of the level-case on the spindle. I do not confine myself to the particular form and construction of the stock A B, as any form of stock, which will afford a proper support for the spindle  $u$ , and for the adjusting-screw  $b$ , may be used.

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

1. The graduated index-plate  $g$ , having the angular notches  $p p$ , and central conical opening  $g'$ , in combination with the tapering spindle  $u$  and spring detent  $k$ , the whole arranged and operating substantially as set forth.

2. The adjusting-pin  $a'$  and screw  $b$ , in combination with the revolving level-case F and stock A B, substantially as described.

PATRICK CLIFFORD.

Witnesses:

C. BLODGETT,  
DONALD MACKINTOSH.