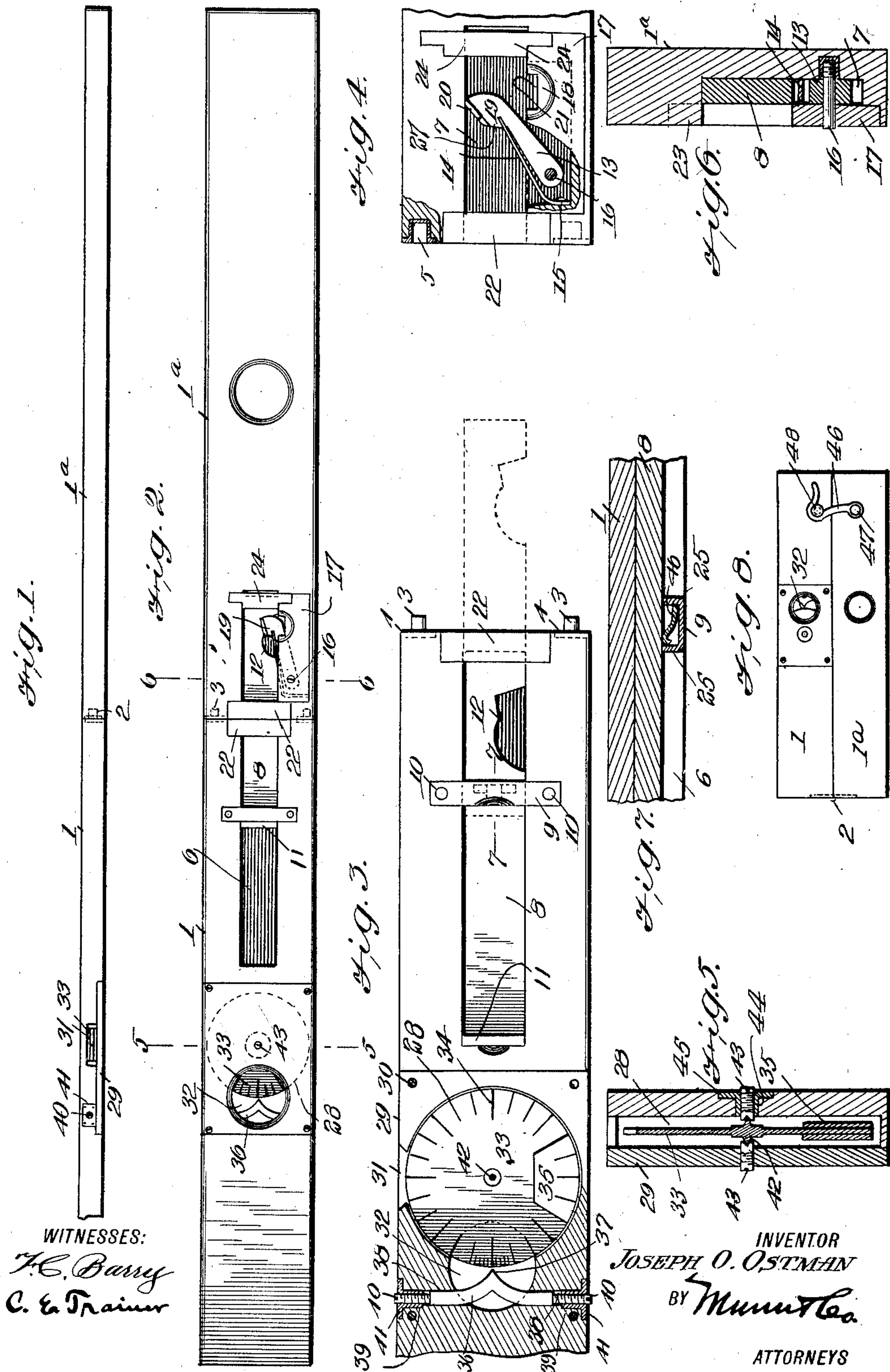


DIAL LEVEL.

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997,084.

Patented July 4, 1911.



UNITED STATES PATENT OFFICE.

JOSEPH O. OSTMAN, OF HANCOCK, MICHIGAN, ASSIGNOR OF ONE-THIRD TO AXEL IMMO AND ONE-THIRD TO ARTHUR ABRAMSON, BOTH OF HANCOCK, MICHIGAN.

DIAL-LEVEL.

997,084.

Specification of Letters Patent.

Patented July 4, 1911.

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To all whom it may concern:

Be it known that I, JOSEPH O. OSTMAN, a citizen of the United States, and a resident of Hancock, in the county of Houghton, State of Michigan, have invented certain new and useful Improvements in Dial-Levels, of which the following is a specification.

My invention is an improvement in dial levels, and consists in certain novel constructions and combinations of parts hereinafter described and claimed.

The object of the invention is to provide a folding level in which the usual tube of liquid having a bubble as an indicator is dispensed with, forming a stronger and more durable level and having an indicator that will respond more quickly to variations in level, and will show more clearly and closely the amount of variation.

A further object is to provide in a folding level an improved means for holding the sections in alinement, which will lock automatically and may be easily and quickly released and which will retain the sections in rigid alinement.

Referring to the drawings forming a part hereof: Figure 1 is a top edge view of the level; Fig. 2 is a side view; Fig. 3 is an enlarged side view of one section; Fig. 4 is a similar view of a part of the other section; Figs. 5 and 6 are sections on the lines 5—5 and 6—6, respectively, of Fig. 2; Fig. 7 is a section on the line 7—7 of Fig. 3; and Fig. 8 is a reduced side view of a modified form showing the level folded.

The embodiment of the invention shown in the drawing comprises a bar which is composed of a plurality of sections 1 and 1^a arranged end to end and connected in a manner to be described. As shown in Figs. 2, 3 and 4, one section 1 is provided at its inner or meeting end with a plurality of spaced pins 3, each of which is provided with a base 4 secured to the section, and the other section 1^a is provided at the corresponding end with a plurality of sockets 5 set into the material of the level for receiving the pins. Each section is also provided on one side at its inner end with a longitudinal recess 6 and 7, respectively, the recesses being in alinement, and a plate 8 is slidable in the recesses and is retained in place by cross straps 9 secured to the sections, as at 10, and extending across the recess.

The plate 8 is provided at one end with a

flange 11 for convenience in sliding the plate, and near the other end with a recess or notch 12, with which is adapted to engage a pawl or latch 13 pivoted at 16 in an opening in one side wall of the recess 7, and normally pressed into engagement with the notch by a spring 14, having one end secured to the section, as at 15, and the other engaging the latch.

A plate 17 is secured to the section over the opening, and the plate is provided with an enlargement 18 for receiving the head 19 of the latch. The said head is also provided with a lateral outwardly extending flange 20, and the enlargement is notched as shown at 21 to receive the flange when the latch is in disengaged position.

A reinforcing plate 22 is arranged on the side of each section over the inner end of the recess, each plate having a flange 23 for engaging the end of the section, the inner edge of the flange forming a guide for the plate in its sliding movement, and another plate 24 is arranged transversely of the outer end of the recess 7.

The cross strap 9 before mentioned is provided with a flange 25 at each edge intermediate its ends, and the flanges extend into the recess 6 (Fig. 7), also forming a guide for the plate 8.

The recess 6 of the section 1 is sufficiently long to receive the plate 8, so that the said plate may be entirely withdrawn into the recess, and it will be noticed from an inspection of Fig. 4 that the pawl is provided with an inclined or beveled surface 27, connecting the body portion with the head so that when the plate is moved into the recess 7 the end of the plate will engage the bevel surface and depress the pawl into the opening. The pawl is held in this position until the recess or notch 12 registers with the pawl, and the pawl is permitted to rise and enter the notch to prevent withdrawal of the plate. The sections are thus firmly locked in alinement, but may be released by depressing the pawl by means of the flange 20.

The section 1 is provided near its outer end with a circular opening or recess 28 in its side, which is normally covered by a plate 29 secured in place over the recess by screws 30. The recess communicates with the upper edge of the section by an opening 31, and a transverse circular open-

ing 32 in the section cuts the edge of the recess 28 at the outer side thereof.

A dial 33 is mounted for rotation in the recess 28 in any suitable manner, and each
5 face of the dial is provided with graduations 34. The edge of the dial extends into the circular opening 32, so that the graduations or scales may be inspected, and the dial is provided at a point on its periphery
10 with a weight 35.

An indicator 36 is provided for coöperating with the dial, and the said indicator consists of a rod which is bent upon itself at its center to form a point 37, and the
15 ends of the rod extend into vertical alined openings 38, extending upwardly and downwardly from the circular opening 32. The weight 35 retains that portion of the circumference of the dial at all times in a
20 dependent position, that is it retains the dial relatively fixed with respect to the bar. The weight is so arranged that when the bar is in a horizontal position the zero mark of the scale will be opposite the point 37,
25 and the deviation from the point will indicate the extent of the angle the bar makes with the horizontal.

Each of the openings 38 has fitted into its outer end an internally threaded socket
30 39 provided with a marginal lateral flange 41 at its outer end, and a screw 40 is threaded into each socket and engages the adjacent end of the indicator with its inner end. By turning the screws 40 the position of the
35 point may be adjusted transversely of the opening 32.

As before stated, the dial may be mounted in any suitable manner, but must be very delicately adjusted, so that the slightest
40 possible amount of friction obtains. The preferred mounting shown in Fig. 5 consists of points 42 secured to each face of the dial at its axis and extending in opposite directions, the points being engaged with recessed seats in the ends of screws 43.

The screw 43 which passes through the plate 29 is threaded through the plate, which is of metal, and the other is threaded through a socket 44 which is let into the bar,
50 and is provided with a marginal flange 45 countersunk in the bar. By turning the screws the dial may be adjusted laterally in the recess. The end walls of the opening 31 are beveled, as shown in Fig. 3.

In use the sections of the bar are arranged as shown in Figs. 1 and 2, the pins 3 of the section 1 being inserted in the sockets 5 of the section 1^a, and the plate 8 engaging both
55 recesses 6 and 7 and locked in position by the pawl. When now the level is laid on a beam or the like, the deviation of the beam from the horizontal will be indicated in subdivisions of degrees, the dial being thus graduated.

65 The scale is so arranged with respect to

the weight that the amount of deviation will be indicated by the scale, and as the dial is held relatively fixed by the weight, the angular movement of the bar with respect thereto will be clearly shown by the
70 scale. The level may be used in vertical position with equal facility and the indicator and point may be adjusted by means of the screws.

In the embodiment shown the bar is of
75 wood and the sockets for the screws are of metal, as are also the various reinforcing plates. It will be evident that the bar might be of metal, in which case minor changes would be made to suit the new
80 conditions.

The improved level is much stronger and more durable than a spirit level, since there is no glass used in its constructions. With a spirit level the bubble is necessarily of
85 some length, and it is a matter of difficulty to secure an accurate adjustment, and practically impossible to obtain a quick adjustment. The graduations 34 are formed by slotting the peripheral edge of the dial radi-
90 ally, so that the said graduations may be seen through the opening 32. A spring 46 is arranged between the flanges 25 of the cross strap, and the spring bears against the plate to hold it firmly against the bottom
95 of the recess as shown.

In Fig. 8 is shown a level especially adapted for masons' use, and the sections 1 and 1^a are connected at one edge by a hinge
100 2. When folded, the sections are held by a hook 46 pivoted to the section 1^a at 47, and the hook engages a pin 48 on the section 1. The construction is otherwise the same.

I claim:

1. A device of the character specified, comprising a bar having near one end a circular
105 recess, and having a transverse circular opening intersecting the recess at one side, the recess having an opening leading to one edge of the bar, a dial arranged parallel
110 with the plane of the bar in the recess, said dial being weighted at one side and having an annular scale on each side, a plate covering the recess, said dial having laterally
115 projecting pins on each side and at the center thereof, screws threaded through the bar and plate and engaging the pins, said screws having recesses at their inner ends
120 for receiving the pins, the edge of the dial extending into the transverse opening, an indicator in said opening, said indicator comprising a rod having a lateral bend at
125 its center, said bend being pointed and co-operating with the scale on the dial, threaded sockets in the bar at the ends of the rod, said rod being arranged in the same plane with the dial and parallel with a diameter thereof, and a screw threaded through each socket and engaging the adjacent end of the
130 rod.

2. A device of the character specified, comprising a bar having intermediate its ends in one side a substantially circular recess, a plate covering the recess and detachably secured to the bar, said bar having a substantially circular transverse opening there-
 5 through and intersecting one edge of the recess, a dial mounted to rotate in the recess, said dial having a scale on each face and being arranged parallel with the side of the bar and extending into the transverse opening, said dial having at each side at its center a laterally extending pin, screws threaded through the bar and the plate and en-
 10 gaging the pins, an indicator in the transverse opening, said indicator comprising a rod having intermediate its ends a lateral point extending toward the edge of the dial, and screws threaded through the bar and
 15 engaging the ends of the rod, said rod being in the plane of the dial and parallel with a diameter thereof.

3. A device of the character specified, comprising a bar having intermediate its ends
 25 in one side a substantially circular recess, a plate covering the recess and detachably secured to the bar, said bar having a substantially circular transverse opening there-
 30 through and intersecting one edge of the recess, a dial mounted to rotate in the recess, said dial having a scale on each face and being arranged parallel with the side of the bar and extending into the transverse opening, said dial having at each side at its center a laterally extending pin, screws threaded
 35 through the bar and the plate and engaging the pins, an indicator in the transverse opening, said indicator comprising a rod having intermediate its ends a lateral point extending toward the edge of the dial, and screws threaded through the bar and engaging the
 40 ends of the rod.

4. A device of the character specified, comprising a bar having intermediate its ends in
 45 one side a substantially circular recess, a plate covering the recess and detachably secured to the bar, said bar having a substantially circular transverse opening there-
 50 through and intersecting one edge of the recess, a dial mounted to rotate in the recess, said dial having a scale on each face and being arranged parallel with the side of the bar and extending into the transverse opening, means for adjusting said dial laterally
 55 in either direction, an indicator in the transverse opening cooperating with the dial, and means for adjusting said indicator in a direction transverse to the axis of the dial and parallel to a diameter thereof.

5. A device of the character specified, comprising a bar having intermediate its ends in
 60 one side a substantially circular recess, a plate covering the recess and detachably secured to the bar, said bar having a substantially circular transverse opening there-

through and intersecting one edge of the recess, a dial mounted to rotate in the recess, said dial having a scale on each face and being arranged parallel with the side of the bar and extending into the transverse opening, means for adjusting the dial laterally, an
 70 indicator in the transverse opening cooperating with the dial, and means for adjusting said indicator transversely of the axis of the dial.

6. A device of the character specified, comprising a bar having a recess in one side, and having a transverse opening intersecting one end of the recess, a plate covering the recess and detachably connected with the bar, a
 80 dial mounted to rotate in the recess and on an axis transverse to the bar, means for adjusting the dial laterally, said dial having a scale on its face, a weight on one side of the axis of the dial, a rod provided with an
 85 indicator in the transverse opening and arranged transversely of the axis of the dial, and means for adjusting the rod longitudinally.

7. A device of the character specified, comprising a bar having a recess in one side,
 90 and having a transverse opening intersecting one end of the recess, a plate covering the recess and detachably connected with the bar, a dial mounted to rotate in the recess
 95 and on an axis transverse to the bar, means for adjusting the dial laterally, said dial having a scale on its face, a weight on one side of the axis of the dial, an indicator in the transverse opening, and means for ad-
 100 justing said indicator transversely of the axis of the dial.

8. A device of the character specified, comprising a bar having a recess in one side,
 105 and having a transverse opening intersecting one end of the recess, a plate covering the recess and detachably connected with the bar, a dial mounted to rotate in the recess and on an axis transverse to the bar, means
 110 for adjusting the dial laterally, said dial having a scale on its face, a weight on one side of the axis of the dial, and an indicator in the transverse opening cooperating with the dial.

9. A device of the character specified, comprising a bar provided intermediate its
 115 ends with a recess between the side walls thereof and having a transverse opening intersecting one end of the recess, a dial mounted for rotation in the recess on an
 120 axis transverse to the bar, said dial having a scale on its face, a weight on one side of the axis of the dial, an indicator in the transverse opening cooperating with the dial, means for adjusting the dial laterally,
 125 and means for adjusting the indicator transversely of the axis of the dial.

10. A device of the character specified, comprising a bar provided intermediate its
 130 ends with a recess between the side walls

thereof and having a transverse opening intersecting one end of the recess, a dial mounted for rotation in the recess on an axis transverse to the bar, said dial having a scale on its face, a weight on one side of the axis of the dial, an indicator in the transverse opening cooperating with the dial, and means for adjusting the dial laterally.

11. A device of the character specified, comprising a bar provided intermediate its ends with a recess between the side walls thereof and having a transverse opening intersecting one end of the recess, a dial mounted for rotation in the recess on an axis transverse to the bar, said dial having a scale on its face, a weight on one side of the axis of the dial, an indicator in the transverse opening cooperating with the dial, and means for adjusting the indicator transversely to the axis of the dial.

12. A level, comprising a bar composed of a plurality of sections, one of said sections having a plurality of projecting pins at one end, and the other a plurality of sockets for receiving the pins, each of said sections having one side longitudinally recessed, the recesses registering when the sections are in alinement, a plate, means for slidably connecting the plate to one bar, the plate being slidable in the recesses and of a length to

be received in the recess of the bar to which it is connected, said plate having a notch in one edge, a pawl pivoted on the other section, a spring pressing said pawl into engagement with the notch, and means on the pawl whereby it may be moved out of engagement with the notch.

13. A level, comprising a bar composed of a plurality of sections, one of said sections having a plurality of projecting pins at one end, and the other a plurality of sockets for receiving the pins, and a plate slidably connected with one section, the other section having means for engagement by the plate, and a pawl pivoted on said other section, the plate having a notch for engagement by the pawl.

14. A level, comprising a bar composed of a plurality of sections, one of said sections having a plurality of projecting pins at one end, and the other a plurality of sockets for receiving the pins, a plate slidably connected with one section, the other section having means for engagement by the plate, and means on said other section for engaging the bar to prevent withdrawal thereof.

JOSEPH O. OSTMAN.

Witnesses:

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SAM JUNTILA.