(No Model.)

O. I. LEWIS.

PLUMB LEVEL.

No. 397,010. Patented Jan. 29, 1889.

FIG.1.

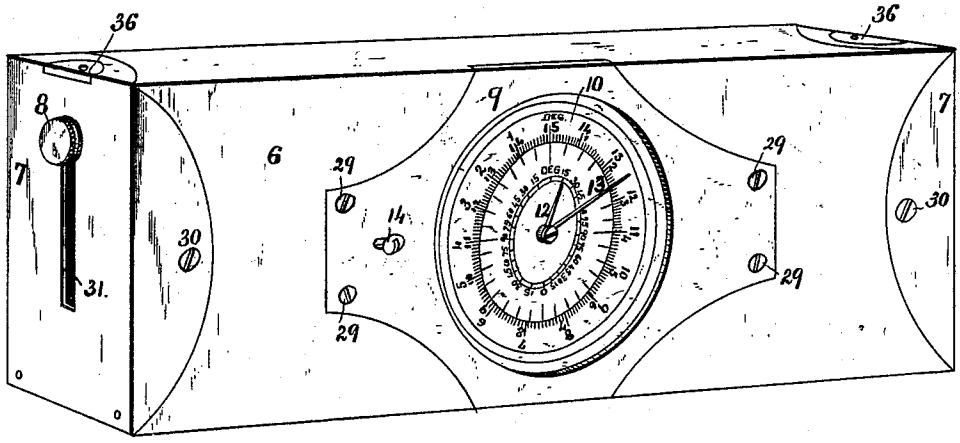


FIG.2.

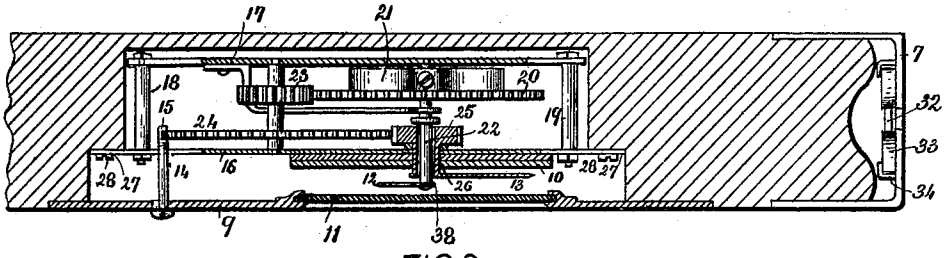


FIG.3.

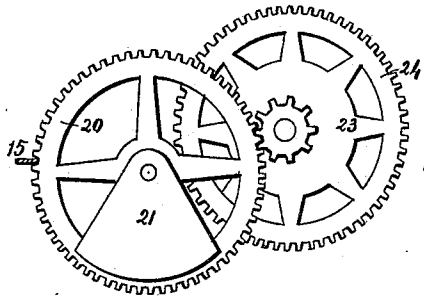


FIG.4.

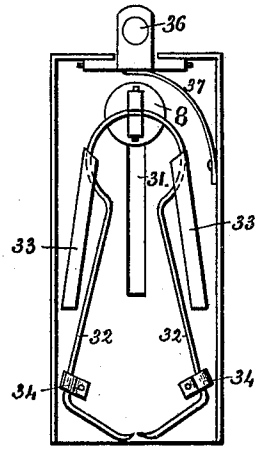
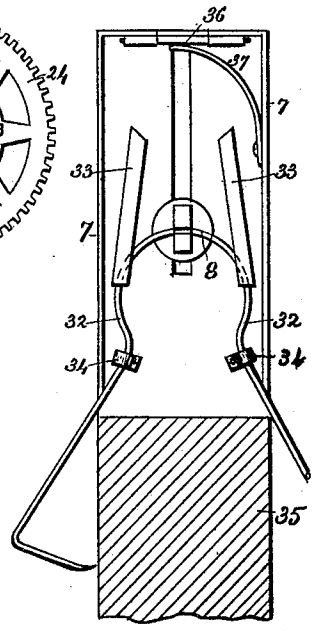


FIG.5.



ATTEST

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UNITED STATES PATENT OFFICE.

OLIVER I. LEWIS, OF NEBRASKA CITY, NEBRASKA.

PLUMB-LEVEL.

SPECIFICATION forming part of Letters Patent No. 397,010, dated January 29, 1889.

Application filed July 23, 1888. Serial No. 280,830. (No model.)

To all whom it may concern:

Be it known that I, OLIVER I. LEWIS, a citizen of the United States of America, residing at Nebraska City, in the county of Otoe and State of Nebraska, have invented certain new and useful Improvements in Plumb-Levels, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in plumb-levels; and the objects of my improvements are to provide a means of accurately determining the deflection from a vertical or horizontal line in degrees and inches, and registering such deflection. I also provide a means of attaching the plumb-level to a straight-edge, and by means of sights provide a means of determining a straight line between any two points.

In the drawings, Figure 1 is a perspective view of my device. Fig. 2 is a horizontal section. Fig. 3 is a side elevation of the weight and gearing viewed from the rear, omitting the pinion 25. The stop 15 is shown in section. Fig. 4 is an elevation of the clamp and sight, the plate being removed from end of block and turned over, disclosing clamping device on the inside retracted and sight elevated. Fig. 5 is the same, showing sight lowered and clamping device extended and in act of clamping straight-edge, (shown in section,) one arm of clamp being cut away.

Similar numbers refer to similar parts throughout the several views.

In Fig. 1, number 6 represents a block of wood or other suitable material of any dimensions desirable, having a doubly-rabbeted mortise, in which the train is placed, as hereinafter more fully described. I prefer a block of wood from two to three feet long, three and one-quarter inches wide, and one-quarter inch thick, having on its front surface an excavation of sufficient depth to receive the works actuating the indices, which excavation is centrally located with reference to ends and sides, the back being solid, as shown in section, Fig. 2. The ends of the block are grooved, as shown in Fig. 2, to receive the clamping device attached to plate 7, as shown in Figs. 4 and 5. The cap-plate 9, having in its center the circular glass 11, (shown in Fig. 2,) serves to inclose the works and exclude dust. This plate is attached to the block by screws 29 29 29 29. In the cap-plate 9 there is the stop-button 14, by which the stop 15 (shown in section, Fig. 3) is operated, the stop being attached to the button.

The dial 10 has indicated upon the outer scale degrees and tenths of degrees; on the inner scale, degrees, said inner scale being subdivided into four groups of ninety degrees each. I may insert proper scale to indicate rise of inches per foot. The figures on the dial are to be read either to the right or left, as may be indicated by the direction of the hands 12 and 13, both hands moving in the same direction.

The works, consisting of a weight and train of wheels and pinions, hereinafter described, are inclosed between the front plate, 16, and rear plate, 17, rigidly fastened together by the posts 18 and 19, and post similar to post 19. (Not shown in the drawings.) The wheel 20 has rigidly attached to it a weight, 21, and at the front end of the arbor 22 the short hand 12 outside of the dial 10. On the periphery of wheel 20 are sixty cogs, which engage the pinion 23, of ten cogs, which is fastened to the arbor of wheel 24, having upon its periphery sixty cogs, which engage the pinion 25, of fifteen cogs. (Shown in Fig. 2, but concealed in Fig. 3.) This pinion 25 is attached to the sleeve 26 on the arbor 22. The sleeve 26 carries on its front the hand 13 outside the dial 10. By this train of wheels, cogs, and pinions it will be seen that the long hand 13 will travel round the circle while the short hand 12 is moving through the space marked as fifteen degrees, or that the long hand will revolve twenty-four times while the short hand revolves once. By gravity the weighted wheel 20 will always assume a vertical position, and will cause the short hand 12 to assume that position. Any deflection of the block 6, carrying the works, from a horizontal position will cause the hands to move correspondingly, indicating the degree of deflection in groups of fifteen degrees by the short hand, and parts of fifteen degrees, in degrees and tenths of degrees, by the long hand. Thus, if the short hand 12 has moved past the point 15 of degrees and the long hand 13 has moved to the point marked fourteen degrees on the outer scale of degrees, the deflection will be twenty-nine degrees; so tenths of degrees are likewise indicated by the long hand 13.

By means of the stop 15, which may be moved inwardly by pressure upon the stop-

button 14, to engage a cog on the wheel 20, the train of wheels is locked, and deflection, as indicated at the time of engagement, remains so indicated until the stop is released. This stop 15 may also be used to lock the train of wheels when device is not in use, thus preventing needless wear and tear. It is apparent that by a change of the graduated scale upon the dial, or an addition thereto with additional gearing and hands, the metric system or any other desired unit of measurement may be brought into use, separate or along with that shown herein. The outer plate, 16, is provided with lugs 27 27, upon which the works rest, being fastened to shoulders provided therefor in the block 6 at 28 28 by means of convenient screws, thus holding the works in place. The dial 10 is rigidly fixed upon the outer plate, 16.

Instead of the supporting device heretofore described, the following (not shown in the drawings) may be used: The train may be inclosed in a drum or cylindrical cup having one end closed, to the opposite sides of which projecting arms may be rigidly affixed supporting the arbor 22 and one end of the arbor of pinion 23 and wheel 24, as shown in Fig. 2, the other end being supported by front plate neatly fitting the cylinder and inclosing the train. Outside the plate and rigidly attached to the surface thereof the dial 10 should be placed. The arbor carrying the short hand 12 and sleeve 26, as shown in Fig. 2, should project beyond the dial. The end of the drum should project far enough beyond the hands or indices to afford them free movement under the glass, which should close the front of the drum tightly, being held in place by a removable rim having a shoulder in which the edge of the glass will rest. This rim should be adjusted by means of suitable screws passing through it and engaging the top edge of the drum.

The drum containing and supporting the actuating machinery may be inserted into an orifice prepared for its reception in the stock and held in place by means of screws driven through the sides of the drum and engaging the stock at convenient points between the glass and the dial. In this form of construction the weight 21 may be detached from the wheel 20, (see Fig. 2,) and the stop 15 will engage the wheel 24 (see Fig. 2) by a projecting shoulder on the lower end of the said stop operating through a slot in the side of the drum for that purpose when the stop-button 14 (see Fig. 1) is pressed inwardly.

The clamping device attached to the ends of the block 6 are covered by the plate 7, Fig. 1, and attached to the block by means of the screws 30 30 and their counterparts on the side opposite to that shown in the drawings. This plate has a slot, 31, Figs. 1 and 4, in which the button 8, Fig. 1, is intended to be operated. Attached to the button 8, on the inner side within the plate 7, as shown in Fig. 4, is a spring-clamp, 32, bearing against plates 33 33 and operating in guides 34 34. The extremities of the spring-clamp 32 terminate in sharp points, hook-shaped, prepared to penetrate and hold to wood or similar substance. By depressing the button 8 the hooked points will be pressed down and outward, opening as the downward pressure is continued. On suddenly releasing the button the spring will recoil, and the sharp points will be driven into any soft substance between them. By this means the device may be readily attached to a straight-edge board when convenience in use makes that desirable. The clamps may also be used for suspending the device.

Fig. 5 shows the button 8 depressed and the sharp points of the spring 32 separated and ready to clamp the board 35, (shown in section.) Upon the top of plate 7 there is hinged a sight, 36 36, which may be raised or lowered at will. This sight is kept in place, either raised or lowered, by the bearing of the flat spring 37. The arbor of the sight 36 is squared, and the spring 37 bears upon the squared portion of said arbor. The short hand 12 is fixed to the arbor 22 by means of a nut, which holds the hand tightly against a shoulder on the end of the arbor.

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

1. In a plumb-level, the oscillating weighted wheel 20, the pinion 23, the cog-wheel 24, and pinion 25, in combination with the plates 16 and 17, posts 18 and 19, supporting train, hands 12 and 13, sleeve 26, and graduated dial 10, as and for the purposes described.

2. In a plumb-level, the doubly-rabbeted stock 6, in combination with plate 9, carrying glass 11, seated in the outer rabbet, and frame-work composed of plates 16 and 17, connected by the posts 18 19, supported in the inner rabbet by screws 28 through lugs 27, and the actuating mechanism supported by said frame-work, as and for the purposes described.

3. In a plumb-level, the hinged sights 36 36, in combination with the level-stock, springs 37, and plate 7, carrying the hinged sights and forming the end plates of the stock.

4. In a plumb-level, the stop 15, in combination with oscillating wheel 24 and plates 16 and 9, having slots in which stop moves, as and for the purposes described.

5. The spring 32, in combination with the bearing-plates 33 33, guides 34 34, the button 8, slot 31, and plate 7, as and for the purposes described.

6. In a plumb-level, the spring 32, the bearing-plates 33 33, guides 34 34, the button 8, slot 31, and plate 7, in combination with the block 6.

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

OLIVER I. LEWIS.

Witnesses:

JNO. B. VAN DYKE,

E. M. CHASE.