No. 632,182. Patented Aug. 29, 1899.

C. D. HODGE.

COMBINED LEVEL, PLUMB, AND INCLINOMETER.

(Application filed Mar. 28, 1898.)

(No Model.)

Fig. 1.

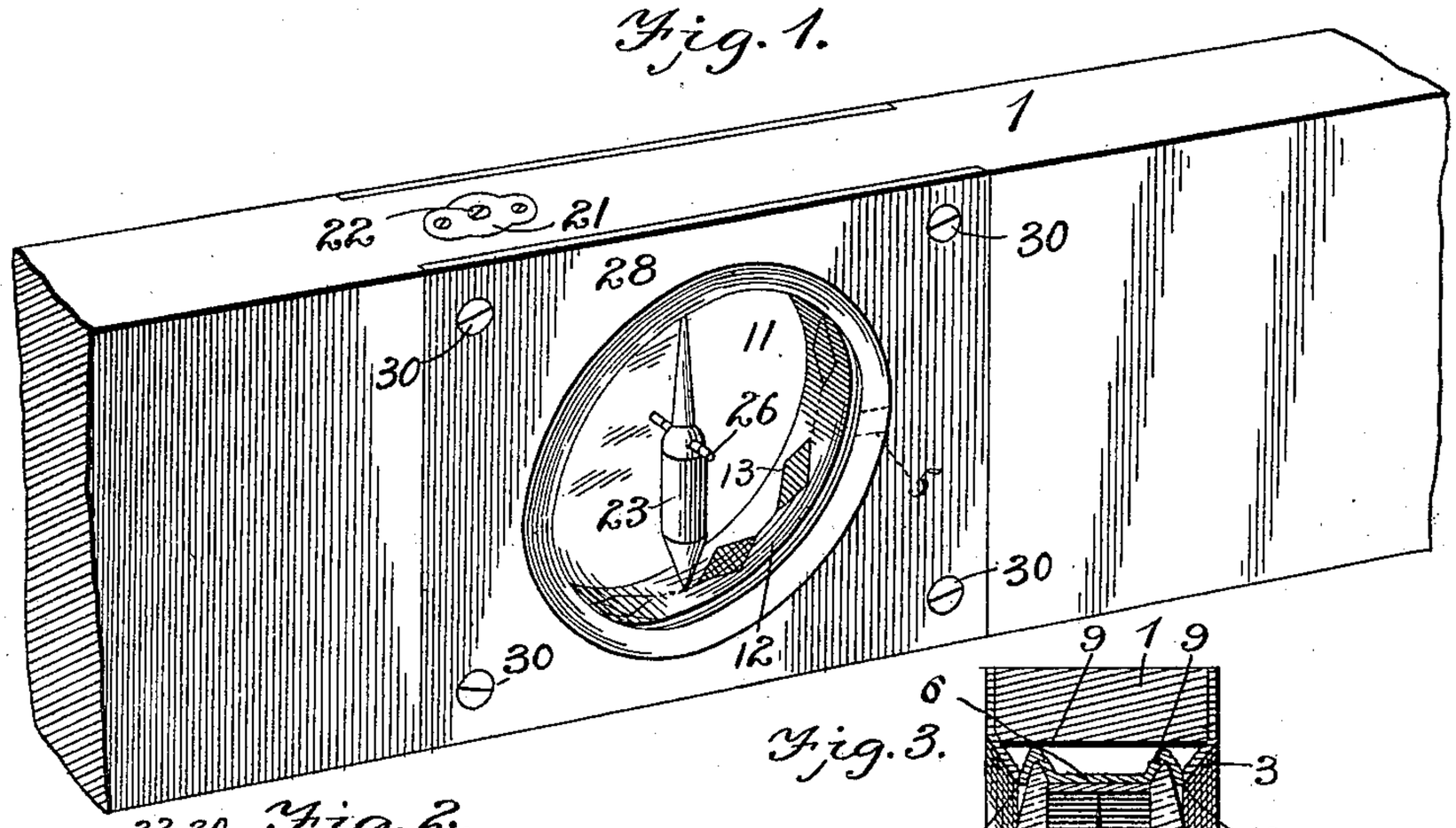


Fig. 2.

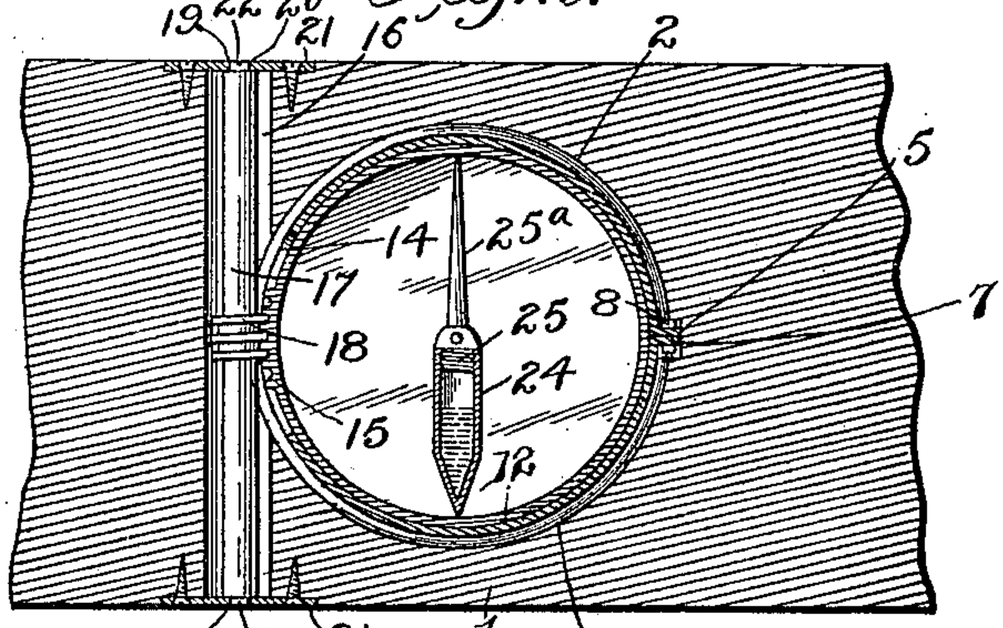


Fig. 3.

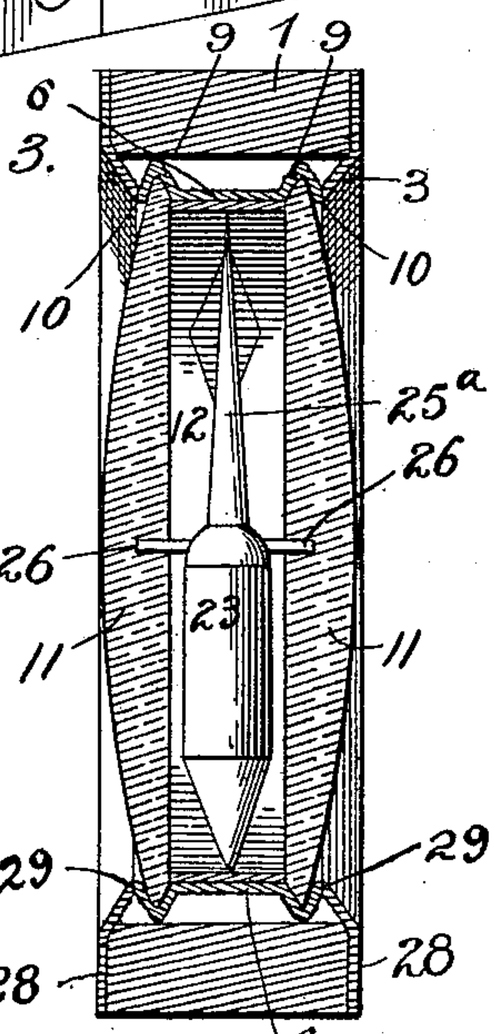


Fig. 4.

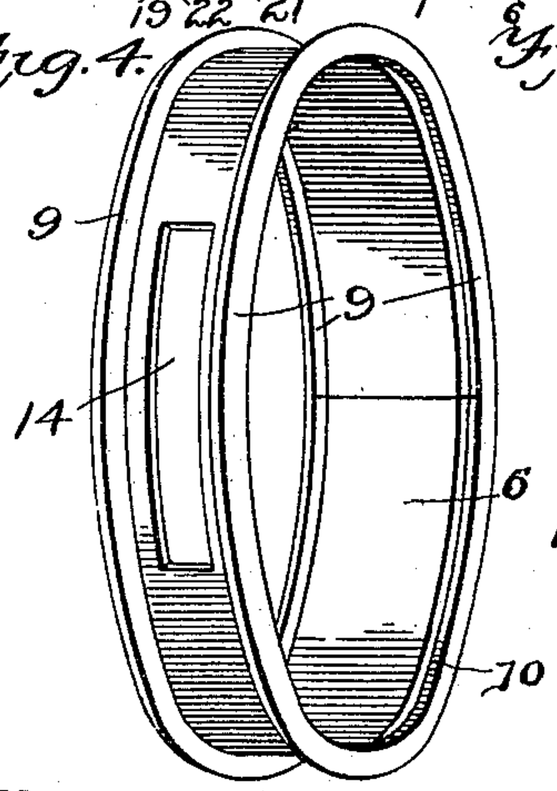


Fig. 5.

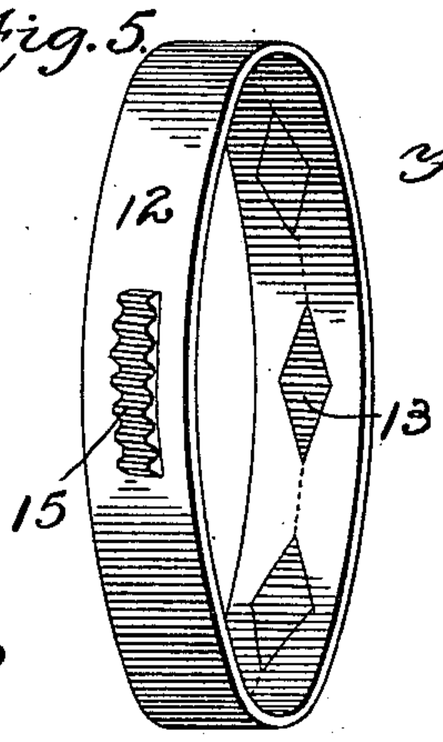
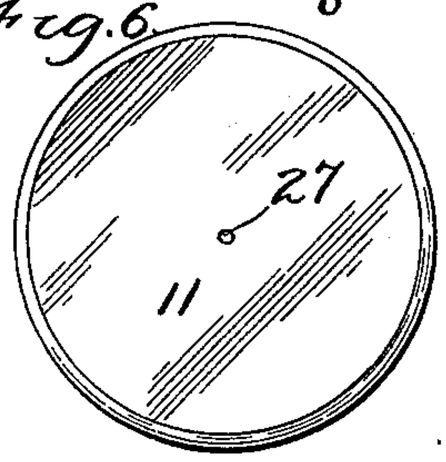


Fig. 6.



Witnesses
Edwin G. McKee
Edwin Cruse.

Inventor
Clinton D. Hodge

By his Attorneys
C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

CLINTON D. HODGE, OF WATERTOWN, NEW YORK.

COMBINED LEVEL, PLUMB, AND INCLINOMETER.

SPECIFICATION forming part of Letters Patent No. 632,182, dated August 29, 1899.

Application filed March 28, 1898. Serial No. 675,444. (No model.)

To all whom it may concern:

Be it known that I, CLINTON D. HODGE, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented a new and useful Combined Level, Plumb, and Inclinometer, of which the following is a specification.

The invention relates to combined levels, plumbs, and inclinometers in which a pivoted plumb-bob serves as an index-hand or pointer for a scale which is secured within the device.

The objects of the invention are to improve and simplify the construction of devices of this character, whereby but a few parts will be required to make a practical, efficient, and accurate device, thereby greatly decreasing the cost of these articles.

With these and other objects in view the invention consists of the several details of construction and combination of parts hereinafter fully described, and particularly pointed out in the claims hereto appended.

In the drawings, Figure 1 is a perspective view of a portion of a level embodying my invention. Fig. 2 is a vertical longitudinal section through the indicating devices. Fig. 3 is a vertical transverse section. Fig. 4 is a perspective view of the outer ring which serves as a support for the lenses. Fig. 5 is a perspective view of the ring on which the scale is formed. Fig. 6 is a plan view of one of the lenses.

Similar reference-numerals indicate similar parts in the several figures.

1 indicates a bar of wood or other suitable material similar to that employed for the ordinary spirit-level and the upper and lower sides of which are parallel. This bar may be of any size or length as the manufacturer may determine. Midway the length of this bar 1 a circular opening 2 is formed which extends transversely through it. The edges of this opening on each side of the bar are beveled, as indicated at 3. A recess 5 is also formed at one side of the opening, as clearly shown in Fig. 2.

6 indicates a metallic split ring, the meeting ends of which are bent outwardly at a right angle to form flanges 7, and these flanges are adapted to be firmly secured together by bolts 8 or other similar securing devices. The flanges 7 are adapted to fit within the recess 5 to hold the ring 6 stationary within the transverse opening of the bar. At each edge of this ring annular V-shaped beads 9 are formed, which project outwardly from the main portion of the ring. V-shaped annular grooves 10 are also formed in the inner periphery of the ring 6, and these grooves form seats for the lenses 11, which will be firmly secured within their seats when the flanges 7 are bolted together. It will be noted that in forming the annular beads upon the stationary ring they also provide the grooves 10.

12 indicates an inner ring which may be of metal or any other suitable material, and on the inner face of which a scale 13 is formed in any desired manner. This ring 12 fits snugly within the ring 6 and lies between the inner faces of the lenses 11.

The ring 6 is provided on one side with an elongated opening 14, and the ring 12 is provided on its outer face with a toothed lug 15, which projects through the opening 14 in the ring 6.

16 indicates a bore extending vertically through the bar 1, and midway its length this bore intersects one side of the opening 2, and the toothed lug 15 projects at its point into the bore 16. A rod 17 fits loosely within the bore 16 and is provided midway its length with a worm 18, which engages the toothed lug 15 on the ring 12. Each end of the rod 17 is reduced, as indicated at 19, and these reduced ends are seated in openings 20 in plates 21, which are firmly secured to the bar 1, the said plates being let in flush with the surface of the bar. Each end 19 is provided with a notch or recess 22 for the reception of a screw-driver, by means of which the rod 17 may be turned from either end, and thereby cause the worm 18 to operate the toothed lug 15 on the ring 12 for the purpose of adjusting the latter to bring the scale into proper position.

23 indicates a plumb-bob which is made in two sections adapted to be screwed together, as indicated at 25 in Fig. 2. The lower section 24 of the plumb-bob is hollow in order that a heavy liquid may be contained in it for the purpose of quickly bringing the plumb-bob to the center of gravity and decreasing its oscillation. The upper section 25^a of the plumb-bob is provided with spindles 26, ex-

tending from it at diametrically opposite points, and these spindles are journaled in openings 27 in the center of the respective lenses. These openings 27 may be drilled or otherwise formed in the lenses and they form practically frictionless bearings for the spindles. Both ends of the plumb-bob are pointed, and either end may therefore be used as an index or pointer for the scale.

28 indicates plates which are provided with central openings 29, and the metal around the openings is bent inwardly at a suitable inclination to fit the beveled edges 3 of the opening in the bar 1, as is clearly shown in Fig. 3. The sides of the bar 1 are recessed to receive these plates 28 in order to bring the outer faces of the bar and the plates flush with each other, and the plates are secured to the bar by the screws 30 or other suitable fastening devices.

It is obvious from the foregoing description that the plumb-bob will always occupy a perpendicular position irrespective of the position which the bar 1 will occupy. The device may therefore be used for either a level, a plumb, or an inclinometer, as desired, and it is obvious that if the scale is set in its proper position when the bar 1 is absolutely level the angle of inclination of any object to which the bar 1 may be applied will be accurately indicated by either end of the plumb-bob on the scale. It is also evident that the position of either end of the plumb-bob can be readily seen through either of the lenses, and consequently that the device may be used in any position.

It will be understood that changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

What I claim is—

1. In a device of the class described, the combination with a bar having a transverse opening formed therethrough, of a ring having an opening provided through one side thereof, a scaled ring having a toothed lug, a pair of spaced lenses and a plumb-bob mounted between the lenses, the scaled ring being loosely mounted inside of the other ring and between the lenses, the toothed lug extending through the opening of the ring, and means extending through the bar and engaging the toothed lug whereby the scaled ring may be adjusted, substantially as set forth.

2. In a device of the class described, the combination with a bar having a transverse opening formed therethrough, and a pair of spaced lenses fitted within the opening, of a plumb-bob mounted between said lenses, the bob being in two separable sections, the lower section being hollow and internally threaded, the upper section having a pointer at one end, an externally-threaded portion at the other end, and oppositely-extending spindles, the hollow section being adapted to receive a heavy liquid and the sections being adapted to be connected together by means of their threaded portions, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CLINTON D. HODGE.

Witnesses:
JOSEPH ATWELL,
P. H. BRENNAN.