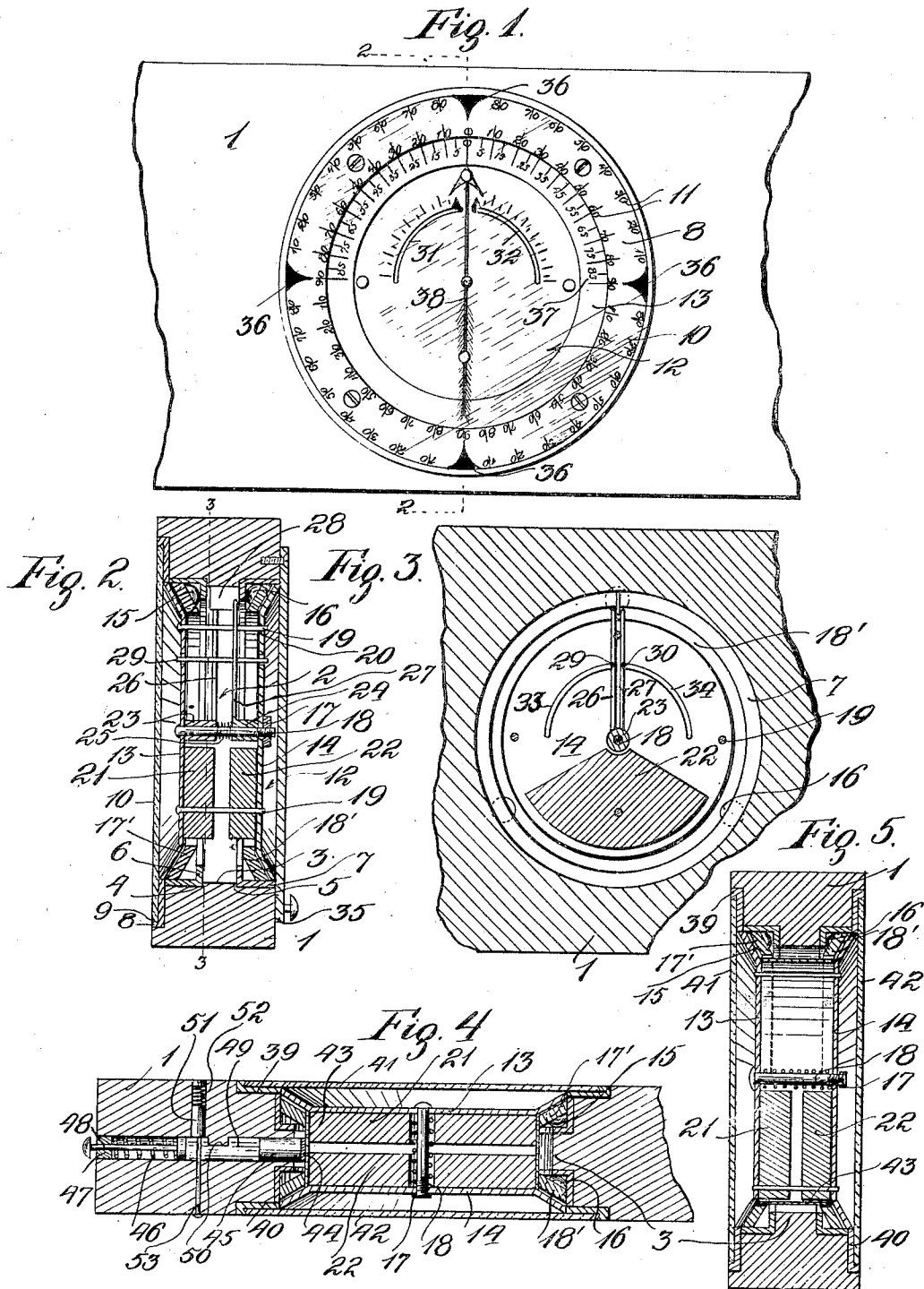


S. W. KLASS.
LEVEL AND CLINOMETER.
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1,203,012.

Patented Oct. 31, 1916.



Witnesses:
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by *John C. [Signature]*

UNITED STATES PATENT OFFICE.

SAMUEL W. KLASS, OF KINGMAN, ARIZONA.

LEVEL AND CLINOMETER.

1,203,012.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL W. KLASS, a citizen of the United States, residing at Kingman, county of Mohave, and State of Arizona, have invented a certain new and useful Level and Clinometer, of which the following is a specification.

This invention relates to a combined level and clinometer, and has for one of its objects to provide a device for determining inclination or angular elevation or depression and for establishing the per cent. of inclination and depression and also the degrees thereof, without calculation.

Another object of this invention is to provide a device in which the per cent. of grade and depression or degrees may be indicated and registered and in which the indicating means will remain in position of indication until intentionally moved back to original position.

Another object of this invention is to provide a combination level and clinometer, particularly for engineers' and builders' use, in which the indicating means may be locked, when on account of darkness or difficulty of position of the instrument the indications cannot be read.

These and other objects are accomplished by the device described in the subjoined specification in connection with the accompanying drawing, and then more particularly pointed out in the claims.

In the drawings, Figure 1 is an elevation of my device showing the same applied in a level. Fig. 2 is a section on line 2—2—Fig. 1. Fig. 3 is a section on line 3—3—Fig. 2. Fig. 4 is a sectional elevation showing a means for locking the dial, and Fig. 5 is a sectional view showing the band for engagement by the locking means to lock the dial.

Referring to the drawing, in which like reference characters denote like parts, 1 designates a suitable holder, which may be a carpenter's or engineer's level. The holder is provided with an opening 2, and with a central annular extension 3, forming two rabbets 4 and 5, for the accommodation of two annular flanged rings 6 and 7, fitting

in said openings and against said rabbets from opposite sides of the holder.

Secured to the holder 1 in any suitable manner is a dial ring 8, provided with a beveled flange 9 for holding a crystal 10, and also with graduations 11, the arrangement of which will be described hereinafter. Cooperating with said dial ring 8 is a dial 12, composed preferably of two plates 13 and 14, secured together and held in adjustable contact with a plurality of balls 15 and 16, by a nut 17, on an arbor 18, which extends centrally through said plates. These balls 15 and 16 are interposed between said flanged rings 6 and 7 and said plates 13 and 14 respectively, and are held spaced by any suitable means, as by ball retainers 17' and 18'. The plates 13 and 14 are prevented from turning independently of each other by pins 19, which are connected to the plate 13, and extend loosely through orifices 20, in the plate 14, for the purpose of enabling both bearing plates to be adjusted. Each plate 13 and 14, carries a weight 21 and 22, to hold the dial 12 always in normal position. On said arbor 18, are mounted two sleeves 23 and 24, spaced from each other and frictionally held in place by a coil spring 25. Said sleeves 23 and 24 are provided with arms 26 and 27 respectively, such arms extending upwardly and on each side of a lug 28, fastened to an annular extension 3 of the holder 1. Said arms 26 and 27 are provided with indicating members 29 and 30 respectively, which project through and are arranged to operate in arcuate slots 31 and 32 in the plate 13 and 33 and 34 in the plate 14, for the purpose of registering the per cent. or degree of grade in accordance with the graduation on the plate 13 adjacent the slots 31 and 32. The other ends of said indicating members 29 and 30, which extend through the slots 33 and 34 in the plate 14, serve to enable the indicating members 29 and 30 to be re-set, access to said members 29 and 30 being had upon opening of a door or other closure 35. As is evident, the dial 12 remains in a normal position at all times and in any position of the holder. In registering grades, in-

clinations or depression, especially those traversed by vehicles, the movement of the holder with the machine, relatively to the dial, causes the lug 28, to engage the arms 5 26 and 27 and move same, the arms remaining in moved position or position of indication, until re-set.

The dial ring 8 is divided into parts separated by suitable pointers 36, and is marked 10 with two or more sets of graduations, reading from left to right, and right to left respectively in each divisional part, and graduations representing the notations required for any specific purpose, and operating in conjunction with the graduations 15 37 on the dial 12, affording a quick means for determining degrees and per cent., without calculation.

On the dial plate 13 is stamped or affixed an indicating arrow 38, which points 20 to the graduations on the dial ring 8, while the pointers 36 on the dial ring point to the graduations 37 on the dial 12, thus making possible the determination simultaneously 25 of degrees and per cent. of grade.

The device shown in Figs. 1, 2 and 3 is more especially adapted for use in determining and registering grades traversed by vehicles, but may find application to many 30 other uses.

The device represented in Figs. 4 and 5 is more especially designed for use by builders and engineers, and generally embodies substantially the same features and construction, with some exceptions, presently 35 noted.

In order that the indications may be read from both sides, two dial rings 39 and 40 are provided, one on each side of the holder 1, such rings having beveled flanges for crystals 41 and 42. Between and held by the plates 13 and 14, is a band 43, against which a brake shoe 44 is arranged to operate to hold the dial in a fixed position. The shoe 45 44 is secured to the end of a plunger 45 normally under the tension of a spring 46, housed and held in said holder by a plug 47, through which extends the stem 48 of said plunger. Said plunger 45 is provided 50 with a flat portion 49, and a recess 50 for the accommodation of a latch member 51, extending transversely through said holder, and under the tension of a spring 52, which normally presses the latch member against the side of the plunger, and causes the same to engage the recess in the plunger 45 when the latch is withdrawn. The latch member 51 has a stem 53 extending through the holder, by means of which the latch member 60 may be operated to release the plunger 45 and the brake shoe to be thrust against the band 43.

Thus the clinometer may be used in any position and for any purpose, and the dial 65 may be locked instantly after ascertainment

of a desired elevation, depression, dip or accomplishment of any object for which the clinometer may be used.

What I claim is:

1. A level and clinometer comprising a 70 holder having an opening therein, a plurality of flanged rings in said holder, two weighted plates within said holder and secured together and forming a dial, having graduations, a plurality of balls between 75 said plates and rings, means to space said balls, and a dial ring having graduations coöperating with the graduations on said dial to ascertain degrees and per cent. of grade.

2. A level and clinometer comprising a 80 holder having an opening therein, a plurality of flanged rings in said holder, two weighted plates within said holder, a plurality of balls between said plates and rings 85 and forming a bearing for said plates, adjustable means for securing said plates together, one of said plates having a series of graduations thereon, a plurality of arms having indicating members thereon, means 90 on and movable with said holder to move said arms, and frictional means to hold said arms in moved position.

3. A level and clinometer comprising a holder, a dial consisting of two weighted 95 plates adjustably secured together, a plurality of balls forming a bearing for the outer edge of said plates, a band between and held in position by said plates, and means to lock said dial against movement. 100

4. A level and clinometer comprising a holder, a dial consisting of two weighted plates, each provided with slots, an arbor 105 extending centrally through said plates, means on said arbor to adjust said plates relatively to each other, a plurality of arms on said arbor having indicating members extending through the slots in said plates, means in said holder to move said 110 arms relatively to said dial, means to frictionally hold said arms in moved position, a plurality of balls forming a bearing for the outer edge of said plates, one of said plates having a series of graduations thereon, and a dial ring having a series of graduations 115 coöperating with the graduations of said dial.

5. A level and clinometer comprising a holder having an opening therein, and a central annular extension forming rabbets, 120 a plurality of balls in said rabbets, a dial consisting of two plates each carrying weights, an arbor extending centrally through said plates, a nut on said arbor to adjust said plates and hold same in contact with said balls, said plates having a plurality of slots and one of said plates having graduations adjacent to said slots, and graduations on the edge thereof and an arrow always perpendicular to the axis of 130

said plate, a lug on said holder, arms on
said arbor extending upwardly and on op-
posite sides of said lug, indicating members
on said arms extending through said slots,
5 means to frictionally hold said arms in po-
sition when operated by the movement of
said lug relatively to said dial, a dial ring
on said holder having graduations coöper-

ating with the graduations on said dial, and
a cover on the back of said holder.

In testimony whereof I have set my hand 10
in the presence of two witnesses.

SAMUEL W. KLASS.

Witnesses:

I. J. WHITNEY,
ELI HILTY.