B. J. COLLINS.

COMBINATION LEVEL AND GRADE FINDER.

APPLICATION FILED APR. 15, 1918.

1,300,818.

Patented Apr. 15, 1919.

2 SHEETS—SHEET 1.

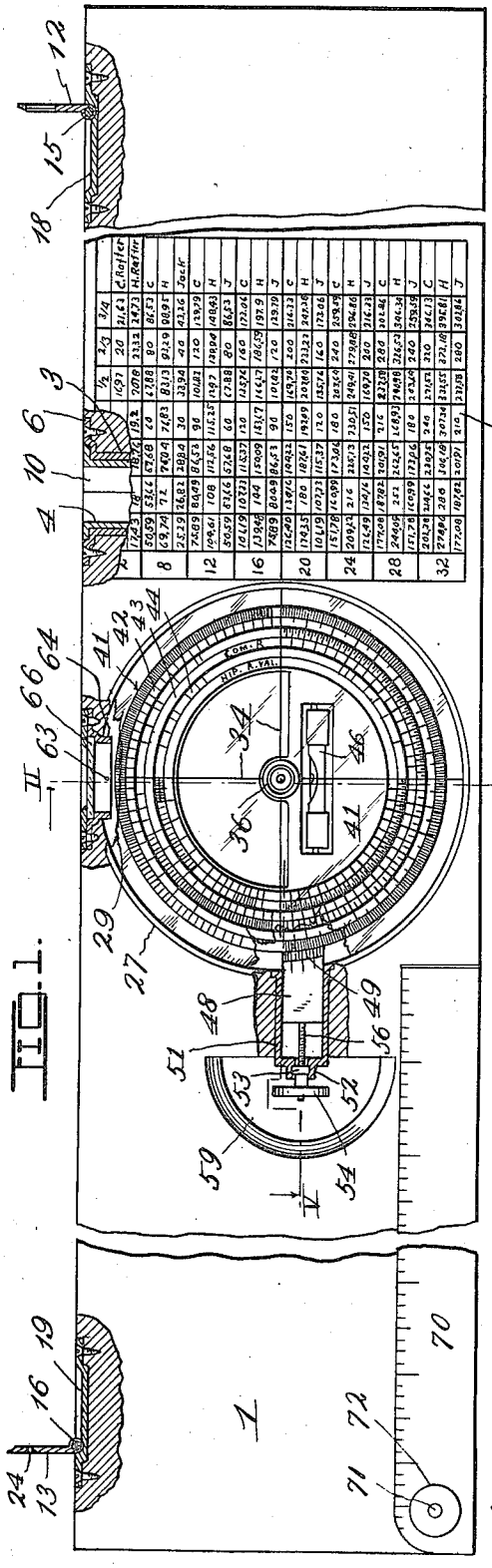


FIG. 1.

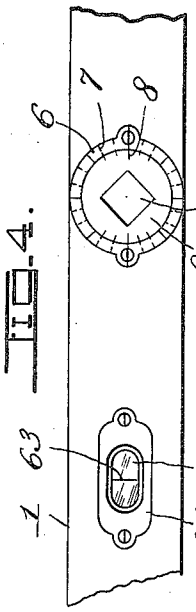


FIG. 4.

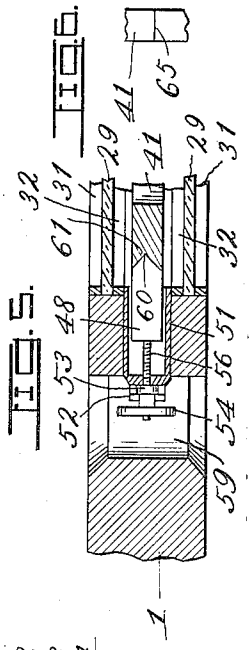


FIG. 5.

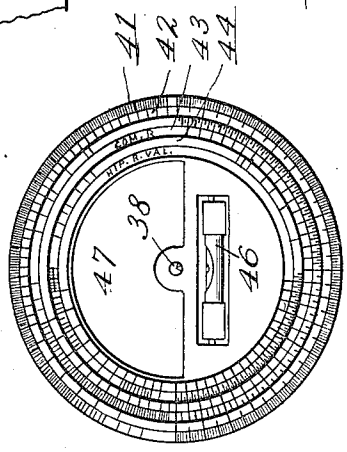


FIG. 3.

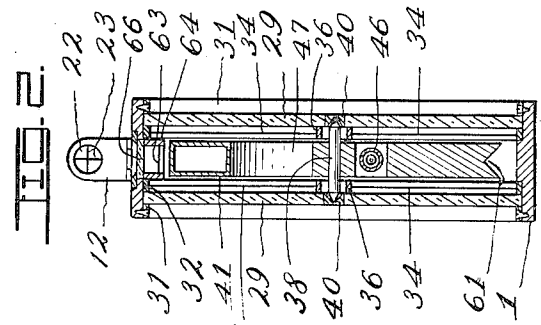


FIG. 2.

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2 SHEETS—SHEET 2.

Fig. 9.

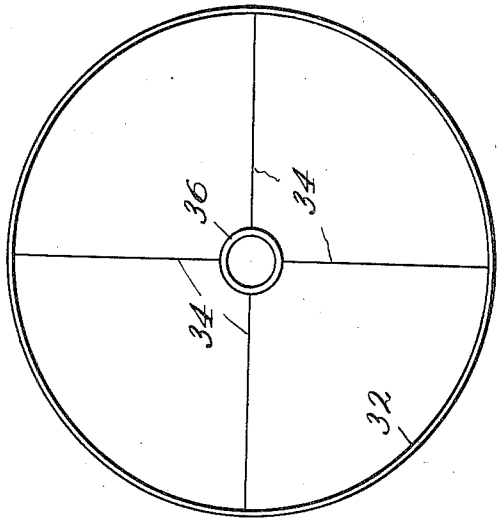


Fig. 8.

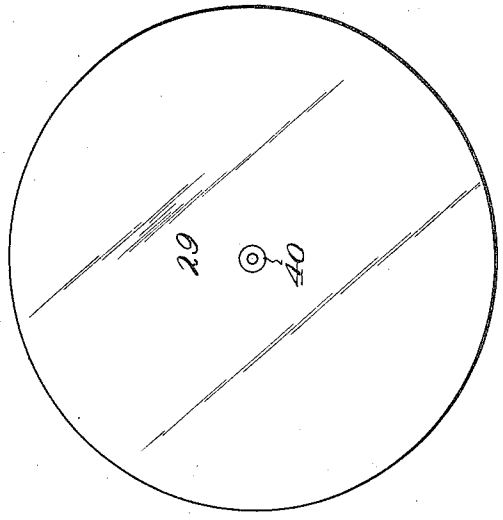
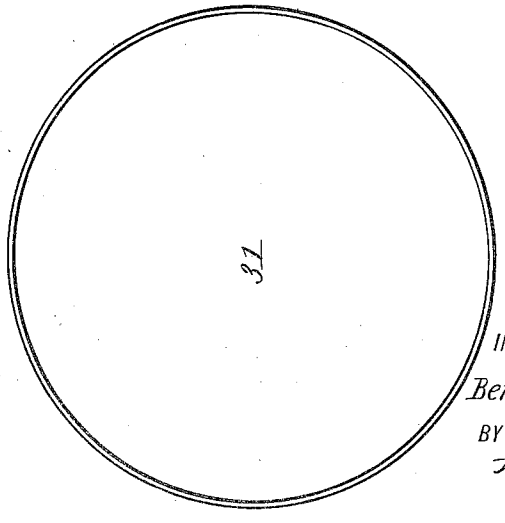


Fig. 7.



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COMBINATION LEVEL AND GRADE-FINDER.

1,300,818. Specification of Letters Patent. Patented Apr. 15, 1919.

Application filed April 15, 1918. Serial No. 228,707.

To all whom it may concern:

Be it known that I, BENJAMIN J. COLLINS, a citizen of the United States, residing at Supply, in the county of Woodward and State of Oklahoma, have invented certain new and useful Improvements in Combination Levels and Grade-Finders, of which the following is a specification.

One object of the present invention is to provide new and useful improvements in devices employed by mechanics and engineers in the construction of buildings, and in readily determining the angles and lengths to which rafters and other timbers are to be cut, and also in ascertaining whether various objects are out of plumb.

A further object is to provide a device of this character which can be employed to advantage by road builders and others in determining grades and levels and the directions of structures and other objects.

Another object is to increase the accuracy and efficiency of devices of this nature and also increase their scope and utility.

In the accompanying drawing, I have illustrated the preferred embodiment of the invention, but it is to be understood that the invention is not necessarily limited thereto, as various changes in the shape, proportions, and arrangement of parts may be resorted to which fairly fall within the spirit and scope of the invention as claimed.

In said drawing. Figure 1 is a broken side elevation partly in section of the device; Fig. 2 is a vertical cross section on line II—II of Fig. 1; Fig. 3 is a detail side elevation of a disk employed in carrying out the invention; Fig. 4 is a broken plan view of the device; Fig. 5 is an irregular horizontal section on line V of Fig. 1; Fig. 6 is a broken plan view of the disk disclosed by Fig. 3; Fig. 7 is an elevation of a ring; Fig. 8 is a side elevation of a glass plate; and Fig. 9 is a side elevation of an indicator.

In carrying out the invention, I employ a stock 1 consisting of wood or metal or a combination of both as preferred, and of about the same size as an ordinary carpenter's level. A fixed tubular member 3 extends vertically through said stock 1 at a point, approximately, midway between the ends thereof and has a tubular member 4 journaled therein. The fixed tubular member 3 is provided at its upper end with an annular flange 6, having radial graduations 7 thereon to coact with radial graduations 8 on a circular flange 9 at the upper end of the member 4, in determining horizontal directions and angles.

The member 4 has a rectangular opening 10 extending longitudinally therethrough to receive a corresponding pin which may be carried upon a tripod or other support when the device is to perform the function of a transit in determining the grade of a road, the level of a foundation, etc. With this end in view the top of the stock 1 is provided with front and rear sights 12 and 13, connected by hinges 15 and 16 to shallow metal frames 18 and 19, respectively, countersunk in the top of the stock as disclosed by Fig. 1. The front sight 12 has an aperture 22 provided with cross-wires 23, while the rear sight 13 has a small peep-hole 24 in axial alinement with the intersecting portions of said cross-wires 23. The hinges 15 and 16 are sufficiently friction-tight to hold the sights 12 and 13 either in the elevated position disclosed by Fig. 1, or in closed position when lowered into the respective frames 18 and 19.

The stock 1 is provided at a point adjacent the tubular member 3 with a circular opening 27 extending transversely therethrough and closed at opposite sides with two circular glass or other transparent plates 29. Each plate 29 is held in position by oppositely-disposed rings 31 and 32, removably-secured in the opening 27 by screws or other suitable fastening devices. Each ring 32 is provided with an indicator consisting of four wires 34 extending at 90 degrees to each other and connected at their outer ends to the ring 32 and at their inner ends to a small ring 36, through which a pintle 38 extends.

The pintle 38 has conical journals mounted in corresponding bearings 40, arranged centrally in the glass plates 29. A dial 41 is fixed upon the pintle 38 and provided with concentric rows of graduations 42, 43 and 44 of different values. The upper half of the dial is hollow, while the lower half is solid to retain a spirit level 46 mounted therein in a horizontal plane irrespective of the angle at which the stock 1 is disposed. A transverse opening 47 is formed in the upper half of the dial to further reduce the weight of said upper half.

48 designates a vernier having graduations 49 at its forward end for subdividing the outer row of graduations 42 on the dial 41.

Said vernier 48 is slidably mounted in a frame 51 arranged within the stock 1 and provided at one end with a bearing 52, to receive the hub 53 of a thumb nut 54 threaded upon a stem 56 projecting rearwardly from the vernier 48. By rotating the thumb nut 54 in one direction the vernier 48 is adjusted into engagement with the periphery of the dial 41 to lock the same in fixed relation to the stock 1 and also to bring the graduations 49 into juxtaposition with the outer row of graduations 42 on the dial. A transverse opening 59 is formed in the stock 1, so that access may be readily had to the thumb screw 54 to rotate the same.

The vernier 48 is of the same thickness as the dial 41 and has a forward pointed terminal 60 for engagement with the walls of a V-shaped groove 61 in the periphery of the dial.

The upper portion of the dial 41 is provided with a transverse wire 63 in a small frame 64, located in the top of the stock 1 at a point immediately above the dial and provided with a glass plate 66, through which the wire 63 and the mark 65 may be viewed. When the wire 63 is immediately above the mark 65, it indicates that the stock 1 occupies a horizontal position.

70 designates a scale divided, preferably, into inches and fractions thereof and mounted in a recess in a lower corner of the stock 1 upon a pivot 71 provided with a thumb nut 72. On loosening the thumb screw 72 the scale 70 may be rotated upon the pintle 71 and set at any angle to the stock 1.

A table 71[a] is placed on one side of the stock 1 as a ready reference in obtaining the lengths of rafters. For instance, assuming a building to be sixteen feet wide and the roof thereof is to have a one-third pitch in opposite directions from a centrally-disposed ridge. The length of the common rafters is obtained by first placing the stock 1 in a horizontal position. The scale 70 is then retained in such horizontal position while the stock 1 is swung upwardly on the pivot 71, until the vertical wire 34 registers with the one-third pitch indicated on the dial 41. The nut 72 is then tightened to lock the scale 70 and the stock 1 in their respective positions and by laying them upon the side of a rafter the angle at which the end thereof should be cut is accurately determined. The length of the rafter is then ascertained by referring to the table 71, wherein it is found to be 107.33 inches long. The same principle applied to hip, valley and jack rafters.

Other uses of the device than those specifically pointed out herein, will readily present themselves to those skilled in the art.

While I have shown the preferred embodiment of the invention, I reserve the right to make such changes in the construction, combination and arrangement of parts as properly fall within the spirit and scope of the invention as defined by the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. In a device of the character described, a stock having an opening extending transversely therethrough, a rotatable dial arranged in said opening, an indicator to coact with said dial, consisting of four wires arranged at angles of ninety degrees to each other, inner and outer concentric rings to which said wires are fixed, the outer ring being fixed to the stock, and glass plates disposed at opposite sides of the dial to close the transverse opening in the stock.

2. In a device of the character described, a stock having an opening extending transversely therethrough, a rotatable dial arranged in said opening and weighted so that the weighted side will be downward irrespective of the angle at which the stock is placed, a suitable support for said dial, an indicator fixedly-connected to the stock to coact with said dial, a vernier mounted in the stock and having a graduated scale that subdivides the smallest divisions on the scale of the dial, and means for adjusting said vernier in and out of engagement with the periphery of the dial.

3. In a device of the character described, a stock having an opening extending transversely therethrough, a rotatable dial arranged in said opening and weighted at its lower side, a suitable support for said dial, an indicator fixedly-connected to the stock to coact with the dial, a vernier having a graduated scale that subdivides the smallest divisions of the scale on the dial, a frame in the stock in which the vernier is slidably mounted, a threaded stem projecting rearwardly from the vernier, and a thumbscrew journaled in the frame and engaging the threaded stem to adjust the vernier in and out of engagement with the dial.

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

BENJAMIN J. COLLINS.

Witnesses:
C. E. HERSCHBERGER,
O. M. MCDANIEL.