ENSMINGER & ELMER.

Water Gage.

No. 66,695. Patented July 16, 1867.

Fig. 1.

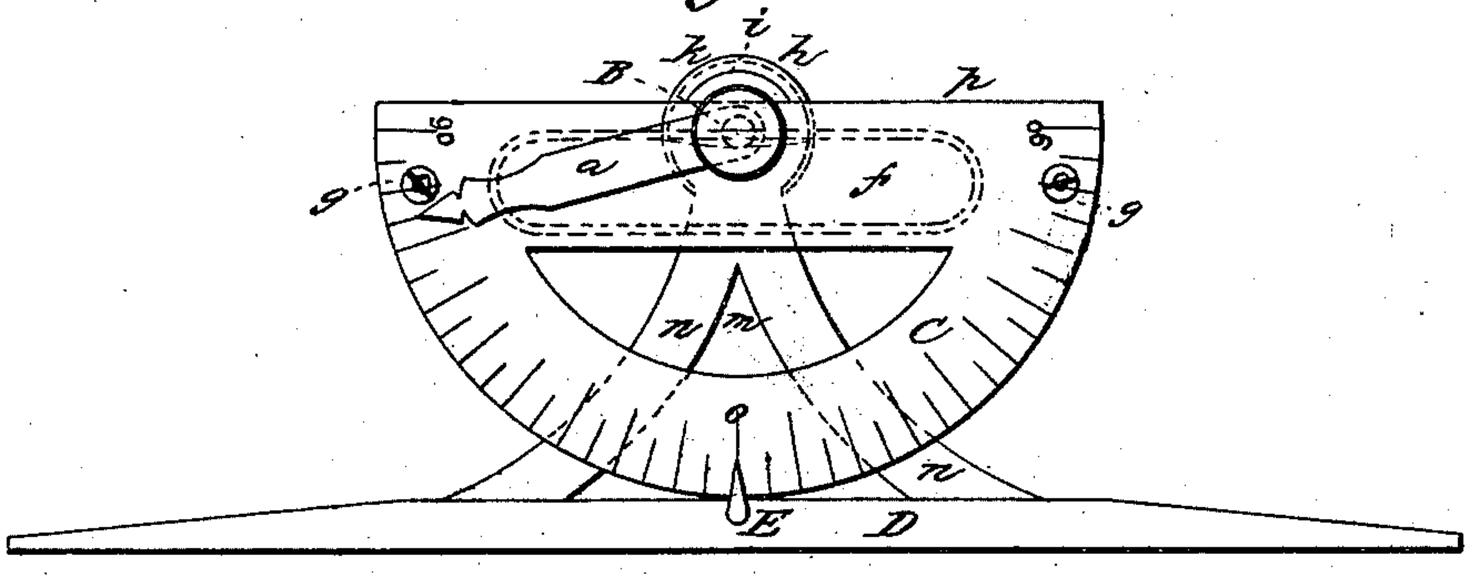
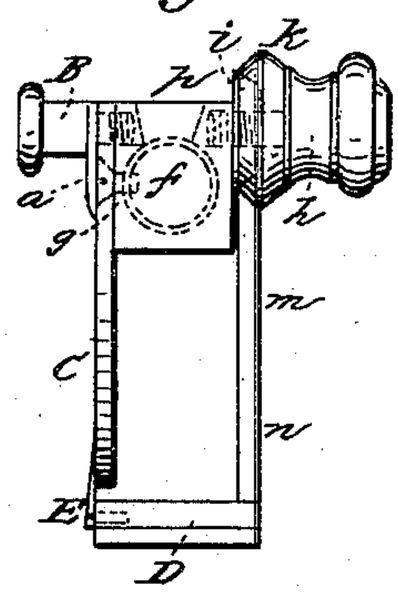


Fig. 2.



Witnesses:

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CHRISTIAN ENSMINGER AND ALPHEUS W. ELMER, OF SPRINGFIELD, MASSACHUSETTS.

Letters Patent No. 66,695, *dated July* 16, 1867.

IMPROVEMENT IN PLUMB-LEVELS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, CHRISTIAN ENSMINGER and ALPHEUS W. ELMER, both of Springfield, in the county of Hampden, and State of Massachusetts, have invented a new and improved instrument for plumbing, levelling, and measuring and laying down angles, which we style a "Universal Level and Protractor;" and we do hereby declare the following to be a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings making a part of this specification, in which—

Figure 1 is an elevation, and

Figure 2 a transverse section.

Architects, machinists, and other mechanics find it necessary to plumb different bodies, to level various surfaces, and to measure and lay down angles, and do all with accuracy and dispatch. Our invention is designed to meet the wants and facilitate the labors of such individuals by combining the various offices of plumb, level, and protractor in one and the same instrument, of simple construction, and of ready and universal application.

And in carrying out our invention we construct the base D of brass, or other suitable metal or material, about six inches in length by three-fourths of an inch in breadth and one-fourth of an inch in thickness. The lower surface of the base D we make a perfect plane, or as nearly so as may be. The front and back sides of the base D we construct parallel planes, or as nearly so as may be. The upper surface of the base D we bevel or chamfer back about one and one-half inch, leaving the ends thereof about one-eighth of an inch in thickness, as seen in fig. 1. To the back side of the base D, equidistant from the ends thereof, we attach the converging pillars *n n*, uniting at *m*, and terminating in the disk *k*. The pillars *n n* and disk *k* we construct of the same material usually as the base D. The disk *k* we construct about three-sixteenths of an inch in thickness, or about twice as thick as the pillars *n n;* and on the front side of the disk *k*, the centre of which is about one and one-half inch above the base D, we form a bevel-socket, as seen in fig. 2; and, further, we perforate the disk *k* in the centre of the socket so formed, or as nearly so as may be. To the front or opposite side of the base D, and rising a little above its upper surface, we attach the pointed steel index E, and the index E is intended to be placed exactly opposite the disk *k*, or, in other words, if a plane at right angles to the lower surface of the base D, and at right angles to its opposite sides, to which *n n* and E are attached, be passed through the centre of the perforation in the disk *k*, then the point of the index E will be found in that plane. We make use of the ordinary spirit-level *f*, inserted in and protected by the beam *p*. The beam *p* we construct of brass, or other suitable metal, about three inches in length and one-half of an inch in breadth and thickness. The top or upper surface of the beam *p* we construct with the usual opening for observing the level *f;* otherwise we construct the upper surface of the beam *p* a perfect plane, or as nearly so as may be. On the back side of the beam *p*, equidistant from the ends thereof, and rising a little above its upper surface, we construct the bevel projection *i*, corresponding to and fitting in the bevel-socket in the disk *k;* but the projection *i* we construct a little larger than the socket in the disk *k*, and our object in this is that the projection may not reach to the bottom of the socket, but come in contact with the outer or bevel edges thereof. The projection *i* we confine in the socket of the disk *k* by means of an ordinary thumb-screw, *h*, thus forming a joint or hinge, allowing the beam *p* to be raised or depressed, or confined at any desired point by tightening the thumb-screw *h;* and further, to the front side of the beam *p* we attach, by means of the screws *g g*, the semicircular steel plate or scale *c;* and this scale *c* is so arranged that the thumb-screw *h* is the continuation of the axis of a circle or wheel, of which the scale *c* is the half; but the scale *c* and the beam *p* may be constructed in one and the same piece, and of the same metal or material. The scale *c* we graduate from the point zero, (0,) opposite the beam *p*, to ninety (90°) degrees, or one-quarter of a circle, in either direction; and the scale *c* being so attached to the beam *p* vibrates as the beam *p* is raised or depressed. And the arrangement of the several parts is such that when the index E marks zero (0) on the scale *c* then the upper surface of the beam *p* and the lower surface of the base D are parallel planes, or as nearly so as may be; and when the index E marks ninety (90) on the scale *c* then the beam *p* and base D are at right angles. To the front side of the beam *p* we attach the movable steel hand *a* by means of the thumb-screw B, thus allowing the hand *a* to be directed to

any desired point on the scale *c*, and there secured. We make use of this hand *a* more particularly to set a bevel squarely at any desired angle. The locality of the thumb-screw B is the centre of a circle, of which the scale *c* is the half; and further, we construct the sides of the hand *a* parallel to each other, and parallel to any radius of the circle of which the scale *c* is a half, provided such radius pass through the extreme outer point of the hand *a*.

Having thus described the construction of our invention, we proceed to its operation.

And when we desire to use it as a level we arrange the beam *p* so that the index E marks zero (0) on the scale *c*, and thus secure it by tightening the thumb-screw *h*. The instrument is then a level, and to determine whether or not any given body is level we place the base D on such body and observe the level *f*. Again, we depress the beam *p* till the index E marks ninety (90) on the scale *c*, and thus secured the instrument is a plumb. To determine whether or not any given body is vertical or plumb we place the base D against such body and observe the level *f*. Again, to determine the inclination of any body, we place the base D on or against such body and depress the beam *p* to a level; the index E then marks the angle of inclination on the scale *c*. To elevate any given body to any desired angle of inclination we depress the beam *p* till the index E marks the corresponding degree of such angle on the scale *c*, and secure the instrument thus by tightening the thumb-screw *h;* we then place the base D on the body to be elevated, and elevate such body till the beam *p* is observed to be level. To set a bevel square, at any desired angle, we move the hand *a* to the corresponding degree on the scale *c*, and there secure it by tightening the thumb-screw B; we then place the bar of the square on the upper surface or plane of the beam *p*, and range the tongue of such square against the hand *a*, and thus secure the square at the angle desired.

The materials and proportions of our invention hereinbefore indicated are the materials and proportions which we prefer, but other suitable materials and proportions may be used.

We do not claim the invention of a level beam, or of a semicircular graduated scale or protractor; but we claim—

The parallel-sided hand *a*, in combination with a semicircular graduated scale *c*, as and for the purpose specified.

CHRISTIAN ENSMINGER,
ALPHEUS W. ELMER.

Witnesses:
JOSEPH MILLER,
JOHN M. STEBBINS.