(No Model.)

L. C. STRONG.

LEVELING INSTRUMENT.

No. 297,093. Patented Apr. 15, 1884.

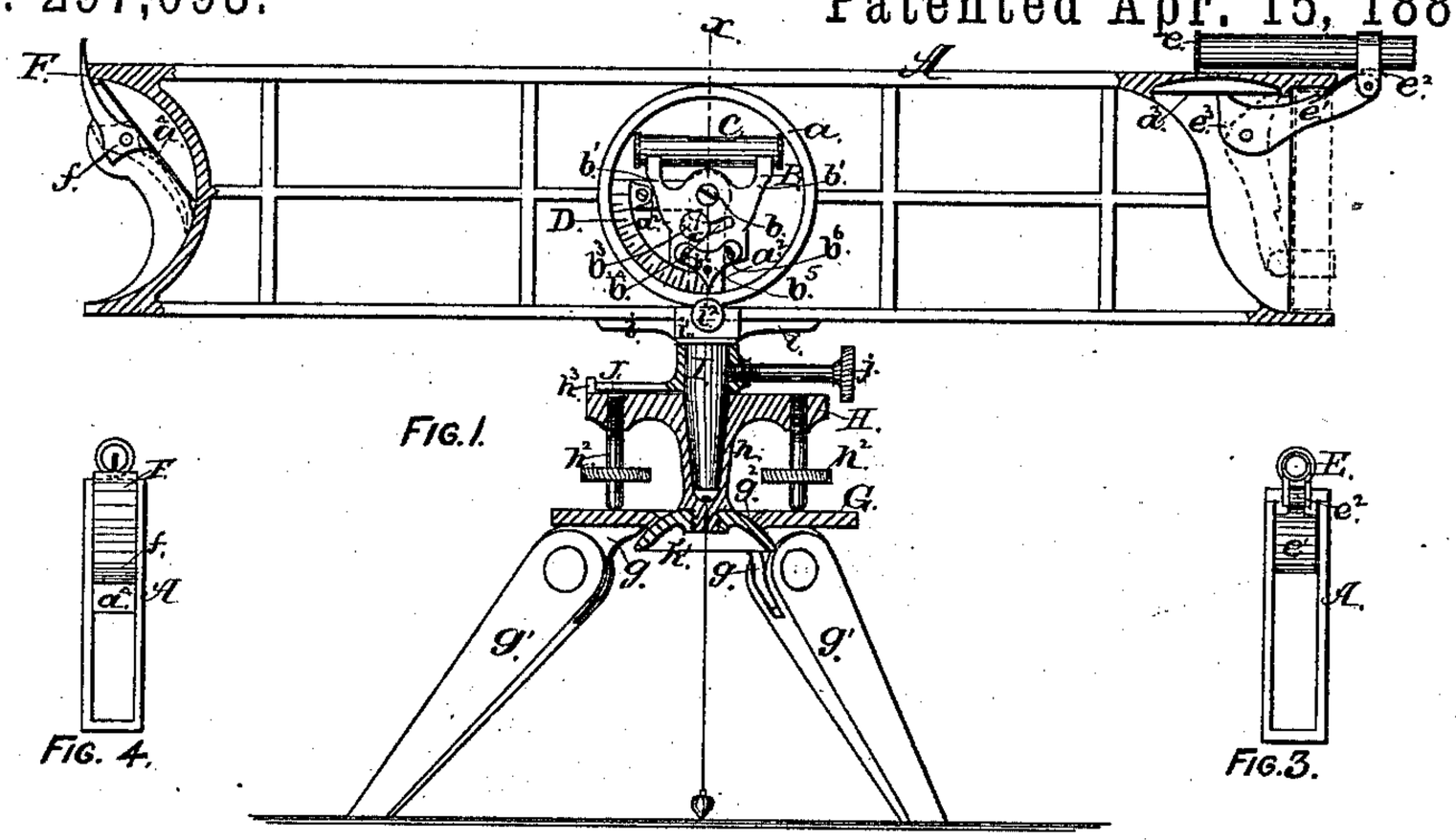

FIG. 1.

FIG. 4.

FIG. 3.

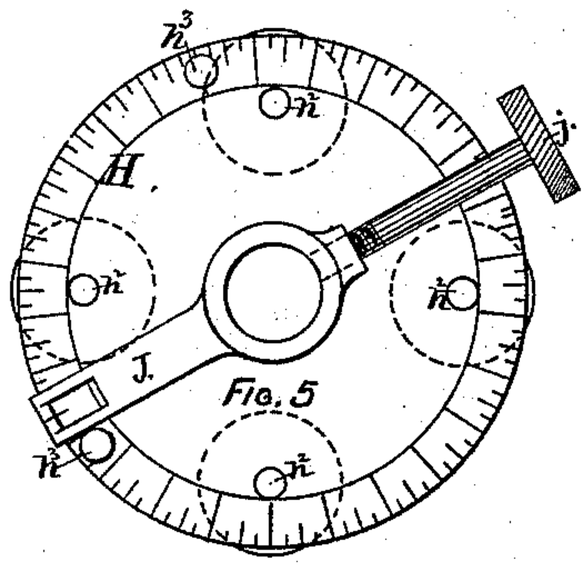

FIG. 5.

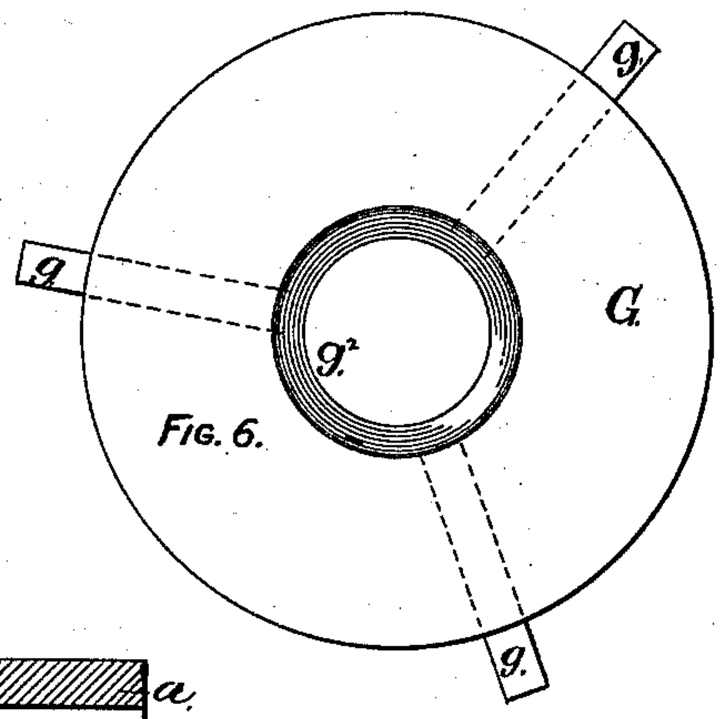

FIG. 6.

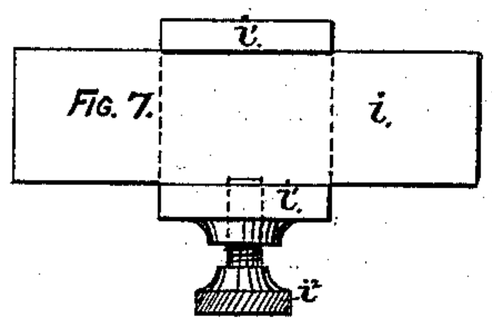

FIG. 7.

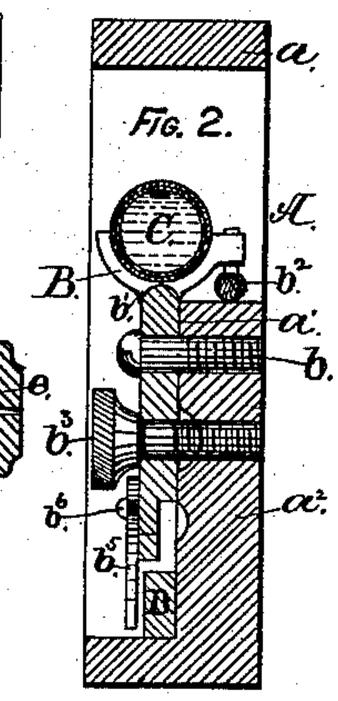

FIG. 2.

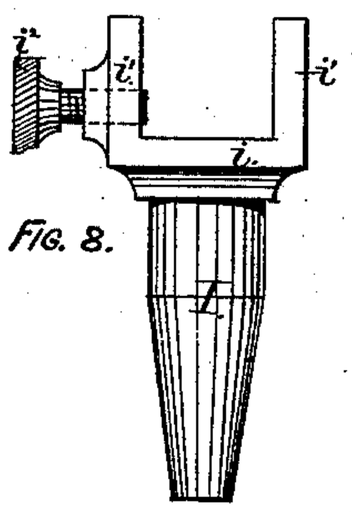

FIG. 8.

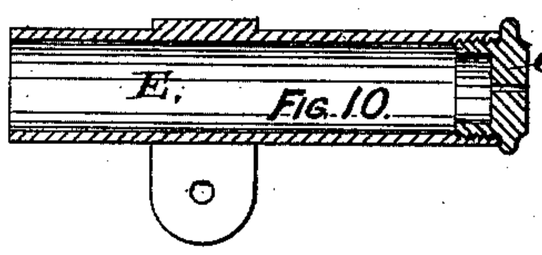

FIG. 10.

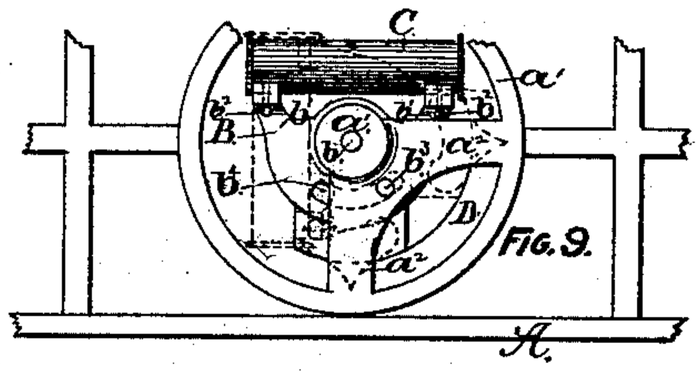

FIG. 9.

Witnesses:

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LEVELING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 297,093, dated April 15, 1884.

Application filed October 3, 1883. (No model.)

To all whom it may concern:

Be it known that I, LEVI C. STRONG, of the city and county of Albany, in the State of New York, have invented certain new and useful Improvements in Leveling-Instruments, of which the following is a specification.

My invention consists in combining, with an ordinary spirit-level, certain appliances and instrumentalities, herein described, whereby the said level is adapted to be optionally used, in addition to the uses to which it is commonly applied, for the following purposes: as a surveyor's level, a plumb, an implement for determining angles on horizontal and vertical planes.

The object of my invention is to provide an inexpensive and reliable implement that can be readily applied to the uses above set forth. I attain this object by means of the construction illustrated in the accompanying drawings, which form part of this specification, and in which—

Figure 1 is a side elevation of my leveling-instrument arranged as a surveyor's level, with parts of the supporting-stand shown in vertical section; Fig. 2, an enlarged vertical section of the frame-work and spirit-level on the line *x* of Fig. 1; Fig. 3, an end elevation of the telescope end of the spirit-level frame detached from its supporting-stand; Fig. 4, a like view of the opposite end of the spirit-level frame; Fig. 5, a plan view of the graduated table of the supporting-stand; Fig. 6, a plan view of the top plate for the supporting-stand. Figs. 7 and 8 are respectively a plan view and end elevation of the clamp-piece and center-pin, whereby the spirit-level is attached to the supporting-stand; Fig. 9, a rear elevation of the central part of the spirit-level frame-work, and Fig. 10, a longitudinal section of the telescope-sight.

As shown in the drawings, A is the frame-work for the spirit-level, having its upper and lower edges made in perfect parallelism with each other, and which is preferably made in the form of an open-work metallic frame having a central circular flange, *a*, provided with a central seat, *a'*, which is connected to the circular flange by means of radial arms a^2, one of said arms being preferably made parallel with the upper and lower edges of the frame-work A, and the other arms perpendicularly thereto.

The carrier B for the spirit-level tube C is pivoted to the seat *a'* by means of the center-pin, *b*. Said carrier is provided with two arms, *b'*, having U-shaped terminals for receiving the spirit-level tube C, each of said arms being also provided with an adjusting-screw, b^2, for regulating spirit-level in a true position in respect to the edges of the frame-work A. A binding-screw, b^3, which passes through a segmental slot, b^4, in the carrier B, permits the latter to turn on its center-pin, *b*, so as to set the spirit-level in a horizontal position and determine the angular position of the frame-work A at any time. An adjustable pointer, b^5, is pivoted to the lower part of the carrier B, and is secured thereto by binding-screws b^6. The said pointer, when the spirit-level has been properly adjusted, should be arranged to coincide with the zero-point on a graduated quadrant, D, fixed inside of the circular flange *a*, and when so adjusted, the angle at which the frame-work A may at any time be placed can be readily ascertained by first turning the spirit-level tube C into a true horizontal position, and then noting the point on the quadrant D at which the pointer b^5 is standing. The quadrant D should be graduated to correspond to the degrees of a circle, and, in addition, may be graduated to any required fractions of such degrees. The said quadrant should be secured within the circular flange *a*, as shown in Fig. 1.

At one end of the frame-work A a telescope-sight, E, is arranged, the said sight being preferably connected to said frame-work by means of a swinging joint. The sight E consists of a cylindrical tube that is provided at one end with a cap, *e*, which contains a small central aperture. The swinging joint consists of a link, *e'*, that is pivoted at one end to the sight E, and at the opposite end to the frame-work A, and it is so arranged that the sight E may be thrown up to lie on the upper edge of the frame-work A, as shown by the full lines in Fig. 1, or be turned down into a recess in the end of the frame-work, as indicated by the dotted lines in the same figure. A spring, e^2, fixed in the end of the link *e'*, attached to the sight E, exerts its pressure be-

neath the outer end of said sight in such manner that it (the sight) will be maintained in its required place in either position above described. The link e' at its end that is pivoted to the frame-work A is provided with a head, e^3, which bears against a spring, a^3, (that is fixed in the frame-work A,) so as to retain the sight E securely in place in both positions above described. At the opposite end of the frame-work A a pointed sight, F, is pivoted in such manner that it may stand erect, as shown by the full lines in Fig. 1, or be turned down into a recess in the frame-work, as indicated by the dotted lines in that part of the same figure; and in either position the said pointed sight is securely held in place by means of a spring, a^4, that is fixed in the frame-work A for that purpose, the said spring being arranged to exert its pressure against the head f, formed on said sight. The sights E and F must be adjusted to range in exact line with the bottom edge of the frame-work A, and when constructed and adjusted as above described, my level, when detached from the supporting-stand, hereinafter described, may be used in any manner that an ordinary spirit-level can, and it can also be employed for the following additional purposes: for determining verticals and angles, and by using the sights E and F for obtaining correct ranges for distant and disconnected parts, either on horizontal or inclined planes.

The supporting-stand for my improved spirit-level is constructed of the following parts: A top plate, G, is provided with lugs g, to which the legs g' of the tripod are pivoted. Said top plate has in its center a circular opening, g^2, for receiving an inverted cup, which forms, in conjunction with said opening, a universal joint. A circular graduated table, H, is provided with a central socket, h, which screws into the inverted cup h', that fits into the opening g^2 of the top plate, G. The table H is supported on four adjusting-screws, h^2, whereby said table can be brought into a perfectly-level position. The upper face of said table is marked with graduations of the degrees of a circle or any required fractions thereof. The said table is also provided with pins or studs h^3, that are fixed in its surface, and arranged in such manner that an arm or index attached to the center-pin of the spirit-level can be moved ninety degrees between said pins.

The center-pin I has on its upper end a bottom plate, i, which, with its side flanges, i', form a channel for receiving the bottom edge of the frame-work A. A clamping-screw, i^2, inserted in one of the flanges i', bears against the bottom flange of the frame-work A, so as to secure the spirit-level in place. The center-pin has its lower part accurately fitted into the socket h, but is left free to turn therein.

An arm or index, J, is arranged to be attached to the center-pin I, and for that purpose is provided with a binding-screw, j. The said arm, when the screw j is slackened, permits the center-pin I to turn freely therein, in order that the sights E and F may be brought to range truly on any required line, and, when that range has been obtained, the arm J can be secured in position in juxtaposition with any point on the graduated circle on the table H. Then by taking that point as a datum-line, the angularity of any other line on a horizontal plane may be obtained by turning the frame-work A (and its attached center-pin I and arm J) until the sights E and F range accurately on the new line, and taking the difference between the first and final positions of the arm J, as represented by the graduations on the table H.

I claim as my invention—

1. The combination, with the frame A for a spirit-level, having a central seat, a', as herein set forth, and the graduated quadrant D, of the carrier B, pivoted to the seat a', and provided with arms b' for containing the spirit-level tube C, the said carrier having the adjusting-screws b^2, binding-screw b^3, and adjustable pointer b^5, all constructed and arranged to operate as herein specified.

2. The combination, with a spirit-level frame, A, having the sights E and F attached thereto, substantially as set forth, of a center-pin, I, provided with flanges i' and clamping-screw i^2, whereby the said spirit-level frame is attached to and adapted to revolve in a supporting-stand, as and for the purpose herein specified.

3. In a supporting-stand for a spirit-level frame, A, provided with sights E and F, as herein set forth, the combination, with the graduated table H, provided with a central socket, h, and supported on adjusting-screws h^2, as herein described, of the center-pin I and arm J, the latter being adjustably connected to said center-pin, as and for the purpose herein specified.

4. The combination, with the graduated table H, provided with the studs or pins h^3, of the center-pin I, having a movable arm or index, J, attachable thereto, for the purpose of limiting the rotatory movement of the center-pin I to the part of the circle intervening between the pins h^3, as and for the purpose herein specified.

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