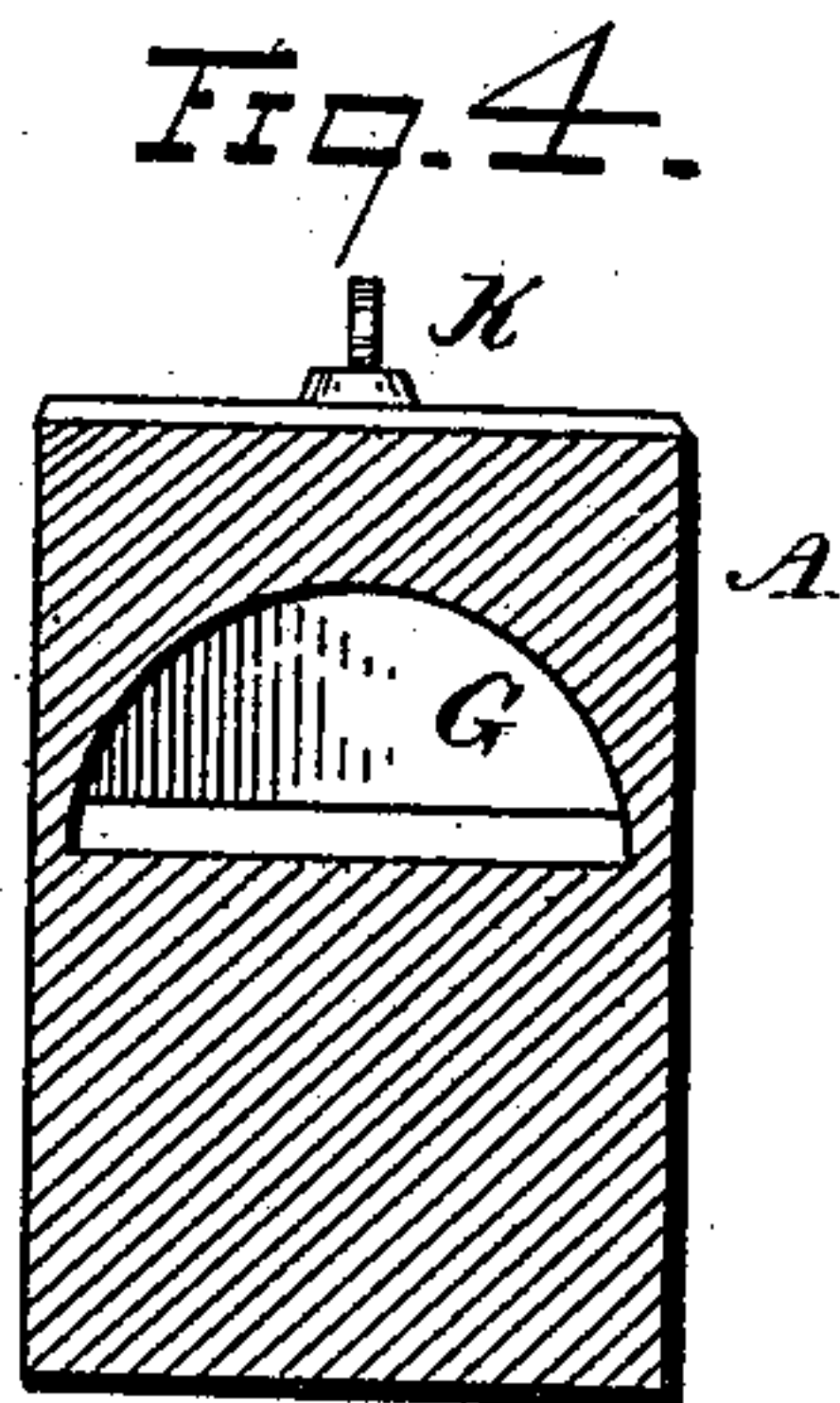
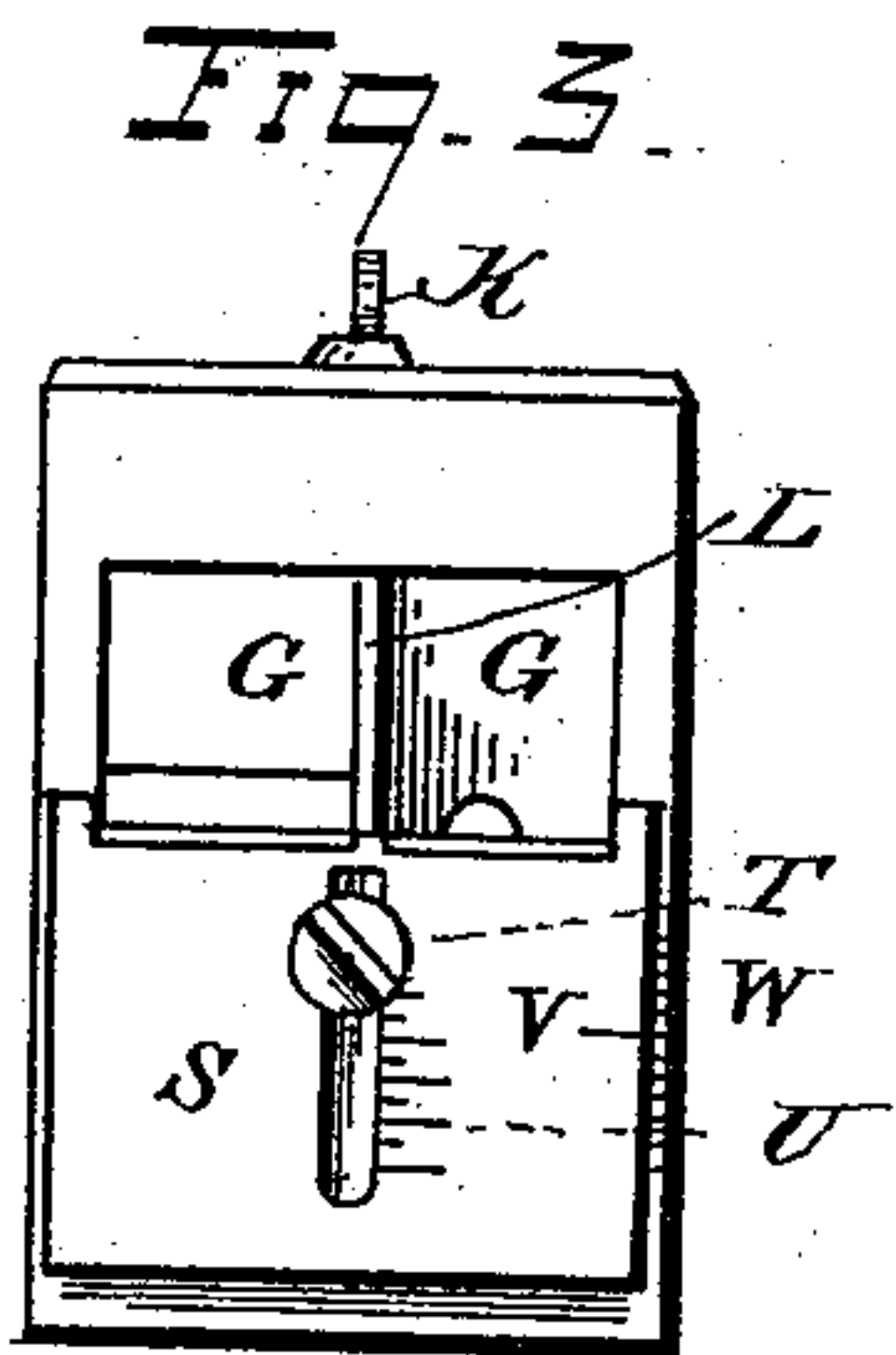
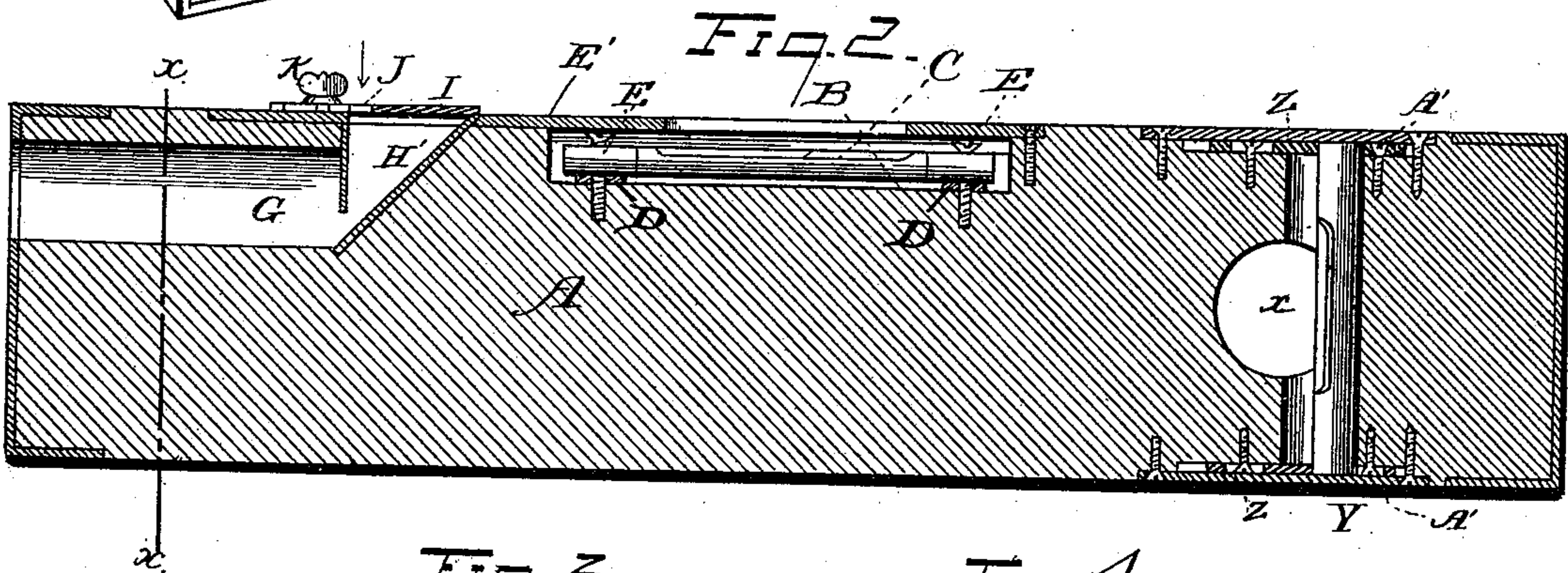
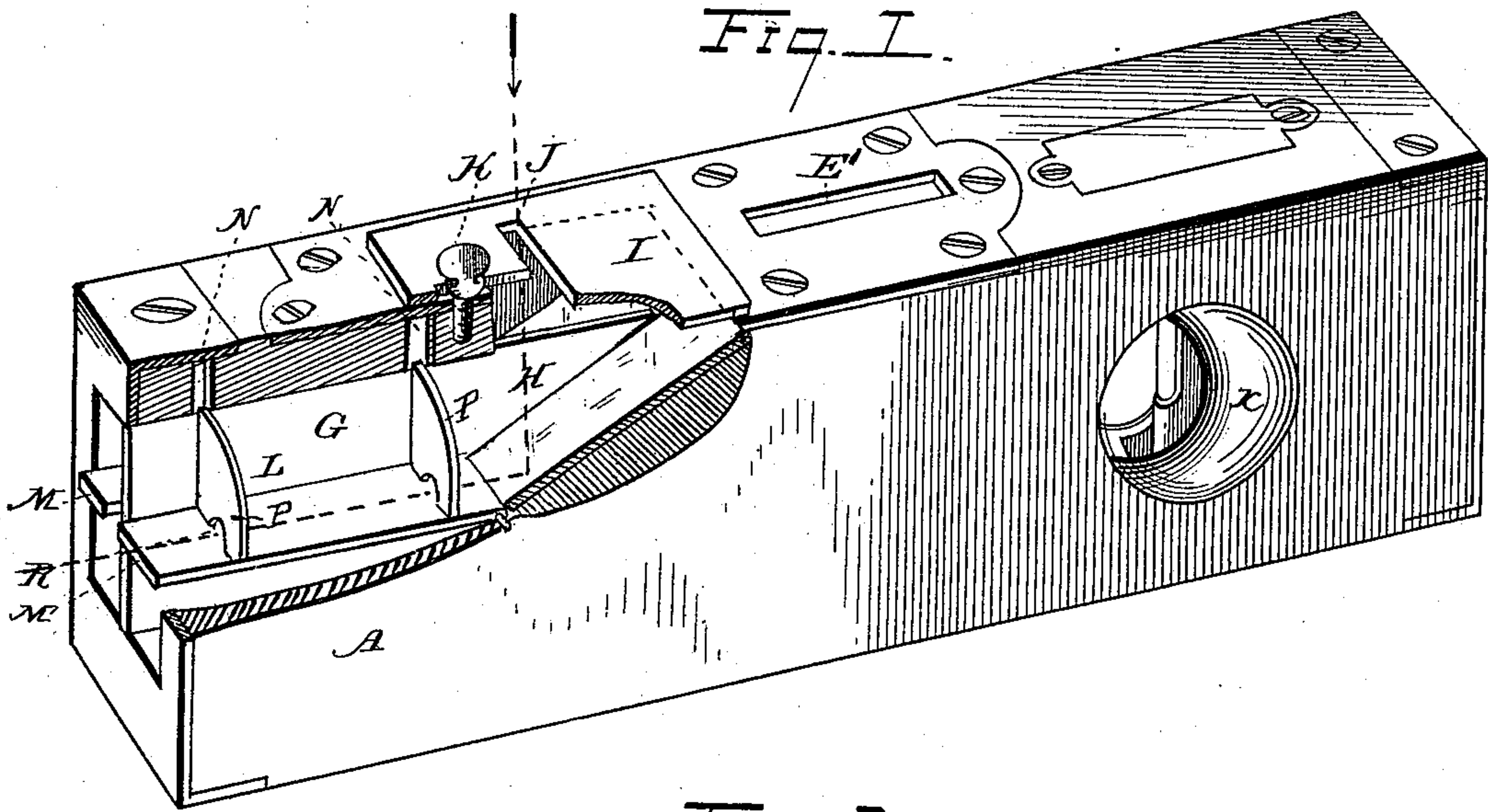


(No Model.)

C. G. SMITH.
LEVELING INSTRUMENT.

No. 338,791.

Patented Mar. 30, 1886.



WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES G. SMITH, OF WASHINGTON, DISTRICT OF COLUMBIA.

LEVELING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 338,791, dated March 30, 1886.

Application filed May 1, 1885. Serial No. 164,102. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. SMITH, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Engineers' Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in engineers' instruments; and it has for its objects to provide a device whereby an exact horizontal or vertical line may be established, and the relative horizontal positions of separate or distant objects accurately and conveniently established, as more fully hereinafter specified. These objects I attain by the means illustrated in the accompanying drawings, in which—

Figure 1 represents a perspective view of my improved implement, with a portion broken away, showing the interior of the same. Fig. 2 represents a longitudinal vertical sectional view of the same, showing the recess, partition and pivoted platforms as dispensed with; Fig. 3, a front elevation of the same, and Fig. 4 a sectional view taken on the line $x x$ of Fig. 2.

The letter A indicates a beam or oblong block of wood or other material, which is formed with straight edges at the sides, bottom, top, and ends, so that when applied to an object, such as a building or other structure, it will determine the horizontal or vertical lines thereof. In the upper part of said beam or block is a recess, B, in which is located a spirit-level, C, which is mounted on bearings D, which are secured in the recess by means of the screws E, and may be made adjustable, if desired. The said recess is covered by a slotted plate, E', secured to the top of the beam in any suitable manner. The forward portion of the beam or block is hollow, or is provided with a longitudinal rectangular recess, G, which is open at the forward end, and at its rear has an inclined mirror, H, set at an angle of forty-five degrees, and above said mirror the recess is provided with a plate, I, having a transverse slot, J, the said plate being capable of longitudinal adjustment by means of a set-screw, K, in such manner that any

object reflected upon the mirror through the front may be seen through the upper slotted adjustable plate. The relative horizontal positions of the object to which the instrument is applied and the distant object will be accurately ascertained or had.

To provide for conveniently sighting distant objects and at the same time aligning the same, I divide the front recess of the beam or block by a vertical horizontal partition, L, on each side of which is pivoted a platform, M, which swings freely upon its pivots.

At one side of the upper portion of the partition dividing the forward recess of the beam or block are formed vertical grooves N N, in which are adapted to slide the diaphragms P. These diaphragms have a semicircular recess, R, at their lower edges, through which the rays of light may pass from the front to the mirror at the rear and thence be deflected upward at an angle of forty-five degrees through the slotted opening in the adjustable plate before mentioned.

To the front of the beam or block is secured a vertically-adjustable plate, S, which is slotted and confined by means of a set-screw, T. The front ends of the pivoted platforms before mentioned rest upon the upper edge of this plate, and the plate is graduated, as indicated by the letter U, so that it can be adjusted to regulate the position of the platforms M in sighting distant objects above a given horizontal plane, and at the same time by means of the graduations to determine the angle formed between said horizontal plane and the platforms. By this device the angle formed between any two objects in different planes may be readily determined from a given point, as will be readily understood. The said plate may be also provided with a mark, V, near one edge, and the front edge of the instrument graduated, as indicated by the letter W, for the same purpose. Near the rear the beam is provided with a transverse aperture, X, at one side of which is adjustably secured a spirit-level, Y, by means of the slotted plates Z, which are confined by the set-screws A', so as to adjust the level parallel with the end of the beam or block, and thus insure perfect accuracy.

The operation of my invention is as follows: For ordinary work, the instrument is used as

a spirit-level; but for determining the angular elevation between distant objects it is located on one object and the bearings of the distant object taken by looking through the
 5 slotted top plate, and adjusting the forward plate until the pivoted platforms are brought to such positions that a reflection from the mirror is obtained through the slot in the upper plate, the deviation of which from a
 10 horizontal line will be determined by the graduations at the front, which will give the exact angle. The object is first sighted through the passage to the left of the figures in the drawings, which, being free and unobstructed,
 15 permits the sight to be readily obtained, and when this is effected the final sighting is accurately made through the passage at the right and the recess under the diaphragms therein. The upper slotted plate, which is adjustably
 20 secured above the recess in which the inclined mirror is located when properly adjusted to its normal position, has the front edge of the slot coincident with the front edge of the recess or flush therewith. As the swinging plat-
 25 forms have their forward edges resting upon the upper edge of the adjustable plate at the front of the block or beam, it will be evident that when the plate is raised or lowered for angular adjustment and measurements the
 30 platforms and the diaphragms will be correspondingly moved.

In sighting distant objects, and determining the height of the said object or the distance of the same from the horizontal line passing
 35 through the object sighted from, a suitable marker, as a pencil, is placed across the face of the object at the proper height, so as to clearly indicate the point by reflection in the mirror, which is determined when the reflec-
 40 tion of the object comes on line with the edges of the upper plate and level recess before mentioned. Then all that is necessary to determine the level of the objects is to deduct or add the height from the base of the block or
 45 beam to the point of the angle of reflection of the mirror, when the common horizontal line of the two objects will be accurately obtained.

Having thus described my invention, what I claim is—

50 1. The combination of the beam transversely apertured, and a spirit-level located within

said aperture, with slotted plates supporting said level and adjustable lengthwise of the beam, and means for securing said plates in an adjusted position, as and for the purpose 55 set forth.

2. The combination, with the block or beam having recess at its forward end and a vertical partition dividing the same, of the mirror located therein at an angle of forty-five de- 60 grees, whereby distant objects may be reflected upward through a suitable opening for ascertaining their relative horizontal level, as specified.

3. The combination, with the block having 65 an open recess at its forward end and the inclined mirror, of the vertical partition, the pivoted platform to each side thereof, and the vertically-sliding diaphragms, whereby angular adjustments and measurements are effected, 70 substantially as described.

4. The combination, with the beam or block having an open recess at its forward end communicating with a transverse opening at the top, of the inclined mirror, and the adjust- 75 able top plate or diaphragm arranged above the mirror over the transverse opening, substantially as described.

5. The combination, with the beam or block having an open recess at its forward end and 80 a transverse opening in its top, of the adjustable slotted plates, and set-screws, and the graduations whereby angular measurement may be determined, substantially as described.

6. The combination, with a level having a 85 recess at its forward end, vertical grooves on either side of said recess, and a transverse opening leading into said recess, of the inclined mirror, an adjustable slotted plate for said transverse opening, vertically-sliding dia- 90 phragms having recesses, the pivoted platforms, and a vertically-adjustable plate supporting the forward end of said platforms, the whole being constructed, arranged, and operated substantially as and for the purposes 95 specified.

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

CHAS. G. SMITH.

Witnesses:

E. EVERETT ELLIS,
 GEO. W. ZEIGLER.