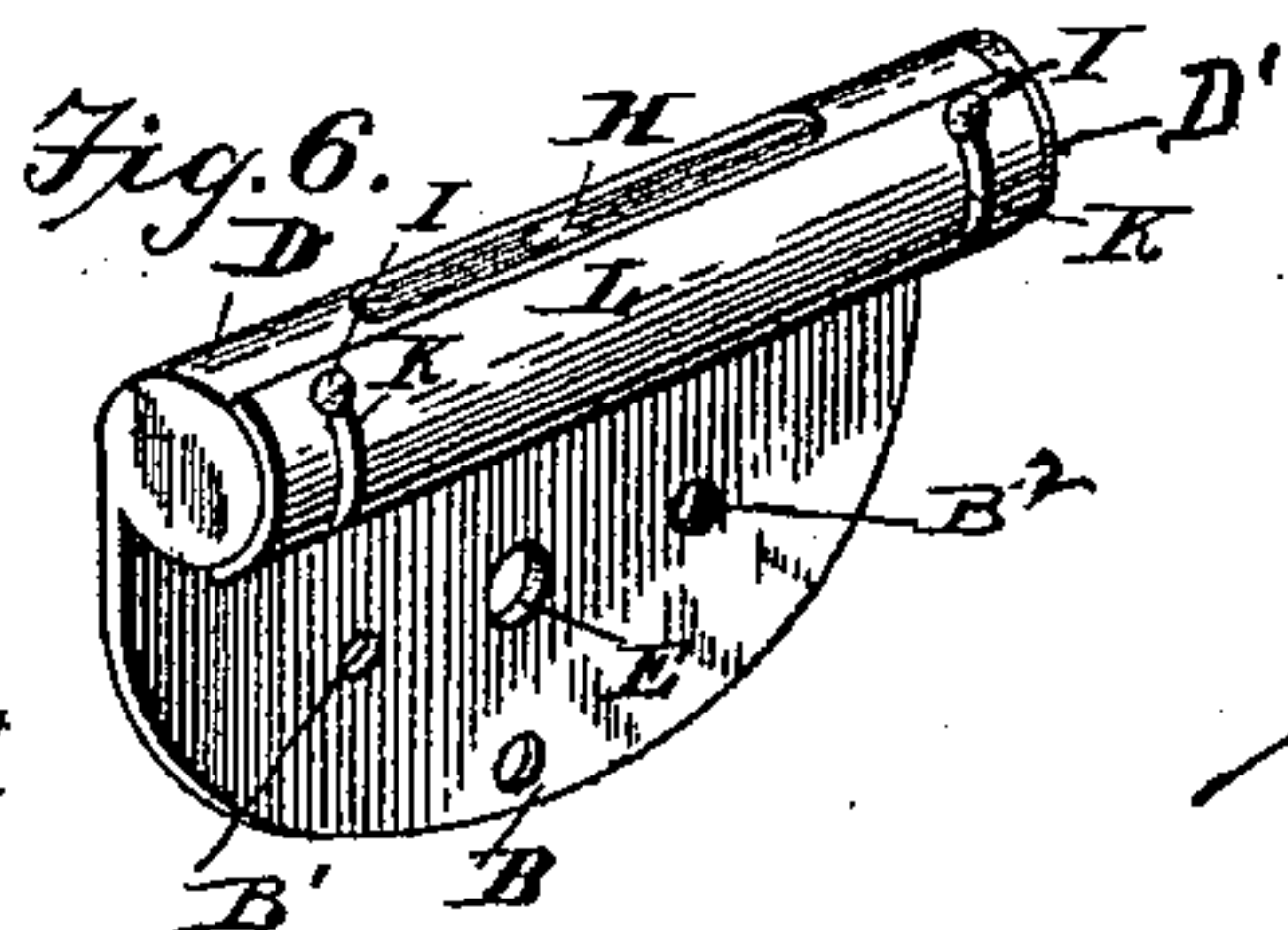
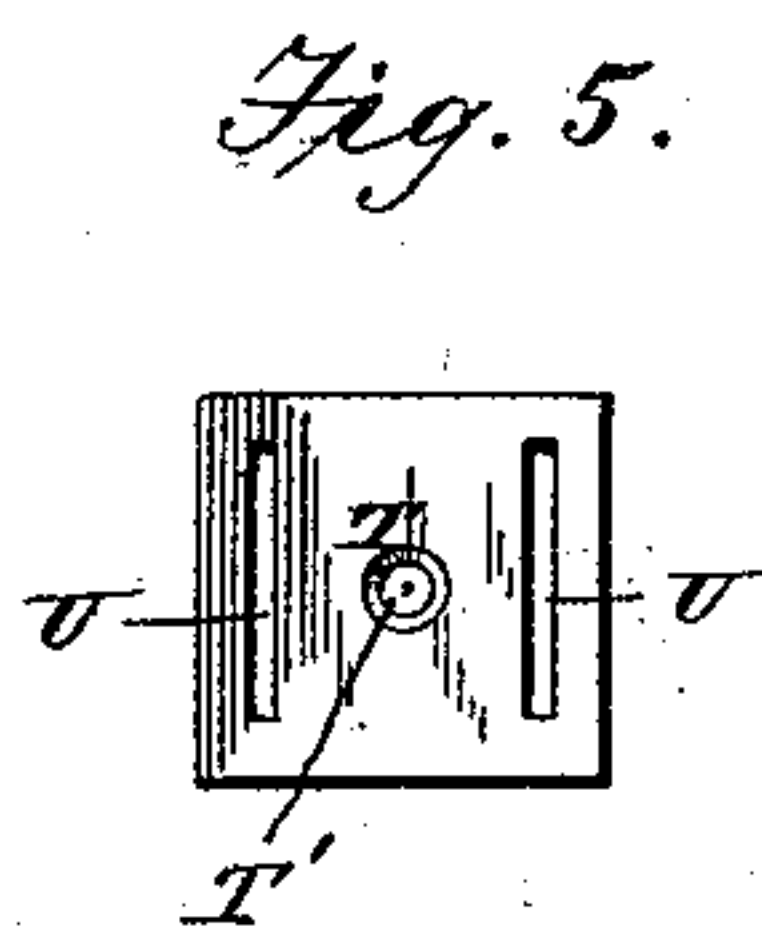
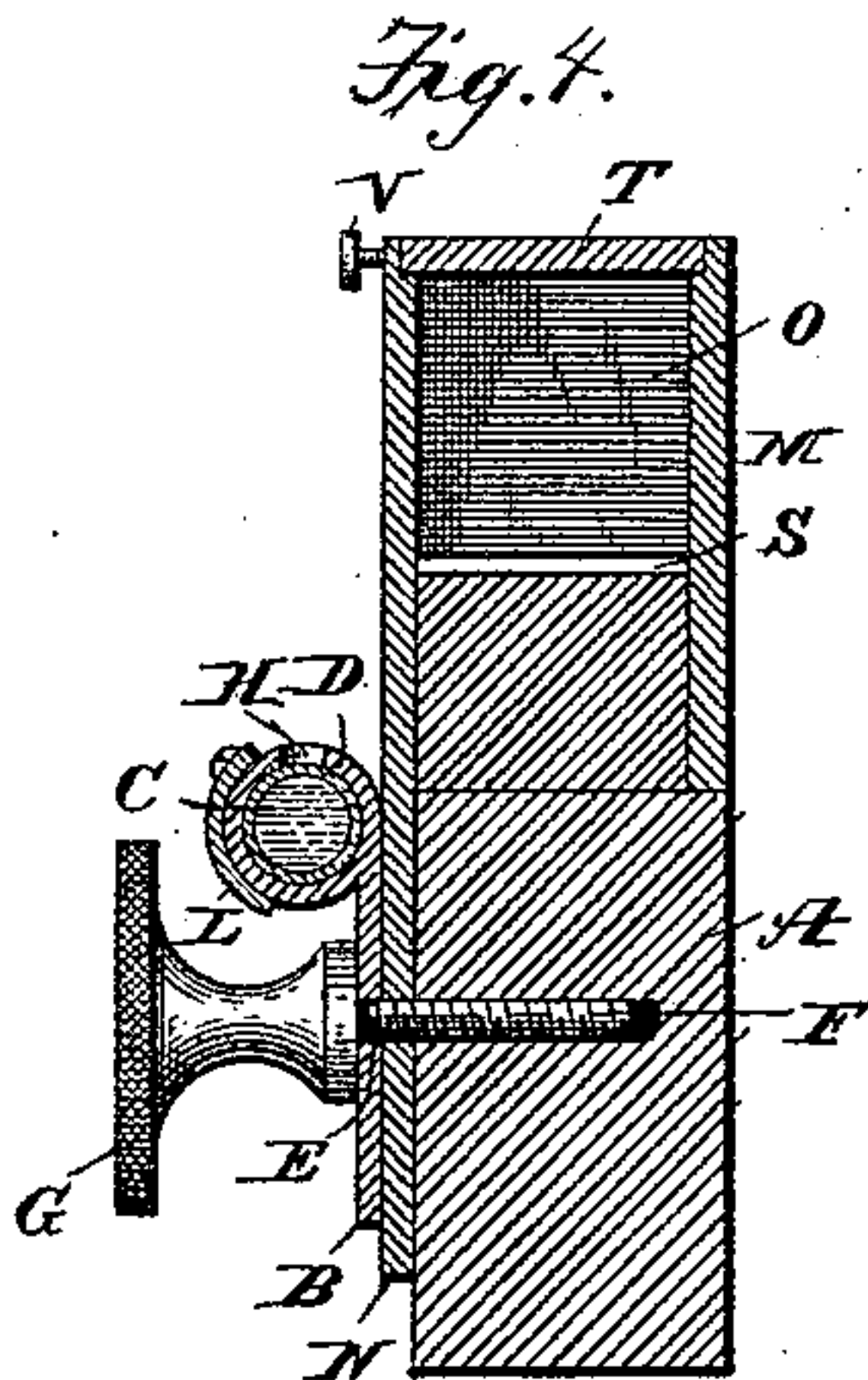
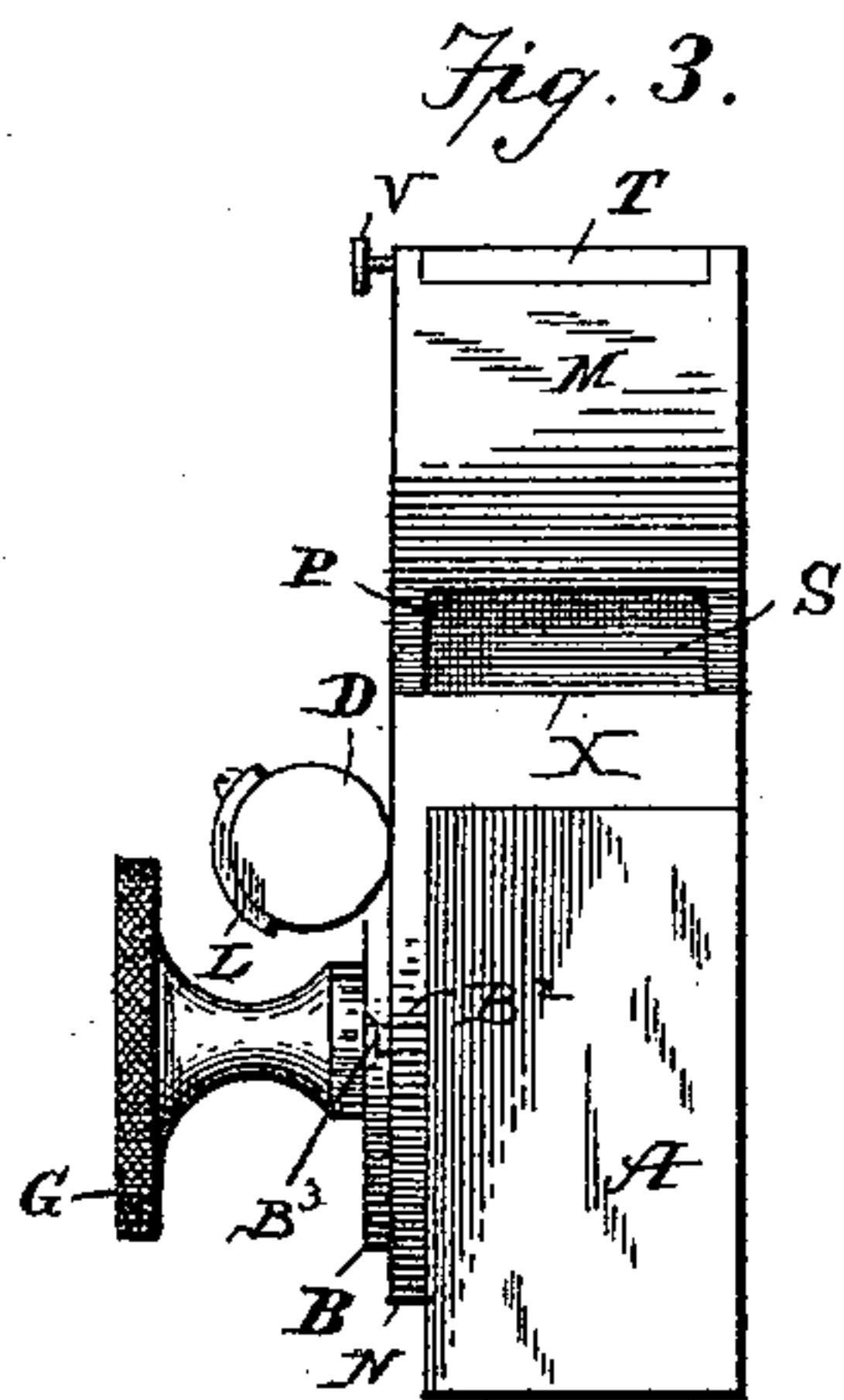
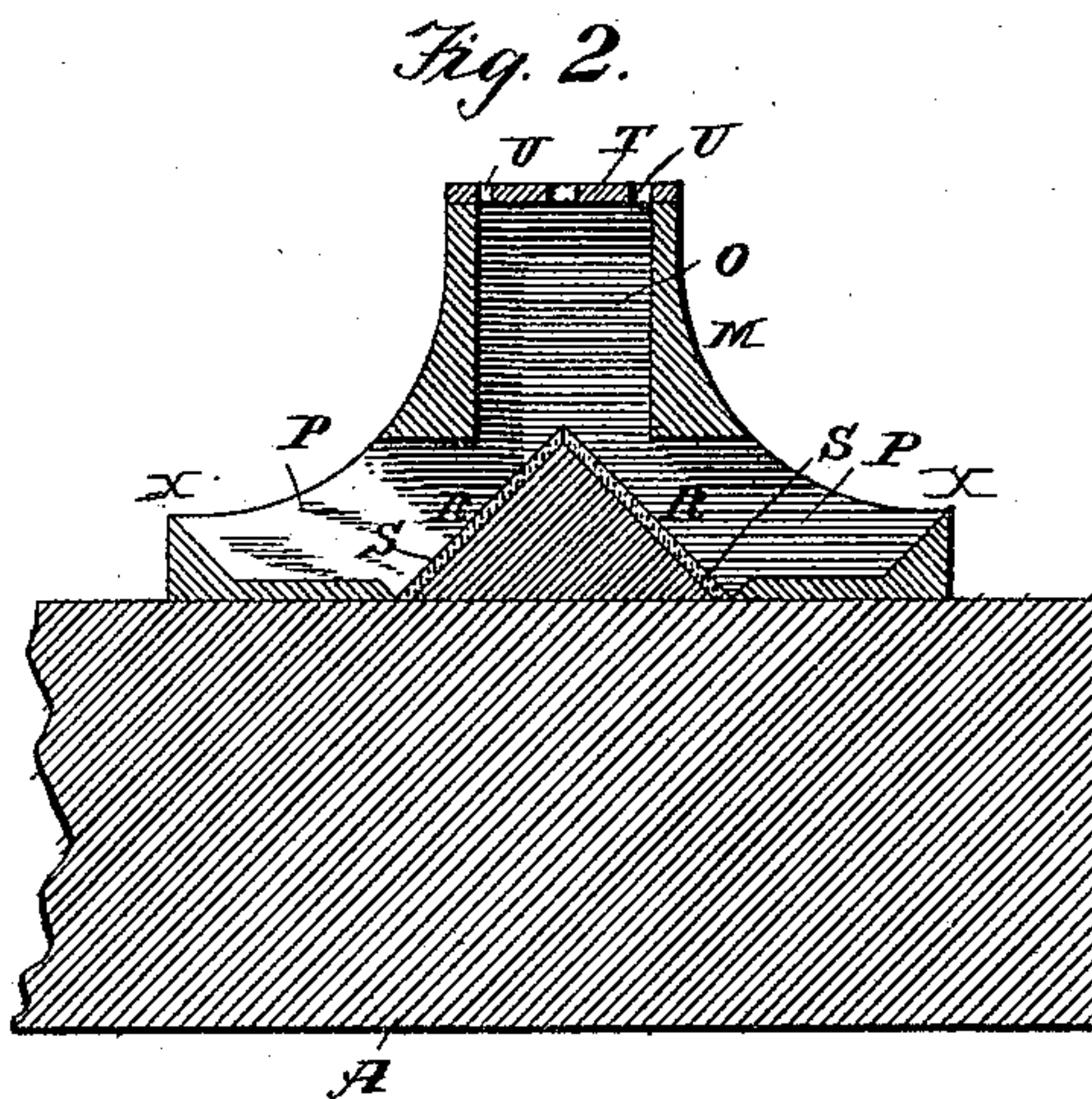
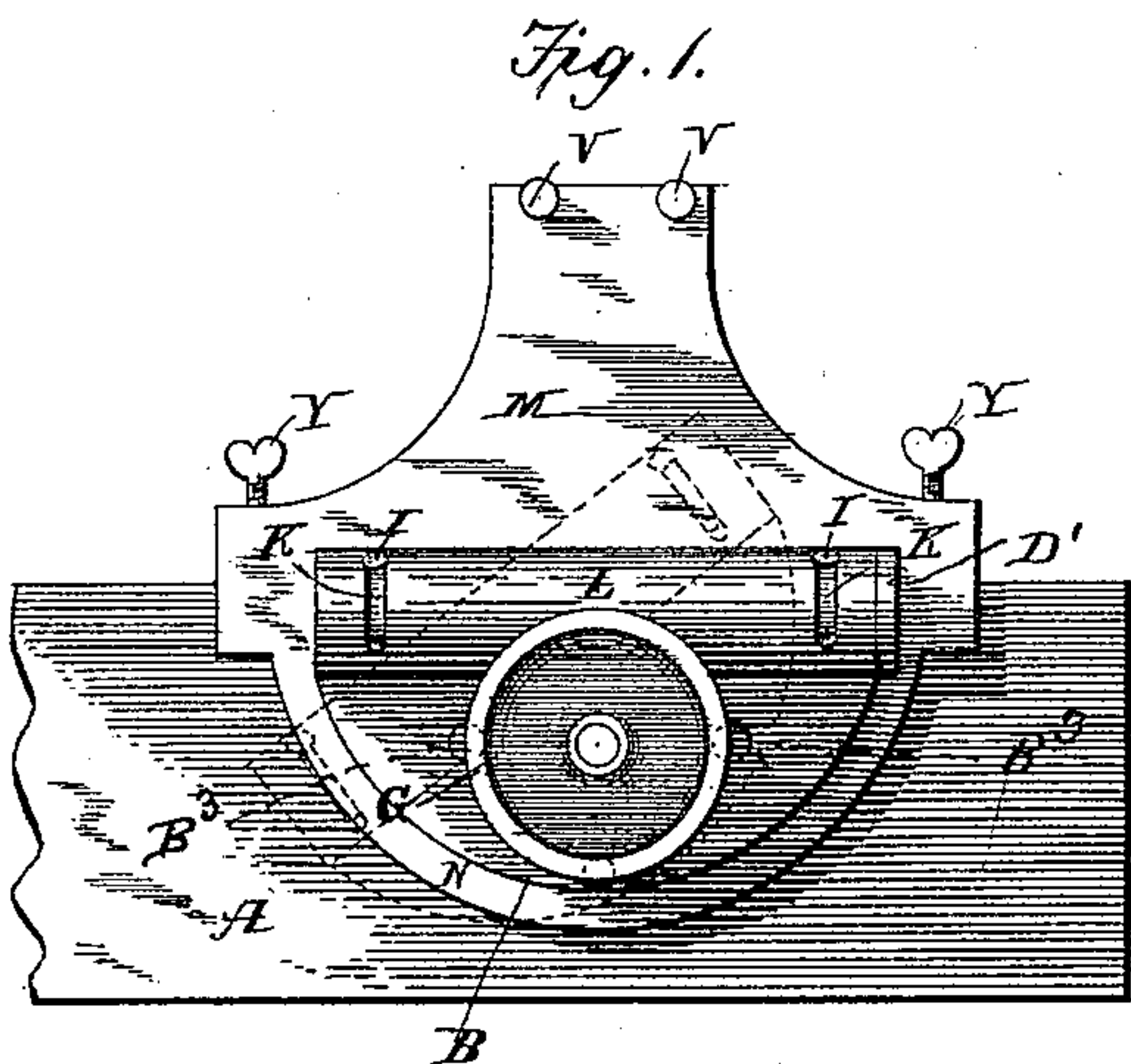


(No Model.)

C. G. SMITH.
LEVELING INSTRUMENT.

No. 438,954.

Patented Oct. 21, 1890.



WITNESSES:

Edwin L. Bradford
Wm. H. Ellis

INVENTOR

Charles G. Smith
BY
E. Everett Ellis
his ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES G. SMITH, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR
OF ONE-HALF TO HELEN MAR HILL, OF SAME PLACE.

LEVELING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 438,954, dated October 21, 1890.

Application filed February 11, 1890. Serial No. 340,020. (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 an Engineer's Instrument or Spirit-Level; 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 improvements in leveling attachments, which may be applied to brick-layers' and carpenters' levels or straight-edges or to an ordinary rectangular block or beam of wood or other similar material.

The invention is designed as an improvement upon the invention set forth and claimed in Letters Patent granted to me March 30, 1886, No. 338,791.

The invention disclosed in said patent described and illustrated a spirit-level set in a block or beam of wood, which block was provided at one end with vertical and longitudinal passages, a slotted plate closing the vertical passage, and a graduated adjustable plate being placed in front of the horizontal passages. A mirror inclined at an angle of forty-five degrees was located at the intersection of these two passages, and the horizontal angle between two objects was determined by the ray of light reflected on the mirror through the slot in the plate covering the vertical passage, taken in connection with the aforesaid adjustable graduated plate. This construction was somewhat objectionable, owing to the fact that it was made integral with the beam or block, thus rendering it costly and expensive.

The object of the present invention is to provide an attachment which can be readily applied to and removed from a beam, block, or other similar object; also, to simplify the construction and mode of operation, and generally to improve the implement and render it less costly and complicated.

The invention consists, essentially, in a sight-tube having horizontal and vertical passages, with oppositely-inclined mirrors

set at angles of forty-five degrees at the point of intersection of said passages, a slotted plate covering the vertical passage, and the horizontal ends of the tube beveled to form sharp edges, which are coincident with the slots in the plate covering the vertical passage, a downwardly-depending wall and a radially-adjustable plate carrying a spirit-level, said plate and the tube being adapted to be secured to a beam or straight-edge, as will be hereinafter more fully explained.

The invention also consists in the novel construction and combinations of parts, hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of an implement constructed according to my invention applied to a straight-edge. Fig. 2 is a longitudinal section of the same. Fig. 3 is a end view. Fig. 4 is a cross-section. Fig. 5 is a detail view of the sight-plate. Fig. 6 is a detail perspective view of the adjustable plate carrying the spirit-level.

The letter A indicates a beam or oblong block of wood or other material, which is formed with straight-edges at its sides, bottom, top, and ends, so that when applied to a building or other structure it will determine the horizontal or vertical lines thereof. To one side of said block is adjustably secured the plate B, carrying the spirit-level C. At its upper end this plate is curved or rounded, forming a housing D, in which the spirit-level is inserted, said housing being closed at one end by a removable cap D'. The lower portion of the plate is flat or plane surfaced and is provided with an aperture E, through which passes the screw F, having a milled head G, and by means of which the plate is secured to the block. The upper portion of housing D is provided with a slot H for observing the air-bubble in the spirit-level, and near each end is also provided with a set-screw I, which passes through slots K in a curved protecting-plate L. By loosening these screws the plate L can be slid over the slot H and the glass tube of the spirit-level be protected from injury when the device is not in use, and may be slid back when it is desired to use the device.

For permanently retaining plate B in a vertical or horizontal position I provide the holes B' and B², which receive the screws B³, which securely hold it.

5 Mounted upon the upper side of the block A is the sight-tube M, which may be made of metal or other suitable material. The bottom of this tube or frame rests upon the top of block A, and one of its sides is extended
10 or prolonged, forming a depending wall N, having an aperture through which passes the binding-screw F, said wall being interposed and held between plate B and block A. This sight-tube or frame is provided with a vertical
15 passage O and two horizontal passages P, said passages intersecting each other, and at their points of intersection R there are located two oppositely-inclined mirrors S S, set at an angle of forty-five degrees. These mirrors
20 meet at their upper ends and are arranged opposite to each other, so that observations may be made from either end of the implement without turning the same.

Closing the upper end of the vertical passage O is an adjustable plate T, having two
25 sight-openings or lateral slots U U, said plate being secured to the tube M by means of set-screws V, by loosening which it may be horizontally adjusted. The ends X of the tube
30 are beveled, as shown, forming sharp edges, the planes of which are coincident with the planes of the sight-openings in plate T—that is to say, a horizontal line drawn from one of the edges to the other will intersect in the
35 mirror's vertical lines let fall from said sight-openings. The tube M is provided at each end with thumb-screws Y, which pass there-through, and by means of which said tube may be adjusted.

40 The manner of using the device is as follows: The implement is secured to a beam, block, or straight-edge by placing the lower edge of tube M upon the face thereof and then passing screw F through the apertures in
45 wall N and plate B into the said beam or block. For determining the angular elevation between distant objects the beam or block is placed or located on one object and the bearings of the distant object taken by elevating
50 one or the other end, as the case may be, of the block or beam until the said object and the edge X of the tube appear in line with each other, as seen through the appropriate sight-opening in plate T. The plate B is now
55 radially adjusted until the air-bubble of the spirit-level indicates "level." The angle formed by the spirit-level in this last position and its normal position or true level will be the horizontal angle between said objects.
60 In sighting distant objects and determining the height of the said objects or the distance of the same from the horizontal line passing through the object sighted from the device may be used as in the patent aforesaid—that
65 is to say, 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 reflection of the object comes in line with the sight-opening in the upper plate and the ends of the tube. Then
70 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 beam to the point of the angle of reflection of the mirror,
75 when the common horizontal line of the two objects will be accurately obtained. The plate T may also be provided with a central sight-opening T', by which distant objects may be accurately aligned. This sight-opening is preferably
80 circular in form, as shown in Fig. 5.

Having thus described my invention, what I claim is—

1. The combination, with a block or beam and an adjustable spirit-level secured thereto,
85 of a sight tube or frame having a vertical passage, horizontal passages intersecting said vertical passage, a top plate having two sight-openings therein, and two mirrors oppositely inclined to each other and located at the intersection of said passages, substantially as
90 described.

2. The combination, with a block or beam and an adjustable spirit-level secured thereto,
95 of a sight tube or frame having a vertical passage, horizontal passages intersecting said vertical passage, a top plate having two sight-openings therein, two mirrors oppositely inclined to each other at angles of forty-five degrees, the beveled lower walls of the horizontal passages, and the adjusting-screws passing
100 through the ends of the sight-tube, substantially as described.

3. The combination, with the block or beam having a sight-tube, of the adjustable plate
105 B, having its upper end formed into a housing D, having slot H, the spirit-level C, and screw F, substantially as described.

4. The combination, with the block or beam A, provided with a sight-tube, of the adjustable plate B, having its upper end formed
110 into a housing D, with a slot H, the spirit-level C, the curved plate L, having slots K, the set-screw I, and binding-screw F, substantially as described.

5. The combination, with the block or beam A, provided with a sight-tube having vertical and horizontal passages, the mirrors S S, and a depending wall N, of the adjustable plate
115 B, having housing D with slot H, the spirit-level C, and the screw F for holding plate B, and wall N, substantially as described.

6. The combination, with the block or beam having a sight-tube, of the adjustable plate B, having its upper end formed into a housing
120 having a slot H and removable cap D', the spirit-level C, and screw F, substantially as described.

7. The combination, with the block or beam A, provided with a sight-tube having vertical
125 and horizontal passages, the mirrors S S, and a depending wall N, having openings or apertures B², of the adjustable plate B, having housing D with slot H and apertures B',

the spirit-level C, the screw F, and screws B³, substantially as described.

5 8. The combination, with the block or beam A, provided with a sight-tube having vertical and horizontal passages and a sight-plate having a central sight-opening T', the mirrors S S, and wall N, of the adjustable plate B, having housing D with slot H, the spirit-level C, and the screw F for holding plate B and wall
10 N, substantially as described.

9. As a new article of manufacture, the herein-described leveling attachment for beams, blocks, straight-edges, and similar ob-
15 jects, the same consisting of a sight-tube having horizontal and vertical passages, with oppositely-inclined mirrors set at angles of forty-five degrees at the point of intersection

of said passages, a slotted plate closing the vertical passage and the horizontal ends of the tube beveled to form sharp edges, which 20 are coincident with the slots of the said closing-plate, a downwardly-depending wall, and a radially-adjustable plate carrying a spirit-level, said plate and the tube being adapted to be secured to the beam or straight-edge by 25 means of a set-screw, substantially as specified.

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

CHAS. G. SMITH.

Witnesses:

SAML. C. MILLS,
GEO. M. HÉNAULT.