

(No Model.)

H. AIKEN.
CASTING INGOTS OR BILLETS.

No. 416,705.

Patented Dec. 10, 1889.

FIG. 1.

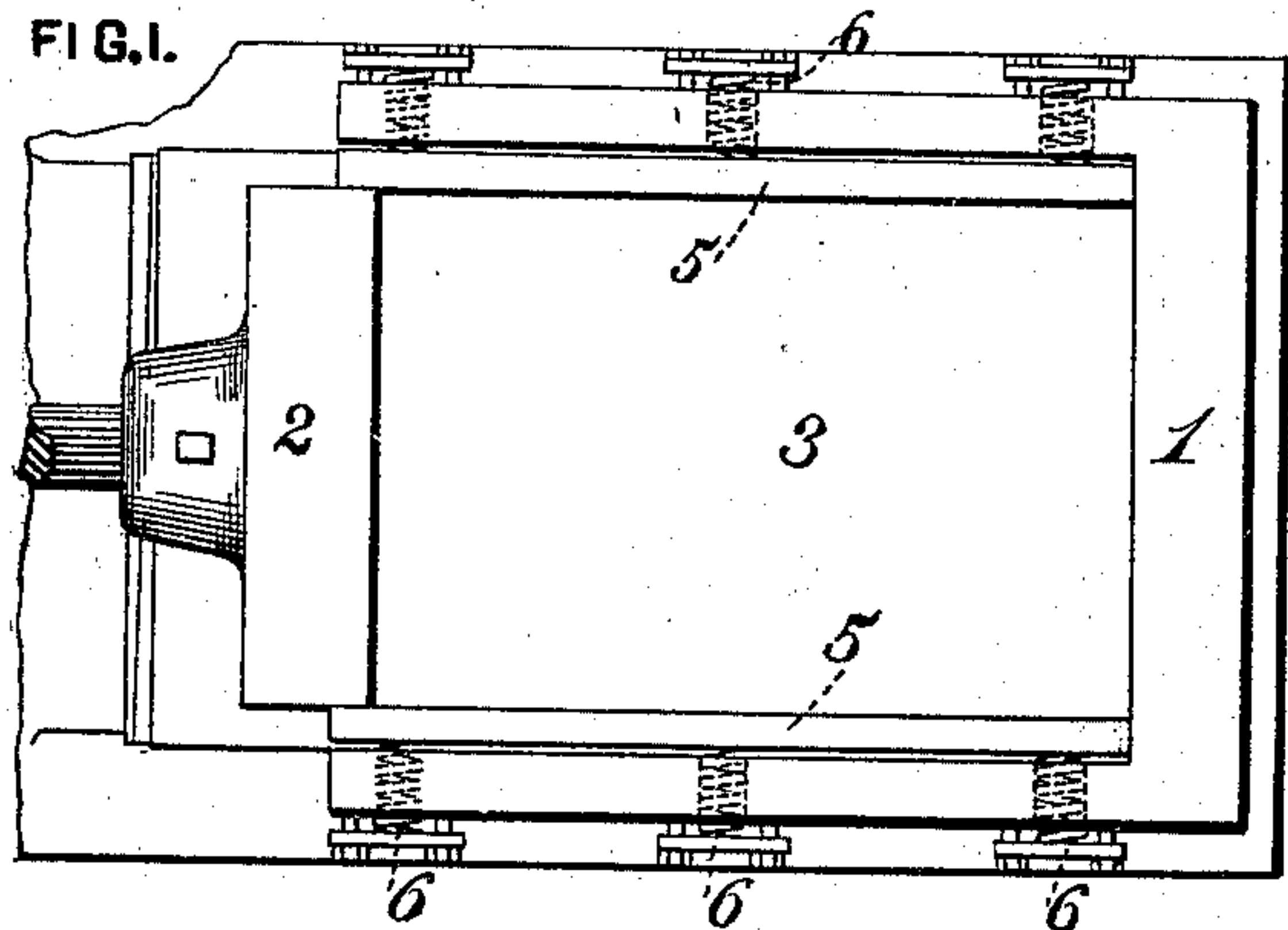


FIG. 2.

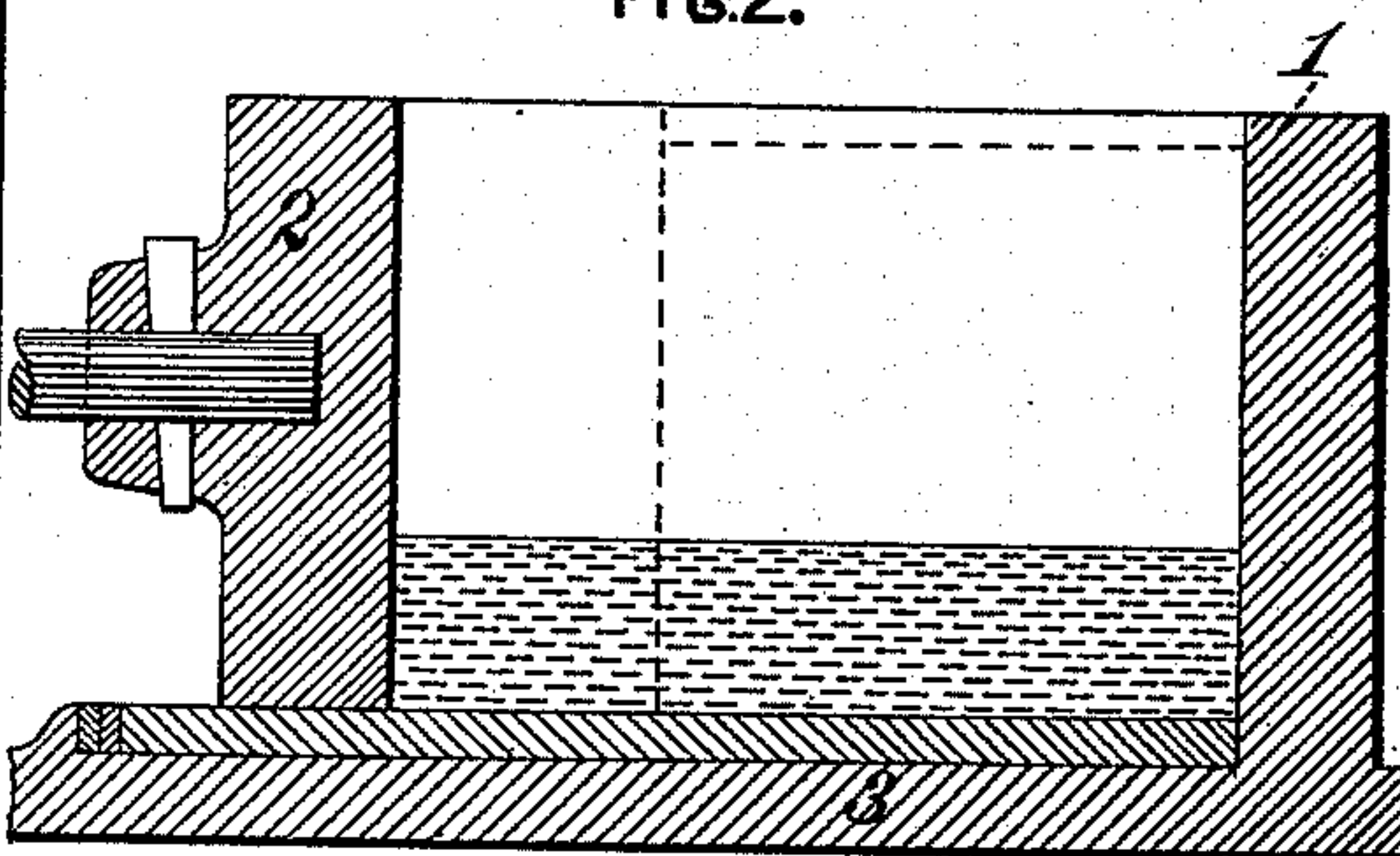


FIG. 3.

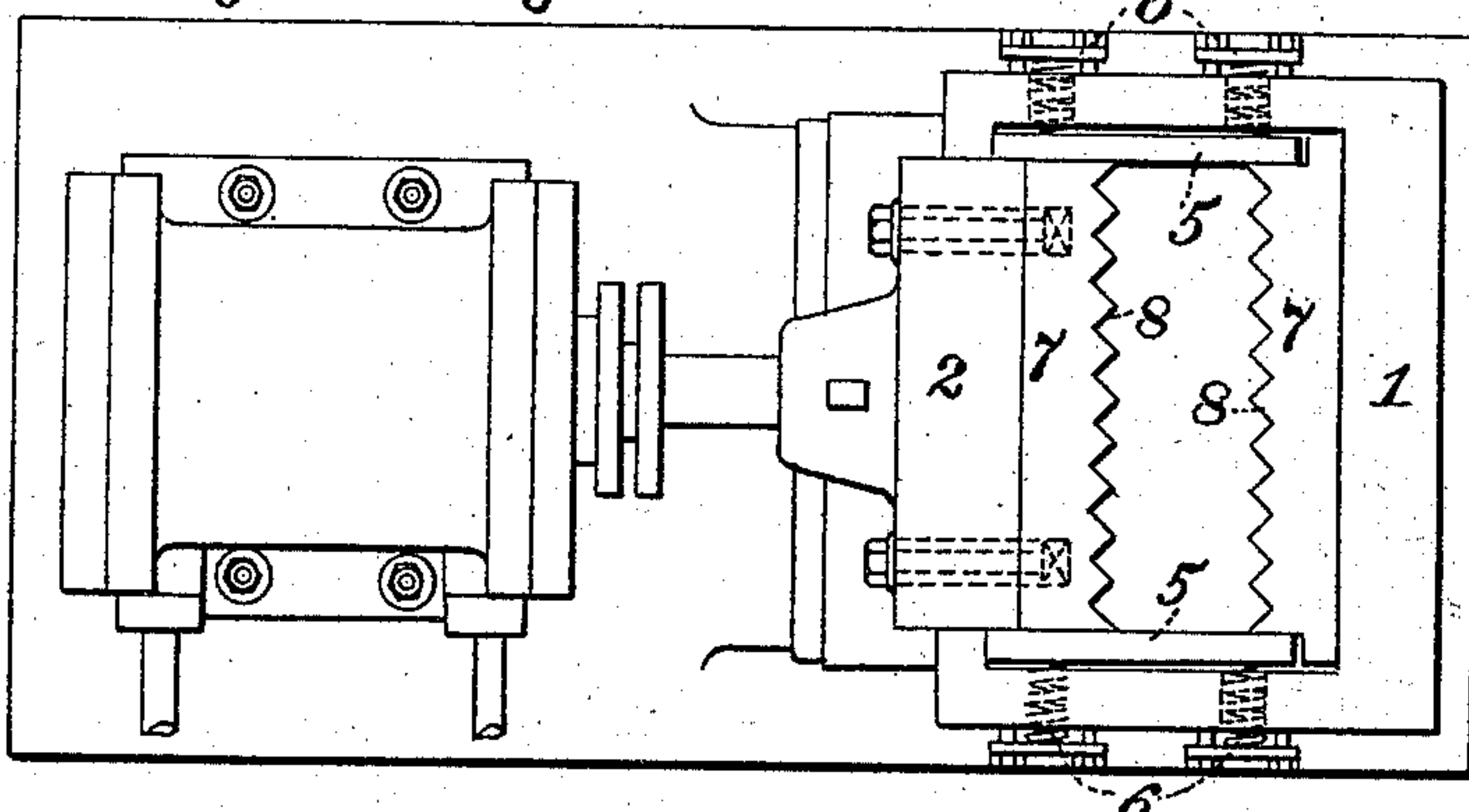


FIG. 4.

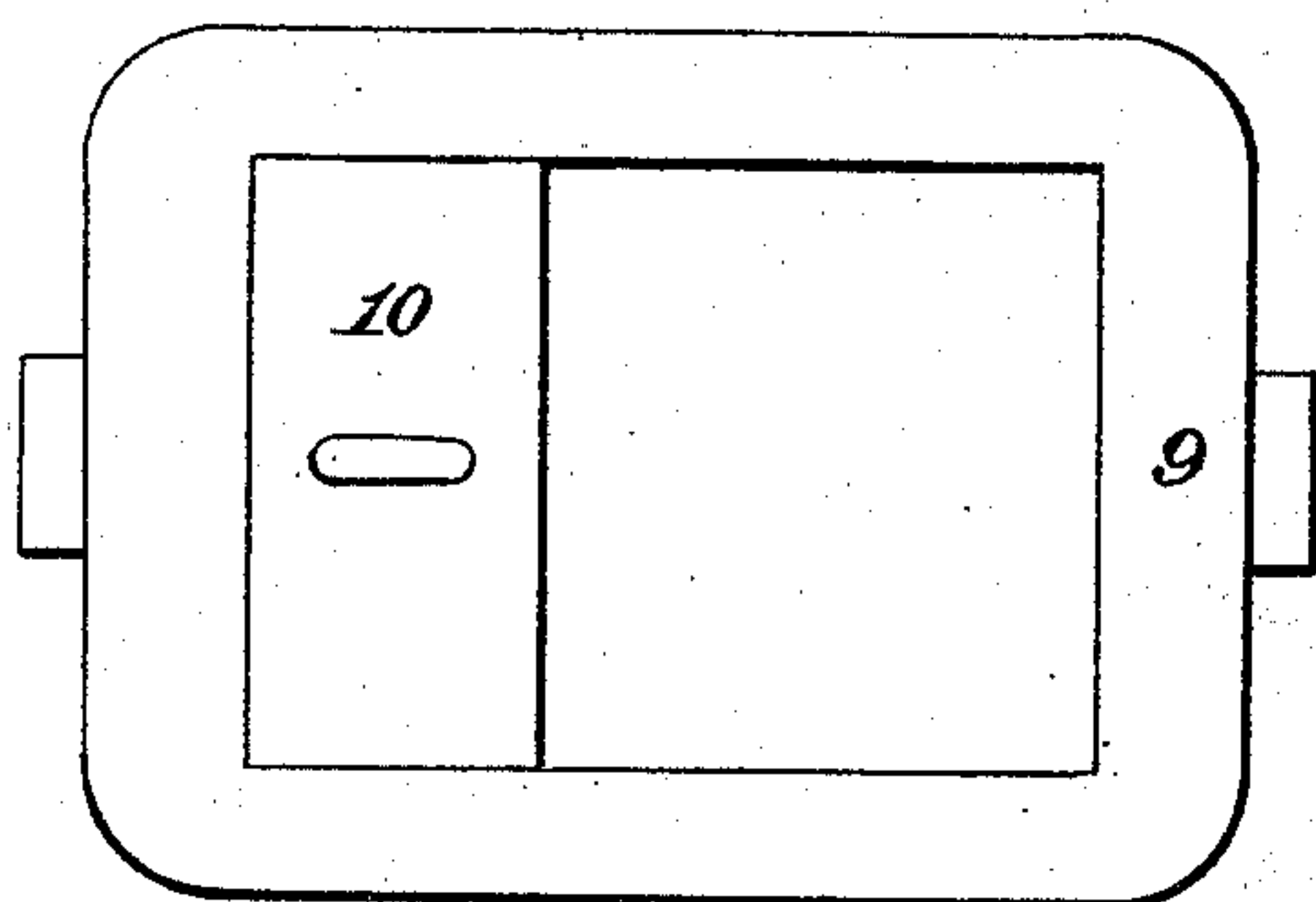


FIG. 5.

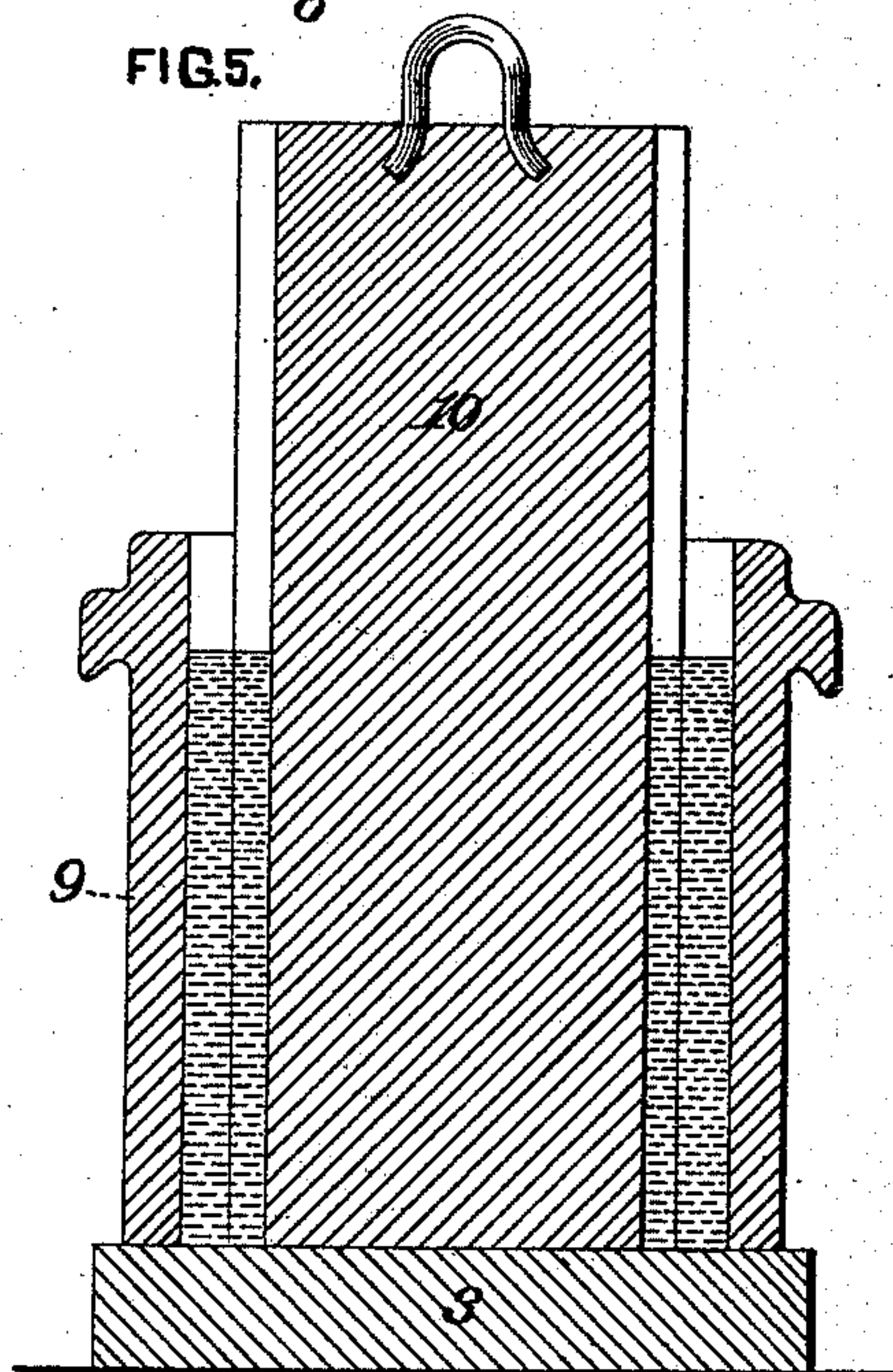
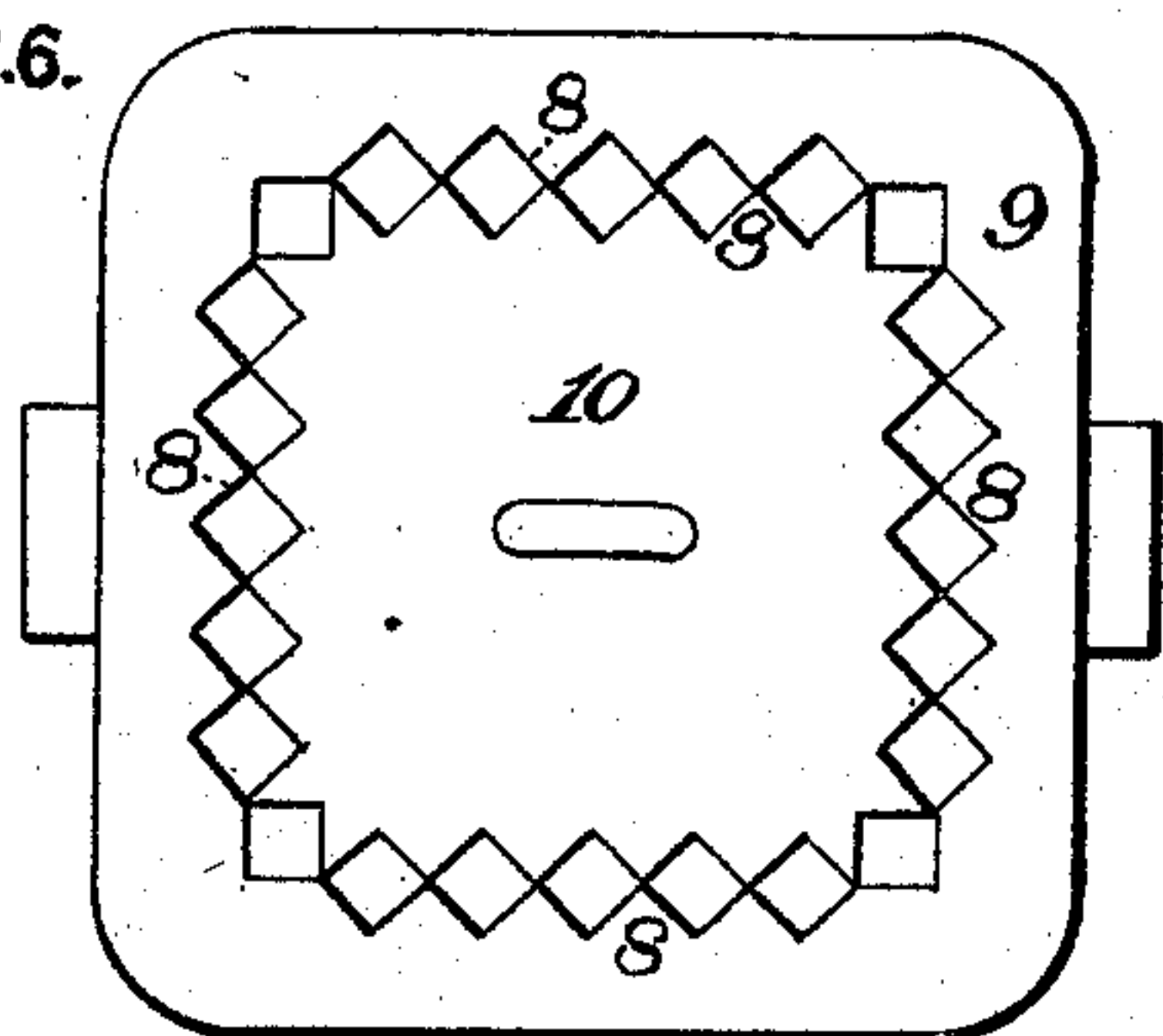


FIG. 6.



WITNESSES:

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UNITED STATES PATENT OFFICE.

HENRY AIKEN, OF HOMESTEAD, PENNSYLVANIA.

CASTING INGOTS OR BILLETS.

SPECIFICATION forming part of Letters Patent No. 416,705, dated December 10, 1889.

Application filed February 25, 1889. Serial No. 301,073. (No model.)

To all whom it may concern:

Be it known that I, HENRY AIKEN, a citizen of the United States, residing at Homestead, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Casting Ingots, Billets, &c., of which improvements the following is a specification.

Great difficulty has heretofore been experienced in casting small ingots or billets from open-hearth or Bessemer metal on account of the cutting of the walls of the molds, thereby causing the billet or bloom to stick in the mold and rendering the latter useless. Hence in forming blooms or billets of open-hearth or Bessemer metal resort has been had to bottom casting; but this method is objectionable on account of the labor and expense incurred in forming the molds, runners, &c., and the waste of metal in the runners.

The object of the invention herein is to provide for the teeming of the molten metal into a mold and the subsequent reduction thereof by lateral displacement into the desired shape.

The invention claimed is hereinafter fully set forth.

In the accompanying drawings, forming a part of this specification, Figures 1 and 2 are top plan and sectional views, respectively, of apparatus adapted for the practice of my invention. Fig. 3 is a plan view of a modification of the apparatus. Fig. 4 is a plan view of a different form or construction of apparatus, and Figs. 5 and 6 are plan and sectional views of a modification of the apparatus shown in Fig. 4.

In the practice of my invention I provide as the preferable form of apparatus a mold consisting of an angular frame 1 and a wall 2, movable back and forth in the frame. The frame and wall are made of a height a little greater than the desired length of the ingot or billet desired, and the sides of the frame adjacent to the movable wall are made considerably wider than the corresponding sides of the bloom to be formed, the other side of the frame and the movable wall being made of approximately the same width as that desired in the corresponding sides of the ingot or billet. The frame and wall are arranged

upon a metal plate 3 and the movable wall is connected to a hydraulic ram or any other suitable mechanism whereby said wall may be quickly moved into and out of the frame. 55

In casting, the wall 2 is moved outwardly sufficiently far to afford ample space for teeming the metal without its coming into contact with the walls of the mold, which is then partially filled. As soon as the flow of metal is stopped, the movable wall is forced inwardly, thereby displacing the molten metal laterally and causing it to rise up in the mold proportionately to the inward movement of the wall 2. After the metal has set, so as to permit handling, the wall 2 is drawn outwardly and the ingot or billet removed, when another charge of molten metal can be run in and the wall again forced inwardly. In order to prevent the formation of an opening between the movable wall 2 and the sides of the frame by the expansion of the latter, I provide movable expansion-plates 5, arranged inside of the sides of the frame and held in contact with the edges of the movable wall 2 by springs 6, as shown. 75

While my improvement can be employed, as hereinbefore described, in casting small single ingots or billets, it is more especially applicable to the simultaneous production of a number of billets or ingots. For this purpose the mold is made substantially as hereinbefore described, except that the movable wall 2 and the corresponding side of the frame 1 are increased in width, such increase in width being proportional to the number and cross-sectional size of the billets or ingots to be formed. Against the inner faces of the movable wall 2 and the corresponding side wall of the frame I arrange liners 7, having a series of projections 8 on their operative faces, as shown. These projections are so disposed on the liners that the edges of the projections on one liner are in line with the edges of the projections on the other liner, so that when the movable wall is moved inwardly, as stated, the projections will be forced into the molten metal, and by the complete or approximate contact of their edges divide the metal more or less perfectly into a series of ingots or billets, as shown by dotted lines in Fig. 4, the division of the metal being sufficiently com- 100

plete that the connecting may be easily broken. The faces of the liners between the projections 8 are shaped in accordance to the cross-sectional contour of the ingot, billet, &c., to be produced—as, for example, if square billets are desired the projections are formed by cutting V-shaped recesses in the operative faces of the liners, or if round billets, semi-circular recesses are formed.

While preferring to effect the displacement of the metal by lateral pressure applied through the medium of a movable wall, as hereinbefore described, it is evident that the same function or purpose—i. e., forcing the molten metal to assume the desired shape—may be effected by a vertically-movable plunger—as, for example, in Fig. 4 I have shown a rectangular frame 9, having at least two of its sides made of a greater width than the corresponding sides of the ingot or billet to be produced. After a proper amount of molten metal has been teemed into the frame or mold a plunger 10 is forced down along one side of the mold, thereby displacing the metal laterally and increasing its vertical depth.

By forming a series of projections 8 on all or part of the operative faces of the mold or plunger, or both, as shown in Figs. 5 and 6, a series of small ingots or billets can be shaped simultaneously, the metal being divided as it rises up between the mold and plunger.

I am aware that it is old in forming cylinders having one end formed integral therewith, as shown in English Patent No. 4,290 of 1880, to partially fill a cylindrical mold and then force into the mold a plunger having its lower portion of less diameter than the mold, so that in descending it will displace and force up some of the metal between it and the sides of the mold, the lower portion of the plunger being made of such length as not to displace an amount of metal at the bottom of the mold proportional to the thickness desired in the head of the cylinder. In other words, the lower portion of the plunger is not designed to displace the entire or approximately the entire body of metal in the mold,

whereas in my method the displacement of all or nearly all the metal in the mold is an essential feature.

I claim herein as my invention—

1. The method of manufacturing solid ingots, billets, &c., which consists in partially filling a mold with molten metal and then displacing the entire or substantially the entire body of metal while still in a fluid state laterally and upwardly, thereby increasing its vertical depth and diminishing its cross-sectional area, substantially as set forth.

2. The method of manufacturing ingots, billets, &c., which consists in partially filling a mold with molten metal, laterally displacing the metal while still in a fluid state laterally and upwardly for the purpose of increasing its vertical depth and diminishing its cross-sectional area, and simultaneous with such displacement dividing the metal more or less perfectly into a series of sections, substantially as set forth.

3. The method of manufacturing ingots, billets, &c., which consists in partially filling a mold with molten metal and then displacing the metal while still in a fluid state laterally and upwardly by laterally-applied pressure, thereby increasing its vertical depth and diminishing its cross-sectional area, substantially as set forth.

4. The method of manufacturing ingots, billets, &c., which consists in partially filling a mold with molten metal, displacing the metal while still in a fluid state laterally and upwardly by laterally-applied pressure for the purpose of increasing its vertical depth and diminishing its cross-sectional area, and simultaneously with such displacement dividing the metal more or less perfectly into a series of sections, substantially as set forth.

In testimony whereof I have hereunto set my hand.

HENRY AIKEN.

Witnesses:

DARWIN S. WOLCOTT.
R. H. WHITTLESEY.