

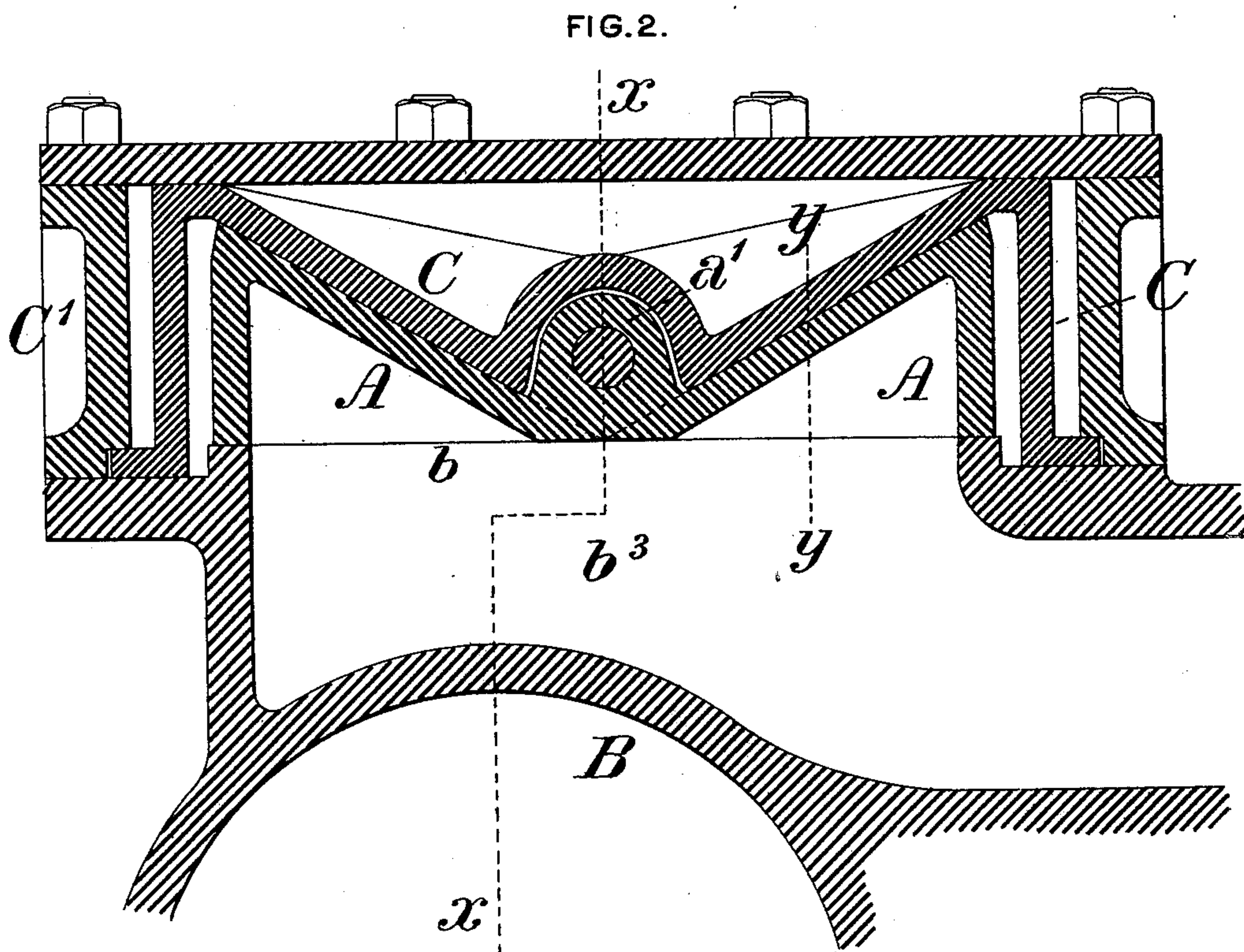
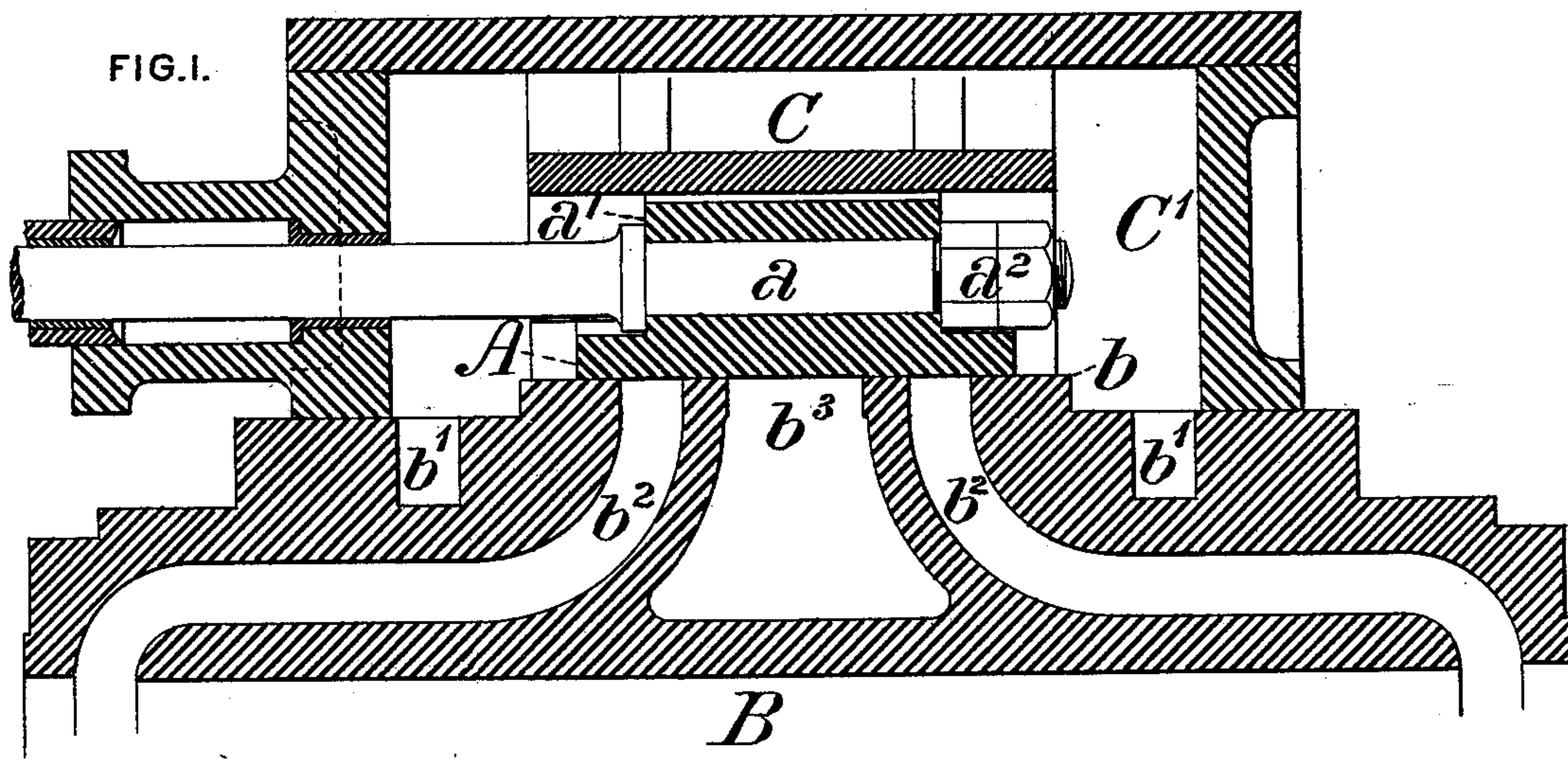
(No Model.)

2 Sheets—Sheet 1.

W. P. TATHAM.  
Balanced Valve.

No. 229,773.

Patented July 6, 1880.



WITNESSES.

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Wm. C. Myers

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(No Model.)

2 Sheets—Sheet 2.

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FIG. 3.

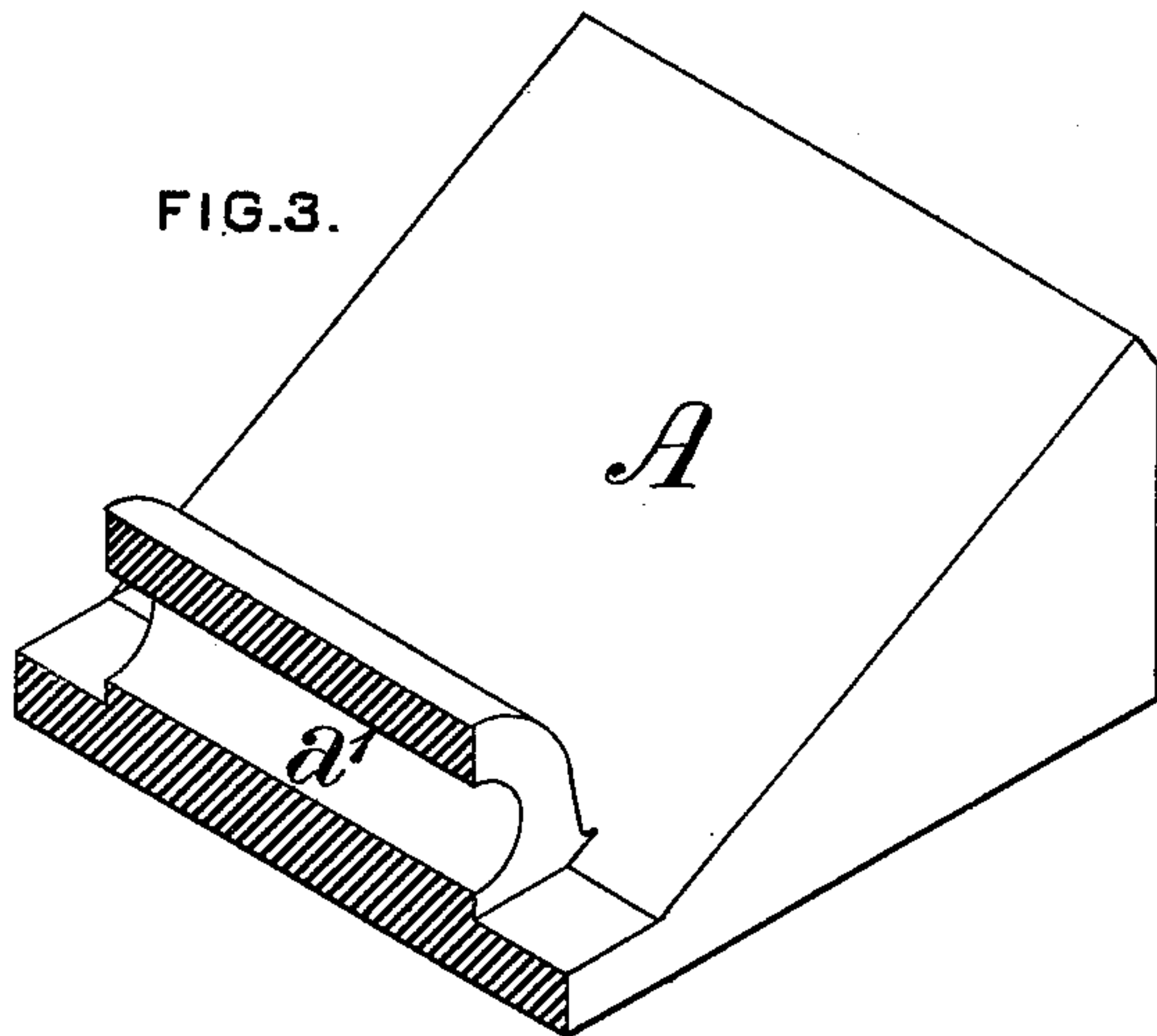


FIG. 4.

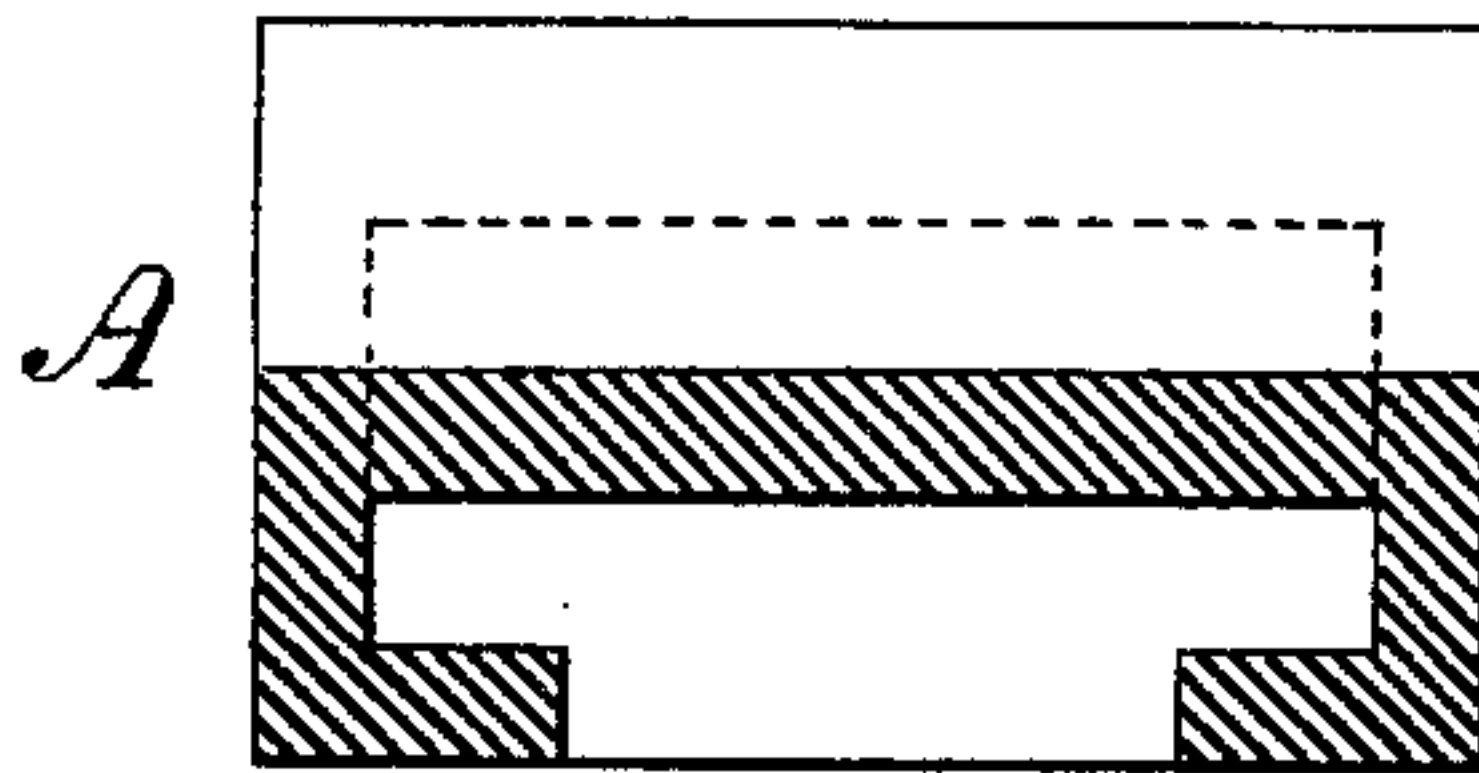


FIG. 6.

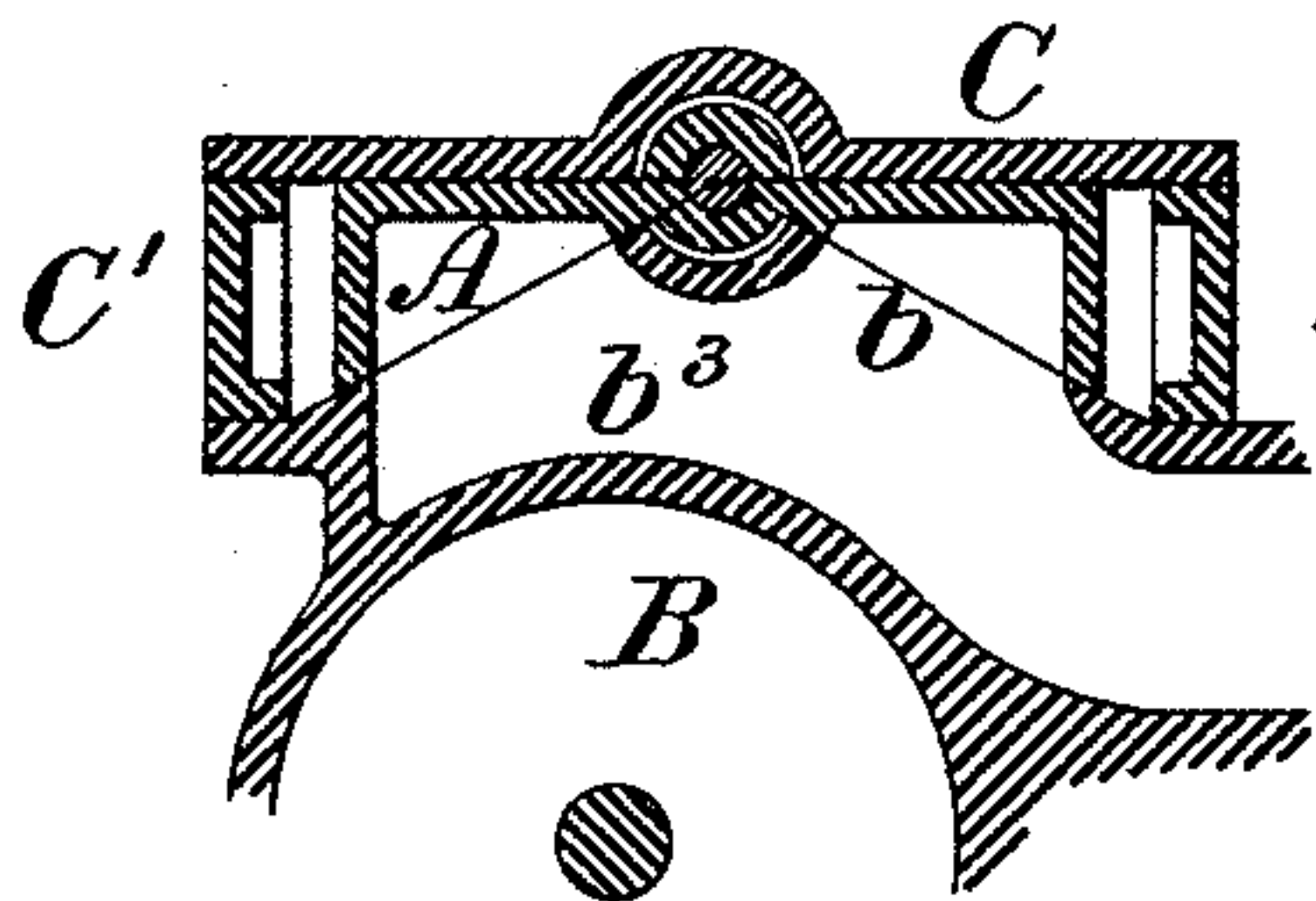
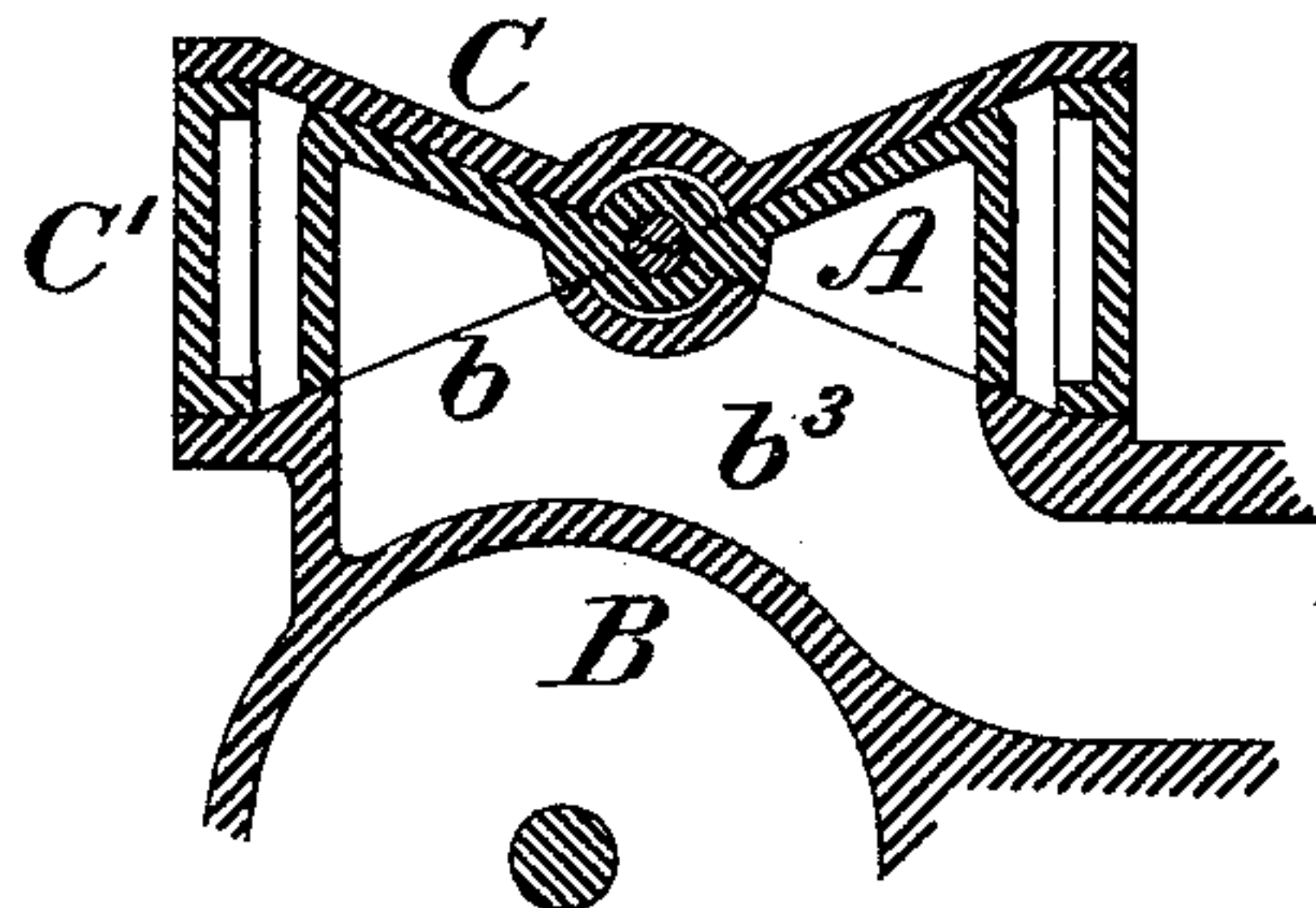


FIG. 5.



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# UNITED STATES PATENT OFFICE.

WILLIAM P. TATHAM, OF PHILADELPHIA, PENNSYLVANIA.

## BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 229,773, dated July 6, 1880.

Application filed May 22, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM P. TATHAM, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Slide-Valves for Steam-Engines, of which improvements the following is a specification.

My invention relates to slide-distribution valves for steam-engines of the class ordinarily termed "balanced," in which, for the purpose of relieving or diminishing the pressure of steam upon the back of the valve, the latter is formed and fitted to slide between the surfaces of a valve-face on the steam-cylinder and

a balance plate or cover on or within the steam-chest, with which surfaces the face and the back of the valve are respectively in contact, and with which the valve is designed to make, as nearly as may be, steam-tight joints. As ordinarily constructed, the valve-face and balance-plate, and consequently the adjoining surfaces of the valve, are in parallel planes, and the operation of valves of such construction is found to be defective and objectionable, from the fact that, as a result of the unequal expansion undergone by the valve and its inclosing-casing under the influence of the heat of the steam, the valve will either "bind"—that is, fit with undue tightness between its seat and cover—or will become so slack as to permit leakage of steam at its joints with the surfaces with which it is in contact.

It is the object of my invention to provide a slide-valve which in operation will be relieved of back-pressure without its effective action being impaired by the above-stated result of inequality of expansion by heat.

To this end my improvements consist in a slide-valve having the surfaces of its face and of its back formed of planes which, when produced, intersect in the longitudinal central plane of the valve, and in the combination of a valve so formed with a valve-face and cover-plate, having all portions of their surfaces which are in contact with the valve located in similarly-intersecting planes.

The improvements claimed are hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a vertical longitudinal section at the line  $x x$

of Fig. 2, through a valve, steam chest, and cylinder, showing the application of my improvements; Fig. 2, a vertical transverse central section through the same; Fig. 3, a vertical longitudinal central section, in perspective, of the valve; Fig. 4, a vertical longitudinal section of the same at the line  $y y$  of Fig. 2; and Figs. 5 and 6, vertical transverse sections, showing modified forms of the same.

My invention is herein described and shown with reference to a short D-slide valve similar to those usually employed in locomotive and other engines, in the respect that steam is supplied around and above its ends and exhausted through a cup or lower recess within it. While, for the reason that these valves are of simple form and in extended use, I have selected such for the exemplification of my invention, it is not to be understood that my improvements are limited in application to this specific class, as it will be obvious to those skilled in the art of steam-engine construction that the principles of my invention may be embodied in valves of other description which slide between and in contact with a valve-face and a cover or balance plate.

Referring to the drawings, the distinguishing characteristic of each of the several valves A therein shown is that the valve is of such form as to present in transverse section two triangular prisms united at or around the meeting-line of two corresponding edges in the longitudinal central plane of the valve, each and all of the surfaces of the valve A which are in contact with the valve-face  $b$  of the cylinder B and with the cover or balance plate C radiating from, and, when produced, intersecting in a line which is located within the longitudinal central plane of the valve, and, by preference, coincides, as nearly as practicable, with the center line of the valve-stem  $a$ , which passes through a hub, boss, or socket,  $a'$ , on the valve, and is secured to the latter by nuts  $a^2$ , or otherwise, as preferred, the valve being properly strengthened at center by providing a suitable thickness of metal at and adjacent to the socket  $a'$ .

The relief of steam-pressure from the back of the valve is effected by fitting the same to slide steam-tight between the valve-face  $b$  and a balance plate or cover, C, which latter may



either form part of the lid or bonnet of the steam-chest C', as in Figs. 5 and 6, or may be a separate piece located entirely within the steam-chest and resting upon the cylinder, as in Figs. 1 and 2, in which case it will be subject to a uniform temperature throughout. The balance-plate is recessed centrally, so as to be always out of contact with the socket  $a'$  of the valve-stem, it being an essential that all the rubbing-surfaces shall be planes radiating from a common center line, as set forth in describing the form of the valves A. Steam is admitted to the steam-chest around and above the valve, either through supply-ports  $b'$  in the cylinder, or by a pipe connected to the steam-chest C, in the usual manner, and, after being led to the cylinder through the induction-passages  $b^2$ , is exhausted through the cavity in the valve included between the back, end, and side plates thereof, into the exhaust-passage  $b^3$ .

It will be observed that the governing principle hereinbefore set forth is preserved and embodied in each of the three valves illustrated, their subordinate variations in form being merely matters of constructive detail and location of parts, which are within the discretion of the constructor, and are governed by the requirements of the special adaptation for which the invention is to be utilized. Thus, in the valve of Figs. 1 to 4 the face is a single plane, and the back two planes inclined relatively to each other and to the face.

Fig. 5 shows a valve in which the face and back are each composed of two inclined planes, all the four planes intersecting at the center line of the valve-stem.

In Fig. 6 the back of the valve is a single plane, and the face, as in Fig. 5, two inclined planes, and the planes similarly intersect. In each instance the valve is fitted to slide between a face and a balance plate, all the contact-surfaces of which are planes, and correspond in relative location and direction with those of the face and back of the valve.

In the operation of my invention the lateral expansion of the valve, tending to separate the surfaces of the valve from those of the valve-face and balance plate, is compensated for by the expansion in thickness, tending to maintain said surfaces in contact, with the result of maintaining the rubbing-surfaces in the normal working contact to which they are originally fitted. Excess of expansion of the valve relatively to that of the valve face and cover will be attended only by the sliding of the surfaces of the valve in planes radiating from the central line of intersection, without tending to alter the proper working relation of the parts, and the same result will attend the expansion of the valve seat and cover, assuming such expansion to be uniform throughout.

I claim as my invention and desire to secure by Letters Patent—

1. A slide-valve whose transverse section is that of two triangular prisms united at or around the meeting-line of two corresponding edges in the longitudinal central plane of the valve, all the rubbing-surfaces of the valve being in planes radiating from, and, when produced, intersecting in said longitudinal central plane.

2. The combination, in a steam-engine, of a box or cupped slide-valve formed of two triangular prisms united at or around their adjacent edges in the longitudinal center line of the valve with a valve-face and a balance plate or cover, the entire rubbing-surfaces of which lie in planes intersecting, when produced, upon a line coincident with the meeting-line of the two prisms forming the valve, substantially as and for the purpose set forth.

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Witnesses:

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