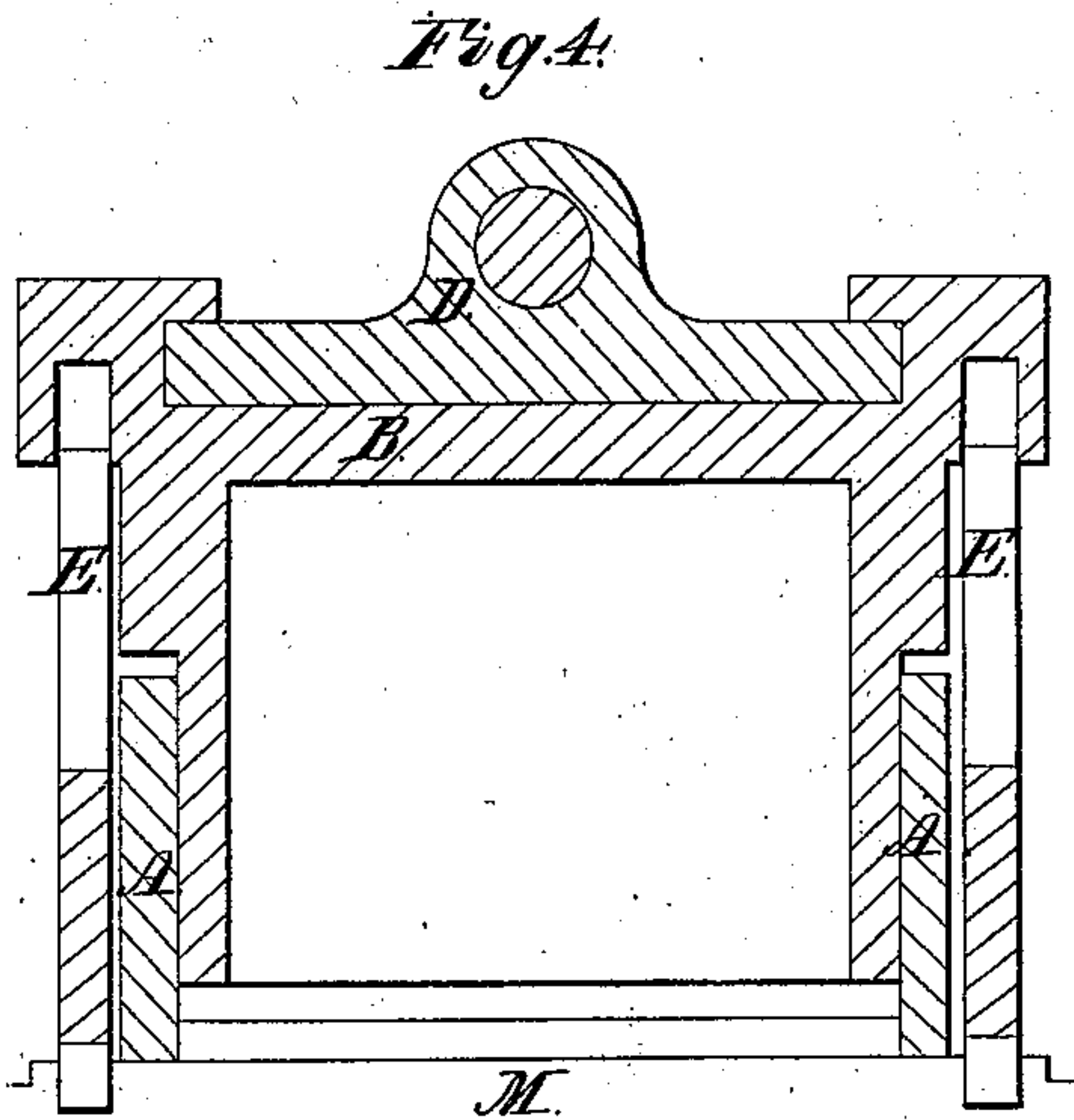
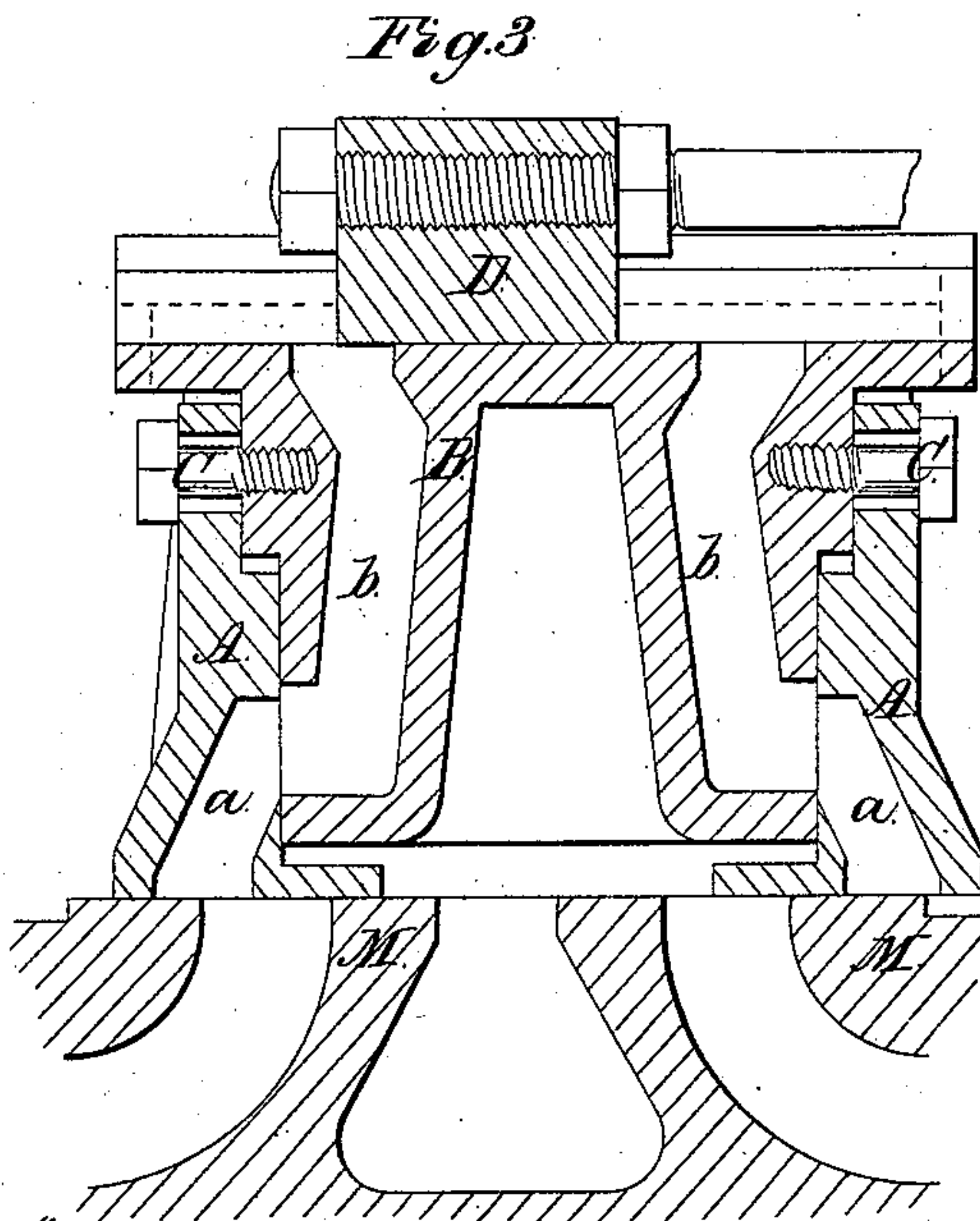
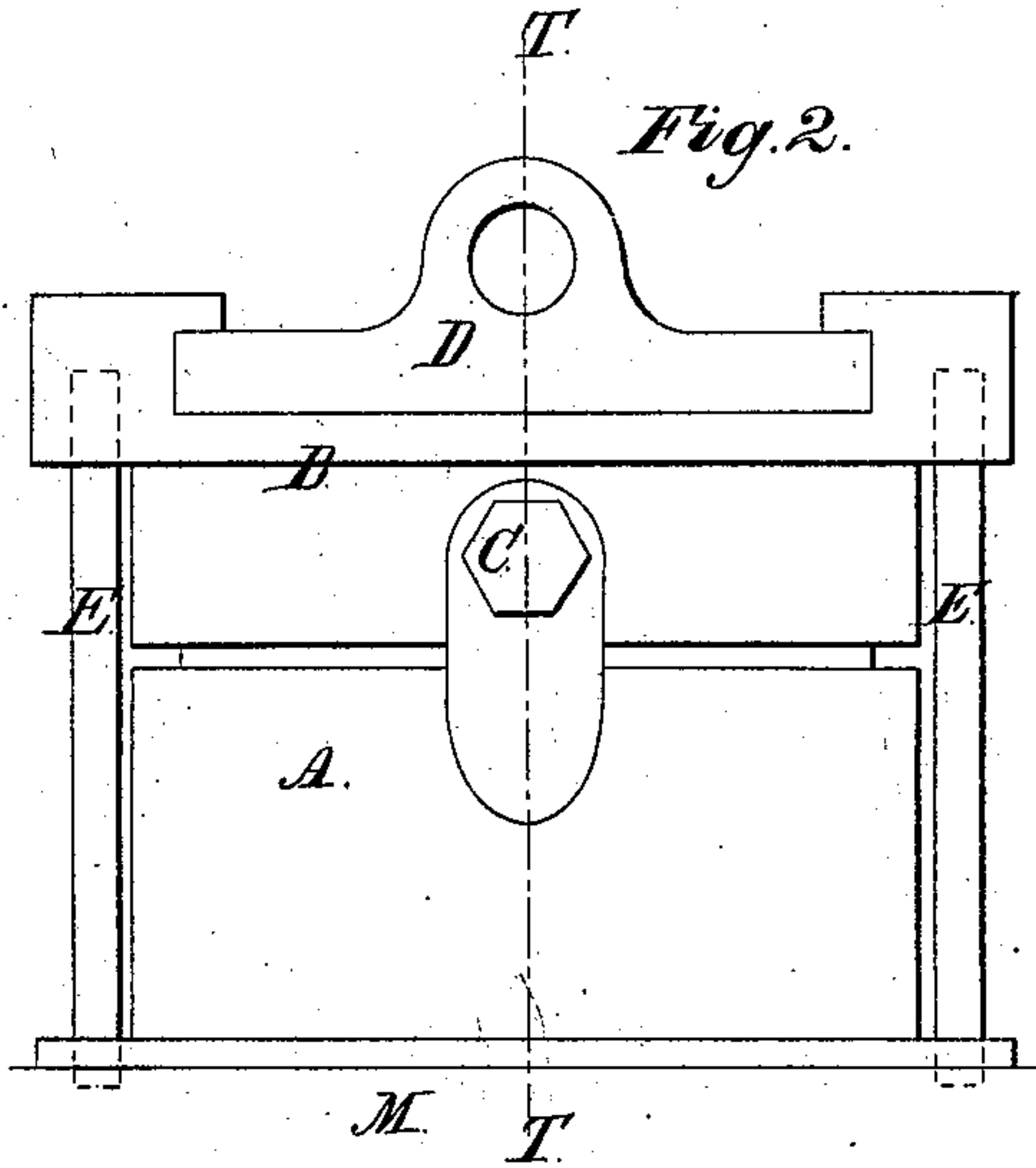
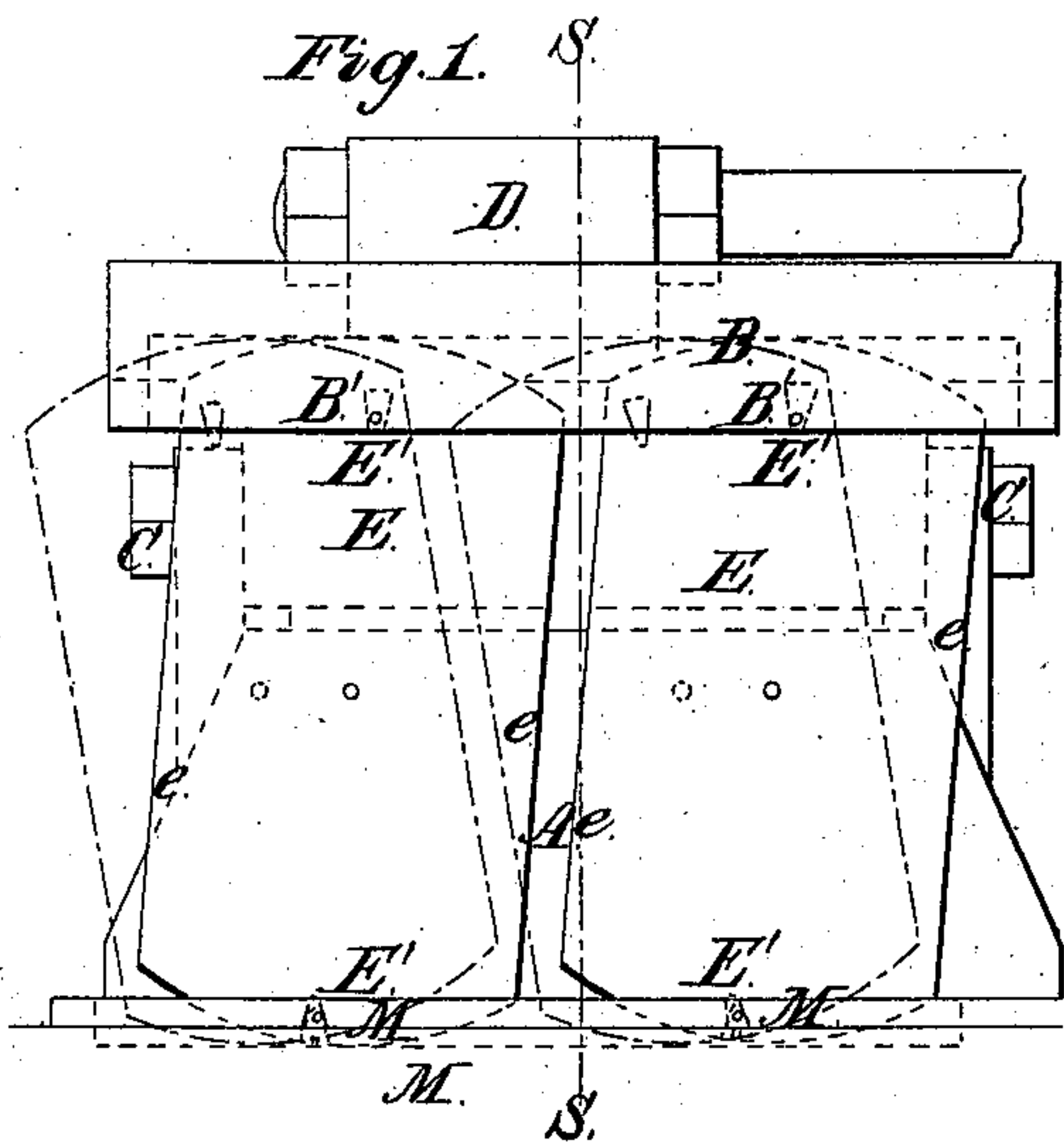


R. C. Bristol,

Steam Balanced Valve.

No 24,439.

Patented June 21, 1859.



Witnesses.

James C. Murawski

Inventor.

R. C. Bristol

UNITED STATES PATENT OFFICE.

RICHARD C. BRISTOL, OF CHICAGO, ILLINOIS.

SLIDE-VALVE FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 24,439, dated June 21, 1859; Reissued February 7, 1859, No. 891.

To all whom it may concern:

Be it known that I, RICHARD C. BRISTOL, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful
5 Improvement in Slide-Valves for Steam and Gas Engines; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the accompanying drawings, forming a part of
10 this specification, in which—

Figure 1 is a side elevation (reckoning relatively to its motion). Fig. 2 is an end elevation. Fig. 3 is a vertical section on the
15 line T T in Fig. 2, and Fig. 4 is a vertical section on the line S S in Fig. 1.

Similar letters of reference indicate like parts in all the drawings.

It is well known that the pressure of the
20 steam upon a slide valve tends to produce a great amount of friction and various devices have been made known with a view to diminish this injurious effect. One of these has been to mount the slide valve upon
25 four wheels, two upon each side, the parts being so proportioned that the rubbing face of the valve should just touch the cylinder face without pressing violently thereon. Such a device has been made more practi-
30 cable by constructing the valve in two parts, the back of the valve being one part and the face of the valve being another part, the wheels being attached to the back part only, and the two parts being fitted in steam
35 tight contact each with the other, but with liberty to work relatively to each other like a piston and cylinder. These and all other previously known devices have accomplished the object but imperfectly. The
40 presence of the wheels has necessitated an unusually capacious and in some instances an impracticably long steam chest. The friction and wear upon the axes of such wheels has been also quite objectionable. The oper-
45 ating of a separate cut-off valve, in the steam pipe, or on a plate extending across the steam chest above the slide valve, has been rendered less effective than usual by reason of the greater capacity of the steam
50 chest, and the very common and desirable plan of working a separate cut-off valve on

the back of the main slide valve has been rendered completely impracticable until my invention overcame this difficulty.

The nature of my invention consists first
55 in employing in lieu of wheels four or more partial rollers which are not subject to any friction upon their axes, neither do they compel any increase in the length of the steam chest. My partial rollers are cir-
60 cular or cylindrical through so large portions of their periphery as to allow the valve to travel thereon to the full extent of its motion;—the remainder of the periphery is reduced in diameter so that these partial
65 rollers may be placed much nearer together and a much larger effective diameter thereof may be adopted as also a shorter steam chest, than with wheels. These partial
70 rollers are also guided and kept in position at or near their bearing points so that they are not like ordinary rollers liable to any possibility of displacement.

The nature of my invention consists second in so arranging a cut-off on the back
75 of the supported part and so arranging suitable passages through both parts of the valve that the steam is conveyed to the cylinder ports through such passages alone with the usual effect due to expansive work-
80 ing, while the two parts of the valve may be allowed to work to a limited extent relatively to each other without involving a leakage of steam at the joints. As balanced
85 slide valves have been heretofore constructed such a result has been impossible.

The nature of my invention consists, third, in a process of adjusting the two parts of the valve by working the front and back
90 parts in free relations to each other for a certain period and then changing the same to that of fixed or rigid union. A unity of the whole in the first instance is impracticable as the parts cannot in such case be
95 adjusted with sufficient nicety. The adjustment of the parts of such valves has been heretofore produced by the pressure of the steam upon a certain portion not balanced. As the friction of one part within the other
100 is liable to be very considerable it has in order to secure a proper adjustment been necessary to leave a large portion of the face-

piece uncovered by the back-piece, and consequently unrelieved from pressure, and the whole pressure upon that portion thus situated has produced a continuous friction between the valve-face and the cylinder-face. My invention overcomes this difficulty by causing a rigid union or unity of the two parts of the valves after the face-piece has assumed the position proper for a tight contact with the cylinder face.

To enable others skilled in the art to make and use my invention I will proceed to describe,—by the aid of the drawings—the manner in which I construct and operate it.

The valve proper is constructed in two portions A, B, the latter being fitted steam tight into the former so that it is adapted to slide vertically therein to a certain extent, as represented, without allowing steam to pass through the joint. Set screws C C are provided by which the portions A B may be made to hold their relative places very firmly if required. The cut off valve D is fitted to slide steam tight on the upper face of B and is guided thereon by ledges or lips. The top of B overhangs A at each side as represented and the partial rollers E E which are introduced between these overhanging portions and the cylinder face M support B on the circular portions of their several peripheries and compel it to travel in a plane parallel to the face M. The form which I prefer for these partial rollers is shown in Fig. 1 and Fig. 2 a part being shown by strong and a part by dotted lines in each figure. The overhanging portion of B is made to inclose and confine the upper sides or circular ends of these partial rollers and the lower sides or lower circular ends thereof are inclosed or confined by analogous means on or near the cylindrical face. I also make suitable apertures E' through the partial rollers E near their extremities, and insert pins B' which extend through these slots into the metal of the back piece B and similar pins M' which extend into the metal of the cylinder face M. These apertures or slots are of such length and such form as to allow the partial rollers to play to the proper extent without touching the pins so long as the partial rollers are in their correct positions but the moment one of the partial rollers E becomes in any considerable degree displaced at either the top or the bottom it presses the side of the corresponding slot against the pin and thus prevents itself from becoming more displaced. Any sensible displacement of either of the partial rollers also causes one of its straight edges to meet the other straight edge or to meet the side of the inclosure at each vibration and thus to aid in preventing it from becoming any further displaced. The red

outlines show the condition of these partial rollers at the end of each movement of the valve.

The steam is admitted to the ports in the cylinder through the passages *a a* and *b b* in the respective parts A B. These passages are arranged as represented so that the part A may slide vertically upon B and vice versa without closing the passages *a b* and without producing any leak at the joint or dividing line.

In commencing to operate my valve the set screws C C are slackened and the part A is thus allowed to be pressed down into steam-tight contact with the cylinder face M by the pressure of the steam on that part of A which is not protected therefrom by B. It is worked for several days in this condition so that it is free to rise and sink without affecting B and is then (either at a single operation or by gradually increasing the tightness at several operations,) set firmly in relation to B by turning the set screws C C, in which case it continues to fit tightly upon the cylinder face M by reason that the motion of B is parallel thereto.

It will readily be seen that my invention is capable of being constructed in various forms and proportions other than those which I have here represented. For example any variety of cut-off device which is suitable to work on the back or within the body of other slide valves may be employed in my invention as the valve D instead of the precise form and proportion which I have represented. Broad heads may also be forged on the pins B' and M' which pins may be threaded and tapped into the respective parts so as to become bolts, and thus a lateral play of the partial rollers E may be prevented by the heads of these bolts in lieu of by the lips represented. Many other modifications may readily be adopted without varying substantially from the principal features of my invention.

I do not claim sustaining a portion or the whole of the pressure upon a slide valve by the use of wheels or of ordinary rollers but Having now fully described my invention what I claim as new therein and desire to secure by Letters Patent is—

1. The construction and arrangement of the partial rollers E when sustained in their respective positions substantially in the manner and for the purposes herein set forth.

2. I do not claim the employment of a cut off valve D sliding on the back of a valve having passages *a b* through which the steam is admitted to the ports in the cylinder under the control of both valves, but I claim the within described arrangement of the supported back piece B loose

face piece A cut off means D and the united passages *a b a b* in the respective parts A B whereby the parts A B are allowed to work to a limited extent relatively to each other
5 without affecting the action of the steam nor allowing an escape of the same through the joint.

3. I likewise claim in connection with the above arrangement of the several parts the
10 within described method of adjusting the

parts A B relatively to each other that is to say working the parts A B for a period in a free relation and then tightening the union by the set screws C C or their equivalents until it becomes rigid substantially 15 as herein shown and described.

R. C. BRISTOL.

Witnesses:

SAM T. ATWATER,
JAS. VAN INWAGEN.