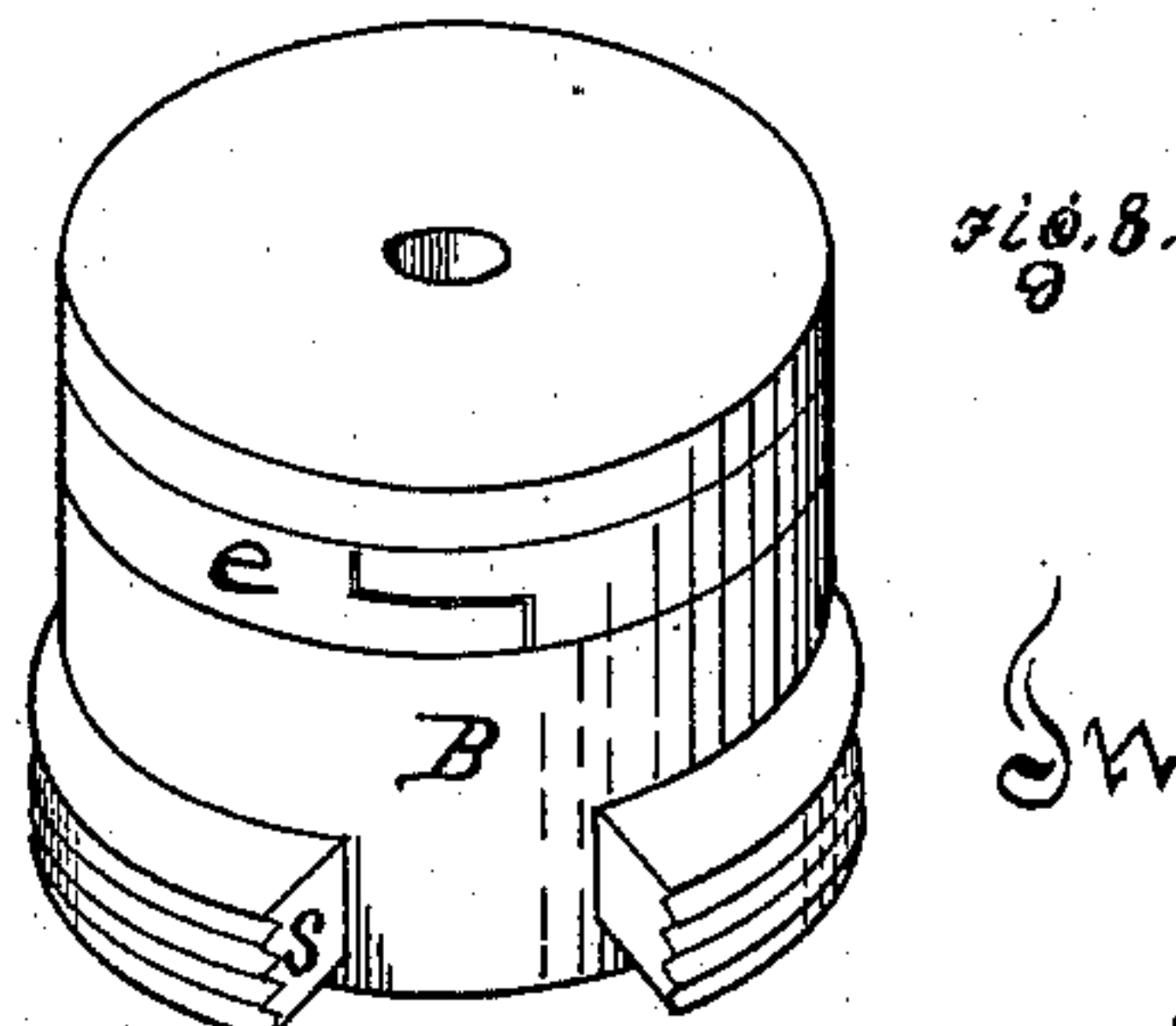
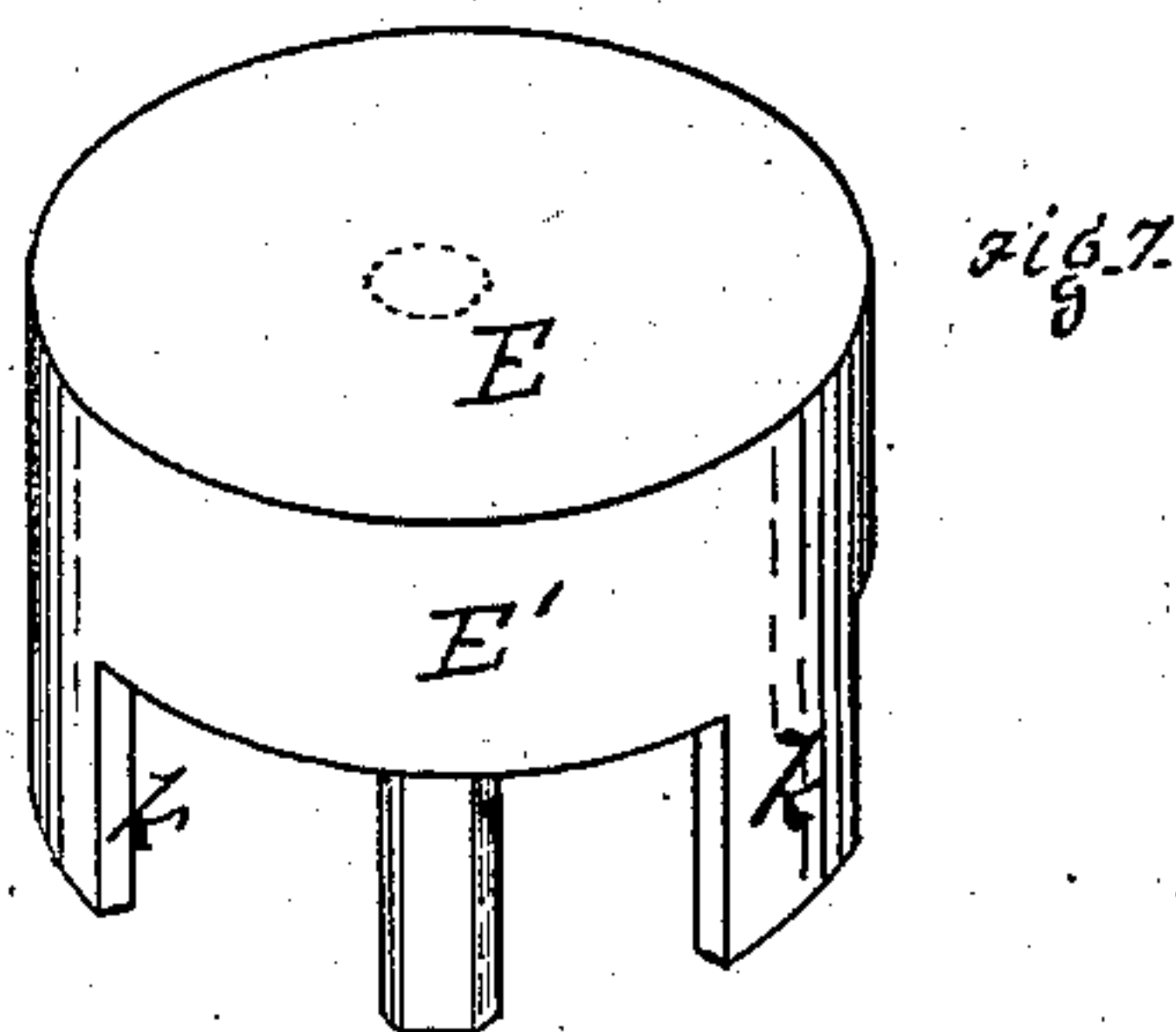
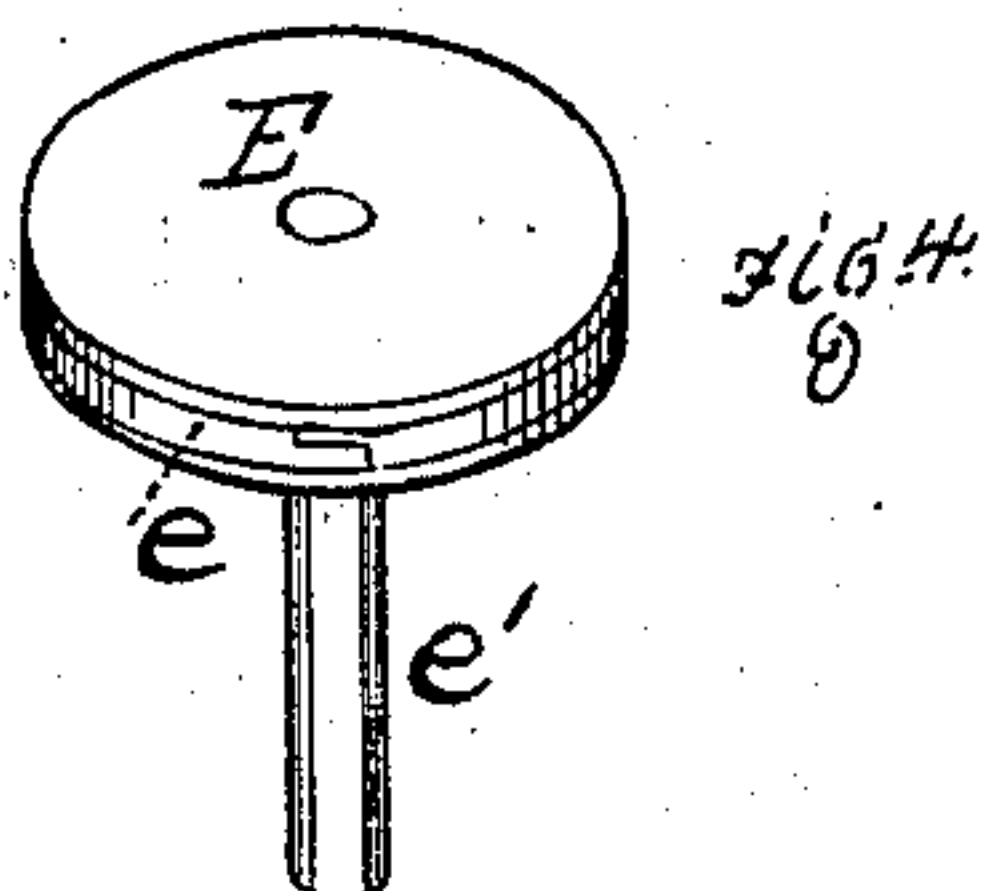
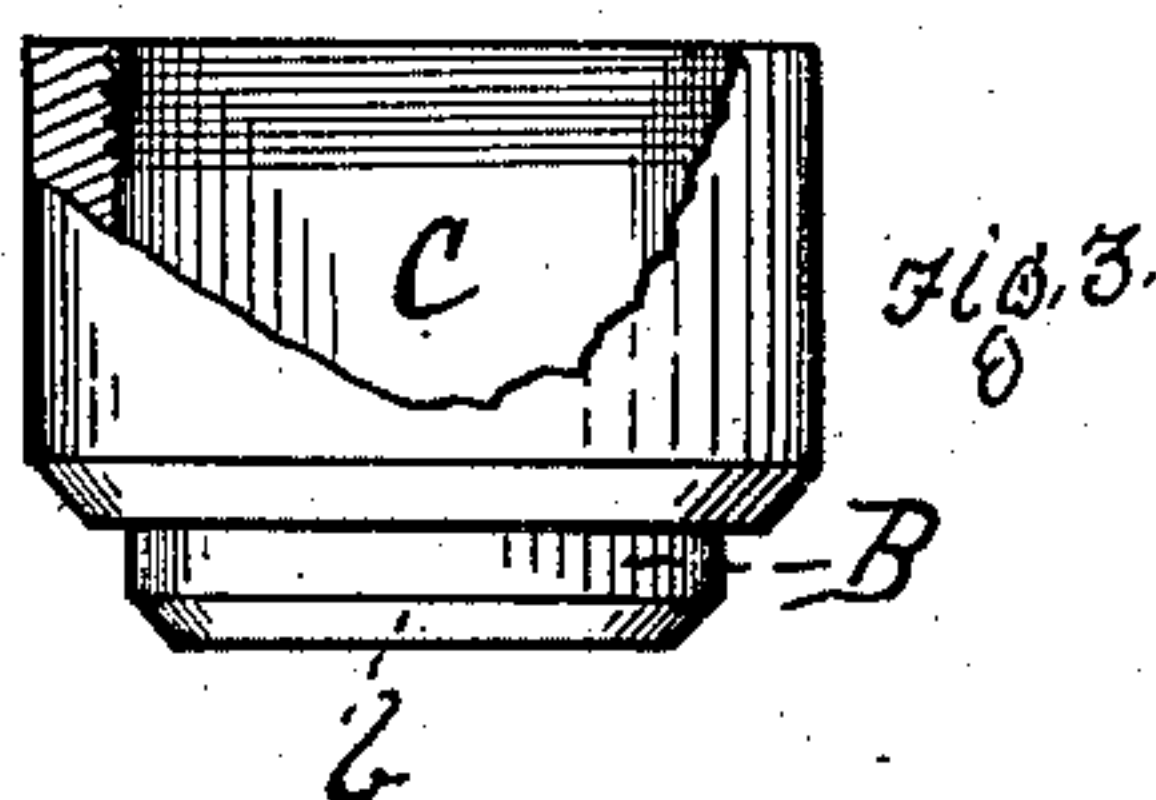
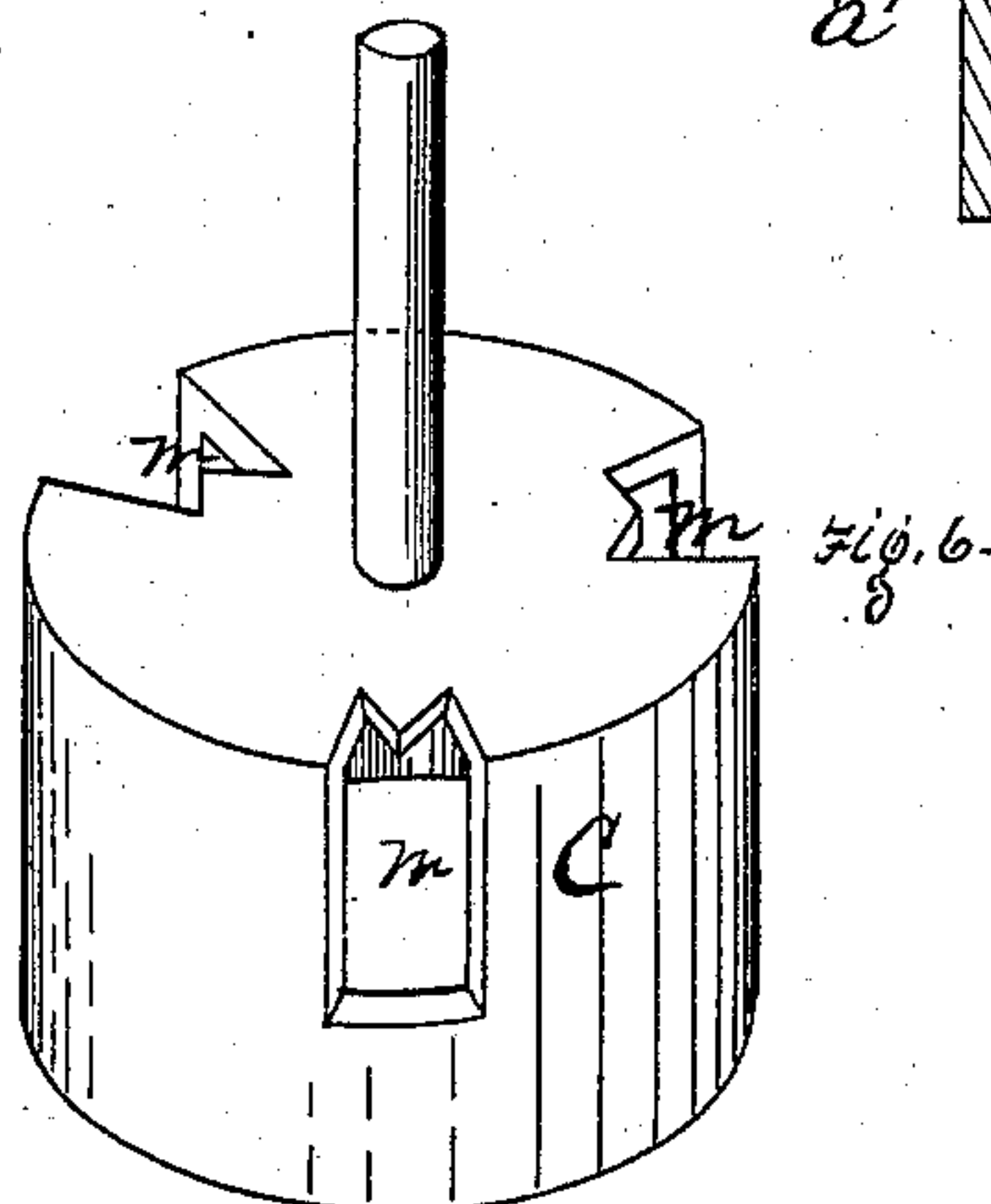
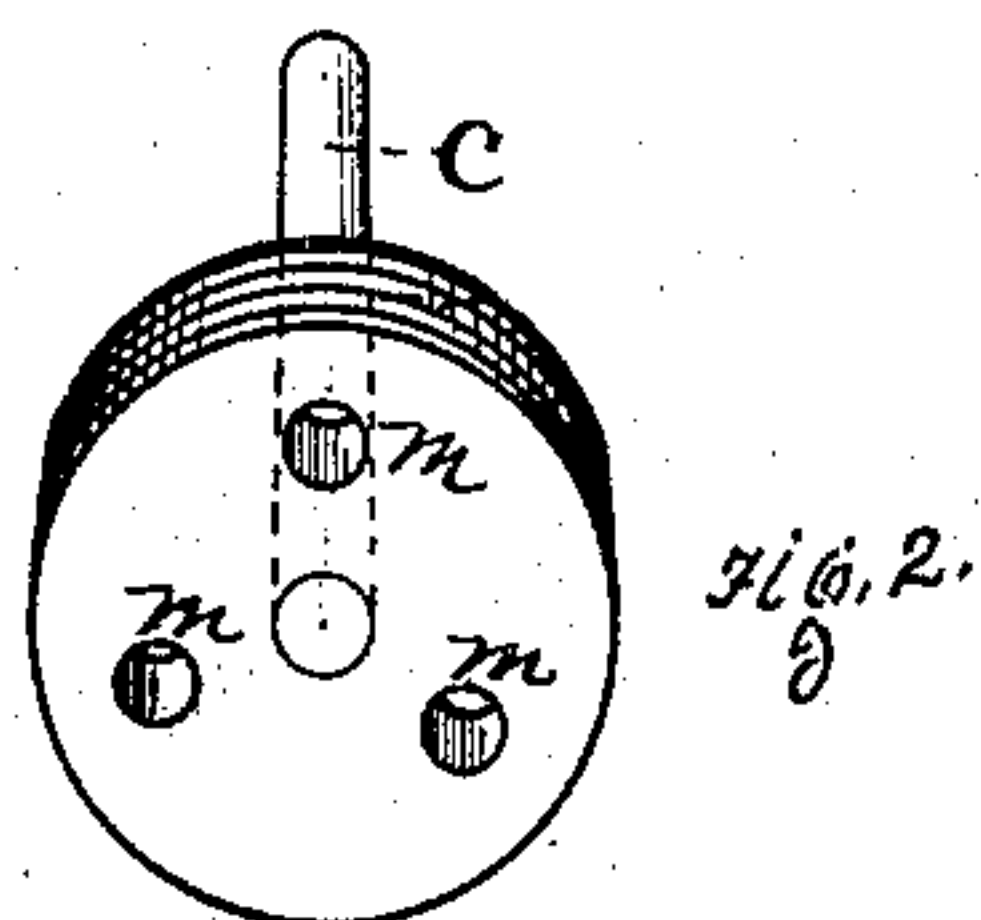
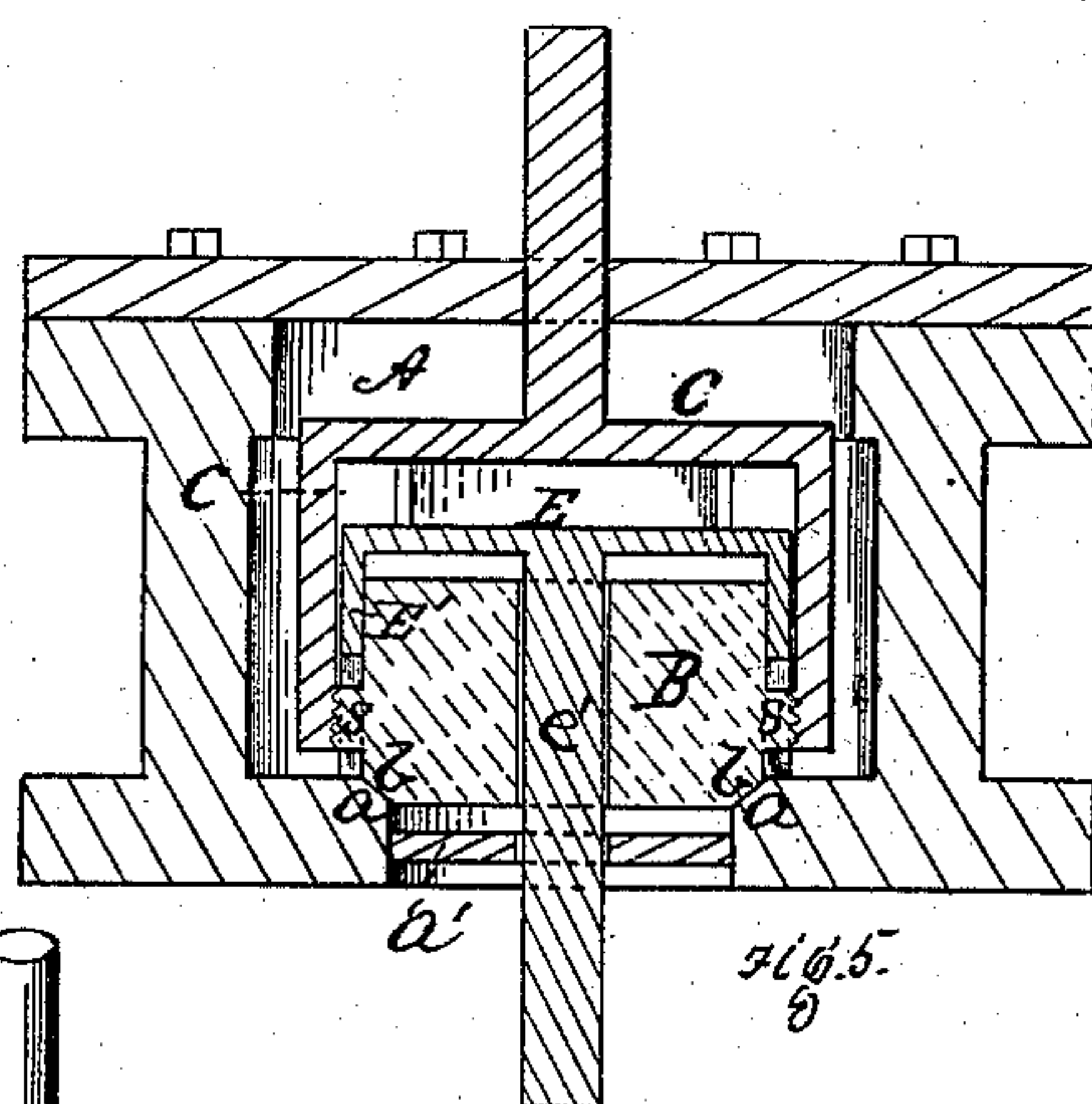
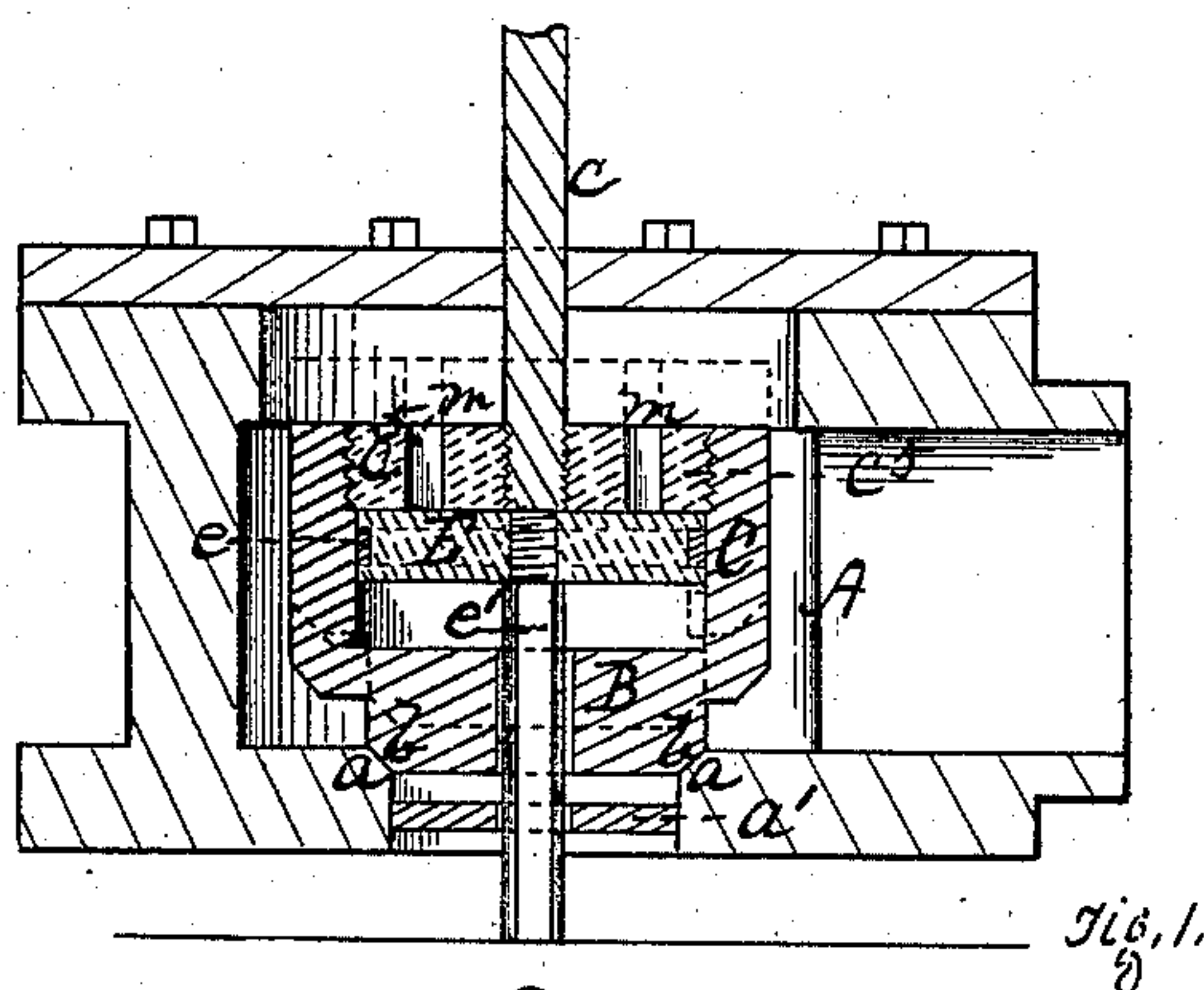


G. W. MOORE & J. W. PERTZ.  
Balance-Valve.

No. 217,019.

Patented July 1, 1879.



Witnesses.  
R. W. W. W. W. W.  
L. W. W. W. W. W.

Surrentors

George W. Moore  
John W. Pertz  
By Bakewell & Kerr  
Attys



# UNITED STATES PATENT OFFICE

GEORGE W. MOORE AND JOHN W. PERTZ, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN BALANCE-VALVES.

Specification forming part of Letters Patent No. **217,019**, dated July 1, 1879; application filed May 12, 1879.

*To all whom it may concern:*

Be it known that we, GEORGE W. MOORE and JOHN W. PERTZ, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Balance-Valves; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical central section of a valve embodying our invention in the preferred form. Figs. 2, 3, and 4 are detached views of the parts. Fig. 5 is a vertical central section of one modification. Figs. 6, 7, and 8 are detached views of the parts of the valve shown in Fig. 5.

Like letters refer to like parts wherever they occur.

Our invention relates to the construction and operation of balance-valves for use with steam, liquids, air, &c.; and consists in combining with the valve a steam-shield, adapted to prevent the pressure of the steam on the valve, so that no more power is necessary to operate the valve than is required to lift the weight of the valve; and it also consists in details of construction, hereinafter more specifically set forth.

In the class of balance-valves to which this invention pertains—viz., balance puppet-valves—the general construction has been that of two disks of unequal area connected to a common stem and provided with two valve-seats, so as to utilize the difference in pressure; but such construction was objectionable, first, on account of the strain caused by the steam acting against the disks in opposite directions, which frequently sprung the stem and caused the valves to leak and cut out; secondly, because of the excessive width of the steamways required to accommodate the two valve-disks; and, thirdly, because the valve was only approximately a balance-valve, the pressure due to the difference in the areas of the two disks having to be provided for.

A more perfect balance puppet-valve has, however, been obtained by constructing the valve so that its body should work in a hollow or over a solid cylinder, which prevented the access of steam-pressure to the top of the

valve except through or around the valve when the valve was lifted; but such construction demands alteration or special construction of the steam-chest or steamway of existing single or non-balanced puppet-valves.

The object of the present invention is, therefore, twofold: first, to simplify and improve the construction of balanced puppet-valves; and, secondly, to adapt them to use in the steam-chest or steamways of single puppet or non-balanced valves, and this with slight and immaterial changes of existing steam-chests of the class specified.

We will now proceed to describe our invention, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates the steam-chest, and *a* the usual valve-seat. B represents the valve, the surface of which, as at *b*, is ground in usual manner to fit the valve-seat *a*. This valve B is formed on or attached to a cylindrical shell or arch, C, from which projects the stem *c*, secured thereto by a screw-head, *c*<sup>5</sup>, or in other suitable manner, and by which the valve is operated. Within the cylindrical shell or arch C, that carries valve B, is a disk, E, provided with a packing-ring, *e*, or equivalent means, for causing it to work steam-tight in the cylindrical shell or arch C; and from the disk E projects a fluted central stem, *e'*, which passes through a hole in the center of valve B and a perforated guide, *a'*, so as to rest upon the bottom of the steam-pipe leading to the cylinder or upon an equivalent means of support.

The stem *e'*, it will be observed, will act as a positive guide for the valve B, and be used to advantage as a guide in grinding the valve, and as the stem is fluted will permit the free escape of any steam which may leak into or be condensed in the space between the top of the valve B and the under side of disk E.

This disk E, or its equivalents, one of which will be hereinafter described, we term the "valve-shield," as its function is to keep the pressure of the steam off the top of the valve. The upper portion of shell or arch C is perforated or slotted, as at *m*, so as to admit steam into the shell or arch C and on top of valve-shield E, and it will thus be perceived that the shell or arch C, having steam on all sides,



is balanced in the steam-space, while the pressure of steam on valve B is prevented by the shield, (which is not necessarily lifted,) and the shield is supported on the steam-chest.

In Figs. 5, 6, 7, and 8 a modification of the valve-shield is shown, wherein the packing-ring *e* is transferred to the upper portion of the valve B, and the valve-shield is formed with a flange, *E'*, or as an inverted cup or hood, within which the body of valve B works steam-tight. The fluted guide-stem of the valve-shield *E* is retained to serve as a guide for the valve in grinding the same, and for the other purposes before specified, excepting that it does not support the valve-shield, which, in the modification, is supported on the bottom of the steam-chest around the valve-seat by legs or supports *k*, which extend down from the shield or its flange *E'*. In this modification, where the valve B is secured to its arch or shell C by a projecting screw-thread, *s*, said threaded portion is cut away, as at *l*, to permit the passage of the lugs or supports *k*; and the perforations or slots *m* in the shell C may also be enlarged, (see Fig. 6,) to give free access of steam to the shell C, as the flange *E'* will prevent the steam from getting between the valve B and its shield *E*.

The operation of our devices is as follows: The parts being in the position shown in the drawings, the valve down on its seat, and the steam-chamber A filled with steam, the valve-shell or arch C will be surrounded by steam, which gains admission to the shell C, and between it and the shield, through ports *m*, so as to balance the shell C, and the valve B will be in a vacuum, or, at least relieved of the pressure of the steam by the protecting valve-shield *E*, (or *E E'*, Figs. 5 and 7,) the shield being supported on the steam-chest. Now, power being applied to lift the valve, the shell C will move entirely in the steam-space, and the valve B will move under (or in) the valve-shield, where it is protected from the pressure of the steam on its upper surface, so that all the power required to move the valve will be what is necessary to lift the actual weight of the devices.

If it is deemed desirable the valve B may have sufficient rise to take under and lift up the valve-shield, and little or no additional power will be necessary, for the reason that as soon as the valve B is off its seat and the steam gets to the under face of the valve the valve-shield is also balanced.

We have throughout the specification spoken of the valve as a steam-valve; but we wish it distinctly understood that we do not limit ourselves to its use simply as a steam-valve, for the reason that it is equally useful, without change, for air, liquids, &c.

The advantages of our invention are its simplicity and effectiveness and the readiness with which it can be adapted to the steam-chests of single or non-balanced puppet-valves.

We are aware that a balance-valve consisting of a cylinder or valve-shell, having its edges beveled off to fit a valve-seat and adapted to slide on wings or guide-arms attached to and projecting from the valve-seat, has been heretofore devised; and also that steam has in such a valve been admitted into the shell beneath the arms or spider of the valve-shell, to which the stem was attached, the steam being kept from the valve-seat by a plate attached to the upper surface of the valve-guides, and we do not herein claim such devices; but,

Having thus described the nature, object, and advantages of our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination, with a puppet-valve, of a valve-shield adapted to prevent the pressure of steam upon the upper surface of the valve, the whole constructed and arranged substantially as and for the purpose specified.

2. The combination of a valve, provided with a valve-shell or arch for securing it to its stem, and a valve-shield located within the valve-shell or arch and over the valve to prevent pressure upon the upper surface of the valve, the whole constructed and arranged substantially as and for the purpose specified.

3. The combination, with the valve provided with a shell or arch for attaching the stem thereto, of a valve-shield located within the shell or arch and a guide-stem projecting from the valve-shield through the valve, substantially as and for the purpose specified.

4. The combination, with the valve and the valve-shield, of the fluted guide-stem projecting from the valve-shield and through the valve, substantially as and for the purpose specified.

5. The combination of the valve B, having its valve-shell C, with a valve-shield and a packing-ring, said ring being located either on the body of the valve or on the valve-shield, substantially as and for the purpose specified.

In testimony whereof we, the said GEORGE W. MOORE and JOHN W. PERTZ, city, county, and State aforesaid, have hereunto set our hands.

GEORGE W. MOORE.  
JOHN WM. PERTZ.

Witnesses:

F. W. RITTER, Jr.,  
C. E. MILLIKEN.