

J. Millholland,

Steam Balanced Valve.

N^o 30,150.

Patented Sep. 25, 1860.

Fig. 1.

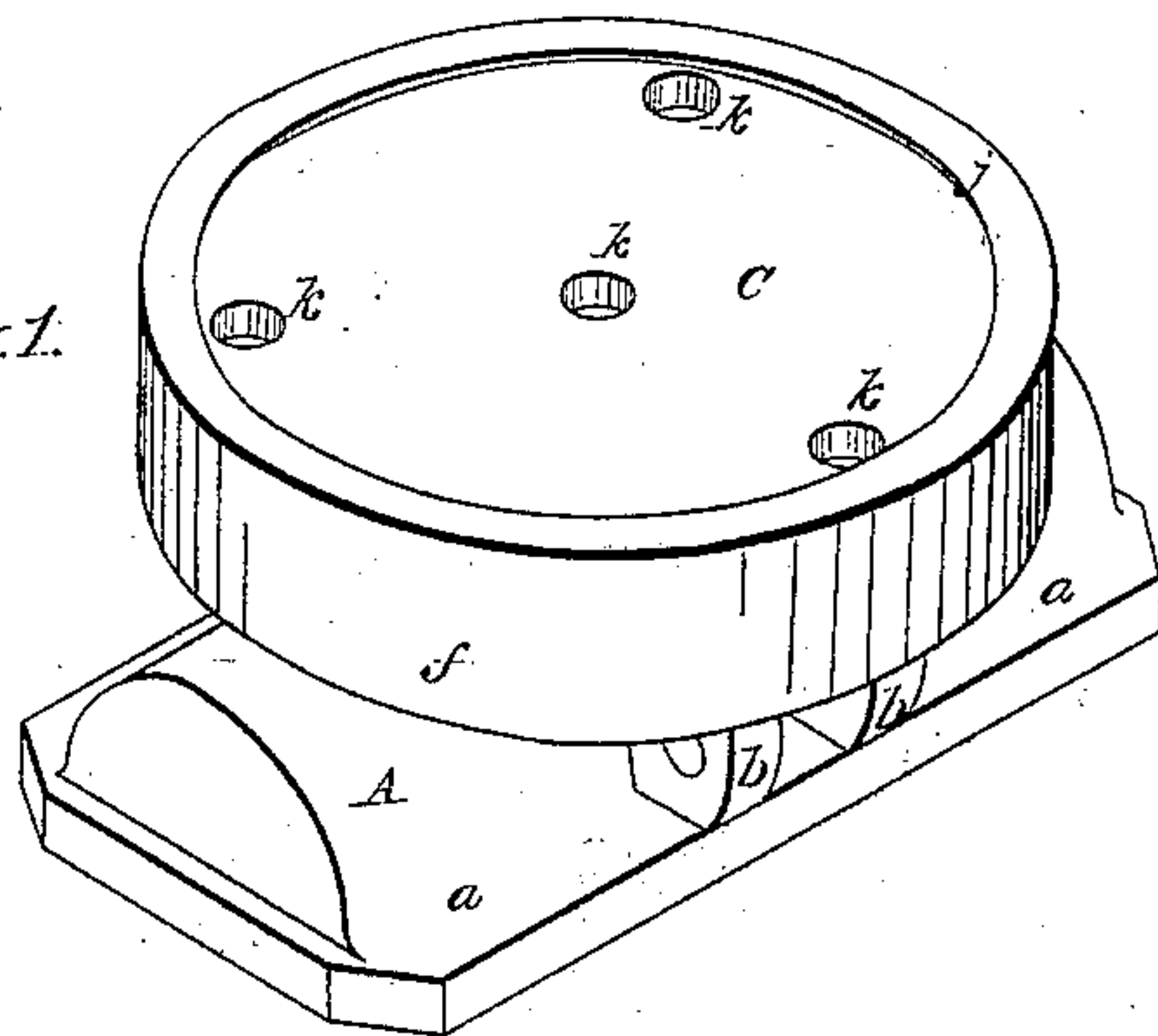


Fig. 7.

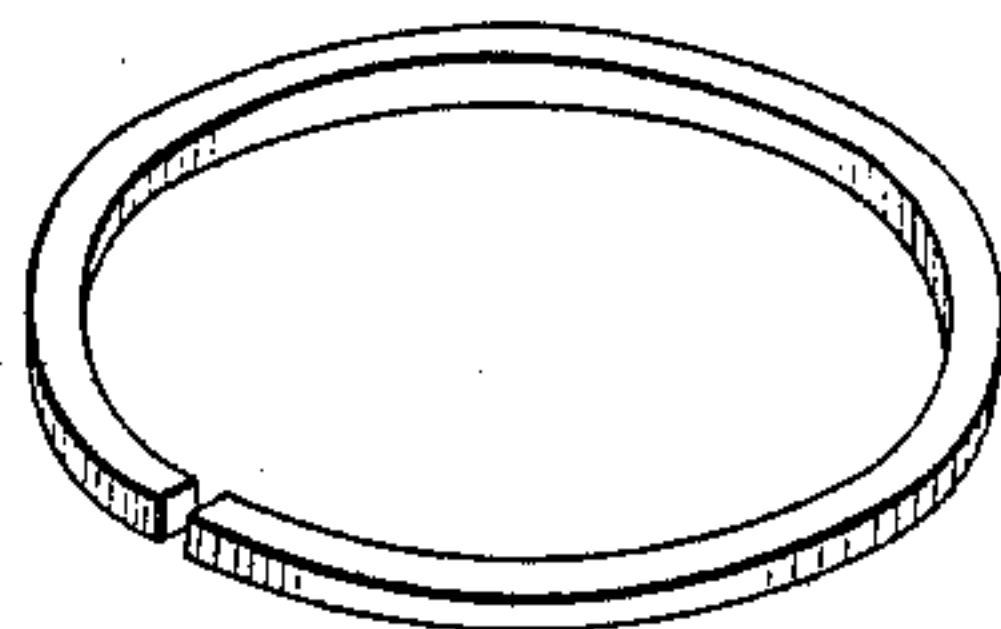


Fig. 6.

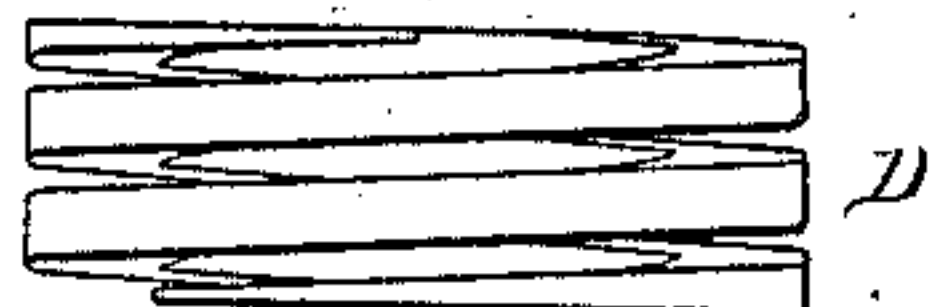


Fig. 2.

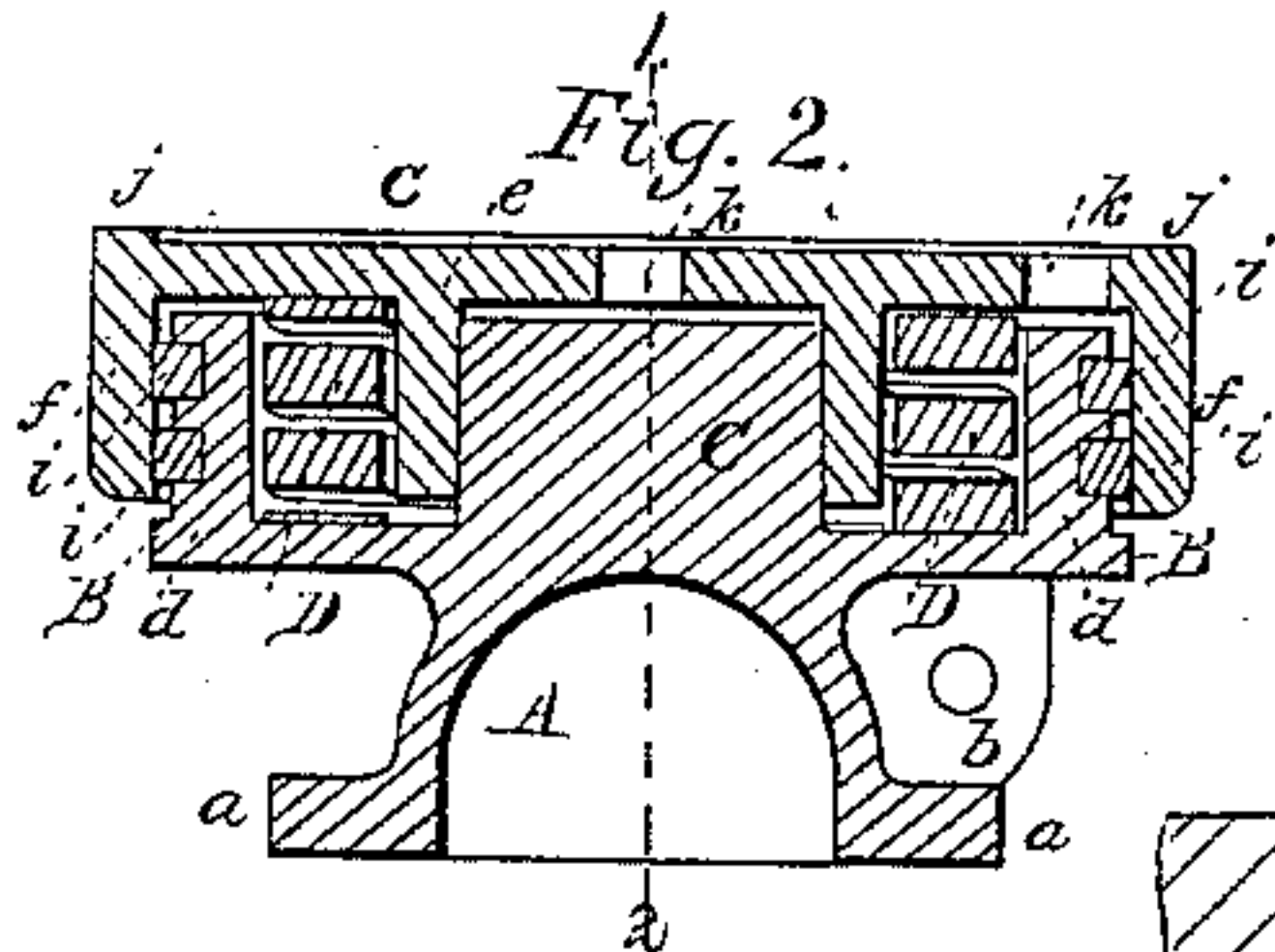


Fig. 4.

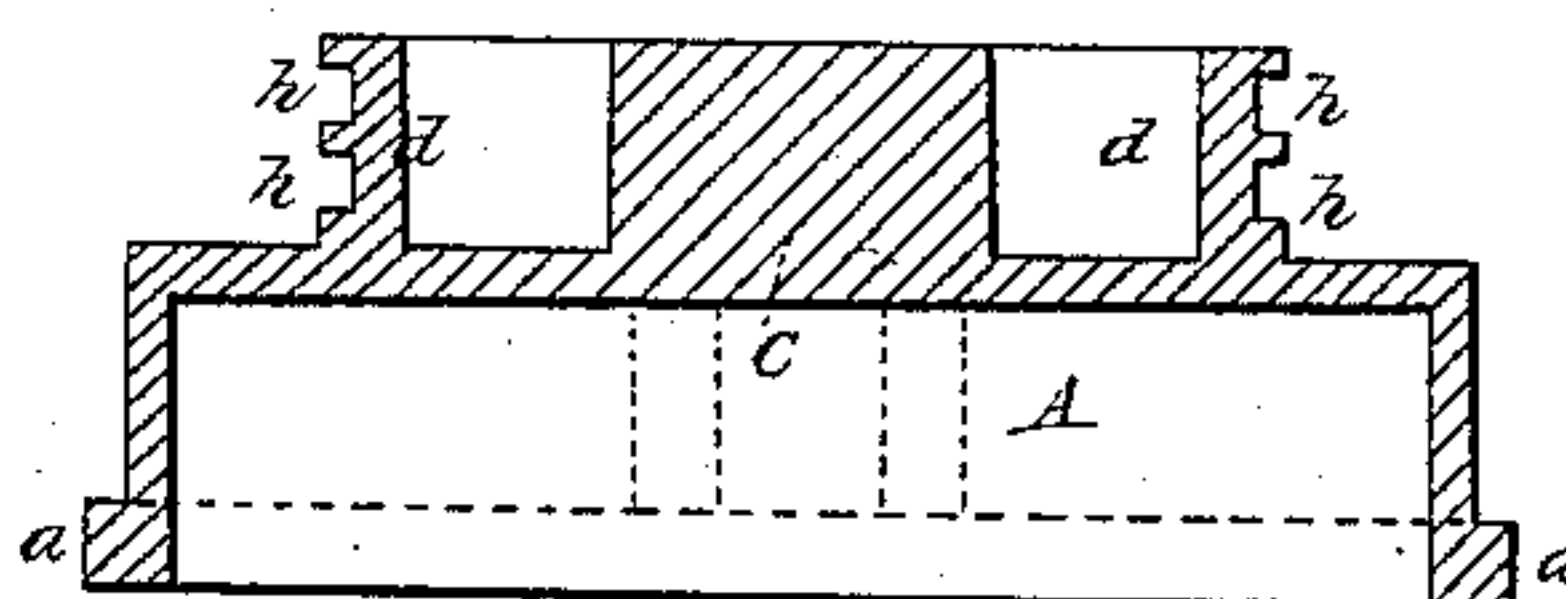


Fig. 8.

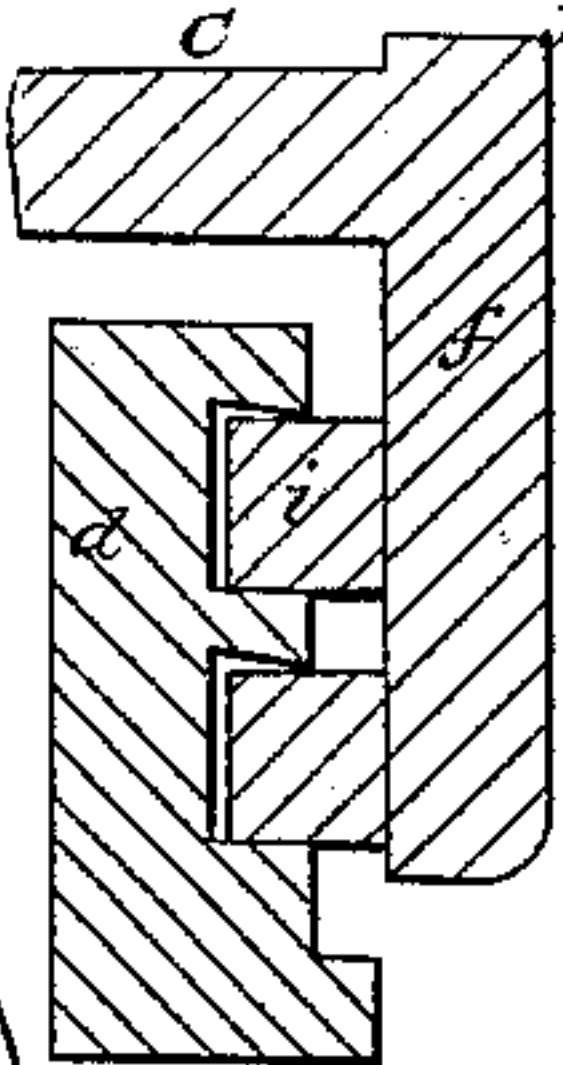


Fig. 3.

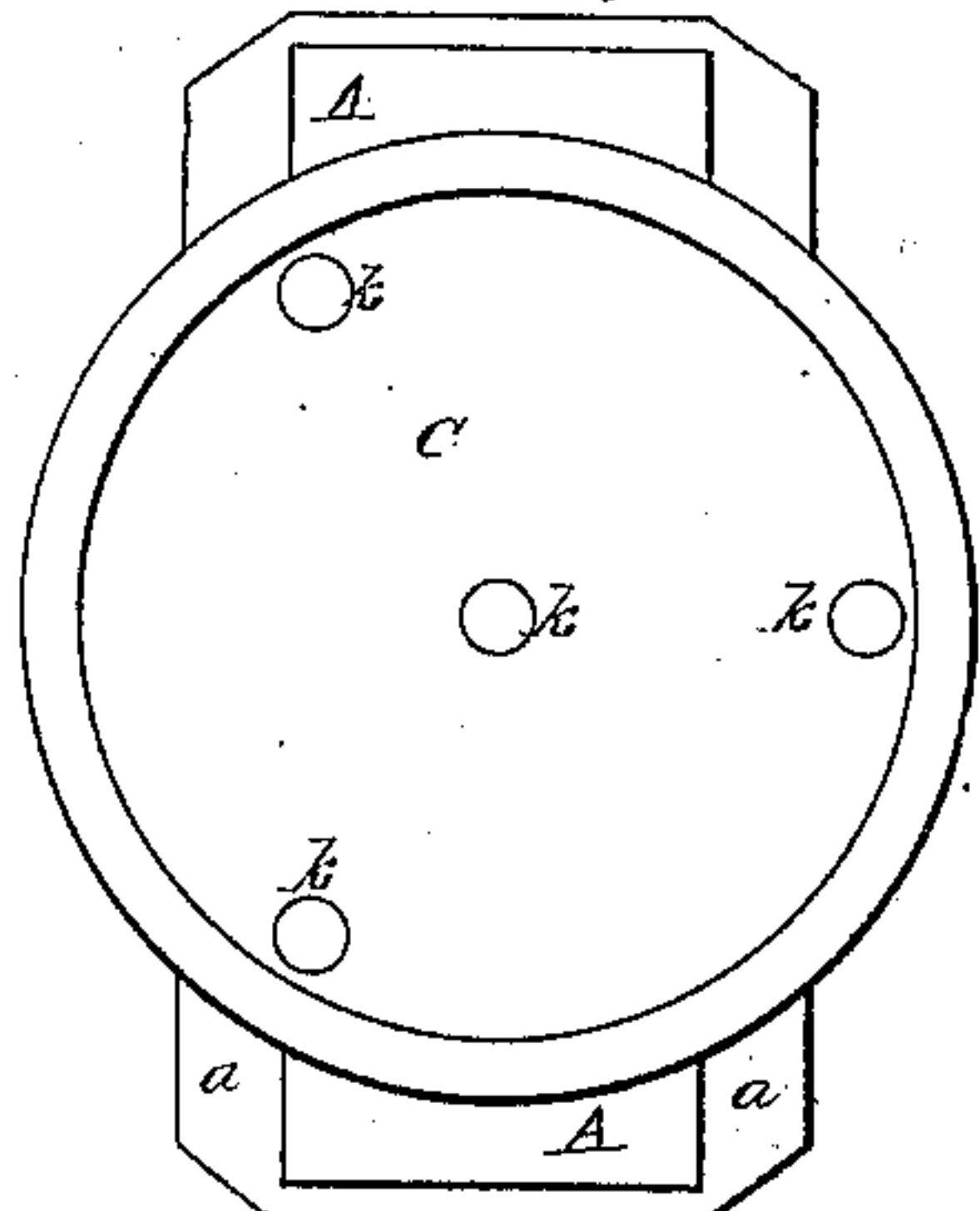
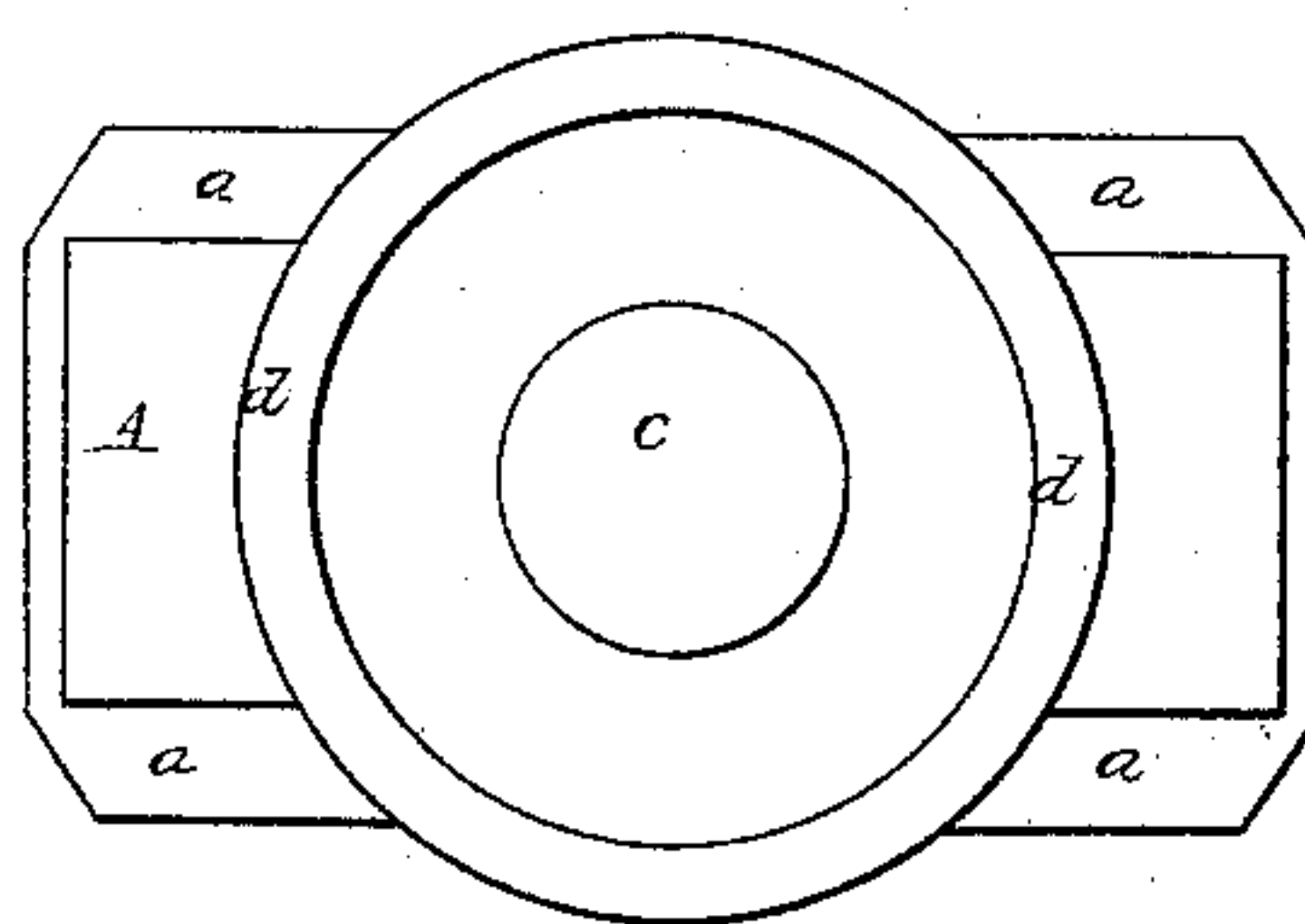


Fig. 5.



Witnesses.
Henry Howson
Charles Howson.

Inventor.

James Millholland

UNITED STATES PATENT OFFICE.

JAMES MILLHOLLAND, OF READING, PENNSYLVANIA.

SLIDE-VALVE.

Specification of Letters Patent No. 30,150, dated September 25, 1860.

To all whom it may concern:

Be it known that I, JAMES MILLHOLLAND, of Reading, Berks county, Pennsylvania, have invented certain new and useful Improvements in Balanced Slide-Valves for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing and to the letters of reference marked thereon.

My invention relates to improvements in the construction of that class of slide valves, in which a cap, fitted to the valve, and bearing against the underside of the steam chest, is used for the purpose of counteracting the pressure of steam on the valve, and thereby avoiding the inordinate and detrimental friction common to ordinary slide valves; and my improvements consist, firstly of a cap with an inner and outer annular flange, the inner flange being so adapted to a hub on the valve, that the said hub shall resist all lateral strains imparted to the cap, having a spiral spring used for raising the cap undisturbed, the whole being applied, and arranged in respect to, the valve substantially as described hereafter.

My invention further consists in the peculiar application explained hereafter, of one, or more metallic rings, forming such a packing between the cap and the valve as will allow the former to move vertically on the latter with freedom, and still form an efficient steam tight joint.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

On reference to the accompanying drawing which forms a part of this specification, Figure 1 is a perspective view of a slide valve with my improvement; Fig. 2, a transverse section of the same; Fig. 3, a plan view of Fig. 2; Fig. 4, a section on the line 1, 2 Fig. 2; Fig. 5, a plan view of Fig. 4; Fig. 6, a detached view of the spring which intervenes between the cap and the valve; Fig. 7, a detached perspective view of one of the packing rings, &c.; Fig. 8, an enlarged sectional view illustrating the mode of applying the packing rings.

Similar letters refer to similar parts throughout the several views.

The lower portion of the valve is formed in a manner similar to that of ordinary slide valves, there being the usual chamber (A)

and flanges (a, a) adapted to the openings in the face of the steam cylinder, and the front edge of the valve having two lugs (b, b) to which the valve spindle is connected. On the top of this lower portion of the valve is a circular plate or disk (B) from which project the central hub c, and annular flange d both disk, hub and flange being arranged concentrically with each other, and occupying the position in respect to the valve, illustrated in Figs. 3 and 5.

(C) is the cap consisting of a circular plate or disk, having an inner annular flange (e) and outer annular flange (f). The inside of the inner flange of the cap is arranged to fit snugly to, but so as to have a free vertical movement on the central hub (c) of the valve; the inside of the outer annular flange of the cap being a short distance from the outside of the annular flange (d) of the valve, as best observed on reference to Fig. 2.

In the space between the flange (e) of the cap and the flange (d) of the valve, is situated the spring (D) which is of the spiral form illustrated by Fig. 6. This spring is made of cast iron, by first turning a hollow cylinder of that metal, and then cutting a spiral groove along and entirely through the cylinder.

In the outside of the annular flange (d), of the valve are cut two annular grooves (h, h) Fig. 4, one groove being a short distance above the other, and into each of these grooves is fitted a packing ring (i) a perspective view of which is shown in Fig. 7. Each ring is made of cast iron turned perfectly true, and afterward severed at one point, the tendency of the ring to expand when thus severed being sufficiently powerful to cause the outer edge of each ring, to bear with the required force against the inside of the annular flange (f) of the cap.

It should be understood that the underside of the steam chest cover is planed perfectly true and smooth as is also the annular strip (j) on the top of the cap (C) which is caused by the spiral spring D to bear against the underside of the steam chest with sufficient force to maintain a steam tight joint at this point without creating inordinate friction.

By making the area of the cap (C) equal in extent to the area of the face of the valve, it will be evident that the enormous and detrimental pressure of steam, which, but for the cap, would be exerted on the valve, is

counteracted; in other words the valve is an antipressure or balance valve, the elasticity of the spring (D,) tending as it does to force the cap and the valve apart, being of itself sufficient to maintain the face of the valve in close steam tight contact with the face of the steam cylinder, and the cap in close steam tight contact with the underside of the steam chest cover.

In some instances the valve face and cap, may be so proportioned that the area of the former shall exceed that of the latter, in which case there will be a proportionate excess of pressure of steam on the valve, tending to maintain the latter close to its seat, independent of the tendency of the spiral spring to accomplish the same end.

The packing rings (*i, i*) are placed in their proper position by expanding them sufficiently to allow them to slip over the annular flange (*d*) of the valve, and depressing them until they coincide with the annular grooves (*h, h*) within which they will at once take their proper places.

It will be observed on reference to the enlarged sectional view, Fig. 8, that the upper side of each of these annular recesses is beveled inward, so as to present a somewhat sharp edge on the outside for the upper side of the packing rings to bear against.

As the tendency of the cap is to move upward it will carry the rings with it, and consequently cause these rings to bear hardest against this narrow bearing formed by the above mentioned bevel of the annular grooves (*h, h*), a closer fit will therefore be insured at this point, than if the ring had a bearing extending the entire depth of the grooves. By fitting the annular projection *e* of the cap over the central hub (*c*) of the valve, the cap and valve become integral parts of each other in every respect excepting that one has a free, vertical movement independent of the other, so that whatever lateral strains may be imparted to the cap during the reciprocating motion of the valve they are resisted by the central hub only, the spiral spring and packing rings remaining undisturbed. It will be observed that there

are several openings (*k, k*) in the top of the cap (C), there are also openings in the steam chest cover so that the space between the cap and the valve is open to the external air, the access of steam to this space being excluded by the rings (*i, i*), the two ends of which are so nicely fitted together as to form a tight joint.

Although I prefer the use of two packing rings, I have found in practice that one ring only is sufficient for the purpose.

My improvement may be readily applied to slide valves of the ordinary construction, the circular plate (B) with its central hub (*c*) and annular flange *d* being bolted or otherwise secured to the top of the valve.

I wish it to be understood that I do not claim broadly the use of a cap fitted to the top of the valve, and bearing against the under side of the steam chest for the purpose of reducing the pressure of steam on the valve, nor do I claim the use of severed rings for steam tight packing, but

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

1. The cap (C) with its annular flanges (*f*) and (*e*), and the spiral spring (D), or its equivalent, when the said flange *e* is so adapted to the hub (*c*) of the valve, that the said hub shall resist all lateral strains imparted to the cap, and when the whole is applied and arranged in respect to the valve substantially as specified.

2. The within described application of one or more severed metallic rings (*i, i*) fitted into grooves in the annular flange (*d*) of the valve, and bearing against the annular flange (*f*) of the cap as and for the purpose set forth.

3. Beveling the upper sides of the annular recesses (*h, h*) so as to present a sharp edge for the purpose specified.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JAMES MILLHOLLAND.

Witnesses:

HENRY HOWSON,
CHAS. HOWSON.