(No Model.) 2 Sheets—Sheet 1.

J. LEWIS.

ELASTIC BALANCED VALVE.

No. 365,136. Patented June 21, 1887.

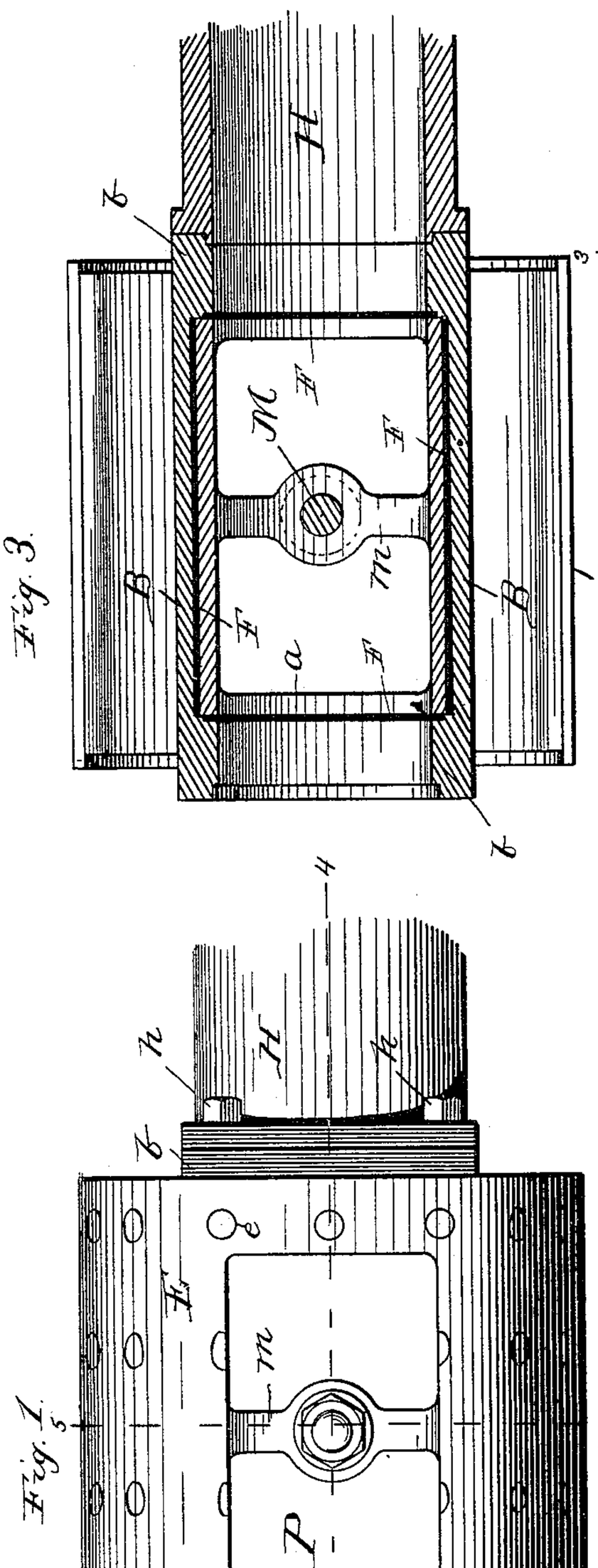

Fig. 3.

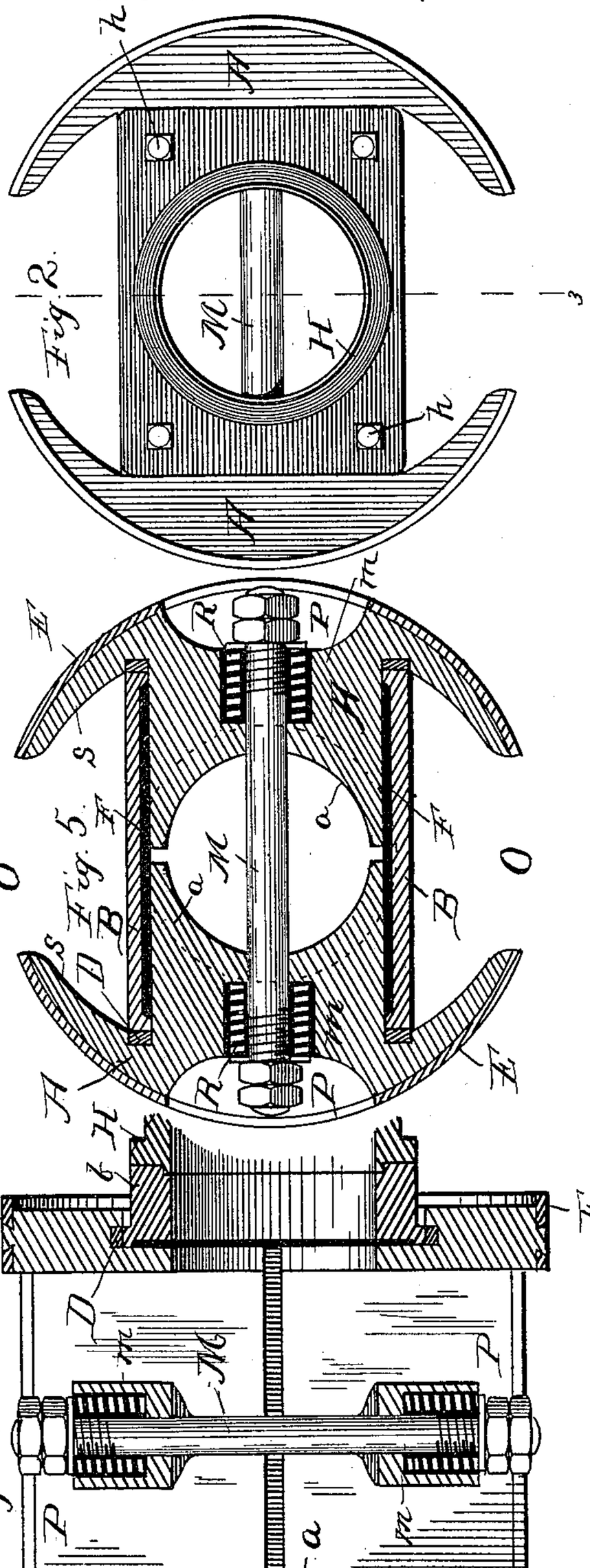

Fig. 2.

Fig. 1.

Fig. 4.

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his Attorneys:

(No Model.) 2 Sheets—Sheet 2.

J. LEWIS.

ELASTIC BALANCED VALVE.

No. 365,136. Patented June 21, 1887.

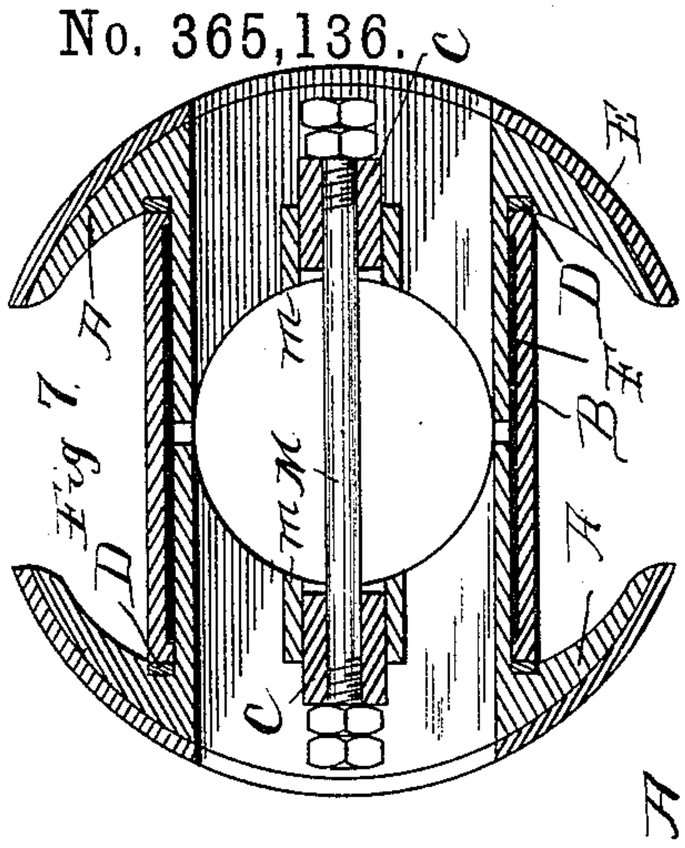

Fig. 7.

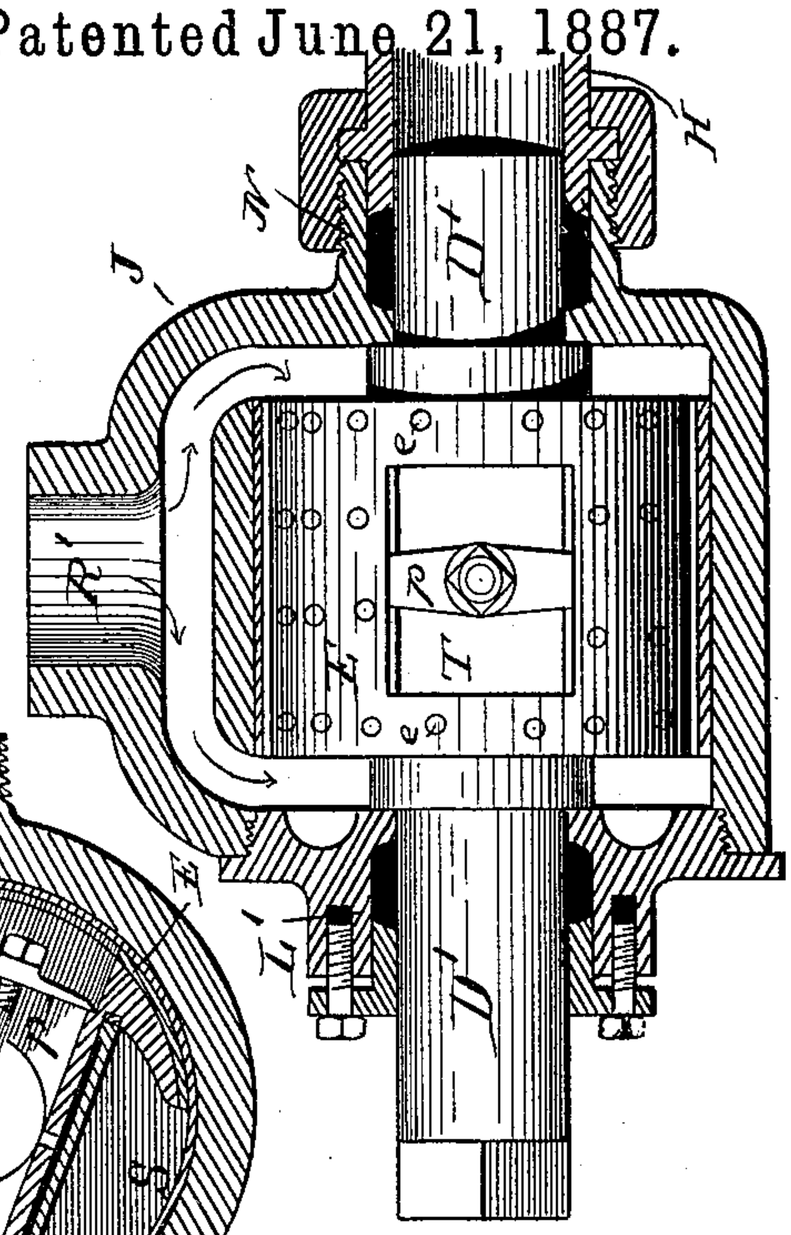

Fig. 10.

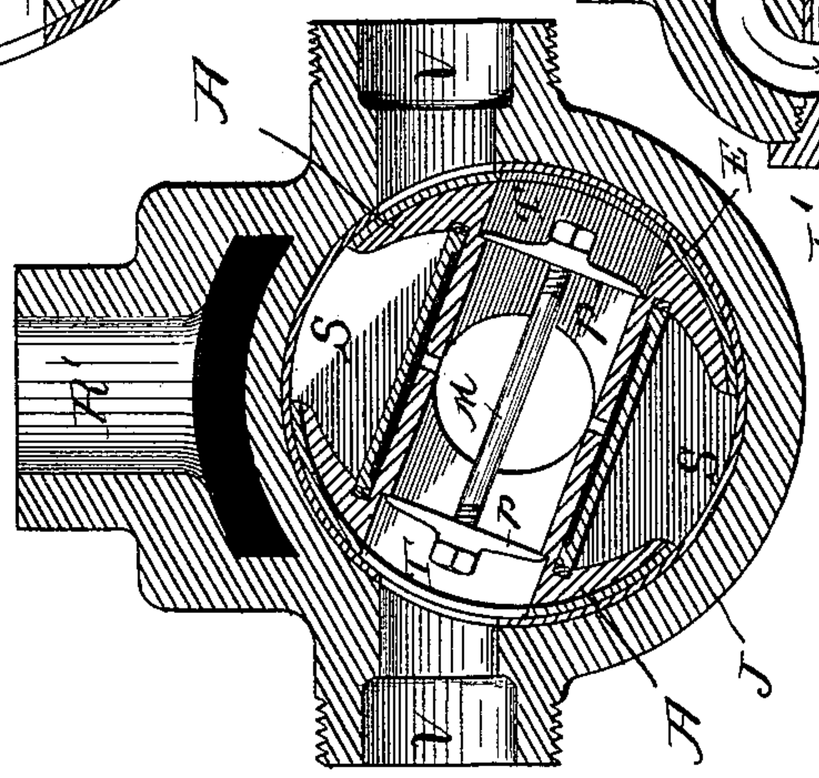

Fig. 11.

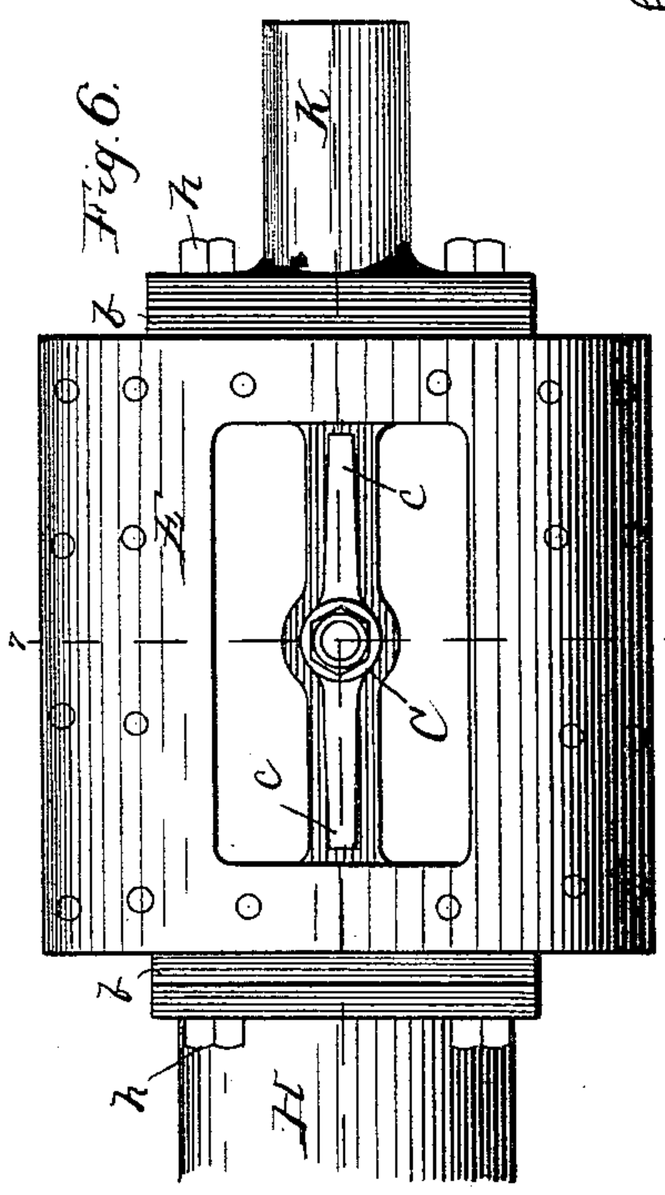

Fig. 6.

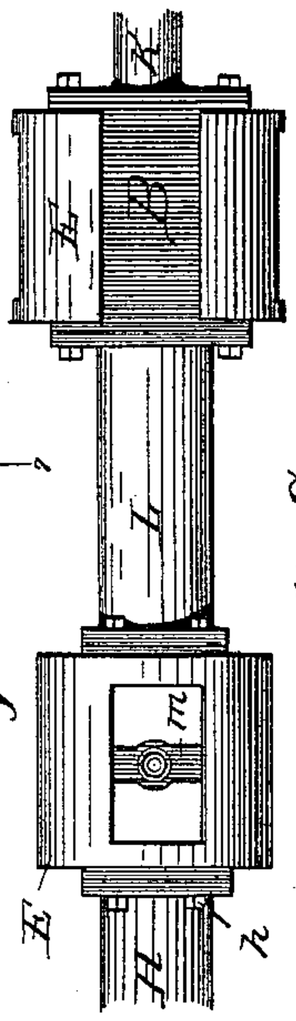

Fig. 9.

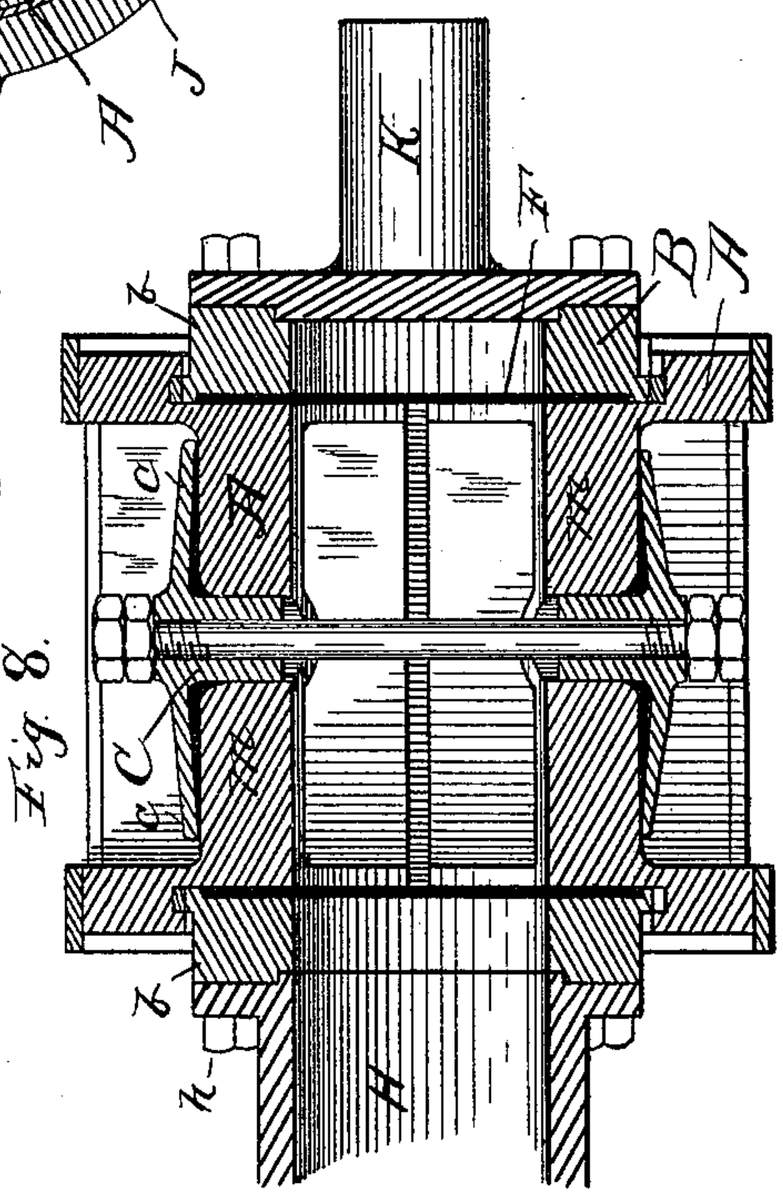

Fig. 8.

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UNITED STATES PATENT OFFICE.

JOSEPH LEWIS, OF SOUTH EVANSTON, ILLINOIS.

ELASTIC BALANCE-VALVE.

SPECIFICATION forming part of Letters Patent No. 365,136, dated June 21, 1887.

Application filed October 7, 1886. Serial No. 215,519. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH LEWIS, a subject of the Queen of Great Britain, residing in South Evanston, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Elastic Balanced Valves, of which the following is a specification.

It is well known that solid cylindrical plug-valves are objectionable for steam-engines, in consequence of the difference between the expansion of the metal of the casing and that of the metal of the plug, and it has been necessary to make an allowance for such difference when fitting the plug to the casing. Considerable loss of steam occurs in all these valves by reason of this allowance for difference of expansion.

My present invention relates to a new elastic plug-valve, which will be steam-tight and balanced under all variations of pressure and expansion of metals, and thus obviate the objection stated. It may be operated with a continuous rotary motion or with a reciprocating motion. It is cylindrical, and the construction, whereby is obtained the elasticity to operate steam-tight under all variations of heat and pressure, is simple, and, because it is cylindrical, a slight longitudinal movement in the casing is admissible and even advantageous, as thereby is secured a more even wear on the valve-surfaces. Valves constructed on this principle are applicable to all forms of steam, gas, and compressed-air engines, water, force, and vacuum pumps, and blowing-engines; also for all forms of cocks and stop-valves for fluids, steam, gas, &c, under pressure.

A valuable feature of the invention lies in the fact that no grinding is required to fit the plugs, as in ordinary conical plug-valves. The casing being bored out cylindrical, the elastic plug is simply turned to fit easily therein, and the fluid pressure expands the valve-cheeks to fit perfectly tight without excessive friction, as will be fully explained below.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is an exterior view of my improved valve. Fig. 2 is an end view of the same. Fig. 3 is a longitudinal section. Fig. 4 is a longitudinal section upon the line 4 4 of Fig. 1. Fig. 5 is a transverse section on line 5 5 of Fig. 1. Fig. 6 is an exterior view of a modification of the construction shown in the previous figures. Figs. 7 and 8 are sections of this modification on lines 7 7 and 8 8, respectively, of Fig. 6. Fig. 9 is an exterior view of a double-headed valve embodying my invention. Fig. 10 is a transverse section of a single-headed valve as applied to cocks, stop-valves, &c., and Fig. 11 is a longitudinal section of the same and its casing.

In the principal figures is shown a cast-metal shell, composed of two flat sides, B B, and ends *b b*. The interior surfaces of the sides and ends are recessed to receive the Babbitt-metal facings F F. I prefer to apply this Babbitt-metal while the shell is on a steel mandrel to secure a perfect opening through the shell, both in form and size.

A A are the expanding-cheeks. They are separate pieces, and are best cast in metal molds, so that when the castings are removed from the molds they will easily fit the babbitted hole in the shell. The outside of the cheek-pieces is covered with hard sheet-brass E E or other suitable material.

While in the flat state the exhaust-port openings hereinafter mentioned are punched out of the brass sheet, and a number of small holes, *e*, are also formed therein and countersunk on the outside. Then the plates are bent into the proper form by rollers in the usual manner; or these plates can be cast of any suitable material which forms a good wearing-surface, in proper form, and with all the openings completely formed therein. The plates are placed in the mold in which the cheeks are cast, so that in the casting of the latter the metal will run into and fill the holes *e*, and thus securely attach the plates. The spots of alloy thus exposed on the valve-surfaces will act as anti-friction strips. The cheek-pieces have hollow interior shanks or guide portions, *a*, which enter the shell transversely and fit against the babbitted sides and the ends thereof.

D D are recesses in the shanks of the valve-cheeks, which are filled with asbestus packing where steam is used, or india-rubber when

cold water is used, thus forming tight joints between the valve-cheeks and the shell, and yet slightly elastic ones.

In the manufacture the cheeks may be placed in the shell, and an ordinary bolt, passing through the cross-arms *m* of the two cheeks, be used to clamp them together, while they are turned to the size required, but when completed for use they are furnished with an elastic or yielding clamp. This may be formed by the bolt M and springs R R. (See Figs. 4 and 5.) The tension of these springs should be such as to nearly balance the intended fluid pressure to which the valve is subjected in use—that is to say the fluid pressure exerted upon the interior surfaces, *s s*, of the valve-cheeks and tending to force the cheeks outward and apart from each other. The particular form of springs and their manner of application is of course quite immaterial, so long as they are strong enough and perform the office designated. They can be adjusted by tightening or loosening the nuts upon the bolt, so that the cheeks will operate steam-tight without exerting excessive friction on the casing. The cross-arms of the cheeks are recessed properly to receive the springs, and it is desirable that both springs and bolts be nickel-plated to prevent oxidation. Instead of a single tension-bolt two or more may be used, as the case may require.

H is a pipe secured by bolts *h*, passing through its flange into the ends *b b*, and represents the central exhaust connecting with the central opening of the valve. As shown, the ports O O are steam-ports, while the ports P P exhaust into the center and thus communicate with pipe H. The valve rotates or oscillates upon the pipe H and spindle K, and its operation will be obvious to those skilled in the art.

In Figs. 6, 7, and 8 a modified form of tension spring is employed, which may be preferable where strength is required to balance the pressure on large valves. It consists of a hub, C, with lateral arms *c*, slightly inclined, as shown, so the extremities only of the arms will rest upon the cross-pieces of the valve-cheeks.

In Fig. 9 a double-headed valve is shown, each head being elastic and constructed according to my present invention. Where the head is thus duplicated any suitable connection may be used to connect the two heads together, as by a pipe, L, similar to the pipe H, and attached to the heads in a similar way by flanges and bolts. It is requisite in the double valve that the two heads be secured to the connection with the steam-ports of one exactly in line with the exhaust-ports of the other. I prefer to make the heads and connection L separate, because they are then more easily manipulated. Heads of all sizes can be made to gage, ready to operate singly or in multiple, as required, and the pipes L be cut to any length desired.

The invention is shown in Figs. 10 and 11 in connection with a suitable casing, J J, and in a form adapted to use with cocks and valves for all fluids under pressure. In this form the cross-arms *m* are dispensed with, and modified springs *p*, spanning the openings through the shanks of cheeks, are employed. The casing is provided with a cap and stuffing-box at L′, and a stuffing-box, N, surrounds the outlet-pipe. The fluid enters the passage R′ and follows the arrows to each end of the plug into the ports S S, corresponding to the steam-ports O O, the pressure acting to spread the valve-cheeks apart, but is controlled by the bolt and springs. The exhaust-ports T T correspond to the ports P P and open to the central exhaust, as in the other figures.

V V are outlet-passages; and it will be noticed from Fig. 11 that one of them is open to one of the exhaust-ports while the other is closed. Of course as the plug revolves these passages are opened and closed alternately, and the same result follows if the plug is oscillated one-fourth of a revolution.

For special purposes the passages V may be placed in various positions. The valve-spindles D′ may in small apparatus be in one piece with the shell, as here shown; but in respects not here mentioned the apparatus shown in these figures is similar to that illustrated in the previous figures.

I claim—

1. As a new manufacture, the plug-valve having elastic or expanding cheeks and a central exhaust, substantially as set forth.

2. The plug-valve provided with expanding cheeks, and a yielding clamp resisting the expansion of the cheeks, substantially as specified.

3. The plug-valve consisting of the shell, the expanding cheeks, and the yielding clamp, all combined and operating substantially as specified.

4. The shell, in combination with the expanding cheeks, having shanks fitting transversely in said shell, and the bolt and springs holding the cheeks together and resisting the pressure upon them, substantially as specified.

5. The shell open transversely to receive the cheek-shanks, and having a central exhaust, in combination with the expanding cheeks having shanks entering the shell and ports open to said central exhaust, and a clamp holding the cheeks together, substantially as specified.

6. The shell, in combination with the expanding cheeks and the packing confined in the recesses D in the latter, substantially as specified.

7. In a valve, the expanding cheeks covered by the brass plates E, cast upon the cheek with its metal filling the countersunk openings in the plates, substantially as specified.

8. In a valve, a shell, in combination with the expanding cheeks having the hollow guiding-shanks, the open ports, and the interior

surfaces, *s s*, to receive the expanding pressure of the steam, substantially as set forth.

9. The valve-casing, in combination with an elastic plug-valve having ports, as set forth, and a central hollow spindle serving as an exhaust, substantially as specified.

10. The valve-casing, in combination with an elastic plug-valve rotating or oscillating therein, the casing having an open space at each end of the plug to balance the pressure thereon, substantially as specified.

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Witnesses:
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