2 Sheets—Sheet 1

W. R. GLUYAS.

Balanced Steam Valve.

No. 230,769. **Patented Aug. 3, 1880.**

Fig. 1.

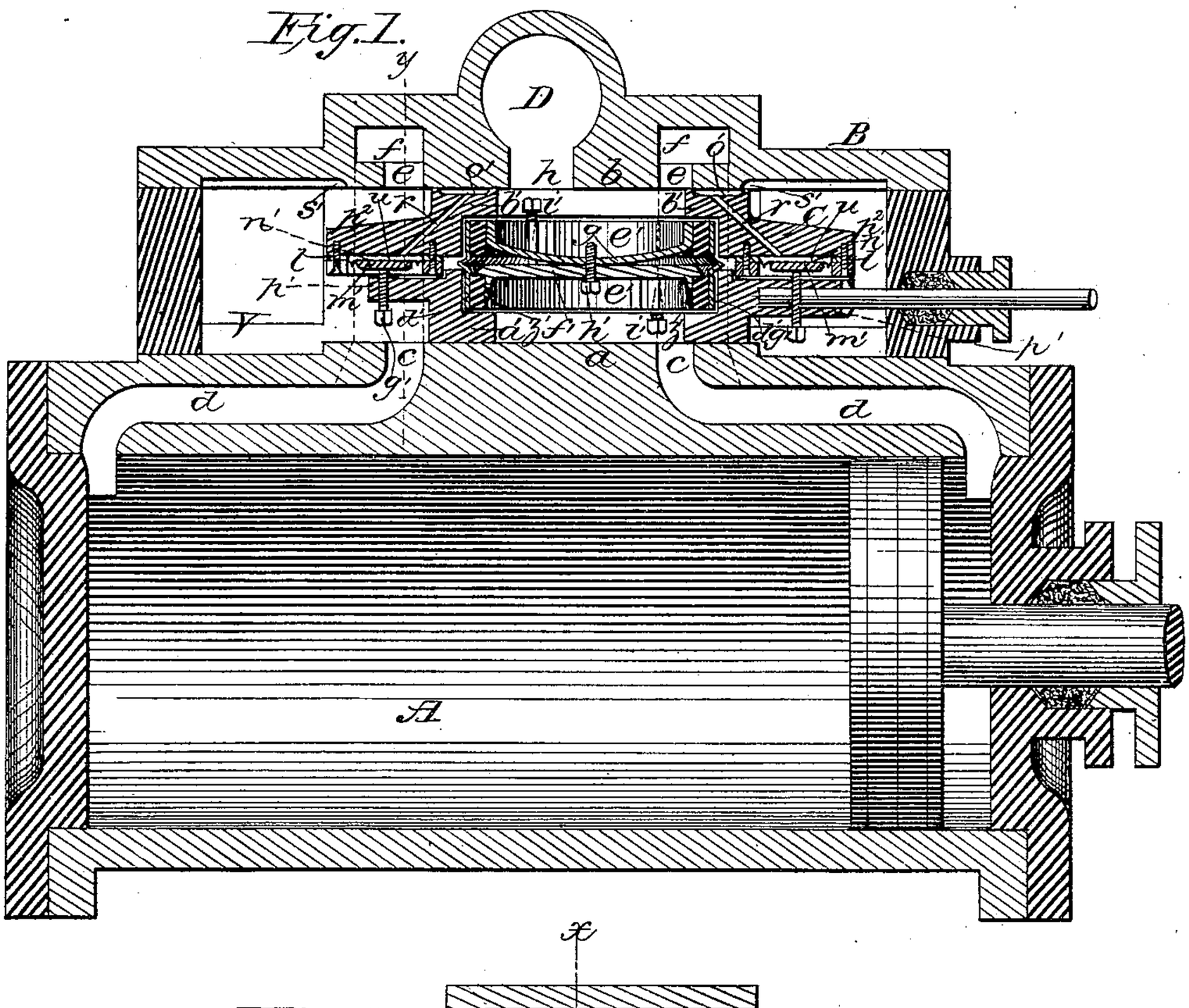


Fig. 2.

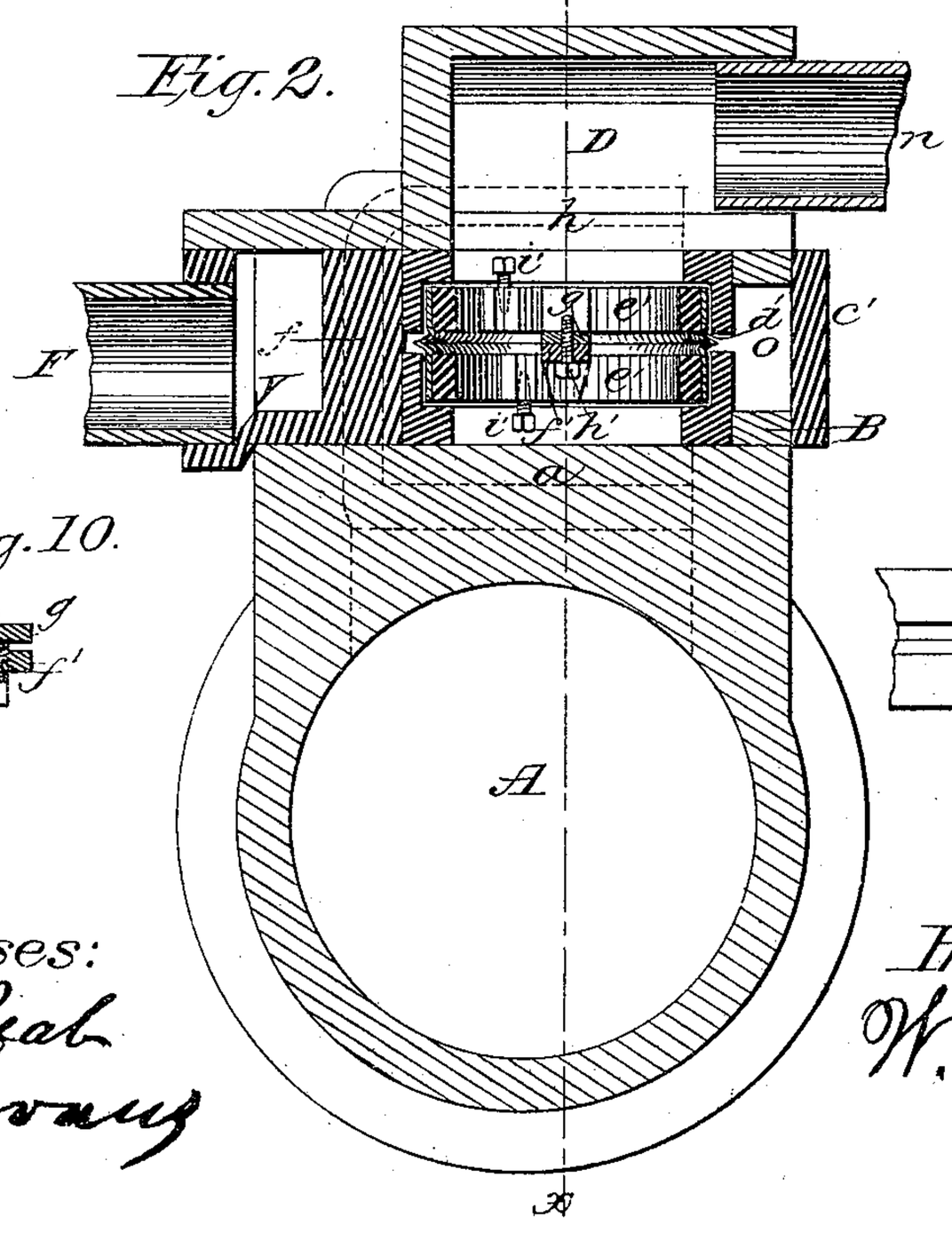
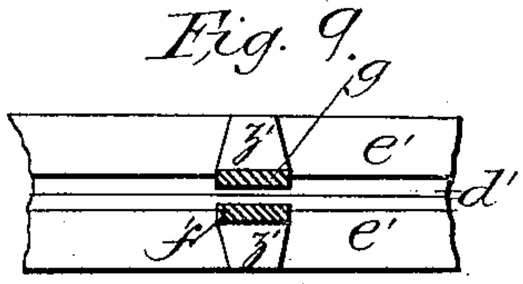


Fig. 10.

Fig. 9.



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2 Sheets—Sheet 2.

W. R. GLUYAS.

Balanced Steam Valve.

No. 230,769. Patented Aug. 3, 1880.

Fig. 3.

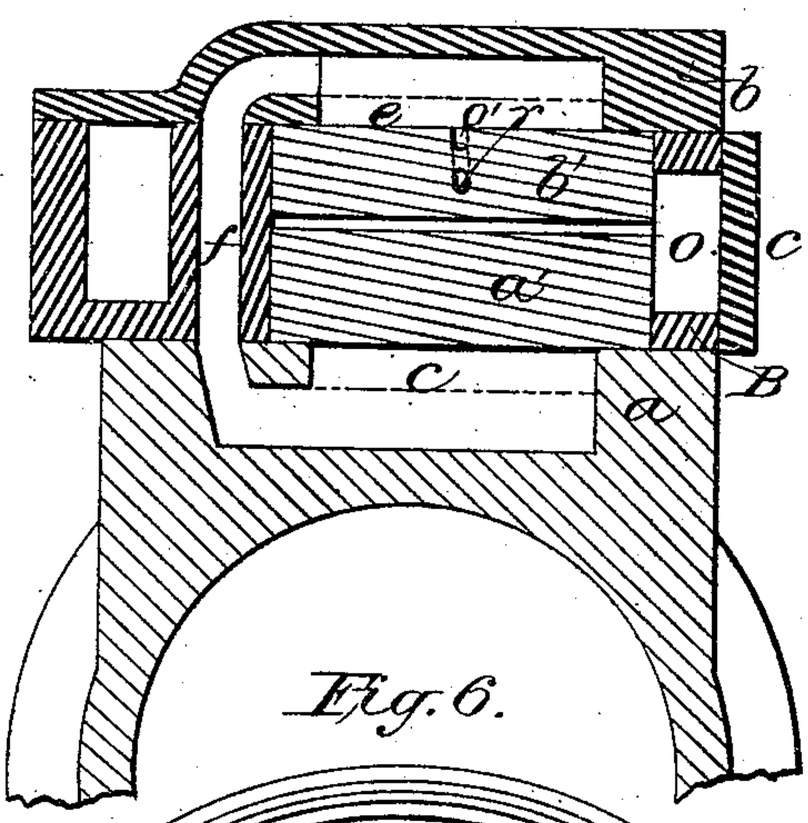


Fig. 7.

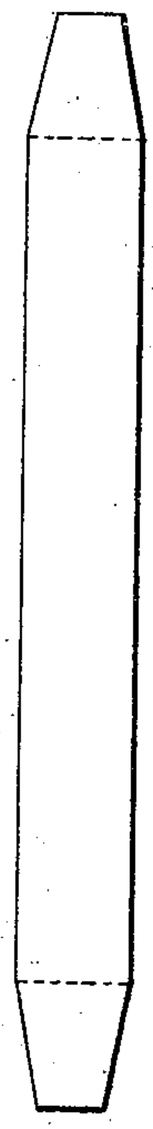


Fig. 6.

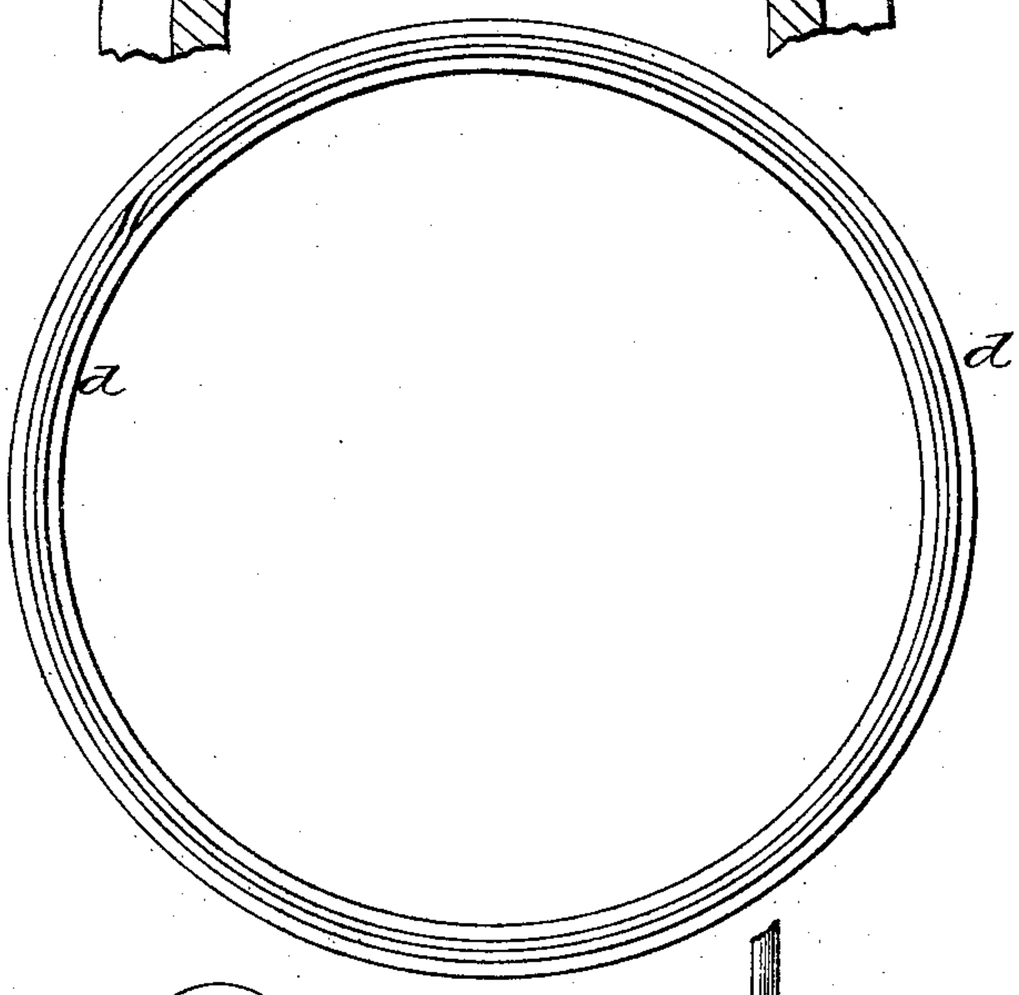


Fig. 8.

Fig. 4

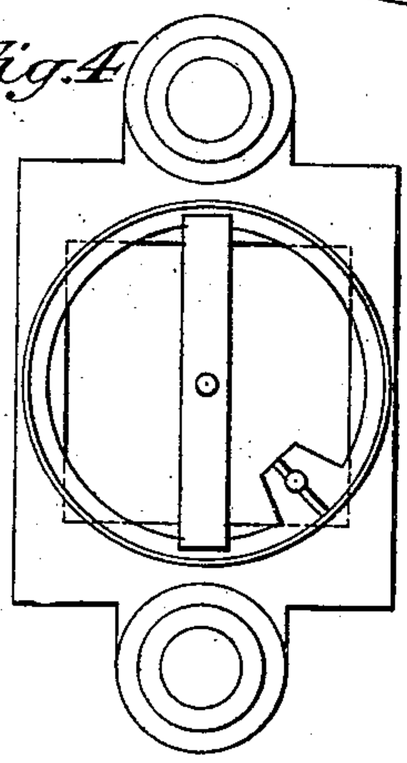
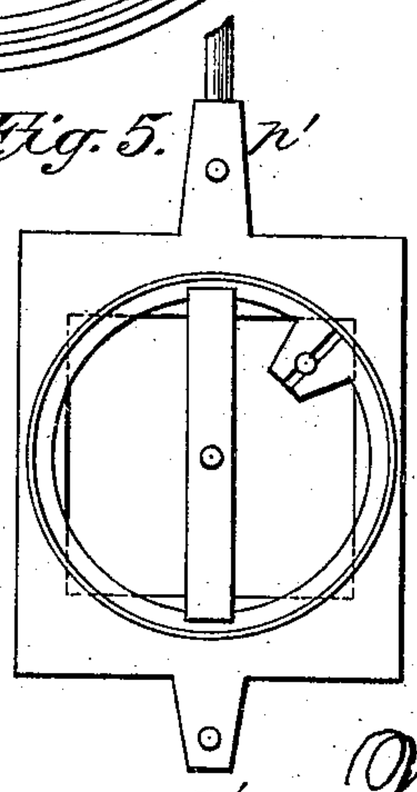


Fig. 5.



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UNITED STATES PATENT OFFICE.

WALTER R. GLUYAS, OF COLUMBUS, OHIO.

BALANCED STEAM-VALVE.

SPECIFICATION forming part of Letters Patent No. 230,769, dated August 3, 1880.

Application filed November 7, 1879.

To all whom it may concern:

Be it known that I, WALTER R. GLUYAS, of Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Improvement in Balanced Slide-Valves for Steam-Engines, of which the following is a specification.

Figure 1 is a longitudinal section of an engine-cylinder and valve-chest containing my improvements, taken on line *x x* in Fig. 2. Fig. 2 is a transverse section taken through the center of the cylinder and valve-chest. Fig. 3 is a transverse section taken on line *y y* in Fig. 1, the valve being closed. Fig. 4 is a detail plan view of the upper valve. Fig. 5 is a detail plan view of the lower valve. Fig. 6 is a plan view of the hoop or ring. Figs. 7 and 8 show the construction of the spring and bar. Fig. 9 shows the tapering grooves in the rings. Fig. 10 shows the screw in bar *f'* to adjust spring.

Similar letters of reference indicate corresponding parts.

My invention relates to the class of engine slide-valves known as "balanced" valves, and is an improvement in my patent of July 2, 1878, No. 205,541; and it consists in the construction and arrangement of the parts of the valve and ports and passages in the valve-chest and cylinder, whereby the valve is relieved from pressure and friction, so that little power is required to move it.

In the drawings, A is the engine-cylinder, having the valve-chest B, in which is placed the slide-valve C. The valve-chest contains two valve-seats, *a b*, one on the cap of the chest, the other on the body of the cylinder. In the valve-seat *a*, formed on the body of the cylinder, there are two ports, *c*, communicating with the ends of the cylinder by passages *d*, and in the valve-seat *b*, on the cap of the chest, are two ports, *e*, directly opposite ports *c*, which communicate with passages *d* by passages *f*. (Shown in dotted lines, Fig. 2.)

Upon the cap of the steam-chest there is a chamber, D, communicating with the valve-chest by the single port *h*. A steam-supply pipe, *n*, delivers steam into the open end of chamber D, whence it passes through port *h* into the valve-chest. The exhaust-steam passes directly into the steam-chest provided with exhaust-pipe F, for conducting away the escape-steam.

The lower part of the steam-chest has a bottom, V, which fits on the lower side of the cylinder, and has a projection which reaches up to the cap of the chest, of suitable dimensions to contain the passages *f f*, which are tapered in the chest-cap. The bottom V also serves to guide the valve.

The chest B has an opening on the upper side with a cover, *c'*, for convenience of access to the valve.

The slide-valve C consists of two main portions, *a' b'*, each having faces closely fitted to their seats. The face of portion *a'* moves on the seat *a*, and the face of portion *b'* moves on the seat *b*. In the face of each portion of the valve there is a central rectangular opening, which is of the same width as the ports *h e*, and is as long as the distance from the outside of one of the ports *e* to the outside of the port *h*. In the back of each portion of the valve there are circular openings, which are bored out to receive a thin metallic hoop or ring, *d'*, which projects equally into each portion of the valve, and has a central V-shaped circumferential fold or rib, which may project either outward or inward. The hoop is held in its place by two rings, *e'*, made of either cast or wrought iron or other suitable material, and which are each drilled and tapped on a vertical line to receive the tapering screws *i'*. The rings are split through the holes in which these screws are placed, so that when the screws are screwed in the rings will be expanded so as to hold the hoop *d'*. The outer surface of the rings are grooved or roughened, as is also the inner surface of the circular openings, so as to hold the hoop or ring *d'* firmly in place. These rings each have two tapering grooves, *z'*, on the inside, directly opposite each other, and on a line with the valve-rod, the rings being made sufficiently thick at these grooves. Into the grooves in the ring which is placed in portion *a'* of the valve the bar *f'* is placed, and into the grooves in the other ring the spring *g* is placed, or the opposite.

Through the centers of the bar *f'* and spring

g holes are drilled, the hole through the bar *f'* being the largest, and which is tapped to receive the set-screw *h'*, a portion of which is made to fit the hole in spring *g*, through which it extends, and which has a shoulder at the lower part of this portion, so that when it is screwed in the shoulder will engage with the spring, which will be compressed, tending to force the two parts of the valve apart.

The bar *f'*, spring *g*, and set-screw *h'* are made of sufficient strength to carry the upper part of the valve, the lower part only being connected with the valve-rod.

The bar *f'* and spring *g* are of substantially the same shape, and may be made of a bar of steel or iron, of the shape shown in Fig. 7, it being bent at the dotted lines into the shape shown in Fig. 8. The bar may be cast, if desired.

The bar *f'* and spring *g* have tapering projections at each end, which are fitted into the grooves in the rings *e'*, the object being to prevent any lateral or longitudinal movement of the upper valve with relation to the lower one. A spring may be substituted for bar *f'*.

Projections p^2 are made at each end of the valve *b'*, and on the lower side of each a circular ring of sheet metal, *l*, is placed, forming a recess, *n'*, over which a diaphragm, *m'*, is placed, having the same effect as a small piston. The diaphragms *m'* have small corrugations just inside of the rings to allow a slight vertical movement. The recess communicates with the ports *e* by passage *r* and slot *o'* in the face of the valve. The slot *o'* is made of sufficient length to communicate with the port *e* only when the valve is in such a position that the steam in the ports *e* and *c* exerts a pressure on the faces of the two parts of the valve, tending to force them together.

A small groove, *s'*, is made in the seat *b'*. This groove is so placed that it will exhaust the steam from the recess through passage *r* and slot *o'* when the valve is in such a position that there is no appreciable pressure on the valve-faces.

At each end of the valve *a'* is projection *p'*, and set-screws *q'* pass through them vertically, so as to bear against the center of the diaphragms *m'* in order to keep them in their proper relative positions. In one of these projections a hole is drilled to receive the valve-rod, and one of the screws *q'* passes through it, holding it firmly in place; or it may be secured in the ordinary manner.

The construction of the hoop or ring *d'* is shown in Fig. 6, being made of a strip of sheet metal bent twice around, with the ends tapered so as to be of uniform thickness, as shown. The fold is formed by well-known means of working sheet metal. Two pieces may be used, if desired, and joined together in substantially the same manner.

The steam-chest projects slightly below the cylinder at the lower side, in order to give room for the exhaust-steam to pass off freely. It is evident that openings may be made at the lower side of the steam-chest at the ends and pipes inserted with the same result, the pipes being connected with a main exhaust-pipe.

When this valve is applied to old engines, where the ports and passages are already amply large, the passages *f f* may be dispensed with, and instead short pipes with two elbows used, holes being drilled in the side of the cylinder into the ports *c c*, also in the cap of the chest to the ports *e e*, for the insertion of these pipes, which are equivalent to the passages *f f*. New engines may also be more cheaply constructed in this manner.

The two parts of the valve may be kept on their seats by the spring *f'* and the pressure of steam under the diaphragms, or the area of the circular openings in the back of each valve may be made sufficiently large to overcome the pressure on the faces of the valves. In such case the diaphragms will be dispensed with and the valve will still be complete, though not so nearly balanced as when the diaphragms are used. The pressure of the spring is constant, and only sufficient to keep the valves to their seats without reference to steam-pressure, while the pressure exerted by the diaphragms varies as near as possible with the pressure on the valve-faces due to steam in ports *e e* from the cylinder. The fold in the hoop *d'* admits of the moving of the two parts of the valve toward or away from each other as much as may be required for their adjustment.

Steam enters the steam-chest through the chamber D and port *h*, and passes through the central part of the valve and through the ports *e e* and passages *d f* to one end of the cylinder. Steam escapes through the passages *d f* and ports *c e* into the steam-chest at the end of the valve, the steam-chest being provided at the lower side with the exhaust-pipe F, for conducting away the escape-steam.

It will be evident that the valve may be made complete without the diaphragms, and that the area of the circular openings may be varied to produce any desired amount of pressure on the backs of the valves, and that pipes may be used instead of passages *f* with nearly the same results.

The valve is moved by an eccentric in the usual way, and as it is relieved from steam-pressure, but little power is required to operate it. It also possesses sufficient elasticity that it will be lifted or forced from the seats should there be an undue amount of pressure in the cylinder from any cause whatever. The parts cannot bind or stick together by the expansion of the metal or other causes, friction and wear are to a great extent avoided, and by the peculiar arrangement of ports and passages a free exhaust is secured.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The steam-chest B, having ports *e* and passages *f* communicating with passages *d* in the cylinder, and the projecting lower side

with bottom V, and with the opening *o* and cover *c'* on the upper side, substantially as herein shown and described.

2. The combination, with rings *e'*, of the tapering vertical screws *i'*, the grooved outer surfaces of said rings with the grooved inner surfaces of the circular openings, the hoop *d'*, made of sheet metal bent around, with the ends tapered so as to be of uniform thickness, and having the circumferential fold, substantially as herein shown and described.

3. The combination, with rings *e'*, having tapering vertical screws *i'* and grooved surfaces, of the tapering grooves *z'*, bar *f'*, spring *g*, and set-screw *h'*, for carrying the upper part of the valve and keeping the parts of the valve to their seats, substantially as described.

4. The combination, with valve *b'*, of the grooves *s'* in seat *b*, and the slots *o'*, passages *r*, recesses *n'*, rings *l*, and diaphragms *m'* on valve *b*, with screws *q'* and projections *p'* on valve *a'*, constructed and arranged as and for the purpose herein shown and described.

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Witnesses:
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THEO. JONES.