J. T. WILSON.

BALANCED SLIDE VALVE.

APPLICATION FILED JULY 24, 1906.

914,470.

Patented Mar. 9, 1909.

2 SHEETS—SHEET 1.

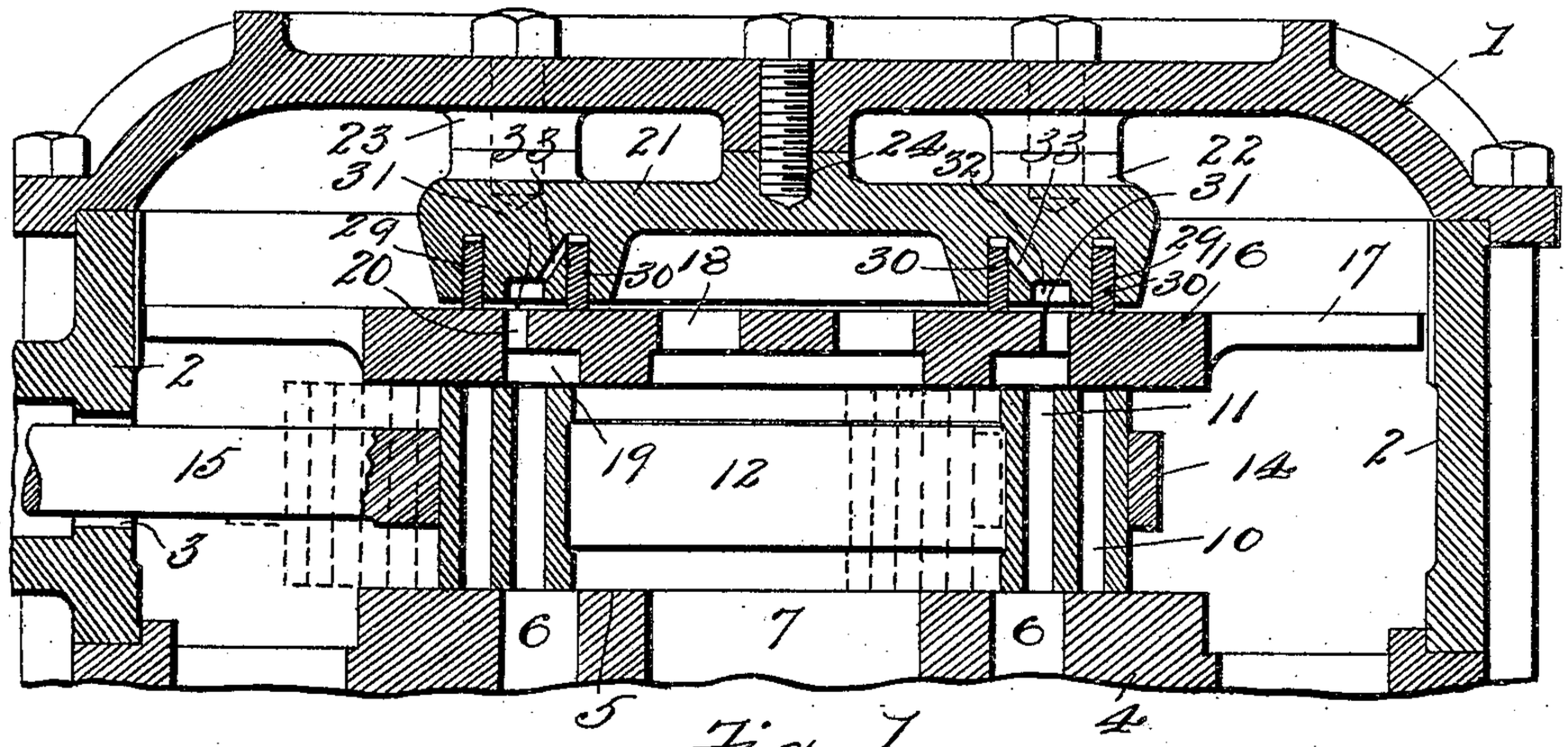

Fig. 1.

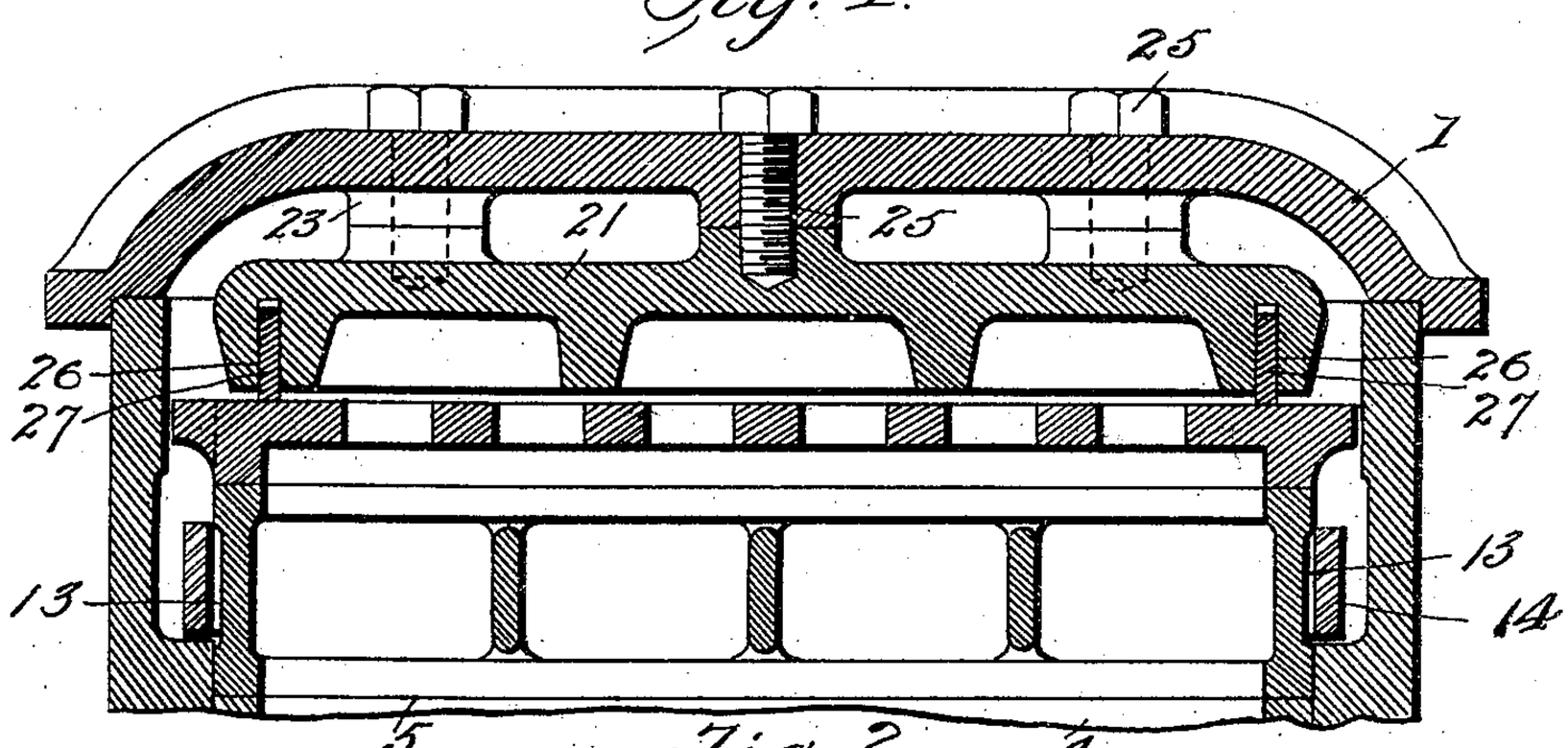

Fig. 2.

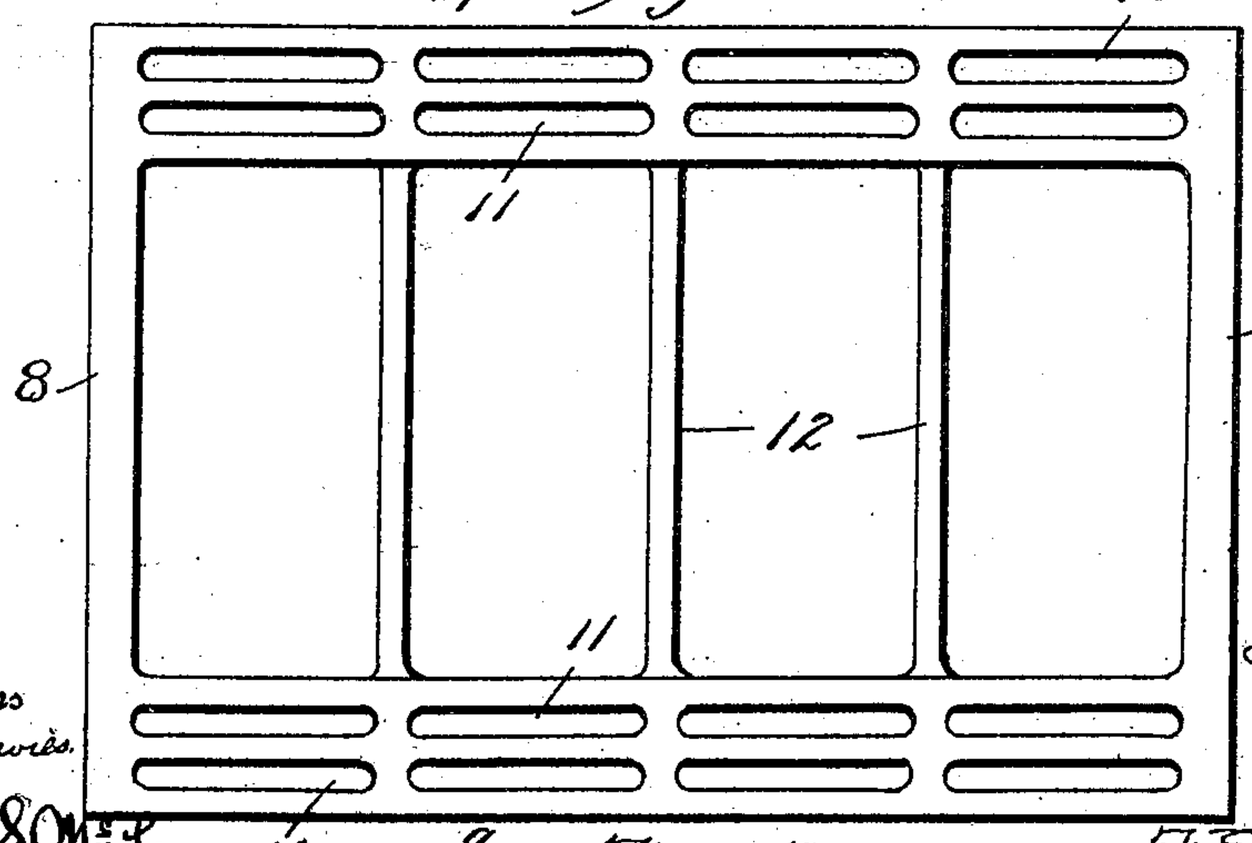

Fig. 3.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

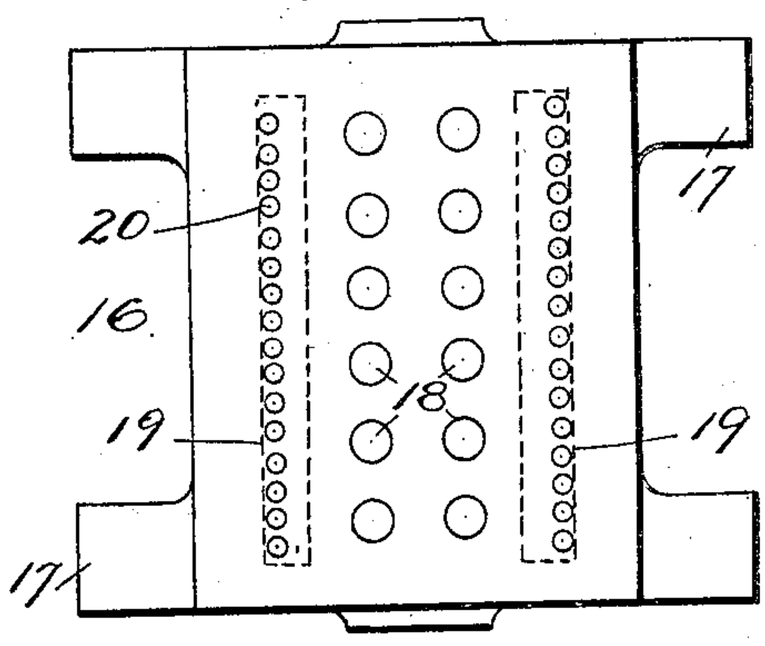


Fig. 5.

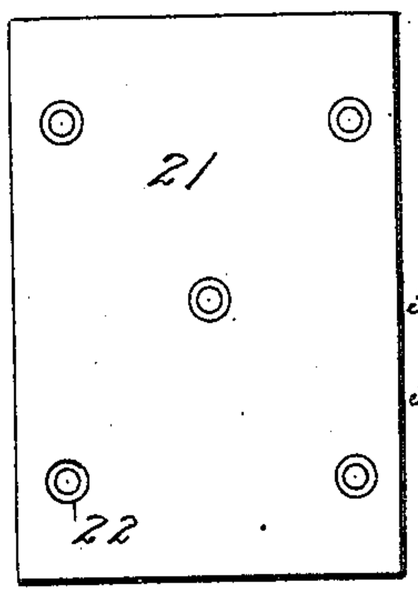


Fig. 6.

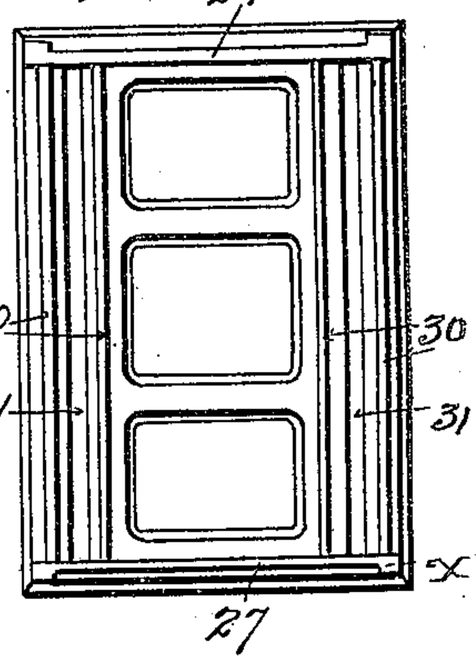


Fig. 7.

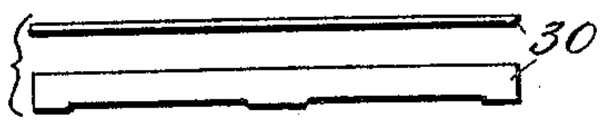
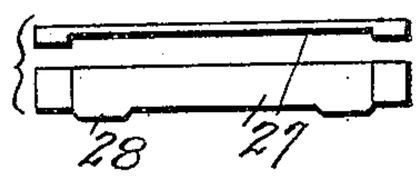


Fig. 8.



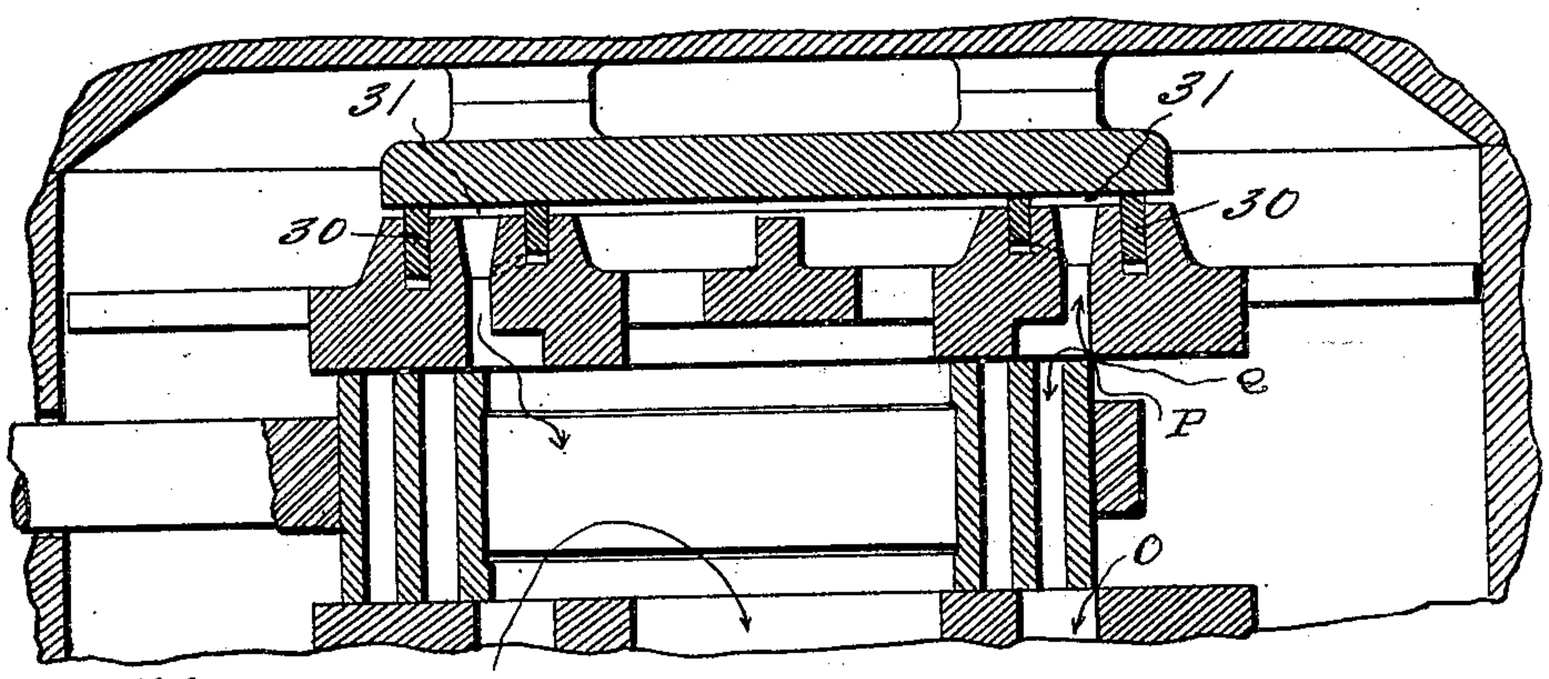


Fig. 10.

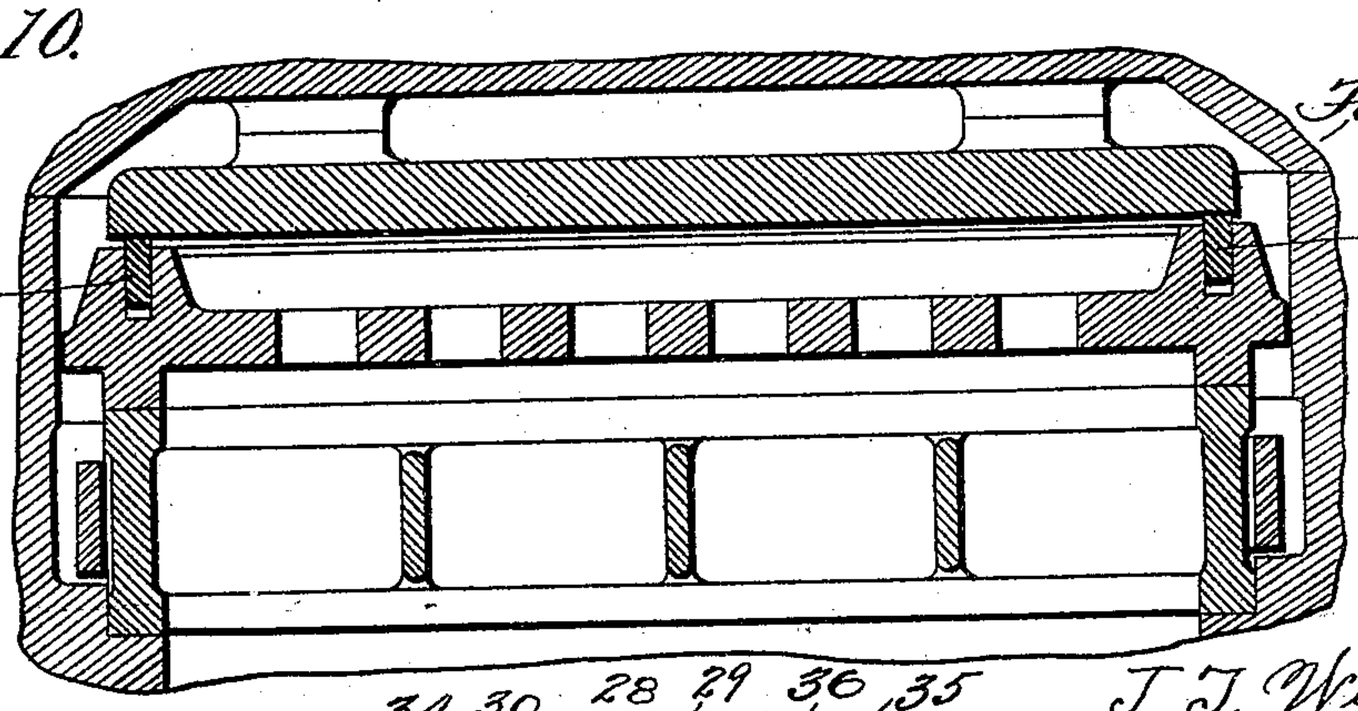


Fig. 11.

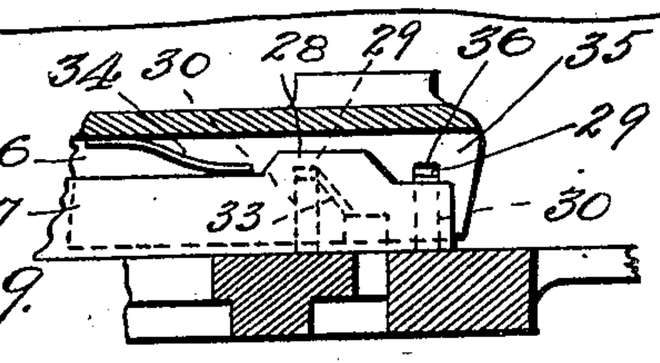


Fig. 9.

Witnesses

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UNITED STATES PATENT OFFICE.

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BALANCED SLIDE-VALVE.

No. 914,470. Specification of Letters Patent. Patented March 9, 1909.

Application filed July 24, 1906. Serial No. 327,480.

To all whom it may concern:

Be it known that I, JOHN T. WILSON, a citizen of the United States, residing at Jersey Shore, in the county of Lycoming and State of Pennsylvania, have invented new and useful Improvements in Balanced Slide-Valves, of which the following is a specification.

The object of my invention is the provision of improved means for controlling the admission of motive fluid to the cylinder of an engine and its discharge therefrom, said means to embrace a reciprocating valve of light weight, means for holding the valve upon its seat when in its central position by a predetermined pressure so it can move easily and still not allow the escape of motive fluid, and means which shall compensate for the variation in pressure when the valve is moved from its central position to its two alternate wide open positions at the ends of its strokes in opposite directions.

The invention consists in certain novelties of construction and combinations of parts as hereinafter set forth.

The accompanying drawings illustrate one complete example, and one modification, of the physical embodiment of the invention constructed according to the best modes I have so far devised for the practical application of the principle.

Figure 1 is a longitudinal section in elevation of a steam chest and part of a cylinder, showing the relative location of the parts of the device. Fig. 2 is a cross section taken at right angles to Fig. 1. Fig. 3 is a top plan view of the valve proper. Fig. 4 is a top plan view of the balance plate on a reduced scale. Fig. 5 is a top plan view of the pressure plate on a reduced scale. Fig. 6 is a bottom plan view of Fig. 5. Figs. 7 and 8 show edge and side views of the packing strips. Fig. 9 is a section on line *x* Fig. 6, showing a channel and an end packing strip in elevation therein. Fig. 10 and 11 are views similar to Figs. 1 and 2, but showing the packing strips located in the balance plate.

Referring to Figs. 1 to 9, the numeral 1 designates the removable steam chest cover; 2, the end walls of the steam chest; 3, an opening for the valve stem; 4, the cylinder; 5, the raised valve seat; 6, the steam admission ports to the cylinder; 7, the exhaust steam port or cavity in communication with the atmosphere; 8, the end walls of the valve; 9, the side walls; 10, a series of admission ports or passages through the side walls; 11, a series of exhaust ports or passages through the valve; 12, ribs joining the sides of the valve; 13, seats for the yoke; 14, the yoke; 15, the valve stem; 16, the balance plate; 17, projecting lugs which loosely engage the inner surfaces of the steam chest walls and hold the plate in central position; 18, two series of holes through the central part of the plate; 19, two longitudinal pockets in the under surface of the plate; 20, two series of holes or pocket ports through the plate and in line with the pockets; 21, the pressure plate; 22, lugs or bosses projecting from the top surface of the plate and which match similar perforated bosses 23 upon the inner surface of the steam chest cover; 24, threaded holes in the lugs of the plate; 25, threaded bolts which pass through the steam chest cover and bosses thereupon and engage the threaded lugs upon the top surface of the pressure plate; 26, channels in the under surface of the plate one at each end; 27, end packing strips in the channels, each strip having a widened portion 28 near each end; 29, two parallel channels in the under surface of the plate at each side; 30, side packing strips in the said channels; 31, spaces or areas at opposite sides of the plate inclosed by the packing strips, each of said spaces being open to a pocket 19 in the balance plate by way of the pocket ports 20 in the plate; 32, pockets in the under surface of the pressure plate; 33, holes from said pockets to the bottoms of the inner channels 29 whereby steam can pass beneath the inner packing strips 30 and force them outwardly and into contact with the top surface of the balance plate; and 34 is one of the springs located in each of the channels 26 and 29 and back of the packing strips 27 and 30, as shown in Fig. 9, which springs force the said strips outwardly against the balance plate.

By reference to Fig. 9 it will be seen that the end channel 26 and the outer channel 29 are open to the steam chest at points 35 and 36 respectively so steam can pass back of the strips 27 and outer strips 30 and force them against the balance plate. The widened portion 28 of strip 27 however covers the end of inner channel 29, as shown, so steam cannot enter except by way of the holes 33 as before specified.

The modified form of construction shown

in Figs. 10 and 11 is identical with that shown in the other figures, except that the packing strips 27 and 30 are located within channels formed in the top surface of the balance plate and the projecting edges of the strips bear against the under surface of the pressure plate. The inclosed areas 31 at the opposite sides of the balance plate are present and formed in substantially the same way; and the mode of operation is the same as in the first example.

It will be observed that both faces of the valve are parallel and of identical construction; that the under surface of the balance plate is of the same area and shape as the raised valve seat, and the pockets 19 of the same area as the steam admission ports to the cylinder; that the balance plate can rock slightly and lift to relieve the cylinder when the engine is drifting, inasmuch as the plate is located a short distance from the under surface of the pressure plate; and that the packing strips are stationary. The inner area of the top surface of the balance plate bounded by the end packing strips 27 and outer strips 30 which is to be excluded from the pressure of steam within the chest is determined in any given case by experiment. However, the main requirement is that the area of the balance plate exterior of these packing strips which is subjected to steam pressure should be sufficient to hold the valve in place and allow it to move from its central position upon a moderate force being applied to the valve stem.

Giving attention to one side of the valve only, the operation is as follows: When the valve is moved from the central position shown in Fig. 1 to the opening position shown by Fig. 10, steam passes as shown by the arrow O directly downward into the cylinder and also by the arrow P through the admission passages 10 to the cylinder. At the same time steam passes as shown by the arrow Q to the inclosed area 31 at the top of the balance plate. Steam pressure upon the top and bottom faces of the valve, where it laps the port, and the top and bottom faces of the balance plate at the edge adjacent the port, is thus equalized. In the wide open position shown in dotted lines, Fig. 1, the balance is preserved, inasmuch as the top face of the valve at the left has passed out from under the balance plate the same distance its lower face has passed over the edge of the valve seat. When the valve is moved from the wide open position toward the right, the position of steam cut off is also shown by Fig. 10. When the valve covers the port, the pressure upon the top and bottom faces and upon the top and bottom surfaces of the balance plate is obviously constant. As the valve moves farther toward the right, and reaches the position of exhaust, steam passes directly from the port and also by way of the exhaust passages 11 to the exhaust cavity 7. At the same time steam in the inclosed space 31 passes out into the exhaust cavity, thus preserving the balance which otherwise would be destroyed by the top surface of the valve excluding from steam pressure the under surface of the balance plate adjacent the pocket 19 therein.

The operation of the opposite side of the valve is simultaneous and identical, but alternate as to the admission and exhaustion of steam.

From the foregoing description taken in connection with the drawings it is clear that I have provided improved means for controlling the admission of motive fluid to an engine cylinder and its discharge therefrom, which means are of the character and perform the functions set forth as the object of my invention.

What I claim is:

1. The combination with a steam chest and a cylinder provided with a valve seat having steam inlet ports to the cylinder and an exhaust port, of a slide valve, a balance plate, and a pressure plate; packing strips being located between the balance plate and pressure plate to form two inclosed spaces, one at each side of the balance plate, and to exclude from steam pressure the central portion of the balance plate; and said balance plate having ports communicating with the said two inclosed spaces whereby steam may be admitted to and discharged from said inclosed spaces simultaneously with the admission of steam to and its discharge from the cylinder ports.

2. The combination with a steam chest having a removable cover and a cylinder provided with a valve seat having steam inlet ports to the cylinder and an exhaust port, of a slide valve, a balance plate, a pressure plate, and bolts for holding the pressure plate relative to the removable cover; packing strips being located between the balance plate and pressure plate to form two inclosed spaces one at each side of the balance plate, and to exclude from steam pressure the central portion of the balance plate; and said balance plate having ports communicating with the said two inclosed spaces whereby steam may be admitted to and discharged from said inclosed spaces simultaneously with the admission of steam to and its discharge from the cylinder ports.

3. The combination with a steam chest, and a cylinder provided with a valve seat having steam inlet ports to the cylinder, and an exhaust port, of a slide valve a balance plate, and a pressure plate; packing strips 27 and 30, the said strips 27 being arranged at angles to strips 30, and all said strips being located between the balance

plate and the pressure plate to form two inclosed spaces, one at each side of the balance plate, and to exclude from steam pressure the central portion of the balance plate; and said balance plate having ports communicating with the said two inclosed spaces whereby upon the reciprocation of the slide valve steam may alternately be admitted to and discharged from said inclosed spaces.

4. The combination with a steam chest, and a cylinder provided with a valve seat having steam inlet ports to the cylinder and an exhaust port of a slide valve, a balance plate, and a pressure plate; packing strips 27 and 30 being located between the balance plate and the pressure plate and within channels formed within one of the said plates, to form two inclosed spaces, one at each side of the balance plate, and to exclude from steam pressure the central portion of the balance plate; and said balance plate being provided with ports communicating with the said two inclosed spaces, for the purpose set forth.

5. The combination with a steam chest, and a cylinder provided with a valve seat having steam inlet ports to the cylinder and an exhaust port of a slide valve, a balance plate, and a pressure plate; packing strips 27 and 30 located between the balance plate and the pressure plate and within channels formed in one of said plates; and openings for admitting steam to the backs of the two strips 27 and the strips 30; said balance plate having ports communicating with each inclosed space formed at the sides of the balance plate by the said packing strips; in substance as set forth.

6. The combination with a steam chest and a cylinder provided with a valve seat having steam inlet ports and an exhaust port, of a slide valve, a balance plate above said valve, and means for forming two inclosed spaces above the balance plate and for excluding from steam pressure the central portion of the balance plate, said means embracing end packing strips 27, side packing strips 30, and an element with a horizontal surface between which surface and the balance plate said packing strips are located; said balance plate being provided with ports communicating with the said two inclosed spaces, whereby upon the reciprocation of the valve steam may simultaneously be admitted to and discharged from a cylinder port and one of the inclosed spaces.

7. The combination with a steam chest and a cylinder provided with a valve seat, of a valve; a balance plate; means for excluding a part of the back of the balance plate from the action of steam pressure and for forming a plurality of spaces at the back of the balance plate, said means embracing straight packing strips which are independent of the movement of the valve; and means for alternately admitting and discharging steam from the said spaces.

8. The combination with a cylinder provided with a valve seat and port, of a valve movable upon the seat; a balance plate in frictional contact with the valve; means embracing straight packing strips which are independent of the motion of the valve to form an inclosed space at the back of the balance plate; and means for alternately admitting steam to and discharging steam from said inclosed space simultaneously with the admission of steam to and its discharge from the port in the cylinder.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN THOMAS WILSON.

Witnesses:
M. L. STAVER,
CORYELL BLACKWELL.