No. 826,254.

PATENTED JULY 17, 1906.

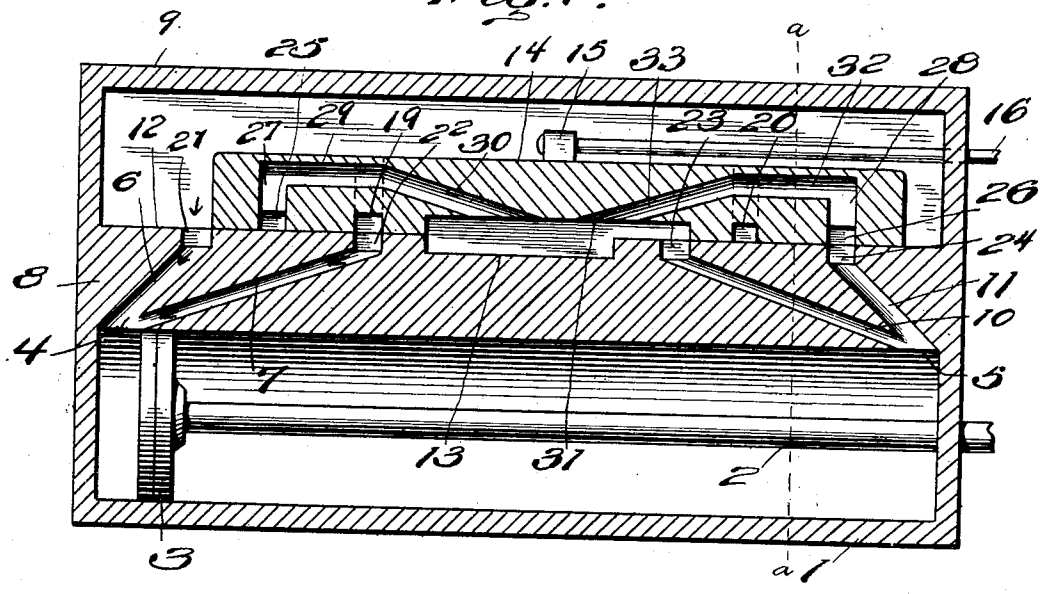
E. E. JOHNSON.

SLIDE VALVE.

APPLICATION FILED JUNE 10, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

FIG. 2.

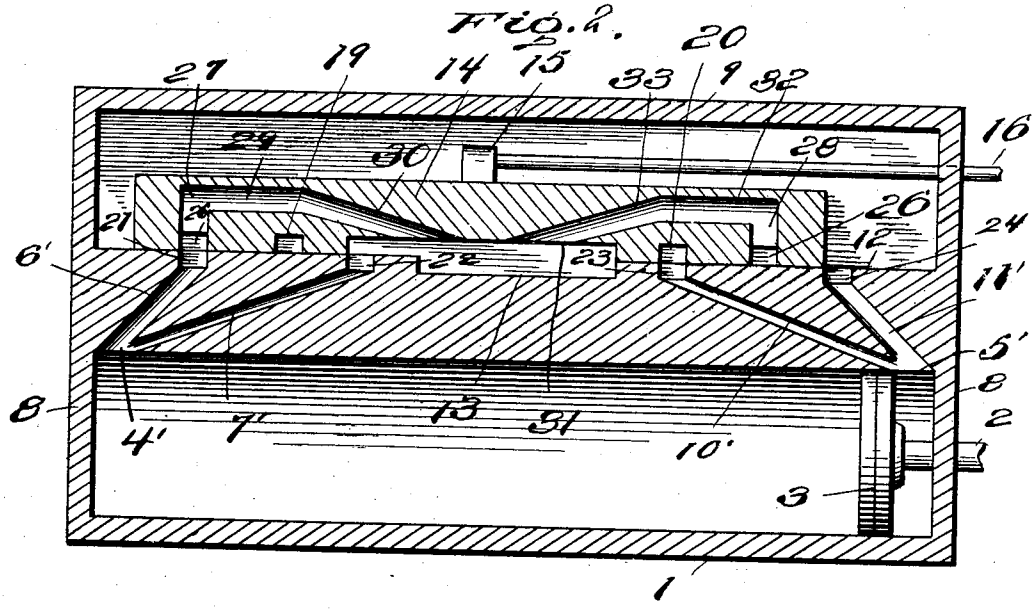


FIG. 3.

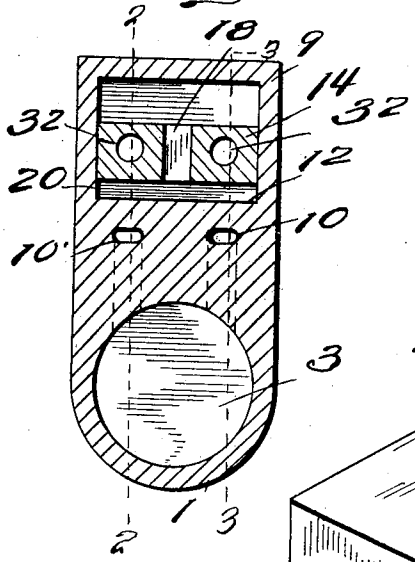
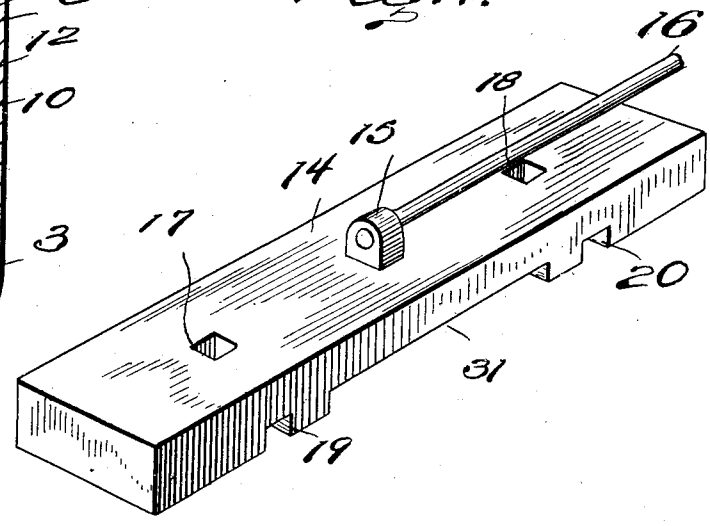


FIG. 4.



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SLIDE-VALVE.

No. 826,254. Specification of Letters Patent. Patented July 17, 1906.

Application filed June 10, 1905. Serial No. 264,692.

To all whom it may concern:

Be it known that I, ELMER E. JOHNSON, a citizen of the United States, residing at North Branch, in the county of Chisago, State of Minnesota, have invented certain new and useful Improvements in Slide-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to steam-engine valves, and more particularly to the type known as "slide-valves."

One object of the invention is to provide two ports at each end of and communicating with the steam-chest and valve-cylinder, so that steam may be fed into the valve-cylinder through two ports at one end and exhausted through two ports at the opposite end.

Another object of the invention resides in the provision of a comparatively simple, inexpensive, durable, and efficient slide-valve for engines or the like.

With these and other objects in view the present invention consists in the novel construction, combination, and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a longitudinal sectional view of my invention on the dotted line 2 2, Fig. 3. Fig. 2 is a longitudinal sectional view of my invention on the dotted line 3 3 of Fig. 3, showing the valve in a position reversed to that shown in Fig. 1. Fig. 3 is a transverse sectional view on the line *a a* of Fig. 1. Fig. 4 is a detail perspective view of the slide-valve.

Referring now more particularly to the accompanying drawings, the reference character 1 designates a cylinder in which is slidably mounted a piston-rod 2, carrying a piston-head 3, there being orifices 4 and 4′ and 5 and 5′ arranged at the top and at the extreme ends of the cylinder. Communicating with the orifices 4 and 4′ are ports 6 and 7 and 6′ and 7′, which converge through the top of the cylinder upon an incline toward the end wall 8 of the cylinder. It will therefore be observed that the inclined ports 6 and 7 and 6′ and 7′ are spaced apart at their upper ends and communicate with the steam-chest 9, with their lower ends converging to a meeting-point for registration with the orifices 4 and 4′, the ports 6 and 6′ and 7 and 7′, respectively, being arranged in alinement. Communicating with the orifices 5 and 5′ are ports 10 and 11 and 10′ and 11′, which extend from the top of the cylinder 1 upon an incline and converge to a meeting-point for communication with the orifices 5 and 5′, the ports 10 and 10′ and 11 and 11′ being arranged, respectively, in alinement.

The top of the cylinder 1 is preferably of greater thickness than the bottom thereof, as shown, the upper face 12 of the top of the cylinder forming a valve-seat and recessed intermediate its ends, as at 13, to provide an exhaust-opening for the exhaust of the steam.

Slidably mounted upon the valve-seat 12 within the steam-chest 9 is a slidable valve 14, having a lug 15 upon its upper surface with which is engaged the valve-rod 16, which latter pierces one end wall of the steam-chest, as clearly shown in the drawings.

The valve 14 is provided with openings 17 and 18 at each end thereof, and extended through the upper face of the valve for communication with the transverse grooves 19 and 20 in the under face of the valve, and which extend from side to side of the latter, the said transverse grooves 19 and 20 being designed to register with the corresponding transverse grooves 21 and 22 and 23 and 24 arranged, respectively, in the upper face of the valve-seat 12, the grooves 21 and 22 registering with the ports 6 and 7 and the grooves 23 and 24 registering with the ports 10 and 11 and extending from side to side of the valve-seat. Formed in the under face of the slide-valve 14, at each end thereof, are transverse grooves 25 and 26, which grooves terminate short of their sides of the slide-valve and communicates at both ends with the upwardly-directed passages 27 and 28, respectively. The vertical passages 27 communicate with the horizontal passages 29, formed in the opposite sides of one end of the slide-valve, and extend inwardly of the latter for communication with the inclined passages 30, the said inclined passage 30 extending into the recess 31, formed in the under face of the slide-valve, and which latter registers with the depression or recess 13 in the valve-seat for coöperation therewith for exhausting purposes, as will be hereinafter more fully explained. Formed in the end of the slide-valve opposite

to that having the horizontal passages 29 are horizontal passages 32, which extend along the upper portion of the sides of the slide-valve, as does the other horizontal passage 29, and which communicate with the vertical passages 28 at one end and with the inclined grooves 33. It will thus be seen that the horizontal passages 29 and 32 are directed toward the corresponding ends of the slide-valve and to the center of the latter, where they communicate with the exhaust-opening formed between the depression or recess 13 and 31.

The illustration in Fig. 1 discloses the position of the parts when steam is being directed into the cylinder 1 at one end and exhausted at the other end. In other words, the position of the slide-valve 14 in Fig. 1 permits the entrance of steam into the cylinder 1 by way of the valve-opening 17, the groove 19, and the ports 7 and 7′, steam entering also at the same time through the ports 6 and 6′ by reason of the fact that the corresponding end of the valve 14 is not disposed over the ports 6 and 6′, this entrance of the steam being shown by arrows in Fig. 1, the arrows at the opposite side of Fig. 1 illustrating the travel of the steam to the exhaust-opening, it being observed that the opening 18 in this particular position of the valve is not in communication with the ports 10 and 11 and 10′ and 11′ and will not be in communication therewith when the valve 14 is moved so that the opening 17 might communicate with the ports 6 and 6′. However, when the slide is moved backwardly the opening 18 in the valve communicates with the ports 10 and 11 and 10′ and 11′ in the same manner as the opening 17 communicated with the ports 6 and 7 and 6′ and 7′ at the opposite end of the cylinder, the return movement of the slide-valve causing the steam to enter the cylinder by way of the ports 10 and 11 and 10′ and 11′ and be exhausted through the ports 6 and 7 and 6′ and 7′, as well understood.

By reference to the accompanying drawings it will be seen that the sides of the slide-valve 14 fit closely within the steam-chest 9 to compel the travel of steam from and through the passages of the valve in the manner stated. It will be now understood that the valve 14 slides backwardly and forwardly over its valve-seat and communicates interchangeably with the ports arranged in the opposite ends of the cylinder, thereby permitting the entrance of steam at one end of the latter and the exhaust of steam at the opposite end thereof. It will also be seen that the horizontal passages in the opposite sides of the valve are directed toward each other and that the ports 6 and 7 and 10 and 11, respectively, are directed downwardly away from each other in pairs, each pair of ports 6 and 7 and 10 and 11, respectively, meeting each other for communication with the respective orifices 4 and 5, through which orifices the steam enters or leaves the piston-cylinder for passage through the corresponding ports.

By reason of the fact that the slide-valve 14 fits tightly within the steam-chest 9 the ports 6′, 7′, 10′, and 11′, together with the corresponding orifices 4′ and 5′, may be eliminated from the structure, if desired, for the reason that the passages arranged in the opposite sides of the valve will communicate with the corresponding transverse grooves in the top of the valve-seat to permit of the proper circulation of steam.

It will readily be understood that there are times when the valve does not communicate with the ports of the steam-cylinder, which time is when the slide-valve is midway of the cylinder. When the valve is in this position, the steam may be used expansively.

What is claimed is—

1. A device of the class described comprising a cylinder having orifices at the top and oppositely-disposed ports arranged at opposite ends thereof, the said ports converging downwardly and being inclined toward the ends of the cylinder, the lower ends communicating with the said orifices, a valve-seat on the upper face of the cylinder having a recess and transverse grooves formed therein, the said ports communicating with the transverse grooves, a slide-valve having grooves in its bottom and passages in its sides for communicating with grooves in the bottom, and a recess in its under face for registration with the recess of the cylinder to provide an exhaust-opening, and means for sliding the valve backwardly and forwardly over the cylinder for registration with the ports at the ends of the cylinder interchangeably.

2. A device of the character described comprising a steam-cylinder having a piston mounted therein, converging ports at its opposite ends and in each of its sides, and a recess in its outer face, a slide-valve having transverse grooves in its bottom, passages in each of its sides for communicating with corresponding transverse grooves, an opening in each end for communicating with a transverse groove, and a recess in its under face for registration with the aforesaid recess in the cylinder to provide an exhaust-opening, and means for moving the valve backwardly and forwardly for registration of its grooves with the ports at each end of the cylinder interchangeably whereby steam may be admitted at one end of the cylinder and exhausted at the other end thereof.

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

ELMER E. JOHNSON.

Witnesses:
O. S. FAGERSTROM,
T. E. WARNER.