(No Model.) 2 Sheets—Sheet 1.

F. D. TOUCEY.

STEAM ENGINE VALVE.

No. 456,174. Patented July 21, 1891.

Fig. 1.

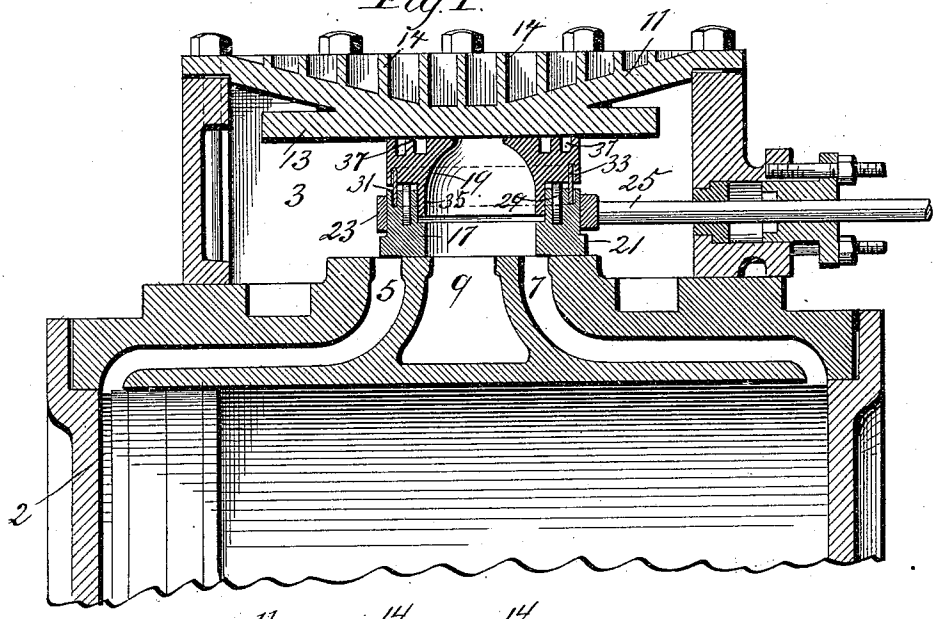


Fig. 2.

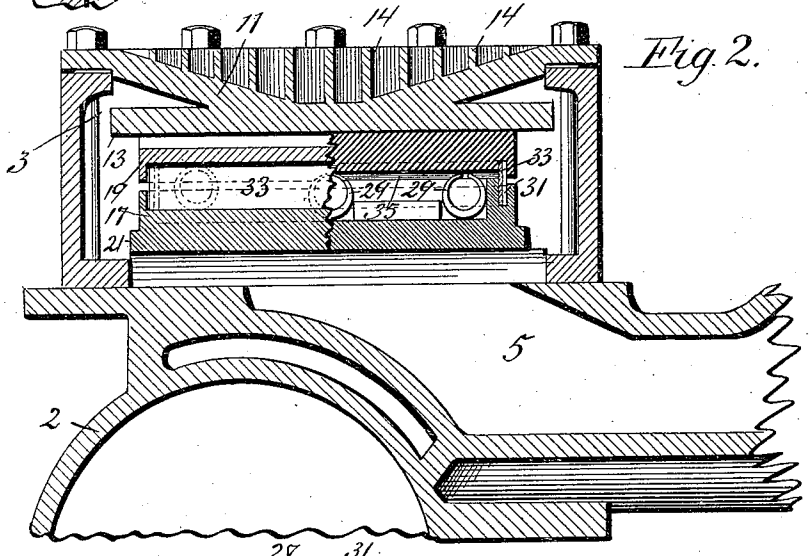
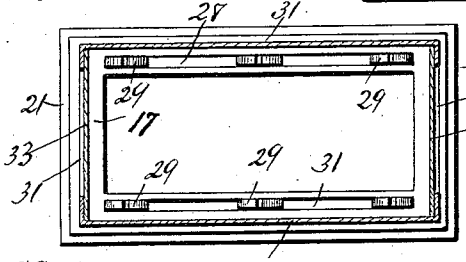


Fig. 3.



Witnesses

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) F. D. TOUCEY. 2 Sheets—Sheet 2.

STEAM ENGINE VALVE.

No. 456,174. Patented July 21, 1891.

Fig. 4.

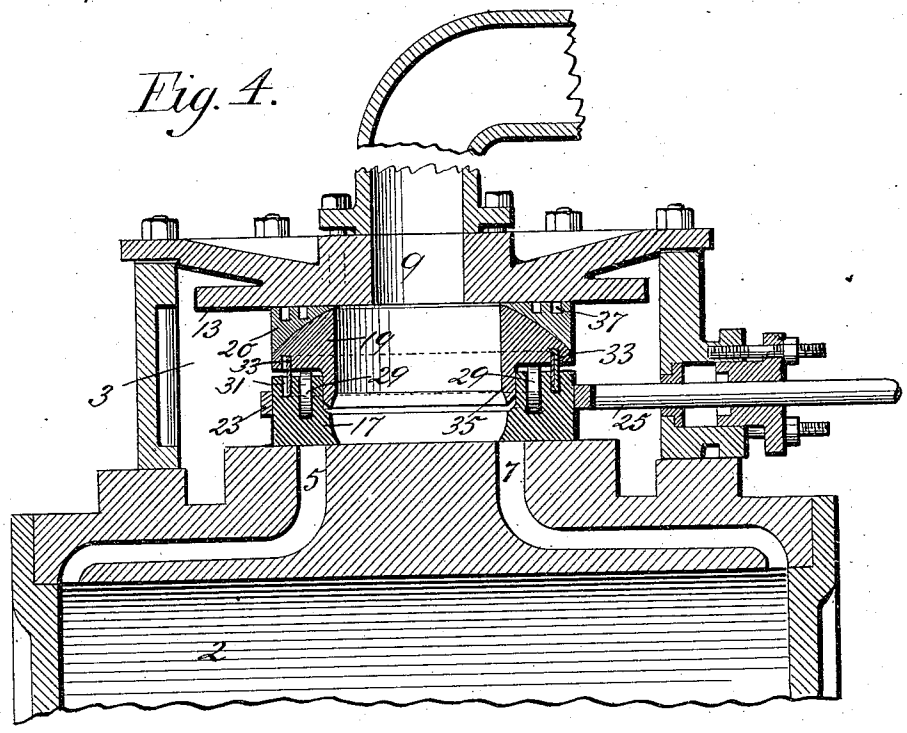
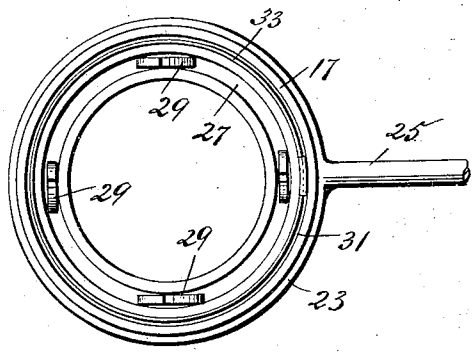


Fig. 5



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UNITED STATES PATENT OFFICE.

FERRIS D. TOUCEY, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF THREE-FOURTHS TO FRANK DUNHAM AND FREDERICK C. JOHNSON, BOTH OF SAME PLACE.

STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 456,174, dated July 21, 1891.

Application filed July 15, 1890. Serial No. 358,816. (No model.)

To all whom it may concern:

Be it known that I, FERRIS D. TOUCEY, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Steam-Engine Valves, of which the following is a specification.

This invention relates particularly to improvements in valves for locomotive-engines, although the invention may be applicable to engines of other kinds, and the objects I have in view are to provide an improved slide-valve that shall be of simple construction and with which there will be the smallest possible amount of friction.

To these ends the invention consists, generally, in the construction and combination hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming a part of this specification, Figure 1 is a longitudinal section of the steam-chest and valve and a portion of the cylinder of a locomotive-engine. Fig. 2 is a transverse section through the steam-chest and a portion of the cylinder and through the valve, the two sides being shown with the section taken in different planes. Fig. 3 is a plan view of the lower or main portion of the valve, showing in section the steel packing placed between the two sections of the valve. Fig. 4 is a section similar to Fig. 1, but showing a circular valve. Fig. 5 is a plan of the lower section of the valve shown in Fig. 4.

In the drawings, 2 represents the cylinder, and 3 the steam-chest, both being of any ordinary or preferred construction. The cylinder is provided with the usual "intake-ports" 5 and 7 and with the exhaust-port 9, all communicating with the steam-chest in the usual way. The steam-chest is provided with a plane-surfaced cover 11, preferably bolted to its upper surface, and I prefer to make this cover of concave form, with the face-plate 13 on the under side of the cover, forming the bearing for the valve. The cover may be strengthened by means of the transverse ribs 14. The cover thus formed is advantageous, for the reason that it is in the form of an arch, and it thus possesses great strength while being very light.

Arranged in the steam-chest is a valve consisting of two parts or sections 17 and 19. The section 17 is of rectangular form, preferably, and is provided with a plane under surface resting upon the valve-seat. This valve-section is preferably provided with a lip or flange 21, extending around it, and a yoke 23 encircles the section above this lip, and to this yoke is connected the valve-stem 25, by means of which the valve is moved in the steam-chest in the usual manner. In the upper surface of the valve-section 17 are the grooves 27, which extend transversely therein, one in each side of the valve-section. In each of these grooves is placed a series of eccentric spring-rings 29. These rings are preferably cut once, and they project for a short distance above the walls of the groove. These rings are of eccentric form, and therefore larger and heavier at the bottom, and they thus naturally remain in position with the cut portions uppermost. I may also provide parallel to the grooves 37 the grooves 31, in which are arranged the steel packing-blades 33, that project into similar grooves in the section 19. These blades are arranged loosely in the grooves and overlap at the corners of the valve. The pressure of steam in the steam-chest holds them against the inner surfaces of the grooves, making steam-tight joints. The upper valve-section 19 is also preferably of rectangular form and is provided with the depending flanges 35, extending transversely across the inner sides of the valve-sections, these flanges being adapted to project inside the valve-section 17. The inner walls of the valve-section 19 above the flanges 35 are preferably curved inward, as shown in Fig. 1, for the purpose of making the upper surface of the section of greater area and preventing the exhaust-steam from striking an upward blow on the steam-chest cover. The valve-section 19 is arranged upon the section 17 with the flange 35 projecting inside of the section 17 and resting upon the eccentric rings 29. The upper surface of the section 19 is against the

under surface of the cover, and the two sections are held apart by the spring-rings 29. I also prefer to provide in the upper surface of the section 19 a groove 37, designed to catch any water that may collect therein from the partial leakage of the steam between the surface of the valve and the cover.

Instead of forming the valve-sections of rectangular form, they may be circular, as shown in Figs. 4 and 5, and in this case the packing-blade will be a ring or clasp lying in the circular grooves in the two sections and having its ends overlapping, as shown in Fig. 5. I prefer, also, in this instance to provide the section 19 with a convex upper surface and to arrange thereon an oscillating ring or cap 20, having a concave lower surface and bearing against the under side of the steam-chest cover. This ring forms a ball-and-socket joint with the section 19.

I have shown with this form of valve an exhaust that leads directly through the cover of the steam-chest. By using this arrangement the exhaust is upward instead of downward, thereby shortening the distance that the exhaust-steam must travel from cylinder to exhaust-nozzle, thus increasing the speed of the engine by preventing back-pressure or choking in the exhaust-pipes.

This valve possesses many advantages over the ordinary form of slide-valve. There is less area on top of the valve exposed to pressure, and hence less friction on the wearing-surface of valve and valve-seat. With this valve I get more power from the engine, as the friction of the slide-valve acts as a brake or load to the engine, so that by lessening the friction the effective power of the engine is increased. There will also be less wear and strain upon the eccentrics and the various parts of the valve-gear. By forming the valve in two sections with a yielding tension device between them the upper section is held against the face-plate on the under side of the steam-chest cover, and, being formed in one piece, makes a better joint and is less liable to leak steam through to the exhaust-cavity. The lower section of the valve is held to its seat with an elastic tension, so that under pressure of water, steam, or air this section can lift and discharge without danger of breaking the cylinder, cylinder-heads, piston-head, or packing-rings, while the top section of valve does not have its bearing on the under side of steam-chest cover. The packing-blades between the two sections of the valve are automatic in their action. They are held over the joint between the two sections of the valve and are loose when there is no pressure of steam. The eccentric spring-rings take up but small space, and the elasticity is greatest toward the ends, so that the tension is equally distributed. With the circular form of valve I obtain a larger and longer area of admission-ports, thereby giving a greater steam-pressure on the piston up to the point of cut-off. The circular valve can also all be made in a lathe and requires no filing or vise work.

The oscillating ring on the top of the valve will in all cases keep its bearing or seat against the inside of steam-chest cover. It makes no difference if the distance does vary between the valve-seat and cover, and there will be no leak, as the eccentric rings between the two sections of the valve will hold the upper surface of the ring elastically against the cover.

I may construct the valve with a horizontal flange on the outside, as shown in Fig. 1, or without such flange, as shown in Fig. 4. As this flange is exposed to steam-pressure and causes additional friction on the seat, I prefer to omit the flange, in which case only the channel, in which the packing-blades are confined, is exposed to pressure.

I claim as my invention—

1. The combination, with the steam-chest, of a valve-section arranged therein provided with grooves in its upper surface, eccentric rings arranged in said grooves and projecting above the surface of the section, and a section arranged upon said first-named section and between it and the cover of the steam-chest, substantially as described.

2. The combination, with a steam-chest, of an open-valve section arranged therein provided with grooves in its upper surface, eccentric rings arranged in said grooves, a second section arranged upon said section, and steel blades arranged in grooves in said sections and forming a steam-packing between said sections.

3. The combination, with the steam-chest, of the valve having the two open sections, with spring-tension devices arranged between said sections, a steam-packing between said sections, and the cover secured upon said steam chest and having a concave form and provided with a face-plate, substantially as described.

4. The combination, with a steam-chest, of open-valve sections arranged in said steam-chest, one of said sections being provided with a convex upper surface, and an oscillating ring or cap arranged upon said section and between it and the under surface of the steam-chest cover, substantially as described.

5. The combination, with a steam-chest, of two open-valve sections arranged therein, spring-tension devices between said sections, and blades 33, arranged in grooves in said sections and forming steam-packing between said sections.

In testimony whereof I have hereunto set my hand this 30th day of May, 1890.

FERRIS D. TOUCEY.

In presence of—

A. M. GASKILL,

C. G. HAWLEY.