

E. TURNER.
STEAM ACTUATED EXHAUST VALVE.
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1,042,846.

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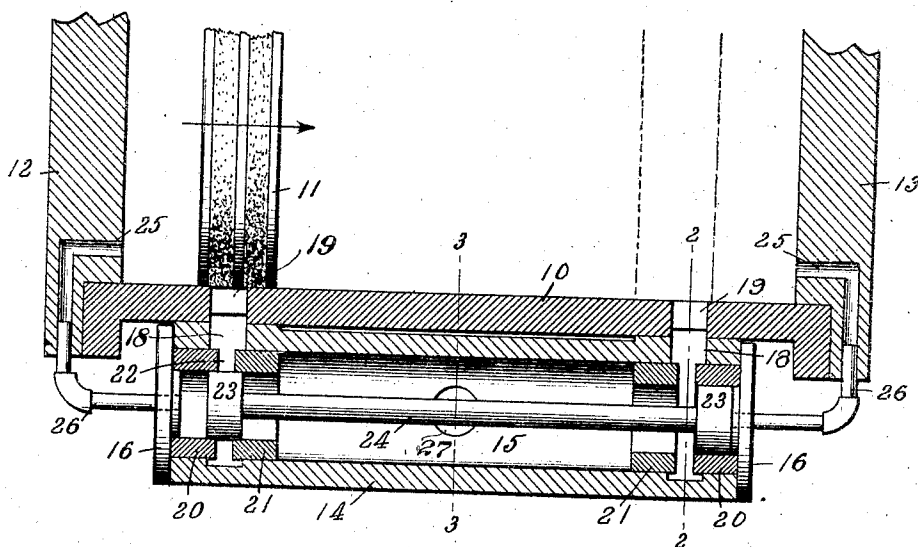


Fig 1

Fig 2

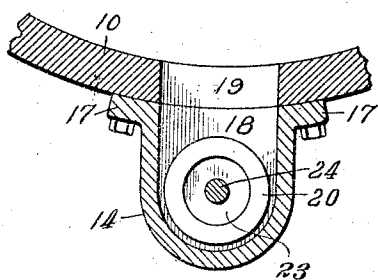
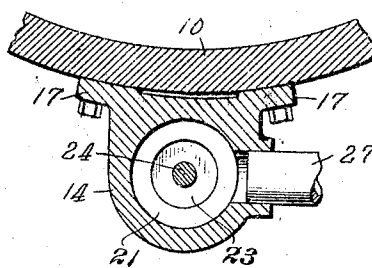


Fig 3



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STEAM-ACTUATED EXHAUST-VALVE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ERNEST TURNER, a citizen of the United States, residing at Dadeville, in the county of Tallapoosa and State of Alabama, have invented certain new and useful Improvements in Steam-Actuated Exhaust-Valves, of which the following is a specification.

This invention relates to steam actuated valves and more particularly to an auxiliary exhaust valve for use with any type of plain slide valve engine, enabling said engine to use steam expansively to the best advantage by eliminating excess back pressure on the piston. This is accomplished in the present instance by means of a supplementary exhaust valve held open by live steam from the working side of the piston so that exhaust steam may escape after the main exhaust by way of the slide valve is closed, said auxiliary exhaust continuing until the piston has nearly reached the end of its stroke, leaving only sufficient steam in the cylinder to cushion the piston.

The valve is simple in construction and operation, comprises but one movable part and works automatically at the beginning of each stroke of the piston.

In the accompanying drawing which illustrates one embodiment of the invention,—Figure 1 is a longitudinal sectional view of the device applied to a steam cylinder, a portion only of which is shown; Fig. 2 is a sectional view on the line 2—2 of Fig. 1, and Fig. 3 is a like view on the line 3—3 of the same figure.

In the drawing, 10 indicates the cylinder of a steam engine which may be supplied with inlet and exhaust valves of any type; and as these valves form no part of the present invention they have been omitted from the drawing. The cylinder is provided with the usual piston 11 and is closed at its ends by heads 12 and 13.

Bolted against the outer side of the cylinder 10 at any suitable point is a casing 14, nearly as long as the cylinder and formed with a longitudinal opening 15 therethrough, preferably cylindrical, and closed at each end by a head 16. Flanges 17 are formed on the casing 14 to receive the fastening bolts, as shown in Figs. 2 and 3. Within the casing 14 and near each end is a port 18, opening through the side wall of said casing adjacent the cylinder 10, said ports registering

with ports 19 of like size and shape extending through the wall of the cylinder.

Within the casing 14 at each end are tightly fitted two bushes 20 and 21 spaced apart to form ports 22 so disposed as to communicate with the ports 18. Slidable in each pair of bushes 20, 21, is a piston valve 23, said piston valves guarding the ports 22 between the bushes, and connected, so as to slide in unison, by a rod 24 of such length that when one port 22 is closed by a piston, the other port 22 will be open to permit the escape of steam from the cylinder 10 into the casing 15. The ports 18 in the casing are wider than and surround the bushings so that the pressure on the piston valves when the ports are closed will be equalized and thus prevent undue friction and binding. A small port 25 in each cylinder head is connected by a pipe 26 with the head 16 closing the adjacent end of the casing 14, so that live steam from the cylinder may enter the casing behind the piston valves and operate them.

The following description will clearly explain the operation of the invention. The piston 11 being at the end of its stroke, say at the left as seen in Fig. 1, will cover the port 19 at that end of the cylinder. Steam entering the cylinder in the usual manner through the slide valve, not shown, passes into the space between the head 12 and the piston 11 to move the piston in the direction of the arrow. Some of the steam enters the small port 25 in the head 12 and passing through the connecting pipe 26 into the casing 14, forces the piston valves to the right or into the position represented in Fig. 1, thereby closing the port 22 at the left and opening the like port at the right of the casing. Exhaust steam can then pass from the cylinder through the ports 19, 18 and 22 into the casing 14 and out through a suitable pipe 27. The main exhaust it must be understood, takes place through the slide valve as usual. As the piston travels to the right, the closed port 19 is uncovered, but escape of steam is prevented through the connected port 22 by the piston valve 23. After the main exhaust has been closed through the movement of the slide valve, exhaust will continue through the aforesaid ports until the piston 11 has neared the end of its stroke to the right and closed the port 19 at that end of the cylinder.

der as indicated by dotted lines, Fig. 1. The steam remaining in the cylinder will be compressed during the balance of the stroke and cushion the piston. The inlet port at the right of the cylinder will now be opened and live steam entering between the piston and the cylinder head 13 will also pass through the small port 25 in that head and the pipe 26 leading therefrom into the casing 14 and drive the piston valves in the opposite direction so that exhaust may take place from the other end of the cylinder. By the use of this valve the main slide valve can be set to cut off at any part of the stroke so that the steam can be used expansively without causing back pressure through the early closing of the exhaust ports.

What I claim is:—

1. An auxiliary exhaust valve for engine cylinders comprising a casing having a live steam port and an exhaust steam port at each end connected to corresponding ends of the engine cylinder respectively through openings in the cylinder heads and walls of the cylinder, and a reciprocating valve in said casing operated automatically by the live steam from the working side of the cylinder piston for opening the exhaust port communicating with the opposite side of the cylinder piston and holding it open after the main exhaust is closed.

2. An auxiliary exhaust valve for engine cylinders comprising a casing having a live steam port and an exhaust port at each end communicating with corresponding ends of the engine cylinder respectively through openings in the cylinder heads and walls of the cylinder, and a double piston reciprocating valve in said casing operated automatically at the beginning of each cylinder piston stroke by live steam from the working side of said piston for opening the exhaust port on the exhaust side of the same piston and holding it open after the main exhaust is closed and until the stroke is about completed.

3. An auxiliary exhaust valve for engine cylinders comprising a casing fastened to the cylinder, a double reciprocating valve in said casing adapted to alternately open and close an exhaust port near each end of said cylinder, and a separate live steam port

connecting each end of the cylinder to the corresponding end of the casing, whereby live steam may enter the casing from the cylinder and operate the valve.

4. An auxiliary exhaust valve for engine cylinders comprising a casing fastened to the cylinder, ports connecting said cylinder and casing near their adjacent ends, a reciprocating valve adapted to alternately open said ports for the passage of exhaust steam from the cylinder, the piston in the cylinder adapted to close said ports prior to the seating of the valve, whereby said piston may be cushioned by the unescaped exhaust, and other ports for conveying live steam from the ends of the cylinder to the corresponding ends of the casing for operating said valve.

5. An auxiliary exhaust valve for engine cylinders comprising a casing fastened to the cylinder, registering ports in the cylinder and casing near their respective ends, a double piston valve adapted to alternately open said ports for the passage of exhaust steam into said casing, spaced pairs of bushes in the ends of said casing within which said valves slide, the spaces between said pairs of bushes registering with the ports in the casing, and a separate live steam port opening into each end of the casing.

6. In combination, a cylinder, a piston adapted to reciprocate in said cylinder, and an auxiliary exhaust valve for the cylinder comprising a casing fastened to the cylinder, aligned ports in the cylinder and casing near their respective ends, a double piston valve adapted to alternately open said ports for the passage of exhaust steam into said casing, the piston adapted to close said ports prior to the seating of the valve whereby said piston is cushioned by the unescaped exhaust, spaced pairs of bushes in the ends of said casing within which said valves slide, the spaces between said pairs of bushes registering with the aligned ports in the cylinder and casing, and a separate live steam port opening into each end of the casing.

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

ERNEST TURNER.

Witnesses:

F. P. WALLACE,
J. H. WYNN.