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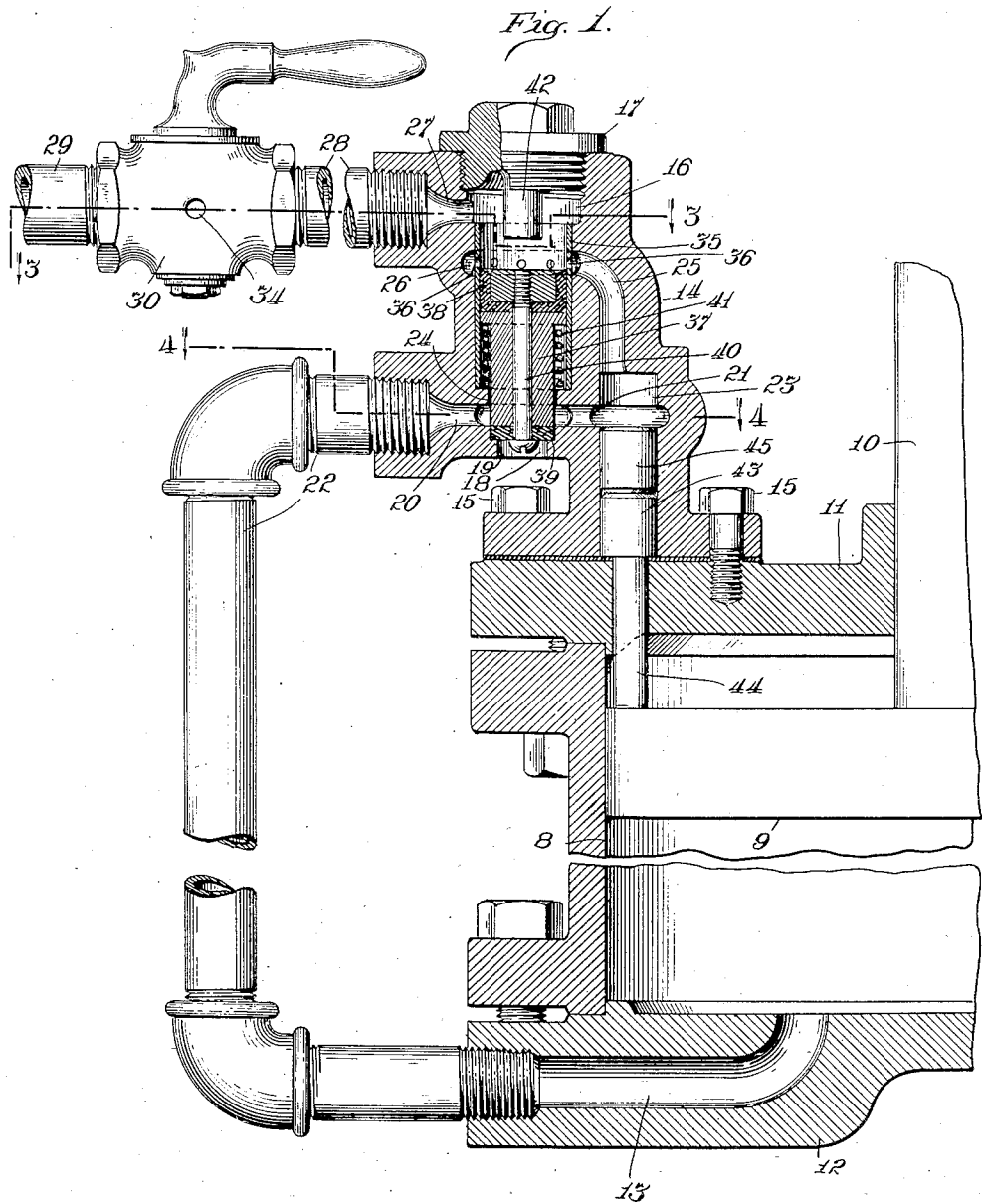
DUMP CAR.

APPLICATION FILED MAR. 5, 1918.

1,361,904.

Patented Dec. 14, 1920.

2 SHEETS—SHEET 1.

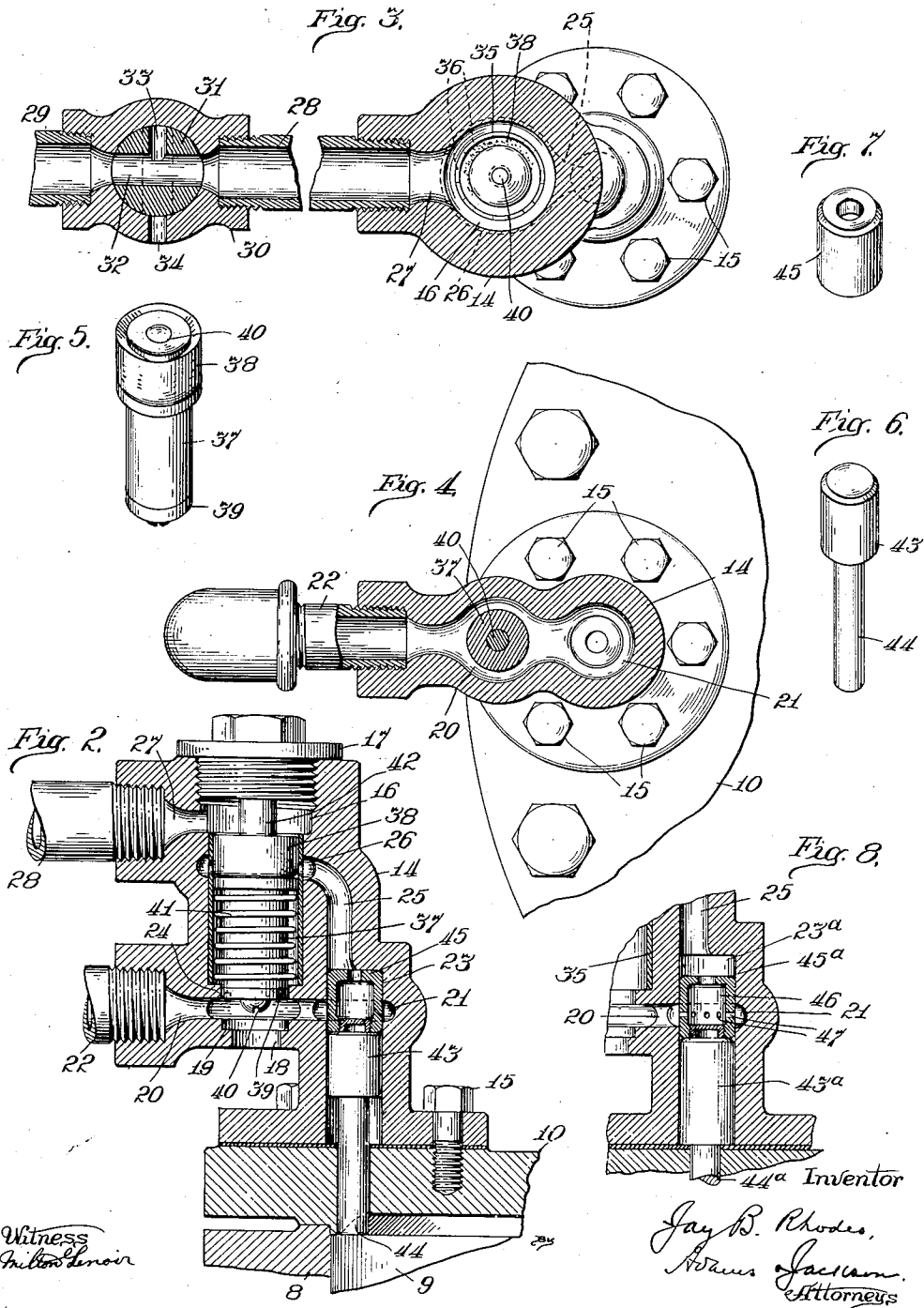


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UNITED STATES PATENT OFFICE.

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DUMP-CAR.

1,361,904.

Specification of Letters Patent. Patented Dec. 14, 1920.

Application filed March 5, 1918. Serial No. 220,554.

To all whom it may concern:

Be it known that I, JAY B. RHODES, a citizen of the United States, and a resident of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Dump-Cars, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to dump cars in which provision is made for dumping the car bed and restoring it to operative position by means of compressed air. In cars of this type, an example of which may be found in Letters Patent No. 1,103,314, granted to me July 14, 1914, it is usual to supply compressed air to all the cars of a train through train pipes, the dumping and restoring of the several car beds being controlled by the engineer by means of a valve in the cab. It is also usual to provide each car with individual valves, similar to stop-and-waste cocks, so that the several cars may be separately cut off from the train pipe to permit one or more cars not so cut off to be separately dumped. My present invention in the embodiment thereof shown and described has to do with compressed air operated dump cars having such equipment and has for its object to provide improved valve mechanism for controlling the admission of compressed air to the dumping cylinder. Also to provide improved means for automatically cutting off the supply of compressed air from the dumping cylinder of any given car as soon as the bed of such car has been dumped, or restored, and for permitting the air in such dumping cylinder to be exhausted therefrom when the operating air pressure in the train pipe is released. A further object is to simplify and improve the construction of such valve mechanism. I accomplish these objects as illustrated in the accompanying drawings and as hereinafter described. What I regard as new is set forth in the claims.

In the accompanying drawings,—

Figure 1 is a view partly in vertical section illustrating part of a dump car cylinder and piston and the valve mechanism associated therewith, the parts being shown in the position they occupy while air under pressure is being supplied to the cylinder and just before the valve mechanism operates to cut off such air pressure;

Fig. 2 is a vertical sectional view showing

the position of the parts of the valve mechanism after the air pressure has been cut off and the cylinder is connected with the exhaust;

Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 1;

Fig. 5 is a perspective view illustrating the plunger of the main valve;

Fig. 6 is a perspective view illustrating the plunger of the cut-off valve;

Fig. 7 is a perspective view of the plug or cylinder which forms a part of the cut-off valve; and

Fig. 8 is a view of the cut-off chamber and valve showing a modification, some parts being in section.

Referring to the drawings,—8 indicates one of the compressed air cylinders of a dump car which are employed to dump the car bed and restore it to its operative position, as will be understood by those familiar with the art. Usually one of said cylinders is provided at each side of the car at or near the longitudinal center thereof, the longitudinal axis of the cylinder being vertically arranged so that its piston moves vertically. The general construction and arrangement of the cylinders in such a car are shown in my said Letters Patent No. 1,103,314, and need not be described in detail herein. It will suffice to say that in the embodiment of my invention illustrated the cylinder 8 is provided with a piston head 9 which carries a sleeve 10 fitted to slide through the cylinder head 11 after the manner of a piston rod. This piston head 9, through a piston rod and intermediate connections, operates to tilt the car bed either to dump it or to restore it to its normal position, all as pointed out in my said patent. In this connection, however, it should be understood that my present invention is not restricted to the use of any particular form of intermediate devices for applying power to the car bed, as any suitable mechanism operated by a reciprocating piston may be employed.

12 indicates the bottom head of the cylinder 8 which is provided with a duct 13 for the passage of air. 14 indicates a valve casing which is mounted upon the head 11 and secured thereto in any suitable way, as by screws 15. Said valve casing is preferably secured to the head 11 adjacent to the

margin thereof, but the precise location of the casing is immaterial. 16 indicates a main valve chamber in the casing 14, the upper end of which is closed by a screw-plug 17 so that access may readily be had to said chamber. 18 indicates an exhaust port which connects the lower end of the chamber 16 with the atmosphere. Said port is made of somewhat smaller diameter than the chamber 16 by providing a flange 19 which forms a seat for the lower end of the main valve plunger, as will hereinafter be pointed out. 20 indicates a duct extending transversely of the main valve chamber near its lower end, said duct having an annular enlargement 21 extending around said main valve chamber, as illustrated in Fig. 4. Said duct at one end connects with a pipe 22 which connects with the duct 13 at the lower end of the cylinder 8. At the other end said duct connects with a cut-off valve chamber 23 as shown in Fig. 1. 24 indicates an annular flange extending into the main valve chamber 16 immediately above the duct 20. 25 indicates a duct leading from the upper portion of the main valve chamber 16 to the upper portion of the cut-off valve chamber 23. An annular channel 26 is provided around the upper portion of the main valve chamber 16 where the duct 25 connects with it to permit air to pass readily to said duct, as will be hereinafter described. 27 indicates a duct leading from the upper end portion of the main valve chamber 16 at a point above the channel 26 to an air pipe 28. 29 indicates a pipe connecting with the train pipe through which compressed air is supplied, the pipe 29 being connected with the pipe 28 through a hand-operated valve 30 similar to the ordinary stop-and-waste cock. As shown in Fig. 3, said valve is provided with a plug 31 having a main passage 32, and a branch passage 33 at one side disposed perpendicularly to the main passage 32. The valve 30 is also provided with an exhaust passage 34 at right angles to the main bore of said valve in position to register with one of the passages in the plug when said plug is turned to the proper position. It will be apparent that when the parts are in the position shown in Fig. 3, the pipes 28—29 are connected through the main passage 32. By turning the plug 31 ninety degrees in a clockwise direction the pipe 28 may be connected with the exhaust passage 34, and by turning said plug ninety degrees in the opposite direction from the position shown in Fig. 3, the pipe 29 may be connected with the exhaust passage 34, cutting off the pipe 28.

35 indicates a cylindrical sleeve or bushing fitted in the main valve chamber 16, its lower end resting on the flange 24. Said bushing is provided with a number of per-

forations 36 opposite the channel 26 and the upper end of the duct 25. 37 indicates a plunger fitted to reciprocate in the main valve chamber 16. The upper end or head of said plunger fits closely in the sleeve 35 and is provided with a leather washer 38 to prevent leakage. The lower portion or stem of said plunger is of reduced diameter and fits loosely within the annular flange 24, its lower end being seated upon the flange 19 at which point it is provided with a washer 39 of leather or other suitable material. 40 indicates a screw which extends longitudinally through the plunger 37 and secures the parts thereof together. 41 indicates a coiled spring which is fitted upon the stem of the plunger 37 between the plunger head and the flange 24 so that it acts normally to move the plunger upward from the position shown in Fig. 1 and hold it in the position shown in Fig. 2, at which time its lower end lies above the duct 20. To limit the upward movement of the plunger the plug 17 is provided with a downwardly-extending lug or stop 42, as shown in Figs. 1 and 2.

It will be apparent that when the plunger 37 occupies the position shown in Fig. 2 its head will lie over and close the perforations 36 in the sleeve 35, thereby cutting off communication between the upper portion of the main valve chamber 16 and the duct 25. At that time the lower end of said plunger will be off its seat 19 and consequently the exhaust port 18 will be in communication with the duct 20. When the plunger 37 occupies the position shown in Fig. 1, the lower end of said plunger will be seated on the flange 19 so that the exhaust port 18 will be closed, while the head of said plunger will lie below the perforations 36, thereby connecting the upper portion of the main valve chamber 16 with the duct 25 and through it with the cut-off valve chamber 23. As has been explained, the latter chamber communicates through duct 20 with pipe 22 which leads to the lower portion of the dumping cylinder 8, so that when the cut-off valve hereinafter described is not in operation, when the parts are in the position shown in Fig. 1, compressed air admitted to the upper portion of the main valve chamber 16 may flow through the duct 25, cut-off chamber 23, duct 20 and pipe 22 to the lower portion of said dumping cylinder. When the plunger 37 is in the position shown in Fig. 2, air in the dumping cylinder 8 may flow in a reverse direction through pipe 22 and the duct 20 to exhaust port 18.

43 indicates a cut-off plunger which is mounted in the lower portion of the cut-off chamber 23 and is provided with a stem 44 which is fitted to reciprocate in the cylinder head 11, the lower end of said stem extending down a short distance into the cylinder 8 in position to be engaged by the piston 9

when the latter approaches the upper end of its stroke. The arrangement is such that during the last part of its upward movement the piston 9 engages and lifts the stem 44 so as to move the plunger 43 upward a short distance. 45 indicates a plug or cylinder which has a ground fit in the cut off chamber 23 and rests upon the upper end of the plunger 43. In the construction shown in Figs. 1 and 2, the upper end of the plug 45 normally lies below the level of the duct 20 so that said duct is then in communication with the cut-off chamber 23. When, however, said plug is moved up in the chamber 23 by the upward movement of the plunger 43 it overlies the duct 20 and cuts it off from the chamber 23. In Fig. 8 I have shown a modified construction for the same purpose in which a plug 45^a is used having a chamber 46 therein open at the top, which chamber is provided with radial openings 47 as shown. In this case the plug 45^a is normally supported by a plunger 43^a in such position that the openings 47 communicate with the duct 20 so that the compressed air flows through the plug 45^a in its passage from the chamber 23^a to the duct 20. When the plunger 43^a is moved upward it carries the plug 45^a with it and consequently moves the openings 47 up out of alinement with the duct 20, said openings then being closed by the wall of the chamber 23^a, which is extended somewhat higher than the corresponding chamber 23, as shown in Figs. 1 and 2. While I have shown the plug 45 in Figs. 1 and 2 as being hollow this is not essential.

The operation of the apparatus is as follows:—Normally the main valve plunger 37 occupies the position shown in Fig. 2 so that the ports 36 are closed, the piston 9 is at the bottom of the pumping cylinder 8, and the cut-off plunger 43 and plug 45 are in their lowermost or inoperative position. Assuming that the hand-operated valve 30 is open, when the engineer admits compressed air to the train pipe to operate the piston 9 either for dumping the car-bed or for restoring it to its normal position, the pressure of the air admitted to the main valve chamber 16 forces the main plunger 37 down to the position shown in Fig. 1, thereby opening the ports 36 so that the compressed air passes through said ports and through duct 25 to cut-off chamber 23. The downward movement of the main plunger 37 causes its lower end to seat on the flange 19, thereby closing the exhaust port 18. Consequently the compressed air is admitted to cut-off chamber 23, and passes through duct 20, around the stem of plunger 37 to pipe 22, by which it is conducted to the lower end of the dumping cylinder 8. This forces the piston 9 upward and operates the car bed. When the said piston approaches the upper limit of its

stroke it strikes the lower end of the stem 44 of the cut-off plunger 43 and as said piston continues to rise it lifts said plunger, moving the plug 45 up in the cut-off chamber 23 until said plug cuts off the adjacent end of the duct 20 from the inlet side of the main valve, thereby cutting off the supply of compressed air from the dumping cylinder 8. The parts retain this position until the engineer releases the pressure in pipe 29, whereupon the pressure in the upper portion of the main valve chamber 16 being relieved, the air pressure in the dumping cylinder 8 will be transmitted in an upward direction against the under side of the head of the main plunger 37, thereby forcing said plunger upward and opening the exhaust port 18. The spring 41 also tends to move said plunger upward and if desired the upward movement of said plunger may be altogether accomplished by said spring, which serves the further purpose of holding said plunger normally in its upper position. When the pressure in the cylinder 8 is released the piston 9 descends, thereby permitting the cut-off plunger 43 to move down to its normal position. At the same time the plug 45 descends, restoring communication between the cut-off chamber 23 and the duct 20. If it be desired to exhaust the pressure from the cylinder 8 of a single car, this may be accomplished by means of the hand-valve 30 since by turning said valve into position to connect the pipe 28 with the exhaust passage 34 the valve mechanism will operate to connect the cylinder 8 with the exhaust port 18 in the manner already described.

An important advantage of the construction described is that I provide cut-off mechanism for cutting off the admission of compressed air from the train pipe to the dumping cylinder which is positively actuated by the piston without the use of intermediate levers, trips or other externally arranged devices which are apt to be damaged or otherwise get out of order under the severe uses to which they are subjected in the operation of dump cars. By my construction the cut-off devices are comprised in the valve mechanism and are entirely inclosed and protected. The object of making the cut-off plug 45 separate from the plunger 43 is for convenience of manufacture, as such plug is externally ground to fit closely in the cut-off chamber 23 and it may be more conveniently manufactured as a separate part. It may, however, be made a part of said plunger, if desired. I wish it to be understood that my invention is not limited to the specific details of the construction shown and described except in so far as they are particularly claimed, but includes generically the subject-matter of the broader claims. While my invention is designed primarily for use in connection with dump cars, it may also

be used in any other situation to which it is adapted, and the claims should be so construed.

What I claim as my invention and desire to secure by Letters Patent, is—

1. The combination with a cylinder and a piston operating therein, of a valve for controlling the operation of said piston, comprising a suitable casing having a passage through which fluid under pressure may be conducted from a source of supply to said cylinder at one side of said piston, an end-wise movable cut-off valve in said casing for closing said passage, said cut-off valve being subject to the pressure of the incoming fluid when it is in its operative position, and means projecting into said cylinder at the opposite side of said piston and acting directly to move said cut-off valve into position to close said passage when said piston approaches the end of its stroke in one direction.
2. The combination with a cylinder, and a piston operating therein, of a fluid pressure operated valve for admitting compressed air to said cylinder to move said piston in one direction, said valve comprising a passage for the admission of compressed air to said cylinder, and a reciprocating plunger projecting through the cylinder head and directly operated by movement of said piston to close said passage to cut off the admission of air to said cylinder.
3. The combination with a cylinder, and a piston operating therein, of a fluid pressure operated valve for admitting compressed air to said cylinder to move said piston in one direction, said valve comprising a passage for the admission of compressed air to said cylinder, a reciprocating plunger directly operated by movement of said piston to close said passage to cut off the admission of air to said cylinder, an exhaust port communicating with said passage, and means adapted to be operated to close said exhaust port when said plunger is out of position to close said passage, and to open said exhaust port when said plunger is moved into position to close said passage.
4. The combination with a cylinder, and a piston operating therein, of a fluid pressure operated valve for admitting compressed air to said cylinder to move said piston in one direction, said valve comprising a passage for the admission of compressed air to said cylinder, a reciprocating plunger projecting through the cylinder head and directly operated by movement of said piston, and a plug carried by said plunger and movable to close said passage for cutting off the admission of compressed air to said cylinder.
5. The combination with a cylinder, and a piston operating therein, of a fluid pressure operated valve for admitting compressed air to said cylinder to move said piston in one direction, said valve comprising a passage for the admission of compressed air to said cylinder, a reciprocating plunger projecting through the cylinder head and directly operated by movement of said piston, and a plug carried by said plunger and movable to close said passage for cutting off the admission of compressed air to said cylinder.
6. The combination with a cylinder, and a piston operating therein, of a fluid pressure operated valve for admitting compressed air to said cylinder to move said piston in one direction, said valve comprising a casing mounted on the cylinder, a fluid pressure operated plunger, a passage leading to said cylinder and normally closed by said plunger against the admission of compressed air, an exhaust port communicating intermediately with said passage and adapted to be closed by said plunger when the same is actuated to admit compressed air to said passage, and means mounted in the valve casing and actuated by movement of said piston for cutting off the admission of compressed air to said cylinder through said passage.
7. The combination with a cylinder, and a piston operating therein, of a fluid pressure operated valve for admitting compressed air to said cylinder to move said piston in one direction, said valve comprising a casing mounted on the cylinder, a fluid pressure operated plunger, a passage leading to said cylinder and normally closed by said plunger against the admission of compressed air, an exhaust port communicating intermediately with said passage and adapted to be closed by said plunger when the same is actuated to admit compressed air to said passage, and a plunger mounted in the valve casing and extending into said cylinder and actuated by movement of said piston for cutting off the admission of compressed air to said cylinder through said passage.
8. The combination with a cylinder, and a piston operating therein, of a valve comprising a suitable casing having main and cut-off chambers, a duct connecting said chambers, an exhaust port, a second duct connecting said cut-off chamber with said cylinder and with said exhaust port, means in said main chamber for normally closing said first-mentioned duct and adapted to be moved by air pressure to open the same and close said exhaust port, and means operating in said cut-off chamber and projecting into said cylinder and actuated by movement of said piston for cutting off the flow of fluid through said second duct to said cylinder.
9. The combination with a cylinder, and a piston in one direction, said valve comprising a casing mounted on the cylinder, a fluid pressure operated plunger, a passage leading to said cylinder and normally closed by said plunger against the admission of compressed air, an exhaust port communicating intermediately with said passage and adapted to be closed by said plunger when the same is actuated to admit compressed air to said passage, and a plunger mounted in the valve casing and extending into said cylinder and actuated by movement of said piston for cutting off the admission of compressed air to said cylinder through said passage.

a piston operating therein, of a valve comprising a suitable casing having main and cut-off chambers, a duct connecting said chambers, an exhaust port, a second duct 5 connecting said cut-off chamber with said cylinder and with said exhaust port, means in said main chamber for normally closing said first-mentioned duct and adapted to be moved by air pressure to open the same and 0 close said exhaust port, and a plunger operating in said cut-off chamber and engaged and operated by said piston when it approaches the limit of its operating stroke for cutting off the flow of fluid through said 5 second duct to said cylinder.

10. The combination with a cylinder, and a piston operating therein, of a valve comprising a suitable casing having main and cut-off chambers, a duct connecting said 0 chambers, a plunger in said main chamber normally closing said duct, a normally open exhaust port, said plunger being arranged to close said exhaust port when moved out of operative relation to said duct, a duct communicating with said exhaust port and connecting said cut-off chamber with said cylinder, and reciprocating means in said cut-off 5 chamber actuated by said piston when it approaches the limit of its operating stroke for cutting off said second duct from said cut-off chamber.

11. A valve of the type described comprising a main valve chamber, a cut off chamber, a duct connecting said chambers, a 5 second duct communicating laterally with said cut off chamber and extending transversely of the longitudinal axis of said main chamber, an exhaust port opening into the latter duct, a plunger in said main chamber 0 and movable either to close said first mentioned duct and simultaneously open said exhaust port, or vice versa, and a plunger in said cut off chamber and movable therein to close said second duct.

12. A valve of the type described comprising a main valve chamber, a cut off chamber, a duct connecting said chambers, a 5 second duct communicating laterally with said cut off chamber and extending transversely of the longitudinal axis of said main chamber, an exhaust port opening into the latter duct, a plunger in said main chamber 0 and movable either to close said first mentioned duct and simultaneously open said exhaust port, or vice versa, said plunger operating normally to close said inlet duct, and a plunger in said cut off chamber and movable therein to close said second duct.

13. The combination with a cylinder and a piston operating therein, of a valve for controlling the operation of said piston, comprising a suitable casing having a passage 0 through which fluid under pressure may be conducted from a source of supply to said cylinder at one side of said piston, a cut-off

valve in said casing for closing said passage, an exhaust port communicating with said passage, a fluid pressure operated valve for closing said exhaust port, and means projecting into said cylinder at the opposite 70 side of said piston and acting directly to move said cut-off valve into position to close said passage when said piston approaches the end of its stroke in one direction.

14. A valve of the type described comprising a casing adapted to be secured to the 75 head of a cylinder, said casing having an inlet adapted to be connected with a source of supply of fluid under pressure, an outlet adapted to be connected with the cylinder, 80 a passage connecting said inlet and outlet, a cut-off valve for closing said passage and a plunger for moving said cut-off valve into position to close said passage, said plunger extending through said casing and being 85 adapted to project into the cylinder when said casing is in position on the cylinder head.

15. A valve of the type described comprising a casing adapted to be secured to the 90 head of a cylinder, said casing having an inlet adapted to be connected with a source of supply of fluid under pressure, an outlet adapted to be connected with the cylinder, a passage connecting said inlet and outlet, a 95 cut-off valve for closing said passage, an exhaust port communicating with said passage, a fluid pressure operated valve for closing said exhaust port, and a plunger for moving said cut-off valve into position to 100 close said passage, said plunger extending through said casing and being adapted to project into the cylinder when said casing is in position on the cylinder head.

16. A valve comprising a main valve 105 chamber, a valve member therein, an exhaust port adapted to be closed by said valve member when fluid under pressure is admitted to said main valve chamber, a passage through which fluid under pressure may be 110 conducted from said main valve chamber to a suitable outlet, and an endwise movable cut-off valve member for cutting off the flow of fluid through said passage.

17. A valve comprising a main valve 115 chamber, a valve member therein, an exhaust port adapted to be closed by said valve member when fluid under pressure is admitted to said main valve chamber, a passage through which fluid under pressure may be 120 conducted from said main valve chamber to a suitable outlet, an endwise movable cut-off valve member for cutting off the flow of fluid through said passage, and fluid pressure operated mechanism for moving said 125 cut-off valve member into operative position against the pressure in said main valve chamber.

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