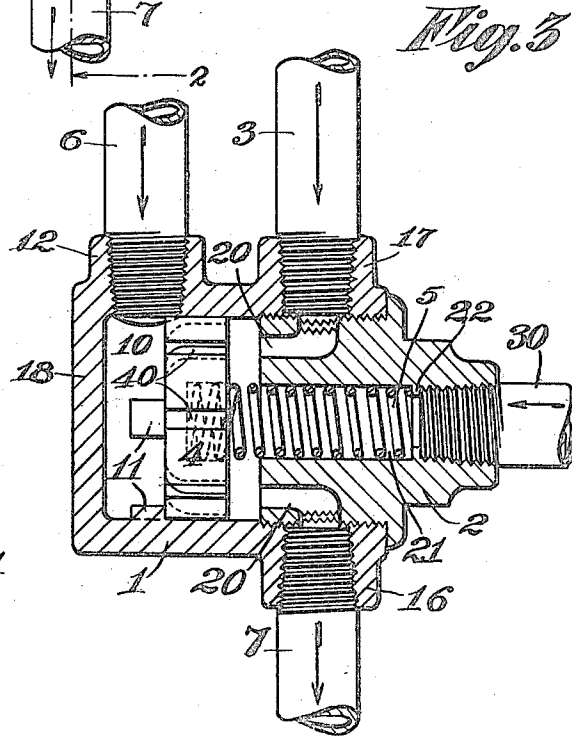
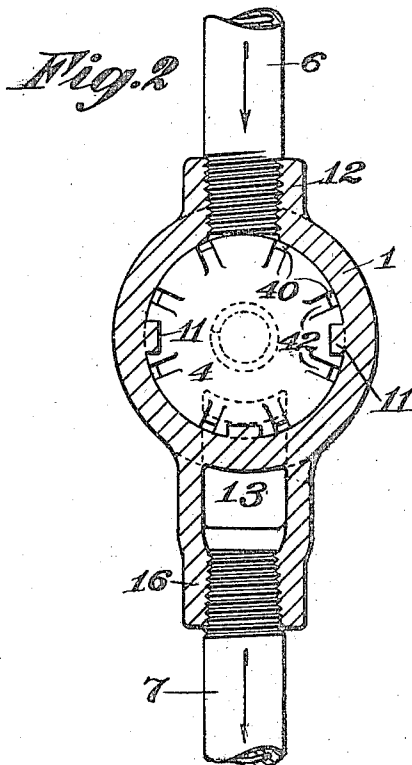
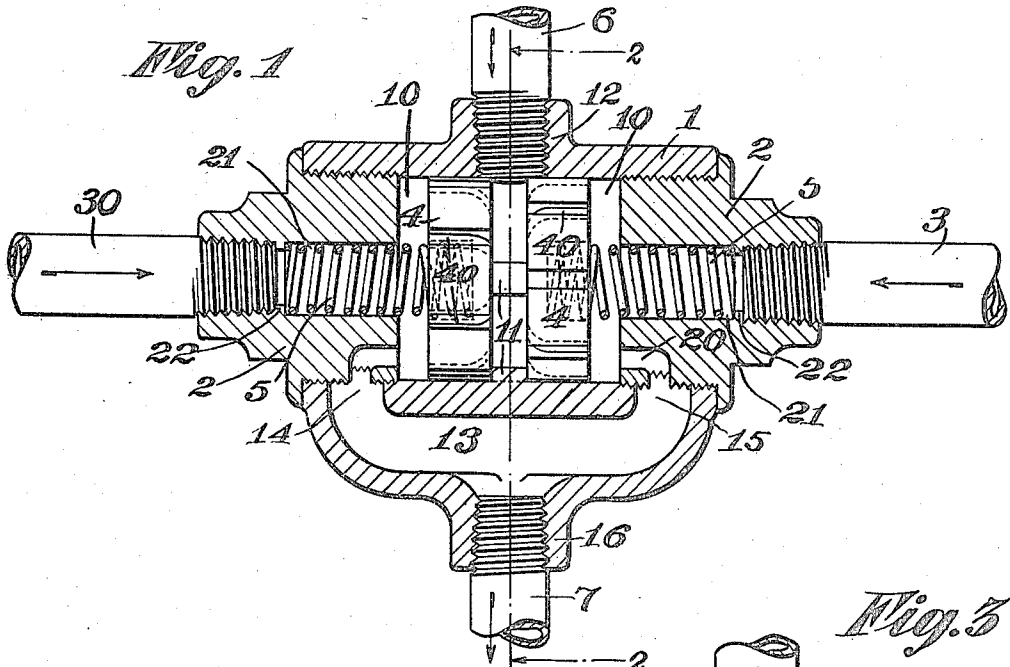


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DRAIN VALVE.
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DRAIN-VALVE.

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To all whom it may concern:

Be it known that I, CHARLES W. NEWCOMBE, a citizen of the United States, and resident of Tacoma, Pierce county, State of Washington, have invented certain new and useful Improvements in Drain-Valves, of which the following is a specification.

My invention relates to drainage valves of a sort which is adapted to automatically act to drain steam spaces as soon as the steam pressure is reduced or removed. My invention, in addition to acting as an automatic drain valve, also acts as a relief valve when applied to the cylinder of a steam engine. The object of my invention is to provide a valve for the purposes mentioned, which is reliable and automatic in its action, which will thoroughly drain itself and the steam spaces with which it is connected, and which may also be used as a relief valve for the discharge of excess pressure, such as may occur in the ends of steam cylinders, whereby this excess pressure and the accumulation of water, which is the usual cause for such excess pressure, may be discharged.

The peculiar features of novelty which I claim, may be determined by a study of the specification and the claims, in which latter they will be particularly pointed out. In the accompanying drawings I have shown my invention in the forms of construction which are now preferred by me.

Figure 1 is a central longitudinal section through one type of construction.

Fig. 2 is a section taken on the line 2-2 of Fig. 1.

Fig. 3 is a central longitudinal section through a modified type of construction, the same being particularly adapted for application to the cylinders of vertical engines.

The present description is of the device herein shown, it being, however, understood that this is only a typical construction and that my invention is not limited alone to the peculiar construction herein shown and described.

The casing 1 is provided with a bored chamber 10, adapted to serve as a piston-receiving cylinder. In the type of construction shown in Fig. 1, the casing is double-ended and is provided with two piston-receiving chambers 10, in each of which is placed a piston 4. This chamber is provided with a piston stop or stops, herein shown as lugs 11, which prevent the two pistons from approaching each other sufficiently to con-

tact. Such stop is preferably made a part of the casing, although it might be made as a projection on the pistons.

The casing is provided with a high pressure inlet or port 12, which is adapted to receive the end of the pipe 6, which is connected with some source of supply of steam received direct from the boiler, the pressure being therefore, constant until it is manually shut off. This connection is placed opposite to the piston stops, or in the same zone therewith, so that the steam pressure will at all times act upon one side of the piston.

The ends of the casing, in the type shown in Fig. 1, are closed by plug members 2, which therefore serve the function of cylinder heads. These are each provided with a drainage port 20, which opens to the inner faces of the members 2 at a comparatively short distance inside of the walls of the cylinders 10. The other ends of ports 20 open to the outer peripheries of the heads 2 and in such position that they register with a drainage port 14 or 15 in the casing. In the double-ended type as shown in Fig. 1, the ports 14 and 15, at opposite ends, are similar in function and connect with a port 13, which leads to the common discharge opening 16, with which the drainage pipe 7 is connected.

The heads or plugs 2 are also provided with passages 21, herein shown as axially placed, with which pipes 3 and 30 are connected, said pipes leading to their respective ends of the engine cylinder which is to be drained. Within this port 21 is placed a helical spring 5, which acts upon the outer face of the piston 4 to force it away from the adjacent face of the head 2, whenever the pressure acting through the pipe 6 is sufficiently reduced. The head 2 is provided with a ledge against which the spring 5 acts, said ledge being herein indicated as a slight flange 22.

The piston 4 is provided with a by-pass port or ports, herein shown as grooves 40, extending parallel with the axis of the piston, and located in the outer face thereof. These grooves are preferably quite shallow and not of sufficient depth to extend inward as far as the outer edge of the drainage port 20 in the head. At the face of the piston which is exposed to the high pressure received through pipe 6, the ends of the grooves are preferably deepened somewhat, as indicated by the curved lines thereof in

Figs. 1 and 3. The purpose of this is to insure that these drainage by-pass ports shall not be closed if and when they correspond in position with one of the stop lugs 11.

5 This is more particularly necessary in case the piston stop is made as a rib extending entirely about the casing.

In the type of construction shown in Fig. 1, two heads 2 and two pistons 4, with their 10 associated parts are shown. In the type of construction shown in Fig. 3, a single piston with its associated parts is employed. In this case, however, the casing 1 is provided with an integral head 18, and with a 15 low pressure inlet port 17, with which one of the drainage pipes 3 is connected. In the double ended type of Fig. 1, the pipe 3 is the low pressure pipe extending to one end of the piston and the pipe 30, a like pipe extending to the opposite end of the engine 20 cylinder.

The head 2 employed in the type of construction shown in Fig. 3, is provided with ports 20, of the type described, one for the 25 discharge of the drainage water and another for the inlet of the drainage from one end of the cylinder. Except for the differences noted, the construction shown in Fig. 3 is like that shown in Fig. 1. There is, however, 30 this difference in favor of the construction shown in Fig. 3. In the case of the production of excessive pressure in one end of the engine cylinder, this pressure will be transmitted through the drainage 35 pipe connecting with this end of the cylinder and will result in forcing the piston valve 4 off of its seat, thus opening all of the ports in the valve. In the construction shown in Fig. 1, under like conditions, only 40 one of the piston valves would be raised from its seat. In consequence, the water which would be the cause of producing this excessive pressure, would be blown out through the discharge ports 15 and 16 without affecting the piston valve which controls 45 the ports leading to the other end of the cylinder.

In the construction shown in Fig. 5, the like causes would open connection between 50 the two cylinder drainage pipes 3 and 30, thus permitting, to a certain extent, the water to be forced from one end of the cylinder through the valve to the other end of the cylinder. It would also open communication, through the by-pass ports 40 in the 55 piston, between the high pressure supply and the drainage pipes leading to each end of the cylinder and would permit the high pressure steam to also be blown through the drainage pipes 3 and 30, as the case may be, 60 into that end of the cylinder which did not have an excess pressure therein.

Such operation could not happen with the type of construction shown in Fig. 1. The 65 construction of Fig. 3 is, however, somewhat

cheaper to make and would satisfy many persons.

What I claim as my invention is:

1. A drain valve comprising a casing having a cylinder positioned with its axis substantially horizontal, a high pressure inlet, 70 a low pressure inlet and a discharge port axially separated from the high pressure inlet, a piston in said cylinder between the high pressure inlet and the other ports and 75 adapted to close the low pressure inlet and the discharge ports under the action of the high pressure, said piston having by-pass ports closed under the same conditions, and a spring acting in opposition to the high 80 pressure.

2. A drain valve comprising a casing having a cylinder positioned with its axis substantially horizontal, a high pressure inlet, 85 a low pressure inlet and a discharge port axially separated from the high pressure inlet, a piston in said cylinder between the high pressure inlet and the other ports, and 90 adapted to close the low pressure inlet and the discharge ports under the action of the high pressure, said piston having by-pass ports in its periphery closed by the action of the high pressure, and a spring acting in 95 opposition to the high pressure.

3. A drain valve comprising a casing having 95 a cylindrical bore, a high pressure port and a discharge port extending from said bore and being axially separated to accommodate a piston valve between them, a piston valve fitting said bore and having by- 100 pass ports extending across its periphery, a plug closing an end of the bore and overlapping the discharge port and having a port opening at its inner face near its lower edge and communicating with the discharge 105 port in the casing, the plug having a low pressure port opening at its inner face, said ports in the plug and in the piston being closed when the piston is seated on the plug, and a spring acting upon the piston to separate it from the plug. 110

4. A drain valve comprising a casing bored to form a piston receiving chamber having its axis placed horizontally, a piston 115 closely fitting said chamber and having by-pass grooves extending across its periphery from face to face, a head closing an end of said chamber, a low pressure port and a discharge port in said head and inwardly of its outer margin, the opposed faces of 120 head and piston forming valve surfaces adapted when contacted to close all of said ports, means normally acting to hold the valve off its seat, and a high pressure connection acting to hold the valve upon its 125 seat.

5. A drain valve comprising a casing bored to form a piston receiving chamber, piston stops centrally placed in said chamber, said casing having a high pressure sup- 130

ply connection within the zone which contains said piston stops, and discharge ports connecting with the lower side of the casing toward each end, a piston in each end of the casing and having by-pass grooves in their peripheries, a head for closing each end of the casing said heads each having a port in its lower part connecting the piston chamber with the discharge port at this end

of the casing, and also having a low pressure inlet port, each piston and its head having seating surfaces adapted when in contact to close all their ports, and a spring for each piston acting to unseat the piston.

Signed at Seattle, Washington, this 30th day of June, 1916.

CHARLES W. NEWCOMBE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."