Nov. 20, 1923. 1,474,756

H. L. BEACH

CONTROL VALVE

Filed May 7, 1920 2 Sheets-Sheet 1

FIG. 1.

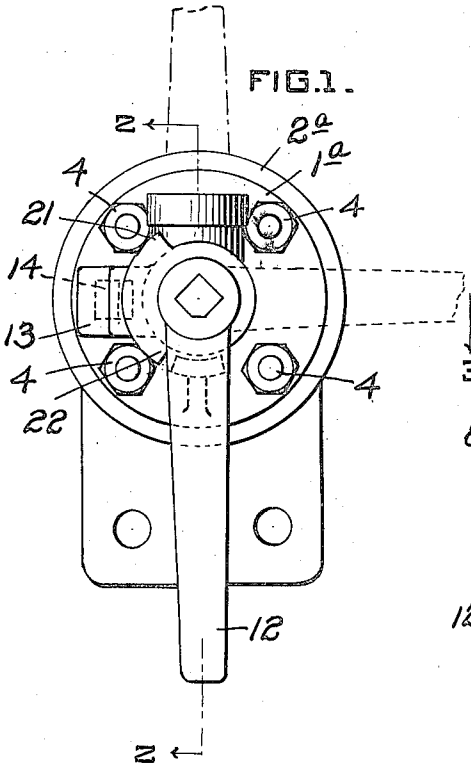


FIG. 2.

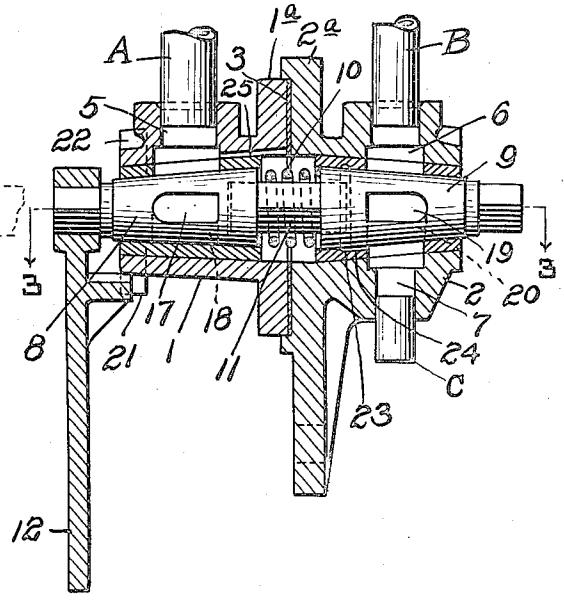
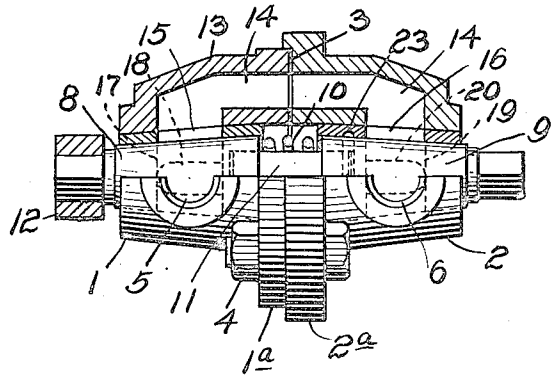


FIG. 3.



WITNESSES

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FIG. 4.

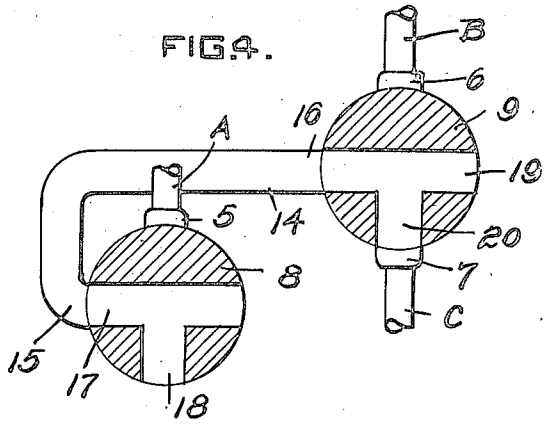


FIG. 6.

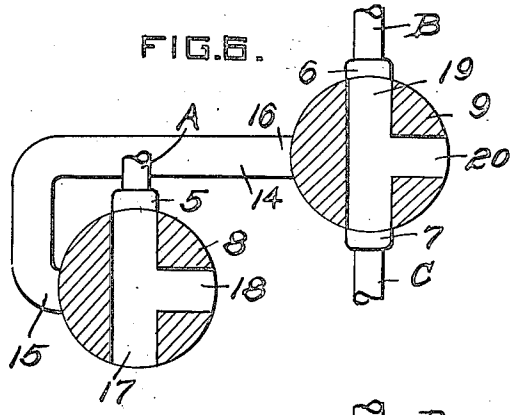
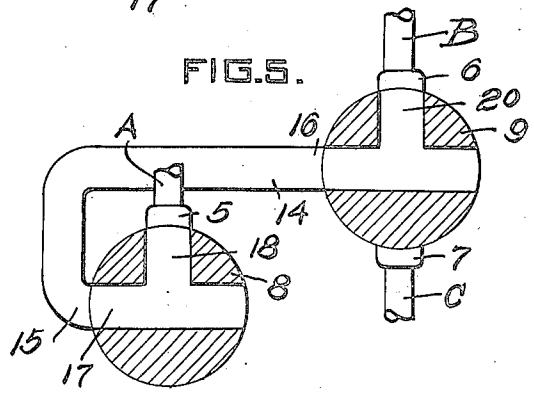


FIG. 5.



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UNITED STATES PATENT OFFICE.

HOWARD L. BEACH, OF MOUNT LEBANON, PENNSYLVANIA, ASSIGNOR TO CLARK CAR COMPANY, A CORPORATION OF PENNSYLVANIA.

CONTROL VALVE.

Application filed May 7, 1920. Serial No. 379,470.

To all whom it may concern:

Be it known that I, HOWARD L. BEACH, a citizen of the United States, and a resident of Mount Lebanon, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Control Valves, of which the following is a specification.

My invention relates to control valves for fluid pressure systems and is adapted for and has been developed in connection with compressed air actuated apparatus for dumping railway cars.

One object of my invention is to eliminate one of the number of valves previously used in similar systems by providing a single valve which performs the functions of two valves previously used, thus reducing the number of operations necessary in operating a system of this type and the number of units requiring attention for assembly, maintenance and repair.

Other objects are to avoid the use of packing in the valve and to prevent any possible operation of the system by leakage from the fluid pressure supply. Objects sought in construction and assembly of my valve and system will appear thruout this specification.

My invention consists of a three way valve and in the accompanying drawings which indicate a preferred construction, Fig. 1 is an end elevation; Fig. 2 is, in part, a side elevation and, in part, a vertical, longitudinal section on line 2—2 of Fig. 1; Fig. 3 is a horizontal, longitudinal section on line 3—3 of Fig. 2; and Figs. 4, 5 and 6 are diagrammatic views illustrating the valve in its different positions; Fig. 4 being the diagram of the position shown in Figs. 1 to 3 inclusive.

In a dump car operated by compressed air such as shown in U. S. Patent No. 1,333,293, the piping system includes a reservoir line, indicated on the present drawings at A and filled with air under operating pressure, an operating line B which leads to a dumping mechanism control (not shown) and an exhaust nipple C. These lines, A, B and C, are controlled by my valve as follows: When the car is to retain its load the entrance port in the valve chamber leading from reservoir line A, and the delivery port leading to operating line B, should be closed and the exhaust port leading to nipple C should be opened. Fig. 4 diagrammatically illustrates the valve when so functioning. When the car is to be dumped, the reservoir and operating lines are to be connected thru the valve chamber and the exhaust port is to be closed. Fig. 5 illustrates the valve when so functioning. When the car has been dumped, if the pressure supply is cut off and the air in the operating line be exhausted, the car body will right itself. Fig. 6 illustrates the valve when functioning to close the supply line and exhaust the operating line.

To facilitate manufacturing, the valve body is made in two sections 1 and 2 provided with flanges 1^a and 2^a respectively. Sections 1 and 2 are assembled by opposing these flanges to each other, inserting a gasket 3 between them and uniting the sections with bolts 4.

Section 1 is provided with an entrance port 5 which is to be connected with the pipe A from the reservoir. Section 2 has ports 6 and 7 on opposite sides, delivery port 6 is to be connected to the operating line B and exhaust port 7 to the exhaust nipple C.

The interiors of sections 1 and 2 are hollow, conical frustums each tapering away from the other and are bushed to receive a rotatable key which consists of two key elements 8 and 9 seated respectively in sections 1 and 2 by a coil spring 10 compressed between them. The opposed ends of the key elements have square recesses in which a square bar 11 fits and prevents their relative rotation. The smaller end of each key element extends outside of the valve body and is squared for the attachment of a removable handle 12. As the ends are presented in opposite directions I can provide for operation of the valve from opposite sides of a car by suitable handles.

The valve chamber is provided with a passage 14 formed within a ridge 13 on body sections 1 and 2 and this passage terminates in a port 15 in section 1 and a port 16 in section 2. The axes of ports 15 and 16 are in the same vertical planes as the axes of ports 5 and 6 respectively but extend at right angles thereto as best shown in Fig. 3.

Key element 8 has a diametral slot 17 and an intersecting, radial slot 18 at right angles thereto, both so positioned longitudinally of the key as to connect ports 5 and 15 when

the key is turned to the location indicated in Fig. 5 at which time handle 12 will be in the position illustrated by the vertical dot and dash lines in Fig. 1. Key element 9 has a diametral slot 19 and a radial slot 20 at right angles thereto, corresponding to slots 17 and 18 in key element 8, the elements being identical. Slots 19 and 20 are positioned abreast of ports 6, 7 and 16.

Body section 1 is provided with a lug having a face 21 which limits the movement of handle 12 to the left when the latter is in the position shown in Fig. 1 and a face 22 which similarly limits the handle's movement when the latter is in its upper vertical position.

An annular recess 23 in the bushing seat for key element 9 has a connecting vent 24 to port 7 and is adapted to intercept and release any air from line A which may escape between key element 9 and its seat. This is a precaution against unintentional operation of the car because of a leaking valve.

A passage 25 from port 5 leads to the space between key elements 8 and 9 and permits the air under pressure in line A to assist spring 10 in maintaining the key elements in their seats.

Operation: The "running" position of the key is illustrated in Figs. 1 to 4. Key element 8 closes entrance port 5 shutting off communication between reservoir line A and passage 14. Key element 9 closes delivery port 6 preventing communication between operating line B and exhaust nipple C, and connects passage 14 to the atmosphere thru ports 16 and 7, thus eliminating any trapped air under pressure and discharging any leakage from line A past key element 8.

The "dumping" position of the key is illustrated in Fig. 5 and by the upper position of handle 12 indicated by dot and dash lines in Fig. 1. Here key element 8, with its slots 17 and 18, has been turned 180 degrees from the position shown in Figs. 1 to 4 so that the elbow passage thru 17 and 18 connects ports 5 and 15. Key element 9 now similarly connects ports 16 and 6 which provides a passage from line A to line B and enables the air pressure to operate the dumping mechanism. In order to prevent air from the supply reservoir being exhausted to the atmosphere, exhaust port 7 is closed by key element 9 thus rendering the system inoperative.

After the car has been dumped and before it will right itself, the operating air must be exhausted and this is accomplished by moving handle 12 to the position indicated by the horizontal dot and dash line in Fig. 1. Key element 8 closes port 15 and key element 9 connects delivery port 6 and exhaust port 7 so that any pressure in line B may be exhausted to the atmosphere.

After exhausting line B, the car body will right itself and the key is returned to its original position with handle 12 depending as shown in full lines in Fig. 1. Port 6 is now closed and if air under pressure should be admitted to line B at some other point than the port 6, the car could be operated as it is when line A is connected to line B.

When a train of cars is in use, provision is usually made for simultaneous operation by installing a continuous train line to which line B in each car in the train is connected and if line B of any car is supplied from the reservoir of that car thru its respective line A, all the other cars may be operated by the same source of supply thru the train line. The necessity of closing the ports 6 from the atmosphere, in the valves on the other cars, is then apparent, as, otherwise, pressure supplied to the train line from any reservoir would be exhausted at the open port and the system rendered inoperative. Each end of each car in the train is provided with a cut-out cock for the operating line so that the car may be dumped by its own reservoir without dumping the other cars, by closing these cocks.

It will be noted that the opposed, tapered portions of the valve chamber and the opposed, tapered key elements seated therein avoid the use of packing material as is generally required around the larger end of a key or plug and this arrangement of the tapered chamber and key elements is made possible by the split construction of the valve body.

I claim:—

1. In combination in a valve, a valve casing having a key-receiving chamber formed therein, and provided with an entrance port at one end and a delivery port and an exhaust port at the other end, and a passage for establishing communication between ports at opposite ends of said casing, and a ported valve key located in said chamber for controlling delivery through said ports and said passage.

2. In combination in a valve, a two part valve casing enclosing a key-receiving chamber, provided with ports at opposite ends thereof, and a ported valve key located in said chamber for controlling communication between said ports.

3. In combination in a valve, a valve casing having a key-receiving chamber formed therein, provided with ports at opposite ends thereof formed in valve seats on the wall of said chamber, a two-part valve located in said chamber, and means for yieldingly forcing the two parts of said valve apart and into engagement with said valve seats.

4. In a valve, a valve chamber formed of two, hollow, conical frustums having their bases adjacent each other, a key for said chamber formed of two cone frustums seated respectively in opposite ends of said

chamber, and a spring compressed between said key frustums to hold them seated in their respective ends of said chamber.

5. In a valve, a valve chamber formed of two, hollow, conical frustums, axially alined with their bases adjacent each other, a valve key comprising two, cone frustums seated respectively in opposite ends of said chamber and having their larger ends opposed and spaced from each other, and a passage adapted to admit fluid from a pressure supply line to the space between said key frustums to maintain the latter seated in their respective ends of said chamber.

6. In a valve for controlling a pressure supply line, a valve chamber comprising two, hollow, conical frustums with their bases juxtaposed and axially alined, a valve key comprising two, cone frustums seated respectively in opposite ends of said chamber and having their larger ends opposed and spaced from each other, and a passage adapted to admit fluid from a pressure supply line controlled by said valve to the space between said key frustums to maintain the latter in their respective seats.

7. In a valve for a fluid pressure system, an entrance port, delivery and exhaust ports spaced therefrom, a key element controlling said entrance port and a key element controlling said delivery and exhaust ports, said key elements being tapered and provided with oppositely tapered seats and having their larger ends opposed and spaced apart, a passage from said entrance port to the space between said key elements, a pressure fluid trap between the larger end of said delivery and exhaust port key element and said delivery port, and a passage from said trap to said exhaust port.

8. In a valve, a casing having an entrance port at one end, and a delivery and an exhaust port at the other, a ported valve key located within said casing for controlling communication between said ports, and a recess associated with said key, communicating with said exhaust port, and located between said entrance port and said delivery port.

9. In a valve, an entrance port and a delivery port, a passageway terminating adjacent said ports, a key adapted to open said entrance port and said delivery port to said passageway or to close said entrance port and open said delivery port to the atmosphere, or to close said entrance port and open said passageway to the atmosphere.

10. In a valve, a valve chamber provided with an entrance port, a delivery port and an exhaust port and a rotatable key which, in different positions, is adapted respectively, to close said entrance and delivery ports and connect said chamber to said exhaust port, or to connect said entrance and delivery ports with said chamber and close said exhaust port, or to close said entrance port and connect said delivery and exhaust ports.

11. In a valve, a valve chamber, a longitudinal passage opening into opposite ends of said chamber, a valve entrance port adjacent one end of said passage, valve delivery and exhaust ports adjacent the other end of said passage, a key contained within said chamber and provided with a slot adapted to connect or disconnect said entrance port and said passage and provided with slots adapted to connect or disconnect said passage with either of said delivery and exhaust ports.

12. In a valve, a valve chamber, a longitudinal passage opening into opposite ends of said chamber, a valve entrance port adjacent one end of said passage, valve delivery and exhaust ports adjacent the other end of said passage, a key contained within said chamber and provided with a slot adapted to connect or disconnect said entrance port and said passage and provided with slots adapted to connect or disconnect said passage with either of said delivery and exhaust ports or to connect said delivery and exhaust ports.

13. In a valve, a longitudinal chamber having a chamber port at one end and two chamber ports at the opposite end, a passage provided with passage ports adjacent said chamber ports, a rotatable key seated in said chamber and provided with a diametrical passage and an intersecting, radial passage adjacent said first mentioned chamber port and its adjacent passage port and provided with similar diametral and radial passages adjacent said last two mentioned chamber ports and their adjacent passage port.

In testimony whereof, I have hereunto subscribed my name this 4th day of May, 1920.

HOWARD L. BEACH.