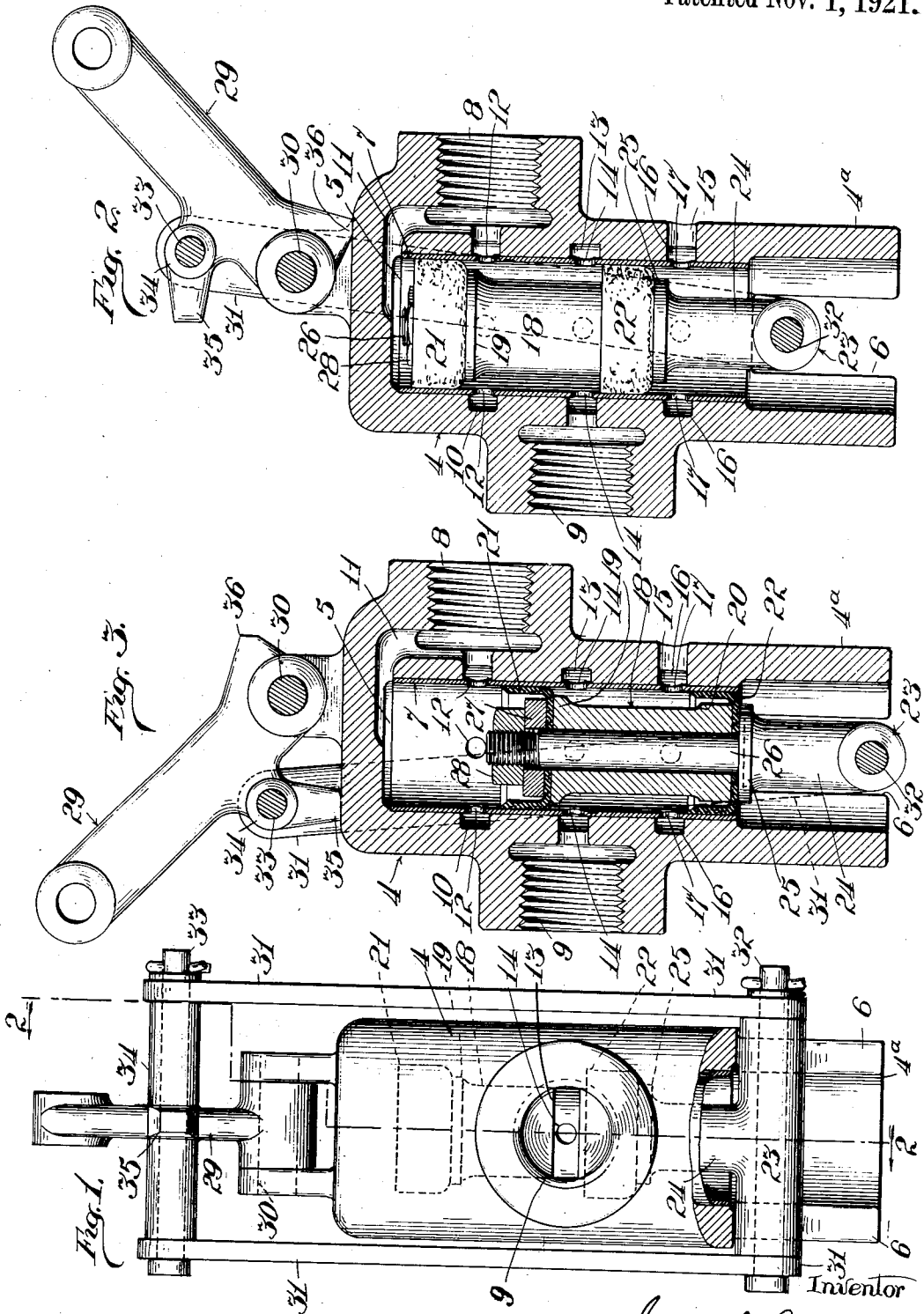


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THREE-WAY VALVE.  
APPLICATION FILED DEC. 2, 1918.

1,395,469.

Patented Nov. 1, 1921.



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# UNITED STATES PATENT OFFICE.

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## THREE-WAY VALVE.

1,395,469.

Specification of Letters Patent.

Patented Nov. 1, 1921.

Application filed December 2, 1918. Serial No. 265,002.

*To all whom it may concern:*

Be it known that I, JAMES D. BENBOW, a citizen of the United States, and a resident of Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Three-Way Valves, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to valves, and has primarily for its object to provide a new and improved three-way valve suitable for use in connection with compressed air operated dump cars in which provision is made for controlling the admission of compressed air from a reservoir to the operating cylinder of the car by auxiliary valve mechanism operated by compressed air. An apparatus of this type is shown and described in my pending application, filed December 2, 1918, Ser. No. 265,001. It should be understood, however, that the valve which forms the subject-matter of my present application may be used in any other situation to which it is adapted, as my invention is not limited to its use in connection with dump car operating systems. The nature of my invention will appear from the following description in connection with the embodiment thereof illustrated in the accompanying drawings. What I regard as new will be set forth in the claims.

In the accompanying drawings:

Figure 1 is an elevation of my improved valve, some parts being broken away;

Fig. 2 is a vertical section on line 2—2 of Fig. 1, showing the valve in its open position; and

Fig. 3 is a similar view showing the valve in its closed or exhausting position.

Referring to the drawings, 4 indicates the body or shell of the valve, in which is an elongated cylindrical valve chamber 5 open on its lower end. As shown at 4<sup>a</sup>, the body 4 extends some distance beyond the lower end of the valve chamber 5, and is provided at opposite sides thereof with longitudinal slots 6. It will be understood that the terms "upper" and "lower" as herein used have reference merely to the parts as shown in the drawings, as the valve may, if desired, be used in other positions. 7 indicates a cylindrical bushing fitted in the valve chamber 5. 8 indicates an inlet passage at one side of the valve body 4, and 9 indicates an outlet

passage at the opposite side of the body and somewhat nearer the longitudinal center thereof. These passages are preferably internally threaded for convenient application thereto of pipes leading in the one case to the source of supply of compressed air or other operating fluid, and in the other case to the device to be operated by such fluid, as for example, the operating cylinder of a dump car. The passage 8 leads to an annular channel 10 which surrounds the bushing 7, and also to a duct 11 which opens into the upper end of the valve chamber 5, as shown in Figs. 2-3, so that the inner end of the slide valve hereinafter described is always subjected to pressure admitted through passage 8, and therefore normally tends to move downward as viewed in the drawings. A series of ports 12 in the bushing 7 opposite the channel 10 are adapted to admit air from the channel 10 to the valve chamber 5.

13 indicates an annular channel which surrounds the intermediate portion of the bushing 7 opposite the passage 9, the bushing at that point being provided with ports 14 for connecting the channel 13 to the interior of the valve chamber 5. 15 indicates an exhaust passage opposite the lower portion of the valve chamber 5 and communicating with an annular channel 16 which surrounds the lower portion of the bushing 7 and communicates with the valve chamber 5 through a series of ports 17 in said bushing.

18 indicates a cylindrical slide valve fitted in the valve chamber 5, said valve having shoulders 19—20 at its opposite ends upon which are fitted cup washers 21—22 of leather or other suitable material. The washers 21—22 fit closely in the bore of the bushing 7 and are separated from each other far enough so that by moving the slide valve to the proper position the inlet and outlet passages may be simultaneously connected with the valve chamber 5 around the intermediate portion of the slide valve, which is reduced sufficiently in diameter to permit the air to flow around it. This position of the parts is shown in Fig. 2. By moving the slide valve to the position shown in Fig. 3, the passage 9 may be connected in a similar manner with the exhaust passage 15.

The slide valve 18 is operated by means of a tubular cross head 23 which is fitted to slide in the slots 6, and is provided with a stem 24 having a shoulder 25, from which

projects a rod 26 which extends through the slide valve, as shown in Fig. 3. A washer 27 is fitted upon the upper end of the rod 26 over the intermediate portion of the washer 21, and a nut 28 screwed upon the upper end of the rod 26 secures the several parts together.

The cross head 23 is reciprocated in the slots 6 to move the slide valve 18 from one position to the other by means of a lever 29 mounted on a pivot 30 at the upper end of the valve body, as shown in Figs. 2 and 3, and connected by links 31 to the opposite ends of the cross head, as shown in Fig. 1. 32 indicates a pivot which connects the links 31 with the cross head 23. The upper ends of the links 31 are connected to the lever 29 adjacent to its fulcrum by a pivot 33 fitted in a transverse sleeve 34 carried by said lever, as shown in Figs. 1 and 3, so that said links are held properly apart. The sleeve 34 is provided with a lug or stop 35 adapted to engage the upper end of the valve body 4 when the lever is in the position shown in Fig. 3, and to limit the movement of the lever in the opposite direction it is provided with a lug or stop 36 at its opposite side adjacent to the pivot 30 which engages the upper end of the body 4 when the lever is in the position shown in Fig. 2. This lug or stop 36 is so arranged that when the lever 29 is in the latter position, the pivot 33 is carried slightly beyond a line intersecting the pivots 30 and 32, as shown in Fig. 2, thereby locking the lever in this position.

It will be apparent that when the parts are in the position shown in Fig. 2, which may be termed the open position of the slide valve, compressed air entering through passage 8 will pass through ports 12 to the space around the intermediate portion of the slide valve, and thence out through the ports 14 to passage 9 leading to the dump cylinder or other device to be operated. The upper end of the slide valve is constantly subjected to air pressure admitted through duct 11 to the upper portion of the valve chamber 5, and consequently the slide valve tends normally to move to its exhausting position shown in Fig. 3. It may, however, be locked in the open position shown in Fig. 2 by means of the lever 29. By swinging the lever 29 over to the left, as shown in Fig. 3, the slide valve is moved down to connect the ports 14 with the exhaust ports 17 and cut off the ports 12 from the ports 14. This permits the compressed air in the operating cylinder or other device to flow back through passage 9 into the lower portion of the valve chamber 5 and escape through the exhaust passage 15. The slots 6 serve to guide the cross head 23 as it is reciprocated. It will be obvious that the parts of the valve may readily be removed and replaced by withdrawing either of the pivots 32 or 33, as this

will permit the slide valve to be drawn out of the valve chamber, and the bushing may then be easily removed. While I prefer to use a lever such as the lever 29 for operating the slide valve, and to mount such lever on the body of the valve, my invention, generically considered, is not limited to the use of a lever for that purpose but includes any equivalent means mounted in any manner suitable to accomplish the desired purpose. In other respects also, except in so far as it is particularly claimed, my invention is not limited to the specific construction shown and described.

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

1. A three-way valve comprising a body having a valve chamber, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, and a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, said valve being constantly subjected to fluid pressure tending to move it longitudinally in said chamber.

2. A three-way valve comprising a body having a valve chamber, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, and a passage constantly connecting said inlet passage with said valve chamber beyond the adjacent end of said slide valve.

3. A three-way valve comprising a body having a valve chamber, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, mechanism movable to operate said slide valve so as to connect said inlet and outlet passages, and means for constantly admitting fluid pressure to said valve chamber above said slide valve.

4. A three-way valve comprising a body having a valve chamber, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a lever movable to operate said slide valve so as to connect said inlet and outlet passages, and means for constantly admitting fluid pressure to said valve chamber above said slide valve.

5. A three-way valve comprising a body having a valve chamber, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points,

a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a lever mounted on the body, and means connecting said lever with one end of said slide valve and adapted to be operated to lock said slide valve in its open position.

6. A three-way valve comprising a body having a valve chamber open at one end, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a lever for moving said slide valve, and means controlled by said lever for locking said valve in its open position.

7. A three-way valve comprising a body having a valve chamber, open at one end, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a lever mounted over one end of the body, a stem connected with said slide valve, and one or more links connecting said lever with said stem and adapted to operate to lock said slide valve in its open position.

8. A three-way valve comprising a body having a valve chamber, open at one end, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a lever mounted on the body, a cross head connected with said slide valve and operating in slots in the body, and links connecting said cross head with said lever.

9. A three-way valve comprising a body having a valve chamber, inlet, outlet and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, and means for constantly admitting fluid pressure to said valve chamber above said slide valve.

10. A three-way valve comprising a body having a valve chamber open at one end, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a lever mounted on one end of the body, means operatively connecting said lever with the opposite end of said slide valve and operat-

ing in one position to lock said slide valve against operation, and stops for limiting the movement of said lever in either direction.

11. A three-way valve comprising a body having a valve chamber, inlet, outlet, and exhaust passages communicating with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage and tending normally to move to its exhausting position, and means for locking said slide valve in its open position.

12. A three-way valve comprising a body having a valve chamber, inlet, outlet, and exhaust passages communicating laterally with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, cup washers carried by the end portions of said slide valve, a duct leading from said inlet passage to said valve chamber above said slide valve, and means mounted on the body for moving said slide valve in said valve chamber.

13. A three-way valve comprising a body closed at one end and having a valve chamber, inlet, outlet, and exhaust passages communicating laterally with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or with said exhaust passage, a rocking lever mounted over the closed end of the body, and means operatively connecting said lever with the outer end of said slide valve and coacting with said lever to lock said slide valve in one position.

14. A three-way valve comprising a body closed at one end and having a valve chamber, inlet, outlet, and exhaust passages communicating laterally with said chamber at longitudinally separate points, a duct leading from said inlet passage to the inner end portion of said valve chamber, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a rocking lever mounted on the closed end of the body, and means operatively connecting said lever with the outer end of said slide valve.

15. A three-way valve comprising a body closed at one end and open at the other, and having a valve chamber, inlet, outlet, and exhaust passages communicating laterally with said chamber at longitudinally separate points, a slide valve movable longitudinally in said chamber to connect said outlet passage either with said inlet passage or with said exhaust passage, a rocking lever mounted on the closed end of the body, a

cross head mounted in said valve body adjacent the open end thereof and connected with said slide valve, and one or more links connecting said cross head with said lever.

5 16. A three-way valve comprising a body closed at one end and having a valve chamber, inlet, outlet, and exhaust passages communicating laterally with said chamber at longitudinally separate points, a duct leading  
10 from said inlet passage to the inner end portion of said valve chamber, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a rocking  
15 lever mounted on the closed end of the body, a cross head mounted in said valve body adjacent the open end thereof and connected with said slide valve, and one or more links connecting said cross head with said lever.

20 17. A three-way valve comprising a body closed at one end and having a valve chamber, inlet, outlet, and exhaust passages communicating laterally with said chamber at longitudinally separate points, a slide valve  
25 movable longitudinally in said chamber to connect said outlet passage with either said in-

let passage or said exhaust passage, a rocking lever mounted on the closed end of the body, a cross head mounted in said valve body adjacent the open end thereof and connected  
30 with said slide valve, one or more links connecting said cross head with said lever, and stops for limiting the extent to which the lever may rock in either direction.

18. A three-way valve comprising a body  
35 closed at one end and having a valve chamber, inlet, outlet, and exhaust passages communicating laterally with said chamber at longitudinally separate points, a duct leading from said inlet passage to the inner end  
40 portion of said valve chamber, a slide valve movable longitudinally in said chamber to connect said outlet passage with either said inlet passage or said exhaust passage, a  
45 rocking lever mounted on the closed end of the body, a cross head mounted in said valve body adjacent the open end thereof and connected with said slide valve, one or more links connecting said cross head with said  
50 lever, and stops for limiting the extent to which the lever may rock in either direction.

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