F. E. KIMMELL.

SIGNAL VALVE.

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956,363. **Patented Apr. 26, 1910.**

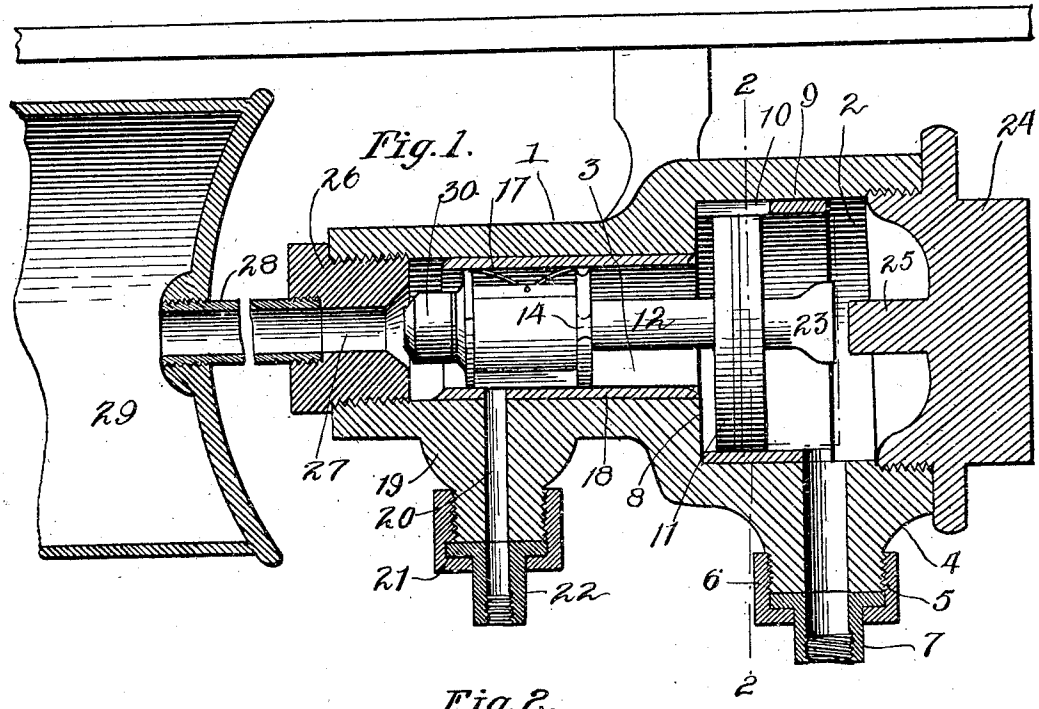


Fig. 2.

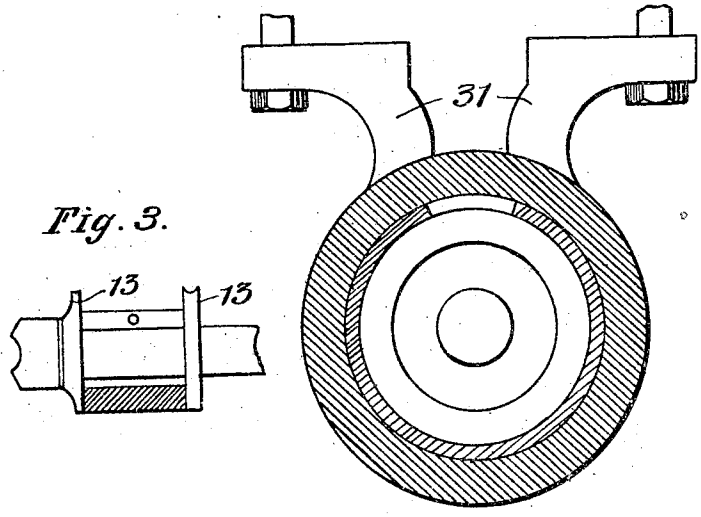
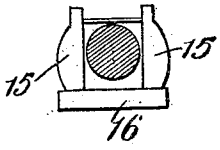


Fig. 3.

Fig. 4.



Witnesses

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SIGNAL-VALVE.

956,363. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed November 5, 1908. Serial No. 461,236.

To all whom it may concern:

Be it known that I, FRANK E. KIMMELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Signal-Valves, of which the following is a specification.

The invention relates to an improvement in signal valves, designed primarily for use in pressure signaling apparatus.

The main object of the present invention is to dispense with the flexible diaphragm forming a material part of the standard signal valve and substitute therefor a valve structure in the use of which the objections of the flexible diaphragm, such as repeating, sticking, and loss of elasticity by continued use, are entirely avoided.

Another object of the invention is the provision of a valve structure in which the parts are so arranged that those elements subjected to wear in the use of the valve are readily accessible and removable to provide for convenient repair or renewal.

The invention will be described in the following specification, reference being had particularly to the accompanying drawings, in which:—

Figure 1 is a longitudinal sectional view. Fig. 2 is a section on line 2—2 of Fig. 1. Fig. 3 is a broken elevation showing the slide valve in longitudinal section. Fig. 4 is a section through the piston stem, showing the slide valve in end elevation.

Referring particularly to the accompanying drawings, my improved signal valve comprises a casing 1 of different diameters at the respective ends, the larger end being interiorly cored to form a chamber 2, while the smaller end is longitudinally cored to form a passage in open communication with the chamber 2 but of materially less diameter than said chamber. The larger end of the casing is formed with a projection 4 cored to provide a passage 5 in communication with the chamber 2, the end of the projection being threaded for the reception of a union 6, whereby the single pipe 7 leading from the usual reducing valve (not shown) may be connected to establish open communication between said pipe and the chamber 2. The relative diameters of the chamber 2 and passage 3 are such as to form an abrupt shoulder 8 at their juncture, and within the chamber and abutting at its forward end against the shoulder 8 is a bushing 9, of usual type. The relatively upper portion of the bushing is cut out or recessed for a part of its length to provide a channel 10, which channel opens through that edge of the bushing abutting the shoulder 8.

Mounted for movement in the chamber 2, or more exactly within the bushing secured within said chamber is a piston 11 provided with an annular packing ring to prevent leakage. The stem 12 is secured on the piston 10 projecting beyond the same in both directions, that projection toward the smaller end of the casing extending within the passage 3 and being adjacent its free end provided with disk heads 13 arranged in spaced relation and peripherally formed with notches 14 for the travel of air lengthwise the passage 3. Between the heads 13 there is secured a valve including side members 15 and a cut-off plate 16, a spring 17 being arranged to normally hold the cut-off plate of the valve to its seat. A bushing 18 is arranged within the passage 3 and at an appropriate point is accurately ground for coöperation with the valve. The reduced portion 2 of the casing is formed with a projection 19 cored to form a passage 20 arranged for communication with the passage 3 and having its communication with said passage controlled by the valve. The projection 19 is formed to receive a coupling nut 21, whereby the pipe 22 leading to the whistle or other signal may be arranged in open communication with the port 20. That portion of the stem 12 projecting beyond the piston 11 toward the open end of the chamber 2 terminates in an enlargement 23, for a purpose which will presently appear. The open end of the chamber 2 is closed by a cap plug 24 having threaded engagement with the casing and centrally formed with a stud 25 arranged in line with the stem 12 and adapted to be engaged by the enlarged end 23 of the stem when the piston 11 is moved in one direction. The open end of the reduced portion 2 of the casing is tapped to receive a plug 26, which is in turn cored at 27 for open communication with the passage 3 and tapped to receive one end of a pipe 28 leading to a pressure reservoir 29. Within the reduced portion of the casing and immediately adjacent the inner end of the plug 26 there is fixed an abutment 30 spaced from the wall of the passage 3 and in line with the stem 12 and the piston, the abutment 30 and stud 25 being thus adapted

to form opposing means to limit the play of the piston. The respective piston stops thus provided are so arranged with respect to the channel 10 in the bushing 9 that when the piston 11 is at that limit of the stroke controlled by the stud 25 one edge of said piston will extend beyond the inner end of the channel and thereby prevent the passage of air through said channel toward the reduced end of the casing, while when the piston is at the limit of stroke controlled by the abutment 30 the piston will be so arranged as to permit the channel 10 to form a free communication around the piston.

In operation the pressure in the signal pipe will so affect the piston 11 as to force said piston until the stem 12 engages the abutment 30, in which position the air from the signal pipe will have uninterrupted passage through the valve and thereby balance the piston with the effect to maintain the same in what may be termed the open position. In this position of the piston it will be noted that the valve 16 closes the port 20 leading to the signal. Any reduction in the signal pipe pressure, as for example by operating one of the relief valves, will cause the pressure on that face of the piston next to the passage 3 to operate the piston until the head 23 engages the stud 25, thereby closing the channel 10 as previously described. This movement of the piston operates the valve 16 with the effect to open the port 20 to the air from the reservoir 29, sounding the signal. Closing of the relief valve causes the pressure in the signal pipe to again assume control with the effect to operate the piston to open the channel 10 and again establish communication between and equal pressure on the opposing sides of the piston to balance the same in open position.

The case may be provided with arms whereby the valve may be secured in place in the engineer's cab.

The head 23 forms an effective handle whereby the piston and valve may be readily withdrawn from the casing in order to permit renewal or repair, access being provided by removing the cap plug 24. The bushing 18 is also decidedly advantageous in valves of this character as it permits an accurate grinding of the valve seat and a convenient renewal of such part without material expense or loss of time when the seat becomes worn.

Having thus described the invention what is claimed as new, is:—

1. A signal valve formed with a chamber in communication with the signal pipe and with a reduced passage in communication with the signal reservoir and signal, a bushing arranged in the chamber and formed with a channel, a piston operative within the bushing and controlled by the signal pipe pressure to open or close the channel to said pressure, and a valve connected with the piston and controlling the communication between the signal and passage, and means to limit the movement of the valve in its closing operation to prevent cutting off communication between the signal reservoir and the reduced passage.

2. A signal valve formed with a chamber in communication with the signal pipe and with a reduced passage in communication with the signal reservoir and signal, a bushing arranged in the chamber and formed with a channel, a piston operative within the bushing and controlled by the signal pipe pressure to open or close the channel to said pressure, a valve connected with the piston and controlling the communication between the signal and passage, and means for limiting movement of the piston in both directions, said means serving to maintain at all times open communication between the signal pipe and valve chamber and between the signal reservoir and the reduced passage.

3. A signal valve comprising a casing formed to provide a chamber and reduced passage, a pressure communication leading from the reduced passage, a pressure communication leading from the chamber, a signal operating pressure outlet leading from the passage, a valve controlling said outlet, a piston operating the valve, and an abutment arranged in the reduced passage and limiting the movement of the valve toward the pressure communication outlet therefrom, said abutment being arranged to provide a free passage therearound between the pressure communication and the reduced passage, whereby the latter is always open to the pressure.

4. A signal valve comprising a casing formed to provide a chamber and reduced passage, a pressure communication leading from the reduced passage, a pressure communication leading from the chamber, a signal operating pressure outlet leading from the passage, a valve controlling said outlet, said valve comprising spaced disks peripherally fitting the interior of the reduced passage, the edges of the disks being formed with notches, and an independently movable cut-off plate arranged between the disk and controlling the signal operating pressure outlet.

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

FRANK E. KIMMELL.

Witnesses:

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