(No Model.)

F. A. McARTHUR.

ENGINEER'S BRAKE VALVE.

No. 305,831. Patented Sept. 30, 1884.

Fig. 1

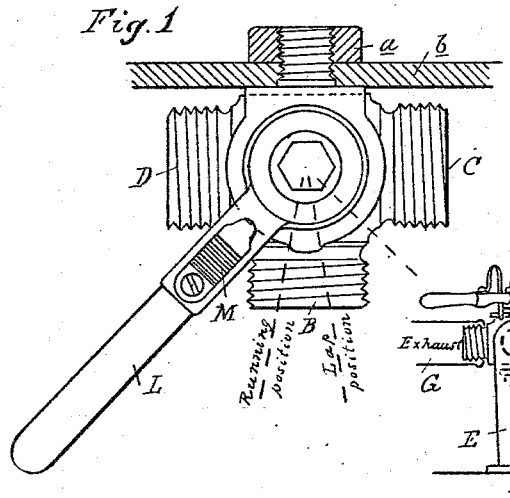
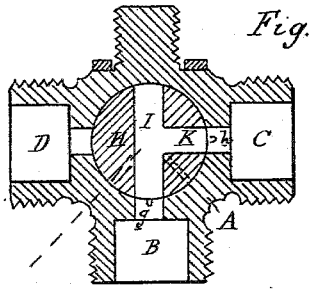


Fig. 2



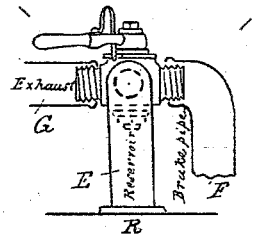


Fig. 9

Fig. 3

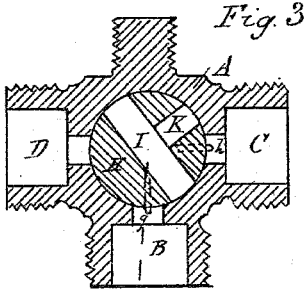


Fig. 4

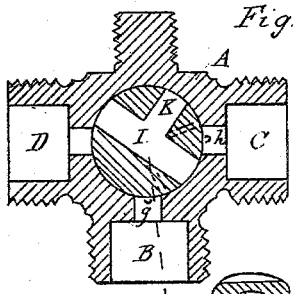


Fig. 5

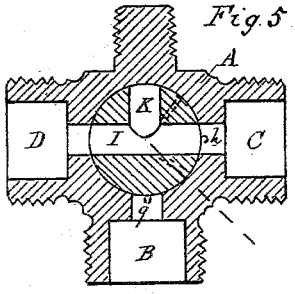


Fig. 6

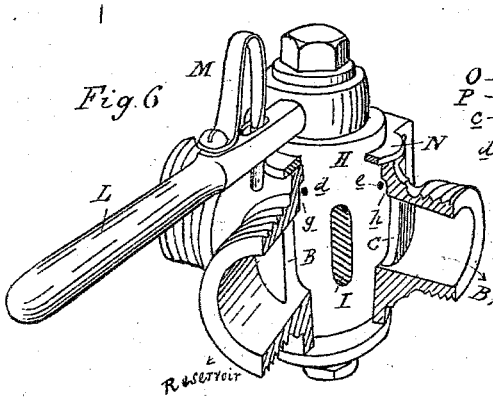
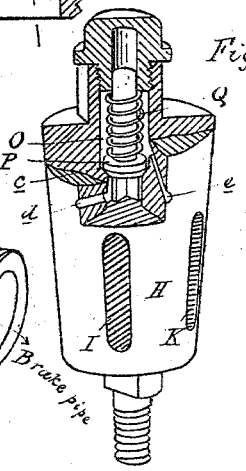


Fig 7



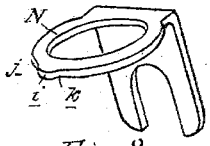


Fig. 8

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UNITED STATES PATENT OFFICE.

FREDERICK A. McARTHUR, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO E. R. E. COWELL AND E. D. BROWNER, OF SAME PLACE.

ENGINEER'S BRAKE-VALVE.

SPECIFICATION forming part of Letters Patent No. 305,831, dated September 30, 1884.

Application filed May 15, 1884. (No model.)

To all whom it may concern.

Be it known that I, FREDERICK A. McARTHUR, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Engineers' Brake-Valves; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to an improvement in three-way valves for air-brakes. In automatic air-brakes—such as the Westinghouse automatic brake—the engineer exercises control over the air-brakes by means of a three-way-cock valve placed in the cab, and commonly called "the engineer's brake-valve," and it is this valve my improvement refers to. By means of this valve the engineer regulates the flow of air from the main reservoir into the brake-pipe for releasing the brakes, and from the brake-pipe to the atmosphere for applying the brakes. In the improved Westinghouse air-brake a new style of an engineer's brake-valve has been introduced, by means of which, when the communication between the brake-pipe and the reservoir is cut off by a certain position of the valve called the "running position," a secondary communication between the reservoir and the brake-pipe is established, allowing enough air to pass from the reservoir into the brake-pipe to provide against leakage in the latter, while it maintains at the same time a differential pressure between the reservoir and the train-pipe—that is to say, it maintains in the brake-pipe an air-pressure of about sixty pounds, while the pressure in the reservoir is twenty pounds higher. The three-way cock, which is still in extended use on the Westinghouse air-brake as an engineer's brake-valve, cannot produce in its present construction this new condition, which is found very desirable to insure the most positive operation of the brakes.

It is the object of my invention to adapt the three-way valve as it is now in use as an engineer's brake-valve to produce this new result—that is, to maintain a differential pressure between the reservoir and the brake-pipe when the valve is put in a certain position called "the running position;" and my invention consists in the new arrangement and construction of certain parts by means of which I have obtained this object, all as hereinafter described.

In the drawings which accompany this specification, Figure 1 is a plan of my improved brake-valve. Figs. 2, 3, 4, and 5 are like horizontal sections illustrating four different positions of the valve-plug, and which are especially referred to hereinafter. Fig. 6 is a perspective of my valve with the shell partly broken away. Fig. 7 is a detached perspective of the valve-plug, partly in section, to show the construction of the differential valve placed in its body. Fig. 8 is a detached perspective of the index-collar. Fig. 9 is an elevation of my valve, showing it connected.

A is the shell of the valve, provided with the ports B C D, the first connecting the valve with the main reservoir R through a pipe, E. The second port connects with the brake-pipe F, and the third with the exhaust-pipe G.

H is the valve-cock, provided with the ports I and K and the handle L, for operating it.

M is a bent leaf-spring, secured upon the handle, and exerting its tension against the periphery of the collar or ring N, which embraces the upper end of the valve-cock, and is held in position by the nut *a*, which also secures the valve in position upon a plate or bracket *b*, as shown in Fig. 1.

The parts so far described constitute the engineer's brake-valve as it has been in use heretofore, and Fig. 2 shows the position of the cock for establishing the communication between the main reservoir and the brake-pipe, while Fig. 5 shows its position for exhausting the air from the brake-pipe. This construction I have improved in the following manner: I form in the upper part of the valve-cock and centrally thereto a valve-chamber, O, provided with the valve-seat *c*. In this chamber I place a puppet-valve, P, around the stem of which is placed the coil-spring Q, the tension of which presses the valve upon its seat. Through the body of the cock I drill two small ports, *d e*, the former leading into the valve-chamber below the valve and the latter in the valve-chamber above the valve.

In the valve-seat of the shell A of the valve I form two small vertical channels, *g h*, (see Fig. 6,) one directly above the upper end of the port B and the other above the port C. The channels *g h* and ports *d e* are in such rel-

ative positions that when the cock of the valve is placed in the position shown in Figs. 3 and 6 the port *d* registers with the channel *g* and the port *e* with the channel *h*. Now, as the channel *g* connects with the port B and the channel *h* with the port C, it is clear that in this position of the cock communication will be established between the main reservoir and the brake-pipe by means of the ports *d e* whenever the resistance or load of the puppet-valve P is overcome by the difference in the air-pressures between the main reservoir and the brake-pipe. In practice a load of about twenty pounds to the square inch is put on the puppet-valve. The parts *d e* need only to be of sufficient area to allow enough air to pass from the reservoir into the brake-pipe to make up for leakage in the latter, so as to easily maintain the required air-pressure in the brake-pipe while the train is running, and which pressure is in practice fixed at about sixty pounds, while the pressure in the reservoir is about eighty pounds.

To mark to the engineer the proper position in which to place his handle to obtain the function of the ports *d e*, as above described, I place a stop, *i*, in the ring N, so that the engineer can easily feel, by the increased resistance of his handle against the shoulder, when he is in this position, which is now the one he has to keep while running, instead of the position shown in Fig. 2, which he keeps with the old valve. The increased number of ports now makes it also desirable to mark to the engineer the exact position in which all his ports lap, which is the position shown in Fig. 4, and wherein all communication between the main reservoir and the brake-pipe is cut off. As this position is close to the running position in Fig. 3, I make the stop *i* of proper peripheral length to form the shoulders *j* and *k* in exact position to form stops, the former for the running position and the latter for the "lap position" of the handle.

To provide against the wear of the parts, I make the channels *g h* about a quarter of an inch long, and place the ports *d e* high enough to register with the upper ends of these channels, so that as the valve-faces wear off the ports *d e* will yet register with the channels.

One advantage of my improved brake-valve is that my improvement can be easily and cheaply applied to the old style brake-valve, which would be otherwise superseded by an entirely new and different valve, which, aside from the larger expense, presents the great drawback of being unfamiliar to the engineer, so that there is great danger that in sudden emergencies he may get confused, or at least not be able to act with the necessary promptness.

The operation of my improved brake-valve does not introduce a single new element liable to confuse an engineer to whom the old brake-valve has become familiar. It simply defines two positions of the brake-handle—the running position and the lap position—which formerly were obtained with a slightly different position of the handle.

Another advantage of my improvement is that it does not impair the simplicity and effectiveness of the three-way cock as a brake-valve, and should the puppet-valve get out of order it can be removed and replaced without discontinuing the use of the brake-valve.

What I claim as my invention is—

1. In a three-way-cock valve for the purposes described, the cock H, provided with the minor ports *d e*, which form an air-passage through the cock, controlled by a differential pressure-valve placed within the body of the cock—such as the spring puppet-valve O—in combination with ports in the shell of the valve, adapted to register therewith, and connecting with two of the main ports of the valve-shell, substantially as and for the purposes described.

2. In a three-way valve for the purposes described, the cock H, having the chamber O, with the valve-seat *c* formed in its body, and two ports, *d e*, one entering above and one below the valve-seat, in combination with the spring puppet-valve P, substantially as and for the purposes described.

3. In a three-way valve for the purposes described, the cock H, having the minor ports *d e*, which form a differential pressure-passage through the valve, substantially as described, in combination with the brake-handle L, friction-spring M, and index-ring N, the latter provided with the offset or shoulder *j*, which forms a stop for the brake-handle, thereby indicating the position in which communication through the valve is established by the minor ports in the cock, substantially as described.

4. In an engineer's brake-valve for automatic air-brakes, a three-way-cock valve having the ports C B D and I K, by means of which the flow of air from the main reservoir into the brake-pipe and from the brake-pipe to the atmosphere is regulated, in combination with minor ports *d e*, forming a differential air-pressure passage through the cock and ports *g h* in the valve-shell, adapted to register therewith and complete the differential air-pressure passage from the reservoir to the brake-pipe, substantially as described.

5. In an engineer's brake-valve for automatic air-brakes, the combination of a three-way-cock valve having the usual ports for connecting the main reservoir with the brake-pipe and the brake-pipe with the atmosphere, and a minor passage through its cock by means of which a differential air-pressure passage between the reservoir and the brake-pipe is established, and the index-ring N, having stop *i*, forming the shoulders *j* and *k*, by means of which the running position and the lap position of the lever are defined, substantially as described.

Witnesses: FREDERICK A. McARTHUR.
H. S. SPRAGUE,
CHARLES J. HUNT.