(No Model.)

# W. O. GUNCKEL.

## AIR BRAKE VALVE.

No. 604,612. Patented May 24, 1898.

FIG. 1.

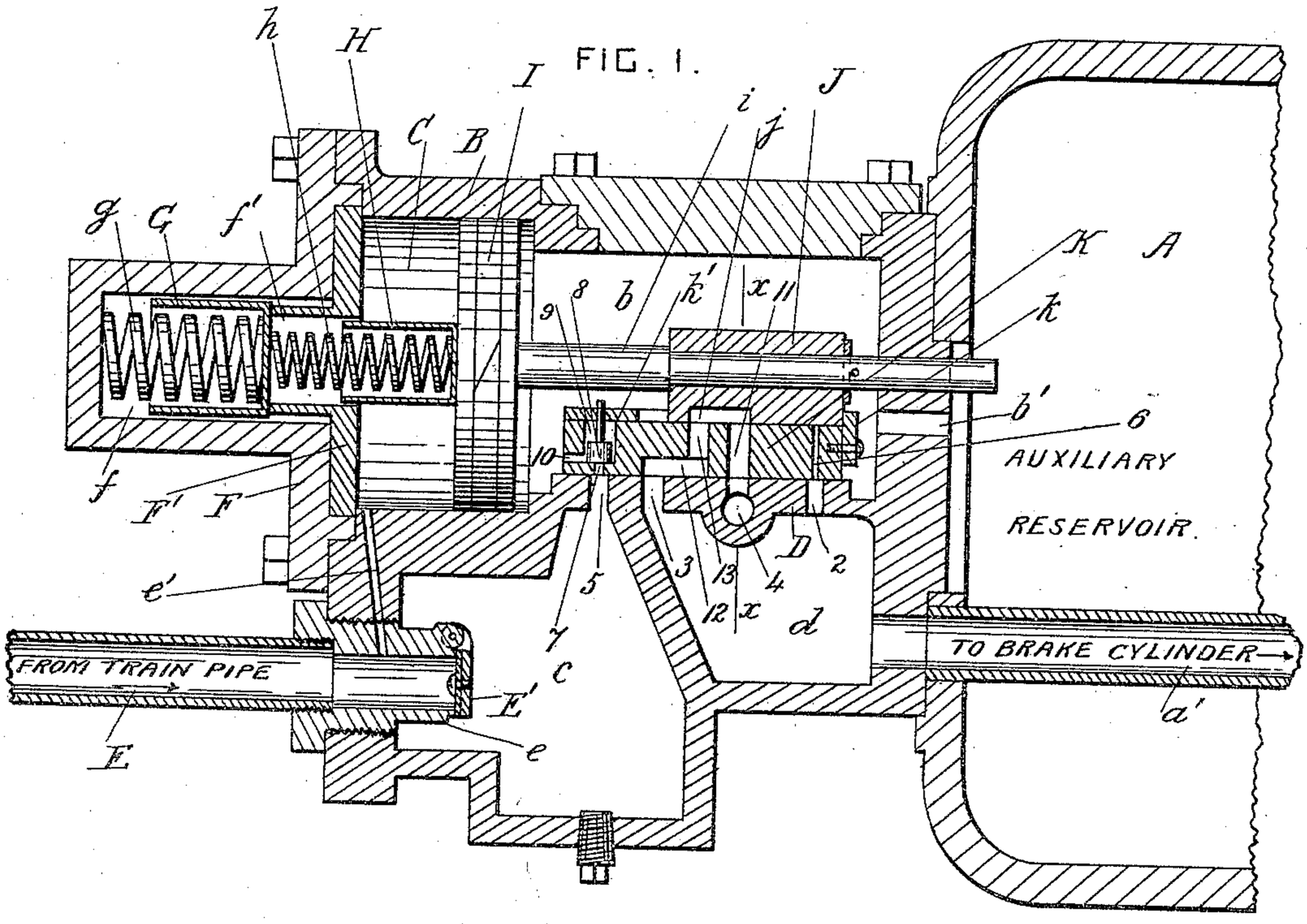
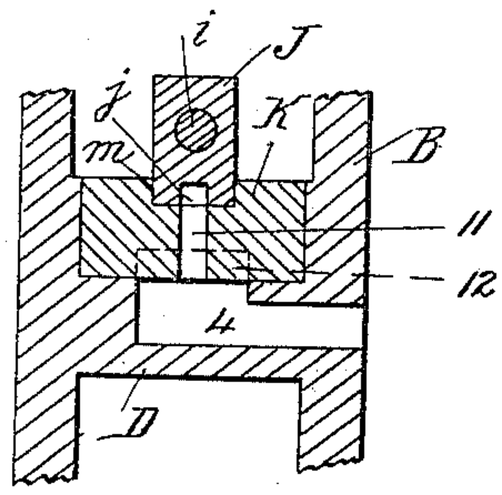



FIG. 2.

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# UNITED STATES PATENT OFFICE.

WINFIELD O. GUNCKEL, OF TERRE HAUTE, INDIANA, ASSIGNOR OF ONE-FIFTH TO GEORGE W. FARIS, OF SAME PLACE.

## AIR-BRAKE VALVE.

SPECIFICATION forming part of Letters Patent No. 604,612, dated May 24, 1898.

Application filed September 3, 1897. Serial No. 650,514. (No model.)

*To all whom it may concern:*

Be it known that I, WINFIELD O. GUNCKEL, a citizen of the United States, residing at Terre Haute, in the county of Vigo and State of Indiana, have invented certain new and useful Improvements in Air-Brake Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the supply-valves of air-brakes; and it consists in the novel construction and combination of the parts, hereinafter fully described and claimed.

In the drawings, Figure 1 is a longitudinal section through the valve. Fig. 2 is a cross-section taken on the line *x x* in Fig. 1.

A is a portion of the auxiliary reservoir for the compressed air, and *a'* is a pipe which leads into the brake-cylinder.

B is the casing of the valve, having its rear end secured to the said reservoir and having a cylinder C formed in it and three chambers *b*, *c*, and *d*. The chamber *b* communicates with the cylinder C and is separated from the chambers *c* and *d* by a faced plate D. The pipe *a'* is connected to the chamber *d*, and the chamber *b* is constantly connected with the reservoir A by a passage *b'*.

The faced plate D is provided with an inlet-port 2 and an exhaust-port 3, extending from the chamber *b* through it into the chamber *d* and 4 is an exhaust-passage arranged between the ports 2 and 3. The passage 4 opens into the chamber *b* and is always in communication with the atmosphere. The faced plate is also provided with a port 5, extending through it into the chamber *c*.

E is a pipe which is connected to the train-pipe in the usual manner and is screwed into a plug *e*, which is screwed into the casing B, so that it projects within the chamber *c*.

E' is a valve pivoted to the plug *e* and closing over the end of the pipe E. A passage *e'* is provided for connecting the interior of the plug *e* with the front end of the cylinder C, and thereby establishing a constant connection between it and the train-pipe.

F is a cover for the front end of the cylinder, provided with a recess *f*.

F' is a support or stop secured between the cylinder and its cover and provided with an annular portion *f'*, projecting into the recess *f*.

G is a cup which normally rests against the stop F', and *g* is a strong spring arranged between the bottom of the cup G and the bottom of the recess *f*.

H is a cup which bears against the piston I, which is slidable in the cylinder C, and *h* is a spring which is weaker than the spring *g* and which is interposed between the bottoms of the cups G and H.

The piston I is provided with a piston-rod *i*, which is guided in a hole in the rear end of the valve-casing and which projects into the reservoir A.

J is a slide-valve secured to the piston-rod *i* and provided with an exhaust-cavity *j*.

K is an intermediate slide-valve arranged between the slide-valve J and the faced plate D. The slide-valve K is provided with two projections *k* and *k'* for the slide-valve J to strike against as it approaches the respective ends of its stroke, so that the slide-valve K may be operated by it; but the two slide-valves may be operatively connected in any other approved manner. The slide-valve K is provided at its rear end with a very small port 6, extending through it and normally communicating with the port 2; but the port 6 is much smaller in area than the port 2. The slide-valve K is provided at its front end portion with a port 7, communicating with the port 5 and a check-valve 8, which normally covers the port 7. The valve 8 works in a chamber 9 in the valve, and 10 is a lateral hole connecting the chamber 9 with the chamber *b*. The slide-valve K is also provided with a port 11, extending through it and connecting the exhaust-cavity *j* with the exhaust-passage 4. A passage 12, of large area, is formed in the face of the slide-valve K next to the faced plate D, and 13 is a port extending through the valve and connecting the passage 12 with the exhaust-cavity *j*.

The differential springs *g* and *h* and the pressure of air in the front end of the cylinder normally hold the piston and the slide-valves in the position shown in Fig. 1 of the drawings. The slide-valve J is much narrower

than the slide-valve K, and it slides in a groove *m* in the back of the slide-valve K, as shown in Fig. 2. The slide-valve K is guided laterally by the sides of the valve-casing.

The operation of the parts is as follows: The auxiliary reservoir is first charged with compressed air of about seventy pounds pressure from the train-pipe. The compressed air enters through the pipe E and valve E′ into the chamber *c*, and also passes through the passage *e′* into the front end of the cylinder C. The compressed air in the chamber *c* passes through the ports 5 and 7 and through the valve 8 into the chamber *b*, and thence through the passage *b′* into the auxiliary reservoir A. The pressure is now equal upon both sides of the piston I, and the brakes are not applied because the brake-cylinder is in communication with the atmosphere by means of the pipe *a′*, chamber *d*, port 3, passage 12, port 13, exhaust-cavity *j*, port 11, and exhaust-passage 4.

When an ordinary service stop is to be made, the pressure in the train-pipe is decreased from one to two pounds. The piston is now forced forward in its cylinder by the excess of pressure behind it, which is greater than the tension of the light spring *h*. The slide-valve J is moved to the left, closing the exhaust-port 11 and opening the small supply-port 6. The compressed air in the reservoir passes into the brake-cylinder through the ports 6 and 2, the chamber *d*, and the pipe *a′* and actuates the brakes. The compressed air from the reservoir cannot pass back into the train-pipe because of the valves 8 and E′, which close automatically. When the pressure in the train-pipe is increased, the piston moves the valve J to the right, closes the port 6, and reopens the exhaust, thereby releasing the brakes.

When a more sudden service stop is to be made, the pressure in the train-pipe is decreased by from three to five pounds. The piston moves suddenly to the left until the cup H strikes the cup G. The exhaust is closed the same as before and the port 6 is opened; but the continued motion of the slide-valve J to the left moves the slide-valve K to the left also, because the slide-valve J strikes the projection *k′*. The valve K uncovers the port 2, which is of much larger area than the port 6, and admits a free supply of compressed air to the brake-cylinder, thereby applying the brakes with greater force. The slide-valve J strikes the projection *k* and restores the slide-valve K to its original position when the pressure in the train-pipe is increased.

When an emergency stop has to be made and it is desirable to apply all the brakes on the train very quickly and strongly, the pressure in the train-pipe is decreased by about fifteen pounds. The piston then moves suddenly to the left, so that the strong spring *g* is compressed by the cup H, which presses the cup G away from its stop. The port 2 is opened by the valve K, as hereinbefore described, and the continued motion of the valve K to the left places the port 5 in communication with the port 3 by means of the passage 12. The pressure in the chamber *d* is for the time being less than in the chamber *b* and in the auxiliary reservoir A, because the passage *b′* is of much larger area than the port 2. The compressed air in the train-pipe therefore raises the valve E′ and passes through the port 5, passage 12, and port 3, which are all of large area, into the chamber *d* and into the brake-cylinder, producing a sudden strong pressure therein. When the pressure in the train-pipe, chambers *c* and *d*, and in the brake-cylinder becomes equal, the valve E′ closes automatically and an excess of pressure still remains in the auxiliary reservoir because of the smallness of the port 2. This excess of pressure in the reservoir becomes reduced by the air feeding through the port 2, and the valve E′ is held shut and the brakes are held on by it until the pressure in the train-pipe is again increased.

The slide-valve J never moves the slide-valve K until it strikes one of the projections *k* or *k′*, because the slide-valve J is of much less area than the slide-valve K.

What I claim is—

1. In an air-brake valve, the combination, with a triple-valve casing provided with a faced plate; of an intermediate valve, said intermediate valve and faced plate being provided with ports 6 and 2 of different area for admitting air from the reservoir to the brake-cylinder and effecting two service stops of different suddenness, and a passage 12 and ports 5 and 3 for admitting air from the train-pipe to the brake-cylinder in an emergency stop, said passage 12 being formed separate from the port 6 and not communicating with it; and a separate valve for admitting air through the said port 6, substantially as set forth.

2. In an air-brake valve, the combination, with a triple-valve casing provided with a faced plate having a port 5 leading to the train-pipe, and ports 2 and 3 leading to the brake-cylinder; of an intermediate valve provided with a port 6 of less area than the said port 2, a passage 12 for connecting the ports 5 and 3, and a port 7 communicating with the port 5; a reservoir check-valve carried by the intermediate valve and normally covering the said port 7; and a separate valve for admitting air through the said port 6, the said ports 6 and 2 and the passage 12 operating respectively to effect two service stops of different suddenness and an emergency stop, substantially as set forth.

3. In an air-brake valve, the combination, with a triple-valve casing provided with a faced plate having ports 5 and 3 at one end, an admission-port 2 at its other end, and an exhaust-passage 4 between the ports 2 and 3; of an intermediate valve provided at one end with a port 6 smaller than said port 2 and communicating with it, said ports 2 and 6 ef-

fecting two stops of different suddenness, a passage 12 in its under face at its other end for connecting the said ports 5 and 3, said passage 12 having no connection with the port 2, a port 13 extending between its upper face and the passage 12, and an exhaust-port 11 extending through it between the ports 6 and 13; and a separate valve operating to uncover the port 6 and provided with an exhaust-cavity for connecting the said port 11 with the port 13 and passage 12, substantially as set forth.

4. In an air-brake valve, the combination, with a triple-valve casing provided with a faced plate having three ports, one of which is an inlet-port leading from the reservoir to the brake-cylinder; of an intermediate valve provided with an air-inlet port of less area than the said inlet-port, and having a passage for connecting the remaining two of the said ports which lead to the train-pipe and brake-cylinder respectively; and a valve for uncovering the said inlet-port of the intermediate valve and effecting an ordinary service stop, the three said ports of the faced plate and the said passage being arranged at such relative distances apart that the intermediate valve upon being moved in one direction operates first to uncover the said inlet-port of the faced plate and effects a more sudden service stop without connecting the brake-cylinder direct with the train-pipe, and subsequently connects the remaining two ports of the faced plate by means of the said passage thereby effecting an emergency stop, substantially as set forth.

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

WINFIELD O. GUNCKEL.

Witnesses:

HERBERT W. T. JENNER,

PATRICK J. WALSHE.