W. J. FORD, G. WESTINGHOUSE, Jr., & T. W. WELSH.

Automatic Air-Escape for Railway Air-Brakes.

No. 162,465. Patented April 27, 1875.

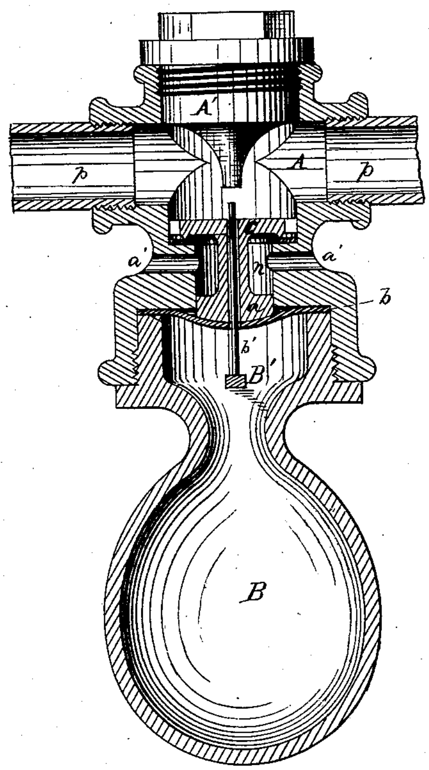

Fig. 1.

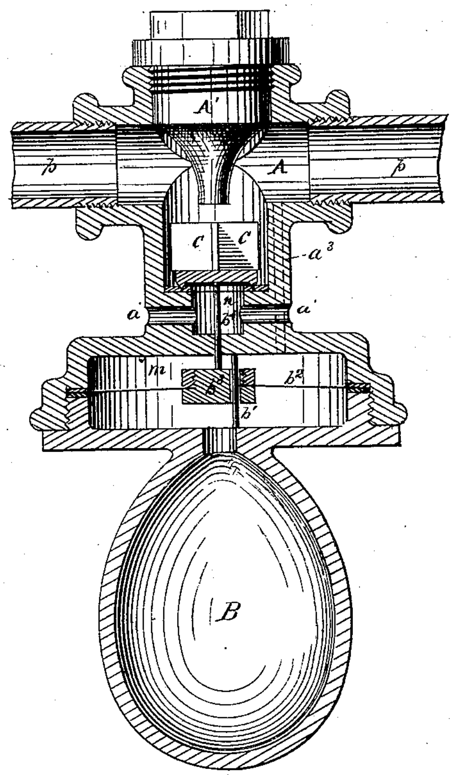

Fig. 2.

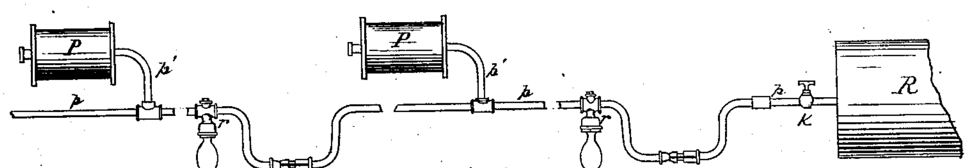

Fig. 3.

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UNITED STATES PATENT OFFICE.

WALTER J. FORD, OF ADRIAN, MICHIGAN, AND GEORGE WESTINGHOUSE, JR., AND THOMAS W. WELSH, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN AUTOMATIC AIR-ESCAPES FOR RAILWAY AIR-BRAKES.

Specification forming part of Letters Patent No. **162,465**, dated April 27, 1875; application filed April 2, 1875.

To all whom it may concern:

Be it known that we, WALTER J. FORD, of Adrian, county of Lenawee, State of Michigan, and GEORGE WESTINGHOUSE, Jr., and THOMAS W. WELSH, both of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Automatic Air-Escape for Railway Air-Brakes; and we do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, in which like letters indicate like parts.

Figures 1 and 2 are sectional views of our improvement in different forms of its application, and Fig. 3 is a view in outline illustrative of the system of apparatus to which it is applied.

At R, Fig. 3, we have shown the main reservoir, such as is used in air-brake apparatus for containing compressed air. From this the brake-pipe *p* leads back beneath the cars, with the usual flexible hose and coupling between cars, and from it a branch pipe, *p'*, leads to each brake-cylinder P.

The object of our invention is to provide for the more immediate escape of the compressed air from the brake-cylinders after it has done its work, instead of passing it back to the three-way cock *k* on the locomotive. For this purpose we attach to the brake-pipe *p* or branch *p'* of one or more cars of a train, as at *r*, Fig. 3, a device, shown in sectional view in Fig. 1, or in a modified form in Fig. 2. This device consists of the T-piece A, Fig. 1, to the bottom of which is attached a small reservoir, B, which screws into the lower part of the T-piece A. The lower part of the T-piece is provided with the valve C, having an annular V-shaped seat on its bottom face, and at its lower end provided with a cylindrical guide, *a*, sliding in the chamber *n*. The valve C is also provided with three or more wings to act as guides. Ports a^1 communicate with the atmosphere from the chamber *n* between the valve C and the guide *a*. Introduced between the pieces A and B is an india-rubber diaphragm, *b*, which is firmly held between the two pieces. The valve C is of such length that when the annular V-shaped seat rests upon the shoulder in the piece A the end *a* presses upon the rubber *b*, causing it to have a depression downward. Through the center of the valve C is drilled a small hole, in which is inserted a wire, b^1, somewhat smaller than the hole, this wire permitting a limited amount of air to pass from the main piece A, through the valve C, into the chamber B. This wire b^1 is, preferably, somewhat shorter than the distance between the cap A' and the cross-bar B', arranged in the chamber B, and permits of the valve C sliding up and down on the wire.

The operation of the device is as follows: When air is admitted to the brake-pipe the pipes are charged, and at the same time a limited portion of the air flows through the valve C around the wire b^1, filling the chamber B to the same pressure as in the pipe. The pressure from the chamber B is prevented from escaping to the atmosphere through the ports a^1 by the rubber disk *b* pressing against the lower part *a* of the valve C. The area of the valve C subject to downward pressure is somewhat larger than the effective area of the diaphragm pressing against the lower end of the valve. Consequently the valve C, when there is an equilibrium of pressure in the brake-pipe and chamber B, remains on its seat. When air is discharged from the brake-pipe for the purpose of releasing the brakes, the pressure within the chamber B, being prevented from escaping as rapidly as from the pipe A by the smallness of the opening around the wire b^1, exerts a pressure on the rubber diaphragm *b*, which causes the valve C to be raised from its seat, and the air to be more rapidly discharged from the brake-cylinders and brake-pipe around the wings of the valve C, and through the ports a^1 to the atmosphere. The wire b^1 is so proportioned in relation to the size of the hole in the valve C that the pressure within the chamber B will, after the brakes are off, be discharged very soon, so that when the brakes are again to be applied the pressure will have escaped from the chamber and permit the valve C to be closed. The cap A' in the part A is made large enough for the valve C to be inserted, and under the valve C is provided a soft rubber or metal seat to

make an air-tight joint to prevent the escape of air.

Fig. 2 represents a modification of the same, in which a thin metal diaphragm is used in place of the rubber diaphragm *b*, Fig. 1. The main part A is similar in construction to the one shown in Fig. 1. A flexible metallic diaphragm, b^2, is held between the parts B and A, and the joint is made air-tight to prevent the escape of air by the insertion of rubber rings each side of the diaphragm. Through the center of the diaphragm is screwed a small piece, b^3, through which is drilled a small hole fitted with a wire similar to that in the valve C, Fig. 1. A communication is made from the chamber *m*, above the diaphragm b^2, to the through passage-way in A by the port a^3, shown in dotted lines. The part A is provided with a valve, C, seated upon a soft-metal or rubber seat, and beneath this valve is the chamber *n*, having discharge-ports a^1 leading to the atmosphere, as before.

The operation will then be as follows: Air enters the brake-pipe and passes through the port a^3 to the upper side of the diaphragm b^2, passing through the center piece b^3, around the wire b^1 to the reservoir B. When the air is discharged from the brake-pipe, the pressure, acting from the reservoir B on the under side of the diaphragm b^3, raises the valve C from its seat by acting against the valve-stem b^4, and thus permitting the air to escape from the brake-cylinders and brake-pipe around the valve C, and through the ports a^1 to the atmosphere, and the excess of pressure in the reservoir B will leak out as before.

The size of the reservoir may be varied at pleasure, but for most purposes one having from ten to twenty cubical inches of space, more or less, will do the work desired.

The like device may be arranged directly on the brake-cylinder, if so preferred, but that described we believe to be the best.

What we claim as our invention is—

1. In combination with a brake-pipe or cylinder, an air-reservoir, B, arranged to be charged with compressed air while the brakes are being applied, an intermediate valve to be opened by the back pressure of the air in such reservoir when the brakes are being released, and an air-escape port or ports for the escape of the air on the opening of the valve, such valve being opened against the pressure of the escaping air, substantially as set forth.

2. As an attachment for the brake-pipe or cylinder, the piece A, containing a chamber, *n*, with valve C at one end, a reservoir, B, at the other, a communicating charging-port, and an intermediate escape-port, substantially as set forth.

3. In combination with the brake-pipe or cylinder, the reservoir B and air-charging port, a valve, C, arranged intermediate between the reservoir and an otherwise unobstructed source of supply, and closing the escape by air-pressure simultaneously with the application of the brakes and the charging of the reservoir, substantially as set forth.

In testimony whereof we have hereunto set our hands.

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