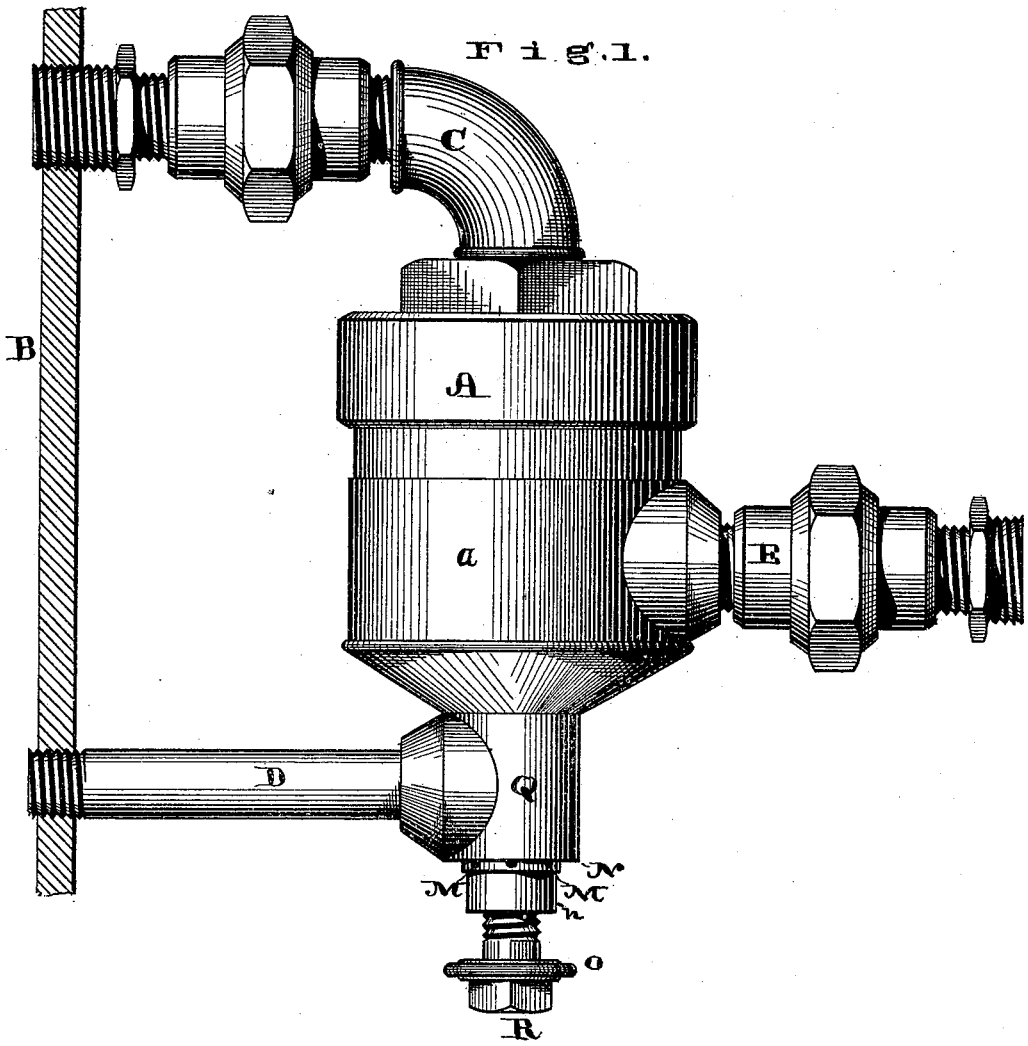
2 Sheets—Sheet 1.

C. CHADWICK.

RELIEF VALVE FOR AIR-BRAKES.

No. 180,460. Patented Aug. 1, 1876.

Fig. 1.



WITNESSES.

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2 Sheets—Sheet 2.

C. CHADWICK.

RELIEF VALVE FOR AIR-BRAKES.

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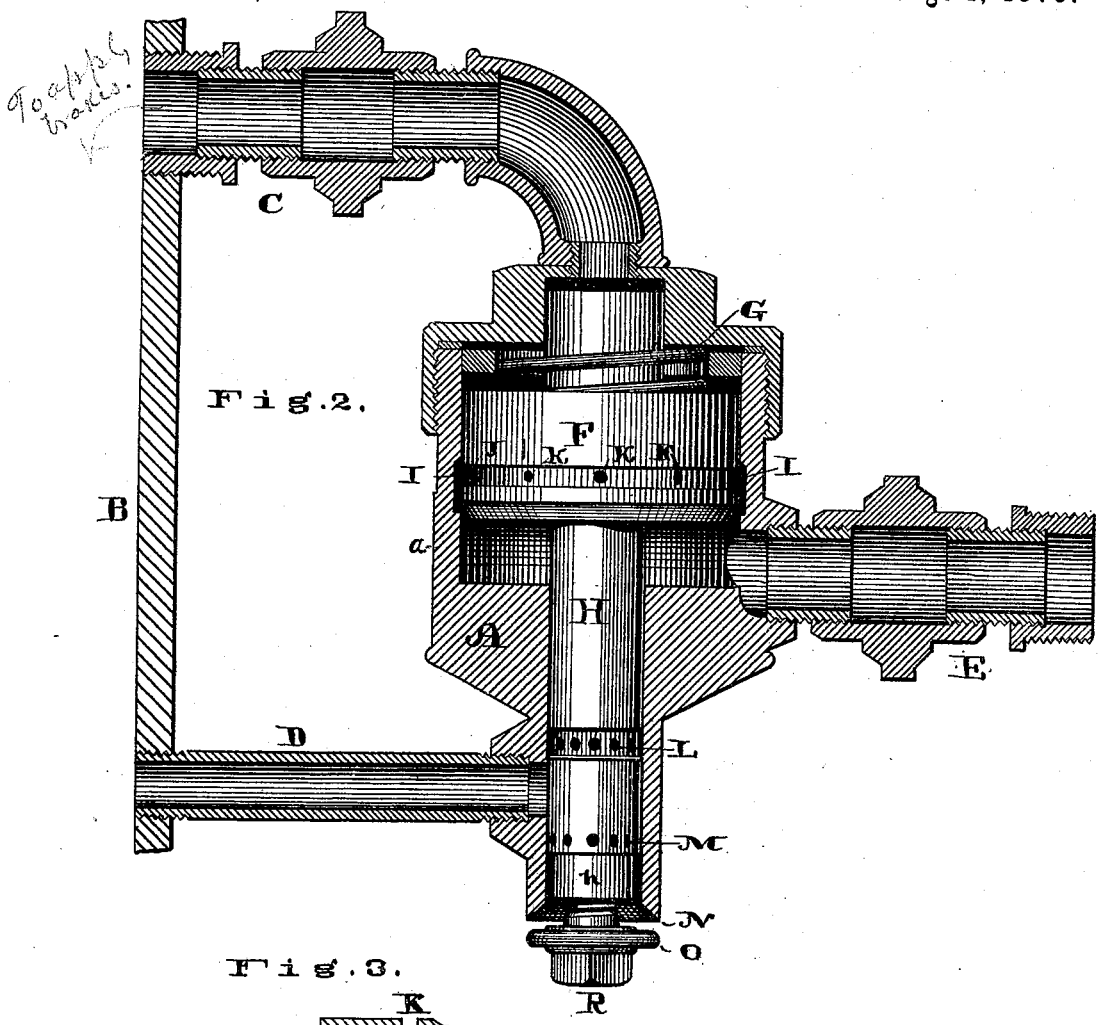

Fig. 2.

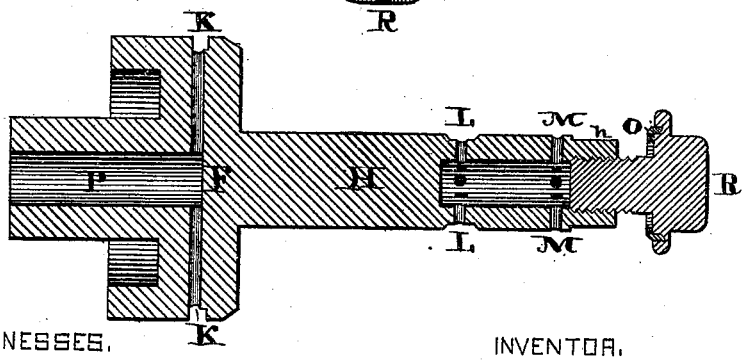

Fig. 3.

WITNESSES.

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D. A. Bowman

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Chas. Chadwick,
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UNITED STATES PATENT OFFICE.

CHARLES CHADWICK, OF HANNIBAL, MO., ASSIGNOR OF PART OF HIS RIGHT TO RICHARD DRANE AND GEORGE A. COE, OF SAME PLACE.

IMPROVEMENT IN RELIEF-VALVES FOR AIR-BRAKES.

Specification forming part of Letters Patent No. **180,460**, dated August 1, 1876; application filed June 3, 1876.

To all whom it may concern:

Be it known that I, CHARLES CHADWICK, a resident of Hannibal, Marion county, State of Missouri, have invented a new and useful Improvement in Relief-Valves for Air Brake Cylinders, of which the following is a full, clear, and exact description, reference being had to the annexed drawing, making a part of this specification, in which—

Figure 1 is a side elevation of the invention; Fig. 2, a sectional elevation, and Fig. 3 a longitudinal section of the valve and stem.

Similar letters refer to similar parts.

Air and steam brakes can, as is well known, be very readily applied. To regulate them, however, after they are applied, and to readily take them off, has hitherto been difficult, although various forms of relief-valves have been designed to effect this purpose. It is the aim of the present invention to provide an improved construction by means whereof such brakes can be more perfectly controlled, and more easily and promptly taken off.

Referring to the annexed drawing, A represents the device. It is, by means of the tubes C and D, attached to the air or steam cylinder B, that is ordinarily arranged under each car of the train. Such cylinder is not shown in full, as its construction is well understood. The air or steam for operating the brakes is supplied through the tube E. The device consists of a valve-chest, *a*, and an extension, Q. The tube C leads from the top of the chest to the cylinder B, and the tube D from the extension Q to the cylinder. A valve, F, and stem H have a vertical reciprocating movement in the chest and extension, respectively. The tube E leads into the chest at the lower part thereof. In the wall of the chest is an annular depression, I. In the valve there is an annular depression, J. From this depression or groove J a series of passages, K K K, &c., lead inward to a central passage, P, which extends upward and through the valve and stem *h'*, and out of the top of the latter. In the top of the valve is a depression, *f*. A spring, G, rests in this depression, pressing below upon the valve, and above against the top of the valve-chest. Suitable packing S is arranged between the valve and chest-top. In the valve-stem H is an annular depression or groove, L, from which a series of passages, L' L', &c., lead inward to a central passage, T, in the stem. The passage T extends downward, and from its lower end a series of passages, M M, &c., lead outward to the periphery of the stem. The latter, at its lower end, *h*, is preferably made of less diameter than the part above. The stem at its lower end is also furnished with a head, R, made in the form of a screw, to enable it to be adjusted to the end of the stem. The head is provided with packing O, which, when the stem is drawn up, comes against the seat N at the lower end of the extension Q, and, operating as a valve, closes the opening in the end of the extension.

The operation of the invention is as follows: To apply the brake air is admitted through the tube E into the chest *a*. This causes the valve F to rise sufficiently for the air to pass from beneath the valve into the depression I in the wall of the chest. It thence passes into the groove J in the valve; thence, through the passages K K, &c., and P, into the tube C, and through the latter into the cylinder B, where it acts upon the piston in the usual way. The depression I is so arranged as to cause it and the groove J to coincide when the valve is raised, as described, and when it is in the position shown in Fig. 2. Meanwhile the stem H has moved sufficiently to interrupt connection between the tube D and the groove L, passages L' L', &c., and to prevent any escape of air from the cylinder through the tube D and stem. At the same time the packing or valve O has come to a bearing upon the seat N and closed the extension Q. In this position the air continues to pass through the tube C into the cylinder until an equilibrium is established above and beneath the valve, for the top and bottom of the valve are of equal area. When this occurs the spring G above the valve acts sufficiently to depress the valve, and, in depressing it, to both close the opening from beneath the valve into the depression I, and also, by bringing the groove L in the stem H opposite the tube D, to provide an opening for the air in the cylinder to escape therefrom, for as soon as the groove L coincides with the tube D the air passes from the tube into the

passages L′ L′, &c., T and M M, &c., and to the open air, for when the groove L is opposite the tube D the openings M M, &c., have fallen below the end of the extension Q. This at once relieves the pressure in the cylinder and upon the brake. It is, however, at once restored by admitting more air through the pipe E.

If desired, the air-supply through the last-named pipe can be cut off and the brake entirely taken off. The action of the device is very prompt, and by suitably managing the air-supply through the tube E the application of the brake is practically brought under perfect control. One of these devices is attached to every cylinder throughout the train. If desired, the arrangement shown in the drawing can be reversed—that is, so that the stem H is uppermost.

The above-described valve, it will be seen, is virtually a balanced valve, and it is especially valuable in operating car-brakes where a peculiarly-sensitive and promptly-acting valve is required. It is equally valuable, however, in delivering and discharging steam, gas, water, or other fluid, and into and from any variety of cylinder or vessel.

What I claim is—

1. The combination of the extension Q, tube D, stem H, groove L, and passages L L, &c., T M M, &c., substantially as described.

2. The combination of the extension Q, seat N, stem H, head R, and valve O, substantially as set forth.

3. The combination of the chest *a*, depression I, valve F, groove J, passages K K, &c., and passage P, substantially as described.

4. The combination, in a relief-valve, of the chest *a*, valve F, and spring G, substantially as described.

5. The combination of the cylinder B, tubes C and D, chest *a*, and extension Q, valve F, spring G, stem H, groove L, passages L L, &c., T and M M, &c., substantially as described.

CHARLES CHADWICK.

Witnesses:

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J. L. LATHROP, Jr.