(No Model.)

R. G. COATES.

AIR BRAKE.

No. 467,921. Patented Feb. 2, 1892.

Fig. 1.

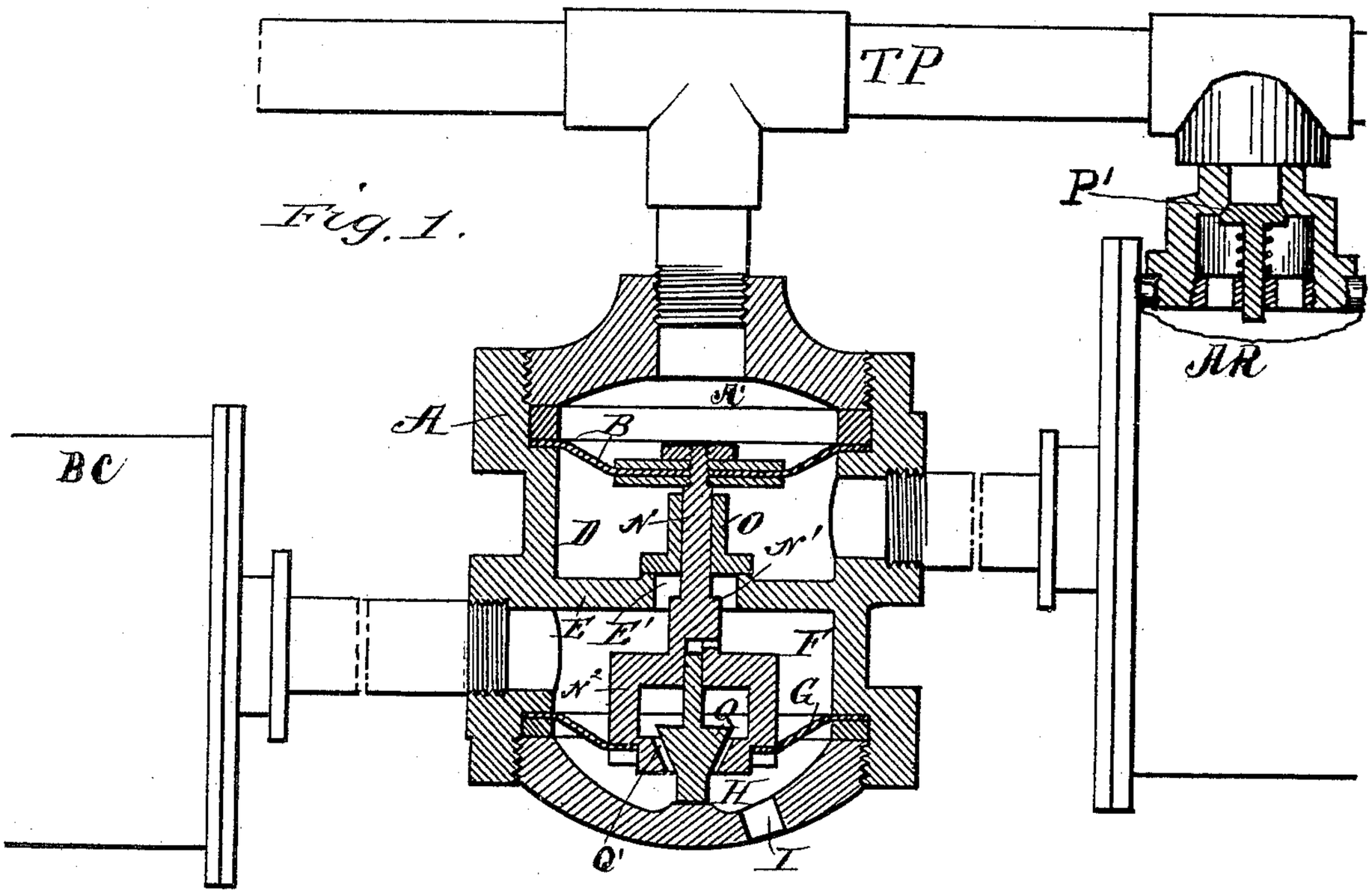
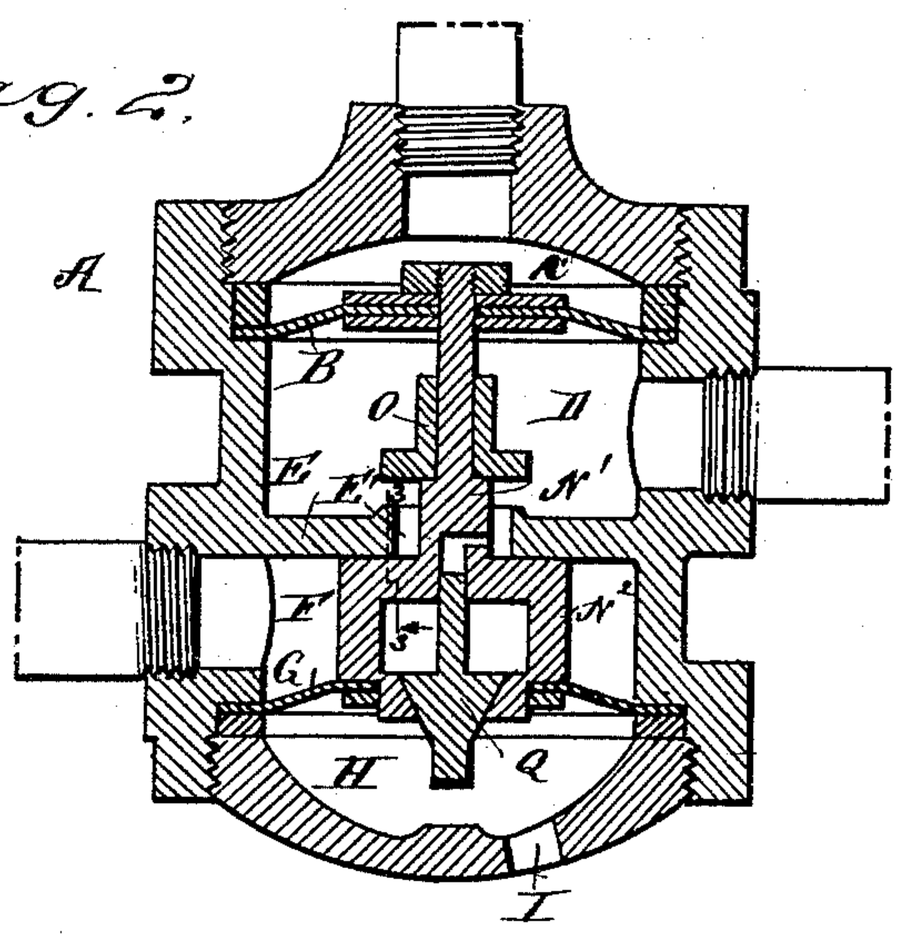


Fig. 2.



WITNESSES:

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Fig. 3.

INVENTOR:

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ATTORNEYS

UNITED STATES PATENT OFFICE.

RAY G. COATES, OF PUNTA ARENAS, COSTA RICA.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 467,921, dated February 2, 1892.

Application filed September 4, 1890. Serial No. 363,917. (No model.)

To all whom it may concern:

Be it known that I, RAY G. COATES, of Punta Arenas, Costa Rica, Central America, have invented a new and useful Improvement in Air-Brakes, of which the following is a full, clear, and exact description.

The invention relates to air-brakes such as are shown and described in Letters Patent of the United States No. 138,827, granted to George Westinghouse, Jr., on the 13th day of May, 1873, and in the application for Letters Patent, Serial No. 354,728, filed by me on the 9th day of June, 1890.

The object of the invention is to provide a new and improved air-brake in which the cut-off and exhaust of the brake-cylinder pressure is controlled by the action of the brake-cylinder pressure and the train-pipe pressure on the one hand and the auxiliary-reservoir pressure on the other hand, each acting on a suitable flexible diaphragm.

The invention consists of a governing or a triple valve provided with an auxiliary diaphragm, subject to the pressure in the brake-cylinder, to assist the pressure of the train-pipe acting upon the principal diaphragm of the ordinary valve in controlling the supply and discharge of the said cylinder for the purpose of maintaining in said cylinder any desirable pressure.

The invention also consists of certain parts and details and combinations of the same, as will be hereinafter more fully described, and then pointed out in the claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement in the position when the brakes are releasing or completely released, and Fig. 2 is a like view of the same in a different position. Fig. 3 is a detail section on line 3 3 of Fig. 2.

The improved governing or triple valve is provided with a casing A, in the upper part of which is arranged a diaghragm B, forming on one side a compartment A′ and on its other side a compartment D, which latter is divided by a partition E from a third compartment F, in which is arranged an auxiliary diaphragm G, forming a compartment H in the lower part of the casing A, the said compartment H being connected by an opening I in the lower cap of the said casing with outer air. The upper compartment A′ is connected with the train-pipe T P, the compartment D is connected with the auxiliary reservoir A R′, and the third compartment F is connected with the brake-cylinder B C. The diaphragm B supports in its middle a valve-stem N, which extends through a valve-seat E′ in the partition E into the compartment F, and on the said valve-stem is fitted to slide loosely a valve O, held in the compartment D and adapted to be seated on the valve-seat. A shoulder N′ on the valve-stem N is adapted to lift the said valve O off the seat E′. On the valve-stem N in the compartment F is formed a fork N^2. In order that said fork N^2 may obstruct the opening E′ as little as possible when the stem N is raised, as shown in Fig. 2, the upper side of the cross-bar of the fork is beveled each way from its longitudinal middle, thus forming, practically, a knife-edge. This construction is only essential, however, when the fork N^2 is used as a stop to limit the upward movement of the stem N. The fork is connected with the auxiliary diaphragm G, previously mentioned, in the middle of the latter being formed a valve-seat Q′, adapted to be closed by a valve Q, serving to connect or disconnect the compartment F with or from the compartment H. A small vent is formed, as shown, between the compartment F and the hole forming the upper guide of the stem of valve Q in order to avoid any resistance to the motion of said valve that might be caused by the air above its said stem. This same result would, however, be attained if the valve-stem were fitted loosely in the hole in which it is guided. Between the train-pipe T P and the auxiliary reservoir A R′ a check-valve P′ is placed and so arranged as to allow pressure to pass from the train-pipe into the auxiliary reservoir, but not in the opposite direction. The train-pipe T P is charged by the engineer in the customary manner. The auxiliary reservoir A R′ is filled through the check-valve P′ and the pressure passes to the compartment D. The diaphragm B is subject to practically an equal pressure on each side and is consequently in equilibrium. The valve O is seated by the pressure of the air in compart-

ment D. This is the normal condition of the valve and the one in which the brakes are released.

In operation, the release of pressure in the train-pipe T P causes the valve-stem N to rise by the action of the pressure in the compartment D against the under side of the diaphragm B, the pressure being supplied from the auxiliary reservoir A R′. The first effect of this movement is to seat the valve Q on its seat Q′, thereby closing the exhaust-opening I. A continued movement of the valve-stem N opens the valve-seat E′ by the upward movement of the valve O, caused by the shoulder N′ of the said valve-stem striking against the under side of the valve O. The seating of the valve Q before the valve O is raised is easily accomplished by the position of the shoulder N′ and also partially by the length of the projecting portion at the lower end of the valve Q. Pressure now passes into compartment F through the opening in the valve-seat E′ (no material obstruction being offered by the cross-bar of the fork N^2 when beveled, as before described) and acts upon the brake-cylinder and also upon the top side of the auxiliary diaphragm G. This force or pressure on the auxiliary diaphragm G acts in the same direction as that in the train-pipe acts upon the main diaphragm B. When the pressure on the auxiliary diaphragm G equals the loss of pressure on the diaphragm B, then the valve-stem N will move downward, thereby cutting off the further increase of pressure in the compartment F, and consequently in the brake-cylinder B C. If the diaphragms B and G are of equal working areas, the rise in the brake-cylinder will equal the loss in the train-pipe. The valve Q does not open in the same movement which closes the valve-seat E′, owing to the loss by the auxiliary diaphragm G of the small area of the upper surface of the valve Q when the latter strikes against the lower cover of the casing A. If now the train-pipe pressure in the compartment A′ is increased, the valve-stem N will move still lower, and by the movement of the auxiliary diaphragm G the valve Q is opened, thus releasing the pressure in the compartment F of the brake-cylinder. This release takes place with the rise in the train-pipe. The arrangement above described is the one preferred, yet the construction may be varied considerably—for instance, the auxiliary diaphragm G may come against the lower valve-cover and the valve Q be fastened to the valve-stem N. It is, however, less delicately arranged and the exhaust does not take place simultaneously with the rise in the train-pipe. The valve Q may be in the side of the casing instead of the diaphragm. Proper connections would then be required. Any of the usual constructions of diaphragms may be used; also any of the customary valves that are suitable for this purpose may be employed, these being details easily changed by any one skilled in this particular art.

I am aware that it is no novelty to regulate the pressure in the brake-cylinder; also that triple valves for this purpose have been made in which the inlet and exhaust valves were loose on the main valve-stem, thereby effecting a result somewhat similar to my device. In these former devices the control of the pressure did not depend upon the utilization of the pressure existing or rising in the brake-cylinder. I am also aware that in triple valves the use of two diaphragms is no novelty.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

In an automatic air-brake, the combination, with an auxiliary air-reservoir, a train-pipe, and brake-cylinder, of the connected casing A, having an apertured partition, a diaphragm B, and auxiliary diaphragm G contained in said casing and subjected, respectively, to the pressures in the train-pipe and brake-cylinder and diaphragm B, also to auxiliary-reservoir pressure, the valve composed of two supplementary valves for admission and discharge of air to and from the brake-cylinder, and a stem connected with the aforesaid diaphragms, whereby the supply and discharge of pressure in the brake-cylinder are controlled, substantially as and for the purpose specified.

The foregoing specification of my new and improved air-brake signed by me this eleventh (11th) day of August, 1890, in the presence of the below-subscribed witnesses.

RAY G. COATES.

Witnesses:
FRANCO. CLAVEROFF,
ONOFRE XATNICH.