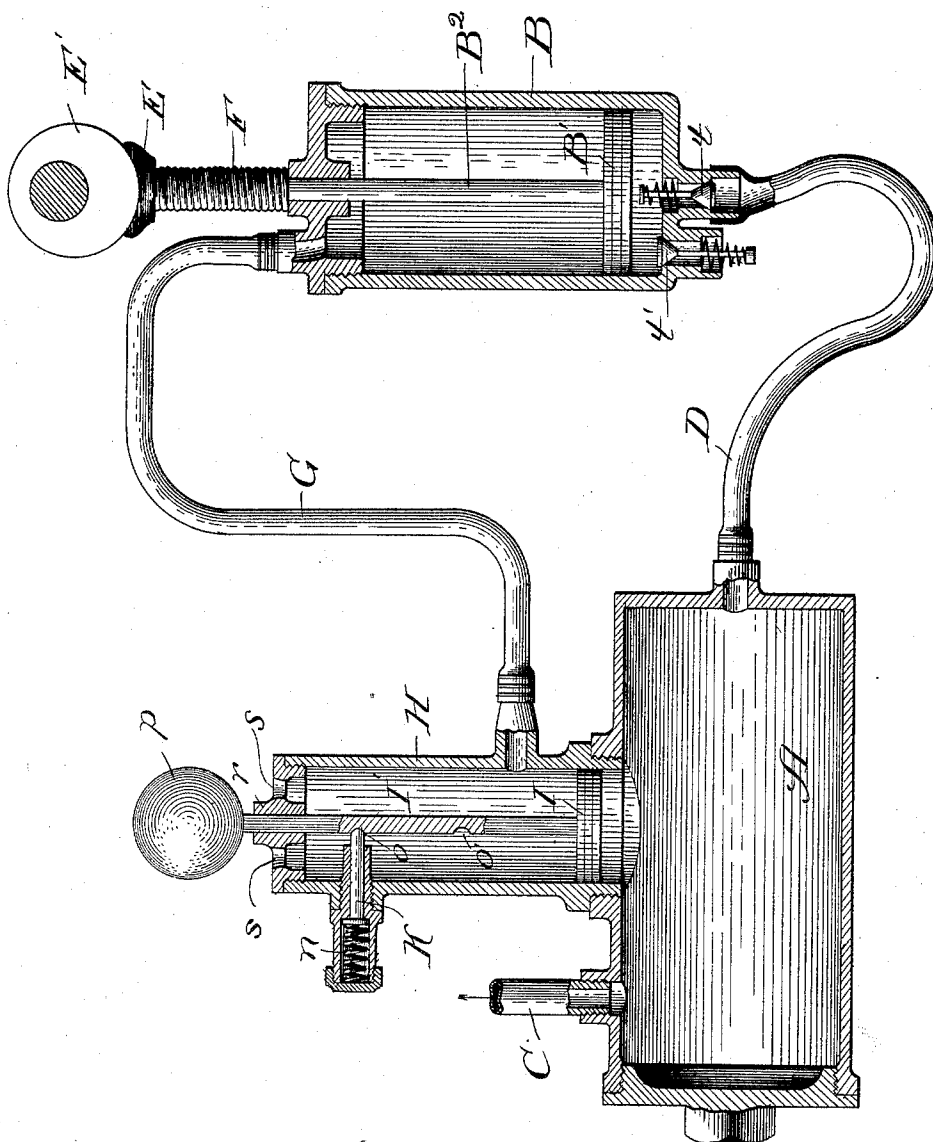


(No Model.)

M. B. MILLS.
AIR PUMP FOR BRAKE MECHANISMS.

No. 476,756.

Patented June 7, 1892.



Witnesses:
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UNITED STATES PATENT OFFICE.

MORTIMER B. MILLS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE MILLS
IMPROVED PNEUMATIC BRAKE COMPANY, OF SAME PLACE.

AIR-PUMP FOR BRAKE MECHANISMS.

SPECIFICATION forming part of Letters Patent No. 476,756, dated June 7, 1892.

Application filed October 5, 1891. Serial No. 407,785. (No model.)

To all whom it may concern:

Be it known that I, MORTIMER B. MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Air-Brake Mechanism, of which the following is a specification.

My invention relates to an improvement in air-brake mechanism for cars, and more particularly to a means for maintaining automatically in the compressed-air receiver a pressure sufficient to operate the brakes.

My invention is in the nature of an improvement upon the apparatus described in a concurrent application of Frank W. Mills, filed August 10, 1891, Serial No. 402,102, involving a mode of operation similar to that device, but differing therefrom in important particulars.

My invention has for its object to provide a means for retaining the pressure in the receiver until the maximum at which the relief-valve is set shall be attained and thereupon to utilize the pressure as a means for counterbalancing, and thus stopping the operation of the pump which feeds air into the receiver.

To this end it consists in the provision on the receiver of a relief-valve which serves in one of its positions to hold the pressure in the receiver while permitting the introduction of air into the pump and in its other position to prevent the admission of external air into the pump.

My invention consists, further, in a catch arranged to engage the valve-stem of the relief-valve and adapted to prevent its movement in either direction until a definite maximum pressure be obtained.

My invention consists, further, in the general and specific details of construction and combination of parts, all as hereinafter set forth.

The drawing illustrates a sectional side elevation of the mechanism to which my invention relates, the brake itself and other well-known parts being omitted to prevent confusion in the view.

A represents the receiver, from which the pipe C leads to the brake in the common manner.

B is the pump-cylinder, communicating with the receiver A through the pipe D. The piston B' has a rod B² extending through the end of the cylinder B, the opposite end of the rod terminating in a shoe E, engaged by an eccentric E', mounted upon or moving with the axle of the car. Between the shoe E and the cylinder B the rod B² is surrounded by a spring F, the normal tendency of which is to retain the piston in an elevated position under the circumstances of the arrangement shown in the figure. It is apparent that the illustrated arrangement may, however, be inverted. The mode of operating the pump is similar to that shown in the concurrent application of Frank W. Mills. In the pipe D is the outgoing valve *t*, and adjacent thereto, in the bottom of the pump-cylinder B, is an ingoing valve *t'* for the common purpose.

From the top of the cylinder B a pipe G leads to the lower side of a relief-valve cylinder H. This cylinder H is open to the air at the top, as shown at *s*, and at its bottom opens into the receiver A, with which the cylinder H may be connected by means of the screw-joint shown. Within the cylinder H a piston I moves, the stem I' of which extends upward through a guide-collar *r* at the top of the cylinder H and is there surmounted by a weight *p*. The combined weight of the piston I, stem I', and weight *p* is nearly equal to the predetermined maximum pressure in the receiver A. The stem I' is notched in two places—*o* and *o'*—for a purpose presently described. Extending into the cylinder H from one side, preferably near the top, is a spring-actuated catch K, the tension of the spring *n* of which is sufficient to retain the point of the catch in one or the other of the notches *o* *o'* until the maximum pressure is attained on either side of the piston I, whereupon the stem may release itself from engagement with the catch at the notch. The distance between the notches *o* and *o'* is about equal to the limit of play of the piston I, which in its uppermost position is above the inlet-pipe G and in its lowermost position below the latter.

The operation is as follows: Assume that a pressure of thirty pounds is determined upon in the receiver A and that a reduction of five

pounds occurs on setting the brakes. While the pressure in the receiver is below thirty pounds the piston I is in its lower position, free communication between the cylinder B and the open air through pipe G is permitted, and the pump-piston is operated by the revolution of the eccentric E'. When the pressure of thirty pounds is obtained and passed, however, the weight of the piston I, stem I', and weight p is overcome, as also is the resistance of the catch K, (increased by reason of the entrance of its point into the upper notch o,) and the piston I is lifted until the notch o' is entered by the catch. The communication between the pump-cylinder B and the outer air through the pipe G is immediately closed, and instead air under pressure from the receiver A enters the pump-cylinder behind the piston B', the pressure being sufficient to overcome the tension of the spring F, and the piston B' is therefore retained near the bottom of the cylinder B until air is again withdrawn from the receiver to permit the piston I to fall. Thereupon the air from above the piston B' in the cylinder B escapes through the pipe G and openings s, permitting the spring F to react and throwing the pump again into operation. It is to be understood that the increased resistance to the movement of the piston I afforded by the catch K when it engages a notch o o', though slight, is positive; but as soon as the catch is freed from the notch the increased resistance is removed, causing the piston to move more rapidly under the pressure behind it. This is an important feature, as it permits the pipe G to be opened or closed with a sudden and quick motion, which is found highly desirable.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a receiver A and a pump for introducing fluid under pressure therein, comprising a cylinder and a piston held to the driving-power, substantially as described, of a passage affording communication between the pump behind the piston and the open air, and a valve operated by the pressure in the receiver and serving to close communication between said passage and the open air and open communication between said passage and the receiver, whereby, according to the amount of pressure in the re-

ceiver, the pressure behind the piston may be normal to permit the pump to operate or equal to that below the piston to cause the same to be balanced, substantially as described.

2. In combination with the receiver, the pump B, having the piston B' and means for operating the same, and a connection between the piston and its driving mechanism, disconnectible on balancing the piston, passage D, leading directly to the receiver from in front of the piston, passage G, leading indirectly to the receiver from a point behind the piston B', and the cylinder H, having communication with the receiver and with the open air, and valve-piston I, moving in said cylinder and exposed to the pressure in the receiver and operating to open and close communication between passage G and the receiver and open air, respectively, substantially as described.

3. In combination with the receiver A, the cylinder H, communicating with the receiver and with the open air, respectively, and having the port shown, piston I, having notched stem I', moving in said cylinder across the port, and catch K, engaging said stem at the notches, the parts being arranged to operate substantially as described.

4. In combination with receiver A, pump-cylinder B, and piston B', connected with and operated by the axle, as described, cylinder H, communicating with the cylinder and open air, respectively, piston I, moving in the cylinder, and passages D and G, affording communication between the pump-cylinder on opposite sides of the piston and the cylinder H and receiver, respectively, substantially as described.

5. In combination with the receiver A, the open cylinder H, the weighted piston I in said cylinder, having the notched stem I', catch K, pump-cylinder B, and piston B' therein, pipe D, leading from said pump to the receiver to convey fluid thereto, and pipe G, affording communication between the cylinders B and H and adapted to be opened and closed by the piston I in its movement, substantially as described.

MORTIMER B. MILLS.

In presence of—

M. J. FROST,
J. N. HANSON.