(No Model.) 2 Sheets—Sheet 1.

L. P. LAWRENCE.

POWER BRAKE.

No. 418,573. Patented Dec. 31, 1889.

Fig. 1

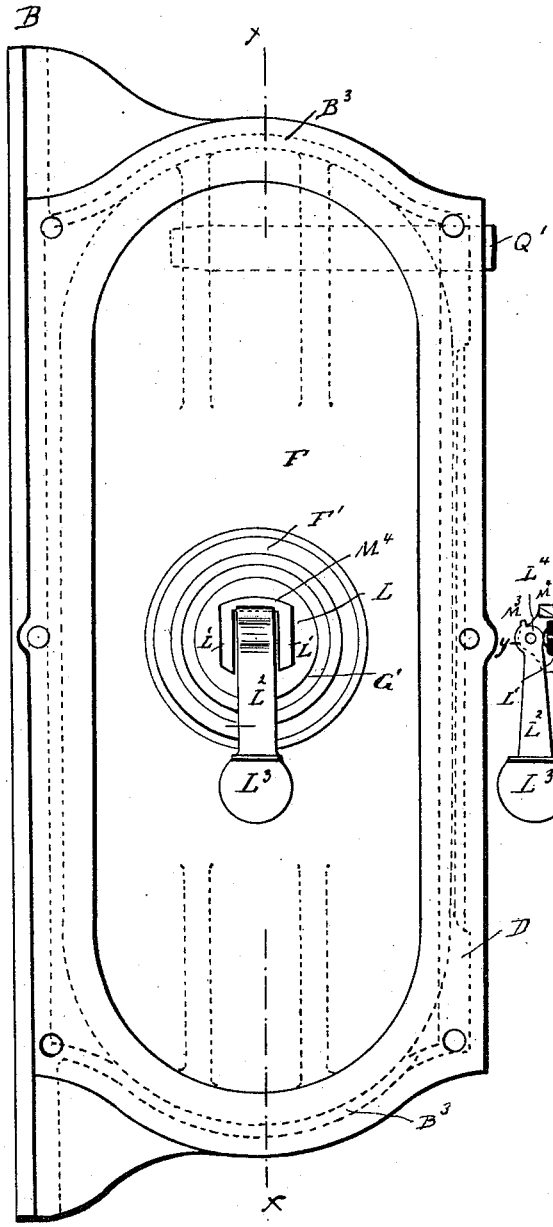
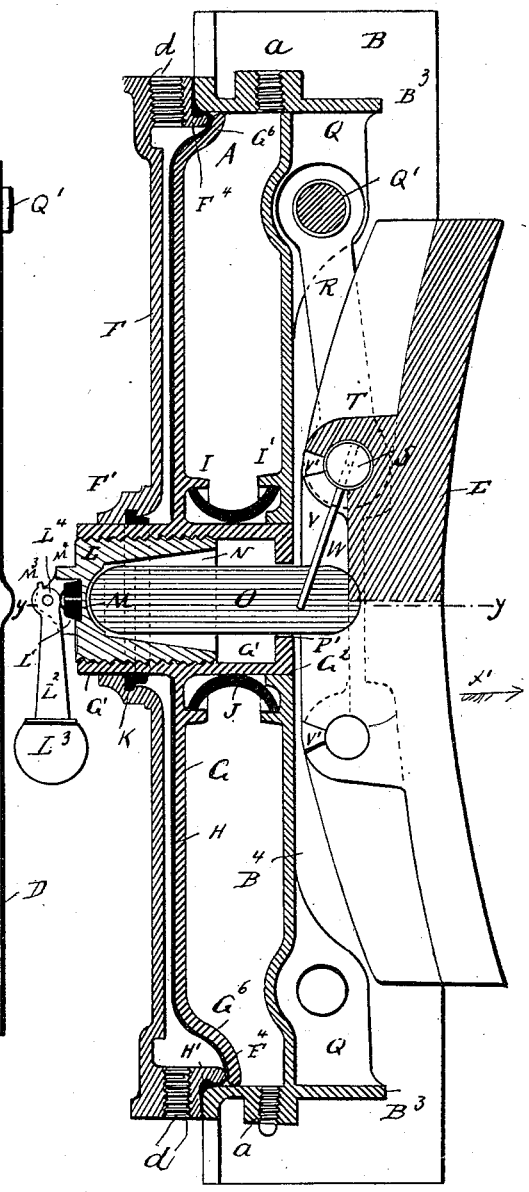


Fig. 2.



WITNESSES:
Henry Huber
Carl Kurz

INVENTOR
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ATTORNEYS

(No Model.)

2 Sheets—Sheet 2.

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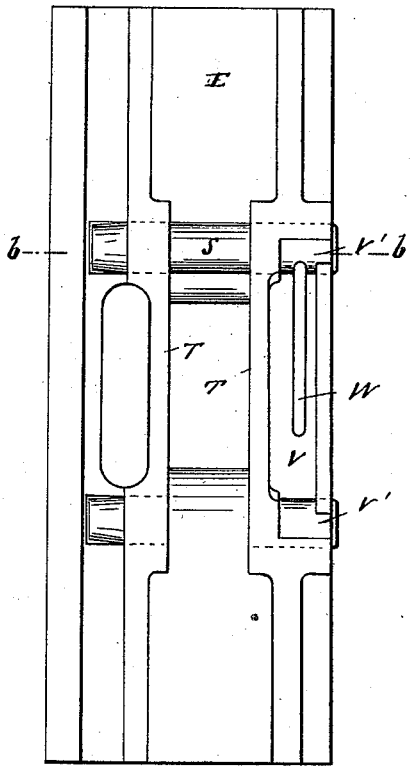


Fig. 3

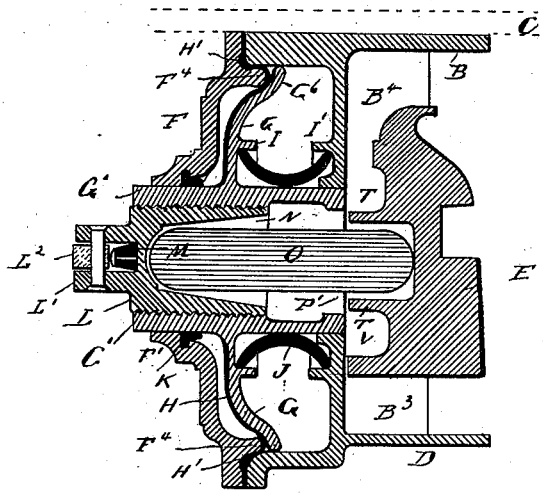
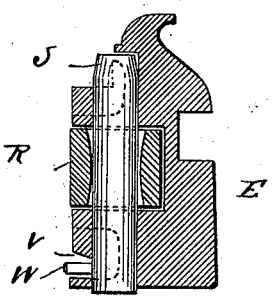


Fig. 5



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UNITED STATES PATENT OFFICE.

LOUIS P. LAWRENCE, OF PASSAIC, NEW JERSEY, ASSIGNOR TO THE LAWRENCE RAILWAY BRAKE COMPANY, OF NEW YORK, N. Y.

POWER-BRAKE.

SPECIFICATION forming part of Letters Patent No. 418,573, dated December 31, 1889.

Application filed March 6, 1889. Serial No. 302,170. (No model.)

To all whom it may concern:

Be it known that I, LOUIS P. LAWRENCE, of Passaic, in the county of Passaic, in the State of New Jersey, a citizen of the United States, have invented certain new and useful Improvements in Power-Brakes, of which the following is a specification.

This invention relates to improvements in that class of brakes for locomotives and cars that are operated by means of a vacuum, compressed air, steam, or any actuating-fluid.

The object of my invention is to provide a brake of this kind which is simple in construction, the parts of which can be readily applied or removed, and which does not subject the locomotive or car-frame or the wheels to any undue or injurious strains.

The invention consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a rear view of my improved power-brake. Fig. 2 is a vertical transverse sectional view on line *x x*, Fig. 1. Fig. 3 is a horizontal sectional view on line *y y*, Fig. 2. Fig. 4 is a rear view of the brake-shoe proper. Fig. 5 is a horizontal sectional view of the brake-shoe on the line *b b*, Fig. 4.

Similar letters of reference indicate corresponding parts.

The brake-cylinder A has greater height than width and has its ends rounded, this shape being given to the same so that the width of the cylinder will not be much greater than the width of the wheel-tire, and the greater height is given for the purpose of having a sufficient area. Said cylinder projects laterally from a plate B, which is bolted or otherwise fastened to the frame C of the locomotive or to a suitable frame or piece on the car or truck.

The cylinder A is provided along its outer edge with a wing D, which is parallel with the plate B. The plate B and wing D are united at the top and bottom by the curved pieces B^3, with which the said plate B and wing D form a compartment B^4 on that end or head of the cylinder facing the rim of the wheel. Between said plate B and wing D—that is, in the compartment B^4—the brake-shoe E is mounted to swing in a manner that will be set forth hereinafter.

The cylinder A is provided with a removable head F, which is bolted on the rear edge of the cylinder, said head being provided with a neck F′, forming a guide-aperture for a neck G′, projecting from both surfaces of the piston G within the cylinder, the front end of said neck G′ being guided in an aperture G^2 in the front head of the cylinder A. A packing-diaphragm H, preferably made of rubber and duck, but which, if desired, may be made of any other suitable material, is provided with a central aperture, through which the neck G′ of the piston G can pass, and along its edges is provided with a bead H′. The edge of the diaphragm H is placed and firmly clamped between the rear edge of the cylinder and the edge of the head F, the diaphragm resting on the rear face of the piston and covering said entire rear surface.

The head F has a rib F^4 on its inner surface along the edge, and the edge of said rib bears on the diaphragm H and presses it against the side of the cylinder, as shown.

The edges of the piston are rounded or curved, as shown at G^6, so that when the piston is back as far as possible the diaphragm H can rest on the same without fold or wrinkle. The diaphragm is so molded or shaped as to have a flat central portion H^5, and having its edge portion curved first in one direction and then in the reverse direction, so as to form a recess H^6, extending along the rim part of the diaphragm between the edge and the above-mentioned flat portion, one side of the recess resting on the rounded or curved part G^6 of the piston. When the piston moves toward the front end of the cylinder, the edge part of the diaphragm leaves the curved part of the piston; but when the piston moves back again the diaphragm will at once resume its snug position. All breaking, cracking, or folding of the diaphragm is thus effectually prevented.

The piston G is provided on its inner face with an annular ridge *l*, and the front head of the cylinder is provided on its inner surface with a like annular ridge *l′*. A heavy rubber packing-ring J, which is meniscus-shaped in cross-section, is passed around the

neck G′ of the piston G, and its edges rest against the annular ridges *l l′*, as shown, the central portion of the inner surface of said rubber ring J resting against the outer surface of the neck G′. The shouldered packing-ring K is placed in an annular groove in the neck F′ of the head F, and rests snugly against the neck G′ of the piston and forms a close and tight joint. The neck G′ is provided with an internal screw-thread, and into said neck the screw-block L is screwed, which is provided on its outer end with two jaws L′ between which a lever L^2 is pivoted, the pivoted end of said lever L^2 being provided with a cam-head L^4, and the opposite end X being provided with the weight L^3 for the purpose of keeping said lever L^2 in vertical position. The cam end of the lever L^2 is provided with a stop-lug M^3, that can abut against a ridge M^4, uniting the jaws L′. Between the jaws L′ a rubber cushion M is fastened by a rivet or otherwise on the outer end of the block L, and bears against the cam end of the lever L^2 to prevent undue swinging of the same. The block L is provided in its inner end with a tapering aperture N, the inner end of which is rounded to receive the rounded end of a push-bar O, the opposite end of which passes through a transverse slot P′ in the front closed end of the sleeve G′, and can bear against the brake-shoe E, as shown in Figs. 2 and 3. The push-bar O and the recess N in the block L form a ball-and-socket joint. The bar O can swing laterally as the shoe swings laterally with the wheel, and said bar is free to move forward and back, and is not positively connected either with the piston or block L or the brake-shoe.

On the front head of the cylinder two lugs Q are formed at the top and bottom, and through a pair of the same a bolt Q′ is passed, which is also passed through an eye formed on one end of a link R, from which the shoe E is suspended by means of a pin S, which also passes through two wings or lugs T on the back of the shoe. As shown in Fig. 2, said wings T have apertures at the top and bottom to permit of reversing the shoe. The bolt S is provided with a pin W, which can swing into a groove V, formed on the back of the brake-shoe, said groove being provided with notches V′ V′, through which said pin W can pass. When the brake-shoe is to be attached, it is held from the front of the cylinder as far as possible and the bolt S passed through the apertures in the wings T and through the aperture in the lower end of the link R, the arm or pin W on said bolt being at right angles to the front of the cylinder, so that it can pass through the corresponding notches V′. When the shoe is then released, it swings down against the front of the cylinder and thereby presses the arm or pin W into the pocket or groove V, thus preventing withdrawing the bolt S. It is thus impossible for the bolt S to become detached accidentally, as the same can only be removed after swinging outward the brake-shoe, turning the bolt until the pin or arm W is at right angles or approximately at right angles to the front of the cylinder, and then withdrawing said bolt.

The cylinder is provided at the top and bottom with a neck *a*, for attaching the pipe, by means of which the air is exhausted, and the head F is provided with necks *d*, to permit the air to enter when the air on the opposite side of the piston is exhausted. In case the brake is to be operated by steam or compressed air or carbonic-acid gas or any other like fluid the pipes are connected with the necks *d*.

The operation is as follows: When the air is exhausted from the space formed between the front of the cylinder and the piston G, the atmospheric pressure presses the piston G in the direction of the arrow *x′* and the push-bar O presses the shoe E against the wheel. At the same time the rubber ring J is compressed and the center part of its inner surface pressed firmly against the outer surface of the neck G′, thus forming an absolutely tight joint. When the vacuum is destroyed, the expansion of the ring J and the weight of the brake-shoe move the piston in the inverse direction of the arrow *x′*. As the brake-shoe wears off, the push-bar O must be moved outward corresponding to the wearing of the shoe. To move the push-bar forward, the screw-block L is turned by means of the lever L^2, so as to move in the direction of the arrow *x′*. In some cases there is not sufficient space to turn the block L when the lever L^2 hangs down from the same. In such cases the lever L^2 is swung outward to be nearly in line with the axis of the block L, it being locked in place by the action of the cushion-spring M on the eccentric or cam part L^4. The stop M^3 prevents swinging the handle-lever L^2 beyond the center. After the block L has been adjusted the handle-lever is swung down and its weighted end L^3 keeps it in a vertical position and prevents accidental unscrewing of the block L. The cylinder can easily be reversed—that is, it can be applied on either side of the locomotive or either side of the wheel, as it is provided at the top and bottom with lugs Q, for hanging the brake-shoe, and provided at the top and bottom with necks for attaching air inlet or outlet pipes.

My improved brake is very simple in construction, as it is composed of few parts, and these in turn are subjected to strains only which are the least injurious. The diaphragm H, which makes the piston absolutely air-tight, is not subjected to any injurious strains, as it at all times rests snugly on the piston G.

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

1. In a power-brake, the combination, with a cylinder having a fixed and a removable head, of a piston in said cylinder, a neck pro-

jecting from said piston and guided in both heads of the cylinder, and a push-bar resting loosely on said piston and against the brake-shoe, substantially as set forth.

2. The combination, with a cylinder, of a piston having a neck guided in both heads of the cylinder, a block screwed into said neck, and a push-bar held loosely in said neck and resting against the back of the brake-shoe, substantially as set forth.

3. In a power-brake, the combination, with a cylinder, of a piston provided with a neck guided in both heads of the cylinder, a screw-block in said neck, a push-bar resting loosely in said screw-block, and a handle-lever pivoted to the outer end of said screw-block and having one end weighted, substantially as set forth.

4. In a power-brake, the combination, with a cylinder, of a piston provided with a neck guided in both heads of the cylinder, a screw-block in said neck, a weighted handle-lever pivoted to the outer end of said screw-block, and a spring acting on the pivoted end of said lever, substantially as set forth.

5. In a power-brake, the combination, with a cylinder having a neck on one head, of a packing-ring in said neck, a piston in said cylinder provided with a neck guided in both cylinder-heads, a screw-block in said piston-neck, and a push-bar held loosely in said screw-block, substantially as set forth.

6. In a power-brake, the combination, with the cylinder, of a piston having a neck guided in said cylinder, and a rubber ring surrounding said neck and bearing against the piston and the inner surface of one cylinder-head, substantially as set forth.

7. In a power-brake, the combination, with a cylinder and a piston having a neck, of a rubber ring, which is meniscus-shaped in cross-section and surrounds the neck on the piston between said piston and one head of the cylinder, substantially as set forth.

8. In a power-brake, the combination, with a cylinder having a guide-opening in one head, an annular projection surrounding said opening on the inner surface of said head, a piston having a neck guided in said opening in the cylinder-head, an annular projection on said piston and around said neck, and a rubber ring surrounding the piston-neck, the edges of said ring bearing against the above-mentioned annular projections, substantially as set forth.

9. In a power-brake, the combination, with a cylinder, of a head provided on its inner surface with a ridge along the edge, and a diaphragm having its edge clamped between the cylinder and its head, the edge of said ridge pressing the diaphragm, near the edge of the same, against the inner side of the cylinder, substantially as set forth.

10. The combination, with a cylinder having an opening in its front, of a piston provided with a neck passing through said opening, one end of said neck being provided with a transverse slot, a push-bar passed through said slot, and a screw-block in the piston-neck, which screw-block has a recess for receiving the inner end of the push-bar, substantially as set forth.

11. In a power-brake, a cylinder made integral with a plate at one side and having a wing at the other side, and pieces uniting said wing at the top and bottom and made integral with said plate and wing, substantially as set forth.

12. In a brake, the combination, with a cylinder, of a piston having a flat portion, a diaphragm in the cylinder, said diaphragm being shaped to have a flat portion resting on the piston and also having a recess along its rim between the said flat portion of the diaphragm and the edge of the diaphragm, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

LOUIS P. LAWRENCE.

Witnesses:
OSCAR A. GUNZ,
FREDK. B. VAN VORST.