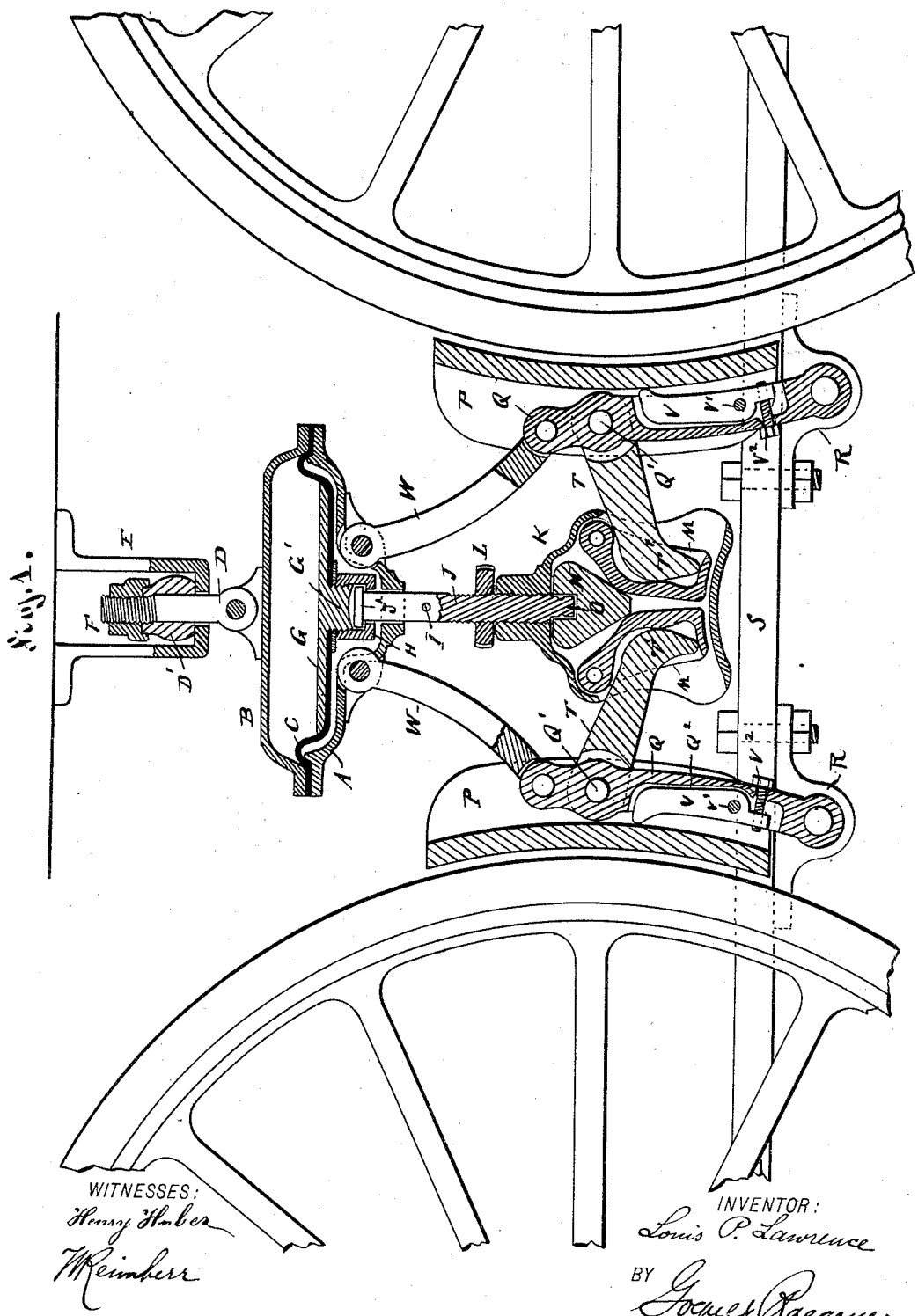
(No Model.)

2 Sheets—Sheet 1.

# L. P. LAWRENCE.

## LOCOMOTIVE BRAKE.

No. 433,414. Patented July 29, 1890.




WITNESSES:
Henry Huber
W. Reimherr

INVENTOR:
Louis P. Lawrence
BY Goepel & Raegener
ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

# L. P. LAWRENCE.

## LOCOMOTIVE BRAKE.

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Fig. 2.

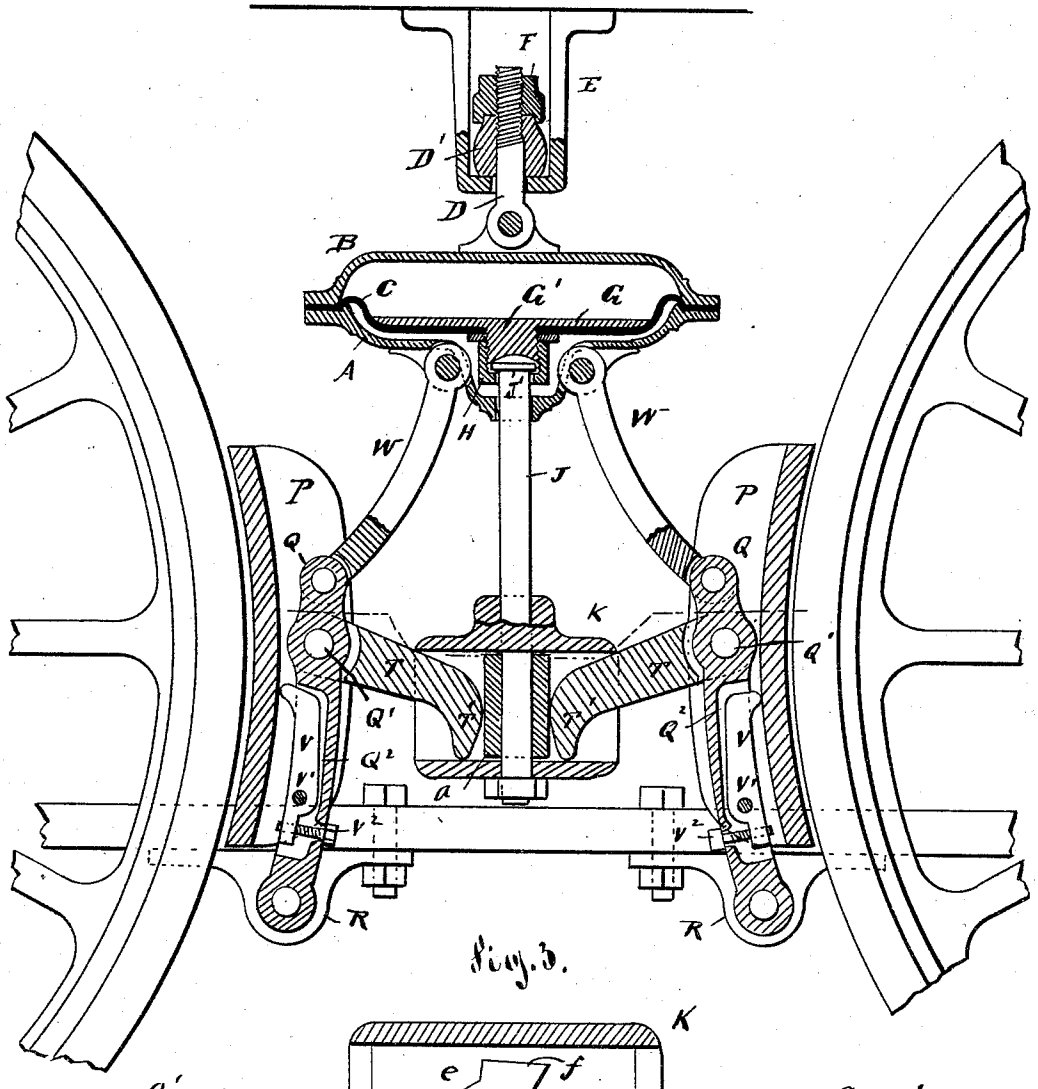
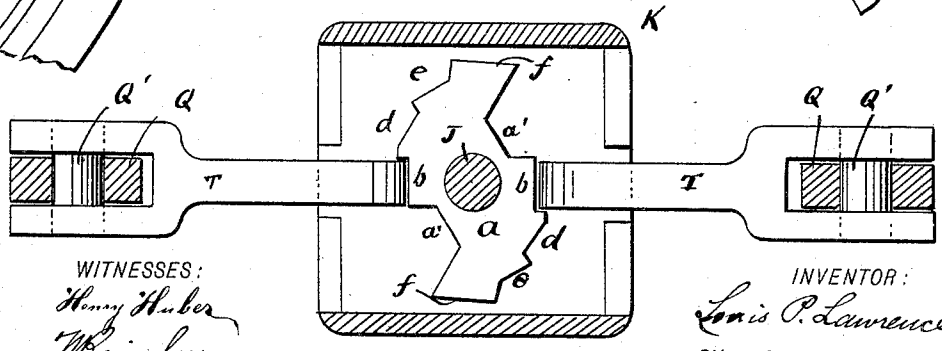



Fig. 3.




WITNESSES:
Henry Huber
M. Reinhart

INVENTOR:
Louis P. Lawrence
BY
Foque & Hagener
ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

LOUIS P. LAWRENCE, OF PASSAIC, NEW JERSEY.

## LOCOMOTIVE-BRAKE.

SPECIFICATION forming part of Letters Patent No. 433,414, dated July 29, 1890.

Application filed January 16, 1890. Serial No. 337,087. (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, have invented certain new and useful Improvements in Locomotive-Brakes, of which the following is a specification.

This invention relates to improvements in power-brakes.

The object of my invention is to provide a power-brake that can be arranged between the vehicle-wheels and is known as a "spread-brake," which improved brake is simple in construction, capable of exerting great power, and which can be easily adjusted to compensate for the wear of the shoes and tires.

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

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of my improved locomotive-brake, parts of the wheels being shown. Fig. 2 is a similar sectional view showing a modified construction of parts. Fig. 3 is a horizontal sectional view of the same.

Similar letters of reference indicate corresponding parts.

The cylinder or chamber A, which is preferably made oblong, but which may have any other suitable shape, is provided with a head or cover B, between which and the cylinder or chamber the diaphragm C is clamped securely. The cylinder or chamber is suspended by means of a bolt D pivoted to the top of the head B and passed into a box E, which is secured to the locomotive-frame and contains a rubber or other spring D′ surrounding said bolt. The upper end of said spring rests against the under side of the nut F screwed on the bolt D. I have described and shown this method of hanging the cylinder in an application filed by me on the 2d day of January, 1890, Serial No. 335,564, and I do not claim it in this application.

The piston G rests on the diaphragm C, and is provided with a downwardly-projecting screw-threaded stem G′, on which the flanged sleeve H is screwed. A pull-rod J, which is passed through the bottom neck of the cylinder or chamber A, is provided at its upper end with a head J′, which is held between the lower end of the stem G′ and the flange of the sleeve H, thus permitting said pull-rod to turn freely on the piston. The lower end of the pull-rod J is screw-threaded, and is screwed into an aperture in the top of a box K.

A lock-nut L on the pull-rod J serves to lock the box K in proper position on the pull-rod. In the upper part of the box K two sockets M M are pivoted in such a manner that they can swing toward or from the transverse plane of the box, the top, bottom, and the inner sides of said sockets being closed and the outer sides facing the ends of the box K being open. A wedge-shaped piece N, which is mounted loosely on the projecting portion O at the lower end of the pull-rod J within the box K, rests on the curved top and inner edges of said hinged sockets M, as shown. The brake-shoes P are pivoted slightly above their centers to supporting bars or levers Q a short distance below the upper ends of said bars or levers, the lower ends of said supporting bars or levers being pivoted to suitable brackets R on the locomotive-frame S. Levers T are mounted to swing on the pivots Q′, by which the supporting bars or levers Q are pivoted to the brake-shoes, the inner ends of said levers T being curved and shaped to form toes T′, which fit in the sockets M hung in the box K. The upper ends of the pivoted supporting bars or levers Q are connected by forked arms W with the cylinder or chamber A. Each supporting bar or lever Q is provided in the edge facing the back of the brake-shoe with a longitudinal recess $Q^2$. In each recess a lever V is pivoted at V′, and through the lower end of each lever V a screw $V^2$ is screwed, which also passes through an aperture in the base or bottom of the recess $Q^2$ and has a head on its end. The upper end of each lever V rests against the back of the shoe a short distance below the pivot, by which the shoe is pivoted to the supporting bar or lever Q. If by means of the screw $V^2$ the lower end of the lever V is moved in the direction away from the back of the shoe, the upper end of said lever V is moved in the re-

verse direction and adjusts the shoe on its pivot Q′ so that it will hang parallel to the wheel-tire.

Instead of resting the ends of the toes T′ formed on the levers T against the pockets M, a double step-shaped cam *a* may be mounted to turn in the box K, and as the shoes and tires wear off the said cam may be adjusted so as to hold the inner ends of the levers T a greater distance from each other.

The operation is as follows: When the brakes are not applied, the parts, are in the position shown in Fig. 1. If the air is exhausted from the cylinder or chamber A the pressure of the exterior air forces the piston G and diaphragm C upward, whereby the pull-rod J is pulled upward, as is also the box K and the pivoted sockets M in the same. Thereby the toe ends of the levers T are pulled upward and their outer ends forced outward, and they in turn force the upper ends of the supporting bars or levers Q toward the wheel-rims and press the brake-shoes P against said wheel-rims. This movement takes place until the shoes P are so tightly applied that the pull-rod J cannot be moved upward any farther. As the air is still being exhausted from the cylinder or chamber, it follows that the entire cylinder or chamber A must move downward, causing the arms W to exert an outward pressure on the upper ends of the pivoted supporting bars or levers Q, whereby the pressure of the brake-shoes against the wheel-rims is augmented to a great extent. When the vacuum is destroyed, the pull-rod J moves downward and the cylinder or chamber A upward, whereby the upper ends of the supporting bars or levers Q are swung from the wheel-rims, and the shoes are also moved from the wheel-rims. As the brake-shoes and wheel-tires wear off, the mechanism must be so adjusted that the shoes are always the proper distance from the wheel-rims. This is accomplished by turning the pull-rod J axially by means of a pin passed into the aperture *l* in said pull-rod or by means of any other device. Thereby the pull-rod J is screwed farther down into the box K, and the wedge-shaped piece N on the lower end of said pull-rod is also forced downward, and acting on the sockets M swings them more or less from each other, whereby the levers T are moved outward, so as to bring the shoes nearer to the wheel-tires. The wedge-shaped piece is gradually lowered in the box in the manner described as the shoes and tires wear off.

No changes whatever are made in the relative lengths or proportions of the arms W, bars Q, or levers T, which is a matter of very great importance, for the reason that if any change were made in the lengths of the several members of the toggle-levers described the operations would be different and the mechanism would not operate as effectively as it does when said members always retain the same proportion in relation to each other. Furthermore, if said members were made adjustable in length it might frequently occur that one member is adjusted to be slightly longer than the corresponding member on the other side, causing an unequal pressure on the two brake-shoes, which in turn would greatly endanger the brake mechanism, as some parts would be unduly strained and would eventually break.

In the mechanism shown in Figs. 2 and 3 the adjustment cannot be made as gradual as in the mechanism shown in Fig. 1. When the brake-shoes and tires are new, the inner ends of the levers T rest against the shortest offsets *a′* of the cams *a*. After the shoes and tires have been worn off to a certain extent, the cam *a* is turned axially and adjusted so that the toes T′ rest against the cams *b*, *d*, or *e*, and so on, until finally the toes rest against the cams *f*, which is the greatest adjustment that can be obtained with this construction. It will be observed, however, that with both constructions the relative lengths of the members of the toggle-levers are never changed. It is only the distance between the inner or toe ends of said levers T and the inclination of the supporting bars or levers and the arms W to the vertical that are changed by the adjustment of the brake.

The above-described brake mechanism can be operated by compressed air, steam, or any other motive-fluid instead of vacuum, but slight changes being required in the mechanism.

If desired, the brake can easily be reversed and the bar or rod J arranged to push instead of pull, the remaining parts requiring no changes.

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

1. In a locomotive-brake, the combination, with a suspended cylinder or chamber, of a diaphragm and piston in said chamber, a rod connected with the said piston, a box on one end of said rod, brake-shoes, bars or levers on which the brake-shoes are hung, which bars or levers in turn are pivoted to the locomotive-frame, levers extending from the bars on which the brake-shoes are hung into the box, and means for adjusting the inner ends of said levers in the box a greater or less distance from each other, substantially as set forth.

2. In a locomotive-brake, the combination, with a brake-shoe, of a pivoted supporting-bar on which the brake-shoe is hung, a lever pivoted on said brake-shoe-supporting bar and having one end rested against the brake-shoe, and a screw acting on the opposite end of said lever, substantially as set forth.

3. In a locomotive-brake, the combination, with a cylinder or chamber, a diaphragm, a piston, and a rod connected with said piston, of brake-shoes, supporting bars or levers pivoted to the locomotive-frame and to the brake-shoes, push bars or levers pivoted to the brake-shoes, a box supported on one end

of the rod connected with the piston, in which box the inner ends of said push bars or levers rest, and arms pivoted to the cylinder or chamber and to the supporting bars or levers on which the brake-shoes are hung, substantially as set forth.

4. In a brake, the combination, with a rod, of a box on the same, bars or levers pivoted to a frame, push bars or levers pivoted to said bars or levers on the frame, the adjacent ends of which push bars or levers are in the said box, and means for adjusting the ends of the push-bars within the box a greater or less distance from each other, substantially as set forth.

5. In a brake, the combination, with a cylinder or chamber and a bar operated from the same, of a box screwed on one end of said bar, a wedge-shaped piece on the end of the bar within the box, pivoted sockets within the box, on which sockets the wedge-shaped piece rests, and push bars or levers having their ends rested in said sockets in the box, and of levers or bars with which the outer ends of said push bars or levers are connected, 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:
EDWARD C. MOORE,
FRANK D. SKEEL.