

**Patented Nov. 11, 1879.**

This diagram illustrates the mechanical components of a printing press. The main frame consists of a large rectangular body labeled *B*. At the top, a horizontal bar is labeled *h*, with a handle or lever labeled *h'* attached to it. A vertical rod or lever is labeled *h<sup>2</sup>*. On the right side, a horizontal bar is labeled *h<sup>3</sup>*. A large, curved lever or arm is labeled *g<sup>3</sup>*. A horizontal bar is labeled *c*, and a vertical bar is labeled *d*. A small, rectangular component is labeled *a*, with a handle or lever labeled *a'*. A small, circular component is labeled *c'*. A small, rectangular component is labeled *b*. A small, circular component is labeled *d'*. A small, rectangular component is labeled *d<sup>2</sup>*. A small, circular component is labeled *g*. A small, rectangular component is labeled *g<sup>2</sup>*. A small, circular component is labeled *h<sup>2</sup>*. A small, rectangular component is labeled *h<sup>3</sup>*. A small, circular component is labeled *h<sup>4</sup>*. A small, rectangular component is labeled *f*. A small, circular component is labeled *g*.

Saml. R. Surges  
J. B. Holderby

John Hickey<sup>INVENTOR</sup>

By R.O. & A. Lacey ATTORNEYS:

# UNITED STATES PATENT OFFICE.

JOHN HICKEY, OF SHEBOYGAN, WISCONSIN.

## IMPROVEMENT IN STEAM-BRAKES FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. **221,562**, dated November 11, 1879; application filed January 29, 1879.

### *To all whom it may concern:*

Be it known that I, JOHN HICKEY, of Sheboygan, in the county of Sheboygan and State of Wisconsin, have invented certain new and useful Improvements in Steam-Brakes for Locomotives; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention has for its object to improve the steam-brake described and patented to me in Letters Patent dated May 7, 1878, and numbered 203,454; and it consists in the novel arrangement of the cylinder and the several rods and bars, whereby I am enabled to secure a direct action of the piston on the brake mechanism of the tender, and whereby the action on the driving-wheel brakes is nearer direct than it was in my former patent; and it consists, further, in a stop mechanism under the control of the engineer, whereby the action on the driving-wheel brakes may be stopped and the brakes of the tender alone operated.

In the drawings, Figure 1 is a side elevation of a portion of a locomotive with my improved brake mechanism attached thereto, and in which the equalizing-bar *b*, to which the piston-rod is attached, is turned slightly out of its normal position in order to show it more plainly in its connections; and Fig. 2 is a plan view of the same, with the foot-board of the locomotive removed.

In my former patent I employed a cylinder supported in a vertical position. The piston-rod connected with an equalizing-bar, the ends of which were again connected with two rock-shafts or angle-levers, which were further connected with mechanism reaching to the brakes of both engine and tender. This arrangement I found to be complicated and expensive, and in order to simplify and cheapen the device, and at the same time preserve and better the effective working of the mechanism, I have devised the present invention.

In this invention I have placed the cylinder in an inclined position, whereby I secure all the benefits of the gravity of the piston and the necessary facilities for the perfect drainage of all water of condensation.

The equalizing-bar *b*, to which the piston-rod *a'* is attached, and the rod *c*, which extends to and operates the tender-brakes, are arranged to move in a nearly direct line with the stroke of the piston. I then employ a vertical rocking arm, *d*, the upper end of which is on the same horizontal plane with the one end of the horizontal equalizing-bar *b*, while its lower end extends downward till it is on the same plane with the stroke or line of movement of the equalizing-bar *c* and the rods *f*.

It will be seen that the arrangement here given dispenses with one rock-shaft, as employed in my former patent, gives a direct action on the tender-brakes, and gives a much better action on the engine-brakes.

*a* is the cylinder, which is placed below the foot-board *g*, and has its head arranged toward the tender and inclined downward, so as to bring the stroke of the piston and the movement of the tender-brake rod *c* in the same line—a result which cannot be obtained with the ordinary horizontal or vertical cylinder.

*b* is the equalizing-bar, to which is attached the piston-rod *a'*. It is placed in the horizontal position shown, and moves longitudinally with the piston-rod *a'* and the piston in the cylinder *a*. To one end of the bar *b* is attached the rod *c*, which extends to and actuates the brakes on the tender. To the other end of the bar *b* is connected, by the link *c'*, the upper end of the vertical rocking arm *d*.

The rock-shaft *d* is made straight, and is journaled in the hangers *d'*, and has its upper end on a line with the horizontal bar *b*, and in line with the stroke of the piston, and has its lower end extended downward to a point in line with the bar *c* and rods *f*.

By the arrangement hereinbefore stated, I secure a direct and an indirect action from the single movement of the piston. The two actions or movements are made in opposite directions and in right lines, without the inter-

vention of the bell-crank levers or rock-shafts shown in my former patent.

$g$   $g$  are stops by which the bar  $e$  may be locked, so that the force of the piston, when desired, may be exerted only on the tender-brakes. I employ two of these stops, arranged at the opposite ends of the main equalizing-bar  $e$ , though only one could be used by placing it so that it would grasp the bar  $e$  at the center.

These stops are secured on a pivot, so that they may be turned readily up or down, as required. They are connected by a rod,  $g'$ , to which is attached the vertical rod  $g^2$ , which extends above the foot-board  $g^3$ , and is provided with a suitable handle, by which it may be drawn up or pushed down at the will of the engineer.

By moving the rod  $g^2$  in the proper direction, the stops  $g$  will engage and hold fast the bar  $e$ , and as a result the intermediate mechanism, connecting with the end of the bar  $b$ , will be locked, thus providing a fixed point on which the end of said bar  $b$  will turn. In this case the action of the piston will be exerted wholly on the rod  $c$ , and set only the tender-brakes.

It is often necessary to do very little braking, as in switching cars and other light work, and in such instances it is very advantageous to relieve the driving-wheels of the engine.

$h$  is a three-way cock placed in the cab, where it may be under the control of the engineer, and connected with the boiler  $B$  by the pipe  $h'$ , through which steam is received for the operation of the piston in the cylinder  $a$ .

$h^2$  is a pipe connecting the steam-cock  $h$  with the cylinder  $a$ . It is carried vertically downward through the foot-board  $g^3$  and below the cylinder, and is connected with the latter by having its end bent upward and inserted through the lowest part of the head thereof, as shown.

The pipe  $h^2$  is provided at its lowest elbow or turn with the relief valve or cock  $h^3$ , by which all water of condensation escapes from it and from the cylinder  $a$ .

$h^4$  is the exhaust-pipe, which is carried from the cock  $h$  vertically downward to the under side of the foot-board  $g^3$ , as shown.

In the three-way cock  $h$ , having the inlet-pipe  $h'$  and exhaust-pipe  $h^4$  and the pipe  $h^2$  carried below and bent upward and into the head of the inclined cylinder  $a$  at the lowest point of the latter, and having the drain-valve  $h^3$  arranged to drain both the cylinder  $a$  and the pipe  $h^2$ , I have a means for operating the brakes which will be kept in perfect working order at all times, and whereby the engineer will have perfect control over the said brakes, the pipes and cylinders will be kept dry, and the piston will respond to the slightest pressure of steam which may be let on through the cock  $h$  and pipe  $h^2$ , so that I am enabled to give to the brake-shoes a lighter touch or contact

with the wheels than can be done where a greater quantity of steam must be let on in order to first overcome the friction caused by imperfectly-drained cylinder and pipes.

By opening the exhaust  $h^4$  the brakes can be released instantly or gradually, as may be desired.

While in the construction and arrangement of my brake mechanism I couple the rod  $a'$  at the center of the bar  $b$ , yet it will be readily understood that the coupling of said rod and bar may be at a point away from said center and nearer to one end or the other, as may be desired.

The bar  $b$  can have a series of holes formed through it, so that the coupling, at any given point, can be effected with little inconvenience.

The object of changing the point of coupling is to increase or diminish the power or pressure exerted on the tender-brakes.

I also employ a governing or regulating valve,  $i$ , which is screwed into the cylinder-head or steam-pipe, for the purpose of preventing more pressure on the brakes than is intended or necessary.

The bore of the cylinder and the length of the brake-levers are got out with a view to do proper brake-work with steam at one hundred pounds pressure to the square inch in the boiler.

The pressure in locomotive-boilers varies much, often rising as high as one hundred and thirty pounds to the inch. The brake-levers being constructed to do work at one hundred pounds, and the actual pressure being one hundred and thirty pounds, and being admitted to the cylinder and brakes, damage might and probably would result by the sliding of the wheels.

My governing-valve will prevent accident from occurring in the manner indicated.

All pressure above that for which the cylinder and brake mechanism are specially constructed is relieved or prevented by the escape of steam from the valve  $i$ .

The valve  $i$  acts to the brakes as the safety-valve does to the steam-boiler.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a locomotive steam-brake, the combination, with the locomotive and brakes, of the cylinder, having a piston therein, and located directly under the deck or foot-board, and having the piston-rod attached to the center of an equalizing-bar, the ends of which are connected to the brake mechanism of both engine and tender, substantially as set forth.

2. The combination, with the inclined cylinder  $a$  and rod  $a'$ , equalizing-bar  $e$ , with its rods  $f$ , and connecting-rod  $d^2$ , of the equalizing-bar  $b$ , rod  $c$ , extending to the tender-brakes, link  $c'$ , and vertical shaft  $d$ , journaled

in hangers *d'*, and having its upper end in the plane or line of stroke of the piston and its lower end in the plane or line of movement of the bar *e*, substantially as and for the purposes set forth.

3. The stop or locking mechanism *g*, arranged in combination with the brakes of a locomotive engine and tender, and under the control of the engineer, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN HICKEY.

Witnesses:

JAMES M. CLEMENTS,  
JAMES BELL.