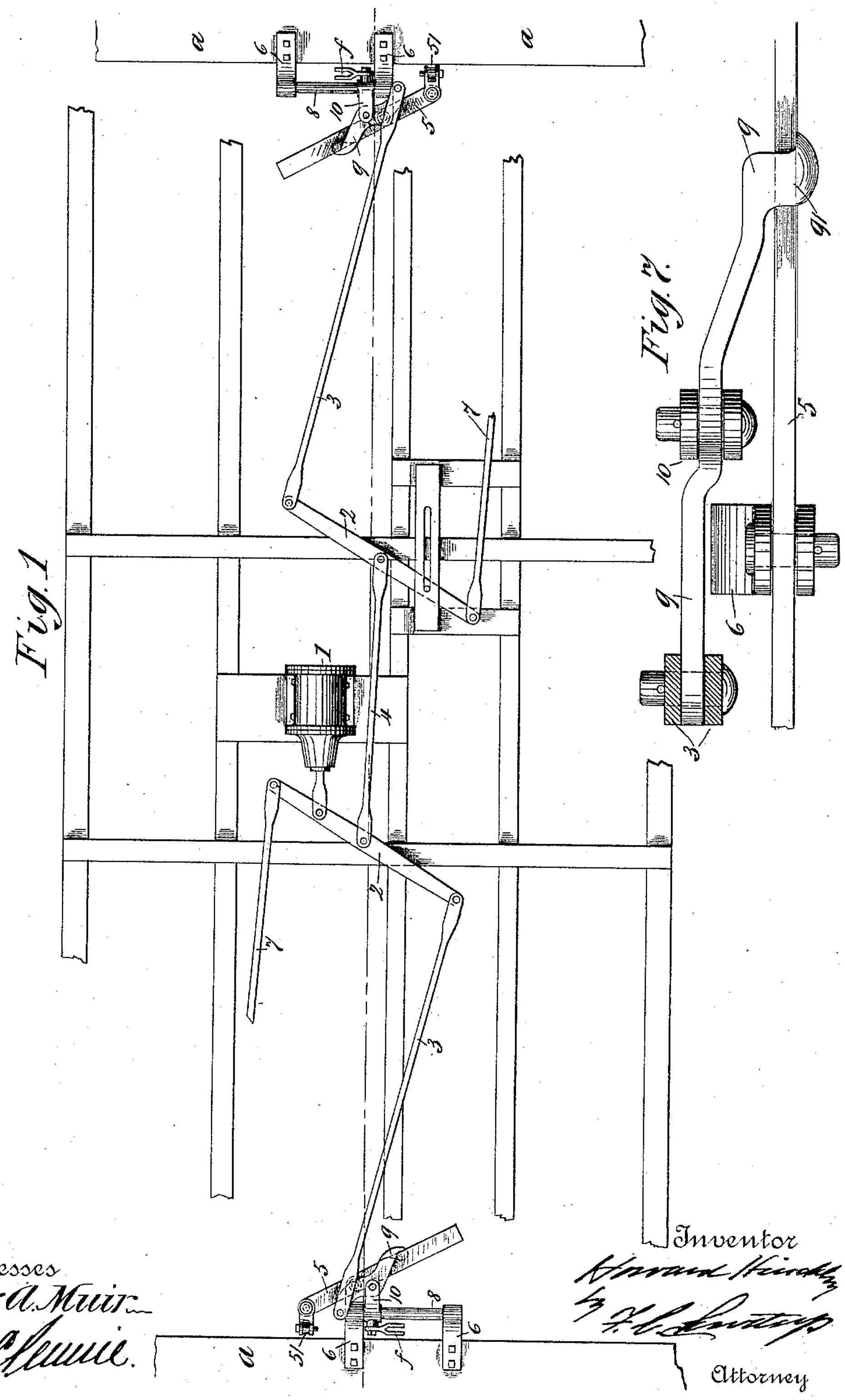
(No Model.) 3 Sheets—Sheet 1.

H. HINCKLEY.

PRESSURE REGULATOR FOR RAILWAY BRAKES.

No. 468,619. Patented Feb. 9, 1892.



Witnesses
Edw. A. Muir.
John C. Rennie.

Inventor
Howard Hinckley
by H. C. Lunday
Attorney

(No Model.) 3 Sheets—Sheet 2.

H. HINCKLEY.

PRESSURE REGULATOR FOR RAILWAY BRAKES.

No. 468,619. Patented Feb. 9. 1892.

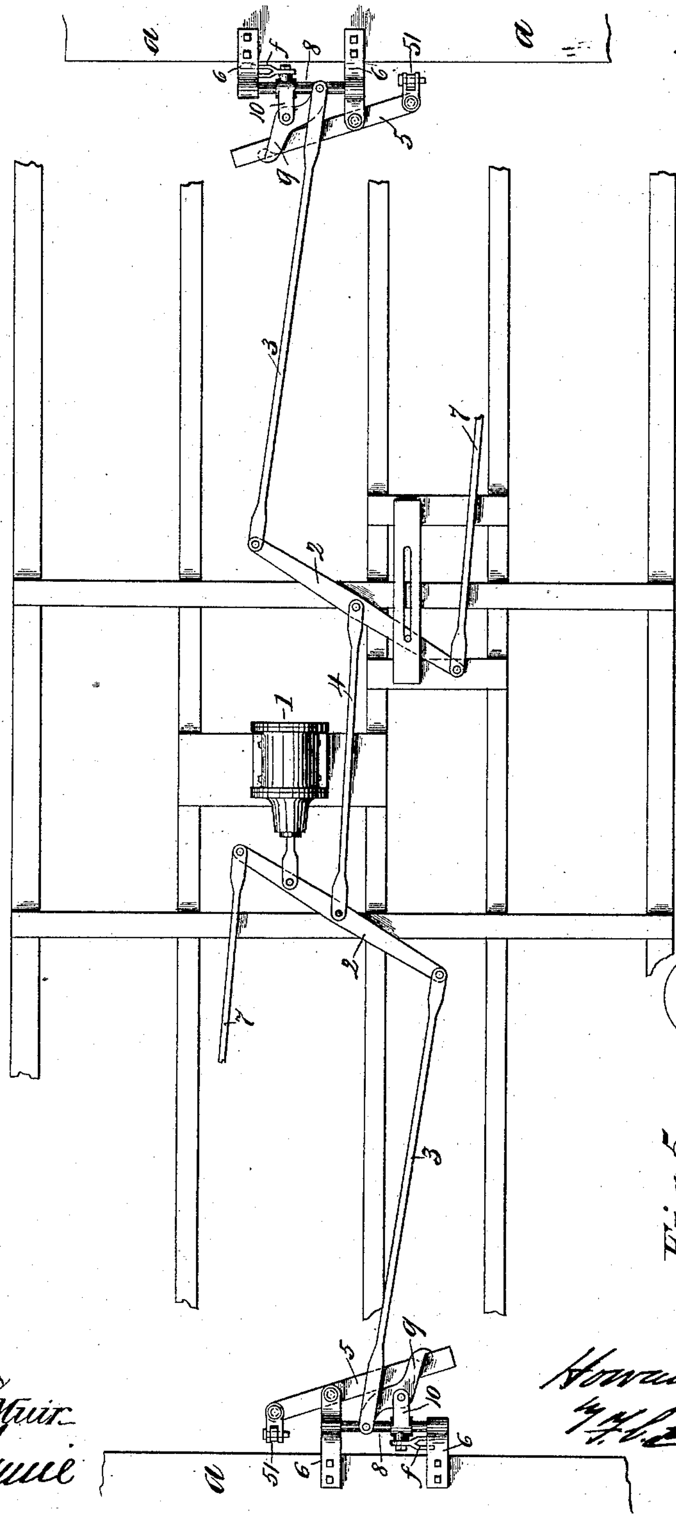


Fig. 2.

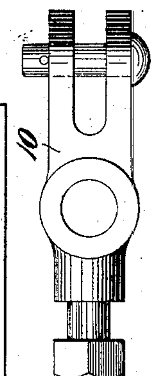


Fig. 6.

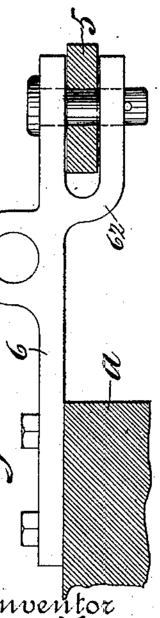


Fig. 5.

Witnesses
Edw. A. Muir.
[signature]

Inventor
Howard Hinckley
by [signature]
Attorney

(No Model.) 3 Sheets—Sheet 3.

H. HINCKLEY.

PRESSURE REGULATOR FOR RAILWAY BRAKES.

No. 468,619. Patented Feb. 9, 1892.

Fig. 4

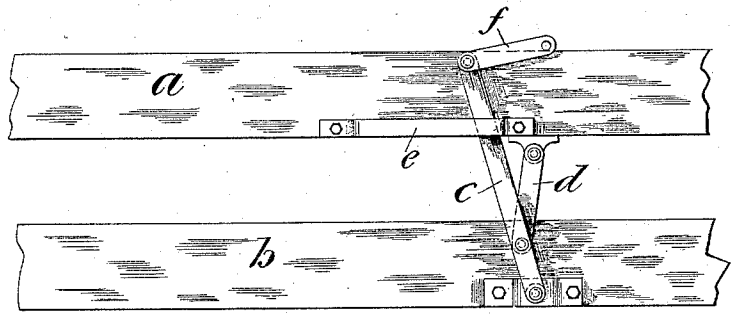
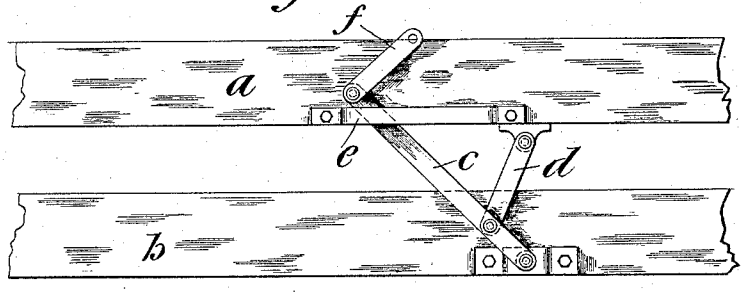


Fig. 3.



Witnesses
Edw. A. Muir.
John C. Purvis.

Inventor
Howard Hinckley
by F. P. Dewey
Attorney

UNITED STATES PATENT OFFICE.

HOWARD HINCKLEY, OF TRENTON, NEW JERSEY.

PRESSURE-REGULATOR FOR RAILWAY-BRAKES.

SPECIFICATION forming part of Letters Patent No. 468,619, dated February 9, 1892.

Application filed September 17, 1890. Renewed July 20, 1891. Serial No. 400,062. (No model.)

To all whom it may concern:

Be it known that I, HOWARD HINCKLEY, a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Pressure-Regulators for Railway-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention has particular relation to automatic power-actuated brakes; and its object is to provide certain new and improved means for automatically regulating the pressure of the brake-shoes on the wheels proportionately to the varying weight and momentum of the car.

It is well understood that in order to operate effectually the maximum pressure of the brake-shoes should approximate a given relation to the maximum weight of the car. In those systems where the brake-power is constant it is therefore necessary to adjust it with relation to the maximum weight of the car, the result of which is that when the pressure is properly proportioned to the work it has to do when the car is loaded it will be altogether out of proportion to what it has to do when the car is empty, being often so much in excess of what is actually needed that the rotation of the wheels is stopped and the car is dragged along, the fixed wheels sliding over the rails and becoming worn away and flattened in places.

It is to overcome this objection that my present invention is more especially designed; and it consists, generically, in causing the primary lever to exert a variable leverage upon the live lever, the mechanism for varying this leverage being controlled by the varying vertical positions of the car under the weight of different loads. Specifically the invention consists in the organization and arrangement of parts hereinafter described and shown.

In an application filed by me September 19, 1890, Serial No. 364,900, I have shown and described a mechanism which in its generic features is similar to this. In that case the connecting-link between the primary and live levers is divided and a pivoted regulating-lever is interposed between its ends. In the present embodiment of the invention, instead of dividing the connecting-link, I connect one end of the regulating-lever, the other end being connected with the ordinary link from the primary lever by intermediate devices, which are shifted along the lever as the car rises and falls under its varying loads.

In the accompanying drawings, Figure 1 is a bottom view of a car, showing my invention applied to the well-known Westinghouse air-brake, the parts being in the position assumed with an empty car and brakes off. Fig. 2 is a similar view, the car being loaded. Figs. 3 and 4 are details of the truck, showing the shifting-lever. Fig. 5 is a detail of the bracket in which the secondary lever is pivoted. Fig. 6 is a detail of the lever-carriage, and Fig. 7 a detail showing the relative arrangement of the regulating and secondary levers.

In the several views like numerals and letters denote the same parts.

1 indicates the primary brake-actuating mechanism, in this instance the cylinder of the Westinghouse compressed-air system. Any other type of mechanism for applying the power to the primary lever may, however, be employed, and, so far as the present invention is concerned, may be regarded as the equivalent of that shown.

2 denotes the primary levers, connected together by the link 4, as usual. One of these levers is, as usual, connected directly with the brake-actuating mechanism.

7 denotes the ordinary rods leading to the hand-brakes.

So far the construction and arrangement of parts do not differ from well-known systems now in common use in this country.

Instead of dividing the link which connects the primary and live levers midway of its length into two parts and interposing a pivoted regulating-lever of the second or third order between the parts, as in the application referred to, I leave the link intact and disconnect its end from the live lever and interpose a pivoted regulating-lever of the first order between the end of the link and the live lever. In this case, as the regulating-lever is connected directly with the live lever, I find

it convenient to pivot it to the bolster of the truck, as shown, though it may be pivoted to any other part.

I will now describe the connection between the end of the link and the regulating-lever, as well as the shifting mechanism by which this connection is adjusted at different points along the lever, so as in effect to lengthen or shorten the lever itself. 6 6 are two parallel brackets rigidly secured to the bolster *a*, or where the cross-frame is used to the latter and projecting inwardly toward the center of the car. In their outer ends these brackets carry the rod 8, which may be round or angular, and one of the brackets is provided with a forked extension 62, as shown in Fig. 5, in which is pivoted the regulating-lever. Other means, however, may be provided for pivoting this lever. Upon the rod 8 is arranged the sliding fulcrum-piece 10, constructed as shown in Fig. 6 of the drawings. In the forked inner end of this fulcrum-piece is pivoted about midway of its length the auxiliary lever 9. One end of this lever is directly connected with the link 3, leading to the primary lever, and the opposite end has a sliding connection with the regulator-lever. The form of this auxiliary lever is shown in Fig. 7. It may, however, be of any other suitable shape or construction adapted to the particular arrangement and relative location of the parts. Its forward end is provided with a downward bend 91 and a horizontal lip, which latter underlies the regulating-lever and prevents the accidental disengagement of the two, yet allows sufficient play between the parts. This auxiliary lever might, however, be provided with a slot or yoke, through which the regulating-lever would be passed. The end of the live lever is shown at 51 in the drawings, and the connection between it and the regulating-lever is made by a swivel-link or other double-jointed connection.

The means for shifting the fulcrum-piece 10 on the guide-rod 8, and the consequent adjustment of the bearing of the auxiliary lever 9 upon the regulating-lever, is as follows: Upon the spring-plank *b* of the truck I pivot a lever *c*. In this case the lever is arranged to swing in a plane parallel with the plank instead of at right angles thereto, as in the application above referred to. It is operated, however, by practically the same means as in the other case—namely, a link *d* connecting it with the overlying bolster, so that as the latter is depressed by the weight of the load it will swing the lever down and cause it to be carried back again as the bolster rises upon the lightening of the load. A metallic strap *e* on the bolster *a* forms a guide for the lever to keep it in proper position. By arranging this lever to swing parallel with the bolster I am enabled to connect its upper end directly with the shifting fulcrum-piece 10 instead of using a rope, as would be necessary if the lever moved at right angles to the bolster, as in the application referred to.

f denotes a link having one end connected with the upper end of the lever and the other end attached to the shifting fulcrum-piece by a screw-stud or other means, as shown in the drawings.

The operation of the invention is as follows: The position of the parts being as shown in Fig. 1, with an empty car and the brakes off, when the brake-actuating mechanism causes the pull on the link 3 it causes the auxiliary lever to bear on the regulating-lever at a point near its fulcrum, as shown. This, it will be understood, exerts the minimum leverage. As the bolster is depressed by the increasing weight of the load the link *d* causes the lever *c* to swing to one side, thereby shifting the fulcrum-piece 10 along its guiding and supporting rod 8. This carries the auxiliary lever lengthwise of the regulator-lever and causes its weight end to bear on the regulator at a point farther removed from its fulcrum, which in effect increases the length of this regulator-lever and adds greatly to its leverage. With the parts in this position it will be understood that the maximum amount of leverage is exerted. When the car is lightened, the rising of the bolster will carry back the lever *c* and restore the shifting fulcrum-piece to its normal position.

It will be noted that the parts of this pressure-regulator are few in number and strong and compact in their arrangement. It can be applied to any of the brake systems now in use by simply disconnecting the link 3 from the live-lever 51 and connecting the parts, as above explained. It can also be supplied at small cost and set up by any mechanic of ordinary intelligence.

I wish to be understood as not being limited to the details of the construction and arrangement of the several parts, as the invention is obviously capable of considerable modification in this respect without departing from its spirit and scope. It will be noted that each truck has its own regulating-lever, so that the brake-pressure upon either truck is regulated by the weight pressing thereon. Thus in the case of irregular and uneven loading of the cars provision is made for applying the greatest amount of pressure to the wheels of that truck carrying the greatest weight.

What I claim, and desire to secure, is—

1. In a brake system, the combination of the actuating mechanism, the primary lever, the live lever, and a regulating-lever, said lever being connected at one end with the live lever and on the other side of its pivot with the primary lever, the latter connection being adjustable lengthwise of the regulating-lever, substantially as described.

2. In a brake system, the combination of the actuating mechanism, the primary lever, the live lever, and an intermediate regulat-

ing-lever, the latter having a fixed connection at one end with the live lever and an adjustable connection with the primary lever on the opposite side of its fulcrum, substantially as described.

3. In a brake system, the combination of the actuating mechanism, the primary lever, the live lever, an intermediate regulating-lever, the latter having a fixed connection at one end with the live lever and an adjustable connection with the primary lever on the opposite side of its fulcrum, and mechanism whereby the latter connection may be adjusted along the regulating-lever, substantially as described.

4. In a brake system, the combination of the actuating mechanism, the primary lever, the live lever, an intermediate regulating-lever, the latter having a fixed connection with the live lever at one end and an adjustable connection with the primary lever on the opposite side of its fulcrum, and shifting mechanism operated by the vertical movement of the car to adjust it along the regulating-lever, substantially as described.

5. In a brake system, the combination of the actuating mechanism, the primary lever, the live lever, an intermediate regulating-lever, the latter having a fixed connection with the live lever on one side of its fulcrum and an adjustable connection with the primary lever on the opposite side of its fulcrum, a lever pivoted on the spring-plank, a link connecting this lever with the bolster, and a connection between the upper end of this lever and the primary lever's connection with the regulating-lever, substantially as described.

6. The combination of the spring-plank, the bolster, the lever *c*, pivoted on the former so as to swing parallel therewith, and the link *d*, connecting the lever with the bolster, substantially as described.

7. The combination of the bolster, the brackets 6, projecting therefrom, the rod 8, carried by the brackets, the carrier 10, sliding on the rod, the spring-plank, the lever *c*, pivoted thereon, the link *d*, connecting the bolster with the lever, and the link *f*, connecting the lever with the sliding carrier 10, substantially as described.

8. The combination of the bolster, the brackets 6, projecting therefrom, the rod 8, carried by the brackets, the regulating-lever 5, pivoted to one of the brackets, the carrier 10, sliding on the rod 8, the auxiliary lever 9, pivoted in the carrier and engaging the regulating-lever, the spring-plank *b*, the lever *c*, pivoted thereon, the link *d*, connecting the bolster with the lever *c*, and the link *f*, connecting the lever with the sliding carrier, substantially as described.

9. The combination of the primary lever, the regulating-lever mounted on a fixed pivot, and an auxiliary lever pivoted on an adjustable fulcrum and connected at one end with the primary lever and at its outer end with the regulating-lever, substantially as described.

10. The combination of the primary lever, the regulating-lever swinging on a fixed fulcrum and connected at one end with the live lever, an auxiliary lever connected at one end with the primary lever and at the other with the regulating-lever, said auxiliary lever being mounted on an adjustable fulcrum, and shifting mechanism between this fulcrum and the car, whereby the vertical position of the car controls the position of the fulcrum and the point of connection between the auxiliary lever and the regulator, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HOWARD HINCKLEY.

Witnesses:
L. SCHOONOVER,
JOS. L. WATSON.