(No Model.)

W. H. MARSHALL.

SLACK ADJUSTER.

No. 543,391. Patented July 23, 1895.

Fig. 1.

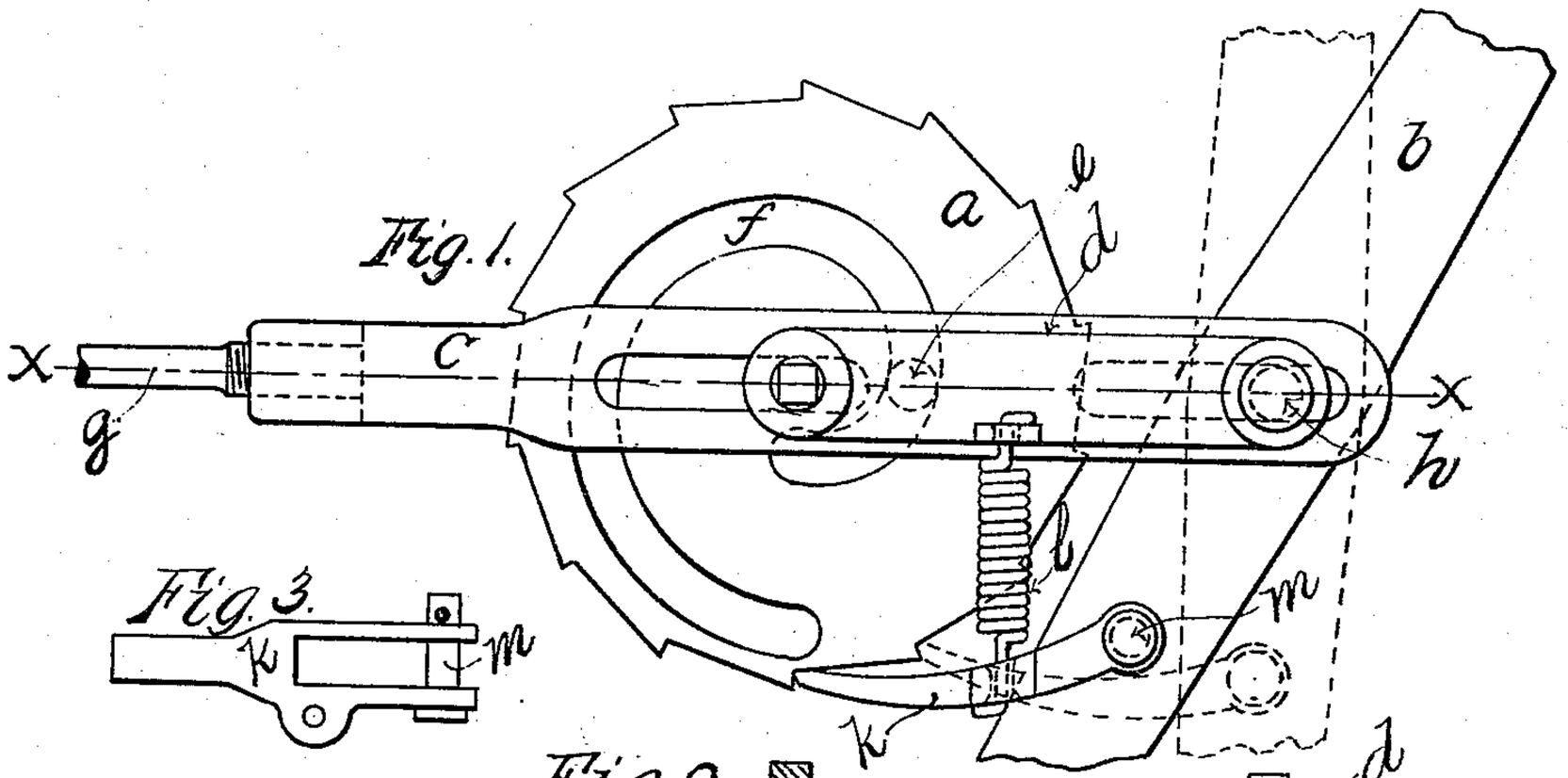


Fig. 3.

Fig. 2.

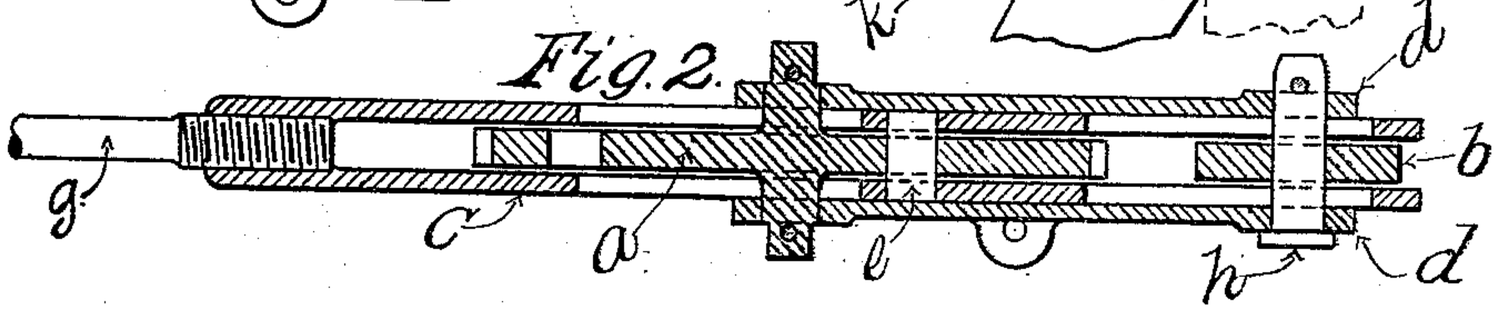


Fig. 4.

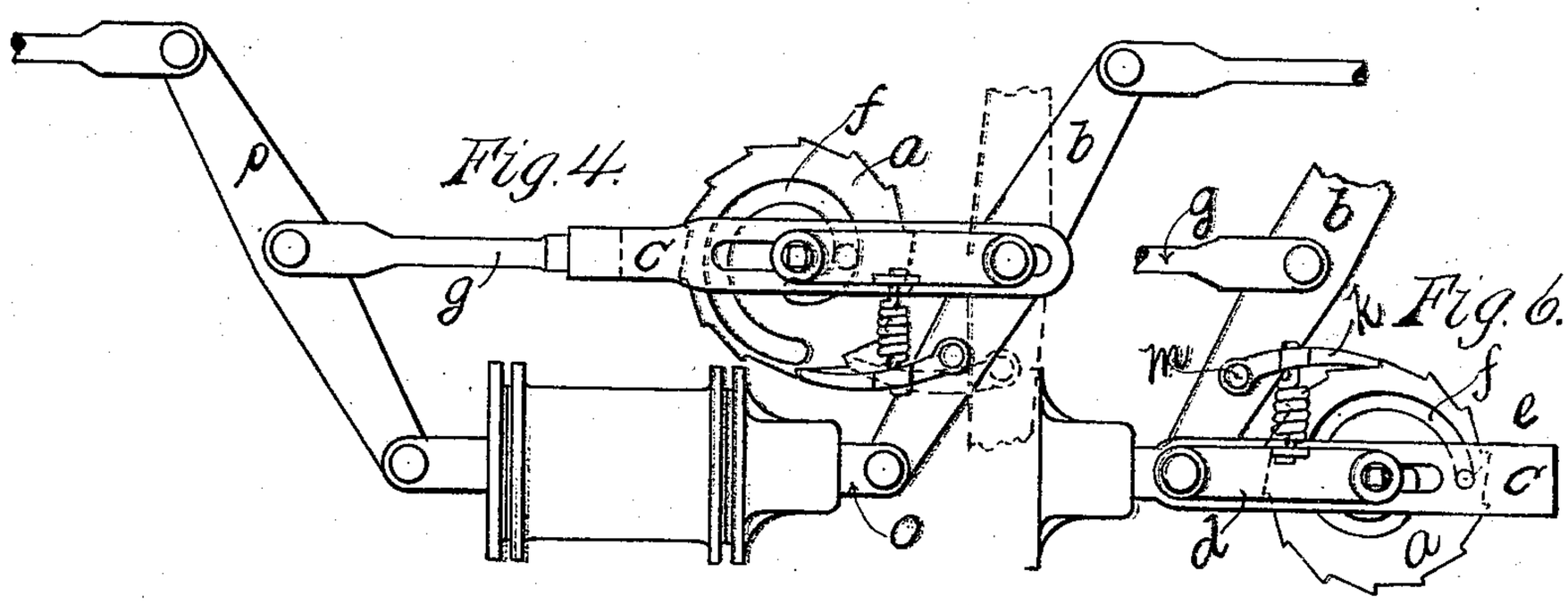
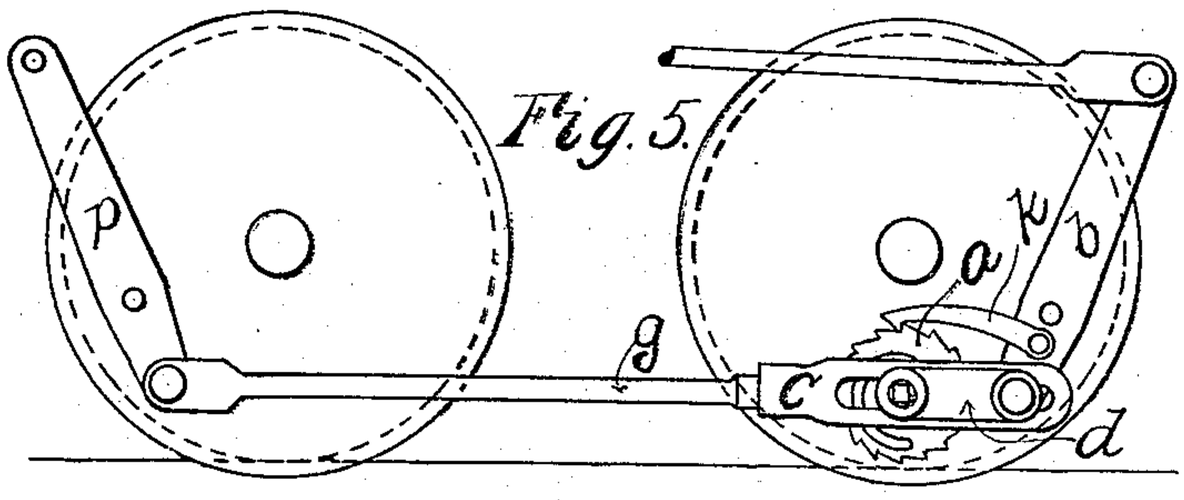


Fig. 6.

Fig. 5.



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SLACK-ADJUSTER.

SPECIFICATION forming part of Letters Patent No. 543,391, dated July 23, 1895.

Application filed February 13, 1895. Serial No. 538,221. (No model.)

To all whom it may concern:

Be it known that I, WALDO H. MARSHALL, a citizen of the United States, residing in the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Car-Brakes; and I declare the following, with the accompanying drawings, which also form a part of this specification, to be a full, clear, and exact description of my invention.

Broadly stated, the object of my invention is to provide a simple and effective device for regulating the travel of pistons in the cylinders of air-brakes on railroad-cars by automatically taking up the slack in the brake-gear produced by the wear of brake-shoes or other parts.

More specifically my invention consists of improvements in automatic brake slack-adjusters, by which spirally-shaped cams are employed to adjust the length of the brake-rods, and all parts of the apparatus are attached to the brake-gear and thereby made independent of other portions of the car, and by means of which the adjuster is made applicable to any part of any brake-gear, the construction simplified, and the cost of manufacture reduced.

In the accompanying drawings, Figure 1 is an elevation of my brake slack-adjuster. Fig. 2 is a section on the line *x x* in Fig. 1. Fig. 3 is a plan of the pawl pivoted on the brake-lever. Fig. 4 shows one location of the adjuster in the brake-gear. Fig. 5 shows a second location, and Fig. 6 illustrates still another location of the device.

From the drawings it will be seen that my device consists of a ratchet-wheel with its journals in the brake rod or connection and rotated by a pawl pivoted on one of the brake-levers, and provided with a spiral cam adapted upon rotation of the wheel to change the length of that member of the brake-gear in which it is located.

It is evident that the device can be located anywhere in the rod or connection whose length is to be adjusted, but for convenience and compactness I place it near or at one end of said member. It can be placed on any connection to or from any lever in the brake-gear where there is an angular movement of the levers during the application and release of the brake, or it can be applied to the piston-rod of the air-brake cylinder.

The construction is as follows: The ratchet-wheel *a* is connected to the operating lever *b* by two links *d d* and the pin *h*, and the wheel is provided with a spiral groove *f*, in which the pin *e* works. This pin is secured in the slotted fork *c*, which is bifurcated for the reception of the ratchet-wheel and for the lever *b*. It is slotted for the axis of the ratchet-wheel and for the pin *h*. This fork *c* is attached to the brake-rod or connection *g* by screw-threads or any other convenient method, so that as far as all operative functions are concerned, it is integral with the rod, and may be considered a portion of it. The pawl *k* is pivoted to the operating-lever *b* by means of the pin *m*, and is held in contact with the teeth on the circumference of the ratchet-wheel by the spring *l*, one end of which is hooked into an eye in the pawl, while the other end is held in a similar eye on one of the links *d*. As far as all strains transmitted through the rod *g* are concerned, the fork *c* need only be long enough to include the axis of the ratchet-wheel and the pin *e*, but I have extended it to include the pin *h*, so that it will keep the links *d d* in alignment with the rod *g* at all times.

The operation of the device is as follows: Upon the application of the brakes the operating-lever assumes approximately the position indicated by the broken lines in Figs. 1 and 4. With the device correctly proportioned and the piston-travel normal the angular movement of the operating-lever would not be sufficient to permit the pawl *k* to engage a new tooth on the ratchet-wheel; but as the brake-shoes wear the piston-travel will increase and the angular movement of the lever *b* will increase proportionately until it is sufficient to cause the pawl to engage a new tooth. Upon the release of the brakes the lever in returning to its normal position will then rotate the ratchet-wheel by the space of one tooth. As a result of this movement the pin *e* in the spiral groove is forced toward the lever *b*, taking with it the fork *c*, which, being a part of the rod *g*, virtually shortens the length of the latter, thereby removing

from the brake-gear the slack caused by the wear of the shoes and restoring the piston-travel to the normal.

The pitch of the spiral should be small enough to make certain that the wheel cannot rotate backward from the effect of a pull on the rod *g*. Otherwise it would be necessary to use a second pawl or detent to hold the wheel while the brakes are setting and the pawl *k* is seeking contact with a new tooth. To keep the pitch of the spiral small and at the same time provide sufficient take-up, it may in some cases be necessary to make the spiral groove longer than shown, giving it more than one complete turn within the wheel. The use of a second detent or pawl is undesirable and can be avoided in this manner. If in any construction it is desirable to lengthen rather than shorten a rod or connection the position of the spiral in the wheel can be reversed, or the direction of rotation of the ratchet-wheel itself can be reversed.

When an operator desires to put new brake-shoes on the car he lets out slack at the adjuster by lifting the pawl *k* and turning the ratchet-wheel backward by means of a suitable wrench applied to either of the square ends on the axis of the wheel.

In Fig. 4 the device is shown applied to the rod connecting the brake-levers *b* and *p*, a location in which it is well protected from dirt, snow, and ice, and where but one per car is required. In Fig. 5 it is shown applied to the bottom rod between the brake-levers on a truck. In this position two per car are required, but an advantage of the location is that taking up the slack at this point causes the least possible distortion of the brake-gear. In this figure the pawl is shown adapted to pull rather than push upon the ratchet-teeth. This is because the ratchet-wheel should in every case be rotated when the brakes are being released and the strain on the rod *g* is diminishing, as the parts of the adjuster are thereby subjected to less strain. The spring on the pawl is omitted in Fig. 5, as gravity will cause it to engage with the ratchet-teeth.

In Fig. 6 the device is shown applied to the piston-rod of the air-brake cylinder. The jaw *o* at the end of the piston-rod (see Fig. 4) for the reception of the lever *b* is removed, and the fork *c* is substituted in its place. The same ratchet-wheel *a*, with spiral *f*, and the same links *d d* are employed, but the parts are arranged on the other side of the lever from that shown in Fig. 4. The principle of operation is the same, however, and the result is a virtual lengthening of the piston-rod as the brake-shoes wear.

I am aware that the use of a spirally-shaped cam in brake-slack adjusters is not in itself novel, but my device is new in that the cam is operated by a pawl pivoted on a brake-lever, thus making the entire mechanism to be contained within the brake-gear and independent of any fixtures on other parts of the car; and, furthermore, the spiral cam is in my device located in the rod or connection whose length is to be adjusted, for which arrangement of parts there are several practical and important advantages. The location of the operating-pawl on a brake-lever establishes a relation between the pawl and ratchet-wheel which is permanent and insures satisfactory operation. They cannot become misplaced with relation to each other, as would certainly result in practice from attaching one member to the car-body, or some other part of the car or truck external to the brake-gear. This permanent relation between the pawl and wheel is a principal essential to the correct action of an automatic adjuster. In my device, no matter what the initial position of the operating-lever may be, an angular movement of it fixed in amount and equal at the pin *m* to the pitch of the ratchet-wheel teeth will cause the slack to be taken up. The piston-travel will certainly be kept uniform under all conditions; but if the pawl be attached to something exterior to the brake-gear the initial position of the ratchet-wheel with reference to the actuating-pawl will determine entirely whether the slack will be taken up, and this relation being variable the operation of the device will be in a large measure independent of the piston-travel.

When brakes are taken down for repairs they are usually put up into place again by unskilled workmen, and the position of the parts is seldom exactly the same as before. Such inexactness evidently does not effect the operation of my device, which is entirely within the brake-gear itself, but would be fatal to the success of devices dependent upon attachments to the car proper.

In placing the ratchet-wheel on the brake-rod several advantages are obtained over other forms of construction employing a spiral cam. It makes it possible to insert my device in brake-gears already on cars without forking or slotting the levers, or making any alterations in them other than drilling a pin-hole for the pawl. Any and all levers now on cars can be retained when this adjuster is applied to them, and this advantage is obtained without employing a construction in which the strains are one-sided or indirect.

Another advantage in placing the wheel in juxtaposition to the lever, but not upon it, is that when pivoting the pawl upon the lever (which I have shown to be the only practicable location for it) any difference in the proportions of brake-levers can be compensated for by varying the position of the pin-hole in the lever; whereas if the wheel were placed on the lever the variation would have to be made in the pitch of the ratchet-teeth, thereby necessitating numerous patterns and causing much expense and confusion. Still another advantage in my arrangement of the ratchet-wheel and operating-pawl over all other devices employing a spiral cam, lies in the greater adaptability of the device to various positions in the brake-gear. It can be

located practically anywhere that is desired, and this is found to be a great boon in practice.

Having thus described my invention, what I claim is—

1. In a brake slack adjuster, a ratchet wheel with its journals in a connection to a brake lever, and having a spirally shaped cam engaging a pin or bearing in the brake rod or connection to be adjusted, and adapted upon rotation to alter the length of said rod.

2. In a brake slack adjuster, a ratchet wheel having a spirally shaped cam engaging a pin or bearing in the brake rod or connection to be adjusted, rotated by a pawl pivoted on an operating lever, and adapted upon rotation to alter the length of said rod.

3. In a brake slack adjuster, a ratchet wheel with its journals in a connection to a brake lever, having a spirally shaped cam engaging a pin or bearing in the brake rod or connection to be adjusted, rotated by a pawl pivoted on an operating lever, and adapted on rotation to alter the length of said rod.

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