(No Model.) 3 Sheets—Sheet 1.

A. PITKETHLY.

AUTOMATIC BRAKE SLACK ADJUSTER.

No. 564,220. Patented July 21, 1896.

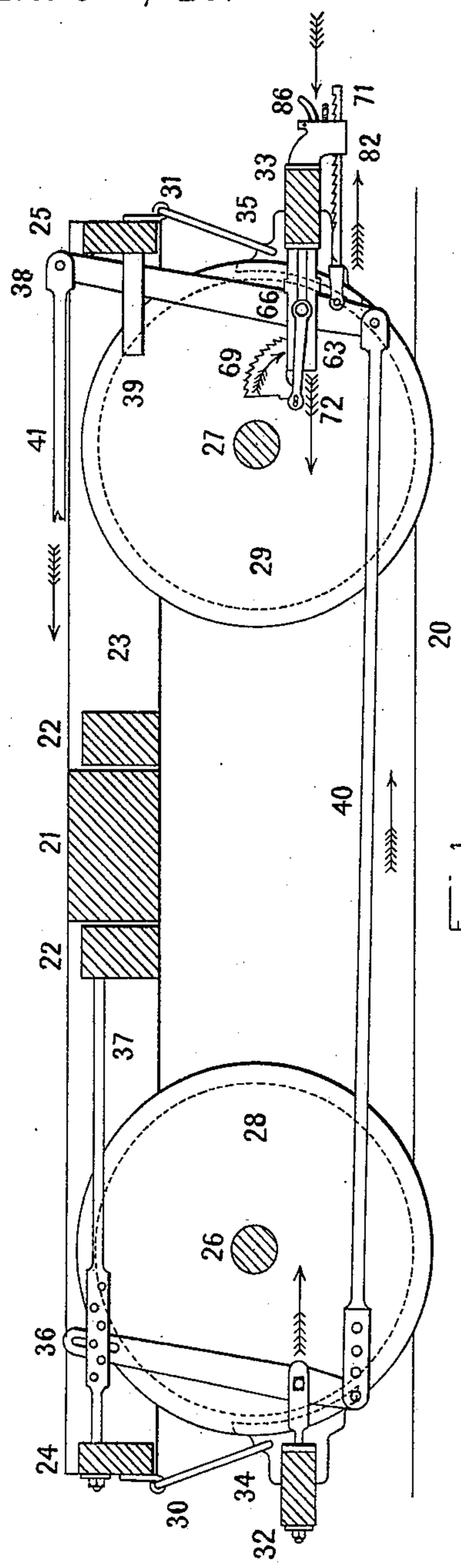

Fig. 1.

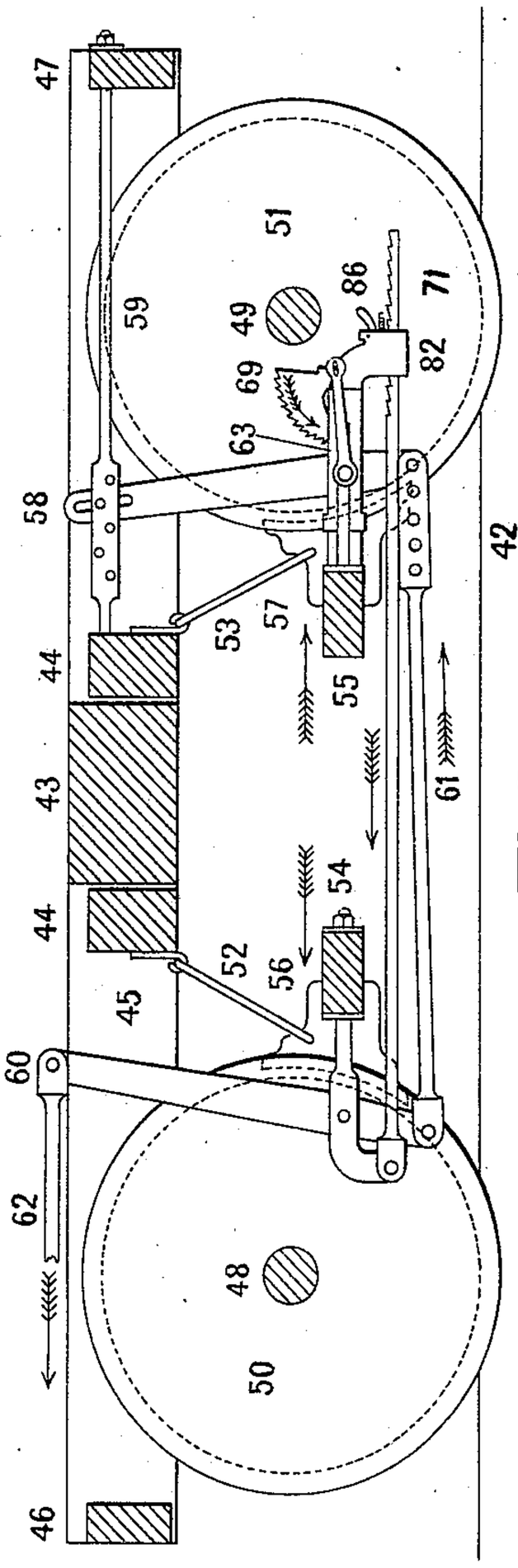

Fig. 2.

WITNESSES:

Charles C. Ellis

Robert H. Orr.

INVENTOR:

Alexander Pitkethly.

BY

E. Frank Woodbury.

ATTORNEY.

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A. PITKETHLY.

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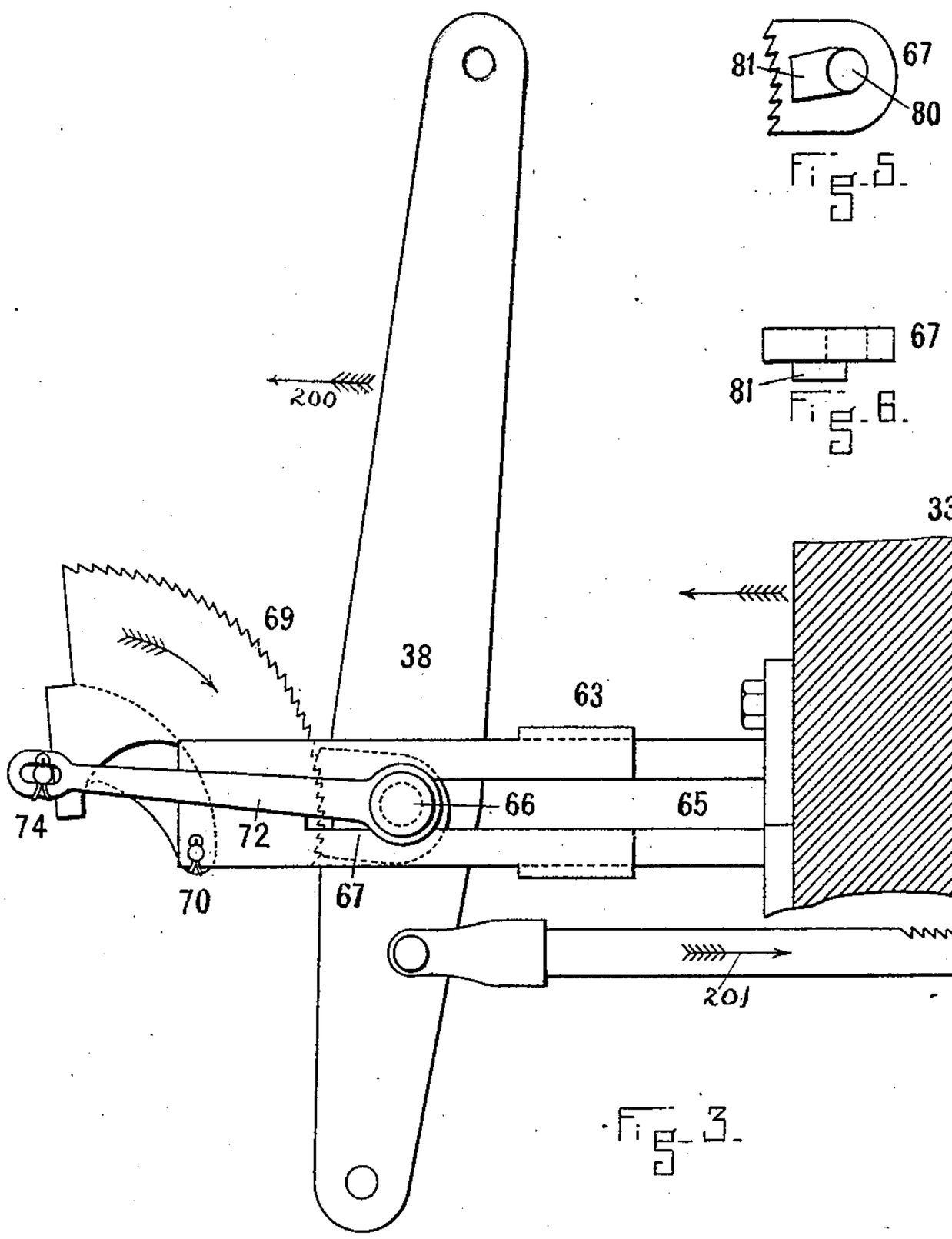

Fig. 3.

Fig. 5.

Fig. 6.

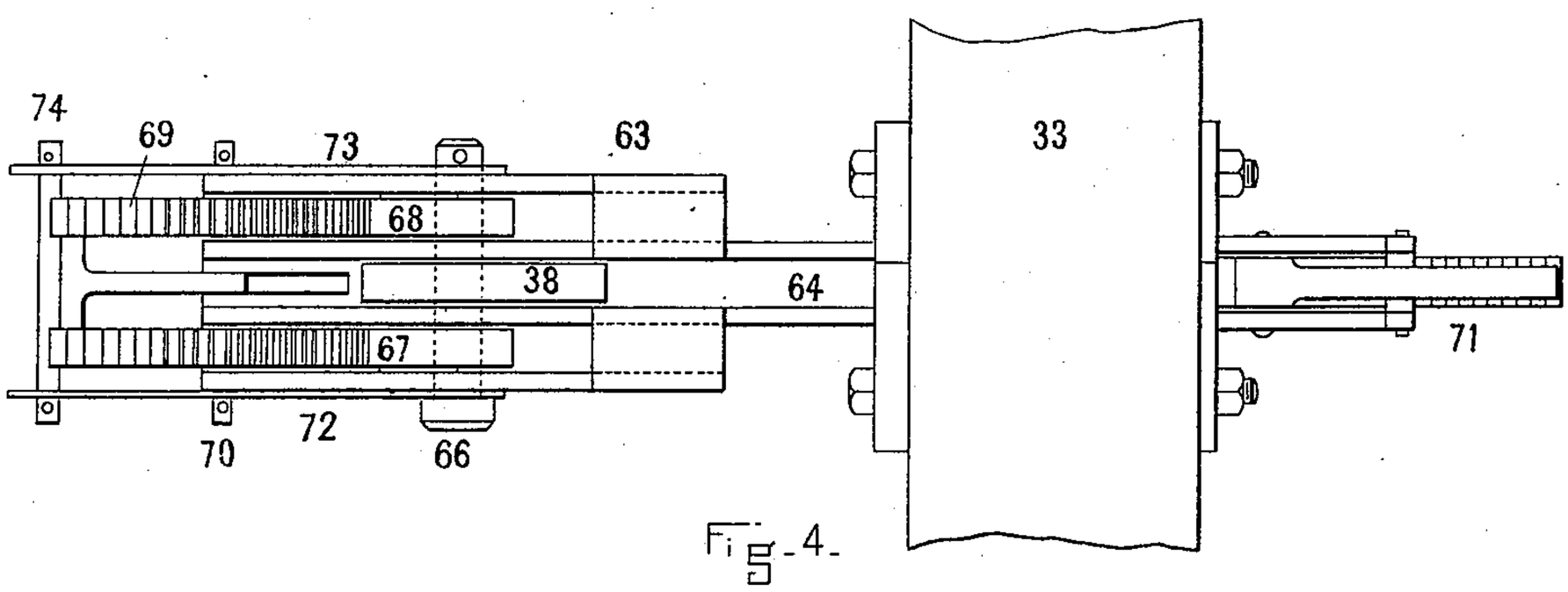

Fig. 4.

WITNESSES:

Charles L. Ellis.

Robert H. Orr.

INVENTOR:

Alexander Pitkethly.

BY

E. Frank Woodbury.

ATTORNEY.

(No Model.) 3 Sheets—Sheet 3.

A. PITKETHLY.

AUTOMATIC BRAKE SLACK ADJUSTER.

No. 564,220. Patented July 21, 1896.

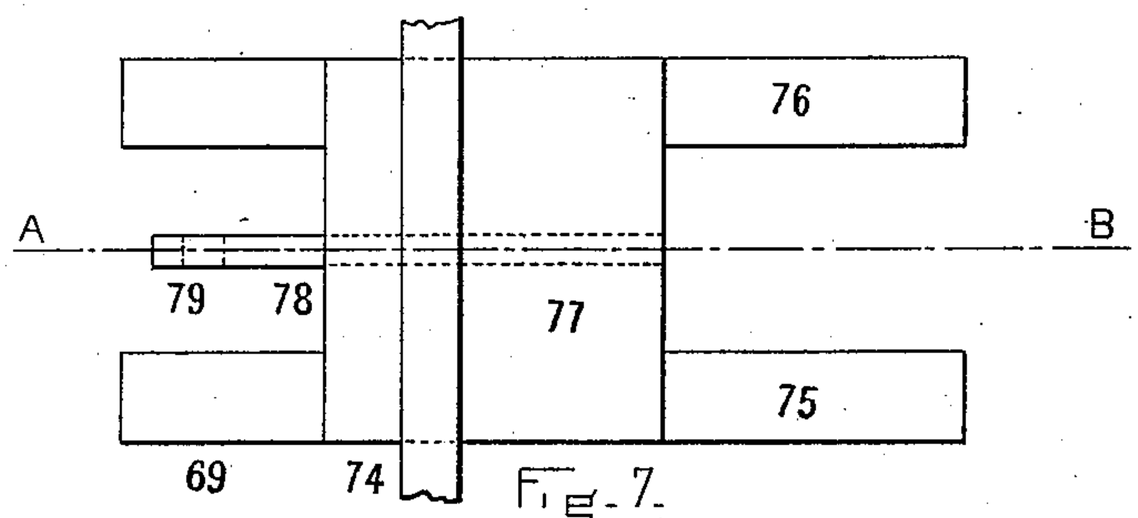

Fig. 7.

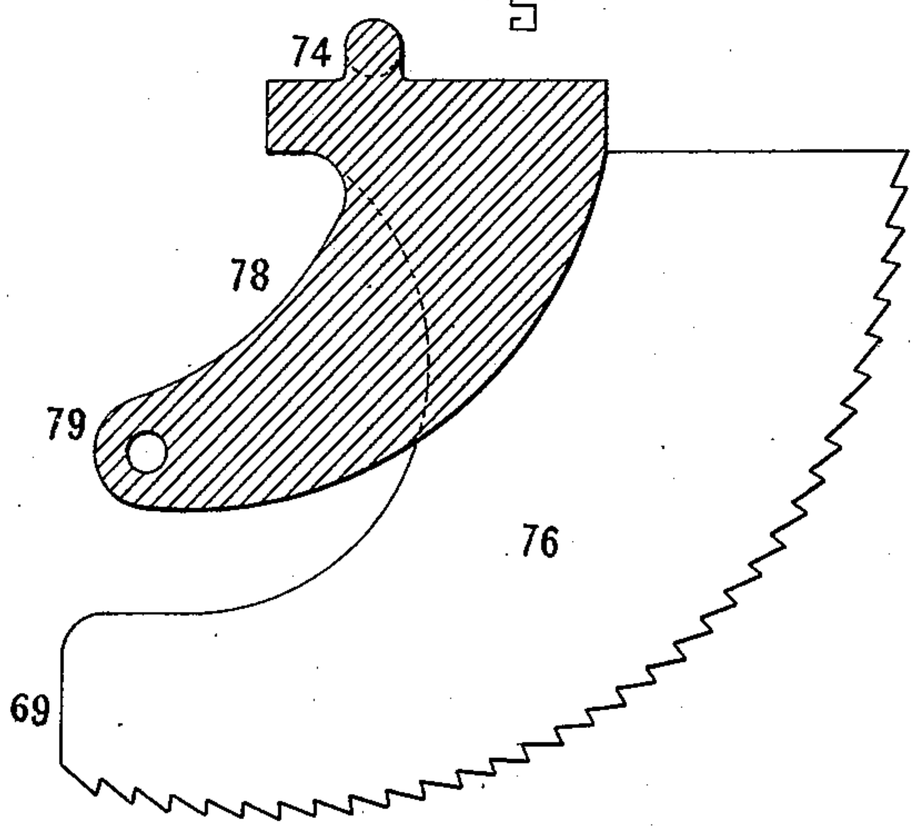

Fig. 9.

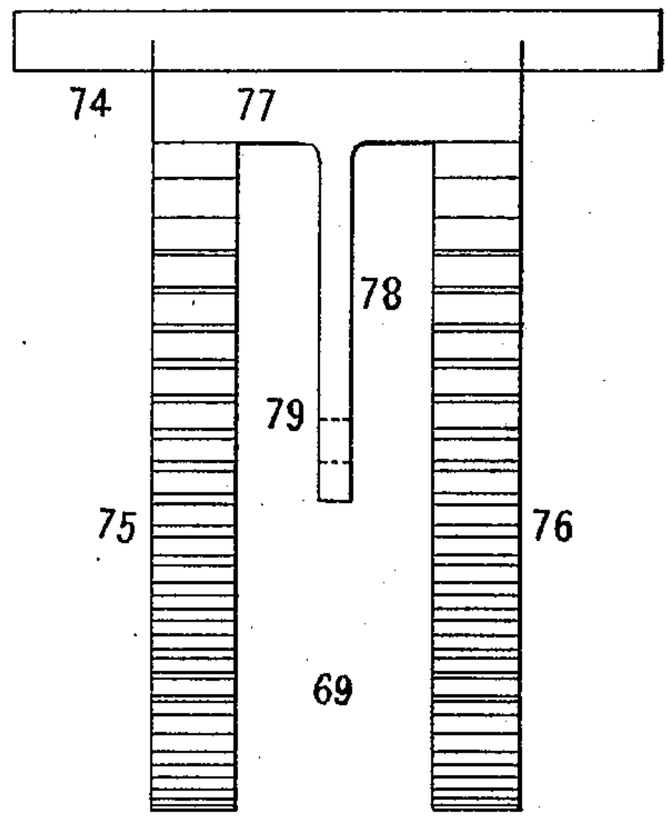

Fig. 8.

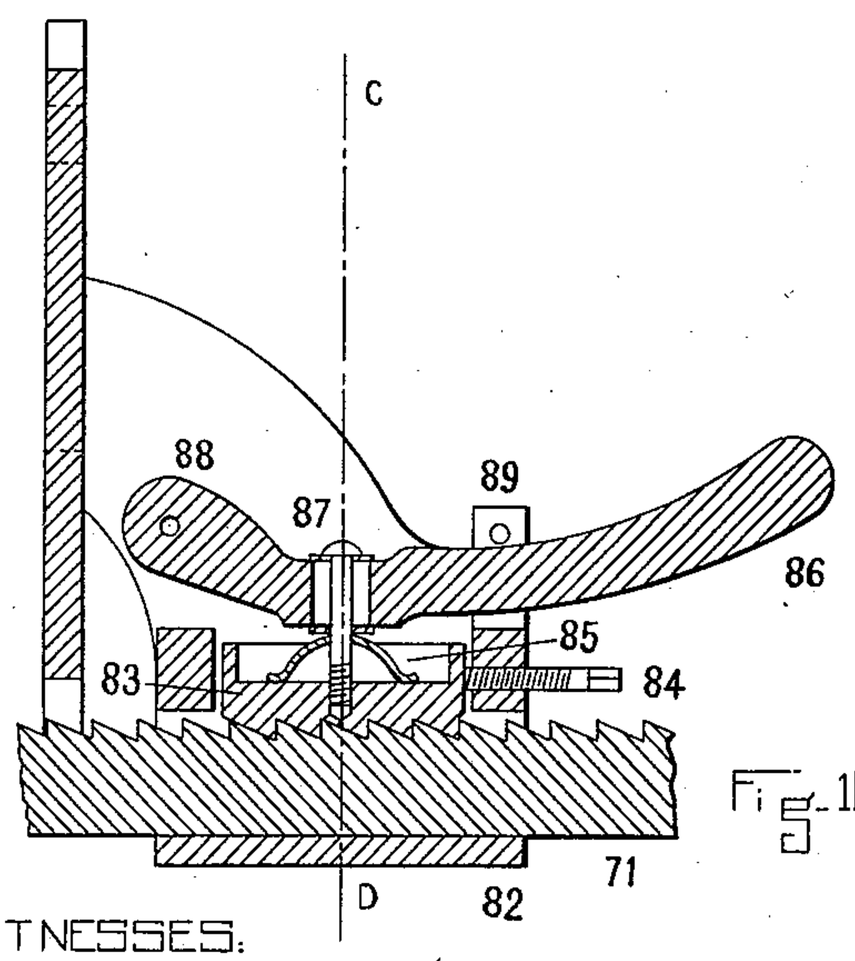

Fig. 10.

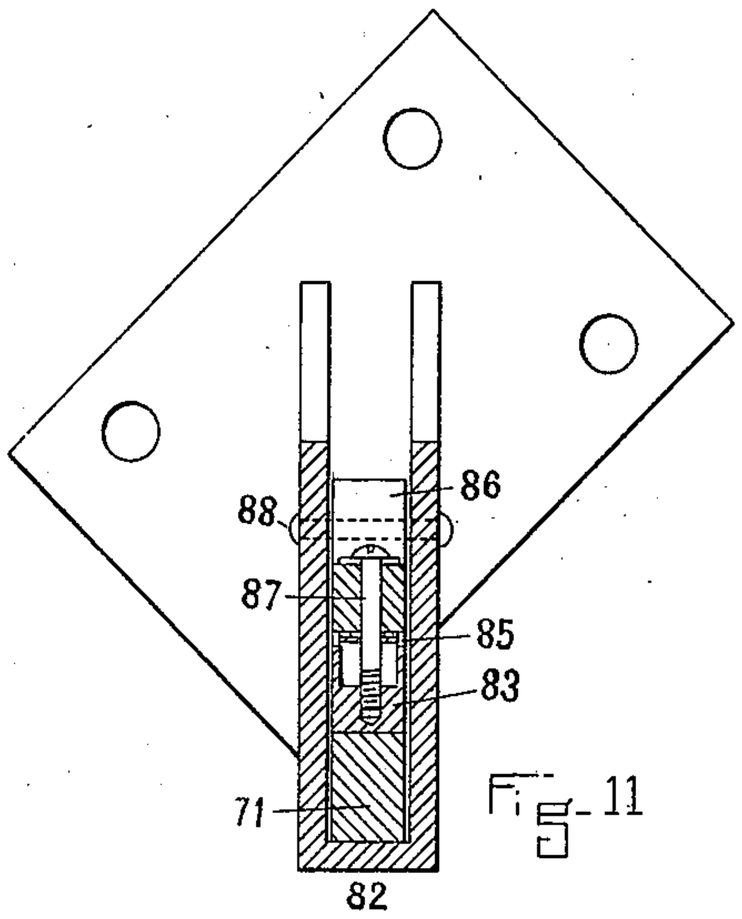

Fig. 11.

WITNESSES:

Charles L. Ellis

Robert H. Orr.

INVENTOR:

Alexander Pitkethly

BY

E. Frank Woodbury.

ATTORNEY.

UNITED STATES PATENT OFFICE.

ALEXANDER PITKETHLY, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO FRANCIS W. PARSONS, OF OSTERVILLE, MASSACHUSETTS.

AUTOMATIC BRAKE-SLACK ADJUSTER.

SPECIFICATION forming part of Letters Patent No. 564,220, dated July 21, 1896.

Application filed October 10, 1894. Serial No. 525,522. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER PITKETHLY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Automatic Brake-Slack Adjusters, of which the following is a specification.

My invention relates to automatic brake-slack adjusters designed to be used as a part of and in connection with braking apparatus as applied to railway-cars and the like.

The object of my invention is to provide a simple, durable, and efficient device for automatically effecting brake-slack adjustment without material change being made in the leverage angularity of either the dead lever or the live lever, so that as the brake-shoes are worn the power with which they are applied to the wheels is not diminished, as would be the case if the angularity of the levers was materially changed in taking up or compensation for the wear of the brake-shoes.

In accordance with this invention one of the brake-operating levers, either the live or the dead lever, as may be found most convenient, is provided with a movable support or fulcrum, which is connected to the brake-beam to effect movement of the said beam on the forward movement of the brake-lever, and the said brake-lever is also connected to the brake-beam by a sliding or adjustable connection capable of changing its position with relation to the brake-beam when the shoes have become sufficiently worn, as will be described, and which adjustable connection becomes fixed with relation to the brake-beam on the return movement of the brake-operating lever, so that the latter on its return movement carries its movable fulcrum or support toward the brake-beam a distance equal to the change of the sliding connection with relation to the brake-beam. The movable support or fulcrum, when moved toward the brake-beam an amount sufficient to compensate for or take up the wear of the brake-shoes, is locked to the brake-beam, as will be described, so that on its next forward movement the brake-beam will move with it as if rigidly connected thereto. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 represents the application of one form of brake-slack adjuster embodying this invention to a car-truck having outside brakes, and Fig. 2 represents my invention as applied to a car-truck having inside brakes. Figs. 3 to 11, inclusive, are enlarged views of the adjuster shown in Figs. 1 and 2. Fig. 3 shows the adjuster in side elevation secured to the brake-beam. Fig. 4 is a plan of Fig. 3. Fig. 5 is a side elevation of the cam-dog. Fig. 6 is a plan of Fig. 5. Fig. 7 is a plan of the cam-wheel. Fig. 8 is a front view of the cam-wheel. Fig. 9 is a sectional view of Fig. 7 on the line A B. Fig. 10 is a vertical sectional view of the rack-holding device. Fig. 11 is a full sectional view on line C D of Fig. 10.

Fig. 1 illustrates the application of one form of apparatus embodying my invention to a car-truck of an ordinary construction having outside brakes, and Fig. 2 illustrates the application of the apparatus shown in Fig. 1 to a car-truck having inside brakes.

In Fig. 1 the apparatus is applied or operatively connected to the live lever, and in Fig. 2 the device is applied or operatively connected to the dead lever. For the purpose of enabling my invention to be clearly understood a portion of a simple and plain car-truck, which may be of any suitable or usual construction, is represented in partial section in Figs. 1 and 2, wherein in Fig. 1 the truck 20 is provided with the following parts, namely: the truck-bolster 21, transom 22, wheel-beam 23, end sills 24 and 25, axles 26 and 27, wheels 28 and 29, brake-hangers 30 and 31, brake-beams 32 and 33, brake-shoes 34 and 35, dead lever 36, dead-lever guide 37, live lever 38, live lever guide 39, lower brake-rod 40, and upper brake-rod 41. In a like manner truck 42 (shown in Fig. 2) is provided with the following parts: truck-bolster 43, transom 44, wheel-beam 45, end sills 46 and 47, axles 48 and 49, wheels 50 and 51, brake-hangers 52 and 53, brake-beams 54 and 55, brake-shoes 56 and 57, dead lever 58, dead-lever guide 59, live lever 60, lower brake-rod 61, and upper brake-rod 62.

In order to illustrate the invention in a clear

and distinct manner, it is represented in the drawings as applied to the live and dead levers, they being in an upright position; but it is intended that the levers should be set in their usual slanting position.

The mode of operation of the device is substantially the same when applied either to outside brakes or inside brakes. Figs. 4 to 11, inclusive, are enlarged views of the device or apparatus shown in Fig. 1 as applied to the live lever 38, which, in accordance with this invention, is provided with a fulcrum-pin 66, movable in a transverse slot 65 of a frame 63, provided with a longitudinal slot 64 substantially at right angles to the transverse slot 65, the frame 63 constituting a supporting-frame for the fulcrum-pin, and in practice the said frame is secured to the brake-beam 33, and in order to obtain as long a brake-lever as possible the frame 63 is secured to the brake-beam 33 at an angle or so that the slot 64 inclines in one direction, while the slot 65 inclines in a direction at right angles to the first inclination. The fulcrum-pin 66 has mounted upon it cam dogs or pawls 67 68, which, in the present instance, coöperate with the double segmental toothed cam-wheel 69, mounted to turn upon the pivot-pin 70, supported by the sides of the frame 63. The segmental cam-wheel 69 is connected to the fulcrum-pin 66 by means of the links 72 73, which engage the ends of a pin 74, secured to or forming part of the segmental wheel 69, on its rear side.

The cam-wheel 69 is composed in the present instance of the two toothed segmental cams 75 76, which are united by means of the cross-piece 77, (see Figs. 7 and 8,) which cross-piece is provided with a projecting flange 78, through which the pivot pin or arbor 70 is extended, the said cross-piece also having secured to or forming part of it the pin 74.

In the above construction it will be seen that the segmental cam-wheel 69 is secured to the frame 63 by the pivot-pin 70, and that by means of the pin 74 and the links 72 73 the segmental wheel 69 is connected to the fulcrum-pin 66, and when the brake-shoes are not worn the segmental cam-wheel 69 and the dogs 67 68 form, practically, a rigid connection between the brake-operating lever 38 and the frame 63, and consequently effect, practically, a rigid connection between the brake-operating lever 38 and the brake-beam 33, so that when the brake-lever 38 is moved forward or toward the left (viewing Fig. 3) the brake-beam 33 will be moved with it, the lever 38 turning on the pin 66 as a fulcrum.

The cam-dog 67 (shown separately in Figs. 5 and 6) is provided with teeth, as herein shown, which engage the teeth of the cam-wheel 69, and the said cam-dog is provided with a hole 80 to receive the fulcrum-pin and with a side lug 81, which is adapted to slide in one of the transverse slots 65 in the supporting-frame, the lug being made, for the best results, of a less width than the slot, so that the dog will readily engage the cam-wheel. The dogs or pawls 67 68 are of like construction, except that they are made right and left as regards the location of the side lug 81. The brake-lever 38 has connected to its short arm, below the supporting-frame 63, a toothed rack-bar 71, pivotally connected at one end to the short arm of the lever 38 and having its other end adjustably connected, as will be described, to the brake-beam.

In the present instance the toothed end of the rack-bar 71 is extended through a housing 82, secured to the brake-beam 33, as shown in Figs. 1, 3, and 4, while in Fig. 2 the housing 82 is shown as secured to the frame 63.

Referring to Figs. 10 and 11, the housing 82 is shown as containing within it a toothed rack dog or pawl 83, designed to engage the teeth of the rack-bar 71, the dog 83 being held in its housing by the set-screw 84, by means of which the horizontal play of the dog in its housing may be easily regulated. The dog 83 is held in engagement with the rack-bar 71 by means of the spring 85, which, as herein shown, is placed between the dog and the handle 86, to which the dog is loosely secured by means of the screw 87. The handle 86 is pivoted on the pin 88, extended through the housing, and is held in a fixed position by means of the retaining-pin 89, by the withdrawal of which the handle and its adjustments, including the dog, may be readily lifted, thereby releasing the toothed rack-bar 71 and permitting the ready hand adjustment of the brake apparatus, especially when it is first applied.

By means of the rack-bar 71 and the toothed dog 83 it will be seen that the short arm of the brake-operating lever 38 is connected to the brake-beam 33. The operation of the apparatus as applied to outside brakes, and as shown in Fig. 1, may be readily understood from an inspection of Figs. 1 and 3, wherein the brake apparatus is represented in its correct working position, the brake-shoes being at their proper distance from the wheels.

By the application of brake power to the upper brake-rod the brakes may be applied in the usual manner, the direction of movement of the different parts being represented by arrows, and when the brake-operating lever 38 is moved in the direction indicated by the arrow 200 in Figs. 1 and 3 the brake-beam 33 will be carried forward with the brake-operating lever, so as to apply the brakes to the shoes. When the brake-operating lever 38 is moved in the direction indicated by the arrow 200, the rack-bar 71 will be moved in the direction indicated by the arrow 201, and if the brake-shoes are not worn the rack-bar 71 will slide in its housing, but its teeth will remain in engagement with the teeth of the dog 83, the teeth of the rack-bar 71 playing back and forth on the teeth of the dog 83

when the brakes are applied and released, and this play back and forth of the rack-bar 71 will continue until the brake-shoes have been worn sufficiently to permit the teeth of the rack-bar 71 to be disengaged from their normally-coöperating teeth of the dog 83 and be moved into engagement with the next adjacent tooth of the said dog. Let it be supposed that the brake-shoes have become worn sufficiently to cause the rack-bar 71 to be engaged with the tooth of the dog 83 next adjacent to that tooth with which a tooth of the rack-bar is normally in engagement. This engagement of the rack-bar 71 takes place on the forward movement of the brake-operating lever 38, namely, when the brakes are applied, and when the brakes are released and the brake-operating lever 38 moves in the direction opposite to that indicated by the arrow 200 it will be seen that the rack-bar 71 is no longer free to respond to this movement, but is held stationary by the brake-beam, and consequently the connecting-pin of the rack-bar 71, with the short arm of the lever 38, constitutes the fulcrum for the brake-operating lever, so that, as the brake-operating lever moves backward on its new fulcrum, the fulcrum-pin 66 will be carried backward toward the brake-beam an amount substantially equal to the distance of one tooth of the rack-bar 71, which represents the amount of wear on the brake-shoes.

By reference to Fig. 3 it will be seen that, when the fulcrum-pin 66 moves in the slot 65 of the frame 63 toward the brake-beam 33 on the pin which fastens the rack-bar 71 to the said lever as a center, the holding-dogs 67 68 move with the fulcrum-pin 66 and tend to move away from the cam-wheel 69, but by reason of the cam-wheel 69 being connected by the links 72 73 to the fulcrum-pin movement of the fulcrum-pin toward the brake-beam produces movement of the cam-wheel 69 on the shaft or arbor 70 as a center, and while the teeth of the cam-wheel remain in engagement with the dogs the said wheel will be turned sufficiently to engage a new tooth or teeth on the wheel with the tooth or teeth on the holding pawls or cams 67 68, so that the connection between the brake-operating lever and the brake-beam through the frame 63 is kept practically rigid and in condition to effect the movement of the brake-beam on the movement of the brake-lever in a direction indicated by the arrow 200. It will thus be seen that on the forward movement of the brake-lever in the direction indicated by the arrow 200 the rack-bar 71 will hold the small or lower arm of the brake-lever when the brake-shoe wears, and prevents the return of the lower arm of the brake-lever back to its normal position, but by reason of the original fulcrum 66 of the brake-lever moving toward the brake-shoe an amount substantially equal to the amount that the small arm of the brake-lever is restrained the said brake-lever is in this manner brought into a new position with relation to the brake-beam, but one in which the angularity of the brake-lever with relation to the brake-beam is the same or substantially the same as the original or normal angularity of the said lever. As a result, the power employed to move the brake-lever when the brake-shoes are of normal size and unworn is not expended fruitlessly when the brake-shoes become worn, but the effect of this power remains the same even when the brake-shoes are worn, which result is effected, as above described, by preserving the normal angularity of the brake-levers. As the live brake-lever 38 is connected to the dead lever 36 by the lower brake-rod 40, the effect of the wear upon the shoes carried by the brake-beam attached to the dead lever will be felt upon the live lever, and will be compensated for at the same time that the wear of the shoes attached to the brake-beam 33 is taken care of.

In Fig. 2 I have shown my invention as applied to a car-truck with the brake-beams located between the car-wheels, the operation being substantially the same as that described in connection with Fig. 1, the live lever 60 having connected to it the rack-bar 71 and the housing 82 being connected to the frame 63, which is connected to the brake-beam 55, the fulcrum of the dead lever 58 being in this case movable toward the brake-beam, but preserving the angularity of the operating-levers.

It is obvious that many minor modifications may be made to adapt my invention to the many different styles of car-trucks and brake-beams, but in all the modifications or adaptations the mode of operation will be substantially the same as herein described. It will be observed that the toothed wheel 69 to all intents and purposes forms a rack-bar, with which coöperates a pawl or dog carried by the fulcrum of the brake-operating lever to obtain an adjustable yet rigid connection between the operating-lever and the brake-beam, and the rack-bar 71 and the dog or pawl 83 accomplish the same result of an adjustable yet rigid connection between the brake-beam and the lower arm of the lever, and while I may prefer this segmental form of rack-bar or toothed cam-wheel 69 I do not desire to limit my invention in this respect, as this form may be changed.

I claim—

1. In an automatic brake-slack adjuster, the combination of the following instrumentalities, viz: a brake-beam, a brake-operating lever provided with a movable fulcrum, a supporting-frame for the movable fulcrum attached to the brake-beam, means to effect an adjustable yet operatively rigid connection between the brake-beam and the fulcrum of the brake-operating lever, and an adjustable connection attached to the brake-operating lever at one side of the movable ful-

crum and movable with relation to the brake-beam to take up the wear of the brake-shoes, means to render the adjustable connection rigid to the brake-beam when in its adjusted position and thereby effect the movement of the movable fulcrum of the brake-operating lever, substantially as described.

2. In an automatic brake-slack adjuster, the combination of the following instrumentalities, viz: a brake-beam, a brake-operating lever provided with a movable fulcrum, a supporting-frame for the movable fulcrum secured to the brake-beam, a pawl movable with the said fulcrum, a rack-bar coöperating with the said pawl, a rack-bar attached to the lever on one side of the movable fulcrum, a pawl carried by the brake-beam and coöperating with the said rack-bar to connect the latter to the brake-beam, substantially as and for the purpose specified.

3. In an automatic brake-slack adjuster, the combination of the following instrumentalities, viz: a brake-beam, a lever-supporting frame secured to said beam and provided with longitudinally-extended slots substantially at right angles to each other, the brake-lever extended through one of said slots, a fulcrum for said lever movable in the other of said slots, a rack-bar carried by said frame, a pawl movable with the fulcrum of the said lever and coöperating with said rack-bar, a second rack-bar operatively connected to said brake-lever, a housing or support for the second rack-bar carried by the brake-beam, and a pawl carried by the brake-beam and coöperating with said second rack-bar, substantially as described.

4. In an automatic brake-slack adjuster, the combination of the following instrumentalities, viz: a brake-beam, a lever-supporting frame attached thereto, a brake-lever provided with a fulcrum movable on said supporting-frame, a rack-bar carried by the said supporting-frame, a pawl movable with the fulcrum of the brake-lever and coöperating with the said rack-bar, a second rack-bar operatively connected to the brake-lever and adjustably connected to the brake-beam, substantially as described.

5. In an automatic brake-slack adjuster, the combination of the following instrumentalities, viz: a brake-beam, a lever-supporting frame attached thereto, a brake-lever provided with a fulcrum movable on the said supporting-frame, an adjustable connection between the said fulcrum and the said supporting-frame operative on the movement of the brake-lever in one direction, and an adjustable connection between the brake-lever and the brake-beam and operative on the movement of the lever in the opposite direction, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALEXANDER PITKETHLY.

Witnesses:
E. FRANK WOODBURY,
GEORGE L. DOLBEARE.