(No Model.) 3 Sheets—Sheet 1.

R. A. PARKE.

SLACK ADJUSTER FOR CAR BRAKES.

No. 480,341. Patented Aug. 9, 1892.

Fig. 1

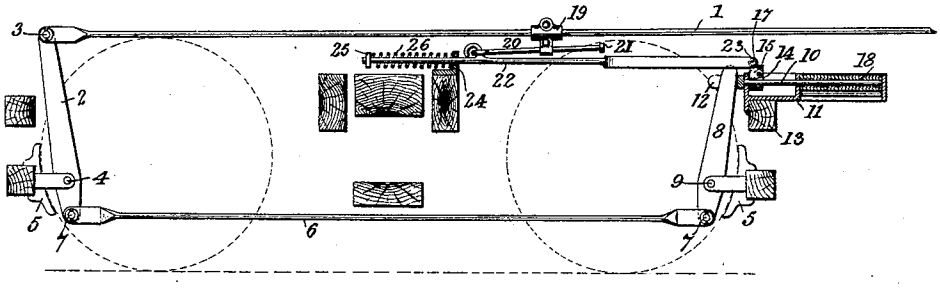


Fig. 2

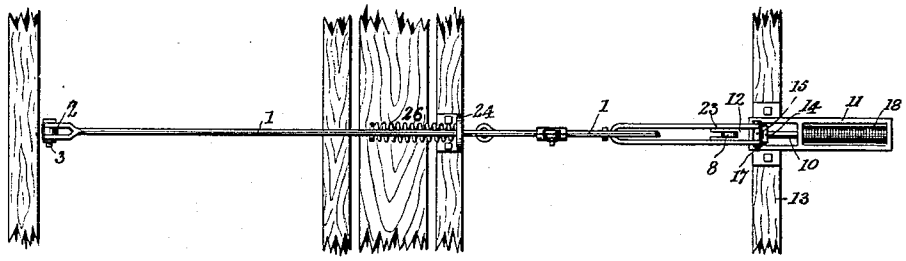


Fig. 3

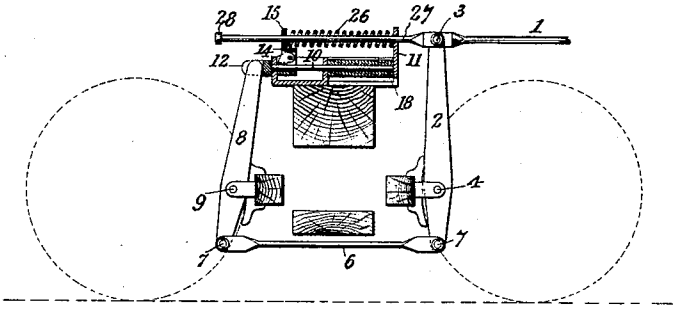
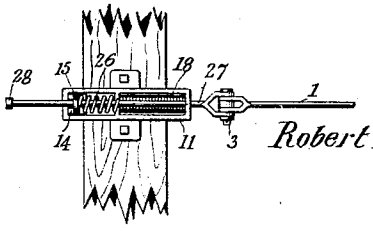


Fig. 4



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(No Model.) 3 Sheets—Sheet 2.

R. A. PARKE.

SLACK ADJUSTER FOR CAR BRAKES.

No. 480,341. Patented Aug. 9, 1892.

Fig. 5

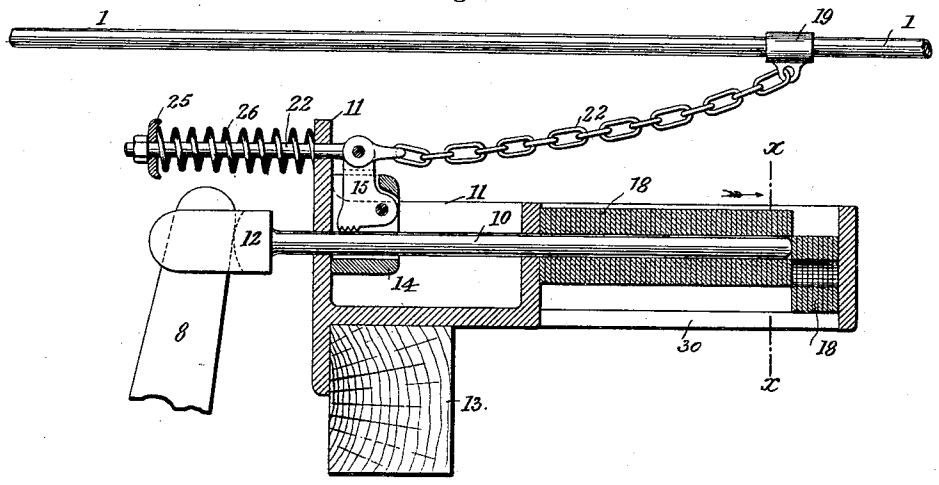


Fig. 6

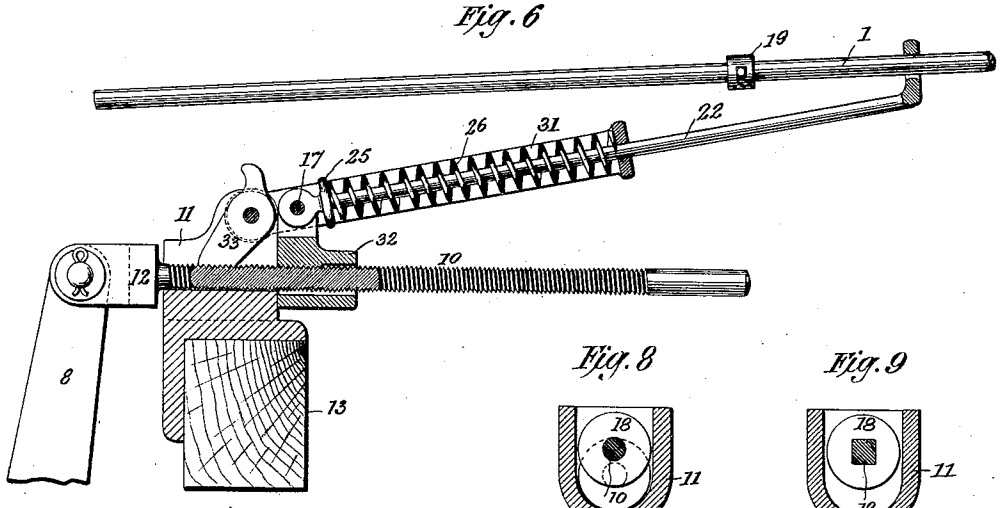
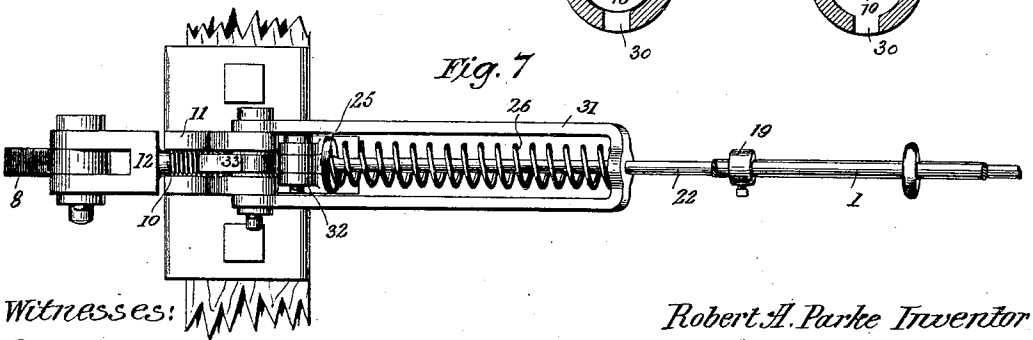


Fig. 8

Fig. 9

Fig. 7



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SLACK ADJUSTER FOR CAR BRAKES.

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Fig. 10

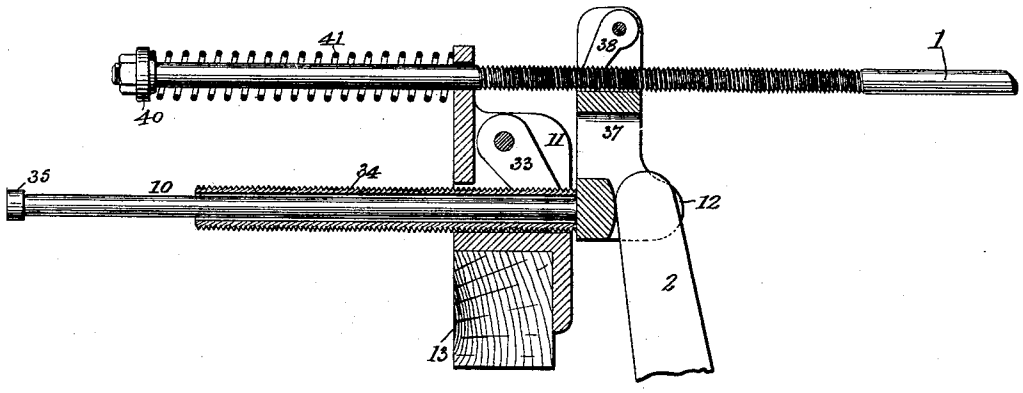
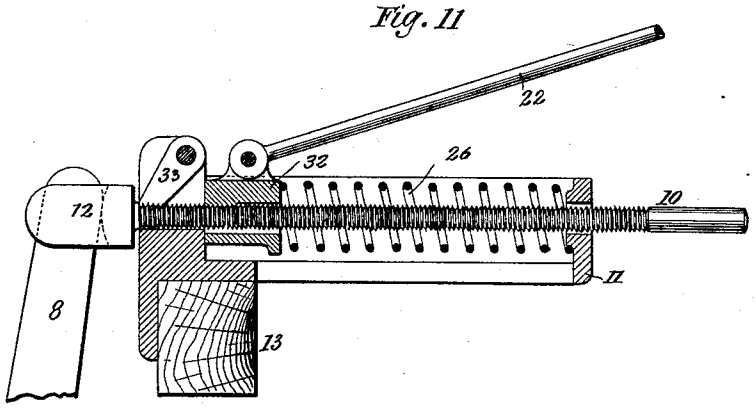


Fig. 11



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

UNITED STATES PATENT OFFICE.

ROBERT A. PARKE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO H. H. WESTINGHOUSE, OF PITTSBURGH, PENNSYLVANIA.

SLACK-ADJUSTER FOR CAR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 480,341, dated August 9, 1892.

Application filed February 13, 1892. Serial No. 421,384. (No model.)

To all whom it may concern:

Be it known that I, ROBERT A. PARKE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Car-Brake Apparatus, of which the following is a specification.

My invention relates to the apparatus used upon car-trucks for the application of a braking or retarding force to the car when in motion and to the method of compensating for the lost motion in such brake apparatus arising from the wearing away of the surface of the brake shoes or blocks through repeated applications to the wheels for reducing the speed of the car. It is well understood that where the brake-shoes are applied to the wheels by the movement of the piston of an air-cylinder through intervening mechanism of levers and rods or by any other device wherein the primary moving member of the motor has a limited movement the wearing away of the shoes and the consequent increased movement of the parts increase the movement of the primary moving member of the motor toward the limit at which the motor ceases to be effective. It thus becomes necessary to prevent such extreme movement of the primary moving member of the motor by compensating at some point in the brake apparatus for the increased movement of the parts of such apparatus due to the wear of the brake-shoes. Where human vigilance is depended upon for manually making such compensation, accidents to railway-trains have occurred from neglect to properly make such compensation.

Various automatic devices to compensate for the wear of the brake-shoes by taking up the excessive slack movement of the apparatus at some point thereof have been proposed and used for the purpose of averting the danger growing out of neglect to adjust the slack by hand. These automatic devices are called "automatic slack-adjusters" or "slack take-ups." My invention consists in an improved automatic slack-adjuster.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying three sheets of drawings, in which—

Figure 1 is a side elevation illustrating the application of my improved automatic slack-adjuster to the ordinary form of passenger-car truck. Fig. 2 is a plan view illustrating the construction and arrangement of some of the parts shown in Fig. 1. Fig. 3 is a side elevation illustrating the application of my improvement to the ordinary form of freight-car truck. Fig. 4 is a plan view illustrating the construction and arrangement of some of the parts shown in Fig. 3. Figs. 5 and 6 are side elevations, partly in section, of modified forms of my improvement. Fig. 7 is a plan view of the construction shown in Fig. 6. Fig. 8 is a cross-section on the line $x x$ of Fig. 5. Fig. 9 is a similar view of a modification. Figs. 10 and 11 are side elevations, partly in section, of modified constructions of my improvement.

Like numerals indicate like parts in the several figures.

Referring now to Figs. 1 and 2, 1 indicates the brake-rod, which is pivotally connected to the upper end of the live-truck brake-lever 2 by means of the pin 3. The brake-rod is also connected to the primary moving member of the motor used for applying the brake—such, for example, as the piston of a fluid-pressure brake-cylinder—by means of such intervening levers and connections as may be incident to the particular style of motor and source of power used, as will be clearly understood by a person skilled in the art. The live-lever 2 is secured by a pin 4 and a suitable clevis to one of the brake beams, to which are attached the brake-shoes 5 of one pair of wheels. The dead-lever 8 is similarly secured by means of the pin 9 and a suitable clevis to the other brake-beam, which carries the brake-shoes 5 of the other pair of wheels. The lower ends of the levers 2 and 8 are connected together by means of the pins 7 and the rod 6, which is familiarly known as the "connecting-rod." The upper end of the dead-lever 8 is inclosed and guided in its movements by an automatically-adjustable abutment 12, having a stem or rod 10, which is supported by and has a free axial movement in a casing 11, secured to the truck-timber 13. The guide 12 is recessed to receive the upper end of the dead-lever 8, and its function is to abut against and force said upper end forward from time to time to take up the slack of the brake apparatus, and this

function of the abutment in conneection with its capability of progressive automatic adjustment, forms the important feature of my improvement.

The casing 11 is divided into two compartments, and when the devices are in their normal position, as illustrated in Fig. 1, the rod 10 extends longitudinally throughout both compartments. In the inner compartment is a sliding sleeve or box 14, which surrounds and is supported by a rod 10. In the sleeve or box 14 is a pawl or clutch 15, which rests on top of the rod 10 and is pivoted in the sleeve 14 in such a manner that it will slide freely along the surface of the rod when moved in a direction away from the dead-lever 8, but when moved in the opposite direction will bite upon the rod and clamp it rigidly against the lower inner face of the sliding sleeve 14, so that the sleeve 14 cannot be moved toward the dead-lever 8 without drawing the rod 10 with it.

In the outer compartment of the casing 11 are washers 18, which loosely encircle the rod 10. These parts are more clearly shown in the enlarged view, Fig. 5. The washers 18 are normally supported by the rod 10, but when the rod is moved axially toward the dead-lever 8 the washers at the right end of the casing 11 successively lose the support of the rod and fall downward in the casing 11, as illustrated in Figs. 5 and 8, to such a position that their solid portions are interposed between the end of the rod 10 and the solid end of the casing 11, so as to lock the rod 10 in the position to which it has been moved toward the dead-lever 8. This movement of the rod 10 has the effect of advancing the abutment 12 to a new position and causing it to force the upper end of the dead-lever 8 forward a corresponding extent.

Removably secured to the brake-rod 1 is a carrier 19, which loosely supports a rod 20. One end of the rod 20 is loosely but durably secured to a rod 22 and the other end terminates in a head or collar 21. One end of the rod 22 is provided with a clevis 23, which is pivotally secured to the upper end of the clutch 15 by a pin 17, and the other end passes through a guide 24, secured to the truck-frame, and terminates in a head or collar 25. Arranged between the guide 24 and the collar 25 is a spring 26, which encircles the rod 22. The carrier 19 is secured to the brake-rod at a point which will permit the desired definite length of movement of the brake-rod and its connections to the right to take place before the carrier engages the collar 21 of the rod 20.

The operation is as follows: When the brakes are applied by the motor, the brake-rod 1 is caused to move toward the right, together with the upper end of the live-lever 2, thereby drawing the brake-beam attached to the lever 2 to the wheels, and at the same time causing the connecting-rod 6 to move to the left, drawing the brake-beam attached to the dead-lever 8 toward its pair of wheels, thus applying the brake-shoes to all the wheels. Should this result be obtained without a sufficient movement of the brake-rod to the right to cause the carrier 19 to engage the collar 21, no further movement of the apparatus will take place. As the brake-shoes wear, however, from repeated applications to the wheels, the brake-rod 1 is permitted to move a greater distance to the right at each successive application of the brakes, until finally the carrier 19 will engage the collar 21 of the rod 20 and cause the rods 20 and 22, clutch 15, and sleeve 14 to be moved to the right and the spring 26 to be compressed. When the brakes are again released, the brake-rod 1 will return to its normal position, (shown in Fig. 1,) disengaging the carrier 19 and collar 21 and permitting the spring 26 to force the rod 22 to return to its normal position. (Shown in Fig. 1.) The return of the rod 22, however, is accompanied by the return of the clutch 15 and sleeve 14, which grip the rod 10 firmly between them, causing the abutment 12 to also move to the left until the sleeve 14 comes to its normal position against the inner end of the casing 11, as shown in Fig. 1. As the rod 10 moves to the left the upper end of dead-lever 8 is carried with it, and one or more of the washers 18 drop off the end of the rod 10 and prevent the return of the rod 10 to the position shown in Fig. 1, when the brakes are again applied. The movement of the upper end of the dead-lever 8 to the left causes the approach of both the brake-beams with their brake-shoes toward the wheels, in the same way that the movement of the upper end of the live-lever 2 to the right effects the application of the brake, and thus the slack of the parts due to the wear of the brake-shoes is reduced or taken up. In this manner all that portion of the movement of the brake-rod 1 to the right in the application of the brakes which exceeds that necessary to cause the carrier 19 to engage with the collar 21 is communicated to the rod 22 and sleeve 14, and when such excess of movement of the brake-rod 1 becomes equal to the thickness of one of the washers 18 the return of the rod 22 by means of the spring 26 will cause the rod 10 to be moved to the left sufficiently to drop one washer from its end. The distance through which it is desired that the brake-rod 1 shall move in the application of the brakes having been determined, the carrier 19 is secured to the rod 1 at such a point that it must traverse such distance before engaging the collar 21. As the brake-shoes subsequently wear in the application of the brakes, the distance moved by the brake-rod 1 can exceed that selected only by such an amount as will cause the rod 10 to drop one washer upon the release of the brakes, which will thus set the abutment 12 forward a corresponding extent, and thereby take up the slack of the brake-shoes and cause

the travel of the brake-rod 1 to become normal again until sufficient further wear of the shoes to drop another washer has taken place.

The construction in Fig. 3 differs somewhat from that in Fig. 1. Here a rod 27 is pivotally secured to the brake-rod 1—as, for instance, by means of a clevis and pin 3. It is supported by and guided in the casing 11 and also passes through a projecting arm of the clutch 15 and terminates at its other end in a head or collar 28. The spring 26 encircles the rod 27 and is confined between the casing 11 and the projecting arm of the clutch 15. In its operation the brake-rod 1 is moved to the right, applying the brake-shoes to the wheels and carrying the rod 27 with it. If the movement of the brake-rod 1 in applying the brakes is increased by the wear of the brake-shoes, the collar 28 will engage the clutch 15 and carry the clutch 15 and sleeve 14 to the right, with the rod 27, through such a distance as the movement of the brake-rod 1 exceeds the normal distance required to set the brake-shoes, the clutch 15 and sleeve 14 sliding freely over the rod 10. When the brakes are released by the movement of the brake-rod 1 to the left, the spring 26 forces the clutch 15 and sleeve 14 in the same direction, causing them to engage the rod 10 and force the abutment 12 against the dead-lever 8, carrying it forward until the sleeve 14 comes in contact with the end of the casing 11 and a washer is dropped off the end of the rod 10, preventing its return and locking the abutment in its new position.

In the modification shown in Fig. 5 the carrier 19 is loosely connected to the clutch 15 by a chain 29, so that the desired movement of the brake-rod 1 to the right before engaging the clutch 15 is secured through the slack of the chain 29. In this construction the spring 26 is confined between the casing 11 and the collar 25 on the rod 22. In Fig. 5 some of the washers are shown in their lower position, the rod 10 having been moved to the left, so as to set the abutment 12 forward and advance the upper end of the dead-lever 8, and thereby take up the slack in the brake apparatus. The bottom of the compartment which contains the washers 18 is slotted, as at 30, to enable the washers to be lifted to their upper position (by inserting a flat instrument or otherwise) when it is desired to move the rod 10 back to its normal position for the purpose of replacing worn brake-shoes with new ones. The sections, Figs. 8 and 9, show that the rod 10 may be either round or square in cross-section. It may be of other shapes, if desired.

Figs. 6 and 7 show another modification, in which a collar on the brake-rod 1 is substituted for the carrier 19 of the former figures. In this instance the rod 22 is loosely suspended from the brake-rod 1 by a loop at its outer end, while its inner end is secured to the sleeve 32 by the pin 17. Pivoted to the casing 11 is a stirrup 31, the outer end of which encircles the rod 22. The spring 26 is secured between the stirrup 31 and the collar 25 on the rod 22. The rod 10 is serrated and the sleeve 32, which fits loosely upon it, has corresponding serrations on its upper inner surface at the left, while its inner surface is otherwise plain. Pivoted in the casing 11 is a pawl 33, having a serrated face for engaging with the serrations of the rod 10. This pawl is so placed as to permit of the free movement of the rod 10 toward the dead-lever, but to check a movement in the opposite direction. It is in this instance the equivalent for the washers in the former figures, its function being to hold the abutment 12 firmly in its adjusted position against the backward thrust of the dead-lever. In the operation of this modified form of the apparatus when the collar 19 of the brake-rod 1 engages the rod 22 and moves it to the right the spring 26 is compressed and the left end of the sleeve 32 is lifted, so as to disengage its teeth from the serrations of the rod 10 and cause it to slip along the rod to the right. When the brakes are released, the collar 19 becomes disengaged from the rod 22, releasing the spring 26, which forces the teeth of the sleeve 32 into the serrations of the rod 10 and causes the rod to be forced to the left until the sleeve comes in contact with the casing 11. The pawl 32 then engages the rod 10 and prevents its movement to the right when the brakes are next applied.

Fig. 11 shows a modification of the construction shown in Fig. 6, in which the spring 26 is secured in the casing 11 between the outer wall of the casing and the sleeve 32. In this construction the stirrup 31 is dispensed with.

Fig. 10 illustrates another modification of my improved appliance, by which the slack of the brake apparatus is taken up at the top of the live truck-lever 2 instead of at the top of the dead truck-lever 8, as before described. In this construction the abutment 12 on the inner end of the rod 10 is provided with a vertical arm 37, to which is pivoted a pawl 38. The rod 10 passes through the tube 34 and at its outer end terminates in a head or collar 35. The exterior of the tube 34 is serrated throughout its length and rests loosely in the casing 11, in such position as to be engaged by a pawl 33, which is pivoted in the casing 11, and is arranged to permit the movement of the tube toward the brake-lever, but to prevent its movement in the opposite direction. The rod 10 slides freely through the tube 34 and is of sufficiently-greater length that the movement necessary for setting the brakes with new or unworn shoes can take place without the collar 35 engaging the end of the tube; but if there is slack in the brake apparatus, caused by the wearing of the shoes, the collar 35 will engage the rear end of the tube 34 before the brakes are fully applied. The upper end of the projecting arm 37 is recessed or slotted, so that the brake-rod 31 may pass

loosely through it, and the pawl 38 is so arranged as to slip over the brake-rod during its backward movement, but to engage with it during its forward movement. The brake-rod also extends through the casing 11 and is provided with a head or collar 40 at its outer end, and the spring 41, which encircles the brake-rod, is confined between the casing 11 and the collar 40. When the brake-rod moves to the right, the pawl 38 engages its serrated portion, so as to draw the arm 37 and abutment 12 against the upper end of the live-lever 2, so as to apply the brakes. If the brake-shoes are worn and there is slack in the apparatus, so that the movement of the brake-rod is greater than the normal distance between the collar 35 and the rear end of the tube 34, such excess of movement will cause the collar 35 to engage the end of the tube 34 and force the tube forward toward the brake-lever, this movement of the tube being permitted by the pawl 33. When the brakes are released, the pawl 33 engages the tube and prevents its return movement, so that the rod 10 and live-lever 2 cannot return to the normal positions shown in Fig. 10, their movement being limited by the new position of the tube 34. The spring 41 causes the brake-rod 1, however, to move back to its normal position, the pawl 38 permitting such movement. The extent to which the tube 34 is advanced is equivalent to the amount of slack in the brake apparatus, so that the abutment 12, which limits the backward movement of the brake-lever 2, is adjusted to a new position, which makes the brake apparatus effective with the normal movement of the brake-rod. The upper end of the brake-lever, through which the slack is taken up, may be secured by a pin to abutment 12, as shown in Fig. 6, or it may rest loosely within its slotted end, as shown in other figures. The function of the abutment 12 is the same in both cases. The brake-rod 1 is intended to represent, broadly, the power connections between the brake-motor and the live truck-lever, and is designed to cover and include such other forms of power connections which directly or indirectly transmit the power from the prime motor to the live truck-lever as will cause my improved devices to operate in the manner described to automatically take up the slack in the brake apparatus caused by the wear of the brake-shoes and wheels.

I am aware that slack-adjusting devices have been applied to the connecting-rod 6, which in such devices is made in two or more pieces, and the slack of the brake apparatus is compensated by a shortening or lengthening of such connecting-rod 6. My invention is different from and much better than such devices, because, first, the connecting-rod 6 is always subjected to the heaviest strains brought upon the brake apparatus, while connections to the upper ends of the truck-levers are subjected to the lightest strains, so that there is less danger of derangement of the adjusting apparatus when it is attached to the upper end of a truck-lever than when it is attached to the connecting-rod; second, should the adjusting apparatus break, the slack can be adjusted by hand at the upper end of the truck-lever, while if attached to the connecting-rod it would destroy the operativeness of the brakes and be liable to cause serious accidents by the parts falling upon the track; third, when it is necessary to return the adjusting apparatus to its normal position for the purpose of applying new brake-shoes it is readily accessible at the upper end of the truck-lever, while if applied to the connecting-rod it would be accessible only with difficulty; fourth, on account of the much greater movement of the upper end of the truck-lever than of the lower end in compensating for a given wear of brake-shoes the adjustment of the slack at the upper end of the truck-lever secures a much more uniform travel of the primary moving member of the motor.

I am also aware that devices have been used for taking up the slack of the brake apparatus at the upper end of the truck-lever by means of a ratchet-and-windlass movement. My invention is an improvement upon such devices in being more direct, simple, and accessible, and, the movement of the parts being axial, no limit to the movement within that caused by the full movement of the primary moving member of the motor is encountered, as is the case where the movement of some parts is radial.

In case the construction shown in Fig. 10 is used with a fluid-pressure brake mechanism in which a spring is arranged in the brake-cylinder to release the brakes the spring 41 may, if desired, be omitted and the releasing-spring in the brake-cylinder be depended on to restore the brake-rod 1 to its normal position. (Shown in Fig. 10.)

The loose connection referred to in the claims is embodied in the parts 19, 20, and 22 in Figs. 1 and 2, the part 27 in Figs. 3 and 4, the parts 19 and 22 in Figs. 5, 6, 7, and 11, and the parts 37, 10, and 34 in Fig. 10. The clutch device referred to in the claims is embodied in the parts 14 and 15 in Figs. 1, 2, 3, 4, and 5, the part 32 in Figs. 6, 7, and 11, and the parts 37 and 38 in Fig. 10. The locking device is embodied in the washers 18 in Figs. 1, 2, 3, 4, and 5 and the pawl 33 in Figs. 6, 7, 10, and 11. The pawls 15 and 33 may be made without teeth and be used with a smooth rod, serving to hold it by friction.

I am aware that Patent No. 465,266, dated December 15, 1891, shows an automatic slack-adjuster, consisting of a windlass which is operated by the abnormal movement of the brake-rod and a chain extending from said windlass to the upper end of the live brake-lever, which communicates the movement of the windlass to the brake-lever, and thereby draws said lever closer to the wheel of the

car, so as to compensate for the wear of the brake-shoes, the said lever being actuated by means of a radial lever and an intermediate pawl and being held in its adjusted positions by a suitable holding-pawl. This device, however, differs both in construction and operation from my invention in that instead of the windlass and chain-draft arrangement described in the said patent, with the numerous parts necessary to such construction, I use an axially-movable abutment which is external to and has no necessary connection with the brake-lever, but which by a positive advance movement corresponding to the wear of the brake-shoes, however small, takes up any slack which may occur in the brake apparatus as the result of such wear. It is not only positive, but by reason of its simple construction and its being mounted independently upon the truck-frame it is not liable to get out of order, and if it should it may be easily and quickly repaired or replaced.

I am aware that Patent No. 428,744, dated May 27, 1890, shows a contractible lower connecting-rod provided with ribs and a series of washers mounted on the rod and supported by the ribs in an elevated position, so that when slack occurs the washers shall drop one by one off of the ribs and down onto the body of the rod between the ends of the ribs and the end of the case that incloses the washers, and thereby compensate for the wear of the brake-shoes. I am also aware that Patent No. 453,062, dated May 26, 1891, shows an extensible lower connecting-rod and a series of liners pivoted to a pintle-rod in such relation to the abutting ends of the two sections of the connecting-rod as to swing one by one between the said ends, and thereby compensate for the wear of the brake-shoes. My stem-and-washer device is different from these devices both in construction and combination, as it is not interposed in and forms no part of the system of rods and levers by which the brakes are applied, as do said prior devices, but is connected with and forms one of the means for adjusting the external abutment, against which one of the brake-levers rests and which holds said lever up to its normal range of movement.

What I claim as my invention is—

1. In an automatic slack-adjuster, a brake-rod having a definite normal movement for setting the brake-shoes, in combination with one of the brake-levers and an axially-movable abutment actuated through intermediate mechanism, substantially as described, by the abnormal movement of the brake-rod caused by the slack produced by the wearing of the brake-shoes, substantially as and for the purposes described.

2. In an automatic slack-adjuster, the brake-rod having a definite normal movement for setting the brake-shoes, in combination with one of the brake-levers, an axially-movable abutment, mechanism arranged between the brake-rod and the abutment and operated in one direction by an abnormal movement of the brake-rod and in the opposite direction by a retracting-spring, whereby the abutment is automatically advanced and forces the brake-lever forward to take up the slack of the brake apparatus caused by the wear of the brake-shoes, and a locking device for holding the abutment in its advanced position, substantially as and for the purposes described.

3. The combination of the brake-rod having a definite normal movement for setting the brake-shoes with an abutment having an axially-movable stem, a clutch device capable of a free backward motion on the stem of the abutment, a loose connection between the brake-rod and the clutch device, and a retracting-spring for actuating the clutch device and causing it to move the abutment forward to a new position, substantially as and for the purposes described.

4. The combination of the brake-rod with the loose connection, the abutment 12, having a stem 10, a clutch device capable of moving freely in one direction on the stem, a spring for moving the clutch device and stem in the opposite direction, and a locking device for holding the abutment in its adjusted position, substantially as and for the purposes described.

5. The combination of the brake-rod with the carrier or collar 19, the loose connection 22, the abutment-stem 10, and the clutch device mounted on the rod 10 and moved by the connection 22 in one direction and a spring 26 in the other direction, substantially as and for the purposes described.

6. In an automatic slack-adjuster, an abutment having a stem by which it is supported on the truck-frame, in combination with a casing containing washers, which, when the abutment is adjusted forward to take up the slack of the brake-lever, fall one by one back of the end of the stem for the purpose of holding the abutment in its adjusted position, substantially as and for the purposes described.

7. The combination of the abutment 12, stem 10, casing 11, and washers 18, substantially as and for the purposes described.

8. The combination of the abutment 12, stem 10, and washers 18 with the casing 11 for containing and holding the washers, provided with a narrow slot 30 for the insertion of an instrument to raise the washers in the casing, substantially as and for the purposes described.

9. The combination of the brake-lever, abutment 12, and stem 10 with the sliding box or sleeve 14 and pawl 15, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 12th day of February, 1892.

ROBERT A. PARKE.

Witnesses:
C. E. THORNALL,
THOMAS B. KERR.