June 11, 1940. B. H. BROWALL ET AL. 2,203,890

AUTOMATIC SLACK ADJUSTER FOR VEHICLE BRAKES, ESPECIALLY RAILWAY CAR BRAKES

Filed July 13, 1937 4 Sheets-Sheet 1

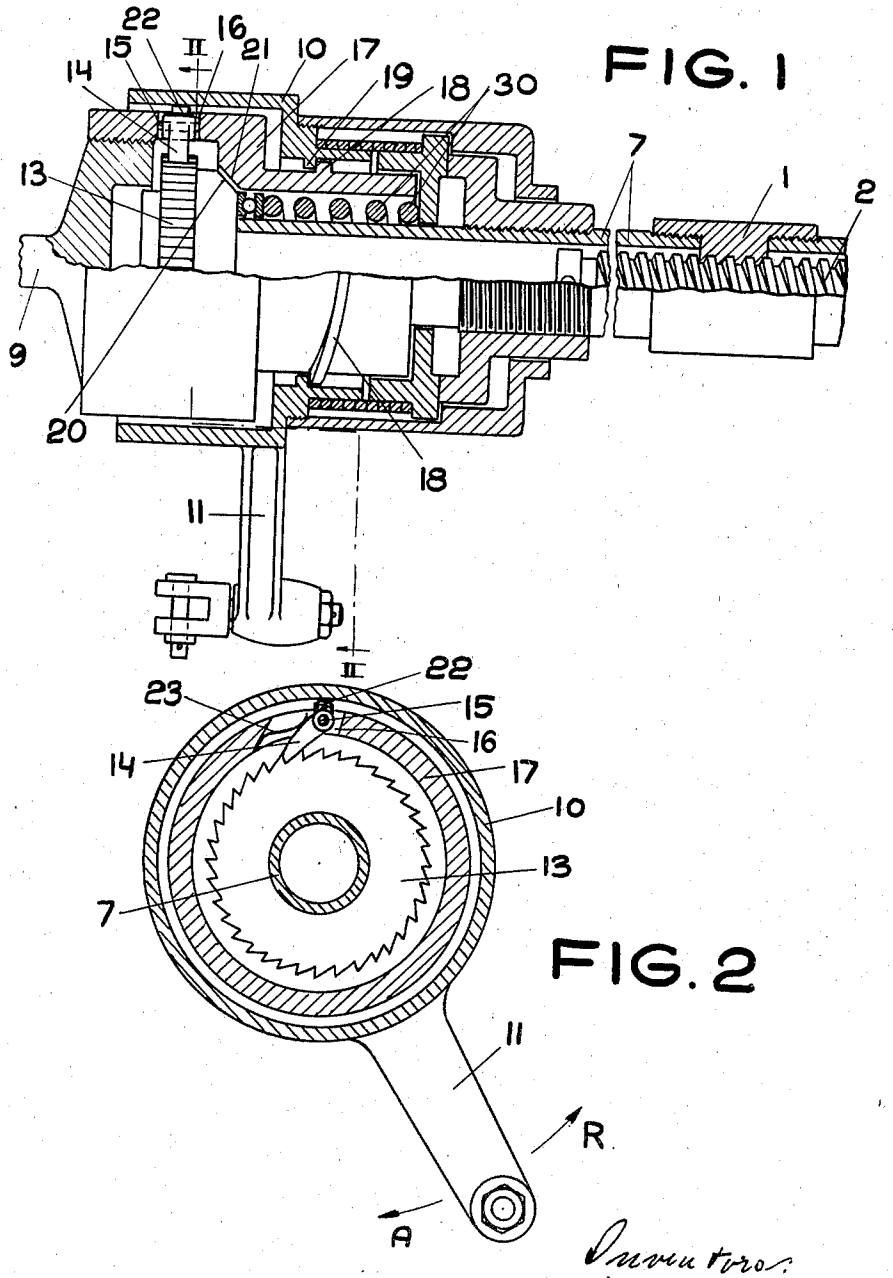


FIG. 1

FIG. 2

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Filed July 13, 1937 4 Sheets-Sheet 2

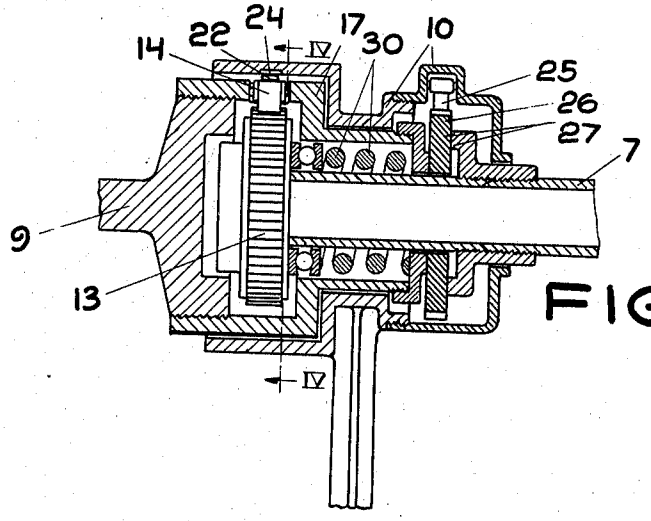


FIG. 3

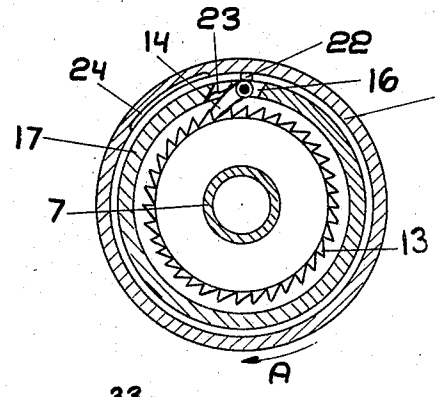


FIG. 4

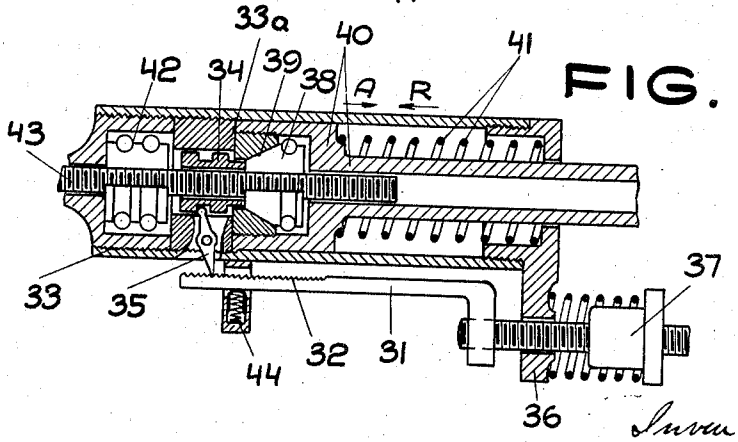


FIG. 5

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Filed July 13, 1937 4 Sheets-Sheet 3

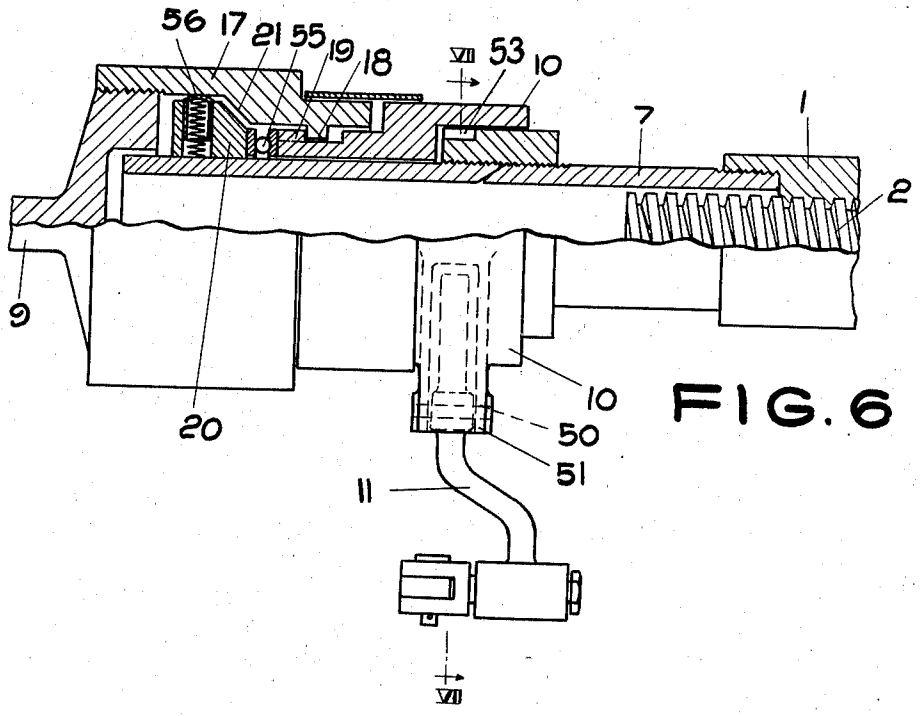
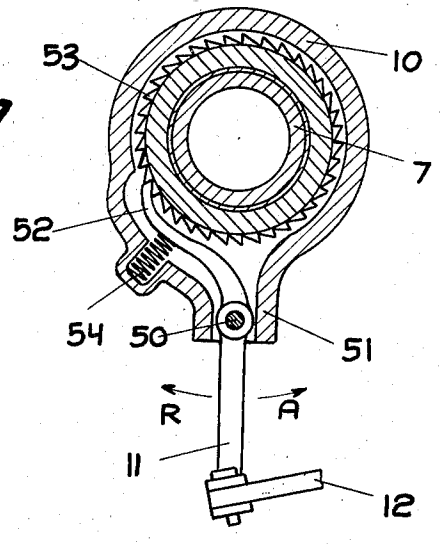


FIG. 6

FIG. 7



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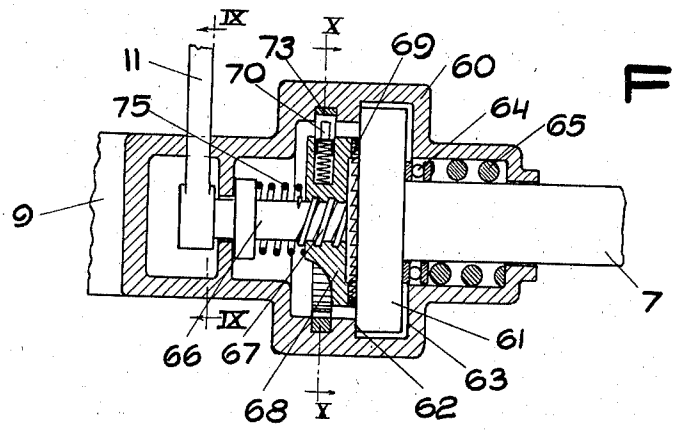


FIG. 8

FIG. 9.

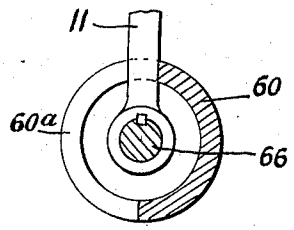
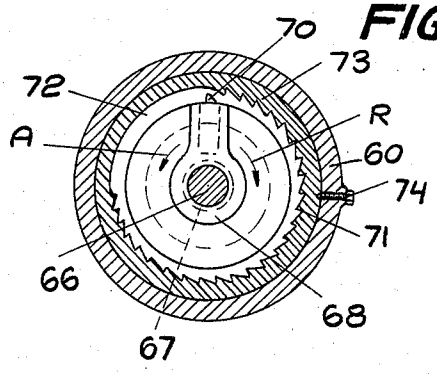


FIG. 10.



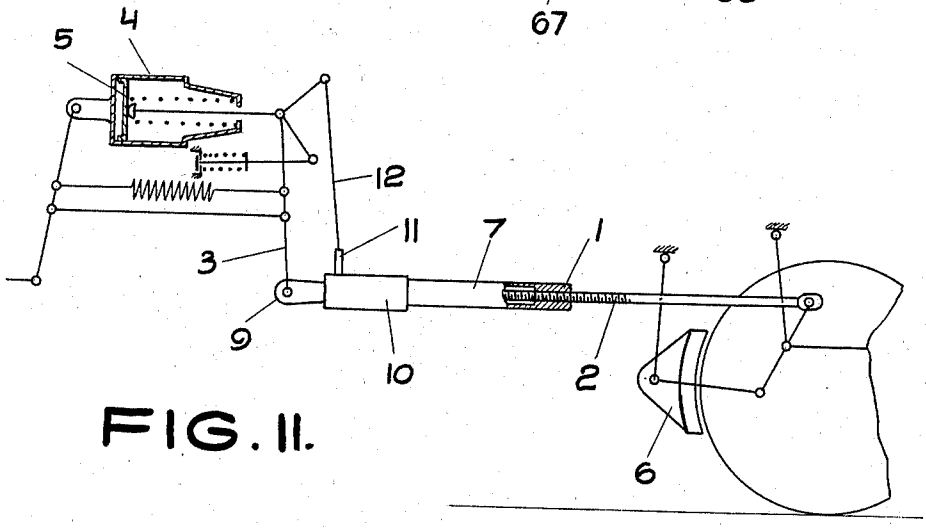


FIG. 11.

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UNITED STATES PATENT OFFICE

2,203,890

AUTOMATIC SLACK ADJUSTER FOR VEHICLE BRAKES, ESPECIALLY RAILWAY CAR BRAKES

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Application July 13, 1937, Serial No. 153,414
In Austria April 7, 1937

15 Claims. (Cl. 188—202)

This invention relates to automatic slack adjusters for vehicle brakes, especially railway car brakes, and more particularly to such automatic slack adjusters which are operative not only for reducing too large a slack or clearance between the brake shoes and the wheels but also for increasing the slack or clearance therebetween when too small, and which perform their slack increasing movement under the action of the stresses arising too early in the brake rigging at a braking operation. Automatic slack adjusters of this double-acting type have many important advantages but also the drawback that they can perform an undesirable slack increasing movement under the action of stresses other than those arising at a braking operation, for instance such sudden stresses which at released brake may arise in the brake rigging due to shocks and the like when switching the cars. Certainly, in order to avoid such undesired slack increasing movement it is already known to construct the slack adjusters and their actuating devices in such a way that the slack adjuster is locked against slack increasing movement not only during the application of the brake, namely when the brake piston has travelled the distance corresponding to the desired brake shoe clearance, but also at the release of the brake, namely when the brake piston has reached its normal end position corresponding to fully released brake. Under certain circumstances this known precaution, however, is not satisfactory because it may happen that the various parts of the brake for one reason or the other, for instance due to a hand brake that has not been fully released, will be prevented from returning to their normal end position corresponding to fully released brake and, consequently, will come to a standstill in a position in which the intended locking of the slack adjuster against slack increasing movement has not yet taken place.

The object of the invention is to improve automatic slack adjusters of the double-acting type above referred to, so that the slack adjuster at the release of the brake will be automatically locked against slack increasing movement irrespective of the position in which the release movement of the brake may come to a standstill. This feature and various other features and advantages will appear from the following description of some embodiments of the invention.

In the drawings—

Figs. 1 and 2 are a side view, partly in section, and a cross section on line II—II in Fig. 1, respectively, of a form of a double-acting slack adjuster of the screw type with a locking device which only performs the function proposed by the invention.

Figs. 3 and 4 are an axial section and a cross section substantially on the line IV—IV in Fig. 3, respectively, of a modified form of a double-acting slack adjuster of the screw type, in which the locking device also performs the further function of locking the slack adjuster against further slack increasing movement at the application of the brake when the brake piston has travelled the distance corresponding to the desired brake shoe clearance.

Fig. 5 is an axial section of a double-acting slack adjuster of the toothed rod type, in which the locking device performs the same further function as in the form of Figs. 3 and 4.

Figs. 6 and 7 are a side view, partly in section, and a cross section substantially on the line VII—VII in Fig. 6, respectively, of a double-acting slack adjuster of the screw type, in which the locking device besides of the function proposed by the invention also performs the further function of transmitting the slack reducing movement from the actuating device of the slack adjuster to the slack adjusting nut thereof at the release of the brake.

Figs. 8, 9 and 10 are an axial section and cross sections on lines IX—IX and X—X in Fig. 8, respectively, of a double-acting slack adjuster of the screw type, in which the locking device besides of the function proposed by the invention also performs both the aforesaid further functions, namely the function of locking the slack adjuster against further slack increasing movement when the brake piston at an application of the brake has travelled the distance corresponding to the desired brake shoe clearance, and the function of transmitting the slack reducing movement from the actuating device of the slack adjuster to the slack adjusting nut thereof at the release of the brake.

Fig. 11 is a diagrammatic view illustrating, by way of example, how a double-acting slack adjuster of the screw type and the actuating device thereof may be mounted in the brake rigging.

The most well known double-acting slack adjusters of the screw type comprise a two-part rod forming part of the brake rigging, the two parts of said rod being connected by a non-self-locking screw connection comprising a screw and a nut, one of which, usually the screw, is non-rotatable and the other of which, usually the nut, is rotatable for adjusting the effective length of the rod and, as a result hereof, the slack or brake shoe clearance. The construction is such that under the control of an actuating device which in turn is operated by the application and release movements of the brake, the rotatable part of the non-selflocking screw connection at an application of the brake is locked against rotation in the direction of an increase of the brake shoe clearance when the brake piston has travelled the distance corresponding to the desired brake shoe clearance, and at the release of the brake

is rotated in the direction of a reduction of the brake shoe clearance for the purpose of reducing the brake piston stroke to its normal value if this, on account of too large a brake shoe clearance, was exceeded at the braking operation.

Referring first to Fig. 11, 1 designates the rotatable nut and 2 the non-rotatable screw of a non-selflocking screw connection connecting the two parts of a two-part rod which is attached to a lever 3 of the brake rigging which serves the purpose of transmitting the braking power from the brake actuator comprising the brake cylinder 4 and the brake piston 5 to the brake shoes 6. The nut 1 and a sleeve 7 to which the nut is secured can, by the operation of the slack adjuster, be locked against rotation relatively to a non-rotatable part 9 which usually is formed with an eye for the attachment of the two-part rod to the lever 3. This operation of the slack adjuster is obtained by rotating a rotatable casing 10 forming part of the slack adjuster in one direction or the other. The rotation of the casing 10 is effected in dependence upon the application and release movements of the brake by means of an actuating device acting upon a crank arm 11 provided on the casing 10. Through this actuating device indicated at 12 the casing 10 is rotated in opposite directions at the application and the release of the brake.

The form of the slack adjuster shown in Figs. 1 and 2 in all essentials is well known in the art (compare for instance Fig. 4 of the U. S. Patent No. 1,983,897) only excepting the locking device proposed by the invention and, therefore, will be described only to the extent necessary for explaining the construction and operation of said locking device. This comprises a ratchet wheel 13 secured on the rotatable sleeve 7, and a pawl 14 coacting with the ratchet wheel. This pawl 14 is pivoted on a pin 15 in an opening 16 in the side of a sleeve 17 which in a known manner is secured on the non-rotatable part 9 and provided with a guiding screw thread 18 cooperating with a corresponding guiding screw thread 19 in the casing 10. The cooperating threads 18, 19 serve the known purpose of allowing a thrust ring 20 secured on the sleeve 7 to engage a thrust surface 21 on the rotatable sleeve 17 when at the application of the brake the casing 10 has been rotated through a certain angle in the direction of the arrow A in Fig. 2 and the brake piston has travelled the distance corresponding to the desired value of the brake shoe clearance. As soon as this has taken place the arising braking power is transmitted from the non-rotatable part 9 directly through the thrust surface 21 to the thrust ring 20 and therefrom through the sleeve 7 and the nut 1 to the screw threaded rod part 2. The friction arising between the ring 20 and the surface 21 due to the thrust pressure locks the sleeve 7 and, consequently, the nut 1 against rotation. As soon as the casing 10 at the application of the brake begins to rotate in the direction of the arrow A in Fig. 2, the pawl 14, by means of a spring pressed friction shoe 22 mounted on the pawl and cooperating with the inside of the rotatable casing 10, is moved out of engagement with the ratchet wheel 13. Through the cooperation of the friction shoe 22 with the casing 10 the pawl 14 is held out of engagement with the ratchet wheel 13 until the casing 10 at the release of the brake is again rotated in the reverse direction, that is in the direction of the arrow R in Fig. 2. As soon as this reverse rotation of the casing 10 in the direction of the arrow R in Fig. 2 begins, the pawl 14 is again moved, through the cooperation of the friction shoe 22 with the rotatable casing 10 and, if desired, by the aid of a spring 23, in engagement with the ratchet wheel 13. The pawl 14 remains in this engaged position until the casing 10 at a new application of the brake is again rotated in the direction of the arrow A in Fig. 2. Thus, the pawl 14 will be held out of engagement with the ratchet wheel 13 only during the application of the brake and as long as the braking operation is going on, and from the moment the release of the brake commences and until a new application movement of the brake begins the pawl 14 will be in engagement with the ratchet wheel 13 and prevent rotation of the sleeve 7 and the nut 1 connected thereto in the direction of an increase of the brake shoe clearance. Thus, the slack adjuster at released brake, irrespective of the position in which the release movement of the brake may have come to a standstill, always will be locked against slack increasing movement, so that an increase of the slack or brake shoe clearance under the action of switching shocks or the like cannot take place.

In the modified form illustrated in Figs. 3 and 4 the locking device 13, 14 performs not only the function proposed by the invention, namely that of locking the slack adjuster against slack increasing (screwing out) movement during the whole release movement of the brake and until the brake is applied anew, but also the further function of locking the slack adjuster against further slack increasing (screwing out) movement when at the application of the brake the brake piston has travelled the distance corresponding to the desired value of the brake shoe clearance, that is the same function which in the form of Figs. 1 and 2 is performed by the cooperating guiding threads 18, 19 and the friction device 20, 21. To this end in the form of Figs. 3 and 4 there is provided in the inside of the rotatable casing 10 a recess or groove 24. In the same manner as in the form of Figs. 1 and 2 the pawl 14 is moved out of engagement with the ratchet wheel 13 through the rotation of the casing 10 in the direction of the arrow A (Fig. 4) at the application of the brake. When the brake piston, however, has travelled a certain distance corresponding to the desired brake shoe clearance, the recess 24 arrives at the friction shoe 22 so that the latter can move freely in the recess and, consequently, loses its frictional engagement with the casing 10. The pawl 14 is then moved in engagement with the ratchet wheel 13 by the spring 23 and locks the sleeve 7 carrying the slack adjusting nut 1 of the non-selflocking screw connection 1, 2 (compare Fig. 11) against rotation in the slack increasing direction. The pawl 14 remains engaged with the ratchet wheel 13 also during the release of the brake and until the brake is applied again, so that the slack adjuster after each braking operation, irrespective of the position in which the brake release movement may have come to a standstill, will be locked against screwing out movement, that is slack increasing movement, under the action of switching shocks and the like.

In the form of Figs. 3 and 4 rotation of the sleeve 7 and the nut 1 attached thereto in the direction of a screwing in, that is a slack reducing movement is effected by means of a pawl 25 mounted in the rotatable casing 10 and cooperating with a rotatable ratchet wheel 26 which

is connected with the sleeve 7 by means of a friction clutch 27 compressed by a spring 30. When at the application of the brake the brake rigging is stressed the compression of the friction clutch 27, however, is relieved so that a slack increasing movement can take place when the pawl 14 is out of engagement.

The form of a double-acting slack adjuster of the toothed rod type illustrated in Fig. 5 is well known in the art (compare U. S. Patent No. 2,084,989) only with the exception for a modification in connection with the main pawl means of the slack adjuster. The description, therefore, will be limited to what is necessary for explaining the operation of this modification according to which a rod 31 forming part of the actuating device of the slack adjuster is provided with a series of teeth 32 with which a lever 35 cooperates, which serves the purpose of sliding the slidable sleeve 34 in the housing 33 of the slack adjuster. In Fig. 5 the parts of the slack adjuster are shown in the position which they take when the brake is released. At the application of the brake the housing 33 of the slack adjuster in a known manner moves in the direction of the arrow A in relation to the actuating rod 31 until the ear 36 on the housing 33 abuts the actuating abutment 37. Immediately at the commencement of this movement the lever 35 on account of its cooperation with the teeth 32 is turned in a clockwise direction as viewed in the figure, whereby the sleeve 34 is displaced to the right and pushes the expandable main pawl nut 38 (which is divided into a plurality of resiliently connected sectors) away from its conical seat 39 in the rod part 40 as long as the latter and the housing 33 under the action of the spring 41 take the position in relation to each other, which is shown on the drawings. Now the pawl nut 38 in a known manner can permit a sliding movement of the rod part 43 (which is provided with teeth in the form of a screw thread for cooperation with the two pawl nuts 38 and 42) relatively to the rod part 40 in the direction of an increase of the brake shoe clearance. After the lever 35, at the beginning of the application movement of the brake, having been turned to the limit in the clockwise direction it slides, at the continued movement of the housing 33 in relation to the rod 31, over the teeth 32, this sliding of the lever 35 over the teeth 32 being rendered possible by such an arrangement of the rod 31 that it can yield sideways against the action of a spring 44. When the ear 36 during the application movement of the brake has reached the abutment 37 the spring 41 is compressed and the rod part 40 moved with the seat 39 away from the sleeve 34, whereby the pawl nut 38 is allowed to abut the seat 39, so that the pawl nut 38 again will block the rod part 43 against displacement relatively to the rod part 40 in the slack increasing direction.

When the brake is released the rod part 40 under the action of the spring 41 again abuts the abutment 33a for the same in the housing 33, and then the housing 33 moves in the direction of the arrow R in relation to the actuating rod 31. As soon as this movement begins the lever 35 through its cooperation with the teeth 32 on the rod 31 is turned in the counter-clockwise direction, whereby the sleeve 34 is displaced away from the pawl nut 38 and allows the latter to seat itself and to remain seated in the conical seat 39 during the whole release movement of the brake and until the brake is applied anew. When so seated the pawl nut 38 locks the rod 40 against displacement relatively to the rod 43 in the slack increasing direction. The lever 35, having been turned to the limit in the counter-clockwise direction immediately at the beginning of the release movement of the brake, will slide over the teeth 32 at the continued brake release movement in the same manner as at the application movement of the brake. As will be readily understood from the foregoing description the slack adjuster after each braking operation, irrespective of the position in which the brake release movement may have come to a standstill, will be locked against slack increasing movement due to switching shocks and the like.

In the form of a double-acting slack adjuster of the screw type illustrated in Figs. 6 and 7 the crank arm 11 by which the rotatable casing 10 of the slack adjuster is connected to the actuating device 12 is pivoted by means of a pin 50 parallel to the axis of the casing 10 in a side opening therein, which opening preferably is surrounded by a flange 51 or the like. Inside of the casing 10 the arm 11 which is movable within limits around its pivot pin 50 is provided with a detent 52 cooperating with a ratchet wheel 53 secured on the sleeve 7 carrying the nut 1 of the non-selflocking screw-connection 1, 2. The detent 52 is actuated by a spring 54 which tends to move the detent in engagement with the ratchet wheel 53. When at the application of the brake the arm 11 is actuated by the actuating device 12 (compare Fig. 11) in the direction of the arrow A in Fig. 7, first the arm 11 is turned about its pivot pin 50 so that the detent 52 is moved out of engagement with the ratchet wheel 53. Then the rotatable casing 10 is rotated around its axis in the direction of the arrow A in Fig. 7, and due to this rotation of the casing 10 the coacting guide threads 18 and 19 on the non-rotatable sleeve 17 and the casing 10 allow the thrust ring 20 (which is supported against the casing 10 by means of a thrust ball bearing 55) to go into locking engagement with the thrust surface 21 when the brake piston has travelled the distance corresponding to the desired value of the brake shoe clearance. By this locking engagement the sleeve 7 is locked against rotation in the slack increasing direction. In order to secure a greater frictional resistance against rotation between the two sleeves 7 and 17 than between the casing 10 and the sleeve 7 during the application of the brake before the thrust ring 20 has come in engagement with the thrust surface 21, so that the sleeve 7 does not partake in the rotation of the casing 10 but only rotates under the action of stresses arising too early (that is before the brake piston has travelled the distance corresponding to the desired brake shoe clearance) in the brake rigging at the application of the brake, the thrust ring 20 is provided with a spring pressed friction shoe 56 or the like frictionally engaging the inside of the sleeve 17. When at the release of the brake the arm 11 is actuated by the actuating device 12 in the direction of the arrow R in Fig. 7, first the arm 11 is turned about the pin 50 so that the detent 52 is moved in engagement with the ratchet wheel 53, whereby the latter and, consequently, the sleeve 7 and the nut 1 are locked against rotation in the slack increasing direction. At the continued actuation of the arm 11 in the direction of the arrow R the casing 10 and, on

account of the engagement of the detent 52 in the ratchet wheel 53, the latter and the sleeve 7 and the nut 1 are rotated in the slack reducing direction. The detent 52 remains in engagement with the ratchet wheel 53 and locks the slack adjuster against slack increasing movement irrespective of the position in which the release movement of the brake may come to a standstill, the detent being moved out of the said engagement only at the beginning of a new application of the brake. Thus, the slack adjuster after each braking operation will be locked against slack increasing movement under the action of switching shocks and the like irrespective of the position in which the brake may have come to standstill at the release of the same. At every release of the brake the slack adjuster performs a slack reducing movement, even though the slack clearance may be proper. Because of the fact, however, that any too large reduction of the slack clearance will be automatically compensated by a corresponding slack increasing movement of the slack adjuster at the next application of the brake, the difference between the actual slack clearance at released brake and the slack clearance corresponding to the desired length of the brake piston stroke never will reach any harmful value.

In the form of a double-acting slack adjuster of the screw type illustrated in Figs. 8 to 10 the non-rotatable part provided with the attaching eye 9 is constructed as a surrounding casing 60 in which a thrust ring 61 secured on the sleeve 7 carrying the nut of the non-selflocking screw connection 1, 2 (compare Fig. 11) is rotatably arranged between two thrust faces 62 and 63 and supported by a thrust ball bearing 64 and a spring 65 which normally holds the thrust ring 61 pressed against the thrust surface 62. The arm 11 to which the actuating device 12 is connected is secured on a spindle 66 rotatably but not slidably mounted in the casing 10 axially thereof, the arm 11 projecting through a long slot 60a in the casing 60 and being rotatable relative thereto. The spindle 66 is provided with a guiding screw thread 67 cooperating with a corresponding internal thread in the bore of a ratchet disk 68 mounted on the spindle. The pitch of the said cooperating threads on the spindle 66 and the ratchet disk 68 is so large that the threads are non-selflocking. On the side facing the thrust ring 61 the disk 68 is provided with ratchet teeth 69 cooperating with corresponding ratchet teeth on the thrust ring 61. The ratchet disk 68 also carries a radially slidable, spring pressed detent 70 for cooperation with ratchet teeth 71 inside of the casing 60. The teeth 71 are not arranged all around the inner circumference of the casing 60, the circumferential row of teeth 71 having an interruption or cut out portion as shown at 72. Preferably the teeth 71 are cut in the inside of a ring 73 so mounted in an annular groove in the inside of the casing 60 that the ring can be adjusted angularly and set in adjusted position by means of a set screw 74, Fig. 10. A spring 75 which is weaker than the spring 65 tends to press the disk 68 towards the thrust ring 61.

In released position of the brake the detent 70 is in engagement with the ratchet teeth 71. When at the application of the brake the spindle 66 is rotated in the direction of the arrow A in Fig. 10 through the arm 11 actuated by the actuating device 12 (compare Fig. 11), at first the ratchet disk 68 does not partake in this rotation, because of being prevented therefrom by the engagement of the detent 70 in the ratchet teeth 71. Thus, due to the cooperating guiding threads on the spindle and the ratchet disk, the latter is axially displaced against the action of the spring 75 until the detent 70 comes at the side of the ring 73 and, consequently, loses its engagement with the teeth 71. When this occurs also the ratchet teeth 69 of the disk 68 are out of engagement with the corresponding ratchet teeth on the thrust ring 61. The disk 68, therefore, now partakes in the rotation of the spindle 66 until the detent 70 reaches the cut out portion 72 of the ring 73. Then the disk 68 under the action of the spring 75 (which may be a compression spring or a torque spring or a combined compression and torque spring tending to displace or screw the disk 68 towards the thrust ring 61) moves on the guiding thread 67 on the spindle 66 towards the thrust ring 61 and comes with its ratchet teeth 69 in engagement with the corresponding teeth on the thrust ring 61 and locks the latter and thereby the sleeve 7 against rotation in the slack increasing direction. This position in which the parts are shown in the drawings is arrived at when the brake piston has travelled the distance corresponding to the desired brake shoe clearance. Before arrival at this position, should the brake shoes already have been applied against the wheels and, as a result hereof, sufficient stresses already have arisen in the brake rigging, a slack increasing (screwing out) movement takes place, the spring 65 being compressed a little due to the said stresses, so that the thrust ring 61 is deprived of its frictional contact with the thrust surface 62 and will rest only against the thrust ball bearing 64, whereby the thrust ring 61 and thereby the sleeve 7 and the nut 1 of the non-selflocking screw connection 1, 2 become free to rotate under the action of the said stresses in the brake rigging. At the beginning of this rotation in the slack increasing direction the disk 68 partakes in the rotation, the detent 70 not preventing rotation of the disk 68 in this direction. The disk 68 is thereby screwed to the left (as viewed in Fig. 8) on the thread 67, whereby the ratchet teeth 69 on the disk 68 may be disengaged from the corresponding ratchet teeth on the thrust ring 61. The parts 61, 7, 1 continue their said rotation in the slack increasing direction until the aforesaid position shown on the drawings is arrived at, in which the ratchet teeth 69 again engage the corresponding ratchet teeth on the thrust ring 61 and stop further rotation in the slack increasing direction. At the release of the brake, during which the spindle 66 is rotated in the direction of the arrow R in Fig. 10, the disk 68 remains with its ratchet teeth 69 in engagement with the corresponding ratchet teeth on the thrust ring 61 and rotates the latter and the sleeve 7 in the slack reducing direction, while the detent 70 slides backwards over the teeth 71. Thus, after each braking operation the teeth 69 on the disk 68 will be in engagement with the corresponding teeth on the thrust ring 61, and the detent 70 will be in engagement with the teeth 71, irrespective of the position in which the brake at the release thereof may have come to a standstill, so that the slack adjuster as soon as the brake is released, will be locked against slack increasing movement under the action of switching shocks and the like.

What we claim and desire to secure by Letters Patent is:

1. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described, members relatively movable for adjusting the slack, a locking device for locking said members against slack increasing movement in relation to each other, and means including an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, for so controlling said locking device that it is rendered active by a commencing movement of the actuating device in the release direction and inactive by a commencing movement of the actuating device in the brake application direction, the locking device being so arranged that it also is operative for transmitting, at the release of the brake, a movement from the actuating device to one of said members in relation to the other in the slack reducing direction.

2. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described and of the type comprising a two-part non-self-locking screw connection one part of which is rotatable relatively to the other for adjusting the slack, a non-rotatable part, a rotatable casing, and an actuating device for rotating said casing forth and back at the application and the release of the brake, respectively, a ratchet wheel securely connected to the rotatable part of the non-selflocking screw connection, and a pawl cooperating with said ratchet wheel, said pawl being pivotally mounted on said non-rotatable part of the slack adjuster and so frictionally engaged with the rotatable casing that the pawl is moved in engagement with the ratchet wheel and thereby locks the rotatable part of the non-selflocking screw connection against slack increasing movement when after a braking operation the actuating device at the release of the brake begins to rotate the rotatable casing in the corresponding direction, and is again moved out of engagement with the ratchet wheel only when the actuating device at the application of the brake at a new braking operation begins to rotate the rotatable casing in the opposite direction.

3. In an automatic slack adjuster as claimed in claim 2 the additional feature that the rotatable casing is provided with a recess or the like due to which the pawl at the rotation of the rotatable casing in the forward direction at the application of the brake and in a position thereof corresponding to the desired value of the slack loses its frictional engagement with the rotatable casing and as a result thereof engages itself with the ratchet wheel and thereby locks the rotatable part of the non-selflocking screw connection against slack increasing movement.

4. In an automatic slack adjuster of the character described and of the type comprising two relatively slidable rod parts one of which is provided with ratchet teeth and the other of which is provided with a pawl cooperating with the teeth of the first rod part and, when abutting a seat, locking the rod parts against slack increasing movement in relation to each other, a housing, an abutment member movable in said housing towards and away from the pawl for unseating and seating the same, an actuating device including an actuating rod adapted to perform a forward and a backward movement relatively to the housing at the application and the release of the brake, respectively, and a movable member mounted on the housing and operatively connecting the said abutment member to said actuating rod, the feature that the said connecting member and the said actuating rod are arranged to cooperate in such a manner that at a commencing movement of the housing of the slack adjuster in the brake release direction relatively to the actuating rod the connecting member is actuated by the actuating rod so as to move the movable abutment member away from the pawl for allowing the latter to seat itself, while at the continued movement of the housing in the brake release direction relatively to the actuating rod the latter slides relatively to the connecting member, so that the latter only at a commencing movement of the housing in the brake application direction relatively to the actuating rod is again actuated thereby so as to move the movable abutment member towards the pawl for pushing it off from its seat.

5. In an automatic slack adjuster of the character described and of the type comprising a two-part non-selflocking screw connection one part of which is rotatable relatively to the other for adjusting the slack, a rotatable casing, an actuating device adapted to rotate said casing forth and back at the application and the release of the brake, respectively, and a driving connection between the rotatable casing and the rotatable part of the non-selflocking screw connection for rotating said part in the slack reducing direction at the release of the brake, the feature that the said driving connection comprises a ratchet wheel securely connected to the rotatable part of the non-selflocking screw connection, an arm operatively connected to the actuating device and pivotally mounted on the rotatable casing so that the arm is movable within limits about an axis substantially parallel to the axis of the casing, and a detent carried on said arm and adapted to cooperate with the said ratchet wheel in a manner so that the detent by a commencing movement of the actuating device in the direction in which it is moved at the release of the brake is engaged with the ratchet wheel on account of the arm, before it begins to carry with it the rotatable casing, being turned about its pivotal axis, the detent when engaged with the ratchet wheel locking the latter and thereby the rotatable part of the non-selflocking screw connection against rotation in the slack increasing direction, and the detent when engaged being again disengaged from the ratchet wheel only by a commencing movement of the actuating device in the direction in which it is moved at the application of the brake.

6. In an automatic slack adjuster as claimed in claim 5 the additional feature that the rotatable part of the non-selflocking screw connection is provided with a friction means cooperating with a non-rotatable part of the slack adjuster so as to ensure a greater frictional resistance against rotation between the rotatable part of the non-selflocking screw connection and the said non-rotatable part of the slack adjuster than between the rotatable part of the non-selflocking screw connection and the rotatable casing.

7. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described, a locking device for locking the slack adjuster against slack increasing movement, spring means tending to keep said locking device in locking position, an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, and controlling means operatively connected to said actuating device for transmitting a com-

mencing movement of the same, when applying the brake, to the locking device for releasing the latter against the action of the spring means, said controlling means being adapted to be effective for releasing the locking device up to a predetermined position only of the brake, corresponding to the desired value of the slack.

8. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described, a locking device for locking the slack adjuster against slack increasing movement, spring means tending to keep said locking device in locking position, an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, and controlling means operatively connected to said actuating device for transmitting a commencing movement of the same in either direction to the locking device, so as to put said locking device out of action against the action of the spring means at a commencing application movement and into action at a commencing release movement of the brake, said controlling means being adapted to be effective for releasing the locking device up to a predetermined position only of the brake corresponding to the desired value of the slack.

9. In an automatic slack adjuster for brakes, especially railway car brakes, of the character described, a locking device for locking the slack adjuster against slack increasing movement, an actuating device adapted to be moved forth and back at application and release of the brake, respectively, and means operatively connected to said actuating device for setting said locking device into action when the brake, after having performed a movement in the direction for applying it, begins a movement in the direction for releasing it, and for setting said locking device out of action when the brake, after having performed a movement in the direction for releasing it, begins a movement in the direction for applying it.

10. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described, a locking device for locking the slack adjuster against slack increasing movement, an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, and means operatively connected to said actuating device for controlling said locking device in dependence upon the directions of the movements of the brake, so that said locking device is set into action when after cease of a movement of the brake in the direction for applying it, a movement of the brake in the direction for releasing it begins, and so that said locking device is set out of action when after cease of a movement of the brake in the direction for releasing it, a movement of the brake in the direction for applying it begins.

11. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described, a locking device for locking the slack adjuster against slack increasing movement, an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, and means operatively connected to said actuating device for controlling said locking device in dependence upon the directions of the movements of the brake so that, with the brake in any given position, said locking device is in or out of action according to whether the brake arrived at such position on movement in the direction for releasing it or on movement in the direction for applying it.

12. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described, a locking device for locking the slack adjuster against slack increasing movement, an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, and means operatively connected to said actuating device for transmitting any commencing movement thereof in either direction, irrespective of its starting point, to the locking device, so as to put said locking device out of action at a commencing application movement and into action at a commencing release movement of the brake.

13. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described, a locking device for locking the slack adjuster against slack increasing movement, an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, and means frictionally connected to said actuating device for transmitting a commencing movement thereof in either direction to the locking device, so as to put said locking device out of action at a commencing application movement and into action at a commencing release movement of the brake.

14. In an automatic slack adjuster for vehicle brakes, especially railway car brakes, of the character described, a locking device for locking the slack adjuster against slack increasing movement, an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, and means slidably connected to said actuating device for transmitting a commencing movement thereof in either direction to the locking device, so as to put said locking device out of action at a commencing application movement and into action at a commencing release movement of the brake.

15. In an automatic slack adjuster for vehicle brakes, especially railway brakes, of the character described, a two-part brake rod one part of which is adapted to be displaced axially in relation to the other for taking up and letting out slack, an actuating device adapted to be moved forth and back by the application and release movements of the brake, respectively, a locking device in the form of a disengageable one-way clutch interposed between said actuating device and said rod part and adapted to couple said rod part to said actuating device at the release movement of the brake, and means operable by lost motion between said actuating device and said rod part for engaging said clutch when such lost motion corresponds to a commencing movement of the brake in the direction for releasing it, and for disengaging said clutch when such lost motion corresponds to a commencing movement of the brake in the direction for applying it.

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