AUTOMATIC SLACK ADJUSTER FOR RAILWAY CARS

Filed Oct. 22, 1949

2 SHEETS—SHEET 2

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This invention relates, generally, to brake rigging for railway cars, and it has particular relation to automatic slack adjusters therefor.

Among the objects of this invention are: to provide for taking up slack in the brake rigging of a railway car automatically when there is a predetermined amount of slack therein; to control the operation of the slack adjusting mechanism as a function of the displacement of the piston in the air brake cylinder by means of which the brakes are applied; to change the position of the fulcrum of the floating fulcrum lever in the brake rigging to take up or adjust the slack therein; to accomplish this by winding a chain connected to the fulcrum point of the lever around a drum; to prevent reverse rotation of the drum; to rotate the drum forwardly in small increments to take up or adjust the slack; to rotate the drum by a pawl operated forwardly by a spring and retracted by a diaphragm type piston in a slack adjusting air cylinder connected to the air brake cylinder so that air pressure is applied to the diaphragm when the piston in the air brake cylinder moves to a predetermined position; and to prevent reverse movement of said pawl and drum should the means intended normally to prevent such reverse movement fail to function.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

This invention is disclosed in the embodiment thereof shown in the accompanying drawings, and it comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of this invention, reference can be had to the following detailed description, taken together with the accompanying drawings, in which:

Figure 1 illustrates schematically and diagrammatically a brake rigging system that is used customarily on railway cars and having applied thereto the present invention;

Figure 2 is a top plan view of the automatic slack adjuster constructed in accordance with this invention;

Figure 3 is a view looking from the left end of the slack adjuster as shown in Figure 2;

Figure 4 is a detailed sectional view taken generally along the line 4—4 in Figure 3 and showing certain details of construction; and

Figure 5 is a view, similar to Figure 4, but showing the manner in which the drum on which the chain is wound is prevented from rotating in a reverse direction in the event that the holding pawl should fail to hold and fail to prevent the reverse rotation, as it is intended normally to do.

Referring now particularly to Figure 1 of the drawings, it will be observed that the reference character 10 designates, generally, a conventional brake rigging which is used widely on railway cars. The brake rigging 10 includes brake beams 11, 12, 13, and 14 which carry brake shoes at their ends that are hung by links from the truck side frames. This construction is well known to those skilled in the art, and, accordingly, it is not further shown nor described herein. The brake beams 11 and 14 are pivoted on the drum. Air pressure for moving the piston 38 to apply the brakes is supplied through a con
duct 41 from a car air reservoir 42. The flow of air from the reservoir 42 to the cylinder 39 is controlled by a valve 40 in conventional manner.

The brakes also may be applied through a hand brake rod 44 by a hand brake mechanism that is indicated, generally, at 45. It will be noted that the hand brake rod 44 also is connected to the cylinder lever 32.

As indicated herebefore the present invention is directed particularly to the automatic slack adjuster 35 which is shown in more detail in Figures 2, 3 and 4 of the drawings. As there shown, the automatic slack adjuster 35 includes a support 48 which is arranged to be bolted or otherwise secured to the car body. The support 48 carries a frame, indicated generally at 49, having a slot 50. Figure 4, therein into which the fulcrum end of the floating fulcrum lever 33 projects.

The fulcrum end of the floating fulcrum lever 33 is secured by a pin 51 to a clevis 52 that is attached to one end of a flexible inextensible member such as a chain 53. The other end of the chain 53 is connected by a pin 54 to a drum 55 and is arranged to be wound thereon so as to shift the position of the fulcrum point 34 of the floating fulcrum lever 33 and take up the slack in the brake rigging 10.

The drum 55 is mounted for rotation on a shaft 56 which extends through and is journaled in a pair of frame side members 57 which form a part of the frame 43. Formed integrally with the drum 55 is a holding ratchet wheel 58. A holding pawl 59 cooperates with the teeth of the holding ratchet wheel 58. The holding pawl 59 is rockably mounted on a shaft 60 which extends between and is carried by the frame side members 57. The end 61 of the holding pawl 59 opposite the toothed portion which engages the teeth of the holding ratchet wheel 58 constitutes a counterweight and acts to bias the holding pawl 59 into engagement with the teeth of the holding ratchet wheel 58.

Also formed integrally with the drum 55 is a slack adjusting ratchet wheel 62. An operating pawl 63 is arranged to cooperate with the slack adjusting ratchet wheel 62 for rotating the same forwardly so as to wind the chain 53 on the drum 55 and take up the slack in the brake rigging 10. It will be noted in Figure 4 that the operating pawl 63 is pivoted at 64 on one arm 65 of a yoke 66 that is indicated generally, at 65. The yoke 66 is rockably mounted on a shaft 67 which extends between and is carried by the frame side members 57.

In order to rotate the slack adjusting ratchet wheel 62 forwardly by corresponding forward movement of the operating pawl 63, a coil compression spring 68 is employed. It will be noted in Figure 4 that one end of the spring 68 bears against a portion of the support 48 while its other end is arranged to act through a rod 69 having a ball shaped head 70 at its opposite end which interferes with a socket 71 in the arm 65. It will be understood that the spring 68 is compressed by means to be described and that, when the force applied to compress it is removed, the yoke 66 is moved from the engagement with the slack adjusting ratchet wheel 62.

The yoke 66 also includes an arm 74 which is movable conjointly with the arm 65. The arm 74 is pivoted at 75 to a clevis 76 which may be regarded as an end of a push rod 77.

As shown more clearly in Figure 2 of the draw-
reverse direction. However, such movement is limited by the engagement of the end surface 88 with the transverse stop pin 89. Not only does the pin 89 prevent further reverse rotation of the drum 55 but also, because of the inclined end surface 88, the operating pawl 63 is moved into wedging engagement with the slack adjusting ratchet wheel as indicated more clearly in Figure 6. Here the possible position of the holding pawl 59 is indicated which would permit the drum 55 to rotate in a reverse direction in the event that the transverse stop pin 89 were not provided.

In describing the operation of the present invention it will be assumed that the slack in the brake rigging 10 initially is adjusted by locating the fulcrum points 21 and 22 along the dead lever fulcums 17 and 18. Preferably the adjustment is such that no part of the chain 53 is wound on the drum 55. This then permits of maximum automatic adjustment by the slack adjuster 58. As long as the piston 38 is not required to travel past the point 65 where the conduit 84 is connected to the air brake cylinder 39, no operation of the automatic slack adjuster 58 takes place. However, when the slack in the brake rigging 10 is such that the piston 38 is required to move in the air brake cylinder 39 so as to uncover the conduit 84, on the next application of air to the air brake cylinder 39, air will be supplied through the conduit 84 to the slack adjusting air cylinder 32. The diaphragm type piston 73 will be moved to the right as viewed in Figure 2 and, through the push rod 77, the yoke 65 will be rocked in a counterclockwise direction. The operating pawl 63 will be moved rearwardly to engage the next tooth of the slack adjusting ratchet wheel 62 and the coil compression spring 65 will be compressed correspondingly. During this interval the drum 65 is prevented from rotating in a reverse direction by the holding pawl 59.

No further action takes place until the air pressure is released and the brake rigging 10 no longer applies the brakes. The release of air pressure from the slack adjusting air cylinder 32 permits the spring 83 to move the operating pawl 63 forwardly and to effect a corresponding forward rotation of the drum 55. This is permitted since the brakes are not applied and the fulcrum point 34 of the floating fulcnum lever 83 is not held stationary. The chain 53 is wound on the drum 55 a slight amount. The forward rotation of the drum 55 is permitted by the holding pawl 39 which, since it is biased by the counterweight action of the opposite end 61, acts to engage the next tooth and prevents reverse rotation of the drum 55. In this manner the slack in the brake rigging 10 will be adjusted in small increments and is maintained at a predetermined value as will be understood readily.

Since certain changes can be made in the foregoing construction and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed is new:

1. An automatic slack adjuster for a fulcrum lever, such as the floating fulcnum lever of a railway car brake rigging operated by a piston in an air brake cylinder comprising, in combination, a rotatable drum, a chain for connection at one end to the fulcrum point of said fulcrum lever and connected at its other end to said drum for winding thereon forwardly to take up the slack in said brake rigging, a ratchet wheel means rotatable with said drum, an operating pawl cooperating with said ratchet wheel means, a stop member in the path of said operating pawl and adapted to be engaged thereby on rearward movement thereof beyond a predetermined position together with said ratchet wheel means to prevent further reverse movement thereof, a spring connected to said operating pawl for moving it to rotate said drum forwardly, a slack adjusting cylinder having a piston therein operatively connected to said spring and a conduit from said slack adjusting air cylinder permitting said spring to rotate said drum forwardly.

2. An automatic slack adjuster for a fulcrum lever, such as the floating fulcnum lever, of a railway car brake rigging operated by a piston in an air brake cylinder comprising, in combination, a rotatable drum, a chain for connection at one end to the fulcrum point of said fulcrum lever and connected at its other end to said drum for winding thereon forwardly to take up the slack in said brake rigging, a ratchet wheel means rotatable with said drum, a holding pawl biased into engagement with said ratchet wheel means and acting to prevent reverse rotation of said drum, an operating pawl cooperating with said ratchet wheel means, a stop member in the path of said operating pawl and adapted to be engaged thereby on failure of said holding pawl to prevent reverse rotation of said drum whereby such reverse rotation is prevented, a spring connected to said operating pawl and acting to move it to rotate said drum forwardly, a slack adjusting cylinder having a piston therein operatively connected to said spring, and a conduit from said slack adjusting air cylinder for connection to said air brake cylinder at a location where operating pressure is applied to said slack adjusting air cylinder after the piston in said air brake cylinder has moved to a predetermined position in applying the brakes whereupon said piston in said slack adjusting cylinder tensions said spring and moves said operating pawl rearwardly to engage the next tooth of said ratchet wheel means, the release of air pressure from said air brake cylinder and from said slack adjusting air cylinder permitting said spring to rotate said drum forwardly.

3. An automatic slack adjuster for a fulcrum lever, such as the floating fulcnum lever, of a railway car brake rigging operated by a piston in an air brake cylinder comprising, in combination, a rotatable drum, a chain for connection at one end to the fulcrum point of said fulcrum lever and connected at its other end to said drum for winding thereon forwardly to take up the slack in said brake rigging, a ratchet wheel means rotatable with said drum, a holding pawl biased into engagement with said ratchet wheel means and acting to prevent reverse rotation of said drum, a rockably mounted member, an operating pawl pivoted to said member and to take into engagement with said ratchet wheel means, a
stop member in the path of said operating pawl and adapted to be engaged thereby on failure of said holding pawl to prevent reverse rotation of said drum whereby such reverse rotation is prevented, a spring connected to said member and acting to move said operating pawl so as to rotate said drum forwardly, a slack adjusting cylinder having a piston therein connected to said member, and a conduit from said slack adjusting cylinder for connection to said air brake cylinder at a location whereby operating pressure is applied to said slack adjusting air cylinder after the piston in said air brake cylinder has moved to a predetermined position in applying the brakes heretofore on said piston in said slack adjusting cylinder rocks said member, tension springs said spring and moves said operating pawl rearwardly to engage the next tooth of said ratchet wheel means, the release of air pressure from said air brake cylinder and from said slack adjusting air cylinder permitting said spring to rotate said drum forwardly.

4. An automatic slack adjuster for a fulcrum lever, such as the floating fulcrum lever, of a railway car brake rigging operated by a piston in an air brake cylinder comprising, in combination, a rotatable drum, a chain for connection at one end to the fulcrum point of said fulcrum lever and connected at its other end to said drum for winding thereon on forward rotation thereof to take up the slack in said brake rigging, ratchet wheel means rotatable with said drum, a holding pawl biased into engagement with said holding ratchet wheel means and acting to prevent reverse rotation of said drum, a rockably mounted member, an operating pawl pivoted to said member and biased into engagement with said ratchet wheel means, a stop in the path of said operating pawl and adapted to be engaged thereby on failure of said holding pawl to prevent reverse rotation of said drum for holding said operating pawl in engagement with said ratchet wheel means and preventing further reverse rotation thereof, a spring connected to said member and acting to move said operating pawl so as to rotate said drum forwardly, a slack adjusting air cylinder having a piston therein connected to said member, and a conduit from said slack adjusting air cylinder for connection to said air brake cylinder at a location where operating pressure is applied to said slack adjusting air cylinder after the piston in said air brake cylinder has moved to a predetermined position in applying the brakes heretofore on said piston in said slack adjusting cylinder rocks said member, tension springs said spring and moves said operating pawl rearwardly to engage the next tooth of said ratchet wheel means, the release of air pressure from said air brake cylinder and from said slack adjusting air cylinder permitting said coil compression spring to rotate said drum forwardly.

6. An automatic slack adjuster for a fulcrum lever, such as the floating fulcrum lever, of a railway car brake rigging operated by a piston in an air brake cylinder comprising, in combination, a rotatable drum, a chain for connection at one end to the fulcrum point of said fulcrum lever and connected at its other end to said drum for winding thereon on forward rotation thereof to take up the slack in said brake rigging, holding and slack adjusting ratchet wheels rotatable with said drum, a holding pawl biased into engagement with said holding ratchet wheel and acting to prevent reverse rotation of said drum, a rockably mounted member, an operating pawl pivoted to one arm of said yoke and biased into engagement with said slack adjusting ratchet wheel, a stop in the path of said operating pawl and adapted to be engaged thereby on failure of said holding pawl to prevent reverse rotation of said drum for holding said operating pawl in engagement with said slack adjusting ratchet wheel and preventing further reverse rotation thereof, a coil compression spring connected to said arm and acting to move said operating pawl so as to rotate said drum forwardly, a slack adjusting air cylinder having a piston therein connected to the other arm of said yoke and a conduit from said slack adjusting air cylinder for connection to said air brake cylinder at a location where operating pressure is applied to said slack adjusting air cylinder after the piston in said air brake cylinder has moved to a predetermined position in applying the brakes heretofore on said piston in said slack adjusting cylinder rocks said yoke, compresses said spring and moves said operating pawl rearwardly to engage the next tooth of said ratchet wheel means and acting to prevent reverse rotation of said drum, a rockably mounted member, an operating pawl having an inclined end surface pivotal to said member and biased into engagement with said ratchet wheel means, a transverse pin in the path of said end surface of said operating pawl and adapted to be engaged thereby on failure of said holding pawl to prevent reverse rotation of said drum forwardly, a piston in said slack adjusting air cylinder having a piston therein connected to said member, and a conduit from said slack adjusting air cylinder for connection to said air brake cylinder at a location where operating pressure is applied to said slack adjusting air cylinder after the piston in said air brake cylinder has moved to a predetermined position in applying the brakes heretofore on said piston in said slack adjusting cylinder rocks said member, tension springs said spring and moves said operating pawl rearwardly to engage the next tooth of said ratchet wheel means, the release of air pressure from said air brake cylinder and from said slack adjusting air cylinder permitting said coil compression spring to rotate said drum forwardly.

7. An automatic slack adjuster for a fulcrum lever, such as the floating fulcrum lever, of a railway car brake rigging operated by a piston in an air brake cylinder comprising, in combination, a rotatable drum, a chain for connection at one end to the fulcrum point of said fulcrum lever and connected at its other end to said drum for winding thereon on forward rotation thereof to take up the slack in said brake rigging, ratchet wheel means rotatable with said drum, a holding pawl biased into engagement with said ratchet wheel means and acting to prevent reverse rotation of said drum, a rockably mounted member, an operating pawl having an inclined end surface pivotal to said member and biased into engagement with said ratchet wheel means, a transverse pin in the path of said end surface of said operating pawl and adapted to be engaged thereby on failure of said holding pawl to prevent reverse rotation of said drum forwardly, a piston in said slack adjusting air cylinder having a piston therein connected to said member, and a conduit from said slack adjusting air cylinder for connection to said air brake cylinder at a location where operating pressure is applied to said slack adjusting air cylinder after the piston in said air brake cylinder has moved to a predetermined position in applying the brakes heretofore on said piston in said slack adjusting cylinder rocks said member, tension springs said spring and moves said operating pawl rearwardly to engage the next tooth of said ratchet wheel means, the release of air pressure from said air brake cylinder and from said slack adjusting air cylinder permitting said coil compression spring to rotate said drum forwardly.
ing and slack adjusting ratchet wheels rotatable with said drum, a holding pawl biased into engagement with said holding ratchet wheel and acting to prevent reverse rotation of said drum, a rockably mounted yoke, an operating pawl having an inclined end surface pivoted to one arm of said yoke and biased into engagement with said slack adjusting ratchet wheel, a transverse pin in the path of said end surface of said operating pawl and adapted to be engaged thereby on failure of said holding pawl to prevent reverse rotation of said drum for wedging said operating pawl into engagement with said slack adjusting ratchet wheel and preventing further reverse rotation thereof, a coil compression spring connected to said arm and acting to move said operating pawl so as to rotate said drum forwardly, a slack adjusting air cylinder having a diaphragm type piston therein connected to the other arm of said yoke, and a conduit from said slack adjusting air cylinder for connection to said air brake cylinder at a location where operating pressure is applied to said slack adjusting air cylinder after the piston in said air brake cylinder has moved to a predetermined position in applying the brakes, whereupon said diaphragm type piston rocks said yoke, compresses said spring and moves said operating pawl rearwardly to engage the next tooth of said slack adjusting ratchet wheel, the release of air pressure from said air brake cylinder and from said slack adjusting air cylinder permitting said coil compression spring to rotate said drum forwardly.

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