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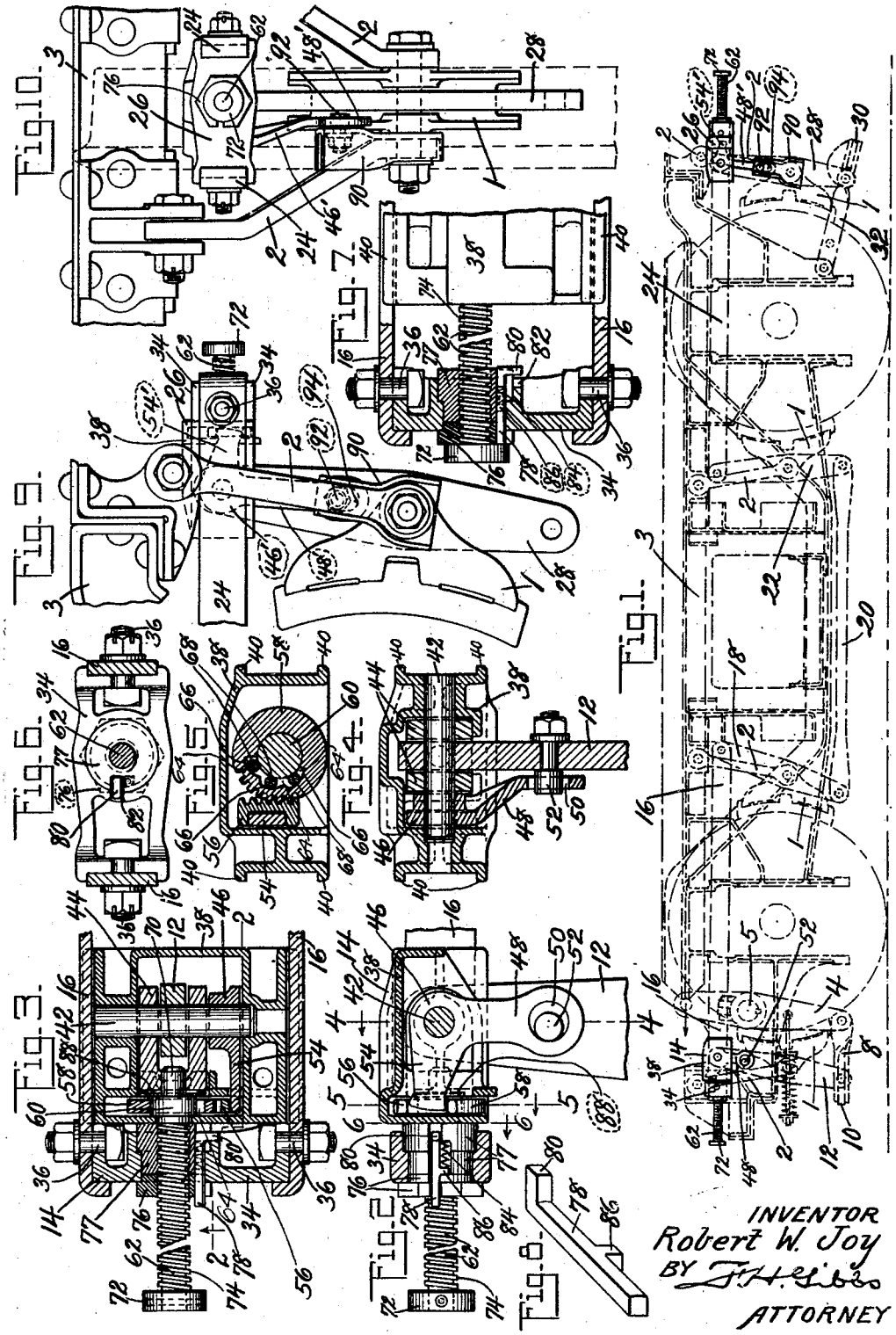

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SLACK ADJUSTER FOR RAILWAY BRAKES

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This invention relates to railway brakes and more particularly to railway brakes of the clasp type in which there is a series of connected levers at each side of the truck, and it is an object of this invention to provide an improved slack adjuster for railway brakes of the class described which will be operated upon brake application and release to maintain the brake shoes at the proper distance from the car wheels by shifting the connection of a brake lever to the rods connecting that brake lever to the other brake lever of a pair of levers for a wheel. It is also an object of this invention to provide a slack adjuster of the type described which will be positive in its operation until the maximum adjustment has been made and which will thereupon cease to operate and prevent jamming or breaking of the adjusting mechanism.

In the drawings:

Figure 1 is a view showing in broken lines a truck provided with a clasp brake and showing in solid lines slack adjusters constructed in accordance with this invention applied to the levers of one side of the truck;

Fig. 2 is a vertical section of the slack adjuster shown at the left in Fig. 1, the section being taken as on the line 2—2 of Fig. 3;

Fig. 3 is a horizontal section of the structure shown in Fig. 2, the parts being shown as adjusted for new brake shoes;

Figs. 4, 5 and 6 are vertical sections taken on the lines 4—4, 5—5 and 6—6, respectively, of Fig. 2;

Fig. 7 is a view partly in plan and partly in horizontal section showing the parts of the slack adjuster when shifted to the position of maximum adjustment;

Fig. 8 is a perspective view of the lock trigger shown detached;

Fig. 9 is a side elevation, drawn to a larger scale and showing the application of the slack adjuster to the brake lever at the right of Fig. 1; and

Fig. 10 is an end elevation of the structure shown in Fig. 9.

In the drawings the slack adjuster is shown applied to a four wheel truck provided with a clasp brake arrangement comprising brake heads 1 carrying shoes adapted to bear on opposite sides of the wheels and supported by brake hangers 2 pivotally mounted on the truck frame 3. At one end of the truck is a live lever 4 pivotally supported intermediate its ends as at 5 and having its upper end connected through suitable brake rigging to the brake cylinder and moved in the direction indicated by the arrow to apply the brake shoes to the wheels. The lower end of lever 4 is connected by fulcrum 8 to the center of a brake beam 10, which, at its ends, is connected to the lower ends of brake levers 12. The brake levers 12 are connected intermediate their ends to the adjacent brake heads 1 and have their upper ends connected through slack adjusters 14 to pairs of spaced tension rods 16.

The other ends of the pairs of tension rods 16 are connected to the upper ends of levers 18 which are connected intermediate their ends to the adjacent brake heads 1 and have their lower ends connected by compression rods 20 to the lower ends of brake levers 22. The brake levers 22 are connected intermediate their ends to the adjacent brake heads 1 and have their upper ends connected to the ends of pairs of spaced tension rods 24. The other ends of the pairs of tension rods 24 are connected through slack adjusters 26 to the upper ends of brake levers 28. The brake levers 28 are connected intermediate their ends to the adjacent brake heads 1 and have their lower ends connected to beams 30 which are connected by links 32 to the truck frame 3.

The slack adjuster 14 comprises a casing 34 attached to the rods 16 by bolts 36 and a casing 38 slidably mounted on the rods 16 by means of outwardly projecting guide flanges 40. The casing 38 is provided with bearings in which is mounted a pin 42 which engages in an opening in the upper end of brake lever 12 and on which is mounted a yoke 44, the arms of the yoke 44 engaging the pin 42 on opposite sides of the lever 12. As shown in Fig. 3, the pin 42 is inserted from one side, the insertion of the pin being limited by a reduction of one of the bearing

openings, and is retained in position by one of the rods 16.

Pivotally mounted on the pin 42 is a bell-crank lever 46 having an arm 48 which extends alongside of the brake lever 12 and is provided with an opening 50 in which the head of a pin 52 carried by the brake lever 12 engages, the opening 50 being of greater diameter than the pin 52 and providing for a limited movement of the pin 52 before the pin operates the bell-crank lever 46. The other arm 54 of the bell-crank 46 engages with a movable rack 56 and reciprocates the rack 56 as the pin 52 operates the bell-crank lever 46. The rack 56 engages with a wheel 58 rotatably mounted on a friction drum 60 formed as part of an adjusting screw 62. The wheel 58 has, adjacent the friction drum 60, communicating recesses 64 formed with curved outer surfaces 66 which are eccentric to the surface of the drum 60. Mounted in the recesses 64 between the wheel 58 and the drum 60 are rollers 68 of less diameter than the widest portions of the recesses and of greater diameter than the narrower portions of the recesses, an arrangement which permits of the wheel 58 and rollers 68 rotating freely on the drum 60 when moved in one direction while binding on the drum 60 and causing the drum 60 and adjusting screw 62 to rotate therewith when moved in the other direction.

Besides the friction drum portion 60, the adjusting screw comprises a reduced inner end portion 70 which engages in an opening in the yoke 44, a collar 72 pinned to the outer end and a threaded portion 74 which extends substantially from the drum 60 to the collar 72 and the length of which determines the permissible adjustment of the upper end of brake lever 12. Surrounding the threaded portion 74 is a two-part nut comprising the parts 76 and 77, which have cylindrical outer surfaces engaging correspondingly shaped surfaces in an opening in the casing 34 but which are kept from rotating therein by a lock trigger 78 mounted in alined slots in the parts 76 and 77 and having a head 80 which is normally kept in engagement in a slot 82 by a spring 84 mounted in a recess in the nut part 77 and acting on a lug 86 on the lock trigger 78. To prevent shifting of the adjusting screw 62, except upon operation of the bell-crank 46, a spring friction plate 88 is mounted on the end portion 70 of the adjusting screw 62 between the yoke 44 and the drum 60 so that it bears upon both the drum 60 and the yoke 44.

While the operation of the slack adjuster 26 is generally the same as that of slack adjuster 14, the difference in lever conditions at the two ends of the truck necessitates a modification in the manner of operating the bell-crank lever and a difference in the direction of movement of some of the parts. In the case of slack adjuster 26, to one of the adjacent brake hangers 2 is secured a bracket 90 carrying a pin 92 which engages in an elongated opening 94 in the depending arm 48′ of the bell-crank 46′, the opening 94 being wide enough to provide the same lost motion as is provided by the opening 50. With this arrangement, as the arm 54 of slack adjuster 14 moves downwardly upon an application of the brakes, the arm 54′ of slack adjuster 26 moves upwardly. This results in a movement in opposite directions of the racks and wheels of the two slack adjusters, but this difference is corrected by changing the position and direction of taper of the recesses in the wheel of slack adjuster 26 so that in both cases the wheels and rollers move freely on the friction drums if the bell cranks are operated during an application of the brakes but bind on the drums and rotate the drums and adjusting screws if the bell-cranks are operated during a release of the brakes.

An application of the brakes will cause the bottom of lever 12 to move to the right in Fig. 1, pivoting about its upper end until the brake shoe bears against the wheel, after which the lever 12 will pivot about its connection with the brake head 1 and the upper end of the lever 12 will be moved to the left in Fig. 1, carrying with it the tension rods 16 and operating the rest of the lever system to apply the other brake shoes to the wheels. The change in the angular relation of lever 12 to rods 16 causes a movement of the pin 52 in opening 50 of the bell-crank lever 46 and the change in angular relation increases with the wear of the brake shoes; the movement of pin 52 in opening 50 increases until eventually the movement of the pin 52 is sufficient to operate the bell-crank in both application and release of the brakes. As shown, operation of the bell-crank 46 during the application by the pin 52 causes the arm 48 to be moved to the right in Fig. 2 and the arm 54 downwardly. The arm 54 moves the rack 56 downwardly and rotates the wheel 58 and rollers 68 about the drum 60, the recesses being arranged so that the rollers 68 do not bind when the wheel is operated by the rack moving downwardly. Upon a release of the brakes, operation of the bell-crank 46 by the pin 52 moves the arm 48 to the left in Fig. 2 and arm 54 upwardly. The arm 54 moves the rack 56 upwardly and starts to rotate the wheel 58 about the drum 60 in the opposite direction; but this movement of the wheel 58 causes the rollers 68 to bind between the curved surfaces 66 and the drum 60 and rotate the drum 60 and adjusting screw 62 with the wheel 58. As the two-part nut is normally held against rotation in the casing 34, rotation of the adjusting screw 62 causes the screw to be advanced in the two-part nut and carrying with it the yoke 44 which,

through its engagement with the pin 42, moves the casing 38 and the upper end of brake lever 12 along the rods 16, thus shortening the distance between the upper ends of brake levers 12 and 18 and bringing their brake shoes closer to the wheel.

The operation just described is repeated as the wear of the shoes continues until the movement of the adjusting screw 62 in the two-part nut brings the collar 72 into engagement with the outer end of the lock trigger 78, whereupon further movement of the adjusting screw 62 in the two-part nut will disengage the head 80 of lock trigger 78 from the slot 82 in casing 34 permitting the two-part nut to revolve in the casing 34 and preventing any further movement of the adjusting screw 62 in the two-part nut. To retract the adjusting screw 62 and casing 38, the two-part nut is rotated by means of a wrench applied to the flat surfaces provided on the part 76, the lock trigger 78 being held to prevent engagement in the slot 82 as soon as the collar 72 is moved from the outer end of the lock trigger 78.

As the operation of slack adjuster 26 is the same as the operation of slack adjuster 14, except for the differences particularly pointed out, it is believed that the operation of slack adjuster 26 will be clear from the description given. It is to be understood that the drawings herein are for illustrative purposes only and that various changes in the form and proportions of the device may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. In a brake, a brake lever, rods operatively connected to said lever and means interposed between said rods and lever for shifting the effective connection of said rods and lever comprising a casing connected to said rods, a second casing movably mounted on said rods and connected to said lever, an adjusting screw mounted in said first casing and operative to shift said second casing and means operative upon relative movements of said rods and lever to operate said adjusting screw.

2. In a brake, a brake lever, rods operatively connected to said lever and means interposed between said rods and lever for shifting the effective connection of said rods and lever comprising a casing connected to said rods, a second casing slidably mounted on said rods and connected to said lever, an adjusting screw mounted in said first casing and operative to shift said second casing, and means mounted in said second casing and operative upon relative movement of said rods and lever to operate said adjusting screw.

3. In a brake, a brake lever, rods operatively connected to said lever and means interposed between said rods and brake lever for shifting the effective connection of said rods and brake lever comprising a casing connected to said rods, an adjusting screw mounted in said casing, a second casing slidably mounted on said rods, a pin mounted in said casing and engaging said brake lever, means connecting said adjusting screw and pin, a bell-crank lever mounted on said pin, an operative connection between said bell-crank lever and screw and means carried by said brake lever operating said bell-crank lever upon a predetermined relative movement of said rods and brake lever.

4. In a brake, a brake lever, rods operatively connected to said lever and means interposed between said rods and lever for shifting the effective connection of said rods and lever comprising a casing connected to said rods, a second casing slidably mounted on said rods and connected to said lever, an adjusting screw mounted in said first casing and operative to shift said second casing, means operative upon a predetermined movement of said rods and lever to operate said adjusting screw and means operated by said adjusting screw to limit the movement of said second casing by said adjusting screw.

5. In a brake, a brake lever, rods operatively connected to said lever and means interposed between said rods and lever for shifting the effective connection of said rods and lever comprising a casing connected to said rods, a two-part nut mounted in said casing, a lock trigger preventing rotation of said nut in said casing, a second casing slidably mounted on said rods and connected to said lever, an adjusting screw mounted in said two-part nut and operative to shift said second casing and means operative upon relative movement of said rods and lever to operate said adjusting screw, said adjusting screw being operative upon a predetermined movement thereof to operate said lock trigger to release said two-part nut to limit the shifting of said second casing.

6. In a brake, a brake lever, rods operatively connected to said brake lever and means interposed between said rods and brake lever for shifting the effective connection of said rods and brake lever comprising a casing connected to said rods, a second casing slidably mounted on said rods, a pin mounted in said second casing and engaging said brake lever, an adjusting screw mounted in said first casing and operatively connected to said pin, a bell-crank lever mounted on said pin and operatively connected to said brake lever, a rack reciprocated by said bell-crank lever and a wheel mounted on said adjusting screw and operated by said rack to rotate said adjusting screw and shift said second casing.

7. In a brake, a brake lever, rods operatively connected to said lever and means interposed between said rods and lever for shifting the effective connection of said rods

and lever comprising a casing secured to said rods, a second casing slidably mounted on said rods, an adjusting screw mounted in said first casing and operative to shift said second casing, means mounted in said second casing and operated by said brake lever to operate said adjusting screw and a brake for said adjusting screw in said second casing.

8. In a brake, a brake lever, rods operatively connected to the upper end of said lever and means interposed between said rods and lever to shift the effective connection of said rods and lever comprising a casing secured to said rods, a second casing slidably mounted on said rods and connected to the upper end of said lever, an adjusting screw mounted in said first casing and operatively connected to said casing and brake lever and means operated upon movement of said brake lever to rotate said adjusting screw and shift said second casing and the upper end of said brake lever with respect to said rods.

9. In a brake, a brake lever, a tension rod, and a slack adjuster interposed between said tension rod and brake lever and operated by said brake lever.

10. In a brake, a brake lever, a tension rod, and a slack adjuster interposed between said tension rod and brake lever and operated by said brake lever for varying the effective length of said rod upon operation of the brake.

11. In a brake, a brake lever, a tension rod, and a slack adjuster interposed between said tension rod and brake lever and operated by said brake lever for shifting the effective connection of said rod and lever.

12. In a brake, a brake lever, a brake rod, casings connected to said lever and rod and means operative upon relative movement of said lever and rod to cause relative movement of said casings to vary the effective connection of said lever and rod.

13. In a brake, a brake lever, a brake rod, casings connected to said lever and rod, means to cause relative movement of said casings to vary the effective connnection of said lever and rod and means operative upon relative movement of said rod and lever to operate said casing moving means.

In witness whereof I have hereunto set my hand.

ROBERT W. JOY.