

Jan. 4, 1938.

H. C. CLAUSEN  
RAILWAY BRAKING APPARATUS

2,104,185

Filed June 16, 1936

7 Sheets-Sheet 1

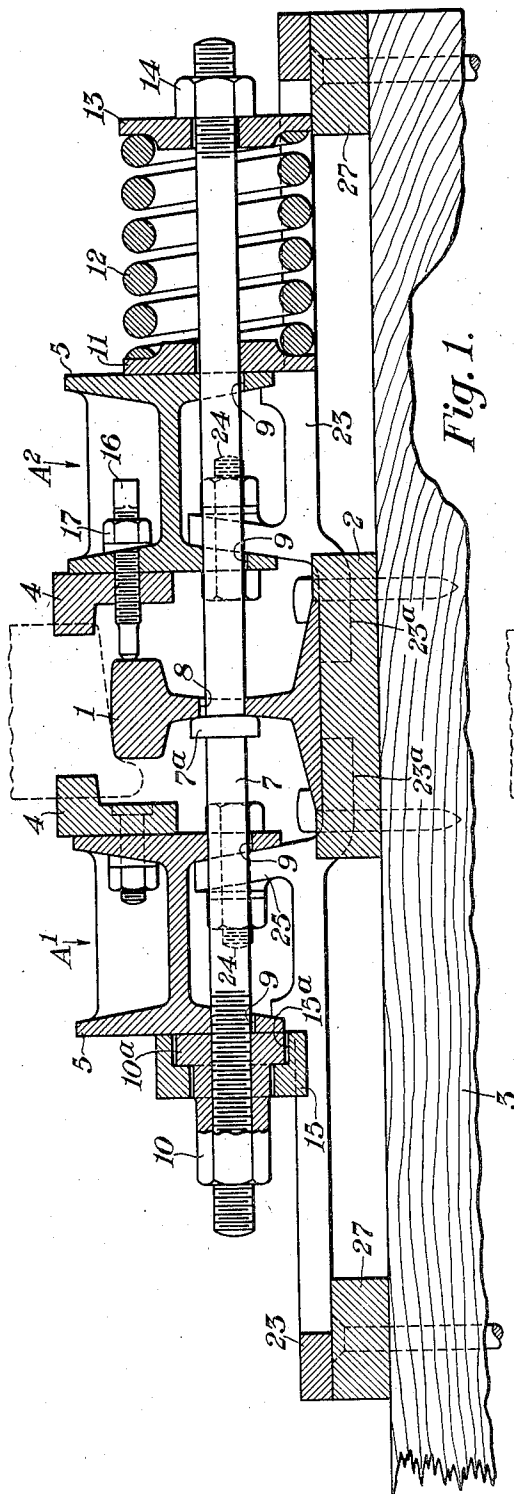


Fig. 1.

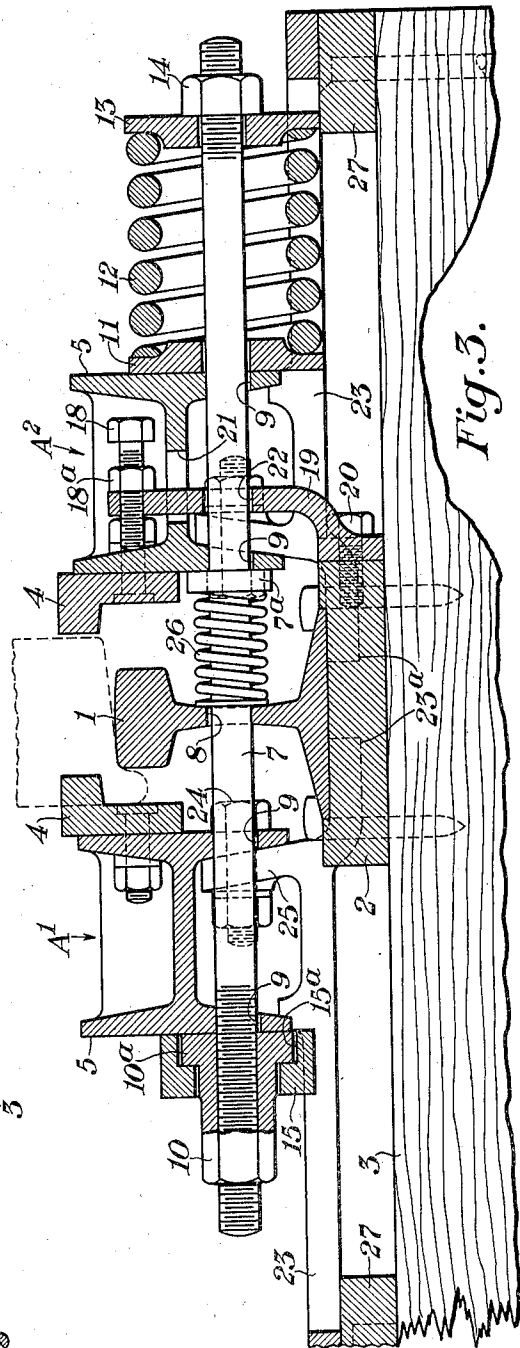


Fig. 3.

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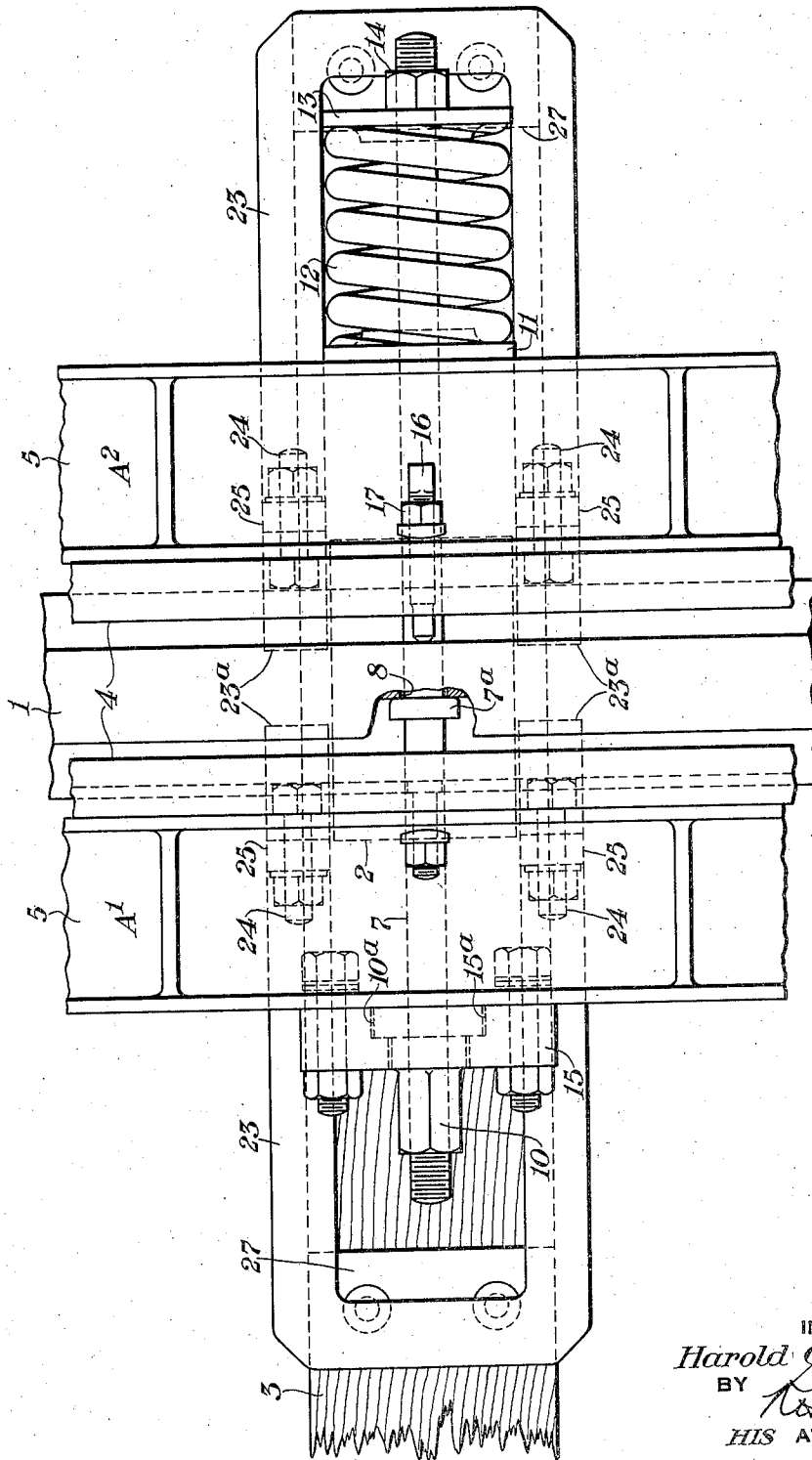


Fig. 2.

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7 Sheets-Sheet 3

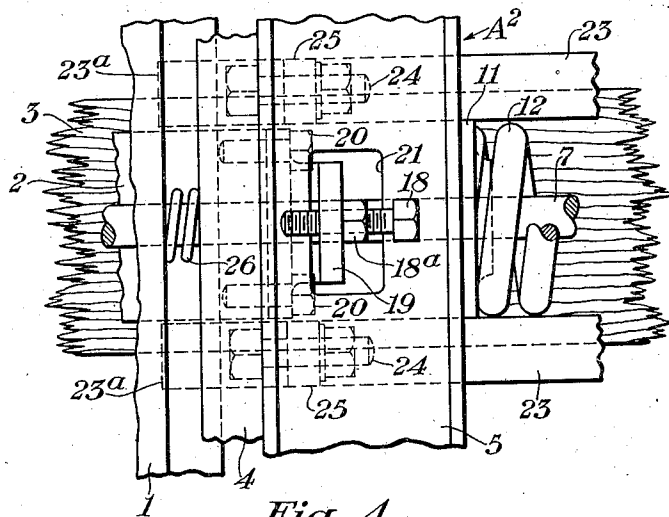


Fig. 4.

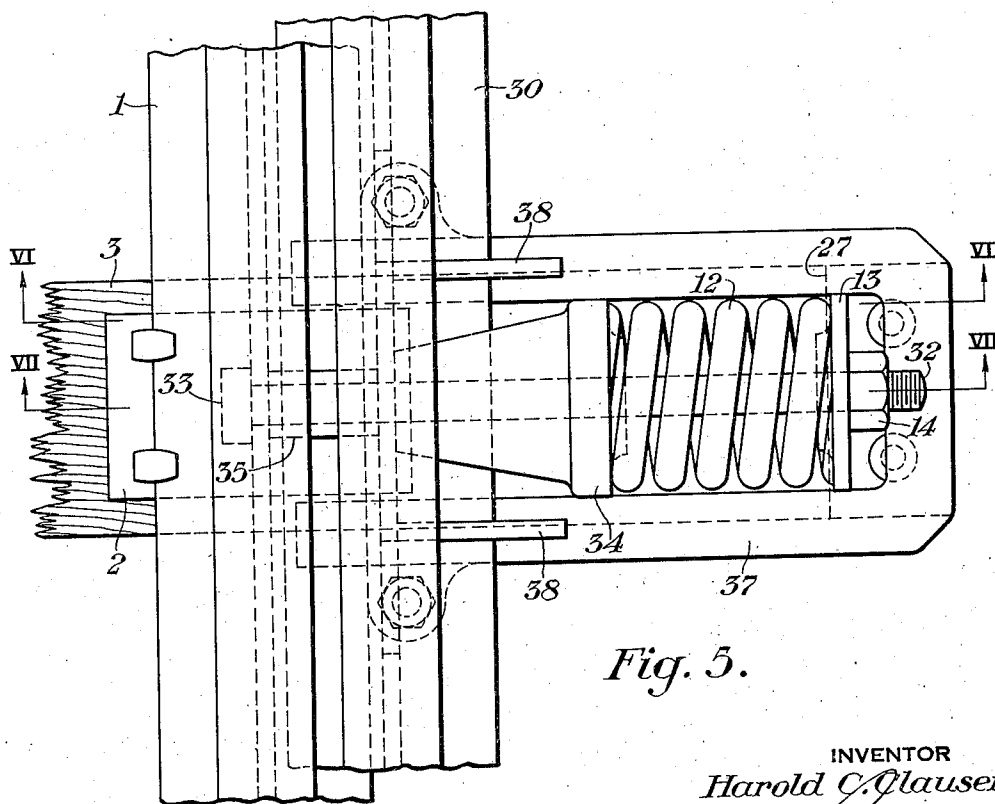


Fig. 5.

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7 Sheets-Sheet 4

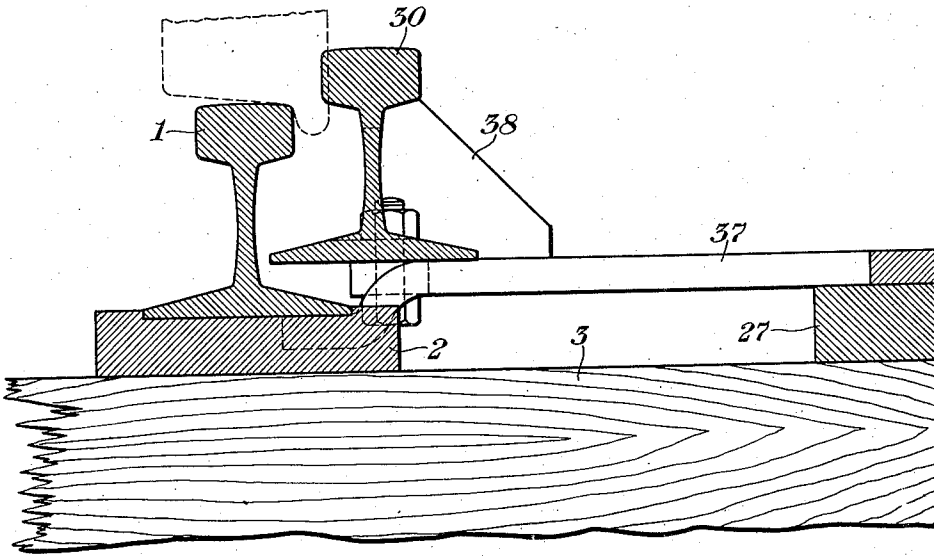


Fig. 6.

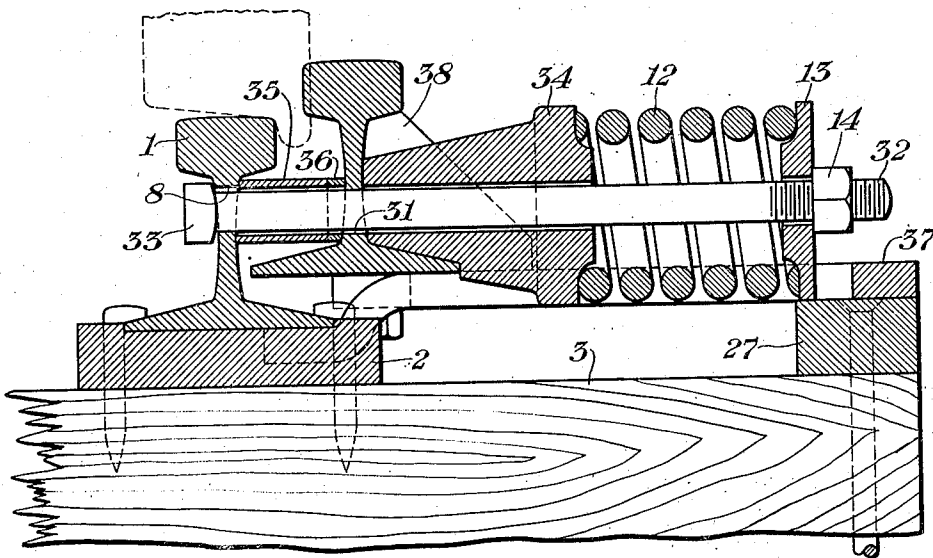


Fig. 7.

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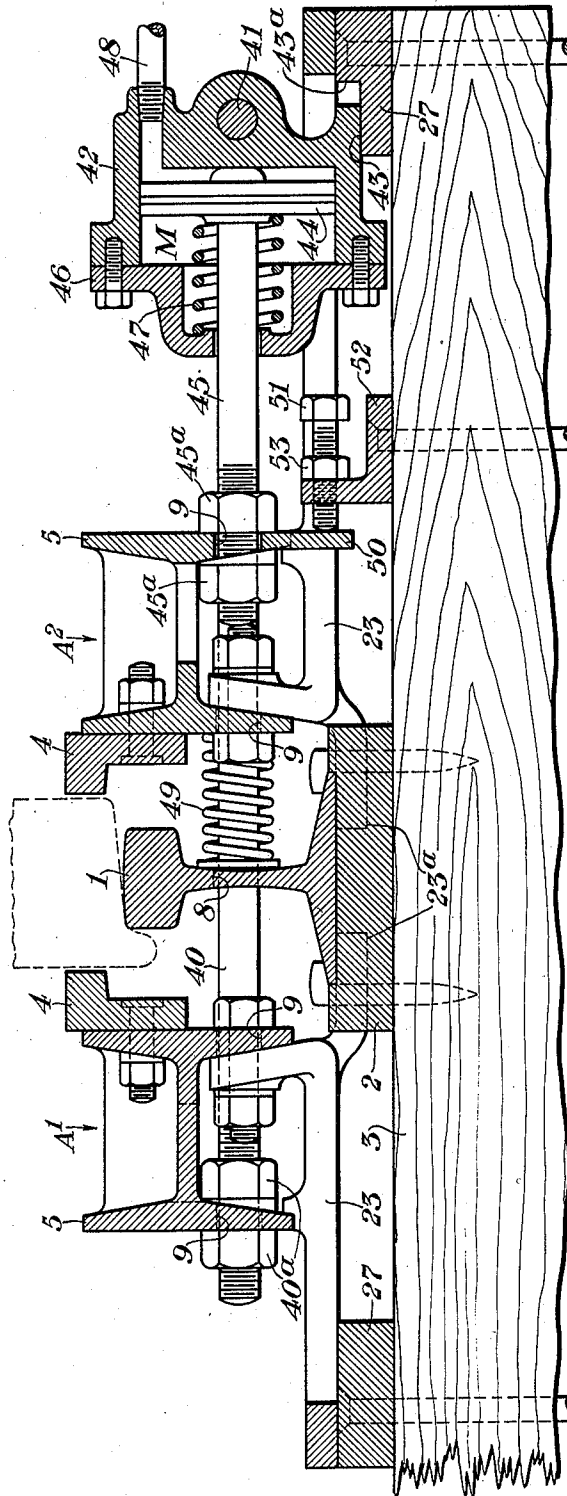
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**2,104,185**

# RAILWAY BRAKING APPARATUS

Filed June 16, 1936

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2,104,185

RAILWAY BRAKING APPARATUS

Filed June 16, 1936

7 Sheets-Sheet 6

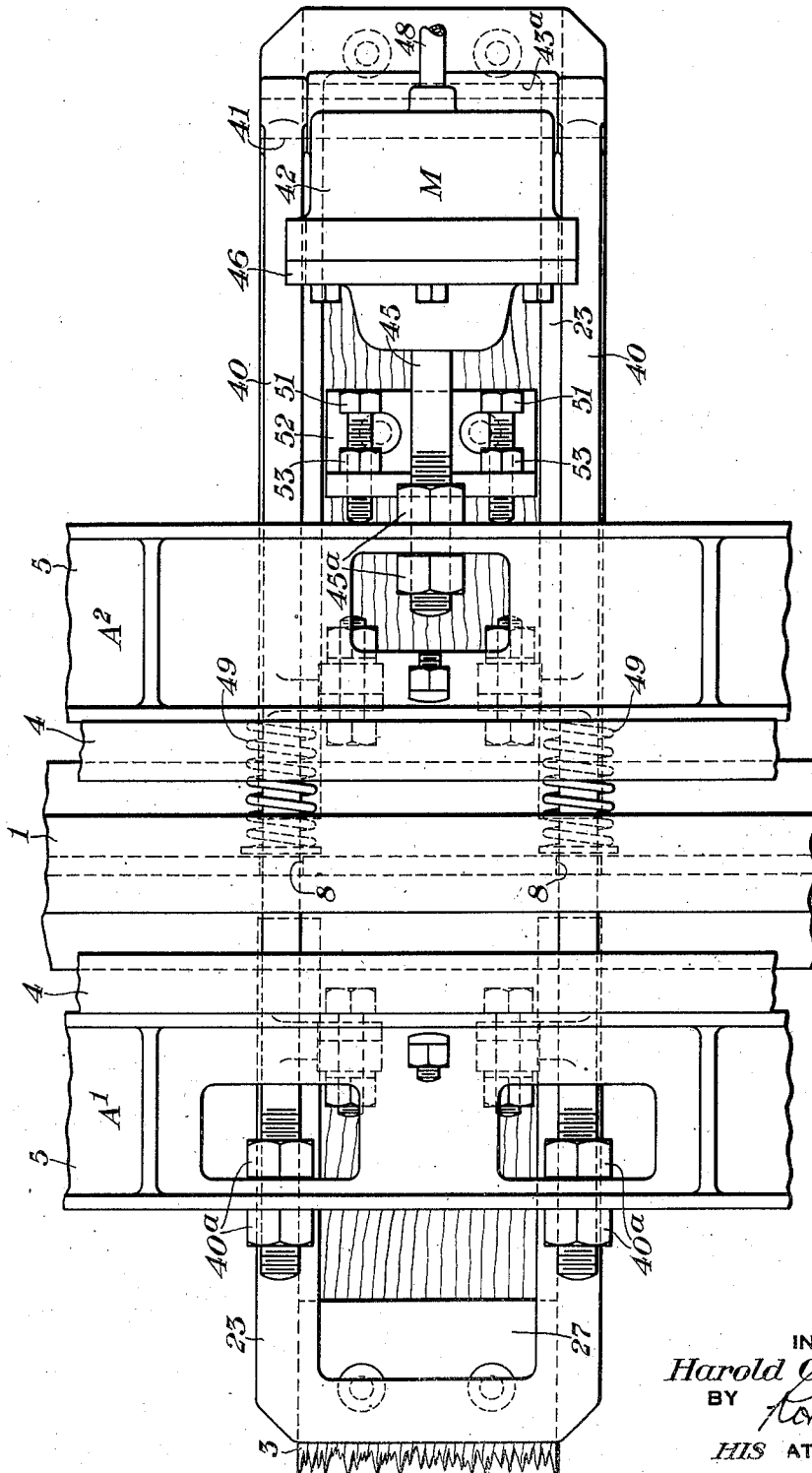


Fig. 9.

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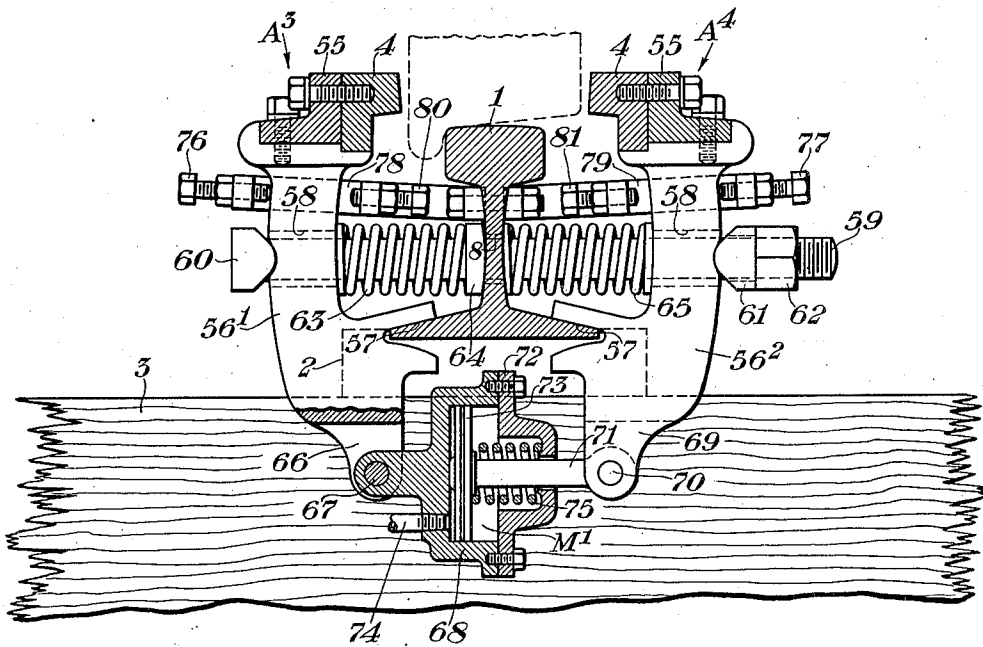
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**2,104,185**

## RAILWAY BRAKING APPARATUS

Filed June 16, 1936

7 Sheets-Sheet 7



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## UNITED STATES PATENT OFFICE

2,104,185

## RAILWAY BRAKING APPARATUS

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Application June 16, 1936, Serial No. 85,506

24 Claims. (Cl. 188—62)

My invention relates to railway braking apparatus, and particularly to that class of railway braking apparatus known as car retarders. More particularly, my present invention relates to car retarders of the type in which the braking bars exert a fixed amount of retardation on all cars passing through the retarder.

One object of my invention is to provide a car retarder of the type described in which the couple caused by the forces which urge the braking bars into engagement with the wheels of cars which are being retarded, and the reaction of the wheels against the braking bars, is counteracted by a structure which is secured to the braking bars.

Other objects of my invention will appear as the description proceeds.

I will describe several forms of car retarders embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings, Fig. 1 is a vertical sectional view showing one form of car retarder embodying my invention. Fig. 2 is a top plan view, partly in section, of the retarder shown in Fig. 1. Fig. 3 is a view, similar to Fig. 1, showing a modified form of the retarder illustrated in Fig. 1. Fig. 4 is a top plan view of a portion of the retarder shown in Fig. 3. Fig. 5 is a top plan view showing another form of retarder embodying my invention. Figs. 6 and 7 are sectional views taken substantially on the lines VI—VI and VII—VII, respectively, of Fig. 5. Fig. 8 is a vertical sectional view, similar to Fig. 1, showing still another form of car retarder embodying my invention. Fig. 9 is a top plan view of the retarder shown in Fig. 8. Fig. 10 is a vertical sectional view showing another form of retarder embodying my invention.

Similar reference characters refer to similar parts in each of the several views.

Referring first to Figs. 1 and 2, the reference character 1 designates one track rail of a stretch of railway track, which track rail is mounted on rail supports 2 secured to the usual cross-ties 3, only one rail support and one cross-tie being shown in the drawings. Extending parallel to the rail 1 on opposite sides of the rail are two braking bars A<sup>1</sup> and A<sup>2</sup>, each comprising a brake shoe 4 secured to a brake beam 5. The brake shoes and brake beams may have any desired cross sectional shape possessing the necessary strength and rigidity, but as here shown, the brake shoes are L-shaped in cross section, while the brake beams are H-shaped in cross section.

The braking bars are slidably supported for

movement toward and away from the rail 1, and are constantly biased toward the rail to braking positions in which the brake shoes 4 will frictionally engage the opposite side faces of each car wheel traversing the rail 1, by means of a spring unit comprising a spring bolt 7 and a compressed coil spring 12. The spring bolt 7 extends with some clearance through a hole 8 provided in the rail web, and through aligned holes 9 provided in the depending leg portions of the brake beams, and carries at its left-hand end a gauge adjusting nut 10. This gauge adjusting nut 10 is made round at its inner end, and is provided with an annular flange 10<sup>a</sup> which is rotatably mounted within an annular recess 15<sup>a</sup> formed in a bearing member 15 that is bolted to the brake beam 5 of the braking bar A<sup>1</sup>, whereby rotation of the nut 10 will cause the braking bar A<sup>1</sup> to move axially along the spring bolt.

The compressed coil spring 12 surrounds the right-hand end of the spring bolt 7 between an inner spring seat 11 which abuts against the outer face of the brake beam 5 of the braking bar A<sup>2</sup>, and an outer spring seat 13 which abuts against a spring compression adjusting nut 14, and it will be apparent, therefore, that the spring 12 will act through the medium of the spring seat 13, nut 14, spring bolt 7, and gauge adjusting nut 10 to exert a force on the braking bar A<sup>1</sup>, and through the medium of the spring seat 11 to exert an equal force on the braking bar A<sup>2</sup>, which forces will tend to move the braking bars toward each other to relative positions which depend upon the amount of initial compression of the spring 12, and hence upon the adjustment of the nut 14. The position to which the braking bar A<sup>1</sup> is free to move due to the force which is exerted on it by the spring 12 is limited by engagement with the rail web of a shoulder 7<sup>a</sup> which is formed on the spring bolt between the braking bar A<sup>1</sup> and the rail web, and the gauge adjusting nut 10 is so adjusted that when the shoulder 7<sup>a</sup> is engaging the rail web, the braking bar A<sup>1</sup> will occupy what I shall term a normal position in which the brake shoe 4 of this braking bar will project a predetermined amount into the path of each car wheel traversing rail 1. The position to which the braking bar A<sup>2</sup> is free to move due to the force which is exerted on it by the spring 12 is limited by engagement with the rail head of a stud bolt 16, which bolt also serves as a means for securing the brake shoe 4 of the braking bar A<sup>1</sup> to the associated brake beam 5. The bolt 16 passes through a clearance hole provided in the inner arm of the associated brake

beam, and is screwed through a threaded hole in the brake shoe, and carries a lock nut 17 for locking the bolt in an adjusted position. The bolt 16 is so adjusted that when the inner end of this bolt is engaging the rail head, the brake shoe 4 of the braking bar A<sup>2</sup> will project a predetermined amount into the path of each car wheel traversing rail 1.

With the retarder constructed in the manner thus far described, it will be apparent that when a car enters the retarder, the wheels of the car will exert a force on both braking bars which force will move the braking bar A<sup>1</sup> toward the left, as viewed in Fig. 1, and the braking bar A<sup>2</sup> toward the right, thus causing the spring 12 to become compressed beyond its initial compression, and hence causing the braking bars to frictionally engage the car wheels in a manner to retard the speed of the car. It will also be apparent that due to the fact that the points at which the braking bars engage the car wheels are located some distance above the spring bolt, a couple of forces will be exerted on the braking bar A<sup>1</sup> which will tend to rotate this braking bar in a counter-clockwise direction, and a similar couple of forces will be exerted on the braking bar A<sup>2</sup> which will tend to rotate this latter braking bar in a clockwise direction. These couples tend to bend the spring bolt 7, and are therefore undesirable, and in accordance with my present invention I provide suitable means for counteracting the turning forces caused by these couples. As here shown, these means comprise two similar U-shaped brackets 23, one of which is secured adjacent its open end to the brake beam 5 of the braking bar A<sup>1</sup> by means of bolts 24 which pass through the one leg of the brake beam and through upstanding lugs 25, one of which is formed on each leg of the brackets; and the other of which brackets is secured adjacent its open end to the brake beam 5 of the braking bar A<sup>2</sup> in the same manner that the first mentioned bracket is secured to the other brake beam. The outer portion of each bracket is slidably supported on a tie-plate 27 secured to the associated tie 3, and the inner ends of the brackets are provided with offset portions 23<sup>a</sup> which extend underneath the base flanges of the rail 1 on opposite sides of the rail support 2.

With the bracket 23 secured to the braking bars in the manner just described, it will be obvious that when the brake shoes are engaging a car wheel, the couple or turning forces produced in the braking bars by the reaction of the wheels against the brake shoes 4 will be counteracted by engagement of the brackets with the tie-plates 27 and with the bottom of the rail, and as a result, any motion of the braking bars will be limited to a straight sliding motion toward and away from the rail. This is very desirable, not only because it prevents the spring bolt from becoming bent, but also because it reduces lost motion, which, in turn, increases the retardation which can be obtained from the retarder and reduces the amount of wear on the parts.

The braking forces which are exerted on a car by a car retarder of the type described will, of course, depend upon the stiffness and initial compression of the spring 12, and the distance which the braking bars are forced apart by the car wheels, and may be adjusted by adjusting the normal positions of the braking bars and the initial compression of the spring 12. A decrease in retardation caused by wear of the brake shoe 4 of the braking bar A<sup>1</sup> may be compensated for by screwing the adjusting nut 10 in-

wardly to move this braking bar closer to the rail, and a decrease in retardation caused by wear of the brake shoe 4 of the braking bar A<sup>2</sup> may be compensated for by screwing the bolt 16 outwardly to permit this braking bar to move closer to the rail.

If it is desired to render the retarder inactive for any reason, this may be done by backing off the gauge adjusting nut 10 a few turns. This will cause the inside braking bar A<sup>1</sup> to move away from the rail to a position in which it is clear of the path of car wheels traversing rail 1, but will not cause the outside braking bar A<sup>2</sup> to move. The retarder, however, is intended primarily for use as a single rail retarder, and when the retarder is used as a single rail retarder, the car wheel which is being engaged by the braking bar A<sup>2</sup> can move laterally away from the brake shoe 4 of this braking bar, the adjustment of the braking bar A<sup>1</sup> being such that a sufficient amount of motion of the car wheel is permitted to render the frictional contact between the outside braking bar and the car wheel substantially negligible.

It should be particularly pointed out that while in the drawings the braking bars A<sup>1</sup> and A<sup>2</sup> of the car retarder are shown supported by only one spring unit, in actual practice these braking bars will be supported by a plurality of similar units disposed at intervals along the rail 1.

As was pointed out hereinbefore, a car retarder of the type described is intended primarily as a single rail retarder. When it is desired to provide both rails with braking bars, each spring unit will preferably be modified in the manner shown in Fig. 3, whereby both braking bars may be moved to positions in which they are out of engagement with car wheels when it is desired to render the retarder inactive. Referring to Fig. 3, as here shown, the shoulder 7<sup>a</sup> of the spring bolt 7 is disposed on the opposite side of the rail from that in which it is shown in Fig. 1, and surrounding the spring bolt between this shoulder and the rail web is a compressed coil spring 26 which constantly biases the spring bolt assembly as a whole toward the right, in a manner which will be obvious from an inspection of the drawing, to a position in which further movement of the parts is prevented by engagement of the brake beam 5 of the braking bar A<sup>2</sup> with an adjustable stop screw 18 mounted in a bracket 19. The bracket 19 is fastened at its lower end to one side of the rail support 2 by means of a pair of stud bolts 20, and this bracket extends upwardly with some clearance through an elongated slot 21 formed in the web of the associated brake beam 5, and has formed therein a hole 22 which slidably receives the spring bolt 7 with some clearance. The adjusting screw 18 carries a lock nut 18<sup>a</sup>, and is so adjusted that when the brake beam 5 of the braking bar A<sup>2</sup> is engaging this stop screw, the braking bar A<sup>2</sup> will occupy a position in which the brake shoe 4 of this braking bar is just clear of the path of car wheels traversing the rail 1. The gauge adjusting nut 10 is so adjusted that when the braking bar A<sup>2</sup> occupies its desired non-braking position and no car wheel is traversing rail 1, the braking bar A<sup>1</sup> will occupy a position in which the brake shoe 4 of this latter braking bar will project some distance into the path of a car wheel traversing rail 1. The remainder of the apparatus shown in Fig. 3 is similar in all respects to that shown in Fig. 1.

The operation of the retarder shown in Fig. 3, as a whole, is as follows: When no car is passing through the retarder, the braking bars A<sup>1</sup> and A<sup>2</sup> are held in their normal positions in which they are shown in the drawings by the springs 26 and 12 in a manner which will be readily apparent from the foregoing description and from an inspection of the drawings. When, however, a car enters the retarder, the car wheels will first engage the brake shoe 4 of the braking bar A<sup>1</sup>, and will thus cause this braking bar to move toward the left, and as this braking bar moves toward the left, a force will be transmitted to the braking bar A<sup>2</sup> through the nut 10, spring bolt 7, nut 14, and spring 12, which force will cause the braking bar A<sup>2</sup> to move toward the left along with the braking bar A<sup>1</sup> until the braking bar A<sup>2</sup> has moved into engagement with the outer face of the car wheel, whereupon the car wheel will force the two braking bars apart in opposition to the bias of the spring 12. It will be seen, therefore, that the braking bars will be held into frictional contact with the car wheels by a force which depends upon the distance that the braking bars are forced apart and the adjustment of the initial compression of the spring 12. When the car leaves the retarder, the spring 12 will restore the braking bars to their normally spaced positions, and the spring 26 will act to restore them to their proper positions relative to the rail 1.

One advantage of a retarder constructed in the manner shown in Fig. 3 is that since the braking bar A<sup>2</sup> is normally out of the path of car wheels traversing rail 1, the retarder can be rendered wholly inactive by backing off the adjusting nut 10 to such a position that the inside braking bar A<sup>1</sup> is also out of the path of the car wheels. This feature is very desirable when the retarder is used as a double rail retarder for reasons which will readily be apparent.

Another advantage of a retarder constructed in the manner shown in Fig. 3 is that, since the pressure exerted by the spring 12 is all taken up by engagement of the shoulder 7<sup>a</sup> of the bolt 7 with the brake beam 5 of the braking bar A<sup>2</sup>, this spring pressure is not affected by adjustment of the adjusting nut 10 or the stop screw 18 to compensate for brake shoe wear. Furthermore, since the gauge adjustments do not vary the spring tension, these adjustments may be made with a minimum amount of effort.

Referring now to Figs. 5, 6, and 7, the retarder here shown is of the single braking bar type in which the braking bar consists of a standard rail section 30 which performs the same functions which the brake beam-brake shoe combination shown in the preceding views perform. The web of the braking bar 30 is provided adjacent its lower end with a hole 31 (see Fig. 7) which aligns with an opening 8 formed in the web of the rail 1 near the upper end thereof, and extending with some clearance through the openings 8 and 31 is a spring bolt 32, the right-hand end of which is provided with a head 33 which cooperates with the rail web adjacent the opening 8, and the left-hand end of which is provided with an inner spring seat 34, a coil spring 12, an outer spring seat 13, and a spring compression adjusting nut 14. The nut 14 is so adjusted that the braking bar 30 is constantly biased toward the rail to a position in which the inner side face of the head of the braking bar will frictionally engage the inner side face of each car wheel traversing rail 1, and mounted

on the spring bolt between the rail and the braking bar is a spacing sleeve 35, and a spacer washer 36, which sleeve and washer serve to position the braking bar relative to the rail when no car wheel is engaging the braking bar. To prevent rotation of the braking bar due to the couple of forces which are exerted on it when it is engaging a car wheel, the braking bar is secured to a U-shaped bracket 37 which is essentially the same in construction as the brackets 23 shown in Figs. 1 and 2, and which cooperates at one end with a tie-plate 27 secured to the tie 3, and at the other end with the rail 1, in the same manner that each of the brackets 23 shown in Fig. 1 cooperates at one end with a tie-plate and at the other end with the rail 1. A stiffening plate 38 is welded to the braking bar and to each arm of the bracket 27 to assist in preventing tipping of the braking bar due to engagement of car wheels therewith.

The operation of the retarder shown in Figs. 5, 6 and 7 will be readily understood from an inspection of the drawings without further detailed description. It should be noted, however, that retardation of cars is obtained due both to the frictional engagement of the braking bar with the inner faces of the car wheels, and to the consequent equal pressure of the wheel flanges against the ball of the rail.

It will be readily understood that with the retarder constructed as shown in Figs. 5, 6 and 7, wear of the braking surface of the braking bar may be compensated for by replacing the washer 36 with a thinner one.

Referring now to Figs. 8 and 9, in the modified form of retarder here shown, the braking bars A<sup>1</sup> and A<sup>2</sup> are slidably supported for movement toward and away from the rail 1 by means of a pair of eyebolts 40 which extend with clearance through holes 8 provided in the web of the rail 1, and through holes 9 provided in the depending legs of the brake beams 5 of the braking bars. The threaded ends of the eyebolts 40 are secured to the brake beam 5 of the braking bar A<sup>1</sup> by means of nuts 40<sup>a</sup>, while the eyes of the eyebolts are mounted on the opposite ends of a pin 41 which extends horizontally through the rear portion of the cylinder 42 of a fluid pressure motor M. The cylinder 42 is slidably supported adjacent its rear end for movement toward and away from the rail 1 within a recess 43 which is formed in a tie-plate 27 secured to the crosstie 3, and has reciprocally mounted therein a piston 44 which drives a piston rod 45. The piston rod 45 extends through a cylinder head 46, and is secured at its free end to the brake beam 5 of the braking bar A<sup>2</sup> by means of nuts 45<sup>a</sup>. The piston 44 is constantly biased to a retracted position within the cylinder 42 by means of a compressed coil spring 47 which surrounds the piston rod between the piston 44 and the cylinder head 46, and the piston is arranged to be at times moved to a projected position, in opposition to the bias of the spring 47, by admitting fluid pressure to the cylinder 42 through an inlet pipe 48. It will be apparent that movement of the piston 44 within the cylinder 42 will act through the piston rod 45 and the eyebolts 40 to move the braking bars toward or away from each other according as the piston is moved toward its projected position or its retracted position, and the parts are so proportioned that when the piston is moved to its projected position, the braking bars will be moved toward each other to such positions that the spacing between the brake shoes

will be less than the width of car wheels traversing rail 1, whereas, when the piston is moved to its retracted position, the braking bars will be moved away from each other to such positions that the distance between the brake shoes will be greater than the width of car wheels traversing rail 1. Surrounding the spring bolts 40 between the rail 1 and the brake beam 5 of the braking bar A<sup>2</sup> are coil springs 49 which constantly bias the braking bar A<sup>2</sup> toward the right to a position in which depending stop lugs 50 which are provided on the brake beam engage stop screws 51 mounted in a bracket 52 secured to the cross-tie 2 adjacent the outer side of the brake beam 5 of the braking bar A<sup>2</sup>. The stop screws 51 each carry lock nuts 53, whereby the stop screws may be locked in adjusted positions. The stop screws are so adjusted that when the braking bar A<sup>2</sup> is engaging the stop screws 51, the brake shoe 4 of this braking bar will be out of the path of car wheels traversing rail 1, and that, when the braking bar A<sup>2</sup> is engaging the stop screws 51 and the piston 44 of motor M occupies its retracted position, the brake shoe 4 of the braking bar A<sup>1</sup> will occupy a position in which it is out of the path of car wheels traversing rail 1. The recess 43 in which the cylinder 42 of motor M slides is of such length, and the parts are so proportioned that when the piston 44 occupies its projected position, and the cylinder 42 is engaging the rear wall 43<sup>a</sup> of the recess 43, the braking bars A<sup>1</sup> and A<sup>2</sup> will then be held in the proper positions relative to the rail 1 to permit a smooth entry of the wheels of cars between the braking bars. A bracket 23 is secured to each of the braking bars A<sup>1</sup> and A<sup>2</sup> in the same manner as in Fig. 1, and these brackets cooperate with tie-plates 27 and with the underside of the rail 1 to prevent rotation of the braking bars due to the couple of forces which are exerted on the braking bars when they are engaging the wheels of a car, in the same manner as in Fig. 1.

The operation, as a whole, of the retarder shown in Figs. 8 and 9 is as follows: When fluid is exhausted from the cylinder 42 of motor M, piston 44 is held in its retracted position by the spring 47, and the braking bars and motor assembly as a whole are moved toward the right by means of the springs 49 to the positions in which the stop lugs 50 engage the stop screws 51. Under these conditions, due to the previously described proportioning of the parts, the brake shoes of the braking bars are separated a distance which is greater than the width of the car wheels, and are so positioned with respect to the rail 1 that both braking bars will be out of the path of car wheels traversing rail 1. It will be apparent, therefore, that when fluid is exhausted from motor M, the car retarder will not exert any braking force on cars passing through it. When, however, fluid is supplied to motor M, the braking bars A<sup>1</sup> and A<sup>2</sup> will then be moved toward each other by the relative movement of the piston 44 and cylinder 42 to the positions in which the spacing between the brake shoes 4 is less than the width of car wheels, and will be positioned relative to the rail 1 by engagement of the motor cylinder with the stop formed by the rear wall 43<sup>a</sup> of the recess 43 in the tie-plate 27 in which the motor cylinder slides, and under these conditions, if a car enters the retarder the wheels of the car will force the braking bars apart, which movement of the braking bars will compress the fluid in the motor cylinder, and will thus cause the braking bars to be held into frictional engage-

ment with the car wheels by a biasing force which depends upon the pressure of the fluid in the motor. It follows, therefore, that when fluid is admitted to motor M, the retarder will act to retard the speed of cars passing through the retarder. When the braking bars of the retarder have been moved to their closed positions by admitting fluid to motor M, and it is desired to move them to their open positions, the fluid which was previously supplied to motor M is exhausted to atmosphere, whereupon the springs 47 and 49 will immediately act to restore the braking bars to their open or non-braking positions.

It should be noted that with the retarder constructed in the manner shown in Figs. 8 and 9, adjustment to compensate for wear of the brake shoe 4 of the braking bar A<sup>2</sup> may be made by turning the nuts 45<sup>a</sup> which fasten the piston rod 45 to the brake beam 5 of this braking bar, while adjustment to compensate for wear of the brake shoe 4 of the braking bar A<sup>1</sup> may be made by turning the nuts 40<sup>a</sup> which fasten the eyebolts 40 to the brake beam 5 of this latter braking bar.

Referring now to Fig. 10, the car retarder in the form here shown comprises two braking bars A<sup>3</sup> and A<sup>4</sup>, each consisting of a brake shoe 4 and a brake beam 55. These braking bars extend parallel to track rail 1 on opposite sides of the rail, and are secured to the upper ends of two similar levers 56<sup>1</sup> and 56<sup>2</sup> which are slidably supported adjacent their lower ends on the opposite base flanges of the rail 1 by means of recesses 57 which loosely receive the base flanges. Formed in the levers 56<sup>1</sup> and 56<sup>2</sup> between the braking bars and the recesses 57 are openings 58 which align with an opening 8 in the web of the rail 1, and extending through the openings 58 and 8 with some clearance is a spring bolt 59, one end of which is provided with a head 60 and the other end of which is provided with a washer 61 and a gauge adjusting nut 62. As will appear more fully hereinafter, the head 60 of the bolt 59 at times serves as a fulcrum for the lever 56<sup>1</sup>, and to facilitate rotation of this lever about the bolt head, the inner face of the bolt head is rounded in the manner shown. In a similar manner, the washer 61 at times serves as a fulcrum for the lever 56<sup>2</sup>, and to facilitate rotation of this lever about the washer, the inner face of the washer is rounded in the manner shown. The lever 56<sup>1</sup> is constantly biased into engagement with the bolt head 60 by means of a compressed coil spring 63 which surrounds the spring bolt 59 between the lever and a shoulder 64 which is provided on the spring bolt, and the lever 56<sup>2</sup> is similarly constantly biased into engagement with the washer 61 by means of a compressed coil spring 65 which surrounds the bolt between the lever and the web of the rail 1. The lower end of lever 56<sup>1</sup> is provided with a depending bifurcated lug 66 which is pivotally connected at point 67 with the cylinder 68 of a fluid pressure motor M<sup>1</sup>, and the lower end of lever 56<sup>2</sup> is provided with a depending bifurcated lug 69 which is pivotally connected at point 70 with one end of a piston rod 71, the other end of which projects into cylinder 68 through a cylinder head 72 and is attached to a reciprocable piston 73. The cylinder 68 is provided with an inlet pipe 74 through which compressed air may at times be admitted to the left-hand end of the cylinder, thereby forcing the piston 73 toward the right and the cylinder 68 toward the left, and so spreading the lower ends of the levers apart. The lower ends of the levers are biased toward

each other by means of a spring 75 which surrounds the piston rod 71 between the piston 73 and the cylinder head 72. The positions to which the levers 56<sup>1</sup> and 56<sup>2</sup> are free to swing due to the bias of the spring 75 is limited by adjustable stop screws 76 and 77, respectively, mounted in brackets 78 and 79 secured to the rail 1, and the positions to which the levers are free to move when air is supplied to the motor M is limited by adjustable stop screws 80 and 81, respectively, mounted in the brackets 78 and 79. The stop screws 76 and 77 are so adjusted that when the levers are engaging these stop screws both braking bars will occupy positions in which they are clear of the path of car wheels traversing rail 1, and the stop screws 80 and 81 are so adjusted that when the levers are engaging these stop screws the brake shoes of both braking bars will project into the path of car wheels traversing rail 1. The parts are so proportioned that the levers will not under any conditions pivot about the base flanges of the rail.

With the retarder constructed in the manner just described, it will be obvious that if a car passes through the retarder when no fluid is being supplied to the motor M<sup>1</sup>, the braking bars will be held out of engagement with the car wheels by the spring 75, and the car retarder will not, therefore, exert any force on the car. When, however, fluid is supplied to motor M<sup>1</sup>, the braking bars will then be biased by the fluid to such positions that the brake shoes will frictionally engage the opposite side faces of each car wheel traversing rail 1, and the retarder will therefore act to retard the speed of cars. It should be noted that when the braking bars are engaging a car wheel they are free to move toward and away from the rail so as to compensate for variations in the thickness of car wheels, and in the spacing of the wheels on different axles, thereby providing a smooth and efficient braking action.

The gauge adjustment of the retarder shown in Fig. 10 may be varied by adjusting nut 62, while the positions of the braking bars in both their open and closed positions may be varied by adjusting the stop screws 76, 77, 80, and 81, whereby variations in retardation caused by shoe wear and the like can be quickly and conveniently compensated for.

Although I have herein shown and described only a few forms of railway braking apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. Railway braking apparatus comprising a braking bar extending parallel to a track rail on one side of the rail, a bolt extending through the rail web and through the braking bar, means mounted on said bolt for constantly biasing the braking bar toward the track rail to a position in which the braking bar will frictionally engage car wheels traversing the rail, and a bracket secured intermediate its ends to the braking bar and slidably supported at one end and slidably cooperating with the underside of the rail at the other end, whereby rotation of the braking bar in response to the couple of forces which is exerted on it when it is engaging a car wheel is prevented by said bracket.

2. Railway braking apparatus comprising two

braking bars slidably supported on opposite sides of a track rail for movement toward and away from the rail by means of a bolt, means on said bolt for biasing the braking bars toward the track rail to positions in which they will frictionally engage the opposite side faces of each car wheel traversing said rail, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being slidably supported at one end and being provided at the other end with means which slidably engages the underside of the track rail.

3. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, means for adjustably securing said bolt to the one brake beam, biasing means operatively connected with said bolt and with the other brake beam and effective for biasing the braking bars toward the track rail to positions in which the brake shoes will frictionally engage the opposite side faces of car wheels traversing said rail, and means for limiting the movement of said braking bars toward the track rail.

4. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, means for adjustably securing said bolt to the one brake beam, means mounted on said bolt for biasing the braking bars toward the track rail to positions in which the brake shoes will frictionally engage the opposite side faces of car wheels traversing said rail, and means for limiting the movement of said braking bars toward the track rail.

5. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, means for adjustably securing said bolt to the one brake beam, and biasing means acting through the medium of said bolt for biasing the braking bars toward the track rail to positions in which the brake shoes will frictionally engage the opposite side faces of car wheels traversing said rail.

6. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, a shoulder formed on said bolt between the one

brake beam and said track rail, means for adjustably securing the one brake beam to said bolt so adjusted that when said shoulder is engaging the track rail the brake shoe secured to said one  
 5 brake beam will project into the path of each car wheel traversing rail 1, a second bolt adjustably mounted in the other brake beam and cooperating with the rail head to limit the movement of the other braking bar toward the track  
 10 rail, said second bolt being so adjusted that when said second bolt is engaging the track rail the brake shoe attached to said other beam will project into the path of each car wheel traversing rail 1, and means for biasing said brake beams to the position in which said shoulder and said  
 15 bolt are engaging said rail.

7. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite sides  
 20 of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, a  
 25 shoulder formed on said bolt between the one brake beam and said track rail, means for adjustably securing the one brake beam to said bolt so adjusted that when said shoulder is engaging the track rail the brake shoe secured to said one  
 30 brake beam will project into the path of each car wheel traversing rail 1, a second bolt adjustably mounted in the other brake beam and cooperating with the rail head to limit the movement of the other braking bar toward the track rail,  
 35 said second bolt being so adjusted that when said second bolt is engaging the track rail the brake shoe attached to said other beam will project into the path of each car wheel traversing rail 1, and means mounted on said first mentioned bolt for biasing said brake beams to the position in which  
 40 said shoulder and said bolt are engaging said rail.

8. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite  
 45 sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, means for adjustably securing said  
 50 bolt to the one brake beam, biasing means connected with said bolt and with the other brake beam and effective for biasing the braking bars toward the track rail to positions in which the brake shoes will frictionally engage the opposite  
 55 side faces of car wheels traversing said rail, means for limiting the movement of said braking bars toward the track rail, and a separate bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being  
 60 slidably supported at one end and being provided at the other end with means which slidably engage the underside of the track rail.

9. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite  
 70 sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement

toward and away from the rail by means of said bolt, means for adjustably securing said bolt to the one brake beam, means mounted on said bolt for biasing the braking bars toward the track rail to positions in which the brake shoes will frictionally engage the opposite side faces of car  
 5 wheels traversing said rail, means for limiting the movement of said braking bars toward the track rail, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being slidably supported at one end and being provided at the other end with means which slidably engage the under-  
 10 side of the track rail.

10. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite  
 20 sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, means for adjustably securing said  
 25 bolt to the one brake beam, biasing means acting through the medium of said bolt for biasing the braking bars toward the track rail to positions in which the brake shoes will frictionally engage the opposite side faces of car wheels traversing said rail, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each  
 30 said bracket being slidably supported at one end and being provided at the other end with means which slidably engage the underside of the track rail.

11. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite sides  
 45 of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, a shoulder formed on said bolt between the one brake beam and said track rail, means for adjustably securing the one brake beam to said bolt so adjusted that when said shoulder is engaging the track rail the brake shoe secured to said one brake beam will project into the path of each car wheel traversing rail 1, a second bolt  
 50 adjustably mounted in the other brake beam and cooperating with the rail head to limit the movement of the other braking bar toward the track rail, said second bolt being so adjusted that when said second bolt is engaging the track rail the brake shoe attached to said other beam will project into the path of each car wheel traversing rail 1, means for biasing said brake beams to the position in which said shoulder and said second bolt are engaging said rail, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being slidably supported at one end and being provided at the other end with means which slidably engage the underside of the track rail.

12. Railway braking apparatus comprising a first and a second braking bar each comprising

a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, a shoulder formed on said bolt between the one brake beam and said track rail, means for adjustably securing the one brake beam to said bolt so adjusted that when said shoulder is engaging the track rail the brake shoe secured to said one brake beam will project into the path of each car wheel traversing rail 1, a second bolt adjustably mounted in the other brake beam and cooperating with the rail head to limit the movement of the other braking bar toward the track rail, said second bolt being so adjusted that when said second bolt is engaging the track rail the brake shoe attached to said other beam will project into the path of each car wheel traversing rail 1, means mounted on said first mentioned bolt for biasing said brake beams to the position in which said shoulder and said second bolt are engaging said rail, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being slidably supported at one end and being provided at the other end with means which slidably engage the underside of the track rail.

13. Railway braking apparatus comprising a first and a second braking bar each comprising a brake shoe secured to a brake beam and each extending parallel to a track rail on opposite sides of the rail, a bolt extending through clearance holes in both brake beams and a clearance hole in the rail web in such manner that the braking bars are slidably supported for movement toward and away from the rail by means of said bolt, a shoulder formed on said bolt between the one brake beam and said track rail, means for adjustably securing the one brake beam to said bolt so adjusted that when said shoulder is engaging the track rail the brake shoe secured to said one brake beam will project into the path of each car wheel traversing said rail, a second bolt adjustably mounted in the other brake beam and cooperating with the rail head to limit the movement of the other braking bar toward the track rail, said second bolt being so adjusted that when said second bolt is engaging the track rail the brake shoe attached to said other beam will project into the path of each car wheel traversing said rail, a nut adjustably screwed onto the outer end of said first mentioned bolt adjacent said other braking bar, and a compressed coil spring mounted on said first mentioned bolt between said nut and said other brake beam.

14. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the bolt for movement toward and away from the rail, means for adjustably securing said first braking bar to said bolt, means connected with the bolt and with the other braking bar for biasing the braking bars toward each other to positions in which they will frictionally engage the opposite side faces of each car wheel traversing said track rail, means for limiting the movement of the braking bars toward each other, and means for

positioning the braking bars relative to said track rail when no car wheel is being engaged by the braking bars.

15. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the bolt for movement toward and away from the rail, means for adjustably securing said first braking bar to said bolt, biasing means mounted on said bolt for biasing the braking bars toward each other to positions in which they will frictionally engage the opposite side faces of each car wheel traversing said track rail, means for limiting the movement of the braking bars toward each other, and means for positioning the braking bars relative to said track rail when no car wheel is being engaged by the braking bars.

16. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the bolt for movement toward and away from the rail, means for adjustably securing said first braking bar to said bolt, means connected with the bolt and with the other braking bar for biasing the braking bars toward each other to positions in which they will frictionally engage the opposite side faces of each car wheel traversing said track rail, means for limiting the movement of the braking bars toward each other, means for positioning the braking bars relative to said track rail when no car wheel is being engaged by the braking bars, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being slidably supported at one end and being provided at the other end with means which slidably engage the underside of the track rail.

17. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the bolt for movement toward and away from the rail, means for adjustably securing said first braking bar to said bolt, biasing means mounted on said bolt for biasing the braking bars toward each other to positions in which they will frictionally engage the opposite side faces of each car wheel traversing said track rail, means for limiting the movement of the braking bars toward each other, means for positioning the braking bars relative to the track rail when no car wheel is being engaged by the braking bars, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being slidably supported at one end and being provided at the other end with means which slidably engage the underside of the track rail.

18. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the

bolt for movement toward and away from the rail, means for adjustably securing said first braking bar to said bolt, a shoulder formed on said bolt between said rail and said second braking bar, a compressed coil spring mounted on said bolt and effective for biasing said two braking bars to the relative positions in which said shoulder engages said second braking bar, said adjustable securing means being so adjusted that when said shoulder is engaging said second braking bar said two braking bars will be closer together than the width of car wheels traversing said rail, and other adjustable means for positioning the braking bars relative to the track rail.

19. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the bolt for movement toward and away from the rail, means for adjustably securing said first braking bar to said bolt, a shoulder formed on said bolt between said rail and said second braking bar, a compressed coil spring mounted on said bolt and effective for biasing said two braking bars to the relative positions in which said shoulder engages said second braking bar, said adjustable securing means being so adjusted that when said shoulder is engaging said second braking bar said two braking bars will be closer together than the width of car wheels traversing said rail, and adjustable means for positioning the braking bars relative to the track rail in such manner that when no car wheel is engaging the braking bars said first braking bar will project into the path of car wheels traversing the track rail and said second braking bar will be disposed outside of the path of car wheels traversing the track rail.

20. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the bolt for movement toward and away from said track rail, means for adjustably securing said first braking bar to said bolt, a shoulder formed on said bolt between said track rail and said second braking bar, a first compressed coil spring mounted on said bolt and effective for biasing said two braking bars to the relative positions in which said shoulder engages said second braking bar, said adjustable means being so adjusted that when said shoulder is engaging said second braking bar said two braking bars will be closer together than the width of car wheels traversing said track rail, a second compressed coil spring surrounding said bolt between said track rail and said shoulder and effective for biasing the braking bars and bolt assembly as a unit to the relative positions in which said first braking bar will project into the path of car wheels traversing said track rail and said second braking bar will be disposed outside of the path of car wheels traversing said track rail, and an adjustable stop screw for limiting the movement of the braking bar and bolt assembly due to the bias of said second spring.

21. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the bolt

for movement toward and away from the rail, means for adjustably securing said first braking bar to said bolt, a shoulder formed on said bolt between said rail and said second braking bar, a compressed coil spring mounted on said bolt and effective for biasing said two braking bars to the relative positions in which said shoulder engages said second braking bar, said adjustable securing means being so adjusted that when said shoulder is engaging said second braking bar said two braking bars will be closer together than the width of car wheels traversing said rail, adjustable means for positioning the braking bars relative to said rail, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being slidably supported at one end and being provided at the other end with means which slidably engaging the underside of the track rail.

22. Railway braking apparatus comprising a first and a second braking bar extending parallel to a track rail, a spring bolt extending through clearance holes in both braking bars and a clearance hole in the rail web in such manner that the braking bars are slidably supported by the bolt for movement toward and away from the rail, means for adjustably securing said first braking bar to said bolt, a shoulder formed on said bolt between said rail and said second braking bar, a compressed coil spring mounted on said bolt for biasing said two braking bars to the relative positions in which said shoulder engages said second braking bar, said adjustable securing means being so adjusted that when said shoulder is engaging said second braking bar said two braking bars will be closer together than the width of car wheels traversing said rail, adjustable means for positioning the braking bars relative to the track rail in such manner that when no car wheel is engaging the braking bars said first braking bar will project into the path of car wheels traversing the track rail and said second braking bar will be disposed outside of the path of car wheels traversing the track rail, and a bracket secured to each braking bar for preventing the braking bars from tipping due to the couple of forces which are exerted on them when they are engaging car wheels, each said bracket being slidably supported at one end and being provided at the other end with means which slidably engage the underside of the track rail.

23. Railway braking apparatus comprising a braking bar consisting of a standard rail section extending parallel to a track rail and slidably supported for movement toward and away from the rail by means of a bolt extending through the rail web and the web of the braking bar, spring means on said bolt for biasing the braking bar toward the track rail to a position in which it will frictionally engage one side face of each car wheel traversing the track rail, and a bracket secured to said braking bar for preventing the braking bar from tipping due to the couple which is exerted on it when it is engaging a car wheel, said bracket being slidably supported at one end and being provided at the other end with means which slidably engages the underside of the track rail.

24. Railway braking apparatus comprising a braking bar consisting of a standard rail section extending parallel to a track rail and slidably supported for movement toward and away from the rail by means of a bolt extending through the

5 rail web and the web of the braking bar, spring means on said bolt for biasing the braking bar toward the rail to a position in which it will frictionally engage one side face of each car wheel traversing the rail, means disposed on said bolt between the rail and the braking bar for positioning the braking bar relative to the rail when the braking bar is not engaging a car wheel,

and a bracket secured to said braking bar for preventing the braking bar from tipping due to the couple which is exerted on it when it is engaging a car wheel, said bracket being slidably supported at one end and being provided at the other end with means which slidably engages the underside of the track rail. 5

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