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M. A. YEAKLEY.

CAR BRAKE.

No. 456,750. Patented July 28, 1891.

Fig 1

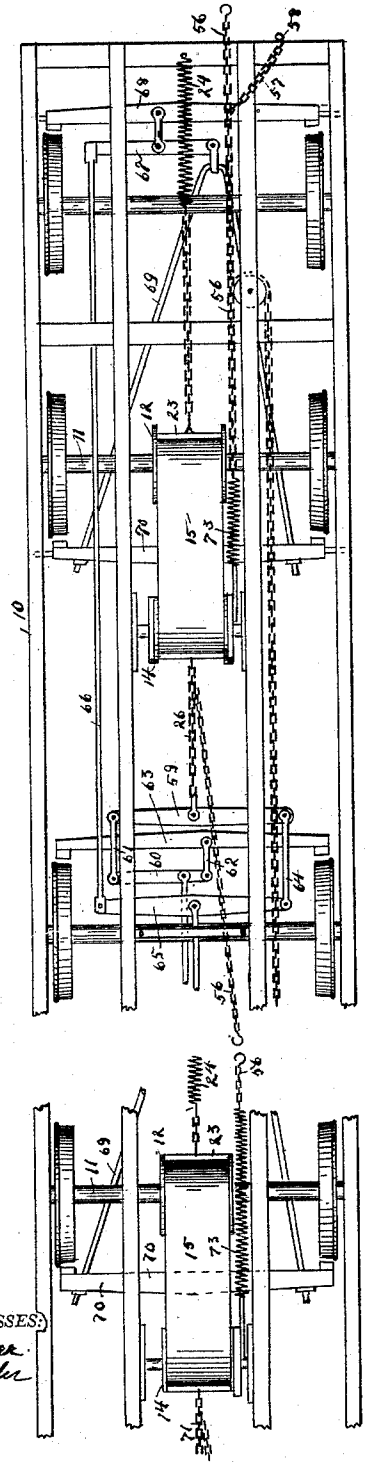
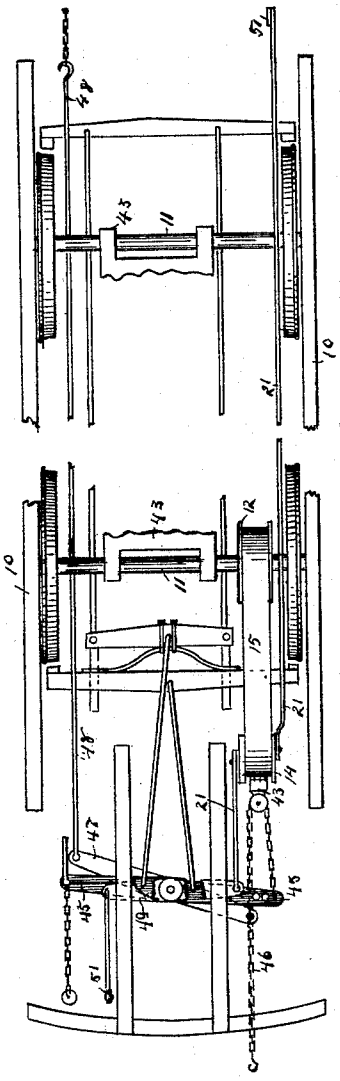


Fig 2



WITNESSES:
R. B. Moore
V. Schneider

INVENTOR.
Melvin A. Yeakley.

H. T. Fisher ATTORNEY.

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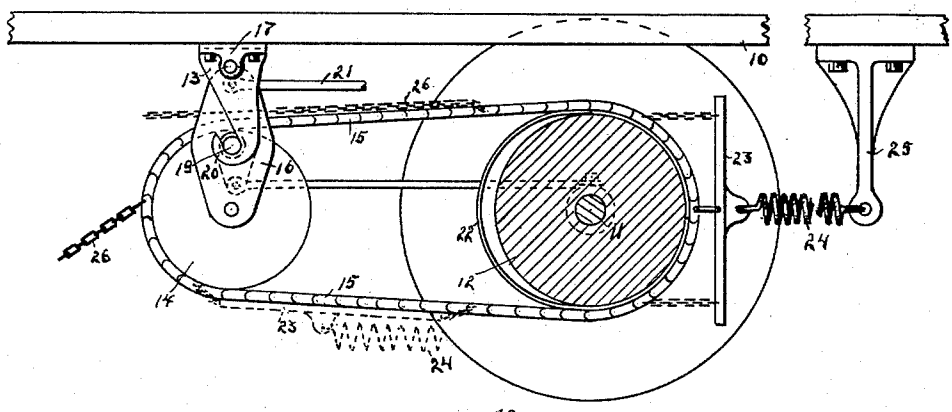
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No. 456,750. Patented July 28, 1891.

Fig 3



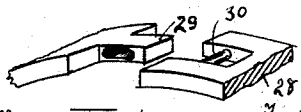


Fig 6

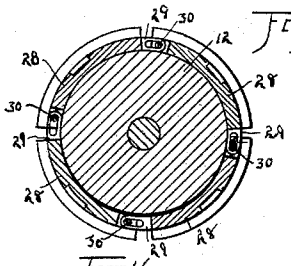


Fig 4

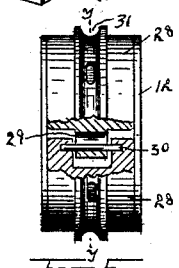


Fig 5

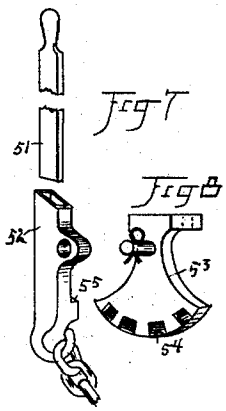


Fig 7

Fig 8

Fig 9



Fig 10

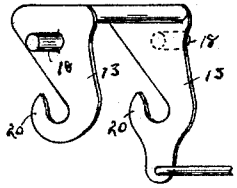


Fig 11

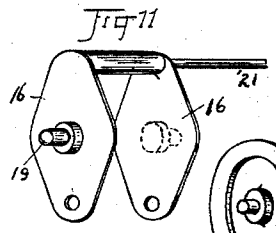
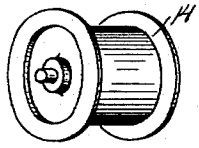


Fig 12



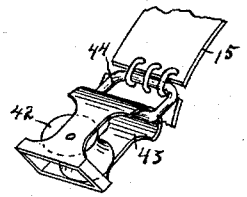


Fig 14

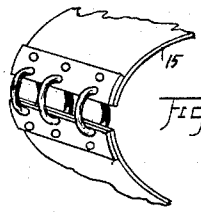


Fig 13

WITNESSES:
R. B. Moser
Victor Schmidt

INVENTOR.
Melvin A. Yeakley.

H. J. Fisher ATTORNEY.

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M. A. YEAKLEY.

CAR BRAKE.

No. 456,750. Patented July 28, 1891.

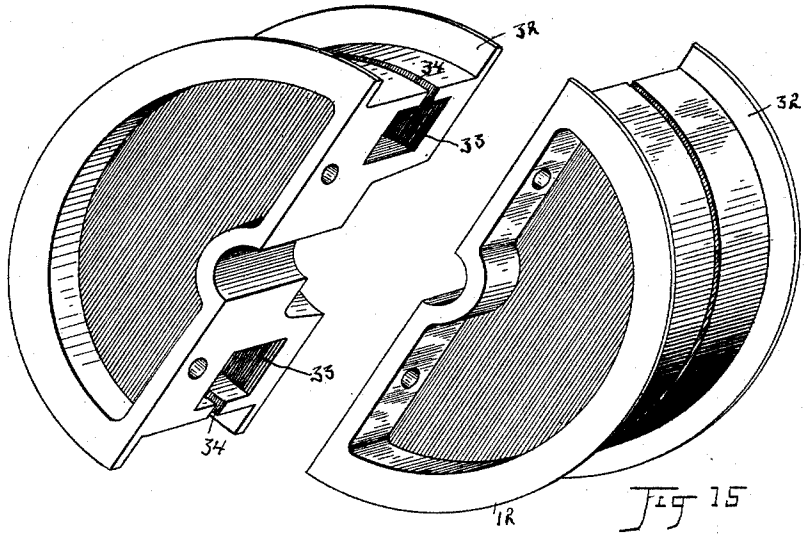


Fig 15

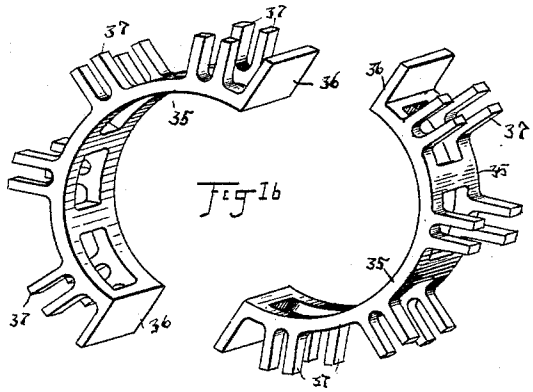


Fig 16

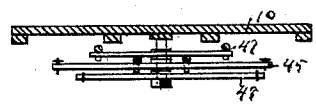


Fig 18

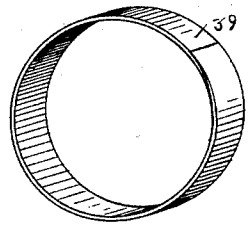


Fig 17

WITNESSES:

R. B. Moser

Victor Schmidt

INVENTOR.

Melvin A. Yeakley

H. T. Fisher ATTORNEY.

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

(No Model.) 4 Sheets—Sheet 4.

M. A. YEAKLEY.

CAR BRAKE.

No. 456,750. Patented July 28, 1891.

Fig 19

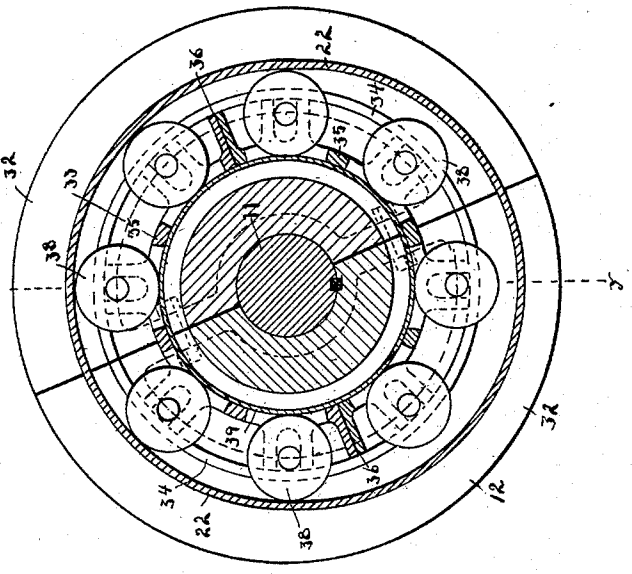
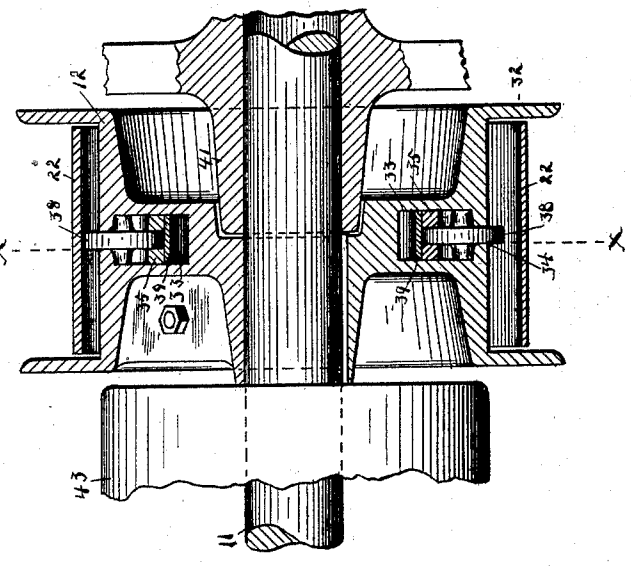


Fig 20



WITNESSES:
R. B. Moser
Victor Schneider

INVENTOR.
Melvin A. Yeakley.

A. T. Fisher ATTORNEY.

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

UNITED STATES PATENT OFFICE.

MELVIN A. YEAKLEY, OF CLEVELAND, OHIO.

CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 456,750, dated July 28, 1891.

Application filed February 7, 1891. Serial No. 380,607. (No model.)

To all whom it may concern:

Be it known that I, MELVIN A. YEAKLEY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Car-Brakes; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in bar-brakes, and belongs to the type of brakes in which the braking power is exerted from the car-axle through frictional mechanism, and in which the momentum of the car is employed to tighten the brakes, all substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of fractions of two trucks of what may be denominated "freight-cars," or the like, in which my invention in part appears as applied to two or more cars. This view is in a measure diagrammatic, serving to illustrate the position and somewhat the relation of parts more particularly than their specific construction. Fig. 2 is a plan view of my improved mechanism, shown as applied to what may be termed a "motor-car," the body of the car and part of the frame-work being removed, including both axles and sets of wheels, broken out centrally, and showing a small plan view of the brake mechanism enlarged in Fig. 3. Fig. 3 is a side elevation, enlarged, of part of the mechanism shown in Fig. 2, the immediate part being the car-axle and drum thereon, the tightening-drum, and friction-belt, with a few incidental parts. Fig. 4 is a sectional view on line *y y*, Fig. 5, which shows a series of metal segments united and adapted to work on the friction-drum on the car-axle, the same being a modification of the method of applying friction shown in Fig. 3. Fig. 5 is an elevation of the connected friction-segments shown in Fig. 4, with a part broken away to show the tongue connection therein; and Fig. 6 shows the method of connecting the said segments. Fig. 7 shows the lever and lever-socket, by which the brake mechanism is operated by the motor man, driver, or other person having control of the brakes. Fig. 8 shows the bracket upon which the said lever is pivoted. In Figs. 9 to 12 are shown the successive parts supporting the tension or tightening drum, which is shown at the left in Fig. 3. Thus in Fig. 9 we have a view of one of the brackets designed to be attached to the bottom of a car-frame and serving as a support for the pivoted yoke shown in Fig. 10. Fig. 11 shows a pivot-frame suspended upon the hooks or open slots in the yoke shown in Fig. 10, and Fig. 12 is a perspective view of the tension-drum pivoted in the frame shown in Fig. 11. Figs. 13 and 14 show a method of joining the friction-belt and sheave and its box connected therewith, through which power is applied to tighten the friction mechanism, as hereinafter more fully described. Fig. 15 is a perspective view of two sections of a friction-wheel designed to be placed on the drum of the car-axle, as seen in side elevation in Fig. 19 and in horizontal section in Fig. 20; and Fig. 16 shows sections of a sheave-support designed to be inserted bodily in the wheel shown in Fig. 15, as appears clearly in Figs. 19 and 20. Fig. 17 is a perspective view of a spring-metal band which is placed between the drum on the axle and the sheaves in the friction-wheel and which operates as hereinafter described. Fig. 18 is a side elevation of the eveners and their support, shown on line *y y*, Fig. 2. Fig. 19 is a side elevation in section of the parts shown in Figs. 15, 16, and 17 of a car-axle and surrounding friction-drum thereon, taken on line *x x*, Fig. 20. Fig. 20 is a horizontal central section of Fig. 19 on line *y y* thereof.

The invention as it is adapted to a street-car, electric-motor car, or other car is illustrated by Figs. 2 and 3, in which 10 represents the truck-frame and 11 a car-axle connected with the friction mechanism. The idea as set forth in the preamble is to employ means simply to tighten the friction mechanism and then depend on the momentum of the car to exert the power by which the brake is pressed against the wheels and the checking or stopping of the car is effected. To accomplish this result in an easy and satisfactory way, I have shown, first, the axle 11 as provided with a drum 12, Fig. 3. In front of this drum is a tension or tightening drum 14, which serves as a support for the friction-belt chain or the like 15, which passes over the

two drums 12 and 14. The tension-drum in turn is hung in a frame 16, and this frame is pivoted at its center, or thereabout, to the lower extremity of the yoke or hanger 13. (Shown also in Fig. 10.) The hanger 13 itself might be fastened directly to the under side of the car-frame, and the frame 16, which carries the tension-pulley, pivoted at the lower extremity of said hanger, thereby omitting the intermediate part; but this is not so desirable a construction as that here shown, in which separate brackets 17 are fixed in the frame, and the yoke or hanger 13 is pivoted therein on trunnions 18. The frame 16 in turn has trunnions 19, which are pivoted in the hooks 20 of the hanger and from which the said frame is readily detachable. The trunnions 19 are in the center of the frame 16, and the tension-pulley 14 is pivoted in the lower extremity of the frame 16. In both Figs. 3 and 11 a rod 21 is shown, which is connected with the operating-lever and designed to swing the frame 16, carrying the tension-pulley, and exert the tension upon the friction-belt 15, through which the brake is tightened, as herein described. This method of suspending pulley 14 adapts it to vibrations of the car and gives it uniform action notwithstanding such vibrations.

The belt 15 may be made out of any suitable material and in any suitable form, having in mind the fact that it is designed to operate by frictional contact through the loose band and other parts on the axle-drum, and when the car is in motion and braking does not occur should rest with as little weight or tension as practicable upon the car-axle drum. The drum 12 has a smooth surface, and upon this drum is placed a friction-band 22 of somewhat larger diameter than the drum, so that when the belt is drawn away from the drum the band will assist in reducing the bearing upon the drum, and thus reduce possible friction to the minimum. In order that such bearing of the belt may be normally avoided, I connect a bar or plate 23 with the belt at its center and ends, substantially as seen in Fig. 3, and at the center of this bar I connect a long spiral wire 24, supported at its opposite extremity on a bracket 25, suspended from the car-frame. This spiral wire has such strength as to draw the endless belt out of contact with the band and friction-drum on the axle when the car is in motion, and the tightening-drum 14 is permitted to swing to its normal position, so as to give slack to the endless belt. When tightening occurs, by throwing the tightening-drum forward the bar or plate 23 is carried forward more or less beneath the drum by the movement of the plate thereon until it occupies a position, say, as shown in dotted lines in Fig. 3, the tension-spring 24 having length and elasticity to accommodate this movement. Then when the tension is relaxed the belt and all the parts resume their normal position.

In Fig. 3 a section 26 of a chain is shown in both full and dotted lines attached to the belt 15. This chain is designed to connect with the brake-bar mechanism and may go to a system of levers arranged for braking a single car, or a series of cars in train, it being of course understood that when tension is applied to the belt 15 by tightening the same through the movement of the drum 14 the said chain 26 will be drawn backward with the belt to a limited extent, thus causing it to exert such degree of tension on the brake mechanism as the tension upon the belt may for the time produce. It will also be seen that by this means the brakeman need exert only such power upon his lever as will cause frictional contact and movement on the drums. Such contact may be a more or less sliding contact, or it may be a positive contact. If the latter, the brakes will be set instantly with great force. If the former, braking will be gradual.

It is obvious that different means of effecting frictional engagement on the drums 12 and 14 may be employed, and I have shown three different forms to illustrate some of the several forms which may be adopted. Thus in Figs. 4, 5, and 6 is shown a form composed of four several segmental cast-metal sections 28, each of which at one end is provided with a transversely-slotted tongue 29, and at the other end is a recess having a fixed pin 30, adapted to engage the slotted tongue. These sections are duly connected by the means shown and placed on the drum 12 over the flexible friction-band 22. (Shown in Fig. 3.) Instead of a wide belt being employed in this case, I may employ a suitable chain, and for this reason have shown the said segments as provided with a groove 31, having notches or recesses at intervals, if preferred, to form catches for the links or projections on the chain. In operation, the chain having relaxed, the segments would become loose at their joints, and thus cause less friction upon the drum than would occur if they had not this flexible connection.

Another form of wheel is shown in Figs. 15, 16, 17, 19, and 20. This form substitutes the drum 12 and the other parts shown and described in the preceding figures, and consists, primarily, of a wheel formed in halves 32, as plainly seen in Fig. 15. These halves or sections are designed to be bolted together and splined, or otherwise rigidly secured to the shafts, and are formed with an annular chamber 33 and a slot 34, opening into the center of said chamber from the periphery and center of the wheel. The chamber 33 is designed to support the skeleton sheave-carrier 35, (seen in Fig. 16,) formed in sections adapted to the chambers 33 in the sections of the wheel. The ends of these skeleton sections meet upon their faces 36 when the wheel-sections are fastened together, and on the periphery of this skeleton are a series of fingers 37, designed to form a bearing for sheaves 38, as

clearly seen in Figs. 19 and 20. These sheaves are placed in their bearings before the sections 35 are put in position, and are carried around in the chamber 33 to working position, as shown. The tread of the sheaves 38 is through the annular slot 34, and the said sheaves are designed to take the pressure that comes on the brake-belt when the belt is running idle. In order that they may do this satisfactorily, I place thereon the band 22, Fig. 3, which comes over the periphery of the wheel, Figs. 19 and 20, and serves the same purpose and function here as in Fig. 3—viz., taking the friction wear of the parts as it slides over the surface of the wheel or drum on either side of slot 34. Then in order that the friction-wheels may be kept out in their relief position, as seen in Figs. 38 and 39, I place a compressible spring-band 40 within the chamber 33 and within the skeleton frame 35 and bearing against the same and the said sheaves 38. Thus it occurs when the tightening-band 15 is released the sheaves carry the idle-belt and reduce the friction of its contact, as seen in Figs. 19 and 20, while at the same time spring 40 has such elasticity as not to interfere with the braking of the car when tension is applied through sheave 14. In this instance I have shown a recess at the right in the wheel-sections 32, adapted to accommodate the hub 41 of the car-wheel, thus making room on the car-axle for the motor-frame 43, as seen in Fig. 20; otherwise this recess in the wheel 32 would not be required.

I have thus shown several modifications of drum mechanism adapted to be connected with the car-axle, and it is obvious that still other means might be described; but these are deemed sufficient to illustrate the nature and scope of the invention in this part of the mechanism.

In Figs. 13 and 14 I show one way of connecting the ends of the friction-belt 15, in which links are employed for this purpose. Any suitable belt-fastening, however, may be employed; but when a system of brake-levers is used like what is shown in Figs. 2 and 18, and which is adapted to brake two or more cars in train by the application of tension through a single lever, loops or links such as shown in Figs. 13 and 14, or their equivalent, are desirable in order that the brake-sheave 42 may be conveniently secured to the belt. In Fig. 14 this sheave is held in a suitable box 43 by a pivot-link 44, connecting with the belt, and over this sheave, as seen in Fig. 2, a brake-chain passes with one end connecting with the brake-evener 45 and the other extending thence to the trail-car, say, as shown in Fig. 2, in which provision is made to connect with the trail-car at the left directly through the end 46 of the said chain, or at the other end through the lower lever 47 and rod or chain connection 48. Power is applied to the tension-pulley 14 through the top evener 49 and the rod 21 at its ends connecting with the lower extremity of the operating-lever 51. (Shown, for example, in Fig. 7.) As here shown, the said lever is provided with a socket-piece 52, which is pivoted on the brake 53, and the said lever is removable from end to end of the car. The bracket 53, which is bolted to the car-frame, has a rack 54 on its segmental lower extremity, the teeth of which rack are engaged by a projection 55 on the lower portion of the lever, by which the lever may be locked in any given position. This or any other suitable means of locking the lever may be employed.

In Fig. 1 the application of the brake system herein provided for is developed for connection with a train of cars. Thus in the right of said figure we have one car broken off at the rear and at the left a section of a second car showing the brake mechanism on the axle, the same substantially as is shown in Fig. 3. In this figure I illustrate a method of tightening the friction-belt by mechanism connected with the car at the front thereof. Thus a chain 56, which is supposed to go forward to the next preceding car, is shown as extending back nearly to the swinging frame 16, which carries the tightening-roller 14, and when this chain is drawn upon it operates to tighten the brake-belt 15 the same as the mechanism shown in Fig. 3, or a short chain 57, connected with the chain 56 and with a brake-shaft 58 at the front of this car, may do the same thing; but whether the said chain be drawn by the next preceding car or by the brake 58 the result is the same on frame 16, and the friction-belt 15 is stretched. Now from this belt a chain 26 goes to an evener 59, and from this evener the brakes on this car are actuated. For this purpose I employ a short evener 60, connected by a link 61, evener 59, and another link 62 connects with the brake-bar 63. At its opposite end the evener 59 connects by a ring 64 with another evener 65, and this evener in turn has a link 66, extending forward to an evener 67, that has secured thereto the brake-bar 68 and by a bent rod 69, and connects with the middle evener or brake 70. The brake mechanism on the rear car at the left of Fig. 1 is operated by a chain 71, connected with the forward friction-belt 15, and this car has similar brake mechanism to that hereinbefore described for the preceding car, and so on, so that a succession of cars may be operated one from the other, as described. Obviously the particular mechanism through which this braking is produced may be materially changed and answer the same purpose, and I have set forth the system here shown more to demonstrate a given way than to indicate that it is the preferred or only way of employing braking power.

In Fig. 1 and at the end of chain 56 next to the frame 16, carrying the tightening-pulley and connecting the chain 56 thereto, is a spiral spring 73, which has sufficient strength to operate said parts without yielding perceptibly, but which being stretched to tighten

the friction-band, has elasticity enough to compensate for the come and go of the cars in respect to each other. Thus it is well known that there is more or less back-and-forth play between two cars coupled together, and if some such elastic connection as this were not made in the brake-controlling chain or cord it could not be used, because the pull of the cars would in some instances come on the said chain and snap it asunder; but by using the spring the chain may be drawn to tightening position, and then the spring will accommodate the come and go of the car and yet the brake will be uniformly set all the time.

The flexible band 22, herein described and shown clearly in Fig. 3, may be leather, metal, or other suitable material, and the belt 15 may be a plain leather or made in other suitable material or out of a series of links or the like, it being understood that the freely-sliding contact occurs between the drum 12 and the band 22, and that the band 22 and the friction-belt move together. Hence this belt may take the form of a chain, as it would in connection with the construction shown in Figs. 4 and 5, and when that construction or something similar is used the inside belt 22 would also be used and the relief mechanism by parts 23 and 24 in Fig. 3.

The limit of the friction-belt in its movement around the drums is shown in Fig. 3, beyond which it cannot go. Any suitable limit and means of fixing the limit may be adopted.

The band 22 on the friction-wheel is preferably of leather, though other material may be employed, which serves to take the frictional wear, so far as the axle-drum is concerned. The bar or plate 23, Fig. 3, is of such length that relief may be afforded not only to the rear of the drum 12, but at its top and bottom also.

It should have been stated as another reason why the tension-spring 73 is needed is the fact that as the drum-frame 16 swings only a few inches till it tightens the drum thereon, while the chain 26 travels, say, two feet, a spring connection between said frame and chain are necessary when used as in Fig. 1 or the chain connection would be unavoidably broken.

The words "belt," "chain," and the like, referring to the part 15, should be interpreted, when either is used alone, as covering either a chain or a belt or its equivalent, as I may use any suitable endless medium to travel over the drums and convey the power, as herein described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a car-brake mechanism, a brake-drum on the car-axle, a tightening-drum, a friction-belt on said drums, and mechanism to relieve the axle-drum of the weight and friction of the belt when the belt is idle, substantially as described.

2. The friction-drums, the belt thereon, and yielding mechanism for relieving the axle-drum from friction when the belt is relaxed, substantially as described.

3. The drums and the tightening-belt thereon, mechanism to relieve the drums of friction when the belt is relaxed, and a swinging frame supporting one of said drums, substantially as described.

4. The car-axle having a drum thereon, a tightening-drum supported in a swinging frame, and lever connections to said frame, a friction-belt on said drums, and a spring to relieve the axle-drum of friction from the said belt when it is loose, substantially as described.

5. A car-axle having a friction-drum with a loose friction-band thereon, a movable drum, and a belt supported on said drums and over said friction-band, substantially as described.

6. A car-axle having a drum and a smooth band of larger diameter than the drum free thereon, a tightening-drum, and a belt working on said drums and provided with connections extending to the brake-bar, substantially as described.

7. In a car-brake of the kind described, two or more cars provided with brake mechanism, and connections between said mechanisms provided with a spring capable of being elongated, substantially as described.

8. In two or more cars, a friction-belt connected with each car and having a limited movement, connections from one belt to the mechanism of the other to tighten the belt thereon, and a tension-spring in said connections, substantially as described.

9. In car-brakes, a pair of friction-brakes on separate cars consisting each of a pair of drums, and a friction-belt on said drums having connections to the brake-bars, and a chain or its equivalent having a spiral-spring extension connecting the belt of one car with the tightening mechanism of the other car, substantially as described.

10. The car-axle provided with a drum, a spring-band around the drum of greater diameter than the drum, and an endless belt or chain around the said band, substantially as described.

11. The car-axle provided with a drum, a spring-band around said drum, and a segmental frictional band outside of said spring-band, substantially as described.

12. The car-axle and the drum thereon, the segmental and detachable friction-band on said drum, and a spring to separate the band from the drum, and an endless belt or chain, substantially as described.

13. The drum on the car-axle and the segmental friction-band thereon having a groove around its periphery, and an endless chain to engage in said groove, substantially as described.

14. The car-axle and the drum thereon, in combination with a pivotally-supported drum and an endless chain or belt connecting said

drums, a spring to keep said belt or chain normally out of contact with the axle-drum, and a spring to restore the belt or chain to normal position after work, substantially as described.

15. Two or more cars in train, brake mechanism on each car, having a brake belt or chain supported on the car-axle and a lever on one car and connections extending therefrom to the brake mechanism of the several cars, whereby the brake-belts on the several cars are tightened, substantially as described.

16. A series of two or more cars, a brake-belt on each car supported at one end on the car-axle and at the other end on a movable drum or pulley, and connections from the brake-belt of one car to the brake-belt of the next succeeding car, whereby one belt is tightened from the other, substantially as described.

Witness my hand to the foregoing specification this 14th day of January, 1891.

MELVIN A. YEAKLEY.

Witnesses:

H. T. FISHER,

N. L. MCLANE.