UNITED STATES PATENT OFFICE.

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AUTOMATIC CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 377,874, dated February 14, 1888.

Application filed July 2, 1887. Serial No. 243,202. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. TURNER, of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Automatic Car-Brakes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention is designed as an improvement on the car-brake covered by Letters Patent of the United States Nos. 268,754, 268,755, 278,833, 278,834, 278,835, and 336,026, and by my application filed in United States Patent Office December 6, 1886, for "improved car-brake;" and it relates to that class of brakes in which the brake mechanism is put in operative position by the inward movement of the draw-bar—in this instance only by the inward movement of both draw-bars—and in which the power for applying the brake is derived from a friction-collar secured upon one of the car-axles and arranged to operate through a friction-wheel certain novel mechanisms especially designed for the purpose of utilizing the rotary movement of the car-axle and the momentum of the car for applying the brake.

Embraced in the invention are new devices for transmitting the inward motion of both draw-bars to the brake mechanism for the purpose of applying the brake and for preventing the application of the brake when the draw-bars are compressed, a novel device for multiplying the initial pressure transmitted through the draw-bars, a new reversible clutch for rendering the brake operative in whichever direction the car may be pulled and by which the brake may be rendered inoperative, and other improved devices which co-operate with those already alluded to.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly-sectional side elevation of a portion of a car-body and of a truck with parts broken away to exhibit other parts, showing my improved brake in place. Fig. 2 is a plan of the same with parts removed to exhibit other parts. Fig. 3 is a reverse plan view showing device for taking up the slack of the connection with the elbow-lever. Fig. 4 is a rear elevation of reversible clutch device for multiplying the initial pressure from the draw-bar and of certain co-operating parts in position. Fig. 5 is a plan view showing part of device for adjusting the mechanism for application of the brake in the opposite direction of car movement. Fig. 6 is a side elevation of the same. Fig. 7 is an end view showing the clutch-operating lever in position. Fig. 8 is a side elevation, partly in section, of the rear end of a car, showing the usual hand-brake staff and connections and the connections of rear draw-bar with the improved brake mechanism. Fig. 9 is a plan of the reverse of the transmitting-lever and a portion of the push-bar. Fig. 9½ is an end elevation of the improved reversible clutch-shell. Fig. 10 is a side elevation of the clutch and shaft. Fig. 11 is a side elevation of clutch block and dog. Fig. 12 is an end elevation of the clutch with sprocket-wheel removed to show an end of clutch-dog. Fig. 13 is an end elvation of the same with outer shell removed. Fig. 14 is a central cross-section on line *z z*, Fig. 17, of the said clutch with shell removed. Fig. 15 is an end elevation of the clutch, which partially envelops the eccentric block or barrel of the clutch. Fig. 16 shows the inner face of the said wedge. Fig. 17 is a plan of the clutch block or barrel and the dog in place thereon. Fig. 18 shows the same with dog removed. Fig. 19 gives plan and side elevation of the dog. Fig. 20 is a sectional end elevation on line *y y*, Fig. 18. Fig. 21 is an end elevation of the dog. Fig. 22 is a front elevation showing, in the position indicated, respectively by full and dotted lines, a portion of the direction-changing mechanism embracing the slotted or cam lever through the medium of which the reversible clutch is operated.

In the following description that end of the car designated by an arrow, Fig. 1, will be called the "front" or "forward" end.

In the drawings, A represents a car-body; B, the car-axles; C, the car-wheels, and C′ a collar rigidly secured on one of the axles.

D represents an ordinary draw-bar; D′ and D², respectively, the usual follower-plates, and D³ the usual spring about the draw-bar shank.

D⁴ indicates the usual brake-levers; D⁵, the brake-beams; D⁶, the brake-shoes, and D⁷ and D⁸ the usual brake chain and rod, respectively.

The front follower-plates, D′, are adapted to be moved rearward by the compression or pushing in of the respective draw-bars, and forward in normal position, as shown in Figs. 1 and 8, by the reaction of spring D^3. Secured to the front follower-plate by a hooked bolt, *a*, so as to transmit the motion of said plate, is a push-bar, E, whose free end terminates in or with a rectangular block, *a′*, moving in a guide-plate, a^2, which is fastened to the under side of car-timbers A′.

All these parts above mentioned are identical with those described and shown in my application above referred to.

The multiplying-levers F (best shown in Fig. 9) are, in order to receive motion from the push-bars E, pivoted on the plates a^2 in such a manner that the bottom of the foot of each lever is in contact with one side of a block, *a′*, the leveled toe *b* of the said lever extending over and past a corner of said block, and the head of said lever, extending laterally, is bored transversely, as indicated, and has held in it by a nut, b^2, the forward end of a rod, F′, whose rear end is hooked, as shown at b^3, and the two rods F′ are connected with each other by a chain, F^2, as shown, which is passed around guide-sheaves b^4 b^5 and about the sheave b^6 of the pulley-block F^3, so that the inward motion of either draw-bar operates to push said pulley-block rearward, for the purposes hereinafter set forth.

The front follower-plates, push-bars, multiplying-levers, continuous chain-and-rod connection, and pulley-block constitute the connections proper to the draw-bars. This pulley-block F^3 consists of two plates, *c c*, held parallel with each other by spindles *c′ c′*, on which, between said plates, are sheaves b^6 *f*, and said pulley-block is fixed so as to be easily moved back and forth in the slot c^2 of a supporting-frame, c^4, which is suitably secured to the car-timber, as shown in Figs. 1, 2, 5, and 6. A hanger, H, having a forked lower end, has pivoted in it a bell-crank, I, in the elbow of which is journaled one end of the shaft K, carrying the friction-wheel K′, while the other end of said shaft is journaled in a hanger, H^2, also secured on the car-truck.

As the bell-crank elbow is capable of movement in an arc of a circle, and as the friction-wheel K′ is fixed on that end of the shaft K nearest said bell-crank and directly opposite the axle-collar C′, it will be seen that the said friction-wheel may be readily moved to make peripheral contact with the axle-collar, so that it may partake of the motion of the same. The hand-operated mechanism is as follows: On the forward end of the car-frame is secured a support, G, extending upward and having fixed on its top, Figs. 1, 2, and 3, a segmental plate, G′, provided with edge notches, *d*. Directly beneath this plate G′ a lug or step, G^2, is secured on the under side of the car-timbers, and a rod, G^3, extending from said plate to said step, is pivoted in them. On the upper end of this rod G^3 is secured a hand-lever, G^4, with which to turn the said rod, and pivoted on said lever is a gravity-pawl, G^5, which is designed to engage in any one of the notches *d* and to hold the rod G^3 and attachments in desired position.

On the lower end of rod G^3, beneath the step G^2, is rigidly secured a segmental plate, G^6, from the under side of which, at opposite corners, project studs *d′* d^2, which hold the ends of a chain, L, to whose bight (the center of the chain) is secured a rod, L′, which, extending rearward, hooks into a chain, L^2, that passes around the sheave *f* of the pulley-block F^3, and then around a guide-sheave, *f′*, and then is made fast to the eye of the rod M, which depends from the elbow-lever or bell-crank I. This device—the chains L L^2 and rod L′—constitutes the intermediate link between the draw-bar connections proper and the brake-applying mechanism proper, and is capable of being tightened or slackened by the action of the hand-operated mechanism to the full measure of the motion of the two multiplying-levers, so that when slackened the compression of the draw-bars will fail to set the brake. Below the free end of the said elbow-lever I is a spiral spring, M′, up through which is passed the rod M, having a broad washer and a nut, *g g′*, respectively, on its lower end and having its upper end formed into an eye, and to this eye is secured one end of the chain L^2, that connects with the hand attachment G^3, G^4, G^6, L, and L′. The nut *g′* may be turned up or down on the rod M, in order to adjust the tension of the spring M′, so that the force with which the friction-wheel is pushed and held in contact with the axle-collar by the upward pull on said rod and spring may be regulated by the proper adjustment of said nut *g′*.

On the shaft K is rigidly secured the eccentric wedge, reversible clutch block or barrel O, having a flange, *h*, on each end, and having a longitudinal slot or groove, *h′*, which extends through both of said flanges, where it is so enlarged, as shown at h^2, as to permit the movement of the clutch-dog O′ therein. Fitted in this slot or groove *h′* so as to readily slide therein is the clutch-dog O′, whose concave under surface conforms with the convex seat of said groove. The upper convex surface of the said dog O′ is provided with an angular cam, h^3, which is an integral part thereof, as best shown in Figs. 17 and 19, and on one end of said dog is secured a peripherally-grooved collar, h^4, which, fitted over the shaft K, holds the said dog in place and serves to guide it in its movements.

A curved double eccentric wedge, O^2, having its outer surface conforming with the peripheries of the flanges *h* and having its inner face formed eccentric thereto and conforming with the curve of the block O, and having projections and recesses h^5 h^6, respectively, as best shown in Figs. 14, 15, and 16, formed in its under face to conform with the cam h^3 of the dog O′, is set in place between the flanges *h*, covering the dog and extending down about

the said barrel or block O, as shown in Figs. 11 and 14.

The cylindrical shell O^3 of the clutch is preferably made in two sections flanged and held together by bolts and nuts, as shown in Figs. 9½ and 10, and is fitted over the other clutch parts—the barrel, flanges, dog, and double wedge. On one end of this shell O^3, and preferably made an integral part thereof, is a sprocket-wheel, h^6, whose functions will be hereinafter set forth, and the other end of this shell is partly closed by an annular flange, h^7, which serves to hold the shell in position with the other parts of the clutch.

The operation of this improved clutch is as follows: When the dog O′ is pushed in its full length into the groove of the clutch-block O, as best shown in Figs. 11, 14, and 17, and the shaft K is revolved in the direction of the curved arrow, Fig. 14, the block, dog, and wedge revolve freely within the shell O^3 without causing the latter to revolve, for the long straight edge h^8 of dog-cam h^3 takes against the projection h^5 of the said wedge and holds the latter on its center and carries it around; but when the shaft K is revolved in the opposite direction, the dog O′ still being pushed in to its full extent, the recess h^6 of the wedge O^2 being opposite the inclined offset h^9 of the cam h^3, the said wedge is no longer held on its center, but, being at liberty, is moved off its center and falls slightly to one side, so that when, in the continued revolution of the block or barrel, the full swell of its eccentric comes around it catches against said wedge and forces and holds it against the shell, so as to carry said shell with it.

By pulling out the dog O′ to the position shown in dotted lines, Fig. 10, the clutch is made operative in the opposite direction.

To the stud d^2 of the segmental plate G^6 is secured the forward end of a rod, P, whose rear end is secured to the upper end of a hooked rocking lever, P′, which is pivoted at its elbow on a lug, k, projecting downward from the car-timbers. This rocking lever P′ is provided with hooks k' k^2, respectively set at a distance apart. A lever, P^2, pivoted at right angles to the said rocking lever on a lug, k^3, projecting downward from the car-timbers, has one end projected between these hooks k' k^2, while its other end is connected by a rod, l, to the free end of a lever, Q, provided with a cam-groove, l', (best seen in Fig. 22,) which lever Q is pivoted on a lug fastened to the car-timbers.

On another lug projecting laterally from the car-timbers is pivoted the clutch-yoke Q′, the tail of which is engaged in the cam-groove of the lever Q, while its forked end embraces the grooved neck of the clutch-dog O′, so that when the said lever Q is moved up and down the said yoke is correspondingly made to force the clutch-dog O′ in or out, as the case may be, of the clutch-block groove, and hold it in the position desired.

If, when the parts are in normal position, as shown in Fig. 1, and the car is being pulled in the direction of the arrow, the engineer desires to set the brake, he slows the engine, and the momentum of the car forcing the car forward brings the head of the front draw-bar against the draw-bar (not shown) of the engine or car in front of it, with the effect of pushing said front draw-bar D rearward, carrying with it the front follower plate, D′, the movement of which latter is transmitted to the front push-bar E, with the effect of turning the forward multiplying-lever F on its pivot, and causing it to pull forward on the forward rod F′ and the chain F^2. The cars in the rear of this forward car at the same time, because of the slowing of the engine, push against the rear draw-bar D (shown in Fig. 8) and push it in, with the effect of causing it to operate through the rear push-bar E and connections to pull rearward on the rear rod F′ and the chain F^2. It will be seen, then, that the front draw-bar pulls forward on its connections, while the rear draw-bar pulls rearward on its connections, and as the chain-connection F^2 between the two rods F′ passes around the guide-pulley b^5 and around the rear sheave, b^6, of the pulley-block F^3, it will be evident that the compression or inward thrust of both draw-bars will tighten the chain F^2 and pull the pulley-block F^3 rearward.

As before stated, the connection between the hand attachment and the bell-crank lever I consists of chain L and rod L′ and chain L^2, extending from the said attachment, the chain L^2 passing around the front sheave, f, of the pulley-block and then around the guide-pulley or sheave f' down to the eye of the rod M, which is encircled by spring M′ and which passes through the eye of the bell-crank lever I. Now, the pulling of the pulley-block F^3 rearward by the compression of the draw-bars operates through chain-connection F^2 to tighten up the chain-and-rod connection L L′ L^2, and thereby causes it to raise the upper end of the bell-crank lever, and thereby force the friction-wheel K′ in contact with the axle-collar, and the revolution of the car-axle then causes the friction-wheel and shaft K to revolve. Now, on this shaft K is the reversible clutch O O′ O^2 O^3, to which the small sprocket-wheel h^6 is secured, so as to revolve with it, and an endless chain, R, connects this sprocket-wheel h^6 with a larger sprocket-wheel, m', which is fixed on a shaft, m, journaled in suitable bearings, as shown in Figs. 1, 2, and 4, and this larger sprocket-wheel, m', has a lateral staple or lug, m^2, to which is fastened one end of the brake-chain D^7, the other end of which is attached in the usual manner to the brake-levers. Now, the revolution of the friction-wheel and shaft operates through the sprocket-wheel chain R to wind the brake-chain around the shaft m, and thus apply the brakes. The purpose of these sprocket-wheels and chains, when used, is to multiply the initial power derived from the friction-wheel and axle-collar, and when they are not applied the brake-

chain will be fastened to the clutch-shell and be wound up around the friction-wheel shaft K.

The brake being applied as aforesaid, should the engineer now desire to release it he does so by quickening the speed of his engine, and thereby the draw-bars D are pulled out, and with them the follower-plates D′ and push-bars E. Now, as the push-bars E are thus pulled out to their normal positions, the multiplying-levers F turn on their pivots to their normal positions, and thereby release the strain on their pulley-block connections, and then the elasticity of the spring M′ and the weight of the friction-wheel operate to release the brakes.

Should the engineer, having the engine attached to the first draw-bar D, desire to back the car or train, the parts being in the position shown in Fig. 1, the pushing in of the draw-bar would, through its connections above described, bring the friction-wheel in contact with the axle-collar, causing said friction-wheel to revolve; but in this position, as will be observed, because the backing of the car changes the direction of the wheel-rotation and because the clutch is arranged or set for braking when the car is moving forward and is operative in the opposite direction, the clutch block or barrel will revolve without operating the clutch and without causing the brake-chain to be wound up, and the car can then be freely backed.

Should it be desired at any time to render the brake entirely inoperative, the lever G^4 must be set by hand, so that the pawl G^5 will engage in the central notch of the plate G′, with the effect of turning and holding the plate G^6 at right angles to its former position, as shown in full lines, Fig. 3, thereby operating to throw slack in the chain-and-rod connection L L′ L^2, for it will be seen that the turning of the hand attachment from the central position shown in full lines, Fig. 3, to either position shown in dotted lines in same figure will operate to tighten one or the other branch of the chain L, as indicated in Figs. 1 and 2, and thereby take up a portion of the slack of the whole chain-and-rod connection between the hand attachment and the bell-crank lever. The slack then being thrown into the chain-and-rod connection, as above explained, and being equal in amount to the slack taken up by the inward movement of the draw-bars and their connections, it will be seen that the inward motion of the draw-bars and their connections, when the former are pushed in, will be insufficient to produce contact of the friction-wheel with the axle-collar so long as the plate G^6 is in the position shown in Fig. 3; hence under such conditions the brake is entirely inoperative. Now, to make the brake operative when the car is being pulled in the direction opposite to that of the arrow, Fig. 1, the lever G^4 is to be turned by hand to the position shown in dotted lines, Fig. 1, to point in the same direction as that in which the car is to be pulled. This change of position from that shown in full lines, Fig. 3, of the lever G^4 serves to tighten up one or the other branch of the chain L and take up a portion of the slack of the rod-and-chain connection L′ L^2, and causes the rod P to push the forked rocking lever P′ to the position shown in Fig. 6, which causes said rocking lever to lift the shorter end of the lever P^2, pivoted to the hanger k^3, thereby causing said lever P^2, through its rod-connection *l*, with the cam-grooved lever Q, as best indicated in dotted lines, Fig. 22, to turn the clutch-yoke Q′ on its pivot, and thereby withdraw the clutch-dog *o*′, as shown in dotted lines, Fig. 10, so that the action of the said clutch will be reversed and made operative in the direction in which the car is now to be pulled. With the clutch set for this direction of car motion the car can be backed up as it was from the forward end.

It will be seen that when it is designed to make the brake operative the lever G^4 is always moved by hand to point in the direction in which the car is to be pulled, and when the brake is to be rendered inoperative the said lever G^4 is to be secured at right angles to the direction of motion, so that at a glance the engineer can be assured whether or not the brake mechanism is properly adjusted.

This brake, it will be seen, operates for application only through connections with both draw-bars and when the latter are compressed or pushed in, but is released on the release of pressure on either draw-bar.

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

1. In a car-brake wherein the combined action of both draw-bars is requisite for bringing the brake mechanism proper into operation, the combination, with said draw-bars and the connections between them, of mechanism consisting of notched plate G′, supported upright rod G^3, lever G^4, gravity-pawl G^5, segment-plate G^6, provided with opposite studs *d*′ d^2, and chain-and-rod connection L L′ L^2, substantially as herein shown and described, adapted and arranged to be operated by hand for the purpose of making the brake mechanism operative in either direction of the car motion or to render it inoperative, as the case may be, as set forth.

2. In a car-brake wherein the combined action of both draw-bars is requisite for bringing the brake mechanism proper into operation, the combination, with said draw-bars, their connected front plates, push-bars, and multiplying-levers, of a continuous rod-and-chain connection between said multiplying-levers and a sliding double pulley-block holding the bight of said chain, substantially as herein shown and described, whereby the inward motion of the draw-bars is transmitted through the pulley-block to suitable mechanism for applying the brake, as set forth.

3. In a car-brake wherein the combined action of the draw-bars is requisite for bringing the brake mechanism proper into operation,

the combination, with said draw-bars and their connections proper, as set forth, and continuous rod-and-chain connection F′ F² F³ b^4 b^5 b^6 between the draw-bars, and with suitable mechanisms for applying the brake, of an adjustable rod-and-chain attachment, L L′ L², capable of being tightened or slackened by hand-operated mechanism and forming a connecting-link between the draw-bar connections proper and the brake-applying mechanism proper, substantially as herein shown and described, whereby the inward thrust of the draw-bars may, at will, be made effective or ineffective, as the case may be, for applying the brake.

4. In a buffer-brake, the combination, with an attachment fixed on the car and embracing a plate, G⁶, provided with studs d' d^2 and fixed on a supported rod and adapted to be turned by hand to make the brake mechanism operative in either direction of the car motion or to render it inoperative, as the case may be, of a rod-and-chain connection, L L′ L², connecting said hand attachment with the brake mechanism proper and adapted to be slackened or tightened by the operation of said attachment, as and for the purposes set forth.

5. In a car-brake wherein the combined action of the draw-bars is requisite for bringing the brake mechanism proper into operation, the combination, with the hand attachment consisting of support G, notched plate G′, step G², rod G³, lever G⁴, gravity-pawl G⁵, and the plate G⁶, with studs d' d^2, and the rod-and-chain connection L L′ L², connecting the hand attachment with the brake mechanism proper, and with the draw-bars and their connections D′ E F F′ F², as specified, of the guide-sheave b^5 and the sliding double block F³, substantially as herein shown and described, whereby the tension or tightening of the said rod-and-chain connection F′ F² by the compression of the draw-bars is made to operate to apply the brake through the medium of the said rod-and-chain connection L L′ L², as set forth.

6. In a car-brake wherein the combined action of the draw-bars is requisite for bringing the brake mechanism proper into operation, the combination, with the draw-bars and their connections proper, D′, E, F, F′, and F², of the guide-sheave b^5 and sheave b^6, of the sliding double block F³, all arranged substantially as herein shown and described, whereby the inward movement of either draw-bar is made to operate to pull said pulley-block rearward, and whereby the inward movements of both draw-bars are made to operate in one and the same direction in relation to the brake mechanism proper, as set forth.

7. The combination, with the hand attachment, substantially as herein specified, chain-and-rod connection L L′ L², rod M, spring M′, and elbow-lever I, which serves as a bearing for the friction-wheel shaft, of the pulley-block sheave f and guide-sheave f', substantially as herein shown and described, whereby the said chain-and-rod connection is supported and guided, as and for the purposes set forth.

8. In a buffer-brake, the combination, with the draw-bar connections proper and the brake-applying mechanism proper, substantially as herein specified, of a device consisting of looped chain L, having its ends secured to opposite corners of a plate adapted to be swung by hand through an arc of a circle, and a rod, L′, secured at one end to the center of the bight of said chain and having its other end secured to a chain, L², which engages over suitable sheaves, constituting an intermediate connection or link between the two, said device being capable of being tightened or slackened by hand-operated mechanism, substantially as and for the purposes described.

9. In a buffer-brake in which a portion of the mechanism for applying the brake consists of an axle-collar and friction-wheel and shaft, the combination, with said shaft, of a reversible clutch constructed substantially as herein shown and described, consisting of eccentric flanged barrel O, dog O′, provided with cam h^3 and collar h^4, curved recessed eccentric double wedge O², fitting between the clutch barrel and shell, and shell O³, all constructed and arranged substantially as set forth.

10. In a buffer-brake, the combination, with a reversible clutch, of a sprocket-wheel secured to or made an integral part of the clutch-shell, substantially as and for the purpose set forth.

11. In a buffer-brake provided with a reversible clutch for making the brake-applying mechanism operative in either direction of the car motion or to render it inoperative, and provided with a hand-operated device, substantially as herein shown and described, the combination, with said clutch and hand-operated device, of a connection between the two consisting substantially of rod P, hooked rocking-lever P′, lever P², rod l, cam-groove lever Q, and clutch-fork Q′, as set forth.

12. In a buffer-brake, as a means for multiplying the power transmitted from the axle-collar through the friction-wheel to the brake-applying mechanism, the combination, with the friction-wheel shaft, of a reversible clutch to which is secured a small sprocket-wheel, a larger sprocket-wheel fixed on an independent shaft around which the brake-chain is designed to be wound for the purpose of applying the brake, and an endless chain connecting the two sprocket-wheels, substantially as herein shown and described.

In testimony that I claim the foregoing I have hereunto set my hand, in the presence of two witnesses, this 14th day of April, 1887.

WM. B. TURNER.

Witnesses:
JACOB J. STORER,
A. J. BAYLESS.