

(No Model.)

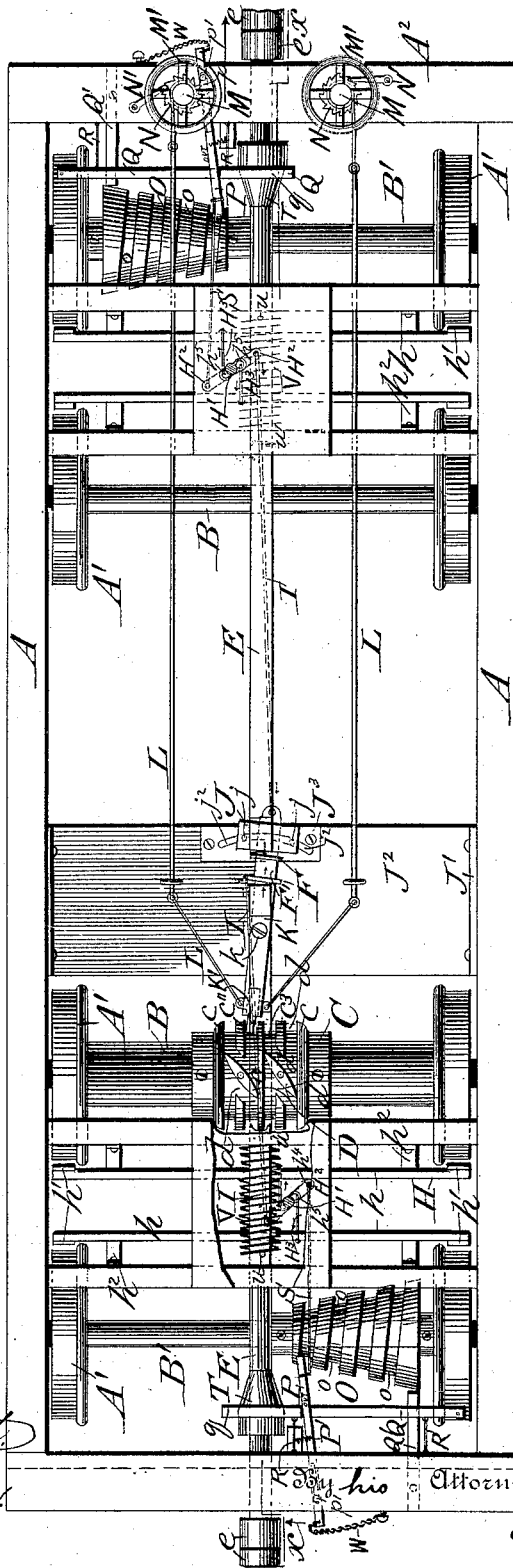
4 Sheets—Sheet 1.

E. W. LUCE.  
AUTOMATIC CAR BRAKE.

No. 382,994.

Patented May 15, 1888.

Fig. 1.



Witnesses,

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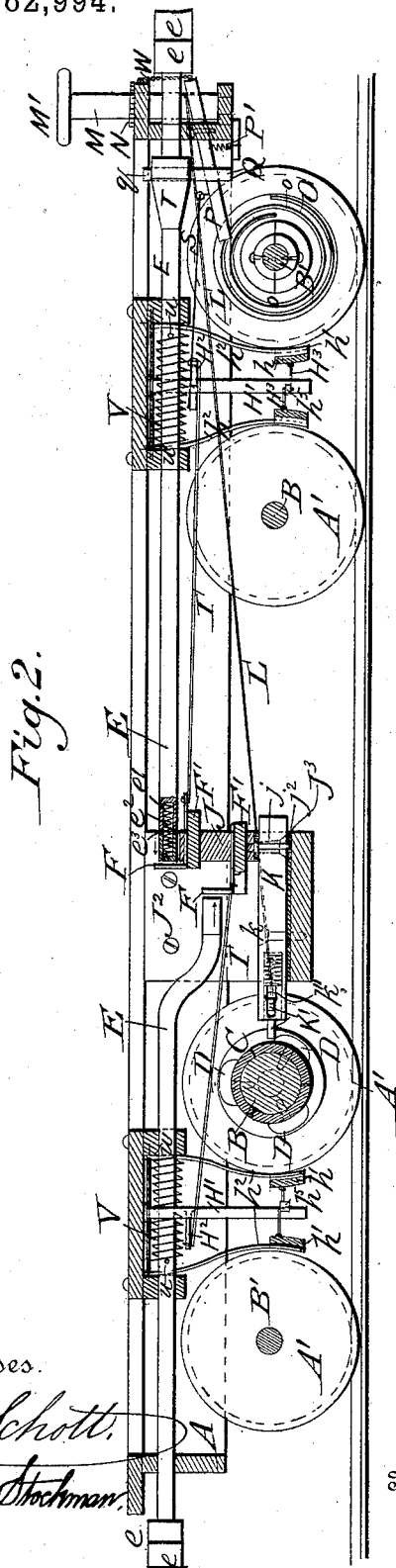
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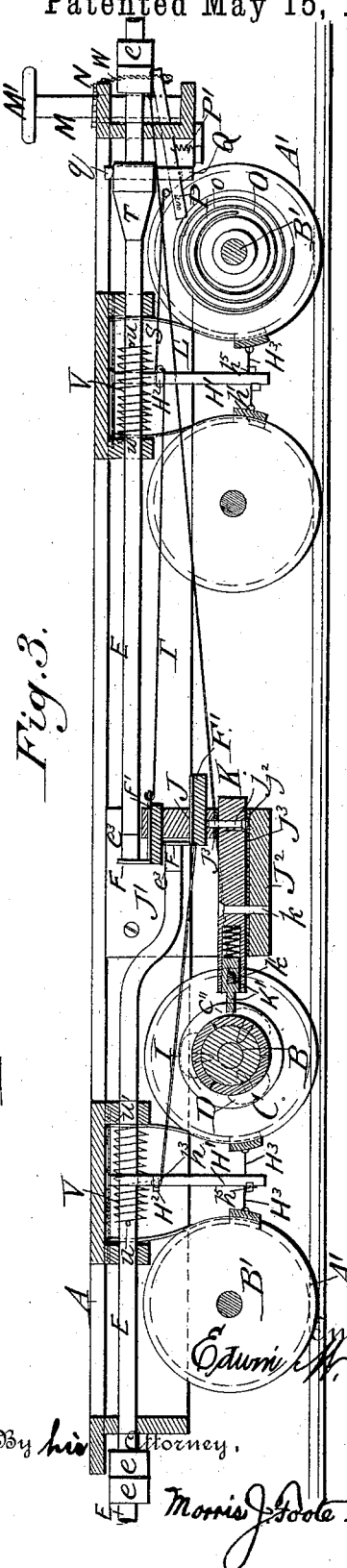
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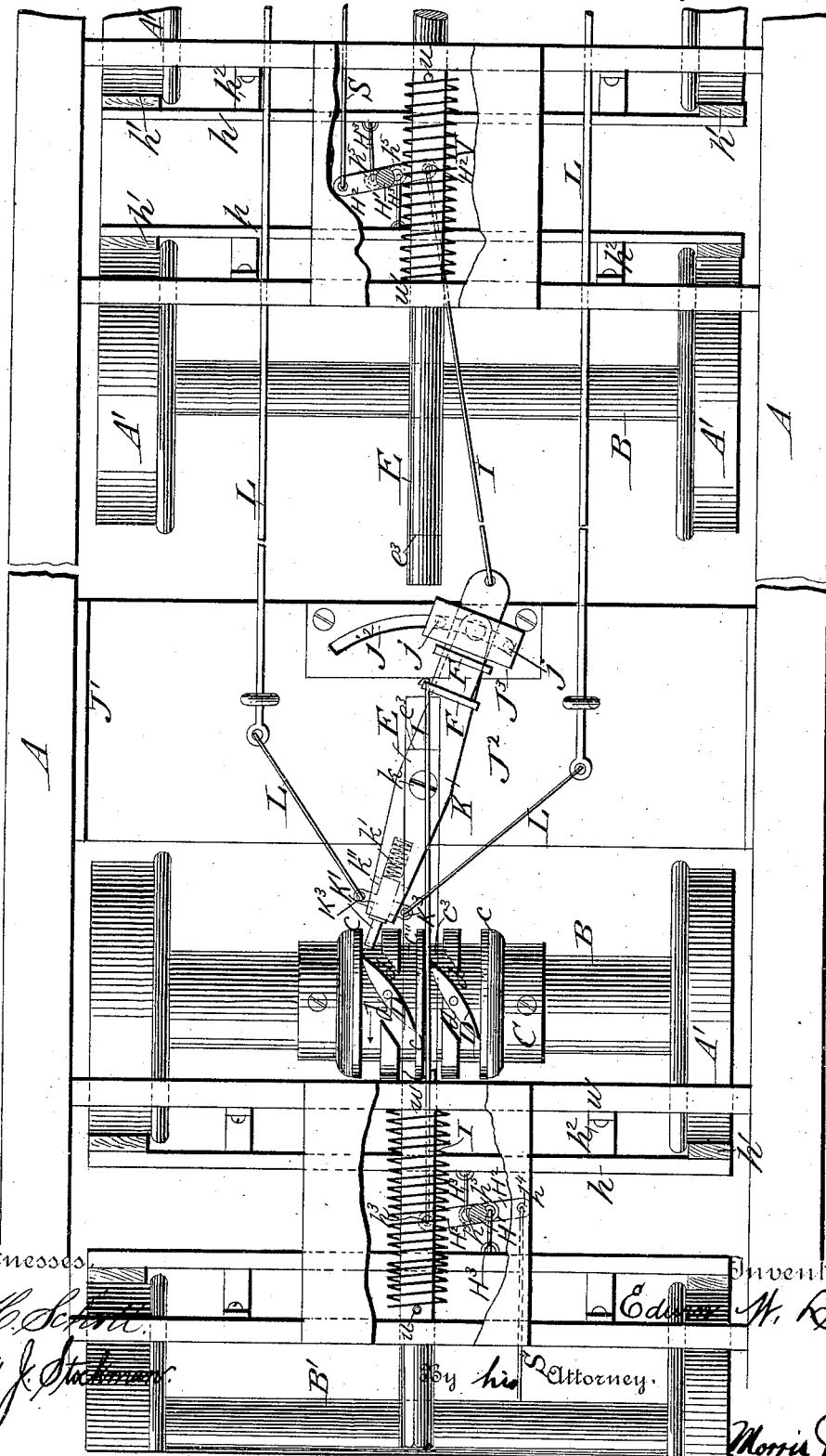
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Fig. 4.



Witnesses

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(No Model.)

4 Sheets—Sheet 4.

E. W. LUCE.  
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Fig. 5.

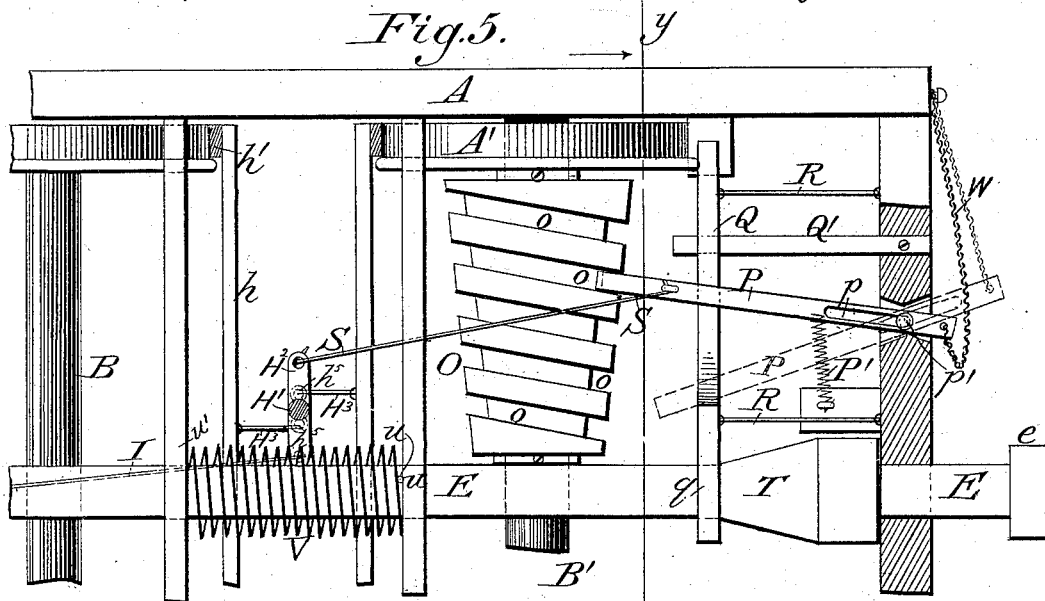


Fig. 6.

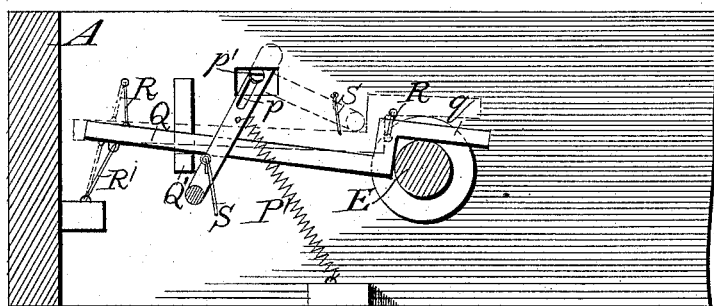
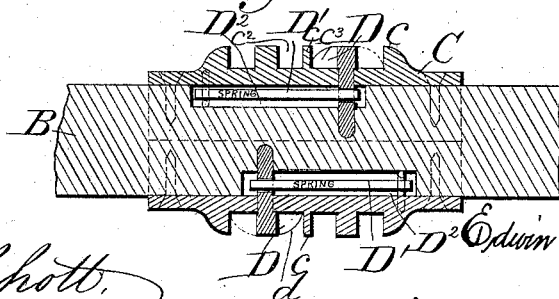


Fig. 7.



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# UNITED STATES PATENT OFFICE.

EDWIN W. LUCE, OF BOLIVAR, NEW YORK.

## AUTOMATIC CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 382,994, dated May 15, 1888.

Application filed January 27, 1888. Serial No. 262,123. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN W. LUCE, a citizen of the United States, residing at Bolivar, in the county of Allegany and State of New York, have invented certain new and useful Improvements in Automatic Car-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-  
10 pertains to make and use the same.

This invention has relation to improvements in that class of car-brakes in which the momentum power of the train is utilized to set the brakes into operation; and it consists in  
15 certain peculiarities in the construction, arrangement, and combination of parts, substantially as will be hereinafter fully described, whereby the brakes will be automatically operated and the train or any portion thereof  
20 stopped in the event of an accident or at any desired time.

In the accompanying drawings, illustrating the invention, Figure 1 is a bottom plan view of my improved automatic car-brake. Fig. 2  
25 is a longitudinal section on the line *xx* of Fig. 1, showing the position of the parts when the brake is not operating, and also showing the innermost extremity of one of the pressure-rods in section to disclose its construction.  
30 Fig. 3 is a longitudinal section likewise taken on the line *xx* of Fig. 1, showing the position the parts assume when the brakes are set into operation and the momentum of the car thereby stopped. Fig. 4 is an enlarged bottom plan  
35 view of portions of the same, showing the position of the switch-bar when the brake mechanism is thrown out of position. Fig. 5 is a detail representation of the mechanism for automatically operating the brakes in the event  
40 of an accident—as, for example, the parting of the train. Fig. 6 is a section through *yy* of Fig. 5, showing in dotted lines the position the parts assume when not in operation; and Fig. 7 is a sectional detail representation of  
45 the grooved cylinder encircling one of the axles near the center of the car, and showing the means for automatically throwing the dogs into position when thrown out by the switch-bar.

50 Like letters of reference designate like parts in the several figures.

A represents the bottom of the main car-body to which my improved automatic car-brake is secured, and *A'* represents the wheels  
of the same mounted upon the axles *B* and *B'*,  
55 which axles are situated, respectively, to either side of the center of the car-body and near the ends thereof. One of the axles *B*, and preferably the one nearest the front end of the car-body, is encircled by and has secured to  
60 it in any approved manner a cylinder, *C*, which is formed on its periphery with ribs *c c'*, the ribs *c'* being made in sections, between which spaces *d* are left, and they are situated on either side of the central rib or wall between  
65 it and the outermost ribs, as shown. Within the spaces *d* and normally extending obliquely from the central rib, *c*, on either side thereof to the outermost ribs, *c*, are pivoted dogs *D*, preferably three in number, in order to give  
70 immediate action, as shown in Figs. 2 and 3, the purpose of which dogs will be hereinafter fully set forth. These pivoted dogs *D* are kept in their normal position by means of  
75 springs *D'*, (shown in Fig. 7,) the said springs being by preference located within recesses *D''*, formed in the car-axle.

*E E* represent pressure-rods extending longitudinally beneath the car from points near  
80 the center of the same out to and beyond the ends of the car a suitable distance, where they terminate in heads *e*, which are always in contact with those of the pressure-rods on the next adjacent car. These pressure-rods *E*,  
85 when it is desired to operate the brakes, are adapted to come into contact with and move plates *F F* rearwardly, which plates connect in the manner hereinafter set forth with the  
brakes proper, *H*, the said brakes preferably  
90 consisting of the transverse bars *h h*, supported by means of springs *h'' h''*, and provided at their extremities with the brake-shoes *h'*, adapted to come into contact with the car-wheels *A'* in  
order to stop their revolution. The springs  
95 *h''*, being secured to the sides of the brake-bars *h* facing the wheels, obviously serve to keep the said bars normally pressed toward each other and the brake-shoes consequently  
out of contact with the car-wheels, in addition to acting as supports or hangers for the said  
100 bars.

Between each of the pairs of the brake-bars

h, and extending downwardly from the frame of the car within which it is pivoted, is a rod, H', (shown best in Figs. 2 and 3,) and having projections H<sup>2</sup> extending horizontally on either side thereof in an oblique direction. This projection H<sup>2</sup> may be formed integral with the said vertical rod H', or it may consist of a pin passing through a slot formed therein. It is formed at its outermost extremities with perforations h<sup>3</sup> h<sup>4</sup>, one of which, as h<sup>3</sup>, is adapted to receive the extremity of a rod or cable, I, serving to connect the said projection with one of the sliding plates F, while the other, as h<sup>4</sup>, receives a rod, S, connecting the same with mechanism hereinafter described. Near their lower extremities each of these rods is formed with eyes h<sup>3</sup> h<sup>3</sup>, extending in a direction parallel to that of the projections H<sup>2</sup>, and adapted to receive the extremities of hooks H<sup>3</sup>, extending from the brake-bars, each of the said hooks engaging with the eye farther away from it. It will thus be seen that when the sliding plates F F are moved rearwardly they will pull upon the connecting-rods and cause the vertical rods H' to turn upon their pivots, and by means of the peculiar connection hereinbefore described of the said rods and the brake-bars the elasticity of the supports h<sup>2</sup> will be overcome by the pressure of the hooks H<sup>3</sup> upon the brake-bars, and the brake-shoes will thus be forced into contact with the car-wheels, the said shoes obviously returning to their normal position when the pressure upon the brake-bars has been released, for the reason before stated.

The sliding plates F F are secured to and supported by blocks F' F', working within slots F<sup>2</sup> F<sup>2</sup>, formed in a block, J, and situated one above the other, as shown. This block J is pivoted upon a switch-bar, K, which is itself fulcrumed at k upon the bottom board, J<sup>2</sup>, of a support, J', which support is secured to and depends from the bottom of the car-body. The supporting-block J is also formed with downwardly-projecting lugs j j, working within curved recesses or guides j<sup>2</sup>, formed in a plate, J<sup>3</sup>, likewise secured to the board J<sup>2</sup> of the support J'.

The extremity of the switch-bar K is formed with a recess, k', adapted to receive and accommodate a projection, K', the extremity of which is normally located within some one of the grooves of the cylinder C, and which is held in its outward or extended position by means of a coiled spring, K<sup>2</sup>, likewise situated within the recess k'. This projection K' is formed with lugs K<sup>3</sup>, extending outwardly on either side thereof through slots k<sup>2</sup>, formed in the switch-bar, and having perforations k<sup>3</sup> for the reception of the extremities of rods or cables L, which are shown in the drawings as extending on either side of the said switch-bar back to and wound around the lower extremities of vertical spindles M, situated at the end of the car and surmounted by levers or handles M'. At their lower ends these spindles M are provided with ratchets N, adapted to be engaged

by the pawl N', whereby they can be securely held in any desired position.

It will be quite obvious that instead of using two spindles, as shown, one may be adopted, having its lower extremity engaging in a suitable manner with a drum, having the cables L wound upon it in such a manner that when the drum is turned in a certain direction by means of the spindle one of the cables will be caused to wind, while the other unwinds. Instead of the form of handles shown, it may be preferable to construct them with the form of arrows or spears, for the purpose hereinafter set forth.

The switch-bar K and its mechanism are designed to permit the use of either of the ends of the car as the foremost end, and it is also adapted to throw the brake mechanism in and out of gear in the manner hereinafter set forth. Supposing the end A<sup>2</sup> of the car to be the foremost or front end, the projection K' of the switch-bar will be in the position shown in Fig. 1—that is, in the groove c<sup>2</sup>, which in reality will be the one immediately to the left of the central wall or rib, c—while if the opposite end of the car is the foremost end the said projection will be located within the groove c<sup>3</sup> on the opposite side of the said central rib. This is a feature of prime importance, in that it obviates the necessity for turning the car when it is desired to have it travel in the opposite direction.

The adjusting of the position of the switch-bar for the purpose above explained is accomplished simply by winding the connecting rods or cables L around the spindles M by means of the handles M', when the projection K' will obviously be caused to move back within the recess k' out of engagement with the grooves of the cylinder C, and a further rotation of one or the other, as the case may be, of the said spindles will cause the said switch bar to turn upon its fulcrum k until opposite the desired groove. The said connecting-rods L then being released to a slight extent by a reverse motion of the spindle, the said projection, by reason of the resiliency of the spring K<sup>2</sup>, will immediately spring out into engagement with the desired groove, and the spindles are held against further movement in any direction by the engagement with the ratchets N of the pawls N'. When the switch-bar is in position—as, for example, that shown in Fig. 1—and the train moving in a forward direction, the innermost extremities of the dogs D, crossing the grooves, will come into contact with and be pressed upon by the projection K', causing the said dogs to turn upon their fulcrums away from the central wall or rib, c, a sufficient distance to permit the said projection to remain within the same groove, and thus the position of the switch-bar will not be interfered with. When the continued revolution of the car-wheels has carried the said dogs out of contact with the said projection K, they will be returned to their normal position by means of the springs D'. (Shown in Fig.

7.) In the event of the train backing or reversing the direction of its movement, the said extremities of the dogs will be pressed in the opposite direction or against the central rib, *c*, by the projections *K*, and the switch-bar *K* will be caused thereby to turn upon its fulcrum *k*, causing the projection to pass through one of the spaces *d* into the next adjacent groove, throwing the brake mechanism out of position, as shown in Fig. 4, and relieving the pressure upon the brakes. The movement of the train in the opposite or original direction will obviously return the switch-bar, and consequently the brake mechanism carried thereby, to its original position. When the brake-handles *M'* are constructed with the form of arrows or spears, the position of the switch-bar may be delineated by the position the said handle occupies, as obviously they may be positioned with reference to that of the said switch-bar, the advantages of which construction will be readily recognized and appreciated.

In order to prevent damage to the innermost extremities of the pressure-rods *E* by the sliding plates *F F* coming into forcible contact therewith when the brake mechanism is being thrown into and out of position, the said pressure-rods are formed near their extremities in two parts having recesses *e*, receiving coiled springs *e'*, secured therein, as shown in Fig. 2. It will thus be seen that a spring-joint, *e'*, is formed near the extremity of each of these pressure-rods, and the said extremity will be capable of giving laterally under pressure, permitting the said plates to pass beyond them.

The brakes are operated in the following manner: As before stated, the heads of the pressure-rods of each car are in contact with those of the next adjacent car, thus forming a continuous rod or bar throughout the entire length of the train. The switch-bars having been placed in proper position, the train is ready to start. When it is desired to stop it, or to lessen its speed upon the lessening of that of the engine, the cars will obviously crowd together, and the pressure-rods will be caused thereby to come into contact with and move rearwardly the sliding plates *F F*; and the brake-bars, by means of their peculiar connection, hereinbefore described, with the said sliding plates, will be pressed toward the car-wheels, and brake shoes or blocks, coming into contact with the said car-wheel, will stop or lessen, as desired, the speed of their revolution. It will be quite obvious that the pressure of the brake-shoes upon the car-wheels will be proportionate to the tendency of the cars to crowd together with more or less force, due to the degree of the lessening of the speed of the engine.

In order to prevent the setting into operation of the brakes when the train is being backed, as obviously the cars will then crowd together with considerable force, the brake mechanism is thrown out of position by the action of the dogs *D* upon the switch-bars in

the manner before stated, so that contact between the pressure-rods and sliding plates will be an impossibility.

The heads *e* of the pressure-rods are preferably located beneath the bumpers of the cars, so as to be screened from harm thereby, and the inner extremity of one on each car is curved downwardly in order to correspond to the position of the sliding plates, which, as before stated, are situated one above the other.

I have thus described the operation of the brakes when it is desired to stop the train from natural causes, or when they can be set into operation by the action of the engine or driver, and will next proceed to describe means for acting upon the brakes in the event of the parting of the train or when the action of the engine would have no effect thereupon. The axles *B'* of the car are provided with tubes *O*, which are preferably, though not necessarily, made in two parts secured thereto in any suitable manner. These tubes *O* are situated diagonally opposite each other, as shown in Fig. 1, and are formed tapering from their outermost extremities and with series of spiral grooves, *o*. The inner terminals of lever-bars *P* are adapted to engage with these conical tubes *O* in the manner hereinafter described, and they are connected with the projections *H'* of the vertical rods *H'* by rods *S*, the said rods having their innermost extremities located within the perforations *h'* of the said projections. The opposite extremities of these levers *P* are formed with elongated slots *p*, encircling headed pins or projections *p'*, secured to the ends of the car-body, and they are also provided with coiled springs *P'*, extending upwardly from the ends of the car and serving to keep the said levers in position tightly against supports *Q* and increasing their power, which supports *Q* are themselves supported by resting upon rearwardly-projecting blocks *Q'*, secured to the frame of the car. Rods *R* or other suitable means connect these supports *Q* with the ends of the car and serve to keep them from horizontal displacement while permitting vertical movement, and they are further secured by means of downwardly-extending arms *R'*, likewise secured to the main car-body. Their inner extremities, *q*, are constructed of the form shown in Fig. 6, and are adapted to rest upon the pressure-rods *E*, which are formed at these points with conical extensions *T*, the largest extremities of which ordinarily abut against the ends of the car. The pressure-rods *E* are encircled by coiled springs *V*, which have their abutments against pins *u*, passing transversely through the said pressure rods and the portions *u'* of the car-frame, to which portions *u'* the brake-beam supports *h'* are secured. When the train is made up, the pressure-rods will obviously be pressed in a comparatively short distance by those of the next adjacent car, and the support *Q*, riding up the inclined face of the conical extension *T*, will carry the lever-bars *P* therewith and keep them normally out of

contact with the tapering tube O. In the event of the parting of the train the forward pressure-rod of the parted portion of the train will be forced outwardly by the springs V, (the pressure on the said rod by the next adjacent forward car having been removed,) and the lever-support Q dropping from its normal position on the conical extension T to the smaller portion of the pressure-rod, the levers P dropping down therewith or being pulled down by the spring P', secured thereto, comes into contact with the tapered tube O on the car-axle, dropping into the smaller end of the spiral groove o, and, following the spirals thereof, is carried to the largest portion of the said tube, pulling upon the connecting rods S in its passage, and thus setting the brakes at this end of the car into operation with a positive force, but tempered by the spiral form of the groove, in order to prevent the sliding of the wheels and also to prevent the too sudden stoppage of the cars. The brakes on the aforementioned car and those on the balance of the cars will obviously be operated by the crowding of the cars together, as before explained. It will thus be observed that this mechanism would have the same effect upon the brakes as the stoppage of the engine. This is a feature of prime importance in my invention, as it prevents any liability when the train has parted upon a downgrade of the rear or parted portion driving into the other portion of the train, telescoping the cars, and resulting in great damage and loss of life. The lever bar on the last car of the train rides easily in the grooves of the tapered tube O.

In case the train has parted when running up an incline and the parted portion thereof desires to run downward, the lever-bar at the rear of the parted portion thereof acts to set the brakes into operation and stop the revolution of the car wheels, and consequently the motion of the cars, in the manner above set forth.

In certain instances—as, for example, during the switching of cars in the yard—it may be desirable not to have the above portion of the car-brake operative, and when such is the case the lever-bar P is pulled outwardly to the extent of the elongated slot p, and is hooked up out of operative position by means of the chain or cable W, which is secured to the outer extremity of the said lever-bar and engages with a suitable device on the frame of the car thereabove. It will be readily seen also that the entire device can be rendered inoperative when desired, in order not to interfere with the working of the ordinary hand-brake or for any other purpose, simply by locating the switch-bar out of position and securing its projection K' back within the recess k by means of the connecting rods L.

The device herein described is extremely simple in its construction, comparatively inexpensive in its cost of manufacture, and entirely automatic in its operation, the momentum power of the train being adapted to operate the brakes, which are set in rapid suc-

cession throughout the entire length of the train, each car controlling its own brakes. Another important advantage resides in the fact that the separation of the train will bring about the immediate action of the brakes on the separate portion without any action whatever being necessary upon the part of the brakemen.

I do not wish to be understood as limiting myself to the precise construction herein shown and set forth, but reserve the liberty of varying the details without departing from the spirit of the invention, as it will doubtless be found in the practical construction thereof that many of the said details might be advantageously changed or varied.

Having now described my invention, what I believe to be new, and desire to secure by Letters Patent, and what I therefore claim, is—

1. In an automatic car-brake, the combination, with pressure-rods, of sliding plates adapted to be moved thereby, and brake beams and shoes connected with the said sliding plates.

2. In an automatic car-brake, the combination, with pressure-rods and sliding plates, of brake-beams having shoes or blocks, and pivoted rods between the pairs of brake-beams and connected therewith and with the said sliding plates.

3. The combination, in an automatic car-brake, with the car-axle, of a grooved cylinder secured thereto and having pivoted dogs, and a pivoted switch-bar adapted to be operated upon by the said dogs in the manner and for the purposes substantially as herein set forth.

4. A switch-bar having a recess at its extremity, in combination with a projection situated within the said recess and having lugs, a spring at the rear of said projection, connecting rods or cables secured to the said lugs, and means, substantially as described, for winding the said connecting rods or cables, for the purpose set forth.

5. The combination, in a car-brake, with a pivoted switch-bar and its connecting rods or cables, of a grooved cylinder, pivoted dogs situated obliquely thereon, for the purposes set forth, and springs for keeping the said dogs in their normal position, substantially as shown and described.

6. The combination, in an automatic car-brake, of pressure-rods and sliding plates, pivoted supports for the said sliding plates, and pivoted switch-bar carrying the said supports, with the grooved cylinder, and the dogs, all arranged in the manner and for the purposes substantially as herein set forth.

7. The combination, in a car-brake, of pressure-rods and sliding plates, with pivoted supports for the said sliding plates, having lugs or projections, a plate having curved grooves or recesses adapted to receive the said lugs and to act as guide for the pivoted supports, switch-bar carrying the said support, rods or cables secured to the said switch-bar, and

means, substantially such as described, for winding the said rods or cables, for the purpose set forth.

8. In an automatic car-brake, pressure-rods, sliding plates adapted to be engaged thereby, pivoted support for the said sliding plates, having lugs or projections, and curved recesses adapted to be engaged by the said lugs and to act as guides for the said support, in combination with pivoted switch-bar carrying the said support and having a recess at its extremity, a projection situated within the said recess, having lugs, a spring at the rear of said projection, cables secured to the lugs of the projection, means for winding the said cables, grooved cylinder secured to the car-axle, and pivoted dogs situated obliquely thereon, all arranged for the purposes herein set forth.

9. The combination, in an automatic car-brake, with pressure-rods having spring-joints at their extremities, and sliding plates and pivoted supports therefor, of pivoted switch-bar carrying the said pivoted support, and grooved cylinder and pivoted dogs thereon, all arranged substantially as described, whereby the brake mechanism is adapted to be thrown into and out of position and the extremities of the pressure-rods will not be liable to injury thereby.

10. In an automatic car-brake, the combination, with axles thereof and tapered cylinders situated thereon and formed with spiral grooves, of lever-bars adapted to engage therewith, brake beams and shoes, and rods connecting the said lever-bar with the brake-beams, whereby the brakes will be automatically operated in the event of the parting of the train.

11. In an automatic car-brake, the combination, with axles thereof, tapered cylinders situated thereon and formed with spiral grooves, and brake beams and their shoes, of lever-bars adapted to engage therewith and connected

with the said brake-beams, supports for the said lever-bars, and pressure-rods having conical extensions and coiled springs, substantially as described, whereby the lever-bars will be normally out of engagement by their supports being normally located upon the largest portion of the conical extension.

12. The combination, in an automatic car-brake, with the pressure-rods having conical extensions and coiled springs, lever-bars also having coiled springs to increase their power, and supports for the said lever-bars, of conical tubes secured to the car-axles, having spiral grooves, brake-beams and their shoes, and rods connecting the said beams with the lever-bars, all arranged to operate in the manner and for the purposes substantially as herein set forth.

13. In an automatic car-brake, the pressure-rods, lever-bars, supports for the said lever-bars, brake-beams and their shoes, and pivoted rods between the pairs of brake-beams and connected therewith, in combination with conical tubes secured to the car-axles and having spiral grooves, and rods connecting the lever-bars with the said pivoted rods, all arranged for joint operation substantially as described.

14. The lever-bars having elongated slots, and headed pins secured to the car-body and passing through the said slots, in combination with cables at the rear of said lever-bars, adapted to engage with hooks on the car, substantially as described, whereby the said lever-bar can be drawn back and secured and the device rendered inoperative when desired.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN W. LUCE.

Witnesses:

JAMES DRUMGERL,  
E. W. PENFIELD.