(No Model.)

2 Sheets—Sheet 1.

J. B. GATHRIGHT.

AUTOMATIC CAR BRAKE.

No. 353,672. Patented Dec. 7, 1886.

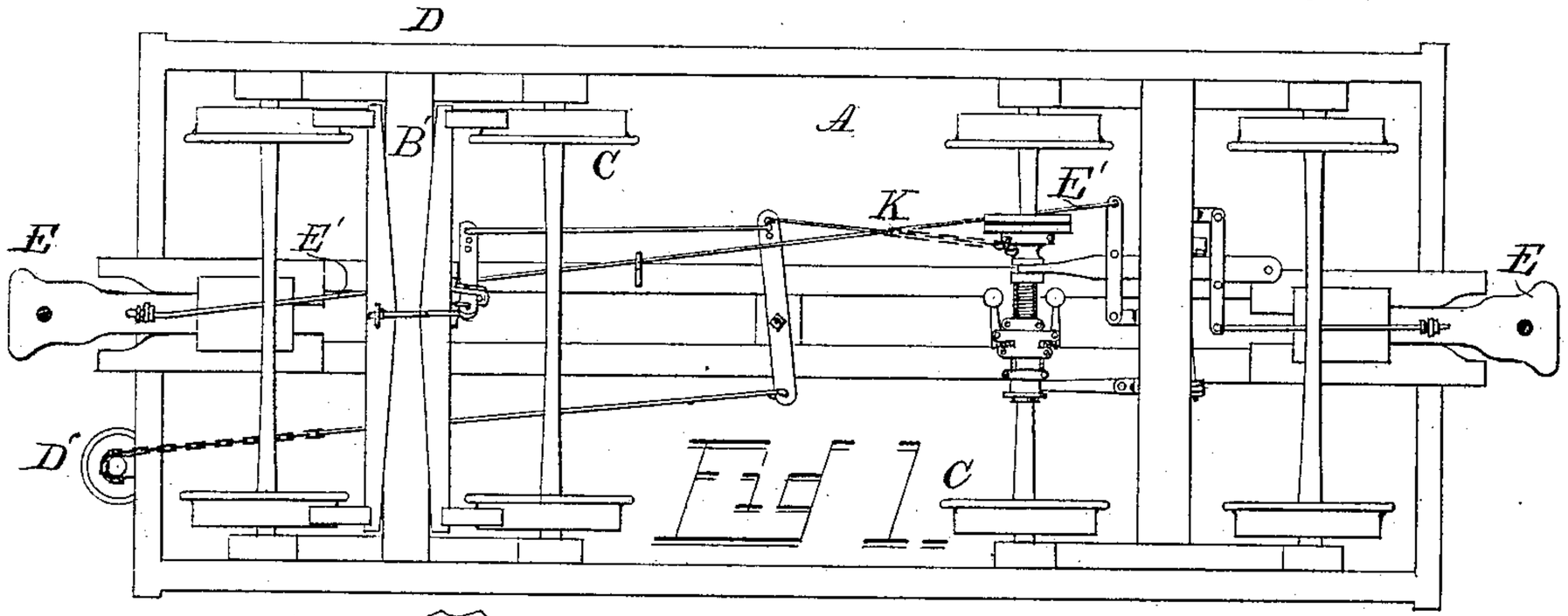

Fig 1.

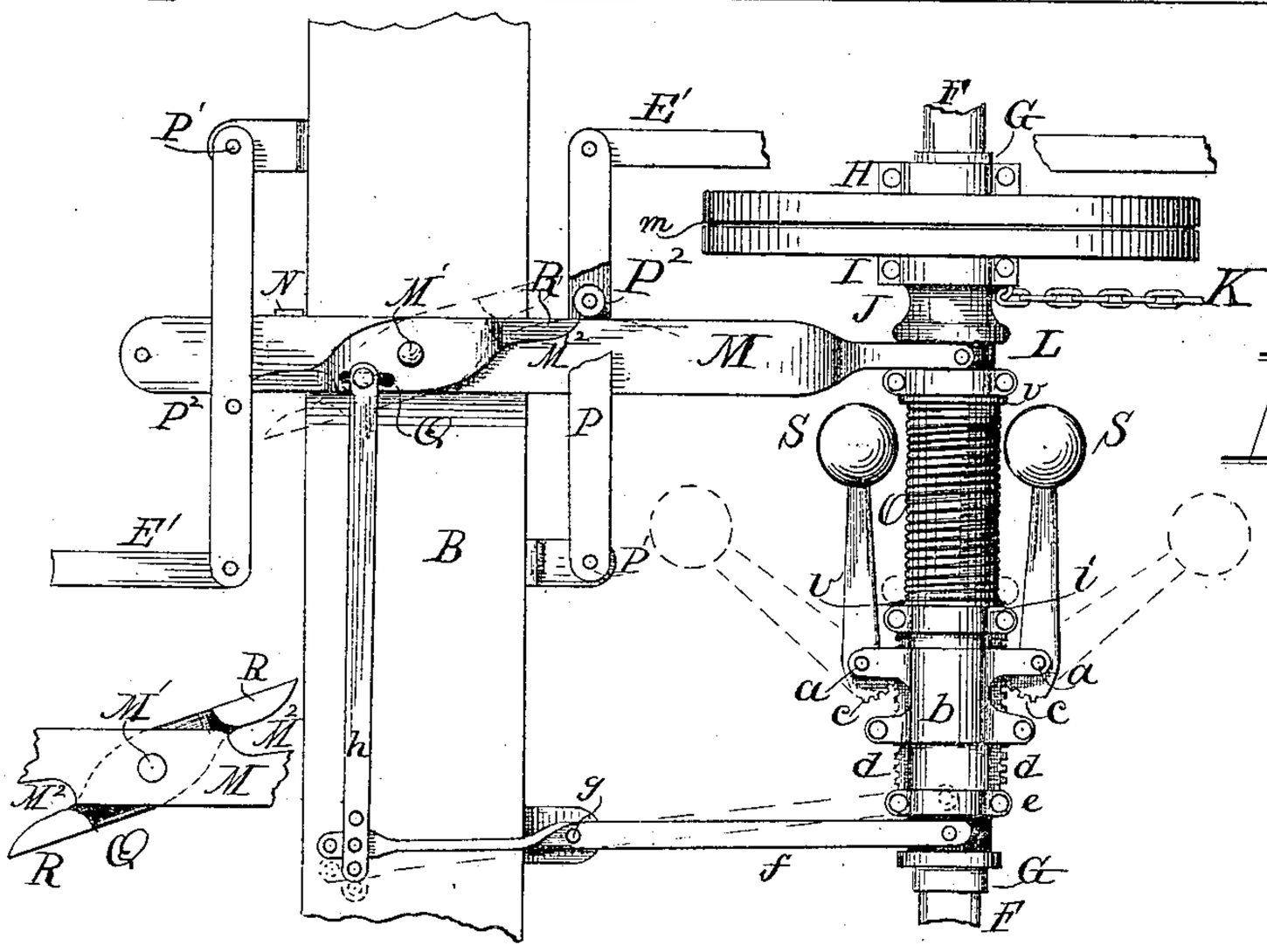

Fig 2.

Witnesses

L. E. Stevens.
P. E. Stevens.

Inventor
Josiah B. Gathright.
By his Attorney W. L. Stevens.

(No Model.)

2 Sheets—Sheet 2.

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Fig 3.

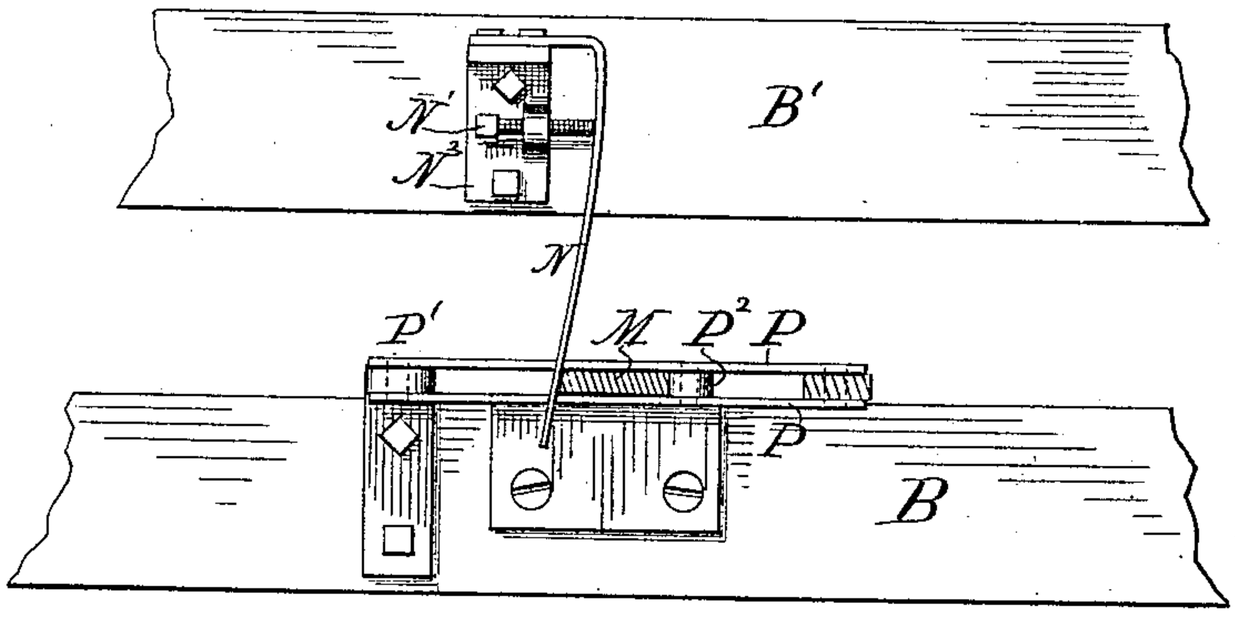


Fig 4.

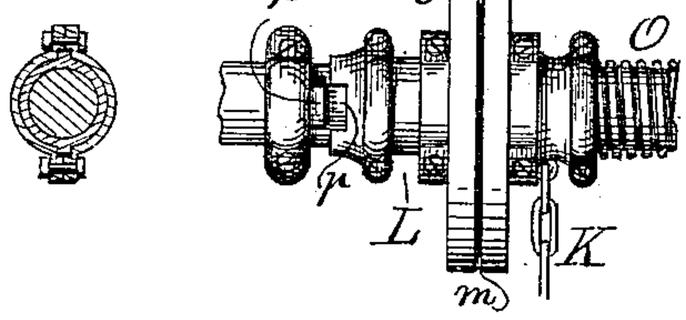


Fig 5.

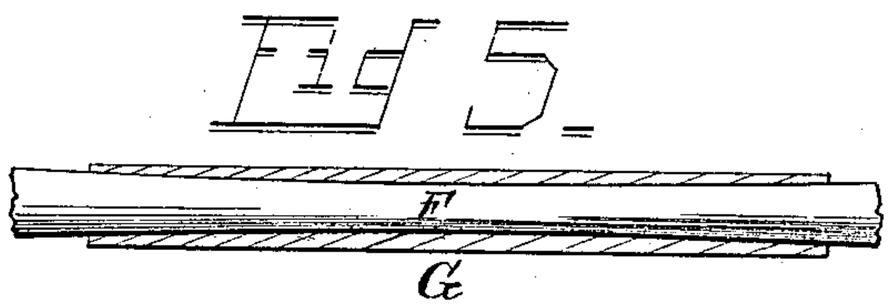


Fig 6.

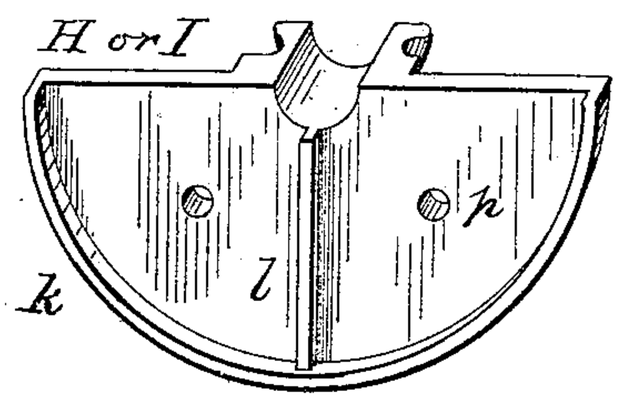
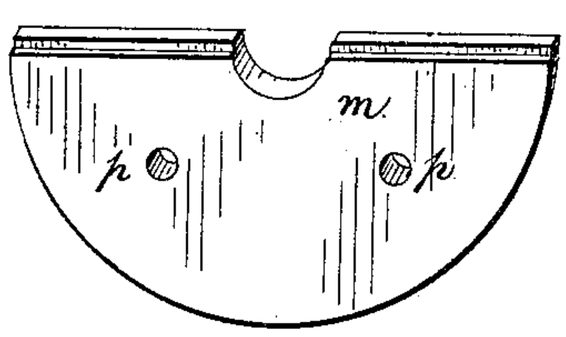


Fig 7.



Witnesses
V. E. E. Stevens.
P. E. Stevens.

Inventor
Josiah B. Gathright.
By his Attorney W. X. Stevens.

UNITED STATES PATENT OFFICE.

JOSIAH B. GATHRIGHT, OF LOUISVILLE, KENTUCKY.

AUTOMATIC CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 353,672, dated December 7, 1886.

Application filed April 10, 1886. Serial No. 198,445. (No model.)

To all whom it may concern:

Be it known that I, JOSIAH B. GATHRIGHT, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, 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 appertains to make and use the same.

This invention relates to that class of devices which are designed to apply the brakes to car-wheels by the act of slackening the speed of the engine; and its object is to provide means whereby the brakes will be automatically wound on when the car draw-bars are retracted to their normal position or pushed in, and automatically released when the draw-bars are drawn out in starting and pulling the car; means whereby the brake mechanism will automatically adjust itself whenever the train comes to a standstill to allow the train to be backed; means whereby the brakes will automatically be applied to the rear section whenever the train breaks in two; means whereby the brakes will be automatically applied with a degree of force proportionate to the load of the car, and means whereby the brakes will be automatically applied with a degree of force proportionate to the speed of the train; also, means whereby the brake mechanism will be effectual, whether the train is being drawn forward or pushed backward, and means whereby the brake devices are operative without change or adjustment, with either end of the car toward the front of the train, and all this to be accomplished by merely starting, slowing, stopping, or reversing the motion of the engine, acting through the medium of the draw-bars of the cars, or some equivalent to the draw-bar having sliding motion similar thereto.

To this end my invention consists in the construction and combination of parts forming an automatic car-brake, hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is an inverted plan view of a car, showing my invention attached to one of the trucks and adapted to operate the ordinary hand-brakes on the other truck. Fig. 2 is a plan view of the principal parts of my invention on a larger scale, the upper bolster being left off to give full view of the top of the under bolster and the devices thereon. Fig. 3 shows a detail, part in elevation and part in vertical section transverse to the car. Fig. 4 shows a modification in which an additional clutch is used, permitting the two disks forming the friction-clutch to remain in constant contact. Fig. 5 is a longitudinal section of a sleeve on a portion of an axle. Fig. 6 shows in perspective one half portion of one of the disks which form the friction-clutch. Fig. 7 shows in perspective a removable wearing-plate for the clutch.

A represents an inverted car; B B′, the bolsters of the trucks; C, the wheels; F, the axles of an ordinary freight-car.

D represents a pair of common hand-brakes, having the usual chain and winding-wheel, D′.

E represents common draw-bars fitted to slide longitudinally when acted upon to pull or push the car.

The axles F frequently taper toward their centers, and as some portions of my invention must be attached to an axle and slide longitudinally thereon, a sleeve, G, is provided in halves to fit upon the tapering axle, and form a cylinder with parallel sides for the parts to work upon. This sleeve also protects the axle from wear, and is used upon straight axles also. This sleeve and all other parts which I place around the axle are formed in halves, so that they may be applied to axles already in use.

H and I are the mated disks of a friction-clutch, of which H is rigidly clamped upon the sleeve G to revolve with the axle, and the mate I is fitted to revolve on the sleeve. The mate I is provided with a hub having one groove, J, wherein the brake-chain K may be wound, and another groove, L, which is engaged by the shifter-lever M, whereby the mate I may be forced against the mate H, to be revolved thereby, or held away from it to remain at rest.

When the disk I with its hub is revolved either way by its frictional adherence to H, the chain K is wound upon the hub, to which one end of the chain is fastened, while the other end is connected with a brake-lever, preferably one in common with the hand winding-chain, and applies the brakes. The winding

of either chain only slackens the other, and hence neither interferes with the other, and they simply co-operate if both are wound at the same time. The shifter-lever M is pivoted at M′ to the lower bolster, B, or to a plate secured thereto, and it is constantly impelled to apply the brakes by the pressure of the spring N. This pressure is proportioned to the weight of the load in the car by the inclined or wedge-like relation of spring N to lever M, as shown in Fig. 3. This spring N is secured to a bracket, N^2, on the upper bolster, and when this bolster is pressed downward by the load in the car the springs between the two bolsters yield and the spring N is wedged more forcibly against the side of the lever M. When the load is removed, it is retracted and the pressure diminished. The initial force of the spring N against the lever may be adjusted by a set-screw, N′, passing through a bracket, N^2, and abutting against the back of the spring. The spring O also presses the lever M by pressing the hub in which the clutch end of the lever is engaged, and adds its force to the frictional adherence of the disks when the brakes are applied. The pressure of this spring is automatically increased in proportion to the speed of the train by the centrifugal levers S and S, as hereinafter described.

The impulse of the springs N and O to apply the brakes is controlled by one or more pairs of double or mated levers, P, pivoted at P′ to brackets on the bolster B, and provided with rollers P^2, journaled between the mates of each of the double levers P, to impinge against a side or sides of lever M and control its motion. One of the levers P is connected with one draw-bar E by means of a stiff rod, E′, and the other lever P is similarly connected with the opposite draw-bar of the same car. The lever M is notched on its edges at M^2, and Q is a switch pivoted concentric with lever M, and having two projections, R, shaped to fill the two notches M^2 when the switch is closed. When this switch is open, the rollers P^2 enter these notches if the levers P are thrust back, thus releasing lever M and permitting the disks to come in contact and apply the brakes; but when the switch is closed the side faces of lever M are restored to a straight line, whereon the rollers P^2 will travel and actuate lever M to separate the disks, the same when thrust back as when drawn forward.

The rollers P^2 are so placed in levers P that when the latter are in their normal position at right angles to lever M, as seen in Fig. 2, the rollers P^2 do not impinge against the sides of lever M, thus leaving the lever M to be actuated by the springs to apply the brake; but when levers P are drawn out the rollers P^2 will describe a short arc, as shown in dotted line, and, striking the side of lever M, will separate the disks and release the brakes. The same effect would be produced by pushing inwardly the lever P if the switch is closed, as the rollers would travel on the outer edge of the closed switch and actuate the shifting-lever. Therefore when the switch is closed the train may be backed; but when the switch is open and the levers P are pushed back the rollers P^2 pass into the notches and the brakes are applied; hence it is necessary that when the train is in motion the switch should be open, or in condition for applying the brakes; but when the train is at rest the switch should be closed, or in condition for backing. I have therefore adapted a common centrifugal governor to hold the switch permanently open when the car is in motion, and a spring to close it when the car stops. I use two of these governors, S and S. They are pivoted at *a* in a collar, *b*, which is firmly clamped upon the sleeve G, to revolve with the axle F. Each governor has a segment of gear-teeth, *c*, upon its inner end, and these engage racks *d*, which are pivoted between the jaws of a collar, *e*, having a groove engaged by a shifter-lever, *f*, which is pivoted at *g* to a bracket on the bolster B.

h is a rod connecting the opposite end of lever *f* with the switch Q.

The spring O bears between the collars (or washers) *i* and *v*, which in turn bear against the ends of the racks *d* and the hub of the disk I, thus serving the double purpose of pressing disk I against disk H, and of pressing back the racks *d* to close the switch Q and the governors S.

The operation is as follows: When the car is at rest, the governors are closed, the switch is closed, and levers P stay at their normal position, as seen in Fig. 2. In this position of the levers P the rollers P^2 leave M free and the brakes are on. Now, if the train be started the draw-bars will be drawn out, and by the rod E′ will open out the levers P, and these, by their rollers P^2, will act upon the lever M and hold the disks apart and release the brakes. The train being now in motion, the governor-balls are thrown out by centrifugal force, and the segment-teeth working in the racks *d* draw the collar *e* toward fixed collar *b*, and thus by the shifter-lever *f* open the switch Q and keep it open while the train continues in motion. At the same time the racks *d* are forced against the loose collar or washer *i* and compress the spring O, thus increasing its pressure against disk I as the speed increases. If, now, the speed of the engine be slackened, so that the draw-bars are retracted or pushed in, the rods E′ and the levers P, with their rollers P^2, are carried back thereby, and when P reaches the normal position shown in Fig. 2 it no longer restrains lever M, the springs N and O force the disks I against disk H, and the brakes are wound on. The train being in motion and the switch open, no amount of backward thrust from the draw-bars will release the brakes, as the rollers P^2 pass into the switch-notches of lever M, and thus can exert no force against the lever, so the brakes remain on until the train is stopped. The spring O now reacts and closes the switch by pushing back the racks and collar, and the same movement closes the gov-

ernors upon the axle again. If, now, it be desired to back the train, the engineer pulls forward, as usual, to open out his train. This movement insures the withdrawal of the rollers P^2 from the switch-notches and the closing of the switch on every car. The train may then be backed without interference from the brakes, as the rollers P^2 will now strike on the outer edge of the switch-points and actuate the lever M, thus throwing apart and keeping apart the disks I and H. In backing, the rollers P^2 will ride upon the switches and keep them closed, and as the governors will be forced out in case any speed is attained, and will exert their force to open the switches, the rear end of lever *f* is made flexible, to absorb the motion imparted by the governors and prevent breakage. To apply the brakes when backing, the engineer slows his engine sufficiently to draw rollers P^2 off the switch ends and allow the governors to open the switches. Now the speed of the engine should be increased enough to push in the draw-bars, when the rollers P^2 will enter the switch-notches, release lever M, and allow springs N and S to apply the brakes. The rods E′ should be so adjusted in length that when the draw-bars are in their normal position (*i. e.*, where their springs will retract them after having been pulled out or pushed back) the rollers P^2 will rest, as seen in Fig. 2, just in front of the switch-notches. This position of the rollers P^2 allows the brakes to go on, and hence if a train breaks into two parts the draw-bars of the rear section will naturally be retracted by their springs to their normal position, as described above, and the brakes will go on, and the switch being open will remain on, no matter how far back the draw-bars are jammed. As the brakes are normally on by reason of the constant pressure of springs N and O, they will alway remain on until released, and hence will always hold a train, even on a steep grade, until the engineer releases them by a forward or backward movement of the engine. It will thus be seen that after my brake is once adjusted to a car it is perfectly automatic under all circumstances. To compensate for wear, each disk may be provided with a flange, *k*, and a radial rib, *l*, Fig. 6, and wear-plates (shown by Fig. 7) made to fit within the flange *k*. These plates, which may be of any suitable material, are preferably secured to the disks by bolts, one bolt being in each half of the disk, the sectional line of the plates being at right angles to that of the disks. The plates are rabbeted along this line, so that their edges may lap over the rib *l* and form a close joint. The ribs merely prevent the plates from turning in the disks or straining the bolts, and are not absolutely necessary. The disk-faces may be perfectly plain and permitted to wear upon each other, or a leather disk may be placed between them, and will form an excellent friction-surface and wear a long time if dust be kept from the leather. For that purpose I have devised a modified form for the clutch devices, as shown in Fig. 4. In this case a lug, *p′*, is clamped rigidly upon the sleeve G, while both disks work loosely upon the sleeve. The lever M engages the groove L and holds the disks away from the clutch *p′*, or allows the springs to force them together when the brakes are to be applied, in which case the notch *r* engages lug *p′*, locking the disk *t*, when the parts will operate the same as in former arrangement. This arrangement keeps the two disks constantly pressed upon the intermediate leather disk and excludes dust, &c. The rod *h* is secured to switch Q by bolt through a slot in Q, which admits of adjustment to compensate for wear of other parts, and the joint of the rod *h* with lever *f* is also provided with a series of pin-holes for the same purpose. There may be one or more washers at the ends of spring O to give more freedom of motion and reduce friction. When the brakes are fully applied, one disk will slip upon the other, but with great resistance, thereby offering additional resistance to the motion of the car.

To get the full benefit of my invention the draw-bars, or their equivalents, should be retracted by springs; but a common sliding draw-bar without springs will answer every purpose, except that the brake will be less apt to go on promptly when a train breaks in two. The levers P may be pivoted to either bolster and stand perpendicular to lever M, working in notches on the sides of the lever, the position being similar to that of spring-bar N, but on opposite side of lever M.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the disk H, fixed on the axle, the disk I, free on the axle and provided with a grooved hub, a shifter-lever, M, pivoted to one of the truck-bolsters and engaging the said groove, and a spring, N, fixed to the other bolster of the same truck in an inclined position to bear against the lever M, substantially as shown and described.

2. The combination of the brake-operating lever M, pivoted to one bolster, and the spring N, fixed to the other bolster and communicating with the lever M by a slanting or wedging contact-surface, substantially as shown and described.

3. The combination of the brake-operating lever M, pivoted to one bolster, and the slanting spring N, fixed to the other bolster and bearing its slanting face against the said lever M, substantially as shown and described.

4. The combination, with car-wheels, brakes therefor, and truck-bolsters, of a friction-clutch comprising a securable and a loose disk on the wheel-axle, a shifter-lever pivoted to one of the bolsters and fitted to engage the loose disk, and having switch-notches in its sides, a retaining lever or levers pivoted to the bolster and crossing the line of the shifter-lever, a roller journaled to the retaining-lever to engage the shifter-lever near a switch-notch, a switch pivoted on the shifter-lever and having projections shaped to fill the said switch-

notches, a spring bearing against the shifter-lever on the side to engage the disks of the clutch, a chain connecting the loose disk with the brake-lever, a centrifugal governor mounted on the axle, and connections between the said governor and the switch, substantially as shown and described.

5. The combination of the shifter-lever M, having notches M^2 in its sides and pivoted to a car, the switch Q, pivoted to the lever M and having projections R to fit the notches M^2, a spring, N, bearing against the side of the lever M, and a lever or levers, P, pivoted to the car and provided with rollers P^2, to engage the lever M in opposition to the action of the spring N, substantially as shown and described.

6. The combination of the lever M, having notches M^2, the switch Q, pivoted thereto and provided with projections R to engage the said notches, and the levers P, hung at right angles to the lever M and provided with rollers P^2, substantially as shown and described.

7. The combination, with the shifter-lever M, the switch Q, and the axle F, of the collar *b*, rigidly fixed upon the axle, the centrifugal arms S, pivoted in the said collar *b* and having segments of gear-teeth *c*, the racks *d*, fitted to engage the said segments and to slide longitudinally through the collar *b*, the grooved collar *e*, connecting the racks *d*, the lever *f*, pivoted to a fixture of the car and engaging the groove of the collar *e*, the rod *h*, connecting the lever *f* with the switch Q, and the spring O, mounted on the axle, substantially as shown and described.

8. The combination, with the shifter-lever M, provided with switch-notches in its sides, and a retainer, P^2, adapted to bear along the switch side of the lever, of a switch, Q, having projections R, shaped to fill the said notches, and means, substantially as described, for opening and closing the switch, as and for the purpose specified.

9. The combination, with the bolsters B B′, of the shifting-lever M, pivoted to the bolster B, the bracket N^2, secured to the bolster B′, the slahting spring N, secured to the bracket N^2 and bearing against the lever M, and the set-screw N′ in the bracket N^2, and bearing against the back of the spring N, substantially as shown and described.

10. The combination, in an automatic car-brake, of an axle, a friction-clutch thereon, a fixed collar, *b*, also on said axle, centrifugal levers S, pivoted to collar *b*, and provided with segments of gear-teeth, the rack *d*, engaged by the segment-gear on said levers, and spring O, interposed between the ends of said racks and the loose disks of the clutch, whereby the centrifugal force of the levers S will increase the spring-pressure to apply the brakes with a degree of force proportionate to the speed of the train, substantially as shown and described.

11. The combination, with the axle F, the disk H, rigidly mounted thereon, the disk I, provided with grooves J and L, and freely mounted on the axle, the centrifugal governor mounted on the axle, and the spring O, acting between the disk I and the racks, of the governor, substantially as shown and described, whereby the spring O performs the double office of forcing the disk I into engagement with the disk H and of retracting the arms of the governor and closing the switch.

12. The combination of the disks H or I, provided with flanges *k* and radial ribs *l*, and the shoes *m*, fitted to rest within the said flange, as and for the purpose set forth.

13. The combination, in an automatic car-brake, of an axle, F, a friction-clutch therein, a brake-chain, K, attached to the loose disk of the clutch, a shifter-lever, M, engaging a grooved collar on said loose disk, a lever or levers, P, to control lever M, a spring, N, bearing against lever M, rods E′, and draw-bars E, as shown and described.

14. The combination, in an automatic car-brake, of an axle, a friction-clutch therein, a spring on the axle pressing constantly against the loose disk of the clutch, a shifter-lever controlling the loose disk against the action of said spring, and a lever or levers for controlling the shifter-lever, as shown and described.

15. In an automatic car-brake, the combination of an axle, F, disks H and I, forming a friction-clutch, with or without a lug, *p*′, a shifter-lever, M, controlling-levers P, and connecting-rods E′, as shown and described.

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

JOSIAH B. GATHRIGHT.

Witnesses:
GEO. W. BRADEN,
WALTER WALKER.