(No Model.) 2 Sheets—Sheet 1.

G. BROWN.

COMBINED BRAKE AND ELECTRIC SWITCH FOR STREET RAILWAY CARS.

No. 525,782. Patented Sept. 11, 1894.

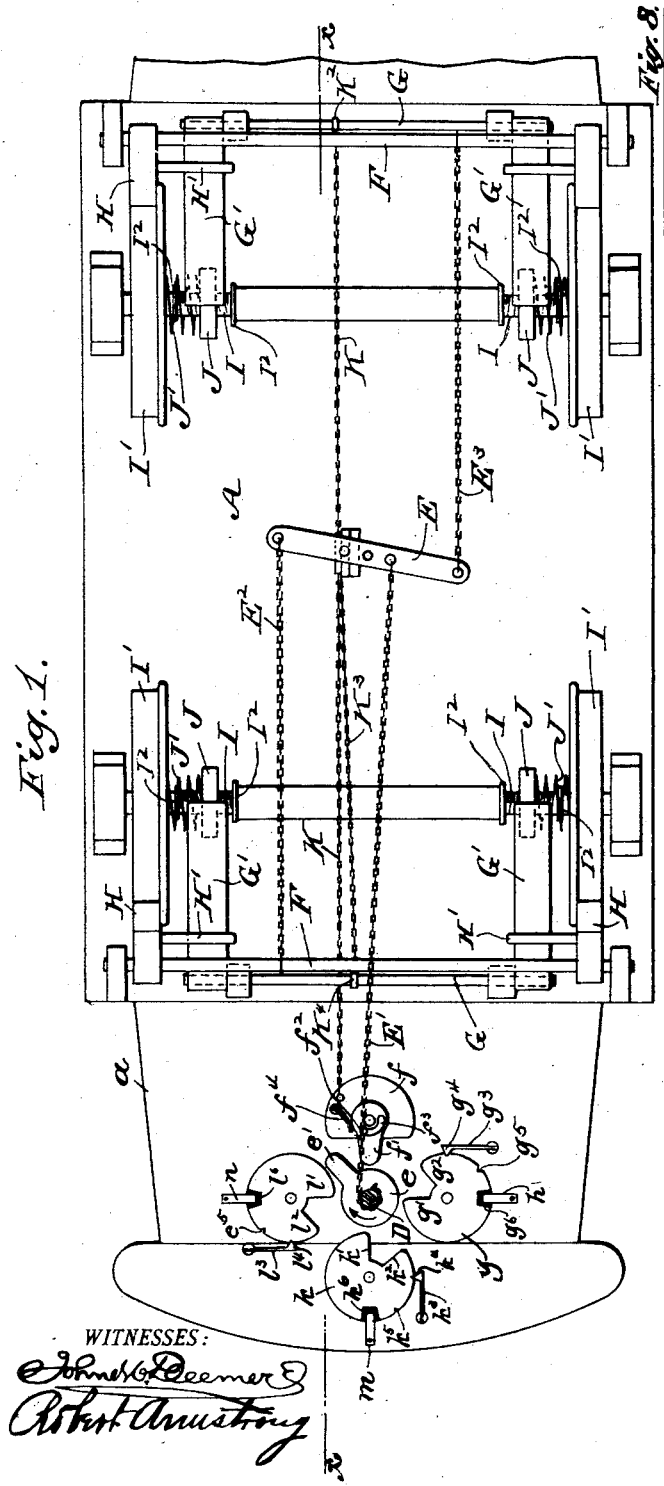

Fig. 1.

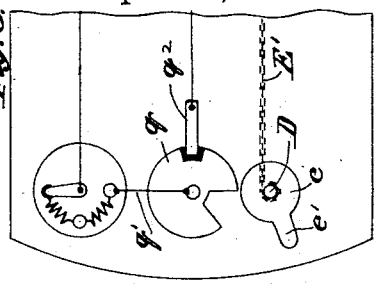

Fig. 8.

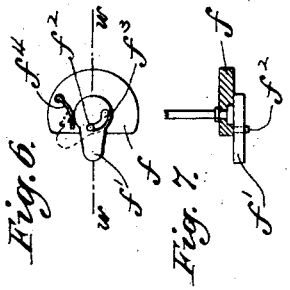

Fig. 6.

Fig. 7.

Fig. 5.

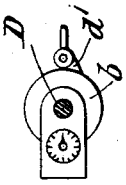

Fig. 4.

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(No Model.) 2 Sheets—Sheet 2.

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COMBINED BRAKE AND ELECTRIC SWITCH FOR STREET RAILWAY CARS.

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Fig. 2.

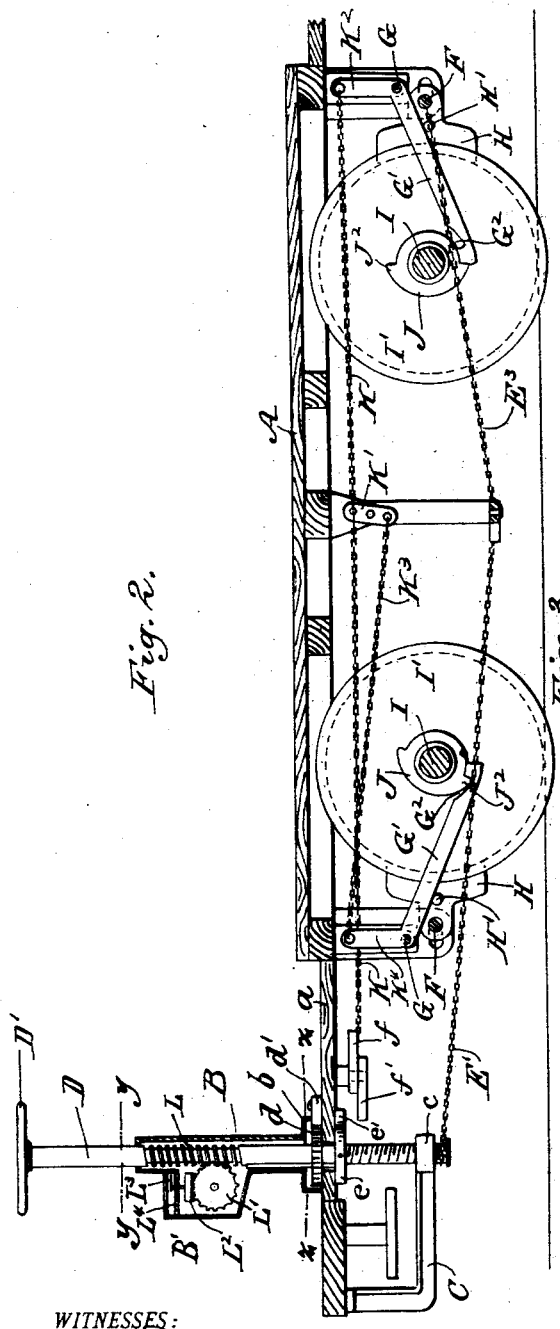
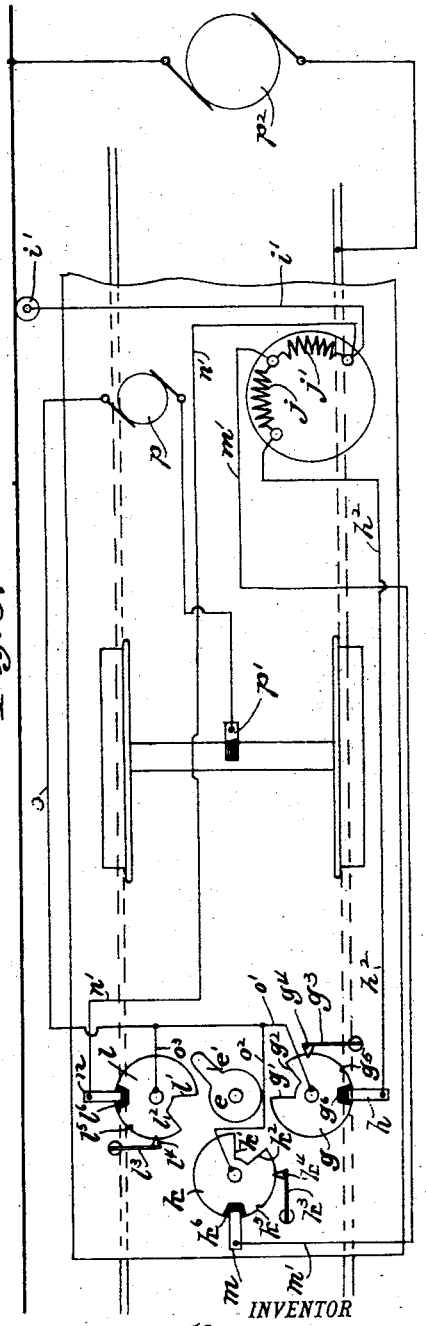


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE BROWN, OF LONG ISLAND CITY, NEW YORK.

COMBINED BRAKE AND ELECTRIC SWITCH FOR STREET-RAILWAY CARS.

SPECIFICATION forming part of Letters Patent No. 525,782, dated September 11, 1894.

Application filed January 20, 1894. Serial No. 497,494. (No model.)

To all whom it may concern:

Be it known that I, GEORGE BROWN, a subject of the King of Portugal, (who have declared under oath my intention to become a citizen of the United States,) and a resident of Long Island City, in the county of Queens, State of New York, have invented certain new and useful Improvements in a Combined Brake and Electric Switch for Street and other Railway Cars, of which the following is a specification.

This invention relates to electric cars for street and other railways and has for its object to provide a simple, automatic and readily operated device for breaking and starting such cars, without the jar or shock incident to a sudden stoppage or forward motion caused by instant withdrawal or release of the current, a further and more specific object of the invention being to furnish means for automatically applying the electric current with gradually increasing strength, at the same time and with the same movement, as when the brakes are removed from the wheels.

The invention consists in the novel construction and arrangement of parts hereinafter more fully described and particularly set forth.

In the accompanying drawings, forming part of this specification, in which like letters of reference designate corresponding parts throughout all the views, Figure 1 is an inverted plan view of a car-body embodying my invention and provided with my improved devices and mechanism. Fig. 2 is a vertical longitudinal section of the same, taken upon the line *x*—*x*, in Fig. 1. Fig. 3 is a diagram of the electrical apparatus and conductors forming part of my invention, illustrating the various circuits. Figs. 4, 5, 6 and 7 are detail views of different portions of the device, Fig. 4 being a section on the line *y*—*y*, Fig. 2; Fig. 5, a section on the line *z*—*z*, Fig. 2; Fig. 6, a reproduction of one of the cam-wheels shown in Fig. 1; and Fig. 7 a section on the line *w*—*w*, Fig. 6. Fig. 8 is a modification.

Upon the platform *a* of the car A, I secure a tubular standard B having the hollow base *b* and underneath the said platform an arm C, having at the end thereof the screw threaded bearing *c* in direct alignment with the standard B.

The brake-shaft D which extends through the said standard and is rotated by the wheel is externally screw-threaded at the end and enters the bearing *c* in the arm C. A ratchet wheel *d* splined upon the said shaft, within the hollow base *b*, engages with a spring pawl, *d'* as shown in Fig. 5.

The brake chain E' secured to the lower end of the shaft D, connects with the lever E, pivoted at the center of the car-body A, similar chains E^2 and E^3 attached to opposite sides of the said lever connecting with the brake-rods F at each end of the car.

Above each of the usual brake-rods F is pivoted a supplemental rod G having thereon the arms G' with the notches G^2 therein. Upon the brake-shoes H, are pins H' on which the arms G' rest.

Surrounding the axles I, which are screw-threaded adjacent to each wheel I', are the double-toothed ratchet wheels J, which are held in place upon the screw threaded axles by the spiral springs J'.

When the brakes are applied, the pins H' thereon slightly raise the arms G', and bring them into contact with the ratchet wheels J, the notches G^2 in the arms engaging with either of the teeth J^2, which are at opposite sides of the ratchet wheels, the said arms G' thus acting as auxiliary brakes. Were the ratchet-wheels J rigidly secured to the axles, the sudden application of the notched arms G' thereto would, when the car was proceeding at all rapidly, cause such a strain as either to shatter the arms or break off the ratchet-teeth. The axles being screw-threaded, however, they and the car wheels continue to turn slowly, the ratchet-wheels, whose lateral motion is limited by the springs J', acting as drags, and upon reaching either of the annular flanges I^2 on the axles wholly stop the car after one or two revolutions of the wheels.

Directly beneath the platform *a* the shaft D has rigidly secured thereon the cam *e* provided with the projecting lug *e'*. Rearward of this cam and journaled in the under side of the platform on a slightly lower level than that of the shaft-cam is a cam-wheel *f*, having beneath it, upon the same journal, an auxiliary cam, or movable lug *f'*. A pin f^2 upon

the cam-wheel f passes through a segmental groove f^3 in the lower cam and serves to prevent the individual movement of the said lower cam in any direction but that indicated by the dotted lines in Fig. 6, a spring f^4 upon the cam-wheel f returning the lug to its normal position.

A chain K secured to one side of the cam-wheel f is attached to the upper end of a vertically pivoted lever K′ just above the brake-lever E, and then passes rearwardly to a link K^2 upon the auxiliary brake-rod G, a chain K^3 secured to the lower end of the lever K′ being attached to a similar link K^4 upon the forward rod G. By these means, when the cam-wheel f is turned to the left, the links K^2, K^4, will be pulled inward, or toward the center of the car, thus releasing the arms or auxiliary brakes G′.

To the right of the brake-shaft and appreciably lower than the cam-wheel f is similarly journaled a second cam-wheel g with the shoulders g', g^2 thereon. A spring pawl g^3, adjoining the cam-wheel g, rests in the notch g^4, a similar notch g^5 being formed in the cam behind the said pawl.

At the rear of the cam-wheel is the brush h bearing upon the insulating material g^6 attached to the cam-wheel at the point of contact with the brush. A conductor h^2 leads off from this brush to the trolley wire i, connecting therewith through the resistance coils j, j'.

In front of the brake-shaft and to the left thereof are the cam-wheels k, l, of like construction to the cam-wheel g, each, however, being on a lower plane than the one immediately preceding it. These cam-wheels have the shoulders respectively, k', k^2 and l', l^2, pawls k^3, l^3, notches k^4, k^5, l^4, l^5, and insulating material k^6, l^6, all of which elements are exactly similar to those of the cam-wheel g and therefore do not need separate description.

Conductors m', n' lead off from the brushes m, n bearing upon the cam-wheels k and l respectively, the said conductor m' passing around the resistance coil j and connecting with the trolley wire i through the coil j' only, and the conductor n' passing around both the coils, and joining with the trolley wire direct.

The conductor o, communicating with the motor p, connects by means of the wires o', o^2, o^3, with the three cam-wheels g, k and l. The motor also connects with the car-wheels by the conductor p', the current, which enters through the trolley i' returning by the rails to the generator p^2.

The operation of the device will be readily apparent from the foregoing description. The car being supposably at rest with the brakes applied, as shown in Fig. 2, and it being desired to start the car, the brake-shaft D is turned to the left, the brake-chain E′ unwinding therefrom and unlocking the brakes H. At the second revolution of the shaft, which being screw-threaded at the end descends as it revolves, the lug e' of the cam e thereon strikes the movable lug f' of the cam-wheel f and turns the said cam-wheel to the right, thereby releasing the auxiliary brakes G′. As the revolution and descent of the shaft continue the lug e' strikes the shoulder g' of the cam-wheel g and partially turns the same until the pawl g^3 engages with the notch g^5. By this movement of the cam-wheel g, contact is made by means of the brush h and wire o', between the conductor o connecting with the motor and thence by ground to the generator; and the conductor h' leading off to the trolley wire, which also communicating with the generator, the circuit is completed and the car started. As the current passes through both the resistance coils j, j', the motion of the car is therefore at first comparatively slow. The shaft further revolving turns the cam-wheel k, creating contact with the conductor m', which communicates with but one of the coils, the current and consequently the speed ot the car being materially increased. At the completion of the revolution, the cam-wheel l is turned, thus substituting the conductor n', which passes around the resistance coils and joins direct to the trolley wire, the current then being fully turned on. As at each contact making, a conductor affording less resistance is introduced, the current will naturally change to the new conductor, by reason of this less resistance.

When the car is to be stopped, the brake shaft is turned to the right, and rising as it revolves, strikes the shoulder l^2 of the cam-wheel l restoring the same to the position shown in Fig. 1, and breaking contact between the said cam-wheel and the brush n, thereby decreasing the strength of the current by sending it through the single resistance-coil conductor. As the brake shaft rises and turns it then similarly actuates the cam-wheels k and g successively, with the first sending the current through the double resistance-coil conductor, and with the second shutting it off altogether. When the shaft comes up to the cam-wheel f the cam e strikes the movable lug f', which yields and moves independently to the right until the cam e passes, when the spring f^4 returns it to the normal position. As soon as the cam-wheels have been actuated and the current gradually shut off, the brake chain E′, which has been winding upon the shaft, tightens and forces the brakes H, against the wheels, the said brakes carrying with them the auxiliary brakes G′, which engage with the ratchet wheels J as hereinbefore stated, thus effectually stopping the car.

In order to register and render ascertainable the position of the cams and consequent strength of current, I form a worm-gear L upon the brake-shaft D and adjoining the said worm-gear attach a box or casing B′ to the standard B, within which box is a vertical gear wheel L′ meshing with the worm-gear, and also with a smaller horizontal gear-wheel L^2, having thereon the hand or pointer

L^3 registering upon a face or dial L^4, shown in Fig. 4. These gears transmit any movement of the brake-shaft to the pointer, the position of the said shaft and that of the cams being thereby indicated upon the dial.

Should it be desired to use my device upon cars already provided with the old style of device, wherein the brakes are operated by the usual shaft and the current applied in varying strength by operating separate levers, I employ the modified form shown in Fig. 8. This mechanism comprises the cam *e* fixed upon the brake-shaft and a cam-wheel *q*, similar to those already described, the conductor *q'* thereof connecting with both resistance-coils, when started, by throwing the cam into contact with the brush q^2. In this device, however, the current is increased by the movement of the different levers, as heretofore, the only portion of any apparatus used being the means for making and breaking contact of the cam-wheel and brush by the movement of the brake-shaft.

I do not confine myself to the use of all the mechanism and devices herein shown, nor to the exact details of construction, set forth, it being manifest that my invention is by no means restricted in this particular.

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

1. A combined automatic brake and electric switch for street and other railway cars, comprising the car brakes, and a plurality of switches adapted to gradually increase or decrease the current, and means for applying or releasing the brakes and actuating the switches successively at the same movement, substantially as shown and described.

2. A combined automatic brake and electric switch for street and other railway cars, comprising the car-brakes, and three switches connecting with conductors of varying resistances, to gradually increase or decrease the strength of the current, and means for applying or releasing the brakes and actuating the switches successively at the same movement, substantially as shown and described.

3. In a combined automatic brake and electric switch for street and other railway cars the combination, with the car-brakes, and a plurality of cam-wheels connecting with conductors of varying resistances, of means for releasing the said cam-wheels from, or throwing the same into contact with, the said conductors, and for applying or releasing the brakes at the same movement, substantially as shown and described.

4. In a combined automatic brake and electric switch for street and other railway cars, the combination, with the car-brakes and a plurality of cam-wheels journaled beneath the car-platform and connecting with conductors of increasing resistances, of means for successively releasing the said cam-wheels from, or throwing the same into contact with, their respective conductors and for applying or releasing the brakes at the same movement, substantially as shown and described.

5. In a combined automatic brake and electric switch for street and other railway cars the combination, with the car-brakes, a plurality of switches, and a screw brake-shaft connecting therewith, of an auxiliary brake connecting to the car-axle, and to the brake-shaft by which it is operated, substantially as shown and described.

6. In a combined automatic brake and electric switch for street and other railway cars the combination, with the car-brakes and a plurality of switches, and a screw brake shaft connecting therewith, of an auxiliary brake comprising a cushioned ratchet-wheel upon the car-axle, and an arm pivoted adjacent thereto and adapted to be brought into engagement therewith, substantially as shown and described.

7. In a combined automatic brake and electric switch for street and other railway cars the combination, with the car-brakes, a plurality of switches, and a screw brake-shaft connecting therewith, and having a cam thereon, of an auxiliary brake comprising a cushioned ratchet-wheel upon the car-axle, and an arm pivoted adjacent to the axle and resting upon the main-brake, and adapted to be released by the cam upon the brake-shaft, substantially as shown and described.

8. In a combined automatic brake and electric switch for street and other railway cars the combination, with the car-brakes, a plurality of switches and a screw-brake-shaft connecting therewith, of an auxiliary brake comprising a cushioned ratchet-wheel upon the car-axle, a notched arm pivoted adjacent thereto and resting on the car-brakes, a safety cam-wheel journaled near the brake-shaft and connecting with the auxiliary brake, and a cam upon the said brake-shaft adapted to turn the said cam-wheel and release the auxiliary brake, substantially as shown and described.

9. In a combined automatic brake and electric switch for street and other railway cars, the combination with means for actuating a plurality of switches by the revolution of the screw brake-shaft, and the main car-brakes connecting with the brake-shaft by a chain wound thereon, of an auxiliary brake comprising a notched arm pivoted adjacent to the car-axle and resting upon pins on the brake shoes, a ratchet wheel screw-threaded upon the axle and held in place by a spring, the said auxiliary brake being adapted to be brought into engagement with the ratchet-wheel by the application of the main brakes, a cam-wheel journaled near the screw brake-shaft and connecting by chains with the auxiliary brake, and a rigid cam upon the said screw brake-shaft adapted to turn the said safety cam-wheel after the main brakes are unlocked, thereby releasing the auxiliary brake, substantially as shown and described.

10. In a combined automatic brake and electric switch for street and other railway cars, the combination with means for actuating a plurality of switches by the revolution of the screw brake-shaft, the main car brakes each comprising a notched arm pivoted adjacent to the car-axle and resting upon pins on the brake shoes, a ratchet wheel screw-threaded upon the axle and held in place by a spring, of a cam-wheel journaled near the screw brake-shaft and connecting by chains with the auxiliary brake, a movable cam lug beneath the cam-wheel, a groove therein and a pin and spring upon the cam-wheel and a rigid cam upon the screw brake-shaft adapted to turn the said cam-wheel, substantially as shown and described.

11. In a combined automatic brake and electric switch for street and other railway cars, the combination with a screw brake-shaft connecting with the car-brakes, arranged on the platform and having a rigid cam thereon, of a plurality of cam-wheels provided with shoulders journaled near the said shaft, the said cam-wheels connecting with conductors of increasing resistances, and adapted to be successively released from or thrown into, contact with the said conductors by the shaft-cam, after the brakes have been released or applied, substantially as shown and described.

12. In a combined automatic brake and electric switch for street and other railway cars, the combination with a screw brake-shaft connecting with the car-brakes, arranged on the platform and having a cam thereon, of one or more switches each consisting of a cam-wheel journaled near the said shaft and provided with shoulders, and a brush adapted to bear upon the said cam-wheel or upon insulating material thereon to make or break the circuit, the said cam-wheel being adapted to be turned by the shaft-cam when the shaft is rotated to apply or release the brakes, substantially as shown and described.

13. In a combined automatic brake and electric switch for street and other railway cars, the combination with a screw brake-shaft connecting with the car-brakes, arranged on the platform and having a rigid cam thereon, of one or more switches each consisting of a cam-wheel journaled near the said screw shaft and provided with shoulders, a pawl resting in notches in the said cam-wheel to limit the movement thereof, and a brush adapted to bear upon the said cam-wheel or upon insulating material thereon, to make or break the circuit, the said cam-wheel being adapted to be turned by the shaft-cam when the screw shaft is rotated to apply or release the brakes, substantially as shown and described.

14. In a combined automatic brake and electric switch for street and other railway cars, the combination with a screw-journaled brake-shaft, connecting with the car brakes adapted to ascend and descend as it revolves, and having a rigid cam thereon, of a plurality of cam-wheels arranged beneath the platform at varying depths, the said cam-wheels being connected with conductors of increasing resistances and adapted to be turned by the cam upon the screw brake-shaft after the brakes have been applied or released, substantially as shown and described.

15. In a combined automatic brake and electric switch for street and other railway cars, the combination with a screw-journaled brake-shaft, connecting with the car-brakes adapted to ascend and descend as it revolves, and having a rigid cam thereon, of a plurality of cam-wheels arranged around the brake-shaft at varying depths beneath the platform, a brush bearing upon insulating material thereon to make or break the circuit, the said brushes connecting with conductors of increasing resistances, and the cam-wheels being adapted to be turned by the screw brake-shaft as it is rotated to apply or release the brakes, substantially as shown and described.

16. In a combined automatic brake and electric switch for street and other railway cars, the combination with a screw brake-shaft adapted to operate the brakes and switches at the one movement, of a worm-gear upon the said shaft, a vertical gear-wheel meshing therewith and with a smaller horizontal gear wheel and a pointer upon the said smaller wheel adapted to register upon a dial, substantially as shown and described.

17. In a combined automatic brake and electric switch for street and other railway cars, the combination with a plurality of switches comprising cam-wheels arranged at varying depths beneath the car-platform, of a brake-shaft screw-journaled in an arm, beneath the platform to ascend and descend as it revolves, a ratchet-wheel splined thereon and a pointer registering the movements of the brake-shaft upon a dial adjoining the said shaft being adapted to operate the brakes and the switches, substantially as shown and described.

18. In a combined automatic brake and electric switch for street and other railway cars, the combination with a screw brake-shaft journaled in an arm beneath the platform the main brakes and auxiliary brakes and release the former and having a rigid cam thereon, of a cam-wheel adjacent to the said shaft and connecting with the auxiliary brakes to release the same, a plurality of cam-wheels journaled around the said brake-shaft, beneath the platform and brushes bearing upon each cam-wheel or upon insulating material thereon to make or break the circuit, the said brushes connecting with conductors of increasing resistance, the cam upon the brake-shaft being adapted to operate the brake or safety cam-wheel and the switch cam-wheels, substantially as shown and described.

19. In a combined automatic brake and electric switch for street and other railway cars, the combination with a brake shaft screw-journaled in an arm beneath the platform and adapted to ascend and descend as it re-

volves, main brakes and auxiliary brakes connecting therewith and a rigid cam upon the screw brake-shaft of a safety cam-wheel adjacent to the said screw shaft and connecting with the auxiliary brakes to release the same, and a plurality of cam-wheels journaled at varying depths beneath the car-platform pawls limiting the movement of the said cam-wheels, brushes bearing upon each cam-wheel or upon insulating material thereon to make or break the circuit, the said brushes connecting with conductors of increasing resistances, the screw brake-shaft being adapted to operate the brakes and the cam thereon to turn the cam-wheels successively, as it revolves, substantially as shown and described.

20. A safety cam consisting of a journaled main cam-wheel, a movable cam upon the same journal, a groove in the said movable cam, a pin upon the main cam-wheel extending through the groove, a spring bearing against the movable cam to restore the said movable cam to its normal position, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 19th day of January, 1894.

GEORGE BROWN.

Witnesses:
JOHN H. DEEMER,
ROBERT ARMSTRONG.