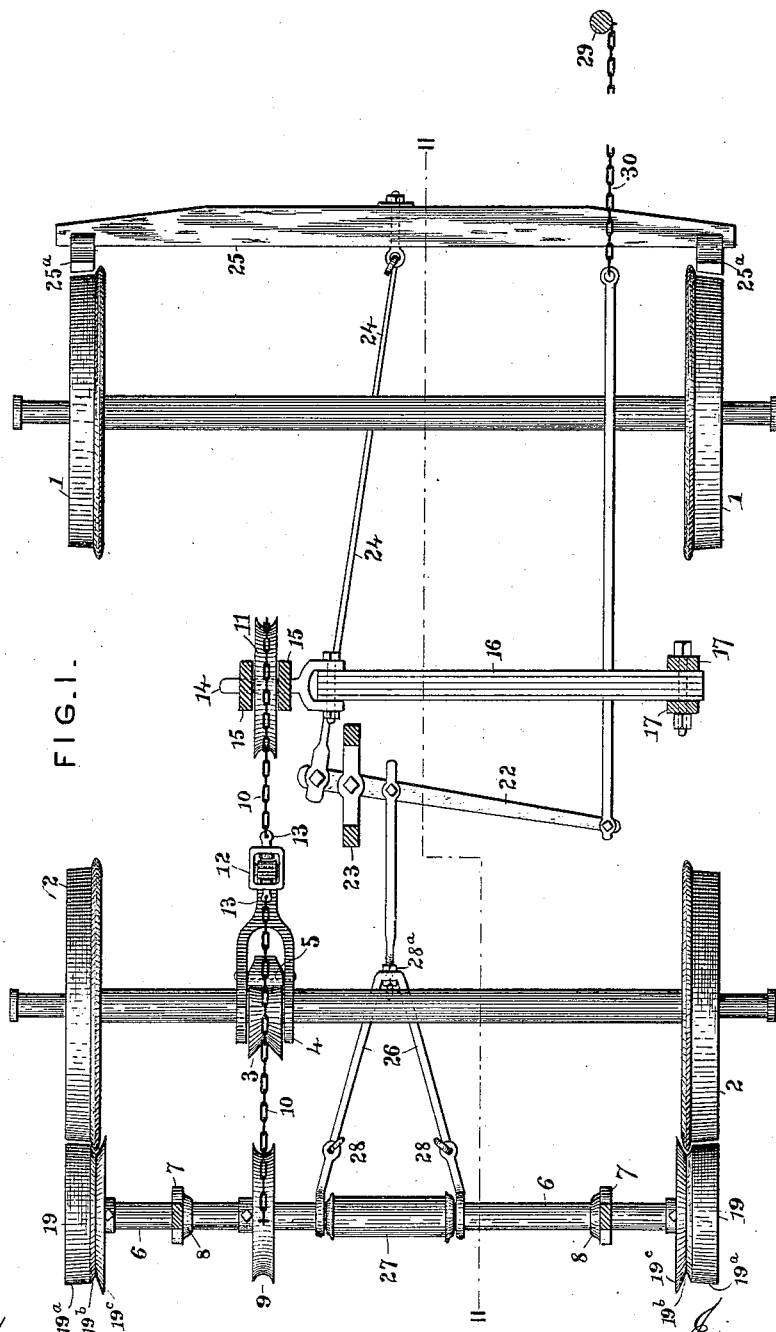


J. W. & G. R. STRICKLE.

CAR STARTER AND BRAKE.

No. 343,144.

Patented June 1, 1886.



Attest:

Geo. T. Smallwood.
[Signature]

Inventors
J. W. Strickle
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By *[Signature]* attys.

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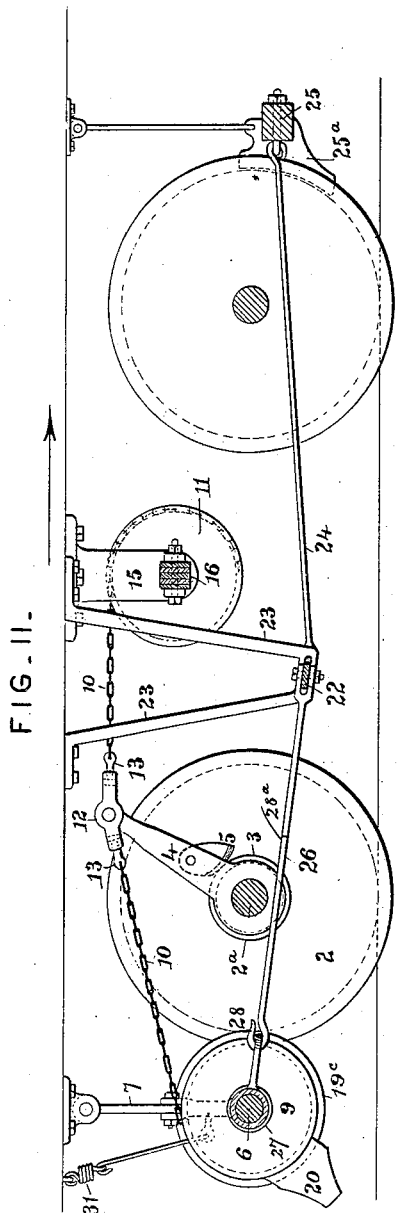


FIG. III.

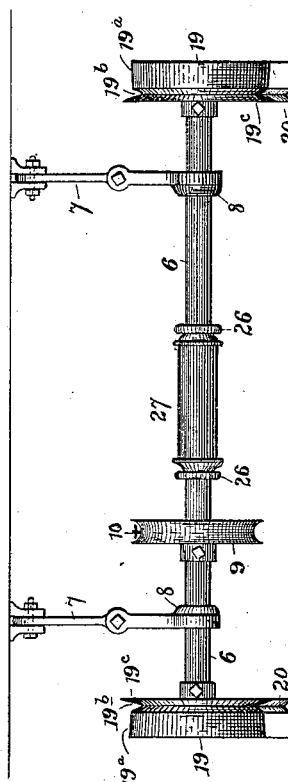


FIG. V.

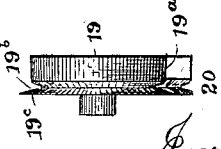


FIG. IV.

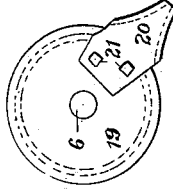
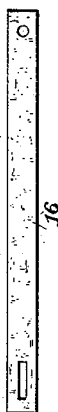


FIG. VI.



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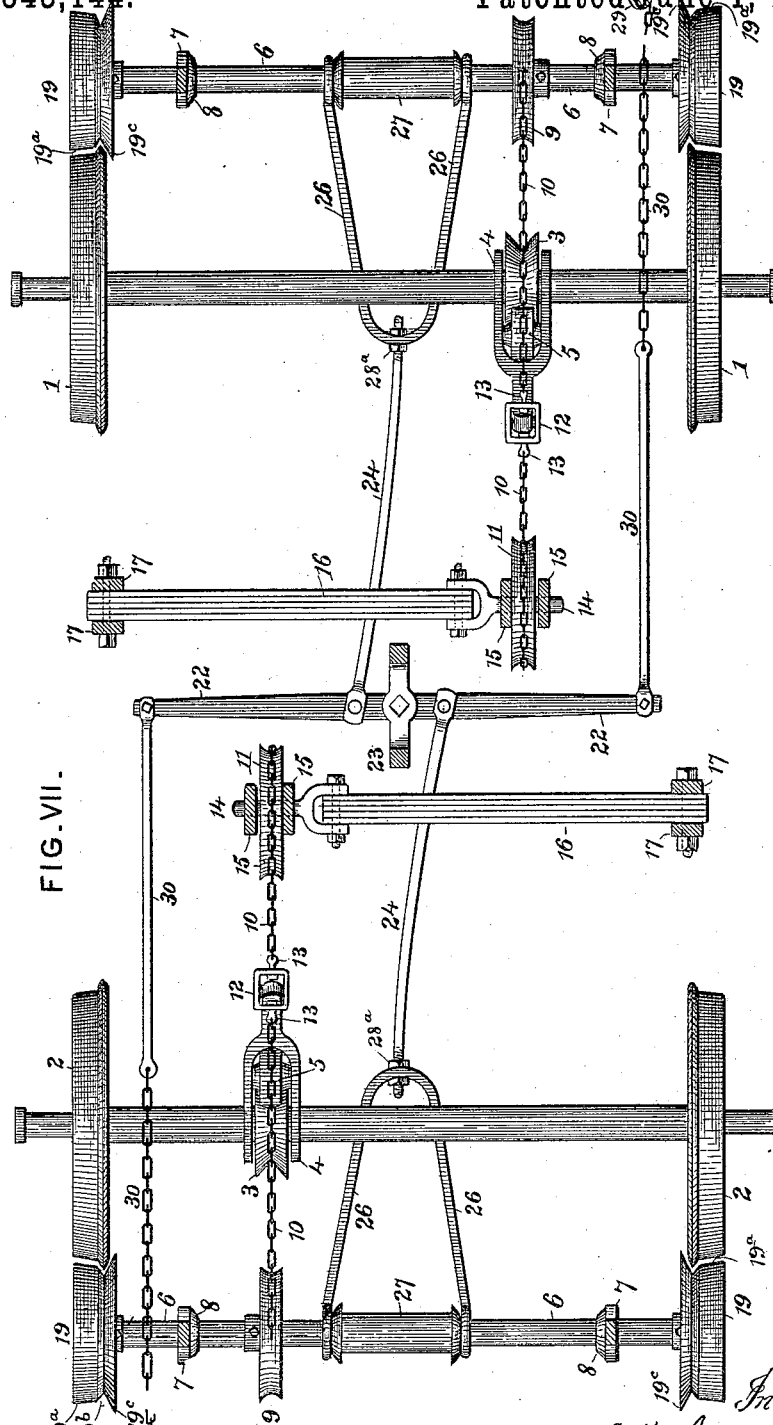
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UNITED STATES PATENT OFFICE.

JACOB W. STRICKLE AND GEORGE R. STRICKLE, OF LOUISVILLE, KENTUCKY.

CAR STARTER AND BRAKE.

SPECIFICATION forming part of Letters Patent No. 343,144, dated June 1, 1886.

Application filed September 11, 1885. Serial No. 176,808. (No model.)

To all whom it may concern:

Be it known that we, JACOB W. STRICKLE and GEORGE R. STRICKLE, citizens of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Car Starters and Brakes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure I is a plan view showing the wheels and axles of a street or other car adapted to be run in but one direction and our improved starter and brake attached thereto, the hangers being shown in horizontal section. Fig. II is a sectional elevation of the same, the line II II, Fig. I, indicating the plane of section. Fig. III is a rear elevation of the friction-pulleys, their carrying-shaft, its hangers, and accessories. Fig. IV is an elevation of one of the friction-pulleys, looking from the inner side, showing a brake-shoe projecting from its periphery. Fig. V is an elevation of the same, looking toward the rear of the car. Fig. VI is an elevation of one leaf or plate of the torsion-spring. Fig. VII is a plan view showing the wheels and axles of a street or other car adapted to be run in either direction and our improved brake and starter attached thereto, the hangers being shown in horizontal section.

Our invention relates to that class of car-starters in which the momentum of the car while stopping is stored up in an accumulator and the power utilized in overcoming the inertia of the car when it is desired to start it.

To this end our invention consists in substituting for the tension, compression, or coiled torsion-spring usually employed, a torsion-spring made up of one or more leaves or plates of spring-steel.

We are aware that a torsion-spring made up of one or more leaves of spring-steel is not in itself broadly new, and do not therefore claim such as our invention, except when constructed and used in connection with other parts of a car-starter, substantially as hereinafter fully described, and more particularly pointed out in the claims.

Our invention consists, further, in applying a brake-shoe to the periphery of the friction-sheave employed for transmitting the motion of the ground-wheels of the car to the power-

accumulator in such a manner that when the requisite amount of power has been stored the further rotation of the friction-sheave will be checked, so as to avoid straining the accumulator, whether it be of spring, hydraulic or other form, and at the same time operate to retard the rotation of the ground-wheels and bring the car to rest.

Our invention consists, further, in the combination, with a power-accumulator and the brake-shoes, of a system of levers for connecting them and a single winding-staff whereby both may be controlled simultaneously and at one operation.

Details of construction also of our invention will be hereinafter fully described, and particularly pointed out in the claims.

In Figs. I and II, 1 and 2 are respectively the front and rear wheels of a car adapted to be run in but one direction, the driver's platform being located at one end and the entrance for the passengers at the other, the form of the device here shown being especially adapted for use on such cars, while in Fig. VII 1 and 2 represent the wheels at the respective ends of the car adapted to run in either direction, the mechanism shown in connection with the rear wheels only in Figs. I and II being here duplicated and applied to the wheels at both ends of the car.

For adapting the invention for use at both ends of the car, it is simply necessary to duplicate all the parts shown in Figs. I and II, omitting the brake beam and shoes of the front wheels, and form one of the levers nearly double the length, as hereinafter described. The single arrangement will be described first, and the change necessary for adapting it for double use afterward pointed out.

To the rear axle is secured a collar, 3, preferably of case-hardened steel, having around its periphery a V-shaped groove.

4 is a lever, loosely journaled at its lower extremity upon the axle, and bifurcated for embracing the collar 3. Between the bifurcated ends of this lever is loosely pivoted a pawl, substantially of the shape shown in dotted and full lines in Fig. II, its face being of a shape corresponding to the V-shaped annular groove in the collar 3, within which it fits. This pawl is of such shape and is so pivoted that when the lever is in its forwardly-inclined position, as

shown in said figure, the pawl will swing clear of and out of contact with the V-groove. The action of a friction pawl or clutch of this character is well understood and needs no further description here.

6 is a shaft, suspended from the bottom of the car by means of a pair of hangers, 7, each of which is articulated, so as to permit relative transverse as well as longitudinal motion between said shaft and the bottom of the car. This construction enables us to secure the said shaft in proper position relatively to the ground-wheels and other parts of the device irrespective of the various irregular movements which the body of the car may have.

8 are washers or collars secured to the shaft 6, to prevent it from sliding longitudinally through the eyes in the lower extremities of the hangers.

9 is a sheave or pulley, adjustably secured to the shaft 6 by a spline or other device, and 10 is a chain secured at one end to said pulley and at the other to a similar pulley, 11, around which it is wrapped one or more times, so that when it is wound upon the pulley 9 it will be unwound from and thereby turn the pulley 11, and vice versa. At an intermediate point the chain 10 is provided with a yoke or enlarged link, 12, whose opposite sides are perforated for the passage of a bolt, by means of which it is secured to the upper extremity of the oscillating lever 4.

In order to prevent the chain 10 from becoming twisted and leaving the grooves in the pulleys 9 and 11, it is provided with swivels 13 13. The pulley 11 is connected by a spline to a shaft, 14, so as to be incapable of rotary but capable of free relative longitudinal movement thereon, said shaft being supported by hangers 15 from the bottom of the car. One extremity of the shaft 14 is firmly connected to a torsion-spring, 16, which we prefer to employ as a power-accumulator, (although so far as other parts of the invention are concerned an accumulator of any construction may be employed,) the other end of said spring being firmly held by hangers or brackets 17. This torsion-spring is composed of any desired number of leaves or plates of spring-steel, which are approximately of the shape represented in Fig. VI, and has sliding connection with the sheave 11, in order that the latter may not be moved out of alignment with the pulley 9 by the shortening of the spring when under torsion. This sliding connection may be between the shaft and pulley, as by the spline above referred to, or between the shaft and spring, as by slotting the spring, as shown in Fig. VI; or both may be employed, if desired. This sliding connection is susceptible of various modifications, as also is the manner of securing the shaft to the spring, which latter will necessarily vary according to the nature of the sliding connection. If the connection between the pulley 11 and shaft 14 is a sliding one, one end of the shaft may

be bifurcated for embracing the extremity of the spring 16, and secured thereto by a bolt passed through perforations in said spring and the bifurcated ends of the shaft. The other extremity of the spring may be similarly secured to the hangers 17. If the connection between the pulley and shaft is rigid, the perforation at one end of the spring may be elongated into a slot, and thus permit the endwise movement. It is obvious that a crank-arm would in all respects be the mechanical equivalent of the pulley 11, although the latter is preferable, as by its use the angle of torsion is not limited, whereas by the use of a crank the spring can only be twisted about ninety degrees, or less.

19 are friction-pulleys secured adjustably to the shaft 6 by splines or other devices, and each formed on its periphery with a flat portion, 19^a, corresponding to the tread of the ground-wheel, a groove, 19^b, complementary to the flange of the ground-wheel, and a flange, 19^c, which lies behind the flange of the ground-wheel and serves to prevent longitudinal movement of the shaft 6.

20 is a two-faced brake shoe projecting from the periphery of each of the friction-pulleys 19, preferably in such a plane as to come in contact with the flange as well as the tread of the ground-wheel of the car, and for this purpose is grooved complementarily thereto, as shown in Fig. V.

By applying the braking-pressure to the flange of the ground-wheel we get an additional leverage, whereby the car is brought more quickly to rest by a given amount of pressure than if it were applied nearer the axis. For securing this shoe in place the side of the pulley 19 is mortised for the reception of the shank of the shoe, the latter being confined therein by screws or bolts 21. (See Fig. IV.) The bearing-faces of the shoe are curved concentrically with the axis of the ground-wheel, so as to have a firm bearing throughout its length.

22 is a lever fulcrumed near one end to a hanger, 23. One extremity of this lever is connected through the medium of a rod, 24, with the brake-beam 25 of the front wheels, 1, of the truck. On the other side of its fulcrum it is connected through the medium of a rod, 26, with the accumulator-shaft 6. The rod 26 is bifurcated, as shown in Fig. I, its extremities being held at the proper distance asunder by a sleeve, 27, surrounding the shaft 6. It is also jointed, as at 28, and provided, as at 28^a, with means for adjusting its length.

29 is the winding-staff suitably mounted on the platform of the car, and 30 the chain or other device connecting it with the free end of the lever 22.

The operation of this device is as follows: The parts are all shown in the drawings in the positions they occupy while the car is in motion, the direction being indicated by the arrow. When it is desired to stop the car, the

brake-chain 30 is wound upon the winding-staff 29, thereby oscillating the lever 22 upon its fulcrum. This causes the rods 24 and 26 to move in opposite directions, (toward each other,) drawing the brake-shoes 25^a and the friction-sheaves 19 into contact with the front and rear wheels, respectively, at the same time and with equal pressure. The frictional contact of the pulleys 19 with the wheels 2 causes the shaft 6 to be rotated and the chain 10 to be wound upon the pulley 9 and unwound from the pulley 11, as before explained, thereby moving the free end of the lever 4 rearward and twisting the spring 16 out of its normal straight shape, the parts remaining in these positions until the brakes are released by permitting the brake-chain 30 to unwind. When so released, the spring 16 resumes its normal shape, and in so doing winds the chain 10 onto the pulley 11 and unwinds it from the pulley 9, drawing the free end of the lever 4 forward and causing it, through the medium of the clutch 35, to impart motion to the axle of the ground-wheel 2.

A light spring, 31, may be provided for drawing the pulleys 19 away from the wheels 2 when the brake-pressure is released; or they may be suspended from the floor of the car at such a point that they will swing away by gravity. It will be seen that as soon as the brake-shoes 20 come in contact with the wheels 2 the rotation of the pulleys 19 will be checked and the continued pressure of the said shoes act to retard the rotation of the said wheels 2. These shoes thus constitute a stop to check the rotation of the shaft 6 when sufficient power has been stored to start the car. This completely avoids the danger of straining the accumulator.

It is found by experiment that in order to store the requisite amount of power in a spring, such as we have described, it is not necessary to give it even so much as half a twist, and it will be seen that when it is learned just how many degrees it should be twisted in order to produce a result in all respects most satisfactory, the pulleys 19 may be so adjusted on the shaft 6 that the brake-shoes or stops 20 will come in contact with the rear wheels, 2, at the proper time. With the pulleys 10 secured in the position shown the shaft 6 will rotate about forty-five degrees before the stops or shoes come in contact with the ground-wheels.

The strength of the spring may be regulated by adding or taking away any necessary number of the leaves.

For applying our invention to both ends of a car, the brake beam 25 and shoes 25^a, for acting upon the front wheels, together with the rod 24, which connects said beam with the lever 22, are dispensed with, and all of the other parts shown in Figs. I and II are duplicated, as shown in Fig. VII, the lever 22 being made of the same length on both sides of its fulcrum, and its opposite ends connected with the brake-staffs at the respective ends of the car. In

this form of the device the shaft 6, which is for the time being at the foremost end of the car, according to the direction in which it is traveling, supplies the place of the brake-beam 25 and the shoes 20 of the shoes 25^a. Its operation is as follows: While the car is in motion the parts occupy the positions shown, the pawls 5 being out of contact with the collars 3, so as to permit the axles to turn freely in either direction without interfering with the starting mechanism. When it is desired to stop the car, the brake-chain 30 is wound upon the brake-staff 29 at either end of the car, which rocks the lever 22 on its fulcrum, and, through the medium of the connecting-rods 26, draws all four of the friction-pulleys 19 into contact with their respective ground-wheels. Those coming in contact with the wheels which are for the time being in the rear will store the power derived from the momentum in the rear accumulator, in the manner already described with reference to Figs. I and II. The friction-pulleys coming in contact with the front wheels will, however, be revolved in a direction contrary to that required to place the accumulator-spring under strain, thereby slacking the chain 10 attached to the pulley 11, and permitting the forward accumulator to remain undisturbed. The rotation of these pulleys will continue until the brake-shoes 20 come into contact with the ground-wheels, whereupon they will act as positive brakes to arrest the motion of the car. In this device, therefore, the foremost one of the shafts 6 is in all respects the equivalent of, and in fact constitutes the brake-beam of the car.

We do not desire to limit ourselves to the use of rods in making such connections as are required to sustain strains of tension only, but desire to have it understood that such connections may consist of chains, wire cables, or other suitable and well-known appliances.

Having thus described our invention, the following is what we claim as new therein, and desire to secure by Letters Patent—

1. In a car starter and brake, the combination, with a power-accumulator, of a shaft, a friction-wheel secured to said shaft, and a stop for limiting the rotation of the latter.

2. In a car starter and brake, the combination, with the ground-wheels of the car and a power-accumulator, of a shaft, pulleys secured thereto and adapted to be brought into contact with the ground-wheels, and a stop or brake-shoe projecting from the periphery of each of said pulleys, as and for the purpose set forth.

3. The combination, with the ground-wheels and an accumulator, of the friction-pulleys, the shaft to which they are secured, and hangers supporting said shaft and articulated so as to swing transversely and longitudinally of the car, substantially as and for the purposes set forth.

4. The combination, with the ground-wheels and an accumulator, of the friction-pulleys,

each having a flange projecting behind the flange of the ground-wheel, as described, a shaft to which said pulleys are secured, and the hangers articulated so as to permit said shaft to swing transversely and longitudinally of the car, as set forth.

5. In a car starter and brake, the combination, with the ground-wheels and an accumulator, of the friction-pulleys suspended in the planes of the ground-wheels, and a stop or brake secured to each of said pulleys in the plane of the flange of the said ground-wheel, as and for the purposes set forth.

6. The combination, with the ground-wheels and an accumulator, of a shaft, friction-pulleys secured adjustably to said shaft, and a stop secured to said pulleys for checking their rotation, as and for the purposes set forth.

7. The combination, with the ground-wheels, the accumulator-shaft, the chain adapted to be wound thereupon, and the clutch mechanism for connecting the chain with the ground-wheel axle, of a pulley to which the other extremity of said chain is secured, a rectangular torsional spring firmly held at one end, and sliding connection between the free end of said spring and the pulley, substantially as and for the purposes set forth.

8. In a car starter and brake, the combination, with the ground-wheels, the accumulator-shaft, the chain secured at one end thereto, and the mechanism for connecting it with the ground-wheel axle, of a second pulley, to which the other extremity of said chain is secured, a torsional spring made up of a number of leaves, and sliding connection between said spring and the pulley last named, as and for the purposes set forth.

9. In a car starter and brake, the combination, with the brake beam and shoes, and the accumulator and its shaft, of a fulcrumed lever, a pair of rods, each connected at one end to said lever on the respective sides of its fulcrum, and at the other end with said brake-beam and accumulator-shaft, respectively, the brake-chain connected to the extremity of said fulcrumed lever and the winding-staff, all arranged to operate substantially as set forth.

10. In a car starter and brake, the combination, with the brake-beam and shoes, and the accumulator and shaft, of a winding-staff having connections with the brake-beam and accumulator-shaft, whereby both are operated simultaneously, as set forth.

11. The combination, with the accumulator-shaft and the articulated hangers, of the operating-lever, a bifurcated rod connecting said shaft and lever, and a thimble surrounding the shaft between the divided extremities of said rod for holding them at the proper distance asunder, as set forth.

12. In a car-starter, the combination, with the chain 10 and the pulley 11, of the shaft 14, to which said pulley is keyed, and the rectangular torsional spring 16, connected to said shaft, as and for the purposes set forth.

13. In a car starter and brake, the combination, with the pulleys 9 and 11 and the lever 4, of the chain 10, having swivels 13, for the purpose set forth.

14. The combination, with the chain 10 and pulley 11, of the shaft 14, bifurcated at one end, the torsional spring 16, composed of a number of rectangular leaves slotted at one end, as described, and the bolt passed through said slots and perforations in the bifurcated extremities of the shaft, as and for the purposes set forth.

15. The combination, with a car, of a car-starter having an accumulator, connections 80 between said accumulator and the ground-wheels, and a stop for limiting the movement of the connections and regulating the amount of strain to which the accumulator is subjected, as set forth.

16. In a car-starter, a torsion-spring made up of a number of leaves or plates of spring-steel, and having connection with the ground-wheels, as set forth.

17. In a car-starter, a torsion-spring made up of a number of leaves or plates of spring-steel, a pulley having connection with the ground-wheels, and a sliding connection between said spring and pulley.

18. In a car starter and brake, the combination, with the brake beam and shoes, the accumulator, a friction device, and connections between said friction device and accumulator for putting the latter under strain, of a winding-staff and connections from said winding-staff to the brake-beam and friction device, as and for the purposes set forth.

19. The combination, with the front and rear wheels of a car-truck, of a pair of car-starters connected respectively therewith, a lever fulcrumed about its mid-length, rods connecting said lever on opposite sides of its fulcrum with the respective starters, as explained, a winding-staff at each end of the car, and connections between said winding-staffs and the respective extremities of the fulcrumed lever, as set forth.

20. The combination, with the ground-wheels of a car, of a pair of shafts suspended upon opposite sides of the axis of said wheels, friction-pulleys secured to said shafts, two-faced brake-shoes projecting from said pulleys, an accumulator having connections with said shafts and the axles of the car, a fulcrumed lever having connections on opposite sides of its fulcrum with the respective shafts, and a winding-staff having connection with said fulcrumed lever, as set forth.

21. The combination, with a car, of a pair of car-starters having a pair of shafts suspended upon opposite sides of the car-wheel, friction-pulleys secured to said shafts, brake-shoes projecting from said pulleys, a winding-staff and connections for drawing all of said friction-pulleys into contact with the ground-wheels, as and for the purposes set forth.

22. In a car-starter, a shaft having friction-

pulleys secured thereto and double-faced brake-shoes projecting from said pulleys, as set forth.

23. The combination, with the ground-
5 wheels, of the shafts 6, suspended on opposite sides thereof, the friction-pulleys 19, secured to said shafts, the two-faced brake-shoes 20, projecting from said pulleys, a winding-staff located upon each platform, connections be-
10 tween each of said staffs and both of said shafts, a pair of accumulators, connections between said accumulators and shafts, and the clutch mechanism for connecting the accumulators with their respective axles, as set forth.

24. In a car brake and starter, the combination, with the brake-shoes and the accumu- 15
lator, of a winding-staff common to both, and connections between said brake-shoes, accumulator, and winding-staff, for the purpose set forth.

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