(No Model.) 2 Sheets—Sheet 1.

D. FULLER.

CAR STARTER.

No. 483,349. Patented Sept. 27, 1892.

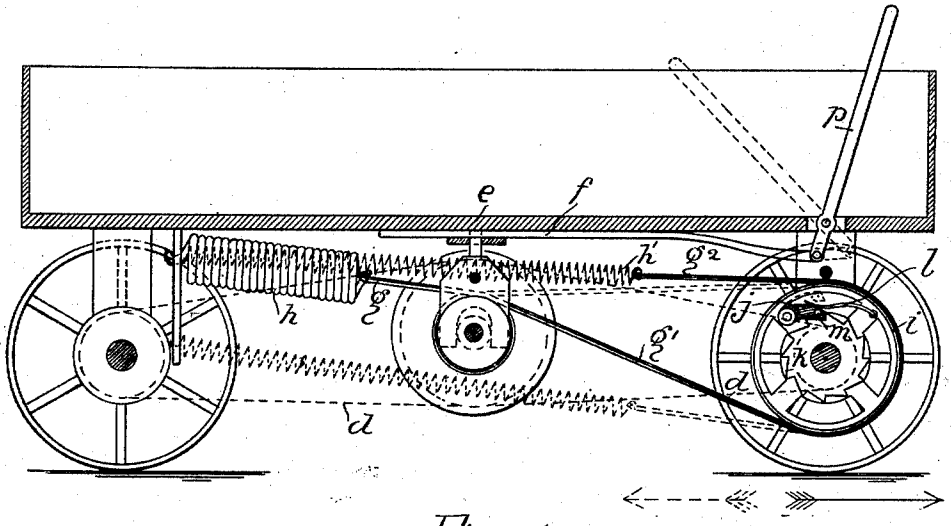

Fig. 1.

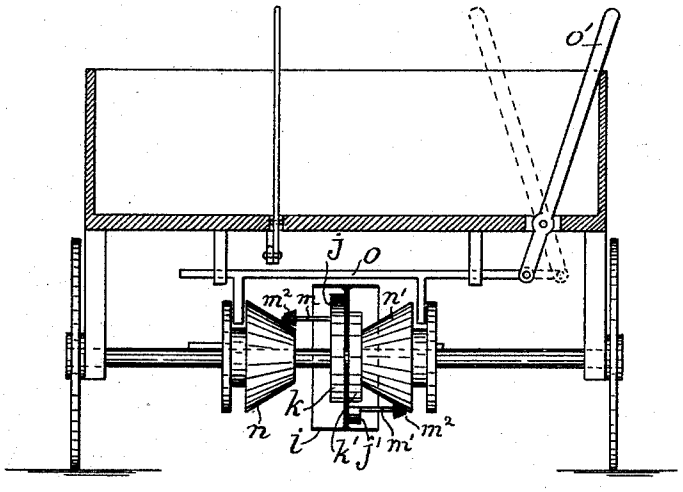

Fig. 2.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C

(No Model.) 2 Sheets—Sheet 2.

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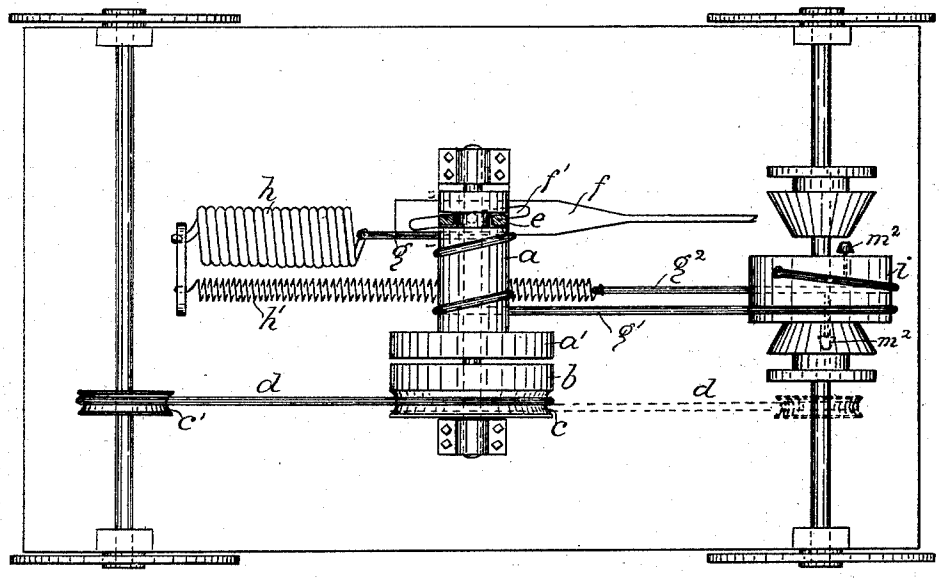

Fig. 3.

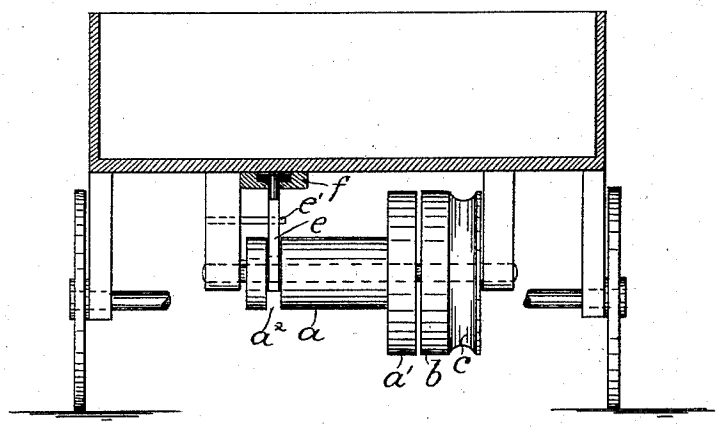

Fig. 4.

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UNITED STATES PATENT OFFICE.

DARIUS FULLER, OF CHICAGO, ILLINOIS.

CAR-STARTER.

SPECIFICATION forming part of Letters Patent No. 483,349, dated September 27, 1892.

Application filed May 17, 1892. Serial No. 433,311. (No model.)

To all whom it may concern:

Be it known that I, DARIUS FULLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Car-Starters, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 shows a vertical longitudinal section of a car with my improved car-starting mechanism applied. Fig. 2 shows a transverse vertical section in front of one of the car-axles. Fig. 3 shows a plan view of a car as seen on its under side with my said improved car-starter attached thereto. Fig. 4 shows a transverse vertical section of a car, taken in front of the mechanism attached to the center of the car-bottom.

Like letters refer to like parts.

The object of my invention is to provide a car-starter for either horse or cable cars, or like vehicles which require frequent starting, of simple, efficient, and practical form, and which may be made to reverse its action on the car when the car-front is reversed, and in order to attain said desirable novel features I construct my said new device in substantially the following manner, namely: Under the car-floor and about midway between its axles and parallel to them I attach a drum a, having a friction end or surface a' at one end and forming a part thereof, which is herein shown increased to a large diameter and forming a flange. There is a groove a^2 at the opposite end of said drum, in which play the ends of a forked lever e, fulcrumed at e', which forms a shifting-gear for said drum. Said drum is loose on its axle and is reciprocated longitudinally thereon by said lever e, which may be operated in any suitable manner—for instance, as herein shown, by a reciprocating bar f, which moves longitudinally in suitable guides and is provided with a slot f' in it at such an angle to its direction and length of motion as to give to the upper or outer end of said lever e, which plays in said slot, sufficient motion to said drum for its operation on a friction-head b, opposite to the flange a' and on the same shaft with it. Said head is provided with a pulley c, which forms a part thereof, or there may be two such pulleys, and the power from both car-axles utilized, or, in other words, it is but a single pulley adapted to receive two belts, and preferably they should be chain belts. Opposite said pulley c is a small pulley c' on the car-axle, from which a belt d runs on the pulley c. (A second and like belt and pulley are indicated in broken lines in Fig. 3.) Through said or like mechanism the friction-head b rotates while the car moves, and it will rotate the drum a whenever the friction-heads a' and b are brought into contact. To said drum is attached a rope or chain g and to the end of the rope a spring h, whereof the outer end is secured to the car-bottom. The rotation of the drum is resisted by the spring h, and thus, through said connected mechanism, the car will be stopped. To the drum a another rope g' is fastened, which unwinds from as the rope g is wound upon said drum. The outer end of the rope g' is wound around the pulley i and fastened thereto, and to said pulley is attached and wound thereon a sufficient distance a second rope g^2, whereof the outer end is attached to a second spring h', which is longer and much weaker than the spring h and which acts in the contrary direction thereto—that is, when the spring h expands it contracts, and conversely.

When each car end is to be the front end of the car alternately, I provide ratchet-wheels k k' with pawls j j', pivoted on opposite sides of the pulley i, which engage with said ratchet-wheels. To alternately release and engage said pawls, I provide some suitable mechanism—as, for instance, that herein shown, which answers the purpose. Said mechanism consists of pins m and m' on the ratchets near their points, of which the outer ends play on cones n and n'. Said cones turn with the car-axle by means of a spline and slide longitudinally thereon. Each of said cones has a circumferentially-grooved outer end, into which project spurs of a connecting and shifting bar o, which is actuated by a lever o'. A roller m^2 may run on the ends of said pins to reduce the friction of them on the cones. Said shifting mechanism is now shown set for one direction of motion of the car. By means of said arrangement either one of said pawls may be raised from its ratchet-wheel and the opposite pawl engaged with its ratchet at pleasure.

Said cones, pins, and shifting-gear, &c., are not required if the same end is always the front end of the car. In that case only one ratchet-wheel and pawl connect with the pulley *i*, and in either case the pawl that is down clicks idly on the ratchet-wheel while the car is going forward, because the pulley *i* is held from turning by the ropes *g'* and g^2 until the spring *h* has been wound up and the car stopped, after which, when the friction-heads *a'* and *b* are separated, the pawl gives the car-axle and its wheels the motion of the pulley *i*, and thus starts the car. Said ropes *g'* g^2 are wound on opposite sides of the drum or pulley *i*, the position of which must be reversed when the opposite end of the car from the one in use is made the front end thereof. When the same end of the car always remains the front end, then only one ratchet-wheel and pawl are required and the shifting-gear and all shifting of parts necessarily required with it will not be required.

The operation of my said device is, when the car is moving in the direction indicated by the arrow and as shown by the full-line parts of the drawings, as follows, namely: When it is desired to stop the car, the friction-heads *a'* and *b* are brought into contact through the lever *p* and intermediate mechanism. This causes the drum *a* to revolve against the constantly-increasing and powerful resistance of the spring *h* until the car is stopped, and thus through the motion of the drum *a* wind the rope *g'* upon it and at the same time also unwind from it the rope or chain *g'*, which had at first been wound upon it, and wind the same upon the drum *i*. The action of the drum *i* is due to the spring *h'*, which is constantly in tension or extended position and only strong enough to wind said rope upon the drum *i*. The direction of motion of the drum *i* is such as to cause the pawl to click on the ratchet-wheel. When the car has ceased to move, the spring *h* is in tension and the spring *h'* in diminished or lower tension. When the friction-heads *a' b* are separated, the force of the spring *h* revolves the drum *a*, and thus causes the rope *g'* to wind upon it from the drum *i*, which through such motion turns said drum *i* with its axle, and thus starts the car. It is also important to note that the proportion of the pulleys and drums is such as will secure the greatest effect—namely, the small pulley *c'* revolves the large pulley *c*, which winds up the spring *h* on a small drum, and that when the spring *h* transmits its stored-up power it acts on the small drum *a*, which turns the large pulley *i*. When the motion of the car is reversed, the drum *a* will revolve in the opposite direction, and consequently wind the ropes *g* and *g'* on the opposite side of the drum. This will then require that the rope *g'* be wound in the opposite direction on the drum *i*, as must then also be the rope g^2, wound on the opposite side of said pulley *i*, and the spring *h'* must be placed from the position in which it is shown into that indicated for it by the broken outlines, after which the cones must be shifted, so as to raise the pawl which was engaged into the idle position and the opposite pawl thereto put into the active position. Then all parts will again operate for the end desired. It must also be observed that said pawls point and act with their ratchet-wheels in opposite directions and that said ratchet-wheels are keyed to the car-axle.

What I claim is—

1. The combination, with alternately-acting, of different tension, and in the same direction acting springs, whereof one connects to two drums, loose upon their shafts, whereof one of said drums revolves in either and the other in only one direction without and in the other direction with its shaft, of a connection opposite to that already made on one of said drums to one of said springs, connecting mechanism from the drum free to revolve in either direction, and the car-axles, and clutch mechanism to said drum, substantially as specified.

2. The combination, with springs acting in the same direction on opposite sides of a drum and a car-axle upon which said drum is loose and adapted to turn with it in one direction and without it in the opposite direction, of a shaft and drum thereon free to turn in either direction and connection from said last to said first drum, clutch mechanism to said last drum, and connection therefrom to the car-axles, substantially as specified.

3. The combination, with car-axles and a drum releasably connected to one of said axles and to a resisting-spring to actuate said drum oppositely, of a loose drum on a car-axle, having a pawl engaged with a ratchet-wheel fixed to its axle, and a second spring resisting in the same direction as the first spring, said springs being attached and acting on opposite sides of said loose drum to act as a car-starter, substantially as specified.

4. The combination, with alternately-acting, of different tension, and in the same direction acting springs connecting on corresponding sides to two drums loose upon their shafts, whereof one revolves in either and the other in only one direction without and in the other direction with its shaft, which is a car-axle, of a flexible crossed connection from said corresponding to the opposite side of the latter drum and coupling mechanism on said former drum, actuated through intermediate mechanism from revolving car-axles, substantially as specified.

5. The combination, with a drum loose upon its shaft and provided with oppositely-pointing pawls carrying laterally-projecting pins on their ends, of connected and longitudinally-sliding cones splined on and revolving with said shaft, which is a car-axle, and pointing toward said pawls, adapted to engage with said pins, substantially as specified.

6. The combination, with a loose drum on a car-axle and pawl on said drum adapted to engage with a ratchet-wheel fixed to said axle,

of springs acting in the same direction alternately on opposite sides of said drum, whereof one of said springs is attached to a second drum actuated by the car-axle, and mechanism to engage, operate, and release said second drum and car-axle, substantially as specified.

7. The combination, with rotary car-axles and pulleys and belts and a clutch actuated by them, of a drum to engage said clutch, ropes to said drum, whereof one winds as the other unwinds from said drum, a second and loose drum with pawl, a ratchet-wheel on the car-axle engaging said pawl, said drums connected on corresponding sides by one of said ropes, and a rope on the opposite side of said second drum and a light spring thereto, a strong spring to the other rope of the first drum, and mechanism to engage and disengage said clutch and drum, substantially as specified.

8. The combination, with two springs acting alternately and in the same direction, fixed at one end and secured to ropes at their other ends, whereof one rope is attached to a drum having one part of a coupling mechanism and the other rope attached to a second drum on the car-axle, adapted to revolve with said axle in one direction and to be at rest when the axle revolves, of a pulley with the opposite part of a coupling mechanism and means to engage and disengage the parts of said coupling mechanism, a pulley on the car-axle, and belt from it to said pulley, with coupling mechanism, and a third rope connecting said drums, substantially as specified.

9. The combination, with a drum loose on its shaft and connected to a lever adapted to give it longitudinal motion, of a longitudinally-reciprocating bar moving in a plane transverse to the motion of said lever and connected thereto in a diagonal slot, adapted to operate substantially as specified.

DARIUS FULLER.

Witnesses:
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ANTON FOUGNER.