# C. J. SHAIN & G. L. WAITT.

## Car-Starter.

No. 162,956. Patented May 4, 1875.

FIG VI

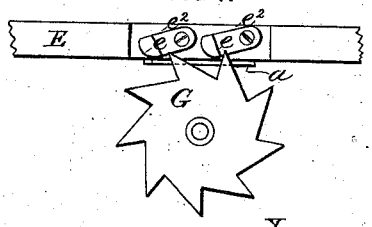



FIG I

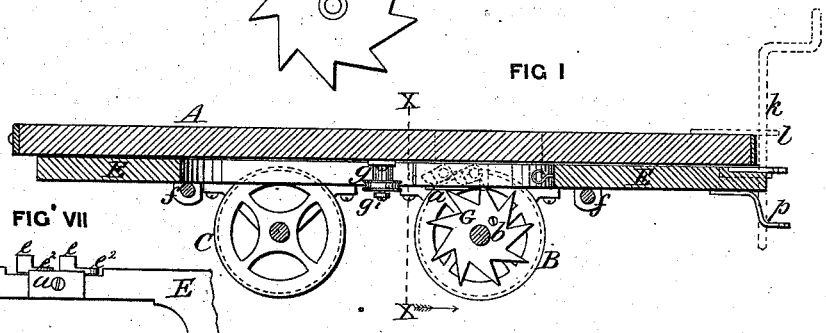



FIG VII

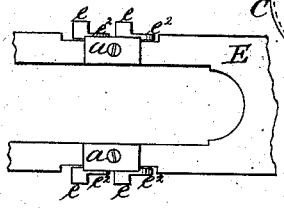



FIG II

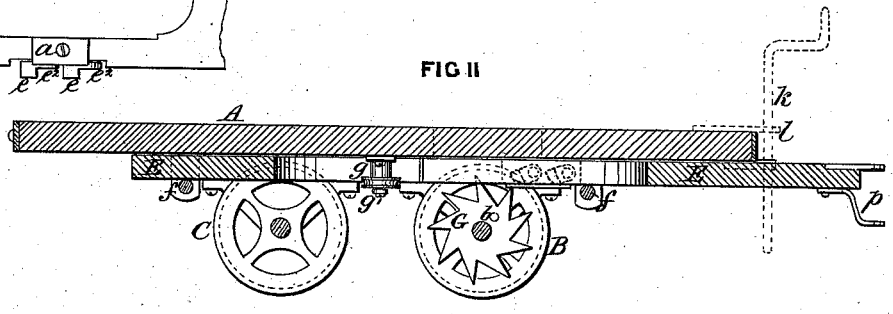



FIG III

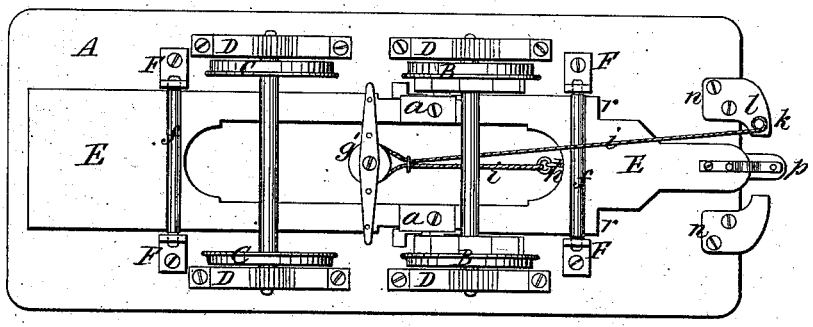



FIG V

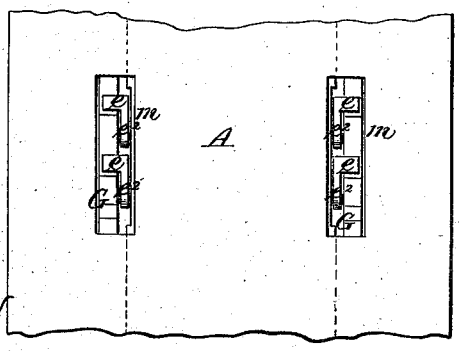
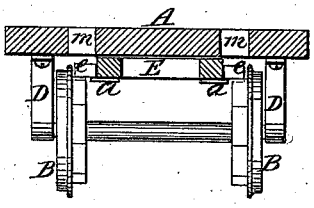



FIG IV




WITNESSES

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# UNITED STATES PATENT OFFICE.

CHARLES J. SHAIN AND GEORGE L. WAITT, OF PHILADELPHIA, PA.

## IMPROVEMENT IN CAR-STARTERS.

Specification forming part of Letters Patent No. **162,956**, dated May 4, 1875; application filed February 26, 1875.

*To all whom it may concern:*

Be it known that we, CHARLES J. SHAIN and GEORGE L. WAITT, of the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Car-Starters, of which the following is a specification:

The object of our invention is to so construct street-cars that the strain in starting them when overloaded is shifted from the body of the car to the wheels, in order to relieve the horses and enable them to set the car in motion. Various plans have been devised to accomplish this, in which the draft bar or slide acts upon ratchet-wheels on the axles, to which the carrying-wheels are made fast, and the starting action effected by means of a lever and chain uniting the draft-bar with the ratchet, and in which the ratchet-levers act like pawls.

The combination of a ratchet-wheel with the draw-bar, and the starting-pawls carried thereby, is not claimed broadly; but my invention consists in providing the inner faces of the car-wheels with wide-spaced ratchets, and combines for action with pawls arranged in pairs at each side of the draw-bar in positions to match the spaces, between the ratchets and draw thereon, in pairs in horizontal positions, whereby the starting force is exerted directly upon the car-wheels and near the circumference thereof, giving the greatest possible leverage with two strong starting-pawls for each wheel.

The invention further consists in combining with the said pawls rest-plates, carried by the draw-bar, whereby the pawls are maintained in horizontal positions for action upon the wheel-ratchets, which revolve at a height above the said pawl-rests, so that the acting shoulders of the pawls, while resting in a plane below the highest points of the ratchets, are held in such positions that they can easily pass over the ratchets as the draw-bar moves backward, but cannot descend below such plane. The pawls are L-shaped, with their arms pivoted to the sides of the slide or draw-bar, and their ratchet ends extending at right angles, so as to overlie the wheel-ratchets and give a free acting movement to the draw-bar between the wheels, and in close proximity to the inner faces of the wheel-ratchets.

Figure 1 represents a longitudinal central setion of the ordinary running gear and flooring of a street-car with our improvement applied thereto, and with the parts in the positions they occupy for starting the car; Fig. 2, a view of the same, showing the position of the device after the car has been started by it; Fig. 3, a bottom view of the running-gear or carriage of a car, with the starting device in the position shown in Fig. 1; Fig. 4, a transverse sectional view taken on the line *x x* of Fig. 1; Fig. 5, a detail top view of the car, showing slots in the floor over the front wheels, and through them the manner in which the pawls take into the toothed wheels; and Fig. 6, a detail view of one of the toothed wheels, showing the pawls as they engage the wheel in starting a car.

The platform A represents the flooring of a street car, and B the forward, and C the rear, wheels. The axles of these wheels are held in their bearings in brackets D, which are secured to the lower body timbers of the car in the usual manner. A platform sliding frame, E, is arranged longitudinally under the body of a car, between the wheels, and is guided and sustained in its forward and backward movements by hangers F and anti-friction rollers *f f*. The hangers F project below the frame E, and receive the journals of the rolls *f f*, which are arranged crosswise of the car underneath the sliding frame E to support the same, and permit it to slide to and fro with little friction. One of the rolls is situated forward of the wheels, and the other in the rear of them. The frame E is open along its center to accommodate the pulley-post *g*, and pivoted to each side of this frame are two pawls, *e e*, the purpose of which is to catch into the toothed or ratchet wheels G when the frame E is drawn forward, and thus start the car. These wheels G are secured rigidly to the inner vertical faces of the front car-wheels B, and are formed with teeth all projecting one way—rearward upon their upper peripheries—to enable the pawls *e e* to take into them and not release their hold until the ratchet-wheels have been turned part-

way round, and the car started. The pulley-post *g* is bolted to the bottom of the car, and carries a suitable pulley, *g'*, that is situated and turns horizontally upon its lower projecting ends. Securely attached to the frame E, at its forward end inside of the central opening, is a staple and ring, *h*, to which one end of a chain or rope, *i*, is fastened, and from this point leads rearward around the pulley *g'*, and thence forward to and around the lower end of an ordinary brake-rod, *k*. This rod is held and permitted to turn at the forward end of the frame A by suitable brackets *l*, and has at its upper end the usual crank-handle. In the floor of the car, as seen in Figs. 4 and 5, are slots *m*, through which access can be had to the pawls *e e* upon either side of the slide, to either raise them or turn them down, so as to catch the toothed wheels, when desired. The brackets *l* have the double function of not only holding the crank rod or brake *k*, but as they are firmly secured to the bottom A their rear ends, which are left broad, as at *n*, serve as stops for the sliding frame E, to limit its forward movement by the shoulders *r*, Fig. 3, striking against them, and by which the car is drawn.

The operation of the starter is as follows: The evener is held by a pin, and between the usual metal straps or brackets *p*, attached to the extreme forward end of the slide E, and the slide being in the position shown in Figs. 1, 3, and 6, the horses are started, which draws the slide E forward and out, as shown in Fig. 2, which causes the pawls *e e*, from their weight, to engage the teeth of wheels G, and by drawing these wheels forward turn the car-wheels and start the car. The leverage thus applied to the wheels is great, and is sufficient to start a car under almost any circumstance, or however much loaded. The slide being in the position shown in Fig. 2, with the shoulder *r* resting against the stops or brackets *n*, the horses draw the car, the strain being at this latter point and upon the body of the car, and thus shifted from the wheels. When the car is stopped, or in stopping it, the slide E is thrown or forced backward into its normal position, as in Figs. 1 and 3, by the horses drawing backward upon the tongue; when no tongue is used the brake-rod *k* is turned by the driver when the car stops, which winds one end of the chain or rope *i* upon its lower end, and thus draws, by means of this brake-rod *k*, pulley *g'*, and staple *h*, the sliding frame E back into position for bringing the strain upon the wheels when the horses start, as before. The slide E could, if desired, be held at the rear or forward position continually by the usual ratchet and wheel upon the brake-rod, or by a pin connecting the slide and car bottom.

It will be seen that the pawls *e* are so pivoted as to work in pairs in the same horizontal line at the sides of the draw-bar or slide E, and that they are maintained in horizontal positions by plates *a a* (see Fig. 7) secured to the draw-bar E, and projecting just enough to form supports for the pawls *e*, and keep them always so; that while their acting points will always catch into the wide spaced ratchets, and draw in pairs, (see Fig. 6,) thus giving a strong hold, as it were, upon each car-wheel, the pawls cannot fall below the said rest-plates. The pawls *e e* are L-shaped, with the arms $e^2$ $e^2$ pivoted to the sides of the slides, and their acting-points *e* projecting outward, so as to overlie the ratchets, as shown in Figs. 5 and 7, and thus allow the draw-bar to be brought near the inner faces of the ratchets, as shown in Fig. 3. This construction gives a strong and certain hold upon the wide-spaced ratchets, and applies the starting-power directly to the car-wheels, instead of by an independent ratchet centrally fixed upon the axle. By the double pairs of ratchets acting at the same moment a steady and strong pull is made directly upon the tops of both front wheels, which gives a good leverage and a comparatively easy start to the car.

We do not claim, broadly, the combination, with a ratchet, rigidly attached to the axle, of a draw-bar bearing pawls, which ride freely over the ratchet when made to slide back, but drop by gravity into such a position as to engage with the ratchets when the draw-bar is drawn forward, being aware that such combination is not new.

We claim—

1. The combination of car-wheels B with wide-spaced ratchets G on their inner sides, draw-bar E, and pawls in pairs at each side of the draw-bar, and matching the wide-spaced ratchets, all substantially as set forth.

2. The combination, with the pawls *e e*, of ratchets G at each side of the car, and rest-plates *a*, to maintain the pawls in horizontal positions, as set forth.

3. The pivoted L-shaped pawl or pawls *e* in combination with the draw-bar, to engage with their operative arms, the ratchets on the inner faces of the car-wheels, but allow the slide to move between the ratchet, substantially as set forth.

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