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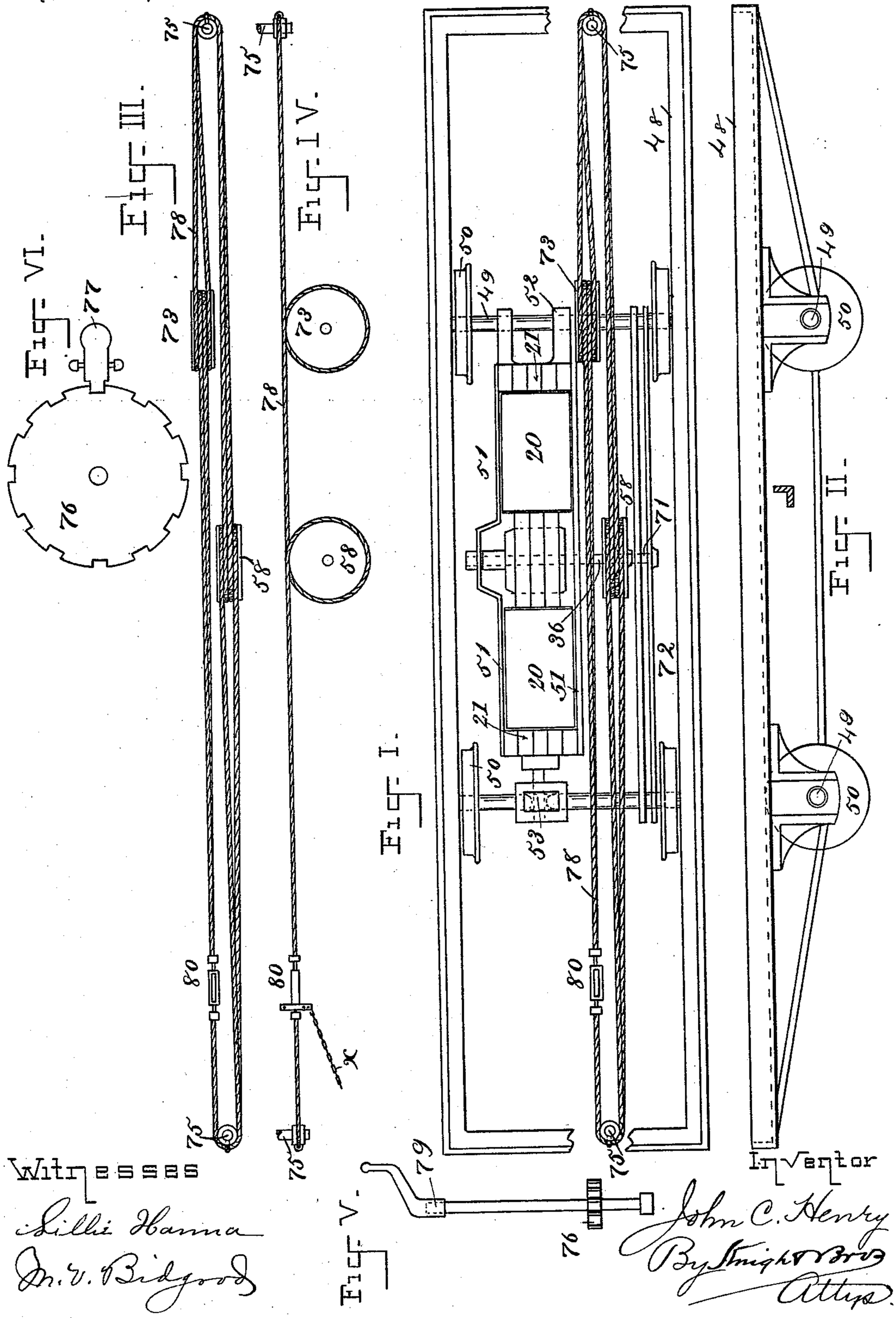
J. C. HENRY.

ELECTRIC CAR.

No. 561,224. Patented June 2, 1896.



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(No Model.) 4 Sheets—Sheet 2.

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ELECTRIC CAR.

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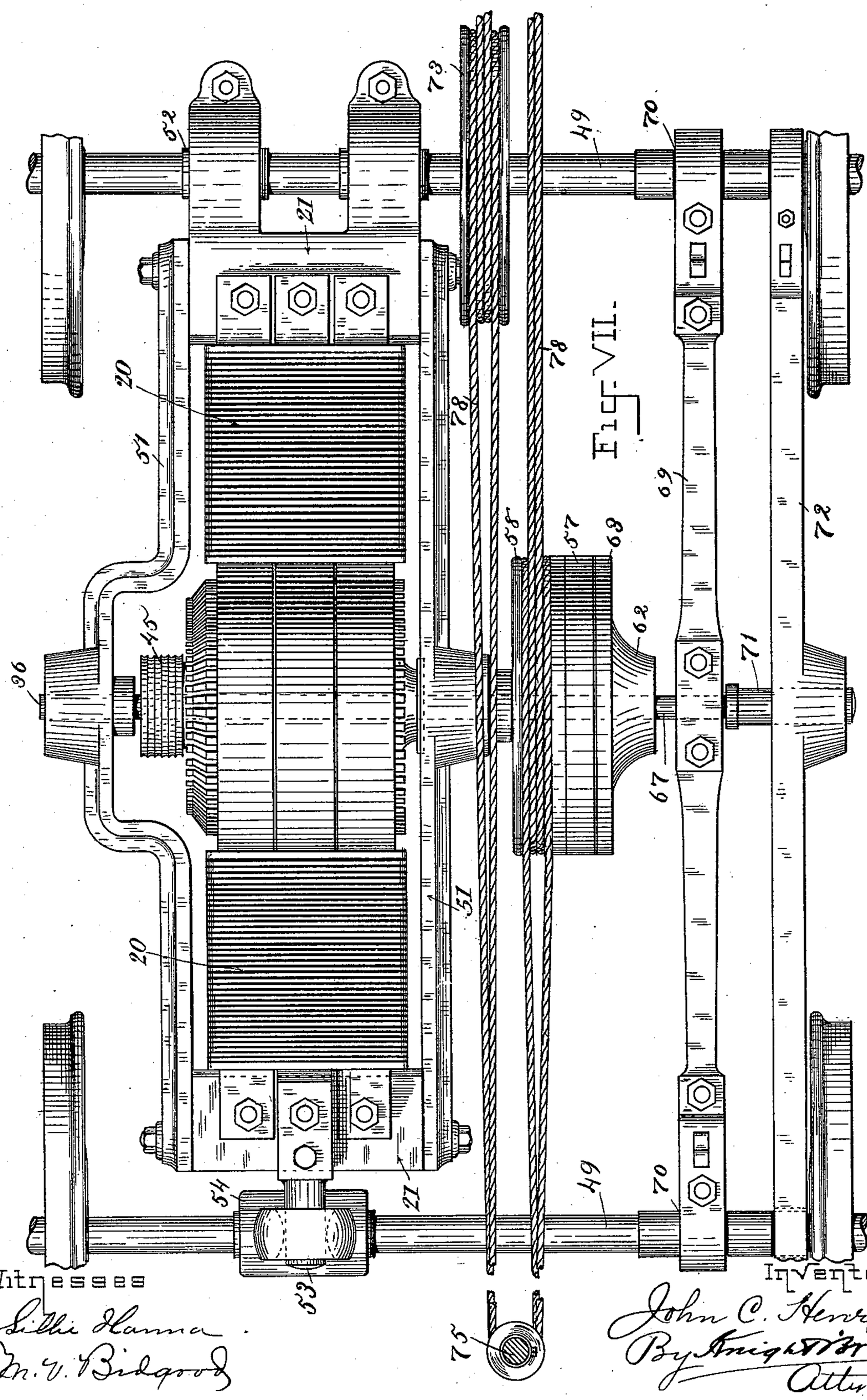

Fig. VII.

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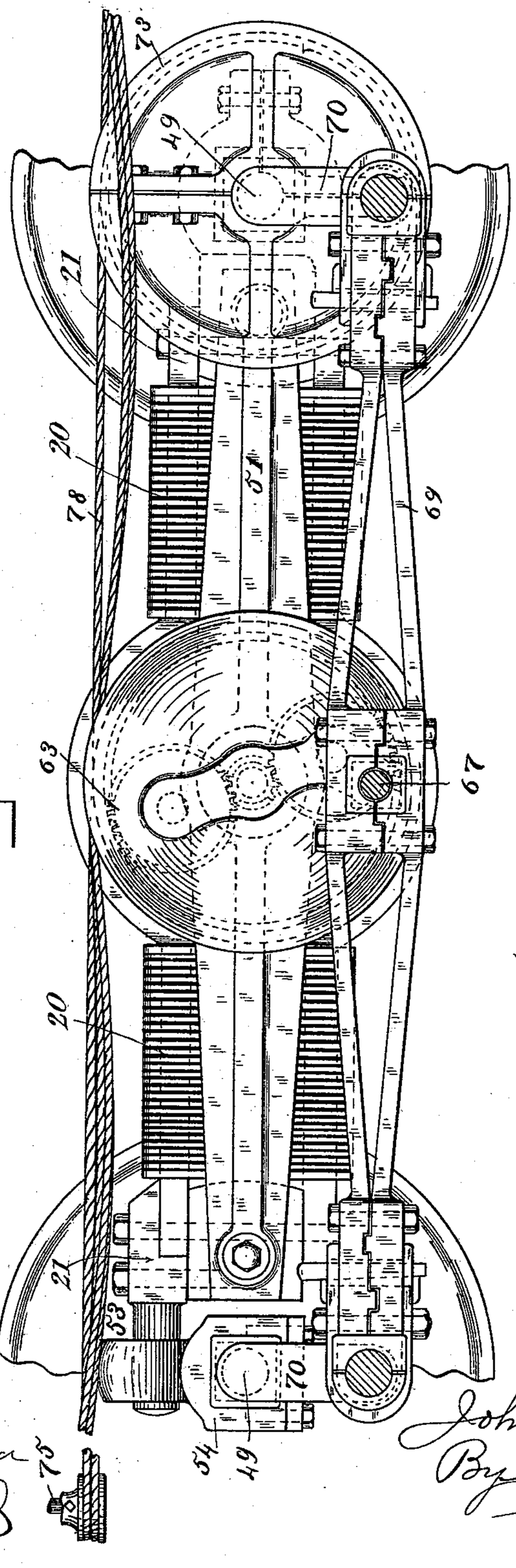

Fig. 5.—VIII.

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(No Model.) 4 Sheets—Sheet 4.

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ELECTRIC CAR.

No. 561,224. Patented June 2, 1896.

Fig. XI.

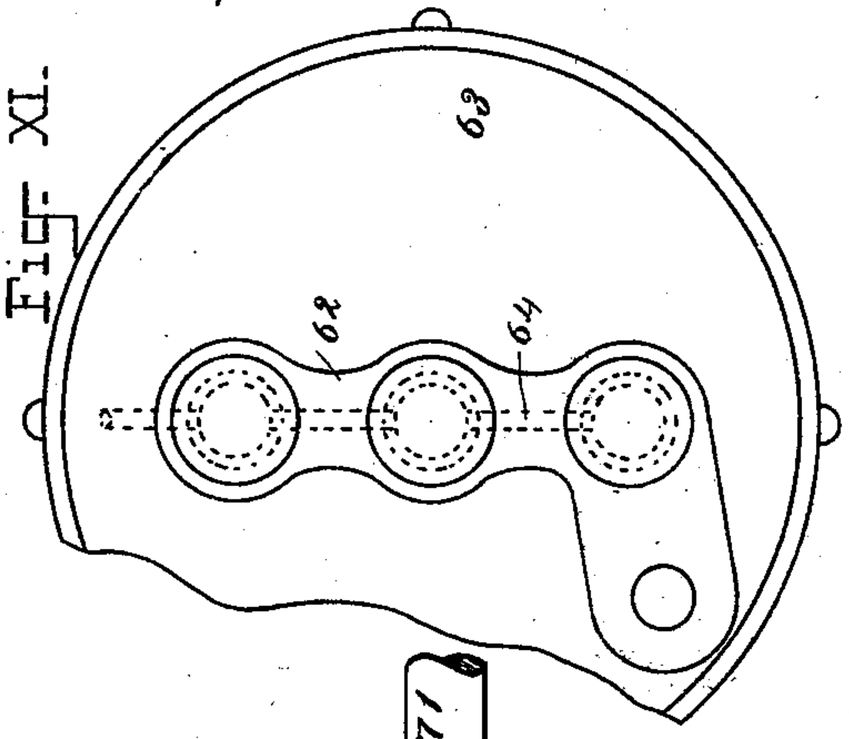


Fig. X.

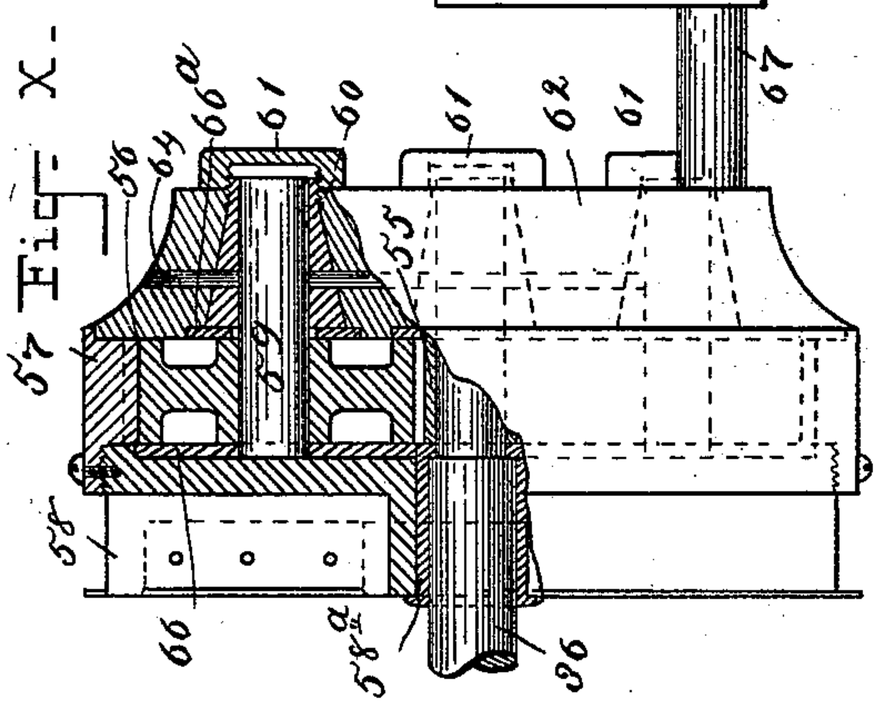


Fig. IX.

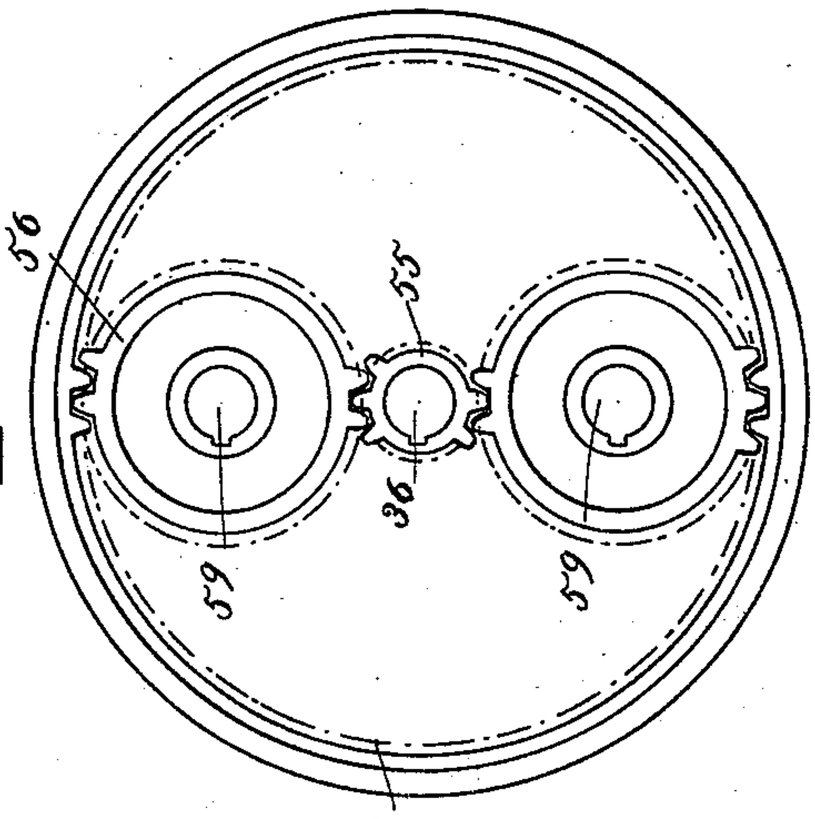


Fig. XVII. Fig. XVIII. Fig. XIX.

Fig. XVI.

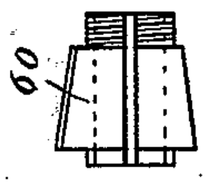


Fig. XV.

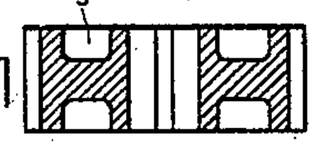


Fig. XIV.

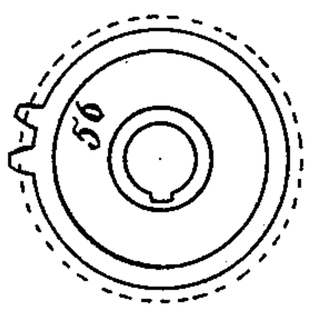


Fig. XXII.

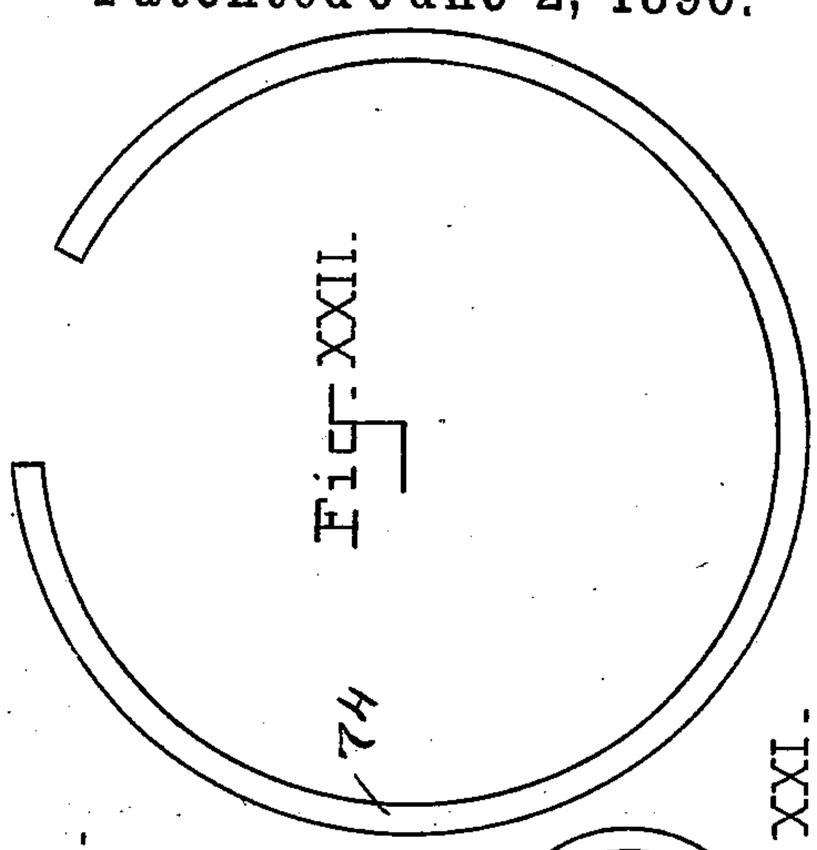


Fig. XXI.

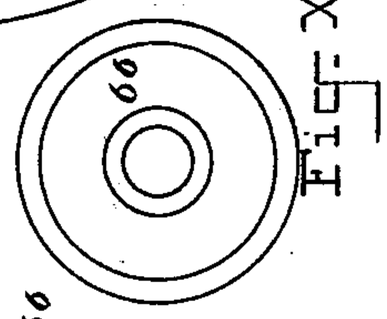


Fig. XX.

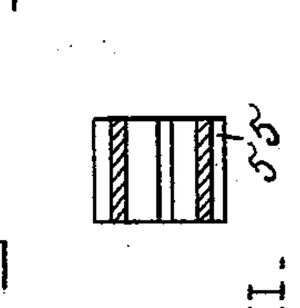
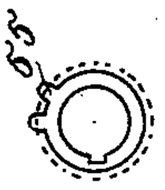


Fig. XIII.

Fig. XII.



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UNITED STATES PATENT OFFICE.

JOHN C. HENRY, OF WESTFIELD, NEW JERSEY.

ELECTRIC CAR.

SPECIFICATION forming part of Letters Patent No. 561,224, dated June 2, 1896.

Original application filed September 27, 1889, Serial No. 325,244. Divided and this application filed February 11, 1893. Serial No. 461,928. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. HENRY, a citizen of the United States, residing at Westfield, county of Union, State of New Jersey, have invented certain new and useful Improvements in Electric Cars, of which the following is a specification.

This application is a division of my application, Serial No. 325,244, filed September 27, 1889.

My invention relates to certain improvements in electric cars, which I will first describe with reference to the accompanying drawings, pointing out in the claims the novel parts.

In said drawings, Figure I is a top view of the car-motor frame. Fig. II is a side view thereof. Fig. III is a top view of the speed-controlling mechanism. Fig. IV is a side view thereof. Fig. V is a side view of the staff thereof. Fig. VI is a plan view of the lock on said staff. Fig. VII is a plan view of the motor and power-transmitting mechanism. Fig. VIII is a side view thereof. Fig. IX is a side view of the transmitting-gear. Fig. X is an end view thereof, partly in axial section. Fig. XI is a view of the side thereof opposite to that shown in Fig. IX. Fig. XII is a side view, and Fig. XIII is an axial sectional view, of the driving-pinion. Figs. XIV and XV are similar views of the intermediate pinion. Figs. XVI and XVII are respectively side and end views of a conical bearing. Figs. XVIII and XIX are face and sectional views of the cap of said bearing. Figs. XX and XXI are sectional and side views of the roller for the intermediate pinions. Fig. XXII is a side view of the brake-shoe.

48 is the car-body frame, made of L-iron, having support on the outer ends of the axles 49 of track-wheels 30.

The motor, comprising bar-fields and a suitable rotary armature, is mounted in a frame supported directly upon the car-axles. Each of the bar-field magnets 20 is securely bolted at its end to a cross-yoke 21, which cross-yokes are united by the removable side bars or frame-pieces 51. The cross-yokes are supported at their extremities upon the car-axles, one being hung on smooth bearings 52 on one axle, while the other at the other end of the frame has a universal joint, consisting of a trunnion 33, engaging loosely in the doubly-flared eye of a clip 54, in which the other axle runs loosely. The motor is thus supported on both axles without interfering with such slight relative motions of the axles as may be caused by obstructions on or irregularities of the track or by the rounding of curves. To enable the armature to be removed, it is only necessary to unbolt the outer side bar of the frame, there being no brake-shoes or brake-rods in the way.

The armature-shaft 36 (see Figs. IX and X) bears near the end opposite to its commutator 45 a small pinion 55, which gears with two larger pinions 56, and the latter in turn engage an internally-toothed gear-wheel 57, carried by a friction-wheel 58, which runs loosely on the armature-shaft. The friction-wheel 58 is interposed between the internal gear 57 and the armature-shaft to receive the wear-shoe 74, so that the strain of the rope will be directly over the bearing. The pinions 56 are keyed to pins 59, which, together with the armature-shaft 36, run in conical bearings 60. The said bearings are split (see Fig. XVI) and are drawn tight in their conical seats to take up wear, and oil is retained and dust excluded at the same time by screw-caps 61.

The seats or bearings 60 are in line in a bar 62, which is formed or fixed on a disk 63 for excluding dust from the nest of gear-wheels 55 56 57. The bar 62 is bored from end to end at 64 in line with holes in the conical bearings, so that all bearings can be lubricated at once. The ready means of lubrication thus afforded is very important.

Each bearing has a fin or key 65 (see Figs. XVI and XVII) to engage in a corresponding groove in its seat and keep it from turning, so that the lubricating-holes in the bearings will remain in line with those in bar 62.

Perforated disks 66 are placed upon the pins 59. These disks have smoothly-turned circumferences, which bear on a turned ring upon sleeve 58^a behind the central pinion and on an internal turned ring behind the outer gear 57, and as these rings are at the pitch-line of the gears by which they are driven the peripheral speed of all is the same. Consequently the disks roll between the central

pinion and the outer gear and have a sliding contact only on the pins passing through their centers. On the side of the pinion 56 opposite from disk 66 and surrounding the pin 59 is a washer 66ª to prevent the hub of the pinion from wearing the bushing.

The bar 62 has fixed to it a pin 67, which forms the wrist of a crank 68. On this wrist is clamped the two-part connecting-rod 69, of the form shown in Fig. VIII. The connecting-rod is "bridged" to insure stiffness vertically, though not of sufficient horizontal thickness to prevent slight lateral flexure. Both axles are cranked inside of the wheels at 70, and to these cranks the ends of the connecting-rod are clamped, bringing all the mechanism under the car-body. An outer bearing for the crank 68 is provided by having its axis 71 enter a central bearing in a stiff bar 72, whose ends are clamped loosely on the car-axles. The overhanging motor-shaft is thus prevented from springing. The bearing of bar 72 on one axle is close-fitting to afford rigid support to the axis, while at the other end slight angular motion of the axle is provided for by a bearing elongated horizontally, as indicated in dotted lines, Fig. VII. To one or each axle is keyed a friction-wheel 73. A wooden shoe 74 (see Fig. XXII) is placed on each friction-wheel 58 and 73.

75 75 are the speed-regulating and brake staffs supported vertically on each car-platform. Said staffs have square notched wheels 76, (see Fig. VI,) with which square-toed hinged pawls 77 engage by gravity to lock the staff from movement in either direction. By depressing the outer end of said pawl with the foot the staff is released and may be turned in either direction. The handle 79 of the staff may be removed from one end of the car to the other. A double rope, cable, or chain 78 is fixed by staples or otherwise to both staffs and runs therefrom around the shoes of both friction-wheels 58 and 73. The shoes are of larger diameter than their wheels, so as to spring out when released. It will be seen that they take the wear and preserve the ropes or cables and that they are readily replaced. The doubled rope is used by preference, as this permits one end to be passed between the two strands of the other, and strain on the rope in either direction does not tend to tilt or twist the friction-wheel, the torsional effort being balanced. A turnbuckle 80 is interposed in the rope to allow the latter to be tightened when rendered necessary by the stretching of the rope.

The brake-chains or motors, or both, of other cars in the train may be connected to the cable by means of the cable X, (shown in Fig. IV,) so that by operation of the one cable 78 on one car the brakes and motors of all the cars of the train may be affected.

It is designed to use a motor of high efficiency to slow speed of, say, seven hundred revolutions per minute, and to have the armature turn constantly at maximum efficiency whether the car is moving or standing still.

Before leaving one platform the motorneer locks the staff thereof and takes with him to the other platform the handle 79. To start the car, he releases the staff and turns it so as to slacken the rope on the shoe of brake-wheel 73, thus freeing the axle, and the same motion tightens the rope on the shoe of wheel 58 and prevents its rotation. The internal gear 57, being held by wheel 58, is also stationary, and pinion 55 will cause pinions 56 to rotate with their pins 59 and revolve about the pinion 55, carrying with them the crank 68 and so driving the car-axles through rod 69 with a varying speed depending upon the tension applied to the rope.

It will be seen that the speed of the armature is geared down to the extent desired by the gears 55 56 57.

To stop the car, it is merely necessary to unlock the staff 75 and turn it in the opposite direction. The motor now freely drives the nest of gears, the gear 57 running freely around, and the axles being connected by rod 69 both axles are braked. It will be seen that but little power is required of the motorneer. As soon as the shoe is clamped on either friction-wheel 58 73 the impetus of the car or of the armature will of itself tighten the grip, the rope being so arranged that said wheel will turn over toward the staff being operated. The operator thus only takes up the slack end with his staff and all the strain comes on the locked staff on the rear platform. With this form of transmitting and braking mechanism the control of the car is effectively in the hands of the motorneer, traction is obtained from all of the car-wheels, the use of the usual hand-brakes is avoided, the speed-reducing mechanism is in compact and strong form and is thoroughly protected from dust, and the parts may be freely lubricated.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination of two driving-axles having suitable cranks, a motor mounted on and between said axles by a non-yielding support, a crank operated by the motor-shaft and rigid connecting-bar hung by rigid or non-yielding support on the three cranks, substantially as set forth.

2. The combination in an electric car, of an electric motor thereon, a driving-shaft, planetary or epicyclic gear from the motor-shaft thereto, a friction-wheel on the internal gear of said planetary or epicyclic gear, a friction-wheel carried by a car-axle, brake stem or stems and a cable fixed to said stem or stems and passing around both of said friction-wheels, whereby when a brake-stem is turned in one direction friction is applied to the wheel on the car-axle and the movement of the car is arrested, while when it is turned in the op-

posite direction the cable is tightened on the friction-wheel of the internal gear and the motion of the car accelerated, substantially as set forth.

3. In an electric-railway car, the combination of a motor, an internal gear mounted on its shaft, a friction-wheel carried by said internal gear, a spring-brake band around the same, a cable wound on said band and means for increasing or decreasing the tension of the cable so as to stop or check the movement of the internal gear.

4. In an electric-railway car, the combination of a motor, an internal gear mounted on its shaft, a friction-wheel carried by said internal gear, a friction-drum on the car-axle, a spring-brake band encircling each, a continuous cable passing around said brake-bands and means for increasing or decreasing the tension of said cable.

5. In an electric car, the combination of a motor, gearing on the motor-shaft controlled by a clutch, a friction-brake on the car-axle and connections from both the clutch and friction-brake to operating devices at both ends of the car, so that either may be operated at will from either end of the car.

6. In an electric-railway car, the combination of an electric motor mounted on and between the car-axles, a driving-crank, speed-reducing gears from the motor-shaft thereto, cranked axles, a connecting-rod from said driving-crank to said cranked axles, and an outside bearing for said crank and shaft mounted on the car-axles, substantially as set forth.

7. The combination of a motor-shaft, an epicyclic gear thereon, a friction-wheel connected to the outer gear-wheel thereof, having a direct bearing on said shaft and a cable for braking said friction-wheel, whereby force applied to the cable will not twist or cant the gear or friction wheel on their shaft.

8. The combination in an electric-railway car of a motor having bar-fields, cross-yokes supported at their extremities on the car-axles, and removable side bars, all united together by said cross-yokes at the neutral points, and an armature supported centrally in said side bars.

9. In an electric-motor car, the combination of a constantly-operating electric motor and a clutch for connecting the armature of the motor with and disconnecting it from the drive-wheels; with a brake mechanism, and suitable mechanism connecting the brake and clutch, and timed for operating the two in succession.

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