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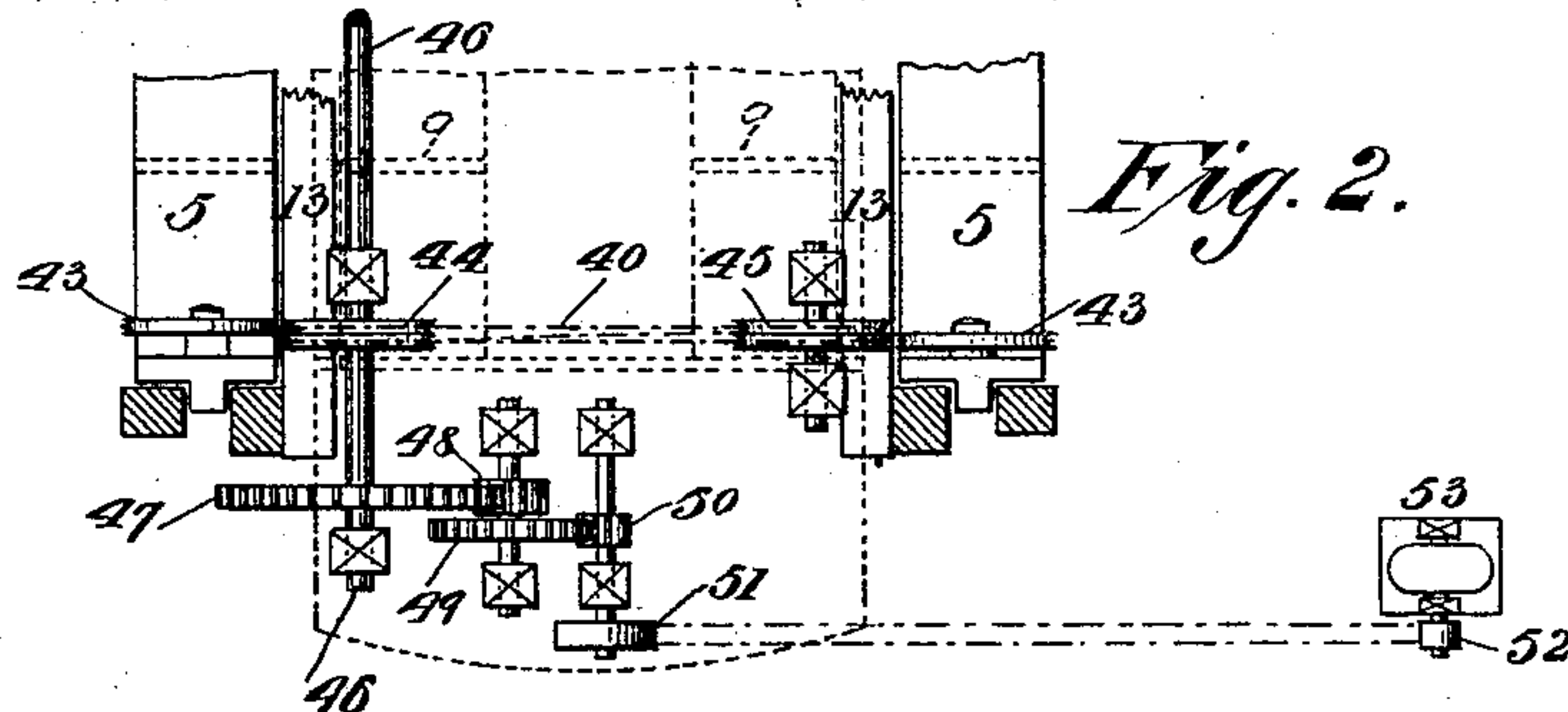
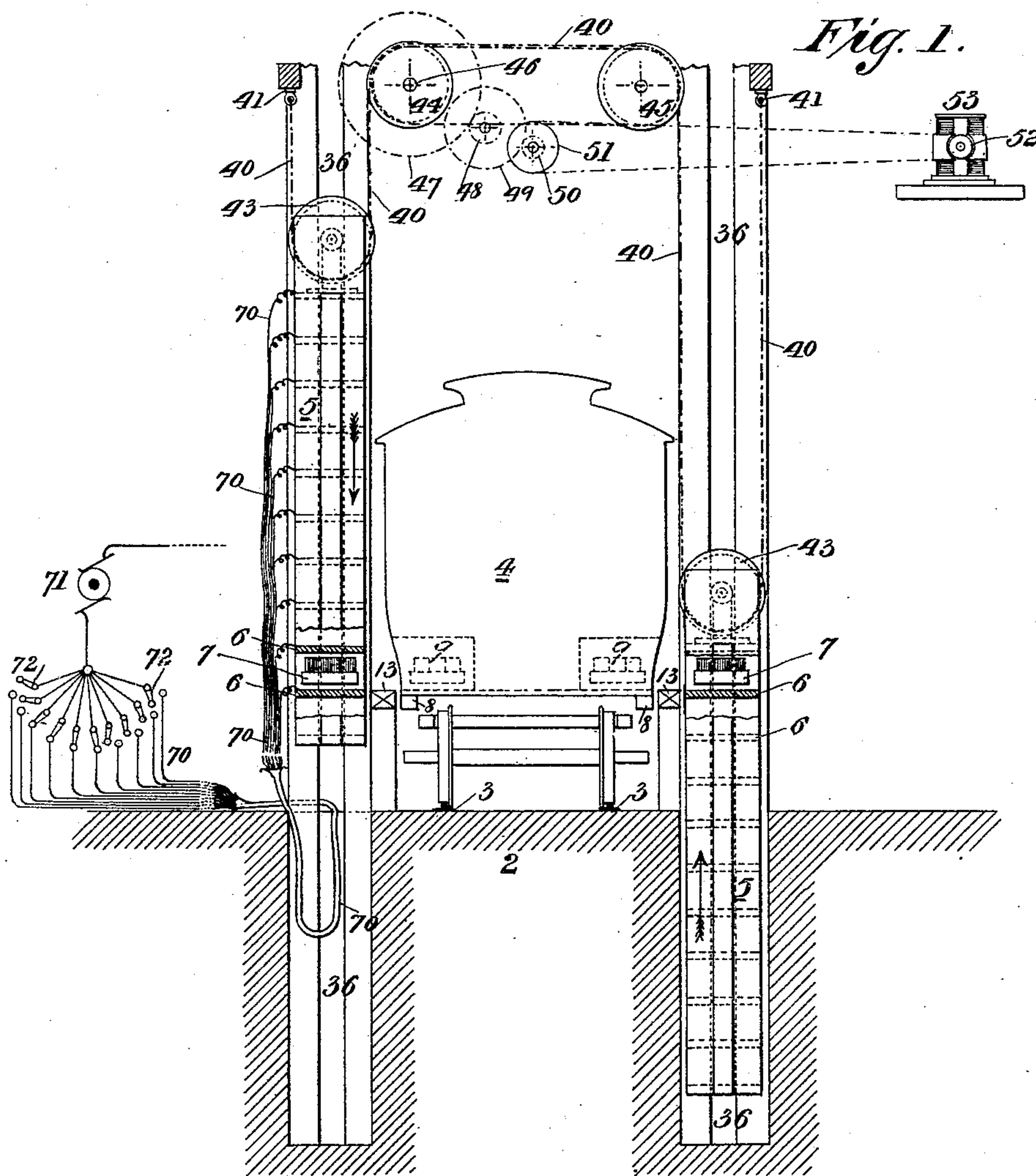
2 Sheets—Sheet 1.

F. G. CORNING.

APPARATUS FOR TRANSFERRING ELECTRIC CAR BATTERIES.

No. 434,581.

Patented Aug. 19, 1890.



WITNESSES:

*Wm. H. Broughton*  
*Aug. 19, 1890*

INVENTOR

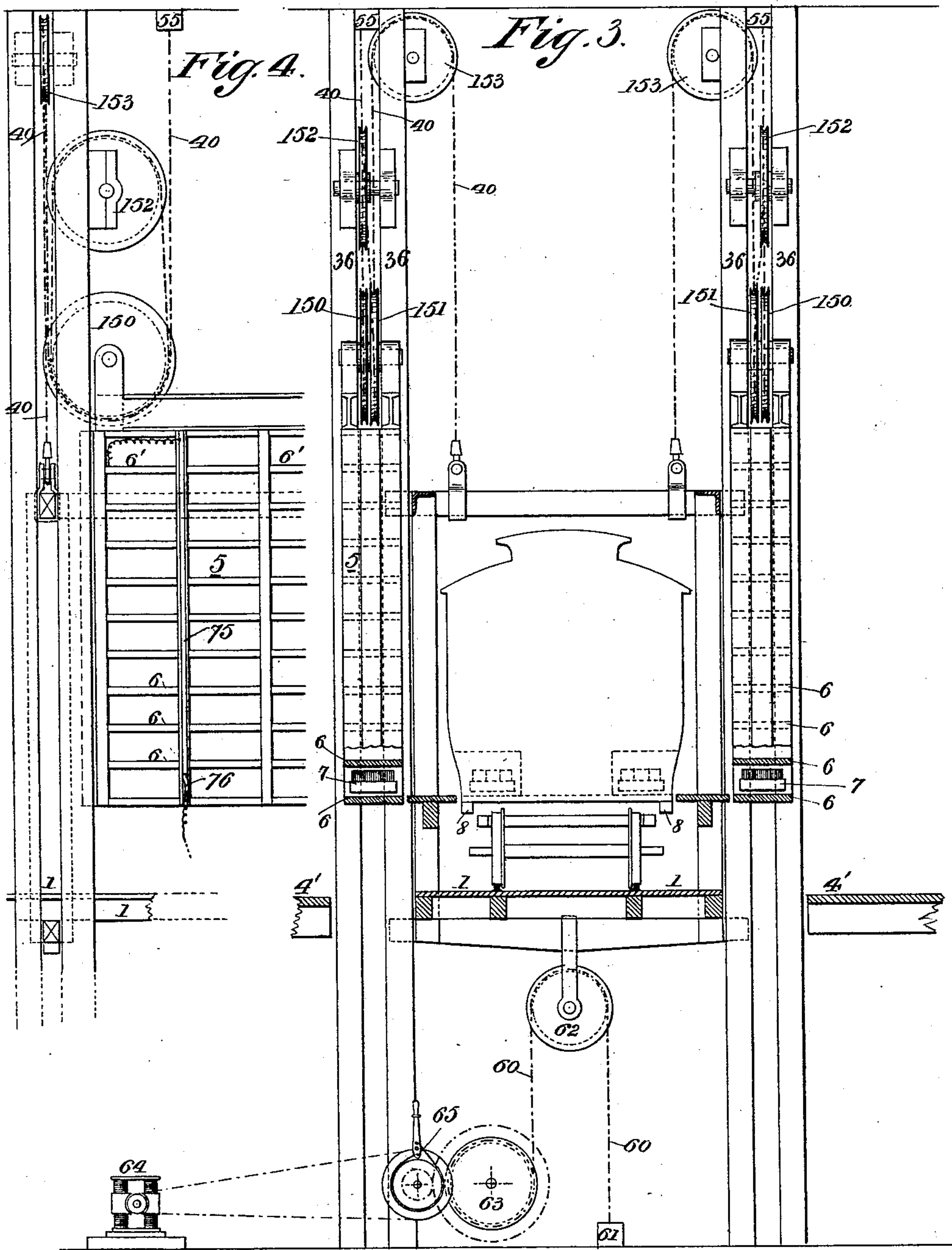
*Frederick G. Corning*  
BY *H. F. Parker.*

ATTORNEY

(No Model.)

2 Sheets—Sheet 2.

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APPARATUS FOR TRANSFERRING ELECTRIC CAR BATTERIES.  
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WITNESSES:

*Wm. J. Haupt*  
*Superintendent*

INVENTOR

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# UNITED STATES PATENT OFFICE.

FREDERICK G. CORNING, OF NEW YORK, N. Y.

## APPARATUS FOR TRANSFERRING ELECTRIC-CAR BATTERIES.

SPECIFICATION forming part of Letters Patent No. 434,581, dated August 19, 1890.

Application filed June 4, 1890. Serial No. 354,289. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK G. CORNING, a citizen of the United States, residing at the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Transferring Electric-Car Batteries, of which the following is a specification.

My invention relates to apparatus wherein "secondary batteries" or "accumulators" or other batteries are shifted between an electro-motive car and vertical series of recharging-benches wherein the storage-space is condensed and the batteries connected with recharging-circuits.

My invention consists, in conjunction with the car-stall at the recharging-station, of vertically-movable battery-racks flanking the car-track in the stall, wherein by the movement of said racks any of the vertical series of charging-benches therein may be brought to a level with the battery-receptacles in the car preparatory to shifting the battery-trays horizontally.

My invention also consists in the combination of the vertically-movable battery-racks and a vertically-movable car-receiving platform, both moving simultaneously in co-operation with each other.

My invention also consists in means for counterbalancing the weight of the racks and that of the car-platform with reference to one another, as will be hereinafter set forth.

Referring to the accompanying drawings, in which similar reference-numerals represent corresponding parts throughout the several views, Figure 1 is a sectional end elevation showing the movable battery-racks and suitable mechanism for operating the same, and Fig. 2 a partial plan view of Fig. 1. Fig. 3 is a sectional end elevation showing the movable battery-racks and a movable car-receiving platform or elevator in connection therewith, and Fig. 4 a partial side elevation of Fig. 3.

Referring to Figs. 1 and 2, 2 represents the floor of the car-stall on a permanent level; 3, the car-tracks therein; 4, an electric car having battery-receptacles 9, located in the usual manner beneath the car-seats, capable of being opened at the sides of the car, and 5 5

the battery-racks containing vertical series of charging-benches 6 6, &c., moving vertically in ways 36 for the purpose above stated.

The bed-sills 8 of the car may be brought in as close proximity as desired to the racks, according to construction. I have, however, represented interposed bridges 13, supplementing the spaces between the car and the racks, whereon the trays 7 are moved horizontally by hand or by automatic means.

The battery-racks 5 5 may be moved co-operatively or independently. Counter-weights may be connected through suitable mechanism to each rack separately—for instance, such as represented in Figs. 3 and 4, in connection with the car-elevator itself, which is therein utilized as a counter-weight. Also, the battery-racks 5 5 may be connected, whereby to counterbalance each other, as in the manner illustrated in Figs. 1 and 2, at present referred to. Herein the racks 5 5 move simultaneously in opposite vertical directions, being connected by a cable 40 at each end of the apparatus, which cables are anchored at 41 41 on the frames 36. The cables are passed around sheaves 43 43, attached to the racks, and passed in coils around the driving-sheaves 44 and idle-sheaves 45. The tension of the coil affords a purchase of the driving-sheaves thereon, and the shaft 46, bearing the driving-sheaves, therefore affords a convenient means of propelling the racks 5 5. Through a spur-gear 47 and system of gearing 48 49 50 and belt-pulleys 51 52 and electric motor 53 or other motor the racks can be operated at will. When so moved simultaneously in opposite directions, the racks 5 5 are preferably adjusted with reference to each other and to the bed-sills of the car, whereby an uppermost bench of the one series and a lowermost bench of the other series shall coincide with the level of the bed-sills at either extreme position of movement of the apparatus. The proper coincidence of benches in all other positions is thereby secured.

Referring now to Figs. 3 and 4, the battery-racks 5 5 move simultaneously in common in vertical directions, the corresponding benches 6 6 being at common levels in all positions of the respective racks. The pair of



battery-racks and the car-elevator move with reference to each other in opposite vertical directions thus simultaneously.

4' represents the floor or ground level upon which the cars are conveyed to or from the stall, and 1 the car elevating and lowering platform or section of car-track. This form of apparatus may also be used in conjunction with successive floors of a station whereon the cars are to be transported from one level to another for sundry purposes additional to that of changing batteries, in the manner described in my separate patent application, filed May 21, 1890, Serial No. 352,638.

Various counterbalancing mechanism may be applied to the movable racks and to the car-elevator independently. I have illustrated the feature of counterbalancing the one with the other, or nearly so, using the force of preponderance in co-operation with a motive force whereby the apparatus is moved.

150 151 represent separate sheaves connected to the battery-racks at each end thereof, and 152 153 separate sheaves connected to the overhead supporting-structure. The cables 40 are anchored to the said supporting-structure or other stationary point at 55, and attached at their opposite ends to the frame of the elevator 1. The weight of the elevator and car combined being much less than that of the battery-racks, the difference is compensated by the leverage obtained through the arrangement of cables and sheaves thus shown. The elevator and its car and the battery-racks may thereby be actually balanced and operated by means of cable-propelling mechanism applied to the elevator, such as illustrated in my separate patent application filed May 31, 1890, Serial No. 353,808, or by other suitable motive appliances well known to the art. In the illustration herein the battery-racks are represented as preponderating the elevator 1 and its car sufficiently to effect the upward motion of the latter when released. In this arrangement the motive power is applied beneath the elevator, a cable 60 being shown, which is anchored at 61, passed over the sheave 62, attached to the elevator, and coiled about the drum 63 of a hoisting-winch.

64 is an electric or other motor connected to drive the winch, and 65 a brake for arresting and retaining the apparatus at any position.

In the practice of my invention electrical connections are established in the racks, whereby each gang of batteries when they are received upon the benches 6 are included in the recharging-circuit. The closing of the circuit is automatically effected by suitable electrical contacts upon the battery-trays connected to the poles of the batteries and corresponding electrical contacts in the bench-racks; or when the battery-trays are shifted to the car the electrical connection is established by similar contacts in the car-recep-

tacles connected with the motor-circuit. Such electrical connections having been heretofore fully described in my patent application Serial No. 352,638, and also in various patents, will not require specific description here.

Flexible conductors 70 70, &c.—such as indicated in connection with Fig. 1—may be employed to connect the several bench-conductors in the movable racks with the generator 71, each conductor 70 being controlled by separate switches 72 72, &c., to cut out any of the circuits (or circuit branches) when a respective gang of batteries have been changed or removed from their bench.

Rheostat switches and ammeters (not illustrated) are included in the several circuit branches, whereby to enable the attendant to observe and regulate the condition of the batteries in the usual manner.

Vertical strips of metal—such as the one 75 in Fig. 4—may be employed on the racks in lieu of the flexible wires 70 to conduct the electric charging-current to each bench, stationary contact-springs 76 being attached to any suitable supports to maintain the connection. The strip 75 is represented as connecting electrically to the bench 6'. The opposite poles of the generator are connected to opposite ends of both charging-benches, although but one such connection is illustrated.

It is to be understood that my invention is not limited by the forms of operating mechanism shown; but

What I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for recharging electric-car batteries, the herein-described vertically-movable battery-racks for receiving the batteries in conjunction with a car-stall wherein the car is introduced to bring its battery-receptacles opposite the racks, and a source of electricity and conductors thereof connecting with the batteries in the said vertically-movable racks, for the purpose described.

2. The combination, with a car-stall in an apparatus for transferring electric-car batteries, of vertically-movable battery-recharging racks flanking the stall and mechanism for changing and controlling the position of said battery-racks at will, whereby to bring any of the charging-benches therein into a common horizontal plane with that of the battery-receptacles in the car, for the purposes set forth.

3. The combination, in an apparatus for transferring electric-car batteries, of a car-stall having a movable platform or section of car-track for conveying the car vertically and battery-recharging racks containing series of charging-benches flanking the stall, also movable vertically.

4. The combination, in an apparatus for transferring electric-car batteries, of a car-elevator, vertically-movable battery-recharging racks flanking the elevator and its path of movement, and connecting mechanism be-



tween the said elevator and racks, whereby the same are moved in opposite vertical directions simultaneously.

5 5. The combination, in an apparatus for transferring electric-car batteries, of a car-elevator, vertically-movable battery-recharging racks flanking the elevator and its path of movement, and connecting mechanism for

moving or permitting the movement of said elevator and racks in counterbalanced relation, or nearly so, substantially as described.

FREDERICK G. CORNING.

Witnesses:

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AUG. CREVELING.