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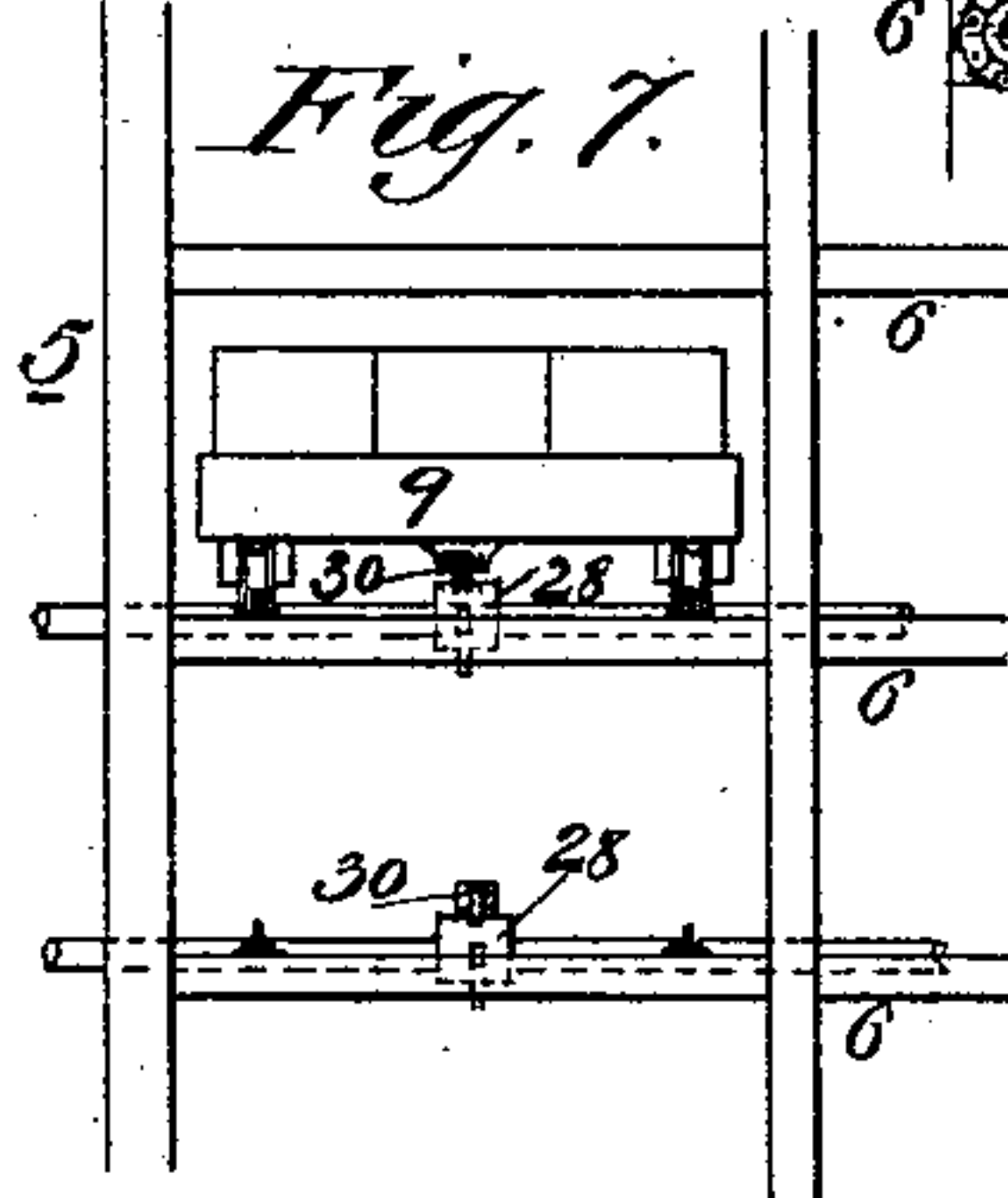
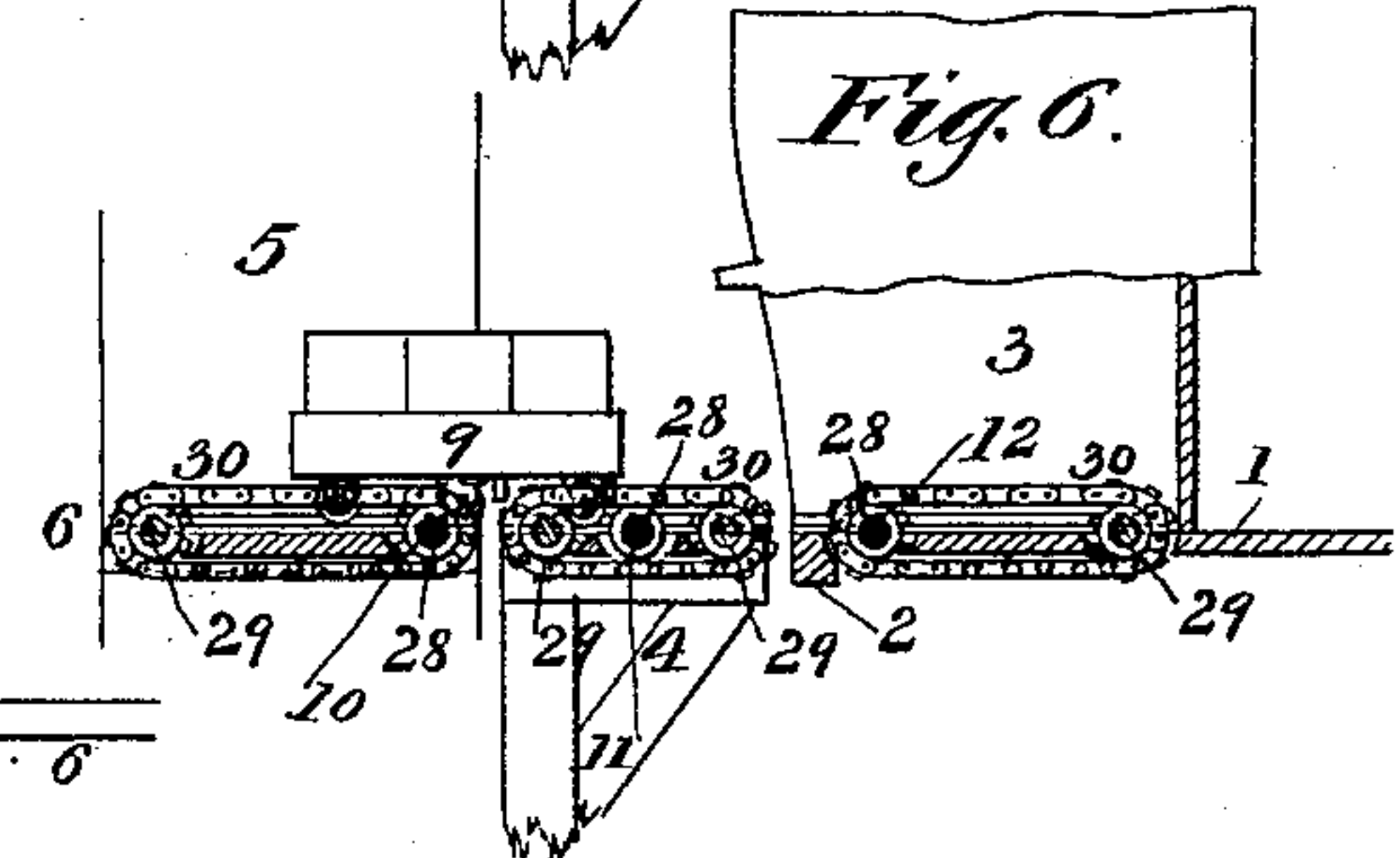
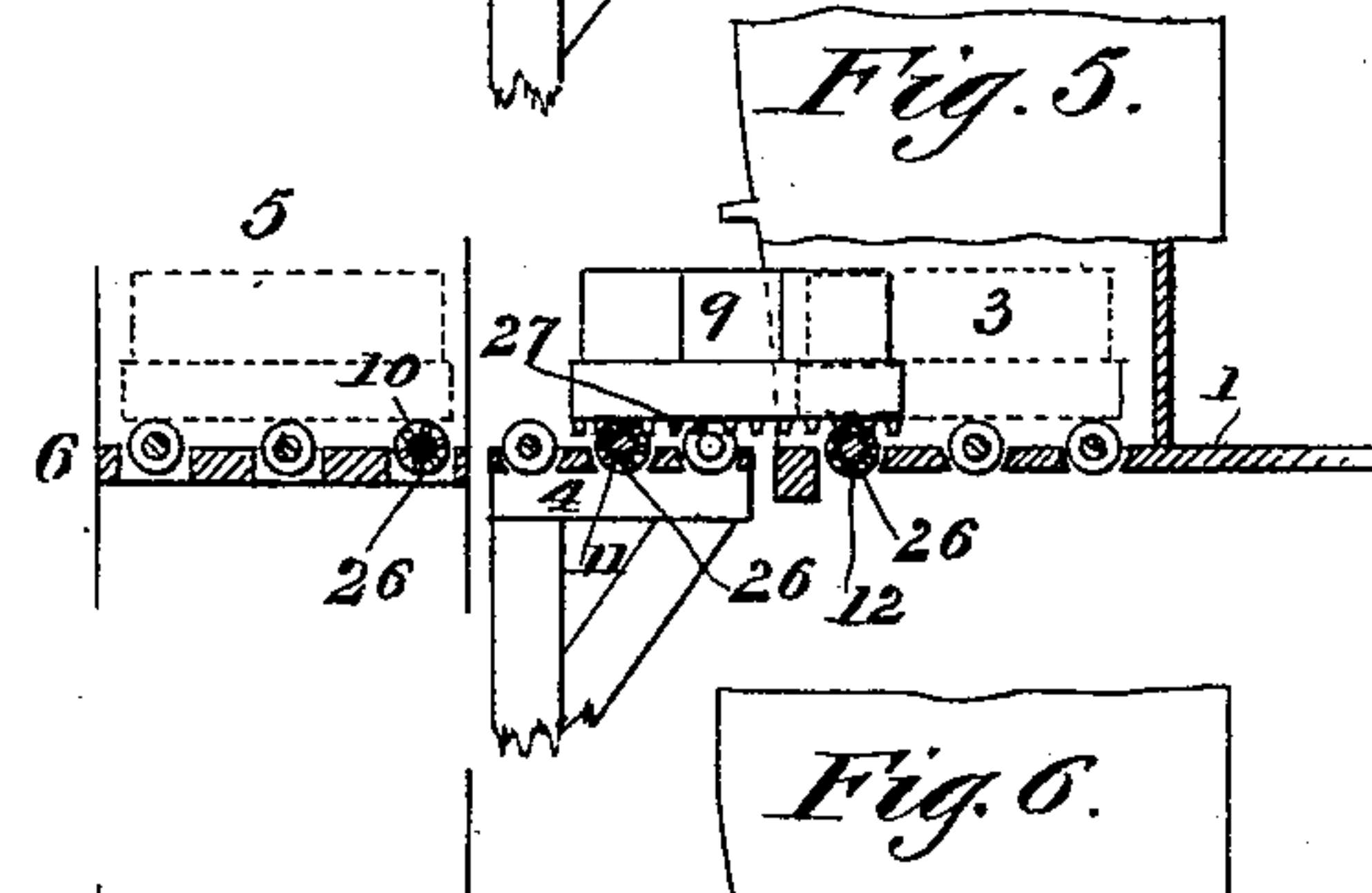
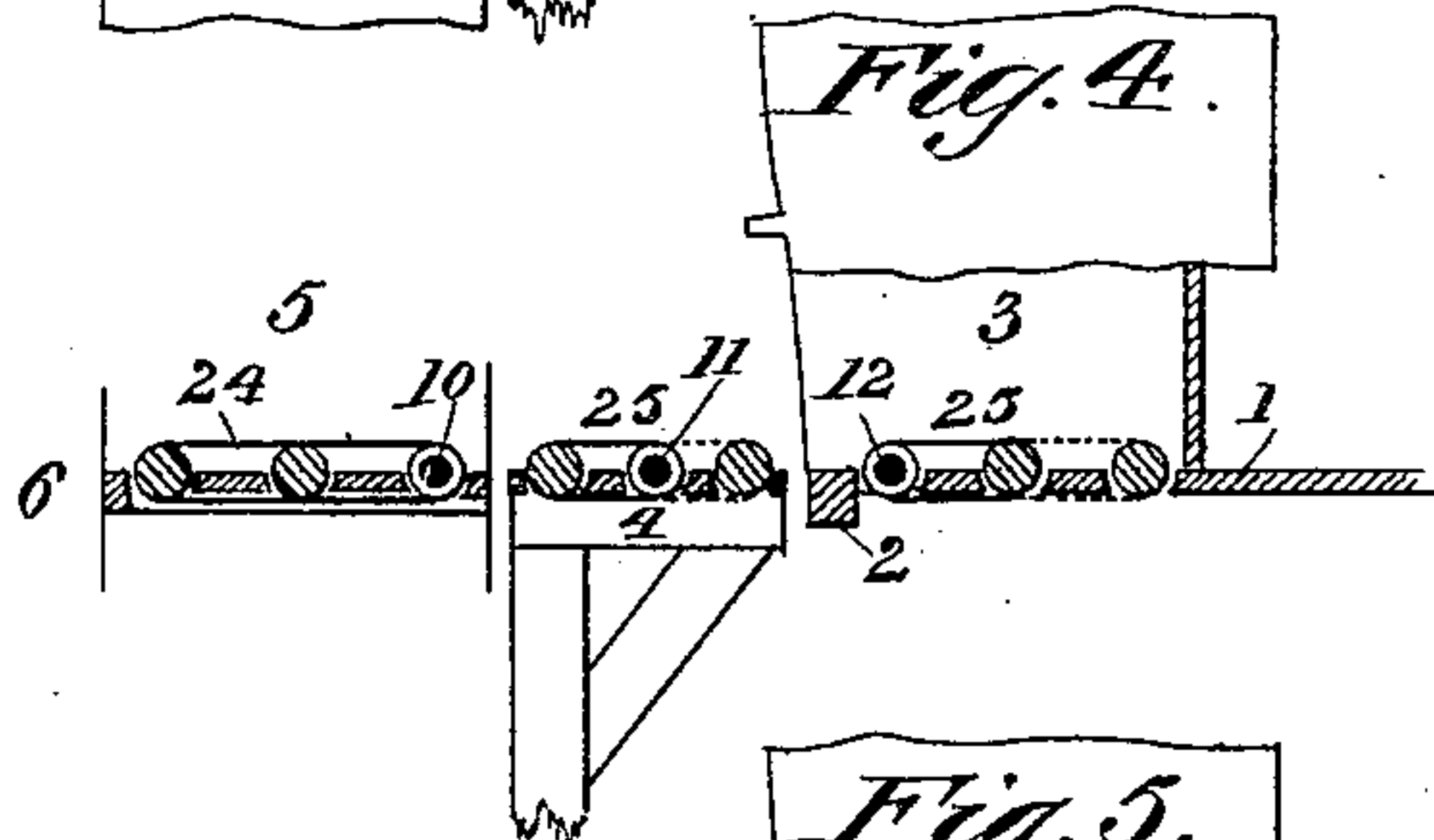
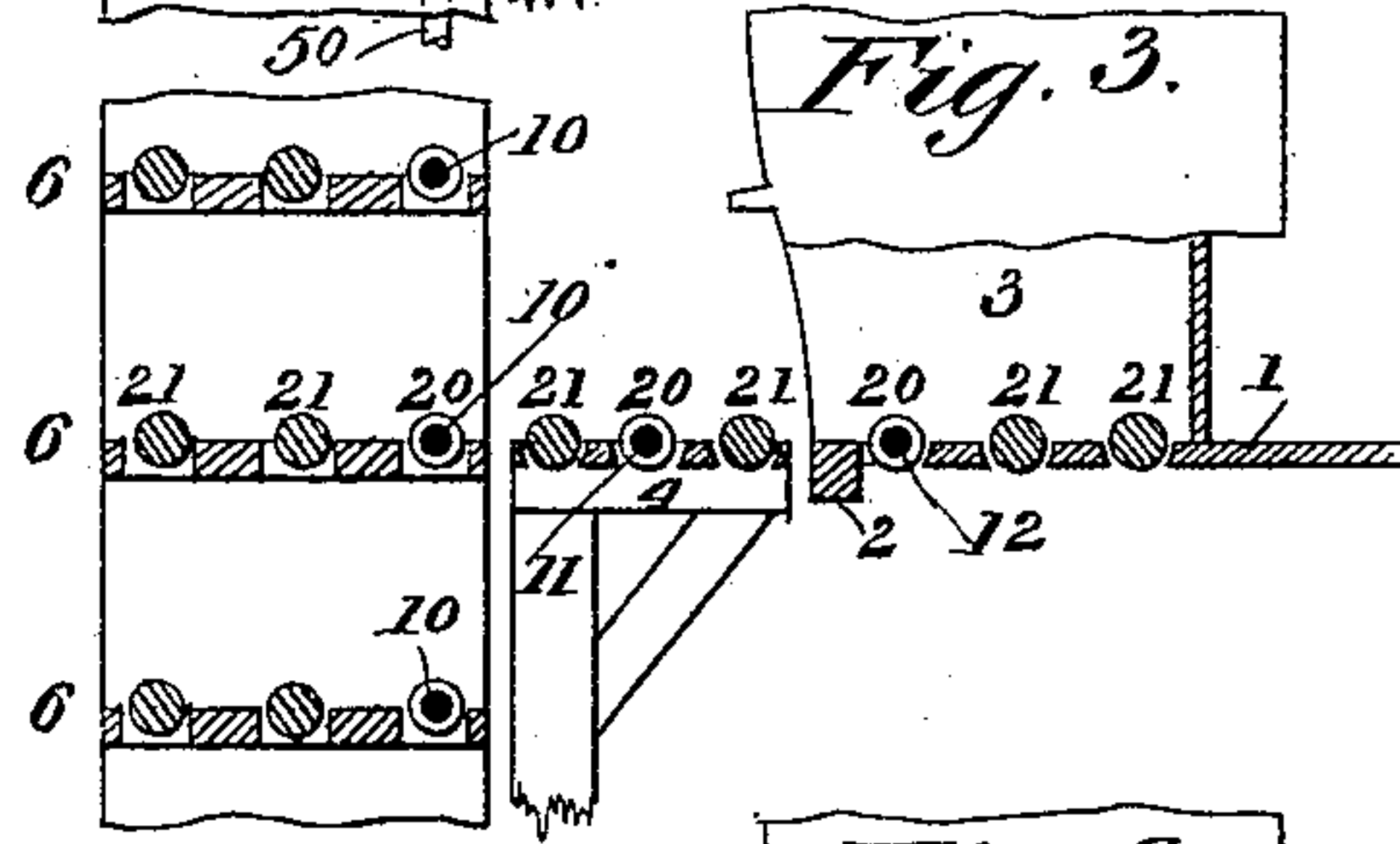
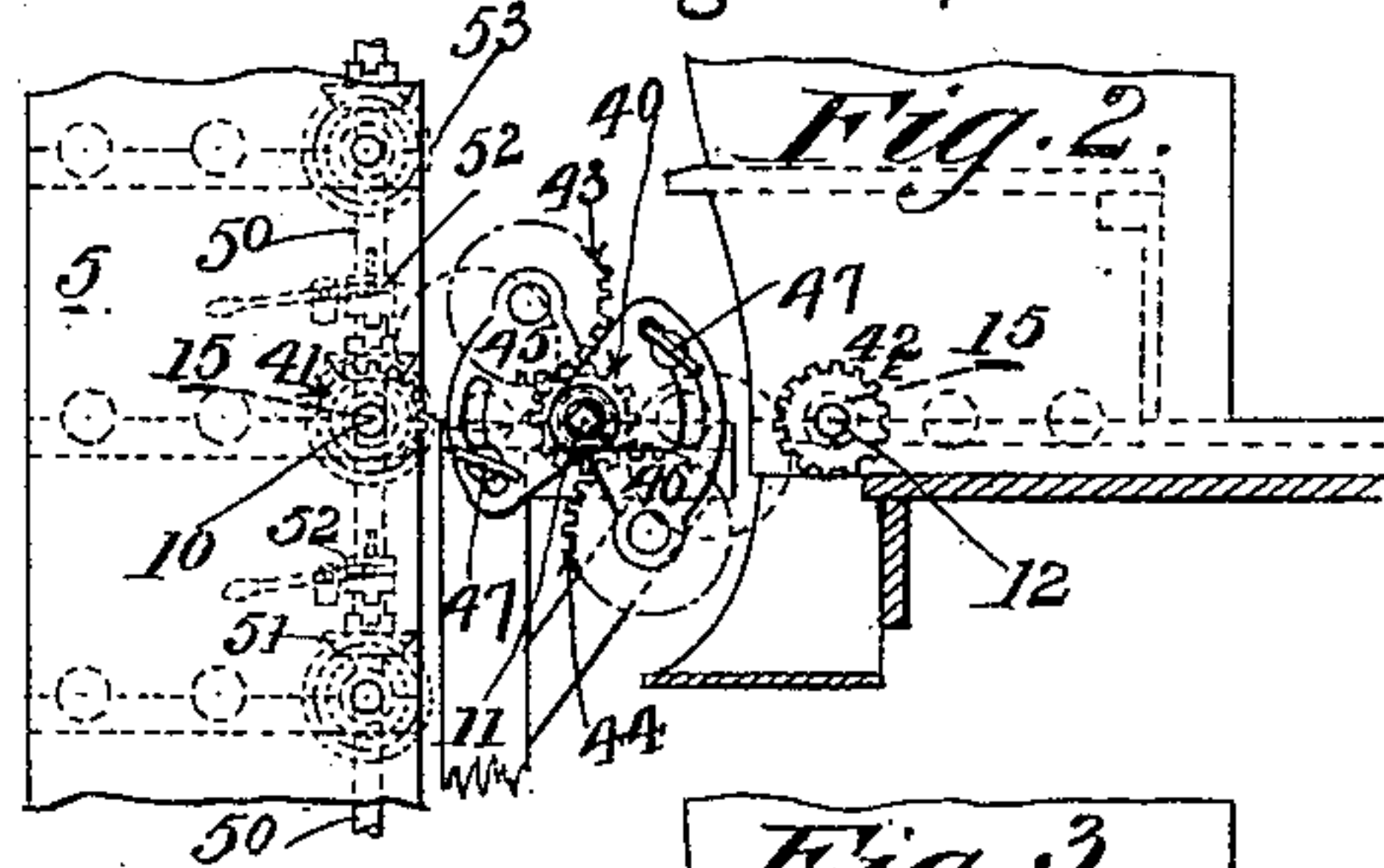
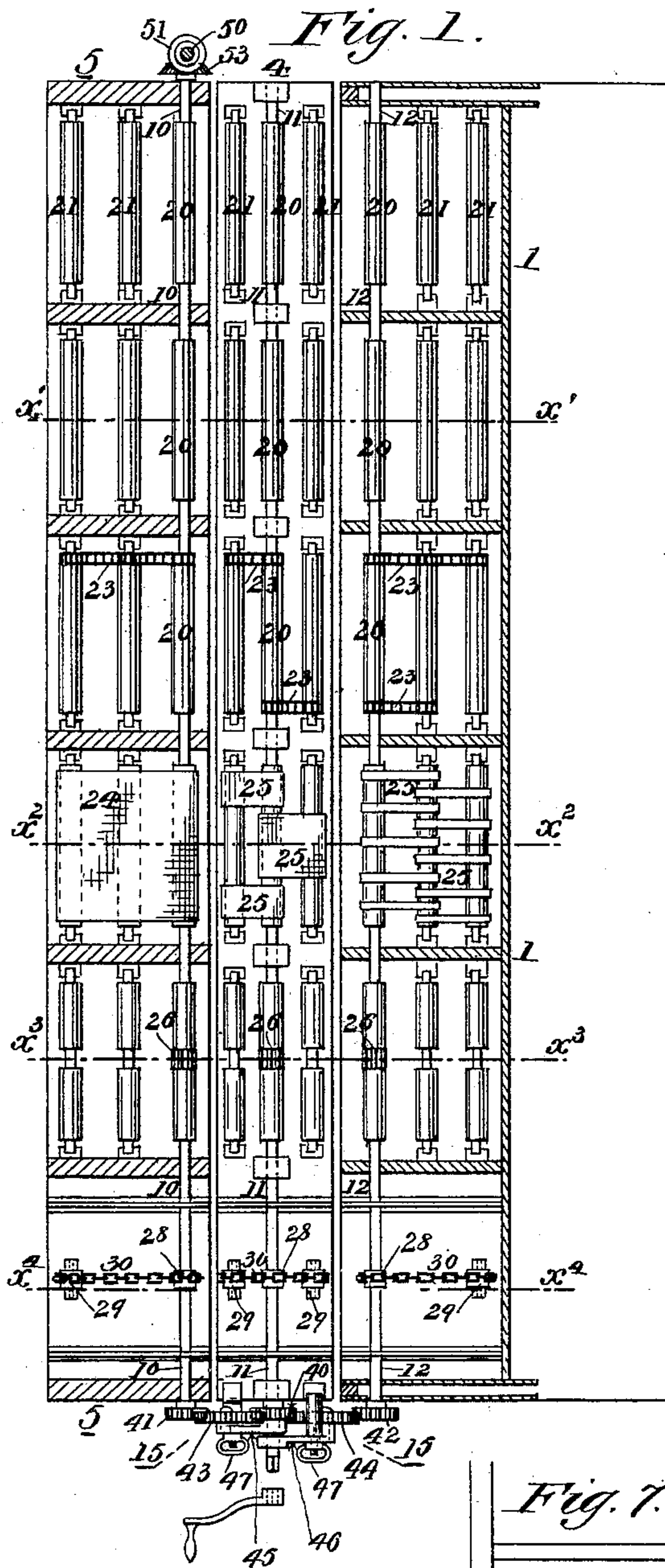
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F. G. CORNING.

MECHANISM FOR TRANSFERRING ELECTRIC CAR BATTERIES.

No. 434,582.

Patented Aug. 19, 1890.



WITNESSES:

John Cook  
Lane M. Ranney

INVENTOR

Frederick G. Corning

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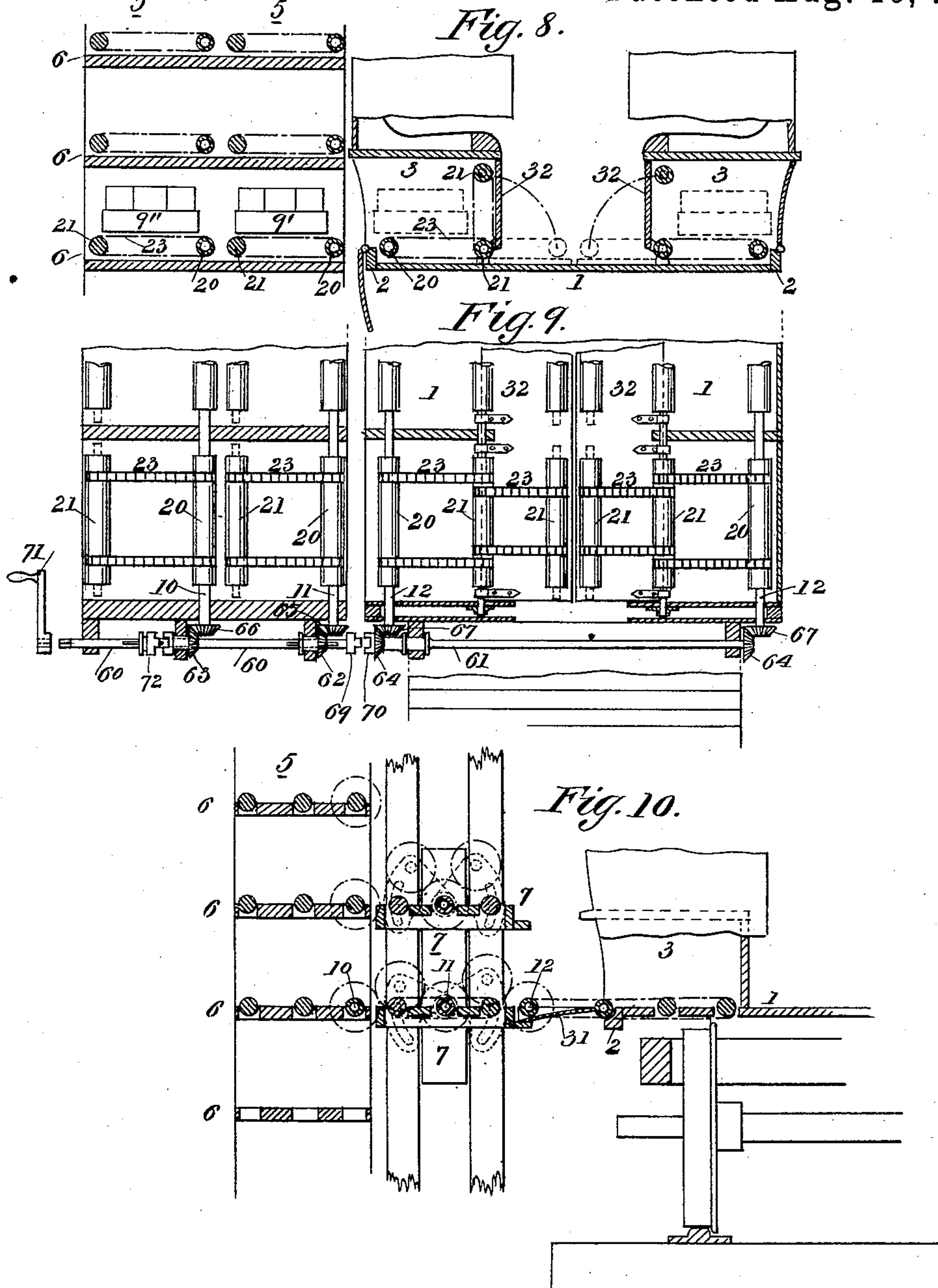
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# UNITED STATES PATENT OFFICE.

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

## MECHANISM FOR TRANSFERRING ELECTRIC-CAR BATTERIES.

SPECIFICATION forming part of Letters Patent No. 434,582, dated August 19, 1890.

Application filed June 9, 1890. Serial No. 354,791. (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 Mechanism for Transferring Electric-Car Batteries, of which the following is a specification.

My invention relates to devices for substituting charged "secondary batteries" or "accumulators" for the exhausted ones in an electric car wherein the motive power is derived from batteries located upon the car itself.

My invention is applicable to all the various forms of apparatus described in my separate patent applications serially numbered 352,638, 353,272, 353,808, and 354,289, in which the car or the charging-benches, or both, are moved vertically to bring the horizontal transferring-surfaces into coincidence; and my invention is also applicable to apparatus in which the batteries are transferred between a stationary charging-rack and a stationary car by means of an independently-movable hoist or carrier such as heretofore described in various patents.

The object of my invention is to shift an entire gang of batteries simultaneously from bench to car, or vice versa, automatically, effecting a great saving of time.

To this end my invention consists, in conjunction with a horizontal transferring surface or way upon or through which the batteries are to be shifted, of propelling wheels or rolls stationed in the paths of movement of the battery-trays to engage them either by frictional or positive contact; and my invention also consists, in conjunction with such rolls or other propelling-surfaces in the paths of the several trays, of means for moving all of the said surfaces (or any plural portion of them) simultaneously from a common point or source of power application, and, moreover, in disconnective transmitting mechanism for driving the propelling-surfaces of the charging-benches, the car-receptacles, or other horizontal ways that are brought into temporary coincidence. Such instrumentalities as rolls, pinion-gears, and sprocket or other wheels are herein treated as equivalents, as also the instrumentality of webs, belts, or sprocket-chains as additional thereto are to be regarded

as equivalents, all included within the meaning of the term "propelling-surfaces." The employment of plane contact-surfaces or racks or spurs on the trays are furthermore included within the meaning of the term "rectilinear contact-surfaces."

Referring now to the accompanying drawings, Figure 1 is a horizontal section representing one side of an electric car, a portion of a battery-rack and a transferring-bridge between the car and the rack, showing my invention applied thereto with various modifications of the propelling rolls or surfaces. Fig. 2 is an end elevation of the same parts, showing one form of disconnective transmitting-gearing between the driving-shafts arranged to be coupled and uncoupled. Fig. 3 is a cross-section on the line  $x' x'$  of Fig. 1; Fig. 4, a cross-section  $x^2 x^2$ ; Fig. 5, a cross-section  $x^3 x^3$ , and Fig. 6 a cross-section  $x^4 x^4$  of Fig. 1. Fig. 7 is an enlarged side elevation of a portion of the charging-rack and one of the trays of the series  $x^4 x^4$  in Figs. 1 and 6. Figs. 8 and 9 are cross-sectional and plan views, respectively, showing the application of the invention to a double bench and other features of apparatus described in my aforesaid application, Serial No. 353,272, and also showing a modification of the disconnective transmitting-gearing between the driving-shafts. Fig. 10 is a cross-section of a portion of the car, the charging-rack, and an intermediate hoist or carrier for the batteries, illustrating the further application of my invention.

1 represents the floor of the car; 2, the bed-sill thereof; 3, one of the battery-receptacles located in the usual manner beneath the seats.

In Figs. 3 to 6, inclusive, 4 represents a transferring-bridge, which is always on a level with the floor of the said battery-receptacles in the car.

5 is the battery-charging rack composed of several horizontal benches 6 6, &c., arranged in vertical series, wherein through suitable electrical connections the batteries are recharged when deposited therein.

The car and bridge 4 may be conveyed vertically together by means of an elevating-platform, or, the car and bridge being stationary, the battery-rack 5 may be moved vertically, or both the car and the battery-rack



may move in co-operation, whereby to bring the receptacles 3 directly opposite any of the benches 6. The bridge 4 may be omitted, as in Fig. 8, the car and rack being in juxtaposition. Again, the car and rack 5 may be permitted to remain stationary, using a separate hoist or carrier 7 as the means of distributing and substituting the batteries.

In Figs. 1 to 7, inclusive, 10 is the driving-shaft of the propelling mechanism in the charging-rack; 11, the driving-shaft on the bridge, and 12 that in the car, each extending the entire length of the gang of batteries. The shafts 10 11 12 are connected by gearing 15 to rotate in a common system. The rotary propelling-surfaces on the shafts or operated by them are located at successive intervals in the paths of the trays, the latter being propelled thereby simultaneously in ranks throughout their course of travel to or from the benches or the car, or upon intermediate transferring-surfaces.

20 represents frictional propelling-rolls upon the driving-shafts 10 11 12, which rolls equal or nearly equal the breadth of a tray and engage therewith on the plane under sides, the friction upon such propelling-rolls due to the weight of the trays being sufficient to propel the latter over the idlers 21 21, &c., intermitting the positions of the said propelling-rolls. The propelling-rolls 20 are located at suitable intervals in the paths of the trays, whereby the leading end of the tray shall have frictional contact with one roll 20 before its following end passes out of contact with the preceding one, rendering the propulsion continuous. Should it be desired to assign the propelling function to all of the rolls 20 and 21 the latter may be connected to the former, as illustrated in Fig. 1, by sprocket-chains 23.

Webs 24, of any suitable flexible material or belts 25, may be employed in addition to the rolls, whereby to extend the propelling-surface, as shown in Figs. 1 and 4.

In order to insure positive contact and perfect alignment of the ranks or gangs of batteries, the pinions 26 may be employed as a part of the propelling-rolls (or the rotary surface other than the pinion-teeth may be dispensed with, the trays being supported upon suitable tracks, as in Fig. 7) and the bottoms of the trays provided with racks 27, as shown in Figs. 1 and 5. Again, sprocket-wheels 28 on the driving-shafts and idlers 29 corresponding thereto, bearing sprocket-chains 30, may be employed and operated in the same manner as are the belts 25, the trays engaging with the chains by means of spurs or projections beneath them, as illustrated in Figs. 1, 6, and 7, the trays being supported on rollers or track-wheels in any of the modes described. As seen in Figs. 8 or 10, in locations where the trays are to be transported over a swinging bridge—such as the bridge 31, forming a portion of the side of the car when closed, or the bridge 32, such as described in my aforesaid application, Serial No. 353,272—some of

the propelling-rolls or equivalent or the idlers may be concentric with the hinges of the bridge, or have a continuous shaft forming such hinge, and the belts or chains passed over them in the manner illustrated forming a continuous propelling-surface when the bridges are let down.

Referring now to the disconnective transmitting mechanism, that in Figs. 1 and 2 consists of a driving-gear 40 on the bridge-shaft 11, driven gears 41 42 on the other shafts 10 12, and transmitting-gears 43 44 on the sectors 45 46 maintaining engagement with the gear 40. The sectors 45 46 are pivoted on the shaft 11, and may be clamped in different positions by means of hand-nuts 47. When the car is moved into the stall or onto the elevator, as the case may be, opposite the bridge, and coincidence of both is obtained with one of the charging-benches, the transmitting-gears 43 44 are engaged and clamped in position and operated by means of a crank applied to the shaft 11. It will be seen that such gears will readily intermesh should the transferring-surfaces for the batteries not be brought into perfect coincidence. When the batteries have been shifted, the gear 43 is returned to its disengaged position preparatory to bringing a different bench into coincidence by the movement of the car or bench-rack, or both, or both gears 43 and 44 disengaged preparatory to moving the car out of the stall.

Power may be applied to any of the shafts 10 at will and thence to the other shafts by a vertical driving-shaft 50, (shown in Fig. 1 and by dotted lines in Fig. 2,) said shaft being driven by a suitable motor, and having loose bevel-gears 51 connected or disconnected with it by clutches 52, said loose gears intermeshing with bevel-gears 53 upon the shaft 10. In Fig. 10 a similar transmitting mechanism as that in the foregoing description is indicated by dotted lines. In Fig. 9 I have illustrated a modified form of disconnective transmitting mechanism, consisting of counter-shafts 60 61, bearing bevel-gears 62 63 64, which engage with bevel-gears 65 66 67, respectively, on the shafts 10 11 12. The counter-shaft 60 is movable lengthwise through the gears 62 63, rotatively engaging with them in all positions, (by means of a spline and groove,) and on the adjacent ends of the shafts 60 and 61 there are clutch-faces 69 70, which when brought opposite one another at the time of coincidence of the car and bench may be engaged by thrusting the shaft 60 endwise, all the parts then being rotated by a crank 71 or power appliance.

Benches 66 of double width are represented in Figs. 8 and 9; also, a continuous transferring-way across the car. Two ranks of batteries in a bench may be transferred to opposite sides of the car by employing a clutch 72, whereby the gear 63 and shaft 10 and its connected propelling-surfaces are disengaged until the first battery-tray—for instance, 9' in Fig. 8—has been moved a proper distance



in advance of the other tray—for instance, 9"—when by closing said clutch both trays subsequently advance simultaneously until their respective positions under the opposite car-seats are reached. The same operation is reversed in removing the exhausted batteries from the car.

Having now thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the horizontal transferring surfaces, ways, or repositories, such as described, in a battery-changing apparatus, of propelling-rolls stationed at successive intervals in the paths of the trays engaging with rectilinear contact-surfaces on said trays, for the purpose set forth.

2. In a battery-changing apparatus, the combination, with the horizontal transferring surfaces, ways, or repositories, such as described, movable into different levels with reference to one another, of the rotary or orbital propelling-surfaces, driving-shafts therefor on each such surface, way, or repository, extending the length of a rank of batteries, and disconnective transmitting mechanism, substantially as described, between the said shafts, for the purposes set forth.

3. The combination, with the charging-benches and the car, (or intermediate bridge or hoist,) of mechanism for transferring the batteries automatically, consisting of propelling-rolls or their equivalent located at successive intervals in the paths of the battery-

trays upon such benches and car, (or intermediate parts,) and driving-shafts connected to the said rolls extending the length of a rank of trays to be moved simultaneously.

4. The combination, with the charging-benches and the car, (or intermediate bridge or hoist,) of mechanism for transferring the batteries automatically, consisting of propelling-rolls or their equivalent located at successive intervals in the paths of the battery-trays upon such benches and car, (or intermediate parts,) driving-shafts connected to the said rolls extending the length of a rank of trays to be moved simultaneously, and disconnective transmitting mechanism between the said driving-shafts, substantially as described.

5. The combination, with the charging-benches and the car, (or intermediate bridge or hoist,) of mechanism for transferring the batteries automatically, consisting of propelling-rolls or their equivalent located at successive intervals in the paths of the battery-trays upon such benches and car, (or intermediate parts,) driving-shafts for the rolls, idlers alternating or succeeding the rolls in the said paths of movement of the trays, and belts or their equivalent distended between said rolls, for the purposes set forth.

FREDERICK G. CORNING.

Witnesses:

JOHN COOK,  
FRANC. M. RANNEY.