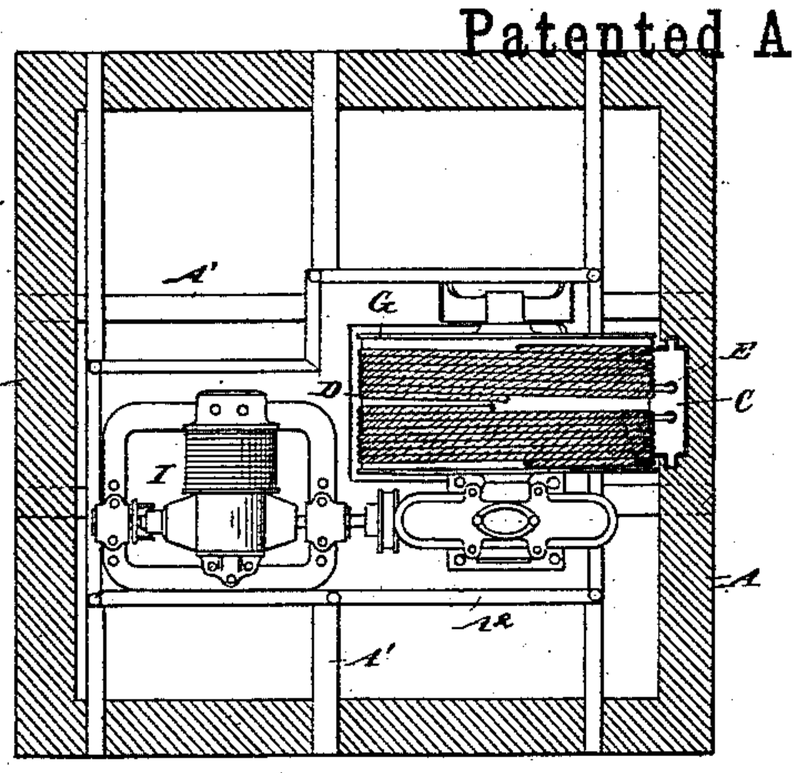
(No Model.)

G. H. REYNOLDS.

ELEVATOR.

No. 458,429. Patented Aug. 25, 1891.

Fig: 2.



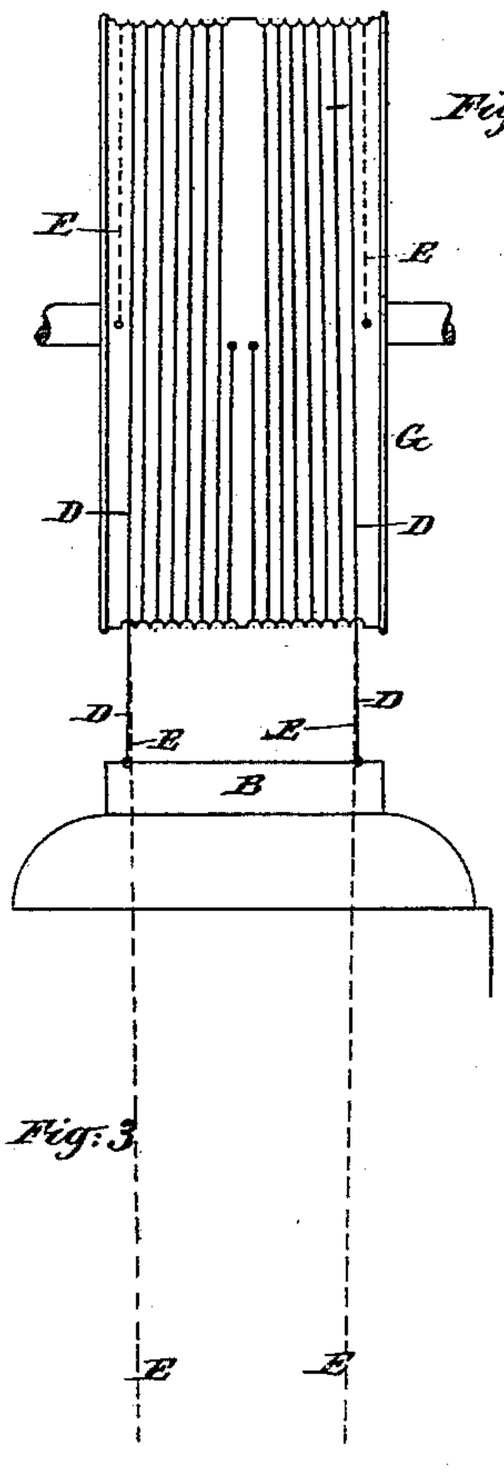
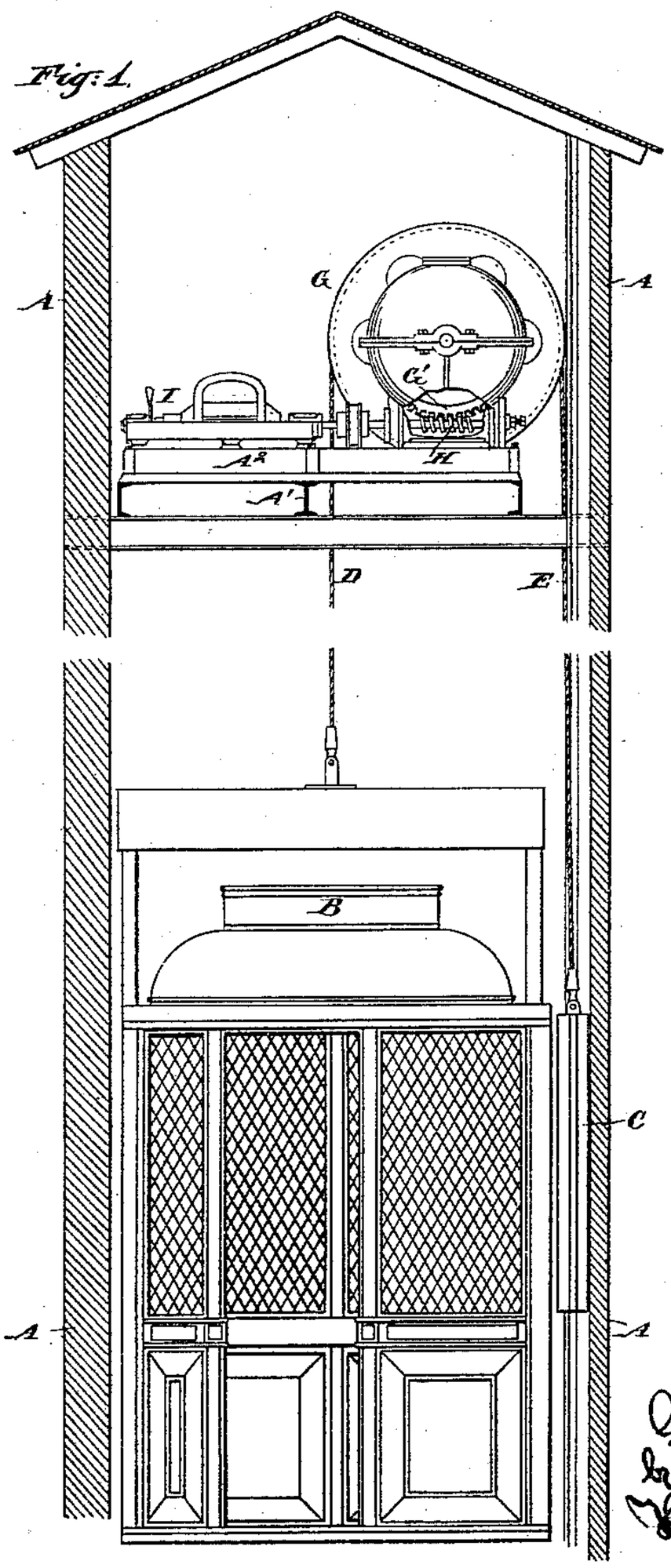


Fig: 3.

Fig: 1.



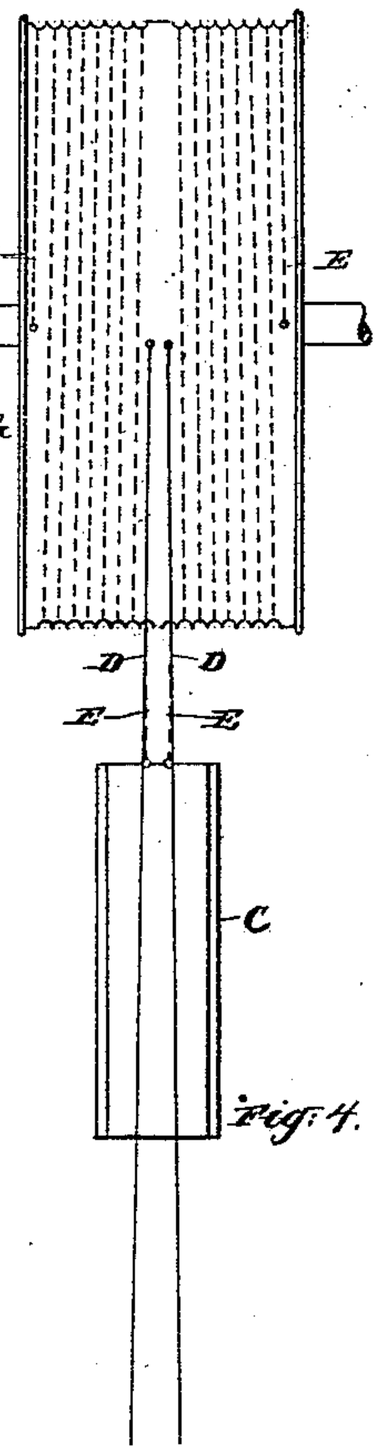
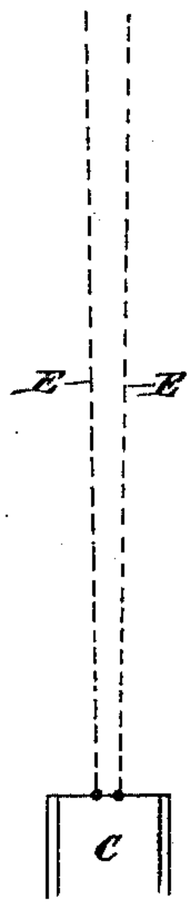
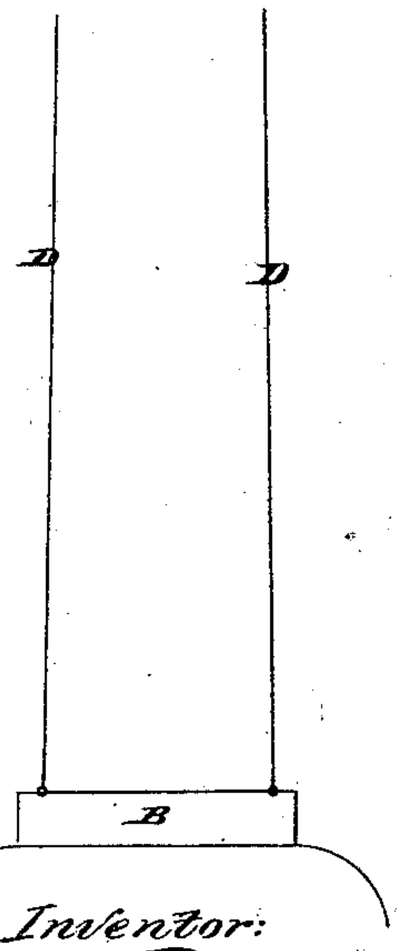


Fig: 4.





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Thomas Drew Sutton

UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y., ASSIGNOR TO THE AMERICAN ELECTRIC ELEVATOR COMPANY, OF SAME PLACE.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 458,429, dated August 25, 1891.

Application filed December 27, 1890. Serial No. 375,948 (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, a citizen of the United States, residing in the city and county of New York, in the State of New York, have invented a certain new and useful Improvement in Elevator-Operating Mechanism, of which the following is a specification.

The improvement is intended more particularly for passenger-elevators in hotels, office buildings, &c.; but it may be used with advantage in elevators for carrying freight and passengers in manufactories and in other situations, as mines, wherever it is possible to place the hoisting apparatus above the load to be raised. In the most complete development of the invention I drive the elevator by an electric motor and arrange the entire mechanism at the top of the hoistway, with a resulting economy in space occupied and in the quantity of rope exposed to wear in raising and lowering the car and the balance-weight. I have devised an arrangement of the ropes which allows the drum to be reduced in diameter or in length, or both, to serve for a given height of elevator and also to counterbalance the weight of the car and any portion of the load to be carried in the car. This is accomplished by attaching the counterbalance cables directly to the drum instead of to the car, as is usually done. By my peculiar arrangement of cables I do not require any sheaves or extra mechanism to carry the counterweight-cables, but at all times lift directly upon the weight and upon the car, and the cables always lead fairly into the grooves on the drum.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is a side elevation showing the parts at the top and bottom of the hoistway, the middle portion, which may be of any desired length, being cut out to save space. Fig. 2 is a plan view of the hoisting mechanism with a horizontal section through the inclosing-walls. Figs. 3 and 4 are diagrams illustrating the action of the cable and drum. They are face views on a larger scale with the hoistway shortened. Fig. 3 shows the car in its highest and the balance-weight in its lowest position, and Fig. 4 shows these conditions reversed.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is the inclosing wall of the hoistway; A′, a floor, and A^2 the bed-plate of the mechanism, which is arranged in the top of the elevator-well or hoistway.

B is the car; C, the balance-weight; D and E, the ropes which connect, respectively, to the car and weight, and G the drum on which the ropes are wound and unwound as the car is raised and lowered.

On the axis of the drum G is a worm-wheel G′. (See Fig. 1.) It is engaged by a worm H, which, when the elevator is worked, is rotated alternately in one direction and the other by a rotary electric motor I. This motor may be a dynamo with a reversed action with provisions for controlling it by a cord or cords extending up and down.

I do not confine myself to an electromotor, as I may use any other power, such as a direct-acting steam-engine or by belting from shafting.

There are two ropes D, which connect from the drum to the car, and two ropes E, which connect from the drum to the weight. Each is a counterpart of the other and wound in the opposite direction on the drum. A description of one of the ropes D and the corresponding rope E will suffice for both. The periphery of the drum is grooved helically, the groove being of sufficient size to accommodate one turn of the rope D, which hoists and lowers the car B, or one turn of the rope E, which hoists and lowers the balance-weight C. I arrange that the same groove shall serve alternately for the hoisting-rope D and the weight-rope E. Suppose the hoist-rope D to be alone attached at first at the proper part of the drum. The car is at the bottom of its course and the long rope is nearly all out. Now revolve the drum in the proper direction and wind the several turns of the hoist-rope D and hoist the car until it is nearly at its highest point and this helical groove in the drum is nearly

filled. Now attach by inserting in a proper hole in the small portion of the groove which remains unfilled the rope E and let it extend downward from the opposite side of the drum and connect the weight C, which is under these conditions at the bottom of its course. Now revolve the drum in the direction to lower the car and it will hoist the weight, and the successive coils of the weight-rope E as they are accumulated on the drum will each lie in the portion of the groove which has just been vacated by the unwinding of the hoist-rope D. When the car is down, the weight will be up, and nearly the whole of the weight-rope E will be held in the same groove which a brief period before held nearly the whole of the hoist-rope D. Reverse the motion of the drum again and the weight will move down, laying bare turn after turn of the groove in the drum, and the hoist-rope D will closely follow it, filling each turn. As soon as any portion of the groove is emptied of the weight-rope it will be filled with the hoist-rope. There need not be but a half-turn of the groove empty between the point where one rope is being delivered off and the point where the other rope is being wound on.

The two hoist-ropes D D are attached to the car or to the safety-levers (not represented) on the top of the car at such a distance apart as allows for the traverse of the ropes on the drum to keep them in line with the helical grooves. When the car is quite to the top, the short lengths of rope extending from it to the drum stand slightly inclined, as shown in strong lines in Fig. 3. When the car is down, they still stand obliquely and in line with the helical groove, as shown by the strong lines in Fig. 4.

The two weight-ropes E E are attached to the weight at points near together. When the weight is up, the short lengths of rope therefrom stand slightly inclined, as shown by dotted lines in Fig. 4. When the weight is down, the ropes E extend to points near the ends of the drum and are similarly inclined, the inclination (shown by dotted lines in Fig. 3) being always in line with the rope-grooves on the drum.

By reason of the fact that the drum is at the top and that the cables extend direct to the car and weight respectively I save much length of cable exposed to wear, and reduce the cost and friction due to the employment of the several pulleys for changing the direction of the cable, and by reason of the fact that the cables extend in lines tangential to the helical grooves on the drum in all parts of the course of the car and weight I insure that the cables are self-guided in being wound on and without friction in being unwound.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. I can dispense with the grooves in the drum and wind and unwind the cables from a smooth cylindrical drum; but in such case the effect of the invention, used either with or without traversing-guides, is the same as described, the cables being each wound on and off in the line exactly coinciding with that which lies in its helical coils on the drum. I can use a single pair of cables, by which I mean only one hoisting and one balance-weight cable, but with such there would be a slight lateral force on the car and weight. With the two, as shown, there is no such disturbing force.

I claim as my invention—

1. In elevating mechanism, a hoisting-drum mounted at the top of the hoistway, with suitable operating means therefor, in combination with a hoisting-cable and a counterweight-cable wound thereon in opposite directions and close together, so that the cables alternately occupy the same place in winding on and paying off, substantially as herein specified.

2. In elevating mechanism, a hoisting-drum mounted at the top of the hoistway, with suitable operating means therefor, in combination with two hoisting-cables attached to the car and two counterweight-cables with suitable counter-weight therefor wound on said drum in the manner shown, one pair of cables being attached near the mid-length and winding toward the ends, respectively, and the other pair being attached toward the center, respectively, all arranged for joint operation substantially as herein specified.

3. In elevating mechanism, a hoisting-drum mounted at the top of the hoistway, with suitable operating means therefor, in combination with a hoisting-cable and a counterweight-cable wound thereon in opposite directions, and attached, respectively, the one near the center and the other near the outer edge, so that in winding and unwinding the cables are drawn at an angle coincident with that in which they are laid on the drum, substantially as herein specified.

4. In apparatus for operating elevators, the combination, with the cage and counter-weight, of the drum G, located near the top of the elevator-shaft, having helical grooves adapted to be occupied alternately by the hoisting and counterweight cables, worm-wheel G′, moving with said drum, worm H, meshing with said worm-wheel, and a motor for actuating the worm, all arranged to operate substantially in the manner and for the purpose specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

GEO. H. REYNOLDS.

Witnesses:
DORA REINERS,
FRANK CREELMAN.