No. 652,301. Patented June 26, 1900.

W. C. STOKES.

ELEVATOR.

(Application filed Feb. 21, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2

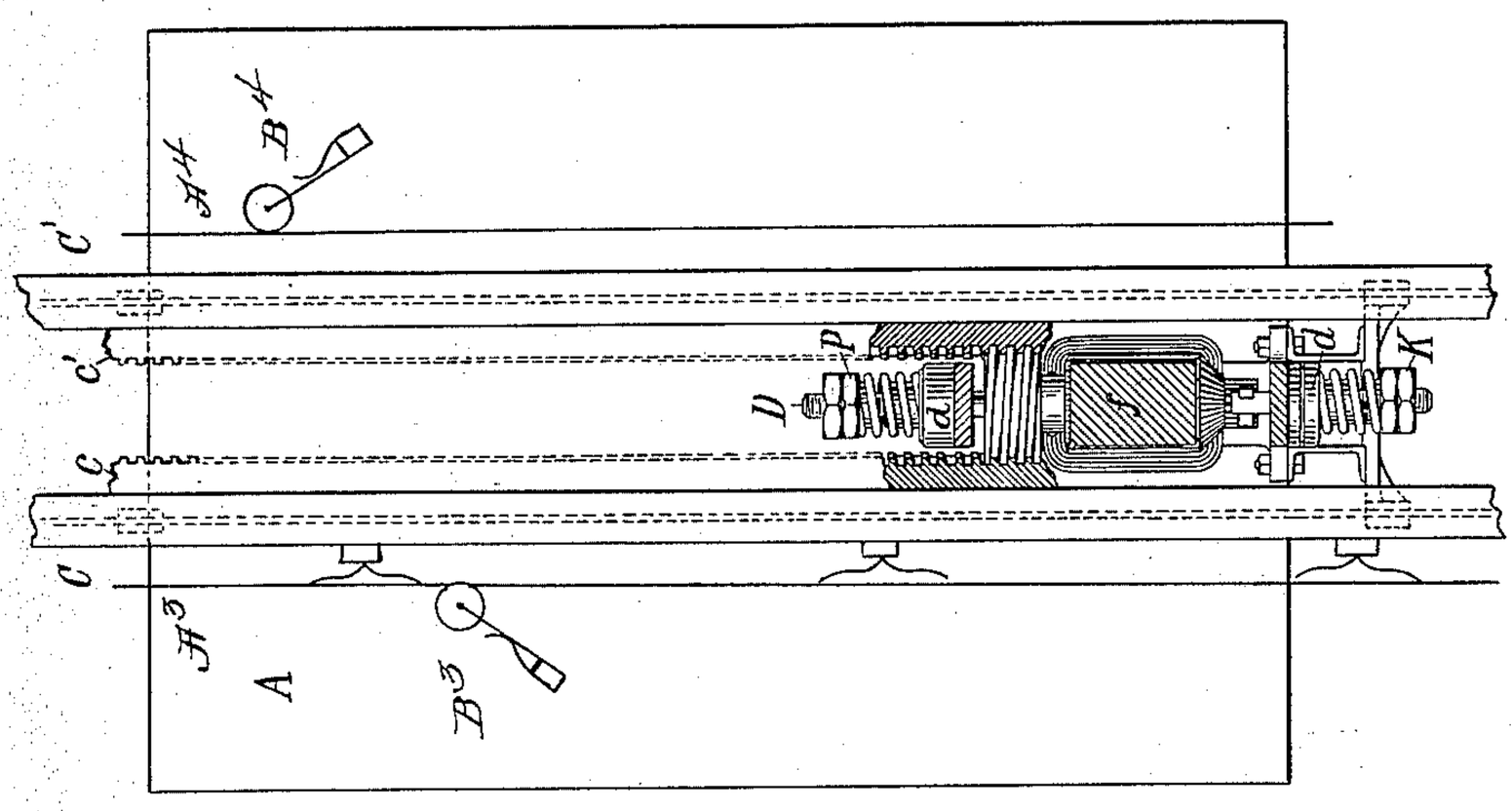
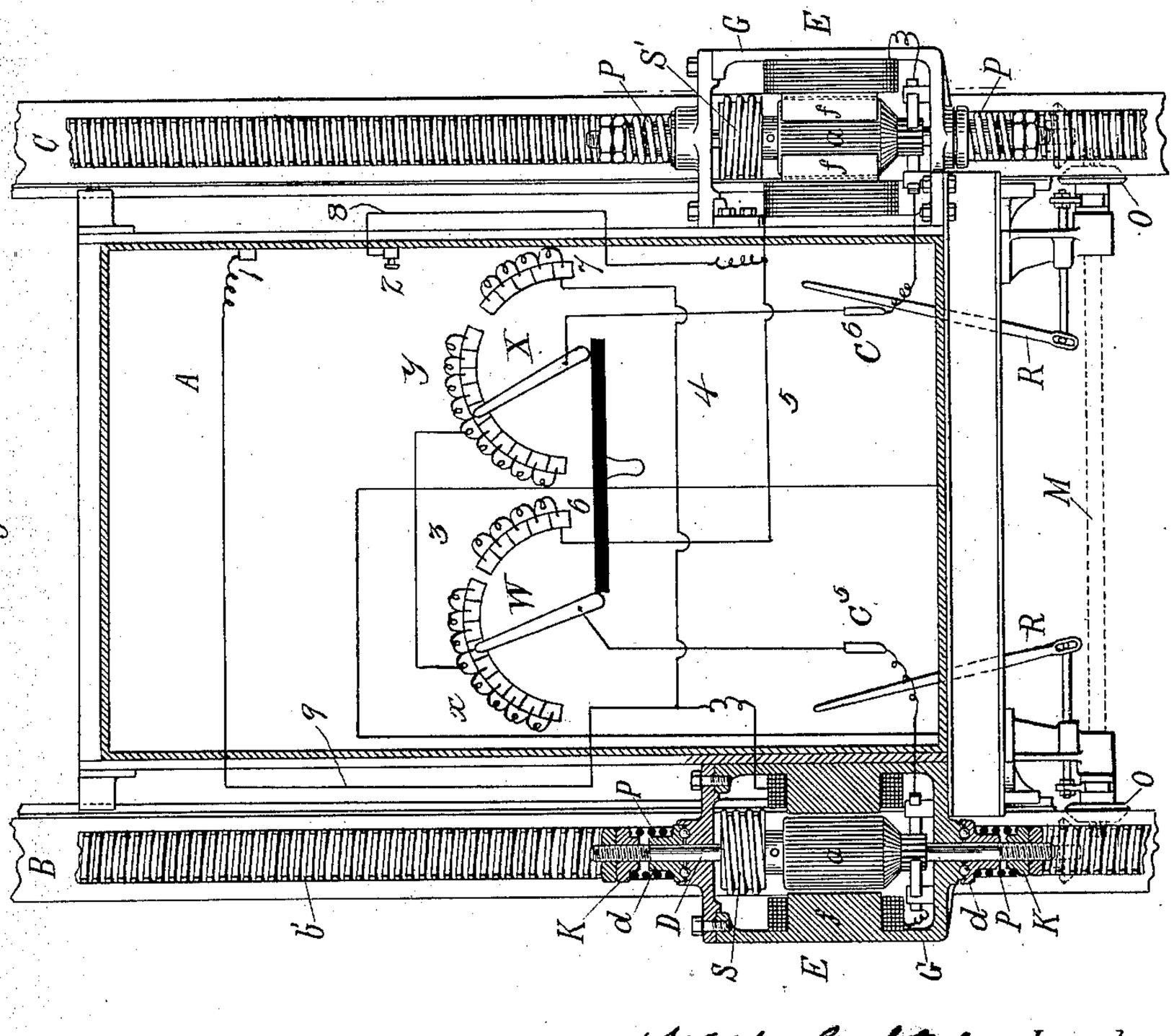


Fig. 1



Witnesses:
Raphael Netter
Catharine D. Morrill

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Fig. 4

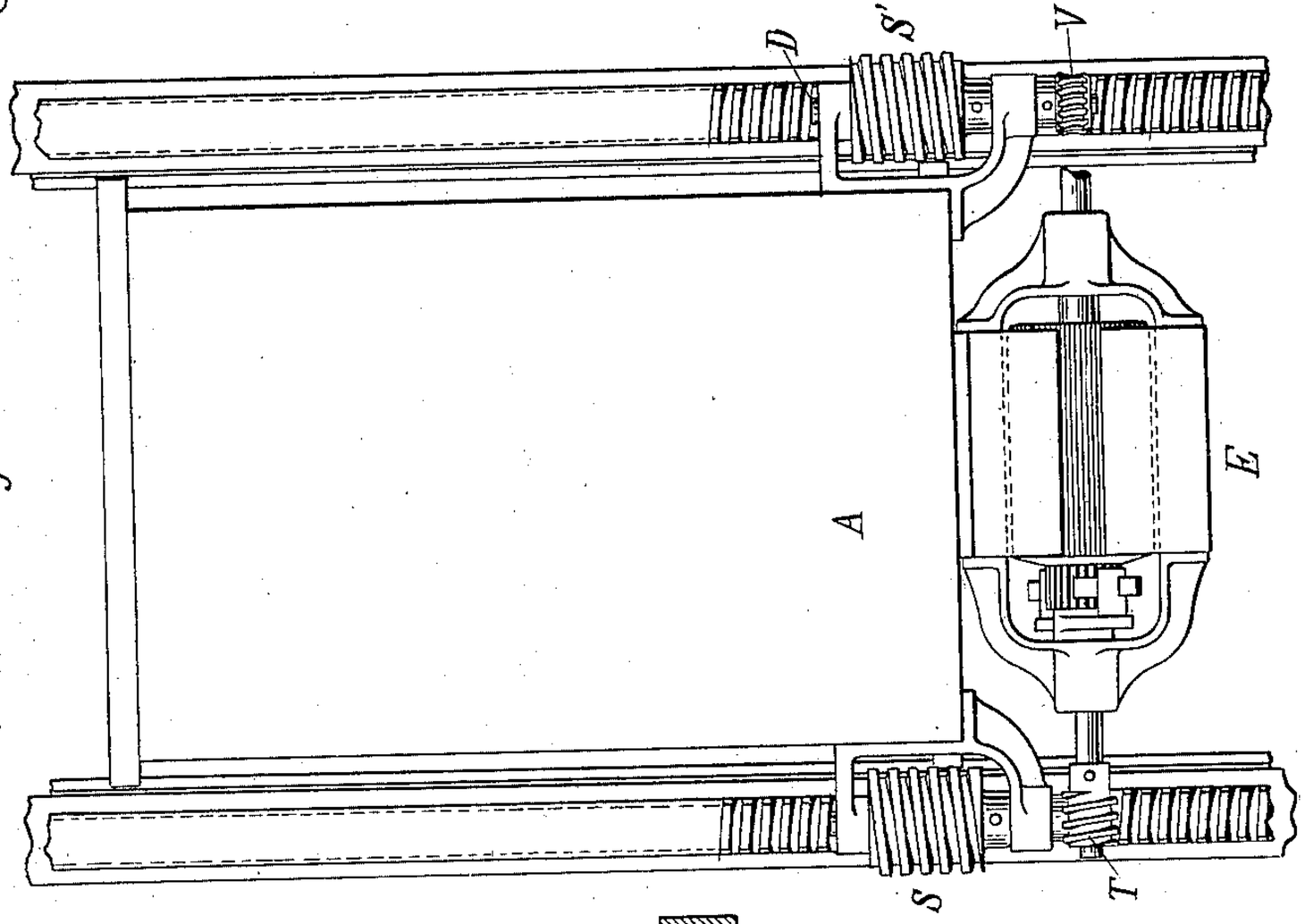
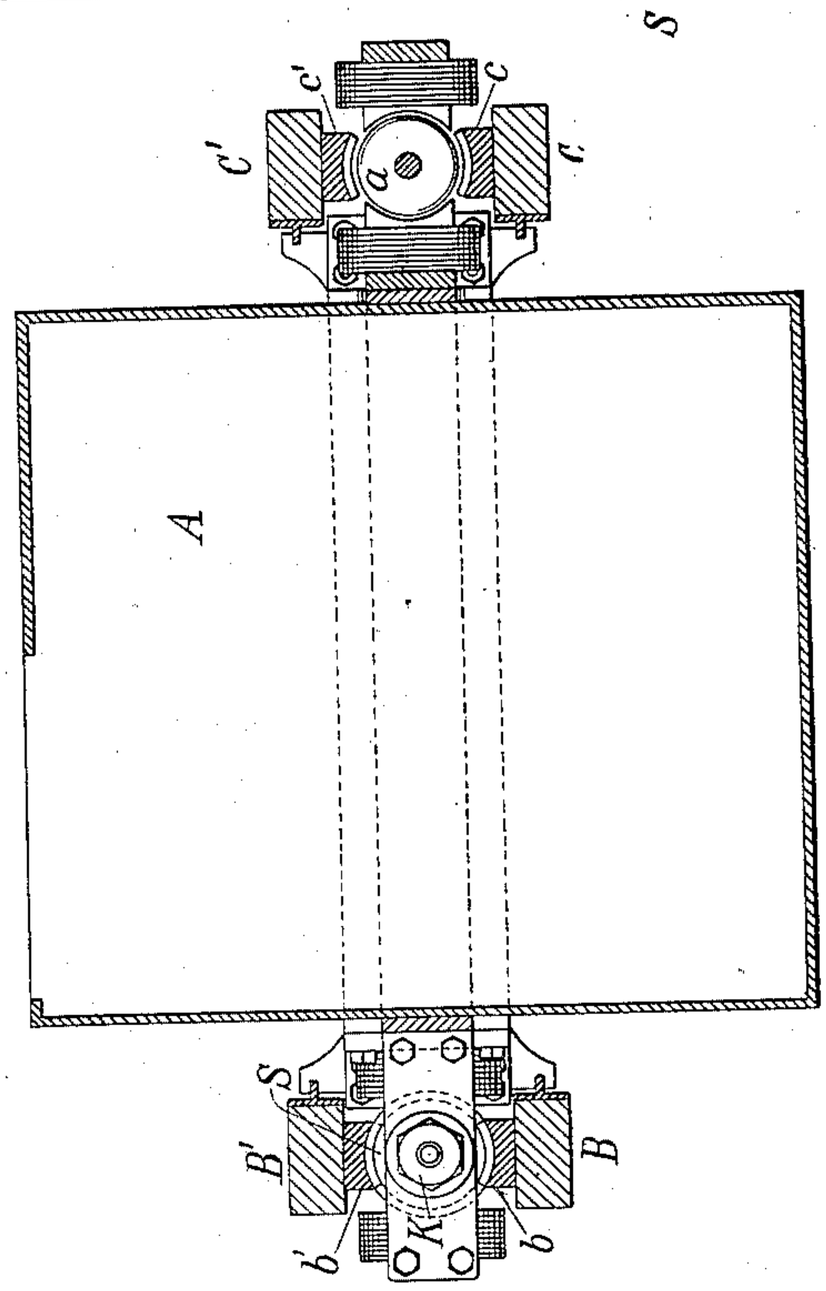


Fig. 3



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UNITED STATES PATENT OFFICE.

WALTER C. STOKES, OF NEW YORK, N. Y.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 652,301, dated June 26, 1900.

Application filed February 21, 1900. Serial No. 6,032. (No model.)

To all whom it may concern:

Be it known that I, WALTER C. STOKES, a citizen of the United States, residing in the city of New York, borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification, reference being made to the accompanying drawings, wherein—

Figure 1 is a front elevation, partly in section, of an elevator embodying my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a horizontal section, and Fig. 4 shows a modification.

My invention relates to elevators of the class wherein the motive apparatus is mounted directly upon the elevator-car and propels the same by operating a screw engaging with a vertical rack.

My improvement consists in constructing the rack in the form of longitudinal tube-sections with the teeth on the interior, so that the screw may engage the rack-sections upon opposite sides and be retained in place between the two sections by the curvature of the engaging teeth and screw-thread. I mount the operating-screw on a vertical shaft concentric with the embracing rack-sections, and between the two rack-sections I introduce the driving mechanism for the said screw. More particularly, I provide an operating-screw upon each side of the car, and on each side of the car I also place suitable racks of the kind described, with which the screws may respectively engage. I preferably operate the screws by individual electric motors directly upon the screw-shaft with their armatures interposed between the opposite racks on the two sides of the screw. By this means I avoid the use of intermediate gearing and afford opportunity for the regulation of the motors by connecting them either in series or multiple to the source of current-supply.

I have also devised certain details of construction, which will be hereinafter described.

Referring to Fig. 1, A represents an elevator-car traveling between upright guide-posts B B′ and C C′. As appears in Fig. 2, there are two of these guide-posts on each side of the car, the ones appearing in Fig. 2 being distinguished as C C′ and those upon the opposite side as B B′. Between the two guide-posts on each side, as appears in Figs. 2 and 3, I place longitudinal rack-bars, which on one side of the car are designated as *b* and *b′* and on the other side as *c* and *c′*. These bars are made in the form of longitudinal sections of a tube with teeth on the interior concave surface, the curve of the teeth being concentric with the tube, which would be formed by a lateral extension of the racks to the point of meeting with each other. S and S′ are screws, one upon each side of the car and fitting each within one of the two pairs of rack-bars *b b′* and *c c′*, respectively. The screws will be held in position by the curvature of the racks, which embrace them to a greater or less degree. Each of these screws is mounted upon a shaft D and is provided with an operating electric motor E. I will particularly describe the screw and motor shown at the left hand of Fig. 1, it being understood that the other is a duplicate thereof. The armature of the motor *a* is mounted directly upon shaft D and rotates between field-magnets *f*, attached to a framework G, that is in turn attached to the car A. The armature is somewhat smaller in diameter than the screw S, so that it may be contained between the rack-bars *b* and *b′*, the distance between these bars being also sufficient to permit of the presentation of the field-magnet poles to the armature. The shaft D passes at top and bottom through the frame G and then has a sliding connection with the bearing-blocks *d*, which, however, turn with the shaft D and have a bearing with intermediate balls upon the frame G. On the opposite end of the shaft D is a nut K, which bears against a spring P, intervening between the nut and the bearing-block *d*. By this means the thrust of the shaft against the frame G is cushioned by the spring P. The electric current will be supplied to the motors by any well-known contrivance, either a flexible cable or a vertical trolley-wire and contact traveling thereon. Any suitable regulator for the motors may be employed; but I prefer therefor one of the well-known series-

multiple type wherein the motors are connected in series for starting and for slow speed and in multiple for higher speed.

In Fig. 2 I have indicated two trolley-wires A^3 and A^4, mounted, respectively, on the guide-posts C and C′. The current from these respective wires is conducted into the car by the small trolleys B^3 and B^4, the former trolley being connected to terminal 2, Fig. 1, and the latter to terminal 1, Fig. 1, from which the current is led to the motors. In Fig. 1 I have illustrated a series-multiple controller. The terminal 1 is connected to the outer terminal of the left-hand motor and terminal 2 is connected to the outer terminal of the right-hand motor. The inner terminals of the motors are connected, respectively, to the switch-levers W and X, which traverse rheostats x and y, to include more or less resistance at the time of and prior to the series-multiple change of the motors in a well-known manner. An intermediate point of rheostat x is connected by wire 3 to a corresponding intermediate point in rheostat y, and the levers W and X are shown, respectively, as bearing upon such intermediate points, so as to be connected by the wire 3 without any resistance. The two motors are now in series. Resistance may be introduced by turning the levers to the left and the circuit ultimately broken by the levers passing off the rheostats. If the levers are turned to the right, resistance is first introduced. Then the circuit is broken and closed again through resistances with the motors in multiple, but with resistance which is finally cut out as the levers are turned to arrive at the points 6 and 7, respectively. In this condition the inner terminal of the left-hand motor is connected by the lever W to the point 6, and thence by the wires 5 and 8 to the opposite line-terminal 2. In a similar manner the inner terminal of the right-hand motor is connected by the lever X to the point 7. Thence it passes by the wires 4 and 9 to the line-terminal 1. The motors are then in multiple. Either motor may be cut out by opening the switch C^5 or C^6, and the multiple rheostat may then be used to regulate the remaining motor.

In the event of one motor being disabled I have provided means for temporarily operating the car by the remaining motor. For this purpose I provide a shaft mounted beneath the car, as shown by dotted line at M, upon each end of which is a beveled pinion O, capable of being moved forward on the shaft by a lever R to engage with a corresponding beveled pinion on the lower extremity of the shaft D. By this means if either motor is disabled both of the screws S may be operated by either one of the motors E.

Referring to Fig. 4, I show a modification in which a single motor E is mounted upon the car A, and on each end of the armature-shaft is a screw T, engaging with a worm-wheel V on the screw-shaft D. By this means a single motor may be used to operate both of the screws S and S′.

The leading advantage of my invention is that it provides a gearless connection, direct, simple, and noiseless, between the motive apparatus and the screws of a screw-driven elevator, and so provides a superior form of an elevator of this type.

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

1. The combination with an elevator-car, of a stationary internal rack on each side thereof made in two parts separated from each other by slots of a width less than the diameter of the screw-thread, a horizontal projection from each side of the car reaching into the space between the two parts of the rack, screws mounted on said projections respectively at a point beyond the side of the car and engaging with said rack, and motive apparatus carried by the car for driving the said screws.

2. The combination with an elevator-car, motive apparatus connected, right and left, with driving-screws, all mounted on the car, of a stationary internal rack on each side of the car adapted to receive the driving-screws; the aforesaid racks being provided with vertical slots the width of each slot being less than the diameter of the screw operating therein; substantially as and for the purpose set forth.

3. The combination with an elevator-car of a screw and rack, operating devices therefor upon each side and two electric motors, one for each of the said devices, mounted upon the car and propelling the same.

4. The combination with an elevator-car of a pair of rack-bars on each side, a screw between each pair of bars mounted on suitable bearings attached to the car and an electric motor mounted directly upon the shaft of each screw and operating the same.

5. The combination with an elevator-car of two electric motors mounted thereon, propelling-gearing for the car upon each side operated by the two motors respectively, and a controlling device for regulating the two motors simultaneously.

6. The combination with an elevator-car of two propelling-motors mounted thereon and operating respectively the propelling-gear devices upon opposite sides of the car, and a controlling-switch for regulating the said motors by changing them from series to multiple connection.

7. The combination with an elevator-car of two propelling-motors mounted thereon and operating respectively the propelling-gears on each side of the car, and a shifting gear for connecting both sets of propelling-gearing to one of the said two motors.

8. The combination with an elevator-car of

a vertical rack upon each side, a screw upon each side of the car engaging with the said rack and mounted in bearings upon the car, a propelling-motor for each set of operating-gears and an intervening spring for giving the respective motors a spring impact upon the load.

In witness whereof I have hereunto subscribed my name, before two subscribing witnesses, this 20th day of February, 1900.

WALTER C. STOKES.

Witnesses:
F. BEACH,
ARTHUR I. THOMSON.