No. 724,504. PATENTED APR. 7, 1903.

J. RICE.

ELEVATOR.

APPLICATION FILED JULY 1, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.

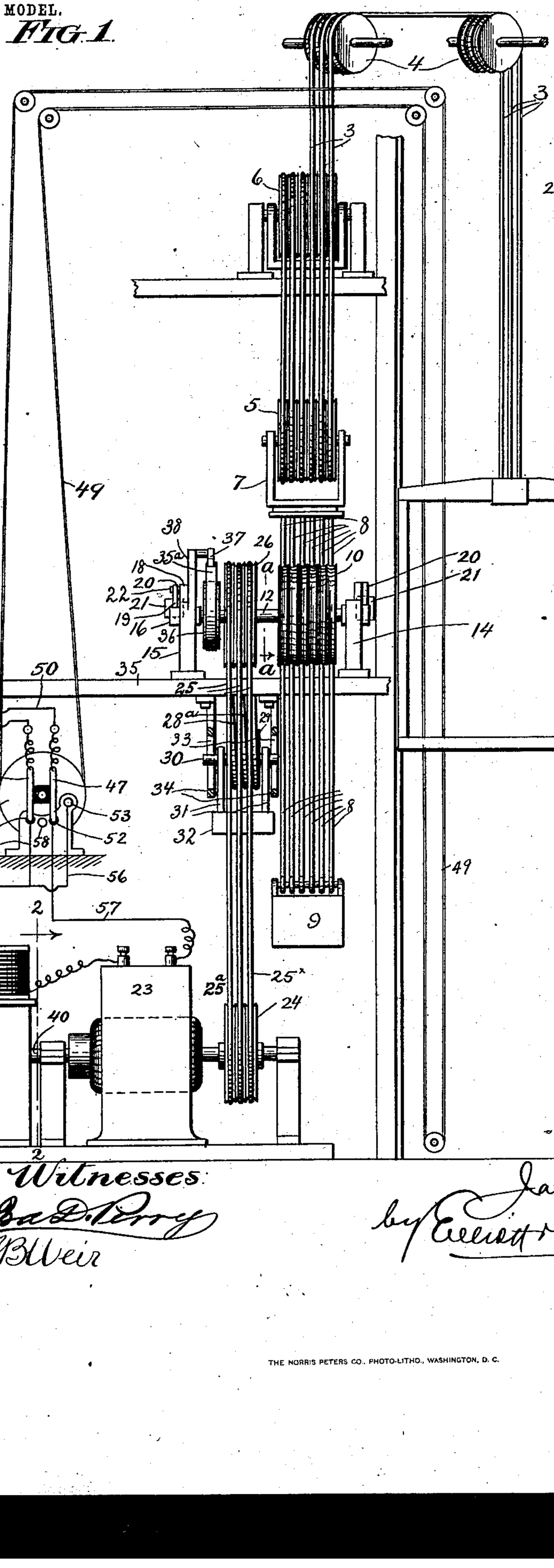
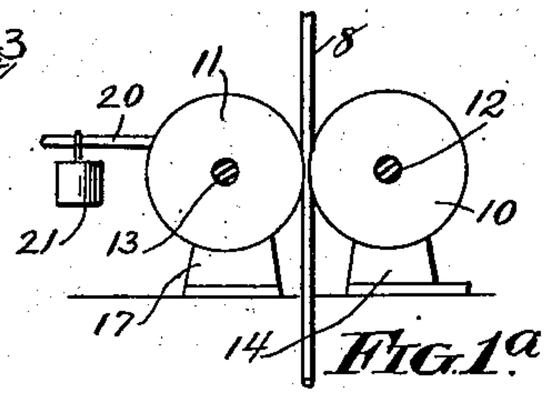


FIG. 1a.



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NO MODEL. 2 SHEETS—SHEET 2.

FIG. 2

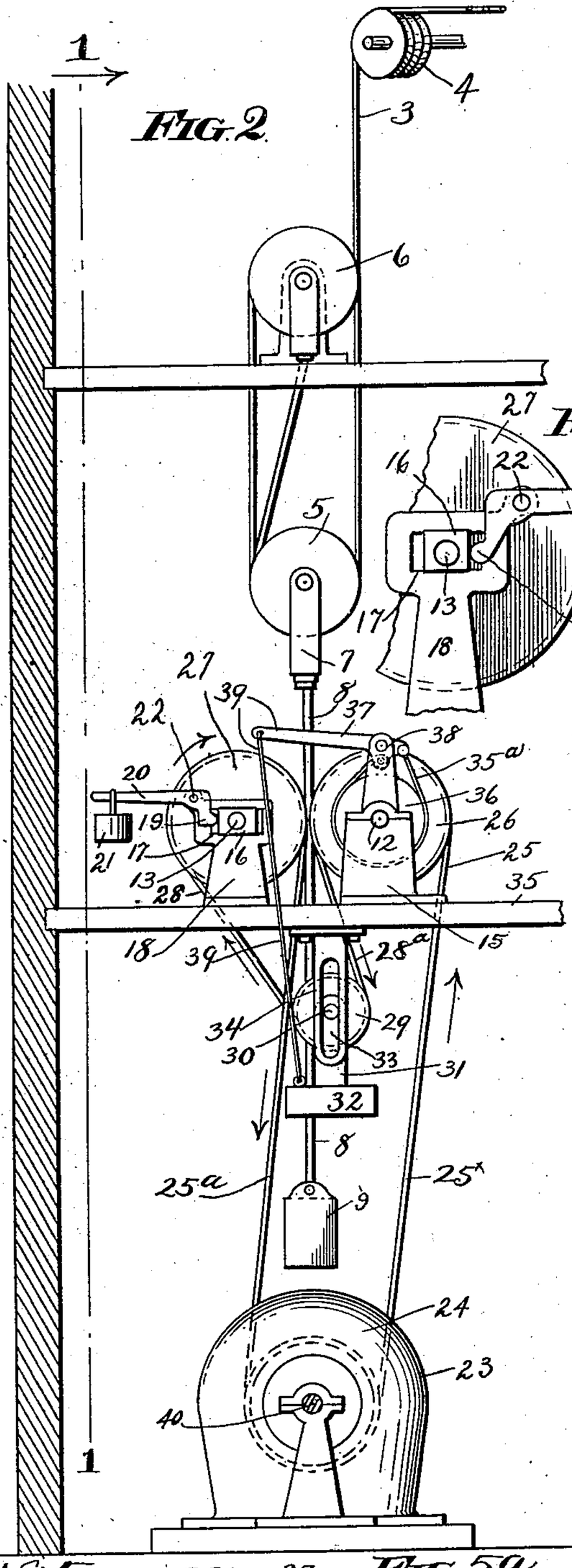


FIG. 3

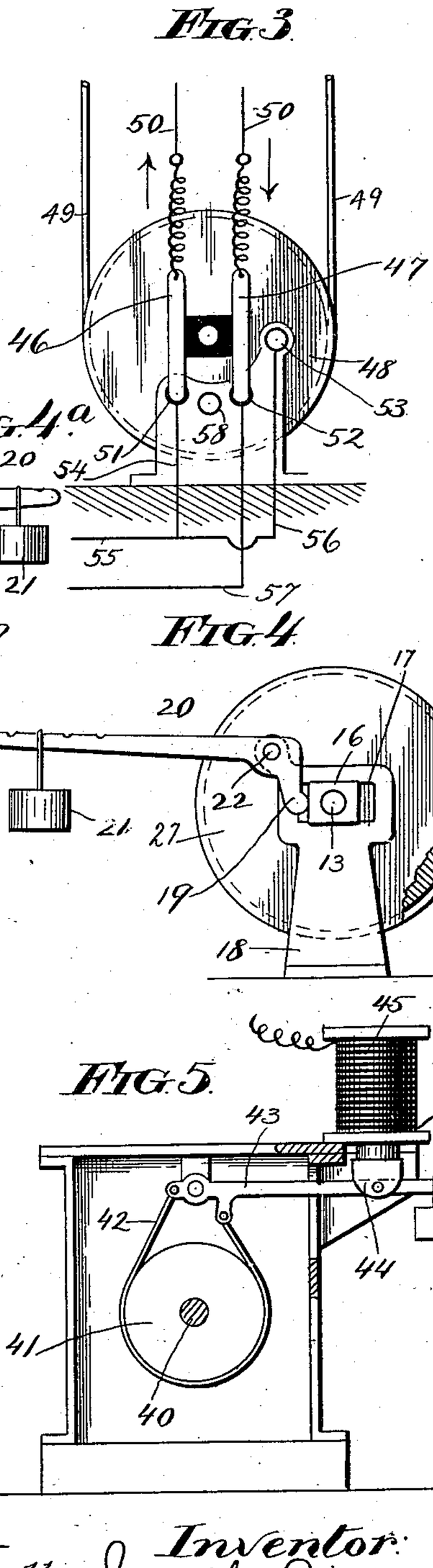
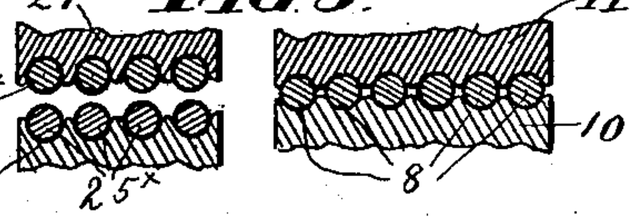


FIG. 4a

FIG. 4

FIG. 5

FIG. 5a



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UNITED STATES PATENT OFFICE.

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ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 724,504, dated April 7, 1903.

Application filed July 1, 1901. Serial No. 66,660. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH RICE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevators, of which the following is a full, clear, and exact specification.

My invention relates to elevators, and the improvements have more especial reference to the means for taking up and paying out the hoisting cable or cables where the same pass around the fixed and traveling sheaves or other equivalent means; and my invention has for its primary object to accomplish this by means of power-driven gripping devices engaging a connection extending from said traveling sheave or equivalent member in such a manner as to take up and pay out such connection, thus also taking up and paying out the folds of the hoisting cable or cables.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a general diagrammatic view of my improved elevator looking from the plane of the line 1 1, Fig. 2. Fig. 1ª is a detail section on the line *a a*, Fig. 1. Fig. 2 is a diagrammatic view looking from the plane of line 2 2, Fig. 1, the motor-shaft being shown in section on said line. Fig. 3 is an enlarged detail diagrammatic view of the controlling-switch hereinafter described. Fig. 4 is an enlarged detail side elevation of one of the movable gripping-wheels, showing the means for holding the same up to its work. Fig. 4ª is a similar view of the opposite side. Fig. 5 is a detail sectional view of an automatic brake mechanism hereinafter explained, and Fig. 5ª is a detail section of the grip-wheels and pulleys.

1 is the elevator-car, running in shaft or well 2 and supported by one or more hoisting-cables 3, passing over the usual or any suitable sheaves 4, and thence downwardly and around traveling sheave 5 and fixed or anchored sheave 6 in one or more folds, as usual, or in any other suitable way, so that as the traveling sheave 5 is moved bodily with relation to the anchored sheave 6 the cable 3 will be taken up or paid out, accordingly as the movable sheave 5 is carried away from or toward its companion sheave 6.

Secured to the movable sheave 5 in any suitable manner, as by means of a yoke 7, is the aforesaid connection with which the gripping devices engage, as before mentioned. In the example of my invention shown in the drawings this connection is flexible and is preferably composed of one or more cables 8, secured at their upper ends to the yoke 7 in any suitable manner and having attached to their lower ends a weight 9, which is thereby suspended in mid-air and which constitutes in greater or less degree a counterbalance for the car 1, said weight being of the usual or any suitable construction and also serving to hold the cables 8 straight and in an upright position.

The form of gripping devices for engaging the cables 8 shown in the present example of my invention consists of two gripping wheels or drums 10 11, secured to shafts 12 13, respectively, and engaging opposite sides of the cables 8, said gripping-wheels being provided with peripheral grooves in their faces for receiving the cables 8, respectively, if desired. The shaft 12 is journaled in standards 14 15, while the shaft 13 is journaled at each end in a sliding box 16, mounted in ways 17 in standards 18, so that the shaft 13 may be adjusted relatively to the shaft 12, and in order that the gripping-wheels 10 11 may be held up to their work in firm engagement with the cables 8 some suitable device is employed for normally pressing the shaft 13 toward the shaft 12. In the drawings I have shown a pair of levers having their short arms 19 engaging the outer sides of the boxes 16 and their long arms 20 provided with weights 21, the levers being pivoted at 22 to suitable supports on the standards 18.

By the described means it will be seen that when the grip-wheels 10 11 are rotated toward one another in one direction the cables or flexible connection 8 will be taken up or drawn downwardly, imparting motion to the

traveling sheave 5, and thus taking up the hoisting-cable 3 and elevating the car, and when said grip-wheels are rotated in the opposite direction the weight 9 will be elevated, the cables 8 paid out, and the hoisting-cable 3 accordingly paid out to permit the car to descend. In order that the gripping-wheels may be thus rotated in either direction for moving and controlling the traveling sheave 5, I preferably connect said grip-wheels with some suitable form of motor. In the drawings I have shown for this purpose an electric motor 23, whose pulley 24 is connected by one or more cables or belts $25^{\times}$, having folds 25 25^{a} 28 28^{a}, with sheaves or pulleys 26 27 secured to the shafts 12 13, respectively. As clearly shown in Fig. 2, the folds 25 28 of these continuous belts or cables pass upwardly on the outer side of and over the pulleys 26 27, respectively, and then pass downwardly between the said pulleys, so as to form folds 28^{a}, which, together with the folds 25 28, provide loops in which is suspended an idler-pulley 29, on the shaft 30 of which is supported, by means of arms 31, a weight 32 of sufficient heft to keep the belts $25^{\times}$ taut and impart the rotation of the pulley 24 to the pulleys 26 27. From the folds 28 the belts extend to the folds 25^{a}, which pass under the pulley 24.

In order that the pulley 29 may be maintained in position and held against undue oscillation, its shaft or pintle 30 is carried outwardly through slots 33 in suitable hangers 34, suspended from support 35.

Should the cables $25^{\times}$ break or slip off their pulleys, the shafts 12 13, and as a consequence the grip-wheels 10 11, will be automatically locked by means of a strap-brake 35^{a} or brake of any other suitable form engaging a drum 36 on the shaft 12. The ends of the strap 35^{a} are secured to one end of a brake-lever 37, pivoted in suitable standard 38 and having its other end connected by cable or connection 39 with the weight 32, which would of course be allowed to fall if the cables or belts $25^{\times}$ broke or jumped their pulleys. It is of course understood that the grip-wheel 11 being forced against the cables 8 by the weights 21 and the cables in turn forced against the grip-wheel 10 the wheel 11 could not rotate without rotating the wheel 10. There are various other brake mechanisms, however, that will readily suggest themselves to those skilled in the art and might be substituted for the example shown in the drawings.

The motor-shaft 40 is provided with a brake-drum 41, (see Fig. 5,) with which engages a strap-brake 42, whose ends are operatively connected in any suitable way with a weighted brake-lever 43, which when not otherwise restrained automatically applies the brake and arrests the rotation of the shaft 40, thus also arresting the rotation of the pulleys 26 27, and thereby holding the cables 8 stationary. To this brake-lever 43 is secured the lower end of an armature or core 44, projecting upwardly into a solenoid 45, coupled up in any suitable manner in circuit with the motor 23, so that when the current through the motor is broken the weighted lever 43 will automatically apply the brake 42. As an example of means for accomplishing this I have shown parallel switches 46 47, secured or otherwise connected to a pulley 48, around which passes the hand-cable 49, which passes through the car in the usual way. These switches 46 47 are connected at their upper ends to the main conductors 50, which lead from the city plant or any other suitable source of electricity, while arranged adjacent to the lower ends of the switches are three contact-points 51 52 53. The contact-point 51 is connected by conductor 54 to conductor 55, which is also connected by branch conductor 56 to contact-point 53, the conductor 55 leading to the solenoid 45 and thence to motor 23, while contact-point 52 is connected by conductor 57 to the other pole of motor 23. With the switches in the position shown in Figs. 1 and 3 the current passes into the motor through switch 47 and conductor 57 and returns to the main line through conductors 55 54 and switch 46, thus causing the motor to rotate in one direction and holding the brake-lever 43 elevated. Should it be desired to rotate the motor in the opposite direction, however, for sending the car in a different direction, the operator imparts sufficient pull to the cable 49 to carry the lower ends of switches 46 47 from the contacts 51 52 to the contacts 52 53, respectively, when the incoming circuit along switch 47 will pass along conductor 56 and enter the motor through conductor 55 and will return from the motor through conductor 57 and enter the main line via switch 46, thus passing into the motor in the opposite direction to which it did before, and consequently reversing the direction of rotation of the armature. Should it be desired to stop the car, necessitating stopping the motor, the hand-cable 49 would be manipulated to bring the lower ends of the switches 46 47 out of contact with contact-point 52, so that one of the switches will be out of circuit. For clearness of illustration I have shown a dead-point or button 58, to which the lower end of switch 47 is moved, carrying lower end of switch 46 away from contact-point 51 when it is desired to open the circuit.

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

1. In an elevator, the combination of the hoisting-cable, a movable sheave suspended in a fold of the hoisting-cable, a flexible connection suspended from the movable sheave, a fixed gripping-wheel located on one side of the flexible connection, a movable gripping-wheel located on the other side of the flexible connection, means for causing the movable gripping-wheel to bear against the flexible connection, and means for rotating the gripping-wheels in unison.

2. In an elevator, the combination of a hoisting-cable, a movable sheave suspended in a fold of the hoisting-cable, a flexible connection, a yoke whereby the flexible connection is suspended from the movable sheave, a counterweight suspended from the flexible connection, a fixed gripping-wheel located on one side of the flexible connection, a movable gripping-wheel located on the other side of the flexible connection, means for causing the movable gripping-wheel to bear against the flexible connection, and means for rotating the gripping-wheels in unison.

3. In an elevator, the combination of a hoisting-cable, a movable sheave suspended in a fold of the cable, a flexible connection suspended from the movable sheave, standards having fixed bearings, a gripping-wheel, having a shaft, mounted in the fixed bearings and bearing against one side of the flexible connection, standards having ways, bearing-boxes, adapted to slide in the ways, a gripping-wheel having a shaft mounted in the bearing-boxes and bearing against the other side of the flexible connection, levers pivoted to the last-named standards, having short arms bearing against the bearing-boxes, and long arms provided with weights, and means for rotating the shafts in unison.

4. In an elevator, the combination of a hoisting-cable, a movable sheave suspended in a fold of the hoisting-cable, a flexible connection suspended from the movable sheave, gripping-wheels mounted on shafts and bearing against the flexible connection and means for rotating the gripping-wheels comprising driven sheaves mounted on the shafts on the gripping-wheels, a motor having a shaft, a driving-pulley mounted on the motor-shaft, an endless belt extending from the driving-pulley to the outer side of and over one of the driven sheaves, between the driven sheaves to the outer side of and over the other driven sheave and between the driven sheaves to the driving-pulley, and an idler-pulley suspended in a fold of the belt beneath the driven sheaves.

5. In an elevator the combination of the hoisting-cable, a movable device for taking up and paying out the same, a connection extending from said movable device, a gripping device for taking up and paying out said connection, a pair of pulleys for actuating said gripping device, a continuous belt passing partially around said pulleys and downwardly between the same to form a loop, a belt-tightener engaging said loop and means for driving said belt, substantially as set forth.

6. In an elevator the combination of the hoisting-cable, a movable device for taking up and paying out the same, a connection extending from said movable device, a gripping device engaging said connection for taking up and paying out the same, a pair of pulleys for operating said gripping device, a continuous belt passing partially around said pulleys and downwardly between them to form a loop, a weighted idler supported by said loop and means for driving said belt, substantially as set forth.

JOSEPH RICE.

Witnesses:
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