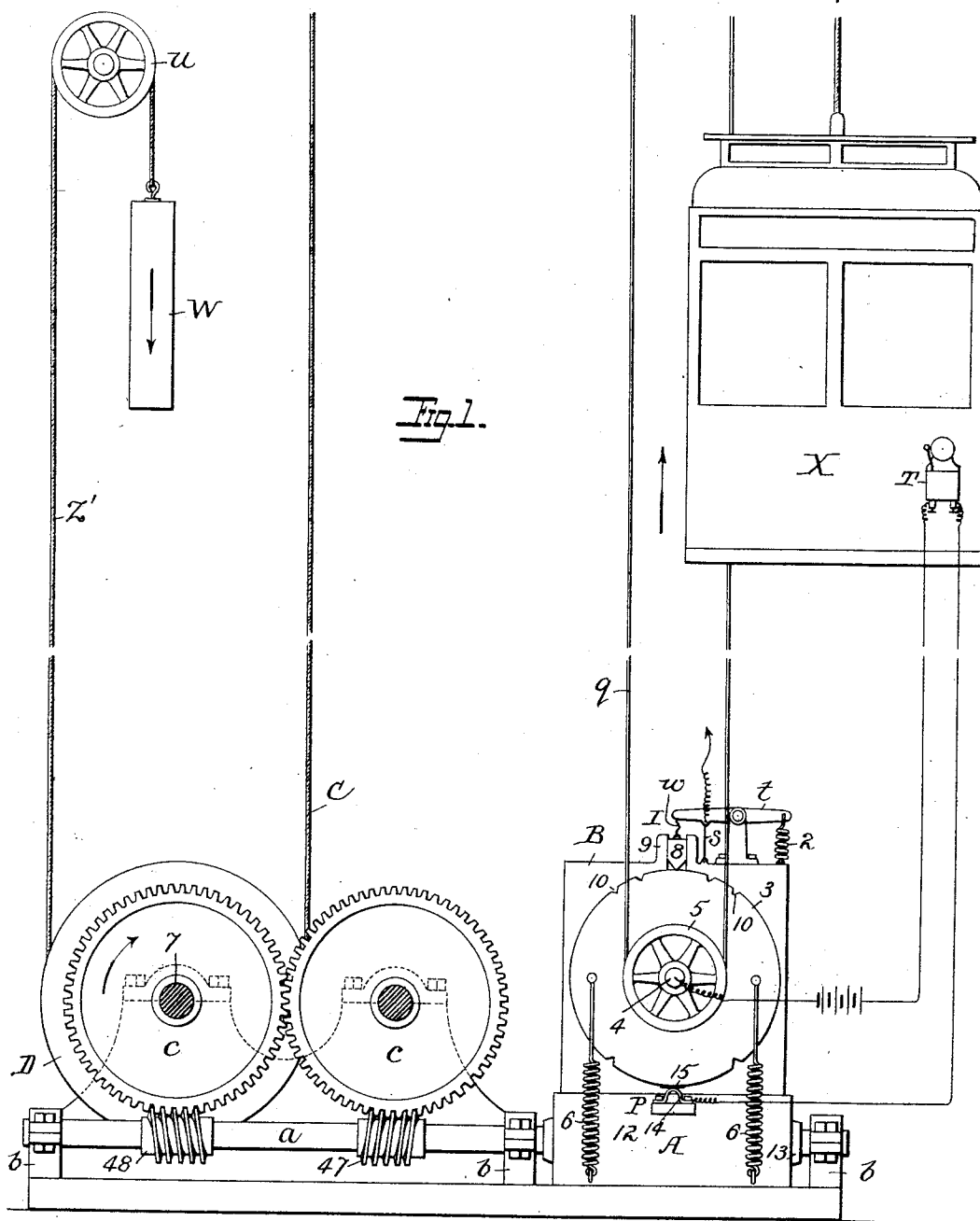


N. P. OTIS.
ELECTRIC ELEVATOR.

No. 513,134.

Patented Jan. 23, 1894.



WITNESSES

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Ch. S. McArthur

INVENTOR

N. P. Otis
By Arthur Foreman

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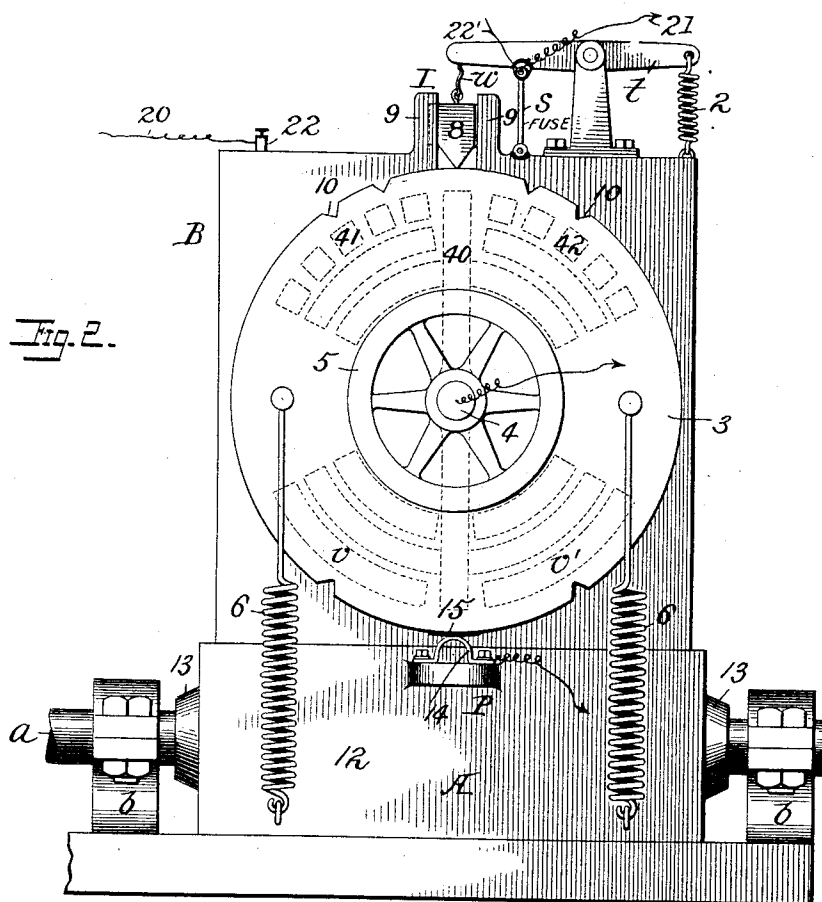
(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

NORTON P. OTIS, OF YONKERS, ASSIGNOR TO THE OTIS BROTHERS & COMPANY, OF NEW YORK, N. Y.

ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 513,134, dated January 23, 1894.

Application filed June 25, 1890. Serial No. 356,689. (No model.)

To all whom it may concern:

Be it known that I, NORTON P. OTIS, a citizen of the United States, residing at Yonkers, Westchester county, New York, have invented certain new and useful Improvements in Elevating Apparatus, of which the following is a specification.

My invention relates to that class of elevator apparatus in which electricity is the motive power and my invention consists in means fully set forth hereinafter for controlling the current and both by the operator and automatically.

In the accompanying drawings:—Figure 1 is a side elevation of sufficient of an elevator and electric operating engine and appliances to illustrate my invention. Fig. 2 is an enlarged view of a current controller and adjunct.

A represents an electric motor which may be of any suitable construction, the armature 13, being upon a shaft *a*, turning in bearings *b*, *b*, said armature revolving between the poles of a field magnet 12.

Upon the shaft *a*, or upon a shaft connected to the shaft *a*, are arranged two reverse worms 47, 48, each of which gears with a worm-wheel *c*, the two worm wheels gearing together, and upon one of the shafts 7, of one of the worm-wheels is a drum *D*, round which is wound the flexible cable or suspensory that is connected with the platform or cage *X*, so that the latter is raised or lowered accordingly as the drum is turned in one direction or the other by the revolution of the armature in one direction or the other.

In order to raise and lower the cage and counterbalancing weight by reversing the rotation of the drum, it is necessary to reverse the armature, and in order to vary the speed of the cage that of the armature must be varied, and I therefore make use of means for reversing and varying the strength of the current passing through the motor, and for this purpose I employ a current controller *B*, of any suitable character, as, for instance, a series of resistance coils 41, 42, shown in dotted lines Fig. 2, of a switch or cut-out 40, carried by a shaft 4, so as to be moved over said coils, and so connected with the conductors 20, 21 and arranged in respect to resistance termi-

nals *v*, *v'*, in connection with the properly wound armature and magnet, that the movement of the switch, Fig. 1, to one side will close the circuit of the resistance and gradually cut out the resistance to impart motion to the armature in one direction, while the movement to the other side will gradually cut out the resistance to impart movement to the armature in the other direction.

The required changes in the position of the switch may be imparted from the car by the operator in any suitable manner. Thus, an ordinary hand rope *q*, passing through the car and over an upper guide pulley, (as usual,) passes also round a grooved pulley 5, on the shaft 4, so that the operator may shift the switch by manipulating said hand rope.

In order that the switch may be maintained in its position when the resistance has been properly cut out to either side to avoid the necessity when the engine is running properly of the operator maintaining continuous hold upon the hand rope or other operating appliance, I make use of a detent *I*, for locking the switch in any position to which it is set until sufficient force is exercised by the operator to overcome the force of the detent, and I also make use of springs or other motor for automatically shifting the switch to its mid position whenever the detent is withdrawn. These parts may be constructed in various ways; but as shown there is a disk 3, connected to the shaft 4, and to which are also connected on opposite sides of the shaft two springs 6, 6, which tend to carry the parts to the position shown in Fig. 1, whenever they are released from any other controlling influence. The detent as shown consists of a bolt 8, sliding between guides 9, 9, and having a double beveled end adapted to V-shaped notches 10, in the edge of the disk 3. Whenever the disk is turned to any position to which it must be set, and the bolt drops into one of the notches it will hold the disk against the power of the springs, but the application of sufficient force of the operator of the cage will turn the disk and force the bolt from the notch.

To protect the apparatus against the injurious results of the transmission of too powerful a current over the main line from

any cause, I place in the main circuit a fuse *s*, in connection with devices whereby the burning out of said fuse will unlock the detent *I* and cause the switch to be automatically thrown to a central position, so that if by any accident the current should then be restored no operation of the apparatus would take place. As shown in the drawings, one of the lead wires 20, is connected with a binding post 22, which in turn has suitable electrical connections with the resistance coils, such connection, however, being not shown. The other lead wire 21 is shown as being connected with a binding post 22', and with this latter binding post the fuse *s* has electrical connection. One means of thus unlocking the bolt consists of a lever *t*, pivoted upon the frame of a machine and connected to one end of a fuse *s*, a spring 2, tending to draw down one end of the lever against the tension of the fuse. The lever *t*, is also connected by a strap or cord *w*, with the bolt 8, which can thus move up and down independently of the lever to a sufficient extent to permit the normal operation of the apparatus. If, however, the fuse should burn away the spring 2, will act to tip the lever, which will let the bolt out of the notch and the springs 6, 6, will then restore the parts to their normal position.

In order that the operator may know when the parts are in their normal position I place upon the cage *X*, any suitable electrical indicator or alarm *T*, in circuit with a battery and with a circuit breaker *P*, one member 14, of which is connected to the frame of the apparatus and to one portion of the circuit wire, while the other member 15, is connected with another portion of the circuit wire and is carried by the disk 3, so as to make contact with the member 14, complete the circuit, and sound the alarm whenever the switch is in its normal or mid-position. The members 14 and 15, are of course insulated upon their supports.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. The combination with the cage and ele-

vating engine, of a current controller, means for automatically carrying the latter to its mid-position, a locking device for holding the controller in the position in which it is set by the operator, a fuse in the main circuit, and appliances for shifting the locking device to release the switch upon the burning of the fuse, substantially as set forth.

2. The combination with the cage and electric elevating engine, of a current controller, means for automatically carrying the latter to a certain position, a detent for holding the controller in the position to which it may be set, the detent being freely movable, means which tend to withdraw the detent from engagement with the controller, and a fuse in the main circuit which holds the said means from operation so long as the fuse is not destroyed, substantially as set forth.

3. The combination with the cage, and the electric elevating engine, of a current controller, means for automatically carrying the latter to a certain position, a sliding bolt 8 which operates as a detent to hold the controller in the position to which it may be set, a lever *T* to which the detent is connected by a strap or cord *w*, a spring which tends to move the lever so as to move the bolt away from the controller, and a fuse *s* in the main circuit which holds the said lever in position to permit the detent to operate, substantially as set forth.

4. The combination with the cage and the electric elevating engine, of a current controller consisting of a switch and a disk 3, the two springs 6, 6, connected on opposite sides of the center of the said disk and tending to restore it to a mid-position, and means whereby the said switch can be operated, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NORTON P. OTIS.

Witnesses:

CHARLES H. FULLER,
J. P. WOODRUFF.