No. 704,264. Patented July 8, 1902.

A. E. MACCOUN.

CONTROLLING SYSTEM FOR ELECTRIC HOISTS OR ELEVATORS.

(Application filed Apr. 29, 1898.)

(No Model.) 2 Sheets—Sheet 1.

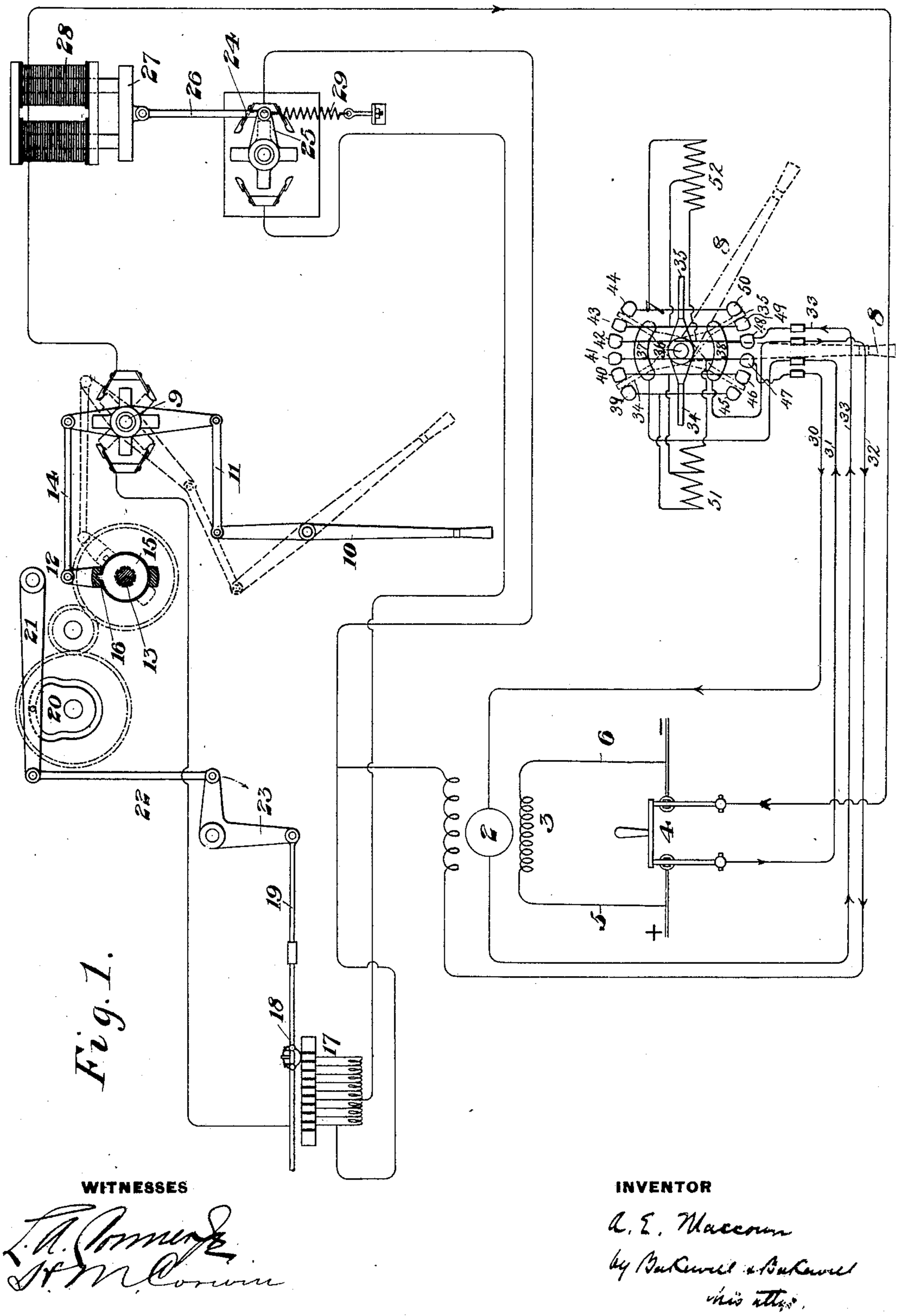

Fig. 1.

WITNESSES

T. A. Somerville
H. M. Corwin

INVENTOR

A. E. Maccoun
by Bakewell & Bakewell
his attys.

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Fig. 2.

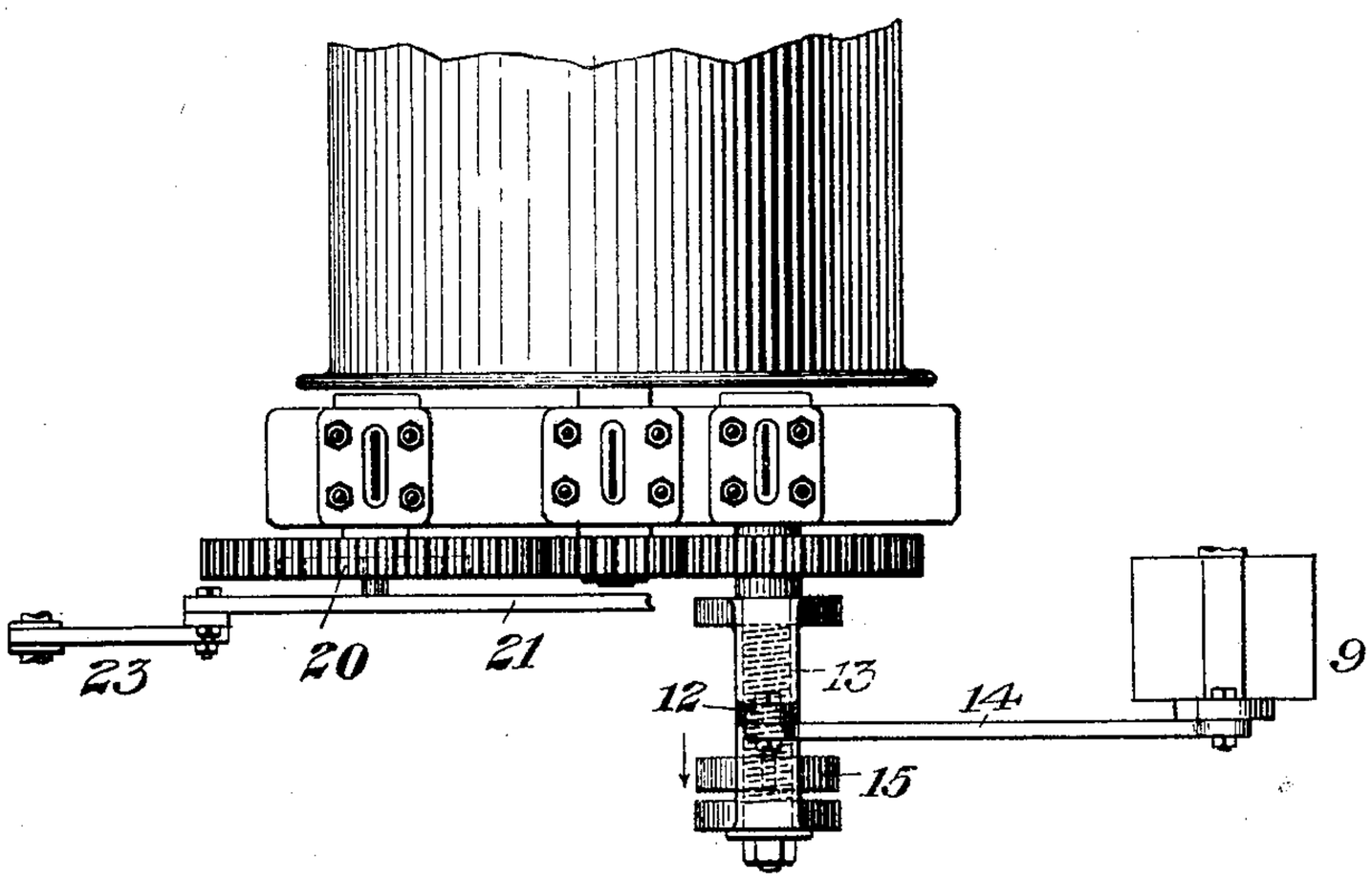
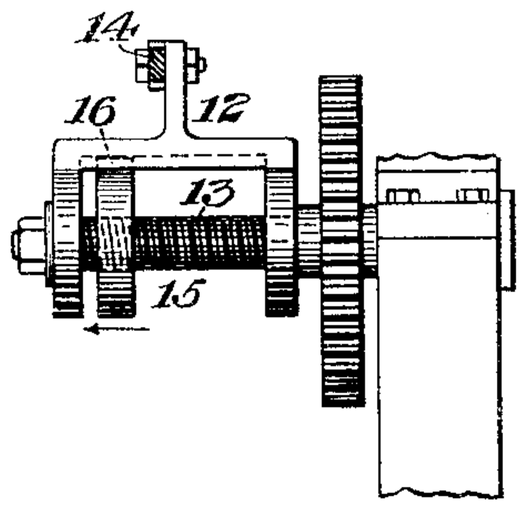


Fig. 3.



WITNESSES

Warren W. Swartz.
George B. Flemming.

INVENTOR

A. E. Maccoun
by McKnight & Bakewell
his attys.

UNITED STATES PATENT OFFICE.

ANDREW E. MACCOUN, OF BRADDOCK, PENNSYLVANIA, ASSIGNOR TO THE OTIS ELEVATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

CONTROLLING SYSTEM FOR ELECTRIC HOISTS OR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 704,264, dated July 8, 1902.

Application filed April 29, 1898. Serial No. 679,204. (No model.)

To all whom it may concern:

Be it known that I, ANDREW E. MACCOUN, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Controlling Systems for Electric Hoists or Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic view showing my improved controlling system. Fig. 2 is a partial top plan view showing the actuating connections between the hoisting-shaft and the cut-out switch, and Fig. 3 is an end detail of the same.

My invention relates to electric hoists and electric elevators, and is designed to provide means for automatically slowing down the car or hoist near each end of its travel, to give perfect control of its movements, and to stop the car or skip at exactly the same point irrespective of the load which is carried.

In the drawings, 2 represents an electric motor, which may be of any desired type and which is shown as a compound motor with the shunt-fields 3 connected to opposite sides of a two-pole switch 4, 5 being the positive connection, and 6 the negative connection, from the dynamo.

7 is an ordinary reversing-controller, having the operating-handle 8 and suitably connected to the dynamo and the switch 4, as indicated.

9 is a cut-out switch, preferably of the rotary type set forth in my copending application, Serial No. 675,407, filed March 28, 1898, though any desired form of switch may be employed. This switch is positively actuated by the handle 10, having link connection 11 therewith, by which the connection may be established, so as to allow the current to flow to the hoist, and is automatically thrown into open position by a lever 12, loosely mounted on shaft 13 and having a pivotal link connection 14 with the drum of the cut-out switch. A loose nut 15 is mounted upon this shaft and is held against rotation by projecting lug 16, and the shaft is geared to the hoisting-drum, the arrangement being such that when the car or skip reaches the limit of its path the screw will engage and actuate the lever, so as to swing the drum and break the motor-circuit.

In order to slow down the car before it reaches the end of its travel, I provide suitable resistance 17, connected to bars in a resistance-box and over which bars travel suitable spring-fingers 18, mounted upon the link 19. The fingers are moved over the resistance by means of a cam 20, acting upon a pin on lever 21, which lever is connected by a link 22 with a bell-crank lever 23, pivotally connected to the link 19. The cam-shaft is geared to the hoisting-drum and is so arranged that when the circuit is closed and the hoist started the lever will drop, thus moving the spring-fingers along the resistance and speeding the motor, while when the hoist nears the end of its path the lever will again be raised, and thus cut in the resistance, so as to slow down the motor before the car reaches the desired point.

The slowing-down device is shown and above described as applied to hoists such as those used on blast-furnaces, where the car is stopped automatically only at the top and bottom. If used upon elevators, where it is desired to stop the car at intermediate points, the automatic slow-down device may be arranged, if desired, to operate at each intermediate point by using a series of notches in the cam-groove, so that the pin would rise and fall at the points corresponding to the different heights. The hoist can of course be stopped at any point by using the hand-controller.

With the arrangement thus far described the motor would stop the car short of the desired point when a heavy load was carried, and to overcome this diffculty I provide a switch 24, the lever 25 on whose drum is connected by a link 26 to the armature 27 of an electromagnet 28. A spiral spring 29 is adjustably secured to one end at a fixed point and connected at the other to the lever 25, and the magnet and switch are connected up, as shown, so that when the controller 7 is thrown on the electromagnet, which is in series with the main current of the motor, will lift the core and cause the switch 24 to short-circuit a part of the slow-down resistance at the starting, and thus cause the motor to start more quickly, as it cuts out part of the

resistance before the spring-fingers are moved along the resistance-bars to accomplish the same purpose. The core will remain lifted and the switch 24 closed until the motor begins to slow down when the car nears the end of its travel, and as the current then is reduced through the electromagnet the armature will drop and the spring will open the switch 24. This spring is adjusted so that the core will be released when a light or medium load is being carried, and thus cut in through resistance and slow down the motor; but when a heavy load is being carried the current will be sufficient to hold up the core and keep the switch closed until the motor reaches nearly the end of its travel. Thus part of the resistance will be cut out and the motor slightly increased in speed. It is evident that by adjusting the spring the parts can be arranged so that the motor will always stop the car or skip at exactly the same point for different loads.

The circuit is as follows: from positive terminal of switch to terminal 31 of the controller. From 31 it is led through a wire to plate 37, and when the controller is thrown on the insulated metal ends 34 and 35 on the arm 36 make the connection from 37 to 39 and from 38 to 50, thus driving the hoist-motor in one direction. When the handle is thrown in the opposite direction, connection is made from 44 to 37 and from 38 to 45, which will reverse the current flowing through the armature and drive the hoist in the other direction. When running in the direction first described, the current-flow from 31 to 37 passes across from 34 to 39, from 39 through the resistance 51 back to 47, from 47 to 30, from 30 through the armature back to 33, thence to 48, from 48 through resistance 52 to 50, to 35, to 38, from 38 to 32, to field-magnet, through 17 to 18, through 9, and then through magnets 28 and thence to the negative terminal of the switch. When a controller is all thrown on, the resistances 51 and 52 are cut out as the arm passes over the segments.

The advantages of my invention will be apparent to those skilled in the art, since the hoist is under complete control, the car or skip will slow down near the end of its travel, and the motor will always stop the car at the same point irrespective of the load being carried. The cut-out switch and controller are of course operated by hand to start the car or skip from either end of its travel, the slowing down and stopping being automatically carried out by resistance.

Many variations may be made in the form and arrangement of the switch, the resistance, and the means for actuating the switch without departing from my invention, since

I claim—

1. In an electric hoist, a reversing-controller and a hand-controlled cut-out switch included in the circuit, and a mechanism connected with the cut-out switch operated by the movement of the hoist and arranged to automatically break the main circuit when the car has reached the limit of its travel; substantially as described.

2. In an electric hoist, a hand-operated reversing-controller and a rotary cut-out switch included in the main circuit, and actuating connections between the hoisting-drum and the cut-out switch arranged to throw such switch so as to break the main circuit independently of the position of the controller, when the car has reached the limit of its travel; substantially as described.

3. In an electric hoist, an electromagnet arranged in series with the current flowing through the motor and adapted to cut in and cut out resistance automatically, a switch actuated thereby, and an adjusting device for the electromagnet, said adjusting device being arranged to vary the air-gaps of the electromagnet so that it will lift for heavy loads and cut out resistance, and remain in normal position for light loads, leaving resistance in, to stop the hoist at the same point, independent of the load carried; substantially as described.

4. In an electric hoist, the combination with resistance, of means for cutting in said resistance near the end of the travel of the car, and an electromagnet in series with the current flowing through the motor and arranged to close the switch so as to cut out a part of the slow-down resistance when the motor is started and arranged so that it will open the switch on a light load when the car nears the end of its travel and thus slow down the motor, but may be held by the current when a heavy load is carried; substantially as described.

5. In an electric hoist, a reversing-controller and a hand-operated cut-out switch included in the circuit, connections between the cut-out switch and the hoisting-drum arranged to operate the switch to break the main current when the car reaches the end of its travel, mechanism arranged to cut in a slow-down resistance as the car nears the end of its travel, and another switch arranged in connection with the slow-down resistance and actuated by a solenoid in series with the current through the main motor; substantially as described.

6. A car, a hoisting-motor therefor, means for accelerating the speed of the motor as it starts up, and means operated by the motor for automatically arresting the car at any predetermined point; substantially as described.

7. A car, a hoisting-motor therefor, and means actuated by the motor for reducing the speed thereof as the car approaches any predetermined stopping-point; substantially as described.

In testimony whereof I have hereunto set my hand.

ANDREW E. MACCOUN.

Witnesses:
W. L. MOOK,
W. A. MCDEVITT.