(No Model.) 2 Sheets—Sheet 1.

F. B. RAE.

SPEED REGULATOR FOR ELECTRIC MOTORS.

No. 538,744. Patented May 7, 1895.

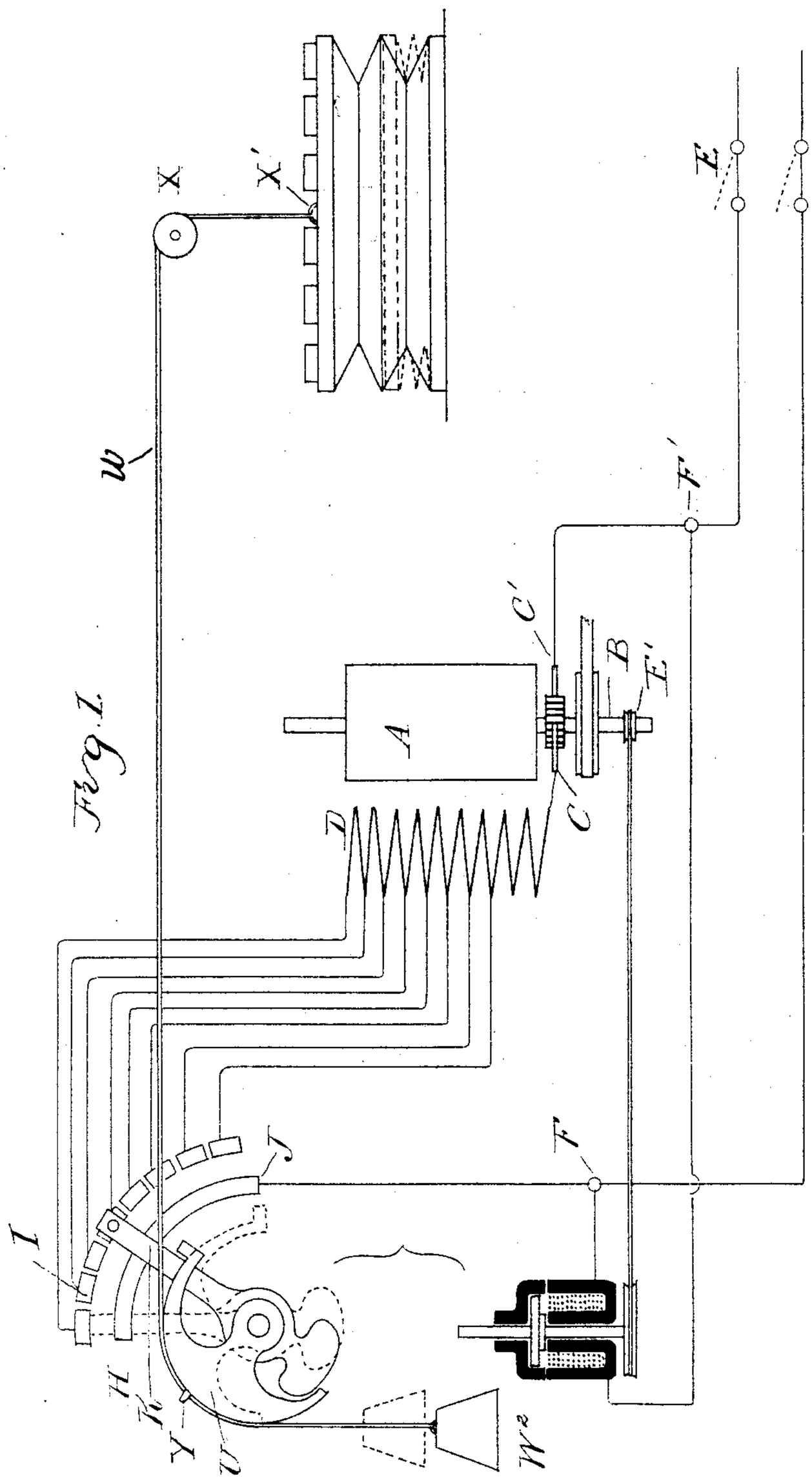

Fig. 1.

Witnesses
L. J. Whittemore
A. F. Barthel

Inventor
Frank B. Rae
By Thos. S. Sprague & Son
Attys.

(No Model.) 2 Sheets—Sheet 2.

F. B. RAE.

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Fig 3.

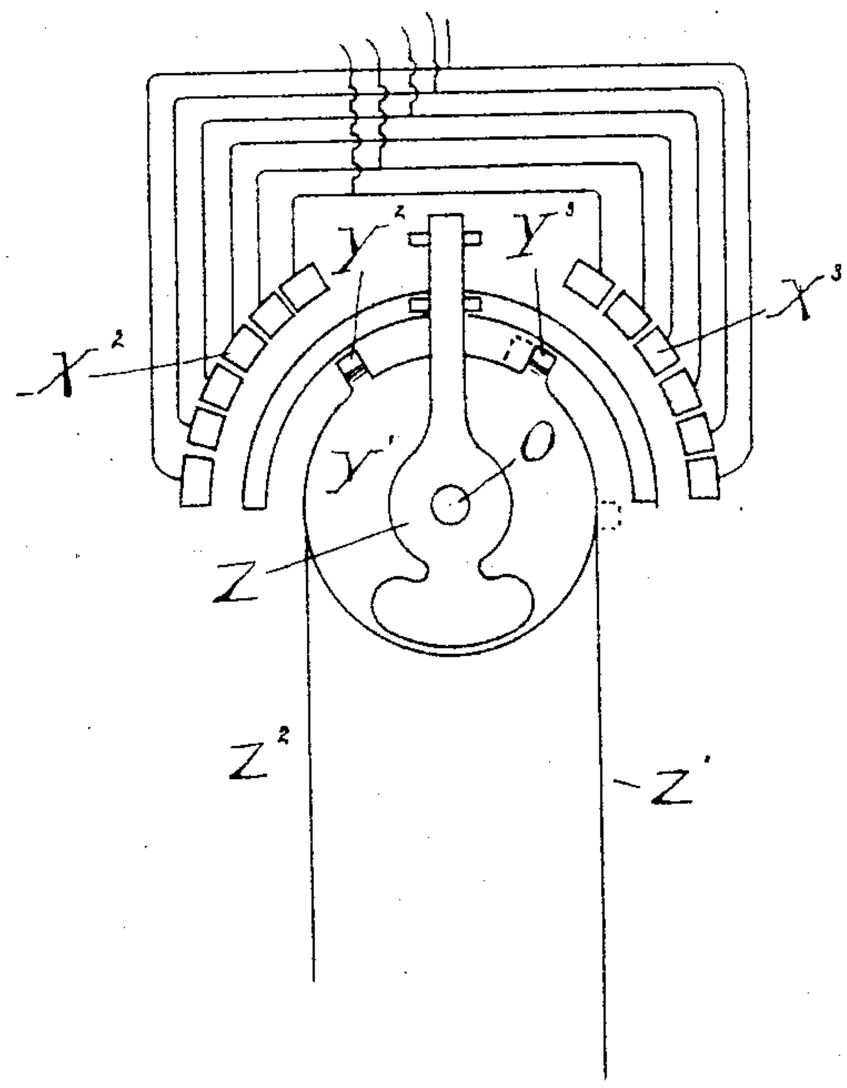
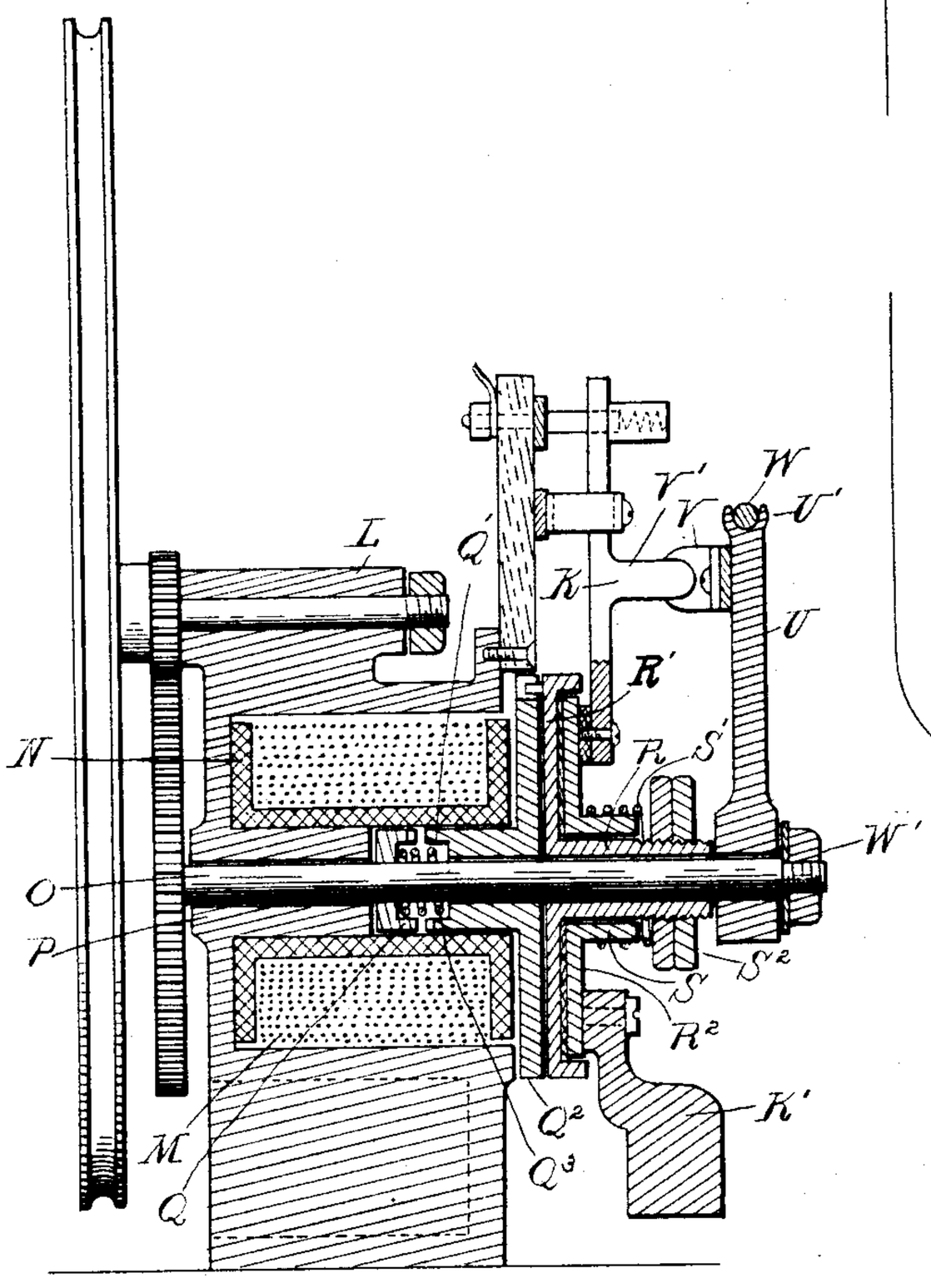


Fig 2.



Witnesses:
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A. F. Barthel

Inventor
Frank B. Rae
By Thos. S. Sprague & Son,
Attys.

UNITED STATES PATENT OFFICE.

FRANK B. RAE, OF DETROIT, MICHIGAN.

SPEED-REGULATOR FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 538,744, dated May 7, 1895.

Application filed August 28, 1894. Serial No. 521,490. (No model.)

To all whom it may concern:

Be it known that I, FRANK B. RAE, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Speed-Regulators for Electric Motors, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention consists in the construction of a rheostatic arm driven forward by frictional devices actuated by the motor, and stops on an arm or wheel for checking and returning the same. It may be so constructed that the rheostatic arm is checked or returned automatically by the device which derives its power from the motor as in the case of the bellows of an organ which regulate the speed in proportion to their inflation, or it may be returned independently as in the case of its use in connection with an elevator where the rheostatic hand is controlled by the elevator cord, all as more fully hereinafter described.

While I have shown and described my invention in connection with organ and elevator motors, I do not wish to be limited to such uses.

In the drawings, Figure 1 is a diagram of a rheostatic switch embodying my device. Fig. 2 is a vertical central cross-section thereof. Fig. 3 is a diagram elevation of a slightly-modified form shown in connection with an elevator.

In Fig. 1 A represents the revolving armature; B, the armature shaft; C C′, the brushes to which the armature circuit is connected, and D the field coil of a series wound electric motor of known construction and connected with a suitable source of electricity by means of the hand switch E and the binding posts F F′ for the purpose of transmitting power through the pulley E′ to the controlling device.

The devices for regulating and controlling the motor have been fully described by me in my previous application, Serial No. 516,737, and of which the following is a brief description.

H is a rheostat, the resistance coils of which are a part of the series winding of the motor. This resistance coil by thus forming a part of the field magnet coils increases the magnetic strength of the field at the time of starting the motor.

J is a contact strip connected to the binding post F, and K is a contact hand electrically connecting the contact plates with the strip.

The actuating devices of the rheostat are constructed as follows:

L is an iron frame in which is stationarily housed a solenoid M wound upon a spool N of insulating material. A shaft O passes through the hollow center of the spool and is journaled in a bearing P. Upon this shaft is secured the fixed member of a clutch Q and the sliding member Q′ which is provided with the pole piece Q^2 to draw the clutch into engagement when the solenoid is energized, a spring Q^3, being interposed to hold the two members apart.

R is a sleeve upon the shaft O provided with a friction disk R′ adapted to frictionally engage with, and carry a corresponding friction disk R^2. This disk has a sleeve S sliding on the sleeve R and a coil spring S′ surrounding it and confined thereon by the adjusting nuts S^2 on the sleeve R. The friction disk R′ has a dog engaging into a recess in the pole piece Q^2 and the friction disk carries the metallic contact hand K insulated from the disk. This contact hand is provided with a counter weight K′ to hold the hand in its normal vertical position.

U is an arm sleeved upon the shaft O and having the segmental grooved rim U′ adapted to carry a cord W.

V is a lug on one end of the arm U arranged in the path of, and adapted to engage with a corresponding lug or pin V′ on the contact hand K.

W′ is a nut on the shaft O for retaining the arm U in its proper position to revolve on the shaft O.

When the rheostatic switch is applied to an organ the speed of the pump motor is the principal factor to be taken into consideration. The speed must be so regulated as to keep the bellows inflated to a certain pressure and my device is so constructed as to increase or decrease the speed of the motor proportionately to said pressure.

W is a cord which passes over a pulley X located above the bellows one end of which is

secured to the bellows at X′. The other end of the cord passes over the segmental grooved rim of the arm U and is secured thereto at Y. It carries the weight W^2.

The parts being as described and shown their operation is as follows: The initial position of the parts, the bellows being uninflated, is shown by the dotted lines Fig. 1. The motor being started the contact hand will be moved over the contact plates I through the friction disks R′ R^2. At the same time as the bellows are inflated the weight W^2 rocks the arm U causing the lug V to approach and strike the lug V′ on the contact hand, stopping the further movement of the contact hand. If the bellows continue to inflate the weight W^2 will rock the arm U and carry the contact hand backward throwing in resistance and thus reducing the speed of the motor. The contact hand thus continues to move back and forward across the contact plates, moved one way by the friction disks and the other way by the weight throwing in and cutting out resistance to decrease or increase the speed of the motor proportionate to the pressure or volume of air in the bellows.

In Fig. 3 I have shown a reversible rheostatic switch composed of two sets of contact plates X^2 X^3 arranged concentrically in the path of the contact hand, thus providing for said hand or arm to be moved either to the left or right as the elevator ascends or descends. The two series of plates have the same length of arc and have an open space between them for the contact arm when the elevator is at rest.

Y′ is a wheel secured to the shaft O in the manner before described and carrying the two stop pins Y^2 Y^3 situated at such a distance apart as to produce an arc between them equal to the arc of either set of plates, thus allowing the contact hand to pass freely over either set.

Z is the contact hand and Z′, Z^2, the elevator cords.

Upon contact being made between the arm and contact plates the elevator is put in motion, also the frictional mechanism for driving forward the contact arm. Therefore to start the elevator the cord Z′ is drawn down causing the stop pin Y^2 to strike the contact arm, moving it into contact with the first of the series of plates X^3. At this movement the stop pins are in the position shown by the dotted lines. The pin Y^3 is so constructed that it forms a stop at this point preventing any further forward movement of the contact hand, and at the same time prevents the pin Y^2 from forcing the contact arm forward, after the driving mechanism for said arm is once put in motion. To slacken the speed, or to stop the elevator, the cord Z^2 may be drawn down causing the contact hand by means of the stop pin Y^3 to assume the position as shown in full lines which shows the elevator at rest.

By means of the reversible switch and the two stop pins upon the wheel, the elevator may be started, stopped or reversed at the will of the party operating the cord.

What I claim as my invention is—

1. The combination with an electric motor, a rheostatic switch for controlling the motor, a friction drive mechanism for actuating the contact hand forwardly, and devices controlled by the pressure or volume of the motive fluid or gas for returning said hand, substantially as described.

2. The combination with an electric motor, a rheostatic switch for controlling the motor, a friction drive mechanism for actuating the contact hand forwardly, and a weight controlled by the pressure or volume of the motive fluid or gas for returning said hand, substantially as described.

3. The combination with an organ motor and its bellows, of a rheostatic switch for controlling said motor, a friction drive mechanism for moving the same forwardly, an arm journaled beside the switch, having a segmental grooved rim, a cord passing over the rim connected at one end to the bellows and to the arm, a weight at the other end of the cord, and a lug on the arm projecting in front of the contact hand, substantially as and for the purpose described.

4. The combination with an electric motor, a rheostatic switch for controlling the motor, a friction drive mechanism for actuating the contact hand forwardly, and a stop for checking and returning said hand, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK B. RAE.

Witnesses:
M. B. O'DOGHERTY,
L. J. WHITTEMORE.