(No Model.) 2 Sheets—Sheet 1.

R. WILSON.

AUTOMATIC RHEOSTAT CONTROLLER.

No. 588,306. Patented Aug. 17, 1897.

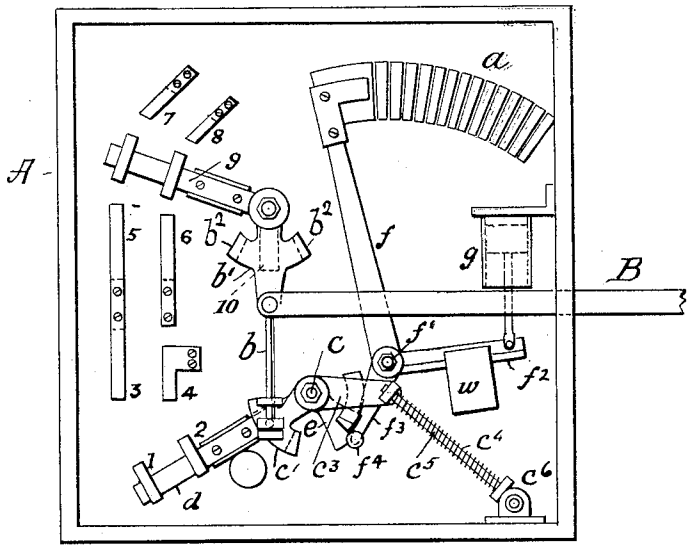


Fig. 1

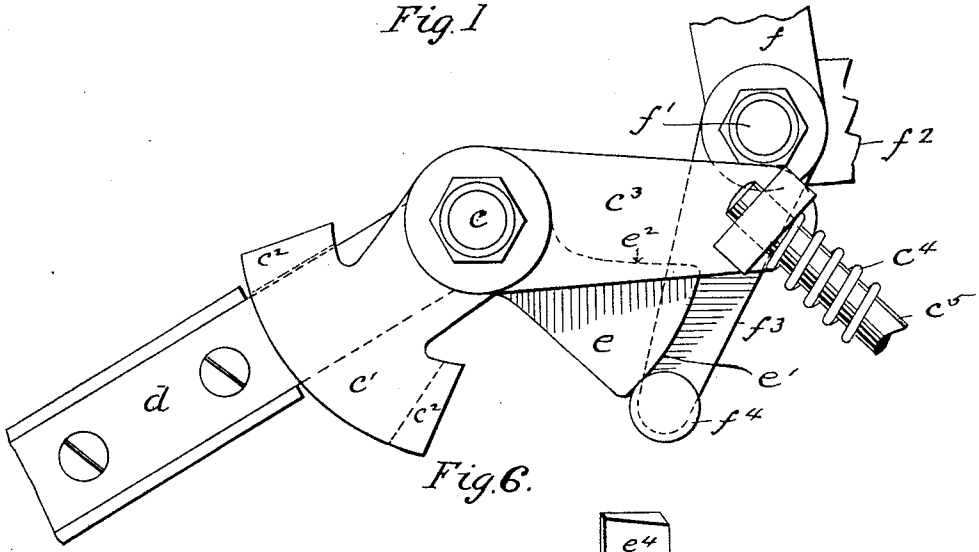


Fig. 6.

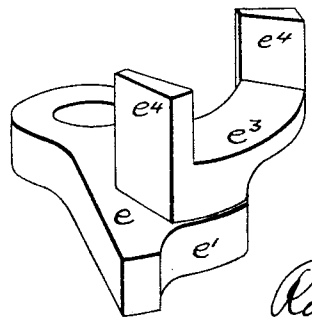


Fig. 5

WITNESSES:
Frank S. Ober
Harry Bailey

INVENTOR
Robert Wilson
BY
Wm. A. Rosenbaum
ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

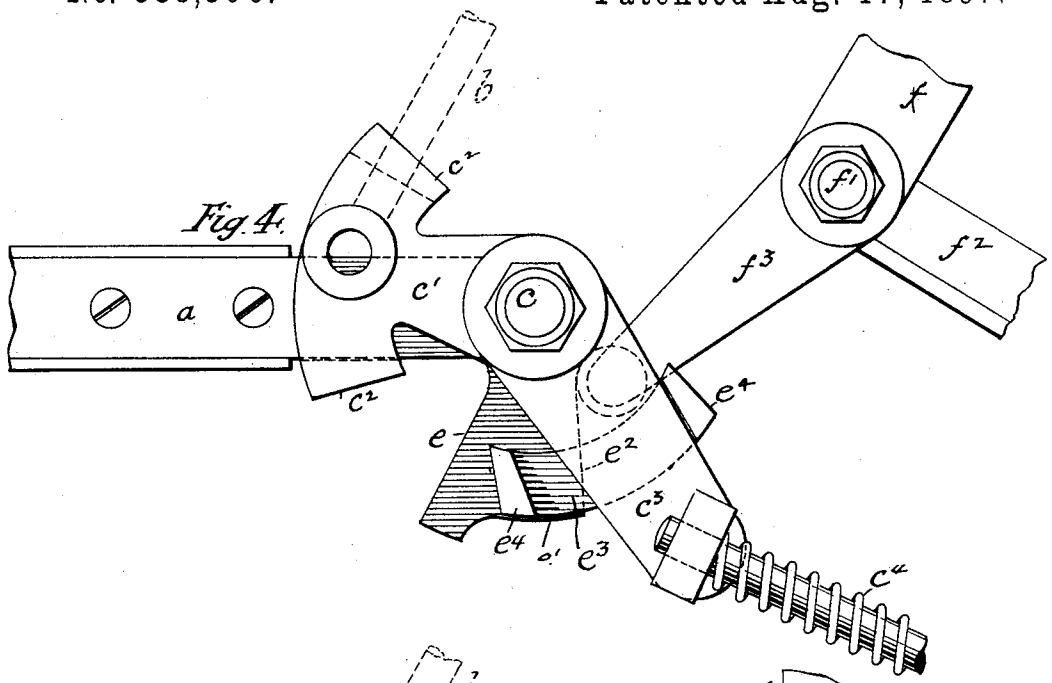


Fig. 3.

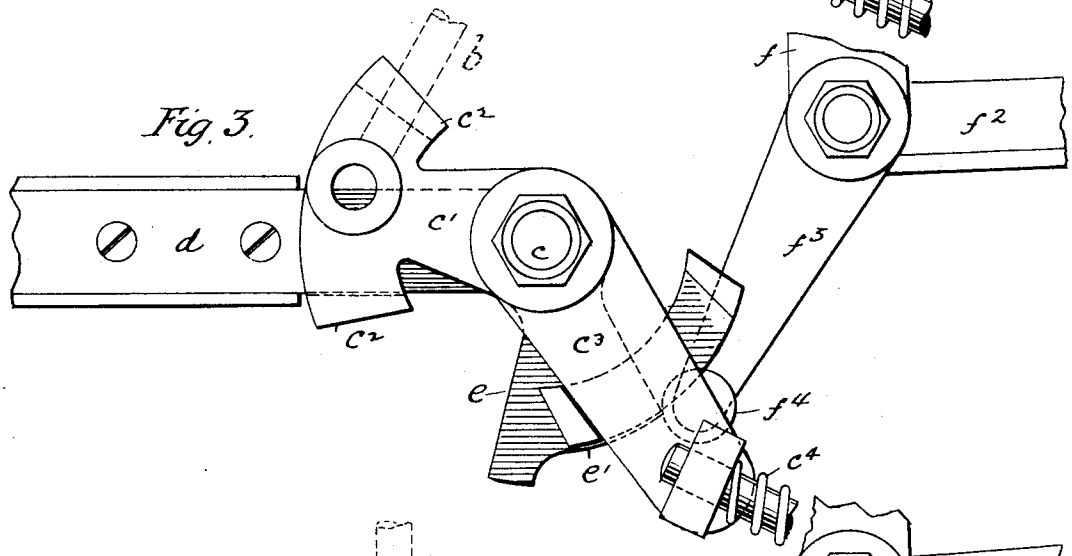
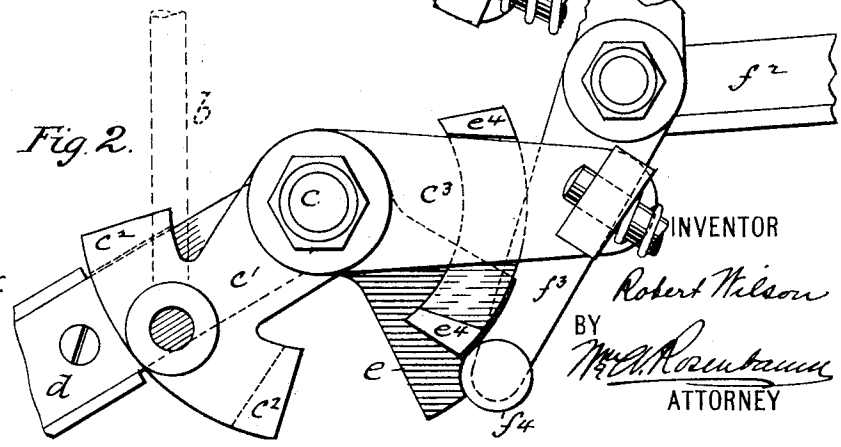


Fig. 2.



WITNESSES:
Frank L. Ober.
Harry Bailey

INVENTOR
Robert Wilson
BY
Mc. A. Rosenbaum
ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROBERT WILSON, OF LOUISVILLE, KENTUCKY, ASSIGNOR TO THE SULZER-VOGT MACHINE COMPANY, OF KENTUCKY.

AUTOMATIC RHEOSTAT-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 588,306, dated August 17, 1897.

Application filed May 29, 1897. Serial No. 638,798. (No model.)

To all whom it may concern:

Be it known that I, ROBERT WILSON, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Automatic Rheostat-Controllers, of which the following is a full, clear, and exact description.

This invention relates to automatic rheostat-controllers for electric motors, and is designed especially for operating electric elevators and hoists, but is not necessarily confined to such apparatus.

The object of the invention is to provide an efficient apparatus by which the main circuit of the motor may be closed and immediately thereafter the controlling resistance gradually removed from the circuit by a simple push or pull upon the operating lever or cable.

The invention consists in general of the combination of a main-switch arm, a rheostat-lever, an actuating-lever, and a cam, the actuating-lever being arranged to move both the switch-lever and the cam, allowance being made for independent movements of the actuating-lever with respect to the switch-arm and cam, whereby the rheostat-lever and switch-arm are caused to act in succession.

The invention will be described in detail with reference to the accompanying drawings, in which—

Figure 1 is a front elevation of the entire apparatus. Figs. 2, 3, and 4 are front views of the particular portions constituting my invention shown in three different positions of operation. Fig. 5 is a detail view of the cam, and Fig. 6 illustrates a modification of the invention.

Referring to the drawings by letter, A represents a box or casing in which the mechanism is located and which contains a set of resistance-coils (not shown) whose terminals respectively connect with the contacts in segment *a*. This resistance is in the main circuit controlled by the mechanism.

B is a main operating-lever passing into the box through an opening in its side and connecting with a short rod *b* and also with a crank *b'* therein. Upon a stud *c* is pivoted a bell-crank-actuating lever, one arm *c'* of which has a cross-head provided at its extremities with lugs c^2, while the other arm c^3 connects with a spring c^4, surrounding a rod c^5 and arranged to exert its pressure against the end of the arm c^3 from an abutment and pivot c^6. On the stud *c* there is also loosely hung a switch-arm *d* and a cam *e*. The switch-arm *d* carries the contact-clips 1 and 2 and stands between the lugs c^2 on the arm *c'*, so as to be struck and moved by said lugs when the arm moves. The cam has a concentric track *e'* and a radial track e^2. It carries an offset e^3, from which two lugs e^4 project and embrace the arm c^3. The lugs c^2 permit arm *c'* to move a certain distance before they make contact with the switch-lever. Likewise the lugs on the cam permit the arm c^3 to move a certain distance before they are struck thereby.

f is the rheostat-lever, pivoted at *f'* and having two branch arms f^2 and f^3, respectively. The lever carries at its free end a contact-piece which travels over the segment of rheostat-contacts *a*. Upon the arm f^2 is an adjustable weight *w*, which tends to swing the rheostat-lever on its center in a direction to cut out the resistance. The arm f^3 carries at its extremity a small roller f^4, which bears upon the track of the cam. The motion of rheostat-lever is made gradual and regular by the dash-pot *g*. The clips 1 and 2 are adapted to engage with the fixed contacts 3 and 4 to close the main circuit, in which the rheostat is located.

The parts 5, 6, 7, 8, and 9 constitute a reversing-switch. 9 is pivoted and carries the extension 10, standing between the two lugs b^2 on the crank *b'*.

The normal position of the parts when the main switch is open is shown in Fig. 1, the resistance being all in circuit. The same position of the parts mounted on the stud *c* is shown in Fig. 2. When the circuit is to be closed and the motor started, lever B is moved in one direction or the other and causes rod *b* to lift arm *c'* and lower arm c^3. These two arms move until lug c^2 strikes switch-lever *d* and lug e^4 is struck by arm c^3. Then switch-lever *d* commences to travel along the concentric track of the cam. When the roller f^4

has traveled about one-half the length of the concentric track, spring c^4, which had during this entire movement been gradually put under compression, passes its line of centers and exerts the force stored in it to impart a quick movement to the arms c^3 and c'. This throws the clips of the switch-arm into full connection with the contacts 3 and 4 and brings the roller f^4 to the end of the concentric track of the cam, where the radial track begins, the position being shown clearly in Fig. 3. Then weight w being released, it swings the roller inward along the radial track of the cam, causing lug e^4 to move away from arm c^3, while at the same time the rheostat-lever travels over the segment of contacts, cutting out the resistance at a rate controlled by the dash-pot, the final position being shown in Fig. 4, where all of the resistance is out and the motor supposed to be running full speed. It will thus be seen that the main switch is fully closed before any of the resistance is cut out and that thereafter it is gradually removed from the circuit.

To stop the motor, lever B is moved in the opposite direction, which causes arm c' of the actuating-lever to move downward and arm c^3 upward. The initial movement of arm c^3 is accompanied by a movement of the cam, and consequently the resistance-lever is swung back to put the resistance into circuit. The entire resistance is in when roller f^4 reaches the concentric track of the cam, at which time the upper lug c^2 has struck arm d, and simultaneously the spring passes its line of centers and suddenly opens the switch, all parts being left in the position shown in Fig. 2.

The reversing-switch is only operated when the main lever B throws the crank b' and rod b from one side of their centers to the other, and then it shifts just before the main switch closes. The lugs b^2 permit the crank to move while the main switch is opening or closing without moving the reversing-switch lever.

Referring now to Fig. 6, which illustrates a modification of the invention in which the cam is formed in one piece with the arm c^3. It is provided with the same concentric and radial tracks, but the offset e^3 with its lugs, which provide for the differential movement of the arm and cam, is omitted. This form of the device is useful in many places, but it has the disadvantage that in closing the circuit it allows the rheostat-lever to cut out some of the resistance before the main switch is closed, the reason for this being that the quick movement caused by the spring carries the concentric track of the cam beyond the roller f^4 before the switch is closed.

Having thus described my invention, I claim—

1. In an automatic rheostat, the combination of an actuating-lever, a cam moved thereby, a rheostat-lever controlled by the cam, and means whereby the actuating-lever is permitted to move a short distance independently of the cam for the purpose set forth.

2. In an automatic rheostat, the combination of a switch-lever, a rheostat-lever and an actuating-lever carrying a cam engaging with and controlling the rheostat-lever, the actuating-lever having a movement independent of the switch-lever and the cam adapted to hold the rheostat-lever stationary while the switch-arm is moved and to move or permit to move, the rheostat-lever when the switch is stationary, substantially as described.

3. In an automatic rheostat, the combination of a switch-lever, a rheostat-lever, a cam controlling the latter and an actuating-lever, the actuating-lever moving the switch-lever and cam but having movements independent of both of them whereby the switch and rheostat are caused to be operated in succession.

4. In an automatic rheostat the combination of a reversing-switch lever, a main-switch arm, an operating-lever, as B, connections from the operating-lever to the reversing-switch lever and to the main-switch arm whereby the reversing-switch may be closed before the main switch, the arrangement being such that the main switch will be closed regardless of the direction of movement of the reversing-switch lever, a rheostat-lever, a cam controlling it and an actuating-lever, the motion of the operating-lever B being transmitted to the main-switch lever through the actuating-lever and the actuating-lever having a movement independent of both the main-switch lever and the cam whereby the switch and rheostat are caused to operate in succession.

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

ROBERT WILSON.

Witnesses:
W. E. HEDGCOCK,
A. E. SCOTT.