No. 699,566. Patented May 6, 1902.

J. E. PUTNAM.

AUTOMATIC STARTER FOR ELECTRIC MOTORS.

(Application filed Sept. 8, 1900.)

(No Model.)

FIG. 1.

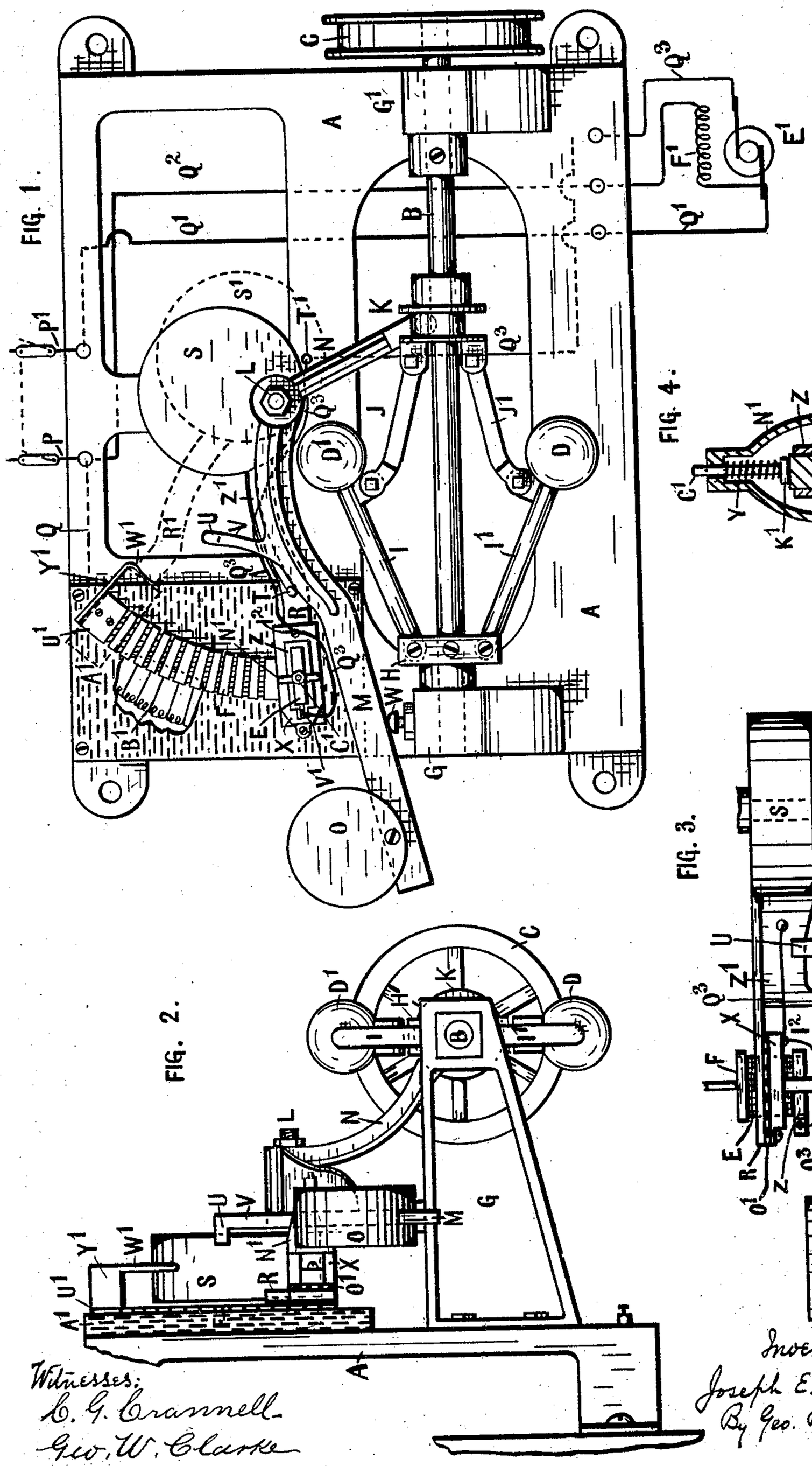


FIG. 2.

FIG. 3.

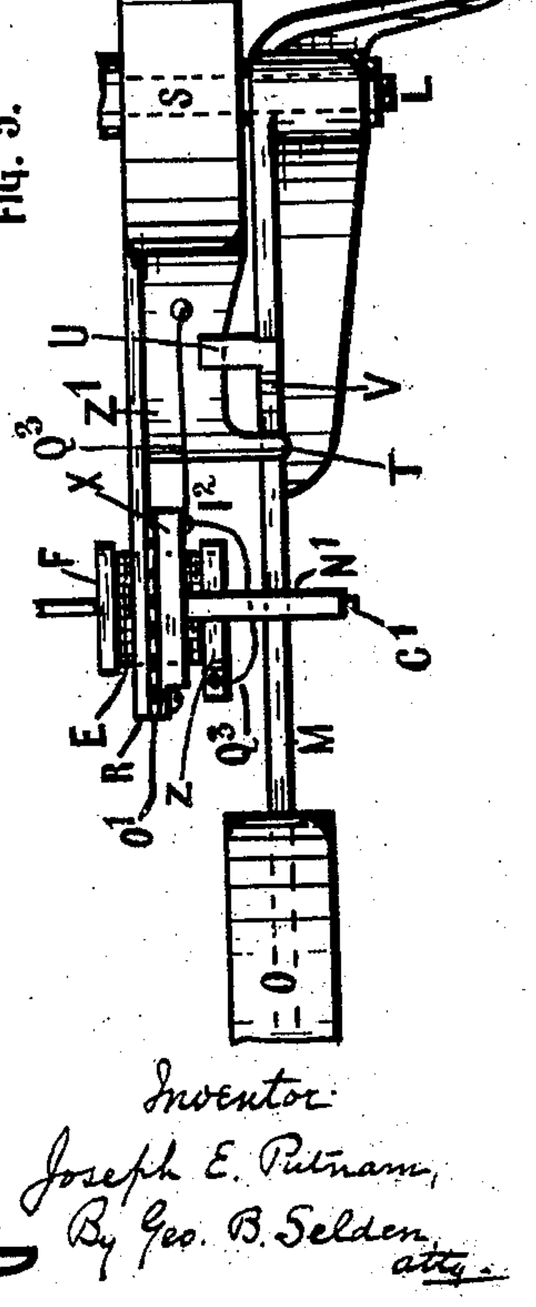
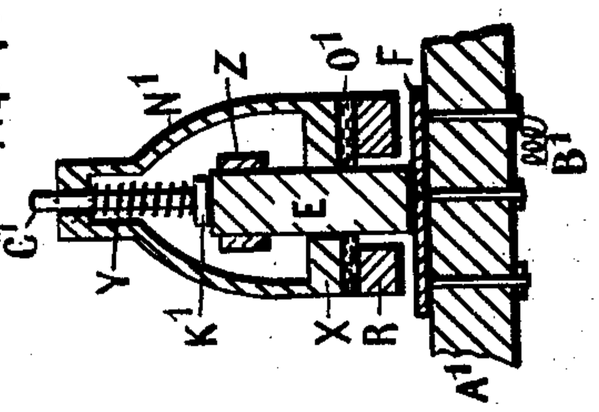


FIG. 4.



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UNITED STATES PATENT OFFICE.

JOSEPH E. PUTNAM, OF ROCHESTER, NEW YORK.

AUTOMATIC STARTER FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 699,566, dated May 6, 1902.

Application filed September 8, 1900. Serial No. 29,397. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH E. PUTNAM, a citizen of the United States, residing at Rochester, in the county of Monroe, in the State of New York, have invented certain Improvements in Automatic Starters for Electric Motors, of which the following is a specification, reference being had to the accompanying drawings.

My present invention relates to improvements on the automatic starter described in my Patent No. 566,936, September 1, 1896, which improvements are fully described and illustrated in the following specification and the accompanying drawings, the novel features thereof being specified in the claims annexed to the said specification.

In the accompanying drawings, Figure 1 is an elevation. Fig. 2 is an end view. Fig. 3 represents the levers detached as seen from the top of Fig. 1. Fig. 4 is a transverse section through the movable contact.

A is a suitable base which sustains the operative parts and is preferably provided with feet by which it is attached to a wall or other support.

B is a shaft driven by the motor by a belt passing over pulley C or other suitable arrangement, and D D′ are the governor-balls which operate the lever M, which in turn shifts the contact-lever R and moves the contact E along the buttons or plates F to vary the resistance to the electric current.

G G′ are suitable arms or brackets attached to the base and in which the shaft B revolves.

H is a collar or head fastened to the shaft and to which the arms I I′ of the governor-balls are pivoted.

K is a grooved collar which slides on the shaft B, being connected to the governor-balls or their arms by the links J J′. A stud L inserted in the base serves as a pivot on which the lever M swings, the arm N extending toward the shaft and being provided with a lug or roller which engages in the groove in the collar K. The lever M is provided with an adjustable weight O.

R is the contact-lever, which is pivoted on the stud L between the base and the lever M and moves independently except as it is controlled by the lug T and by a lug U on the arm V, extending outward from the lever M. When the lever M swings away from the shaft B, the lug T compels the contact-lever R to move with it; but the lever M can return for some distance before it draws the lever R back by means of the lug U, and the lever M is capable of independent swinging movements within these limits.

W is a stop for the lever M, attached to the bracket G.

The plates F are arranged in an arc having its center at L on the insulating-block A′, attached to the base. Suitable resistances B′ are interposed beneath the insulating-block. Each plate is provided with a stem which passes through the block, and the resistances are attached to these stems. The plate A′ is partially broken away in Fig. 1.

The construction of the contact E on the end of the contact-lever R will be understood from the sectional view, Fig. 4. A hole is made through the arm, and the insulated carbon contact-block E is arranged to slide through it, being supported by an insulated frame X and pressed against the plates by the spring Y. A clamp Z is applied to the outer end of the block E and serves to attach the wire Q^3 to the block. The spring Y is arranged on a rod C′, which is supported by the arch N′, attached to the frame X, but insulated therefrom by the packing O′.

K′, Fig. 4, is a washer between the end of the rod C′ and the block E. The wire Q^3 is attached to the frame X at I^2 and extends outward and is connected to the clamp Z at V′, Fig. 1. The wire Q^3 comes from one of the brushes on the motor E′ and passes through the base in a hole T′, Fig. 1, located near the pivot L, and thence passes through a hole in the web on the lever R and thence to the frame X and block E.

P P′ are the line-wires, which are provided with any suitable switch and from one of which, P, the current is conducted by the wire Q to the block U′ at the outer end of the row of contact-plates F. From P the wire Q′ leads to one of the brushes of the motor E′ and through the field-coils F′ by the wire Q^2 to the other pole P′. The current which goes through the armature is led by the wire Q^3 to the carbon contact E on the end of the lever R, as already described.

The lever M is provided with the adjust-

able weight O, which tends constantly to return the lever to its lowest position and to close up the governor-balls. The contact-lever R is provided with a weight S, so arranged relatively to the pivot L that when the lever is at the extremity of its upward movement the weight holds it in that position, which is indicated by the dotted lines R′ S′, Fig. 1. Thus the lever M may move the contact-lever R to its limit and return or oscillate within the limits prescribed by the arm T and lug U; but during this time the weight S at S′ will hold the contact-lever R at its highest position, and in this position the frame X makes contact with the spring W′ on a flange Y′, extending upward from the contact-block U′, so that the current from P through wire Q travels through the wire Q^3 back to the motor without encountering any resistance. This is the condition of normal current and normal speed for the motor, and the lever M may vary in position within the limits described without affecting the position of the contact-lever R; but when the motor is slowed by too great load or defective current the lever M will sink back to its position of rest, and the lug U will carry the contact-lever R with it to the lowest position in which all the resistances are cut in. It will be understood that when the motor is started and the balls D D′ begin to revolve and expand from the shaft the lever M swings outward and carries the contact-lever R with it and that when the levers have arrived at the limit of their movement the contact-lever R (at R′) has made contact with the spring W′ and is overbalanced by the weight S at S′, so that it remains in that position until the other lever M recedes. When the contact-lever occupies the position shown by the full lines in Fig. 1, its weight holds it in place, with the stud T resting against the lever M. The contact-lever R is provided with a web Z′, which at its outer end carries the stud T. The wire Q^3 passes through an opening in this web. The arm V on the lever M is provided with the lug U, which engages over the web Z′ and draws the contact-lever downward, when the operating-lever M returns to normal position. At the same time each of the levers has a capacity of movement independent of the other within the limits fixed by the stud T and the lug U. It will of course be understood that the operating-lever may be made heavy enough to dispense with the weight on it; but I prefer to make the weight separate and adjustable. It is not necessary that the levers should be pivoted on the same stud, and any suitable means of connecting them together may be employed, so that they may have the independent movements described. The governor may be constructed in many different ways, and it may be arranged vertically.

I claim—

1. The combination with the electric motor, of the weighted operating-lever, the counterbalanced contact-lever, the variable resistance, the connections between the levers, suitable means driven by the motor for shifting the operating-lever in accordance with the speed of the motor and suitable electrical connections, as and for the purposes specified.

2. The combination with the electric motor, of the weighted operating-lever, the counterbalance contact-lever, the conductor swinging with the contact-lever, the variable resistance, the electrical contact with the contact-lever at the upper end of the resistance, the connections between the levers, suitable means driven by the motor for shifting the operating-lever in accordance with the speed of the motor, and suitable electrical connections, as and for the purposes specified.

3. The combination with the electric motor, of the weighted operating-lever, the contact-lever provided with the counterbalance placed above the pivot of the lever and adapted to hold the lever in its uppermost position, the variable resistance, the connection between the levers, suitable means driven by the motor for shifting the operating-lever in accordance with the speed of the motor, and suitable electrical connections, as and for the purposes specified.

4. The combination with the electric motor, of the operating-lever provided with the longitudinally-adjustable weight, the contact-lever provided with the counterbalance placed above the pivot of the lever and adapted to hold the lever in its uppermost position, the variable resistance, the connections between the levers, suitable means driven by the motor for shifting the operating-lever in accordance with the speed of the motor, and suitable electric connections, as and for the purposes specified.

JOSEPH E. PUTNAM.

Witnesses:

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