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S. S. NEU.

MOTOR CONTROLLER.

APPLICATION FILED OCT. 10, 1904.

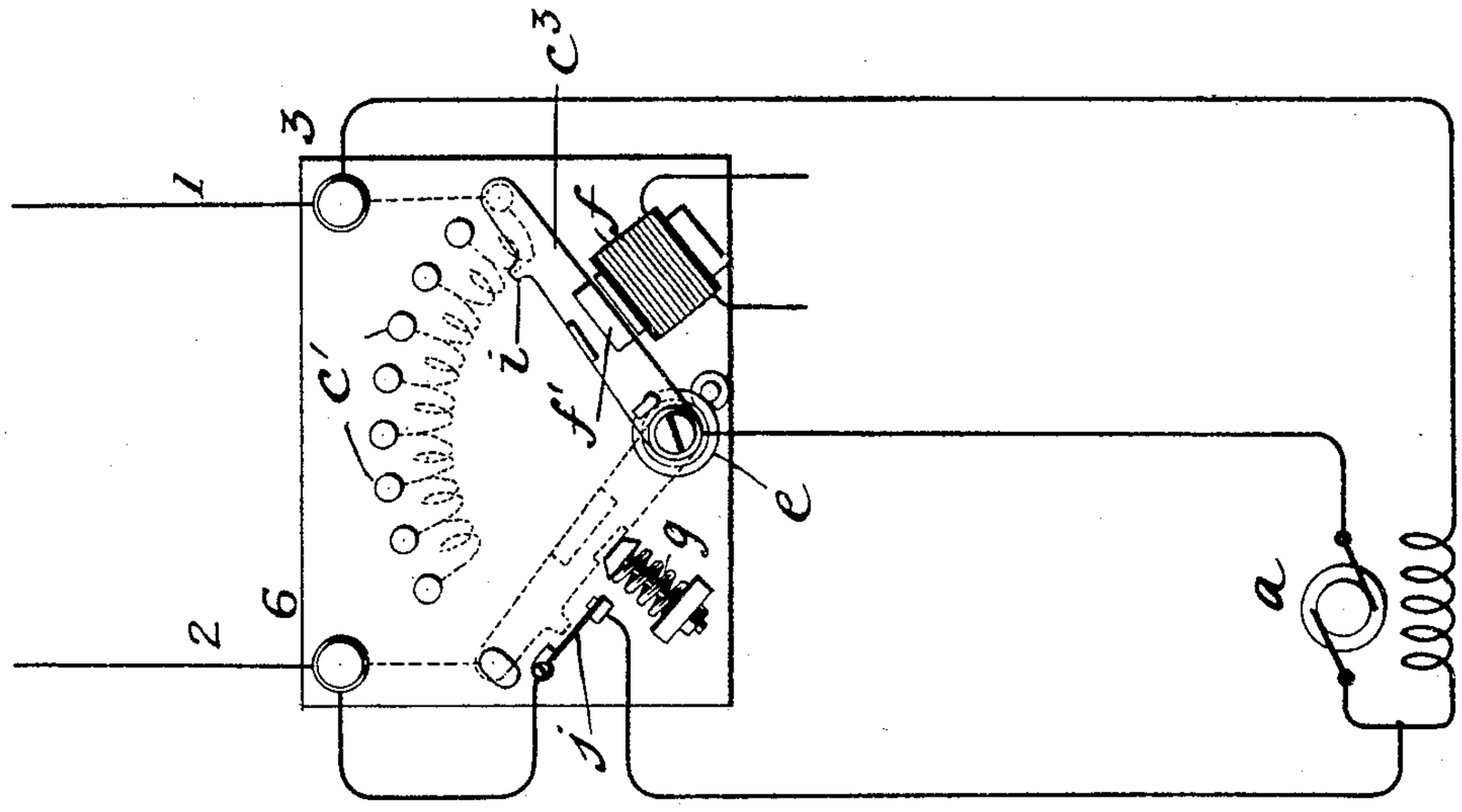

Fig. 2.

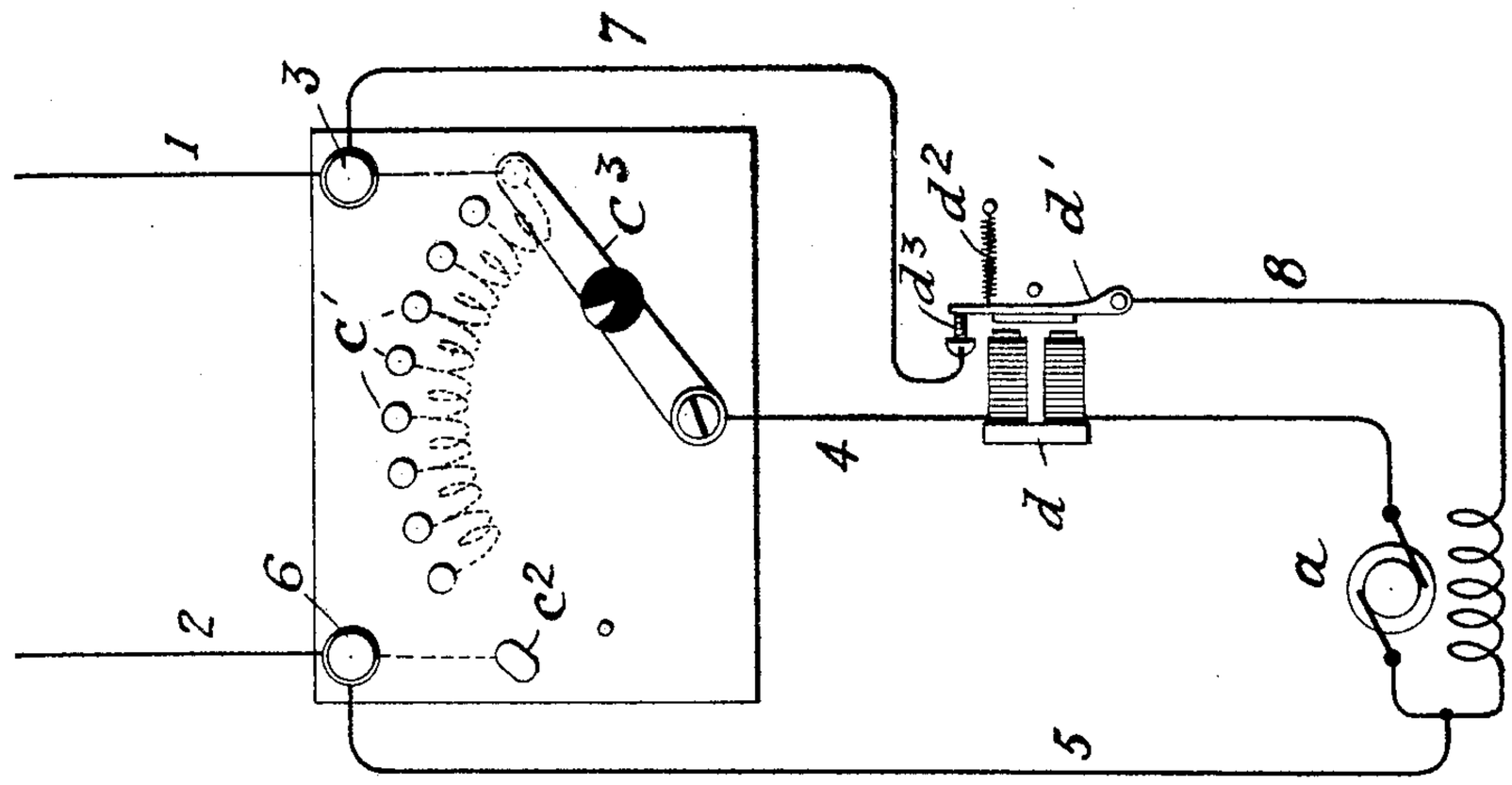

Fig. 1.

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MOTOR-CONTROLLER.

No. 800,816. Specification of Letters Patent. Patented Oct. 3, 1905.

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To all whom it may concern:

Be it known that I, SAMUEL SIDNEY NEU, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Motor-Controllers, of which the following is a full, clear, and exact description.

This invention relates to the operation of electric motors of that type commonly used for driving small machines, such as sewing-machines, and wherein in order to quickly bring the machine to a stop the motor is converted into a generator and consumes its own momentum by the rapid generation of current in its circuits.

The invention has particular reference to a shunt or compound-wound motor, in which the armature is thrown onto a short-circuit entirely independent of the field-magnet circuit, the latter being ordinarily left intact and being constantly energized; but in accordance with my invention means are provided for permitting the armature to come to a stop under its generator action and then automatically open the field-magnet circuit to avoid consumption of current while the machine is idle. It is found that while the field-magnet circuit has a comparatively high resistance and takes very little current, yet where large numbers of the machines are used, as in a large factory, the total consumption for a given period while the machines are frequently stopped, as is the case in the operation of sewing-machines, the consumption of current in the field-magnet circuits when the motors are idle, is considerable and well worth saving. This is the primary object of my invention.

In general terms the invention consists of an automatic cut-out switch in circuit with a field-magnet shunt-coil, which is actuated after the armature has been thrown onto a short circuit and after it has come to rest by reason of such short circuit.

The accompanying drawings illustrate in Figures 1 and 2 two different ways of carrying out my invention.

Referring first to Fig. 1, a indicates a motor-armature, and b a field-magnet coil therefor. c is a starting-rheostat having the usual series of contact-buttons c', connected with the various resistance-coils and having in addition a final contact-point c^2, spaced sufficiently far from the last point c' to enable the arm c^3 of the rheostat to leave said last point before engaging the point c^2. d is an electromagnet having an armature d' under the influence of a retractile spring d^2, but engaging with a front stop d^3 when the magnet is energized. The main-circuit wires are indicated by 1 and 2, respectively, and the circuits therefrom are traced as follows: from wire 1 to post 3, the resistance-coils of the rheostat, arm c^3, wire 4, including electromagnet d, armature a, wire 5, post 6, and main wire 2. The field-magnet b is in a shunt-circuit leading from post 3, by wire 7, to contact d^3, armature d', wire 8, coil b, to wire 5. With the apparatus in the condition shown in Fig. 1, the motor is supposed to be running full speed, all of the resistance being cut out and the field-magnet circuit being closed through the armature d', which is held in contact with d^3 by reason of the armature-current flowing through magnet d. When the motor is to be stopped, arm c^3 is thrown over to the contact c^2. Before it engages this contact, however, the arm fully leaves the last contact c', so that the reaction from the field-magnet has no closed circuit over which to flow, and thus form an arc as the arm leaves the last contact c', as would be the case if the arm engaged c^2 before it left c'. As soon as the arm strikes contact c^2 the armature is thrown upon a closed short circuit, as can readily be traced along wires 4 and 5, and arm c^3, and as the field-magnet is still on a closed circuit the rotation of the armature under its momentum will cause a heavy current to be rapidly generated in its closed circuit, which will at once consume the momentum and bring the armature to a stop. When this takes place, no further current flowing through the armature-circuit, electromagnet d becomes deënergized and releases armature d', allowing spring d^2 to open the field-magnet circuit and prevent the flow of current through any portion of the motor while it is stationary. During the short time that the arm c^3 is passing from the last of the contacts c' to contact c^2 no current flows through magnet d and an instantaneous interruption of the field-circuit occurs, which, however, does not modify the operation more than to show a small spark at d^3, and the residual magnetism of the field is sufficient to enable the armature to generate at the instant arm c^3 touches contact c^2, thus energizing magnet d and permitting current to continue through the field. To start the motor again, the usual method of moving arm c^3 slowly to the right is followed. When it engages the first of

contacts c', the current then admitted to the armature also energizes the magnet d and draws up armature d' to close the field-magnet circuit. The motor then starts and speeds up in the usual way as the resistance is cut out. Thus it will be seen that the electromagnet d, with its armature, acts as an automatic switch to cut out the field-magnet coil when the motor is stopped and to again cut it in when it is started.

A similar method is carried out in Fig. 2 in connection with an electromagnetic release for a spring-actuated rheostat-arm and a retarding device for delaying the opening of the field-circuit until the armature has come to a stop. The rheostat-arm c^3 is in the running position subjected to the tension of a spring e, which is prevented from moving the arm by an energized electromagnet f holding the armature f', attached to the arm. When the motor is to be stopped, the circuit of magnet f is opened in any suitable way, thus allowing spring e to quickly throw the arm to the left. Here after leaving the last of the contacts c' it strikes a spring-buffer g and about the same time engages the contact c^2. The buffer retards the free travel of the arm, allowing sufficient time for the momentum of the armature to be consumed under the generator action, and finally at about the time the armature ceases to rotate a lug i on the arm strikes a circuit-opening spring j and opens the field-magnet circuit, as well as incidentally the armature-circuit. The tension of spring e is sufficient to hold spring g under compression and maintain the open circuit at j. To start up the motor, arm c^3 will be thrown over by hand or in any other manner, its first movement permitting the circuit to be closed at j, and thereafter as soon as the arm strikes the contacts c' the armature receives current and the motor starts.

It will be obvious that other ways may be devised for automatically opening the field-circuit when the motor is stopped, and I wish it to be understood that my invention extends to any method of accomplishing this purpose.

Having described my invention, I claim—

1. The combination of an electric motor having a shunt field-magnet coil, of a rheostat having a contact-point which when engaged by the arm of the rheostat throws the armature onto a short circuit, an electromagnet in said short circuit and an armature therefor controlling the circuit of said shunt field-magnet coil.

2. The combination of an electric motor having a shunt field-magnet coil, of a rheostat having a contact-point, which, when engaged by the arm of the rheostat, throws the armature onto a short circuit, and an automatic switch in circuit with said shunt field-magnet coil and controlled by the current in said armature short circuit.

3. The combination of an electric motor having a shunt field-magnet coil, of a rheostat having a contact-point, which, when engaged by the arm of the rheostat, throws the armature onto a short circuit, a circuit-opener in circuit with the shunt field-magnet coil and means for delaying the opening of said circuit-opener after the armature is thrown onto the short circuit.

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

SAMUEL SIDNEY NEU.

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