

No. 868,581.

PATENTED OCT. 15, 1907.

A. F. POOLE.
SELF WINDING CLOCK.
APPLICATION FILED FEB. 10, 1904.

Fig. 1.

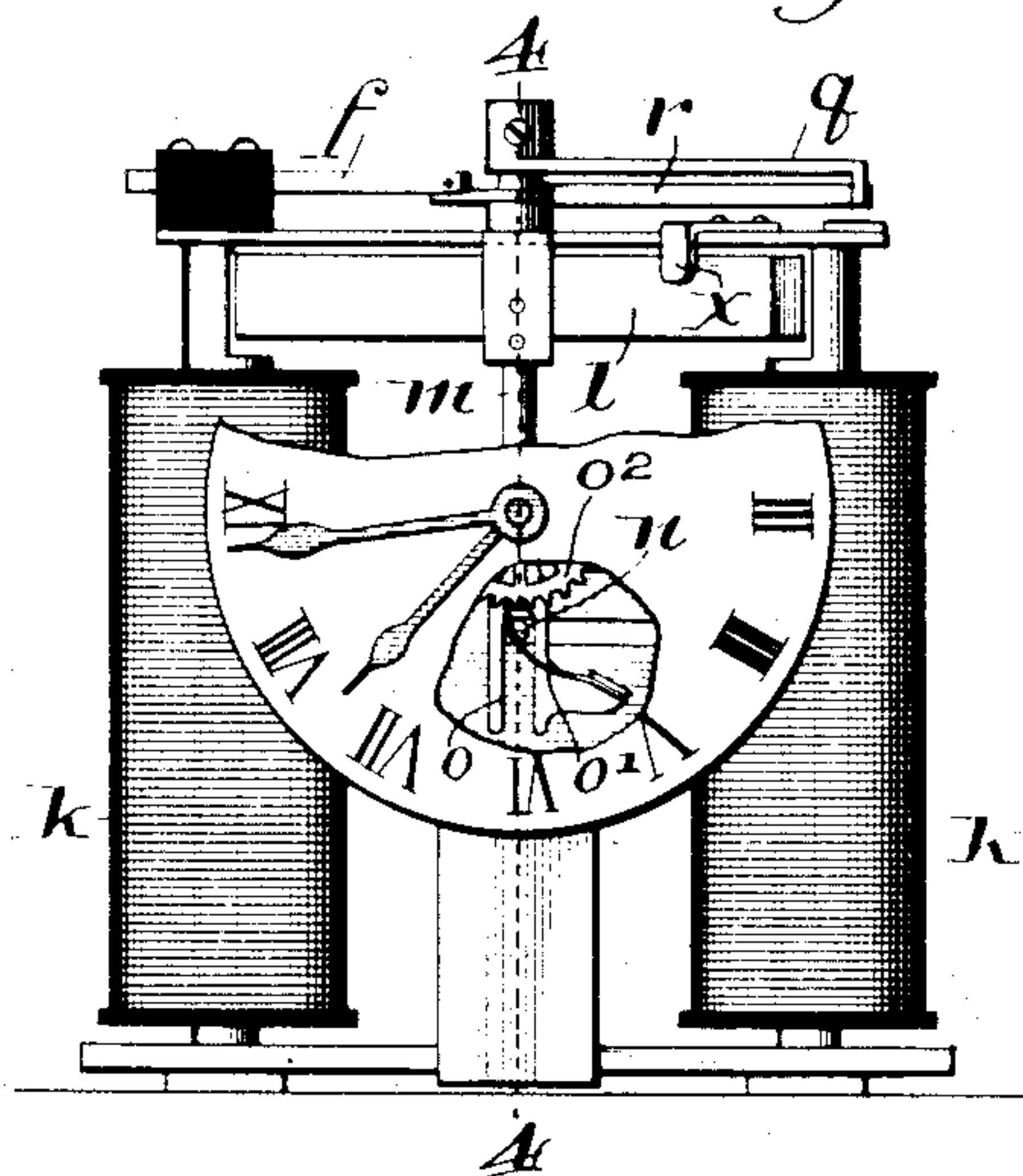


Fig. 6.

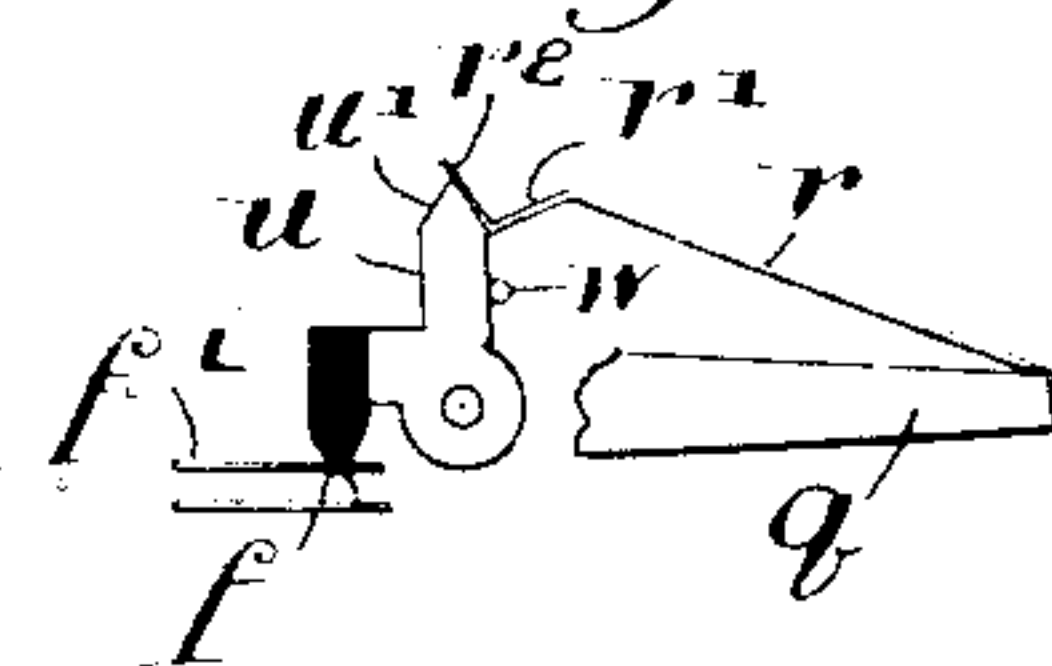


Fig. 2.

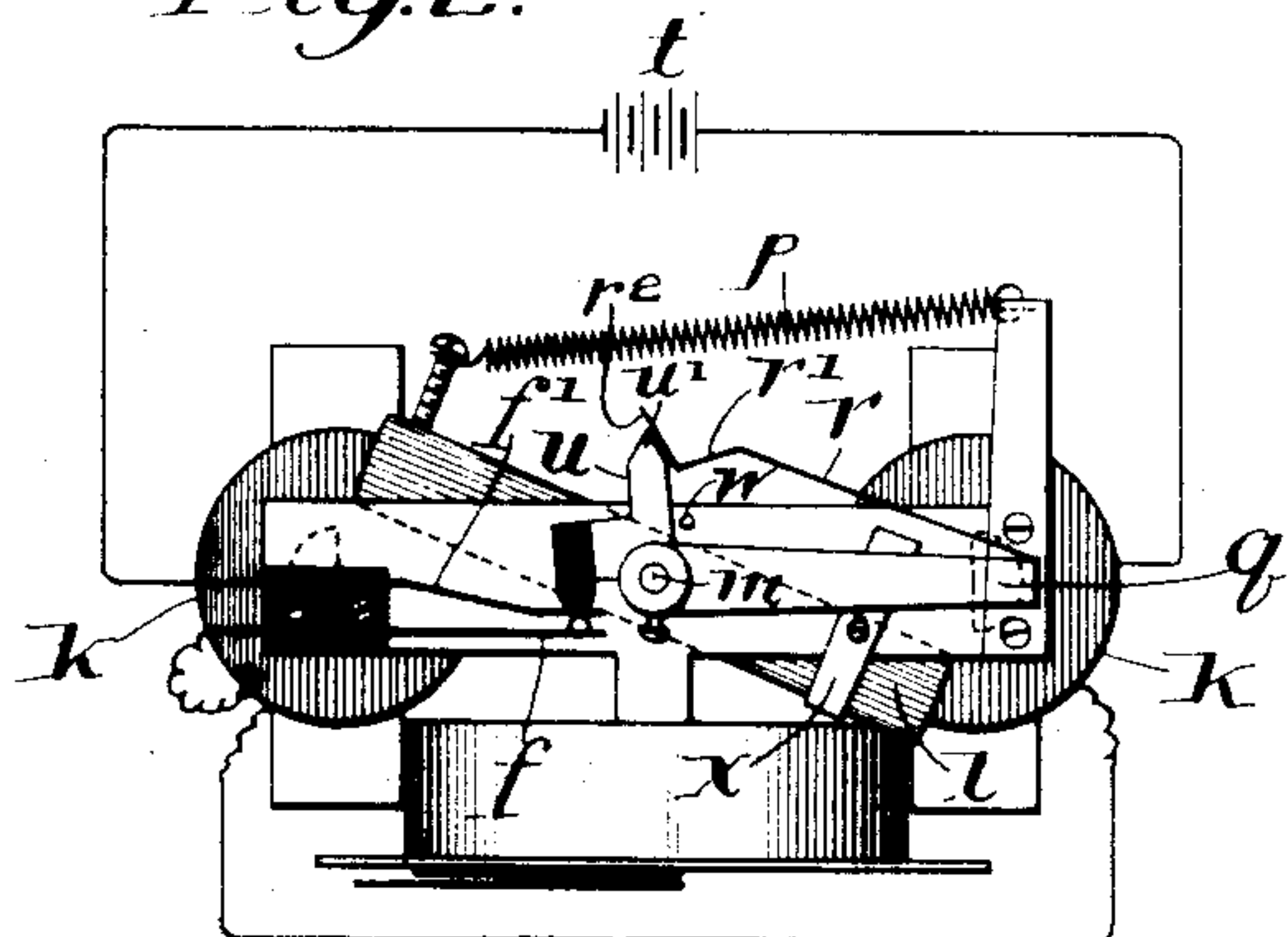


Fig. 3.

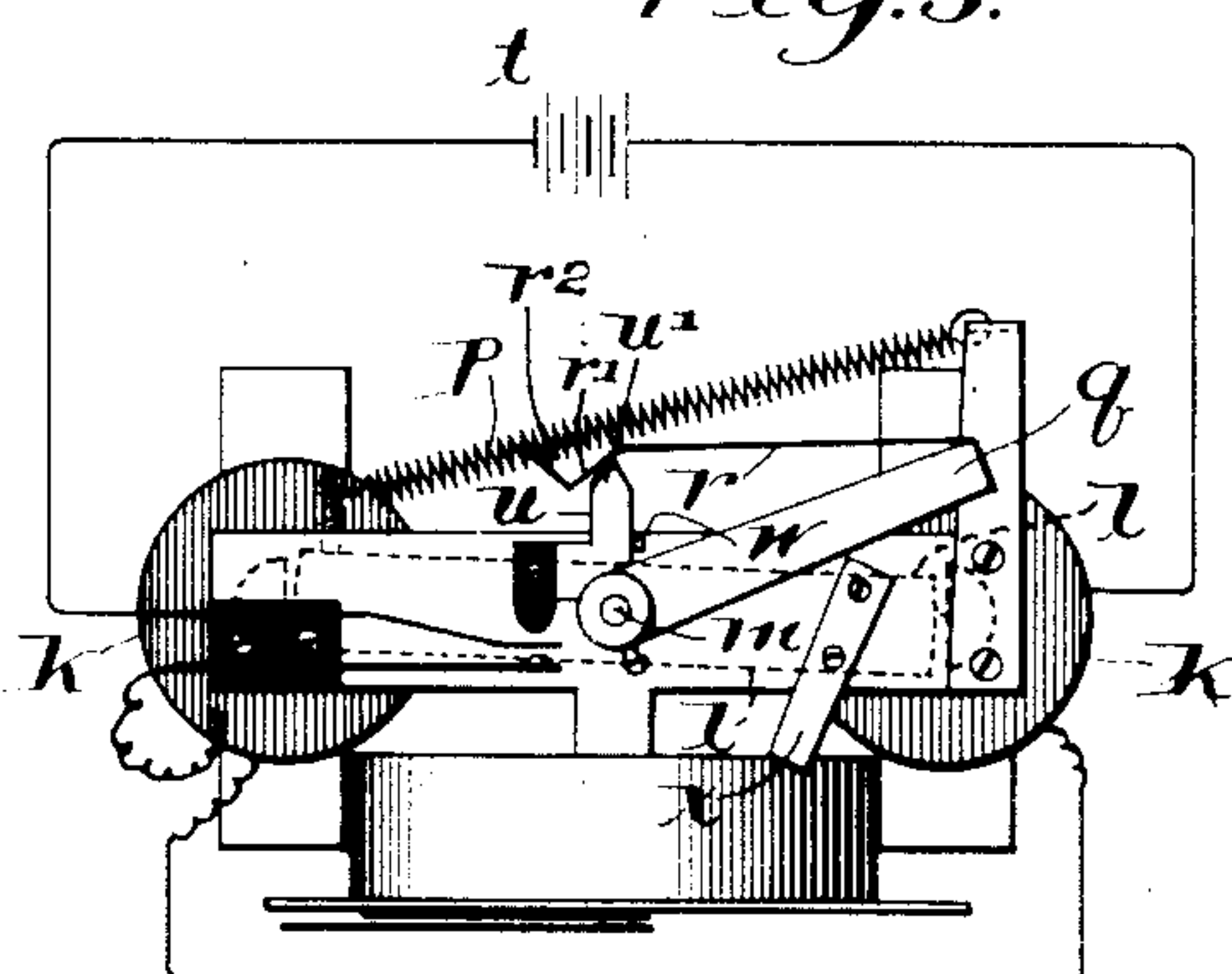


Fig. 4.

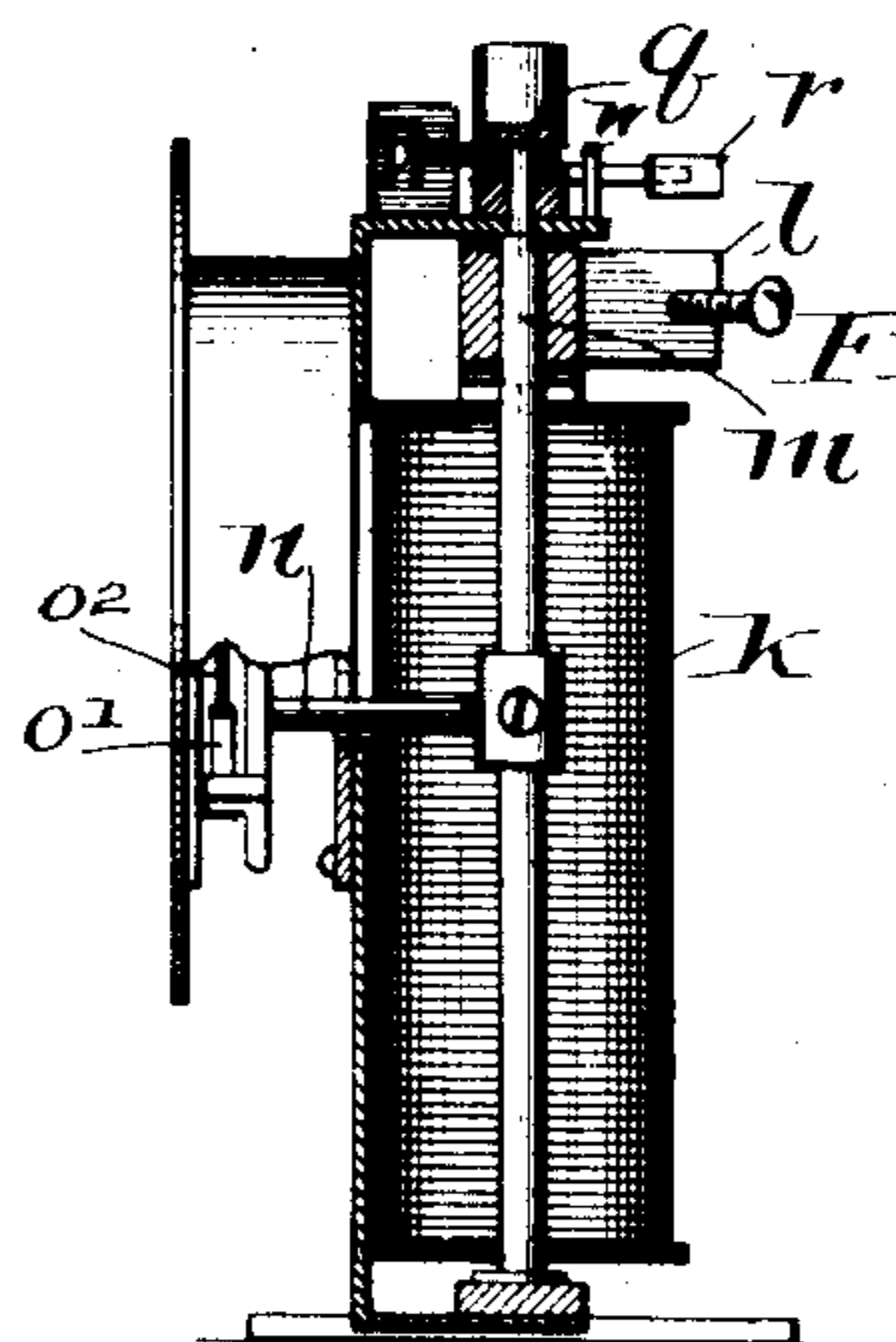
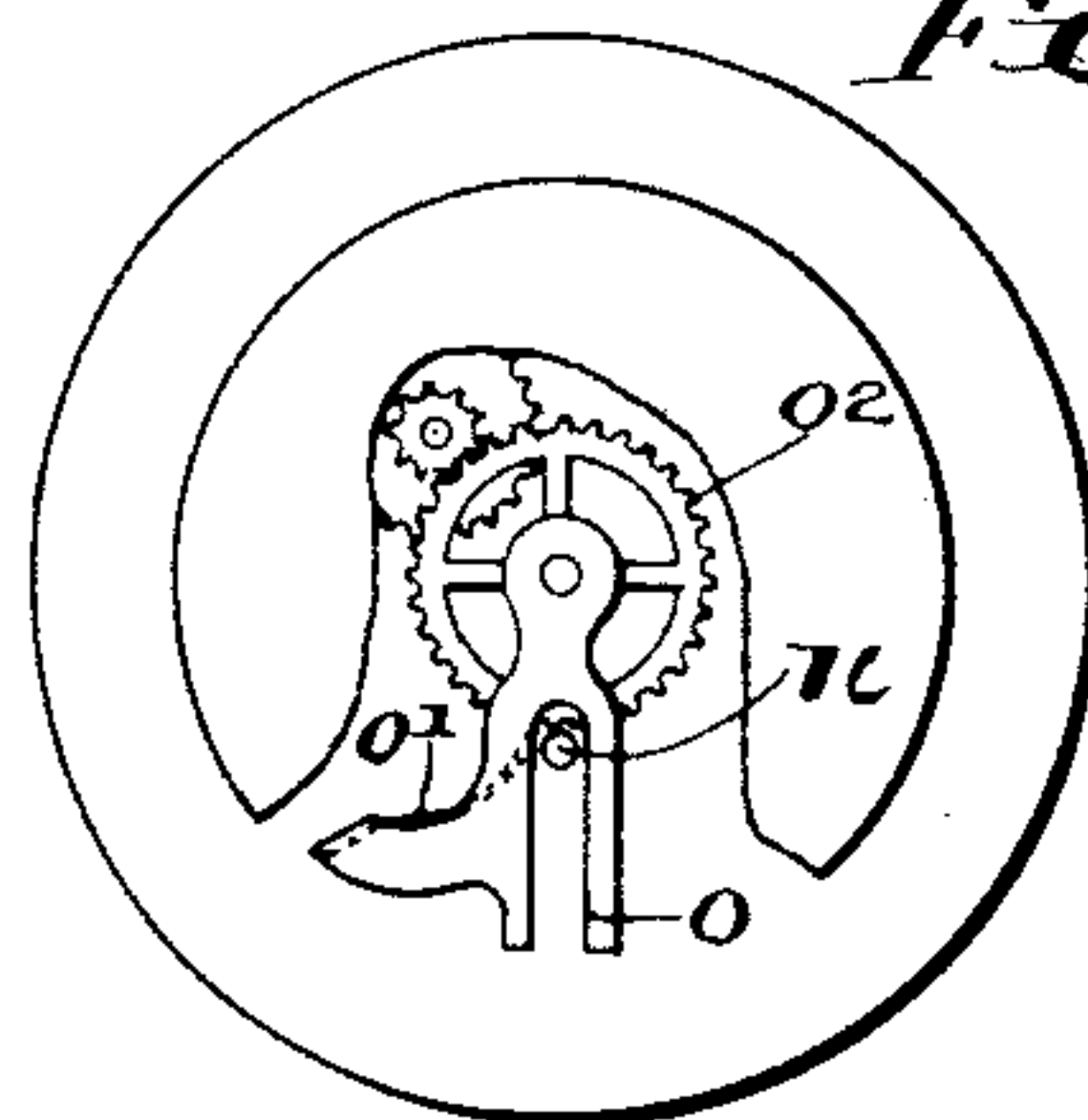


Fig. 5.



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UNITED STATES PATENT OFFICE.

ARTHUR F. POOLE, OF SANTA BARBARA, CALIFORNIA.

SELF-WINDING CLOCK.

No. 868,581.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed February 10, 1904. Serial No. 192,938.

To all whom it may concern:

Be it known that I, ARTHUR F. POOLE, a citizen of the United States, residing at Santa Barbara, in the county of Santa Barbara and State of California, have

invented a certain new and useful Improvement in Self-Winding Clocks, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to motor-controlling apparatus and especially to a controller for an electric motor used to effect the automatic winding of a clock.

Owing to the delicacy of the mechanism used in self-winding clocks, it is essential that any motor-control be operated with great precision irrespective of slight variations in the current supplied, and without appreciable effort or vibration.

My invention comprises a switching mechanism having an element the sole function of which is to operate the switch proper, and which beyond this acts merely as a passive intermediary, being acted upon only by the single element actuating the same. The means employed for closing the switch is brought by the electric motor into position to escape the switch-actuating element upon closing the circuit.

My invention will be readily understood by reference to the accompanying drawings, in which

Figure 1 is a front elevation partly broken away to show the connection between the clock-train and the shaft carrying the armature; Fig. 2 is a plan view illustrating the position of the respective parts at the moment of closing the circuit; Fig. 3 is a similar view illustrating the position of the respective parts when the armature is in its attracted position; Fig. 4 is a transverse elevation on the line 4-4 of Fig. 1; Fig. 5 is a detail rear elevation of a portion of the clock-train; and Fig. 6 is a plan view of the element of the switching mechanism, isolated.

In the drawings, k represents the field coils of an electric motor, forming a partial magnetic circuit which is completed by an armature l rigidly mounted upon a shaft m . A finger n rigidly connected to said shaft engages with a fork o whereby, when the armature assumes its attracted position with respect to the field k , the click spring o' is caused to ride over the wheel o^2 and engage a new tooth thereof. The attraction of the armature by the field increases the tension of a spring p with the consequent storage of the potential energy required to actuate the clock-train. The shaft m has an arm q fixed thereto which carries a strip metal spring r that has a V-shaped kink at its free end which serves to engage a switch actuating element u .

The switching mechanism consists of the terminals f and f' , the latter a strip metal spring, a battery t , the helices k , a spring r and an element u preferably separate and distinct from the terminals. The switching

element u comprises a block which is loosely mounted upon the shaft m , effects a closure of the circuit by movement in an anti-clockwise direction and opens the circuit as it moves in a clockwise direction. This latter movement is limited by a stop w so placed that the peak of the cam-shaped portion u' of the switching element which engages the spring r is limited to the sides r' and r^2 of the detent end of the spring r . To prevent short-circuiting, the end of the switching element which engages the terminal spring f' is insulated. A stop x maintains the armature within the field of the coils k .

The operation is as follows: Assuming the position of Fig. 3 to be the initial position, then, the circuit being open, the armature, in response to the tension of the spring p , moves outwardly, rotating the shaft m in a clockwise direction, which actuates the clock-train through the agency of the finger n , the fork o and the click spring o' . With the outward rotation of the armature the spring r is gradually retracted, since they are mounted on a common shaft m , and the cam u' rides over the face r' of the detent in the end of the spring r . So long as this face bears upon the switching element u , the opposite insulated end of the same is prevented from causing contact between the terminals f , f' . As soon, however, as the cam u' rides over the apex of the detent and the opposite face r^2 is brought to bear upon the same, the pressure of the spring r with respect to the switching element u is reversed, and the latter being free to rotate in an anti-clockwise direction is instantly thrown into contact with the terminal f' , which is in turn pressed into contact with the opposing terminal f , thus closing the circuit as indicated in Fig. 2. The closing of the circuit excites the field coil k and the armature being attracted reassumes the position indicated in Fig. 3.

In the electric motor herein described it is impossible to have such imperfect operation as to cause a buzzing between the terminals of the motor circuit because the terminal f' is thrown to one or the other of its alternative positions by means mounted wholly independent of the armature, when the latter has reached one or the other of its alternative positions. Obviously the interval between said movements may be long or short and in practice I have found a four minute period to be very satisfactory.

Having thus described the nature and object of my invention what I claim is:

1. In combination, an electromagnet, an oscillating armature therefor, a circuit closing device independent of the armature, and an elastic member carried by said armature and adapted to engage said circuit closing device and to move it into alternative positions, substantially as described.

2. In combination, an electromagnet, an oscillating armature therefor, a circuit closing device mounted independently of the armature, a freely movable intermediate

element loosely mounted on the armature shaft for operating the circuit closing device, and means carried by the armature for actuating said movable element, substantially as described.

- 5 3. In combination, an electromagnet, an oscillating armature therefor, a circuit closing device mounted independently of the armature, a freely oscillating intermediate element loosely mounted on the armature shaft for operating the circuit closing device, and means carried
10 by the armature for actuating said movable element, substantially as described.

4. The combination with an electric motor, of switching mechanism governing its circuit, an element of said switching mechanism being rotatably mounted, means
15 for effecting rotation of said element, and means for effecting a bodily movement of the aforesaid means in a direction opposite to that which the aforesaid means thereupon causes the said element to move, substantially as described.

5. The combination with an electric motor including
20 an oscillating armature, of switching mechanism governing the circuit of the electric motor, said switching mechanism including an actuating element *u*, a spring provided with a kinked or cam portion and carried by an actuated element of the electric motor to effect an operation
25 of the said block *u* to close the circuit of the motor, and a spring in opposition to which the armature is rotated when circuit through the motor is closed, substantially as described.

6. The combination with an electric motor including an
30 oscillating armature, of switching mechanism governing the circuit of the electric motor, said switching mechanism including the actuating element *u* provided with a cam *u'* having meeting sloping surfaces, and a spring *r* provided with a kinked or cam portion and carried by an actuated
35 element of the motor, one side of the kink or cam of the spring serving to engage one slope of the cam and the other side of said kink serving to engage the other slope of the cam as said spring is moved by the motor, substantially as described.

7. The combination with an electric motor including an
40 oscillating armature, of switching mechanism governing the circuit of the electric motor, said switching mechanism including the actuating element *u* provided with a cam *u'* having meeting sloping surfaces, a spring *r* provided with a kinked or cam portion and carried by an
45 actuated element of the motor, one side of the kink or cam of the spring serving to engage one slope of the cam and the other side of said kink serving to engage the other slope of the cam as said spring is moved by the motor, and
50 a spring in opposition to which the armature of the motor rotates when circuit through the motor is closed, substantially as described.

8. The combination with an electric motor including an
55 oscillating armature, of switching mechanism governing the circuit of the electric motor, said switching mechanism including an actuating element *u*, a spring provided with a kinked or cam portion and carried by an actuated element of the electric motor to effect an operation of the
60 said block *u* to close the circuit of the motor, a spring in opposition to which the armature is rotated when circuit through the motor is closed, and clock mechanism including a train operated by said spring, substantially as described.

9. The combination with an electric motor including an
65 oscillating armature, of switching mechanism governing the circuit of the electric motor, said switching mechanism including the actuating element *u* provided with a cam *u'* having meeting sloping surfaces, a spring *r* provided with a kinked or cam portion and carried by an
70 actuated element of the motor, one side of said kink serving to engage one slope of the cam and the other side of said kink serving to engage the other slope of the cam as said spring is moved by the motor, and clock mechanism

including a train operated by said spring, substantially as described. 75

10. The combination with an electric motor including
an oscillating armature, of switching mechanism governing
the circuit of the electric motor, said switching mechanism including the actuating element *u* provided with a
80 cam *u'* having meeting sloping surfaces, a spring *r* provided with a kinked or cam portion and carried by an actuated element of the motor, one side of the kink serving to engage one slope of the cam and the other side of the kink serving to engage the other slope of the cam
85 as said spring is moved by the motor, a spring in opposition to which the armature of the motor rotates when circuit through the motor is closed, and clock mechanism including a train operated by said spring, substantially as described.

11. The combination with an electric motor including
90 an oscillating armature, of a spring in opposition to which said armature is rotated when the motor circuit is closed, switching mechanism governing its circuit, an element of said switching mechanism being rotatably mounted, means
95 for effecting rotation of said element, means for effecting a bodily movement of the aforesaid means in a direction opposite to that which the aforesaid means thereupon causes the said element to move, and a clock whose train is driven by said spring, substantially as described.

12. The combination with an electric motor including
100 an oscillating armature, of a spring in opposition to which said armature is rotated when the motor circuit is closed, switching mechanism governing its circuit, means for effecting movement of said element, means for effecting
105 a bodily movement of the aforesaid means in a direction opposite to that which the aforesaid means thereupon causes the said element to move, and a clock whose train is driven by said spring, substantially as described.

13. The combination with an electric motor including
an oscillating armature, of a spring in opposition to which
110 said armature is rotated when the motor circuit is closed, switching mechanism governing its circuit, an element of said switching mechanism being rotatably mounted, means for effecting rotation of said element, and means for effecting
115 a bodily movement of the aforesaid means in a direction opposite to that which the aforesaid means thereupon causes the said element to move, substantially as described.

14. The combination with an electric motor including
an oscillating armature, of switching mechanism governing
120 the circuit of the electric motor, and an actuating element operating independently of the motor and carried by an element driven by the motor and adapted to engage and thereafter escape an operating element of the switching mechanism, substantially as described. 125

15. The combination with an electric motor including
an oscillating armature, of switching mechanism governing
the circuit of the electric motor, and an actuating element
carried by an element driven by the motor and adapted to
engage and thereafter escape an operating element of the
130 switching mechanism, substantially as described.

16. In combination, an electromagnet, an oscillating
armature therefor, circuit terminals connected with a
source of electricity, a circuit-closing element adapted to
engage one of said terminals and permanently insulated
135 from the circuit, and means actuated by the armature for momentarily closing the circuit through said circuit-closing element.

In witness whereof, I hereunto subscribe my name this nineteenth day of January A. D., 1904.

ARTHUR F. POOLE.

Witnesses:

G. L. CRAGG,

C. H. CRAWFORD.