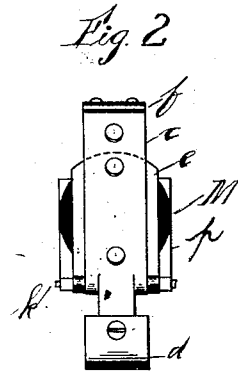
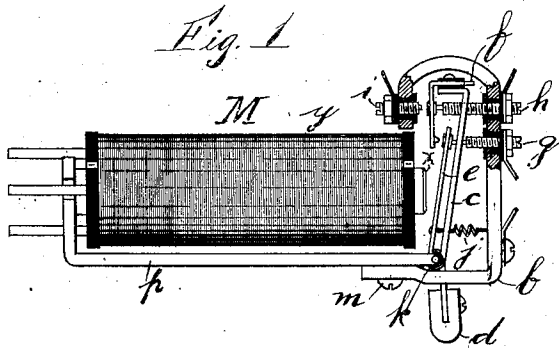
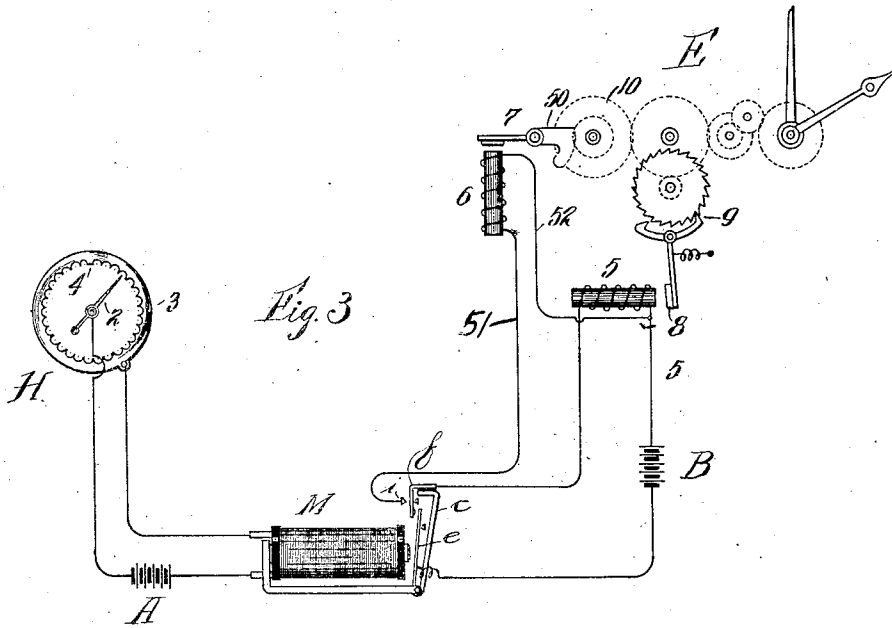


H. G. WEBSTER.
CIRCUIT CHANGING MECHANISM.
APPLICATION FILED JULY 5, 1906.

1,056,866.

Patented Mar. 25, 1913.



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CIRCUIT-CHANGING MECHANISM.

1,056,866.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed July 5, 1906. Serial No. 324,844.

To all whom it may concern:

Be it known that I, HARRY G. WEBSTER, a citizen of the United States, and resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Circuit-Changing Mechanism, of which the following is a specification.

My invention relates to circuit changing apparatus, and particularly to that class known as "relays," in which the armature of an electromagnet is associated with and controls electrical circuit changing connections.

The object of my invention is the provision of improved means whereby the movement of the armature of the electromagnet will cause one set of circuit connections when the relay magnet is energized by momentary current impulses, and another set of circuit connections when the winding is energized by prolonged impulses or steady currents.

In accordance with my invention, I associate with the electromagnet an armature having relatively slight inertia or mass, adapted, by its motion, to engage a movable member or stop having relatively great inertia. When the magnet is energized by a momentary flow of current, the armature engages the moving stop and comes to rest without completing its stroke, the force of the stroke being taken up by the inertia of the stop. When the magnet is energized by a prolonged current, the stop is engaged by the armature in its forward stroke and carried with it in its further attraction toward the pole piece of the magnet. The armature and the stop may be utilized as, or associated with, contact pieces or springs to secure the various circuit combinations desired.

My invention will be more fully understood by reference to the accompanying drawings forming part of this specification, in which—

Figure 1 shows a side elevation of one form of relay embodying my invention, and Fig. 2 an end view of the same device; Fig. 3 is a diagrammatic illustration of an application of my invention to a time service system.

Like characters refer to corresponding parts in the various figures.

Referring to Fig. 1, the relay M has a core

x provided with a winding y and a polar extension p of magnetic material. Adjacent to the end of the core x , and hinged to the part p by the pivot k , is an armature e , which is of relatively light weight and normally retracted against the contact-stop g by the spring j . This stop and spring are carried by the part b which is preferably of non-magnetic material and is secured to the extension p by the screw m . Associated with the armature e is a moving member c , hinged also upon the pivot k and preferably of non-magnetic material. This part c is of relatively great weight and stiffness and the inertia of the part is further increased by the weight d secured thereto. Attached to the upper end of the part c is an insulated contact-piece f , normally resting against the contact-stop h and forming, in connection with the part c and weight d , a movable stop for the armature. When the relay magnet is energized by momentary currents, the armature will engage the part f at each impulse, but owing to the relative inertia of the armature and stop, its motion will be arrested at this point. In the structure shown, this actuation will serve to interrupt an electrical connection between armature e and contact-stop g and to establish a new electrical connection from armature e to contact-piece f which is normally in connection with contact-stop h . If the relay magnet be energized by prolonged current impulses, or by a steady current, this energization will be sufficient to overcome the inertia of the movable stop which will be carried with the armature to its completely attracted position. The actuation thus described serves to break the electrical connections normally existing between armature e and stop g and between contact-piece f and stop h and to bring into connection armature e , contact-piece f and stop i . These or other changes in the electrical connection may be utilized for a variety of purposes.

Fig. 2 is an end view of the relay with the part b removed. It will be evident from this figure that the pivot k is carried by projecting lugs on the polar extension p ; that the armature e is provided with extensions in movable relation on the pivot k next to these lugs; and that the part c is provided with similar extensions adjacent to the armature extensions, also hinging it to the pivot k .

Fig. 3 is a diagram illustrating the ap-

plication of my invention to a time service system. In this figure, H indicates a circuit-controlling device associated with a master-clock. In this device, the wiper 2 moves at
 5 regular intervals over the projections of the ring 3 and, at each movement, establishes a temporary circuit of battery A through the winding of relay M. This circuit is of but momentary duration except when the wiper
 10 passes over the broad projection 4, at which time a prolonged energization of the relay magnet ensues. An electrically operated clock is diagrammatically indicated at E. This clock is provided with an escapement 9,
 15 controlled by electromagnet 5, and with a winding-drum 10, controlled by electromagnet 6. In the operation of the structure, the wiper 2, being given a step-by-step motion by the master-clock mechanism, establishes
 20 at each step a momentary circuit for relay M as previously described. At each current pulsation, the armature *e* is attracted sufficiently to engage the contact-piece *f* carried by the movable stop *c*, but is not attracted
 25 to a point where the contact *i* will be engaged. At each impulse, therefore, a circuit of battery B is closed through magnet *b*, causing the attraction of its armature 8, and the retraction of the armature *e* breaks the
 30 circuit. The consequent retraction of armature 8 of magnet 5 allows the escapement-wheel to progress one tooth, the progression being upon the release of the magnet armature. This action takes place at every step
 35 of the wiper 2, except when the broad projection 4 is reached. When the wiper passes over this projection 4, a prolonged current impulse is sent which serves to cause the complete attraction of armature *e*. When this
 40 occurs, armature 8 of magnet 5 is attracted as before, and a circuit is likewise established through wire 51, wire 52 and magnet 6 at contact *i*. Armature 7 of magnet 6 is provided with an extension 50 engaging the
 45 winding mechanism 10 of the clock; and the attraction of armature 7, in response to current in the circuit just traced, serves to wind the driving spring of the clock at the required time. The subsequent deenergization
 50 of the magnet of relay M, which occurs when the wiper 2 passes out of engagement with projection 4 and comes to rest, opens the circuit of magnets 5 and 6, releasing the escapement 9 at the proper time interval and allowing
 55 armature 7 and its associated parts to assume their normal positions.

While I have illustrated my invention as embodied in particular forms of mechanical construction, it is obvious that many modifications or other forms of constructions may be used without departing from its spirit. It is also obvious that such a relay or circuit-changing device may be utilized in many other structures than those shown. I
 65 therefore do not wish to be limited to the

particular applications and the particular structures illustrated and described, but claim:—

1. Circuit changing mechanism comprising an electromagnet, a pole piece therefor, an armature carried by said pole piece, a movable stop for said armature, carried by said pole piece and operative to arrest the motion of said armature in response to a momentary energization of said electromagnet and to move with said armature in response to a prolonged energization of the electromagnet, contact pieces associated with said armature and said stop, and means for giving said electromagnet momentary and prolonged energization. 70 75 80

2. Circuit changing mechanism comprising an electromagnet, a pole piece therefor, an armature carried by said pole piece, a relatively heavier movable stop for said armature, also carried by said pole piece and operative to arrest the motion of said armature in response to a momentary energization of said electromagnet and to move with said armature in response to a prolonged energization of the electromagnet, contact pieces associated with said armature and said stop, and means for giving said electromagnet momentary and prolonged energization. 85 90 95

3. Circuit changing mechanism comprising an electromagnet, a pole piece therefor, an armature carried by said pole piece, a movable stop for said armature also carried by said pole piece, means for affecting said stop to arrest the motion of said armature in response to a momentary energization of said electromagnet, said stop being adapted to move with said armature in response to a prolonged energization of the electromagnet, contact pieces associated with said electromagnet, and means for giving said electromagnet momentary and prolonged energizations. 100 105

4. Circuit changing mechanism comprising an electromagnet, a pole piece extension therefor, a flat armature pivoted to said extension and extending adjacent to the core of said electromagnet, a movable stop for said armature also pivoted to said extension, means for affecting said stop to arrest the motion of said armature in response to a momentary energization of said electromagnet, said stop being adapted to move with said armature in response to a prolonged energization of the electromagnet, contact pieces associated with said electromagnet, and means for giving said electromagnet momentary and prolonged energizations. 110 115 120

5. Circuit changing mechanism comprising an electromagnet, an armature, a polar extension for the electromagnet in the magnetic circuit of said magnet and armature, a moving member of relatively great mass in the path of motion of said armature, said 125 130

moving member operating to engage said
armature and to stop its motion when the
electromagnet is energized by momentary
currents and to move with said armature
5 when the electromagnet is energized by more
than momentary currents, circuit connections
controlled by said armature and moving
member, and means for energizing said elec-

tromagnet by momentary and more than
momentary currents.

In witness whereof, I hereunto subscribe
my name this 2nd day of July 1906.

HARRY G. WEBSTER.

Witnesses:

GEO. E. MUELLER,
A. H. DYSON.