No. 807,684. PATENTED DEC. 19, 1905.

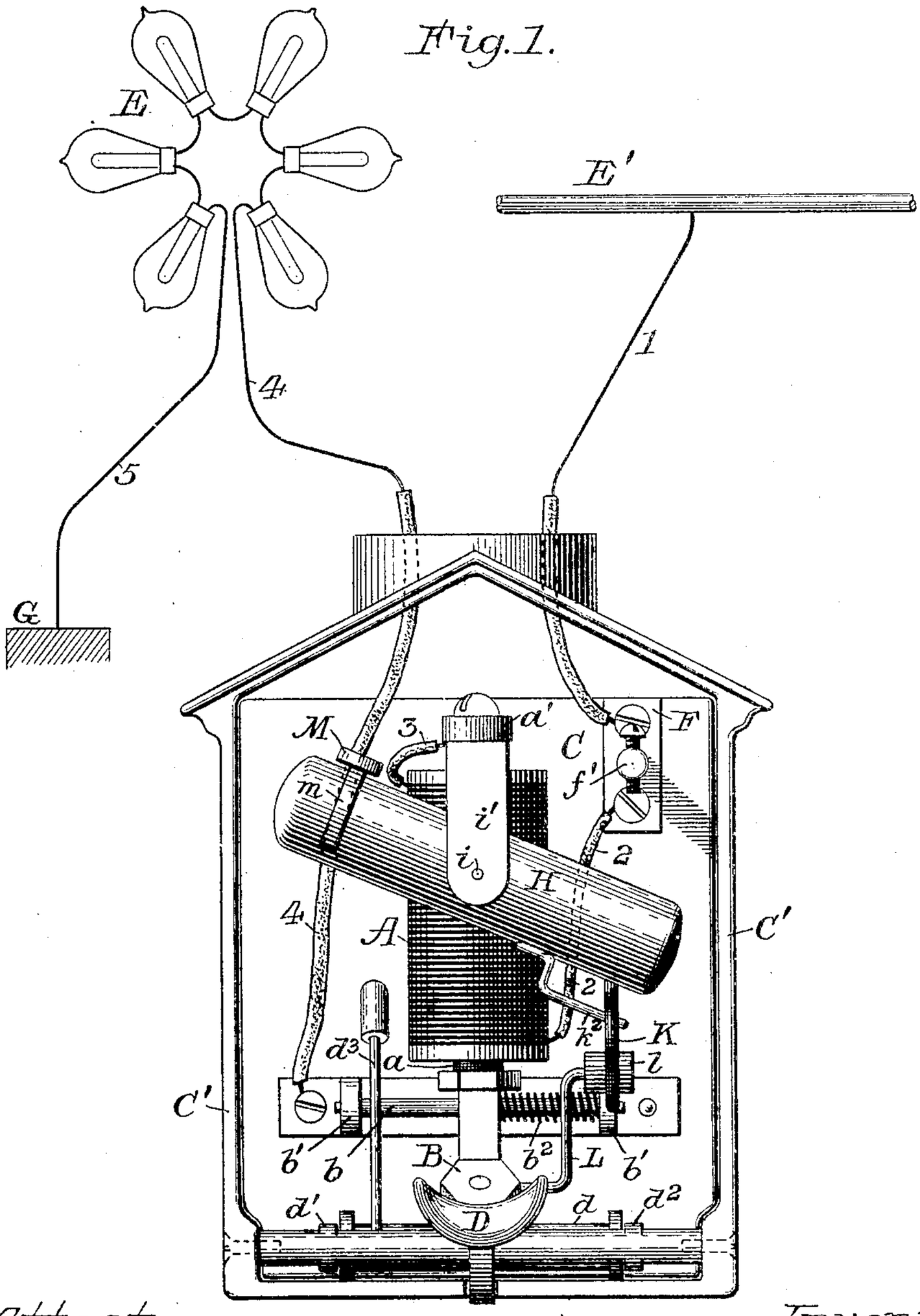
G. E. PAINTER.

CIRCUIT CONTROLLING DEVICE.

APPLICATION FILED JULY 18, 1903.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 3.

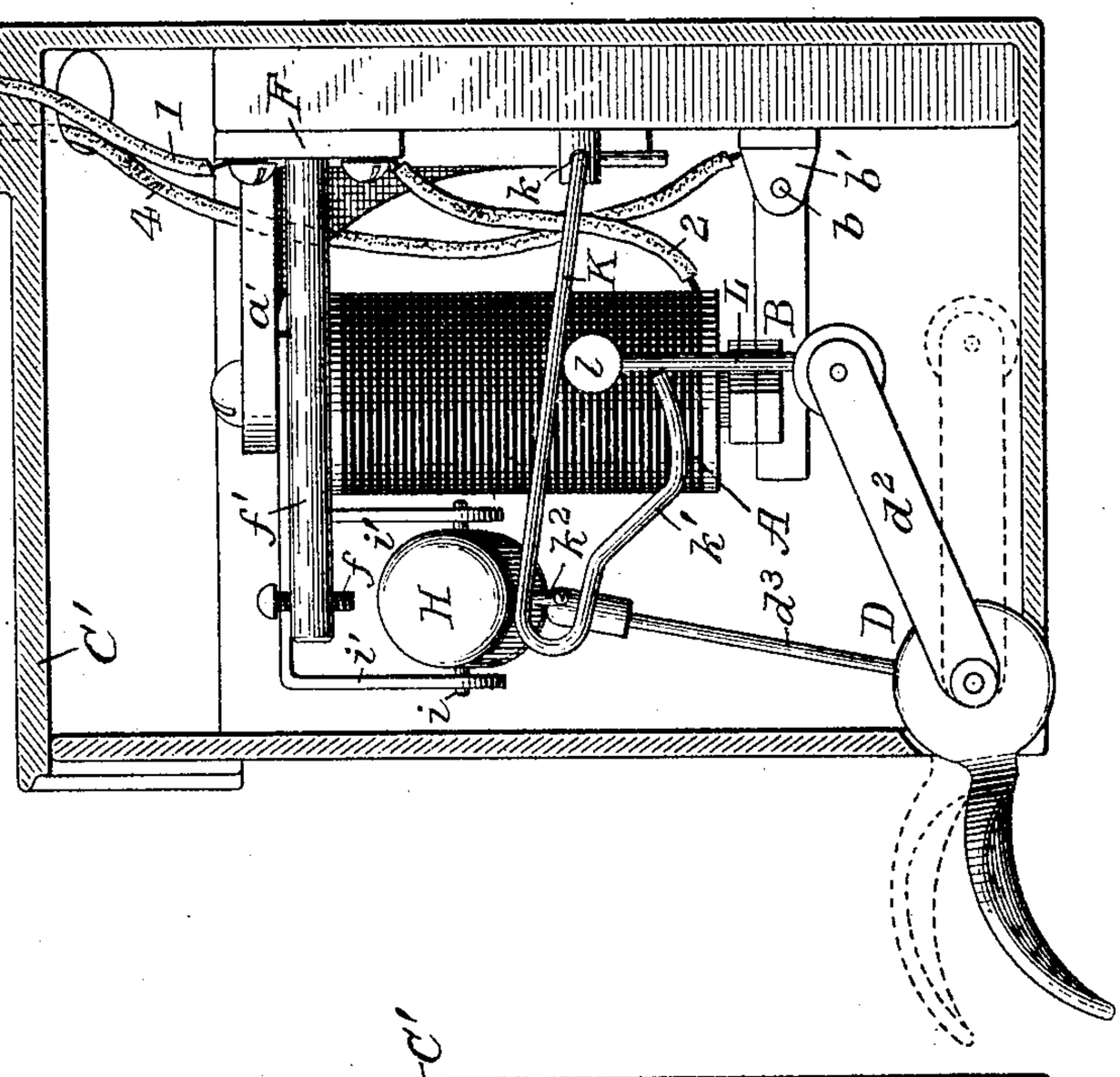
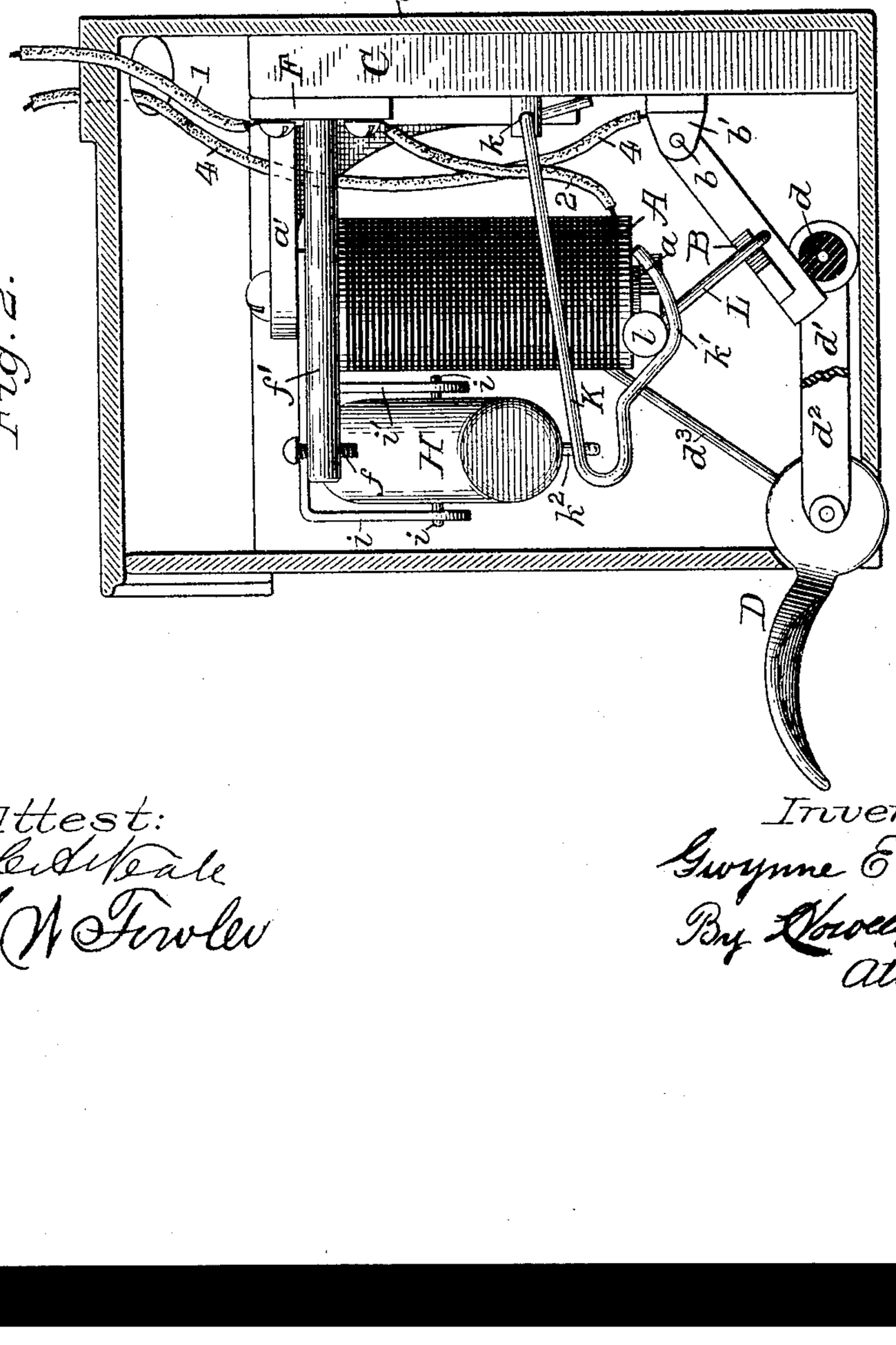


Fig. 2.



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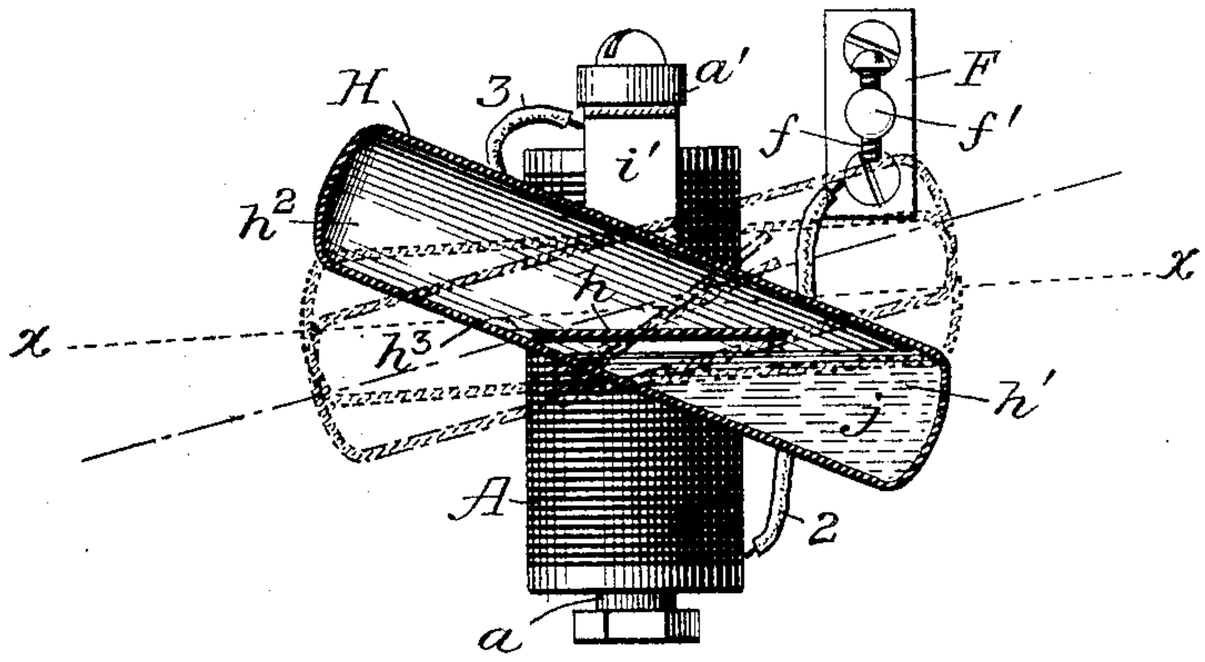
3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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CIRCUIT-CONTROLLING DEVICE.

No. 807,684. Specification of Letters Patent. Patented Dec. 19, 1905.

Application filed July 18, 1903. Serial No. 166,096.

To all whom it may concern:

Be it known that I, GWYNNE E. PAINTER, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Circuit-Controlling Devices, of which the following is a specification.

My invention relates to a circuit-controlling device, and has been devised more especially for use in connection with an electric signaling device or apparatus designed to be used by patrons of suburban railways for stopping an approaching car.

In the United States Letters Patent No. 681,371, granted to me August 27, 1901, I show and describe a signaling apparatus designed for the purpose indicated, in which a signal is displayed by manually closing a normally open circuit by means of a switch, the said signal being thereafter extinguished by means of a device which is operated by a passing car for causing the signal-controlling switch to return to its normal open position. As is well known, devices which are designed to be operated by a passing car for displaying or extinguishing a signal are very unreliable when the car is traveling at high speed and are soon rendered inoperative by the successive blows to which they are subjected by the passing cars.

My present invention has been devised with a view to dispensing with the car-operated signal-extinguishing device shown and described in my prior Letters Patent before referred to, and to this end I have constructed a circuit-closing device which will automatically open the circuit at the expiration of a predetermined interval of time after said circuit has been closed, so that a signal controlled thereby will be displayed a predetermined length of time and then be automatically extinguished.

My invention consists in the combination, with a circuit-closing switch, of an electromagnet normally within the circuit controlled thereby and adapted when energized to hold the switch in its closed position and timing mechanism adapted to automatically short-circuit said magnet at the expiration of a predetermined interval of time after the circuit has been closed. It also consists in certain novel features of construction, all of which will be hereinafter described, and particularly pointed out in the appended claims.

Referring to the drawings forming part of this specification, Figure 1 is a front view of a device embodying my invention, said device being shown as connected in circuit with a cluster of electric signaling-lamps. Figs. 2 and 3 are side views of said device respectively illustrating the circuit-controlling switch in its open and closed circuit positions. Fig. 4 is a detail sectional view of the timing mechanism.

In the device illustrated the circuit-controlling switch consists of an electromagnet A and an armature B, the magnet-core *a* constituting the fixed member and the armature B the movable member of said switch.

The magnet A is suspended from a bracket *a'*, secured to a plate C, composed of suitable insulating material, said plate serving also as the support for the armature B, the latter being in the form of a lever mounted on a shaft *b*, pivotally supported in a bracket *b'*, which is securely fastened to the plate C. The armature is mounted to swing or move into and out of contact with the magnet-core *a* for closing and opening the circuit controlled thereby, its retracted or open-circuit position being controlled by gravity or by a spring b^2. (Shown in Fig. 1.)

The armature when in its normal or open position has its free end resting upon a roller *d*, made of suitable insulating material and mounted between two arms *d'* and d^2 of the operating-lever D, the latter being pivotally mounted in the side walls of a box or casing C', in which the instrument or device is preferably inclosed, said lever D being so mounted that by pressing down its outer end, (which projects outside of the box or casing C',) its inner end will raise the armature B in contact with the core of the magnet A.

In Fig. 1 I have illustrated the device as being connected in circuit with a cluster of electric lamps E, which serve as a signal for stopping an approaching car. When these signals are placed along the line of an electric railway, current may be supplied from the trolley-wire E'; but when used along lines of railways employing other motive power a special source of electric energy must be provided. As illustrated in Fig. 1, current is supplied from a trolley-wire E' by means of a wire 1, which connects with a metal plate F, mounted on the supporting-plate C, said plate F being connected to one end of the magnet-coil by a wire 2. The other end of said coil is connected directly to the magnet-core *a* or to the supporting-bracket *a'* by a wire 3. Connection is made from the bracket *b'*, which

supports the armature B, to the signal-lamps E by means of a wire 4, and from said lamps a wire 5 connects to ground G.

The circuit is closed by pressing down on the outer end of the operating-lever D, the inner end of said lever operating to raise the armature B into contact with the magnet-core *a*. Current then passes from the trolley-wire E′ over wire 1 to plate F and over wire 2 to and through the magnet-coil to the wire 3, thence by way of the magnet-core *a*, armature B, wire 4, lamps E to ground by way of wire 5. The operating-lever D returns to normal position as soon as pressure is removed from its outer end, the armature being held in its closed position by the magnet A.

For opening the circuit I provide a timing mechanism, which in Figs. 1 to 4, inclusive, is organized to automatically short-circuit the magnet A at the expiration of a predetermined interval of time after the circuit has been closed, the magnet being thereby caused to release the armature and permit it to drop to its normal or open-circuit position. Various forms of timing mechanism may be employed for this purpose; but in every instance said mechanism must be so organized that it will be set for operation by the circuit-closing switch or its operating mechanism.

The timing device or mechanism illustrated consists of a pivotally-mounted receptacle containing alcohol, glycerin, or some other free-flowing agent, said receptacle being divided into two chambers by a partition-wall having a small opening therethrough for the passage of the alcohol or other agent from one chamber to the other, the operation of the device depending upon a shifting of the center of gravity by the slowly-moving alcohol, which causes the receptacle to tilt against a contact and complete a shunt-circuit around the coil of the magnet A.

The receptacle H is preferably in the form of a tube which is closed at both ends and provided on opposite sides with trunnions *i*, located centrally between the two ends of the tube and supported in brackets or supports *i′ i′*, secured to the upper end of the magnet-core *a* or to the magnet-supporting bracket *a′*. The partition-wall *h*, which divides the receptacle into the two chambers *h′* and h^2, extends from the lower wall of the receptacle upwardly in an inclined direction to within a short distance of the upper wall, the inclination being upwardly toward the normally depressed end of the receptacle and at a proper angle to permit the alcohol *j* to readily pass over the partition *h* from the chamber h^2 to the chamber *h′* when the latter is moved from its elevated to its normally depressed position. (Illustrated in Fig. 4.) Through the bottom of the partition-wall *h* there is a small opening or hole h^3 for the passage of alcohol from the chamber *h′* to the chamber h^2 when the normally depressed end of the receptacle is elevated sufficiently to permit the alcohol to flow through said opening.

Beneath the normally depressed end of the receptacle there is a lever K, which operates to raise the former slightly above a true horizontal position, so that the alcohol *j* will pass slowly from the chamber *h′* to the chamber h^2 through the opening or hole h^3. When sufficient alcohol has passed into said chamber h^2, the normally depressed end of the receptacle will be raised thereby against a contact *f* for short-circuiting the magnet A, as will be presently explained. The lever K, which is preferably made of wire of suitable thickness, is pivotally mounted, as at *k*, on the plate C, and its free end, which projects beneath the normally depressed end of the receptacle H, is bent back to form a hooked end *k′*. Secured to the armature B is an arm L, which at its upper end carries a circular block *s*, of insulating material, projecting beneath the lever K in proper position to raise the same when the armature is moved into contact with the core of magnet A, said arm L acting by engagement with the hooked end *k′* of lever K to return the latter to its normal position when the armature B returns to its normal or open-circuit position.

Secured to the receptacle H is a hook k^2, which projects between the lever K and its hooked end *k′* in position to be engaged by said lever when the latter descends to its normal position for the purpose of returning the receptacle to its normal position after it has performed its function of short-circuiting the magnet A, said hook k^2 being, however, a sufficient distance away from the bottom of the receptacle to permit the latter to tilt into engagement with the contact *f* when raised by said lever. When the armature B is moved into contact with the magnet-core *a*, the arm L raises the lever K, and the latter in turn raises the normally depressed end of the receptacle slightly above a true horizontal position, and for preventing the momentum of the movement from carrying the receptacle beyond the desired position an arm d^3 is attached to the operating-lever D, said arm being so proportioned and arranged that when the outer end of lever D is depressed said arm d^3 will be beneath the chamber h^2 of the receptacle and prevent that end of the receptacle from descending beyond the desired position. The arm d^3 is moved from the path of the receptacle by the return movement of the lever D. The contact *f*, with which the receptacle engages for short-circuiting the magnet, is supported above the chamber *h′* by an arm *f′*, secured to the metal plate F.

The operation of the device is as follows: When it is desired to light the lamps E, the operating-lever D is pressed down for moving the armature B into contact with the core of magnet A, the circuit being thereby closed from the trolley-wire E′ over wire 1 to the

plate F, thence by way of wire 2 to and through the coil of magnet A over wire 3 to the magnet-core *a*, thence by way of armature B and wire 4 to and through the lamps E, and thence to ground over wire 5. The movement of armature B to its closed-circuit position causes the arm L to lift lever K, which latter in turn lifts the normally depressed end of the receptacle H slightly above a true horizontal position, (indicated by the dotted line *x* in Fig. 4.) The alcohol *j* will then slowly flow from the chamber *h* to the chamber h^2 through the small opening or passage-way h^3, and when sufficient alcohol has passed through said opening to cause the center of gravity of the receptacle to be shifted across the pivotal support chamber *h'* will ascend until the receptacle touches the contact *f*. The moment this takes place the circuit is shunted around the magnet-coil as follows: From wire 1 the current passes to plate F over arm *f'* to and through contact *f*, receptacle H, brackets *i'* to the magnet-core *a*, and then by way of armature B, wire 4, lamps E, and wire 5 to ground G. The magnet-coil being thus excluded from the circuit, the armature drops to its open-circuit position, which causes the arm L to engage the hooked end *k'* of the lever K and pull the latter down for returning the receptacle H to its original or normal position, the alcohol *j* being returned to the chamber *h'* by way of the opening h^4 above the partition *h*, the device being then ready for another operation.

The interval of time between the closing and opening of the circuit may be regulated to suit requirements by making the passage-way h^3 between the chambers *h'* and h^2 larger or smaller for decreasing or increasing the time required for the passage of the alcohol therethrough. Said interval of time may also be increased or decreased by means of a weight, which is slidably mounted on the receptacle at one side of its pivotal support, as illustrated at M in Fig. 1, said weight being secured to a spring-clasp *m*, encircling the receptacle and slidable thereon toward and from the pivotal support, so that a greater or lesser quantity of alcohol will be required for raising the chamber *h'*, as will be readily understood.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a circuit-controlling device the combination of a circuit-closing switch, an electromagnet within the circuit controlled thereby and adapted when energized to hold the movable member of said switch in its closed-circuit position, and timing mechanism adapted to automatically short-circuit said magnet at the expiration of a predetermined interval of time after the circuit has been closed by said switch, substantially as described.

2. In a circuit-controlling device, the combination of an electromagnet, a normally retracted armature adapted to close a circuit through the coil of said magnet when moved in contact therewith, and a timing mechanism adapted to automatically short-circuit said magnet at the expiration of a predetermined interval of time after the circuit has been closed, substantially as described.

3. In a circuit-controlling device, the combination of an electromagnet, a normally retracted armature adapted to close a circuit through the coil of said magnet when moved in contact therewith, and a timing mechanism adapted to be set for operation by the closing movement of said armature and to short-circuit said magnet at the expiration of a predetermined interval of time after said circuit has been closed, substantially as described.

4. In a circuit-controlling device, the combination of an electromagnet, a normally retracted armature, terminal connections for the device connected respectively to said armature and to one terminal of the magnet-coil, the other terminal of said coil being connected to the magnet-core, a timing mechanism adapted to be set for operation by said armature when the latter is moved in contact with said magnet and to short-circuit said magnet at the expiration of a predetermined interval of time thereafter, substantially as described.

5. In a circuit-controlling device, the combination of an electromagnet, a normally retracted armature adapted to close a circuit through the coil of said magnet when moved in contact therewith, a timing mechanism consisting of a pivotally-supported receptacle divided into two communicating chambers located on opposite sides of the pivotal support and containing a free-flowing agent adapted by proper movements of the receptacle to gravitate from one chamber to the other and cause said receptacle to tilt on its pivotal support, means operated by the closing movement of said armature for giving the proper initial movement to said receptacle, and a contact adapted to be engaged by said receptacle when the latter is tilted by said free-flowing agent for shunting the coil of said magnet, substantially as described.

6. In a circuit-controlling device, the combination of an electromagnet, a normally retracted armature adapted to close a circuit through the coil of said magnet when moved in contact therewith, a timing mechanism consisting of a pivotally-supported receptacle divided into two communicating chambers located on opposite sides of the pivotal support and containing a free-flowing agent adapted by proper movements of the receptacle to gravitate from one chamber to the other and cause said receptacle to tilt on its pivotal support, means operated by the closing move-

ment of said armature for giving the proper initial movement to said receptacle, a contact adapted to be engaged by said receptacle when the latter is tilted by said free-flowing agent for shunting the magnet-coil, and means for returning the receptacle to its original or normal position, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GWYNNE E. PAINTER.

Witnesses:

MURRAY HANSON,

BENJ. W. BERRY.