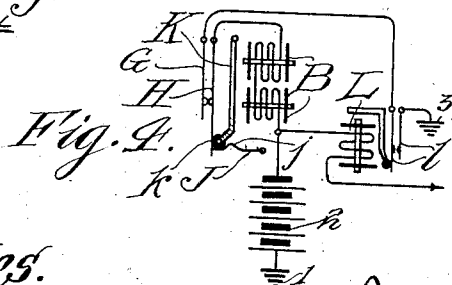
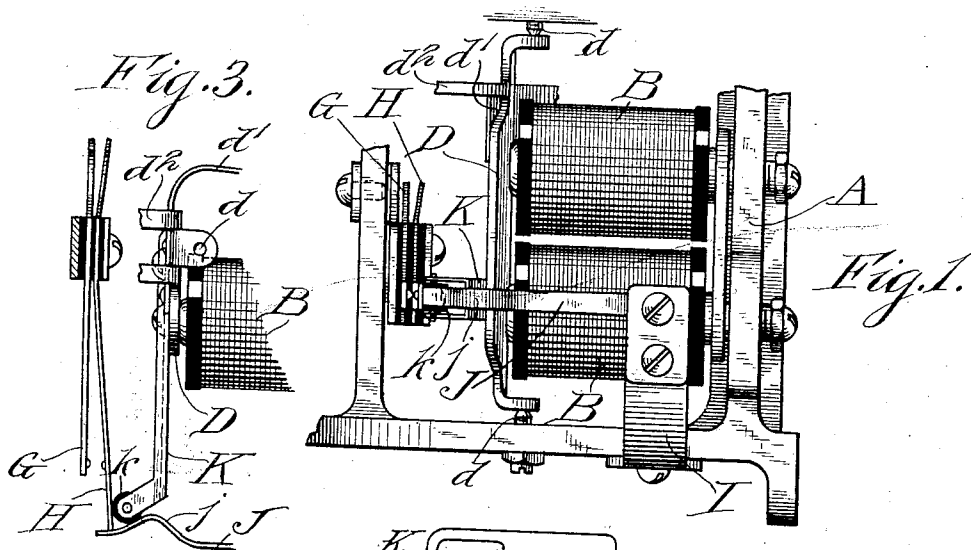
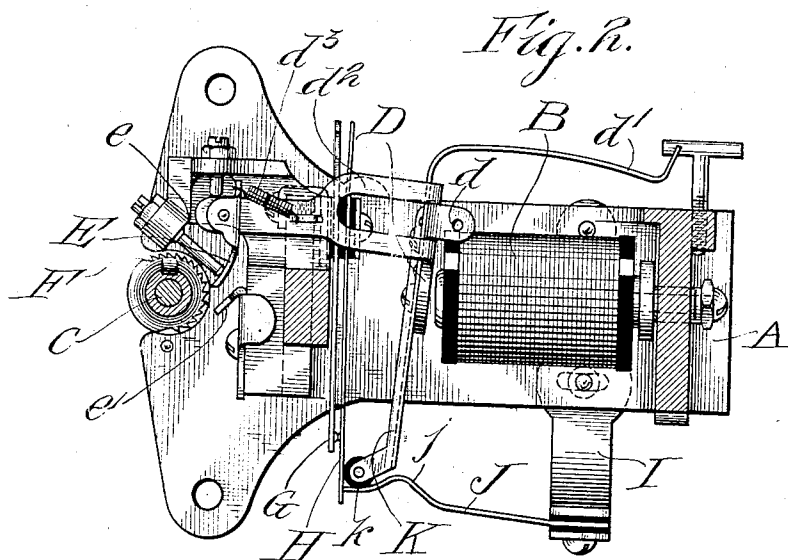


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J. ERICKSON.
INTERRUPTER FOR ELECTROMAGNETS.

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Witnesses.

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INTERRUPTER FOR ELECTROMAGNETS.

No. 841,004.

Specification of Letters Patent.

Patented Jan. 8, 1907.

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To all whom it may concern:

Be it known that I, JOHN ERICKSON, a citizen of the United States of America, and a resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Interrupters for Electromagnets, of which the following is a specification.

My invention relates to interrupters for electromagnets in general, but more particularly to interrupters for use in connection with electromagnets for operating any suitable step-by-step switches, and especially to interrupters for use in connection with electromagnets for operating automatic telephone-line-selecting switches—such, for example, as automatic trunk-selectors.

Generally stated, the object of my invention is the provision of an improved and highly efficient interrupter for electromagnets.

Special objects of my invention are the provision of an improved and simplified interrupter for the electromagnets of automatic telephone-selecting switches, the provision of an improved construction and arrangement for enabling the so-called "rotary" magnet of a telephone-selector to interrupt or alternately open and close its own energizing-circuit, and to continue this action as long as the said circuit remains closed at all other points, whereby the said selector automatically continues in operation until it finds an idle line, the provision of an improved construction and arrangement for interrupting the flow of energizing-current through an electromagnet, involving a switch controlling the circuit of the electromagnet, a spring-latch for normally holding said switch closed, and means carried by the magnet-armature for operating said latch, whereby the switch is open when the armature is in its fully-attracted position, and whereby the switch is closed when the armature is in its normal or fully-retracted position, the provision of an improved current-interrupter for magnets, involving a switch in the energizing-circuit of the magnet, a spring-latch for normally holding the switch closed, and a roller-actuated by the magnet-armature and adapted for operating said spring-latch, whereby the switch is opened by the attraction of the armature and closed by the retractive movement of the armature, and the provision of certain

details and features of improvement tending to increase the general efficiency and serviceability of a device of this particular character.

Broadly considered, my improved interrupter can be applied to electromagnets for operating various devices—that is to say, it can be applied to electromagnets employed for various purposes. In certain respects, however, it will be seen that my invention is in the nature of an improvement on the interrupter covered by Letters Patent 831,875 granted to Alexander E. Keith on the 25th day of September, 1906, for improvement in interrupter for automatic telephone or other switches.

To the foregoing and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a portion of a selector-switch, showing the so-called "rotary" magnet and interrupter therefor embodying the principles of my invention. Fig. 2 is a plan of the parts and devices shown in Fig. 1, showing also in horizontal cross-section the rotatable selector-switch shaft, together with the ratchet-and-pawl connection between said shaft and the armature of said magnet. Fig. 3 is a detail plan view showing the interrupter parts in a different position. Fig. 4 is a simplified diagram of the circuit arrangement of the said magnet and interrupter and indicating the manner in which a relay or switch operating magnet or other similar device is employed for controlling the energizing-circuit of said magnet at a point therein other than the point at which the same is controlled by the interrupter itself.

As thus illustrated, the frame A, the so-called "rotary" magnet B, the shaft C, together with the magnet-armature D, and the pawl and ratchet-teeth E and F, as well as all other essential elements of the switching-machine as a whole, may, with the exception, of course, of the interrupter itself, be substantially of the general type disclosed in Patent No. 815,321 granted March 13, 1906, to Keith and Erickson. As in said prior patent, the said armature is pivoted at *d*, so as to vibrate about a vertical axis, and is retracted or held in its normal position away from the magnet by a spring *d'*. The pawl E is carried by the armature-finger *d*², is pivotally mounted

thereon, and controlled by a small spring d^3 applied thereto. The pin e guides the pawl out of engagement with the teeth when the armature is released or retracted, while the stop or guide pin e' serves to limit the forward rotation of the shaft, (by engaging the pawl at the limit of the forward stroke thereof,) and thus prevents the shaft from rotating more than one step at a time. The rotary magnet or shaft-propelling magnet B is secured to the frame in any suitable or desired manner.

As illustrated, my improved interrupter comprises a spring-switch composed of the stationary contact G and the spring or movable contact H, the spring-switch thus provided being normally closed. A bracket I is secured to the under side of the said frame and provided at its upper end with an insulated spring or spring-latch J. This spring J serves as a latch for normally holding the circuit-controlling contacts G and H in electrical engagement with each other, and thus serves as a spring-latch for keeping the switch normally closed. Near its free end the said spring J is provided with a bend or hump j . The armature D is provided with an interrupter-finger K, having a roller k , suitably mounted at its free or distal end. This roller is preferably of rubber or other insulating material and is adapted to engage the inner surface of the spring J, as shown in Figs. 2 and 3. Normally, therefore, the said roller engages the spring J at a point between the latter's end and the said hump j , as shown in Fig. 2; but when the armature is attracted the said roller rides up the incline provided by the said hump, as shown in Fig. 3. This forward or attractive movement of the armature causes the roller to press the spring-latch J outward, and the parts are so proportioned that the end of the spring J does not disengage from the spring H until after the armature strikes the pole-pieces of the magnet—that is to say, not until after the armature reaches the limit of its forward stroke. In this way the circuit through the magnet is not interrupted until after the armature has been fully attracted, and in this way not until after the switch-shaft C has been given a full and complete rotary step. In other words, it is obvious that should the circuit be interrupted too soon there would then be some danger of the armature failing to give the shaft a complete rotary step. With the armature fully attracted the interrupter parts assume the position shown in Fig. 3. The circuit then being open the magnet loses its attractive power and the spring d' restores the armature to its normal position. During this restoring or retractive movement of the armature the roller k rides down the incline on the spring J. This backward movement of the roller moves the end of the spring H along the inner surface of the spring J, and

the movement continuing the spring J is finally disengaged and allowed to spring back into the position which it occupies in Fig. 2. Obviously, however, it is also desirable that the continuity of the circuit be not restored until after the armature has fully regained its normal position, or at least not until after the pawl E has been fully disengaged from the ratchet-teeth carried by the switch-shaft. For this reason the end of the spring H does not during the retractive or restoring movement of the armature reach the end of the spring J until after the pawl has been fully disengaged from the ratchet-teeth. In this way the requisite current condition is maintained in the electromagnet B until the end of the stroke of the armature in either direction.

Any suitable device may be employed for controlling the energizing-circuit of the said magnet B at all other points, or at any other point except that at which the current-flow is controlled by the said interrupter. For example, as shown in Fig. 4, the electromagnet L may be the so-called "private" magnet of a well-known form of selector, or it may be a relay or any other suitable electromagnet. In the type of selector indicated this electromagnet L is energized while the private wiper on the shaft is passing over busy contacts. Consequently the energizing-circuit of the magnet B remains closed until an idle trunk-line is found; but while the magnet L is energized the contacts l are closed together and current flows from the grounded pole 1 of the battery 2 through the ground 3, through said contacts, through the contacts G and H of the interrupter, and through the windings of the magnet B to the non-grounded pole of the said battery. With this arrangement the said magnet will be given an intermittent energizing and its armature a rapid vibration until the magnet L is deenergized by the arrival of the said wiper upon the non-busy contact. Obviously, however, as previously stated, my improved interrupter can be used for many purposes other than the automatic selection of an automatic telephone-exchange trunk-line.

The spring G is substantially a stationary contact, although preferably the adjustment is such that this spring is normally under slight tension, and in this way it follows the spring H a short distance when the latter is disengaged or released by the latch. In this way the interrupter is adapted not to open the circuit before the armature reaches the limit of its forward stroke, for the armature reaches the pole-pieces and the spring H is disengaged before a separation occurs between the two springs.

What I claim as my invention is—

1. The combination of an electromagnet, an armature therefor, a spring-switch, a spring-latch for keeping said switch normally

closed, means carried by the armature and adapted to operate said latch, a source of current, and an energizing-circuit for said magnet including said switch and source of current, together with an electromagnetic device for controlling said circuit, whereby said electromagnet alternately opens and closes its own circuit as long as the same remains closed at all other points.

2. The combination of an electromagnet, an armature therefor, an arm on said armature, a spring-switch, a spring-latch for normally holding said switch closed, and an energizing-circuit for said magnet, said circuit including said spring-switch, said arm adapted to operate said spring-latch, whereby said magnet alternately opens and closes its own energizing-circuit as long as the same remains closed at all other points.

3. The combination of an electromagnet, an armature therefor, a ratchet-and-pawl mechanism operated by said armature, a spring-switch, a latch for normally holding said switch closed, and an arm carried by said armature and adapted for operating said latch, together with an energizing-circuit for said magnet, said circuit including said spring-switch, whereby the said magnet vibrates its armature as long as said circuit remains closed at all points other than at the said spring-switch.

4. The combination of an electromagnet, an armature therefor, a spring-switch, a latch for normally holding said switch closed, an arm carried by said armature, and a roll carried at the end of said arm, together with an energizing-circuit for said magnet including said spring-switch, said roll adapted to operate the latch to open said switch, and adapted directly to operate the switch to close and restore the same in latched condition.

5. The combination of an electromagnet, an armature therefor, a switch adapted when released to open of its own accord, a latch for normally holding the switch closed, an arm carried by the armature and adapted for operating said latch, and an energizing-circuit for said magnet, said circuit including said switch, said arm adapted to operate the latch to open the switch, and adapted directly to engage and operate the switch to close and restore the same to latched condition.

6. The combination of an electromagnet, an armature therefor, an arm secured to said armature, a roll mounted at the end of said arm, a switch consisting of two contacts whereof one is adapted of its own accord to spring away from the other, a spring mounted at one end and adapted to engage said springy switch-contact with its other end, said spring having a hump between its mounted end and its free end, said roll adapted to engage said hump and press the spring out of engagement with said springy switch-contact, and adapted directly to engage said springy switch-contact to close the switch and restore the said spring to normal position.

7. The combination of an electromagnet, an armature therefor, a spring-switch adapted when released to open of its own accord, spring means for holding the switch normally closed, and means operated by the said magnet for opening and closing the switch, together with an energizing-circuit for said magnet, said circuit including said switch.

Signed by me at Chicago, Cook county, Illinois, this 1st day of February, 1906.

JOHN ERICKSON.

Witnesses:

E. D. FALES,
C. J. ERICKSON.