G. GRABE.

AUTOMATIC INTERRUPTER FOR ELECTROMAGNETICALLY OPERATED PAWL AND RATCHET MECHANISM.

APPLICATION FILED FEB. 15, 1916.

1,262,326. Patented Apr. 9, 1918.

Fig. 1

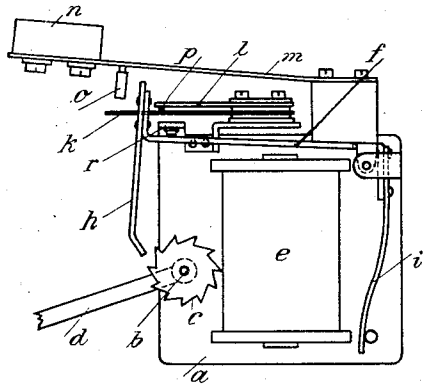
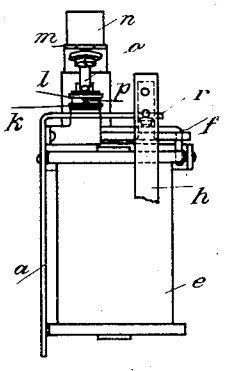


Fig. 2



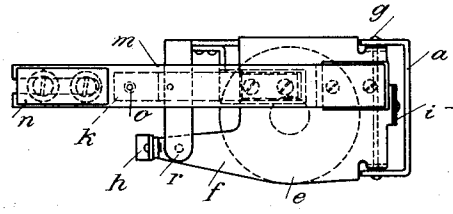


Fig. 3

George Grabe
Inventor
by Knight Bros.
Attys.

UNITED STATES PATENT OFFICE.

GEORG GRABE, OF NIKOLASSEE, NEAR BERLIN, GERMANY, ASSIGNOR TO SIEMENS & HALSKE AKTIENGESELLSCHAFT, OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

AUTOMATIC INTERRUPTER FOR ELECTROMAGNETICALLY-OPERATED PAWL-AND-RATCHET MECHANISM.

1,262,326. Specification of Letters Patent. Patented Apr. 9, 1918.

Application filed February 15, 1916. Serial No. 78,475.

To all whom it may concern:

Be it known that I, GEORG GRABE, a citizen of the German Empire, and residing at Nikolassee, near Berlin, Germany, have invented certain new and useful Improvements in Automatic Interrupters for Electromagnetically-Operated Pawl-and-Ratchet Mechanism, of which the following is a specification.

This invention relates to automatic make-and-break devices for electromagnetically operated pawl-and-ratchet mechanisms, and a primary object is to provide that the pawl-and-ratchet mechanism is certainly fed one whole step whenever the armature is attracted by its magnet even when the pawl-and-ratchet mechanism operates rapidly, to which end, according to the invention, the interrupter contact is made and broken at times when the armature is not moving or as near such times as possible.

I attain this end by elastically connecting the armature in such a manner with a lever arm moved by it that the latter lags behind the moved armature.

In a preferred form of such an interrupter or make-and-break device a momentum is imparted to a lever arm during the pull on the armature, and the interrupter contact is thereby broken after the completion of the pull on the armature and is made during the last part of the return movement of the armature or only after the completion of this movement.

To these ends, the invention consists in the construction, arrangement and combination of parts described hereinafter and pointed out in the claims.

One illustrative embodiment of the invention is represented by way of example in the accompanying drawing, wherein:—

Figure 1 is a side elevation,

Fig. 2 is an end elevation, and

Fig. 3 is a top plan view of an improved interrupter or make-and-break device according to the invention.

Referring to the drawing, in the frame a is journaled an axle b which carries fast on it a ratchet wheel c and the arm d, for example the switch arm of a selector. The frame also carries the feed magnet e whose armature f is mounted on the axle g and is provided with a spring h. Whenever the armature is attracted by the magnet this spring h turns the ratchet wheel c one tooth and thereby feeds the arm d one step forward. When the magnet is deënergized another spring i attached to the armature returns the armature into its normal position shown in the drawing. The contact springs k, l are also mounted on the frame. A lever arm m, preferably in the form of a leaf spring, is firmly connected at one end with the armature near its axle; the other end of this arm carries a longitudinally adjustable weight n. The contact springs k, l and the spring m and the armature f are located approximately parallel to one another and all in the same plane of movement. The free ends of the springs k, l and m are directed in the same direction and the springs k, l are located between the spring m and the armature f. This arrangement is particularly simple and preferable because all the parts are readily accessible and adjustable. In addition, a leaf spring is the simplest form of the lever arm m, and its attachment directly to the armature is the simplest mode of attachment thereof.

The described device operates as follows:—

When the circuit containing the electromagnet e and the contact springs k, l has been closed the armature f is attracted and the spring m is moved in the direction of movement of the armature. The weight n has imparted to it a certain speed, and owing to the momentum of this weight thus created the free end of the spring m is moved farther than the stroke of the armature f. The spring m presses by means of an insulated pin o on the contact spring k, which is only weak relatively to the spring m, and breaks the contact p and the circuit of the electromagnet e. Consequently, the armature returns into its normal position under the influence of the spring i without the weight n immediately following the return movement of the armature. The direction of motion of the weight is reversed

only after the armature has almost or quite returned into its normal position. The contact p is then made and the circuit of the electromagnet is closed again, whereupon the described cycle of operations is repeated until the circuit of the electromagnet is operated at some other place, say by the selector.

The stroke of the armature can be adjusted by a stop r. This also determines the momentum imparted to the weight n when the armature is attracted, and thus the throw of spring m. Further, this momentum can be varied by shifting the weight n longitudinally on the spring m. The frequency of oscillation of the armature is simultaneously determined by these adjustments.

Having thus described my invention I claim as new and desire to secure by Letters Patent of the United States:—

1. In a make and break device, the combination with an electromagnet carried by a frame, a spring influenced armature, contacts in circuit with said electromagnet, resilient springs carrying some of said contacts, all of said contacts being supported by said frame, of an elastic lever arm loaded at one end and having its other arm firmly connected with said armature and being adapted to actuate said contacts, said lever adapted to lag in phase behind the movement of said armature and to determine its oscillation frequency.

2. In a make and break device, the combination with an electromagnet carried by a frame, a spring influenced armature, contacts in circuit with said electromagnet, resilient springs carrying some of said contacts, all of said contacts being supported by said frame, of an elastic lever arm loaded at one end and having its other arm firmly connected with said armature and being adapted to actuate said contacts, said lever adapted to lag in phase behind the movement of said armature and to determine its oscillation frequency, and to swing through an amplitude larger than that of the armature.

3. In a make-and-break device, the combination with an electromagnet, a spring-influenced armature, a pair of contacts in the circuit of the electromagnet, one of said contacts being carried by a spring, of an elastic lever arm loaded at one end and having its other end firmly carried by the armature and provided with means for actuating said contact carrying spring, the said armature, contact spring and lever arm being located substantially in one plane, the contact spring being between the armature and the lever arm, whereby the contact of the contact spring is broken after the armature has been attracted by the electromagnet and is made only at the end of the return movement of the armature into its normal position.

4. In a make and break device, the combination with an electromagnet, a spring-influenced armature and a pair of contacts in the circuit of the electromagnet, one of said contacts being carried by a spring, of an elastic lever arm loaded at one end and having its other end firmly carried by the armature but adapted to oscillate independently thereof and being provided with means for actuating said contact-carrying spring, said armature, contact spring and lever arm being located substantially in one plane, the contact spring being between the armature and the lever arm, whereby the contact of the contact spring is broken after the armature has been attracted by the electromagnet and is made only at the end of the return movement of the armature into its normal position.

5. In a make and break device, the combination with an electromagnet, a spring-influenced armature, a pair of contacts located in the circuit of the electromagnet, one of said contacts being carried by a spring, of an elastic lever arm having one end firmly carried by the armature for imparting to it the armature motion and adapted to freely oscillate with its other end and being provided with means for actuating said contact carrying spring, a weight movable longitudinally on the other end of the lever arm causing a lag in the lever movement against the armature movement, whereby, when the armature is attracted, the lever arm opens the contact spring only at the end of the armature stroke and admits of the contact being made only at the end of the return movement of the armature into its normal position.

In testimony whereof I have signed my name to this specification.

GEORG GRABE.