

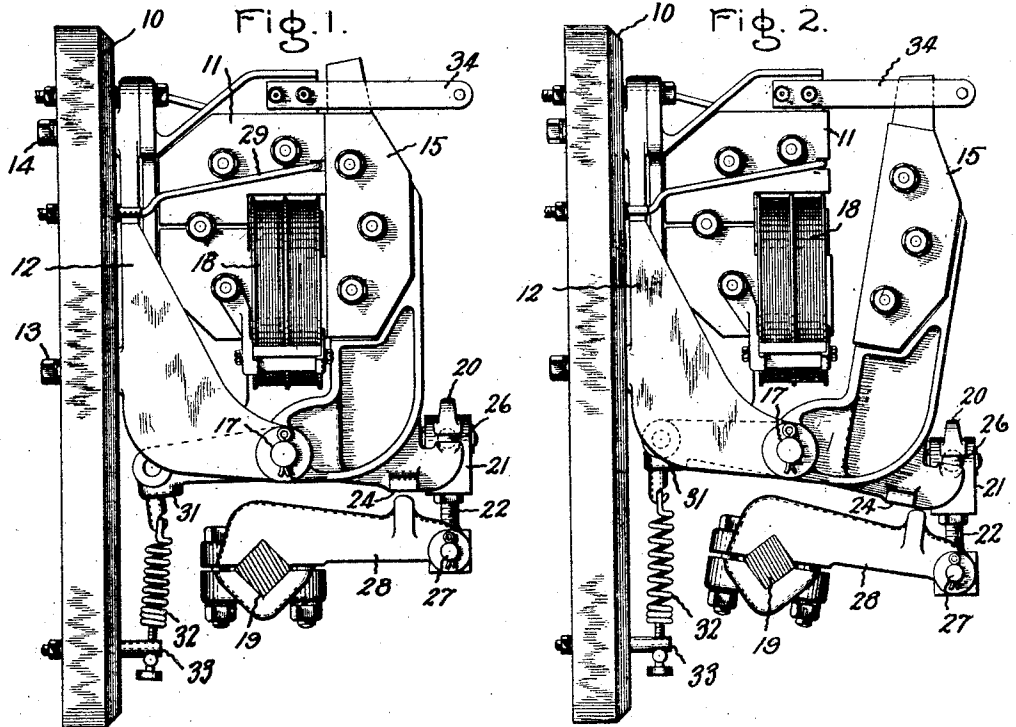
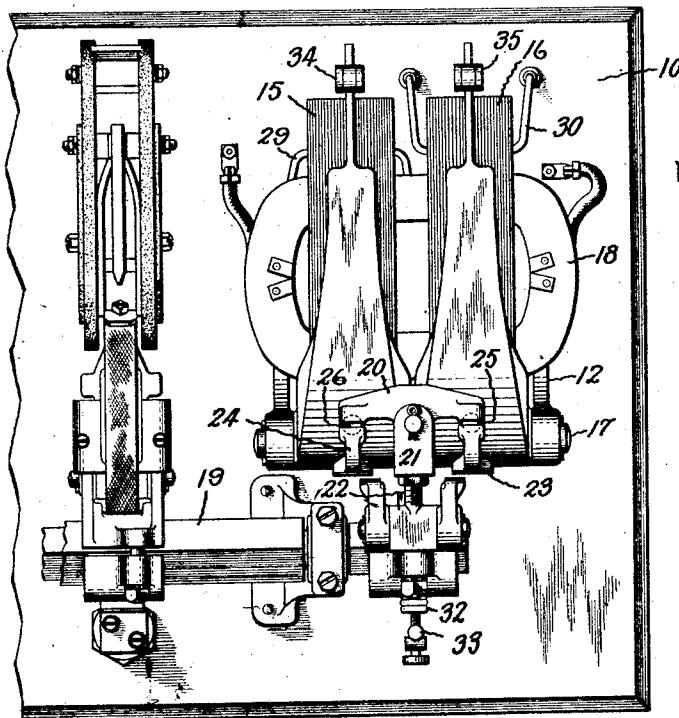
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C. L. PERRY

ELECTROMAGNETIC OPERATING MECHANISM

Filed Jan. 22, 1921



Inventor.  
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# UNITED STATES PATENT OFFICE.

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## ELECTROMAGNETIC OPERATING MECHANISM.

Application filed January 22, 1921. Serial No. 439,253.

*To all whom it may concern:*

Be it known that I, CHARLES L. PERRY, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electromagnetic Operating Mechanisms, of which the following is a specification.

My invention relates to improvements in electromagnetic operating mechanism for movable devices such as electric switches and the like.

In the usual type of electromagnetic operating mechanism for such movable devices, particularly those having relatively heavy moving parts, a very great hammer blow occurs when the electromagnetic mechanism operates and this requires that not only the various parts of the operating mechanism but also those of the movable device be designed to take care of the stresses which such hammer blows set up. One of the objects of my invention is to reduce this hammer blow effect. Another object of my invention is to eliminate one source of noise in such electromagnetic operating mechanism when used on alternating current circuits.

In carrying my invention into effect I provide the operating mechanism with a plurality of independent magnetic structures, each of which has a movable element connected to the movable device mechanism for operating the same, and the several magnetic structures may be simultaneously energized by a single operating winding if desired, although it will be understood that my invention may also be carried out with individual operating windings for the several magnetic structures which are arranged to be simultaneously energized. The arrangement is such that the armatures or movable elements jointly operate the movable device, but neither armature will prevent the other or others from sealing properly. Humming or chattering due to the interference of one armature with the other or others is thereby prevented when the electromagnetic operating mechanism is used on alternating current circuits. An improved equalizing connection is provided between the various armatures and the movable device operated thereby by means of which the armatures are caused to jointly and simultaneously operate the movable de-

vice and by means of which each armature is free to seal itself with the contacting face of its independent magnet structure.

My improved electromagnetic operating mechanism having a plurality of independent magnetic structures and movable magnetic elements attracted thereby is of particular utility when applied to operate an electric switch since the various parts of the switch as well as those of the operating mechanism can then be made lighter than would be the case if an operating mechanism having a single movable magnetic member were provided.

For a better understanding of my invention, reference is had to the accompanying drawing, which illustrates my invention applied to the operating mechanism of an electric switch for the purpose of explaining the principles thereof and in which Fig. 1 shows a side view of my improved electromagnetic operating mechanism in the position in which the electric switch is closed; Fig. 2 is a similar view with the operating mechanism in the position in which the electric switch is opened; and Fig. 3 is an elevation of Fig. 1.

Referring to the drawings, the electromagnetic operating mechanism having two independent magnetic structures is mounted on the base 10 of insulating material. One of the independent magnetic structures is indicated at 11, and this magnetic structure, as well as the other which lies directly behind (referring to Figs. 1 and 2), is supported in a suitable framework 12 which is secured to the base 10 by means of the bolts 13 and 14. Each magnetic structure is provided with an independently movable member or armature. The armature for the left hand electromagnet is designated by the numeral 15, and the armature for the right hand electromagnet is designated by the numeral 16. These armatures are pivotally mounted on the shaft 17 supported by the framework 12, and the armatures are adapted to be moved through a limited angular distance independently of each other. In the preferred form shown, a single operating winding 18 is provided for the two electromagnetic structures, so that when the winding is energized both armatures will be attracted to their respective magnetic structures. The two armatures are adapted to operate a rotatable switch

member 19 on which a plurality of switches may be mounted for simultaneous operation, the switch contact 19' being shown merely for purposes of illustration.

5 In order to insure that the armatures will jointly operate the switch member, and nevertheless permit each armature to seal with its respective magnetic structure so as to prevent humming or chattering due to the  
10 interference of one of the armatures with the other, the pivoted equalizing bar 20 is provided. This equalizing bar is pivotally mounted at its mid-position in the pivotal support 21 which is adapted to be rotated  
15 about the rod 22. Extensions 23 and 24 are provided on the right and left hand armatures respectively, and these extensions are adapted to cooperate with the ends of the equalizing bar. A ball and socket connection is provided between each armature extension and its respective end of the equalizing  
20 bar 20. These ball and socket connections comprise the balls 25 and 26 which cooperate with corresponding spherical surfaces in the ends of the armature extensions to the equalizing bar. The rod 22 is pivotally mounted on the shaft 27 which is mounted in the operating arm 28 secured to the rotatable operating shaft 19 for the various  
25 switches.

It will be observed that the connection between the armatures 15 and 16 and the shaft 19 for the switch members is in effect a universal joint. This movement of the armature 15 with the armature 16 held stationary  
35 will tilt the left hand end of the equalizing bar 20, raise the operating arm 28, and also cause the pivotal support 21 to turn about the rod 22. Similar movement of the armature 16 will tilt the right hand end of the bar 20 and effect a similar result. It has been found that it is desirable to limit the amount of movement of one armature with respect to the other for the reason that it  
45 is not desirable that one armature be fully operated before the other armature has started its movement. If one armature should complete its movement while the other armature was still in the open position, the attractive force of the operating electromagnet for the open armature would not be sufficient to cause this armature to close. The amount of independent movement will be determined for each type of switch and  
50 will vary with different designs for electromagnetic switches.

It will also be observed that I have provided an electromagnetic operating mechanism having a plurality of independently  
60 movable armatures, so that the hammer blow effect is materially less than if the same turning force on the shaft 19 were set up by an electromagnet having a single armature.

The operation of my invention is briefly as follows:—

With the armatures in their open position as shown in Fig. 2, the energization of the winding 18 will cause the armatures to be attracted to their independent magnetic structures. The simultaneous movement of the armatures will cause the operating shaft of switch member 19 to be rotated so as to close the electric switches, one of which is indicated at 19'. In case armature 15 first aligns itself with its magnetic structure 11, the  
75 equalizing or universal joint connection previously described will permit the armature 16 to also seal with its respective magnetic structure. Chattering or humming due to interference of one armature with the other is thereby prevented.

The conductor 29 is embedded in the one pole face of the magnet structure 11, and the ends of this conductor are connected with terminals on the back of the supporting  
85 base 10, between which a resistor is interposed, thereby causing a dephased magnetic flux to be set up in the pole face of the electromagnet 11, which also assists in preventing the humming or chattering in alternating current electromagnets. Conductor 30, embedded in the magnetic structure of the right hand electromagnet, is provided for a similar purpose.

Each armature is provided with an extension to which a spring is connected for the purpose of partially counterbalancing the weight of the armature, and for cushioning the opening movement of the armature. Thus the extension 31 is provided on the left  
100 hand armature, and this extension cooperates with a spring 32 having one end secured to the post 33 which is secured to the base 10. The opening movement of each armature is limited by means of a strap. The strap for the left hand armature is designated by the numeral 34, and the strap for the right hand armature is designated by the numeral 35.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the  
115 invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An electromagnetic operating mechanism for a movable device comprising, a plurality of independent electromagnetic structures and independently movable pivoted members attracted thereby for operating the said device, and a universal joint connection between the pivoted members and arranged for connection with the said device, whereby upon the energization of the said structures, the pivoted members jointly operate the said device and each pivoted member is permitted to seal with a  
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contacting face of its electromagnetic structure.

2. An electromagnetic operating mechanism for a rotatable switch shaft, comprising a plurality of independently movable pivoted magnetic members for operating the switch shaft, and an equalizing connection between the said pivoted members and arranged for connection with the said switch shaft, whereby upon the energization of the electromagnetic operating mechanism, the pivoted members jointly operate the switch shaft, and each pivoted member is permitted to seal with the contacting face of the electromagnetic operating mechanism.

3. An operating mechanism for a movable switch member, comprising an electromagnet having a plurality of independently movable pivoted members attracted thereby for operating the switch member, an equalizing bar arranged to be pivotally connected to the switch member, and a universal joint connection between the equalizing bar and the pivoted members, whereby upon the energization of the operating electromag-

net, the pivoted members jointly operate the switch member and each pivoted member is permitted to seal with a contacting face of the said electromagnet without interfering with another member.

4. An operating mechanism for a movable switch member, comprising an electromagnet having a plurality of independent magnetic structures and independently movable pivoted members attracted thereby for operating the switch member, an equalizing bar arranged to be pivotally connected at a mid-position to the switch member, and a ball and socket joint between each end of the equalizing bar and the pivoted members, whereby upon the energization of the operating electromagnet, the pivoted members jointly operate the switch member and each pivoted member is permitted to seal with a contacting face of its electromagnetic structure.

In witness whereof, I have hereunto set my hand this 21st day of January, 1921.

CHARLES L. PERRY.