Dec. 14, 1926. 1,610,279

C. F. GILCHRIST

RELAY

Filed Oct. 11, 1920

Fig. I.

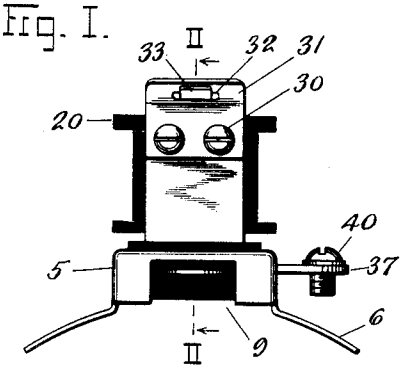


Fig. II.

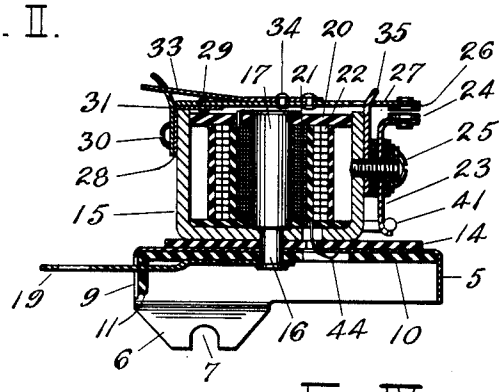


Fig. III.

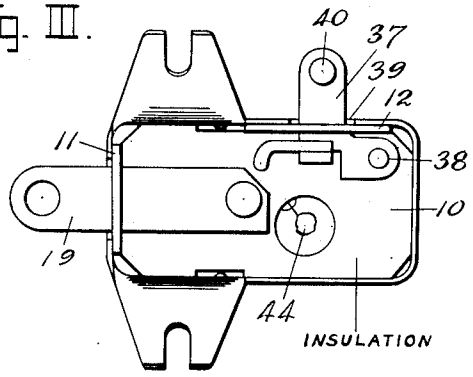


Fig. IV.

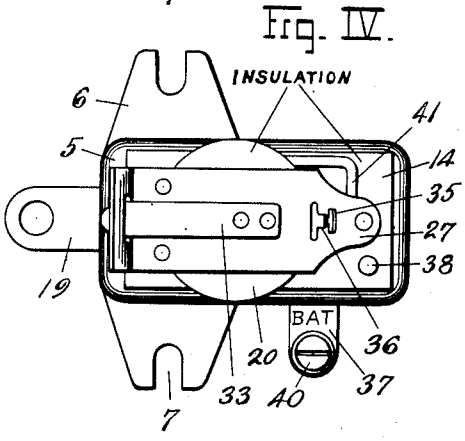
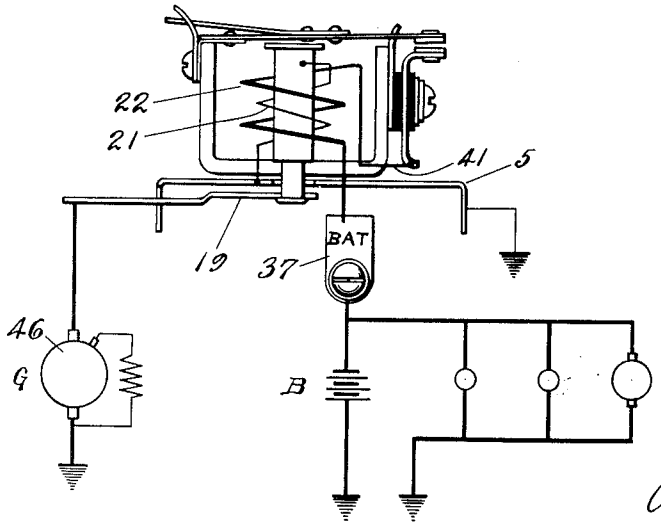


Fig. V.



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UNITED STATES PATENT OFFICE.

CLARENCE F. GILCHRIST, OF TOLEDO, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE ELECTRIC AUTO-LITE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

RELAY.

Application filed October 11, 1920. Serial No. 415,999.

This invention relates to relays, particularly to reverse current relays or cut-outs such, for example, as are commonly used in the battery charging circuit of auto-vehicles and it is an object of this invention to generally improve the structure of devices of this nature whereby they shall not only function in a superior manner but their construction and installation may be facilitated. Another important object contemplated is the provision of an electromagnetic relay provided with non-magnetic means for limiting the maximum amount of magnetic flow in the circuit of the device. Still another object is the provision of means for controlling the spring tension of the relay or analogous apparatus by means of which the frequency or amplitude or both frequency and amplitude of the movable member of the apparatus is or are controlled.

Further objects of this invention relate to economies of manufacture and details of construction as will hereinafter appear from the detailed description to follow. I accomplish the objects of my invention in one instance by the devices and means described in the following specification, but it is evident that the same may be varied widely without departing from the scope of the invention as pointed out in the appended claims. A structure constituting one embodiment of my invention, which may be the preferred, is illustrated in the accompanying drawings forming a part hereof, in which:

Figure I is an end view of a device embodying my invention.

Fig. II is a vertical sectional view of the same taken on the line II—II of Fig. I.

Fig. III is a bottom plan view.

Fig. IV is a top plan view and

Fig. V is a circuit diagram.

In the drawings, the same reference numerals refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the arrows at the ends of the section lines.

Referring to the drawings, 5 represents a hollow base member, preferably stamped up from sheet metal, and having two outwardly extending flanges 6, each of which is provided with an elongated opening 7 to receive a screw or bolt by which the device is secured in position. The flanges 6 in this case are shown curved to conform to the curvature of a round generator with which the relay is adapted to be used, the flanges may, however, be made flat or given any desired shape, depending upon what the relay is to be mounted. One end portion of the base 5 is shown cut away as at 9 for a purpose to be described hereinafter and fitted within the base 5 is a strip of insulation 10, such as fiber, one end of this strip being bent at right angles and extending down to cover the cut away portion 9 in the base. A second extension 12 is provided on the side of the strip, which is also bent downwardly against the adjacent side flange of the base. Resting on top of the base 5 and separated therefrom by a strip of insulation 14 is a yoke member 15 of magnetic material having an opening near the middle through which passes the reduced end 16 of the core 17.

This reduced portion 16 of the core also extends through the base and the two strips of insulation and has its extremity riveted over to form a head to thereby securely clamp the parts thus far described as a unit. A terminal member 19 is also secured under the head of the rivet and extends through a suitable opening in the bent up end portion 11 of the insulating strip 10 and also through the cutaway end 9 of the base member. By this construction the terminal member 19 passes through the base and is effectively insulated therefrom.

Between the two arms of the yoke member 15 and surrounding the core 16 is a spool 20 carrying a shunt winding 21 and a series winding 22, each of which are suitably insulated from the core and from each other. One arm of the yoke 15 supports a strip 23 carrying the stationary contact 24 by means of a screw 25, the strip being suitably insulated, as shown, by disks of insulating material. To the opposite arm of the yoke member 15 is flexibly connected the armature 27, which is a flat strip of magnetic material carrying the movable contact 26 to co-operate with the stationary contact 24. The connecting means for the armature comprises a relatively thin strip 28 of non-magnetic

material, bent at right angles and having one portion riveted to the armature, as at 29, while the other portion is secured to the adjacent arm of the yoke member by screws 30, the openings for which in the strip 28 are made large enough to insure the strip always seating against the end of the yoke 15. The screws 30 also serve to secure a plate 31 having an elongated opening 32 through which extends the free end of a flat spring 33 secured to the armature by rivets 34. The upper portion of the plate 31 is adapted to be bent to the right or left as viewed in Fig. II to vary the tension on the spring 33 and thereby adjust the armature to operate in the desired manner. A member 35 having at its upper end a pair of oppositely arranged notches forming a T-shaped head is also secured to the yoke member 15 by the screw 25. At a point opposite this member 35 the armature is provided with a substantially T-shaped opening 36 through which the end of member 35 is projected in assembling the device and is afterward bent as illustrated so as to constitute a limiting stop for the upward movement of the armature. The necessary adjustment of the armature may be effected by bending this member more or less.

One of the advantages of the construction described is that the unit previously referred to comprising the base, yoke member, and core may be faced off on a flat grinder so that the extremities of the core and yoke member shall lie in the same plane, thereby insuring a proper relation between the flat armature and the ends of the yoke and core. Furthermore, by the use of a thin strip 28 for attaching the armature to the yoke the magnetic gap at this point is fixed, being determined by the thickness of the strip 28 and the reluctance of the magnetic circuit is thereby less subject to variations due to inequalities in the sizes and shapes of the parts and location of rivet and screw holes, whereby the degree of accuracy required in making the parts is lessened, facilitating manufacture in large quantities without sacrificing uniformity.

The series winding 22 is connected at one end to a terminal member 37 marked "BAT" which is riveted to the base by a rivet 38 but insulated therefrom by the strip 10. The free portion of this terminal member extends out through a suitable opening 39 in the side of the base and also through the extension 12 of the insulation and carries at its extremity a screw 40 for the attachment of a wire leading to the generator. The opposite end of the series winding connects by a wire 41 with the member 23 to which is attached the stationary contact 24. One end of the shunt winding 21 is grounded directly on the core 17 while the opposite end passes through suitable openings in the yoke, base member and the insulating strips 10 and 14 and is adapted to be soldered as at 44 to the base 5.

In the circuit diagram of Fig. V it will be seen that the generator 46 is at all times connected with the shunt winding while the battery and load circuits are connected with the generator only when the relay is energized and the contacts are closed. The current traverses the shunt and series winding in the same direction when the battery is being charged or energy is supplied to the load circuit but when the voltage of the generator falls below that of the battery the resulting reverse current causes the relay to open the main circuit and thereby prevent further discharge of the battery back through the generator. Since the operation of the relay is similar to that of relays of this character in common use, a detailed description of its operation will not be given.

Inasmuch as the invention herein disclosed is susceptible of various other embodiments and as various changes might be made in the embodiment set forth, it is to be understood that all matter described above or shown in the accompanying drawing is to be interpreted as illustrative only, and not in a limiting sense.

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

1. In a relay, the combination of a coil, a yoke partially surrounding said coil, an armature adjacent the ends of said yoke and said coil, means for flexibly connecting said armature to one end of said yoke, a leaf spring secured to said armature, a plate secured to said yoke end for engaging said spring, said plate being adapted to be bent to vary the spring tension.

2. In a relay, the combination of a coil, a core therefore, a magnetic yoke connected with said core and extending about three sides of said core, an armature covering the remaining side of said coil and overlying one end of said yoke, a non-magnetic strip connected to and lying between said armature and said yoke for magnetically spacing said parts, and resilient means between said armature and said yoke for withdrawing said armature.

3. In apparatus of the class described, the combination of a yoke, a member movably mounted on one end of the yoke, and adapted to contact with the other end of said yoke, a spring secured to the member, a plate on the support slidably connected to the spring by means of a slot connection whereby the tension of the spring is adjusted relative to the support.

4. In a relay, the combination of a sheet metal base, an electro-magnet comprising a core having a plurality of windings thereon,

a yoke, an armature secured thereto, a stationary contact carried by said yoke, a movable contact carried by said armature, a strip of insulation separating said electromagnet from one side of said base, and a pair of terminals lying adjacent to but insulated from the other side of said base, one of said terminals being electrically connected to one of said windings, said core having an extension passing through said base and the other of said terminals and upset to bind said parts together.

In testimony whereof I affix my signature.

CLARENCE F. GILCHRIST.