

Sept. 10, 1946.

L. HANFF

2,407,418

RELAY DEVICE

Filed July 4, 1942

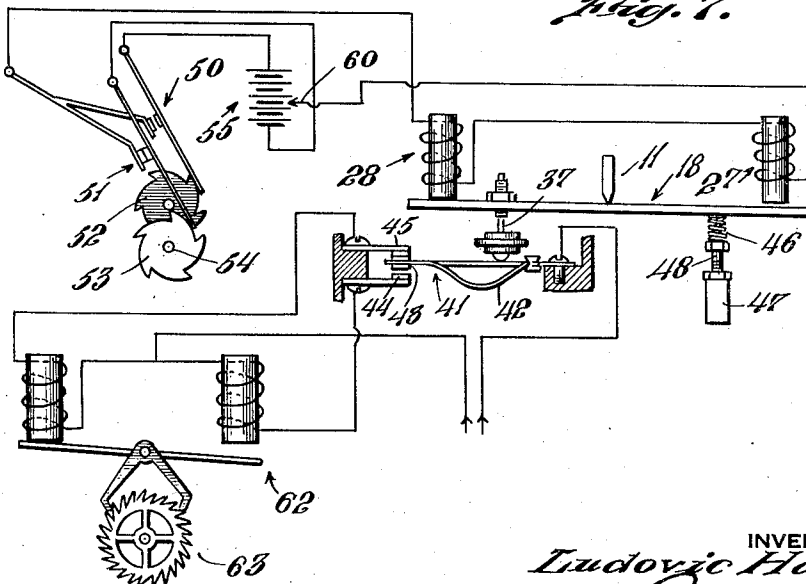
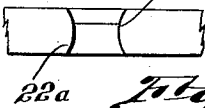
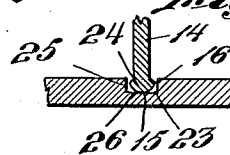
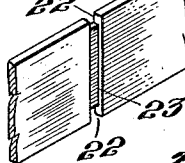
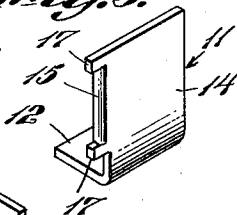
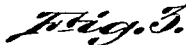
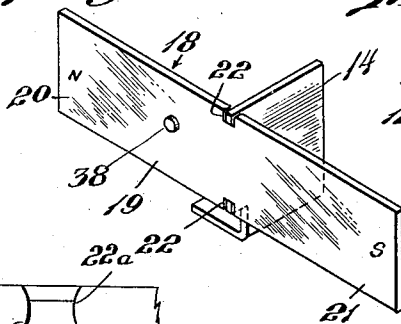
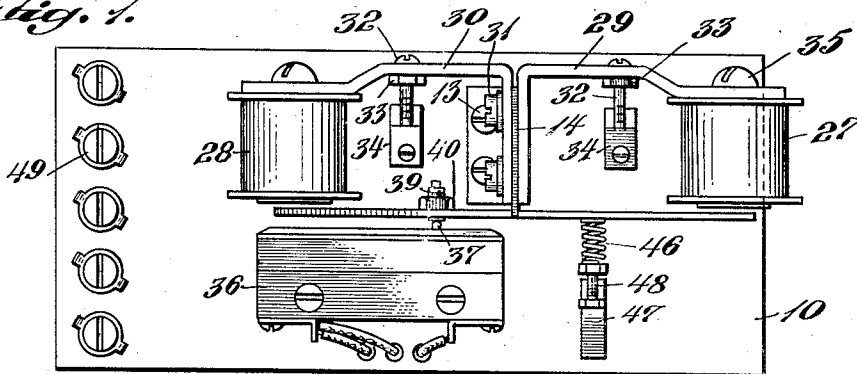


Fig. 7.

INVENTOR

INVENTOR
Ludovic Hanff
BY *Barlow & Barlow*
ATTORNEYS

BY *Barlow & Barlow*
ATTORNEYS

ATTORNEYS

UNITED STATES PATENT OFFICE

2,407,418

RELAY DEVICE

Ludovic Hanff, Warwick, R. I.

Application July 4, 1942, Serial No. 449,835

6 Claims. (Cl. 175-339)

1

This invention relates to a relay device such as may be used in various ways in electrically operated apparatus.

One of the particular uses for this invention is in connection with recording or totalizing certain behaviors in a watt hour meter, although it will be readily apparent to those skilled in the art that a relay may be used in various other connections. Frequently in the operation of totalizing the closure of certain contacts in a watt hour meter there is present a mechanical arrangement having such an amount of friction that the energy required to operate the device is considerable.

One of the objects of this invention is to provide an arrangement whereby but a small amount of power may be required for operating the device, thus making the device sensitive and one which will respond to sensitive operation.

Another object of this invention is to provide a balanced armature which will require but a small amount of current to operate the same.

A further object of this invention is to provide a mounting for the armature so that but a minimum amount of friction will be required or consumed in operation, or rocking of the armature back and forth.

A more specific object of the invention is to provide a sensitive armature which in turn will operate or control a switch designed to carry a greater amount of current, and utilizing the secondary contacts for carrying the main body of the current.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawing:

Fig. 1 is a top plan view of a unit illustrating my relay as associated with an auxiliary switch device.

Fig. 2 is a perspective view of the armature and its fulcrum mounting;

Fig. 3 is a perspective view of the fulcrum mounting alone;

Fig. 4 is a fragmental view of the armature showing the grooving in the central rear portion thereof;

Fig. 5 is a sectional view illustrating the shaping of the fulcrum mounting and the recess in the rear face of the armature;

Fig. 6 is a top plan view showing the top edge of the armature as seen in Fig. 2; and

Fig. 7 is a diagrammatic view, partly in section, illustrating a hookup of my device in an electrical circuit, such for instance as utilized in the

2

watt hour meter and a multiple totalizer which may be associated therewith.

In proceeding with this invention I have utilized a permanent magnet having north and south poles, and have so mounted this magnet on a fulcrum midway between its ends that it will mechanically operate another switch. This switch has a resilient means for causing the armature to be urged in one direction and I have balanced such pressure on this armature. By this arrangement the electromagnet which I have provided having two spaced poles adjacent the poles of the permanent bar magnet enables but a slight amount of current to be expended in rocking the armature so as to cause it to mechanically actuate the auxiliary switch.

With reference to the drawing, I have illustrated a unit mounted upon a base 10 which may be conveniently handled and installed in a position where it is desired that the same shall operate. A fulcrum means designated generally 11 (see Fig. 3) has a portion 12 which is secured as by means of bolt 13 to the base 10 with a portion 14 projecting upwardly therefrom and shaped to provide an edge 15 which is convex and of a thickness greater than the upstanding portion 14 (see Fig. 5). This curved edge 15 is provided with rather sharp edges 16 such as might be formed by two arcuate surfaces each of a radius greater than the distance between the arcs coming together. The surface 15 provides a good rocking point for an armature which is mounted thereon. Fingers 17 at either end of this surface 15 serve to limit lateral movement of an armature which is placed between them.

The armature designated generally 18 consists of a bar-like member 19 having permanent polarity with a north pole 20 and a south pole 21. The bar is notched as at 22 for the reception of the fingers 17 with arcuate edges 22a to provide bearing surfaces for the rocking of this armature in certain positions of the device, while the rear surface of the bar is recessed as at 23 at a location connecting the notches 22 so as to receive the enlarged portion 24 carrying the surface 15 and the edge portion 16. The depth of this recess 23 is such that the edge portions 16 will be received when the curved portion 15 engages the bottom 26 of the recess while the width will cause the portions 16 to just clear the side wall 25 of the recess to provide a convenient rocking point for the armature about this fulcrum mounting. This notching and recessing is such that the parts fit together to prevent both longitudinal movement and lateral movement of the

3

armature 18 with reference to its fulcrum mounting 11, while permitting guided free rocking movement of the armature on this fulcrum with a minimum amount of friction.

An electromagnet comprising two coils 27 and 28 is mounted for movement of the armature. Iron brackets 29 and 30 are each mounted by means of bolts 31 upon the upstanding portion 14 of the fulcrum member. Some resiliency in the arms 29 and 30 of these brackets is present, thus permitting some adjustment of the brackets by means of set screws 32 and locking nuts 33 against a post 34 which is fixedly mounted upon the base 10. Bolts 35 secure the brackets to the cores of the electromagnet.

When the electromagnets 27 and 28 are energized by reason of the connection of their windings as shown diagrammatically in Fig. 7 they both have the same polarity. Thus, if they were both south poles adjacent the ends of the armature the pole of the coil 28 would attract the north pole of the armature and the south pole of the coil 27 would repel the south pole of the armature in the rocking of the armature about its fulcrum. If the current were reversed the opposite would be the situation. As both poles of the coils 27 and 28 adjacent the armature would then be north poles the armature would be attracted in the opposite direction and repelled in the opposite direction.

The movement of the armature by reason of the energizing of the electromagnets is intended to mechanically operate a switch located in the housing 36 and having a feeler 37 extending therefrom to engage a pressure point 38 adjustably mounted through the armature by reason of the threaded member 39 and binding nut 40. By this arrangement the contact 38 may be accurately adjusted for engagement with the feeler 37 in the switch 36. In the housing 36 the toggle switch arm 41 is biased in one direction by a spring portion 42 while its end 43 may engage contact 44 or contact 45. Upon pressure being exerted upon the feeler finger 37 the contact is moved from one contact to the other but as the spring 42 always tends to move the arm of the feeler 37 outwardly some pressure against the armature is always inherent in the switch although different according to the different positions of the switch arm 41.

The pressure which is inherent in the switch 36 is balanced by a spring 46 shown in Fig. 1 and in Fig. 7. This spring is suitably adjustably mounted on a post 47 where the bolt 48 may be moved into or out of the post to exert varying amounts of pressure on the spring 46. The spring is so chosen and its adjustment is such that it will exert substantially the same pressure on the armature as exerted by the feeler finger 37 that the same will be in substantial balance. This spring is so chosen that it will exert varying amounts of pressure depending upon the position of the armature, the spring 46 exerting less pressure when the armature is rocked counterclockwise as seen in Fig. 7.

The unit 19 shows several binding posts 49 and suitable wiring beneath the unit 19 is led to these binding posts for convenience of installation of the unit in operation.

The wiring diagram of an installation of the unit is shown in Fig. 7. The contacts 50 and 51 in a watt hour meter are shown as being operated by cams 52 and 53 which are both on the same shaft 54 and are operated in unison which causes the contacts 50 to be open while the

4

contacts 51 are closed, and vice versa. These contacts control electric circuits energized by a battery 55 having a central connection 60 thereto and as will be seen from the circuit the battery will cause current to be passed through the coils 27 and 28 in one direction when the contacts 50 are closed, and a current to be passed through the coils 27 and 28 in the opposite direction when the contacts 51 are closed. The current thus is first passed through the coils in one direction and then in the opposite direction in operation. This causes a rocking of the armature 18 about its fulcrum to alternately move the arm 41 against the contacts 44 and 45 which in turn are connected to a unit in a multiple totalizer shown generally at 62 and provided with a positively driven escapement at 63 which records the behavior of the watt hour meter as is desired.

By this arrangement of balancing the armature and causing it to in turn mechanically operate other contacts, a much heavier circuit or current may be passed through the contacts 41, 44, 45 to operate the escapement of the totalizer than would be desirable to be carried in a circuit in which the armature 18 is operated. However, by this arrangement a very delicate control and one using a small amount of energy is provided and yet the energy may be transmitted in a second circuit controlled by this delicate arrangement, that an accurate and well arranged mechanism may be had. The armature 18 will be held in its last operated position by the permanent magnetic flux which is inherent in it as the springs are so nearly balanced that they will not overcome this magnetic attraction of the armature.

I claim:

1. In combination a polarized armature comprising an elongated bar having notches in its opposite edges and a locating recess in one surface connecting said notches, fulcruming means comprising a portion to enter said recess and fingers to enter said notches to prevent movement laterally and longitudinally of said armature, and electromagnetic means having spaced poles adjacent the poles of the armature to rock the armature about its fulcrum.

2. In combination a polarized armature comprising an elongated bar having notches in its opposite edges and a locating recess in one surface connecting said notches, fulcruming means comprising a portion expanded into a head at its end to enter said recess and fingers to enter said notches to prevent movement laterally and longitudinally of said armature, and electromagnetic means having spaced poles adjacent the poles of the armature to rock the armature about its fulcrum.

3. In combination a polarized armature comprising an elongated bar having notches in its opposite edges and a locating recess in one surface connecting said notches, the edges of said notches being arcuate, fulcruming means comprising a portion expanded into a head at its end with an arcuate end surface to enter said recess and fingers to enter said notches to prevent movement laterally and longitudinally of said armature, and electromagnetic means having spaced poles adjacent the poles of the armature to rock the armature about its fulcrum.

4. In combination a polarized armature comprising an elongated bar having notches in its opposite edges and a locating recess in one surface connecting said notches, fulcruming means comprising a portion expanded into a head at its

5

end with an arcuate end surface and sharp angular corners at the side of said head to enter said recess and fingers to enter said notches to prevent movement laterally and longitudinally of said armature, and electromagnetic means having spaced poles adjacent the poles of the armature to rock the armature about its fulcrum.

5. In combination a polarized armature, comprising an elongated bar, means to pivotally mount the armature on a fulcrum intermediate its ends substantially at the mid point of said bar, spaced pressure means acting in parallel rectilinear directions and engaging the armature on each side of the fulcrum so chosen as to cause the armature to be in substantial balance and an electromagnetic means having spaced poles adjacent the poles of the armature to rock the armature first in one direction and then in the

6

other direction, said balancing making necessary but a small amount of energy for such rocking.

6. In combination a polarized armature, comprising an elongated bar, means to pivotally mount the armature on a fulcrum intermediate its ends substantially at the mid point of said bar, spaced pressure means acting in parallel rectilinear directions and engaging the armature on each side of the fulcrum so chosen as to cause the armature to be in substantial balance and an electromagnetic means having spaced poles adjacent the poles of the armature to rock the armature first in one direction and then in the other direction, said balancing making necessary but a small amount of energy for such rocking, one of said pressure means being a spring acting in opposition to the other pressure means.

LUDOVIC HANFF.