Nov. 25, 1941. W. B. ELLWOOD 2,264,022

RELAY

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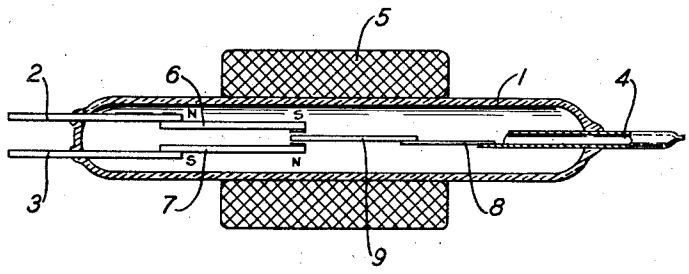

INVENTOR
W. B. ELLWOOD
BY
ATTORNEY

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RELAY

Walter B. Ellwood, New York, N. Y., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

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5 Claims. (Cl. 200—93)

This invention relates to switches and particularly to electromagnetically operated switches.

The object of the invention is to provide a relay unit contact device which is economical, reliable and easily replaceable.

A feature of the invention is a contact arrangement for polarized operation consisting essentially of contacts of magnetic material sealed in a vessel either evacuated or filled with an inert gas, which may be operated by an external magnetic force whereby costly contact metals are eliminated. To secure polarized operation, permanent magnets are sealed within this vessel and form part of both the magnetic circuit of the relay and the electrical circuit to be operated thereby.

According to another feature of the invention two permanent magnets oppositely disposed and placed substantially parallel to each other are sealed into one end of the said vessel and a flexible tongue of magnetic material is sealed into the other end thereof and so disposed that its end may travel between and make contact with one end of each of the said permanent magnets.

According to another feature, the moving contact may be a composite structure being formed partly of spring steel to lend flexibility and partly of a magnetic alloy having extremely low retentivity to facilitate free movement from one permanent magnet to another.

A further feature of the invention resides in the stiffness of the mounting of the flexible contact member. By making this quite flexible a polarized relay may be produced which will continuously maintain either one path or the other closed. By making this flexible contact member comparatively stiff a polarized relay may be produced which will maintain either path closed only when energized, that is, a so-called center adjusted relay may be produced.

By making the middle member stiff and the magnet supports flexible a continuity polar transfer may be produced. That is both magnets will make contact with the middle and one or the other will break contact upon energizing the middle tongue with a coil depending upon the direction of the current.

This device is of the general type disclosed in Patent 2,187,115 to Ellwood and Holden, granted January 16, 1940.

The drawing consists of a single sheet showing a relay contact structure in cross-section.

The device consists of a glass envelope 1 in which are sealed two contact members 2 and 3 at one end and a third contact member 4 at the opposite end. A coil 5 external to the envelope causes the relay action inside the envelope. To the conducting members 2 and 3 inside the envelope are attached two small permanent magnets 6 and 7, respectively. These may be attached in any well-known manner such, for instance, as by welding. These two permanent magnets are poled in opposite directions as indicated by the figures N and S, representing north and south.

To the lead-in conductor 4 is attached a resilient member of magnetic material 8 and another member of magnetic material 9 which may not be of the same resiliency as the member 8. If the member 8 is sufficiently stiff, the end of the member 9 may be held between the ends of the members 6 and 7 without making contact with either when the coil 5 is not energized. Thereafter, the member 9 will move into contact with either the member 6 or the member 7 in accordance with the direction in which the coil 5 is energized.

If the resilient member 8 is less stiff then the member 9 may remain in contact with either the member 6 or the member 7 to which it was last attracted and will only move out of that position when the coil 5 is energized in such a direction to move the member 9 to the alternate contact.

It is not necessary that the two members 8 and 9 be used but the member 8 alone may be used and made long enough to substitute for the combined structure of members 8 and 9 together.

By making the single member comprising the members 8 and 9 stiff and the mountings 2 and 3 within the envelope 1 comparatively flexible a continuity polar transfer contact device may be produced. With such construction both contacts will make contact with the middle one during periods when the coil is not energized and one or the other will break contact upon energizing the coil in accordance with the direction of energization.

In order to render this unit as small as possible and to make it capable of being inserted into a coil from either end, metal tubulation is used. Thus the contact member 4 is a metal tube sealed into the envelope 1 and it may be used to exhaust the envelope and then to fill the envelope with an inert gas before being sealed off. No claim is made to this metal tubulation since the expedient is well known.

What is claimed is:

1. A magnetically operated switch structure comprising two magnetic elements each termi-

nating in a permanent magnet, the two said permanent magnets being oppositely poled, and a flexible magnetic element movable between the ends of said permanent magnets, said magnetic elements forming parts of both the magnetic circuit and the electrical circuit of said structure and being mounted within a vessel sealed against oxidizing or corrosive influences, the said elements being subject to external magnetic influences.

2. A magnetically operated switch structure comprising two magnetic elements each terminating in a permanent magnet, the two said permanent magnets being oppositely poled, and a flexible magnetic element movable between the ends of said permanent magnets, said magnetic elements forming parts of both the magnetic circuit and the electrical circuit of said structure and being mounted within a vessel sealed against oxidizing or corrosive influences, the said elements being subject to external magnetic influences, said flexible magnetic element having sufficient stiffness to maintain it out of contact with the end of either of said permanent magnets when said structure is free of any said external magnetic influences.

3. A magnetically operated switch structure comprising two magnetic elements each terminating in a permanent magnet, the two said permanent magnets being oppositely poled, and a flexible magnetic element movable between the ends of said permanent magnets, said magnetic elements forming parts of both the magnetic circuit and the electrical circuit of said structure and being mounted within a vessel sealed against oxidizing or corrosive influences, the said elements being subject to external magnetic influences, said flexible magnetic element having sufficient flexibility and sufficient retentivity to hold it in contact with that permanent magnet to which it was last moved after such external magnetic influence has ceased.

4. A magnetically operated switch structure comprising two flexible magnetic elements each terminating in a permanent magnet, the two said permanent magnets being oppositely poled, and a magnetic element mounted with its end placed between the ends of said permanent magnets, said magnetic elements forming parts of both the magnetic circuit and the electrical circuit of said structure and being mounted within a vessel sealed against oxidizing or corrosive influences, the said elements being subject to external magnetic influences, the said elements having sufficient flexibility and retentivity to hold all three elements in electrical contact when free of external magnetic influence.

5. A magnetically operated switch structure comprising magnetic elements forming parts of both the magnetic circuit and the electrical circuit thereof, said elements being mounted within a sealed tubular vessel, permanent magnets forming part of certain of said elements, all said elements being mounted on lines parallel to the axis of said tubular vessel and said vessel being adapted to be placed in an unoriented position in a magnetic circuit whose field extends parallel to the axis of said tubular vessel.

WALTER B. ELLWOOD.