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C. P. CLARE ET AL

2,267,191

RELAY

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Fig. 1

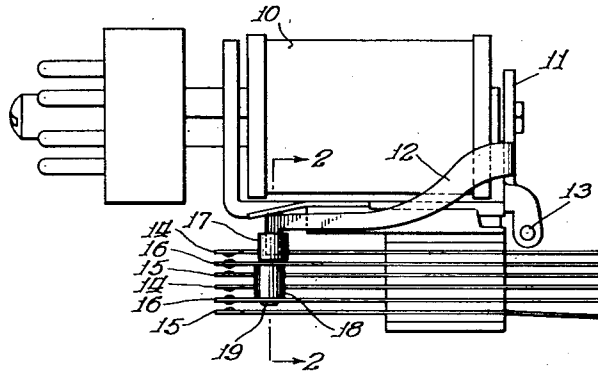


Fig. 2

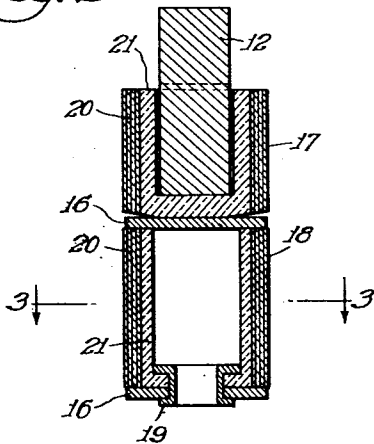
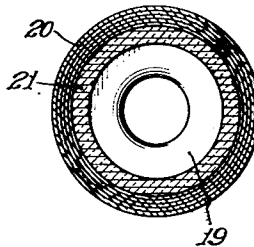


Fig. 3



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UNITED STATES PATENT OFFICE

2,267,191

RELAY

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4 Claims. (Cl. 200—166)

The present invention relates to relays for controlling various electric circuits. It is more particularly concerned with the actuation of the relay springs which carry the movable contacts and the means by which a plurality of springs are operated from a single actuating arm. In relays of the type to which the present invention applies, it is customary to provide the several spring arms with spacers of insulating material and to provide the actuating arm with an insulating member that engages the first spring. The insulating members transmit the movement of the actuating arm to the first spring and from there to each succeeding spring. It is evident that the accuracy with which the insulating members are manufactured and maintained is very important in the continued operation of the relay. A small amount of wear on each of the insulating members will result in an accumulative error which, in a short time, will make the relay inoperative. It is also evident that these insulating members must be free from objectionable swelling or shrinkage due to changes in humidity or temperature of the surrounding atmosphere.

The present invention contemplates the production of a novel insulating member for interposition between the actuating arm of the relay and the adjacent springs, and between the several springs which are to be moved by the actuating arm. Heretofore, various types of insulating members have been employed, but apparently they have not been designed with a full understanding of the problem involved. Hard rubber insulating members have been utilized, but they have the objection that they wear rapidly and the dust on the relay contacts seriously impairs the conductivity, often times resulting in failures. The hard rubber insulating members also have the difficulty that they are not capable of withstanding a very high temperature without softening.

We have considered the matter of fiber insulating members, but such material has been found to be too susceptible to atmospheric conditions for the accuracy desired. Furthermore, the fiber material is structurally weak and will often break in riveting the insulating members to the spring.

We have found that a certain construction of insulating member utilizing synthetic resin to be very satisfactory for our purpose. It is necessary to construct the insulating member in a particular fashion in order to obtain the desired results. The construction of such insulating

member and its embodiment in the relay constitute the novel features of the present invention.

The features and advantages of the present invention will appear more fully as the description proceeds, reference being had to the accompanying drawing wherein a preferred form of the invention is shown. It is to be understood, however, that the drawing and description are illustrative only, and are not to be taken as limiting the invention except insofar as it is limited by the claims.

In the drawing:

Fig. 1 is an assembly view of a relay to which the present invention is applied;

Fig. 2 is an enlarged sectional view taken on the line 2—2 of Fig. 1 and illustrating the mounting of the insulating members on the actuating arm of the relay and on the spring;

Fig. 3 is an enlarged sectional view taken on the line 3—3 of Fig. 2.

Referring now in detail to the drawing, the coil portion of the relay is indicated by the numeral 10. The armature of the relay is indicated at 11. This armature carries an arm 12 and the armature is pivoted by means of a pivot pin 13. The stationary contacts of the relay are indicated at 14 and 15, the contacts 14 being the back contacts, while the front contacts are the contacts 15 that are made when the relay coil is energized. The movable spring contacts of the relay are indicated at 16, two contacts of this type being shown. It is evident, of course, that the contacts 16 may include one or several spring contacts, depending upon the particular purpose for which the relay is designed.

Actuation of the spring contacts 16 is by means of the arm 12. This arm carries an insulating member 17 to engage the first spring. The second spring has riveted thereto an insulating member 18. Succeeding springs would also have insulating members similar to 18 thereon. The rivet 19 secures the insulating member 18 to the second spring 16.

It will be appreciated that in transmitting the movement of the arm 12 to the first spring contact and through this spring contact to the succeeding spring contact of the relay, the insulating members 17 and 18 are continually subjected to wear at their free ends. Furthermore, in mounting the insulating member 17 upon the arm 12 it is necessary to secure it, and in order to do so, the most desirable manner of securing is by a drive fit by which the arm is secured in a recess provided in the insulating member 17. We have found normal construction of rods of

synthetic resin material and fibers to be totally impractical for this purpose, the reason being that a cleavage of the insulating member results from the interior pressure. The insulating member 18 encounters much the same difficulty in securing it to the spring contact by means of the rivet 19. We have endeavored to use ordinary commercial forms of rods made from synthetic resin material such as "Bakelite." However, such materials develop cleavage lines where they have little or no strength, and the destruction of the insulating members is too frequent for practical use. On the other hand, the synthetic resin materials do have very fine wearing qualities, particularly where the construction includes an impregnated paper or fabric as a part of the finished rod.

In order to obtain the desired characteristics, we have found it necessary to construct our insulating materials in the following manner. We first take ordinary sheet material of synthetic resin which is made from a plurality of layers of paper impregnated with the resin and pressed together. From this material, rods 21 are cut, the rods being of very small diameter in the neighborhood of less than one-eighth inch. Cleavage lines of course appear in these rods parallel to the laminations. In order to overcome this weakness, we then wrap the rods with paper which has passed through the synthetic resin compound so as to build up a coil 20 of resin impregnated paper about the rod which is cut from the sheet. The rod is then cured with the coiled impregnated paper about it by placing it in a mold and subjecting it to the necessary heat and pressure. From the resulting rod, we cut the lengths that are used for the insulating members 17 and 18.

It will be noted that the maximum strength of these rods lies in the rolled portion 20 around the central rod 21, and it is the central rod portion that is drilled out in order to receive the tip of the arm 12 or the rivet 19. There is no radial line of cleavage in the rod. Thus the full strength and advantage of the impregnated paper is available to prevent cracking of the insulating member.

It has been proposed to roll the rods initially without a center rod and thus avoid the apparently expensive process of originally forming rods from sheets. We have found this to be inoperable for the reason that when the rod is molded there is such a shrinkage as to form folds in the paper and thus establish a radial cleavage line.

The insulating members constructed in the manner hereinbefore described have the advantages

of sufficient tensile strength to avoid breakage when fitting them on the arms and the rivets. They also have the advantage of wearing very slightly where they contact the surfaces of the spring contacts. They take a very high polish and when the surface of the spring is also polished, a very long life results. The temperature characteristic is also very good. With the ordinary "Bakelite" material, there is no softening at temperatures which the relays will normally stand. Since the material is inherently a water repellent and has a low temperature coefficient of expansion, atmospheric conditions do not seriously affect the operation of the relay by changing the lengths of the insulating members.

From the foregoing description it is believed that the construction and advantages of our invention will be readily apparent to those skilled in this art. Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A movement transferring spacer for relay springs and the like comprising an inner rod section of phenolic resin impregnated sheets of paper having planar lines of cleavage, and a shell section of phenolic resin impregnated paper coiled about said rod section and intimately united therewith.

2. A movement transferring spacer for relay springs and the like, comprising an inner rod of insulating material, said rod having mounting means therein, and a peripheral shell encircling said rod, said peripheral shell being composed of a plurality of layers of fibrous sheet material impregnated with an insulating composition and fitting tightly about the rod.

3. A movement transferring spacer for relay springs and the like, comprising a rod section of insulating material having a recess extending into it from one end thereof, said rod being provided with an aperture leading from said recess to the other end thereof to receive a fastener, a fastener mounted in the aperture, and a peripheral shell on said rod composed of circumferential layers of fibrous material impregnated with an insulating composition and free of radial cleavage lines.

4. A movement transferring spacer of the character described, comprising an inner rod of insulating material having a recess therein extending inwardly from one end thereof, and a peripheral shell encircling said rod, said shell being composed of compressed layers of a fibrous sheet impregnated with an insulating composition, the layers encircling the rod.

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