Oct. 19, 1937. J. S. GARVIN 2,096,456

ELECTROMAGNETIC SWITCHING DEVICE

Filed April 16, 1935

FIG. 1

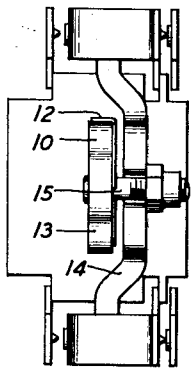


FIG. 2

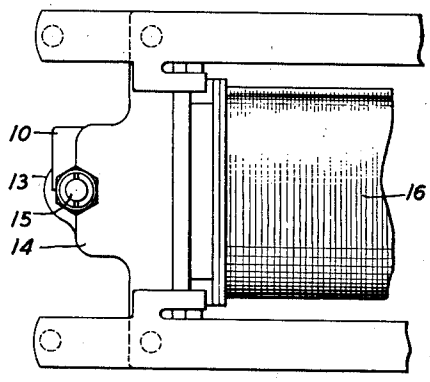


FIG. 3

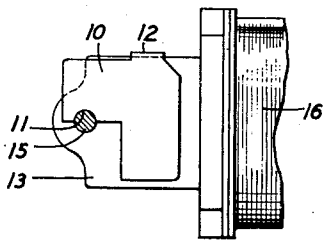
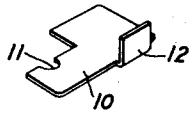


FIG. 4



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ELECTROMAGNETIC SWITCHING DEVICE

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3 Claims. (Cl. 175—336)

This invention relates to electromagnetic switching devices and more particularly to means for improving the release characteristics of electromagnetic relays.

The correct functioning of electric circuits generally, and telephone circuits particularly, depends to a major degree upon the accurate operation of the switching devices used to control such circuits. Electromagnetic relays are designed and adjusted to exhibit definite time operating characteristics. That is, a relay under favorable conditions will operate or release at a definite time following the energization or deenergization of the relay magnet, either immediately or, in the case of slow-acting relays, shortly after the closure or opening of the relay circuit.

In order that switching devices serve in a precise manner the purpose for which they are employed, it is essential that the elements thereof, such as the armature and core between which mutual attraction exists when the electromagnet is energized, be free from foreign matter, such as dust, dirt, etc., which causes sticking.

It is the object of this invention to improve the operating characteristics of electromagnetic switching devices by precluding the possibility of an accumulation of dust, dirt or other foreign matter on cooperating pole faces of such devices.

This object is attained in accordance with a feature of the invention by the provision of a metal separator which may be readily inserted between the oppositely disposed pole faces of the armature and core.

Another feature of the invention resides in so designing and mounting the separator that it insures the dislodgment of foreign matter which may settle on the contacting surfaces of the armature and core, thereby minimizing the tendency to stick.

These and other features of the invention will be readily understood from the following detailed description made with reference to the accompanying drawing, in which:

Fig. 1 is a front end view of a relay illustrating the relative disposition of the separator and the relay armature and core;

Fig. 2 is a fragmentary plan view of the relay shown in Fig. 1;

Fig. 3 is a fragmentary view similar to that of Fig. 2 in which the relay armature, contact springs and adjusting nut have been omitted; and

Fig. 4 is a perspective view of a particular form of separator.

The separator 10 of this invention is a detail of lightweight metal, such as phosphor bronze, which may be stamped or otherwise formed to provide it with a shape suitable for use with a particular type of switching device. It may be necessary, in order to satisfy structural peculiarities or characteristics of certain relays to modify the form of separator shown in Fig. 4. This may be done without departing from the spirit or scope of the present invention, it being understood that the particular types of relay and separator shown have been selected as being illustrative of one embodiment of the invention only.

The separator 10 which is substantially L-shaped is provided with a semi-circular notch or indent 11 and a flat lug or tab 12 integrally associated therewith and extending at right angles therefrom. By virtue of the notch 11 and lug 12, the separator 10 is floatingly mounted on the relay core 13 in the following manner. The separator is inserted between the core 13 and armature 14 so that the lug 12 extends at right angles to the longitudinal axis of the core 13 and rests upon the upper edge thereof. The separator may then be shifted in either direction along the upper edge of the core until the air-gap adjusting screw 15 engages the notch 11. This position of the separator on the relay core is clearly illustrated in Fig. 3.

The length of the lug 12 is greater than the length of the normal air-gap between the relay armature and core in order to insure against the falling of the separator through the gap, it being understood that the separator 10 is not rigidly fixed but is free to move away from the core with the core edge and adjusting screw as points of support.

When armature 14 is actuated as a consequence of the energization of the relay coil 16, it approaches the core 13 and on its travel engages the separator 10 which may be in the position shown in Fig. 1 or in a position further removed from the core 13. In any event, due to the fact that the separator is not fixed and is free to move relative to the core and armature, it effects a wiping action on the core and armature surfaces thereby minimizing the possibility of dirt accumulating on either of these surfaces to cause sticking. When the energizing force is removed from the coil 16, the armature restores to normal and in pulling away from the core causes the separator to be moved slightly, or agitated. It is evident, therefore, that the floatingly mounted separator moves relative to the core and armature both on the operate and release strokes of

the armature to produce a cleansing action on the surfaces thereof.

The introduction of the separator between the armature and core also increases the number of contacting surfaces upon which an accumulation of dirt is necessary before a sticking condition can exist. The possibility of sticking is accordingly reduced.

What is claimed is:

1. In an electromagnetic switching device, an electromagnet having a core, an armature, said core and armature having pole faces separated by an air-gap, means for adjusting said air-gap including a screw, and means for preventing contact between said pole faces when said electromagnet is energized, said means comprising a metal detail having a lug for engagement with an edge of said core and an indent for engagement with said screw whereby said detail is floatingly supported in said air-gap.

2. In an electromagnetic switching device, an electromagnet having a core, an armature, said core and armature being separated by an air-gap of predetermined length and a metal detail detachedly supported in said air-gap by means of an integral lug resting on the edge of said core and extending in a direction corresponding to the line of travel of said armature, said lug having a length greater than the length of said air-gap.

3. In an electromagnetic switching device, an electromagnet having a core, an armature, said core and armature having pole faces separated by an air-gap, means for adjusting said air-gap including a screw, a sheet-like detail located in said air-gap and detachedly supported on said core and said screw, opposite surfaces of said detail making surface contact with the pole faces of said armature and core respectively when said electromagnet is energized, and means for energizing said electromagnet.

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