

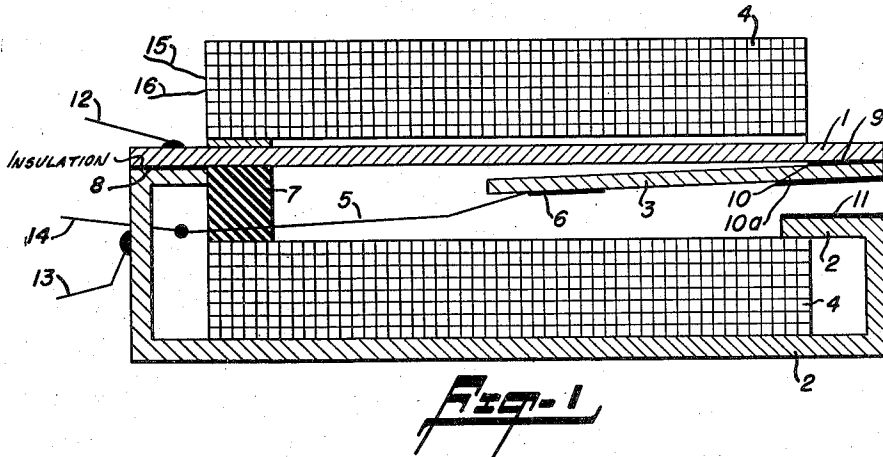
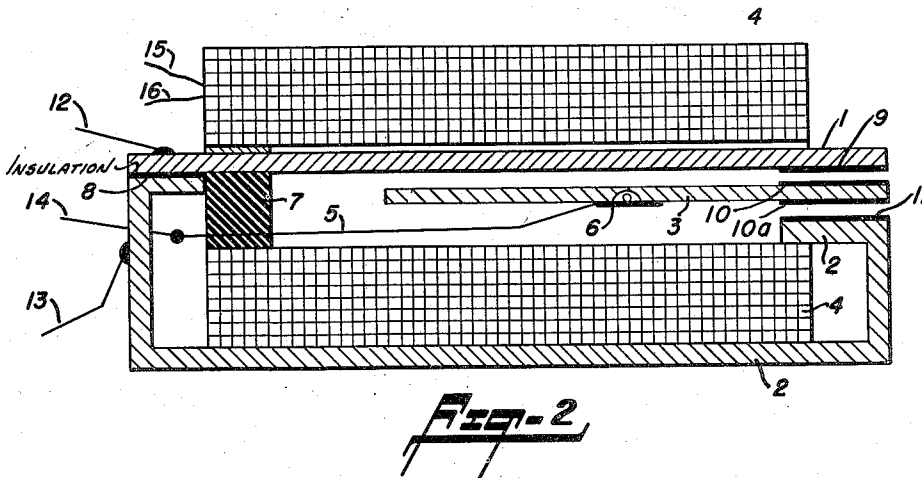
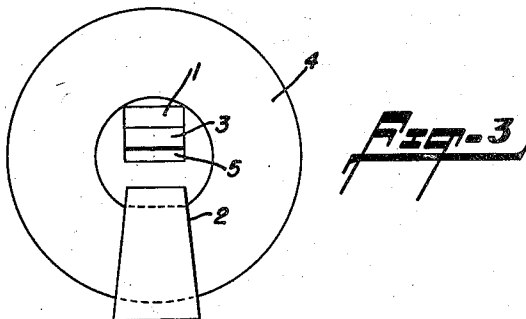
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P. A. AMOURIQ

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MINIATURE ELECTROMAGNETIC RELAY

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PAUL A. AMOURIQ  
INVENTOR.

BY  
*Rudolph L. Swick*  
ATTORNEY

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## MINIATURE ELECTROMAGNETIC RELAY

Paul A. Amourig, Paris, France, assignor to Brion, Leroux & Cie, Paris, France, a corporation

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6 Claims. (Cl. 317-165)

The following invention has as its object an electromagnetic relay whose characteristics, which are defined hereunder, permit the realization of a miniature relay which means having extremely small dimensions so that in conjunction with sub-miniature tubes it offers numerous applications in the electronic field.

The miniature relay, according to this invention, possesses essentially inserted in an oblong winding an assembly of three (3) long parts made of a metallic composition of high magnetic permeability of which two (2) parts are fixed and one is a movable armature, mounted between the two (2) fixed parts on a metallic non-magnetic leaf so that it can be displaced under the double effect of the repulsion produced by one of the fixed parts and the attraction produced by the other.

As an essential characteristic of this invention, it is these three (3) parts (the two (2) fixed parts and the movable armature) which in themselves constitute the contacts of the relay.

The relay, in accordance with this invention, is shown for purposes of exemplification in the attached drawings.

Figure 1 is a cross sectional view along the longitudinal axis of the relay;

Figure 2 is the cross-sectional view along the longitudinal axis of a slight variation of the form of design shown in Figure 1; and

Figure 3 is a schematic end view of the relay according to Figure 1 or Figure 2.

In the drawings, 1 and 2 represent the two (2) fixed parts and 3 the movable armature which assembly is inserted into coil winding 4 preferably so mounted it extends slightly beyond the two ends of the coil.

The movable armature 3 is mounted on an elastic non-magnetic spring leaf 5 which is either attached at one of its ends 6 (Figure 1) or articulated (Figure 2) and which at its other end is mounted on an insulating block 7. An insert 8 assures the electrical insulation between pieces 1 and 2.

In accordance with one of the characteristics of the relay, its parts 1, 2 and 3 consisting of metal or of a magnetic alloy which form in themselves the contacts of the relay at their ends 9 (piece 1), 10 and 10a (piece 3) and 11 (piece 2).

According to another characteristic, it is desirable to submit the contact forming ends, which may anyway provide for long life due to flat engagement, or one over a relatively large area, to an appropriate treatment, which preferably may consist in providing these parts with an electrolytic deposit of metal or of an alloy of the most favorable qualifications such as silver, or palladium, etc., in order to give these parts the qualities necessary from the point of view of permanence of the contacts.

On the other hand, in order to insure the function of

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the relay and the constancy of its qualities it is desirable to mount the assembly in a cylindrical case (not shown), strictly dimensioned to accommodate this assembly which case after being filled with an inert or reducing gas is sealed.

In these conditions, the relay presents itself in form of a small cylindrical tube of dimensions comparable to those of a sub-miniature tube whose overall dimensions, in order to establish some idea, would be in the order of 8 x 8 x 30 mm., extended on one of its sides by short lengths of wires necessary for making the connections, such as the wires 12, 13 and 14 for the contacts and the wires 15 and 16 for the energization of coil 4.

It is understood that the invention extends to the application of its characteristics as described above to the design of an electromagnetic relay of conventional form for handling either small or large contact power.

I claim:

1. A miniature electromagnetic relay comprising an elongated coil having an axial hole therethrough, a first fixed member of magnetic material extending through the said hole, a second fixed member of magnetic material disposed outside of the coil and having an end spaced from an end of the said first member, an armature of magnetic material, and a non-magnetic spring supporting the armature for transverse bodily movement between the spaced ends of the said first and second members.

2. The invention as recited in claim 1, wherein the said armature extends into the said hole and the said spring has an end secured substantially to the midpoint thereof, the arrangement being such that upon energization of the coil the inner end of the armature is repelled from the said first member and the outer end of the armature is attracted to said end of the second member.

3. The invention as recited in claim 1, wherein the spaced ends of the said two members and the armature constitute the contacts of the relay.

4. The invention as recited in claim 1, wherein the spaced ends of the said two members and the cooperating end of the armature are plated with a material having good electrical contact properties from the standpoint of permanence.

5. A miniature electromagnetic relay comprising an elongated coil having an axial hole therethrough, a first fixed member of magnetic material extending through the hole and having an exposed end constituting one fixed contact of the relay, a second fixed member of magnetic material disposed outside of the coil and having an end spaced from the exposed end of the first member to constitute a second fixed contact of the relay, an armature made of magnetic material disposed essentially within the said hole and having an end movable between the spaced ends of the said first two members, a non-magnetic spring normally supporting the said armature substantially axially within the said hole, a sealed, cylindrical housing enclosing the coil and the spaced ends of the said first and second members, and connection leads passing through the said housing and individually connected to the said two fixed members, the armature and the ends of said coil.

6. An electro-magnetic relay comprising an elongated coil having an axial hole therethrough, a first fixed member of magnetic material, rectangular in section, extending through said hole and with one end portion constituting one fixed relay contact, a second fixed member of magnetic material, rectangular in section, extending outside of said coil and having an end spaced from the fixed relay contact end portion of said first member and con-

stituting a second fixed relay contact, with its other end portion extending close to the other end of said first fixed member but insulated therefrom, an armature also formed of magnetic material, rectangular in section, and disposed within said hole adjacent said first fixed member with an end normally disposed flatly between said spaced end contact portions of said fixed members, and a non-magnetic spring normally supporting said armature in said hole between said members, whereby said armature is bodily movable between flat engagement with the contacts of said first and second fixed members.

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