

Sept. 7, 1943.

J. F. EBERT

2,329,036

RELAY STRUCTURE

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Fig. 1

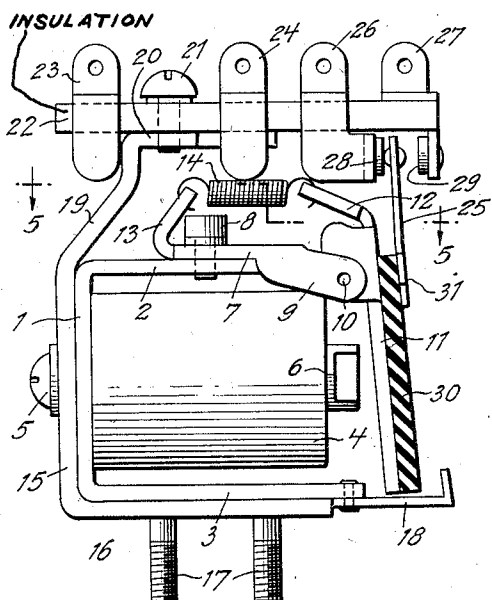


Fig. 2

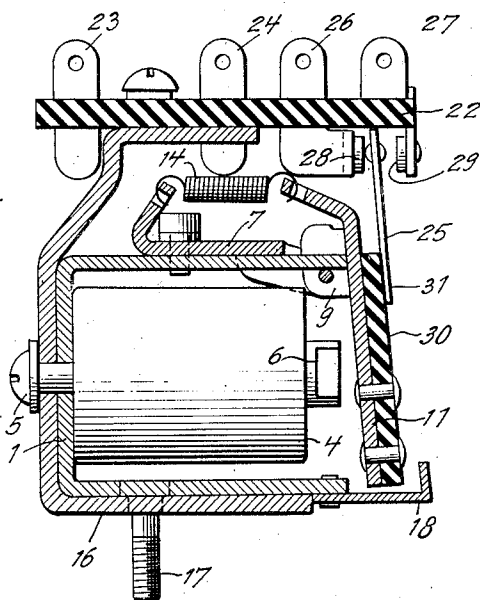
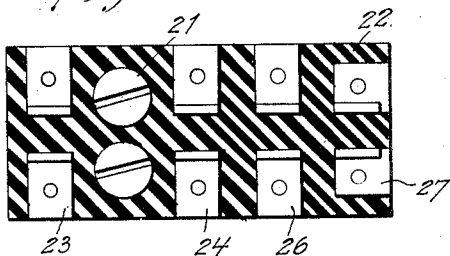


Fig. 3



INSULATION

Fig. 4

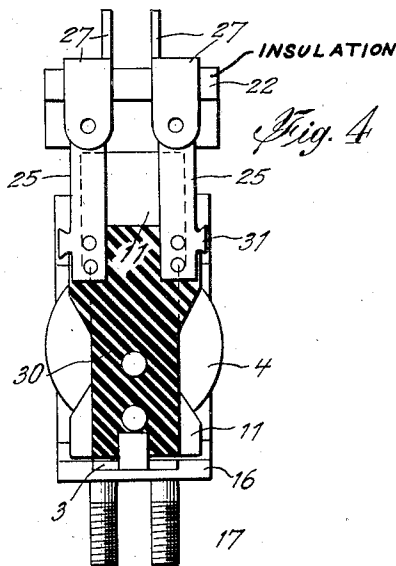
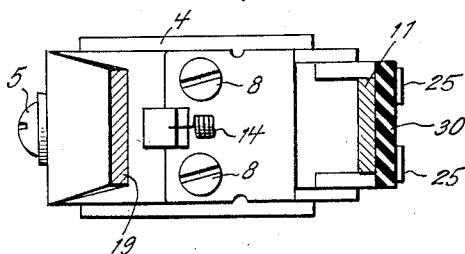


Fig. 5



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UNITED STATES PATENT OFFICE

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RELAY STRUCTURE

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6 Claims. (Cl. 200—87)

The present invention is directed to relays, more particularly to an improved structure of relay whereby a compact device is obtained with a minimum of labor.

Relays have long been known and used. There are a considerable number of structures which have heretofore been proposed and which have been in quantity production. However, many of these relays have disadvantages in that the structure is such that they are incapable of being fitted into small spaces or are inaccessible in order to remove or repair damaged parts. Also, in many of such prior art relays the fabrication was difficult due to the relative arrangement and character of the parts, so that considerable labor was necessary.

The present invention is intended and adapted to overcome the difficulties of prior structures and to provide a relay which is small and compact and in which the various parts are readily accessible, both for the provision of electrical connections and for the removal and repair of parts thereof.

It is also among the objects of the present invention to provide a relay structure in which there are a number of sub-assemblies which are thereafter completely assembled to give the finished relay.

In practicing the present invention I provide a plate of iron or other suitable magnetic material having the ends thereof bent to form a U, and having a magnetic coil secured to said plate. An armature is mounted as a separate unit on a suitable member, together with spring means for biasing the same, said unit being adapted to be assembled on the coil unit. There is also provided a terminal block which is a separate unit from the other portions of the relay, and a base is provided to which all of the aforesaid sub-assembly elements are readily united to give the complete relay structure.

In the accompanying drawing constituting a part hereof and in which like reference characters indicate like parts:

Fig. 1 is a side elevational view of a relay made in accordance with the present invention;

Fig. 2 is a vertical longitudinal cross-sectional view thereof;

Fig. 3 is a top plan view thereof;

Fig. 4 is an end view; and

Fig. 5 is a horizontal cross-sectional view taken along the line 5—5 of Fig. 1.

The relatively narrow and long plate 1 has the ends 2 and 3 thereof bent at right angles to the plate to form the legs of a U. A coil 4 is removably secured on plate 1 by means of screw 5, and a core 6 projects from the opposite end of said coil.

A flat member 7 is secured to leg 2 by screw 8. Depending from one end thereof is a pair of ears

9 having openings adapted to register with similar openings on ears projecting from armature 11. A pin 10 passes through said openings forming a hinge and pivoting the armature 11.

An inwardly extending portion 12 on the side of the hinge opposite the armature overlies part of member 7. The opposite end 13 of member 7 is bent inwardly towards portion 12 and a coil spring 14 tends to draw parts 12 and 13 together.

The base is in the form of an L, having side 15 contacting with plate 1 and side 16, in which are fitted screws 17, or the like, for attaching the relay to a suitable support. Stop member 18 is secured to the end of leg 3 for limiting the motion of armature 11.

Extending from side 15 is a bracket 19 having a flat upper surface 20 into which screws 21 are adapted to be threaded to hold the relatively narrow, long insulating plate 22. A pair of terminals 23 are fixed on one end of insulating plate 22, said terminals being adapted to be secured to the wires leading to coil 4 to energize the latter. A set of terminals 24 secured to insulating plate 22 are adapted to be electrically connected to contact arms 25 secured to armature 11. Sets of terminal members 26 and 27, also secured to insulating plate 22, provide means for connecting the relay into the circuits to be controlled. The latter terminals are provided with contact faces 28 and 29, respectively, for making electrical contact with contact arms 25. As will be seen more particularly from Figs. 3 and 4, there are two rows of contact members on plate 22, these being located along the longitudinal edges of said plate. By reason of such arrangement, all of the terminals are readily accessible for making the necessary electrical connections.

Interposed between armature 11 and contact arms 25 is insulating plate 30. It will be noted that the lower end of each contact arm 25 has a projecting portion 31 at a point approximately opposite to pin 10 of the hinge. Therefore, at 31 the movement of the armature and contact arms is a minimum and, therefore, the wires connected to 31 have the minimum of movement and the danger of breaking by flexing is practically eliminated.

In the fabrication of the relay it is feasible to make each of the sub-assemblies separately from the rest, so that each specialized portion of the work may be accomplished by a specialized worker. For example, the insulating plate 22 and the terminals held thereby may be made as a single operation. Also, element 7 with the assembly of armature and spring may be made as a separate unit. The coil, magnetic circuit, and core may be made as a single unit. Thereafter, the assembly is quite simple in that element 7 and its associate parts may be secured to leg 2, this assembly in turn secured to the base

by screw 5, and then the insulating plate assembly secured to bracket 19 by screws 21.

The armature is balanced, that is, the weight thereof is so distributed that the pivot thereof is the center of balance. Thereby, a structure is obtained which is positive in its movements, highly resistant to vibrations, and capable of maintaining contact under adverse conditions.

Not only are there advantages in the assembly, but also in the use thereof. If it becomes necessary to replace a part, then any one of the sub-assemblies may be removed as a unit and replaced without disturbing the other sub-assemblies. Furthermore, the general form of the relay is that of a rectangular parallelepiped, which occupies a minimum of space for the mechanism involved, and thereby becomes adapted for introduction into such places in electrical apparatus where space is at a premium. This does not interfere with the accessibility of the various parts for connecting the same into the several circuits.

Although I have described my invention setting forth a single embodiment thereof, the physical construction of the relay may be varied within the principles as set forth above. One may change the number of contacts on insulating member 22 or rearrange the same within relatively wide limits. Also, the various assemblies may be made in units somewhat different from the specific ones described and the order in which they are assembled on the base may be changed. However, the principal features of the present invention may be embodied in all such variations of the mechanical structures used. Therefore, the invention is to be broadly construed and not to be limited except by the character of the claims appended hereto.

What I claim is:

1. A relay comprising a plate of magnetic material having the ends thereof bent at about right angles thereto to form the legs of a U, a coil held on said plate with the axis thereof at right angles to said plate, an armature pivoted on one of said legs, an insulating plate spaced from said one leg and approximately parallel thereto, a member extending from said one leg toward said insulating plate, a spring having one end connected to said member and its other end connected to said armature between said one leg and said insulating plate, terminals on said insulating plate, and at least one contact arm insulatingly secured to said armature and extending to said insulating plate to make contact with at least one of said terminals.

2. A relay comprising a plate of magnetic material having the ends thereof bent at about right angles thereto to form the legs of a U, a member secured to one leg having hinge ears at one side and spring holding means on the other, an insulating plate spaced from said one leg and approximately parallel thereto, an armature pivoted to said hinge ears, a spring having one end connected to said spring holding means and its other end connected to said armature between said one leg and said insulating plate, terminals on said insulating plate, and at least one contact arm secured to said armature and extending to said insulating plate and in a plane substantially parallel to said armature to make contact with at least one of said terminals.

3. A relay comprising a base having secured thereto a plate of magnetic material having the ends thereof bent at about right angles thereto

to form the legs of a U, a coil held therein, an armature pivoted on one of said legs, an insulating plate supported by said base in spaced parallel relation to said one leg, a member extending from said one leg toward said insulating plate, a spring having one end connected to said member and its other end connected to said armature between said one leg and said insulating plate, terminals on said insulating plate, and at least one contact arm secured to said armature and extending to said insulating plate and in a plane substantially parallel to said armature to make contact with at least one of said terminals.

4. A relay comprising a base of L-shape having secured thereto a plate of magnetic material having the ends thereof bent at about right angles thereto to form the legs of a U, a coil held therein, an armature pivoted on one of said legs, an insulating plate supported by said L member spaced from said one leg and approximately parallel thereto, a member extending from said one leg toward said insulating plate, a spring having one end connected to said member and its other end connected to said armature between said one leg and said insulating plate, terminals on said insulating plate, and at least one contact arm secured to said armature and extending to said insulating plate and in a plane substantially parallel to said armature to make contact with at least one of said terminals, said base being secured to the second leg of said U and having means for attaching said relay to a support.

5. A relay comprising a U member of magnetic metal, a metal strip fitting one leg and the base of said U member and having a portion in spaced parallel relation to the remaining U member leg, a block of insulating material supported by said portion, a supporting member attached to that part of the strip fitting said one leg, a coil within said U member attached to the base thereof, an armature pivoted on said remaining leg and overlying the end of said coil, said armature having an extension projecting toward said insulating plate, terminals on said insulating plate, a member extending from said remaining leg toward said insulating plate, a spring having one end connected to said member and its other end connected to said armature extension, and at least one contact arm insulatingly secured to said armature and extending to said insulating plate to make contact with at least one of said terminals.

6. A relay comprising a U-member of magnetic metal, a metal strip fitting one leg and the base of the U member and having a portion in spaced parallel relation to the remaining U member, a supporting member attached to that part of the strip fitting said one leg, an insulating plate attached to said strip portion, a coil within said U member attached to the base thereof, a member secured to said remaining leg provided at one end with hinged ears and with spring-holding means at the other end, an armature connected to said hinge ears and overlying the end of said coil, said armature having an extension projecting toward said insulating plate, a spring secured between said holding means and said armature extension, terminals on said insulating plate, and at least one contact arm secured to said armature and extending to said insulating plate to make contact with at least one of said terminals.

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