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MAGNETIC CONTACT ALLOY

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FIG. 1

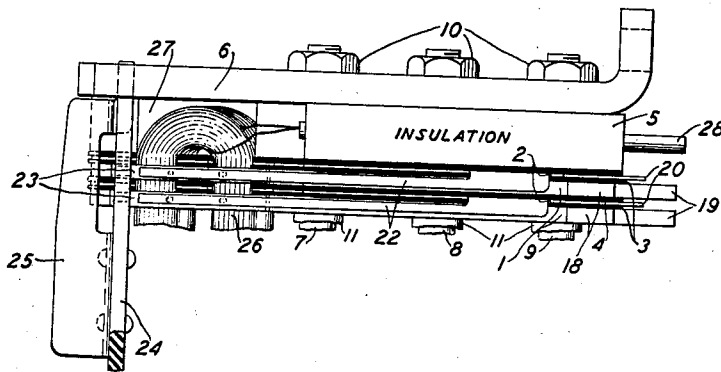
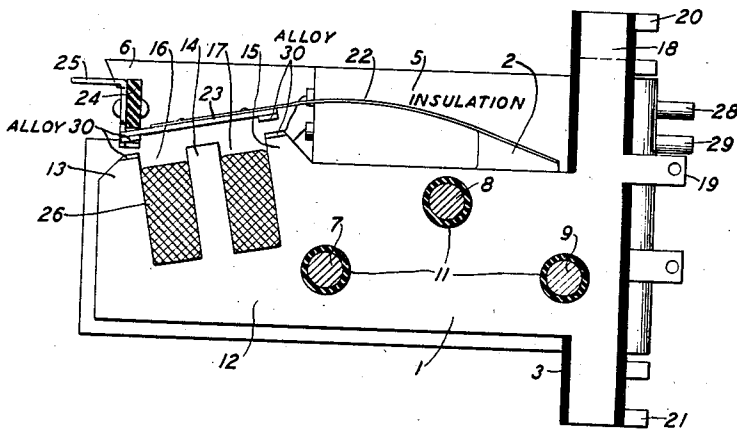


FIG. 2



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MAGNETIC CONTACT ALLOY

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Application December 9, 1939, Serial No. 308,498

1 Claim. (Cl. 200—166)

This invention relates to alloys for use in connection with electrical apparatus and more particularly to alloys for use in the magnetic circuits of such apparatus.

An object of the invention is to provide a magnetic alloy which, while retaining its magnetic properties also has good conductivity, high resistance to mechanical wear, corrosion and to electrical erosion.

It has been proposed to construct a relay, the work circuit of which is established upon the attraction of the armature to the pole-pieces of the relay core by the conductive engagement of the armature with the core, thus eliminating the contact springs usually operated by the armature and thereby simplifying the relay structure and reducing its cost. A relay of this type is disclosed for example in the copending application of C. N. Hickman and E. Lakatos, Serial No. 308,497, filed December 9, 1939, in which the contact resistance between the armature and the relay core upon the engagement of the armature with the pole-pieces of the core is reduced by plating the pole faces or by plating both the pole faces and the contacting surface of the armature with a metal having good conductivity such as silver.

In accordance with the present invention, it is proposed to improve the conductivity of the core pole faces and the contact surface of the armature of a relay of this type by employing strips welded thereto of an alloy composed of iron or other magnetic material and a metal of the platinum group. The proportion of the metal of the platinum group in the alloy may be considerably varied, it being, however, essential that the alloy contain sufficient iron or other magnetic material to maintain its magnetic efficiency while attaining the greatest possible conductivity through the addition of the metal of the platinum group.

As illustrative of the application of a magnetic alloy of the type contemplated by the present invention, reference may be had to the accompanying drawing in which:

Fig. 1 discloses a partial top plan view of a relay of the type in which the magnetic circuit elements have contact surfaces fabricated from the proposed magnetic alloy; and

Fig. 2 discloses a side elevation view of the relay disclosed in Fig. 1.

The relay comprises an assembly of a plurality of magnetic circuit units each comprising a core lamination 1, an armature supporting spring lamination 2, and an interposed lamina-

tion 3 of insulating material such as hard rubber or fiber. The several units are assembled side by side and insulated from each other by spacing laminations 4 of insulating material such as hard rubber or fiber, between end blocks, one of which is shown at 5, and end plates, one of which is shown at 6, on threaded studs 7, 8 and 9 which extend through aligned holes in the end plates, the end blocks, the spacing laminations and the laminations comprising the several units. The assembled structure is clamped together by nuts 10 threaded upon the ends of the studs. For insulating the core laminations 1 and the spring laminations 2 from the studs 15 which pass through the holes therein, the studs are surrounded by sleeves 11 of insulating material such as hard rubber.

Each core lamination 1 is stamped from a sheet of magnetic material into the T-shape disclosed in Fig. 2 and comprises a horizontal portion 12 having three pole-pieces 13, 14 and 15 on its upper edge formed by the two parallel slanting slots 16 and 17 and a rear portion 18 provided with a rearwardly extending terminal lug 19.

Each spring lamination 2 is stamped from a sheet of nickel-silver and is also of the same general configuration as the core lamination having slots in its outer end for alignment with the slots 16 and 17 of the associated core lamination and having rearwardly extending terminal lugs 20 and 21. Each spring lamination is bent at right angles along its upper edge and the bent-over portion is severed from the body of the lamination along the major portion of its length to form a spring finger 22 which extends forwardly at a rising angle over the top edge of the associated core lamination 1. An armature 23 is welded or otherwise secured to the free end of the spring finger 22 in a position to overlie the pole faces of the pole-pieces 13, 14 and 15 of the associated core lamination. The insulating laminations 3 and 4 also have the same general configuration as the core lamination and are provided with slots in their outer ends for alignment with the slots 16 and 17 of the core laminations.

Normally the working air-gaps between the pole faces of the core laminations and the lower faces of the armatures are maintained by a common back-stop bar 24, the ends of which are seated in notches in the ends of the end plates, such as 6, and maintained in such notches by spring members 25 secured to the ends of the back-stop bar.

A common energizing coil 26 is seated in the

aligned slots of the core, spring and insulating laminations thereby surrounding all of the middle pole-pieces 14 of the core laminations. The end blocks are cut away to provide clearance for the ends of the coil and the block 5 is provided with two brass tubes 28 and 29 extending therethrough to the forward ends of which the terminals of the coil 26 are connected and the rear ends of which serve as terminals to which conductors of the energizing circuit of the relay coil may be connected.

In the operation of the relay when the coil 26 is energized, all of the core laminations 1 become magnetized and attract their associated armatures 23 into conductive engagement with their pole-piece faces thereby establishing a plurality of work circuits, each of which extends from a core lamination through the attracted armature to the spring lamination which supports the armature.

In accordance with the present invention the contact resistance between an armature and the pole-pieces of the core lamination with which it is engaged is decreased by welding small pieces 30 of an alloy having good magnetic and conductive properties to the faces of the pole-pieces of the core lamination and to the under-surface of the armature. This alloy has been found to be most efficient magnetically and conductively when composed of approximately 40 per cent iron and

60 per cent platinum by weight. As previously stated these percentages may be varied, it being essential however that the percentage of platinum added to increase the conductivity of the alloy shall not be great enough to reduce the iron content to such an extent as to destroy the magnetic efficiency of the alloy.

While platinum has been stated as a suitable metal for increasing the conductivity of the alloy, it will be obvious that other metals of the platinum group such as palladium could be employed. Furthermore, instead of a binary alloy of iron and a metal of the platinum group, a ternary alloy of iron, nickel and a metal of the platinum group, such as palladium, has been found to provide a magnetic material having good magnetic and conducting properties.

It is to be understood that while the application of the invention has been illustrated in connection with a specific relay structure, the invention is equally applicable to any relay in which a work circuit is established by the conductive engagement of the armature with the relay core.

What is claimed is:

An electrical contact element fabricated from a magnetic material having good electrical conductivity comprising a ternary alloy of palladium, nickel and iron.

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