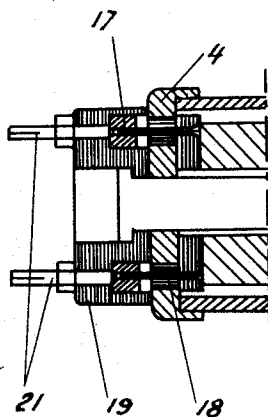
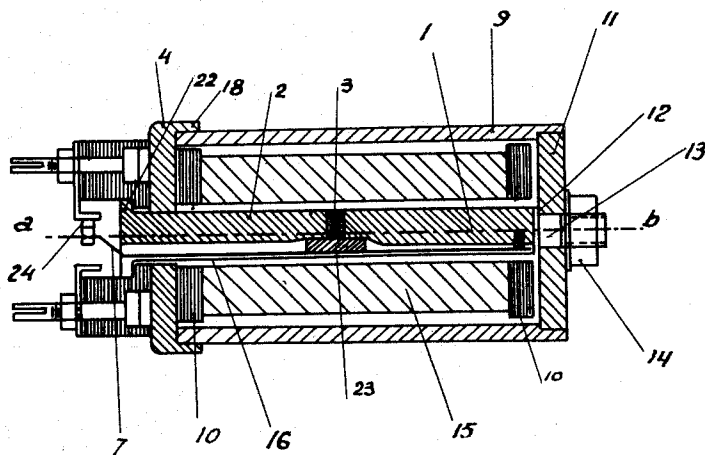


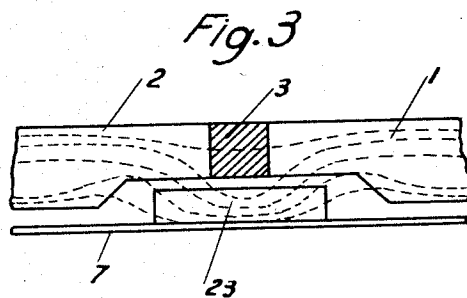
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Fig. 1



*Fig. 2*



*Fig. 3*

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## UNITED STATES PATENT OFFICE

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## IRON CLAD RELAY MAGNET

Application filed July 16, 1930, Serial No. 468,414, and in France July 22, 1929.

My invention has for its object an iron clad electromagnetic relay having an outer cylinder and a central core of magnetic material carrying at its ends magnetic covers closing the cylinder. According to my invention the core is formed of two alined magnetic elements separated by a body of nonmagnetic material and alongside of said core and inside the usual coil surrounding same is disposed a contact spring secured through one end to one core element and carrying in front of the nonmagnetic body the armature adapted to be attracted by the core in a direction substantially perpendicular to the axis of the latter.

I have described hereinbelow by way of example and illustrated in accompanying drawing a form of execution of my invention.

Fig. 1 is a cross-section of the device through the axis thereof.

Fig. 2 is a cross-section perpendicular to the axis showing the connection between the coil and the terminals.

Fig. 3 shows diagrammatically the distribution of the lines of force.

The electromagnet comprises two alined bars of suitable magnetic metal such as soft iron 1 and 2 connected through a sufficiently thick plate 3 of nonmagnetic material such as copper or brass. The bar 2 engages with some friction the central aperture of a disc 4 of same magnetic metal, part of the aperture remaining free so as to allow the contact-bearing spring 7 of the relay to pass.

The disc 4 is provided with a flange 8 inside which a cylinder 9 also of soft iron or the like is engaged with slight friction so as to form the casing of the relay. At its other end the cylinder is provided with a circular groove carrying a second disc 11 of soft steel or the like provided with a central aperture. The soft steel bar 1 ends with a shoulder 12 and a part of reduced diameter 13 passing through the said aperture in the disc 11; its end is threaded for receiving the assembling nut 14.

The exciting coil 15 is wound over a copper or brass tube 16 and is bounded by insulating flanges 10. The ends of the wire forming this coil are connected with plugs 17

(Fig. 2) passing through the disc 4 from which they are insulated by sleeves such as 18. The plugs are fitted with friction inside metal sleeves carried by the insulating support 19 and provided at their ends with terminals or else with wires to which are welded the ends of the outer leads. The plate 19 is held against the disc 4 by a shoulder 22 on the bar 2.

The movable armature 23 is secured to the spring 7 of nonmagnetic material such as bronze or brass. This spring is secured to the bar 1 through one end, the other end carrying a contact part 24 adapted to open or to close the circuit controlled by the relay. The movable armature 23 is disposed in front of the connecting plate 3.

It is apparent that the mounting and dismantling of the apparatus are very easy. By unscrewing the nut 14, I may remove the disc 11, then the cylinder 9 and finally slide off the coil 15. The feed plugs 17 are removed without difficulty from their metal sleeves. The spring 7 and the armature 23 are then apparent and easy to inspect.

The electric working is as follows: the ends (Fig. 3) of the bars 1 and 2 show at their end trapezoidal notches provided with bevels against which the armature 23 is adapted to bear. If the thickness of the plate 3 is sufficient and the notch wide enough, it is apparent that the greater part of the magnetic flux passes through the gap between the armature 3 and the bevels and through the armature, so as to act on the latter with a view to controlling the contact at 24.

My relay is capable of many applications. It is in particular very useful in systems for protection against fire and theft.

It has been stated that the core, the outer discs and the cylindric casing are of soft iron. In practice any magnetic metal may be used and it is possible by using a suitable material to make the properties of the relay vary to a considerable degree.

Thus for improving the sensitivity of the relay, I may replace the soft iron by metal or alloys which are magnetically very permeable such as the so-called permalloy alloy or certain very pure nickel-iron alloys. I

obtain with such material remarkable results due to the fact that the cylindrical casing screens them from the action of any external magnetic field.

- 5 If on the contrary it is desired to obtain a high frequency response, the same parts may be advantageously made of a similar alloy having a smaller remanent power.

It is apparent that by a modification in the material constituting the parts mentioned, a considerable range of relays with different properties may be obtained.

What I claim is:

1. An electromagnetic relay comprising a magnet body constituted by a central core of two alined elements separated by a gap, two discs fitted over the outer ends of said elements and a cylindrical part fitted between the peripheries of the discs, a non-magnetic part separating the two core elements, a spring disposed parallel to and adjacent the core, a coil wound over the core, and passing over the spring, means for securing one end of the spring, a contact controlled by the spring and an armature carried by the spring in front of the non-magnetic part separating the two core elements.

2. An electromagnetic relay comprising a magnet body constituted by a central core of two alined elements separated by a gap, two discs fitted over the outer ends of said elements and a cylindrical part fitted inside the periphery of one disc and passing over the periphery of the other, a non-magnetic part separating the two core elements a spring disposed parallel to and adjacent the core, a coil wound over the core, and passing over the spring, means for securing one end of the spring, a contact controlled by the spring and an armature carried by the spring in front of the non-magnetic part separating the two core elements.

3. An electromagnetic relay comprising a magnet body constituted by a central core of two alined elements separated by a gap, two discs fitted over the outer ends of said elements, one disc being frictionally set over the corresponding core element, a nut for securing the other disc over its core element and a cylindrical part fitted between the peripheries of the discs, a non-magnetic part separating the two core elements, a spring disposed parallel to and adjacent the core, a coil wound over the core, and passing over the spring, means for securing one end of the spring, a contact controlled by the spring and an armature carried by the spring in front of the non-magnetic part separating the two core elements.

4. In a relay as claimed in claim 1 the provision of plugs secured to the ends of the coil, metal sockets forming terminals fitted over the plugs and an insulating plate held against one of the magnetic discs and carrying said sockets.

5. An electromagnetic relay comprising a magnet body constituted by a central core of two alined elements separated by a gap, the core elements being cut away in front of said gap so as to form a trapezoidal recess, two discs fitted over the outer ends of said elements and a cylindrical part fitted between the peripheries of the discs, a non-magnetic part separating the two core elements and the surface of which forms the bottom of the trapezoidal recess thereof, a spring disposed parallel to and adjacent the core, a coil wound over the core and passing over the spring, means for securing one end of the spring, a contact controlled by the spring and an armature carried by the spring in front of the non-magnetic part separating the two core elements.

6. An electromagnetic relay comprising a magnet body made of very permeable nickel iron alloy and constituted by a central core of two alined elements separated by a gap, two discs fitted over the outer ends of said elements and a cylindrical part fitted between the peripheries of the discs, a non-magnetic part separating the two core elements, a spring disposed parallel to and adjacent the core, a coil wound over the core and passing over the spring, means for securing one end of the spring, a contact controlled by the spring and an armature carried by the spring in front of the non-magnetic part separating the two core elements.
- In testimony whereof I have affixed my signature.

YSABEL MARIE-LOUISE de PANIAGUA.