

Nov. 22, 1938.

H. N. WAGAR

2,137,818

RELAY

Filed Sept. 22, 1937

FIG. 1

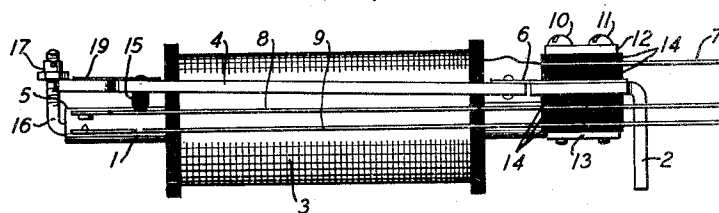


FIG. 2

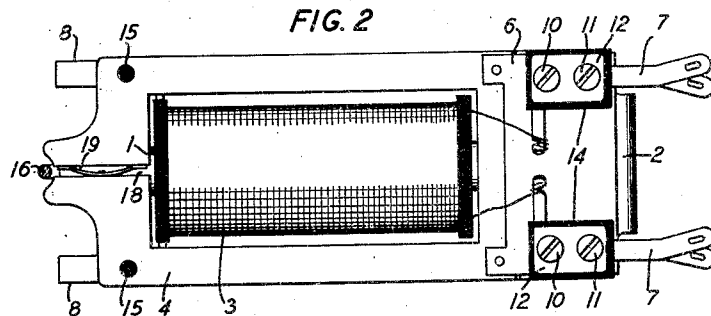
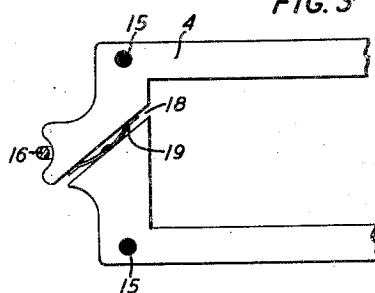


FIG. 3



INVENTOR
H. N. WAGAR
BY
P. C. Smith

ATTORNEY

UNITED STATES PATENT OFFICE

2,137,818

RELAY

Harold N. Wagar, New York, N. Y., assignor to
Bell Telephone Laboratories, Incorporated, New
York, N. Y., a corporation of New York

Application September 22, 1937, Serial No. 165,020

6 Claims. (Cl. 175—336)

This invention relates to relays and more particularly to relays for use in telephone systems.

In electric circuits generally and in telephone circuits particularly, electromagnetic relays are extensively employed. In such circuits the functions to be performed are numerous and varied and it is often very essential that relays employed in such circuits shall positively make and break the circuits controlled over their contacts. If the contacts of a relay do not make firmly, or break cleanly, or in other words, if the contacts have a tendency to chatter when they make or break, false operation in the circuits controlled thereover will result.

It has been found that one of the chief factors which contributed to the tendency of relay contacts to chatter upon the release of the armature against the back stop or the operation of the armature against the pole face of the relay core, is the kinetic energy stored in the armature during its movement. If a large part of this energy can be dissipated at the instant of impact of the armature either against the back stop or against the core, then the bouncing of the armature and the transmission of the vibration of the armature to the contact springs controlled thereby will be reduced. It has been found from experimentation that the tendency of the relay armature to bounce or vibrate as a whole may be reduced by so forming the free end of the armature that the energy stored in the armature is dissipated within the armature itself.

It is therefore the object of this invention to improve the design of an electromagnetic relay armature so as to reduce its tendency to bounce or vibrate and to thereby reduce the chattering of contacts controlled thereby. This object is attained in accordance with the present invention by cleaving the forward or free end of the armature and by introducing an energy absorbing means such as a leaf spring or a strip of cellulose stiffened silk, paper or the like between the adjacent edges of the cleft portion.

The invention will be more readily understood from the following detail description taken in connection with the accompanying drawing in which:

Fig. 1 is a side elevational view of a well-known type of relay in which the invention is embodied;

Fig. 2 is a top plan view of the relay of Fig. 1 with certain parts omitted; and

Fig. 3 is a partial plan view of a relay armature

constructed in accordance with a modified form of the invention.

The relay disclosed in Fig. 1 of the drawing is of a well-known type consisting of a core 1 secured at its rear end to a heel-piece or mounting bracket 2, an energizing coil 3 surrounding the core 1, an armature 4 having front and rear cross members and side arms uniting said members, the forward cross member of which co-operates with the pole face 5 of the core 1 and the rear cross member of which is riveted to a reed hinge 6, coil terminal lugs 7 and a spring pile-up on each side of the relay coil, each comprising two or more contact springs such as 8 and 9. The reed hinge 6, coil terminal lugs 7 and springs 8 and 9 are suitably clamped to the mounting bracket 2 by screws 10 and 11 which pass therethrough and through the clamping plates 12 and 13. For insulating the terminal lugs and contact springs from each other, from the bracket 2 and from the clamping plates 12 and 13, strips 14 of insulating material are interposed. For engaging the contacts of springs 8 and 9 of each spring pile-up upon the attraction of the armature 4 toward the core 1, the armature is provided near its forward end with operating studs 15 of insulating material.

To limit the movement of the armature 4 away from the core 1 upon the deenergization of the coil 3 and to afford means for adjusting the normal air-gap between the front cross member of the armature 4 and the pole face 5 of the core 1, the back stop screw 16 carrying the back stop nut 17 is provided. The back stop screw is L-shaped having its horizontal arm seated in the end of the core 1 and its vertical arm threaded to receive the back stop nut 17.

The forward cross member of the armature 4 is cleft, as indicated at 18, so that each side arm of the armature may be attracted to the pole face 5 of the core 1 substantially independently of the other side arm except as restrained by the integral rear cross member joining the rear ends of the side arms. Interposed in the cleft 18 between the adjacent edges of the side arms is a friction member 19 which may be a leaf spring or a strip of cellulose acetate stiffened silk, paper or other material held in place by any suitable manner as by a rivet.

With the relay armature so constructed, when it strikes the back stop nut 17, one side arm tends to vibrate with respect to the other and the vibratory movement between the two arms is damped by the frictional engagement with the insert 19 positioned in the cleft 18 between the side arms.

The kinetic energy stored in the armature during its movement toward the back stop is thus dissipated at the moment of impact between the armature and the back stop nut and the tendency of the armature to rebound from the back stop nut and to transmit its rebound movement through the operating studs 15 to the contact springs is reduced. Similarly, the energy stored in the armature during its attractive movement toward the core is dissipated at the moment of impact between the arms of the armature with the core.

As an alternative construction the cleft 18 dividing the forward cross member of the armature may be made diagonally in such a manner as to unbalance the masses of the two side arms of the armature. In this modified construction a similar friction insert 19 is interposed within the cleft between the adjacent walls of the cleft.

What is claimed is:

1. In an electromagnetic structure, a heel-piece, a core secured to said heel-piece extending forwardly therefrom and having a pole face on its forward end, an armature having two side arms, said arms being hinged at one end to said heel-piece and having their free ends extending in juxtaposition over the pole face of said core, and friction means inserted between adjacent edges of the juxtaposed ends of said arms.
2. In an electromagnetic structure, a heel-piece, a core secured to said heel-piece extending forwardly therefrom and having a pole face on its forward end, an armature having two side arms, said arms being hinged at one end to said heel-piece and having their free ends extending in juxtaposition over the pole face of said core, and a strip of spring material inserted between the adjacent edges of the juxtaposed ends of said arms.
3. In an electromagnetic structure, a heel-piece, a core secured to said heel-piece extending for-

wardly therefrom and having a pole face on its forward end, an armature having two side arms, said arms being hinged at one end to said heel-piece and having their free ends extending in juxtaposition over the pole face of said core, and a leaf spring inserted between the adjacent edges of the juxtaposed ends of said arms.

4. In an electromagnetic structure, a heel-piece, a core secured to said heel-piece extending forwardly therefrom and having a pole face on its forward end, an armature having two side arms, said arms being hinged at one end to said heel-piece and having their free ends extending in juxtaposition over the pole face of said core, and a cellulose acetate stiffened friction member inserted between the adjacent edges of the juxtaposed ends of said arms.

5. In an electromagnetic structure, a heel-piece, a core secured to said heel-piece extending forwardly therefrom and having a pole face on its forward end, an armature having a rear cross member, a front cross member overlying said pole face and two side arms uniting said cross members, said rear cross member being hinged to said heel-piece and said front cross member being cleft, and friction means inserted within said cleft and in frictional engagement with the adjacent edges thereof.

6. In an electromagnetic structure, a heel-piece, a core secured to said heel-piece extending forwardly therefrom and having a pole face on its forward end, an armature having a rear cross member, a front cross member overlying said pole face and two side arms uniting said cross members, said rear cross member being hinged to said heel-piece and said front cross member being diagonally cleft, and friction means inserted within said cleft in frictional engagement with the adjacent edges thereof.

HAROLD N. WAGAR.