

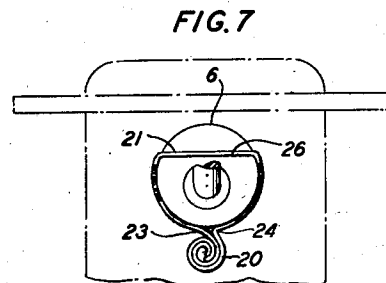
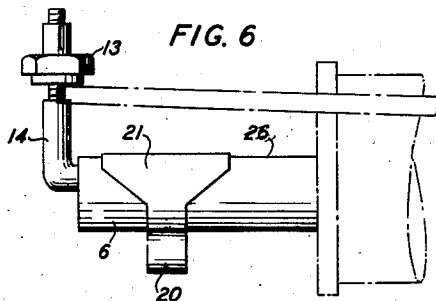
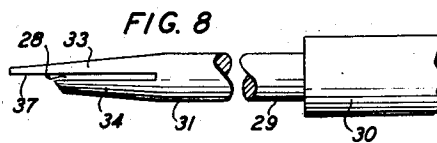
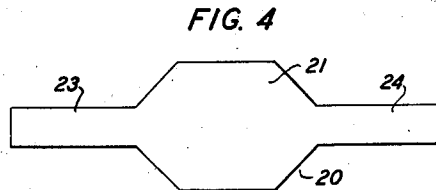
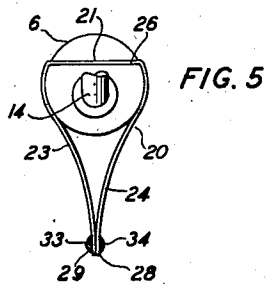
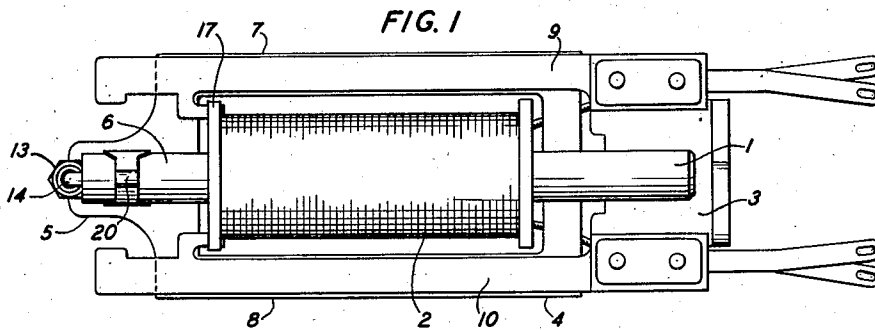
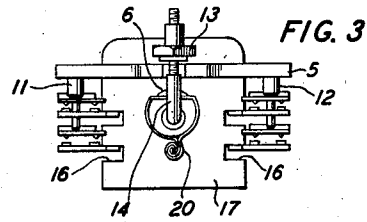
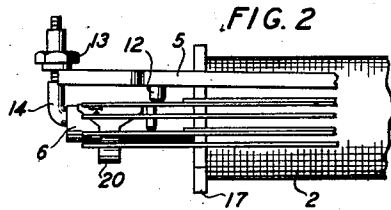
Dec. 18, 1945.

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2,391,222

METHOD OF MAKING ELECTROMAGNETIC DEVICES

Filed June 22, 1944



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2,391,222

METHOD OF MAKING ELECTROMAGNETIC DEVICES

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Application June 22, 1944, Serial No. 541,481

6 Claims. (Cl. 29—155.5)

This invention relates to electromagnetic devices, such as relays for use in telephone systems and particularly to methods of making them.

An object is to improve the construction of such relays to increase their efficiency.

Heretofore relays have been provided in which shims or auxiliary spacers have been placed in the air-gap between the core and the armature for regulating the performance characteristics thereof. In some cases, as shown for example in Patent 2,096,456 to J. S. Garvin, a non-magnetic spacer is placed between the operating surfaces of the core and the armature by loosely hanging it on the core by an angular extension thereon and having it rest on a regulating bolt secured thereto. In other cases, as for example in the copending application of L. J. Stacy, Serial No. 541,636, filed June 22, 1944, a magnetic spacer is secured to the core by being wrapped over it and held in place by threading one end of the spacer through an aperture in the opposite end. The spacers used in the above-mentioned patent and application are for the purpose of regulating the release characteristics of the relays.

It is a feature of the present invention to provide a special method of making and securing a spacer of this latter type on the core of a relay which consists in preparing a spacer having a flat intermediate portion and opposite narrow bands, placing the flat portion of this spacer against the flat operating surface of the core, folding the bands around the core, inserting the free ends of these bands in a slot formed by the two tines of a forked tool, one tine being longer than the other to facilitate this insertion with the tines tapered toward their free ends, rolling the bands over themselves by turning the tool until the flat portion is tightly drawn against the operating surface of the core and then withdrawing the tool without disturbing the tight fit of the spacer as facilitated by the taper of the tines.

The invention has been illustrated in the accompanying drawing in which:

Fig. 1 shows a bottom view of a relay structure on which the applicant's invention has been applied;

Fig. 2 shows a fragmentary side view of the relay shown in Fig. 1;

Fig. 3 shows a front view of this relay;

Fig. 4 shows a spacer constructed in accordance with the applicant's invention;

Fig. 5 shows an enlarged view of the method of applying this spacer to the core;

Figs. 6 and 7 show the spacer constructed in accordance with the applicant's invention applied to the core, Fig. 6 showing a side view and Fig. 7 showing a front view; and

Fig. 8 shows the construction of the tool for applying the spacer to the core.

Referring now to the drawing, Fig. 1 shows a typical relay structure to which the applicant's invention may be applied. This relay may consist of a round core member 1 surrounded by a winding 2. At the rear end of the relay the core extends out from the winding and attached thereto is a mounting member 3 which carries a hinged U-shaped armature 4. This armature crosses at 5 the front core portion 6 for the attraction of the armature to the core 1 at this point. Below the side members 7 and 8 of the armature are mounted spring pile-ups 9 and 10 which are actuated by studs, such as 11 and 12 on the armature to close and open connections between the associated springs in desired combinations. The springs are so tensioned as to normally maintain the armature in released condition and the back stroke of the armature is regulated by a nut 13 on a screw 14 secured to the outer end of the core portion 6. The stationary springs of the two pile-ups may be held in normal position by slots, such as 16, in the spool head 17 for the coil 2.

On the core end 6 may be wrapped the applicant's shim or spacer 20 which may be shaped as shown in Fig. 4. This spacer 20 is provided with a central flat portion 21, a left-hand narrow band extension 23 and a right-hand narrow band extension 24, said bands being of equal length and shape.

This spacer may be wrapped around the portion 6 of the core in accordance with the applicant's invention by placing the central flat portion 21 against the surface 26 of the core and then wrapping the bands 23 and 24 back over the core as shown in Fig. 5. The free ends of the bands are then inserted in the slot 28 of the tool 29 shown enlarged in Fig. 8. This tool 29 is provided with a handle 30, a shaft portion 31, and two fork prongs 33 and 34 to form the slot 28. These prongs are tapered towards their free ends and prong 34 is somewhat shorter than the prong 33 to facilitate the insertion of the free outer ends of the bands 23 and 24 in slot 28. For example, the two bands 23 and 24 may be held together by hand and placed against the surface 37 of prong 33 and then the tool shifted so that these ends will enter the slot 28, the slot being slightly wider than the combined thickness of the

two bands. Then the tool 29 is turned to roll the two bands 23 and 24 over each other until the bands are tightly wrapped around the core and hold the central flat portion 21 of the spacer 20 tightly against the flat portion 26 of the core 6. The tool 29 may then be withdrawn from the roll formed by these two bands 23 and 24. It is readily seen that due to the taper of the prongs 33 and 34 this withdrawal of the tool 29 from the roll may be accomplished without disturbing the tightness of the roll or the tight fit of the spacer 20 on the core. Figs. 6 and 7 show the spacer 20 in its proper position on the core, Fig. 6 showing a side view and Fig. 7 a front view.

What is claimed is:

1. The method of making and affixing a spacer in the air-gap of an electromagnetic relay for controlling the operation characteristics thereof which comprises forming said spacer with a flat intermediate section between narrow opposing flat end sections, applying the intermediate section of said spacer to the surface of the relay core in said air-gap, folding the two end sections towards each other around the core, inserting the free ends of said end sections in the slot between the two tines of a forked operating tool, turning said tool to roll said end sections over themselves until the flat intermediate portion of the spacer is drawn tightly against the surface of said core, and withdrawing the tool from the roll thus formed by said end sections of the spacer.

2. The method of making and affixing a spacer in the air-gap of an electromagnetic relay for controlling the residual magnetism thereof which comprises forming said spacer with a flat intermediate section between narrow opposing flat end sections, applying the intermediate section of said spacer to the surface of the relay core in said air-gap, folding the two end sections towards each other around the core, inserting the free ends of said sections in the slot between the two tines of a forked operating tool having said tines tapered towards their free ends, turning said tool to roll said end sections over themselves to draw the flat intermediate portion of the spacer against the surface of the core, and withdrawing the tool from the roll thus formed by said end sections, the taper of the tines permitting the said withdrawal to be made without disturbing the tightness of said roll.

3. The method of making and affixing a spacer in the air-gap of an electromagnet relay for controlling the residual magnetism thereof which comprises forming said spacer with a flat intermediate section between narrow opposing flat ends, applying the intermediate section of said spacer to the surface of the relay core in said air-gap, folding the two flat ends towards each other around the core, inserting said flat ends in the slot between the two tines of a forked operating tool, having said tines tapered towards their free ends and having one of said tines shorter than the other to facilitate said insertion, turning said tool to roll said flat ends over themselves to draw the flat intermediate portion of the spacer against the surface of the core,

and withdrawing the tool from the roll thus formed by said flat ends, the taper of the tines permitting said withdrawal to be made without disturbing the tightness of said roll.

4. The method of making and affixing a spacer of magnetic material to the core of an electromagnetic relay in the air-gap between said core and the armature of said relay for controlling the residual magnetism in said core and armature which comprises forming said spacer with a flat intermediate portion and opposing narrow and equal flat bands, applying the intermediate section of said spacer to the surface of said core in said air-gap, folding the two bands around the core to lie flat against each other at their outer end, inserting said outer end in a slot slightly wider than the combined thickness of the two bands between the two tines of a forked tool, turning said tool to roll said bands over themselves until the intermediate portion of the spacer is drawn tightly and flatly against the surface of said core in said air-gap, and withdrawing the tool from the roll thus formed by said bands.

5. The method of applying and affixing a spacer in the air-gap of an electromagnetic relay for controlling the residual magnetism thereof which comprises forming said spacer with a flat intermediate section between narrow opposing flat end sections, applying the intermediate section of said spacer to the surface of the relay core in said air-gap, folding the two end sections towards each other around said core, inserting the free ends of said sections in the slot between the two tines of a forked operating tool, turning said tool to roll said end sections over themselves until the flat portion of the spacer is drawn tightly against the surface of said core, and withdrawing the tool from the roll thus formed by the end sections of the spacer.

6. The method of making and fixing tightly a thin flat metal layer to a flat pole-face surface formed by a segment cut away from a cylindrical core member comprising making from a flat thin metal sheet a flat intermediate section and two opposite narrow bands of equal length extending therefrom, placing this intermediate section flat against said flat pole-face surface, folding the opposite bands around the core towards each other at their free ends perpendicularly across from the flat pole-face surface, inserting said free ends into a slot formed between two tines of a forked operating member with one tine shorter than the other to facilitate said insertion and having the tines slightly tapered toward their free ends, rotating said tool on its axis to roll said bands tightly over themselves and around the tines until the intermediate section is pressed tightly as a flat metal layer against said pole-face surface and then withdrawing said tool from the roll thus formed by said bands, the taper on the tines enabling said withdrawal without changing the position or disturbing the tightness of said flat metal layer on the pole-face surface.

DAVID G. BLATTNER.

CERTIFICATE OF CORRECTION.

Patent No. 2,391,222.

December 18, 1945.

DAVID G. BLATTNER.

It is hereby certified that the name of the assignee in the above numbered patent was erroneously described and specified as "Bell Laboratories, Incorporated" whereas said name should have been described and specified as --Bell Telephone Laboratories, Incorporated--, as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of April, A. D. 1946.

Leslie Frazer

First Assistant Commissioner of Patents.

(Seal)