June 15, 1926. 1,588,512

W. M. AUSTIN

ELECTRICAL COIL

Filed Sept. 19, 1922 2 Sheets-Sheet 1

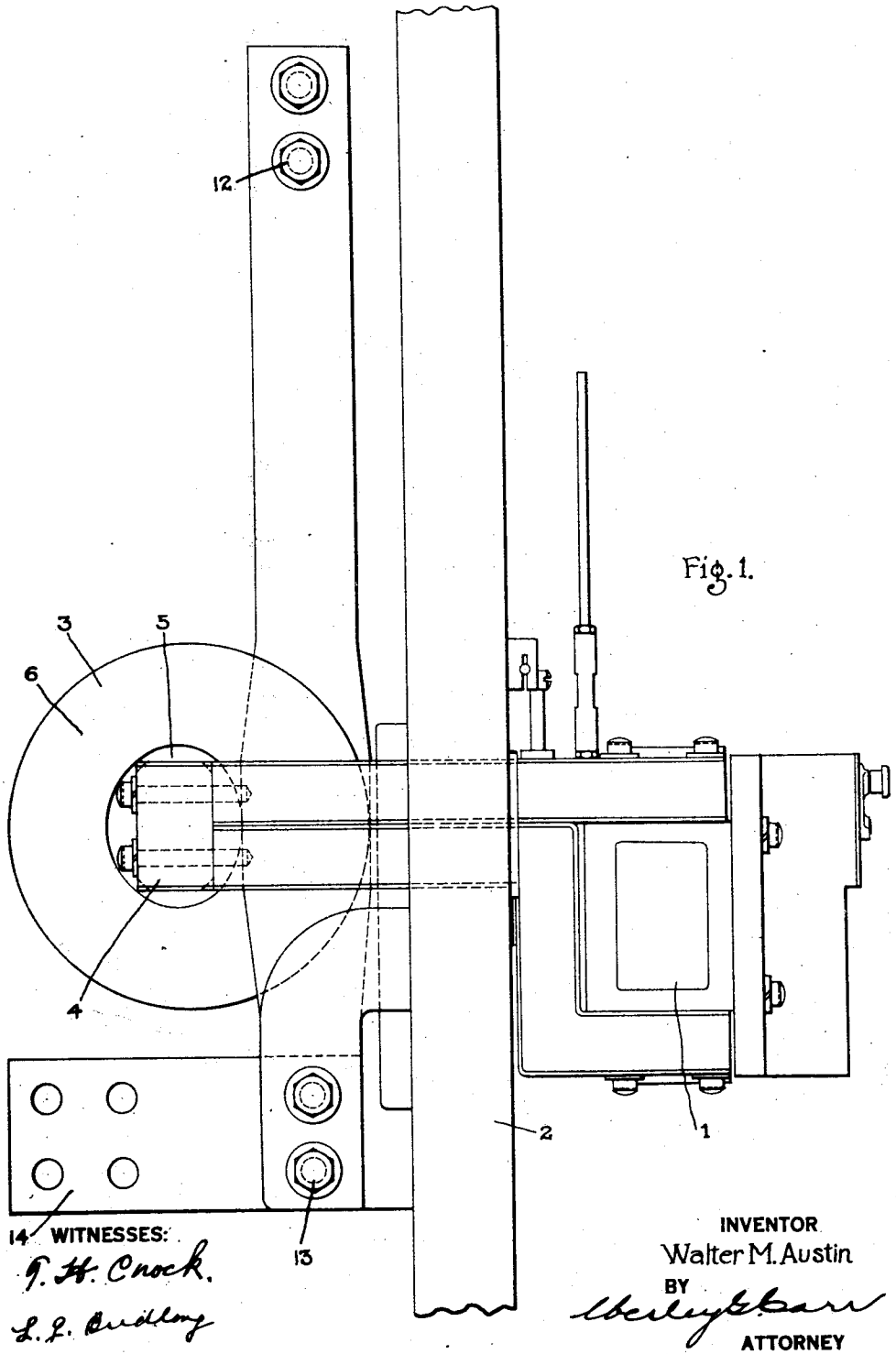


Fig. 1.

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Fig. 3.

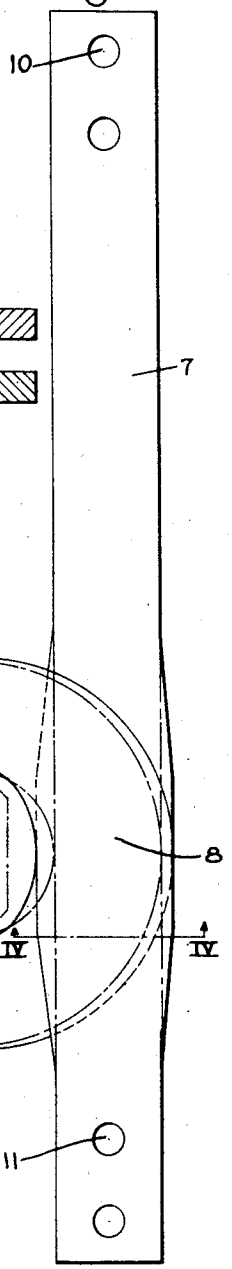


Fig. 4.

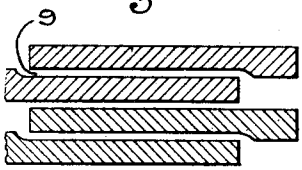
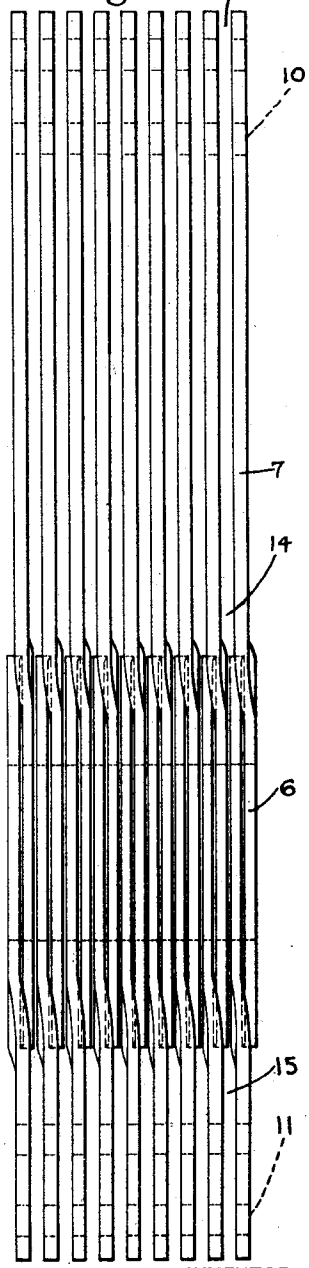


Fig. 2.



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UNITED STATES PATENT OFFICE.

WALTER M. AUSTIN, OF SWISSVALE, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

ELECTRICAL COIL.

Application filed September 19, 1922. Serial No. 589,104.

My invention relates to electrical devices and more particularly to the electrical coils used in connection therewith and to methods of making the same.

The object of my invention is to provide an electrical coil in a minimum space and, at the same time, secure a maximum amount of ventilation.

A further object of my invention is to provide a sectional electrical coil composed of a plurality of similar elements.

It is also an object of my invention to simplify the construction of electrical coils.

In electrical coils, as heretofore constructed, it has been customary to bend at the expense of a large amount of energy, a single large bar, or several smaller bars held together, of conducting material, as for example, copper. These processes have been unsatisfactory because of the mechanical difficulty of properly bending and working the large or many bars of metal required by modern electrical devices.

In accordance with my invention, a single flat strip of conducting metal is bent, intermediate its ends, to form a single closed loop, and a plurality of such strips are then mounted side by side with a common core member, or yoke, passing through the loops of all the metal strips. By reason of this disposition of parts, the size of the individual metal bars may be very materially reduced.

It is only necessary to have a single set of working tools for all sizes of electrical devices within each commercial class for the reason that the capacity of any coil may be varied by the simple process of adding or subtracting additional metal strips.

In the accompanying drawings,—Figure 1 is a side view of an electrical device equipped with an electrical coil embodying my invention.

Figure 2, is a face view of an assembled coil.

Figure 3, is a side view of the same, and

Figure 4, is a cross-sectional view taken on the section line IV—IV of Figure 3, showing the spaced relation of a pair of coil elements.

In the several figures, similar reference numerals indicate similar parts.

In Fig. 1, is shown a reverse-current relay mounted on a panel 2 and equipped with an electrical coil 3 embodying my invention. It is to be understood that this coil may be used in any type of electrical device for which it is suited, as its use is not limited to reverse-current relays.

A core member 4, of U-shape, extends through the opening 5 in the loop portion 6 of the coil 3. The magnetic fluxes set up in the core member 4 are conveyed to the reverse-current device 1.

In Figure 2, a plurality of units 7 are shown in their assembled position. As these units are all similar in construction, a description of a single unit and the method of making the same is believed to be sufficient.

A flat-strip of conducting material, such as copper or aluminum, is bent into a complete loop which extends substantially in the plane of the original metal strip. The overlapping portions 8 of the loop then occupy the position shown by the dash-and-dot lines shown in Fig. 3.

Pressure is then applied to the overlapping portions 8, with a resulting change in the cross-section of the metal, as is shown in Figure 4. The metal, when placed under this pressure, spreads outwardly into the position shown in full lines in Figure 3, and the opening 5 assumes an elliptical shape. As shown in Fig. 4, a slight air space 9 is left between the portions 8 for insulating and ventilating purposes.

Perforations 10 and 11 are made in the straps 7 for the insertion of securing bolts 12 and 13, respectively. Bolts 12 may also serve as terminals for electrical conductors (not shown). The bolts 13 also secure a terminal member 14.

A plurality of elements 7 are placed side by side as is shown in Figure 2. By reason of the shape assumed by the loop portion 6—8 after the squeezing process, such loops, when assembled, lie close to, but not in contact with one another, leaving spaces 14 and 15 between the several strips.

The strips 7 are preferably not insulated, although they may be insulated, if desired.

In order to insure a proper flow of current through the loop portions 6, and prevent the shunt circuiting of these loops at the overlapping portions 8, the maintenance of the air gaps 9 is of great importance. As shown in Fig. 4, the amount of metal displaced during the squeezing process is sufficient to provide an air space between the overlapping portions 8 of each coil 6, and

between each adjacent pairs of coils while keeping the strips 7 in parallel alignment and spaced at distance of approximately twice their width.

By reason of the spaces 14 and 15, such heat as is generated upon the passage of an electrical current through the coil 3 is dissipated without injurious effect upon the coil. Because of this disposition of parts, I am enabled to secure a coil for a given current capacity in a relatively small space without danger of overheating the same, and the current density in the various straps may safely be carried comparatively high, as adequate ventilating space is provided by the openings 14 and 15.

Because of the overlapping portions 8 in each strip 7, I am able to secure the magnetic effect of a double loop upon the core member 4 for approximately one third of the circumference of each loop 6.

It is obvious that the carrying capacity of a coil may be increased or decreased at will by the addition of or subtraction of strips 7.

I have invented an electrical coil and the method of making the same which consists of a plurality of similar looped strips secured together in a minimum space and, at the same time, I have provided adequate means for ventilating the coil.

Such modifications may be made within the spirit and scope of this invention as defined in the accompanying claims.

I claim as my invention:

1. An element for a composite electric coil comprising a strip of metal, a loop formed intermediate the ends of said metal strip and extending in approximately the plane of said metal strip, the metal at the overlapping portion of said loop being displaced under pressure.

2. In an electrical coil, a plurality of similar metal strips, each strip comprising a loop extending approximately in the plane of said strip intermediate the ends thereof, the overlapping portions of said loops being slightly distorted, whereby said overlapping portions, when in the assembled position, lie close to one another and permit ventilation of the remainder of said coil, and means for securing corresponding ends of said strips together.

3. An electrical element comprising a core member and a plurality of similar detachable metal strips for encircling and energizing the core member, each strip constituting a single loop extending approximately in the plane of said strip intermediate the ends thereof, whereby each strip produces a multiple effect upon the core member.

4. An electrical element comprising a core member and a metal strip for encircling and energizing the core member, said strip constituting a single loop extending approximately in the plane thereof intermediate its ends, whereby the strip produces a multiple effect upon the core member.

In testimony whereof, I have hereunto subscribed my name this 15th day of September 1922.

WALTER M. AUSTIN.