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L. C. FRANK

1,768,950

SHADING COIL

Filed Jan. 30, 1930

Fig. 1.

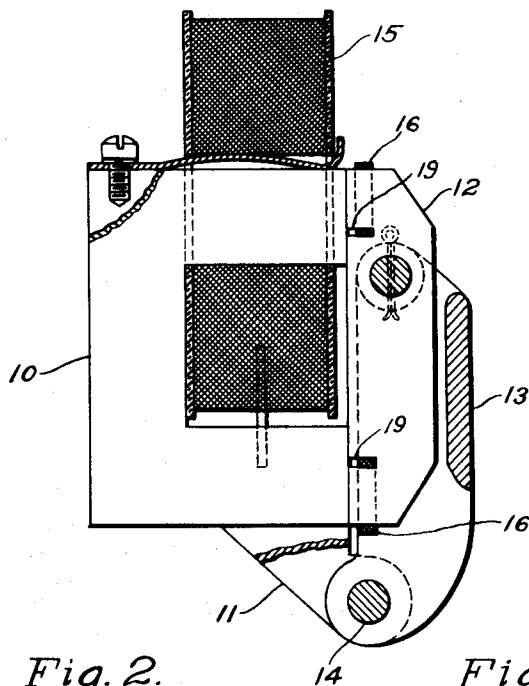


Fig. 2.

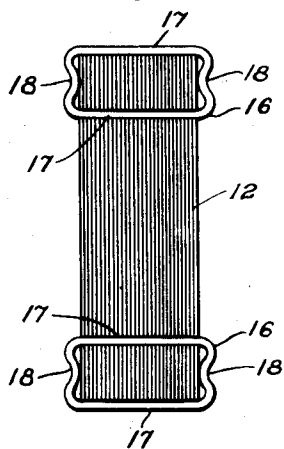
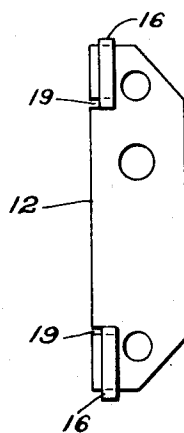


Fig. 3.



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SHADING COIL

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My invention relates generally to shading coils for alternating-current magnets.

The use of shading coils in connection with electromagnets, which are energized by alternating current, to reduce chattering of the armatures is old in the art, the theory of operation is well known and will not be described in detail.

Heretofore, a great deal of trouble has been experienced with shading coils becoming loose and breaking as a result of the impact of the armature striking the core when the magnet is actuated. This impact and also the heating of the armature causes the laminations of the armature to spread apart or expand. When shading coils are used on the magnets of contactors for industrial service, which operate almost constantly, this action produces strains on the coils which cause them to break.

An object of my invention is to provide a shading coil which may be economically manufactured and readily assembled by a machine operation.

A more specific object of my invention is to provide a shading coil that shall be resilient and may be distorted slightly in shape to permit expansion of the magnetic conductor on which it may be mounted without subjecting the members of the coil to disrupting strains.

It is also an object of my invention to facilitate the mounting of the shading coil by making it resilient.

For a clearer understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is a view, partly in section and partly in side elevation, of an electromagnet having shading coils, constructed in accordance with my invention, mounted thereon;

Fig. 2 is a view, in front elevation, of the armature and shading coils of the magnet shown in Fig. 1;

Fig. 3 is a view, in side elevation, of the armature shown in Fig. 2, showing shading coils in position.

Referring now to the drawing, the illus-

trated magnet comprises a magnetizable core 10 of U-shape which is supported by a frame 11, a portion only of which is shown. An armature 12 is supported by an arm 13 which is pivotally mounted on the frame 11 by a pin 14.

In order to effect the operation of the armature 12, a coil 15 is mounted on one leg of the core 10.

When the coil 15 is excited from a source of alternating current, the core member 10 is energized and deenergized cyclically. The energization of the magnet effects the actuation of the armature 12 into engagement with the core member 10, thereby establishing a closed magnetic circuit.

In order to prevent chattering, which is caused by the varying flux, shading coils 16 are mounted on the armature 12. In this particular instance, the shading coils are made from sections of seamless tubing, usually of brass or copper, but it will be readily understood that any other suitable non-magnetic conductor may be utilized. A section of tubing is so shaped as to constitute an elongated link having side members 17 and reentrant end portions 18 for engaging the armature 12. A coil constructed in this manner is resilient and may be distorted slightly in shape.

The customary slots 19 are provided in the armature, as shown in Fig. 3, for receiving one side of the shading coils. In assembling the magnet, the coils are pressed into position, the inwardly curved ends resiliently engaging the armature. In such manner, the coils are retained in position. It will also be readily appreciated that, by constructing the coils in this manner, they will permit a predetermined expansion of the armature before breaking. It has been found that coils of this type are seldom subjected to disrupting strains.

It will be evident that I have provided a shading coil which is economical to manufacture may be readily assembled by a machine operation and which will have a long life.

Since it is possible to modify the embodiment of my invention hereinbefore set forth and adapt it to various applications without

departing from the spirit and scope of the invention, it is desired that the foregoing description be construed as illustrative and not in a limiting sense.

5 I claim as my invention:

1. A shading coil for the armature of an alternating-current magnet comprising an elongated link member of conducting material for mounting on the armature, said link
10 member having its ends curved inwardly to present faces for resiliently engaging the armature to permit expansion of the latter without imposing sufficient strains on the link member to break it.

15 2. A shading coil for an alternating-current-magnet core comprising a link member of conducting material for mounting on the core, said link member having portions extending inwardly to provide resilient projec-
20 tions to engage the core.

3. A shading coil for a magnetic conductor comprising a link member for mounting on the conductor, said link member being curved inwardly to present a face to re-
25 siliently engage the conductor to permit a predetermined expansion of the conductor without exerting sufficient strains to break the link.

4. A shading coil for a magnetic conductor comprising a link of conducting material having a reentrant portion disposed to re-
30 siliently engage the magnetic conductor and to permit a predetermined expansion of the conductor without exerting disrupting strains on the link.
35 on the link.

5. A shading coil for a magnetic conductor comprising a link of conducting material having a plurality of reentrant portions disposed to resiliently engage the conductor
40 and to permit a predetermined expansion of the conductor without exerting disrupting strains on the link.

6. A shading coil for a magnetic conductor comprising a section of seamless tubing so shaped as to constitute an elongated
45 link for mounting on the conductor, said link having portions curved inwardly to resiliently engage the conductor and to permit a predetermined expansion of the conductor
50 without producing sufficient strains on the link to break it.

7. A shading coil for a magnetic conductor comprising a section of tubing having a substantially rectangular shape for mounting
55 on the conductor, said section having portions curved inwardly to resiliently engage the conductor and to permit a predetermined expansion of the conductor without breaking the section of tubing.

60 In testimony whereof, I have hereunto subscribed my name this 21st day of January, 1930.

LEO C. FRANK.