

Sept. 20, 1938.

F. J. RUSSELL

2,130,653

MOUNTING MEANS FOR SHADING COILS

Filed June 1, 1937

Fig. 1

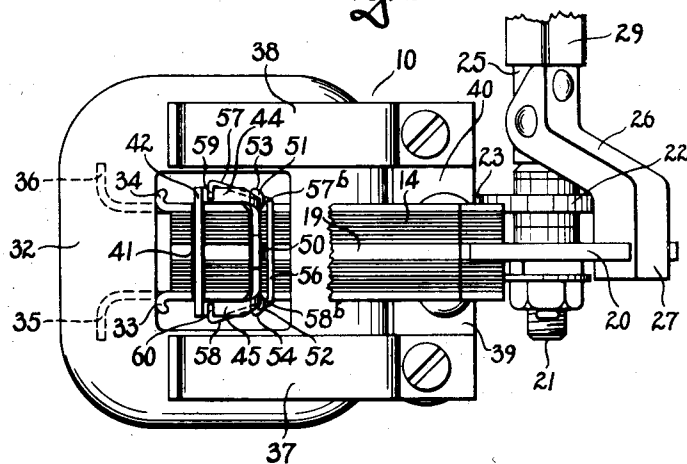


Fig. 2

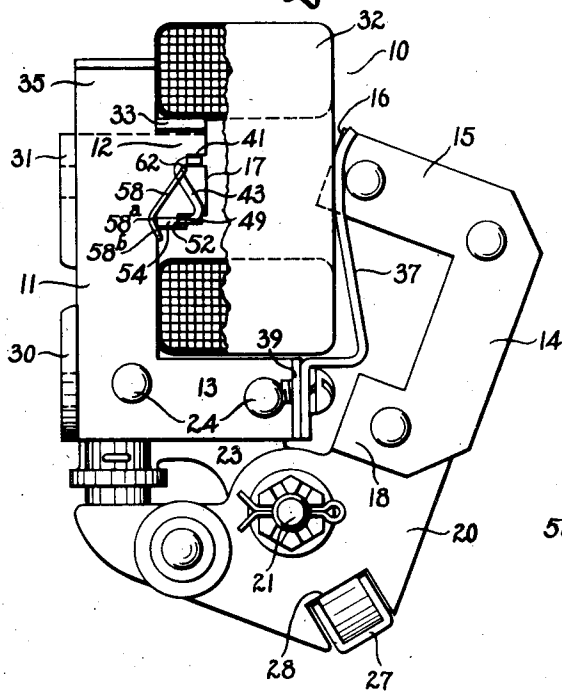


Fig. 3

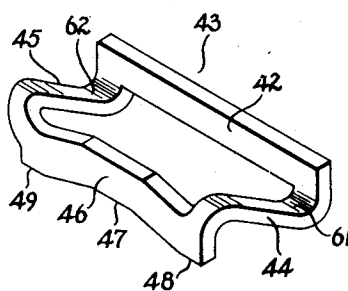
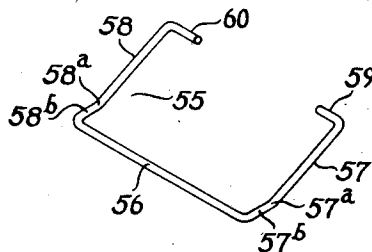


Fig. 4



Inventor
Frank J. Russell
By Frank H. Hubbard
Attorney

UNITED STATES PATENT OFFICE

2,130,653

MOUNTING MEANS FOR SHADING COILS

Frank J. Russell, Wauwatosa, Wis., assignor to
Cutler-Hammer, Inc., Milwaukee, Wis., a cor-
poration of Delaware

Application June 1, 1937, Serial No. 145,722

7 Claims. (Cl. 175-333)

This invention relates to an improvement in mounting means for shading coils.

Heretofore considerable trouble has been experienced due to breaking of the shading coils on alternating current contactors. Such breaking of the shading coils is due primarily to the operation of staking or clinching of the core material about the shading coil to hold the latter in place. Breakage or loosening of the shading coil may occur subsequent to assembly thereof due to the strain set up therein by the staking and clinching operation, and as an incident to the vibration and possible wear to which the coil is subjected during operation of the contactor, or to wearing away or breaking off of the upset or clinching portions of the core. Moreover, when a shading coil is thus staked or clinched in position at the factory, it is difficult for the user of a contactor to remove a broken shading coil and replace it with a new one, there being considerable likelihood that the user may damage the new shading coil when trying to stake it in place.

The primary object of my invention is to provide novel means for mounting a shading coil whereby all of the aforementioned difficulties are obviated.

Another object is to minimize the likelihood of breakage of shading coils when in use, whereby the life thereof is greatly increased.

Another object is to facilitate attachment of a shading coil to and removal thereof from a contactor core.

Another and more specific object is to provide releasable resilient means for retaining a shading coil in position.

Another object is to provide a shading coil retaining device in the form of a spring wire clip.

Other objects and advantages of the invention will become apparent in the course of the following description.

The accompanying drawing illustrates an embodiment of the invention which will now be described, it being understood that the embodiment illustrated is susceptible of modification within the spirit and scope of the appended claims.

In the drawing, Fig. 1 is a top plan view of the operating electromagnet of an alternating current contactor, a portion of the pivoted laminated armature being broken away to illustrate the shading coil and the novel form of spring wire clip adapted to releasably retain the same in assembled position.

Fig. 2 is a side elevational view of the parts shown in Fig. 1, a portion of the magnet winding being broken away to illustrate the shading coil

and the spring wire retaining clip associated therewith.

Fig. 3 is an enlarged perspective view of the preferred form of shading coil, and

Fig. 4 is an enlarged perspective view of the spring wire retaining clip.

In the drawing the numeral 10 designates generally the electromagnetic operating means of an alternating current contactor of known form, the same comprising essentially a laminated core 11 having a relatively short arm 12 and a relatively long arm 13; and a laminated pivoted armature 14 having a relatively long arm 15, the inner end 16 of which is movable into engagement with the pole face 17 provided by arm 12, and a relatively short arm 18 the inner end of which is movable into engagement with the pole face (not shown) provided at the adjacent end of arm 13. The relatively thick central lamination 19 (Fig. 1) of armature 14 is provided with an integral extension 20 which is supported by shaft 21 for pivotal movement. Shaft 21 is provided with spaced bearings, one of which is shown at 22, the same comprising a bracket 23 which is rigidly attached to the arm 13 of core 11, as by means of rivets 24.

Shaft 21 is preferably provided with a portion 25 of square cross section to which is rigidly attached a stamped sheet metal crank member 26, the offset end 27 of which fits into a notch 28 of corresponding shape in extension 20. It follows from this arrangement that upon pivotal movement of armature 14 a substantially corresponding degree of angular movement of shaft 21 is effected. The square portion 25 of shaft 21 is provided with an insulating covering 29 to which the movable contact arms (not shown) may be attached by suitable clamps in a well known manner.

Core 11 has integral lugs 30 and 31 extending from opposite sides thereof, said lugs having openings (shown in dotted lines, Fig. 2) to accommodate bolts whereby the core and its associated parts may be attached to a suitable insulating panel. The operating winding 32 is positioned as shown to surround arm 12 or core 11, pairs of lugs 33, 34 and 35, 36 being provided on core 11 to assist in positioning said coil. A pair of resilient arms 37 and 38 are respectively attached to lugs 33 and 40, formed integrally with 50 core 11, said arms overlying opposite sides of coil 32 to retain the latter in assembled position.

The aforementioned pole face 17 provided by core arm 12 is provided with a horizontal slot 41 which is adapted to freely receive edgewise the

upper end portion 42 of a preferred form of shading coil, which is designated in general by the numeral 43. Shading coil 43 is preferably punched and stamped, to the form best illustrated in Fig. 3, from a plate or sheet of non-magnetic material such as aluminum. The side portions 44 and 45 of shading coil 43 are preferably of substantially S-shape in vertical cross section, whereby the lower portion 46 thereof substantially underlies portion 42 in a plane parallel with the latter. The outer edge of portion 46 is preferably provided with flat surfaces 47, 48 and 49 to respectively seat against shoulders 50, 51 and 52 formed integrally with arm 12 of core 11, the shoulders 51 and 52 being provided by lugs 53 and 54 extending laterally from arm 12.

In accordance with my invention the shading coil is resiliently retained in the assembled position thereof illustrated in Fig. 1 as by means of a clip 55 which is formed from a single length of hard drawn steel spring wire of the desired gauge. Thus the particular clip 55 in Fig. 4 is preferably composed of a piece of wire approximately 2½ inches long and of .032 inch diameter or gauge. Clip 55 is preferably of substantially U-shape, the same having a connecting portion 56 and arms 57 and 58. Predetermined lengths 59 and 60 of the free ends of arms 57 and 58 are bent to extend toward each other. Arms 57 and 58 are bent upwardly at points 57^a and 58^a at an angle of approximately forty-five degrees with respect to the plane of connecting portion 56 and the adjacent portions of said arms.

In assembling clip 55 the bent or hooked end 59 of arm 57 is preferably engaged with the concavity 61 provided adjacent to the upper end of side portion 44 of the shading coil. The portion 57^b of arm 57 is positioned behind the rear edge or shoulder of lug 53, as shown in Fig. 1. The other arm 58 of the clip is then spread or pulled outwardly, as by means of a pair of pliers or a screw driver, in a manner to bring the portion 58^b thereof to the rear of lug 54, as shown in each of Figs. 1 and 2; and said arm is so held as to bring the inwardly bent end 60 thereof into alinement with the concavity 62 provided adjacent to the upper end of side portion 45 of the shading coil, said end 60 being manually brought into engagement with the curved wall of concavity 62, with consequent retention of shading coil 43 and clip 55 in assembled relation to each other and to the core 11.

When it is desired to remove shading coil 43 for the purpose of inspecting the same or to replace the same with a new shading coil, the clip 55 may be readily removed by first pulling outwardly or laterally one of the arms 57 or 58, and then the other to effect disengagement of the respective inwardly bent ends 59 and 60 from said concavities 61 and 62. Upon reinsertion of the same shading coil or a new one the clip may be again employed to releasably and resiliently retain the same in position with respect to the core.

By the use of my novel form of retaining clip the shading coil is held firmly in place; is not damaged by the clip; has a relatively long life, and may be readily replaced, if necessary.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with an alternating current magnet having a core formed with a groove at one end thereof to freely receive a shading coil of suitable form, a punched and stamped sheet metal shading coil having a portion thereof located

within said groove, and a single, separate resilient metal member straddling said core for support thereby and having hooked ends respectively engaged under tension with opposite ends of said shading coil to positively but releasably retain the latter in assembled relation to said core.

2. The combination with an alternating current magnet having a core formed at one end thereof to freely receive a shading coil of suitable form, a shading coil, and resilient means associated with said core and with said shading coil to releasably retain the latter in assembled position, said means comprising a single spring wire clip having arms with hooked ends engaged under tension with said shading coil at opposite sides respectively of said core.

3. The combination with an alternating current magnet having a core formed at one end thereof to freely receive a shading coil of suitable form, a shading coil, and resilient means associated with said core and with said shading coil to releasably retain the latter in assembled position, said means comprising a single spring wire clip having arms with hooked ends engaged under tension with said shading coil at opposite sides respectively of said core, said core having lugs formed integrally therewith at opposite sides thereof, and said arms being engaged with said lugs to prevent accidental displacement of said clip.

4. The combination with a shading coil having concavities formed in the side portions thereof adjacent the upper ends of the latter, of a spring wire retaining clip for said shading coil, said clip being of substantially U-shape and having the free ends of the arms thereof bent inwardly for engagement with the walls of the respective concavities, and the connecting portion of said clip and the portions of the arms adjacent thereto being located in a plane at an angle to the plane of the major portions of said arms, whereby said clip may be releasably engaged with a suitable support, with said arms under tension as an incident to engagement of said bent ends thereof with said shading coil.

5. The combination with an alternating current magnet core having a groove in one pole face thereof, a shading coil of suitable form having a portion freely insertable into said groove, means for resiliently mounting and releasably retaining said shading coil in assembled relation to said core, said means comprising a single spring wire clip of approximately U-shape, the connecting portion of said clip and the arm portions adjacent thereto being adapted to releasably engage portions of said core, and said arms having hooked ends adapted to releasably engage the respective side portions of said shading coil.

6. The combination with a laminated core for alternating current magnets, said core having a horizontally extending groove in the face of one pole thereof, of a punched and stamped sheet aluminum shading coil having an upper end portion freely insertable edgewise into said groove and a lower end portion arranged in a plane parallel to the plane of said upper end portion and adapted to underlie said pole, the side portions of said shading coil extending edgewise from said pole and being of substantially S-shape in vertical cross section, said core having lugs extending from opposite sides thereof, a spring wire retaining clip of approximately U-shape, the connecting portion of said clip and the arm portions adjacent thereto being located in a given plane

whereby the same are respectively engageable with said core and with said lugs, the free portions of said arms being located in a common plane at an angle to the plane last mentioned, and said arms having end portions extending toward each other, said end portions being adapted, upon distortion of said arms, for engagement under tension with the concavities provided adjacent the upper ends of said S-shaped side portions, whereby said shading coil and said clip are releasably restrained from accidental movement relatively to said core.

7. The combination with a punched and stamped sheet metal shading coil having upper

and lower portions arranged in substantially parallel planes, the side portions of said coil being of substantially S-shape in vertical cross section, of a spring wire clip of substantially U-shape, the free ends of the arms of said clip being bent inwardly to provide hooks engageable with the upper concavities in the respective side portions, and said arms and the connecting portion of the clip being respectively engageable with portions of a suitable support, whereby said clip and said shading coil are restrained against accidental displacement.

FRANK J. RUSSELL.