Nov. 16, 1965 J. E. BARRICK 3,218,592

COIL FORM ASSEMBLY

Filed Sept. 28, 1962

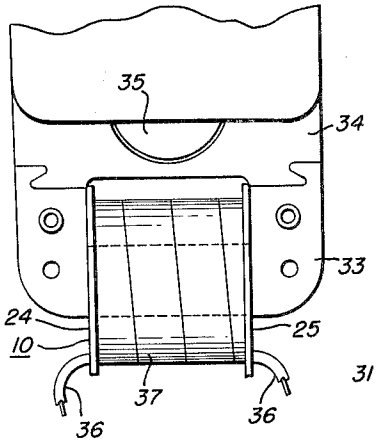

Fig. 1

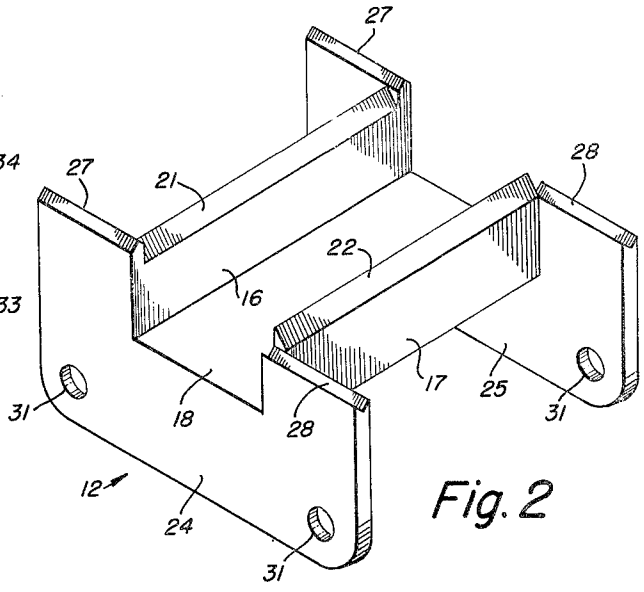

Fig. 2

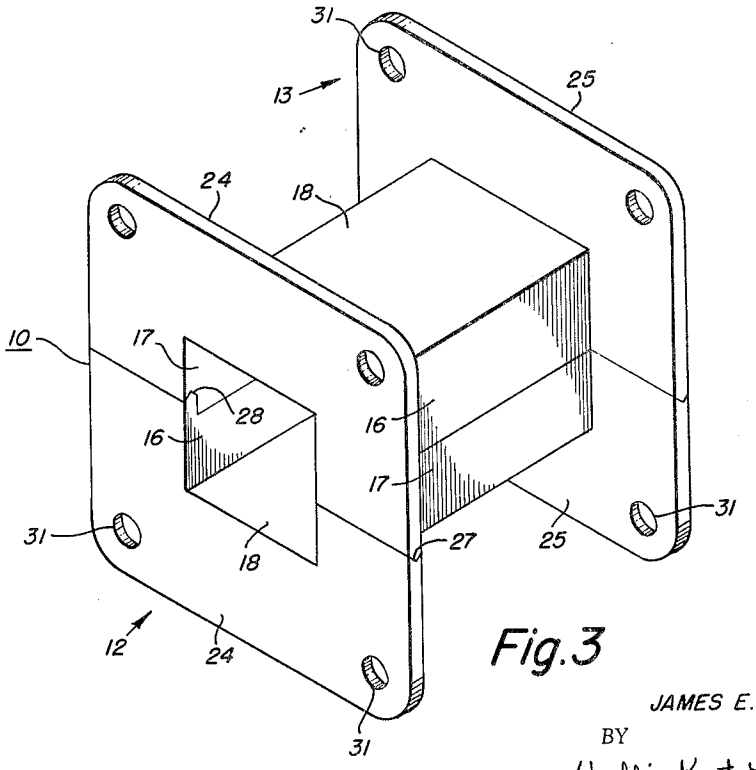

Fig. 3

INVENTOR.
JAMES E. BARRICK
BY
Woodling, Krost, Granger & Rust
Attys.

United States Patent Office 3,218,592 Patented Nov. 16, 1965

3,218,592

COIL FORM ASSEMBLY

James E. Barrick, Alliance, Ohio, assignor to Consolidated Electronics Industries Corporation, a corporation of Delaware

Filed Sept. 28, 1962, Ser. No. 226,900
8 Claims. (Cl. 336—198)

The invention relates in general to a coil form assembly and more particularly to such an assembly formed of two complementary parts.

An object of the present invention is to provide a coil form assembly comprised of at least two mateable parts which fit together in such a way as to form a long leakage path to ground.

Another object of the present invention is to provide a coil form assembly made up of two complementary parts which cannot be incorrectly assembled.

Another object of the present invention is to provide a coil form having mating parts engaging each other to form an enclosure with the engaging parts being beveled to provide a longer path from and to the enclosure.

Another object of the present invention is to provide a coil form assembly with enclosure-forming members which fit together on beveled edges and which have flanges which interfit by means of triangular-shaped ridges and grooves.

Another object of the present invention is to provide a coil form assembly which includes two mating parts and which interfit by means of beveled surfaces and V-shaped ridges and grooves whereby the wrapping of wire on the coil form serves to hold the mating parts together and prevents warping of the same and exposure of the wire.

Another object of the present invention is to provide a coil form assembly which includes two identical form members generally U-shaped in an elevational view with one of the legs of the U-shape being slightly longer than the other whereby two such form members cannot be assembled in an incorrect manner.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

FIGURE 1 is a view of the coil form assembly of the present invention in place on the magnetic circuit of an electric motor;

FIGURE 2 is an isometric view of one of the identical coil forms used to construct the coil form assembly of the present invention; and

FIGURE 3 is an isometric view of the coil form assembly which is comprised of two identical coil forms as shown in FIGURE 2.

The completed coil form assembly of the present invention is shown both in FIGURES 1 and 3 and has been indicated generally by the reference numeral **10**. This assembly includes in combination first and second identical coil forms **12** and **13**, both shown in FIGURE 3, with a single coil form **12** shown in FIGURE 2. Each of the coil forms comprises first, second and third wall members **16**, **17** and **18**, respectively, and the first and second wall members are spaced from each other and extend generally parallel to each other with the first wall member **16** being longer than the second wall member **17**. In other words, viewing the three walls above described, for example in FIGURE 2, it might be said that they describe a generally U-shape with the first leg of the U-shape being slightly longer than the second leg of the U-shape. The third wall member **18** extends between and connects a first end portion of each of the first and second wall members.

Wall means are provided on a second end portion of the

first and second wall members **16** and **17**, respectively, and these wall means define beveled wall surfaces or joining surfaces **21** and **22**, respectively, and it will be noted that the beveled surfaces both face or extend in the same direction, which is to the right as viewed in FIGURE 2. The beveled surfaces extend at an acute angle with respect to the extent of or the direction of the first and second wall members. This acute angle is preferably on the order of 30° to provide for a long leakage path between the inside and the outside of the two members when they are assembled as shown in FIGURE 3. As seen in FIGURE 2, the beveled wall surfaces **21** and **22** of the first and second wall members **16** and **17** of the first coil form **12** engage, respectively, the beveled wall surfaces **22** and **21** of the second and first wall members **17** and **16** of the second coil form **13** in the assembled condition of the two coil forms.

First and second flange members **24** and **25**, respectively, are provided on each of the coil forms **12** and **13**. The first and second flange members are generally parallel to each other and are located, respectively, at either end of the wall members and generally perpendicular to the extent of the wall members. A first portion of each of the first and second flange members is provided with a generally triangular-shaped ridge **27** and these ridges **27** are located on substantially the same level as the beveled surface **21** of the wall member **16**. A second portion of each of the first and second flange members has a generally trangular-shaped groove **28** which is located on substantially the same level as the beveled surface **22** of the second wall member **17**. As noted in FIGURE 2, the ridges **27** of the first coil form **12** reside in the grooves **28** of the second coil form **13** and the ridges **27** of the second coil form **13** reside in the grooves **28** of the first coil form **12** in the assembled condition of the two shown in FIGURE 3. Openings or holes **31** are provided in the flanges **24** and **25** of each of the coil forms and these openings serve to position the electrical leads which supply power to the windings on the coil form assembly **10**.

As assembled, the wall members **16**, **17** and **18** establish a bobbin base for receiving a coil of wire, and the flanges **24** and **25** establish bobbin flanges to contain any such coil.

The coil forms **12** and **13** are shown at about full size in FIGURE 1 as an illustration of the utility of the device. The coil forms may be made from an integral molded structure, for example of molded nylon. The wall thicknesses may be in the order of .040 to .050 inch which provides a semi-rigid structure having some resiliency in various parts. This thickness is sufficient to withstand the normal coil to ground voltage breakdown test which may be in the order of 1100 to 1500 volts. Currently, this electrical test requirement is twice the normal coil voltage plus 1,000 volts.

FIGURE 1 illustrates the coil form assembly located on the magnetic circuit of a shaded pole motor merely as an example of its use and the magnetic circuit as shown comprises a first group of laminations **33** connected to a second group of laminations **34**, also shown is a rotor **35** of the motor. The laminations are shown in plan and the lamination stack is held together in a conventional manner. With the first group of laminations **33** separate from the second group of laminations **34**, before assembly as shown in FIGURE 1, the coil forms **12** and **13** are simply placed around the laminations in the manner shown in FIGURE 3, in other words, with the lamination group **33** extending through the central opening of the coil form assembly shown in FIGURE 3. With the semi-rigid nylon forms, the coil forms **12** and **13** are readily inserted on the lamination stack and will cling thereto by the inherent resiliency of the wall members **16** and **17**. This

is also aided by the slight roughness of the edges of the laminations. Accordingly, no tape is required on the wall members 16–18 to hold together the two coil forms 12 and 13. The coil is then wound upon the coil form with the windings residing between the flanges 24 and 25. The coil may then be wrapped with tape 37 (FIGURE1) in a conventional manner. The first group of laminations 33 with the coil and coil form assembled thereon are then secured to the second group of laminations 34 also in a conventional manner.

With the use of the two identical coil forms constructed in the manner which has been described herein, it is possible to construct a complete coil form assembly which cannot be assembled in an incorrect manner. The use of the beveled surfaces 21 and 22, which interfit with similar surfaces 22 and 21 in the assembled condition of the assembly and with the angle of the bevel being on the order of 30°, provides a long leakage path between the magnetic circuit on the one hand and the coil windings on the other hand. Since the electrical standards provide that the coil form must provide sufficient insulation to withstand a test on the order of 1000 volts to ground, it is necessary that the leakage path be quite long. The use of the beveled surfaces and the interfitting of the triangular-shaped ridges and grooves also provides a construction which, when the windings are wound upon the coil form assembly, merely serves to more tightly hold the two parts together and also provides a construction wherein one or both of the coil form parts will not warp or distort.

With the wall member 17 slightly shorter than the wall member 16, there is an ease of assembly of each coil form on the stack of laminations. The short wall may first be partially placed upon the lamination stack and then the resiliency of the nylon coil form plus the beveled surface 21 permits the first wall member 16 to readily be slipped onto the other side of the lamination stack. Also, it is easy for the assembler to determine the correct position for assembly of the two coil forms 12 and 13 because the end of the flange 24 which contains the V-groove 28 is shorter than the end of the flange having the V-ridge 27. Thus, the entire coil assembly 10 is quickly assembled since the V-ridge is complementary with the V-groove and the beveled surface 21 is complementary with the beveled surface 22, so that the two coil forms 12 and 13 are not only completely complementary but are complementary in only one assembled position. This makes it extremely difficult to assemble improperly, since the parts will not mate and extremely easy to assemble correctly even by unskilled assemblers.

The laminations in a magnetic core generally have some tolerance on thickness. Each lamination may be in the order of .050 inch thick for example, plus or minus .002 inch. Thus, with a stack of 24 laminations for example, it is possible to have a maximum variation of .048 inch. Preferably, therefore, the dimensions of the coil form 12 are made to accommodate the thickest lamination stack in this range of tolerances. Then when the normal lamination stack is encountered which is slightly thinner, that is, a lesser stack height, the beveled surfaces 21 and 22 merely overlap slightly more especially at the center of the walls 16 and 18 but still provide the same long leakage path to ground. With the maximum stack height, the beveled surfaces 21 and 22 will just touch and the wall 16 and mating wall 17 will be co-planar.

There is no open joint at the mating line of the flanges 24 and 25 with the wall members 16, 17 and 18, and thus, there is no leakage path to ground at these junction lines.

The V-ridge 27 being complementary with the V-groove 28 prevents any warping of the end flanges 25 and 25 which might otherwise open up a small crack. The warping might be due to aging of the coil form or due to uneven pull of the wire wound on this coil form assembly.

The coil forms 12 are easily molded using a simple mold and with a wall thickness of only about .050 inch, which is quite thin, there is a greater coil winding space provided than the former prior art system of separate ground insulation tape around the lamination stack and separate flange ends.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and ararngement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A coil form assembly including in combination first and second identical coil forms,
each coil form comprising wall means defining a generally U-shaped enclosure member with a first leg thereof being longer than a second leg,
wall means on the ends of said legs defining beveled wall surfaces each extending in the same direction and at an acute angle with respect to the extent of said legs,
said beveled wall surfaces of said first and second legs of said first coil form engaging respectively said beveled wall surfaces of said second and first legs of said second coil form in the assembled condition of said first and second coil forms.

2. A coil form assembly including in combination first and second coil forms,
each coil form comprising first, second and third wall members,
said first and second wall members being spaced from each other and extending generally parallel to each other with said first wall member being longer than said second wall member,
said third wall member extending between and connecting a first end of said first and second wall members together,
wall means on a second end of said first and second wall members defining beveled wall surfaces each extending in the same direction,
said beveled wall surfaces of said first and second wall members of said first coil form engaging respectively said beveled wall surfaces of said second and first wall members of said second coil form in the assembled condition of said first and second coil forms.

3. A coil form assembly including in combination first and second identical coil forms,
each coil form comprising first, second and third wall members,
said first and second wall members being spaced from each other and extending generally parallel to each other with said first wall member being longer than said second wall member,
said third wall member extending between and connecting a first end of said first and second wall members together,
wall means on a second end of said first and second wall members defining beveled wall surfaces each extending in the same direction and at an acute angle with respect to the extent of said first and second wall members,
said beveled wall surfaces of said first and second wall members of said first identical coil form engaging respectively said beveled wall surfaces of said second and first wall members of said second identical coil form in the assembled condition of said first and said coil forms.

4. A coil form assembly including in combination, first and second identical coil forms,
each coil form comprising first, second and third wall members,
said first and second wall members being spaced from each other and with said first wall member being longer than said second wall member,
said third wall member extending between and connect-

ing a first end of said first and second wall members together,

wall means on a second end of said first and second wall members defining beveled wall surfaces,

said beveled wall surfaces of said first and second wall members of said first identical coil form engaging respectively said beveled wall surfaces of said second and first wall members of said second identical coil form in the assembled condition of said first and second coil forms,

first and second flange members on each of said coil forms,

said first and second flange members being located respectively at either end of said wall members,

a first portion of said first and second flange members having ridge means,

a second portion of said first and second flange members having groove means,

said ridge means of said first coil form residing in said groove means of said second coil form and said ridge means of said second coil form residing in said groove means of said first coil form in the assembled condition of said coil forms.

5. A coil form assembly including in combination, first and second identical coil forms,

each coil form comprising first, second and third wall members,

said first and second wall members being spaced from each other and extending generally parallel to each other with said first wall member being longer than said second wall member,

said third wall member extending between and connecting a first end of said first and second wall members together,

wall means on a second end of said first and second wall members defining beveled wall surfaces each extending in the same direction and at an acute angle with respect to the extents of said first and second wall members,

said beveled wall surfaces of said first and second wall members of said first identical coil form engaging respectively said beveled wall surfaces of said second and first wall members of said second identical coil form in the assembled condition of said first and second coil forms,

first and second flange members on each of said coil forms,

said first and second flange members being generally parallel to each other and being located respectively at either end of said wall members and generally normal thereto,

a first portion of said first and second flange members having ridge means on substantially the same level as said beveled surface of said first wall member,

a second portion of said first and second flange members having groove means on substantially the same level as said beveled surface of said second wall member,

said ridge means of said first coil form residing in said groove means of said second coil form and said ridge means of said second coil form residing in said groove means of said first coil form in the assembled condition of said coil forms.

6. A coil form assembly including in combination, first and second identical coil forms,

each coil form comprising first, second and third wall members,

said first and second wall members being spaced from each other and extending generally parallel to each other with said first wall member being longer than said second wall member,

said third wall member extending between and connecting a first end of said first and second wall members together,

wall means on a second end of said first and second wall members defining beveled wall surfaces each extending in the same direction and at an acute angle on the order of 30° with respect to the extent of said first and second wall members,

said beveled wall surfaces of said first and second wall members of said first identical coil form engaging respectively said beveled wall surfaces on said second and first wall members of said second identical coil form in the assembled condition of said first and second coil forms,

first and second flange members on each of said coil forms,

said first and second flange members being generally parallel to each other and being located respectively at either end of said wall members and extending generally perpendicular thereto,

a first portion of said first and second flange members having a generally triangular shaped ridge on substantially the same level as said beveled surface of said first wall member,

a second portion of said first and second flange members having a generally triangular shaped groove on substantially the same level as said beveled surface of said second wall member,

the walls of said ridges making an angle with each other on the order of 90° and the walls of said grooves making an angle with each other on the order of 90°,

said ridges of said first coil form residing in said grooves of said second coil form and said ridges of said second coil form residing in said grooves of said first coil form in the assembled condition of said coil forms.

7. A coil form assembly for an electrical coil mountable on a magnetic core,

said coil form assembly including first and second identical and complementary coil forms,

each coil form comprising wall means for establishing a bobbin base on which wire may be wound,

first and second flanges on the ends of said wall means and generally perpendicular thereto to form bobbin flanges of the completed coil form assembly,

acute angled joining surfaces on said wall means and complementary with the counterpart joining surfaces on the complementary coil form,

and interlocking ridge and groove means on each said flange with said ridge and groove means being complementary to the counterpart groove and ridge means on the flange of the complementary coil form,

said interlocking ridge and groove means preventing movement in both lateral directions of said first and second flanges.

8. A coil form assembly for an electrical coil mountable on a magnetic core,

said coil form assembly including first and second identical and complementary coil forms,

each coil form comprising wall means for establishing a bobbin base on which wire may be wound,

first and second flanges on the ends of said wall means and generally perpendicular thereto to form bobbin flanges of the completed coil form assembly,

acute angled joining surfaces on said wall means and complementary with the counterpart joining surfaces on the complementary coil form,

and interlocking ridge and groove means on each said flange with said ridge and groove means being complementary to the counterpart groove and ridge means on the flange of the complementary coil form,

said joining surfaces being flat beveled surfaces extending at an acute angle relative to the plane of said wall members to establish a long leakage path from any said coil to ground,

said ridge and groove means on each said flange being a generally 90° V-ridge and a complementary 90°

V-groove lying in planes at generally a 45° angle relative to the plane of the respective flange to resist warping or movement of each flange out of the plane of the complementary flange,

said V-ridge being at one end portion of a flange and said V-groove being at the opposite end portion of the same flange,

one said end portion having a longer length than the other said end portion to establish only a single mode of complementary assembly of two coil forms into a single coil form assembly.

References Cited by the Examiner

UNITED STATES PATENTS

2,305,999	12/1942	Steinmayer et al.	242—4
2,565,331	8/1951	Torsch	242—9 X
2,581,862	1/1952	Johnson et al.	336—206
2,644,651	7/1953	Stahl et al.	242—118.7
2,787,743	4/1957	Hultgren	336—192
2,912,481	11/1959	Backus et al.	336—192

JOHN F. BURNS, *Primary Examiners.*