Feb. 18, 1969 M. H. BROWN ETAL 3,428,929

COIL RECEIVING STRUCTURE

Filed May 12, 1967

FIG. 1.

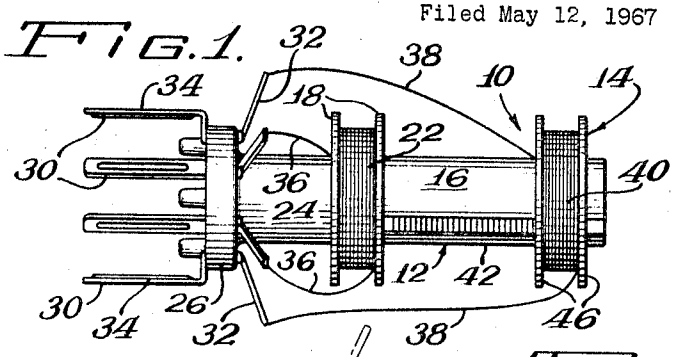


FIG. 2.

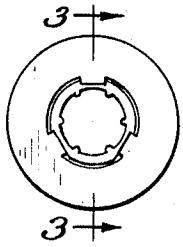


FIG. 3.

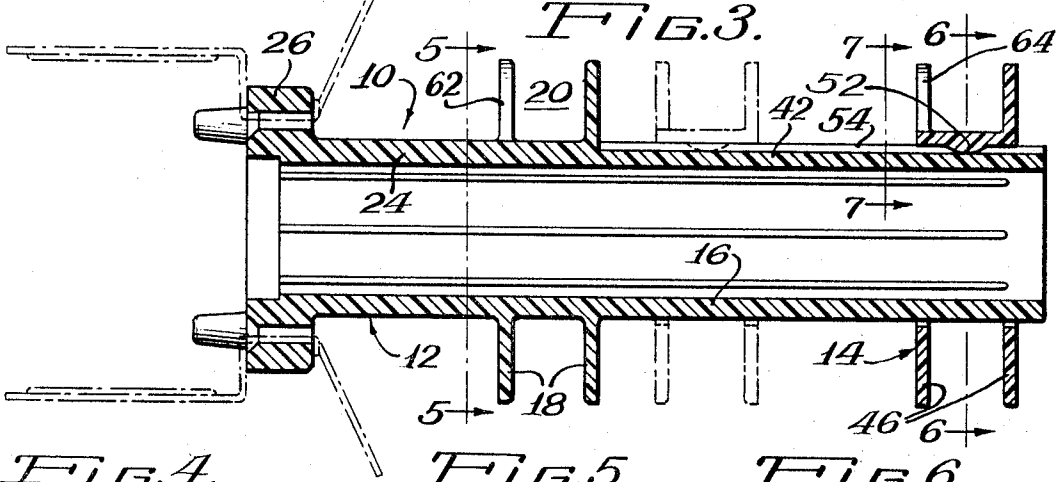


FIG. 4.

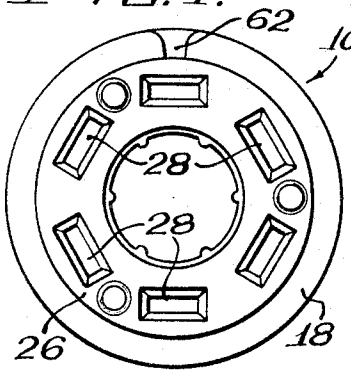


FIG. 5.

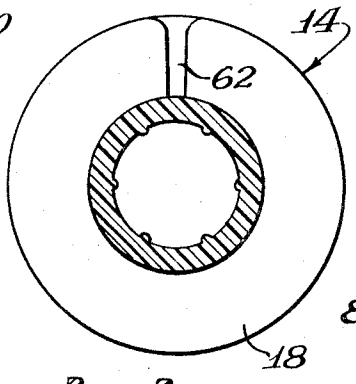


FIG. 6.

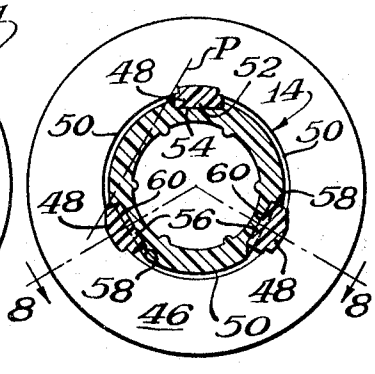


FIG. 8.

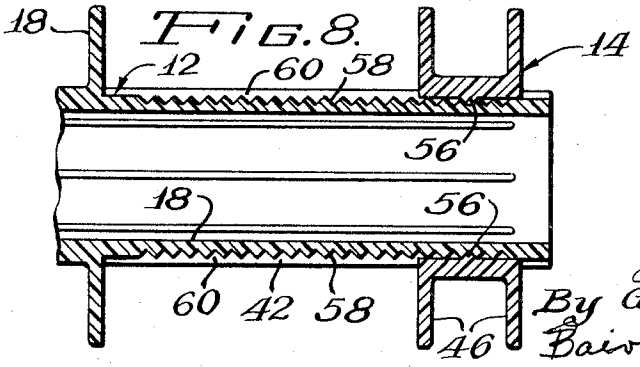
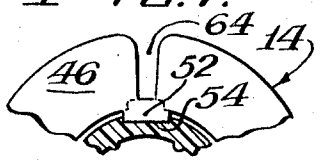


FIG. 7.



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COIL RECEIVING STRUCTURE

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Int. Cl. H01f 21/04

ABSTRACT OF THE DISCLOSURE

A coil receiving structure having a core, a pair of integral spaced flanges fixedly mounted on the core, and a bobbin slidably mounted on the core. A coil is carried between the integral flanges and another coil is carried on the slidable bobbin. The bobbin is adjustable on the core so that the spacing between the two coils may be readily controlled. The coil and bobbin assembly is locked in position on the core at a predetermined spacing from the coil between the integral flanges.

BACKGROUND OF THE INVENTION

Field of the invention and description of the prior art

This invention relates to an improved coil receiving structure and it particularly relates to a structure for mounting first and second coils at a predetermined lateral spacing.

Coil structures having a pair of coils in spaced relationship to each other on the same core are commonly used in radio and television sets. These coil structures are commonly used as interstage transformers to inductively couple a pair of cascaded tuned circuits, such as radio and television I.F. (intermediate frequency) amplifiers. In such assemblies, varying the number of turns in one coil alters the inductance of that coil while variations in the spacing between the two coils alters their mutual inductives. These coils may also be "permeability tuned" by moving a slug of magnetic material axially through the central core of that bobbin.

Generally, the spacing between two such coils is determined empirically by the television or radio set manufacturer. After the spacing has been empirically determined, a coil structure with two spaced coils is made up so that the coils are at the empirically predetermined spacing on a cylindrical core.

Occasionally, bobbins having two pairs of spaced flanges at the predetermined spacing are made of molded plastic. In these constructions, the flanges are thus fixed at the predetermined spacing. Such molded bobbin structures, however, have significant disadvantages. In a television set, for example, a large number of these coil structures are used. The spacing of the flanges on the core and the coil sizes are, however, generally different from one another. This requires a large inventory of such molded bobbins to be maintained by the manufacturer for each type of television or radio chassis. The maintenance of a large inventory of parts is generally considered to be highly disadvantageous because of problems in storage and added expense. A further disadvantage of providing such molded bobbin structures is the result of the criticality of the spacing between the coils. For example, even after the spacing has been predetermined and the parts molded, the spacing of the coils may later have to be changed after a television set goes into production to correct certain deficiences in the operation of the set. For a given television set, there may be several times when the spacing of the coils of such a molded structure must be changed. Every time a change is required, it is necessary for the manufacturer to have a new mold made to provide a bobbin structure having flanges at the new spacing. Since new molds are required each time a new spacing is required, it becomes excessively expensive. Thus, the use of molded plastic bobbins wherein pairs of flanges are molded at a fixed spacing is very limited.

Because of the above problems of the described molded plastic bobbins, they have not generally been used by manufacturers. Rather manufacturers have used pairs of spaced self-sustaining coils wound about a cylindrical hollow core. When self-sustaining coils are used, after a manufacturer determines the desired spacing, the coils are wound and secured to the core at the desired spacing. Since the coils are self-sustaining, no flanges are required and the spacing can be easily changed. The manufacturer simply changes the place that the particular coils are wound upon the core, and it is not necessary to make new molds. The self-sustaining coils avoid the problem of maintaining a large inventory since only a few cylindrical cores would have to be maintained in stock.

Although the self-sustaining coils avoid the disadvantages of the above described molded plastic bobbins, they have one significant drawback in that self-sustaining coils are quite expensive to wind because of the way they must be wound to be self-sustaining. Randomly wound coils provide the same results as self-sustaining coils but do not require any special type of winding procedure. The randomly wound coils, however, do require the use of flanges to hold them in place.

SUMMARY OF THE INVENTION

It is therefore an important object of this invention to provide an improved coil receiving structure which avoids the disadvantages of the prior art structures of the type which have pairs of spaced coils mounted on a single core.

It is also an object of this invention to provide an improved coil receiving structure wherein the structure, which is made of a molded plastic material, has the spaced coils randomly wound between flanges and yet the spacing between the two coils is readily adjustable.

It is another object of this invention to provide a coil receiving structure for mounting spaced coils wherein only a single coil structure needs to be maintained in inventory for accommodating a large variety of such coil receiving structures.

It is yet another object of this invention to provide an improved coil receiving structure for mounting pairs of coils wherein the structure is particularly characterized by its simplicity and economy of construction, manufacture, and use.

Further purposes and objects of this invention will appear as the specification proceeds.

The foregoing objects are accomplished by the provision of a coil receiving structure having a core, with a first pair of spaced flanges on the core for receiving a first coil or wire, at least one bobbin slidaby mounted on the core for receiving another coil of wire, and cooperating means on said bobbin and on said core for adjustably locking said bobbin and said second coil at a predetermined spacing from the first coil.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, there is shown one particular embodiment of the present invention, wherein:

FIGURE 1 is a side elevational view of our improved coil receiving structure;

FIGURE 2 is an end view of the embodiment of FIGURE 1;

FIGURE 3 is an enlarged cross-sectional view taken along the line 3—3 of FIGURE 2 showing the details of construction for the coil receiving construction of FIGURE 1;

FIGURE 4 is an end view of the embodiment of FIGURE 3, which is at the end of the structure opposite to that shown in FIGURE 2;

FIGURE 5 is a cross-sectional view through the coil receiving structure, taken along the line 5—5 of FIGURE 3;

FIGURE 6 is a cross-sectional view through the coil receiving structure, taken along the line 6—6 of FIGURE 3;

FIGURE 7 is a fragmentary cross-sectional view through the coil receiving structure taken along the line 7—7 of FIGURE 3; and

FIGURE 8 is a fragmentary, transverse cross-sectional view through the coil receiving structure taken along the line 8—8 of FIGURE 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings and particularly to FIGURES 1 and 3, our improved coil receiving structure, generally **10**, comprises a first elongated coil receiving member, generally **12**, and a second coil receiving member or bobbin, generally **14**, slidably received by the first coil receiving member **12**.

The first coil receiving member **12** has an elongated hollow core **16** and a pair of spaced integral parallel flanges **18** defined thereon at a point intermediate the opposite ends of the core **16**. The flanges **18** are generally circular in shape as shown in FIGURE 5 and extend radially outwardly from the hollow core **16**. The circular flanges **18** cooperate with the core **16** to define a winding space **20** for receiving a randomly wound electrical coil **22**.

The core **16** includes an electrical terminal receiving portion **24** having an enlarged circular base **26**. As best shown in FIGURES 3 and 4, the base **26** includes a plurality of arcuately spaced upright terminal receiving slots **28**. The upright slots **28** receive metal terminals **30** therein. Each of the terminals **30** includes an upper outwardly extending bent portion **32** and downwardly projecting connector portions **34**. The connector portions are for electrical connection to the opposite leads **36** of the coil **22** and to the leads **38** of a second coil **40**. The downwardly projecting portions **34** are connected to external circuit components. The slots **28** are positioned radially outwardly of the main portion of the core **16** and are elongated in a direction perpendicular to radii extending from the central axis of the core **16**. The terminals **30** are secured within the slots **28** in any suitable way. In the embodiment shown, the terminals are secured to the enlarged portion **32** of the base **26** by being bent into locking engagement with the opposite sides of the base portion **26**. The bobbin flanges **18** are spaced from the base **26** to provide ease of connection between the leads **36** and **38** and the lead connector portions **32** of the terminals **30**.

The bobbin receiving portion **42** of the core **16** extends from the flanges in a direction opposite to that of the terminal receiving portion **24**. The bobbin receiving portion **42**, like the terminal receiving portion **24**, is in the general form of an elongated cylinder.

The bobbin, generally **14**, is slidably received on the bobbin receiving portion **42** of the core **16**. The bobbin **14** includes a pair of parallel, circular flanges **46** which, when mounted upon the core **16**, are substantially parallel with the first pair of flanges **18**. The bobbin flanges **46** are interconnected by a plurality of arcuately spaced ribs **48** which are substantially parallel with the central axis of the core **16**. The ribs **48** interconnect the flanges **46** to thereby define the bobbin structure **14**. Windows **50** are defined between the ribs **48** and the opposite flange **46**. As will be explained hereinafter, the windows cooperate with the windings of the coil **40** to lock the bobbin **14** at a predetermined position on the core **16**.

Referring to FIGURES 3 and 6, the inner periphery of one or more of the ribs **48** preferably includes an inwardly projecting arcuate portion **52** for providing secure sliding and abutting relationship with the core **16** to assist in maintaining the bobbin **14** in a fixed relative position on the core **16**. The arcuate projection **52** is received within an elongated longitudinal depression **54** on the surface of the core **16**. One or more depressions **54** are provided in the core **16** depending upon the number of the ribs **48** with projections **52**.

Alternatively, one or more of the ribs **48** include an inwardly projecting tooth **56** for engaging one of the teeth **58** provided in a longitudinal depression **60** in the core **16**, as best shown in FIGURE 8, wherein two toothed depressions are shown. The use of the tooth **56** on the ribs **48** for engaging the teeth **58** in the depression **60** provides for positively locking the bobbin **14** at the predetermined spacing from the flanges **18**. When no teeth **58** are in the depression **60** or teeth **56** on the ribs **48**, infinite adjustment is possible between the flanges **18** and the bobbin flanges **46**. When the teeth **56** and **58** are used, the spacing between the flanges **46** and bobbin **14** is limited by the distance between the valleys of the teeth. The projections **52** and/or projections **56** also cooperate with the depressions **54** and/or **60** to prevent rotation between the bobbin **14** and the core **16**.

The windows **15** defined between the ribs **48** on the bobbin **14** cooperate with the inner layers of wire on the coil **40** to lock the relative position of the bobbin **14** on the core **16**. The wires of the coil **40** pass across each of the windows **50** and bear against the arcuate outer segments on the surface of the core **16** to thereby lock the bobbin **14** in a fixed relative position on the core **16**. Referring to FIGURE 6, it is important that the outer arcuate surface of the core **16** between the ribs **48** extends beyond an imaginary plane P passing tangentially across the outer surfaces of the ribs **48**. In this way, the wires of the coil **40** bear against the core **16** to lock the bobbin **14** in a position on the core **16** at a predetermined spacing from the flange **18**.

In using the coil receiving structure **10**, it is necessary only for the manufacturer to maintain in stock structures **10**, which permits adjustment of the relative spacing of coil pairs. It is thus not necessary for the manufacturer to maintain a large supply of coil receiving structures for receiving pairs of coils. The manufacturer merely needs to purchase a single mold for the coil receiving structures **10** to maintain an inventory of these parts for substantially all such structures required in a particular television or radio set. The manufacturer has full freedom in varying the spacing between the coils wound on the structure.

Furthermore, the coils wound between the flanges **18** and on the bobbin **14** are the randomly wound type, which are far more economical than self-sustaining coils. The randomly wound coils are used since the flanges **18** and **46** maintain the coil **22** and the coil **40** in position. Although the described structure **10** shows one fixed set of flanges, it is obvious that all the sets of flanges on the structure **10** could be adjustable.

After the terminals **30** are positioned in the terminal receiving portion **24** of the coil receiving member **12**, the coil **22** is wound upon an automatic winding machine. The beginning lead wire is passed through a radial slot or opening **62** in the flange **18** facing the terminal receiving portion **24**. After the beginning lead wire is secured to a terminal **30** and after the end wire is secured to another terminal **30**, the predetermined spacing between the coil **22** and the coil **40** to be wound upon the bobbin **14** may be set by means of a jig. After the spacing is set, the wire of the coil **40** is wound about the bobbin **44**. Again, a radial slot **64** is provided in a flange **46** to permit the passage of the lead wire of the coil **40**. During the winding operation, the wire from the coil **40** bears against the core **16** by passing across the windows **50** to thereby lock the bobbin **14** in a fixed position on the core **16** at a predetermined distance from the coil **22**. After the proper number of turns has been wound about the bobbin **44**, the lead wires **38** are soldered to the terminals **30**. A struc-

ture having a pair of randomly wound coils at a predetermined spacing is thus provided.

While in the foregoing, there has been provided a detailed description of particular embodiments of the present invention, it is to be understood that all equivalents obvious to those having skill in the art are to be included within the scope of the invention as claimed.

What we claim and desire to secure by Letters Patent is:

1. A coil receiving structure for receiving at least two coils of wire thereon, said structure comprising a core, a pair of spaced flanges on said core receiving one of said coils of wire therebetween, a bobbin with flanges slidably mounted on said core receiving another of said coils of wire, means interconnecting said bobbin flanges, said interconnecting means being unitary with said bobbin flanges, and cooperating means on said core and on said bobbin for locking said bobbin in a fixed relative position to said pair of spaced flanges.

2. The bobbin of claim 1 wherein said spaced flanges are unitary with said core.

3. The device of claim 1 wherein said core and said pair of spaced flanges are integrally molded of a plastic material, and said bobbin including said bobbin flanges and said interconnecting means are unitary and are molded of plastic material.

4. The device of claim 1 wherein said interconnecting means includes means permitting the wire of said another coil to bear against said core and lock said bobbin in position on said core.

5. The device of claim 4 wherein said interconnecting means comprises a plurality of spaced, substantially parallel ribs interconnecting said bobbin flanges having apertures therebetween, and said apertures are sufficiently large so that a tangential plane passing across the top of said ribs intersects said core so that said wire bears against said core.

6. The device of claim 1 wherein said interconnecting means comprises a plurality of spaced, substantially parallel ribs interconnecting said bobbin flanges, longitudinal grooves are provided in the outer surface of said core, and means are provided on the inner periphery of said connecting ribs for engaging the slots in said core whereby said bobbin is maintained in a substantially fixed position on said core.

7. The device of claim 6 wherein at least one of said grooves in said core has teeth, and at least one of said ribs has means for engaging said teeth to positively lock said bobbin in a fixed position relative to said flanges on said core.

8. The device of claim 1 wherein said core includes a first portion which extends from one side of said spaced flanges, said bobbin is slidably received on said first portion, a second portion is on the opposite side of said pair of flanges, and electrical terminals are mounted on said second portion for connecting the lead wires of each of said coils to an external circuit.

9. The device of claim 7 wherein a radial slot is provided in one of said flanges on said core, and a radial slot is provided in one of the bobbin flanges, said radial slots provided entrance means for the lead wires of each of said coils.

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U.S. Cl. X.R.

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