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Heijnen et al.

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[54] **HIGH-FREQUENCY COIL HAVING A SYNTHETIC RESIN BASE**

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[52] **U.S. Cl.** **336/65,** 336/136, 336/192

[51] **Int. Cl.**.....**H01f 15/02,** H01f 15/10

[58] **Field of Search**.....336/65, 192, 198, 208, 136

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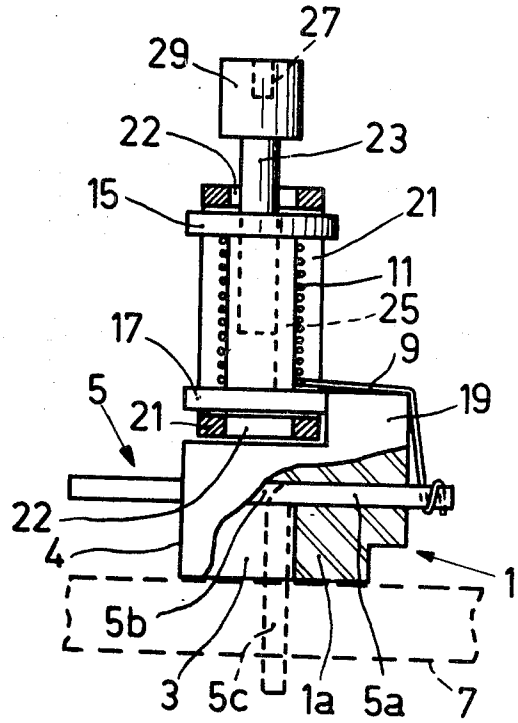
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[57] **ABSTRACT**

A small high frequency coil having a synthetic resin base with a plurality of parallel grooves which extend to the lower surface of the base and to one side face thereof. Each groove contains a wire-shaped connecting contact with a portion thereof embedded in the base whereas a second portion is partly contained within the groove and protrudes from said one side face. The second portion of the wire-shaped contact is adapted to be bent at right angles to a position in which it protrudes from the lower surface of the base. The coil can be conveniently mounted on a printed circuit board with the coil axis either parallel or perpendicular to the board.

9 Claims, 3 Drawing Figures



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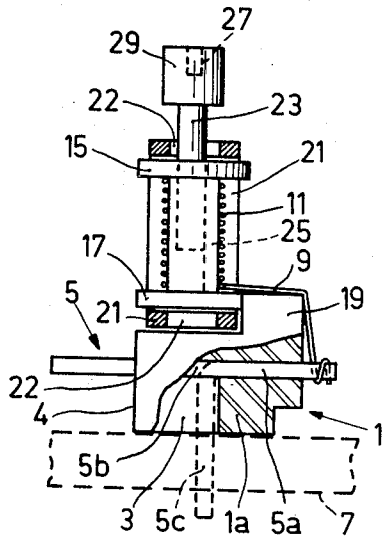


Fig.1

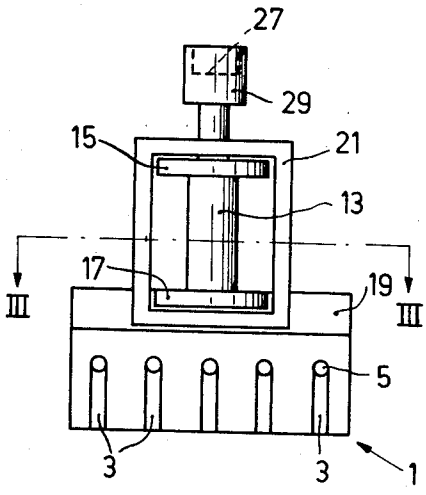


Fig.2

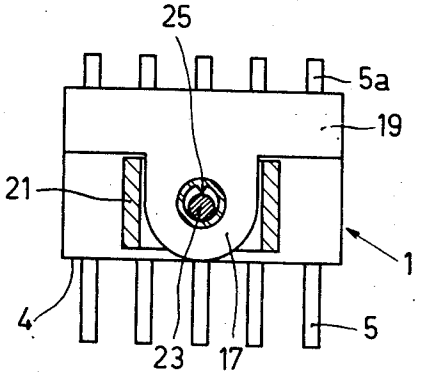


Fig.3

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HIGH-FREQUENCY COIL HAVING A SYNTHETIC RESIN BASE

This invention relates to a high-frequency coil having a base made of synthetic resin and wire-shaped connecting contacts which also serve for mounting on a printed-circuit board. The object of the invention is to provide a construction which is suitable for inexpensive series manufacture and which can be mounted on a printed-circuit board with the coil axis both parallel to and perpendicular to said board.

According to the invention we provide a high frequency coil with a winding supported on the upper side of a base of synthetic resin having two opposite side faces and being provided with wire-shaped connecting contacts which also serve for mounting the base on a printed circuit board. In accordance with the desired mounting position, the portions serving as soldering tags may be straight or may be bent at right angles. The length and depth of the grooves are preferably chosen such that the wire-shaped connecting contacts contained therein protrude equally far from the base, both in the straight condition and in the condition where they are bent at right angles around the material of the base.

In order that the invention may be readily carried into effect, one embodiment thereof will now be described in detail, by way of example, with reference to the accompanying drawing, in which:

FIG. 1 is a side elevation and partly a vertical cross-sectional view of one embodiment, and

FIGS. 2 and 3 are another side elevation and a horizontal cross-sectional view, respectively, of the same device.

In a plan view (FIG. 3) the high frequency coil shown has a rectangular insulating base 1 made of synthetic resin which is provided at the lower side with generally parallel grooves 3 which extend perpendicular to the left-hand side face 4 (FIG. 1) of the base, their open left-hand ends terminating in this face. In the right-hand direction in FIG. 1 the grooves 3 terminate within the base 1. The coil has a number of wire-shaped connecting contacts 5 which are embedded into the material of the base 1 over a portion of their length. The embedded portion 5*a* of each of the contacts 5 is situated in line with the bottom portion (upper portions in FIGS. 1 and 2) of one of the grooves 3.

The coil is preferably manufactured with straight connecting contacts 5, as shown in FIG. 1, for mounting on a printed-circuit board engaging the left-hand side face 4 of the base. However, by using a suitable bending jig, it is readily possible to bend the portions 5*b* of the contacts 5, situated to the left of the embedded portions 5*a* in FIG. 1, around the material portion of the base 1, denoted by reference numeral 1*a*, at right angles for mounting as a soldering tag on a horizontal printed-circuit board 7 (denoted by broken lines in FIG. 1), as shown in broken lines by the bent-over position 5*c*. The depth and the length of each of the grooves 3 is chosen such that the connecting contact 5 protrudes in both positions approximately equally far — i.e. over the most suitable length for mounting — outside the base 1. The width of the groove 3 is approximately equal to the thickness of the connecting contact 5 so that the contact, which is bent at right angles, is a tight fit and cannot pivot around the embedded portion 5*a*.

The straight end (FIG. 1) of the contact portion 5*a* protrudes outside the base 1 from the side face of the base 1 opposite to side face 4, and serves as a connecting point for one or more wire lead-outs 9 of the coil winding 11. This winding (not shown in the FIGS. 2 and 3) is accommodated on a coil former 13 extending perpendicular to the base 1 and having two flanges 15 and 17, which coil former has been moulded to form an internal unit with the base 1. The edge of the lower flange 17 coheres with an elongated elevation 19 which is formed on the base 1 above the row of embedded wire portions 5a. Between the flange 17 and the base 1 a space is left in which fits one side of a rectangular frame 21 of ferrite which is secured, for example, by gluing. This frame serves as a magnetic termination or yoke for the coil and has an opening 22 in the lower and in the upper side to allow passage of a preferably smooth cylindrical ferrite pin 21, which serves as an adjustable core for the coil. This pin is rotatable and vertically displaceable with some friction inside the former 13, as a resilient tag 25 is formed on the inside thereof which resiliently engages the pin 23. The displacement may be effected by a helical movement imparted to the core pin by means of a screw-driver engaging into a groove 27 which is formed in a synthetic resin head 29 secured to the upper end of the pin 23.

What is claimed is:

1. A high-frequency coil comprising a winding supported on the upper side of a synthetic resin base member having two opposite side faces and provided with a plurality of wire-shaped connecting contacts which also serve for mounting the base on a printed circuit board, the base of the coil including a plurality of approximately parallel grooves at the lower side which terminate at one end at one of said two opposite side faces, the other end of the grooves being situated inside the base, each groove containing a wire-shaped contact with each wire-shaped contact having a first portion partly contained within one of said grooves in which it is a tight fit and from which it protrudes in part, the protruding part serving as a soldering tag for making external connections whereas the remaining portion of the wire-shaped contact extends in line with the bottom of the groove and is embedded in the material of the base with an end portion protruding from the second one of said two opposite side faces, and the coil winding being connected to said protruding end portion.

2. A high-frequency coil as claimed in claim 1, wherein said first portion of each contact is adapted to be bent into a position at right angles to said remaining portion and wherein the length and the depth of the grooves are chosen such that the tag parts of the wire-shaped connecting contacts contained therein protrude equally far from the base, both in the straight condition and in the condition where they are bent at right angles around the material of the base.

3. A high-frequency coil as claimed in claim 1 further comprising a coil former composed of synthetic resin extending perpendicular to the base and having a pair of flanges, one of said flanges forming an integral unit with the base, around which a ferrite frame which serves as a magnetic yoke is provided, characterized in that the edge of said one flange of the coil former coheres with an elevation member formed on a portion of the base member so as to provide a space between

the one flange and the coil base, and means securing one side of the ferrite frame within said space.

4. A high frequency coil as claimed in claim 3 wherein said first portion of each contact is adapted to be bent into a position at right angles to said remaining portion and wherein the length and depth of the grooves are arranged so that the tag parts of the wire-shaped contacts protrude the same distance from the base in either the straight or bent position thereof.

5. A high-frequency coil comprising a coil former with a base member for mounting the coil to a board and having a pair of opposed side walls, a winding mounted on the coil former with its axis perpendicular to the base member, a plurality of parallel grooves located in the bottom surface of the base member and extending perpendicular to the coil axis, said grooves extending from a first one of said side walls to a point inside the base member, a plurality of wire-shaped contacts each located with a first part in a respective groove and one end protruding from said one side wall for making external connections thereto and a second part in line with its respective groove and totally embedded within the base member with a second end protruding from the other of said side walls to provide a connecting terminal for said winding, said first part of each contact being adapted to be bent into a position perpendicular to the second part so as to protrude from said bottom surface of the base.

6. A coil as claimed in claim 5 wherein said grooves are dimensioned so that said one end of the wire-shaped contacts protrude substantially the same distance from the side wall and the bottom surface of the base member in the in-line and bent positions, respectively, of the contacts.

7. A coil as claimed in claim 6 wherein said coil former extends perpendicular to the base member and includes a flange that is an integral unit with the base member and forms a recess with a part of the base member, and a magnetic yoke frame member with one end located within said recess.

8. A coil as claimed in claim 6 further comprising a cylindrical ferrite core axially movable within said coil former to adjust the inductance of the coil.

9. A coil as claimed in claim 6 wherein said base member has a generally rectangular shape and is composed of a synthetic resin material.

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