

(45)

HIGH-FREQUENCY COIL COMPRISING CONNECTION PINS.

The invention relates to a high-frequency coil comprising a coil winding which is supported on a coil former on a plastics base in which are embedded wire connection contacts which extend
5 perpendicularly to the axis of the coil former and each of which has first and second end portions projecting from the base, at least one lead of the winding being connected to the first end portion of a connection contact.

A high-frequency coil of this kind is known from United
10 Kingdom Patent Specification No. 1,293,886. It is also known therefrom to bend the second end portion of each connection contact through 90° and use these portions of the contacts for mounting the coil on a board comprising surface wiring with the axis of the coil former perpendicular to the plane of the board. During bending,
15 the material of the connection contacts, as well as that of the base, is subjected to mechanical stresses; this imposes restrictions as regards the choice of the properties and the thickness of these materials. Moreover, the length of the part to be bent is usually not sufficient for attaching the coils
20 temporarily to a tape-like carrier, as is often desirable for the automated mounting of the coils on a board comprising surface wiring, for example, a printed-wiring board.

It is an object of the invention to provide a high-frequency coil which is suitable for mounting on a printed-wiring board or
25 the like with the axis of the coil former perpendicular to the plane of the board, without any bending of the connection contacts being necessary.

According to the invention there is provided a high-frequency coil comprising a coil winding which is supported on a coil former
30 on a plastics base in which are embedded wire connection contacts which extend perpendicularly to the axis of the coil former and each of which has first and second end portions projecting from the base, at least one lead of the winding being connected to the first end portion of a connection contact, wherein the coil further
35 comprises connection pins, each of which comprises a first portion

which extends parallel with and is electrically connected to the second end portion of an associated one of the connection contacts, each connection pin also comprising a second portion which extends from the base in a direction perpendicular to the first portion of the pin and parallel to the axis of the coil former.

The second portions of the connecting pins serve for establishing an electrical connection between the coil and a printed-wiring board and, if desired, for mounting the coil on the board.

The connection between each connection pin and the associated connection contact is preferably formed by a welded joint.

Embodiments of the invention will be described in detail hereinafter with reference to the accompanying drawings, in which

Figure 1 is an elevation, partly in section, of a first embodiment of a high-frequency coil in accordance with the invention the section being taken on the line I-I in Figure 2,

Figure 2 is an elevation of this coil viewed at right angles to Figure 1,

Figure 3 is a sectional view of part of a second embodiment and

Figure 4 is an elevation of a part of a tape-like carrier with a number of coils in accordance with the invention, for use in the automated mounting of the coils.

The high-frequency coil shown in Figures 1 and 2 comprises a winding 1 (denoted by dotted lines) supported on a coil former 3 which is made of an insulating material and which is mounted on a plastics base 5 with the axis 4 of the coil former extending perpendicularly to the flat lower face of the base 5. The coil former 3 and the base 5 are preferably formed integrally as one plastics unit. A ferromagnetic core 7 is displaceable in the coil former. If desired, the coil former 3 may be made of a ferromagnetic material (for example, ferrite) and be connected to the base 5, for example, by adhesive.

Wire connection contacts 9 made of, for example, phosphor bronze, are embedded in the base 5 so as to extend perpendicularly

to the axis 4 of the coil former 3. Each contact has first and second end portions 11 and 13 respectively projecting from the base. A lead 15 of the winding 1 is connected to the first end portion 11 of a contact 9, for example, by a welded or soldered joint 17. If desired, several leads 15 may be connected to the first end portion 11 of one contact. For establishing an electrical connection between the coil and, for example, a printed-wiring board, and for mounting the coil on such a board, connection pins 19 are provided, each of which is connected to an associated one of the connection contacts 9. Each connection pin 19 comprises first and second portions 21 and 23 which extend perpendicularly to one another. In this embodiment each connection pin is bent into an L shape so that it has two limbs extending perpendicularly to one another and comprising the first and second portions respectively of the pin. The connection pins 19 may be made of, for example, copper wire. The first portion 21 of each pin 19 extends parallel to the second end portion 13 of the associated connection contact 9. The two parallel portions 13 and 21 are in contact with one another and are electrically and mechanically interconnected, preferably by a welded joint 27. Part of that limb of each connection pin 19 which comprises the first portion 21 of the pin extends in an associated groove 25 in the lower side of the base 5, which groove also accommodates a portion of the associated connection contact which adjoins the second end portion 13 thereof. The limb of each connection pin 19 which comprises the second portion 23 of the pin extends from the lower side of the base 5 in a direction parallel to the axis 4 of the coil former 3 to serve for establishing an electrical connection between the coil and, for example, a printed-wiring board, and if desired, for mounting the coil on the board. The embodiment shown in Figures 1 and 2 comprises two connection pins 19, the second portions 23 of which are situated in a plane containing the axis 4 of the coil former 3 (the plane of drawing of Figure 2). This is convenient for the automated mounting of the coil on a printed-wiring board.

Figure 3 is a sectional view of the base 5 of a second embodiment of the high-frequency coil in accordance with the invention. This view corresponds to the lower part of Figure 1 and corresponding parts are denoted by the same reference numerals as in Figure 1. In this embodiment each connection pin 19 is bent through 90° at three points and in one plane so that it comprises not only first and second portions 21 and 23 which extend perpendicularly to one another but also an intermediate portion 29 which extends parallel to the first portion 21 but which is offset therefrom in the direction of the second portion 23. The intermediate portion 29 extends along and adjoins the lower side of the base 5 so that it is not necessary to provide a groove 25 in the base. It may be desirable, however, to provide a filler block 30 on the lower side of the base 5 adjacent the intermediate portion 29. Thus, the coil will not be supported only by the intermediate portion after mounting on a printed-wiring board; otherwise it might become tilted. If desired, the filler block 30 may be formed by a separate block of plastics which is glued to the lower side of the base 5. In that case a specially adapted mould will not be required for forming the base 5, which may be done by, for example, injection moulding.

Figure 4 shows a part of a tape-like carrier 31 in which coils in accordance with the invention are carried. A carrier of this kind may be wound onto a reel which can be arranged in a known machine for automated mounting of the coils. This machine gradually unwinds the carrier 31 from the reel and successively removes the coils one by one for mounting on a printed-wiring board, for example, by soldering. The coils are attached to the carrier by inserting the second portions 23 of the connection pins 19 of the coils into pockets extending transversely of the longitudinal direction of the carrier 31. Consequently, these second portions 23 are comparatively long; their length is greater than twice the length of the second end portions 13 of the connection contacts 9, for example, ten times the length thereof. After the removal of the coils from the carrier, the second..

portions 23 of the connection pins can be cut to a length which is desirable for mounting the coils.

5

10

15

20

25

30

35

20



CLAIMS:

1. A high-frequency coil comprising a coil winding which is supported on a coil former on a plastics base in which are embedded wire connection contacts which extend perpendicularly to the axis of the coil former and each of which has first and second end portions projecting from the base, at least one lead of the winding being connected to the first end portion of a connection contact, wherein the coil further comprises connection pins, each of which comprises a first portion which extends parallel with and is electrically connected to the second end portion of an associated one of the connection contacts, each connection pin also comprising a second portion which extends from the base in a direction perpendicular to the first portion of the pin and parallel to the axis of the coil former.
2. A high-frequency coil as claimed in Claim 1, wherein the connection between each connection contact and the associated connection pin is formed by a welded joint.
3. A high-frequency coil as claimed in Claim 1 or 2, comprising at least two of said connection pins arranged with their second portions situated in a plane containing the axis of the coil former.
4. A high-frequency coil as claimed in any of the preceding claims, wherein the connection pins are L-shaped so that each pin comprises first and second limbs extending perpendicularly to one another and comprising the first and second portions respectively of the pin, part of the first limb of each connection pin extending in an associated groove in the base, which groove also accommodates a portion of the associated connection contact which adjoins the second end portion thereof.
5. A high-frequency coil as claimed in any of the preceding claims, wherein the length of the second portion of each connection pin is greater than twice the length of the second end portion of the associated connection contact.
6. A high-frequency coil substantially as herein described with reference to Figures 1 and 2 or Figure 3 of the accompanying drawings.