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TAP STRUCTURE FOR REACTIVE DEVICE

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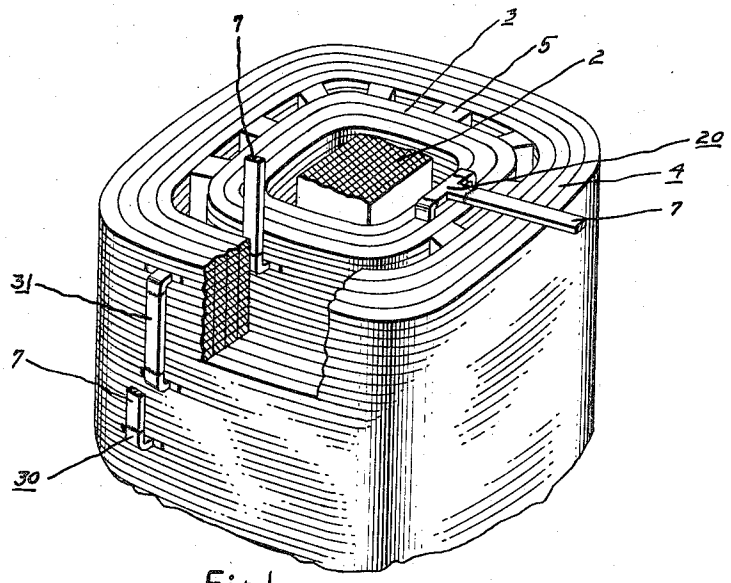


Fig 1.

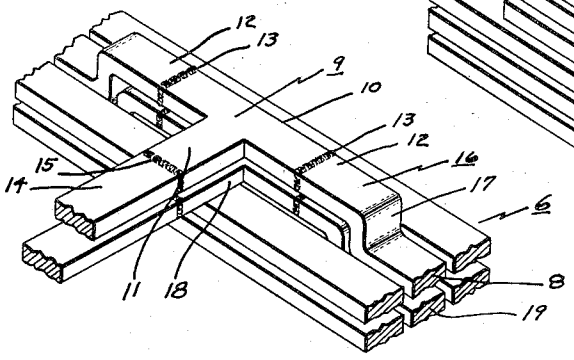


Fig 2.

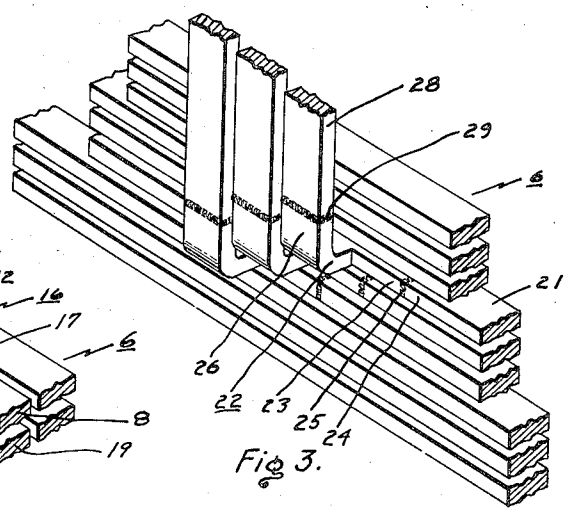


Fig 3.

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TAP STRUCTURE FOR REACTIVE DEVICE

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This invention relates to reactive devices and more particularly to reactive devices having tapped leads connected thereto.

Reactive devices, such as transformers, autotransformers and reactors are frequently provided with one or more tap leads connected to the winding intermediate the ends thereof. The coils of larger reactive devices are frequently formed of rectangular wire or bar stock. In the past, these conductors have conventionally been copper and the necessary tap leads were merely brazed to the side or top of the conductor. It may be desirable however, to utilize some conductive material other than copper for the coils, such as aluminum. It has been found difficult to secure a satisfactory brazed connection to aluminum due to galvanic corrosion. It is therefore desirable to provide an improved reactive device construction which does not require the use of brazed connections for bringing out the tap leads. It is further desirable that such a construction facilitate the winding operation and that the tap connections be substantially corrosion free thus eliminating the formation of oxides and brittle joints.

It is therefore an object of this invention to provide an improved reactive device incorporating the desirable features set forth above.

Further objects and advantages of this invention will become apparent by reference to the following description and the accompanying drawing, and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

This invention, in its broadest aspects, provides a reactive device having a coil and a separate tap connection member for connecting the coil to a tap lead, the tap connection member having a substantially T-shaped configuration. The coil is split into at least two sections and the ends of the bar portion of the tap connection member are respectively joined to one end of each of two of the coil sections. The end of the leg portion of the tap connection member is then adapted to be connected to a tap lead, or may serve as a tap terminal itself.

In the drawing, Fig. 1 is a fragmentary view in perspective, partly broken away, illustrating a reactive device incorporating the improved construction of this invention;

Fig. 2 is a fragmentary view in perspective illustrating one type of improved tap connection in accordance with this invention; and

Fig. 3 is another fragmentary view in perspective illustrating another form of the improved tap connection of this invention.

Referring now to Fig. 1, there is shown a reactive device, generally identified as 1, shown here as being a transformer, having a core portion 2 preferably formed of a plurality of relatively thin laminations of magnetic material. The core 2 is surrounded by an inner coil 3, which may be the primary winding, which in turn is surrounded by an outer coil 4, which may be the secondary

winding, the coils 3 and 4 being separated by conventional spacers 5.

Referring now to Figs. 2 and 3 in addition to Fig. 1, it is seen that the coils 3 and 4 of the reactive device 1 are formed of conductors 6 having a substantially rectangular cross section. In order to provide tap connections 7 for the coils 3 and 4, an individual turn 8, as shown in Fig. 2, from which the tap lead is to be taken, is split thus dividing the coil into at least two sections. A separate tap connection member 9 is provided having a leg portion 11 extending from a side edge of bar portion 10. The tap member 9 is preferably formed of sheet material so that the bar portion 10 and the leg portion 11 thereof have substantially rectangular cross sections corresponding to the cross section of the conductor 6. In the alternative, tap connection member 9 may be fabricated from a section of bar stock having a rectangular cross section with the leg portion being integrally joined thereto in any suitable manner, such as helium arc welding. The ends of the bar portion 10 are integrally joined to the ends 12 of the two sections of turn 8 of the coil in any suitable manner, as at 13. These connections may be made, in the case of aluminum conductor, by resistance butt upset welding. In accordance with this welding technique, current is passed through the joint and the resistance of the butt joint heats the adjacent areas to the desired welding temperature. Pressure is continuously applied by the welding apparatus so that the ends are forged together. Tap lead 14, also having a substantially rectangular cross section preferably corresponding to the cross section of leg portion 11 of tap connection member 9, may then be similarly integrally joined to the leg portion 11 of tap connection member 9, as at 15.

It will be seen in Fig. 2 that the portion 16 of turn 8 of the coil in which the tap connection member 9 is located is off-set from the remaining portion of the turn as at 17, so that the leg portion 11 and tap lead 14 are spaced from the other conductors of the coil. This off-set may be sufficiently high to permit another tap connection 18 to be taken from an inner turn 19. A connection of this type may be used to take a tap lead from the top of the coil when the coil is edgewise wound, as shown at 20 in Fig. 1 or, in the event that the coil is flat wound, to take a tap lead from the side of the coil.

Referring now to Fig. 3, the particular turn 21 from which the tap lead is to be taken is again split to form two coil sections and substantially T-shaped tap connection member 22 is provided with the ends 23 of its bar portion integrally joined to the ends 24 of conductor 21, as at 25. Here, the end 26 of the leg portion of tap connection member 22 may be formed at right angles to the plane of conductor 21 so that the tap lead 28, which is integrally joined to end 26 of tap connection 22 as at 29, is parallel to the side of the coil. Such a connection may be used in an edgewise wound coil, as shown at 30 in Fig. 1 to take a tap connection from a side of the coil. It will be obvious that this construction may also be used for making inter coil connections, as at 31 in Fig. 1. It will also be obvious that the leg portions 11 and 26 of the tap connection may be formed as terminals for direct connection of external leads instead of having the tap leads 14 and 28 integrally joined thereto.

It will now be readily apparent that this invention provides an improved reactive device construction wherein tap leads may be brought out without the use of joints subject to corrosion and brittleness.

While we have shown and described particular embodiments of this invention, further modifications and improvements will occur to those skilled in the art and we desire in the appended claims to cover all modifications which do not depart from the spirit and scope of this invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a reactive device, a coil formed of a conductor having a substantially rectangular cross section, and a tap connection member for connecting said coil to a tap lead, said tap connection member having a substantially T-shaped configuration, with its leg portion extending from a side edge of its bar portion, said bar portion of said tap connection member having a substantially rectangular cross section, said coil having at least two sections, the ends of said bar portion of said tap connection member being respectively integrally joined to one end of each of two of said coil sections, the leg portion of said tap connection member being adapted to be connected to said tap lead.

2. In a reactive device, a coil formed of a conductor having a substantially rectangular cross section, and a tap connection member for connecting said coil to a tap lead, said tap connection member having a substantially T-shaped configuration with its leg portion extending from a side edge of its bar portion, said bar portion and said leg portion of said tap connection member having a substantially rectangular cross section, said coil having at least two sections, the ends of said bar portion of said tap connection member being respectively integrally joined to one end of each of two of said coil sections, and a tap lead having a substantially rectangular cross section integrally joined to the end of said leg portion of said tap connection member.

3. In a reactive device, a coil formed of a conductor having a substantially rectangular cross section, and a tap connection member for connecting said coil to a tap lead, said tap connecting member having a substantially T-shaped configuration with its leg portion extending from a side edge of its bar portion, said bar portion of said tap connection member having a substantially rectangular cross section, said coil having at least two sections, the ends of said bar portion of said tap connection member being respectively joined to one end of each of two of said coil sections, said leg portion of said tap connection member being adapted to be connected to said tap lead, said leg portion extending at an angle to the plane of said bar portion.

4. In a reactive device, a coil formed of a conductor having a substantially rectangular cross section, and a tap connection member for connecting said coil to a tap lead, said tap connection member having a substantially T-shaped configuration with its leg portion extending from a side edge of its bar portion, said bar portion of said tap connection member having a substantially rectangular cross section, said coil having at least two sections, the ends of said bar portion of said tap connection member being respectively integrally joined to one end of each of two of said coil sections, said leg portion of said tap connection member being adapted to be connected to said tap lead, said leg portion extending at right angles to the plane of said conductor.

5. In a reactive device, a coil formed of a conductor having a substantially rectangular cross section, and a tap connection member for connecting said coil to a tap lead, said tap connection member having a substantially T-shaped configuration with the leg portion extending from a side edge of its bar portion, said bar portion of said tap connection member having a substantially rectangular cross section, said coil having at least two sections, the ends of said bar portion of said tap connection member being respectively integrally joined to one end of each of two of said coil sections, said leg portion of said tap connection member being adapted to be connected to said tap lead, said ends of said coil sections to which said tap connection member is joined being off-set from the remainder of said coil sections, said leg portion of said connection member extending over said coil and being spaced therefrom.

6. In a reactive device, a coil formed of a conductor having a substantially rectangular cross section, a tap connection member for connecting said coil to a tap lead, said tap connection member having a substantially T-shaped configuration with its leg portion extending from its side edge of its bar portion, said bar portion and said leg portion of said tap connection member having a substantially rectangular cross section, said coil having at least two sections, the ends of said bar portion of said tap connection member being respectively integrally joined to one end of each of two of said coil sections, the leg portion of said tap connection member extending at right angles to the plane of said bar portion, and a tap lead having a substantially rectangular cross section integrally joined to the end of said leg portion of said tap connection member.

7. In a reactive device, a coil formed of a conductor having a substantially rectangular cross section, a tap connection, member for connecting said coil to a tap lead, said tap connection member having a substantially T-shaped configuration with its leg portion extending from its side edge of its bar portion, said bar portion and said leg portion of said tap connection member having a substantially rectangular cross section, said coil having at least two sections, the ends of said bar portion of said tap connection member being respectively integrally joined to one end of each of two of said coil sections, and a tap lead having a substantially rectangular cross section integrally joined to the end of said leg portion of said tap connection member, said end of said coil sections to which said tap connection member is joined being off-set from the remainder of said coil sections, said tap lead extending over said coil and being spaced therefrom.

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