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D. C. VAN IPEREN

2,790,055

INDUCTOR

Filed Sept. 24, 1953

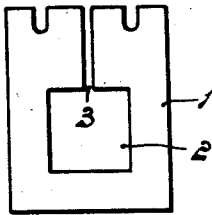


Fig. 1

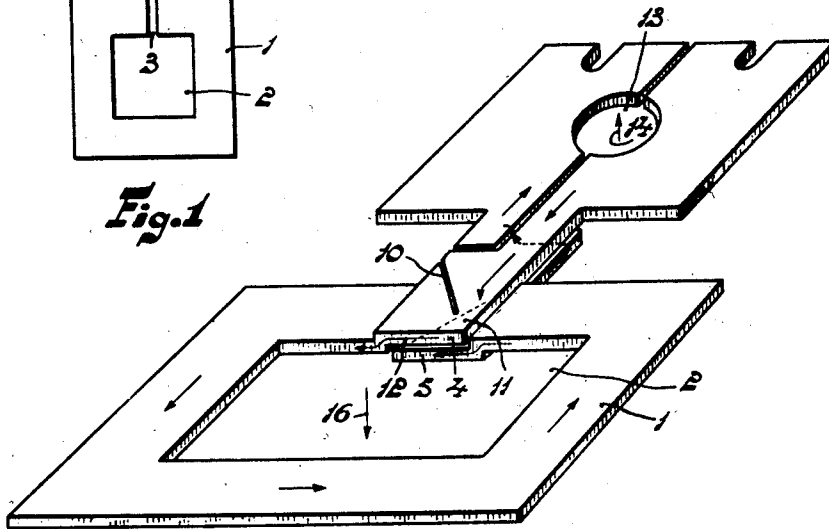


Fig. 3

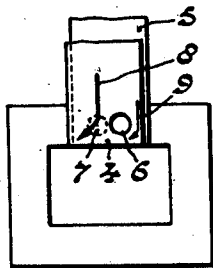


Fig. 2

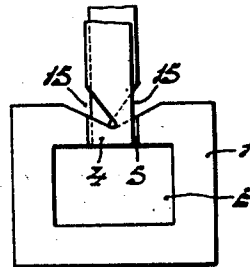


Fig. 4

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AGENT

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2,790,055

INDUCTOR

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Claims priority, application Netherlands October 16, 1952

1 Claim. (Cl. 219—10.79)

This invention relates to inductors and more particularly to plate-shaped inductors for inductive HF-heating.

According to the invention, parts of the inductor in the axial direction thereof and adjacent the inner edge of the working aperture are arranged with small spacing and in overlapping position at the area of the connections to the supply conductors, at least one part having a narrowed portion in planes at right angles to the axial direction of the inductor.

The use of the said overlapping parts results in more satisfactory heating of the work-piece at this area in contradistinction with the case in which an ordinary inductor is used, since the current path and hence the magnetic field surrounding the work-piece is then interrupted due to the air-gap between the current supply areas.

Furthermore, the narrowed part makes it possible for the current path and the current strength in at least one of the overlapping parts at the inner edge bounding the working aperture of the inductor to be matched to the requirements imposed upon the heating of the work-piece.

According to a further feature of the invention, the narrowed part results from the presence of an aperture in one of the said parts.

In one particular embodiment, said aperture extends into one side of the said part, but preferably into the outer edge thereof.

Furthermore, it is frequently desirable that an aperture should be provided in each of the overlapping parts, in which case the apertures are preferably located symmetrically with respect to one another.

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

Fig. 1 shows a prior art inductor,

Fig. 2 shows an improved form of inductor,

Fig. 3 shows a plate shape inductor which is a further, more improved, plate-shaped inductor embodying the present invention, and

Fig. 4 is another embodiment of the present invention.

In Fig. 1, reference numeral 1 indicates an ordinary plate-shaped inductor having a working aperture 2 in which the work-piece is arranged. Due to the presence of an air-gap 3, the work-piece in the vicinity of the air-gap is heated insufficiently with respect to the other part thereof.

The aforesaid disadvantage is mitigated due to the use of overlapping parts 4 and 5 arranged with small spacing in the axial direction of the inductor (see Figures 2 and 3). The current flowing through the said two parts is rectified (see the arrows in Figure 3). However, in order to prevent the magnetic field at this area from being unduly strong with respect to the field in the other part of the circuit, at least one part exhibits a narrowed portion. In Figure 2, this portion results

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from the use of an aperture 6 in the part 4. Such an aperture indicated by 7 may also be provided in the part 5. The larger proportion of the current follows the path indicated diagrammatically by a large arrow 8, a smaller proportion following the path indicated by a small arrow 9, since the resistance along the last-mentioned path is higher due to the presence of aperture 6. A suitable distribution of current in connection with the desired heating of the work-piece may thus be obtained, even if in particular cases in the region of the overlapping parts 4 and 5 a temperature of the work-piece is locally desired which is higher than in the other part thereof.

In Figure 3, a sawcut 10 instead of the aperture 6 of Figure 2 is provided. According to the position of this sawcut, which is more to the left or more to the right and/or shorter or longer, the current is forced more or less into a corner 11, so that the current 12 in the overlapping part 4 at the inner edge bounding the work-piece may be caused by the said means to have a smaller or greater influence. A similar sawcut may be provided in the other part 5 at the area indicated by a dotted line in Fig. 3.

My co-pending application Serial No. 289,052, now Patent No. 2,714,648, suggests that a second aperture should be provided in series with the working aperture to permit matching of the impedance. If such an aperture 13 is used in the supply conductors of the inductor shown in Fig. 3, the particular advantage is obtained that the field generated by the current flowing round the aperture 13 strengthens the field within the working aperture 2. If the field in the aperture 13 is directed according to arrow 14, the field in the working aperture 2 extends in the opposite direction according to arrow 16, since the sense of the current is opposite to that around the aperture 13. The field in the vicinity of the overlapping parts 4 and 5 in the working aperture 2 will thus be strengthened more than in the other part of the working aperture, the spacing between the apertures 2 and 13 here being smallest and the influence of the field 14 decreasing according as the spacing increases. It is thus possible to obtain automatically strengthening of the field adjacent the parts 4 and 5, so that the length of the overlapping parts may be reduced, resulting in saving of material.

Finally, in Fig. 4 a different shape of the aperture 10 is indicated by 15.

Such inductors are important more particularly for soldering tins or similar objects.

While I have shown and described the preferred embodiment of my invention, it will be understood that the latter may be embodied otherwise than as herein specifically illustrated or described and that in the illustrated embodiment certain changes in the details of construction and in the arrangement of parts may be made without departing from the underlying idea or principle of the invention within the scope of the appended claim.

What I claim is:

A plate-shaped inductor for high frequency heating having a working aperture therein comprising a pair of supply conductors, a pair of spaced parts on said inductor connected to said supply conductors and being laterally displaced to locations out of the plane of said inductor and arranged in superposed relationship to one another and forming an airgap therebetween, and at least one of said superposed parts having at least one slit-like aperture extending into one side of said one part whereby the desired distribution of current in said inductor is furnished.

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