Feb. 7, 1967 H. KUHLBARS 3,303,314

INDUCTOR

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Fig. 1

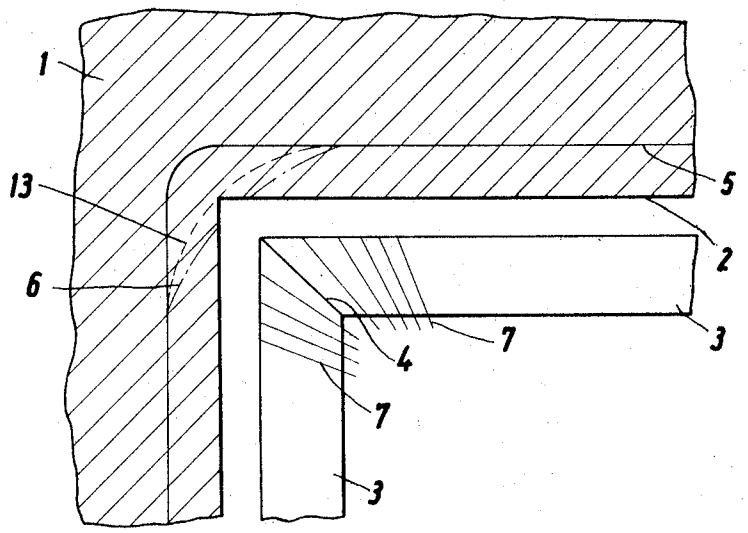
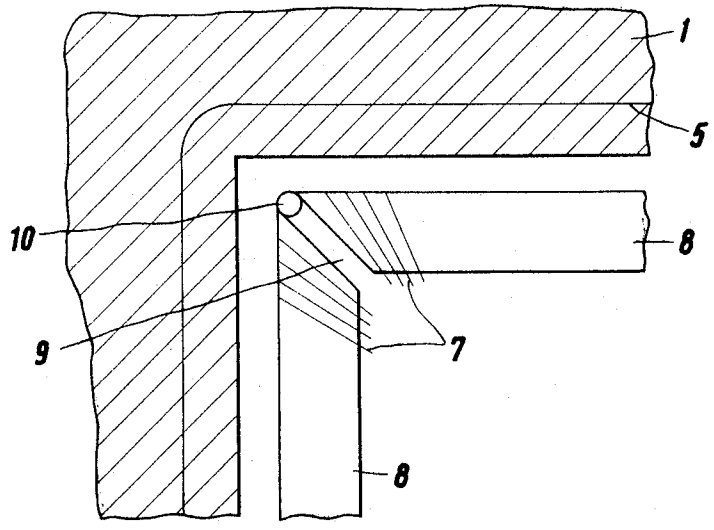



Fig. 2



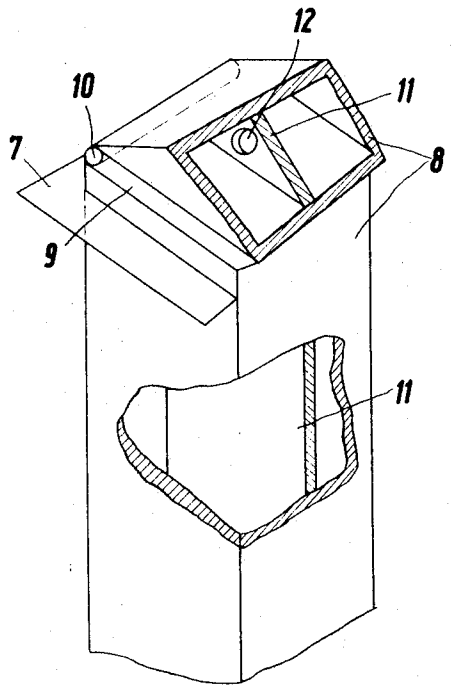

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Fig. 3




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United States Patent Office

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# INDUCTOR

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2 Claims. (Cl. 219—10.43)

The invention relates to an inductor for heat treating workpiece faces meeting at an angle.

It is already known that inductors may be constructed roughly to conform with the contours of the work they are intended electro-inductively to heat. This applies irrespectively as to whether it is desired to heat exclusively the surface or the entire cross section of the work. However, particularly in cases in which the heating operation forms part of a surface treatment, for instance for hardening the surface, difficulties arise in producing a suitable temperature distribution in the work at points where two workpiece faces angularly meet. For dealing with this situation the inductor is constructed to make a matching angle at such a corner, but the distribution of the current in the cross section of the conductor at the corner then tends to be such that an adequate intensity of the heat supplying sources and hence the required heating effect in the region of the vertex of the angle in the workpiece is not produced.

As known, it has already been proposed to remedy this defect by providing magnetic yokes made of laminar iron sheet. However, where a conductor makes a sharply angled corner such laminations cannot be suitably mounted to produce a satisfactory effect which extends well into the actual corner in the work. This phenomenon is connected with the fact that on the inside of an angle in the conductor there is less room for mounting laminations than on the outside of the angle.

It is the object of the present invention to provide an inductor which will have a penetrating heating effect even in corners where two workpiece faces make an angle. According to the invention this is achieved by mitre cutting the conductor at the corner and electrically joining the mitred ends only at the outside vertex of the mitre angle. This brings about a concentration of the field lines in the corner and thus intensifies the field sufficiently to produce a penetrating thermal effect into the workpiece corner, exceeding that which known angular inductors can provide.

In a preferred arrangement the mitred joint is filled with an insulating material to provide the required mechanical strength. The electrical connection is formed by welding a wire across the joint. Conveniently the hollow conductor sections are of the twin chambered type, the central web being perforated at the joint.

In the drawings FIG. 1 is a view of a workpiece in association with a conventional inductor,

FIG. 2 is a view of an inductor according to the invention, whereas

FIG. 3 is a fragmentary part sectional perspective view of the proposed inductor.

Assuming that the problem is to surface harden a corner region 2 in a workpiece 1, then the inductor would have effective sections marked 3 in FIG. 1 and the inductor would be moved across the surface of the work in a direction normal to the plane of the paper. The effective sections 3 of the inductor form an angle at 4. Their ends are therefore mitred in such a way that the resultant angle conforms with the corner region 2 of the workpiece 1. If it is now desired to heat and hence to harden a surface zone defined by the line at 5, then this cannot be done with an inductor of the kind shown in FIG. 1. The hardened zone which is actually achieved with this inductor has the shape indicated by the dot-dash line at 6.

This shape of hardened zone can be improved to conform a little better with the shape of the desired hardened zone, as defined by 5 and to assume the shape indicated by the chain line 13, if laminar yokes 7 are mounted on the inductor. However, a hardened zone of the desired shape is not achieved.

The invention permits this to be remedied by leaving a gap 9 between the mitred ends of the two inductor sections. A copper wire 10 welded or soldered across the joint at the vertex of the angle formed by the mitre cuts provides the necessary electrical connection between the inductor sections. Conveniently the gap in the mitred joint 9 is filled with an insulating material suitable for imparting the necessary mechanical strength to the joint. The effect of this inductor can now be quite substantially further improved by mounting magnetic yokes 7 on the sections 8 in the same way as shown in FIG. 1.

As known, inductors usually require cooling. To this end the sections 8 of the inductor have the form of twin chambered sections, the dividing web 11 being perforated in the region of the mitre cut 9, as indicated at 12. The liquid coolant can thus flow from one chamber into the other.

What I claim is:

1. An inductor for heat treating an angular workpiece comprising angularly arranged conductor portions having opposed end mitre faces electrically connected only in the region of the outer vertex of the mitre angle and comprising a wire forming the said electrical connection and being welded across the said end mitre faces and insulating material filling the said gap between the said faces.

2. An inductor for heat treating an angular workpiece comprising angularly arranged conductor portions having opposed end mitre faces electrically connected only in the region of the outer vertex of the mitre angle, said conductor portions being hollow and being each provided with an internal partition forming twin longitudinal chambers therein, said partition being perforated in the region of the mitre joint.

**References Cited by the Examiner**

UNITED STATES PATENTS

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| 2,810,053 | 10/1957 | Messner | 219—10.79 X |
| 2,810,054 | 10/1957 | Jones | 219—10.79 X |

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