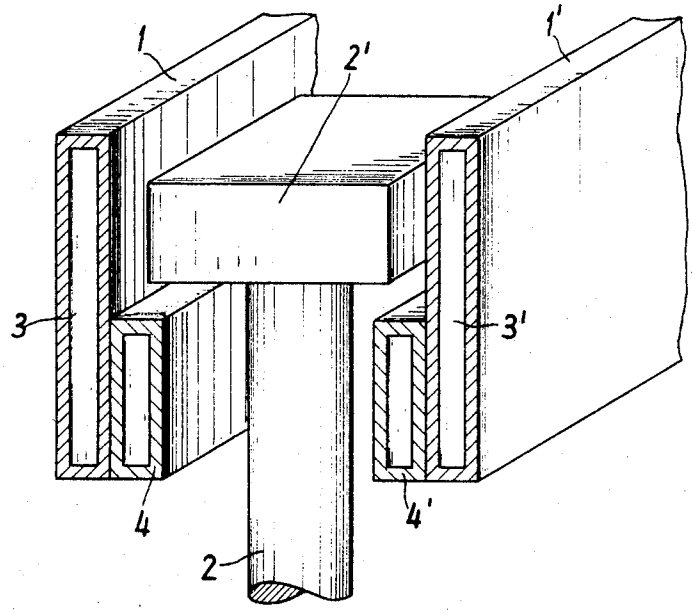
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CROSSFIELD INDUCTOR FOR INDUCTIVELY HEATING WORKPIECES OF VARYING CROSS SECTION

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CROSSFIELD INDUCTOR FOR INDUCTIVELY HEATING WORKPIECES OF VARYING CROSS SECTION

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ABSTRACT OF THE DISCLOSURE

In crossfield inductive heating arrangements using a single pair of conductor bars, difficulty is experienced in obtaining uniform heating of workpieces of varying cross section, e.g. screw blanks. This difficulty is obviated by providing relatively narrow supplementary conductor bars adjacent to and inbetween the principal conductor bars, more nearly to conform to the outline of the workpieces.

This invention relates to the inductive heating of electrically conducting workpieces in a transverse magnetic field generated between two parallel, adjustably spaced conductor bars.

In such inductive heating arrangements the adjustability of the parallel bars is necessary to permit the distance between the bars to be adapted to the varying sizes of the workpieces that are to be passed through the inductor and to provide a satisfactory coupling between the heating inductor and workpieces of different size.

However, such adjustment is difficult to effect if the workpieces that are to be inductively heated have cross sections which differ along the length. An example of such a workpiece is a blank for a screw or bolt.

The invention seeks to overcome this difficulty, whereby workpieces such as for example screw blanks may be evenly heated for a following hot working operation.

The invention consists of a crossfield inductor for heating workpieces of non-uniform cross section, comprising two principal conductor bars of width corresponding to the entire width of the heating zone and spaced so as to accommodate the largest cross section of the said workpiece, and associated with each of the said principal conductor bars and disposed adjacent to and inbetween the said principal conductor bars, a supplementary conductor bar of relatively narrow width.

The narrow supplementary inductor bars may be electrically connected to the principal conductor bars, or they may be electrically insulated therefrom. Each principal and its associated supplementary inductor bar may be conducted to the voltage source either in parallel or in series. In a preferred arrangement of the invention, the width of the supplementary conductor bars corresponds to the length of that part of the heated workpiece which has the smaller cross section, and the width of the principal inductors is equal to the overall length of the workpiece, to achieve even heating of the workpiece.

An embodiment of the invention is hereinafter described and illustrated in the accompanying drawing which is a perspective representation of the cross field inductor arrangement of the invention showing a workpiece in the form of a screw blank in course of being conducted between the bars.

The width of the crossfield inductor comprising the conductor bars **1** and **1'** preferably corresponds to the total length of the workpiece **2** that is to be heated including the discontinuity in its cross section. As will be understood from the drawing the conductor bars **1** and

1', are provided with cavities **3** and **3'** in conventional manner for the passage therethrough of a liquid coolant. It is desirable to provide the sides of the conductor bars facing away from the workpiece with cores made of sheet metal or soft magnetic materials.

An inductor consisting exclusively of the conductor bars **1** and **1'** would adequately heat only the heads **2'** of the blanks. In the region of the shaft of the blank, supplementary narrower conductor bars **4** and **4'** are however, according to the invention located adjacent the inside of the conductor bars **1** and **1'**.

The arrangement according to the invention is also suitable for raising the temperature of a desired longitudinal portion of the workpiece, e.g. shaft, to the temperature of a head portion or to a higher temperature, and ensures that the electrical efficiency of the inductor is increased. This is due to the fact that a higher density current will flow through the conductors **4** and **4'** because of their lower inductivity. Consequently, the field intensity in this region of the inductor will be higher and capable of adjustment by a suitable selection of the dimensions of the conductor bars **4** and **4'**.

Since the power induced in the workpiece or in parts thereof is proportional to the square of the strength of the field, by selection of different field strengths in the several regions of the cross section, the desired pattern of heat distribution may be achieved in an arrangement according to the invention.

What is claimed is:

1. A crossfield inductor for heating workpieces of non-uniform cross section, comprising two principal conductors bars of width corresponding to the entire width of the heating zone and spaced so as to accommodate the largest cross section of the said workpiece, and associated with each of the said principal conductor bars and disposed adjacent to and inbetween the said principal conductor bars, a supplementary conductor bar of relatively narrow width.

2. A crossfield inductor according to claim **1**, in which each supplementary conductor bar is electrically connected to its associated principal conductor bars of the inductor.

3. A crossfield inductor according to claim **1**, in which the supplementary conductor bars are insulated from the main conductor bars.

4. A crossfield inductor according to claim **1**, in which the width of the supplementary conductor bars corresponds to the heating zone of the part of smaller cross section of the workpiece to be heated.

5. A crossfield inductor for uniformly heating workpieces of non-uniform cross section, comprising two principal conductor bars of width corresponding to the entire width of the heating zone and spaced so as to accommodate the largest cross section of the said workpieces, and a supplementary conductor bar of relatively narrow width corresponding to the heating zone of a part of smaller cross section of the workpiece to be heated affixed to each of said principal conductors bars, the principal and supplementary conductors bars substantially conforming to the outline of said workpieces to provide uniform heating thereof.

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