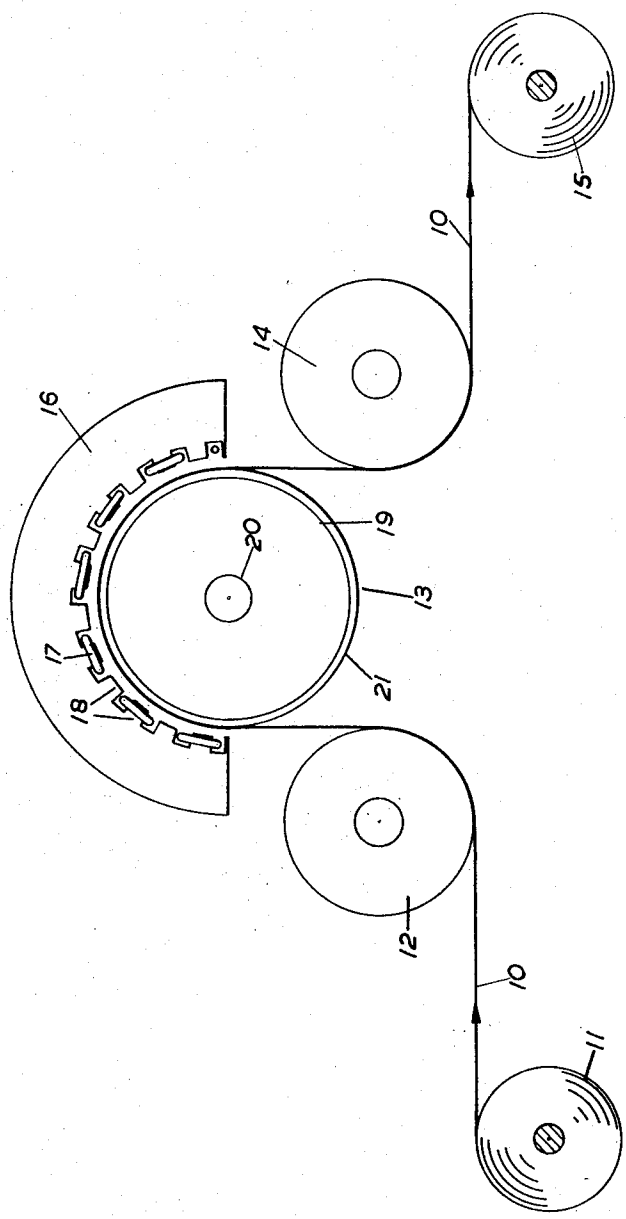
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ELECTRIC INDUCTION HEATING APPARATUS

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ELECTRIC INDUCTION HEATING APPARATUS

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1 Claim. (Cl. 219—47)

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This invention relates to electric induction heating apparatus for heat treatment of metallic strip progressively.

There are a number of forms of inductor suitable for heating a workpiece in strip form, which act asymmetrically on the workpiece, for example on only one side of it. That known as the pancake type comprises a flat spiral coil; that known as the hairpin or loop type comprises a single turn or multiple turns of elongated shape; whilst various forms of iron cored inductor are available employing a single turn or a number of turns associated with a laminated or powder core of magnetic material to concentrate the flux. All types of inductors when energised and presented to one side of the workpiece set up mechanical forces which tend to move the strip towards, or away from, the inductor, depending on whether the workpiece is magnetic or not. In order to maintain a constant heat input to a workpiece in strip form, and hence a constant temperature, it is essential to maintain constant the relative position between the strip and the inductor. Moreover in many cases it is important not to impair the surface finish of the strip, and this rules out the use of guides through which the strip rubs, since these would tend to scratch and spoil the surface.

It is therefore an object of the invention to provide means for the heat treatment of metallic strip by electric induction heating in which the relative position of the inductor and strip is kept constant without scratching the surface of the strip.

According to the present invention electric induction heating apparatus for heat treatment of metallic strip includes a locating roller round a portion of the circumference of which the strip is wrapped, an inductor acting on that side of the strip remote from the roller, and means for keeping the strip in tension as it is advanced. The inductor may be of any of the forms referred to above, but is preferably suitably curved to conform to the curvature of the strip as it passes round the locating roller.

The invention may be carried into practice in various ways, but one specific embodiment will now be described by way of example with reference to the accompanying drawing, which represents diagrammatically in side elevation electric induction heating apparatus for the heat treatment of metal strip.

In this embodiment the strip 10 is fed from a supply roll 11, under a guide roller 12, over a locating roller 13, and under a second guide

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roller 14 to a take-up roller 15. The relative position of the locating roller 13 and the two guide rollers 12 and 14 is such that the strip 10 is wrapped round anything up to about half the circumference of the locating roller. The strip 10 is kept in tension by winding mechanism acting on the take-up roll 15 and supply roll 11, thereby holding it firmly in contact with the locating roller 13, which rotates freely. An inductor 16 acts upon the side of the strip 10 remote from the locating roller 13. The inductor 16 is of laminated cored type with the winding 17 wound in sinuous form around teeth 18 in the stack of laminations. The core is curved so as to conform to the curvature of the strip 10 as it approaches, passes round and recedes from the locating roller 13. In the construction shown in the drawing, in which the strip 10 passes round half the circumference of the locating roller 13, the core is of semi-cylindrical shape as shown.

The construction of the locating roller 13 may vary but in this embodiment it comprises a refractory drum 19 mounted on a steel spindle 20 and covered with a smooth heat-resisting metal tube 21. In this case the heat resisting tube 21 will be heated by induction and heat will be conducted from it to the strip 10, thus supplementing the heat produced by induction in the strip itself.

The apparatus may be employed for continuous hardening and tempering of steel strip or sheet or for annealing of ferrous or non-ferrous strip. Moreover, it may be enclosed in a gas-tight chamber to provide an inert atmosphere for bright heat treatment.

What I claim as my invention and desire to secure by Letters Patent is:

In apparatus for heating continuous lengths of moving metallic strip including a rotatably mounted drum over which the strip to be heated is adapted to pass and having an axis of rotation, a high-frequency inductor in operative relationship with said drum and said strip on one side of said axis and a pair of other rotatably mounted drums under which the strip to be heated is adapted to be passed and each having an axis of rotation, the axes of rotation of said other drums being positioned on a side of the axis of rotation of said first mentioned drum opposite from that of said inductor, said inductor having an arcuate concave surface having a center of curvature approximating that of the axis of rotation of said drum, the arcuate face of the inductor being in slightly spaced relationship with the surface of said drum, the improve-

ment which comprises said drum being comprised of an outer steel shell mounted on a ceramic insulating inner member, said outer shell being inductively heated by the high-frequency inductor to elevated temperatures whereby to assist in the transfer of heat to the strip by both conduction and radiation.

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