July 12, 1966 O. KREISEL 3,260,792

METAL BRAIDED INDUCTION HEATING CONDUCTOR COIL

Filed Feb. 5, 1962

Fig. 1

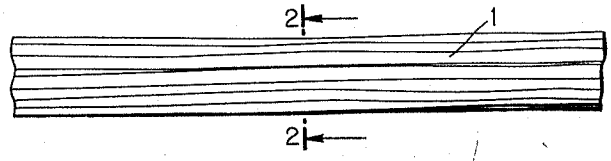


Fig. 2

Fig. 3

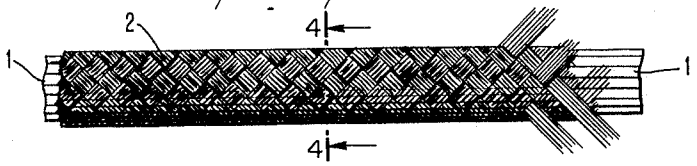


Fig. 4

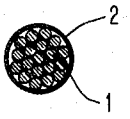


Fig. 5

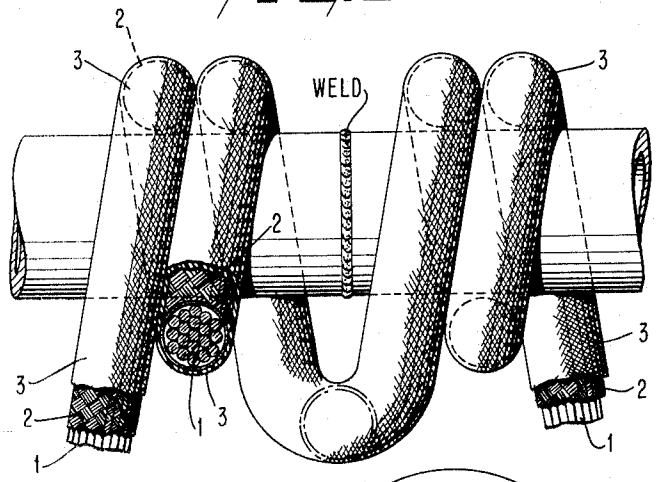
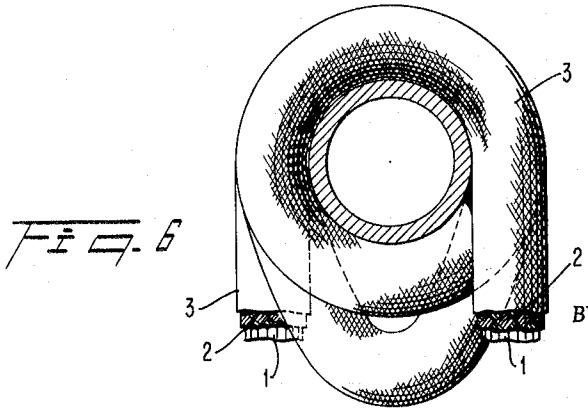


Fig. 6



INVENTOR.
OTTO KREISEL
BY Bauer and Seymour
ATTORNEYS

United States Patent Office

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METAL BRAIDED INDUCTION HEATING CONDUCTOR COIL

Otto Kreisel, Robin Road, Warren Township, Plainfield, N.J.

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1 Claim. (Cl. 174—130)

This invention relates to an induction heating coil for use particularly in the welding together of pipes.

In the present day "on the job" fabrication of piping, involving welding, stresses are set up within the pipe due to the heat from the welding arc. Such stresses, particularly where the pipes are used for high pressure steam, have to be relieved. Moreover, in the present day steel pipes it is necessary to preheat the pipe before welding. The induction method of heat treating of pipes has been proven to produce extremely satisfactory results. One object of this invention is to provide an induction heating coil which is efficient and which can be easily applied to the areas of the pipes to be welded.

Another object of this invention is to provide a cable for an induction heating coil which is adaptable to any size or shape of pipe.

Another object is to provide an induction heating coil cable that maintains a constant cross-sectional shape regardless of the shape or diameter of the pipe upon which it is wound.

Another object is to provide an induction heating coil cable that provides a precise controlled heating of the weldment regardless of the shape or diameter of the pipe joint upon which it is used.

Another object is to provide an induction heating coil cable that prevents the creation of hot spots when applied to various shapes and diameters of pipes and which consequently prevents damage to the cable itself.

A further object of the invention is to provide an induction heating coil cable which can be quickly and easily applied to any shape or size of pipe joint to obtain uniform and controlled heating of the weldment without damage to the cable.

A still further object of my invention is to provide an induction heating coil cable which may be applied to the pipe sections to be welded adjacent the area to be welded so that the coil does not have to be moved during the welding operation thereby permitting the coil to be used to preheat and to stress relieve without being moved.

The above and further objects and novel features of the invention will more fully appear from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the invention wherein:

FIGURE 1 is a side view of an induction coil cable made up of a plurality of conductors;

FIGURE 2 is a view on the line 2—2 of FIG. 1;

FIGURE 3 is a side view of an induction coil cable having a flexible covering;

FIGURE 4 is a view on the line 4—4 of FIG. 3;

FIGURE 5 is a view of an induction coil formed from the cable coil shown in FIG. 3 placed in operative position around a pipe that is to be welded; and

FIGURE 6 is an end view of FIGURE 5.

It has been found that a pipe may be heat treated by the induction method by spirally winding a conductor about it and supplying an alternating current to the conductor. The induction coil is made from copper cable having a cross-sectional area of 50,000 cm. and consisting of approximately 20,000 strands of thin wire. When this cable was found about a pipe it would flatten out and overlap the edges of adjacent turns. This caused the coil to overheat and burn out at the overlapped areas and at the same time the heating of the pipe was uneven and difficult to control with precision.

There is shown in FIGS. 1 and 2 an induction heating coil cable made from a plurality of strands of copper wire 1. When such a cable is wrapped about a pipe it assumes a somewhat flattened cross-sectional shape as shown in FIG. 2. The induction heating coil cable of this invention is best utilized with a low frequency alternating current having a low voltage and high amperage. Alternating current of high amperage tends to crowd toward the outside surface of the cables carrying this current. Because of this fact it was found that by keeping the cable completely round at all times there would be less heat developed within the cable itself due to the limited contact of the cable with the weldment. Moreover, it was found that by keeping the cable completely round, that is having its cross-sectional area circular, at all times when applied to the workpiece, the alternating current was equally distributed throughout the coil and therefore the workpiece was evenly heated. It was also discovered that if the coils could be maintained concentric the coils themselves were evenly heated and the previous creation of hot spots in the coils was eliminated.

The cable, as shown in FIG. 3, is encased in a braided copper sheath 2 which is applied to tightly hold the copper wire strands together and in a perfectly round or circular cross-section shape as shown in FIG. 4. The sheath is applied to hold the copper wires tightly and to maintain the circular cross-sectional shape but at the same time to permit a sliding frictional contact between the sheath and the strands of copper wire and between the strands of copper wire themselves. With such a structure a cable having a cross-sectional area of for instance 500,000 cm. can be easily coiled about a pipe having an outside diameter of 4 inches and still have the cable maintain a circular cross-sectional shape throughout its entire length. It was also found that the life of this coil cable could be materially improved by plating each of the copper wires with nickel which reduced the oxidation of the cable. Also the nickel plating reduces the friction between the strands of wire which in turn increases the flexibility of the coil.

The cable described above may be easily inserted into an insulation sleeve 3 as shown in FIGS. 5 and 6 to protect it from the heated pipe. Any of the commercially available insulating materials may be utilized depending upon the temperature range that the coil is subjected to.

It is to be understood that changes may be made in the details, other than those mentioned, without departing from the disclosed invention or from the scope of the appended claim.

What I claim is:

An alternating current electrical cable having sufficient flexibility to be helically coiled about a pipe of relatively small diameter for induction heating of the latter and comprising a plurality of uninsulated, longitudinally-extending electrical conductors each consisting of a plurality of uninsulated strands of nickel plated copper wire and having a generally circular transverse cross section,

said conductors being assembled in a bunch of generally circular transverse cross section, and a braided wire conduit closely surrounding said bunch of conductors to maintain the generally circular cross sectional contour thereof, the wires of said braid being uninsulated nickel plated copper wires.

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LARAMIE E. ASKIN, *Primary Examiner.*

JOHN P. WILDMAN, JOHN F. BURNS, *Examiners.*

D. A. KETTLESTRINGS, *Assistant Examiner.*