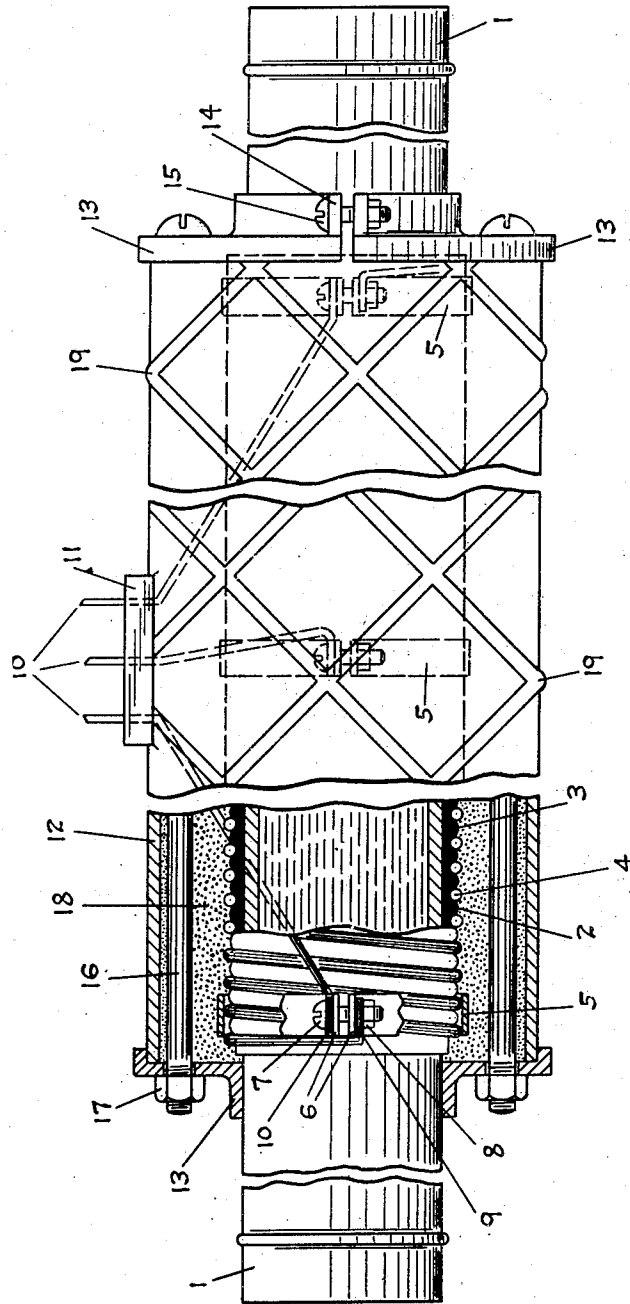


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ELECTRIC HEATING ELEMENT AND METHOD OF MAKING THE SAME.
APPLICATION FILED FEB. 3, 1919.

1,375,084.

Patented Apr. 19, 1921.



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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATING ELEMENT AND METHOD OF MAKING THE SAME.

1,375,084.

Specification of Letters Patent. Patented Apr. 19, 1921.

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To all whom it may concern:

Be it known that I, JOHN W. Cox, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Electric Heating Elements and Methods of Making the Same, of which the following is a specification.

This invention relates to an electric heating element and the method of making the same and consists in certain improvements therein as will be hereinafter fully described and pointed out in the claims.

More particularly the invention relates to a heating element designed to heat a hollow tube, or pipe, so as to heat a circulating liquid within the pipe.

The invention is illustrated in the accompanying drawing which is a side elevation of the heating element partly in section.

1 marks the tube, or core in which there is a liquid which it is desired to heat. This tube, or core, is surrounded by a coating of insulating material 2 which is slightly plastic, a compound known as micanite being well adapted for this purpose. After this is placed around the tube it is indented by dies, the dies indenting the insulating material in the form of a spiral groove 3. A heating coil formed of wire 4 is wound in this groove.

A clamp 5 is arranged around the ends of the coil securing the ends in place. The clamp is simply an annular plate terminating in the ears 6. A screw 7 extends through these ears and a nut 8 on the screw is operated to set the clamp. The clamp may be placed inwardly or outwardly from the extreme end of the coil to vary the length of the coil and effect the resistance which may be desired. The end 9 of the wire forming the coil is brought around the screw 7 under the nut 8 and thus secured. A conductor 10 is secured under the end of the screw 7 and carried out to an electric plug 11.

A tube 12, ordinarily a piece of pipe is arranged outside of the coil and spaced from it. Covers 13 are arranged on the end of the tube. These covers are formed in halves with the ears 14. Screws 15 extend through the ears, or lugs 14 so as to clamp the covers on the core or tube 1. Clamping rods 16 extend through the covers and are

arranged within the tube 12. The clamping rods are provided with the nuts 17 by means of which the covers are clamped on the ends of the tube. The space between the walls of the tube 12 and the heating coil is filled with an insulating compound, a compound sold as Sil-O-Cel answering very well for this purpose. This substance is made plastic and poured into the space and hardens in this space forming the filler 18, thus firmly holding the coils of wire in place and locking the parts together. This material is not only an electrical insulator but the important feature is that it is a heat insulator and prevents very largely radiation or loss of heat outwardly.

The pipe 12 is preferably provided with grooves or indentures. As shown the tube or pipe is provided with grooves which are indicated on the reverse or outside by ribs 19. These more thoroughly lock the pipe on the filler 18 and thus lock the parts more securely together.

It will be noted that the clamp 5 not only secures the coil in place but it also forms an electrical connection with a sufficient length of the coil to reduce the current passing the extreme end 9 of the wire. This wire being brought slightly away from the insulating layer is apt to be overheated but by taking up a part of the current prior to its reaching this extreme end this over-heating is prevented.

What I claim as new is:—

1. In an electric heating element, the combination of a tubular heat transmitting core; an insulating material arranged thereon; a heating coil wound on the insulating material; a clamping band securing the end of the coil on the insulating material and forming an electric connection therewith; a screw for the clamp forming a terminal for the coil and supplementing the connection through the clamp; and a conductor extending from the screw.

2. In an electric heating element, the combination of a tubular heat transmitting core; an insulating material arranged thereon; a heating coil wound on the insulating material; a clamping band for securing the end of the coil, said band terminating in ears; a screw extending through the ears for setting the clamp; a loop on the end of the coil secured and clamped by said screw; and a

conductor secured to said screw and clamped thereby.

3. In an electric heating element, the combination of a core; a heating coil on the
5 core; a tube around the coil and spaced therefrom; covers for the ends of the tube separable transversely; means for clamping the cover to the core; and means for securing the cover to the tube.

10 4. In an electric heating element, the combination of a core; a heating coil on the core; a tube around the coil and spaced therefrom; covers for the ends of the tube;

and clamping bars extending from cover to cover within the tube.

5. In an electric heating element, the combination of a core; a heating coil on the core; a tube around the coil and spaced therefrom; covers for the ends of the tube; clamping bars extending from cover to cover
20 within the tube; and means for securing one of the covers to the core.

In testimony whereof I have hereunto set my hand.

JOHN W. COX.