Jan. 13, 1959 R. H. BARFIELD ET AL 2,868,938

INDUCTORS FOR HEATING TUBES OR CYLINDERS

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FIG. 1.

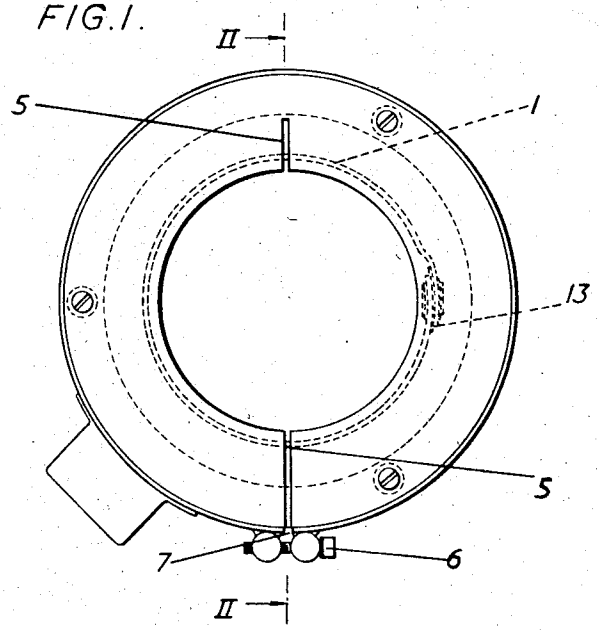
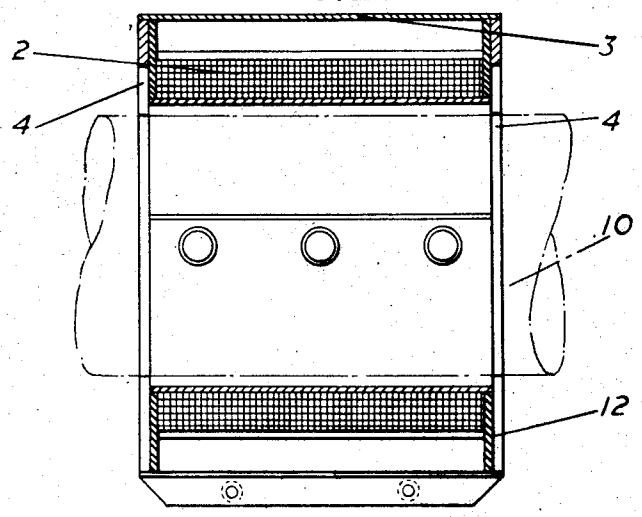


FIG. 2.



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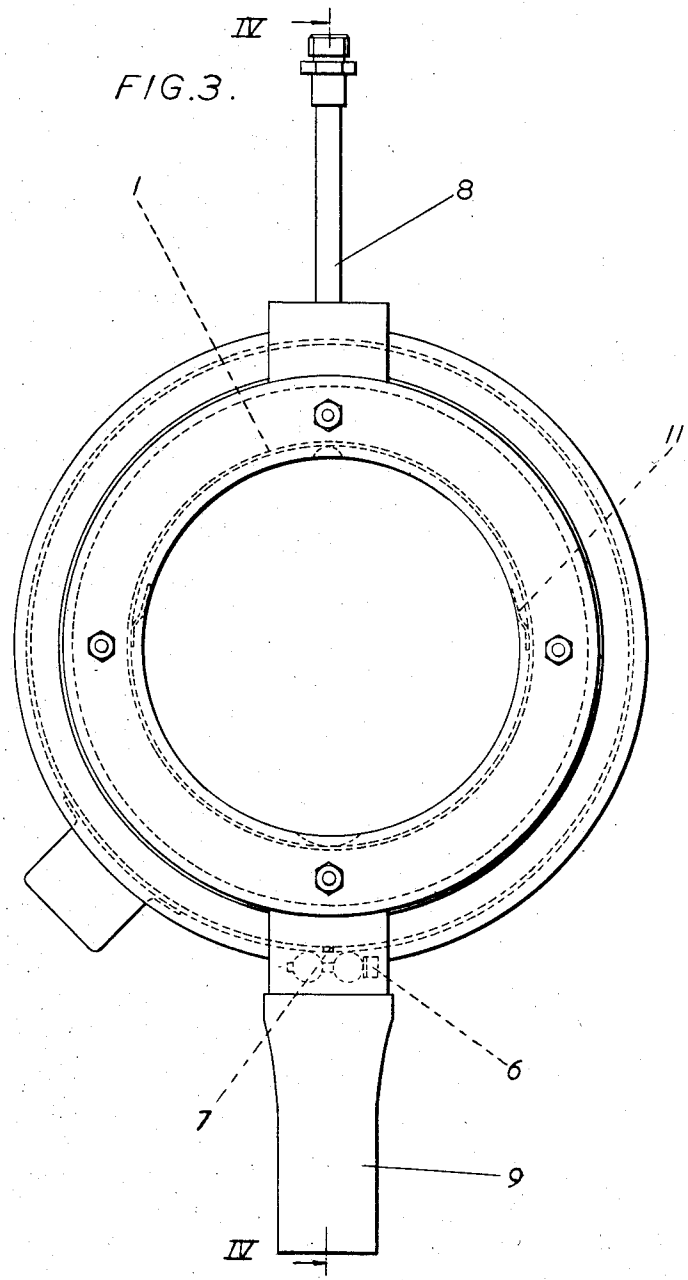
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INDUCTORS FOR HEATING TUBES OR CYLINDERS

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FIG. 3.



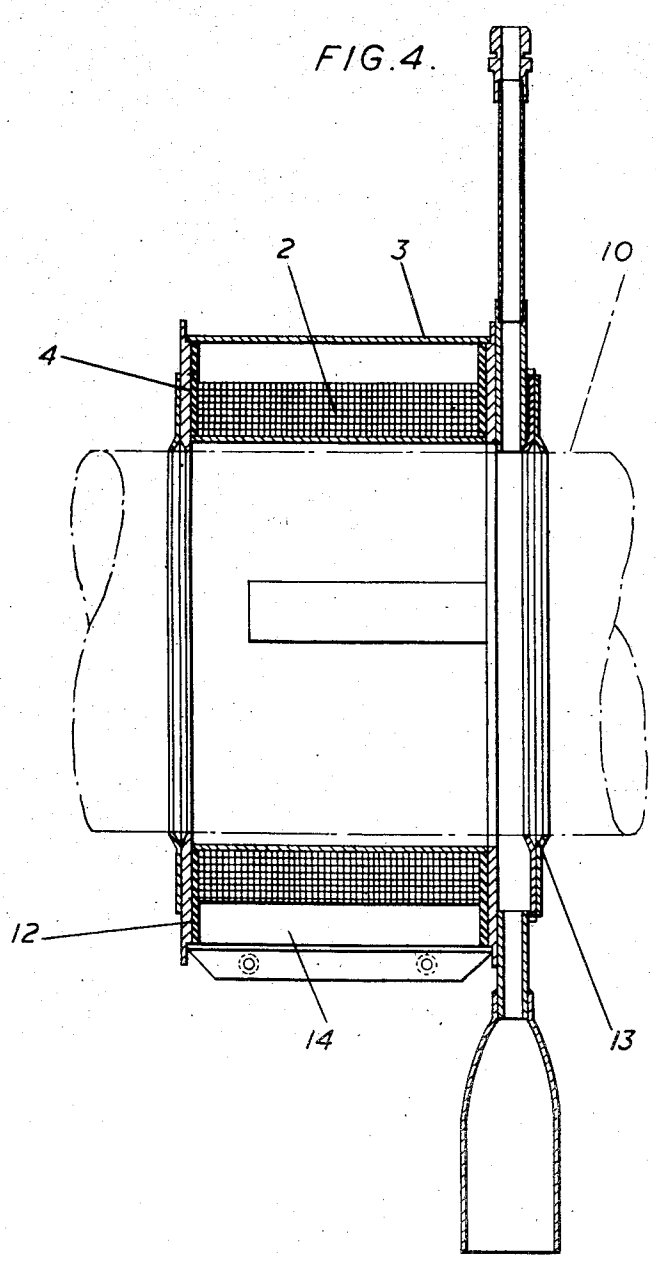
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INDUCTORS FOR HEATING TUBES OR CYLINDERS

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FIG. 4.



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2,868,938

INDUCTORS FOR HEATING TUBES OR CYLINDERS

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Application September 10, 1956, Serial No. 608,786

Claims priority, application Great Britain September 15, 1955

4 Claims. (Cl. 219—10.49)

This invention relates to the heating of tubes or cylinders such as the cylinders leading to the nozzles of plastic moulding or extrusion machines.

In order to keep material flowing in such cylinders in proper condition, it is necessary to control the temperature of the cylinder. At the beginning it is necessary to heat the cylinder but after a time, the heat-generated by internal work may be sufficient to make such external heating unnecessary and it may even be desirable to apply a cooling medium such as water to the cylinder at certain points along its length.

Hitherto such cylinders have been heated electrically by cuffs embodying electric resistance elements surrounding the cylinders.

It is an object of the present invention to provide means (hereinafter referred to as a cuff) for heating such cylinders by low frequency induction heating, preferably using the normal mains frequency say 50 cycles per sec., though the use of any other frequency is not precluded if for any reason more convenient.

Another object of the invention is to provide a cuff for heating such cylinders adapted to provide also means for circulating a cooling medium around the cylinder.

From one aspect, a cuff for cylinders (for example the cylinders of plastic moulding or extrusion machines) comprises an inner cylindrical tube adapted to surround the cylinder to allow a slight clearance therebetween and constructed in such a way as to prevent it becoming heated inductively, a primary winding wound on this inner tube and an outer casing of mild steel surrounding the winding and provided with end plates adapted to clamp closely on the cylinder, this outer casing with the end plates and the surface of the cylinder forming a closed magnetic circuit, the outer casing having a longitudinal slot and the end plates having radial slots to prevent them becoming heated inductively.

The inner cylindrical tube may be prevented from becoming heated inductively either by means of a longitudinal slot or by making it of a metal (such as stainless steel) having a high electrical resistivity. In which case a longitudinal slot is unnecessary.

In a modified form of construction means are provided to effectively seal, or render watertight, the space between the inner tube and the outer surface of the cylinder, so that water may be caused to flow therein without penetrating into the space occupied by the winding and thereby damaging the winding and causing an electrical breakdown. In this particular arrangement, it is clearly preferable that the inner tube should be formed of stainless steel thus avoiding the need for a longitudinal slot, and that the radial slot should not extend to the inner periphery of the end plates.

Other parts of the invention are embodied in the preferred forms which will now be described in some detail by way of example with reference to the accompanying drawings in which

Fig. 1 is an end view of one form,
Fig. 2 is a section on the line II—II of Fig. 1,
Fig. 3 is an end view of another form and
Fig. 4 is a section on the line IV—IV of Fig. 3.

In one form, the cuff comprises a brass tube **1** split longitudinally at **13** and adapted to be slipped over the extrusion cylinder **10** so that there is a small clearance between the two. On the tube is wound a primary winding **2** adapted to be supplied with alternating current at mains frequency. The winding is of aluminum wire covered with glass fibre and covered with silicone resin, so that a high working temperature can be withstood. Surrounding the winding is an outer casing **3** of mild steel with annular end plates **4** at each end. The end plates **4** are provided with radial slots **5** one of which is fitted with draw screws **6**, thus enabling the unit to be clamped firmly on the extrusion cylinder. The outer cylindrical casing **3** together with its end plates **4** and the surface skin of the cylinder, forms a closed magnetic circuit. To prevent the formation of induced currents, the outer casing is split longitudinally at **7**.

Insulation **12** is provided between the winding **2** and the end plates **4**.

In another form shown in Figs. 3 and 4, the casing is substantially the same as above except that the inner tube **1** is of stainless steel and is not split longitudinally. The annular spacing between the cylinder and this inner tube is closed at each end by the end plates **4** of the outer casing **3** which is similar to that previously described. These end plates **4** are not split at their inner periphery, where they serve to enclose the annular space **14**, thus forming a water-tight compartment.

An inlet **8** to, and/or an outlet **9** from, the annular space **14** is provided, so that cooling water may be circulated through the space round the extrusion cylinder **10**. A baffle plate **11** is provided in the water system.

In use, a number of these cuffs may be arranged successively along the cylinder and are independently controlled, so that the temperature gradient along the cylinder may be controlled. If the cylinder becomes overheated at any point, for example, because of internal work, the appropriate cuff may be switched off. If this is not sufficient to reduce the temperature to the desired value, cooling water may be circulated through the cuff to reduce the temperature as desired. Either or both of these operations can be performed either by hand or automatically.

It will be understood that the invention is not restricted to the details of the preferred forms described by way of example, which may be modified without departing from the broad ideas underlying them.

We claim:

1. A low frequency induction heating cuff for cylinders, comprising an inner cylindrical tube slightly larger in diameter than the cylinder to be heated and surround the cylinder to allow a slight clearance therebetween and including means to prevent it becoming heated inductively, a primary winding wound on this inner tube, and an outer casing of mild steel surrounding the winding and provided with end plates clampable on the cylinder, this outer casing with the end plates being composed of magnetic material and forming with the surface of the cylinder a closed magnetic circuit, the outer casing having a longitudinal slot and the end plates having radial slots to prevent them becoming heated inductively.

2. A cuff according to claim 1 in which the inner tube is split longitudinally to prevent it becoming heated by induction.

3. A cuff according to claim 1 in which the inner tube

is of metal having a high electrical resistivity to prevent it becoming heated by induction.

4. A cuff according to claim 1 having means to effectively seal, or render watertight, the space between the inner tube and the outer surface of the cylinder and having inlet and outlet means for cooling water to said space.

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