May 4, 1954 G. CANEGALLO 2,677,743

RESISTOR MOUNT WITH FLUID CIRCULATION COOLING

Filed March 14, 1952

Fig.1

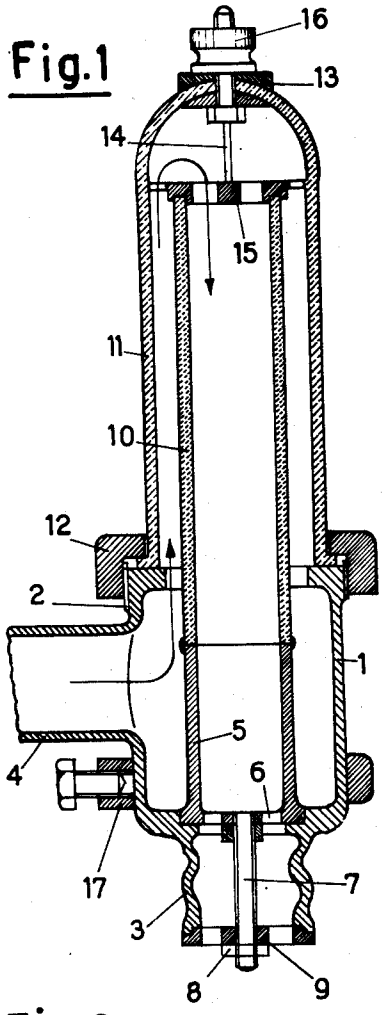


Fig.3

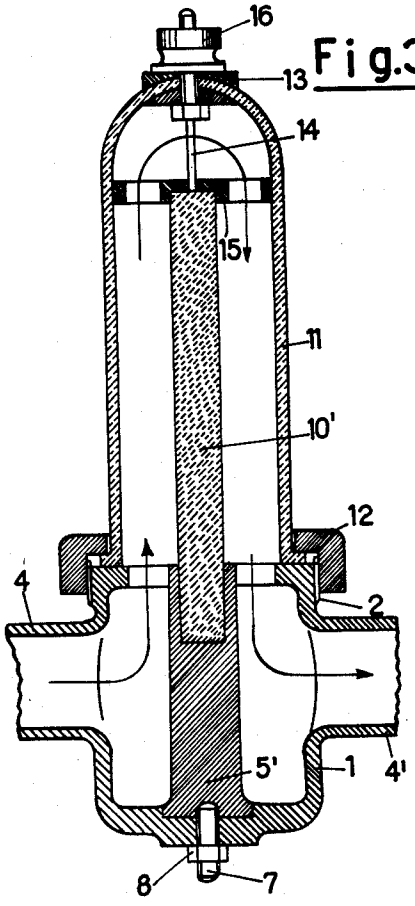


Fig.2

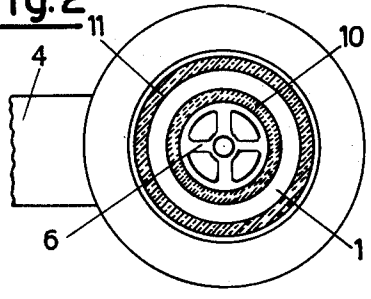
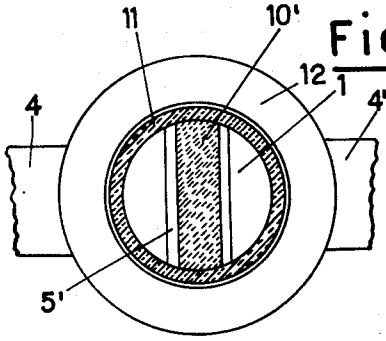


Fig.4



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RESISTOR MOUNT WITH FLUID CIRCULATION COOLING

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4 Claims. (Cl. 201—65)

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In order to handle high electric power values by means of resistors, resistors are usually cooled artificially so as to remove rapidly the heat developed and to allow thus for reducing their dimensions and weight.

This artificial cooling is obtained by circulating about the resistor, contained in suitable casings, a convenient fluid (air, water, an insulating liquid), which while flowing over the surface of the resistor absorbs the heat developed, transporting it speedily elsewhere and reducing thus the temperature of the resistor to a value admissible for its preservation.

With the conventional embodiments of such resistors with forced cooling, the resistor (which may be of any type used in practice: wire, enamelled, layer, etc.) would be contacted by the cooling fluid flowing over the internal or external side or over both sides of the resistor, which generally is of cylindrical, prismatic or tubular shape; said movement of the fluid however takes place always in one sense only, from one end to the other of the resistor.

Now that system requires one fluid inlet pipe union support at one resistor end and an outlet pipe union support at the other end of the sheath, within which the resistor is contained, and this involves besides higher costs, inconveniences with many radio frequency and high voltage application, owing to the complication of one or two insulations to ground.

In fact, while one of the supports may be insulated or grounded, the second one has to be insulated in respect to the first one for a voltage that may be very high, and this second support may introduce into the high frequency circuits obnoxious losses and capacities.

One attempt proposed so far for embodying only one single support uses a complicated device, by means of which the liquid is circulated with tangential introductions and axial return only inside the tubular resistor, which, therefore, is not cooled externally.

It is an object of the present invention to provide an inlet and outlet for the cooling liquid at the same end of the resistor, circulating said fluid over both the faces of the resistor, viz. in one sense inside the resistor and in the opposite sense outside or vice versa, so that the inlet and outlet for the liquid are at the same side.

In this way, a powerful cooling action is attained, because over the whole extension of its surface the resistor is contacted by the cooling liquid and, moreover, only one support is employed, which is the only one to be insulated or grounded as the case may be and, in case it is grounded, no other insulation is necessary.

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To make operation of the invention more fully understood, two forms of embodiment thereof are described hereinafter with reference to the drawing, wherein:

Figures 1 and 2 represent in axial section and in cross section respectively one form of embodiment with a tubular resistor and Figures 3 and 4 represent in analogous sections respectively a second example of embodiment with a solid prismatic resistor.

With reference to Figures 1 and 2, the resistor comprises a metallic body with a base 1 shaped as a bowl open at top and having an external threading 2; while at bottom it contracts at 3 in the shape of a corrugated pipe for connection with a rubber hose. At the side of the body of the bowl there is provided another pipe 4 arranged radially and which too may be for connection with a rubber hose.

On the bottom of the bowl 1 there rests a metallic support 5 with a bottom perforated at 6, to which there is screwed on a threaded rod 7 projecting from the bowl 1 downward. By means of a nut 8 and a perforated washer 9, the support 5 is rigidly connected with the body 1 and the projecting end of the rod 7 can serve as a connecting terminal at the same time.

A tubular resistor 10 is fixed to the tubular support 5, which constitutes thus the base thereof.

On the top of the bowl 1 there rests an insulating sheath 11, which may be of glass or porcelain or other insulating material, and which has a bottom flange allowing for tightening it against the body 1 by means of the threaded ring 12 to be screwed on the threaded portion 2.

The sheath 11 is shaped at its upper end as a semi-sphere with a bore through which there penetrates a through-bolt connected internally to the resistor 10 by means of a small rod 14 and a perforated plate 15; the bolt 13 projects from the sheath 11 to receive a threaded nut 16 adapted to serve as a current terminal.

It will be understood from the drawing that if introducing from the radial pipe of the base body a fluid (oil, water, gas), this rises along the interspace between the sheath 11 and the tubular resistor 10, then penetrates through the perforated plate 15 and descends inside the resistor 10 and its metallic support 5, to pass through the holes provided in the bottom 6 into the discharge pipe 3, which it can leave through the holes of the washer 9.

The outside of the body 1 is shaped in such a manner that it can receive a ring 17, by means of which it can be fixed with screws to a supporting frame, directly or with the intermediary of supporting insulator, according to whether it has to be grounded or insulated.

A variant of this structure is illustrated in Figures 3 and 4, wherein the prismatic resistor 10' and the support 5' have solid rectangular cross section. In this case, the sheath 11 adheres to the two smaller faces of the resistor and the cooling fluid flows over one of the larger faces of the resistor in one sense and over the other face in the opposed sense as diagrammatically indicated in Figures 3 and 4, wherein the other reference numerals indicate equivalent parts of Figures 1 and 2. However, in the case of Figures 3 and 4, the cooling fluid outlet is through a pipe 4' coaxial with pipe 4.

The single-support mount can allow for placing the assembly in any position, since a vertical position of the resistor is not necessary for the satisfactory operation of the fluid circulation.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A fluid cooled resistor assembly comprising a closed jacket composed of two sections, one of said sections being tubularly shaped and closed on one end, the other section being generally bowl-shaped, the said two sections being joined at their open ends to form said closed jacket and

said bowl-shaped section including inlet opening and an outlet opening for a cooling fluid, a resistor element longitudinally mounted within said jacket, one end of the resistor element being fastened fluid tight to the jacket end having said openings, the other end of the resistor element terminating short of the opposite end of the jacket, the said resistor element being disposed in a spacial relationship with the jacket such that a continuous fluid circulation channel is formed extending from the inlet along one outer face of the resistor element, over said other end of the resistor element and along another face of the resistor element to the outlet.

2. A resistor assembly according to claim 1, wherein a support member in said bowl-shaped section supports said resistor element.

3. A resistor assembly according to claim 2, wherein the said tubular jacket section is made of insulation material.

4. A resistor assembly according to claim 1, wherein a terminal extends from each end of the resistor through the respective end of the jacket.

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