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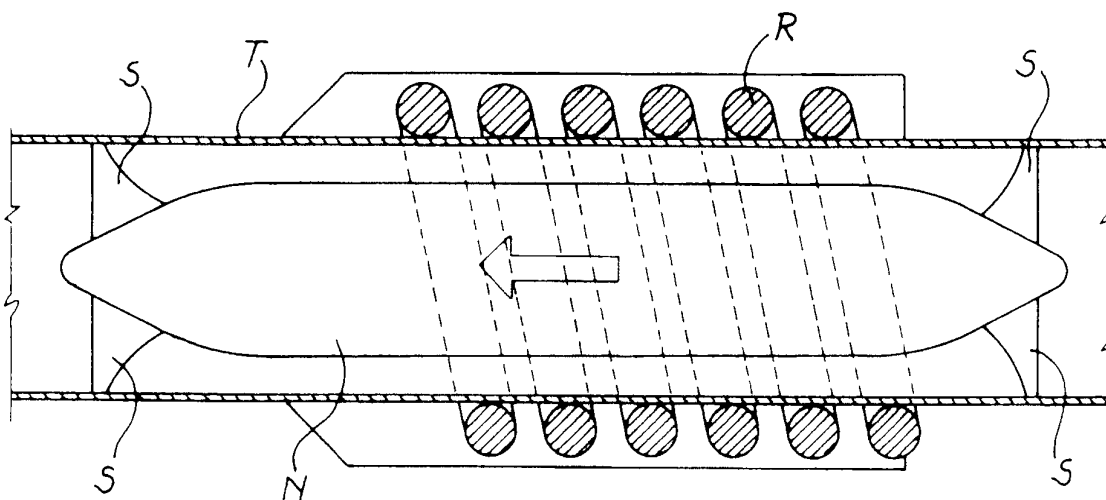
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(54) **Device for heating water, in particular in a dishwasher**

(57) A device for heating water includes a metallic tube (T) on which there is wound a resistor (R), as well as a tapered body (N) mounted inside the tube (T) by means of a plurality of supports (S). In this way, thanks to the reduction of the free cross-section, an increase in the speed of the water flow is achieved without decreas-

ing the heat exchange area while maintaining the same overall size. The subsequent higher rate of heat exchange allows to reduce the activation time and/or the power of the resistor, and thus ultimately to reduce the power consumption and/or limit the peak power absorbed by the machine.

Fig. 2



Description

[0001] The present invention relates to devices for heating water, and in particular to a device typically used in dishwashers. Reference will be made hereafter to a dishwasher, while being clear that what is said can also be applied to a washing machine or to other types of similar machines.

[0002] It is known that in order to heat the water during the washing steps various kinds of heating elements may be used, among which a resistor element spiral-wound around a metallic tube wherein the water flows. In this kind of device the heat transfer takes place by conduction when the water flows along the inner surface of the tube. As a consequence, the heat exchange rate is a function of the area of the exchange surface and of the speed of the water flow which flows along said surface.

[0003] However, the mere reduction of the diameter of the tube in order to increase the flow speed (while maintaining the same flow rate) also implies a decrease in the exchange surface which has to be compensated by an increase in the tube length. Therefore the tube becomes more bulky and of complex structure, in particular making more difficult to wind the resistor around a surface which is not cylindrical and of varying diameter.

[0004] As an alternative, the tube could remain unchanged on the outside and provided with internal fins in order to increase the exchange surface, but this implies a great increase in flow resistance and a subsequent decrease in the speed of the water flow. Moreover, such a tube is much more complicated and expensive to manufacture.

[0005] Therefore the object of the present invention is to provide a heating device suitable to overcome the above-mentioned drawbacks.

[0006] This object is achieved by means of a heating device including a tapered body mounted at the center of the tube and extending along the whole length of the externally wound resistor.

[0007] The fundamental advantage of the present device is that of achieving an increase in flow speed (thanks to the reduction of the free cross-section) with a very small increase in flow resistance and without decreasing the exchange surface while maintaining the overall size.

[0008] The subsequent higher rate of heat exchange allows to reduce the operating time and/or the power of the resistor and therefore its heat loss. and ultimately to reduce the power consumption and/or limit the peak power absorbed by the machine.

[0009] A second advantage of this device is that it contributes to the reduction of the total volume of the washing circuit, so as to reduce the global consumption of water and therefore also of power.

[0010] Still another advantage of the present device stems from its structural simplicity, since the additional

body has a simple shape which makes its manufacturing and installation both easy and cheap.

[0011] These and other advantages and characteristics of the device according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

Fig.1 is a diagrammatic see-through view of a dishwasher provided with the present device;

Fig.2 is an enlarged longitudinal sectional view which shows in detail the above-mentioned device; and

Fig.3 is a front view of the device of fig.2.

[0012] With reference to said figures, there is seen that in a dishwasher a heating device E according to the invention is arranged between the water collecting chamber A and the pump P which feeds the water to the sprinklers. It is clear that such an arrangement is just an example, since the device can be arranged in other places and/or more devices can be provided (e.g. one on each feed duct to the sprinklers).

[0013] The above-mentioned heating device conventionally includes a metallic tube T on which a spiral resistor R is wound. The novel aspect of the present device is provided by the tapered body N which is mounted at a central position coaxial with tube T by means of a plurality of supports S arranged at its ends. The supports S may vary in number, and they are thin and tapered so as to minimize the flow resistance caused by their presence.

[0014] The shape of body N is substantially cylindrical with ogival ends, so as to prevent the formation of stagnation points and to achieve a proper progressive decrease and increase of the free cross-section respectively upstream and downstream from the length where resistor R extends.

[0015] It should be noted that body N is suitably hollow so as to reduce its thermal mass, and also that it could be arranged at a position forward or rearward with respect to resistor R, while maintaining supports S preferably mounted outside the length of resistor R.

[0016] It is clear that the above-described and illustrated embodiment of the device according to the invention is just an example susceptible of various modifications. In particular, the shape and size of body N and supports S may be somewhat changed according to the needs, as well as the position of supports S on body N and the type of resistor R (e.g. a longitudinal coil rather than a spiral-wound one).

Claims

1. A device for heating water including a metallic tube (T) on which there is applied a resistor (R), characterized in that it further includes a body (N) mounted

inside said tube (T) by means of a plurality of supports (S).

2. A device according to claim 1, characterized in that the shape of the body (N) is substantially cylindrical with ogival ends. 5
3. A device according to claim 1 or 2, characterized in that the length of the body (N) is greater than the length along which the resistor (R) extends. 10
4. A device according to one or more of the preceding claims, characterized in that the supports (S) are arranged at the ends of the body (N). 15
5. A device according to one or more of the preceding claims, characterized in that the resistor (R) is a coil which is spiral-wound around the tube (T).
6. A device according to one or more of the preceding claims, characterized in that the body (N) is hollow. 20
7. A device according to one or more of the preceding claims, characterized in that the body (N) is arranged coaxial with the tube (T). 25
8. A dishwasher characterized in that it includes a heating device according to one or more of the preceding claims. 30
9. A dishwasher according to claim 8, characterized in that said heating device is arranged between the collection chamber (A) and the washing pump (P).

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Fig. 1

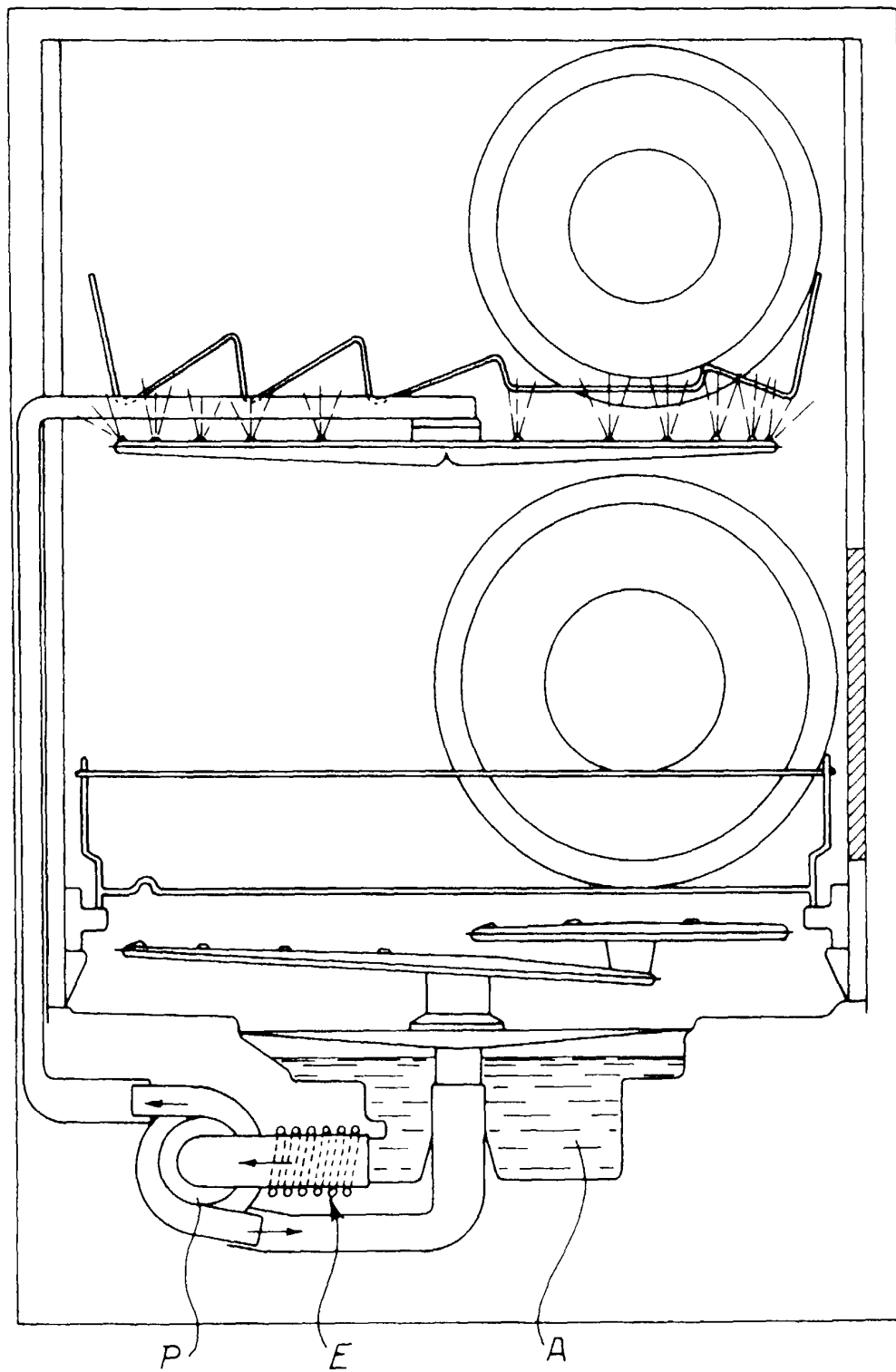


Fig. 2

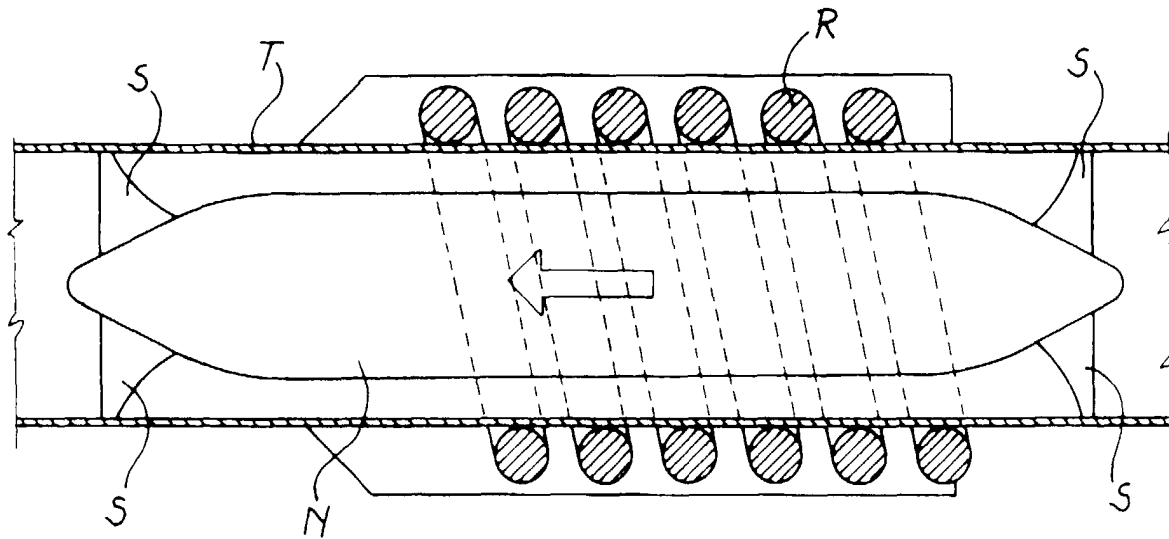


Fig. 3

