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(54) Self-protection for an electric type heating element, particularly heating element for washing machines, water heaters and like.

(57) The present invention relates to a self-protection system for an electric type heating element, particularly a heating element for washing machines, water heaters and like, comprising a copper terminal element (2 ; 2')having a substantially extended shape, one end of which is coupled to a terminal (1 ; 1') of the electric heating element, within the casing (6 ; 6') enclosing the electric heater, a self-protection element (4, 4') for the electric heater, coupled to the other end of said copper terminal element (2 ; 2') in such a way that the self-protection element (4 ; 4') is placed externally with respect to the resistance, a ring (5 ; 5') outer with respect to said self-protection element (4 ; 4') having thermal and electric insulation properties, and a closure element (7, 9), placed in correspondence of the end of the self-protection element (4 ; 4') that is not coupled to the copper terminal element (2 ; 2') and coupled with said insulating ring (5 ; 5').

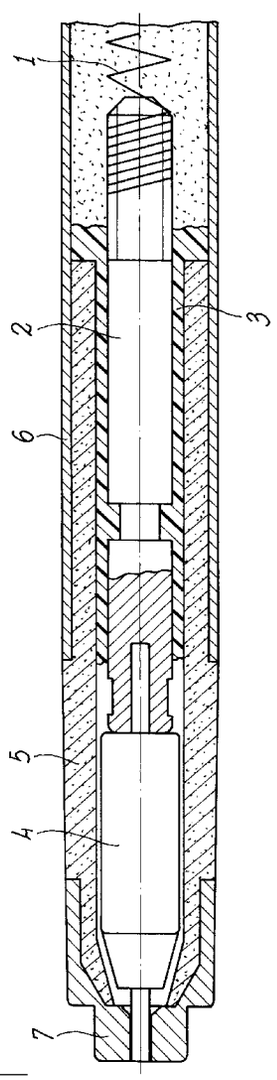

FIG. 1

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The present invention concerns a self-protection system for an electric type heating element, particularly a heating element for washing machines, water heaters and like.

More particularly, the invention consists in an improvement of a system of the above kind that allows to obtain a optimum protection in case of anomalous working of the resistance.

As it is well known, all the apparatuses providing an electric heating element, or resistance, must be provided with a protection system intervening in case of anomalous working.

For example, in the washing machines, the manufacturers provide that the self-protection system must intervene within a preestablished time, particularly 75 seconds, from the moment when the dry working of the resistance starts, in order to avoid that the clothes within the washing machine or the adjacent plastic parts take fire.

In the past, a thermofusible element out of the heating lement were provided.

However, this kind of solution had the inconvenient that did not guarantee the intervention of the self-protection within the required time, so that the desired effect were not always obtained.

Then, solutions have been proposed that were able to overcome the above mentioned drawback, bringing the self-protection within the resistance.

A first solution of this kind is for example provided in the U.S. patent N° 4,697,069 of Bleckmann, filed on August 22, 1983 and having as title: "Tubular heating element provided with overload safety means".

Another solution that provides this kind of solution to overcome the drawbacks above mentioned is described in the Italian patent application N° 22892A/83, filed on September 15, 1983 in the name of I.R.C.A. S.p.A. Industria Reistenze Corazzate ed Affini, and having as title: "Self protected armoured electric heating element".

In said Italian application a heating element is described which provides a temperature limiting device contained within the sheath the contains the heating element, and serially connected with the resistances.

However, it must be noted that in these second generation solutions, the self-protection element is very close to the heating zone, so that once the interruption is intervened, a remarkable thermal inertia verifies determining an increasing of the temperature of the of the self-protection casing (thermofusible element)..

In consequence of this fact, a temperature remarkably higher than the exercise temperature is present inside, so that in view of the structural features of the thermofusible element, it is out of work also after its intervention.

In view of the above, the Applicant has thought and realized a technical solution that obviates all the mentioned drawback.

In fact, the solution according to the present invention provides that the self-protection element is placed again out of the resistance, but the coupling with the latter has been conceived and realized in such a way to be sure to fulfil with absolute certainty the intervention times provided.

Therefore, with the solution according to the present invention an opportune intervention of the self-protection is obtained, without the risk that the same rearms after its intervention.

It is therefore a specific object of the present invention a self-protection system for an electric type heating element, particularly a heating element for washing machines, water heaters and like, comprising a copper terminal element having a substantially extended shape, one end of which is coupled to a terminal of the electric heating element, within the casing enclosing the electric heater, a self-protection element for the electric heater, coupled to the other end of said copper terminal element in such a way that the self-protection element is placed externally with respect to the resistance, an ring outer with respect to said self-protection element having thermal and electric insulation properties, and a closure element, placed in correspondence of the end of the self-protection element that is not coupled to the copper terminal element and coupled with said insulating ring.

In a first preferred embodiment according to the invention, said self-protection element is made up of a thermofusible element coupled to said copper terminal element by clinching.

The closure terminal element will be in this case made up of a metal ring moulded as insert of said insulating ring.

In a second embodiment of the system according to the invention, said self-protection element will be made up of a spring, realized with a high electrically conductive and low electric resistivity material, coupled to the copper terminal element by a welding employing an alloy having features that allows the melt at a desired temperature.

Preferably, according to the invention, the terminal of the resistance comprises a spiral that is screwed on a thread realized on said copper terminal element.

Still according to the invention, about said copper terminal a sealant is provided.

The present invention will be described, for illustrative, but not limitative purposes, according to its preferred embodiments, with particular reference to the figures of the enclosed drawings, wherein:

figure 1 is a longitudinal section view of a first embodiment of the system according to the invention; and

figure 2 is a longitudinal section view of a second embodiment of the system according to the invention.

Referring first to the figure 1, the reference 1 indicates the terminal, in the specific case comprising a spiral of the resistance, not shown, with which the system according to the invention must be coupled.

The spiral 1 is coupled by screwing at one end of a copper terminal 2. About the terminal 2 a layer 3 of polyurethanic sealant material is provided.

On the other end of the copper terminal a thermofusible element 4 is coupled by clinching, and about said element 4 a safety ring 5 realized with a material having good properties of thermal and electric insulation is provided.

As it can be seen from figure 1, the ring 5 is partly coupled within the armour 6 of the resistance, overlapping with the copper terminal 2, while the thermofusible element 4 is external with respect to the same armour.

On the other end of the thermofusible element 4 a metallic ring 7 is provided, said ring 7 being moulded as an insert of the ring 5, and external to said ring 7 a faston is welded.

As it can be noted from the above description, the system according to the invention, being external with respect to the resistance, does not rearm, while the kind of coupling with the resistance allows to have an optimum activation time, contrary to the prior art solutions.

In figure 2 a second embodiment of the system according to the invention is provided.

The elements corresponding in the figures are indicated by the same references, with the add of an apex.

In this case, instead of the thermofusible element 4 a spring 4' is provided, realized with a highly electrically conductive and low electric resistivity material.

Said spring is coupled to the end of the copper terminal 2' by welding employing an alloy 8' having well defined melt features, said features being chosen each time on the basis of specific needings, so that at the preestablished temperature the alloy melts, releasing the spring the withdraws interrupting the connection.

On the other end the spring 4' is coupled to the outer capsule 9'.

The present invention has been described for illustrative, but not limitative purposes, according to its preferred embodiments, but it is to be understood that variations and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined by the enclosed claims.

Claims

1. Self-protection system for an electric type heating element, particularly a heating element for washing machines, water heaters and like, characterized in that it comprises a copper terminal element having a substantially extended shape, one end of which is coupled to a terminal of the electric heating element, within the casing enclosing the electric heater, a self-protection element for the electric heater, coupled to the other end of said copper terminal element in such a way that the self-protection element is placed externally with respect to the resistance, an ring outer with respect to said self-protection element having thermal and electric insulation properties, and a closure element, placed in correspondence of the end of the self-protection element that is not coupled to the copper terminal element and coupled with said insulating ring.

2. Self protection system according to claim 1, characterized in that said self-protection element is made up of a thermofusible element coupled to said copper terminal element by clinching.

3. Self protection system according to claim 2, characterized in that the closure terminal element is made up of a metal ring moulded as insert of said insulating ring.

4. Self protection system according to claim 1, characterized in that said self-protection element is made up of a spring, realized with a high electrically conductive and low electric resistivity material, coupled to the copper terminal element by a welding employing an alloy having features that allows the melt at a desired temperature.

5. Self protection system according to one of the preceding claims, characterized in that the terminal of the resistance comprises a spiral that is screwed on a thread realized on said copper terminal element.

6. Self protection system according to one of the preceding claims, characterized in that about said copper terminal a sealant is provided.

7. Self-protection system for an electric type heating element, particularly a heating element for washing machines, water heaters and like, according to each one of the preceding claims, substantially as illustrated and described.

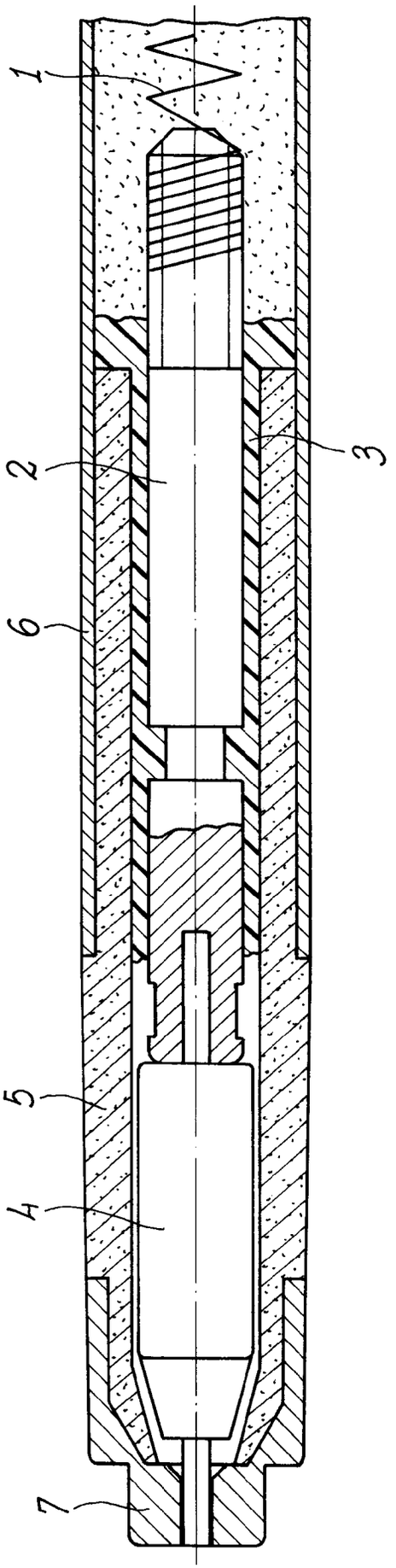

FIG. 1

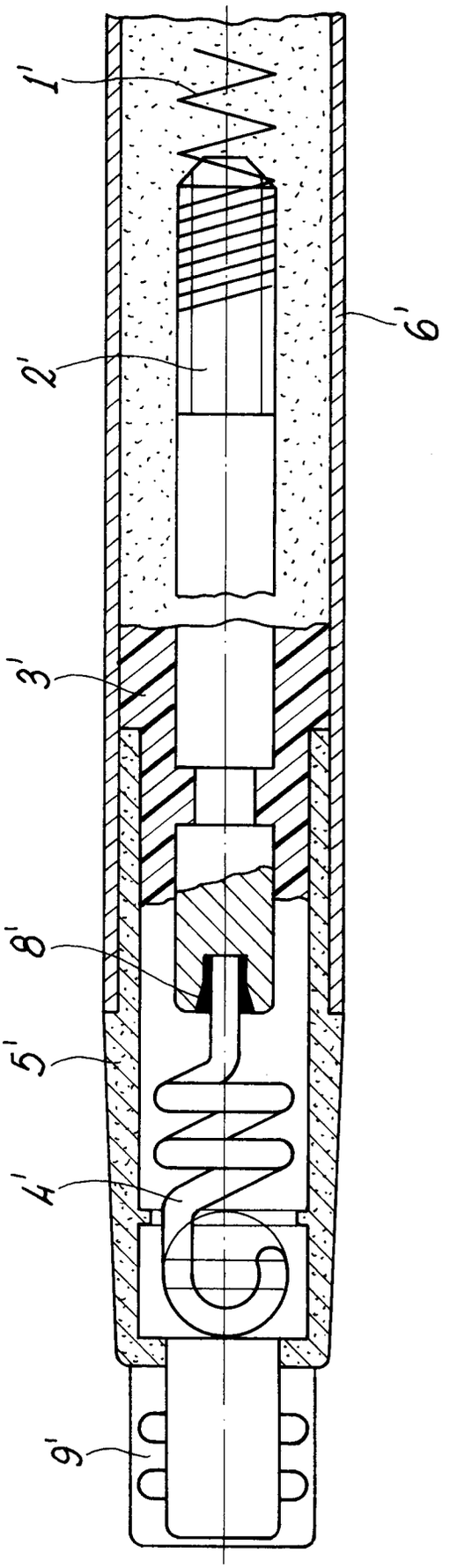

FIG. 2