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(54) Device for sealingly securing a heater element in an electric household appliance, particularly a laundry washing machine.

(57) A device for sealingly securing electric heater elements (7, 8, 9, 10) in an opening (4) formed to this purpose in the wall of a liquid receptacle (3) of a household appliance such as a laundry washing machine comprises a sealing gasket (11) made of an elastic material, and a resilient fastener element (12) amde of metal. The sealing gasket has a passage for each heater element to pas therethrough, including a toothed portion (24) for sealing engagement with the respective heater element, and a cavity (25) surrounded by a peripheral lip (18) formed with a peripheral channel (19) for engagement with the peripheral edge (20) of the opening. The fasteenr element is formed with resilient fingers (13, 14, 15, 16) adapted to be brought into snap engagement with the interior wall of the gasket cavity and the outer surface of the heater element for compressing said lip against the peripheral edge of the opening and retaining the heater element in place.

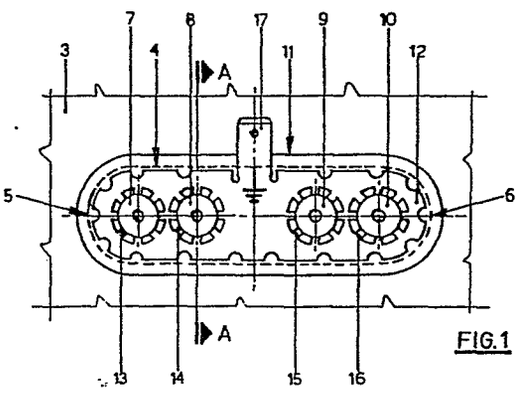

FIG.1

EP 0 153 572 A2

1 Description

The invention relates to a simple device for sealingly securing an electric heater element in an electric household appliance, particularly a laundry washing machine.

As generally known, the heating of the liquid contained in a receptacle of an electric household appliance such as a laundry washing machine, a diswashing machine, a boiler or the like is usually accomplished by means of armoured electric heater elements removably mounted in the interiro of the respective receptacle.

In particular, the mounting of such heater elements in the laundering tub of a laundry washing machine is accomplished by introducing the heater element through an opening formed for this purpose in the lower part of the tub and subsequently sealing this opening by means of at least one sealing gasket surrounding the respective heater element and dimensioned so as to snugly fit into the opening. The sealing gasket is finally secured to the wall of the tub by means of at least one metal flange compressively engaged with the gasket by means of screws and nuts or similar fasteners.

A securing device of this construction is rather complicated and cumbersome in use.

In the case described, the gasket held under compression against the wall of the tub indeed tends to be permanently deformed, thereby rendering difficult the extraction of the heater elements from the tub as may be required for maintenance operations and/or replacement of the heater elements themselves. In addition there is the possibility that the thus deformed sealing gasket is no longer capable of ensuring the hermetic closure of the tub opening after a certain operating lifetime of the heater elements.

For eliminating the discussed shortcomings there have been proposed securing devices of various types, all of which substantially comprise an elastic sealing gasket of annular shape and locking elements for the gasket, such as flanges, sleeves and the like which are slipped onto the heater element and act on the sealing gasket from the interior of the receptacle so as to keep it compressed against the wall of the receptacle. These securing devices additionally include at least one resilient element which is slipped onto the heater element from the exterior of the tub for securing the heater element in position.

These securing devices permit the heater elements to be secured to electric household appliances in a simple and rapid manner without permanent deformation of the respective sealing gaskets thanks to the fact that screws and nuts are no longer employed for securing and compressing the gasket.

In this case, however, the edge of the opening formed in the tub has to be deformed so as to obtain a seat for engagement by the sealing gasket in order to achieve a hermetic seal between the heater element and the surrounding opening in the receptacle of the electric household appliance.

A further disadvantage of this type of securing device consists in the fact that eventually required maintenance or repair operations or the replacement of the heater elements and/or the securing device are rather difficult. As a matter of fact, dismounting of the heater elements and of the securing devices cannot be accomplished solely from outside the electric houshold appliance, as would be desirable, but requires certain operations to be carried out inside the receptacle of the appliance, which again may require the receptacle itself to be dismounted in the first place.

It is therefore an object of the present invention to elim-

inate the above discussed shortcomings and limitations by providing a securing device of simple construction and operation for hermetically sealing and securing heater elements in electric household appliances, particularly in a tub of a laundry washing machine, and permitting such heater elements to be readily dismounted from the tub or the like for maintenance operations or replacement by acting on the securing device solely from the exterior of the tub.

These and other objects ar attained according to the invention by a device for sealingly securing at least one electric heater element in an electric household appliance, particularly a laundry washing machine having a laundering tub formed with at least one opening for said heater element to extend therethrough into said tub, said device comprising at least one resilient fastener element for said heater element and at least one sealing gasket provided with a circumferential lip for releasable engagement with the peripheral edge of said opening for hermetically sealing the latter, said sealing gasket being formed with a passage for said heater element to pass therethrough. In accordance with the invention, a device of this type is characterized in that said passage is formed with a toothed portion cooperating with said heater element for providign a hermetic seal therebetween, and in that said resilient fastener element is designed to be snap-fitted onto said heater element and within a corresponding cavity of said sealing gasket so as to compress said lip against said peripheral edge.

Further characteristics and advantages of the invention will become more clearly evident from the following description, given by way of example with reference to the accompanying drawings, wherein:

fig. 1 shows a front view of a portion of the laundering tub of a laundry washing machine provided with heater elements mounted therein with the aid of securing

devices according to the invention, and fig. 2 shows a sectional view taken along the line A-A in fig. 1.

Diagrammatically shown in fig. 1 is part of the lower portion 3 of the laundering tub of a laundry washing machine of a conventional type, the wall of which is formed with an elongate opening 4 having rounded ends 5 and 6 . Opening 4 is adapted to receive therein a number of tubular armoured heater elements 7, 8, 9, 10 required for heating the washing liquid contained in the tub.

The heater elements are removably secured in place by means of the securing device according to the invention, comprised substantially of an elastic sealing gasket 11 made of rubber or any other suitable material, and dimensioned to snugly fit into openign 4 for hermetically sealing it, and a resilient fastener element 12 of conventional type made of a metallic material and having the saem configuration, although at smaller dimensions, as opening 4.

In particular, resilient fastener element 12 is formed with a plurality of sets of resilient fingers 13, 14, 15, 16 at the respective locations of heater elements 7, 8, 9, 10, the function of said fingers to be described hereinafter.

Fastener element 12 additionally serves for connecting the heater elements to ground and is to this purpose provided with a terminal portion 17 adapted to have a grounding conductor (not shown) of the machine connected thereto. With reference to fig. 2, it is noted that sealing gasket 11 is formed with a circumferential lip 18 having the same profile, at larger dimensions, as opening 4, and surrounded by a circumferential channel 19 adapted to engagingly receive the peripheral edge 20 of the opening so as to retain the gasket in place.

The other end portion 21 of gasket 11 is of smaller diameter than lip 18 and connected thereto by a divergent portion 22

and a substantially parallel-walled portion 23.

At the locations of the heater elements to be secured to the tub, end portion 21 of gasket 11 is formed with respective passages for the heater elements to extend therethrough. In the example shown, the passage of end portion 21 is of cylindrical shape and provided with a toothed portion 24 opening into a cavity 25 of gasket 11, the purpose of which will be described as the description proceeds.

The profile of cavity 25 substantially corresponds to that of the resilient fingers 14 of resilient fastener element 12, permitting the resilient fingers to be removably inserted into the cavity. For mounting the heater elements in the laundering tub of the machine, sealing gasket 11 and resilient element 12 are slipped onto the heater elements, whereupon the latter are introduced into the opening 4 of the tub, together with a portion of sealing gasket 11.

In the case of fig. 2, heater element 8 is thus at first inserted into toothed passage portion 24 of sealing gasket 11 to the desired position. Subsequently the resilient fingers 14 of fastener element 12 are introduced into cavity 25, so that curved portions 26 and 27 thereof, respectively, come into snap-engagement with the interior wall of cavity 25 and the exterior surface of heater element 8.

The toothed passage portion 24 on its part is resiliently constrained into contact with the outer surface of heater element 8 so as to provide a hermetic seal therebetween.

The heater element 8 and the interior part of sealing gasket 11 are then introduced into opening 4, with the sealing gasket and resilient fingers kept in a compressed state, so as to engage peripheral edge 20 of opening 4 with peripheral channel 19 of gasket 11 to achieve a hermetic seal therebetween.

In this state, the hermetically sealing contact of toothed passage portion 24 of gasket 11 with the outer surface of heater element 8 prevents the washing liquid contained in the tub from escaping therefrom at this location.

The engagement of curved portions 26 of resilient fingers 14 with the interior wall surface of cavity 25 of gasket 11 is effective to compress lip 18 of the gasket against peripheral edge 20 of opening 4 so as to securely retain the gasket in place and at the same time to maintain a constant compression force acting on the lip, whereby to hermetically seal opening 4.

On the other hand, the engagement of curved portions 27 of resilient fingers 14 with heater element 8 is effective to retain the heater element in place. The end portion of heater element 8 projecting outside the tub is formed with a terminal 29 for connection to an electric power supply of the machine by means of a conductor (not shown).

The device according to the invention for securing heater elements in a household appliance or the like is of simple construction and simple in operation, consisting as it does of only two components, namely, the gasket and the resilient fastener element described above. The securing device according to the invention permits the heater elements to be readily and quickly installed in the receptacle of an electric household appliance, i.e. the tub of a laundry washing machine without the necessity of preliminarily deforming the edges of an opening formed to this purpose, and without permanent deformation of the sealing gasket as in prior art.

In addition, the mounting of the heater elements and the dismounting thereof for maintenance or replacement is accomplished by acting solely from the exterior of the tub or receptacle, and without the necessity of preliminarily dismounting the receptacle for gaining access to the interior thereof.

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Device for Sealingly Securing a Heater Element in an Electric Household Appliance, Particularly a Laundry Washing Machine

Patent Claim

A device for sealingly securing at least one electric heater element in an electric household appliance, particularly a laundry washing machine having a laundering tub formed with at least one opening for said heater element to extend therethrough into said tub, said device comprising at least one resilient fastener element for said heater element and at least one sealing gasket provided with a circumferential lip for releasable engagement with the peripheral edge of said opening for hermetically sealing the latter, said sealing gasket being formed with a passage for said heater element to pass therethrough, said device being characterized in that said passage (4) is formed with

a toothed portion (24) cooperating with said heater element (8) for providing a hermetic seal therebetween, and in that said resilient fastener element (12) is designed to be snap-fitted onto said heater element (8) and within a corresponding cavity (25) of said sealing gasket (11) so as to compress said lip (18) against said peripheral edge (20).

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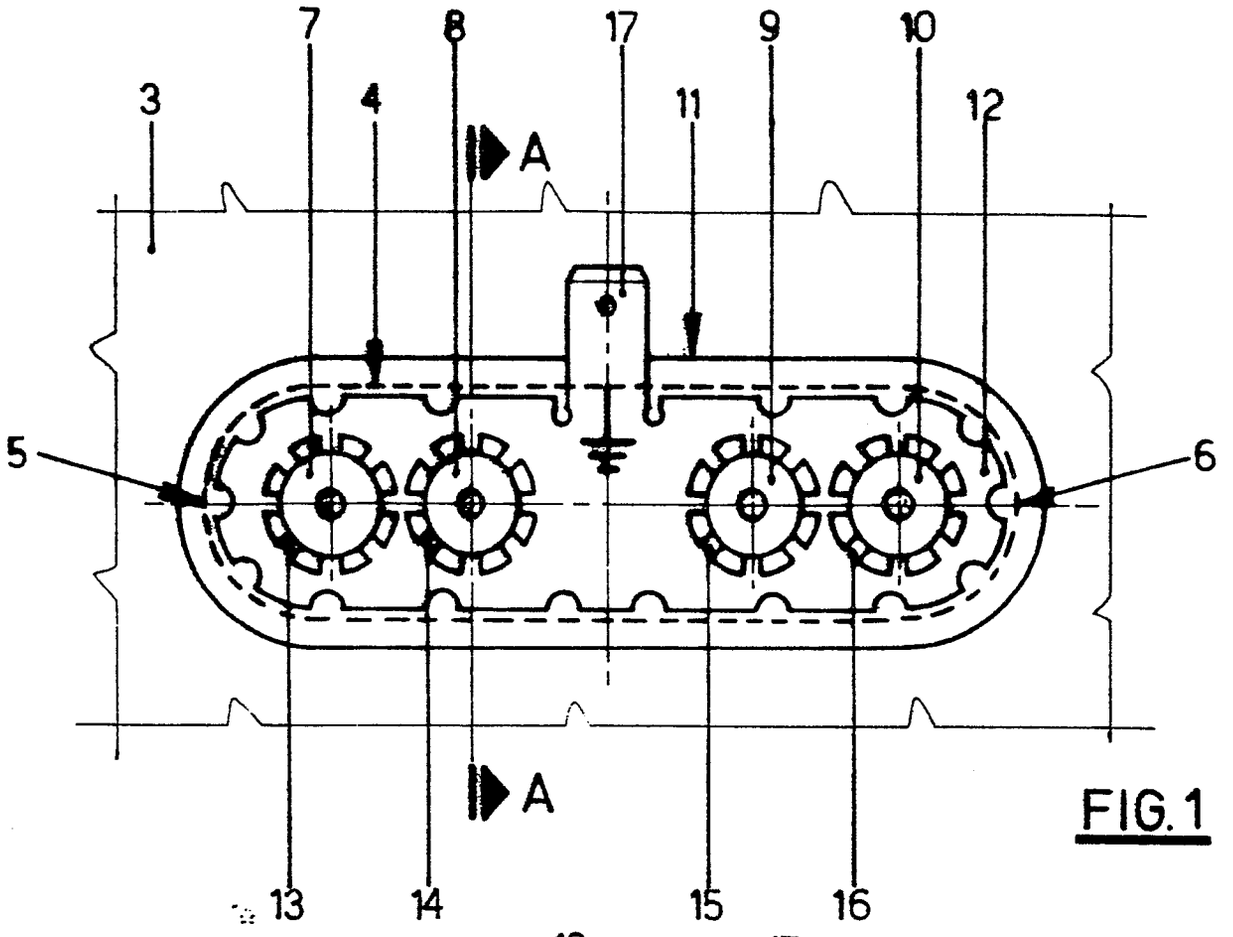

FIG.1

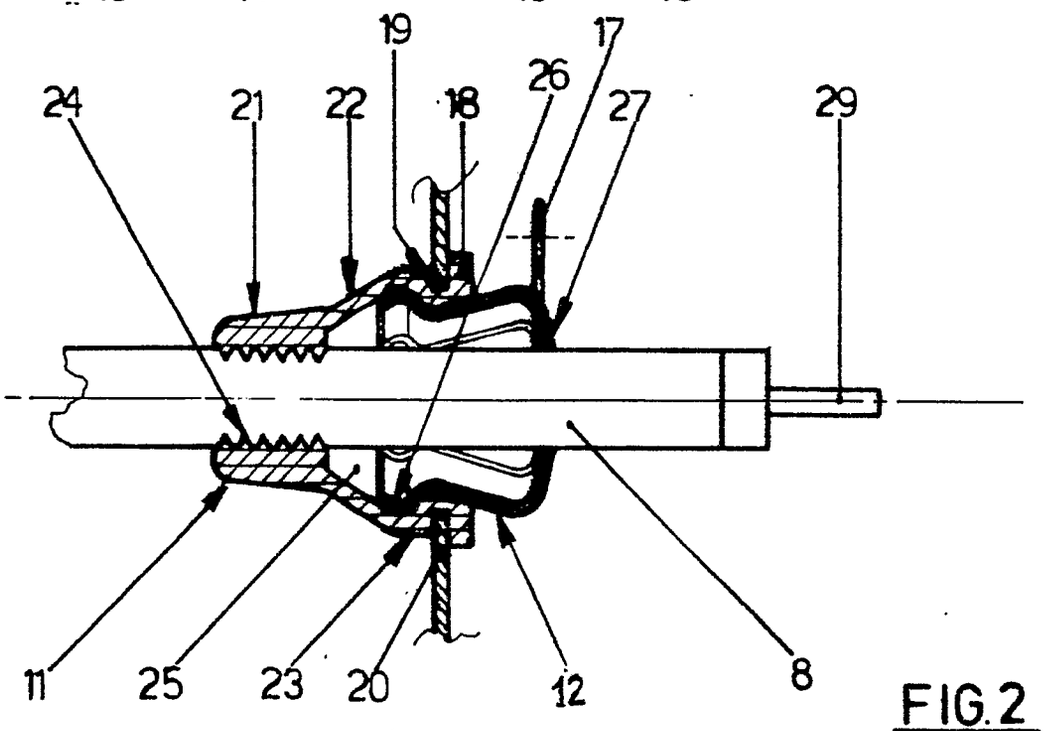

FIG.2