WASHING MACHINE INCLUDING A SHIPPING PROTECTION ARRANGEMENT

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ABSTRACT
A washing machine includes an appliance housing having a front housing part and a rear wall, and includes a washing assembly capable, in an operating mode, of oscillating relative to the appliance housing. The washing assembly includes a washing drum and a suds container enclosing the washing drum. The suds container has a bracket integrally formed thereon. A shipping protection arrangement is provided for protecting the suds container against shocks. The shipping protection arrangement includes a rod and a sleeve-like or tube-like locking element received on the rod. The rod, when in a secured position, is fixed in a first holding receptacle of the front housing part and is fixed in a force-fit manner in a second holding receptacle of the rear wall via the locking element. The rod is connected in a central region thereof in a force-locking manner to the washing assembly via the suds container, the bracket, and the locking element.
WASHING MACHINE INCLUDING A SHIPPING PROTECTION ARRANGEMENT

[0001] Priority is claimed to German patent application DE 10 2005 031 488.0, filed Jul. 4, 2005.

[0002] The present invention relates to a washing machine having a washing assembly which is capable of oscillating relative to the appliance housing and which includes a washing drum and a suds container enclosing the washing drum and which further is protected against shocks by a shipping protection arrangement formed by at least one rod, said rod, when in the secured position, being fixed in holding receptacles on a front housing part and in further holding receptacles on the rear wall of the appliance housing, the rod being connected in a force-locking manner to the washing assembly in the central region via the suds container by means of brackets.

BACKGROUND

[0003] When shipping washing machines, these appliances may happen to fall from relatively great heights on the rear or front feet of the housing. This can happen especially when shipping a plurality of appliances using freight forwarding companies or by rail, because there the appliances are stacked on top of each other for reasons of space and pulled from their elevated position at the top down to the bottom area by only one person. In order to prevent interior damage, especially to the oscillating washing assemblies, during these shipping operations, so-called shipping protection devices are used to immobilize, in particular, the resiliently mounted components inside the washing machine housing for shipment. The actual shipping protection devices are inserted into the interior of the appliance through two openings provided in the rear wall. When in the secured position, the rods are fixed in holding receptacles at the front and rear sides of the appliance housing. In the fixed position, the rods are connected to the suds container in the central region via brackets in a form-locking and/or force-locking manner.

[0004] German Patent DE 199 14 370 C2, for example, describes a shipping protection arrangement, which is intended to be used in particular for suds containers made of sheet metal. Another shipping protection arrangement is known from German Patent DE 102 50 494 C1, where, in particular, the holding receptacles for the rods and the receiving brackets are provided with additional cushioning means. The rod solutions known in the prior art are not suited for suds containers made of plastic, because the introduction of force via narrow projecting noses and small contact areas damage the plastic suds container to an extent that cracks may occur, as a result of which the container is no longer sufficiently leak-tight.

[0005] German Patent Application DE 42 15 780 A1 describes a shipping protection arrangement, where bolts are inserted through the rear wall and screwed into the container wall. In their central region, the bolts are designed as perforated sleeves of hardened steel, which provides a certain degree of resilience. This allows shocks and vibrations of the suds container during shipping to be tolerated to a very limited extent.

[0006] The known solutions of screwing the plastic suds container to the rear wall are not possible either, since such a solution requires a very rigid rear wall because the assembly has a very strong leverage effect and can only be supported on one side. Moreover, very long bolts are required because the assemblies are held in an inclined position in the appliance housing. Insertion or removal of such a shipping protection device can only be done with the aid of a tool, which makes handling more difficult.

SUMMARY OF THE INVENTION

[0007] It is, therefore, an object of the present invention to provide a washing machine including a shipping protection arrangement, which reduces or prevents destruction or deformation of the container wall.

[0008] The present invention provides a washing machine including an appliance housing having a front housing part and a rear wall, and including a washing assembly capable, in an operating mode, of oscillating relative to the appliance housing. The washing assembly includes a washing drum and a suds container enclosing the washing drum. The suds container has a bracket integrally formed thereon. A shipping protection arrangement is provided for protecting the suds container against shocks. The shipping protection arrangement includes a rod and a sleeve-like or tube-like locking element received on the rod. The rod, when in a secured position, is fixed in a first holding receptacle of the front housing part and is fixed in a force-fit manner in a second holding receptacle of the rear wall via the locking element. The rod is connected in a central region thereof in a force-locking manner to the washing assembly via the suds container, the bracket, and the locking element.

[0009] Advantages that can be achieved with the present invention include that optimal use of the material properties may be achieved with minimal manufacturing effort. The shipping rod is not weakened and is thus capable of receiving the forces in an optimum manner. Also, there is no more need for a reinforcement in the form of solid material. If necessary, very rigid material could also be used here. The locking function is provided by a plastic component, because the easiest way to implement complex functions is by using plastic material.

[0010] In order to secure the assembly, especially the suds container, the rod is provided with a sleeve-like or tube-like locking element which, on the one hand, provides the form-fit or force-fit with the rear wall of the housing and, on the other hand, the form-fit or force-fit with the bracket or eye integrally formed on the suds container and facing toward the rear wall. This type of locking is particularly suitable for a suds container which is made of plastic and on which brackets are integrally formed in one piece therewith, because the locking element distributes the forces over larger areas. The immobilization of the oscillating washing assembly and the locking of the shipping rod are easily brought about using the locking element, which is a simple molded plastic part cooperating with the rod. For purposes of locking and fixing, the tube-like locking element has ribs radially formed thereon, said ribs having a gap in the region of the bracket and in the region of the rear wall, the gaps corresponding to the thickness of the bracket and rear wall, respectively. Thus, the oscillating washing assembly is both immobilized and fixed in place at a distance from the rear wall. In particular, for inserting the locking element and the rod through the rear wall of the appliance housing, the
through-hole in the rear wall is substantially circular in shape, recesses being provided in diametrical relationship for passing the ribs therethrough.

In an embodiment of the present invention, the tube-like locking element is formed by a molded plastic part, which is slipped over the end of the rod and secured by a press fit. To this end, the sleeve-like locking element is provided with one or more clamping ribs on its inner circumference, said clamping ribs tightly enclosing the inserted rod by means of an axially extending entry bevel, thus providing a press-fit connection.

To limit insertion into the opening of the rear wall, a disk-like molded part is provided on the end of the locking element. After insertion or in the locked position, said disk-like molded part rests flat against the rear wall.

The locking is done after inserting the shipping rod, together with the locking element, into the openings provided in the housing parts and in the brackets of the suds container. The locking is accomplished by rotating the locking element in the inserted position. In doing this, the ribs are rotated out of alignment with the diametral recesses and, after being rotated approximately one-quarter turn, the ribs rest with their end faces against the bracket and rear wall regions surrounding the through-holes. Thus, the suds container cannot move in radial or axial direction, nor is it possible to pull out the shipping rod.

In accordance with the present invention, in order to prevent unintentional loosening of the locking element, a resilient latching nose is provided in the disk-like molded part to secure the locking element against rotation. Said latching nose can be made, for example, by punching. In an advantageous embodiment, this latching nose is attached to a flat spring disposed in a planar relationship with respect to the disk-like molded part, the flat spring and the latching nose being cut out in one piece from the disk-like molded part. After rotating the locking element, the latching nose snaps behind an edge of the diametral recesses in the opening of the rear wall.

For purposes of operating the locking element, for example, to loosen or tighten the locking element, gripping elements are integrally formed on the disk-like molded part, said gripping elements being radially oriented in a manner similar to the ribs and accessible at the rear wall of the appliance housing.

**BRIEF DESCRIPTION OF THE DRAWINGS**

An exemplary embodiment of the present invention is shown in the drawings in a schematic way and will be described in more detail below. In the drawings,

**Fig. 1** shows a washing machine;

**Fig. 2** is a perspective view specifically showing the rear wall area of a washing machine, and indicating the lower portion of the suds container, and further showing the brace for the shipping protection rods, which is located in the front area;

**Figs. 3a to c** are rear, side and top views of the representation of Fig. 2;

**Fig. 4** is a perspective view of the locking element according to the present invention, which is disposed on the shipping rod in the end region;

**Fig. 5** is a detail view showing the locking element with the rod inserted; and

**Fig. 6** specifically shows the receiving area in the rear wall of the appliance housing.

**DETAILED DESCRIPTION**

**Fig. 1** is a cross-sectional overview of a washing machine. Housing 2 includes a rear wall 11 and a front housing part 10, said housing part 10 being either a frame element extending along the front or a front wall. Assembly 3, which includes a drum 5 and a suds container 6 enclosing drum 5, is resiliently mounted inside housing 2.

**Fig. 2** shows a perspective view of the rear wall area of the appliance housing 2 of a washing machine, in which housing the washing assembly is resiliently mounted. In addition to washing drum 5 shown in Fig. 1, the washing assembly also includes a suds container 6 enclosing washing drum 5, said suds container being sketched here only schematically. Suds container 6 is protected against shocks by shipping protection devices in the form of shipping rods 7. When in the secured position, rods 7 are located in holding receptacles 9 in front housing part 10 and in further holding receptacles 8 in rear wall 11. In the central portion, rods 7 are connected to suds container 6 via brackets or eyes 12, 13 in a form-locating and/or force-locating manner. In the front region of the central portion, rod 7 is connected to front bracket 13; in the rear region of the central portion, rod 7 is connected to rear bracket 12 in a force-locating manner with the aid of locking element 14.

**Fig. 3a** is a rear view of rear wall 11 with locking elements 14 inserted. The side view of Fig. 3b illustrates the shape of the inserted shipping protection device, the front end of rod 7 extending into the holding receptacles of front housing part 10, and the rear end of rod 7, with locking element 14 slipped thereover, extending into rear wall 11. In the central region, oscillating suds container 6 is fixed in place by this rod 7 and via the locking element. Fig. 3c is a top view showing that two rods 7, which each have one locking element 14, are inserted parallel to each other, the inserted rods extending substantially alongside the suds container 6.

**Fig. 4** is a perspective view of locking element 14, which is designed, in particular, to protect suds container 6, which is made of plastic, the locking element being slipped over rod 7 in a sleeve- or tube-like manner (Fig. 5). Locking element 14 combines two functions. On the one hand, it provides the form-fit and force-fit with rear wall 11 of housing 2 and, on the one hand, it provides the form-fit and force-fit with bracket or eye 12 integrally formed on suds container 6 and facing toward the rear wall. For purposes of locking and fixing, tube-like locking element 14 has ribs 15 radially formed thereon, said ribs having a gap in the region of the bracket and in the region of the rear wall, the gaps corresponding to the thickness of bracket 12 and rear wall 11. As can be seen from Fig. 6 in particular, through-hole 18 of rear wall 11 is substantially circular in shape, recesses 19 being provided in diametrical relationship for passing ribs 15 therethrough. Through-hole 17 of bracket 12 is similar in shape.

As can be seen from Fig. 4, tube-like locking element 14 is formed by a single molded plastic part, which
is slipped over the end of rod 7 and frictionally forced into a press-fit engagement. It is apparent that when rod 7 is pushed into tube-like locking element 14, projections 23 integrally formed on locking element 14 prevent rod 7 from rotating within locking element 14. As shown in FIG. 5, tube-like locking element 14 is provided with clamping ribs 25 on its inner circumference, said clamping ribs pressing against the outer surface of the inserted rod 7, thus providing a good press-fit engagement with rod 7. It is also conceivable for the attachment to be provided by snap-in locking elements or by a bayonet type of connection. As can further be seen from FIG. 5, projections 23 each extend into recesses 24 provided on the rear end of rod 7, thus providing a non-rotational, form-locking engagement, so that when locking element 14 is rotated, rod 7 is also rotated accordingly. As can be seen from FIG. 4, a disk-like molded part 20 is provided on the end of locking element 14, said disk-like molded part resting flat against rear wall 11 in the locked position. In order to prevent locking element 14 from unintentionally rotating back, a resilient latching nose 21 and a flat spring 26 are punched in disk-like molded part 20. In a specific position, here, for example, in the 90° position, said latching nose snaps into one of the two diametral openings 19 in rear wall 11 to secure locking element 14 against rotation. In FIG. 2, locking element 14 is shown in the locked position. In this position, latching nose 21 extends through diametral opening enlargement 19 into the interior of the housing. It is apparent that when loosening the shipping protection device, latching nose 21 needs to be released to allow rotation back from the 90° position and to thereby allow locking element 14 to be removed from rear wall 11. To provide easy operation, gripping elements 22 are integrally formed on disk-like molded part 20. In an advantageous embodiment, said gripping elements are radially oriented in a manner similar to the ribs 15. To operate locking element 14, in particular to insert the same, ribs 15 need to be appropriately aligned such that they can be passed through through-hole 17 of bracket 12 and through-hole 18 of rear wall 11 until disk-like molded part 20 rests against rear wall 11 of appliance housing 2. Then, locking element 14 is rotated by gripping elements 22 according to the arrow indicated on disk-like molded part 20, so that ribs 15 are rotated out of their pass-through position, thus effecting the locking in front of and behind through-hole 17 of bracket 12 and through-hole 18 of rear wall 11. Thus, suds container 6 is fixed in place in a simple manner using a molded part, thus protecting washing assembly 3 for shipping purposes.

What is claimed is:

1. A washing machine comprising:
   an appliance housing including a front housing part and a rear wall;
   a washing assembly capable, in an operating mode, of oscillating relative to the appliance housing, the washing assembly including a washing drum and a suds container enclosing the washing drum, the suds container having a bracket integrally formed thereon; and
   a shipping protection arrangement configured to protect the suds container against shocks, the shipping protection arrangement including a rod and a sleeve-like or tube-like locking element received on the rod, the rod, when in a secured position, being fixed in a first holding receptacle of the front housing part and being fixed in a force-fit manner in a second holding receptacle of the rear wall via the locking element, the rod being connected in a central region thereof in a force-locking manner to the washing assembly via the suds container, the bracket, and the locking element.

2. The washing machine as recited in claim 1 wherein the suds container includes a plastic material and the bracket is integrally formed on the suds container as one piece.

3. The washing machine as recited in claim 1 wherein the locking element includes at least one radially extending rib so as to provide locking and fixing, the at least one rib including a first gap in the region of the bracket and a second gap in the region of the rear wall, the first gap corresponding to a thickness of the bracket and the second gap corresponding to a thickness of the rear wall.

4. The washing machine as recited in claim 1 wherein the bracket and rear wall each include a respective through-hole each having a substantially circular shape and a pair of respective recesses disposed in diametrical relationship, the respective through-holes being configured to allow passage of the tube-like locking element with the at least one rib.

5. The washing machine as recited in claim 1 wherein the sleeve-like locking element is formed by a molded plastic part configured to be received over an end of the rod.

6. The washing machine as recited in claim 5 wherein the locking element includes a disk-like molded part at the end thereof, the disk-like molded part being configured to abut flatly against the rear wall in a locked position of the locking element.

7. The washing machine as recited in claim 6 wherein the locking element includes a disk-like molded part having a resilient latching nose configured to secure the locking element against rotation.

8. The washing machine as recited in claim 7 wherein the resilient latching nose is connected to the disk-like molded part via a flat spring.

9. The washing machine as recited in claim 6 wherein the locking element includes outwardly directed gripping elements integrally formed on the disk-like molded part.

10. The washing machine as recited in claim 1 wherein the bracket faces toward the near wall.

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