US 20090064730A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2009/0064730 A1

(43) Pub. Date: Mar. 12, 2009

Emmerich et al.

(54) **HOUSEHOLD APPLIANCE WITH A LYE CONTAINER**

(75) Inventors: **Frank Emmerich**, Berlin (DE); **Georg Gramm**, Berlin (DE); **Wilfried Wildung**, Berlin (DE)

Correspondence Address:
BSH HOME APPLIANCES CORPORATION
INTELLECTUAL PROPERTY DEPARTMENT
100 BOSCH BOULEVARD
NEW BERN, NC 28562 (US)

(73) Assignee: **BSH Bosh und Siemens Hausgerate GmbH**, Munchen (DE)

(21) Appl. No.: **12/224,726**

(22) PCT Filed: **Feb. 20, 2007**

(86) PCT No.: **PCT/EP2007/051582**

§ 371 (c)(1),
(2), (4) Date: **Sep. 3, 2008**

(30) **Foreign Application Priority Data**

Mar. 7, 2006 (DE) 10 2006 010 518.4
Mar. 8, 2006 (DE) 10 2006 010 788.8

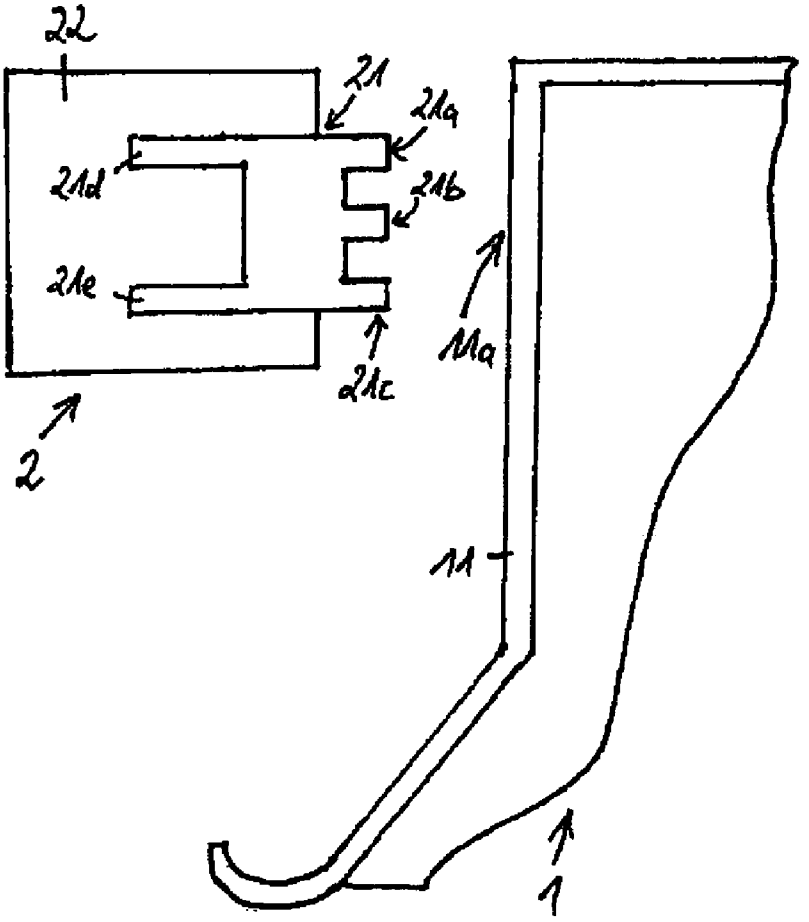
Publication Classification

(51) **Int. Cl.**
D06F 39/08 (2006.01)

(52) **U.S. Cl.** **68/207**

(57) **ABSTRACT**

A household appliance having a detergent container at least partially formed from plastic defining a plastic area and further including at least one ballast weight having a plastic body attached to the detergent container, wherein a mechanical connection of the plastic body of the ballast weight to the plastic area of the detergent container is formed using a plastic welding process. The household appliance includes at least one raised connecting element formed on at least one of the plastic body of the ballast weight and the plastic area of the detergent container, configured for contact with a contact surface of at least one of the plastic body to be connected and the plastic area to be connected, wherein the at least one raised connecting element is configured for bonded connection to the contact surface using a plastic welding process.



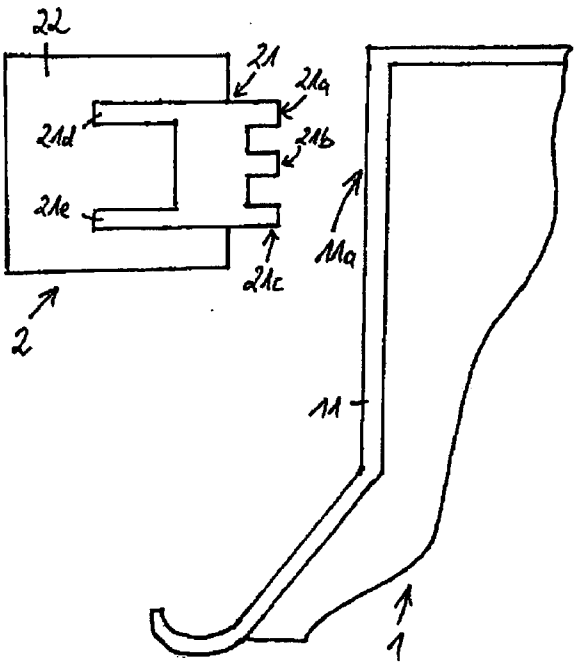


Fig. 1

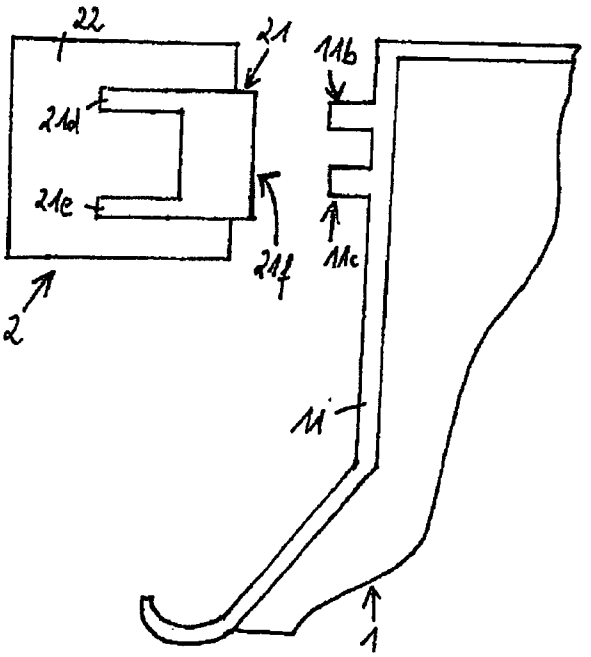


Fig. 2

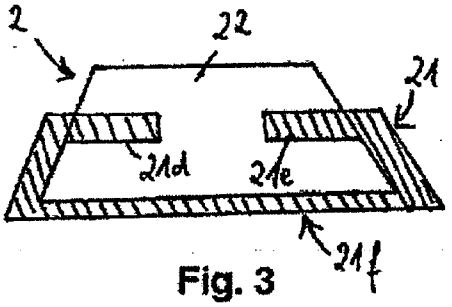


Fig. 3

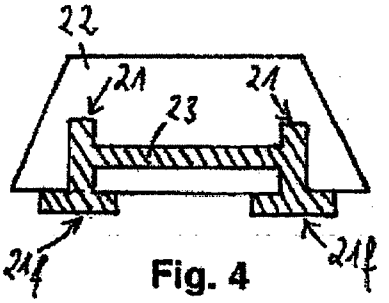


Fig. 4

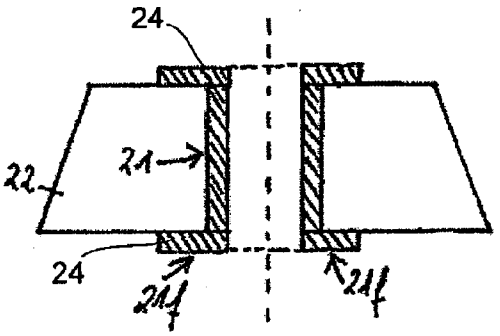


Fig. 6

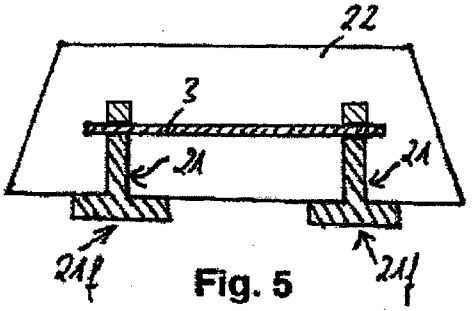


Fig. 5

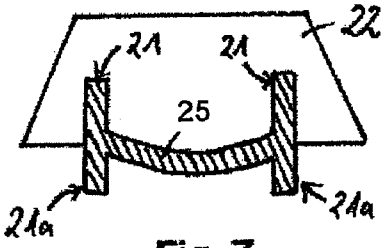


Fig. 7

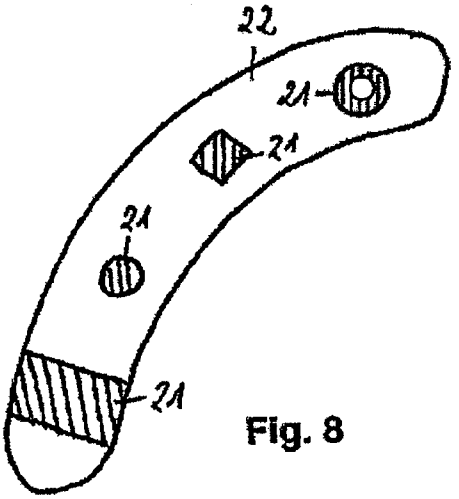


Fig. 8

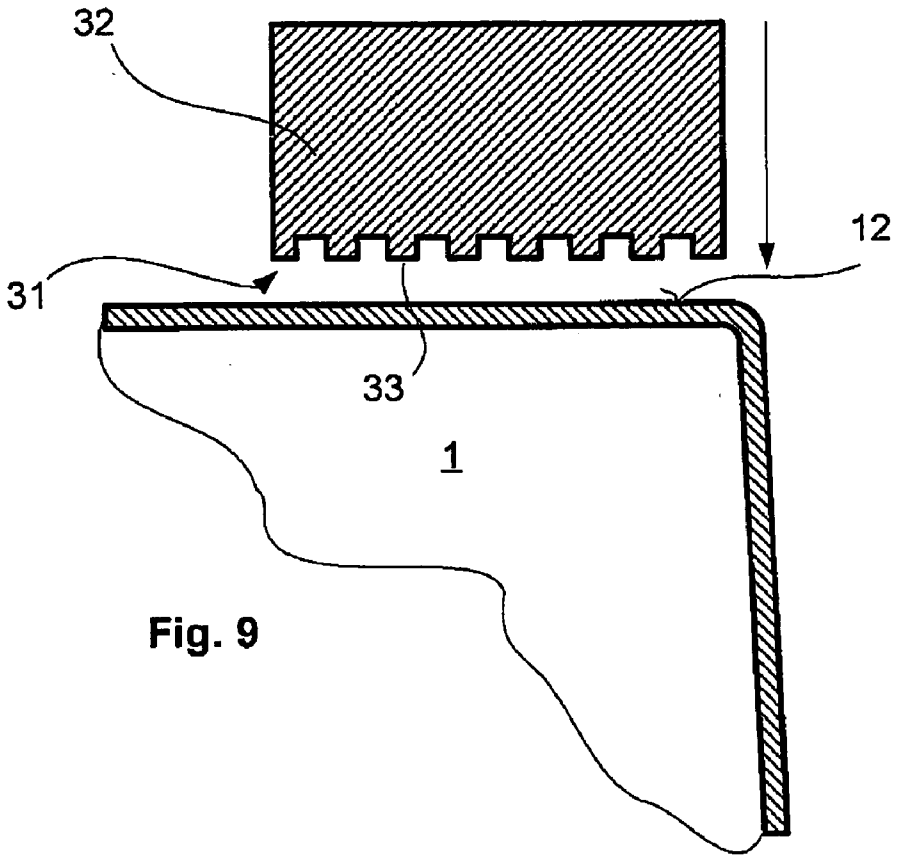


Fig. 9

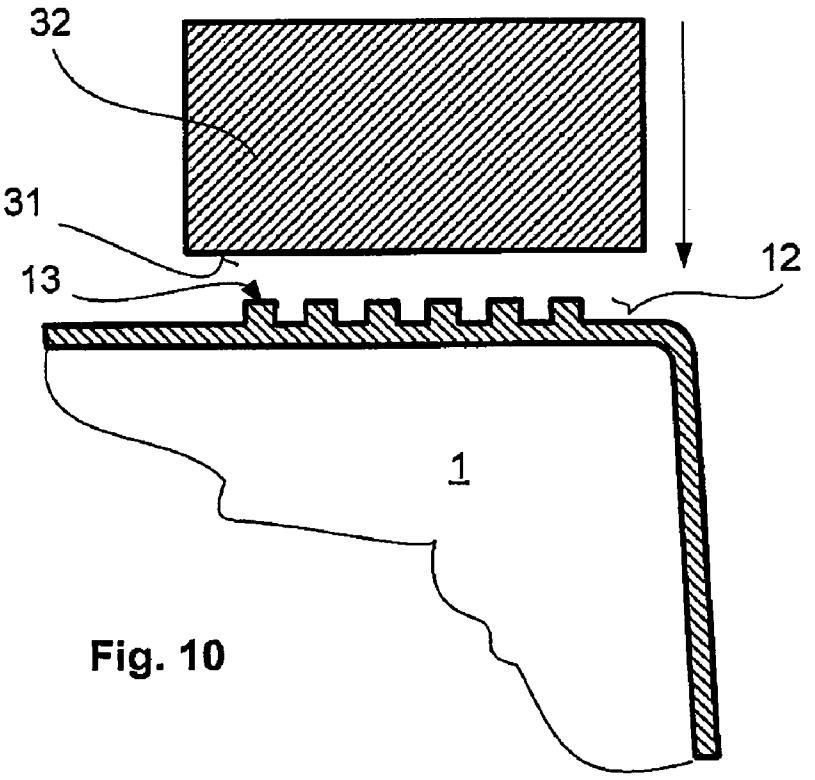


Fig. 10

HOUSEHOLD APPLIANCE WITH A LYE CONTAINER

[0001] The invention relates to a household appliance, having a lye container, which at least in part is embodied in plastic, and having at least one ballast weight with at least one plastic body, which is attached to the lye container, where the mechanical connection of the plastic body of the ballast weight to a plastic area of the lye container is created by means of a plastic welding process.

[0002] Besides the attachment of ballast weights by means of friction and/or form fit using screws or a tension band, fixing by means of a plastic welding process is also known. DE 693 07 668 T2 thus discloses a washing machine or a combined washer/dryer, in which at least one ballast weight is attached to a lye container made of plastic. The ballast weight has a hollow plastic container which can be filled with water as the ballast material. The plastic container has a plastic outrigger element, which fits together precisely and thus in a form-fit manner with a corresponding plastic outrigger element on the lye container. The plastic container is arranged on the lye container in such a way that the two plastic outrigger elements are connected in a form-fit manner, where the pairs of matching outrigger elements are permanently connected to each other after joining by plastic welding of the plastic material. In addition to this DE 693 07 668 T2 also mentions the prior art whereby concrete blocks completely surrounded by a plastic covering are employed as ballast weights. Connection of this plastic covering to a lye container by means of a plastic welding process is also known from this. The fixing of the ballast weights to a lye container in the case of known household appliances requires a relatively high degree of effort. In all cases a form fit between the elements must first be established.

[0003] The object of the present invention is thus to create a household appliance of the kind specified at the outset, in which a connection between a ballast weight and a lye container can be embodied with little effort and a high degree of security. This object is achieved by a household appliance having the features as characterized in claim **1**.

[0004] In a household appliance according to the invention, at least one raised connecting element is embodied on the plastic body of the ballast weight and/or on the plastic area of the lye container, which can come into contact with a contact surface of the plastic area or the plastic body to be connected, where the raised connecting elements can be connected in a bonded manner with the contact surface by means of a plastic welding process.

[0005] The household appliance comprises at least one ballast weight, where the ballast weight has at least one plastic body. The ballast weight is attached to the lye container, where the mechanical connection between the plastic body of the ballast weight and a plastic area of the lye container is effected by means of a plastic welding process.

[0006] In the case of a dishwasher as the household appliance, instead of being attached to a lye container the ballast weight can also be attached to a plastic housing section in the same manner. An essential idea of the invention is specifically that at least one raised connecting element is embodied on the plastic body of the ballast weight or the plastic area, to which the ballast weight is to be attached, which is brought into contact with the contact surface of the plastic area to be connected, and the raised connecting element can subsequently be connected in a bonded manner to the contact surface by means of the plastic welding process, in order to create the mechanical connection between the plastic areas.

[0007] The mechanical connection between the ballast weight and the lye container can thus be embodied with little effort, but nonetheless in a secure manner. Prior form fit joining of the ballast weight to the lye container is no longer required. The raised connecting element here extends in the direction of the contact surface of the plastic area with which the connecting element is to be connected in a bonded manner, thus enabling simple execution of the connection by means of a plastic welding process.

[0008] Advantageous embodiments of the invention are indicated in the subclaims, and can be combined individually or in any combination with each other or with the invention according to claim **1**.

[0009] In an advantageous manner the ballast weight is embodied by at least two solids, with one material being the plastic body, and at least one further part of the body made of a solid material being connected with the plastic body. The second solid is preferably concrete or a concrete compound. An appropriate heavy ballast weight can thus be created which is especially suitable as a counterweight. The second solid can, however, also be gray cast iron or cast steel.

[0010] Such ballast weights attached to a lye container serve, in the case of a washing machine, to counterbalance this lye container, that is to increase its inertia and consequently to limit the oscillations generated in the lye container during a spin phase. This is then particularly advantageous if a drum of the washing machine is filled with items of laundry, and driven at a relatively high rotational speed. The aforementioned oscillations are brought about by conditions arising as a result of the uneven distribution of laundry items over the cylindrical wall of the drum.

[0011] In the case of a dishwasher, the ballast weight can, however, also be attached to a rear housing section embodied in plastic. Here, the ballast weight serves to offset at the rear the weight of the front-opening door of the dishwasher, so that the dishwasher does not tip forwards when the door is open.

[0012] Advantageously, the plastic body of the ballast weight extends in part into the second solid. In particular, provision can be made for the second material to be completely interspersed by the plastic body of the ballast weight. In this way dual-material ballast weights can be created, which can be embodied in a large number of different ways. In particular variable shapes of these two materials can here be implemented, which can be optimized with respect to the arrangement of the ballast weight on the lye container or on the housing section and in the household appliance.

[0013] Advantageously, the raised connecting elements are embodied in the manner of ribs. The connecting elements can, however, be embodied in any other shape which results in a raised structure of the connecting elements compared with the remainder of the plastic area. The connecting elements can, for example, be embodied in the form of pins, spikes or cones. Here too, an optimized shape can be selected depending on the situation and with respect to the requirements of the ballast weight (space requirements, strength, etc.).

[0014] Provision can be made for the plastic body of the ballast weight to be embodied in the form of a hook or a comb. On the one hand the connection of the plastic body to the second material of the ballast weight can thereby be improved

and on the other the best possible mechanical connection with the plastic area of the lye container with respect to strength can be achieved.

[0015] Provision can be made for the connecting element or connecting elements to be embodied on the lye container, and for connection to the plastic body of the ballast weight to be contactable with an essentially uniform contact surface of the plastic body of the ballast weight. Equally, however, provision can also be made for the connecting elements to be embodied on the ballast weight, and to be contactable with an essentially uniform contact surface of the plastic area of the lye container.

[0016] Advantageously, a multiplicity of raised and preferably similarly oriented connecting elements is embodied on the plastic area or on the plastic body. It is also possible here to embody connecting elements on the contact surfaces of the parts to be connected with each other, and to weld these together. According to a further development of the invention, by means of multiplicity of connecting elements a number of contact areas can be created with the plastic area to be connected, by which the strength of the mechanical connection can be improved.

[0017] Provision can be made for the ballast weight to have at least two separate plastic bodies which are connected with a connecting stud. The connecting stud is preferably embodied in plastic. Provision can, however, also be made for the arrangement of a reinforced wire for the connection of at least two plastic bodies. The connection between at least two separate plastic bodies of the ballast weight can thereby be embodied in many different ways.

[0018] Provision can be made for the connecting stud and/or the reinforced wire to be surrounded, at least in part, by the second material of the ballast weight. This can, for example, be cast in the second material. A permanent connection between the materials can thereby be created, and a positionally stable arrangement at least of the connecting studs can be guaranteed.

[0019] The ballast weight can be embodied in cuboid or annular form. The form of the ballast weight is, however, not restricted thereby and can also be embodied in many other ways.

[0020] The connecting element is preferably integrated into the assigned plastic body. The plastic body and the connecting elements can thereby be manufactured in one piece. A single body can for example be manufactured here by means of injection molding.

[0021] The household appliance is advantageously embodied as a dishwasher, as a washing machine or as a combined washer/dryer.

[0022] The invention is described below in greater detail on the basis of exemplary embodiments shown in diagrammatic form. Where:

[0023] FIG. **1** shows part of the frontal aspect of a lye container, to which is to be attached a ballast weight with a plastic body with its own connecting elements;

[0024] FIG. **2** shows part of the frontal aspect of a lye container with connecting elements, to which a ballast weight with a smooth-surfaced plastic body is to be attached;

[0025] FIG. **3** to FIG. **7** show a number of different embodiments of a ballast weight according to the invention,

[0026] FIG. **8** shows a view of contact surfaces of a ballast weight embodied in the shape of a crescent.

[0027] FIG. **9** shows a ballast weight with connecting elements which is to be attached to the mantle surface of a lye containers,

[0028] and FIG. **10** shows a ballast weight with a smooth contact surface, which is to be attached to a mantle surface of a lye container structured by means of connecting elements.

[0029] The section shown diagrammatically in FIG. **1** shows part of a lye container **1** of a washing machine (not shown), to the front wall of which **11***a* ballast weight **2** is to be attached. The contact surface **11***a* is provided for this purpose.

[0030] Besides the ballast weights shown here, such ballast weights could also be used, in which the plastic body takes the form of a plastic mass distributed in a concrete mixture. Amorphous and part-crystalline thermoplastic either with or without aggregates may, for example, be considered for this purpose. This can moreover also apply at least to the contact surface(s) of the lye container **1**.

[0031] In the exemplary embodiments, the ballast weight **2** is embodied as two different parts made of solid materials. The ballast weight **2** here has a plastic body **21**, which is embedded in a second body, the ballast body **22**, which is made of concrete. Plastic body **21** and ballast body **22** are connected to each other in a form-fitted and force-fitted manner. In FIG. **1** the ballast weight **2** is embodied as a cuboid.

[0032] According to FIG. **1**, the plastic body **21** is embodied in a comb-like form on its side facing the contact surface **11***a* of the lye container **1**, and thus has three raised connecting elements **21***a*, **21***b* and **21***c*. These connecting elements **21***a* to **21***c* protrude from the plastic body **21** and essentially extend in the same direction. In the exemplary embodiment, these raised connecting elements **21***a* to **21***c* are embodied as ribs.

[0033] In addition the plastic body **21** has cross-sectionally longitudinal extensions **21***d* and **21***e*, which extend in the direction of the ballast body **22**, and are completely surrounded by the concrete of the ballast body **22**.

[0034] For connection of the ballast weights **2** to the front wall **11** of the lye container **1**, the raised connecting elements **21***a* to **21***c* of the ballast weight **2** are arranged on the contact surface **11***a*. This gives rise to a mechanical contact between the contact surface **11***a* and these three connecting elements **21***a* to **21***c*. By means of a plastic welding process, for example vibration welding or mirror welding, a molten mass connection between the plastic body **21** of the ballast weight **2** and the front wall **11** of the lye container **1** is created. A bonded connection with the contact surface **11***a* is here established through melting of the raised connecting elements **21***a* to **21***c*. The raised connecting elements **21***a* to **21***c* here serve as the material supply for melt material, which after establishment of the connection becomes part of this connection.

[0035] According to the exemplary embodiments, the mechanical connection then established between the ballast weight **2** and the lye container **1** is created in such a way that in the event of heating, in particular of the plastics in the lye container **1** and the ballast weight **2**, this connection cannot loosen. To this end, the contact surface **11***a* on the lye container **1** is matched to the corresponding connection surface of the plastic body **21** of the ballast weight **2**, and in particular to the connection surfaces of the raised connecting elements **21***a* to **21***c*. The size of the connection surfaces between the plastic body **21**, in particular its raised connecting elements **21***a* and **21***c*, and the contact surface **11***a* of the lye container **1**, can be chosen according to the forces to be anticipated.

[0036] In addition, the form and force fit connection between the plastic body **21** and the concrete body **22** can withstand heat caused by the heating-up of the lye and any operating forces generated during the spinning of a drum of the washing machine.

[0037] FIG. **2** shows a second general embodiment of the ballast weight **2** and of the lye container **1**. In contrast to the example shown in FIG. **1**, no raised connecting elements are here embodied on the plastic body **21**. Here, only a contact surface **21***f* is embodied on the ballast weight **2**, which faces towards the front wall **11** of the lye container **1**. The connection between the plastic body **21** and the concrete body **22** is embodied in a similar manner as shown in FIG. **1**.

[0038] Here the contact surface of the front wall **11** of the lye containers **1** has raised connecting elements **11***b* and **11***c*. The number of these has been selected solely by way of example, and can preferably vary upwards. The connecting elements **11***b* and **11***c* extend in one piece from the front wall **11**. To prepare the connection, the contact surface **21***f* of the plastic body **21** of the ballast weights **2** is brought into contact with the raised connecting elements **11***b* and **11***c*. A plastic welding process is then used to create the bonded connection.

[0039] The sectional view in FIG. **3** of a further exemplary embodiment of a ballast weight **2** shows the concrete body **22** partially encased by the plastic body **21**. Here, the contact surface **21***f* extends over the entire width of the concrete body **22**. The extremities **21***d* and **21***e* here extend from the side into the interior of the concrete body **22**, and are surrounded by its concrete material. Otherwise than shown here, the concrete body **22** can be entirely encased in the plastic body **21**.

[0040] In cross section, the ballast weights according to FIG. **3** to **7** are broadly trapezoidal in form, but likewise have a longer extension vertically relative to the level of the diagram. The ballast weights **2** in FIGS. **2** and **3** have the advantage that their contact surfaces **21***f* are embodied in completely smooth form and can thus be freed of concrete residues in a simple manner. Additionally in the case of an embodiment of this kind, in which a flat area **21***f* is embodied on the ballast weight **2** and the raised connecting elements **11***b* and **11***c* on the washing liquor container **1**, connection by means of vibration welding is advantageous.

[0041] The exemplary embodiment of a ballast weight **2** according to FIG. **4** has two plastic bodies **21**, which partially penetrate into the concrete body **22**. The two plastic bodies **21** are T-shaped in cross section (reversed T) and are connected with a connecting stud **23**, which is a one-piece element of the plastic body **21**. The connecting stud **23** is here completely surrounded by the concrete material of the concrete body **22**. Parts of the plastic body **21**, specifically the cross-pieces of the T, extend outwards from the concrete body **22**. On these are embodied contact surfaces **21***f*, which are connected with raised connecting elements **11***b* and **11***c* to the lye container **1** according to FIG. **2**.

[0042] As in FIG. **4**, the ballast weights **2** in FIG. **5** are provided with plastic bodies **21**, which penetrate the concrete body **22**. Instead of the connecting stud **23** in FIG. **4**, however, the plastic bodies **21** within the concrete body **22** are connected to each other by means of a reinforced wire **3**. The reinforced wire **3** can however also be provided in addition to the connecting stud **23**, in order to secure the connection of the two plastic bodies **21**. A multiplicity of connecting studs **23** and/or a multiplicity of reinforced wires **3** can also be provided for. The reinforced wire **3** or multiplicity thereof primarily serve, however, to stabilize the concrete body, and can be used in the manner shown to anchor the plastic body or bodies **21** in the concrete, and if applicable as a means of connecting them to each other.

[0043] FIG. **6** shows an embodiment varying in principle from the previous embodiment of the ballast weight **2**, the plastic body **21** of which is embodied in a pipe-like form and completely intersperses the concrete body **22**. Here too, however, contact surfaces **21***f* are embodied, which serve to provide the connection with raised connecting elements on the lye container **1**. The pipe-shaped plastic body **21** has at both ends flanges **24**, which closely abut the broad exterior surfaces of the concrete body **22**.

[0044] The ballast weight **2** according to FIG. **7** has two essentially strip-like plastic bodies **21** of rectangular cross section. They are likewise connected to the concrete body **22** in such a way that they partially penetrate the concrete body. In a similar manner to a connecting stud **23** according to FIG. **4**, however, the two plastic body strips **21** are connected to each other via a curved connecting stud **25**. Connecting stud **25** penetrates the concrete body **22** only partially, so that it is connected to it by means of form fit and force fit. Connecting elements **21***a* embodied on the outer strip edges of the plastic body **21** serve to create a connection with a flat-faced area, for example the contact surface **11***a* in FIG. **1** of the lye container **1**. In addition, however, further connecting elements can also be embodied on the exterior of the connecting stud **25**.

[0045] FIG. **8** shows a ballast weight **2**, viewed across its large surface, thus here the contact surfaces facing the front wall of the lye container **1**. The curved embodiment of the ballast weight **2** follows the shape of the contact surface **11***a* on the front wall of the lye container **1**, which extends in a ring around a loading aperture (not shown) of the lye container's front wall **11**. Based on this view, different shapes of contact surface are shown on the plastic body **21**. Circular, rectangular and annular surfaces are shown, which are indented from the lateral edge of the ballast weight **2**, as well as a contact surface which extends across the entire width of the ballast weight **2**, representative of the fact that a practically unlimited number of embodiments is possible.

[0046] Each of these contact surfaces of the plastic body **21** can have at least one raised connecting element **21***a* (not shown). Provision can also be made, however, for at least one of these plastic bodies **21** to have a flat-faced area **21***f* (not shown) which can be connected in a bonded manner with at least one raised connecting element of the lye container.

[0047] Finally, FIGS. **9** and **10** show a cross-sectional view of ballast weights **32** shaped in such a way that their contact surface **31** to the lye container **1** they follow the curve of the mantle surface **12** of the lye container **1**. Here, as in the remaining examples, the contact surfaces **31** can be embodied on plastic bodies of the ballast weights **32**; accordingly no detailed representation of the embodiment is provided here. In a similar manner to that shown in FIGS. **1** and **2**, the contact surfaces **31** of the ballast weight **32** and/or the contact surfaces on the lye container mantle **12** can be provided with connecting elements **33** or **13**, in order to be equipped for connection through the use of a plastic welding process, in preparation for which the ballast weights are pressed onto the contact surface on the lye container mantle **12** in the direction of the arrow.

[0048] As a result of the various forms of embodiment of the ballast weight **2**, a very wide variety of shapes can thus be created which are embodied from two solids. Besides low-cost concrete, only relatively simple plastic parts are required,

which can be inserted into the mold during manufacture of the concrete parts. A simple embodiment of the entire ballast weight **2** can thereby be realized, even if the respective shapes of the concrete body **22** and the plastic body **21** are embodied in more complex form. Cost-effective realization of the ballast weight **2** can be guaranteed through the choice of material.

[0049] A rapid and secure connection can be created by means of the plastic welding process, whereby the welded connections can be produced fully automatically in a simple welding plant without further additives. The welded connections can be realizable for attaching a ballast weight to a front wall or to a mantle or to a base of the lye container. In addition the welded connections are suitable for oscillating systems with high spin speeds, because load forces are directed into the components concerned over a wide area, so that the tension in the mechanical connection is very small.

1-14. (canceled)

15. A household appliance having a detergent container at least partially formed from plastic defining a plastic area and further including at least one ballast weight having a plastic body attached to the detergent container, wherein a mechanical connection of the plastic body of the ballast weight to the plastic area of the detergent container is formed using a plastic welding process, the household appliance comprising at least one raised connecting element formed on at least one of the plastic body of the ballast weight and the plastic area of the detergent container, configured for contact with a contact surface of at least one of the plastic body to be connected and the plastic area to be connected, wherein the at least one raised connecting element is configured for bonded connection to the contact surface using a plastic welding process.

16. The household appliance according to claim **15** wherein the plastic body of the ballast weight is embedded in a second solid.

17. The household appliance according to claim **16** wherein the second solid is formed as a concrete body formed from at least one of concrete and a concrete compound.

18. The household appliance according to claim **17** wherein the plastic body of the ballast weight is present as a distributed mixture in the concrete compound.

19. The household appliance according to claim **17** wherein the plastic body of the ballast weight partially extends into the concrete body, in particular completely intersperses the concrete body.

20. The household appliance according to claim **15** wherein the connecting element is in a ribbed form.

21. The household appliance according to claim **15** wherein the plastic body of the ballast weight is formed as at least one of a hook and a comb.

22. The household appliance according to claim **15** wherein the connecting element is formed on the detergent container and configured for connection to an essentially uniform contact surface of the plastic body of the ballast weight.

23. The household appliance according to claim **15** wherein a plurality of raised and preferably similarly oriented connecting elements is formed on at least one of the plastic body of the ballast weight and the plastic area of the detergent container.

24. The household appliance according to claim **15** wherein the ballast weight has at least two separate plastic bodies connected with at least one of a connecting stud and reinforced wire.

25. The household appliance according to claim **24** wherein the connecting stud is formed from plastic.

26. The household appliance according to claim **15** wherein the ballast weight is formed as at least one of a general cuboid, an annular form and a ring segment.

27. The household appliance according to claim **15** wherein the raised connecting element is integrated in at least one of the plastic area and the plastic body.

28. The household appliance according to claim **15** wherein the appliance is formed as at least one of a dishwasher, a washing machine and a combined washer/dryer.

* * * * *