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**Blomberg et al.**(10) **Pub. No.: US 2007/0295037 A1**(43) **Pub. Date: Dec. 27, 2007**(54) **FRONT-LOADING DRUM-TYPE WASHING  
MACHINE HAVING A LAUNDRY  
DEFLECTOR ON A THE BELLOWS SEAL**(30) **Foreign Application Priority Data**

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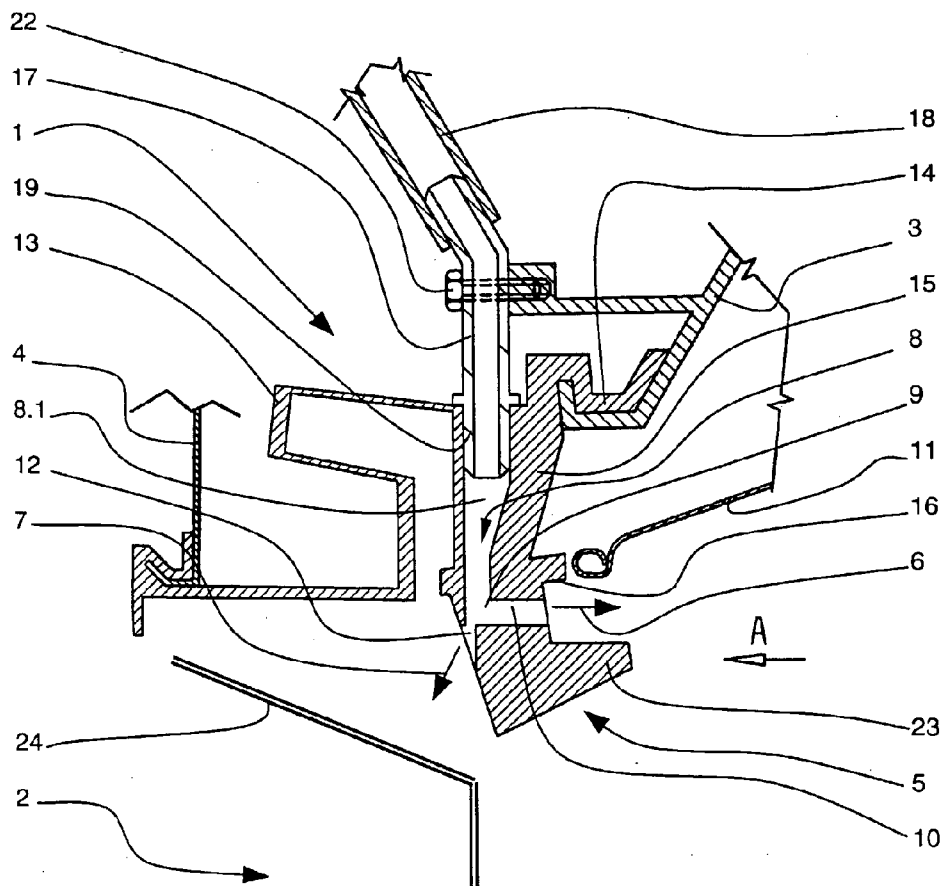
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**DARBY & DARBY P.C.****P.O. BOX 770****Church Street Station****New York, NY 10008-0770 (US)**(57) **ABSTRACT**

A front-loading drum-type washing machine includes an appliance housing, a suds container a drum rotatably disposed in the suds container, and a bellows seal disposed between the suds container and the appliance housing. The bellows seal is configured to seal a door opening area of the appliance housing and includes a laundry deflector disposed in a region of a twelve o'clock position of the bellows seal. The laundry deflector is directed towards the drum and includes a channel system forming an opening in a wall of the bellows seal. A conduit is provided for supplying at least one of water, wash liquid and rinse liquid to the door opening area. The conduit is in fluid connection with the opening in the wall of the bellows seal.

(73) Assignee: **MIELE & CIE. KG**, Guetersloh (DE)(21) Appl. No.: **11/574,824**(22) PCT Filed: **Aug. 31, 2005**(86) PCT No.: **PCT/EP05/09378**

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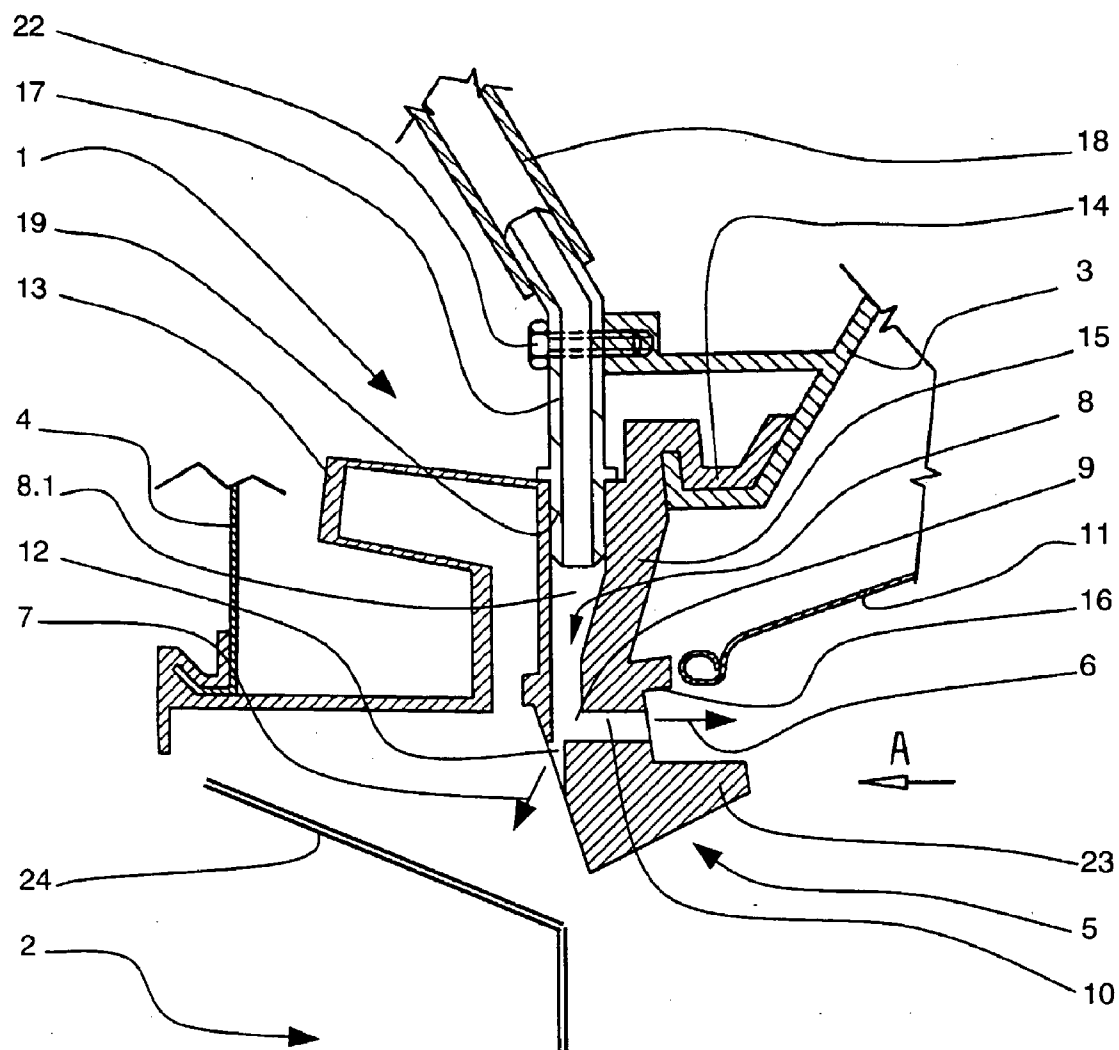


Fig. 1

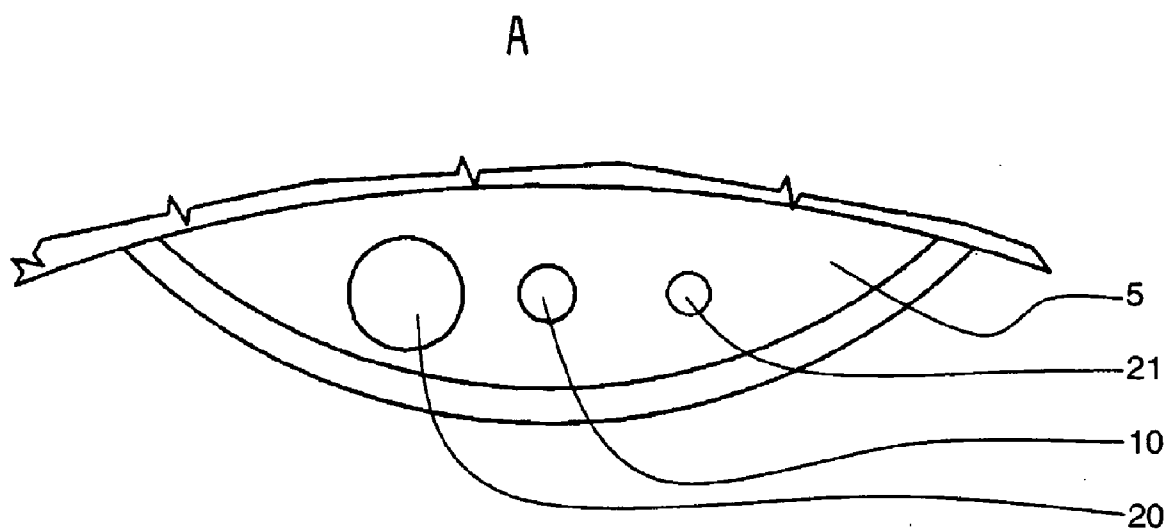


Fig. 2

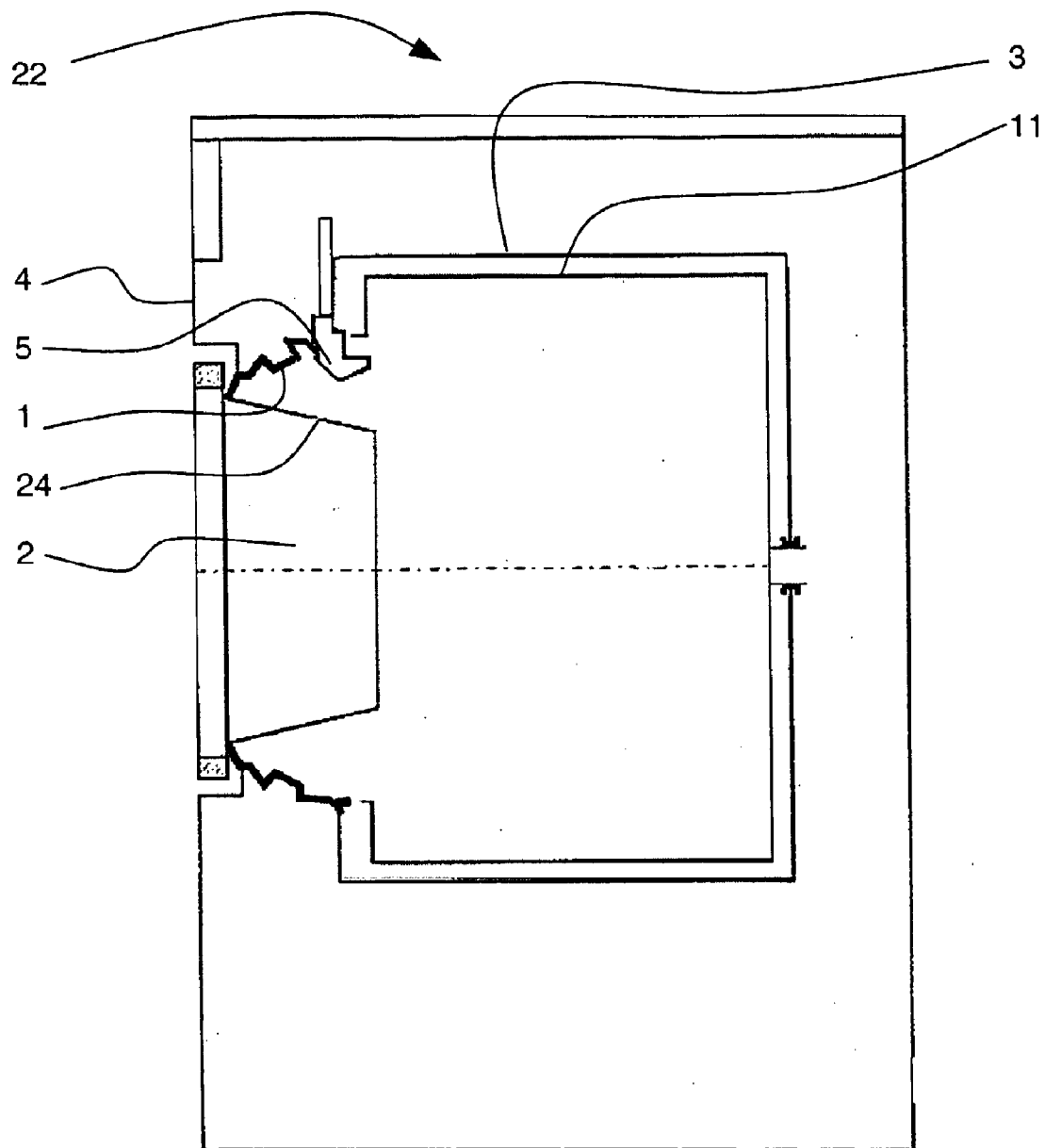


Fig. 3

# **FRONT-LOADING DRUM-TYPE WASHING MACHINE HAVING A LAUNDRY DEFLECTOR ON A THE BELLOWS SEAL**

## **CROSS REFERENCE TO PRIOR APPLICATION**

[0001] This is a U.S. national phase application under 35 U.S.C. §371 of International Patent Application No. PCT/EP2005/009378, filed Aug. 31, 2005, and claims benefit of German Patent Application No. 10 2004 043 671.1, filed Sep. 7, 2004, which is incorporated by reference herein. The International Application was published in German on Mar. 16, 2006 as WO 2006/027149 A1 under PCT Article 21(2).

[0002] The present invention relates to a front-loading drum-type washing machine including a drum rotatably mounted in a suds container, further including a bellows seal which is disposed between the suds container and the appliance housing for sealing the door opening area and which has formed thereon a laundry deflector in the region of the twelve o'clock position, said laundry deflector being directed towards the drum, the washing machine further including a conduit for supplying water, wash or rinse liquid to the door opening area.

## **BACKGROUND**

[0003] In front-loading washing machines, it has become common practice to make the door opening relatively large, thereby making it easier for user to load and unload the drum. This requires, inter alia, a large opening in the front of the drum. Since the drum diameter is defined by the standardized housing widths, the width of the annular ring that acts as the front drum end wall is necessarily reduced because of the enlarged opening. As a consequence of this reduction in width, laundry is more likely to be pushed over the edge of the front drum end wall as the drum rotates, and then get jammed between the door glass and the bellows seal. Therefore, it has been proposed, for example, in WO 02/12612 A1, to provide a laundry deflector in the region of the bellows seal and, more specifically, in the twelve o'clock position. The laundry deflector is formed on the door sealing ring such that it is directed toward the drum and serves to return the laundry back into the rotating drum. For automatic washing machines having a large drum volume, it is necessary to reinforce the laundry deflector because of the high weight of the laundry. To this end, it is proposed in WO 02/12612 A1 that the clamping ring used to secure the bellows seal to the suds container be provided with a loop to be inserted into the laundry deflector. This may lead to difficulties during manufacture, because it is necessary to position the bellows seal on the suds container and the loop into the deflector at the same time, while also having to tighten the clamping ring in the process.

[0004] In front-loading washing machines, it is also known to introduce water, wash or rinse liquid into the suds container or the drum in the area of the door opening. In the process, the liquid is either sprayed directly onto the laundry (DE 197 31 667 A1), or directed onto the door glass (DE 295 20 300 U1). In both cases, the wall of the bellows seal has an opening formed therein through which the liquid is passed into the interior of the drum via a nozzle or a hose line. A combination of direct injection and introduction by flushing via the door glass known from DE 197 31 667 A1. There, the tubular member, or the nozzle, directed toward

the drum has formed therein an opening which is located in the immediate vicinity of the bellows seal and is directed toward the door glass.

[0005] To provide for wetting of the laundry, it is necessary to use a nozzle that projects from the swinging fold. This results in the laundry rubbing against the nozzle, which causes wear of the laundry. German Patent Application DE 37 38 388 A1 describes a laundry appliance having a bellows seal which has an inflow channel formed in the inner wall thereof. This channel has an opening directed toward the drum, and thus provides for direct wetting of the laundry. This channel is located in the flat portion of the bellows seal and is deformable in nature, thus preventing damage to laundry items entering this region. In document WO 02/12612 A1, it is proposed to insert a nozzle as a separate part into a laundry deflector.

[0006] German Patent Application DE 199 61 459 A1 describes a laundry appliance which has sensors disposed in the region of the door opening in the upper portion thereof. The laundry appliance described in DE 41 26 966 A1 has an illuminating device mounted in the bellows seal to illuminate the drum. These additional components are disposed in the portion of the bellows seal that is directed toward the housing opening, and thus in the movable portion thereof.

## **SUMMARY**

[0007] In view of the above, it is an object of the present invention to increase the stability of the laundry deflector in a front-loading drum-type washing machine of the type mentioned at the outset, and at the same time to simplify the design and manufacture of the washing machine, while also ensuring gentle treatment of the laundry.

[0008] The present invention provides a front-loading drum-type washing machine. The washing machine includes an appliance housing; a suds container; a drum rotatably disposed in the suds container; and a bellows seal disposed between the suds container and the appliance housing and configured to seal a door opening area of the appliance housing. The bellows seal includes a laundry deflector disposed in a region of a twelve o'clock position thereof. The laundry deflector is directed towards the drum and includes a channel system forming an opening in a wall of the bellows seal. A conduit is provided configured to supply at least one of water, wash liquid and rinse liquid to the door opening area, the conduit being in fluid connection with the opening in the wall of the bellows seal.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

[0009] 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,

[0010] FIG. 1 is a sectional detail view of a bellows seal having a laundry deflector integrally formed thereon and a channel system incorporated therein;

[0011] FIG. 2 is an elevation view showing a laundry deflector and the components incorporated therein; and

[0012] FIG. 3 is a sketch of a washing machine.

## **DETAILED DESCRIPTION**

[0013] Advantages that can be achieved with the present invention are seen in the fact that by incorporating the

channel system for liquid supply, there is no obstruction in the path of the laundry to be treated. This reduces the risk of damage occurring to the laundry. In addition, since the laundry deflector is positioned closer to the drum, and thus closer to the laundry, a more uniform wetting of the laundry is achieved. This completely eliminates the need for additional nozzles to ensure door glass flushing and laundry wetting at the classical positions. Another advantage results from that fact that the laundry deflector is stiffened by incorporation of the channel system. Finally, the combination of different functions into the laundry deflector allows for a reduction in the number of parts, thus simplifying assembly.

[0014] According to the present invention, this is achieved in that the wetting of the laundry is performed by the laundry deflector while, in addition, door glass flushing can be performed together with the wetting of the laundry. To this end, the laundry deflector has a channel formed therein which, on the one hand, wets the laundry and, on the other hand, supplies water for flushing the door glass.

[0015] For this purpose, it is convenient to manufacture the laundry deflector from elastic or partially elastic solid material, and to form the channel therein as a bore or through-hole. When the laundry deflector is integrally connected to the bellows seal, the laundry deflector is usually made of the same material as the bellows seal, and preferably of an elastomer.

[0016] In a suitable embodiment, the laundry deflector originates at and extends radially from the hammer section toward the center of the door opening area. The laundry deflector has an extension formed on the outer end thereof, said extension pointing toward the interior of the drum and partially covering the gap between the hammer section and the edge of the drum opening. Thus, laundry items entering this region are reliably pressed against the laundry deflector and returned back into the drum by means of the laundry deflector.

[0017] In an advantageous embodiment, the channel branches at a branch point, the branch channel for laundry wetting being directed toward the drum, and the branch channel for door glass flushing being directed forwardly toward the door glass. To control the amount of water required for door glass flushing, on the one hand, and for laundry wetting, on the other hand, the branch channel for laundry wetting has a larger cross-sectional area than the branch channel for door glass flushing. Thus, the water jet entering through the main channel is divided according to its intended functions.

[0018] In an advantageous refinement of the present invention, the main channel extends in the region of the hammer section of the bellows seal, while the branch channels extend below the hammerhead region of the bellows seal. Furthermore, the upper portion of the main channel is enlarged to receive a connecting member for a water supply hose.

[0019] It is advantageous if the connecting member, which is in the form of a tubular member, extends relatively far into the main channel. As a result, the tubular member acts as a reinforcement of the laundry deflector. For this purpose, it is convenient to manufacture the tubular member from a hard plastic. To further improve the fit of the connecting member,

it is convenient for the inherently rugged connecting member to be secured to the suds container, i.e. to the front end wall in the area of the suds container opening, by means of a fastening element. For this purpose, it is possible to use, for example, a screw but other fasteners, such as insertion pins or clamps, could also be used.

[0020] In an advantageous refinement of the present invention, a sensor and a light-emitting means can be incorporated in the laundry deflector, in addition to the water channel. Thus, in particular, the access points, which were usually distributed over the entire area of the swinging fold, are limited to one area, and more specifically to the region of the laundry deflector. This provides a bellows seal that ensures gentle treatment of the laundry.

[0021] FIG. 3 shows a front-loading drum-type washing machine 22 having a housing 4 and a suds container 3 disposed in housing 4. A drum 11 is rotatably mounted within suds container 3. A bellows seal 1 extends in door opening area 2 between front appliance housing 4 and suds container 3. In the operational position, door glass 24 extends at least partially into housing 4 in door area 2. When washing machine 22 is in its normal position, a laundry deflector 5 is disposed or formed on the wall of bellows seal 1 in the upper region thereof, said laundry deflector extending toward drum 11, i.e., toward the edge thereof.

[0022] FIG. 1 is a sectional detail view showing a bellows seal 1 for a laundry appliance, especially a front loader. Bellows seal 1 is integrated into the laundry appliance in such a manner that it is disposed between the fragmentarily illustrated suds container 3 and machine housing 4 (also shown only fragmentarily) in order to seal door opening area 2. In the front view of bellows seal 1 shown in FIG. 2, a laundry deflector 5 is disposed on bellows seal 1 in the twelve o'clock position, said laundry deflector pointing toward the drum.

[0023] As illustrated in FIG. 1, laundry deflector 5 originates at and extends from hammer section 6 toward the interior of the door opening area 2. The laundry deflector has an extension 23 formed on the outer end thereof, said extension pointing substantially axially toward the interior of the drum. This extension 23 at least partially covers the gap between hammer section 6 and the edge of the opening of drum 11.

[0024] As shown in the cross-sectional view, wetting of the laundry is performed via laundry deflector 5 in the direction of arrow 6, the liquid supply for laundry wetting 6 also providing for door glass flushing in the direction of arrow 7. For this purpose, hammer section 15 and laundry deflector 5 are manufactured from an elastic or partially elastic solid material in which is formed a channel system 8 which supplies water for laundry wetting 6 on the one hand and for door glass flushing 7 on the other. Channel system 8 has a branch point 9, one branch channel 10, which is for laundry wetting 6, being directed toward drum 11. Another branch channel 12 is directed forwardly toward the fragmentarily illustrated door glass 24.

[0025] As shown in the cross-sectional view, branch channel 10, which is for laundry wetting 6, has a larger cross-sectional area than branch channel 12 for door glass flushing 7. Branch channels 10 and 12 are approximately orthogonal to one another, main channel 8.1 being directed approxi-

mately toward door glass flushing 7. Bellows seal 1 itself has a swinging fold 13 and, adjacent thereto, a hammer shaped section which, in turn, has contiguous therewith a shoulder 14 for engagement with the edge of suds container 3. Laundry deflector 5 is integrally formed below the so-called hammer section 15, main channel 8.1. extending in the region of hammer section 15 of bellows seal 1. Branch channels 10 and 12 are located below hammerhead region 16 of bellows seal 1. The upper portion of main channel 8.1 is adapted to receive a connecting member 17, so that a water supply hose 18 can be attached to connecting member 17.

[0026] As can be seen in the cross-sectional view, the upper portion of main channel 8.1 is enlarged, so that connecting member 17, which is formed from hard plastic and takes the form of a tubular member 19, can extend, or be inserted, relatively far into main channel 8.1. This, in conjunction with water supply hose 18 and the deeply inserted tubular member 19 of connecting member 17, creates a vibration damper, especially in the region of laundry deflector 5. The damping action is advantageously assisted if connecting member 17 is additionally connected directly to suds container 3, or secured to the edge of suds container 3 by means of a fastening element 22, as shown in FIG. 1. In the present example, the attachment is by means of a screw inserted into the material of suds container 3. Other fastening elements, such as insertable pins or clamps, could also be used. Using this fastener 22, laundry deflector 5 is particularly well stabilized relative to suds container 3.

[0027] The elevation view A of FIG. 2 illustrates the situation on the outlet side toward drum 11 (FIG. 1), showing, on the one hand, the opening region of branch channel 10 in the middle of laundry deflector 5, and, to the left thereof, an opening region 20 which may be intended for a light-emitting means, and, to the right of thereof, a further opening region 21 which may be intended for a sensor. Sensor 21 is preferably an optical sensor and serves to detect any laundry (not shown) that may have been pulled into the gap between bellows seal 1 and drum edge 11 (FIG. 1) in this area. When such a condition is detected, suitable steps may be initiated, such as aborting the spin cycle and/or redistributing the laundry. Furthermore, the sensor may be used to detect high foam volume or to sense the condition of the wash liquid (turbidity, conductivity, pH, etc.).

[0028] The present invention is not limited to the embodiments described herein; reference should be had to the appended claims.

1-12. (canceled)

13. A front-loading drum-type washing machine comprising:

an appliance housing;

a suds container;

a drum rotatably disposed in the suds container;

a bellows seal disposed between the suds container and the appliance housing and configured to seal a door opening area of the appliance housing, the bellows seal including a laundry deflector disposed in a region of a twelve o'clock position thereof, the laundry deflector being directed towards the drum, the laundry deflector including a channel system forming an opening in a wall of the bellows seal; and

a conduit configured to supply at least one of water, wash liquid and rinse liquid to the door opening area, the conduit being in fluid connection with the opening in the wall of the bellows seal.

14. The laundry appliance as recited in claim 13 wherein the laundry deflector includes an elastic or partially elastic solid material.

15. The laundry appliance as recited in claim 13 wherein the laundry deflector:

originates at a hammerhead region of the bellows seal and extends into the door opening area; and

includes an extension at an outer end thereof, the extension being directed toward an interior of the drum.

16. The laundry appliance as recited in claim 13 wherein the channel system includes a branch point, a first branch channel directed toward the drum for laundry wetting, and a second branch channel directed forwardly toward a door glass of the appliance for door glass flushing.

17. The laundry appliance as recited in claim 16 wherein the first branch channel has a cross-sectional area larger than a cross-sectional area of the second branch channel.

18. The laundry appliance as recited in claim 16 wherein:

the channel system includes a main channel extending in a region of a hammer section of the bellows seal; and

the first and second branch channels extend below the hammerhead region of the bellows seal.

19. The laundry appliance as recited in claim 13 wherein the channel system includes a main channel extending in a region of a hammer section of the bellows seal, an upper portion of the main channel having an enlarged section configured to receive a connecting member for a water supply hose.

20. The laundry appliance as recited in claim 19 wherein the connecting member includes a tubular member configured to extend into the main channel.

21. The laundry appliance as recited in claim 20 wherein the connecting member includes a hard plastic material.

22. The laundry appliance as recited in claim 19 wherein the connecting member is configured to be secured to the suds container by a fastening element.

23. The laundry appliance as recited in claim 13 wherein the laundry deflector includes an integrated sensor.

24. The laundry appliance as recited in claim 13 wherein the laundry deflector includes an integrated light-emitting device.

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