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(54) **HOUSEHOLD APPLIANCE COMPRISING AT LEAST ONE DUCT FOR GUIDING A PROCESS AIR FLOW**

(57) A household appliance 1 including a housing 2, a processing chamber 3, a process air conditioner 4, a process air guide 6, and a control unit 7; said process air guide 6 including at least one duct 8, 9 connected between said process air conditioner 4 and said processing chamber 3; and said control unit 7 configured to selectively execute a first operational process which includes guiding the process air flow 5 through said process air guide 6, and a second operational process which excludes guiding the process air flow 5 through said process air guide 6. Further, said at least one duct 8, 9 has flow control means 10, 11, 12 and is inflatable and deflatable; and the flow control means 10, 11, 12 are configured for inflating and deflating said at least one duct 8, 9 during said first and second operational process, respectively.

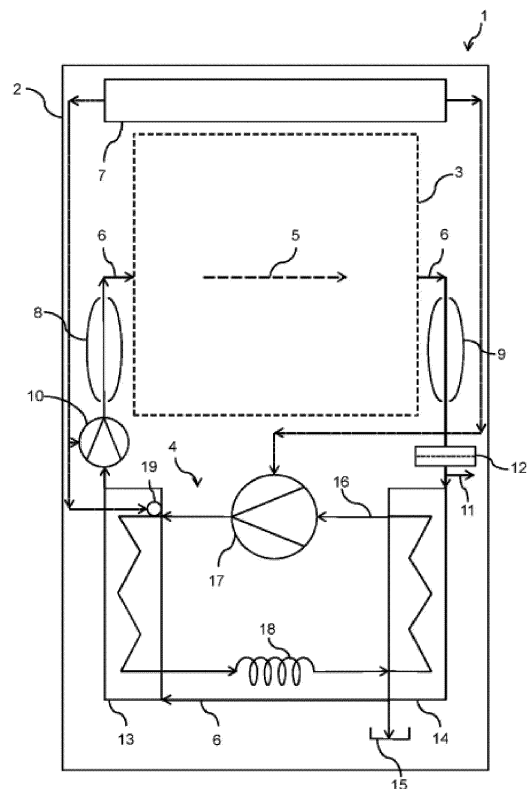


Fig. 1

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Description

[0001] The invention relates to a household appliance including a housing, a processing chamber for receiving items to be processed, a process air conditioner configured for providing a process air flow conditioned for processing the items, a process air guide for guiding the process air flow between said process air conditioner and said processing chamber, and a control unit for controlling operation of said household appliance; said processing chamber, said process air conditioner, said process air guide, and said control unit, disposed in said housing; said process air guide including at least one duct connected between said process air conditioner and said processing chamber and disposed in said housing; and said control unit configured to selectively execute at least two operational processes for processing the items, said at least two operational processes comprising a first operational process which includes guiding the process air flow through said process air guide, and a second operational process which excludes guiding the process air flow through said process air guide.

[0002] Document EP 1 411 163 A2 applies flexible connection members or bellows for connecting between a swinging tub and an immovable heat pump in a household appliance for washing and drying laundry or washer-dryer. These bellows are made of easily deformable material, and are not dedicated to being deflated and inflated in operation but remain constantly open even under deformation as the tub swings relative to the heat pump during washing, dewatering, or drying laundry placed in the tub.

[0003] Document EP 2 843 111 A1 discloses a flexible hose connecting a tub to a heat pump in an immovable top of a washer-dryer, the hose being collapsible or extendible to an extent. Again, the hose is not dedicated to being deflated and inflated in operation but remains constantly open even under deformation as the tub swings relative to the heat pump during washing, dewatering, or drying laundry placed in the tub. Deflating the hose for any purpose is neither provided for on any purpose nor necessary for proper operation.

[0004] Document GB 887,747 A discloses a collapsible exhaust air hose for use with a vented dryer, the hose having a nozzle at its distal end to provide for internal pressure above the ambient pressure. When in use the hose is inflated by exhaust air passing through, whereas it may be easily stowed when not in use.

[0005] Document WO 2012/144775 A2 discloses a laundry washing appliance including an air exhaust pipe provided for connecting an air passageway applicable for drying laundry to the appliance's ambient, the air passageway fixed to a swinging tub, and the exhaust pipe corrugated for preventing transmission of vibration to a rear panel of the appliance's housing where the exhaust pipe opens to the ambient. The exhaust pipe is made from easily deformable material and appropriately shaped so as to allow for deformation as the tub swings.

Again, the exhaust is not dedicated to being deflated and inflated in operation but remains constantly open even under deformation as the tub swings relative to the heat pump during washing, dewatering, or drying laundry placed in the tub. Deflating the hose for any purpose is neither provided for on any purpose nor necessary for proper operation.

[0006] In the present context a household appliance is an appliance determined for use in operating a private household to attain a specific and predetermined material purpose, particularly by specifically processing items of concern in a household and disposed in a processing chamber in the household appliance. Examples of a household appliance are a laundry care appliance, a dishwasher, a cooling appliance such as a refrigerator and a freezer, a food processing appliance such as an oven for preparing items of food and a water heater, a mobile heating appliance, and a climate control appliance. Specifically a laundry care appliance is a household appliance determined for providing laundry care by washing and/or drying such as a washing machine, a laundry dryer, and a washer-dryer.

[0007] A household appliance determined for processing items by a conditioned process air flow requires considerable space for the process air conditioner and the process air guide required for guiding the process air to the items to be processed. A processing chamber for containing the items may have to be allowed to swing within the household appliance's housing in response to periodic forces and moments such as appear when spinning items of laundry to be processed in a rotating drum for the purpose of washing, rinsing or extracting process liquids. If such household appliance is in addition equipped with a system for processing items of laundry by process air such as on purpose of drying, allocation of sufficient space for all components required in the machine may become difficult.

[0008] Accordingly there is a need for a household appliance wherein allocation of space for various functions and related components may adapt to requirements of specific functions, specifically the function of processing items by a process air flow.

[0009] Therefore it is an object of the invention to provide a household appliance as defined in the initial paragraph above which allows for adaptive space allocation for specific functions, specifically the function of processing items by a process air flow.

[0010] On purpose of solving this object the present invention provides a household appliance of the generic type as defined in the generic part of the independent claim attached which also includes the features of the characterizing part of said independent claim.

[0011] Preferred embodiments of the invention are defined in dependent claims attached as well as in the subsequent disclosure. Such preferred embodiments may also be applied in mutual combinations insofar as possible under technical considerations to any extent, even if not specified herein explicitly.

[0012] Accordingly the present invention provides, as a solution to the problem as defined above, a household appliance including a housing, a processing chamber for receiving items to be processed, a process air conditioner configured for providing a process air flow conditioned for processing the items, a process air guide for guiding the process air flow between said process air conditioner and said processing chamber, and a control unit for controlling operation of said household appliance; said processing chamber, said process air conditioner, said process air guide, and said control unit, disposed in said housing; said process air guide including at least one duct connected between said process air conditioner and said processing chamber and disposed in said housing; and said control unit configured to selectively execute at least two operational processes for processing the items, said at least two operational processes comprising a first operational process which includes guiding the process air flow through said process air guide, and a second operational process which excludes guiding the process air flow through said process air guide. Further said at least one duct is inflatable and deflatable; and flow control means are disposed in said process air guide and configured for inflating said at least one duct during said first operational process, and for deflating said at least one duct during said second operational process.

[0013] Advantages of the invention include that at least part of the process air guide may be inflated on purpose of applying it to its predetermined service, and deflated if not actually used. Absent actual use the deflatable duct or ducts may be reduced in size and thus set aside, releasing space for use by any other process provided for execution in the household appliance.

[0014] Principally the invention may be applied to any household appliance. In particular the household appliance may be a laundry care machine such as a laundry dryer or a washer-dryer, or a dishwasher, all eventually equipped with a heat pump for a purpose such as drying pieces of laundry or other respective items.

[0015] In accordance with a preferred embodiment of the invention said flow control means comprise at least one process air blower disposed in said process air guide and configured for driving the process air flow through said process air guide. Inflating the at least one duct will require to establish a pressure therein which is at least slightly above the pressure of the duct's ambient within the housing. This may be accomplished by raising a static pressure within the process air guide above the ambient pressure, as may be accomplished by a blower which provides such pressurization. It may also be accomplished by properly designing the dynamical pressure within the process air guide, ascertaining that during operation the local pressure within any inflatable duct is greater than its ambient pressure.

[0016] In accordance with another preferred embodiment of the invention said flow control means comprise at least one pressure balancer connecting said process air guide to an ambient of said process air guide. Thereby

the pressure balancer may be applied at a point of lowest dynamic pressure within the process air guide, whereby it is ascertained that the dynamic pressure within the process air guide is above the ambient pressure at every other point within, including any inflatable duct. Certainly, in case of a process air guide substantially closed in itself the pressure balancer may be embodied to be equipped with a small blower for raising the pressure within the process air guide above the ambient pressure. However, it is more preferred if the at least one pressure balancer merely includes an open connection between said process air guide and said ambient for simplicity.

[0017] In accordance with a further preferred embodiment of the invention said process air guide includes flow control means configured for keeping said process air guide essentially closed in itself during said first operational process.

[0018] In accordance with an alternatively preferred embodiment of the invention said process air guide includes flow control means configured for keeping said process air guide essentially open to said ambient during said first operational process. In such context, ascertaining a dynamic pressure within the process air guide may require no more than placing a blower for driving the process air upstream of every inflatable duct, to have it properly inflated as soon as the process air flow is established.

[0019] In accordance with another alternatively preferred embodiment of the invention said flow control means are configured for keeping said process air guide in exchange of air with said ambient during said first operational process, thereby having the process air guide partly open and partly closed.

[0020] In accordance with an additional preferred embodiment of the invention said flow control means comprise at least one throttle disposed in said process air guide. A throttle is a means which will provide a dynamic pressure drop across itself upon being traversed by the process air flow, thereby establishing a relatively high pressure upstream of itself. Thus a throttle placed at a downstream end of an inflatable duct may be applied to ascertain sufficiently high dynamic pressure within the duct.

[0021] In accordance with yet another preferred embodiment of the invention said at least one duct comprises a first duct and a second duct, wherein said first duct, said processing chamber and said second duct are connected in sequence to each other. Thereby the processing chamber may be mechanically decoupled from parts of the process air guide which eventually include the process air conditioner, allowing a rather free movement of the processing chamber within the housing. This is of particular interest in the case of a household appliance embodied as a washer-dryer wherein the processing chamber is or includes a tub swingingly suspended within the housing.

[0022] In accordance with yet a further preferred embodiment of the invention said process air conditioner includes a heat pump for cyclically supplying heat the

process air flow prior to entering said processing chamber and extracting heat from the process air flow after exiting said processing chamber during said first operational process. Such heat pump, particularly a heat pump applying the inverse Rankine cycle of cyclically evaporating and condensing a working fluid such as propane in a closed circuit, is generally a rather complex system of considerable requirements of space, and may be difficult to be installed in a household appliance dedicated to laundry care. It may be preferred to install the heat pump immovably within the housing, and provide ducts of the process air guide connecting the heat pump to the processing chamber suspended with freedom to swing in response to inertial forces and moments that are pliable and deformable enough to adapt to such movements.

[0023] In accordance with yet an additional preferred embodiment of the invention said at least one duct is made from a deformable material. More preferred said deformable material is a synthetic rubber, in particular an EPDM, or a thermoplastic elastomer, in particular a TPU.

[0024] In accordance with still another preferred embodiment of the invention said at least one duct is formed from two rigid profiles connected by a seal and movable relative to each other for inflating and deflating. More preferred said two profiles are also connected by an actuator configured for moving said profiles. Even more preferred said seal is a bellows device. Such embodiments of the invention may serve with an inflatable duct attached to a swinging tub as in the case of the household appliance for laundry care. The duct may be installed directly at the tub and inflated as items in the tub are to be processed by a process air flow. Otherwise the duct may be deflated, thereby reducing the spatial extension of the tub and allowing extended movement in reaction to inertial forces and moments as occurring upon de-watering wet laundry by spinning.

[0025] In accordance with still a further preferred embodiment of the invention said processing chamber comprises a tub supported swingingly within said housing, and said process air conditioner is supported immovably within said housing. More preferred, said processing chamber comprises a drum rotatably disposed in said tub. Even more preferred, means for inputting a liquid into said processing chamber and means for exiting the liquid from said processing chamber are provided for use in said second operational process. Yet more preferred such household appliance is embodied as a laundry care machine wherein the items to be processed are pieces of laundry. Still more preferred, such household appliance is embodied as a washer-dryer configured for processing the pieces of laundry by washing in the second operational process and by drying in the first operational process.

[0026] In accordance with still an additional preferred embodiment of the invention the household appliance is embodied as a dishwasher wherein the items to be processed are dishes and configured for processing the dishes

by washing in the second operational process and by drying in the first operational process. A dishwasher is generally characterized by providing a processing chamber which as a cabinet for placing dishes to be cleaned which is relatively large in size. Accordingly implementation of at least one inflatable duct may assist in properly integrating all necessary components into the housing, particularly if the process air conditioner includes a heat pump.

[0027] Preferred embodiments of the invention are now explained in detail with reference to the Figures of the attached drawing. These Figures show and exhibit as follows:

15 Fig. 1 shows a schematic view of a household appliance including two inflatable and deflatable ducts;

20 Fig. 2 shows a processing chamber embodied to comprise a tub suspended swingingly and including a rotatable drum for processing items of laundry;

25 Fig. 3 shows a processing chamber embodied as a cabinet for processing items of dishes;

Fig. 4 shows an inflatable duct composed of two mutually movable profiles; and

30 Fig. 5 shows an inflatable duct made from a pliable material.

[0028] As shown in detail in Fig. 1, a household appliance 1 includes housing 2, processing chamber 3 for receiving items 20, 28 (not in Fig. 1 but see Figs. 2 and 3) to be processed, process air conditioner 4 configured for providing process air flow 5 conditioned for processing items 20, 28, process air guide 6 for guiding process air flow 5 between process air conditioner 4 and processing chamber 3, and control unit 7 for controlling operation of household appliance 1. Processing chamber 3, process air conditioner 4, process air guide 6, and control unit 7, are all disposed in housing 2.

[0029] Process air guide 6 includes at least one duct 8, 9, that is presently first duct 8 and second duct 9, connected between process air conditioner 4 and processing chamber 3 and disposed in housing 2. First duct 8, processing chamber 3, and second duct 9 are connected in sequence to one another. Control unit 7 is configured to selectively execute at least two operational processes for processing items 20, 28, said at least two operational processes comprising a first operational process which includes guiding the process air flow 5 through said process air guide 6, and a second operational process which excludes guiding the process air flow 5 through said process air guide 6. Specifically, the first operational process may be a process for drying items 20, 28, by process air flow 5 which is conditioned for the purpose by process

air conditioner 4, and the second operational process may be a process for cleaning items 20, 28 in processing chamber 3 by other means.

[0030] Presently each of first duct 8 and second duct 9 is inflatable and deflatable, and flow control means 10, 11, 12 are disposed in process air guide 6 and configured for inflating ducts 8, 9 during said first operational process, and for deflating ducts 8, 9 during said second operational process. Thereby at least part of process air guide 6 may be inflated on purpose of applying it to its predetermined service, and deflated if not actually used. Absent actual use ducts 8 and 9 may be reduced in size and thus set aside, releasing space for use by any other process provided for execution in household appliance 1.

[0031] Specifically flow control means 10, 11, 12 comprise at least one process air blower 10 disposed in process air guide 6 and configured for driving process air flow 5 through process air guide 6. Inflating ducts 8 and 9 will require establishing a pressure therein which is at least slightly above the pressure of the ducts' ambient within housing 2. This may be accomplished by raising a static pressure within process air guide 6 above the ambient pressure, as may be accomplished by a blower which provides such pressurization. It may also be accomplished by properly designing the dynamical pressure within process air guide 6, ascertaining that during operation the local pressure within each inflatable duct 8, 9 is greater than its ambient pressure.

[0032] Flow control means 10, 11, 12 may comprise at least one pressure balancer 11 connecting process air guide 6 to an ambient of process air guide 6, which in the present case is the inside of housing 2. Of course this inside may be connected to the ambient outside of household appliance 1 in accordance with common practice. The main purpose of pressure balancer 11 is to ascertain proper inflation of ducts 8 and 9, which will be the case as during operation of process air flow 5 the pressure inside ducts 8 and 9 is larger than the ambient pressure within housing 2.

[0033] In the simplest case as shown in Fig. 1 pressure balancer 11 may be just an open connection between process air guide 6 into the ambient, thereby establishing the ambient pressure to occur within process air guide 6 at a location downstream of ducts 8 and 9, thereby implying that the pressure within ducts 8 and 9 must be above the ambient pressure and keep ducts 8 and 9 properly inflated. If the simplest solution cannot be applied it may be considered to place a second blower into pressure balancer 11, and operate this second blower to inflate process air guide 6 with ducts 8 and 9 to a pressure slightly above the ambient pressure prior to operating process air flow 5.

[0034] Solutions outlined in the preceding chapter may be particularly preferred as process air guide 6 with flow control means 10, 11, 12 is configured for keeping process air guide 6 essentially closed in itself during said first operational process. The presence of an open connection 11 does not preclude having process air guide 6 es-

sentially closed in itself, with process air flow 5 circulating without any considerable exchange with ambient air. In such context exchange of air caused by unavoidable leakage through any necessary seal should not be considerable.

[0035] Yet, process air guide 6 with flow control means 10, 11, 12 may alternatively be configured for keeping said process air guide 6 essentially open to the ambient during said first operational process. In such case pressures above the ambient pressure may be ascertained in ducts 8 and 9 just by having process air blower 10 placed upstream of inflatable ducts 8 and 9.

[0036] Another alternative of design of process air guide may be an intermediate of the two designs just described, with process air guide 6 and flow control means 10, 11, 12 configured for keeping said process air guide 6 in exchange of air with said ambient during said first operational process, so as to have process air flow 5 circulate in part only.

[0037] Another flow control means 10, 11, 12 may be considered for application in household appliance 1, namely a throttle 12, or at least one throttle 12, disposed in process air guide 6. Such throttle 12 may be applied to establish a drop of dynamic pressure within process air guide 6 as process air flow 5 is operated and thereby elevate pressure within process air guide 6 upstream of throttle 12. This may be utilized in providing internal pressure for properly inflating ducts 8 and 9. Presently throttle 12 is embodied as a lint filter 12 dedicated to catching small fibres and particulates released by process air flow 5 from the items to be processed which may be pieces of laundry being tumbled for drying, and not to be allowed to enter process air conditioner 4.

[0038] In the presently exhibited embodiment process air conditioner 4 includes a heat pump 13, 14, 15, 16, 17, 18, 19 for cyclically supplying heat to process air flow 5 prior to entering said processing chamber 3 and extracting heat from the process air flow 5 after exiting said processing chamber 3 during said first operational process. The heat pump shown applies the inverse Rankine cycle by cyclically evaporating, compressing, and condensing, a working medium which may be designated to be a refrigerant according to common practice, and may be propane in the present example. The heat pump includes heat source 13, heat sink 14, condensate collector 15, working medium guide 16, compressor 17, restrictor 18, and sensor 19. Process air flow 5 having traversed processing chamber 3 traverses first throttle or lint filter 12 and then heat sink 14 for being cooled so as to bring humidity carried by process air flow 5 to condensation. Condensate thus formed is removed from process air flow 5 by precipitation and collected in condensate collector 15. Process air flow 5 then traverses heat source 13 for being heated and reached first process air blower 10 to be impelled and then again processing chamber 3. The process thus defined may serve to dry items to be processed in processing chamber 3. The working medium circulating in working medium guide 16 in a closed

circuit emerges from heat sink 14 in evaporated state and is compressed by compressor 17 to reach heat source 13. In heat source 13 the working medium releases heat to process air flow 5 and thereby condenses to a liquid. The liquid working medium then traverses restrictor 18 which acts as a throttle for reducing its internal pressure, whereby the working medium partly evaporates. The working medium then reaches heat sink 14 again, where it fully evaporates by absorbing heat from process air flow 5 and completing its cycle. Sensor 19 may be understood as a representative for any means applied for controlling operation of the heat pump by control unit 7.

[0039] As shown in Fig. 2 which exhibits an example of processing chamber 3 in household appliance 1 of Fig. 1, processing chamber 3 may comprise a tub 21 supported swingingly within housing 2 by schematically shown support means 22 which may include springs and dampers, and process air conditioner 4 may be supported immovably within housing 2. Processing chamber 3 also comprises a drum 23 rotatably disposed in said tub 21. Further, means 26 for inputting a liquid into processing chamber 3 and means 27 for exiting the liquid from processing chamber 3 are provided for use in said second operational process. Thereby household appliance 1 is embodied as a laundry care machine wherein the items to be processed are pieces of laundry 20. Thereby household appliance 1 is embodied as a washer-dryer configured for processing the pieces of laundry 20 by washing in the second operational process and by drying in the first operational process.

[0040] As shown in Fig. 3 which exhibits another example of processing chamber 3 in of Fig. 1, household appliance 1 may be embodied as a dishwasher wherein processing chamber 3 includes a cabinet 29 for placing items to be processed which are dishes 28 on a rack 30, and a spraying arm 31 provided for spraying washing liquid or water onto dishes 28. The dishwasher is configured for processing the dishes 28 by washing in the second operational process and by drying in the first operational process.

[0041] Fig. 4 exhibits an example of an inflatable and deflatable duct 8. Accordingly duct 8 is composed of two rigid profiles 32 and 33 which together form duct 8. First profile 32 may be a section of a tub 21 as shown in Fig. 2, where the U-shape of profile 32 may be defined by enforcement ribs in an outer structure of tub 21. Rigid profile 33 is another U-shaped profile fitting into profile 32 to compose a channel of substantially rectangular cross-section. Profiles 32 and 33 are connected by a seal 34 embodied as a bellows device 34 and are movable relative to each other for inflating and deflating. Profiles 32, 33 are also connected by an actuator 35 configured for moving said profiles 32 33 for varying the channel that they define, thereby inflating and deflating duct 8. Such inflatable duct 8 attached to swinging tub 21 as in Fig. 2 is integrated directly into the structure of tub 21 to be inflated as items in the tub 21 are to be processed by

process air flow 5, and deflated otherwise. Thereby the spatial extension of tub 21 may be reduced as duct 8 is not required for an operational process, allowing extended movement in reaction to inertial forces and moments as occurring upon de-watering wet laundry by spinning.

[0042] Fig. 5 exhibits an example of an inflatable and deflatable duct 8. Accordingly duct 8 is made from a deformable material, for example by injection moulding or extruding, wherein the deformable material may be a synthetic rubber, in particular an EPDM, or a thermoplastic elastomer, in particular a TPU. Duct 8 includes a duct body 36 which is pliable and may be inflated or deflated, and duct collars 37 which may be applied to fasten duct 8 to other components of household appliance 1 such as processing chamber 3 and process air conditioner 4, for example by clamping to appropriately fashioned ports. Duct 8 made from deformable material is particularly preferred because it may adapt to available space, and may also adapt to movements of a component swingingly suspended in housing 2 and swinging in response to inertial forces and moments generated during operation.

[0043] Advantages of the invention include that at least part of process air guide 6 may be inflated on purpose of applying it to its predetermined service, and deflated if not actually used. Absent actual use the deflatable duct 8, 9 or ducts 8 and 9 may be reduced in size and thus set aside, releasing space for use by any other process provided for execution in household appliance 1.

LIST OF REFERENCE NUMERALS

[0044]

1	Household appliance
2	Housing
3	Processing chamber
4	Process air conditioner
5	Process air flow
6	Process air guide
7	Control unit
8	First inflatable/deflatable duct
9	Second inflatable/deflatable duct
10	Flow control means, process air blower
11	Flow control means, pressure balancer, open connection
12	Flow control means, throttle
13	Heat pump, heat source
14	Heat pump, heat sink
15	Heat pump, condensate collector
16	Heat pump, working fluid guide
17	Heat pump, compressor
18	Heat pump, restrictor
19	Heat pump, sensor
20	Item to be processed, piece of laundry
21	Tub
22	Support means
23	Drum
24	Direction of rotation

- 25 Paddle
- 26 Means for inputting liquid
- 27 Means for exiting liquid
- 28 Item to be processed, dish
- 29 Cabinet
- 30 Rack
- 31 Spraying arm
- 32 First profile
- 33 Second profile
- 34 Seal
- 35 Actuator
- 36 Duct body
- 37 Duct collar

Claims

1. A household appliance (1) including a housing (2), a processing chamber (3) for receiving items (20, 28) to be processed, a process air conditioner (4) configured for providing a process air flow (5) conditioned for processing the items (20, 28), a process air guide (6) for guiding the process air flow (5) between said process air conditioner (4) and said processing chamber (3), and a control unit (7) for controlling operation of said household appliance (1);

said processing chamber (3), said process air conditioner (4), said process air guide (6), and said control unit (7), disposed in said housing (2);

said process air guide (6) including at least one duct (8, 9) connected between said process air conditioner (4) and said processing chamber (3) and disposed in said housing (2); and said control unit (7) configured to selectively execute at least two operational processes for processing the items (20, 28), said at least two operational processes comprising a first operational process which includes guiding the process air flow (5) through said process air guide (6), and a second operational process which excludes guiding the process air flow (5) through said process air guide (6); **characterized in that** said at least one duct (8, 9) is inflatable and deflatable; and

flow control means (10, 11, 12) are disposed in said process air guide (6) and configured for inflating said at least one duct (8, 9) during said first operational process, and for deflating said at least one duct (8, 9) during said second operational process.

2. The household appliance (1) according to claim 1, wherein said flow control means (10, 11, 12) comprise at least one process air blower (10) disposed in said process air guide (6) and configured for driv-

ing the process air flow (5) through said process air guide (6).

3. The household appliance (1) according to claim 2, wherein said flow control means (10, 11, 12) comprise at least one pressure balancer (11) connecting said process air guide (6) to an ambient of said process air guide (6).

4. The household appliance (1) according to claim 3, wherein said at least one pressure balancer (11) includes an open connection (11) between said process air guide (6) and said ambient.

5. The household appliance (1) according to one of the preceding claims, wherein said process air guide (6) includes flow control means (10, 11, 12) configured for keeping said process air guide (6) essentially closed in itself during said first operational process.

6. The household appliance (1) according to one of the preceding claims, wherein said process air guide (6) includes flow control means (10, 11, 12) configured for keeping said process air guide (6) essentially open to said ambient during said first operational process.

7. The household appliance (1) according to claim 6, wherein said flow control means (10, 11, 12) are configured for keeping said process air guide (6) in exchange of air with said ambient during said first operational process.

8. The household appliance (1) according to one of the preceding claims, wherein said flow control means (10, 11, 12) comprise at least one throttle (12) disposed in said process air guide (6).

9. The household appliance (1) according to one of the preceding claims, wherein said at least one duct (8, 9) comprises a first duct (8) and a second duct (9), wherein said first duct (8), said processing chamber (3) and said second duct (9) are connected in sequence to each other.

10. The household appliance (1) according to one of the preceding claims, wherein said process air conditioner (4) includes a heat pump (13, 14, 15, 16, 17, 18, 19) for cyclically supplying heat to the process air flow (5) prior to entering said processing chamber (3) and extracting heat from the process air flow (5) after exiting said processing chamber (3) during said first operational process.

11. The household appliance (1) according to one of the preceding claims, wherein said at least one duct (8, 9) is made from a deformable material.

12. The household appliance (1) according to claim 11, wherein said deformable material is a synthetic rubber, in particular an EPDM, or a thermoplastic elastomer, in particular a TPU. 5
13. The household appliance (1) according to one of claims 1 to 10, wherein said at least one duct (8, 9) is formed from two rigid profiles (32, 33) connected by a seal (34) and movable relative to each other for inflating and deflating. 10
14. The household appliance (1) according to claim 13, wherein said two profiles (32, 33) are also connected by an actuator (35) configured for moving said profiles (32, 33). 15
15. The household appliance (1) according to one of claims 13 and 14, wherein said seal (34) is a bellows device. 20
16. The household appliance (1) according to one of the preceding claims, wherein said processing chamber (3) comprises a tub (21) supported swingingly within said housing (2), and said process air conditioner (4) is supported immovably within said housing (2). 25
17. The household appliance (1) according to claim 16, wherein said processing chamber (3) comprises a drum (22) rotatably disposed in said tub (21). 30
18. The household appliance (1) according to one of claims 16 and 17, wherein means for inputting a liquid (26) into said processing chamber (3) and means for exiting the liquid (27) from said processing chamber (3) are provided for use in said second operational process. 35
19. The household appliance (1) according to claim 18 which is embodied as a laundry care machine wherein the items to be processed are pieces of laundry (20). 40
20. The household appliance (1) according to claim 19 which is embodied as a washer-dryer configured for processing the pieces of laundry (20) by washing in the second operational process and by drying in the first operational process. 45
21. The household appliance (1) according to one of claims 1 to 15 which is embodied as a dishwasher wherein the items to be processed are dishes (28) and configured for processing the dishes (28) by washing in the second operational process and by drying in the first operational process. 50
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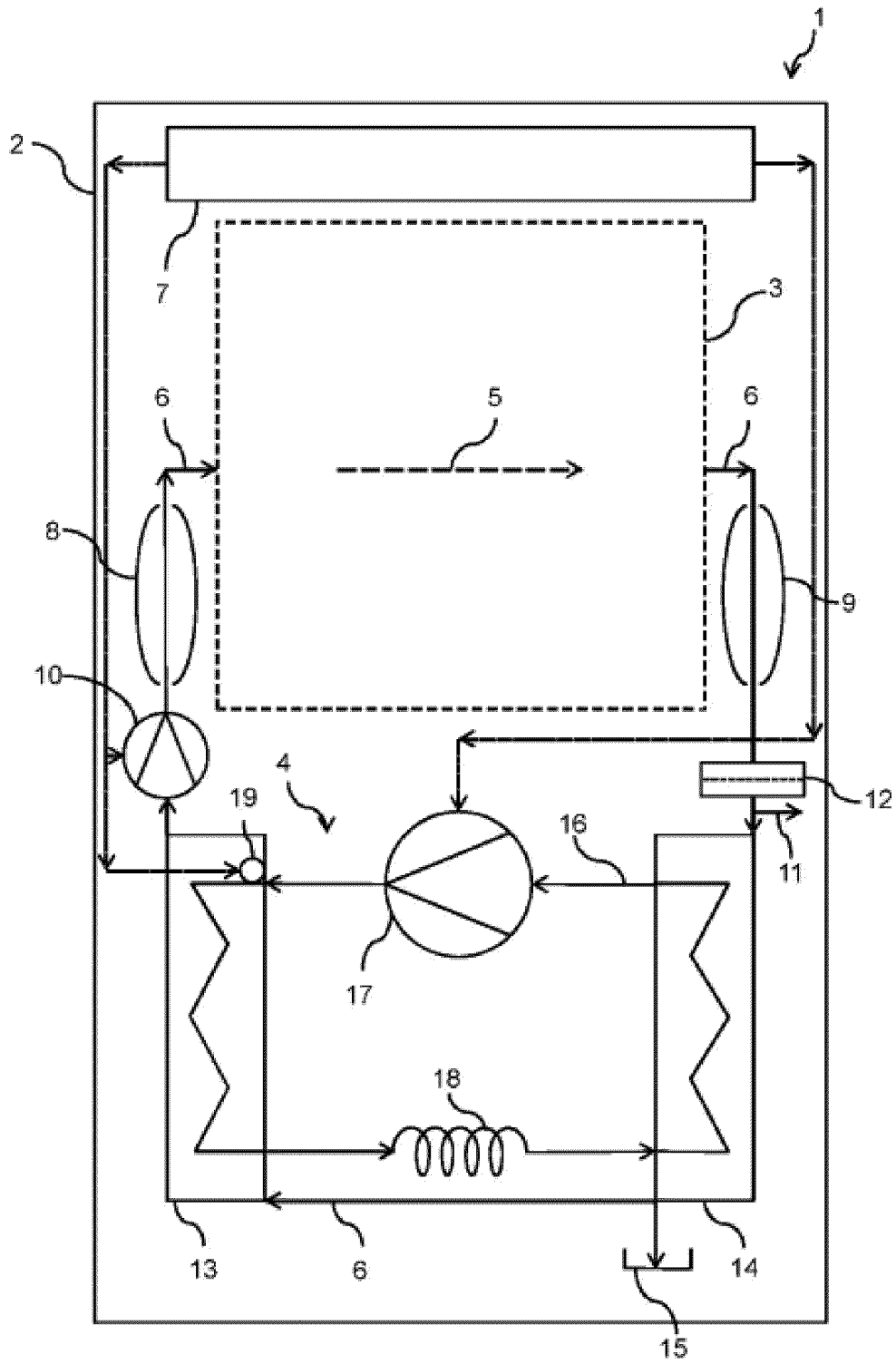


Fig. 1

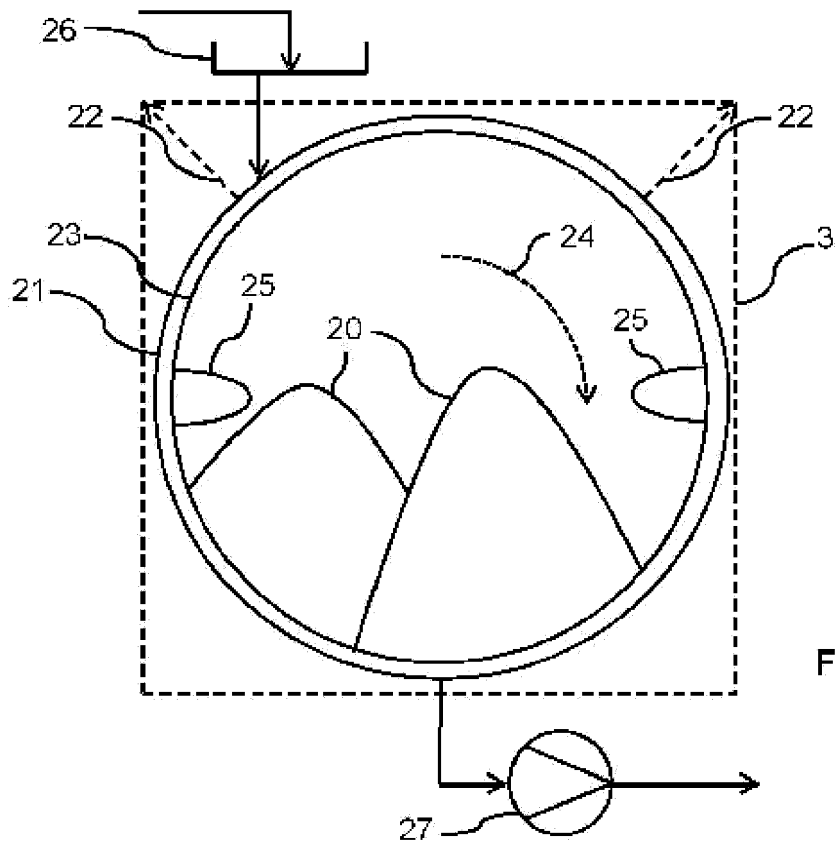


Fig. 2

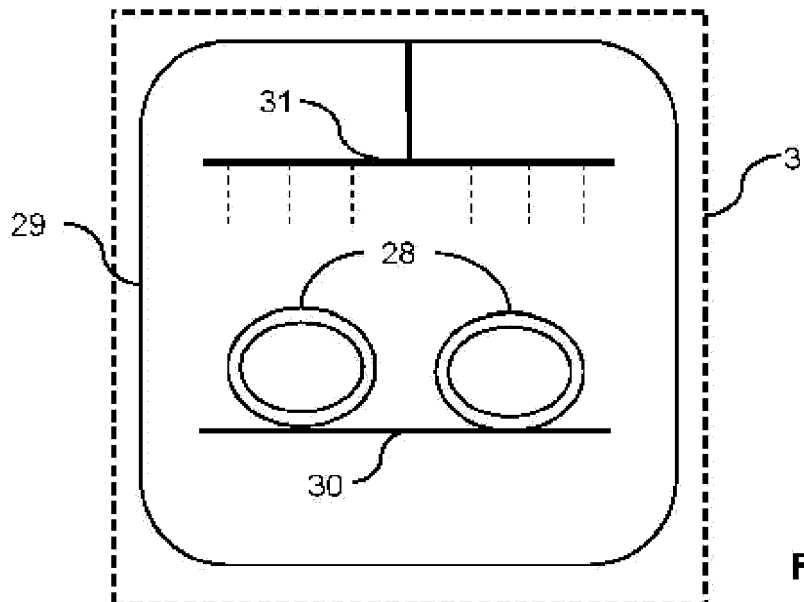


Fig. 3

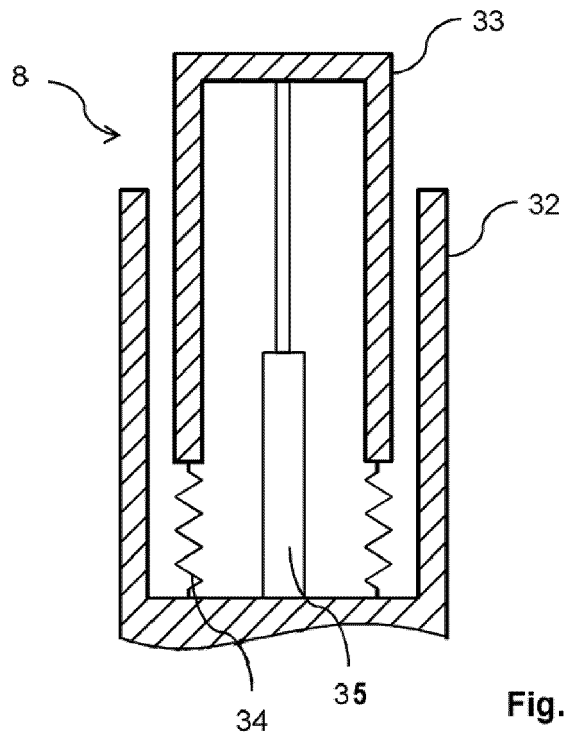


Fig. 4

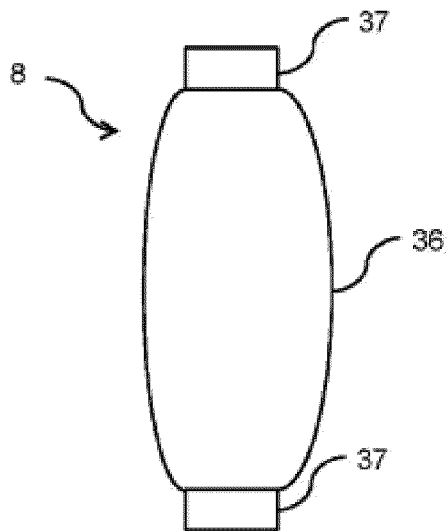


Fig. 5



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 0428

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	<p>JP 2005 304989 A (MATSUSHITA ELECTRIC IND CO LTD) 4 November 2005 (2005-11-04)</p> <p>* figures 2-4 *</p> <p>* claim 10 *</p> <p>* paragraph [0045] - paragraph [0046] *</p> <p>-----</p>	1, 2, 8, 11, 12	<p>INV.</p> <p>D06F58/04</p> <p>D06F58/20</p> <p>A47L15/48</p>
X	<p>DE 10 2014 209733 A1 (BSH HAUSGERAETE GMBH [DE]) 26 November 2015 (2015-11-26)</p> <p>* figures 2-3 *</p> <p>* claims 1, 11, 13, 15 *</p> <p>* paragraph [0003] *</p> <p>* paragraph [0029] *</p> <p>-----</p>	1, 2, 8, 11, 12, 16-20	<p>ADD.</p> <p>D06F23/02</p> <p>D06F25/00</p> <p>A47L15/42</p>
A	<p>US 2016/160427 A1 (LEE YONGJU [KR] ET AL) 9 June 2016 (2016-06-09)</p> <p>* figures 5-6 *</p> <p>* paragraph [0067] *</p> <p>-----</p>	1-21	
			<p>TECHNICAL FIELDS SEARCHED (IPC)</p> <p>D06F</p> <p>A47L</p>
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		9 August 2022	Werner, Christopher
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone</p> <p>Y : particularly relevant if combined with another document of the same category</p> <p>A : technological background</p> <p>O : non-written disclosure</p> <p>P : intermediate document</p> <p>T : theory or principle underlying the invention</p> <p>E : earlier patent document, but published on, or after the filing date</p> <p>D : document cited in the application</p> <p>L : document cited for other reasons</p> <p>.....</p> <p>& : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 16 0428

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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09-08-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2005304989 A	04-11-2005	JP 4541023 B2 JP 2005304989 A	08-09-2010 04-11-2005
DE 102014209733 A1	26-11-2015	DE 102014209733 A1 EP 2947195 A1	26-11-2015 25-11-2015
US 2016160427 A1	09-06-2016	CN 105671902 A EP 3031974 A1 KR 20160069333 A US 2016160427 A1 US 2019003108 A1	15-06-2016 15-06-2016 16-06-2016 09-06-2016 03-01-2019

EPO FORM P0459

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1411163 A2 [0002]
- EP 2843111 A1 [0003]
- GB 887747 A [0004]
- WO 2012144775 A2 [0005]