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## (54) A set having a first dryer and a second dryer

(57) The invention relates to a set having a first dryer 11 and a second dryer 31 for concurrent series production. Each dryer 11,31 comprises a respective housing 12,32 enclosing a respective interior 13,33. Each housing 12,32 comprises a respective front wall 14,34 and a respective back wall 15,35, a respective drying chamber 16,36 disposed within said housing 12,32, and a respective process air guide 17,37 for guiding process air through said respective drying chamber 16,36 for drying articles 18,38 disposed therein. Each process air guide 17,37 comprises a respective back channel 19,39 disposed on said respective back wall 15,35 outside said respective interior 13,33, each back channel 19,39 projecting into said respective interior 13,33 through a respective first hole 20,40 and a respective second hole 21,41 in said back wall 15,35. Each first hole 20,40 is placed below each respective second hole 21,41 with respect to a respective vertical axis 22,42. Each process air guide 17,37 is configured for guiding the process air through each respective back channel 19,39 from said respective first hole 20,40 to said respective second hole 21,41, and from said respective second hole 21,41 into said respective drying chamber 16,36. In said first dryer 11, said respective process air guide 17,37 comprises an air-to-air heat exchanger 1 disposed within said respective housing 12, and an electric heater 2 disposed within said respective back channel 19. In said second dryer 31, said respective process air guide 17,37 comprises a heat sink 3 and a heat source 4, said heat sink 3 and said heat source 4 belonging to a heat pump 3,4,5,6,7,9 disposed within said respective housing 32. In said first dryer 11, said respective second hole 21 is a single passage for said respective back channel 19 to project into said respective interior 13. In said second dryer 31, said respective back wall 35 has at least one third hole 8, with said respective back channel 39 projecting into said respective interior 33 through said at least one third hole 8 and said respective second hole 41 in parallel, and with said respective process air guide 37 being configured for guiding the process air from said respective first hole 40 to said respective second hole 41 and said at least one third hole 8.

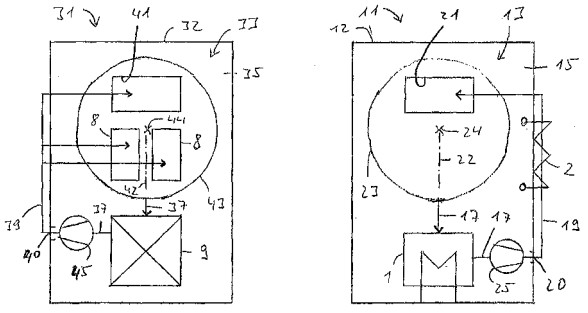

Fig. 1

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## Description

**[0001]** The invention relates to a set having a first dryer and a second dryer for concurrent series production, wherein each dryer comprises a respective housing enclosing a respective interior, each housing comprising a respective front wall and a respective back wall, a respective drying chamber disposed within said housing, and a respective process air guide for guiding process air through said respective drying chamber for drying articles disposed therein, wherein each process air guide comprises a respective back channel disposed on said respective back wall outside said respective interior, each back channel projecting into said respective interior through a respective first hole and a respective second hole in said respective back wall, wherein each first hole is placed below each respective second hole with respect to a respective vertical axis, and wherein each process air guide is configured for guiding the process air through each respective back channel from said respective first hole to said respective second hole, and from said respective second hole into said respective drying chamber, wherein, in said first dryer, said respective process air guide comprises an air-to-air heat exchanger disposed within said respective housing, and an electric heater disposed within said respective back channel, and wherein, in said second dryer, said respective process air guide comprises a heat sink and a heat source, said heat sink and said heat source belonging to a heat pump disposed within said respective housing.

**[0002]** A dryer known from WO 2007/118742 A1 comprises a housing enclosing an interior and comprising a front wall and a back wall, a drying chamber disposed within said housing, and a process air guide for guiding process air through said drying chamber for drying articles disposed therein. The process air guide comprises a back channel disposed on said back wall outside said interior, the back channel projecting into said interior through a first hole and a second hole in said back wall, wherein the first hole is placed below the second hole with respect to a vertical axis, and wherein the process air guide is configured for guiding the process air through the back channel from said first hole to said second hole, and from said second hole into said drying chamber.

**[0003]** In a dryer of the kind specified above, which known dryer is particularly known as a condensation-type dryer, the process air guide comprises an air-to-air heat exchanger disposed within the housing and an electric heater disposed the back channel. A drying process in such dryer is effected by heating the process air by the electric heater, passing it through the drying chamber containing the articles to be dried for picking up humidity from the articles, and finally making the humidity condensate by extracting heat from the process air by the heat exchanger. In the heat exchanger, the heat extracted from the process air is transferred to cooling air that exits the dryer, thereby dissipating the heat into the ambient of the dryer without any possibility of recovery.

**[0004]** In a dryer known from WO 2008/080831 A1, the process air guide comprises a heat sink and a heat source, wherein the heat sink and the heat source belong to a heat pump disposed within the housing. While this type of dryer is also a condensation-type dryer in principle, it comprises a means to recover the heat which is introduced into the process air by the heat source and extracted again from the process air by the heat sink. This means is commonly known as a heat pump. Its action is basically a transfer of heat having been charged through the heat sink to the heat source and including any appropriate rise of temperature, for discharging the heat through the heat source at a possibly elevated temperature. It is understood that including such secondary fluid circuit will result in an advantageous embodiment of a dryer comprising a heat pump but is not a general requirement for a dryer comprising a heat pump.

**[0005]** A known type of heat pump and mentioned in WO 2008/080831 A1 includes a closed circuit wherein a refrigerant is circulated, the circuit including two heat exchangers as heat source and heat sink, and a compressor to compress refrigerant having exited the heat sink in gaseous state and forward the refrigerant to the heat source. In the heat source, the refrigerant is liquefied to release heat which is subsequently discharged through the heat source. After passing the heat source, the now liquid refrigerant passes an expansion device like a throttle as embodied in a valve, a nozzle, or a capillary, to return to the heat sink at reduced pressure and temperature, to be evaporated in the heat sink again upon being charged with heat, thereby completing the cycle. Other types of heat pumps including a heat pump based on a process of adsorption and desorption and a heat pump based on the Peltier effect are known. It is noted that the heat pump exhibited in the cited document includes at lest one secondary fluid circuit to transport heat to or from the heat pump.

**[0006]** EP 0 163 265 A2 discloses a dryer having a housing, a rotatable drum with an associated electric drive and a blower for driving process air through the drum for drying laundry and a channel to guide the process air disposed in the housing, where a heater to heat the process air prior to passing the drum and having an air inlet opening to the channel for charging process air into the channel is disposed outside the housing, and the housing has an air outlet opening to the channel for discharging process air from the channel. A variety of additional apparatus including a recirculation device for returning process air from the air outlet to the air inlet and possibly including a heat exchanger, and a heat pump may be connected between the air outlet and the air inlet. Accordingly, the dryer as defined by the housing and components contained therein is reduced to an incomplete base element which may be completed to a truly functional unit by connecting an additional apparatus selected from a given variety to its outside. Yet, as such additional apparatus has to be fixed to the outside of the dryer, it must be subject to considerable spatial restric-

tions. Thereby, any degree of flexibility in view of a obtaining a functionality selected from various alternatives is counterbalanced by strict spatial limitations for such additional apparatus, incurring possibly grave functional limitations. It may be for such reasons that a dryer according to the cited document has never attained a significant commercial relevance.

**[0007]** WO 2007/118742 A1 in turn exhibits a modular dryer which may, by changing a limited amount of components, be embodied as a condensation-type dryer wherein process air used for drying is circulated in a substantially closed loop, or a vented dryer wherein process air is charged from an ambient of a dryer, to be passed along laundry to be dried only once and discharged from the dryer after having passed the laundry. The components to be changed are basically an air-to-air heat exchanger with a pump and a condensate container for condensate precipitated in the heat exchanger during drying for the condensation-type dryer. For the vented dryer, the components to be changed are basically a process air guide to replace the heat exchanger and a cover to close an opening in a front of the dryer to replace the condensate container. An electric air heater for the process air is present both in the condensate-type dryer and the vented dryer. While the document cited specifies a modular dryer which may serve as a commercially relevant basis for concurrent production of a condensate-type dryer and a vented dryer, the document is silent as to concurrent production of a condensate-type dryer as specified therein and a condensate-type dryer which relates on a heat pump as specified hereinabove, wherein the heat pump replaces both the electric air heater and the heat exchanger. In this context, even EP 0 163 265 A2 will not serve to provide guidance since the disclosure of that document relates on an incomplete base element which is by no means a condensate-type dryer or a functionally significant part thereof.

**[0008]** It is known for a manufacturer of dryers to manufacture series of both a condensation-type dryer comprising an electric heater and an air-to-air heat exchanger and a condensation-type dryer comprising a heat pump, establishing a set of the two dryers specified as a basis for concurrent series or even mass production. In general, each series of dryers to be manufactured is based on its own and specifically developed resources as embodied in production tools and processes, and components to be included in the dryers. The more differences between dryers of different series, the less similarity in terms of resources will be present, thus requiring a considerable effort as to define and allocate components and resources for series production individually, without considerable options for multiple series products to share resources in concurrent series production.

**[0009]** It is an object of the present invention to specify a set of a type as defined in the introduction, wherein both dryers are designed for extended structural similarity between themselves in spite of pertinent functional differences, to allow use of an extended amount of equal or similar components in manufacturing both dryers in concurrent series production.

**[0010]** This object is achieved by a set as specified in the independent claim attached hereto. Preferred embodiments of the inventive set are specified in the dependent claims attached hereto. Combinations of such preferred embodiments are also understood to constitute preferred embodiments within the scope of the present invention.

**[0011]** Accordingly there is specified, in accordance with the invention, a set having a first dryer and a second dryer for concurrent series production, wherein each dryer comprises a respective housing enclosing a respective interior, each housing comprising a respective front wall and a respective back wall, a respective drying chamber disposed within said housing, and a respective process air guide tor guiding process air through said respective drying chamber for drying articles disposed therein, wherein each process air guide comprises a respective back channel disposed on said respective back wall outside said respective interior, each back channel projecting into said respective interior through a respective first hole and a respective second hole in said respective back wall, wherein each first hole is placed below each respective second hole with respect to a respective vertical axis, and wherein each process air guide is configured for guiding the process air through each respective back channel from said respective first hole to said respective second hole, and from said respective second hole into said respective drying chamber, wherein, in said first dryer, said respective process air guide comprises an air-to-air heat exchanger disposed within said respective housing, and an electric heater disposed within said respective back channel, and wherein, in said second dryer, said respective process air guide comprises a heat sink and a heat source, said heat sink and said heat source belonging to a heat pump disposed within said respective housing, and wherein, in said first dryer, said respective second hole is a single passage for said respective back channel to project into said respective interior, and that, in said second dryer, said respective back wall has at least one third hole, with said respective back channel projecting into said respective interior through said at least one third hole and said respective second hole in parallel, and with said respective process air guide being configured for guiding the process air from said respective first hole to said respective second hole and said at least one third hole

**[0012]** According to the invention, the two dryers that constitute the set are designed and manufactured with a particularly high structural similarity while retaining respective advantageous features of each dryer. In particular, the housings and a considerable part of their interiors including the drying chambers, control units and condensate collecting devices may be quite equal. However, the first dryer's electric heater is placed at a highly advantageous location for minimizing heat losses at an upside end of the process air guide's back channel on

one hand. On the other hand, the second dryer's heat pump may be constructed as a compact unit for placement below the drying chamber in the housing, and space thus saved in the respective process air guide's back channel is utilized to improve the air resistance within the process air guide for better process air throughput by inserting the at least one third hole.

**[0013]** According to the invention, a set comprising two functionally disparate dryers is provided for concurrent series production, wherein each dryer is designed and equipped for its own best functionality, but wherein a possibly maximal similarity between the two dryers is retained to allow a possibly large use of equal or similar components in both dryers without affecting each dryer's specific functional advantages. Thereby, the respective production systems dedicated to producing the dryers may rely on an extended amount of shared resources as embodied in equal or similar components and related equal or similar production means and supplies in concurrent series production of the dryers defining the set.

**[0014]** In the present context, the term "concurrent series production" is not to be construed as relating to synchronism in series production itself but relating to synchronism in disposal of products from both series through regular commerce subsequent to production. Consequently and for example, concurrent production of the two dryers belonging to the set according to the invention may occur in true temporal synchronism on two mutually parallel production lines and relying in extensively on shared means and resources, or concurrent production may occur by using a single line of production and changing between periods of production for the first dryer and periods of production for the second dryer, while continuing to rely on shared means and resources extensively, the periods defined to be small enough to ascertain effectively continuous availability and disposal of both dryers in regular commerce.

**[0015]** In accordance with a preferred embodiment of the invention, each said drying chamber is a drum rotatable about a respective rotational axis, wherein each rotational axis placed between said respective first hole and said respective second hole as seen along said respective vertical axis, and wherein, in said second dryer, said at least one third hole is placed between said respective rotational axis and said respective first hole. Thereby, a maximum space is provided in the first dryer's back channel for positioning the electric heater, while a maximum opening for conveying process air into the drying chamber is provided in the second dryer, thus allowing for better operation of the heat pump contained therein. In a more preferred embodiment, said first dryer's electric heater is placed at a common level with said respective rotational axis as seen along said respective vertical axis. Still more preferred, said second dryer's second hole and at least one third hole are arranged within a circle not exceeding a projection of said respective drying chamber onto said respective back wall and parallel to said respective rotational axis. This maximizes the opening in the second dryer, while minimizing heat losses in the first dryer.

**[0016]** In accordance with another preferred embodiment of the invention, said first dryer's air-to-air heat exchanger is placed below said respective drying chamber as seen along said respective vertical axis, and said second dryer's heat pump is placed below said respective drying chamber as seen along said respective vertical axis. Thereby, particularly good use is made of spaces provided in the housings.

**[0017]** In accordance with a further preferred embodiment of the invention, said second dryer's at least one third hole is two third holes. Still more preferred said two third holes are arranged symmetrically with respect to said respective vertical axis. This makes a particularly good use of space provided on the second dryer's back wall, retaining any necessary or desirable structural stiffness at the back wall.

**[0018]** Further details and advantages of the invention may be inferred from the subsequent description of preferred embodiments as shown in the drawing attached hereto. In the drawing,

Fig. 1 shows a schematic front view of a set of two dryers for concurrent series production;
Fig. 2 shows a schematic side view of a set of two dryers for concurrent series production; and
Fig. 3 shows a diagram of a heat pump.

**[0019]** As to usage of reference numerals in the drawing, it should be noted that similar features in different figures always carry the same reference numeral. Further, reference numerals from 1 to 9 denote features which are present in strictly one dryer of the said only. Reference numerals from 11 to 26 are used to indicate features of the first dryer which have corresponding features in the second dryer, which corresponding features are denoted with reference numerals from 31 to 47.

**[0020]** Figure 1 exhibits a set having a first dryer 11 and a second dryer 31, each dryer 11 or 31 comprising a housing 12 or 32 enclosing a respective interior 13 or 33. The view according to Figure 1 exhibits principally the back walls 15 and 35, with the process air guides 17 and 37 and the back channels 19 and 39 being denoted only schematically. To indicate the placements of back channels 19 and 39 on each respective back wall 15 or 35 and outside the respective interior 13 or 33, the back channels 19 and 31 are drawn besides of the back walls 15 and 35. Each process air guide 17 or 37 includes a respective blower 25 or 45.

**[0021]** In the first dryer 11, an air-to-air heat exchanger 1 is provided to extract heat from process air flowing in through the process air guide 17. Such cooling will effect condensation of humidity which has been picked up by the process air from articles to be dried 18 (see Figure 2). Liquid condensate thus formed will be collected and stored for later removal by means not shown in the drawing for simplicity. The cooling is effected by cooling air

which is driven through a corresponding cooling channel of the heat exchanger from an ambient of the first dryer 11 by another blower not shown for the sake of simplicity, and returned to the ambient subsequently. Process air exiting the heat exchanger 1 through the process air guide 17 is driven through the back channel 19, to pass the electric heater 2 disposed therein to collect heat prior to passing the articles to be dried 18 again. To allow the process air to exit the interior 13, a first hole 20 which is indicated only schematically is provided in the back wall 15. Process air exiting the back channel 19 will return into the interior 13 through the second hole 21 for entering the drying chamber 16 as shown in Figure 2. In Figure 1, the shape of the drying chamber 16the circle 23, and is also disposed above an axis of rotation 24 which is indicated by the letter x, as seen along a vertical axis 22. This provides some space in the back channel 19 to place the electric heater 2 at a common level with the rotational axis 24, as seen along the vertical axis 22.

**[0022]** In the second dryer 31 a heat pump 9 replaces both the heat exchanger 1 and the electric heater 2 as present in the first dryer 11. The heat pump 9 is placed below the respective drying chamber 36 (see Figure 2) and constructed as a compact unit. This has the advantage that the retaining of a refrigerant which is material for the functioning of heat pump 9 is easiest. The heat pump 9 includes both the function of cooling process air entering via process air guide 37, and heating the process air after removing condensate formed as detailed for the first dryer 11 prior to exiting through the process air guide 37 towards the blower 35. From the blower 35, the process air exits the interior 33 through first hole 40, to enter the back channel 39 and flow in an upward direction along the vertical axis 42 to the second hole 41. Besides the second hole 41 which is placed in the same way as the second hole 21 in the first dryer 11, two third holes 8 are provided which allow that the process air passing the back channel 39 is branched into three parallel branches, to pass into the interior 33 through the second hole 41 and the third holes 8 in parallel. Thereby, the flow resistance of the process air guide 37 is considerably reduced, easing operation of the heat pump 9. All the second hole 41 and the third holes 8 are contained within the circle 43 which indicates the shape of the rotatable drying chamber 36 as seen in Figure 2, to give a maximum opening for the process air to pass into the drying chamber 36. The circle is drawn around the rotational axis 44 indicated by letter x. While the second hole 41 is placed above the rotational axis 44, the two third holes 8 are placed below the rotational axis 44 and symmetric to the vertical axis 42 as apparent from the drawing.

**[0023]** Figure 2 exhibits a side view of the two dryers 11 and 31. Each dryer 11 or 31 has a respective front wall 14 or 34 and a respective back wall 15 or 35. Each back wall 15 or 35 has the back channel 19 or 39 placed thereon with a respective first hole 20 or 40 and a respective second hole 21 or 41 to pass the process air through the back wall 15 or 35. Each blower 25 or 45 is placed in the respective back channel 19 or 39. Each interior 13 or 33 contains a drying chamber 16 or 36, constructed as a rotatable drum 16 or 36 to be driven by a drive means not shown for the sake of simplicity. Each drum 16 or 35 is rotatable about a respective rotational axis 24 or 44, and is filled with articles to be dried 18 or 38. Access into the drum 16 or 36 may be had by opening the respective door 26 or 46 placed on the respective front wall 14 or 34.

**[0024]** As to the first dryer 11, Figure 2 details the placement of the electric heater 2 at a common level with the respective rotational axis 24. As to the second dryer 31, placement of the third holes 8 below the respective rotational axis 44 is noted. To allow the process air to enter, each drum 16 or 36 has a surface positioned against the respective back wall 15 or 35 containing a multiplicity of permeations to allow for the passing of the process air. Means for sealing between each drum 16 or 36 and the respective back wall 15 or 35 will be needed, but such means are not shown in Figure 2 for the sake of simplicity.

**[0025]** Figure 3 details the heat pump 9 present in the second dryer 31. The drying chamber 36 is shown schematically with the process air guide 37 arranged to pass the process air through the drying chamber 36 in a closed circuit, In this context, "closed" means not a hermetic sealing, but means only exclusion of any uncontrolled substantial exchange of air between the process air guide 37 and its ambient as long as the second dryer 31 is operating. Establishing of an essential pressure difference between the interior of the process air guide 37 and its ambient is neither intended nor desired, absent pressure differences occurring by circulation of the process air through the process air guide 37.

**[0026]** Upon exiting the drying chamber 36 through the process air guide 37, the process air which is laden with humidity from articles 38 contained in the drying chamber 36 will first pass a fluff filter 47 which is dedicated to filtering particulate matter which is torn from the articles 38 by the process air from that process air. Such particulate matter is usually specified as fluff or lint. Subsequently, the process air enters the heat sink 3 which is a correspondent of the heat exchanger 1 in the first dryer 11. In the heat sink 3, the process air is cooled to condensate the humidity and strip the liquid thus obtained from the process air. After exiting the heat sink 3 through the process air guide 27, the process air enters the heat source 4 which is a correspondent of the electric heater 2 in the first dryer 11. In the heat source 4, the process air is heated again to be returned to the drying chamber 36 by the blower 45, thus completing its cycle through the process air guide 37.

**[0027]** In the heat pump 9, both the heat sink 3 and the heat source 4 are heat exchangers which exchange heat between the process air and a refrigerant circulating through the refrigerant circuit 5. The refrigerant is an agent that is condensable and evaporable under suitable conditions of pressure and temperature. In particular, the

refrigerant may be selected from the group comprising carbon dioxide, propane, fluorinated hydrocarbons R134a and R152a, and compositions of fluorinated hydrocarbons R407C and R407A. The refrigerant enters heat sink 3 in liquid state, and is evaporated by picking up heat from the process air flowing through heat sink 3. After its evaporation, the refrigerant exits the heat sink 3 and passes by refrigerant circuit 5 to the compressor 7. In the compressor 7, the refrigerant is compressed while retaining its gaseous state, and passed to the heat source 4. In the heat source 4, the refrigerant condensates by releasing heat to the process air also passing through the heat source 4. Subsequently, the refrigerant exits the heat source 4 through the refrigerant circuit 5 in liquid state, and passes through a throttle 6 which will reduce the internal pressure as well as the temperature of the refrigerant. The throttle 7 may be embodied as a nozzle, a capillary or a valve. Subsequent to throttle 7, the refrigerant will return to the heat sink 3, thereby completing its cycle. It may be noted that a real heat pump 9 may contain two heat exchangers instead of one composing the heat source 4, possibly to allow for dissipating excess heat generated by action of the compressor 7. Likewise, two heat exchangers may compose the heat sink 3. Such embodiments are known in the art and are not detailed presently.

**[0028]** As a conclusion, the present invention defines two dryers constituting a set for concurrent series production, which dryers may be designed and manufactured with a particularly high structural similarity but retaining advantageous features of each dryer.

**Reference Numerals**

**[0029]**

1 Air-to-air heat exchanger
2 Electric heater
3 Heat sink
4 Heat source
5 Refrigerant circuit
6 Throttle
7 Compressor
8 Third hole
9 Heat pump

11 First dryer
12 Housing
13 Interior
14 Front wall
15 Back wall
16 Drying chamber
17 Process air guide
18 Articles to be dried
19 Back channel
20 First hole
21 Second hole
22 Vertical axis
23 Circle on back wall
24 Rotational axis
25 Blower
26 Door

31 Second dryer
32 Housing
33 Interior
34 Front wall
35 Back wall
36 Drying chamber
37 Process air guide
38 Articles to be dried
39 Back channel
40 First hole
41 Second hole
42 Vertical axis
43 Circle on back wall
44 Rotational axis
45 Blower
46 Door
47 Fluff filter

**Claims**

**1.** A set having a first dryer (11) and a second dryer (31) for concurrent series production, wherein each dryer (11, 31) comprises a respective housing (12, 32) enclosing a respective interior (13, 33), each housing (12, 32) comprising a respective front wall (14, 34) and a respective back wall (15, 35), a respective drying chamber (16, 36) disposed within said housing (12, 32), and a respective process air guide (17, 37) for guiding process air through said respective drying chamber (16, 36) for drying articles (18, 38) disposed therein, wherein each process air guide (17, 37) comprises a respective back channel (19, 39) disposed on said respective back wall (15, 35) outside said respective interior (13, 33), each back channel (19, 39) projecting into said respective interior (13, 33) through a respective first hole (20, 40) and a respective second hole (21, 41) in said respective back wall (15, 35), wherein each first hole (20, 40) is placed below each respective second hole (21, 41) with respect to a respective vertical axis (22, 42), and wherein each process air guide (17, 37) is configured for guiding the process air through each respective back channel (19, 39) from said respective first hole (20, 40) to said respective second hole (21, 41), and from said respective second hole (21, 41) into said respective drying chamber (16, 36), wherein, in said first dryer (11), said respective process air guide (17, 37) comprises an air-to-air heat exchanger (1) disposed within said respective housing (12), and an electric heater (2) disposed within said respective back channel (19), and wherein, in said second dryer (31), said respective process air

guide (17, 37) comprises a heat sink (3) and a heat source (4), said heat sink (3) and said heat source (4) belonging to a heat pump (3, 4, 5, 6, 7; 9) disposed within said respective housing (32), **characterized in that**, in said first dryer (11), said respective second hole (21) is a single passage for said respective back channel (19) to project into said respective interior (13), and that, in said second dryer (31), said respective back wall (35) has at least one third hole (8), with said respective back channel (39) projecting into said respective interior (33) through said at least one third hole (8) and said respective second hole (41) in parallel, and with said respective process air guide (37) being configured for guiding the process air from said respective first hole (40) to said respective second hole (41) and said at least one third hole (8).

**2.** The set according to claim 1, wherein each said drying chamber (16, 36) is a drum (16, 36) rotatable about a respective rotational axis (24, 44), wherein each rotational axis (24, 44) placed between said respective first hole (20, 40) and said respective second hole (21,41) as seen along said respective vertical axis (22, 42), and wherein, in said second dryer (31), said at least one third hole (8) is placed between said respective rotational axis (42) and said respective first hole (40).

**3.** The set according to claim 2, wherein, in said first dryer (11), said electric heater (2) is placed at a common level with said respective rotational axis (24) as seen along said respective vertical axis (22).

**4.** The set according to one of claims 2 and 3, wherein, in said second dryer (31), said second hole (41) and said at least one third hole (8) are arranged within a circle (43) not exceeding a projection of said respective drying chamber (36) onto said respective back wall (35) and parallel to said respective rotational axis (42).

**5.** The set according to one of the preceding claims, wherein, in said first dryer (11), said air-to-air heat exchanger (1) is placed below said respective drying chamber (16), as seen along said respective vertical axis (22), and wherein, in said second dryer (31), said heat pump (3, 4, 5, 6, 7; 9) is placed below said respective drying chamber (36) as seen along said respective vertical axis (42).

**6.** The set according to one of the preceding claims, wherein, in said second dryer (31), said at least one third hole (8) is two third holes (8).

**7.** The set according to claim 6, wherein said two third holes (8) are arranged symmetrically with respect to said respective vertical axis (42).

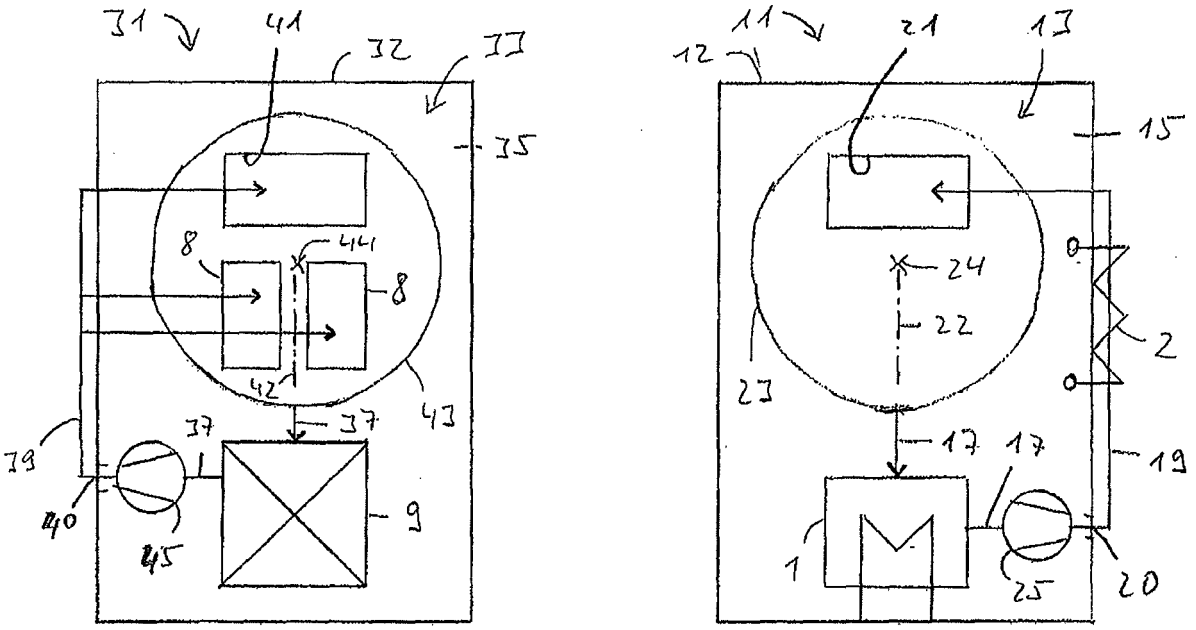
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Fig. 1

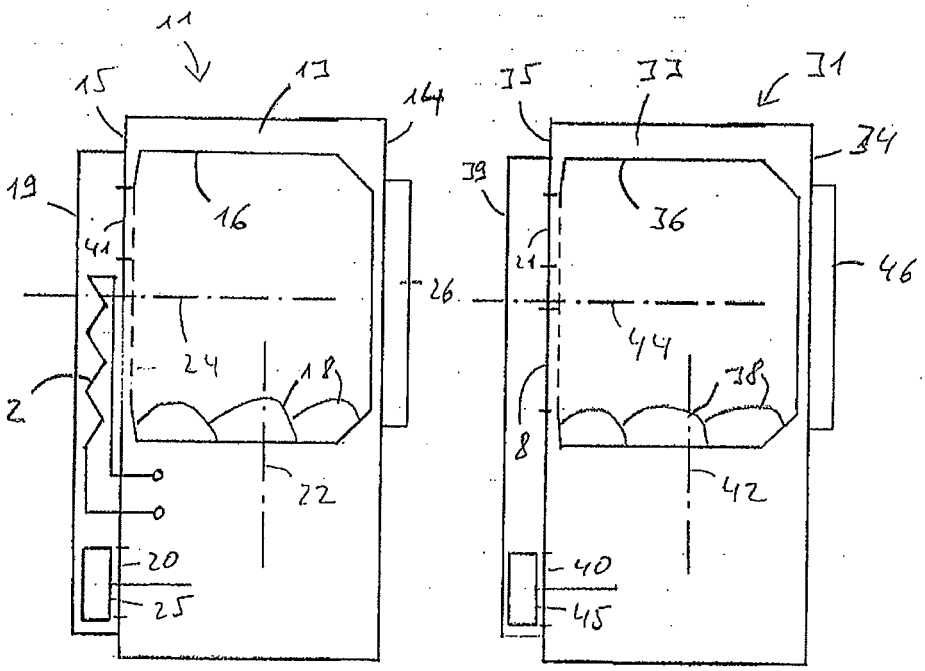
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Fig. 2

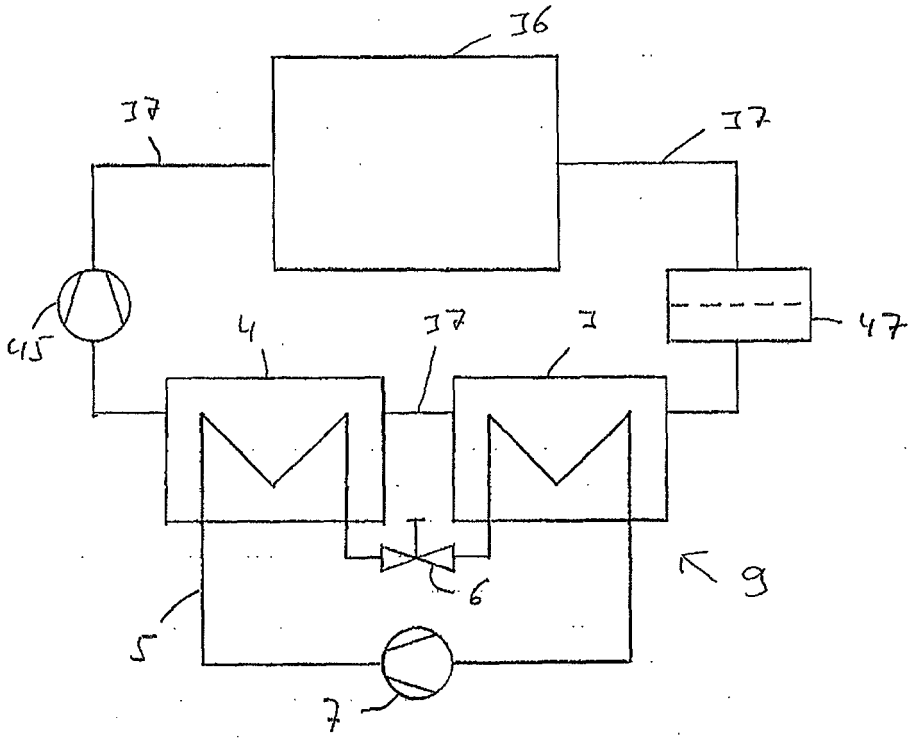


Fig. 1

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# EUROPEAN SEARCH REPORT

Application Number
EP 09 16 7353

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| Y | EP 0 163 265 A (MIELE & CIE) 4 December 1985 (1985-12-04) * page 2, line 5 - line 23 * * page 6, line 13 - line 30; figures 4,5 * | 1 | INV. D06F58/20 |
| Y<br>A | DE 10 2006 017068 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 18 October 2007 (2007-10-18) * paragraphs [0006], [0023], [0029], [0032]; figures 1-4 * | 1<br>2-7 | |
| A | EP 0 503 586 A (ZANUSSI ELETTRODOMESTICI [IT]) 16 September 1992 (1992-09-16) * abstract; figures 2,4 * | 1-7 | |
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 26 October 2009 | Westermayer, Wilhelm |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 16 7353

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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26-10-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

## REFERENCES CITED IN THE DESCRIPTION

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- WO 2008080831 A1 **[0004] [0005]**
- EP 0163265 A2 **[0006] [0007]**