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(54) Title: INNOVATION IN VENTED DRYERS

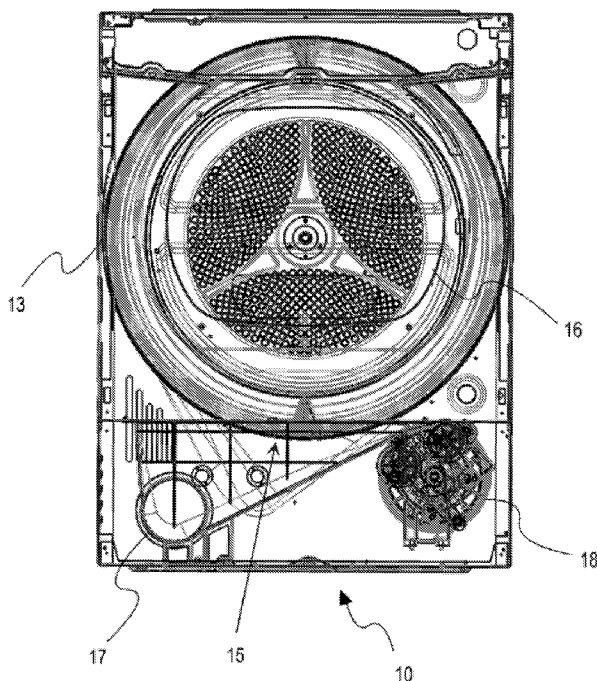


FIGURE 1

(57) Abstract: The invention relates to a dryer (10) with at least one fan (11) that allows the air to be aspirated from the outer environment and sent through at least one heater (12) to at least one tumbler (13), to cool and dehumidify the hot and humid air that dries the textile products before being thrown out. The innovation of the invention is characterized in at least one vent (17) acting as a heat exchanger, provided with at least two nested pipes, including at least one internal pipe (171) and at least one external pipe (172) surrounding the said internal pipe (171), the motor (18) from which said fan (11) element and said tumbler (13) take the rotational force, and at least one temperature sensor (30) positioned at the end of the vent (17), providing communication between the card and the pump (40) mechanism.



INNOVATION IN VENTED DRYERS

5 TECHNICAL FIELD

The invention relates to an innovation in vented dryers, which aims to condense the humidity of the air, which has a high temperature and humidity compared to the environment, and to discharge it from the vent after lowering its temperature, and which is also embodied such
10 that it prevents the thermal comfort of the environment from changing.

BACKGROUND

In today's world, the importance of energy saving is increasing day by day. Global warming is
15 still an important problem on the world agenda. Therefore, especially in the designs of washing machines and dryers, dishwashers, refrigerators and similar devices, studies are carried out in order to obtain maximum performance with minimum energy. In the vented dryers in the technique, the air aspirated from the environment by the fan snail system is firstly sent to the heaters. The air, the temperature of which rises with the help of the heater,
20 is sent to the tumbler and dehumidifies the textile products in the machine. Then, the said humid air is passed through the filter and evacuated from the dryer with the help of a vent.

The system takes the air it absorbs from the environment and directs it to the outside of the machine environment with an open cycle by dehumidifying of the laundry. According to the
25 suitability of the house and the device, the mentioned humid and hot air is attempted to be evacuated directly to the outside. In cases where it is not possible to evacuate to the outer environment or when the temperature and humidity of the air thrown into the environment are desired to be lowered, the temperature and humidity of the air should be brought to normal levels.

30 In the state of the art, vented tumble dryers are the dryers with the lowest energy class among other types of textile product dryers. In the said dryers, the drying air works as an open cycle instead of a closed cycle. The hot air, which dehumidifies the textile products, passes through the filter and is discharged to the room environment with the help of a vent.
35 Vented dryers operating with open cycles, on the other hand, sometimes discharge the waste air to the outer environment, and at times regularly release the air of the drying cycle to the environment due to the lack of relevant equipment. The humid and hot air taken from

the wet textile products is given to the outside until the drying cycle is completed. It is thought that if it cannot be evacuated from the room environment, it will disrupt the comfort of the environment. As a result of the above, a design change in the system is required.

- 5 There is a patent document with the application number JP2004135752A in the literature. The invention relates to a tumble dryer. An object of the invention is to cool the air exhausted from the textile product dryer and thus, reduce the humidity in the hot air. In order to achieve this, a second pipeline, which is fed with mains water, is circulated over the air outlet vent. Thereby, heat transfer takes place from the hot air in the vent to the cold tap water.

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There is a patent document with the application number US2009038173A1 in the literature. The said invention relates to a textile product dryer. The textile product dryer as the subject of the invention has a system to dehumidify the exhausted air. Accordingly, the air comes into contact with a pipe structure in which water is circulated in the outlet region wherein it is cooled down.

15

As a result, all the above-mentioned problems have made it necessary to make an innovation in the related technical field.

20 **BRIEF DESCRIPTION OF THE INVENTION**

The present invention relates to an innovation in vented dryers in order to eliminate the above-mentioned disadvantages and bring new advantages to the related technical field.

- 25 An object of the invention is to present a vented dryer, which aims to condense the humidity of the air exhausted from the vent and which has a high temperature and humidity compared to the environment and to discharge it by lowering its temperature.

Another object of the invention is, in case the drying air is given directly to the environment, to put forward a vented dryer that is structured in a way that prevents the thermal comfort of the environment from changing.

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In order to realize all the objectives mentioned above and which will emerge from the detailed explanation below, the present invention is a dryer with at least one fan that provides the aspiration of the air from the outer environment and sending of this air to at least one tumbler by passing through at least one heater, in order to cool and dehumidify the hot and humid air that dries the textile products before being discharged into the outer

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environment. Accordingly, its innovation lies in that it comprises a vent that acts as a heat exchanger, provided with at least two nested pipes, at least one internal pipe and at least one external pipe surrounding the said internal pipe. Thereby, it aims to create a vented dryer that allows the hot and humid air that dries the textile products in the dryer to be cooled and dehumidified before being discharged outside of the dryer.

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A characteristic of a possible embodiment of the invention is to provide the said fan element and the motor from which the said tumbler gets its rotational force. Thereby, air is transferred into the dryer, and it provides the necessary power for the dryer to work.

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The characteristic of another possible embodiment of the invention is to provide at least one temperature sensor positioned at the end of the vent, providing communication between the card and the pump mechanism. Thereby, with the pump system that communicates with the temperature sensor, the mains water is pumped to the vent according to the needs of the system and it is aimed to prevent excessive water consumption by providing the use of mains water based on need.

15

The characteristic of another possible embodiment of the invention is that the vent is positioned at least partially inclined with respect to the floor in order to carry the condensed water in the same.

20

Thereby, the condensed water is discharged from the vent in a controlled manner.

The characteristic of another possible embodiment of the invention is that it comprises at least one collecting vessel to which the vent is associated from one side. Thereby, the accumulation of condensed water is ensured.

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BRIEF DESCRIPTION OF THE FIGURES

In Figure 1, a representative view of the innovation in vented dryers as the subject of the invention is given.

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In Figure 2, a representative rear view of the innovation in vented dryers as the subject of the invention is given.

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In Figure 3, a representative rear detailed view of the innovation in vented dryers as the subject of the invention is given.

In Figure 4, a representative detailed view of the innovation in vented dryers as the subject of the invention is given.

- 5 In Figure 5, a representative detailed view of the vent in the innovation in vented dryers as the subject of the invention is given.

DETAILED DESCRIPTION OF THE INVENTION

- 10 In this detailed description, the innovation in vented dryers (10) of the invention is described only for the better understanding of the subject and in the way to create no limiting effect whatsoever.

Vented dryers (10) in the present technique basically work with the following principle; vented
15 dryers (10) have at least one fan (11) configuration that ensures the continuation of the cycle system. Said fan (11) configuration ensures that the air inside the dryer (10) is aspirated and that this air is sent to at least one tumbler (13) by passing through at least one heater (12). The circulation of the air inside the dryer (10) is also provided by at least one air inlet opening (14) on the walls of the dryer (10). The hot air, which dehumidifies the wet textile products in
20 the tumbler (13), passes over at least one cover (16) element and is directed to at least one filter (15), and at least one vent (17) after the said filter (15). The circulation air is regularly discharged to the outer environment from the said vent (17). Said fan (11) element and said tumbler (13) receive their rotational force by at least one motor (18) located in the dryer (10).

- 25 With the innovation in vented dryers (10) with the vent (17) of the invention, some changes have been made, different from the existing dryers (10). There is a nested vent (17) system in the dryer (10) of the invention, to work as a heat exchanger. While the humid and hot air of the drying air passes through the said vent (17), the mains water circulates through the outer wall of the vent (17). The amount of water is regulated by at least one card and at least one
30 pump (40) mechanism that communicates with the help of a temperature sensor (30) measuring at the end of the vent (17). The mains water, which takes the heat of the hot air, is sent back to the mains drain (20). The temperature of the air decreases with the heat transferred to the water in the walls. The temperature drop in the air causes the water vapor in the vent (17) to condense. The condensed water drains through the vent (17) designed at
35 an angle of approximately 3° and accumulates in the collecting vessel (50). The person using the dryer (10) must replace at least one water collecting vessel (50) after each cycle.

The air cycle is aspirated from inside the dryer (10) by means of a fan (11), such as dryers (10) with vents (17) existing in the state of the art, and sent to the heater (12) in the arrangement, and the air with an increased temperature is sent to the tumbler (13). Then, the hot air, which dehumidifies the textile products, passes through the filter (15) and comes to the vent (17). The incoming air leaves its heat to the vent (17) with the help of the vent (17) system, which is nested to work as a heat exchanger, and then it is pressed to the outer environment. The inner diameter of the vent (17), which acts as a heat exchanger, is approximately 100 mm and its outer diameter is approximately 110 mm. Depending on the characteristics of the dryer (10), it can also be in different sizes if desired. Additionally, there are wings for increasing the surface inside the inner diameter. The wing structure of the dryer (10), which has a vent (17) system that acts as a heat exchanger, can also change according to the system requirement.

With the said invention, it is aimed to cool and dehumidify the hot and humid air that dries the textile products in the dryers (10) with vent (17) before being thrown out of the dryer (10). To achieve this, a vent (17) system is provided in the form of a nested tube. Accordingly, it is seen that while waste hot air passes through at least one internal pipe (171), mains water passes through at least one external pipe (172). In this way, the hot air transfers heat to the water in the said external pipe (172) and ensures the cooling of the water. The vent (17) system is inclined to discharge the water condensed in the said internal pipe (171) as a result of the cooling in the hot air.

The invention aims to condense the humidity of the air, which has a high temperature and humidity compared to the environment and discharge the same from the vent (17), by lowering its temperature. Thanks to the invention, direct delivery of the drying air to the environment and thus changing the thermal comfort of the environment is prevented. In addition, it is aimed to increase the performance of the dryer (10) with the said invention. Since the energy efficiency of the dryer (10) working with high performance will be high as well, a contribution to the environment and natural resources is aimed.

In addition, in the present standards, thermal comfort is given in ASHRAE Standard 55 – 2004 and ISO 7730. Considering the comfort conditions, when the air discharged by the existing dryers (10) to the environment is examined; the air, which changes depending on the decrease in the humidity of the laundry, where the relative humidity is 100%, especially in the first cycles, is given to the environment. The air supplied to the environment can reach temperatures of 50°C in the middle of the drying cycle. One of the most important shortcomings of the present system is the direct supply of hot air, which aspirates the

humidity from the laundry, to the environment. At this point, the invention not only condenses the humidity of the waste air from the laundry in the vent (17), but also helps to provide the comfort condition by reducing the temperature of the air and thus, meet the present standards.

5

The protection scope of the invention is given in the attached claims, and it cannot be limited to what have been described as an example in this detailed description under any circumstances. It is understood that a person with the skill in the related technique can put forth similar embodiments in the light of what have been described above, without departing from the main theme of the invention.

10

REFERENCE NUMERALS IN THE FIGURES

	10 Dryer
15	11 Fan
	12 Heater
	13 Tumbler
	14 Air Inlet Opening
	15 Filter
20	16 Cover
	17 Vent
	171 Internal Pipe
	172 External Pipe
	18 Motor
25	20 Mains Drain
	30 Temperature Sensor
	40 Pump
	50 Collecting Vessel
30	

CLAIMS

- 5
1. A dryer (10) with at least one fan (11) that allows the air to be aspirated from the outer environment and sent through at least one heater (12) to at least one tumbler (13), in order to cool and dehumidify the hot and humid air that dries the textile products before being discharged into the outer environment, ***characterized in that*** it comprises at least one vent (17) acting as a heat exchanger, provided with at least two nested pipes, including at least one internal pipe (171) and at least one external pipe (172) surrounding the said internal pipe (171).
- 10
2. A dryer (10) according to Claim 1, ***characterized in that*** it comprises the said fan (11) element and the motor (18) from which the said tumbler (13) receives its rotational force.
- 15
3. A dryer (10) according to Claim 1, ***characterized in that*** it comprises at least one temperature sensor (30) located at the end of the vent (17), which enables the communication of the card and the pump (40) mechanism.
- 20
4. A dryer (10) according to Claim 1, ***characterized in that*** the vent (17) is positioned at least partially inclined with respect to the floor in order to carry the condensed water in the same.
- 25
5. A dryer (10) according to Claim 1, ***characterized in that*** the vent (17) comprises at least one collecting vessel (50) to which it is associated from one side.

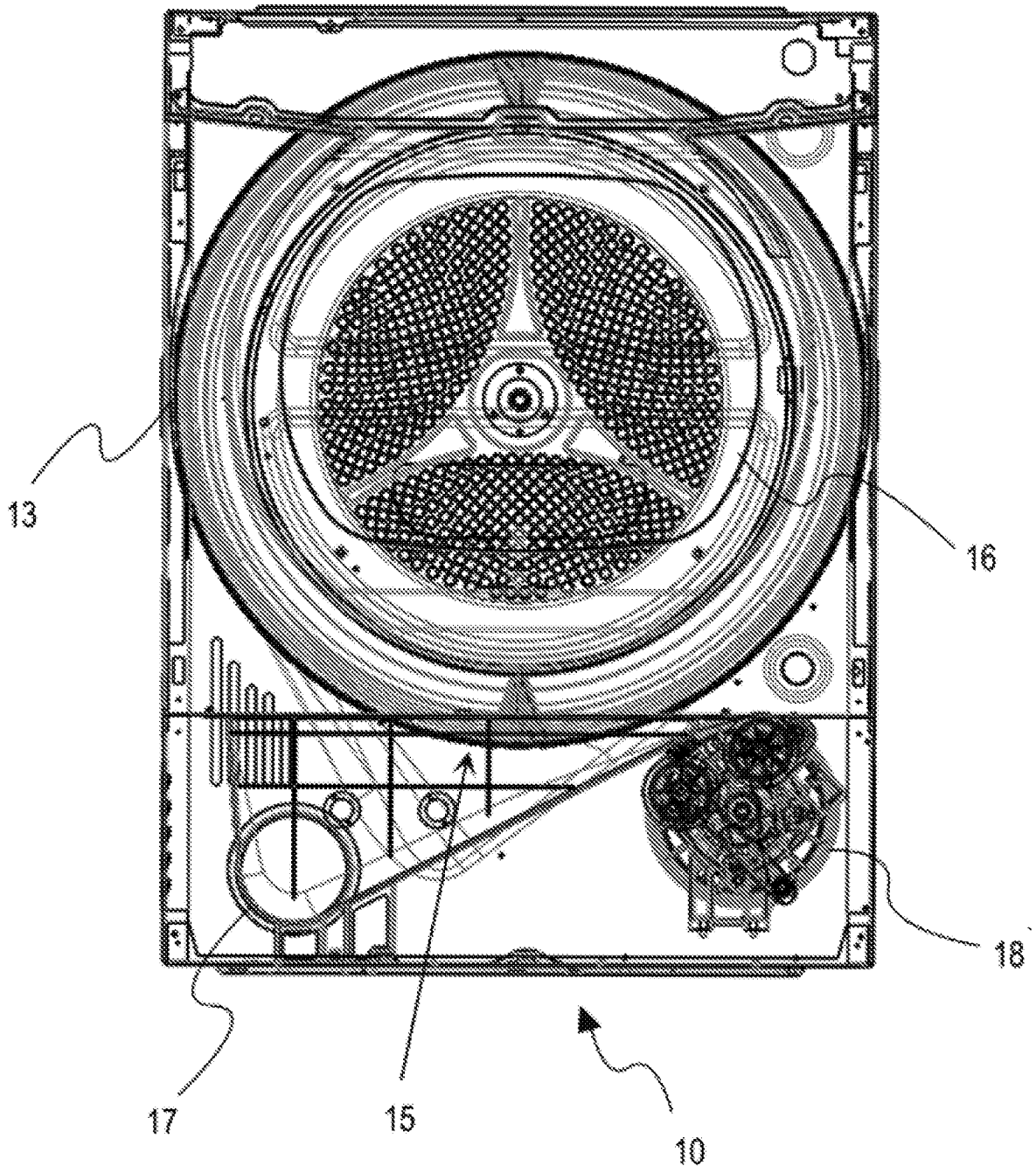


FIGURE 1

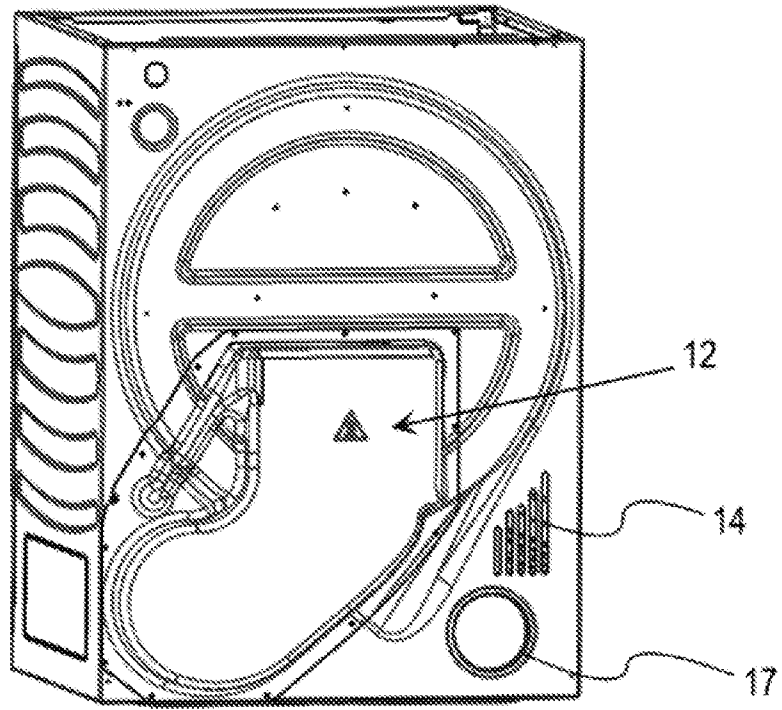


FIGURE 2

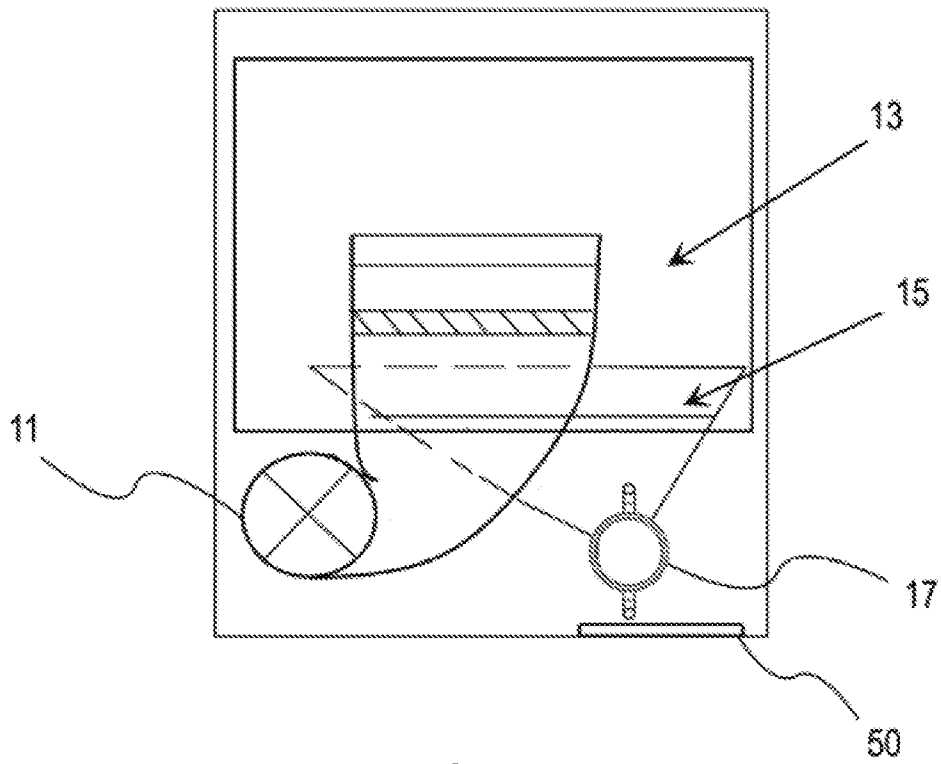


FIGURE 3

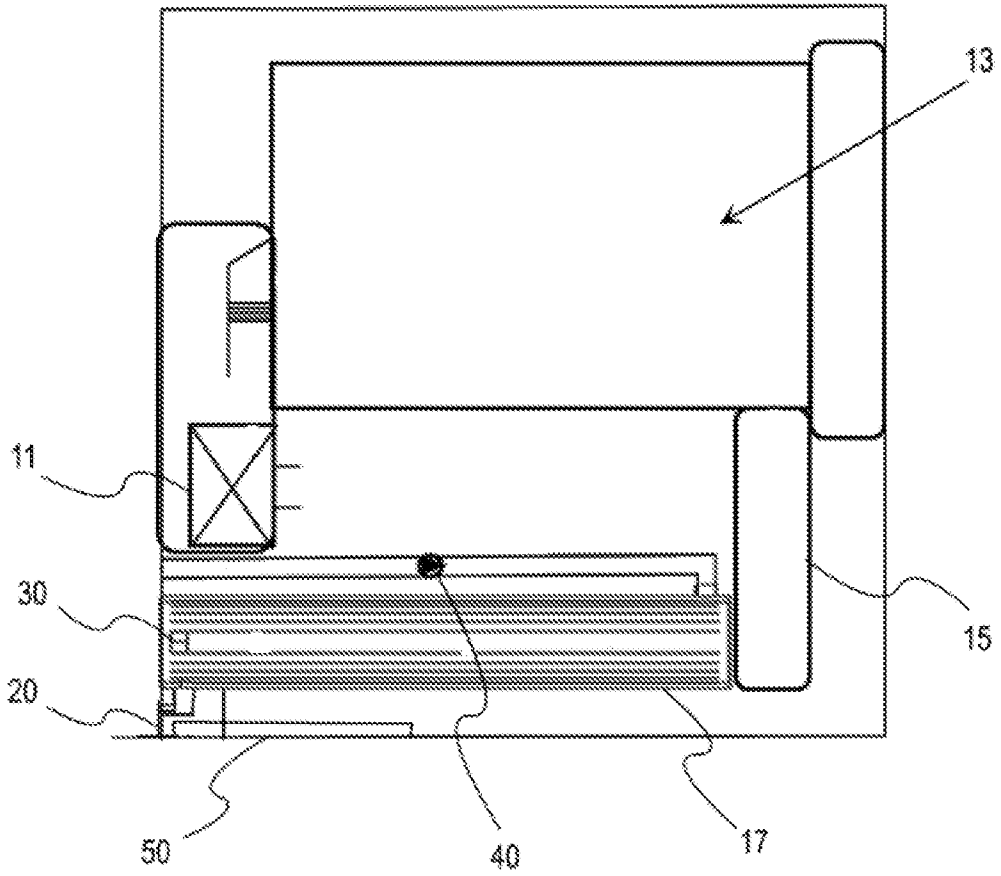


FIGURE 4

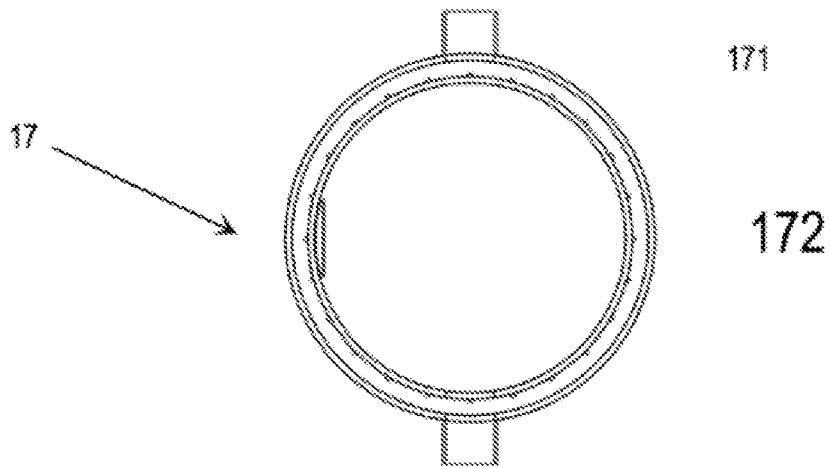


FIGURE 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/TR2022/051619

A. CLASSIFICATION OF SUBJECT MATTER		
D06F 58/00 (2020.01); D06F 25/00 (2006.01)i		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) D06F 58/00; D06F 25/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Turkish National Patent Database		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, Google Patent, Turkish National Patent Database, Espacenet & Keywords: dry, machine, fan, tumble, cool, dehumidify, heat, exchange, pipe, hose, duct, tube, funnel, motor, sense, detect, temperature, condense, vessel, chamber, vent, external, internal, pump, water		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2008113981 A (HITACHI APPLIANCES INC) 22 May 2008 (2008-05-22) Abstract; Paragraph 16	1-5
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D,A	EP 2028313 A2 (LG ELECTRONICS INC [KR]) 25 February 2009 (2009-02-25) Whole document	1-5
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "D" document cited by the applicant in the international application "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 20 April 2023		Date of mailing of the international search report 20 April 2023
Name and mailing address of the ISA/TR Turkish Patent and Trademark Office (Turkpatent) Hipodrom Caddesi No. 13 06560 Yenimahalle Ankara Türkiye Telephone No. +903123031000 Facsimile No. +903123031220		Authorized officer Rabia Nurgül ÖZBAYLANLI Telephone No. +903123031594

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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