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(54) **Clothes drying machine with a moisture sensor**

(57) The present invention relates to a clothes drying machine 1, or combined clothes washing and drying machine, comprising a drum 3 suitable to receive the clothes 10 to be dried, an air circulating system adapted to circulate a flow of drying air into the drum 3, an outlet circuit 15, at a location downstream of the drum 3, for the exhaust air exiting the drum 3, a lint filter device 30 arranged in the outlet circuit 15, a control device for controlling said clothes drying machine 1 during a drying cycle, and a moisture sensor connected to the control device for the measurement of the moisture level of the clothes 10 during the drying cycle. The moisture sensor comprises at least two electrical contacts 40, 41 associated to the lint filter device 30 and connected or connectable to the control device. The control device is configured for calculating a control parameter P indicative of the impedance Z between the electrical contacts 40, 41 and for controlling the drying cycle according to the value of the control parameter.

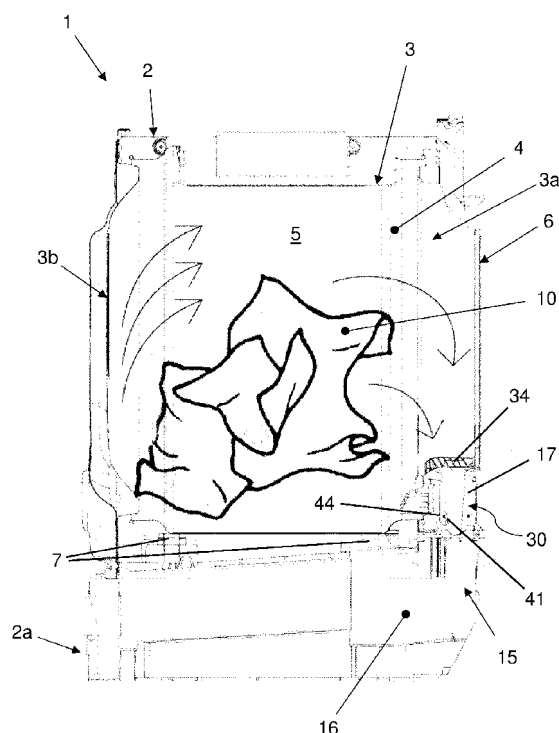


FIG. 1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns the field of clothes drying techniques.

[0002] In particular, the present invention refers to clothes drying machines, or clothes dryers.

[0003] More particularly, the present invention refers to clothes drying machines provided with a moisture sensor.

BACKGROUND ART

[0004] Nowadays the use of clothes drying machines, both "simple" clothes drying machines (i.e. clothes drying machines which can only dry clothes) and clothes washing-drying machines (i.e. machines which can also wash the clothes), is widespread.

[0005] In the present description with the term "clothes dryers" we will refer to both simple clothes drying machines and combined clothes washing and drying machines.

[0006] Clothes dryers generally comprise an external casing provided with a rotatable drum where the wetted clothes to be dried are placed.

[0007] In case of a combined clothes washing and drying machines, the rotatable drum is contained in a washing tub.

[0008] The drying effect is obtained by forcing heated air inside the drum against the tumbling clothes. The heated air removes the moisture from the clothes and then the air with moisture is expelled from the drum.

[0009] In a conventional vented clothes dryer the air with moisture is conveyed through a vent duct to the outside.

[0010] In a conventional condenser clothes dryer, instead, the air with moisture is conveyed to a condenser unit in which the air passes through a heat exchanger where the water condenses.

[0011] In conventional clothes dryers the duration of the drying cycle is based on the detected moisture level of the clothes.

[0012] For this purpose clothes dryers of the known type utilize moisture sensors that detect the moisture level of the clothes.

[0013] A moisture sensor belonging to the known technique is disclosed in document US 5,940,986; this document discloses a sensor placed inside the drum which comes into contact with the tumbling clothes during the drum rotation.

[0014] The sensor comprises a pair of elongated sensor electrodes which face toward the interior of the drum such that clothes being tumbled and dried will periodically engage and bridge the electrodes. The sensor electrodes are properly connected to a dryer moisture sensing circuit.

[0015] The measured resistance between the elec-

trodes is indicative of the moisture level of the clothes bridging the electrodes.

[0016] A high resistance between the electrodes is indicative that the clothes are dry. A low resistance between the electrodes is indicative of wet clothes bridging the electrodes.

[0017] However, the dryer above described belonging to the known art poses some drawbacks.

[0018] A first drawback posed by this known technique is constituted by the fact that the moisture level measured is exclusively the moisture level of the clothes which come into contact with the electrodes. The moisture level detected by the sensor, therefore, does not take into account of the total amount of moisture of all the clothes inside the drum.

[0019] This may cause a wrong duration of the drying cycle which may end with part of the clothes not fully dry.

[0020] Another drawback is the fact that in particular condition, for example when the drum is rotated at high speed, the clothes do not touch the sensor electrodes. This is interpreted as a dry condition for the clothes, even if the clothes are still wetted. This may cause an early undesired end of the drying cycle.

[0021] A further drawback is the fact that the contact with the clothes may damage the sensor electrodes, in particular when buttons, loops or other hard parts of the clothes hit the sensor electrodes.

[0022] Another drawback is the fact that the sensor electrodes may be damaged by the moisture over time.

[0023] In particular at the beginning of the dryer cycle the clothes may have a high level of moisture and may contain even water.

[0024] This may cause loosening of performance of the sensor electrodes or, on the other hand, may require the use of special treated material for its construction, which increases the production costs.

[0025] Damaging of sensor electrodes may further irreversibly affect their functionality, making it necessary to replace them. This may require the intervention of a specialist.

[0026] The main object of the present invention is therefore to overcome said drawbacks.

[0027] In particular, it is one object of the present invention to provide a moisture sensor for a clothes drying machine which allows a more correct moisture level measurement of the clothes loaded in the drying machine than the devices of known type. This makes it possible to obtain a more efficient drying of the clothes compared to the known technique.

[0028] It is another object of the invention to provide a moisture sensor for a clothes drying machine that lasts longer than sensors of known type.

[0029] It is a further object of the invention to provide a moisture sensor for a clothes drying machine that makes it possible to simplify replacement operations in case of damaging.

DISCLOSURE OF INVENTION

[0030] The present invention relates to a clothes drying machine, or combined clothes washing and drying machine, comprising a drum suitable to receive the clothes to be dried, an outlet circuit at a location downstream of the drum, for the exhaust air exiting the drum, and a lint filter device arranged in the outlet circuit.

[0031] The applicant has found that by providing two electrical contacts connected to the lint filter device, the control device of the clothes drying machine may calculate the impedance between the electrical contacts so that it is possible to measure the correct level moisture of clothes loaded in the drying machine.

[0032] The present invention relates, in a first aspect thereof, to a clothes drying machine, or combined clothes washing and drying machine, comprising:

- a drum suitable to receive the clothes to be dried;
- an air circulating system adapted to circulate a flow of drying air into said drum;
- an outlet circuit, at a location downstream of the drum, for the exhaust air exiting the drum;
- a lint filter device arranged in said outlet circuit;
- a control device for controlling said clothes drying machine during a drying cycle;
- a moisture sensor connected to said control device for the measurement of the moisture level of said clothes during said drying cycle; wherein said moisture sensor comprises at least two electrical contacts associated to said lint filter device and connected or connectable to said control device, said control device being configured for calculating a control parameter indicative of the impedance between said electrical contacts and for controlling said drying cycle according to the value of said control parameter.

[0033] In a preferred embodiment of the invention, the lint filter device comprises a frame and one or more filtering surfaces suitable to catch the lint of the exhaust air passing therethrough.

[0034] Preferably the electrical contacts are connected to two separated filtering surfaces of the filtering surfaces.

[0035] In a further preferred embodiment of the invention, the electrical contacts are connected to a same filtering surface of the filtering surfaces.

[0036] In a preferred embodiment of the invention, the electrical contacts are two.

[0037] In a further preferred embodiment of the invention, the electrical contacts are more than two.

[0038] Advantageously the filtering surface comprises a net.

[0039] Opportunely the net is made of an electrical conductive material.

[0040] In a preferred embodiment of the invention, the net comprises three or more layers wherein two of the layers comprise an electrical conductive material suitable

to form the electrical contacts and wherein another one of the layers comprises an electrical insulating material which is interposed between the two layers comprising an electrical conductive material.

[0041] In a further preferred embodiment of the invention, the net comprises elements disposed in a grid-like structure wherein one or more of the elements are made of electrical conductive material and are grouped to form a first electrical contact and one or more of the elements are made of electrical conductive material and are grouped to form a second electrical contact.

[0042] Advantageously the lint filter device is removable with respect to the outlet circuit.

[0043] Preferably the outlet circuit comprises a housing suitable to receive the lint filter device and the housing comprises electrical connectors connected to the control device suitable to contact the electrical contacts when the lint filter device is received in the housing.

[0044] Opportunely the control device comprises an oscillator adapted to calculate the impedance between the electrical contacts.

[0045] In a preferred embodiment the machine further comprises a washing tub surrounding the drum for washing the clothes before they are subjected to the drying process.

BRIEF DESCRIPTION OF THE DRAWINGS

[0046] Further characteristics and advantages of the present invention will be highlighted in greater detail in the following detailed description of some of its preferred embodiments, provided with reference to the enclosed drawings. In the drawings, corresponding characteristics and/or components are identified by the same reference numbers. In particular:

- Figure 1 shows a diagrammatic cross-sectional view of a dryer machine according to the invention;
- Figure 2 shows an enlarged detail of Figure 1;
- Figure 3 shows an isometric view of a lint filter device for the dryer machine of Figure 1 according to a first embodiment of the invention;
- Figure 4 shows the lint filter device of Figure 3 in an opened configuration;
- Figures from 5 to 8 show further embodiments of Figure 4;
- Figure 9 shows a further embodiment of Figure 5;
- Figure 10 shows a further embodiment of Figure 6;
- Figure 11 shows an enlarged detail of a lint filter device according to a further embodiment of the invention;
- Figure 12 shows a side view of Figure 11;
- Figure 13 shows a further embodiment of Figure 11.

DETAILED DESCRIPTION OF THE INVENTION

[0047] The present invention has proved to be particularly successful when applied to clothes drying ma-

chines. It should in any case be underlined that the present invention is not limited to this type of application. On the contrary, the present invention can be usefully applied to all the machines requiring a drying phase for wetted clothes, as for example a combined clothes washing and drying machine. With reference to Figure 1 a clothes dryer machine 1 according to a first embodiment of the invention is described.

[0048] The clothes dryer machine 1, hereinafter referred to as dryer 1, comprises an external casing or casing 2, in which a rotatable drum 3 is provided.

[0049] The drum 3 preferably has a substantially cylindrical shape with a receiving space 5 where the wetted clothes 10 to be dried can be loaded.

[0050] The front side wall 3a of the drum 3 comprises an aperture 4, substantially aligned with a loading/unloading door 6, from which the clothes 10 are loaded/unloaded.

[0051] The drum 3 is advantageously provided with a rear portion 3b formed with perforations.

[0052] The drum 3 is advantageously rotated by an electric motor, not shown, which preferably transmits the rotating motion to the drum 3, preferably by means of a belt/pulley system.

[0053] The drum 3 is preferably supported by means of rolling bearing 7.

[0054] The dryer 1 comprises an air circulating system adapted to circulate a flow of drying air into the drum 3. The air circulating system advantageously comprises a fan, not illustrated, which blows a flow of drying air through the drum 3. The air circulating system preferably comprises a heating device, not illustrated, adapted to heat up the air at a location upstream of the drum 3.

[0055] Preferably the heating device comprises an electric heating element arranged upstream of the drum along the air flow.

[0056] In further embodiment the heating device may be of different type, as for example a heat pump, etc.

[0057] Circulation of the drying air evaporates the moisture from the wetted clothes 10 so as to form a moisture-laden hot air, hereinafter indicated with exhaust air. The dryer 1 advantageously comprises an exhaust air outlet circuit 15 through which the exhaust air exiting the drum flows.

[0058] The exhaust air outlet circuit 15 advantageously comprises an outlet conduit 16 arranged downstream of the drum 3 through which the exhaust air may flow out. It is underlined that in the present application the terms "upstream" and "downstream" are referred to the flowing direction of the air, heated air and/or exhaust air, during the standard functioning of the dryer; for example saying that the heating device is at a location upstream of the drum means that in the standard functioning of the dryer the air firstly passes through the heating device and then flows into the drum; saying that the outlet conduit is arranged downstream of the drum means that in the standard functioning of the dryer the air firstly circulates inside the drum and then passes through the outlet conduit. In

the embodiment shows in Figure 1 the outlet conduit 16 terminates towards the outside at the rear 2a of the casing 2. In this case the exhaust air coming from the drum 3 and passing through the outlet circuit 15 is conveyed to the outside. In a further embodiment, as known from a condenser-type clothes drying machine, the exhaust air outlet circuit may comprise a heat exchanger to cool the exhaust air coming from the drum. The heat exchanger preferably condenses the water vapour of the exhaust air into either a drain pipe or a collection tank. The air then may be preferably conveyed to the outside.

[0059] In a further embodiment, the air outputted by the heat exchanger may be conveyed inside the drum through a closed loop circuit.

[0060] According to the invention the exhaust air outlet circuit 15 advantageously comprises a lint filter device 30. The lint filter device 30 is arranged at the outlet conduit 16, preferably in proximity of the drum 3.

[0061] As shown in Figures 2 and 3, the lint filter device 30 is preferably wedge-shaped. The lint filter device 30 is advantageously inserted in a housing 17 of the outlet conduit 16.

[0062] The lint filter device 30 is preferably removably associated to the outlet conduit 16 so that it can be easily removed in order to be cleaned or replaced.

[0063] The lint filter device 30 preferably comprises two lateral surfaces 31, 32 which preferably form an acute angle between themselves. The two lateral surfaces 31, 32 preferably merge in a lower surface 33, advantageously curved. A cover vent 34 connects the upper part the two lateral surfaces 31, 32. Two opposite side surfaces 35, 36 close the lint filter device 30.

[0064] The lint filter device 30 is advantageously made so as it can be opened, as shown in Figure 4. Advantageously, retaining means 37 provided between the cover vent 34 and the rear lateral surface 32 permits the lint filter device 30 to be easily opened, and closed, for cleaning. Retaining means 37 preferably comprises a tongue 38 in the upper part of the rear lateral surface 32 which is inserted in an aperture 39 of the cover vent 34. This makes a snap-fit connection between the rear lateral surface 32 and the cover vent 34.

[0065] The two lateral surfaces 31, 32 and the lower surface 33 advantageously comprise a frame 40 provided with filtering surfaces 31a-31d, 32a-32d, 33a, as shown in Figure 4.

[0066] The frame 40 is preferably made of plastic. In further embodiment the frame may be made with different material, as for example metal.

[0067] The filtering surfaces 31a-31d, 32a-32d, 33a preferably comprise a metallic net. In further embodiment the net may made with different material, as for example nylon, polystyrene (optionally with a sponge structure), and optionally of the same material of the frame 40.

[0068] The exhaust air coming from the drum 3 passes through the cover vent 34 and then through the filtering surfaces 31a-31d, 32a-32d, 33a. The net of the filtering surfaces 31a-31d, 32a-32d, 33a catches the lint con-

tained in the exhaust air. The cleaned exhaust air then flows through the outlet conduit 16.

[0069] According to the invention, the lint filter device 30 comprises at least two electrical contacts 41, 42. The two electrical contacts 41, 42 are preferably arranged in two separate filtering surfaces 31a and 31d of the front lateral surface 31.

[0070] Two electrical connectors, only one visible in Figure 2 and indicated with the number 44, are arranged at the housing 17 of the outlet conduit 16 in correspondence of the two electrical contacts 41, 42 of the lint filter device 30 in its mounted configuration in the housing 17.

[0071] The two electrical connectors 44 are advantageously flexible and can bend easily to make a good contact with the electrical contacts 41, 42 of the lint filter device 30.

[0072] The two electrical connectors 44 are connected to a control device, not shown, of the dryer 1.

[0073] The control device is advantageously connected to the various parts of the dryer 1 in order to ensure its operation. The control device is opportunely connected also to an interface unit which is accessible to the user and by means of which the user selects and sets various parameters, in particular the desired drying cycle. Advantageously, other parameters can optionally be inserted by the user, for example the type of fabric of the loaded clothes, the load in terms of weight of the clothes to be dried, the starting time, etc..

[0074] Based on the parameters acquired by said interface unit, the control device sets and controls the various parts of the dryer 1 in order to carry out the desired drying cycle.

[0075] The electrical contacts 41, 42 of the lint filter device 30 are preferably made of electrical conductive material. The electrical contacts 41, 42 are advantageously made with metallic strips applied to the net of the corresponding filtering surface 31a, 31d.

[0076] In a preferred embodiment, the electrical contacts 41, 42 are glued to the net, or they may be associated to the net by over-moulding or by welding.

[0077] By means of the two electrical connectors 44, 45 the control device of the dryer 1 may advantageously calculate a parameter P indicative of the impedance Z between them.

[0078] The value of the impedance Z between the two electrical contacts 41, 42, and also its variation during the time, depends on different parameters. One of these parameters is the quantity of humidity contained in the exhaust air that passes through the net of the filtering surfaces 31a-31d, 32a-32d, 33a.

[0079] In a preferred embodiment of the invention the parameter P is represented by, and corresponds to, the value of impedance Z actually measured between the two electrical contacts 41, 42.

[0080] In this case, the control device may preferably calculate the value of the impedance Z between the two electrical contacts 41, 42 by means of an oscillator.

[0081] From the values of the parameter P, as for ex-

ample the measured impedance Z, the control device of the dryer 1 may therefore determine the level of humidity of the exhaust air. The level of humidity of the exhaust air gives information on the status of all the loaded clothes 10 inside the drum 3, for example the percentage of relative humidity of the loaded clothes 10.

[0082] The control device may determine therefore if the clothes 10 are dry and hence if the drying cycle may be ended. On the other hand, if the control device determines that the clothes 10 are still wet the drying cycle is not interrupted. Advantageously, the values of the parameter P calculated by the control device refer to the effective level of humidity of all the loaded clothes 10 inside the drum 3, being such a parameter P linked to the impedance Z between the two electrical contacts 41, 42 placed advantageously downstream of the drum 3. Furthermore, the electrical contacts 41, 42 do not contact the tumbling clothes 10 during the drum rotation and therefore the electrical contacts 41, 42 are not damaged.

[0083] Also, the replacement or the cleaning of the electrical contacts 41, 42 may be easily performed by removing the lint filter device 30 from the housing 17.

[0084] With reference to Figures from 5 to 10, construction variants of the lint filter device are described.

[0085] The lint filter device 50 of Figure 5 differs from lint filter device 30 shown in Figure 4 for the different displacement of the electrical contacts 51, 52.

[0086] The first electrical contact 51 is arranged in a filtering surface 31a of the front lateral surface 31 and the second electrical contact 52 is arranged in a filtering surface 32a of the rear lateral surface 32.

[0087] Accordingly, two electrical connectors, not illustrated, will be arranged at the housing 17 of the outlet conduit 16 in correspondence of the two electrical contacts 51, 52 of the lint filter device 50 in its mounted configuration in the housing 17.

[0088] The lint filter device 60 of Figure 6 differs from lint filter device 30 shown in Figure 4 for the different displacement and size of the electrical contacts 61, 62. The first electrical contact 61 is arranged along the filtering surfaces 31a-31d of the front lateral surface 31 and the second electrical contact 62 is arranged along the filtering surfaces 32a-32d of the rear lateral surface 32.

[0089] Accordingly, two electrical connectors, not illustrated, will be arranged at the housing 17 of the outlet conduit 16 in correspondence of the two electrical contacts 61, 62 of the lint filter device 60 in its mounted configuration in the housing 17.

[0090] The lint filter device 70 of Figure 7 differs from lint filter device 30 shown in Figure 4 for the numbers and displacement of the electrical contacts 71-78.

[0091] Each of the eight filtering surfaces 31a-31d, 32a-32d of the front and rear lateral surfaces 31, 32 is provided with an electrical contact 71-78.

[0092] Accordingly, electrical connectors, not illustrated, will be arranged at the housing 17 of the outlet conduit 16 in correspondence of the electrical contacts 71-78 of the lint filter device 70 in its mounted configuration in the

housing 17.

[0093] The eight electrical connectors are preferably grouped so as to form two main connectors which are connected to the control device.

[0094] Advantageously the eight electrical contacts 71-78 distributed over all the filtering surfaces 31a-31d, 32a-32d of the front and rear lateral surfaces 31, 32 allow a more precise monitoring, or measurement, of the impedance Z, and of its variations, due to the level of humidity of the exhaust air passing therethrough.

[0095] The lint filter device 80 of Figure 8 differs from lint filter device 30 shown in Figure 4 for the different displacement of the contacts 81, 82.

[0096] Both the first and the second electrical contacts 81, 82 are arranged at the same filtering surface 31a of the front lateral surface 31.

[0097] Accordingly, electrical connectors, not illustrated, will be arranged at the housing 17 of the outlet conduit in correspondence of the electrical contacts 81, 82 of the lint filter device 80 in its mounted configuration in the housing 17.

[0098] In a preferred embodiment the filtering surface 31 a is made of an electrical conductive net.

[0099] The lint filter device 90 of Figure 9 differs from lint filter device 50 shown in Figure 5 for the different construction of the filtering surfaces 31a-31d, 32a-32d of the front and rear lateral surfaces 31, 32. In particular the filtering surfaces 31a-31d of the front lateral surface 31 are made with a common portion of a net which is applied to the frame 40. Analogously the filtering surfaces 32a-32d of the rear lateral surface 32 are made with a common portion of a net which is applied to the frame 40.

[0100] Advantageously, the construction of the lint filter device is simplified.

[0101] The lint filter device 100 of Figure 10 differs from lint filter device 60 shown in Figure 6 for the different construction of the filtering surfaces 31a-31d, 32a-32d of the front and rear lateral surfaces 31, 32. In particular the filtering surfaces 31a-31d of the front lateral surface 31 are made with a common portion of a net which is applied to the frame 40. Analogously the filtering surfaces 32a-32d of the rear lateral surface 32 are made with a common portion of a net which is applied to the frame 40.

[0102] In a further embodiment, not illustrated, all the filtering surfaces 31a-31d, 32a-32d, 33a may be advantageously made with a common portion of a net which is applied to the frame 40.

[0103] Advantageously, the construction of the lint filter device is simplified.

[0104] As said before, the net may be made with any proper material, preferably a metallic material, which is associated to the frame with known technology, for example by an over-moulding process.

[0105] With reference to Figures 11 and 12 a construction variant of the lint filter device of the invention is described. More particularly, a construction variant of a filtering surface 110 for a lint filter device is described with reference to Figures 11 and 12.

[0106] The lint filter surface 110 is composed by three layers 110a, 110b, 110c. Each layer 110a, 110b, 110c preferably comprises a net suitable to catch the lint of the exhaust air passing therethrough.

[0107] The two lateral (i.e. external) layers 110a, 110c are advantageously made with an electrical conductive material while the inner layer 110b is advantageously made with an insulating material.

[0108] Any part of the first electrical conductive lateral layer 110a forms the first electrical contact of the lint filter device according to the invention and any part of the other electrical conductive lateral layer 110c forms the second electrical contact of the lint filter device according to the invention.

[0109] With reference to Figure 13 a further construction variant of the lint filter device of the invention is described. More particularly, a construction variant of a filtering surface 120 for a lint filter device is described with reference to Figure 13.

[0110] The lint filter surface 120 substantially comprises a net. The grid-like structure of the net comprises electrical insulating elements 121 (warp yarns) and electrical conductive elements 122, 123 (weft yarns). The electrical conductive elements 122, 123 are connected and grouped into two groups 122 and 123 which join onto respective electrical contact 122a and 123a. The electrical contacts 122a and 123a form the electrical contacts of the lint filter device according to the invention.

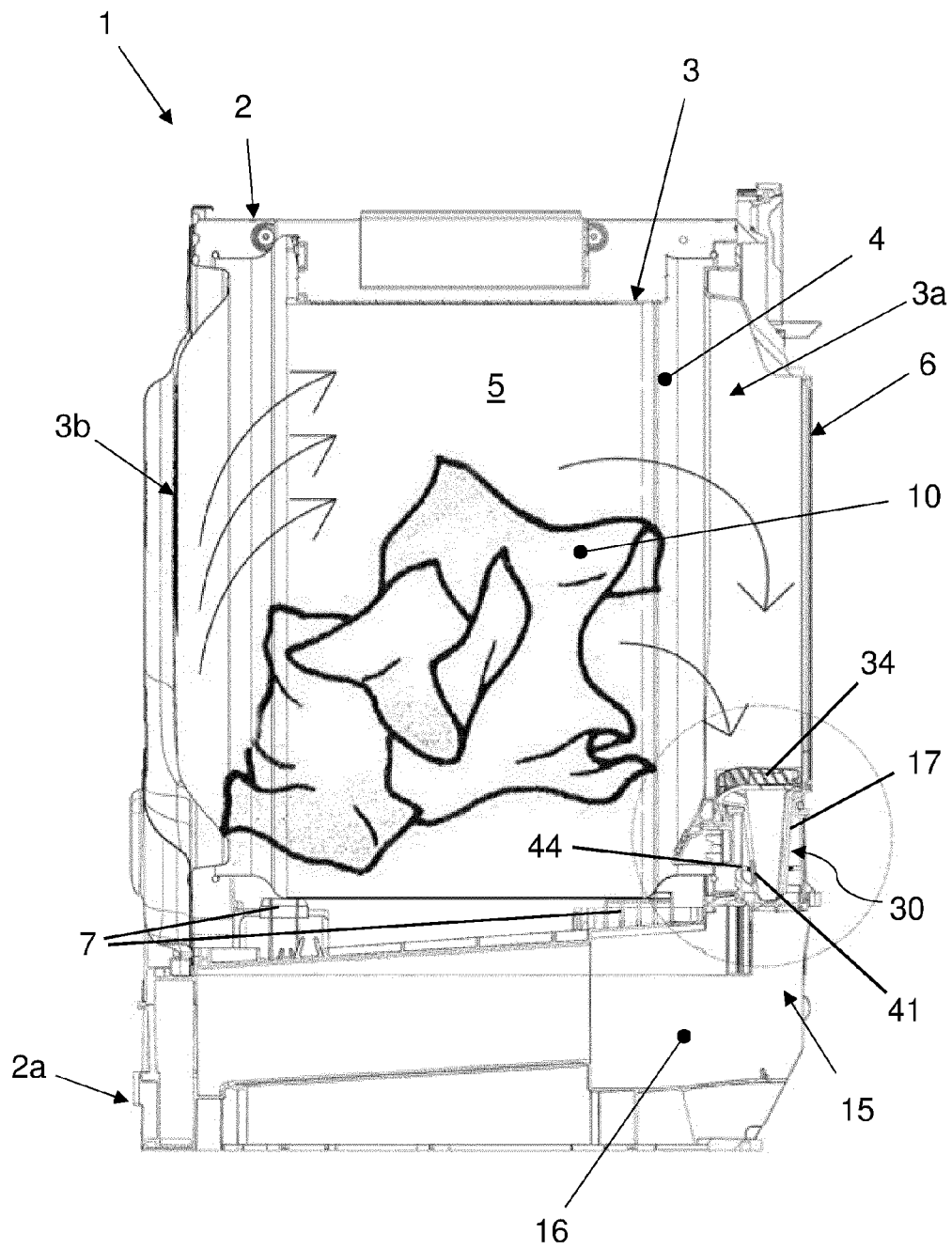
[0111] It has thus been shown that the present invention allows all the set objects to be achieved. In particular, it makes it possible to obtain a moisture sensor for a clothes drying machine which allows a more correct moisture level measurement of clothes loaded in the drying machine than the devices of known type.

[0112] While the present invention has been described with reference to the particular embodiments shown in the figures, it should be noted that the present invention is not limited to the specific embodiments illustrated and described herein; on the contrary, further variants of the embodiments described herein fall within the scope of the present invention, which is defined in the claims.

Claims

1. A clothes drying machine (1), or combined clothes washing and drying machine, comprising:
 - a drum (3) suitable to receive the clothes (10) to be dried;
 - an air circulating system adapted to circulate a flow of drying air into said drum (3);
 - an outlet circuit (15), at a location downstream of said drum (3), for the exhaust air exiting said drum (3);
 - a lint filter device (30; 50; 60; 70; 80; 90; 100) arranged in said outlet circuit (15);
 - a control device for controlling said clothes dry-

- ing machine (1) during a drying cycle;
 - a moisture sensor connected to said control device for the measurement of the moisture level of said clothes (10) during said drying cycle;
characterized in that
 said moisture sensor comprises at least two electrical contacts (40, 41; 51, 52; 61, 62; 71-78; 81, 82; 110a, 110c; 122a, 123a) associated to said lint filter device (30; 50; 60; 70; 80; 90; 100) and connected or connectable to said control device, said control device being configured for calculating a control parameter (P) indicative of the impedance (Z) between said electrical contacts (40, 41; 51, 52; 61, 62; 71-78; 81, 82; 110a, 110c; 122a, 123a) and for controlling said drying cycle according to the value of said control parameter.
2. A machine (1) according to claim 1, **characterized in that** said lint filter device (30; 50; 60; 70; 80; 90; 100) comprises a frame (40) and one or more filtering surfaces (31a-31d, 32a-32d, 33a; 110; 120) suitable to catch the lint of said exhaust air passing there-through.
 3. A machine (1) according to claim 2, **characterized in that** said electrical contacts (40, 41; 51, 52; 61, 62; 71-78; 110a, 110c; 122a, 123a) are connected to two separated filtering surfaces (31a-31d, 32a-32d, 33a; 110; 120) of said one or more filtering surfaces (31a-31d, 32a-32d, 33a; 110; 120).
 4. A machine (1) according to claim 2, **characterized in that** said electrical contacts (81, 82) are connected to a same filtering surface (31a) of said one or more filtering surfaces (31a-31d, 32a-32d, 33a; 110; 120).
 5. A machine (1) according to anyone of the preceding claims, **characterized in that** said electrical contacts (40, 41; 51, 52; 61, 62; 81, 82; 110a, 110c; 122a, 123a) are two.
 6. A machine (1) according to anyone of the preceding claims from 1 to 4, **characterized in that** said electrical contacts (71-78) are more than two.
 7. A machine (1) according to anyone of the preceding claims from 2 to 6, **characterized in that** said one or more filtering surfaces (31a-31d, 32a-32d, 33a; 110; 120) comprise a net.
 8. A machine (1) according to claim 7, **characterized in that** said net is made of electrical conductive material.
 9. A machine (1) according to claim 7, **characterized in that** said net comprises three or more layers (110a, 110b, 110c) wherein two (110a, 110c) of said layers (110a, 110b, 110c) comprise an electrical conductive material suitable to form said electrical contacts (40, 41; 51, 52; 61, 62; 71-78; 81, 82; 110a, 110c; 122a, 123a) and wherein another one (110b) of said layers (110a, 110b, 110c) comprises an electrical insulating material which is interposed between said two layers (110a, 110c) comprising an electrical conductive material.
 10. A machine (1) according to claim 7, **characterized in that** said net comprises elements (121, 122, 123) disposed in a grid-like structure wherein one or more of said elements (122) are made of electrical conductive material and are grouped to form a first electrical contact (122a) and one or more of said elements (123) are made of electrical conductive material and are grouped to form a second electrical contact (123a).
 11. A machine (1) according to anyone of the preceding claims, **characterized in that** said lint filter device (30; 50; 60; 70; 80; 90; 100) is removable with respect to said outlet circuit (15).
 12. A machine (1) according to claim 11, **characterized in that** said outlet circuit (15) comprises a housing (17) suitable to receive said lint filter device (30; 50; 60; 70; 80; 90; 100) and said housing (17) comprises electrical connectors (44) connected to said control device suitable to contact said electrical contacts (40, 41; 51, 52; 61, 62; 71-78; 81, 82; 110a, 110c; 122a, 123a) when said lint filter device (30; 50; 60; 70; 80; 90; 100) is received in said housing (17).
 13. A machine (1) according to anyone of the preceding claims, **characterized in that** said control device comprises an oscillator adapted to calculate said impedance (Z) between said electrical contacts (40, 41; 51, 52; 61, 62; 71-78; 81, 82; 110a, 110c; 122a, 123a).
 14. A machine (1) according to anyone of the preceding claims, **characterized in that** it further comprises a washing tub surrounding said drum for washing said clothes (10) before they are subjected to the drying process



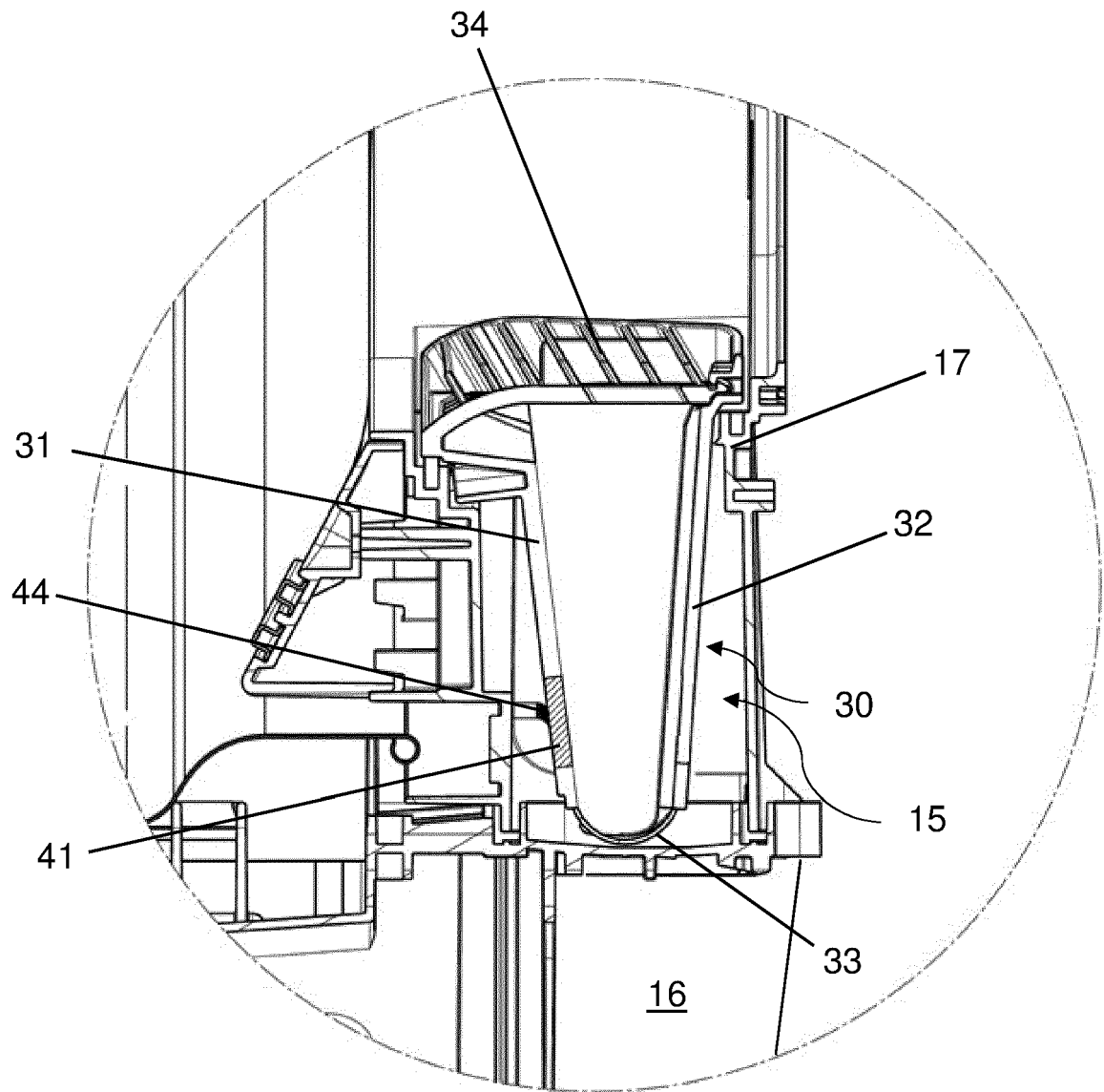


FIG. 2

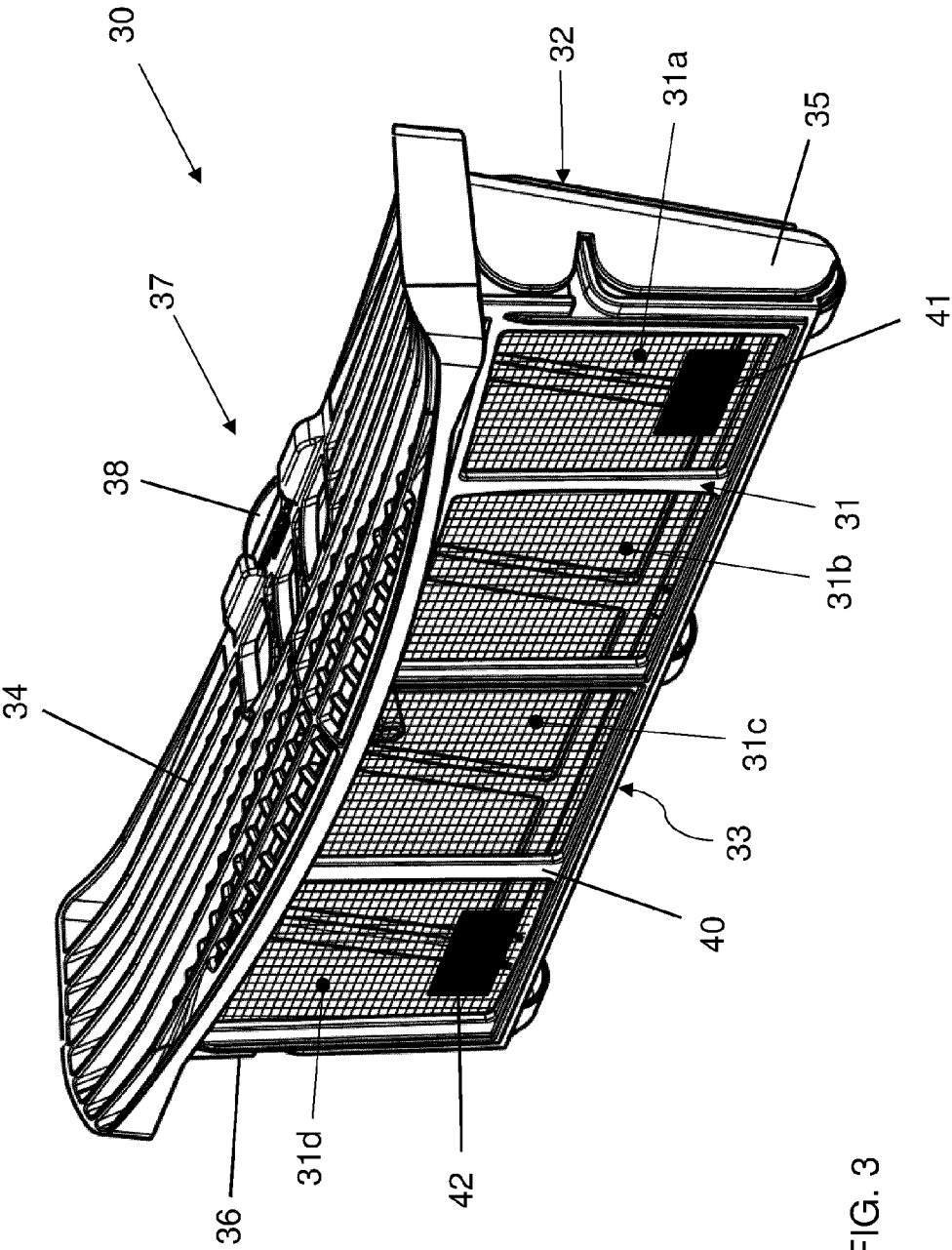


FIG. 3

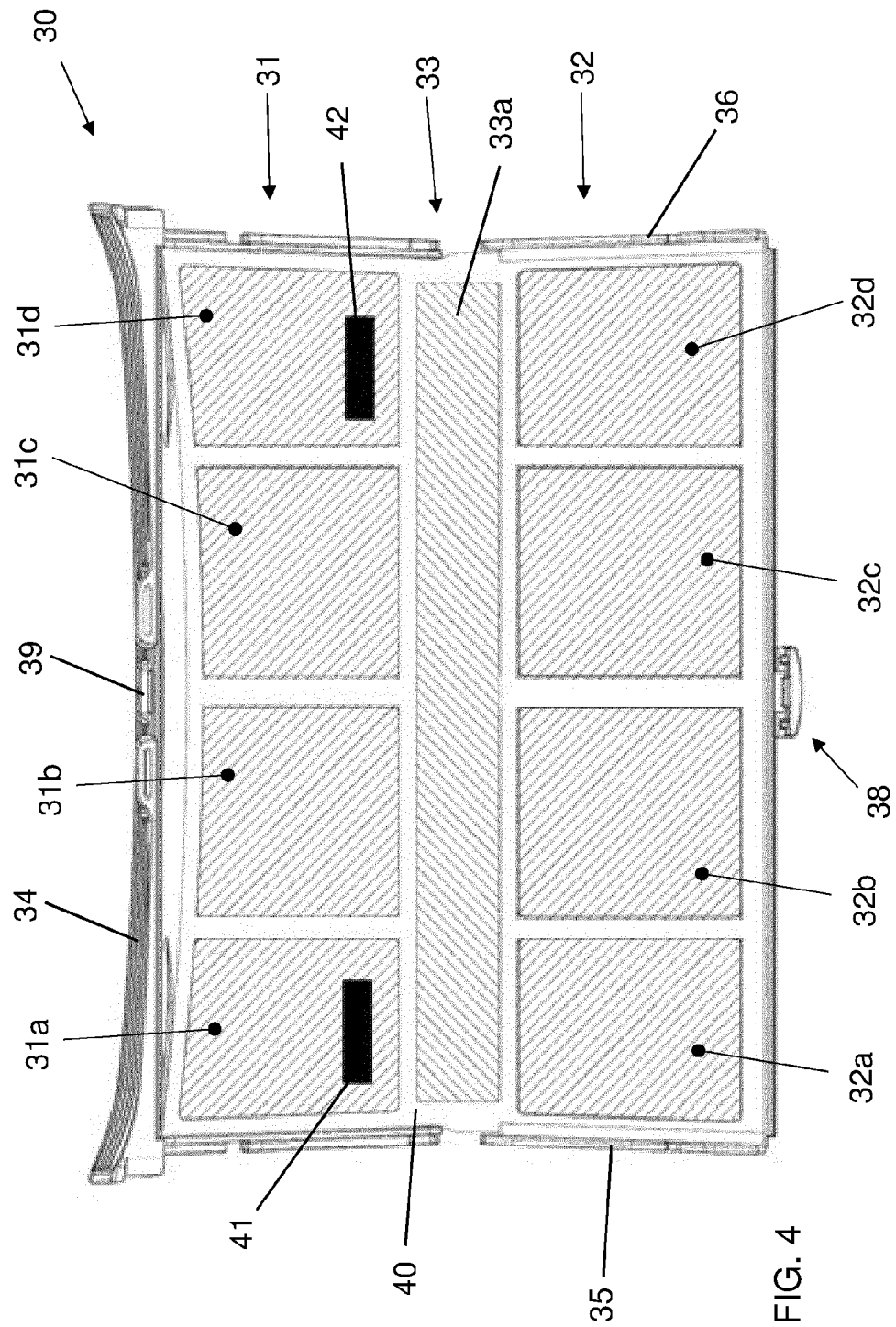
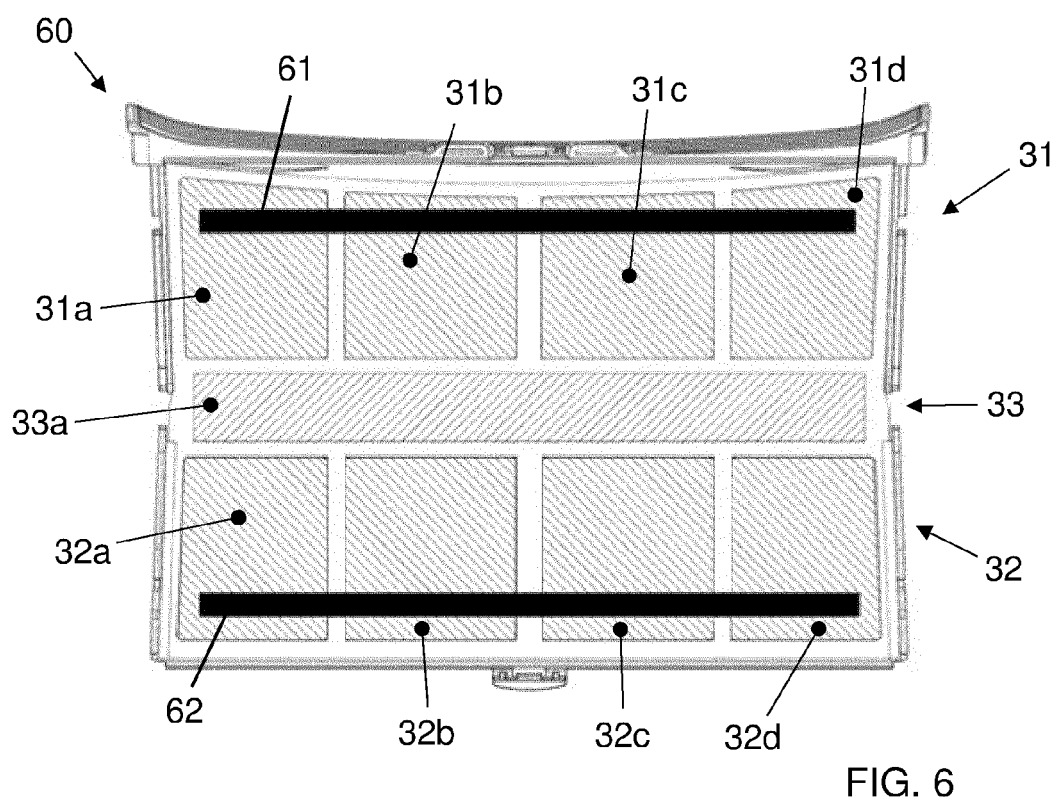
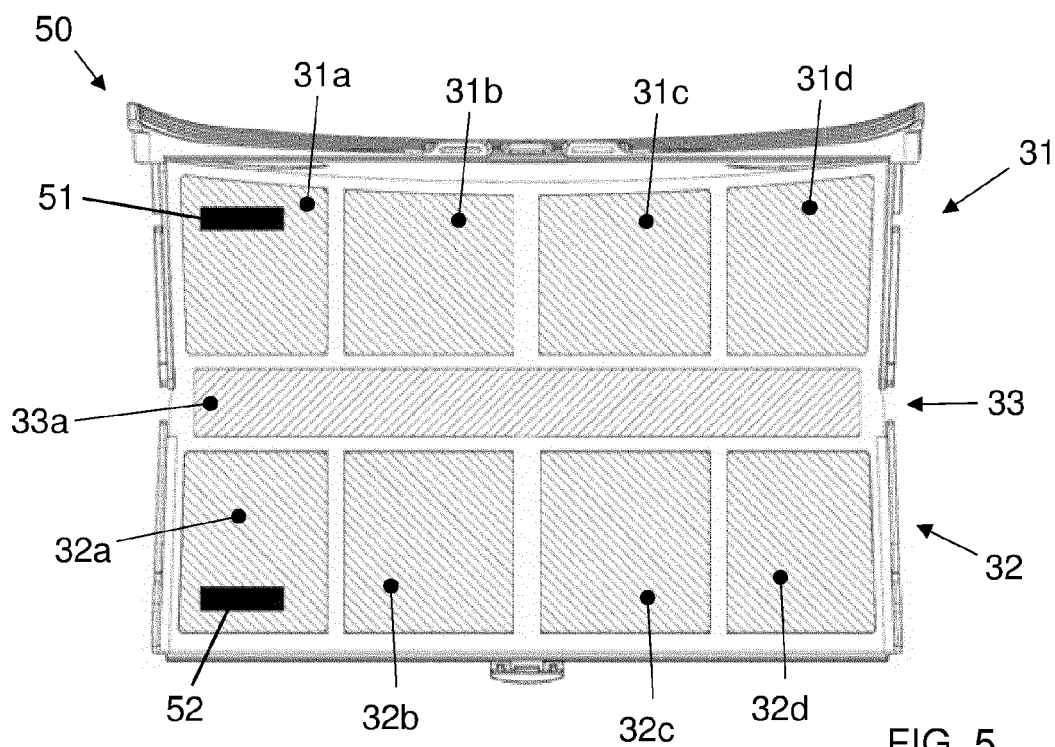
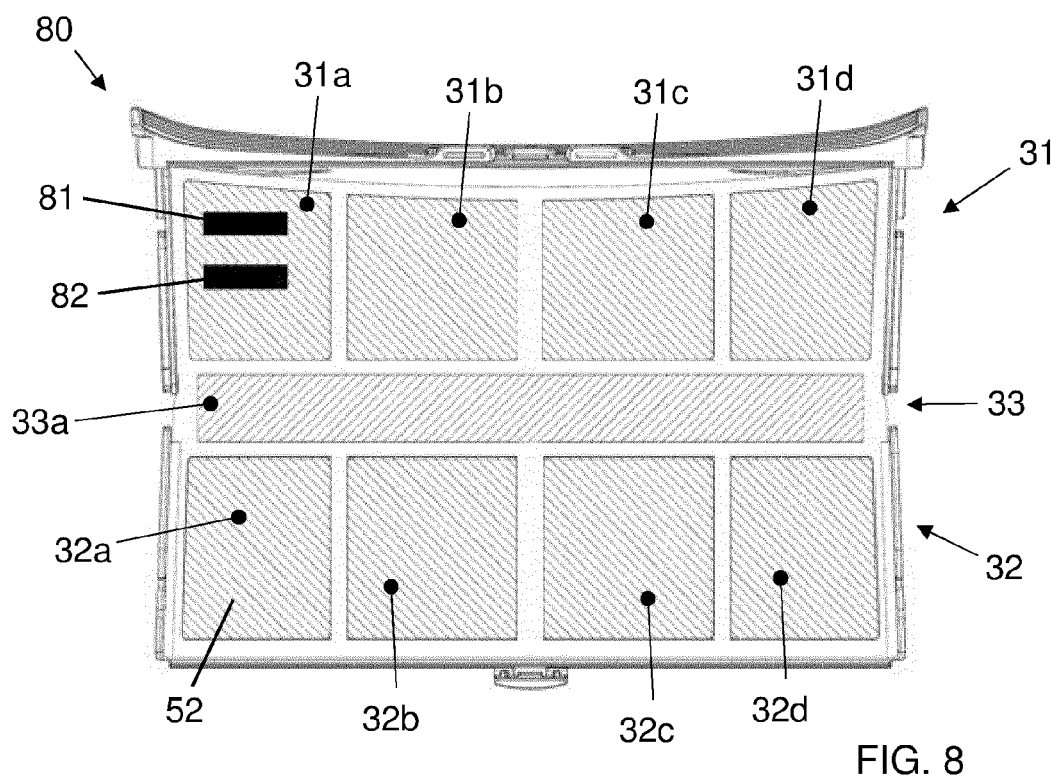
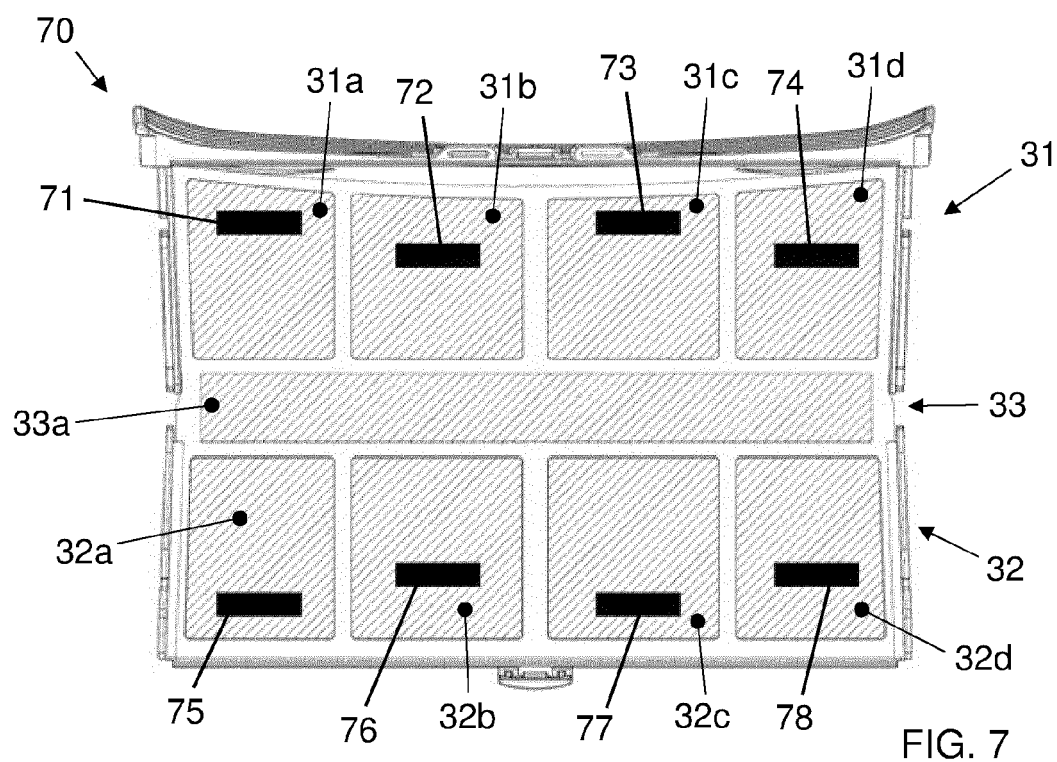


FIG. 4





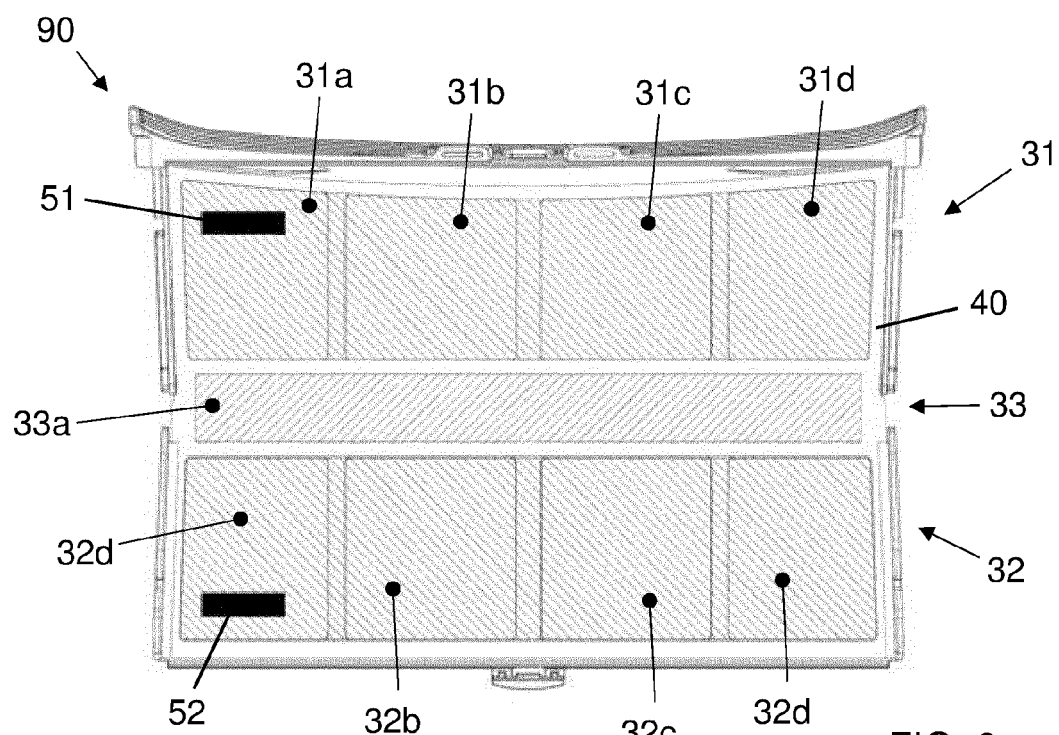


FIG. 9

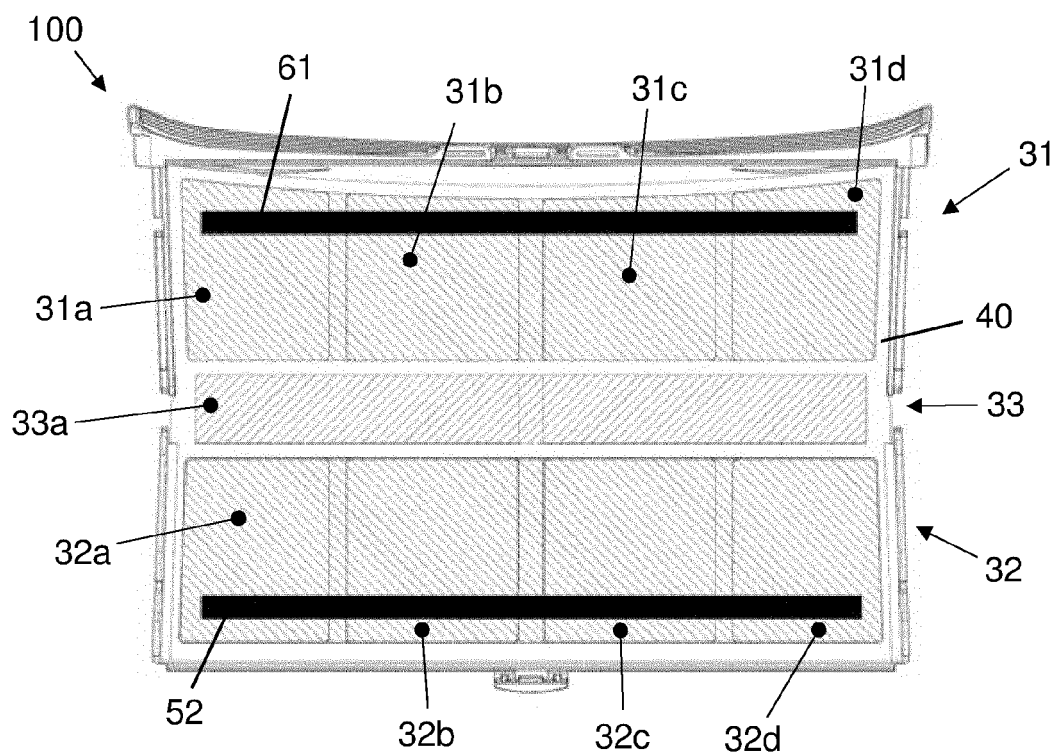


FIG. 10

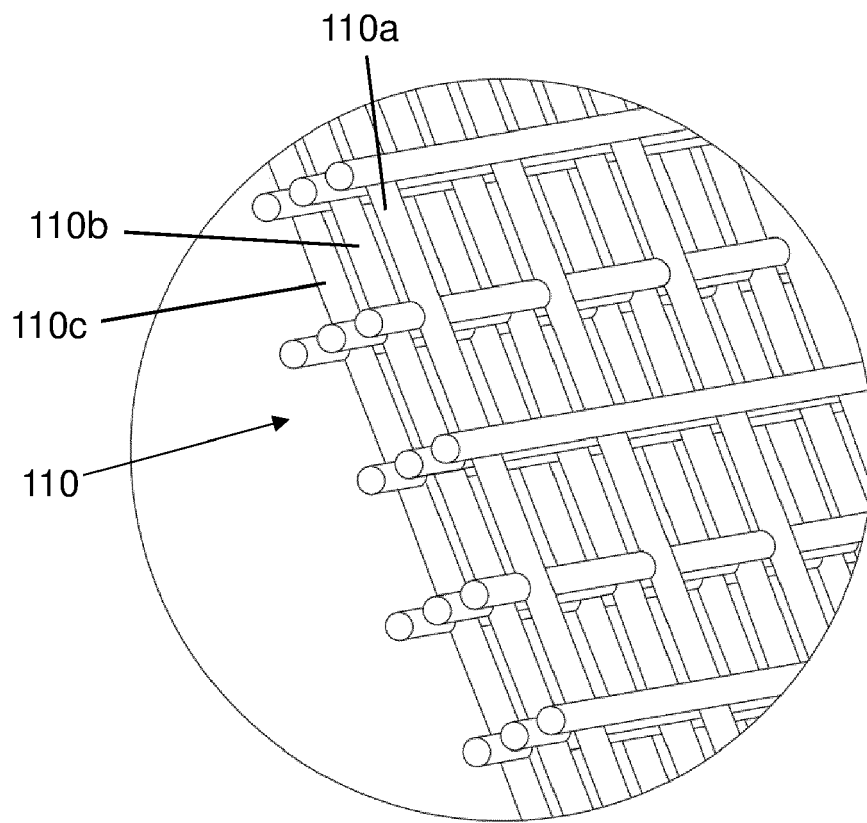


FIG. 11

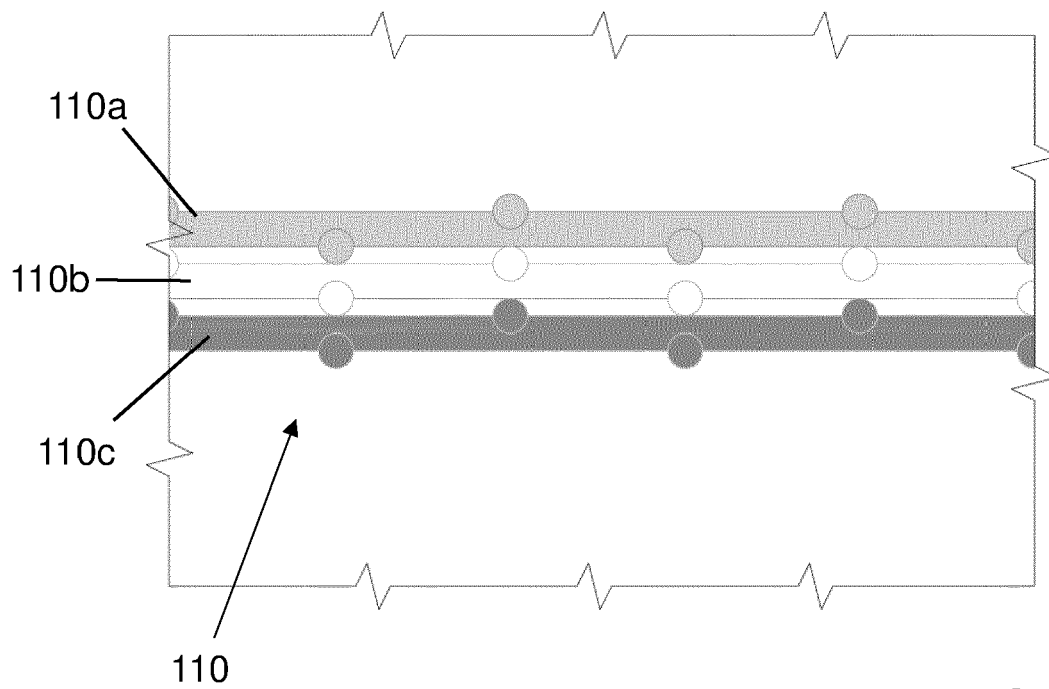


FIG. 12

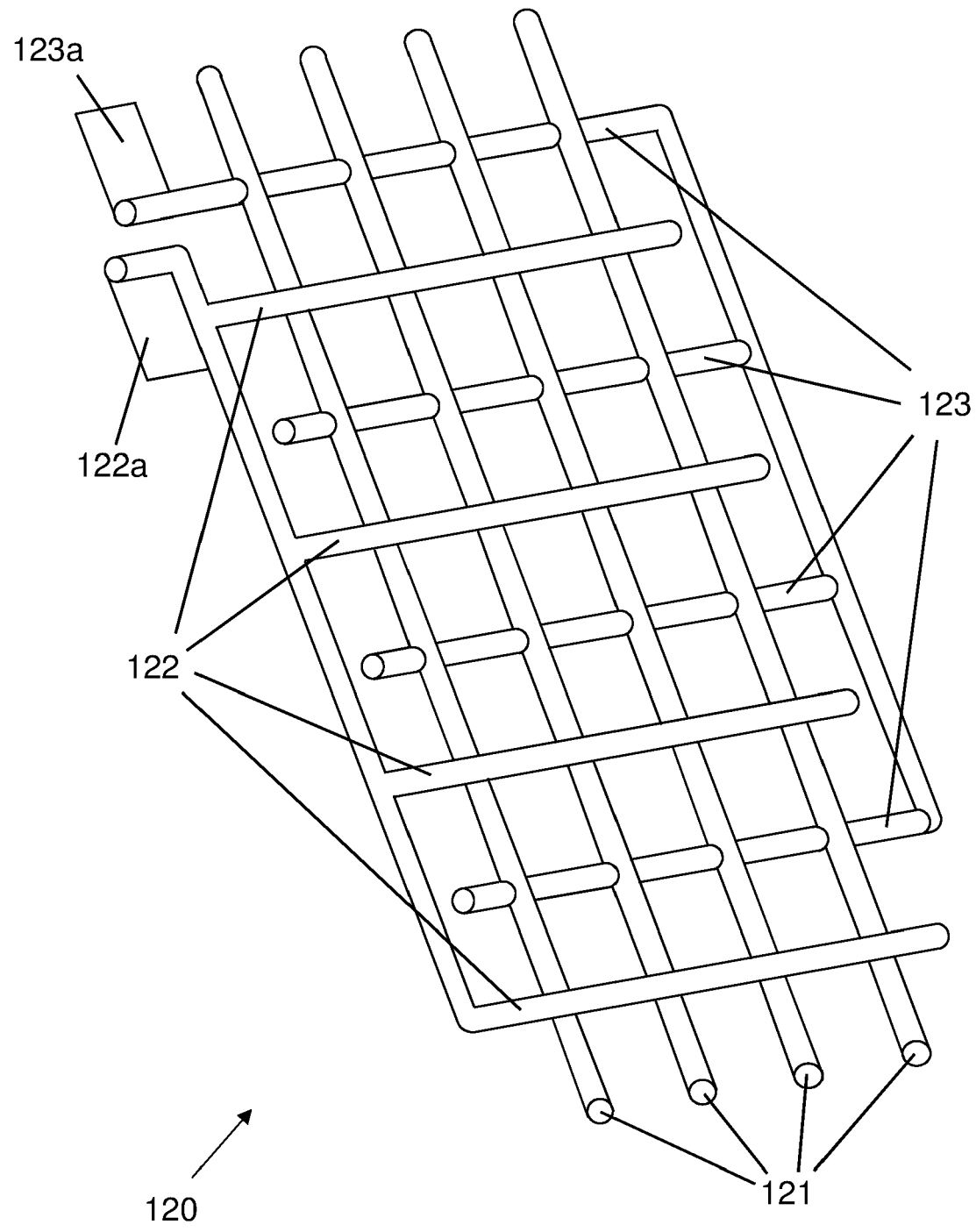


FIG. 13



EUROPEAN SEARCH REPORT

Application Number
EP 11 18 6051

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			D06F
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Place of search The Hague		Date of completion of the search 5 January 2012	Examiner Jezierski, Krzysztof
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure 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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