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(54) **INSULATION ELEMENT, ASSEMBLY AND TUMBLE DRYER**

(57) Insulation element (10) for a household appliance, in particular a tumble dryer, comprising: a first portion (11) and a second portion (12), which are designed to provide insulation, at least one slit portion (13),

which is arranged between the first portion (11) and the second portion (12) wherein the first portion (11) and the second portion (12) are designed to be separated from each other.

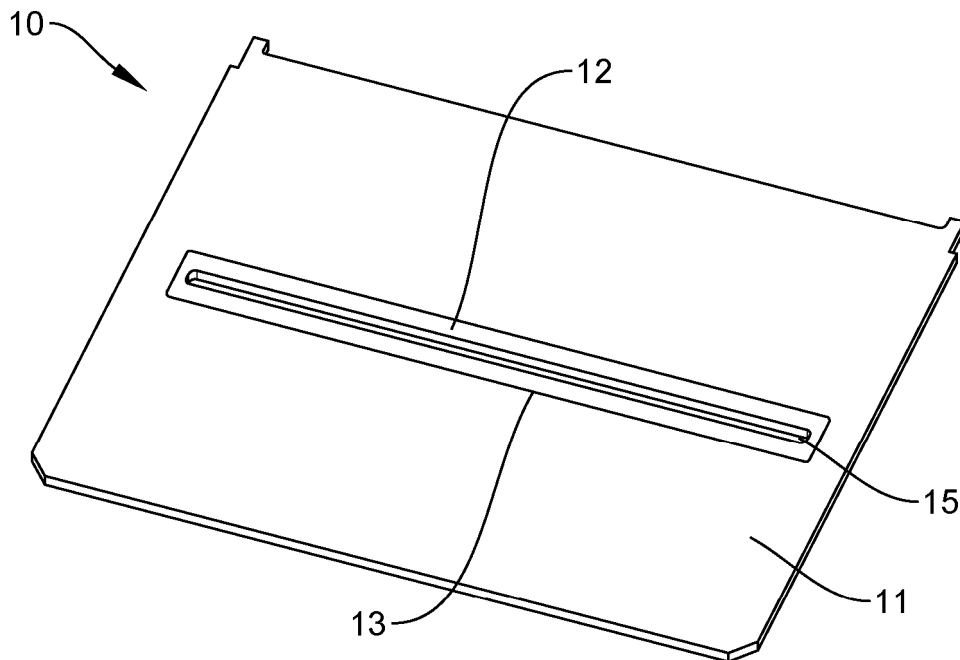


FIG. 1

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Description

[0001] The present invention relates to an insulation element for a household appliance, in particular a tumble dryer. The present invention further relates to an assembly with such an insulation element and a tumble dryer.

[0002] It is well known that thermal insulation elements are used in household appliances that radiate heat energy. Such insulation elements are usually in contact with a surface that is adjacent to a heat source, i.e. the surface from which the heat energy emanates. Such surfaces may comprise complex geometries, to which the insulation element must be amended, or several insulation elements may be necessary. For example, Tumble dryers, use a heated process air stream to heat textiles inside a tumble drum and to absorb moisture from the textiles. The tumble dryer comprises heat exchangers, to remove moisture from the air. It is known to insulate the heat exchanger from the rest of the process components.

[0003] In view of this, it is found that a further need exists to provide an improved insulation element, in particular for a tumble dryer.

[0004] Therefore, it is an object of the present invention to provide an insulation element, in particular for a tumble dryer. Furthermore, it is an object of the present invention to provide an assembly and a tumble dryer.

[0005] These and other objects, which become apparent upon reading the following description, are solved by the subject matter of the independent claims. The dependent claims refer to preferred embodiments of the invention.

[0006] An aspect of the present invention is directed to an Insulation element for a household appliance, in particular a tumble dryer, comprising: a first portion and a second portion, which are designed to provide insulation, at least one slit portion, which is arranged between the first portion and the second portion wherein the first portion and the second portion are designed to be separated from each other.

[0007] The insulation element may provide acoustic insulation and/or vibration insulation. Such an insulation element may be used to secure heat exchangers in place. By doing so, the lifespan of tubes connected to the heat exchangers and the heat exchangers themselves may improve. The insulation element also provides thermal insulation from the heat exchangers. The insulation element may secure a tight connection between an internal diffuser and a lid to provide proper water flow. Additionally, the insulation element may secure process air bypasses between heat exchangers and a lid. That is, the insulation element may also have sealing properties.

[0008] In contrast to the state of the art, the insulation element according to the present invention allows for a faster installation of the insulation element. The insulation element may be installed only by the use of hands. This means that no tools may be necessary. The insulation element may be provided as a single component. For example, the first portion and the second portion may be

provided in one piece, or they are held together by friction or another connection mechanism. During installation, the insulation element may be installed such that the first portion and the second portion are separated and adapted to corresponding geometries. In this way, the number of steps necessary to assemble the insulating element may be reduced. Therefore, this solution allows to reduce costs of worker labor during gluing process of mats and all costs of additional part handling. This is particularly advantageous when a more complex geometry or surface is present, i.e. a mold with a cavity. It may even be possible that the insulation element comprises more than a first portion and a second portion.

[0009] The insulation element may preferably be made of a material that has particularly good properties with regard to the insulation of thermal energy, for example a polyolefin. The insulation element has a first portion and a second portion. The first portion and the second portion are separated from each other by the slit portion. The slit portion is the portion in which the first portion and the second portion are not connected to each other. It is possible that the first portion and the second portion are at least partially in contact with each other, but not connected to each other in the slit portion.

[0010] Preferably, the first portion corresponds to a first geometry and the second portion to a second geometry. In this way, it is possible to combine two separate insulation elements in one insulation element.

[0011] The insulation element extends preferably in an X-direction, a Y-direction, and a Z-direction. The insulation element may span a plane in the X-direction and in the Y direction. The extent of the insulation element in the Z-direction may also be referred to as the depth, i.e. thickness. This means that the extension of the insulation element in the X-direction and the Y-direction is a multiple greater than the extension of the insulation element in the Z-direction. In other words, the isolation element is essentially flat.

[0012] The term "essentially" is generally understood to mean that a deviation of up to 5%, in particular up to 10%, in particular up to 25%, is possible.

[0013] Preferably, the slit portion at least mostly bounds the second portion. In other words, the slit portion may almost completely enclose the second portion. This means that the slit portion may have far greater dimensions, in particular a far greater length, than the connection portion. The length may preferably be understood as the extent of the slit portion in the X-direction and in the Y-direction.

[0014] Preferably, the first portion and the second portion are arranged in a single plane. More precisely, a surface area of the first portion and a surface area of the second portion may be in a single plane. The single plane may be a plane in X-direction and Y-direction. This may make it easier to manufacture the insulation element, in particular from a single workpiece.

[0015] Preferably, the first portion may be larger, in particular may have a larger surface area, than the sec-

ond portion. By doing so, it is possible that the second portion may be enclosed by the first portion. In other words, the second portion may be bordered by the first portion in X-direction and in Y-direction. This way, the insulation element may be amended to different structures and/or surface areas.

[0016] In an embodiment, the insulation element comprises at least one connection portion, which connects the first portion and the second portion, wherein the connection portion is designed to allow the first portion and the second portion to be separated from each other. The first portion and the second portion are connected to each other via the connection portion. Preferably, the first portion and the second portion are connected to one another via the connection portion in such a way that it is possible to separate the second portion from the first portion manually, in particular to separate them by hand and/or by using a tool. To do this, it may be advantageous for the connection portion to be as small as possible. In particular, the connection portion may only extend a few mm or even a fraction of a mm. The connection portion may be described as a part of the insulation element that is not cut or slit. In other words, the connection portion may be designed as a bridge between the first portion and the second portion.

[0017] In an embodiment, the first portion and the second portion are connected to each other by a holding force, in particular a clamping force, a gripping force and/or a frictional force. For example, the insulation element may comprise no connection portion. That is, the first portion and the second portion may exclusively be connected to each other by a holding force. The holding force may act from the first portion on to the second portion. For this, the first portion and second portion may be at least partially in contact with each other. For example, the material may extend just enough in an area of the slit portion in X-direction and/or Y-direction such that the first portion and/or the second portion exert a force.

[0018] In an embodiment, the insulation element comprises two connection portions, which are preferably arranged on opposite sides of the second portion. This can, for example, prevent the second portion from accidentally coming loose from the first portion. Furthermore, the opposite connection portions may allow for a fast and easy way to separate the first portion from the second portion. It is possible that the insulation element comprises several connection portions. This means that the insulation element may comprise several slit portions. For example, several slit portions and several connection portions may be arranged in such a way that a perforation is formed. This may also be a way to provide an easy way to separate the two portions.

[0019] In an embodiment, the first portion and the second portion are formed from a single piece. This means that the first portion and the second portion may be produced in a single forming process. For example, the first portion and the second portion may be

produced by cutting or punching. Consequently, the first portion and the second portion are integrally connected to one another. Preferably, the first portion and the second portion of the insulation element are produced from a single workpiece.

[0020] In an embodiment, a width of the slit portion is between 0,1 mm and 2 mm. In particular, the width of the slit portion may range from 0.1 mm to 0.5 mm. The width of the slit portion refers to the distance between the first portion and the second portion. The size of the first portion and/or the second portion may be defined by the width of the slit portion. For example, the size of the second portion may be reduced by an especially large slit portion.

[0021] In an embodiment, the slit portion extends in one direction all the way through the insulation element. This means that the second portion preferably extends completely in the Z-direction through the insulation element. In other words, the slit-portion may penetrate the insulation element completely in the Z-direction. The Z-direction may also be described as depth or thickness of the insulation element. This may make it easier to separate the two portions from each other, in particular by hand or with the help of a tool.

[0022] In an embodiment, the second portion comprises at least one passage opening, which is designed to allow a water flow. The passage opening of the second portion preferably comprises a slot. The slot may extend in a longitudinal direction. The longitudinal direction may also correspond to the X-direction of the insulation element. The second portion may comprise multiple passage openings, in particular slots. Furthermore, the passage opening may have different shapes. The passage opening may have a circular and/or a polygonal shape. The passage opening may correspond to an outlet, in particular to a diffuser, which is designed to eject water.

[0023] In an embodiment, the first portion and/or the second portion have/has a rectangular shape. More precisely, the first portion and the second portion may have essentially a rectangular shape. That is, the first portion and the second portion may have a rectangular base form, which may comprise additional geometries, for example protrusions. This shape may be useful to position the insulation element in a corresponding lid element. The lid element may be designed as a water distribution module, comprising at least to water channels.

[0024] In an embodiment, the length of the connection portion amounts to between 0,1% and 50% of the length of the slit portion, in particular 0,1% to 25%, in particular 0,1% to 15%, in particular 0,1% to 5%. In particular, a length of the slit portion is understood to mean an extension in the X-direction and/or in the Y-direction. Preferably, the connection portion may be as small as possible in relation to the slit portion. This makes it possible to separate the first portion and the second portion manually, in particular by hand. Alternatively, a tool such as a knife or similar may be used.

[0025] In an embodiment the insulation element comprises a foam material in particular a polyolefin foam. Polyolefin foam has a high resistance to compression set, meaning it maintains its shape and sealing properties even after being compressed for long periods. This makes it effective for applications that require long-term sealing performance. Polyolefin foams are resistant to a wide range of chemicals, oils, and fuels. This makes them suitable for use in harsh environments where other materials might degrade. Polyolefin foam is lightweight, which is beneficial in applications where weight is a concern. Polyolefin foam has low water absorption, making it ideal for sealing applications where moisture resistance is important, such as in certain household appliances. It has also good thermal insulation properties, helping to reduce heat transfer, which can be useful for sealing in environments with temperature fluctuations. Polyolefin foam has excellent elasticity, which allows it to compress and return to its original shape, ensuring that it continues to provide an effective seal over time. Polyolefin foam can be easily processed and shaped, allowing for custom cuts and designs for specific sealing needs. Polyolefin is considered a safer, non-toxic material compared to other foams. It's also recyclable, making it an environmentally friendly option. Polyolefin foam offers good performance at a relatively low cost compared to other sealing materials, making it an economical choice for many applications.

[0026] In an embodiment, the insulation element comprises a liner and/or coating to allow a material-locking connection. In particular, the insulation element may have an adhesive surface covered with a film or a paper. The adhesive surface may be exposed by peeling off the film, and the insulation element may be adhered to a desired surface. The first portion and the second portion may be separated from each other before or after adhesion, for example. The slit portion may not extend through the film or the paper. As a result, the film or paper may be removed in one step from the first portion and from the second portion. This reduces the time to install the insulation element.

[0027] In an embodiment, the insulation element is mat-shaped. The term "mat-shaped" refers to a shape or structure that resembles a mat or other flat, often soft and flexible shape. Something that is "matte-shaped" might have a flat, carpet-like shape or a similar pattern that covers the entire surface or is evenly distributed. The term may be used to describe an object that come in such a uniform shape or that resembles a mat.

[0028] An aspect of the present invention is directed to an assembly comprising an insulation element according to one of the preceding embodiments and a lid element, wherein the insulation element is connected to the lid element, preferably by a material-locking connection, in particular by adhesive bonding. The lid element may be designed as a water distribution module comprising at least two water channels.

[0029] In an embodiment, the assembly is arranged on

at least one heat exchanger. Furthermore, the assembly may be arranged on a heat exchanger system, for example a heat pump. That way, the insulation element may be used to thermally insulate a device from the heat exchanger system or heat pump.

[0030] An aspect of the present invention is directed to a dryer device, in particular a tumble dryer, comprising the insulation element according to one of the preceding embodiments of the assembly or the insulation element.

[0031] In the following, the present disclosure is described exemplarily with reference to the enclosed figures, in which

Figure 1 is a schematic view of an insulating element according an embodiment of the present invention;

Figure 2 is a detailed view of the insulating element according to **Figure 1**; and

Figure 3 is a schematic view of an embodiment of an assembly according to the present invention.

[0032] **Figure 1** shows an insulation element 10. The insulation element extends in an X-direction, a Y-direction and a Z-direction. The X-direction may be referred to as the longitudinal direction. The Y-direction may be referred to as the transverse direction. The Z-direction may be referred to as the thickness or depth of the insulation element 10. The insulation element 10 has essentially a mat-shape. This means that the insulation element 10 extends many times more in the X-direction and in the Y-direction than in the Z-direction. The insulation element may comprise a foam material in particular a polyolefin foam.

[0033] The insulation element 10 has a first portion 11 and a second portion 12. The first portion 11 is larger than the second portion 12. The first portion 11 has a substantially rectangular geometry. The second portion 12 also has a substantially rectangular geometry. In particular, the second portion 12 has a substantially rectangular outer geometry. The second portion 12 is smaller than the first portion 11. The second portion has an elongated, i.e., narrow geometry. In particular, the extent of the second portion 12 in the X-direction is greater than the extent in the Y-direction.

[0034] A passage opening 15 is arranged in the second portion. The passage opening 15 is configured as a slot extending between X-directions. The passage opening 15 extends completely through the second portion 12 of the insulation element 10.

[0035] The first portion 11 encloses the second portion 12. The second portion 12 is enclosed by the first portion 11 in the X-direction and in the Y-direction. A slit portion 13 is arranged between the first portion 11 and the second portion 12. The slit portion 13 is shown in detail in **Figure 2**. The slit portion 13 extends completely in the Z-direction

through the insulation element 10.

[0036] The first portion 11 and the second portion 12 are connected to each other by two connection portions 14. The two connection portions 14 are arranged on the short sides of the second portion 12 extending in the Y-direction and connect the second portion 12 to the first portion 11. In other words, the slit portion 13 is interrupted by the two connection portions 14. The extent of the connection portions 14 in the Y-direction is preferably between 0.5 mm and 10 mm, in particular between 1 mm and 8 mm, in particular between 2 mm and 6 mm, in particular between 3 mm and 4 mm. Alternatively or additionally, additional connection portions 14 may be provided, which are arranged on sides of the second portion 12 that extend in the X-direction.

[0037] The insulating element 10 has two beveled corners. It is possible that the corners were beveled during assembly. For example, the corners may be pre-cut such that a beveled corner may be provided during assembly.

[0038] The insulation element 10 may further comprise protrusions, wherein each protrusion is arranged on opposite corners. The protrusion may extend in the same direction, preferably a Y-direction. Each protrusion may be arranged opposite to a beveled corner.

[0039] An adhesive element, for example an adhesive surface, may be arranged on a backside of the insulation element 10 (not shown). The adhesive element may be covered with a film that is peeled off before use in order to activate the adhesive element, i.e. to prepare it for use. The adhesive element may be arranged on the first portion 11 and on the second portion 12. The adhesive element may be designed to correspond to the first portion and to the second portion. This means that the adhesive element may comprise or correspond to at least one connection portion 14 and/or at least one slit portion 13.

[0040] Figure 3 shows an assembly comprising a lid 16 or cover and an insulation element 10. The insulation element 10 is glued to a surface of the lid 16. Alternatively or additionally, other uses are possible. In the present case, the lid 16 is particularly intended to be arranged on a heat pump arrangement of a dryer, in particular a tumble dryer. The passage opening 15 in the second portion 12 is intended to enable a heat exchanger to be cleaned, i.e., to allow a water flow to clean a heat exchanger. The lid 16 may therefore be part of a water-bearing system, i.e. it may surround and/or delimit a water pipe or channel.

[0041] The present disclosure has been described in conjunction with a preferred embodiment as examples as well. However, other variations can be understood and effected by those persons skilled in the art and practicing the claimed invention, from the studies of the drawings, this disclosure and the claims. In the claims as well as in the description the word "comprising" does not exclude other elements or steps and the indefinite article "a" or "an" does not exclude a plurality. A single element or

other unit may fulfill the functions of several entities or items recited in the claims. The mere fact that certain measures are recited in the mutual different dependent claims does not indicate that a combination of these measures cannot be used in an advantageous implementation.

Reference signs

[0042]

10	insulation element
11	first portion
12	second portion
13	slit portion
14	connection portion
15	passage opening
16	lid

Claims

1. Insulation element (10) for a household appliance, in particular a tumble dryer, comprising:
 - a first portion (11) and a second portion (12), which are designed to provide insulation,
 - at least one slit portion (13), which is arranged between the first portion (11) and the second portion (12)
 - wherein the first portion (11) and the second portion (12) are designed to be separated from each other.
2. Insulation element (10) according to claim 1, wherein the insulation element comprises at least one connection portion (14), which connects the first portion (11) and the second portion (12), wherein the connection portion (14) is designed to allow the first portion (11) and the second portion (12) to be separated from each other.
3. Insulation element (10) according to claim 2, wherein the insulation element (10) comprises two connection portions (14), which are preferably arranged on opposite sides of the second portion (12).
4. Insulation element (10) according to one of the preceding claims, wherein the first portion (11) and the second portion (12) are connected to each other by a holding force, in particular a clamping force, a gripping force and/or a frictional force.
5. Insulation element (10) according to one of the preceding claims, wherein the first portion (11) and the second portion (12) are formed from a single piece.
6. Insulation element (10) according to one of the preceding claims, wherein a width of the slit portion (13)

is between 0,1 mm and 2 mm.

7. Insulation element (10) according to one of the preceding claims, wherein the slit portion (13) extends in one direction all the way through the insulation element (10). 5
8. Insulation element (10) according to one of the preceding claims, wherein the second portion comprises at least one passage opening (15), which is designed to allow a water flow. 10
9. Insulation element (10) according to one of the preceding claims, wherein the length of the connection portion (14) amounts to between 0,1 and 50% of the length of the slit portion, in particular 0,1 to 25%, in particular 0,1 to 15%, in particular 0,1 to 5%. 15
10. Insulation element (10) according to one of the preceding claims, wherein the Insulation element (10) comprises a liner and/or coating to allow a material-locking connection. 20
11. Assembly comprising an Insulation element (10) according to one of the preceding claims and a lid element, wherein the Insulation element (10) is connected to the lid element, preferably by a material-locking connection, in particular by adhesive bonding. 25
12. Dryer device, in particular a tumble dryer, comprising the Insulation element (10) according to one of the claims 1 to 10 or the assembly according to claim 11. 30

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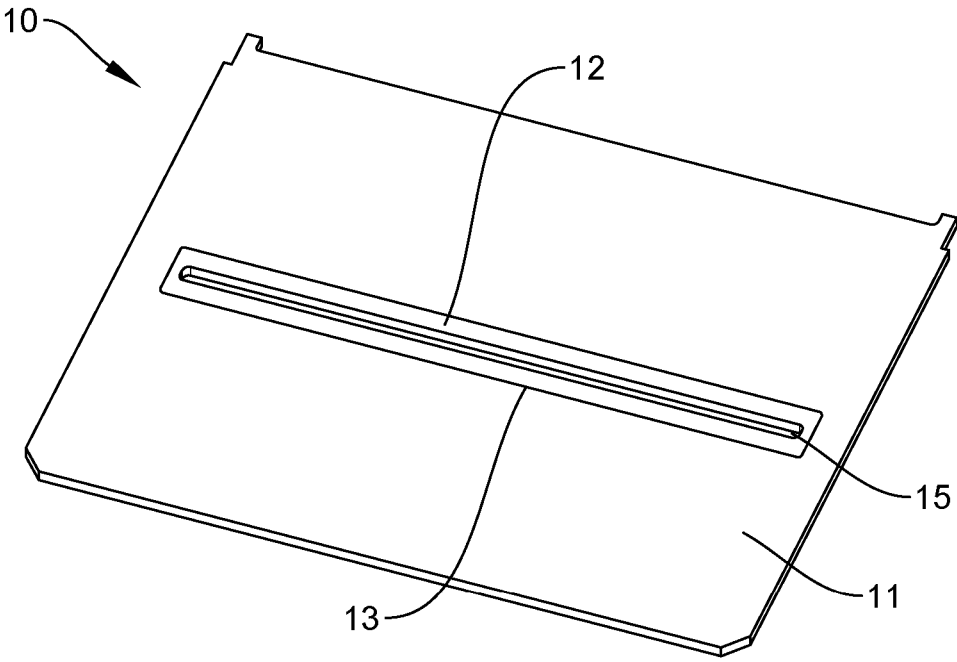


FIG. 1

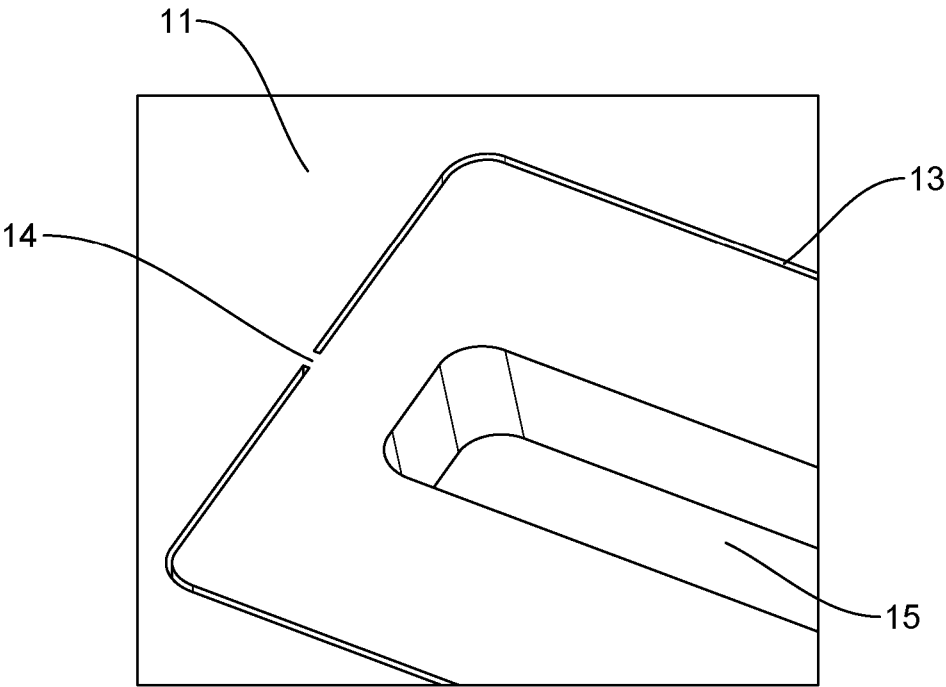


FIG. 2

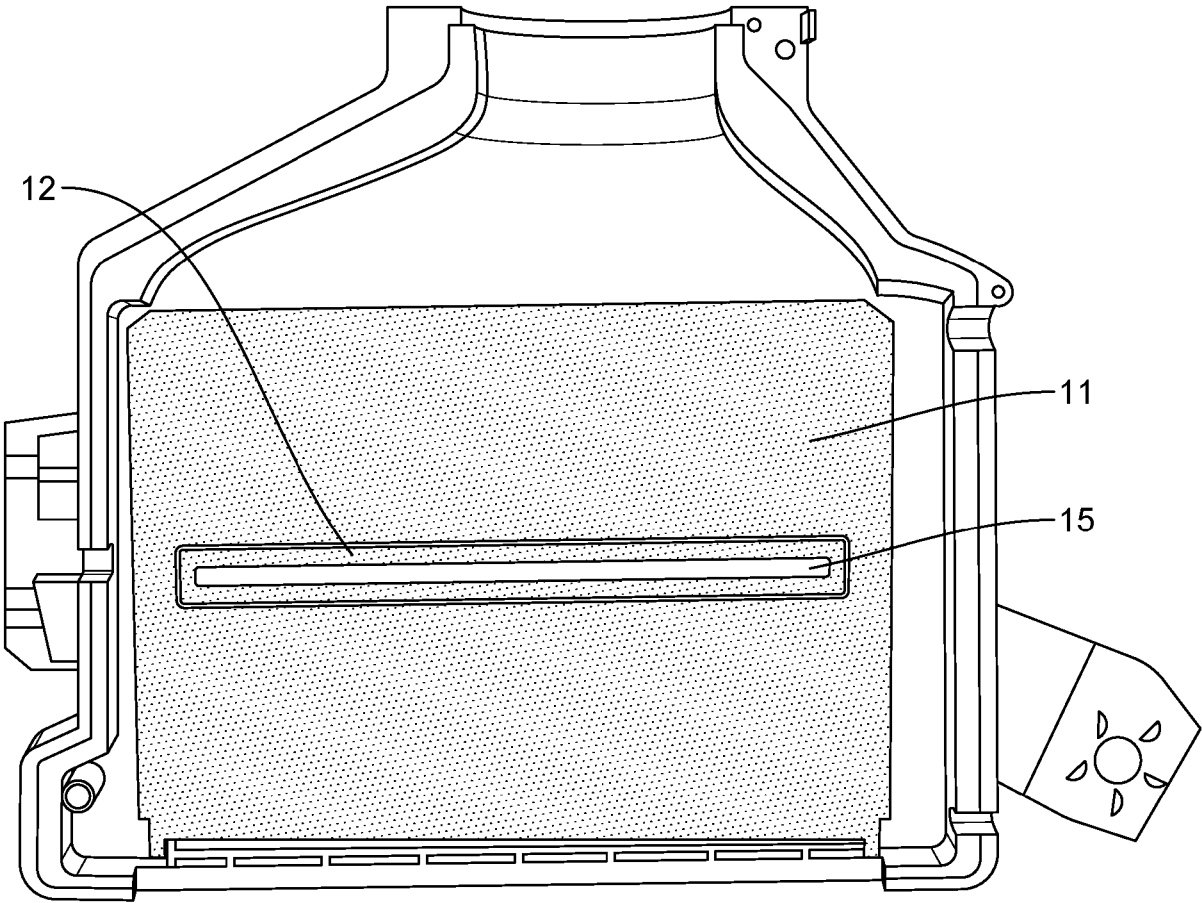


FIG. 3



EUROPEAN SEARCH REPORT

Application Number

EP 25 16 7397

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KR 101 134 898 B1 (DAE YANG ETS CO LTD [KR]) 17 April 2012 (2012-04-17) * paragraph [0059] - paragraph [0060]; figures 1, 4-5 *	1-10,12	INV. D06F58/24
X	US 2019/048514 A1 (CHRISTENSEN MARK J [US] ET AL) 14 February 2019 (2019-02-14) * paragraph [0032] - paragraph [0035]; figures *	1,11,12	ADD. D06F58/20 D06F58/22
A	EP 3 155 161 B1 (BSH HAUSGERAETE GMBH [DE]) 28 March 2018 (2018-03-28) * paragraph [0023] - paragraph [0024]; figure 1 *	1-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		8 August 2025	Diaz y Diaz-Caneja
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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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08-08-2025

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 101134898 B1	17-04-2012	JP 2013138826 A	18-07-2013
		KR 101134898 B1	17-04-2012

US 2019048514 A1	14-02-2019	EP 3441518 A1	13-02-2019
		US 2019048514 A1	14-02-2019

EP 3155161 B1	28-03-2018	CN 106661811 A	10-05-2017
		DE 102014211303 A1	17-12-2015
		EP 3155161 A1	19-04-2017
		PL 3155161 T3	28-09-2018
		WO 2015189129 A1	17-12-2015

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