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(71) Applicant: **Electrolux Home Products Corporation N.V.**
1130 Brussel (BE)

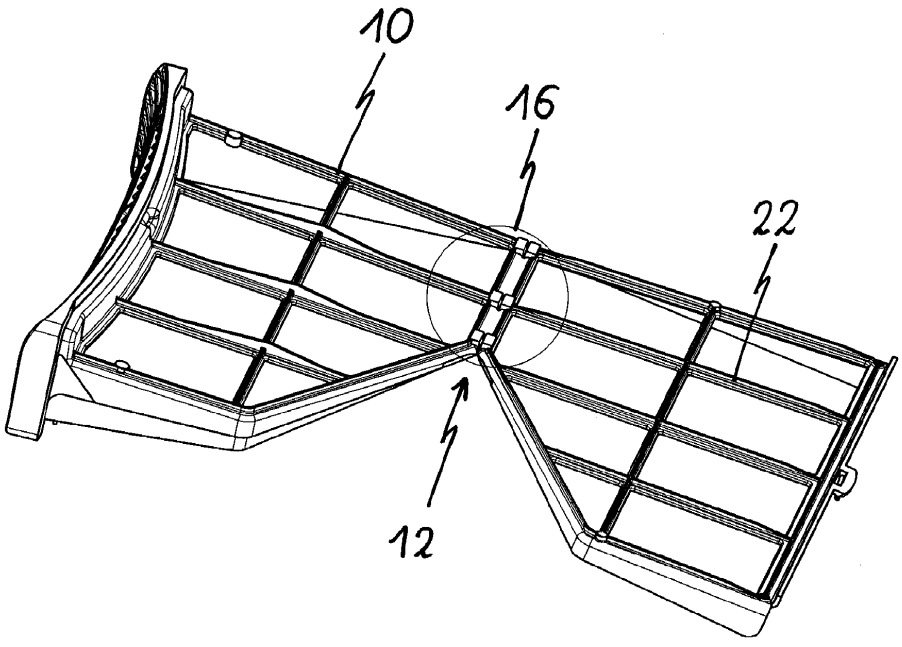
(72) Inventor: **Santarossa, Marco**
33080 Porcia (PN) (IT)

(74) Representative: **Nardoni, Andrea et al**
Electrolux Italia S.p.A.
Corso Lino Zanussi, 30
33080 Porcia (PN) (IT)

(54) Air stream filter for a laundry dryer

(57) The present invention relates to an air stream filter, in particular for an air stream channel in a laundry dryer (26). The air stream filter includes at least one plastic frame (10, 210). The plastic frame (10, 210) comprises two substantially symmetric wings. A net sheet (14, 214) covers the plastic frame (10). The net sheet (14, 214) is provided for filtering fluff. A hinge (12) extends along a symmetry axis between the wings of the plastic frame (10, 210), so that the plastic frame (10, 210) is openable and closable in a book-like fashion. In the closed state of the plastic frame (10, 210) the air stream filter is formed as a pocket. At least one reinforcing element (20) is attached on at least one side of the net sheet (14, 214) in a hinge portion (16) between the wings of the plastic frame (10, 210). Further, the present invention relates to a laundry dryer (26) with at least one air stream filter.

FIG 1



EP 2 562 304 A1

Description

[0001] The present invention relates to an air stream filter for a laundry dryer. Further, the present invention relates to a laundry dryer with at least one air stream filter.

[0002] In a laundry dryer a hot and dry air stream passes a laundry drum containing laundry to be dried. After passing the laundry drum the humidity of the air stream increases and its temperature decreases. Further, the air stream carries an amount of fluff removed from the laundry to be dried. Thus, the air stream has to be filtered in order to remove the fluff. Moreover, the air stream has to be dehumidified by passing an evaporator of a heat pump circuit or by a heat exchanger receiving cold ambient air. Additionally, the air stream has to be heated up by a condenser of the heat pump circuit or by an electric resistance, for example. These three operations are carried out in that order before the air stream is reintroduced again into the laundry drum.

[0003] An air stream filter for removing fluff according to the prior art is disclosed in GB 2 091 123. Said air stream filter comprises two sieves connected by a hinge. Two net patches are supported by a frame in each case. The two frames are connected by the hinge.

[0004] Usually air stream filters are formed as an openable pocket having a rigid plastic frame. Said plastic frame is over-injected on a net sheet. The net sheet is the air filtering part. The plastic frame supports the net sheet. The plastic frame is formed by two separate parts, while the net sheet is a single foil extending on the both separate parts of the plastic frame. Thus, the net sheet is permanently joining the parts of the plastic frame. The filter in the pocket form may be opened in a book-like fashion in order to remove the fluff. A hinge may be provided on the bottom part of the pocket in order to allow an opening of the air stream filter without separating the two parts of the plastic frame. In the prior art said hinge is simply formed by the net sheet itself connecting the two parts of the plastic frame.

[0005] Since the net sheet is damageable and the pocket is frequently opened and closed by the user, often the net sheet breaks in the connecting portion between the two parts of the plastic frame. The air stream filter has to be cleaned after one or two drying cycles. Further, the plastic frame of large size air stream filters is heavy.

[0006] It is an object of the present invention to provide an air stream filter for a laundry dryer, wherein said air stream filter has an improved connecting portion between the two parts of the plastic frame.

[0007] The object of the present invention is achieved by the air stream filter according to claim 1.

[0008] The present invention relates to an air stream filter, in particular for an air stream channel in a laundry dryer, wherein

- the air stream filter includes at least one plastic frame,
- the plastic frame comprises two substantially symmetric wings,
- a net sheet, provided for filtering fluff, covers the plastic frame,
- a hinge extends along a symmetry axis between the wings of the plastic frame, so that the plastic frame is openable and closable in a book-like fashion, and
- at least one reinforcing element is attached on at least one side of the net sheet in a hinge portion between the wings of the plastic frame.

[0009] According to the present invention the reinforcing element is attached at the net sheet in a hinge portion between the wings of the plastic frame. Thus, the hinge is formed by the net sheet between the wings of the plastic frame and additionally by the reinforcing element.

[0010] In particular, the plastic frame comprises a grid. The grid provides an increased stability of the plastic frame and the airstream filter.

[0011] For example, the reinforcing element is a plastic layer connecting the wings of the plastic frame.

[0012] Further, the plastic frame may comprise at least two layers, wherein the net sheet is sandwiched between said two layers.

[0013] In particular, the at least two layers of the plastic frame extend over the two wings of the plastic frame.

[0014] For example, a part of the net sheet is over-injected by the plastic frame.

[0015] In a similar way, the hinge portion of the net sheet may be over-injected by the reinforcing element.

[0016] The net sheet may preferably be in a single foil extending over the two wings of the air stream filter.

[0017] Further, at least a part of a hinge portion of the net sheet may be uncovered by the over-injection of the reinforcing element. In this case, the hinge can act as an air filter.

[0018] Moreover, at least a part of the hinge region of the net sheet may have a pattern which is different than that of the net extending on the wings of the air stream filter.

[0019] At last, the present invention relates to a laundry dryer with at least one air stream filter, wherein the laundry dryer comprises at least one air stream filter mentioned above.

[0020] The novel and inventive features believed to be the characteristic of the present invention are set forth in the appended claims.

[0021] The invention will be described in further detail with reference to the drawings, in which

FIG 1 shows a schematic perspective view of an outer side of a plastic frame of an air stream filter according to a preferred embodiment of the present invention,

FIG 2 shows a detailed schematic perspective view of the outside hinge region of the air stream filter shown in Figure 1,

FIG 3 shows a schematic front view of a inner side of the plastic frame of the air stream filter shown in Figure 1,

FIG 4 shows a detailed schematic front view of the inside hinge region of the air stream filter shown in Figure 1,

FIG 5 shows a more detailed schematic front view of an end portion of the inside hinge region of the air stream filter according to the preferred embodiment of the present invention,

FIG 6 shows a sectional side view taken along line A-A of Figure 5 of a hinge portion of the air stream fil- ter according to the preferred embodiment of the present invention,

FIG 7 shows a sectional side view taken along line A-A of Figure 5 of a hinge portion of the air stream filter according to a further embodiment of the present invention,

FIG. 8 shows a partial front view of a laundry dryer with the air stream filter according to the present invention, and

FIG 9 shows a partial perspective view of the laundry dryer with the air stream filter according to the present invention.

[0022] FIG 1 illustrates a schematic perspective view of a plastic frame 10 of an air stream filter according to a preferred embodiment of the present invention. The air stream filter is preferably provided for a laundry dryer.

[0023] The plastic frame 10 includes two symmetric wings. A hinge 12 extends along the symmetry axis between said wings, so that the plastic frame 10 can be closed and opened in a book-like fashion. In the closed state of the plastic frame 10 the air stream filter has the form of a pocket and is insertable into the laundry dryer, in a region of an opening for loading laundry into a treating chamber. In the open state of the plastic frame 10 the air stream filter can be cleaned by the user. Each wing of the plastic frame 10 comprises a grid 22. The grids 22 provide an increased stability of the plastic frame and the air stream filter. A hinge portion 16 of the plastic frame 10 is shown in FIG 2 by more details.

[0024] FIG 2 illustrates a detailed schematic perspective view of the plastic frame 10 of the air stream filter according to a preferred embodiment of the present invention. FIG 2 is a detailed representation of the hinge portion 16 in FIG 1 as viewed from the outside of the air stream filter, i.e. the hinge part resting outside the pocket formed by the filter in a closed state. FIG 2 clarifies the structure of the plastic frame 10 in the hinge portion 16.

[0025] FIG 3 illustrates a schematic front view of the inner side of the plastic frame 10 of the air stream filter according to a preferred embodiment of the present invention. A net sheet 14 covers the whole plastic frame 10. The plastic frame 10 and the net sheet 14 form the air stream filter. The net sheet is preferably in a single foil extending over the plastic frame 10.

[0026] For example, a reinforcing element 20 formed as a plastic layer is attached on one side of the net sheet 14 in the portion of the hinge 12, as shown in Figure 6. The plastic layer rests on the outside of the hinge region 16, i.e. on the outer side of the pocket formed by the air stream filter in a closed state. Alternatively, in a further preferred embodiment of the present invention, the net sheet 214 is embedded in the plastic frame 210 in the portion of the hinge 212, as illustrated in Figure 7. In the latter case, the net sheet 214 is sandwiched between two layers of the plastic frame 210 in the portion of the hinge 212. Further, the net sheet 14, 214 is over-injected by the plastic frame 10, 210. Thus, the plastic frame 10, 210 is formed as a single-piece part, and the net sheet 14, 214 is not the only connection between the wings of the plastic frame. A part from the different arrangement of the net 214 and the plastic frame 210 in the hinge region 16, the air stream filter embodiment shown in figure 7 is identical to that described with reference to Figures 1 to 6.

[0027] FIG 4 illustrates a detailed schematic front view of the plastic frame 10 of the air stream filter according to a preferred embodiment of the present invention. FIG 4 shows by more details the hinge portion 16 in FIG 3 as viewed from the inside of the pocket formed by the filter in a closed state.

[0028] FIG 5 illustrates a more detailed schematic front view of the plastic frame 10 of the air stream filter according to a preferred embodiment of the present invention. FIG 5 shows an end portion 18 of FIG 4 by more details.

[0029] FIG 6 illustrates a sectional side view of a hinge portion 16 of the air stream filter according to a preferred embodiment of the present invention. FIG 6 shows the sectional side view along the axis A-A in FIG 5.

[0030] In this example, the reinforcing element 20 is attached at one side of the net sheet 14. The reinforcing element 20 extends along the hinge 12. Thus, the hinge is formed by the net sheet 14 and the reinforcing element 20.

[0031] Figure 7 illustrates a sectional side view of a hinge portion 16 of the air stream filter according to a further embodiment of the invention.

In this further example, the plastic frame 210 includes two layers. The net sheet 214 is sandwiched between said two layers of the plastic frame 210. The two layers of the plastic frame 210 may also extend over the two wings of the plastic frame.

[0032] The reinforcing element 20, 220 is a plastic layer connecting the wings of the plastic frame 10, 210.

[0033] According to the invention, along the hinge portion 16 of the air stream filter it is possible to over-inject the reinforcing element 20, 220 only on some parts of the net sheet 14, 214, while keeping other parts of the net sheet free from the over-injection, and therefore ex-

posed to air for filtering it. In this way, even the hinge part 16 of the filter maintains filtering properties. The over-injection of the reinforcing element 20, 220 may be made on one or both sides of the net sheet 14, 214

[0034] As a further embodiment, the filtering net sheet 14, 214, over-injected on one or both sides thereof with plastic to form the pocket air stream filter, may have a strip, corresponding in position and dimensions to the hinge region 16, wherein the pattern of the net is different compared to the pattern of the net extending on the grid 22.

Since in the hinge portion 16 the net 14, 214 may lose its air filtering function because the hinge region 16 may be completely over-injected with plastic, the pattern of the strip extending on the hinge region 16 may comprise lower air permeability compared to the net sheet portions extending on the grid 22 thereby enhancing the reinforcement of the hinge region 16. Alternatively said strip extending on the hinge region 16 may be air impermeable; for example the strip may be imperforate.

Even the thickness of the net sheet strip to be embedded into the plastic frame in the hinge region 16 may be thicker than the rest of the net extending on the grid 22.

[0035] The air stream filter according to the present invention allows a very solid hinge 12. The reinforcing element 20, 220 prevents that the net sheet 14, 214 breaks in the hinge portion 16.

[0036] FIG 8 illustrates a partial front view of a laundry dryer 24 with the air stream filter according to the present invention.

[0037] FIG 9 illustrates a partial perspective view of the laundry dryer 24 with the air stream filter according to present invention.

[0038] FIG 8 and FIG 9 show the position of the air stream filter within the laundry dryer 24. The air stream filter is arranged below an opening 26 for loading a laundry drum. The air stream filter can be removed and inserted via said opening 26. FIG 9 clarifies that the air stream filter is formed as a pocket.

[0039] Although an illustrative embodiment of the present invention has been described herein with reference to the accompanying drawings, it is to be understood that the present invention is not limited to that precise embodiment, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the claimed the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the appended claims.

List of reference numerals

[0040]

10, 210	plastic frame
12, 212	hinge
14, 214	net sheet
16	hinge portion
18	hinge end portion
20, 220	reinforcing element
22	grid
24	laundry dryer
26	opening

Claims

1. An air stream filter, in particular for an air stream channel in a laundry dryer (26), wherein

- the air stream filter includes at least one plastic frame (10, 210),
- the plastic frame (10, 210) comprises two substantially symmetric wings,
- a net sheet (14, 214), provided for filtering fluff, covers the plastic frame (10, 210),
- a hinge (12, 212) extends along a symmetry axis between the wings of the plastic frame (10, 210), so that the plastic frame (10, 210) is openable and closable in a book-like fashion,

characterised in that

at least one reinforcing element (20, 220) is attached on at least one side of the net sheet (14, 214) in a hinge portion (16) between the wings of the plastic frame (10, 210).

2. The air stream filter according to claim 1, **characterized in that** the plastic frame (10, 210) comprises a grid (22).

3. The air stream filter according to claim 1 or 2, **characterized in that** the reinforcing element (20, 220) is a plastic layer connecting the wings of the plastic frame (10, 210).

4. The air stream filter according to any one of the preceding claims, **characterized in that** the plastic frame (210) comprises at least two layers, wherein the net sheet (214) is sandwiched between said two layers.

5. The air stream filter according to claim 4, **characterized in that** the at least two layers of the plastic frame (210) extend over the two wings of the plastic frame (210).

6. The air stream filter according to any one of the pre-

ceding claims,
characterized in that
a part of the net sheet (14, 214) is over-injected by the plastic frame (10, 210).

7. The air stream filter according to any one of the preceding claims,
characterized in that
a hinge portion (16) of the net sheet (14, 214) is over-injected by the reinforcing element (20, 220).

8. The air stream filter according to claim 7,
characterized in that
at least a part of a hinge portion (16) of the net sheet (14, 214) is uncovered by the over-injected reinforcing element (20, 220).

9. The air stream filter according to any one of the preceding claims,
characterized in that
in a hinge portion (16), the net sheet (14, 214) comprises a strip having a first pattern that is different from a second pattern of a net sheet part extending on a grid (22) of the plastic frame (10, 210).

10. The air stream filter according claim 9
characterized in that
the first pattern comprises a lower air-permeability than the second pattern.

11. The air stream filter according to claim 9 or 10
characterized in that
the first pattern is air-impermeable.

12. A laundry dryer with at least one air stream filter,
characterized in, that
the laundry dryer comprises at least one air stream filter according to any one of the claims 1 to 11.

FIG 1

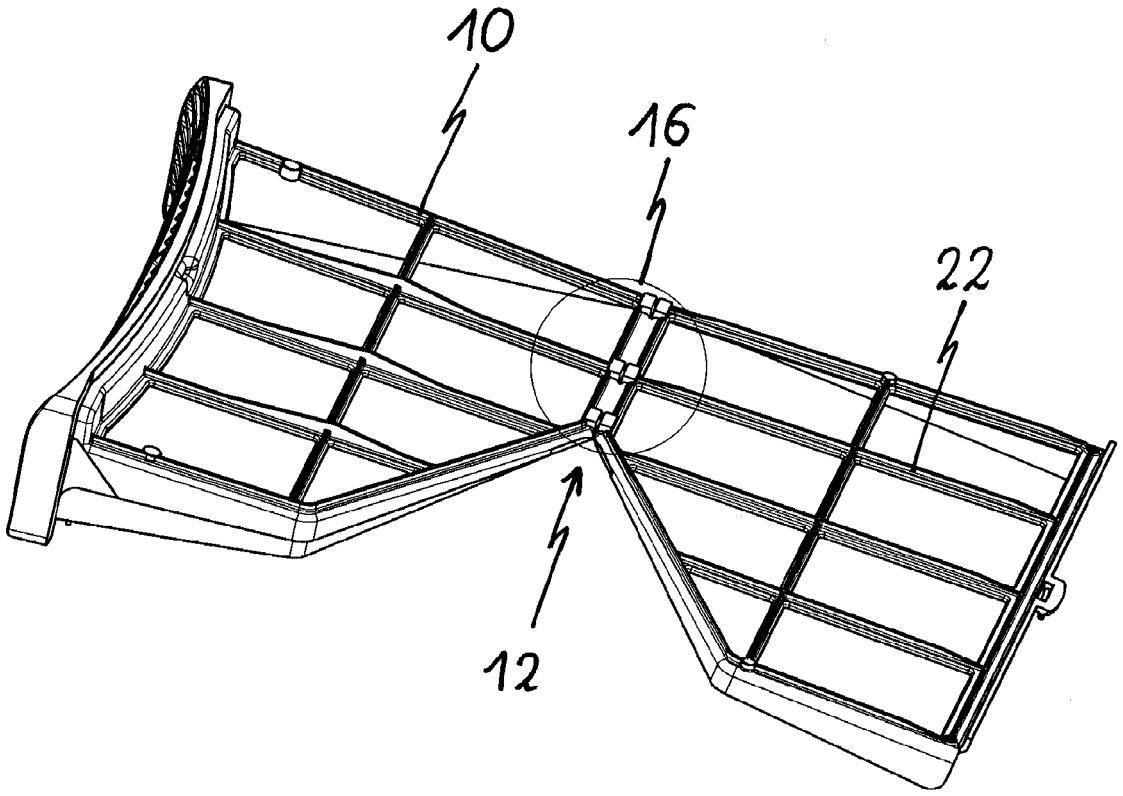


FIG 2

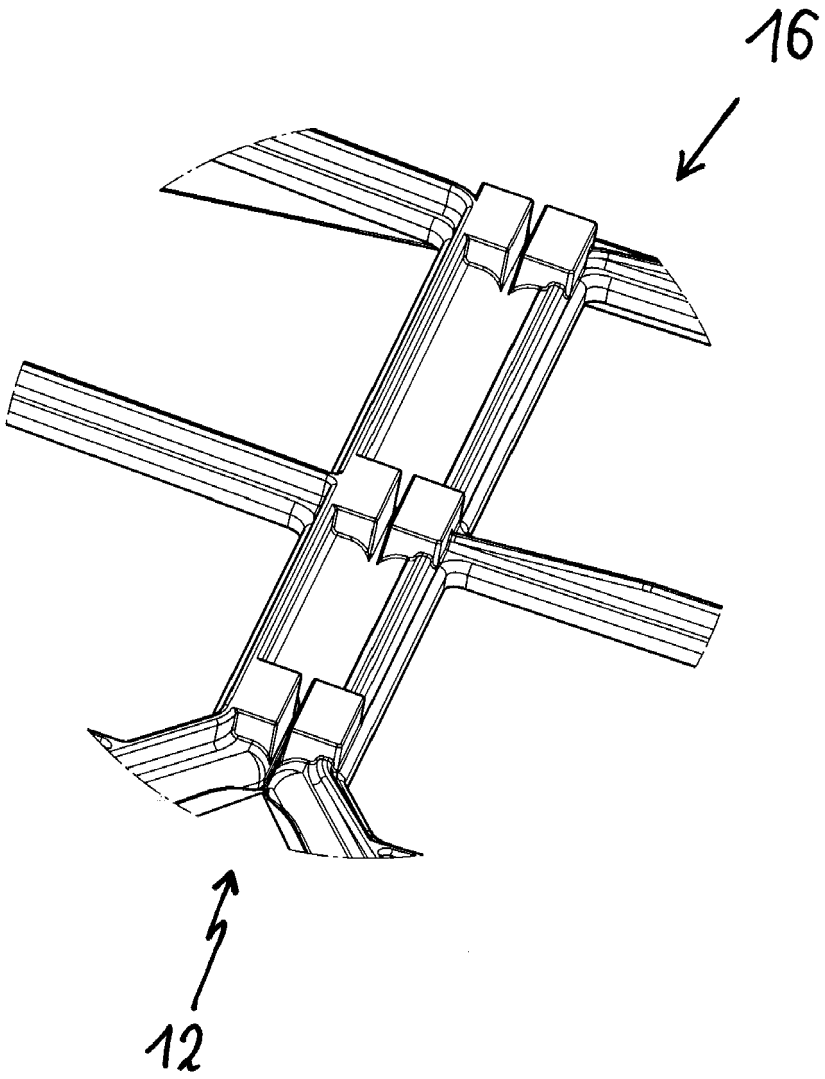
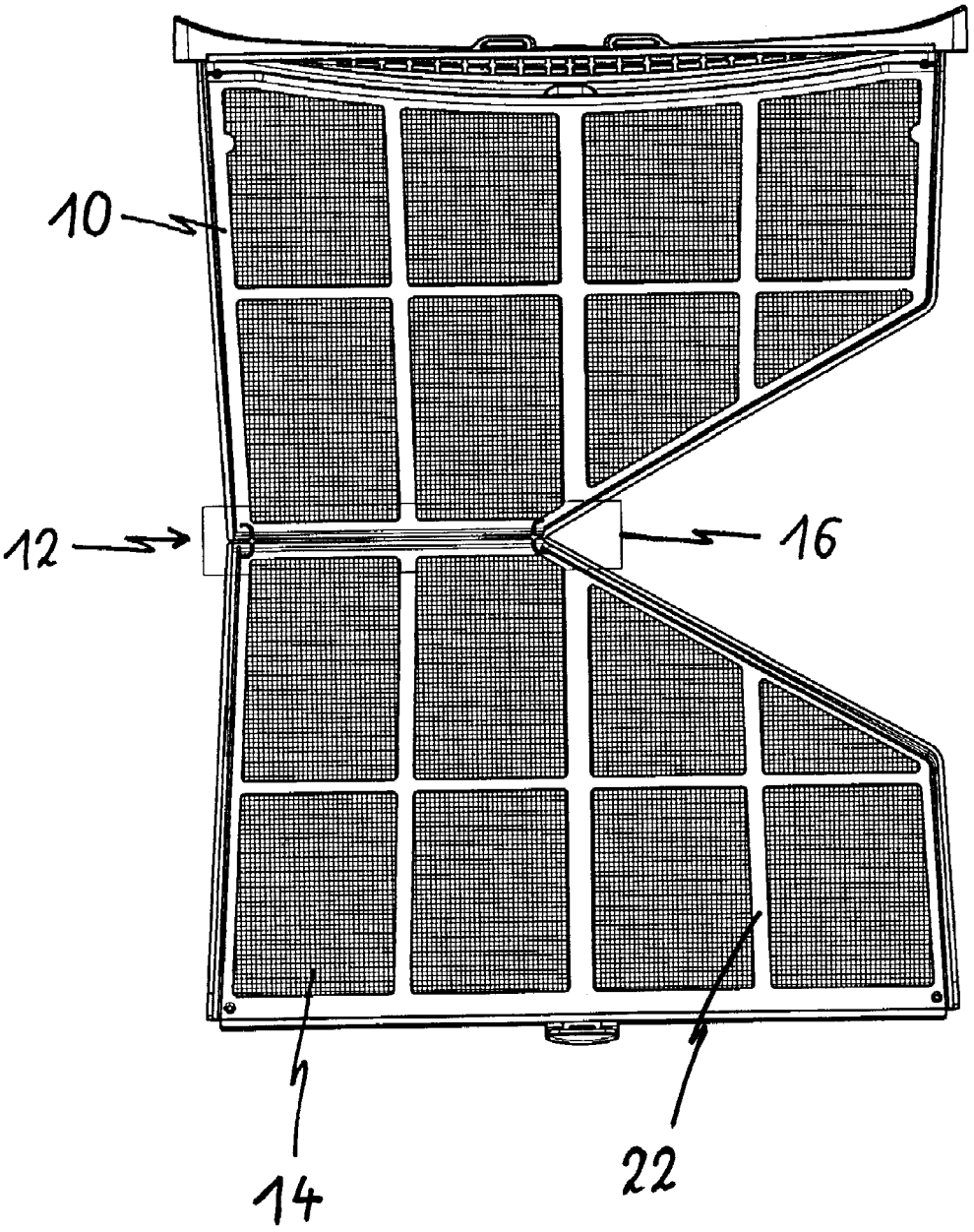


FIG 3



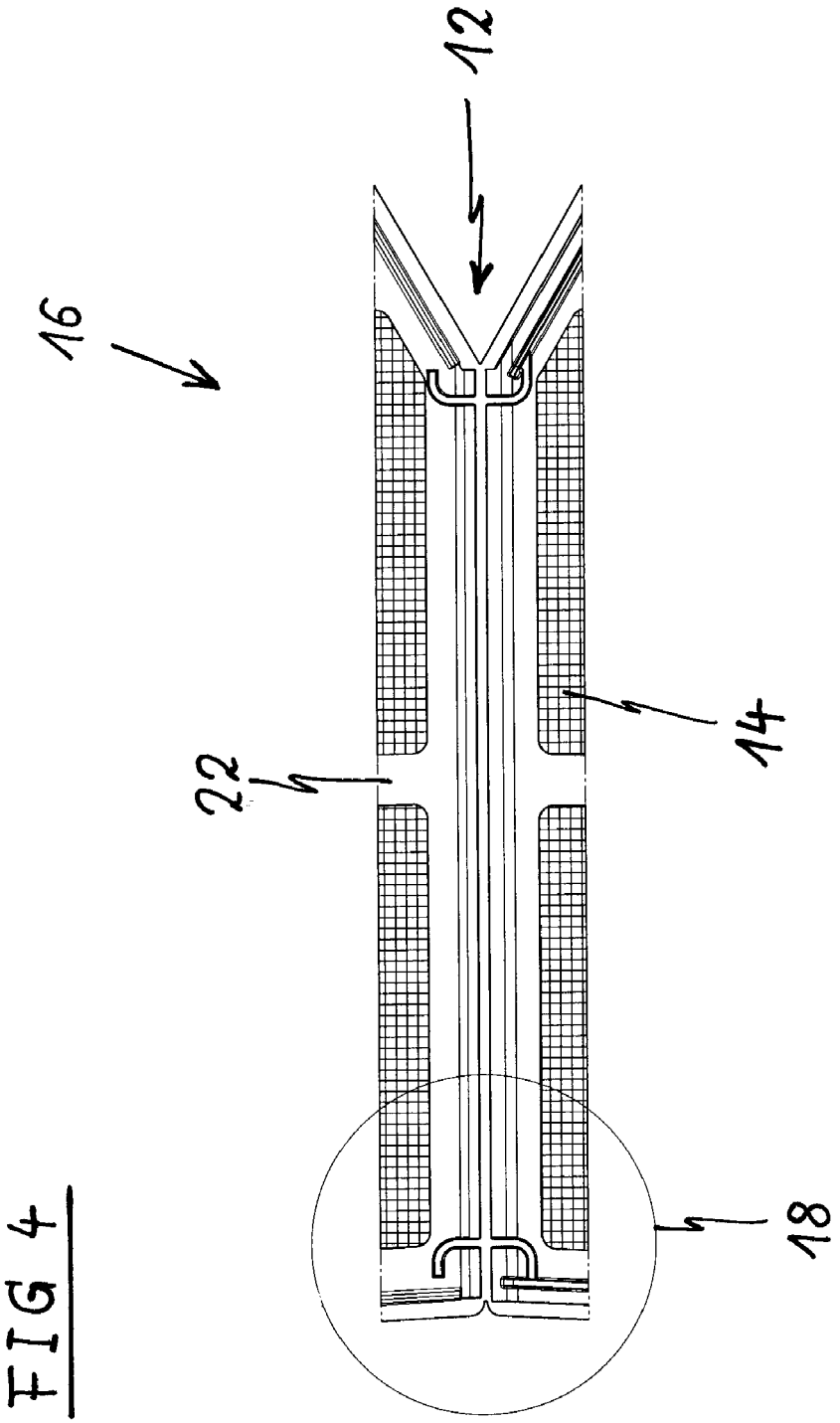


FIG 4

FIG 5

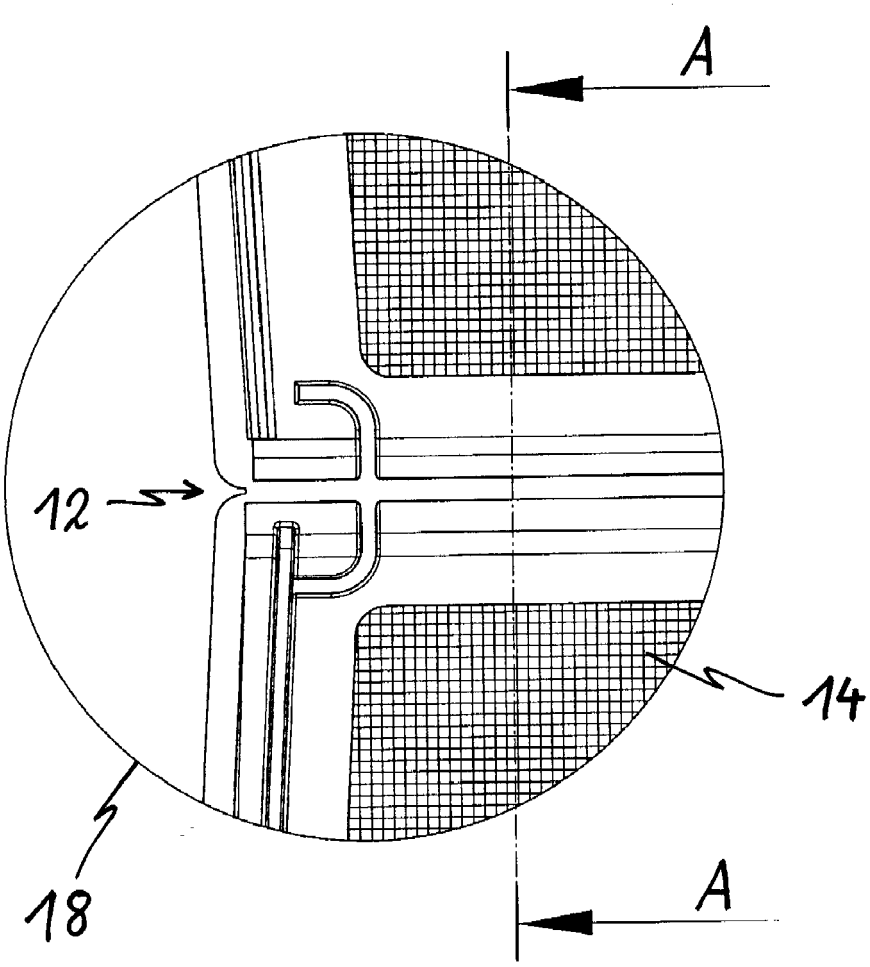


FIG 6

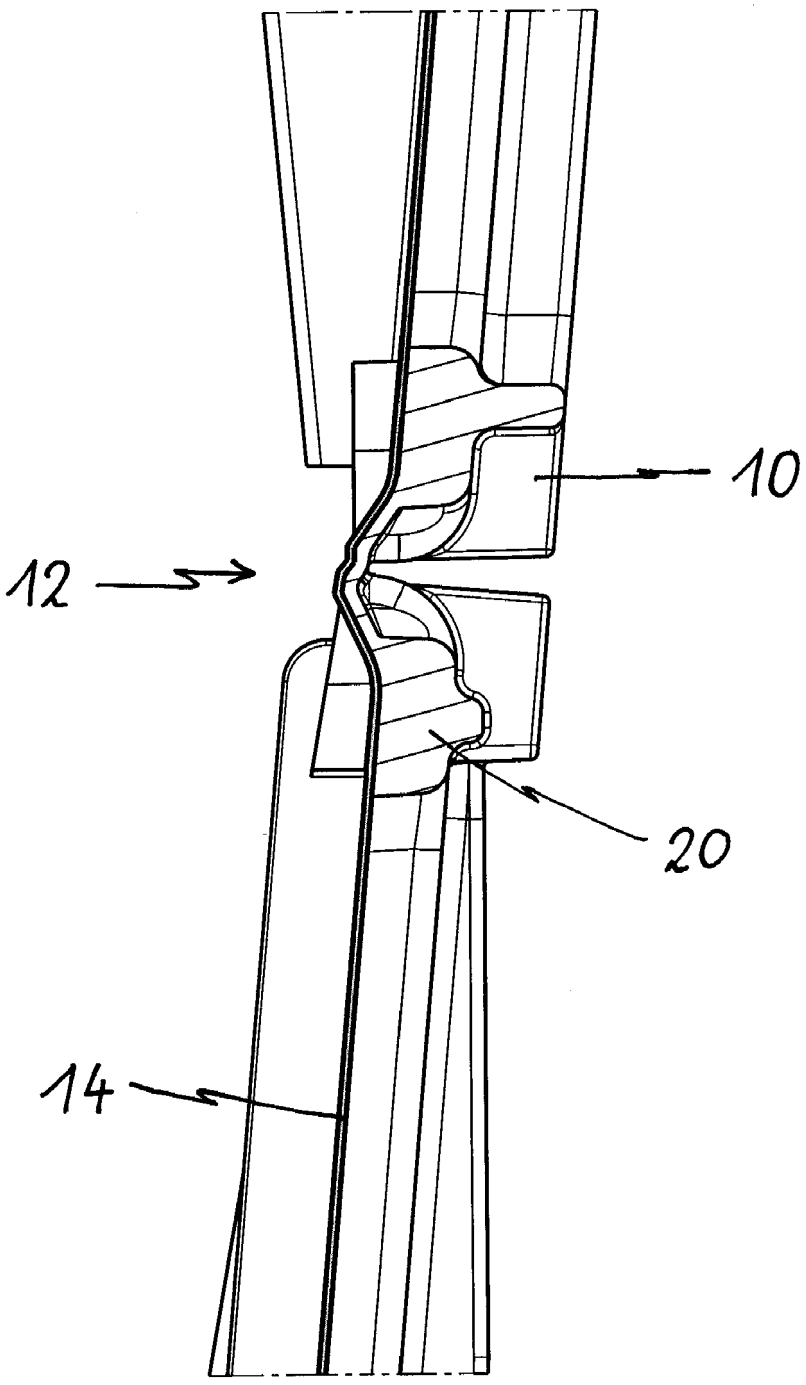


FIG 7

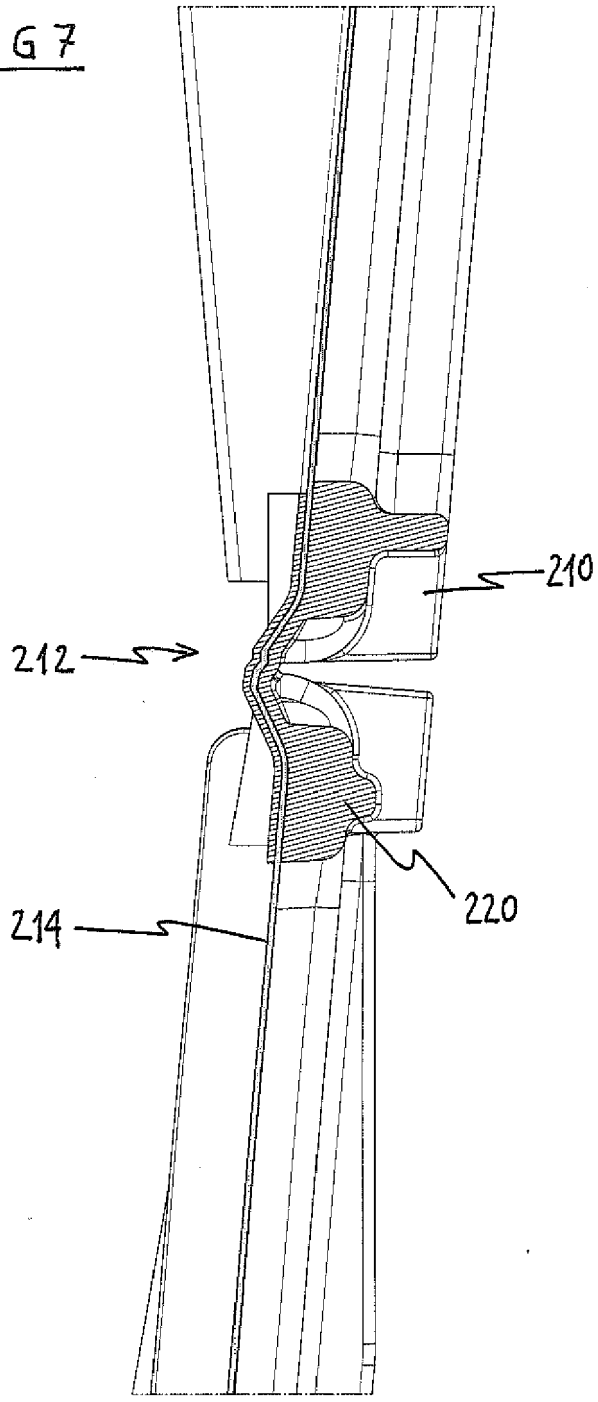


FIG 8

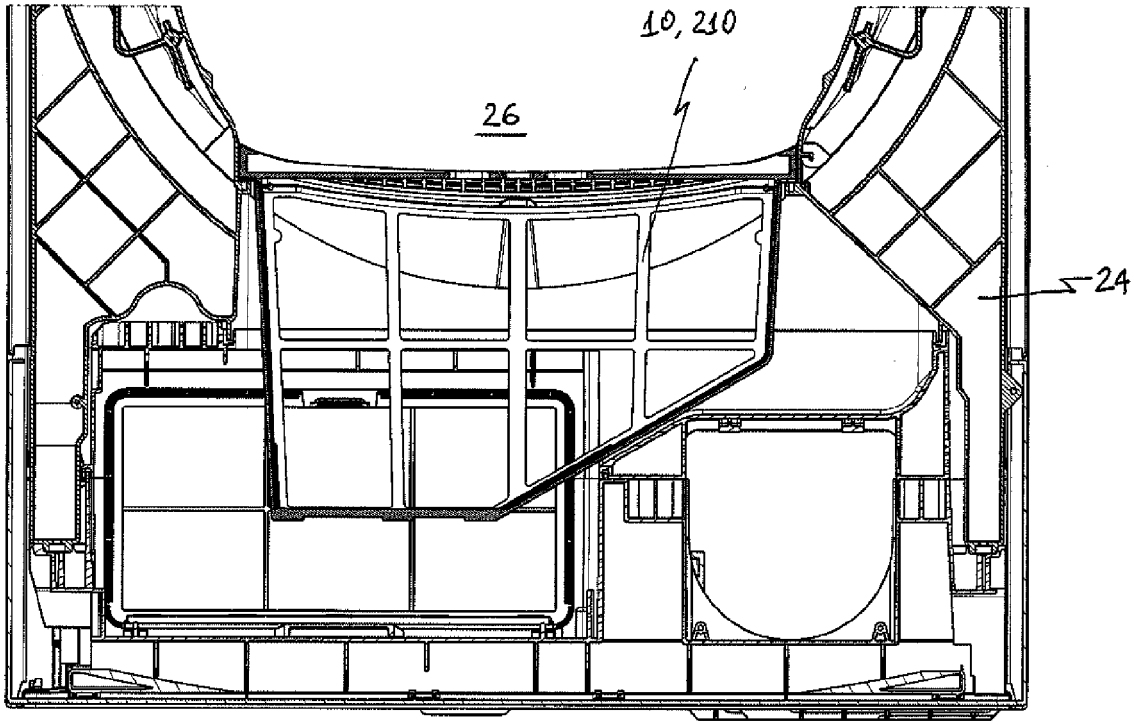
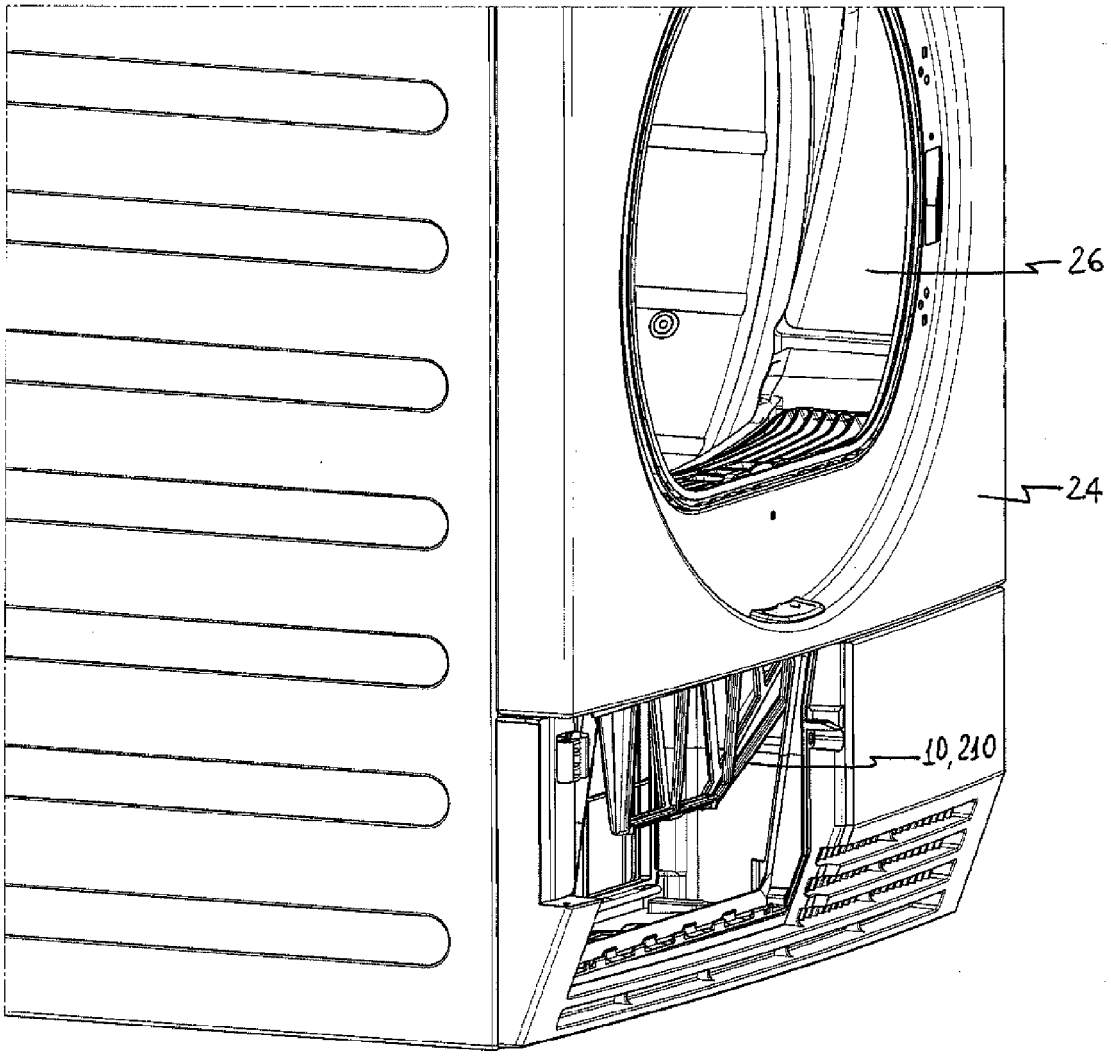


FIG 9



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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 8601

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	GB 2 091 123 A (BAUKNECHT GMBH G) 28 July 1982 (1982-07-28) * the whole document * -----	1-12	INV. D06F58/22
A	EP 0 106 289 A2 (ZANUSSI A SPA INDUSTRIE [IT]) 25 April 1984 (1984-04-25) * the whole document * -----	1-12	
A	US 3 378 934 A (ERICKSON CLIFFORD E) 23 April 1968 (1968-04-23) * the whole document * -----	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	10 February 2012	Diaz y Diaz-Caneja

CATEGORY OF CITED DOCUMENTS

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10-02-2012

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

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