

Description

[0001] The invention relates to a lint strainer for a laundry care apparatus wherein the lint strainer comprises a filter and a flap that are pivotally attached to each other at two pivot joints, such that, in a closed position, the filter and the flap form a bag-shaped air-filtering shell. The invention also relates to a laundry care apparatus comprising such a lint strainer. The invention particularly relates to a laundry care apparatus having a laundry drying function, e.g. a clothes dryer or a washing/drying combination.

[0002] DE 296 18 169 U1 discloses a lint filter device for a programmable electric clothes dryer having a laundry drum with a front loading port, wherein the loading port corresponds with the lint filter device that is supported by a door covering the loading port, wherein the lint filter device consists of a removable fine mesh and an upstream coarse mesh that are parts of a centering or retaining body held at an inner side of the, and wherein a locking or blocking element is mounted at the centering or retaining body and cooperates with the fine mesh such that in the absence of the fine mesh closing the door and thus putting the clothes into operation is prevented by supporting at the front panel.

[0003] US 3,378,9341 discloses - for use in a clothes dryer of the type having a clothes receptacle and an exhaust duct with an inlet opening positioned for convenient manual access, wherein a flow of heated air passes through the receptacle and then enters the exhaust duct - an improved lint trap comprising: (a) first and second sides having the major part thereof foraminous, said sides: (i) being hinged together at the bottom thereof; (ii) providing a generally U-shaped cross-sectional configuration in a first relationship; (iii) being pivotable to a second relationship in which the surfaces forming the inside of the said U-shaped cross-section are easily and independently accessible; (b) said trap being insertable in said exhaust duct when said sides are in said first relationship; (c) means at the top of said sides cooperatively effective with the duct inlet opening to retain said trap at said opening with said sides extending generally in the direction of flow; and (d) means closing the ends of said U-shaped configuration so that air flows into said trap at the top of said U-shaped configuration and flows out of said trap only through the foramina formed therein.

[0004] EP 2 682 515 A1 discloses a laundry dryer comprising an outer casing having a front wall provided with a laundry loading / unloading pass-through opening, and an air-filtering cartridge which is fitted in removable manner into an air-vent which is passed through by a laundry drying airflow (f), said air-filtering cartridge comprising a first substantially bag- or pocket-shaped, air-filtering shell or vessel which is dimensioned for being inserted / plugged into said air-vent and a second substantially bag- or pocket-shaped, air-filtering shell or vessel which is fitted / recessed into said first air-filtering shell or vessel, so as to be passed through by substantially the same

airflow (f) that crosses the first air-filtering shell or vessel, each of said first and second air-filtering shells or vessels having a two valve-like structure which is openable in a book-like manner and has surfaces arranged to restrain fluff and / or lint particles in suspension into the airflow (f). The laundry dryer has the second air-filtering shell or vessel hingedly coupled to the first air-filtering shell or vessel, such that, in an open position, both valve-like structures displace the inner faces of said surfaces on the same side.

[0005] However, the lint strainers according to the prior art are rather expensive to produce and difficult to clean. They are also rather less robust.

[0006] It is the object of the present invention to at least partially overcome the disadvantages of the prior art and in particular to provide an easy cleanable and robust lint strainer that can be produced in a cost-effective manner.

[0007] The object is achieved by the subject-matter of the independent claims. Advantageous embodiments can be derived from the dependent claims and the description.

[0008] The object is solved by a lint strainer for a laundry care apparatus, wherein the lint strainer comprises a filter and a flap that are pivotally attached to each other at two pivot joints, such that, in a closed position, the filter and the flap form an upwardly open bag-shaped air-filtering shell and that, in an open position, the filter and the flap are spaced apart below the pivot joints.

[0009] This lint strainer has the advantage of an improved handling during cleaning since, in the open position, the flap can detach from all parts of the filter below the pivot joints, including a bottom region. This is particularly useful since the lint typically accumulates at the bottom of the shell. A user can thus clean the flap and the filter below the pivot joints without being hindered by the other component and the pivot joints (e.g. in contrast to a lint strainer that opens in a book-like manner). Also, such a lint strainer can be implemented using particularly simple pivot joints and simply formed flaps and filters. Additionally, such a lint strainer is very robust. Furthermore, such a lint strainer is easy to handle in comparison to a lint strainer that opens in a book-like manner.

[0010] The filter may also be called a 'filter part' or 'filter component' of the lint strainer. The filter may have one or more filter elements that have the ability to strain or filter air, in particular process air being transported (in particular being circulated) in the laundry care apparatus. The filter is permeable for air but withholds or filters particles contained in the air, e.g. lint. The lint may have detached from the laundry during a laundry care process, e.g. a laundry drying process. The lint may include hair. Alternatively, the lint strainer may be used to filter fluid, e.g. water. In the following, the invention is only described in relation to an air filter but it should be understood that it may also be a fluid filter.

[0011] The at least one filter element may be embodied as at least one mesh. Multiple meshes elements may

have the same or different mesh sizes, e.g. be coarser or finer.

[0012] That the filter and the flap are pivotally attached to each other may include that they can be pivoted or rotated around the pivot joints.

[0013] The upwardly open bag-shape includes at least one upwardly open air inlet for letting unfiltered air into the shell. While the air can leave the shell through the filter, the lint is withheld. The flap may be used to avoid parasitic air flows and to more effectively direct the unfiltered air through the filter.

[0014] That, in an open position, the filter and the flap are spaced apart below the pivot joints includes that the filter and the flap, if being rotated out of the closed position, are pivoted or rotated around a rotation axis that does not coincide with a lower section or bottom rim of the filter but that is positioned at a distance from the lower section. Consequently, the pivot joints are positioned at a distance above or from the lower section. It follows that the pivot joints are markedly distanced above a lowest point of the shell. Thus, the filter and the flap do not open in a book-like manner but in a mouth-like manner. The flap is not rotated to a position laterally next to the filter but to a position that is still opposite to or vis-à-vis the filter.

[0015] The directional descriptions (e.g. 'below', 'upwards', 'bottom', and so on) in particular relate to, without being limited thereto, a typical orientation of the lint strainer in the laundry care apparatus.

[0016] It is an embodiment that, in the closed position, the shell has a wedge-like outer contour that narrows downwards. This embodiment enables an easy insertion into a respective seating or socket of the laundry care apparatus. In particular, a high contact pressure between the flap and the filter can be achieved by simply inserting the lint strainer. The high contact pressure in turn may result in a substantially airtight contact between the flap and the filter, thus reducing or eliminating gaps between these components which in turn reduces or eliminates parasitic air flows around the filter element(s).

[0017] It is an embodiment that the filter comprises a frame holding at least one filter element for filtering lint. This frame may also be called an 'outer frame'. The frame may have a substantially rectangular shape comprising a bottom frame section, two side frame sections and a top frame section since this allows a particularly large filtering area and easy insertion. The side frame sections may then each have a first pivot joint means engaging a respective second pivot joint means of the flap, while the first pivot joint means is markedly distanced from the bottom frame section. This enables the opening of the shell in a 'mouth-like' manner. In particular, in the closed position, the flap may contact a lower part of the frame below the first pivot joint means including the bottom frame section and at least parts of the side frame sections extending from the bottom frame section towards the first pivot joint means. The flap may contact the lower part of the frame practically up to the first pivot joint means or may

contact the lower part of the frame up to a distance from the first pivot joint means (i.e. not all the way up to the first pivot joint means). Thus, in the open position, the flap is pivoted around the first pivot joint means such that a gap may exist between the flap and the lower part of the frame between the bottom frame section and the first pivot joint means.

[0018] It is an embodiment that the flap is pivotable at least 90° from the closed position.

[0019] It is an embodiment that the flap has a u-shaped, band-like base with two lateral sections connected by a transversal section. The second pivot joint means may be positioned at free end regions of the lateral sections such that the free end regions do not substantially protrude over the second pivot joint means. Also, at least the lower part of the frame has a u-shaped, band-like form such that, in the closed position, the base of the flap is in a side-by-side relation to the lower part of the frame. Thus, the base of the flap fits into the lower part of the frame. It is an advantage that particularly small parasitic air flows can be achieved even if the contact pressure between the flap and the frame is rather small. Additionally, the lower part of the frame can act as an outer boundary for the flap to protect the flap against mechanical strain. Therefore, a particularly robust lint strainer is provided.

[0020] It is an embodiment that, in the closed position, a rim of the base of the flap contacts the lower part of the frame. Thus, a tightly fitting contact area is provided. To this end, the frame may have an inwardly protruding lip or flange for contacting the rim of the base of the flap.

[0021] It is an embodiment that the base of the flap is connected to a cover part of the flap. The cover part may in particular be a wall of the shell that (in the closed position) is positioned opposite to or vis-à-vis the filter. To achieve a wedge-like form of the shell, the cover part comprises two triangle-shaped side walls that are each connected to a lateral section of the base of the flap at a first edge with the edge reaching the transversal section of the base of the flap. The cover part also comprises a part (called 'front part') that connects second edges of the side parts that also reaches the transversal section of the base of the flap.

[0022] It is an embodiment that the front part has a recessed free edge. The free edge may in particular be an upper edge. The recessed free edge enables a conformal fit with other components of the laundry care apparatus, e.g. a loading port and/or a bearing shield.

[0023] It is an embodiment that a top frame section of the frame is formed as an inlet for process air. This enables a compact design of the laundry care apparatus. Also, an air inflow direction into the shell can thus be formed in great detail and highly reproducible.

[0024] The top frame section of the frame may have a curved (in particular circularly curved) form to conform to a form of a loading port and/or a bearing shield.

[0025] It is an embodiment that the frame comprises at least one strut, the strut holding at least part of a filter

element. This prevents sagging of the at least one filter element and in particular allows secure holding of more than one filter element. For example, one strut may separate two mesh elements, two cross-like arranged struts may separate four mesh elements etc.

[0026] The object is also achieved by a laundry care apparatus comprising at least one lint strainer as described above.

[0027] It is an embodiment that the laundry care apparatus comprises a seating for the lint strainer that, in the closed position of the lint strainer, presses the flap against the filter. This enables a particularly great reduction of parasitic air flows. The seating may itself at least partially have a wedge-like form or may have wedge-like arranged guide elements. To ensure a high pressure of the flap against the frame (and vice versa), a wedge angle of the seating may be smaller than a wedge angle of the shell of the lint strainer.

[0028] It is an embodiment that the laundry care apparatus has a horizontally rotatable drum for accommodating laundry wherein the drum is rotatably held by a front-side bearing shield. At its rear side, the drum may be rotatably held by a rear-side bearing shield. The seating for the lint strainer may in particular be part of the front-side bearing shield which combines a compact design with a large filter area.

[0029] It is an embodiment that the laundry care apparatus has a laundry drying function. For example, the laundry care apparatus may be a clothes dryer, in particular a tumble dryer, or a washing machine with a drying function. The laundry care apparatus may in particular be a household appliance.

[0030] At least some of above mentioned features, characteristics, and advantages of the present invention are now schematically described by way of one embodiment that is explained with reference to the Figures of the attached drawing. In the drawing:

- Fig.1 shows an oblique view of a rear side or face of a front-side bearing shield comprising a seating for a lint strainer and a lint strainer inserted into the seating;
- Fig.2 shows an oblique view of a front side or face of the lint strainer of fig.1 with a flap in a closed position;
- Fig.3 shows an oblique view of the front side of face of the lint strainer of fig.1 with the flap in an open position; and
- Fig.4 shows another oblique view of the front side or face of the lint strainer of fig.1 with the flap in the open position.

[0031] Fig.1 shows a rear or inner face of a front-side bearing shield 1 of a laundry care apparatus in form of a clothes dryer D. The front-side bearing shield 1 comprises a loading port 2 for loading clothes into a drum (not shown) through a respective opening 3. The drum is rotatably held on one side by the front-side bearing shield

1. In particular, the clothes dryer D is a tumble dryer with the drum being rotated around a horizontal axis. The loading port 2 can be closed by a door (not shown). The clothes dryer D may in particular have a closed-loop process air channel wherein warm and relatively dry process air flows through the drum therefore drying the clothes. In the depicted clothes dryer D, the process air flows through the drum in a rear-to-front direction. In the drum, the process air is getting moister from absorbing water from the clothes. Also, lint gets detached from the clothes and is carried away by the process air. The now moist and lint-containing process air flows to a condensing unit (not shown) where it is cooled down. The moist of the cooled process air condenses at the condensing unit, and the resulting condensate then typically drips into a condensate tank (not shown). The lint easily sticks to the wet sides of the condensing unit and aggregates there over time. The aggregated lint acts as a thermal barrier and reduces an efficiency of the condensing unit. The cooled and now relatively dry process air then flows to a heating unit for re-heating the process air before re-entry into the drum. To drive the air flow, the closed-loop process air channel may comprise a respective fan. The condensing unit and the heating unit may be part of a heat pump, e.g. a compressor heat pump. A clothes dryer of such a layout is generally known and does not need to be described in greater detail.

[0032] To remove the lint before it reaches the condensing unit, it is generally known to position a lint strainer or lint filter into the process air channel between the drum and the condensing unit. The lint strainer may be permanently placed into the process air channel and be cleanable by a respective cleaning unit. It is also known to use lint strainers that are removably seated in the process air channel. The removable lint strainer can be manually removed and cleaned by a user.

[0033] In the shown clothes dryer D, the front-side bearing shield 1 has a socket or seating 4 for a lint strainer 5. The seating 4 is positioned at a lowest section of the loading port 2. The lint strainer 5 can be inserted into the seating 4 from the top. The process air may in particular flow through the lint strainer 5 in a top-to-bottom fashion, a top-to-side fashion, or a side-to-side fashion. At least a lower region of the seating 4 is substantially wedge-shaped.

[0034] Fig.2 shows an oblique view of a front face of the lint strainer 5 of Fig.1 with a filter 6 and a flap 7, the flap 7 being in a closed position, as also shown in Fig.1. The filter 6 and the flap 7 are pivotally attached to each other at two pivot joints 8. This, the flap 7 can be rotated around a rotation axis R. In the closed position, the filter 6 and the flap 7 form an upwardly open bag-shaped air-filtering shell 10. The shell 10 has a wedge-like outer contour that fits into the wedge-shaped part of the seating 4 such that the seating 4 presses the flap 7 and the filter 6 together. The shell 10 is positioned below the pivot joints 8.

[0035] The filter has a frame 11 showing a basically

rectangular shape comprising a bottom frame section 12, two side frame sections 13 and a top frame section 14. The bottom frame section 12 and the two side frame sections 13 together have u-shaped, band-like form. The side frame sections 13 each have a hole 15 acting as a first pivot joint means of the pivot joint 8 engaging a latch pin 16 of the flap 7 acting as a respective second pivot joint means of the pivot joint 8. The holes 15 and thus the pivot joints 8 are markedly distanced from the bottom frame section 12, namely approximately in the middle of the respective side frame sections 13. Such a pivot joint 8 is very easy to implement, lowers costs of the pivot joint and also is very robust in order to improve a lifetime.

[0036] The top frame section 14 has a partly curved form to fit or conform to a bottom side of the opening 3 of the loading port 2. The top frame section 14 may be formed as an inlet for the process air.

[0037] The filter 6 further comprises a strut 17 that leads from the bottom frame section 12 to the top frame section 14. Two mesh elements 18 acting as filter elements are each held by the strut 17, a side frame section 13 and respective halves of the bottom frame section 12 and of the top frame section 14. The mesh elements 18 let process air through but hold back lint.

[0038] In the closed position, the flap 7 contacts a lower part 11 a of the frame 11 below the holes 15 including the bottom frame section 12 and a length of the side frame sections 13 extending from the bottom frame section 12 up to the holes 15. In particular, the flap 7 has a u-shaped, band-like base 19 with two lateral sections 20 connected by a transversal section 21 (shown in Fig.3 and Fig.4). The latch pins 16 are positioned at free end regions 22 of the lateral sections 20. In the closed position, the base 19 of the flap 7 is in a side-by-side relation to the lower part 11 a of the frame 11. Also, in the closed position, a rim 23 of the base 19 of the flap 7 contacts the lower part 11 a of the frame 6, namely an inwardly protruding flange 30. The seating 4 of the front-side bearing shield 2 is design such that, in the closed position of the flap 7 and the lint strainer 5, presses the flap against the lower part 11 a of the frame 11.

[0039] To implement the wedge-shaped outer contour of the shell 10, the base 19 of the flap 7 is connected to a cover part 24 of the flap 7. The cover part 24 comprises two triangle-shaped side walls 25. Each side wall 25 is connected to a lateral section 20 of the base 19 of the flap 7 with a first edge 26. The first edge 26 reaches the transversal section 21 of the base 19 of the flap 7. The cover part 24 further comprises a front part 27 that connects second edges 28 of the side walls 25. The second edges 28 also reach the base 19. The front part 27 has a recessed free edge 29 to conform e.g. with adjacent parts of the loading port 2, as shown e.g. in Fig.1.

[0040] In the closed position, the shell 10 can act as a tight retainer for lint (including hair etc.) that falls down or flows down from the mesh elements 18.

[0041] After certain duration of operation, the shell 10 will be at least partially filled with lint. A user of the clothes

dryer D may then remove the lint strainer 5 and clean it. The cleaning comprises opening the flap 7 by rotating it, as will be described in greater detail further below with respect to Fig.3 and Fig.4.

[0042] Fig.3 shows an oblique view of the front face of the lint strainer 5 with the flap 7 in an open position. Fig.4 shows another oblique view of the front face of the lint strainer 5 in the open position.

[0043] In the open position, the filter 6 and the flap 7 are spaced apart below the pivot joints 8. In the shown embodiment, the flap 7 is pivotable more than 90° from the closed position, as indicated by the arrow O. In this position, the lower part 11a of the frame 11 can be cleaned (i.e. freed from the lint) in one sweeping motion with a cloth without being hindered by the pivot joints 8 and the flap 7. Also, the flap 7 can be cleaned with a cloth in one sweeping motion. Furthermore, the filter 6 can be rinsed without the lint being stuck between the filter 6 and the flap 7 or the lint flowing onto the flap 7. Additionally, such a lint filter 5 does not dangle awkwardly in the hands of a user, thus improving a handling of the lint strainer 5 during the manual cleaning.

[0044] The invention is not restricted by the shown embodiment.

[0045] For example, the flap may also comprise at least one filter element, in particular mesh or mesh element.

List of Reference Numerals

[0046]

1	front-side bearing shield
2	loading port
3	opening
4	seating
5	lint strainer
6	filter
7	flap
8	pivot joint
10	shell
11	frame
11a	lower part of the frame
12	bottom frame section
13	side frame section
14	top frame section
15	hole
16	latch pin
17	strut
18	mesh element
19	base
20	lateral section
21	transversal section
22	free end region
23	rim of the base
24	cover part of the flap
25	side wall
26	first edge
27	front part

28 second edge
 29 recessed free edge
 30 flange
 D clothes dryer
 R rotation axis

(7) is in a side-by-side relation to the lower part (11 a) of the frame (11).

Claims

1. A lint strainer (5) for a laundry care apparatus (D), wherein
 - the lint strainer (5) comprises a filter (6) and a flap (7) that are pivotally attached to each other at two pivot joints (8), such that,
 - in a closed position, the filter (6) and the flap (7) form an upwardly open bag-shaped air-filtering shell (10) and that,
 - in an open position, the filter (6) and the flap (7) are spaced apart below the pivot joints (8).
2. The lint strainer (5) according to claim 1, wherein, in the closed position, the shell (10) has a wedge-like outer contour.
3. The lint strainer (5) according to any of the preceding claims, wherein
 - the filter (6) comprises a frame (11) holding at least one filter element (18) for filtering lint,
 - the frame (11) having a substantially rectangular shape comprising a bottom frame section (12), two side frame sections (13) and a top frame section (14),
 - the side frame (11) sections each having a first pivot joint means (15) engaging a respective second pivot joint means (16) of the flap (7), and
 - the first pivot joint means (15) is markedly distanced from the bottom frame section (12), wherein,
 - in the closed position, the flap (7) contacts a lower part of the frame (11) below the first pivot joint means (15) including the bottom frame section (12) and at least parts of the side frame sections (13) extending from the bottom frame section (12) towards the first pivot joint means (15).
4. The lint strainer (5) according to claim 3, wherein
 - the flap (7) has a u-shaped, band-like base (19) with two lateral sections (20) connected by a transversal section (21),
 - the second pivot joint means (16) are positioned at free end regions (22) of the lateral sections (20), and
 - at least the lower part (11 a) of the frame (11) has a u-shaped, band-like form such that,
 - in the closed position, the base (19) of the flap
5. The lint strainer (5) according to claim 4, wherein, in the closed position, a rim (23) of the base (19) of the flap (7) contacts the lower part (11 a) of the frame (11).
6. The lint strainer (5) according to a combination of claim 2 and any of the claims 4 or 5, wherein
 - the base of the flap (7) is connected to a cover part (24),
 - the cover part (24) comprises two triangle-shaped side walls (25),
 - each side wall (25) is connected to a lateral section (20) of the base (19) of the flap (7) at a first edge (26)
 - with the first edge (26) reaching the transversal section (21) of the base (19) of the flap (7), and
 - the cover part (24) comprises a front part (27) that connects second edges (28) of the side walls (25) that also reaches the transversal section (21) of the base (19) of the flap (7).
7. The lint strainer (5) according to claim 6, wherein the front part (27) has a recessed free edge (29).
8. The lint strainer (5) according to any of the preceding claims, wherein a top frame section (14) of the frame (11) is formed as an inlet for process air.
9. The lint strainer (5) according to any of the preceding claims, wherein the frame (11) comprises at least one strut (18), the strut (18) holding at least part of a filter element (18).
10. The lint strainer (5) according to any of the preceding claims, wherein the flap (7) comprises at least one filter element.
11. A laundry care apparatus (D), comprising at least one lint strainer (5) according to any of the preceding claims.
12. The laundry care apparatus according to claim 11, comprising a seating for the lint strainer (5) that, in the closed position of the lint strainer (5), presses the flap (7) against the filter (6).
13. The laundry care apparatus (D) according to any of the claims 11 to 12, wherein
 - the laundry care apparatus (D) has a horizontally rotatable drum for accommodating laundry,
 - the drum is rotatably held by a front bearing shield (2), and
 - the seating (4) is part of the front bearing shield

(2).

14. The laundry care apparatus (D) according to any of the claims 11 to 13, wherein the laundry care apparatus (D) has a laundry drying function.

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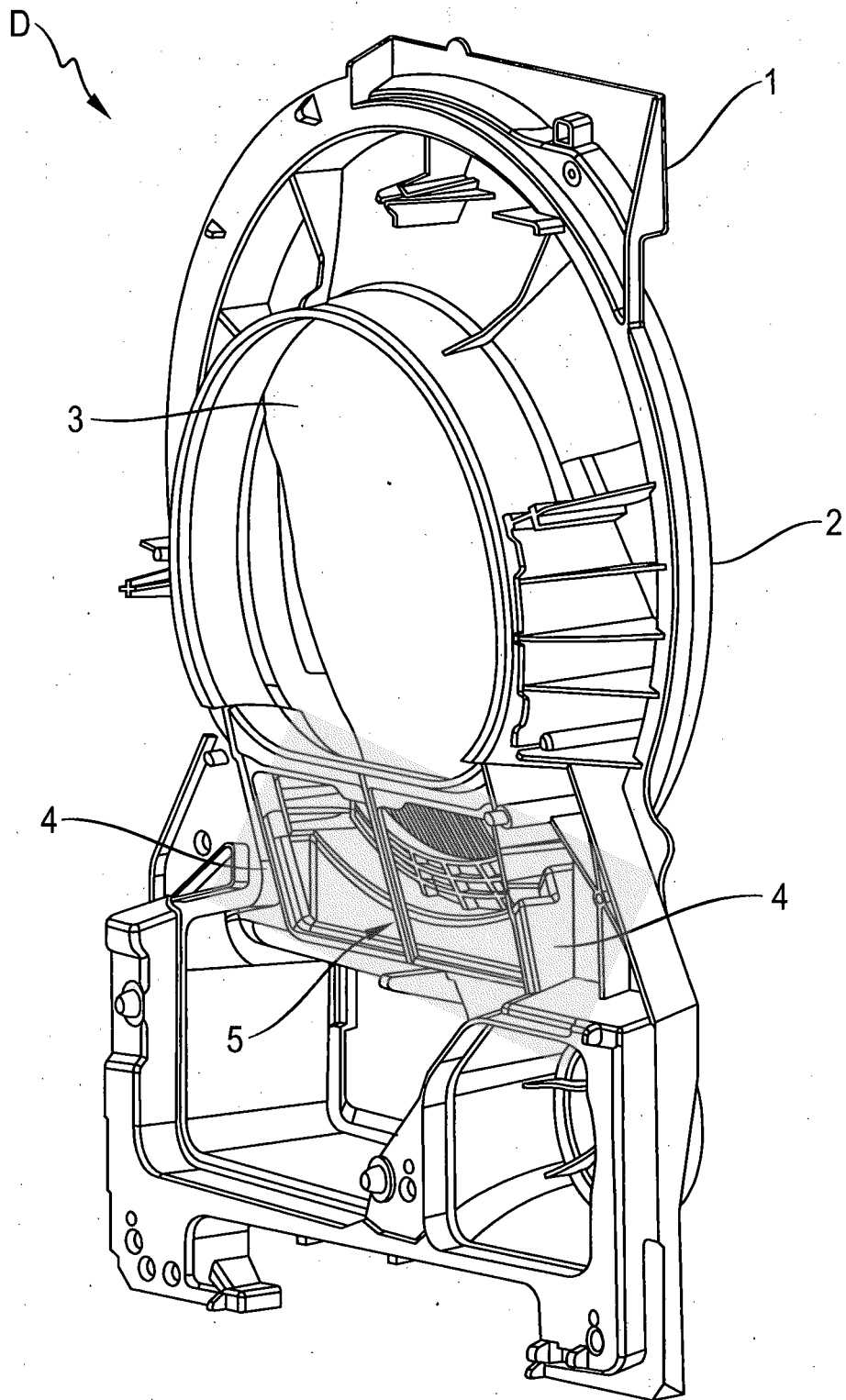


Fig. 1

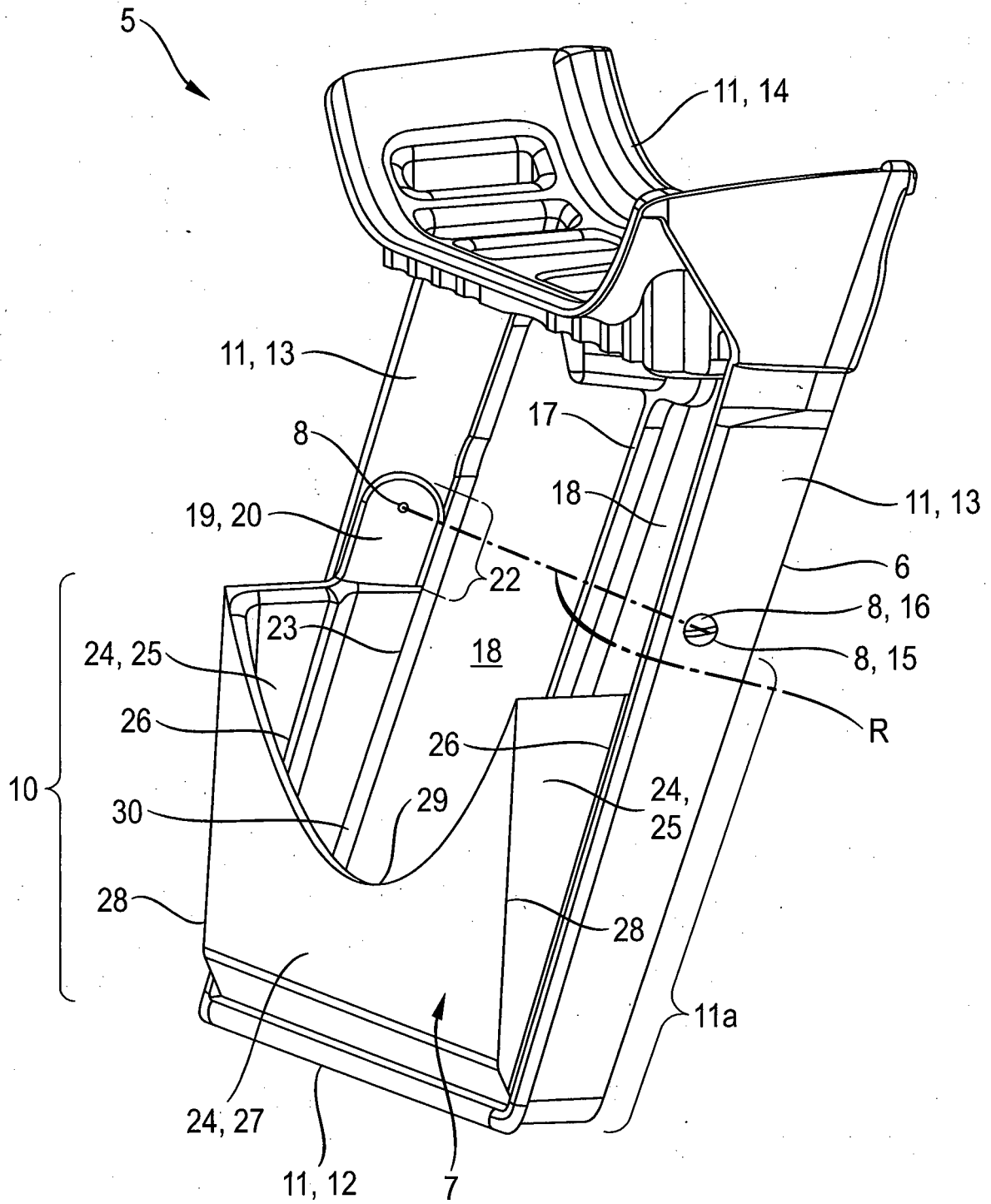


Fig. 2

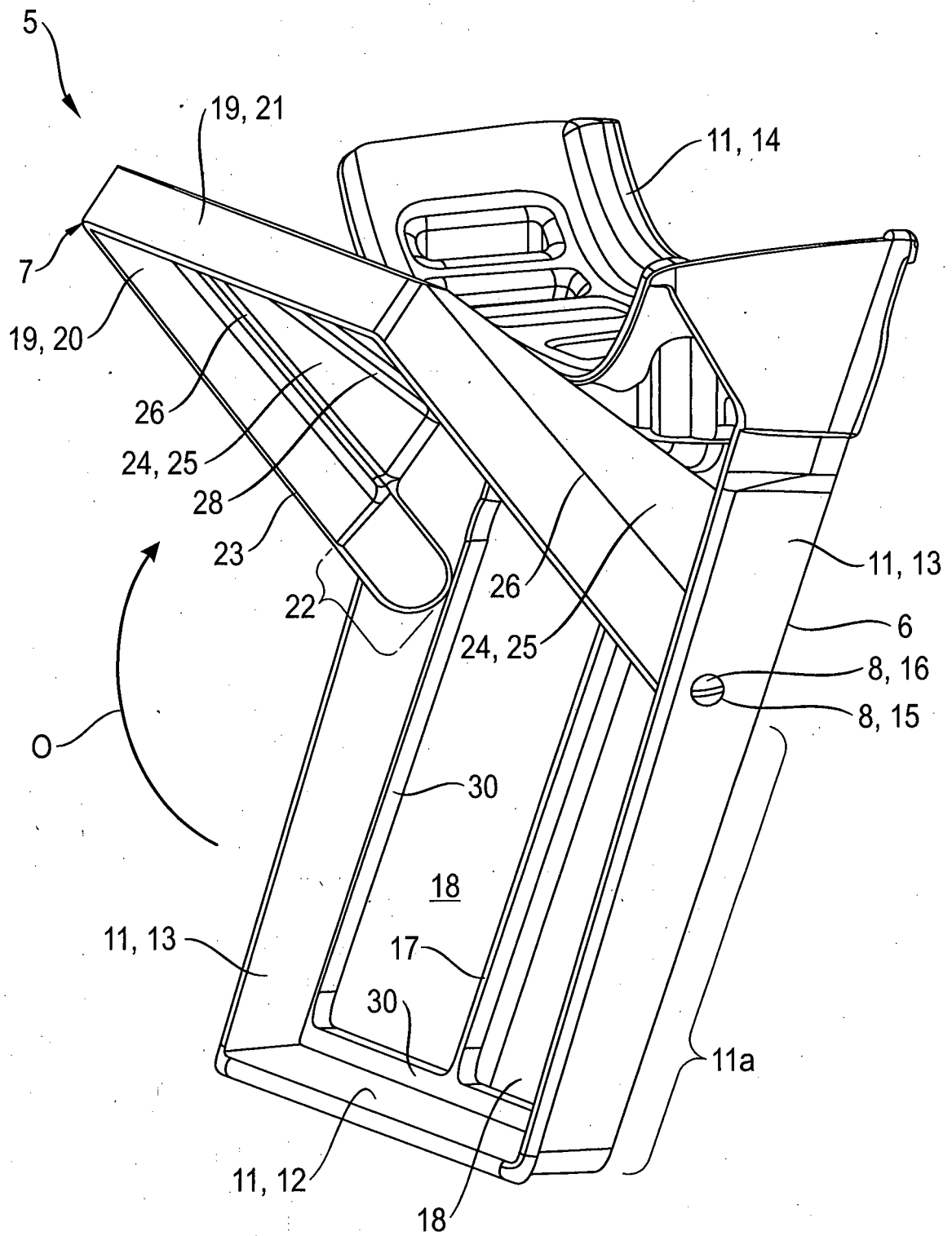


Fig. 3

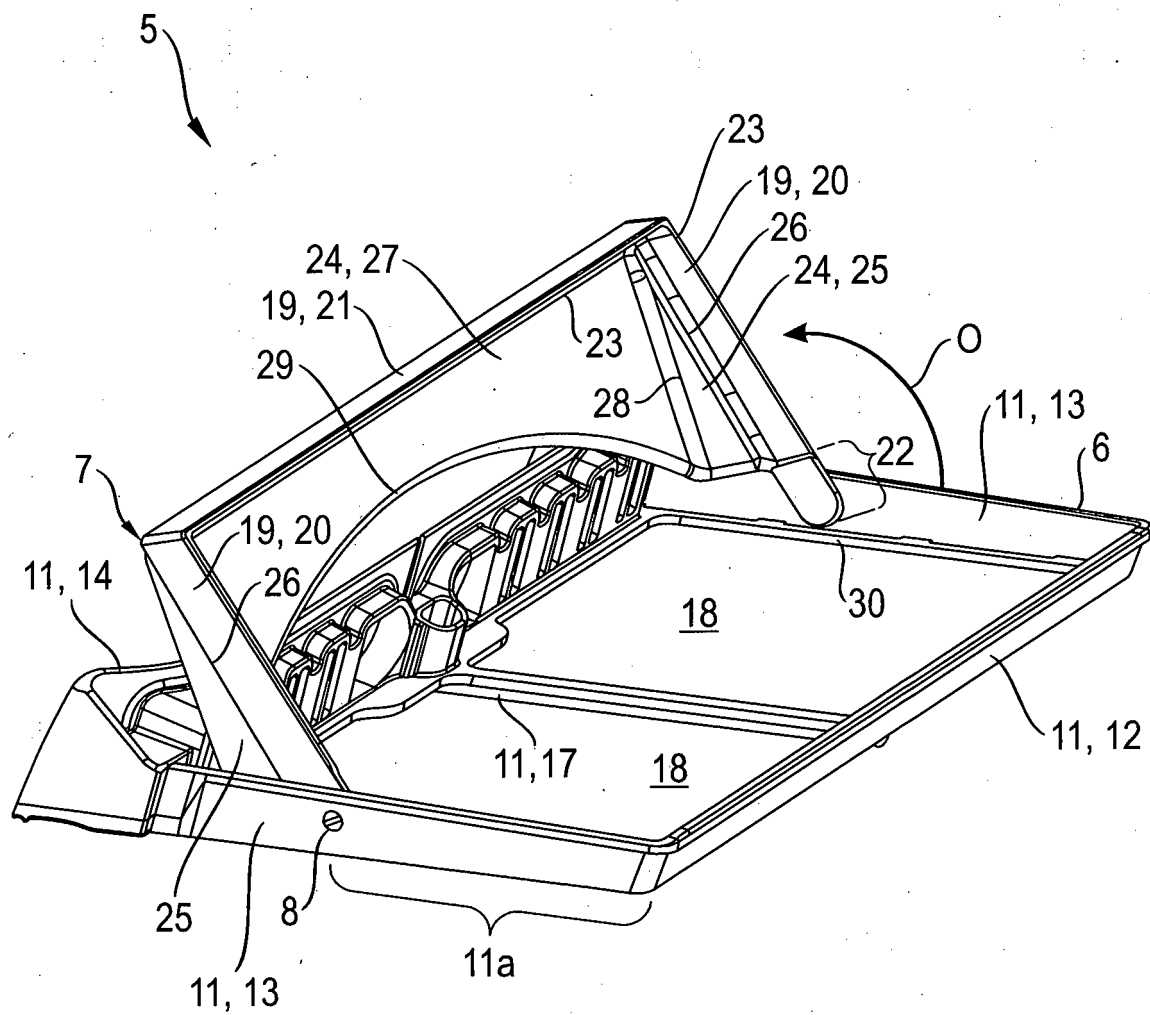


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 6765

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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,D	EP 2 682 515 A1 (ELECTROLUX HOME PROD CORP [BE]) 8 January 2014 (2014-01-08) * paragraphs [0009] - [0015] * * paragraphs [0017], [0025] * * paragraphs [0037] - [0064] * * figures 1-7 *	1-14	INV. D06F58/22
A,D	US 3 378 934 A (ERICKSON CLIFFORD E) 23 April 1968 (1968-04-23) * column 2, line 3 - column 2, line 34 * * column 3, line 49 - column 5, line 6 * * figures 1-6 *	1-14	
A	EP 2 662 487 A1 (ELECTROLUX HOME PROD CORP [BE]) 13 November 2013 (2013-11-13) * abstract; figures 1-16 *	1-14	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 March 2015	Examiner Weinberg, Ekkehard
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 14 18 6765

5 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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09-03-2015

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

REFERENCES CITED IN THE DESCRIPTION

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