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(54) **Fluff filter for a laundry drying machine**

Flusensieb für Wäschetrockner

Filtre à peluches pour sèche-linge

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## Description

### Field of the Invention

**[0001]** The present invention relates to laundry drying machines, such as laundry dryers and washer/dryers, for example tumble dryers. Particularly, the invention relates to a fluff filter for a laundry drying machine.

### Description of the Related Art

**[0002]** As known, tumble dryers typically comprise a cabinet substantially parallelepiped-shaped; the cabinet accommodates a rotatable drum apt to contain the laundry to be dried, as well as the electrical, electronic, mechanical, and hydraulic components necessary for the operation of the tumble dryer. A front panel of the cabinet has a loading opening to access the rotatable drum for loading/unloading the laundry, and a door is provided for closing the loading opening, particularly during the tumble dryer operation.

**[0003]** In operation, the laundry is dried by causing warm, dry air to flow through the drum while the latter is rotated, so that the laundry is tumbled.

**[0004]** During the drying process, the clothes inside the rotating drum typically loose lint particles or fluff. Said fluff is light and tiny so it can be brought by the hot air flow into the drying air circuit. Once the fluff enters the drying air circuit, it can obstruct it or affect the fan operation, to the extent of possibly cause the latter to stop; in general, this has a detrimental effect on the dryer functioning. Moreover, an excessive presence of fluff within the drying circuit is really dangerous, since it may cause the trigger of fire.

**[0005]** Therefore, fluff (or "de-fluff") filters have been designed suitable to retain the fluff so as to prevent it from damaging the dryer's components. Briefly, a fluff filter is provided with an input opening and (output) filtering portions adapted to allow the passage of air but to impede the passage of fluff. The input opening is configured to receive hot air carrying fluff lost by the clothes from the drum. The air is forced to exit from the fluff filter by passing through the filtering portions. In this way, the fluff retained by the filtering portions remains confined within the fluff filter.

**[0006]** The fluff filter needs to be periodically cleaned to avoid it to get clogged; to this purpose, the fluff filter is removably accommodated in a filter seat, for example located at the front of the cabinet, adjacent the loading opening and in fluid communication with the drying air circulation circuit.

**[0007]** Various types of fluff filters are known in the art.

**[0008]** For example, EP 0106289 discloses a filter comprising two complementary frames formed of a suitable insulating material and enclosing each a metallic filtering surface of a fine mesh structure. The two frames are hingedly connected to one another along adjacent edges, so that the filter can be opened in the manner of

a book for cleaning and lint removal. The opposite free edge portions of the two frames are formed with mutually engageable means for retaining the two frames in a partially closed position, in which they form an acute angle between themselves, so as to maintain a certain distance between the filtering surfaces.

**[0009]** The US patent US 3,378,934 discloses a lint trap comprising first and second sides having the major part thereof of foraminous. The sides are hinged together at the bottom thereof, provide a generally U-shaped cross-sectional configuration in a first relationship, and are pivotable to a second relationship in which the surfaces forming the inside of said U-shaped cross-section are easily and independently accessible. When said sides are in said first relationship, the trap is insertable in an exhaust duct (of a clothes dryer) through which heated air flows. The lint trap includes means at the top of said sides cooperatively effective with a duct inlet opening to retain said trap at said opening with said sides extending generally in the direction of flow. The lint trap further includes 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. The EP patent application published as EP 2562304 constitutes prior art under Article 54(3) EPC and shows an air stream filter which includes at least one plastic frame with two symmetric wings, a net sheet covering the plastic frame and provided for filtering fluff and a hinge which 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. 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. The EP patent application published as EP 2562305 constitutes prior art under Article 54(3) EPC and shows discloses an air stream filter which includes at least one plastic frame with two symmetric wings, a net sheet covering the plastic frame and provided for filtering fluff and a hinge which 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. The hinge is shorter than the half of the wing sides opposite to said hinge, so that in the open state of the plastic frame a space between the wings is formed beyond at least one end of the hinge.

**[0010]** EP 2230349 discloses a laundry dryer machine comprising a fluff filter for filtering drying air from fluff lost by laundry during the laundry dryer machine operation, the fluff filter comprising an input opening for receiving the drying air, a first filtering portion and a second filtering portion for outputting drying air filtered from fluff, the first filtering portion including a first frame structure and the second filtering portion including a second frame structure, wherein the fluff filter further comprises hinge elements for pivotally coupling the first frame structure with the second frame structure.

### Summary of the invention

**[0011]** Both of the first aforementioned solutions provide for a filter comprising two separated filtering portions, each one having respective filtering surfaces. In order to manufacture such filters, the two portions are fabricated independently, and then connected to one another by means of hinge structures.

**[0012]** The Applicant has found that manufacturing fluff filters using the abovementioned method is not efficient, in terms of time and cost. Indeed, the known solutions require to repeat the same phases for each one of the two separated filtering portions, and specifically the generation of at least one filtering surface, the generation of frames structures adapted to bear said filtering surfaces during the filter operation, and the installation of the filtering surfaces within the frame structures.

**[0013]** Moreover, the applicant has observed that both the two aforementioned filters are affected by a further drawback: the section of such filters corresponding to the junction between the two portions - *i.e.*, the section wherein the hinge structures are located - lacks of any filtering element, being instead formed by the junction of frame elements supporting the respective filtering surfaces. The junction between such frame elements may give rise to an open slit through which fluff may exit from the filter and reach the drying air circuit.

**[0014]** The Applicant has considered that it would be possible to exploit a single filtering surface acting as a filtering surface for both the two filtering portions as well as a junction between the two portions, removing the hinge structures. This kind of fluff filter could be expediently produced in a single step, *e.g.*, by over-injecting the frames on the filtering surface in a single injection molding step. Moreover, a fluff filter of this type would avoid any undesired passage of fluff through the junction between the frames, since such junction would be provided with a filtering element, too. However, the filtering surfaces are relatively fragile, being formed by nets or sieves. Therefore, such single filtering surface may break along the section thereof wherein the two filtering portions are joint together even after few openings and closings of the fluff filter. Moreover, a fluff filter of this kind results to be more prone to torsional stresses, since the two filtering portions may twist to one another.

**[0015]** The Applicant has found that the abovementioned drawbacks can be solved by having a filtering surface to be supported by the frames of both the filtering portions, at the same time providing that the frames of the filtering portions are coupled to one another by means of hinge elements. Such filtering surface extends from one filtering portion to the other one filtering portion, joining the former with the latter.

**[0016]** An aspect of the present invention provides for a laundry dryer machine in accordance with independent claim 1. The laundry dryer machine comprises a fluff filter for filtering drying air from fluff lost by laundry during the laundry dryer machine operation. The fluff filter compris-

es an input opening for receiving the drying air and a first filtering portion and a second filtering portion for outputting drying air filtered from fluff. The first filtering portion includes a first frame structure and the second filtering portion includes a second frame structure. The fluff filter further comprises hinge elements for pivotally coupling the first frame structure with the second frame structure. The fluff filter still further comprises a filtering surface supported by the first and second frame structures; said filtering surface joins the first frame structure with the second frame structure.

**[0017]** Thanks to its peculiar structure, the proposed fluff filter may be manufactured by carrying out a single molding step. Compared to the known solutions, the proposed fluff filter results to be simpler, and less expensive. Furthermore, the proposed fluff filter avoids any undesired passage of fluff through the junction between the frames, since such junction is provided with a fluff filtering element.

**[0018]** Moreover, thanks to the presence of hinge elements acting as a reinforcing structure for the portion of the filtering surface at the junction between the two filtering portions, the fluff filter results to be as structurally robust as the known fluff filters having separated filtering surfaces.

**[0019]** Each hinge element preferably comprises a pin connected to a first selected frame structure among the first frame structure and the second frame structure, and a corresponding seat connected to a second selected frame structure among the first frame structure and the second frame structure different from the first selected frame structure. The seat is adapted to rotatably house the pin.

**[0020]** In this way, the hinge elements are particularly robust, and the whole structure results to be less prone to torsional stresses, since the hinge elements avoid the two filtering portions to twist to one another. In an embodiment the hinge elements are configured to substantially avoid that the first filtering portion and the second filtering portion twist to one another.

**[0021]** According to an embodiment of the present invention, the seat is a hollow cylinder provided with an internal longitudinal cavity extending from an opening located on a base of the cylinder; the cavity is adapted to rotatably house the corresponding pin.

**[0022]** According to a further embodiment of the present invention, the seat further include a longitudinal slit configured to allow the corresponding pin to be laterally snapped into the internal cavity.

**[0023]** The second frame structure is connected to an input face of the fluff filter wherein the input opening is located. The first frame structure is configured to rotate with respect to the second frame structure around the hinge elements from a closed filter configuration, wherein the first filtering portion is folded on the second filtering portion and engages the input face, to an opened filter configuration, wherein the first filtering portion is disengaged from the input face.

**[0024]** According to an embodiment of the present invention, the filtering surface is a single integral element extending from an edge of the first frame structure to an edge of the second frame structure.

**[0025]** According to another embodiment of the present invention, the filtering surface comprises at least two juxtaposed filtering surface portions.

**[0026]** Another aspect of the present invention relates to a method for manufacturing a fluff filter for a laundry dryer machine in accordance with independent claim 8. The method comprises providing a filtering surface and molding a first frame structure, a second frame structure, and hinge elements - for pivotally coupling the first frame structure to the second frame structure - on the filtering surface in a single molding step.

**[0027]** Preferably, the step of molding the first frame, the second frame and the hinge elements in a single molding step includes arranging a single mold on a face of the filtering surface, injecting melted plastic inside the mold, and removing the mold when the plastic is hardened.

**[0028]** According to an embodiment of the present invention, said molding the hinge elements comprises molding for each hinge element a pin and a corresponding seat adapted to rotatably house the pin.

**[0029]** According to a further embodiment of the present invention, said molding the hinge elements comprises molding the hinge elements with the pins that result to be already housed in the corresponding seats.

**[0030]** According to another embodiment of the present invention said molding the hinge elements comprises molding the hinge elements with the pins that result to be disengaged from the corresponding seats, and inserting the pins in the corresponding seats.

#### Brief description of the drawings

**[0031]** These and other features and advantages of the present invention will be made apparent by the following description of some exemplary and non limitative embodiments thereof; for its better intelligibility, the following description should be read making reference to the attached drawings, wherein:

**Figure 1A** is a perspective view of a tumble dryer wherein a fluff filter according to an embodiment of the present invention may be employed;

**Figure 1B** is a sectional view of the tumble dryer of **Figure 1A**;

**Figure 2A** is a perspective view of a fluff filter according to an embodiment of the present invention in the closed configuration;

**Figure 2B** is a view from the above of the fluff filter of **Figure 2A** in the opened configuration;

**Figure 2C** is a magnification view of a portion of **Figure 2B** wherein two filtering portions thereof are joined to one another;

**Figure 3A** is a side view of a hinge element accord-

ing to an embodiment of the present invention;

**Figure 3B** is a cross sectional view of the hinge element of **Figure 3A**;

**Figure 4A** is a cross sectional view of a possible implementation of a portion of a mold for obtaining the hinge element of **Figures 3A** and **3B**;

**Figure 4B** is a cross sectional view of the mold of **Figure 4A** with the sections thereof that are detached to one another, and

**Figures 5A** and **5B** are perspective views of a hinge element according to a further embodiment of the present invention.

#### Detailed description of the invention

**[0032]** **Figures 1A** and **1B** are partially cutaway views of a portion of a tumble dryer, hereinafter simply referred to as dryer. **Figure 1A** is a perspective view of the tumble dryer, depicted without laundry loading door, while **Figure 1B** is a sectional view of the tumble dryer taken along line I-I, depicted with the laundry loading door closed.

**[0033]** The tumble dryer, denoted as **100** in the drawings, comprises a cabinet **105**, for example parallelepiped-shaped. The cabinet accommodates a rotatable drum **110** adapted to contain the laundry to be dried, as well as the electrical, electronic, mechanical, and hydraulic components necessary for the operation of the tumble dryer (not shown in figures since they are well known in the art). A front panel **115** of the cabinet has a loading opening **120** to access the rotatable drum **110** for loading/unloading the laundry to be dried. The loading opening **120** has a border **125**, preferably substantially annular, in which door hinges **130** as well as door locking means (not shown) are arranged for, respectively, hinging and locking a door **135**. Said door **135** is adapted for sealably closing said loading opening **120** during the tumble dryer operation. A fluff filter **140** is housed in a fluff filter seat formed in correspondence of the front panel **115** adjacent to the loading opening **120** and behind the annular border **125**.

**[0034]** As it is well known to those skilled in the art, the dryer **100** (typically, the rear side thereof) is provided with openings (not shown) for the suction of air which is conveyed within the rotatable drum **110** by way of an inlet duct provided with at least one electric heater element or heat pump (not shown). Once reached the rotatable drum **110**, the heated air is conveyed to an outlet opening (not shown) by means of an output air duct having a motor-driven blower installed therein (not shown). In the dryers of the so-called recirculation type, instead of being conveyed to an outlet opening, the heated air is conveyed back to the inlet duct, after being cooled and dehumidified by means of a condenser located in the output air duct.

**[0035]** The fluff filter seat is located at, or in proximity to, the entrance of the output air duct in such a way that the heated air is forced by the blower to enter the fluff filter **140** from an input opening **145** located on the upper side of the filter. Passing through a frontal filtering portion

150 (facing toward the front panel 115) and through an opposite rear filtering portion 155 (facing toward the interior of the dryer), the heated air exits from the fluff filter 140 and reaches the output air duct. The filtering portions 150 and 155 are provided with filtering surfaces adapted to allow the passage of air but to impede the passage of fluff. The fluff lost by the clothes located in the rotatable drum 110 during the dryer 100 operation, being retained by the filtering surfaces of the filtering portions 150 and 155, remains confined within the fluff filter 140. Therefore, the air reaching the output air duct results to be substantially free from any foreign matter capable of obstructing or affecting the operation of the blower located therein and/or setting fires. An example of air flow entering the input opening 145 and exiting from the filtering portions 150 and 155 of the fluff filter is schematically depicted in Figure 1B by means of dashed arrows.

[0036] In order to avoid that the fluff filter 140 gets clogged, the fluff filter 140 is configured to be easily removed from its seat for being cleaned from the fluff collected during the dryer 100 operation. Once removed from the seat, the fluff filter 140 is further configured to be opened so as to allow a user of the dryer to easily remove the fluff. For this purpose, the filtering portions 150 and 155 are pivotally hinged together at their bottoms so as to allow the fluff filter 140 to switch from a closed configuration, wherein the two filtering portions 150 and 155 are folded to one another so as to form an acute angle between themselves, to an opened configuration, in which the two filtering portions 150 and 155 form a substantially straight angle.

[0037] A detailed view of a fluff filter 140 according to an embodiment of the present invention is shown in Figures 2A, 2B and 2C. Figure 2A is a perspective view of the fluff filter 140 in the closed configuration, with the frontal filtering portion 150 in the close up, Figure 2B is a view from the above of the fluff filter 140 in the opened configuration, and Figure 2C is a magnification view of the portion of Figure 2B wherein the two filtering portions 150 and 155 are joined to one another.

[0038] The fluff filter 140 comprises an upper face (or also input face) 156 wherein the input opening 145 is located. Preferably, the input opening 145 comprises a grid structure that prevents clothes or foreign matters from accessing the fluff filter 140 itself and the air duct downstream the fluff filter 140. The upper face 156 is, in this particular embodiment, curved, and it is capable of adapting itself to the peripheral rim of the annular border 125, once the fluff filter 140 is correctly housed in its seat (see Figure 1A).

[0039] The rear filtering portion 155 comprises a frame 160 (e.g., made of plastic material) including a perimeter section which surrounds a plurality of rod elements 161. The perimeter section of the frame 160 has an upper edge 162 connected to the upper face 156, and an opposite lower edge 164 hingedly coupled to the filtering portion 150. Two lateral edges connect the upper edge 162 with the lower edge 164. The rod elements 161 are

arranged so as to define a plurality of windows 166 (eight in the example at issue). According to an embodiment of the present invention, the rear filtering portion 155 is integral to the upper face 156.

5 [0040] Similarly, the frontal filtering portion 150 comprises a frame 170 (made in a plastic material) including a perimeter section surrounding a plurality of rod elements 171. The perimeter section of the frame 170 has an upper edge 172 adapted to engage the upper face 156 when the fluff filter 140 is in the closed configuration, and an opposite lower edge 174 hingedly coupled to the filtering portion 155. Two lateral edges connect the upper edge 172 with the lower edge 174. The rod elements 171 are arranged so as to define a plurality of windows 176 (eight in the example at issue).

10 [0041] The lower edge 164 of the frame 160 is pivotally coupled with the lower edge 174 of the frame 170 by means of hinge elements 178 (two, in the example at issue). Each hinge element 178 includes a pin 180 and a seat 182 adapted to rotatably house the pin 180. Making reference to the illustrated example, each pin 180 is supported by a respective supporting element 184 that is connected to the lower edge 164 of the frame 160, while each seat 182 is connected to the lower edge 174 of the frame 170. Similar considerations apply in case the pins 180 (and the supporting elements) are located on the frame 170 and the seats 182 on the frame 160. Mixed solutions are also contemplated, wherein at least one hinge element 178 has the pin 180 located on the frame 170 and the corresponding seat 182 on the frame 160 and at the same time at least one further hinge element 178 has the pin 180 located on the frame 160 and the corresponding seat 182 on the frame 170. Since in the considered embodiment the supporting elements 184 protrude from the edge 164 toward the edge 174, in order not to obstacle the folding movement of the filtering portions 150, 155 during the opening/closing of the fluff filter 140, the lower edge 174 of the frame 170 is provided with suitably shaped recesses 186, each one facing a respective supporting element 184.

40 [0042] According to an embodiment of the present invention, both the frame 160 and the frame 170 support a same filtering surface 190 which extends from the upper edge 162 to the upper edge 172 passing through the portion of the fluff filter 140 wherein the hinge elements 178 are located, joining the frame 160 with the frame 170. In the present description, the filtering surface 190 has to be considered as the part of the fluff filter 140 having fluff filtering capabilities. For example, such filtering surface 190 may include a net made in nylon, a metallic sieve, or any kind of septum adapted to allow the passage of air but to impede the passage of fluff and to retain the latter. Therefore, in operation, the air entered from the input opening 145 is forced to exit from the fluff filter 140 by passing through the portions of the filtering surface 190 delimited by the windows 166, 176 defined by the frames 160, 170.

55 [0043] According to an embodiment of the present in-

vention, the filtering surface **190** is a single integral (*i.e.*, in one piece) element - *e.g.*, a single piece of net - extending from the edge **172** to the edge **162**. According to another embodiment of the present invention, the filtering surface **190** is instead formed by two or more juxtaposed filtering surface portions - *e.g.*, two or more juxtaposed pieces of net joined to one another by means of the frames. Advantageously, the filtering surface **190** is present at the junction between the lower edge **164** of the frame **160** and the lower edge **174** of the frame **170**, *i.e.*, the lowermost portion of the fluff filter **140** when the latter is housed in its fluff filter seat.

**[0044]** According to an embodiment of the present invention, the upper face **156**, the filtering portions **150**, **155**, as well as the components of the hinge elements **178** - such as the pins **180** and the seats **182** -, are jointly formed on said filtering surface **190** at the same time in a single molding step.

**[0045]** According to an embodiment of the present invention, the fluff filter **140** is manufactured in the following way.

**[0046]** The first step comprises providing a sheet made of a proper filtering material, such as a nylon net.

**[0047]** Then, the sheet is cut in such a way to substantially assume the shape of the desired filtering surface **190**.

**[0048]** Both the upper face **156**, the filtering portions **150**, **155** and the components of the hinge elements **178** are then directly molded on a face of the filtering surface **190** in a single molding step exploiting a same mold. For example, the mold is arranged on a face of the filtering surface **190**, and then melted plastic is injected inside the mold. When the plastic cools and hardens, the mold is removed, and the filtering portions **150**, **155** results to be firmly attached to the filtering surface **190**.

**[0049]** Compared to the known solutions, the fluff filter according to the present invention may be manufactured in a faster and easier way, being sufficient carrying out a single molding step on a single filtering surface.

**[0050]** Furthermore, the fluff filter according to the present invention avoids any undesired passage of fluff through the junction between the lower edges of the frames, since such junction is provided with a fluff filtering element. This feature is quite advantageous, since said junction is located in the lowermost portion of the filter, wherein fluff largely cumulates because of the force of gravity.

**[0051]** It has to be appreciated that the presence of hinge elements acts as a reinforcing structure for the portion of the filtering surface at the junction between the two filtering portions. Should the filtering surface brake because of a repeated opening/closing of the fluff filter, the filtering portions would correctly remain pivotally attached to one another thanks to the presence of the hinge elements. Moreover, the whole structure results to be less prone to torsional stresses, since the hinge elements substantially avoid the two filtering portions to twist to one another, allowing only a rotation around the rotation

axis of the hinge elements themselves.

**[0052]** According to an embodiment of the present invention, the mold used to mold the upper face **156**, the filtering portions **150**, **155** and the components of the hinge elements **178** on the filtering surface is shaped so that the pins **180** results to be already housed within the corresponding seats **182**, not requiring any further assembling step. According to a further embodiment of the present invention, the mold is instead configured so that the hinge elements **178** are molded with the pins **180** that are still disengaged from the corresponding seats **182**; therefore, the pins **180** are inserted in the seats **182** in a subsequent phase. In this latter case, the mold is arranged so that each resulting pin/seat pair is formed with the pin **180** that is sufficiently far from the seat **182** to facilitate the insertion operations; additionally, the length of the filtering surface **190** obtained from the starting filtering material sheet may be slightly oversized so as to further facilitate the insertion operations.

**[0053]** According to an embodiment of the present invention, the seat **182** of the hinge elements **178** is a bushing, *i.e.* a hollow cylinder provided with an internal longitudinal cavity extending from an opening located on a base of the cylinder to an opening located on the opposite base, which cavity is adapted to rotatably house the corresponding pin **180**. According to a further embodiment of the present invention, instead of having two opposite openings, the internal longitudinal cavity may be closed at one of the two bases of the cylinder. A side view of a hinge element **178** according to said embodiment of the invention is illustrated in **Figure 3A**, while a cross sectional view thereof is illustrated in **Figure 3B**. **Figure 4A** illustrates a cross sectional view of a possible implementation of a portion of such mold corresponding to a hinge element **178**. In the considered embodiment, said portion of the mold comprises an upper section **410**, a lower section **420** and a lateral section **430**, which together define a cavity **440** to be filled with the melted plastic for obtaining the hinge element **178**. Since a space between the external lateral surface of the pin **180** and the internal surface of the seat **182** is required for allowing the pin to rotate inside the seat, the lateral section **430** is shaped so as to include a corresponding spacing element **450**, having the shape of a protruding hollow cylinder. **Figure 4B** illustrates the same mold portion of **Figure 4A** with the sections **410**, **420** and **430** that are detached to one another, after that the melted plastic injected into the cavity **450** is hardened.

**[0054]** According to a further embodiment of the present invention illustrated in **Figures 5A** and **5B**, the seat **182** of the hinge elements **178** has a shape similar to that of the bushing of the embodiment illustrated in **Figures 3A** and **3B**, with the addition of a longitudinal slit **500** allowing the pin **180** to be laterally snapped into the internal cavity of the seat **182**.

**[0055]** Although in the present description reference has been made to a tumble dryer, the concepts of the present invention may be applied to other laundry drying

machines, such as for example washing/drying machines.

### Claims

1. Laundry dryer machine (100) comprising a fluff filter (140) for filtering drying air from fluff lost by laundry during the laundry dryer machine operation, the fluff filter (140) comprising:
  - an input opening (145) for receiving the drying air;
  - a first filtering portion (150) and a second filtering portion (155) for outputting drying air filtered from fluff, the first filtering portion (150) including a first frame structure (170) and the second filtering portion (155) including a second frame structure (160), and
  - hinge elements (178) for pivotally coupling the first frame structure (170) with the second frame structure (160), **characterised in that** the fluff filter further comprises:
    - a filtering surface (190) supported by the first frame structure (170) and by the second frame structure (160), said filtering surface joining the first frame structure (170) with the second frame structure (160), wherein each hinge element (178) comprises:
      - a pin (180) connected to a first selected frame structure among the first frame structure (170) and the second frame structure (160), and
      - a corresponding seat (182) connected to a second selected frame structure among the first frame structure (170) and the second frame structure (160) different from the first selected frame structure, the seat (182) being adapted to rotatably house the pin (180).
2. The laundry dryer machine (100) of claim 1, wherein the hinge elements (178) are configured to substantially avoid that the first filtering portion (150) and the second filtering portion (160) twist to one another.
3. The laundry dryer machine (100) of claim 2, wherein the seat (182) is a hollow cylinder provided with an internal longitudinal cavity extending from an opening located on a base of the cylinder, the cavity being adapted to rotatably house the corresponding pin (180).
4. The laundry dryer machine (100) of claim 3, wherein the seat (182) further include a longitudinal slit (500) configured to allow the corresponding pin (180) to be laterally snapped into the internal cavity.
5. The laundry dryer machine (100) of any one among the preceding claims, wherein the second frame structure (160) is connected to an input face (156) of the fluff filter (140), the input opening being located on the input face (156), the first frame structure (170) being configured to rotate with respect to the second frame structure (160) around the hinge elements (178)
  - from a closed filter configuration, wherein the first filtering portion (170) is folded on the second filtering portion (160) and engages the input face (156),
  - to an opened filter configuration, wherein the first filtering portion (170) is disengaged from the input face (156).
6. The laundry dryer machine (100) of any one among the preceding claims, wherein the filtering surface (190) is a single integral element extending from an edge (172) of the first frame structure (170) to an edge (162) of the second frame structure (160).
7. The laundry dryer machine (100) of any one among claims 1 to 5, wherein the filtering surface (190) comprises at least two juxtaposed filtering surface portions.
8. Method for manufacturing a fluff filter (140) for a laundry dryer machine (100) according to claim 1, the method comprising:
  - providing a filtering surface (190), and
  - molding:
    - a first frame structure (170),
    - a second frame structure (160), and
    - hinge elements (178) for pivotally coupling the first frame structure (170) to the second frame structure (160)

on the filtering surface (190) in a single molding step.
9. The method according to claim 8, wherein the step of molding the first frame (170), the second frame (160) and the hinge elements (178) in a single molding step includes:
  - arranging a single mold on a face of the filtering surface (190);
  - injecting melted plastic inside the mold, and
  - removing the mold when the plastic is hardened.
10. The method according to claim 8 or 9, wherein said molding the hinge elements (178) comprises molding for each hinge element (178) a pin (180) and a

corresponding seat (182) adapted to rotatably house the pin (180).

11. The method according to claim 10, wherein said molding the hinge elements (178) comprises:

- molding the hinge elements (178) with the pins (180) that result to be already housed in the corresponding seats (182).

12. The method according to claim 10, wherein said molding the hinge elements (178) comprises:

- molding the hinge elements (178) with the pins (180) that result to be disengaged from the corresponding seats (182), and  
- inserting the pins (180) in the corresponding seats (182).

### Patentansprüche

1. Wäschetrockner (100), ein Flusensieb (140) zum Filtern von Flusen, die sich während des Wäschetrocknerbetriebs von der Wäsche gelöst haben, aus der Trockenluft umfassend, wobei das Flusensieb (140) Folgendes umfasst:

- eine Eingangsöffnung (145) zur Aufnahme der Trockenluft;  
- einen ersten Filterabschnitt (150) und einen zweiten Filterabschnitt (155) zum Ausgeben der von Flusen befreiten Trockenluft, wobei der erste Filterabschnitt (150) eine erste Rahmenstruktur (170) umfasst und der zweite Filterabschnitt (155) eine zweite Rahmenstruktur (160) umfasst,  
und

- Scharnierelemente (178) zum verschwenkbaren Koppeln der ersten Rahmenstruktur (170) mit der zweiten Rahmenstruktur (160), **dadurch gekennzeichnet, dass** das Flusensieb ferner Folgendes umfasst:

- eine Filterfläche (190), die von der ersten Rahmenstruktur (170) und von der zweiten Rahmenstruktur (160) getragen wird, wobei die Filterfläche die erste Rahmenstruktur (170) mit der zweiten Rahmenstruktur (160) verbindet, wobei jedes Scharnierelement (178) Folgendes umfasst:

- einen Stift (180), der mit einer ersten ausgewählten Rahmenstruktur von der ersten Rahmenstruktur (170) und der zweiten Rahmenstruktur (160) verbunden ist, und

- eine zugehörige Aufnahme (182), die mit einer zweiten ausgewählten Rahmenstruktur von der ersten Rahmenstruktur (170) und der zweiten Rahmenstruktur (160), die sich von der ersten

ausgewählten Rahmenstruktur unterscheidet, verbunden ist, wobei die Aufnahme (182) dazu eingerichtet ist, den Stift (180) drehbar aufzunehmen.

2. Wäschetrockner (100) nach Anspruch 1, wobei die Scharnierelemente (178) dazu ausgelegt sind, im Wesentlichen zu verhindern, dass sich der erste Filterabschnitt (150) und der zweite Filterabschnitt (160) zueinander verdrehen.

3. Wäschetrockner (100) nach Anspruch 2, wobei die Aufnahme (182) ein Hohlzylinder ist, der mit einem inneren Längshohlraum versehen ist, der sich von einer Öffnung, die sich an der Unterseite des Zylinders befindet, erstreckt, wobei der Hohlraum dazu eingerichtet ist, den zugehörigen Stift (180) drehbar aufzunehmen.

4. Wäschetrockner (100) nach Anspruch 3, wobei die Aufnahme (182) ferner einen in Längsrichtung verlaufenden Schlitz (500) umfasst, der dazu ausgelegt ist, zuzulassen, dass der zugehörige Stift (180) seitlich in den inneren Hohlraum eingerastet wird.

5. Wäschetrockner (100) nach einem der vorstehenden Ansprüche, wobei die zweite Rahmenstruktur (160) mit einer Eingangsseite (156) des Flusensiebs (140) verbunden ist, wobei sich die Eingangsöffnung an der Eingangsseite (156) befindet, wobei die erste Rahmenstruktur (170) dazu ausgelegt ist, sich in Bezug zur zweiten Rahmenstruktur (160) wie folgt um die Scharnierelemente (178) zu drehen:

- von einer geschlossenen Filterkonfiguration, wobei der erste Filterabschnitt (170) auf den zweiten Filterabschnitt (160) gefaltet ist und in die Eingangsseite (156) eingreift,  
- zu einer geöffneten Filterkonfiguration, wobei der erste Filterabschnitt (170) von der Eingangsseite (156) gelöst ist.

6. Wäschetrockner (100) nach einem der vorstehenden Ansprüche, wobei die Filterfläche (190) ein einzelnes, integrales Element ist, das sich von einer Kante (172) der ersten Rahmenstruktur (170) zu einer Kante (162) der zweiten Rahmenstruktur (160) erstreckt.

7. Wäschetrockner (100) nach einem der Ansprüche 1 bis 5, wobei die Filterfläche (190) mindestens zwei nebeneinander angeordnete Filterflächenabschnitte umfasst.

8. Verfahren zur Herstellung eines Flusensiebs (140) für einen Wäschetrockner (100) nach Anspruch 1, wobei das Verfahren Folgendes umfasst:

- Vorsehen einer Filterfläche (190) und
  - Formen:
    - einer ersten Rahmenstruktur (170),
    - einer zweiten Rahmenstruktur (160) und
    - von Scharnierelementen (178) zum verschwenkbaren Koppeln der ersten Rahmenstruktur (170) mit der zweiten Rahmenstruktur (160) auf der Filterfläche (190) in einem einzelnen Formschritt.
9. Verfahren nach Anspruch 8, wobei der Schritt des Formens des ersten Rahmens (170), des zweiten Rahmens (160) und der Scharnierelemente (178) in einem einzelnen Formschritt Folgendes umfasst:
- Anordnen einer einzelnen Form auf einer Seite der Filterfläche (190);
  - Spitzgießen geschmolzenen Kunststoffes in die Form und
  - Entfernen der Form, wenn der Kunststoff ausgehärtet ist.
10. Verfahren nach Anspruch 8 oder 9, wobei das Formen der Scharnierelemente (178) das Formen eines Stifts (180) und einer zugehörigen Aufnahme (182), die dazu eingerichtet ist, den Stift (180) drehbar aufzunehmen, für jedes Scharnierelement (178) umfasst.
11. Verfahren nach Anspruch 10, wobei das Formen der Scharnierelemente (178) Folgendes umfasst:
- Formen der Scharnierelemente (178) mit den Stiften (180), die bereits in den zugehörigen Aufnahmen (182) aufgenommen sind.
12. Verfahren nach Anspruch 10, wobei das Formen der Scharnierelemente (178) Folgendes umfasst:
- Formen der Scharnierelemente (178) mit den Stiften (180), die von den zugehörigen Aufnahmen (182) gelöst sind, und
  - Einsetzen der Stifte (180) in die zugehörigen Aufnahmen (182).

## Revendications

1. Sèche-linge (100) comprenant un filtre à peluches (140) pour filtrer dans l'air de séchage les peluches perdues par le linge pendant le fonctionnement du sèche-linge, le filtre à peluches (140) comprenant :
- une ouverture d'entrée (145) pour recevoir l'air de séchage ;
  - une première partie de filtrage (150) et une seconde partie de filtrage (155) pour faire sortir
2. Sèche-linge (100) selon la revendication 1, dans lequel les éléments charnières (178) sont conçus pour éviter sensiblement que la première partie de filtrage (150) et la seconde partie de filtrage (160) se tordent l'une vers l'autre.
3. Sèche-linge (100) selon la revendication 2, dans lequel le siège (182) est un cylindre creux muni d'une cavité longitudinale interne s'étendant depuis une ouverture située sur une base du cylindre, la cavité étant conçue pour loger la broche correspondante (180) en rotation.
4. Sèche-linge (100) selon la revendication 3, dans lequel le siège (182) comprend en outre une fente longitudinale (500) conçue pour permettre à la broche correspondante (180) d'être pressée latéralement dans la cavité interne.
5. Sèche-linge (100) selon l'une quelconque des revendications précédentes, dans lequel la seconde structure de cadre (160) est reliée à une surface d'entrée (156) du filtre à peluches (140), l'ouverture d'entrée étant située sur la surface d'entrée (156), la première structure de cadre (170) étant conçue pour tourner par rapport à la seconde structure de cadre (160) autour des éléments charnières (178) d'une configuration de filtre fermé dans laquelle la

l'air de séchage filtré exempt de peluches, la première partie de filtrage (150) comprenant une première structure de cadre (170) et la seconde partie de filtrage (155) comprenant une seconde structure de cadre (160), et des éléments charnières (178) pour coupler en pivotement la première structure de cadre (170) à la seconde structure de cadre (160), **caractérisé en ce que** le filtre à peluches comprend en outre :

une surface de filtrage (190) supportée par la première structure de cadre (170) et la seconde structure de cadre (160), ladite surface de filtrage joignant la première structure de cadre (170) à la seconde structure de cadre (160), dans lequel chaque élément charnière (178) comprend :

une broche (180) reliée à une première structure de cadre sélectionnée parmi la première structure de cadre (170) et la seconde structure de cadre (160), et un siège correspondant (182) relié à une seconde structure de cadre sélectionnée parmi la première structure de cadre (170) et la seconde structure de cadre (160) différente de la première structure de cadre sélectionnée, le siège (182) étant conçu pour loger la broche (180) en rotation.

- première partie de filtrage (170) est pliée sur la seconde partie de filtrage (160) et est en prise avec la surface d'entrée (156), à une configuration de filtre ouvert dans laquelle la première partie de filtrage (170) est dégagée de la surface d'entrée (156). 5
6. Sèche-linge (100) selon l'une quelconque des revendications précédentes, dans lequel la surface de filtrage (190) est un élément unique d'une seule pièce s'étendant d'un bord (172) de la première structure de cadre (170) à un bord (162) de la seconde structure de cadre (160). 10
7. Sèche-linge (100) selon l'une quelconque des revendications 1 à 5, dans lequel la surface de filtrage (190) comprend au moins deux parties de surface de filtrage juxtaposées. 15
8. Procédé de fabrication d'un filtre à peluches (140) pour un sèche-linge (100) selon la revendication 1, le procédé comprenant : 20
- la fourniture d'une surface de filtrage (190), et le moulage : 25
- d'une première structure de cadre (170), d'une seconde structure de cadre (160), et d'éléments charnières (178) pour coupler en pivotement la première structure de cadre (170) à la seconde structure de cadre (160) 30
- sur la surface de filtrage (190) en une seule étape de moulage. 35
9. Procédé selon la revendication 8, dans lequel l'étape de moulage du premier cadre (170), du second cadre (160) et des éléments charnières (178) en une seule étape de moulage comprend : 40
- la disposition d'un moule unique sur une surface de la surface de filtrage (190) ; l'injection de plastique fondu à l'intérieur du moule, et 45
- le retrait du moule lorsque le plastique est durci.
10. Procédé selon la revendication 8 ou 9, dans lequel ledit moulage des éléments charnières (178) comprend le moulage pour chaque élément charnière (178) d'une broche (180) et d'un siège correspondant (182) conçu pour loger la broche (180) en rotation. 50
11. Procédé selon la revendication 10, dans lequel ledit moulage des éléments charnières (178) comprend : le moulage des éléments charnières (178) avec les broches (180), de façon à ce qu'elles soient déjà 55
- logées dans les sièges correspondants (182).
12. Procédé selon la revendication 10, dans lequel ledit moulage des éléments charnières (178) comprend : le moulage des éléments charnières (178) avec les broches (180), de façon à ce qu'elles soient dégagées des sièges correspondants (182), et l'insertion des broches (180) dans les sièges correspondants (182).

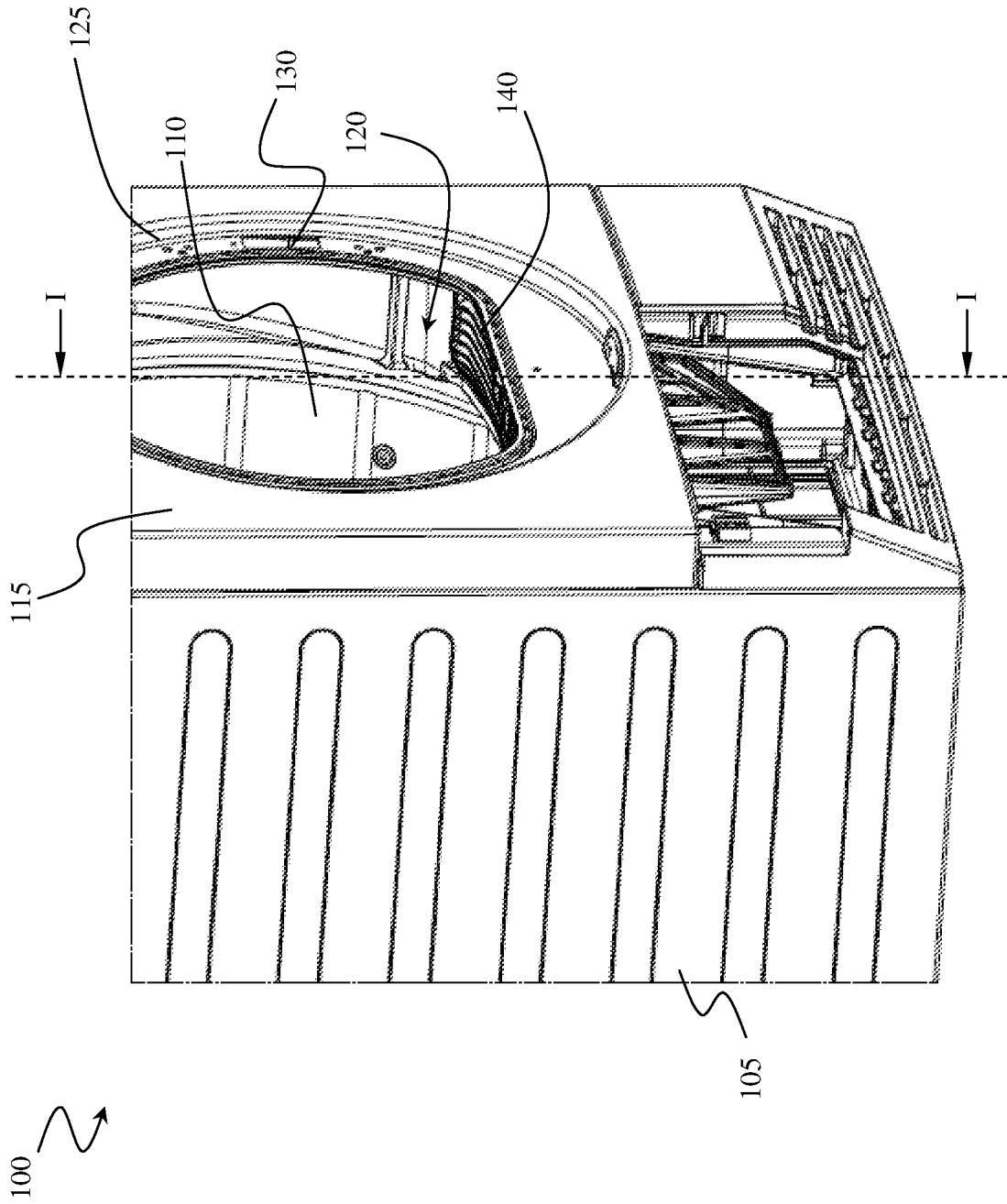
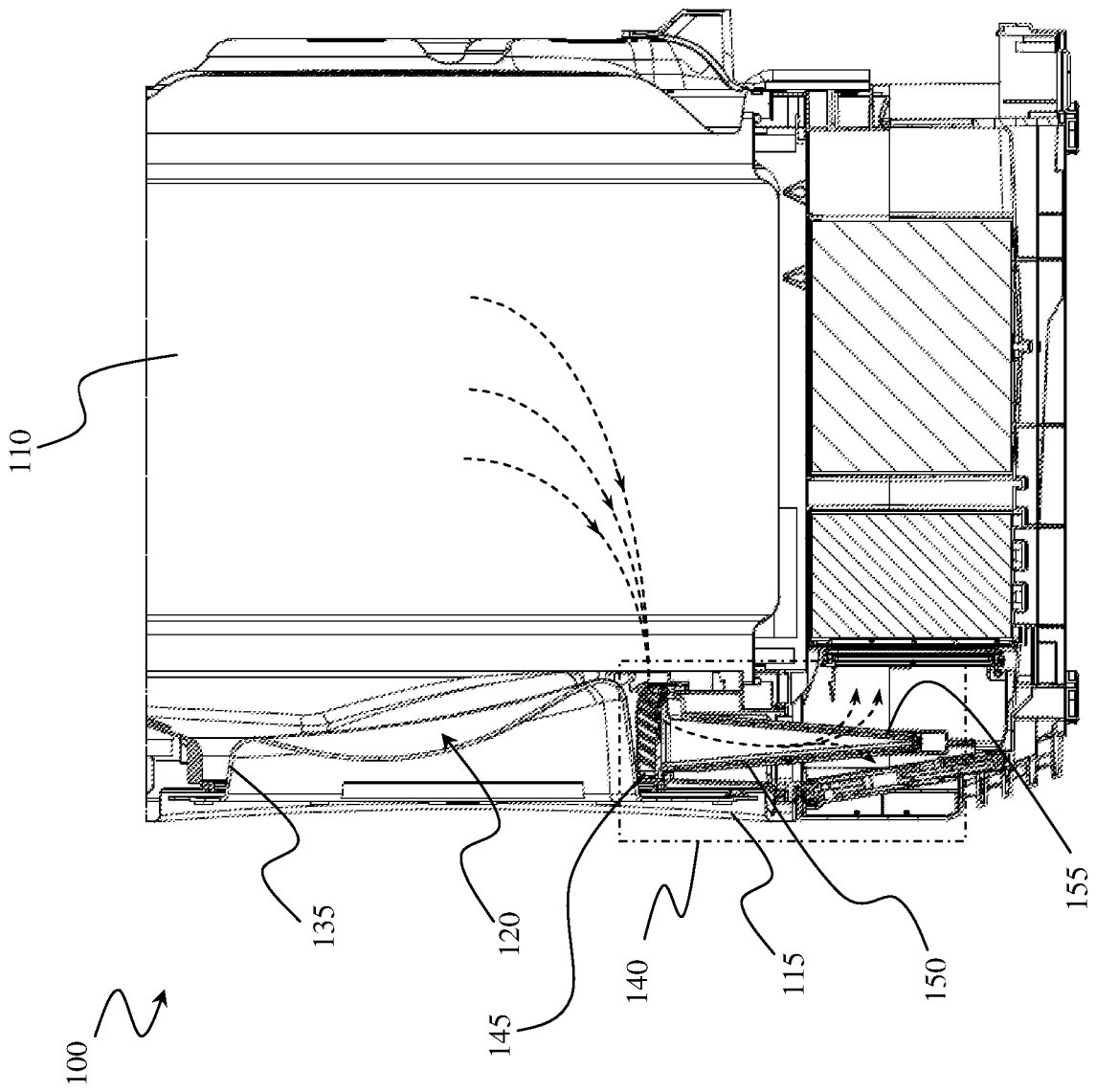


FIG. 1A

FIG. 1B



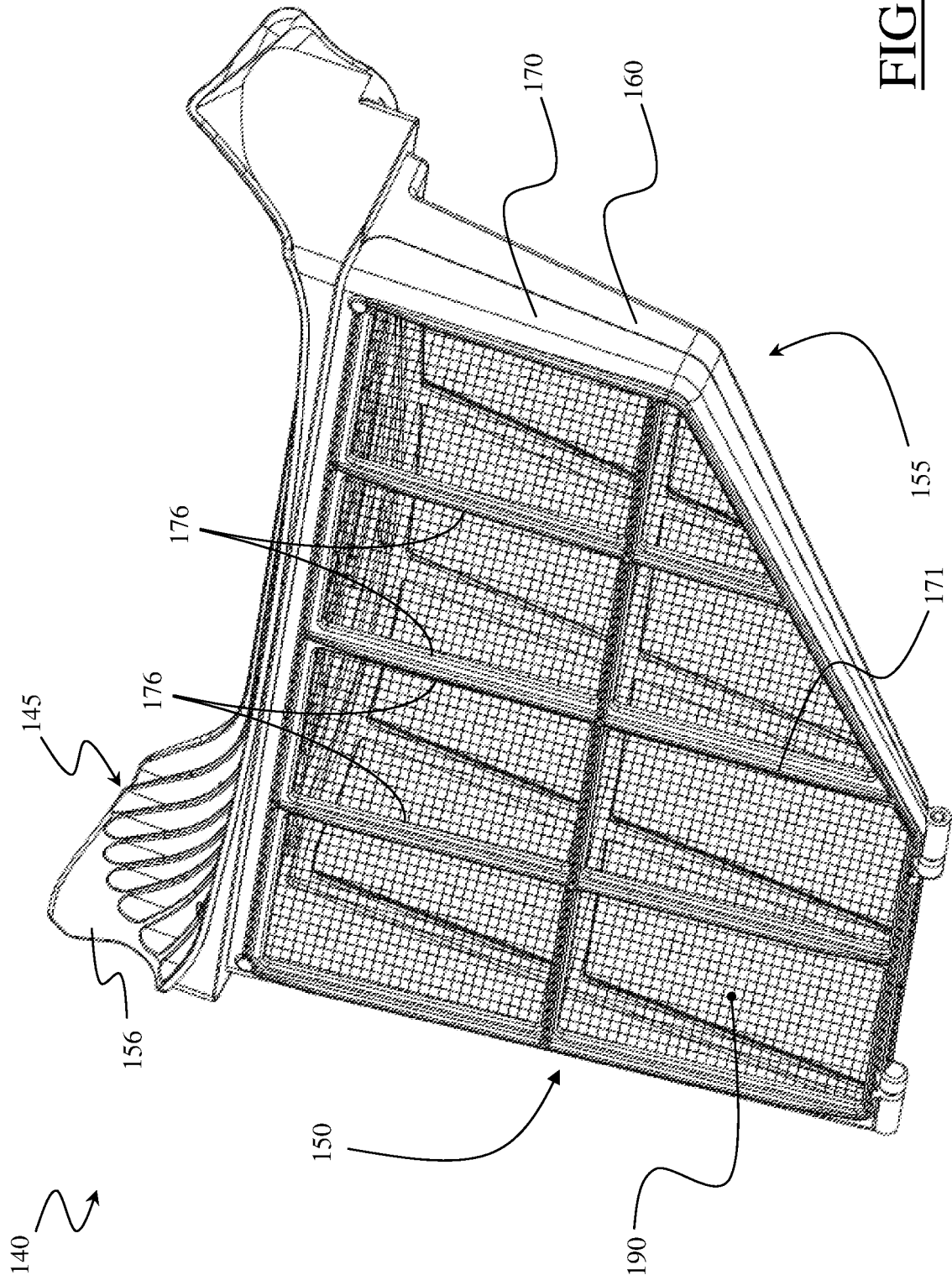
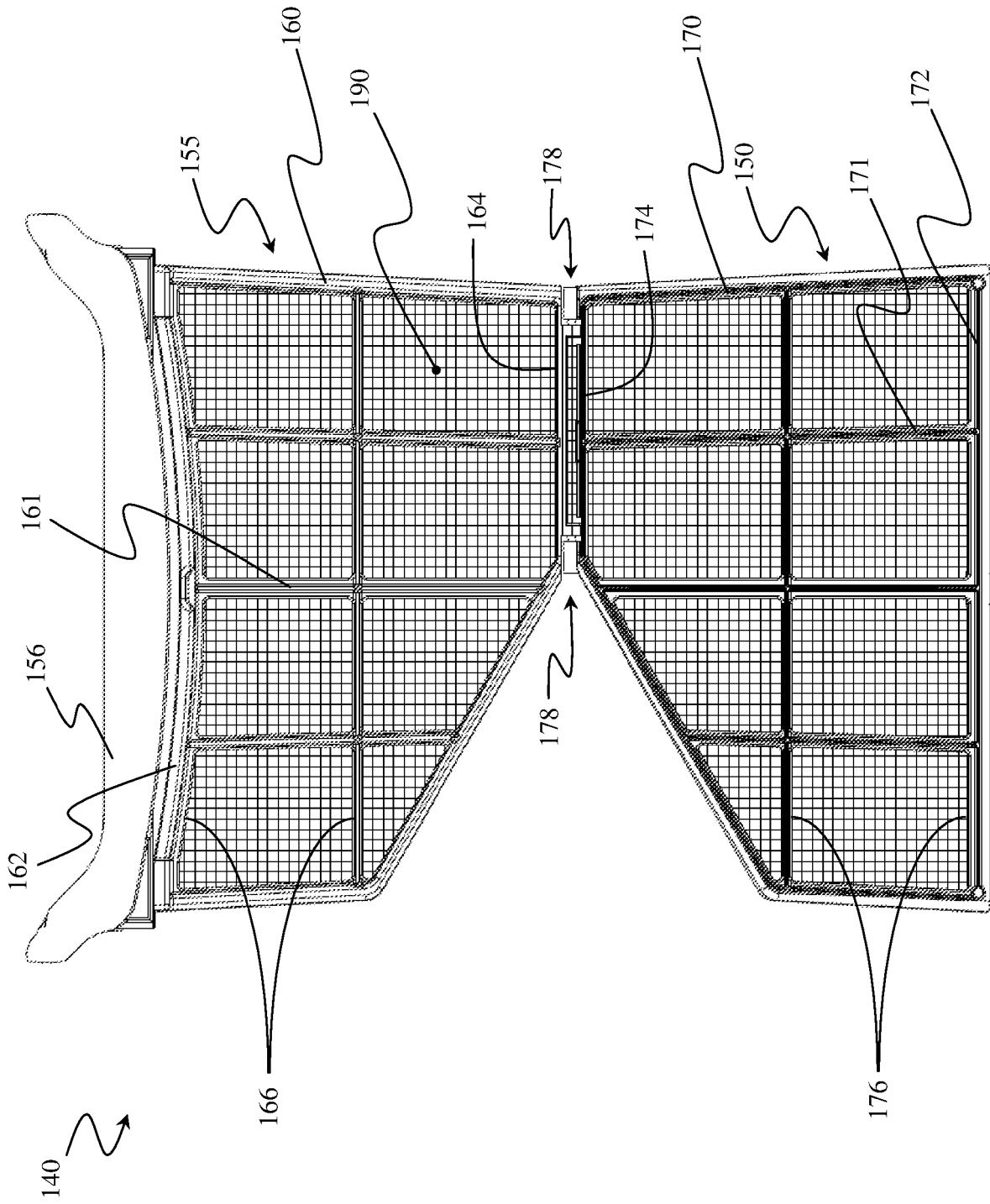
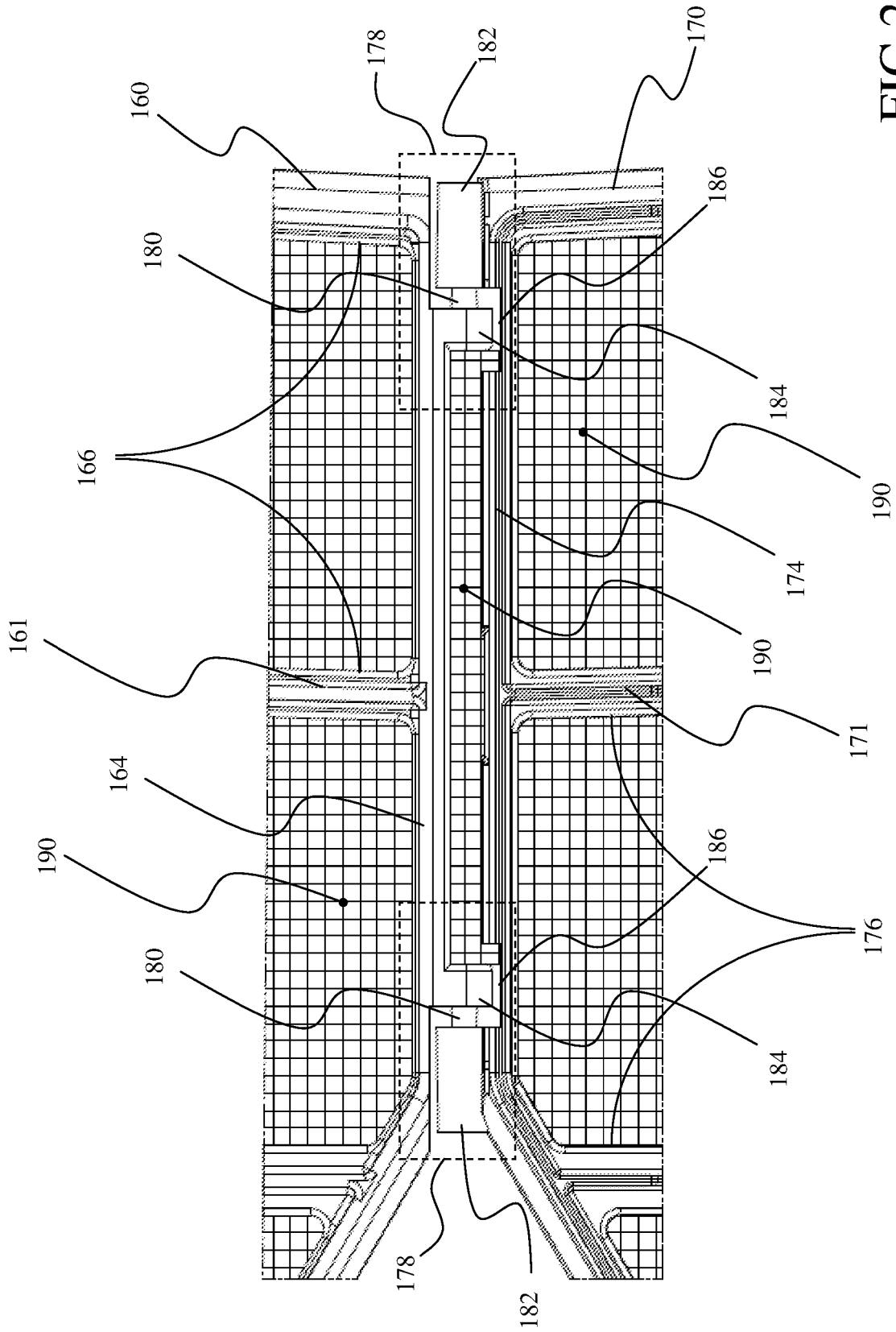


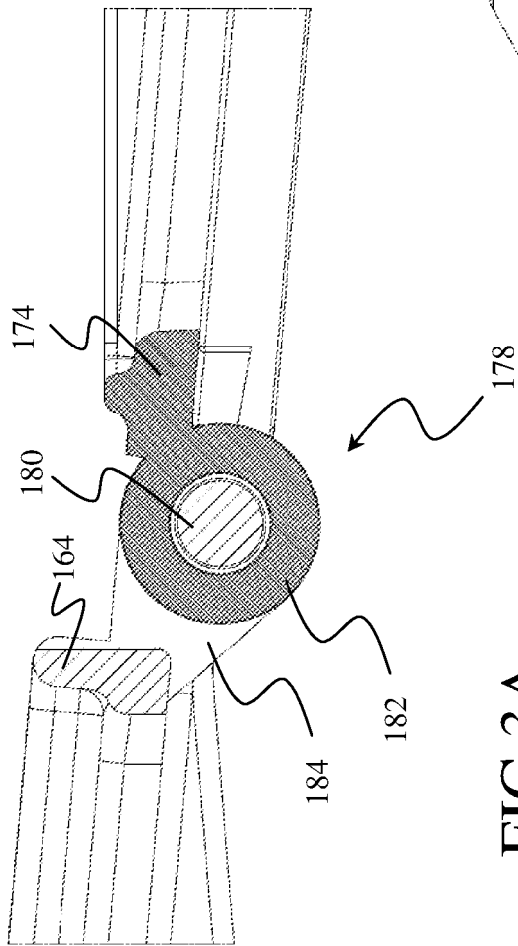
FIG.2A



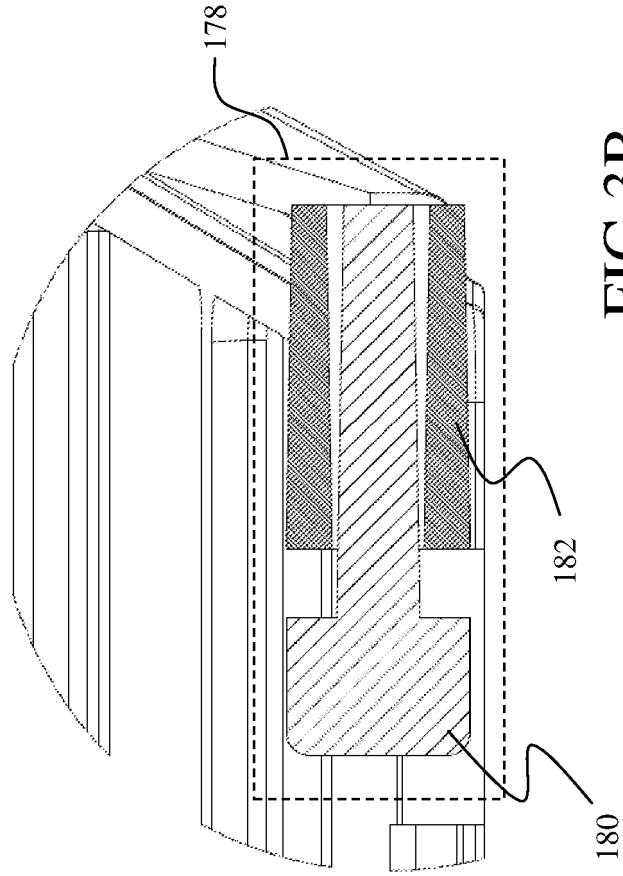
**FIG. 2B**



**FIG. 2C**



**FIG. 3A**



**FIG. 3B**

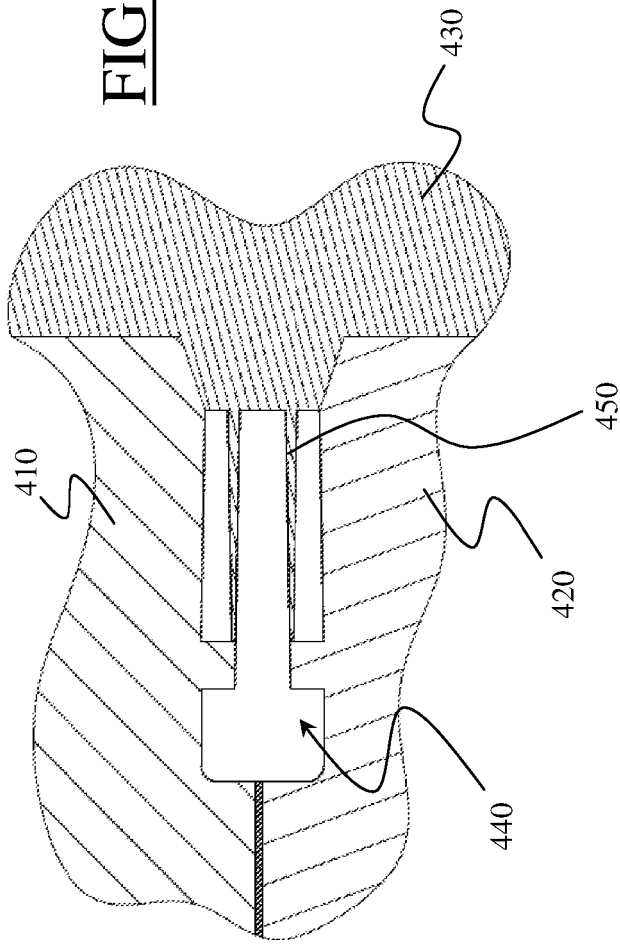


FIG. 4A

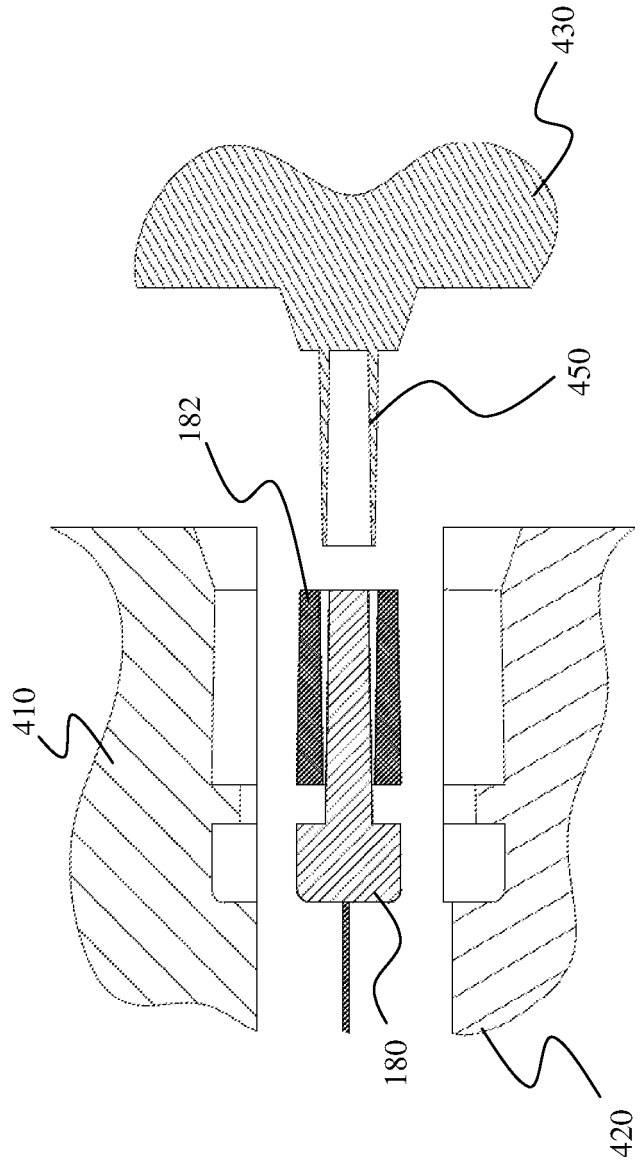
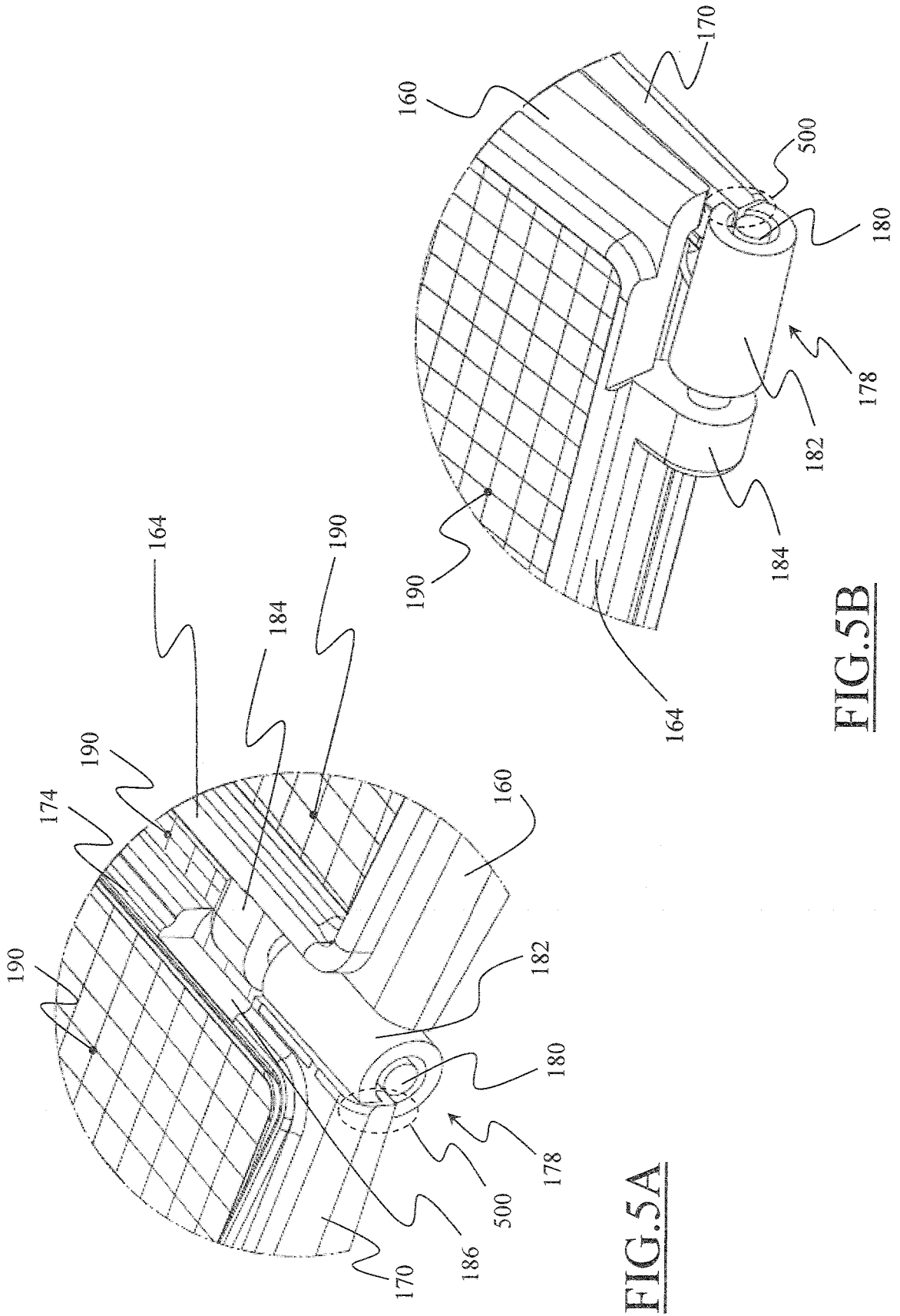


FIG. 4B



**FIG. 5A**

**FIG. 5B**

**REFERENCES CITED IN THE DESCRIPTION**

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