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(54) **Laundry drying apparatus with removable lint filter unit**

(57) The invention relates to a laundry drying apparatus (2) comprising: a cabinet (4); a rotatable drum arranged within the cabinet (4) and adapted to receive laundry to be dried; a loading opening (12) for loading and unloading laundry to and from the drum; a door (14) arranged at the cabinet (4) and adapted to close the loading opening (12); an air channel arranged within the cabinet (4) and adapted to guide within the cabinet (2) drying air exiting the drum; a filter unit (24, 24'); a filter unit seat (22) arranged at, upstream or in the air channel and adapted to receive the filter unit (24, 24'), wherein, when the filter unit is arranged in its operational position in the filter seat, the filter unit is adapted to filter fluff from the drying air exiting the drum; and a grip section arranged at the filter unit (24, 24') adapted to remove the filter unit from the filter unit seat (22). Specifically the grip section comprises at least one handle element (30, 30') that is movably arranged at the grip section; and the at least one handle element (30, 30') is movable between a rest position (I) and an operational position (II).

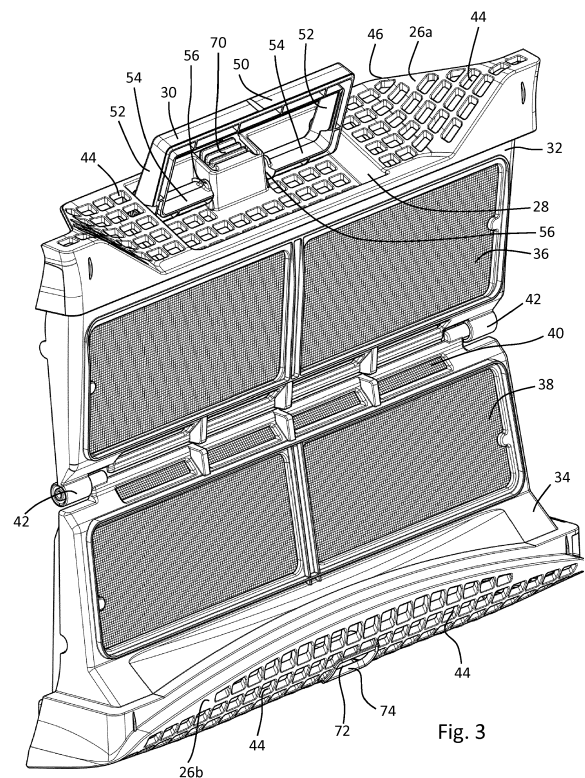


Fig. 3

Description

[0001] The invention relates to a laundry drying apparatus, in particular to a condensate or vented dryer, which has a filter unit insertable in and removable from a filter seat at a loading opening of the drying apparatus.

[0002] EP 2 458 071 A1 discloses a laundry dryer with a rotatable drum, a loading opening for loading laundry into the drum, and a lint filter that is removably positioned in a filter seat arranged at a frame at the loading opening. The filter is formed of two shells supporting the filter web, wherein the shells are pivotably connected to each other for opening and closing the filter when being removed from the filter seat. After opening, fluff can be conveniently removed. In each shell a finger-hole is provided at the top surface, which is exposed to the user, when the filter is inserted in the filter seat. By gripping into the finger-holes and pulling out, the filter can be removed from the operational position within the filter seat.

[0003] It is an object of the invention, to provide a laundry drying apparatus having a filter unit improving user convenience in filter handling, and to provide a method of handling such filter unit.

[0004] The invention is defined in claims 1 and 19, respectively. Particular embodiments are set out in the dependent claims.

[0005] According to the invention, a laundry drying apparatus is provided, in particular a condensate dryer or a vented dryer. The condensate dryer may be a heat-pump system tumble dryer. In a cabinet of the dryer a rotatable drum is arranged adapted for receiving laundry to be dried. The drum is for example a horizontal axis drum or an inclined axis drum that has a rotation axis inclined relative to the horizontal axis - preferably it is not a vertical-axis drum and/or the inclination angle is less than 60°. Laundry to be dried is loaded into the drum (and unload therefrom) through a loading opening. During drying-operation the loading opening is closed by a door arranged at the cabinet. Preferably the door is pivotably supported at the cabinet or at a front frame of the dryer.

[0006] During operation, drying air is flown through the drum and the drying air that exits the drum at the loading opening is passed into and guided by an air channel, which is arranged within the cabinet. In case of a condensate dryer the air channel preferably guides the drying air from the area of the loading opening to a dehumidifying element (e.g. evaporator, heat exchanger), to a heater (electrical heater and/or condenser) and then to the drum. The dehumidified and heated drying air enters the drum (preferably at the backside of the drum) through one or more drum openings. The air channel has an inlet opening at the loading opening, which preferably is arranged in or at a front frame of the dryer (where the front frame is preferably arranged rearward and/or behind a front wall of the cabinet).

[0007] Upstream and/or at and/or in the air channel a filter unit seat is arranged which is adapted to receive a filter unit. The filter unit seat may be arranged at the or a front frame and/or at or in the air channel and/or at an inward-extending front wall section of a front wall of the cabinet (inward-extending in the meaning that the front wall section extends from the front surface toward the inner space of the drum). When the filter unit is positioned in its operational position in the filter seat, the filter unit is adapted to filter fluff from the drying air exiting the drum. Preferably, when inserted, the filter unit extends beyond the filter unit seat (also denoted as filter seat or just seat) and preferably into the air channel.

[0008] In an embodiment, when the filter unit is inserted into the filter unit seat, an exposed filter surface is exposed towards the inflowing drying air leaving the drum interior towards the air channel. Preferably the exposed filter surface has one or more inlets for drying air such that the drying air can pass from the drum into the filter unit. Alternatively or additionally the filter unit is inserted in the seat such that only a small portion or only an inlet surface side (e.g. a top surface) of the filter unit extends and/or is exposed towards the loading opening (here: is accessible for a user when the door is opened). The other portion of the filter unit is inserted and/or received by the filter seat and/or the air channel. Preferably the filter unit is inserted from above into the filter seat and/or the inlet surface side is a top side of the filter unit. And/or the filter unit, when received in its seat, is arranged between the drum front edge and a (the) front wall of the cabinet and/or is received in a (the) front frame.

[0009] When the filter unit is inserted in the operational position within the seat, the filter unit filters fluff during drying operation and is collecting the fluff in the inner space of the filter unit. From time to time (after one or more drying cycles) the user has to pull the filter unit out of its seat for removing the fluff collected in the filter unit. For manually removing the filter unit by the user, a grip section is arranged at the filter unit adapted to manually remove the filter unit from the filter unit seat. Preferably the grip section is arranged at the inlet surface side or top surface of the filter unit.

[0010] The grip section comprises at least one handle element that is movably arranged and/or supported at the grip section, wherein the at least one handle element is movable between a rest position and an operational position. Here and in the following - unless otherwise mentioned - the 'at least one' handle element may be one or more handle elements. In case of more than one handle element, all handle elements are meant to be moveable and are meant to have the same relative position (e.g. all in rest position or all in operational position at the same time). Furthermore 'the at least one' handle element may be replaced by 'a' or 'the' handle element.

[0011] The at least one handle element is preferably permanently mechanically connected to the filter unit (as far as normal and non-destructive handling concerns) and/or is connected in a way to be movable relative to the filter unit. 'Movably arranged' is for example: slidably supported (connected), pivotably supported (connected), extendible sup-

ported (connected) or any combination of sliding and/or pivoting and/or extendible moveable arrangement. For example a slide-bearing may be provided at the filter unit such that the at least one handle element can be pulled out from the rest position and slid to the operational position. The slide bearing may be combined with the/a pivot bearing such that e.g. in the slid-out position the at least one handle element may be pivoted (e.g. over a predetermined angular region).
 5 Additionally or alternatively the at least one handle element may be provided like a telescope for expanding and contracting.

[0012] The operational position of the at least one handle element is a position where a user can grip/hold the at least one handle element, e.g. for removing the filter unit from the seat and/or for transporting the filter unit. Preferably the at least one handle element can be moved from the rest position to the operational position by activity of a user. Preferably
 10 the operational position is or represents a (first) final position of the movement range of the at least one handle element.

[0013] The rest position of the at least one handle element is a position where the at least one handle element is positioned, when the filter unit is in its seat and the dryer is operated (e.g. during drying operation). Preferably the rest position is or represents a (second) final position of the movement range of the at least one handle element.

[0014] Having the at least one handle element movably arranged at the filter unit, the user comfort is increased in that the user does not have to grip the filter main body during handling. Normally the filter main body is somewhat contaminated by the collected fluff. Further, the user is motivated by providing the at least one handle element to seize the filter unit at that element and is distracted to seize it at e.g. the filter web which might be damaged by the gripping force. Further, filter orientation and filter insertion leading edge for inserting the filter unit into its seat are easily to be recognized when holding it at the at least one handle element. All these advantages individually contribute to user comfort.

[0015] According to an embodiment, in the rest position, the at least one handle element is in a flush position (e.g. where the handle element is or the handle elements are flush with the surrounding surface of the filter unit) and/or in a retracted position and/or in an inserted position and/or in a non-protruding position and/or in a flat position. These positions are describing the rest position with respect to a main body or outer surface profile of the filter unit and/or with respect to the operational position of the at least one handle element. In the rest position the at least one handle element is preferably not extending from the main outer configuration or profile of the filter unit and thus the handle element(s) does not disturb the operation of the dryer and/or opening and/or closing of the door. Herein the 'outer surface profile' is an outer profile which the filter unit assumes when being inserted in or at the air channel in its operating position allowing the filter unit to effectively filter fluff from the drying air. Such rest position(s) prevent or reduce the risk of laundry being captured by the handle element(s) and/or fluff deposited at the handle element(s).

[0016] According to an embodiment, in the operational position, the at least one handle element is in an extracted position and/or in an extended position and/or in a protruding position and/or in a raised position - with respect to the main outer configuration of the body or outer surface profile of the filter unit and/or with respect to the rest position. Such operational position(s) facilitate filter unit (manual) handling by the user. When the at least one handle element is moved to the operational position, gripping is easier and/or the 'extracted' handle element(s) avoids the need that the user grips a portion of the filter unit that may be contaminated with the collected fluff.

[0017] Preferably the grip section further comprises a receptacle adapted to receive the at least one handle element, when the handle element is or the handle elements are in the rest position.

[0018] The receptacle may be or may comprise a recess. The receptacle for receiving the handle element(s) in its rest position assists in avoiding the handle element(s) being contaminated with fluff and/or assists in withdrawing the handle element(s) from an exposed position below or flush with the filter unit outer profile. Preferably when being in rest position in the receptacle, the handle element(s) are in the one or more positions as mentioned above for the rest position.

[0019] According to an embodiment, the grip section further comprises a pivot bearing for the at least one handle element adapted to pivotably support the at least one handle, such that the at least one handle can be pivoted at least between the rest position and the operational position. Preferably the rest position and/or the operational position define an end angular range for the swing movement of the handle element(s). Preferably the rest position is a first end position and the operational position is a second end position. This or these end position relation(s) for the movement end position and/or the movement range of or between the rest position and the operational position correspondingly applies also to the other above-listed movement types. I.e. the rest/operational position(s) define endpoint(s) for the linear movement, telescope/extraction movement and so on.

[0020] Preferably, when the filter unit is received in the filter unit seat, the grip section is arranged at a surface section of the filter unit which is exposed to the loading opening and/or is arranged at an upper or outer surface of the filter unit. The 'upper' and/or 'outer' surface is a surface with respect to a correct operational orientation of the apparatus and/or with respect to the air channel in case the filter unit is at least partially received in the air channel (e.g. the outer surface is outside the air channel). Preferably the surface of the filter unit, which is exposed, is an inlet surface for passing drying air to be filtered from the drum inner volume towards the air channel.

[0021] According to an embodiment an ensemble comprising the filter unit seat, the filter unit, the loading opening and the door are designed and arranged relative to each other such that, when the filter unit is received in the filter unit seat and the door closes the loading opening, the door prevents the at least one handle element to be moved from its rest

position or to be moved from its rest position to the operational position(s). Preferably the door has an inward-protruding section which, when the door is closing the loading opening, is positioned at least partially over the grip section, in particular over the handle element(s). Preferably in the closed position, the door abuts against the at least one handle element or it leaves only small gap such that handle element(s) can be moved from rest position only a short or very short movement path towards the operational position. Such an arrangement prevents that during drum rotation and/or laundry drying the laundry moves or lifts the handle element(s). Also with the handle element(s) held down or held close to the rest position, tangling or hooking of laundry to the handle element(s) is prevented.

[0022] In an embodiment, the at least one handle element is pivotably mounted at the grip section by means of a or the pivot bearing, wherein each of the handle elements comprises a basis portion located proximal to the pivot bearing and a grip portion located distant to the pivot bearing. Preferably, when the filter unit is inserted in the filter unit seat and the at least one handle element is in its rest position, a) the basis portion is arranged proximal to the drum and the grip portion is arranged distant to the drum, or b) the basis portion is arranged distal to the drum and the grip portion is arranged proximal to the drum. In case a) the grip portion of the handle element(s) is closer to the front of the laundry drying apparatus and the basis portion of the handle element(s) is closer to the drum interior (in relation to each other). In case b) the basis portion of the handle element(s) is closer to the front of the laundry drying apparatus and the grip portion of the handle element(s) is closer to the drum interior (in relation to each other). Preferably, in case of a) the grip portion of the handle element(s) is more distant to the laundry (and preferably normally a gap between grip portion and door is narrower as compared to the gap between base portion and door), such that risk of laundry lifting the handle element(s) is reduced. Preferably, in case of b) the closing of door results in pivoting of the handle element(s) to or towards the rest position and prevents breaking of handle elements by closing door when the handle is at or close to the operational position.

[0023] In an embodiment, the grip section comprises an elastic element adapted to provide a biasing force on the at least one handle element, wherein the biasing force is adapted to move the at least one handle element from the operational position to or towards the rest position. Preferably the elastic element provides that, when a user removes the grip or fingers from the handle element(s), the handle element(s) 'automatically' (=driven by the bias) or self-actuated moves to the rest position. Preferably the biasing force is provided at least when the handle element(s) is in the operational position, more preferably the biasing force of the elastic element is provided over the whole or a portion of the movement path of the handle element(s).

[0024] Preferably the elastic element is or comprises one or more of: an elastic or elastically supported rip or stud, spring, flat spring, and/or a spiral spring. Additionally or alternatively a cam or projection is arranged at the elastic element or at the at least one handle element adapted to interact with the at least one handle element or an element arranged at the filter unit body or a shell thereof, respectively, such as to build up the biasing force when the at least one handle element is moved towards the operational position.

[0025] In an embodiment, a rib, a cam or a projection is arranged at the filter unit or at the at least one handle element. The rib/cam/projection is adapted to interact with the at least one handle element or adapted to interact with the body of the filter unit (or at least one of the shells forming the filter unit and/or a filter unit wall neighboring a position where the at least one handle element is moveably supported). The interaction is such that the rib/cam/projection acts as a stop element restricting the movement range of the handle element(s) such that the at least one handle element is stopped in an inclined or tilted orientation, when the filter unit is inserted in the filter unit seat. Preferably the 'inclined' relates to a vertical orientation and an inclined orientation of the handle element(s) in the operational position (being an end of range position). E.g. it means that the movement or rotation range of the handle element(s) ends a small angle (α in the figures) before a position in which the handle element(s) would be in the vertical orientation (filter unit inserted in seat). Due to the inclined orientation of the handle element(s), the at least one handle element moves to the rest position by gravitational force (e.g. when no other force is exerted onto the at least one grip element). When the handle element(s) is tilted or inclined in the operational position, which thereby is an end-of-movement-range position due to the cam/rib/projection, and when the user withdraws the grip from the handle element(s), the handle element(s) assume their rest position without further user activity and the door can be closed without interference door/handle element(s).

[0026] In an embodiment the cam/rib/projection is arranged at an or the elastic element or at the at least one handle element adapted to interact with the spring element. And/or the rib/cam/projection may be provided itself as an elastic element to cooperate with the handle element(s) or at the handle element(s) to cooperate with the elastic element.

[0027] In a preferred embodiment the filter unit comprises a filter body which is formed of or which comprises two body shells. The two body shells are adapted to be connected and/or closed for inserting the filter unit into its operational position in the filter unit seat. Further the two body shells are adapted to be opened and/or at least partially disconnected from each other for filter cleaning. Preferably one or both of the shells each provides a mechanical support structure for supporting one or more filtering elements. The filtering elements may be a web or mesh or grid or sieve structure. Preferably in the closed position of the body shells, the body shells are not moveable relative to each other and form a rigid structure to be stably inserted in the seat. Preferably in the open position, i.e. when the two shells are oriented such as to expose their (filtering) interior, the body shells are movably connected to each other. E.g. a pivot bearing is provided

allowing pivoting the body shells relative to each other. Alternatively or additionally the two body shells may be separated from each other by resolving the connection between the shells and/or by disconnecting the moveable connection. The moveable connection may be a pivot connection and/or sliding connection and/or clamping connection. Fully separating the body shells from each other facilitates filter cleaning.

[0028] In an embodiment the filter unit and/or the grip section thereof comprises a or the receptacle adapted to at least partially receive the at least one handle element in the rest position. Further the filter unit (or grip section thereof) comprises a handle support adapted to support the at least one handle element along the moving path (see e.g. the above examples). Preferably the receptacle and the handle support are arranged at a first one of the body shells. Alternatively a first portion of the receptacle is arranged at a first one of the body shells and the handle support and a second portion of the receptacle is arranged at the second body shell. Further alternatively the receptacle is arranged or is essentially arranged at a first one of the body shells and the handle support is arranged at the second body shell. Herein 'arranged in/at' may be denoted as 'formed in/at'. As mentioned above the handle support is for example a pivot bearing for pivotably supporting the at least one handle element or a linear bearing for slidably supporting the at least one handle element.

[0029] Preferably the filter unit further comprises a locking element adapted to releasably connect the body shells to each other in the connected or closed state. Preferably the filter unit further comprises a user-operable actuation element adapted for unlocking the locked state of the locking element. The actuation element may be arranged in the surface region of the receptacle adapted for receiving the at least one handle element in its rest position. Alternatively the actuation element is arranged outside the surface region of the receptacle adapted for receiving the at least one handle element.

[0030] In an embodiment the at least one handle element is rotatably arranged at a first one of the two body shells and a or the user-operable actuation element, which is adapted for unlocking the locked state of the locking element, is arranged at the first body shell. Further the user-operable actuation element is arranged at a distance from the rotation axis of the at least one handle element. When the filter unit is held at the at least one handle element by a user, the degree of freedom for rotation of the at least handle element is such that the handle is caused to rotate relative to the first body shell, when a pressing force is acting onto the user-operable actuation element. In this embodiment, when the filter unit is freely (out from seat) held by a user and the user presses the actuation element, the handle element can freely rotate (preferably towards the rest position) relative to first body shell. This means that when the shells are closed and the user presses (e.g. with the thumb) on the actuation element while holding with the other fingers of the hand the handle element(s), the pressing force is unlikely to un-lock the locking element, but instead the filter unit swings somewhat to the side as a reaction. The user-operable actuation element can also be denoted as opening button. This embodiment is intended for opening the filter unit (separating the two shells) using two hands and for preventing an unintentional opening during filter unit transportation.

[0031] In another embodiment (alternative to the last paragraph), the at least one handle element is rotatably arranged at a first one of the two body shells and a user-operable actuation element adapted for unlocking the locked state of the locking element is arranged at the first body shell. The user-operable actuation element (e.g. opening button) is arranged at a distance from the rotation axis of the at least one handle element. When the filter unit is held at the at least one handle element, the degree of freedom for rotation of the at least one handle element is such that the handle is blocked to rotate relative to the first body shell, when at the same time a pressing force is acting onto the user-operable actuation element. In this embodiment when the user holds the filter unit freely (out from seat) and presses the actuation element (e.g. with the thumb of the same hand), the handle element, whose rotation degree of freedom is blocked at the operational position, can not rotate in response to the torque exerted between handle element and actuation element. E.g. the handle element(s) is fully at its operational position (e.g. abutting against a stop element - see e.g. above cam) and can not further rotate. The pressure force onto the actuation element results in actuation thereof for opening the locking element and opening the two shells. Thus this embodiment prefers a one-hand opening of the filter unit (opening of the body shells) for removing the fluff.

[0032] Preferably, in particular in the embodiment described in the preceding paragraph, the locking element comprises a or the user-operable actuation element, which is adapted for unlocking the locked state of the locking element. Preferably the locking element is arranged at a first side of the filter unit and a or the pivot bearing, which is pivotably connecting the two body shells, is arranged at a second side of the filter unit opposite to the first side. Further, a plane, which is parallel to the bearing axis of the pivot bearing between the two body shells, is spanned by the center of mass of the closed filter unit and a supporting point or line of the at least one handle element at the filter unit. Further, when the filter unit is freely supported by holding it outside the cabinet at the at least one handle element, the center of mass of the second body shell is outside the plane at a side at which the second body shell is arranged. In this embodiment, when the actuation element is actuated, the center of mass of the second body shell results in a gravity-assisted self-swing opening of the second shell. Thus an opening of the filter unit by the user using one hand is facilitated.

[0033] In another embodiment alternatively or additionally relating to the above described two-hand-opening-operation, the locking element comprises a or the user-operable actuation element adapted for unlocking the locked state of the

locking element, wherein the locking element is arranged at a first side of the filter unit. Further, a or the pivot bearing pivotably connecting the two body shells is arranged at a second side of the filter unit opposite to the first side. Then, when the filter unit is freely supported by holding it outside the cabinet at the at least one handle element, the actuation element is located from the supporting point or supporting line of the at least one handle element towards the center of mass of the second body shell. In this embodiment, when pressing the actuation element, the filter unit is rotated around the support point or support line such that self-opening of the filter unit is obstructed.

[0034] In an embodiment the filter unit further comprises one or more inner filter frames or a first and second inner body shell, which is or are arranged in an inner space of the filter unit provided between the inner sides of the first and second body shells, when the first and second body shells are in their closed state. The inner filter frames support additional filter elements (filter web, grid etc.) and provide an increased filter area. Flow resistance of the filter for the passing air is thus slower built-up by the ongoing collection of fluff.

[0035] Preferably, when the filter unit is outside the cabinet and freely held at the at least one handle element, the upper or exposed surface of the filter unit (see inlet surface above) is formed by the combined surface portions of the first and second body shells, wherein a junction is formed at the upper surface between the surface portions of the first and second body shells. The course of the junction is preferably provided at the upper surface such that one or more of the following arrangements is applicable: a) the at least one handle element is arranged at the first body shell and the supporting point or line of the at least one handle element is arranged close to the side wall of the first body shell which has an edge with the surface portion and which is located opposite to the junction; b) the at least one handle element is arranged at the first body shell and the surface portion of the second body shell is larger than the surface portion of the first body shell; and c) a or the receptacle for receiving the at least one handle element in the rest position is arranged or is essentially arranged in the surface portion of the second body shell. In this embodiment the opening of the filter by using one hand may be or is facilitated.

[0036] In another embodiment to the last paragraph, when the filter unit is outside the cabinet and freely held at the at least one handle element, the upper surface of the filter unit is formed by the combined surface portions of the first and second body shells, wherein a junction is formed at the upper surface between the surface portions of the first and second body shells. Preferably the filter unit is characterized by one or more of the following courses of the junction: a) the at least one handle element is arranged at the first body shell and the supporting point or line of the at least one handle element is arranged close to the junction; b) the at least one handle element is arranged at the first body shell and the surface portion of the first body shell is larger than the surface portion of the second body shell; and c) a or the receptacle for receiving the at least one handle element in the rest position is arranged or is essentially arranged in the surface portion of the first body shell. In this embodiment the opening of the filter by using two hands may be or is facilitated (preventing the unintentional opening by one hand).

[0037] Unless otherwise mentioned, the above embodiments and/or features can be combined in any combination or sub-combination. Further the above embodiments and/or features can be combined with any of the below features or elements or claim elements or details of the detailed embodiment without any restriction, e.g. by combining any element or sub-combination of elements or group of elements with any feature or sub-group of features of the claims and the above description.

[0038] A method is provided for removing a filter unit from a drying apparatus, in particular from a condensate dryer or a vented dryer. The method comprises the steps: opening a door arranged at a cabinet of the laundry drying apparatus, thereby providing access to a loading opening arranged at a cabinet, moving at least one handle element, which is movably arranged at a grip section of a filter unit, from a rest position to an operational position, gripping the at least one handle element, raising the filter unit at the at least one handle element, which is in the operational position, and thereby pulling out or off the filter unit from a filter unit seat, which is arranged at, upstream or in an air channel of the apparatus.

[0039] The drying apparatus in or at which the method is implemented preferably has one or more or any sub-combinations of features of the drying apparatus as described above or as described below (representative example of dryer applies to all dryers as above). Method steps as described below are applicable in the method individually or in any sub-combination.

[0040] Embodiments are described in more detail under reference to the Figures, which show:

- Fig. 1 a perspective front view of a laundry dryer,
- Fig.2 a perspective view of a fluff filter according to a first embodiment in an opened state with a view to the inside thereof,
- Fig. 3 the filter of Fig. 2 in opened state seen from outside with a filter web depicted,
- Fig. 4 the filter of Fig. 2 in a closed state and with a handle in operational position,
- Fig. 5 the filter of Fig. 2 with the handle in the rest or retracted position,
- Fig. 6 a cross sectional view of the filter of Fig. 2 with the section perpendicular to the main longitudinal extension of the filter through one of the handle side legs,

- Fig. 7 an enlarged cross sectional view taken from the circle of Fig. 6,
 Fig. 7a a schematic indication of the handle position relative to the vertical axis, when the filter of Fig. 2 is inserted into the filter seat of the dryer shown in Fig. 1,
 Fig. 7b the cross section as shown in Fig. 7 with indication of torque moments acting when the user is pressing on a lock actuator,
 Fig. 8 the filter of Fig. 2 in an opened state without showing the filter webs,
 Fig. 9 a front perspective view of the filter of Fig. 2 in a closed state with the handle in operational position,
 Fig. 10 the same view as in Fig. 9 with the handle in its rest position,
 Fig. 11 the dryer of Fig. 1 having inserted in the filter seat a filter according to another embodiment (see Fig. 12),
 Fig. 12 a filter according to the second embodiment in a front perspective view with the filter closed and the handle in operational position,
 Fig. 13 the filter of Fig. 12 with the handle in rest position,
 Fig. 14 the filter of Fig. 12 in an opened state shown the inner sides of the filter,
 Fig. 15 the filter of Fig. 12 in an opened state showing from the outside and including the filter webs,
 Fig. 16 a simplified diagram of the levers and torque moments acting when a user holding the filter of Fig. 12 presses on a lock actuating element,
 Fig. 17 a rear perspective view of the filter of Fig. 12 in a closed state with a handle in operational position, and
 Fig. 18 the filter shown in Fig. 17, when the handle is in the rest position.

[0041] The drawings are not drawn in scale, however mechanical details are appropriately depicted such that conclusion to and support for technical elements is well provided to the skilled person. Herein, relative terms like "top", "bottom", "front", "rear", and so on relate to a positional orientation as conventional in dryers, where the front side is the front side at which the user operates the dryer, the "sides" are the sides of the dryer (compare side wall 8), the 'top' or upper side is at the top of the dryer (compare top plate 6) and the 'rear side' is the rear side of the dryer not shown in Fig. 1. Such relative orientation is transferred to the filters 24, 24', when the filter is inserted into its seat 22, such that the relative terms in respect of the dryer 2 are passed to the filter related to its inserted state.

[0042] Fig. 1 shows a front perspective view of a tumble dryer 2 having inserted therein a filter 24 according to a first embodiment. The dryer 2 may be a vented dryer, a condensate dryer or any other type of dryer. The condensate dryer may be a heat pump tumble dryer or may have a drying air/ambient cooling air heat exchanger for cooling the drying air. Preferably the dryer is a tumble dryer having a drum that is rotating around a horizontal axis or around an axis inclined relative to the horizontal axis (e.g. by less than 50°).

[0043] The dryer in the embodiment shown in Fig. 1 has an outer case 4 formed by a top plate 6, side walls 8 (only one shown), a front wall 10, a rear wall (not shown) and a bottom part (not shown). The front wall 10 has a loading opening 12 for loading and unloading laundry into and from an interior 16 of a drum (not illustrated). The loading opening 12 is closed by a door 14, which - in the closed state - partially extends from the front side of the dryer through a front frame 20 which surrounds the loading opening 12. At a lower portion of the front frame 20, between the front wall 10 and a front edge of the drum, a filter seat 22 is provided at an inlet to an air channel. The inlet section of the air channel (not shown) is arranged between the front wall 10 and the front edge of the drum and receives the drying air that is leaving the drum. The air channel guides the air exiting the drum towards a heat exchanger or to an exhaust opening for exhausting the drying air out of the outer case 4 or cabinet of the dryer 2.

[0044] With its bottom side (see channel section 82 in Fig. 10) the fluff filter 24 of the first embodiment is inserted into the air channel until a seat line 80 (Fig. 10) rests on the filter seat 22. When placed in the seat 22, the filter 24 is aligned with the front frame 20 such as to assume its correct operational position during drying operation of the dryer. In the operational position of the filter 24 in its filter seat 22, an inlet section 84 (Fig. 10) extends outside the air channel. On the upper surface of the filter 24, the inlet section 84 has an exposed or top surface 26, which has distributed thereover a plurality of air inlets 44 (see Fig. 3). The drying air exiting the drum is passing through the air inlets 44 to the interior of the fluff filter 24. The drying air then passes from the interior of the filter 24 through filter webs 36, 38, 40 (Fig. 3) and is filtered thereby. The filtered air having passed through the filter webs is then continuing its path in the air channel. Preferably the channel section 82 of the filter 24 is wedge-shaped such that an even flow of air through the filter webs from the filter interior to the filter exterior in the air channel is provided.

[0045] Fig. 2 shows a perspective top-rear view of the fluff filter 24 in an opened state such that the inside of the filter can be partially seen. The user can pull out the filter 24 from the filter seat 22 and the air channel by lifting a handle 30 and then pulling at the handle such that the filter moves upward out of the air channel such that it can be removed from the front frame 20. The filter comprises a first shell 32 and a second shell 34, wherein the filter can be opened by tilting the shells 32, 34 relative to each other, when the filter is outside the filter seat 22.

[0046] Fig. 3 shows an enlarged view of the filter 24 in the opened state (as in Fig. 2) showing the outer sides of the first shell 32 and second shell 34. The shells 32, 34 provide a supporting frame with wide openings for supporting the filter webs 36, 38, 40. A first shell filter web 36 is clued or fixed to the inside of the first shell 32 as indicated by the grid

in Fig. 3. A second side filter web 38 is supported on the inner frame structure of the second shell 34 and a first portion of a bottom filter web 40 and a second bottom filter web 40 are arranged on the inside of the bottom frame structure of the first and second shells 32, 34, respectively. The two shells are pivotably connected by shell hinges 42 that are arranged at a bottom end of the filter 24 and at the lateral ends of the longitudinal main extension of the filter 24. In an embodiment of the filter the shells may be releasably connected by the hinges 42 or alternatively the filters (24, 24') may be connected via clamping connections such that when the locking means (see below) is released, the two filter shells 32, 34; 32', 34' are disconnected from each other.

[0047] When the filter 24 (also 24') is inserted in the filter seat, the "top" surface 26, 26' is pointing upward and exposed to the drum interior. As further shown in Fig. 3, by opening the filter 24, the top surface 26 is separated to a first surface portion 26a, which is formed at the first filter shell 32, and a second surface portion 26b, which is formed on the second shell 34. The first surface portion 26a and the second surface portion 26b are separated by a junction line 46 as for example indicated in Fig. 5, when the filter is closed, i.e. when the first and second surface portions 26a, 26b are neighboring to each other and the borderline forms the junction line 46.

[0048] Further, referring to Fig. 3, the first surface portion 26a of the top surface 26 has a recess 28 which receives the handle 30 in its rest position I. The rest position I of the handle 30 is shown in Fig. 5, where the "retracted" handle does not protrude beyond the upper edge of the recess 28, such that the handle in rest position I is "flush" with the surrounding surface as can be seen from Fig. 1. If laundry is rotated within in the drum during drying, the laundry pieces or laundry tails have no point of action at the handle which would involve the danger that laundry tangles around the handle or would be caught there or could damage the handle by pulling force. Fig. 3 shows the handle 30 in its operational position II, where it has been swung upward by the user so that she/he can grip the handle 30 and pull out the filter from its seat 22.

[0049] The handle 30 comprises a traverse 50 which is forming the gripping section of the handle. At both edges of the traverse 50 each a side leg 52 is provided which is connected at its lower end (operational position II) or basis to each a base traverse 54 in this embodiments. The inner ends of the base traverses 54 form each a hinge 56 which is pivotably supported at a bearing element of the first surface portion 26a/first shell 32/recess 28.

[0050] Fig. 6 shows a cross section through the first shell 32 and a portion of the second shell 34. The grip 30 is in its operational position II and is thus swung out of the recess 28 where its rest position I is located. The cross section is taken perpendicular to the main longitudinal extension of the filter 24, wherein the main longitudinal extension of the filter is parallel to the front wall 10. As shown in enlarged detail in Fig. 7 (which shows the cross section area within the circle shown in Fig. 6), the hinges 56 provide an axis 58 of rotation (which in this embodiment also runs parallel to the longitudinal extension and/or parallel to the front wall 10). In the cross section of Fig. 7 the handle 30 has reached its end position of the angular movement which forms the operational position II. The cross section shows a bottom plane 62 of the recess 28 and a side wall 64 of the recess. Close to the axis 58 a cam 60 (or stop) is provided at a lower end of the side legs 52 (compare Fig. 10). The cam 60 interacts with the side wall 64 of the recess such as to define the end angular range in the operational position.

[0051] In Fig. 7a the side leg 52 is represented as a simplified line which also represents the angular orientation in the operational position. Fig. 7a also shows the vertical axis 66 and the angle α between the side leg 52 and the vertical line 66 as well as an indication for the angular orientation of the bottom plane 62. By the stop or abutting action of the cam 60 towards the side wall 64, the handle 30 is inclined by the angle α and when the user withdraws his fingers (i.e. does not grip the handle), by gravitational force the handle 30 is swung around the rotation axis 58 and falls self-actuated to its rest position where the handle is (at least substantially) parallel with the bottom line 62 of the recess 28.

[0052] In the rest position I as shown in Fig. 1 for the first embodiment and in Fig. 11 for the second embodiment, the handle 30, 30' is flush with the top or exposed surface 26, 26' of the fluff filter 24, 24'. Besides the above mentioned advantage that laundry cannot be tangled or caught at the handle in its rest position, the self-actuated movement of the handle from the operational position II to the rest position I has further the advantage that the handle is flush as soon as the user removes his hands. Then the door 14 of the dryer 2 can be closed without the risk of damaging the handle by the closing action. As shown in Figs. 1 and 11, the door 14 has a glass window which protrudes in its middle area from the plane of the door and is extending in the closed position from the front side into the depth of the front frame 20. Then in the closed position there is only a small gap between the top surface of the filter and the lower surface of the protruding portion of the glass window. Therefore, the handle 30, 30' has to be in its rest position flush within the recess 28, 28' so that the door can be closed without interfering with the handle. Further, in the closed position the lower surface of the protruding portion of the glass window assists in holding the handle down in its rest position so that the handle cannot be lifted during operation (e.g. by laundry) from the rest position towards the operational position.

[0053] Unlocking and locking operation of a locking element of the filter 24 (correspondingly 24') for opening and closing the filter is now described. Locking elements are described in the following for the first and second embodiment having a latch or hook 70, 70' and a detent or recess 72, 72', respectively. However other embodiments of locking elements may be provided.

[0054] Fig. 6 and in more detail Fig. 7 show for the first embodiment a hook 70, which is provided at the upper side

of the first surface portion 26a of the first shell 32. One end of the hook 70 is connected to the first surface portion 26a and is (laterally) protruding therefrom. Further the locking element comprises a detent or recess 72 formed at the second surface portion 26b of the second shell 34 as can be seen for example in Fig. 3. The free standing or extending end of the hook 70 has a sloped surface 70a which acts as sliding surface for receiving the detent 72 in a closing movement of the filter. The proximal end of the hook 70 comprises a lock section 70b which follows the sloped end section 70a and is mating with or is adapted to receive or to engage with a land 74 of the detent 72 (Fig. 3). In the closing movement the land 74 comes in contact with the upper side of the sloped end section 70a and presses down the resilient or elastic hook 70 until the land 74 is slit over the sloped end section 70a and arrives at the lock section 70b. When the land 74 is received in the lock section 70b, the elastic hook 70 swings back and thus provides mechanical stop or mechanical engagement for the land 74 and thus provides a lock against an opening movement between the first and second shell 32, 34.

[0055] In the closed state of the filter, i.e. when the first and second shells 32, 34 abut to each other, the first and second surface portions 26a, 26b are neighboring such as to form the junction line 46. For an unlocking action the user can press a fingertip against the sloped end section 70a, which thereby acts as a user-operable actuation element. By the pressing force of the user onto the upper side of the sloped end section 70a, the hook 70 is bent downwards and the lock section 70b gives the land 74 free such that the second shell 34 can be moved away from the first shell 32 (in this embodiment by the swing movement around the hinge 56).

[0056] The mechanical design of the locking element 70, 72 of the first embodiment filter 24 is provided such as to facilitate the opening of the filter by the user using two hands, while obstructing somewhat an unlocking of the locking element with the user using only one hand. Below it is described for the second embodiments filter 24' and its locking element 70', 72' that the lock element of this embodiment is designed to facilitate a one-hand unlocking so that the user not necessarily needs to use two hands for opening the filter 24'. For the first embodiment, Fig. 7b is a copy of Fig. 7 showing torque actions by the curved arrows a, b and c, which represent the exerted force when the user is trying to unlock the locking element using only one hand. For this scenario, the filter 24 is removed from its filter seat 22 and is freely born by one hand of the user by gripping with the fingers the traverse 50 of the handle 30. The handle 30 is in its operational position II, i.e. the cam 60 is abutting against the side wall 64 of the recess 28. When now the user exerts with the same hand, which is holding the handle, an actuation or unlocking force on the top side of the sloped section 70a of the hook 70, a torque moment a (as shown in counter-clockwise direction) is generated around the axis 58 of the handle. In the clockwise direction, a torque moment b is acting on the traverse 50 relative to the axis 58. As in this embodiment the handle 30 is free to rotate from the operational position II towards the rest position I, the two levers, which are formed between the travers 50 and inclined surface 70a of hook 70 relative to the axis 58, exert a swing momentum in reaction to the force acting on the sloped section 70a, such that the first and second shell 32, 34 undergo a momentum relative to the axis 58 as shown by curved arrow c corresponding to the torque momentum a acting onto the hook 70. Describing in another way: with this design of levers and torque momentums, the handle 30 can be rotated around the axis 58 towards the rest position and the actuation force exerted by the user more likely results in a rotation of the first and second shells 32, 34 relative to the handle 30, instead of elastically deflecting the hook 70 relative to the first shell 32, which would be necessary to release the land 74 from the detent 72. So in this embodiment an unintentional unlocking and opening of the filter 24 is more likely prevented. Thus the fluff collected within in the filter cannot unintentionally fall out.

[0057] Summarizing, the first embodiment offers the main advantages of:

- providing a handle that facilitated manual user handling of the filter,
- providing a self-actuation of the handle to move towards its rest position,
- obstructing unintentional opening by one-hand manipulation by the user.

[0058] In an embodiment a single one of these advantages may be provided or each of the advantages can be combined with one or more of the other advantages.

[0059] Figs. 11 to 18 show a second embodiment of the fluff filter 24' to be inserted in the filter seat 22 of the tumble dryer 2. Unless otherwise mentioned, the above described in connection with the first embodiment and the claims is fully applicable to the second embodiment. Elements with the same reference numerals or the reference numerals, that are above without an apostrophe and below with apostrophe, fulfill the same function and are arranged in the same way - unless otherwise mentioned herein below. The following is intended to describe the differences.

[0060] Figs. 12 to 14, 17 and 18 show the fluff filter 24' without the filter webs 36, 38, 40 (described above), while Fig. 15 shows the filter webs provided on the inner frame structure of the first and second shell 32', 34'. Figs. 12, 13, 17 and 18 show the filter 24' in the closed state, wherein Figs. 12 and 13 show the perspective front view, while Figs. 17 and 18 show the perspective rear view. In Figs. 12, 14, 15 and 17 the handle 30' is in its operational position II, while in Figs. 13 and 18 the handle 30' is in the retracted rest position I, where the handle is received in the recess 28'.

[0061] As in the first embodiment, if the handle is in the operational position II (e.g. Fig. 12) the cam 60 (Fig. 13)

arranged at the side leg 52 of the handle 30' abut against a side wall of the recess 28' (compare Fig. 7 for the first embodiment). The handle 30' has no base traverses 54, but instead the hinges 56' are arranged at the lower ends of the side legs 52'. Also in this embodiment the junction line 46 divides the exposed top surface 26' into the first surface portion 26a' and the second surface portion 26b'. While in the first embodiment the recess 28 is completely formed in the first shell 32, in the second embodiment only the portion of the recess 28' surrounding the hinges 56' is formed in the first surface portion 26a' of the first shell 32'. Most portion of the recess 28' is formed in the second surface portion 26b' of the second shell 34' - as can be seen in the top perspective in Fig. 12 and in a bottom view of the recess 28' in Fig. 14.

[0062] As can be seen from Fig. 14, the mechanical fixation line of the hook 70', i.e. the proximal end of the hook or latch 70' is provided close to the rotation axis 58 of the handle 30' around the hinges 56', or the fixation base of the hook 70' at the first shell 32' is even somewhat shifted to behind the axis 58 with respect to the inclined section 70a' of hook 70'. The above mentioned one-hand operability for opening the locking element is now described with reference to Fig. 16.

[0063] Fig. 16 shows in a simplified manner the bottom plane 62 of the recess 28', the axis 58 of the handle rotation, which at the same time is or is close to the connection base of hook 70' at the first shell 32'. The cam 60, which stops the rotation of the handle 50 at the operational position of the handle, is represented by the arrow and prevents that the inclination angle α of the handle lever (side leg 52' of the handle) becomes smaller than α shown to be relative to the vertical line 66. The actuation point which is at the inclined section 70a' of the hook 70' is indicated at point 70a' and represents another lever with respect to the rotation axis 58/fixing basis of the hook 70' at the first shell 32'. When the user exerts a torque momentum i onto the inclined section 70a', the opening angle β (which is the maximum angle between the rest and the operational positions of handle 50) cannot further increase due to the stop momentum exerted by cam 60. Thus the opening momentum i exerted by the user to 70a', while holding the traverse 50 with the other fingers, results in a bending torque onto the hook 70'. Thereby, the hook 70' is resiliently deflected downwards and the lock section 70b' releases the land 74' of the detent or recess 72'. Thereby the lock between the first and second shells 32', 34' is unlocked and the second shell 34' can swing open relative to the first shell 32' which is still hold by the user at the handle 50. In this way the design and relative arrangement of the handles and hook 70' of the second embodiment facilitates opening of the filter 24' using only one hand.

[0064] In the first and second embodiment as well as according to the invention, preferably the first shell 32, 32' is made as a unitary and/or monolithic and/or single piece, preferably by injection molting. Preferably in this single and/or unitary and/or monolithic and/or injection molded construction one or more of the following elements is/are formed together with the first shell 32, 32':

- a portion of one or both of the shell hinges 42,
- a portion of one or both handle hinges 56, 56',
- at least a portion of the hook 70, 70', and
- at least a portion of the recess 28, 28'.

[0065] In the first and second embodiment as well as according to the invention, preferably the second shell 34, 34' is made as a single and/or unitary and/or monolithic and/or injection molded piece. Preferably one or more of the following elements are formed together with the second shell 34, 34' in the single piece and/or unitary and/or monolithic and/or injection molded piece:

- a portion of one or both shell hinges 42,
- a portion or all of the detent/recess 72, 72',
- the land 74, 74'
- at least a portion of the recess 28, 28'.

[0066] As described before, the filter webs or filter grids 36, 38 and 40 are provided separately on the frame structure around the openings provided by the first and/or second shell 32, 32'; 34, 34'.

Reference Numeral List:

2	tumble dryer	46	junction line
4	outer case	50, 50'	traverse/grip
6	top plate	52, 52'	side leg
8	side wall	54	base traverse
10	front wall	56, 56'	hinge
12	loading opening	58	axis
14	door	60	cam/stop
16	drum interior	62	bottom plane of recess

(continued)

	18	control panel	64	side wall of recess
	20	front frame	66	vertical line
5	22	filter seat at air channel opening/inlet	70, 70'	latch/hook
			70a, 70a'	sloped end section
	24, 24'	fluff filter	70b, 70b'	lock section
	26, 26'	exposed/top surface	72, 72'	detent/recess
10	26a, 26a'	first surface portion	74, 74'	land
	26b, 26b'	second surface portion	80	seat line
	28, 28'	recess	82	channel section
	30, 30'	handle	84	inlet section
	32, 32'	first shell		
15	34, 34'	second shell	I	rest position
	36	first shell filter web	II	operational position
	38	second shell filter web	α , β	angle
	40	bottom filter web	a, b, c	torque
	42	shell hinge	k, i	torque
20	44	air inlets		

Claims

- 25 1. Laundry drying apparatus (2), in particular condensate dryer or vented dryer, comprising:
- 30 a cabinet (4),
a rotatable drum arranged within the cabinet (4) and adapted to receive laundry to be dried,
a loading opening (12) for loading and unloading laundry to and from the drum,
a door (14) arranged at the cabinet (4) and adapted to close the loading opening (12),
an air channel arranged within the cabinet (4) and adapted to guide within the cabinet (2) drying air exiting the drum,
a filter unit (24, 24'),
a filter unit seat (22) arranged at, upstream or in the air channel and adapted to receive the filter unit (24, 24'),
35 wherein, when the filter unit is arranged in its operational position in the filter seat, the filter unit is adapted to filter fluff from the drying air exiting the drum, and
a grip section arranged at the filter unit (24, 24') adapted to remove the filter unit from the filter unit seat (22),
characterized in that
40 the grip section comprises at least one handle element (30, 30') that is movably arranged at the grip section, and
the at least one handle element (30, 30') is movable between a rest position (I) and an operational position (II).
2. Apparatus according to claim 1, wherein in the rest position (I) the at least one handle element (30, 30') is at least one of:
- 45 in a flush position where the handle element is or the handle elements are flush with the surrounding surface (26, 26') of the filter unit (24, 24'),
received in a receptacle (28, 28') formed in an outer surface of the filter unit (24, 24')
in a retracted position,
in an inserted position,
50 in a non-protruding position, and
in a flat position,
- with respect to a main body or outer surface profile of the filter unit.
- 55 3. Apparatus according to claim 1 or 2, wherein in the operational position (II) the at least one handle element (30, 30') is at least one of:

protruding from a or the receptacle (28, 28') formed in an outer surface of the filter unit (24, 24'),
 in an extracted position,
 in an extended position,
 in a protruding position, and
 in a raised position,

with respect to a main body or outer surface profile of the filter unit.

4. Apparatus according to claim 1, 2 or 3, wherein the grip section further comprises a receptacle (28, 28') adapted to receive the at least one handle element (30, 30'), when the handle element is or the handle elements are in the rest position (I).
5. Apparatus according to any of the previous claims, wherein the grip section further comprises a pivot bearing (56) for the at least one handle element (30, 30') adapted to pivotably support the at least one handle element, such that the at least one handle element can be pivoted at least between the rest position (I) and the operational position (II).
6. Apparatus according to any of the previous claims, wherein, when the filter unit (24, 24') is received in the filter unit seat (22), the grip section is arranged at a surface section (26, 26') of the filter unit which is exposed to the loading opening (12) or is arranged at an upper surface of the filter unit.
7. Apparatus according to any of the previous claims, wherein the filter unit seat (22), the filter unit (24, 24'), the loading opening (12) and the door (14) are designed and arranged relative to each other such that, when the filter unit is received in the filter unit seat and the door closes the loading opening, the door prevents the at least one handle element (30, 30') to be moved from its rest position (I) or to be moved from its rest position to or towards the operational position (II).
8. Apparatus according to any of the previous claims, wherein the at least one handle element (30, 30') is pivotably mounted at the grip section by means of a or the pivot bearing (56), wherein each of the handle elements comprises a basis portion located proximal to the pivot bearing and a grip portion (50) located distant to the pivot bearing, and wherein, when the filter unit (24, 24') is inserted in the filter unit seat (22) and the at least one handle element is in its rest position (I),
 - a) the basis portion is arranged proximal to the drum and the grip portion (50) is arranged distant to the drum, or
 - b) the basis portion is arranged distal to the drum and the grip portion (50) is arranged proximal to the drum.
9. Apparatus according to any of the previous claims, wherein a rib, a cam (6) or a projection is arranged at the grip section or at the at least one handle element, adapted to act as a stop element at the operational position (II) of the at least one handle element, such that the at least one handle element is stopped in the operational position (II) at an inclined orientation (α), when the filter unit (24, 24') is inserted in the filter unit seat (22), and such that the at least one handle element moves to the rest position (I) by gravitational force when no other force is exerted onto the at least one grip element, and/or wherein a rib, a cam (60) or a projection is arranged at the grip section adapted to interact with the at least one handle element (30, 30'), or a rib, a cam (60) or a projection is arranged at the at least one handle element (30, 30') adapted to interact with the grip section, and wherein the rib, the cam (60) or the projection is an elastic element or is arranged at an elastic element, such as to build up a biasing force when the at least one handle element is moved towards its operational position (II).
10. Apparatus according to any of the previous claims, wherein, when the filter unit (24, 24') is inserted into the filter unit seat (22), an exposed filter surface (26, 26') is exposed towards the inflowing drying air.
11. Apparatus according to any of the previous claims, wherein the filter unit (24, 24') comprises a filter body comprising two body shells (32, 34; 32', 34'), wherein the two body shells are adapted to be connected to each other or closed for inserting the filter unit into its operational position in the filter unit seat (22) and the two body shells are adapted to be opened or at least partially disconnected from each other for filter cleaning.
12. Apparatus according to claim 11, wherein the filter unit (24, 24') comprises a or the receptacle (28, 28') adapted to at least partially receive the at least one handle element (30, 30') in the rest position (I) and a handle support (56, 56') adapted to support the at least one handle element along the moving path between the rest position (I) and the

operational position (II), and wherein:

the receptacle (28) and the handle support (56) are arranged at a first one of the body shells (32), or
 a first portion of the receptacle is arranged at a first one of the body shells and the handle support and a second
 portion of the receptacle are arranged at the second body shell, or
 the receptacle (28') is essentially arranged at a first one (34') of the body shells and the handle support (56') is
 arranged at the second body shell (32').

13. Apparatus according to claim 11 or 12, wherein the filter unit (24, 24') further comprises:

a locking element (70, 72; 70', 72') adapted to releasably connect the body shells (32, 34; 32', 34') to each other
 in the connected or closed state, and
 a user-operable actuation element (70a, 70a') adapted for unlocking the locked state of the locking element,
 wherein preferably the actuation element is arranged at the region of the receptacle (28, 28') adapted for
 receiving the at least one handle element (30, 30'), or wherein the actuation element is arranged outside the
 region of the receptacle adapted for receiving the at least one handle element.

14. Apparatus according to claim 11, 12 or 13, wherein the at least one handle element (30) is rotatably arranged at a
 first one (32) of the two body shells and a or the user-operable actuation element (70a) of a or the locking element
 (70, 72), which is adapted for unlocking the locked state of the locking element, is arranged at the first body shell (32),
 wherein the user-operable actuation element is arranged at a distance from the rotation axis (58) of the at least one
 handle element, and
 wherein, when the filter unit (24) is held at the at least one handle element (30), the degree of freedom for rotation
 of the at least one handle element is such that the handle is caused to rotate relative to the first body shell (32),
 when a pressing force is acting onto the user-operable actuation element (70a).

15. Apparatus according to claim 11, 12 or 13, wherein the at least one handle element (30') is rotatably arranged at a
 first one (32') of the two body shells and a user-operable actuation element (70a') of a or the locking element (70',
 72'), which is adapted for unlocking the locked state of the locking element, is arranged at the first body shell (32'),
 wherein the user-operable actuation element is arranged at a distance from the rotation axis (58) of the at least one
 handle element, and
 wherein, when the filter unit (24, 24') is held at the at least one handle element, the degree of freedom for rotation
 of the at least one handle element is such that the handle is blocked to rotate relative to the first body shell (32'),
 when a pressing force is acting onto the user-operable actuation element (70a').

16. Apparatus according to any of the previous claims 11 to 15, further comprising one or more inner filter frames or a
 first and second inner body shell, which is or are arranged in an inner space of the filter unit (24, 24') provided
 between the inner sides of the first and second body shells (32, 34; 32', 34'), when the first and second body shells
 are in their closed state.

17. Apparatus according to any of the previous claims 11 to 16, wherein the filter unit (24') is **characterized by** one or
 more of the following:

- a) a junction (46) is formed at the upper surface (26') between the surface portions (26a', 26b') of the first and
 second body shells (32', 34'), and the at least one handle element (30') is arranged at the first body shell (32')
 and the supporting point or line (58) of the at least one handle element is arranged at the surface portion (26a')
 of the first body shell close to the side wall of the first body shell and spaced from the junction (46),
- b) the at least one handle element (30') is arranged at the first body shell (32') and the surface portion (26a')
 of the first body shell is smaller than the surface portion (26b') of the second body shell (34'), and
- c) a or the receptacle (28') for receiving the at least one handle element (30') in the rest position (I) is arranged
 or is essentially arranged in the surface portion (26b') of the second body shell (34').

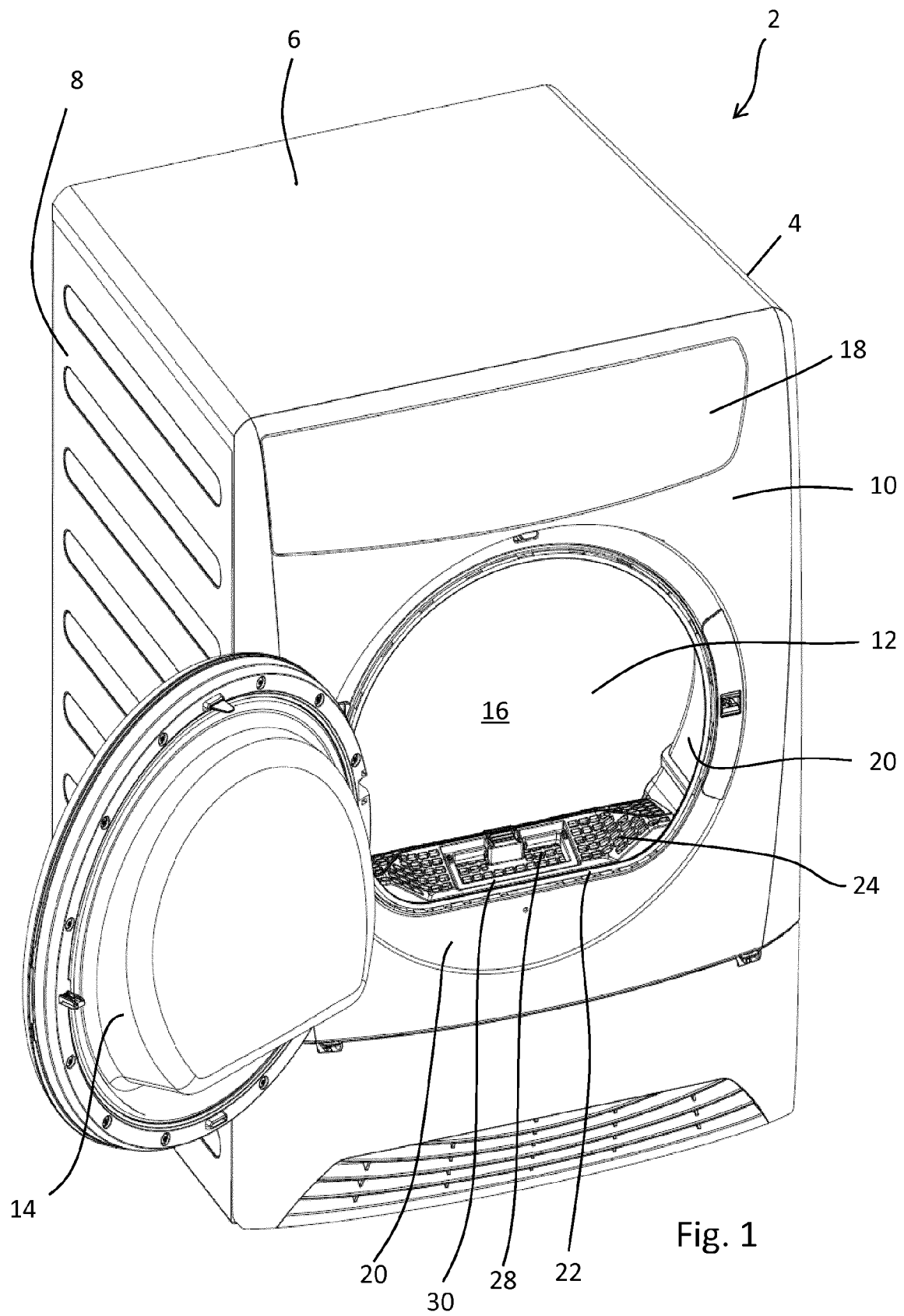
18. Apparatus according to any of the previous claims 11 to 16, wherein the filter unit (24) is **characterized by** one or
 more of the following:

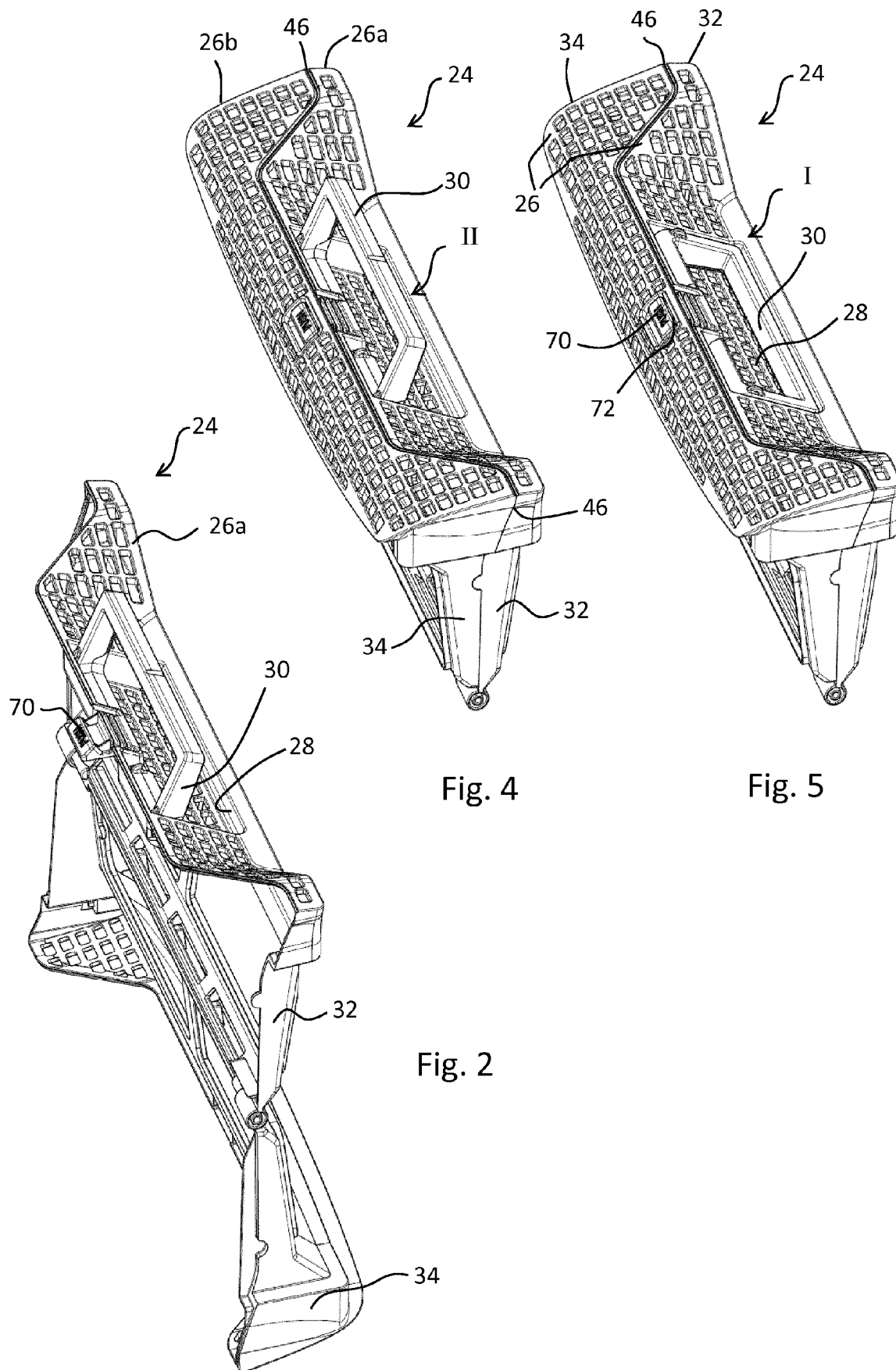
- a) a junction (46) is formed at the upper surface (26a) between the surface portions of the first and second body
 shells (32, 34) and the at least one handle element (30) is arranged at the first body shell and the supporting
 point or line (58) of the at least one handle element is arranged close to the junction (46),

b) the at least one handle element (30) is arranged at the first body shell (32) and the surface portion (26a) of the first body shell is smaller than the surface portion (26b) of the second body shell (34), and
c) a or the receptacle (28) for receiving the at least one handle element (30) in the rest position (I) is arranged or is essentially arranged in the surface portion (26a) of the first body shell (32).

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19. Method of removing a filter unit (24, 24') from a drying apparatus (2), in particular from a condensate dryer or a vented dryer or a drying apparatus according to any of the previous claims, the method comprising the steps:

10 opening a door (14) arranged at a cabinet (4) of the laundry drying apparatus, thereby providing access to a loading opening (12) arranged at a cabinet (4),
moving at least one handle element (30, 30'), which is movably arranged at a grip section of a filter unit (24, 24'), from a rest position (I) to an operational position (II),
gripping the at least one handle element (30, 30'),
15 raising the filter unit (24, 24') at the at least one handle element, which is in the operational position (II), and thereby pulling off the filter unit from a filter unit seat (22), which is arranged at, upstream or in an air channel of the apparatus.





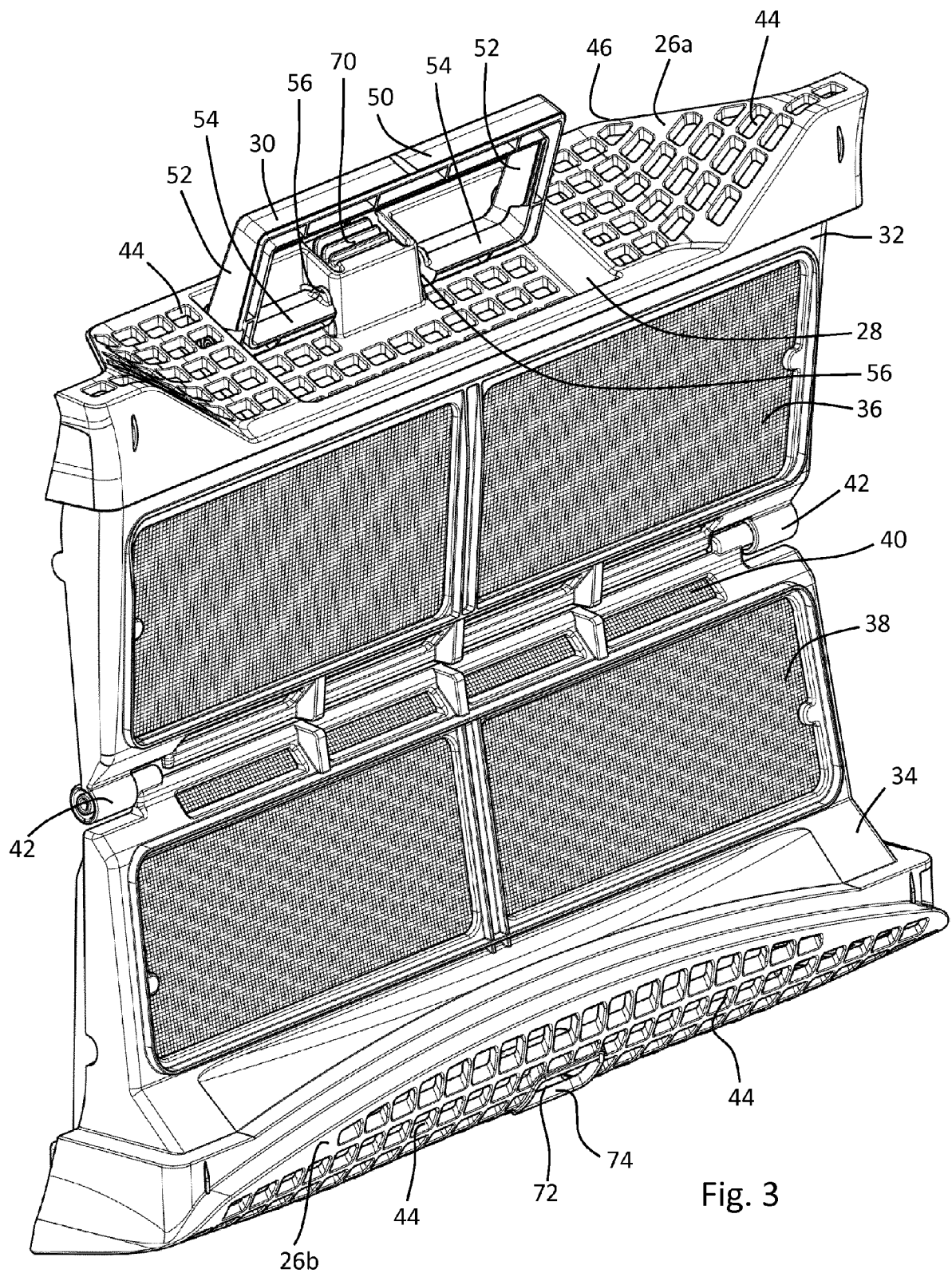


Fig. 3

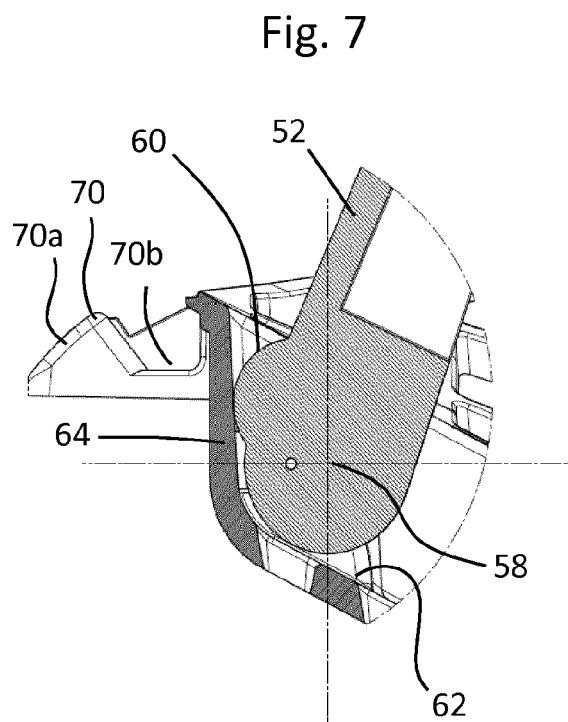
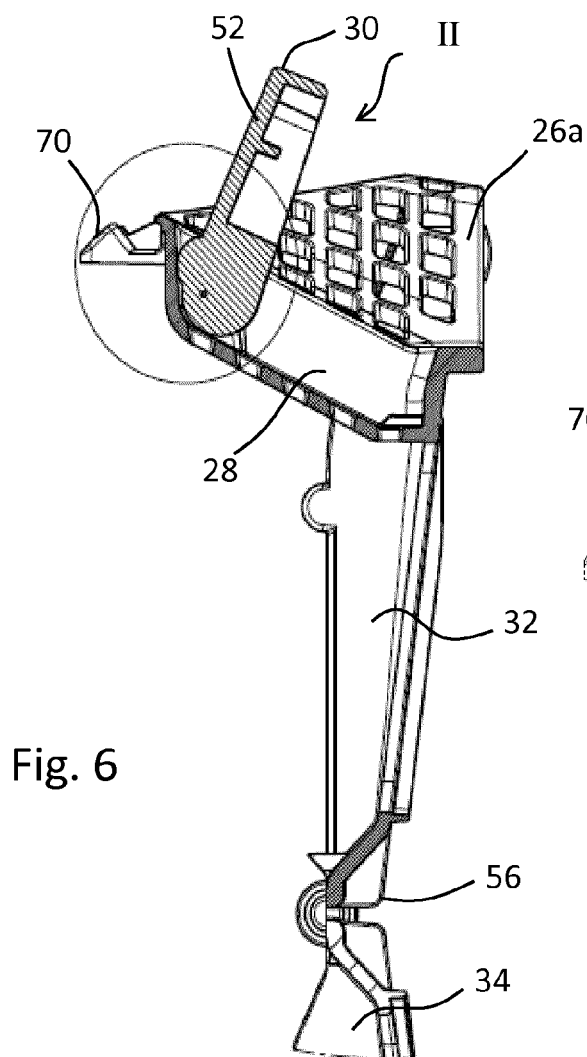
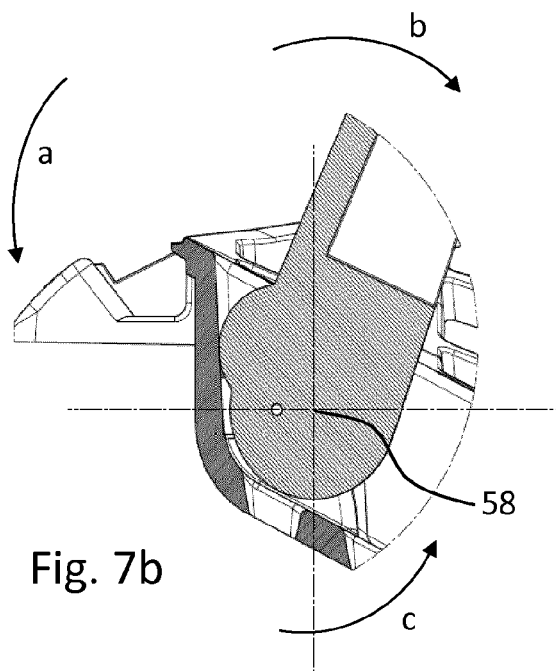
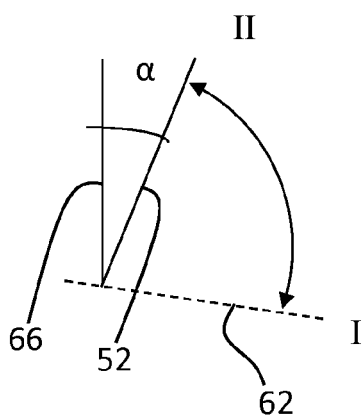


Fig. 7a



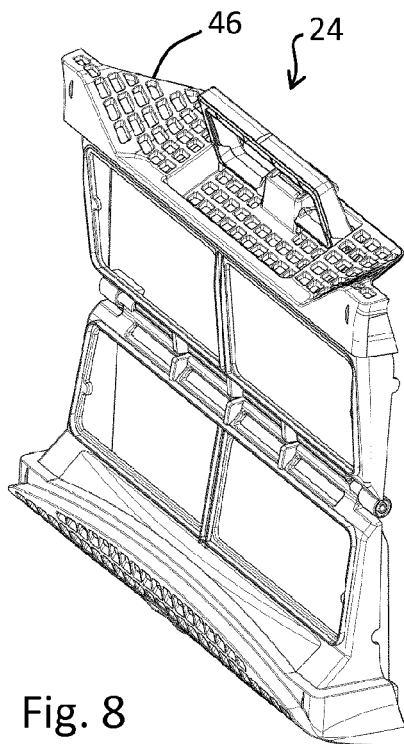


Fig. 8

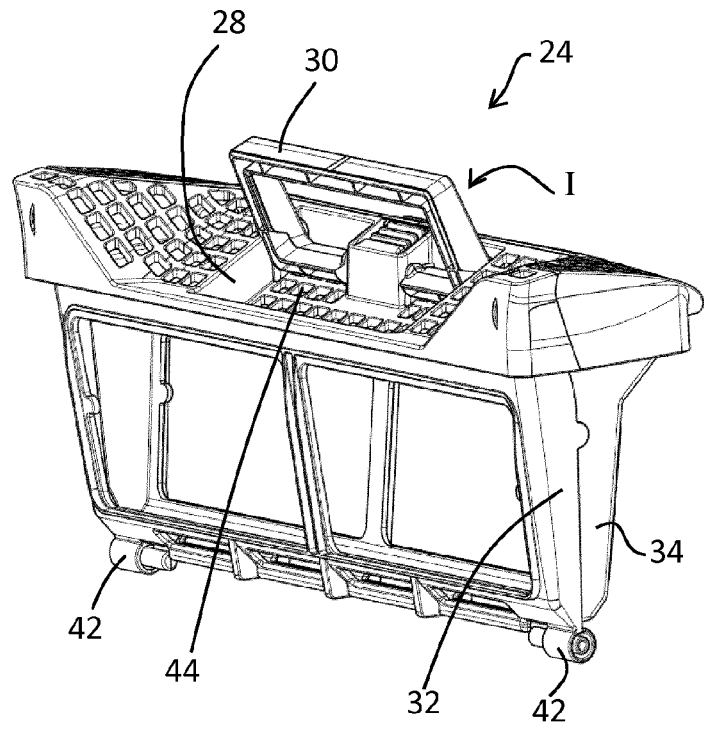


Fig. 9

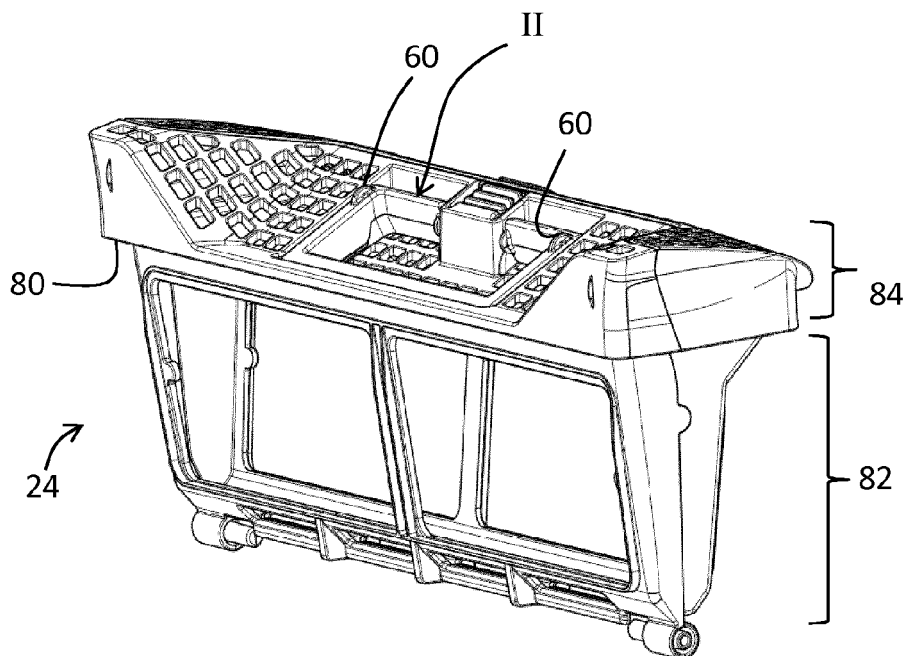


Fig. 10

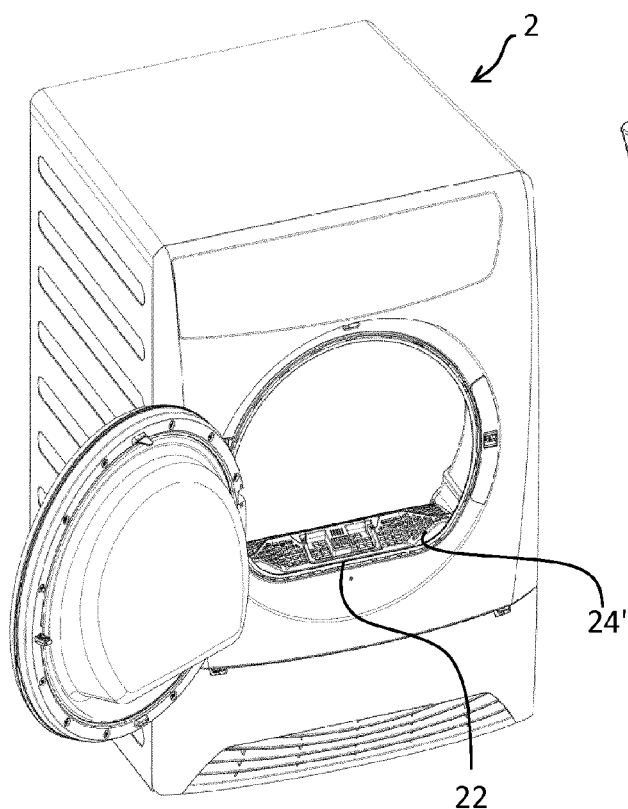


Fig. 11

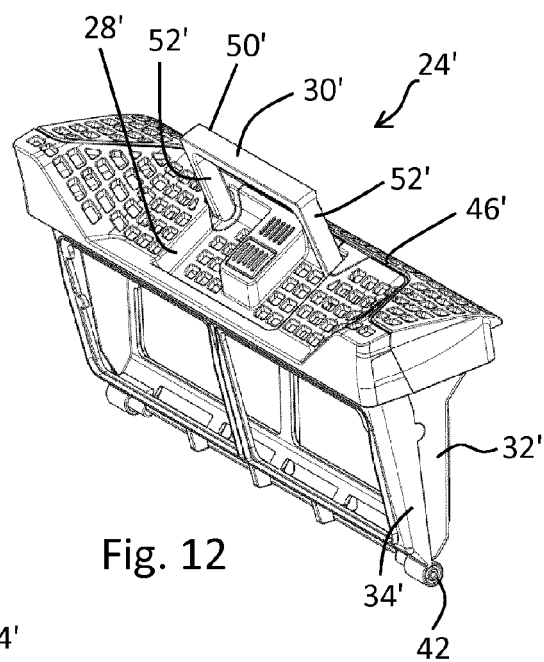


Fig. 12

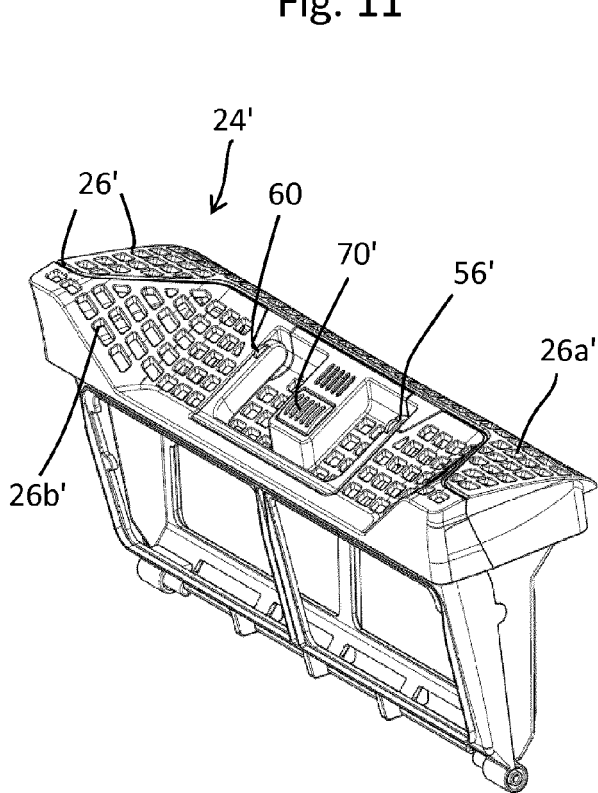


Fig. 13

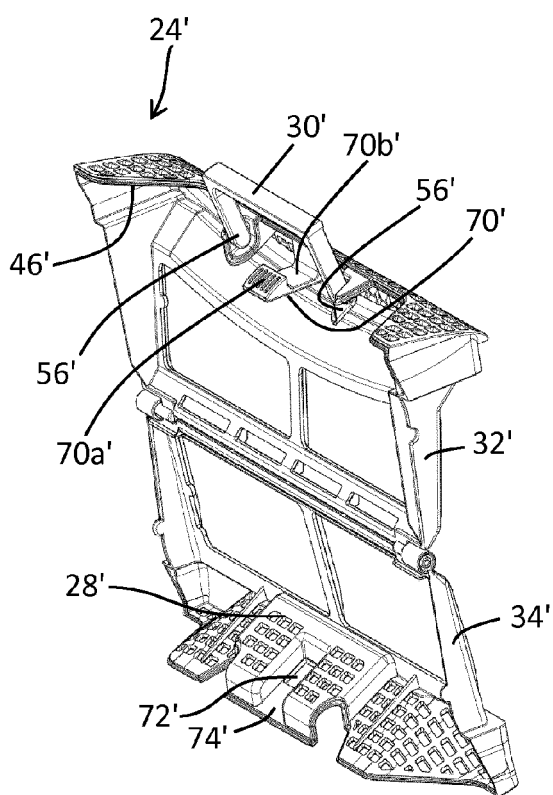
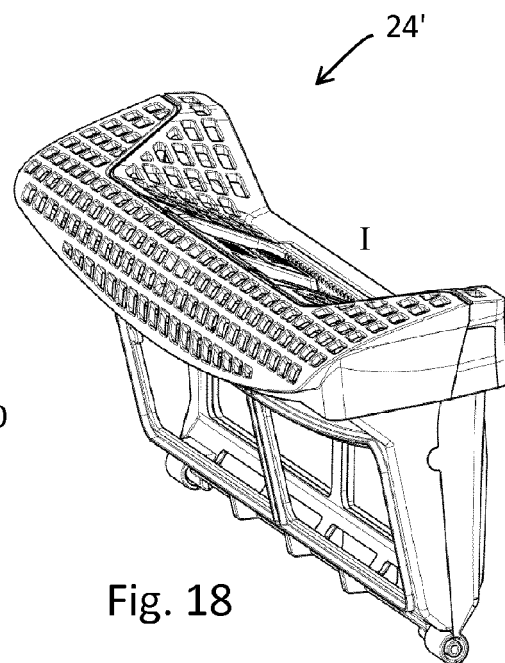
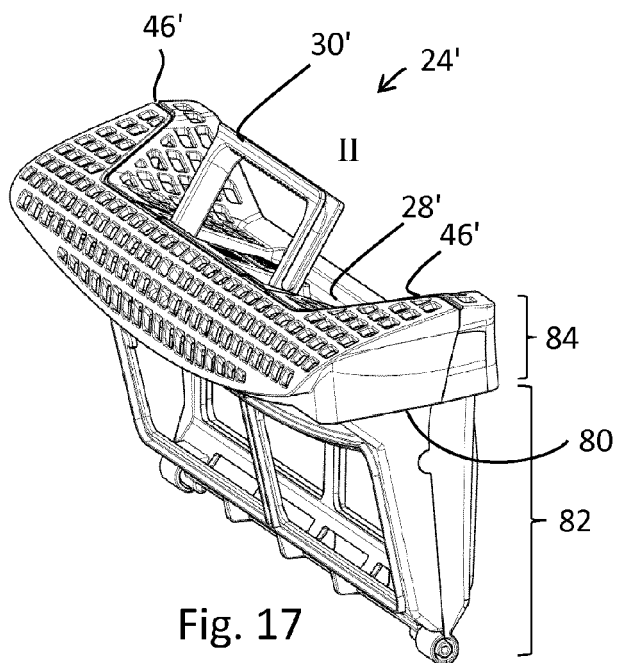
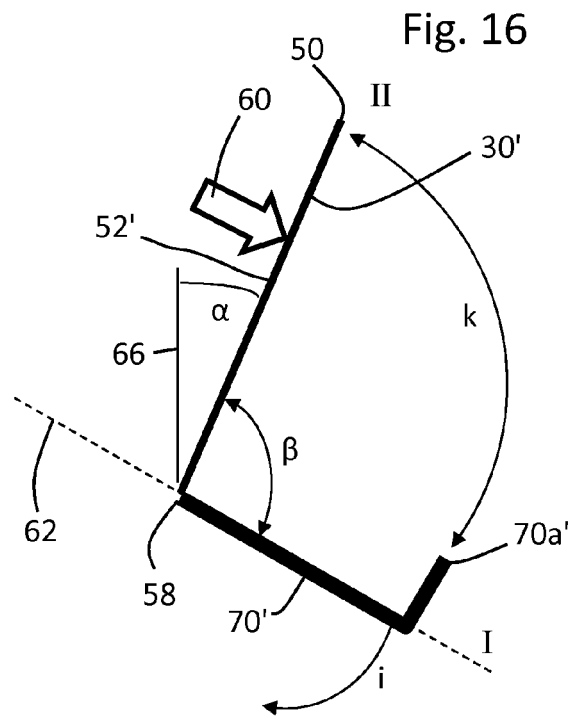
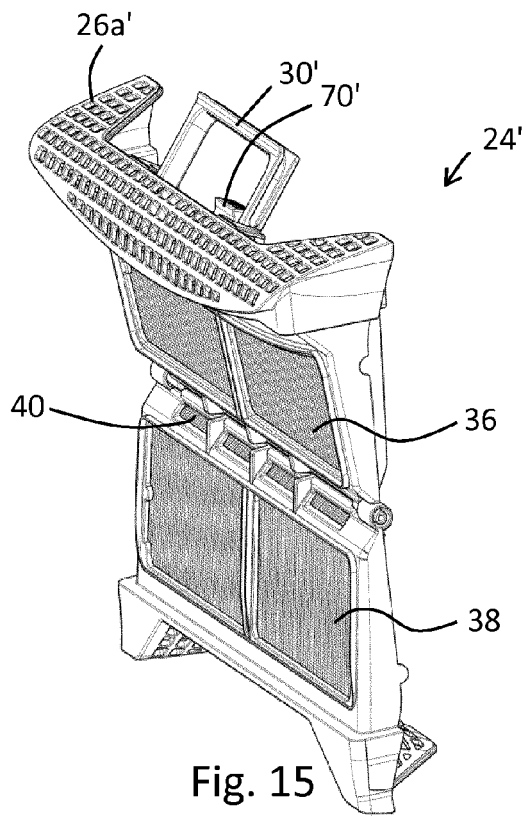


Fig. 14





EUROPEAN SEARCH REPORT

 Application Number
 EP 14 19 7612

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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	WO 2012/062894 A2 (ARCELIK AS [TR]; ATAY CANYIGIT [TR]; DEMIRHAN DOGAN [TR]; SAR CAN [TR]) 18 May 2012 (2012-05-18) * paragraphs [0017], [0029]; figures 2-5 *	1,2,4-6, 19	INV. D06F58/24
X	JP 2010 005097 A (KOWA CO) 14 January 2010 (2010-01-14) * figures 2,5,6 *	1,3,19	
X	WO 2007/074124 A1 (ARCELIK AS [TR]; CINAR LEVENT [TR]; KANLIKUYU RESUL [TR]; SAR CAN [TR]) 5 July 2007 (2007-07-05) * figures 1-3,6 *	1,5,6,19	
A	US 2011/271543 A1 (KIM DONGHYUN [KR] ET AL) 10 November 2011 (2011-11-10) * figures 1-3,5 *	1,6,7, 11-13,19	
A	KR 2004 0056808 A (LG ELECTRONICS INC) 1 July 2004 (2004-07-01) * figures 1-5 *	1,6,7,19	TECHNICAL FIELDS SEARCHED (IPC)
A	US 2006/107632 A1 (BERKHOEL JAMES L [US] BERKHOEL JAMES LEONARD [US]) 25 May 2006 (2006-05-25) * figures 2-6 *	1-5,19	D06F
A,D	EP 2 458 071 A1 (INDESIT CO SPA [IT]) 30 May 2012 (2012-05-30) * paragraph [0032] *	1,11-14	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 May 2015	Examiner Kising, Axel
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 19 7612

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2012062894 A2	18-05-2012	EP 2638197 A2	18-09-2013
		WO 2012062894 A2	18-05-2012
JP 2010005097 A	14-01-2010	JP 4245653 B1	25-03-2009
		JP 2010005097 A	14-01-2010
WO 2007074124 A1	05-07-2007	EP 1966428 A1	10-09-2008
		WO 2007074124 A1	05-07-2007
US 2011271543 A1	10-11-2011	AU 2011249152 A1	20-12-2012
		CA 2798779 A1	10-11-2011
		CN 102884244 A	16-01-2013
		DE 212011100095 U1	11-01-2013
		EP 2567016 A2	13-03-2013
		TW 201202502 A	16-01-2012
		US 2011271543 A1	10-11-2011
		WO 2011139092 A2	10-11-2011
KR 20040056808 A	01-07-2004	NONE	
US 2006107632 A1	25-05-2006	NONE	
EP 2458071 A1	30-05-2012	EP 2458071 A1	30-05-2012
		IT T020100184 U1	30-05-2012

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2458071 A1 [0002]