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Technical Field

The present invention relates to an extractor hood with a grease filter and a suction system for applying underpressure to this grease filter in order to force gases through this grease filter, which gases are to be cleaned, in particular air polluted by cooking vapour, and with a suction area before the grease filter, which is modifiable by air guide devices, like in flaps, drawer-like moving outs and the like.

Background Art

It is appropriate if the receiving area of the extractor hood covers at least the area of the hob for the cooking vapours, in case of a kitchen extractor hood arranged above a cooking space, such that as much as possible of the rising cooking vapours are captured by the extractor hood. Corresponding big configurations of extractor hoods and food are very advantageous with regard to the function, but they appear rather too voluminous and disturbing for operating the hob in smaller kitchens.

For this reason, extractor hoods were realised, like e.g. described in the published patent applications EP 0603637, EP 1624254 or EP 1842008, which are smaller in their construction and additionally equipped with air guide devices, like plates, drawer-like moving outs and the like in order to increase the capturing area of the extractor hood. Furthermore, it is known e.g. to increase the suction area of the extractor hood by drawer-shaped moving outs, which are equipped with complete grease filters.

In DE20316130 a modular system is described, in case of which extractor hoods with different dimensions can be mounted at a fan box. The fans have drawer

parts with different widths, wherein the drawer parts have flat grease filters at the bottom side.

In EP0443301, an extractor hood with a vertically adjustable inlet part is described, which is connected to a sucking fan via a channel.

Although these known extractor hoods with moving outs are already an improvement, moving outs are demanded for modern kitchen equipment, which should affect the appearance of the cooker as little as possible and should be formed as unobtrusive as possible.

Disclosure of the Invention

According to the present invention, an extractor hood is provided with an fixed escape shaft and a hood part with filter elements and a moving out, wherein the moving out consists of at least one removable insert part, which forms alone a small air channel which is widely free of pressure decreasing openings and/or elements, between a boundary zone of the insert part and the fixed hood part with an also basically free inlet slit at the front end of the air channel.

The air channel is preferably limited by basically air-impermeable walls such that an underpressure as high as possible is generated in the area of the inlet slit at the edge.

In particular, the inlet to the air channel at the edge and the air channel itself are kept free from filter elements which potentially cause a considerable pressure gradient in the channel. Such filters are e.g. small meshed, especially multi-layered grease filters or porous filters like active carbon filter. Advantageously, an effective edge suction can also be realized with a moving out, which has a very small height by disclaiming such elements. This height of the air channel can be maximally 5 cm, in particular preferably maximally 3 cm.

The removable built-in part can have coarse filter elements in the form of sieves or grids in the area of the air channel, for separating fat droplets and the like, which filter elements are oriented transversally or with an inclination to the basically horizontally directed air flow in the air channel in the installed condition of the insert part. The coarse filter elements preferably touch at least once the upper and the lower boundary surface of the air channel. Particularly preferably, the coarse filter elements are formed in a waved way such that they touch either the upper or the lower boundary surface or both at least twice at separated positions in horizontal direction. Additionally or alternatively to these coarse filter elements, the built-in part can also have guiding surfaces, which deflect the air flow behind the air entrance slit, but before the inlet into the hood part in the direction of the lower or upper boundary surface of the air channel.

These filter elements and/or guiding surfaces are shaped or arranged such that they do not effect an essential pressure loss. Thereby, a big part of the suction effect, which is generated at the end of the air channel facing the hood part, is still available at the air inlet slit arranged at the opposite end of the air channel even during installation of such elements.

Preferably, the upper and/or the lower boundary surface of the air channel are parts of the removable insert part. Therefore, the surfaces, which limit the air slit and the air channel and where grease residues increasingly deposit, can be cleaned with the insert part separated from the rest of the extractor hood. Therefore, the material of the insert part is preferably dishwasher safe, e.g. made of stainless steel.

A very strong suction effect can be generated by the shape of the air channel and the air slit according to the invention at the front edge of the moving out,

which suction effect avoids the spread of cooking vapour to the front into the room particularly well.

Additionally, the device has one or several filter elements which cover a lower inlet opening of the hood part during operation. The filter formed by this element or these elements primarily serves for the grease separation and is either mounted in a stationary way at the hood part or movably mounted and coupled to the moving out.

In the case of a filter mounted in a stationary way at the hood part, the filter can be located at a height which lies below the lower boundary surface of the air channel such that the moving out is arranged above the filter in the moved in state. Alternatively, the filter can be mounted in a stationary way at a height which lies between the levels of the lower and the upper boundary surface of the air channel. Thereby, during moving in the filter is displaced into the air channel such that the filter lies between the top and the bottom of the air channel in the moved in state.

As a third variant, the filter mounted in a stationary way can also be mounted on a level above the upper boundary surface of the air channel. In this variant it can be advantageous to provide the bottom side of the air channel with a sloping guiding surface, the upper edge of which is arranged at least very close to the bottom side of the stationary filter. Therefore, this guiding surface separates the air channel from the remaining lower inlet surfaces. Thereby, the air which enters through the air channel is also sucked through a part of the stationary filter.

If the filter is movably arranged to the hood part and coupled to the moving out, it can be supported by joints or a push and edges such that the rear edge moves in a sloping or vertical direction in the hood at moving in or moving out the moving out. The filter can also be foldable, wherein the folding axe(s) move(s) in a

sloping or vertical direction in the hood during moving in or moving out the moving out.

The extractor hood has a fan in the escape shaft in a known way for generating an underpressure. Furthermore, it can have even further filters arranged in the escape shaft especially during recirculating air operation. In an also known way, the air sucked in the lower area of the extractor hood and through the front air slit can be transported either through a pipe outwardly or can be circulated back into the room during recirculating air operation.

Brief Description of the Drawings

Further embodiments, advantages and applications of the invention arise from the dependent claims and the following description according to the figures. Thereby show:

FIG. 1A a perspective view of an extractor hood according to an embodiment of the invention;

FIG. 1B a perspective view of the bottom side of the extractor hood of FIG. 1A;

FIG. 2A a vertical sectional view of an extractor hood according to an embodiment of the invention with a fixedly embedded filter;

FIG. 2B - 2C a detail of a vertical sectional view of an extractor hood according to further embodiments of the invention with fixedly embedded filter;

FIG. 2D - 2F vertical sectional views of an extractor hood according to further embodiments of the invention with fixedly embedded filter; and

FIG. 3a - 3b vertical sectional views of an extractor hood according to further embodiments of the invention with movably embedded filter.

Modes for Carrying Out the Invention

A schematic perspective full view of an extractor hood 10 is shown in the figures 1A and 1B. The hood consists of an escape shaft or a chimney part 11, a lower hood part 12 firmly connected with the escape shaft 11, and a moving out 13 which is supported movably in horizontal direction like a drawer in a hood part 12 and/or on the escape shaft 11. An extractor hood of this type is installed e.g. above a cooking stove.

With regard to the following description, directions parallel to the vertical axis of the escape shaft are named "top" or "bottom", the side with the moving out is named "front" and the opposite side of the hood "rear". The "depth" is considered as the distance from the front side to the rear side and the "width" as the extension perpendicular to the vertical axis and to the depth. When indicated, these definitions are analogously transferred to terms which are equivalent to the terms defined in such a way. The terms "separable", "insertable" and "cleaning" and terms equivalent to these are understood as removable and cleanable with normal means usual in household. Furthermore, a material is dish washer safe, if no essential discolorations or deformations occur after at least 100 normal cleanings in a commercial dish washer.

Typically, the escape shaft 11 ends in a connection 111 which opens either into a pipe or into air outlet openings (not shown), through which filtered air can be recirculated into the room with the cooking stove. The fans or the ventilators can also be arranged in the escape shaft 11, which suck air from the bottom side of the extractor hood 10 and transport it through the escape shaft to the top.

At the firmly connected hood part 12, grease filters 121 are primarily mounted, which close the hood part 12 at least for the essential part of its base surface towards the bottom. The grease filter can consist of one part or of several parallel part filters, as shown.

The filter 121 is removably mounted in the rigid hood part 12 and can be removed and reinserted without tools in order to clean the hood part 12. The hood part may also have further operating elements and lighting elements 122, as partly indicated in FIG. 1B.

The moving out 13 basically consists of a gripping edge 131, a frame 132 and an insert 133 removably fixed in the frame. The insert 133 can be removed from the frame without tools by removing an anchorage 134 from the frame and it can be cleaned as a separate part and reinserted again without tools. This insert is preferable made dish washer safe, e.g. fully made of stainless steel. It basically comprises all parts of the moving out, along which the fume or the vapour are guided.

The insert 133 forms a slit 135 at its front edge, through which air is sucked during operation of the fan. This slit basically has the same length as the insert 133. The slit 135 is widely free of grid-shaped or sieve-shaped elements in order to avoid a pressure loss at this slit. In case of a small total height of the moving out in this way and due to an air channel in the moving out which is also mostly free except for possible coarse grease filters, as described below related to FIG. 2B and 2C, a strong vapour extraction through the slit 135 can also be reached.

The total height of the moving out is thereby 25 mm for moving outs with a width up to 50 cm, 55 cm or 60 cm and 30 mm for moving outs between 60 and 90 cm or even and 120 cm. The height of the moving out is determined in an area which excludes the front edge 131 with the handle. The height of the moving out 13 can be determined e.g. as an averaged value along the full width of the insert 133 about at the half of the depth of the insert or a line parallel to this line in order to not consider local structures and mouldings of the moving out 13.

The inner structure of the moving out is shown in the further figures 2 and 3, which are described in the following. Thereby, the described variants basically differ with regard to the arrangement of the grease filter 121 with respect to the moving out 13. As far as possible, hereby the same reference signs are used as in the figures 1A and 1B, wherein dashed arrows show air flows, in the way how they can occur during the operation of the extractor hood. Double arrows with solid lines indicate movements of the elements of the extractor hood during the operation.

In the cross-sectional area of FIG. 2A an escape shaft 11, a fixed hood part 12 and a moving out 13 are illustrated again. Filter elements 112 with activated carbon are arranged in the escape shaft itself in order to allow a recirculating air operation. In the illustrated example, the filter elements are arranged vertically and form small shafts in the escape shaft 11, which are alternately closed at the bottom or at the top by plates, such that the air sucked from below flows transversally through the filter elements 112 in order to rise further to the top in the chimney. Instead of the illustrated filter elements 112, filter plates arranged horizontally or arranged transversally can be used.

The wider hood part 12 follows the escape shaft 11 and is however also stationary mounted, the bottom side of which is an escape opening which is covered by a grease filter 121 during operation. This filter 121 is removable but rigidly connected with a bottom plate of the hood part 12. The bottom plate also serves as a support for lamp carriers 122 and for the stationary part of the mounting for the moving out 13.

The moving out has a gripping edge 131 at the front. It constitutes the end of the frame 132 towards the front. The removable insert 133 consists of a top part 136 and a bottom part 137, which are the upper and the lower boundary surfaces for the air channel 138. In

the illustrated example, both the top part 136 and the bottom part 137 do not have further openings such that no air can enter into the channel in the area of the air channel 138 itself.

The top part 136 has a guiding surface 136-1 in the front area, which is bent down and guides vertically rising air into the horizontal air channel 138. The distance between the front edges of the guiding surface 136-1 and the front edge of the bottom part 137 defines an air slit 135 opened towards the bottom for the edge suction function of the hood 10.

The bottom part 137 has a rear guiding surface 137-1 at its rear edge, which extends in a slope towards the top. It improves the suction through the air channel 138 by the fan (not shown) arranged above the filter elements 112. With the form and the surface of this rear guiding surface 137-1, it is possible to approximately adjust which part of the suction power generated by the suction engine in the escape shaft 11 is provided to the air channel 138 and therefore to the air slit 135 in the moving out 13 or for the suction through the grease filter 121 of the hood part 12, respectively.

The distance between the top part 136 and the bottom part 137 defines the height of the air channel 138 or basically the height of the moving out 13 with the restrictions already mentioned above, respectively.

In the example according to FIG. 2A, the moving out is supported and dimensioned such that the bottom part 137 is moved over the grease filter 121 during insertion and the moving out 13 is arranged substantially between the grease filter 121 and the chimney 11 in the inserted state.

As shown in the example of FIG. 2A, the air channel 138 can be free of obstacles, like filter elements, which cause an additional pressure drop. In this case the air channel at least does not have extended structures between the bottom part 137 and the top part

136 but is preferably formed with walls as even as possible.

Contrary to this, in the example of a modified moving out 13, which is illustrated enlarged in FIG. 2B, a grid shaped expanded metal 139 is clamped in the area of the air channel 138 between the front edge of the top part 136 and the rear edge of the bottom part 137 transversally to the air channel. This grid 139 serves to improve the grease separation and can be removed from the frame 132 together with the complete insert 133 for cleaning. Ideally, the grid 139 is formed and arranged such that it only constricts the air flow through the air channel 138 slightly, e.g. as expanded metal or simple single-layer perforated plate.

In the example shown in FIG. 2C, the grid 139 is an expanded metal in a wave form, which touches the top part 136 with the wave peaks and the bottom part 137 in the lowest part of the wave troughs.

The grid 139 can be firmly connected with the top part 136 and/or the bottom part 137, e.g. kept itself in the air channel by a welding or a screwed connection or by an elastic effect of the grid.

The grid can be designed continuously or fragmented in segments along the width of the moving out 13, e.g. in stripes which are parallel but inserted with displaced orientation or phase-delayed, respectively, which stripes are parallel to the flow direction of the air in the air channel 138.

Instead of a grid shaped separation plate, which spans the full height (and width) of the air channel at least once, the top part 136 and/or the bottom part 137 can have guiding plates which extend only into the air channel 138 without fully bridging over it. These guiding plates change the flow direction of the air sucked through the air channel 138 and thereby lead to an improved separation of grease droplets from the sucked air. In FIG. 2D, the top part 136 is equipped with such

an additional air guiding plate 136-2 which extends transversally into the air channel 138 and thereby guides the air flow basically horizontally along the channel downwards in direction of the bottom part 137.

The additional air guiding plate 136-2 doesn't have to continuously span the full width of the insert 133 or of the air channel 138, respectively, but it can be formed e.g. by partial guiding surfaces which are shorter with respect to width and are offset in the depth, which part guiding surfaces substantially span at least the width together, such that no part of the air flow can pass the zone with the guiding plates without the desired deflection. The partial pieces which are with respect to width can also be fixed e.g. alternatingly at the top part 136 and the bottom part 137.

In the variant illustrated in FIG. 2E, the bottom part 137 of the insert 133 is arranged below the grease filter 121. In this arrangement, the grease filter 121 is pushed into the air channel while inserting the moving out 13 at this arrangement. Thereby, the bottom part 137 is adapted as even surface without a guiding surface.

In the variant of FIG. 2F, the grease filter 121 is arranged on a level which lies above the moving out 13. In this example, the level is chosen such that a rear guiding surface 137-1 at the rear edge of the bottom part 137, which extends transversally towards the top, touches the bottom side of the grease filter 121 with its upper edge. In this variant of the invention, the air sucked through the air channel 138 passes a part of the grease filter 121 on the way into the escape shaft 11 and is thereby cleaned further from grease residues. The grease filter is not connected with the bottom plate of the hood part 12 in this case, but mounted in the middle or at the upper end of the hood part 12.

In the previous variants and examples of the invention, the moving out 13 and the grease filter 121

are not coupled, i.e. the grease filter stays stationary or fixed even if the moving out is moved. In the following embodiments of the invention, which are illustrated in the figures 3A and 3B, the grease filter is coupled with the moving out either directly or indirectly such that a movement of the moving out is transferred into a movement of the filter or at least of a part of the filter.

In the course of this movement, the grease filter is preferably moved such that it covers the lower opening of the extractor hood to such extent that it uncovers the moving out during pull out and push in.

In the embodiment as shown in FIG. 3A, the grease filter 121 is made foldable. The filter 121 is folded to the top when pushing in the moving out 13, in such a way that the fold axis moves to the top along the middle of the filter. Thereby, the filter 121 is flexibly connected with the moving out 13 at the front edge. The filter 121 is likewise connected with the bottom plate of the hood part 12 at the rear edge.

In the embodiment shown in FIG. 3B, the grease filter 121 moves as a rigid part to the top into the hood part 12 or into the escape shaft 11 when pushing in the moving out 13. Thereby, the grease filter 121 is connected with the moving out 13 at the front edge in an articulated way. The rear edge of the filter 121 moves to the top along a path which e.g. can be defined by guiding rails 123.

It should be understood that above the statements about the movement, the adaptation and the fixation of the grease filter can generally also be applied to a frame, in which the actual filter or its filter elements are removably fixed.

Likewise, elements of the examples shown above can be combined. Consequently, e.g. the shown additional elements in the air channel, like the grid 139 in FIG. 2B or 2C or the additional guiding surfaces 136-2 in

FIG. 2D, can be applied in all variants of the invention. It is clearly noted that the invention is not restricted to the shown examples and may be carried out in other ways within the scope of the following claims.

Patentkrav

1. Emhætte (10) med ubevægelig aftræksskakt (11) og hjelmdel (12) med filterelementer (121) og et udtræk (13), hvor udtrækket (13) består af mindst en indsatsdel (133), der til rengøring af emhætten (10) kan skilles og indsættes igen, **kendetegnet ved, at** indsatsdelen alene danner en smal luftkanal (138) mellem en luftindgangsspalte (135) langs udtrækkets (13) forreste ende og den ubevægelige hjelmdel (12) og aftræksskakten (11), og hvor luftkanalen (138) i det væsentlige er fri for åbninger i siden, således at luft i drift i det væsentlige kun indsuges i luftkanalen (138) gennem luftindgangsspalten (135).

2. Emhætte (10) ifølge krav 1, hvor luftkanalen (138) har en højde på mindre end 50 mm.

3. Emhætte (10) ifølge krav 1, hvor luftkanalen (138) har en højde på mindre end 30 mm.

4. Emhætte (10) ifølge et af kravene 1 til 3, hvor luftindgangsspalten (135) til luftkanalen (138) er holdt fri for filterelementer eller gitre.

5. Emhætte (10) ifølge et af kravene 1 til 4, hvor en fedtseparator (136-2,139) er anbragt i luftkanalen (138).

6. Emhætte (10) ifølge krav 5, hvor fedtseparatoren omfatter si- eller gitterelementer (139).

7. Emhætte (10) ifølge krav 6, hvor si- eller gitterelementerne (139) langs luftkanalen (138) mindst en gang er i kontakt med en lågdel (136) og en bunddel (137) af luftkanalen (138).

8. Emhætte (10) ifølge krav 5, hvor fedtseparatoren i det mindste omfatter en ledeflade (139), der rager ind i luftkanalen (138), og som påvirker luftstrømmens retning i luftkanalen (138).

9. Emhætte (10) ifølge et af kravene 1 til 8, hvor indsatsdelen (133), der til rengøring af emhætten (10) kan skilles og indsættes igen, består af et materiale, der kan tåle maskinvask.

10. Emhætte (10) ifølge krav 9, hvor top- og bunddele (136, 137), der danner den største del af luftkanalens (138) indvendige begrænsningsflader, er en del af indsatsdelen (133).

11. Emhætte (10) ifølge et af kravene 1 til 10, med et eller flere filterelementer (121), der kan aftages til rengøring, og som danner en fedtseparator til at dække en nedre indgangsåbning af hjelmdelen (12).

12. Emhætte (10) ifølge et af kravene 1 til 11, hvor det ene eller flere filterelementer (121) er monteret bevægeligt og er koblet til udtrækket (13), således at det ene eller flere filterelementer (121) ved indskubning af udtrækket (13) bevæges opad i retning af aftræksskakten (11).

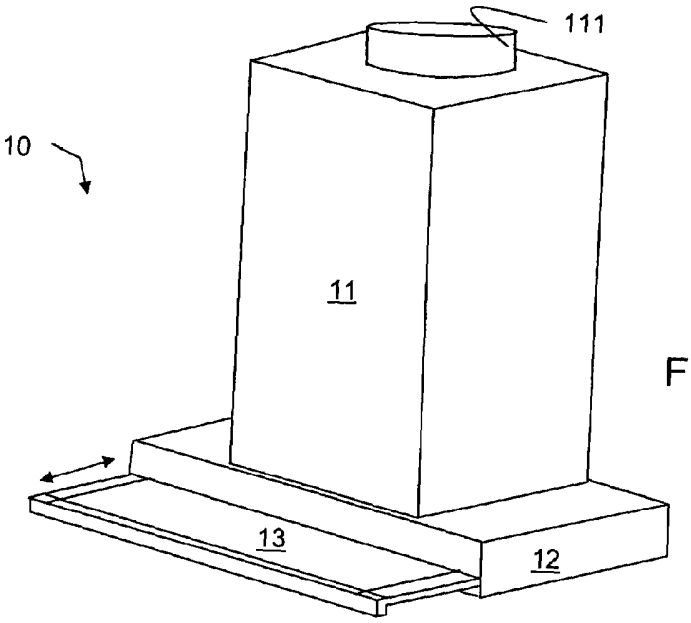

FIG. 1A

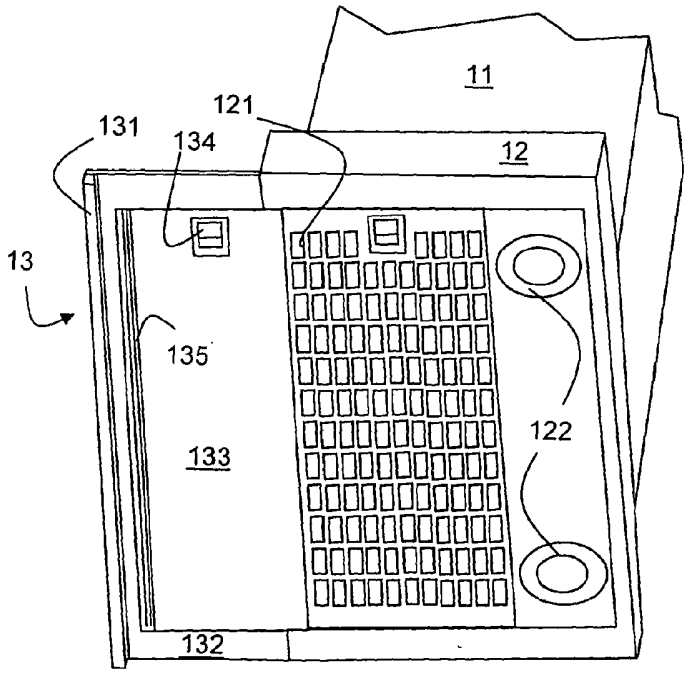

FIG. 1B

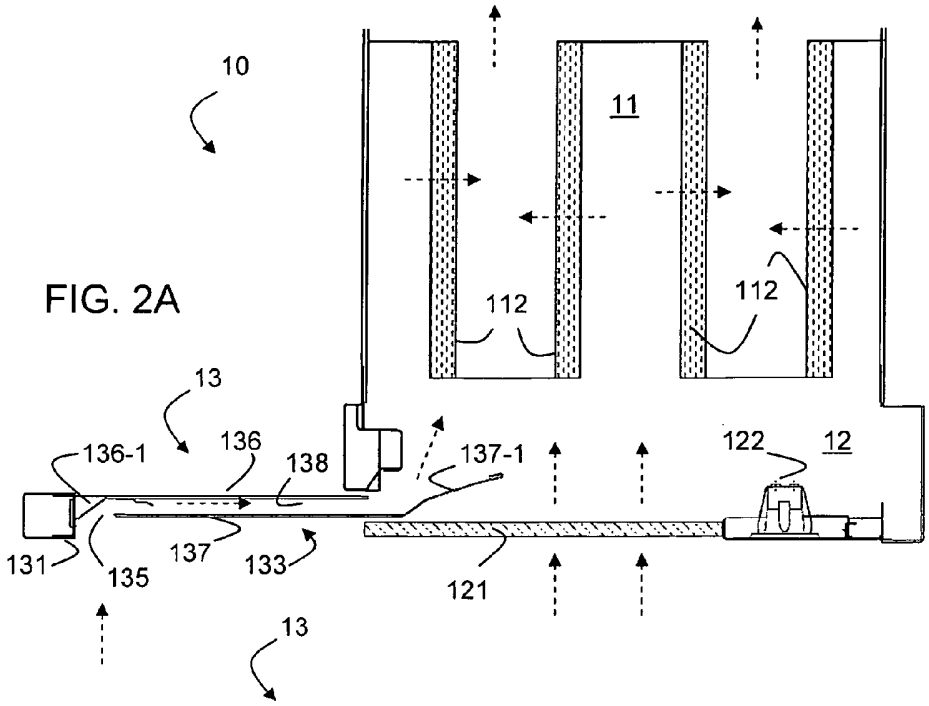

FIG. 2A

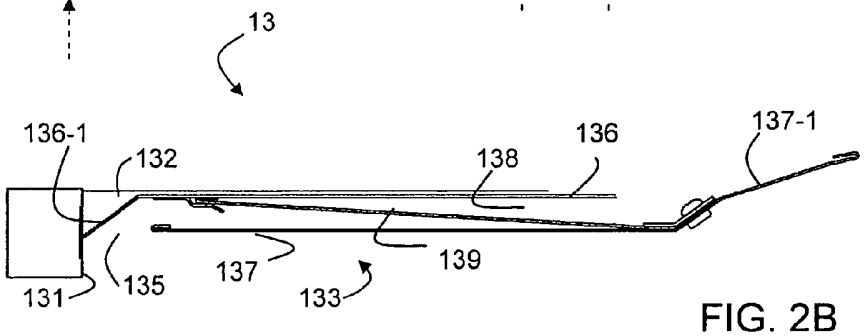

FIG. 2B

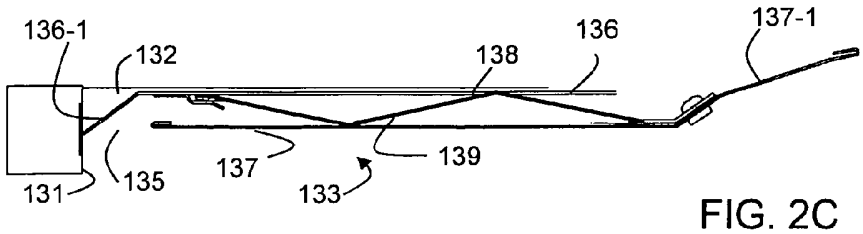

FIG. 2C

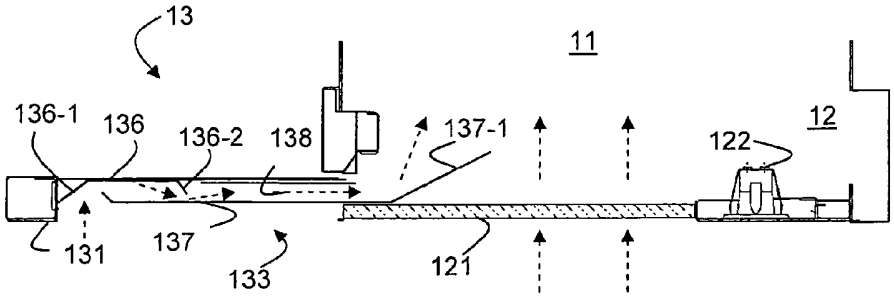

FIG. 2D

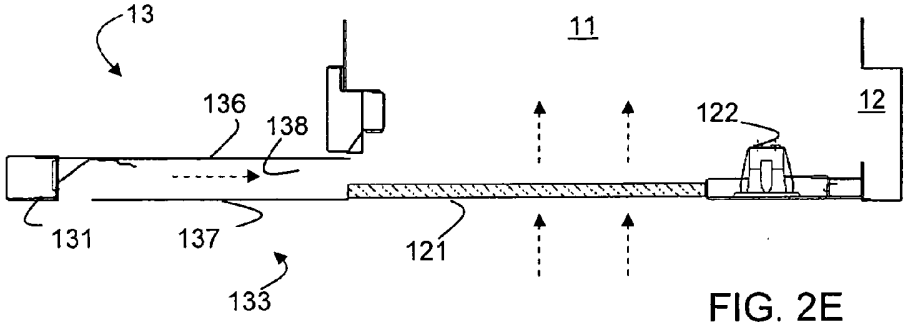

FIG. 2E

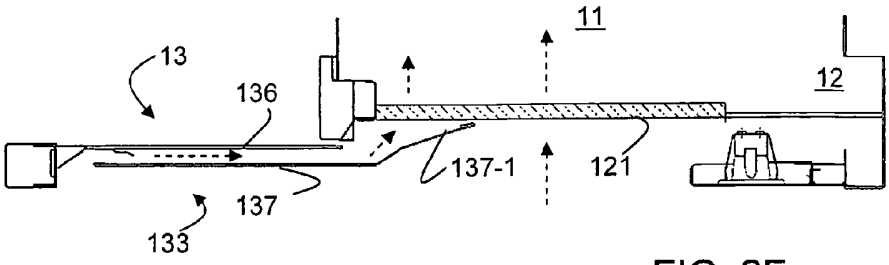

FIG. 2F

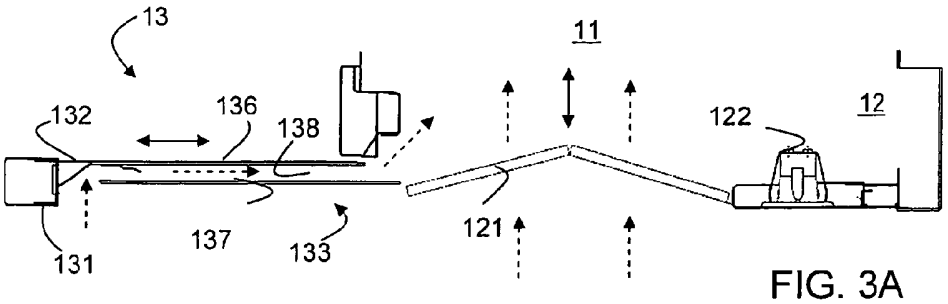
13
11
132
136
138
122
12
131
137
133
121

FIG. 3A

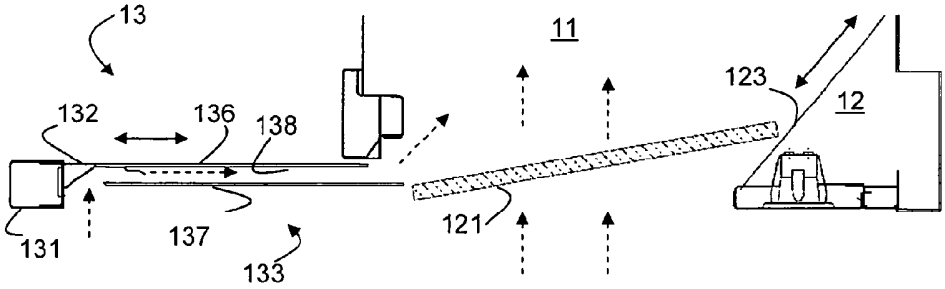
13
11
123
132
136
138
12
131
137
133
121

FIG. 3B