



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.04.2014 Bulletin 2014/17

(51) Int Cl.:
B05B 15/02 (2006.01) B05C 5/02 (2006.01)

(21) Application number: **13187516.3**

(22) Date of filing: **07.10.2013**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

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(30) Priority: **16.10.2012 BE 201200699**

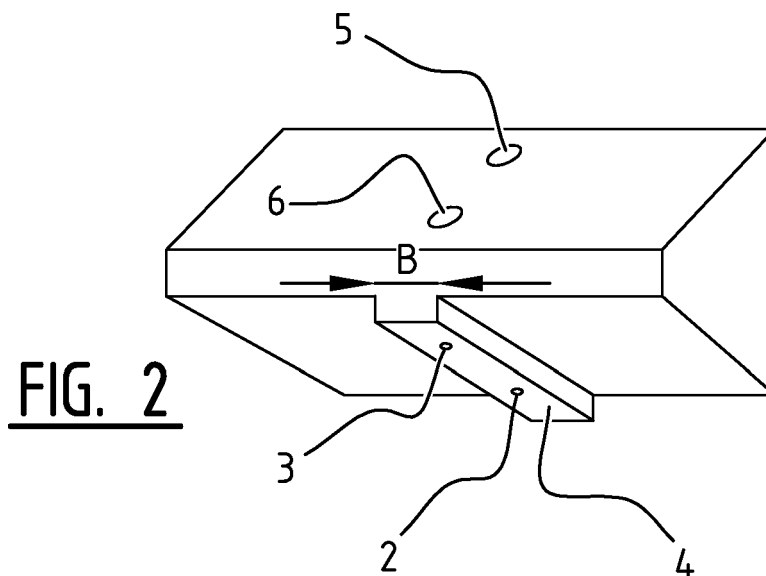
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(54) **Dosing device and method for its cleaning**

(57) Dosing device comprising a dosing part with a downward directed dosing opening for dosing a product at a location situated under the dosing opening, wherein the dosing device further comprises a cleaning agent

doser and a guide surface which are configured to carry a film of cleaning agent along the guide surface for the purpose of cleaning a zone adjacent to the dosing opening.



Description

[0001] The present invention relates to a dosing device and to a method for cleaning a dosing device. The dosing device typically comprises a dosing part with a downward directed dosing opening for dosing a product at a location situated under the dosing opening.

[0002] Problems may arise during the dosing of liquids because these liquids dry out, solidify, drip after use, or a combination thereof, at the position of the dosing opening. This causes contamination and blockage of the dosing head and has adverse consequences for the reliability of the dosing. Contamination and blockage can cause considerable problems, particularly if the moments when dosing does or does not take place are important. In order to obviate such problems the dosing would have to be interrupted at regular points in time in order to clean the dosing heads. Such regular cleaning makes the construction of a dosing installation more complicated, is expensive and limits the dosing period.

[0003] The present invention has for its object to provide a dosing device of the type stated in the preamble which allows an improved cleaning.

[0004] The dosing device comprises for this purpose a cleaning agent doser and a guide surface which are configured such that a film of cleaning agent is carried along the guide surface for the purpose of cleaning a zone adjacent to the dosing opening for the product.

[0005] In the context of the present invention the term "film" must be understood to mean a thin layer, the thickness of which will typically not be constant and will depend on a number of parameters, such as the surface tension between the guide surface and the cleaning agent.

Such a dosing device will allow the cleaning agent to flow periodically or continuously in a zone adjacent to the dosing opening and thus guarantee a good cleaning. The cleaning can take place between successive dosing times as well as during dosing, this in simple manner without access to the dosing openings being necessary. The cleaning between successive dosing times is particularly important in avoiding solidifying or drying out of product residues.

[0006] The guide surface preferably extends at least around the dosing opening and is adjacent to the dosing opening. A good cleaning is in this way guaranteed all the way up to the opening through which the product for dosing flows out. In the case of discontinuous dosing and of cleaning taking place after the dosing has been interrupted, the cleaning agent will also run over the product end in the dosing opening. Drying out of this product end is in this way prevented.

[0007] Note that, according to a possible embodiment, the cleaning can also take place during dosing. Some of the cleaning agent will in this case typically be entrained by the product for dosing, although this is acceptable for determined products for dosing.

[0008] The guide surface and the cleaning agent are

preferably configured such that the film of cleaning agent is held against the guide surface by adhesive forces. The guide surface can in this way be formed on the underside of the dosing part and the cleaning agent can move along the underside of the dosing part into the zone adjacent to the dosing opening.

[0009] The guide surface can be a flat surface, but can also have a determined curvature. The guide surface is preferably a downward sloping surface with a high side and a low side, wherein the dosing opening is provided on the low side and the cleaning agent doser is configured to apply the cleaning agent on the high side. The cleaning agent is preferably applied here on the high side in the same vertical plane as the plane in which the dosing opening lies. A film of cleaning agent can in this way slide downward in simple manner along the guide surface in the direction of the dosing opening as a result of gravitational force.

[0010] According to an advantageous embodiment, the dosing part has an oblique underside and the guide surface is provided on this oblique underside. The dosing opening is then likewise provided in this guide surface. The guide surface can in this way be obtained in simple manner as an integral surface of the dosing part.

[0011] The guide surface is preferably a guide strip with a width such that the film of cleaning agent extends over the whole width. The width of the guide strip is preferably smaller than 2 cm. Note that this width will also depend on the type of cleaning agent used. If water is used as cleaning agent, a width of less than 2 cm is advantageous. The guide strip can for instance protrude from the underside of the dosing part and can for instance be an underside of a slat or beam-like element provided on the underside of the dosing part.

[0012] According to a possible embodiment, the cleaning agent doser comprises a dosing opening provided in the guide surface. The cleaning agent can in this way be dosed directly onto the guide surface, for instance in drop-wise manner. According to a variant, the cleaning agent doser is configured for deposition of the cleaning agent in vapour form on the guide surface. The cleaning agent will then condense onto the guide surface and form a film of cleaning agent which can slide toward or be driven toward the dosing opening for the product.

[0013] According to a possible embodiment, an additional heat source can be provided for heating the dosing part. In this way the product for dosing is also prevented from solidifying.

[0014] According to a possible embodiment, a driving means is further provided for driving the layer of cleaning agent along the guide surface in the direction of the dosing opening. Note that this driving means can be configured for blowing or pushing as well as for suctioning or pulling a layer of cleaning agent.

[0015] The product for dosing is typically a liquid, but can also be a solid. The product for dosing is for instance a gelatin. The cleaning agent can for instance be a liquid such as water or a solvent.

[0016] According to a further developed embodiment, the dosing part comprises a plurality of dosing openings arranged in a first row and a plurality of cleaning agent dosers arranged in a second row. The skilled person will appreciate that a plurality of rows of dosing openings can also be provided for one row of cleaning agent dosers, or that a plurality of rows of dosing openings can be combined with a plurality of rows of cleaning agent dosers. A guide surface is preferably provided here for each cleaning agent doser for the purpose of supplying and discharging a layer of cleaning agent carried by this guide surface to and from each dosing opening. Such an embodiment thus allows optionally simultaneous, periodic or continuous cleaning of a plurality of dosing openings. The dosing part preferably has an oblique underside with a low side and a high side, wherein the first row of arranged dosing openings is disposed on the low side. The cleaning agent dosers arranged in a second row are then preferably configured to apply cleaning agent on the high side, this such that the cleaning agent flows from the high side to the low side toward each dosing opening of the first row. The guide surfaces can for instance be formed by parallel guide strips extending from the high to the low side.

[0017] According to another aspect of the invention, a method is provided for cleaning a dosing device with a dosing part with a downward directed dosing opening. The method comprises the following steps of: supplying a film of cleaning agent along a guide surface toward a zone adjacent to the dosing opening and discharging this film of cleaning agent from this zone. The supply and/or discharge preferably takes place by having a cleaning agent slide downward along an oblique underside of the dosing part. According to a variant, the film of cleaning agent is driven along the underside of the dosing part, for instance by a gas flow. The cleaning agent and the underside of the dosing part are preferably chosen such that the film of cleaning agent is held against this underside by adhesive forces.

[0018] Supply of the film of cleaning agent can for instance be performed while the dosing is interrupted and a product end is present in the dosing opening, such that this product end is flooded by the film of cleaning agent. The film of cleaning agent is preferably also discharged along the guide surface.

[0019] According to an advantageous embodiment of the method, an above described embodiment of a dosing device according to the invention is used in the method.

[0020] The present invention will be further elucidated on the basis of a number of by no means limitative exemplary embodiments of a dosing device according to the invention, with reference to the accompanying drawings, in which:

Figure 1 illustrates a schematic section of a first embodiment of a dosing device according to the invention;

Figure 2 illustrates a perspective view of the first em-

bodiment of figure 1;

Figure 2A shows a detail view of a layer of cleaning agent lying on the guide surface.

Figure 3 shows a perspective view of a dosing system with a second embodiment of a dosing device according to the invention;

Figure 3A shows a perspective detail view of the second embodiment of the dosing device of figure 3;

Figure 4 shows a schematic view of a third embodiment of a dosing device according to the invention; Figure 5 shows a schematic view of a fourth embodiment of a dosing device according to the invention; and

Figure 6 shows a schematic view of a fifth embodiment of a dosing device according to the invention.

[0021] The dosing device illustrated in figures 1 and 2 comprises a dosing part 1, here in the form of a solid body, preferably of stainless steel, in which is provided a supply channel 5 which debouches into a dosing opening 2. A product for dosing is guided through supply channel 5 to dosing opening 2. The product for dosing is carried through supply channel 5 and through the downward directed dosing opening 2 to a location situated under dosing opening 2. Supply channel 5 is intended for connection to a dosing installation, and more particularly for connection to a reservoir in which the product for dosing is stored. The product for dosing can for instance be gelatin, but can also be any other more or less viscous substance.

[0022] Dosing part 1 is further provided with a supply channel 6 for supplying a cleaning agent. Supply channel 6 debouches into a dosing opening 3. Dosing opening 2 and dosing opening 3 lie in the same vertical plane. A guide surface 4 extends from the higher dosing opening 3 for cleaning agent to the lower dosing opening 2. The cleaning agent doser, with supply channel 6 and dosing opening 3, and guide surface 4 are thus configured such that a film of cleaning agent can flow downward along guide surface 4 and around dosing opening 2 for the purpose of cleaning a possibly contaminated zone around dosing opening 2. The cleaning agent can for instance be water or any other suitable liquid.

[0023] Guide surface 4 is thus formed by a downward sloping surface with a high side and a low side, wherein the cleaning agent doser 6, 3 is configured to apply the cleaning agent on the high side such that it can flow downward to dosing opening 2. As best shown in figure 2, guide surface 4 takes the form of a guide strip of a limited width which is preferably such that the film 8 of cleaning agent extends over the full width, see also the detail of figure 2A. Film 8 is held fast against guide surface 4 as a result of the adhesive forces between the cleaning agent and this guide surface 4. The width of guide strip 4 is preferably smaller than 2 cm. In the shown embodiment guide strip 4 protrudes in the form of a beam from the underside of dosing part 1. The skilled person will appreciate that other designs can be envisaged and that

the delimiting of the guide surface can be formed in other ways, for instance by providing an adjacent strip with a material which repels the cleaning agent.

[0024] The use and operation of the above described dosing device is very simple, and is as follows. Using a dosing installation connected to supply channels 5 and 6 a product for dosing and a cleaning agent are respectively supplied. Using the drive of the dosing installation, a product for dosing can be dosed at the desired times through dosing opening 2 via supply channel 5, and a cleaning agent can be dosed through dosing opening 3 via supply channel 6. By means of the inclination of guide surface 4 and the adhesion of the cleaning agent to guide surface 4 there forms on the guide surface a film extending to dosing opening 2. If cleaning takes place after the dosing has been interrupted, further drying out of the product for dosing at the position of dosing opening 2 is avoided. The cleaning agent flushes the undesired residues of the product for dosing away from the zone around dosing opening 2.

[0025] Note that it is possible to not interrupt the cleaning during dosing of the product for dosing. In this case the film of cleaning agent 8 will typically lie adjacently of the product for dosing in dosing opening 2 and be entrained to greater or lesser extent by the dosing jet.

[0026] Figures 3 and 3A illustrate a second embodiment of a dosing device according to the invention which is incorporated in a dosing installation. The dosing installation comprises among other parts a dosing part 1, a block with heating elements 8, a gelatin reservoir 9, a heating block 10 for the gelatin reservoir and a reservoir for cleaning agent (not illustrated). Gelatin reservoir 9 and the reservoir for the cleaning agent can for instance be connected by means of modified connecting means to horizontal channels in dosing part 1, see the openings in the side of dosing part 1. These horizontal channels are then in turn connected to supply channels 5, 6 (see figure 1).

[0027] Dosing part 1 is provided here with a plurality of dosing openings 2 lying in a first line, and a plurality of dosing openings 2' lying in a second line, for a product for dosing. Dosing part 1 is in addition provided with a plurality of dosing openings 3 for a cleaning agent lying in a line. The first and second lines of dosing openings 2, 2' are parallel to the line with dosing openings 3, and each dosing opening 2, 2' is associated with a dosing opening 3 lying in the same vertical plane. Between each dosing opening 3 for cleaning agent and dosing opening 2, 2' for a product for dosing there is provided a guide strip 4 embodied in the same way as in the first embodiment described above with reference to figures 1 and 2. A detailed description of guide strip 4 has therefore been dispensed with here. Guide strips 4 are formed by the undersides of slat-like elements protruding from the underside of the dosing part. The guide strips are thus delimited by walls directed downward from the underside of the dosing part. The skilled person will appreciate that the guide strips can be flat downward sloping surfaces

as well as curved downward sloping surfaces.

[0028] In this embodiment it is thus also possible via dosing openings 3 to dose a droplet of cleaning agent at a time which will spread evenly over the width of guide strips 4 and run downward in the direction of dosing openings 2, 2'. The edges of dosing openings 2, 2' can in this way be fully surrounded on a regular basis by sliding cleaning agent. In the case of a liquid product for dosing, the cleaning preferably takes place shortly after the dosing has been interrupted so that a product end in dosing openings 2, 2' is flooded and drying out or solidifying of the liquid product residues is avoided. In the case of solid product residues the cleaning agent is preferably such that these residues are dissolved and removed.

[0029] Figure 4 illustrates a third embodiment of a dosing device according to the invention. The dosing device comprises a dosing part 11 in which a supply channel 15 for a product for dosing is arranged. Supply channel 15 debouches into a downward directed dosing opening 12. Dosing part 11 has an oblique underside for the purpose of forming a guide surface 14. In this embodiment the cleaning agent is applied via a cleaning agent doser in the form of an evaporator 16 for deposition of for instance water vapour on guide surface 14, where the water condenses and forms a film of cleaning agent which slides downward along guide surface 14 in the direction of dosing opening 12.

[0030] Figure 5 illustrates a fourth embodiment of a dosing device according to the invention. The dosing device comprises a dosing part 21 in which a first supply channel 25 for a product for dosing and a second supply channel 26 for a cleaning agent are arranged. Supply channel 25 leads to a downward directed dosing opening 22 for applying the product for dosing at a location situated thereunder. The cleaning agent is carried here into the vicinity of dosing opening 22 via a guide channel 23. A film 28 of cleaning agent will here also form on a guide surface 24 extending around dosing opening 22, and the cleaning agent can also slide downward over the product end or along dosing opening 22.

[0031] Finally, figure 6 also illustrates a further fifth embodiment of a dosing device according to the invention with a dosing part 31 with a substantially horizontal underside. Provided in dosing part 31 are two supply channels 35, 36 for respectively the product for dosing and the cleaning agent. These supply channels 35, 36 transverse into respective dosing openings 32, 33 which debouch into the underside of dosing part 31. In addition to supply channel 36 and dosing opening 33 the cleaning agent doser comprises here a fan 39 for driving a film of cleaning agent 38 in the direction of dosing opening 32. Here too the film of cleaning agent 38 remains adhered to the underside of dosing part 31 as a result of adhesive forces, although the movement of this film is not caused by gravitational force but by an airflow caused by fan 39.

[0032] The skilled person will appreciate that the present invention is not limited to the above described exemplary embodiments and that many modifications

and changes can be envisaged within the scope of the invention. It will for instance be apparent that an additional heat source can be provided in addition to the heat source created in natural manner by coupling the supply channel of the product for dosing to the dosing installation and by heat transfer from the product for dosing. The cleaning agent can further be dosed in the form of drop-lets or in the form of a jet. The examples show that the guide can optionally take an inclining form and that a direction of movement can also be imparted to the cleaning agent by means of a kinetic force imparted to the cleaning agent during dosing or during collection of the dosed cleaning agent.

[0033] The scope of protection of the invention is defined solely by the following claims.

Claims

1. Dosing device comprising a dosing part (1, 11, 21, 31) with a downward directed dosing opening (2, 12, 22, 32) for dosing a product at a location situated under the dosing opening, **characterized in that** the dosing device further comprises a cleaning agent doser (6, 16, 26, 36) and a guide surface (4, 14, 24, 34) which are configured to carry a film (8, 18, 28, 38) of cleaning agent along the guide surface for the purpose of cleaning a zone adjacent to the dosing opening (2, 12, 22, 32); and that the guide surface (4, 14, 24) is a downward sloping surface with a high side and a low side, wherein the dosing opening is provided on the low side, and that the cleaning agent doser is configured to apply the cleaning agent on the high side.
2. Dosing device as claimed in claim 1, **characterized in that** the guide surface (4, 14, 24, 34) extends at least around the dosing opening and is adjacent to the dosing opening (2, 12, 22, 32).
3. Dosing device as claimed in any of the foregoing claims, **characterized in that** the guide surface is further configured to discharge the cleaning agent to a discharge zone at a distance from the dosing opening.
4. Dosing device as claimed in any of the foregoing claims, **characterized in that** the dosing part (1, 11, 21) has an oblique underside, that the guide surface is provided on this oblique underside and that the dosing opening is provided in the guide surface.
5. Dosing device as claimed in any of the foregoing claims, **characterized in that** the guide surface (4, 14, 24, 34) is a guide strip with a width smaller than 2 cm.
6. Dosing device as claimed in claims 4 and 5, **characterized in that** the guide strip protrudes from the underside of the dosing part.
7. Dosing device as claimed in claim 5 or 6, **characterized in that** a strip of a material which repels the cleaning agent is provided on either side of the guide strip.
8. Dosing device as claimed in any of the claims 1-7, **characterized in that** the cleaning agent doser (16) is configured for deposition of the cleaning agent in vapour form on the guide surface.
9. Dosing device as claimed in any of the foregoing claims, **characterized in that** the dosing part comprises a plurality of dosing openings which are arranged in a first row and of which said dosing opening is one.
10. Dosing device as claimed in claim 9, **characterized in that** a plurality of cleaning agent dosers arranged in a second row are provided, wherein a guide surface is provided for each cleaning agent doser for the purpose of carrying a layer of cleaning agent held by this guide surface to each dosing opening.
11. Dosing device as claimed in claim 9 or 10, **characterized in that** the dosing part has an oblique underside with a low side and a high side and that the first row of arranged dosing openings is disposed on the low side, and that the cleaning agent dosers arranged in a second row are configured to apply cleaning agent on the high side, this such that cleaning agent flows from the high to the low side toward each dosing opening of the first row.
12. Dosing device as claimed in claim 10 or 11, **characterized in that** the guide surfaces are formed by parallel guide strips extending from the high to the low side.
13. Method for cleaning a dosing device comprising a dosing part with a downward directed dosing opening, **characterized in that** the method comprises of supplying a film of cleaning agent along a guide surface toward a zone adjacent to the dosing opening and discharging the film of cleaning agent from this zone; and that the supply along a guide surface consists of having the film of cleaning agent slide downward along a downward sloping surface with a high and a low side, wherein the dosing opening is provided on the low side.
14. Method as claimed in claim 13, **characterized in that** the supply along the guide surface consists of having the film of cleaning agent slide downward along an oblique underside of the dosing part, wherein the dosing opening is provided in this oblique un-

derside.

15. Method as claimed in claim 13, **characterized in that** the supply of a film of cleaning agent along a guide surface consists of driving a film of cleaning agent along an underside of the dosing part, wherein the dosing opening is provided in this underside; and/or that the film of cleaning agent is held against the guide surface by adhesive forces while being supplied along the guide surface; and/or that the supply of the film of cleaning agent is performed while the dosing is interrupted and a product end is present in the dosing opening, and that this product end is flooded by the film of cleaning agent.

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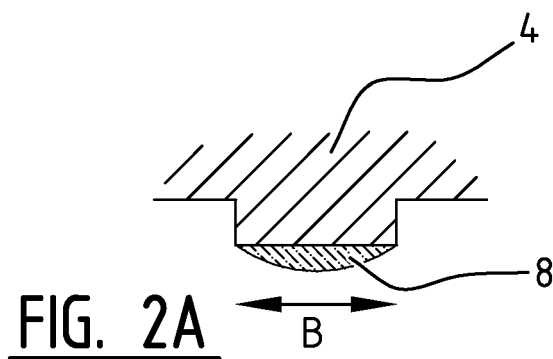
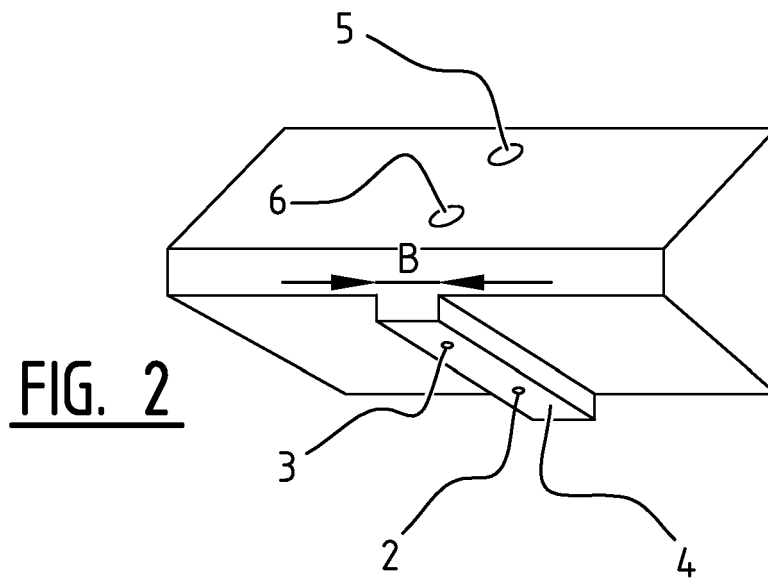
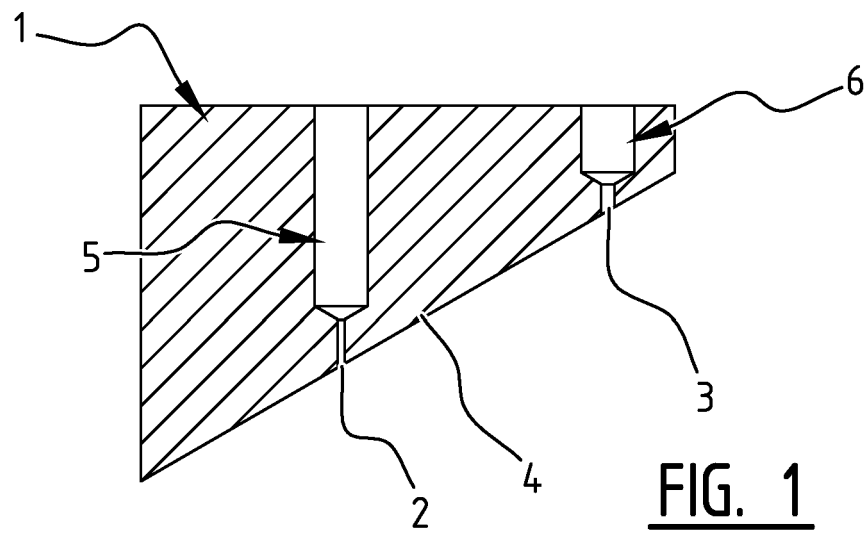
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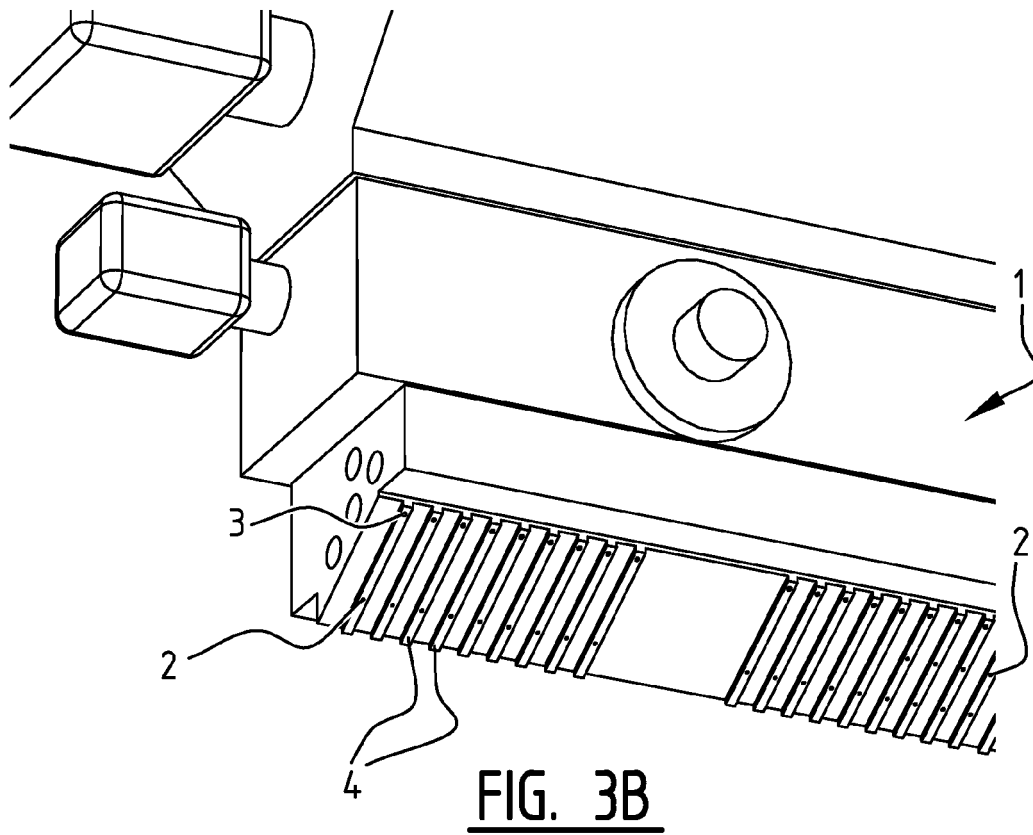
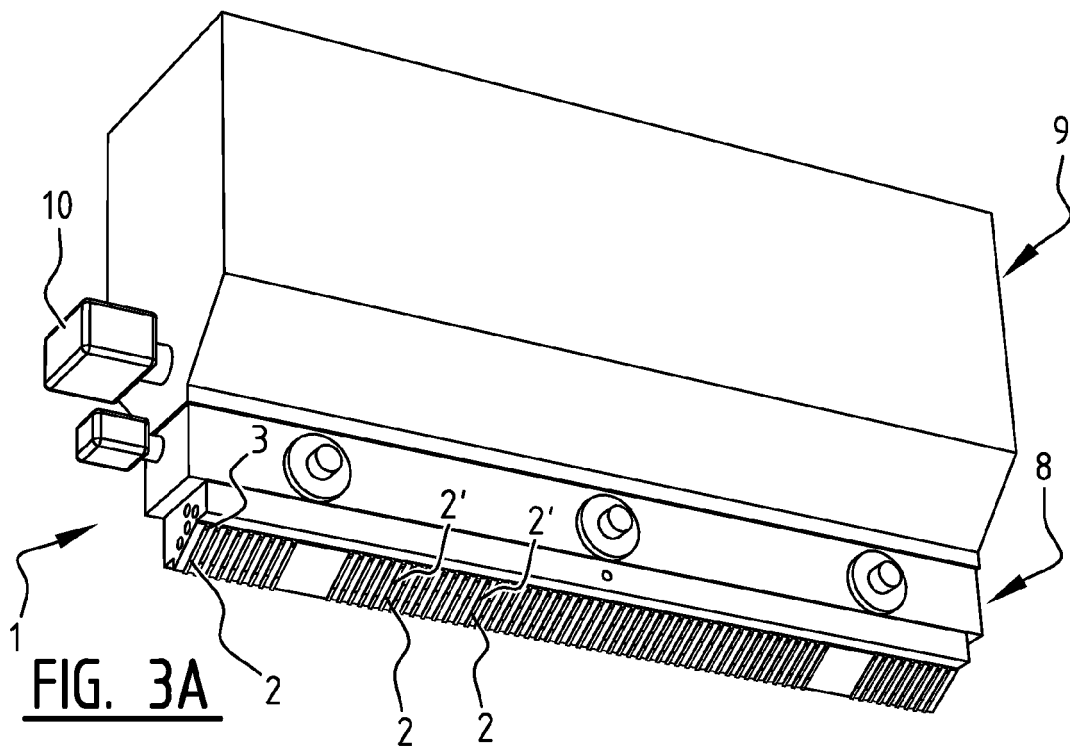
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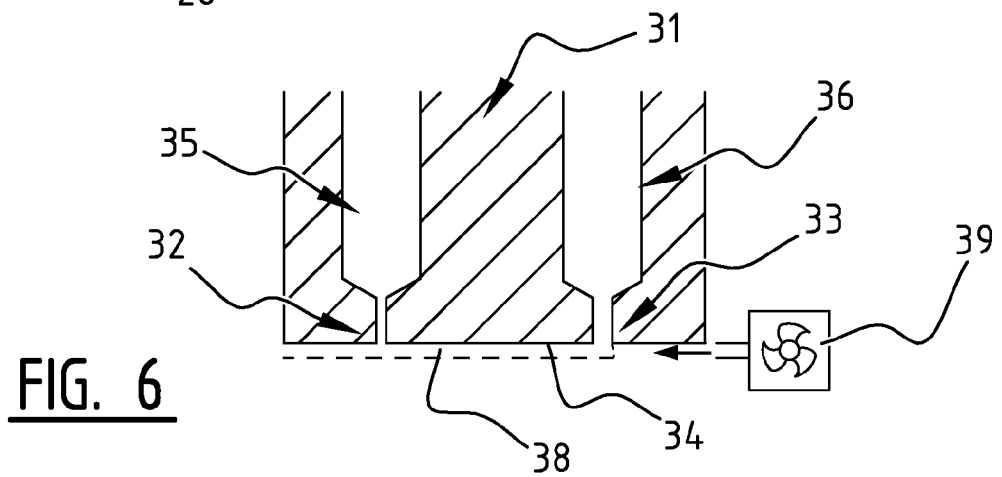
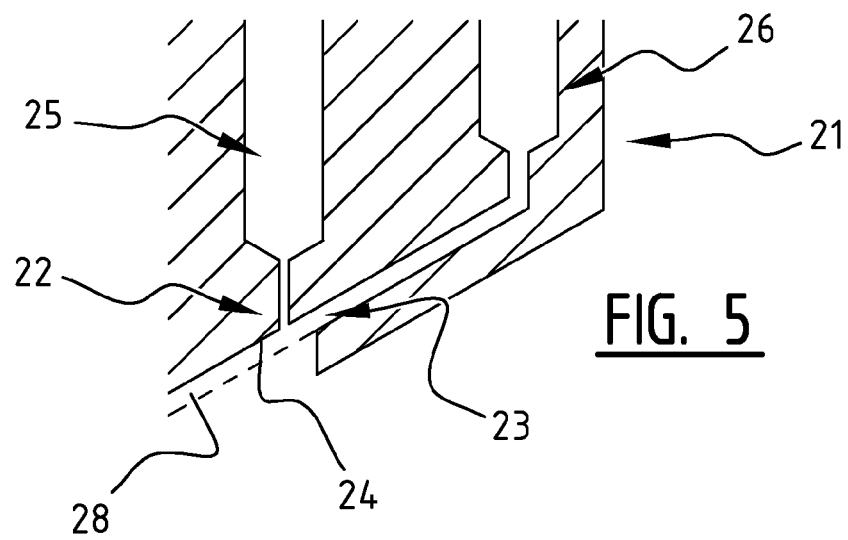
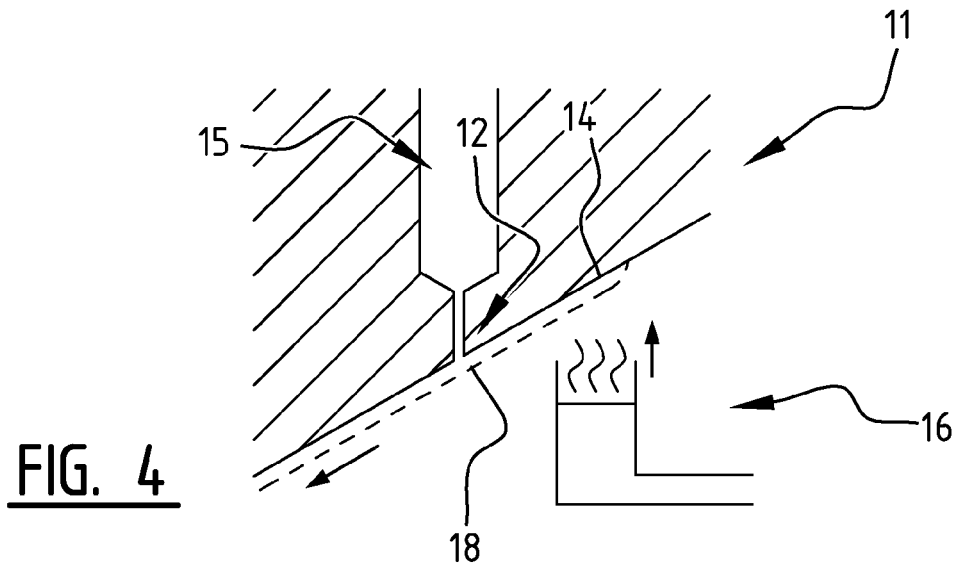
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EUROPEAN SEARCH REPORT

Application Number
EP 13 18 7516

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			B05B B05C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 December 2013	Examiner Innecken, 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
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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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