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(54) **SHIELDING APPARATUS FOR SHIELDING AGAINST CONTAMINATED AIR, FUMES OR VAPOURS**

(57) A shielding device (1) for shielding against contaminated air, fumes or vapours generated during the use of a workstation (2), in particular a workstation (2) comprising food cooking devices (4; 5; 6), the shielding device (1) comprises a containing body (8) arranged for housing airflow generating means (9) intended for forming an airflow, and channelling means (12) connected in the airflow generating means (9) and intended for conveying the airflow to airflow diffusing means (16) with which it is in flowing connection, the airflow diffusing means (16) being arranged for conveying the airflow to

an area located above a cooking zone (22) of the workstation (2). The diffusing means (16) comprises at least one diffusing element (18, 18a) provided with a tubular body (27) in which there is obtained a plurality of openings (28) arranged aligned and shaped so as to create an air knife (L) during the transit through the openings (28) of the airflow generated by the airflow generating means (9), or of a portion of the airflow, the air knife (L) being intended for separating the cooking zone (22) from an operator working at the workstation (2).

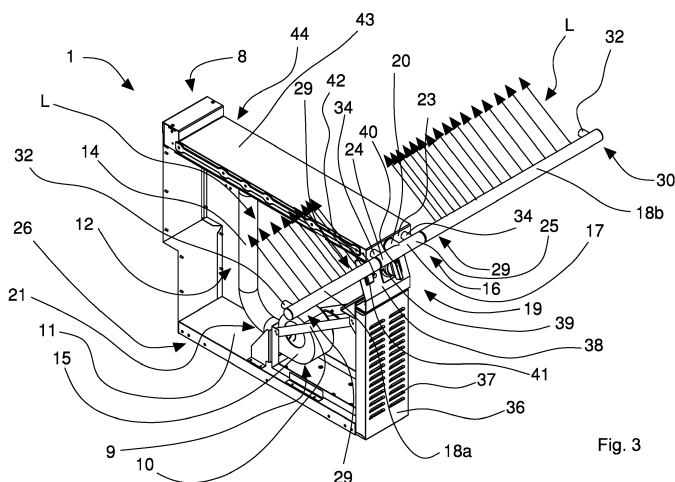


Fig. 3

Description

[0001] The invention relates to a shielding apparatus, in particular an apparatus arranged for preventing or limiting diffusion of contaminated air and of heat coming from a workstation to an operator working near the workstation or to an environment in which the workstation is located.

[0002] Operating workstations exist, comprising, for example, a cooking apparatus in a kitchen, that emit, in use, air that is contaminated, for example through the effect of the process of heating and cooking foods. The contaminated air may contain vapours and/or fumes and/or suspended liquid particles and/or suspended solid particles, that can comprise polluting compounds such as, for example, nitrogen oxides, sulphur oxides or polycyclic aromatic hydrocarbons that may harm the health of an operator, for example a cook, working near such a workstation and who is thus subjected to inhaling such contaminated air.

[0003] In addition, such operating workstations can emit significant thermal energy in the form of heat, for example always through the effect of the cooking of foods.

[0004] To avoid the contaminated air spreading in an environment in which the workstation is located, and to limit the inhaling of contaminated air by the operator, it is known to provide at each workstation an extraction hood, generally positioned above the workstation, for example above a cooking apparatus, arranged for sucking said contaminated air. Nevertheless, the extraction hood is arranged at a preset height with respect to a work plane of the workstation determined in such a manner as to enable the operator to have a certain room for manoeuvre over the cooking apparatus. The aforementioned height is such as not to ensure that the contaminated air does not reach the environment in which the workstation is located, or the operator who works at the workstation. In other words, not all the contaminated air is sucked by the extraction hood.

[0005] In addition, prior art extraction hoods are unable to ensure good limitation of the diffusion of heat coming from the workstation to the external environment and thus, also to the operator.

[0006] Such drawbacks entail enormous discomfort for the operator who has to work at the workstation.

[0007] One object of the invention is to provide a shielding apparatus arranged for shielding at least partially an operator working at a workstation from the contaminated air and from the heat arising during use of the workstation, for example during a process of cooking foods on a cooking apparatus.

[0008] The aforesaid object is achieved with a shielding apparatus according to claim 1.

[0009] Owing to the shielding apparatus according to the invention, an air curtain is formed between the operator and the workstation that prevents or limits inhalation of contaminated air coming from the workstation by the

operator and which prevents or limits diffusion of the contaminated air or of heat from the workstation to the operator or in general to the environment in which the workstation is located. This enables the working conditions of the operator near the workstation to be improved considerably.

[0010] The invention can be better understood and implemented with reference to the attached drawings, which illustrate an embodiment thereof by way of non-limiting example, in which:

Figure 1 is a perspective view of a shielding apparatus according to the invention, associated with a workstation;

Figure 2 is a top view of Figure 1;

Figure 3 is a perspective view of the shielding apparatus of Figure 1 removed from the workstation and devoid of a portion of containing body to highlight airflow generating means;

Figure 4 is a perspective view of airflow diffusing means with which the shielding apparatus according to the invention is provided;

Figure 5 is a perspective view of a version of the shielding apparatus of Figure 3.

[0011] With reference to Figures 1 and 2, a shielding apparatus 1 according to the invention is shown, associated with a workstation 2, for example a kitchen, comprising a work plane 3. The shielding apparatus 1 is intended for shielding an operator working near the workstation 2, or an environment where the workstation 2 is located, from the contaminated air and from the heat generated by the use of the workstation 2, for example following cooking of foods.

[0012] The work surface 3 can comprise a plurality of cooking apparatuses, such, for example, a cooking grill 4, a fryer 5, for example a two-tray fryer 5, a hob 6 of the frytop type, each provided with at least one respective cooking zone 22.

[0013] The shielding apparatus 1 can be inserted between the cooking apparatuses of the workstation 2. In particular, the shielding device 1 comprises a containing body 8 that can be mounted in such a manner as to be interposed between two cooking apparatuses, as shown in Figures 1 and 2 where the shielding apparatus 1 is arranged between the cooking grill 4 and the hob 6.

[0014] According to an embodiment that is not illustrated, the shielding device 1 can be arranged in such a manner that the containing body 8 is arranged facing a cooking apparatus. According to a further embodiment that is not illustrated, the containing body 8 can be arranged next to the workstation 2, for example next to a cooking apparatus.

[0015] With reference to Figure 3, the shielding apparatus 1 is shown separated from the workstation 2 and with a portion of the containing body 8 removed in order to highlight certain components of the shielding apparatus 1 housed in the containing body 8.

[0016] The containing body 8 can have a substantially box shape.

[0017] The shielding apparatus 1 comprises airflow generating means 9 arranged for generating an airflow intended to form an air knife, or air wall, that separates the work surface 3 from the rest of the environment in which the workstation 2 is arranged.

[0018] The airflow generating means 9 is housed inside the containing body 8 that acts as a protection against dirt and dust.

[0019] The airflow generating means 9 comprises a fan 15, for example a centrifugal fan, driven by a motor, not shown in the Figures. The airflow generating means 9 comprises a frame that can be fixed by one or more brackets 10 to at least one inner wall of the containing body 8.

[0020] In the embodiment illustrated in Figure 3, the fan 15 is fixed by a plurality of brackets 10, in particular to a bottom inner wall 11 of a bottom element 26 of the containing body 8 and to a front inner wall of the containing body 8, not illustrated in the Figures.

[0021] The shielding apparatus 1 further comprises channelling means 12, through which the airflow is conveyed to a frontal zone 13 (Figure 2) of the shielding device 1.

[0022] The channelling means 12 comprises a pipe 14, for example made of a metal material, in particular C-shaped steel.

[0023] The pipe 14 is arranged for connecting the airflow generating means 9 to airflow diffusing means 16, arranged for conveying the airflow generated by the airflow generating means 9 to an area located above a cooking zone 22 of the work surface 3 and distanced therefrom. In particular, as will be explained better below, owing to the conformation of the airflow diffusing means 16, in use, the shielding apparatus 1 is intended to create at least one air knife L that separates at least one portion of the work surface 3 from the operator working at the workstation 2, so as to shield the operator from the contaminated air, fumes or vapours generated during the use of the workstation 2.

[0024] In particular, the pipe 14 connects an outlet port of the airflow generating means 9 to an inlet port of a fitting element 17 of the airflow diffusing means 16 by a through opening obtained in a frontal element 19 of the containing body 8. In particular, a first end 21 of the pipe 14 is connected to the outlet port of the airflow generating means 9, whilst a second end of the pipe 14, which is not visible in the Figures, is connected to the inlet port of the fitting element 17.

[0025] The airflow diffusing means 16 comprises at least one diffusing element 18, connected to the fitting element 17 and in flowing connection with the pipe 14, this diffusing element 18 being arranged for creating at least one air knife L to the transit therethrough of the airflow generated by the airflow generating means 9, or of a portion of the airflow. In particular, in Figure 3 two diffusing elements 18 are shown, a first diffusing element

18a and a second diffusing element 18b, which are distinguished only by a respective length.

[0026] The at least one air knife L is shown schematically in Figure 3 by a plurality of arrows. With reference to Figure 4, an embodiment of a diffusing element 18 is shown.

[0027] The diffusing element 18 comprises a tubular body 27 the length of which is variable and chosen on the basis of the width of the workstation 2, or of a portion thereof, corresponding, for example to the width of a cooking zone 22 with which the operator has to interact.

[0028] The tubular body 27 has a substantially cylindrical shape and can be up to 1600 mm in length.

[0029] In the tubular body 27 a plurality of openings 28 is obtained that are arranged substantially aligned along the length of the diffusing element 18. In other words, the openings 28 lie on the same line. In this manner, in use, the diffusing element 18 creates, at the transit of airflow coming from the pipe 14 through the openings 18, an air knife that separates an operator from a cooking apparatus.

[0030] A distance D between an opening 28 and a further opening 28 adjacent thereto, can be the same for the entire length of the tubular body 27. Alternatively, the distance between an opening 28 and the immediately adjacent opening can be variable along the length of the tubular body 27, for example can be less near a first end zone 29 of the tubular body 27 and increase progressively moving away from the latter to a second end zone 30 of the tubular body 27, opposite the first end zone 29.

[0031] When the tubular element 18 is mounted on the fitting element 17, the first end zone 29 of the tubular body 27 is arranged near the fitting element 17, whilst the second end zone 30 is arranged far from the fitting element 17.

[0032] The tubular element 18 can also be mounted on a plane 7 of the workstation 2 by a supporting element 32 arranged for supporting the tubular body 27 and ensuring that the mass of the diffusing element 18 is unloaded at least partially on the plane 7.

[0033] The supporting element 32 can be mounted near the second end zone 30 of the tubular body 27.

[0034] The supporting element 32 is mounted, in use, inside a slot 31 obtained in the tubular body 27.

[0035] The slot 31 is dimensioned so as to ensure a set rotation of the tubular body 27 around a longitudinal axis A of the diffusing element 18 so as to vary the creation position of the air knife L. The size of the rotation axis of the diffusing element 18 around the longitudinal axis A depends on the dimensions of the slot 31. The rotation axis can be comprised for example between 20° and 40°, preferably equal to about 30°.

[0036] The diffusing element 18 can in fact undergo an angular shift between a first position in which the air knife L creates with an outer surface 43 of an upper element 44 of the containing body 8, a first angle, for example comprised between about 40° and about 60°, preferably equal to about 45°, and a second position in which the

air knife L creates with the outer surface 43 of the upper element 44 a second angle, for example comprised between about 60° and about 90°, preferably equal to about 75°. The outer surface 43 can be arranged at the same height as the work surface 3.

[0037] A closing element 33, for example a cap, is mounted at the second end zone 30 in order to prevent the airflow being released into the environment without traversing the openings 28. The first diffusing element 18a and the second diffusing element 18b are similar to the diffusing element 18 shown in Figure 4.

[0038] With reference to Figures 1 and 2, the shielding apparatus 1 is shown having a containing body 8 inserted into the workstation 2, in particular the shielding apparatus 1 is interposed between the cooking grill 4 and the hob 6. The tubular body 27 of the first diffusing element 18a has a length that is substantially the same as the width as the hob 6, whereas the tubular body 27 of the second diffusing element 18b has a length that is substantially the same as the width as the cooking grill 4. Naturally, the containing body 8 can be interposed between other cooking apparatuses, or be arranged next to or near one of them, and the length of the tubular bodies 27 can vary, for example, the tubular body 27 of the first diffusing element 18a can have a length substantially the same as the sum of the width of the hob 6 and of the fryer 5.

[0039] Again with reference to Figure 3, the fitting element 17 can have a T-shaped conformation, like that shown in Figure 3.

[0040] The fitting element 17 comprises a connection portion 20 conformed so as to be inserted at least partially into the through opening obtained in the frontal element 19 and engage with the second end of the pipe 14 to permit a flowing communication between the airflow generating means 9 and the airflow diffusing means 16. An end part of the connection portion 20 makes the inlet port of the fitting element 17.

[0041] The connection portion 20 has a substantially cylindrical shape and can be mounted substantially perpendicularly to a portion of front surface 23 of the frontal element 19, so as to protrude from the portion of front surface 23 to the outer environment.

[0042] In the embodiment illustrated in the Figures, the connection portion 20 and the second end of the pipe 14 are coupled, for example shapingly coupled, with a connection element, which is also not shown in the Figures, interposed therebetween and which permits the connection between the connection portion 20 and the second end of the pipe 14.

[0043] In another embodiment, not illustrated in the Figures, the connection portion 20 and the second end of the pipe 14 are coupled together by a twisting pair connection. For example, the connection portion 20 can comprise an internal thread arranged for screwing into an external thread in the second end of the pipe 14, or the second end of the pipe 14 can comprise an internal thread arranged for screwing into an external thread

made in the connection portion 20 of the fitting element 17.

[0044] The fitting element 17 can be mounted on the containing body 8 and, in particular on the frontal element 19, by further supporting elements 34 that are arranged for supporting the fitting element 17 and ensuring that the mass of the fitting element 17 is unloaded at least partially onto the containing body 8.

[0045] The fitting element 17 comprises a first end portion 24 and can comprise, further, a second end portion 25, both having a substantially cylindrical shape.

[0046] The first end portion 24 and the second end portion 25 branch off on opposite sides with respect to the connection portion 20 with which they are in flowing connection.

[0047] The first end portion 24 and the second end portion 25 can be arranged substantially perpendicularly to the connection portion 20.

[0048] The first end portion 24 and the second end portion 25 can be connected to the first diffusing element 18a and to the second diffusing element 18b, respectively, at the respective first end zone 29 of each diffusing element 18a, 18b.

[0049] The first end portion 24 and the first end zone 29 of the first diffusing element 18a couple rotatably, for example through shaping coupling, with a further connection element, not shown in the Figures, interposed between the first end portion 24 and the first end zone 29 and that permits the connection between the fitting element 17 and the first diffusing element 18a.

[0050] In the same manner, the second end portion 25 and the first end zone 29 of the second diffusing element 18b couple, for example through shaping coupling, with a still further connection element, not shown in the Figures, interposed between the second end portion 25 and the first end zone 29 and which permits the connection between the fitting element 17 and the second diffusing element 18b.

[0051] The first diffusing element 18a and the second diffusing element 18b are rotatably connected to the fitting element 17 so as to be free to rotate around their own longitudinal axis A.

[0052] In addition, the coupling between each first end zone 29 and the further connection element or the still further connection element is of the type with interference, such that each diffusing element 18, after rotating around the longitudinal axis A by a set rotation axis, can remain locked there.

[0053] As shown in particular in Figure 2, once mounted, the longitudinal axis A of the first diffusing element 18a and of the second diffusing element 18b are substantially parallel to a supporting plane of the containing body 8 and are arranged in front of a front 35 of the workstation 2 so as to be interposed between the operator and the workstation 2.

[0054] The frontal element 19 comprises a ventilation grille 36 arranged for permitting transit of air from the outer environment to inside the containing body 8, in par-

ticular to enable the airflow generating means 9 to suck air from the outer environment.

[0055] The ventilation grille 36 comprises a plurality of slits 37, each slit being shaped in such a way as to permit the transit of air and in such a way as to limit dirt being able to infiltrate inside the containing body 8.

[0056] The shielding apparatus 1 further comprises a control panel 38 provided in a portion of the frontal element 19, for example an upper portion of the frontal element 19, arranged for housing control devices of the shielding apparatus 1.

[0057] The control devices comprise power control and adjusting means 39 that, once it is driven, acts on the motor of the airflow generating means 9 to adjust the power of the airflow. The power control and adjusting means 39 can comprise a knob 40 that an operator can rotate to adjust the power of the airflow.

[0058] The control devices further comprise switching-on means 41, for example in the shape of a switch, arranged for driving the shielding apparatus 1. The switching-on means 41 is linked to the motor of the airflow generating means 9 and enables the motor to receive the electric supply necessary for the operation thereof.

[0059] The control panel 38 further comprises an indicator light 42 that indicates the switched-on/switched-off status of the shielding apparatus 1. For example, a green colour of the indicator light 42 can be associated with switched-on status of the shielding apparatus 1 and no colour can be associated with switched-off status.

[0060] In use, when an operator who has to interact with a cooking apparatus of the workstation 2 desires to drive the shielding apparatus 1, the operator acts on the switching-on means 41, for example by pressing a switch, the switching-on means 41 enabling the motor of the airflow generating means 9 to create an airflow that is conveyed, owing to the channelling means 12, to the fitting element 17, i.e. to the front 35. After traversing the connection portion 20, the airflow branches into two flows, a first flow that is directed inside the tubular body 27 of the first diffusing element 18a and a second flow that is directed inside the tubular body 27 of the second diffusing element 18b. Owing to the power of the airflow, the first flow and the second flow traverse the openings 28 of the respective diffusing element 18a, 18b and each generate an outlet airflow in the form of air knife having a direction that depends on the position of the openings 28.

[0061] The shielding apparatus 1 is mounted in such a manner as to be interposed between the operator and the workstation 2; further, the diffusing elements 18a, 18b are mounted in such a manner that each air knife L faces an area located above the work surface 3. In this manner each air knife L shields the contaminated air, the fumes and/or the vapours that may arise using a respective cooking zone 22 of the workstation 2 from the operator and from the environment in which the workstation 2 is located.

[0062] Further, the air knife L enables the contaminat-

ed air, the fumes and/or the vapours to be guided to a possible extraction hood that can be placed above a cooking apparatus, so as to increase the sucking efficiency of the extraction hood.

[0063] The operator can vary the airflow power and consequently the intensity of the air blades acting on the power control and adjusting means 39. Further, the operator can vary the angulation of each air knife L with respect to the upper surface 26, rotating the respective tubular body 27 around its own longitudinal axis A.

[0064] With reference to Figure 5, a perspective view of a version of the shielding apparatus according to the invention is shown that differs from the shielding apparatus of Figure 3 through the fact that only one diffusing element 18, the first diffusing element 18a, is present whereas the second diffusing element 18b is absent.

[0065] In this case, a further closing element, which is not shown in the Figures but is completely similar to the closing element 33, is mounted at the second end portion 25 of the fitting element 17 in order to prevent the airflow being dispersed in the environment without traversing the openings 28 of the single diffusing element 18.

[0066] Owing to each air knife L formed by the shielding device 1 according to the invention, diffusion is prevented or limited of contaminated air, fumes, vapours and heat coming from a workstation 2 to an operator working near said workstation 2 or to an environment in which the workstation 2 is located.

[0067] This enables the work conditions of the operator to be improved significantly, inasmuch as it is avoided or anyway limited, that the operator inhales the contaminated air, the fumes and/or the vapours that may contain substances that are harmful to human health and it is avoided, or anyway limited, that the contaminated air, the fumes and/or the vapours spread to the rest of the environment in which the workstation 2 is located.

[0068] Further, each air knife L enables the diffusion of heat to the operator or to the environment in which the workstation 2 is located to be limited, providing relief to the operator.

[0069] In the practical embodiment, the materials, dimensions and constructional details may be different from those indicated but be technically equivalent thereto, without thereby falling outside the scope of the present invention.

Claims

1. Shielding device (1) for shielding against contaminated air, fumes or vapours generated during the use of a workstation (2), in particular a workstation (2) comprising food cooking devices (4; 5; 6), the shielding device (1) comprising a containing body (8) arranged for housing airflow generating means (9) intended for forming an airflow, and channelling means (12) connected to said airflow generating means (9) and intended for conveying said airflow

to airflow diffusing means (16) with which it is in flowing connection, said airflow diffusing means (16) being arranged for conveying said airflow to an area located above a cooking zone (22) of said workstation (2), said shielding device being **characterised in that** said diffusing means (16) comprises at least one diffusing element (18, 18a) provided with a tubular body (27) in which there is obtained a plurality of openings (28) arranged aligned and shaped so as to create an air knife (L) during transit through the openings (28) of said airflow generated by said airflow generating means (9), or of a portion of said airflow, said air knife (L) being intended to separate said cooking zone (22) from an operator working at said workstation (2).

2. Shielding device (1) according to claim 1, wherein said airflow diffusing means (16) further comprises a fitting element (17) that connects a pipe (14) of said channelling means (12) to a first end zone (29) of said at least one diffusing element (18, 18a).
3. Shielding device (1) according to claim 2, wherein said fitting element (17) comprises a first end portion (24), said first end portion (24) and said first end zone (29) coupling rotatably with a connection element interposed therebetween, such that said at least one diffusing element (18, 18a) is free to rotate around an own longitudinal axis (A).
4. Shielding device (1) according to claim 3, wherein said first end zone (29) and said connection element couple with interference, such that said at least one diffusing element (18, 18a), after rotating around said longitudinal axis (A) by a set rotation axis, can remain locked there.
5. Shielding device (1) according to claim 4, wherein in said tubular body (27) a slot (31) is further obtained that is intended for receiving a supporting element (32) inside arranged for connecting said tubular element (27) to a plane (7) of said workstation (2), a size of said rotation axis being a function of the dimensions of said slot (31).
6. Shielding device (1) according to claim 4 or 5, wherein said rotation axis is comprised between 20° and 40°, in particular is equal to about 30°, said rotation axis being measured between said air knife (L) and an outer surface (43) of an upper element (44) of said containing body (8).
7. Shielding device (1) according to claim 6, wherein said diffusing element (18, 18a) undergoes an angular shift between a first position in which said air knife (L) creates with said outer surface (43) a first angle comprised between about 40° and about 60°, in particular equal to about 45°, and a second posi-

tion wherein said air knife (L) creates with said outer surface (43) a second angle comprised between about 60° and about 90°, in particular equal to about 75°.

8. Shielding device (1) according to claim 7, wherein said longitudinal axis (A) is substantially parallel to a resting plane of said containing body (8) and is arranged in front of a front (35) of said plane (7) such that said diffusing element (18, 18a) is interposed between said operator and said workstation (2).
9. Shielding device (1) according to any one of claims 2 to 8, wherein said fitting element (17) comprises a connection portion (20) conformed in such a way as to be inserted at least partially into a through opening obtained in a frontal element (19) of said containing body (8) and engage with said pipe (14) to permit a flowing communication between said airflow generating means (9) and said airflow diffusing means (16), a first end (21) of said pipe (14) being connected to an outlet port of said airflow generating means (9) and a second end of said pipe (14) being connected to said connection portion (20).
10. Shielding device (1) according to claim 9, wherein said connection portion (20) has a substantially cylindrical shape and is mounted substantially perpendicularly to a portion of front surface (23) of said frontal element (19).
11. Shielding device (1) according to any one of claims 2 to 10, wherein said fitting element (17) has a T-shaped conformation.
12. Shielding device (1) according to claim 11, when claim 11 is appended to claim 9 or 10, wherein said fitting element (17) comprises a second end portion (25) connected to a second diffusing element (18b), said second diffusing element (18b) being similar to said at least one diffusing element (18, 18a), said at least one diffusing element (18, 18a) and said second diffusing element (18b) branching off on opposite sides to said connection portion (20) with which they are in flowing connection.
13. Shielding device (1) according to any one of claims 9 to 12, when claim 11 is appended to claim 9 or 10, and further comprising a control panel (38) provided in a portion of said frontal element (19) and arranged for housing control devices of said shielding apparatus (1).
14. Shielding device (1) according to claim 13, wherein said control devices comprise power control and adjusting means (39) arranged for adjusting a power of said airflow generating means (9).

15. Shielding device (1) according to claim 13 or 14, wherein said control devices further comprise switching-on means (41), connected to said airflow generating means (9) to enable an electric supply to be received or not that is necessary for the operation thereof. 5
16. Workstation (2) comprising a cooking apparatus (4, 5, 6) and a shielding device (1) according to any one of claims 1 to 15. 10

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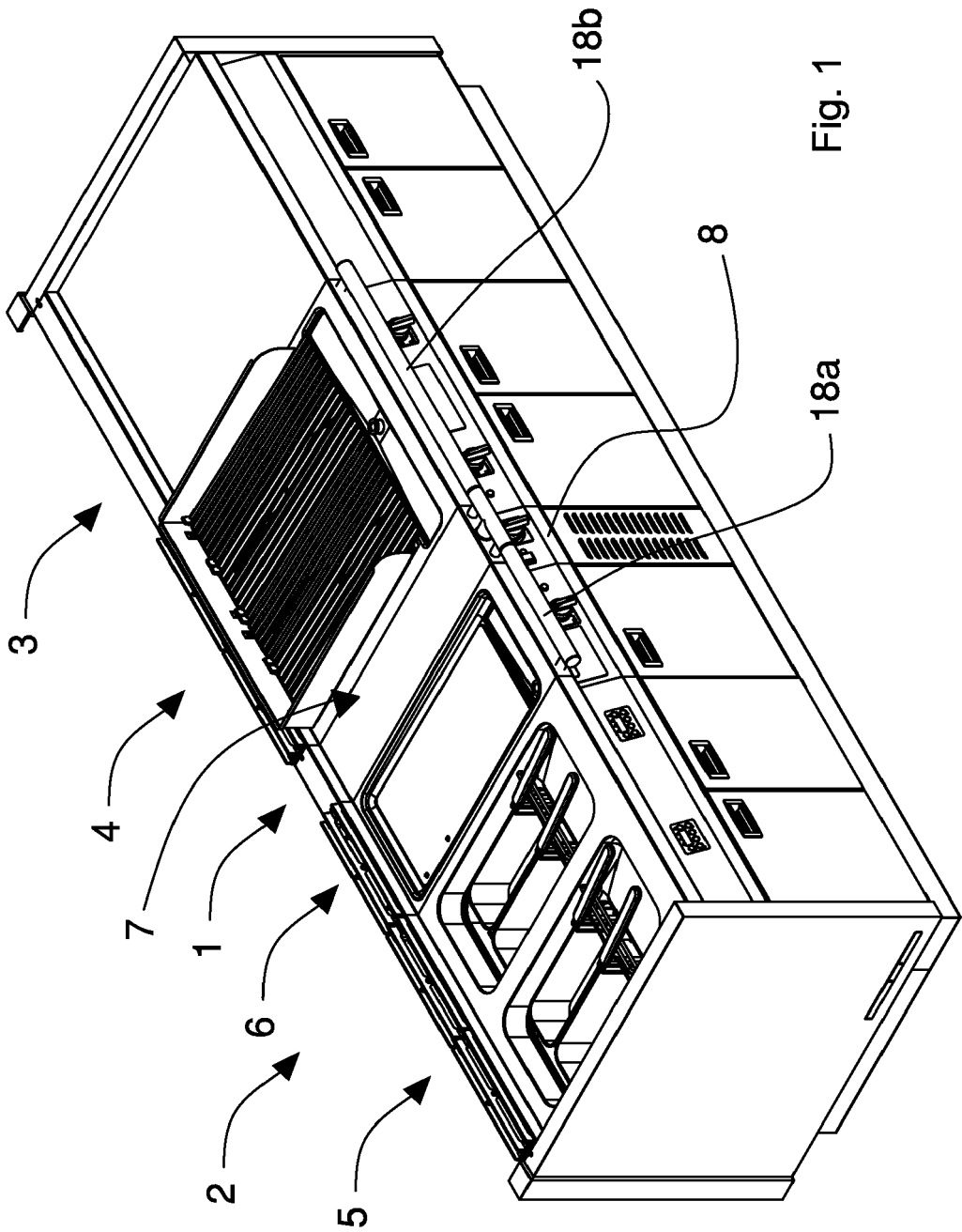


Fig. 1

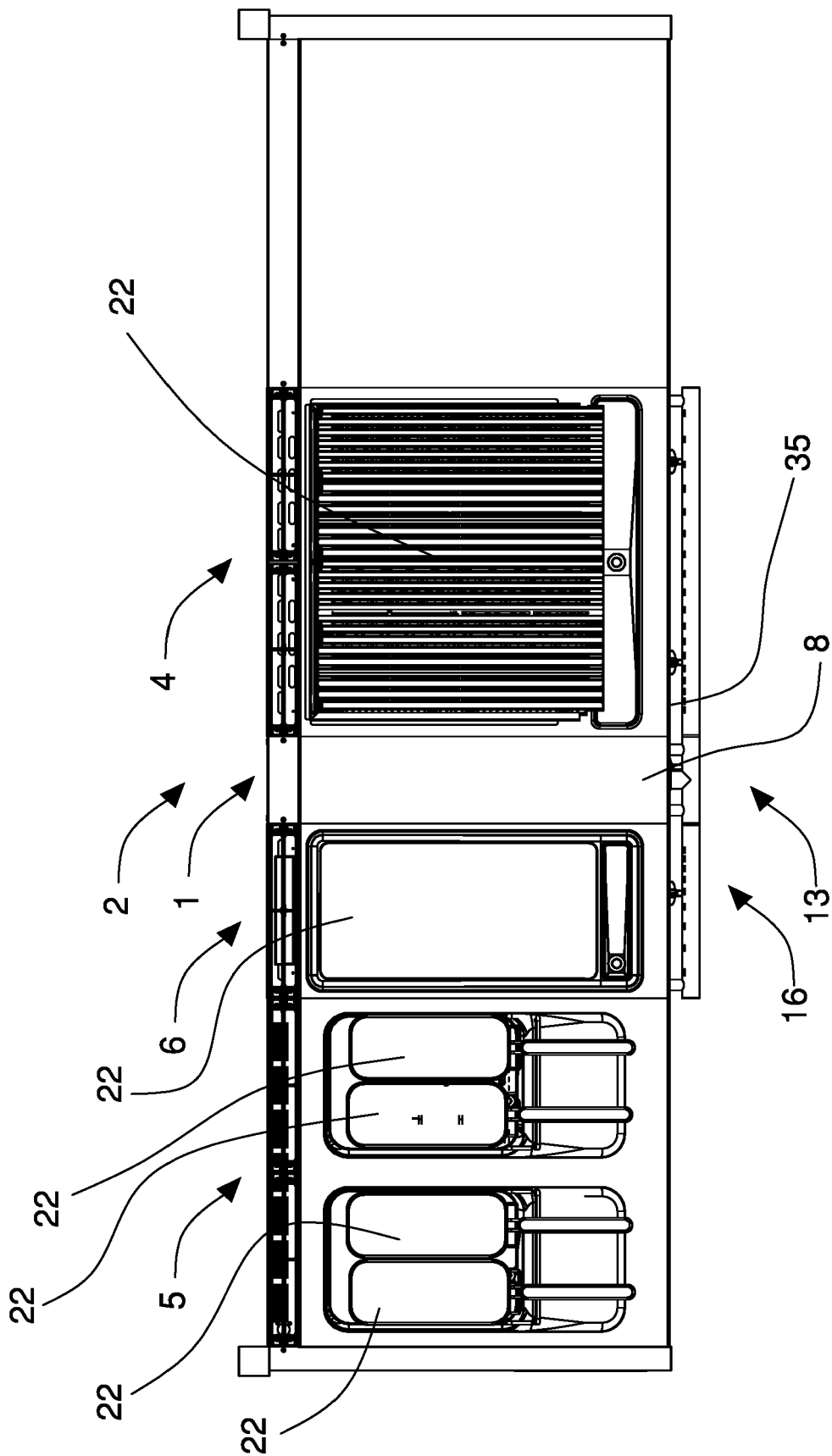


Fig. 2

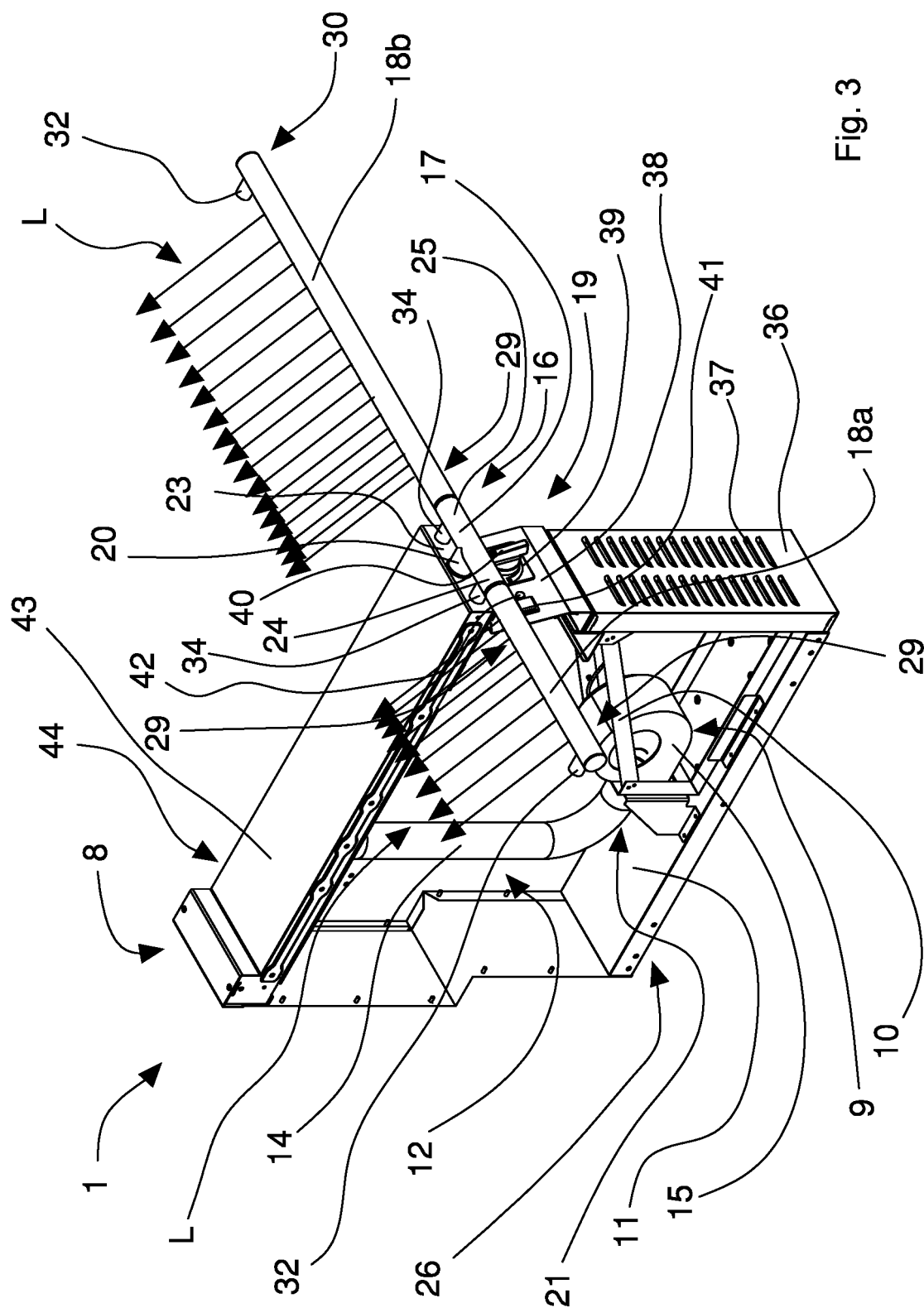


Fig. 3

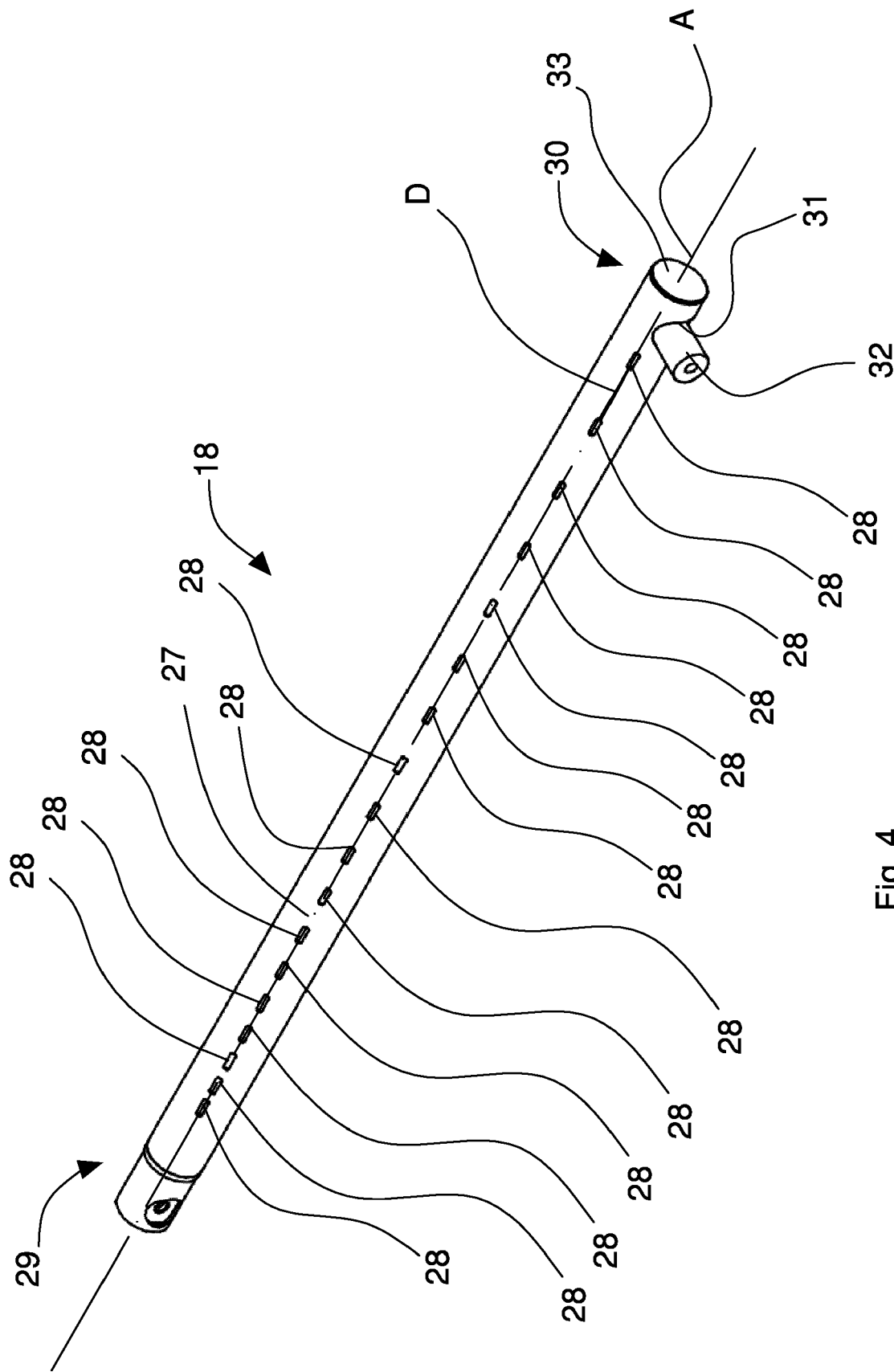


Fig. 4

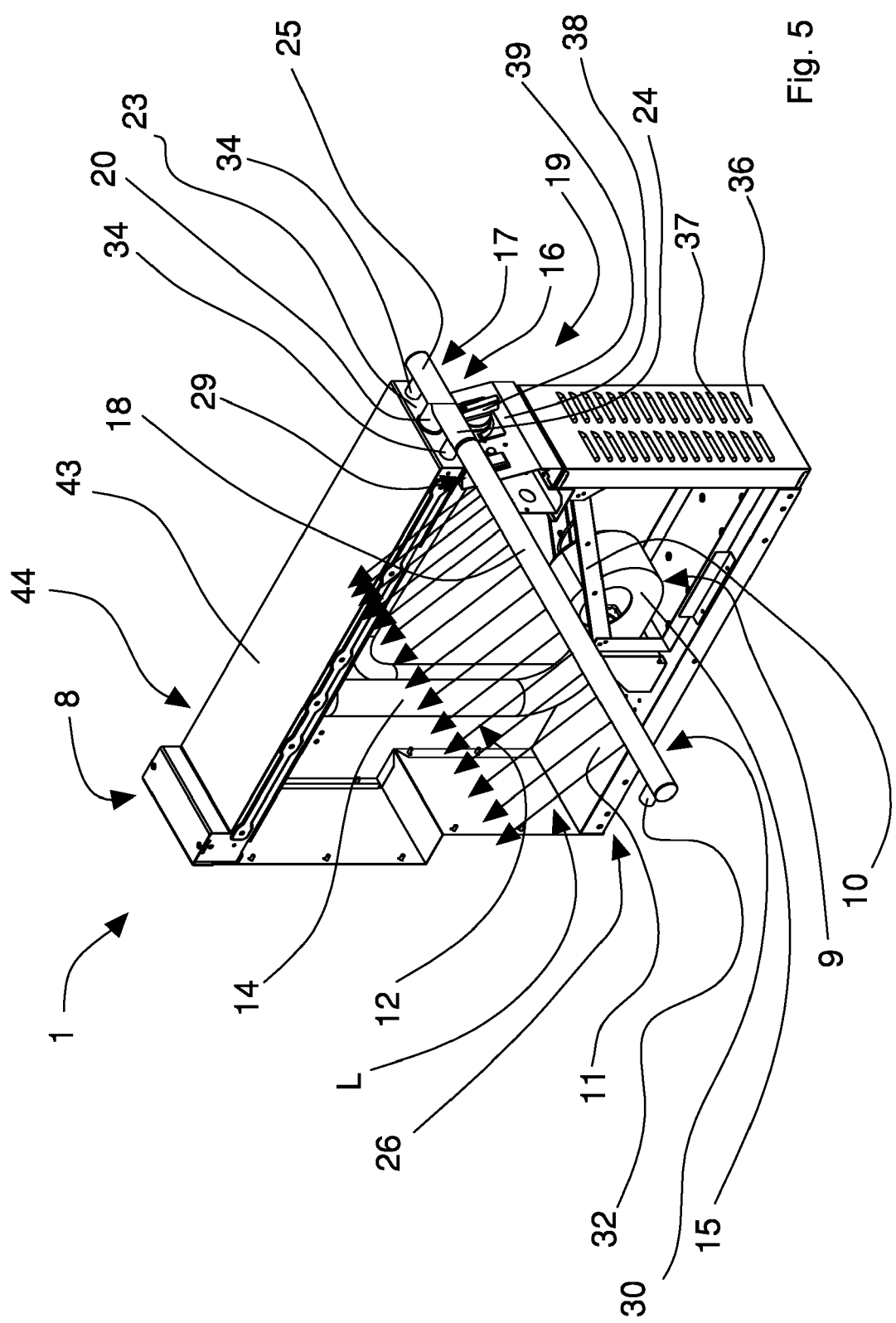


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 16 19 4646

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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)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 February 2017	Examiner Fest, Gilles
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