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(54) **Integrated fan assembly for cooling an oven**

(57) An integrated fan assembly (1) for cooling an oven (60) has a tangential fan (3) having an axis (R) of rotation; a scroll casing (2) housing the fan and having an intake opening (16) and a delivery opening (17), both located along a peripheral edge (18) of the fan (3) and spaced angularly apart about the axis (R); and a delivery conduit (21) connected to the delivery opening (17) and projecting from the scroll casing (2); the scroll casing (2) is formed integrally in one piece with the delivery conduit (21) to form a one-piece body (25) of molded plastic material; and the scroll casing (2) has an auxiliary intake opening (19) connected to an intake flue (20).

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Description

[0001] The present invention relates to an integrated fan assembly for cooling a food-cooking oven.

[0002] As is known, food-cooking ovens normally comprise a ventilation system for circulating the air and so ensuring an even temperature inside the oven, and for cooling the front of the oven where the door handle and electronic oven control instruments are located.

[0003] More specifically, to cool the front of the oven, a tangential fan is known to be used, in which the impeller is a so-called "flow-through" or "cross-flow" tangential fan, i.e. a fan designed to work with airflow substantially tangent to its outside diameter, and which is normally longer than its diameter; the fan is powered by an electric motor and housed inside a scroll casing shaped to define an airflow channel about the fan; the scroll casing has an inlet or intake opening and an outlet or delivery opening spaced angularly apart about the rotation axis of the fan; and the delivery opening is connected to a conduit which directs the airflow produced by the fan towards the front of the oven.

[0004] Fans of the above type are unsatisfactory in terms of easy manufacture and installation, by requiring the assembly of various separate component parts, as well as in terms of performance, by only providing for cooling, as opposed to other useful functions such as exhausting fumes, gas and vapour from the oven.

[0005] It is an object of the present invention to eliminate the above drawbacks by providing a fan assembly which, besides being cheap and easy to produce, assemble and install, provides for both effective cooling and effective exhaust of fumes, gas and vapour from the oven.

[0006] The present invention therefore relates to an integrated fan assembly for cooling an oven, as claimed in the accompanying Claim 1, and to an oven featuring such a fan assembly.

[0007] The fan assembly according to the invention is cheap and easy to produce, assemble and install, by virtue of the scroll casing and the intake conduit (and possibly also the flue or at least an inlet portion of it) being formed in one piece of molded plastic material, thus enabling even complex shapes to be achieved cheaply and easily.

[0008] Moreover, providing the auxiliary intake opening and the flue allows the assembly to function simultaneously as a tangential and centrifugal fan, with suction in a direction substantially tangential to the fan and substantially parallel to the rotation axis of the fan. By connecting the flue to the cooking chamber of the oven, the fan assembly according to the invention therefore provides for both cooling, and for exhausting fumes, gas and vapour from the oven.

[0009] Non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic side view of an integrated fan assembly in accordance with the invention;

Figure 2 shows a schematic top plan view of the Figure 1 fan assembly;

Figure 3 shows a longitudinal section of a fan forming part of the Figure 1 fan assembly;

Figure 4 shows a schematic view in perspective, with parts removed for clarity, of the Figure 1 fan assembly;

Figure 5 shows a partial schematic view in perspective of an oven fitted with the fan assembly according to the invention.

[0010] With reference to Figures 1 and 2, an integrated fan assembly 1 for cooling a food-cooking oven comprises a scroll casing 2; and a fan 3 housed inside scroll casing 2 to rotate about a rotation axis R and powered by an electric motor 4 by means of a shaft 5. Scroll casing 2 extends substantially along axis R and about fan 3, defines an inner cavity 6 housing fan 3, and comprises two opposite lateral walls 8, 9 substantially parallel to each other and perpendicular to axis R, and a conducting wall 10 connecting lateral walls 8, 9.

[0011] Conducting wall 10 comprises a curved portion 11 curving about axis R; and a substantially flat bottom portion 12 connected to curved portion 11. Conducting wall 10 extends longitudinally between lateral walls 8 and 9 and transversely between two end edges 14, 15 spaced angularly apart and respectively defining - with reference to the rotation direction of fan 3 indicated by the arrow in Figure 1 - an intake opening 16 and a delivery opening 17 of scroll casing 2. Intake opening 16 and delivery opening 17 are located along a radially outer peripheral edge 18 of fan 3, and are spaced angularly apart about axis R.

[0012] Outside scroll casing 2, i.e. outside cavity 6, lateral wall 8 supports motor 4 in known manner not shown or described by the sake of simplicity.

[0013] Lateral wall 9 has an auxiliary intake opening 19 formed through lateral wall 9, along axis R, and connected to an intake flue 20; and fan assembly 1 also comprises a delivery conduit 21 projecting from scroll casing 2. Scroll casing 2 (defined by lateral walls 8, 9 and conducting wall 10) is formed integrally in one piece with delivery conduit 21 and flue 20 to form a one-piece body 25 of molded plastic material, e.g. polyamide.

[0014] As shown in detail in Figure 3, fan 3 is a substantially known tangential fan. More specifically, fan 3 is substantially cylindrical and hollow, and comprises a number of longitudinal blades 30 substantially parallel to one another and to axis R; blades 30 have a cross section curving about axis R, and are shaped to produce an airflow substantially tangent to peripheral edge 18; fan 3 is substantially elongated along axis R, extends between two axial ends 31, 32, and is longer than its diameter; blades 30 are fitted to two lateral members 33, 34; lateral member 33 is defined by a disk fitted centrally with a hub 36 in which shaft 5 is inserted; and lateral member 34 is

substantially annular, and comprises a central, substantially circular opening 37 located along axis R and aligned with auxiliary intake opening 19.

[0015] Fan 3 is fitted to and projects from scroll casing 2 at axial end 31 by means of shaft 5 fitted through lateral wall 8 and fixed inside hub 36; and axial end 32 has opening 37 and no support or mechanical connection to scroll casing 2.

[0016] With reference also to Figure 4, flue 20 extends substantially perpendicularly to auxiliary intake opening 19, and comprises a tubular member 40 located outside scroll casing 2 and adjacent to lateral wall 9, and bounded by a lateral wall 41. More specifically, flue 20 extends along lateral wall 9, substantially perpendicularly to axis R and vertically, between two opposite, respectively bottom and top, ends 42, 43.

[0017] Flue 20 has a first opening 44 located substantially at bottom end 42 and close to bottom portion 12; and at least one optional second opening 45 located at end 43 and/or formed in lateral wall 41. In the example shown, opening 45 is located at top end 43 and also formed in lateral wall 41.

[0018] Delivery conduit 21 is substantially tangent to fan 3 and scroll casing 2, extends substantially parallel to bottom portion 12, is connected to delivery opening 17 by a closed, annular - in the example shown, rectangular - peripheral frame 46, and terminates with an open free end 47.

[0019] Viewed from above, delivery conduit 21 is substantially trapezoidal with curved sides. More specifically, delivery conduit 21 comprises two lateral walls 48, and a main wall 49 connecting lateral walls 48; and lateral walls 48 are curved, diverge from each other from delivery opening 17 to free end 47, and taper towards free end 47.

[0020] Delivery conduit 21 has a substantially U-shaped cross section, and lateral walls 48 have respective bottom edges 50 substantially aligned with bottom portion 12 of scroll casing 2 and cooperating, in use, with an outer supporting surface 51 defining a further wall, substantially facing main wall 49, of the conduit.

[0021] Fan assembly 1 has fastening members 52 for connection to supporting surface 51, e.g. fast-fit fastening members comprising L-shaped teeth 53 projecting downwards from edges 50 to engage respective slots 54 formed in supporting surface 51. Fan assembly 1 may also be fixed to supporting surface 51 by screws or rivets inserted through holes 55 in body 25.

[0022] Free end 47 of delivery conduit 21 has tabs 56, e.g. substantially parallel to one another, which project from main wall 49 to supporting surface 51, inside delivery conduit 21, and define both reinforcing members for structurally reinforcing the delivery conduit, and flow-deflecting members.

[0023] In Figure 4, fan assembly 1 is installed in a substantially known food-cooking oven 60 comprising a cooking chamber 61 closed at the front by a door 62; and an operating compartment 63 located over chamber 61, separated from chamber 61 by a partition 64, and housing various known component parts and/or electronic instruments (not shown) of oven 60.

[0024] Fan assembly 1 is housed inside compartment 63, and rests on a surface of partition 64 defining supporting surface 51.

[0025] Flue 20 is connected to chamber 61 via a hole 65 formed in partition 64 and communicating with end 42 of flue 20.

[0026] In actual use, as shown in Figure 4, rotation of fan 3 inside scroll casing 2 draws in a tangential primary flow F1 through intake opening 16 along peripheral edge 18, and, at the same time, a first auxiliary flow F2 from chamber 61 through opening 44 of flue 20, and a second auxiliary flow F3 from compartment 63 through opening 45.

[0027] Both auxiliary flows F2, F3 are drawn in through auxiliary intake opening 19 into fan 3, and flow together with flow F1 to form a flow F4 substantially tangent to peripheral edge 18, and which flows through delivery opening 17 into delivery conduit 21 to cool the front of oven 60 and door 62.

[0028] Clearly, changes may be made to the fan assembly as described and illustrated herein without, however, departing from the scope of the accompanying Claims.

Claims

1. An integrated fan assembly (1) for cooling an oven, and comprising a fan (3) having an axis (R) of rotation; and a scroll casing (2) housing the fan and having an intake opening (16) and a delivery opening (17), both located along a peripheral edge (18) of the fan (3) and spaced angularly apart about the axis (R); the fan assembly being **characterized in that** the scroll casing (2) comprises an auxiliary intake opening (19) connected to an intake flue (20); and the scroll casing (2) is formed integrally in one piece with the flue (20) to form a one-piece body (25) of molded plastic material.

2. A fan assembly as claimed in Claim 1, **characterized by** comprising a delivery conduit (21) connected to the delivery opening (17) and projecting from the scroll casing (2); the delivery conduit (21) being formed integrally in one piece with the scroll casing (2) to form said one-piece body (25).

3. A fan assembly as claimed in Claim 1 or 2, **characterized in that** the flue (20) is located to the side of the fan (3), at an axial end (31) of the fan.

4. A fan assembly as claimed in one of the foregoing Claims, **characterized in that** the fan (3) is a tangential fan.

5. A fan assembly as claimed in one of the foregoing Claims, **characterized in that** the auxiliary intake opening (19) is formed in a lateral wall (9) of the scroll casing (2), close to an axial end (32) of the fan (3).

6. A fan assembly as claimed in Claim 5, **characterized in that** said axial end (32) of the fan (3) has at least one opening (37) for drawing an auxiliary flow through the auxiliary intake opening (19) into the fan (3).

7. A fan assembly as claimed in one of the foregoing Claims, **characterized in that** the delivery conduit (21) is substantially tangent to the fan (3) and the scroll casing (2).

8. A fan assembly as claimed in one of the foregoing Claims, **characterized in that** the flue (20) extends substantially perpendicularly to the auxiliary intake opening (19).

9. A fan assembly as claimed in one of the foregoing Claims, **characterized in that** the flue (20) has a first opening (44) located substantially at a first end (42) of the flue (20), and through which the fan (3) draws a first auxiliary flow (F2).

10. A fan assembly as claimed in Claim 9, **characterized in that** the flue (20) has a second opening (45) located at a second end (43) of the flue or formed in a lateral wall (41) of the flue, and through which the fan (3) draws a second auxiliary flow (F3).

11. A fan assembly as claimed in one of the foregoing Claims, **characterized in that** the delivery conduit (21) is substantially trapezoidal in shape with curved sides.

12. A fan assembly as claimed in one of the foregoing Claims, **characterized in that** the delivery conduit (21) comprises two lateral walls (48), and a main wall (49) connecting the lateral walls; the lateral walls (48) being curved and diverging from the delivery opening (17) to a free end (47) of the delivery conduit (21).

13. A fan assembly as claimed in Claim 12, **characterized in that** the lateral walls (48) taper towards the free end (47) of the delivery conduit (21).

14. A fan assembly as claimed in Claim 12 or 13, **characterized by** comprising fastening members (52) for connection to an outer supporting surface (51) defining a further wall, substantially facing the main wall (49), of the delivery conduit (21).

15. A fan assembly as claimed in one of the foregoing Claims, **characterized in that** the fan (3) projects inside the scroll casing (2), and is only supported at one axial end (31), the opposite axial end (32) being a free end.

16. A food-cooking oven (60) comprising a cooking chamber (61), and an operating compartment (63) separated from the chamber by a partition (64); and **characterized by** comprising an integrated fan assembly (1) as claimed in one of the foregoing Claims.

17. An oven as claimed in the foregoing Claim, and **characterized in that** the fan assembly (1) is housed inside the compartment (63), and the flue (20) is connected to the chamber (61) via a hole (65) formed in the partition (64).

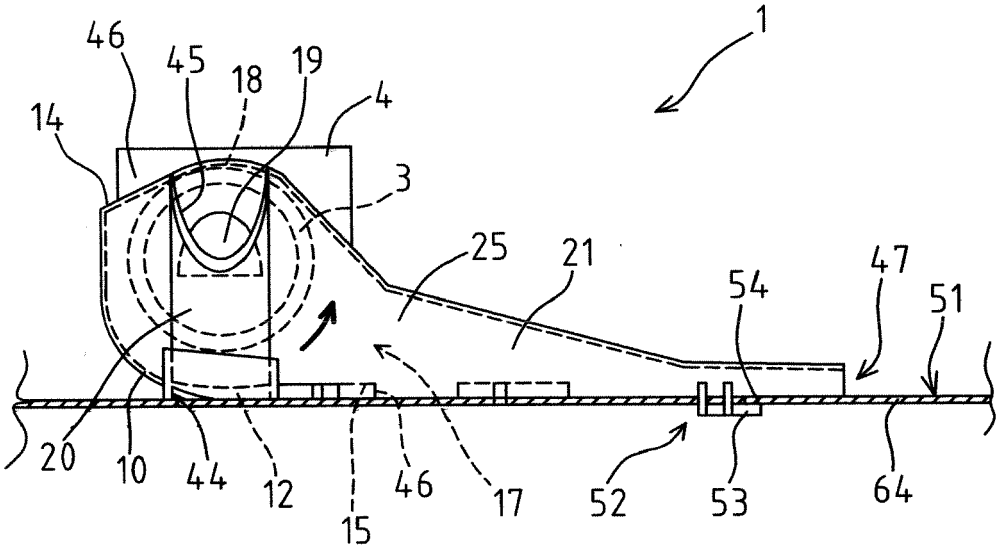
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Fig.1

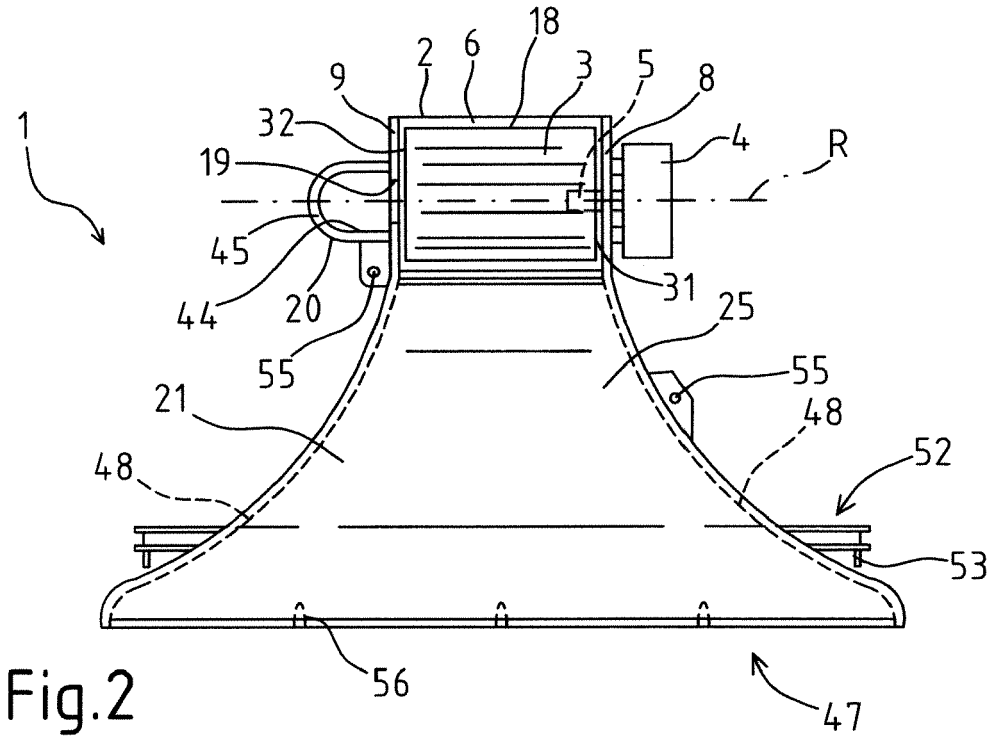
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Fig.2

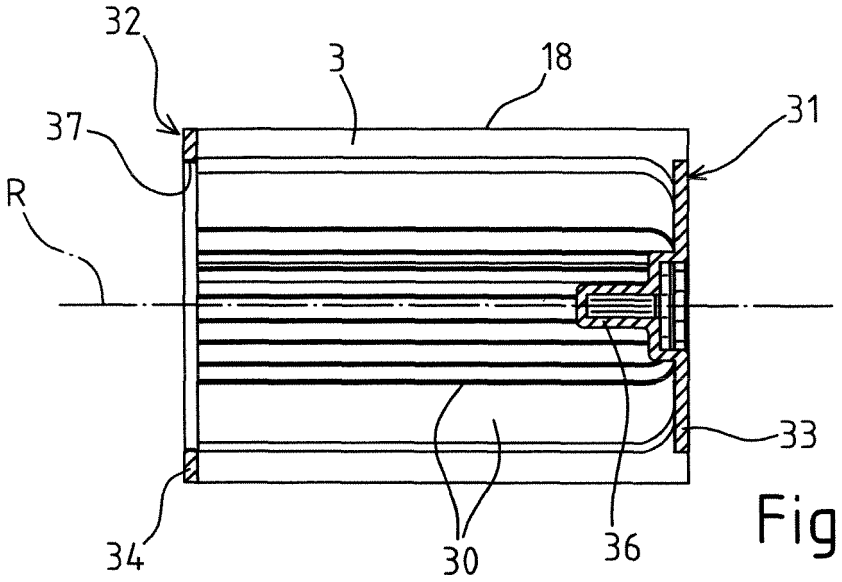
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Fig.3

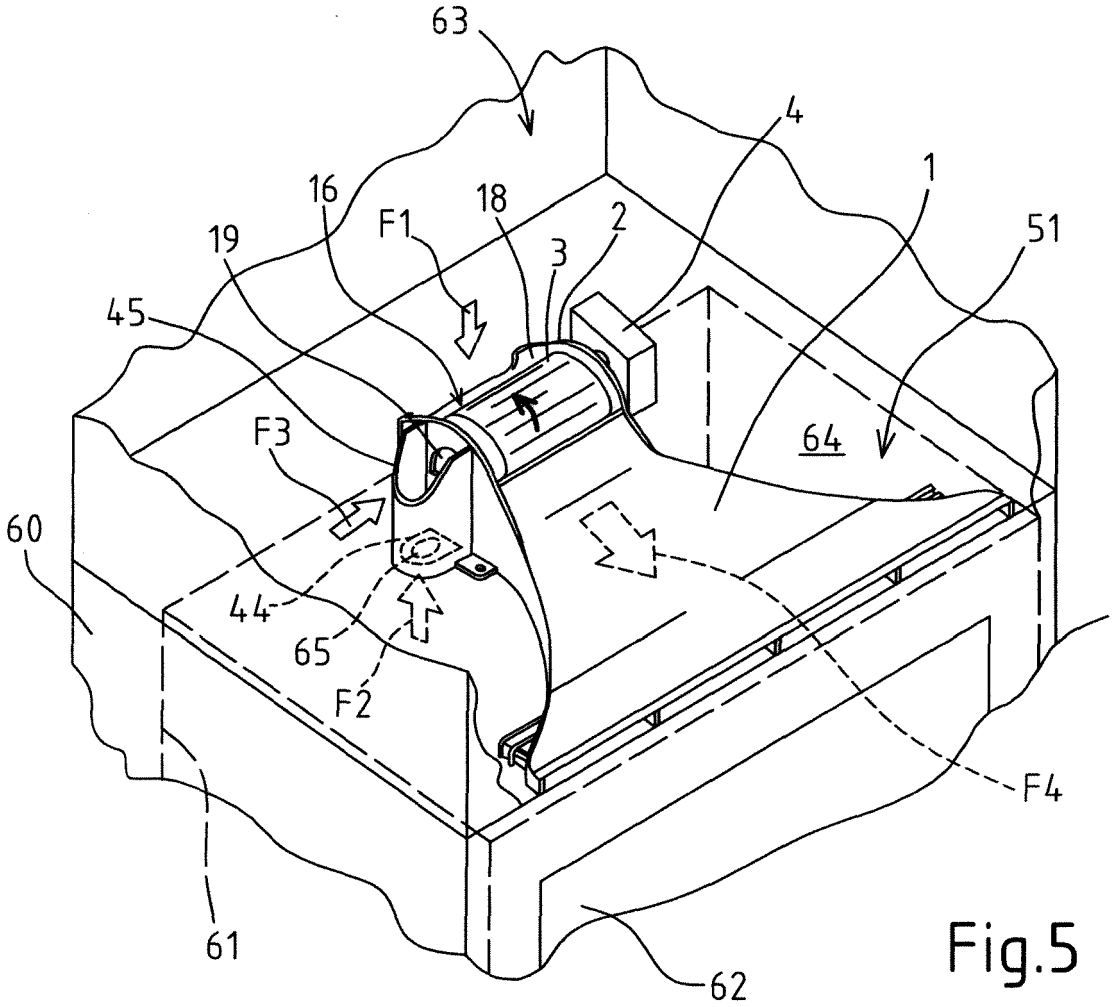
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Fig.5

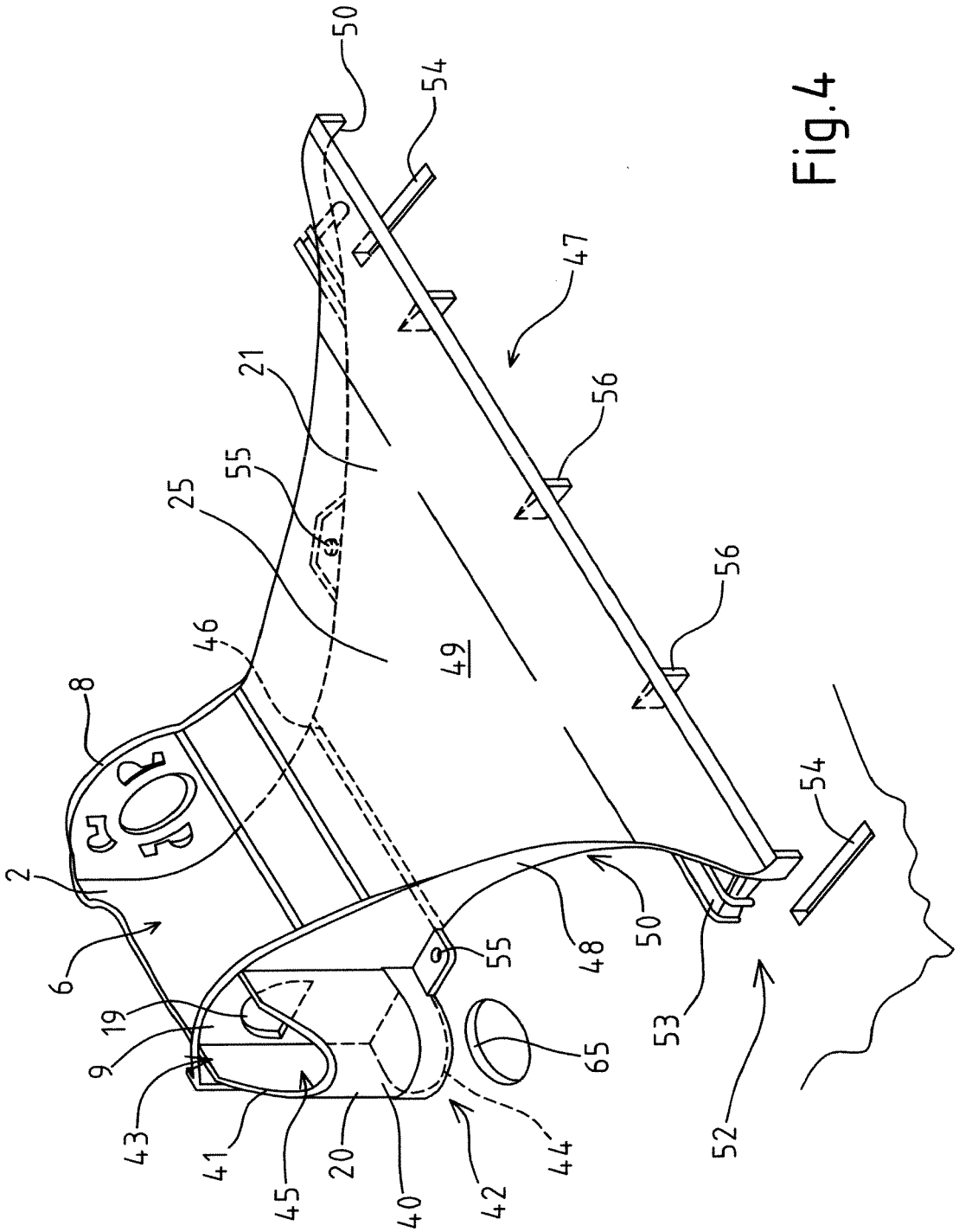
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Fig.4