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(54) Cleaning apparatus with liquid filter

(57) A cleaning apparatus comprises a tank (1) suitable for containing a liquid (L), conduit means (9, 12, 13, 16) for conveying a flow of air and dust to said liquid (L), sucking means for extracting said air from said tank (1) after said dust has been absorbed into said liquid (L),

said conduit means (9, 12, 13, 16) comprising a first conduit (12) and a second conduit (13) converging on a region (R) of said tank (1) for conveying to said region (R) respectively a first flow and a second flow of air and dust, so that said first flow and said second flow collide together.

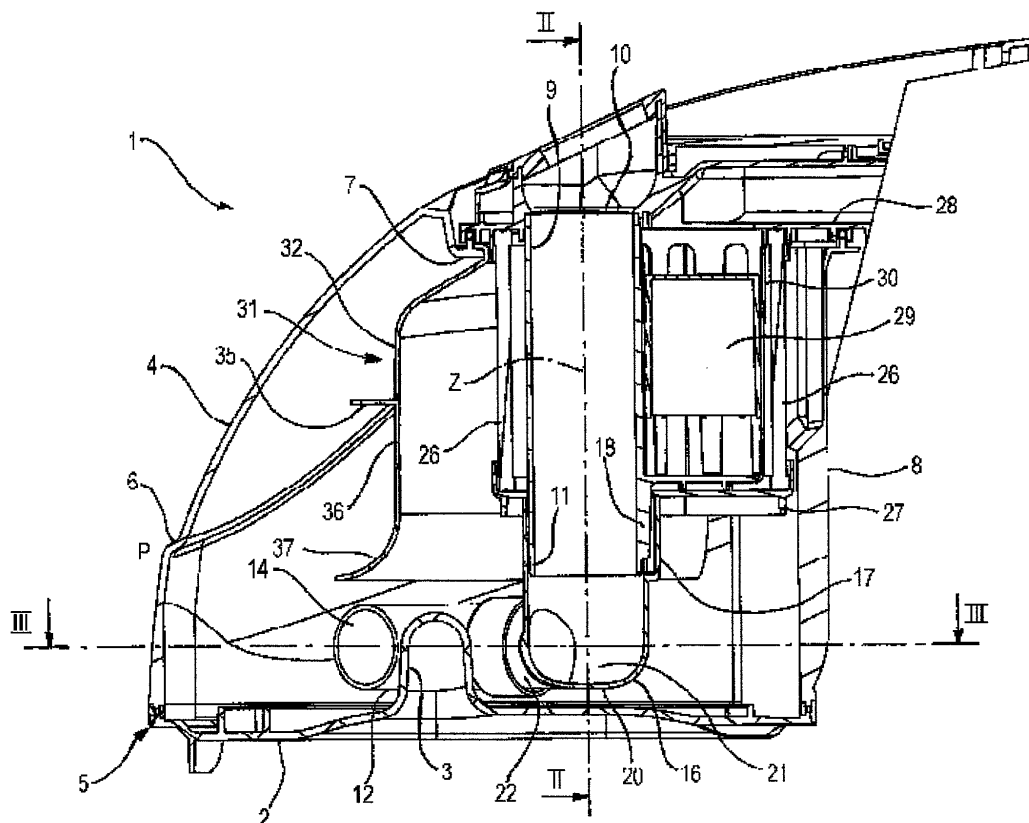


Fig. 1

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Description

[0001] The invention relates to a cleaning apparatus, in particular a vacuum cleaner of the type comprising a tank containing a liquid, for example water, inside which a flow of air is conveyed that is mixed with dust or dirt particles sucked from a surface.

[0002] EP 1112712 discloses a vacuum cleaner comprising a tank inside which a certain quantity of liquid is contained, for example water. The tank comprises a substantially flat support base, connected to a concave side wall and to a rear wall that is also substantially flat. The side wall is provided with an upper edge, from which a vertical baffle extends to inside the tank. To the upper edge of the side wall a filter holder is removably fixed that is formed of an annular grille inside which a spongy filter is arranged that is also annular in shape.

[0003] The vacuum cleaner furthermore comprises a conduit for conveying inside the tank a flow of air mixed with particles of dust. The conduit passes inside the filter, in a position that is coaxial with the filter, and ends in an end portion that is provided with a mouth that has an oval cross section, that is below the free surface of the water. The end portion of the conduit is positioned in such a way that the flow of air and dust has a component that is substantially tangential to the support base.

[0004] During operation, the flow of air and dust sucked from a surface to be cleaned passes through the conduit and exits from the mouth in a direction that is tangential to the support base, mixing with the water contained in the tank. In this way a mixture of water, air and dust is formed that, after touching the support base, is intercepted by the side wall and rises upwards tangentially to the side wall. A first portion of this mixture reaches approximately half way up the side wall, after which it falls again to the support base; a second portion of the mixture, on the other hand, rises along the side wall until it reaches the upper edge and is pushed against the baffle by the concave profile of the side wall. This second portion descends again down the baffle to the support base, mixing with the first portion of mixture that has not reached the upper edge. A whirling motion of the mixture of water, air and dust is thus created by means of which it is possible to separate the dust, which is absorbed by the water and remains inside the tank, by the air, which after passing through the filter is readmitted to the surrounding environment through sucking means comprising a fan that sucks air from the tank.

[0005] The vacuum cleaner disclosed in EP 1112712 does not have optimal efficacy inasmuch as some particles of dust are not captured by the water, but rather remain in the air flow that is returned to the external environment. In order to entrap the greatest possible number of particles of dust in the water, the water in fact has to be nebulised into extremely fine droplets, so as to maximise the surface in contact with the dust. In the vacuum cleaner disclosed in EP 1112712, this nebulization is limited, inasmuch as the mixture of water, air and dust

moves with a certainly whirling motion, but which also has a certain degree of regularity. In fact, this mixture follows a substantially regular path inside the tank, gently touching first the support base, then the side wall and lastly the baffle.

[0006] Furthermore, in the vacuum cleaner disclosed in EP 1112712 certain drops of water may be sucked by the sucking means that extracts the purified air from the tank. In fact, when the mixture of water, air and dust moves in a whirling motion inside the tank, as disclosed previously, some drops of water touch the vertical baffle and fall into the water underneath near the zone in which the clean air is sucked to be returned to the surrounding environment. These drops, if they are sucked by the sucking means, can reach undesired zones of the vacuum cleaner and cause malfunctions thereof. If, for example, the drops of water reach the fan that sucks the clean air from the tank, they can oxidise the blades thereof, that are usually made of untreated aluminium. Owing to this, the vacuum cleaner becomes noisier and its performance diminishes.

[0007] An object of the invention is to improve existing cleaning apparatuses, in particular vacuum cleaners.

[0008] A further object of the invention is to provide a cleaning apparatus in which the risk is reduced that particles of dust are present in the air that is returned to the environment after it has been purified in the tank.

[0009] A still further object of the of the invention is to provide a cleaning apparatus in which the risk has been reduced that particles of liquid contained in the tank can be sucked by the sucking means by means of which the air is extracted from the tank to be returned to the external environment, which would lead to damage of the sucking means.

[0010] In a first aspect of the invention, a cleaning apparatus is provided comprising a tank suitable for containing a liquid, conduit means for conveying a flow of air and dust to said liquid, sucking means for extracting said air from said tank after said air has been absorbed into said liquid, characterised in that said conduit means comprises a first conduit and a second conduit converging on a region of said tank for conveying to said region respectively a first flow and a second flow of air and dust, so that said first flow and said second flow collide together.

[0011] Owing to this aspect of the invention, it is possible to improve the efficacy of the cleaning apparatus. The first conduit and the second conduit in fact enable two flows of air and dust to be delivered into the tank, instead of a single flow as in the prior art. The two flows of air and dust, by colliding together, form a mixture of liquid, air and dust that is much more turbulent than that of the prior art, which enables the liquid to be nebulised to a greater extent. In this way a great number of liquid particles with very small dimensions is created, that easily absorb the particles of dust contained in the first flow and in the second flow. As a result, it is very difficult for the particles of dust to be returned to the surrounding

environment.

[0012] In a second aspect of the invention, a cleaning apparatus is provided comprising a tank suitable for containing a liquid and for receiving a flow of air and dust to be purified, filtering means for filtering said air leaving said tank, guard means of said filtering means, said guard means comprising a wall at least partially surrounding said filtering means, characterised in that said guard means furthermore comprises deflecting means that protrudes from said wall to deflect said liquid away from said wall.

[0013] Owing to this aspect of the invention, it is possible to reduce the risk that particles of liquid may reach the filtering means, traverse them and subsequently come into contact with components of the apparatus that have not been designed to work in contact with the liquid, for example the fan that sucks the air from the tank. Any particles of liquid that move along the wall of the guard means in fact interact with the deflecting means that moves them away from the filtering means.

[0014] The invention can be better understood and implemented with reference to the attached drawings, that show an exemplifying and non-limitative embodiment thereof, in which:

Figure 1 is a cross section taken along a vertical median plane of a tank of a cleaning apparatus;
Figure 2 is a section taken along the plane II-II in Figure 1;
Figure 3 is a section taken along the plane III-III in Figure 1;
Figure 4 is a perspective and enlarged view of conduit means of the apparatus in Figure 1;
Figure 5 is a plan view of the conduit means in Figure 4;
Figure 6 is a perspective and enlarged view of guard means of the apparatus in Figure 1;
Figure 7 is a cross section taken along a plane of symmetry of the guard means in Figure 6;
Figure 8 is a cross section similar to the one in Figure 1, showing the operation of the cleaning apparatus.

[0015] With reference to Figures 1 to 3, there is shown a tank 1 of a cleaning apparatus, particularly of a vacuum cleaner. The tank 1 is suitable for containing a liquid, for example water to which detergent substances may have been added, inside which a flow of air and dust is conveyed that has been sucked from a surface to be cleaned. This flow can be introduced into the vacuum cleaner by means of a flexible pipe to which a suction tool is connected in a removable manner. The flexible pipe is connected to a body provided with wheels, which can be moved by the user in the environment that it is desired to clean.

[0016] The tank 1, which is mounted in a removable manner to the body of the vacuum cleaner, is delimited by a base wall 2 provided with a protuberance 3, facing the inside of the tank 1, suitable for housing a pivot that

is not shown on which a wheel is mounted that enables the vacuum cleaner to be moved. From the base wall 2 a side wall 4 extends that is connected to the base wall 2 at a sharp edge 5. On the side wall 4, which has a substantially concave shape, there is obtained a step 6 having the function of preventing the mixture of liquid, air and dust generated in the tank 1 from climbing up the side wall 4 tangentially thereto, as will be disclosed better below. The step 6 extends around the entire side wall 4, starting from minimum distance point P from the base wall 2 at the median section shown in Figure 1, and gradually moving away from the base wall 2, as shown in Figure 2. Minimum distance point P of the step 6 from the base wall 2 is at a distance from the base wall 2 that is equal to approximately a third of the height of the tank 1.

[0017] The side wall 4 is adjacent to a rear wall 8 that delimits the tank 1 at the rear. The side wall 4 is furthermore provided above with an edge 7 that extends around a central opening, inside which a conduit 9 is inserted that enables a flow of air and dust sucked from a surface to be cleaned to be introduced inside the tank 1. The conduit 9 is provided with a first end portion 10 that can be connected to the flexible tube of the vacuum cleaner and with a second end portion 11, opposite the first end portion 10 and arranged inside the tank 1. A "Y"-shaped joint 16 is connected in a removable manner to the second end portion 11 and is shown in detail in Figures 4 and 5. The joint 16 comprises a tubular body 19, that can be fitted onto the second end portion 11 of the conduit 9 and for this purpose it is provided, in an upper region, with a groove 17 suitable for engaging in a shapingly coupled manner a projection 18 formed on the second end portion 11 of the conduit 9. The groove 17 ensures that the joint 16 is mounted on the conduit 9 still in the same angular position and prevents corresponding rotations between the conduit 9 and the joint 16. The tubular body 19 is closed below by a transverse wall 20, that delimits a lower region 21 of the tubular body 19 from which a first branch 22 and a second branch 23 lead away that are internally hollow and extend perpendicularly in relation to the tubular body 19. To the first branch 22 and to the second branch 23 a first conduit 12 and a second conduit 13 can be connected respectively in a removable manner, they having respective cross sections that are equal to about half of the cross section of the conduit 9 and extending, in use, parallel to the base wall 2.

[0018] The first conduit 12 and the second conduit 13 are provided with respective seats 24 that are suitable for engaging in a shapingly coupled manner corresponding ridges 25 obtained on the first branch 22 and on the second branch 23. In this way it is guaranteed that the first conduit 12 and the second conduit 13 are respectively fitted on the first branch 22 and on the second branch 23 in a correct angular position and a rotation between each conduit 12, 13 and the corresponding branch 22, 23 is prevented. In the embodiment shown in Figures 4 and 5, the first conduit 12 and the second con-

duit 13 have the same geometry and can be mounted indifferently on the first branch 22 and on the second branch 23. This simplifies the construction of the first conduit 12 and of the second conduit 13 and mounting them on the joint 16.

[0019] The first conduit 12 and the second conduit 13 are symmetrical in relation to a plane of vertical symmetry π and passing through a longitudinal axis Z along which the conduit 9 extends. They are also provided respectively with a first end section 14 and with a second end section 15, arranged on the opposite side to the joint 16. The first end section 14 and the second end section 15 face the same region R. In the example in Figure 5, the first end section 14 and the second end section 15 lie on respective planes and the straight lines R1, R2 perpendicular to these end sections intersect one another at a point Q that lies on the plane of symmetry π . The first conduit 12 and the second conduit 13 shown in Figure 5 furthermore each has a "C" plan shape. This "C" may, in particular, be defined by an arc of a circle.

[0020] It is nevertheless also possible to adopt other forms of the first conduit 12 and of the second conduit 13, that could, for example, be provided with straight portions, or with curved portions having a different plan shape from the arc of a circle.

[0021] The tank 1 is furthermore provided with an outlet conduit 28, connected to sucking means that is not shown, comprising for example a fan driven by an electric motor. The sucking means enables the air delivered into the tank 1 through the conduit 9 to be extracted from the tank 1, after the air has been purified and the particles of dust dragged therefrom have been absorbed by the liquid contained in the tank 1. The purified air is then delivered again to the external environment through the sucking means.

[0022] In order to prevent any dust or dirt particles that have not been absorbed by the liquid in the tank 1 from being again delivered into the external environment, a filter 26 is provided, that is sleeve-shaped and mounted on a respective support 27. The filter 26 may comprise a yarn formed of threads in plastics, for example polyester or propylene, and may be dismantled by the user and washed if the need arises. Outside the filter 26, a filtering net may be provided having the object of preventing any detritus of relatively large dimensions from reaching the filter 26.

[0023] The filter 26 may have a substantially triangular plan shape.

[0024] The conduit 9 passes inside the filter 26 in a decentralised position in relation to the filter 26. In other words, the longitudinal axis Z of the conduit 9 does not coincide with the axis of the filter 26. In this way, inside the filter 26 it is possible to house a float 29, that is movable parallel to the longitudinal axis Z inside a respective guide 30. If the liquid in the tank 1, following a fault, reaches a successive level, the float 29 rises up the guide 30 until it closes the outlet conduit 28, thus preventing the liquid from reaching components of the vacuum cleaner

that have not been designed to work in contact with the liquid, such as the fan of the sucking means.

[0025] The tank 1 furthermore comprises guard means 31 arranged to protect the filter 26 from the sprays of liquid that are generated inside the tank 1 during operation. The guard means 31, shown in detail in Figures 6 and 7, comprises a wall 32 arranged around the filter 26 so as to surround it at least partially. The wall 32 is provided, in an upper region thereof, with an edge 33 suitable for engaging the edge 7 of the side wall 4 and a pair of protrusions 34 that can be inserted in corresponding recesses that are not shown obtained on the edge 7. Owing to the edge 33 and to the protrusions 34, the guard means 31 can be fixed to the tank 1 and subsequently removed therefrom so as to enable the user to more easily access the inside of the tank 1, for example to clean it.

[0026] The guard means 31 is provided with deflecting means that protrudes from the wall 32, and is configured in such a way as to move away from the zone occupied by the filter 26 any drops of liquid adhering to the wall 32. In particular, the deflecting means enables the drops of liquid to be moved away from the wall 32, and thus from the filter 26, in a radial direction.

[0027] The deflecting means comprises a fin 35, that protrudes from an intermediate portion 36 of the wall 32, in a direction that is transverse in relation to the intermediate portion 36. In the example in Figures 6 and 7, the intermediate portion 36 extends vertically inside the tank 1, i.e. parallel to the longitudinal axis Z, whereas the fin 35 lies on a substantially horizontal plane. As shown in Figure 6, the fin 35 has a "C" plan shape.

[0028] The deflecting means furthermore comprises a curved edge 37, that delimits the wall 32 below, giving it a shape like the a portion of bell. The curved edge 37 is provided with a concavity facing the fin 35. The wall 32 could also be delimited by an edge with a different shape from the curved edge 37, but which was shaped in a manner such as to convey any drops of liquid adhering to the wall 32 to the side wall 4, as will be explained better below.

[0029] During operation, inside the tank 1 a quantity of liquid L is introduced such that the first conduit 12 and the second conduit 13 are partially immersed in the liquid L, as shown in Figure 8. A flow of air and dust sucked from a surface to be cleaned enters, through the flexible pipe, the conduit 9, as shown by the arrows F. Upon reaching the joint 16, the flow of air and dust divides into a first flow, that traverses the first conduit 12, and into a second flow, that traverses the second conduit 13, as shown by the arrows F1 and F2 in Figure 5. The geometry of the joint 16 prevents detritus of significant dimensions that may be present in the flow of air and dust, for example cigarette butts, from reaching the tank 1. Such detritus, hindered by the bifurcation of the tubular body 19 in the first branch 22 and in the second branch 23, is deposited in fact on the transverse wall 20 and remains in the lower region 21 of the joint 16, without being able to traverse the first conduit 12 and the second conduit 13. The joint

16 thus acts as a first filter, preventing any detritus of large dimensions from reaching inside the tank 1. If this occurred, the detritus would tend to float in the liquid L and dirty it. As, furthermore, the side wall 4 of the tank 1 may be made of transparent plastics, the detritus floating in the liquid L would be visible from the exterior, detracting from the aesthetic appearance of the tank 1.

[0030] It should furthermore be noted that the first conduit 12 and the second conduit 13 have a substantially constant cross section with a substantially circular shape. Owing to this cross section, it is possible to prevent detritus being able to escape from the lower region 21 of the joint 16, from moving to the tank 1 and thereby obstructing the first conduit 12 and/or the second conduit 13, as could, on the other hand, occur if such conduits had a section that narrows progressively, of the type shown in EP 1112712.

[0031] The first flow F1 and the second flow F2, after respectively crossing the first conduit 12 and the second conduit 13, move to the region R in which they collide with one another. When the first flow F1 and the second flow F2 collide, great turbulence is created inside the liquid L. Owing to this turbulence, the liquid L is nebulised into a multiplicity of extremely fine droplets that mix with the particles of dust and with the air introduced into the tank 1 through the first conduit 12 and the second conduit 13. The mixture of liquid L, air and dust tends to rise up inside the tank 1, as shown by the arrows M1 in Figure 8, and subsequently move downwards, as indicated by the arrows M2. When the mixture of liquid L, air and dust moves inside the tank 1, the particles of liquid L collide with the particles of dust and absorb them carrying the dust in suspension in the liquid L to the bottom of the tank 1. The air that has been freed of the particles of dust is then sucked by the sucking means and returned to the external environment through the outlet conduit 28, as indicated by the arrow A.

[0032] It should be noted that before reaching the outlet conduit 28, the air passes through the filter 26, having the object, as already said previously, of retaining any particles of dust and/or droplets of liquid L still mixed with the air.

[0033] It should be noted that the filter 26 has been introduced into the tank 1 merely as a precaution as it is difficult for it to be reached by particles of dust and/or droplets of liquid L.

[0034] The particles of dust, owing to the great turbulence that is generated in the tank 1 and to the consequent subtle nebulization of the liquid L, are in fact very effectively eliminated by the liquid L, in which they pass in suspension.

[0035] The drops of liquid L are on the other hand moved away from the filter 26 owing to the guard means 31, as shown in detail in Figure 7. The guard means 31 does not only prevent the drops of liquid L from reaching the filter 26 directly, but also enables the drops of liquid L to be moved away from the filter 26, lessening the likelihood that the droplets may be sucked by the sucking

means. In fact, any drops G of liquid L that knock against the wall 32, slide down the wall until they reach the fin 35 or the curved edge 37. At this point, the drops G follow the profile of the fin 35 or of the curved edge 37, until they reach the respective ends, after which they fall again to the bottom of the tank 1, as shown in Figure 7. The fin 35 and the curved edge 37 then enable the drops G to be moved away from the wall 32 and then from the filter 26, so that the drops G fall into the liquid L near the side wall 4, at a distance from the filter 26 that is greater than that at which they would fall in the absence of the fin 35 and/or of the curved edge 37. This makes it more difficult for the sucking means to suck droplets of liquid L.

[0036] It should be noted that neither the side wall 4, nor the guard means 31 act as intercepting means of the flow of air and dust to generate a whirling motion of the mixture of air, dust and liquid in the tank 1. In order to prevent this mixture being able to rise tangentially to the side wall 4 and then redescend tangentially to the wall 32, disturbance elements have been introduced into the tank 1 that tend to move the mixture of air, dust and liquid away from the walls. These disturbance elements comprise the sharp edge 5, the step 6 and the deflecting means 35 and 37.

[0037] In the tank 1 disclosed so far, the guard means 31 simply serves to protect the filter 26 from the drops of liquid L, whereas the side wall 4 is used as a containing means for closing the tank 1, so as to prevent spurts of liquid L from being able to soil the surrounding environment and enable a vacuum to be created inside the tank 1. Nevertheless, neither the side wall 4, nor the guard means 31 are needed to direct the flow of air and dust along a whirling path. For this reason, the side wall 4 could also have a different shape from the one shown in Figures 1 and 8.

[0038] The mixture of air, liquid and dust generated inside the tank 1 moves with a turbulent motion in the tank not because it is intercepted by the side wall 4 or by the guard means 31, which does not occur, but because even two flows of air and dust are conveyed into the tank that collide with one another. This enables effectiveness of dust elimination to be achieved that is greater than that of other vacuum cleaners of the prior art.

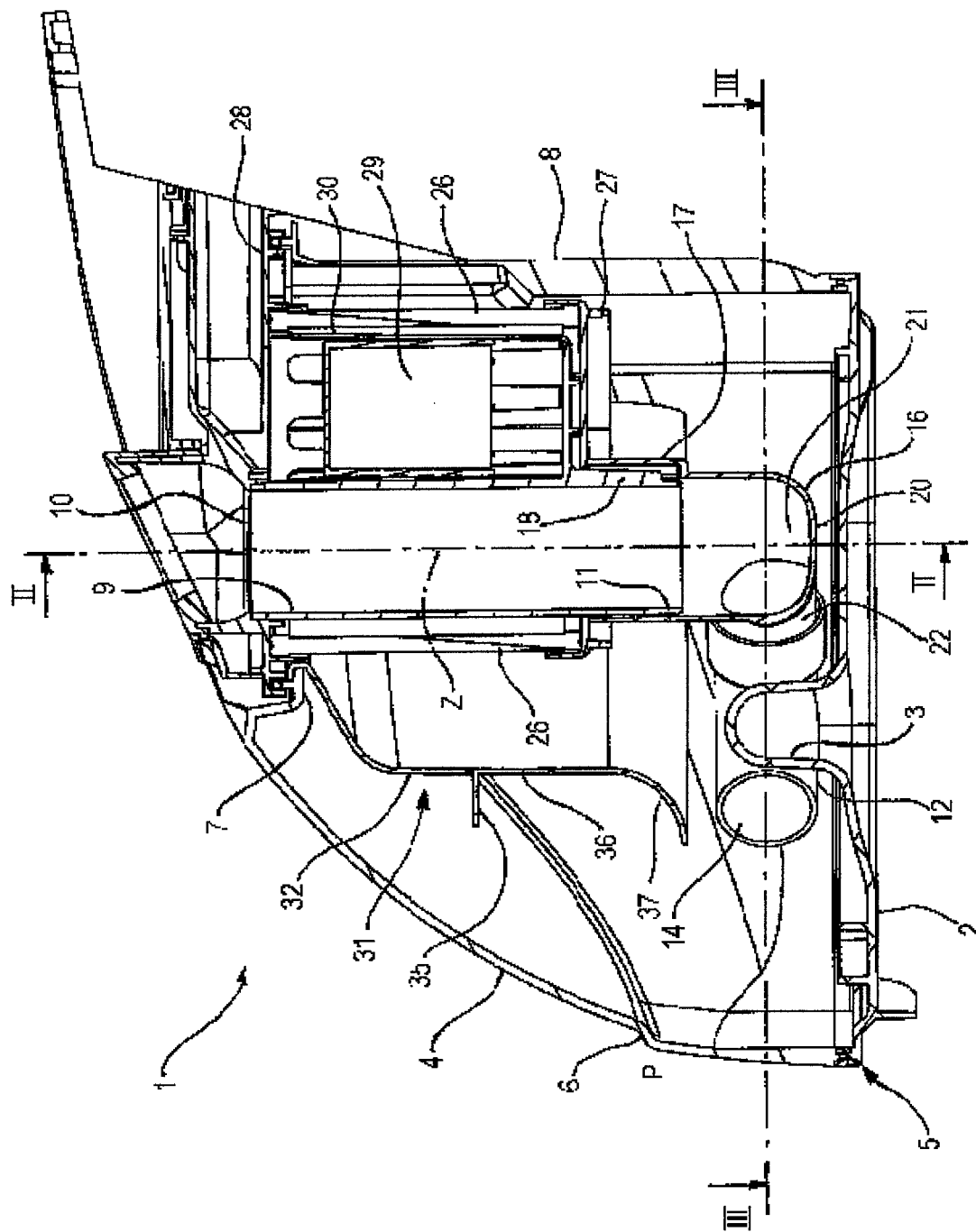
[0039] The previously disclosed vacuum cleaner can, if the user so wishes, also operate without water or another liquid inside the tank 1. In this case, the flow of air and dust sucked through the conduit 9 is not purified through the contact with the liquid contained in the tank 1, but interacts only with the filter 26, which enables the particles of dust to be retained.

Claims

1. Cleaning apparatus comprising a tank (1) suitable for containing a liquid (L), conduit means (9, 12, 13, 16) for conveying a flow of air and dust to said liquid (L), sucking means for extracting said air from said

- tank (1) after said dust has been absorbed into said liquid (L), **characterised in that** said conduit means (9, 12, 13, 16) comprises a first conduit (12) and a second conduit (13) converging on a region (R) of said tank (1) for conveying to said region (R) respectively a first flow and a second flow of air and dust, so that said first flow and said second flow collide together.
2. Apparatus according to claim 1, wherein said first conduit (12) and said second conduit (13) are provided with respective ends (14, 15) by means of which said first flow and said second flow can be delivered into said tank (1), said respective ends converging on a point (Q) of said region (R) arranged on a plane of symmetry (n) of said conduit means (9, 12, 13, 16).
 3. Apparatus according to claim 1 or 2, wherein said first conduit (12) and said second conduit (13) fork from an inlet conduit (9, 19) near a base wall (2) of said tank (1).
 4. Apparatus according to claim 3, wherein said first conduit (12) and said second conduit (13) extend laterally from said inlet conduit (9, 19) said inlet conduit (9, 19) being closed by a transverse wall (20) defining in said inlet conduit (9, 19) a zone (21) suitable for retaining detritus present in said flow.
 5. Apparatus according to claim 3 or 4, wherein said first conduit (12) and said second conduit (13) are substantially parallel to said base wall (2).
 6. Apparatus according to any one of claims 3 to 5, wherein said inlet conduit (9, 19) extends along a longitudinal axis (Z) substantially perpendicular to said base wall (2).
 7. Apparatus according to any one of claims 3 to 6, wherein said inlet conduit (9, 19) comprises an elongated conduit (9) and a joint (19) removably connected to said elongated conduit (9), said joint (19) comprising a first branch (22) and a second branch (23) suitable for removably receiving said first conduit (12) and said second conduit (13).
 8. Apparatus according to claim 7, wherein said first conduit (12) and said second conduit (13) have the same shape, so as to be able to be mounted indifferently on said first branch (22) or on said second branch (23).
 9. Apparatus according to any one of claims 3 to 8, wherein said tank (1) comprises a side wall (4) connected to said base wall (2) at a sharp edge (5).
 10. Apparatus according to claim 9, wherein on said side wall (4) there is obtained a step (6) to prevent a mixture of liquid (L), air and dust from moving tangentially to said side wall (4) in said tank (1).
 11. Apparatus according to any preceding claim, and furthermore comprising filtering means (26) for filtering said air leaving said tank (1) and guard means (31) of said filtering means (26), said guard means (31) comprising a wall (32) at least partially surrounding said filtering means (26) and deflecting means (35, 37) that protrudes from said wall (32) to deflect said liquid (L) far from said wall (32).
 12. Apparatus according to claim 11, wherein said deflecting means (35, 37) protrudes from a side of said wall (32) opposite a further side of said wall (32) facing said filtering means (26).
 13. Apparatus according to claim 11 or 12, wherein said deflecting means (35, 37) extends on a plane transverse to said wall (32).
 14. Apparatus according to claim 13, wherein said plane is substantially perpendicular to a portion (36) of said wall (32) from which said deflecting means (35, 37) protrudes.
 15. Apparatus according to any one of claims 11 to 14, wherein said deflecting means (35, 37) comprises a fin (35) protruding from said wall (32) along a significant angular extension of said wall (32).
 16. Apparatus according to claim 15, wherein said fin (35) has a "C" plan shape.
 17. Apparatus according to any one of claims 11 to 16, wherein said deflecting means (35, 37) comprises an edge (37) shaped in such a way that any drops of said liquid (L) sticking to said wall (32), by running down said edge (37), are moved away from said filtering means (26) in a radial direction.
 18. Apparatus according to claim 17, wherein said edge (37) is delimited by a curved profile so as to give said wall (32) a form such as a bell portion.
 19. Apparatus according to any one of claims 11 to 18, wherein said filtering means comprises a filter (26) made of a yarn in plastics.
 20. Apparatus according to claim 19, wherein said filter (26) is sleeve-shaped, said conduit means (9, 12, 13, 16) extending in said sleeve in a decentred position.
 21. Apparatus according to any preceding claim, wherein said first conduit (12) and said second conduit (13) each has a "C" plan shape.

22. Apparatus according to any preceding claim, wherein said first conduit (12) and said second conduit (13) each has a substantially constant cross section.
23. Apparatus according to any preceding claim, wherein said first conduit (12) and said second conduit (13) each has a substantially circular cross section.
24. Apparatus according to any preceding claim, wherein said first conduit (12) and said second conduit (13) are partially immersed in said liquid (L).
25. Cleaning apparatus comprising a tank (1) suitable for containing a liquid (L) and for receiving a flow of air and dust to be purified, filtering means (26) for filtering said air leaving said tank (1), guard means (31) of said filtering means (26), said guard means (31) comprising a wall (32) at least partially surrounding said filtering means (26), **characterised in that** said guard means (31) furthermore comprises deflecting means (35, 37) that protrudes from said wall (32) to deflect said liquid (L) away from said wall (32).
26. Apparatus according to claim 25, wherein said deflecting means (35, 37) protrudes from a side of said wall (32) opposite a further side of said wall (32) facing said filtering means (26).
27. Apparatus according to claim 25 or 26, wherein said deflecting means (35, 37) extends on a plane transverse to said wall (32).
28. Apparatus according to claim 27, wherein said plane is substantially perpendicular to a portion (36) of said wall (32) from which said deflecting means (35, 37) protrudes.
29. Apparatus according to any one of claims 25 to 28, wherein said deflecting means (35, 37) comprises a fin (35) protruding from said wall (32) along a significant angular extension of said wall (32).
30. Apparatus according to claim 29, wherein said fin (35) has a "C" plan shape.
31. Apparatus according to any one of claims 25 to 30, wherein said deflecting means (35, 37) comprises an edge (37) shaped in such a way that any drops of said liquid (L) adhering to said wall (32), sliding along said edge (37), are moved away from said filtering means (26) in a radial direction.
32. Apparatus according to claim 31, wherein said edge (37) is delimited by a curved profile so as to give to said wall (32) a shape like a bell portion.
33. Apparatus according to any one of claims 25 to 32, wherein said filtering means comprises a filter (26) made of a yarn in plastics.
34. Apparatus according to claim 33, wherein said filter (26) has a sleeve shape, said conduit means (9, 12, 13, 16) extending in said sleeve in a decentralised position.



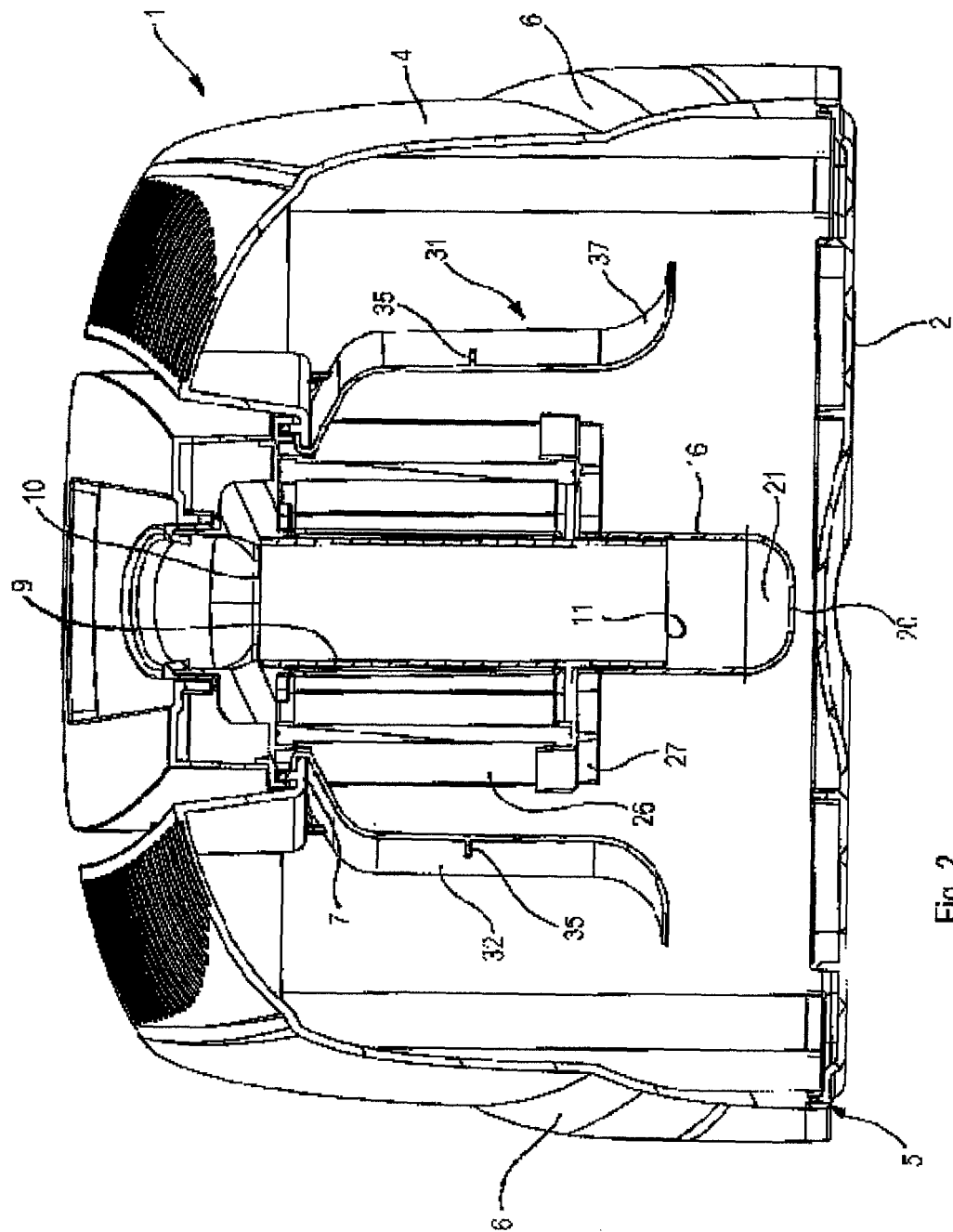


Fig. 2

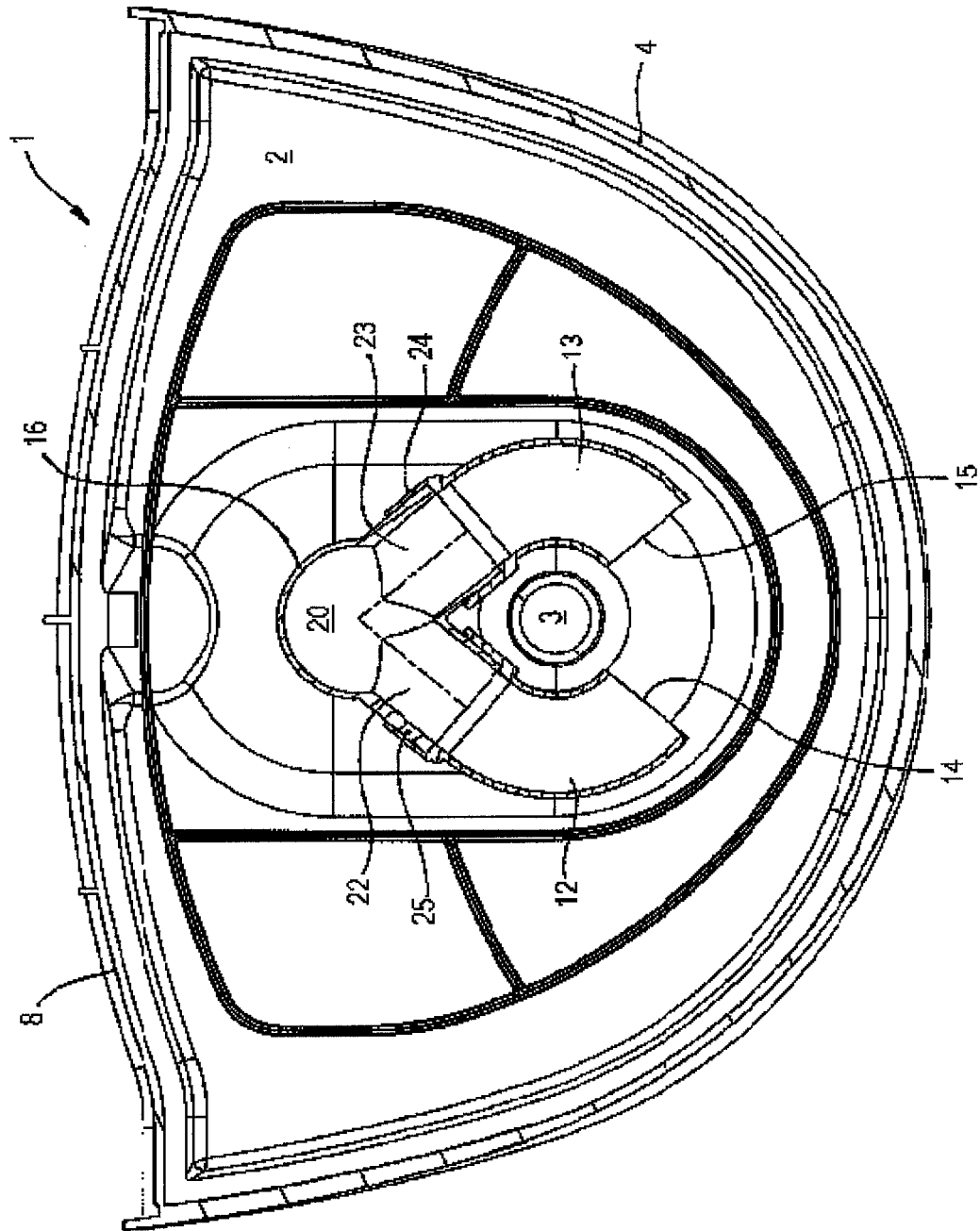
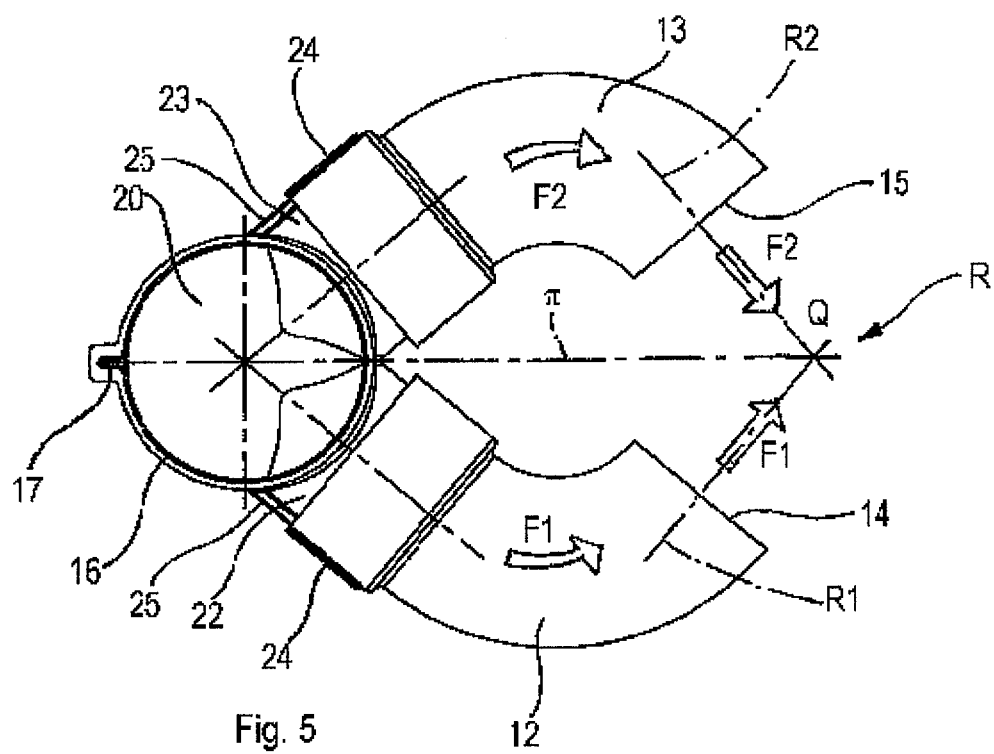
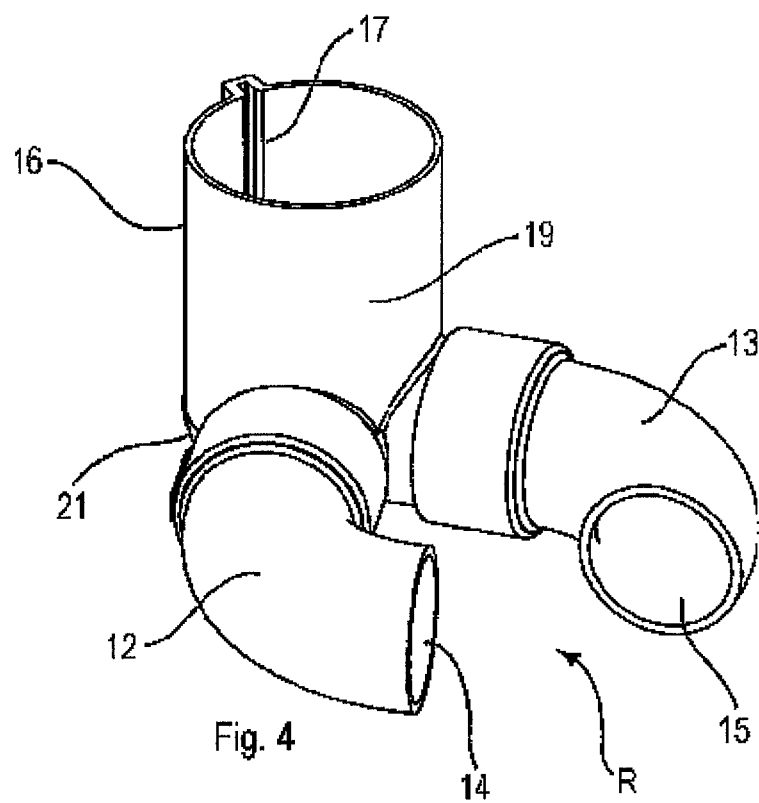


Fig. 3



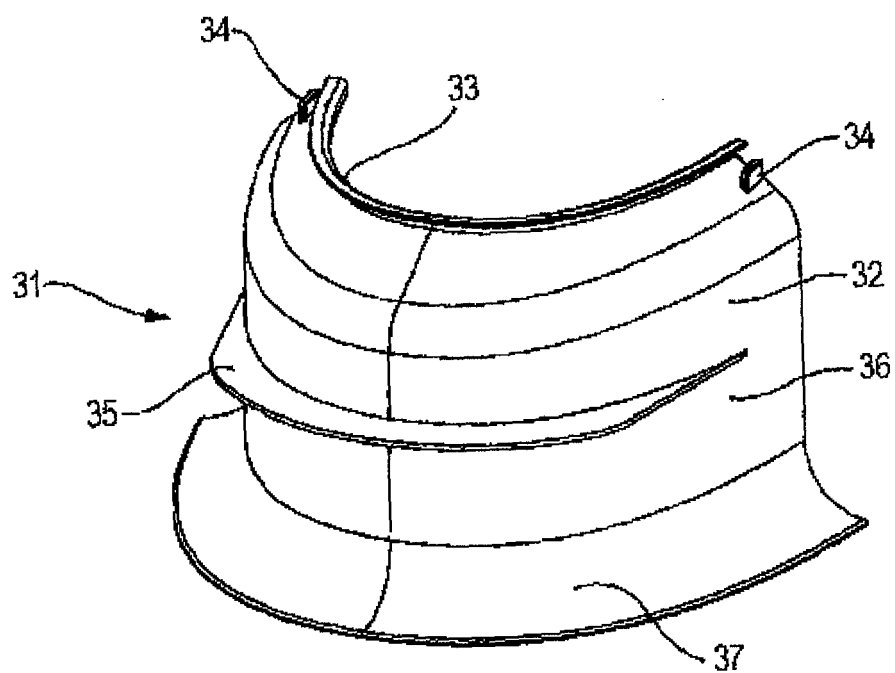


Fig. 6

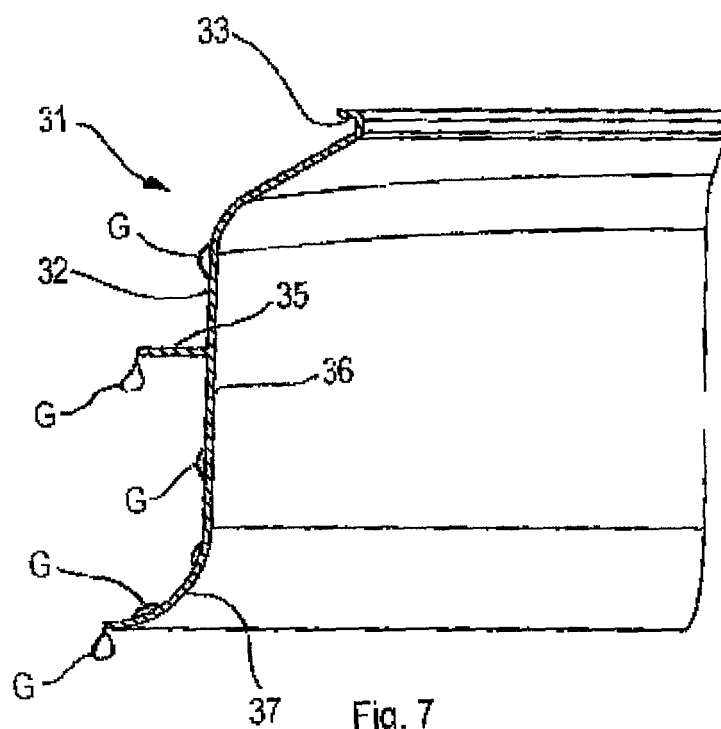


Fig. 7

