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(54) Circular vibratory finishing machine with automatic separation of the parts to be treated and of the finishing media

(57) The present invention relates a circular vibratory finishing machine (1) with automatic separation of the parts to be treated (3) and of the finishing media (4), comprising a circular tank body (2) for containing the parts to be treated (3) and the finishing media (4) and provided with a bottom (10) that has an extraction ramp (11) that can be engaged by an extraction flap (15) for conveying the mass being treated in the tank body (2) toward a grille (20) for separating the treated parts. The particularity of the invention consists in that it comprises, below the separation grille (20), an intermediate grille (30) is provided for selecting the finishing media (4) in order to convey the reusable finishing media (4) into the tank body (2) and the undersized finishing media (5) onto a lower surface (40) for outward evacuation.

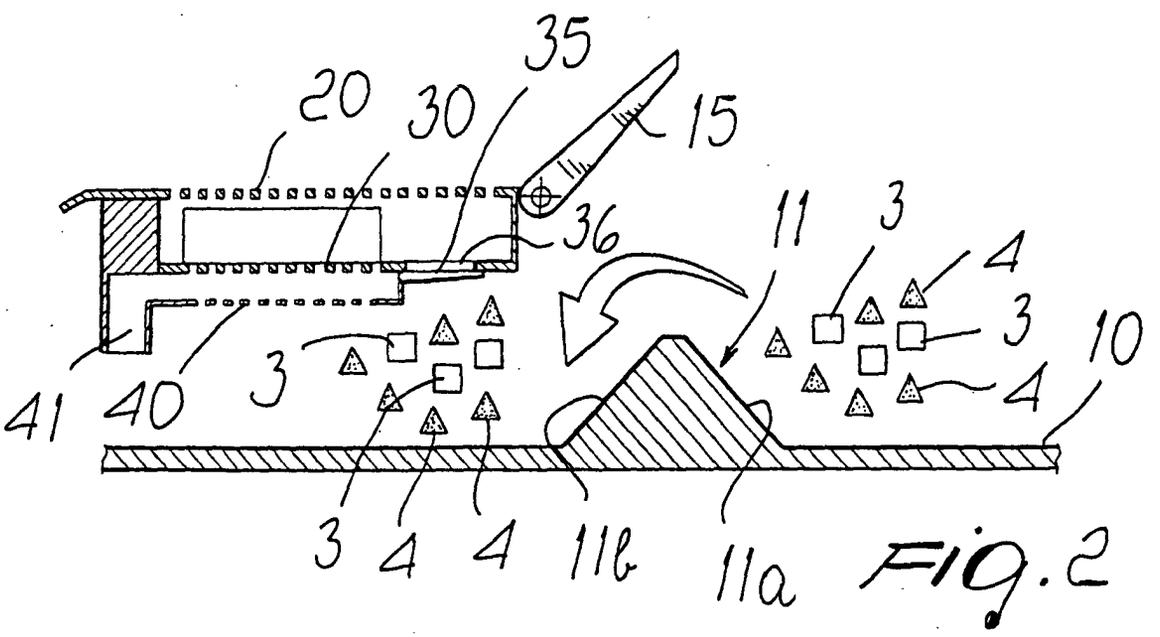


Fig. 2

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Description

[0001] The present invention relates to a circular vibratory finishing machine with automatic separation of the parts to be treated and of the finishing media.

[0002] As is known, circular vibratory finishing machines with automatic separation are usually constituted by a circular tank body into which the parts to be treated and the finishing media, which can be of the most disparate types, are introduced.

[0003] In known types of machine there is a system for automatic separation between the parts to be treated and the finishing media, which removes the treated parts and keeps the finishing media inside the tank.

[0004] Many vibratory finishing processes uses finishing media constituted by preformed plastic abrasive parts, whose wear over time produces small worn preformed parts that might jam in certain undercuts, through holes or dead holes of the part being treated and may also clog the discharge filters of the machine.

[0005] It is therefore necessary to be able to remove the undersized parts; in the solutions of the known art, this can be achieved substantially by removing the finishing media from the tank body and then performing separation outside the tank.

[0006] Some solutions that have attempted to achieve separation of the undersized parts inside the tank have not proved to be valid, since the separation performed was found to be entirely insufficient and furthermore entailed difficulties in the correct handling of the mass constituted by the parts being treated and by the finishing media inside the tank.

[0007] Other known problems that have been observed with machines of the known art refer to the difficulties in washing the parts due to the insufficient functionality and effectiveness of the washing systems, which typically have an opening for discharging the process waste which is located at the bottom of the tank and an optional waste removal door, which expels the undersized finishing media but has an extremely limited active surface, so that in practice these solutions have not been successful.

[0008] Substantially, in the machines of the known art it is always necessary to use a total discharge opening, which completely discharges the finishing media for their possible replacement.

[0009] The aim of the invention is to eliminate the drawbacks noted above, by providing a circular vibratory finishing machine with automatic separation of the parts to be treated and of the finishing media that allows first of all to select the finishing media during the normal working cycle of the machine, without therefore having to fully remove the finishing media from the machine.

[0010] Within the scope of this aim, an object of the invention is to provide a machine in which it is possible to remove the fragments and chips produced by the wear of the finishing media and by the burr of the parts being treated, thus allowing easier management of the process with removal of these minute parts, which are troublesome because they can clog the filters.

[0011] Another object of the present invention is to provide a circular machine in which it is possible to use an innovative washing system that allows to use large filtration regions.

[0012] Another object of the present invention is to provide a circular vibratory finishing machine that thanks to its particular constructive characteristics is capable of giving the greatest assurances of reliability and safety in use.

[0013] This aim and these and other objects that will become better apparent hereinafter are achieved by a circular vibratory finishing machine with automatic separation of the parts to be treated and of the finishing media, comprising a circular tank body for containing the parts to be treated and the finishing media and provided with a bottom that has an extraction ramp that can be engaged by an extraction flap for conveying the mass being treated in said tank body toward a grille for separating the treated parts, characterized in that it comprises, below said separation grille, an intermediate grille for selecting the finishing media in order to convey the reusable finishing media into said tank body and the undersized finishing media onto a lower surface for outward evacuation.

[0014] Further characteristics and advantages will become apparent from the description of a preferred but not exclusive embodiment of a circular vibratory finishing machine with automatic separation of the parts to be treated and of the finishing media, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a schematic top plan view of the circular machine according to the invention;
Figure 2 is a diagram of the operation of the machine during the normal treatment steps;
Figure 3 is a diagram of the machine during the step for extracting the treated parts and for controlling the flow of the finishing media;
Figure 4 is a diagram of the operation of the machine during the step for separating and evacuating the undersized finishing media;
Figure 5 is a diagram of the washing elements of the machine according to the invention;
Figure 6 is a schematic view of the circular machine during a step of washing by flotation;
Figure 7 is a view of the circular machine during the final step of drying, after washing, the parts being treated.

[0015] With reference to the figures, the circular vibratory finishing machine with automatic separation of the parts to be treated and of the finishing media according to the invention, generally designated by the reference numeral 1, comprises a circular tank body 2, inside which the parts to be treated, designated by the refer-

ence numeral 3, are arranged; in the drawing, said parts are constituted symbolically by squares. The finishing media, designated by the reference numeral 4 and constituted symbolically by triangles, are introduced together with the parts to be treated.

[0016] A cavity is formed inside the tank body 2 and is provided with an annular bottom 10, which typically has, in a central portion, an extraction ramp 11, which has an ascending portion 11a followed by a descending portion 11b. An extraction flap 15 acts at the vertex and can be actuated manually or automatically in order to convey the mass being treated inside the tank body 2 toward a separation grille 20, which conveys the treated parts outward and simultaneously separates the finishing media.

[0017] An important particularity of the invention consists in that below the grille for separating the treated parts there is an intermediate grille 30, which substantially lies over a long extent below the separation grille; the grille 30 is adapted to separate the finishing media 4 that can still be reused from the undersized finishing media, which are designated by the reference numeral 5 and shown as small triangles in the schematic drawings.

[0018] The intermediate grille 30 conveys the reusable finishing media 4 back toward the inside of the tank 2, in practice returning them immediately to the process, while the undersized finishing media 5 and any chips or residues of the treatment are deposited on a lower evacuation surface 40, which is connected to an evacuation duct 41 that conveys outward the worn-out finishing media and any other smaller element.

[0019] It should be noted that it has been found experimentally that placing all the reusable finishing media onto the separation grille can cause, during the initial discharge steps, a decrease of the propelling force on the material to be fed onto the ramp 11, since an excessive quantity of mass is extracted which, by falling at a certain distance from the ramp, can form a barrier that prevents the correct movement of the parts.

[0020] In order to overcome this problem, in the initial portion of the intermediate grille, which corresponds to the initial portion of the separation grille, there is a flow control flap 35, which can be arranged in an open position, in which it leaves open a passage 36, which causes part of the finishing media to fall directly back into the tank, so that only a fraction of the finishing media is placed on the intermediate grille during the steps of the discharge of the parts.

[0021] When instead one wishes to select the finishing media, the flow control flap 35 is arranged in the position for closing the passage 36, so that all the finishing media are conveyed onto the intermediate grille, which separates the undersized finishing media.

[0022] Another important aspect of the invention consists in that washing means are provided which, in addition to the conventional sprinklers 50 arranged in the upper part of the tank, have a lower opening 51 that allows to introduce the washing water from below, so as to produce in practice a flotation of the particles, which exit through the lower evacuation surface 40, which is advantageously provided by means of a fine-mesh grille.

[0023] The presence of the lower opening is particularly important, since by introducing the washing fluid from below it allows to provide flotation with a large filtering surface when external overflow occurs.

[0024] The step of rinsing by flotation allows to remove rapidly foam and low-density impurities, which are made to overflow over the evacuation surface, which in practice acts as an overflow element; furthermore, complete cleaning of the grille is also achieved in this step.

[0025] A pump that acts by suction instead of by pressure can be applied at the opening 51 in order to rapidly discharge the tank, thus providing a step for the forced aspiration of liquids that produces the rapid emptying of the tank.

[0026] In an upward region, there is a cover 60, which is covered so as to be noise-deadening and is provided with an inlet 61 which allows not only to introduce water or air but also to introduce any acids or media elements required for the treatment.

[0027] The system is completed by an auxiliary opening, designated by the reference numeral 55, which allows to perform filtration and normal exit of the water.

[0028] From the inlet 61 it is further possible to perform drying by means of hot air, which can be combined or not with the step for the lower aspiration of liquids and air.

[0029] From the above description it is thus evident that the invention achieves the intended aim and objects, and in particular the fact is stressed that a circular vibratory finishing machine is provided which is totally innovative, since it allows to perform directly in the machine the separation of the finishing media in order to expel the undersized elements and also allows to perform the washing steps by utilizing the introduction of the washing liquid from below in order to provide substantially a flotation that allows the evacuation of sludge or deposits, utilizing for this a large filtering region that is provided by the lower surface for outward evacuation of the undersized finishing media.

[0030] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0031] All the details may further be replaced with other technically equivalent elements.

[0032] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements.

[0033] The disclosures in Italian Patent Application No. MI2002A000826 from which this application claims priority are incorporated herein by reference.

[0034] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of in-

creasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A circular vibratory finishing machine with automatic separation of the parts to be treated and of the finishing media, comprising a circular tank body for containing the parts to be treated and the finishing media and provided with a bottom having an extraction ramp that can be engaged by an extraction flap for conveying the mass being treated in said tank body toward a grille for separating the treated parts, **characterized in that** it comprises, below said separation grille, an intermediate grille for selecting the finishing media in order to convey the reusable finishing media into said tank body and the undersized finishing media onto a lower surface for outward evacuation.

2. The machine according to claim 1, **characterized in that** said intermediate grille lies below said separation grille substantially along the entire portion of said separation grille that is located inside said tank body.

3. The machine according to the preceding claims, **characterized in that** it comprises an evacuation duct on said lower evacuation surface.

4. The machine according to one or more of the preceding claims, **characterized in that** it comprises, at the initial portion of said intermediate grille, a flow control flap, which can be arranged in an open position, in which it frees a passage for the fall of at least part of the finishing media back into said tank, and in a closed position, in which all the finishing media are conveyed onto said intermediate grille.

5. The machine according to one or more of the preceding claims, **characterized in that** said evacuation surface is constituted by a fine-mesh grille.

6. The machine according to one or more of the preceding claims, **characterized in that** it comprises, at said bottom, a lower opening for introducing washing water from below into said tank, exiting at said evacuation duct.

7. The machine according to one or more of the preceding claims, **characterized in that** the introduction of washing water from said lower opening is adapted to produce a flotation inside said tank body.

8. The machine according to one or more of the preceding claims, **characterized in that** said lower evacuation surface is adapted to provide a surface that performs filtering toward the outside.

9. The machine according to one or more of the preceding claims, **characterized in that** it comprises means for aspirating liquids, which can be associated with said lower opening for the rapid discharge of the liquid contained in said tank.

10. The machine according to one or more of the preceding claims, **characterized in that** it comprises a cover that is provided with an inlet for introducing water and air and the media required for the treatment.

11. The machine according to one or more of the preceding claims, **characterized in that** it comprises means for introducing hot air through said inlet.

12. The machine according to one or more of the preceding claims, **characterized in that** it comprises, at the bottom of said tank, an auxiliary opening with a filtering element for gravity discharge.

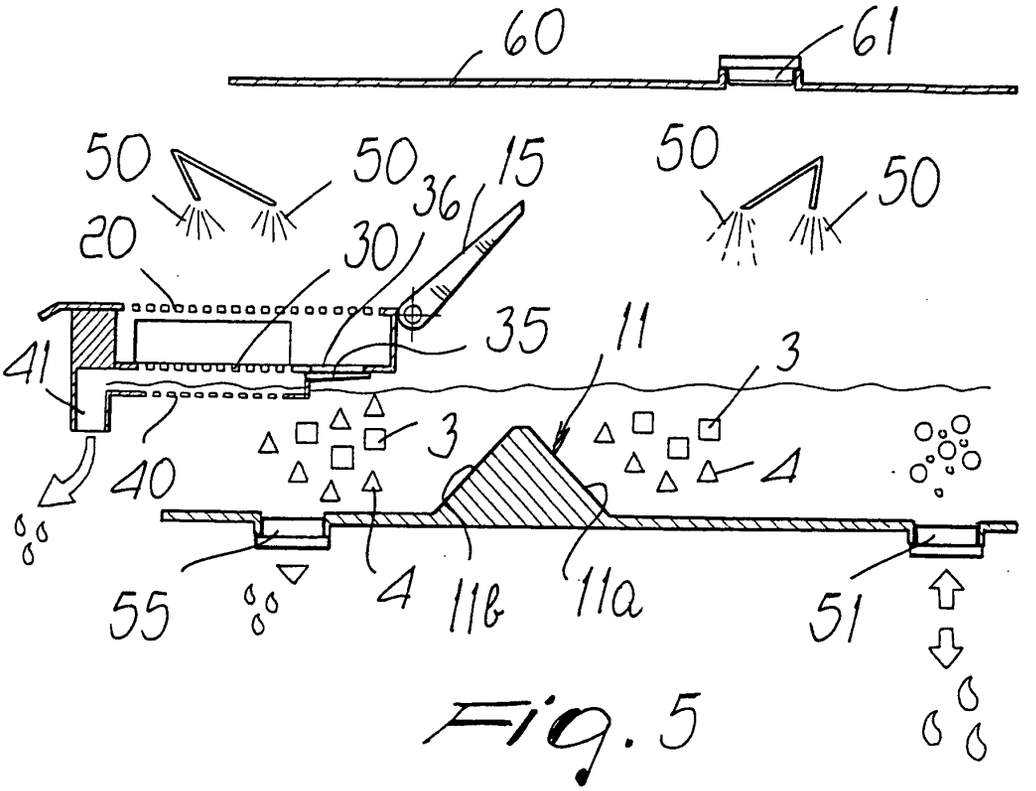

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Fig. 5

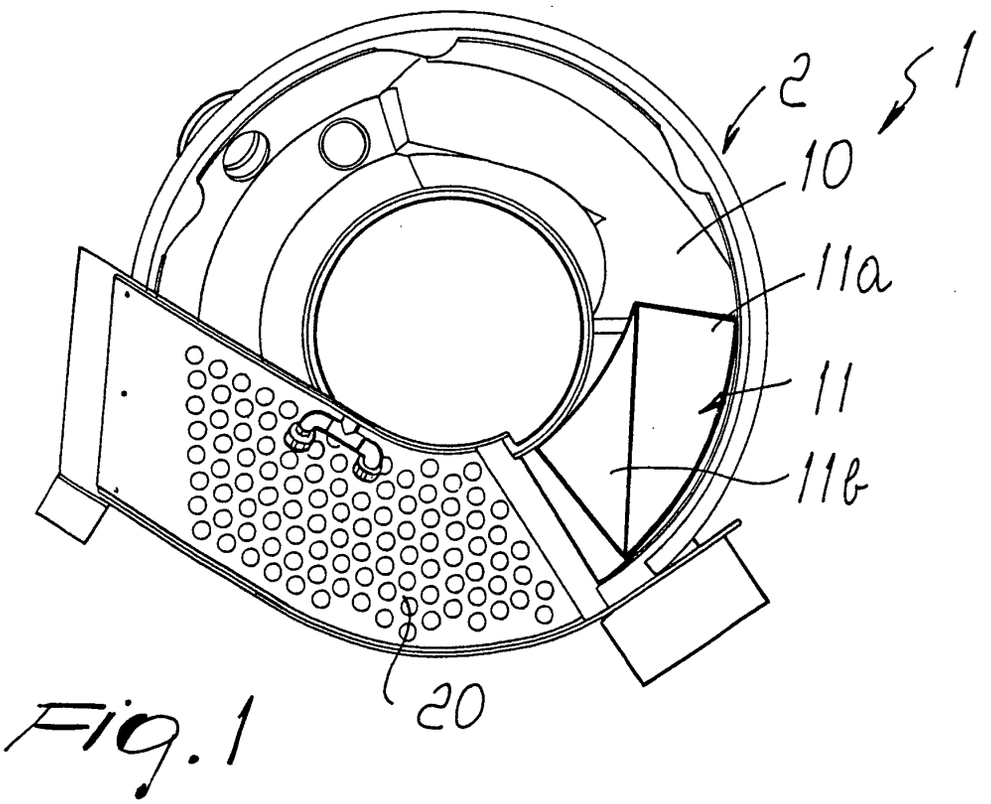

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Fig. 1

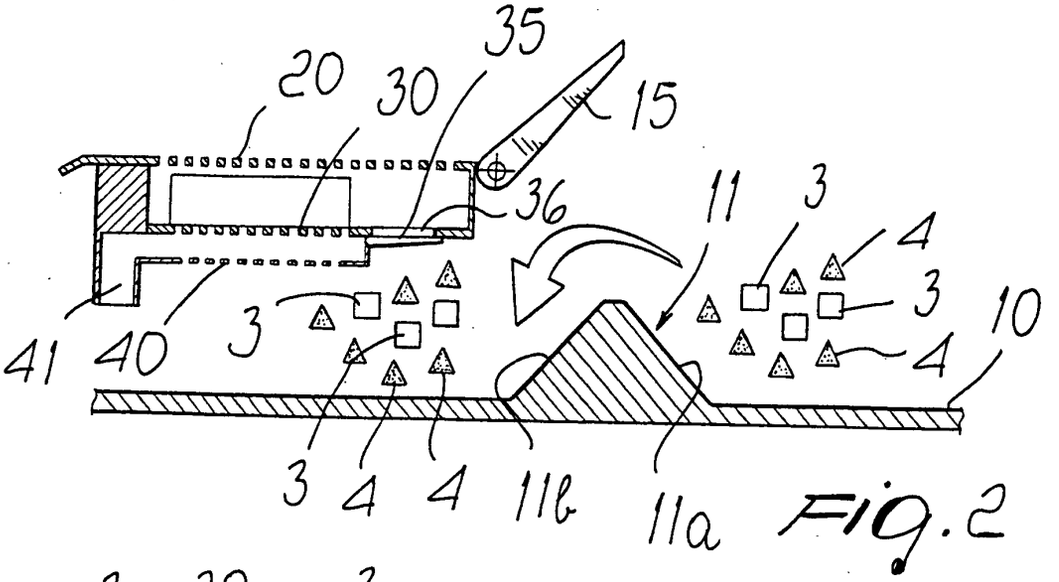


Fig. 2

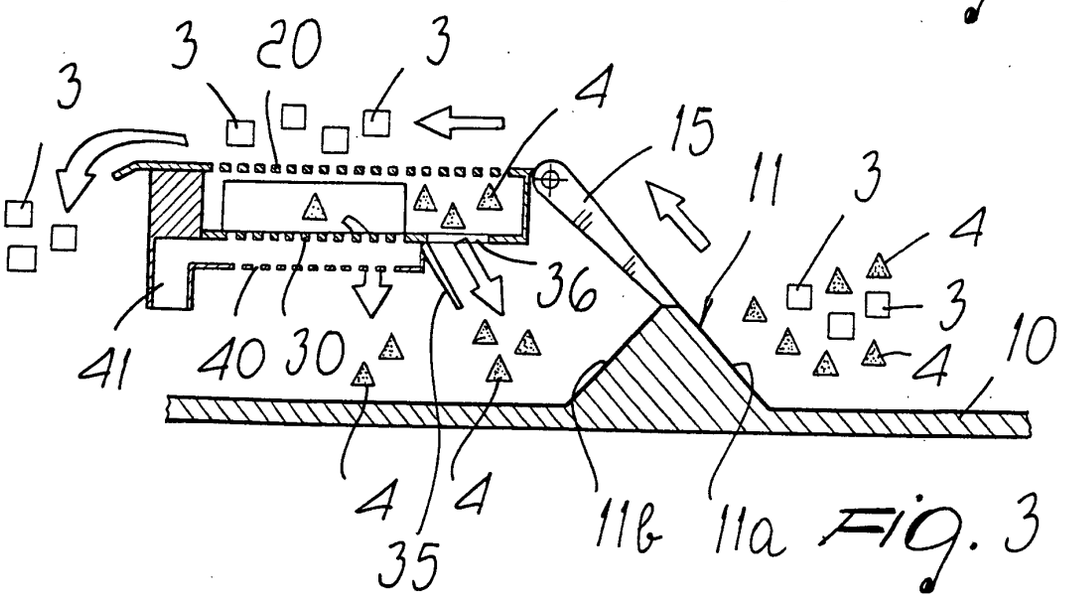


Fig. 3

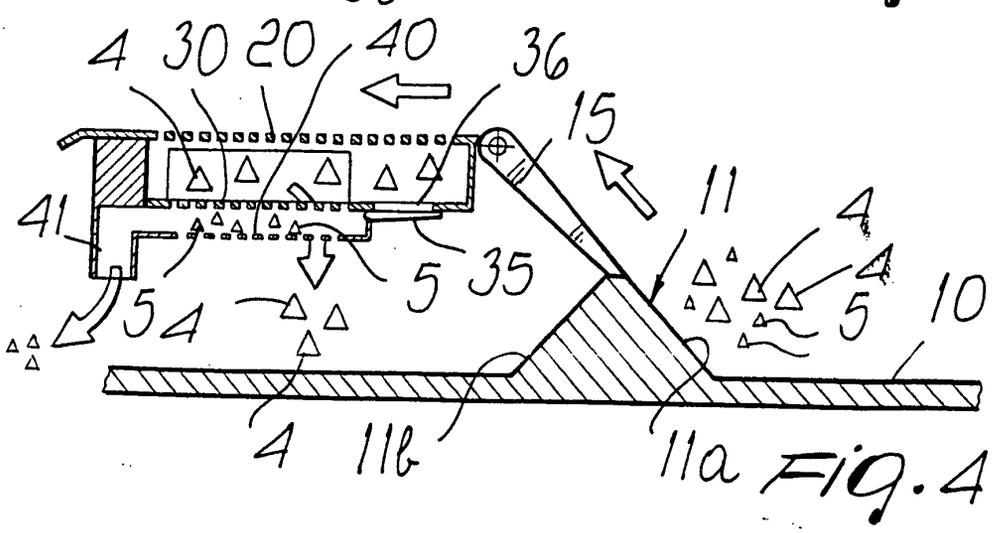


Fig. 4

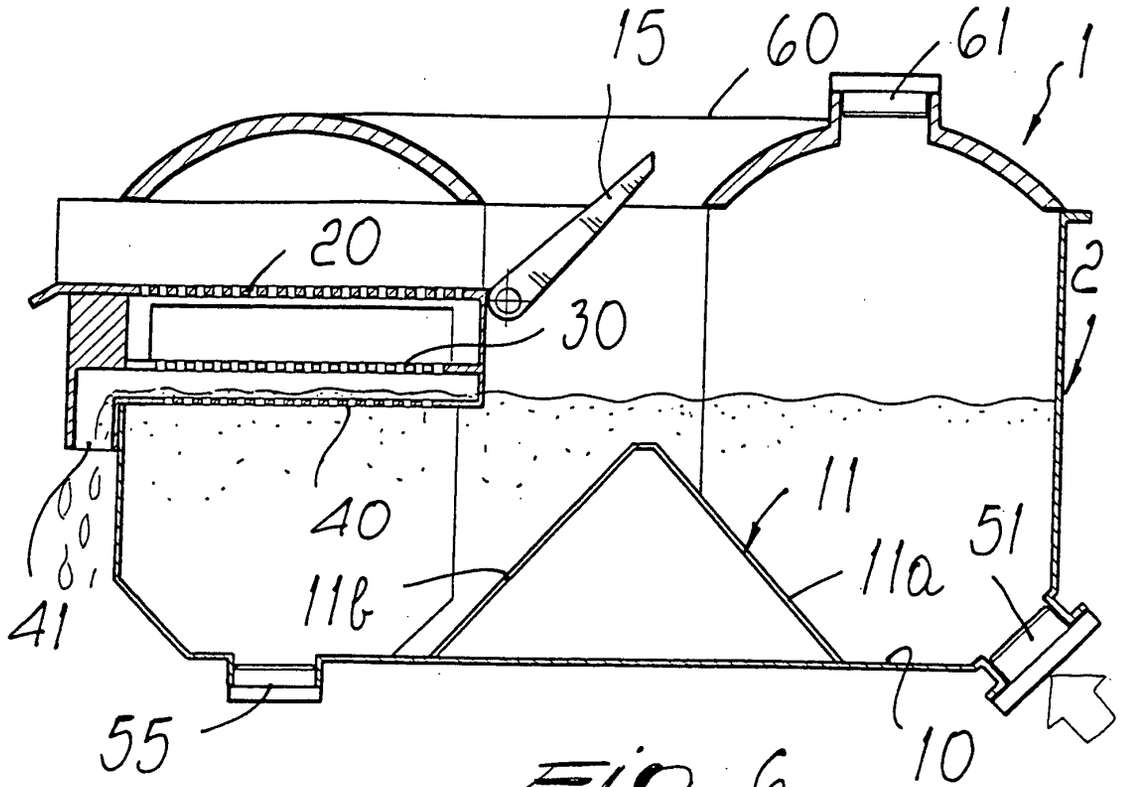

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Fig. 6

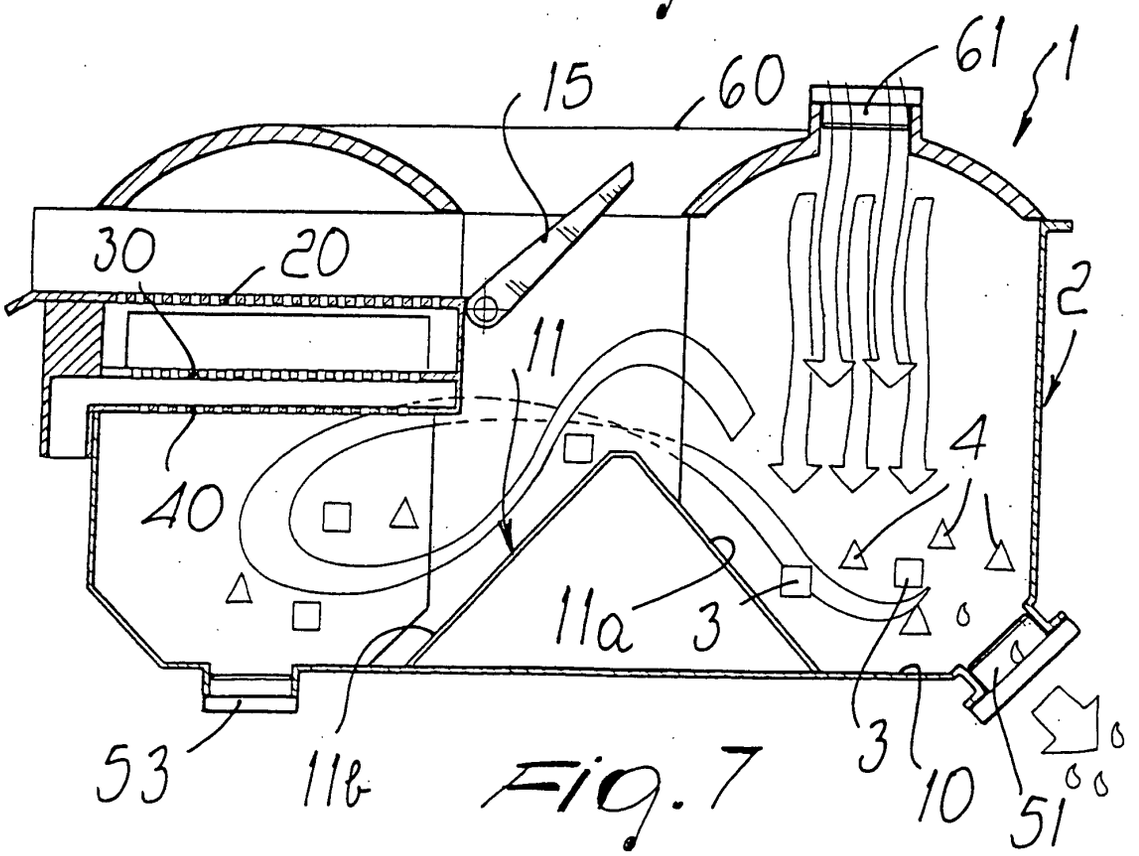

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Fig. 7