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(54) **CONCRETE DISTRIBUTION APPARATUS**

(57) Distribution apparatus (10) for distributing concrete, which comprises a containing compartment (11) to contain the concrete and, inside it, a washing device (21).

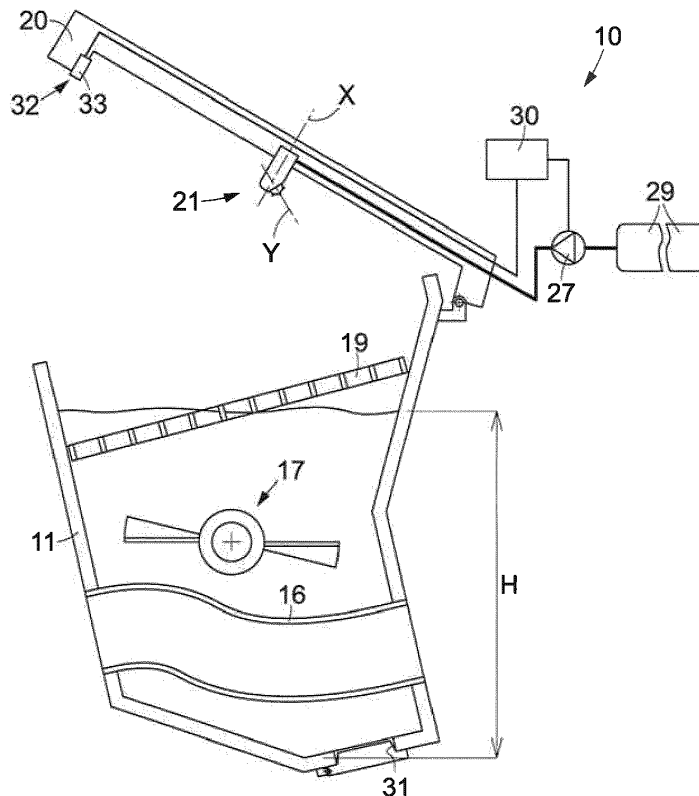


fig. 3

Description

FIELD OF THE INVENTION

[0001] The present invention concerns an apparatus for distributing concrete, which can be installed, for example but not exclusively, in an apparatus for pumping concrete from a containing compartment or tank to a distribution pipe.

BACKGROUND OF THE INVENTION

[0002] Known apparatuses for distributing concrete comprise a containing compartment usually having the form of a hopper with a rectangular base and located in a rear zone of a pumping unit, normally installed in a heavy vehicle. The concrete coming from a concrete mixer or truck mixer is poured into and mixed in the containing compartment.

[0003] Generally, the containing compartment is provided with a covering member suitable to cover the containing compartment, to prevent any concrete from escaping and, at the same time, any foreign bodies from entering.

[0004] Furthermore, there are also mechanical parts in the containing compartment, such as an exchange valve, known to persons of skill in the art as an "S valve", and a paddle mixer, which are in motion during the pumping of the concrete. To protect the operator during the work steps, the containing compartment is provided with a grid positioned at a certain distance from the moving mechanical parts. During the work step, the level line of the concrete partly covers the grid.

[0005] At the end of each work cycle, ordinary cleaning operations are normally carried out, which include washing the containing compartment where the concrete has been poured, using washing devices or systems. This operation is essential to prevent the deposited concrete from solidifying, risking compromising the operation of the entire apparatus.

[0006] However, these apparatuses have the disadvantage that the washing operation, as well as being an inconvenient and unsafe procedure, requires a lot of time and suitable personnel to perform it, usually using a lance with a high-pressure water jet.

[0007] Document JP2001171420A describes an apparatus that comprises a washing device that allows to clean the internal walls of the containing compartment. In particular, the washing device is attached to a suitable lid which is configured to be positioned on the containing compartment, which does not have one. The device is provided with nozzles and, rotating, it allows the jet of water delivered by the latter to be projected onto the internal walls of the containing compartment.

[0008] Document JPH0675707U describes an apparatus that comprises a washing device disposed above the containing compartment and associated with the closing lid of the latter, in which the device substantially

consists of a pipe provided with nozzles, or alternatively holes.

[0009] Document WO2014/191766A1 describes an apparatus that comprises a system for recovering concrete residues, provided with one or more nozzles disposed in different washing points.

[0010] Document JPS55107307U describes an apparatus that comprises a washing system integrated in a mixing shaft inside a containing compartment. The washing system provides a plurality of nozzles, or alternatively holes, disposed radially on the mixing shaft, to deliver water at high pressure. In particular, the water is delivered when the mixing shaft is made to rotate.

[0011] There is therefore a need to provide an apparatus for distributing concrete that can overcome the above disadvantage of the state of the art by simplifying and shortening the times of the washing operation.

[0012] To do this, it is necessary to solve the technical problem of automating the step of washing the containing compartment, without compromising the other functions of both the compartment and also the mechanical members inserted in it.

[0013] Therefore, one purpose of the present invention is to provide an apparatus for distributing concrete in which it is possible to facilitate and automate the cleaning operations of the containing compartment, avoiding the manual intervention of an operator and/or limiting it to a minimum.

[0014] Another purpose of the present invention is to carry out these cleaning operations in a safe, simple, reliable, functional and inexpensive way.

[0015] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0016] The present invention is set forth and characterized in the independent claim. The dependent claims describe other characteristics of the present invention or variants to the main inventive idea.

[0017] In accordance with the above purposes and in order to resolve the technical problem disclosed above in a new and original way, a distribution apparatus for distributing concrete, according to the present invention, comprises a containing compartment to contain the concrete, which is provided with a covering member capable of assuming a closed position to completely close the containing compartment, and an open position to allow access to the containing compartment from above.

[0018] We must clarify that, in the present description and in the attached claims, the term concrete has to be understood as any composition of aggregates, such as for example sand, gravel, crushed stone or similar materials, bonded together by cement and water, or any other cement-based artificial stone conglomerate.

[0019] In accordance with one aspect of the present

invention, the containing compartment comprises inside it a washing device which is associated with the covering member. Furthermore, the washing device comprises detection means configured to detect the open or closed position of the covering member.

[0020] The presence of a specific device dedicated to washing the containing compartment determines the advantage of being able to carry out this operation in an automated manner, for example at the end of a concrete pumping cycle, instead of doing it manually, with all the consequent advantages in terms of cost reduction, to the benefit of operators' safety. Furthermore, this has the advantage of not requiring interventions on the actual containing part of the containing compartment, in which the various mechanical members are disposed and into which, during pumping operations, the concrete is also poured.

[0021] In accordance with another aspect of the present invention, the detection means are mounted on the covering member.

[0022] In accordance with another aspect of the present invention, the detection means are operatively connected to a control unit and they are configured to send to the latter an enabling signal indicative that the covering member is in the closed position. The control unit is programmed to activate the washing device only after having received the enabling signal.

[0023] In accordance with another aspect of the present invention, the detection means are configured to send to the control unit an interruption signal indicative that, during a washing step, the covering member is in the open position. The control unit is programmed to deactivate the washing device after receiving the interruption signal.

[0024] In accordance with another aspect of the present invention, the washing device comprises one or more fixed and/or rotating members provided with one or more nozzles that deliver a washing fluid.

[0025] In accordance with another aspect of the present invention, each of the rotating members comprises a base body mounted on the covering member, a first rotating part mounted rotatable with respect to the base body about a first axis of the latter, and a second rotating part mounted rotatable with respect to the first rotating part and configured to rotate about a second axis that is inclined by an angle comprised between about 30° and about 90° with respect to the first axis.

[0026] In accordance with another aspect of the present invention, the nozzles are positioned on the second rotating part, and they are configured to make both the first rotating part and also the second rotating part rotate by means of the reaction force of the jet of the washing fluid, in order to completely remove the residual concrete present both on the internal walls of the containing compartment and also on the mechanical members present therein.

[0027] In accordance with another aspect of the present invention, the distribution apparatus also com-

prises pumping means configured to pump the washing fluid toward the washing device, and the control unit is configured to also command the pumping means.

[0028] In accordance with another aspect of the present invention, the containing compartment comprises, in a lower part thereof, a drainage aperture to make the washing fluid flow downward.

[0029] In accordance with another aspect of the present invention, a covering member for a concrete distribution apparatus is provided with a containing compartment to contain the concrete, wherein the covering member comprises, mounted thereon, one or more nozzles of a washing device and detection means configured to detect whether the covering member is in an open or closed position with respect to the containing compartment.

DESCRIPTION OF THE DRAWINGS

[0030] These and other aspects, characteristics and advantages of the present invention will become apparent from the following description of some embodiments, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a perspective and schematic view of a distribution apparatus for distributing concrete according to the present invention, installed on a vehicle;
- fig. 2 is a partly sectioned and schematized lateral view of the distribution apparatus of fig. 1, in a first operating position;
- fig. 3 is a partly sectioned and schematized lateral view of the distribution apparatus of fig. 1, in a second operating position;
- fig. 4 is a lateral view, on an enlarged scale, of a detail of the distribution apparatus of fig. 1.

[0031] We must clarify that in the present description the phraseology and terminology used, such as for example the terms horizontal, vertical, front, rear, upper, lower, internal and external, with their declinations, have the sole function of better illustrating the present invention with reference to the attached drawings and must not be in any way used to limit the scope of the invention itself, or the field of protection defined by the attached claims.

[0032] Furthermore, the people of skill in the art will recognize that certain sizes or characteristics in the drawings may have been enlarged, deformed, or shown in an unconventional or non-proportional way in order to provide a version of the present invention that is easier to understand. When sizes and/or values are specified in the following description, the sizes and/or values are provided for illustrative purposes only and must not be construed as limiting the scope of protection of the present invention, unless such sizes and/or values are present in the attached claims.

[0033] To facilitate comprehension, the same refer-

ence numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one embodiment can be conveniently combined or incorporated into other embodiments without further clarifications.

DESCRIPTION OF SOME EMBODIMENTS OF THE PRESENT INVENTION

[0034] With reference to fig. 1, a distribution apparatus 10, according to the present invention, for distributing concrete, comprises a containing compartment 11 to contain concrete, or other similar material, and which has the shape of a tub, or a hopper, with a rectangular base.

[0035] The containing compartment 11 is located in a rear zone of a pumping unit 12, installed on a bearing structure 13 which, for example, can be the frame of a vehicle 15, such as a heavy truck, but it is not limited thereto.

[0036] Inside the containing compartment 11, which can have, for example, a capacity of about 550 liters, there are disposed both an exchange valve, or S-shaped valve, 16 (figs. 2 and 3), of a known type, and a paddle mixer device 17 for mixing the concrete, and also a protection grid 19 disposed above them.

[0037] On an upper part of the containing compartment 11 there is hinged a covering member 20, which acts as a lid and which is mobile, manually or in an automated manner, between a closed position, shown in fig. 2, and an open position, shown in fig. 3.

[0038] In accordance with one aspect of the present invention, the containing compartment 11 comprises a washing device 21 inside it.

[0039] In particular, in one embodiment, the washing device 21 is installed in the covering member 20, preferably in a central zone thereof.

[0040] The washing device 21 (fig. 4) comprises a base body 22, which is mounted in the internal part of the covering member 20 and has a longitudinal axis X of its own, a first rotating part 23 mounted rotatable with respect to the base body 22 about the longitudinal axis X, and a second rotating part 24 mounted rotatable with respect to the first rotating part 23 about a second axis Y, which is inclined by an angle, preferably comprised between about 30° and about 90°, with respect to the longitudinal axis X.

[0041] On the second rotating part 24 there are attached one or more nozzles 26, each configured to emit a jet of a washing fluid, for example water, possibly mixed with other washing substances. Furthermore, the nozzles 26 are positioned in such a way that the reaction force of their jet makes both the first rotating part 23 and also the second rotating part 24 rotate.

[0042] In the example described here, a single central nozzle 26, identified with the reference number 26a (fig. 4), is suitable to make the first rotating part 23 rotate, while the other four nozzles 26 are configured to make the second rotating part 24 rotate. In this way, the jets of

the washing fluid are directed in all directions inside the containing compartment 11, and the complete removal of the residual concrete is carried out, both from the internal walls of the containing compartment 11 and also from the mechanical parts present inside it.

[0043] As schematically shown in figs. 2 and 3, the washing device 21 is connected to a pump 27 which sucks the washing fluid from a tank 29 and takes it to a pressure such as to guarantee the correct operation of the washing device 21, which can be for example up to about 150 bar.

[0044] The pump 27 is controlled by a control unit 30 which allows an operator to start or end the washing step and possibly carry out other operations, such as for example a setting, or other adjustments, on the control unit 30 itself and therefore on the operation of the distribution apparatus 10 and, in particular, of the washing device 21.

[0045] The washing step can take place, for example, at the end of a pumping step, during which the containing compartment 11 is emptied of the concrete present inside it.

[0046] For example, the washing step can last for a few minutes and use about 70 liters of washing fluid.

[0047] The containing compartment 11 is usually filled with concrete up to a height H (figs. 2 and 3) from the base of the containing compartment 11, that is, up to the grid 19, or slightly above it.

[0048] In accordance with other embodiments of the present invention, not shown in the drawings, one or more washing members 27 could be positioned in any position whatsoever, even above the height H, in order to guarantee a high efficiency and durability of the washing devices 21.

[0049] The containing compartment 11 comprises, in its lower part, a drainage aperture 31 to make the washing fluid used and the washed concrete flow downward, for example on an external pipe, not shown in the drawings.

[0050] The washing device 21 comprises detection means 32 which are configured to detect the open or closed position of the covering member 20, and which comprise at least one sensor 33.

[0051] The detection means 32 can be operatively associated with the containing compartment 11. Furthermore, the detection means 32 are operatively connected to the control unit 30, for example, in wireless mode.

[0052] In particular, the sensor 33 is mounted on the covering member 20 and it is configured to detect whether the covering member 20 is in a closed position (fig. 2), in which it completely closes the containing compartment 11, or in an open position (fig. 3). The sensor 33 is configured to send an enabling signal to the control unit 30 only when the covering member 20 is in its closed position.

[0053] In fact, the washing step can only start when the covering member 20 is closed.

[0054] Specifically, if the covering member 20 were in the open position, or it were to open, even accidentally (fig. 3), the sensor 33 is configured to send an interruption

signal to the control unit 30 in order to interrupt the washing step immediately, so as not to spray washing fluid outside the containing compartment, for example toward an operator.

[0055] Advantageously, at the end of each concrete pumping operation, the step of washing the containing compartment 11 can be immediately started by using the control unit 30, and this washing step can therefore occur automatically, in a simple, safe and reliable manner, preventing the solidification of the concrete on the internal walls of the containing compartment 11 and/or on the mechanical members present inside it.

[0056] It is clear that modifications and/or additions of parts may be made to the distribution apparatus 10 as described heretofore, without departing from the field and scope of the present invention as defined by the claims.

[0057] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of distribution apparatuses, all coming within the scope of the present invention.

[0058] In the following claims, the sole purpose of the references in brackets is to facilitate reading and they must not be considered as restrictive factors with regard to the field of protection defined by the claims.

Claims

1. Concrete distribution apparatus (10), comprising a containing compartment (11) to contain the concrete, which is provided with a covering member (20) able to assume a closed position to completely close said containing compartment (11) and an open position to allow access to said containing compartment (11) from above, **characterized in that** said containing compartment (11) comprises a washing device (21) inside it which is associated with said covering member (20), **and in that** said washing device (21) comprises detection means (32) configured to detect the open or closed position of said covering member (20).
2. Distribution apparatus (10) as in claim 1, **characterized in that** said detection means (32) are mounted on said covering member (20).
3. Distribution apparatus (10) as in claim 1 or 2, **characterized in that** said detection means (32) are operatively connected to a control unit (30) and are configured to send to the latter an enabling signal indicative that said covering member (20) is in said closed position, **and in that** said control unit (30) is programmed to activate said washing device (21) only after having received said enabling signal.
4. Distribution apparatus (10) as in claim 1, 2 or 3, **characterized in that** said detection means (32) are configured to send to said control unit (30) an interruption signal indicative that, during a washing step, said covering member (20) is in said open position, **and in that** said control unit (30) is programmed to deactivate said washing device (21) after receiving said interruption signal.
5. Distribution apparatus (10) as in any claim from 1 to 4, **characterized in that** said washing device (21) comprises one or more rotating members (23, 24) provided with one or more nozzles (26) that deliver a washing fluid.
6. Distribution apparatus (10) as in claim 5, **characterized in that** each of said rotating members comprises a base body (22) mounted on said covering member (20), a first rotating part (23) mounted rotatable with respect to said base body (22) about a first axis (X) thereof, and a second rotating part (24) mounted rotatable with respect to said first rotating part (23) and configured to rotate about a second axis (Y) that is inclined by an angle comprised between about 30° and about 90° with respect to said first axis (X).
7. Distribution apparatus (10) as in claim 6, **characterized in that** said nozzles (26) are positioned on said second rotating part (24) and are configured to make both said first rotating part (23) and also said second rotating part (24) rotate, by means of the reaction force of the jet of said washing fluid, in order to completely remove the residual concrete present both on internal walls of said containing compartment (11) and also on mechanical members present therein.
8. Distribution apparatus (10) as in any claim from 5 to 7, **characterized in that** it also comprises pumping means (27) configured to pump said washing fluid toward said washing device (21), **and in that** said control unit (30) is configured to also command said pumping means (27).
9. Distribution apparatus (10) as in any claim from 5 to 8, **characterized in that** said containing compartment (11) comprises, in a lower part thereof, a drainage aperture (31) to make said washing fluid flow downward.
10. Covering member (20) for a concrete distribution apparatus (10) provided with a containing compartment (11) to contain the concrete, **characterized in that** said covering member (20) comprises, mounted thereon, one or more nozzles (26) of a washing device (21) and detection means (32) configured to detect whether said covering member (20) is in an open or closed position with respect to said containing compartment (11).

11. Vehicle (15) comprising a distribution apparatus (10)
as in any claim from 1 to 9.

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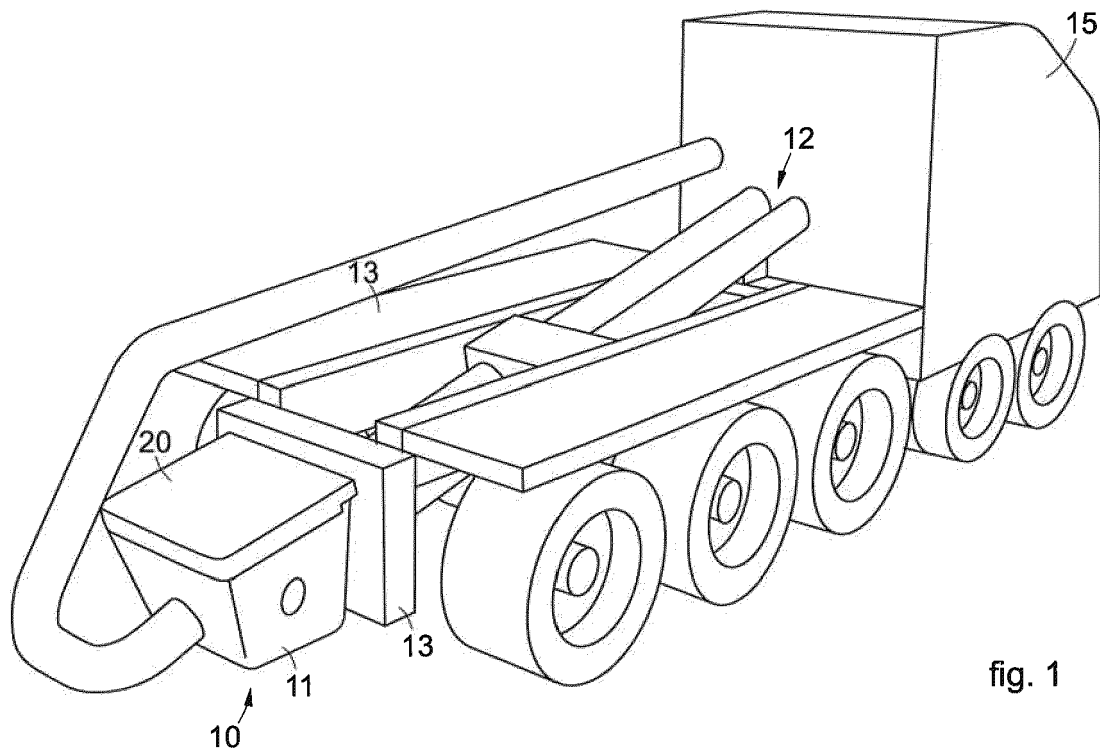


fig. 1

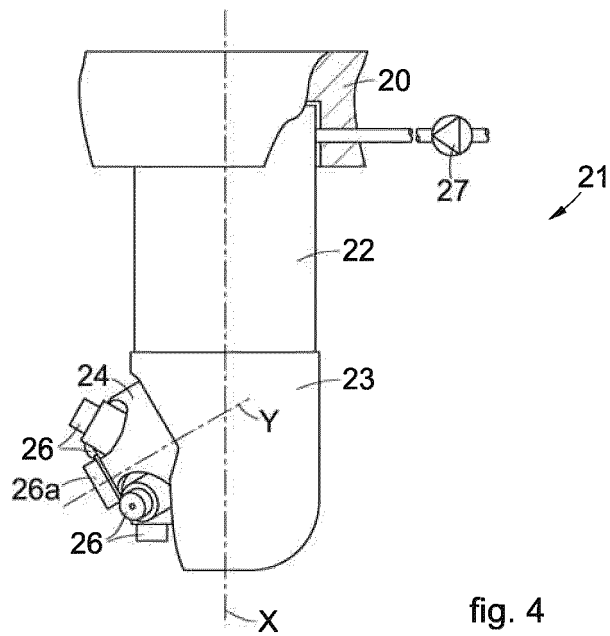


fig. 4

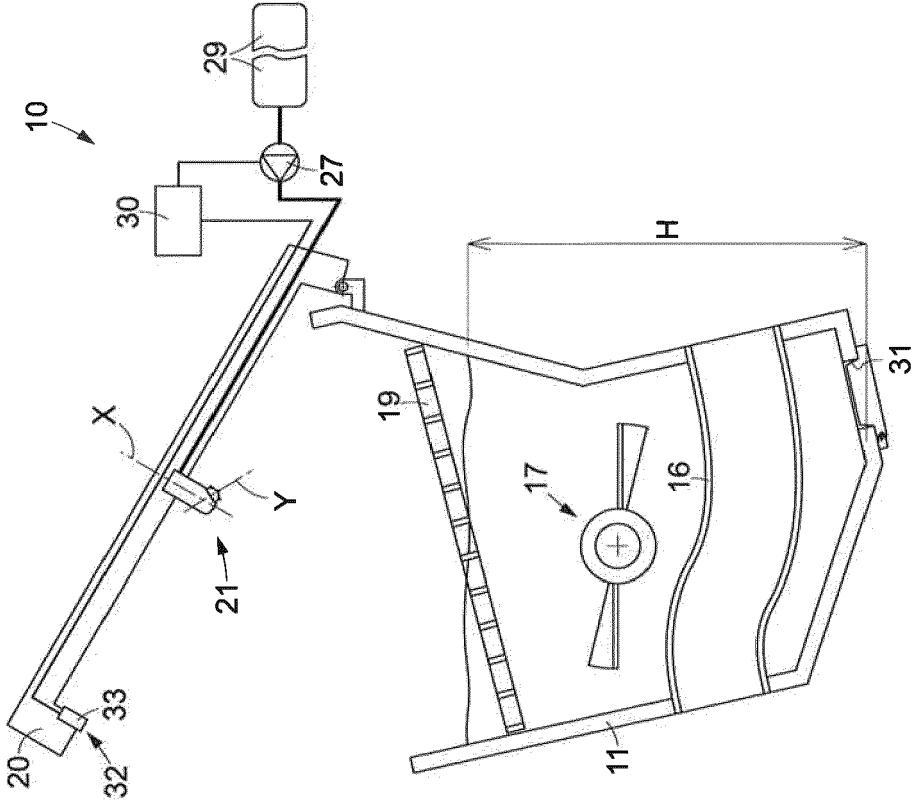


fig. 3

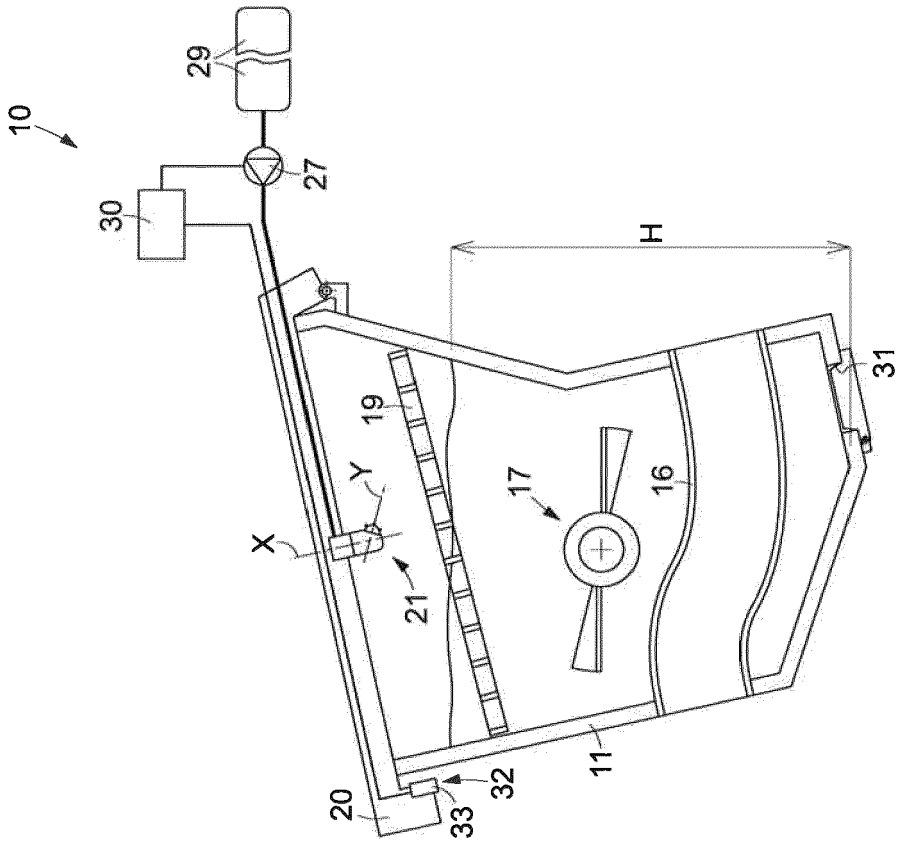


fig. 2



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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 7 September 2022	Examiner Cassiat, Clément
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



EUROPEAN SEARCH REPORT

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Examiner Cassiat, Clément			
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