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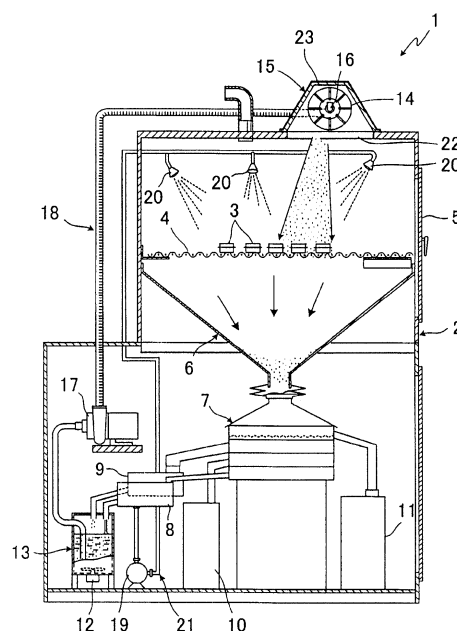
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(54) **PROJECTOR AND BLASTING MACHINE**

(57) Disclosed are a projector comprising an impeller rotated at high speed by a high-speed rotation driving device and a cover for covering the outer peripheral part of the impeller and having a projection material suction port and a projection material discharge port; and a blasting machine. In the projector, the entire of the impeller or the portion of the impeller with which the projection material is collided is formed of a high wear resistant rubber. It is possible to prevent the impeller and the projection material from damage, and to improve the durability of the projector. Furthermore, projection materials having high grinding property or those having fine particles and low specific gravity may also be used for the projector. Since the weight of the projector is light, it can be rotated directly by a motor at high speed and can be used under such conditions as ultra low temperature, ordinary temperature, high moisture, etc.

Fig. 7



Description

Background of the Invention

[0001] The present invention relates to a projector to be used for a shot blast machine, and a shot blast machine which is adapted to deburr and treat surfaces of molded goods and to remove crud attached to surfaces of workpieces.

[0002] A conventional shot blast machine uses a projector with an impeller which is made of metal material. This brings a drawback that the projectiles damage themselves when striking the impeller. Another drawback is that projectiles with high grindability cannot be used, since they damage the impeller. A still further drawback is that the impeller being used is made of metal material and heavy, requiring a large motor to drive it, incurs high cost and it is hard to rotate the impeller at high speed. Patent Document 1: Japanese published unexamined application H3-2.34470

Summary of the Invention

[0003] In view of the conventional drawbacks as described above, it is an object of the present invention to provide a projector and a shot blast machine which do not give any damage to and can increase the durability of the impeller and the projectiles.

[0004] It is another object of the present invention to provide a projector and a shot blast machine which can use projectiles with high grindability or of small particle size or light gravity.

[0005] It is still another object of the present invention to provide a projector and a shot blast machine which can be used at any condition, including extreme cold temperatures, normal temperatures, wet conditions and the like.

[0006] The above and further objects and novel features of the present invention will more fully appear from the following detailed description when the same is read in connection with the accompanying drawings.

[0007] It is to be understood that these are for purpose of illustration only and are not intended to be a definition of the limits of the invention.

[0008] In order to achieve the above mentioned purpose, in the present invention, the projector comprises an impeller which is a high-speed device rotated by a high-speed rotating driving device, and a cover which covers a periphery of the impeller, wherein the cover has a projectile suction port and a projectile exhaust port therein, and wherein further an entire impeller or a portion of the impeller, where the projectiles strike, is formed of high abrasion-resistant rubber.

[0009] According to another aspect of the invention, a shot blast machine, which is equipped with the projector, comprises an impeller, which is a high-speed device rotated by the high-speed rotating driving device, and the cover which covers the periphery of the impeller and has

a projectile suction port and a projectile exhaust port therein, wherein the entire impeller or a portion of the impeller, where the projectiles strike, is formed of high abrasion-resistant rubber.

[0010] As is clear from the above-mentioned explanations, the present invention as hereinabove defined provides various advantageous effects as enumerated below.

(1) For the shot blast machine with the impeller, since the shot blast machine uses the impeller which is formed of the high abrasion-resistant rubber, it can prevent a damage of the projectiles when they are blasted and strike the impeller. Therefore, it can improve the durability of the projectiles, and it is possible to manufacture it at a relatively low cost.

(2) As described in the above item (1), the noise, which is produced when the projectiles strike the impeller, can be reduced.

(3) As described in the above item (1), when the projectiles with high grindability are used, it can be used without a damage of the impeller. Therefore, the different kinds of the projectiles are widely used, and they can be used for the different kinds of workpieces widely.

(4) As described in the above item (1), since the weight of the impeller can be reduced, it is possible to rotate at high speed. Therefore, the projectiles can be blasted out in efficiency, and projectiles with small particles and high gravity can be used.

(5) Claim 2 has the same effect as indicated in the above items (1) to (4), since the impeller can be directly rotatably driven by a small high speed motor. Thus, size reduction and low cost manufacturing can be achieved.

(6) Claim 3 has the same effect as indicated in the above items (1) to (5), since durability of the projectiles can be further improved and the projector can be further noise-reduced.

(7) Claim 4 has the same effect as indicated in the above items (1) to (5), deformation of the impeller body under temperature changes can be suppressed by the supporting plate, the disc flange, and the plurality of spacing members.

(8) Claim 5 has the same effect as indicated in the above items (1) to (4).

(9) Claim 6 has the same effect as indicated in the above items (1) to (5).

(10) Claim 7 has the same effect as indicated in the

above items (1) to (4), and the projector with the impeller blasts out the liquid with the projectiles widely, and it can burr molded goods, treat the surface of molded goods and remove crud attached to the surface of workpieces.

(11) As described in the above item (10), since the projectile-mixed liquid can be supplied into the projector with the impeller by the pump, its structure is simple, and it can be performed to carry the projectile-mixed liquid smoothly.

(12) As described in the above item (10), since the projectile-mixed liquid can be supplied into the projector with the impeller by the pump and can be blasted out to the workpiece by the projector so as to remove the weld flash of the molded goods, it is not necessary to accelerate the speed and increase pressure for the carrying of the projectile-mixed liquid to the projector, its structure is simple, it can carry it certainly.

(13) Claim 8 has the same effect as indicated in the above items (1) to (5), and the projector has a simple structure and it is easy to manufacture. In addition, since a slurry pump is used, it can supply the liquid with the durable projectiles with efficiency.

Brief Description of the Drawings

[0011]

- FIG. 1 is a front view showing a first embodiment of the present invention;
- FIG. 2 is a side view showing the first embodiment of the present invention;
- FIG. 3 is a cross-sectional view taken along a line of 3-3 in FIG. 1;
- FIG. 4 is a vertical cross-sectional view of a projector showing the first embodiment of the present invention;
- FIG. 5 is a cross-sectional view taken along a line of 5-5 in FIG. 4;
- FIG. 6 is an explanation view of a nozzle showing the first embodiment of the present invention;
- FIG. 7 is an explanation view of an operation showing the first embodiment of the present invention;
- FIG. 8 is a schematic view showing a second embodiment of the present invention;
- FIG. 9 is an explanation view of an operation showing the second embodiment of the present invention;
- FIG. 10 is front view showing a third embodiment of the present invention;
- FIG. 11 is a cross-sectional view taken along a line of 11-11 in FIG. 11;
- FIG. 12 is an explanation view of an operation showing the third embodiment of the present in-

vention;

- FIG. 13 is a schematic explanation view showing a fourth embodiment of the present invention;
- FIG. 14 is an explanation view of an operation showing the fourth embodiment of the present invention;
- FIG. 15 is a front view showing a fifth embodiment of the present invention;
- FIG. 16 is a cross-sectional view taken along a line of 16-16 in FIG. 15;
- FIG. 17 is a cross-sectional view showing a sixth embodiment of the present invention;
- FIG. 18 is a partial fracture cross-sectional view showing a projector;
- FIG. 19 is a cross-sectional view taken along a line of 19-19 in FIG. 18;
- FIG. 20 is a plan view showing a projector of the sixth embodiment of the present invention;
- FIG. 21 is a front view showing an impeller of the sixth embodiment of the present invention;
- FIG. 22 is a side view showing an impeller of the sixth embodiment of the present invention;
- FIG. 23 is a cross-sectional view taken along a line of 23-23 in FIG. 22;
- FIG. 24 is a front view showing a seventh embodiment of the present invention;
- FIG. 25 is cross-sectional view taken along a line of 25-25 in FIG. 24; and
- FIG. 26 is a plan view showing the seventh embodiment of the present invention.

Detailed Description of the Invention

[0012] Preferred embodiments of the present invention will now be described in detail below with reference to the accompanying drawings.

[0013] FIGS. 1 to 7 illustrate a first embodiment of the present invention wherein reference numeral 1 is a shot blast machine which is adapted to deburr molded goods, to treat the surface of molded goods and to remove crud attached to the surface of the workpieces. The shot blast machine 1 comprises the following components: a case body 2; a table 4, as a supporting tool supports a workpiece 3, installed into an upper portion of the case body 2, formed of a perforated plate or mesh body; an openable door 5 attached to the case body 2 capable of taking the workpiece 3 in and out of the table 4; a separator 7 with a vibrating screen, provided at a lower portion of the table 4 in the case body 2 through the hopper 6; a liquid tank 8 providing a liquid including water, cleaning liquid or the like sorted out by the separator 7 therein.

[0014] The machine further comprises a projectile tank 9 providing the projectiles therein; a small dust tank 10 providing small dusts therein; and a large dust tank 11 providing large dusts therein; a mixing tank 13 having a mixer 12 which mixes the liquid from the liquid tank 8 and the projectiles from the projectile tank 9; a projector 15 having an impeller 14 made of a high abrasion-resistant

rubber, installed in the upper portion of the case body 2 capable of blasting out the projectile-mixed liquid to the table 4; a supplying channel 18 interposed a slurry pump 17 therebetween, wherein the pump 17 sucks the projectile-mixed liquid in the mixing tank 13 and introduces it into a nozzle 16 positioned in the projector 15; a pump 19 which showers the liquid of the liquid tank 8 to the workpiece 3 supported by the table 4; and a shower device 21 having a shower nozzle 20.

[0015] The projector 15 further includes a wheel cover 23 having an opening 22 provided at the lower portion thereof and forming a nozzle-insertion hole 24 at a wall surface 23a of a side of suction and inserting fixedly the nozzle 16; the impeller 14 is attached into the wheel cover 23 rotatably, being made of high abrasion-resistant rubber; and a high-speed motor 25 attached to the wheel cover 23, capable of making the impeller 14 to drive at a high speed.

[0016] In addition, the impeller 14 further includes one side plate 27 attached to a drive shaft 26 of the high-speed motor 25, formed in the shape of a disc; a plurality of blades 28 are fixed to a part except for a center portion of the side plate 27 in a radial pattern; and another side plate 30 is fixed so as to cover the blades 28, having a nozzle-insertion hole 29 formed at a part corresponding to the nozzle-insertion hole 24 of the wheel cover 23.

[0017] The above-constructed shot blast machine 1 uses water as a liquid when it removes the weld flashes of the molded goods. In addition, it uses washing water when it removes the crud attached to the surface of the workpiece.

[0018] When it is performed to blast, the projector 15, the pump 19, the slurry pump 17 and the separator 7 are driven after the workpiece 3 has been put on the table 4. Thereby the projectile-mixed liquid of the mixing tank 13 is blasted from the nozzle 16 after it has passed through the supplying channel 18 by the slurry pump 17. The blasted liquid including the projectile is blasted to the workpiece 3 on the table 4 by the impeller 14, which rotates at a high speed, from the projector 15.

[0019] In this way, since the projectiles of the blasted liquid strike the rotating impeller 14 with the high abrasion-resistant rubber, it can prevent damages as in the case of the conventional metallic impeller, and the blasting from the impeller 14 can be carried out as in the case of the conventional metallic impeller.

[0020] The projectile-mixed liquid blasted out by the projector 15 is supplied to the separator 7 with the removed objects from the workpiece through the hopper 6, and is sorted out as the large particle dust, projectiles, small particle dust and liquid, and are introduced into the large-dust tank 11, projectile tank 9, small-dust tank 10 and liquid tank 8 respectively. The liquid supplied into the liquid tank 8 is supplied into the shower nozzle 20 by the mixing tank 13 and pump 19 of the shower device 21, and it is showered to the workpiece 3 on the table 4.

[0021] In this way, the projectile-mixed liquid and liquid which is showered are circulated and used for blasting.

[0022] Explained next are other embodiments of the present invention as illustrated in FIGS. 8 to 28. When explaining these other embodiments of the present invention, the same component parts as those in the first preferred embodiment of the present invention are given the same numerals in order to avoid overlapping explanations.

[0023] A second embodiment of the present invention is shown in FIGS. 8 and 9 and is distinguished from the first embodiment by the fact that a high abrasion-resistant rubber sheet 39 is fixed to an inner wall surface of the wheel cover 23 by adhering, coating and the like in order to blast the projectile-mixed liquid to the workpiece 3 on the table from the side and upper portion of the case body 2; and the projector 15 is replaced by two projectors 15A, 15A on which is adhered or coated a high abrasion-resistant rubber 41 on a surface of an impeller body 40 made of metal.

[0024] A shot blast machine 1A in this way according to the second embodiment has similar advantages to that according to the first embodiment.

[0025] A third embodiment of the present invention is shown in FIGS. 10 to 12 and is distinguished from the first embodiment by the fact that a belt conveyor 31 as a supporting device is used, formed in the shape of an L-letter, capable of holding the workpiece 3 and agitating it. A shot blast machine 1B with the belt conveyor 31 according to the third embodiment has similar advantages to that according to the first embodiment.

[0026] In addition, reference numerals 32, 33, 34 designate revolving shafts which are arranged at the case body 2 so as to be formed in the shape of an L-letter, reference numeral 35 is belt which is laid on the revolving shaft 32, 33 and 34 so as to be formed in the shape of an L-letter, having a plurality of through holes 36; reference numerals 37, 37 designate guide rollers which are attached to the case body 2, pressing both edges of the belt 35 positioned between the revolving shafts 32 and 34; and reference numerals 38 designates a reversible motor attached to the case body 2, making the revolving shaft 33 rotate in the forward and backward directions.

[0027] A fourth embodiment of the present invention is shown in FIGS. 13 and 14 and is distinguished from the first embodiment by the fact that the liquid and projectile which are selected by the separator 7 are stored automatically by their own weight into the mixing tank 13 with the mixer 12, and the liquid which overflows from the mixing tank 13 is supplied into the shower device 21.

[0028] In this way, a shot blast machine 1C according to the fourth embodiment has similar advantages to that according to the first embodiment.

[0029] A fifth embodiment of the present invention is shown in FIGS. 15 and 16 and is distinguished from the first embodiment by the fact that the projectiles which are selected by the separator 7 are stored in a projectile tank 42, and the projectiles are sucked from the projectile tank 42 by a suction hose 43 and are supplied into the projector 15.

In this way, a shot blast machine 1D according to the fifth embodiment may be composed.

[0030] A sixth embodiment of the present invention is shown in FIGS. 17 to 23 and is distinguished from the first preferred embodiment of the present invention by the fact that the impeller 14A comprises the following components: an impeller body 40 comprising a discoid side panel 27 of which central portion a projectile suction port 44 is formed, a plurality of blades 28 which are integrally formed in a radial pattern between the projectile suction port 44 on the inner surface and the periphery of the side plate 27, and another side plate 30 integrally formed with the plurality of blades 28; a disk flange fitting hole 45 being formed in a central portion thereof; a metallic supporting plate 46 attached in such a manner that it contacts with the lateral surface of the one side plate 27 of the impeller body 40; a disc flange 47 which is attached to the drive shaft 26 of the high-speed motor 25 in such a manner that it contacts with the lateral surface of the other side plate 30 of the impeller body 40; and a plurality of metallic spacing members 49 which are attached at a predetermined distance through a plurality of shaft holes 48, 48 formed in the one side plate 27 and the other side plate 30 in such a manner that the distance between the periphery of the disc flange 47 and the supporting plate 46 is kept constant.

[0031] In this way, a shot blast machine 1E constructed by using a projector 15B and a wheel cover 23A according to the sixth embodiment has similar advantages to that according to the first preferred embodiment of the present invention.

[0032] In the embodiments of the present invention, high abrasion-resistant rubber 51, 51, 52 is disposed on inner wall surfaces, which form also an outer periphery of both sides of a cover body 50, the high abrasion-resistant rubber 51, 51 are fixed to the cover body 50 by a plurality of countersunk screws 53 and nuts 54. However, the present invention is not limited to this application. It may also be applicable to use a high abrasion-resistant rubber which is integrally formed in such manner that it fits inside the inner wall surface of the cover body 50.

[0033] A seventh embodiment of the present invention is shown in FIGS. 24 to 26 and is distinguished from the sixth embodiment of the present invention by the fact that it comprises: a hopper-shaped bulkhead 57 which divides the case body 2 in such manner that the upper portion serves as a blast-processing chamber 55 while the lower portion serves as a projectile-processing chamber 56; a deburring parts holder 61 which comprises a motor 58 which is mounted on the case body 2 inside the blast-processing chamber 56 so as to allow the motor 58 to support and rotate the deburring parts, and a bucket 60 which is formed of a perforated plate having a plurality of through holes 59 being formed therein which allow the projectiles to pass through them; a projectile container 62 which retains the projectiles being separated by the separator 7 installed in the projectile-processing chamber 56.

[0034] A suction hose 63 is installed in such a manner that the projectiles retained in the projectile container 62 can be sucked to the impeller 14A by high-speed rotation of the impeller 14A in the projector 15B; a refrigerant supplier 66 having a refrigerant pipe 65 which is equipped with a solenoid valve therein, the refrigerant supplier 66 supplies refrigerant such as liquefied inert gas including liquefied nitrogen and liquefied carbon dioxide to the blast-processing chamber 55; and an exhaust pipe 68 which is installed on top of the blast-processing chamber 55 and has a damper therein.

[0035] In this way, a shot blast machine 1F according to the seventh embodiment has similar advantages to that according to the first preferred embodiment of the present invention.

[0036] The present invention allows using projectiles other than those mentioned in the embodiments of the present invention for any type of shot blast machine as long as it blasts out such projectiles by an impeller.

[0037] The present invention is applicable in the industry of manufacturing the shot blast machine.

Claims

1. A projector comprising an impeller which is a high-speed device rotated by a high-speed rotating driving device and a cover which covers a periphery of the impeller, wherein the cover has a projectile suction port and a projectile exhaust port therein, and wherein further an entire impeller or a portion of the impeller, where projectiles strike, is formed of high abrasion-resistant rubber.
2. The projector of claim 1, wherein the high-speed rotated impeller is attached to a drive shaft of the high-speed rotating motor through a disc flange.
3. The projector of claim 1 or 2, wherein high abrasion-resistant rubber is affixed to the portion of the cover where the projectiles strike.
4. The projector of any one of claims 1 to 3, wherein the impeller comprises:
 - an impeller body comprising a discoid side panel of which central portion a projectile suction port is formed, a plurality of blades which are integrally formed in a radial pattern between the projectile suction port on the inner surface and the periphery of the side plate, and another side plate integrally formed with the plurality of blades, a disk flange fitting hole being formed in a central portion thereof;
 - a supporting plate mounted in such manner that it contacts with a lateral surface of the side plate of the impeller body;

- a disc flange which is attached to the drive shaft of the high-speed motor in such manner that it contacts with a lateral surface of the other side plate of the impeller body; and

- a plurality of spacing members which are attached at predetermined distance through shaft holes formed in the side plate and the other side plate in such manner that the distance between the periphery of the disc flange and the supporting plate is kept constant.

5. A shot blast machine which is equipped with a projector comprising an impeller which is high-speed rotated by a high-speed rotating driving device and a cover which covers the periphery of the impeller and has a projectile suction port and a projectile exhaust port, wherein the entire impeller or a portion of the impeller, where projectiles strike, is formed with high abrasion-resistant rubber.

6. The shot blast machine of claim 5, wherein the high-speed rotated impeller is attached to a drive shaft of the high-speed rotating motor through a disc flange.

7. A shot blast machine, comprising:

a projector that employs a case body; a supporting device provided therein to support workpieces; an impeller which can project a projectile-mixed liquid to the workpieces supported by the supporting device, which is made of high abrasion-resistant rubber or an impeller to which high abrasion-resistant rubber is affixed at the portion where the projectiles strike; and a slurry pump which supplies the projectile-mixed liquid to this projector.

8. A shot blast machine, comprising:

a projector further comprising: a case body; a supporting device provided therein to support workpieces; a wheel cover which can project projectile-mixed liquid to the workpieces supported by the supporting device, the underside of the wheel cover being open and a nozzle-insertion hole being formed on a wall of the suction-side; and a plurality of radially-disposed high abrasion-resistant blades; an impeller having blades with high abrasion-resistant rubber fixed thereon, and a high-speed motor which rotatably drives the impeller at high speed; and a slurry pump which supplies projectile-mixed liquid to the projector.

Fig.1

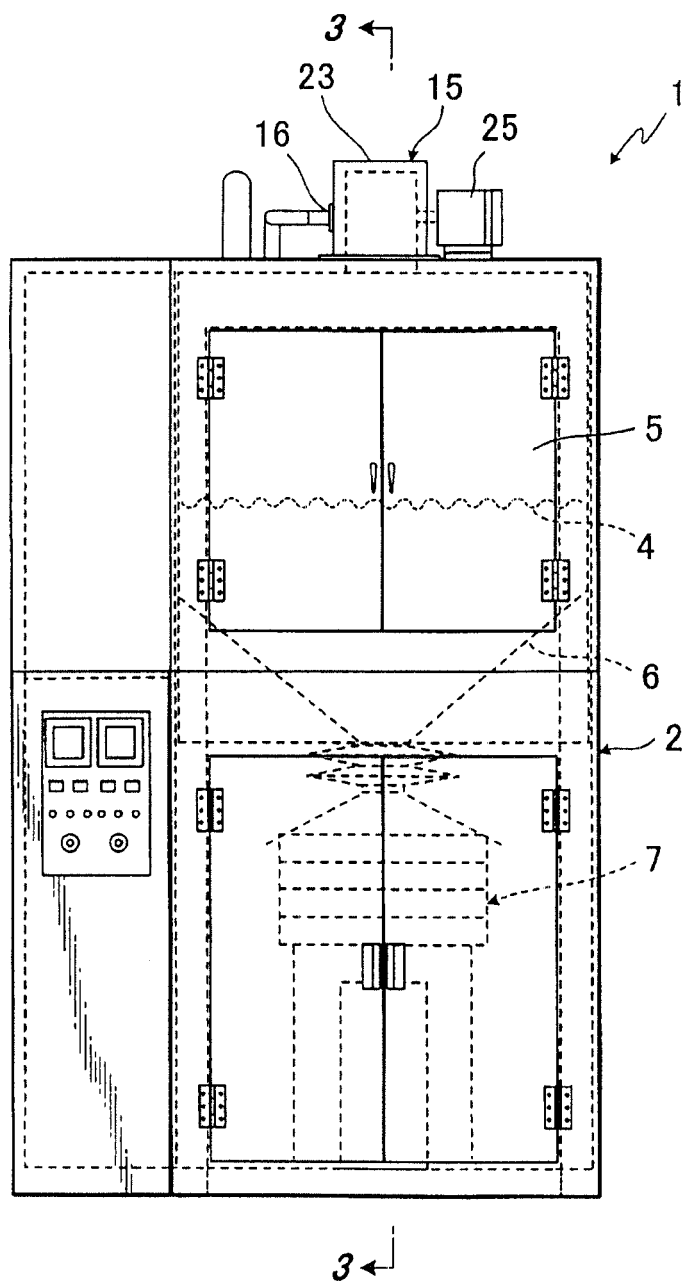


Fig.2

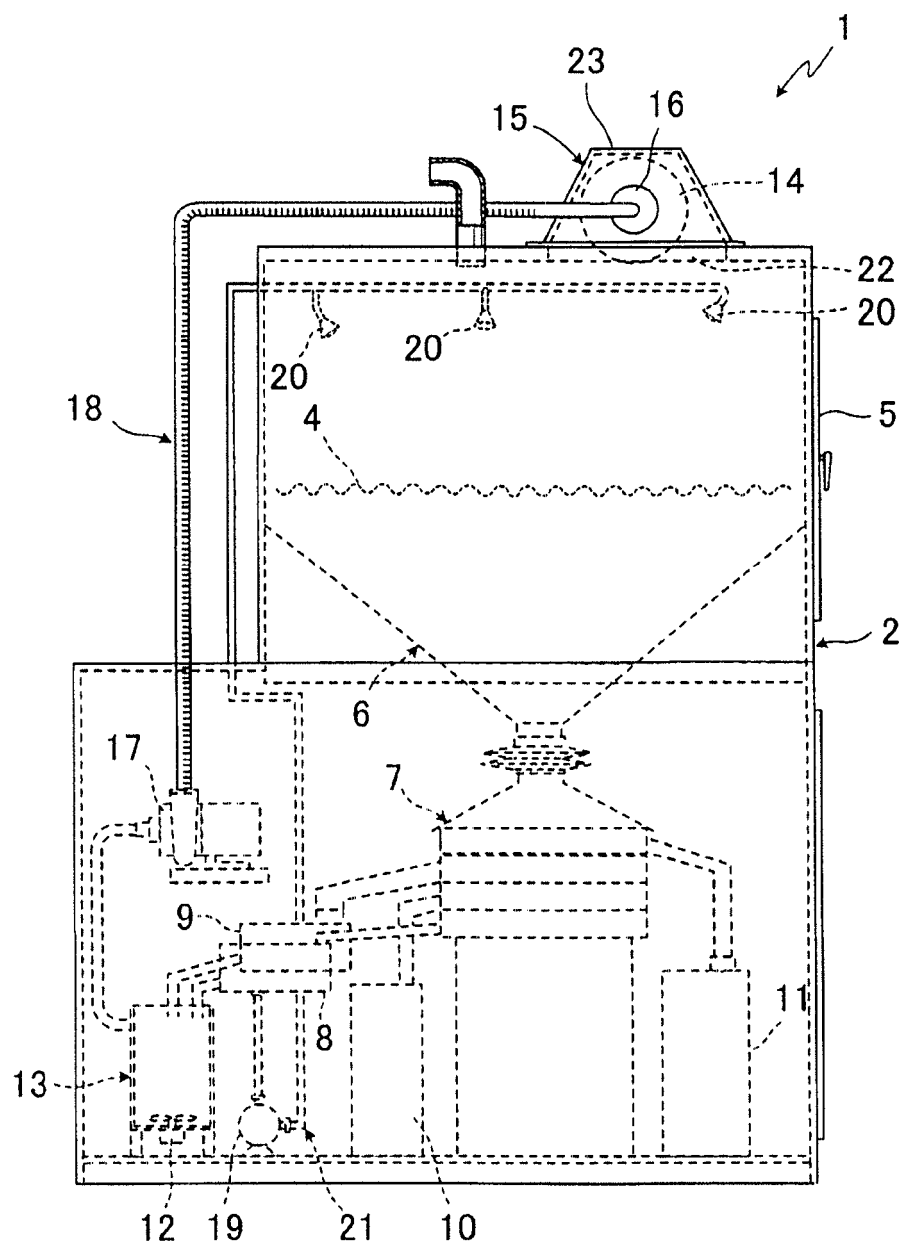


Fig.3

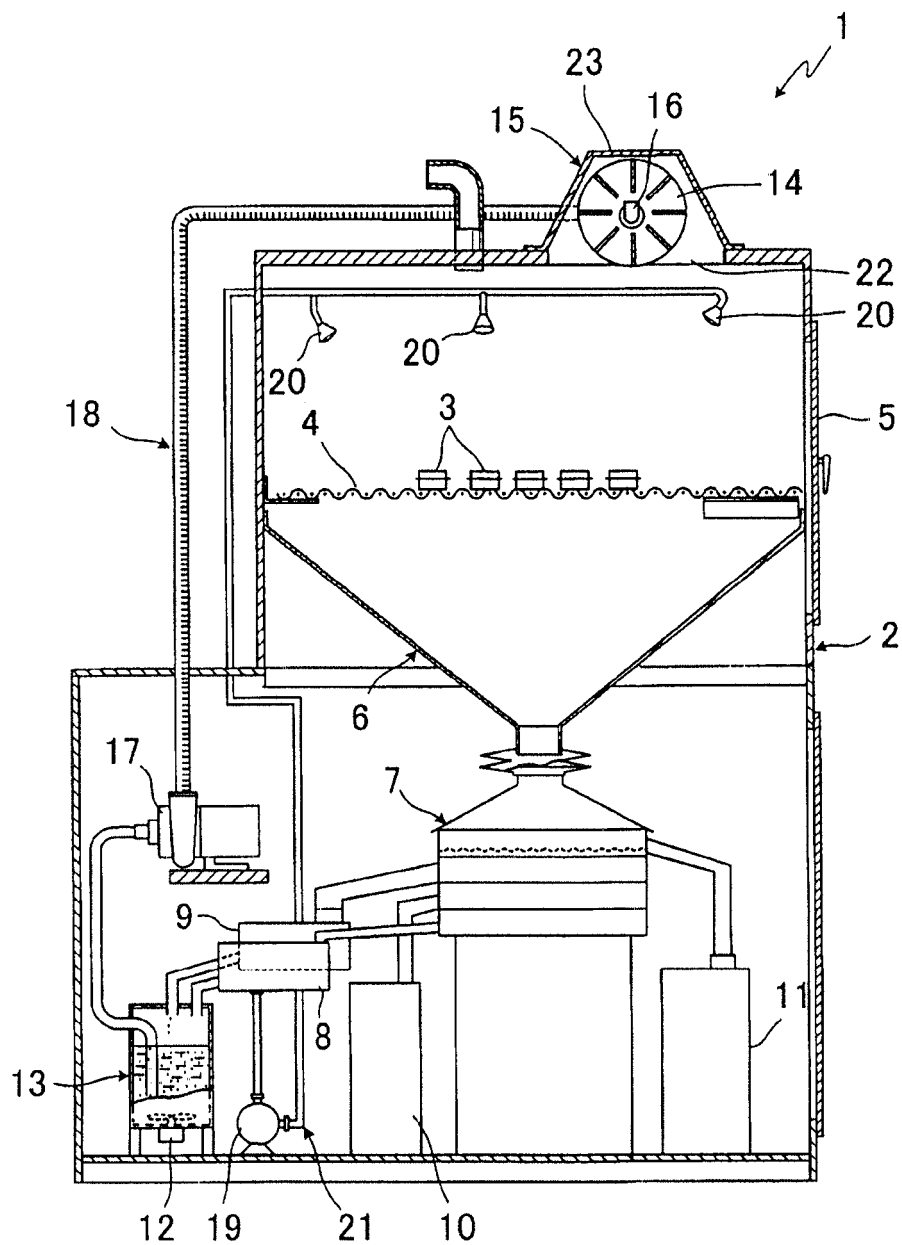


Fig.4

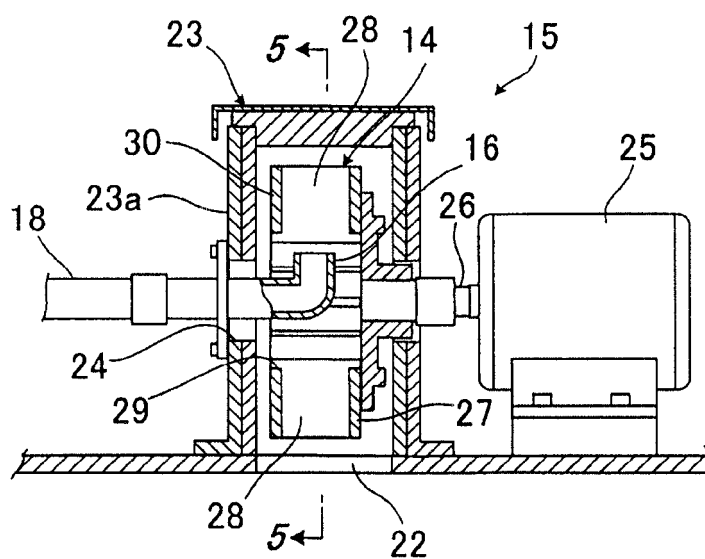


Fig.5

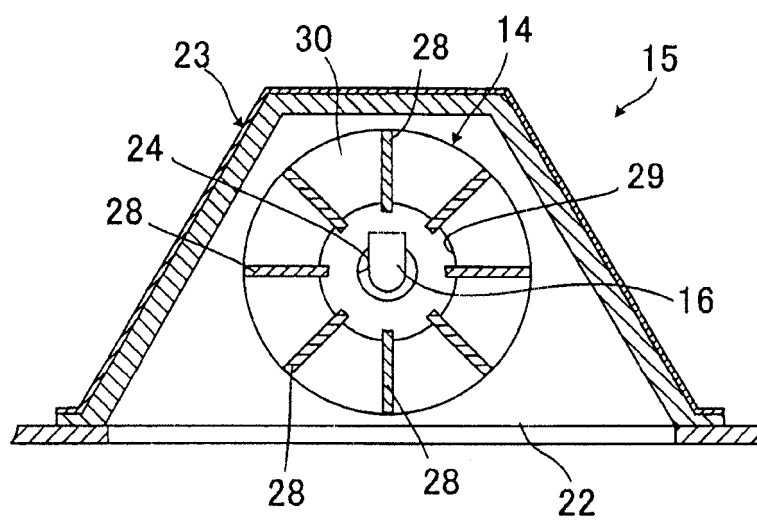


Fig.6

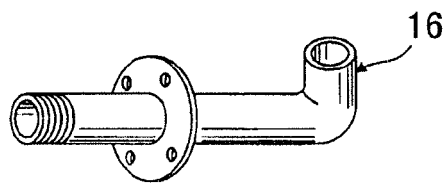


Fig. 7

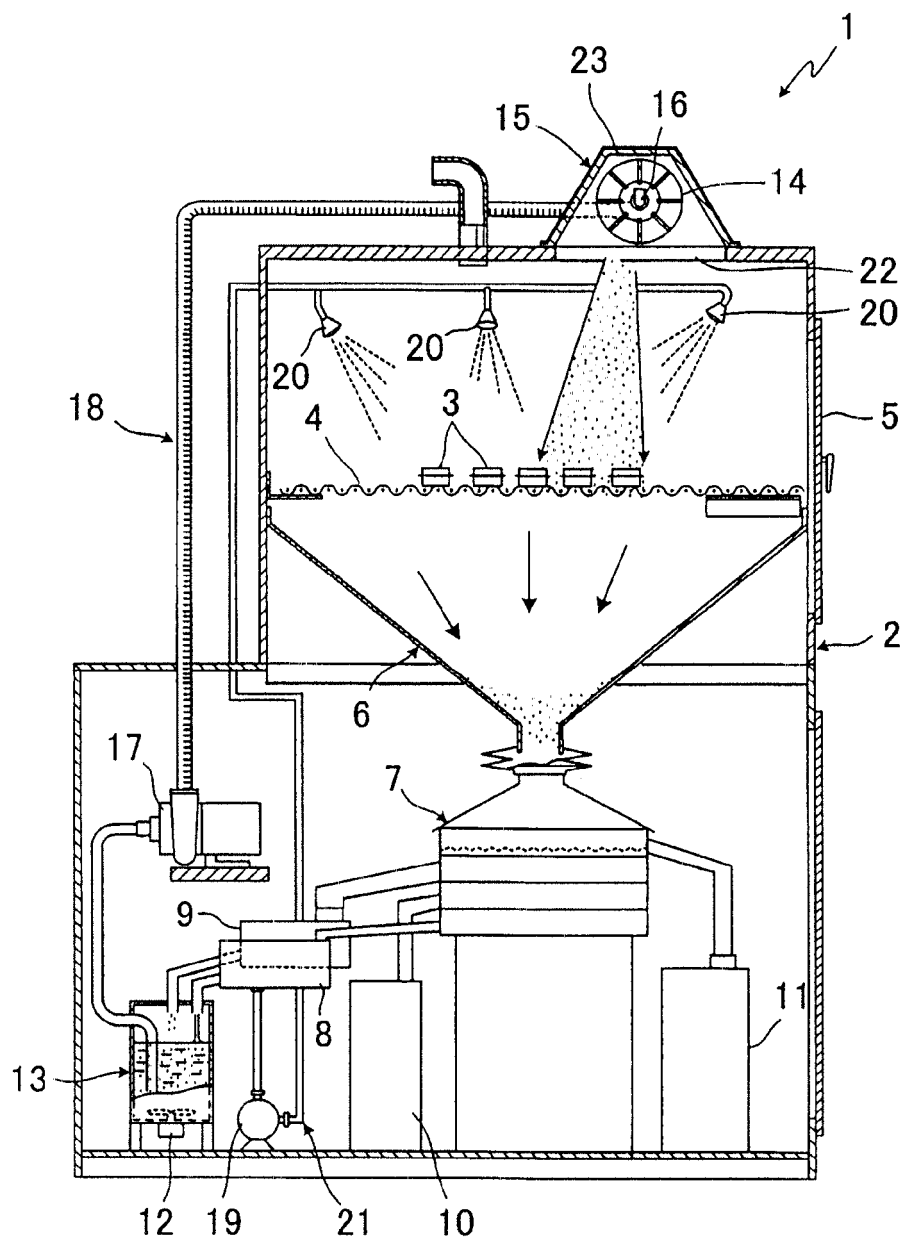


Fig.8

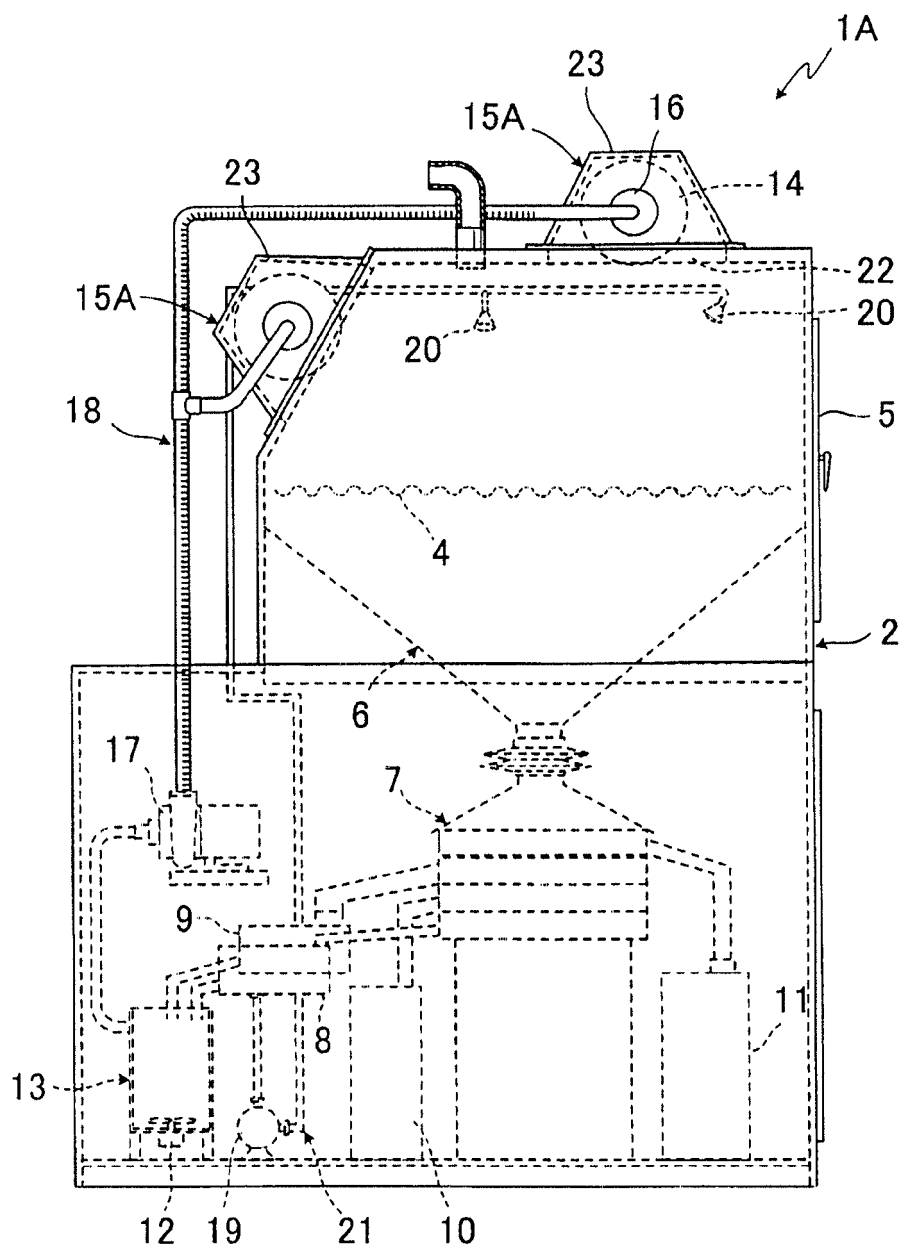


Fig.9

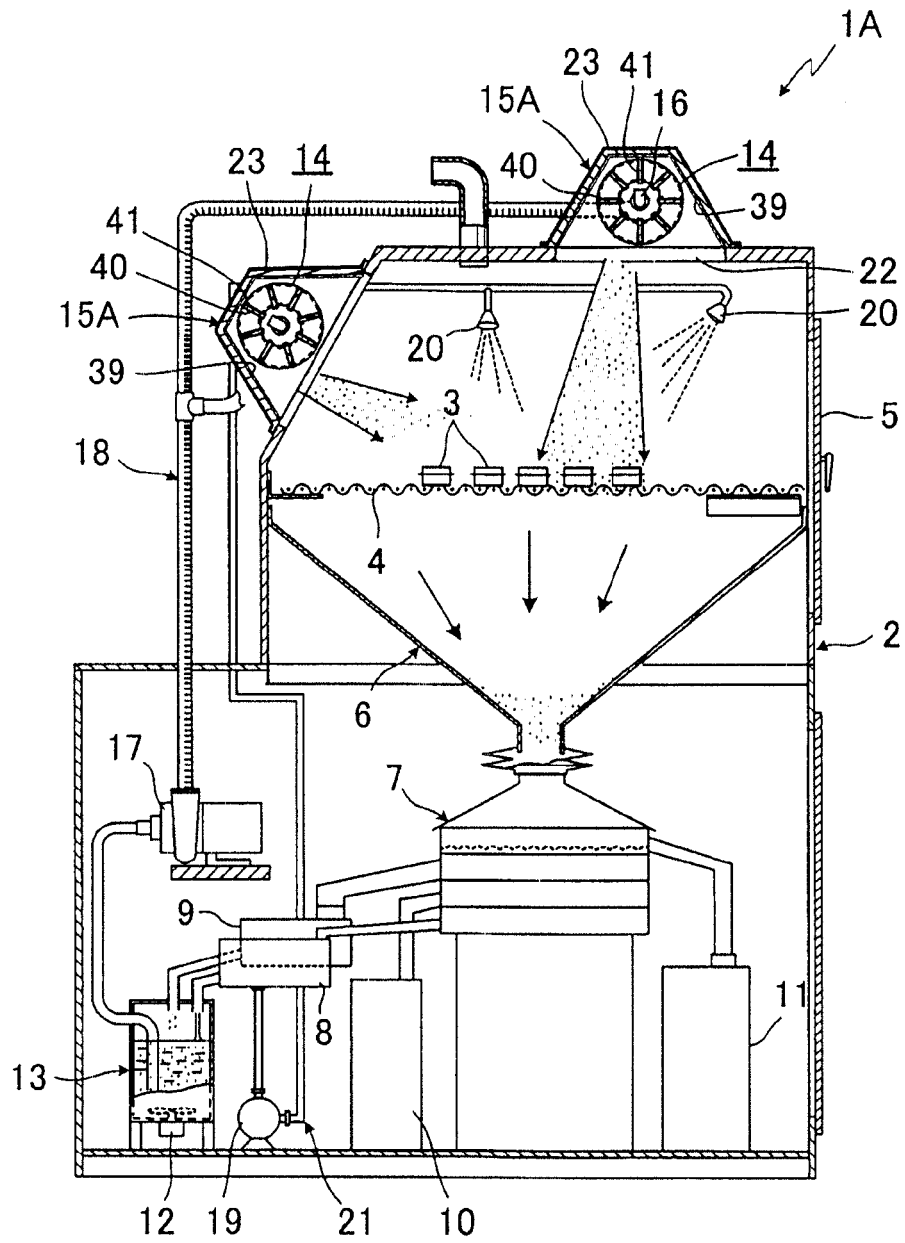


Fig. 10

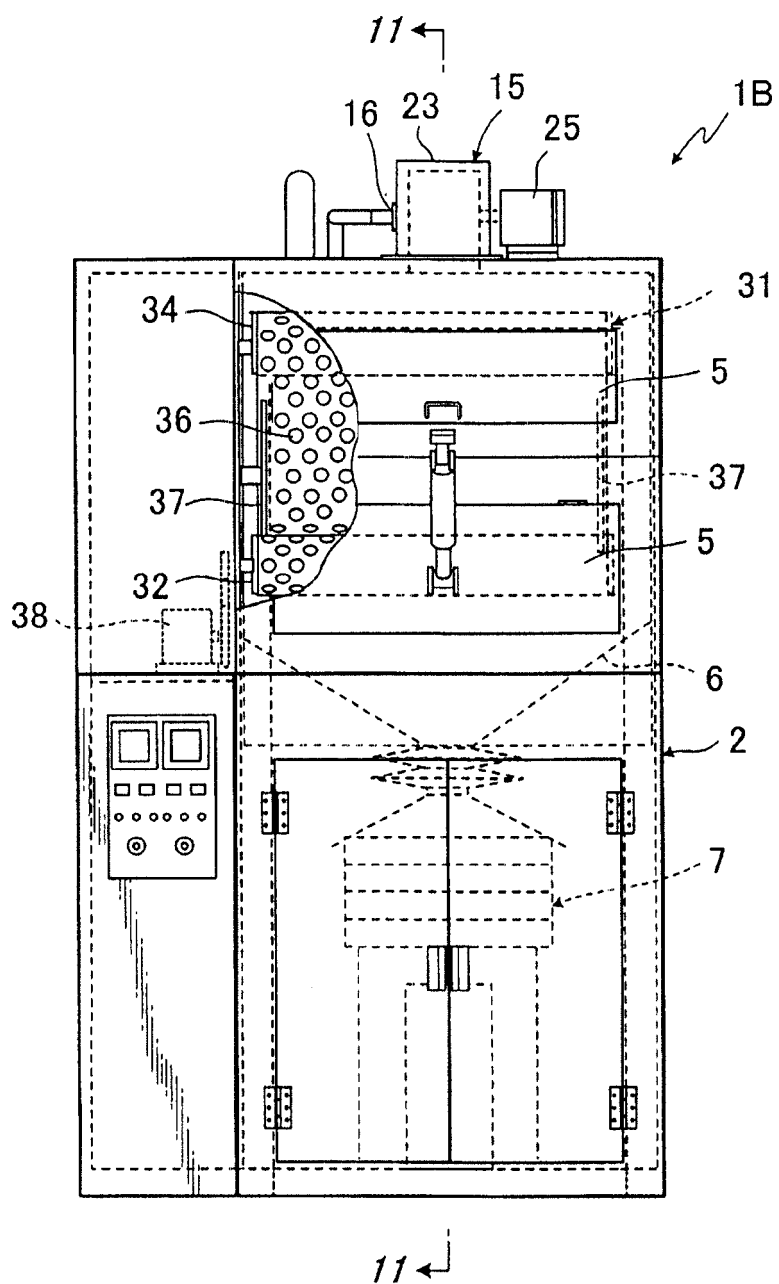


Fig. 11

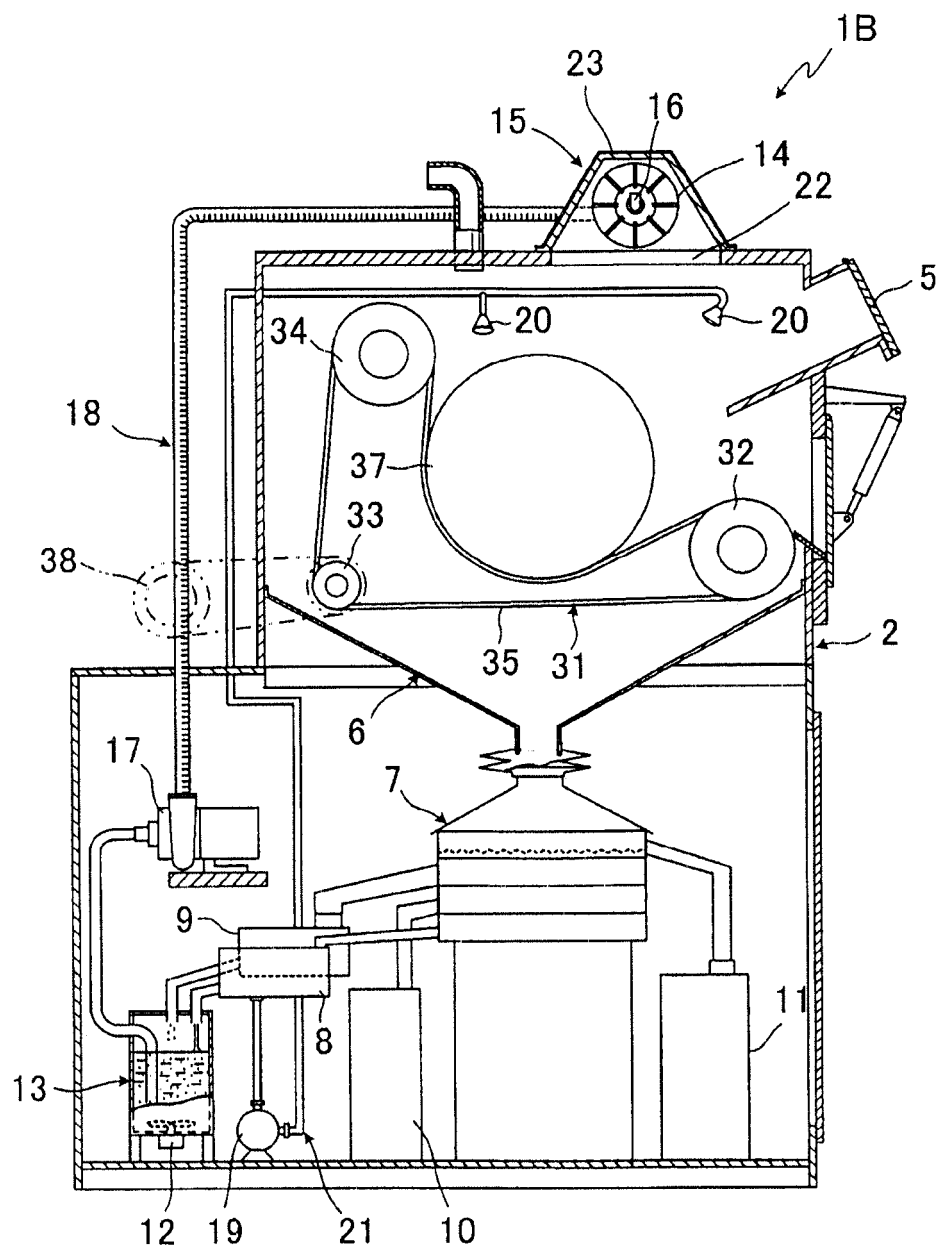


Fig. 12

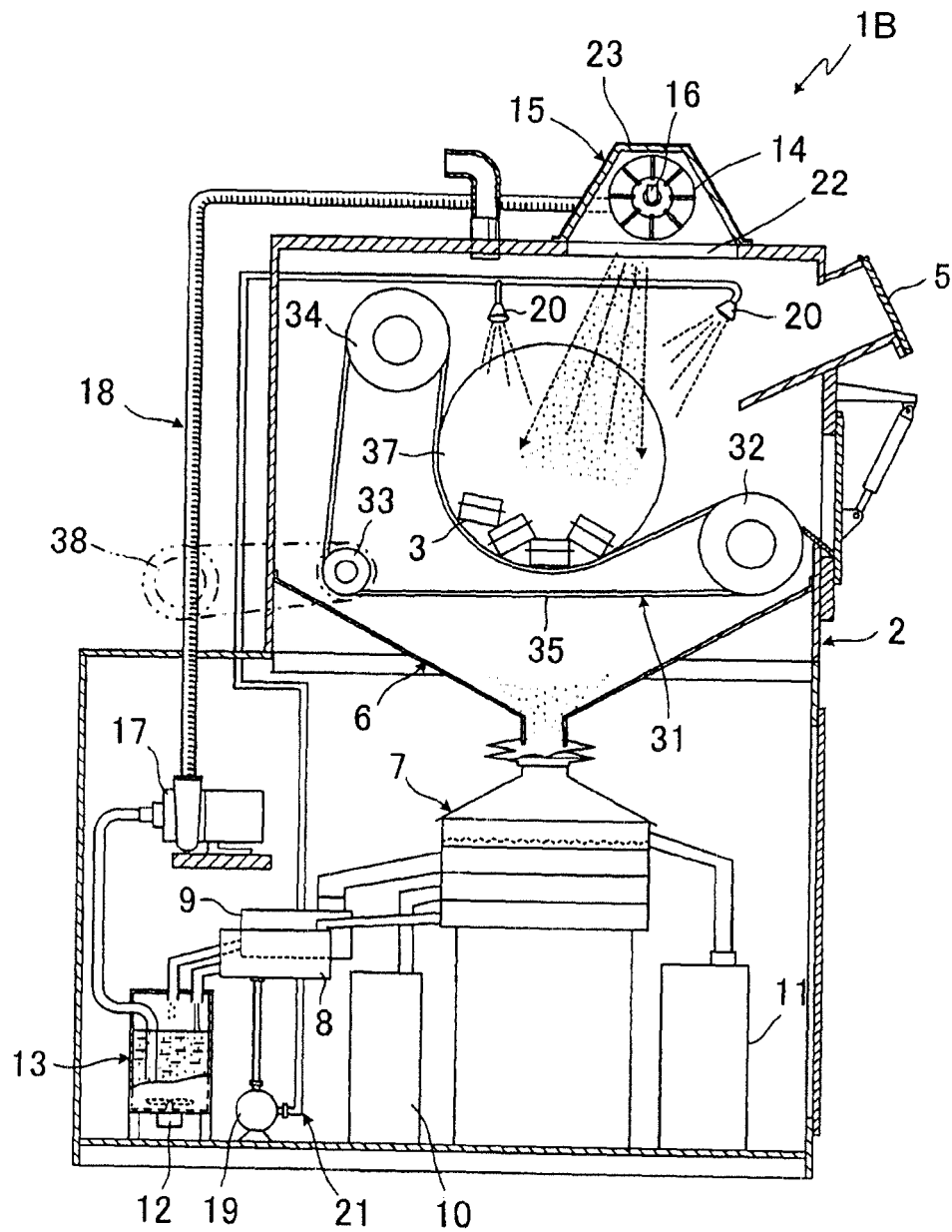


Fig. 13

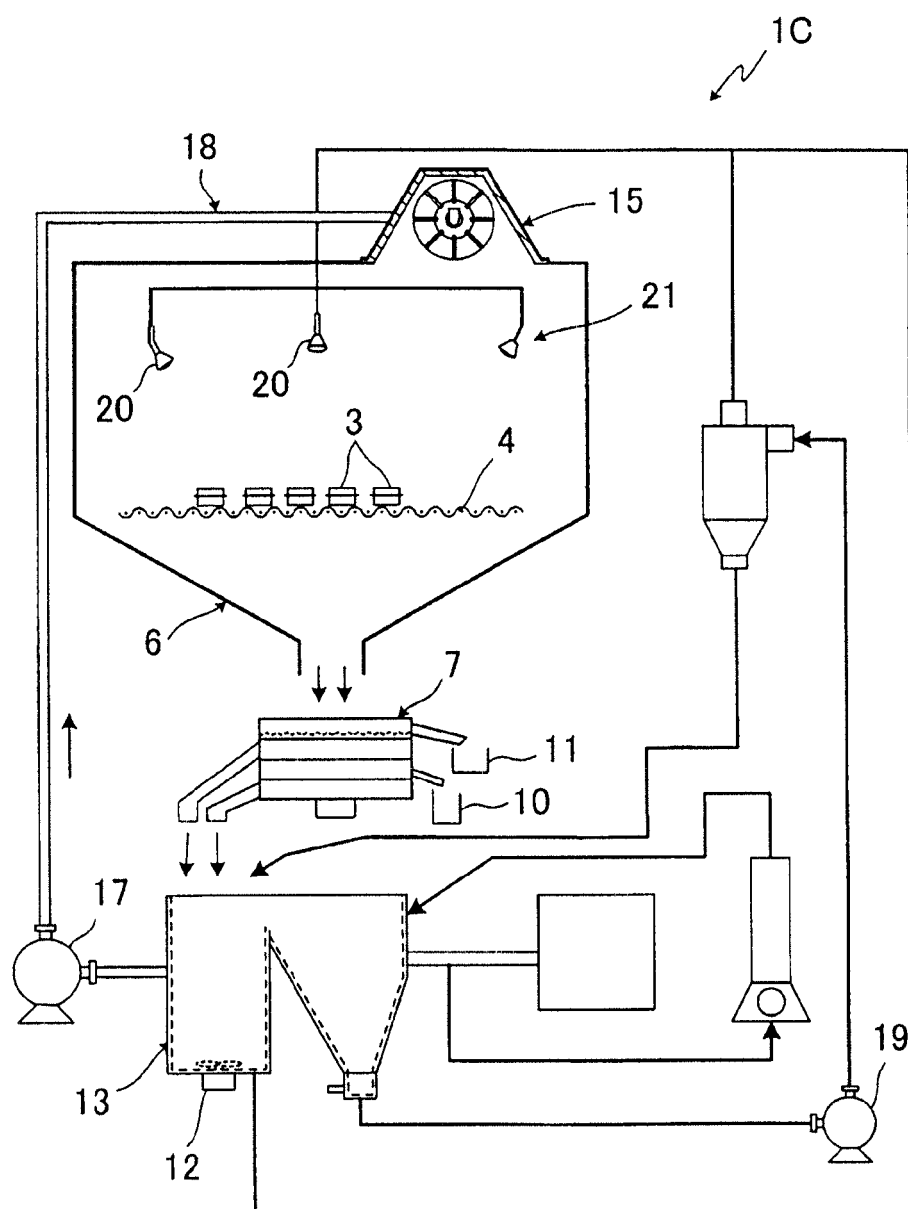


Fig. 14

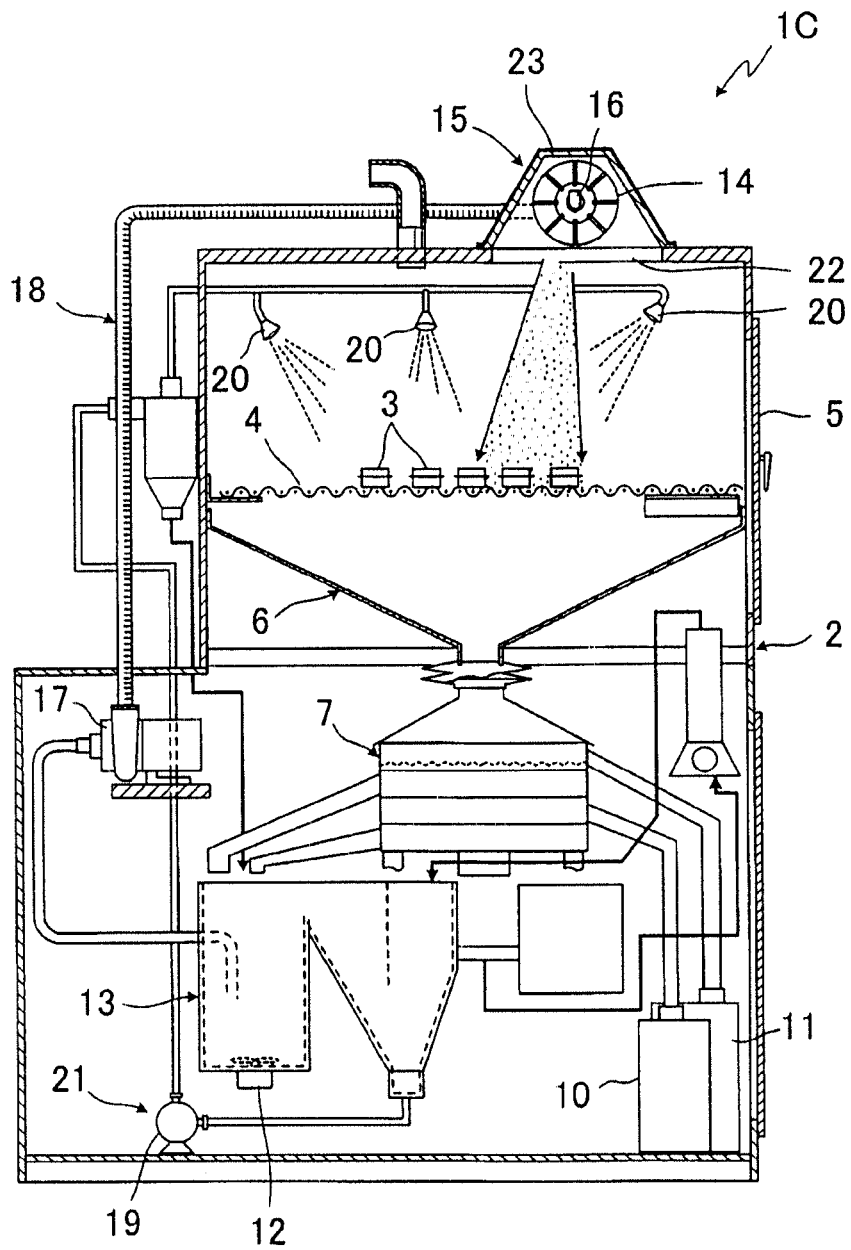


Fig.15

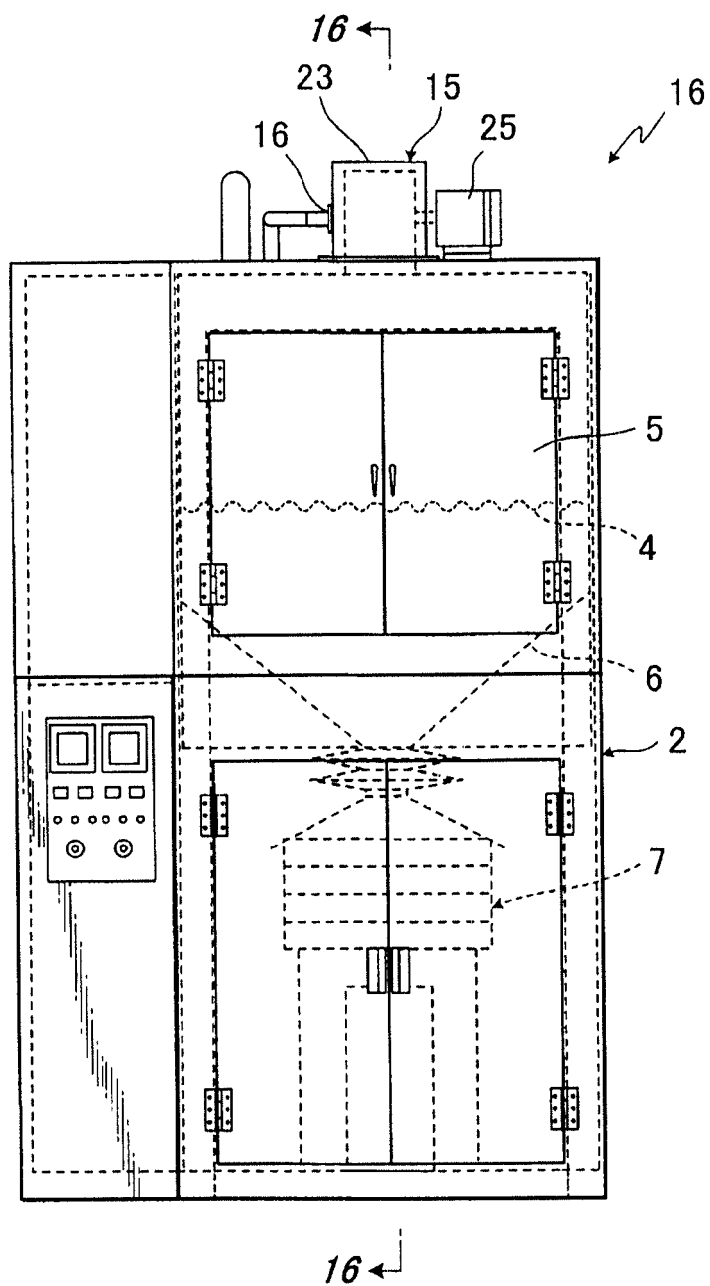


Fig. 16

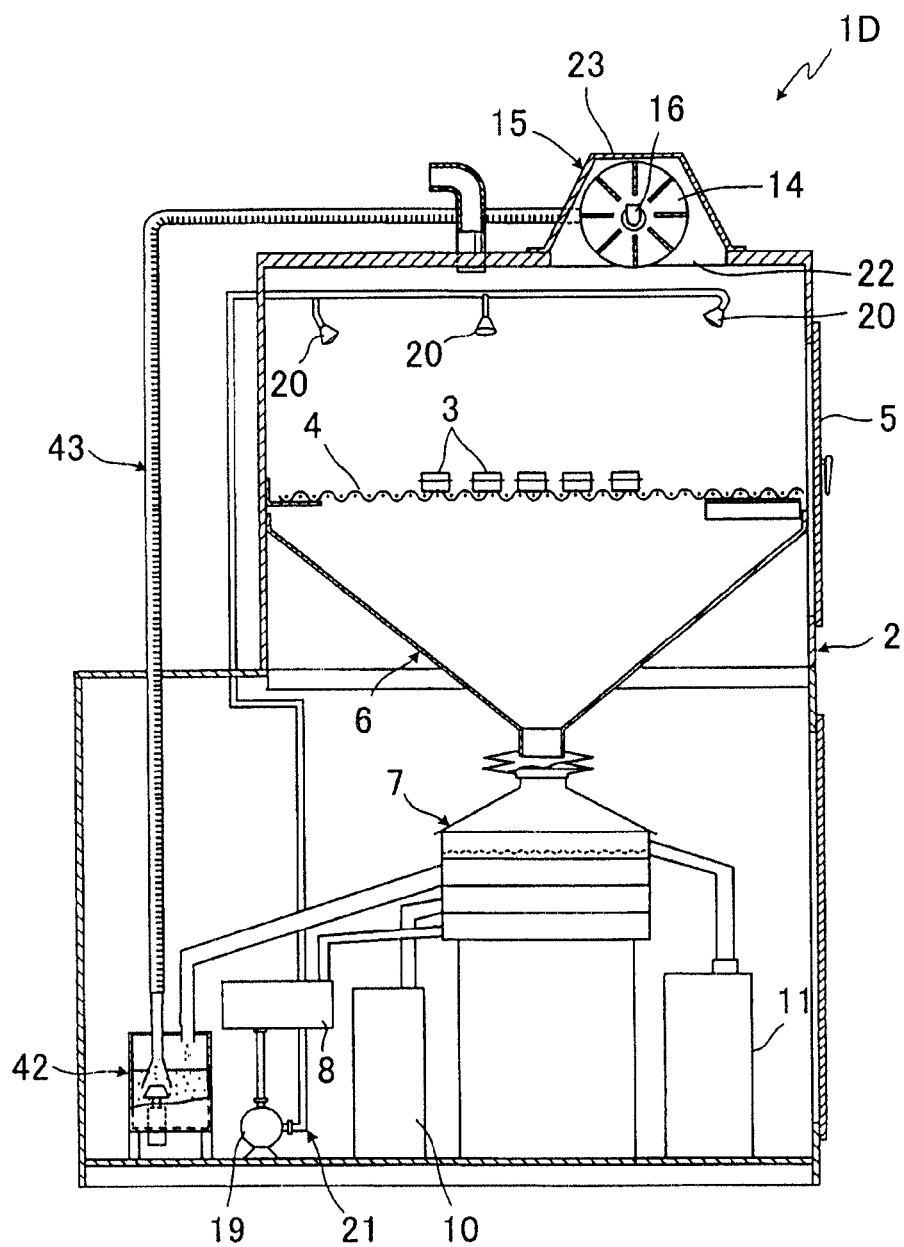


Fig. 17

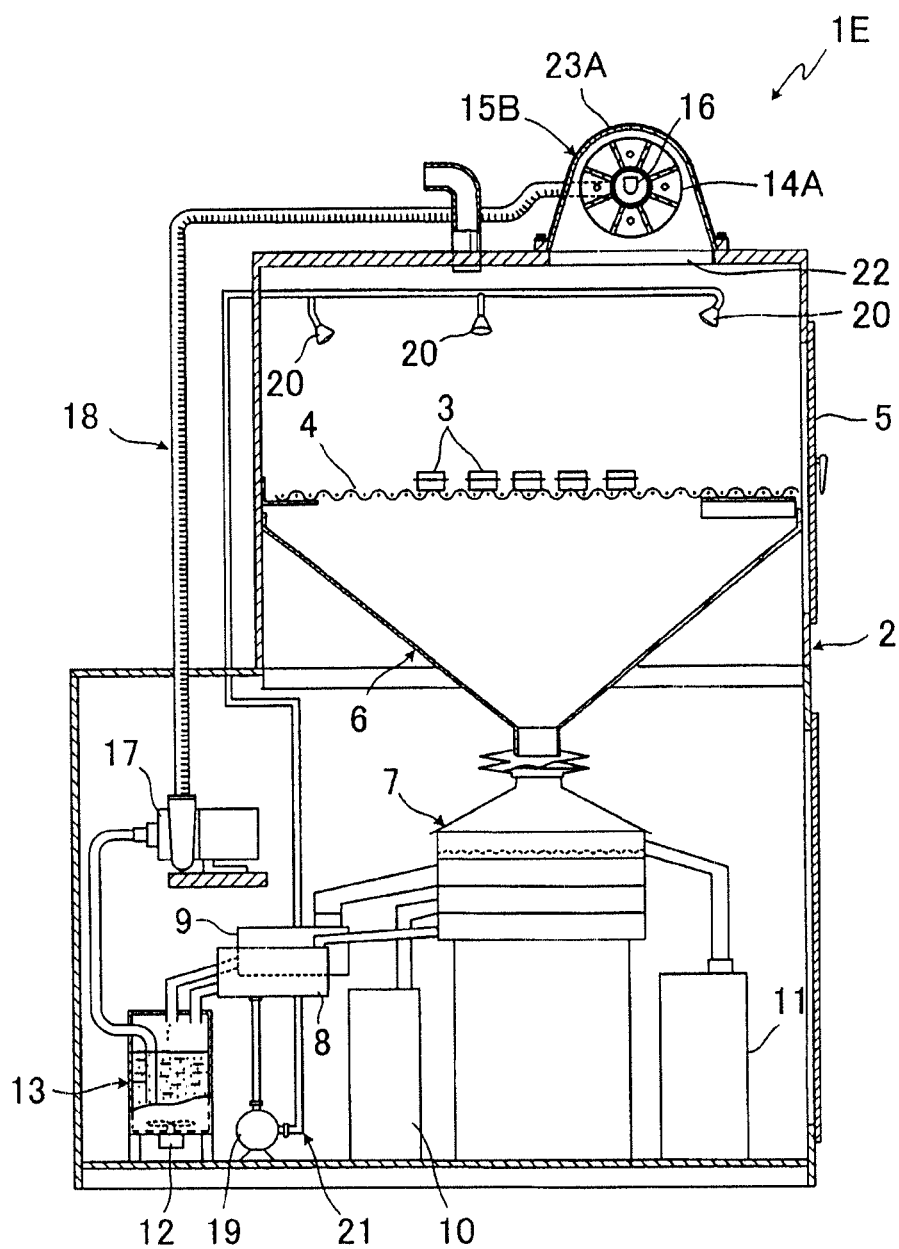


Fig. 18

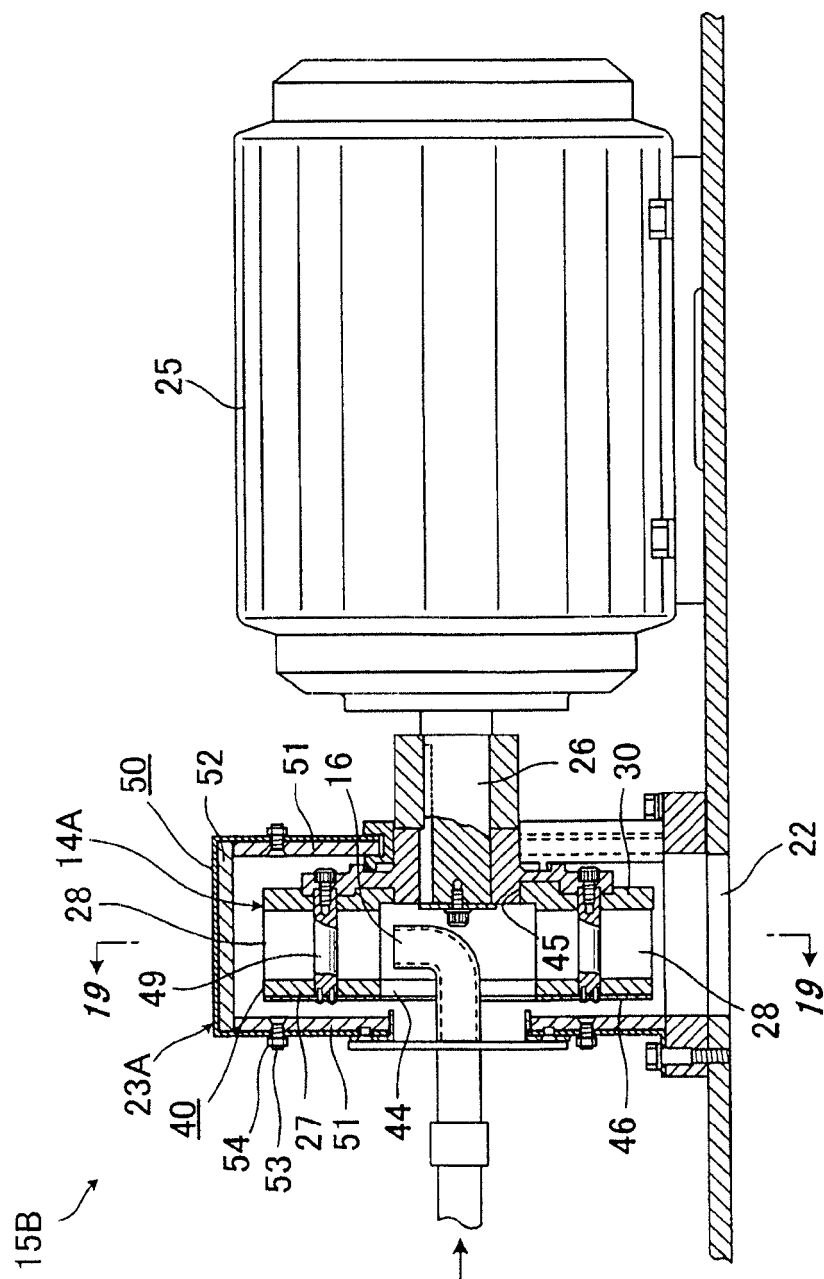


Fig. 19

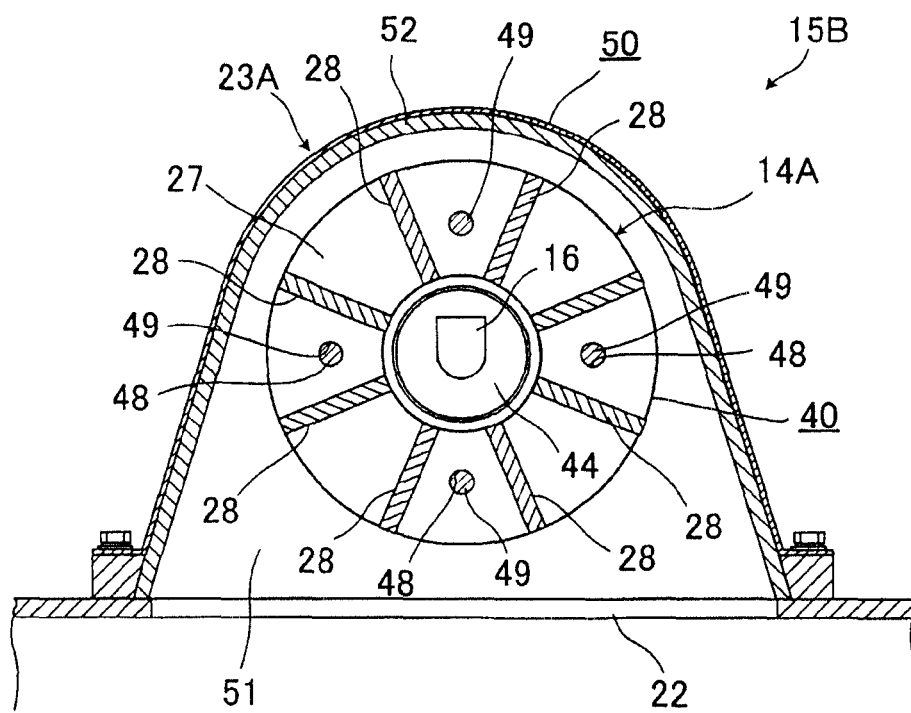


Fig.20

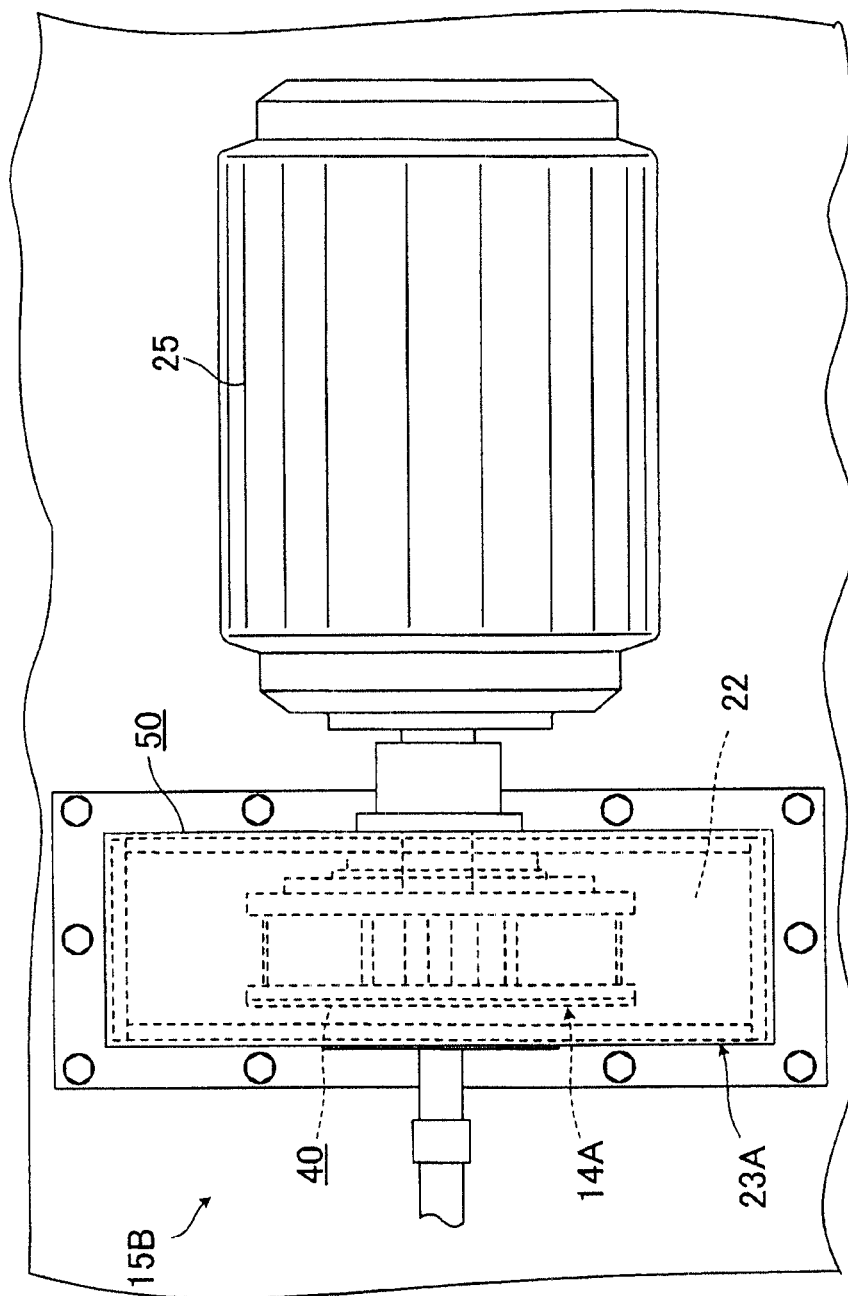


Fig.21

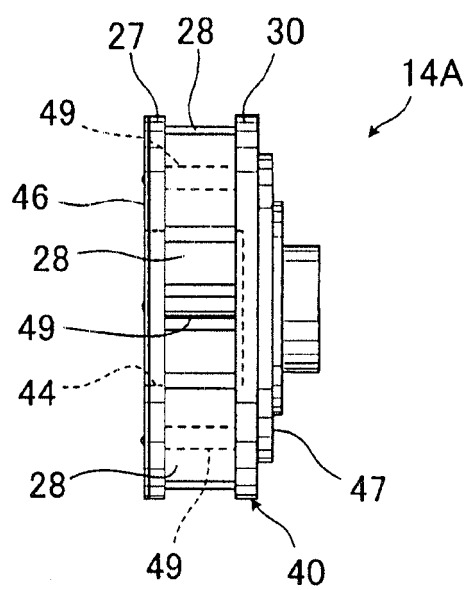


Fig. 22

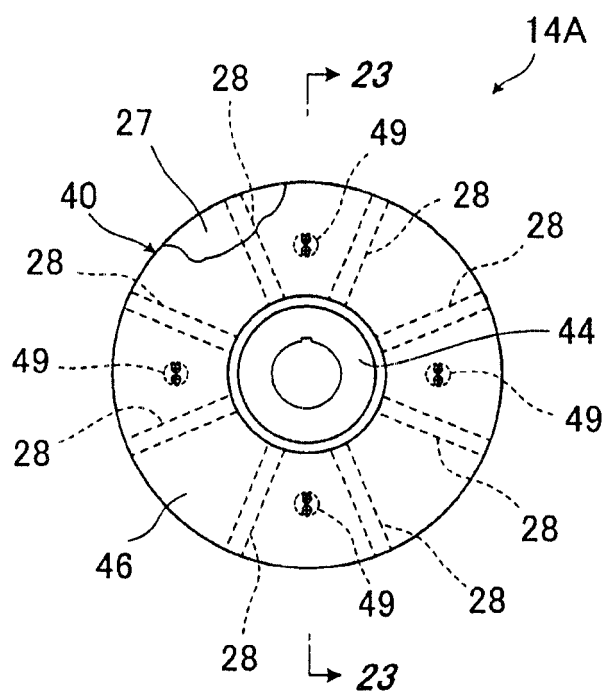


Fig. 23

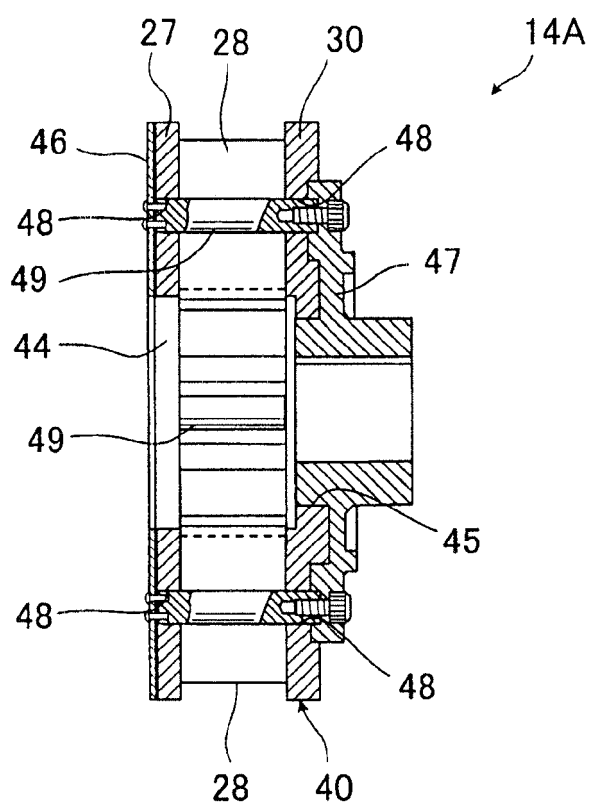


Fig.24

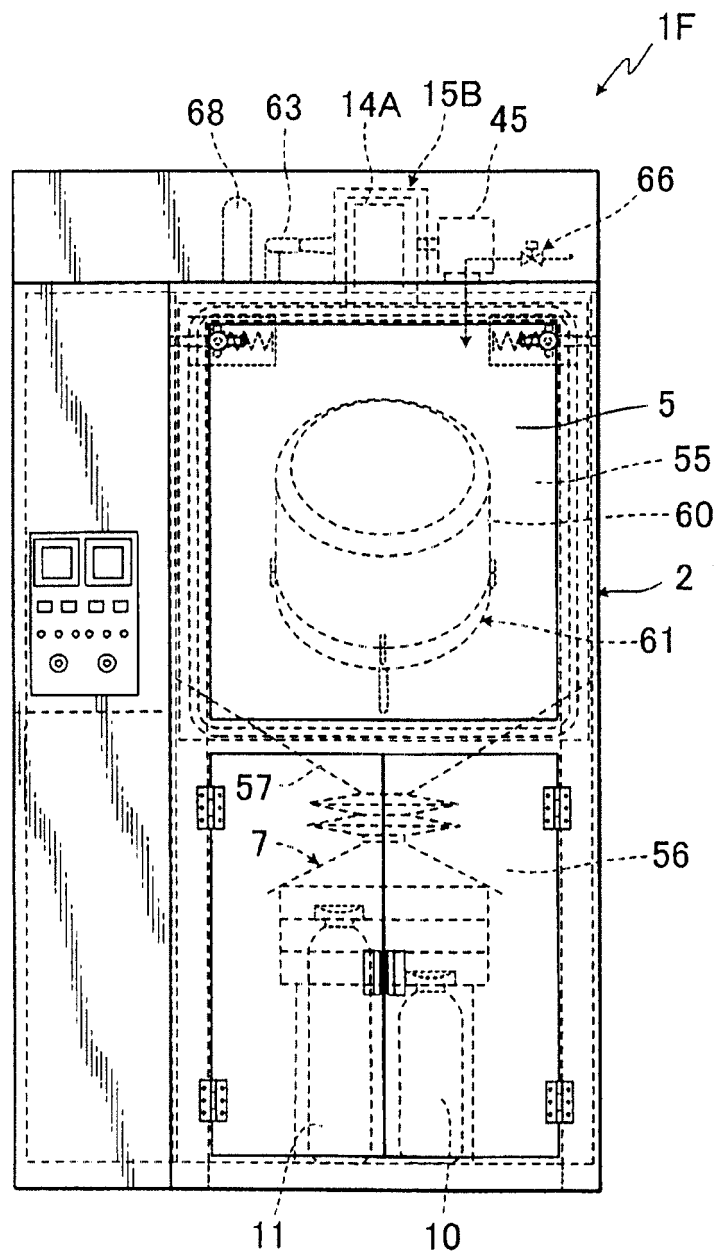


Fig.25

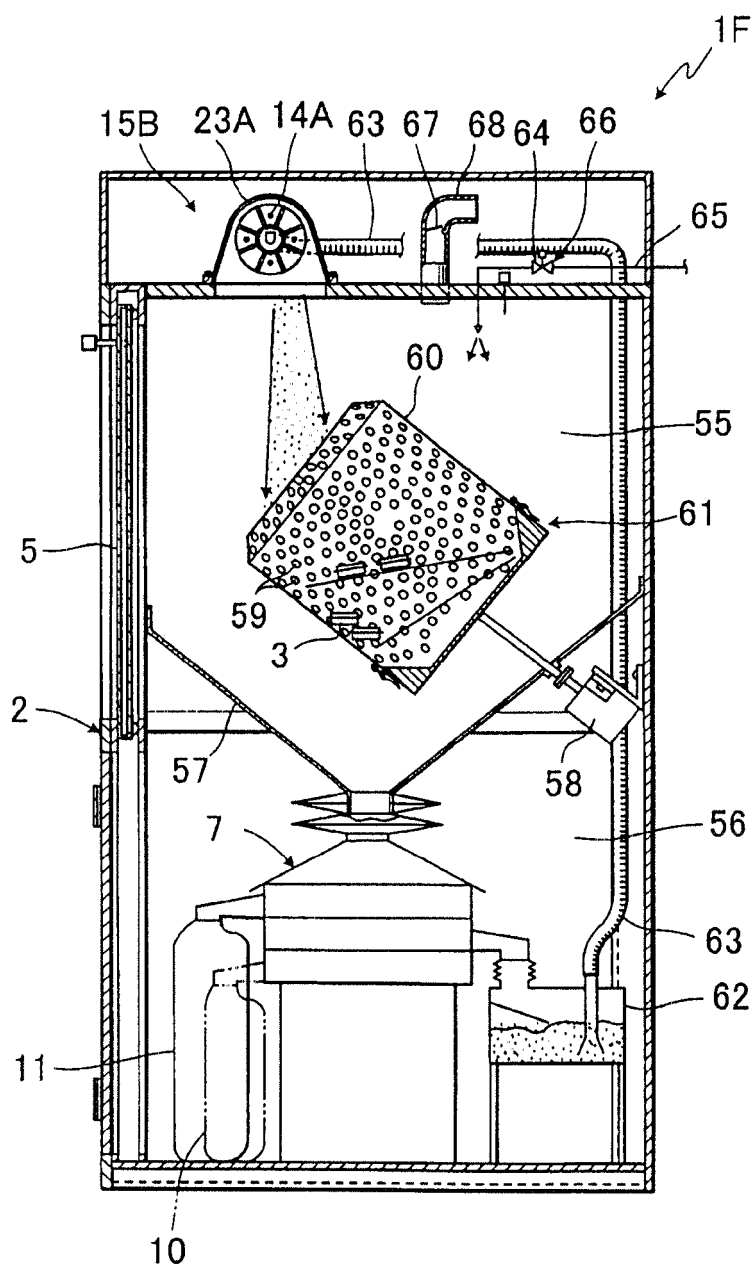
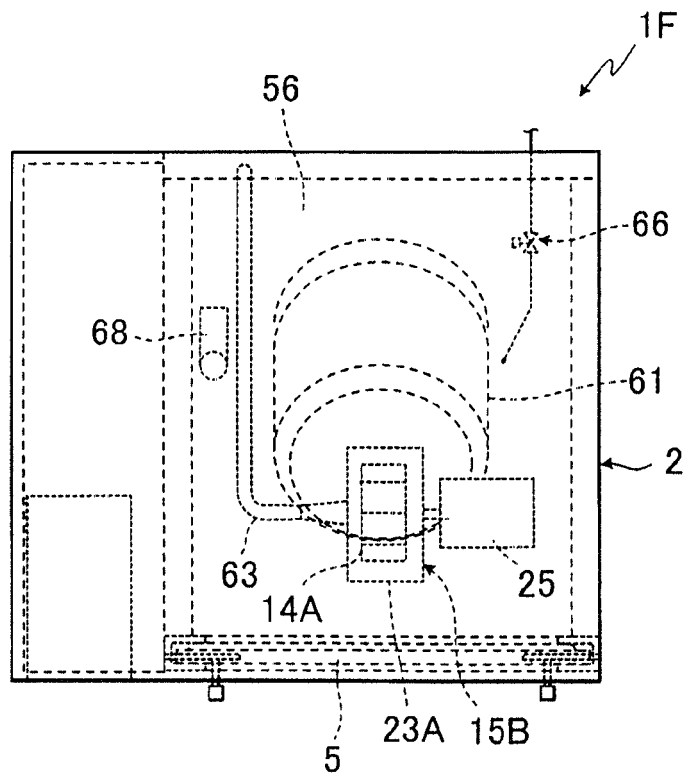


Fig.26



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2005/023394

A. CLASSIFICATION OF SUBJECT MATTER

B24C5/06 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B24C5/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2006
Kokai Jitsuyo Shinan Koho	1971-2006	Toroku Jitsuyo Shinan Koho	1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 51-30316 B1 (Inoue Japax Research Inc.), 31 August, 1976 (31.08.76), Column 1, line 34 to column 2, line 4, column 2, lines 17 to 26 (Family: none)	1-8
Y	JP 2003-326460 A (Fuji Machinery Co., Ltd.), 18 November, 2003 (18.11.03), Full text; all drawings (Family: none)	1-8

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
29 March, 2006 (29.03.06)Date of mailing of the international search report
11 April, 2006 (11.04.06)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2005/023394

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 14787/1982 (Laid-open No. 117347/1983) (Sinto Kogyo Ltd.), 10 August, 1983 (10.08.83), Description; page 2, line 8 to page 3, line 8; Figs. 1, 2 (Family: none)	2, 4, 6
Y	JP 2001-212762 A (Sinto Kogyo Ltd.), 07 August, 2001 (07.08.01), Par. No. [0006]; Figs. 1, 2 (Family: none)	3
A	JP 7-5980 Y2 (Nissanki Co., Ltd.), 15 February, 1995 (15.02.95), Full text; all drawings (Family: none)	1-8
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 86463/1974 (Laid-open No. 15087/1976) (Kabushiki Kaisha Otani Denki Seisakusho), 03 February, 1976 (03.02.76), Description; page 3, line 12 to page 4, line 13 (Family: none)	1-8
A	CD-ROM of the specification and drawings annexed to the request of Japanese Utility Model Application No. 72779/1993 (Laid-open No. 37564/1995) (Sinto Kogyo Ltd.), 11 July, 1995 (11.07.95), Figs. 1, 2 (Family: none)	2, 4, 6
A	JP 51-1592 Y1 (The Wheelabrator Corp.), 17 January, 1976 (17.01.76), Fig. 1 (Family: none)	2, 4, 6

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H3234470 B [0002]