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(54)

SELF-SERVICE GRAIN MILL WITH REDUCED ENVIRONMENTAL IMPACT

(57)

A self-service grain mill with reduced environmental impact comprises, in a cabinet (1) provided with a front wall (2), a hopper (11), situated above, for feeding grains to be ground, a pair of grinding wheels (13, 14), one of which is moved by a gearmotor (19), both placed inside a casing (15) of the grinding wheels which communicates at the top with the hopper (11) for feeding the grains and has a bottom (17) with a passage opening (18), and a compartment (5) for unloading flour into a bag. The casing (15) of the grinding wheels is positioned inside a container (20) having sound-absorbing walls. The container (20) communicates with the outside of the cabinet (1), on one side, by means of an air suction tube (21) sucking from the environment, and on the other side by means of a duct (22) for expelling air into the environment.

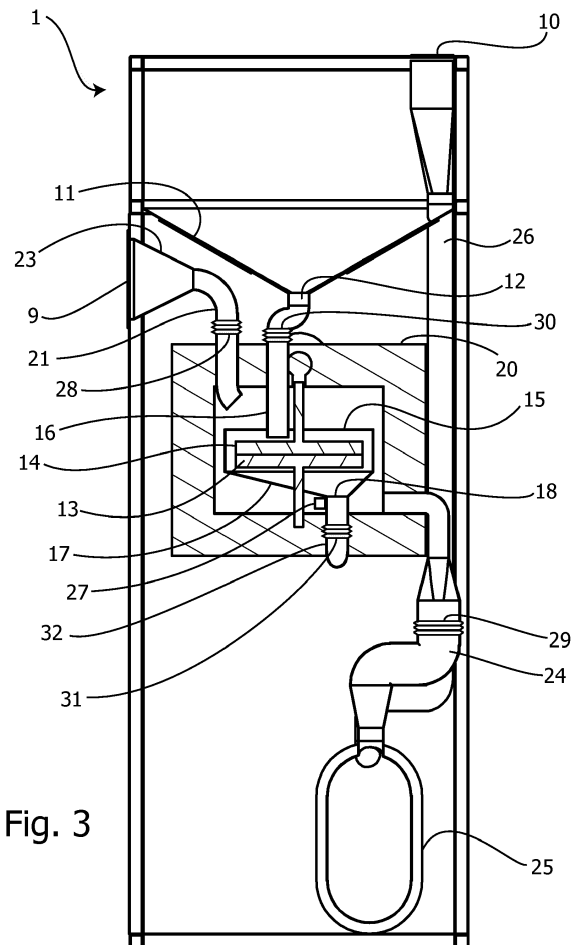


Fig. 3

Description

[0001] The present invention relates to a self-service grain mill with reduced environmental impact. The specification of cereals is not intended as exclusive for the mill because the invention could also be used for grinding rice or other grains, such as legumes. The grain mill can be intended for installation in a commercial establishment.

[0002] JP 2009 050832 A is a prior art document considered to be the closest to the present invention, as defined in the preamble of claim 1. However, it does not contain any indication of the distinctive features in the characterizing part of the invention.

[0003] JP H11 42438 A, filed by the same applicant as the previous document, describes a machine with features contained in the preamble of claim 1. This document also does not contain any indication of the distinctive features in the characterizing part of the invention.

[0004] US 2007/108321 A1 discloses a mill with air recirculation and noise reduction during grinding, thanks to sound-absorbing mounting supports.

[0005] CN108160204A describes a grain mill in which an engine with a driving shaft is positioned on a storage box. Next to the motor shaft, on the opposite side to the motor, there is a housing with a hopper at the top and an outlet hole for the ground cereals at the bottom. The housing contains grinding wheel fixed parts and a grinding wheel rotating part that is connected to the motor shaft. The grinding wheel fixed parts are arranged on the left and right sides of the grinding wheel rotating part. The housing has a wall with an internal layer made of sound-absorbing material, such as cotton or polyurethane.

[0006] The grain mill described in CN108160204A does not present effective acoustic insulation, because the sound-absorbing material is in one piece with the housing and in contact with both the fixed parts and the rotating part of the grinding wheel. The noise produced by the grinding due to friction of the cereal between the parts of the grinding wheel and the same vibrations of both the motor and the driving shaft in contact with the housing, is immediately transmitted inside with acoustic pollution of the environment.

[0007] Furthermore, powders produced in the grinding process are likely to disperse in the surrounding environment with evident negative consequences for people and things. Both the first and the second drawback are particularly critical if the grain mill is located within a store, where customers could buy cereals, such as wheat and corn, but also rice, and personally proceed with their grinding.

[0008] In this context, the technical task underlying the present invention is to propose a grain mill which overcomes the drawbacks of the prior art mentioned above.

[0009] In particular, it is an object of the present invention to provide a grain mill that does not exceed the permitted noise limits.

[0010] Another object of the invention is to not disperse

the dust produced by grinding in the surrounding environment.

[0011] A further object of the present invention is to propose a grain mill which has a semiautomatic operation so as to interact with customers and collect the money for its use. The specified technical task and the above said purposes are substantially achieved by a self-service grain mill with reduced environmental impact, comprising, in a cabinet provided with a front wall,

- a hopper, located above, for feeding grains to be ground,
- a pair of grinding wheels, one of which is moved by a gearmotor, both placed inside a casing of the grinding wheels which communicates at the top with the hopper through a conduit for feeding the grains and has a bottom with a passage opening,
- a compartment communicating at the top with the casing of the grinding wheels through a duct connected to said passage opening for unloading flour, the compartment being open in the front wall of the cabinet for positioning a bag to collect the flour, and
- a vibrating device acting on the casing of the grinding wheels,

in which said casing of the grinding wheels is positioned inside a container having sound-absorbing walls.

[0012] It is understood that, advantageously, the pair of grinding wheels is contained within the casing of the grinding wheels which partially absorbs the noise produced during grinding. This noise is further if not completely reduced by the container with sound-absorbing walls that surround not only the casing of the grinding wheels but also the vibrating device, allowing only the passage for the entry of the grains and the exit of the flour.

[0013] In addition, the container communicates with the outside of the cabinet, on the one hand, through an air intake pipe from the environment, and on the other, through a duct for expelling the air into the environment. In order not to disperse the dust produced during grinding in the environment surrounding the expulsion duct, an air filter is connected.

[0014] Further features and advantages of the present invention will become most clear from the indicative, and therefore non-limiting, description of a preferred but not exclusive embodiment of a self-service grain mill with reduced environmental impact as illustrated in the accompanying drawings wherein:

- figure 1 is an axonometric view of a grain mill according to the present invention;
- figure 2 is a right lateral perspective view of figure 1 with a cabinet panel removed; and
- figure 3 is a central vertical cross-section of figure 2.

[0015] Consideration is taken on figure 1 which shows the grain mill according to the present invention, comprising a cabinet indicated generally with 1. The cabinet

1, represented as prismatic in shape, has, among others, a front wall 2, a left side wall 3 and an upper cover 4. In the front wall 2 a compartment 5 is shown for positioning a bag (not shown) for collecting flour, a user interface display 6, and an automatic pay station 7 for the payment of the service offered by the grain mill according to the invention. The automatic pay station 7 can be provided in the event that the grain mill is intended to be installed in a commercial operation, such as for example a supermarket. A transparent window 8 is preferably located in the front wall 2 of the cabinet 1 so that the user can view the interior, as will be seen below.

[0016] In the left side wall 3, a first opening complete with filters for the entry of air is indicated with 9, and on the upper cover 4 there is a second opening 10, also complete with filters, for expelling the air. It should be clear that these openings can also be made in other parts of the cabinet 1.

[0017] Reference is made now to figures 2 and 3 which are, respectively, a right lateral perspective view of figure 1, for reasons of clarity without a panel in a cabinet wall opposite to the left side wall 3, and a central vertical cross-section of figure 2. Below the upper cover 4, the cabinet 1 comprises a hopper 11 for feeding the cereals to be ground, having a bottom wall converging towards a passage 12 with solenoid valve for the cereal grains loaded in the hopper 11. On the external side of the hopper 11 resistances 110 are located to heat the hopper and remove a certain degree of moisture from the cereal seeds to improve their grinding. A pair of grinding wheels 13, 14 is placed inside a casing 15 of the grinding wheels, which communicates above with the hopper 11 through a feeding duct 16. The grinding wheels 13, 14 can be made of any suitable material, such as stone, composite and steel. The casing 15 has a bottom 17 with a passage opening 18.

[0018] Grinding wheel 14 is traditionally connected to a gearmotor unit, indicated as 19 in figure 2 and not further shown or described. The casing 15 of the grinding wheels is positioned inside a container 20, having sound-absorbing walls that are crossed by the feeding duct 16 and other pipes, as will be seen below.

[0019] The container 20, which, by way of example, is represented in a prismatic form, communicates with the outside of the cabinet 1, on the one hand, by means of a tube 21 for the intake of air from the environment communicating with the first opening 9 in the left side wall 3 of the cabinet and, on the other, by means of an air expulsion duct 22 for expelling the air, the air expulsion duct 22 communicating with the outside of the cabinet 1 through the second opening made in the upper cover 4 of the cabinet 1.

[0020] The air suction tube 21, which is shown crossing the container 20 at the top, has a flared fitting 23 covered by an inlet air filter, which covers the first opening 9 in the left side wall 3 of the cabinet 1.

[0021] The air expulsion duct 22 for expelling the air from inside the container 20 comprises a first section 24,

internally provided with an axial fan (not shown), and, downstream of this axial fan, a dust filtering device 25 for filtering dust and a second section 26 at the outlet of the dust filtering device 25. The second section 26 of the air expulsion duct 22 ends in the second opening 10 in the upper cover 4. The dust filtering device 25 is provided to trap the flour which could possibly escape from the casing 15 of the grinding wheels through the passage areas of the grinding wheel supports, of the grain duct 16 and of a discharge tract 32 for discharging the flour. The discharge tract 32 is connected to the passage opening 18 in the bottom 17 of the casing 15.

[0022] To avoid clogging of the casing 15 due to a reduction in the outflow of flour through the discharge tract 32, it is convenient that the casing 15 is subjected to vibration by means of a vibrating device indicated as 27, acting through an eccentric on the lower part of the casing 15 of the grinding wheels in the vicinity of the discharge tract 32. Since the container 20 is also affected by the vibration, it is appropriate that corrugated sections are provided for all the tubes entering or exiting the container 20. These corrugated sections of tube are indicated with 28, 29, 30, 31 in the suction tube 21, in the expulsion duct 22, in the grain feeding duct 16, and in the flour discharge tract 32, respectively.

[0023] The dust filtering device 25 may employ water filtration or fabric filtration.

[0024] The air circuit formed by the suction tube 21, the container 20 and the expulsion duct 22 is intended to cool the casing 15 of the grinding wheels, and therefore the grinding wheels themselves, and to possibly remove the dust escaping from the casing 15. The compartment 5 open in the front wall 2 of the cabinet communicates at the top with the casing 15 via the flour discharge tract 32.

[0025] The compartment 5 is used for the introduction and removal of a bag (not shown) for collecting the flour from the grinding wheels 13 and 14.

[0026] Grinding takes place in the traditional way. By lifting the upper cover 4 of the cabinet 1, the grains of corn to be ground can be poured into the hopper 11. Once the lid is closed, the grains are visible through the transparent window 8. A collection bag will be placed in compartment 5 to receive the flour as a grinding result. Once the machine is activated through the user interface display 6, the grinding proceeds until the grains fed through the hopper 11 are exhausted.

[0027] The grinding operation is very muffled in its noise thanks to the container 20 made of sound-absorbing material. The container 20 could reduce the cooling of the grinding wheels. For avoiding this drawback, the air circulation system is provided comprising the air suction tube 21 for sucking in air from the environment and the air expulsion duct 22 for expelling the air, both communicating with the outside of the cabinet 1. The dust filtering device 25, provided in the air expulsion duct 22, significantly reduces the dispersion of flour in the environment.

[0028] As can be understood from the foregoing description, the self-service mill according to the present invention can be used directly by the end user without the assistance of employees. For example, the cereal can be stored in the hopper; through the interface the user can select the desired quantity and the passage 12 with solenoid valve will interrupt the supply of cereals according to the flow rate of the feeding duct 16. Alternatively, the cereals can be discreetly fed into the hopper in the desired quantity of cereals to be ground.

Claims

1. Self-service grain mill with reduced environmental impact, comprising, in a cabinet (1) provided with a front wall (2),
 - a hopper (11), situated above, for feeding grains to be ground,
 - a pair of grinding wheels (13, 14), one of which is moved by a gearmotor (19), both placed inside a casing (15) of the grinding wheels which communicates at the top with the hopper (11) through a feeding duct (16) for feeding the grains and has a bottom (17) with a passage opening (18),
 - a compartment (5) communicating at the top with the casing (15) of the grinding wheels through a discharge tract (32) connected to said passage opening (18) for unloading flour, the compartment (5) being open in the front wall (2) of the cabinet (1) for positioning a bag to collect the flour, and
 - a vibrating device (27) acting on the casing (15) of the grinding wheels, **characterized in that** said casing (15) of the grinding wheels is positioned inside a container (20) having sound-absorbing walls.
2. Self-service grain mill according to claim 1, wherein said container (20) communicates with the outside of the cabinet (1), on one side, by means of an air suction tube (21) sucking from the environment, and on the other side by means of an air expulsion duct (22) for expelling air into the environment.
3. Self-service grain mill according to claim 2, wherein said air suction tube (21) has a fitting (23) flared towards the outside and covered by an inlet air filter.
4. Self-service grain mill according to claim 2, wherein provided in said air expulsion duct (22) for expelling air into the environment is an axial fan and, downstream of this axial fan, a dust filtering device (25).
5. Self-service grain mill according to claim 4, wherein said dust filtering device (25) uses water filtration.
6. Self-service grain mill according to claim 4, wherein said dust filtering device (25) uses fabric filtration.
7. Self-service grain mill according to claim 1, in which first corrugated sections (30, 31) are provided respectively in the feeding duct (16) for feeding the grains and in the discharge tract (32) for unloading the flour.
8. Self-service grain mill according to claim 2, wherein second corrugated sections (28, 29) are provided in the air suction pipe (21) and in the duct (22) for expelling air into the environment, respectively.
9. Self-service grain mill according to claim 1, wherein a display (6) for interfacing with the user is located on the front wall (2) of the cabinet (1).
10. Self-service grain mill according to claim 1, **characterized in that** the grain mill is intended for installation in a shop, an automatic pay station (7) for the payment of its use being placed on said front wall (2) of the cabinet (1).

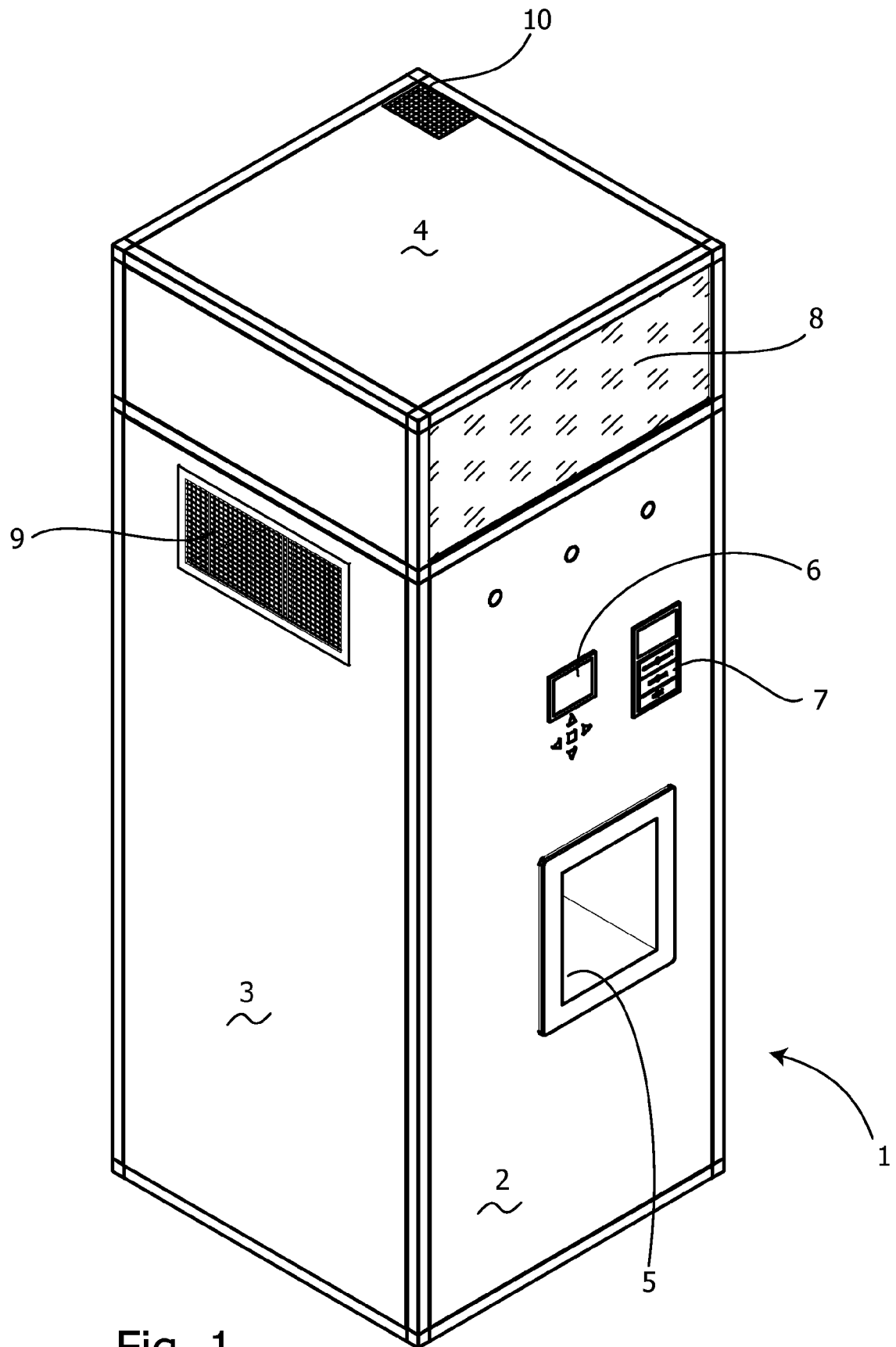


Fig. 1

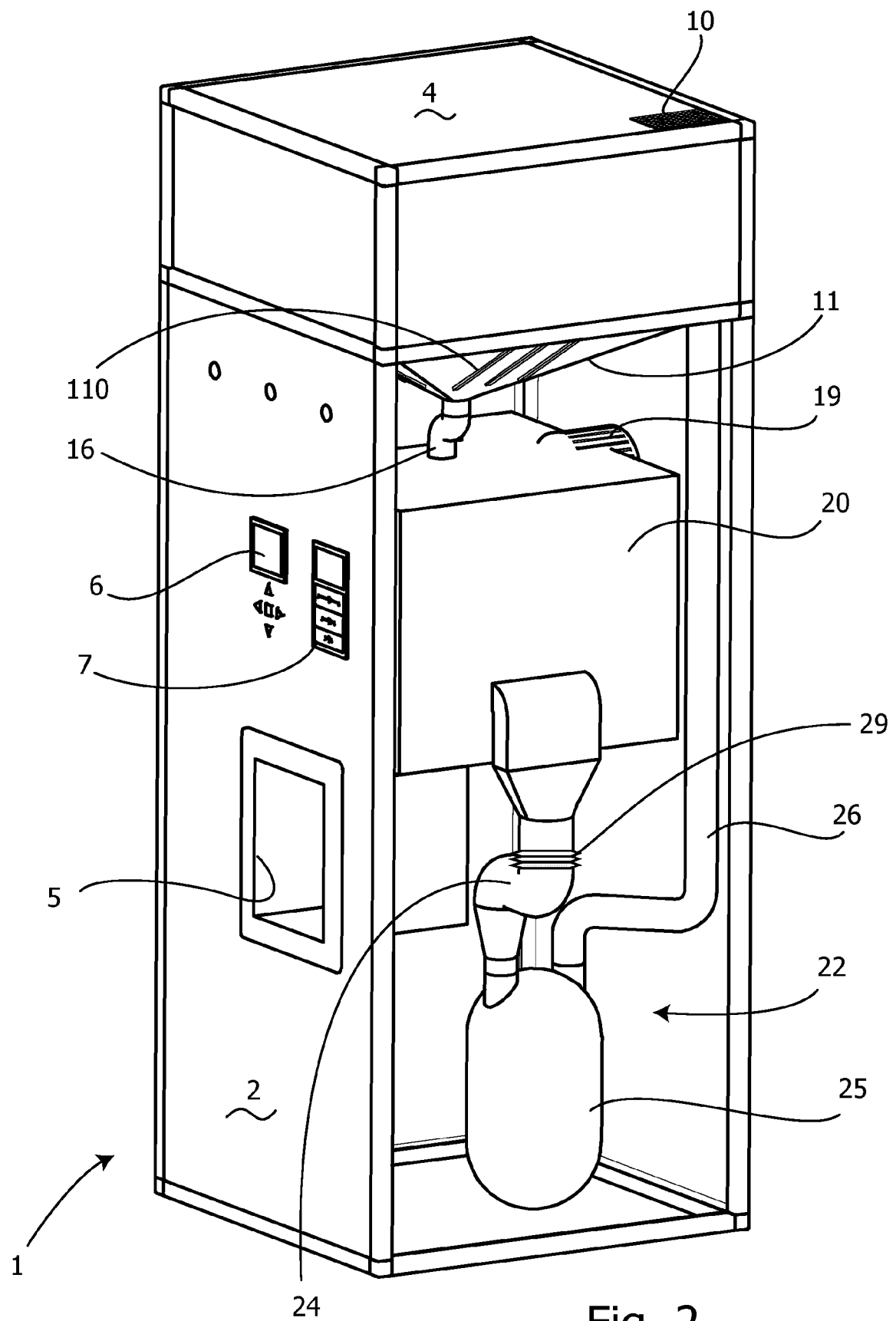
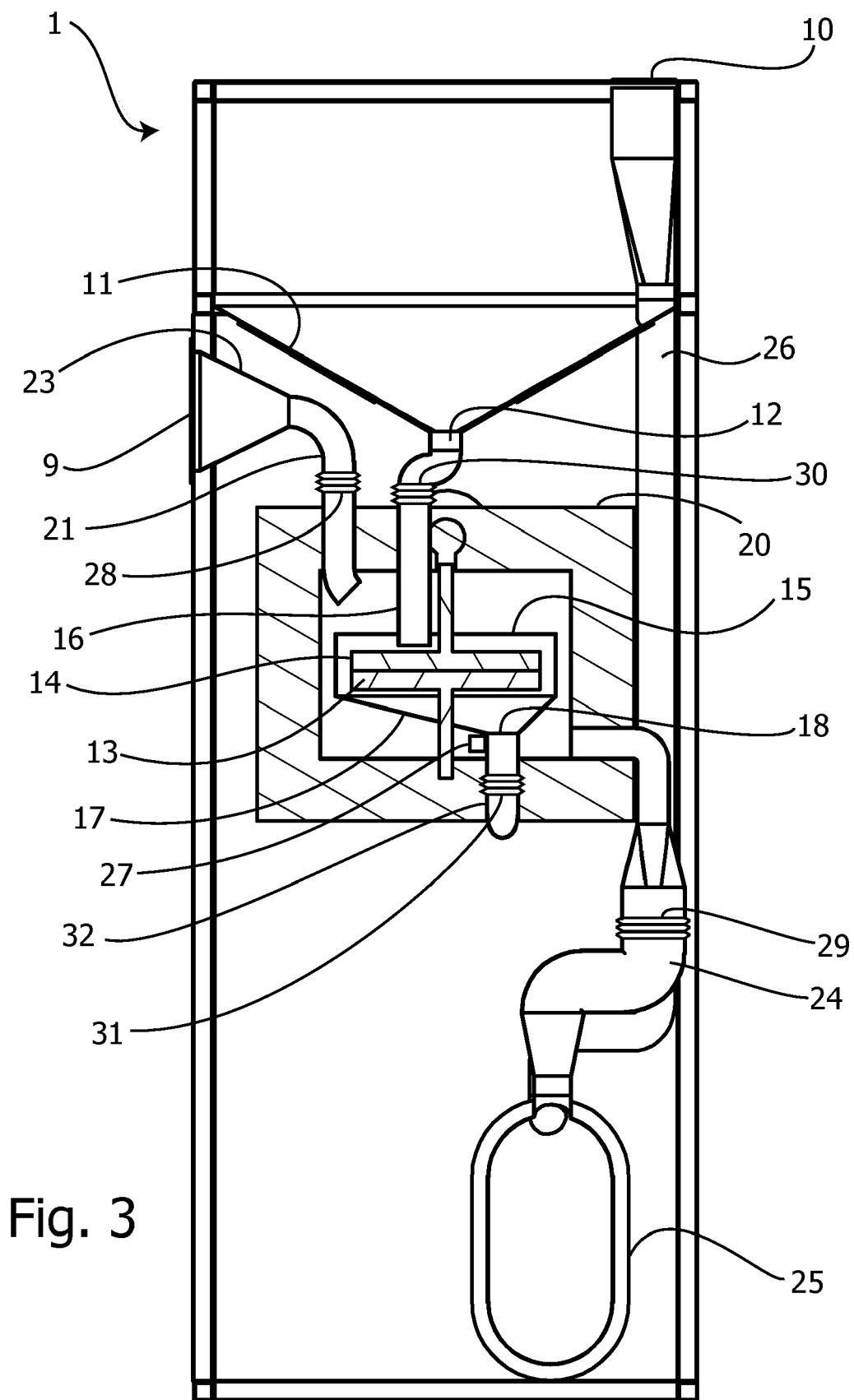


Fig. 2





EUROPEAN SEARCH REPORT

Application Number
EP 20 18 0157

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	JP 2009 050832 A (ISEKI AGRICULT MACH) 12 March 2009 (2009-03-12) * abstract; figures 2,3,4 * * paragraphs [0014], [0017], [0018], [0020] *	1-10	INV. B02C7/13 B02C7/18 B02C11/08
Y	JP H11 42438 A (ISEKI AGRICULT MACH) 16 February 1999 (1999-02-16) * abstract; figures 1,3,4 *	1-10	
Y,D	CN 108 160 204 A (WANG KE) 15 June 2018 (2018-06-15) * abstract; figure 1 *	1-10	
Y	US 2007/108321 A1 (BOOTH RODNEY I [AU] ET AL) 17 May 2007 (2007-05-17) * paragraph [0046]; figures 1,2 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			B02B G07F B02C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 October 2020	Examiner Iuliano, Emanuela
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			

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ON EUROPEAN PATENT APPLICATION NO.**

EP 20 18 0157

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2009050832 A	12-03-2009	JP 4998152 B2 JP 2009050832 A	15-08-2012 12-03-2009
JP H1142438 A	16-02-1999	JP 3765165 B2 JP H1142438 A	12-04-2006 16-02-1999
CN 108160204 A	15-06-2018	NONE	
US 2007108321 A1	17-05-2007	CA 2568313 A1 US 2007108321 A1	16-05-2007 17-05-2007

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2009050832 A [0002]
- JP H1142438 A [0003]
- US 2007108321 A1 [0004]
- CN 108160204 A [0005] [0006]