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(54) **Machine for pumping mortar, plaster, concrete or similar**

(57) A machine (1) is provided for pumping mortar, plaster, concrete or the like comprising: a hopper (2) for conveying the mortar in the fluid state to the bottom (2a) of the hopper (2), mechanical members (3), positioned on the bottom (2a) of the hopper (2), and comprising conveying means (3a) of the mortar, an outlet opening (4) for the mortar in the fluid state positioned near the bottom (2a) of the hopper (2), the conveying means (3a) defining a movement trajectory (3b) of the mortar in the fluid state towards the outlet opening (4), a transfer pipe (6) defining a transfer channel (6a) of the mortar in the fluid state, positioned beyond the outlet opening (4), and during use, in fluidic through communication with said outlet (4), drive means (5) suitable to move, without dismantling, the mechanical members (3) and the transfer pipe (6) in a direction away from the bottom (2a) of the hopper (2) to facilitate cleaning of the hopper (2),in addition the distancing of the transfer pipe (6) is suitable to free the outlet opening (4) so as to allow, for cleaning operations, the output of the mortar from the hopper (2) through the outlet opening (4) towards the outside environment and not into the transfer channel (6a).

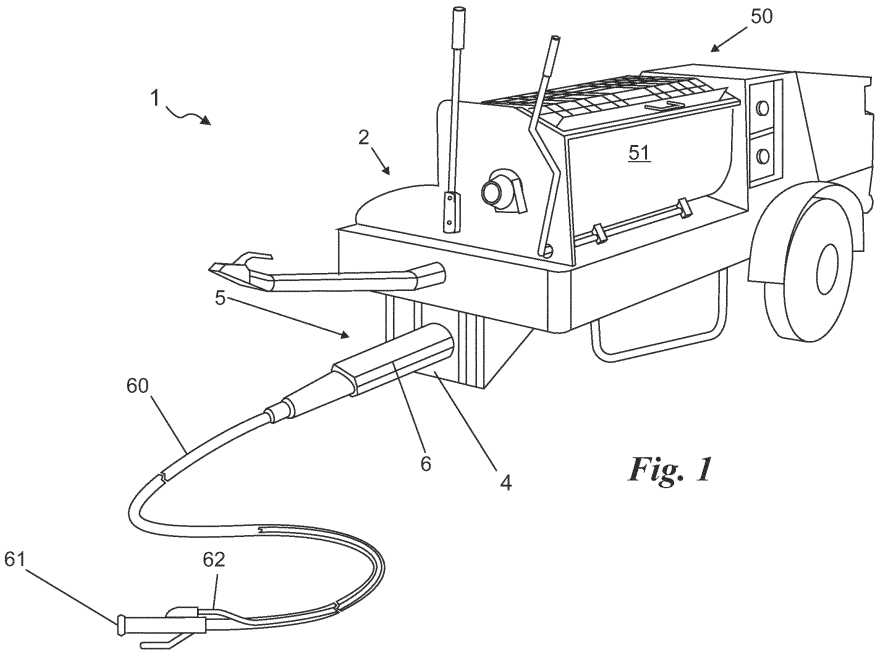


Fig. 1

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Description

[0001] The present invention relates to a machine for pumping mortar, plaster, concrete or similar of the type specified in the preamble of the first claim.

[0002] Various types of machines for pumping mortar, plaster, concrete, self-levelling screeds and the like, hereinafter simply called mortars, are currently known of.

[0003] In particular, plastering machines are known of. Such plastering machines comprise a first container, inside which binders, aggregates and water are placed and mixed to prepare mortar or the like in the fluid state, in particular a thick fluid. Such first container comprises a mixer, suitable for mixing said components. The mortar is then fed, still in the fluid state, into a hopper below.

[0004] In said hopper the mortar is further mixed and conveyed by said hopper, to the bottom thereof. From the bottom of the hopper the mortar is then conveyed to a pump.

[0005] The pump is lastly suitable to spray the mortar with the help of a jet of compressed air, at a wall or the like to be covered by the mortar and in particular plastered. Similar machines for pumping mortar, plaster, concretes or the like are described for example in the patent applications MA-A-20978, US-A-3807706A, DE-A-10011487, DE-A-3809661.

[0006] Said plastering machines achieve enormous advantages in terms of production speed and simplicity of use.

[0007] For such reasons, said machines are widespread throughout the world and are available in many versions and sizes.

[0008] The prior art described above has several significant drawbacks.

[0009] In fact, such machines must be cleaned of the residual mortar after each work session, so either daily or twice a day. Not cleaning the machine would, in fact, result in the solidification of the mortar, in particular on the bottom of the hopper, and the consequent complete obstruction of the machine itself.

[0010] To such purpose, said machines have a secondary output, placed on the bottom of the hopper and with the output direction substantially perpendicular to the direction of the main extension axis of the auger, which permits the emptying of the mortar in the cleaning phase.

[0011] Cleaning is then carried out by operators using jets of water, by means of high pressure water jets or the like on the bottom of the hopper.

[0012] However, such cleaning is complicated by the interaction of the auger or of the mechanical members present, and the mortar, which often forms hardened blocks at such points.

[0013] At the secondary output blocks of hardened mortar difficult to dissolve, which require mechanical intervention, are also frequently formed.

[0014] Furthermore said secondary output is often complex and awkward to open.

[0015] All the said drawbacks slow down the cleaning phase of the machine making it very difficult and thus expensive.

[0016] To partially overcome said drawbacks the patent application CH-A-667036 describes a machine for pumping mortar, plaster or the like equipped with a rapid dismantling system making it possible to separate the individual pumping components for cleaning or replacement thereof. This system however requires the operator to manually move such components thus coming into direct contact with the mortar and increasing the cleaning time in any case.

[0017] In this situation the technical task according to the present invention is to devise a machine for pumping mortar, plaster, concrete or the like able to substantially overcome the drawbacks mentioned.

[0018] Within the sphere of said technical purpose one important aim of the invention is to obtain a machine for pumping mortar, plaster, concrete or the like which is quick and easy to clean.

[0019] The technical purpose and specified aims are achieved by a machine for pumping mortar, plaster, concrete or the like as claimed in the appended Claim 1. Preferred embodiments are described in the dependent claims.

[0020] The characteristics and advantages of the invention are clearly evident from the following detailed description of a preferred embodiment thereof, with reference to the accompanying drawings, in which:

Fig. 1 shows an assembly of the machine according to the invention;
Fig. 2a shows an axonometric view of a first example of a machine according to the invention in a first configuration;
Fig. 2b is a view of Fig 2a in a second configuration;
Fig. 3a shows a sagittal cross-section of the first example of a machine according to the invention in a first configuration;
Fig. 3b is a view of Fig 3a in a second configuration;
Fig. 4a shows an axonometric view of a second example of a machine according to the invention in a first configuration;
Fig. 4b is a view of Fig 4a in a second configuration;
Fig. **5a** shows a sagittal cross-section of the second example of the machine according to the invention in a first configuration; and
Fig. **5b** is a view of Fig 5a in a second configuration.

[0021] With reference to said drawings, reference numeral 1 globally denotes the machine for pumping mortar, plaster, concrete or the like according to the invention.

[0022] It pumps mortar, concrete, plaster or self-levelling screeds, or other similar materials having a cement matrix or not. Below solely the term mortar will be used for convenience.

[0023] The preferred embodiment provides that the machine 1 is a plastering machine or a machine for pump-

ing or spraying mortar, concrete, plaster or self-levelling screeds.

[0024] As known, plastering machines 1 comprise a first section **50**, in which the mortar is made. For example the first section 50 comprises a container **51** inside which binders, aggregates, water, premixed materials and the like, and mixing means **52,** such as a mixer, of said components are placed, to prepare the mortar.

[0025] The mortar is then poured into a hopper **2** below.

[0026] The hopper 2 is suitable to convey the mortar in a fluid state on its bottom **2a.** It preferably substantially has the shape of a prism with a triangular base, with an axis placed in a horizontal position and in such a way that one of the edges parallel to the axis constitutes the bottom 2a. Said bottom 2a thus has a preferably straight, main extension trajectory.

[0027] At the bottom 2a of the hopper 2 the machine 1 comprises mechanical members **3.** Said mechanical members comprise conveying means **3a** of said mortar, and may possibly comprise further devices such as mixers and the like. Preferably, the conveying means 3a are an auger suitably of the type with central shaft. Furthermore, the conveying means 3a are suitably the totality of the mechanical members 3.

[0028] The mechanical members 3 are further connected, preferably at the ends of the hopper, with further external connections to the hopper 2, such as an electric motor or hydraulic motors and to the members specified below. Such connection is suitably made by means of flexible joints **3d** such as universal or elastic joints for the purposes specified below.

[0029] The hopper 2 further comprises an outlet opening **4** for the mortar in the fluid state positioned near the bottom 2a of the hopper 2 and on the front face of the hopper 2. It is substantially an opening in the walls of the hopper 2.

[0030] Consequently, said conveying means 3a define a movement trajectory **3b** of the mortar in the fluid state towards the outlet opening 4. This trajectory 3b is preferably rectilinear and coincides with the bottom of the hopper 2. Furthermore, the outlet opening 4 has an output direction preferably substantially coincident with the movement trajectory 3b. It thus preferably extends along a surface perpendicular to the movement trajectory 3b at said outlet opening 4.

[0031] The machine 1 further comprises a transfer pipe **6** defining a transfer channel **6a** of the mortar in the fluid state, placed beyond the outlet opening 4 and, during use, in fluidic through communication with said outlet opening 4. Said transfer pipe 6 comprises inside the channel 6a a pump, preferably a screw pump, including a rotor inside the screw pump suitable to pump the mortar to an output for use. In this case, the transfer pipe 6 preferably constitutes the stator of the screw pump.

[0032] In plastering machines the screw pump transports the fluid mortar along a pipe **60** and to an ejection nozzle **61**. At the nozzle the introduction of compressed air is also provided for, which permits spraying of the mortar on walls. The compressed air preferably originates from a compressor and channels **62** placed on said machine 1.

[0033] Preferably the pipe 6, at the hopper 2 has a flange **9** constrained, preferably integrally, to the transfer pipe 6 and suitable to occupy the outlet opening 4. Inside the flange an inlet opening **9a** is provided in fluidic through communication with the transfer channel 6 and with the outlet opening 4.

[0034] The machine 1 innovatively comprises drive means **5** suitable to move the mechanical members 3 and the transfer pipe 6 without dismantling, in the direction away from the bottom 2a of the hopper 2, to facilitate the cleaning operations of said hopper 2.

[0035] The expression without dismantling is understood to mean that said mechanical members 3 and/or the transfer pipe 6 are not dismantled or detached from the machine 1 and/or each other. The drive means 5 are therefore obviously not quick dismantling systems of the machine 1. The dismantling of the machine cannot in fact be considered a movement of the parts, given that no real distancing of the mechanical members 3 and transfer pipe 6 away from the bottom ensues.

[0036] Said mechanical members 3 may thus be substantially lifted from the bottom by means of a translation, preferably in the vertical direction, or, alternatively, through a rotation around an axis parallel to the movement trajectory 3a with its centre in one end of the drive means 5.

[0037] The drive means 5 are also suitable, as well as for moving the transfer pipe 6, to free the outlet opening 4 so as to allow, for cleaning operations, the output of the mortar from the hopper 2 through the outlet opening 4 towards the outside environment and not into the transfer channel 6a.

[0038] In particular, the drive means 5 are suitable to move the flange 9 so as to free the outlet opening 4.

[0039] Furthermore, the mechanical members 3 are preferably connected to the pipe 6, more in particular are directly constrained to the inner rotor of the screw pump. Consequently the lifting of the flange 9 causes the movement of the pipe 6 which involves the lifting of the screw pump and of the inner rotor and, consequently, the lifting of the mechanical members 3.

[0040] The drive means 5 further comprise actuation means 10 of said drive means 5, consisting of advantageous lever mechanisms, manually activated, or activated by electric motors or otherwise.

[0041] More in detail, in a first variant (Figs. 2a, 2b, 3a, 3b), the drive means 5 comprise a skate **5a** suitable to allow the translation of the flange 9 along slide gibs **5b** or guides by means of the actuation means 10. The latter preferably consist of an advantageous lever mechanism suitable to be moved manually. Alternatively, it may comprise an electric motor which drives a worm screw for example. The lever mechanism also has, preferably, at least two positions of stable equilibrium: a working position, with the flange 9 positioned with the inlet opening

9a on the outlet opening 4 and a cleaning position, with the flange away from the outlet opening 4.

[0042] In a second variant (Figs. 4a, 4b, 5a, 5b), the drive means 5 comprise a hinge suitable to permit the rotation of the flange 9 around an eccentric axis **7a,** and actuation means 10 of the rotation of the flange. In this case too the lever mechanism also preferably has at least two positions of stable equilibrium: a working position, with the flange 9 positioned on the outlet opening 4, obtained by means of interlocking **7b** with an end position, and the cleaning position, with the flange at a distance from the outlet opening 4, achieved by support **7c** of a lever belonging to the lever mechanism.

[0043] The machine 1 also comprises a switch, suitable to stop or permit the power supply of the mechanical members 3. Said switch permits the power supply of the mechanical members 3 automatically in the configuration of use, when the mechanical members 3 are near the bottom 2a of the hopper 2, and interrupts the electrical connection when the mechanical members 3 are in the cleaning configuration i.e. away from bottom 2a of the hopper 2. Such switch permits safe cleaning of the machine 1 and prevents hands from being inserted in the opening 4 in correspondence with the auger when it is active.

[0044] The functioning of a machine 1 for pumping mortar, plaster, concrete or the like, described above in a structural sense, is described below. It further defines a new method.

[0045] During use, the machine 1 is used like a machine of the known type, such as a known plastering machine.

[0046] In particular, during use (Figs. 2a, 3a, 4a, 5a), the aggregates, binders and water are inserted in the first container 51 and the mortar, concrete, plaster or self-levelling screeds are made by means of the mixing means 52.

[0047] The mortar is transported into the hopper 2 and here positions itself on the bottom 2a from where it is pushed by the conveying means 3a, in particular by the auger, towards the outlet 4 and then through the inlet opening 9a of the flange 9.

[0048] All said operations are carried out when in use with the mechanical members 3 in the position of use and thus close to the bottom 2a of the hopper 2. Furthermore, the transfer channel 6a is in fluidic through connection with the outlet opening 4 and consequently with the hopper 2. In particular, the inlet opening 9a of the flange 9 is in fluidic through connection with the outlet opening 4.

[0049] The mortar, still in the fluid state, is thus inside the channel 6a, where the screw pump which transports it along the pipe 60 towards the ejection nozzle 61 is positioned. Here the air is introduced, which flows along the channels 62 and permits the spraying of the mortar over a wall to be plastered or the like.

[0050] After use the cleaning step begins.

[0051] In said cleaning step (Figs. 2b, 3b, 4b, 5b) the mechanical members 3 are distanced from the bottom by means of the drive means 5 and placed in the cleaning position at a distance, relative to the position of use, from the bottom 2a of the hopper 2. Furthermore, the transfer channel 6a is not in fluidic through connection with the outlet opening 4 since moved by means of said drive means 5. The outlet opening 4 is in fact in fluidic through connection with the hopper 2 and the outside environment. In particular, by means of the actuation means 10, the flange 9 is moved away from the outlet 4. Together with the flange 9 and the pipe 6 the mechanical members 3 are also moved. The movement preferably takes place via the lever mechanisms shown and described or with said motor means.

[0052] The operators can thus clean the hopper very quickly with water jets. In fact the residues, liquid or solidified, do not stop at the members 3 but can flow freely onto the bottom of the hopper and follow the same path that the mortar follows during use. Such path appropriately does not provide for corners or similar obstacles, since the outlet 4 has an output direction substantially coincident to the movement trajectory 3b.

[0053] After cleaning by means of the drive means 5 it is possible to return the devices to the configurations of use, and thus draw the members 3 towards the bottom of the hopper again and align the channel 6a with the outlet opening 4.

[0054] The invention achieves some important advantages.

[0055] In fact, the machine 1 permits quick and accessible cleaning.

[0056] In detail, the mechanical members 3, in particular the auger, do not interfere with the bottom of the hopper in the cleaning phase and any solidified lumps are quickly removed without manual intervention.

[0057] Furthermore, the fact that the outlet opening 4 coincides with the output area of the mortar during use means that it is placed in an ideal position, and in particular that its surface is perpendicular to the movement trajectory 3b at said outlet opening 4.

[0058] The opening used for emptying thus permits a rapid emptying of the residues. Moreover, the machine 1 can be easily and quickly put into the use and cleaning configurations.

[0059] Furthermore, the removal operation of the mechanical organs 3 and of the transfer pipe 6 is very rapid and effective at the same time. Indeed the applicant has verified that it is not necessary to completely dismantle said elements from the machine 1 to achieve optimal cleaning of the machine itself, but that it is sufficient to distance the mechanical members 3 and the transfer pipe 6 from the bottom of the hopper, without dismantling them.

[0060] Variations may be made to the invention without departing from the scope of the inventive concept expressed in the independent claims and by their technical equivalents. All details may be replaced with equivalent elements and the materials, shapes and dimensions may

be any within the scope of the independent claims and by their technical equivalents.

Claims

1. Machine (1) for pumping mortar, plaster, concrete or the like, comprising:

   - a hopper (2) for the conveyance of said mortar, plaster, concrete or the like in the fluid state on the bottom (2a) of said hopper (2),
   - mechanical members (3) positioned on the bottom (2a) of said hopper (2),
   - said mechanical members (3) comprising conveying means (3a) of said mortar, plaster, concrete or the like,
   - an outlet opening (4) for said mortar, plaster, concrete or the like in the fluid state positioned near said bottom (2a) of said hopper (2),
   - said conveying means (3a) defining a movement trajectory (3b) of said mortar, plaster, concrete or the like in the fluid state towards said outlet opening (4).
   - a transfer pipe (6) defining a transfer channel (6a) of said mortar, plaster, concrete or the like in the fluid state, positioned beyond said outlet opening (4), and during use, in fluidic through communication with said output (4),
   - **characterised in that** said machine comprises drive means (5) suitable to move, without dismantling, said mechanical members (3) and said transfer pipe (6) in the direction away from said bottom (2a) of said hopper (2) to facilitate the cleaning of the hopper (2).

2. Machine (1) according to claim 1, wherein said distancing of said transfer pipe (6) is suitable to free said outlet opening (4) so as to allow, for said cleaning operations, the output of said mortar, plaster, concrete or the like from said hopper (2) through said outlet opening (4) towards the outside environment and not in said transfer channel (6a).

3. Machine (1) according to claim 2, comprising: a flange (9) constrained to said transfer pipe (6) and suitable to occupy said outlet opening (4), said flange (9) comprising an inlet opening (9a) in fluidic through communication with said transfer channel (6a) and with said outlet opening (4), and wherein said drive means (5) are suitable to move said flange (9) so as to free said outlet opening (4).

4. Machine (1) according to claim 3, wherein said drive means (5) comprise a skate suitable to permit the translation of said flange (9) and actuation means (10) of said translation.

5. Machine (1) according to claim 3, wherein said drive means (5) comprise a hinge suitable to permit the rotation of said flange (9) around an eccentric axis and actuation means (10) of said rotation.

6. Machine (1) according to one or more of the previous claims, wherein said transfer pipe (6) comprises, inside said transfer channel (6a), a screw pump, including an inner rotor, said rotor being coupled to said mechanical members (3).

7. Machine (1) according to one or more of the previous claims, wherein said outlet opening (4) extends preferably along a surface perpendicular to said movement trajectory (3b) at said outlet opening (4).

8. Machine (1) according to one or more of the previous claims, consisting of a plastering machine for mortars.

9. Machine (1) according to one or more of the claims 1-7, consisting of a machine for pumping self-levelling screeds.

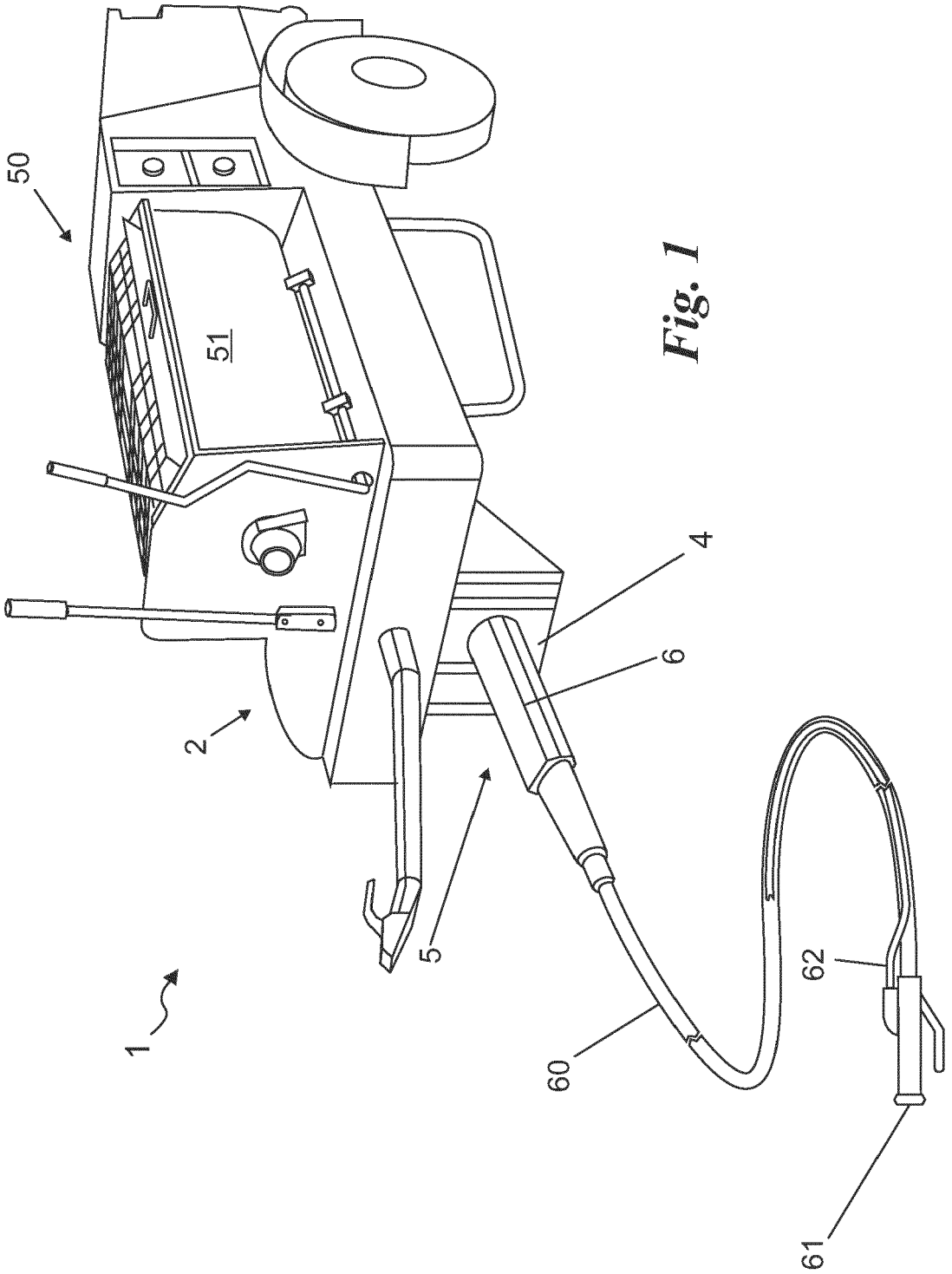


Fig. 1

Fig. 2a

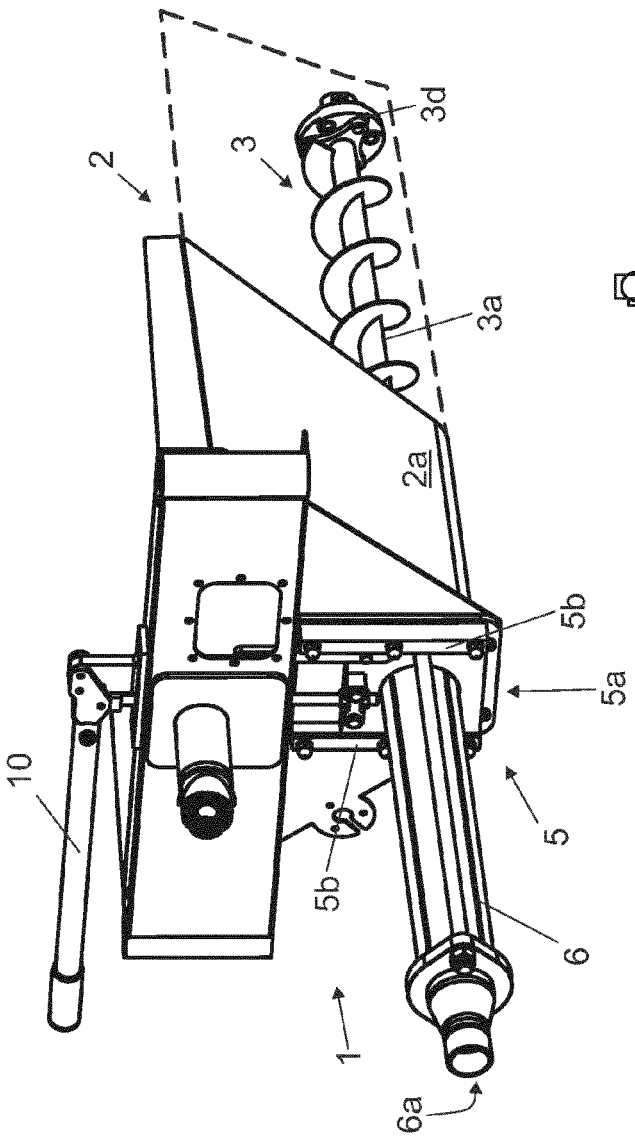
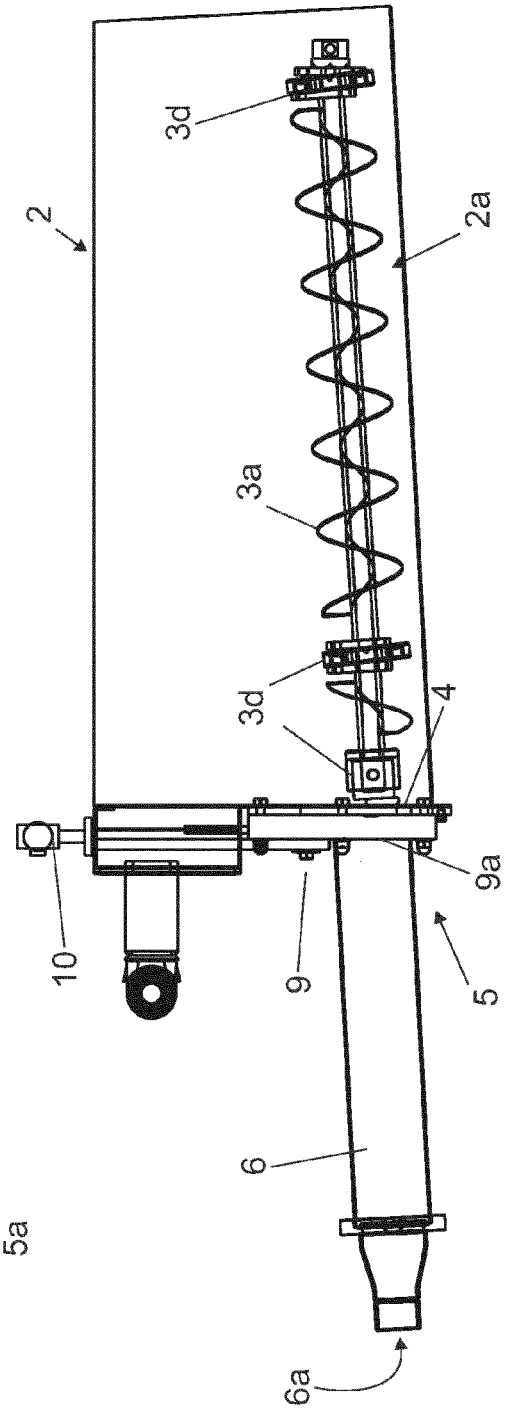


Fig. 3a



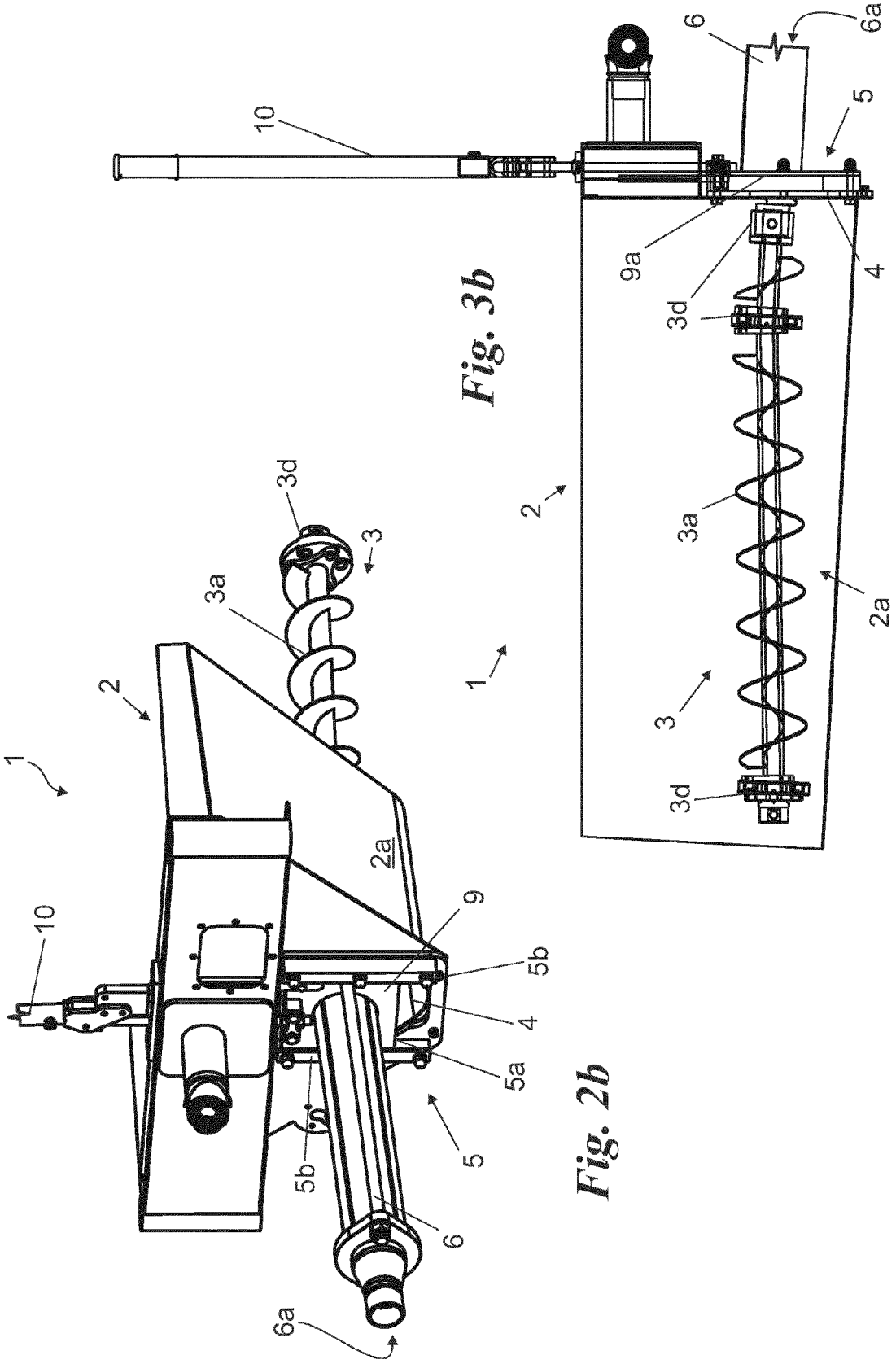


Fig. 3b

Fig. 2b

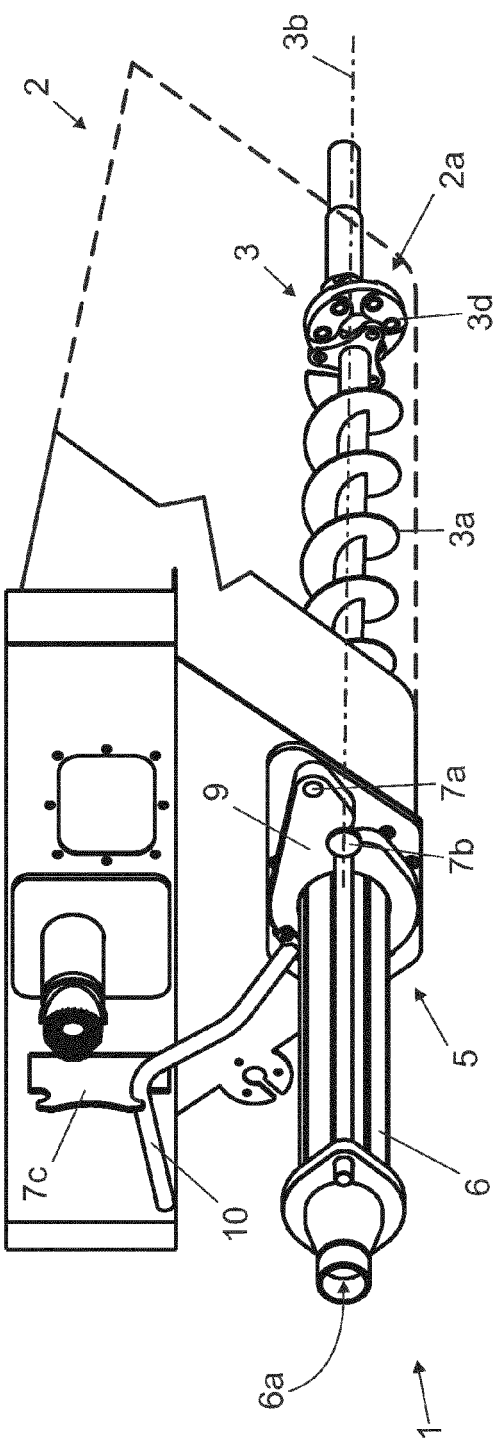


Fig. 4a

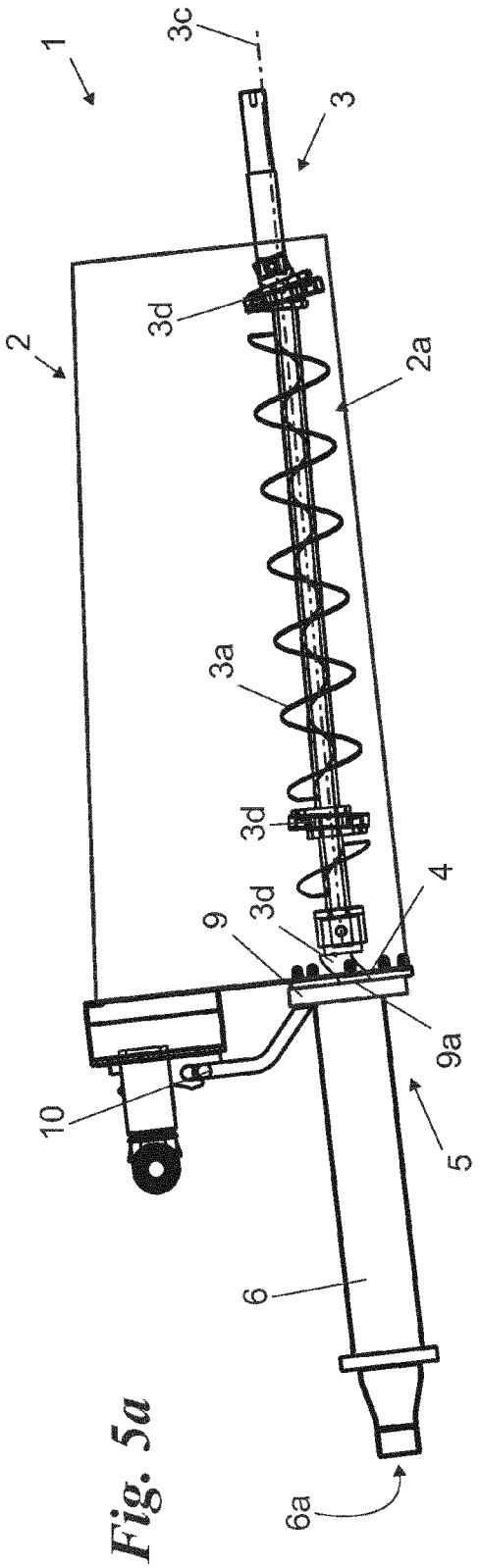


Fig. 5a

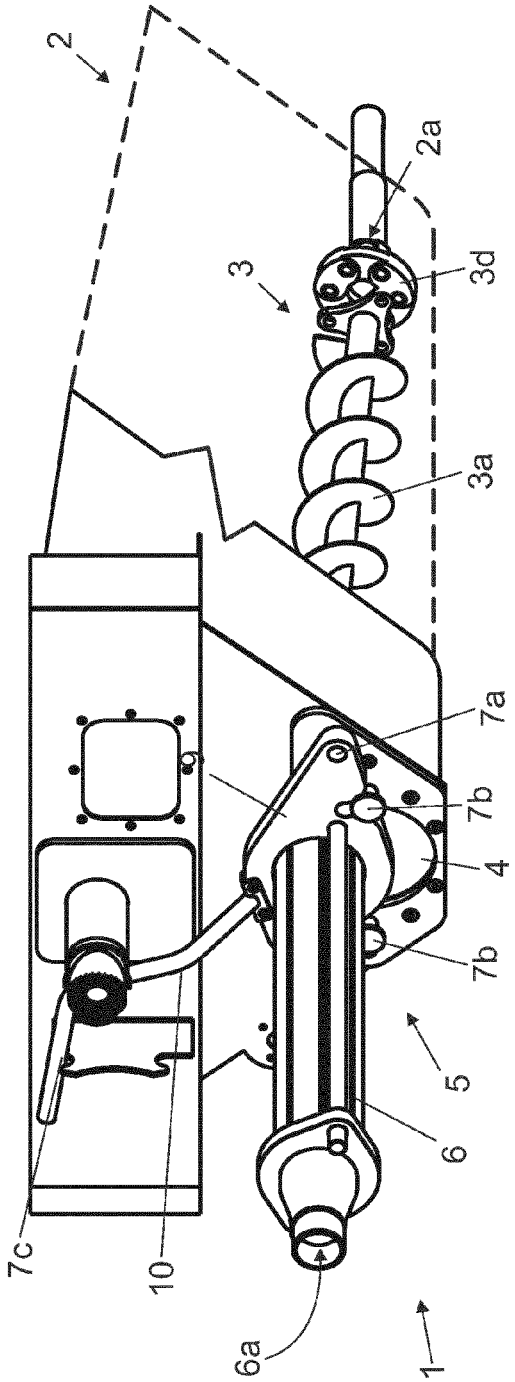


Fig. 4b

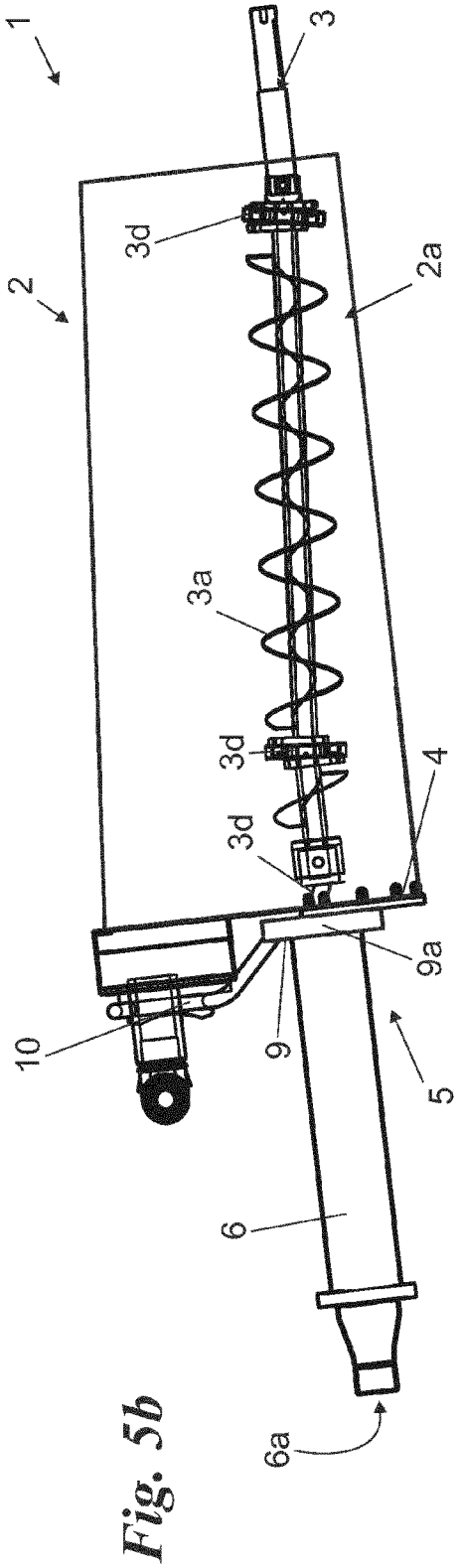


Fig. 5b

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EUROPEAN SEARCH REPORT

Application Number
EP 14 17 4220

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CH 667 036 A5 (RIESER & LEPRI AG [CH]) 15 September 1988 (1988-09-15) * figure 1a * * page 3, line 17 - line 39 * -----	1-9	INV. F04B15/02 B28C5/12 B01F7/00 B28C7/16
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A	US 3 807 706 A (IRL DAFFIN ASSOCIATES, INC. [US]) 30 April 1974 (1974-04-30) * figures 7, 8 * * column 3, line 67 - column 6, line 49 * -----	1-9	
A	DE 100 11 487 A1 (BADUM TECHNICS GMBH & CO, KG [DE]) 13 September 2001 (2001-09-13) * figures 1-3 * * column 1, line 3 - line 55 * -----	1-9	
A	DE 38 09 661 A1 (GD ANKER GMBH & CO. KG [DE]) 12 October 1989 (1989-10-12) * figure 1 * * column 4, line 51 - column 5, line 55 * -----	1-9	TECHNICAL FIELDS SEARCHED (IPC) F04B B28C B01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 February 2015	Gnüchtel, Frank

CATEGORY OF CITED DOCUMENTS

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26-02-2015

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