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(54) Feeding unit for the feeding of a solid mixing phase to a mixing chamber, for mortar, plasters and grout mixing machines

(57) A feeding unit (1) for the feeding of a solid mixing phase (3) to a mixing chamber (5), for mortar, plasters and grout mixing machines, comprising: a charging hopper (13) for the feeding of the solid phase (3) into the feeding unit (1) and an outlet (12) for the discharging of the solid phase (3) into the mixing chamber (5), and a motor vibrator (10), rigidly connected to said charging hopper (11) in order to transmit to it its vibrating movement. In this manner the unit offers a reduced installation power, is light and therefore easy to handle and offers uncomplicated maintenance, reduced dust making and low noise.

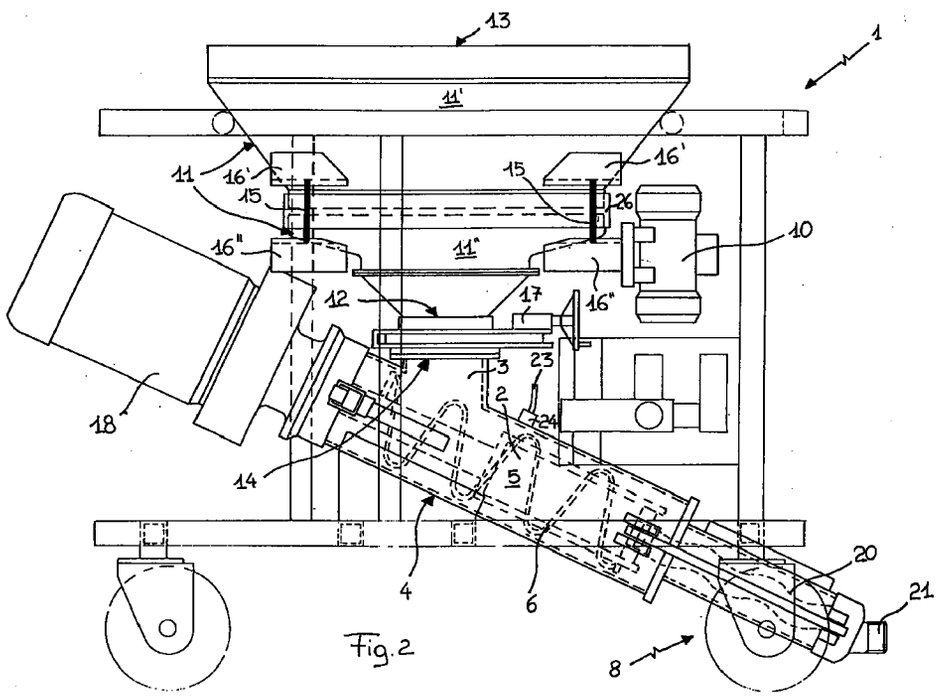

Fig.2

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Description

The object of this invention is a feeding unit for the feeding of a solid mixing phase to a mixing chamber, for mortar, plasters and grout mixing machines.

Commonly, in mortar, plasters and grout mixing machines the liquid phase is mixed with a solid phase, granulated or powdery, followed by the pressure projection of the fluid mixture which is obtained.

More precisely, said machines are particularly used in the building field, whenever it is necessary to pressure project grouting mortar mixtures with binders, to obtain plasters, castings for walls and ceilings' facings, castings for the strengthening of old walls, injections and the like. To obtain the fluid mixture to be pressure projected a solid phase, granulated or powdery with a variable granulometry but usually less than 8 mm, for example sand and binders, is mixed with a liquid phase, generally water. The batching of the two mixing phases has a great influence on the consistency of the mixture to be pumped and projected as well as on the physical and mechanical characteristics of the hardened plaster and it is therefore of the utmost importance that both mixing phases be accurately batched.

At present, according to the known art, a first feeding unit, for the batch feeding of the solid phase into the mixing chamber, requires a batching screw operated by a gearmotor. Said batching screw is set horizontally in a hollow casing with a filling inlet for the solid phase.

The inconvenience of this common feeding unit is that it foresees the installation of a gearmotor to operate the batching screw, which requires a considerable installation power. Besides this the gearmotor greatly increases the overall weight of the feeding unit reducing its manoeuvrability, which is one of the qualities sought after by the operators of the machine onto which it is installed.

Another inconvenient can be attributed to the fact that the feeding of the solid phase is effected by means of a moving machine member and therefore subject to wear.

Furthermore the movement of the batching screw creates dust and noise which worsens the working conditions of the operators. The presence of a rotating feeding member also causes the unmixing of the solid phase or rather the separation of the solid phase's components which is generally a heterogeneous composition.

Another inconvenience also occurs when the solid phase to be mixed is changed, since unavoidably a so-called "tail" of the previously used solid phase remains in the device which interferes with the new mixture to be obtained.

In an improvement of this common feeding unit the batching screw is operated by a gear assembly, by means of the operating gearmotor of a mixer, therefore trying to exploit the operation of the mixing unit to move the members of the feeding unit. Further to this the batching screw has been placed obliquely whereby the solid phase is lifted towards the mixing chamber.

The main inconvenience of said feeding unit is its mechanical complexity due to the gear assembly since this expedient has not reduced the operating power also due to the fact that the solid phase is fed to the mixing chamber against the force of gravity.

Moreover the other aforementioned problems relative to the presence of moving machine members remain.

In a second common feeding unit the solid phase is fed by means of a rotating blade which pushes towards a filling inlet of the mixing chamber the solid phase contained in a truncated cone tank. The rotating blade is operated by its own gearmotor, therefore even this feeding unit presents the same inconveniences outlined above due to the presence of a gearmotor.

Another inconvenience of this feeding unit consists in the fact that the tolerance between the sliding contact elements, that is between the rotating blade and the bottom of the tank, is a compromise between the optimal results which would be obtained if powdery solid phases were to be fed and the case in which a granulated solid phases were to be fed. It is therefore impossible to obtain a problemless operation because with a larger tolerance the mechanical wear is reduced but it is not possible to feed powdery solid phases, whereas with a smaller tolerance it is possible to feed powdery solid phases but the mechanical wear is greater.

The main object of this invention is to provide a remedy to the above mentioned inconveniences by the implementation of a feeding unit for the feeding of a solid mixing phase to a mixing chamber, for mortar, plasters and grout mixing machines, which shall have a reduced installation power, be light and easy to handle, with uncomplicated maintenance, reduced dust making and low noise.

These and other objects are obtained by a feeding unit for the feeding of a solid mixing phase to a mixing chamber, for mortar, plasters and grout mixing machines, due to the fact that it includes a charging hopper with a filling inlet for the feeding of the solid phase into the feeding unit and an outlet for the discharging of the solidphase into the mixing chamber and a motor vibrator, rigidly connected to said charging hopper so as to transmit to it its vibrating movement.

In this manner the feeding unit has a reduced installation power and is lighter than the common feeding units due to the fact that both the power and the weight of the motor vibrator are inferior to those of a gearmotor.

Furthermore for the batch feeding of the solid phase no rotating or sliding members are required. Feeding occurs by gravity due to the shakes inflicted upon the solid phase by the charging hopper which vibrates at the frequence set by the motor vibrator. By acting on the vibration frequency of the motor vibrator it is possible to adjust the delivery of the solid phase according to its granulometry and specific weight.

Therefore all the wear, unmixing, dust raising and noise problems relative to the moving members of the prior art are eliminated.

Conveniently the charging hopper consists of a first section, in which is situated the filling inlet, and a second section, rigidly connected to said motor vibrator in which is situated the outlet, the two sections being mutually translatable in a plane parallel to the motor vibrator's plane of action.

In this manner it is possible to vibrate only the second section of the charging hopper and the solid phase it contains, which is fed in the mixing chamber as a consequence of the vibrations produced. This is an advantage, from a point of view of the masses subject to vibration, since most of the solid phase is contained in the first section of the charging hopper from where it falls, by gravity, filling the hollow spaces left by the solid phase in the second section.

In this case it is advantageously foreseen that the first section is adequately fixed to the mortar, plasters and grout mixing machine and the second section is supported to the first section by means of numerous brackets, the brackets being respectively supported, with a clearance parallel to the motor vibrator's plane of action, by means of supports whic are respectively fixed to the first section and to the second section of the charging hopper.

This layout permits a simple and effective reciprocal movement of the two sections of the charging hopper.

So as to avoid any dispersion of the solid phase from the charging hopper, in the area of mutual proximiyy of the two sections are conveniently disposed gaskets.

Furthermore an on-off valve for the solid phase can be positioned between the outlet and the mixing chamber.

In this manner can be interrupted the feeding owing to the gravity of the solid phase, for example in the event of maintenance and cleaning.

Finally, advantageously, the motor vibrator has a horizontal plane of action. In this manner the vibrations do not raise any dust when the solid phase is powdery.

Further characteristics and advantages of this invention shall be emphasized by the enclosed detailed description of such an implementation, illustrated by way of example only, but not restrictive, in the accompanying drawings, wherein:

figure 1 illustrates a very schematic top view of a mortar, plasters and grout mixing machine assembly equipped with the feeding unit according to this invention;

figure 2 illustrates a very schematic side view of the machine assembly of figure 1.

Figure 1 schematically represents the assembly of a mortar, plasters and grout mixing machine, equipped with a feeding unit 1 for the feeding of a solid mixing phase 3 to a mixing chamber 5 according to this invention.

For the batch feeding of the liquid phase 2 to the mixing chamber 5 known means are foreseen, which may consist of, for example, a pump (not illustrated), a conduit 23 from the pump to the first feeding inlet 24 of the mixing chamber 5 and a member regulating the delivery of the liquid phase 2 (not indicated) positioned in the conduit 23. Even the means 8 for the pressure projection of the fluid mixture are commonly used ones. For example, they may consist of an hourglass screw and worm gear pump 20, connected to the mixing chamber 5 near to an outlet 21 and operated by a gearmotor 18.

The mixing of the solid phase 3 and the liquid phase 2 takes place in the mixing chamber 5 by means of a mixer 6. As indicated in figure 2 the mixer 6 can be, for example, an Archimedean screw which is operated by a gearmotor 18.

In order to batch feed the solid phase 3 into the mixing chamber 5, there is provided a feeding unit 1 for the feeding of a solid mixing phase 3 to the mixing chamber 5. According to this invention it conprises of a motor vibrator 10 and a charging hopper 11 into which the solid phase 3 is delivered by means which are not indicated. The charging hopper 11 is rigidly connected to the motor vibrator 10, so that the vibrations effected by the motor vibrator 10 are transmitted to it.

As indicated in the figures the charging hopper 11 consists of a first section 11' and a second section 11". The first section 11' presents a filling inlet 13, through which the solid phase 3 to be mixed is delivered into the feeding unit 1, by means which are not indicated. The second section 11" is rigidly connected to the motor vibrator 10 and presents an outlet 12 towards the mixing chamber 5 and in particular to a second feeding inlet 14 of the same.

The second sections 11' and 11" are conveniently translatable in a plane parallel to the motor vibrator's plane of action. In this manner only the second section 11", which is closer to the mixing chamber 5, shall effect the vibrations transmitted by the motor vibrator 10. Consequently only the solid phase 3 contained in the second section 11", that is the one being delivered into the mixing chamber 5, shall be shaken, whereas viceversa the solid phase on top of it, contained in the first section 11', shall drop, by gravity, into the free spaces left by the solid phase underneath.

In the area of mutual proximity of the two sections 11' and 11" are disposed gaskets 26 to hold the solid phase 3 within the charging hopper 11. To support and reciprocally translate the two sections 11' and 11", the first section 11' is supported to the mortar, plasters and grout mixing machine and the second section 11" is supported to the first section 11' by means of numerous brackets 15. The brackets are respectively supported, with a clearance parallel to the clearance of the motor vibrator's 10 plane of action, by supports 16' and 16". These supports are fixed to the first section 11' and the second section 11" of the charging hopper 11.

Between the outlet 12 and the mixing chamber 5 an on-off valve 17 may be disposed to interrupt the feeding of the solid phase.

This invention therefore fulfils the pre-established objects.

Of course, in its practical implementation, the unit may have a different shape and configuration than the one described above without in any case departing from the object of the present invention.

Furthermore all the components may be substituted with technically equivalent ones and the shapes, dimensions and materials used shall be of any nature according to the requirements.

Claims

1. A feeding unit (1) for the feeding of a solid mixing phase (3) to a mixing chamber (5), for mortar, plasters and grout mixing machines, **characterised in that** it comprises:

   - a charging hopper (11), with a filling inlet (13) for the feeeding of the solid phase (3) into the feeding unit (1) and an outlet (12) for the discharging of the solid phase (3) into the mixing chamber (5), and
   - a motor vibrator (10) rigidly connected to said charging hopper (11) in order to transmit to it its vibrating movement.

2. A feeding unit according to claim 1 **characterised in that** said charging hopper (11) consists of a first section (11'), in which is situated the filling inlet (13), and a second section (11"), ridigly connected to said motor vibrator (10) in which is situated the outlet (12), the two sections (11' and 11") being mutually translatable in a plane parallel to the motor vibrator's (10) plane of action.

3. A feeding unit according to claim 2 **characterised in that** the first section (11') is supported to the mortar, plasters and grout mixing machine and the second section (11") is supported to the first section (11') by means of numerous brackets (15), the brackets (15) being respectively supported, with a clearance parallel to said motor vibrator's (10) plane of action, by means of supports (16' and 16") which are respectively fixed to the first section (11') and to the second section (11") of said charging hopper (11).

4. A feeding unit according to claim 2 **characterised in that** in the area of mutual proximity of the two sections (11' and 11") are disposed gaskets (26) to hold the solid phase (3) within the charging hopper (11).

5. A feeding unit according to claim 1 **characterised in that** between the outlet (12) and said mixing chamber (5) is positioned an on-off valve (17) for the solid phase (3).

6. A feeding unit according to claim 1 **characterised in that** said motor vibrator (10) has a horizontal plane of action.

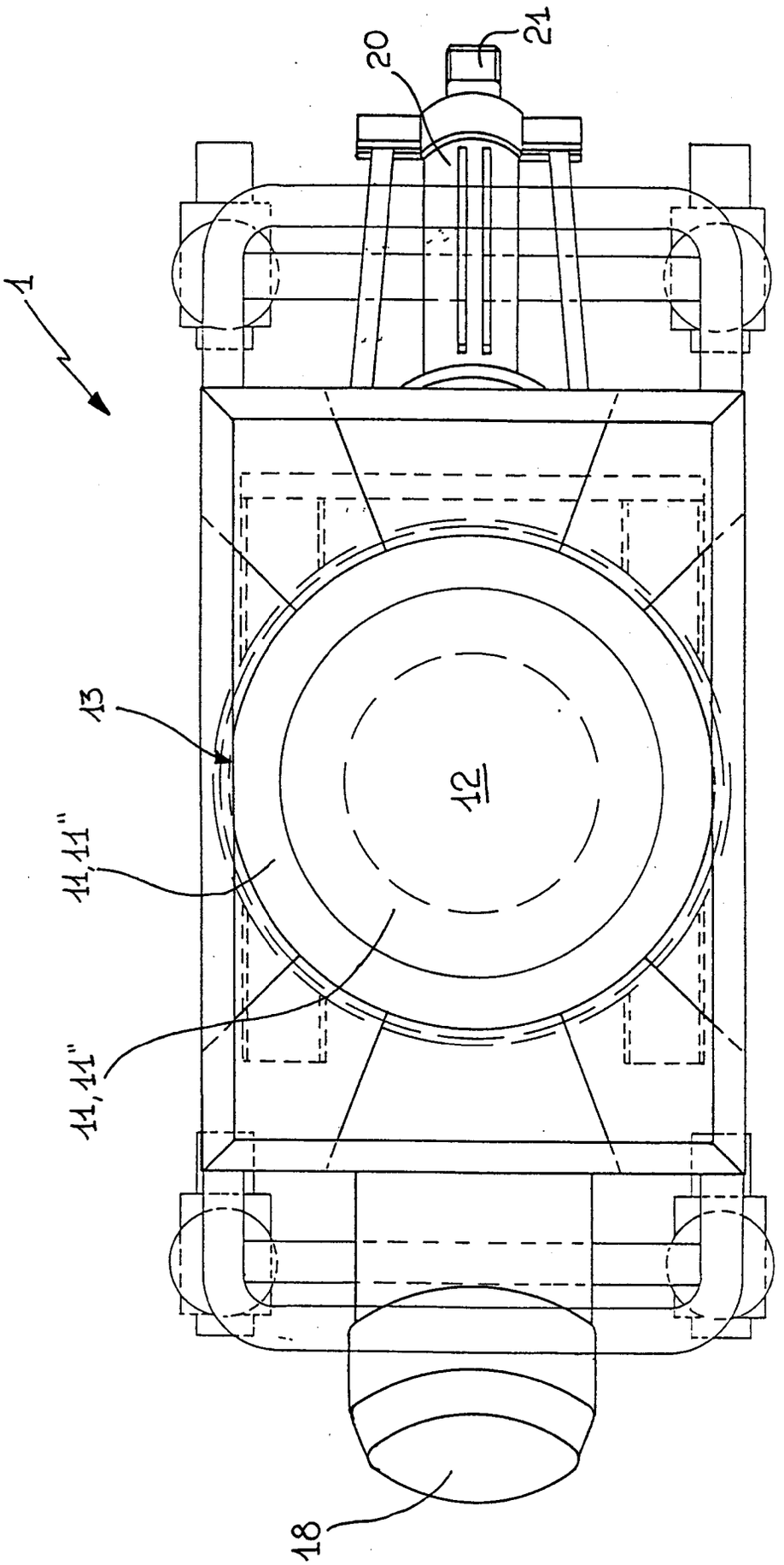

Fig. 1

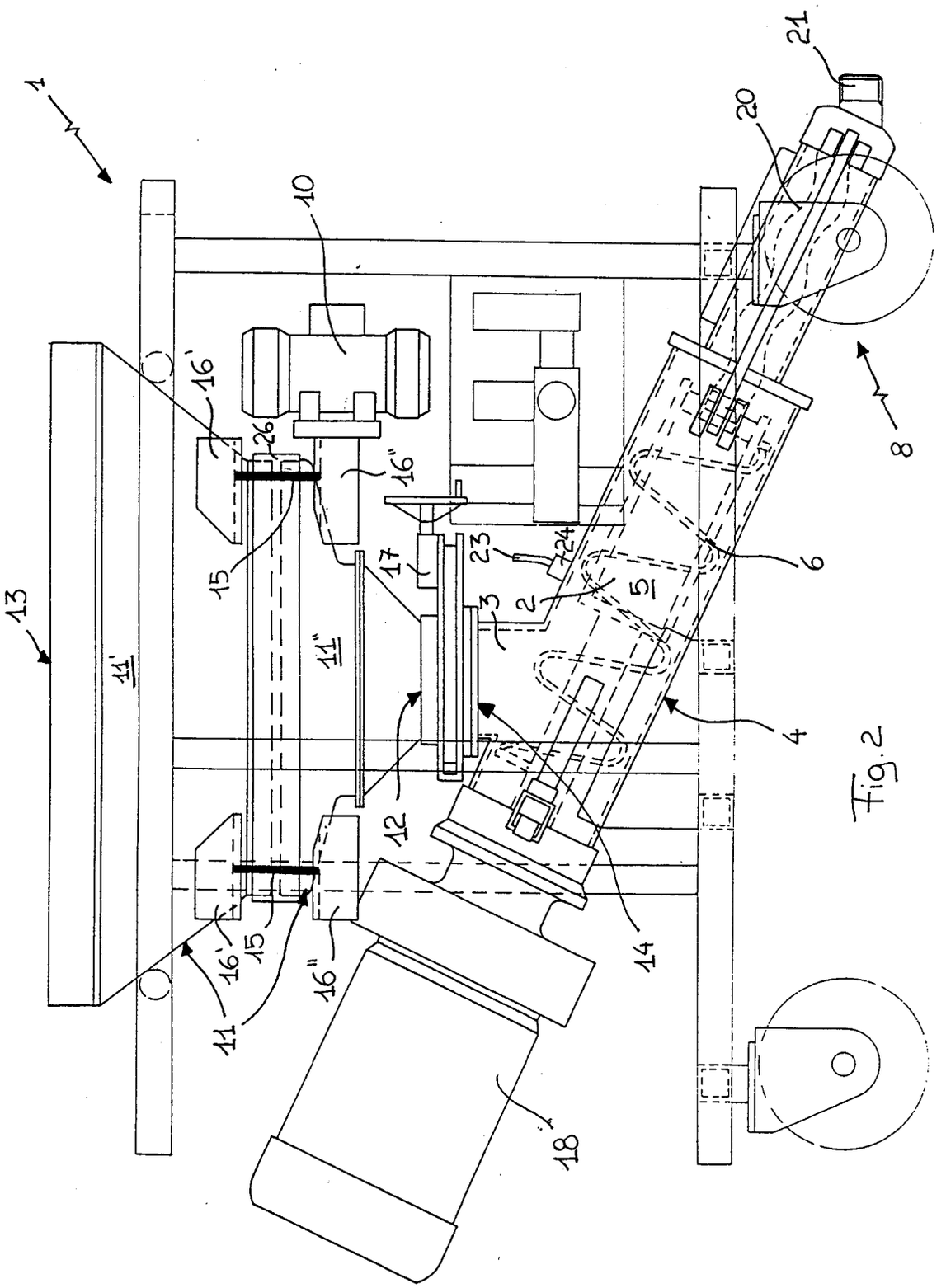

Fig. 2