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(71) Applicant: **SO.PA.RI.S. di VICCHI GIULIANO PIOVACCARI FABIO E TONINO S.n.c.**
40026 Imola (Bologna) (IT)

(72) Inventors:
- **Vicchi, Giuliano**
  40026 Imola (Bologna) (IT)
- **Piovaccari, Fabio**
  47100 Forli (IT)
- **Piovaccari, Tonino**
  40027 Mordano (Bologna) (IT)

(74) Representative: **Lanzoni, Luciano**
c/o BUGNION S.p.A.
Via dei Mille, 19
40121 Bologna (IT)

(54) A concrete mixer, in particular for the building trade

(57) The concrete mixer (1), in particular for the building trade, can be used to obtain mortar, concrete and similar mixtures by mixing a liquid with at least two components and consists of a feed hopper (2) designed for the infeed of a first component, connected at its out-feed to a tubular transfer and mixing channel (3) which has an outlet (8) and at least a first (4) and second (5) inlet, positioned between the hopper (2) and the outlet (8), designed for the infeed of a second component and the liquid into the channel (3), having mixing and transfer means consisting of a screw feeder (6) which is turned by drive means (7) and having, along its length, at least two differently shaped sections, of which a first section (6a), positioned at least at the first inlet (4), is prevalently for material transfer and the second (6b), positioned at least near to the outlet (8) is of the transfer and mixing type.

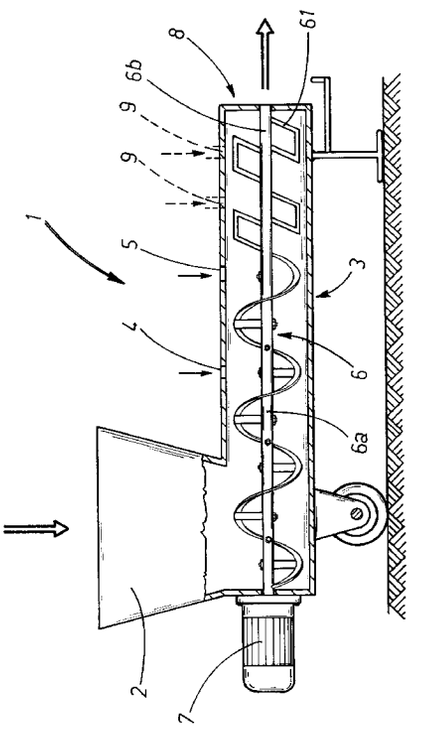

FIG1

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Description

The present invention relates to a concrete mixer, that is to say, an apparatus for the mixing of preparations and is included, in particular, in the sector of machines which can be used in the building trade, designed to mix powdered or granulated solids with a liquid so as to obtain an homogenous mixture.

As is known, the preparation of concrete and cement- or chalk based mortars in general is of great importance in the building trade. For the purpose of simplicity, in the following text the term mortar shall be used to distinguish the various mixtures used.

The preparation of mortars is important to both the quality of the works created and the production costs.

One method for the preparation of mortar, normally used for small jobs, is the conventional portable concrete mixer. In such a machine, the mixture is created by pouring the various components into a drum or barrel which contains blades, then turning the barrel until the desired mixture is obtained. One disadvantage of this type of machine is that only a relatively small quantity of mortar is obtained with each mixing cycle (e.g.: around 1 m^3). For this reason, when carrying out work which requires a significant quantity of mortar, it is extremely difficult to obtain barrels of mortar which have the same mixing specifications; moreover, for some jobs which envisage the simultaneous drying of all of the mortar used (e.g.: when laying some types of self-levellers), the machine cannot be used, since the pouring of the mortar obtained from the portable concrete mixer must occur is successive phases.

Another type of procedure envisages the use of so-called automatic concrete mixers. These machines consist essentially of a hopper and an outlet channel.

A ready-mixed material, i.e.: material whose inert and binding components were previously dosed, is poured into the hopper from packaged sacks, or by connecting the machine to a silo. The ready-mixed material is then mixed with water and mixed by a screw feeder which is turned by a geared motor and sent on to the outfeed for subsequent use, normally involving a final hopper, upon which a pump operates to transfer it to the final unloading point.

Therefore, only ready-mixed materials can be used with machines of this type, that is to say, materials with ready-dosed inert and binding components. For this reason, possession of the particular mixture recommended for the job in question is essential, since the percentages of the individual components of the mixture cannot be changed. This is a great disadvantage at both a functional level, when particularly elaborate mixing is required, and also as regards costs, which are relatively high for ready-mixed materials compared with the components considered individually.

The aim of the present invention is, therefore, to eliminate the afore-stated disadvantages.

The Applicant has designed a concrete mixer which is able to continuously mix the individual components and the liquid, to provide mortars of the type desired, allowing variations in the percentages of the components themselves.

The technical features of the present invention, in accordance with the said aims, are clearly described in the claims herein and the advantages of the invention are more clearly shown in the detailed description below, with reference to the accompanying drawings which illustrate an embodiment by way of example only, and in which: - figure 1 is a schematic side view with some parts shown in cross-section and others cut away, of an embodiment of the present invention; - figure 2 is a detail of a possible screw feeder which may be used with the present invention; figure 3 is a diagram relative to another embodiment of the invention.

With reference to the accompanying drawings, and in particular figure 1, the concrete mixer, indicated as a whole by the numeral 1, can be used in particular in the building trade.

As already indicated, the concrete mixer is suitable for use in obtaining mortar, concrete and similar mixtures by mixing a liquid with at least two components, suitably mixed according to the purpose for which the mortar is prepared, at least one being a binder.

In figure 1 the machine is supported by a structure with wheels which allow for its transportation; obviously, the machine may be supported in various ways, according to its use.

An advantage of the concrete mixer 1 is that it consists of a feed hopper 2 connected to a tubular transfer and mixing channel 3.

The hopper 2 is designed for the infeed of a first component (which may be an inert component) in the direction indicated by the arrow at infeed. The tubular channel 3 has an outlet 8 and at least a first 4 and second 5 inlet, positioned between the hopper 2 and the outlet 8.

The two inlets 4 and 5 are designed for the infeed of a second component and the liquid (which may be water) into the channel 3.

In the figures, arrows indicate the direction of infeed and outfeed of the various materials used in the concrete mixer 1.

Inside the tubular channel 3 there are mixing and transfer means consisting of a screw feeder 6 which is turned by drive means 7 such as a geared motor. The screw feeder illustrated in figure 1 may be supported by a single shaft, driven by the geared motor or, depending on construction and/or functional requirements, by two sections of shaft which are interconnected and turn together.

There are at least two differently shaped sections along the length of the screw feeder 6.

The first section 6a extends along the tubular channel 3 at least at the first inlet 4 and is prevalently for material transfer.

The second section 6b which extends at least near

to the outlet 8 of the tubular channel 3 is of the transfer and mixing type.

The fact that the first section 6a of the screw feeder is prevalently for material transfer allows the suitable infeed of the second component into the channel, without the problems caused, for example, by a screw feeder with blades which could prevent infeed of the component.

In the embodiment illustrated, the first section 6a of the screw feeder 6 is shaped as a spiral screw feeder, whilst the second section 6b has the shape of a screw feeder with blades 61, in particular with square, open blades 61.

In other words, the function of the screw feeder at the inlets for the infeed of substantially non-fluid components (for example, the binder at inlet 4), is preferably to receive the component as it enters the channel and transfer the said component, together with any others present, downstream, where a successive section of the screw feeder mixes them.

As shown in the illustration, the first inlet 4 can be positioned upstream of the second inlet 5 and is designed for infeed of the binder (which may be cement).

Automatic measuring means may be fitted to the feed hopper 2 and first 4 and second 5 inlets, so as to regulate the volume of the components and the liquid fed into the concrete mixer 1.

For example, a flowmeter can be fitted at the second inlet 5, to regulate the quantity of liquid fed into the tubular channel 3, and so the density of the mixture.

Extra inlets 9, 9' may be present on the tubular channel 3, in addition to inlets 4 and 5, and may be used to feed a corresponding number of extra components into the channel. There may be one or more of the said extra inlets, indicated by the dashed line in the figure 1 and, as shown in the embodiment, these are preferably indicated for the infeed of liquid or foam additives or components, provided that they are positioned over the section of screw feeder with blades (transfer-mixing section).

According to the embodiment illustrated in figure 2, the screw feeder 6 may be spiral-shaped, its second section 6b having straight connecting sections 62, with length substantially equal to the pitch of the screw feeder and supported, parallel with the axis of rotation X of the screw feeder, between two successive loops in the spiral defined by the screw feeder.

In the embodiment in figure 2, as in figure 3, another inlet 4' is envisaged, which may be used for the infeed of a powdered or granular component into the channel 3.

The embodiment in figure 3 includes a schematic illustration of a possible connection between the concrete mixer 1 and a plurality of machines which feed materials to the concrete mixer.

In this embodiment, the concrete mixer 1 has at least a first screw feeder 6', positioned at the hopper 2, at least partially shaped like a screw feeder of the prevalently transferring type, and a second screw feeder unit 6, at least partially shaped like a transfer and mixing screw feeder.

The first screw feeder 6' is located in a front transfer channel 20, and the second screw feeder 6 in the transfer channel 3; the two screw feeders 6', 6 are driven by separate drive means, respectively motor 7 and motor 7', so that the transfer speed is independent of the concrete mixer 1 mixing speed.

The concrete mixer 1 includes automatic feed means (described below) controlled by relative control means 10, represented by a block 10 in figure 3, designed to allow variations in the mixing of the components and liquid depending on the type of mortar, concrete or similar mixture.

A silo 14 or conveyor 15 can be connected to the infeed of the hopper 2, the former being suitably connected and controlled by the control means 10, so as to vary the flow of a component, e.g.: inert, into the hopper 2.

The two transfer channels 20 and 3 are interconnected at an intermediate zone 34. In the figure, the two channels 20 and 3 are separated; when the concrete mixer is operative, the two channels are connected and the two screw feeders 6' and 6 are coaxial and turn independently.

Two transfer screw feeders 16, 18 are connected to inlets 4 and 4' which are located in the zone upstream 30 of the channel 3, the motors 17, 19 of said screw feeders being controlled by the control means 10. The inlets 4, 4' can be used for the infeed of a binder and an inert component such as polystyrene for lightened mixtures.

A pump 31 may be connected to a tank 33 and controlled by the control means 10, for the infeed through inlet 5, of the water for mixing the mortar.

A device which produces foam is envisaged at the infeed of inlet 9. The said device consists of a foaming-agent tube 26, fed by a pump 25, which feeds an additive to a relative tank 24, and a pump 23, which feeds water from a tank 27, as well as a compressor 21, having an adjustment valve 22. The tank 24 for the water used for the foam may be the same as that used (33) for the water for the mixture.

The circuits upon which the water pumps act may have sub-circuits which are regulated by valves 32, so as to allow partial recirculation of the water when the pump is running slowly.

The infeed of inlet 9' may be connected to a pump 28 which feeds another additive, for example a fluidizer, which can be drawn from a relative tank 29.

The outlet 8 is connected to a mixer 11, driven by a relative motor 13 and, in turn, connected to a pump 12 for mortar transfer.

All of the components described above are controlled by the control means 10 and, wherever hydraulic motors are used, they are connected to the compressor 21.

The present invention, thus designed for the said

objects, may be subject to numerous variations, all encompassed by the original design concept, and all components may be replaced with technically equivalent parts.

Claims

1. A concrete mixer, in particular for use in the building trade, to obtain mortar, concrete and similar mixtures by mixing at least two components with a liquid, at least one of the components being a binder, suitably mixed in accordance with the purpose for which the mortar is prepared, characterised in that it consists of a feed hopper (2), designed to feed in a first component, the outfeed of the hopper being connected to a tubular transfer and mixing channel (3) having an outlet (8) and at least a first (4) and second (5) inlet positioned between the hopper (2) and the outlet (8), the inlets being designed for the infeed into the channel (3) of a second component and the liquid, there being mixing and transfer means consisting of a screw feeder (6) turned by a drive means (7) and having, along its length, at least two differently shaped sections, the first section (6a), positioned at least at the first inlet (4) and being prevalently for material transfer, and the second section (6b), positioned at least near the outlet (8) and being of the transfer and mixing type.

2. The concrete mixer as described in claim 1, characterised in that the first inlet is upstream of the second inlet.

3. The concrete mixer as described in claim 1, characterised in that the second component is the binder and is fed into the tubular channel (3) through the first inlet (4) upstream of the second inlet (5).

4. The concrete mixer as described in claim 1, characterised in that the first section (6a) of the screw feeder (6) has the shape of a spiral screw feeder.

5. The concrete mixer as described in claim 1, characterised in that the second section (6b) of the screw feeder (6) has the shape of a screw feeder with blades (61).

6. The concrete mixer as described in claim 5, characterised in that the blades (61) are square and open.

7. The concrete mixer as described in claim 1, characterised in that the screw feeder (6) has the shape of a spiral screw feeder, its second section (6b) having straight connecting sections (62), with length substantially equal to the pitch of the screw feeder and supported, parallel with the axis of rotation (X) of the screw feeder, between two successive loops in the spiral.

8. The concrete mixer as described in claim 1, characterised in that a flowmeter is envisaged at the second inlet (5), to regulate the quantity of liquid fed into the tubular channel (3), and so the density of the mixture.

9. The concrete mixer as described in claim 1, characterised in that automatic measuring means are envisaged on the feed hopper (2) and first (4) and second (5) inlets, to regulate the volume of the components and the liquid fed into the concrete mixer (1).

10. The concrete mixer as described in claim 1, characterised in that a number of extra inlets (9, 9') are present on the tubular channel (3) and can be used to feed a corresponding number of extra components into the channel.

11. The concrete mixer as described in claim 1, characterised in that it has at least a first screw feeder (6'), which is at least partially shaped like a screw feeder prevalently for transfer purposes, and a second screw feeder (6), at least partially shaped like a transfer and mixing screw feeder, said first and second screw feeders being driven by separate motors (7, 7'), so that the speed of transfer is independent of the concrete mixer mixing speed.

12. The concrete mixer as described in claim 1, characterised in that it includes automatic feed means connected at least to the said inlets, controlled by relative control means (10), designed to allow variation of the mixing of the components and liquid, depending on the intended use of the mortar, concrete or similar mixture.

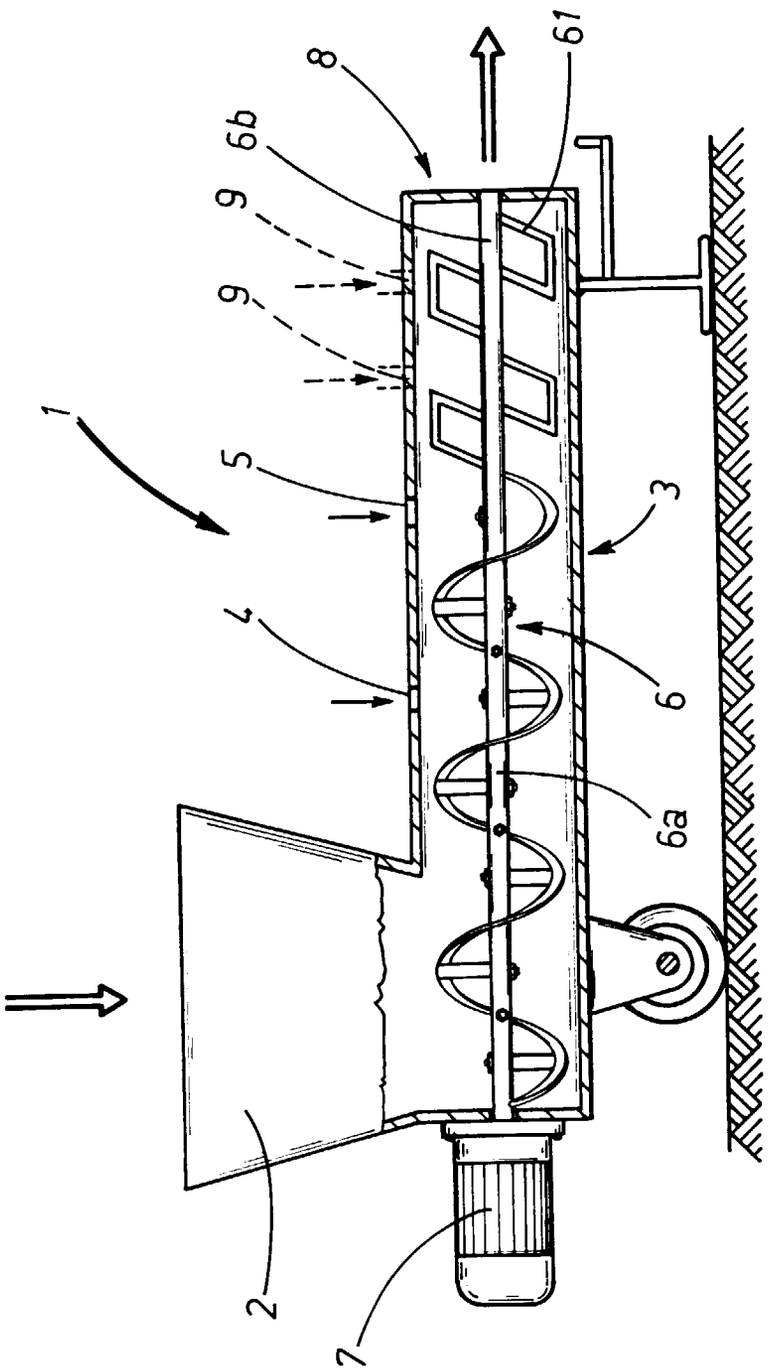

FIG1