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(54) Installation for preparing and transporting mortar on a building site.

(57) The invention relates to an installation for preparing and transporting mortar on a building site, said installation being provided with a mixing device for mixing cement and sand, with a mortar conveying device comprising a compressor installation and with a transportable silo for the storage and/or transport of cement and sand. The silo is provided with at least one pair of separate compartments, one compartment being intended for accommodating sand and one for accommodating cement. The compartments are at their bottom sides provided with outlets which can be closed by way of closing means. The two outlets of the compartments of the silo open into the upper ends of a pair of separate measuring rooms (10,1'), having a certain volume and which are likewise provided with openings at their lower ends, which openings can be closed by closing means. The closing means are adjustable by means of pneumatically operating driving means (9,13), which are connected to the compressor installation of the mortar transporting device for being supplied with pressurized air.

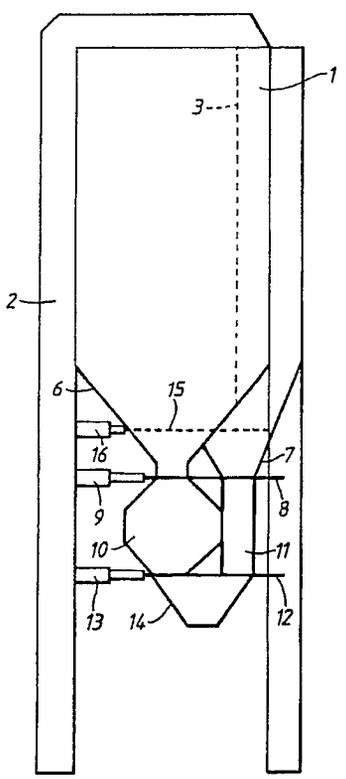

Fig.1.

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Installation for preparing and transporting mortar on a building site.

The invention relates to an installation for preparing and transporting mortar on a building site, said installation being provided with a mixing device for mixing cement and sand, with a mortar conveying device comprising a compressor installation and with a transportable silo for the storage and/or transport of cement and sand, whereby said silo is provided with at least two separate compartments, one compartment being intended for accommodating sand and one for accommodating cement, said compartments at their bottom sides being provided with outlets which can be closed by closing means.

Such an installation is known from German Offenlegungsschrift No. 3,616,077. With this known installation the compartment containing sand is in open communication with a shaker conveyor during operation, which shaker conveyor must be vibrated for the discharge of sand to a collecting container. Supplying sand to the collecting container in this manner is continued until a certain quantity of sand has been supplied to the collecting container by means of a weighing device co-operating with the collecting container. Then, after the vibrating of the shaker conveyor has been stopped, a certain quantity of cement is supplied to the collecting container by means of said weighing device, by opening a closing means in an outlet of the compartment containing the cement.

Filling the collecting container in this manner takes a comparatively great deal of time, whilst at the same time an accurate dosing cannot be ensured, as the compartment containing the sand always remains open during operation.

The device is provided with several adjustable closing means, but possible driving means for said closing means are not disclosed.

The object of the invention is to obtain an installation of the above kind, which has a simple and efficient construction, whilst an accurate dosing of the various materials is still possible.

According to the invention this can be achieved in that the two outlets of the compartments of the silo open into the upper ends of two separate measuring rooms having a certain volume and likewise being provided at their lower ends with openings which can be closed by closing means, said closing means being adjustable by pneumatically operating driving means, which are connected to the compressor installation of the mortar transporting device for being supplied with pressurized air.

When using the installation according to the invention both measuring rooms can be filled simultaneously by opening the closing means closing the compartments of the silo, when the closing means located at the bottom ends of the measuring rooms are in their closed position, whereby the volumes of the measuring rooms will be measured in accordance with the desired mixing ratio of cement and sand. After the compartments of the silo have been closed the closing means at the bottom ends of the measuring compartments can be opened for the discharge of the sand and the cement to the mixing device, which forms part of a cement pump comprising a compressor installation, by means of which the cement and the sand can be mixed with water and then be transported to the desired place.

An accurate dosing of both the sand and the cement in order to obtain an optimum product can thereby be realised by using a simple construction of the installation, because the closing means, by means of which the dosing of the cement and the sand is regulated, are controlled by means of pneumatic driving means, which take the pressurized air required for their operation from the compressor installation, said compressor installation being provided with a tank, which contains the pressurized air required for pumping the mortar produced, the capacity of said tank in general being such that sufficient pressurized air will be available for controlling the driving means, the more so because during normal operation the driving means will be operated in the period when no cement is being pumped.

It is noted that from US Patent Specification 1,559,416 there is known an installation provided with two compartments arranged side by side, said compartments being intended for accommodating various materials. Under said compartments there are arranged separate measuring rooms, which are provided, both at their bottom ends and at their upper ends, with openings that can be closed. Said installation is not intended for producing and transporting mortar, however, and consequently has no mixing device for mixing the materials, nor does said installation have a device for transporting the materials. The closing means are operated by hand in this installation.

The invention will be further explained hereinafter with reference to an embodiment of a silo according to the invention diagrammatically illustrated in the accompanying figures.

Figure 1 is a diagrammatic side view of the silo according to the invention, in the upright position suitable for operation.

Figure 2 is a diagrammatic plan view of the silo illustrated in Figure 1, wherein parts have been left out in order to show parts located thereunder.

As is illustrated in Figures 1 and 2 the silo is

formed by a tank 1 which is cylindrical along the larger part of its length, which tank is supported by a frame 2 in such a manner, that the longitudinal axis of the tank 1 extends vertically in the operating position illustrated in Figure 1. The tank 1 is divided into two separate compartments by means of a partition 3 provided in the interior of the tank. The one compartment intended for accommodating sand is at the upper side of the tank provided with an intake 4 for introducing sand into the tank. The compartment intended for accommodating cement is provided with an intake 5 for introducing cement into the compartment in question. Of course the intakes 4 and 5 can be closed by closing means (not shown) such as covers.

The bottom ends of the two compartments are formed by funnel-shaped parts 6 and 7 respectively, which are provided with outlets at their lower ends, which outlets can be opened and closed by means of a common slide 8. Said slide 8 is movable to and fro in horizontal direction, by means of a pneumatically operating setting cylinder 9 fixed to the frame 2, between a position in which said slide releases the outlets located at the bottom side of the compartments of the silo 1, and a position in which said outlets are closed by the slide 8. Of course it is also possible to use a separate slide for each compartment, whereby both slides are adjustable, whether or not simultaneously, by pneumatic operating means.

Under the outlets of the funnel-shaped ends 6 and 7 of the compartments in question there are arranged measuring chambers or measuring rooms 10 and 11. Said measuring rooms are at their lower ends provided again with outlets, which outlets can be opened and closed by means of a movable slide 12 which is likewise movable in horizontal direction. The slide 12 is horizontally adjustable again by means of a pneumatic setting cylinder 13 fixed to the frame, between a first position, in which the slide closes the outlets located at the bottom side of the measuring rooms 10 and 11, and a second position, in which said outlets are closed by the slide 12.

When the outlets of the rooms 10 and 11 are closed by means of the slide 12, and the outlets of the compartments of the silo 1 are opened, sand can flow into the measuring room 10 and cement can flow into the measuring room 11. After said rooms have been filled the slide 8 can be put back, by means of the pneumatic setting cylinder 9, into a position in which the outlets of the two compartments of the silo 1 are closed. A certain quantity of sand will be accommodated in the measuring room 10 and a certain quantity of cement will be accommodated in the measuring room 11. The volumes of the measuring rooms are thereby selected such that the ratio of the measured quantity of sand to the measured quantity of cement tallies with the ratio desired for producing a suitable mortar.

The two outlets of the measuring rooms 10 and 11 are located above a hopper 14 arranged under the slide 12, so that, when the outlets located at the bottom side of the measuring rooms 10 and 11 are opened, by moving the slide 12, the cement and the sand will flow into said hopper 14, to be led towards a suitable mixing device via said hopper, where the sand and the cement can be mixed with water. Said mixing device may e.g. form part of a conventional cement pump, which is arranged under the hopper 14. For operating sand cement pump, in particular for transporting the cement to the processing place, use is generally made of pressurized air, so that the cement pump is provided with a compressor installation. The capacity of said compressor installation is generally such that an amply sufficient stock of pressurized air is available. The fact is that pumping the cement usually takes place intermittently, consequently the compressor runs off load for longer periods with the conventional compressor installations . Said periods are sufficiently long for being utilized for pressurizing air required for the pneumatically operating control means of the silo.

By consequently equipping the silo with pneumatically operating adjusting means for adjusting the slides 8 and 12 efficient use can now be made of said capacity, which is already available anyhow, of the compressor installation, for operating the various movable parts forming part of the silo.

As is furthermore indicated in Figure 1 the silo may be provided with a sieve 15 extending at least substantially horizontally, said sieve extending under the lower funnel-shaped parts 6 and 7 of the two compartments of the silo. The sieve 15 is thereby connected with a pneumatically operating adjusting means 16, by means of which the sieve can be put into a reciprocating movement during operation, as desired, in order to influence an even discharge of the material from the two compartments of the silo advantageously.

The design of the silo is preferably such that in the position illustrated in Figure 1 the silo can be filled with sand and cement at a storage place or the like, and then be transported, tilted through 90°, to a building site or the like by means of a lorry. Of course it is also possible to transport the silo to the building site in empty condition and only fill it with sand and cement at that location.

Furthermore it is desirable to be able to vary at least the volume of either of the two storage rooms 10 and 11, for adapting the mixing ratio of sand and cement to the mortar required. For this purpose it is e.g. possible to subdivide the measuring room or chamber 10 into an upper part and a lower part, whilst said two parts are telescopically mov-

able relative to each other by means of suitable adjusting means, such as screw spindles or the like.

While hereinabove a silo provided with two compartments has been discussed, it will be apparent that also more than two compartments may be accommodated in the silo, e.g. besides the compartments for sand and cement a compartment for aggregates, e.g. small-size gravel or carborundum, which is processed in the production of industrial floors.

Claims

1. Installation for preparing and transporting mortar on a building site, said installation being provided with a mixing device for mixing cement and sand, with a mortar conveying device comprising a compressor installation and with a transportable silo for the storage and/or transport of cement and sand, whereby said silo is provided with at least two separate compartments, one compartment being intended for accommodating sand and one for accommodating cement, said compartments at their bottom sides being provided with outlets which can be closed by closing means, characterized in that the two outlets of the compartments of the silo open into the upper ends of a pair of separate measuring rooms having a certain volume and likewise being provided at their lower ends with openings which can be closed by closing means, said closing means being adjustable by means of pneumatically operating driving means, which are connected to the compressor installation of the mortar transporting device for being supplied with pressurized air.

2. Installation according to claim 1, characterized in that under the bottom ends of the two measuring rooms of the silo there is arranged a hopper, in which the sand and the cement accommodated in the discharge rooms can be discharged when the closing means in question are discharged.

3. Installation according to claim 1 or 2, characterized in that the volume of at least one of the two measuring rooms is adjustable.

4. Installation according to any one of the preceding claims, characterized in that there is provided a sieve extending at least substantially horizontally, said sieve extending through the lower parts of the two compartments, said sieve being connected with a pneumatically operating adjusting means, by means of which the sieve can be put into a reciprocating movement during operation, whilst said pneumatically operating driving means is connected to the compressor installation of the mortar transporting device for the supply of pressurized air.

5. Silo, to be used in an installation according to one or more of the preceding claims.

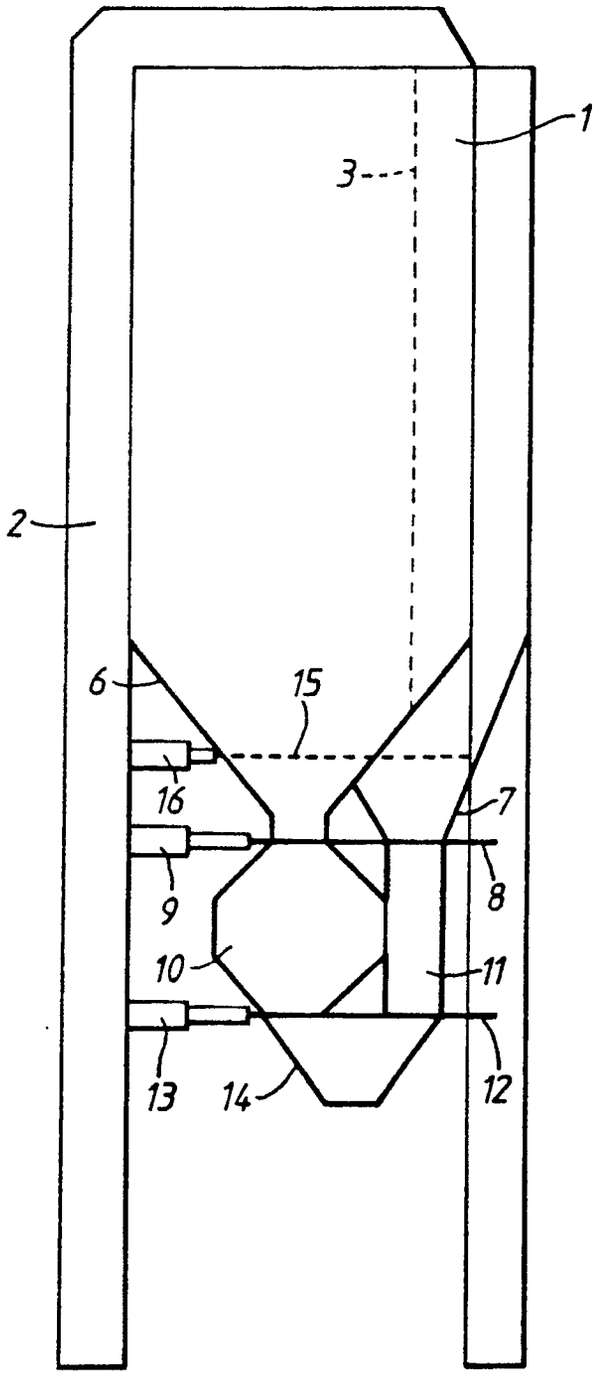

Fig.1.

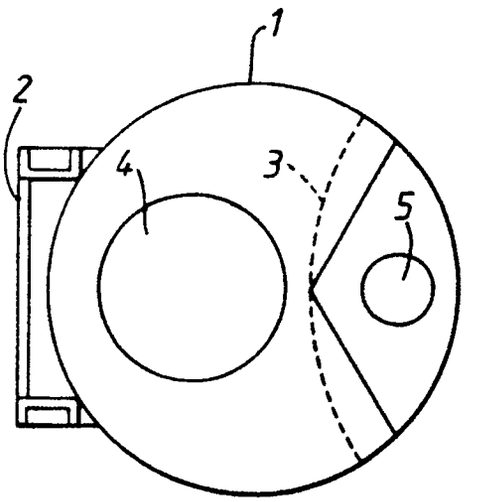

Fig.2.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 0896

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,X	US-A-1 599 416 (JONES) * Whole document *	1-5	B 28 C 7/04
A	US-A-3 973 703 (PESCHL) * Abstract; fig. *	4	
A	FR-A- 975 318 (MATERIEL)		
A	FR-A-1 233 608 (RICHIER)		
A	FR-E- 45 149 (RICHIER)		
A	FR-A- 484 703 (BANCON)		
A	FR-A- 373 301 (KREFT)		
A	US-A-1 723 234 (GWYNNE)		
A	US-A-3 746 313 (WEEKS)		
A	GB-A-1 017 225 (AVELING)		
A	DE-A-3 616 077 (LIPFERT)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 28 C
B 01 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30-07-1990	PEETERS S.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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