

(19)



(11)

EP 2 946 895 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.11.2015 Bulletin 2015/48

(51) Int Cl.:
B28C 7/06 (2006.01) B65G 53/58 (2006.01)

(21) Application number: **15168443.8**

(22) Date of filing: **20.05.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA

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(30) Priority: **20.05.2014 IT UD20140082**

(54) **APPARATUS FOR THE PRODUCTION OF A CEMENT AGGLOMERATE AND CORRESPONDING METHOD**

(57) Apparatus for the production of a cement agglomerate comprising a mixing machine (90) configured to mix raw materials making up at least part of the cement agglomerate with at least a liquid substance such as water. The apparatus comprises a machine for dosing ad-

ditive particles (70) equipped with at least a pipe (60) that connects the dosing machine (70) to the mixing machine (90) and with a pneumatic feed mean (78) configured to feed the additive particles pneumatically into the mixing machine (90) through the pipe (60).

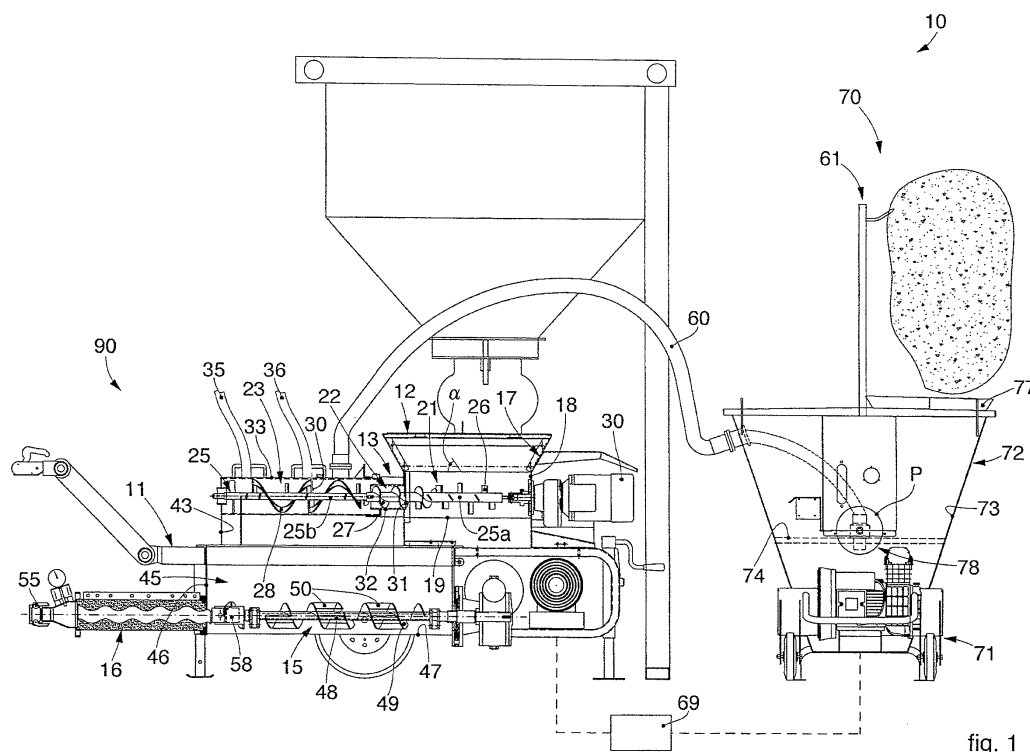


fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns an apparatus for the production of cement agglomerates and in particular, for the production of cement agglomerates which have been made lighter for example by additive particles such as particles of polystyrene, reinforcement fibers, aramid fibers, carbon fibers, expanded clays, perlite, cork, vermiculite and hemp.

[0002] The present invention also concerns the corresponding method for the production of said cement agglomerate.

BACKGROUND OF THE INVENTION

[0003] Apparatuses for the production of cement agglomerates are known, such as concrete mixers or spiral mixers, in which raw materials are introduced in order to form said material.

[0004] In known apparatuses the raw materials are suitably mixed together to define a homogeneous compound and with a desired consistency to allow it to be used in the designated zone.

[0005] These apparatuses comprise a loading hopper through which the raw material is introduced, which is homogenized by a first mixer located on the bottom thereof. Then, the material can be introduced into a second mixer, disposed downstream of the first, which provides to mix it with additives, such as water and foam for example, to obtain a homogeneous paste with the necessary technical requirements in relation to the application.

[0006] In particular, the foam is introduced to regulate the consistency and density of the cement agglomerate so as to determine desired properties of heat and acoustic insulation of the cement agglomerate when installed.

[0007] Known apparatuses also comprise a pumping device, for example a screw pump, located downstream of the mixer, which provides to pump the paste obtained through pipes toward the destination site.

[0008] It is also known, for specific applications, to add to the agglomerate solid additives or solid particles to confer on the concrete determinate properties of resistance, heat insulation, and acoustic insulation.

[0009] It can be provided for example to add polystyrene particles, expanded clay, perlite, cork, vermiculite, hemp or other materials.

[0010] Said particles are introduced manually into the loading hopper together with the other raw materials.

[0011] This makes it particularly difficult to control the quantity of particles inserted into the hopper on each occasion, since such control is mainly determined by the experience of the operator.

[0012] Furthermore, with a manual or discontinuous loading of the particles, cement blocks are obtained that have compositions that vary from the start to the end of the cycle.

[0013] Moreover, a manual loading of the particles does not allow a continuous production cycle of the mixer because, before the liquid and foam are added, the solid particles added must be well homogenized with the other raw materials.

[0014] Furthermore, this solution requires great efforts from the operators to load the particles into the hopper, with a consequent increase in production times.

[0015] One purpose of the present invention is to obtain an apparatus for the production of a cement agglomerate that allows to precisely dose the addition of the particles for the production of a cement agglomerate with the desired properties.

[0016] Another purpose of the present invention is to obtain an apparatus for the production of a cement agglomerate that simplifies the production of a cement agglomerate and makes it quicker.

[0017] Another purpose of the present invention is to obtain an apparatus for the production of a cement agglomerate that does not require interruptions to the production cycle.

[0018] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0019] The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0020] In accordance with the above purposes, an apparatus for the production of a cement agglomerate comprises a mixing machine configured to mix raw materials making up at least part of the cement agglomerate with at least a liquid substance such as water.

[0021] In accordance with one aspect of the present invention, the apparatus comprises a machine for dosing additive particles in which the latter are located, and equipped with at least a pipe that connects the dosing machine to the mixing machine and with a pneumatic feed mean configured to feed the additive particles pneumatically into the mixing machine through the pipe.

[0022] In this way, thanks to the pneumatic feed mean driven by compressed air, it is possible to suitably dose the quantity of particles that must be added on each occasion to the other raw materials to obtain a cement agglomerate of preestablished density.

[0023] The pneumatic feed mean allows to deliver the particles substantially continuously, thus immediately obtaining in the mixing machine a cement agglomerate with properties, that is, a density of homogeneous particles.

[0024] Moreover, the direct connection between the particle dosing machine and the mixing machine allows to simplify the production operations of the cement agglomerate, without requiring continuous intervention by the operators.

[0025] In possible forms of embodiment, the apparatus can comprise a management and control device connected to the mixing machine and to the dosing machine at least to manage and control the dosing of the additive particles in the mixing machine.

[0026] The management and control device allows to regulate the delivery of compressed air on the basis of the properties that the cement agglomerate is intended to have, simplifying and accelerating production. The management and control device also allows to deliver the compressed air continuously, consequently rendering the feed of the additive particles to the mixing machine continuous.

[0027] The present invention also concerns a method for the production of a cement agglomerate which comprises mixing the raw materials that make up at least part of the cement agglomerate with at least a liquid substance such as water.

[0028] In accordance with one aspect of the present invention, the method comprises a substantially continuous pneumatic feed step, to feed additive particles to the raw materials and to the at least one liquid substance during the mixing.

[0029] As well as the substantially continuous introduction of the additive particles, the compressed air, used as a vector fluid, increases the foaminess of the aggregate thanks to the formation of air bubbles inside it, which reduce its density and thus improve the heat and acoustic insulation and also reduce the weight of the cast of agglomerate once installed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] These and other characteristics of the present invention will become apparent from the following description of some forms of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic representation of an apparatus for the production of a cement agglomerate according to the present invention;
- fig. 2 is a schematic view of the detail P in fig. 1.

[0031] To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one form of embodiment can conveniently be incorporated into other forms of embodiment without further clarifications.

DETAILED DESCRIPTION OF SOME FORMS OF EMBODIMENT

[0032] We shall now refer in detail to the various forms of embodiment of the present invention, of which one or more examples are shown in the attached drawing. Each example is supplied by way of illustration of the invention

and shall not be understood as a limitation thereof. For example, the characteristics shown or described insofar as they are part of one form of embodiment can be adopted on, or in association with, other forms of embodiment to produce another form of embodiment. It is understood that the present invention shall include all such modifications and variants.

[0033] Figs. 1-2 are used to describe forms of embodiment of an apparatus 10 for the production of a cement agglomerate that comprises a mixing machine 90, configured to mix raw materials that make up at least part of the cement agglomerate with at least a liquid substance such as water, and a machine for dosing additive particles 70, configured to dose additive particles to be added to the raw materials and the at least a liquid substance, during their mixing.

[0034] The additive particles can be chosen from a group comprising for example polystyrene particles, reinforced fibers, aramid fibers, carbon fibers, expanded clay, perlite, cork, vermiculite and hemp.

[0035] The dosing machine 70 and the mixing machine 90 can be reciprocally connected by means of a pipe 60 with the function of transferring the additive particles from the dosing machine 70 to the mixing machine 90.

[0036] The mixing machine 90 comprises a bearing structure 11 on which first containing means are mounted, in this case a first hopper 12 to contain the raw materials making up the cement agglomerate.

[0037] The mixing machine 90 comprises a mixing chamber 33 in which the raw materials are mixed at least with a liquid substance.

[0038] Said pipe 60 can be connected directly to the mixing chamber 33 for the introduction of the additive particles.

[0039] The mixing machine 90 can also comprise a first mixer 13 configured to remove the raw materials from the first hopper 12 and to mix them in the mixing chamber 33. The first mixer 13 can be disposed in the first hopper 12 and in the mixing chamber 33 as described hereafter.

[0040] The mixing machine 90 can also comprise a second mixer 15 disposed downstream of the first, and a pumping device 16 that can be predisposed to pump the cement agglomerate toward the site destination thereof.

[0041] The whole bearing structure 11 can be provided to support at least said components inside it making a compact structure that can be easily transported even by road thanks to the fact that it can be mounted on wheels provided for its movement.

[0042] The first hopper 12, see for example fig. 1, comprises a loading chamber 17 defined by lateral walls 18 and by a bottom wall 19 and in which at least some of the raw materials making up the cement agglomerate can be loaded.

[0043] Merely by way of example, the raw materials can be chosen from a group comprising cement, recycled plastic, gravel, sand, clay. In particular, in the case where recycled plastic is used, the latter can have an average

size of about 10 mm and an apparent or bulk density comprised between 200kg/m³ and 300kg/m³.

[0044] The first mixer 13 can extend beyond the bulk of the first hopper 12 and can be disposed in particular in proximity to the bottom wall 19 of the loading compartment 17.

[0045] The first mixer 13 comprises a plurality of mixing sections and in this case a first section 21, a second section 23 and an intermediate section 22, interposed between the first hopper 12 and the mixing chamber 33. The first section 21 can be disposed in the first hopper 12 and can extend substantially for the length of the bottom wall 19. The first section 21 can provide to mix the raw materials introduced through the first hopper 12, thus obtaining a homogeneous composition thereof.

[0046] The intermediate section 22 can be configured to prevent a reflux both of the liquid substance and also of the air introduced by the dosing machine 70 with the additive particles to the first hopper 12.

[0047] The intermediate section 22 can be suitable to transfer the raw materials from the first hopper 12 toward the second section 23, dosing the quantity thereof that is taken from the first hopper 12.

[0048] In the second section 23 the raw materials introduced into the first hopper 12 can be mixed with water, foam and possibly other additives.

[0049] The first mixer 13 can be provided with a rotation shaft 25 which can extend for the entire length of the first and second sections 21 and 23 and the intermediate section 22.

[0050] According to the present description, the rotation shaft 25 can comprise a first segment 25a that can extend for the length of the first section 21 and intermediate section 22, and a second segment 25b that can extend for the length of the second section 23.

[0051] The first segment 25a and the second segment 25b can be reciprocally connected by connection means, for example threaded or flanged connections or joints, or similar or comparable connection means suitable for the purpose.

[0052] In the form of embodiment shown in fig. 1, the rotation shaft 25 can be made to rotate by a single drive member 30 which can be keyed in proximity to the end of the first segment 25a of the rotation shaft 25.

[0053] In other forms of embodiment it can be provided that the first segment 25a and respectively the second segment 25b of the rotation shaft 25 are made to rotate independently of each other, for example by respective drive members.

[0054] The rotation shaft 25 can be provided with a plurality of bladings having a different configuration in the first section 21, second section 23 and intermediate section 22, which can be mounted or connected to the rotation shaft 25 by connection means or by welding.

[0055] In particular, in correspondence with the first section 21, intermediate section 22 and second section 23, first bladings 26, second bladings 27 and third bladings 28 can be respectively provided.

[0056] The first bladings 26 can be blade shaped, they can extend radially with respect to the rotation shaft 25 and can be disposed so that the width of their section is disposed transverse to the axial direction of the rotation shaft 25.

[0057] In particular, the first bladings 26 can be inclined with respect to the axis of rotation of the rotation shaft 25 by an angle of inclination α of about 30° with respect to the direction of feed of the raw materials.

[0058] Merely by way of example, non-restrictive of the present invention, the first bladings 26 can have a rectangular section and a length in a radial direction comprised between 40 mm and 60 mm.

[0059] The first bladings 26 can perform both the function of feeding the raw materials loaded in the first hopper 12, given precisely by the particular inclination of the first bladings 26, and also a function of breaking up possible agglomerates that may be present.

[0060] On one of the lateral walls 18 of the first hopper 12, and in correspondence with the bottom wall 19 an aperture 31 can be made.

[0061] In correspondence with the aperture 31 an intermediate chamber 32 can be connected, in which the intermediate section 22 of the first mixer 13 can be housed.

[0062] The second bladings 27 of the intermediate section 22 can be screw shaped and can have the function of feeding the raw materials toward the second section 23 of the first mixer 13.

[0063] The particular conformation of the second bladings 27 can allow to separate the first section 21 from the second section 23 and prevent any reflux of material from the latter to the first section 21.

[0064] By way of example, the second bladings 27 can have a diameter of about 90 mm and a screw pitch that varies from 70 mm to 90 mm, to define an angle of deflection of the bladings 27, or screw angle, comprised between 60° and 80°.

[0065] The helix of the second bladings 27 can be defined by a shaped blade that can be attached to the first part 25a of the rotation shaft 25 and which can extend continuously for the whole radial development thereof.

[0066] The second section 23 of the first mixer 13 can be housed inside the mixing chamber 33, which can be associated substantially in continuity with the intermediate chamber 32, and can have a bigger section size than the latter.

[0067] According to one form of embodiment not shown in figs. 1-2, the third bladings 28 of the second section 23 of the first mixer 13 can also be conformed as a blade, and can be solidly associated with the respective rotation shaft 25, for example by welding, disposing them with their longitudinal development substantially radial with respect to the shaft 25 and with their width disposed transverse with respect to the axial direction of the shaft 25.

[0068] According to another form of embodiment, shown in fig. 1, the third bladings 28 can have a helical

type conformation and are the type independent from the rotation shaft 25. In particular, the third bladings 28 comprise a shaped blade that affects part of the diameter of the mixing chamber 33. The shaped blade can have a helical profile and can be attached to the second part 25b of the rotation shaft 25 by connection elements.

[0069] In the mixing chamber 33 and in proximity to the center line of its longitudinal extension, at least one through hole can be made, for feeding water and/or foam.

[0070] In this case, with reference to fig. 1, two through holes can be made, to which a first pipe 35 and a second pipe 36 can be respectively connected.

[0071] Furthermore, at least another through hole can be made in the mixing chamber 33 for connection of the pipe 60.

[0072] The pipe 60 can be disposed in a position nearer the intermediate chamber 32 than the position of the first 35 and second pipe 36, to allow to insert the additive particles into the mixing chamber 33 before the water and/or foam.

[0073] In particular, the first pipe 35 can be provided to bring water inside the second section 23, and to regulate the consistency of the mixture of cement to be obtained.

[0074] To this purpose, a pumping device, not shown in figs. 1-2, can be associated with the first pipe 35, to feed the water to the mixing chamber 33.

[0075] The second pipe 36 can be provided to deliver foam to the mix that is made. The foam can confer the desired density on the cement agglomerate.

[0076] A foam generation device, not shown in figs. 1-2, can be associated with the second pipe 36, and provides to feed the foam to the mixing chamber 33.

[0077] In the second section 23 of the first mixer 13, first water and then foam can be added to the raw materials in the desired quantities.

[0078] The pipe 60 can be, for example a flexible pipe, a rigid pipe, a connection union.

[0079] The mixing chamber 33 can be provided with a discharge aperture 43, in this case facing downward, through which the cement agglomerate can be discharged already pre-mixed with the additive particles, to feed it to the second mixer 15.

[0080] In particular, the cement agglomerate can be discharged from the first mixer 13 into second containing means, in this case a second hopper 45 comprising lateral walls 46 and a bottom wall 47.

[0081] The second mixer 15 can be disposed in proximity to and for the whole extension of the bottom wall 47 of the second hopper 45, to keep the cement agglomerate, already mixed, stirred and prevent the formation of aggregates that could block the pipes located downstream.

[0082] The lateral walls 46 can be convergent to each other so that the cement agglomerate, when discharged from the first mixer 13, converges toward the bottom wall 47 and hence toward the second mixer 15.

[0083] The second mixer 15 comprises a shaft 48 to

which helix blades 49 can be solidly associated. The helix blades 49 can be defined by a shaped blade continuous from its attachment portion to the shaft 48 to its tip.

[0084] Longitudinal blades 50 can be associated to the helix blades 49, and can extend parallel to the axis of the shaft 48 and can be disposed between one helix and the following one. The blades 50 can have the function of increasing the stirring effect to which the cement agglomerate is subjected.

[0085] The shaft 48 can be made to rotate by a drive member, not shown in figs. 1-2, possibly by reduction devices.

[0086] One of the lateral walls 46 can be provided with an aperture that provides to convey the cement agglomerate toward the pumping device 16.

[0087] The pumping device 16 in this case comprises a screw pump that in this case can be made to rotate by the same shaft 48 that makes the second mixer 15 rotate.

[0088] More specifically, the screw pump can be associated with the shaft 48 of the second mixer 15 by means of a joint element 58.

[0089] At exit from the screw pump an attachment portion 55 can be provided, to which can be connected the pipes through which the cement agglomerate is pumped to convey it toward the installation zone.

[0090] One or more devices - not shown in the drawings - to measure the level of the material contained therein can be associated with the second hopper 45.

[0091] When a maximum level of material is reached in the second hopper 45, the measuring device commands the first mixer 13 to stop, to prevent leakage of material.

[0092] The dosing machine 70 comprises a containing body 72 configured to contain the additive particles inside it.

[0093] The containing body 72 can be defined by lateral walls 73 converging toward each other and can be delimited below by a bottom 74.

[0094] The containing body 72 can comprise a loading member 77, for example a hopper, configured to convey the additive particles into the containing body 72.

[0095] The dosing machine 70 can also comprise a pneumatic feed mean 78 configured to feed the additive particles pneumatically into the mixing machine 90 through the pipe 60.

[0096] The pneumatic feed mean 78 can be incorporated inside the containing body 72 and, in particular, in correspondence with the bottom 74 to contain the bulk.

[0097] The pneumatic feed mean 78 comprises a device 63 to generate compressed air, such as a blower or compressor, and a device 83 with a Venturi effect connected to the compressed air generation device 63 and the containing body 72 of the additive particles.

[0098] The pneumatic feed mean 78, see for example fig. 2, can be configured to move the additive particles contained in the containing body 72, using a stream of compressed air generated by the compressed air generation device 63.

[0099] The Venturi effect device 83 comprises a first tubular segment 79 connected to the containing body 72, a second tubular segment 80 to which the compressed air generation device 63 is connected, and a tubular segment delivery 81, connected to the pipe 60, in which both the first tubular segment 79 and the second tubular segment 80 converge.

[0100] The compressed air passes from the second tubular segment 80 to the delivery tubular segment 81, generating a depression in the first tubular segment 79.

[0101] The depression is caused by an increase in the speed of the air due to the geometry of the delivery tubular segment 81 that accelerates the air according to a Venturi effect.

[0102] The depression in the first delivery tubular segment 79 determines the suction of the additive particles present in the containing body 72 and allows them to be subsequently sent to the mixing machine 90.

[0103] The first tubular segment 79, the second tubular segment 80 and the delivery tubular segment 81 can be made in a single body, or separately and assembled later.

[0104] In particular, the first tubular segment 79 and the delivery tubular segment 81 (see for example fig. 2) can be coaxial with each other and disposed sequentially one after the other in the order of transit of the compressed air.

[0105] The first tubular segment 79 can be disposed with its longitudinal extension parallel to the bottom 74 of the containing body 72.

[0106] In particular, the first tubular segment 79 can be separated from the containing body 72 by means of a valve 84, shown schematized in fig. 2, which can be installed to choke the suction of additive particles.

[0107] The first tubular segment 79 can be disposed so that one end is free and located in the containing body 72.

[0108] The delivery tubular segment 81 can have a decreasing cross section, such as for example a truncated cone external shape, or truncated pyramid, suitable to determine an acceleration of the compressed air in transit.

[0109] Between the delivery tubular segment 81 and the first tubular segment 79 the second tubular segment 80 can converge.

[0110] The second tubular segment 80 can have a cylindrical shape and can be connected to the compressed air generation device 63.

[0111] The compressed air generation device 63 can be driven by a motor 85.

[0112] The Venturi effect device 83 can be provided with a conveyor element 82, such as for example an appendix mounted between the first tubular segment 79 and the second tubular segment 80, and configured to direct the compressed air arriving from the second tubular segment 80 toward the delivery tubular segment 81, preventing it from flowing back toward the first tubular segment 79.

[0113] The conveyor element 82 can be disposed

transverse with respect to the longitudinal development of the second tubular segment 80.

[0114] In particular, the conveyor element 82 can define a passage gap L between the first tubular segment 79 and the second tubular segment 80 to allow the passage of the compressed air arriving from the second tubular segment 80 toward the delivery tubular segment 81.

[0115] The conveyor element 82 can also be configured to divert the path of the stream of air arriving from the second tubular segment 80 toward the delivery tubular segment 81.

[0116] In some forms of embodiment, the apparatus 10 according to the present invention comprises a management and control device 69 connected to the mixing machine 90 and to the dosing machine 70, at least to manage and control the transfer of the additive particles from the dosing machine to the mixing machine 90.

[0117] In some forms of embodiment, the dosing machine 70 can comprise a frame 71 on which the containing body 72, the compressed air generation device 63 and the pneumatic feed mean 78 are mounted.

[0118] The frame 71 can also be easily transported on the road, thanks also to the fact that it can be mounted on wheels provided to move it.

[0119] In some forms of embodiment, the dosing machine 70 can comprise a support rod 61 attached to the frame 71 to keep sacks of additive particles, schematized in fig. 2, in suspension. The support rod 61 is configured to suspend each sack above the loading member 77.

[0120] We shall now describe the functioning of the dosing machine 70, combined with that of the mixing machine 90 for the production of a cement agglomerate.

[0121] The additive particles are loaded into the containing body 72.

[0122] Subsequently, the compressed air generation device 63 is driven to compress the air to a suitable pressure, for example 4 bar, and to introduce it by means of the second tubular segment 80 into the delivery tubular segment 81 of the Venturi effect device 83.

[0123] The compressed air is introduced into the delivery tubular segment 81 by means of diverting it by the conveyor element 82. The compressed air, transiting in the delivery tubular segment 81, is accelerated due to the Venturi effect.

[0124] The acceleration of the stream of compressed air generates a depression in the first tubular segment 79 which attracts the additive particles located in the containing body 72.

[0125] The action of attraction forms a mixture of compressed air and additive particles that are sent, through the pipe 60, to the mixing chamber 33 of the mixing machine 90. The flow rate of compressed air can be modified by acting on the management and control device 69. The flow rate of compressed air influences the characteristics of the resulting cement agglomerate, modifying its density and consequently the properties of heat and acoustic insulation, and the weight of the cast.

[0126] At the same time, the raw materials are loaded

into the first hopper 12 of the mixing machine 90. The first bladings 26 provide to break up any possible agglomerates that can be present and to feed the raw materials toward the mixing chamber 33 in which the water and foam are added in the desired quantities to determine the density and consistency of the cement agglomerate to be obtained.

[0127] Furthermore, the pipe 60 transporting the mixture comprising compressed air and additive particles and generated in the dosing machine 70 converges into the mixing chamber 33.

[0128] The addition of this mixture inside the mixing chamber 33 leads to an additional mixing deriving from the blowing in of compressed air.

[0129] Subsequently, the cement agglomerate obtained is discharged through the discharge aperture 43 into the second hopper 45.

[0130] The second mixer 15 provides to homogenize further the cement agglomerate generated in the first mixer 13, preventing problems of aggregation of the concrete which could compromise both the functioning of the screw pump and also obstruct the pipes that are associated with the attachment portion 55.

[0131] By activating the second mixer 15, the pumping device 16 is also activated, and hence the screw pump to pump the cement agglomerate toward the destination where it will be installed.

[0132] It is clear that modifications and/or additions of parts may be made to the apparatus 10 for the production of a cement agglomerate and corresponding method as described heretofore, without departing from the field and scope of the present invention.

[0133] In some forms of embodiment, the dosing machine 70 and the mixing machine 90 can be integrated in a single support structure, with the advantage of great compactness and versatility of use of the apparatus 10.

[0134] In these forms of embodiment, the pipe 60 can be a connector between the dosing machine 70 and the mixing machine 90.

[0135] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of the apparatus 10 for the production of a cement agglomerate, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Apparatus for the production of a cement agglomerate comprising a mixing machine (90) configured to mix raw materials making up at least part of said cement agglomerate with at least a liquid substance such as water, **characterized in that** it comprises a machine for dosing additive particles (70) equipped with at least a pipe (60) that connects said dosing

machine (70) to said mixing machine (90) and with a pneumatic feed mean (78) configured to feed said additive particles pneumatically into said mixing machine (90) through said pipe (60).

2. Apparatus as in claim 1, **characterized in that** said pneumatic feed mean (78) comprises a compressed air generating device (63) and a Venturi effect device (83) connected to said compressed air generating device (63) and a body (72) containing said additive particles.
3. Apparatus as in claim 2, **characterized in that** said Venturi effect device (83) comprises a first tubular segment (79) connected to said containing body (72) and a second tubular segment (80) to which said compressed air generating device (63) is connected, said first tubular segment (79) and said second tubular segment (80) both converging in a delivery tubular segment (81) connected to said pipe (60).
4. Apparatus as in any claim hereinbefore, **characterized in that** said mixing machine (90) comprises a mixing chamber (33) in which said raw materials are mixed at least with a liquid substance, and **in that** said pipe (60) is connected to said mixing chamber (33).
5. Apparatus as in claim 4, **characterized in that** said mixing machine (90) comprises first containing means (12) to contain said raw materials and a mixer (13) configured to take said raw materials from said first containing means (12) and to mix them inside said mixing chamber (33).
6. Apparatus as in claim 5, **characterized in that** said mixer (13) comprises a first mixing section (21) disposed in said first containing means (12), an intermediate section (22) interposed between said first containing means (12) and said mixing chamber (33) and a second mixing section (23) disposed in said mixing chamber (33) and configured to mix said raw materials with at least a liquid substance, and with said additive particles.
7. Apparatus as in claim 6, **characterized in that** said intermediate section (22) is configured to prevent a reflux of either said liquid substance or the air introduced by said pneumatic feed mean (78) with said additive particles toward said first containing means (12).
8. Apparatus as in any claim hereinbefore, **characterized in that** it comprises a management and control device (69) connected to said mixing machine (90) and to said dosing machine (70) at least to manage and control the dosage of said additive particles in said mixing machine (90).

9. Apparatus as in any claim hereinbefore, **characterized in that** said mixing machine (90) and said dosing machine (70) are integrated in a single support structure.

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10. Method for the production of a cement agglomerate comprising the mixing of raw materials that make up at least part of said cement agglomerate with at least a liquid substance such as water, **characterized in that** it comprises a substantially continuous pneumatic feed step, to feed additive particles to said raw materials and to said at least one liquid substance during said mixing.

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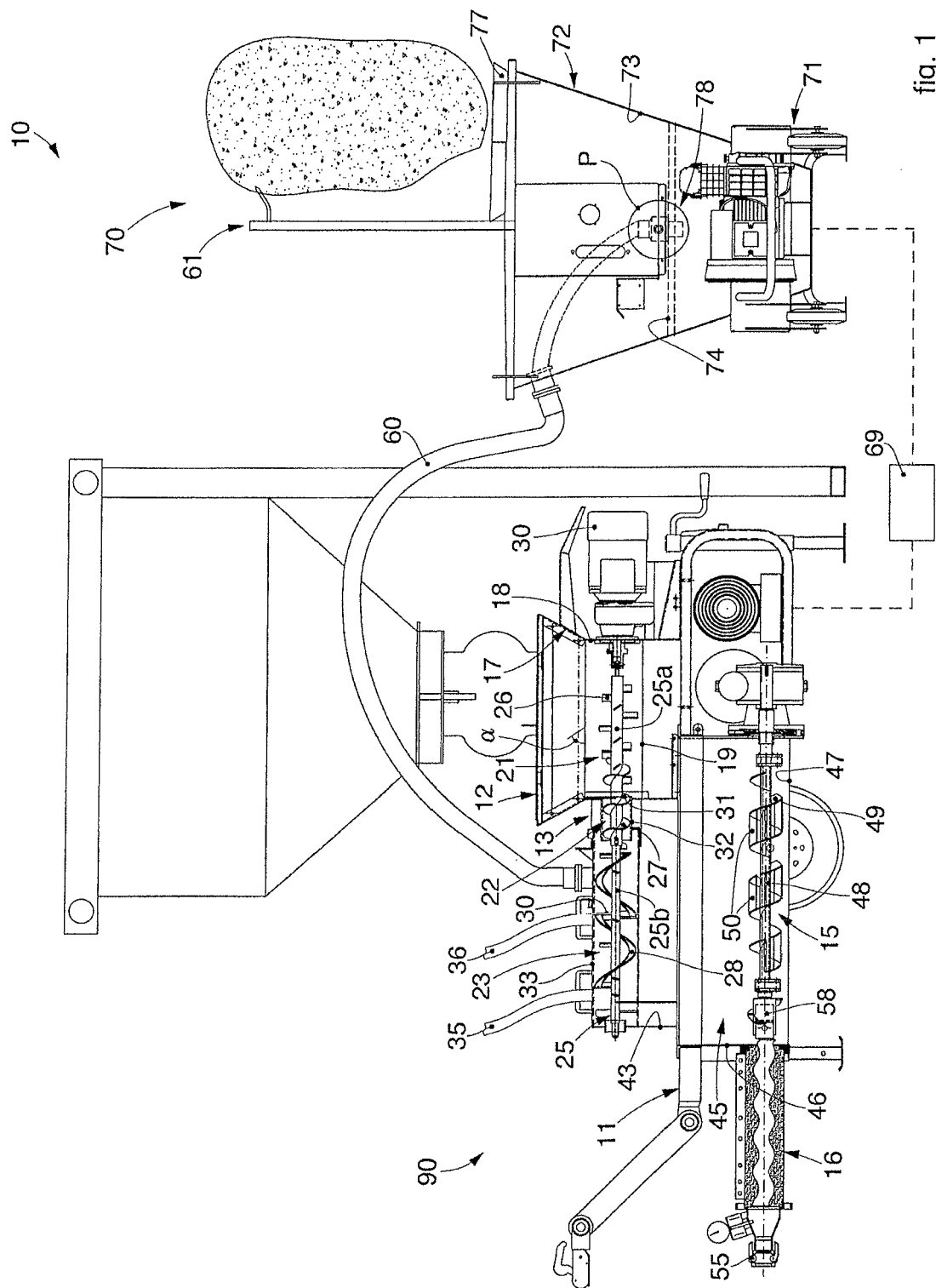
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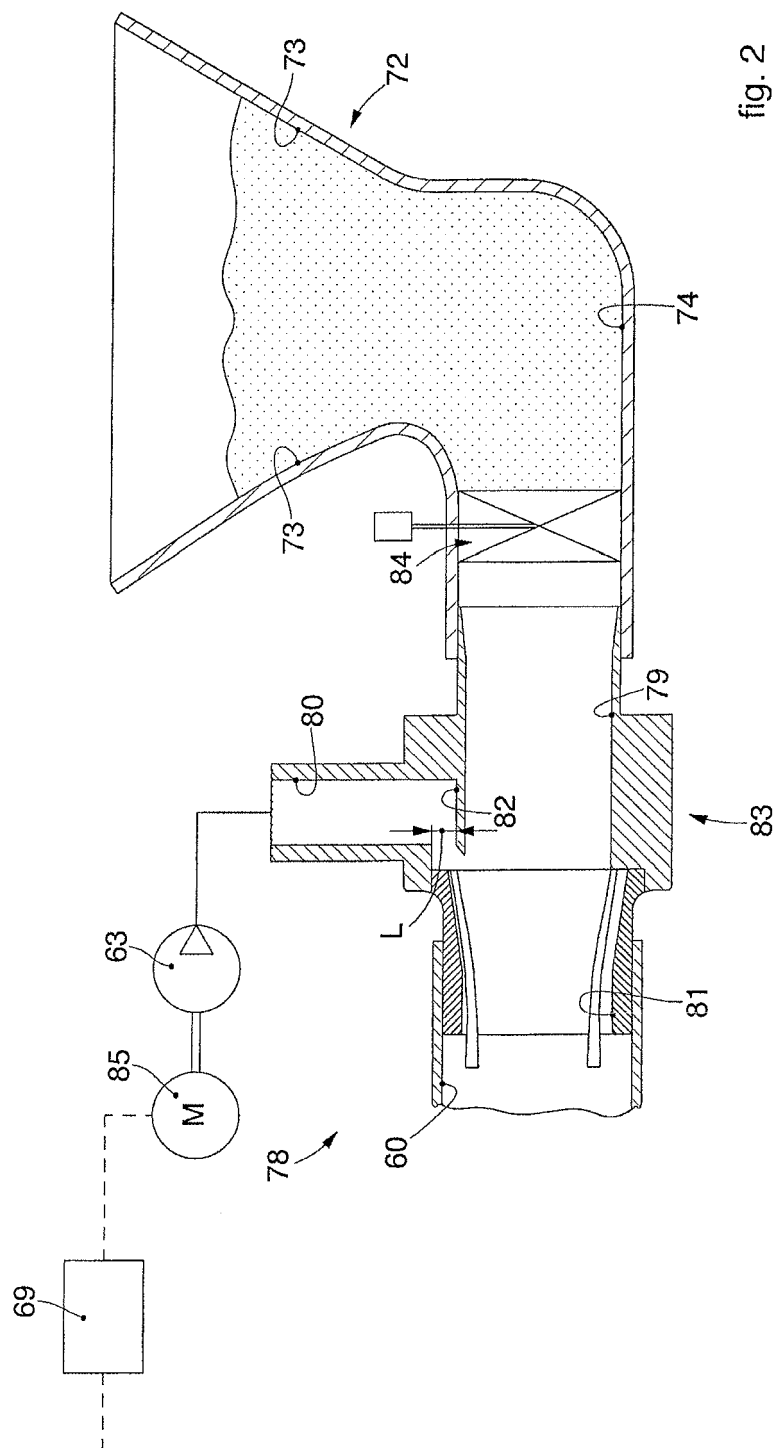


fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 15 16 8443

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 03/004233 A1 (MINERALPLUS GES FUER MINERALST [DE]; ROLL JUERGEN [DE]; KOENSLER WINFR) 16 January 2003 (2003-01-16) * mixing chamber = 15; figures 1,2 *	1-4,8-10	INV. B28C7/06 B65G53/58
X	FR 2 964 059 A1 (TERRACHANVRE [FR]) 2 March 2012 (2012-03-02) * aggregates come from 102, though sluices 114, then blown by 106 towards 116. "Dans la mélangeuse sont mélangés un liant hydraté, par exemple de la chaux, et de l'eau dans les proportions adéquates qui sont sensiblement de 1 kg de chaux pour 1 kg d'eau. Le mélange, également appelé "soupe de chaux", est ensuite propulsé jusqu'à la buse 202 à travers un tuyau de transfert 206 où il est expulsé dans le tuyau de projection 116 au voisinage de la sortie de celui-ci dans le flux de fibres de chanvre." Additional mixing occurs in truncated cone-shaped pipe, which disturbs pulsated air flow produced by the blower to generate swirls at the outlet of the blowing pipe so as to brew the aggregates agglomerated during its passage through the sluices and separate the aggregates from each other, thus creating continuous flow of the aggregate in the projection pipe.; claims 1-3; figures 1,4 *	1	TECHNICAL FIELDS SEARCHED (IPC) B28C B65G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 September 2015	Examiner Boone, John
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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EUROPEAN SEARCH REPORT

 Application Number
EP 15 16 8443

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X	EP 0 744 259 A2 (CMP SPA [IT] CMP SPA) 27 November 1996 (1996-11-27) * tube 251 sprays glue there is provided a mixing means of traditional type, comprising a rotatable shaft 250 provided with paddles 252; figure 3 *	1	
X	GB 257 680 A (ROBERT FITZMAURICE) 8 September 1926 (1926-09-08) * mixer is implicitly disclosed; claims 1-3; figures 1,2 *	1,2	
X	DE 35 20 877 A1 (SCHLECHT KARL) 11 December 1986 (1986-12-11) * Compressor can suck aggregates into mixer via tube (3,5). No venturi, instead suction side of compressor is used.; claims 1-3; figure 1 *	1	
X	DE 202 03 463 U1 (WALTER HEILIT VERKEHRSWEGEBAU [DE]) 10 July 2003 (2003-07-10) * claims 1-3; figure 1 *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
Place of search The Hague		Date of completion of the search 17 September 2015	Examiner Boone, John
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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17-09-2015

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