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- (6), at least one solid-phase component "S", in reduced quantities, into at least one container (4);
- b) introducing, by means of a dosing system (6), at least one liquid-phase component "L", in reduced quantities, into at least one container (4);
- c) amalgamating/mixing the compound by using at least one mixer (2);
- d) closing container (4) before it is delivered to the final customer.



Description

[0001] The invention relates to an innovative method for dosing and amalgamating powders or granulated materials into a liquid-phase component in order to obtain wall paints or coatings.

[0002] During the process currently used for producing wall paints and coatings, all the components required for preparing such compounds are dosed in large mixers.

[0003] The components necessary for preparing such compounds include, accounting for 50% at most, liquid components such as, for example, water or paints; the remaining percentage includes solid-phase components such as powders and granulated materials.

[0004] Such powders and granulated materials normally constitute most of the compound mass inside the mixer, which is similar to a concrete mixer.

[0005] When amalgamating these materials by using these mixers, much power is required to rotate such big mixers at an adequate speed so as to properly homogenize the product. The mixing step normally takes a very long time because of the large volumes and masses involved inside the mixer, so that much time is required to obtain a product having the desired density, viscosity and homogeneity characteristics. At the end of the mixing step, said compound is dosed into different containers, the capacity of which is often quite small, i.e. less than 30 litres.

[0006] This dosing into small capacity containers implies that the producer must keep a large number of such containers in stock, which many times will not be completely sold, thus increasing the warehouse inventory.

[0007] The above-described method clearly appears to be not very flexible and involves the following: high costs due to the large quantity of product used for preparing a stock of product; a long processing time, since mixing large quantities of product takes a very long time to obtain adequate product homogeneity; high energy consumption, because such mixers require much power to rotate.

[0008] The present invention aims at overcoming the above-mentioned problems by proposing a method for dosing and amalgamating wall paints and coatings wherein mixing takes place in small containers, thus making the production system more flexible and reducing both the production cost and the time necessary for preparing a stock of such compounds.

[0009] One aspect of the present invention relates to a method for dosing and amalgamating/mixing solid-phase components, such as powders, sand, marble and crushed stone, into a liquid-phase component in order to obtain wall paints and coatings characterized as set out in the appended claim 1.

[0010] Further auxiliary features are set out in the appended dependent claims.

[0011] The features and advantages of said method will become more apparent from the following description of one embodiment thereof referring to the annexed

drawings, which specifically illustrate the following:

- Fig. 1 shows one example of a system using the method according to the present invention;
- Figs. 2A, 2B show different embodiments of the present method according to the present invention.

[0012] With reference to the above-mentioned drawings, the method for dosing and amalgamating/mixing, by means of at least one mixer or mixing device 2, at least one solid-phase component "S", e.g. powder, sand, marble or crushed stone, to be amalgamated/mixed with at least one liquid-phase component "L" in order to obtain wall paints and coatings with homogeneous mixtures, is applied to a production system 3 for making such products.

[0013] Said method comprises the following operating steps:

- a) introducing, by means of at least one dosing system 6, at least one solid-phase component "S" into at least one container 4 for the final customer, at at least one dosing point P;
- b) introducing, by means of a dosing system 6, at least one liquid-phase component "L" into at least one container 4 for the final customer, at at least one dosing point P;
- c) amalgamating/mixing the compound formed by the components inside said at least one container 4 by means of a mixer 2;
- d) closing said at least one container 4 before it is delivered to the final customer.

[0014] Mixer 2 is essentially a device adapted to amalgamate/mix said at least one component "S" and said at least one component "L" when they have already been introduced and dosed into container 4, e.g. by plunging at least a mixing portion of mixer 2 into container 4.

[0015] Said mixer 2 is a stand-alone device, external to the structure of container 4 that contains the compound not yet amalgamated/mixed.

[0016] One embodiment of the method according to the present invention illustrated in Fig. 1 comprises: a step "a" of introducing, by means of at least one dosing system 6, at least one solid-phase component "S".

[0017] Said solid-phase component "S" is used for providing the final effect of the coating.

[0018] Said components "S" are introduced into container 4, intended for the final customers, by means of at least one dosing system 6, preferably a dosing apparatus 62A for solids.

[0019] Containers 4 are, for example, cans and buckets, preferably having a limited capacity not exceeding, for example, 50 litres.

[0020] Preferably, dosing apparatus 62A for solids is a rotary valve, which ensures a controlled and accurate metering of the components being introduced.

[0021] The introduction of said solid-phase "S" in the

process allows to create small doses of final product to meet any final customer's requirements.

[0022] In said step it is possible to choose which components "S" must be introduced into container 4, so that different product combinations can be created.

[0023] Prior to step "a" of introducing, by means of at least one dosing system 6, at least one solid-phase component "S", it is advantageous to carry out an additional step of pre-mixing the solid-phase components "S", wherein the components "S" are pre-mixed, preferably inside at least one mixing funnel 61, by means of at least one mixing means comprised in funnel 61.

[0024] Said pre-mixing step is carried out prior to step (a) of introducing the components into at least one container (4). In said mixing funnel 61, the mixing means creates a mixture of solid-phase components "S" as homogeneous as possible before step "a" of introducing at least one solid-phase component "S" into container 4 takes place.

[0025] Said pre-mixing is adapted to ensure a more homogeneous distribution of the solid phase.

[0026] Said at least one mixing means may be, for example, a worm screw or auger, or blades that mix said components "S". Said mixing funnels 61 may be more than one and may receive one or more solid-phase components "S".

[0027] Initially, each solid-phase component "S" is contained in at least one container for solids 12, e.g. silos for solids.

[0028] The transfer from said at least one container for solids 12 to a dosing point P, where there is at least one containment funnel 63, e.g. arranged above dosing system 6, and to mixing funnel 61 preferably takes place through at least one transport means for solids 70, which is, for example, an aeromechanic circuit including, for example, at least one pump for solids 75 pushing said components "S", or auger and funnel systems.

[0029] Prior to the introduction step "a", e.g. as the solid-phase component "S" is being transported as stated above, a further flow-rate adjustment step may be carried out wherein at least one flow-rate reduction funnel 9 changes the speed and flow rate at which the component "S" arrives at dosing systems 6 from the container 12 for solids, depending on specific requirements.

[0030] In order to carry out said flow-rate reduction step, bottlenecks may be arranged along transport means 70.

[0031] Said flow-rate reduction funnel 9 and the various flow-rate reduction means used in system 3 are in a number appropriate to the dimensions and extension of system 3 itself.

[0032] An additional measurement step may also advantageously be carried out to measure the quantities of both the various solid-phase components "S" and the various liquid-phase components "L" to be introduced into container 4.

[0033] Said measurement step may be executed before or after the steps "a" and/or "b", depending on the

measurement method in use.

[0034] The actual measurement occurs at predetermined measurement points 8, where said measurement step is carried out preferably by implementing volumetric measurement methods or by measuring the mass of the components.

[0035] The measurement of the mass of the components "S" or "L" may take place in two alternative forms:

- by difference;
- funnel scale.

[0036] According to the method of measurement by difference, during step "a" and/or "b" container 4 is laid on scales that measure the residual mass and thus determine the mass of the output material by difference.

[0037] According to the funnel scale measurement method, system 3 comprises at least one measurement point 8 including at least one funnel scale device, which receives the solid-phase components "S" and determines the mass of each.

[0038] As aforementioned, it is also possible to determine the quantity of the component to be introduced into container 4 by determining its volume, e.g. by knowing its flow rate. This volumetric measurement method can be used at measurement points 8 to measure the liquid-phase components "L".

[0039] The position of measurement points 8 depends on the technology employed for taking said measurement and on the component's density and specific weight.

[0040] It is therefore possible to perform the measurement at the outlet of the containers of the components, both those in the solid phase "S" and those in the liquid phase "L", or when introducing the components into containers 4 or at any other point of system 3.

[0041] The introduction of the components "S" is done by means of at least one dosing system 6 at at least one dosing point "P" along the chain of production system 3 for making said products.

[0042] Each dosing system 6 preferably comprises a containment funnel 63 receiving at least one solid-phase component "S", where, for example, the weight or the volume of the component can be determined before it is introduced into container 4.

[0043] The transfer of both the solid-phase component "S" and the liquid-phase component "L" from dosing system 6 to container 4 occurs when the chain of production system 3 transports said container 4 to dosing point P under system 6.

[0044] An additional suction step is advantageously included which is adapted to suck both the dusts and the fumes generated during the introduction of both the solid-phase components "S" and the liquid-phase components "L", e.g. during the dosing step "a" to suck the dusts created in the air during said step, or during step "b" to suck the fumes created by the liquid-phase components "L" when the latter are, for example, solvents.

[0045] Step "a" of introducing the solid-phase compo-

nent "S" is advantageously followed by a further step of eliminating any residues, e.g. from the transport means for solids 70, paying particular attention to the end portion thereof near dosing systems 6, so as to avoid contaminating the next production.

[0046] In the portion near dosing point P, the transport means for solids 70 is preferably a tube adapted to convey the components "S" towards containment funnel 63 arranged above the dosing apparatus for solids 62A.

[0047] This step can be implemented, for example, by blowing compressed air into transport means 70 from at least one predetermined intake point 702 towards at least one drain valve 701, through which said residues are discharged.

[0048] An alternative method of implementation of said residue elimination step may require, for example, the sliding of at least one cleaning element inside transport means 70, e.g. a flexible tubular element of a size compatible with means 70.

[0049] Said cleaning element is inserted into transport means 70 at a predetermined insertion point 702 in order to push the production residues towards said at least one drain valve 701.

[0050] This step allows cleaning the transport means before reusing it for producing another compound.

[0051] Step "a" of introducing at least one component "S" is followed by step "b" of introducing, by means of at least one dosing system 6, at least one liquid-phase component "L" into at least one container 4 for the final customer. In this step, at least one liquid-phase component "L" is introduced into container 4, preferably the water-based coating compound or solvents into which the solid-phase components "S" must be amalgamated/mixed, so as to obtain a product having the desired physical, density and viscosity properties.

[0052] The introduction of said at least one liquid-phase component "L" is carried out by means of at least one dosing apparatus for liquids 62B, through which the component "L" is introduced into said at least one container 4.

[0053] Said at least one dosing apparatus for liquids 62B is preferably a rotary valve for liquids.

[0054] The introduction of said at least one component "L" may occur, for example, by volume or by mass as a function of the characteristics of the dosing device used in accordance with the above-described methods.

[0055] The various liquid-phase components "L" that must be stored inside containers 4 may be directly introduced into container 4 by using a corresponding number of dosing apparatuses for liquids 62B or may be advantageously subjected to an additional step of mixing the liquid-phase components "L".

[0056] Said step of mixing the components "L" is carried out prior to step "b", preferably by means of at least one dissolver for liquids 13, which receives at least two liquid-phase components "L" from as many containers for liquids 11, which are then mixed together and conveyed into at least one piping circuit 71 suitable for trans-

porting liquids, wherein they are fed under pressure by means of at least one pump for liquids 73.

[0057] The above-mentioned introduction steps "a" and "b" may be executed in the reverse order without changing the result in the final product.

[0058] This solution can be implemented by placing into said at least one piping circuit 71 at least one flow diverter 5, adapted to divert the flow of the liquid component "L". Said at least one diverter 5 allows introducing said component "L" before and/or after the solid-phase component "S" without altering neither the quality nor the physical characteristics of the final compound obtained through the present invention.

[0059] The above-mentioned steps may also be alternated, even many times, in order to create compounds that require that the introduction of at least one solid-phase component "S" be alternated with at least one liquid-phase component "L", so as to produce special compounds requiring the alternate introduction of solid-phase components "S" and liquid-phase components "L".

[0060] It is therefore possible to carry out said steps "a" and "b" according to the present invention in different execution orders while still attaining the same result in the final product; furthermore, said steps "a" and "b" may be alternated, in the most appropriate sequence, so as to obtain predetermined components which, for example, require a predetermined component introduction sequence to provide the desired compound.

[0061] The introduction of at least one component "S" and at least one component "L" is followed by the step of amalgamating/mixing the compound by using a mixer 2.

[0062] In this step, the amalgamation is executed on said at least one component "S" and said at least one component "L" previously introduced into container 4 intended for the final customer.

[0063] System 3 includes at least one mixer 2, which performs said amalgamation/mixing step "c".

[0064] In order to carry out the amalgamation/mixing step "c" according to the present invention, it is advantageous to arrange a plurality of said at least one mixer 2 at different points of the chain of system 3, depending on the characteristics, and hence on the components "S" and "L", of the product to be made.

[0065] Intermediate mixings may thus be executed by means of at least one mixer 2 located upstream of predetermined dosing points "P" for both the "S" and "L" components in order to obtain particular characteristics of the compound.

[0066] In one possible embodiment, said at least one mixer 2 employed for executing step "c" essentially operates as described in the general principles of operation set out in patent application no. T02008A000008.

[0067] A further typology of mixers which may be used for carrying out the amalgamation/mixing step "c" is, for example, a vibration mixer 2 which, by vibrating container 4, amalgamates/mixes the compound inside container 4 itself without coming directly in contact with the com-

pound.

[0068] Such a solution is useful when many amalgamation/mixing steps "c" must be carried out.

[0069] Said vibration mixer 2 also reduces the time necessary for producing said compounds, especially in systems 3 where different compounds are to be mixed.

[0070] The use of mixers 2 as described in patent application T02008A000008 requires that the mixing portion immersed into container 4 be cleaned whenever the components "S" and "L" are changed, so as to avoid any contamination between different compounds.

[0071] Once the last component required for obtaining the final product has been introduced into container 4, and possibly after the last amalgamation/mixing step "c", container 4 containing the desired final product arrives at step "d" of closing containers 4 ready for sale.

[0072] In this step "d" container 4, which contains the final product to be sold, is closed by means of at least one covering means 41, such as thin films and covers, preferably hermetically.

[0073] During said step "c", said at least one covering means 41 is placed on top of container 4 and, through at least one closing mechanism 42, said at least one covering means 41 is secured to container 4.

[0074] The closing action carried out by said at least one closing mechanism 42 preferably ensures a hermetic seal.

[0075] In an alternative embodiment, the amalgamation/mixing steps "c" can be carried out by a mixer 2 before or after step "d" of closing containers 4.

[0076] If step "d" is executed before step "c", it is preferable to implement the amalgamation/mixing step "c" by using the above-mentioned vibration mixer 2, which vibrates the container already appropriately closed, or by using equivalent amalgamation methods adapted to amalgamate a compound inside a closed container 4.

[0077] If step "c" is executed before the closing step "d", it is preferable to implement the amalgamation/mixing step "c" by using a mixer 2 as described in patent application T02008A000008.

[0078] In a further embodiment, a mixing step can be carried out between step "a" of introducing solid-phase components "S" and step "b" of introducing liquid-phase components "L", preferably by using a vibration mixer 2 to speed up the production process and to avoid having to carry out a step of cleaning mixer 2, which would otherwise be required by an immersion mixer to prevent the compounds from being unintentionally contaminated, for example.

[0079] In the embodiment shown in Fig. 1, once containers 4 have been closed, said containers 4 are ready for being used and sold to the final customer, who requested such a product having specific properties.

[0080] A further step may advantageously be added to the method according to the present invention for introducing at least one dye.

[0081] In said step of introducing at least one dye, said at least one dye may be either in the solid phase or in

the liquid phase.

[0082] The introduction of said at least one dye may occur by considering said dye as a solid-phase component "S" or a liquid-phase component "L".

[0083] Depending on the characteristics of the dye in use, the aforementioned introduction step will be carried out accordingly.

[0084] Like the above-mentioned components "S" and "L", the point along the chain of system 3 where the dye is introduced may vary according to the type of product to be obtained.

[0085] The present method is preferably implemented in an automatic production system 3 wherein the operator only has to select: the size of container 4; at least one solid-phase component "S"; at least one liquid-phase component "L", and possibly a dye, so as to obtain the desired wall paint or coating.

[0086] Such a method, applied to a production system 3 for making said products, may be integrated into more complex and articulated systems; however, said method may also be implemented as a stand-alone system.

Claims

1. Method for dosing and amalgamating/mixing, by means of at least one mixer or mixing device (2), at least one solid-phase component (S) to be amalgamated/mixed with at least one liquid-phase component (L) in order to obtain wall paints and coatings with homogeneous mixtures, applied to a production system (3) for making such products; said method being **characterized in that** it comprises the following operating steps:

- a) introducing, by means of at least one dosing system (6), at least one solid-phase component (S), in reduced quantities, into at least one container (4) for the final customer;
- b) introducing, by means of a dosing system (6), at least one liquid-phase component (L), in reduced quantities, into at least one container (4) for the final customer;
- c) amalgamating/mixing the compound by using at least one mixer (2);
- d) closing the container (4) before it is delivered to the final customer.

2. Method according to claim 1, wherein the mixer (2) is a stand-alone device, external to the structure of the container (4), adapted to amalgamate/mix said at least one solid-phase component (S) and said at least one liquid-phase component (L) when they have been already dosed into said at least one container (4).

3. Method according to claim 1, wherein a further measurement step is advantageously comprised, which

is adapted to measure the quantity of both said at least one solid-phase component (S) and said at least one liquid-phase component (L) which will form the final compound within said at least one container (4).

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4. Method according to claim 1, wherein said at least one container (4) are cans and buckets for the final customer.

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5. Method according to claim 1, wherein a further suction step is advantageously comprised, which is adapted to suck both the dusts and the fumes generated during the steps of introducing both the solid-phase components (S) and the liquid-phase components (L).

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6. Method according to claim 1, comprising a step of pre-mixing said at least one solid-phase component "S", which components are pre-mixed preferably inside at least one mixing funnel (61) prior to step (a) of introducing them into at least one container (4), for the purpose of creating a mixture of solid-phase components "S" as homogeneous as possible.

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7. Method according to claim 1, advantageously comprising a further step of mixing the liquid-phase components "L", which is carried out prior to the dosing step "b" by means of at least one dissolver for liquids (13).

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8. Method according to claim 1, comprising a step of introducing a dye, both in the solid phase and in the liquid phase, prior to executing the last amalgamation/mixing step "c".

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9. Method according to claim 1, comprising a residue elimination step, which is carried out after the introduction of the solid component (A) and which is adapted to eliminate any production residues from at least one transport means for solids (70) adapted to transport the solid-phase components (S) to the dosing system (6).

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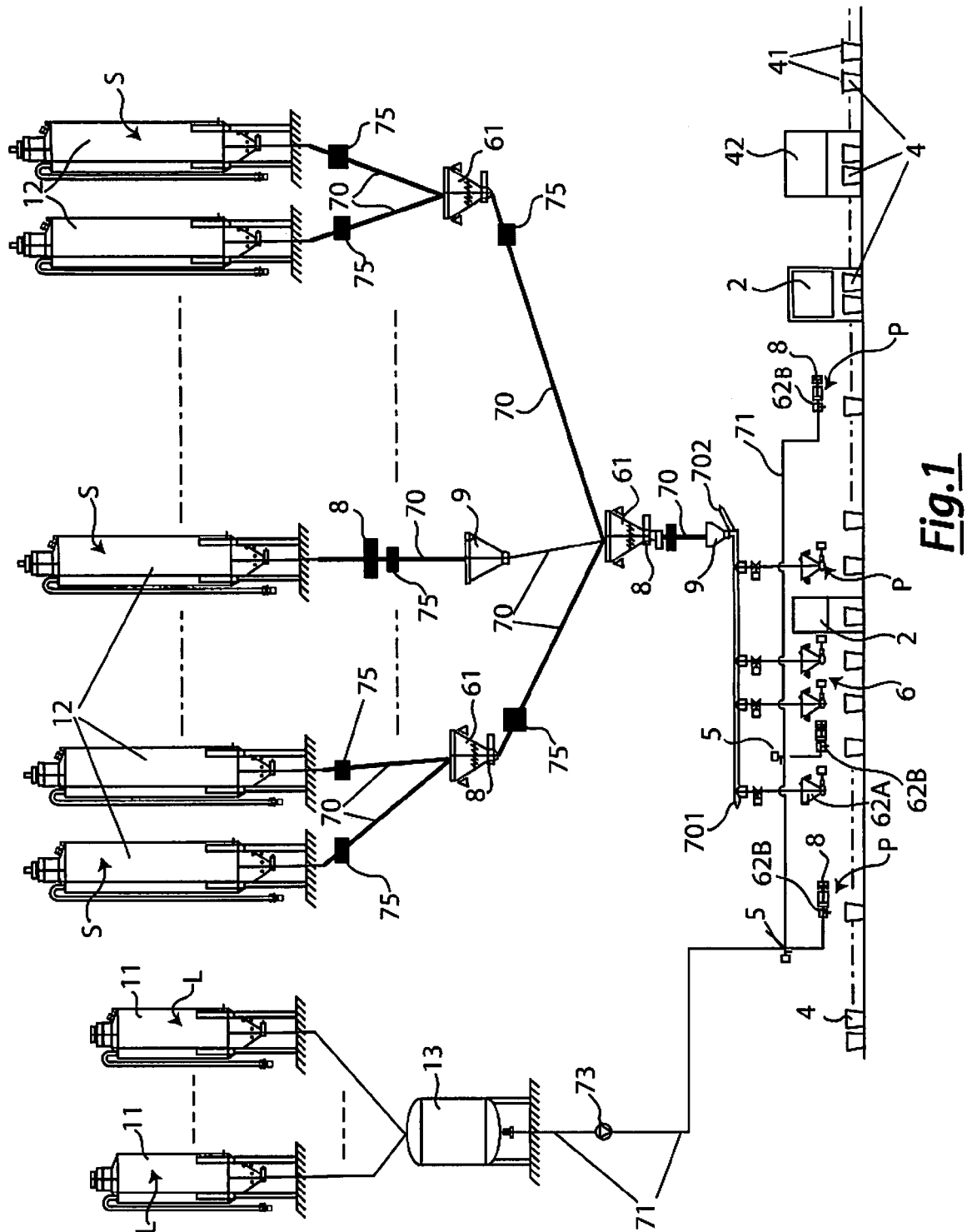
10. Method according to claim 1, comprising a further flow-rate adjustment step, wherein at least one containment funnel (9) is adapted to either decrease or increase the speed and flow rate of the solid-phase components (S) prior to the execution of step (a) of introducing a solid-phase component (S).

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11. Method according to claim 1, wherein the containers (4) are sealed hermetically.

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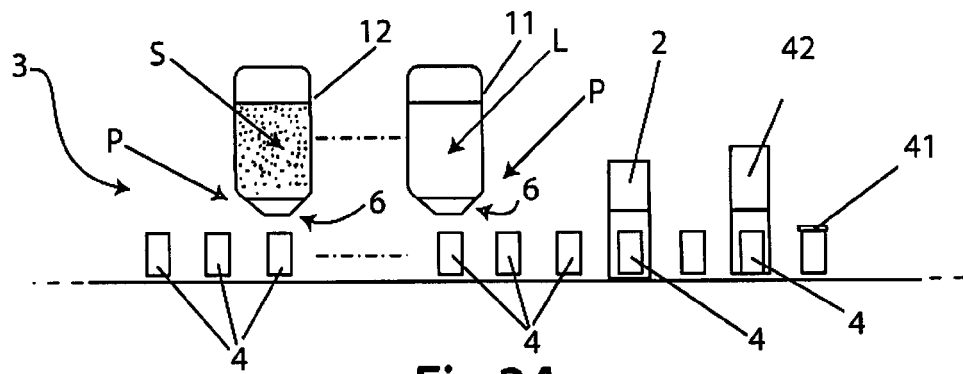


Fig.2A

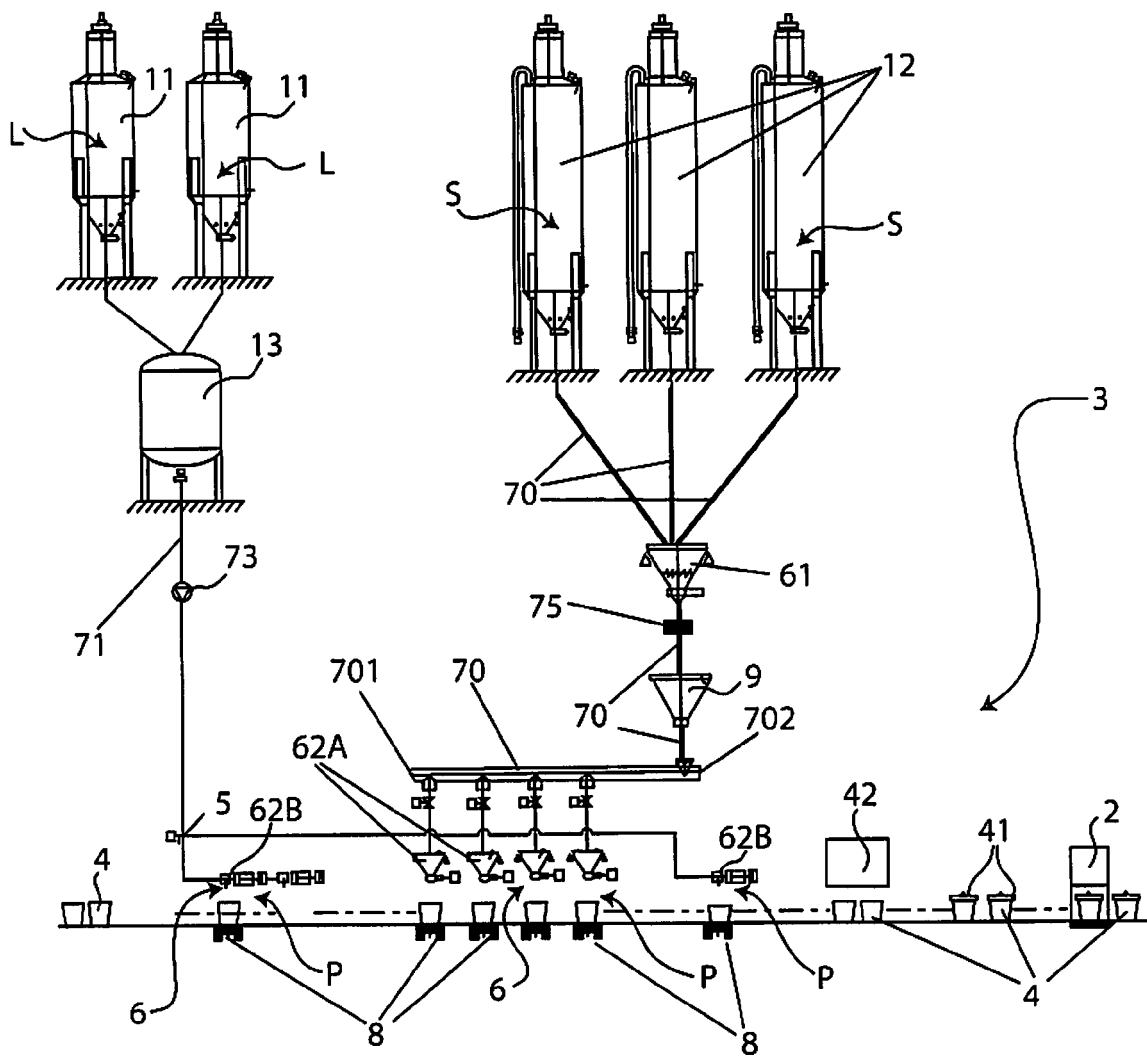


Fig.2B



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Application Number
EP 11 18 0854

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Place of search Munich		Date of completion of the search 9 January 2012	Examiner Brunold, Axel
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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