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(54) **PRE-DRYING AND MECHANICAL AGITATION DEVICE FOR THE PRODUCTION OF PASTA**

(57) The present invention relates to a predrying and mechanical agitation device (1) for the production of pasta comprising conveying means (12) suitable for conveying dust (13) carried by said one or more air flows (11) which pass through the heating means (8) of such device (1) into one or more accumulation and decantation regions (14) present inside a containment structure (2) of the device (1), and automatic extraction means (15) to automatically remove dust (13) from one or more accumulation and decantation regions (14) and transport it outside the containment structure (2) of such device (1).

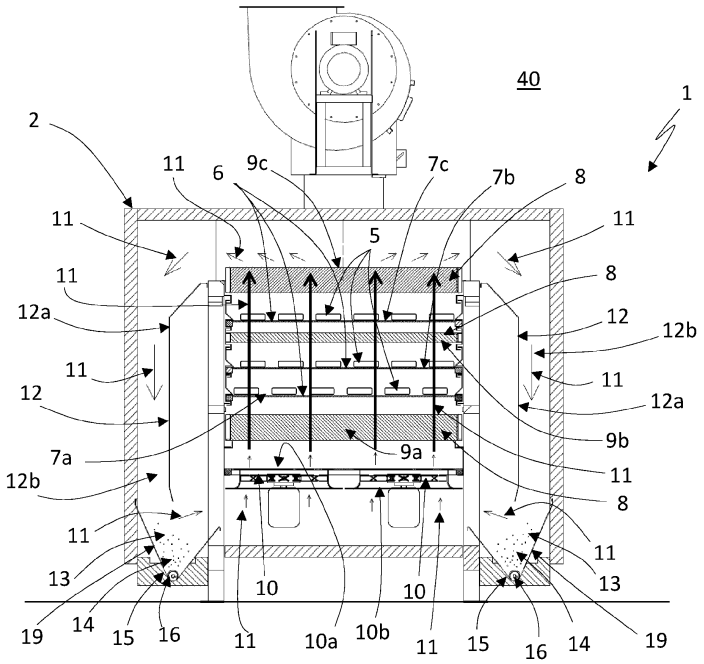

Fig. 3

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Description

[0001] The present invention refers to a pre-drying and mechanical agitation device for the production of pasta.

[0002] In the field of pasta processing lines, in particular short pasta, such as penne, fusilli, etc., the use of a pre-drying and mechanical agitation device, usually called a "shaker", is well known, in which the pasta, after being extruded, is subjected to mechanical agitation and simultaneous heating, typically by blowing hot air over it, in order to rapidly remove a high quantity of moisture from the freshly extruded (and therefore still very wet) pasta, preventing, thanks to mechanical agitation, the various pieces of pasta (precisely because they are very wet) from sticking together before reaching a sufficient degree of surface hardness.

[0003] Such shakers of a known type comprise a containment structure provided with an inlet opening and an outlet opening for the pasta, within which there are vibrating shelves that mechanically agitate the pasta, while transporting it from the inlet opening to the outlet opening.

[0004] Inside the containment structure, there are also heat exchangers, typically finned batteries fed by a thermodynamic circuit in which a heat transfer fluid flows, which heat a flow of air that is generated by fans, and which cyclically passes through these heat exchangers, heating up, and through the pasta that transits on conveyor belts, removing a certain percentage of moisture therefrom.

[0005] These known types of shakers are also equipped with an ejection system that extracts air from the inside of the containment structure, evacuating it into the environment, while at the same time creating a vacuum inside the containment structure that causes new air to enter from the environment through the inlet opening.

[0006] However, such known shakers have certain drawbacks.

[0007] In particular, due to both the mechanical agitation and the erosion action exerted by the air, a large amount of dust is separated from the pasta, which is circulated by the air itself within the containment structure.

[0008] This dust, by settling on the various internal components of the containment structure, compromises its operation and/or performance, thus leading to frequent maintenance operations, with the high costs and downtime this entails.

[0009] This drawback is particularly serious if dust is deposited in the narrow gaps between the fins of the finned batteries of the heat exchangers, in which case there is a risk that heat exchange may be impaired, even irreparably (resulting in the need to replace the battery).

[0010] Furthermore, the presence of a high amount of dust in the air that is ejected by the ejection system means that the latter requires a complex filtering system, which, in addition to increasing the overall costs of the shaker, requires frequent cleaning and maintenance, resulting in increased downtime and operating costs.

[0011] The main scope of the present invention is to solve the problems listed above, and thus to realise a pre-drying and mechanical agitation device for the production of pasta (a so-called shaker), wherein the need for maintenance and the risk of machine downtime caused by dust separating from the pasta are reduced compared to the known technique described above.

[0012] As part of this scope, another aim of the invention is to realise a pre-drying and mechanical agitation device for the production of pasta that allows reducing the use of and/or the frequency of maintenance or replacement of filters to trap the dust present in the air released into the environment by the device.

[0013] A further aim of the invention is to facilitate the removal of the dust that separates from the pasta inside the pre-drying and mechanical agitation device.

[0014] The scope and aims according to the present invention are achieved by a pre-drying and mechanical agitation device for the production of pasta comprising:

- a containment structure, provided with an inlet opening and an outlet opening for pasta;
- agitation and transport means, suitable for mechanically agitating pasta, transporting it at the same time from said inlet opening to the outlet opening;
- heating means, suitable for heating a flow of air that passes through them;
- ventilation means, suitable for generating one or more air flows which pass through the heating means and the agitation and transport means, and then return cyclically, at least in part, into the ventilation means;
- conveying means suitable for conveying dust carried by the one or more air flows into one or more accumulation and decantation regions present inside the containment structure;
- automatic extraction means positioned at least partially in the one or more accumulation and decantation regions to automatically remove dust from them and transport it outside the containment structure;

wherein the ventilation means are positioned below the agitation and transport means, and wherein the one or more accumulation and decantation regions are positioned below and laterally with respect to the ventilation means,

wherein the conveying means comprise one or more bulkheads positioned laterally to the agitation and transport means to guide the one or more air flows, after their passage through the agitation and transport means, and before their return to the ventilation means, towards the one or more accumulation and decantation regions, in such a way that the one or more air flows deposit at least part of the dust present therein;

wherein the agitation and transport means comprise one or more vibrating shelves, suitable for housing pasta which enters the containment structure

through the inlet opening, having a perforated structure and having a substantially rectangular plan, positioned inside the containment structure in such a way to be crossed by the one or more air flows generated by the ventilation means, wherein the ventilation means are positioned below the one or more vibrating shelves, wherein the one or more accumulation and decantation regions are positioned below and laterally with respect to the one or more vibrating shelves and to the ventilation means;
wherein the bulkheads are at least two, and they are positioned respectively at the two long sides of the two or more shelves.

[0015] Other advantageous features of the invention are reported in the dependent claims.

[0016] The features and advantages of the present invention will be more apparent from the following description, which is to be understood as exemplifying and not limiting, with reference to the appended schematic drawings, wherein:

- figure 1 is a plan view of an advantageous embodiment of a pre-drying and mechanical agitation device for the production of pasta according to the invention;
- figure 2 is a section operated according to the section plane II-II of figure 1;
- figure 3 is a section operated according to the section plane III-III of figure 2.

[0017] With reference to the attached figures, a pre-drying and mechanical agitation device for the production of pasta has been globally indicated by number 1.

[0018] Such a device 1 may advantageously be part of a pasta production plant which may comprise other devices, not illustrated, operatively connected upstream (e.g. a pasta die) and downstream (e.g. a dryer and cooler) of the device 1.

[0019] The device 1 advantageously comprises electronic control means, not illustrated, configured to control one or more functions of the device 1 itself; advantageously, such electronic control means may comprise, for example, a microprocessor, or a microcontroller, or a programmable logic controller (PLC), etc.

[0020] The device 1 comprises a containment structure 2, such as a metal casing, the inside of which is in fluid communication with the external environment 40 through an inlet opening 3 and an outlet opening 4 for pasta 5.

[0021] Inside the containment structure 2 there are agitation and transport means 6, suitable for mechanically agitating the pasta 5, while transporting it from the inlet opening 3 to the outlet opening 4.

[0022] In an advantageous embodiment, the agitation and transport means 6 comprise one or more vibrating shelves (in the advantageous example illustrated in the appended figures there are three shelves, indicated respectively by the numbers 7a, 7b and 7c,) positioned within the containment structure 2, suitable for housing pasta 5 which enters the containment structure 2 through the inlet opening 3; such one or more vibrating shelves 7a, 7b, 7c advantageously have a perforated structure (or in other words, they have through-holes obtained on their surface, so that they can be crossed by a flow of air) and have a substantially rectangular plan.

[0023] In an advantageous embodiment, such as for example that illustrated in the appended figures, within the containment structure 2 there is a plurality of vibrating shelves (three, 7a, 7b and 7c in the advantageous example of the appended figures), arranged one above the other, advantageously at a predetermined mutual distance (not necessarily the same for all the pairs of overlapping shelves), and are advantageously arranged, in plan view, offset from one other, in such a manner that the pasta 5 which, due to vibration, escapes from one end of an upper shelf (e.g. the shelf 7c in the appended figures), falls onto the shelf arranged immediately below it (e.g. the shelf 7b in the advantageous example in the appended figures); in this way the pasta entering from the inlet opening 3, after having travelled, being agitated, through a first vibrating shelf (for example the shelf 7c), passes from one shelf to the lower shelf (for example from 7c to 7b), until reaching a last vibrating shelf (7a in the advantageous example of the appended figures) which communicates with the outlet opening 4, finally exiting from the latter by the action of the vibration.

[0024] According to the invention, the device 1 comprises heating means 8 suitable for heating a flow of air that passes through them.

[0025] Advantageously, such heating means 8 comprise one or more heat exchangers, e.g., in the advantageous case illustrated in the appended figures, three heat exchangers, indicated respectively by the numbers 9a, 9b, 9c, comprising, for example, one or more finned batteries supplied by a heat transfer fluid, suitable for heating a flow of air that passes through them.

[0026] Advantageously, the supply of the heat transfer fluid to one or more finned batteries can be controlled by a suitable thermodynamic circuit, not illustrated, controlled for example by the electronic control means of the device 1.

[0027] The device 1 comprises ventilation means 10, for example fans 60, preferably with axial flow, adapted to generate one or more air flows, illustrated schematically in figure 3 by arrows 11, which pass through the heating means 8 and the agitation and transport means 6, so as to hit the pasta 5 when it is transported by them, and then cyclically return, at least in part (since a part of such one or more air flows 11 may escape from the containment structure 2 instead of returning to the ventilation means 10), to the ventilation means 10.

[0028] Advantageously, the ventilation means 10 comprise a delivery region 10a, from which the one or more air flows 11 escape, and a suction region 10b, through which at least part of the one or more air flows 11 cyclically re-enter the ventilation means 10; it is underlined that a

part of the one or more air flows 11 that is generated by the ventilation means 10 may not cyclically re-enter such ventilation means 10, as, for example, it may be given off outside the containment structure 2.

[0029] Advantageously, as in the advantageous embodiment shown in the appended figures, the ventilation means 10 are positioned below the agitation and transport means 6.

[0030] In the advantageous embodiment illustrated in the appended figures, the one or more air flows 11, after being generated by the ventilation means 10, first pass through a first heat exchanger 9a, heating up, then a first vibrating shelf 7a, yielding heat to such first vibrating shelf 7a and to the pasta 5 contained therein, then a second vibrating shelf 7b, yielding heat to such second vibrating shelf 7b and to the pasta 5 contained therein, then a second heat exchanger 9b, heating up, a third vibrating shelf 7c, releasing heat to said third vibrating shelf 7c and to the pasta 5 contained therein, and finally a third heat exchanger 9c, heating up.

[0031] Subsequently, the one or more air flows 11 are drawn in from the suction region 10b of the ventilation means 10, re-entering the same and then being discharged from the delivery region 10a of the ventilation means 10 towards the first heat exchanger 9a.

[0032] Thus, a circulation of one or more flows 11 is established within the containment structure 2, affecting the heating means 8, the agitation and transport means 6 (and the pasta 5 contained therein) and the ventilation means 10.

[0033] According to the invention, the device 1 comprises conveying means 12 suitable for conveying dust 13 carried by the one or more air flows 11 into one or more accumulation and decantation regions 14 present inside the containment structure 2.

[0034] Advantageously, the one or more accumulation and decantation regions 14 communicate with the outside of the containment structure 2 through one or more discharge openings 17.

[0035] In an advantageous embodiment, such as that illustrated in the appended figures, the conveying means 12 comprise one or more bulkheads 12a positioned to the side of the agitation and transport means 6 for guiding the one or more air flows 11, after their passage through the agitation and transport means 6, and before their return to the ventilation means 10, towards the one or more accumulation and decantation regions 14, in such a way that these one or more air flows 11 deposit therein, by gravity, at least part of the dust 13 present therein.

[0036] Advantageously, the one or more bulkheads 12a present, in a section operated according to a transverse plane to the device 1, such as, for example, plane III-III of figure 2, a substantially C-shaped conformation, advantageously with the concavity facing the agitation and transport means 6; in such an advantageous embodiment, a channel 12b is defined between a bulkhead 12a and the contiguous containment structure 2 for the passage of one or more air flows 11, which leads them into one of the one or more accumulation and decantation regions 14.

[0037] In an advantageous embodiment, such for example that illustrated in the appended figures, wherein the agitation and transport means 6 comprise one or more vibrating shelves (e.g. the three vibrating shelves 7a, 7b and 7c arranged one above the other, as in the advantageous embodiment illustrated in the appended figures) having a substantially rectangular plan, there are at least two bulkheads 12a, and they are positioned respectively at the two long sides of the two or more shelves (e.g. the shelves 7a, 7b 7c).

[0038] In the advantageous embodiment in which the ventilation means 10 are positioned below the agitation and transport means 6, such as, for example, that illustrated in the appended figures, the one or more accumulation and decantation regions 14 are advantageously positioned below and laterally with respect to the ventilation means 10; thus, the one or more air flows 11, in order to return to the ventilation means 10, must first descend into one of the one or more accumulation and decantation regions 14, and then rise again therefrom, which promotes the decantation and accumulation in that region of the dust 13 contained in the one or more air flows 11.

[0039] Advantageously, in the case where the agitation and transport means 6 comprise one or more vibrating shelves (e.g. the three vibrating shelves 7a, 7b and 7c arranged one above the other, as in the advantageous embodiment illustrated in the appended figures), the one or more accumulation and decantation regions 14 may advantageously be positioned below and laterally with respect to the one or more vibrating shelves (e.g. the three vibrating shelves 7a, 7b and 7c) and the ventilation means 10.

[0040] In an advantageous embodiment, such as the one illustrated in the appended figures, the one or more accumulation and decantation regions 14 are at least partially defined by one or more profiles 19 preferably having a concave cross-section, preferably substantially V-shaped, with the vertex facing away from the conveying means 12; such V-shaped conformation promotes the decantation and accumulation of dust 13 near the vertex of the "V" itself.

[0041] The device 1 also comprises automatic extraction means 15 positioned at least partially in the one or more accumulation and decantation regions 14 to automatically remove dust 13 from them and transport it outside the containment structure 2.

[0042] In an advantageous embodiment, such as that illustrated in the appended figures, the automatic extraction means 15 comprise one or more Archimedean screws 16 arranged in such a way to transport the dust 13 present in said one or more accumulation and decantation regions 14 up to said one or more discharge openings 17, communicating with the outside of the containment structure 2, for example with a dust collection tank 13, not illustrated, external to the device 1.

[0043] In other advantageous embodiments, not illustrated, the automatic extraction means 15 advantageously comprise other mechanical systems, such as a conveyor belt, not illustrated, arranged at least partially within an accumulation and decantation region 14, on which the dust 13 is deposited to be transported outside the containment structure 2.

[0044] In an advantageous embodiment, such as the one illustrated in the attached figures, the device 1 comprises suction and ejection means 18 of the air contained in the support structure 2 and/or of the air just having left the outlet opening 4.

[0045] In an advantageous embodiment, such suction and ejection means 18 comprise one or more suction ports (e.g. a suction port 20 located at the outlet of the outlet opening 4, and a suction port 21 communicating with the inside of the containment structure 2) for sucking in the air contained in the support structure 2 and/or the air just having left the outlet opening 4.

[0046] Advantageously, the suction and ejection means 18 also comprise a piping system 22 for conveying the air sucked in by the one or more suction outlets to a desired region or zone outside the containment structure 2, e.g. the external environment 40.

[0047] Advantageously, the suction and ejection means 18 include suction means 23, such as a pump, which generate the suction action that causes air to be sucked in from one or more suction ports, and transported through the piping system 22.

[0048] In an advantageous embodiment, the suction and ejection means 18 further comprise sensor means, not illustrated, such as, for example, one or more sensors, not illustrated, adapted to detect the pressure and/or temperature and/or moisture within the containment structure 2, and regulation means, not illustrated, for example a modulation valve, not illustrated, operatively connected to said sensor means, preferably via the electronic control means of the device 1, if present, to regulate the amount of air expelled through the suction and ejection means 18 as a function of the pressure and/or temperature inside the support structure 2.

[0049] In an advantageous embodiment, the device 1 comprises means 30 for the selective input of air from the outside to the inside of the containment structure 2, through the inlet opening 3, configured to define an at least partial barrier to the entry of further air, with the exclusion of that introduced by the selective input means 30 themselves, through the inlet opening 3.

[0050] In an advantageous embodiment, such as that illustrated in the appended figures, the selective input means 30 are positioned outside the containment structure 2; in other advantageous embodiments, not illustrated, such selective input means 30 may be positioned inside the containment structure 2, or partially inside and partially outside the containment structure 2.

[0051] In an advantageous embodiment, such selective input means 30 comprise means for generating 31 an advantageously heated air blade 32 which enters the inlet opening 3, thereby defining a partial barrier to the entry of further air, with the exclusion of the air blade 32 itself, through the inlet opening 3; this prevents an excessive amount of air, apart from that provided by the air blade 32 itself, from entering the containment structure 2 through the inlet opening 3.

[0052] The use of the air blade 32 contributes to reduce the overall energy consumption of the device 1, as it prevents an excessive amount of air at room temperature from entering the containment structure 2, cooling the environment inside it and thus requiring the supply of more heat energy through the heating means 8.

[0053] Furthermore, an excessive amount of air inside the containment structure 2 creates excessive internal pressure, and must therefore be evacuated through the ejection suction means 18, which, in addition to in itself entailing a certain energy expenditure for the activation of such means, leads to a lowering of the temperature inside the containment structure 2, with a consequent need to supply greater thermal power through the heating means 8, and also leads to a reduction of the internal moisture, which could create cracks or other structural or chromatic non-uniformities in the treated pasta 5.

[0054] The air blade 32, particularly when heated, also helps to thermally insulate the inside of the containment structure 2 from the external environment 40.

[0055] In an advantageous embodiment, such for example the one illustrated in the appended figures, the device 1 comprises a bypass duct 50 that connects the delivery region 10a of the ventilation means 10 with the inlet opening 3, bypassing the agitation and transport means 6 and the heating means 8.

[0056] In such an advantageous embodiment, a part of the one or more air flows 11 generated by the ventilation means 20, for example the part of the flow indicated with the arrows 11a in figure 2, instead of flowing towards the heating means 8 and the agitation and transport means 6, enters the bypass duct 50, passes through it, and exits inside the containment structure 2, near the inlet opening 3.

[0057] In this way, the depression created near said inlet opening 3 due to the circulation of the one or more air flows 11 which, after having passed through the heating means 8 and the agitation and transport means 6, are sucked in by the suction region 10b of the ventilation means 10, and due to the suction operated by the suction and ejection means 18, is compensated by the pressure exerted by the air flow 11a of one or more air flows 11 exiting from the bypass duct 50, thus preventing the uncontrolled suction of air due to this depression from the external environment 40 into the inside of the containment structure 2, through the inlet opening 3.

[0058] In an advantageous embodiment, such as the one illustrated in the appended figures, the bypass duct 50 is defined between the inner surface 2a of the containment structure 2 and a wall 70a of a containment enclosure 70, internal to the containment structure 2, which contains at least partially the agitation and trans-

port means 6 and the heating means 8; advantageously, the bypass duct 50 communicates with the delivery region 10a of the ventilation means 10 through one or more through openings 71 formed in the wall 70a of the containment enclosure 70.

[0059] The operation of the device 1 is described below.

[0060] Some pasta 5, generally immediately after coming out of the respective die, not illustrated, is fed into the containment structure 2 through the inlet opening 3, and is deposited on the agitation and transport means 6 (for example, with reference to the attached figures, on the shelf 7c), which start to vibrate, causing a simultaneous agitation and advancement of the pasta 5 through the containment structure 2 (in the example illustrated in the attached figures, by passing it through the second shelf 7b and the third shelf 7a), to the outlet opening 4.

[0061] Activating the ventilation means 10 creates, inside the containment structure 2, the circulation of one or more air flows 11, which pass through the heating means 8, heating up, and the pasta 5, heating it and removing moisture from it.

[0062] Due to both mechanical agitation and the erosion action exerted by the air, a large quantity of dust 13 is separated from the pasta 5, which is circulated by one or more air flows 11 inside the containment structure 2.

[0063] The conveying means 12, by creating preferential paths for the circulation of the one or more air flows 11, help to convey the dust 13 transported by such one or more air flows 11 to one or more accumulation and decantation regions 14, where such dust 13 settles due to the effect of gravity, and accumulates, avoiding recirculation with the air.

[0064] As the dust 13 is deposited in the one or more accumulation and decantation regions 14, the automatic extraction means 15 automatically remove such dust 13 from the one or more accumulation and decantation regions 14, transporting it outside the containment structure 2, thereby reducing the risk of such dust 13 circulating again inside the containment structure 2, with the risks that this would entail.

[0065] In the advantageous embodiment in which the device 1 comprises means 30 for the selective input of air from the outside to the inside of the containment structure 2, activating such selective input means 30 creates an at least partial barrier to the entry of further air, to the exclusion of air introduced by the selective input means 30 themselves, through the inlet opening 3.

[0066] In the advantageous case where such selective input means 30 comprise means 31 for generating an air blade 32, in particular where such air blade is heated, the air blade also contributes to thermally insulating the inside of the containment structure 2 from the external environment 40.

[0067] In the advantageous embodiment in which the device 1 comprises suction and ejection means 18, by activating the latter, a part of the air present inside the containment structure 2 and/or the air exiting the outlet opening 4 is sucked in and ejected to a desired region of the external environment 40; in this way, the pressure inside the containment structure 2 is prevented from reaching too high values, which could jeopardise the correct drying of the pasta 5.

[0068] In the advantageous embodiment in which the suction and ejection means 18 comprise the sensor means and the regulation means described above, by means of the sensor means it is possible to regulate the quantity of air ejected through the suction and ejection means 18 as a function of the pressure and/or temperature and/or moisture inside the support structure 2.

[0069] It has also been observed that the circulation of the one or more air flows 11 which, after having passed through the heating means 8 and the agitation and transport means 6, are sucked in by the suction region 10b of the ventilation means 10, together with the suction action of the suction and ejection means 18, if present, could create, in the vicinity of the inlet opening 3, a depression which would tend, despite the presence of the selective input means 30, to suck in air from the external environment 40, through the inlet opening 3; however, in the advantageous embodiment in which the device 1 comprises the bypass duct 50, thanks to the latter some air is sent from the supply region 10a of the ventilation means 10 to the area near the inlet opening 3, thus compensating for this depression, and preventing the uncontrolled entry of ambient air into the containment structure 2 through the inlet opening 3.

[0070] It has therefore been found that the pre-drying and mechanical agitation device for the production of pasta according to the invention solves the above scope and aims; in fact, thanks to the dust conveying and automatic removal means, the risk of dust decantation on the various internal components of the containment structure, in particular on the heat exchangers, compromising their operation and/or performance, is greatly reduced, thus reducing the need for maintenance, and consequently machine downtime, and related costs.

[0071] Furthermore, the automatic removal of dust directly from one or more accumulation and decantation regions reduces the need for dust filters to filter the air leaving the device, and the frequency of maintenance and/or replacement of any filter provided.

[0072] Moreover, thanks to the automatic removal means, dust removal can take place continuously even while the device is operating, reducing the need to stop the machine for manual dust removal, and in any case reducing the amount of any dust that is deposited in other parts of the device, making its removal less expensive.

[0073] Finally, it is clear that the pre-drying and mechanical agitation device for the production of pasta according to the invention is susceptible to numerous modifications or variants, all of which fall within the scope of the invention; moreover, all details are substitutable by technically equivalent elements without departing from the scope of the appended claims.

Claims

1. Pre-drying and mechanical agitation device (1) for the production of pasta comprising:

- a containment structure (2), provided with an inlet opening (3) and an outlet opening (4) for pasta (5) ;
- agitation and transport means (6), suitable for mechanically agitating pasta (5), transporting it at the same time from said inlet opening (3) to said outlet opening (4);
- heating means (8), suitable for heating a flow of air (11) that passes through them;
- ventilation means (10), suitable for generating one or more air flows (11) which pass through said heating means (8) and said agitation and transport means (6), and then return cyclically, at least in part, into said ventilation means (10);
- conveying means (12) suitable for conveying dust (13) carried by said one or more air flows (11) into one or more accumulation and decantation regions (14) present inside said containment structure (2);
- automatic extraction means (15) positioned at least partially in said one or more accumulation and decantation regions (14) to automatically remove dust (13) from them and transport it outside said containment structure (2) ;

wherein said ventilation means (10) are positioned below said agitation and transport means (6), and wherein said one or more accumulation and decantation regions (14) are positioned below and laterally with respect to said ventilation means (10);

wherein said conveying means (12) comprise one or more bulkheads (12a) positioned laterally to said agitation and transport means (6) to guide said one or more air flows (11), after their passage through said agitation and transport means (6), and before their return to said ventilation means (10), towards said one or more accumulation and decantation regions (14), in such a way that said one or more air flows (11) deposit there at least part of the dust (13) present therein;

wherein said agitation and transport means (6) comprise one or more vibrating shelves (7a, 7b, 7c), suitable for housing pasta (5) which enters said containment structure (2) through said inlet opening (3), having a perforated structure and having a substantially rectangular plan, positioned inside said containment structure (2) in such a way to be crossed by said one or more air flows (11) generated by said ventilation means (10), wherein said ventilation means (10) are positioned below said one or more vibrating shelves (7), wherein said one or more accumulation and decantation regions (14) are positioned below and laterally with respect to said one or more vibrating shelves (7a, 7b, 7c) and to said ventilation means (10),

characterized in that

said bulkheads (12a) are at least two, and they are positioned respectively at the two long sides of said two or more shelves (7a, 7b, 7c).

2. Device (1), as in claim 1, wherein said one or more accumulation and decantation regions (14) communicate with the outside of said containment structure (2) through one or more discharge openings (17).

3. Device (1), as in claim 2, wherein said automatic extraction means (15) comprise one or more Archimedean screws (16) arranged in such a way to transport the dust (13) present in said one or more accumulation and decantation regions (14) up to said one or more discharge openings (17) .

4. Device (1), as in one or more of the preceding claims, wherein said one or more accumulation and decantation regions (14) are at least partially defined by one or more profiles (19) having a concave cross-section.

5. Device (1), as in claim 4, wherein said one or more profiles (19) have a substantially V-shaped cross section, with the vertex facing away from said agitation and transport means (6) .

6. Device (1), as in one or more of the preceding claims, comprising selective introduction means (30) of air from the outside to the inside of said containment structure (2), through said inlet opening (3), configured to define an at least partial barrier to the entry of further air, excluding that introduced by said selective input means (30) themselves, through said inlet opening (3).

7. Device (1) as in claim 6, wherein said input means (30) comprise means (31) for generating an air blade (32) which enters said inlet opening (3), defining a partial barrier to the entry of further air, with the exclusion of said air blade (32) itself, through said inlet opening (3).

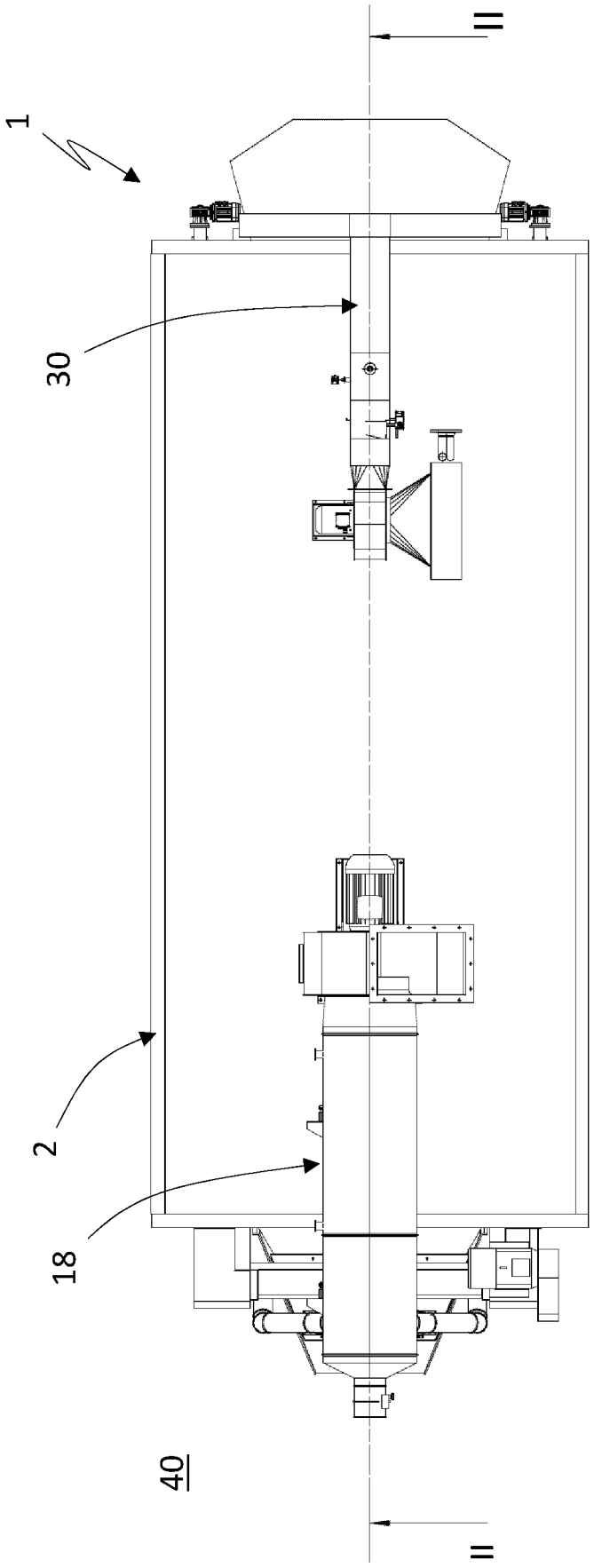
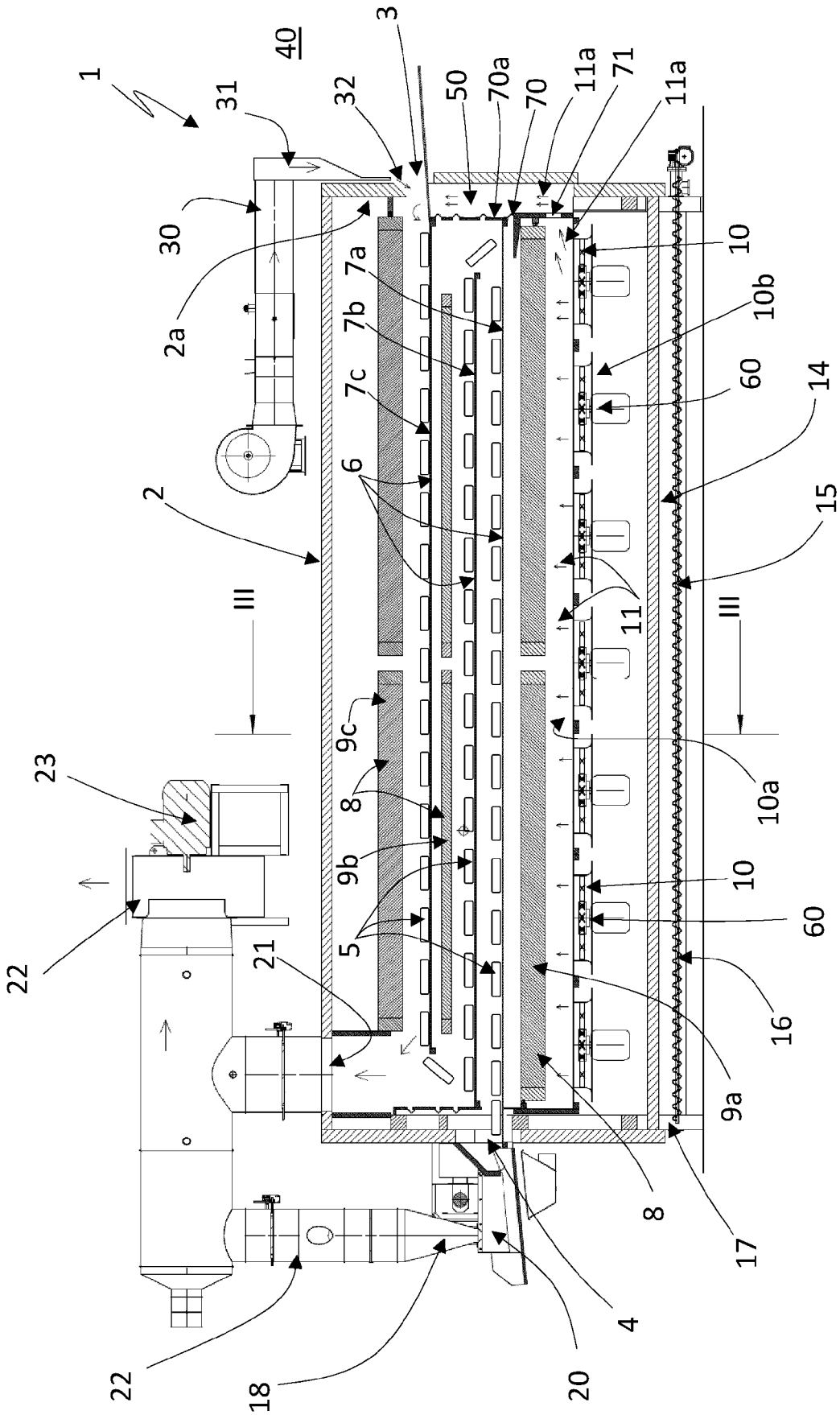


Fig. 1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15
III
III
11
9c
10a
23
8
9b
10
5
60
22
21
16
9a
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17
4
22
18
20

Fig. 2

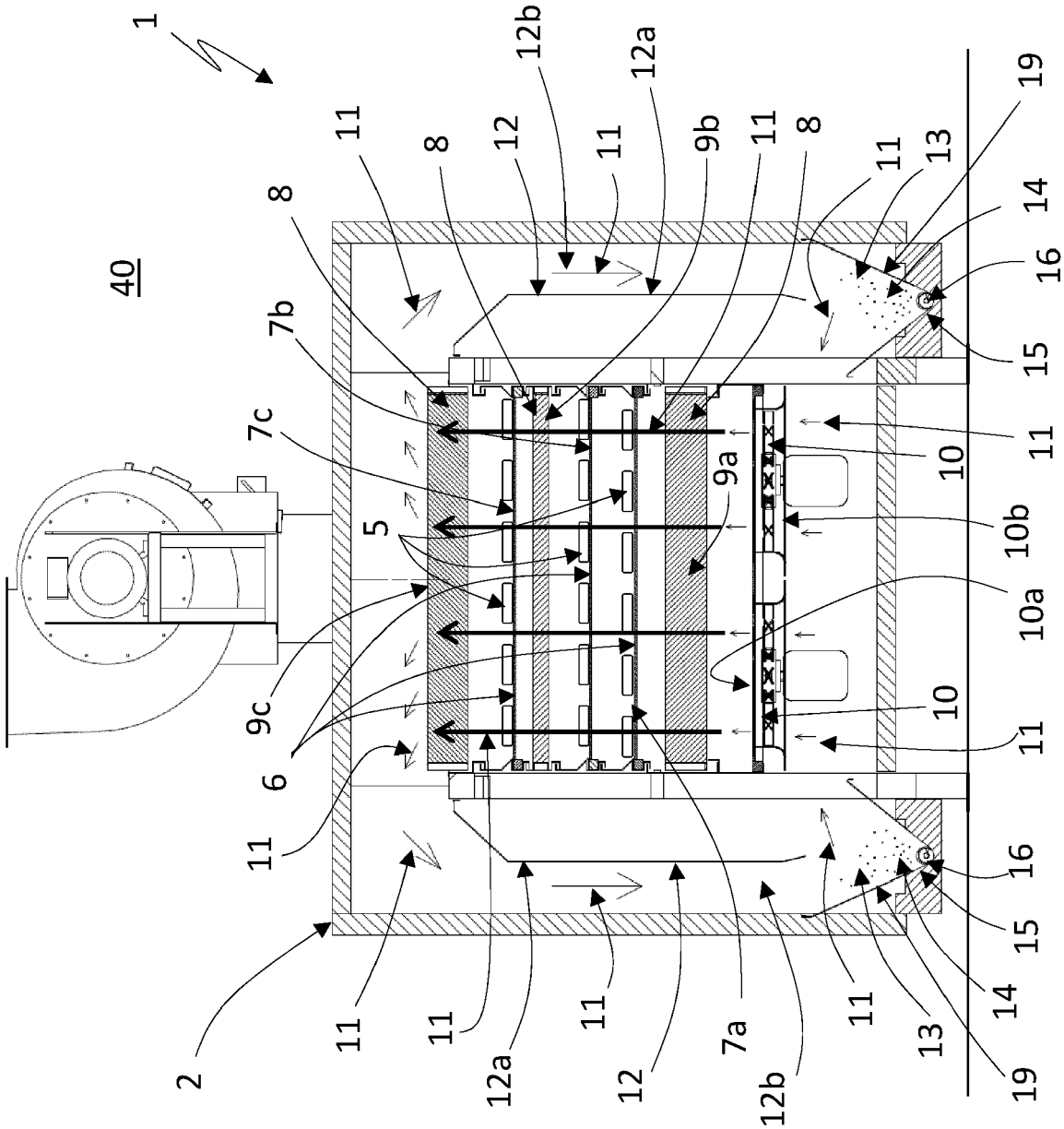

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 9671

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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CATEGORY OF CITED DOCUMENTS

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