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(54) **DENSIMETRIC SEPARATION TABLE**

(57) Densimetric separation table. The table (1) comprises a main separation box (2) in which two materials are separated by means of the fluidification of the lightweight material and the vibration of a working base of the box (3). The table also comprises a fluidification channel (7) for the prior separation of the materials, comprising a conduit (8) with a channel treatment base (9) allowing the passage of an airflow therethrough, such that a first

part of lightweight materials is directed to the suction system (6), a second part is directed to a lightweight material outlet (4), and a third part is directed to the working box (2) mixed with the heavy material. The table comprises a fan (10) for generating the airflow and a duct (11) through which the airflow is directed to the conduit (8) where it is forced through the channel treatment base (9).

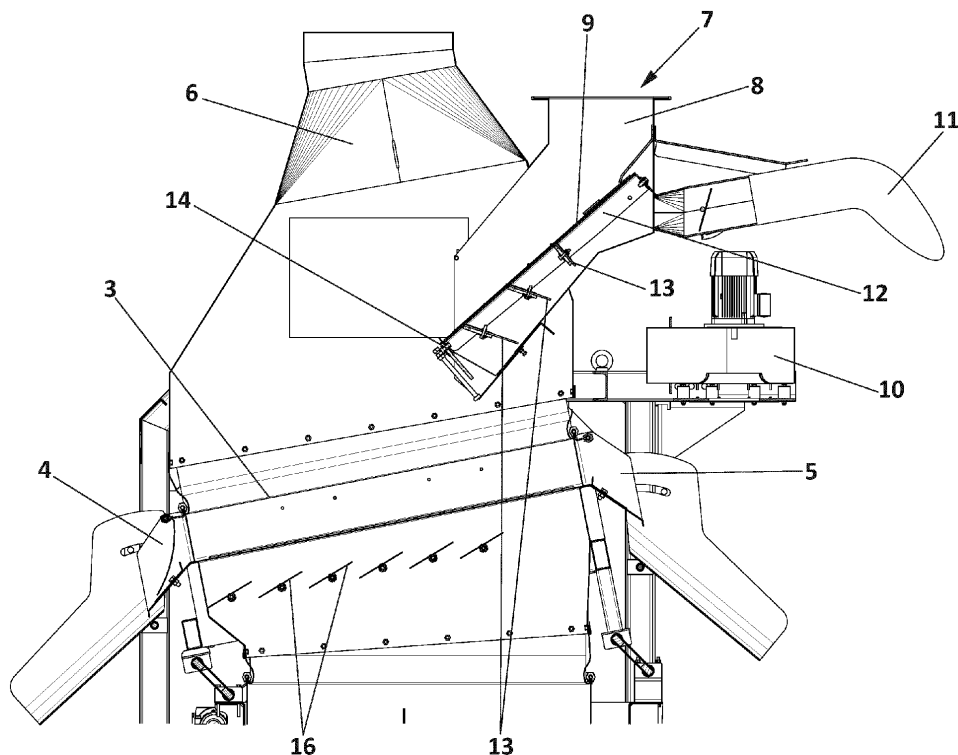


FIG. 2

Description

The air can be reused in a closed circuit system.

OBJECT OF THE INVENTION

[0001] This invention is comprised in the industry of densimetric separation tables, i.e., equipment configured for the dry separation of materials with different densities. More specifically, a densimetric separation table with increased loading capacity with respect to densimetric tables of the state of the art is described.

TECHNICAL PROBLEM TO BE RESOLVED AND BACKGROUND OF THE**INVENTION**

[0002] Densimetric separation tables are equipment which allow bulk materials to be separated according to their specific weight and shape.

[0003] For example, document US2022048041A1 which describes a system for the gravimetric sorting of a mixture of substances during the processing and/or the recycling of residual building materials and/or demolition materials is known in the state of the art. The system comprises a fractioning unit adapted to divide the mixture of substances into at least m fractions; at least $n \cdot m$ gravimetric densimetric tables, arranged in m cascades each with at least n densimetric tables distributed to n stages, wherein the fractioning unit is coupled to the densimetric tables of the first stage such that a different one of the at least m fractions can be supplied to each of the densimetric tables of the first stage. Within each cascade, each densimetric table of a considered stage is coupled to a densimetric table of the preceding stage such that either the first partial fraction or the second partial fraction of the densimetric table of the preceding stage can be supplied to the densimetric table of the considered stage.

[0004] Document ES1077288U which discloses a device for recovering remnants of ammunition from the ground of shooting ranges is also known. The device comprises a vibrating sieve provided with a fabric screen to sieve a mixture formed by earth and remnants of ammunition from the ground of a shooting range, wherein the screen further comprises first vibration means for causing the vibration of the fabric; a densimetric table for performing the density separation of the ammunitions present in the sieved product, by means of an air current; and evacuation means allowing the transport of the sieved product from the sieve to the densimetric table.

[0005] Likewise, document FR2696661A1 describes a dry sorting method for eliminating non-stone materials. The finest particles are separated in a first removal phase after which the remaining material is subjected to densimetric granulation by means of an air current in order to eliminate wood and other lightweight materials. This sorting is performed by passing a continuous flow of the material over a vibrating table and then allowing it to fall through an air current passing through a dust extractor.

DESCRIPTION OF THE INVENTION

[0006] The present invention describes a densimetric separation table. Preferably, the table is particularly configured for separating organic matter (compost) and inert materials (glass, soil, etc.). These materials have very different densities with respect to one another and a low separation residence time.

[0007] A dry densimetric separation is performed. The key of the proposed densimetric separation table is that it does not only perform a main separation by means of fluidification, inclination, and vibration in a working base (fluidification of the lighter-weight material, inclination, and vibration of the working base, causing the lightweight material, which remains above the heavier material as a result of fluidification, to move to one side of the working base while the denser material gradually moves to the opposite side). Before reaching the working base, the material entering the densimetric separation table is passed through a fluidification channel. In said fluidification channel, certain material is sent to suction on one hand (depending on the speed of flight of the material to be separated, i.e., the speed at which said material can move through the air) and a prior separation of the materials occurs in the rest of the segment, such that separation time is saved. The specific load is increased with both modifications.

[0008] In the tables of the state of the art, the material is passed directly to the working base where the described main separation is performed. However, in the present invention, the material is introduced in the table through the fluidification channel and part of the lighter-weight material is already being separated as it goes through the fluidification channel. In this manner, only a part of the lightweight material reaches the working base along with the heavy material.

[0009] In the fluidification channel, a first airflow is passed through a channel treatment base, which is arranged with a specific decreasing inclination with respect to a horizontal direction, along which the material moves. The channel treatment base is a perforated plate with openings which, in an exemplary embodiment, are 6 mm in diameter. The inclination of the channel treatment base can be modified.

[0010] As a result of said first airflow, a first part of lightweight materials (lighter-weight material) is directly separated from the heavy materials (heavier material), being directed to a suction system. A second part of lightweight materials is sent, from the fluidification channel, by means of the first airflow, directly in parabolic flight to the lightweight material outlet. Only a third part of lightweight materials reaches the working base still mixed with the heavy material. Said third part arrives still mixed but pre-separated, i.e., it arrives already broken up, and therefore when it reaches a main separation box arranged downstream, the complete separation can be per-

formed in a much easier and more effective manner than in the tables of the state of the art. The overall separation time is thereby reduced.

[0011] Part of the heavy material may slip through the openings of the fluidification channel treatment base. In this case, they fall directly close to the region of heavy material outlet of the table.

[0012] The percentage of lightweight material separated in each of said three parts will depend on the types of materials to be separated, on the first airflow which is passed through the fluidification channel, on the residence time of the materials, etc.

[0013] As a result of this prior separation, the specific loading capacity of the densimetric separation table increases, where it may even double. Additional modifications which contribute to obtaining these results and comprise the modification of the angle of inclination of the working base of the separation box and the inclusion of chevrons in said working base of the separation box will be described throughout the specification.

[0014] When the loading capacity of the densimetric separation tables of the state of the art is to be increased, their size in width is increased. The reason is that longitudinal size parameters, such as the length of the working base, are predetermined by factors that depend on the type of material, on the residence times, etc., so they cannot be modified. Therefore, in order to increase the loading capacity, i.e., to increase the amount of material to be processed, the measurements of the table are increased width-wise.

[0015] With the present invention, the same amount of material as in a densimetric separation table that is 1 m wide of the state of the art can be processed with a densimetric separation table that is only 0.5 m wide.

[0016] In an exemplary embodiment of the invention, the time the material spends in the fluidification channel is 3-4 seconds, so the present invention is particularly designed for separating materials with a short separation residence time.

[0017] Furthermore, the fluidification channel comprises blades whereby the amount of first airflow which is passed through the channel treatment base can be controlled and different sections of the channel treatment base through which the passage of said first airflow is allowed can be selected. In this manner, the amount of lightweight materials directed to the suction system, to the lightweight material outlet, and to the working base is adjusted. The inclination of the channel treatment base with respect to a horizontal direction can also be adjusted, thereby controlling the time during which the material is in the fluidification channel: the greater the inclination with respect to the horizontal direction, the shorter the residence time, and the smaller the inclination with respect to the horizontal direction, the longer the residence time. Likewise, the blades have sliding flaps such that the distance between each flap and the conduit of the fluidification channel can be modified. The angle of each of said flaps can also be adjustable.

[0018] Additionally, the densimetric separation table can be modified, with respect to the known solutions of the state of the art, by modifying the angle of inclination of the working base in relation to a horizontal direction. More specifically, said angle is increased. This makes it easier for the lightweight materials to be sent to the lightweight material outlet at the end of the working base which is arranged at a lower height, but makes it harder for the heavy materials to move to the heavy material outlet at the end of the working base which is arranged at a greater height.

[0019] In the cases in which the densimetric separation table is used with compost, the compost is 80% lightweight material. By increasing the angle of inclination of the working base of the main separation box, the tonnes of compost which can be processed per hour increase.

[0020] To counteract the tendency of the heavy materials to be directed to the lightweight material outlet upon increasing the inclination of the working base, said working base comprises chevrons oriented with the vertex pointing towards the lightweight material outlet (the lower outlet with respect to ground level), in order to prevent the heavy materials from moving back towards the lightweight material outlet. This technical feature also contributes to increasing the specific load of the densimetric separation table, where the specific capacity of the table (T/h *metre of width of the table) may even be doubled.

[0021] The chevrons are preferably rods which have a rounded section with a diameter of 5 mm and are made of stainless steel. The chevrons are attached to the working base by means of welding.

[0022] The densimetric separation table comprises a suction system which can be, for example, a bag filter or a suction cyclone, and is the element in charge of suctioning the lightweight materials separated from the heavy materials due to the passage of an airflow through the fluidification channel treatment base. It also absorbs the lightweight materials separated from the heavy materials due to the passage of an airflow through the working base.

[0023] Furthermore, to control the airflow directed through the working base creating a speed profile suitable for the separation (air speed in heavy materials-air speed in lightweight materials), the main separation box may comprise a plurality of directing devices such as blades, for example. In an exemplary embodiment, blades have been placed, but any other element or mechanism which allows obtaining the same solution could be used.

[0024] In the densimetric separation tables of the state of the art, part of the material reaching the working base slips, in an undesired manner, through the perforations in the working base. This material is commonly known as "sifted materials", and to collect same, the densimetric separation tables of the state of the art comprise a collection hopper, arranged below the working box. Generally, this hopper comprises a throttle valve in its lower part to control the emptying of the hopper when it has

been filled with sifted materials.

[0025] In this sense, an advantage of the densimetric separation table of the present invention is that it may comprise an additional base, arranged below the working base, which prevents the passage of sifted materials that go through, in an undesired manner, the perforations in the working base to a collection hopper. In other words, the densimetric separation table of the invention does not require a collection hopper, so the table has a much smaller height than the tables known today, thereby reducing the size of the general structure of the table.

[0026] The additional base is made of a material which allows the passage of air therethrough but prevents the passage of heavy particles downwards. Preferably, the additional base comprises a mesh and prevents the passage of material through the perforations of the working base generally having a diameter of 0.4-0.5 mm. The material with particles having a size smaller than said diameter is fluidified with the airflow going through the working base. The working base is a sandwich type and, as seen, in some exemplary embodiments, the table further comprises the additional base which is attached to the working base, preferably by means of rivets to make sure that it is taut.

[0027] This entails additional savings because a specific sifted material outlet is not needed and furthermore the height of the table, and therefore of the entire structure and the feed and collection bands, is reduced.

[0028] The elements of the table already described are assembled in a chassis such that the table forms a compact unit. Preferably, the chassis is formed with a folded plate and a plurality of laminated profiles.

[0029] In an exemplary embodiment, the densimetric separation table comprises a fan which generates an airflow that can be directed completely to the working base, generating the main airflow. In this case, the densimetric separation table comprises another fan, configured for generating the first airflow, which is directed to the fluidification channel. In an alternative embodiment, the table comprises a single fan which is configured for generating the main airflow and the first airflow. In other words, said fan is connected, by means of ducts, to the main separation box and to the fluidification channel.

[0030] The fan can be a centrifugal type and can be manufactured in a carbon steel plate and equipped with a manual regulating valve. The fan can be operated by means of a motor with belt transmission, protected by a fairing that can be readily disassembled.

[0031] The suction system configured for collecting suspended particles of organic matter may comprise at least one suction fan and a decantation and/or filtration element which is preferably a cyclone and/or a bag filter.

[0032] The suction fan produces an air current suitable for suctioning dust lifted from the fluidification channel and the working base. The table comprises, in its upper section, over the fluidification channel and the working base, an extraction hood, in which the suction fan is arranged.

[0033] Another object of the present invention relates to a method for the densimetric separation of two materials in a table such as the one described above.

5 BRIEF DESCRIPTION OF THE FIGURES

[0034] To complete the description, and for the purpose of helping to make the features of the invention more readily understandable, this description is accompanied by a set of drawings constituting an integral part of the same, which by way of illustration and not limitation represents the following:

Figure 1 depicts a perspective view of the densimetric separation table.

Figure 2 depicts a sectioned view of the fluidification channel, the main separation box, and the suction system.

Figure 3 depicts a sectioned perspective view of the main separation box.

DETAILED DESCRIPTION

[0035] As can be seen in Figure 1, the present invention proposes a densimetric separation table for separating at least two materials with different densities.

[0036] The table (1) comprises at least one main separation box (2), with a working base (3) and with a lightweight material outlet (4) and a heavy material outlet (5). This working base (3) has vibrating movement and comprises perforations for the passage of a main airflow, i.e., it is a perforated plate. The materials are separated in the main separation box (2) by a combination of the vibrating movement of the working base (3) and the fluidification of the lighter-weight material as a result of the airflow.

[0037] The table (1) also comprises a suction system (6) for suctioning part of the lightweight material lifted as a result of the airflow.

[0038] Likewise, the table (1) comprises a fluidification channel (7) configured for performing a prior separation of the materials.

[0039] The fluidification channel (7) is the element through which the material, which is introduced in the table, reaches the working base (3) in the main separation box (2). As observed, a prior separation of the materials is performed in said fluidification channel (7) such that the material reaching the working base (3) already comprises a smaller percentage of lightweight materials in comparison to the material which is introduced initially. This allows the loading capacity of the table (1) to be increased without modifying the measurements thereof (or allows the measurements of the table (1) to be reduced in order to obtain the same loading capacity).

[0040] With respect to a densimetric separation table of the state of the art, 40% of lighter-weight material exits through the suction system during operation of the densimetric separation table of the present invention.

[0041] The table of the invention provides twice the specific production of 0-10 mm compost that a table of the state of the art with the same measurements would produce.

[0042] The main separation box (2) is linked to a movement mechanism configured for generating a vibrating movement by means of a connecting rod-crank mechanism in which the connecting rod is an eccentric. Preferably, the amplitude of the eccentric of the densimetric table of the invention is greater than the amplitude of the eccentric of the densimetric tables of the state of the art.

[0043] The fluidification channel (7) can be seen, for example, in Figure 2 and comprises a conduit (8) which houses a channel treatment base (9) with perforations that allow the passage of a first airflow therethrough, such that a prior separation of the materials is performed. As a result of this prior separation of the materials, a first part of lightweight materials is directed to the suction system (6), a second part of lightweight materials is directed to the lightweight material outlet (4), and a third part of lightweight materials is directed to the working box (2) mixed with the heavier material; it comprises a fan (10) configured for generating the first airflow and a duct (11) connected to the fan (10) and to the conduit (8), below the channel treatment base (9), such that the airflow generated by the fan (10) is directed to the conduit (8) and passed through the channel treatment base (9).

[0044] An embodiment in which the conduit (8) comprises a first region in which it is attached to the duct (11) and comprises a gate (12) arranged in said first region, on the fluidification channel treatment base (9), can also be observed in said Figure 2. The gate (12) is capable of moving between an open position in which it allows the passage of the first airflow through the fluidification channel treatment base (9) in the first region, and a closed position in which it prevents said passage.

[0045] This same Figure 2 also shows how the conduit (8) may comprise, below the channel treatment base (9), blades (13) which are capable of moving between a first position in which they are in contact with a lower wall of the conduit (14), preventing the passage of the first airflow in the longitudinal direction of the conduit (8), and a second position in which they are separated from the lower wall of the conduit (14), allowing the passage of the first airflow in the longitudinal direction of the conduit, and forming different sections for the passage of the first airflow.

[0046] Furthermore, it may comprise a front seal arranged between a front end of the fluidification channel treatment base (9) and a front wall of the conduit (8) and side seals arranged between side ends of the fluidification channel treatment base (9) and the side walls of the conduit (8). These seals allow air leaks to be prevented.

[0047] The channel treatment base (9) has a specific inclination with respect to a horizontal direction and said inclination is adjustable. Preferably, it is adjusted between 45 and 65° of inclination with respect to a horizontal direction, and it is adjustable with shims in suspension.

[0048] Figure 3 depicts a sectioned view of the main separation box (2). In a preferred embodiment, such as the one shown in Figure 3, in order to control the direction and the amount of main airflow which is passed through the working base (3), the main separation box (2) may comprise a plurality of main airflow directing devices (16), arranged between a fan (10) and the working base (3). Preferably, these devices, which are seen in Figure 4B, are capable of performing a tilting movement with respect to a horizontal direction about a longitudinal axis of each main airflow directing device (16). Preferably, the main airflow directing devices (16) are blades.

[0049] In the example shown in Figures 2 and 3, the directing devices (16) are arranged with their longitudinal axes being equidistant with respect to the working base (3) such that, since the working base (3) is inclined, said directing devices (16) are arranged with their longitudinal axes of rotation at different heights with respect to the horizontal. When the angle of inclination of the directing devices (16) coincides with the angle of inclination of the working base (3), passage of the air current to the working base (3) is closed. The larger the angle of inclination of the directing devices (16) is with respect to the angle of inclination of the working base (3), the greater the airflow reaching the working base (3) will be.

[0050] In an exemplary embodiment, all the directing devices (16) tilt in a synchronous manner. In another exemplary embodiment, they are independent of one another and each of them tilts individually, i.e., the tilting movement of each of them is independent of the tilting movement of the rest of the main airflow directing devices (16).

[0051] Preferably, the working base (3) is inclined between 8° and 11° with respect to a horizontal direction. This constitutes a big change with respect to the working bases of the tables of the state of the art in which the inclination was 3° with respect to a horizontal direction.

[0052] To prevent part of the heavy materials from moving to the lightweight material outlet (arranged at a lower height due to the inclination of the working base (3)) when increasing the inclination of the working base (3) with respect to the horizontal, the working base (3) preferably comprises chevrons (15) arranged on a surface of the working base (3) and oriented with the vertex thereof pointing towards the heavy material outlet. Said chevrons (15) are formed by rods welded to the surface of the working base (3) and said rods preferably have a circular section with a diameter of 5 mm.

[0053] To prevent part of the heavy materials from slipping through the working base (3) (which is a perforated plate), the main separation box (2) comprises an additional base, arranged below the working base (3), where said additional base is a material which allows the passage of air therethrough and blocks the passage of particles. Preferably, this additional base is a mesh.

[0054] In an exemplary embodiment, the table (1) comprises two fans (10) where one of them is configured for generating a first airflow and is connected to the conduit

(8) of the fluidification channel (7) through the duct (11), and another one of them is configured for generating a main airflow and is connected to the main separation box (2).

[0055] Another object of the present invention relates to a method for densimetric separation in the densimetric separation table described above. Said method comprises the steps of:

- a) introducing a material to be separated in the fluidification channel (7);
- b) generating a first airflow with a fan (10) and directing said first airflow to the fluidification channel (7);
- c) performing a prior separation of the materials in the fluidification channel (7) by means of fluidification, forcing the passage of the first airflow through the channel treatment base (9);
- d) suctioning a first part of lightweight materials with the suction system (6) and collecting a second part of lightweight materials in the lightweight material outlet (4);
- c) performing a main separation of a third part of lightweight materials and heavy materials in the working base (3) of the main separation box (2) which comprises the sub-steps of:
 - i) generating a main airflow with a fan (10) and directing said main airflow through the working base (3);
 - ii) moving the working base (3) by means of a vibrating movement;
- d) collecting the heavy materials driven by the vibrating movement of the working base (3) in the heavy material outlet (5) and collecting the lightweight materials lifted by the main airflow and driven by the vibrating movement of the working base (3) in the lightweight material outlet (4).

Claims

1. A densimetric separation table (1) for separating at least two materials with different densities which comprises at least one main separation box (2), with a working base (3) and with a lightweight material outlet (4) and a heavy material outlet (5), and where the working base (3) has vibrating movement and comprises perforations for the passage of a main airflow, such that the materials are separated by a combination of the vibrating movement of the working base (3) and the fluidification of the lighter-weight material as a result of the airflow, and comprises a suction system (6) for suctioning part of the lightweight material lifted as a result of the airflow; and the table is **characterised in that** it comprises a fluidification channel (7) configured for performing a

prior separation of the materials, where said fluidification channel comprises:

a conduit (8) which houses a channel treatment base (9) with perforations that allow the passage of a first airflow therethrough, such that a prior separation of the materials is performed, such that a first part of lightweight materials is directed to the suction system (6), a second part of lightweight materials is directed to the lightweight material outlet (4), and a third part of lightweight materials is directed to the working box (2) mixed with the heavier material; it comprises a fan (10) configured for generating the first airflow and a duct (11) connected to the fan (10) and to the conduit (8), below the channel treatment base (9), such that the airflow generated by the fan (10) is directed to the conduit (8) and passed through the channel treatment base (9).

2. The densimetric separation table (1) according to claim 1, wherein the conduit (8) comprises a first region in which it is attached to the duct (11) and comprises a gate (12) arranged in the first region, on the fluidification channel treatment base (9), which is capable of moving between an open position in which it allows the passage of the first airflow through the fluidification channel treatment base (9) in the first region, and a closed position in which it prevents said passage.
3. The densimetric separation table (1) according to any one of the preceding claims, wherein the conduit (8) comprises, below the channel treatment base (9), blades (13) which are capable of moving between a first position in which they are in contact with a lower wall of the conduit (14), preventing the passage of the first airflow in the longitudinal direction of the conduit (8), and a second position in which they are separated from the lower wall of the conduit (14), allowing the passage of the first airflow in the longitudinal direction of the conduit, and forming different sections for the passage of the first airflow.
4. The densimetric separation table (1) according to any one of the preceding claims, wherein the channel treatment base (9) has a specific inclination with respect to a horizontal direction and said inclination is adjustable.
5. The densimetric separation table (1) according to any one of the preceding claims, comprising a front seal arranged between a front end of the fluidification channel treatment base (9) and a front wall of the conduit (8) and side seals arranged between side ends of the fluidification channel treatment base (9) and the side walls of the conduit (8).
6. The densimetric separation table (1) according to any one of the preceding claims, wherein the working

base (3) is inclined at an angle of between 8° and 11° with respect to a horizontal direction.

7. The densimetric separation table (1) according to any one of the preceding claims, wherein the working base (3) comprises chevrons (15) arranged on a surface of the working base and oriented with the vertex thereof pointing towards the heavy material outlet. 5
8. The densimetric separation table (1) according to claim 7, wherein the chevrons (15) are formed by rods welded to the surface of the working base (3). 10
9. The densimetric separation table (1) according to any one of the preceding claims, wherein the main separation box (2) comprises an additional base, arranged below the working base (3), where said additional base is a material which allows the passage of air therethrough and blocks the passage of particles. 15 20
10. The densimetric separation table (1) according to claim 9, wherein the additional base comprises a mesh attached to the working base. 25
11. The densimetric separation table (1) according to any one of the preceding claims, wherein the main separation box (2) comprises a plurality of main airflow directing devices (16) arranged between a fan (10) and the working base (3), where said devices are capable of performing a tilting movement with respect to a horizontal direction about a longitudinal axis of each main airflow directing device (16). 30
12. The densimetric separation table (1) according to claim 11, wherein the main airflow directing devices (16) are linked to one another such that they tilt in a coordinated manner. 35
13. The densimetric separation table (1) according to claim 11, wherein the main airflow directing devices (16) are independent of one another such that the tilting movement of each of them is independent of the tilting movement of the rest of the main airflow directing devices (16). 40 45
14. The densimetric separation table (1) according to any one of the preceding claims, comprising two fans (10) where one of them is configured for generating a first airflow and is connected to the conduit (8) of the fluidification channel (7) through the duct (11) and another one of them is configured for generating a main airflow and is connected to the main separation box (2). 50 55
15. A method for densimetric separation in the densimetric separation table according to any one of claims 1 to 14, **characterised in that** it comprises

the steps of:

- a) introducing a material to be separated in the fluidification channel (7);
- b) generating a first airflow with a fan (10) and directing said first airflow to the fluidification channel (7);
- c) performing a prior separation of the materials in the fluidification channel (7) by means of fluidification, forcing the passage of the first airflow through the channel treatment base (9);
- d) suctioning a first part of lightweight materials with the suction system (6) and collecting a second part of lightweight materials in the lightweight material outlet (4);
- c) performing a main separation of a third part of lightweight materials and heavy materials in the working base (3) of the main separation box (2) which comprises the sub-steps of:
 - i) generating a main airflow with a fan (10) and directing said main airflow through the working base (3);
 - ii) moving the working base (3) by means of a vibrating movement;
- d) collecting the heavy materials driven by the vibrating movement of the working base (3) in the heavy material outlet (5) and collecting the lightweight materials lifted by the main airflow and driven by the vibrating movement of the working base (3) in the lightweight material outlet (4).

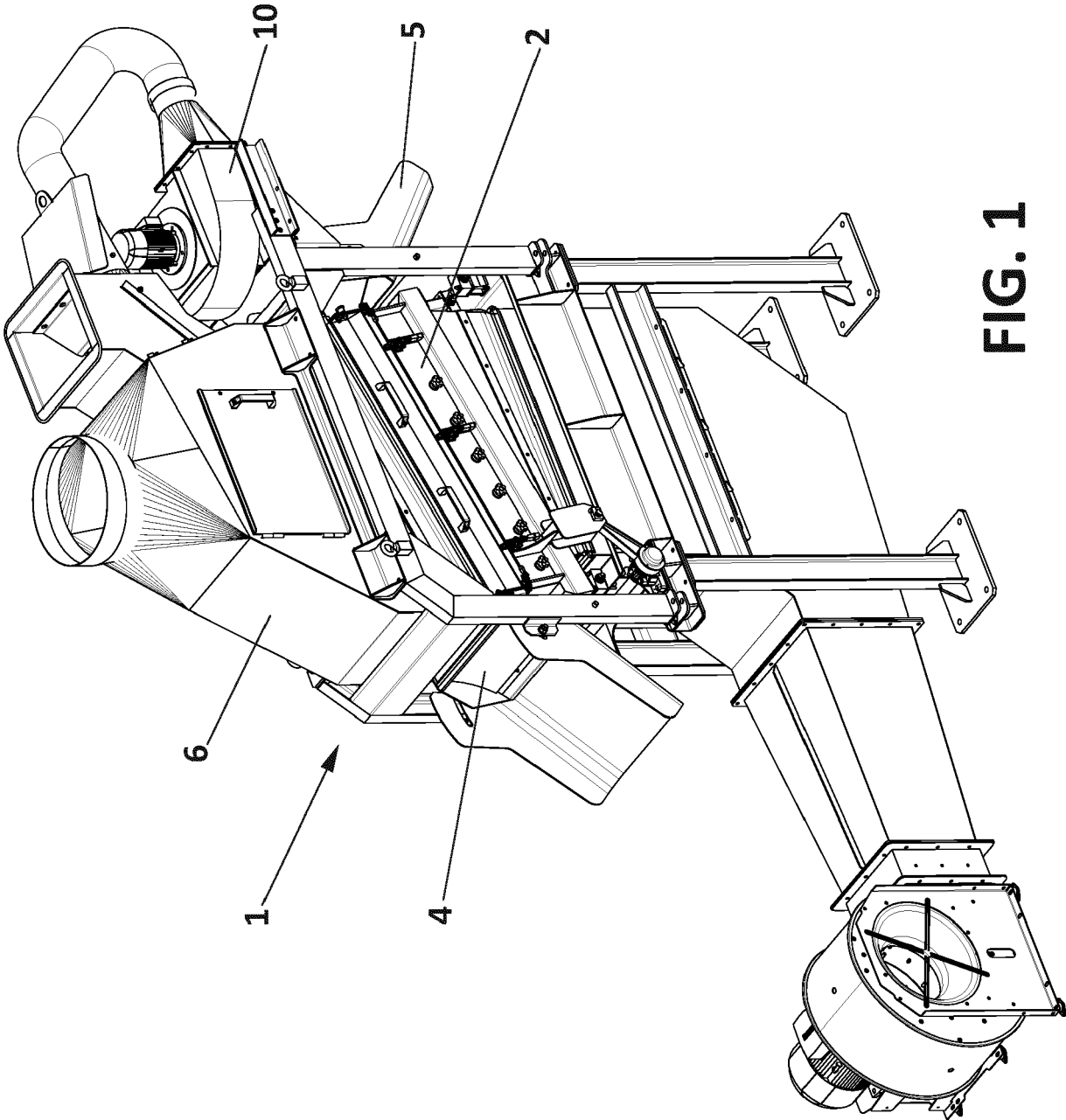


FIG. 1

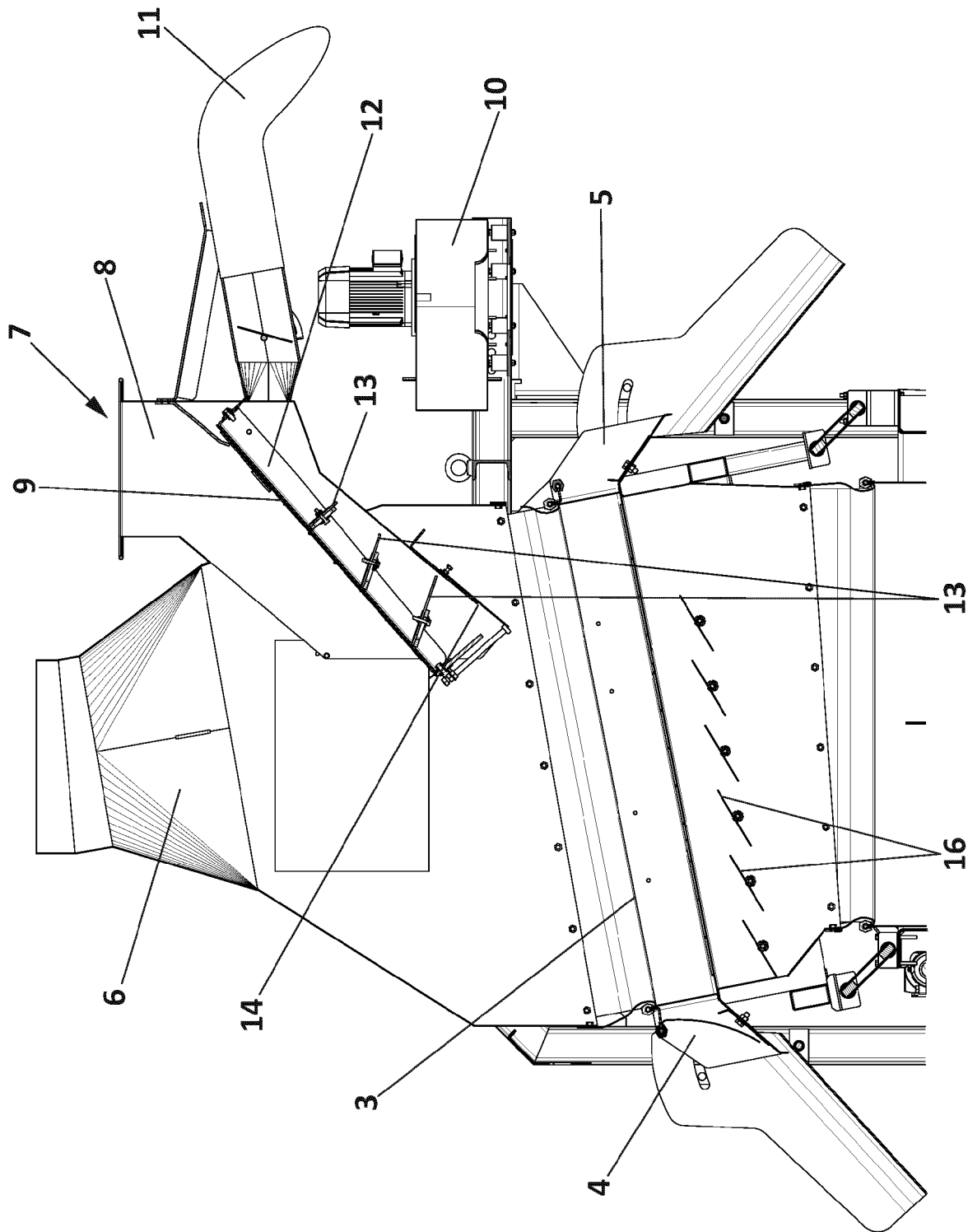


FIG. 2

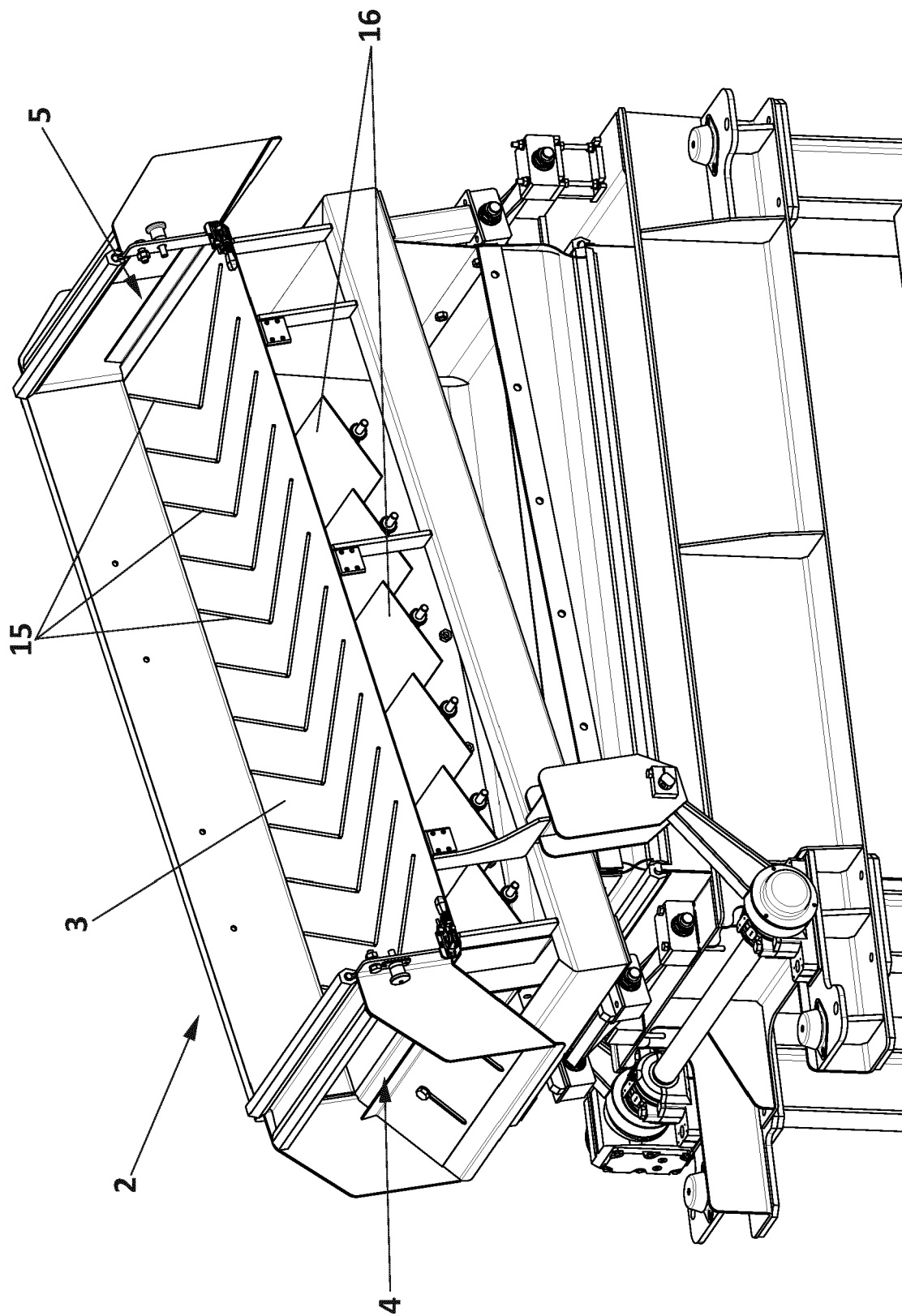


FIG. 3



EUROPEAN SEARCH REPORT

Application Number

EP 22 38 2563

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EPO FORM 1503 03:82 (P04C01)

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	US 2 040 196 A (HENRY BERRISFORD WILLIAM) 12 May 1936 (1936-05-12) * page 1, right-hand column, line 16 - page 3, left-hand column, line 43; figures 1,4,5 *	1-3, 6, 9, 11-15	INV. B03B4/02
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			TECHNICAL FIELDS SEARCHED (IPC)
			B03B B07B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 November 2022	Examiner Leitner, Josef
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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