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(54) APPARATUS AND METHOD FOR COMPRESSING MATERIALS

VERFAHREN UND VORRICHTUNG ZUM VERDICHTEN VON WERKSTOFFEN

APPAREIL ET PROCEDE POUR COMPACTER DES MATERIAUX

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EP 0 675 798 B1

Description

TECHNICAL FIELD

The present invention relates to an apparatus for receiving and compacting material according to the preamble to the independent claims.

BACKGROUND ART

There is a need in this art to be able to compact material which includes components of various sizes, densities, elasticity, moisture content etc. Material of the type mentioned by way of introduction is often massive and bulky and needs to be compressed or compacted in order to be capable of being handled and transported in an economically viable manner. Such needs occur, for example, in industrial operations and in municipal waste disposal, for exampel in refuse collection. For wet matter, it is also often desirable to reduce the moisture content of the material in connection with its compression (compaction).

Prior art technology calls for the employment of hydraulic compactors for compacting material of the above-disclosed type. Hydraulic compactors are expensive, unwieldly and heavy, in addition to which the reduction in volume which is obtained is relatively slight. As regards, for example, domestic or commercial waste, the reduction involved is no greater than a factor of 3. This slight degree of compaction is because all material to be found in the transport container is compacted at the same time.

For compaction purposes, use is also made of screw compactors consisting of a mechanical shaft which is fitted with thread blades and is surrounded by a tubular casing. Compaction is achieved in that the screw compactor presses the material into a container which is filled in due course. When the container has been filled, the screw compactor is employed to continue to force material into the container and there is thereby obtained a certain degree of compression of the material which is located in the container. However, the level of compaction is relatively slight; nor does this technique exceed a level of compaction of a factor 3. The explanation for the slight degree of compaction is that those pressure forces which are exercised by the screw compactor are absorbed by substantially all material located in the container, with the result that those forces which act on each individual component will, naturally be relatively slight. Screw compactors have relatively low capacity in relation to their size, suffer from difficulties in handling large objects and require considerable power for their operation. In addition, screw compactors are large and heavy, as well as being expensive in both purchase and operation.

Spiral compactors are also employed for compacting material. The term spiral compactor is here taken to signify compactors including a spiral which is rotary about its longitudinal axis, which lacks a mechanical shaft and which includes a spiral or helical blade stood on its end and surrounded by a casing. In such instance, the spiral and the casing form a precompaction zone where compaction of the material commences. In the precompaction zone the spiral has an outer diameter which is slightly less than the inner diameter of the casing. Thereby, the spiral closely approaches (with slight clearance) the surrounding casing. The precompaction zone is followed, in the direction of displacement of the material, by a region which has no spiral and in which the final compaction of the material takes place.

SE-B-446 956 and SE-B-440 154 each shows an apparatus including a spiral lacking a mechanical shaft and placed in a casing. The casing is disposed with an infeed opening and a discharge opening. The spiral ends at a distance from the discharge opening. Baffle means are disposed in association with the discharge opening for impeding displacement of the material. When rotated, the spiral presses the material into the space between the free end of the spiral and the baffle means. The material is accumulated and compacted between the spiral end and the baffle means. When internal pressure within the space exceeds a certain value, the baffle means open and compacted material is discharged.

Spiral compactors have a relatively simple design and construction which results in low practical and running costs, at the same time as the degree of compaction is considerably better than the above-disclosed factor of 3. The construction of spiral compactors described in the preceding paragraph (slight clearance between casing and spiral) entails, however, the disadvantage that, on varying material size, the material is occasionally jammed between the spiral and the casing. In particular when large-piece material is involved, blockages readily occur, with resultant operational disturbance or operational disruption.

OBJECT OF THE INVENTION

The present invention has for its object to devise a spiral compactor in which the above-disclosed drawbacks are obviated and in which the advantages afforded by the spiral compactor are attained.

SOLUTION

This object is attained by means of a technology as disclosed in the characterizing clause of the appended independent claim 1.

Expedient embodiments of the apparatus according to the present invention are disclosed in the appended subclaims.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying drawings. In the accompanying drawings:

Fig. 1 shows one embodiment of a spiral compactor cut away in the longitudinal direction, provided with but a single spiral;

Fig. 2 shows a section taken along the line II-II in Fig. 1;

Fig. 3 shows a section taken along the line III-III in Fig. 1;

Fig. 4 shows another embodiment of a spiral compactor cut away in the longitudinal direction, with two spirals;

Fig. 5 shows a section taken along the line V-V in Fig. 4; and

Fig. 6 shows a section taken along the line VI-VI in Fig. 4.

DESCRIPTION OF PREFERRED EMBODIMENT

Figs. 1-3 show one embodiment of an apparatus according to the present invention including a spiral 30 which is placed in path 10. The spiral is rotary about its geometric centre axis 31. The path has a lower portion 26 which is of a cross-section entailing that the lower region surrounds the spiral with relatively slight clearance. In the embodiment illustrated in Fig. 2, the cross-section of the lower portion is semicircular, in addition to which the lower portion merges into two substantially upstanding walls 28a,b, which form the upper portion 27 of the path. The one end 34 of the spiral, its driving end, is connected, via a journal 16 in the one end, the drive end of the path 10, to drive means 60 for rotating the spiral. The spiral 30 includes a spiral blade 33 which is stood on its end and is, in the illustrated embodiment, composed of an inner part spiral blade 37 and an outer part spiral blade 38 connected with the inner part spiral blade. The arrows A indicate the direction of rotation of the spiral.

The spiral blade 33 is journalled only in connection with its drive means 60, while its other end 39 is non-journalled. Hereinafter, the non-journalled end will generally be designated the free end 39 of the spiral blade or the spiral. The free end 39 is located in or adjacent the discharge end 43 of the path. The jornal 16 is placed such that the spiral blade 33 rotates, most proximal the journal 16, without any mechanical contact with the lower portion 26 of the path or with the upwardly directed walls 28a,b of the path. On rotation, the spiral is disposed, with the exception of its portion located most proximally the journal, to abut with its outer defining edge 32, against the lower portion 26 of the path 10. However, as a rule the spiral blade abuts against only a limited region of the lower portion of the path, defined as that region of the lower portion with which the spiral blade 33 during rotation progressively alters its direction of movement from being substantially vertical to being substantially horizontal. This side of the path against which the spiral substantially abuts will hereafter be designated the support side. It is clear that, on rotation of the spiral blade, material particles are often entrained between the path and the defining edge and also often form a thin layer of material between the spiral blade and the path. As a result, in operation, abutment between the spiral blade and the path is intermittent. However, for the sake of simplicity it will hereinafter be disclosed that the spiral blade abuts against the path or is supported by the path 10 irrespective of whether the spiral blade 33 is in direct contact with the path or in contact via a material layer located between the spiral blade and the path. In order to achieve the sought-for abutment against the path, the journal 16 and the spiral blade 33 are, as a rule, designed so as, on heavy loading, to allow the spiral to be resiliently displaced in a radial direction.

On abutment of the spiral 30 against the path 10, the outer defining edge 32 of the spiral is substantially parallel with the inner defining surface of the path. As a result of the elasticity of the spiral in the radial direction, the spiral will, on rotation, progressively abut with its outer defining edge 32 against the path along the greater portion of the length of the spiral according as the abutment surface moves in the longitudinal direction of the path. Hereby, wear of the inside of the path will not be concentrated at a restricted area, as would be the case if the spiral had been radially rigid. A spiral supported by a central mechanical shaft entails such a "concentrated" wear if the spiral abuts against the path in its end regions.

An infeed device 40, shown in Fig. 1 as a hopper-like device, connects to an opening 11 provided in the path, the infeed opening of the path. In the longitudinal direction of the path the infeed opening 11 is of a length which essentially corresponds to the entire length of the spiral 30. The spiral and the path form, in this region, a feed compartment 35 for the supplied material. In one preferred embodiment, the diameter and pitch of the spiral are then adapted such that the spiral has substantially but one spiral turn. Between the infeed opening 11 of the path and the discharge opening 12 of the apparatus, there is disposed a chamber 41 surrounded by a casing 42 in the circumferential direction. That part of the space which is located between the free end 39 of the spiral and the discharge opening 12 of the path forms a space which, hereinafter, will generally be designated the compaction cell of the apparatus. The compaction cell normally consists of a part of the chamber 41, but in certain embodiments a part of the feed compartment 35 is also included in the compaction cell. With the exception of the dimensions, the cross-sectional configuration of the compaction cell is optional. It may, for example be circular, oval, include curved portions, be polygonal etc.

The free end 39 of the spiral is disposed in the region of the transition 36 between the opening 11 and the compaction cell 15. The intention here, in certain embodiments, is to project the spiral a short distance into the chamber 41, at most approximately half of the length of the chamber and, as a rule, at most approximately one third of the length of the chamber. In another embodiment, the free end 39 of the spiral is located in the region of a plane transversely of the axial direction of the spiral path the bounding definition of the infeed opening 11, most proximal the discharge opening 12. In a third embodiment, the spiral terminates ahead of the above-mentioned plane and at a distance therefrom corresponding to at most one third of a thread pitch, as a rule at most a quarter of a thread pitch.

The chamber 41 surrounded by the casing 42 is dimensioned so as to eliminate the risk of jamming of material which is fed into the chamber. This is achieved in that the chamber 42 is given larger cross-section than the feed compartment 35. Primarily the upper bounding definition 46 of the chamber is raised in relation to the corresponding part of the feed compartment. As a rule, the side definitions 44a,b and lower definition 45 of the chamber are also placed at a greater distance from a geometric centre line 31 continuing from the spiral 30 than corresponding parts of the feed compartment in relation to the centre line. To this end, in certain embodiments the transition between the feed compartment and the chamber forms a step, while in other embodiments the transition diverges continually. There are also embodiments in which the step is substantially replaced by the chamber 41 continually flaring towards the discharge opening 12 of the chamber (the apparatus). However, in this latter case, the upper bounding definition of the chamber is, as a rule, raised in comparison with the corresponding portion of the feed compartment. In certain embodiments, the chamber is provided with substantially continually tapering cross-sectional area after the step.

In connection with the discharge opening 12 of the casing there is disposed a baffle member 13a,b which prevents displacement of the material. The baffle members are designed to assume a position which does not prevent displacment of the material on a pressure loading which exceeds a certain value. In Fig. 1 examples of alternative embodiments of the baffle member are shown in which these are journalled in the outer edge of the opening 12.

In the lower region of Fig. 1, there is shown a baffle member 13a which is connected to the opening 12 of the compaction cell 15 in a journal 17. This is designed as a hinge with a built-in return spring, i.e. a spring which returns the baffle member to its starting position when the baffle member is not under the influence of external forces. The hinge is provided with means for adjusting the size of that force with which the integral spring of the hinge acts on the baffle member.

In the upper portion of the Figure there is shown an embodiment in which a baffle member 13b is journalled in a journal 16. The baffle member is provided with one or more projecting portions 20 which, via one or more spring members 18, hold the baffle member in the position illustrated in the Figure. By modifying the distance between the journal 16 and the anchorage point of the spring member 18 in each respective projecting portion 20, that force which is required for moving aside the baffle member 13b from the starting position of the member is regulated. It will be obvious to a person skilled in the art that the baffle can be of any optional design and also be connected to any optional suitable, fixed portion of the apparatus. Similarly, means are provided in certain embodiments for pretensioning the spring members 18.

Two embodiments for returning the baffle members and for governing the force required for moving the baffle members in a direction away from the starting position of these members have been described above and shown on the Drawings. It will be obvious to the skilled reader that a corresponding function will also be achieved in other embodiments, for example employing pneumatically or hydraulically operating devices. It will likewise be obvious to a person skilled in the art that the positions of the journals 16 and 17 for the baffle members are selected in certain embodiments so that the journals are disposed within the compaction cell 15. In such instance, the baffle members are at least partly disposed within the path 10. In certain embodiments, the baffle members are designed as resiliently returning throttle cones.

At least one first mechanical guide member 50 is disposed substantially above the spiral 30 and in the region of the opening 11. The guide member is oriented in the longitudinal direction of the spiral and is of a length which substantially corresponds to the length of the infeed opening in the longitudinal direction of the spiral. It further applies according to the invention that the guide member is disposed on the support side of the path, i.e. on that side against which the spiral blade 33 is displaced in a radial direction on rotation of the spiral. The disclosed displacement in a radial direction depends upon the direction of rotation (right or left-hand turn) of the spiral and those reaction forces which occur between the spiral and the material displaced by the spiral. The guide member 50 is located closely adjacent or abuts against the outer defining edge 32 of the spiral, at least when the spiral 30 rotates. The guide member also forms a scraper blade for material which accompanies the spiral on its rotation. In addition, the guide member prevents the spiral from being lifted up out of the path as a result of upwardly directed forces which may occur on rotation of the spiral. In one preferred embodiment in which the apparatus includes one or more first guide members 50, the minimum distance between the first guide member and the opposing wall 28a of the opening is generally less than the diameter of the spiral. Also in this embodiment, it is ensured that the spiral remains in its path if the spiral were to be exposed to upwardly directed forces. As a rule, the first guide member 50 constitutes a sufficient obstacle preventing the spiral from being lifted up out of its path.

In certain embodiments, at least one supplementary mechanical guide member 51 (second guide member) is provided in the region of the opening 11. The supplementary guide member is disposed on the opposite side of the opening 11 in relation to the previously mentioned (first) guide member. Generally, the second guide member is also of a length corresponding to the length of the first guide member and is oriented in the longitudinal direction of the spiral. The distance between the first guide member 50 and the second guide member 51 is less than the diameter of the spiral. It will hereby be ensured that the spiral is not lifted up out of its path as a result of possible upwardly directed forces which may occur in connection with rotation of the spiral.

In one preferred embodiment in which the apparatus is intended to compact moist material and, in such instance, reduce the moisture content in the material, the path 10 and/or the casing 42 is provided with drainage apertures 14 through which liquid pressed out of the material leaves the feed compartment 35 and/or the compaction cell 15. As a rule, drainage means 14, such as perforations, apertures etc, are provided in both the feed compartment and the compaction cell.

Fig. 1 also shows one embodiment of the present invention in which the compaction cell 15 accommodating the feed compartment 35 and the chamber 41 consists of two separate parts which are interconnected by means of connection devices 19 and 21, respectively. These are shown in the Figure as flange elements, but it will be obvious to a person skilled in the art that any appropriate design whatever of the connection devices may be employed without departing from the scope of the present invention.

In certain embodiments, the chamber 41 is connected to a container (not shown), in which event the compaction cell is, in certain practical applications, connected to the container in the region of the discharge opening of the compaction cell while, in other practical applications, the compaction cell is wholly or partly housed in the container.

The design of the feed compartment 35 and the compaction chamber 15 as two separate units also affords considerable freedom in the dimensioning of the feed compartment and compaction cell in dependence upon the relevant composition of the material which is to be handled by the apparatus. Thus, it applies that the length of the compaction cell is selected, for instance, depending upon the desired degree of compaction and/or total solids of the material once it has passed through the apparatus, or requisite friction to achieve a stable material plug in the compaction cell. The other dimensions involved may also be adapted in response to the relevant material type. Thus, the compaction cell is preferably given greater height and width than the feed compartment in the event of massive material pieces. Both the feed compartment 35 and the compaction cell 15 are given cross-sectional configuration which is adapted to suite the relevant material type. Likewise, the clearence between the path and the spiral is dimensioned in view of the material which is to be handled.

Figs. 4-6 show one embodiment of the present invention in which two mutually cooperating spirals 30a,b are provided for infeed of material to the compaction cell 15a. In this embodiment the apparatus is substantially constructed corresponding to that previously described with particular reference to Figs. 1-3. For the sake of simplicity, the same reference numerals will be employed for the embodiment illustrated in Fig. 4 as those previously used for devices corresponding to previously described devices. The path 10 for each respective spiral is of a design corresponding to that disclosed above for previously described embodiments, entailing that, in those areas where the spiral normally abuts against the path 10 or, in certain operational cases is brought into abutment against the path, the minimum radius of curvature of the path corresponds substantially to or exceeds half of the outer diameter of each respective spiral. Even though the expression radius of curvature has been employed here, the described principle is also applicable when only portions of the path form supports which are discrete in the longitudinal direction. Drive means 60 impart to the spirals counter-directed rotation (cf. the arrows A), the direction of rotation being selected so that the material, on displacement towards the compaction cell 15a, will also shots a tendency to be displaced towards the region between the two spirals. Hereby, material is accumulated in a central material strand which forces the spirals downwardly and assists in preventing the spirals from being raised up from the path 10a.

The Figures show one embodiment of the compaction cell 15 which is suited for use when the apparatus includes two mutually cooperating spirals 30. In such instance, the compaction cell 15 has, in the illustrated embodiment, a substantially planar upper bounding definition 46 and a substantially planar lower definition 45. The upper definition merges in the lower definition via bounding definitions 44a,b which, in their lower regions curve in towards the substantially planar lower definition 45.

In one preferred embodiment, the guiding of the rotation of the spirals is designed such that rotation is terminated by each respective spiral being set in a reception position in which that portion of the spiral blade which is located beneath the central region of the infeed opening is located adjacent the lowermost part of each respective path. This disclosure also applies to embodiments comprising but a single spiral.

When the apparatus according to the present invention is reduced into practice, material is supplied via the infeed device 40 and the infeed opening 11. The drive means 60 rotate the spiral 30 and this displaces material towards the discharge opening 12 of the casing. The baffle members 13 arrest the material in its displacement and a material plug of compacted material begins to be built up in the compaction cell 15,15a. New material which is fed in by the spiral is accumulated and compacted against the material plug and, when this has reached a certain length, it exercises such a pressure against the baffle members that these give way. However, movement of the material plug in the casing is still retarded by the friction between the casing, the baffle members and the material in the plug, at the same time as the spiral blade, at its free end, forces material towards the plug and thereby compacts the material. As new material is fed through the opening, material is accumulated and compacted against the plug and this is displaced out of the casing. On compaction of the material, extremely high compacting forces are achieved since the material is located in a restricted and small space and since the compressive forces applied against the material are concentrated to a very small surface area whose size is determined by the end portion of the spiral.

On rotation of the spiral, the guide member 50 (which closely approaches the spiral proper) prevents material from penetrating in between the spiral and the path. On rotation of the spiral, material may occasionally adhere to the spiral blade but the guide member scrapes such material free from the spiral blade.

A compaction apparatus according to the present invention will be of considerably smaller dimensions and display a higher degree of compaction than a screw compactor of corresponding capacity, since the screw compactor has a "flow area" for the material which is determined by the height of the thread blade, while the spiral compactor has a "flow area" which is substantially determined by the diameter of the spiral. An increase in the transport area in the compaction cell 15 in relation to the feed compartment 35 will eliminate the clog risk which occurs in prior art spiral compactors. The compact construction makes it possible to install the spiral conveyor in areas where available space does not permit installation of spiral compactors according to prior art technology for the material which passes into the compaction cell.

The above detailed description has referred to but a limited number of embodiments of the present invention, but it will readily be perceived by a person skilled in this art that the present invention encompasses a large number of embodiments without departing from the scope of the appended claims.

Claims

1. An apparatus (1) for compacting material (2) wherein the apparatus includes a path (10), an infeed opening (11) and a discharge opening (12) disposed in the path, at least one spiral (30) which is rotary about its longitudinal axis by drive means (60), formed as a spiral blade (33), and lacking a mechanical shaft, a feed compartment (35) formed by said at least one spiral (30) and said path (10) for supplied material, a chamber (41) disposed between the infeed opening (11) and the discharge opening (12), wherein a spiral free part (15) of the chamber (42) forms a cell (15), most proximal of the discharge opening, for accumulation and compaction of material fed into the cell on rotation of the spiral, wherein the spiral is journalled solely in its drive end (38), and wherein baffle means (13) are disposed in association with the discharge opening (12) for impeding displacement of the material, **characterized** in that at least a first mechanical guide member (50) is disposed substantially in the path before the spiral (30) and in the region of the infeed opening (11).

2. The apparatus as claimed in claim 1, **characterized** in that, the spiral comprises substantially one spiral turn.

3. The apparatus as claimed in claim 1 or 2 , **characterized** in that, the free end (39) of the spiral (30) projects into the chamber (41) at most approximately half of the distance between the infeed opening (11) and the discharge opening (12).

4. The apparatus as claimed in any of claims 1-3, **characterized** in that, the feed compartment (35) directly merges into the compaction cell (15).

5. The apparatus as claimed in any one of claims 1-4, **characterized** in that the free end (39) of the spiral is disposed in the region of the transition between the feed compartment (35) and the compaction cell (15).

6. The apparatus as claimed in any one of claims 1-5, **characterized** in that the extent of the infeed opening (11) in the longitudinal direction of the path (10) substantially encompasses the entire length of the spiral (30).

7. The apparatus as claimed in any one of claims 1-6, **characterized** in that the guide member is disposed on that side of the path against which the spiral blade (33) is caused to abut on rotation of the spiral.

8. The apparatus as claimed in any one of claims 1-7, **characterized** in that the maximum distance, when one spiral only is employed, between the first guide member (50) and the defining edge or edges of the infeed opening (11) is less than the diameter of the spiral.

9. The apparatus as claimed in claim 8, **characterized** in that at least a second mechanical guide member (51) is disposed on the side of the infeed opening (11) opposite to the first guide member (50).

10. The apparatus as claimed in claim 9, **characterized** in that the maximum distance between said first and said second guide members (50,51) is less than the diameter of the spiral.

11. The apparatus as claimed in any one of claims 1-10, **characterized** in that the feed compartment (35) and/or the chamber (41) are provided with drainage apertures (14).

12. The apparatus as claimed in any one of claims 1-7,9-11 **characterized** in that the apparatus includes two mutually substantially parallel spirals (30) disposed in the path (10), and that the spirals are disposed to rotate in opposing directions of rotation directed such that the material under displacement in the longitudinal direction of the path is accumulated towards the central portion of the path.

13. The apparatus as claimed in any one of claims 1-12, **characterized** in that the baffle members (13a,b) cooperate with means (17,18) for regulating that force which is required for displacement of the baffle members in a direction away from the starting position of said members.

Patentansprüche

1. Vorrichtung (1) zum Verdichten von Material (2), bei der die Vorrichtung einen Weg (10), eine Einfüllöffnung (11) und eine Auslaßöffnung (12), die in dem Weg angeordnet sind, wenigstens eine Schnecke oder Spirale (30), die durch Antriebsmittel (60) um ihre Längsachse drehbar ist, als ein Spiralenblatt (33) aufgebildet ist und keine mechanische Achse aufweist, ein Zuführabteil (35), das durch die wenigstens eine Spirale (30) und den Weg für zugeführtes Material gebildet wird, eine Kammer (41), die zwischen der Einfüllöffnung (11) und der Auslaßöffnung (12) angeordnet ist, aufweist, wobei ein spiralenfreier Teil (15) der Kammer (42) eine Zelle (15) der Auslaßöffnung am nächsten bildet, um in die Zelle eingefülltes Material bei Drehung der Spirale anzusammeln und zu verdichten, wobei die Spirale lediglich an ihrem Antriebsende (38) gelagert ist, und wobei Leitflächenmittel (13) in Verbindung mit der Auslaßöffnung (12) vorgesehen sind, um der Verschiebung des Materials Widerstand entgegenzusetzen, dadurch gekennzeichnet, daß wenigstens ein erstes mechanisches Führungsglied (50) im wesentlichen im Weg vor der Spirale (30) und im Bereich der Einfüllöffnung (11) angeordnet ist.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Spirale im wesentlichen eine Spiralwindung aufweist.

3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das freie Ende (39) der Spirale (30) in die Kammer (41) wenigstens ungefähr über die halbe Entfernung zwischen der Einfüllöffnung (11) und der Auslaßöffnung (12) hineinragt.

4. Vorrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß das Zuführabteil (35) direkt in die Verdichtungszelle (15) übergeht.

5. Vorrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß das freie Ende (39) der Spirale im Bereich des Übergangs zwischen dem Zuführabteil (35) und der Verdichtungszelle (15) angeordnet ist.

6. Vorrichtung nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß die Ausdehnung der Einfüllöffnung (11) in Längsrichtung des Weges (10) im wesentlichen die gesamte Länge der Spirale (30) umfaßt.

7. Vorrichtung nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß das Führungsglied an der Seite des Weges angeordnet ist, bei der bewirkt wird, daß sich das Spiralblatt (33) bei Drehung der Spirale gegen sie anlegt.

8. Vorrichtung nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß die größte Entfernung, wenn nur eine Spirale verwendet wird, zwischen dem ersten Führungsglied (50) und der begrenzenden Kante oder den begrenzenden Kanten der Einfüllöffnung (11) geringer ist als der Durchmesser der Spirale.

9. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß wenigstens ein zweites mechanisches Führungsglied (51) auf der Seite der Einfüllöffnung (11) angeordnet ist, die dem ersten Führungsglied (50) gegenüberliegt.

10. Vorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß die größte Entfernung zwischen den ersten und zweiten Führungsgliedern (50,51) kleiner ist als der Durchmesser der Spirale.

11. Vorrichtung nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, daß das Zuführabteil (35) und/oder die Kammer (41) mit Drainageöffnungen (14) versehen sind.

12. Vorrichtung nach einem der Ansprüche 1 bis 7, 9 bis 11, dadurch gekennzeichnet, daß die Vorrichtung zwei miteinander im wesentlichen parallele Spiralen (30) aufweist, die in dem Weg (10) angeordnet sind, und daß die Spiralen so angeordnet sind, daß sie sich in entgegengesetzten Drehrichtungen drehen, die so gerichtet sind, daß das Material, das in der Längsrichtung des Weges verschoben wird, zum mittigen Bereich des Weges hin angesammelt wird.

13. Vorrichtung nach einem der Ansprüche 1 bis 12, dadurch gekennzeichnet, daß die Leitflächenglieder (13a,b) mit Mitteln (17,18) zum Regulieren der Kraft zusammenwirken, die für Verschiebung der Leitflächenglieder in einer Richtung weg von der Anfangsposition der Glieder erforderlich ist.

Revendications

1. Appareil (1) servant au compactage de matières (2), dans lequel l'appareil comprend un conduit (10), une ouverture d'admission (11) et une ouverture d'évacuation (12), située dans le conduit, au moins une hélice (30), qui peut être entraînée en rotation autour de son axe longitudinal par un moyen de commande (60), ladite hélice se présentant sous la forme d'une lame en spirale (33), et étant dépourvue d'arbre mécanique, un compartiment d'alimentation (35), formé par ladite au moins une hélice (30) et ledit conduit (10) pour les matières amenées, une chambre (41), située entre l'ouverture d'admission (11) et l'ouverture d'évacuation (12), une partie sans hélice (15) de la chambre (42) formant une cellule (15), très proche de l'ouverture d'évacuation, pour l'accumulation et le compactage de matières amenées dans la cellule lors de la rotation de l'hélice, l'hélice étant montée à tourillon uniquement à son extrémité de commande (38), et dans lequel des moyens formant chicanes (13) sont placés en association avec l'ouverture d'évacuation (12) afin d'empêcher tout écart des matières, caractérisé en ce qu'au moins un premier élément mécanique de guidage (50) est disposé sensiblement dans le conduit avant l'hélice (30) et dans la zone de l'ouverture d'admission (11).

2. Appareil selon la revendication 1, caractérisé en ce que l'hélice comprend sensiblement une seule spire.

3. Appareil selon la revendication 1 ou 2, caractérisé en ce que l'extrémité libre (39) de l'hélice (30) fait saillie dans la chambre (41), au maximum à approximativement la moitié de la distance entre l'ouverture d'admission (11) et l'ouverture d'évacuation (12).

4. Appareil selon l'une quelconque des revendications 1 à 3, caractérisé en ce que le compartiment d'alimentation (35) se raccorde directement à la cellule de compactage (15).

5. Appareil selon l'une quelconque des revendications 1 à 4, caractérisé en ce que l'extrémité libre (39) de l'hélice est disposée dans la zone de transition entre le compartiment d'alimentation (35) et la cellule de compactage (15).

6. Appareil selon l'une quelconque des revendications 1 à 5, caractérisé en ce que l'étendue de l'ouverture d'admission (11), dans le sens longitudinal du conduit (10), englobe sensiblement toute la longueur de l'hélice (30).

7. Appareil selon l'une quelconque des revendications 1 à 6, caractérisé en ce que l'élément de guidage est disposé du côté du conduit contre lequel la lame en spirale (33) est amenée à venir en butée lors de la rotation de l'hélice.

8. Appareil selon l'une quelconque des revendications 1 à 7, caractérisé en ce que la distance maximale, lorsqu'une seule hélice est utilisée, entre le premier élément de guidage (50) et le bord ou les bords de délimitation de l'ouverture d'admission (11), est inférieure au diamètre de l'hélice.

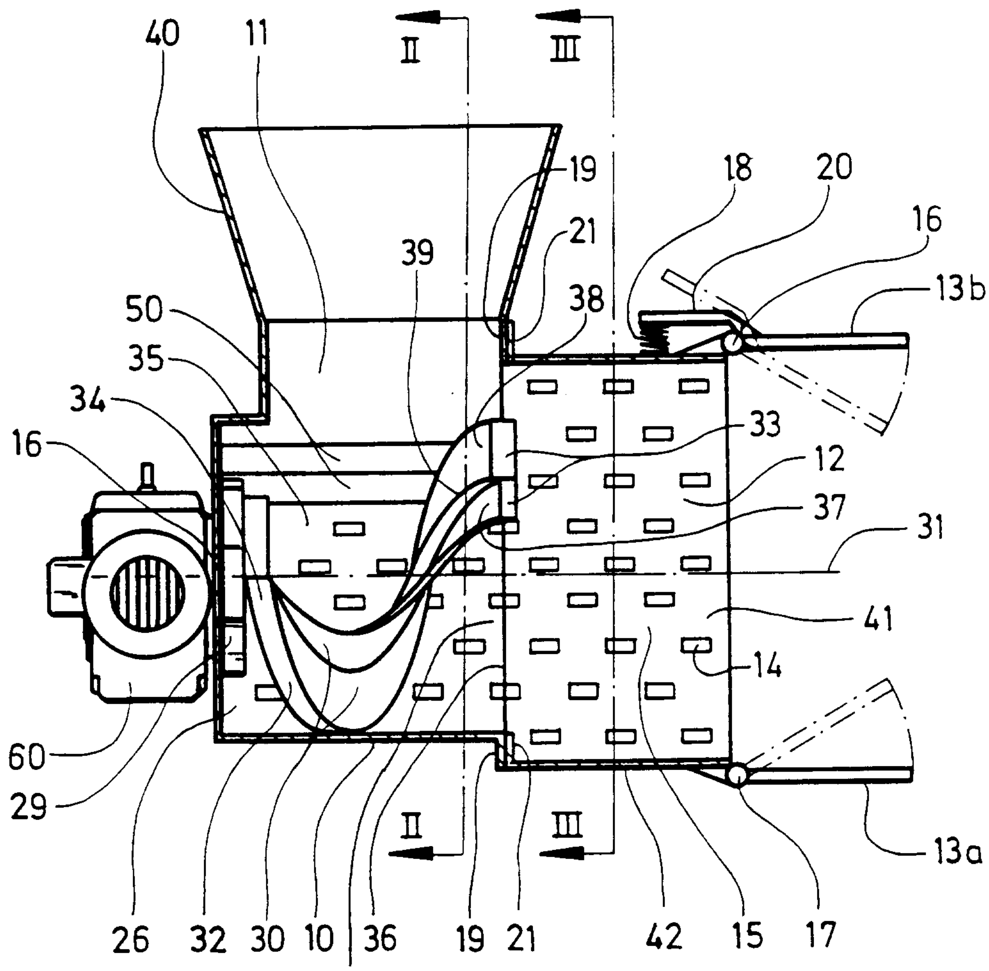
9. Appareil selon la revendication 8, caractérisé en ce qu'au moins un deuxième élément mécanique de guidage (51) est disposé sur le côté de l'ouverture d'admission (11), faisant face au premier élément de guidage (50).

10. Appareil selon la revendication 9, caractérisé en ce que la distance maximale entre ledit premier et ledit deuxième élément de guidage (50, 51) est inférieure au diamètre de l'hélice.

11. Appareil selon l'une quelconque des revendications 1 à 10, caractérisé en ce que le compartiment d'alimentation (35) et/ou la chambre (41) sont pourvus d'orifices d'écoulement (14).

12. Appareil selon l'une quelconque des revendications 1 à 7, 9 à 11, caractérisé en ce que l'appareil comprend deux hélices (30), sensiblement parallèles l'une à l'autre et disposées dans le conduit (10), et en ce que les hélices sont prévues de manière à tourner dans des sens opposés de rotation, de telle sorte que les matières acheminées dans le sens longitudinal du conduit s'accumulent en direction de la partie centrale du conduit.

13. Appareil selon l'une quelconque des revendications 1 à 12, caractérisé en ce que les éléments formant chicanes (13a, b) coopèrent avec des moyens (17, 18) permettant la régulation de la force requise pour le déplacement des éléments formant chicanes afin d'éloigner lesdits éléments par rapport à leur position de départ.


40
11
II
III
19
18
20
16
21
39
13b
50
38
35
34
33
16
12
37
31
41
14
60
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26
32
30
10
36
43
19
21
42
15
17
13a

FIG. 1

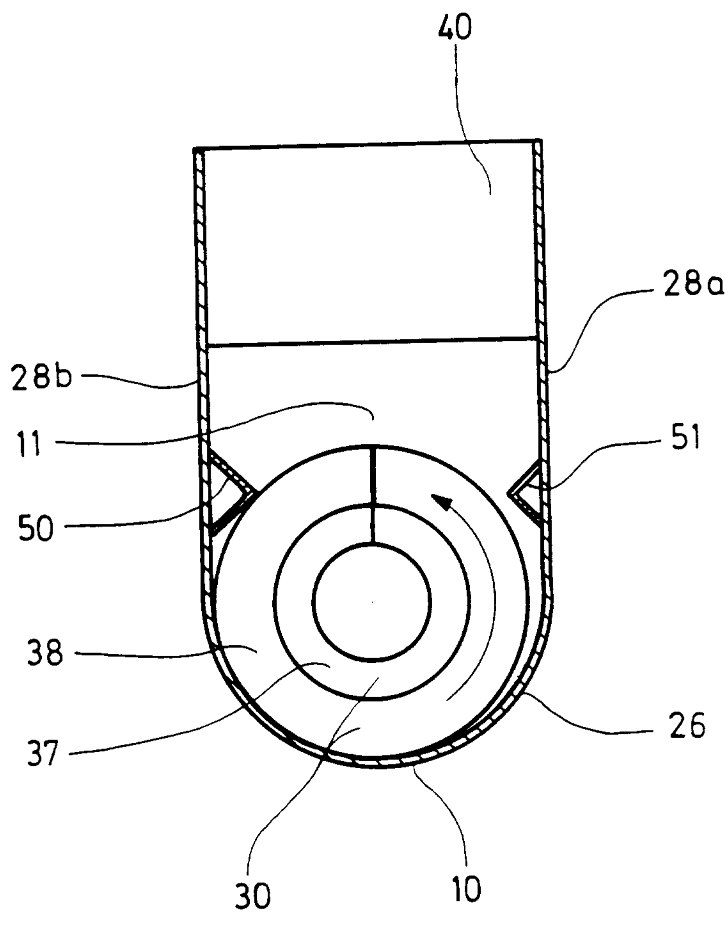

FIG. 2

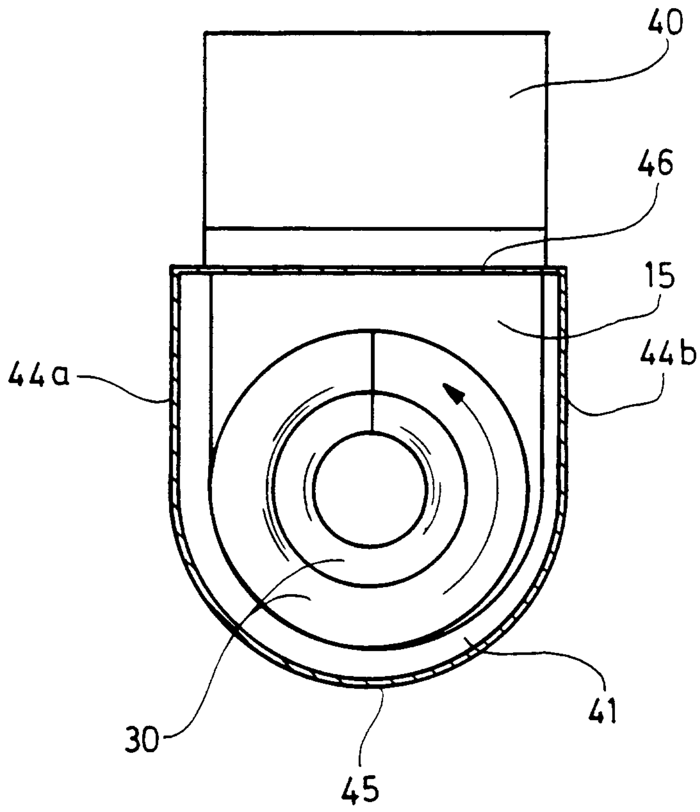

FIG. 3

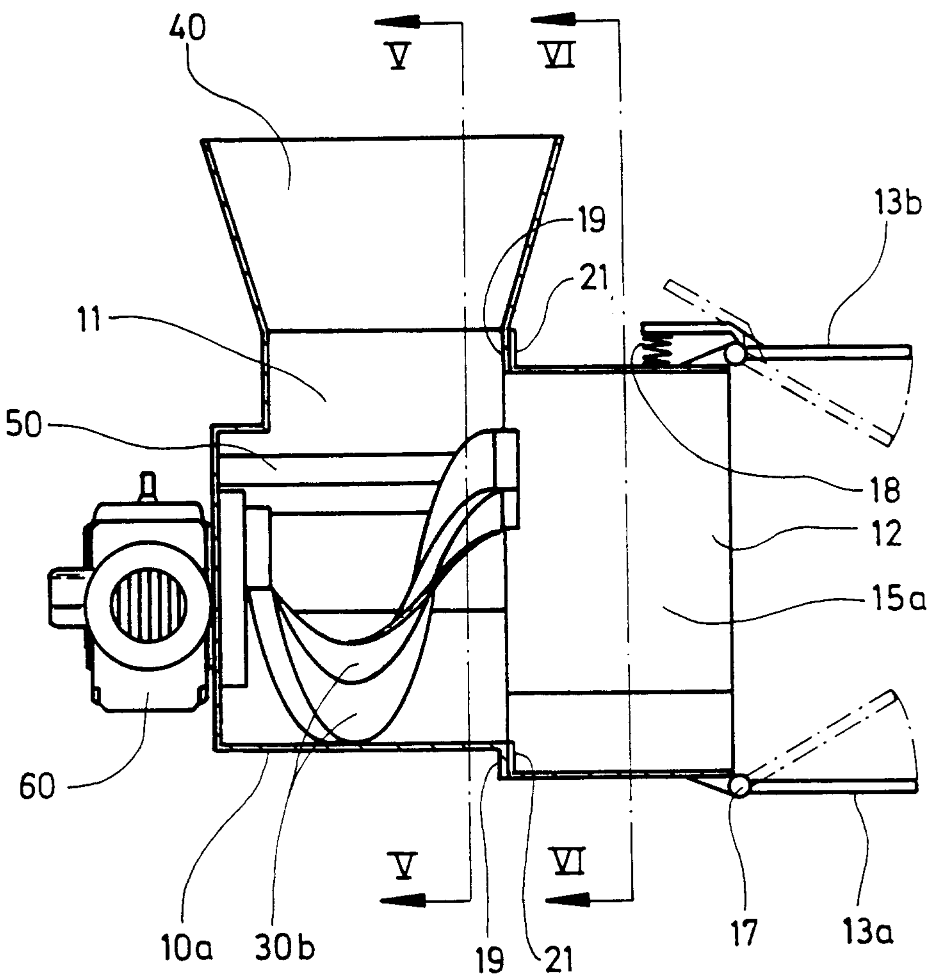

FIG. 4

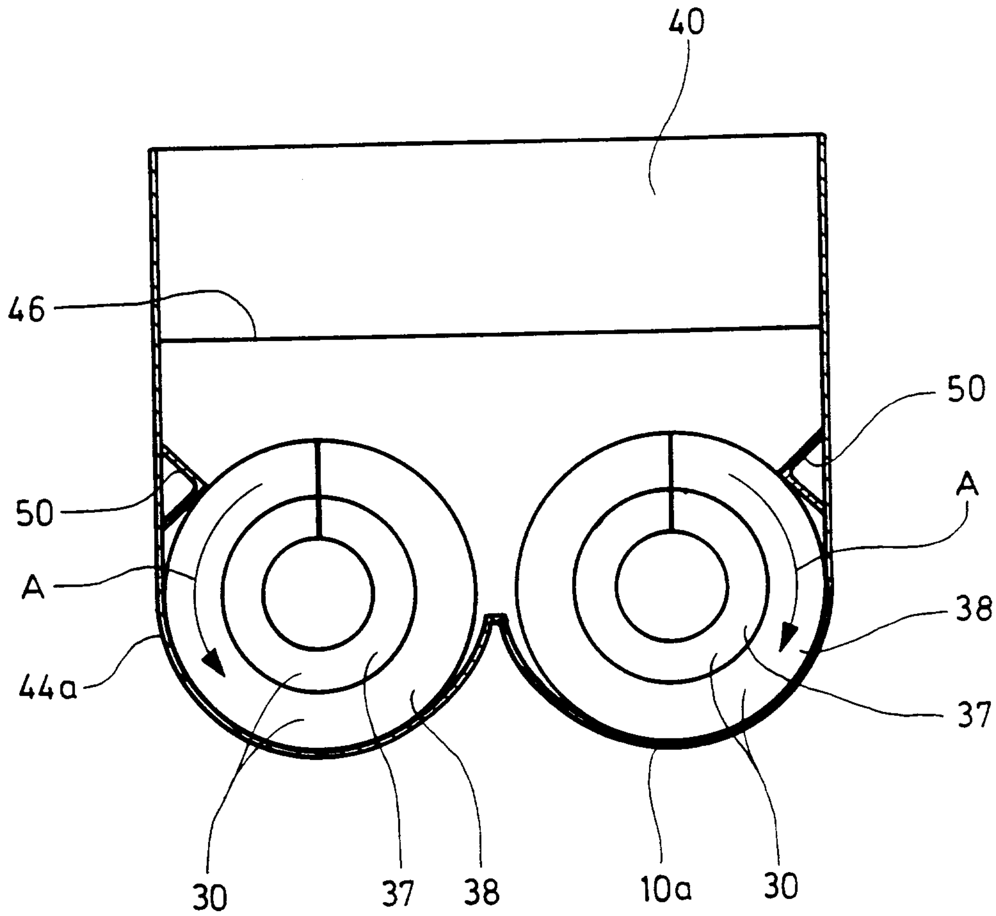

FIG. 5

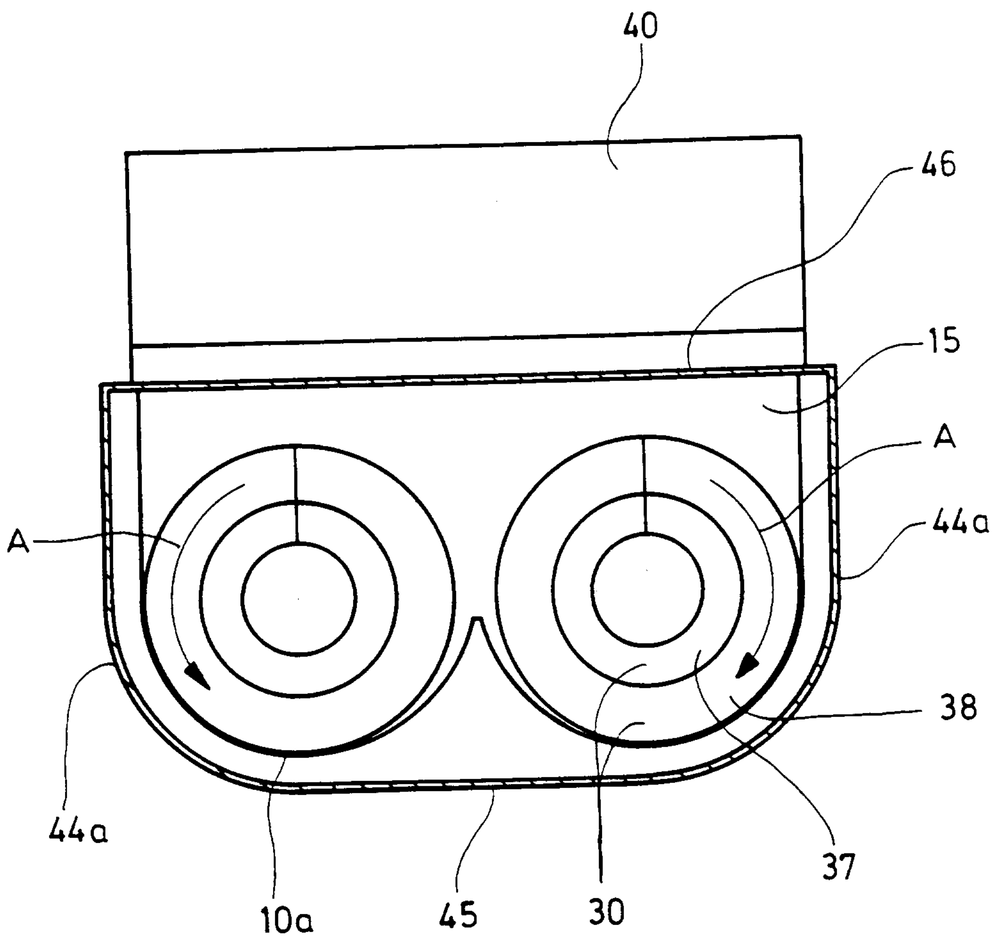

FIG. 6