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(54) **A CONVEYOR APPARATUS**

FÖRDERVORRICHTUNG

APPAREIL DE TRANSPORT

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(56) References cited:

AT-B- 295 277

DE-A- 3 002 326

DE-A- 3 122 131

FR-A- 1 494 284

FR-A- 2 522 585

NO-C- 73 823

NO-C- 106 457

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Description

The present invention relates to an apparatus for receiving, conveying and compacting material as stated in the preamble of Claim 1. Such an apparatus is known from the prior use according to the Renspress of the Maskinleveranser AB, Box 36, S-57076, Ruda (SE).

Material in which is included fractions of different sizes, densities, elasticity, moisture-content etc. needs to be moved in many different contexts, both in industrial operations and in, for example, municipal refuse disposal and management (refuse handling, screenings from the wastewater treatment plants and so on). Consequently, such material is handled in large quantities daily and it is a reality that this handling cannot be effected without meeting a number of problems. These are because the material is, as a rule, difficult to handle, for example in that it is bulky and needs to be compacted in order to attain an acceptable level of transport economy. When the material is wet, it needs to be compacted in order to reduce the moisture-content so as thereby to make for greater ease of handling. For compacting material of the above-indicated type, the prior Art calls for the employment of separate compactors or screw presses.

One disadvantage inherent in hitherto employed combinations of conveyors and compactors is that the combinations require a great deal of space and are costly. In certain applications hydraulic compactors are used, and in other applications, screw presses. The hydraulic compactors take up a great deal of space and operate intermittently, which occasions problems in, for example, the formation of material "bridges" at the infeed section, while the conventional screw presses find difficulty in swallowing the bridge and plug forming materials here under discussion. This is because the screw presses have a centre shaft or axle about which ensnaring material such as textiles, plastic sheeting, strips etc. become wound and cause plug formation in the material flow.

From DE-A-3 002 326 is known a conveyor comprising a casing and a shaftless spiral disposed in the casing. Either the inlet end or the outlet end of the casing could be provided with a drive means to rotate the spiral to convey material towards the discharge opening of the conveyor. The casing and the spiral consist of flexible or elastic material with the exception of the portion in proximity to the drive means where the casing consists of rigid material and the spiral surrounds a drive shaft. The aim of the conveyor is to adapt the outlet level to the level of a receiving equipment. The shown combination is however not suited to compact material depending on the flexible or elastic properties of the casing and the spiral. The publication does not indicate any measures to compact the material while being conveyed.

The present invention constitutes a conveyor apparatus in which is included means for compaction of the material being conveyed and in which the above-indi-

cated disadvantages are obviated to a remarkable extent. The invention relates to a combination of a shaftless spiral and a casing as disclosed in the characterising part of the independent Claim 1.

The combination of spiral and casing creates a compact unit of equipment which makes for reliable conveyance of the material and is used, according to the invention, to realise a compaction of the material at same time as the material is enclosed, which entails that the surrounding environment is not affected. In certain applications of the present invention, the employment of compaction reduces the moisture-content in the material, while in other applications, the compaction of the material constitutes the basis of a batchwise discharging of the material from the apparatus.

In certain embodiments, the compaction is further amplified in that the spiral is provided with progressively diminishing pitch. The spiral is completely free, i.e. is not journaled in that end which is directed towards the discharge section of the casing.

In one embodiment of the present invention, the counter-pressure member consists of a spring-loaded counterpressure plate which is movably journaled in the upper defining surface of the casing and/or in conjunction with the discharge opening of the casing. In certain embodiments, the counterpressure plate is disposed in a receptacle chamber. In other embodiments, the braking effect of the casing on the material is amplified in that the casing, most proximal the discharge opening, is provided with reduced inner cross-section.

In yet a further embodiment, the counterpressure member consists of a receptacle device, for example a container, a hose etc., the member being shiftable in the axial direction of the casing. During rotation of the spiral, the material is conveyed into the receptacle device, the material moving the receptacle device in the axial direction of the spiral.

In still a further preferred embodiment of the apparatus, the counterpressure member consists of a shaftless spiral disposed in a casing, this casing having an infeed opening connected to the discharge opening of the delivering casing. That casing which discharges the material is, in this instance, of an orientation which entails that its axis is directed towards the centre axis of the spiral and the receiving combination of casing and spiral. The pitch, speed and/or radial extent of the spiral blades are, in the receiving combination, adapted so as to occasion a braking of the material movement before the material reaches the discharge opening of the disclosed casing. Hereby, it is possible in such operation to attain a substantially complete filling of the space in the receiving casing. The substantially complete filling constitutes a precondition for being able to convey the material upwardly in a more or less vertical direction. Thus, according to the present invention, it is possible to dispose the receiving combination with its axis directed, for example, horizontally, vertically, or therebetween.

The casing is provided with drainage openings which are located in that region of the casing where

compaction of the material takes place. In such an instance, an orientation of the casing is advantageously selected so as to entail that the discharge section of the casing is placed higher than its infeed section, whereby, on compaction, the pressed out liquid is conveyed in a direction opposite to the direction of movement of the material and is drained out from the casing through the previously-mentioned drainage openings.

The nature of the present invention and its aspects will be more readily understood from the following brief description of the accompanying Drawings, and discussion relating thereto.

In the accompanying Drawings:

Figure 1 is an axial section through an apparatus not covered by Claim 1.

Figures 1a - c are sections taken along the lines A-A, B-B, and C-C in Figure 1;

Figure 2 shows the material distribution in the longitudinal direction of the apparatus, not covered by Claim 1.

Figures 4-5 illustrate embodiments of the apparatus according to the present invention in which this is provided with counterpressure members for braking the material on its movement;

Figure 3 and 6a are not covered by Claim 1 and show different screw presses. Figure 6b is a partial section through the apparatus according to the present invention, in which the casing of the apparatus is provided with drainage openings;

Figures 7a and b are partial sections through embodiments of the apparatus according to the present invention, in which this is provided, in conjunction with its discharge opening with a shiftable receptacle member;

Figures 8a and b are partial sections through one embodiment of the apparatus according to the present invention, in which this, in conjunction with its discharge opening, cooperates with a conveyor apparatus which includes a casing surrounding a shaftless spiral; and

Figures 9a-c show details of the free end of the spiral.

Referring to the Drawings, Figures 1 and 2 illustrate the fundamental construction and function of a screw press. In these Drawing Figures, there is shown an apparatus 1 which includes an elongate, tube-like casing 2 in which is placed a shaftless spiral 3. At its one end, the casing is provided with an infeed opening 14 which connects to an upwardly-directed drum 16. A motor 4 drives the spiral 3 by the intermediary of a gear-

ing and journalling unit 30. The other end of the casing constitutes the discharge portion 18 of the apparatus, which is provided with a discharge opening 24. The spiral is solely journaled in connection with the gearing and journalling unit, while that end of the spiral which is directed towards the discharge portion is fully free.

Seen in the axial direction of the casing, the combination of spiral and casing is divided into an infeed zone 20, a transport zone 21, a precompaction zone 22 and a compaction zone 23. The cross-sections through each respective zone in the illustrated embodiment are apparent from Figures 1a-c. It will be appreciated from these Figures that the cross-section of the casing in the precompaction zone is substantially circular and surrounds the spiral with slight play. Figure 1 also shows by solid line a relatively abrupt transition between the transport zone 21 and the precompaction zone 22. However, in certain physical applications, the embodiment shown by broken lines is selected, with a relatively continuous transition between the cross-sections of the transport zone and the precompaction zone.

Figure 2 shows in particular how the material flow 40 encompasses a relatively small portion of the cross-section of the casing as long as the material is in the transport zone 21, and how the material, on its passage through the precompaction zone, takes up steadily increasing part of the cross-section in order, in the compaction zone proper, substantially to fill out the entire cross-section.

Figures 3 and 4 show how the combination of spiral and casing is provided with a counterpressure member 25, 8 for arresting or braking the movement of the material in the compaction zone 23 of the casing. In the embodiment illustrated in Figure 3, the counterpressure member 25 is formed in that the movement of the material is braked during movement in the longitudinal direction of the casing, because of friction against the inner surface of the casing. In certain physical applications, the braking effect is amplified in that the casing is, in the region of the compaction zone 23, provided with reduced inner cross-section.

Figure 4a shows, first, one embodiment in which the counterpressure member consists of a counterpressure plate 8a disposed in association with the discharge opening 24 and pivotally journaled in conjunction with the upper region of the discharge opening, and movable in the direction of the double-headed arrow A; and secondly, an embodiment in which the counterpressure member consists of a counterpressure plate 8b which is pivotal and preferably return springbiased in the upper defining surface 27 of the casing 2. Figure 4b shows a partial longitudinal section and Figure 4c a view taken along the line D-D in Figure 4b of one embodiment in which the counterpressure member consists of a split cone 34. For example, the cone comprises two halves 34a and 34b and is openable under the counteraction of springs 34 whose spring force is adapted to provide that counterpressure which is requisite to attain the intended compaction of the material.

Figure 5 shows one embodiment in which the counterpressure plate 8a, in conjunction with the discharge opening 24, is disposed in a receptacle chamber 7. In the embodiment illustrated in this Figure, the counterpressure plate is journaled in the upper defining surface of the chamber, but the journalling may, for example, correspond to that of those embodiments as shown in Figure 4.

Figures 6a and b show embodiments in which the casing 2, in conjunction with the precompaction zone 22 and the compaction zone 23, is provided with drainage openings 33.

Figures 7a and b show embodiments of the present invention in which the counterpressure member consists of a receptacle device 26, 28, shiftable in the axial direction of the casing and, in Figure 7a, comprising a container 26, while in Figure 7b, a hose 28, in this instance, the hose 28 is drawn out from a magazine 29. In certain embodiments, braking means 36 are provided for restricting the withdrawal of the hose from the magazine. In the Figures, an arrow F intimates a force which is counter-directed to the movement of the container. The arrow represents a device, for example a hydraulic cylinder. In Figure 7a, it is shown that, in certain embodiments, the hose 28 cooperates with the container 26 (broken lines) and is brought into abutment with the inner surfaces of the container according as the hose is filled with material from the casing. Thus, Figures 7a and b show embodiments of the invention in which the material surrounded by the container and/or the hose is compacted.

Figures 8a and b show one embodiment of the invention in which the apparatus 1 includes at least one supplementary conveyor apparatus 50 comprising a casing 52 and a shaftless spiral 53 placed therein. The spiral is driven by a motor 54 by the intermediary of a gearing and journalling unit 51 and its speed is, thus, for example by modification of the gear ratio, adjustable to any desired level. The direction of the first spiral 3 and/or a central shaft of the discharge end 18 of the casing is towards the central axis of the spiral 53 of the conveyor apparatus. The opening surface area of the discharge opening 24 of the casing 2 substantially agrees with the crosssectional area of the receiving casing 52, both of the casings being substantially sealingly interconnected. The conveyor apparatus 50, is, in certain embodiments, disposed to move the material essentially horizontally, while in other embodiments, movement is effected during alteration of the level of the material. There are also embodiments of the present invention in which the casing 52 of the conveyor apparatus 50 with the spiral placed therein, has a substantially vertical direction. In this instance, the free end of the spiral is directed upwardly.

Figures 9a-c show embodiments of the free end 31-32 of the spiral 3. In Figure 9a, the end 31 of the spiral terminates in such a manner that its blade height continuously diminishes from the inner and outwardly, i.e. the centre hole of the spiral increases progressively. Fig-

ures 9b and c show embodiments in which the end 32 of the spiral is disposed for a gradual reduction of its blade height.

Material which is supplied to the apparatus 1 through the infeed opening 14 in the casing 2 is moved in a direction towards the discharge opening 24 by rotation of the spiral 3. As will be apparent from Figure 2, a gathering of material takes place in the precompaction zone 22 partly in that the spiral 3, in certain embodiments, has a smaller pitch than in the transport zone 21, and partly in that the movement of the material is braked in the compaction zone 23 and/or by the counterpressure members 8, 25, 26, 28, and 50. As a result, the material, in the compaction zone, as a rule substantially fills out the entire crosssection of the casing.

In Figures 3-5, braking is effected of the movement of the material in the compaction zone 23 by friction against the inner wall of the casing in the compaction zone (Figure 3), by the action of the counterpressure plates 8a, 8b (Figures 4 and 5), or by a combination of friction and pressure which is obtained in that the cross-section (Figure 3) of the casing diminishes, or alternatively in that the casing terminates in the cone 34 (Figure 4b).

In the embodiments illustrated in Figures 6 and 6b, a reduction is effected of the liquid-content of the material, during passage through the precompaction zone 22 and the compaction zone 23. In many examples of physical application, the casing 2 is, in such instances, disposed such that the material is moved slightly upwardly when it passes in a direction towards the discharge opening 24. Hereby, drainage of the material will be facilitated, since a portion of the liquid will pass in a direction opposite to the direction of movement of the material and substantially in the centre of the shaftless spiral, before the liquid runs out through the drainage openings 33. As a result, it will be possible for the liquid to reach the drainage openings of the casing in a region where the material has not yet had time to be compacted to any appreciable degree.

On movement of material into the container 26 or into the hose 28 (Cf. Figures 7a and b), the container, the hose or alternatively the hose in combination with the container is progressively forced out from the casing 2 by the action of forces from the material, at the same time as the material is compacted and then attains, as a rule, a degree of compaction which is in addition to the previously-attained compaction.

In the embodiment illustrated in Figures 8a and b, the conveyor apparatus 50 constitutes a counterpressure member in that the dimensions, pitch and speed of the spiral 53 have been selected such that the material is braked in its movement on passage out from the discharge opening 24 of the casing 2. There will hereby be obtained the desired compaction of the material when this is located in the casing 52 of the receiving combination, and thereby requisite filling of the casing of the receiving combination.

The above-described counterpressure members are, in certain embodiments, combined so that, for example, there will be included in one and the same apparatus, a counterpressure plate 8a, b, and a terminating conical portion of the casing; a counterpressure plate 8a, b, and a shiftable receptacle member 26, 28; a cone 34 and the receiving casing 52 with spiral 53; and so on.

In certain physical applications of the invention, a braking of the material takes place in the precompaction zone to such a great extent that at least that section of the casing located most proximal the compaction zone will be as good as completely filled with material. The thus compacted material is thereafter caused to leave casing through its discharge opening 24 in batches whose size is determined by the rotation of the spiral (the angular alteration which the spiral undergoes), in conjunction with each discharge occasion. Hence, the present invention offers a simple and reliable technique for the batchwise discharge, with a relatively degree of accuracy, of material from an apparatus according to the present invention.

The above detailed description refers only to a limited number of embodiments of the present invention, but the skilled reader of this Specification will readily perceive that many modifications and embodiments of the present invention are conceivable without departing from the scope of the appended Claims.

Claims

1. An apparatus (1) for conveying and compacting compactable material containing liquid and solid components from refuse handling and waste water treatment wherein the apparatus includes an infeed portion (29) and a discharge portion (18) with a discharge opening (24), wherein a rotatable shaftless spiral (3) is disposed in a casing (2) which at least along a portion of its length is enclosing the spiral, wherein the spiral has a terminal free end (31, 32) and a free central passage extending longitudinally along the length of the spiral, wherein a drive means (4) for rotating the spiral is provided in conjunction with said infeed portion to cause the spiral to advance the material towards the discharge opening, wherein one or more infeed openings (14) for the material are disposed in said infeed portion and wherein an end portion (22, 23) of the casing (2) in conjunction with the discharge portion (18) has a substantial circular cross section to surround the spiral with slight play, wherein that the end portion (22, 23) comprises a compacting zone (23) where the casing (2) is extending from and beyond said terminal free end whereby material conveyed into the compacting zone is opposed to advance, accumulated and thereby compacted, that the end portion also comprises a precompacting zone (22) interacting with the compacting zone, said precompacting zone being placed in that region of the end

portion which precedes the compacting zone and where the casing surrounds the spiral with slight play, whereby via the free central passage of the spiral compacted material interacts with the material in the precompacting zone (22) in order to gradually retard the advancement of the material and press it together, characterised in that a counterpressure member (8, 25, 26, 28, 35, 50) interacting with the casing (2) and movable with respect to the same is provided in connection with the compacting zone (23), and that the casing is provided with a plurality of draining openings traversing the casing wall in the region where compaction of the material takes place.

2. The apparatus as claimed in Claim 1, characterised in that the spiral is provided, in the precompacting zone (22), with a pitch which diminishes towards the discharge opening (24) of the casing.
3. The apparatus as claimed in Claim 1 or 2, characterised in that the free end (31, 32) of the spiral has a blade height whose radial extent diminishes towards the end of the spiral, the radial extent of the end (31) diminishing continually, or the radial extent of the end (32) diminishing stepwise.
4. The apparatus as claimed in any one of the preceding claims, characterised in that the counterpressure member consists of a preferably spring-loaded counterpressure plate (8a, 8b) which is movably journaled in the upper defining surface (27) of the casing and/or in the discharge opening (24) of the casing, and/or consists of a positively yieldable throttling (34), for example a cone (34) openable against spring action.
5. The apparatus as claimed in Claim 4, characterised in that the counterpressure plate (8a) or the cone (34) is disposed in a receptacle chamber (7).
6. The apparatus as claimed in any one of Claims 1 to 3, characterised in that the casing (2) in the compacting zone (23) has a crosssection which, in all parts of the zone is substantially uniform or diminishes in the direction towards the discharge opening (24) of the casing.
7. The apparatus as claimed in any one of Claims 1 to 4 or 6, characterised in that the counterpressure member consists of a container (26) shiftable in the axial direction of the casing, of a withdrawable hose (28) surrounding the casing, or of the hose (28) disposed of movement into the container (26), the container, the hose or the combination of hose and container receiving material discharged from the discharge opening (24) of the casing, the material moving the container, the hose or the combination

of hose and container in the axial direction of the casing.

8. The apparatus as claimed in any of Claims 1 or 6, characterised in that the counterpressure member consists of a device (50) in which there is included a shaftless spiral (53) disposed in a casing (52), the discharge opening (24) connecting substantially sealingly with the infeed opening of the device (5) and having an opening surface area which substantially agrees with the cross-sectional area of the casing (52) of the device (50).
9. The apparatus as claimed in Claim 8, characterised in that the pitch, speed, and/or radial extent of the spiral blades for the spiral (53) disposed in the receiving casing (52) are adapted so as to realise a braking of the material movement in the end section (23) of the casing (2) and/or in the zone (22).

Patentansprüche

1. Vorrichtung (1) zum Fördern und Kompaktieren von kompaktierbarem Material, das flüssige und feste Komponenten aus der Müll- und Abwasserbehandlung enthält, wobei die Vorrichtung einen Einfüllbereich (29) und einen Auslaßbereich (18) mit einer Auslaßöffnung (24) aufweist, wobei eine drehbare achsenlose Spirale (3) in einem Gehäuse (2) angeordnet ist, das wenigstens entlang einem Teil seiner Länge die Spirale umschließt, wobei die Spirale ein am Ende freies Ende (31, 32) und einen freien mittigen Durchlaß, der sich entlang der Länge der Spirale in Längsrichtung erstreckt, wobei ein Antriebsmittel (4) zum Drehen der Spirale in Verbindung mit dem Einfüllbereich vorgesehen ist, damit die Spirale Material zur Auslaßöffnung vorwärtsbewegt, wobei eine oder mehrere Öffnungen (14) für das Material in dem Einfüllbereich angeordnet sind und wobei ein Endbereich (22, 23) des Gehäuses (2) in Verbindung mit dem Auslaßbereich (18) einen im wesentlichen kreisförmigen Querschnitt aufweist, um das Gehäuse mit leichtem Spiel zu umgeben, wobei der Endbereich (22, 23) eine Kompaktierungszone (23) aufweist, in der sich das Gehäuse (2) von und über das am Ende angeordnete freie Ende erstreckt, durch die in die Kompaktierungszone gefördertes Material an der Weiterbewegung gehemmt, angesammelt und dadurch kompaktiert wird, wobei der Endbereich auch eine Vorkompaktierungszone (22) aufweist, die mit der Kompaktierungszone in Wechselwirkung steht, wobei die Vorkompaktierungszone in dem Bereich des Endbereiches, der der Kompaktierungszone vorangeht, angeordnet ist, und wo das Gehäuse die Spirale mit leichtem Spiel umgibt, wodurch über den freien mittigen Kanal der Spirale kompaktiertes Material mit dem Material in der Vorkompaktierungszone (22) zusammenwirkt, um all-

mählich die Weiterbewegung des Materials zu verzögern und es zusammenzudrücken, dadurch gekennzeichnet, daß ein mit dem Gehäuse (2) wechselwirkendes und relativ zu diesem bewegliches Gegendruckelement (8, 25, 26, 28, 35, 50) in Verbindung mit der Kompaktierungszone (23) vorgesehen ist, und daß das Gehäuse mit einer Mehrzahl von Drainageöffnungen versehen ist, die die Gehäusewand in dem Bereich durchdringen, in dem die Kompaktierung des Materials stattfindet.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Spirale in der Vorkompaktierungszone mit einer Ganghöhe versehen ist, der sich zur Auslaßöffnung (24) des Gehäuses verringert.
3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das freie Ende (31, 32) der Spirale eine Blatthöhe hat, deren radiale Ausdehnung sich zum Ende der Spirale verringert, wobei die radiale Ausdehnung des Endes (31) sich kontinuierlich verringert oder sich die radiale Ausdehnung des Endes (32) stufenweise verringert.
4. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß das Gegendruckelement aus einer vorzugsweise federbelasteten Gegendruckplatte (8a, 8b) besteht, die drehbar an der oberen Grenzoberfläche (27) des Gehäuses und/oder in der Auslaßöffnung (24) des Gehäuses gelagert ist, und/oder aus einer unter Kraft nachgebenden Drosseleinrichtung (34), zum Beispiel einem Kegelstumpf (34) besteht, der sich gegen Federwirkung öffnen kann.
5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß die Gegendruckplatte (8a) oder der Kegelstumpf (34) in einer Behälterkammer (7) angeordnet ist.
6. Vorrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß das Gehäuse (2) in der Kompaktierungszone (23) einen Querschnitt aufweist, der in allen Teilen der Zone im wesentlichen gleichförmig ist oder sich in der Richtung zur Auslaßöffnung (24) des Gehäuses verringert.
7. Vorrichtung nach einem der Ansprüche 1 bis 4 oder 6, dadurch gekennzeichnet, daß das Gegendruckelement aus einem Behälter (26), der in Axialrichtung des Gehäuses verschiebbar ist, aus einem zurückziehbaren Schlauch (28), der das Gehäuse umgibt, oder aus dem Schlauch (28), der für Bewegung in den Behälter (26) angeordnet ist, besteht, wobei der Behälter, der Schlauch oder die Kombination von Schlauch und Behälter Material aufnehmen, das von der Auslaßöffnung (24) des Gehäuses abgegeben wird und das Material den

Behälter, den Schlauch oder die Kombination von Schlauch und Behälter in Axialrichtung des Gehäuses bewegt.

8. Vorrichtung nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß das Gegendruckelement aus einer Einrichtung (50) besteht, die eine achsenlose Spirale (53) aufweist, die in einem Gehäuse (52) angeordnet ist, wobei die Auslaßöffnung (24) einen im wesentlichen dichtende Verbindung mit der Einfüllöffnung der Einrichtung (50) bildet und ein Gebiet der Öffnungsfläche hat, daß im wesentlichen mit dem Querschnittsgebiet des Gehäuses (52) der Einrichtung (50) übereinstimmt.
9. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß Ganghöhe, Geschwindigkeit und/oder radiale Ausdehnung der Spiralblätter der Spirale (53), die im aufnehmenden Gehäuse (52) angeordnet ist, so ausgebildet sind, daß sie ein Bremsen der Materialbewegung im Endabschnitt (23) des Gehäuses (2) und/oder in der Zone (22) bewirken.

Revendications

1. Appareil (1) pour le transport et le compactage de matière compactable dans lequel l'appareil comporte une partie d'admission (29) et une partie de sortie (18) présentant une ouverture de sortie (24), dans lequel une hélice sans arbre rotative (3) est disposée dans une enveloppe (2) qui enferme l'hélice sur une partie au moins de sa longueur, dans lequel l'hélice présente une extrémité libre terminale (31, 32) et un passage central libre s'étendant suivant la longueur de l'hélice, dans lequel un moyen d'entraînement (4) pour l'entraînement en rotation de l'hélice est prévu conjointement avec ladite partie d'admission pour amener l'hélice à faire avancer la matière vers l'ouverture de sortie, dans lequel une ou plusieurs ouvertures (14) d'admission de la matière sont disposées dans ladite partie d'admission et dans lequel une partie d'extrémité (22, 23) de l'enveloppe (2) conjointement avec la partie de sortie (18) présente une section sensiblement circulaire pour entourer l'hélice avec un léger jeu, dans lequel la partie d'extrémité (22, 23) comprend une zone de compactage (23) où l'enveloppe (2) s'étend à partir et au-delà de ladite extrémité libre de sorte que la matière amenée à l'intérieur de la zone de compactage subit une résistance à l'avancement, s'accumule et se trouve par là tassée, que la partie d'extrémité comprend aussi une zone de précompactage (22) interagissant avec la zone de compactage, ladite zone de précompactage étant placée dans la région de la partie d'extrémité qui précède la zone de compactage et où l'enveloppe entoure l'hélice avec un léger jeu, de sorte que via le passage central libre

de l'hélice la matière compactée interagit avec la matière présente dans la zone de précompactage (22) afin de retarder progressivement l'avancement de la matière et de la compresser, caractérisé en ce qu'un organe de contre-pression (8, 25, 26, 28, 35, 50) interagissant avec le tube souple (2) et déplaçable par rapport à ce dernier est prévu conjointement avec la zone de compactage (23), et en ce que le tube souple est pourvu d'une pluralité d'ouvertures de drainage traversant le mur du tube souple dans la région où a lieu le compactage de la matière.

2. Appareil selon la revendication 1, caractérisé en ce que l'hélice présente, dans la zone de précompactage (22), un pas qui diminue vers l'ouverture de sortie (24) de l'enveloppe.
3. Appareil selon la revendication 1 ou 2, caractérisé en ce que l'extrémité libre (31, 32) de l'hélice a une hauteur de pale dont l'étendue radiale diminue vers l'extrémité de l'hélice, l'étendue radiale de l'extrémité (31) diminuant continuellement, ou l'étendue radiale de l'extrémité (32) diminuant par paliers.
4. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que l'organe de contre-pression est constitué par une plaque de contre-pression (8a, 8b) de préférence chargée par ressort, qui tourillonne avec possibilité de déplacement dans la surface de délimitation supérieure (27) de l'enveloppe et/ou dans l'ouverture de sortie (24) de l'enveloppe, et/ou est constituée par un étranglement doté d'élasticité positive (34), par exemple cône (34) ouvrant à l'encontre d'un ressort.
5. Appareil selon la revendication 4, caractérisé en ce que la plaque de contre-pression (8a) ou le cône (34) est disposé dans une chambre-réceptacle (7).
6. Appareil selon l'une quelconque des revendications 1 à 3, caractérisé en ce que l'enveloppe (2) présente dans la zone de compactage (23) une section qui, dans toutes les parties de la zone, est sensiblement uniforme ou diminue en direction de l'ouverture de sortie (24) de l'enveloppe.
7. Appareil selon l'une quelconque des revendications 1 à 4 ou 8, caractérisé en ce que l'organe de contre-pression est constitué par un récipient (26) déplaçable suivant l'axe de l'enveloppe, par un tube souple amovible (28) entourant l'enveloppe, ou par le tube souple (28) monté mobile dans le récipient (26), le récipient, le tube souple ou la combinaison de tube souple et de récipient recevant la matière déchargée par l'ouverture de sortie (24) de l'enveloppe, la matière déplaçant le récipient, le tube sou-

ple ou la combinaison de tube souple et de récipient suivant l'axe de l'enveloppe.

8. Appareil selon l'une quelconque des revendications 1 ou 6, caractérisé en ce que l'organe de contre-pression est constitué par un dispositif (50) où est incluse une hélice sans arbre (53) disposée dans une enveloppe (52), l'ouverture de sortie (24) étant reliée de manière sensiblement hermétique à l'ouverture d'admission du dispositif (50) et présentant une superficie d'ouverture qui correspond sensiblement à l'aire de section de l'enveloppe (52) du dispositif (50). 5 10
9. Appareil selon la revendication 8, caractérisé en ce que le pas, la vitesse et/ou l'étendue radiale des pales d'hélice de l'hélice (53) disposée dans l'enveloppe réceptrice (52) sont adaptés de façon à assurer un freinage du déplacement de la matière dans la section d'extrémité (23) de l'enveloppe (2) et/ou dans la zone (23). 15 20

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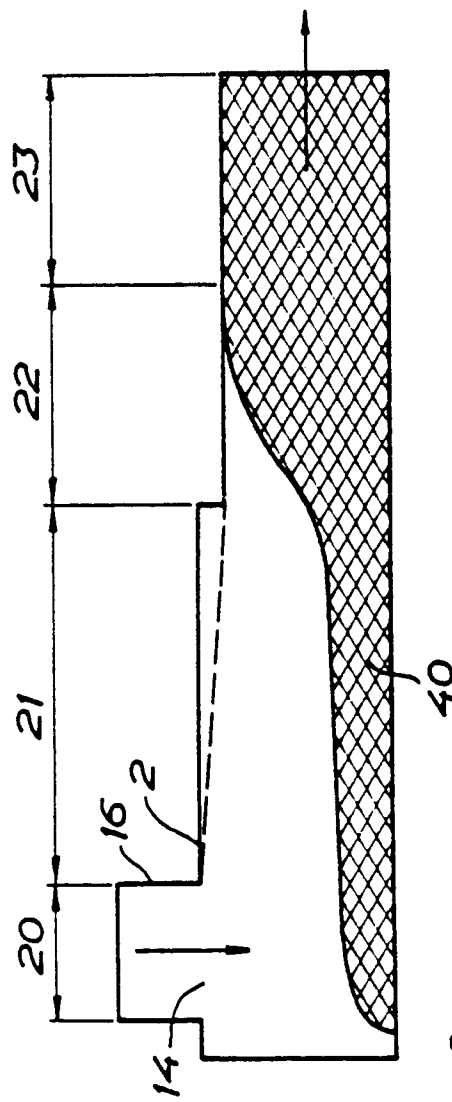
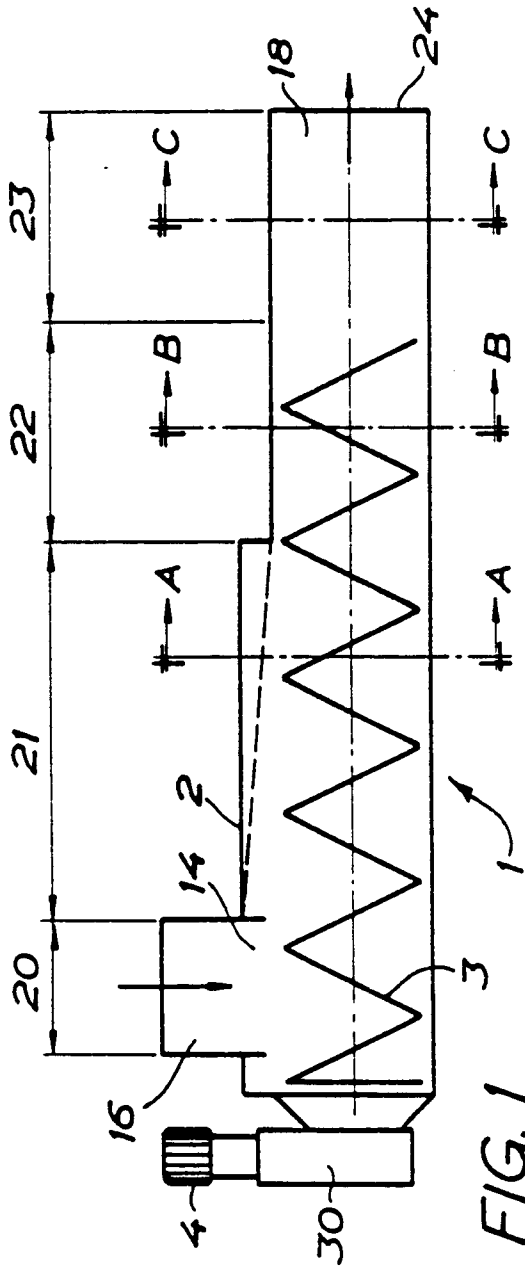
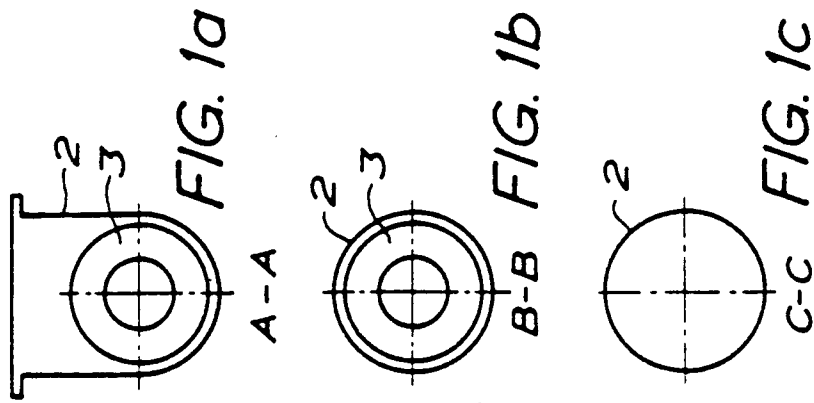
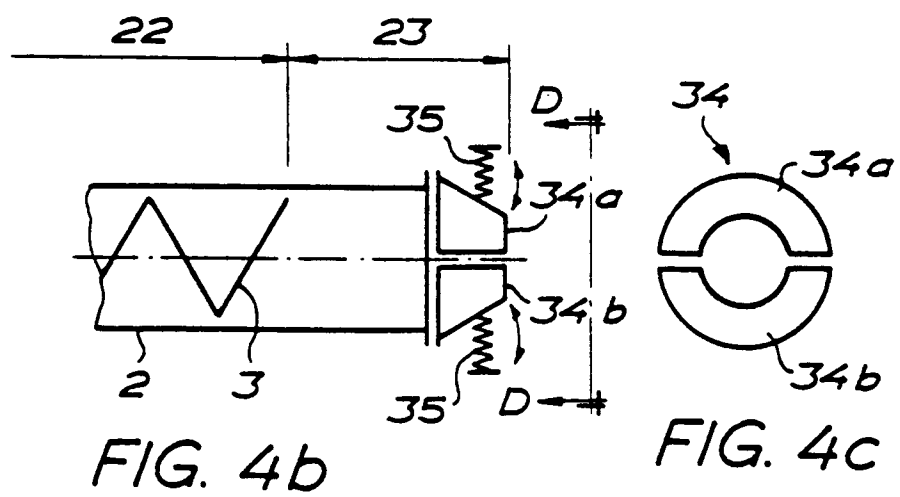
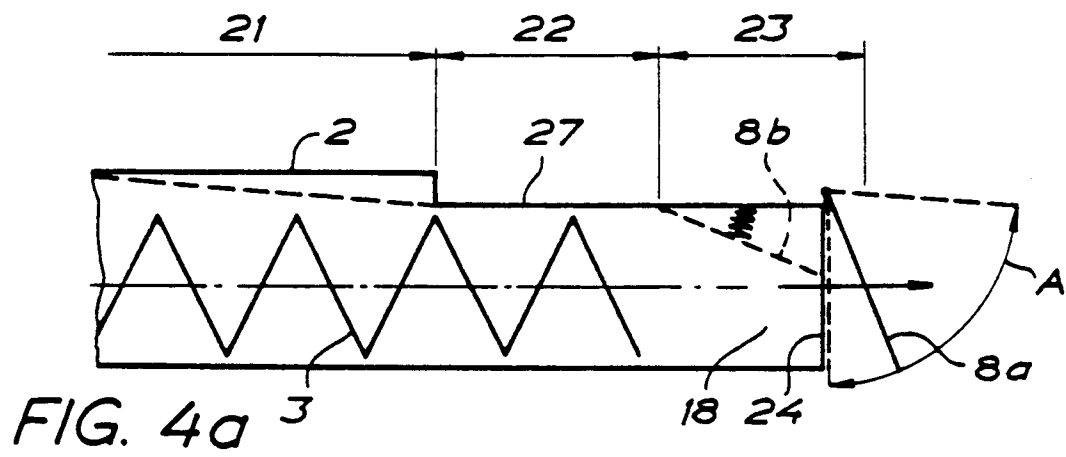
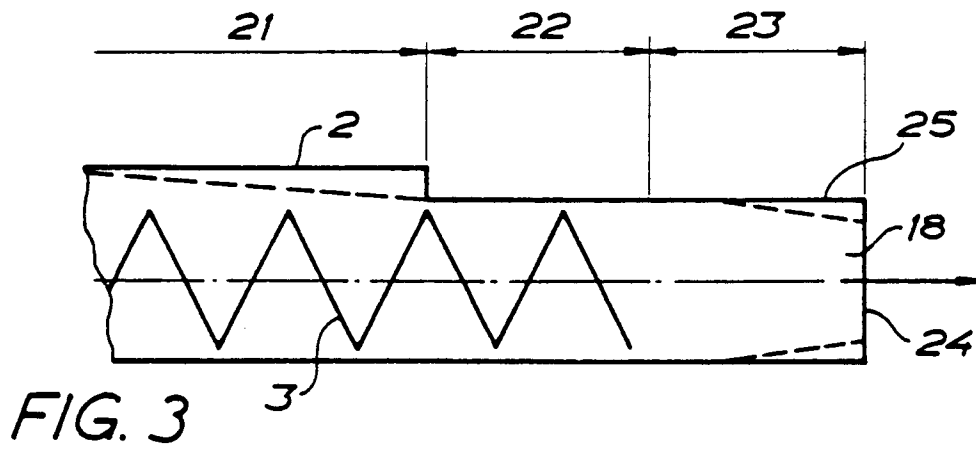


FIG. 2



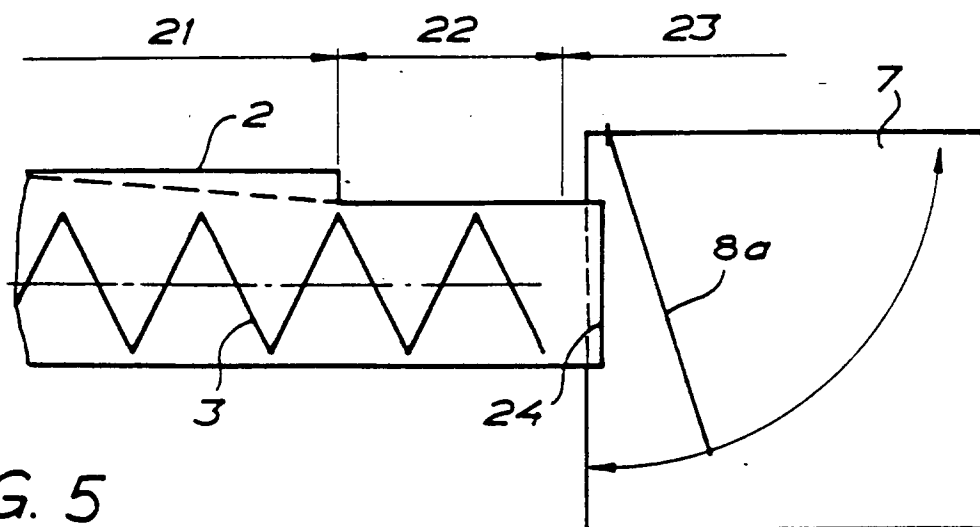


FIG. 5

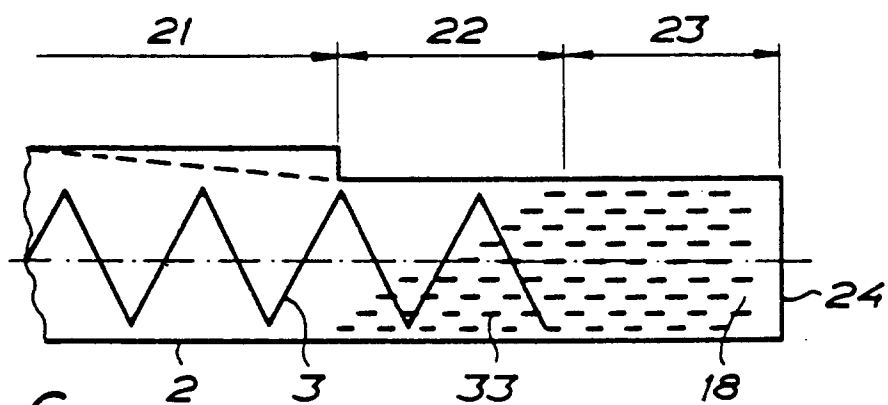


FIG. 6a

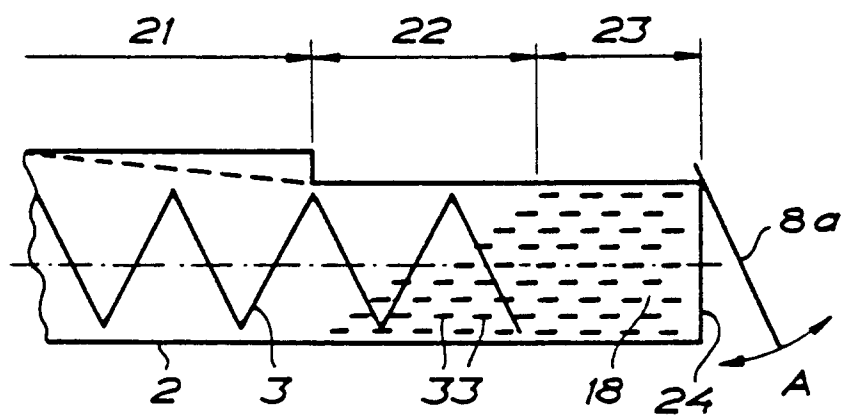


FIG. 6b

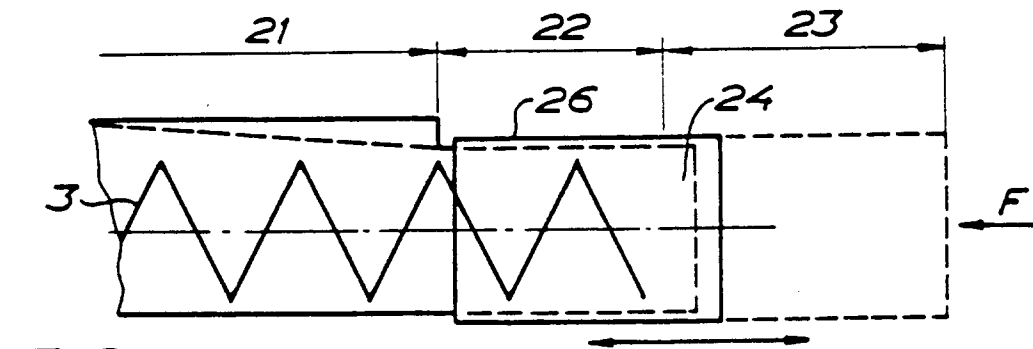


FIG. 7a

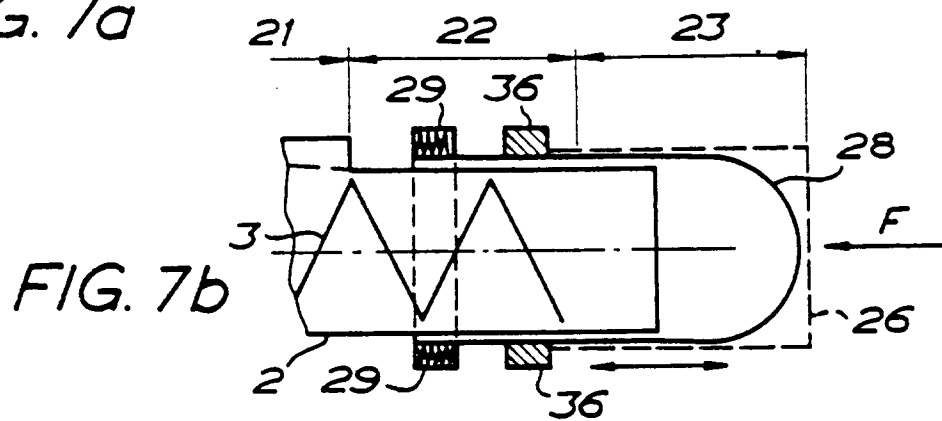


FIG. 7b

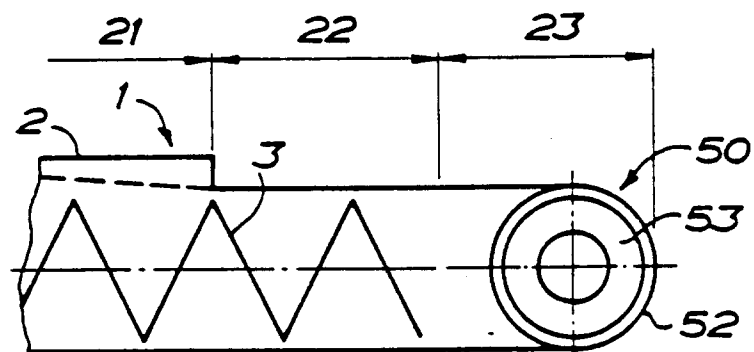


FIG. 8a

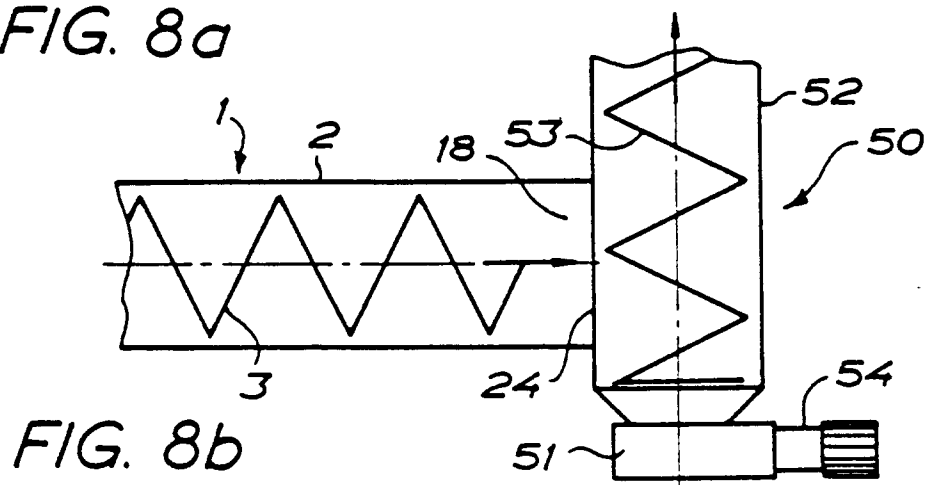


FIG. 8b

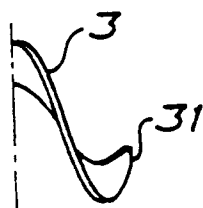


FIG. 9a

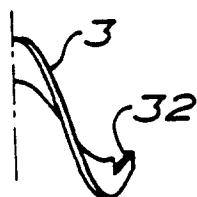


FIG. 9b

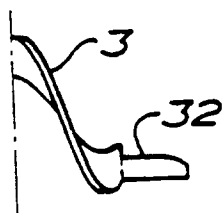


FIG. 9c