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Description

The present invention relates to an arrangement in a substantially horizontally extending double-screw press, having a common feed hopper extending downwardly towards the press screws, which has a large height relative to the breadth and/or length dimension(s) of the feed hopper, where wings of the press screws are adapted to rotate in a direction towards each other in a direction downwardly into the intermediate space between respective cores of the press screws. Such an arrangement is shown in SE,C,91789

In screw presses there is generally a problem in achieving the desired high degree of filling of the screw wing-intermediate spaces in the lower basket, that is to say the passages between the press screws in the intake end of the press. Several attempts have been made to get the material, which is to be pressed, pushed into the press by means of a high feed pressure, but with only marginal improvements. A material cause of the problem of lack of filling is that the material which is supplied to the intake end of the press is given the opportunity to be eased out of the press by means of screws of the press. In an attempt to compensate for such backward sliding of supplied material there have been employed for example relatively high, downwardly extending feed hoppers, so that the weight of the overlying material can contribute to pushing the material to a sufficient degree inwardly into the press opposite the pushing from screws of the press. Feed pumps have also been proposed in order to supply the material under specific pressure directly to the press. With large pressures in the feed hopper there have also been problems with bulging of the sheet material in the feed hopper. This has especially been the case when using feed pipe of rectangular cross-section and in particular when using feed pipe having gradually increasing cross-sectional areas. It is found with the previously known constructions that the material readily piles up locally with bridge formations just above and at the side of the screws in or just by the feed hopper, both with high and low feed hoppers. Such accumulation of the material in bridge formations in the press construction is unfavourable, both when it applies to the wish to achieve a high degree of filling in the intake end of the press and besides when it applies to the carrying out of the press operation. Attempts have been made to remedy this by designing the feed hoppers with gradually increasing cross-sectional areas downwardly towards the press screws, but only with marginal improvements and with a tendency for bulging of the sheet material in the feed hopper as a result of the pressure loading towards the lower end of the feed hopper.

It is observed that the material which is to be pressed with existing presses, after it is supplied to the intermediate space between the press screws, has the possibility to be pressed backwards towards the feed hopper as a result of the screw geometry and the geometry which has been employed in the passage between the feed hopper and the upper basket of the press. In addition it has been possible, as a result of pocket formations in the passage between the lower portion of the feed hopper and the upper basket of the press, to press together supplied material so that bridge formations occur in the passage between feed hopper and upper basket of the press. Furthermore it has been found that said pocket formations and said bridge formations act negatively on effective filling of the press. It is especially unfortunate that the pressure of material from the press provides the basis for the return of the material from the press towards the feed hopper almost independently of the feed pressure and thereby counteracts the desired high degree of filling of the lower basket of the press.

With the present invention the aim is a solution, where the afore-mentioned problems can be avoided in a relatively simple manner. The objective is to obtain a better filling of the press at its intake end and then particularly to obtain an effective filling of the lower basket of the press directly from the feed hopper.

This is achieved according to the invention in that the cross-sectional area of the feed hopper is the same or substantially the same over the whole height of the feed hopper, and that the outlet opening of the feed hopper, which is localised just at the top of the press screws, communicates directly with the lower basket of the press via relatively open and unrestricted passage between the press screws, the outlet opening of the feed hopper having a breadth dimension (D) across the press substantially equal to or somewhat less than the centre distance (a) between the press screws, while screw wings of the press screws, which are relatively thin-walled, are arranged in and at the intake end of the press substantially wing-to-wing, for the defining of a relatively large cross-sectional area between cores of the screws and between wing portions of the screws impacting wing-to-wing in pairs, and a distance between the outer surfaces of the screw cores at the intake end of the press is equal to or larger than the diameter of the screw core.

By ensuring a constant or substantially constant cross-section over the whole height of the feed hopper, there is the possibility of reducing to a minimum the friction of the press material against the feed hopper in order to guarantee an effective filling of the intake end of the press.

By ensuring a relatively open and unrestricted passage of the press material from the feed hopper and directly to the lower basket of the press there is the possibility to guarantee a static pressure against the press material completely downwards to the lower basket of the press, that is to say to the bottom of the press.

The relatively open and unrestricted passage of the press material via a constricted region in the upper basket of the press and via the intermediate space between the press screws directly to the lower basket of the press is ensured by means of the special constructional relationship which is mentioned above.

According to the invention there is the possibility of counteracting the otherwise usual backward flow of material from the upper basket to the feed hopper, in that the feed hopper laterally outside the upper basket surrounds upper outer wing portions of the press screws and the press material is supplied to a concentrated region centrally in the press in the zone between the press screws. In other words there is the possibility of directing the flow of press material in a controlled manner in a rectilinear movement inwardly into the intermediate space between the screws and directly to the lower basket, so that an effective filling of the lower basket of the press can be ensured.

Gradually as the pair of wing portions arranged wing-to-wing move along the outlet opening of the feed hopper, the passage in front of the pair of wing portions is refilled with press material, while an increasing proportion of press material is filled into the subsequent passage behind the pair of wing portions. By means of the pairs of wing portions arranged wing-to-wing which have their respective pressure surfaces directed obliquely downwards and forwards backward flow of press material can be effectively counteracted from the region in front of the pair of wings towards the outlet opening of the feed hopper.

According to the invention it is furthermore advantageous in connection with the afore-mentioned solution that the feed hopper has in a manner known *per se* a cylindrical pipe shape of uniform diameter, that is to say that said breadth dimension corresponds to the inner diameter of the feed hopper.

By this there is the possibility of ensuring that the material can be transported in a concentrated and controlled manner with little friction from the feed hopper and directly inwards into the intermediate spaces or the ducts between the screws down to the lower basket. Firstly a simple pipe construction can be employed as feed hopper, without the danger of bulging in the wall of the pipe. Secondly a low friction in the material itself can be ensured, partly as a result of the rectilinear

contour of the feed hopper and partly as a result of the circular cross-section. Thirdly an even supply can be ensured by transferring a uniformly thick string of material in a controlled manner to a precisely adapted and limited working zone in the intake of the press. There is a special advantage that backward flow of the press material to the feed hopper can be counteracted, by supplying the material which is to be pressed, to that region where both screws jointly or alternately press the material downwards and forwards into working chambers (upper and lower baskets) of the press.

Further features of the present invention will be evident from the following description having regard to the accompanying drawings, in which:

Fig. 1 shows an arrangement according to the invention in a first embodiment.

Fig. 2 shows the arrangement according to Fig. 1 illustrated in part in a section along line 2-2 of Fig. 1.

Fig. 3 shows in a schematic plan view a detail at the intake to the press.

There is shown in the drawing a part of a double-screw press 10 at the intake end of the press. The press is provided with two mutually parallel, horizontal press screws 11, 12 the directions of rotation of which are shown by arrows 13 and 14 in Fig. 1. The screws 11, 12 comprise a core 11a and 12a respectively and a screw-shaped wing 11b and 12b respectively fastened to the core. The screws 11, 12 are illustrated in mirror image form with opposite directions of rotation, where the screw 11 is shown with a direction of rotation (see the arrow 13) corresponding to the clockwise direction, while the screw 12 is shown with a direction of rotation (see the arrow 14) in the counterclockwise direction.

At the intake to the press there is shown a centre distance a (Fig. 1) between the screws and an equivalent pitch b (Fig. 2) in each of the screws and a distance c (Fig. 1) between outer surfaces of the cores 11a, 12a plus an outer screw diameter d (Fig. 1) at the periphery of wings of the screws. The pitch b in the illustrated embodiment is approximately $2/3$ of the screw diameter. The distance c between outer surfaces of the cores is approximately equal to diameter d' (Fig. 1) of the core which in turn constitutes approximately $1/3$ of the outer diameter d of the screw.

The screws are surrounded below by a lower basket 15 with associated sieve sheet 15a and are surrounded above by an upper basket 16 with associated sieve sheet 16a. The lower basket is reinforced with a stand 15b, while the upper basket 16 is reinforced with an equivalent series of bridges 16b which are separately fixed with tension bolts and the like to the associated stand 15b. One end of the screws, as shown at 12c in Fig. 2, is shown

mounted in connection with an end cover 17. The screw cores 11a, 12a project endwise outside the end cover 17, where they are mounted in a bearing 18.

There is illustrated a substantially vertically extending feed hopper 21 which comprises a short lower section 21a and an elongate upper main section 21b. Both sections 21a, 21b have a corresponding inner diameter D and both extend rectilinearly in alignment with each other. In order to ensure the least possible friction between the material which is to be supplied to the press and the feed hopper itself, the feed hopper 21 is lined with a special friction-reducing material. In the illustrated embodiment inner diameter D of the feed hopper is shown equal to the centre distance a between the screws 11, 12, so that a uniformly thick string of the material which is supplied to the press can be fed directly to the intermediate space between the screws. In practice one preferably seeks to achieve the largest possible inner diameter D for the feed hopper and then limited to a size corresponding to the centre distance a. However, a somewhat smaller diameter D, than that which is illustrated in Fig. 1, will also be practically applicable, while on the other hand a diameter D greater than that which is shown in Fig. 1, reduces the effect of the solution according to the invention. In other words one seeks besides to design outlet opening 21c of the feed hopper with a cross-sectional area corresponding to the inner area of the feed hopper. The outlet opening 21c is not designed in one and the same plane, but is shown at one level at the top of the screw threads and at another, lower level at the centre plane centrally between the screws. Outlet opening 21c of the feed hopper 21 is localised just at the top of the press screws, centrally between the press screws, and has a breadth dimension equal to or less than the centre distance between the press screws. Radially outside the feed hopper the upper press basket is arranged, so that the feed hopper projects axially just within (below) the top portion of the press basket. This applies preferably at both ends of the outlet opening, regarded in the longitudinal direction of the press, but if desired the feed hopper can project downwardly between the screws only at the one end, for example only at the one end which faces inwardly into the press towards its discharge end.

According to the present invention the illustrated short, lower section 21a is fastened at the rear edge via a lower fastening flange 21a' directly to the end cover 17 and at the front edge directly to an adjacent bridge member 16b. The section 21a is terminated at a level just above the generatrix of the press as indicated by chain lines 22 (Fig. 2). The upper, elongate section 21b, which constitutes the main section of the feed hopper 21

and which can have a height dimension of several metres, is flangedly connected via an upper fastening flange 21b' directly to upper fastening flange 21a'' of the lower section 21a. The lower section 21a has an outlet which is particularly adapted to the inlet of the press, the section 21a projecting along the whole periphery a distance below its lower fastening flange 21a'. As is evident from Fig. 1, the feed hopper 21 is designed so that the lower portion 21a''' of the section 21a centrally in the press projects an additional distance downwardly into the cleft between screw wings 11b, 12b of the two screws 11, 12, more specifically the lower portion 21a''' projects further downwards at both opposite ends of the portion 21a''', as shown in Fig. 2. By means of the said lower portion 21a''', one can ensure that the flow of material from the feed hopper is led in a concentrated and accurate manner directly into place in the intermediate spaces or the ducts between the press screws. Furthermore one can ensure that the said lower portion 21a''' forms a mechanical blocking arrangement or guard arrangement, which can prevent at least certain portions of the flow of material in the press from being pushed into the path of the flow of material from the feed hopper. It is assumed that the extended lower portion 21a''' of the feed hopper will effectively prevent the backward flow of material from the press back to the feed hopper.

In Fig. 2 both of the screws 11, 12 are shown with two thread crests in a position corresponding to the outer ends of the outlet opening of the feed hopper. Gradually as the screws are rotated the thread crests will be displaced in Fig. 2 towards the right in the press, some of the press material will be supplied to the region beyond the rear pair of thread crests while an increasing proportion of the press material will be supplied to the region behind the rear pair of thread crests. There will be a pulsating movement of the material in the press, but with the concentrated string of material which is supplied from the feed hopper to the region between the screws, the flow of material from the feed hopper can dampen the effect of such a pulsating movement of the material in the press. As is evident from Fig. 2 and 3 a bottle neck-like passage 30 and 31 respectively is shown in the screw cores 11a and 12a, reckoned from the bearing-forming end of the screw cores towards the main portion of the screw cores as indicated to the right in Fig. 2. As is evident from Fig. 3 there is obtained hereby in the extension of the feed hopper a relatively large intake area between the screw cores.

According to the invention the pulsating movement has been changed by placing the thread crests of the screws axially close to each other as is shown in Fig. 2. In this connection wings 11b,

12b of the screws 11, 12 according to Fig. 2 and 3 are arranged tightly up to each other ("wing-to-wing"). A larger common intake area between the press screws is obtained hereby and the pulsating action of the press screws can thereby be dampened to a significant degree, the press screws jointly pushing the supplied material downwardly and inwardly into the press by means of the two screw wings moveable towards each other and moveable relatively close to each other, and thereby ensuring a uniform flow of material to the lower part of the press.

Claims

1. Arrangement in a substantially horizontally extending double-screw press (10), having a common feed hopper (21) extending downwardly towards the press screws, which has a large height relative to the breadth and/or length dimension(s) of the feed hopper, where wings (11b, 12b) of the press screws (11, 12) are adapted to rotate in a direction towards each other in a direction downwardly into the intermediate space between respective cores (11a, 12a) of the press screws (11, 12), characterised in that the cross-sectional area of the feed hopper (21) is the same or substantially the same over the whole height of the feed hopper, and that outlet opening (21c) of the feed hopper (21), which is localised just at the top of the press screws, communicates directly with lower basket (15) of the press via a relatively open and unrestricted passage between the press screws (11, 12), the outlet opening (21c) of the feed hopper (21) having a breadth dimension (D) across the press substantially equal to or somewhat less than the centre distance (a) between the press screws (11, 12), while screw wings (11b, 12b) of the press screws (11, 12), which are relatively thin-walled, are arranged substantially wing-to-wing in and at the intake end of the press, for the defining of a relatively large cross-sectional area between cores (11a, 12a) of the screws (11, 12) and between wing portions of the screws impacting wing-to-wing in pairs, and a distance between outer surfaces of the screw cores (11a, 12a) at the intake end of the press is equal to or larger than the diameter of the screw core.
2. Arrangement in accordance with claim 1, characterised in that the feed hopper has in a manner known per se a cylindrical pipe shape of uniform diameter, that is to say that said breadth dimension corresponds to inner diameter (D) of the feed hopper.

3. Arrangement in accordance with claim 1 or 2, characterised in that breadth dimension (D) of the feed hopper (21) substantially corresponds to the screw pitch (b) at the outlet opening (21c) of the feed hopper.
4. Arrangement in accordance with one of the claims 1-3, characterised in that the cores (11a, 12a) of the two press screws (11, 12) have at the intake end of the press a core diameter approximately equal to the core diameter at the bearing end of the core, in order to guarantee a largest possible intake area between the screws, and preferably form bottle neck-like passages (30, 31) between the bearing end of the core and the core downstream of the intake end of the press.

Patentansprüche

1. Anordnung in einer sich im wesentlichen horizontal erstreckenden Doppelschneckenpresse (10) mit einem gemeinsamen Einfülltrichter (21), der sich nach unten zu den Preßschnecken erstreckt, eine große Höhe in bezug auf die Breiten- und/oder Längenabmessungen des Einfüllstrichers hat, wobei sich die Flügel (11b, 12b) der Preßschnecken (11, 12) in einer Richtung aufeinander zu nach unten in den Zwischenraum zwischen entsprechenden Kernen (11a, 12a) der Preßschnecken (11, 12) drehen, **dadurch gekennzeichnet**, daß die Querschnittsfläche des Einfülltrichters (21) über die gesamte Höhe des Einfülltrichters gleich oder im wesentlichen gleich ist, und daß die Auslaßöffnung (21c) des Einfülltrichters (21), die sich direkt oberhalb der Preßschnecken befindet, über einen relativ offenen und ungehinderten Durchgang zwischen den Preßschnecken (11, 12) direkt mit der unteren Trommel (15) der Presse in Verbindung steht, wobei die Auslaßöffnung (21c) des Einfülltrichters (21) eine Breitenabmessung (D) quer zur Presse aufweist, die im wesentlichen genauso groß ist wie oder etwas geringer als der Mittenabstand (A) zwischen den Preßschnecken (11, 12) wobei die Schneckenflügel (11b, 12b) der Preßschnecken (11, 12), die relativ dünnwandig sind, im wesentlichen Flügel an Flügel in und an dem Einlaßende der Presse angeordnet sind und so eine relativ große Querschnittsfläche zwischen Kernen (11a, 12a) der Schnecken (11, 12) und zwischen Flügelabschnitten der Schnecken bilden, die paarweise Flügel an Flügel aufeinandertreffen, und ein Abstand zwischen Außenflächen der Schneckenkerne (11a, 12a) an dem Einlaßende der Presse genauso groß ist wie oder größer als der Durchmesser

des Schneckenkerns.

2. Anordnung nach Anspruch 1, **dadurch gekennzeichnet**, daß der Einfülltrichter auf an sich bekannte Weise eine zylindrische Rohrform mit gleichmäßigem Durchmesser hat, d.h. daß die Breitenabmessung dem Innendurchmesser (D) des Einfülltrichters entspricht. 5
3. Anordnung nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß die Breitenabmessung (D) des Einfülltrichters (21) im wesentlichen der Schneckensteigung (b) am Auslaßende (21c) des Einfülltrichters entspricht. 10
4. Anordnung nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet**, daß die Kerne (11a, 12a) der beiden Preßschnecken (11, 12) am Einlaßende der Presse einen Kerndurchmesser haben, der ungefähr dem Kerndurchmesser am Lagerungsende des Kerns gleich ist, um eine größtmögliche Einlaßfläche zwischen den Schnecken zu gewährleisten, und vorzugsweise flaschenhalsartige Durchgänge (30, 31) zwischen dem Lagerungsende des Kerns und dem Kern unterhalb des Einlaßendes der Presse bilden. 15 20 25

Revendications

1. Agencement dans une presse (10) à deux vis s'étendant sensiblement horizontalement, comprenant une trémie d'alimentation commune (21) qui s'étend vers le bas, en direction des vis de la presse, qui possède une grande hauteur relativement à la dimension ou aux dimensions de largeur et/ou longueur de la trémie d'alimentation, dans laquelle les filets (11b, 12b) des vis (11, 12) de la presse sont adaptés pour tourner les uns vers les autres dans la direction descendante en s'engageant dans l'espace intermédiaire entre les noyaux respectifs (11a, 12a) des vis (11, 12) de la presse, caractérisé en ce que l'aire de section de la trémie d'alimentation (21) est constante ou sensiblement constante sur toute la hauteur de la trémie d'alimentation et en ce que l'ouverture de sortie (21c) de la trémie d'alimentation (21), qui est placée juste au niveau de la partie supérieure des vis de la presse, communique directement avec un carter inférieur (15) de la presse à travers un passage relativement ouvert et dépourvu d'étranglement compris entre les vis (11, 12) de la presse, l'ouverture de sortie (21c) de la trémie d'alimentation (21) ayant une dimension en largeur (D), mesurée en travers de la presse, sensiblement égale ou légèrement inférieure à la distance entre cen- 30 35 40 45 50 55

tres (a) des vis (11, 12) de la presse, tandis que les filets (11b, 12b) des vis (11, 12) de la presse qui sont à paroi relativement mince, sont disposés sensiblement filet contre filet dans la presse et à l'extrémité d'entrée de la presse, pour définir une aire de section relativement grande entre les noyaux (11a, 12a) des vis (11, 12) et entre les portions des filets des vis qui se rencontrent filet contre filet par paires, et la distance entre les surfaces extérieures des noyaux (11a, 12a) des vis à l'extrémité d'entrée de la presse est égale ou supérieure au diamètre du noyau des vis.

2. Agencement selon la revendication 1, caractérisé en ce que la trémie d'alimentation possède, d'une façon connue en soi, une forme de tube cylindre en diamètre uniforme, c'est-à-dire que ladite dimension en largeur correspond au diamètre intérieur (D) de la trémie d'alimentation. 15 20
3. Agencement selon la revendication 1 ou 2, caractérisé en ce que la dimension en largeur (D) de la trémie d'alimentation (21) correspond sensiblement au pas (b) des vis à l'ouverture de sortie (21c) de la trémie d'alimentation. 25
4. Agencement selon une des revendications 1 à 3, caractérisé en ce que les noyaux (11a, 12a) des deux vis (11, 12) de la presse possèdent, à l'extrémité d'entrée de la presse, un diamètre de noyau approximativement égal au diamètre de noyau mesuré à l'extrémité côté palier du noyau, pour ménager une aire d'entrée aussi grande que possible entre les vis, et de préférence former des passages (30, 31) en forme de goulot de bouteille entre l'extrémité côté palier du noyau et le noyau en aval de l'extrémité d'entrée de la presse. 30 35 40 45 50 55

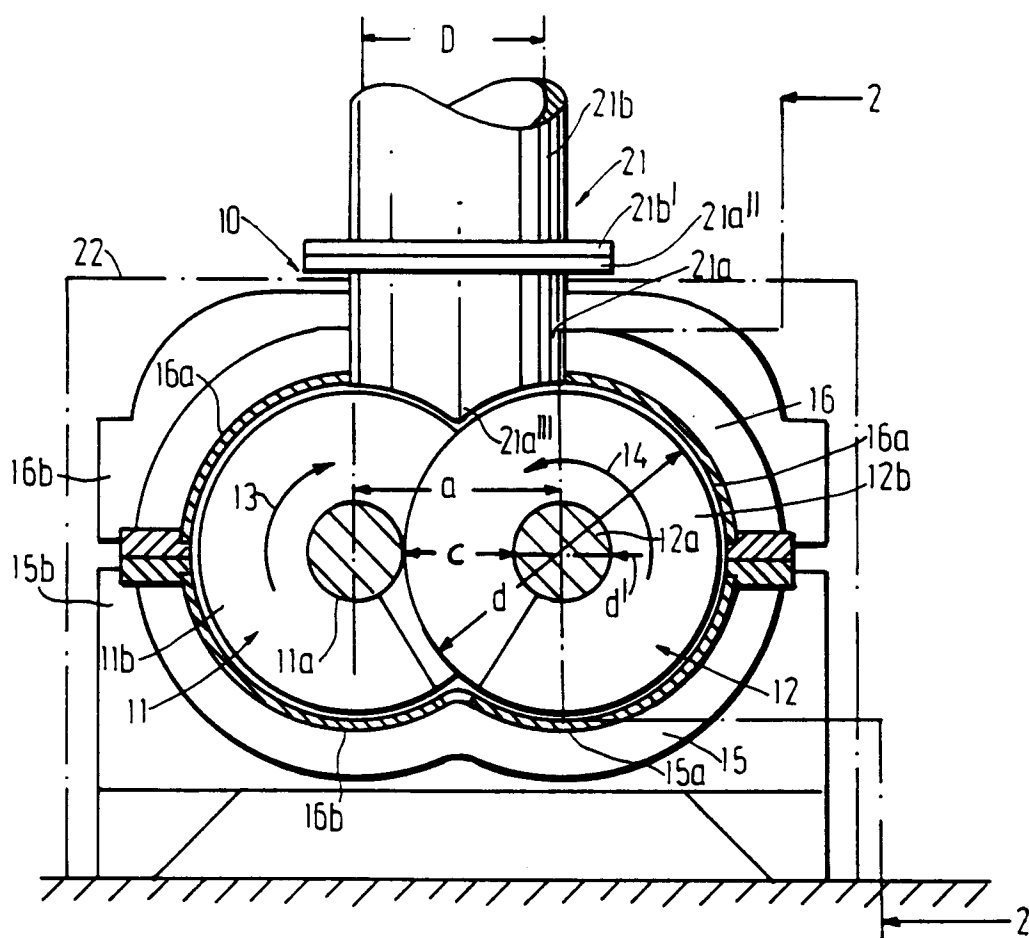


FIG. 1

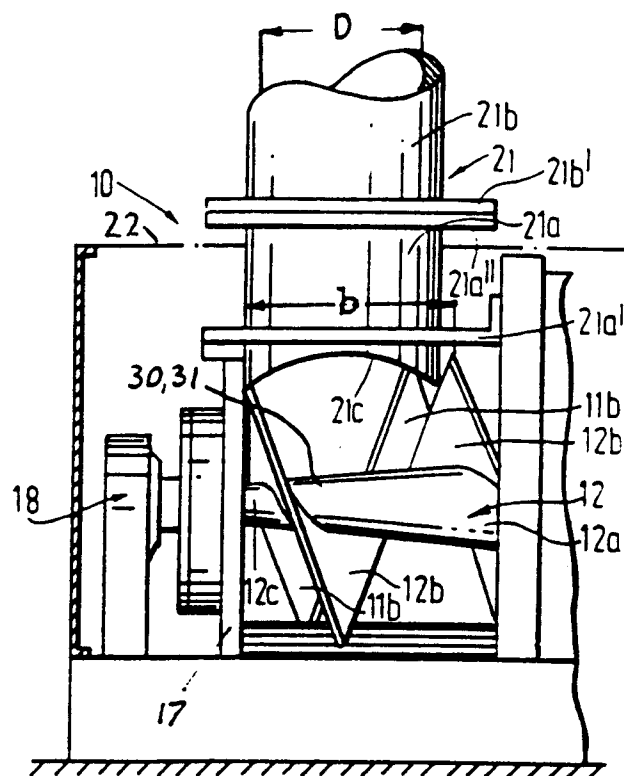


FIG. 2

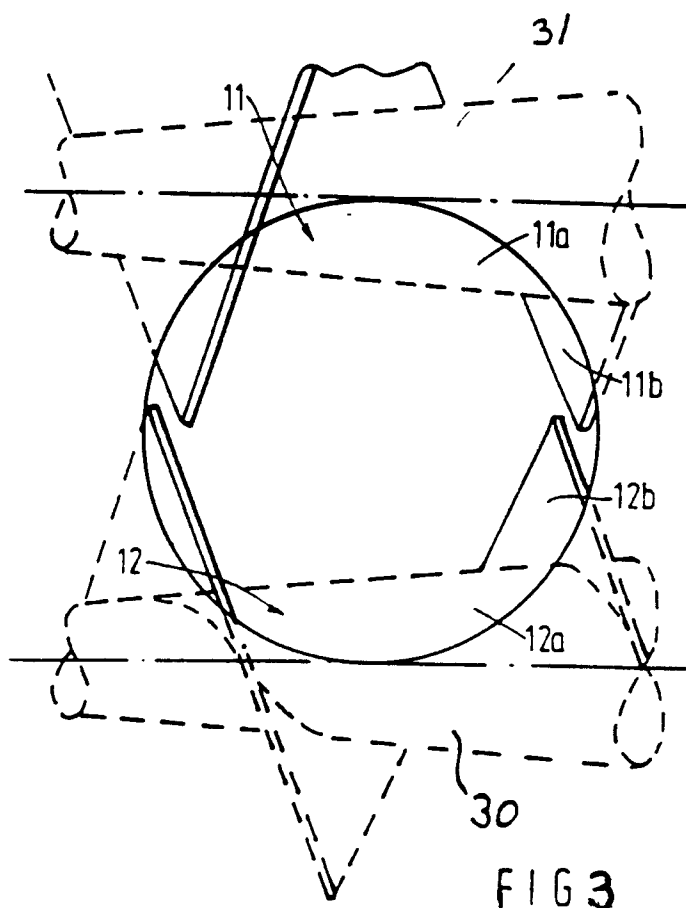


FIG. 3