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(54) Arrangement in a screw press.

(57) A screw press with horizontal screw elements have mutually co-operating screw threads for conjointly feeding the material to be conveyed through the press in order to strain liquid therefrom. The screw elements are all enclosed by a relatively tight-fitting press casing having openings for straining liquid from the material fed through the press. The press casing (13,31) encloses three screw elements (23,24,30) of which a first (23) and a second (24) are disposed side by side at the bottom of the press screw while a third screw element (30) is disposed at the top of the press casing parallel to, straight above and midway between the first and second screw elements.

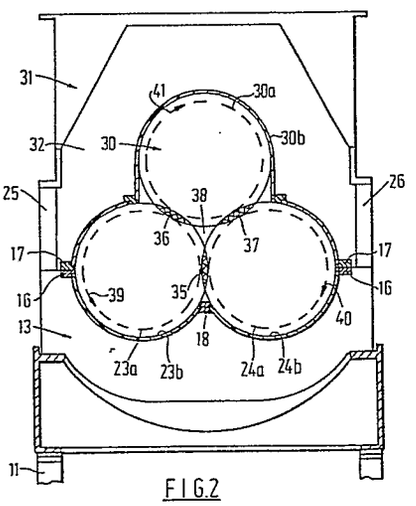

FIG.2

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Description

ARRANGEMENT IN A SCREW PRESS

The present invention relates to an arrangement in a screw press with horizontal screw elements having mutually co-operating screw threads for conjointly feeding the material to be conveyed through the press for pressing out liquid therefrom, and being conjointly enclosed by a relatively tight-fitting press casing having openings for straining liquid from the material conveyed through the press.

In conventional horizontal screw presses with two parallel screw elements, i.e. two screw elements which are arranged horizontally side by side, there is a general problem linked with the cleaning of the depressed portion or upper cleft between the press casing since sludge from the material transported through the press tends to collect and remain in said depressed portion or cleft. It is difficult to design the press casing so as to avoid such collection of sludge and ensure efficient cleaning of the press in said area during and after operation thereof.

In the above-mentioned conventional double-screw presses, there is also a problem in attaining the expected capacity of the press when it is given large dimensions because of an increased co-rotation of material. Experience has shown that if the screw element has a large diameter, an increase of this diameter will not yield the expected capacity increase despite the increased power consumption required for driving screw elements of increased diameter.

The present invention aims at solving the above-indicated problems by relatively simple means.

The present invention is characterized in that the press casing encloses three screw elements of which a first and a second screw element are disposed side by side at the bottom of the press casing and delimited at the bottom by a common, lower press casing part, while a third screw element is disposed at the top of the press casing parallel to, above and midway between said first and second screw elements and delimited by one or a pair of upper press casing parts.

For practical reasons, it is preferred that the first and second screw elements are disposed at the bottom of the press. In this way, it will be easy to modify existing presses while retaining the essential parts thereof. In addition, it is possible, when feeding material into the press, to ensure an even supply to all three screw elements at the very inlet end of the press by supplying the material to the third screw element and, respectively, on opposite sides thereof to the subjacent first and second screw elements.

By this solution, the depressed portion or upper cleft between the lower two press casings will also be elimintated. Thus, any collection of material can be efficiently avoided in this area, and efficient self-cleaning or cleansing of said area is made possible.

By using three screw elements instead of two, an at least 50% capacity increase is achieved as compared with a double-screw press (on the same floor space). In the case of three co-operating screw elements according to the invention, a delimited (triangular) space is defined between the screw elements, but this space will not become a "dead space", but an active space which is constantly subjected to pressure and feed action by adjacent material fed by the adjacent screw elements. All three screw elements may have a right-hand or a left-hand thread and rotate in the same direction. Alternatively, it is possible to use screw elements two of which rotate in the same direction and one in the opposite direction. Since each screw element rotates in "engagement" with the other two screw elements, it is expected that the co-rotation of material will become substantially less than in the case of double-screw presses, which means enhanced efficiency.

Other features and advantages of the invention will appear from the following description, reference being made to the accompanying drawings, in which:

Fig. 1 is a vertical cross-section of a per se known screw press with two parallel screw elements provided in a common press casing;

Fig. 2 is a cross-section, corresponding to Fig. 1, of a screw press according to the invention in a first embodiment thereof;

Fig. 3 is of a horizontal, longitudinal section of the screw press in Fig. 2; and

Fig. 4 is a cross-section, corresponding to Fig. 2, of a screw press according to the invention in a second embodiment thereof.

In Fig. 1, there is shown a horizontal screw press 10 having a lower frame 11 resting on a horizontal supporting surface 12. The screw press comprises a press casing 13,14 divided into two parts and having a stationary bottom part 13 and a removable top part 14. The press casing is provided in a conventional manner (not shown in more detail) with an inner surface 15 forming a straining surface throughout the entire circumference of the press casing and throughout the entire length thereof. Longitudinal clamping strips 16,17 are provided on opposite sides of the press casing at the joint between the press casing parts 13,14. Also, there are provided longitudinal, central strips 18,19 at the interspace 20 between two internal, parallel working chambers 21,22, i.e. a lower strip 18 extending upwards into said interspace, and an upper strip 19 extending downwards into said interspace 20.

In the working chambers 21,22, there are mounted two parallel screw elements 23,24. None of the illustrated screw elements has a straining surface, but for increased drainage of liquid, the screw elements may be provided with a straining surface, e.g. on the screw trunks 23a,24a of the screw elements. Optionally, there may also be provided straining surfaces on the screw threads 23b,24b of the screw element.

As illustrated, the press casing 13,14 is supported in upper and lower bridge sections 13a,14a which, at their outer ends, are adjustably clamped against

each other by clamping means 25,26.

At the lower strip 18, there is no or only minimal collection of sludge during and after the pressing operation, while a substantial amount of sludge and liquid is generally collected at the upper strip 19. Such collection of sludge is difficult to remove by a simple cleaning operation since the collected matter will adhere after some time as a solid cake to the press casing and is outside the field of operation of the press screw.

As shown in Fig. 2, the press according to Fig. 1 is modified by a reconstruction of the top part of the press. In other words, the bottom part 13 remains unaltered with the associated clamping strips 16, the lower central strip 18 and the bridge sections 13a. Also, the two screw elements 23,24 and the lower frame 11 remain the same.

Straight above the interspace 20 over said (first and second) screw elements 23,24, there is mounted a third screw element 30 of a design corresponding to that of the screw elements 23,24. Further, there is provided a new, upper press casing section or top part 31 with associated bridge sections 32. In the illustrated embodiment according to Fig. 2, the upper bridge sections 32 are clamped against the associated lower bridge sections 13a by clamping means corresponding to the clamping means 25,26 in Fig. 1.

According to the invention, it is thus possible by simple means to reconstruct a double-screw press of conventional commercial design into a three-screw press according to the invention, whereby to gain considerable advantages in respect of operation and maintenance.

As shown in Fig. 3, use is made of a relatively wide feed opening 33 (in the longitudinal direction) in the press according to the invention as compared with the prior art construction, for complying with the increased capacity of the press, as illustrated to the right in Fig. 3. In the illustrated embodiment, use is made of a full screw thread also on the third screw element, but as an alternative it is possible along a section straight below the feed opening, to dispense with the screw thread on the third screw element. To the left in Fig. 3, there is shown a new gear 34 for driving the three screw elements instead of the gear used for driving the two screw elements earlier used.

As shown in Fig. 2, the three screw elements 23,24,30 define three overlapping thread portions 35,36,37 (hatched portions) and an intermediate triangular space 38 defined between the peripheries of the three screw elements. The screw trunks 23a,24a, 30a are indicated by dashed lines, while the peripheries of the screw threads 23b,24b, 30b are indicated by full lines. It is evident that the material is fed through the press in the interspaces between the screw threads of the rotating screw elements and the adjoining stationary press casing but also at the hatched thread portions where the screw threads of the screw elements overlap each other and at the space 38 centrally defined between the screw elements.

In the embodiment of Figs. 2 and 3, the first screw element 23 is rotatable anticlockwise as indicated by the arrow 39, while the second screw element 24 and the third screw element 30 are rotatable clockwise as indicated by the arrows 40 and 41, i.e. in a direction opposite to the direction of rotation of the screw element 23. This results in a forced or positive feed of material.

It is also possible to have the screw elements 23,24 rotate in the same direction, and the screw element 30 rotate in the opposite direction with respect to the screw elements 23,24. Further, it is possible to have the screw elements 23,24 rotate in mutually opposite directions, i.e. in directions opposite to those shown in Fig. 2.

In Fig. 4, there is shown an alternative embodiment in which the bottom part is also modified. As illustrated, a stationary section or bottom part 42 extends through only one third of the press casing while two further sections 43,44 form the top parts of the press and together extend through the remaining two thirds of the press casing. In this case, each of the sections 42,43,44 can be designed substantially identical. The upper two sections 43,44 may, for instance, be hingedly connected at the bottom to the section 42 at 45,46, while they can be clamped together at the top by clamping means corresponding to one of the clamping means in the embodiment according to Fig. 1. In the illustrated press casing embodiment, it is possible to expose the screw elements in a far more favourable way than in the embodiment according to Figs. 2 and 3, by pivoting the sections 43 and 44 each to one side of the press. Preferably, the hinge connections are provided at 45,46 in a manner to make the upper sections 43,44 easily dismountable from the press.

In the illustrated embodiment, the screw casing diameter is widened at the inlet end, but may alternatively be constant throughout the entire length of the screw.

Claims

1. Arrangement in a screw press (10) with horizontal screw elements (23,24) having mutually co-operating screw threads (23b,24b) for conjointly feeding the material to be conveyed through the press for pressing out liquid therefrom, and being conjointly enclosed by a relatively tight-fitting press casing (13,14) having openings for straining liquid from the material conveyed through the press, **characterized** in that the press casing (13,31; 42,43,44) encloses three screw elements (23,24,30) of which a first screw element (23) and a second screw element (24) are disposed side by side at the bottom of the press casing and delimited at the bottom by a common, lower press casing part (13,42), while a third screw element (30) is disposed at the top of the press casing parallel to, above and midway between said first and second screw elements and delimited by one (31) or a pair (43,44) of upper press casing parts.

2. Arrangement as claimed in claim 1,

characterized in that the screw threads (23b,24b, 30b) of the three screw elements (23,24,30) each engage in the screw thread gaps of the respective other two screw elements throughout the entire length of the screw elements.

3. Arrangement as claimed in claim 1 or 2, **characterized** in that the three screw elements (23,24,30) are enclosed by a press casing (42,43,44) divided into three parts, preferably three substantially equally large parts of which one part (42), which forms a stationary bottom part of the press casing, is connected to a respective neighbouring part (43,44) of the press casing at a level below a horizontal plane through the longitudinal axis of said first (23) and said second (24) screw element.

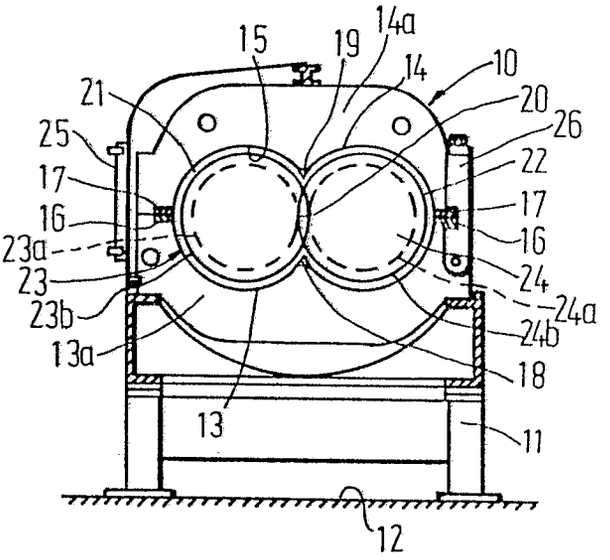
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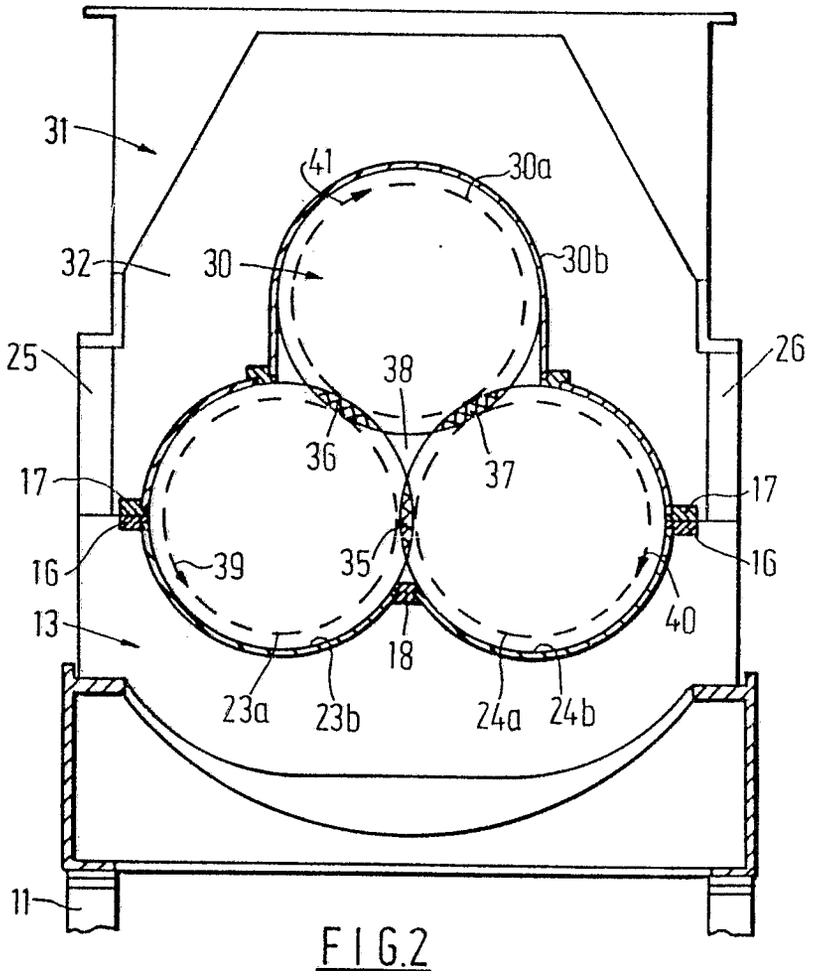
FIG.1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24b
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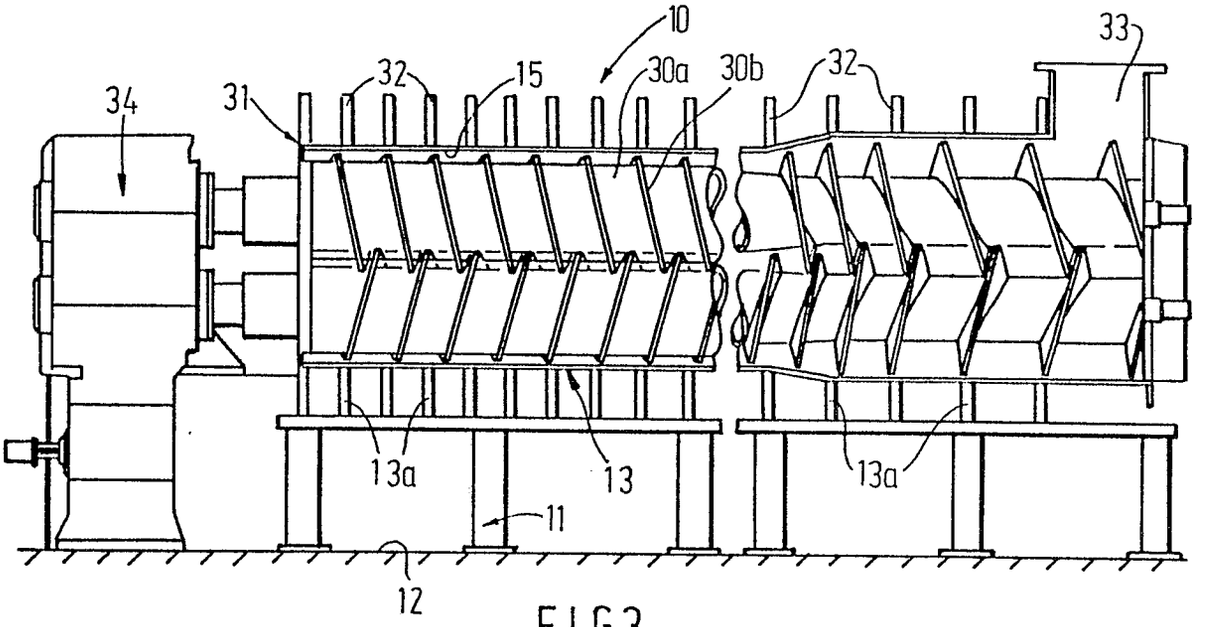
FIG.2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13a
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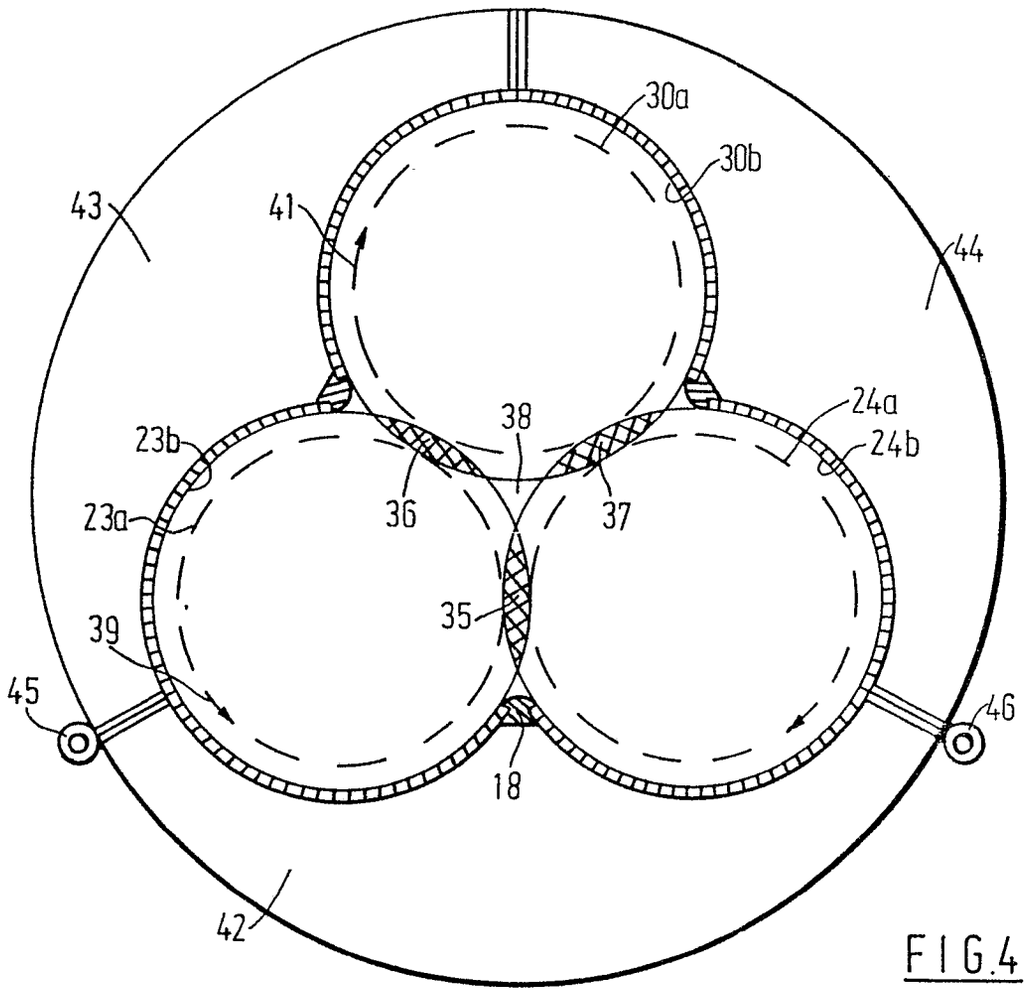
FIG.3


30a
30b
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24a
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23b
24b
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23a
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42

FIG.4

European Patent Office

EUROPEAN SEARCH REPORT

. Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 88850266.3

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	DE - C - 872 732 (BAYER) * Totality *	1,2	B 30 B 9/16
Y		3	
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Y	US - A - 4 438 691 (SOLBERG) * Fig. 2,3; abstract *	3	
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A	DE - A - 1 502 214 (LANDSVERK) * Fig. 14; page 9 *	1-3	
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A	DE - A1 - 3 412 170 (SALZGITTER MASCHINEN)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 30 B 9/00
B 30 B 11/00
B 65 G 33/00
D 21 C 9/00
D 21 F 1/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	31-10-1988	LIDL

CATEGORY OF CITED DOCUMENTS

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