



(22) Date de dépôt/Filing Date: 1997/04/22

(41) Mise à la disp. pub./Open to Public Insp.: 1997/10/25

(45) Date de délivrance/Issue Date: 2006/06/27

(30) Priorité/Priority: 1996/04/25 (ATA 749/96)

(51) Cl.Int./Int.Cl. *B30B 9/14* (2006.01),  
*F26B 5/14* (2006.01), *B30B 9/12* (2006.01)

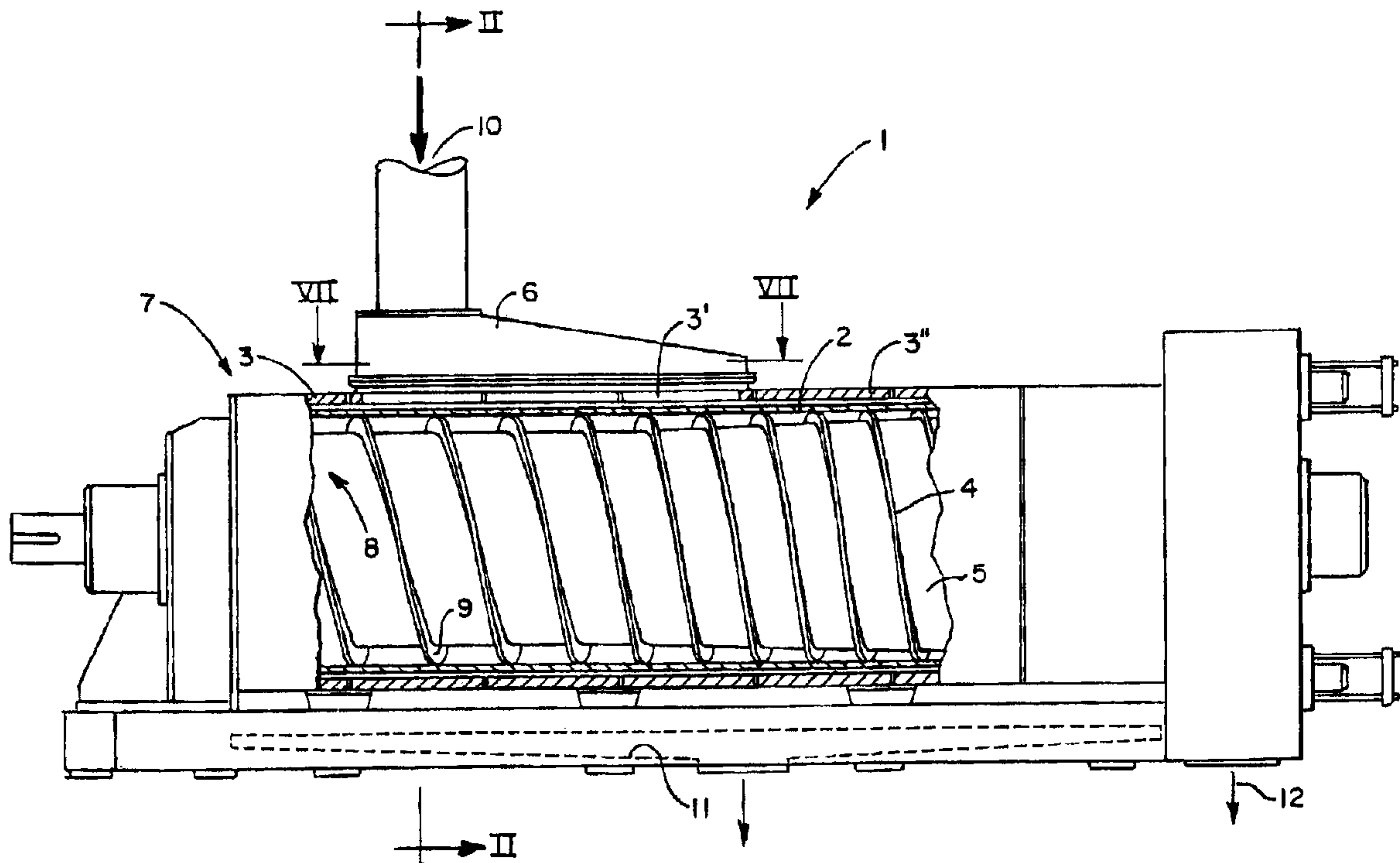
(72) Inventeurs/Inventors:  
SCHEUCHER, PETER, AT;  
STADLAUER, RUDOLF, AT

(73) Propriétaire/Owner:  
ANDRITZ-PATENTVERWALTUNGS-GESELLSCHAFT  
M.B.H., AT

(74) Agent: MARKS & CLERK

(54) Titre : PRESSE A VIS POUR LA SEPARATION DE LIQUIDES DANS LES MELANGES SOLIDES-LIQUIDES

(54) Title: SCREW PRESS FOR SEPARATING LIQUIDS FROM SOLID-LIQUID MIXTURES



(57) Abrégé/Abstract:

A screw press for separating liquids from solid-liquid mixtures, particularly pulp suspensions. The press comprises a casing having liquid-flow passages therethrough, a screw having upstream and downstream ends rotating inside the casing for conveying the solid-liquid mixture through the casing in a transport direction and for forcing liquid through the liquid-flow passages, and solid-liquid mixture feed means for feeding the solid-liquid mixture into the casing through a feed opening. The casing comprises a plurality of casing segments, at least one of which contains the feed opening, and the casing segments are interchangeable to change the position of the feed opening. Preferably, the solid-liquid mixture feed means extends over at least two of the casing segments.

## ABSTRACT

A screw press for separating liquids from solid-liquid mixtures, particularly pulp suspensions. The press comprises a casing having liquid-flow passages therethrough, a screw having upstream and downstream ends rotating inside the casing for conveying the solid-liquid mixture through the casing in a transport direction and for forcing liquid through the liquid-flow passages, and solid-liquid mixture feed means for feeding the solid-liquid mixture into the casing through a feed opening. The casing comprises a plurality of casing segments, at least one of which contains the feed opening, and the casing segments are interchangeable to change the position of the feed opening. Preferably, the solid-liquid mixture feed means extends over at least two of the casing segments.

## **SCREW PRESS FOR SEPARATING LIQUIDS FROM SOLID-LIQUID MIXTURES**

The invention relates to a screw press for separating liquids from solid-liquid mixtures, in particular pulp suspensions.

When dewatering suspensions with low consistencies, it is only possible to achieve good dewatering performance in the inlet area of a screw press at very low pressures. At higher pressure, the stock, particularly if a pulp suspension, is pushed onto the openings in the screen from the inside and impedes the dewatering action. After a first rise in pressure, the filtrate no longer flows out of all the holes in the screen, but only out of those that have just been cleared by

the rotating screw flight moving past. If the pressure rises further, the screw flight cannot clean the screen at all any more because of the required gap between flight and screen, unless there are already drier pulp fibres upstream of the flight which bridges the gap. The clogged screen surface is lost for dewatering purposes. In pulp feed boxes already known and which are located at the beginning of the screw, the screen basket starts to clog as the pressure rises from the beginning of the screw towards its end.

An aim of the invention is to create a screw press which is suitable for suspensions with low inlet consistencies and which yields high dewatering performance.

It is characterised by a suspension feed area which is changeable in its position and/or its length. This provides the possibility of adapting the suspension feed area to the required dewatering conditions when the pulp feed conditions have changed.

According to one aspect of the present invention, there is provided a screw press for separating liquids from solid-liquid mixtures, the press comprising a casing having liquid-flow passages therethrough, a screw having upstream and downstream ends rotating inside of the casing for conveying the solid-liquid mixture through the casing in a transport direction and for forcing liquid through the liquid-flow passages, and solid-liquid mixture feed means for feeding the solid-liquid mixture into the casing through a feed opening, wherein the casing comprises a plurality of casing segments, at least one of the casing segments contains the feed opening, wherein the casing segments are interchangeable to change the position of the feed opening, and wherein the solid-liquid mixture feed means extends over at least two of the casing segments.

According to a further aspect of the present invention, there is provided a screw press for separating liquid from a pulp-liquid mixture, the press comprising a cylindrical casing having a plurality of liquid passages through the sides thereof

thereby forming a screening structure, the casing being divided into a plurality of interchangeable cylindrical segments, a conveying screw mounted inside the cylindrical casing and including means for rotating the conveying screw to convey the pulp-liquid mixture through the casing and for forcing liquid out through the plurality of liquid passages, a feed area for feeding the pulp-liquid mixture into the casing, the feed area including a slit through the side of at least one of the cylindrical segments, and means for changing the position of the feed area with respect to the cylindrical casing, including means for interchanging some of the cylindrical segments.

In accordance with this invention a screw press for separating liquids from solid-liquid mixtures comprises: a casing having liquid-flow passages therethrough; a screw having upstream and downstream ends rotating inside of that casing for conveying the solid-liquid mixture through the casing in a transport direction and for forcing liquid through the liquid-flow passages; and solid-liquid mixture feed means for feeding the solid-liquid mixture into the casing through a feed opening. The casing comprises a plurality of casing segments, at least one of them containing the feed opening, and the casing segments are interchangeable to change the position of the feed opening.

A favourable further development of the invention is characterised by the suspension feed area extending over several segments of the casing. If the suspension feed area, which can take the form of a slit, is at the top and



extends over several screen baskets, this permits even screw filling over a greater length and even better pressure distribution.

An advantageous further development of the invention is characterised by the suspension feed area only beginning at a casing segment located some  
5 distance from the beginning of the screw, viewed in the transport direction of the suspension. If the active suspension feed area, i.e. the open feed cross-section, does not begin until after the first sector at the beginning of the screw, the pulp fed in must flow against the transport direction in the screw passage between the flights. Due to the resulting loss of pressure, very slight pressure  
10 is applied at the beginning of the screw which causes dewatering to take place in this area in any event. Thus, drier fibres are produced here right at the beginning of the screw upstream of the screw flight which clears the screen right from the beginning.

A favourable configuration of the invention is characterised by the individual  
15 casing segments of the screw being interchangeable. Since these segments are interchangeable both with and without suspension feed opening, the position and also the length of the suspension feed area can be adapted ideally to the required dewatering conditions. This provides a simple means of adapting the suspension feed to changes in pulp feed conditions at short notice  
20 and without longer shutdowns if these conditions fluctuate substantially.

A further favourable configuration of the invention is characterised by the inlet slit to the suspension feed area being fitted with at least one element for modifying the open feed cross-section, which can take the form of a gate valve. Panels can also be inserted in this sector or flaps can be used. In this way, it is  
25 possible to change the position and the length of the suspension feed within certain limits even more easily and quickly. Thus, adaptations to accommodate slight changes or fine adjustments to meet the pulp feed conditions can be achieved even more effectively.

A favourable configuration of the invention is characterised by the screw having elastic elements as scrapers at the beginning of the screw flights on its outer circumference and which can be mounted on the screw flight or directly upstream of the screw flight. This is a particularly good way of bridging the gap  
 5 between the screw flight and the casing (screen basket) and thus, of achieving good dewatering right at the beginning of the screw, with the screen surface being cleared regularly for dewatering.

In an advantageous further development of the invention at least one filtrate tray, which may have filtrate overflows, is provided under the screw casing. In  
 10 screw presses with a large diameter, the pressure on the lower side of the screen is higher due solely to the height difference. This difference in pressure can be compensated easily by submersion in a filtrate tray.

If the filtrate tray is divided into zones with different heights of filtrate overflows, the pressure progression can be adjusted particularly well to the required  
 15 dewatering pressures.

The invention will now be described in examples on the basis of the drawings, where Fig. 1 shows a screw press according to the invention, Fig. 2 a sectional view across the line marked II-II in Fig. 1, Figs. 3 and 3a show a variant of the invention, Figs. 4 and 4a a further variant of the invention, Figs. 5a and b also  
 20 show a variant of the invention, Figs. 6a, b and c illustrate the pressure progression according to Fig. 5b, and Fig. 7 shows a section through VII-VII shown in Fig. 1.

Fig. 1 shows a screw press 1 with a (screw) casing 2, which is divided into segments 3, 3' and 3". A screw 4 mounted on a shaft 5, which is preferably  
 25 hollow, rotates inside this casing 2. The suspension, e.g. pulp suspension is fed to the screw press 1 through a suspension feed area 6. This suspension feed area 6 is designed as a distribution box, which extends over three casing segments 3' in the variant shown. This top suspension feed area 6, which can take the form of a slit, thus permits even filling of the screw 4 over a

considerable length and as a result, even better distribution of pressure. The suspension feed area 6 with the casing segments 3' allocated to it does not start right at the beginning 7 of the screw, but a little further on in the conveying direction. Thus, there is at least one casing segment 3 without a feed opening  
 5 at the beginning 7 of the screw. As a result, the pulp fed in must flow against the transport direction in the passage 8 between the screw flight. Due to the resulting loss of pressure, very slight pressure is applied at the beginning 7 of the screw which causes dewatering to take place in this area in any event. Thus, drier fibres are produced here right at the beginning 7 of the screw  
 10 upstream of the screw flight 9 which clears the screen right from the beginning. In order to adapt the screw press 1 better to the operating conditions, the casing segments 3, and 3' are interchangeable so that a suitable point can always be found for the suspension feed.

Since these segments 3, 3' are interchangeable, both with (3') and without  
 15 suspension feed opening (3), the position and also the length of the suspension feed area 6 can be adapted ideally to the required dewatering conditions. This also provides a simple means of adapting the suspension feed to changes in pulp feed conditions at short notice and without longer shutdowns if these conditions fluctuate substantially.

20 The pulp suspension enters the distribution box (pulp feed area) 6 at 10. The water draining off through the casing 2 during dewatering is collected in a filtrate tray 11 and drained off from there. The dewatered pulp leaves the screw press 1 at the pulp discharge 12.

Fig. 2 shows a cross-section through the line marked II-II in Fig. 1. The pulp  
 25 from the distribution box (pulp feed area) 6 is fed in at casing segment 3' through a slit 13 which extends right through the casing 2.

Fig. 3 shows a variant of the screw 4 where scrapers 14 are mounted on the screw flight 9 and form an angle, preferably around 70°, with the screw flight 9, with several scrapers 14 being provided at the beginning 7 of the screw. In the



case of the double screw flights shown, this applies to both flights. Fig. 3a shows a detail illustrating the mounting for the scraper 14 on the screw flight 9.

Figs. 4 and 4a show an alternative form of scraper 15, which is mounted directly upstream of the screw flight 9. Here the scraper 15 is held by a metal plate 16 and pressed onto the casing 2 with some yield by a sealing ring 17.

Fig. 5a contains a schematic diagram of a screw press 1 with a casing 2 and pulp feed area 6, as well as a pulp outlet 12. In this variant, the water pressed out is drained first of all into a filtrate tray 18, 18' and 18'', from where it reaches the filtrate tray 11 through filtrate overflows 19, 19' and 19''. In screw presses with a large diameter, the pressure on the lower side of the screen 2 is higher due solely to the height difference. This difference in pressure can be compensated easily by submersion in a filtrate tray 18, 18', 18''. The pressure progression according to the design in Fig. 5b, which shows a section through the line marked V-V in Fig. 5a, is shown in Fig. 6a, b and c. Fig. 6a illustrates the inner pressure applied due to the difference in height. Fig. 6b shows the counter-pressure obtainable in the filtrate tray 18'. Fig. 6c then shows the differential pressure to be set, clearly indicating that a constant differential pressure results due to the counter-pressure generated in the filtrate tray 18' in the sector marked H, which corresponds to the height of the filtrate tray 18'.

Fig. 7 shows a section through the line VII-VII in Fig. 1 and shows various configurations of elements used to narrow the cross-section in the pulp feed area 6. Here it is possible to use either metal plates 20 to cover the slit 13, rotary flaps 21 for setting the open cross-section or gate valves 22. In this case it is possible to use either single elements to alter the cross-section or several of the same type or several different types of element.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A screw press for separating liquids from solid-liquid mixtures, the press comprising a casing having liquid-flow passages therethrough, a screw having upstream and downstream ends rotating inside of said casing for conveying said solid-liquid mixture through said casing in a transport direction and for forcing liquid through said liquid-flow passages, and solid-liquid mixture feed means for feeding said solid-liquid mixture into said casing through a feed opening; wherein said casing comprises a plurality of casing segments, at least one of said casing segments contains said feed opening, wherein said casing segments are interchangeable to change the position of said feed opening, and wherein said solid-liquid mixture feed means extends over at least two of said casing segments.
2. The screw press as defined in claim 1, wherein at least one feed opening in said casing segments includes means for modifying the size of that feed opening.
3. The screw press as defined in claim 2, wherein said means for modifying the size of said feed opening comprises a gate valve.
4. The screw press as defined in any one of claims 1 to 3, wherein said solid-liquid mixture feed means is located at a distance downstream from the upstream end of said screw.
5. The screw press as defined in any one of claims 1 to 4, wherein said screw includes an outer circumference and elastic scraper elements attached to said screw on said outer circumference, to clean said liquid-flow passages.
6. The screw press as defined in any one of claims 1 to 5, wherein at least one filtrate tray is provided below said casing.

7. The screw press as defined in claim 6, wherein there are a plurality of filtrate trays, and said filtrate trays have filtrate overflows.
8. The screw press as defined in claim 7, wherein said filtrate trays each have filtrate overflows at different heights.
9. A screw press for separating liquid from a pulp-liquid mixture, the press comprising:
  - a cylindrical casing having a plurality of liquid passages through the sides thereof thereby forming a screening structure, the casing being divided into a plurality of interchangeable cylindrical segments;
  - a conveying screw mounted inside said cylindrical casing and including means for rotating said conveying screw to convey said pulp-liquid mixture through said casing and for forcing liquid out through said plurality of liquid passages;
  - a feed area for feeding said pulp-liquid mixture into said casing, the feed area including a slit through the side of at least one of said cylindrical segments; and
  - means for changing the position of said feed area with respect to said cylindrical casing, including means for interchanging some of said cylindrical segments.

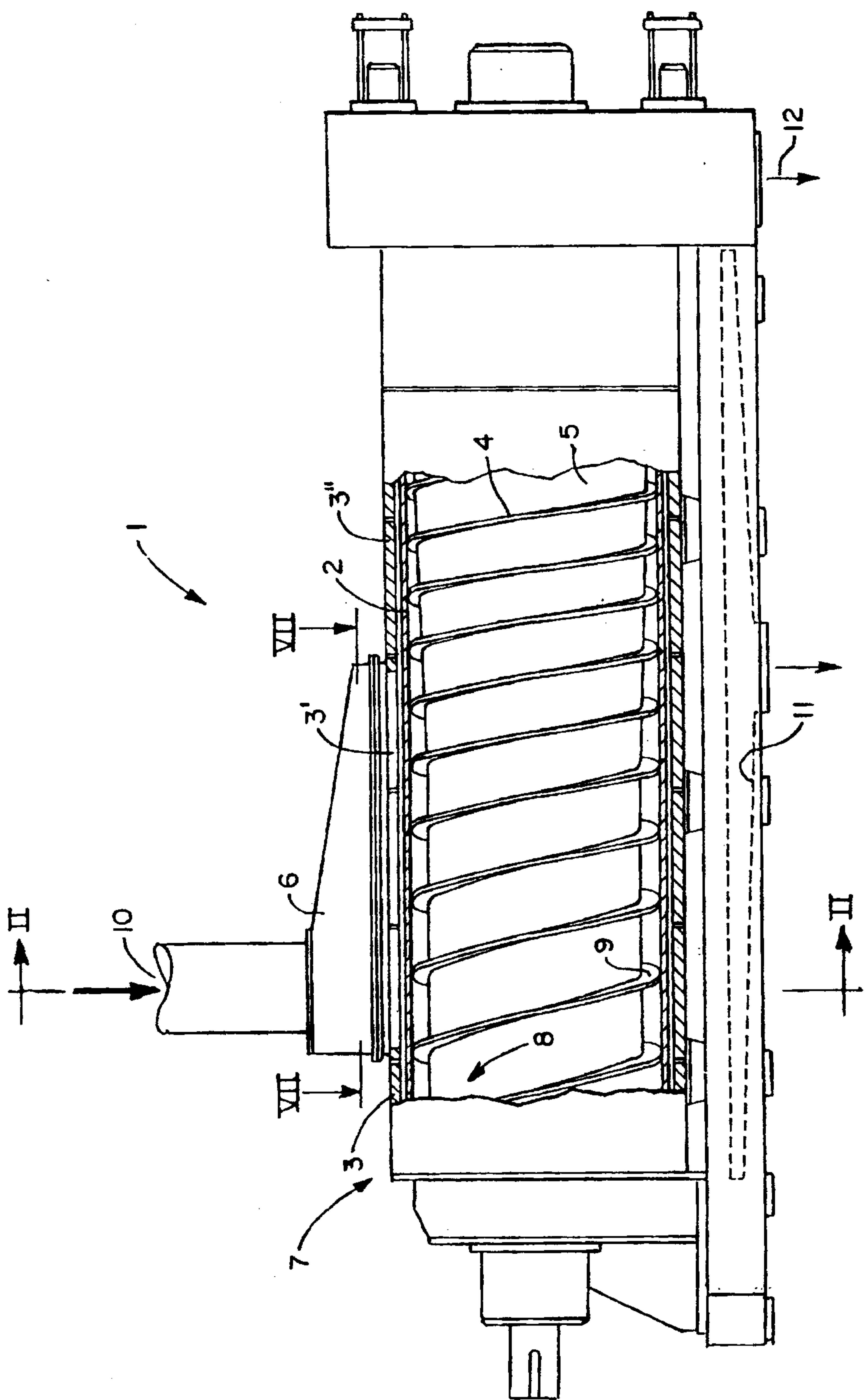


FIG. 1



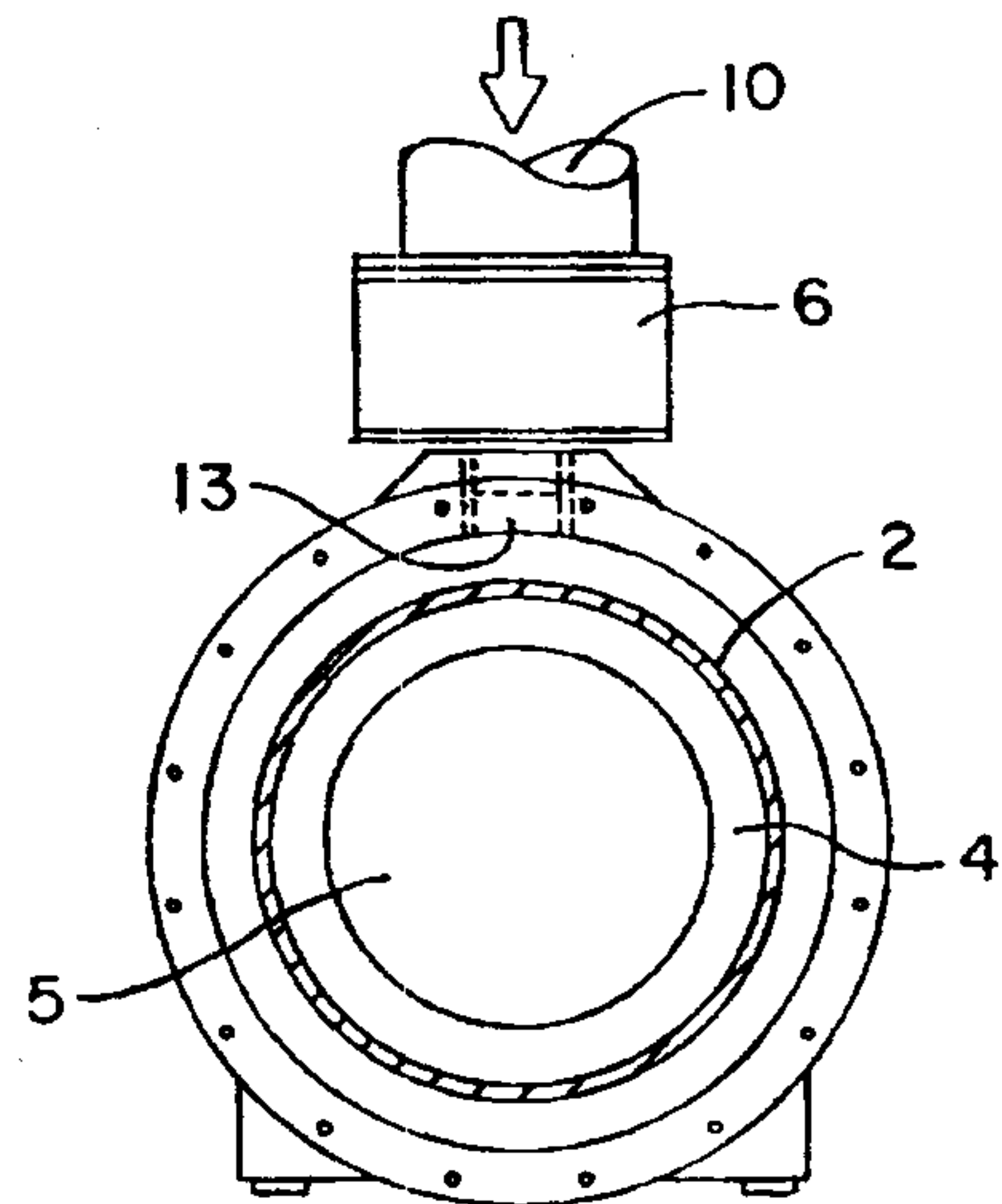


FIG. 2

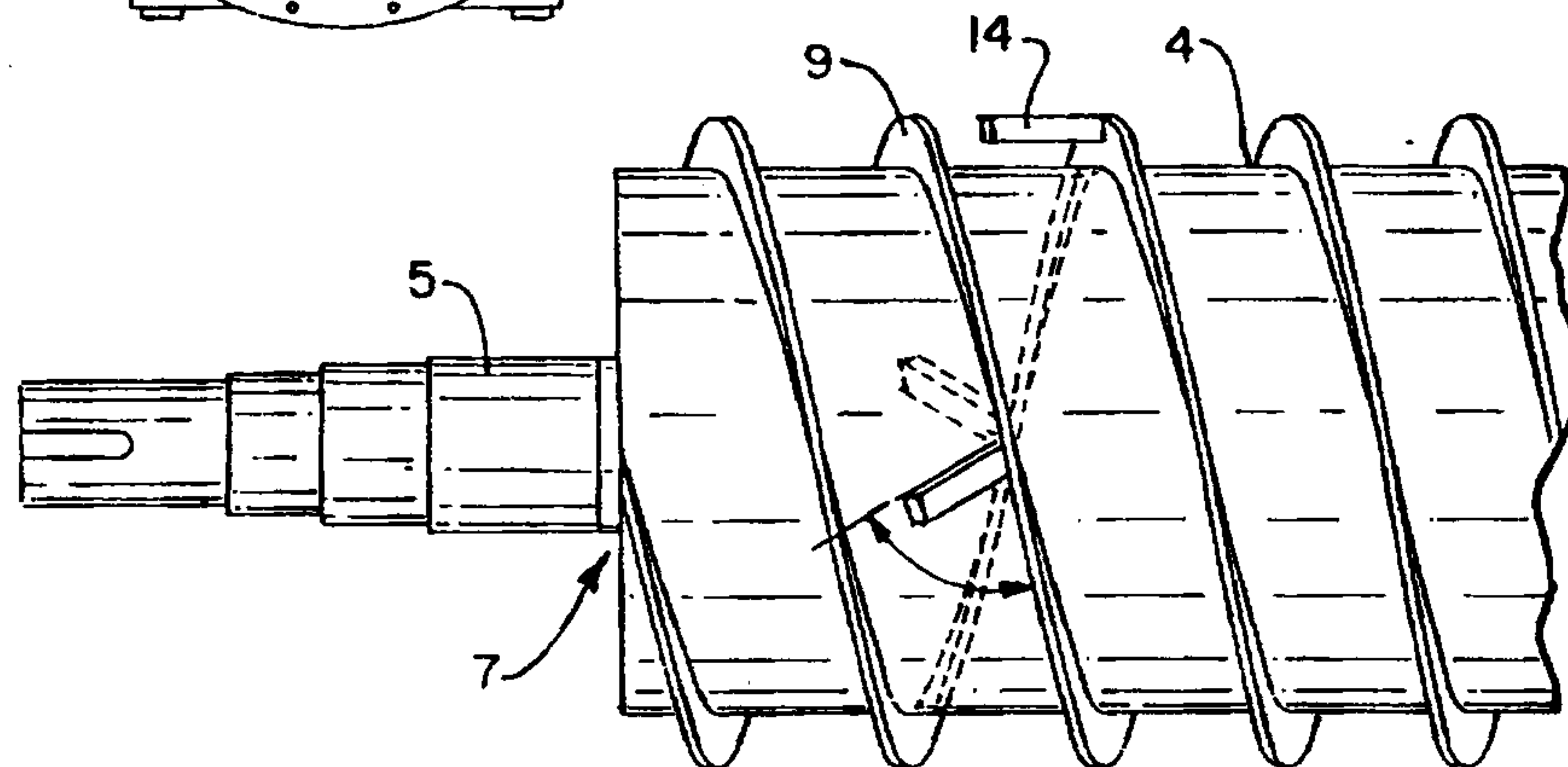


FIG. 3

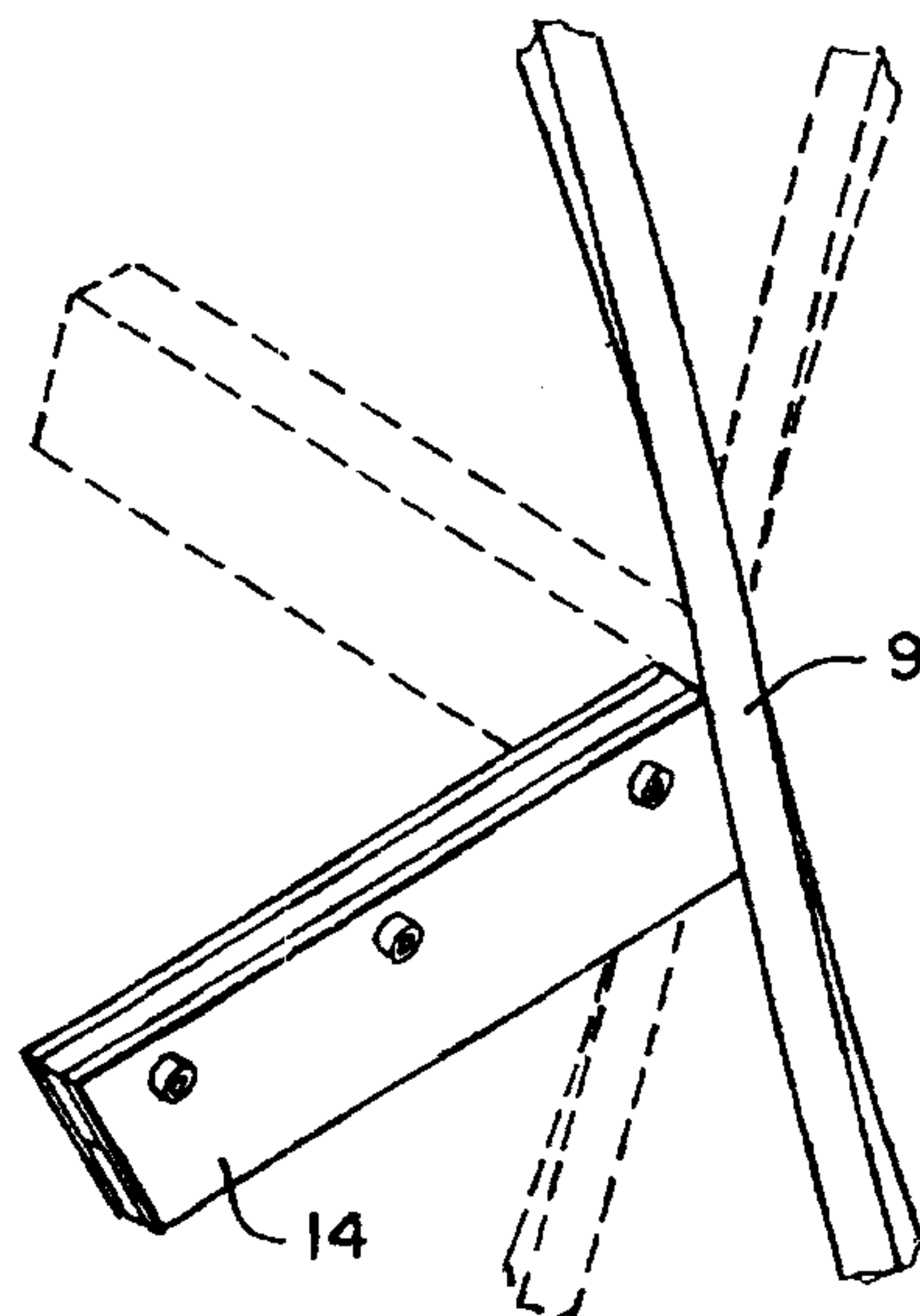


FIG. 3a

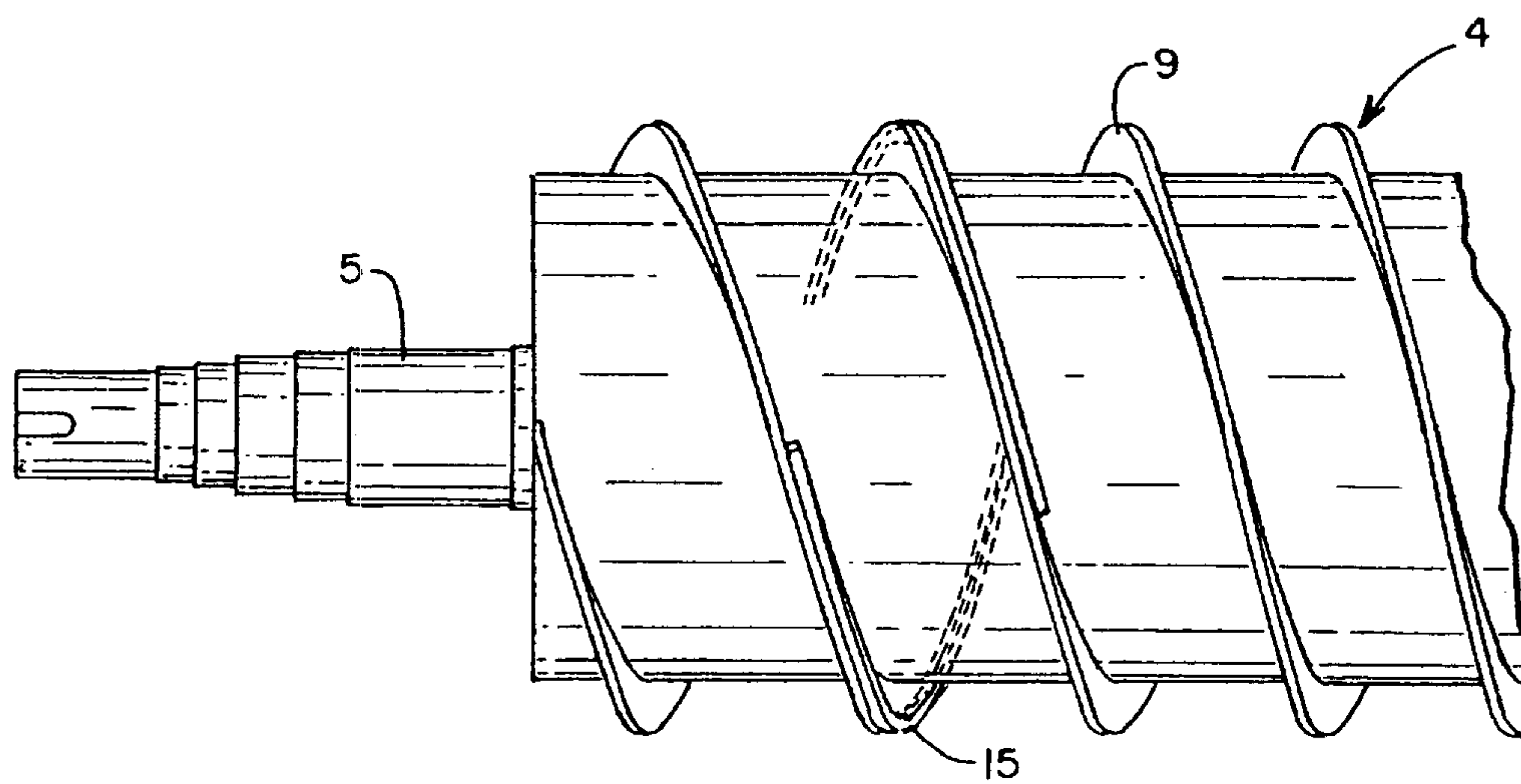


FIG. 4

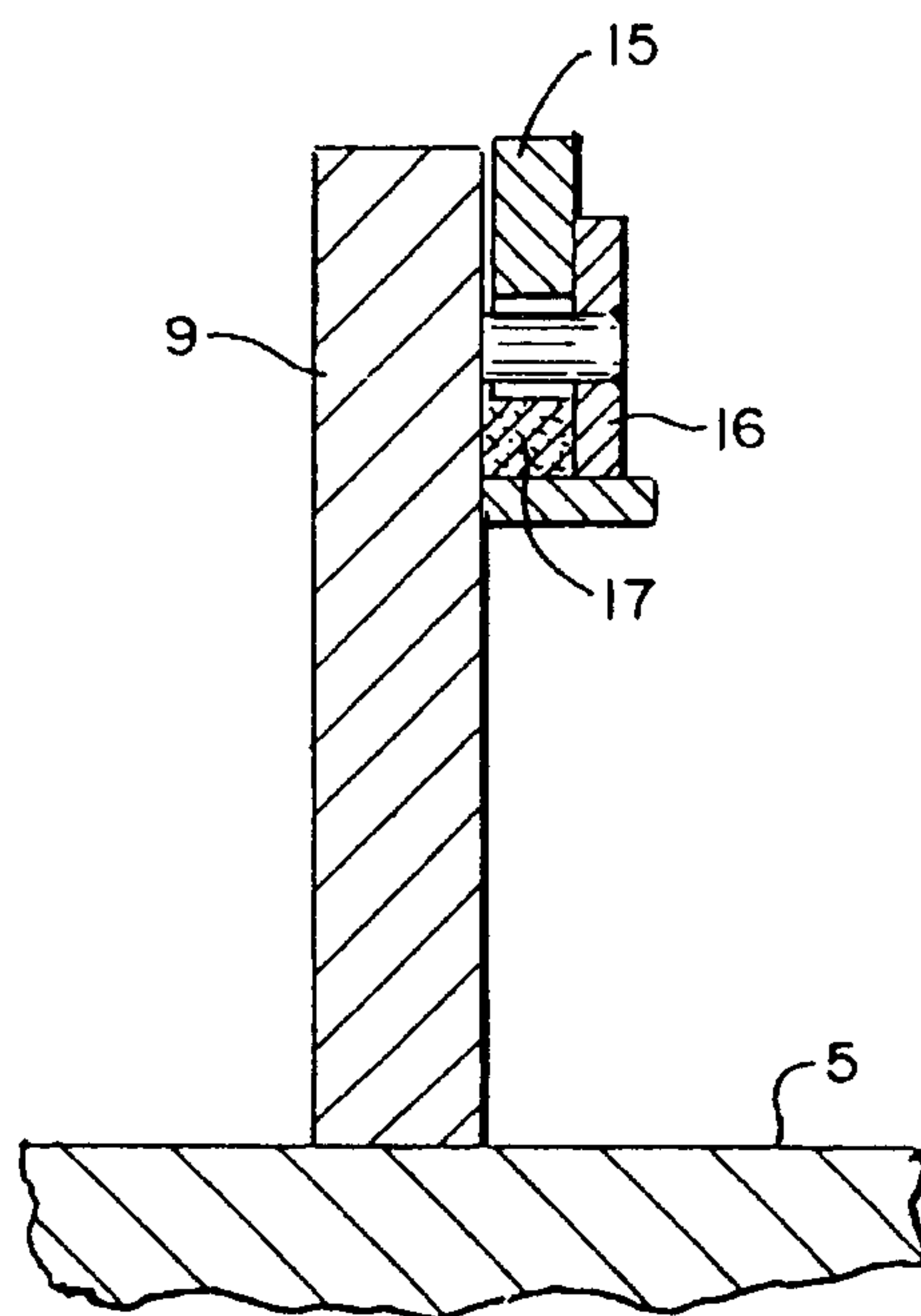


FIG. 4a

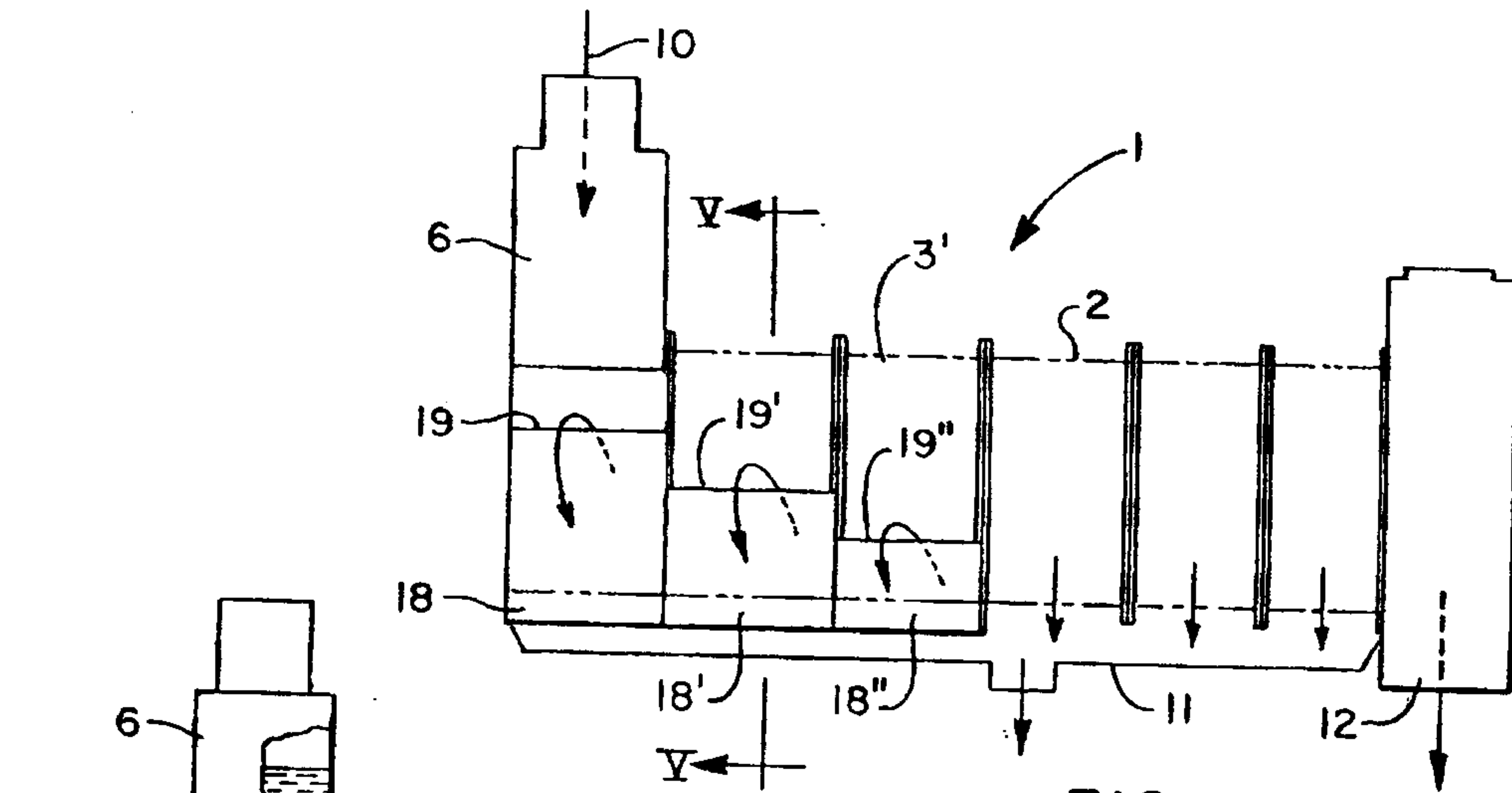


FIG. 5a

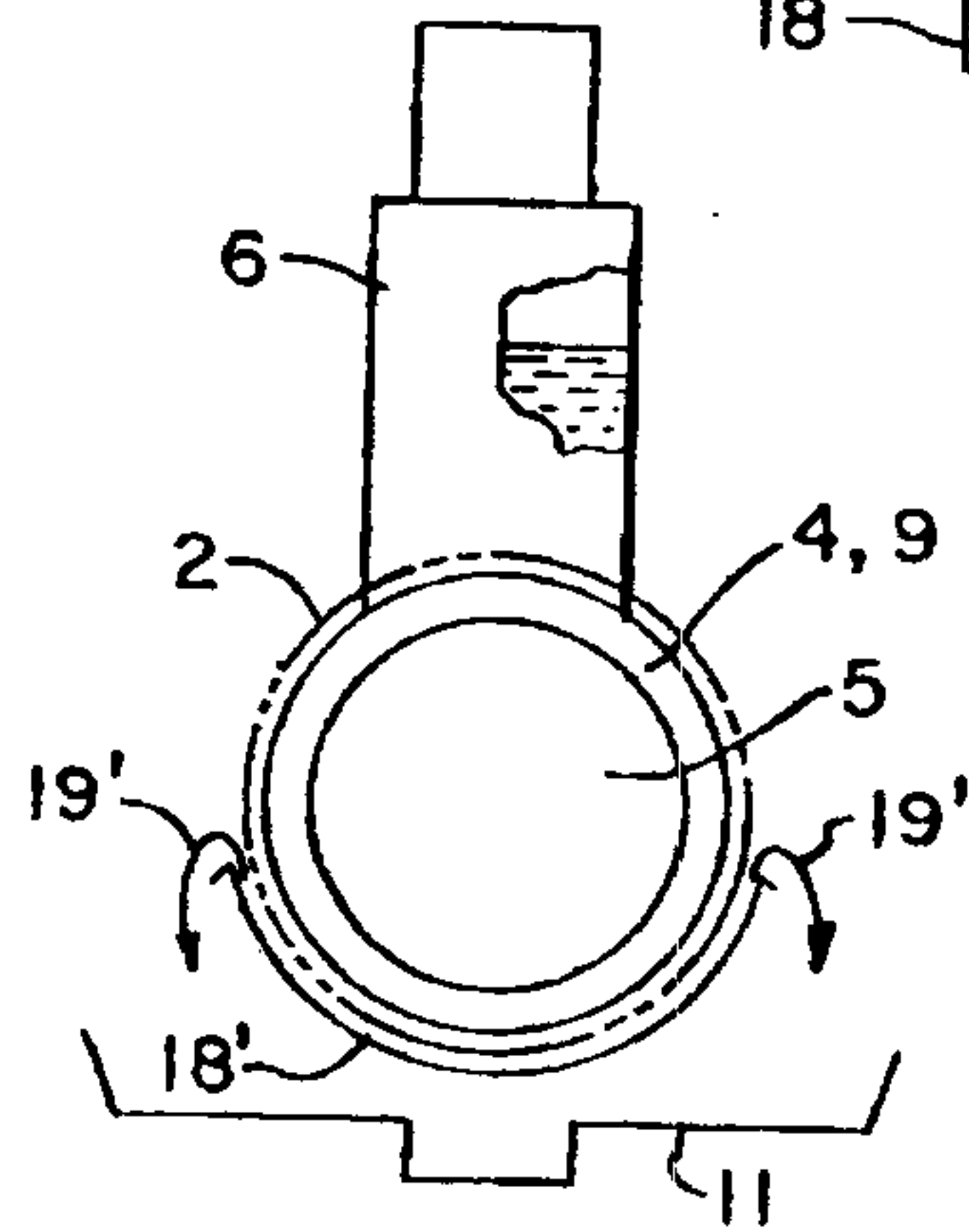


FIG. 5b

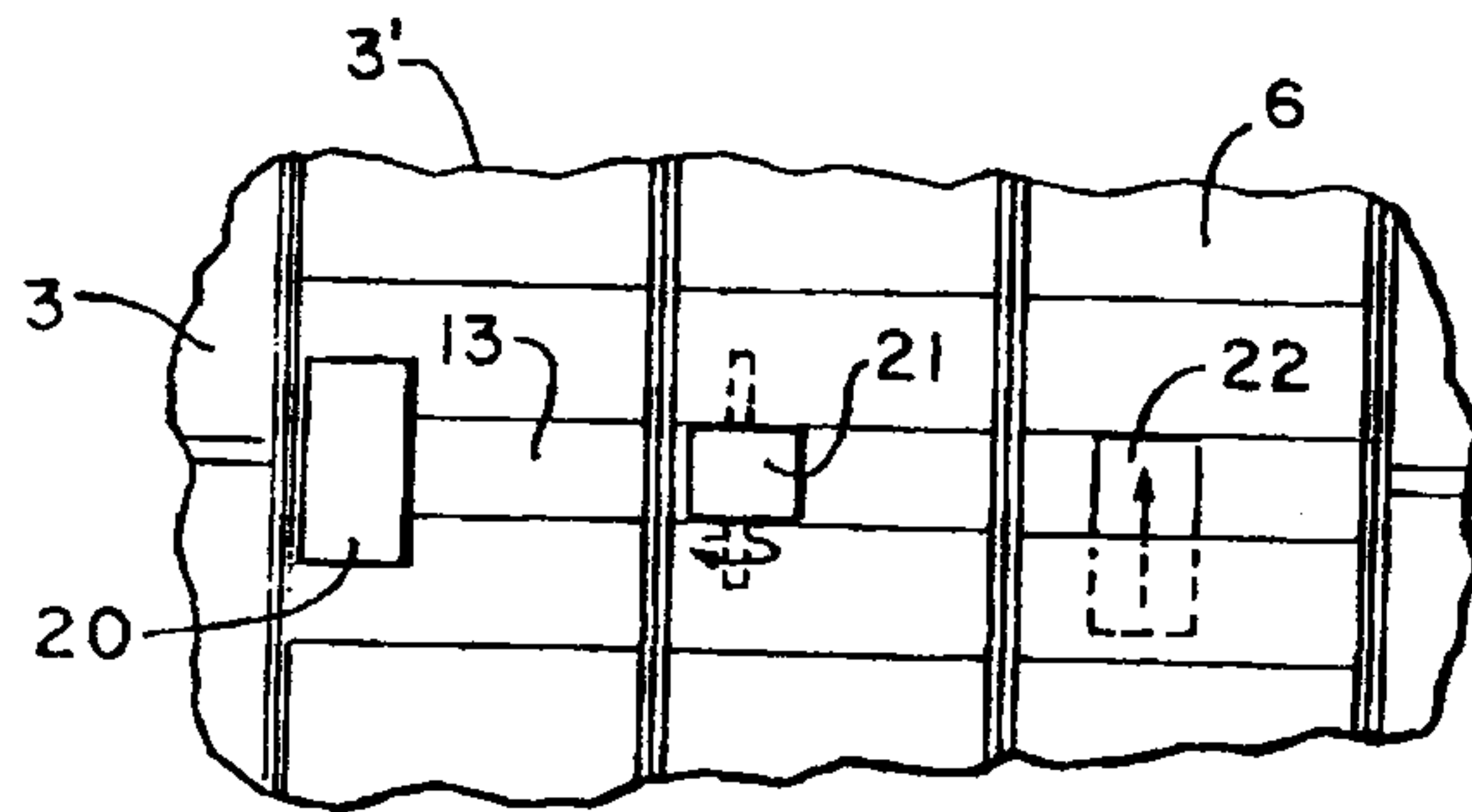


FIG. 7

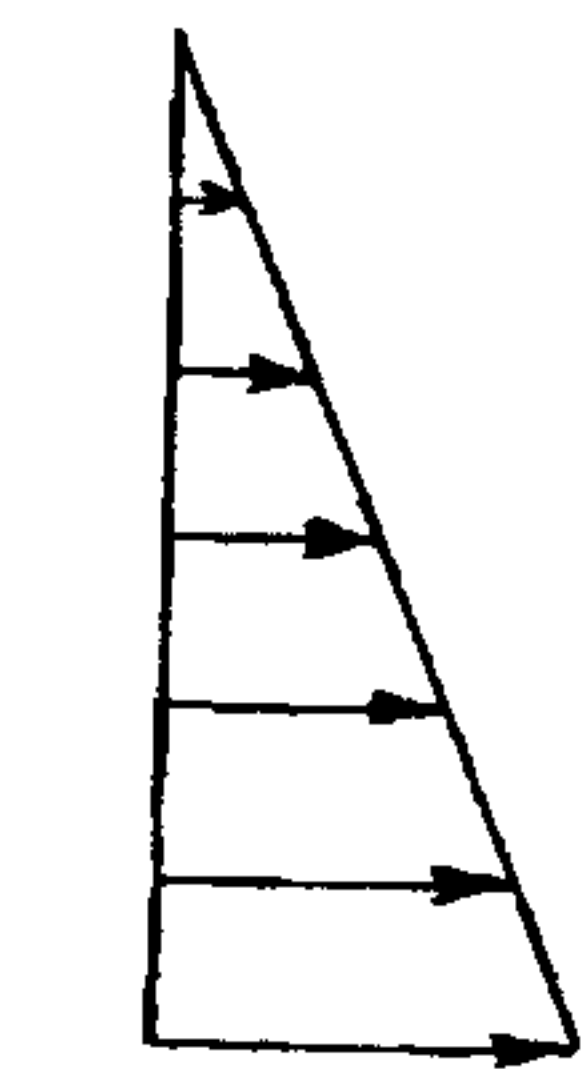


FIG. 6a



FIG. 6b

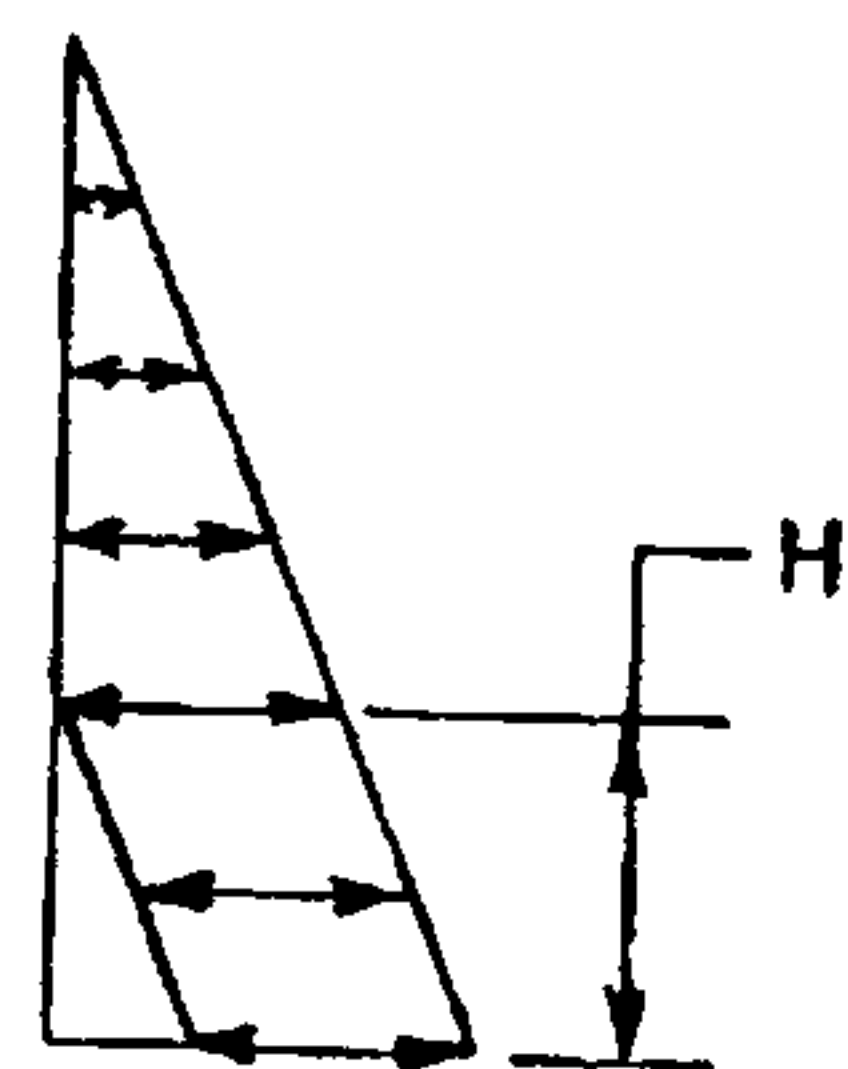


FIG. 6c

