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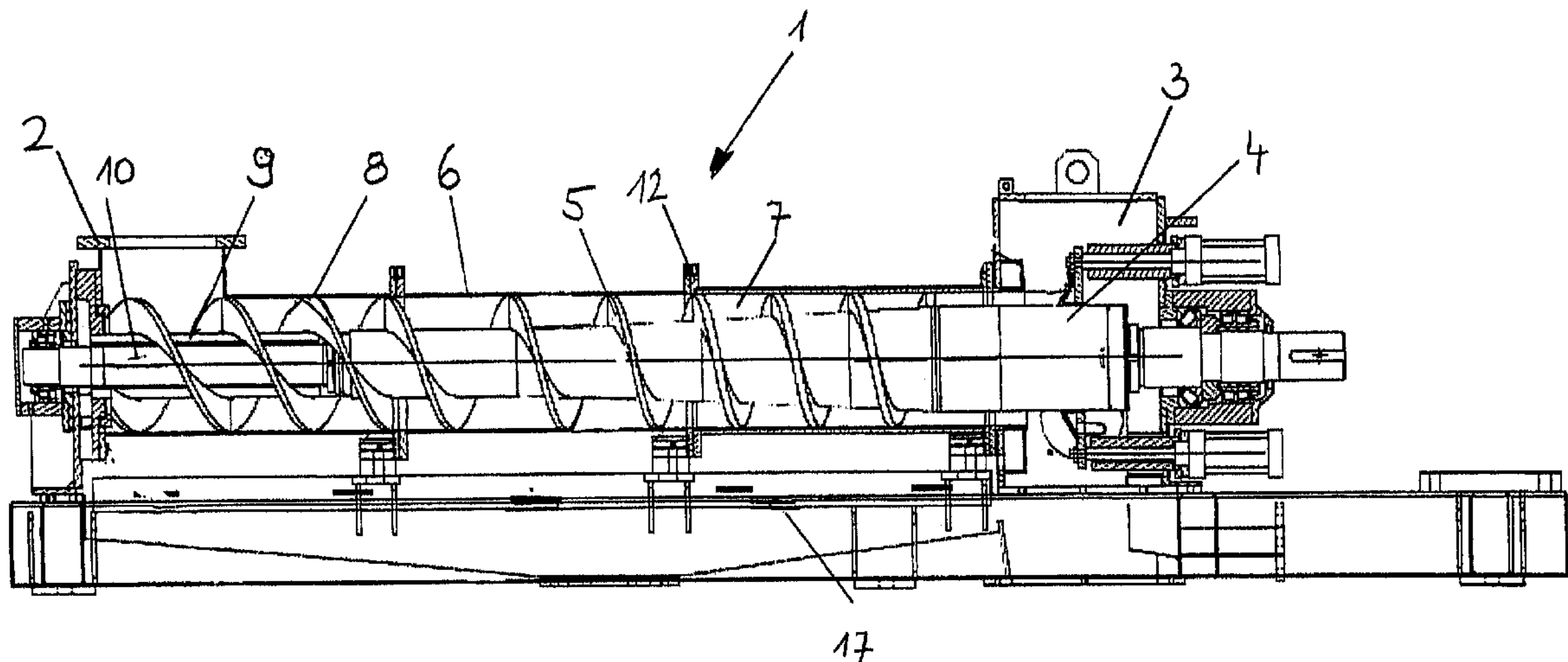
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(57) **Abrégé/Abstract:**

The invention relates to a dewatering screw press for separating liquids from the solids suspended in them. The screw press comprises a shaft and a spiral helix provided thereon, wherein the helix goes over in the inlet region of the screw press into a freely projecting helix. In order to increase the screening area, a fixed pipe is provided in the inlet region of the screw press over which the freely projecting flight brushes. A gap is provided between the fixed pipe and the freely projecting flight. As a result, the screening area can be increased greatly in size. The fixed pipe may be a screen pipe with grooves or surfaces such that co-rotation of the suspension with the shaft can be reduced or avoided.

ABSTRACT

The invention relates to a dewatering screw press for separating liquids from the solids suspended in them. The screw press comprises a shaft and a spiral helix provided thereon, wherein the helix goes over in the inlet region of the screw press into a freely projecting helix. In order to increase the screening area, a fixed pipe is provided in the inlet region of the screw press over which the freely projecting flight brushes. A gap is provided between the fixed pipe and the freely projecting flight. As a result, the screening area can be increased greatly in size. The fixed pipe may be a screen pipe with grooves or surfaces such that co-rotation of the suspension with the shaft can be reduced or avoided.

Screw press

The invention relates to a screw press with a shaft and helical flight mounted on it,
5 where the flight becomes a freely projecting flight at the inlet area of the screw press.

In general, dewatering screw presses are used to separate liquids from the solids
suspended in them. A lot of these thickening and dewatering units are used in the
pulp and paper industry in particular because this sector always works with mixtures
of water and fibres – in other words suspensions. Dewatering screw presses have
10 proved to be particularly efficient machines for thickening suspensions with a solids
content of 3.5% to 4% at the inlet to between 25 and 35% solids content at the outlet.
A description of a screw press of this kind can be found, for example, in AT398 090.
JP 63154297 A describes a (vertical) filter with a compression screw, where there is
no further dewatering in the compression sector. DE 299 01 683 U1 describes a
15 screw press with damming cones and an axially displaceable hollow shaft. In
addition, dewatering units are known from US 5857405 A and US 2004/0178053 A1,
where materials are conveyed into a pipe by means of free flighting and compacted
there. In addition, DE 198 05 451 describes a screw conveyor for a sweep washer.
Here, there is an open screw that conveys the material to a container for removal
20 without compressing it. JP 2006075953 also does not show a screw press, but a
screw conveyor for wood chips. FR 593 115 shows a screw press, but in this case, a
thin screw rotates round a stationary shaft, thus pressing the material onto an outer
screen basket. In particular, the screening area available is proving to be problematic
in state-of-the-art dewatering screw presses. This is the factor that limits dewatering.
25 The larger the screening area is, the greater the dewatering capacity of the press.
The screening area is currently defined almost entirely by the diameter and length.
The aim of the invention is thus to increase the screening area within the given length
and diameter.

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SHEET

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According to the invention, this is achieved by providing a pipe in the inlet area of the screw press over which the freely projecting flight brushes and where preferably a gap is provided between pipe and flight. As a result, the screening area available in
5 the inlet area of the dewatering screw press is enlarged by a factor in the range of 1.5 to 1.8. Here, both the dewatering and the throughput capacity of the screw press are increased.

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According to an aspect of the present invention, there is provided a screw press with a shaft and helical conveying flight mounted on the shaft, a shaft journal and a casing shell surrounding the flight, wherein the flight becomes a freely projecting flight at an inlet area of the screw press, wherein a fixed pipe is provided in said inlet area of the screw press over which the freely projecting flight brushes, wherein a gap is provided between the fixed pipe and the freely projecting flight, wherein said fixed pipe is a screen pipe, and wherein the shaft journal of said screw press is guided through the freely projecting flight and the shaft journal through said fixed pipe.

An advantageous development of the invention is characterised in the pipe have a fixed design and being connected to the frame of the screw press. This ensures that the liquid is carried away properly without creating any difficulties with sealing.

A favourable embodiment of the invention is characterised in the shaft journal of the screw press being held in the freely projecting flight, where the shaft journal can be held by the fixed pipe.

A favourable development of the invention is characterised in the fixed pipe being a screen pipe, where the fixed pipe may also have grooves or microscopic/macrosopic surfaces that counteract the co-rotation.

An advantageous embodiment of the invention is characterised in the fixed pipe having at least one filtrate channel, where the filtrate channel can be formed by another pipe between the fixed pipe and the shaft journal.

An advantageous development of the invention is characterised in the filtrate channel being divided into several filtrate channels that are separated from one another by means of web plates.

In the following, the invention is described on the basis of drawings.

Here:

Fig. 1 shows a screw press according to the invention,

Fig. 2 shows the inlet area of a screw press according to the invention and

Fig. 3 shows a screw shaft according to the invention.

A screw press 1 as in Fig. 1 consists of an inlet casing 2, an outlet casing 3, a screw shaft 4 with one or more helical screw flights 5 mounted on the screw shaft, where these screw flights 5 can be continuous or discontinuous, and a casing shell 6 surrounding this screw shaft 4. A conveying *gap* 7 for the suspension to be dewatered is then formed between the casing shell 6, the screw shaft 4, and the helical screw flight 5. This conveying *gap* 7 can change its geometry along the axis of the screw shaft 4, however this is not essential.

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The principle of the screw press 1 is as follows: The screw shaft 4, which is supported on bearings inside the casing shell 6 is set in rotating motion by a drive of any kind. A suspension is fed in through the inlet casing 2 connected to the casing shell 6. The rotating shaft 4 moves this suspension through the helical screw flight 5 within the conveying gap 7 in the direction of the outlet casing 3 connected to the casing shell 6. The casing shell 6 of a dewatering screw press 1 is usually designed as a screen. The conveying gap 7 formed by the shaft 4, the screw flight 5 and the casing shell 6 changes its geometry along the shaft axis in the direction of the outlet casing 3 in a way that is beneficial to dewatering. In most cases, the volume available is reduced along the length of the shaft axis in order to force dewatering of the suspension. The liquid released in this process is drained off through the casing shell, which is designed as a screen. In the area of the inlet casing 2, the screw flight 5 becomes a freely projecting helical flight 8. The flighting need not necessarily have two flights (as shown). In order to increase the stability of the flight, it could also be reinforced with a U-profile. The freely project flight 8 brushes over a fixed pipe 9 in the inlet area of the screw press 1 leaving an adequate gap. This pipe 9 is connected securely to the frame of the screw press 1 and does not make any rotating movement. The pipe 9 secured to the press frame is preferably designed as a screen, which enlarges the screening area enormously in the inlet area of the press 1. The pipe 9 need not be designed as a screen pipe, but can also have any kind of groove or a macroscopically or microscopically rough surface. The co-rotation is counteracted by this surface as well as by the grooves or a screen. In addition to better dewatering, this has the effect of stopping the solids suspension (fibrous suspension) from adhering to the metallic surface, thus also guaranteeing solids transport in axial direction.

The shaft journal 10 of the conventional screw shaft 4 runs through the pipe 9 secured to the frame of the press 1 and is then supported in conventional bearings after passing through the casing.

Figure 2 shows the inlet part 2 of a screw press 1 according to the invention. The suspension enters the inlet branch 11. The entire inlet part is connected to the casing shell 6 by a flange 12 in the embodiment shown. Of course, the inlet part can also have a different design. The inlet part 2 has a pipe 9 firmly secured to it, for example as shown here by means of screws. This figure also shows that a concentric pipe 13

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with a larger diameter than the shaft journal 10 (not shown) is provided. Pipes 9 and 13 thus form a filtrate channel 14. This filtrate channel 14 can also be divided into several filtrate channels separated from one another by web plates. The filtrate collected in the pipe 9 is then carried through the filtrate channel 14 to the filtrate
5 collecting flange 15 and guided through a filtrate collecting pan 16 into the filtrate tray 17 (Fig. 1) of the screw press, for example, in this embodiment.

Figure 3 now shows a section through a screw shaft 4. The (conventional) screw flight 5 is visible here, as well as the projecting flight 8 and the shaft stub 10.

The present invention offers two advantages over conventional screw presses:

10 The screening surface in the inlet area 2 of the screw press 1 is enlarged by a factor of 1.5 to 1.8. This results in a significant increase in the dewatering capacity of the press 1.

In addition, co-rotation of the fibre pulp is reduced. Fibre pulps tend to adhere to the rotating shaft. If the fibre pulp adheres to the screw shaft 4, transport in axial direction
15 is reduced or even comes to a halt. The determining factor in this co-rotation is largely the friction conditions prevailing inside the press. In conventional presses and also in the conventional part 4, 5 of the screw press 1, the pulp is prevented from co-rotating by the casing shell 6 of the press 1 designed as a screen. However, the screw shaft 4 itself tries to set the pulp in a rotating movement. In addition, the pulp
20 adheres to the surface of the screw shaft 4 and then co-rotates at the shaft speed without experiencing any major forward movement in axial direction as it does so. In the present invention, the pulp is prevented from adhering to the rotating screw shaft 4 in the inlet area because only a vertical pipe 9 is installed in the inlet area 2. The pipe 9 is preferably designed as a screen, but may also have any kind of
25 grooves or a macroscopically or microscopically rough surface. These grooves or macroscopically or microscopically rough surface can also be applied to a pipe 9 designed as a screen. The screw shaft 4 or rather the journal 10 rotates inside this pipe 9. Both the screen-type casing shell 6 and the screen pipe 9 used in the inlet area 2 prevent the pulp from rotating. The projecting flight 8 brushes over the screen
30 pipe 9 and transports the pulp forwards in axial direction only. This leads to a considerable increase in transport efficiency and thus to increased removal of

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material from the inlet area 2 of the press 1, which causes a rise in the inlet mass flow.

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

1. A screw press with a shaft and helical conveying flight mounted on the shaft, a shaft journal and a casing shell surrounding the flight, wherein the flight becomes a freely projecting flight at an inlet area of the screw press, wherein a fixed pipe is provided in said inlet area of the screw press over which the freely projecting flight brushes, wherein a gap is provided between the fixed pipe and the freely projecting flight, wherein said fixed pipe is a screen pipe, and wherein the shaft journal of said screw press is guided through the freely projecting flight and the shaft journal through said fixed pipe.
2. The screw press according to claim 1, wherein said fixed pipe has a fixed design and is connected to a frame of the screw press.
3. The screw press according to claim 1 or 2, wherein said fixed pipe has grooves or surfaces that counteract co-rotation.
4. The screw press according to any one of claims 1 to 3, wherein said fixed pipe has at least one filtrate channel.
5. The screw press according to claim 4, wherein said at least one filtrate channel is formed by another pipe between said fixed pipe and said shaft journal.
6. The screw press according to claim 4 or 5, wherein said at least one filtrate channel is divided into several filtrate channels that are separate from one another by means of web plates.

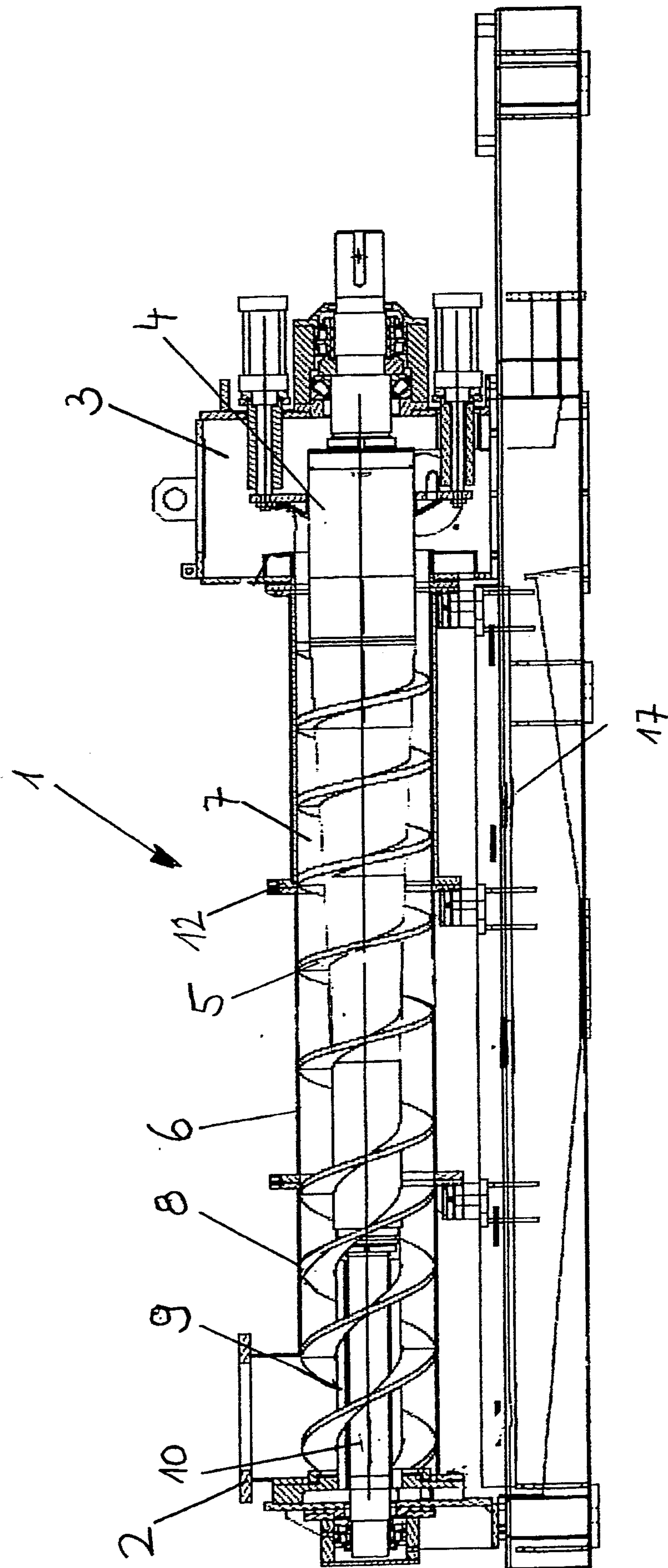
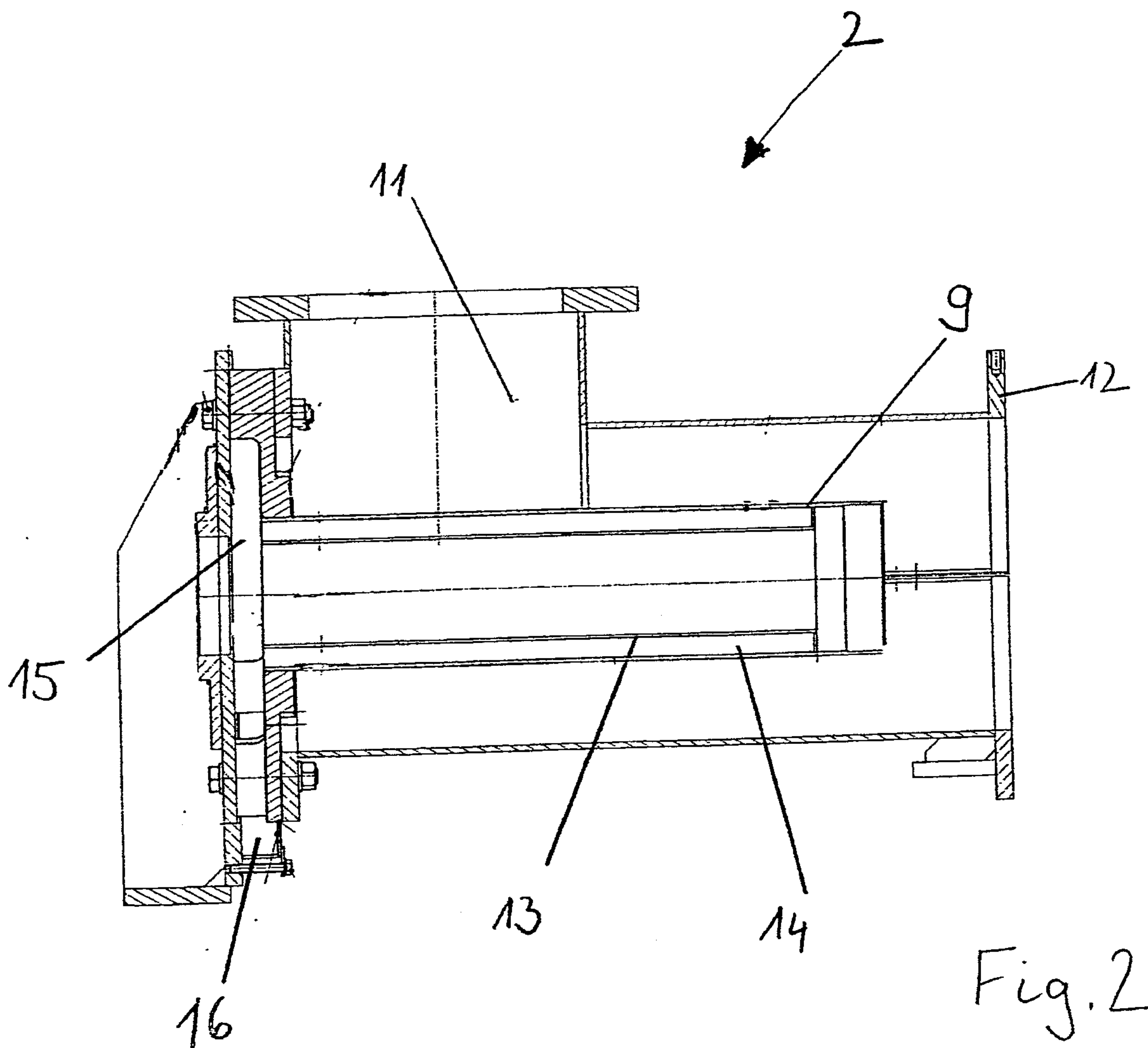


Fig. 1



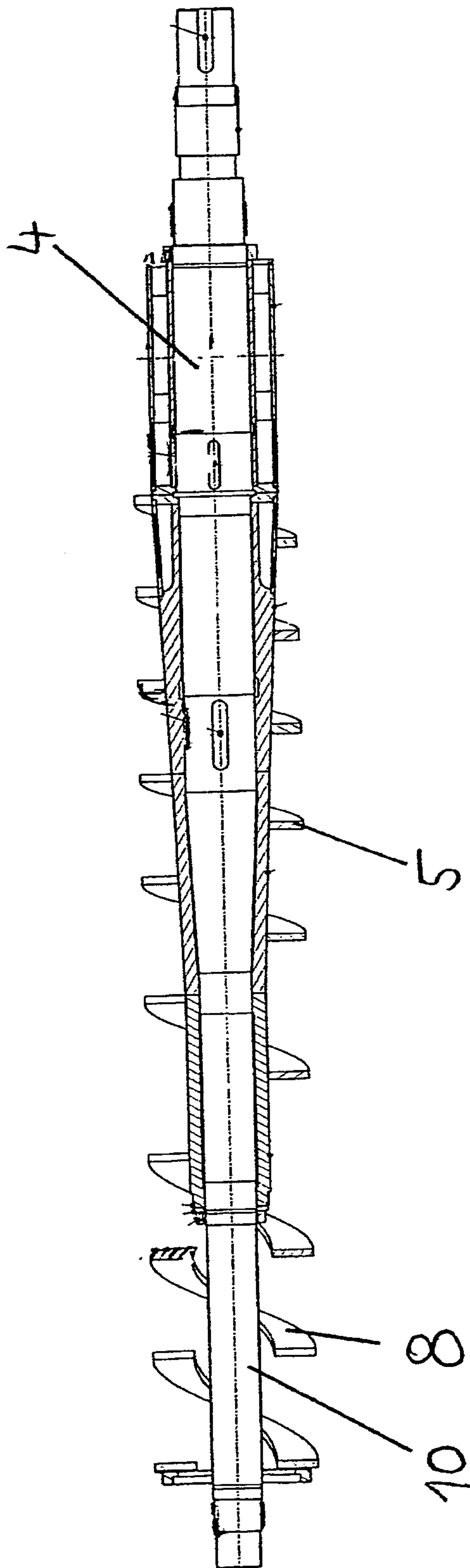


Fig. 3

