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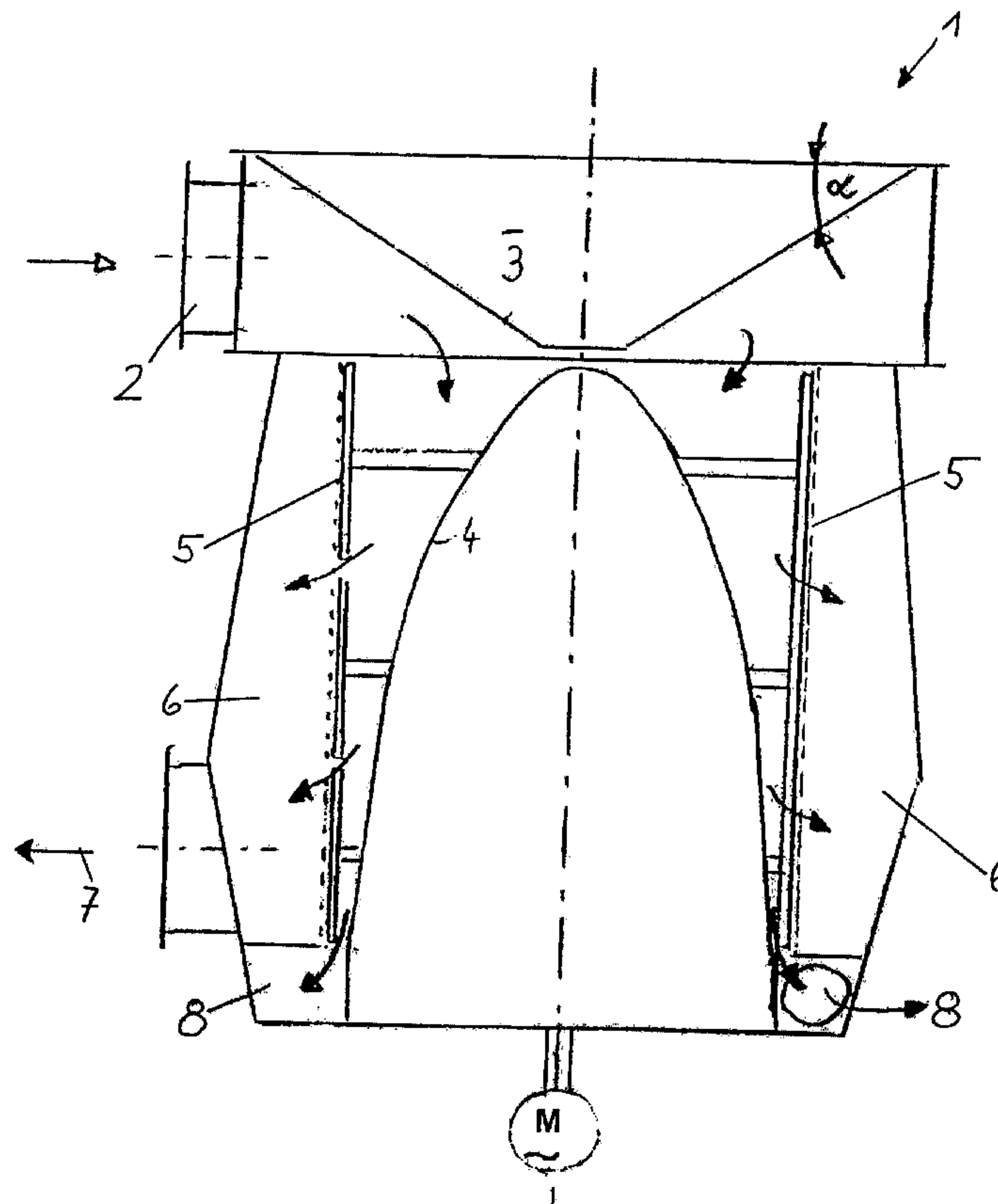
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(57) Abrégé/Abstract:

The invention relates to a screen 1 for cleaning a pulp suspension. It is mainly characterized by a stationary installation 3, 3', 3'' being provided in the infeed area between the tube branch 2 and the free end of the rotor 4.



ABSTRACT

The invention relates to a screen 1 for cleaning a pulp suspension. It is mainly characterized by a stationary installation 3, 3', 3" being provided in the infeed area between the tube branch 2 and the free end of the rotor 4.

The invention relates to a screen for cleaning pulp suspensions.

5 Screens are machines used in the paper industry for the purpose of cleaning a pulp suspension consisting of water, fibres and dirt particles. In doing so, a feed flow is led over a screening device, with the accept stream consisting of water and fibres through the screen. A partial stream, called the reject stream, consisting of water, fibres and dirt particles, is generally withdrawn from the end
10 located opposite the feed end. Generally speaking, such a screen is designed rotationally symmetrically and consists of a casing with a tangentially arranged infeed, a cylindrical screen basket, mostly with holes or vertical slots, and a revolving rotor. The rotor has the task of keeping the screen slots clear, and this is achieved by blades which rotate just below the screen surface. The
15 accept stream is collected in an accept chamber, often one of a conical design, and extracted radially at some point. The reject stream is generally led to the end of the screen basket opposite the infeed into a reject chamber, which is in most cases annular, and extracted from the chamber tangentially. Such a screen is known for instance from US 4,268,381. The disadvantage of these
20 screening machines consists in the risk of clogging at low flow rates occurring in the relatively large reject chamber. Also, non-uniform inflow into the screen basket and non-uniform flow conditions in the accept chamber, especially in the area of the accept discharge, occur.

25 The purpose of the invention is, therefore, to create an improvement of the flow conditions in the screen in order to decrease the energy used at increased production rate and dirt removal.

30 The invention is therefore characterized by a stationary installation, which may be designed rotationally symmetrically, being provided in the infeed area between the tube branch and the end of the rotor. This gives a substantial improvement of the flow conditions and as a consequence, a reduction of the amount of energy used.

An advantageous advancement of the invention is characterized by the installation being a cone, a truncated cone, a hemisphere, a spherical segment, spherical segment between two parallel circles, a paraboloid, or a hyperboloid of two sheets.

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A favourable variant of the invention is characterized by the cone angle α amounting to between 10° and 60° for installations designed as a cone or truncated cone.

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A favourable advancement of the invention is characterized by the axis of the infeed branch being arranged in parallel to the cone shell. This allows better routing of the flow and further reduction of the energy losses.

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A favourable, alternative variant of the invention is characterized by the installation being a spiral-shaped body, with the pitch of the spiral being selectable such that the flow speed in the infeed area is kept constant over the entire screen basket width.

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An advantageous advancement of the invention is characterized by the installation being arranged centrally.

An advantageous variant of the invention is characterized by the accept chamber being designed double-conically.

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An advantageous advancement of the invention is characterized by the screen being designed as double machine.

A favourable advancement of the invention is characterized by the infeed taking place axially through the rotor.

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A favourable variant of the invention is characterized by the drive-side rotor part being of the same height as or higher than the rotor part on the other side of the drive into which and through which the pulp flows.

5 A favourable variant of the invention is characterized by the infeed taking place centrally from the side.

An advantageous advancement of the invention is characterized by two accept discharges being provided.

10 An advantageous variant of the invention is characterized by the screen being arranged horizontally.

15 A favourable advancement of the invention is characterized by a screen basket for preliminary screening, which turns together with the rotor, being provided in the infeed area, with rotating blades possibly being provided in the preliminary screening area.

20 A favourable advancement of the invention is characterized by the rotor having several blades arranged at different heights and/or distributed over the circumference.

25 The invention is described below in examples and with reference to the drawings, where Fig. 1 shows a variant of the invention, Fig. 2 an alternative variant of the invention, Fig. 3 a design as a double machine, Fig. 4 a further variant of the invention, Fig. 5 a 3-D presentation of a variant of the invention, Fig. 6 the area for integrated preliminary screening, Fig. 7 a diagram showing the specific energy versus the screen plate flow and Fig. 8 a diagram of dots reduction versus the screen plates flow.

30 Fig. 1 shows a screen 1, to which a pulp suspension is fed through an infeed branch 2 for cleaning. In the area of the infeed, an installation 3 is provided,

which is shown as a truncated cone here. The "top" of the truncated cone points in the direction of the rotor 4. Installation 3 may be a hollow or a filled body. The flank angle α of the truncated cone amounts to between 10° and 60° in view of optimum deflection. The pulp suspension enters at the area between rotor 4 and screen plate 5 and is fed to the accept chamber 6 through the screen plate. The casing of the accept chamber is designed as a double cone, i.e. the casing tapers conically from about the upper edge of the accept outlet 7 toward the reject chamber, with the angle of the accept chamber being designed in view of a constant flow speed at an assumed uniform discharge through the screen plate.

For this, the rotor 4 of the screen 1 is designed for uniform screen inflow, which necessitates lower thickening behaviour along the screen plate height. It is shaped as a parabola, and this means that the axial flow rate inside the screen basket remains constant at an assumed uniform outflow through the screen plate. As an alternative, the shape of the rotor may be approached through a conical shape.

To ensure suitable discharge of the reject flow, the reject chamber is designed such that flow rates above 2.5 m /sec. with or without additional introduction of agitating energy by the rotor are achieved. This virtually avoids clogging.

Fig. 2 shows an analogous arrangement of a screen 1, with the infeed branch 2 being arranged such that the suspension is fed parallel to the shell 3 of the truncated cone 3. This means that the energy loss which normally exists in case of flow diversion can be avoided.

Fig. 3 shows the design as a top machine as it is used for high production rates. For this, the rotor is, for instance, designed as a double parabolic rotor 4, 4' or double-cone rotor. The reject discharge 8, 8' and the screen basket 5, 5' are also provided twice. Here, too, the accept chamber 6, 6' comes as a double cone, and this means in this case as well that the casing tapers approximately

from the upper edge of the accept flow discharge toward the reject chamber. The pulp suspension is also fed via infeed branch 2 and, in the configuration shown, routed axially through the rotor. With this type of inflow, the height L1 of drive-side rotor part 4 is equal or larger than height L2 of rotor part 4' into which and through which the flow takes place, and which is opposite the drive side. The suspension leaves the rotor part 4', through which the flow takes place, through openings 9 at the centre and is distributed in both directions. It passes through the screen basket 5, 5' into accept chamber 6, 6', the same as for a simple screen, this accept chamber being in this case also designed as a double cone. The reject flows both upwards and downwards and is in this case discharged from the machine via a reject chamber 8, 8'. In another configuration, the infeed may take place centrally from the side. There may be two accept discharges, one on top (7') and bottom (7) or a single one in the centre. The screening device may be designed horizontally.

Fig. 4 shows a variant of the invention, where as installation a vertically sheet 3' is provided, which extends approx. 270 °. This sheet 3' directs the pulp flow evenly from the inlet 2 into the screen basket 5 in spiral form. In Fig. 4 this installation 3' is shown as top view. It can be seen that the sheet 3' starts at point 16 and then extends in spiral form around the centre (the axis) until point 17. The space 15 (hatched) between sheet 3' and the outer wall of the screen may be left empty. Important is, that the flow area decreases continually and therefore an even flow velocity as far as possible is provided, which is adjusted to the infeed of the suspension into the screen basket 5.

Fig. 5 shows a 3-D presentation of a further variant of the invention. Installation 3' is mounted on the top whereby the surface is extending in spiral form in direction to the screen basket. The pulp suspension is directed from the feed 2 direct into the screen basket along the surface showing to the screen basket. Also here is considered the suspension flow into the screen basket to achieve a constant flow velocity. In this way energy losses will be kept at a minimum.

Fig. 6 now shows the upper part of screen 1 with an integrated preliminary screening. The pulp suspension is fed to the screen 1 via infeed branch 2. In order to discharge heavy particles in the area of the prescreening, a prescreening area 10 is provided in the upper part of screen 1, into which the suspension passes through a screen plate 11. This allows efficient removal of specifically heavy particles and large-surface contaminants, which result from dirty or very dirty pulps. There is a locked-in rotor 12 outside screen plate 11, this rotor being connected to rotor 4 via an extension 13. The heavy particles leave the prescreening area through branch 14. Rotor 12 may be running in the prescreening area 10 both in the infeed flow (as shown) or in the accept flow, which is then led to further fine screening in the lower area of the screen 1. If the rotor 12 runs in the infeed flow, then the rotating cleaner blades of the rotor 12 keep the highly abrasive heavy particles from hitting that surface of screen plate 11, thereby damaging it.

The specifically heavy parts are thereby centrifuged outside. This allows to achieve longer useful life for the screen baskets in the prescreening area, and on the other hand also to have a planned barrier in the form of the prescreening basket as a consistent impediment for the heavy parts to pass into the centrifugal post-screening area. This means that the rotors, for the fact that they rotate in the first-stage accepts, are being loaded longer at the onflow edges and are therefore subject to lesser abrasion and energy consumption and can therefore be adjusted more closely to the surface of screen plate 5, without triggering damage to the rotor or screen plate surface. The separation of coarse and minor contaminants results in increased performance (throughput and effectiveness increase) in comparison to conventional screening machines. This variant can also be designed with a double-cone rotor for high production rates.

Fig. 7 shows the diagram of the energy requirement over the screen plate through-flow, with one curve being shown for existing screens and one for screens according to the invention, with conical installation in the infeed area.

Fig. 8 shows the dot reduction over the screen plate through-flow. It can be seen here that with a conical installation in the infeed area, it was also possible to improve the dot reduction substantially and to reduce the specific energy consumption at the same time.

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Claims

1. Screen for cleaning a pulp suspension, characterized by a stationary
5 installation (3, 3', 3'') being provided in the infeed area between the tube
branch (2) and the free end of the rotor (4).
2. Device according to Claim 1, characterized by the installation (3) being
designed rotationally symmetrically.
- 10 3. Device according to Claim 2, characterized by the installation (3) being
a cone, a truncated cone, a hemisphere, a spherical segment, a spherical
segment between two parallel circles, a paraboloid, or a hyperboloid of two
sheets.
- 15 4. Device according to Claim 2, with an installation as cone or truncated
cone, characterized by the cone angle α amounting to between 10° and 60° .
- 20 5. Device according to Claim 4, characterized by the axis of the infeed
branch (2) being arranged in parallel to the cone shell.
6. Device according to Claim 1, characterized by the installation (3', 3'')
being a spiral-shaped body.
- 25 7. Device according to Claim 6, characterized by the pitch of the spiral
being selected such that the flow speed in the infeed area is kept constant over
the entire screen basket width.
- 30 8. Device according to one of the Claims 1 to 7, characterized by the
installation (3, 3', 3'') being arranged centrally.

9. Device according to one of the Claims 1 to 7, characterized by the accept chamber (6, 6') being designed double-conically.

10. Device according to one of the Claims 1 to 9, characterized by the screen (1) being designed as double machine.

11. Device according to Claim 10, characterized by the infeed taking place axially through the rotor (4).

12. Device according to Claim 11, characterized by the drive-side rotor part (4) being of the same height as or higher than the rotor part (4') on the other side of the drive into which and through which the pulp flows.

13. Device according to Claim 12, characterized by the infeed taking place centrally from the side.

14. Device according to one of the Claims 10 to 13, characterized by two accept discharges (7, 7') being provided.

15. Device according to one of the Claims 1 to 14, characterized by the screen (1) being arranged horizontally.

16. Device according to one of the Claims 1 to 15, characterized by a screen basket (11) for preliminary screening being provided in the infeed area which turns together with the rotor (12).

17. Device according to Claim 16, characterized by rotating blades being provided in the preliminary screening area (10).

18. Device according to one of the Claims 1 to 17, characterized by the rotor (4, 4') having several blades arranged at different heights and/or distributed over the circumference.

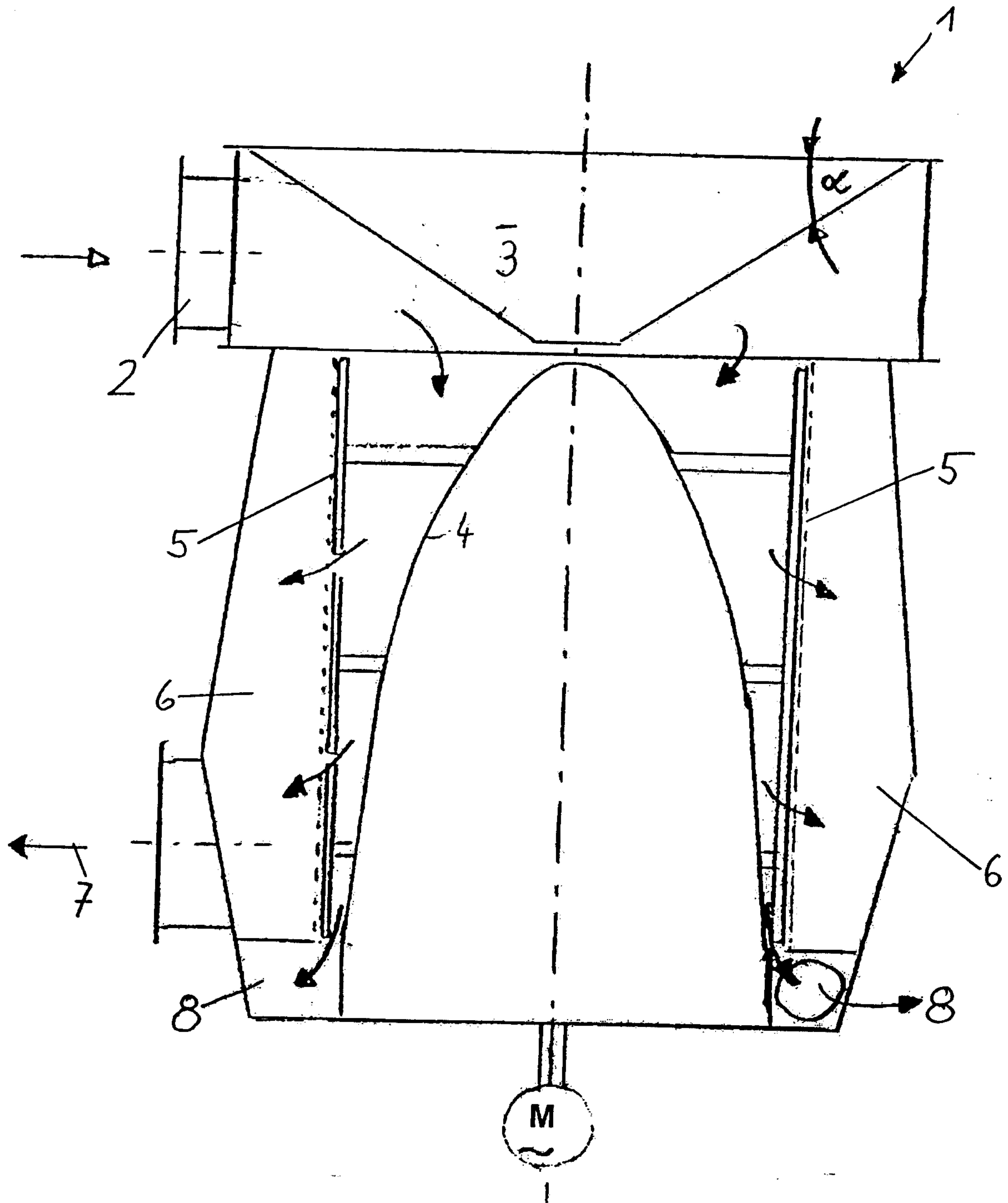


Fig. 1

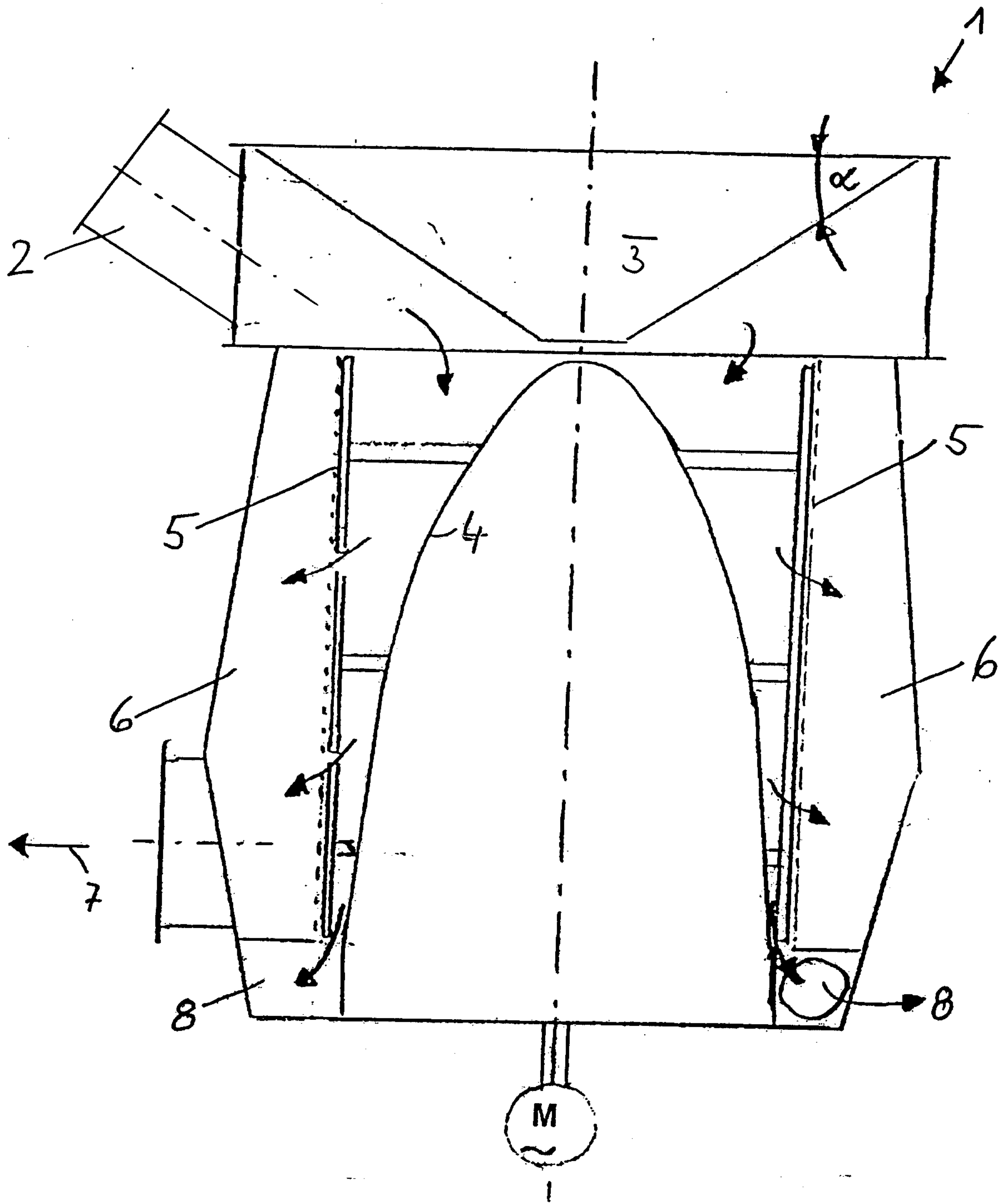
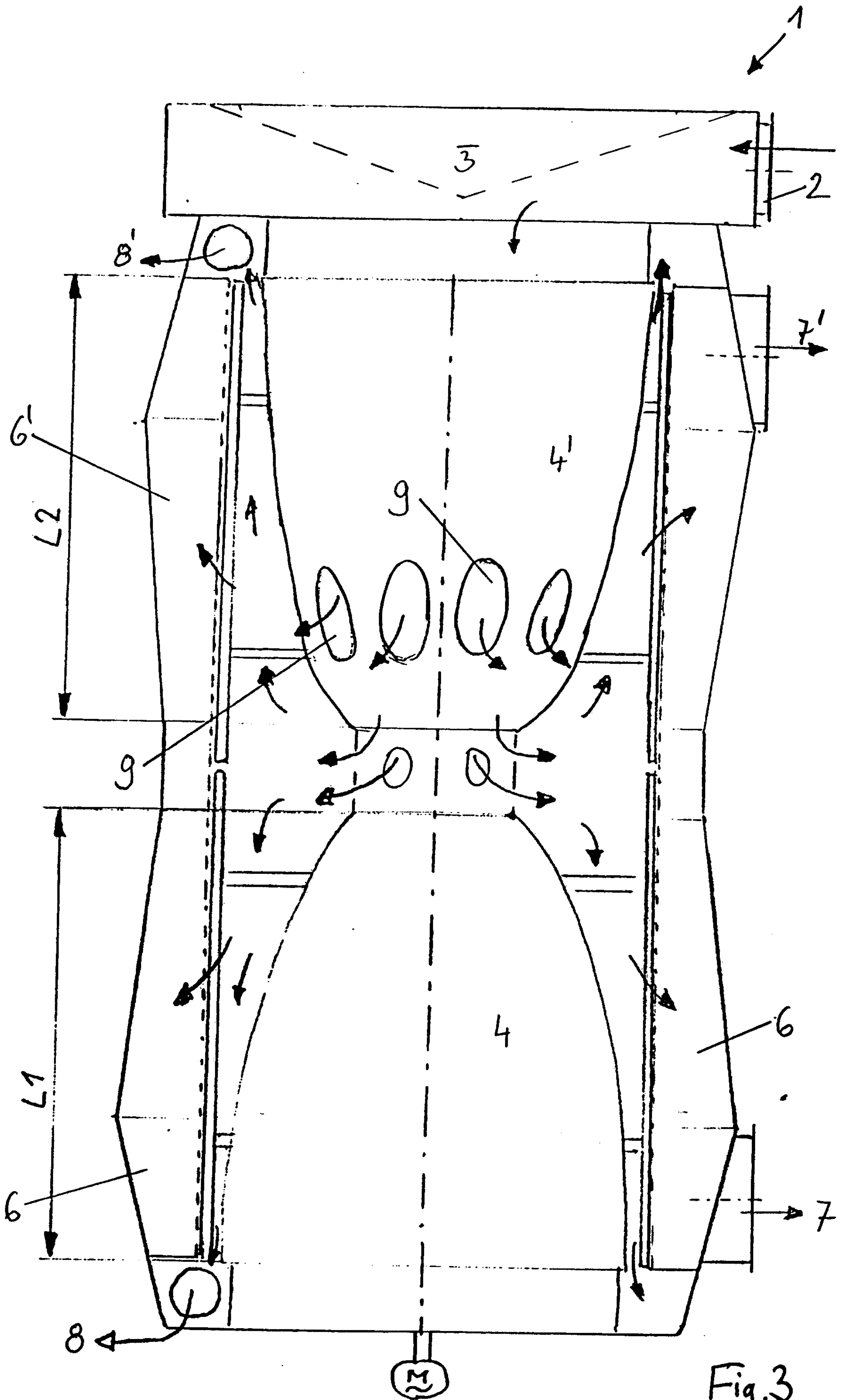


Fig. 2



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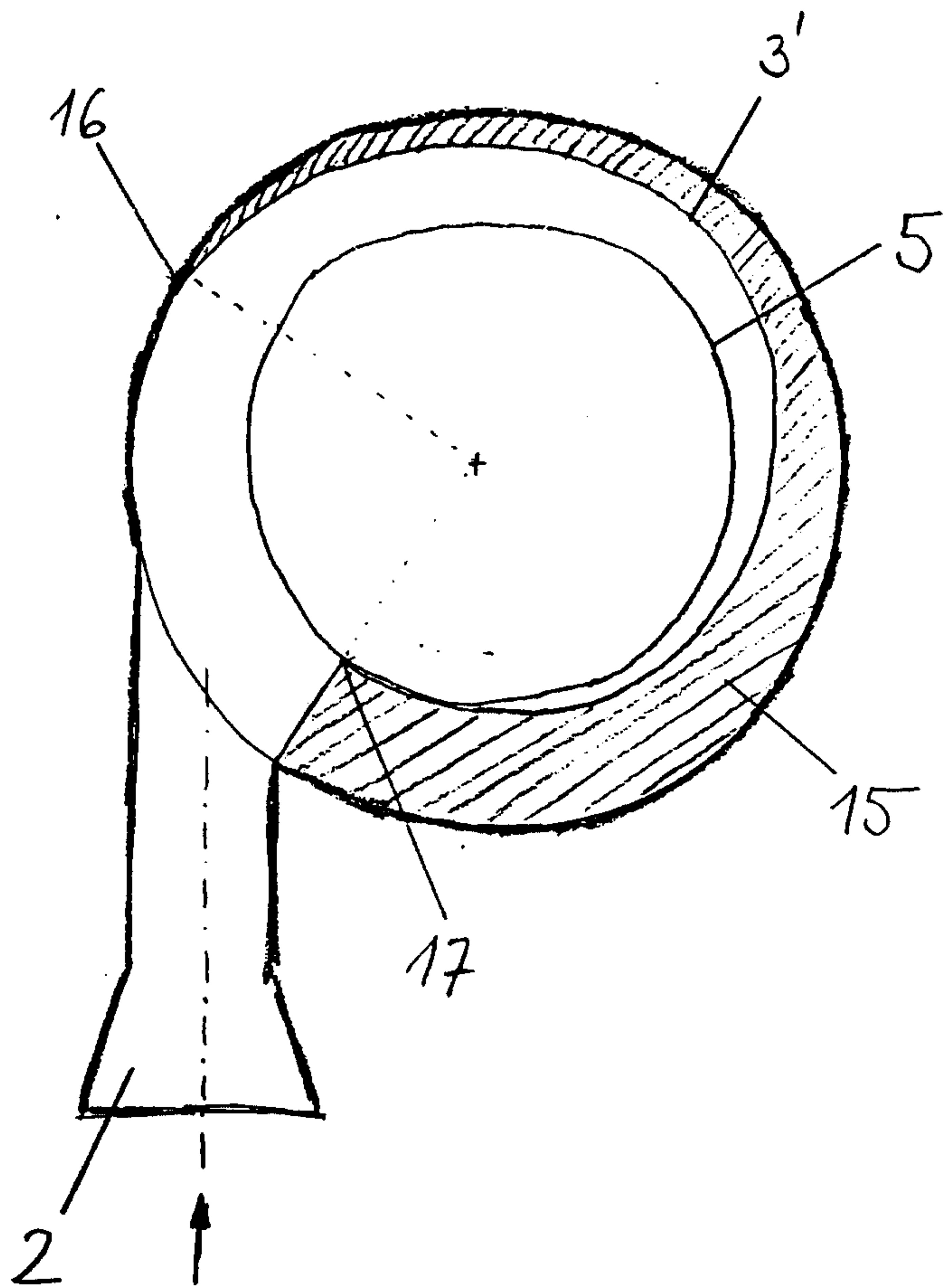


Fig. 4

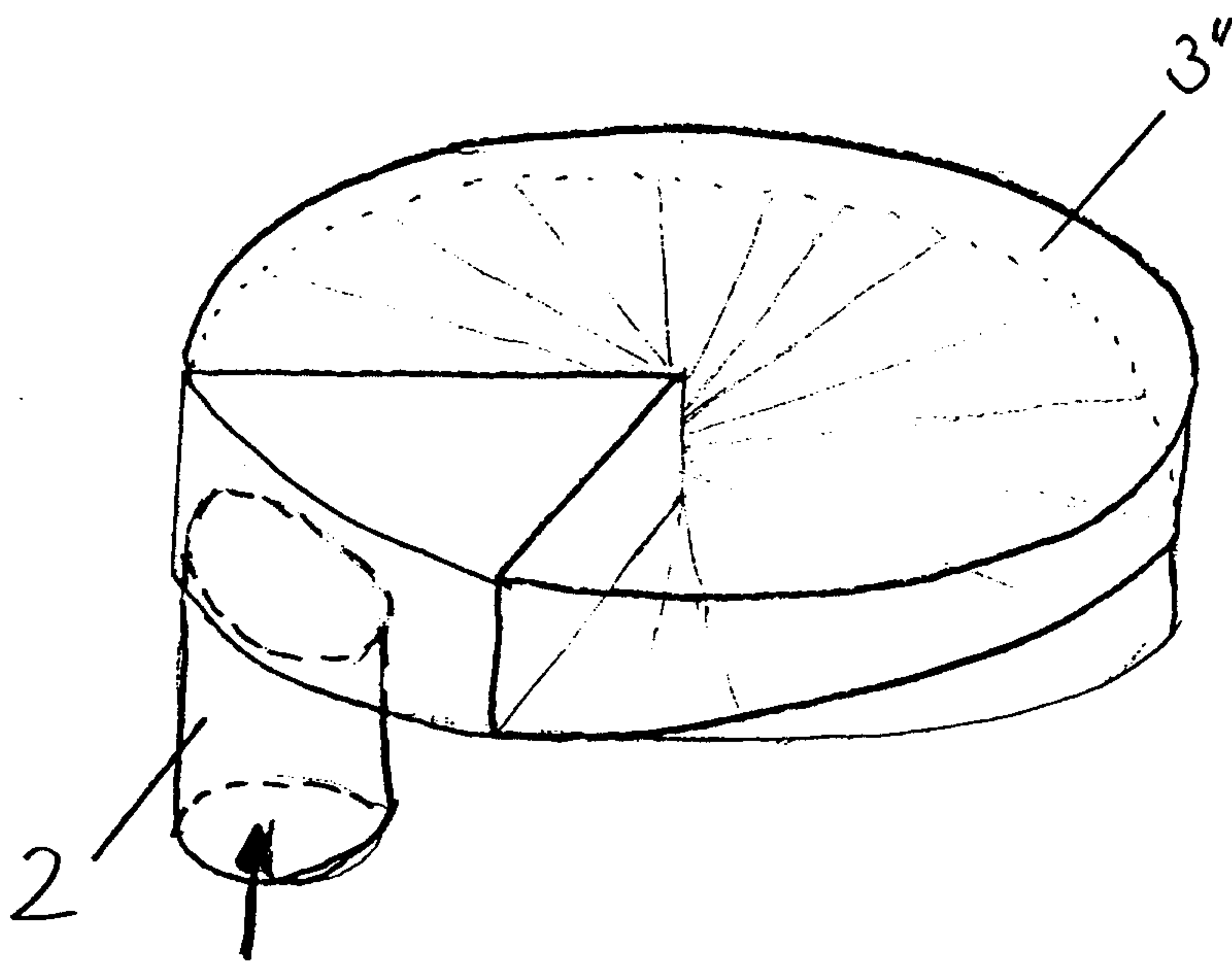


Fig 5

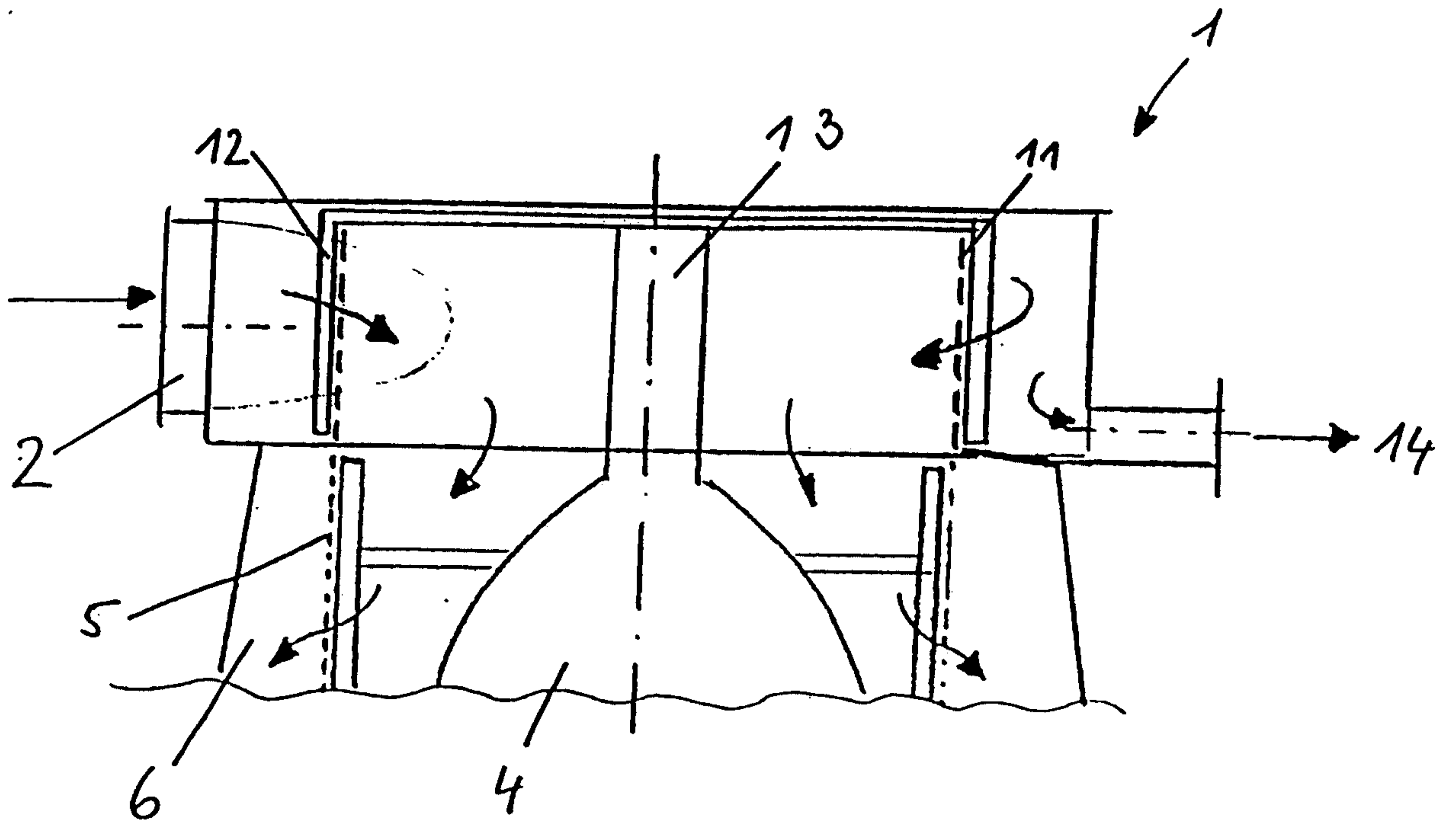


Fig. 6

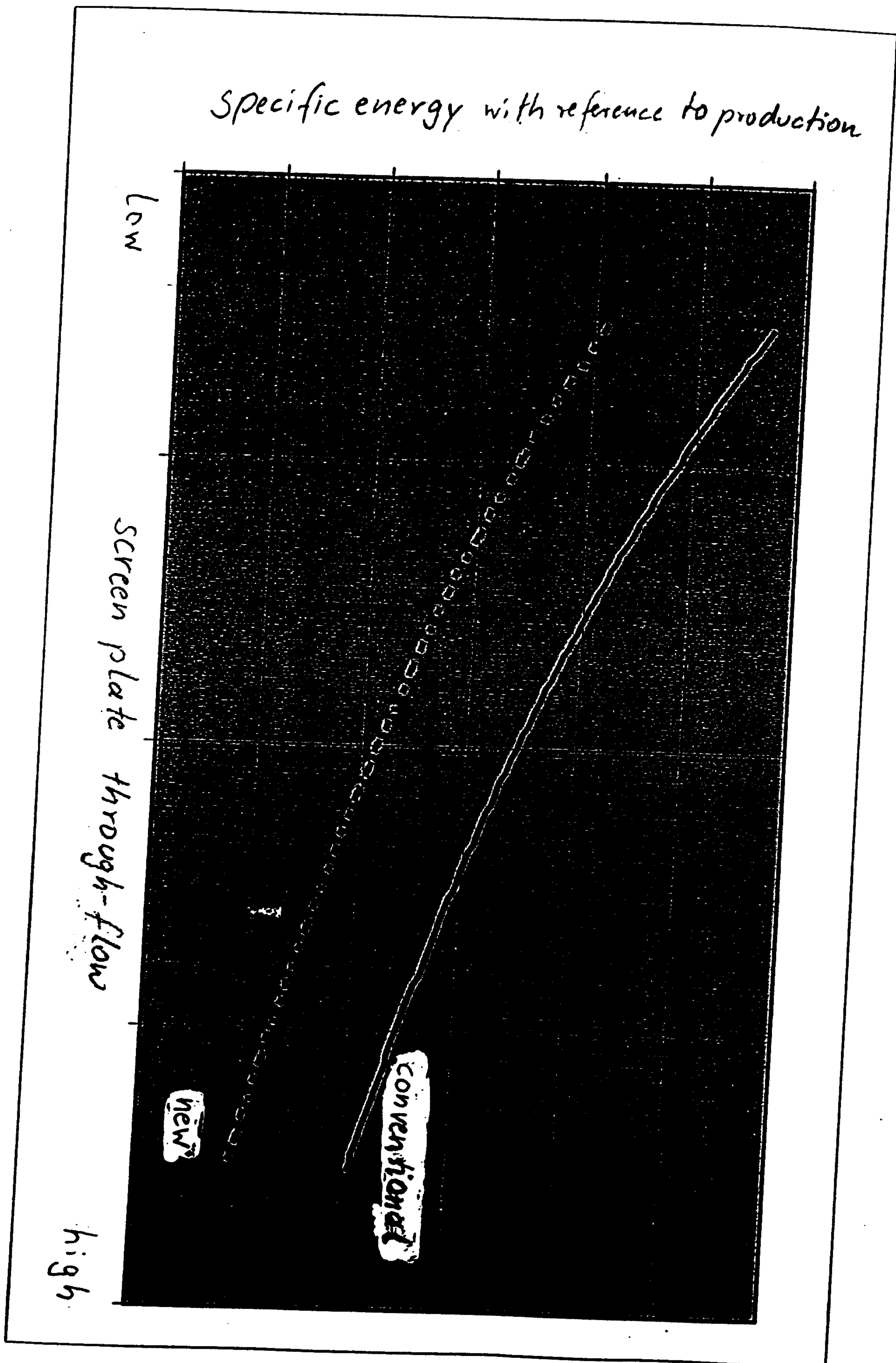


Fig. 7

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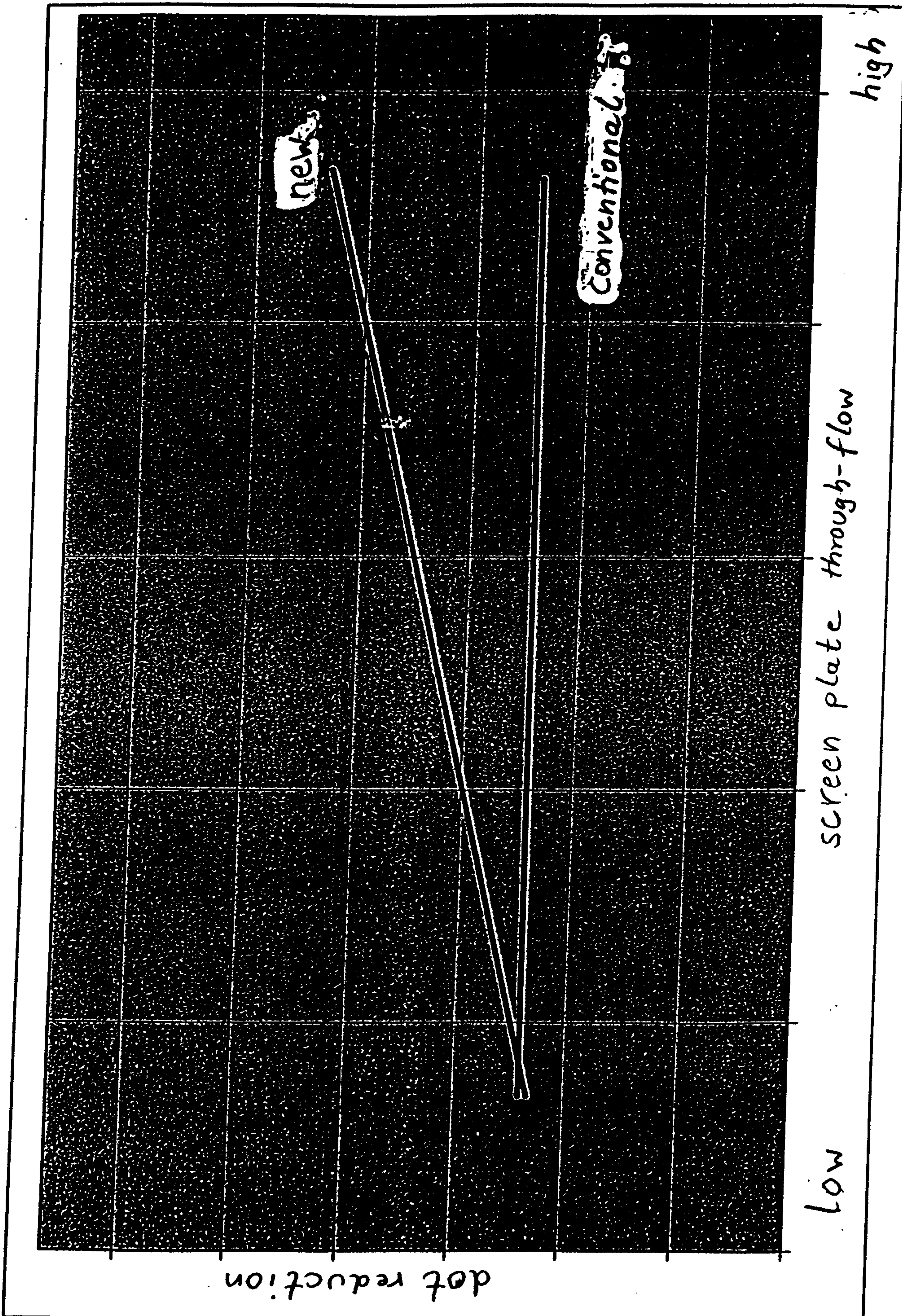


Fig. 8

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