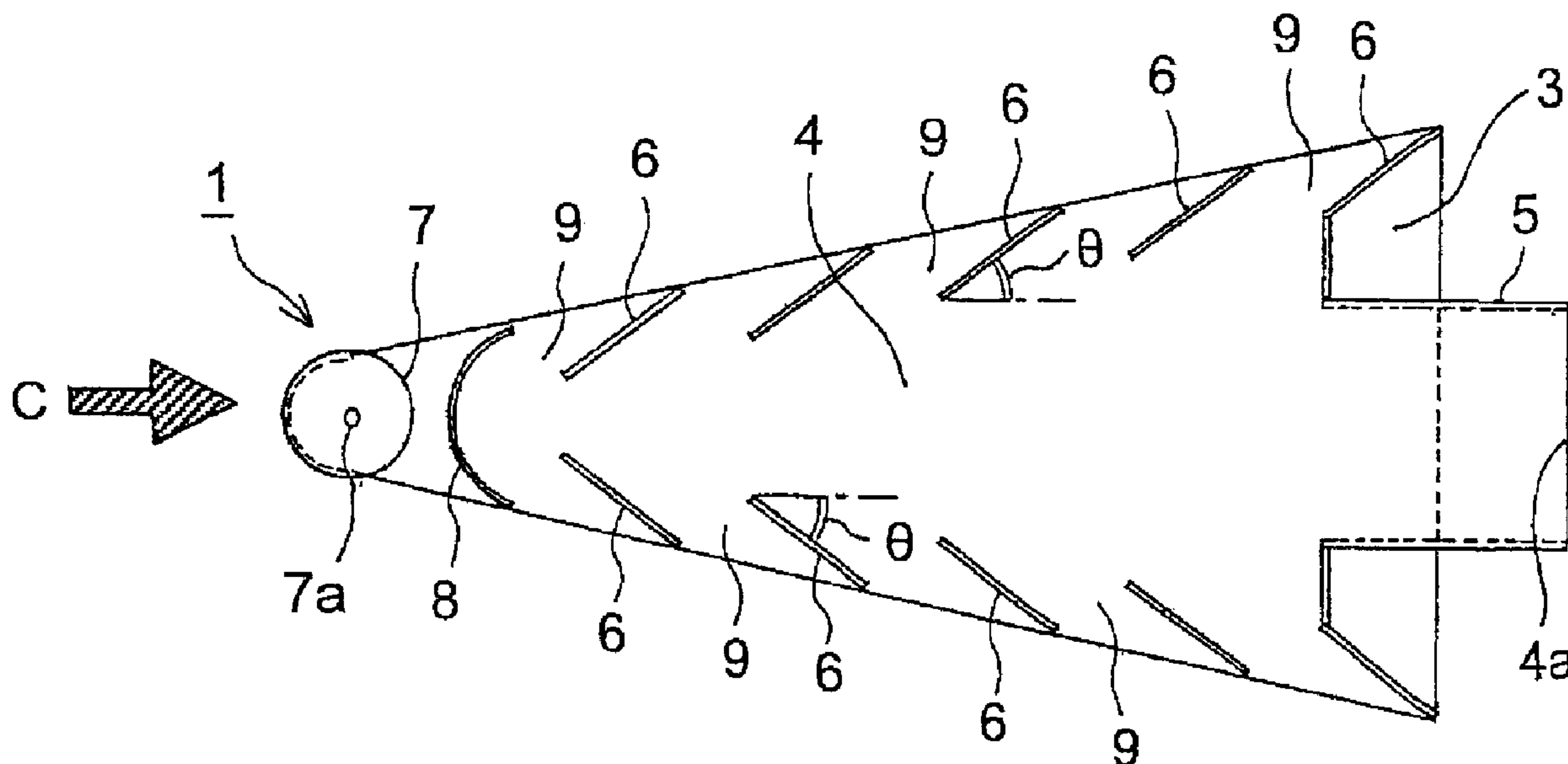




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(54) Titre : DISPOSITIF D'ADMISSION D'EAU
 (54) Title: WATER INTAKE DEVICE



(57) Abrégé/Abstract:

A water intake device for supplying or draining water from a water source to a water utilizing device is provided. The intake device comprises a chamber whose upstream side is a closed end and whose downstream side is provided with a water supply port, the width of the chamber being wider as it goes from the upstream side to the downstream side; vertical plates arranged in line along an inclined side portion of the chamber at a predetermined interval in a substantially vertically erect posture and a pair of supporting plates that supports the vertical plates by sandwiching the chamber. The extending direction of each vertical plate in a plan-view, which extends to an outside of the chamber, forms an acute angle with respect to a flow-down direction of the water source. Water entering the chamber via openings adjacent to the vertical plates are drained from the port.

ABSTRACT

A water intake device for supplying or draining water from a water source to a water utilizing device is provided. The intake device comprises a chamber whose upstream side is a closed end and whose downstream side is provided with a water supply port, the width of the chamber being wider as it goes from the upstream side to the downstream side; vertical plates arranged in line along an inclined side portion of the chamber at a predetermined interval in a substantially vertically erect posture and a pair of supporting plates that supports the vertical plates by sandwiching the chamber. The extending direction of each vertical plate in a plan-view, which extends to an outside of the chamber, forms an acute angle with respect to a flow-down direction of the water source. Water entering the chamber via openings adjacent to the vertical plates are drained from the port.

DESCRIPTION

WATER INTAKE DEVICE

Technical Field

[0001] The present invention relates to a water intake device for taking water from a river, a water channel, a water reservoir, a lake, the sea, etc. and sending the taken water to supply or drain the same to a water utilizing device such as a small-scale hydraulic power generating device and various water utilizing facilities, etc.

Background Art

[0002] For example, while a small-scale hydraulic power generating device cannot generate large output, because it does not require a commercial power supply and does not adversely affect the natural environment, it is used as a power supply with an output of less than a few kW such as in a mountain area and a farm. On an upstream side of the small-scale hydraulic power generating device, a water intake device is disposed to supply water taken from a river, a water channel, etc. to the hydraulic power generating device. The water intake device is required to function as a strainer for removing refuse.

[0003] In more detail, because refuse such as fallen leaves and dead branches are mixed in water flowing in a river, a water channel, etc., a water intake device of a small-scale hydraulic power generating device has to remove such refuse (contaminants) that has a possibility to adversely affect an operation of the hydraulic power generating device when taking water from the river, the water channel, etc. On the other hand, when the water intake device is configured to work in a filtration manner in which it merely prevents passage of refuse, refuse is easily accumulated in a filtering portion, which results in clogging, and moreover, it is highly possible that water is hardly taken. In addition, because refuse accumulated in the filtering portion has to be removed frequently in order to prevent clogging of the filtering portion, maintenance of

the water intake device becomes troublesome. In this connection, when the water intake device is configured such that water is able to forcibly flow back from the inside of the water intake device to an outside thereof, it is possible to relatively easily send refuse accumulated in the filtering portion back to a river, a water channel, etc. However, a water intake device including the configuration above requires high costs, and accordingly, it is not preferred in a small-scale system.

[0004] Conventionally, as a water intake device for a small-scale hydraulic power generating device, etc., there has been presented the one comprising a substantially cylindrical member whose one end in an axial direction is an closed end and the other end is provided with a water supply port, and in this type of the conventional water intake device, a large number of round holes whose diameters are smaller than the objects to be removed are arranged on a cylindrical surface of the substantially cylindrical member (for example, see the Patent Document 1 below). The conventional water intake device is placed in a river, a water channel, etc., in a state where the axial direction thereof matches a flow-down direction of water and the closed end is directed to an upstream side of the river, the water channel, etc., so that water is taken from the river, the water channel, etc. via the round holes, and the taken water is sent to a small-scale hydraulic power generating device, etc. via the water supply port. According to the Patent Document 1, even when refuse such as fallen leaves attaches to the cylindrical surface and covers the round holes, water flowing along the axial direction causes an action that peels the attached refuse off from the round holes, and therefore, refuse is hardly accumulated on the cylindrical surface that serves as a filtering portion.

Prior Art Document

Patent Document

[0005] Patent Document 1: Japanese Patent Application
Laid-Open No. 2007-187014 A

Summary

Problems to be solved by the Invention

[0006] However, when placing the water intake device for a small-scale hydraulic power generating device according to the Patent Document 1 in the river, the water channel, etc., as the number of the round holes that are covered by refuse such as fallen leaves increases, the round holes that are not covered thereby easily suck refuse because a flow rate of water flowing into the uncovered holes increases. For the reason above, if a flow rate of water flowing in the river, the water channel, etc. is not much large, the refuse attached to the cylindrical surface of the water intake device cannot be easily peeled off, which results in that a large amount of refuse remains attached thereon. That is, when installing the conventional water intake device in a place where a flow rate of water is large, refuse is hardly accumulated thereon, on the other hand, when installing it in a place where a flow rate of water is small, refuse is easily accumulated thereon. In this way, the conventional water intake device is inconvenience when using because a place suitable for installing the same is limited.

[0007] The present invention was made in view of such problems stemming from the conventional technique described above, and an object of the present invention is to provide a water intake device used in a water utilizing device such as a small-scale hydraulic power generating device and various water utilizing facilities, etc., on which refuse is hardly accumulated and whose maintenance is easy, and which is convenient when using because a place suitable for installing the same is not limited.

Means for solving the problem

[0008] In order to achieve the object described above, the present invention provides a water intake device placed in a river, a water channel, etc. to supply or drain water taken therefrom to such as a small-scale hydraulic power generating device, comprising: a water intake chamber whose upstream side is a closed end and whose downstream side is provided with a water supply port, and the width of the water intake chamber

being formed wider as it goes from the upstream side to the downstream side; a plurality of vertical plates that are arranged in line along an inclined side portion of the water intake chamber at a predetermined interval in a vertically or substantially vertically erect posture; a rotary roller that is disposed on a side upstream from the closed end of the water intake chamber and is rotatable about a vertical line; and a pair of supporting plates that supports the vertical plates by sandwiching the water intake chamber from above and below, wherein an extending direction of the each vertical plate in a plan-view, which extends to an outside of the water intake chamber, forms an acute angle with respect to a flow-down direction of the river, the water channel, etc., and water entering an inside of the water intake chamber via openings that are adjacent to the vertical plates are drained from the water supply port.

[0009] By placing the water intake device configured as above in a river, a water channel, etc., relatively large refuse such as dead branches flowing from an upstream side can be led aside (away to a right outside direction and/or a left outside direction of the water intake device) by the rotary roller, and moreover, refuse flowing toward the inclined side portions of the water intake chamber can be led to an outside of the water intake device by water current of the river, the water channel, etc. that flows along outer edges of the vertical plates. In addition, a flow rate of water entering the inside of the water intake chamber via the openings adjacent to the vertical plates becomes smaller by setting a total value of opening areas of all the openings of the water intake chamber to be sufficiently larger than an opening area of the water supply port, and accordingly, capacity of water to convey refuse decreases and the possibility that small refuse such as fallen leaves enters the inside of the water intake chamber becomes low. Therefore, according to the water intake device of the present invention, it is possible to effectively prevent retention and/or entering of refuse in either cases where the flow rate of water flowing

in the river, the water channel, etc. in which the water intake device is placed is large or small, and moreover, the water intake device according to the present invention can be manufactured at low cost due to its simple structure.

Furthermore, the water intake device according to the present invention has an effect of preventing retention and entering of refuse as well even when being installed so as to relatively move with respect to water that is at rest. That is, the water intake device according to the present invention makes it possible to prevent retention and/or entering of refuse when it is attached to a mobile body such as a vessel and used to take water from water that is at rest in such as a lake, the sea, etc.

[0010] In the water intake device according to the present invention, an average flow rate of inflow water at an inflow portion of the water intake chamber can be obtained by a following calculation formula, where a total value of opening areas of the inflow portion of the water intake chamber is S_1 and an opening area of the water supply port is S_2 :

An average flow rate of inflow water at the openings of the water intake chamber = a flow rate of drain water from the water supply port $\times S_2 / S_1$.

Therefore, when a total value of opening areas of the openings is set to be sufficiently large in accordance with a flow rate of drain water from the water supply port and an opening area of the water supply port, a flow rate of water flown thereinto from the openings becomes constantly smaller than that of water flowing in the river, the water channel, etc. at an installation place of the water intake device, which results in that the effect to prevent retention and/or entering of refuse can be preferably enhanced.

[0011] Furthermore, when the water intake device according to the present invention is configured such that the water intake chamber includes a pair of side portions which are inclined in mutually opposite directions and the vertical plates are arranged in line on at least one of the side portions,

it is also possible to obtain the effect to prevent retention and/or entering of refuse. In this case, when the plurality of the vertical plates are arranged on both of the side portions of the water intake chamber in a linear symmetrical positional relationship and the each vertical plate located on mutually corresponding positions of the both side portions is arranged in a plan-view shape widening from the upstream side to the downstream side, it is possible to design the structure of the water intake device to be symmetrically, which excels in balance of both its appearance and function.

[0012] Furthermore, when the water intake device according to the present invention is configured such that the each vertical plate is rotatably supported by the supporting plates so that an inclination angle of the each vertical plate with respect to the flow-down direction of the river, the water channel, etc. is adjustable, the inclination angle of the each vertical plate can be appropriately changed in accordance with the flow rate of water in an installation place thereof, and accordingly, it is possible to perform adjustment easily to attain the desired function.

Effect of the Invention

[0013] According to a water intake device of the present invention which is used in a water utilizing device such as a small-scale hydraulic power generating device and various water utilizing facilities, relatively large refuse such as dead branches flowing from an upstream side can be led aside (away to a right outside direction and/or a left outside direction of the water intake device) by a rotary roller, and moreover, refuse flowing toward inclined side portions of a water intake chamber can be led to an outside of the water intake device by water current of a river, a water channel, etc. that flows along outer edges of vertical plates. In addition, a flow rate of water entering the inside of the water intake chamber via openings that are adjacent to the vertical plates becomes smaller by setting a total value of opening areas of all the openings of the water intake chamber to be sufficiently larger

than an opening area of a water supply port, and accordingly, capacity of water to convey refuse decreases and the possibility that small refuse such as fallen leaves enters the inside of the water intake chamber becomes low. Therefore, according to the water intake device of the present invention, it is possible to effectively prevent retention and/or entering of refuse in either cases where a flow rate of water flowing in the river, the water channel, etc. in which the water intake device is placed is large or small. And moreover, the water intake device of the present invention has an excellent effect of easy maintenance and good usability where a place suitable for installing the same is not limited.

Brief Description of Drawings

[0014] [FIG.1] FIG. 1 is a side view of a water intake device according to a first embodiment of the present invention.

[FIG. 2] FIG. 2 is a sectional view taken along a line A-A of FIG. 1.

[FIG. 3] FIG. 3 is a back view seen from a direction B of FIG. 1.

[FIG. 4] FIG. 4 is a sectional view of a water intake device according to a second embodiment of the present invention.

[FIG. 5] FIG. 5 is a sectional view of a water intake device according to a third embodiment of the present invention.

Description of Embodiments

[0015] Hereinafter, embodiments according to the present invention will be described with reference to the drawings. Firstly, with reference to FIGs. 1 to 3, a water intake device according to a first embodiment, which is used in a water utilizing device such as a small-scale hydraulic power generating device and various water utilizing facilities, will be described.

[0016] A water intake device 1 illustrated in FIGs. 1 to 3 is placed in a river, a water channel, etc., and used to supply or drain water, which is taken from the river, the water channel, etc., and from which refuse is removed, to a water utilizing device such as a small-scale hydraulic power generating device

and various water utilizing facilities (not shown). The water intake device 1 is installed in the river, the water channel, etc., in a state where a longitudinal direction thereof matches a flow-down direction of water and a narrow width side thereof in a plan view (see FIG. 2) is directed to an upstream side of the river, the water channel, etc.

[0017] The water intake device 1 mainly includes a top and bottom pair of supporting plates (a top plate 2 and a bottom plate 3), a water intake chamber 4 which is a space formed between the top and bottom pair of supporting plates 2 and 3 and whose upstream side is a closed end, a water supply port 4a disposed on a downstream side of the water intake chamber 4, a water supply pipe 5 that serves as an extension member of the downstream side of the water intake chamber 4 and is arranged to surround the water supply port 4a, a plurality of vertical plates 6 that are arranged in line along inclined side portions of the water intake chamber 4, and a rotary roller 7 that is disposed on a side upstream from the water intake chamber 4 and is rotatable about a vertical line. In FIGs. 1 and 2, the upstream side of the river, the water channel, etc., in which the water intake device 1 is placed, is illustrated on the left side of each drawing and the downstream side thereof is illustrated on the right side of the drawings, and accordingly, the flow-down direction of water flowing in the river, the water channel, etc. corresponds to a direction illustrated with an arrow C. In the present embodiment, while a total of the ten vertical plates 6 is arranged on the inclined sides of the water intake chamber 4, the number of the vertical plates 6 can be appropriately selected. Also in the present embodiment, while the respective vertical plates 6 are set to be the same with each other in the values such as the length of the each vertical plate 6, an interval therebetween, and an inclination angle θ thereof with respect to the flow-down direction (the direction indicated by the arrow C) of the river, the water channel, etc., they can be set so as to differ from each other in the respective values above.

[0018] The top and bottom pair of supporting plates 2, 3 that is both made to have the same size and shape is arranged in parallel to face each other. As illustrated in FIG. 2, the plan-view shape of the supporting plates 2, 3 is formed into an isosceles triangular shape in which the space between the equal length sides is gradually widened from the upstream side to the downstream side. When placing the water intake device 1 on the river, the water channel, etc., the pair of supporting plates 2, 3 is set in a substantially horizontal state and then the narrowed side of the pair of supporting plates 2, 3 is directed toward the upstream side. In the present embodiment, the top and bottom pair of supporting plates 2, 3 is arranged in parallel and made to have the same size and shape, and the plan-view shape thereof is formed in the shape of an isosceles triangle in which the space between the equal length sides is gradually widened from the upstream side to the downstream side. However, the supporting plates 2, 3 can be arranged in non-parallel and/or made to have different size and shape, and moreover, the plan-view shape thereof can be made into a shape other than an isosceles triangle.

[0019] An end portion of the water intake chamber 4 on the upstream side is closed by a cover member 8 that is a semicylindrical standing wall portion. The cover member 8 is supported by the supporting plates 2, 3 from above and below. Water in the water intake chamber 4 is drained from the water supply port 4a disposed on the downstream side and then supplied to a water utilizing device such as the small-scale hydraulic power generating device and various water utilizing facilities via a water sending pipe (not shown) connected to the water supply pipe 5.

[0020] The water intake chamber 4 is formed into an isosceles triangular shape in which the space between the equal length sides becomes wider as it goes to the downstream side in a plan-view, excluding a portion surrounded by the water supply pipe 5. On one of the inclined side portions of the water intake chamber 4 and the other inclined side portion thereof, a total

of the ten vertical plates 6 is arranged in a linear symmetrical positional relationship. Furthermore, openings 9 into which water is taken are provided respectively in each interval between the mutually adjacent vertical plates 6 and spaces formed between the cover member 8 and the vertical plates 6. That is, one of the inclined side portions of the water intake chamber 4 and the other inclined side portion thereof are respectively provided with the five vertical plates 6 which are arranged thereon in an erect posture at a predetermined interval (openings 9), and the respective vertical plates 6 are supported by the supporting plates 2, 3 from above and below. The vertical plates 6 located on one of the side portions of the water intake chamber 4 are arranged in parallel to each other, and those located on the other side portion of the water intake chamber 4 are also arranged in parallel to each other. As illustrated in FIG. 2, the each vertical plate 6 located on mutually corresponding positions of the both side portions of the water intake chamber 4 is arranged in a plan-view shape widening from the upstream side to the downstream side (an inverted V shape). Accordingly, an inclination angle θ of the each vertical plate 6 with respect to the flow-down direction (the direction indicated by the arrow C) of the river, the water channel, etc. in which the water intake device 1 is placed is an acute angle. The inclination angle θ is made between an extending direction of the each vertical plate 6 in the plan-view, which extends to an outside of the water intake chamber 4, and the flow-down direction of the river, the water channel, etc., and the inclination angle θ is preferably set appropriately within a range of 20° to 60° in accordance with a flow rate of water flowing in the river, the water channel, etc. In the present embodiment, the vertical plates 6 are arranged vertically to an axial direction while they may be arranged at an angle other than 90° .

[0021] The rotary roller 7 is disposed adjacent to a side upstream from the cover member 8 where is the closed end of the water intake chamber 4, and a rotary shaft 7a of the rotary roller

7 is supported by the supporting plates 2, 3 from above and below. That is, the rotary roller 7 is located at the uppermost stream side of the water intake device 1 that is placed in the river, the water channel, etc.

[0022] The water intake device is placed in the river, the water channel, etc., and water in the river, the water channel, etc. is flown in the inside of the water intake chamber 4 via the openings 9 and then drained from the water supply port 4a (the water supply pipe 5). At this time, refuse such as fallen leaves and dead branches conveyed together with water of the river, the water channel, etc. is prevented by the rotary roller 7, the cover member 8, and the vertical plates 6 and cannot easily enter the inside of the water intake chamber 4. In this way, water in which refuse is not included is flown into the inside of the water intake chamber 4, and such water is supplied or drained to a water utilizing device such as a small-scale hydraulic power generating device and various water utilizing facilities, etc. from the water supply pipe 5 via the water sending pipe. In addition, a total value of opening areas of all the openings 9 is set to be sufficiently larger than an opening area of the water supply port 4a so that a flow rate of water flown thereinto from the openings 9 becomes constantly smaller than that of water flowing in the river, the water channel, etc. at an installation place of the water intake device.

[0023] As described above, by placing the water intake device 1 according to the first embodiment in the river, the water channel, etc., relatively large refuse such as dead branches flowing from an upstream side can be led aside (away to a right outside direction and/or a left outside direction of the water intake device 1) by the rotary roller 7, and moreover, refuse flowing toward the inclined side portions of the water intake chamber 4 can be led to an outside of the water intake device 1 by water current of the river, the water channel, etc. that flows along outer edges of the vertical plates 6. In addition, the flow rate of water entering the inside of the water intake

chamber 4 via the openings 9 adjacent to the vertical plates 6 becomes smaller by setting the total value of the opening areas of all the openings of the water intake chamber 4 to be sufficiently larger than the opening area of the water supply port, and accordingly, capacity of water to convey refuse decreases and the possibility that small refuse such as fallen leaves enters the inside of the water intake chamber 4 becomes low. Therefore, according to the water intake device 1 of the present invention, it is possible to effectively prevent retention and/or entering of refuse in either cases where the flow rate of water flowing in the river, the water channel, etc. in which the water intake device 1 is placed is large or small. Furthermore, the water intake device 1 according to the present invention can be manufactured at low cost due to its simple structure.

[0024] In the first embodiment, the total value of the opening areas of all the openings 9 is set to be sufficiently larger than the opening area of the water supply port 4a, and accordingly, the flow rate of water flowing thereto from the openings 9 becomes constantly smaller than that of water in the river, the water channel, etc. in which the water intake device 1 is placed. Therefore, the effectiveness of preventing retention and/or entering of refuse are high.

[0025] Furthermore, in the first embodiment, because the plurality of the vertical plates 6 are arranged respectively on one of the inclined side portions of the water intake chamber 4 and the other inclined side portion thereof, and accordingly, water without including refuse to be removed can be effectively taken from both of the left and right sides of the water intake chamber 4. In addition, in the first embodiment, the vertical plates 6 are arranged on one of the inclined side portions of the water intake chamber 4 and the other inclined side portion thereof in a linear symmetrical positional relationship, and the each vertical plate 6 located on mutually corresponding positions of the both side portions of the water intake chamber 4 is arranged in a plan-view shape widening from the upstream

side to the downstream side (an inverted V shape). Accordingly, it is possible to design the structure of the water intake device 1 to be symmetrically, which excels in balance of both its appearance and function.

[0026] FIG. 4 is a sectional view of a water intake device 12 according to a second embodiment of the present invention, which is used in a water utilizing device such as a small-scale hydraulic power generating device and various water utilizing facilities, etc. In FIG. 4, the features that are the same as those of FIG. 2 are denoted by the same signs as those of FIG. 2, and explanations which overlap with those of FIG. 2 will be omitted hereinafter.

[0027] In the water intake device 12 illustrated in FIG. 4, the vertical plates 6 are arranged in line along only one of the inclined side portions of the water intake chamber 4 while arrangement of the vertical plates 6 on the other side portion thereof is omitted. This configuration can also obtain the effectiveness of preventing retention and/or entering of refuse. That is, when there is not necessary to take water from the other inclined side portion of the water intake chamber 4 for some reasons such as shape of the river, the water channel, etc. in which the water intake device 12 is placed and a flow rate of water flowing therein, it is sufficient to design the water intake device 12 such that water is taken into the inside of the water intake chamber 4 only from one of the side portions while closing the other side portion. In this way, it is possible to make the structure of the water intake device 12 simple. Furthermore, also in this case, by setting the total value of the opening areas of all the openings 9 to be sufficiently larger than the opening area of the water supply port 4a, the flow rate of water flowing thereto from the openings 9 becomes constantly smaller than that of water flowing in the river, the water channel, etc. in which the water intake device 12 is placed.

[0028] FIG. 5 is a sectional view of a water intake device according to a third embodiment of the present invention, which

is used in a water utilizing device such as a small-scale hydraulic power generating device and various water utilizing facilities, etc. In FIG. 5, the features that are the same as those of FIG. 2 are denoted by the same signs as those of FIG. 2, and explanations which overlap with those of FIG. 2 will be omitted hereinafter.

[0029] In the water intake device 13 illustrated in FIG. 5, the each vertical plate 6 arranged on the inclined side portions of the water intake chamber 4 is rotatably supported by the supporting plates 2, 3 so that the inclination angle θ of the each vertical plate 6 with respect to the flow-down direction of the river, the water channel, etc. in which the water intake device 13 is placed can be adjusted. In the water intake device 13, the inclination angle θ of the each vertical plate 6 can be appropriately changed in accordance with the flow rate of water in an installation place thereof, and accordingly, it is possible to perform adjustment easily to attain the desired function.

Explanation of References

- [0030] 1, 12, 13 water intake device
2 top plate (supporting plate)
3 bottom plate (supporting plate)
4 water intake chamber
4a water supply port
5 water supply pipe
6 vertical plate
7 rotary roller
8 cover member
9 opening
 θ inclination angle.

What is claimed is:

1. A water intake device placed in any one of a river, a water channel, a water reservoir, a lake, and the sea to supply or drain water taken therefrom to a water utilizing device including at least one of a small-scale hydraulic power generating device and various water utilizing facilities, comprising:

a water intake chamber whose upstream side is a closed end and whose downstream side is provided with a water supply port, and the width of the water intake chamber being formed wider as it goes from the upstream side to the downstream side;

a plurality of vertical plates that are arranged in line along an inclined side portion of the water intake chamber at a predetermined interval in a vertically or substantially vertically erect posture; and

a pair of supporting plates that supports the vertical plates by sandwiching the water intake chamber from above and below, wherein

an extending direction of the each vertical plate in a plan-view, which extends to an outside of the water intake chamber, forms an acute angle with respect to a flow-down direction of any one of the water source, the water reservoir, the lake, and the sea; and

water entering an inside of the water intake chamber via openings that are adjacent to the vertical plates are drained from the water supply port.

2. The water intake device according to Claim 1, further comprising a rotary roller disposed on a side upstream from the closed end of the water intake chamber and is rotatable about a vertical line.

3. The water intake device according to Claim 1 or 2, wherein a total value of opening areas of all the openings is set to be larger than an opening area of the water supply port.

4. The water intake device according to any one of Claims 1 to 3, wherein the water intake chamber includes a pair of side portions which are inclined in mutually opposite directions, and the vertical plates are arranged in line on at least one of the side portions.

5. The water intake device according to Claim 4, wherein the plurality of the vertical plates are arranged on both of the side portions of the water intake chamber in a linear symmetrical positional relationship, and the each vertical plate located on mutually corresponding positions of the both side portions is arranged in a plan-view shape widening from the upstream side to the downstream side.

6. The water intake device according to any one of Claims 1 to 5, wherein the each vertical plate is rotatably supported by the supporting plates so that an inclination angle of the each vertical

plate with respect to the flow-down direction of the one of the river, the water channel, the water reservoir, the lake, and the sea is adjustable.

FIG. 1

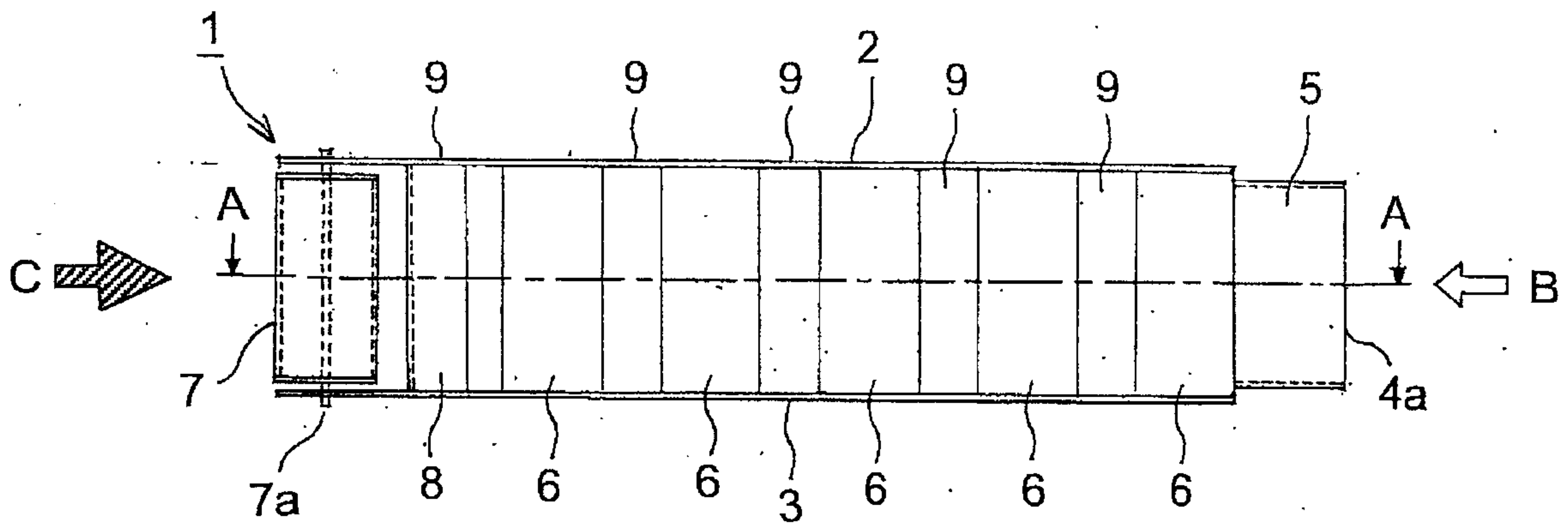


FIG. 2

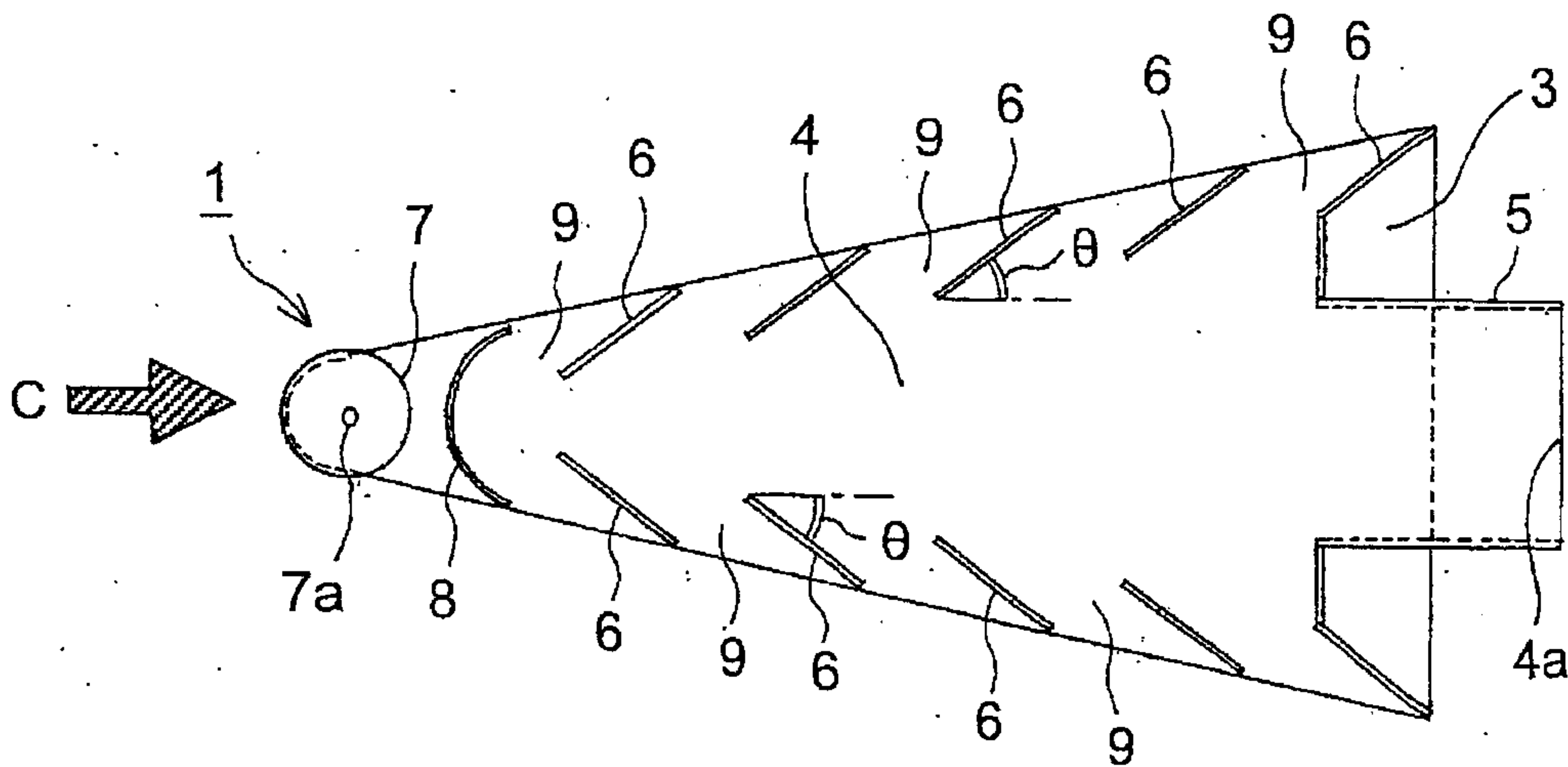


FIG. 3

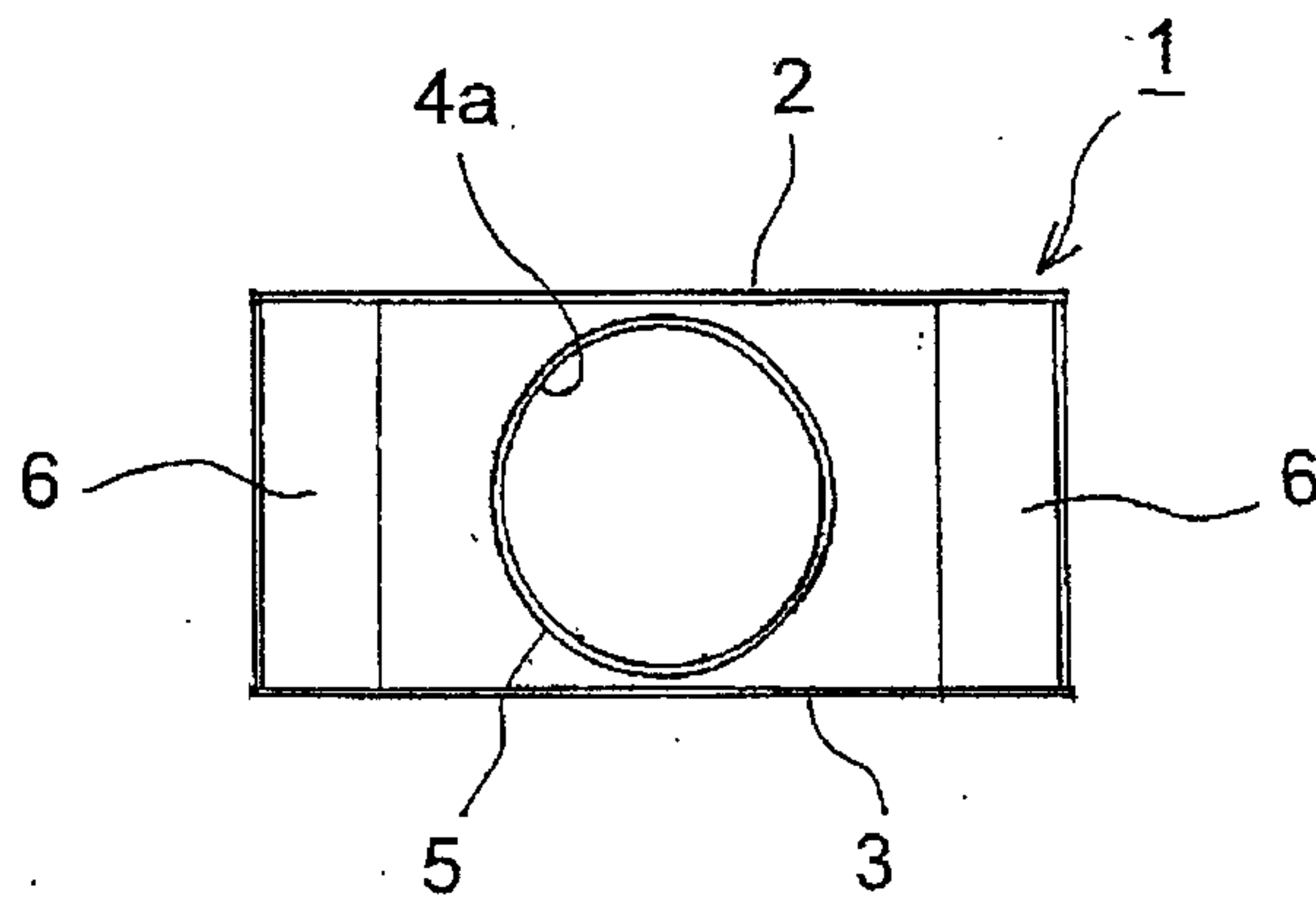


FIG. 4

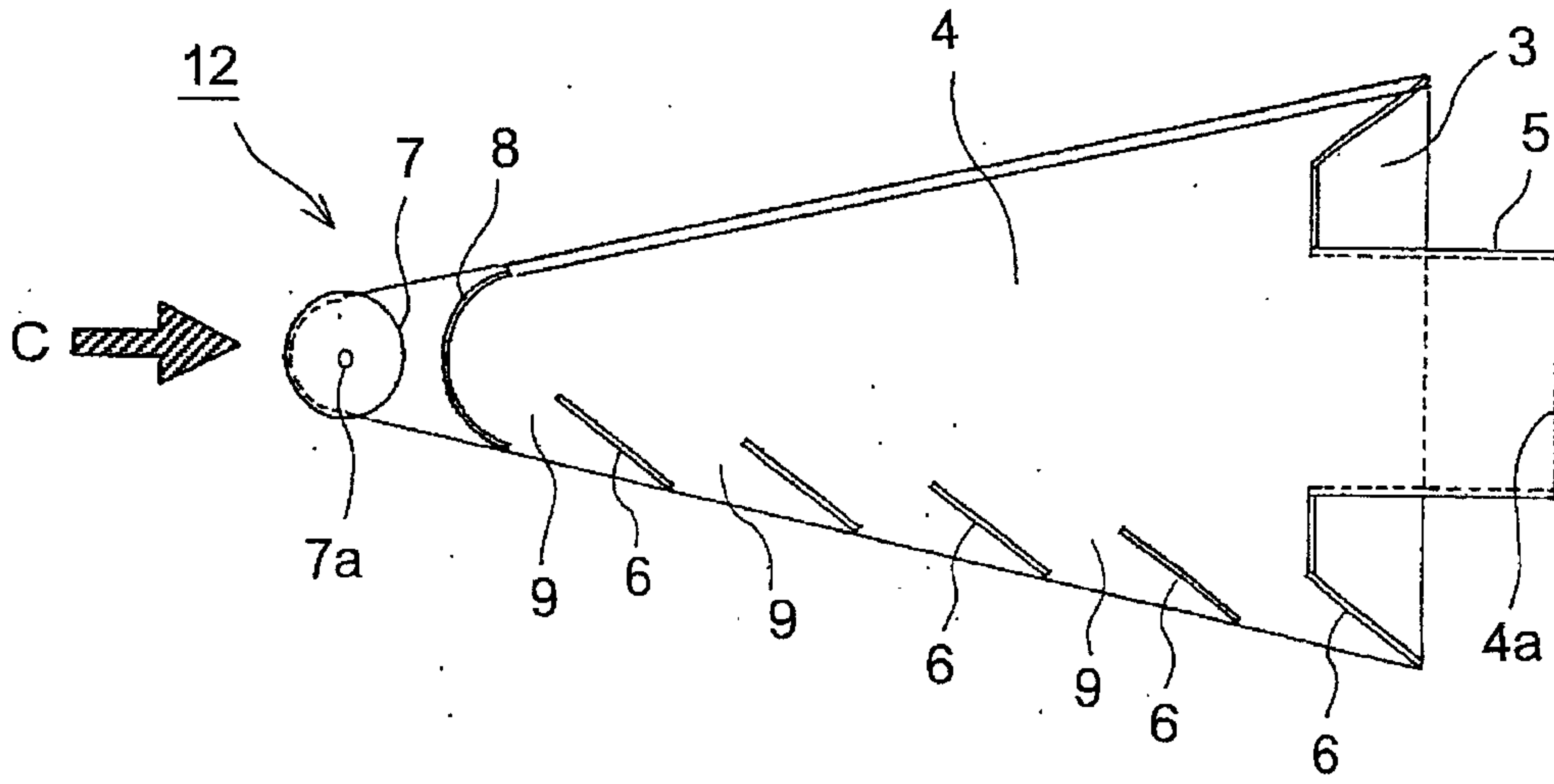


FIG. 5

