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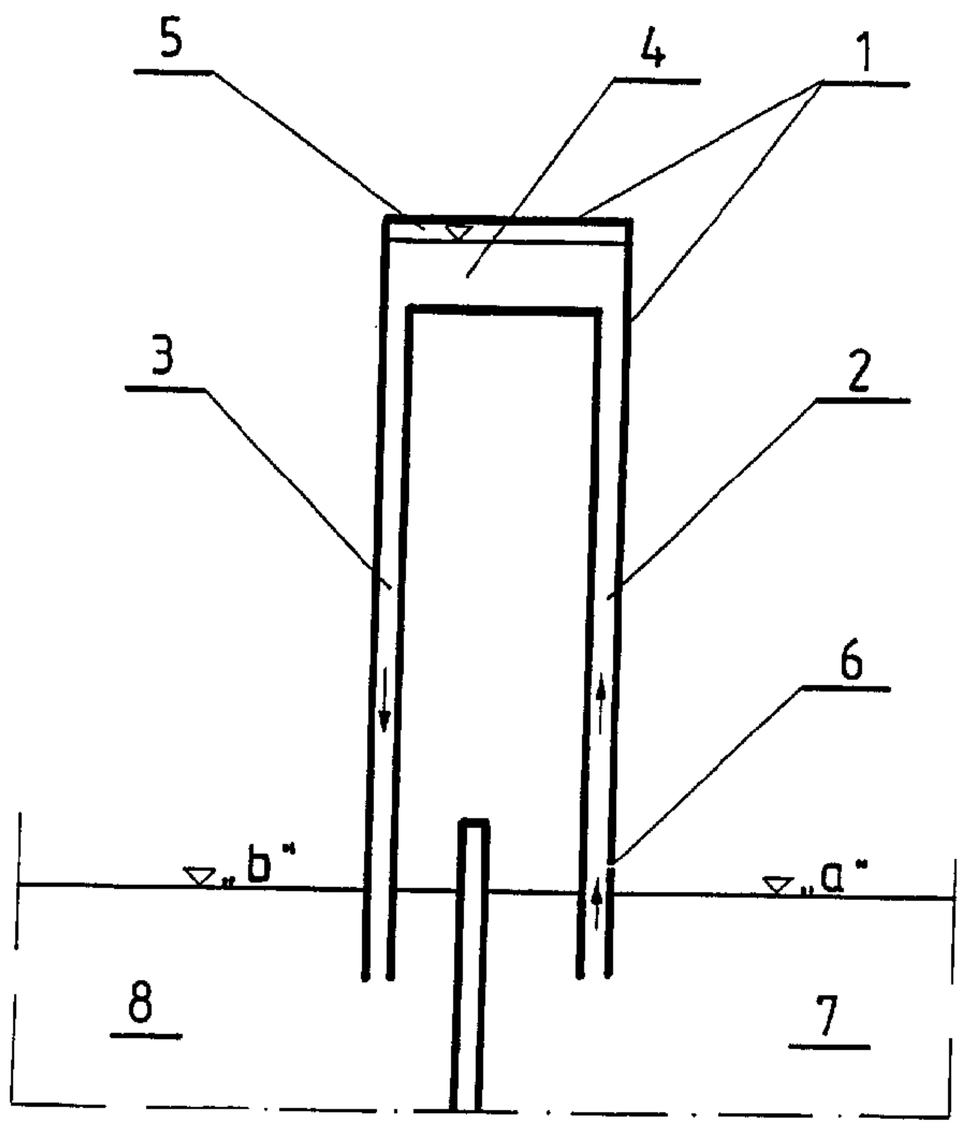
(72) Inventeur/Inventor:
GOLCZ, Andrzej, PL

(73) Propriétaire/Owner:
GOLCZ, Andrzej, PL

(74) Agent: GOWLING LAFLEUR HENDERSON LLP

(54) Titre : PROCEDE ET DISPOSITIF DE DEGAZAGE DE BOUES ACTIVEES
(54) Title: ACTIVATED SLUDGE DEGASSING PROCESS AND DEVICE



(57) Abrégé/Abstract:
A waste water purification process, in particular a continuous waste water purification process is disclosed, as well as a waste water purification plant system, in particular for continuous waste water purification. Waste water is purified in that an aerated mixture of waste water with activated sludge is degassed before being discharged into the secondary settling basin. The waste water purification system has a venting device (1) that connects the aerating container or a separate chamber thereof (7) to the secondary settling basin (10) or a separated chamber thereof (7). The venting device (1) is designed as a U-shaped tube. One of its branches forms the supply collecting pipe (2) and the second branch forms the discharge collecting pipe (3), whereas the section that interconnects its two top ends delimits the intermediate chamber (4) that contains a separate gas suction chamber (5).

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(71)(72) Anmelder und Erfinder: GÓLCZ, Andrzej [PL/PL]; Robotnicza 55/10, PL-82-300 Elblag (PL).

(74) Anwalt: WIERZCHON, Jan; Jan Wierzchon & Co., Patent and Trademark Office, Tamka 49/46, PL-00-355 Warszawa (PL).

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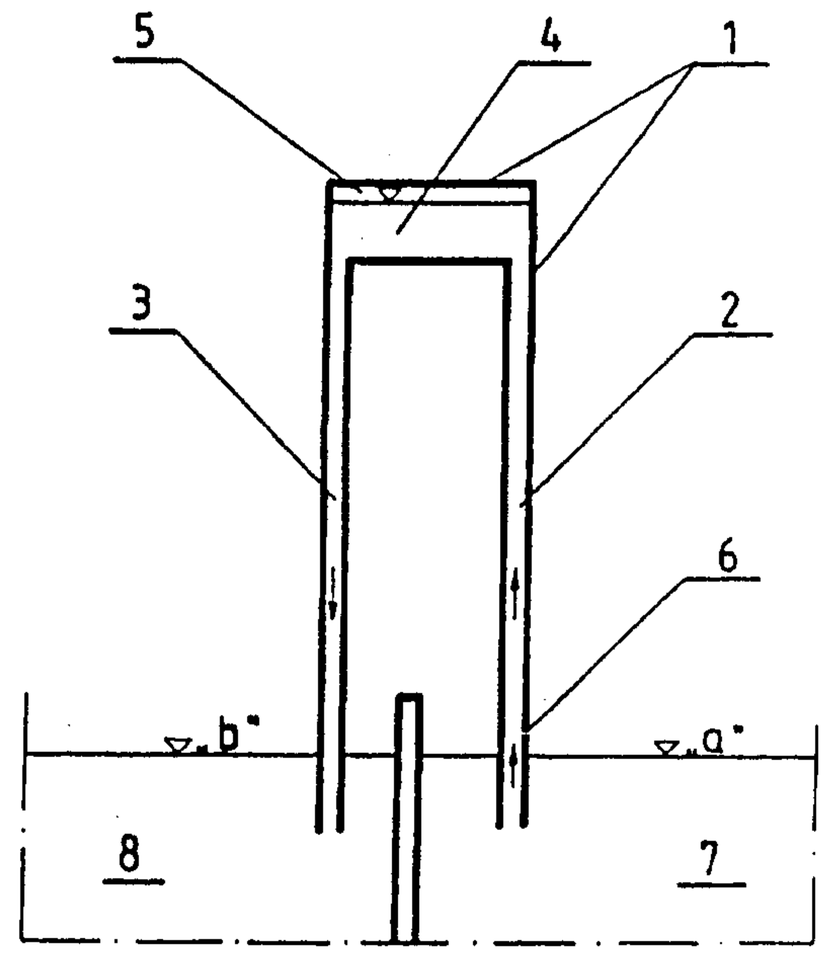
(54) Title: ACTIVATED SLUDGE DEGASSING PROCESS AND DEVICE

(54) Bezeichnung: VERFAHREN UND VORRICHTUNG ZUR BELEBTSCHLAMMENTGASUNG

(57) Abstract

A waste water purification process, in particular a continuous waste water purification process is disclosed, as well as a waste water purification plant system, in particular for continuous waste water purification. Waste water is purified in that an aerated mixture of waste water with activated sludge is degassed before being discharged into the secondary settling basin. The waste water purification system has a venting device (1) that connects the aerating container or a separate chamber thereof (7) to the secondary settling basin (10) or a separated chamber thereof (7). The venting device (1) is designed as a U-shaped tube. One of its branches forms the supply collecting pipe (2) and the second branch forms the discharge collecting pipe (3), whereas the section that interconnects its two top ends delimits the intermediate chamber (4) that contains a separate gas suction chamber (5).



(57) Zusammenfassung

Gegenstand der Erfindung ist die Weise der Abwasserreinigung, besonders der kontinuierlichen Reinigung, sowie das System der Abwasserreinigungsanlage, besonders für die kontinuierliche Reinigung der Abwässer. Die Reinigungsweise der Abwässer besteht darin, dass die belüftete Mischung der Abwässer mit dem belebten Schlamm, vor der Abführung in das Sekundärklärbecken, entgast wird. Das System der Abwasserreinigung besitzt eine Entlüftungsvorrichtung (1), bildend eine Verbindung des Belüftungsbehälters oder seiner abgeschiedenen Kammer (7) mit dem Sekundärklärbecken (10) oder seiner abgeschiedenen Kammer (8). Die Entlüftungsvorrichtung (1) besitzt die Gestalt eines Rohres in Form des umgekehrten Buchstabens U, dessen einer Arm das Zuführungssammelrohr (2) bildet, wogegen der zweite Arm das Abführungssammelrohr (3) ist, dagegen der Abschnitt, verbindend ihre beiden oberen Enden, die Zwischenkammer (4) mit dem in ihr abgeschiedenen Raum (5) der Gasabsaugung begrenzt.

Activated sludge degassing process and device

The present invention relates to a waste water purification process, especially to a continuous purification process, as well as to a waste water purification plant arrangement, especially a continuously working one.

In the known waste water purification processes consisting in making use of the active sludge, the mixture of that active sludge is held in suspension in the treated wastes and aerated, and after leaving the aeration tanks said mixture is directed to the secondary sedimentation tank in which sedimentation is continued by sludge precipitation. The precipitated sludge is once more used in the purification process, and the decanted liquid is directed to a receptacle as the cleaned waste water. The active sludge recirculated to the purification process maintains its ability to clean new quantities of raw wastes introduced continuously or in batches.

Purification processes of this kind, carried out especially in aeration chambers formed as deep tanks, e.g. deeper than 5 m, are connected with essential disadvantages when put in practice. It is because of the fact that the active sludge is characterised by its relatively low sedimentation capacity and/or the disadvantageous feature of sludge flocs coming up to the surface, what seriously renders it difficult, and in a case of very deep tanks or multi-storey processes simply makes it impossible to carry out the sedimentation in the secondary sedimentation tank.

It is known, in order to eliminate that effect, to use in wastes treatment processes an additional operation consisting in flocculating mixing the aerated wastes before their flow into the sedimentation tank, what makes the treatment process to be superfluously long-lasting, and frequently running in a chimerical way.

The base of this invention is the statement of a fact that flocs of the active sludge during the known wastes treatment processes have undesirable features resulting in limited effectiveness and capacity of said processes.

Basing on this statement operations and technical means have been used according to the present invention, causing new features being achieved by flocs of the recovery sludge, acting as the active sludge in the recirculation process, said features allowing to increase the effectiveness and capacity of wastes treatment.

A waste water purification process, especially continuous one, consisting in mixing wastes together with the active sludge and aerating

the resulted mixture in a tank, and afterwards discharging the aerated mixture into the secondary sedimentation tank, as well as in reusing the recovery sludge gathered in the secondary tank in the process of aerating wastes, is according to the invention characterised in that, the aerated mixture of wastes together with the active sludge is degassed before discharging said mixture into the secondary sedimentation tank.

Said degassing is advantageously carried out by sucking gas particles.

Said degassing is advantageously carried out by creating negative pressure.

Before degassing the aerated mixture is brought about in the state of turbulent and oriented flow, advantageously by introducing an additional air quantity in it.

A wastes purification plant arrangement, especially continuously working one, comprising any tank for aerating the mixture of wastes and active sludge, especially a multi-storey tank, connected by a one-way and recirculating connection to the secondary sedimentation tank, is according to the invention characterised in that, it has a venting device being a combination of the aeration tank or its separated chamber with the secondary sedimentation tank or its separated chamber.

The venting device is shaped as an upside-down U-pipe with one of its arms forming the supply collecting pipe, and the other one forming the discharge collecting pipe, while the segment connecting their upper ends delimits the intermediate chamber together with the gas suction chamber separated in it.

The lower ends of the supply collecting pipe and of the discharge collecting pipe are submerged in or connected respectively to the active sludge mixture aeration tank and to the secondary sedimentation tank or to the separated chamber of said tank and the separated chamber of said secondary tank.

The supply collecting pipe is provided with the opening located above the level of wastes to be aerated, said wastes filling the tank designed for wastes to be treated, or above the chamber separated in said tank.

Advantageously a suction and force pump is placed in the supply collecting pipe or alternatively a suction and force pump is placed in the discharge collecting pipe.

The mixture level in the aeration tank or in the chamber separated in it is higher than the mixture level in the secondary sedimentation tank

or in the chamber separated in it. The gas suction chamber is connected to a vacuum source, advantageously to a suction pump.

The present invention is based on the statement of a fact that flocs of the active sludge during waste treatment processes have undesirable features causing said processes to be not able to give satisfactory results.

The invention will be described in detail in its embodiment shown in the enclosed drawing in which Fig. 1 represents a wastes treatment device in a schematic partial view, and Fig. 2 represents the same device used in a wastes treatment plant arrangement having a multi-storey tank.

Venting device 1 comprises essentially an upside-down U-pipe, with one of its branches being a supply collecting pipe 2, and the second one being a discharge collecting pipe 3, whereas a section connecting their upper ends delimits an intermediate chamber 4 together with a gas suction chamber 5 separated in it. Lower ends of the supply collecting pipe 2 and the discharge collecting pipe 3 are submerged in or connected respectively to an active sludge mixture aeration tank and to a secondary sedimentation tank or they are connected to a separated chamber 7 of the container and to a separated chamber 8 of the secondary sedimentation tank, as it is shown in Fig. 1.

The supply collecting pipe 2 is provided with an opening 6 located above the "a" level of the waste water to be aerated, filling the waste water tank or the chamber 7 separated in it.

The gas suction chamber 5 is connected to a vacuum source, e.g. a vacuum pump not shown in the drawings.

In Fig. 2 there is shown the venting device 1 located between the last upmost chamber 9 in the multi-storey system for aerating the active sludge in the waste water to be treated, and the secondary sedimentation tank 10.

The movement and the turbulent flow of the formerly aerated mixture of waste water and active sludge is forced in the described venting device 1 by sucking an additional air quantity through the opening 6 located above the level of the liquid filling the chamber 7 of the aeration tank. An effect of a mammoth pump is used in this case in order to achieve that flow. The additionally introduced air quantity, causing the required reduction in the specific gravity of the mixture, is sucked then together with gases comprised in that mixture.

Example

Waste water having a contamination load of 30 kg O_2 per hour, and introduced in a quantity of 100 m^3/h into a typical municipal wastes purification plant, comprising a container for the mixture consisted of wastes and active sludge, was effectively and efficiently treated. The active sludge sedimentation capacity has been substantially increased on installing the venting device according to the present invention, making it able to increase the sludge quantity in the treatment system, and finally to achieve the effective and efficient wastes treatment process with capacity at least by 50% greater with no needs to use additional aeration tanks.

This effect may be obtained because after venting the formerly aerated mixture consisting of wastes and active sludge under vacuum conditions, caused by the venting device according to the present invention, flocs of the active sludge, surrounding micro-bubbles of a gas closed in them, are made free of that gas which in the above mentioned vacuum conditions expands to a many times greater volume, and in a result of that the micro-bubbles are disconnected from a floc, while its flocculate structure is almost entirely degraded. Afterwards, during the further flow through the venting device, in conditions of a negative pressure value decreasing in steps, individual sludge flocs, having a much greater specific gravity after said venting operation, and in a result of that a substantially increased their sedimentation capacity, are quickly rebound together.

The possibility is created by that to carry out the treatment by substantial and more advantageous for the process quantities of filiform micro-organisms comprised in the sludge without disturbing the sludge sedimentation capacity that can not be achieved by using the known processes.

Active sludge flocs, suspended in the suspension filling the secondary tank, produce, on degassing them, in a result of intrafloccule processes, a gas that does not create micro-bubbles in a sludge floc, but is dissolved in a previously outgassed mixture.

It has been determined that the active sludge gathered in the secondary tank, vacuum outgassed, and then directed once more to the aeration process as the recovery sludge is characterised by the increased absorbing capacity for contamination comprised in wastes to be treated, what substantially accelerates their treatment, including also bonding phosphorus contamination.

It has been also found that said sludge has higher resistance for sudden overloading by contamination.

We claim:

1. A waste water purification process, for continuous purification, consisting in mixing wastes together with the active sludge and aerating the resulted mixture in a tank, and afterwards discharging the aerated mixture into the secondary sedimentation tank, while using degassing, as well as in reusing the recovery sludge gathered in the secondary tank in the process of aerating wastes, characterised in that, the aerated mixture of wastes together with the active sludge is vacuum degassed, under the high negative pressure having a value of 90-97% of the vacuum, before discharging said mixture into the secondary sedimentation tank, said mixture is directly before said vacuum degassing brought about in the state of turbulent flow, by introducing an additional air quantity in it.

2. A wastes purification plant arrangement, for continuous wastes treatment, comprising any tank for aerating the mixture of wastes and active sludge, especially a multi-storey tank, connected by a one-way and recirculating connection to the secondary sedimentation tank by a upside-down U-shaped pipe conduit with one of its arms forming the supply collecting pipe, and the other one forming the discharge collecting pipe, characterised in that, it has a vacuum degassing means (1) in a form of a intermediate chamber (4) having a gas suction chamber (5) separated in it, being at least in its part a length connecting upper ends of both collecting pipes (2, 3) and having its cross-section greater than those of said collecting pipes connecting the aeration tank or its separated chamber (7) to the secondary sedimentation tank (10) or its separated chamber (8), and moreover it has means causing the turbulent motion of the mixture of wastes with the active sludge supplied into the intermediate chamber (4).

3. An arrangement according to claim 2, characterised in that, the gas suction chamber (5) is connected to a vacuum source.

4. An arrangement according to claim 2, characterised in that, the lower ends of the supply collecting pipe (2) and of the discharge collecting pipe (3) are submerged in or connected respectively to the active sludge mixture aeration tank and to the secondary sedimentation tank or to the separated chamber (7) of said tank and the separated chamber (8) of said secondary sedimentation tank.

5. An arrangement according to claim 2 or 4, characterised in that, means causing the turbulent motion being an opening (6) in the supply collecting pipe (2), said opening being located above the level (a) of wastes to be aerated, said wastes filling the tank designed for wastes to be treated or the chamber (7) separated in said tank.

6. An arrangement according to claim 2 or 4, characterised in that, a suction and force pump is placed in the supply collecting pipe (2).

7. An arrangement according to claim 2 or 4, characterised in that, a suction and force pump is placed in the discharge collecting pipe (3).

8. An arrangement according to claim 3, characterised in that, the vacuum source is a suction pump.

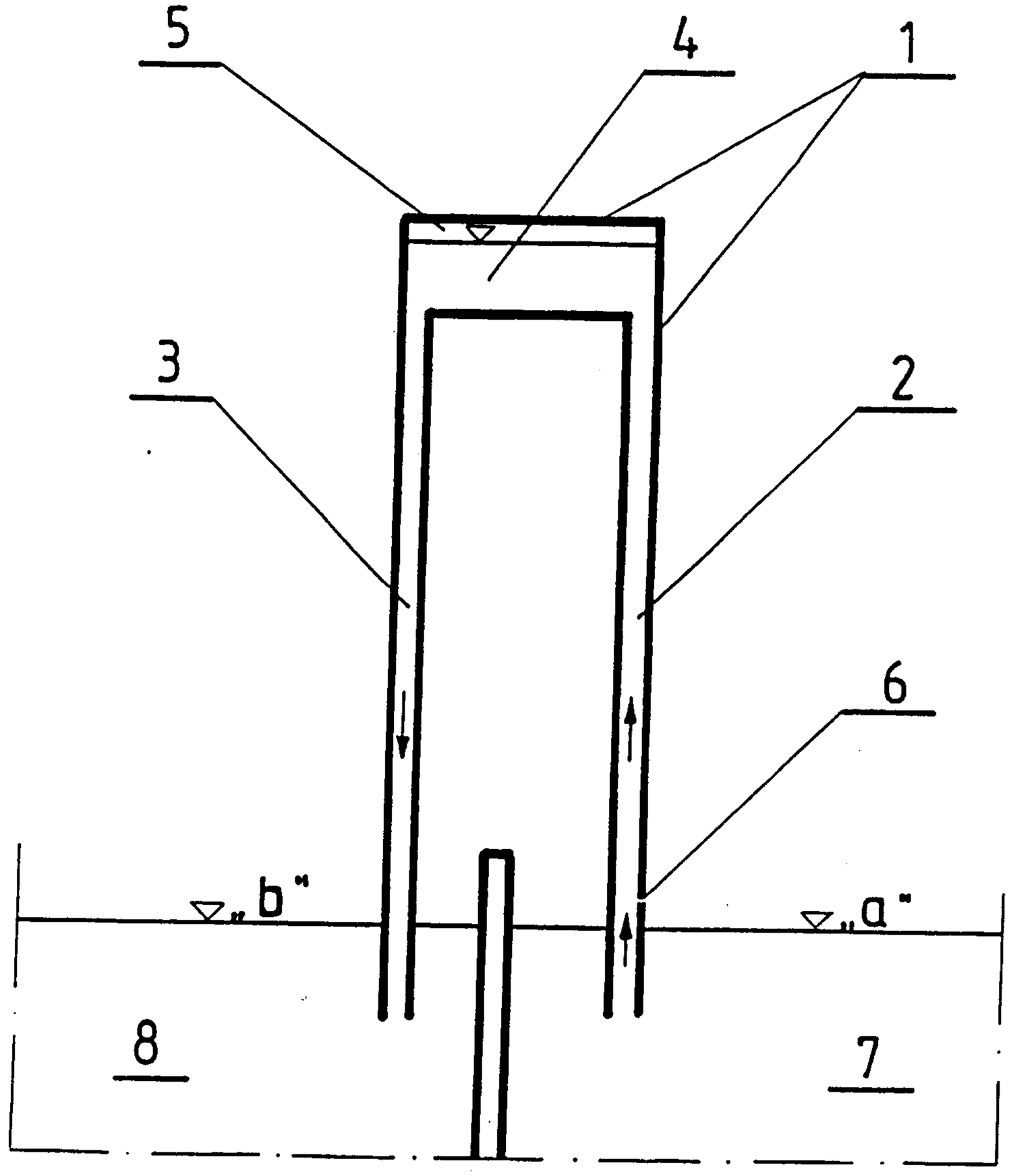


fig. 1

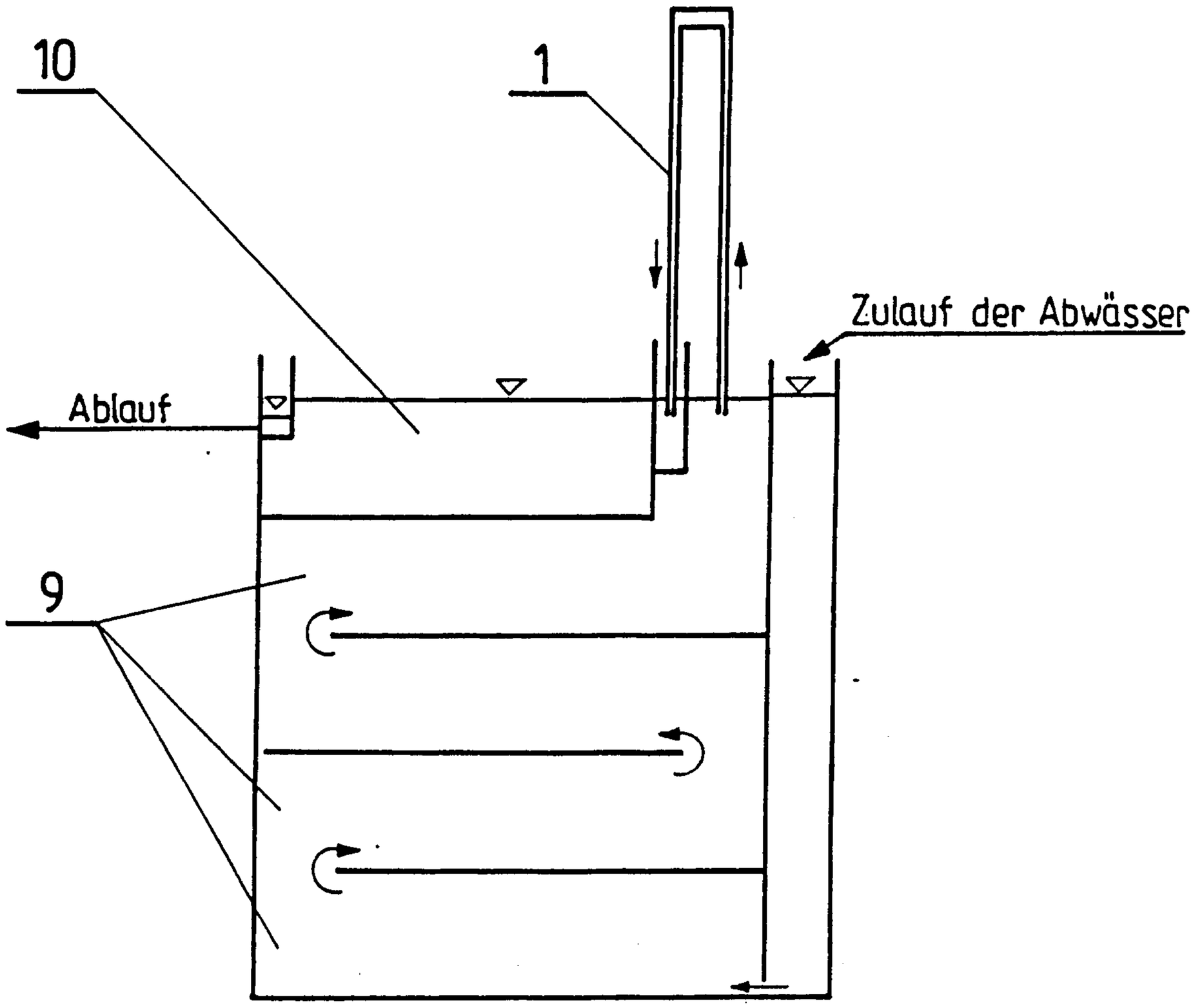
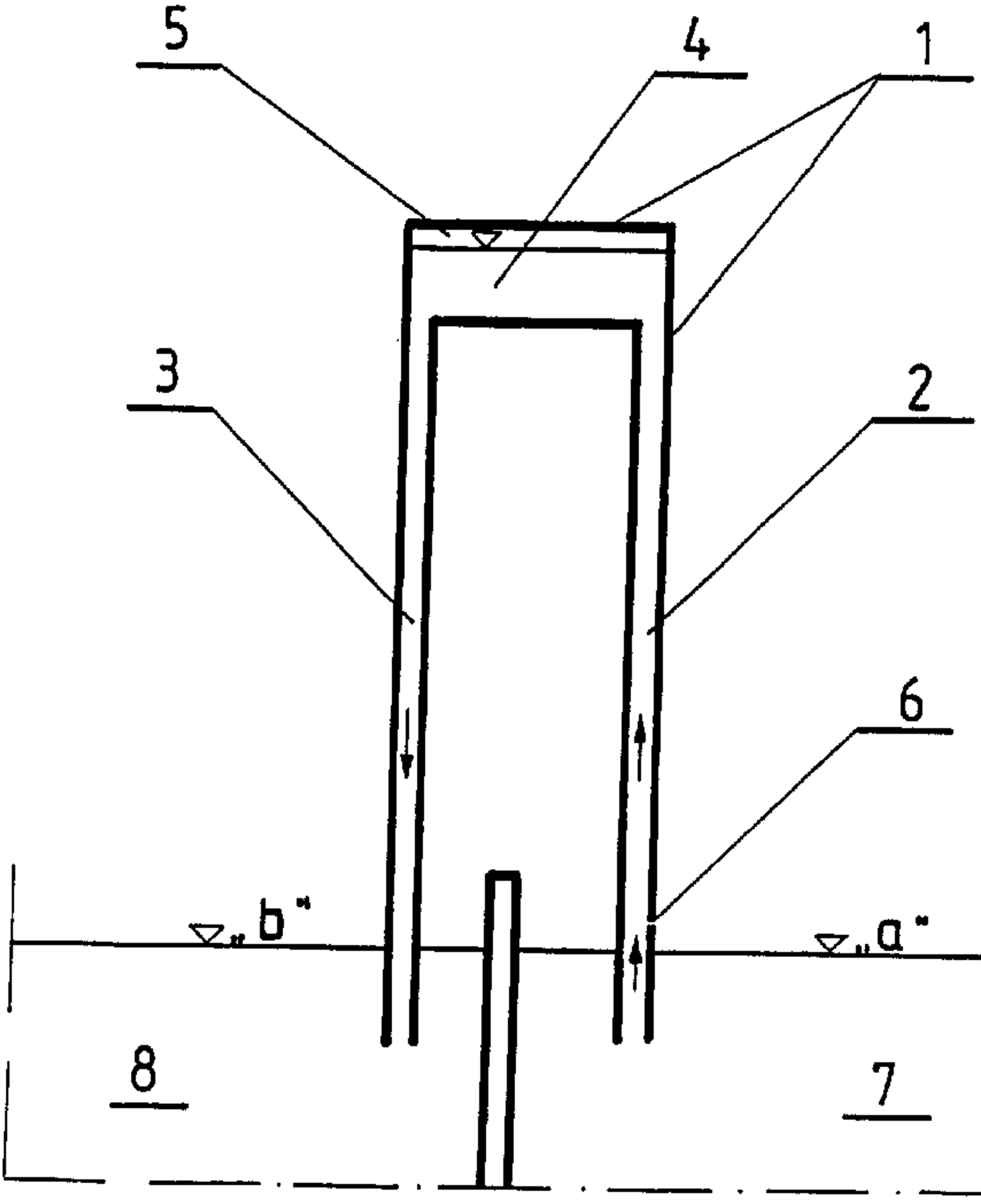


fig. 2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