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(71) Applicant : **ITT Flygt Aktiebolag**
Box 1309
S-171 25 Solna (SE)

(72) Inventor : **Arbeus, Ulf**
Pyrolavägem 38
S-181 60 Lidingö (SE)

(74) Representative : **Larsson, Sten**
Flygt AB Box 1309
S-171 25 Solna (SE)

(54) **Clog resistant pump.**

(57) The invention concerns a non-clogging pump of centrifugal or axial flow type.
The vanes (6) of the pump housing (5) are designed with strongly back swept leading edges (7) as seen in the direction of the flow, the vanes (6) being given a bulb form in the outward direction.

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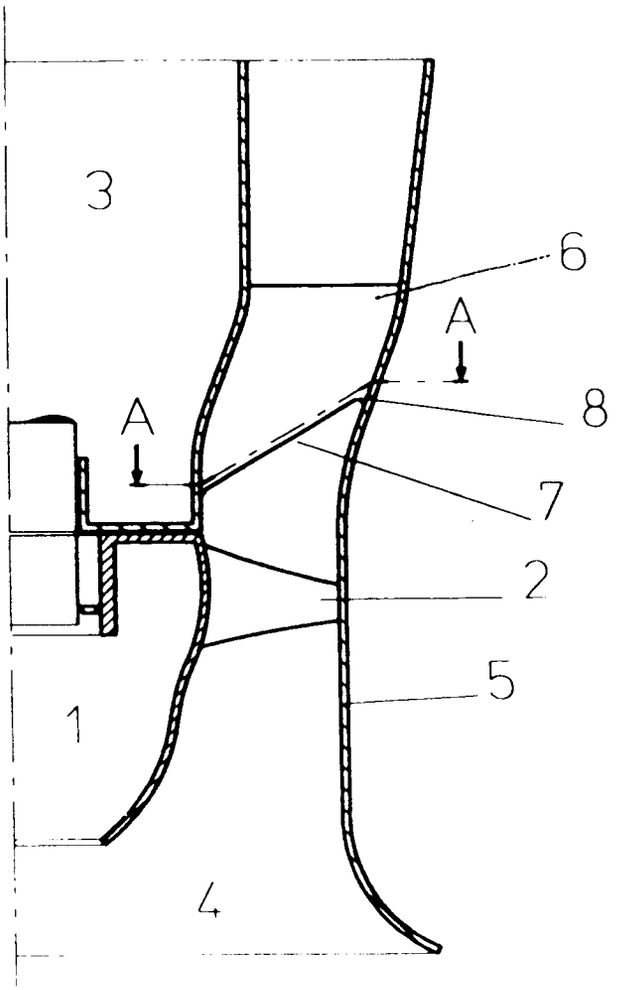


FIG 1.

This invention concerns a rotodynamic pump comprising an impeller rotating in a pump housing. Such pumps may roughly be categorized as centrifugal pumps and axial pumps.

The centrifugal pump comprises an impeller consisting of a hub, at least one cover disc on said hub and a number of vanes, a so-called open impeller. A closed impeller is provided with two cover discs and intermediate vanes. Common for the two types is that the liquid is sucked into the centre of the impeller in an axial direction and leaves it tangentially at the periphery.

The axial flow pump differs from the centrifugal pump in that the liquid leaves the pump in a substantially axial direction. This linking of the fluid is taken care of by a number of vanes in the pump housing after the impeller. These vanes also normally serve as supporting elements in the housing construction.

When pumping sewage water and certain types of process water containing elongated fibres, the pumping may be disturbed by rags, fibres etc getting stuck to the front edges of the vanes on the impeller and in the pump housing. Such build-ups can initially create vibrations in the pump, consequently the efficiency decreases and finally the pump might get totally clogged. One way to make the objects leave the vanes is to let the pump rotate backwards at certain intervals, but this is of course not an acceptable solution. Another way to diminish the clogging risk is to provide the pump with cutting means which divide the pollutions into pieces before they are sucked into the impeller. An example of such a solution is shown in the Swedish Pat No 820 5774-6. A disadvantage with this solution is that the cutting means may be quickly worn-out which might cause the clogging problem to become even worse.

The purpose of this invention is to solve the clogging problems mentioned above in a totally new and different way. The solution is obtained by help of the device stated in the claims.

The invention is described more closely below with reference to the enclosed drawings which show an axial and a meridian cut through an axially flow pump.

In the drawings 1 stands for an impeller hub provided with vanes 2. 3 stands for a motor unit, 4 an annular channel, 5 pump housing and 6 vanes having leading edges 7 and bulbs 8.

The pump operates in the following way:
The rotating impeller vanes 2 suck the liquid through the annular channel 4. When the liquid has passed said vanes it is linked by the vanes 6 for obtaining pressure energy.

In order to diminish the risk that fibres and the like will clog on the leading edge 7 of the vane 6, the latter is designed strongly swept backwards, as seen in the direction of the flow, causing the fibres to slip outwards in the direction of the wall 5 of the pump housing where the velocity is the highest. In addition, the vane is designed with a bulb 8 having increased thickness towards the wall 6 and with decreasing thickness towards the trailing edge of the vane. In this way the fibres easily slip over the edge of the vane and the bulb has only a slight influence on the flow as a whole. In order to prevent solid material from getting stuck in the transition between leading edge 7 and wall 5, said part is designed with a radius and no sharp corners.

By help of the invention is obtained a device which considerably diminishes the risk for clogging in pumps operating with liquids containing fibres, rugs etc.

Claims

1. A pump of axial flow type for pumping liquids containing pollutions such as elongated fibres, which pump comprises a motor (3) driving a rotary impeller (1) both surrounded by an essentially pipe formed pump housing (5) which supports the motor housing by help of a number of attaching means (6) arranged downstream of the impeller (1), said attaching means also serving as vanes for the liquid, characterized in that the leading edges (7) of the vanes (6) are swept backwards as seen in the direction of the flow, meaning that their respective attachments to the pump housing (5) are situated downstream of their respective attachments to the motor housing (3), said leading edges (7) being designed with a successively increasing thickness into a bulb form in the direction of the pump housing (5).

2. A pump according to claim 1, characterized in that the thickness increase of the vanes (6) is obtained by rounding of their respective pressure and suction sides.

3. A pump according to claim 2, characterized in that the rounding of the pressure side of the vane (6) is abruptly cut off at a distance from the attachment in the pump housing (5).

4. A pump according to claim 1, characterized in that the transition between the leading edge (7) of the vane (6) and the pump housing wall (5) is formed with a radius thus obtaining a smooth line without sharp edges.

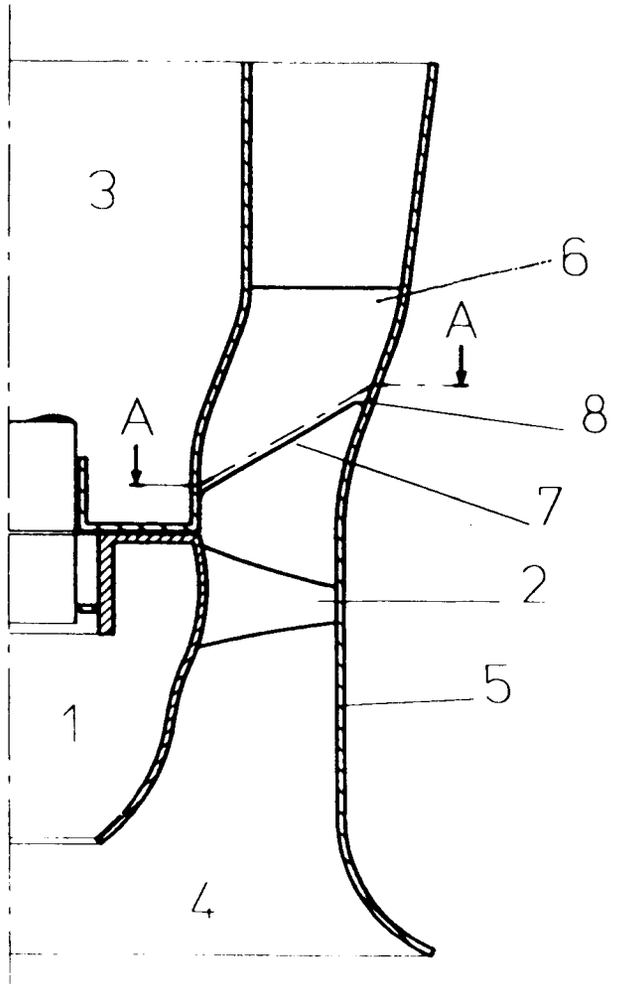


FIG 1.

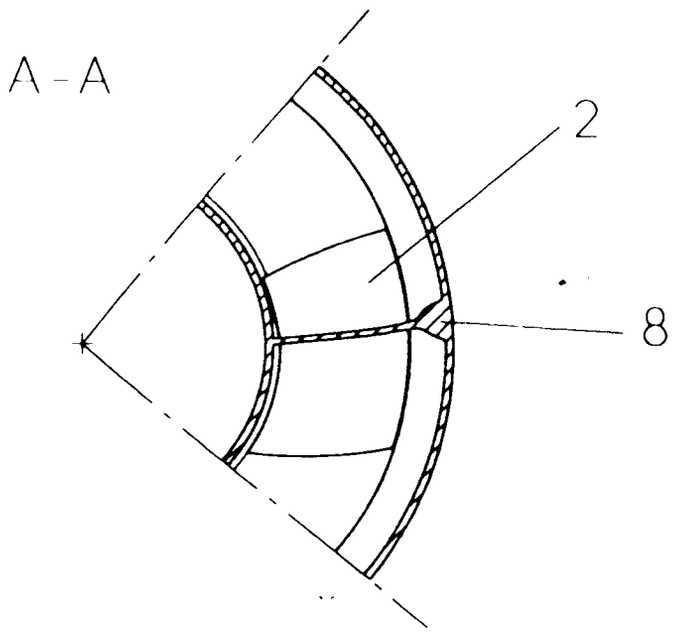


FIG 2.

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EUROPEAN SEARCH REPORT

Application number
EP 91850194.1

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 640 666 (INTERNATIONAL STANDARD ELECTRIC CORP.) *figure 1; abstract*		F 04 D 3/00, 7/04 29/54
A	DE-C- 475 984 (SCHULZ) *whole document*		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F 04 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	10-10-1991	JOHANSSON L.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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