Patent Claims

1. A membrane filter for filtering a liquid to be filtered, the membrane filter comprising:

a. at least one membrane carrier at which membranes are attached which facilitate filtering a liquid permeate from the liquid and wherein the membrane carrier includes a permeate collecting cavity at which the membranes are connected with an open permeate side, and a permeate outlet for letting the permeate out of the permeate collecting cavity;

b. a gas distribution system arranged below the at least one membrane carrier and including at least one downward open and upward closed tub which includes a wall with downward open vertical slots for distributing a gas into the liquid; and

c. at least one gas inlet into the gas distribution system ;

characterized in that

d. the at least one tub includes an inner edge respectively between adjacent slots in at least one vertical cross section orthogonal to the wall wherein the inner edge encloses an angle relative to horizontal of less 60° at least in a portion of a lower half of the slots in each point.

2. The membrane filter according to claim 1, characterized in that the gas distribution system is configured at a bottom side of the at least one membrane carrier.

3. The membrane filter according to one of the claims 1 or 2, characterized in that the at least one tub includes at least one vertical rib extending from the wall in an inward direction and respectively arranged between adjacent slots wherein an extension of the vertical rib into the at least one tub decreases in a downward direction.

4. The membrane filter according to one of the preceding claims, characterized in that the gas distribution system includes downward open gas distribution

channels which adjoin at least a portion of the slots on an outside for forwarding and distributing the gas away from the at least one tub .

5. The membrane filter according to the preceding claim, characterized in that the gas conducting channels adjoin the slots with a vertical upward offset.

6. The membrane filter according to one of the preceding claims, characterized in that the slots become wider in a downward direction.

7. The membrane filter according to one of the preceding claims, characterized in that the slots have cross sectional surfaces with different sizes.

8. The membrane filter according to one of the preceding claims, characterized in that the at least one gas inlet laterally adjoins the at least one tub.

9. A method for filtering a liquid in a membrane filter , including at least one membrane carrier , at least one gas inlet , and a gas distribution system with at least one downward open and upward closed tub which includes a wall with downward open slots, wherein

a. a gas flows through the at least one gas inlet into the at least one tub,

b. the gas fills the at least one tub and the slots up to a portion of a height of the slots with a gas cushion ,

c. the gas flows out the gas cushion through the slots in a laterally outward direction from the at least one tub and thus flows into the liquid at several locations below the at least one membrane carrier,

d. the gas generates a liquid flow at a phase boundary below the gas cushion during a lateral flow of the gas through the slots wherein the liquid flow is parallel to the lateral gas flow,

e. the gas rises in the membrane filter, and thus generates an upward movement of the liquid in the membrane filter, and

f. the rising liquid and the gas flush the at least one membrane carrier and membranes attached thereon,

characterized in that

g. the liquid flow that is generated below the gas cushion flows against an inner edge of the at least on tub respectively between adjacent slots in at least one vertical cross section orthogonal to the wall, wherein the inner edge includes an angle relative to horizontal of less than 60° at least in a portion of a lower half of the slots.

10. The method according to claim 9, characterized in that the gas after flowing through some of the slots flows through the gas conducting channels into portions of the membrane filter which are further remote in outward direction from at least one tub.

11. The method according to claim 9 or 10, characterized in that the gas distribution system is configured at a bottom side of the at least one membrane carrier and that the gas flows around the at least one membrane carrier after flowing into the liquid.