Patent Claims

1. A pump for conveying a highly viscous fluid having a kinematic viscosity of at least 10^{-4} m^2/s, comprising a casing (2) with at least a first inlet (3) and an outlet (4) for the fluid, an impeller (5) for conveying the fluid from the inlet (3) to the outlet (4), wherein the impeller (5) is arranged on a rotatable shaft (6) for rotation around an axial direction (A), and comprises a front shroud (7) facing the first inlet (3) of the pump, wherein the casing (2) is provided with a stationary impeller opening (8) for receiving the front shroud (7) of the impeller (5) and having a diameter (D), wherein the front shroud (7) and the stationary impeller opening (8) form a gap (9) having a width (R) in a radial direction perpendicular to the axial direction (A), characterized in that the ratio of the width (R) of the gap and the diameter (D) of the impeller opening (8) is at least 0.0045.

2. A pump in accordance with claim 1, wherein the ratio of the width (R) of the gap (9) and the diameter (D) of the impeller opening (8) is at least 0.0050.

3. A pump in accordance with anyone of the preceding claims wherein the ratio of the width (R) of the gap (9) and the diameter (D) of the impeller opening (8) is at most 0.0070.

4. A pump in accordance with anyone of the preceding claims, wherein the gap (9) has a length (L) in the axial direction which is at least 0.092 times the diameter (D) of the impeller opening (8).

5. A pump in accordance with anyone of the preceding claims, wherein the gap (9) comprises a plurality of lands (12) consecutively arranged with respect to the axial direction (A) and wherein two adjacent lands (12) are respectively separated by a groove (13).

6. A pump in accordance with anyone of the preceding claims, wherein the stationary inlet opening (8) comprises a wear ring (11) delimiting the gap (9) with respect to the radial direction, the wear ring (11) being arranged stationary with respect to the casing (2).

7. A pump in accordance with anyone of the preceding claims, wherein the impeller (5) comprises a wear ring (11') delimiting the gap (9) with respect to the radial direction, the wear ring (11') being arranged stationary with respect to the impeller (5).

8. A pump in accordance with anyone of the preceding claims being designed as a double suction pump, having a second inlet (3') for the fluid being arranged oppositely to the first inlet (3) of the pump, wherein the impeller (5) is designed as a double suction impeller (5) comprising vanes (51) for conveying the fluid both from the first inlet (3) and from the second inlet (3') to the outlet (4).

9. A pump in accordance with claim 8, wherein the impeller (5) comprises a second front shroud (7') facing the second inlet (3') of the pump, wherein the casing (2) is provided with a second stationary impeller opening (8) for receiving the second front shroud (7') of the impeller and having a diameter (D'), wherein the second front shroud (7') and the second stationary impeller opening (8') form a second gap (9') having a width (R') in the radial direction perpendicular to the axial direction (A), and wherein the ratio of the width (R') of the second gap (9') and the diameter (D') of the second impeller opening (8') is at least 0.0045.

10. A pump in accordance with claim 8 or 9, wherein the ratio of the width (R') of the second gap (9') and the diameter (D') of the second impeller opening (8') is at least 0.0050.

11. A pump in accordance with anyone of claims 8-10 wherein the second gap (9') has a length (L') in the axial direction which is at least 0.092 times the diameter (D') of the second impeller opening (8').

12. A pump in accordance with anyone of claims 8-11, wherein the second stationary inlet opening (8') comprises a second wear ring (11") delimiting the second gap (9') with respect to the radial direction, the second wear ring (11") being arranged stationary with respect to the casing (2).

13. A pump in accordance with anyone of claims 9-12, wherein the gap (9) and the second gap (9') are designed essentially in an identical manner.

14. A pump in accordance with anyone of the preceding claims being designed as a centrifugal pump, in particular as a single stage centrifugal pump.

15. A pump in accordance with anyone of the preceding claims being designed for the use in the oil and gas industry.