

PATENT SPECIFICATION

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(54) IMPROVEMENTS RELATING TO CENTRIFUGAL PUMPS

(71) I, EMIL JULIUS ASK, a Norwegian subject, of Aksnes, Haugesund, Norway, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to centrifugal pumps, that is to say pumps of the type having a casing containing a rotary bladed impeller and in which the casing inlet is aligned with the impeller axis whereas the casing outlet is at its periphery. This type of pump is comparatively cheap and has a large capacity in relation to its size.

It has, however, several disadvantages. The peripheral outlet for example is normally of a shape such that it can only be formed by casting and such pumps lack the capacity to evacuate a suction pipe or the pump liquid mixed with air.

Another type of pump is the so-called annular side channel pump in which both casing inlet and casing outlet extend axially at the periphery of the pump casing. Such a pump has a high pressure output and is self-priming. Its disadvantage is a low efficiency and a noisy performance.

An object of the invention is to provide a combination of these two types, whereby a pump is obtained which, in comparison with known centrifugal pumps, is self-priming, has a high capacity in relation to its dimension and which, compared with an annular side channel pump, has a quiet performance, a central inlet and thereby a good efficiency.

According to the present invention, there is provided a centrifugal pump comprising a bladed impeller rotatable within a casing having an axially directed central inlet and a tangentially directed peripheral outlet, the radially outer ends of the blades of the impeller being movable along the inner surface of the casing wall except at the outlet and being shaped so as to form with the adjacent casing wall, a circular side

channel or channels each communicating with the casing outlet.

According to a special embodiment of the invention, the pump can be provided with more than one outlet.

An embodiment of the invention is hereinafter described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a longitudinal part sectional view of a pump taken across the section A A in Figure 2; and

Figure 2 is a sectional plan view of the pump shown in Figure 1, taken across the section B B in Figure 1.

As shown in the drawing, the pump has an impeller with blades 4 mounted for rotation in a casing having an axially directed central inlet 1 and a tangential peripheral outlet 5. The impeller has an axial inlet 2 and the casing has an outlet opening 3. Circular side channels 6 are formed between the impeller blade ends and the adjacent casing wall, the radial clearance of the impeller blades being shown at point 7.

When the impeller rotates, the outer ends of the blades 4 sweep past the entire inner wall of the pump housing except at the outlet opening 3. The pumped medium is drawn into the centre of the pump through the inlet 1, and, as a result of the rotation, is thrown radially outwards between the blades 4. The pumped medium is then impelled by the blades with constantly rising velocity towards the side channels 6 and then out through the outlet 5 which functions as a diffuser.

With centrifugal pumps, problems arise on the production side because of the number of intended uses of the pumps and the number of capacities and heads. Usually pumps are formed in such a way that castings are the only way of manufacturing such units. This calls for a great number of expensive casting moulds. Pump manufacturers have therefore always wanted to be able to fabricate pumps from

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standard plates and flanges which can be welded together. However, the shapes of pumps have limited these possibilities to a minimum.

5 An advantage of this invention is that it has been possible to design the pump in such a way that the most economical production is to fabricate the whole pump. This has been achieved by avoiding a volute chamber or side channels formed in the pump housing itself.

10 Apart from the tangential outlet, the pump casing is completely circular inside and outside. The essential side channel is formed by the impeller blades and is circular. This gives the unique opportunity that by merely machining off various side channel depths on the periphery of the impeller vanes, different curves of head and capacities can be obtained.

20 This feature is unique from a production point of view, in order to meet the numerous demands for various heads and capacities, viscosities and specific speeds.

25 According to the present invention, the problems associated with a spiral housing have been solved by eliminating the volute chamber surrounding the impeller. To replace the volute chamber, the pump has been given circular side-channels. These side-channels communicate with the opening 3 of the outlet 5 which is of increasing cross-sectional area in the direction of flow. Being so shaped, the tangential outlet therefore acts as a diffuser or ejector to the medium being pumped. The side-channels 6 give the pump excellent self-priming properties, and the pump has been found to be able to function with a large quantity of air in the liquid without, as centrifugal pumps normally do, losing its pumping capacity. The forced flow in the side-channel, with each blade acting on the

liquid, ensures a high liquid velocity in the outlet which may be converted to pressure by the outlet diffuser. In this way a considerably higher pressure is obtained in a single-stage pump, with good efficiency at rather smaller capacities than with a conventional centrifugal pump. As a smaller outlet also limits the maximum volume flow which the pump can produce, the outlet opening can therefore be limited to the desired size in such a way that the power consumption of the pump as a function of the volume flow is almost identical for all heads, so that there is no risk of overloading of the motor. This design enables a very good result to be obtained when the same pump is to be used both as a fire pump and as a bilge pump.

WHAT I CLAIM IS:—

1. A centrifugal pump comprising a bladed impeller rotatable within a casing having an axially directed central inlet and a tangentially directed peripheral outlet, the radially outer ends of the blades of the impeller being movable along the inner surface of the casing wall except at the outlet and being shaped so as to form with the adjacent casing wall, a circular side channel of channels, each communicating with the casing outlet.

2. A pump according to claim 1, having more than one outlet.

3. A pump substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

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