Swivel impeller pump with low rotational speed

OSIM Patent 126143 B1, 2014
Ioan Alecu, Ion Antonescu, Dumitru Cuciureanu, Adrian Mihailă

"Gheorghe Asachi" Technical University of Iași alecu_ioan@yahoo.com

Q SRL Iași

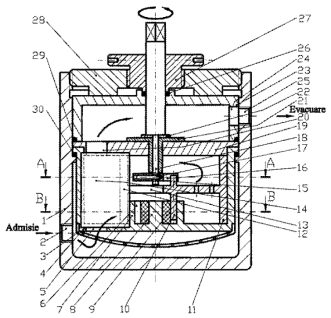
Introduction

It is a well-known fact that liquids are incompressible, and mechanical movement is required to move them. All known pumps require a high rotational drive mode causing the liquid to flow in laminar or turbulent mode depending on viscosity, speed and section. The laminar flow regime through pipes corresponding to the Reynolds criterion is achieved at low speeds, small sections and high viscosity, leading to a reduction in energy consumption. This is not the case with dynamic pumps due to the high speeds of the moving components required to transmit fluid energy. In the case of volumetric pumps, the laminar flow does not take place at high speeds or large flow sections. The technical problem solved by the invention consists in the realization of a volumetric pump to be operated with low rotation speed and possibly variable, in order to achieve the displacement of the liquid in laminar flow regime with low energy consumption. This allows the pump to be operated using energy sources with low and variable rotational speeds.

Motivation and Description of Work

The invention relates to a volumetric pump for liquids, operated manually or mechanically with a very low rotational speed and which can be variable or constant. The pump is intended for pumping liquids in industry, the construction of various machines, water purification, dosing pumps, bilge pumps and, in particular, for renewable energy systems, such as wind, hydraulic or photovoltaic installations, where the rotational speed is reduced and variable. Constructive solutions, currently known, for liquid pumps: volumetric, dynamic, axial piston, centrifugal, helical, vortex, etc. converts mechanical energy into hydraulic energy at a constant, relatively high speed, necessary to achieve the geodetic height for absorption and discharge, so as to avoid cavitation flow, and raising the liquid to different heights depending on the purpose for which they were built.

Results



Conclusions

According to the invention, the proposed solution eliminates the known disadvantages in that:- The operation of the pump does not require a high and constant speed for operation, allowing the direct use, without speed multipliers, of energy sources;- In case of using photovoltaic solar energy sources, it eliminates the need to use current inverters;- Reduced operating speed eliminates the need to use bearings for bearings;- In operation there are no problems related to cavitation, allowing the use of materials with low costs;- The component parts have relatively simple shapes, which do not require the use of complex manufacturing technologies.

References

[1] Hassan M. Badr, Wael H. Ahmed, Pumping Machinery Theory and Practice, John Wiley & Sons, Ltd, 2015

[2] J. Phillip Ellenberger, Piping and Pipeline Calculations Manual, Elsevier Inc. 2010