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(54) **Title**: MULTIPOLAR, AXIAL FLUX MOTOR, ESPECIALLY FOR PUMP

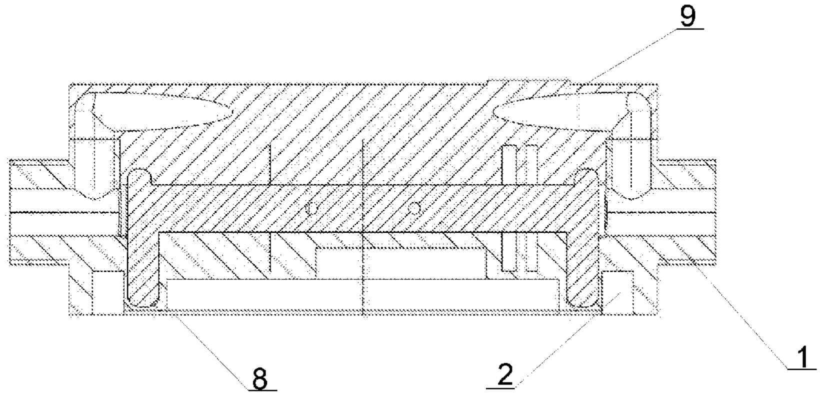

Fig. 2

(57) **Abstract**: Subject of invention is multi-pole axial flux motor, especially for centrifugal pump, especially segmented, axial flux synchronous motor, with three phase voltage, controlled by frequency converter. Multipolar axial flux motor is characterized in that stator teeth (4) are located in circumferencial channel (2), beneficially in pump housing (1), containing magnetic ring (3) with fixed magnets (31) and stator teeth (4) are fixed in circumferencial cut-outs (61) of stator ring (6), and have circumferencially located coils (5).

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Multipolar, axial flux motor, especially for pump

Subject of invention is multipolar, axial flux motor, especially for centrifugal pump, especially the segmented, axial flux synchronous motor, for three-phase voltage, controlled by frequency converter.

There are known axial flux motors for wet-running centrifugal pumps.

There is known, from Polish patent description No PL 191102B1, multiphase axial flux motor, with stator and rotator located on one side, where in stator containing electric ring-shaped windings, yokes having U-form are placed alternately one by one, in the same plane and assigned to phase windings, and yokes having I-form, whereas on the surface of rotator, close to yokes, over a flat, annular return conductor, permanent magnets are fixed, placed in rows shifted against each other in this way, that currents in ring windings have a phase shift, characterized in that neighbouring columns of U-shaped yokes, in each section of phase winding, are in front part mutually bent one towards other, and the middle columns of phase winding yokes are integrally connected and located close to two rows of permanent magnets.

There is known, from other Polish patent description No 206133B1 a synchronous machine for changing mechanical energy into electric one or electric energy into mechanic one, consisting of concurrent cylindrical surfaces, where on one surface grooves with stationary winding of power circuit are located and on the other surface, rotating field magnet of kinetic system is placed.

There is also known, from international application PCT No WO 2006027023 multipolar motor, linear or rotational, synchronous with direct drive, which contains basic and additional parts. Main part of the motor consists of yoke and many teeth and sockets.

Multipolar, axial flux motor, especially for pump, according to invention, is characterized in that teeth of stator are located in circumferencial channel, beneficially in pump housing, containing magnetic ring with fixed magnets. Teeth of stator are fixed in cut outs in stator and have circumferencially located coils. Ring of stator creates return path. Whereas magnetic ring contains beneficially 56 magnets, beneficially in form of rectangular plates, fixed on return ring. Stator teeth have rectangular cut-outs for circumferencial cut-outs of stator ring. Beneficially, proportion of radius R1 of magnetic ring of stator to radius R2 of magnetic ring, is 0,955.

Multipolar, axial flux motor, according to invention, thanks to integration of rotator magnet into pump rotator, in external place, possibly high torque is reached with lower number of magnets and coils, resulting in lower production cost of motor and pump. Introduction of big size radius of stator active ring has significantly increased the torque. Thanks to direct integration with pump active element – the rotator, presence of shafts and bearings has been eliminated, whereas the motor work stability is increased. Motor according to invention may be used for driving two types of devices like centrifugal compressors (centrifugal pumps) and piston pumps with magnetic coupler.

Invention is shown on drawings, where fig. 1 presents the idea of the motor, fig. 2 – cross-section of a pump with channel 2, fig. 3 – top view of a magnetic ring, fig. 4 – cross-section A-A from fig. 3, fig. 5 – 3-D view of a magnet 31, fig. 6 – top view of stator ring with installed stator teeth, fig. 7 – cross-section B-B from fig. 6, fig. 8 – top view of stator ring, fig. 9 – 3-D view of stator tooth.

Multipolar axial flux motor, integrated with a pump, beneficially centrifugal one, containing housing 1, drives rotator of pump 8 shielded with cover 9. Stator teeth

4 are located in circumferencial channel 2, beneficially in pump housing 1, containing magnetic ring 3 with fixed magnets 31. Stator teeth 4 are fixed in circumferencial cut-outs 61 of stator ring 6 and have coils 5, located circumferencially. Stator ring 6 creates return path 7. Stator teeth 4 have rectangular cut-outs 41 for circumferencial cut-outs 61 of stator ring 6. Proportion of radius R1 of stator magnetic ring 6 to radius R2 of magnetic ring 3, is 0,955.

Claims

1. Multi-pole axial flux motor, especially for driving centrifugal pump, integrated with pump, beneficially centrifugal one, driving pump rotator, characterized in that stator teeth (4) are located in circumferencial channel (2), beneficially in pump housing (1), which contains magnetic ring (3) with fixed magnets (31) and stator teeth (4) are fixed in circumferencial cut-outs (61) of stator ring (6) and have circumferencially located coils (5).
2. Multipolar axial flux motor, especially for driving centrifugal pump, according to claim 1, characterized in that the stator ring (6) creates return path.
3. Multipolar axial flux motor, especially for driving centrifugal pump, according to claim 1, characterized in that the magnetic ring (3) contains 56 magnets (31), beneficially in form of rectangular plates, fixed on return ring (7).
4. Multipolar axial flux motor, especially for driving centrifugal pump, according to claim 1, characterized in that stator teeth (4) have rectangular cut-outs (41) for circumferencial cut-outs (61) of stator ring (6).
5. Multipolar axial flux motor, especially for driving centrifugal pump, according to claim 1, characterized in that the proportion of radius (R1) of stator ring (6) to radius (R2) of magnetic ring, is 0,955.

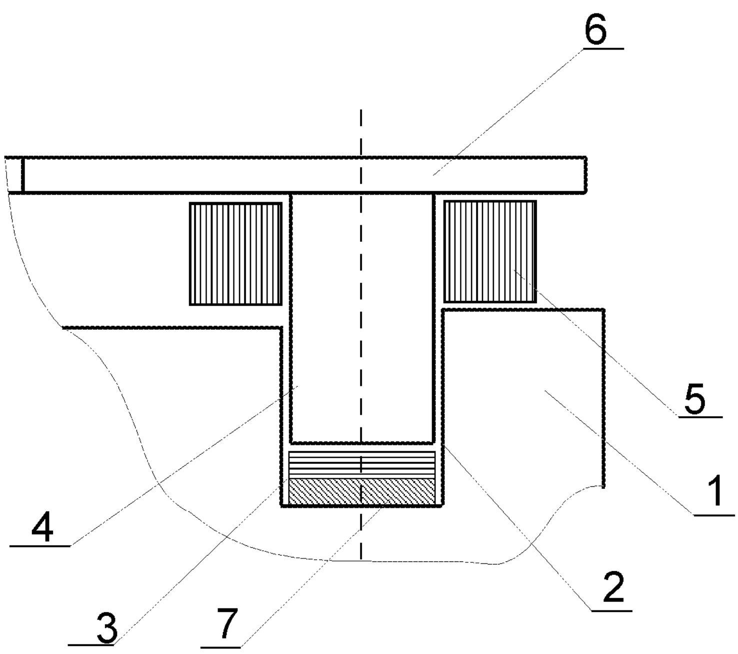

Fig. 1

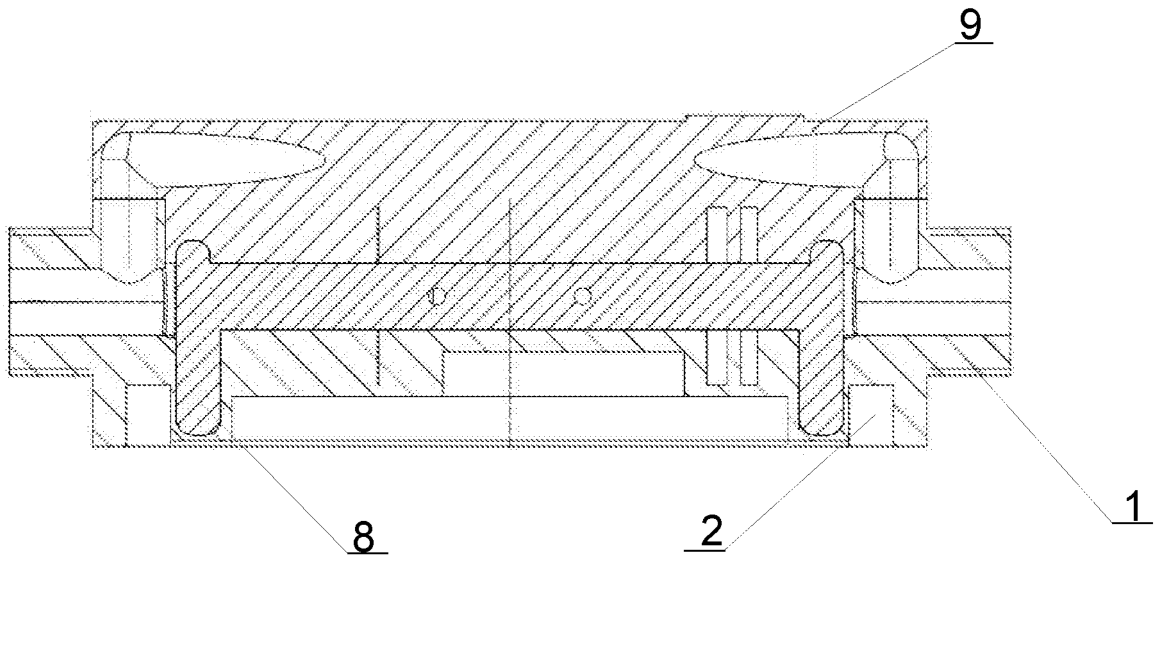

Fig. 2

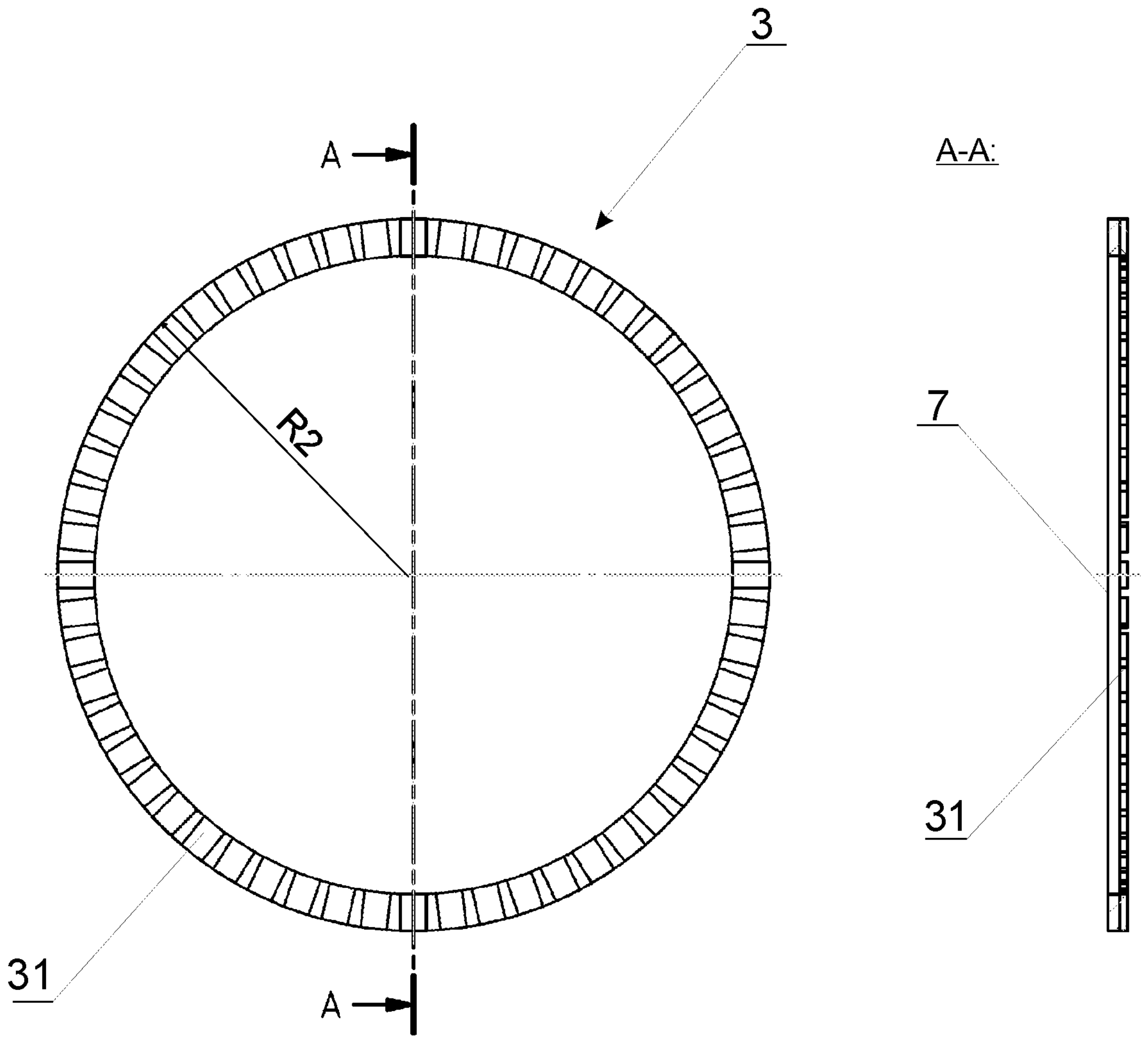

Fig. 3

Fig. 4

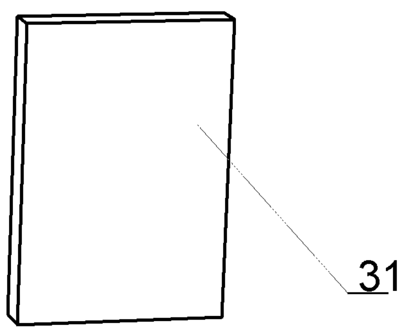

Fig. 5

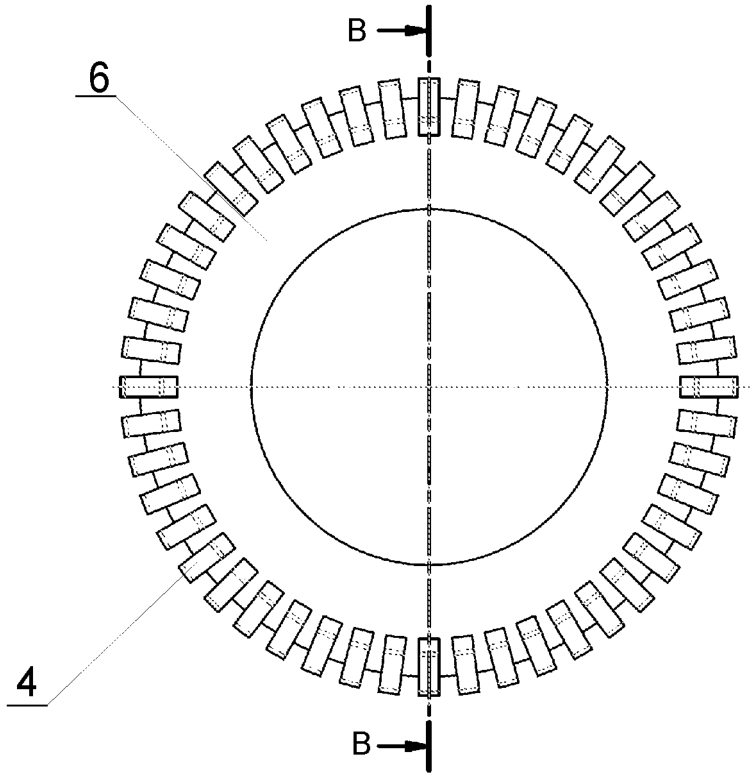

Fig. 6

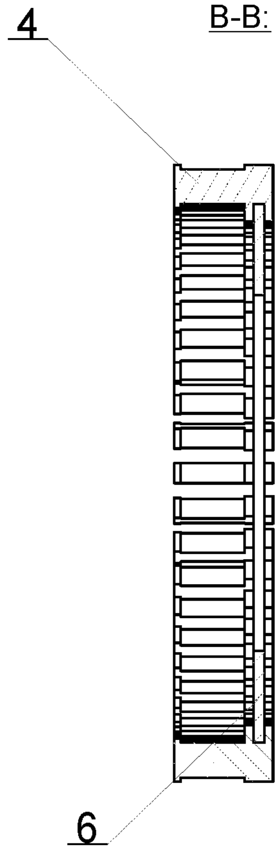

Fig. 7

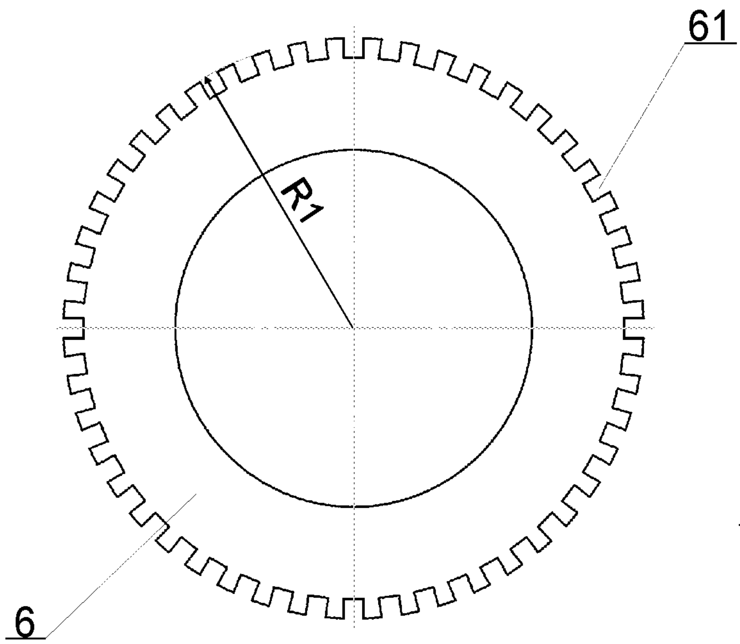

Fig. 8

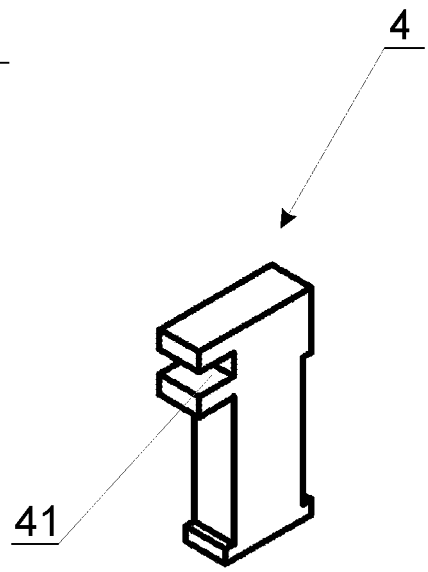

Fig. 9