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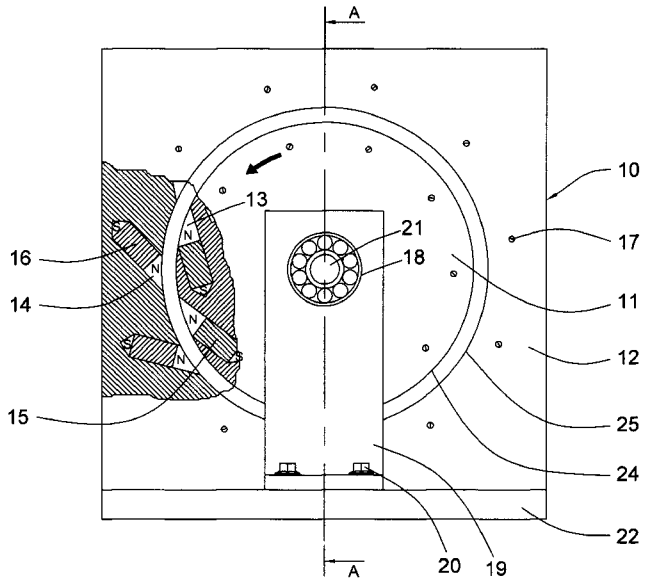
(54) Title: PERMANENT MAGNET MOTOR



FRONT ELEVATION
FIG. 3

(57) Abstract: A permanent magnet motor (10) generates mechanical output power without the need for electric power supply or any other forms of input energy. Permanent magnets (15, 16) placed inside bored holes (13, 14) around outer circumference surface of rotor (11) and inner circumference surface of stator (12) at an inclined angle with respect to the rotor centre line. First pair of permanent magnets in stator and rotor repels each other generating tangential force by repelling force of permanent magnets having similar polarity placed in a rotating rotor and a stationary stator. The Tangential force results in rotational movement to the rotor and this process will continue when following pairs of permanent magnets reaches inline position and generate tangential force. The rotor, stator and other accessories are made of non-magnetic and magnetic field shieling material. Rotor shaft generates mechanical output power which can be utilized for useful applications such as generate electric power supply.

Specification

FIELD OF THE INVENTION

Title: Permanent Magnet Motor

[0001] The present invention relates to a permanent magnet motor in general and more specifically to such motor having a plurality of movable permanent magnets on rotor which interact with a fixed magnets on stator to generate mechanical output power without the need for electric power supply or any other forms of input energy.

BACKGROUND OF THE INVENTION

[0002] Many prior art motors have utilized movable permanent magnets in the rotor with stationary wound fields, wherein the windings are electrically energized to generate electromagnet field. Prior art motors requires electric energy to rotate the rotor to generate mechanical output power.

[0003] The present invention was developed to create a motor which utilizes repelling force of permanent magnets having similar magnetic polarity to generate mechanical output power without need of electric power supply or any other forms of input energy.

SUMMARY OF THE INVENTION

[0004] The present invention involves a permanent magnet motor which generates mechanical output power by the repelling force of permanent magnets having similar magnetic polarity placed in a rotating rotor and a stationary stator. The permanent magnets in cylindrical shape are placed inside inclined bored holes around outer circumference surface of the rotor and on inner circumference surface of the stator. The permanent magnets inside the bored holes are positioned at an inclined

angle with respect to the centre lines of the rotor and the stator. Permanent magnets are positioned in the rotor and stator in an orientation to have similar magnetic polarity when both permanent magnets face each other. When a pair of permanent magnets in stator and rotor reaches an inline position, the permanent magnets having similar magnetic polarity repels each other and generates tangential force to the rotor which results in rotational movement to the rotor. When the rotor starts to rotate the next pair of permanent magnets in rotor and stator reaches inline position and repels each other continuing to apply the tangential force to rotate the rotor. The rotational movement of the rotor continues when the following pairs of permanent magnets reaches inline position one after another.

[0005] The main components of this permanent magnet motor are a rotating rotor, stationary stator with base, permanent magnets, set screws, ball bearings to support the rotor shaft, frames wherein ball bearings are attached and frame mounting bolts.

[0006] The rotating rotor and the stationary stator are provided with uniformly spaced bored holes in the middle of the outer circumference surface of rotor and inner circumference surface of the stator. The holes on the rotor and stator are bored at an angle inclined in respect with the centre line of the rotor and stator.

[0007] The permanent magnets in cylindrical shape are placed inside the inclined bored holes in the rotor and the stator without projecting out from the circumference line. The inclined angle alignment of the permanent magnets on the rotor and stator are in same axis line when both permanent magnets face each other in an aligned position. The permanent magnets are locked in position inside the bored holes with set-screws.

[0008] The permanent magnets arranged in the rotor are uniformly spaced in the order that all magnets orientation have the same magnetic polarity (e.g. north) facing outward towards the stator and the permanent magnets arranged in the stator are uniformly spaced in the order that all magnets orientation have the same magnetic

polarity (e.g. north) facing inward towards the rotor. In such arrangement, the permanent magnets orientation, results in permanent magnets on the rotor facing similar magnetic polarity on the stator (e.g. north polarity faces north polarity). The permanent magnets also can be arranged in orientation wherein south magnetic polarity positioned in place of north polarity as described earlier.

[0009] The quantity of the permanent magnet on the rotor is lower than quantity of the permanent magnet on stator in order to have at least one pair of permanent magnets in rotor and stator in an inline position at any given time while the rotor is in rotating state to maintain the presence of the repelling force of the similar magnetic polarity and the tangential force continuously.

[0010] The rotor outer diameter is slightly smaller than the stator inner diameter in order to have slight clearance gap to avoid the rotor rubbing against the stator. The centre shaft of the rotor is supported by a pair of ball bearings to allow the rotor to rotate freely inside the centre hub of the stator. The ball bearings are attached to a pair of support frames which are mounted to the base of the stator with bolts.

[0011] The rotor, stator with base, support frames with mounting bolts, ball bearings and set screws are made of non-magnetic and magnetic shielding material such as stainless steel, Mu metal, copper, aluminum, etc. in order to avoid being attracted to the permanent magnet and to shield the magnetic field around the permanent magnets surfaces except the exposed surface near the circumference lines of the rotor and stator. Magnetic field shielding around the non-exposed surfaces of the permanent magnet is necessary to reduce or to prevent the magnetic field attraction caused by the dissimilar magnetic polarity which will affect the performance of the permanent magnet motor and reduce its efficiency.

[0012] The rotor rotates continuously with the presence of the repelling force between the permanent magnets arrayed in the circumference of the rotor and stator.

The rotation of the rotor is solely driven by the repelling force energy between the permanent magnets without need of electric power supply or any other forms of input energy. The rotor also acts as flywheel and with the help of the angular momentum effect the rotor rotates smoothly.

[0013] The rotor generates mechanical output power which can be connected and utilized for useful applications such drive an electric generator (not shown) to generate electric power supply or to drive equipment (not shown). The present invention generates mechanical output power (torque) in the form of "green energy" without polluting the atmosphere and without emission of gases.

[0014] The quantities, size and magnetic field strength of the permanent magnet can be increased to enhance the mechanical output power (torque) and the rotor rotational speed. Similarly the size of the rotor and stator can be increased and quantities of rotors and stators can be added in series in a common shaft to increase the mechanical output power (torque) and the rotor rotational speed.

[0015] In order to start the rotor to commence rotation from a stationary state, an external starter (not shown) can be applied to provide a "kick-start force" to the rotor shaft. Once the rotor commences to rotate, the permanent magnet repelling action and the tangential force will begin and thereafter maintain the rotation of the rotor continuously. At this stage the external starter can be disengaged from the rotor shaft.

[0016] In order to slow down or to stop the rotor rotation, an external brake (not shown) can be applied to the rotor shaft.

[0017] While the invention is defined in the claims explained previously, additional understanding of the invention can be gained by referencing the following brief description of the drawings, detailed description of the preferred embodiments and the attached drawings.

Specification

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] An embodiment of the present invention is illustrated in the drawings and described hereinafter.

FIG. 1 is an isometric view showing the permanent magnet motor in assembled form;

FIG. 2 is an exploded isometric view showing the rotor, stator, permanent magnets, ball bearings, support frames, set-screws and frame mounting bolts;

FIG. 3 is a front elevation view of FIG. 1, in assembled form;

FIG. 4 is a view thru Section A-A of the permanent magnet motor depicted in FIG. 3;

FIG. 5 is a view thru Section B-B of the permanent magnet motor depicted in FIG. 4;

FIG. 6 is a view thru Section B-B of the permanent magnet motor depicted in FIG. 4 showing the rotor in a moved position;

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0019] FIGS. 1, 2, 3, 4, 5 and 6 of the drawing generally indicates the embodiment of a permanent magnet motor according to the invention. Permanent magnet motor 10 includes a stator 12 having generally rectangular shape vertical body with flat horizontal base 22 having circular opening 23 in the centre of vertical body wherein the rotor 11 is positioned.

[0020] The rotor 11 is attached to shaft 21 and 23 extending out from both sides of the rotor 11. The shafts 21 and 23 are supported with a pair of ball bearings 18 which

are attached to a pair of support frames 19 mounted to the stator base 22 with fastening bolts 20.

[0021] The rotor 11 has plurality of bored holes 13 spaced uniformly at its outer circumference surface 24 wherein the bored holes 13 positioned at an inclined angle with respect to the centre lines of the rotor 11.

[0022] The permanent magnets 15 in cylindrical shape placed uniformly inside the bored holes 13 of the rotor 11 and locked-in position with set-screws 17 without extending out from the rotor 11 outer circumference surface 24. The set-screws 17 when in locked position do not extend out from rotor 11 side surface wall. All permanent magnets 15 positioned in rotor 11 bored holes 13 with same polarity (e.g. North) facing outward towards the stator 12.

[0023] The stator 12 has plurality of bored holes 14 spaced uniformly at its inner circumference surface 25 wherein the bored holes 14 positioned at an inclined angle with respect to the centre lines of the stator circular opening 25.

[0024] The permanent magnets 16 in cylindrical shape placed uniformly inside the bored holes 14 of the stator 12 and locked-in position with set-screws 17 without extending out from the stator 12 inner circumference surface 25. The set-screws 17 when in locked position do not extend out from stator 12 side surface wall. All permanent magnets 16 positioned in stator 12 bored holes 14 with same polarity (e.g. North) facing inward towards the rotor 11.

[0025] The rotor 11 assembly with its permanent magnets 15 locked-in position placed in the centre hub opening of the stator 12. The rotor 11 shaft 21 and 23 are supported with a pair of ball bearings 18 which are attached to a pair of support frames 19. The support frames 19 are mounted on the stator base 22 with fastening bolts 20.

[0026] In operation of all the embodiments described, a permanent magnet motor generates mechanical output power (torque) by the repelling force of permanent magnets placed in the rotating rotor and a stationary stator having similar magnetic polarity when they face each other. The permanent magnets placed inside bored holes around outer circumference surface of the rotor and on inner circumference surface of the stator and positioned at an inclined angle with respect to the centre lines of the rotor and the stator. Permanent magnets positioned in the rotor and stator in the orientation to have similar magnetic polarity when a pair of permanent magnets approaches to adjacent position and faces each other. When a pair of permanent magnets in stator and rotor reaches an inline position having similar magnetic polarity repels each other and generates tangential force to the rotor which results in rotational movement to the rotor. When the rotor starts to rotate the next pair of permanent magnets in rotor and stator reaches an inline position and repels each other continuing generating the tangential force to rotate the rotor. The rotational movement of the rotor continues when the following pairs of permanent magnets reaches inline position one after another.

[0027] The permanent magnets arranged in the rotor uniformly spaced in the order that all magnets orientation have the same magnetic polarity (e.g. north) facing outward towards the stator and the permanent magnets arranged in the stator uniformly spaced in the order that all magnets orientation have the same magnetic polarity (e.g. north) facing inward towards the rotor. In such arrangement of the permanent magnets orientation results in magnets on the rotor facing similar magnetic polarity on the stator (e.g. north polarity faces north polarity). The permanent magnets also can be arranged in position orientation wherein south magnetic polarity applied in place of north polarity as described previously.

Claims

Title : Permanent Magnet Motor

Claim 1: A permanent magnet motor comprising: a rotating rotor and a stationary stator, both having plurality of permanent magnets uniformly spaced in the outer circumference surface of the rotor and on inner circumference surface of the stator. The permanent magnets inside bored holes positioned at an inclined angle with respect to the centre lines of the rotor and the stator. The inclined angle alignment of the permanent magnets on the rotor and stator are in same line when a pair of permanent magnets reaches an inline position faces each other. The permanent magnets are locked in position inside the bored holes with set-screws.

The permanent magnets arranged in the rotor are uniformly spaced in the order that all the magnets orientation have the same magnetic polarity (e.g. north) facing outward towards the stator and the permanent magnets arranged in the stator are uniformly spaced in the order that all magnets orientation have the same magnetic polarity (e.g. north) facing inward towards the rotor. In such arrangement, the permanent magnets orientation results in magnets on the rotor facing similar magnetic polarity on the stator (e.g. north polarity faces north polarity). The permanent magnets also can be arranged in orientation wherein south magnetic polarity positioned in place of north polarity as described previously.

The quantity of the permanent magnets on the rotor is lower than quantity of the permanent magnets on the stator.

The rotor outer diameter is slightly smaller than the stator inner diameter in order to have slight clearance gap to avoid the rotor from rubbing against the stator. The centre shaft of the rotor is supported by a pair of ball bearings to allow the rotor to rotate freely inside the centre hub of the stator. The ball bearings are attached to a pair of support frames which are mounted to the base of the stator with bolts.

Claims

The rotor, stator with base, support frames with mounting bolts, ball bearings and set screws are made of non-magnetic and magnetic shielding material such as stainless steel, Mu metal, copper, aluminum, etc.

Claim 2: A permanent magnet motor according to claim 1 wherein when a pair of permanent magnets in stator and rotor reaches an inline position, the permanent magnets having similar magnetic polarity repels each other and generates tangential force to the rotor which results in rotational movement to the rotor. When the rotor starts to rotate the next pair of permanent magnets in rotor and stator reaches an inline position and repels each other, continuing to apply the tangential force to rotate the rotor. The rotational movement of the rotor continues when the following pairs of permanent magnets reaches inline position one after another.

Claim 3: A permanent magnet motor according to claim 2 wherein the rotor rotates continuously with the presence of the repelling force between the permanent magnets arrayed in the circumference of the rotor and stator. The rotor also acts as flywheel and with the help of the angular momentum effect, the rotor rotates smoothly.

Claim 4: A permanent magnet motor according to claim 3 wherein the rotation of the rotor is solely driven by the repelling force energy between the permanent magnets without need of electric power supply or any other forms of input energy. The rotor generates mechanical output power (torque) in the form of "green energy" without polluting the atmosphere and without emission of gases.

Claim 5: A permanent magnet motor according to claim 3 wherein the rotor generates mechanical output power which can be connected and utilized for useful applications such as drive an electric generator to generate electric power supply or to drive equipment.

Claim 6: A permanent magnet motor according to claim 1 wherein the quantity of the permanent magnet on the rotor is lower than quantity of the permanent magnet on stator

in order to have at least one pair of permanent magnets in rotor and stator in an inline position at any given time while the rotor is in rotating state to maintain the presence of the similar magnetic polarity repelling force and the tangential force continuously.

Claim 7: A permanent magnet motor according to claim 5 wherein the quantities, size and magnetic field strength of the permanent magnet can be increased to enhance the mechanical output power (torque) and the rotor rotational speed. Similarly the size of the rotor and stator can be increased and quantities of rotors and stators can be added in series in a common shaft to increase the mechanical output power (torque) and the rotor rotational speed. The permanent magnet can be in any shape suitable for the application.

Claim 8: A permanent magnet motor according to claim 1 wherein the rotor, stator with base, support frames with mounting bolts, ball bearings and set screws are made of non-magnetic and magnetic shielding material such as stainless steel, Mu metal, copper, aluminum, etc. in order to avoid being attracted to the permanent magnet and to shield the magnetic field around the permanent magnets surfaces except the exposed surface near the circumference lines of the rotor and stator. Magnetic field shielding around the non-exposed surfaces of the permanent magnet is necessary to reduce or to prevent the magnetic field attraction caused by the dissimilar magnetic polarity which will affect the performance of the permanent magnet motor and reduce its efficiency.

Claim 9: A permanent magnet motor according to claim 1 wherein, in order to start the rotor to commence rotation from a stationary state, an external starter can be applied to provide a "kick-start force" to the rotor shaft. Once the rotor commences to rotate, the permanent magnet repelling action and the tangential force will begin and thereafter maintain the rotation of the rotor continuously. At this stage the external starter can be disengaged from the rotor shaft.

Claim 10: A permanent magnet motor according to claim 1 wherein in order to slow down or to stop the rotor rotation, an external brake can be applied to the rotor shaft.

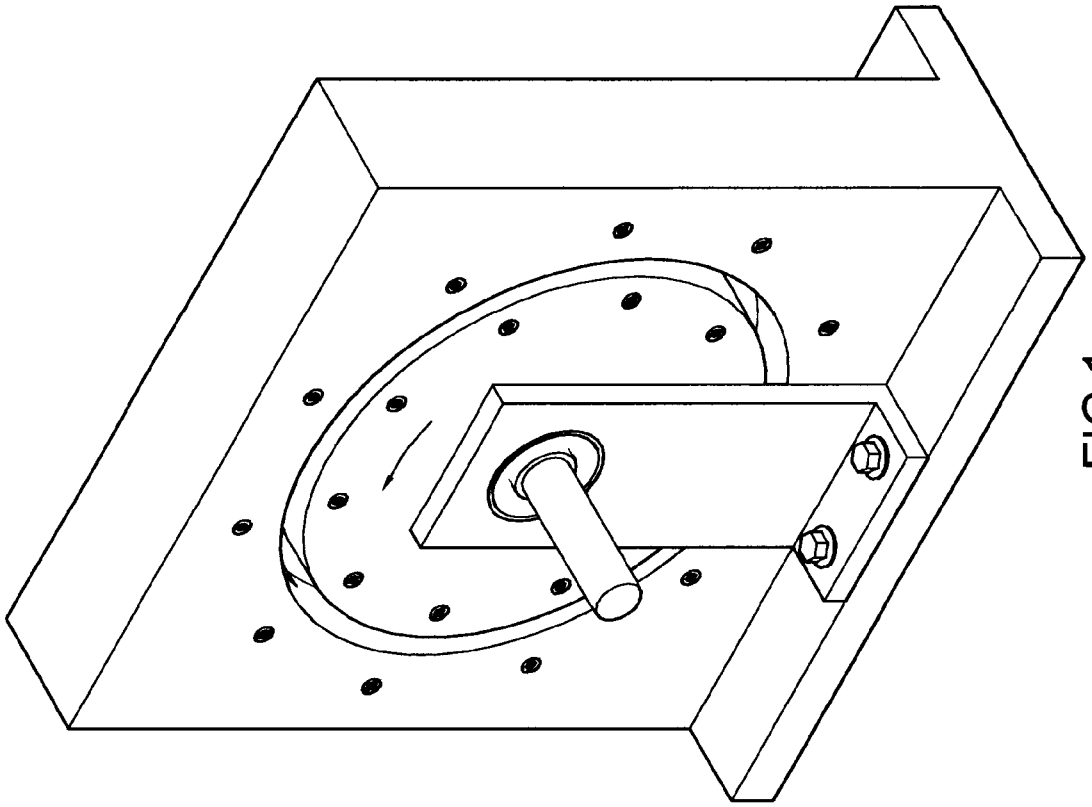


FIG.1

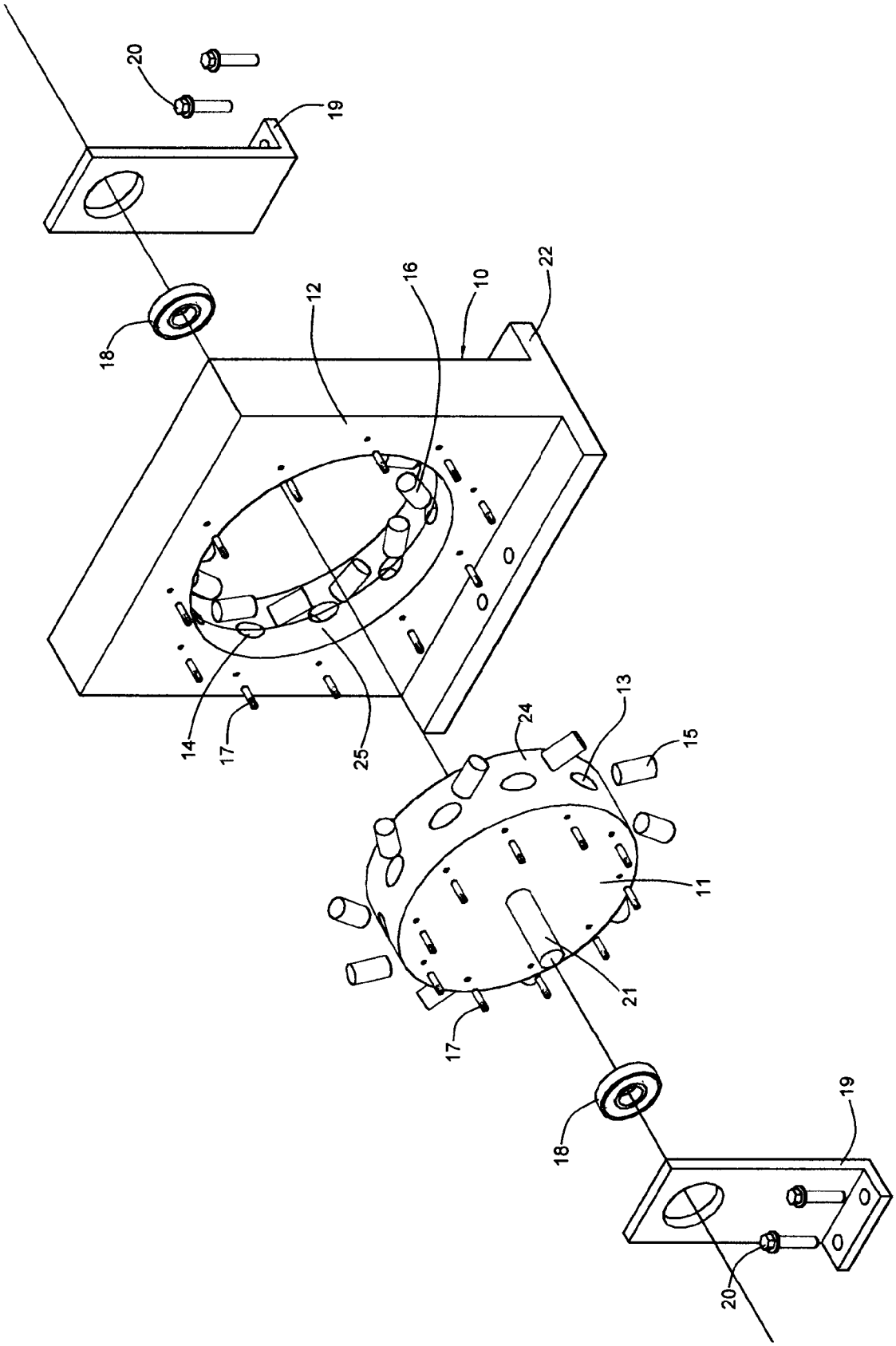
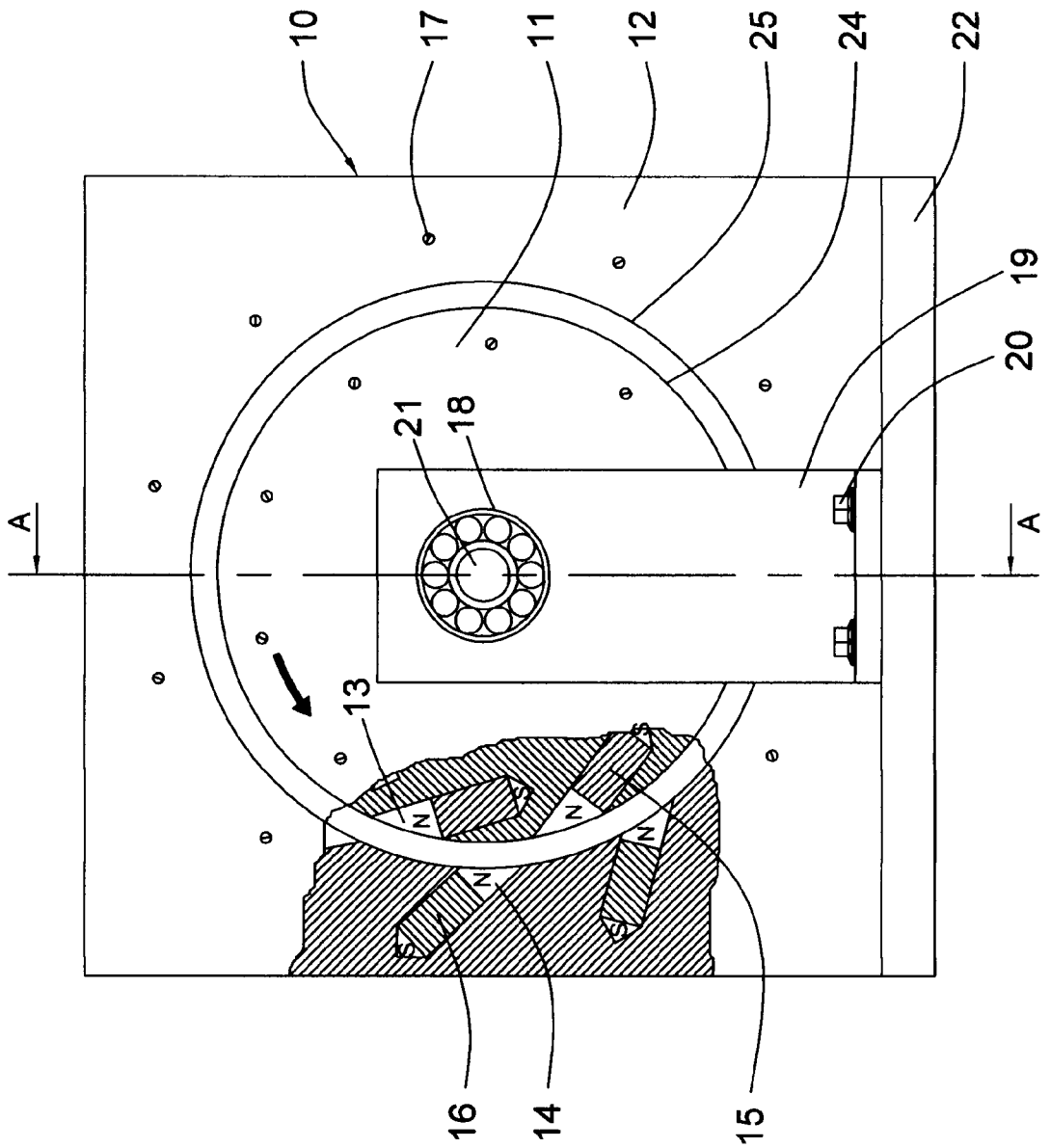
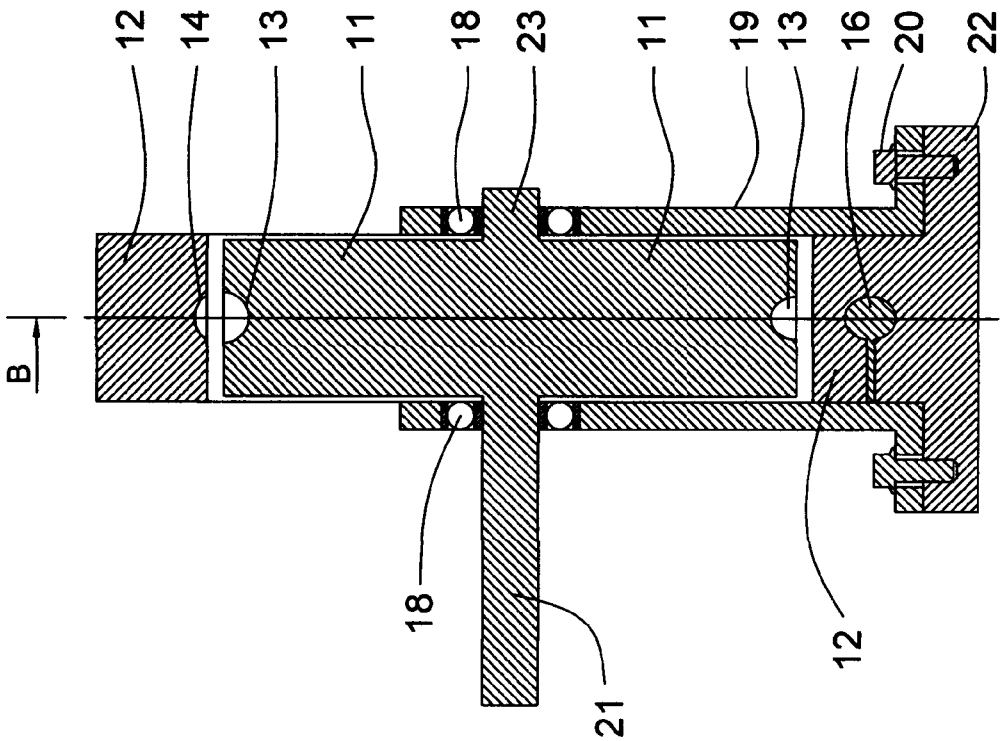


FIG.2



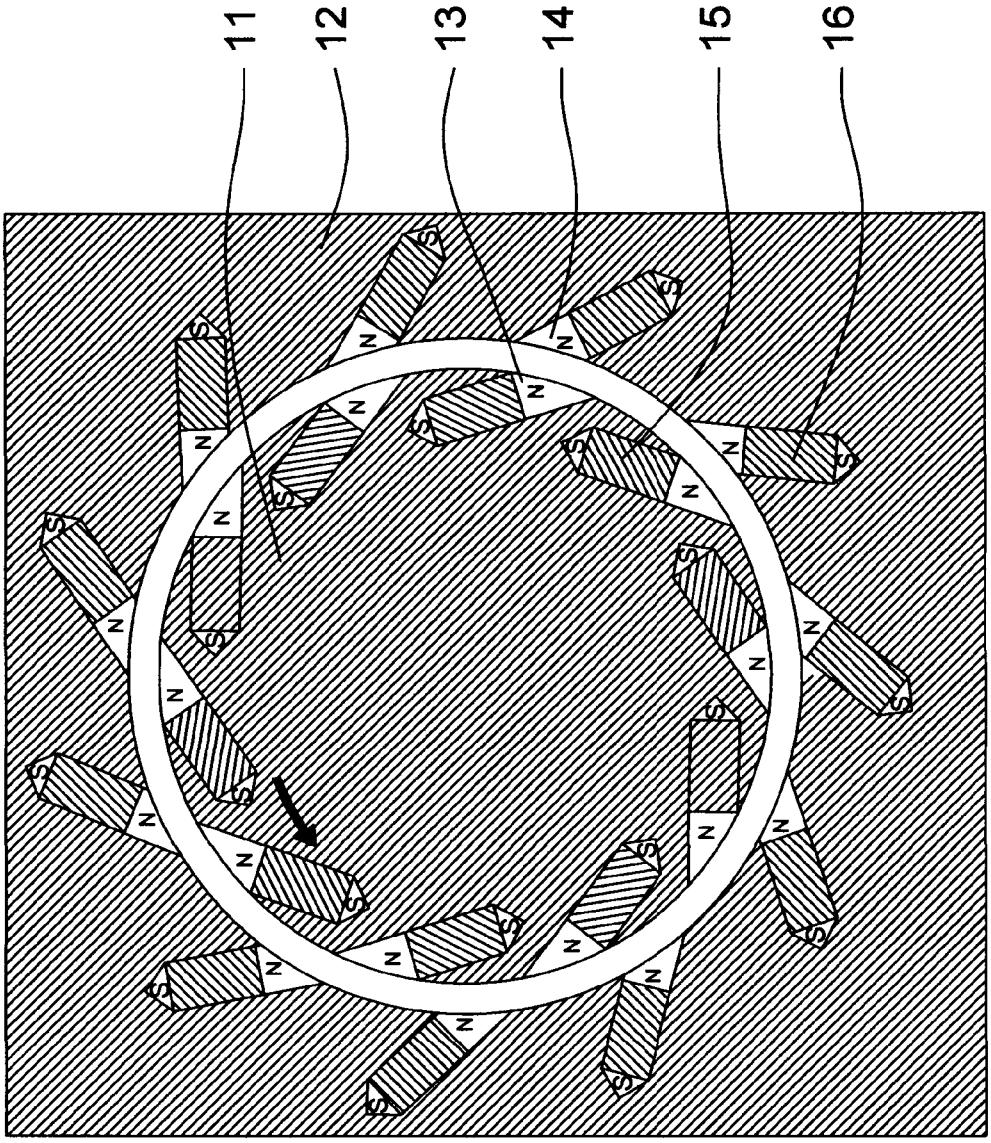
FRONT ELEVATION

FIG. 3



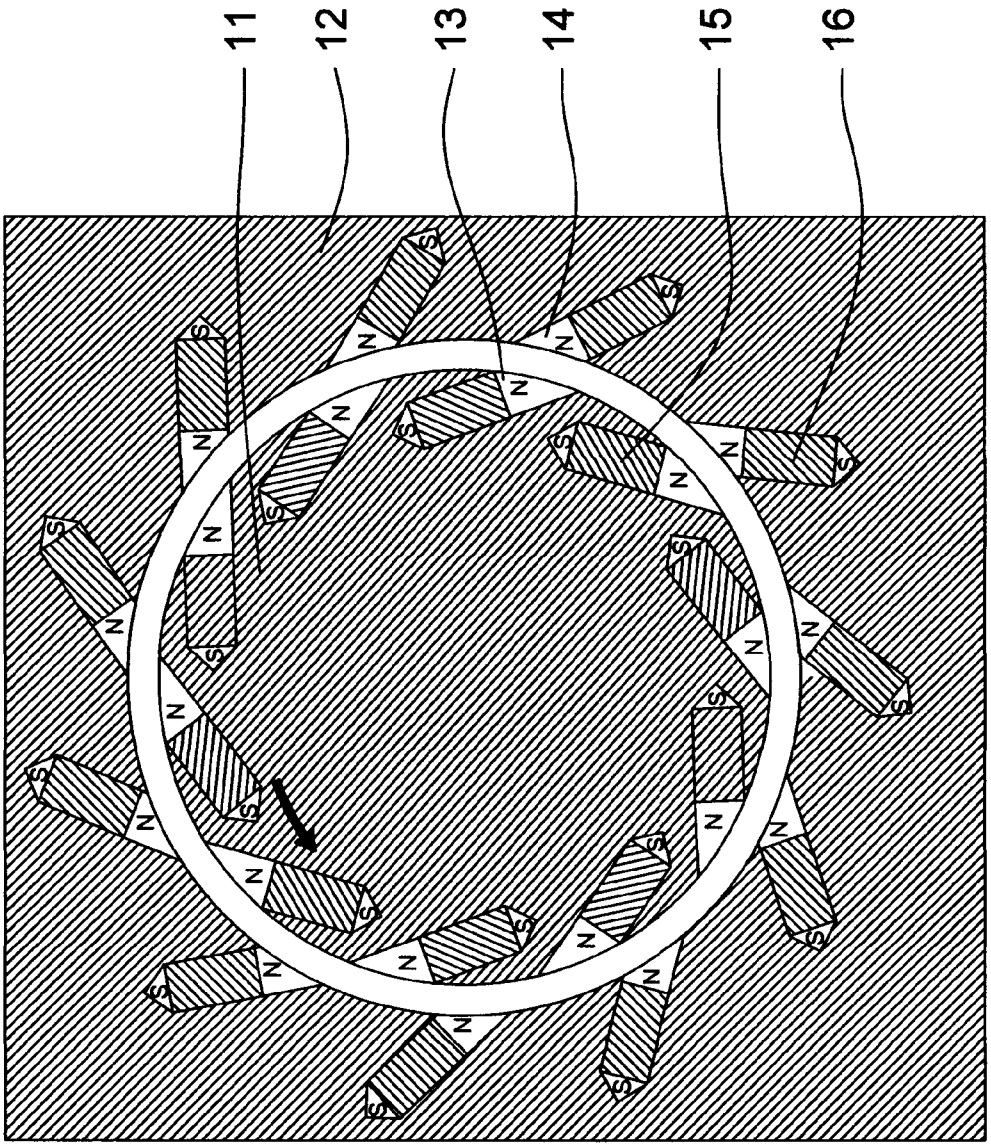
SECTION VIEW A-A

FIG. 4



SECTION VIEW B-B

FIG. 5



SECTION VIEW B-B

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MY2014/000231

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. H02K53/00(2006.01)i, H02N11/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. H02K53/00, H02N11/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2015
Registered utility model specifications of Japan 1996-2015
Published registered utility model applications of Japan 1994-2015

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 60-113678 A (KOHAMA, Hiroaki) 1985.06.20, whole document, figures 1-2 (No Family)	1-10
Y	JP 3-32379 A (TAKAHASHI, Katsuaki) 1991.02.12, whole document, figures 1-3 (No Family)	1-10
Y	US 2003/0234590 A1 (GITZEN, Christopher Mark) 2003.12.25, paragraphs [0024], [0037], [0038], figures 1, 5 (No Family)	1-10

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02.02.2015	10.02.2015

Name and mailing address of the ISA/JP	Authorized officer
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