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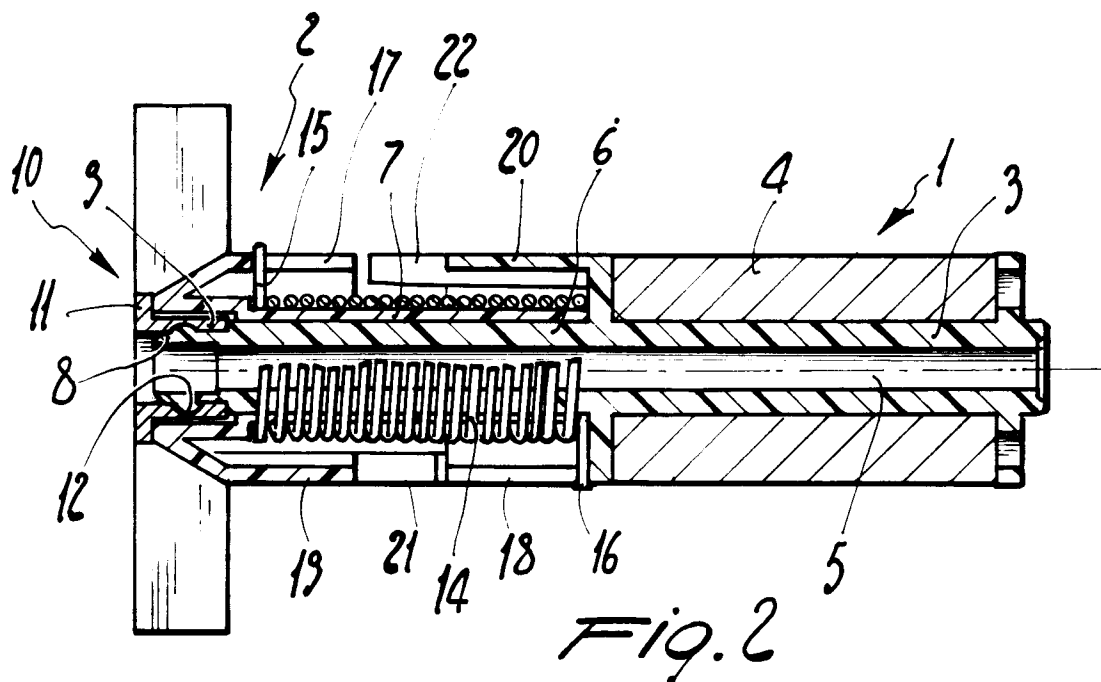
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I-20123 Milano(IT)(54) **Device for mutually coupling the rotor and the impeller of electro pumps or the like with permanent-magnet motor.**

(57) The device for mutually coupling the rotor (1) and the impeller (2) of electric pumps or the like with permanent-magnet motor comprises elastic rotation-

al coupling means, preferably constituted by a cylindrical helical spring (14), which associate the rotor with the impeller.

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The present invention relates to a device for mutually coupling the rotor and the impeller of electric pumps or the like with permanent-magnet motor.

In current electric pumps with permanent-magnet motor, the device for mutually coupling the rotor and the impeller substantially comprises a non-axial front protrusion which extends from the body of the rotor and is suitable for abutting with a corresponding non-axial protrusion which extends from the body of the impeller, actuating it so that it rotates.

It is known that the rotation of the rotor of a permanent-magnet motor is due to the variations in the magnetic field formed between the polar expansions of the stator pack.

In practice, a continuous exchange of polarities occurs between the polar expansions of the stator pack.

Due to this reason, the rotation rate of the rotor is not constant but oscillates periodically between a maximum value and a minimum value.

The extent of this oscillation with respect to a constant mean value generally depends upon the frequency of the alternating supply current, upon the mass of the rotor and upon other parameters, including those which relate to the magnetic characteristics of the field and of the magnet inserted therein.

The negative result of this oscillation is that knocking arises between the protrusions which define the rotational coupling between the rotor and the impeller.

This causes materials fatigue which can lead to rupture of the protrusions.

The impeller, being itself coupled to the rotor, does not rotate at a constant rate and this negatively affects the flow parameters.

The aim of the present invention is to provide a new device for mutually coupling the rotor and the impeller of electric pumps or the like with permanent-magnet motor which eliminates the problems described above in known types.

A consequent primary object is to provide a device which reduces materials fatigue due to prolonged use.

Not least object is to provide a device which is constructively simple and has a low cost.

This aim, these objects and others which will become apparent hereinafter are achieved by a device for mutually coupling the rotor and the impeller of electric pumps or the like with permanent-magnet motor, characterized in that it comprises elastic rotational coupling means which associate said rotor with said impeller.

Advantageously, said elastic rotational coupling means are constituted by a cylindrical helical spring.

Further characteristics and advantages of the invention will become apparent from the detailed description of an embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is an exploded view of the assembly constituted by the rotor and impeller of an electric pump with permanent-magnet motor;

figure 2 is a longitudinal sectional assembled view of the rotor/impeller assembly of figure 1.

With reference to the above figures, the rotor of a permanent-magnet motor is generally designated by the reference numeral 1, whereas the impeller is generally designated by the reference numeral 2.

In particular, said rotor 1 comprises a cylindrical body 3 made of plastic material in which an annular permanent magnet 4 is embedded.

The body 3 is coaxially provided with a hole 5 for a shaft, not illustrated, upon which it is freely rotatable.

A tubular protrusion 6 extends axially from said body 3 and is suitable for being inserted in a corresponding tubular protrusion 7 which also extends axially from said impeller 2, which is also made of plastic material.

The coupling between the protrusions 6 and 7 has a slight play, particularly in a radial direction.

At its end, said tubular protrusion 6 of the rotor 1 has a tapered portion 8 which is suitable for being inserted in a bush 9 which extends from an axial locking element 10 which is also conveniently provided with a flange 11 which abuts on the top of the impeller 2.

Conveniently, said tapered portion 8 has a small annular ridge 12 which is suitable for being inserted in a corresponding annular seat 13 of the locking element 10, providing the coupling between the parts.

According to the invention, said tubular protrusion 7 of the impeller 2 is surrounded by a cylindrical helical spring 14 whose ends, respectively 15 and 16, extend radially and are inserted in corresponding radial slots 17 and 18 defined in respective tubular portions 19 and 20 which extend coaxially around the protrusions 6 and 7, respectively from the impeller 2 and from the rotor 1.

Said tubular portions 19 and 20 have the same diameter, but their ends are spaced from one another so as to leave an annular empty space in which end non-axial protrusions, respectively 21 and 22, which extend respectively from the impeller 2 and from the rotor 1.

As regards operation, the spring 14 constitutes an elastic rotational coupling element which is suitable for absorbing the knockings induced by the rotor 1 due to its pulsating rotation.

In this manner the impeller 2 is not subjected

to rotation rate oscillations.

The two non-axial protrusions 21 and 22 constitute safety elements which are suitable for allowing the rotor 1 to rotate the impeller 2 in any case.

In practice it has thus been observed that the coupling device according to the invention has achieved the intended aim and objects of the present invention.

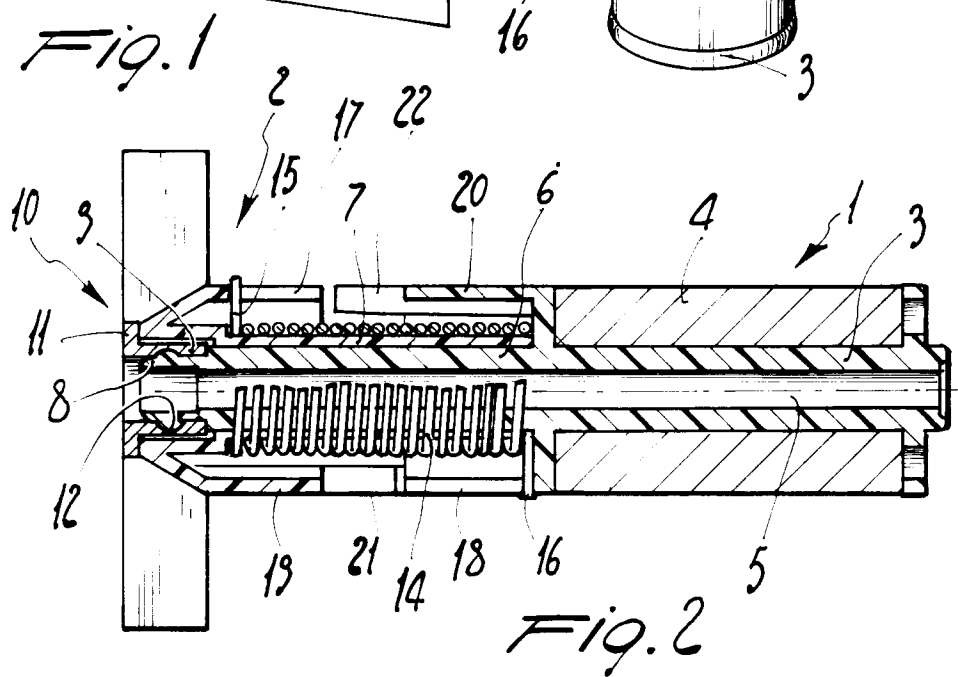
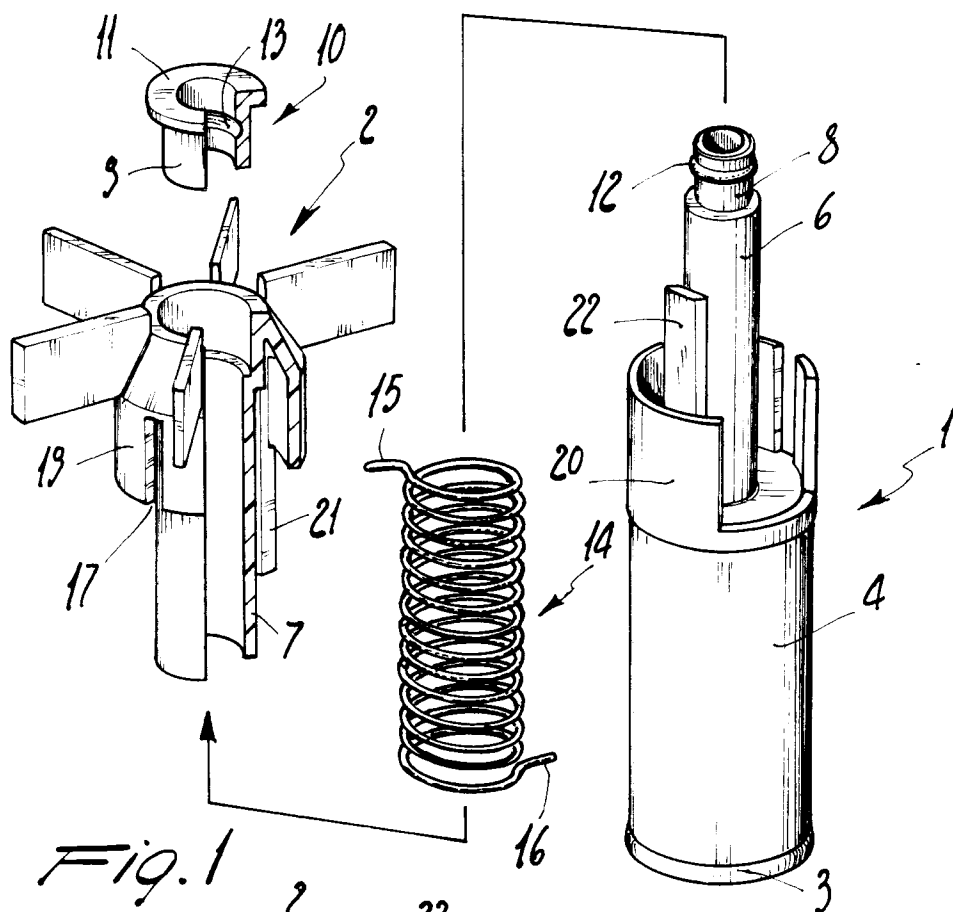
In practice, the materials employed, so long as compatible with the contingent use, as well as the dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Device for mutually coupling the rotor (1) and the impeller (2) of electric pumps and the like with permanent-magnet motor, characterized in that it comprises elastic rotational coupling means (14) which associate said rotor with said impeller.
2. Coupling device according to claim 1, characterized in that said elastic coupling means are constituted by a spring (14).
3. Coupling device according to claims 1 and 2, characterized in that said spring is shaped like a cylindrical helix with its ends (15,16) coupled respectively to the rotor and to the impeller.
4. Coupling device according to one or more of the preceding claims, characterized in that the ends of said cylindrical helical spring extend radially and are inserted in radial slots (17,18) defined in tubular portions (19,20) which extend respectively from the impeller and from the rotor.
5. Coupling device according to one or more of the preceding claims, characterized in that said cylindrical helical spring surrounds a first tubular protrusion (7) which extends axially from said impeller, a second tubular protrusion (6) being loosely inserted in said first tubular protrusion, said second tubular protrusion extending axially from said rotor and being coupled to a locking element (10) arranged at the top of said impeller.

6. Coupling device according to one or more of the preceding claims, characterized in that the end of said second tubular protrusion which extends from said rotor has a tapered portion (8) which is suitable for being inserted in a bush (9) which extends from said axial locking element, which is also provided with an abutment flange (11), said tapered portion having an annular ridge (12) which is suitable for being inserted in a corresponding seat (13) of said bush, thereby mutually locking the parts.
7. Coupling device according to one or more of the preceding claims, characterized in that it comprises two non-axial mutual traction protrusions (21,22) which extend respectively from the impeller and from the rotor.





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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 5046

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 207 430 (EASTHORPE) * page 1, line 1 - line 5 * * page 5, line 21 - page 10, line 12 * * page 17, line 14 - page 18, line 22; figures 1-5, 16 * * especially fig. 16*	1-3	F04D13/02
A	---	7	
X	DE-U-8 807 108 (SIEMENS) * page 2, line 19 - line 25 * * page 5, line 1 - page 7, line 9; figure *	1,2	
A	-----	3	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F04D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03 JUNE 1992	Examiner ZIDI K.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			