

DESCRIPTION

The invention relates to a rotor for small electric motors with a ring magnet made of permanent-magnetic material with magnetized magnetic poles and a carrier part made of plastics material, which is bonded to the ring magnet and connects this to a power-take-off pinion on the rotor central axis. See DE-U-6947050. The applicant has for years been putting small electric motors with a rotor of the type mentioned at the beginning hereof on the market in large quantities. In the case of these rotors, see Fig. 1 of the drawings, the carrier part made of plastics material is bonded with the ring magnet at the inner circumference thereof over the full width. Such a bonding is durable so long as the coefficient of expansion of the magnet material and of the plastics material of the carrier plate are approximately identical at higher temperatures as well as upon the cooling after the injection process of the carrier part. Upon the use of a new magnet material made of sintered ceramics, however, the previous design of carrier part and ring magnet is no longer possible on account of the different coefficients of expansion of the two materials. It would lead to the tearing of the plastics carrier part from the ring magnet after the cooling down from the injection process.

The problem of the invention is to demonstrate a development of the rotor in the case of which the different coefficients of expansion of the materials of carrier part and ring magnet have no affect on the bonded connection between the two components.

In accordance with the invention it is, therefore, proposed that the carrier part has recesses in such a way that no radially continuous material connection exists between the power-take-off pinion and the ring magnet.

As a result of this design, the carrier part is given in itself to a limited extent a resilient behaviour and can, thus, without particular stressing of the bonding points compensate for different material expansions of carrier part and ring magnet.

In a preferred further development of the invention provision is made for the fact that the recesses are designed as circular-ring-shaped slots, which are positioned concentrically and mutually offset in the direction of rotation of the rotor on the carrier part.

Still further developments of the invention are explained in the sub-claims.

The invention will be explained hereinafter with reference to the drawings by an exemplified embodiment.

Fig. 1 shows a rotor in section according to the state of the art,

Fig. 2 shows a rotor in accordance with the invention in top view,

Fig. 3 shows a rotor in accordance with Fig. 2 in section along the section line III-III.

In the case of the known rotor, a carrier part 1 made of plastics material is produced in one piece with a power-take-off pinion 2 made from a thermoplastic plastics material. This carrier part is bonded in the region of its circumferential line with a ring-shaped permanent magnet 3 made of barium ferrite material along the line 4. This bonded connection is adequate in the event of approximately the same coefficient of expansion of ring magnet and carrier part at various temperatures.

In Figures 2 and 3 the development of a rotor in accordance with the invention is shown, in the case of which the bonding of carrier part and ring magnet upon changes in temperatures no longer leads to excessive stressing of the bonding of the two parts and, thus, to a partial tearing-off of the carrier part from the ring magnet. Such a partial tearing-off would impair the truth of rotation of the rotor and lead to the development of noise upon running, in an unfavourable case to failure of the motor.

Designated by 11 in Figures 2 and 3 is the carrier part made of a thermoplastics plastics material, which is produced in one piece with a power-take-off pinion 12. A ring magnet 13 made of permanent-magnetic material is provided at its circumference with magnetized magnetic poles, 12 North and South poles each. This ring magnet 13 is bonded along the line 14 to the carrier part 11. The design is, in this respect, made such that the carrier part in the region of its outer circumference is completely surrounded by adhesive and at no point butts or rests on the ring magnet. Circular-ring-shaped slots 15 and 16 are positioned on various concentric circles with regard to the rotor central axis in the carrier part 11. These circular-ring-shaped slots overlap one another in the radial direction, so that, considered from the rotor central axis, no continuous material connection with regard to the ring magnet exists.

It is within the sense of the invention naturally also possible to form the recesses in a geometrically different manner. What is essential in this respect is merely that the recesses make an adequate resilient behaviour of the carrier part 11 possible and that this resilient behaviour is not disturbed by continuous radial material webs between power-take-off pinion and ring magnet.

Designated by 17 are cams which, in cooperation with a

lever which is not shown, form a run-back stop. Designated by 18 are, finally, slots in the carrier 11 which fill with adhesive upon the bonding procedure and ensure a better connection between carrier part 11 and ring magnet.



CLAIMS

1. A rotor for small electric motors with a ring magnet (13) made of permanent-magnetic material with magnetized magnetic poles (12) and a carrier part (11) made of plastics material, which is bonded to the ring magnet (13) and connects this to the power-take-off pinion on the rotor central axis, characterised in that the carrier part (11) has recesses (15, 16) in such a way that no radially continuous material connection exists between the power-take-off pinion (12) and the ring magnet (13).
2. A rotor according to claim 1, characterised in that the recesses (15, 16) are designed as circular-ring-shaped slots which are positioned concentrically and mutually offset in the direction of rotation of the rotor on the carrier part (11).
3. A rotor according to claim 1 or 2, characterised in that the carrier part (11) has radial recesses (18) on its circumference in the region of the bonding (14) with the ring magnet (13).
4. A rotor according to claim 1, characterised in that the carrier part (11) and the power-take-off pinion (12) are produced in one piece from thermoplastic plastics material.