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2,835,834

ELECTROMOTOR

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Fig. 1

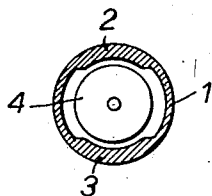
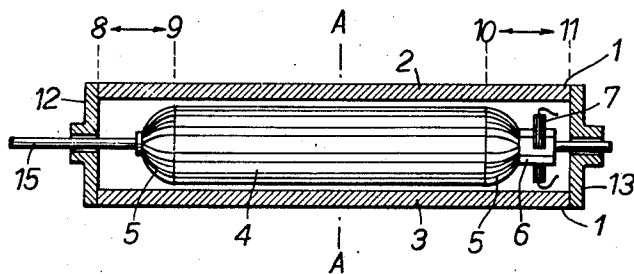


Fig. 2

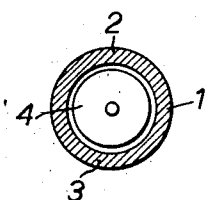


Fig. 3

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ELECTROMOTOR

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4 Claims. (Cl. 310—154)

The present invention relates to an electromotor for use in driving a sound recording and a sound reproducing apparatus.

Such electromotors must meet several requirements one of which is that they should not have a strong outwardly directed magnetic stray field as the latter could interfere with the magnetizing of the steel wire by the magnetic head. In order to prevent the straying of lines of force from the poles of the motor outwardly, i. e. into the space surrounding the motor, it is well known to enclose the latter by a housing of iron sheet which as it is magnetically conducting effectively prevents the passage of stray lines of force. However this means is not applicable in a sound recording and reproducing apparatus of smallest dimensions, for example of pocket size, as the room at disposal for the electromotor within the apparatus is very limited. Other ways had therefore to be found for reducing the straying of the outwardly directed lines of force to a value at which they would no more interfere with the operation of the apparatus.

According to the present invention this object is attained by a novel construction of the electromotor. This construction is based on the recognition that by increasing, through an additional inner stray path of smaller magnetic resistance parallelly arranged to the outer path of stray, the total stray flow in such a way that the magnetic potential difference producing this stray flow substantially decreases at the front faces of the poles that then also the outwardly directed stray flow takes a correspondingly smaller value.

According to the present invention the inner stray path of smaller magnetic resistance and parallel to the outer stray path is obtained in that the magnetic system of the electromotor manufactured from a permanent magnetic steel projects axially in both directions beyond the armature to such an extent that the magnetic potential difference between the front faces of the poles is brought down by the magnetic stray flow running through the inner of the housing to a value in which no interfering outwardly directed straying occurs. With respect to the total stray flow, the ratio between the portion extending in the interior of the housing and outwardly directed portion of the stray flow is inversely proportional to the ratio between the magnetic resistances of the associated stray paths. The effect of the protruding pole faces may be increased by connecting the front faces of the poles by a small bridge of magnetically conductive material. In order not to weaken the main field of the motor by the artificially increased straying the axial length of the armature is chosen relatively great, for example at least the double or more than the diameter of the armature. The electromotor thereby receives, seen from outwardly, the form of an elongated cylinder or roller of very small diameter.

Other features and advantages of the present invention will become apparent from the description now to follow of a preferred embodiment thereof given by way of ex-

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ample and in which reference will be made to the accompanying drawings, in which:

Fig. 1 shows the electromotor in longitudinal section, and

Figs. 2 and 3 are cross-sections through this motor.

In the drawings reference numeral 1 designates the magnetic system of the electromotor manufactured from permanent magnetic steel, reference 2 designating the one (e. g. north) and reference 3 the other (e. g. south) pole. Reference numeral 4 designates the armature with the armature coil 5, collector 6 and commutator brushes 7. This magnetic system 1 projects at both ends beyond the armature 4 about a distance 8—9 and 10—11 respectively. Between these protruding pole ends there is a stray field extending within the housing, that is a field which does not permeate the armature. The resistance of these stray fields extending at both sides of the armature is substantially smaller than the resistance of the stray field closing over the outer space. The whole stray field is thereby increased but the magnetic potential difference between the front faces of the poles is substantially lower which results in the outwardly directed prejudicial stray field taking a correspondingly smaller value.

As visible from Fig. 1 the axial length of the armature 4 is a multiple of the armature diameter so that the portion of the poles producing the "useful" field constitutes the largest portion of the whole pole surface. Owing to this the additional straying does not substantially prejudice the output of the motor.

The bearing shields designated by 12 and 13, in which the bearings for the shaft 15 of the motor are arranged, may contain magnetically conductive material so that the additional straying is further increased. This measure too, would assist in the reducing of the outwardly directed straying.

In Figs. 2 and 3 of the drawings the motor is represented in cross section along the line A—A of Fig. 1. The same reference numerals designate the same elements as in Fig. 1. The construction of the magnetic system is especially advantageous in that sharp pole edges are avoided. In the heretofore generally known constructions of the poles these present at the on and off running point of the armature more or less sharp edges. As the armature is toothed rotation of the armature produces air vibrations at the mentioned points which are the origin of the motor noise.

Such noises interfere with the operation of the wire recording apparatus and should for this reason be avoided as far as possible. The compact construction of the electromotor according to the present invention and more particularly the manufacture of the magnetic system from permanent magnetic steel renders possible to make very small the radial length of the poles and to make the transition from the pole edges to the cross-bar in such a manner that no air vibrations occur at the pole edges when the armature rotates. According to the invention a sharp pole edge is avoided, as visible from Figure 2, by making the transition from the pole to the cross-bar in form of a curve. An even increased degree of noiseless running of the motor may be attained by making the magnetic system without distinct poles as for example shown in the variant of Fig. 3. This construction moreover has the great advantage that the recesses in the cross-bar iron, which are visible in Fig. 2 between the poles, may be avoided and that only cylindrical surfaces limit the magnetic system outwardly and inwardly thus particularly simplifying and facilitating the manufacture. The wall of the cylinder constituting the magnetic system is of a same thickness throughout.

I claim:

1. An electromotor for use in driving a sound recording and reproducing device comprising, an elongated arm-

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ature, a magnetic system of permanent magnetic steel enclosing said armature and having poles protruding in axial direction beyond the axial length thereof to produce, an inner stray path for lines of force at each front face of the magnetic system between said poles, said inner stray path being parallel to any outer stray path of lines of force magnetically conductive material bridging said poles at the front sides of the magnetic system to decrease the magnetic resistance of said inner stray path substantially below the magnetic resistance of the outer stray path in order to attain that the greatest part of the stray field flow is closed from pole to pole over the inner stray parallel paths and only a small part follows the outer stray path.

2. An electromotor as claimed in claim 1, in which the axial length of the armature is at least twice the diameter of the armature.

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3. An electromotor as claimed in claim 1, in which the poles are short in radial direction and in which the transition from the pole to the yoke is curved so as to avoid sharp pole edges.

4. An electromotor as claimed in claim 1, in which the magnetic system has no distinct poles and is constituted by a cylindrical tube having a same wall thickness throughout.

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