

DRIVING MECHANISM FOR MAGNETIC DISC DRIVE UNIT

The invention relates to a driving mechanism for magnetic disc memories, particularly so called "hard disc" memories with a driving motor having a stator and a rotor for driving a hub for receiving at least
05 one hard memory disc and located within a first space of the disc memory.

So called "hard discs" are suitable for storing large quantities of data, which can be written to or read out with the aid of a magnetic head arrangement
10 if the disc is rotated with respect to the magnetic head.

In practice, it has been found that occasionally data stored on hard discs are lost and/or problems occur when writing in or reading out the data.

15 This invention seeks to provide a driving mechanism for hard disc memories preventing data losses and avoiding problems during data input and output.

The cause of the aforementioned deficiencies can
20 be magnetic fields emanating from the driving arrangement. These problems may be caused not only by high frequency fields, but also by low frequency fields. There can, in particular, be a demagnetization of the magnetic coating of the hard disc. It has been
25 shown that the magnetic coating can be damaged even with fields above approximately 3 to 5 gauss.

According to the invention, there is provided a driving mechanism for a magnetic disc memory drive unit comprising a brushless direct current motor having a stator and permanent magnet external rotor, said rotor having a bell-shaped rotor casing and at least one permanent magnet fixed in said casing, said motor when energized having parts producing a magnetic flux; a rotor shaft connected to the rotor casing and extending concentrically from the open end thereof, a hub for receiving at least one magnetic memory disc in a first zone, said hub being mounted on said rotor shaft beyond and facing the open end of the rotor casing; and a substantially flat magnetic shielding ring extending coaxially with the rotor shaft and located between the hub and rotor casing to cover the open end of the rotor casing to shield said first zone from said magnetic flux.

The shielding ring makes it possible to prevent, or at least considerably reduce, leakage of the magnetically active motor part in the vicinity of the disc, so that also the static or low frequency magnetic field is reduced to harmless values in the vicinity of the disc.

Preferably, adjacent to the axial end of the motor remote from the hub there is provided a ventilation zone. Thus, on one side of the driving motor a first zone which is substantially free from

magnetic interference fields is produced, whilst on the other side of said motor a second zone is obtained which, in the assembled condition, is separated from said first zone and between which there is a forced turbulence of the ambient air which is desired for
05 cooling purposes.

Suitably, the rotor carries, on the face remote from the hub, a fan for forming the ventilation zone. Such a construction is not only particularly simple, but also leaves the circumferential face of the rotor
10 free as a braking surface for a brake which is frequently provided with such driving mechanisms.

The driving motor is a brushless direct current external rotor-type motor with a permanent magnetic rotor. In the rotor casing there is advantageously a
15 one-part permanent magnetic ring or a permanent magnetic band with an approximately trapezoidal radial magnetization over the pole pitch which is bent in annular manner. The permanent magnets can be, in particular, plastic-bound magnets or so-called rubber
20 magnets. Such magnets are made from mixtures of hard ferrites and elastic material, particularly barium ferrite combined with elastomer.

A driving mechanism of the aforementioned type generally comprises a speed control circuit and/or
25 driving electronics which ensures the necessary commutation. If the magnetic shielding ring is

connected to the motor stator, this ring can additionally be used for cooling the speed control circuit and/or driving electronics, particularly if semiconductor components are held in thermally conductive contact with the shielding ring.

05 The magnetic tracks of hard discs are extremely close to one another. Furthermore, despite the high precision, certain tolerances and eccentricities of the discs, the hub and/or the bearing system for the rotor shaft are unavoidable. As a result, on
10 disassembling the rotor shaft., the alignment between the magnetic head arrangement and the magnetic tracks of the disc is lost. This leads to a loss of the data stored on the disc, so that the disc must be rewritten. In order to avoid such a data loss when
15 parts of the drive, particularly components of the driving electronics or the speed control circuit or the stator winding fail, according to a preferred embodiment of the invention at least certain parts of the stator and/or rotor are detachably connected to
20 the rotor shaft, independently of the connection between said shaft and the hub. This makes it possible to replace defective drive parts without losing the reciprocal alignment between the magnetic head arrangement and the magnetic tracks on the hard
25 disc. To make it unnecessary to obviate the need for entering the highly clean space containing the disc

plate during such a replacement, the detachable parts of the stator and/or rotor are preferably accessible from the side of the driving mechanism remote from the hub.

In conformity with a further development of the
05 invention the rotor shaft is mounted in a mounting tube which mounting tube is sealed against the space for housing the hard disc, in order to prevent the transfer of contaminant particles, e.g. oil or grease particles, from the bearing system into the clean
10 space for receiving the hard disc or discs. In this respect magnetic field fluid seals inserted into the mounting tube have proved to be particularly effective; such magnetic fluid seals are known per se under the trade names "Ferrofluidic seal"
15 (manufactured by the Ferrofluidics Corporation, Nashua, New Hampshire, U.S.A) and "Magring Seal" (manufactured by the Servoflo Corporation, Lexington, Massachusetts, U.S.A). As to further particulars, reference is made to the leaflet "Ferrofluidic Sealing
20 Capabilities" by Ferrofluidic Corporation, 1979, the article "Tonic prevents computer amnesia" by N.C. Persson in Design News, April 18th 1977, the article "Magnetic shaft seal protects optical encoder" by David J. Bak, in Design News, January 19th 1981 as
25 well as the article "Magnetic-fluid seals" by R.E. Rosensweig, G. Miskolczy and F.D. Ezekiel in Machine

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Design, March 28th 1968.

Functional members and/or mounting members, e.g. a magnetic flux conducting ring of a Fluidic seal, preferably may be integrated into the mounting tube, e.g. integrally cast with the latter.

05 A number of preferred embodiments of this invention will now be described in greater detail with reference to the accompanying drawings, wherein:

Fig 1 is a section through an embodiment of the driving mechanism according to the invention.

10 Fig 2 is a section through a second embodiment similar to that of Fig 1.

Fig 3 is a section through an embodiment which is identical to the embodiment of Fig 1 with the exception of sealing means being provided in the
15 mounting tube.

Figs 4 and 5 are sections through further modified embodiments of the invention comprising detachable rotor and stator members.

Fig 6 is a large scale plan view of one of the
20 cooling plates of the arrangement of Fig 5.

Fig 7 is a side view of the cooling plate of Fig 6.

Fig 8 is a partial plan view of the stator winding core with a diagrammatically indicated
25 rotation position detector in the position for rotation to the right or left.

Fig 9 is a plan view of the rotation position

detector support plate, and

Fig 10 is a side view of another embodiment of the driving mechanism.

The driving mechanism illustrated in Fig 1 has a brushless direct current motor with a bell-shaped casing 74 fixed to a rotor shaft 12 and concentric to the latter. A stator lamination 58 carrying a stator winding forms part of the stator of the motor. The stator lamination 58 surrounds mounting tube 44 . Rotor shaft 12 is mounted in mounting tube 44 with the aid of two bearings 48, 48', which are held in place by spaced retaining rings. A cup spring 52 bears on the bottom of bearing 48' and the hub body 76 of the rotor casing so that bearings 48, 48' are axially braced relative to one another. Together with an assembly flange 30 facing the open end of the rotor casing, mounting tube 44 forms a one-piece die casting. As an alternative, the mounting tube 44 can be force-fitted into a hub joined to flange 30.

Rotor casing 74 surrounds the stator lamination 58 leaving a cylindrical air gap.

A hub 75, which is separate from rotor casing 74 and serves to receive one or more hard discs, is fixed to the free end of rotor shaft 12.

In this embodiment, rotor casing 74 is made from magnetically conductive material and is preferably deep-drawn. It is connected to rotor shaft 12 by the

hub body 76, which is pressed into a central opening of the rotor bell. A permanent magnet 56 directly engages on the inner wall of rotor casing 74. The permanent magnet is preferably made from a mixture of hard ferrite, e.g. barium ferrite and an elastic material and thus forms a so-called rubber magnet. It is trapezoidally or approximately trapezoidally radially magnetized via the pole pitch with a relatively small pole clearance.

A printed circuit board 79 and a substantially flat shielding ring 80 are connected to the end plate 67 of the stator by means of brackets 77, 78. The printed circuit board is connected to a d.c. voltage source by a line 31. In conjunction with rotor casing 74, shielding ring 80 prevents the escape of magnetic stray field into the space occupied by the hard memory discs. The steel ball bearing 48 also offers a certain shielding action. Semiconductor components of the driving electronics and/or the speed control circuit (not shown in Fig 1) can be held in thermally conductive contact with the assembly flange 30 and/or the shielding ring 80 for cooling purposes.

An axially flat radial impeller constructed as an injection moulded part is fixed to the outside of base 81 of rotor bell 74 and, in the manner indicated by arrows 83, draws air into the central area and discharges it radially outwards.

In the modified embodiment of Fig 2, the bell-shaped rotor casing 74 is detachably connected to rotor shaft 12. For this purpose, a hub body 85 fixed to rotor shaft 12 has a seat 86 for the rotor bell and an external thread 87. A screw ring 88 can be screwed
05 into the external thread 87 and presses, in a detachable manner, rotor casing 74 against seat 86 of hub body 85. In an alternative embodiment (not shown), seat 86 can be a conical seat.

After detaching screw ring 88, the rotor casing
10 74 can be drawn off without there being any modification to the reciprocal alignment between the rotor shaft 12 or a hub corresponding to hub 75 fixed on the free end of said shaft and the magnetic head arrangement of the rigid disc memory. After
15 removing the rotor casing 74, access can be obtained to driving electronics and a speed control circuit located on printed circuit board 90. If necessary, the printed circuit board 90 can be removed from the stator and replaced. If desired, the arrangement can
20 also be such that the stator lamination 58 can be removed from the mounting tube 44 together with the stator winding 29. A seal 93 is provided above bearing 48 to prevent any grease vapours or the like from bearing 48 passing into the space receiving the
25 discs.

It is obvious that the above-described

embodiments can, if necessary, be modified. For example, a seal corresponding to seal 93 of Fig 2 preferably is also provided in the embodiment of Fig 1. Seal 93 can appropriately be a low friction lip seal. In place of this, or in addition thereto, 05 bearings 48, 48' can be sealed precision bearings.

The brushless direct current motor advantageously is a single-phase electronic motor with an auxiliary reluctance torque (one or two-pulse) (U.S. Patent 3,873,897) or a three-phase electronic motor of the 10 type described in U.S. Patent 4,092,572. The idling speed of the motor can be 5,800 r.p.m. and the rated speed e.g. 3,600 r.p.m. Advantageously, the stator has four marked, wound poles, whose pole tips are deformed in such a way that in the vicinity thereof 15 the width of the air gap between the stator and rotor is modified and consequently the auxiliary reluctance torque is produced.

The embodiment of Fig 3 is substantially identical to that of Fig 1. However, in order to seal 20 the bearing system of rotor shaft 12 relative to the space receiving the disc or discs, a magnetic field seal 95 is inserted into the mounting tube 44 in the region between hub 75 and bearing 48. Magnetic fluid seal 95 consists of a pair of pole pieces 96, 97, a 25 permanent magnet ring 98 positioned between the two pole pieces, and a magnetic liquid in an annular gap

99 between the magnet ring 98 and a sleeve 100 fixed to rotor shaft 12. Such a seal is known under the trade name "Ferrofluidic seal". Seal 95 prevents contaminant particles moving from the bearing system into the space receiving the rigid memory discs.

- 05 The embodiment of Fig 4, in a manner similar to the embodiment of Fig 1, comprises rotor shaft 12 which carries hub 75 at one of its ends, the rotor shaft being rotatably mounted by bearings 48, 48' in mounting tube 44 which merges into mounting flange 30.
- 10 A shielding ring 101 is fixed to the lower surface of mounting flange 30 in concentric relationship relative to mounting tube 44. Rotor casing 74 and permanent magnet 56 are detachably fixed to rotor shaft 12. For this purpose a screw 102 engages a central threaded
- 15 bore at the lower end of rotor shaft 12. The head of screw 102 engages a hub body 103 of rotor casing 74 and urges the hub body against a securing ring 104. The latter is inserted into a circumferential groove of rotor shaft 12. Cup springs 52 abut the opposite
- 20 side of ring 104. Stator lamination 58 is detachably mounted on the lower end of mounting tube 44. Stator lamination 58 is urged against a shoulder 106 of mounting tube 44 by screws 105 which are screwed into the lower end of mounting tube 44. Only one of screws
- 25 105 is shown in Fig 4. A body 107 which is connected to the stator lamination 58 carries at its upper end a

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printed circuit board 108 for the driving electronic unit and/or a speed control circuit.

By loosening screw 102 rotor casing 74 together with permanent magnet 56 may be removed from rotor shaft 12. Then, upon loosening of screws 105, the
05 stator lamination 58 carrying stator winding 29, and the printed circuit board 108 likewise may be detached from mounting tube 44. The relative alignment between the magnetic head arrangement of the disc memory and the magnetic tracks of the memory discs mounted on hub
10 75 is not affected by this.

A sleeve 110 is pressed into the upper end of mounting tube 44 in the region between upper bearing 48 and hub 75. Sleeve 110 carries a permanent magnet ring 111. A magnetic liquid is introduced into the
15 gap between permanent magnet ring 111 and an extension 112 of hub 75. This magnetic liquid together with magnet ring 111 defines a Magring seal, which as seal 95 of the embodiment of Fig 3, prevents movement of grease or oil particles from the bearing system into
20 space receiving the hard memory discs.

Sleeve 110 need not be a separate member and may in fact be integrated into mounting tube 44. In the embodiment of Fig 3 at least the pole piece 97 may be integrally moulded into mounting tube 44.

25 As seen in Fig 4, rotor casing 74 in this embodiment does not carry blower blades or the like.

Nevertheless, because of the high speed of rotation of rotor casing 74, a considerable ventilation effect is obtained by the rotation of the casing.

In order to further improve the magnetic shielding effect, rotor casing 74 may protude beyond
05 permanent magnet 56 (as indicated in Fig 4 in dotted lines) and extend into the vicinity of magnetic shielding ring 101.

In much the same way as in the embodiments of Figs 1 to 4, the embodiment shown in Figs 5 to 8 has a
10 rotor casing 14 made from a good magnetically conducting material and in particular mild steel. Hub 75 is not shown. Slotted supports 114 are shaped onto the upper stator end plate 67 (Fig 5) and said supports carry three shielding and cooling plates 60
15 which are electrically separate.

In turn, the shielding and cooling plates 60 are provided with legs 115 for holding circuit carrier 20 constructed in the form of a printed circuit board, with rotation position detectors 35, output stage
20 transistors 61 and further circuitry components, whereof one is indicated at 63. Core 58 carrying the stator winding, circuit carrier 20 and the shielding and cooling plate 60 in this way form a pre-assemblable unit, which can be connected to the
25 remaining motor assemblies as an entirety and which permits a precise reciprocal angular alignment of the

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stator pole clearances and the rotation position detectors 35.

As can be gathered in detail from Figs 6 and 7, each of the shielding and cooling plates 60 has two groups of rectangular recesses 116, 117. Each of the
05 plates 60 is held by two supports engaged either in recesses 116 or recesses 117 as a function of the motor rotation direction. Each of the plates 60 is in good thermally conducting connection with in each case one of the output stage transistors 61 of circuit
10 carrier 20. Openings 118 are provided in the shielding and cooling plates 60 for fixing the output stage transistors 61. Plates 60 also contain a guidance opening 119, through which is passed one of the rotation position detectors 35, preferably Hall
15 IC's soldered to circuit carrier 20. Rotation position detector 35 is stuck in guidance opening 119 in order to ensure a particularly stable seat. Each of the plates 60 is provided with a group of three legs 115 stamped from the sheet metal material forming
20 the shielding and cooling plate and are bent upwards at right angles with respect to the plane of the plate. Attachments 120 of legs 115 are inserted through corresponding recesses in circuit carrier 20 and are soldered to the latter. These attachments 120
25 form shoulders 121 on which rest the circuit carrier 20. Here again, the soldering of attachments 120

appropriately takes place in one operation, e.g. by dip soldering, with the production of the soldered joints between circuit carrier 20 and the circuitry components of the driving electronic and control circuit.

05 It has proved advantageous in practice to displace the rotation position detector or detectors 35 by a certain lead angle, i.e. by a certain amount counter to the rotation direction with reference to the stator pole clearances in the centre of the stator slot. As a result, the commutating signal is necessarily advanced compared with the induced voltage and consequently the commutated current rise delayed by the winding inductance is compensated. For example, for a rotor rotation direction 122 (Fig 8) 10 with reference to the slot centre 123 the rotation position detector 35 should have the position indicated at 124. However, in the case of an opposite rotor rotation direction 125 a corresponding advance is sought by displacing rotation position detector 35 15 in the opposite direction to point 126 with reference to slot centre 123. This differing alignment of the rotation position detectors with respect to the stator pole clearances as a function of the desired rotation direction is brought about here in a very simple way 20 in that the slotted supports 114 provided with detents 127 can alternatively be engaged in recesses 116 or

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recesses 117, which for example have a reciprocal angular distance of 12° . Together with recesses 116 or 117, slotted supports 114 form snap connections. If necessary, they can be detached by compressing the legs of the slotted supports until the detents can
05 pass through recesses 116 or 117.

In the embodiment of Fig 5, for the reasons indicated hereinbefore, rotor case 14 and winding core 58 are constructed so as to be detachable together with circuit carrier 20. To this end, a hub 128 is
10 connected to rotor casing 14, e.g. by caulking or wedging and is placed on the lower end of rotor shaft 12. This end of rotor shaft 12 has a reduced diameter external thread portion 129. A standard nut, e.g. a hexagonal nut 130, is screwed onto the threaded
15 portion 129 and, by means of washer 131 presses the hub against the retaining ring 54. The end face of threaded portion 129 is rounded and, in conjunction with a contact (not shown), can be used to eliminate electrostatic charges from shaft 12.

20 For the detachable fixing of winding core 58, the bottom stator lamination of the e.g. riveted bundle of laminations 59 is formed by a lamination 132 with an internal diameter which is the same or smaller than the internal diameter of mounting tube 44. This
25 lamination 132 engages on the lower end face of mounting tube 44. In this area, it is provided with three circumferentially distributed holes 133. Self-

tapping screws 105 engaging in cored holes 134 of mounting tube 44 project through holes 133.

As a result of the cooperation of screws 105 with holes 133 of stator lamination 132, torsion between mounting tube 44 and winding core 58 is effectively
05 prevented. After removing screws 105, winding core 58 together with the stator winding (not shown in Fig 5), circuit carrier 20 and shielding and cooling plates 60 can be effortlessly removed from mounting tube 44 without a detaching device being required.

10 Whereas in the embodiment of Fig 5, the connection between winding core 58 and shielding and cooling plates 60 takes place by means of the support 114 on end plate 67, it is for example possible for rivets 135 (Fig 8), which are electrically insulated
15 from the stator laminations or which are made from insulating material and serve to hold together the bundle of stator laminations, to project beyond the end face of winding core 58 and then the shielding and cooling plates can be fixed to said projecting rivet
20 ends.

A layer 138 (Fig 5) made from a soft damping material is inserted between the bundle of stator laminations 59 and that part of the mounting tube 40 which carries the latter. This damping material
25 prevents vibrations and noise resulting therefrom.

If, in the embodiment of Fig 5, the drive

electronics and an optionally provided control circuit are arranged separately from the motor 11 in place of the shielding and cooling plate 60 carrying the circuit board 20 a carrier plate 140 of the type shown in Fig 9 can be clipped to three of the slotted
05 supports 114. Plate 140 then only carries the rotation position detectors 35 constituted in the present embodiment by three Hall IC's at a reciprocal angular distance of 60° . In much the same way as with shielding and cooling plate 60, carrier plate 140 is
10 provided with three groups of rectangular recesses 141, 142, having e.g. a reciprocal angular distance of 12° . When supports 114 are engaged either in recesses 141 or in recesses 142, a desired lead angle for one or other motor rotation direction can be set for
15 commutating purposes. In this case, the magnetic shielding ring (not shown) can, for example, be provided in the area between end plate 67 and the bottom of flange 30.

In the embodiment of Fig 10, a hub 145 with a
20 cast-in bush 146 is pressed onto the upper end of rotor shaft 12, which is provided with a milled edge 144. The internal diameter of hub 145 is larger by a relatively small amount than the external diameter of mounting tube 44 and, as shown at 147, the inner area
25 of the hub is widened conically in a downward direction. Base 148 of hub 145 is spaced from the

upper end plates of mounting tube 44 and this distance is greater than the distance between the inner peripheral wall of the hub from the outer peripheral wall of the mounting tube. A plurality of bores 149, of which only one is shown in Fig 10, extend parallel to the rotation axis through base 148 of hub 145. It has been found that this construction leads to a particularly effective formation of a desired air flow in the vicinity of the rigid memory discs located on hub 145.

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CLAIMS

1. A driving mechanism for a magnetic disc memory drive unit comprising
a brushless direct current motor having a stator and permanent magnet external rotor, said rotor having a
05 bell-shaped rotor casing and at least one permanent magnet fixed in said casing, said motor when energized having parts producing a magnetic flux;
a rotor shaft connected to the rotor casing and extending concentrically from the open end thereof;
10 a hub for receiving at least one magnetic memory disc in a first zone, said hub being mounted on said rotor shaft beyond and facing the open end of the rotor casing; and
a substantially flat magnetic shielding ring extending
15 coaxially with the rotor shaft and located between the hub and rotor casing to cover the open end of the rotor casing to shield said first zone from said magnetic flux.
2. A driving mechanism as Claimed in Claim 1,
20 wherein the shielding ring is stationary.
3. A driving mechanism as claimed in Claim 2, wherein the rotor shaft is mounted in bearings in a mounting tube concentric therewith and is connected to a motor assembly flange.
- 25 4. A driving mechanism as claimed in Claim 3, wherein the shielding ring is carried by the assembly



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flange.

5. A driving mechanism as claimed in Claim 2 or Claim 3, wherein the shielding ring is carried by the stator.

6. A driving mechanism as claimed in any one of
05 Claims 2, 3 or 5, wherein at least one semiconductor component is held in thermally conductive contact with the shielding ring.

7. A driving mechanism as claimed in Claim 4,
wherein at least one semiconductor component is held
10 in thermally conductive contact with the shielding ring.

8. A driving mechanism as claimed in Claim 7,
wherein the assembly flange carries a printed circuit board for semiconductor components, the shielding ring
15 is positioned adjacent to said board, and at least one of the said components is held in conductive contact with the assembly flange and/or with the shielding ring.

9. A driving mechanism as claimed in any one of the
20 preceding Claims, wherein the rotor casing is made of magnetically conductive material and forms part of the magnetic shield shielding said first zone.

10. A driving mechanism as claimed in any one of the preceding Claims, wherein adjacent to the axial end of
25 the motor remote from the hub is provided a ventilation zone.



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11. A driving mechanism as claimed in Claim 10,
wherein, the rotor carries, on its face remote from
the hub, a fan.
12. A driving mechanism as claimed in Claim 11,
wherein an impeller is fixed to the radially directed
05 outside of the rotor casing.
13. A driving mechanism as claimed in Claim 11 or
Claim 12, wherein the fan is constructed as an axially
flat radial blower.
14. A driving mechanism as claimed in any one of the
10 preceding Claims, wherein at least part of the stator
and/or rotor is detachably connected to the rotor
shaft, independently of the connection between the
rotor shaft and the hub.
15. A driving mechanism as claimed in Claim 14,
15 wherein the detachable parts of the stator and/or
rotor are accessible from the side of the driving
mechanism remote from the hub.
16. A driving mechanism as claimed in Claim 14 or
Claim 15, wherein the rotor shaft is mounted in
20 bearings in a mounting tube, the rotor casing is
detachably connected to said shaft and a stack of
stator laminations is detachably mounted on the
mounting tube.
17. A driving mechanism as claimed in Claim 16,
25 wherein said stack of stator laminations has, in the
vicinity of one end face, at least one lamination



having an internal diameter the same as, or smaller than, the internal diameter of the mounting tube and provided with holes through which are inserted fixing elements cooperating with the mounting tube.

18. A driving mechanism as claimed in Claim 16 or
05 Claim 17, wherein a soft damping material is placed between the stack of stator laminations and that part of the mounting tube carrying said stack.
19. A driving mechanism as claimed in any one of Claims 16 to 18, wherein a printed circuit board for a
10 driving electronic unit and/or a speed control circuit is connected to the stack of stator laminations and is detachable from the mounting tube together with said stack.
20. A driving mechanism as claimed in any one of the
15 preceding Claims, wherein the permanent magnet is constituted by a one-piece permanent magnetic ring or a permanent magnetic band with an approximately trapezoidal radial magnetism, which ring or band is curved in an annular manner.
- 20 21. A driving mechanism as claimed in any one of the preceding Claims, wherein the permanent magnet includes a ferrite combined with an elastomer.
22. A driving mechanism as claimed in Claim 21, wherein the ferrite is barium ferrite.
- 25 23. A driving mechanism as claimed in any one of the preceding Claims wherein the rotor is mounted in



bearings in a mounting tube which is sealed at the end proximate the hub.

24. A driving mechanism as claimed in Claim 23, wherein said end is sealed by a magnetic fluid seal.

25. A driving mechanism as claimed in Claim 24,
05 wherein the functional members and/or mounting members of the magnetic fluid seal are integral with the mounting tube.

26. A driving mechanism as claimed in any one of the preceding Claims, wherein a circuit carrier is
10 provided for a driving electronic unit and/or a control circuit, whose output stage transistors are associated with cooling plates electrically separate from one another and the cooling plates are fitted to a stator winding core and in turn support the circuit
15 carrier.

27. A driving mechanism as claimed in Claim 26, wherein the cooling plates together comprise the shielding ring.

28. A driving mechanism as claimed in Claim 26 or
20 Claim 27, wherein the cooling plates are fitted to the stator winding core by means of snap connections.

29. A driving mechanism as claimed in Claim 28, wherein the snap connections are detachably constructed.

25 30. A driving mechanism as claimed in any one of Claims 26 to 29, wherein supports projecting from one



end face of the winding core are provided for connecting the stator winding core to the cooling plates and said supports can engage in recesses of the cooling plates.

31. A driving mechanism as claimed in Claim 30,
05 wherein the supports are shaped onto a stator end plate.

32. A driving mechanism as claimed in any one of Claims 26 to 31, wherein legs are stamped and bent from the cooling plates for supporting the circuit
10 carrier, said legs also being inserted and soldered in the recesses of the circuit carrier.

33. A driving mechanism as claimed in any one of Claims 26 to 32, wherein the circuit carrier carries one or more position rotation detectors and the snap
15 connections can be randomly engaged in one of at least two differently reciprocal angular alignment positions between the stator winding core and the circuit carrier supported on the cooling plate.

34. A driving mechanism as claimed in Claim 33,
20 wherein the position rotation detector or detectors are inserted through guidance openings in the cooling plate.

35. A driving mechanism as claimed in Claim 34, wherein the rotation position detector or detectors
25 are fixed with respect to the guidance openings.

36. A driving mechanism as claimed in any one of the



Claims 1 to 24, wherein a driving electronic unit is arranged separately from the driving motor and a carrier plate for at least one rotation position detector can be provided to a stator winding core by means of supports in alternatively one of at least two
05 different reciprocal angular alignment positions between the winding core and the carrier plate.

37. A driving mechanism as claimed in any one of the preceding Claims, wherein the hub has a central opening widening conically towards the driving motor
10 and air passage openings are formed in the base of the hub for an air flow passing through the central opening.

38. A driving mechanism as claimed in Claim 1 and substantially as described with reference to and as
15 shown in Figure 1.

39. A driving mechanism as claimed in Claim 1 and substantially as described with reference to and as shown in Figure 2.

40. A driving mechanism as claimed in Claim 1 and
20 substantially as described with reference to and as shown in Figure 3.

41. A driving mechanism as claimed in Claim 1 and substantially as described with reference to and as shown in Figure 4.

25 42. A driving mechanism as claimed in Claim 1 and substantially as described with reference to and as



shown in Figures 5 to 9.

43. A driving mechanism as claimed in Claim 1 and substantially as described with reference to and as shown in Figure 10.

44. A magnetic disc memory drive unit comprising a
05 housing defining a first zone for accommodating at least one magnetic memory disc and a driving mechanism as claimed in any one of the preceding Claims, said mechanism being positioned with the motor outside the housing, and the hub within the housing whereby the
10 motor can drive the disc and the shielding ring shields the disc from magnetic flux produced in the motor.

45. A magnetic disc memory unit comprising a housing defining a first zone accommodating at least one
15 magnetic memory disc and a driving mechanism as claimed in any one of the preceding Claims, said mechanism being positioned with the motor outside the housing and the hub within the housing and supporting the disc or discs, whereby the motor drives the disc
20 or discs and the shielding ring shields the disc or discs from magnetic flux produced in the motor.

46. A unit as claimed in Claim 45, wherein the disc is a hard disc.