US 20050104466A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0104466 A1**

Barreiro (43) **Pub. Date: May 19, 2005**

(54) **ELECTRODYNAMIC MACHINE**

(75) Inventor: **Manuel Vieira Barreiro**, Ellenbrook (AU)

Correspondence Address:
MERCHANT & GOULD PC
P.O. BOX 2903
MINNEAPOLIS, MN 55402-0903 (US)

(73) Assignee: **BARREIRO MOTOR COMPANY PTY LTD.**, Perth (AU)

(21) Appl. No.: **11/021,427**

(22) Filed: **Dec. 23, 2004**

(30) **Foreign Application Priority Data**

Mar. 9, 2000 (AU) PQ6117

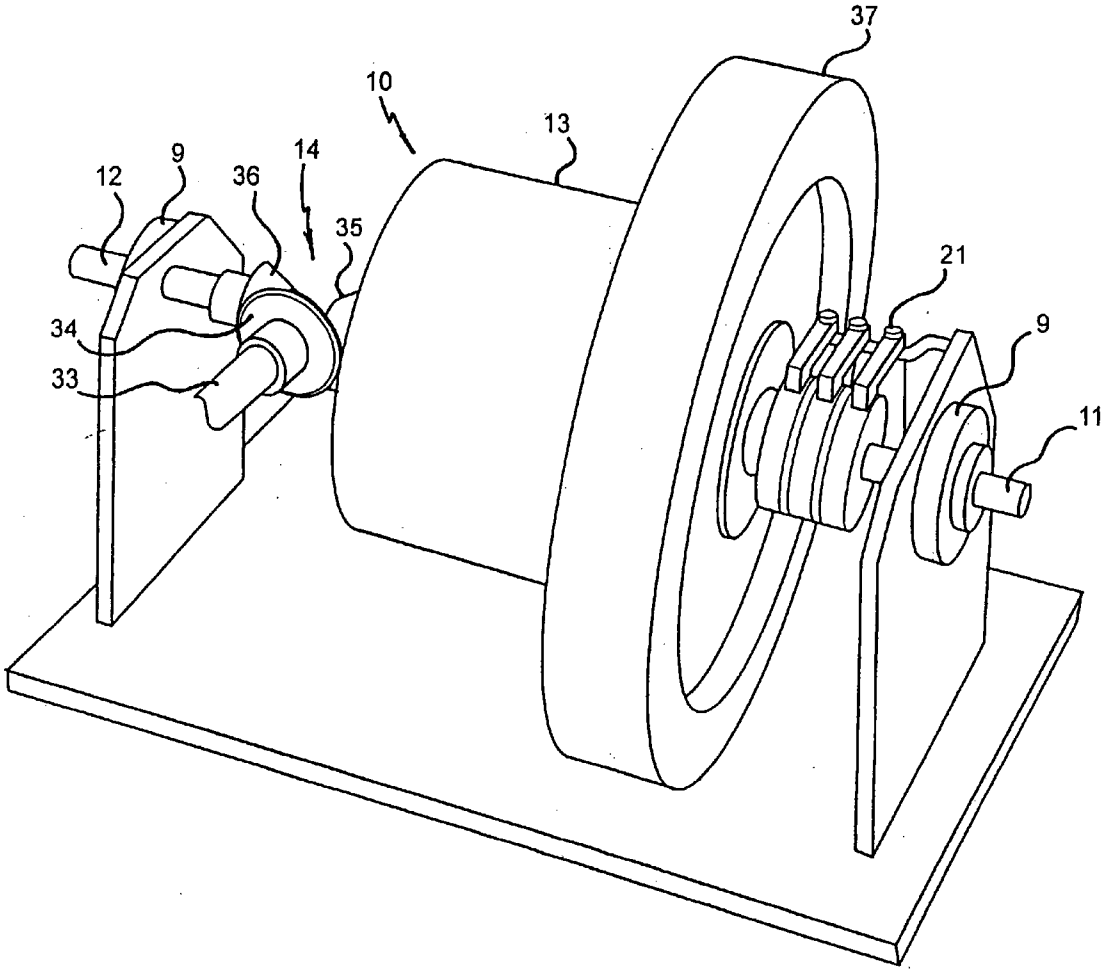
Publication Classification

(51) **Int. Cl.**[7] **H02K 7/02**; H02K 7/06; H02K 16/02

(52) **U.S. Cl.** **310/114**; 310/83; 310/74

(57) **ABSTRACT**

An electrodynamic machine (**10**) comprising a first rotor (**13**) and a second rotor (**15**). The first and second rotors (**13, 15**) are adapted to rotate relative to each other, preferably in opposite directions. The electrodynamic machine (**10**) may operate as an electric generator or as an electric motor.



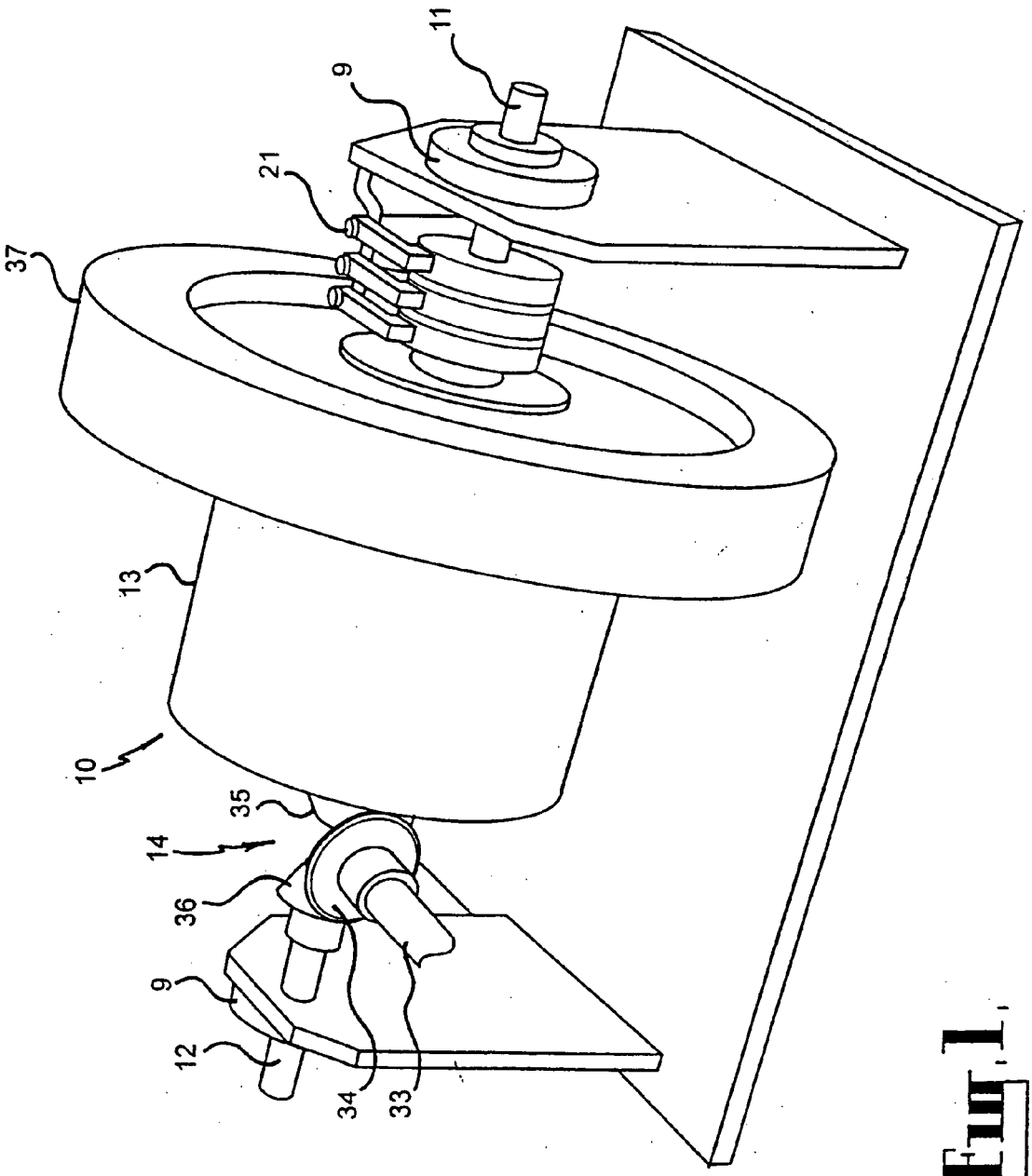


Fig. 1

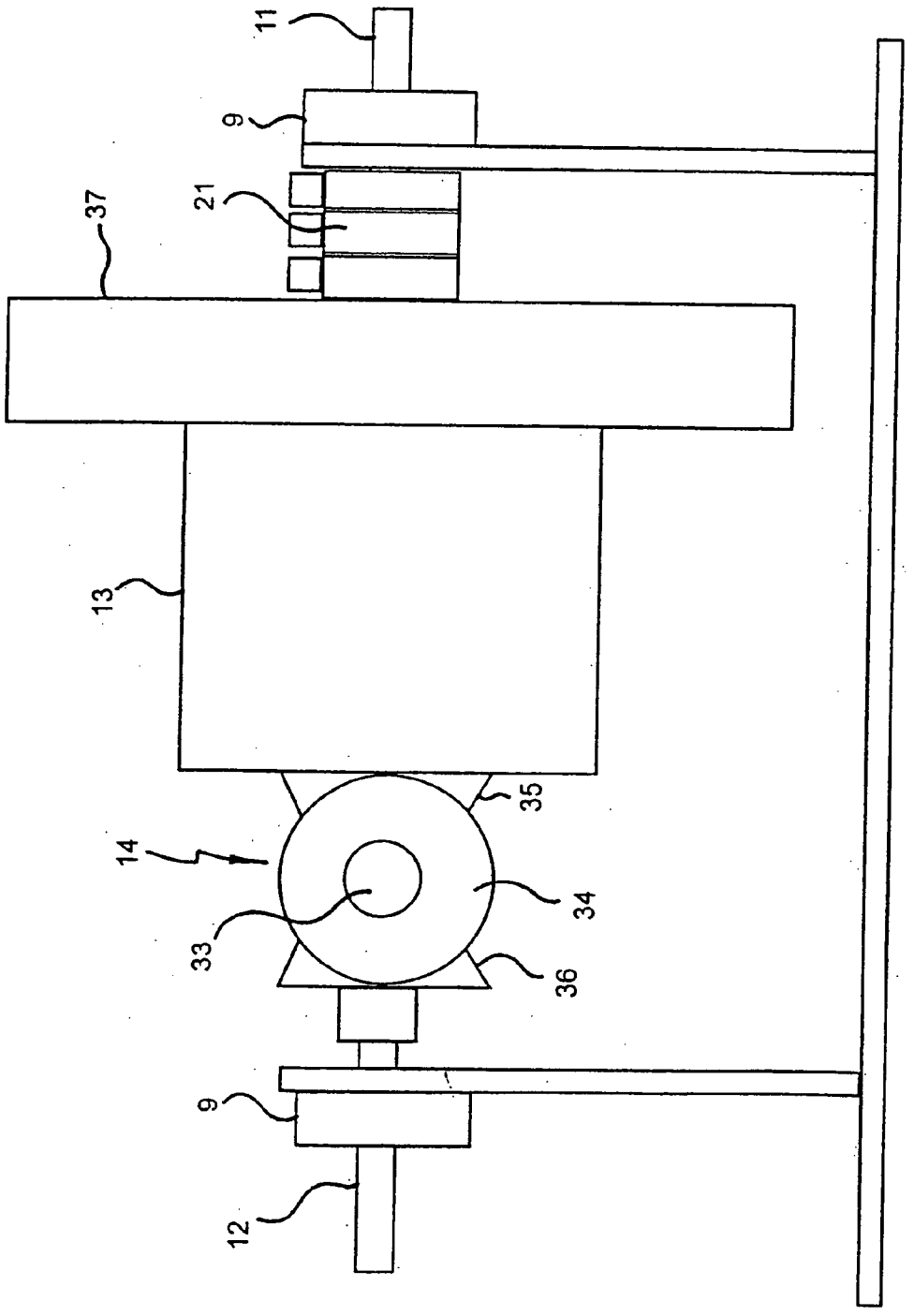


Fig. 2

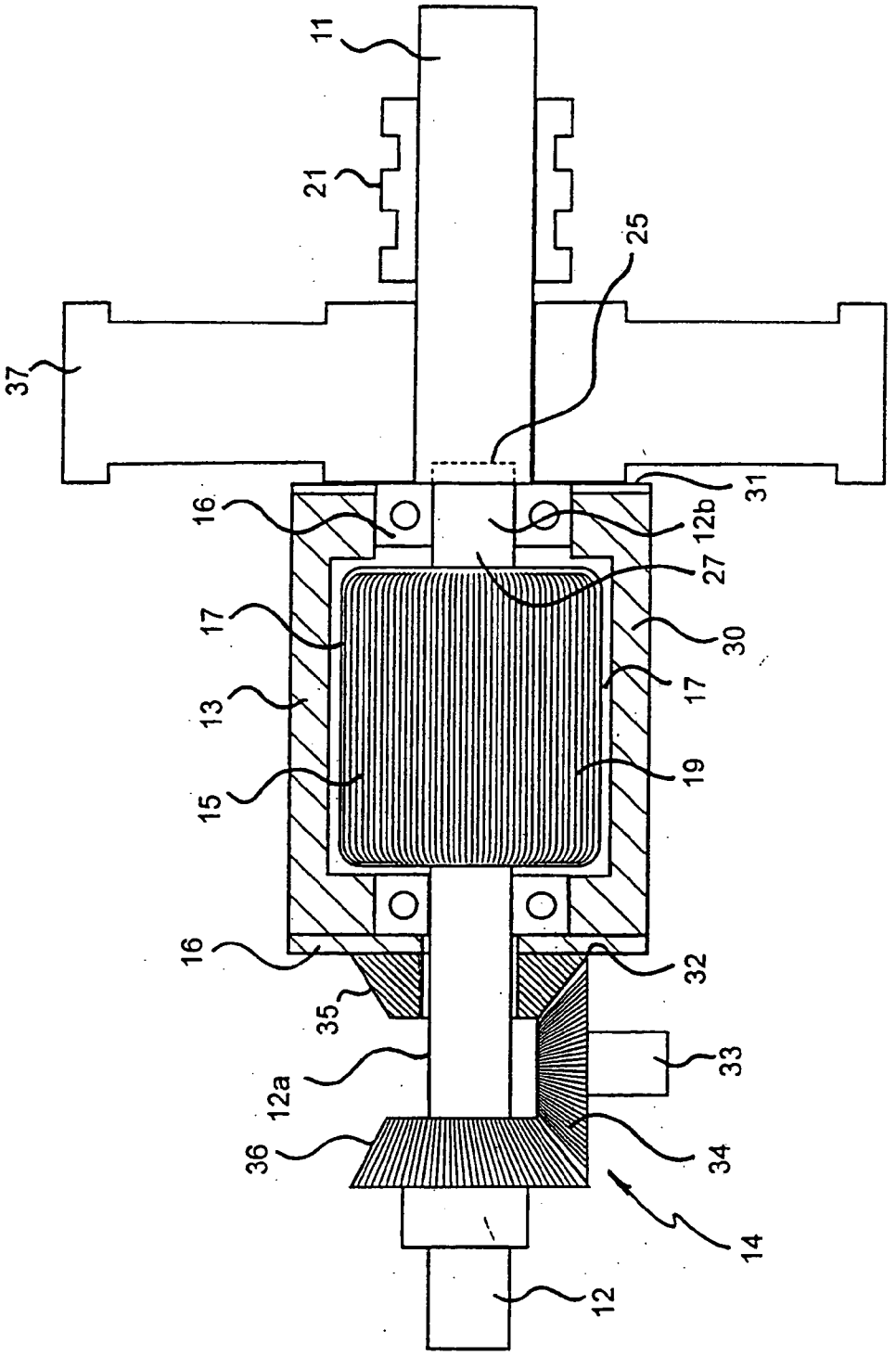


Fig. 3

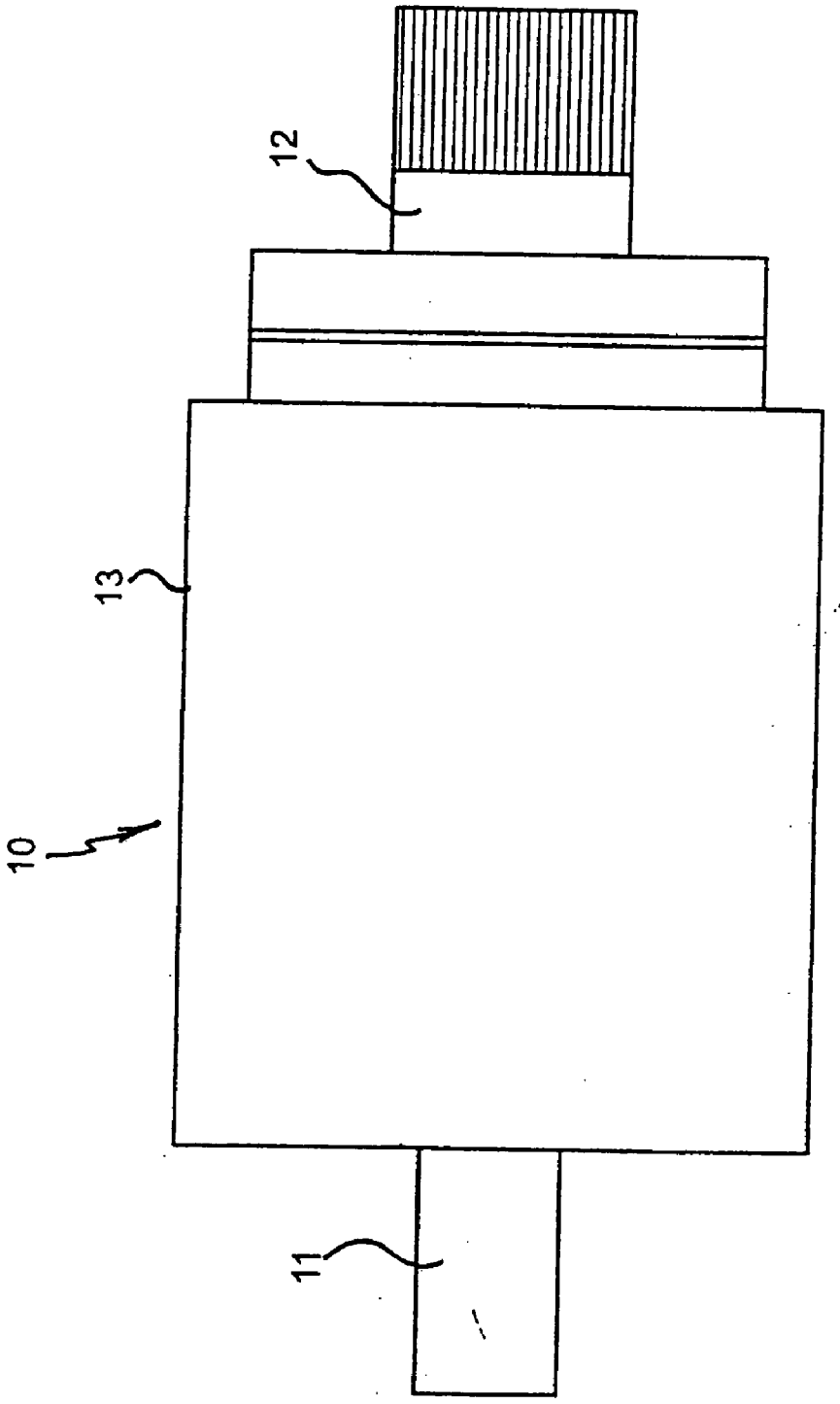


Fig. 4

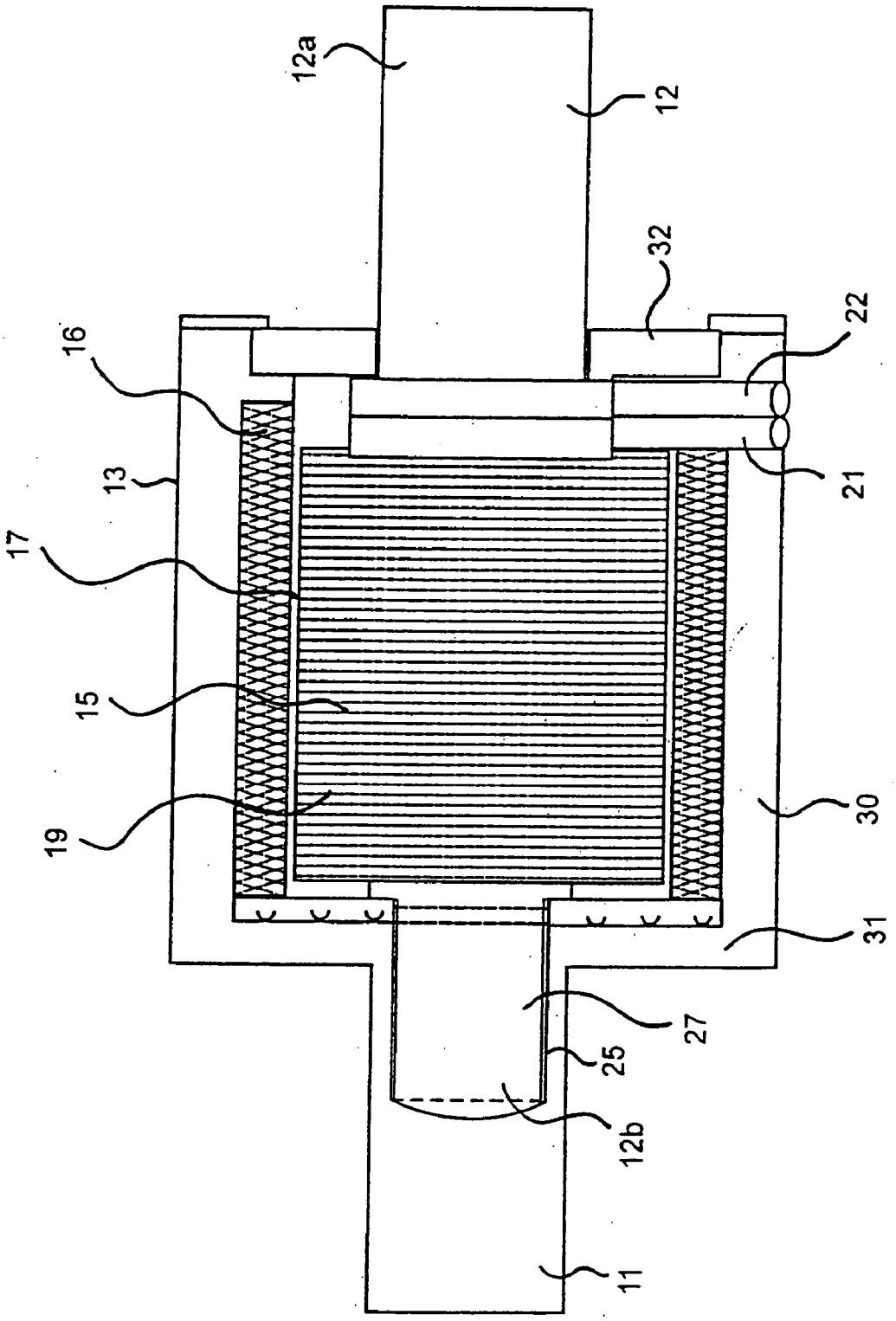


Fig. 5

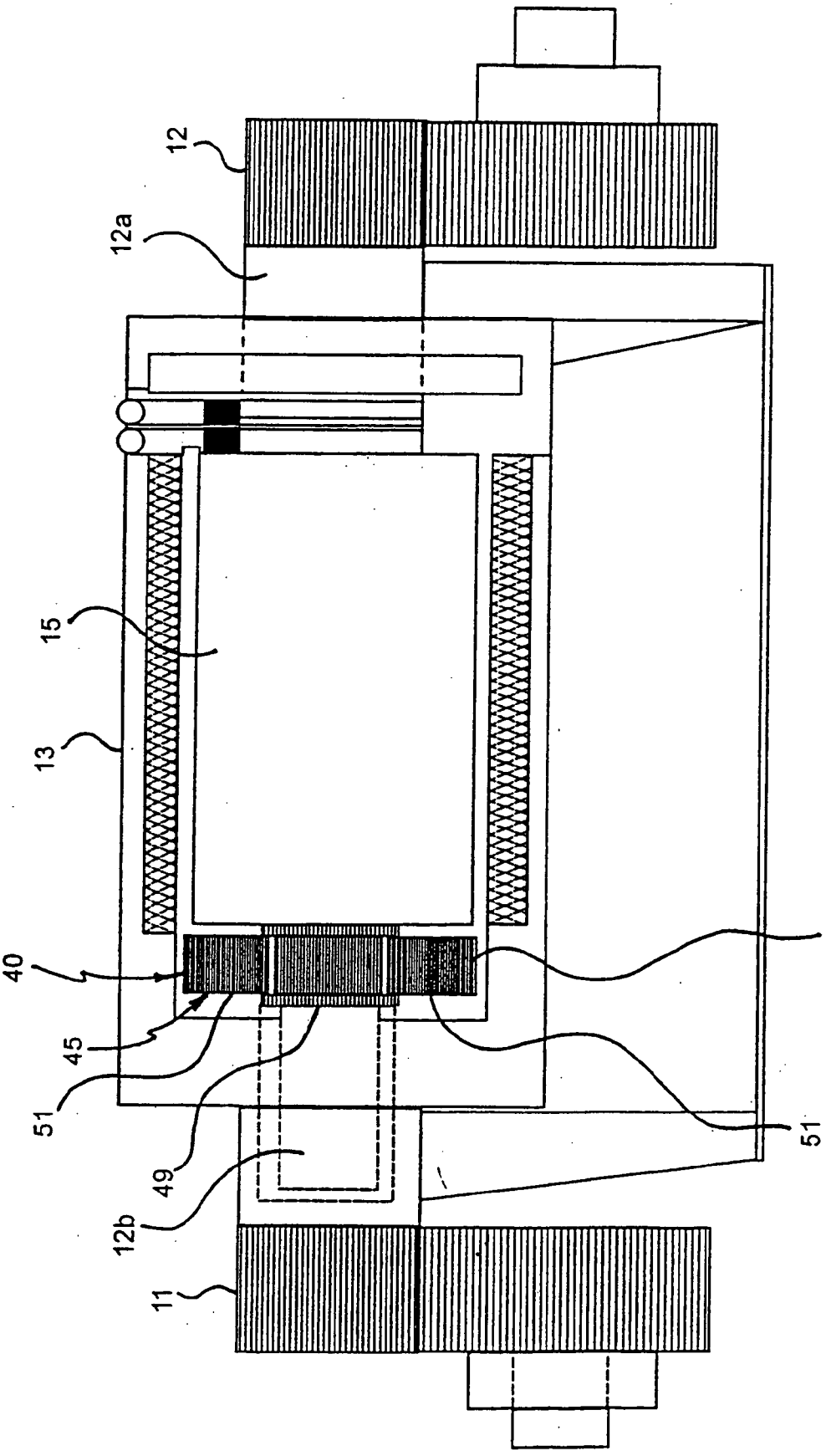


Fig. 6

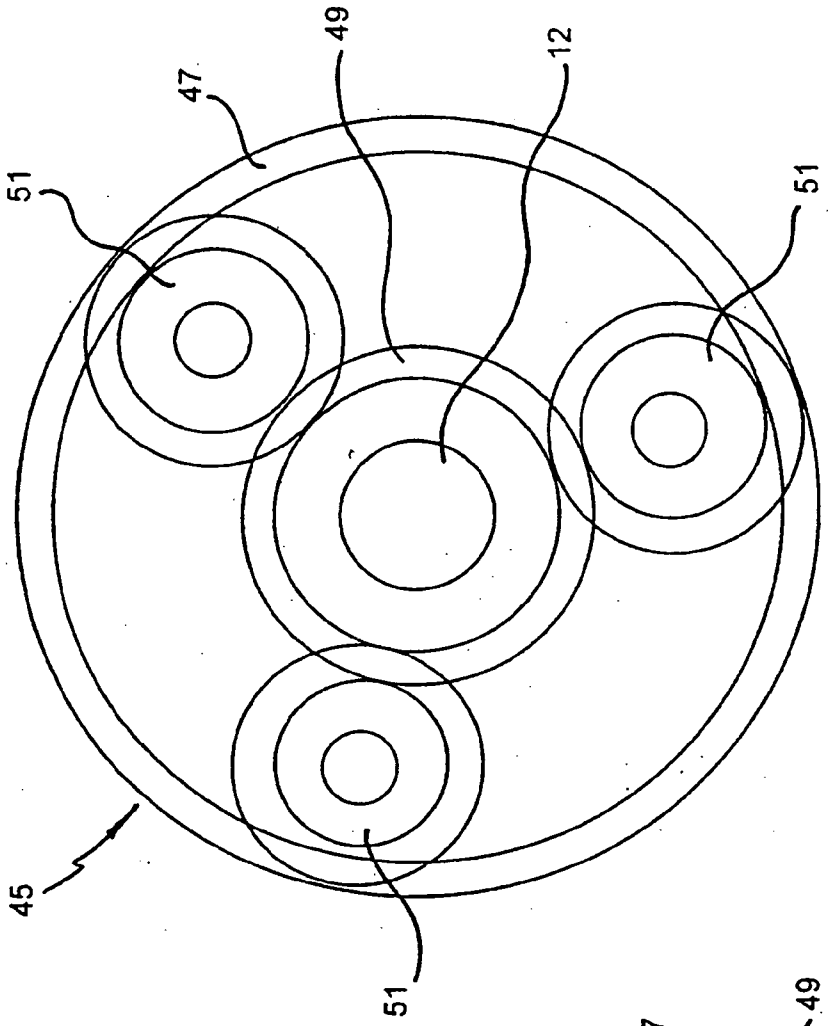


Fig. 7

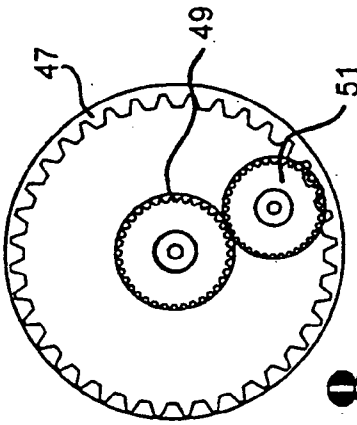


Fig. 8

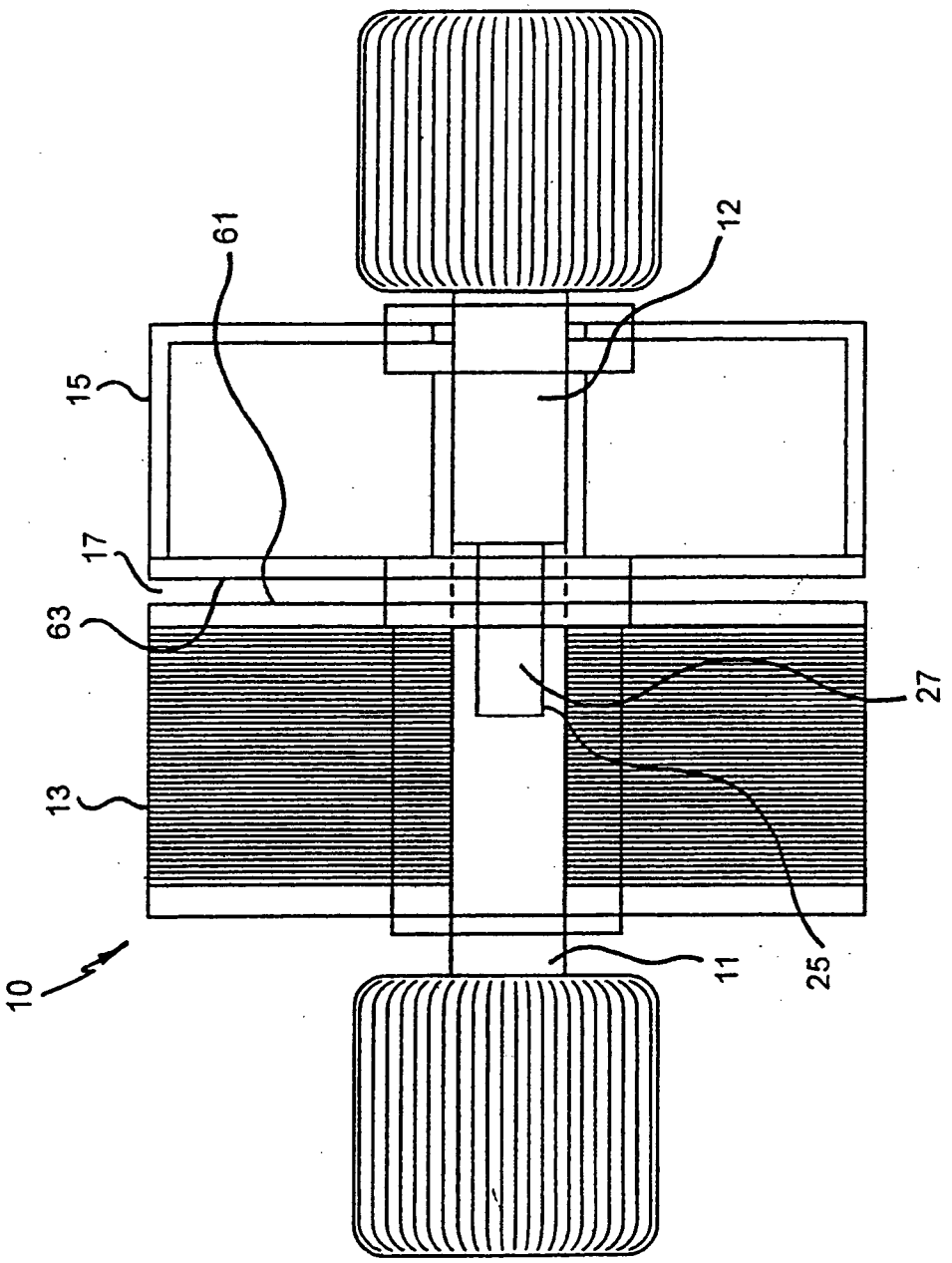


Fig. 9

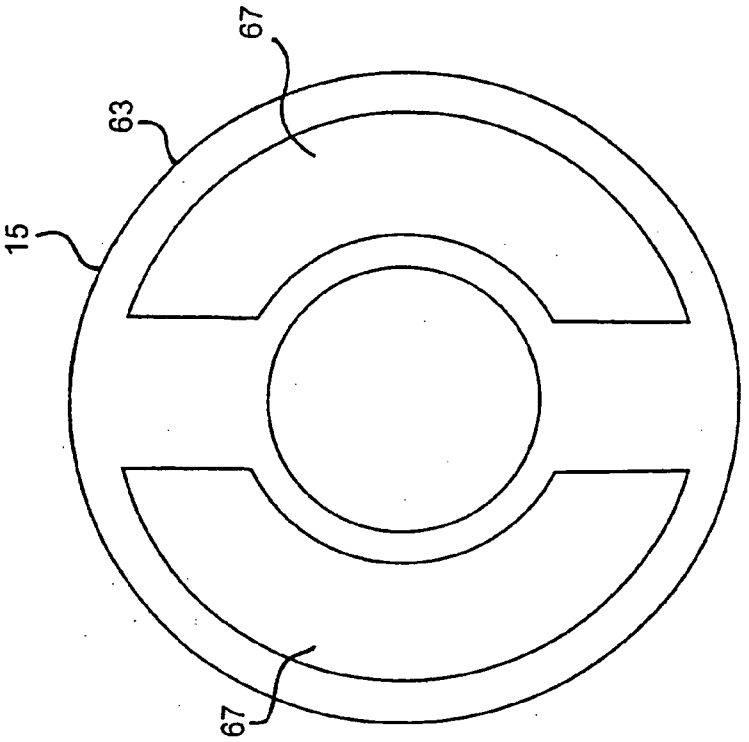


Fig. 11

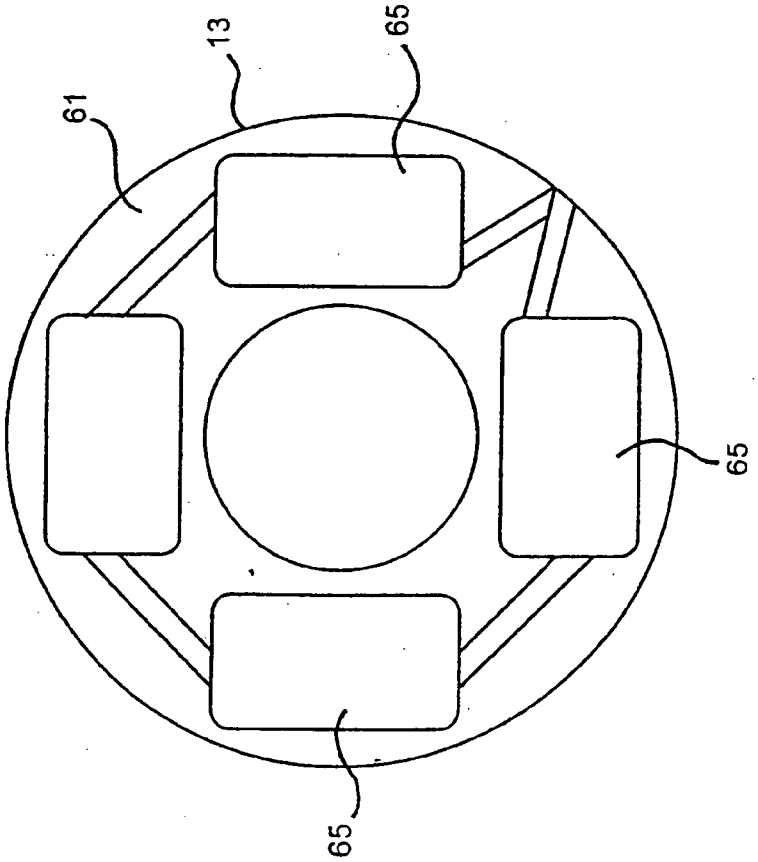


Fig. 10

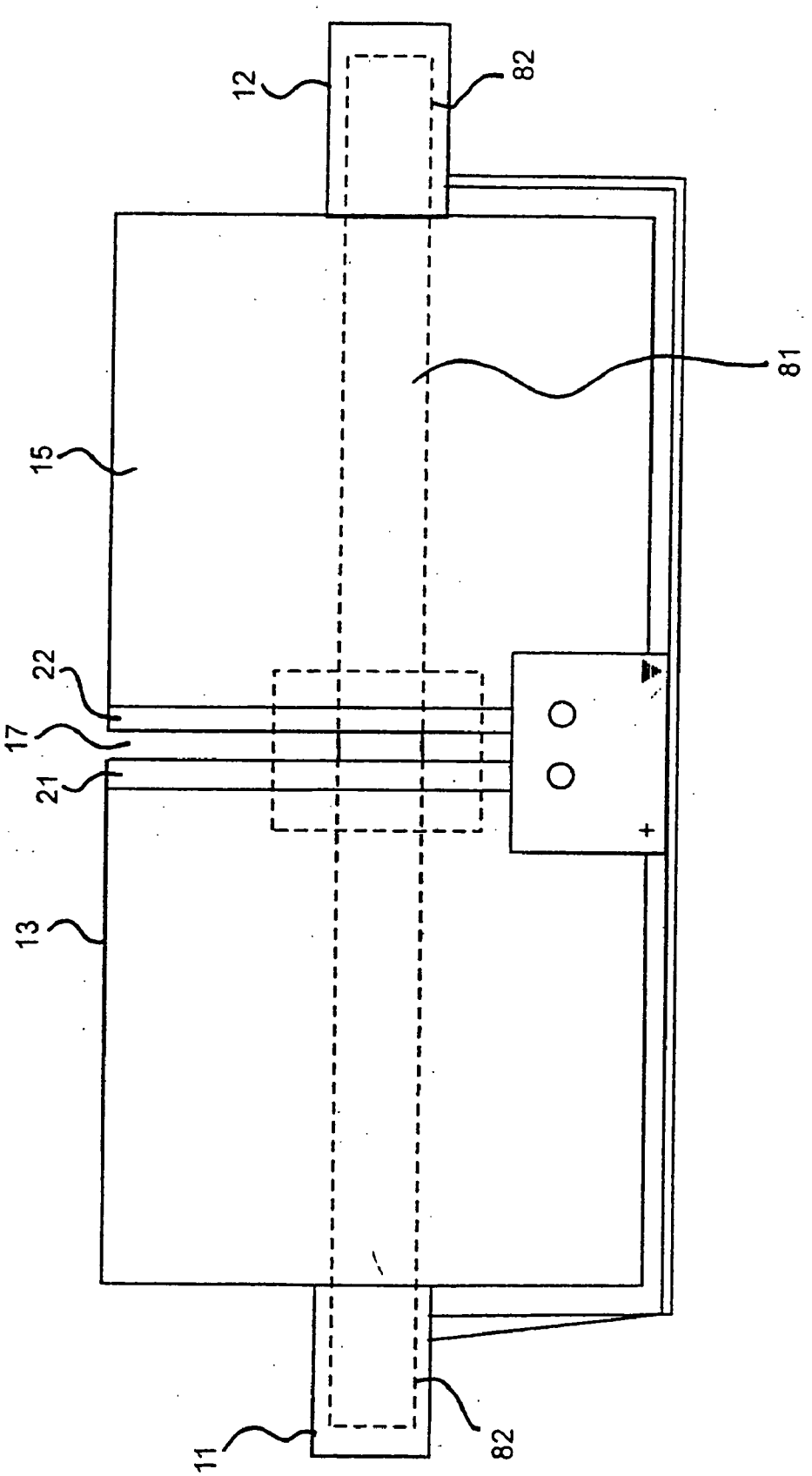


Fig. 12

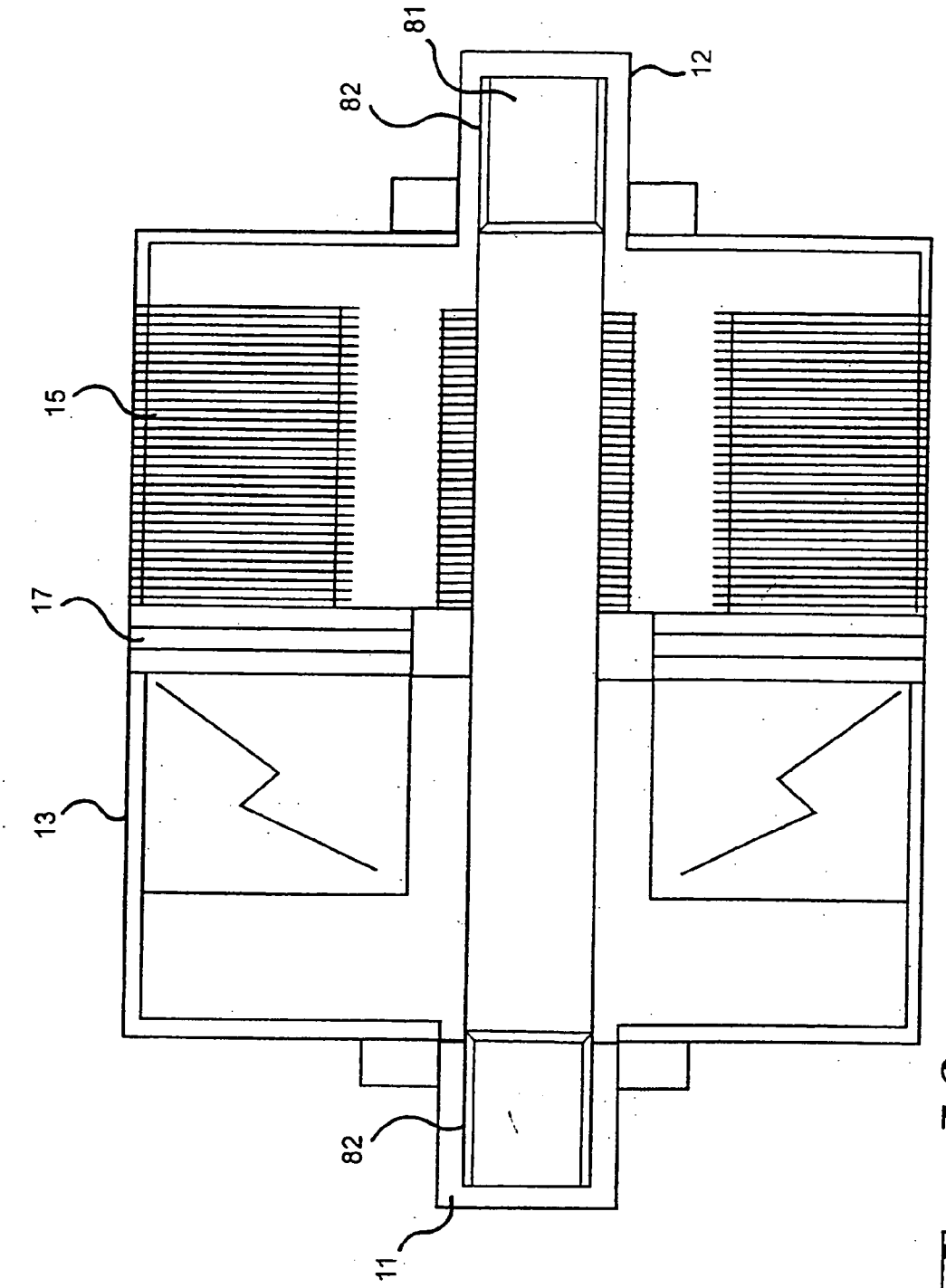


Fig. 13

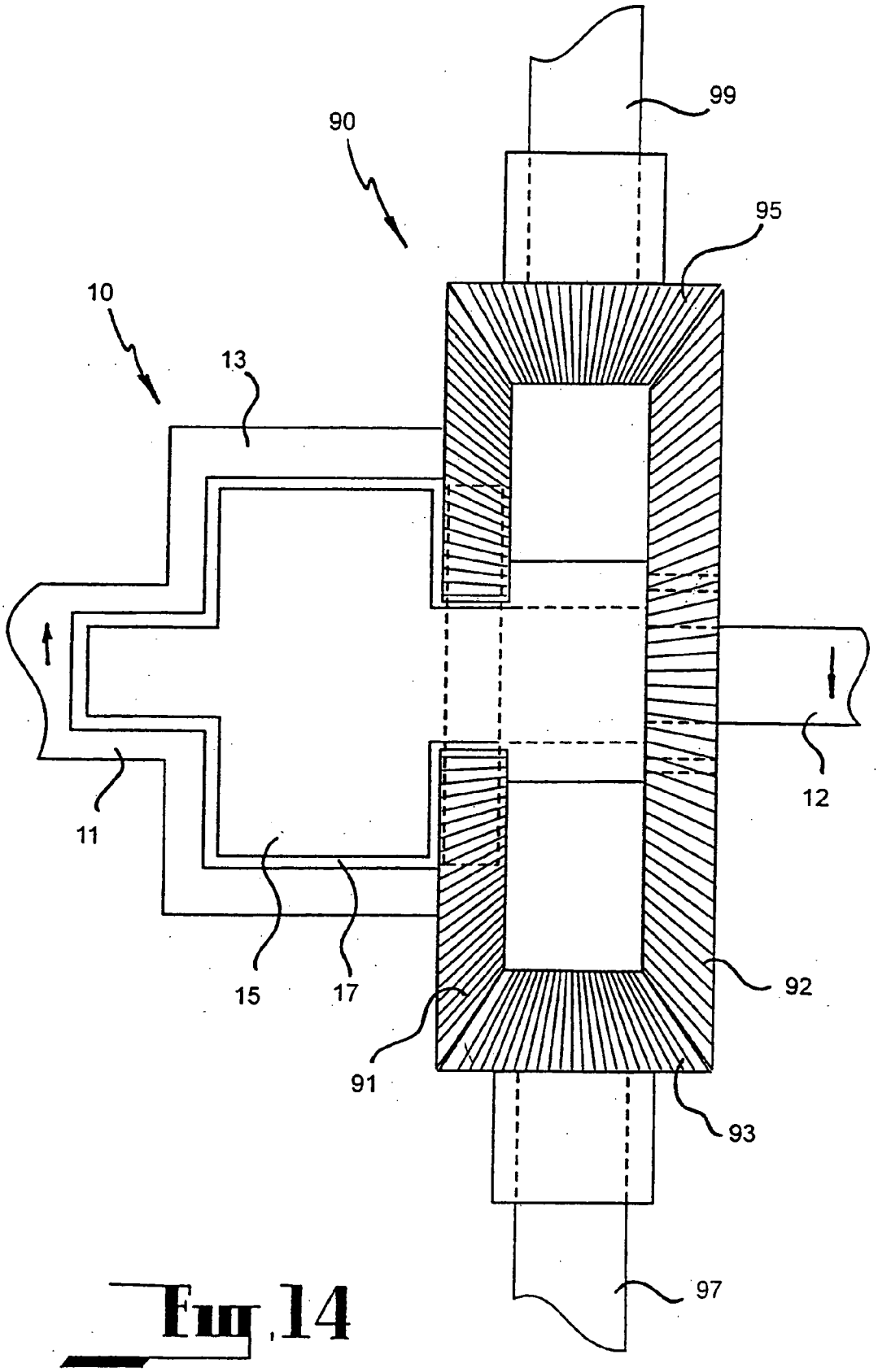


Fig. 14

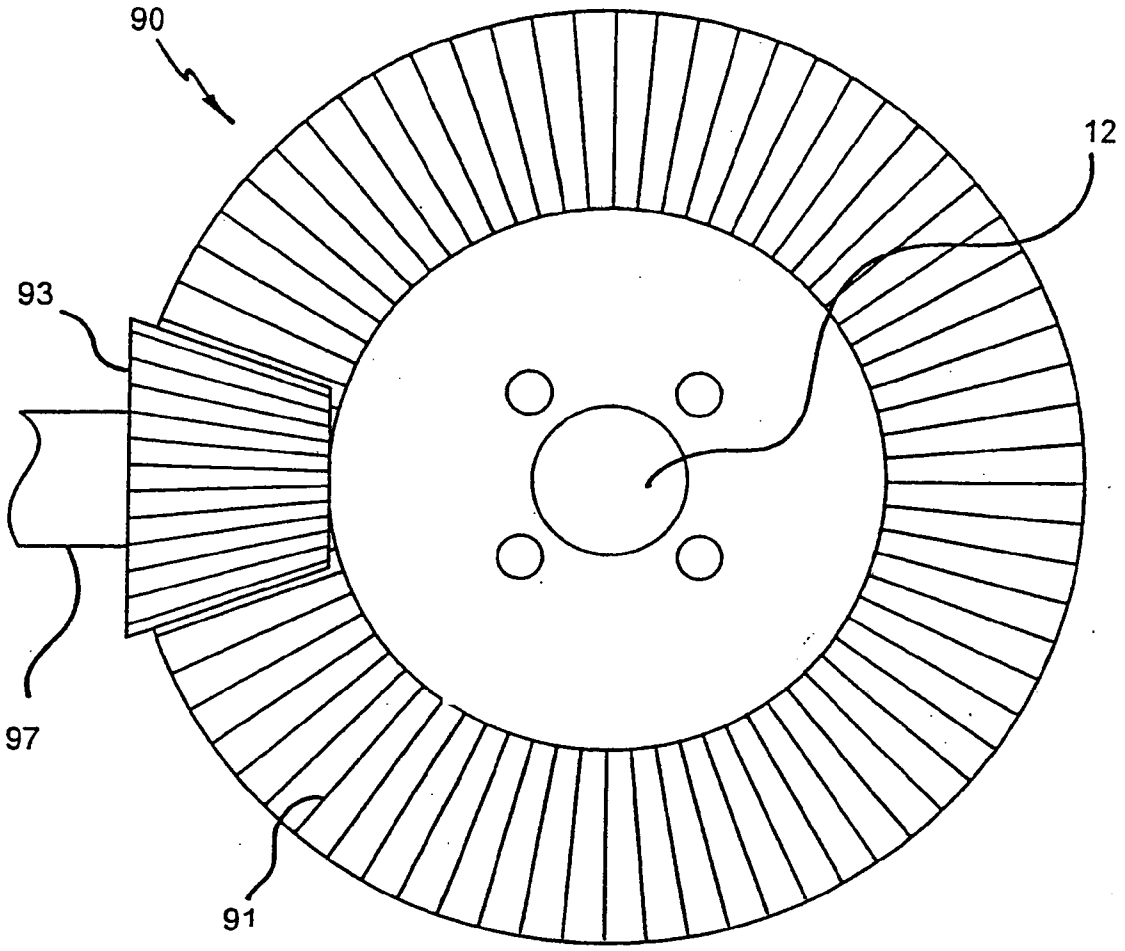


Fig. 15

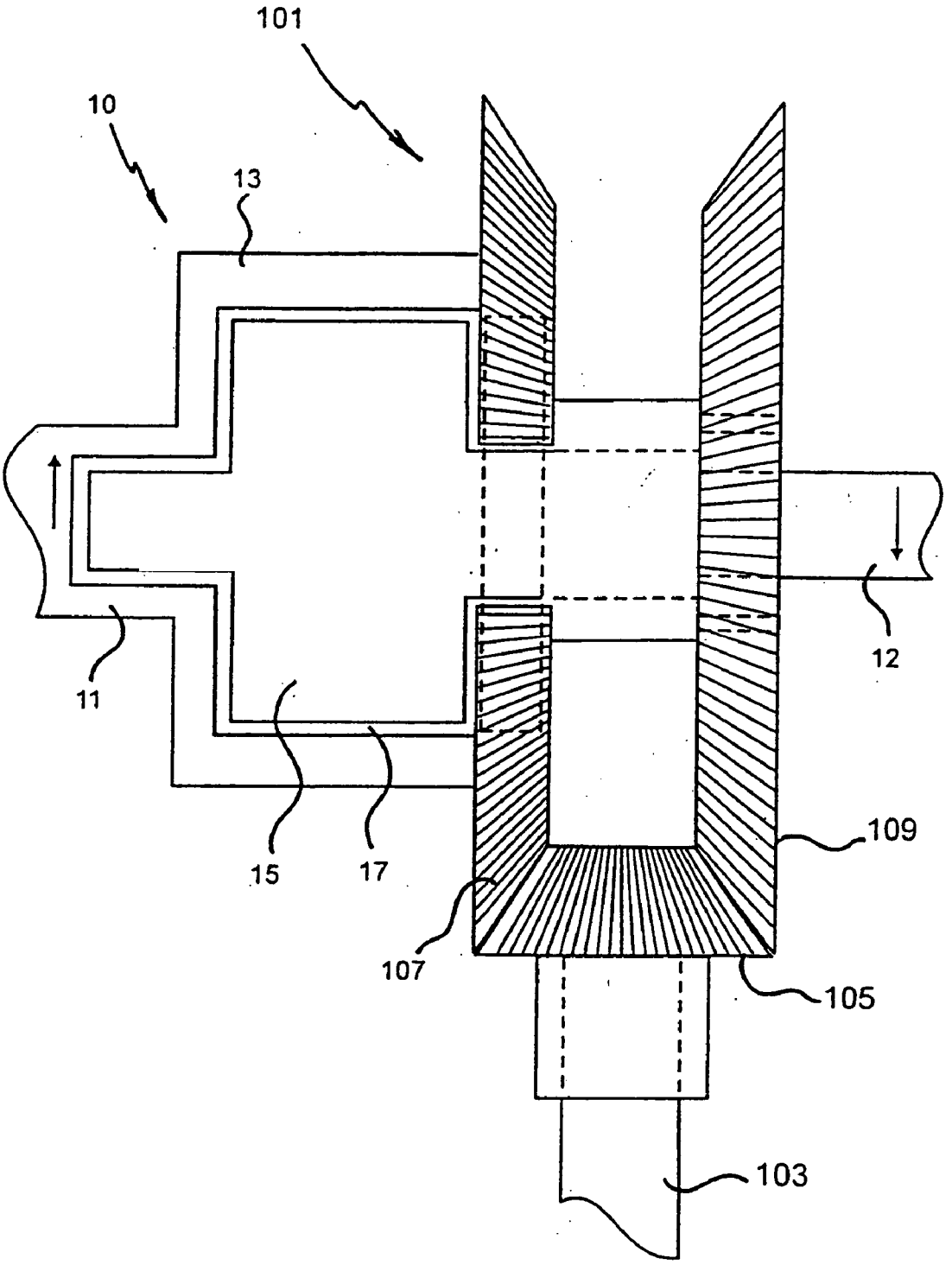


Fig. 16

ELECTRODYNAMIC MACHINE

TECHNICAL FIELD

[0001] This invention relates to an electrodynamic machine such as an electric generator or an electric motor.

BACKGROUND OF THE INVENTION

[0002] The invention has been devised as an electrodynamic machine for generating an electrical current, although it may also be used as an electric motor.

[0003] Typically, an electrodynamic machine comprises two parts, being a stator and a rotor, one of which incorporates a magnet (which can be either a permanent magnet or an electromagnet) and the other of which incorporates a conductor. In the case of an electric generator, relative movement between the rotor and the stator generates an electrical current in the conductor. In the case of an electric motor, the passage of an electric current through the conductor induces rotation of the rotor relative to the stator.

SUMMARY OF THE INVENTION

[0004] The present invention utilises two parts which rotate relative to each other but neither of those parts is stationary during such relative movement in the sense of a conventional stator.

[0005] More particularly, the present invention provides an electrodynamic machine comprising a first rotor mounted on a first shaft, a second rotor mounted on a second shaft, the first and second rotors being adapted to rotate relative to each other, the first and second shafts being in axial alignment with adjacent ends thereof being interconnected to provide mutual support while allowing relative rotation therebetween and a drive means operable to cause rotation of the first rotor and also rotation of the second rotor, with the two rotors rotating relative to each other, the drive means including a drive shaft drivingly connected to both the first rotor and the second rotor.

[0006] Typically, the first and second rotors rotate in opposite directions. However, it will be understood that the first and second rotors may alternatively rotate in a common direction but at different rotational speeds so as to provide the relative rotation therebetween.

[0007] Where the electrodynamic machine is an electric generator, relative movement between the two rotors generates an electrical current. Typically, one rotor provides a magnetic field which may be established by either a permanent magnet or an electromagnet. The other rotor provides a conductor in which the electric current is generated upon movement of the conductor through the magnetic field. Any suitable structure such as a commutator or a slip ring arrangement may be provided for transferring current from the conductor.

[0008] In one arrangement, one rotor may be disposed within the other rotor, with an air gap defined therebetween. In another arrangement, the two rotors may be positioned in an axially spaced relationship with an air gap defined therebetween.

[0009] Preferably the second rotor is disposed within the first rotor, and the drive means comprises a drive shaft, a drive pinion connected to the drive shaft for rotation therewith, and first and second driven pinions in meshing engagement with the drive pinion, the first driven pinion being connected to the first rotor for rotation therewith and the second driven pinion being connected to the second shaft to rotation therewith.

[0010] A speed control means may be provided to ensure that the two shafts rotate at the same angular velocity but in opposite directions.

[0011] The speed control means may comprise a gear mechanism operatively connecting the two shafts. The gear mechanism may comprise an epicyclic gear train in which the internal gear is rigidly connected to one shaft and the sun gear is rigidly connected to the other shaft. In such an arrangement, the internal gear is typically connected to said one shaft by being mounted on the particular rotor associated with that shaft.

[0012] The invention also provides an electrical generator comprising a first shaft having a first rotor drivingly connected thereto, a second shaft having a second rotor, drivingly connected thereto, the two rotors co-operating to generate an electrical current upon relative rotation therebetween, the two shafts being interconnected in a manner to provide mutual lateral support while allowing relative rotation therebetween.

[0013] The invention has been devised particularly, although not solely, for use with an engine means as disclosed in Australian Provisional Patent Application Nos. PQ4601 and PQ4700, the contents of which are incorporated herein by way of reference. Certain embodiments of that engine means have two output shafts which are adapted to rotate in opposite directions and which are operatively connected to an electrodynamic machine for generating electrical current. The electrodynamic machine driven by the engine means can be an electrodynamic machine according to the present invention.

[0014] The invention also provides a combination of an engine means and an electric generator adapted to be driven by the engine means, the engine means having a first output shaft and a second output shaft, the electric generator having a first rotor and a second rotor, the first rotor being drivingly connected to the first output shaft of the engine and the second rotor being drivingly connected to the second output shaft of the engine, the first and second rotors being adapted to rotate relative to each other thereby to cause generation of an electric current.

[0015] The engine means may comprise two separate engines one of which provides the first output shaft and the other of which provides the second output shaft.

[0016] The invention also provides an electrodynamic machine comprising a first outer rotor mounted on a first shaft, a second inner rotor mounted on a second shaft, the second inner rotor being disposed within the first outer rotor and the two rotors being adapted to rotate relative to each other, the first and second shafts being in axial alignment with adjacent ends thereof being interconnected to provide mutual support while allowing relative rotation therebetween and a third shaft drivingly connected to the first third shaft rotor and the second rotor.

[0017] Preferably, the third shaft is drivingly connected to the first and second rotors through a gear mechanism com-

prising first, second and third gears in meshing engagement, the first gear being connected to the first outer rotor for rotation therewith, the second gear being connected to the second shaft for rotation therewith, and the third gear being connected to the third shaft for rotation therewith.

[0018] The third gear may comprise a bevel pinion, and the first and second gears may each comprise a bevel gear.

[0019] The electrodynamic machine may comprise an electric generator in which relative movement between the two rotors generates an electrical current, and wherein the third shaft comprises a drive shaft whereby rotation of the drive shaft causes rotation of the first rotor and also rotation of the second rotor, with the two rotors rotating relative to each other.

[0020] Alternatively, the electrodynamic machine may comprise an electric motor in which relative rotation induced between the two rotors causes rotation of the third shaft.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The invention will be better understood by reference to the following description of several specific embodiments thereof as shown in the accompanying drawings in which:

[0022] **FIG. 1** is a perspective view of an electric generator according to a first embodiment;

[0023] **FIG. 2** is a schematic side view of the electric generator;

[0024] **FIG. 3** is a schematic sectional side view of part of the electric generator;

[0025] **FIG. 4** is a schematic side view of an electric generator according to a second embodiment;

[0026] **FIG. 5** is a schematic sectional view of the electric generator of **FIG. 4**;

[0027] **FIG. 6** is a schematic elevational view of the electrical generator according to the second embodiment fitted with a speed regulation mechanism;

[0028] **FIG. 7** is a schematic end elevational view of an epicyclic gear train of the speed regulation mechanism;

[0029] **FIG. 8** is a schematic view of a further alternative form of speed regulation mechanism;

[0030] **FIG. 9** is a schematic side elevational view of an electric generator according to a further embodiment;

[0031] **FIG. 10** is a view of an end face of one of the rotors of the electric generator according to the embodiment of **FIG. 9**;

[0032] **FIG. 11** is an end view of an end face of the other rotor of the electric generator according to the embodiment of **FIG. 9**;

[0033] **FIG. 12** is a schematic side view of an electric generator according to a still further embodiment;

[0034] **FIG. 13** is a sectional view of the electric generator of **FIG. 12**;

[0035] **FIG. 14** is a schematic view of a gear mechanism for use with an engine having two output shafts for operating the electric generator;

[0036] **FIG. 15** is a schematic view of part of the gear mechanism; and

[0037] **FIG. 16** is a schematic view of a gear mechanism for use with an engine having one output shaft for operating the electric generator.

BEST MODE(S) FOR CARRYING OUT THE INVENTION

[0038] Referring now to FIGS. **1** to **3** of the accompanying drawings, there is shown an electrodynamic machine **10** in the form of an electric generator for generating an electrical current which can be either a DC current or an AC current. Accordingly, the electric generator **10** can function as any appropriate form of generator such as a dynamo or an alternator.

[0039] The electric generator **10** comprises a first shaft **11** and a second shaft **12**. The two shafts **11**, **12** are supported in bearings **9**. A first rotor **13** is mounted on the first shaft **11** and a second rotor **15** is mounted on the second shaft **12**. The two shafts **11**, **12** are connected to a drive means **14** which operates to drive the shafts in opposite directions and thereby cause the first and second rotors **13**, **15** to rotate one relative to the other in opposite directions.

[0040] In this embodiment, the two rotors **13**, **15** are positioned one within the other, with an air gap **17** defined therebetween. Accordingly, the first rotor **13** constitutes an outer rotor and the second rotor **15** constitutes an inner rotor. The first (outer) rotor **13** is rotatably supported on the second (inner) rotor **15** by bearings **16**.

[0041] The two rotors **13**, **15** are adapted to co-operate to generate an electrical current. This is achieved in this embodiment by the outer rotor **13** providing a magnetic field established by way of an electromagnet structure **16** incorporated into the rotor. The inner rotor **15** incorporates a conductor defined by a series of windings **19** which are connected to a slip ring system **21**. Accordingly, the construction of the outer rotor **13** is similar to that of a stator in a conventional electric generator, and the construction of the inner rotor **15** is similar to a rotor in a conventional electric generator. In a conventional electric generator, relative rotation between the rotor and the stator generates an electrical current. A similar result is achieved in the present embodiment whereby relative rotation between the two rotors **13**, **15** generates an electrical current which is extracted by way of the slip ring system **21** in known manner.

[0042] The two shafts **11**, **12**, are connected together in a manner which provides mutual lateral support while allowing relative rotation therebetween. Specifically, the shaft **11** incorporates a socket **25** which receives a spigot **27** provided on the second shaft **12**. The second shaft **12** is actually formed in two sections **12***a* and **12***b*, with the inner rotor **15** being positioned between the two sections. The second section **12***b* provides the spigot **27**, as best seen in **FIG. 3** of the drawings.

[0043] The outer rotor **13** is of hollow construction comprising a cylindrical side wall **30** and two end walls **31**, **32**. The end wall **32** is detachably mounted on the cylindrical

side wall **30** to facilitate removal for access to the interior region defined within the hollow outer rotor **13** to facilitate installation and removal of the inner rotor **15**.

[**0044**] In operation of the electric generator, rotation of the two shafts **11, 12** in opposite directions causes relative rotation between the rotors **13, 15** also in opposite directions. The relative rotation between the rotors **13, 15** generates an electrical current which is delivered via the slip ring system **21**.

[**0045**] The drive means **14** in this embodiment comprises an input drive shaft **33** which is drivingly connected to a motor (not shown). A drive pinion **34** is mounted on the input drive shaft **33** for rotation therewith. The drive pinion **34** is in meshing engagement with a first driven pinion **35** and a second driven pinion **36**. The second driven pinion **36** is mounted on the second drive shaft **12** for transmission of rotational torque from the input drive shaft **33** to the second drive shaft **12**. The first driven pinion **35** is drivingly connected to the outer router **13**. More particularly, the first driven pinion **35** is mounted on the end wall **32** of the outer router **13** and is rigidly secured thereto by suitable fixings or by welding. The first driven pinion **35** is not connected to the second shaft **12** but merely surrounds the second shaft without being drivingly connected thereto. This is accomplished by the second shaft **12** passing freely through a central passage within the first driven pinion **35**.

[**0046**] With this arrangement, the input driving shaft **33** is drivingly connected to the first and second rotors **13, 15** so as to cause relative rotation therebetween in opposite directions. Specifically, the input drive shaft **33** is drivingly connected to the first rotor **13** through the drive pinion **34** and the first driven pinion **35** which is in meshing engagement with the drive pinion **34** and which is drivingly connected to the first rotor **13**. Similarly, the driving input shaft **33** is drivingly connected to the second rotor **15** through the drive pinion **34** which is drivingly connected to the second driven pinion **36** which is in turn drivingly connected to the second drive shaft **12** which is in turn drivingly connected to the inner rotor **15**.

[**0047**] In this embodiment, a fly wheel **37** is mounted on the first shaft **11** provided for the purpose of maintaining reasonably constant rotational speeds for the routers **13, 15** in spite of any minor variations in the input power delivered by the motor (not shown) driving the drive shaft **33**.

[**0048**] The slip ring system **21** is conveniently located on the first shaft **11** adjacent the fly wheel **37**.

[**0049**] The drive means **14** has several advantages, one of which is that it ensures that the rotors **13, 15** rotate at the same angular velocity (although in opposite directions) by virtue of the drive pinion **34** being in meshing engagement with both of the driven pinions **35, 36**. The drive means **14** provide the additional benefit that the two shafts **11, 12** undergo rotation and can be used to deliver rotational torque for other purposes.

[**0050**] In an alternative arrangement, the engine (not shown) for driving the electric generator can be drivingly connected to the second shaft **12**, with the shaft **33** as well as the shaft **11** both in functioning as output shafts for delivering rotational torque for other purposes.

[**0051**] Referring now to **FIGS. 4 and 5**, the electric generator **10** according to the second embodiment comprises a first shaft **11** and a second shaft **12**. A first rotor **13** is mounted on the first shaft **11** and the second rotor **15** is mounted on the second shaft **12**. In this embodiment, each shaft **11, 12** is adapted to be connected to a respective drive means (not shown) such as an engine. The electric generator **10** according to this embodiment operates in a similar fashion to the electric generator of the first embodiment in the sense that rotational torque is applied to the first shaft **11** and the second shaft **12** in opposite directions so as to cause the first and second rotors **13, 15** to also rotate one relative to the other in opposite directions.

[**0052**] There may be advantages in ensuring that the two shafts **11, 12** rotate at the same angular velocity (although in opposite directions). For this purpose, a speed regulation means may be used in association with the electric generator. Such an arrangement is utilised in the electric generator **10** according to the third embodiment as shown in **FIGS. 6 and 7**. The electric generator **10** of this embodiment incorporates a speed regulation means **40** comprising a gear mechanism **41** in the form of an epicyclic gear train **45** having an internal gear **47** mounted on or formed integrally with the outer rotor **13** and a sun gear **49** mounted on the second shaft **12**, with a series of planetary gears **51** in meshing engagement between the internal gear **47** and the sun gear **49**. Because the internal gear **47** is mounted on the outer rotor **13**, which is directly connected to the first shaft **11**, the epicyclic gear train **45** provides a geared connection between the first shaft **11** and the second shaft **12**, thereby ensuring that the two drive shafts rotate at a common angular velocity (although of course in opposite directions).

[**0053**] **FIG. 8** of the drawings illustrates a further speed control means **40** which is similar to the speed control means illustrated in **FIGS. 6 and 7** with the exception that only one planetary gear is utilised.

[**0054**] It is to be appreciated that any other suitable gear mechanism may be utilised to couple the two shafts **11, 12** together to ensure that they are caused to rotate at a common angular velocity (although in different directions).

[**0055**] Referring now to **FIGS. 9, 10** and **11**, there is shown an electric generator **10** according to a further embodiment. The electric generator **10** according to this embodiment comprises a first shaft **11** on which a first rotor **13** is mounted, and a second shaft **12** on which a second rotor **15** is mounted. In this embodiment, the two rotors **13, 15** are not mounted one within the other as was the case with the first embodiment but rather are positioned axially in a side-by-side relationship with an air gap **17** defined therebetween.

[**0056**] As was the case with the earlier embodiments, the two shafts **11, 12** are connected one to another in a manner which provides mutual lateral support while allowing relative rotation therebetween. This is achieved by the provision of a socket **25** in one of the shafts receiving a spigot **27** on the other of the shafts.

[**0057**] The first rotor **13** has an end face **61** which confronts the air gap **17** and the second rotor **15** has an end face **63** which also confronts the air gap **17**. The end face **61** incorporates winding coils **65** and the end face **63** incorporates magnetic iron **67**, the arrangement being such that relative rotation between the two rotors causes interaction between the winding coils and the magnetic iron so as to generate an electrical current.

[0058] Referring now to **FIGS. 12 and 13** of the accompanying drawings, there is shown an electric generator according to a still further embodiment. The electric generator according to this embodiment is somewhat similar to the electric generator of the previous embodiment inasmuch as the two rotors **13, 15**, are mounted axially with respect to each other with an air gap **17** defined therebetween. In this embodiment, however, the two rotors **13, 15** are mounted on a common axle shaft **81**. The ends of the axle shaft **81** are received in sockets **82** provided in the corresponding ends of the first drive shaft **11** and the second drive shafts **12**. This arrangement provides mutual support for the two shafts **11, 12** through the axle shaft **81** while allowing relative rotation between those two shafts and, of course, the two rotors **13, 15**. The first shaft **11** is of course drivingly connected to the first rotor **13** and the second shaft **12** is drivingly connected to the second rotor **15**. A slip ring system **21** is provided for extracting current generated by relative rotation between the two rotors **13, 15**.

[0059] Referring now to **FIGS. 14 and 15**, there is shown an electric generator **10** adapted to be drawn by two engines (not shown), one engine having output shaft **97** and the other engine having output shaft **99**. The two output shafts **97, 99** are drivingly connected to the two shafts **11, 12** of the electric generator **10** through a gear mechanism **90**. The gear mechanism **90** comprises a first bevel pinion **93** mounted on output shaft **97** and a second bevel pinion **95** mounted on the output shaft **99**. The two bevel pinions **93, 95** are in meshing engagement with a first bevel gear **91** and a second bevel gear **92**. The two bevel gears **91, 92** are in spaced apart relationship and rotate about a common axis. The first bevel gear **91** is mounted on the outer rotor **13** and so is drivingly connected to the first shaft **11**. The second bevel gear **92** is drivingly connected to the second shaft **12** by being mounted thereon. The meshing engagement between the pinions **93, 95** and the gears **91, 92** ensures that the two rotors **13, 15** rotate at the same angular velocity but in opposite directions.

[0060] With this arrangement, rotational torque delivered through output shafts **97, 99** is transmitted through the gear mechanism **90** to the electric generator **10**, causing the outer rotor **13** and the inner rotor **15** to rotate in opposite directions in a similar fashion to the first embodiment. This arrangement has the additional benefit that the two shafts **11, 12** undergo rotation and can be used to deliver rotational torque for other drive purposes. In particular a fly-wheel can be mounted on one of the two shafts **11, 12**.

[0061] Referring now to **FIG. 16** of the drawings, there is shown a gear mechanism **101** through which an electric generator **10** according to a further embodiment can be driven from a single output shaft **103** of an engine (not shown). The gear mechanism **101** comprises a bevel pinion **105** mounted on the output shaft **103**. The bevel pinion **105** is in meshing engagement with a first bevel gear **107** and a second bevel gear **109**. The two bevel gears **107, 109** are in spaced relationship and rotate about a common axis. The first bevel gear **107** is mounted on the outer rotor **13** of the electric generator **10** and so is drivingly connected to the first shaft **11**. The second bevel gear **109** is drivingly connected to the second shaft **12** by being mounted thereon. The meshing engagement between the pinion **105** and the two bevel gears **107, 109** ensures that the two rotors **13, 15** rotate at the same angular velocity but in opposite directions.

[0062] With this arrangement, rotational torque delivered by the engine through the output shaft **103** is transmitted through the gear mechanism **101** to the electric generator **10**, causing the outer rotor **13** and the inner rotor **15** to rotate at the same angular velocity but in opposite directions. This arrangement has the additional benefit that the two shafts **11, 12** undergo rotation and can be used to deliver rotational torque for drive purposes. A fly-wheel (not shown) can be mounted on one of the two shafts **11, 12**.

[0063] From the foregoing, it is evident that the present invention provides a simple yet highly effective electrodynamic machine which incorporates two rotors rotating one relative to the other.

[0064] While the embodiments have been described in relation to the electrodynamic machine functioning as an electric generator, it will be appreciated that the electrodynamic machine may function as an electric motor whereby electrical energy delivered to the electrodynamic machine is converted into mechanical energy in the form of rotational torque delivered to the drive shafts of the two rotors.

[0065] It should be appreciated that the scope of the invention is not limited to the scope of the embodiments described.

[0066] Throughout the specification, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

1. An electrodynamic machine comprising a first rotor mounted on a first shaft, a second rotor mounted on a second shaft, the first and second rotors being adapted to rotate relative to each other, the first and second shafts being in axial alignment with adjacent ends thereof being interconnected to provide mutual support while allowing relative rotation therebetween and a drive means operable to cause rotation of the first rotor and also rotation of the second rotor, with the two rotors rotating relative to each other, the drive means including a drive shaft drivingly connected to both the first rotor and the second rotor.

2. An electrodynamic machine according to claim 1 wherein the first and second rotors are adapted to rotate in opposite directions.

3. An electrodynamic machine according to claim 1 wherein the electrodynamic machine is an electric generator and wherein relative movement between the two rotors generates an electrical current.

4. A electrodynamic machine according to claim 3 wherein one rotor provides a magnetic field and the other rotor provides a conductor in which the electric current is generated upon movement of the conductor through the magnetic field.

5. A electrodynamic machine according to claim 4 wherein one rotor is disposed within the other rotor, with an air gap defined therebetween.

6. A electrodynamic machine according to claim 1 wherein one shaft has an axial spigot on an end thereof received in a complimentary axial socket provided in the adjacent end of the other shaft.

7. A electrodynamic machine according to claim 1 wherein a speed control means is provided to ensure that the two shafts rotate at the same angular velocity but in opposite directions.

8. A electrodynamic machine according to claim 7 wherein the speed control means comprises a gear mechanism operatively connecting the two shafts.

9. A electrodynamic machine according to claim 8 wherein the gear mechanism comprises epicyclic gear train in which the internal gear is rigidly connected to one shaft and the sun gear is rigidly connected to the other shaft.

10. A electrodynamic machine according to claim 1 wherein the second rotor is disposed within the first rotor and wherein the drive means comprises a drive shaft, a drive pinion connected to the drive shaft for rotation therewith, and first and second driven pinions in meshing engagement with the drive pinion, the first driven pinion being connected to the first rotor for rotation therewith and the second driven pinion being connected to the second shaft to rotation therewith.

11. An electrical generator comprising a first shaft having a first rotor drivingly connected thereto, a second shaft having a second rotor drivingly connected thereto, the two rotors co-operating to generate an electrical current upon relative rotation therebetween, the two shafts being interconnected in a manner to provide mutual lateral support while allowing relative rotation therebetween.

12. A combination of an engine means and an electric generator adapted to be driven by the engine means, the engine means having a first output shaft and a second output shaft, the electric generator having a first rotor and a second rotor, the first rotor being drivingly connected to the first output shaft of the engine and the second rotor being drivingly connected to the second output shaft of the engine, the first and second rotors being adapted to rotate relative to each other thereby to cause generation of an electric current.

13. An electrodynamic machine comprising a first outer rotor mounted on a first shaft, for rotation therewith, a second inner rotor mounted on a second shaft, for rotation therewith, the second inner rotor being disposed within the first outer rotor and the two rotors being adapted to rotate relative to each other, the first and second shafts being in axial alignment with adjacent ends thereof being interconnected to provide mutual support while allowing relative rotation therebetween, and a third shaft drivingly connected to the first rotor and the second rotor.

14. An electrodynamic machine according to claim 13 wherein the third shaft is drivingly connected to the first and second rotors through a gear mechanism comprising first, second and third gears in meshing engagement, the first gear being connected to the first outer rotor for rotation therewith, the second gear being connected to the second shaft for rotation therewith, and the third gear being connected to the third shaft for rotation therewith.

15. An electrodynamic machine according to claim 14 wherein the third gear comprises a bevel pinion, and the first and second gears each comprise a bevel gear.

16. An electrodynamic machine according to claim 13, wherein the first and second rotors are adapted to rotate in opposite directions.

17. An electrodynamic machine according to claim 13 wherein the electrodynamic machine is an electric generator in which relative movement between the two rotors generates an electrical current, and wherein the third shaft comprises a drive shaft whereby rotation of the drive shaft causes rotation of the first rotor and also rotation of the second rotor, with the two rotors rotating relative to each other.

18. An electrodynamic machine according to claim 13 wherein the electrodynamic machine is a motor in which relative rotation induced between the two rotors causes rotation of the third shaft.

19. An electrodynamic machine substantially as herein described with reference to the accompanying drawings.

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