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(72) Inventor; y
(71) Solicitante: TROFYMCHUK, Oleksiy [ES/ES]; C/.Prim nº 123-125, 2º 3ª, 08911 Badalona (ES).

(74) Mandatario: ESPIELL VOLART, Eduardo Mª; C/ Pau Claris Nº 77, 1º 2ª, 08010 Barcelona (ES).

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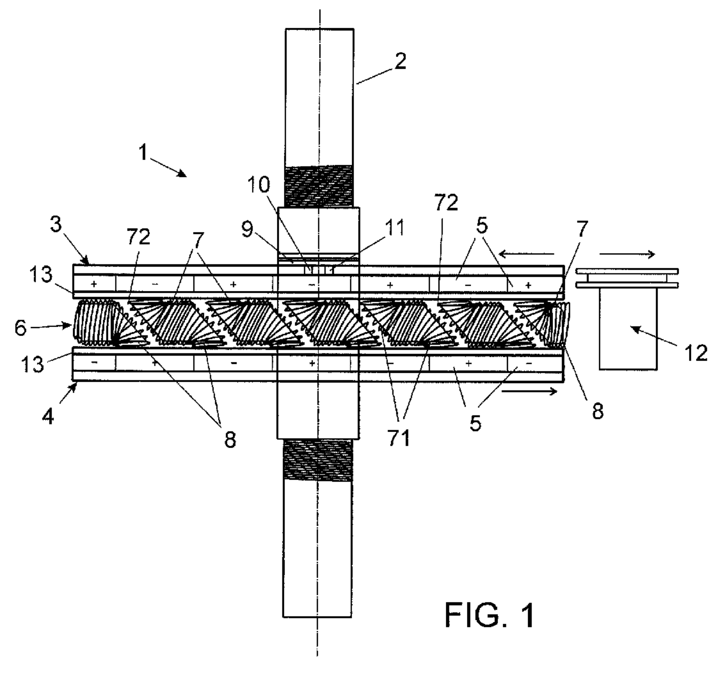

FIG. 1

(57) Abstract: The invention relates to a magnetic device that can be used as a power generator or drive motor and which comprises: a shaft (2); discs (3, 4) with at least two magnets or magnetic poles (5) having different polarity and positioned radially in both discs, with successively alternating positive and negative polarity, each of the discs (3, 4) being rotatably coupled with respect to the shaft (2); and a central coil (6) situated between the two discs (3, 4) and non-rotatably coupled with respect to the shaft. The central coil comprises at least two windings formed along a core (7) of magnetic material with a configuration in which both lateral sides have ends with sides (71) inclined towards a single side with respect to the shaft (2) and ending in a point (72), the cores (7) being situated at a distance from each other such that the ends of the inclined sides (71) with a point (72) overlap one on top of the other in contiguous

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[Continúa en la página siguiente]

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coils, and a winding (8) of conductive wire wound around the core (7). The magnetic device further comprises a layer of material (13) that allows or prevents the passage of magnetic fields, situated between the central coil (6) that generates the magnetic waves and the discs (3, 4) with the magnets or alternating magnetic poles (5), the layer being able to prevent the magnetic fields of the winding (8) from exiting towards the discs (3, 4) or to allow same to pass, depending on whether or not the layer has been activated by means of an activator means to which is it connected for such purpose.

(57) Resumen: Dispositivo magnético aplicable como generador de energía o como motor de impulsión que, comprendiendo un eje (2), unos discos (3, 4), con al menos dos imanes o polos magnéticos (5) de polaridad distinta colocados radialmente en ambos discos, con la polaridad sucesivamente alterna, positiva y negativa, estando cada uno de los discos (3,4) acoplados con posibilidad de giro respecto al eje (2), y un bobinado central (6) situado entre los dos discos (3, 4) y acoplado sin posibilidad de giro respecto al eje y que, a su vez, comprende al menos dos bobinas formadas por un núcleo (7) de material magnético cuya configuración presenta, en ambos lados laterales, extremos de lados inclinados (71), hacia un mismo lado respecto del eje (2), acabados en punta (72), estando dichos núcleos (7) situados a una distancia tal entre ellos que sus extremos de lados inclinados (71) con punta (72) se solapan el uno sobre el otro en las bobinas contiguas y un devanado (8) de hilo conductor enrollado alrededor de dicho núcleo (7), comprendiendo una capa de material que permite o bloquea el paso a los campos magnéticos (13), situada entre el bobinado central (6) generador de las ondas magnéticas y los discos (3, 4) con los imanes o polos magnéticos (5) alternos, que tiene la capacidad de bloquear la salida de los campos magnéticos del bobinado (8) hacia los discos (3, 4) o de permitir su paso según si está activada o no a través de un medio activador al que se encuentra vinculado para tal fin.

DISPOSITIVO MAGNÉTICO APLICABLE COMO GENERADOR DE ENERGÍA O COMO MOTOR DE IMPULSIÓN

MEMORIA DESCRIPTIVA

OBJETO DE LA INVENCIÓN

La invención, tal como expresa el enunciado de la presente memoria descriptiva, se refiere a un dispositivo magnético aplicable como generador de energía o como motor de impulsión que aporta, a la función a que se destina, ventajas y características, que se describen en detalle más adelante, que suponen una mejora del estado actual de la técnica.

El objeto de la presente invención recae en un dispositivo magnético que, aplicable para usarse como generador de energía eléctrica o como motor de impulsión, dependiendo del modo de instalación, y estando constituido, esencialmente, por un eje con dos discos giratorios provistos de imanes o polos magnéticos y un bobinado central, sin posibilidad de giro respecto al eje, en el que se contemplan dos o más núcleos magnéticos de extremos inclinados cuyas puntas se solapan y a los que se enrollan devanados de hilo conductor, pudiendo comprender o no una placa de control electrónico y sensores que controlan el impulso eléctrico que se aplica cuando se usa como motor, presenta una serie de perfeccionamientos que, basados principalmente en la incorporación en cada núcleo de un único devanado que abarca tanto la parte central como las puntas solapadas para conducir la salida de los campos magnéticos a través de ellas, y una capa de superconductor que, activada permite el paso de los campos magnéticos y desactivada los bloquea.

CAMPO DE APLICACIÓN DE LA INVENCIÓN

El campo de aplicación de la presente invención se enmarca dentro del sector de la industria dedicada a la fabricación de aparatos, sistemas y dispositivos para la generación de energía eléctrica, centrándose particularmente en el ámbito de los generadores eléctricos o motores de impulsión magnéticos.

ANTECEDENTES DE LA INVENCIÓN

Por el documento P201630853, cuyo titular es el propio solicitante de la presente invención, se conoce un dispositivo magnético apto para usarse como generador de electricidad si se aplica una energía cinética o bien como motor de impulsión magnético si se aplica una energía eléctrica que comprende un eje al que se acoplan dos discos con al menos dos imanes o polos magnéticos y un bobinado central con bobinas formadas por un núcleo de material magnético y un devanado de hilo conductor, en el que, acoplados al eje con posibilidad de giro incorpora, al menos, un primer disco y un segundo disco con varios polos magnéticos y, sin posibilidad de giro, el bobinado central situado entre ambos discos, estando los imanes o polos magnéticos colocados radialmente en ambos discos, con la polaridad sucesivamente alterna, positiva y negativa, y el núcleo de las bobinas del bobinado central dotadas de una configuración que presenta, en ambos lados laterales, extremos de lados inclinados hacia un mismo lado respecto del eje y acabados en punta y situados a una distancia entre ellos que dichos extremos se solapan uno sobre otro en las bobinas contiguas; contemplando además un elemento externo que imprime movimiento a un primer disco de modo que genera un campo magnético que, a su vez, determina la excitación de las bobinas y, consecuentemente, el giro en sentido opuesto del segundo disco.

En consecuencia, si se aplica una corriente eléctrica al bobinado, por ejemplo mediante su conexión a una batería, el dispositivo se convierte en un motor eléctrico de impulsión magnética.

Asimismo, se conoce también otro documento que con nº de solicitud ES2019/070242 divulga una versión mejorada del dispositivo descrito en su versión como motor de impulsión, en particular para mejorar su efectividad a través del control de la aplicación de los impulsos eléctricos al devanado, ya que la eficacia del mismo en dicha aplicación como motor depende, en gran medida, de la posición relativa de los polos de los discos, para lo cual comprende, además una placa de control electrónico que, conectada entre la fuente de alimentación y el devanado de hilos conductores, decide cuando dar un impulso eléctrico a dicho devanado y unos sensores para detectar el cambio de polaridad, tal como un sensor hall, o para detectar la situación y/o velocidad de los rotores, tal como un sensor optométrico, conectado a la placa de control para detectar la situación de los polos magnéticos de los discos respecto al bobinado central, y en el que, adicionalmente, también se contempla la inclusión de un sensor de velocidad conectado a la placa de control para detectar la velocidad de giro de los discos, así como un segundo devanado extra situado sobre una de las puntas de los núcleos de cada bobina del bobinado central para forzar la salida del campo magnético generado en la bobina a través de dicho segundo devanado.

Pues bien, el objetivo de la presente invención es proporcionar una nueva versión mejorada del descrito dispositivo magnético que proporcione mayor efectividad al mismo, tanto si se usa como generador eléctrico como si su usa como motor de impulsión, básicamente mediante una optimización de la conducción de la salida de los campos magnéticos a través del bobinado y mediante una mayor capacidad de control del paso o bloqueo de dichos campos utilizando una la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos, tal como un superconductor.

Por otra parte, y como referencia al estado actual de la técnica, cabe señalar que se desconoce la existencia de ningún otro dispositivo magnético ni ninguna a otra invención similar que presente unas características técnicas, estructurales y constitutivas iguales o semejantes a las que presenta el que aquí se reivindica.

EXPLICACIÓN DE LA INVENCIÓN

El dispositivo magnético aplicable como generador de energía o como motor de impulsión que la invención propone se configura como la solución idónea al objetivo anteriormente señalado, estando los detalles caracterizadores que lo hacen posible y lo distinguen convenientemente recogidos en las reivindicaciones finales que acompañan la presente descripción.

Concretamente, lo que la invención propone, como se ha señalado anteriormente, es un dispositivo magnético que, de manera conocida, comprende un eje al que se acoplan, al menos, dos discos de polos magnéticos giratorios y un bobinado central fijo, en que ambos discos están dotados de polos magnéticos y están dispuestos de manera adyacentemente alterna, es decir, colocados de manera alternada con polo positivo y con polo negativo sucesivamente en disposición radial al centro del disco.

De preferencia, ambos discos son exactamente iguales, o al menos, presentan el mismo número de polos magnéticos de semejante potencia magnética.

Y, por su parte, el bobinado central está dispuesto en dos o más bobinas que presentan, cada una, un núcleo de material conductor magnético, tal como el acero, alrededor del cual se incorpora el devanado de filamentos conductores, contando dicho núcleo con una particular configuración de lados inclinados que se solapan sucesivamente en sus extremos acabados en punta, y que determina la capacidad de provocar el movimiento en sentido contrario del segundo disco.

Más concretamente, cada núcleo posee, en ambos lados, una terminación inclinada hacia un mismo lado, respecto del eje, determinando respectivos cuerpos de configuración, en su alzado frontal, aproximadamente en forma de rombo cuyos extremos en punta quedan algo separados y solapados uno sobre el de la bobina contigua.

Además, opcionalmente, el dispositivo puede comprender también, por una parte, una placa de control electrónico para regular, en función de la velocidad de giro, los impulsos eléctricos que se aplican a los hilos del devanado cuando se usa el dispositivo como motor de impulsión, y a los que se encuentra conectada dicha placa entre estos y la batería o fuente de alimentación eléctrica, y, por otra parte, unos sensores para detectar el cambio de polaridad, tal como un sensor hall, o para detectar la situación y/o velocidad de los rotores, tal como un sensor optométrico, y consecuentemente la polaridad de los impulsos eléctricos que se deben introducir al motor para que funcione, así como un sensor de velocidad instalado de modo que registra la velocidad de giro de los discos, de tal manera que la placa de control pueda retrasar el envío de los impulsos eléctricos al devanado dependiendo de la situación de los polos magnéticos de los discos respecto al bobinado central y de la velocidad de los discos.

En cualquier caso, el dispositivo magnético, en su versión conocida, incluye opcionalmente unos bobinados secundarios para forzar la salida de los campos magnéticos a través de ellos y que están conformados por un segundo devanado, independiente al devanado principal que envuelve la zona central de cada núcleo, y que va situado sobre una o ambas puntas del núcleo con el fin de forzar la salida del campo magnético generado en la bobina a través de dicho segundo devanado.

Pues bien, a partir de esta configuración conocida, el dispositivo magnético que la presente invención propone se distingue, esencialmente, en los dos siguientes aspectos principales:

Por una parte, en el hecho de comprender, en el bobinado central, un único devanado envolviendo cada uno de los núcleos con el que se fusiona, en un mismo hilo, el devanado principal que abarca al zona central del cuerpo del núcleo y el devanado secundario de la puntas, para conducir correctamente la salida del campo magnético generado en la bobina a través del mismo hacia los discos.

Y, por otra parte, en el hecho de comprender una capa de material que permite o bloquea el paso (aislar) a los campos magnéticos tal como un material superconductor que, situada entre el bobinado central generador de las ondas magnéticas y los discos con los imanes o polos magnéticos alternos, tiene la capacidad de bloquear dicha salida de los campos magnéticos hacia los discos o de permitir su paso según si está activado o no.

Dicha activación de la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos, tal como un superconductor, se puede efectuar de diferentes maneras, por ejemplo, mediante la aplicación de electricidad, temperatura, un agente químico, un excitador lumínico, u otras.

En una forma de realización la descrita la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos, tal como un superconductor, forma parte integral de los discos, de manera que gira solidariamente con los mismos.

En otra forma de realización la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos, tal como un superconductor forma parte del conjunto del bobinado central quedando unido al mismo.

Y, en unta tercera forma de realización la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos, tal como un superconductor es una capa independiente situada, con cierta separación, entre los discos y el bobinado central.

Por otra parte, la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos, tal como un superconductor, en una opción de realización es una capa única, es decir formada por una sola pieza que abarca toda la superficie del espacio entre los discos y el bobinado central; y en una opción de realización alternativa, la capa de superconductor está partida en segmentos que cubren la superficie existente entre los discos y cada una de las bobinas generadoras del campo magnético, es decir, del conjunto de núcleo y su devanado, que forman el bobinado central.

Por último cabe señalar que, en una forma realización preferida, el dispositivo comprende, como bobinado central una pluralidad de nano bobinas que incluyen, cada una en forma una única unidad independiente, el núcleo, el devanado y la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos, tal como un superconductor.

DESCRIPCIÓN DE LOS DIBUJOS

Para complementar la descripción que se está realizando y con objeto de ayudar a una mejor comprensión de las características de la invención, se acompaña a la presente memoria descriptiva, como parte integrante de la misma, una hoja de dibujos en la que con carácter ilustrativo y no limitativo se ha representado lo siguiente:

La figura número 1.- Muestra una vista esquemática en alzado de un ejemplo de realización del dispositivo magnético, objeto de la invención, apreciándose las principales partes y elementos que comprende, así como su configuración y disposición; y

la figura número 2.- Muestra una vista esquemática en alzado de un ejemplo de las nano bobinas que comprende, opcionalmente, una forma de realización del dispositivo de la invención.

REALIZACIÓN PREFERENTE DE LA INVENCIÓN

A la vista de las mencionadas figuras, y de acuerdo con la numeración adoptada en ellas, se puede apreciar un ejemplo no limitativo del dispositivo magnético aplicable como generador de energía o como motor de impulsión, el cual comprende lo que se indica y describe en detalle a continuación.

Así, tal como se aprecia en la figura 1, el dispositivo (1) en cuestión comprende, de manera conocida, un eje (2) al que se acoplan, con posibilidad de giro e interponiendo correspondientes rodamientos (no representados), al menos, dos discos (3, 4) con imanes o polos magnéticos

(5) y, sin posibilidad de giro, es decir, fijado solidariamente al eje (2), un bobinado central (6), situado entre un primer disco (3) y un segundo disco (4).

Además, los polos magnéticos (5) van colocados radialmente y dispuestos con la polaridad sucesivamente alterna, positiva y negativa, siendo, preferentemente, su número, posición y fuerza magnética igual o, al menos, muy semejante en cada uno de dichos discos (3, 4), siendo, preferentemente, ambos discos (3, 4) y sus polos magnéticos (5) exactamente idénticos.

Por su parte, el bobinado central (6) comprende dos o más bobinas constituidas, cada una, por un núcleo (7) de material conductor magnético, tal como el acero, con un devanado (8) de hilo conductor, siendo la configuración de dicho núcleo (7) la de un cuerpo cuyos laterales presentan respectivos lados inclinados o escalonados (71), siempre hacia un mismo lado respecto del eje (2), acabados en punta (72), de modo que su desarrollo en alzado frontal es, aproximadamente, en forma de rombo, estando dichos lados inclinados o escalonados (71) de los núcleos (7) situados a una distancia tal entre ellos que sus respectivas puntas (72) se solapan una sobre la de la bobina contigua.

Opcionalmente, el dispositivo (1) prevé, además, un elemento externo (12) que imprime movimiento a un primer disco (3), haciendo que se genere un campo magnético que, a su vez, provoca la excitación de las bobinas y, a la vez, el giro, en sentido opuesto del segundo disco (4).

También opcionalmente, el dispositivo (1) comprende una placa de control (9) electrónico que, conectada entre una fuente de alimentación eléctrica y el devanado (8) de hilos conductores, decide cuando dar un impulso eléctrico a dicho devanado (8), un sensor (10) para detectar el cambio de polaridad, tal como un sensor hall, o para detectar la situación y/o velocidad de los rotores, tal como un sensor optométrico, conectado a la placa de control (9) para detectar la situación de los polos magnéticos (5) de los discos (3,4) respecto al bobinado central (6) y un sensor de velocidad (11) conectado a la placa de control (9) y para detectar la velocidad de giro de los discos (3,4).

Y, a partir de esta configuración ya conocida, el dispositivo (1) se distingue, esencialmente, por comprender, en el bobinado central (6), un único devanado (8) que envuelve con un mismo hilo cada uno de los núcleos (7) abarcando tanto al zona central del cuerpo del núcleo (7) como los lados inclinados o escalonados (71) y las dos puntas (72), conduciendo la salida del campo magnético generado en la bobina a través de dicho devanado (8) hacia los dos discos (3, 4).

Y, asimismo, el dispositivo (1) se distingue también por comprender una la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13), situada entre el bobinado central (6) generador de las ondas magnéticas y los discos (3, 4) con los imanes o polos magnéticos (5) alternos, que tiene la capacidad de bloquear la salida de los campos magnéticos del bobinado (8) hacia los discos (3, 4) o de permitir su paso según si está activada o no a través de un medio activador (no representado) al que se encuentra vinculado para tal fin.

El medio activador de la capa de material superconductor (13) puede ser de carácter eléctrico, de temperatura, químico lumínico o de otra índole.

En una forma de realización la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) forma parte integral de los discos (3, 4), de manera que gira solidariamente con los mismos.

En otra forma de realización capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) forma parte del conjunto del bobinado central (6) quedando unido al mismo.

Y, en unta tercera forma de realización capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) es una capa independiente tanto a los discos (3, 4) como al bobinado central (6).

En cualquier caso, capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13), en una opción de realización está formada por una sola pieza que abarca toda la superficie del espacio entre los discos (3, 4) y el bobinado central (6), como muestra la figura 1, y, en una opción de realización alternativa, capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) está partida en segmentos que abarcan cada una de las bobinas generadoras del campo magnético que forman el bobinado central (6).

Por último cabe señalar que, en una forma realización preferida, las bobinas del bobinado central (6) del dispositivo (1) están conformadas por nano bobinas (6a) que, como se observa en la representación de la figura 2, que incluyen, cada una en forma de una única unidad independiente, el núcleo (7), el devanado (8) y la capa de superconductor (13).

Descrita suficientemente la naturaleza de la presente invención, así como la manera de ponerla en práctica, no se considera necesario hacer más extensa su explicación para que cualquier experto en la materia comprenda su alcance y las ventajas que de ella se derivan, haciéndose constar que podrá ser llevada a la práctica en otros modos de realización que difieran en detalle de la indicada a título de ejemplo, siempre que no modifique lo fundamental.

REIVINDICACIONES

1.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión que, comprendiendo:

- un eje (2),
- unos discos (3, 4), con al menos dos imanes o polos magnéticos (5) de polaridad distinta colocados radialmente en ambos discos, con la polaridad sucesivamente alterna, positiva y negativa, estando cada uno de los discos (3,4) acoplados con posibilidad de giro respecto al eje (2),
- y un bobinado central (6) situado entre los dos discos (3, 4) y acoplado sin posibilidad de giro respecto al eje y que, a su vez, comprende al menos dos bobinas formadas por:
  - un núcleo (7) de material magnético cuya configuración presenta, en ambos lados laterales, extremos de lados inclinados (71), hacia un mismo lado respecto del eje (2), acabados en punta (72), estando dichos núcleos (7) situados a una distancia tal entre ellos que sus extremos de lados inclinados (71) con punta (72) se solapan el uno sobre el otro en las bobinas contiguas
  - y un devanado (8) de hilo conductor enrollado alrededor de dicho núcleo (7),

está **caracterizado** por comprender una capa de material que permite o bloquea el paso a los campos magnéticos (13), situada entre el bobinado central (6) generador de las ondas magnéticas y los discos (3, 4) con los imanes o polos magnéticos (5) alternos, que tiene la capacidad de bloquear la salida de los campos magnéticos del bobinado (8) hacia los discos (3, 4) o de permitir su paso según si está activada o no a través de un medio activador al que se encuentra vinculado para tal fin.

2.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según la reivindicación 1, **caracterizado** porque el medio activador de la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) es eléctrico.

3.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según la reivindicación 1, **caracterizado** porque el medio activador de la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) es químico.

4.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según la reivindicación 1, **caracterizado** porque el medio activador de la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) es lumínico.

5.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según cualquiera de las reivindicaciones 1 a 4, **caracterizado** porque la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) forma parte integral de los discos (3, 4), de manera que gira solidariamente con los mismos.

6.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según cualquiera de las reivindicaciones 1 a 4, **caracterizado** porque la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) forma parte del conjunto del bobinado central (6) quedando unido al mismo.

7.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según cualquiera de las reivindicaciones 1 a 4, **caracterizado** porque la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) es una capa independiente tanto a los discos (3, 4) como al bobinado central (6).

8.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según cualquiera de las reivindicaciones 1 a 7, **caracterizado** porque la capa de material que permite o bloquea el paso (aislar) a los campos magnéticos (13) está formada por una sola pieza que abarca toda la superficie del espacio entre los discos (3, 4) y el bobinado central (6).

9.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según cualquiera de las reivindicaciones 1 a 7, **caracterizado** porque capa de material que permite o bloquea el paso (aislar) a los campos magnéticos está partida en segmentos que abarcan cada una de las bobinas generadoras del campo magnético que forman el bobinado central (6).

10.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según cualquiera de las reivindicaciones 1 a 4, **caracterizado** porque las bobinas del bobinado central (6) están conformadas por nano bobinas (6a) que incluyen, cada una en forma de una única unidad independiente, el núcleo (7), el devanado (8) y la capa de superconductor (13).

11.- Dispositivo magnético aplicable como generador de energía o como motor de impulsión, según cualquiera de las reivindicaciones anteriores, **caracterizado** por comprender, en el bobinado central (6), un único devanado (8) que envuelve con un mismo hilo cada uno de los núcleos (7) abarcando tanto al zona central del cuerpo del núcleo (7) como los lados inclinados o escalonados (71) y las dos puntas (72), conduciendo la salida del campo magnético generado en la bobina a través de dicho devanado (8) hacia los dos discos (3, 4).

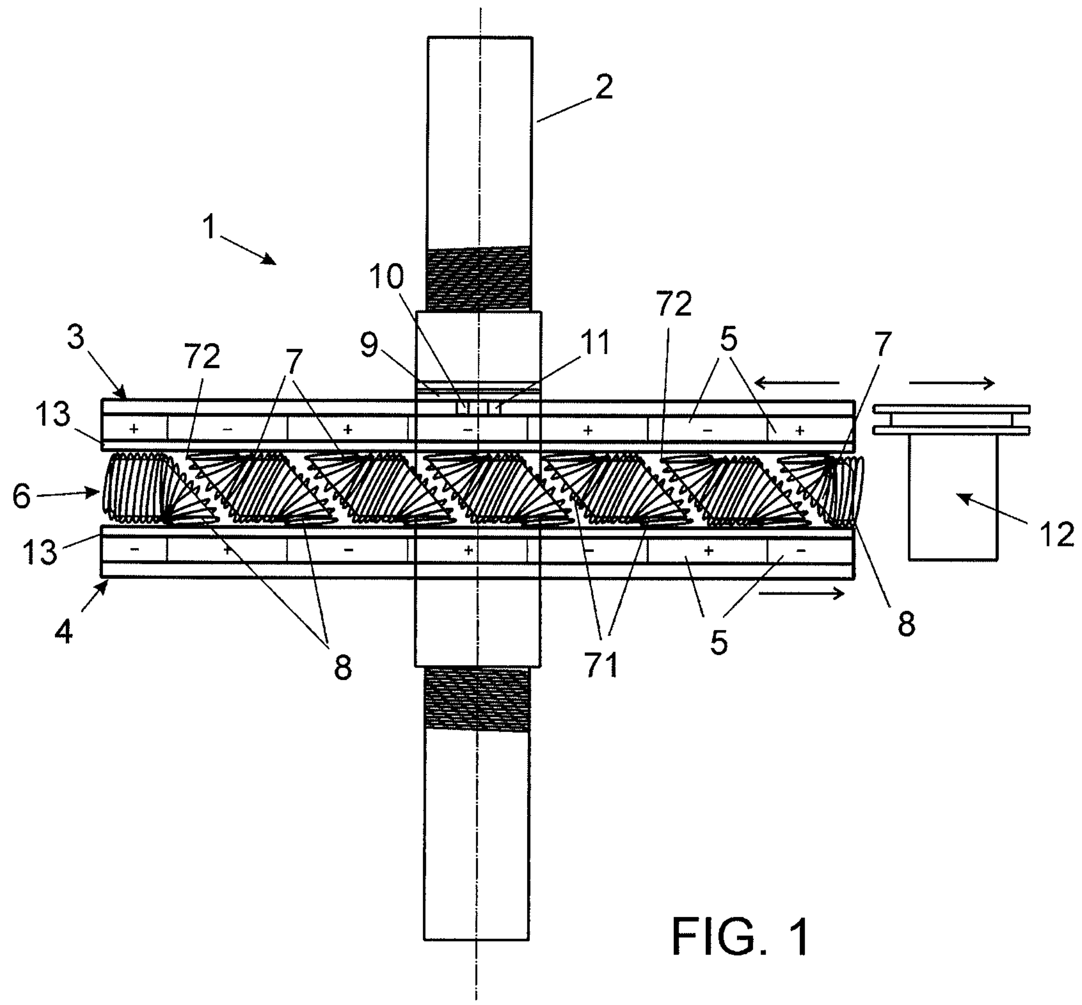

FIG. 1

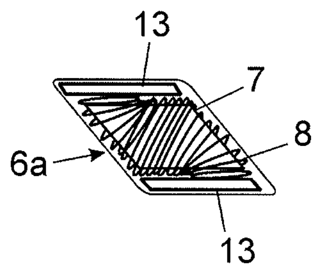

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2019/070369

A. CLASSIFICATION OF SUBJECT MATTER

H02K21/24 (2006.01)
H02K1/27 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, XPI3E, XPESP, XPIEE, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO2017220826 A1 (TROFYMCHUK, OLEKSIY) 28/12/2017, Page 6, line 13- page 7, line 21; figures	1-11
Y	TW201042901 A1 (ZHOU LONG-XIU) 26/05/2006, Abstract, figures	1-11

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance.
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure use, exhibition, or other means.
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents , such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05/02/2020	**(07/02/2020)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer L. García Aparicio Telephone No. 91 3493057

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ES2019/070369

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
WO2017220826 A1	28.12.2017	EP3512082 A1	17.07.2019
		ES2608468 A1	11.04.2017
		ES2608468 B1	07.02.2018
TW201042901 A	01.12.2010	NONE	

INFORME DE BÚSQUEDA INTERNACIONAL

Solicitud internacional nº

PCT/ES2019/070369

A. CLASIFICACIÓN DEL OBJETO DE LA SOLICITUD
H02K21/24 (2006.01)
H02K1/27 (2006.01)
De acuerdo con la Clasificación Internacional de Patentes (CIP) o según la clasificación nacional y CIP.

B. SECTORES COMPRENDIDOS POR LA BÚSQUEDA

Documentación mínima buscada (sistema de clasificación seguido de los símbolos de clasificación)
H02K

Otra documentación consultada, además de la documentación mínima, en la medida en que tales documentos formen parte de los sectores comprendidos por la búsqueda

Bases de datos electrónicas consultadas durante la búsqueda internacional (nombre de la base de datos y, si es posible, términos de búsqueda utilizados)
EPODOC, INVENES, XPI3E, XPESP, XPIEE, INSPEC

C. DOCUMENTOS CONSIDERADOS RELEVANTES

Categoría*	Documentos citados, con indicación, si procede, de las partes relevantes	Relevante para las reivindicaciones nº
Y	WO2017220826 A1 (TROFYMCHUK, OLEKSIY) 28/12/2017, Página 6, línea 13- página 7, línea 21; figuras	1-11
Y	TW201042901 A1 (ZHOU LONG-XIU) 26/05/2006, Resumen, figuras	1-11

☐ En la continuación del recuadro C se relacionan otros documentos ☒ Los documentos de familias de patentes se indican en el anexo

* Categorías especiales de documentos citados:
"A" documento que define el estado general de la técnica no considerado como particularmente relevante.
"E" solicitud de patente o patente anterior pero publicada en la fecha de presentación internacional o en fecha posterior.
"L" documento que puede plantear dudas sobre una reivindicación de prioridad o que se cita para determinar la fecha de publicación de otra cita o por una razón especial (como la indicada).
"O" documento que se refiere a una divulgación oral, a una utilización, a una exposición o a cualquier otro medio.
"P" documento publicado antes de la fecha de presentación internacional pero con posterioridad a la fecha de prioridad reivindicada.
"T" documento ulterior publicado con posterioridad a la fecha de presentación internacional o de prioridad que no pertenece al estado de la técnica pertinente pero que se cita por permitir la comprensión del principio o teoría que constituye la base de la invención.
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"&" documento que forma parte de la misma familia de patentes.

Fecha en que se ha concluido efectivamente la búsqueda internacional. 05/02/2020	Fecha de expedición del informe de búsqueda internacional. **07 de febrero de 2020 (07/02/2020)**
Nombre y dirección postal de la Administración encargada de la búsqueda internacional OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Nº de fax: 91 349 53 04	Funcionario autorizado L. García Aparicio Nº de teléfono 91 3493057

INFORME DE BÚSQUEDA INTERNACIONAL

Informaciones relativas a los miembros de familias de patentes

Solicitud internacional nº

PCT/ES2019/070369

Documento de patente citado en el informe de búsqueda	Fecha de Publicación	Miembro(s) de la familia de patentes	Fecha de Publicación
WO2017220826 A1	28.12.2017	EP3512082 A1 ES2608468 A1 ES2608468 B1	17.07.2019 11.04.2017 07.02.2018
TW201042901 A	01.12.2010	NINGUNO	

(12) **SOLICITUD INTERNACIONAL PUBLICADA EN VIRTUD DEL TRATADO DE COOPERACIÓN EN MATERIA DE PATENTES (PCT)**

(19) **Organización Mundial de la Propiedad Intelectual**
Oficina internacional

(43) **Fecha de publicación internacional**
15 de octubre de 2020 (15.10.2020)

WIPO | PCT

(10) **Número de publicación internacional**
WO 2020/208268 A1

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(21) **Número de la solicitud internacional:** PCT/ES2019/070242

(22) **Fecha de presentación internacional:** 09 de abril de 2019 (09.04.2019)

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(72) **Inventor; y**
(71) **Solicitantes: TROFYMCHUK, Oleksiy** [UA/ES]; C/.Prim nº 123-125, 2º 3ª, 08911 BADALONA (ES). **MANRIQUE MORENO, Antonio** [ES/ES]; C/.Villaroel nº 44, 4º 1ª, 08011 BARCELONA (ES). **SAFONT MARESMA, Benet** [ES/ES]; C/.Martí Julià nº 1-3, 4º 3ª, 08911 BADALONA (ES).

(74) **Mandatario: ESPIELL VOLART, Eduardo María**; Pau Claris, 77, 2º, 1ª, 08010 Barcelona (ES).

(81) **Estados designados** *(a menos que se indique otra cosa, para toda clase de protección nacional admisible)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH,

(54) **Title:** AXIAL-COAXIAL MOTOR AND AXIAL-COAXIAL ELECTRICITY GENERATOR

(54) **Título:** MOTOR AXIAL - COAXIAL Y GENERADOR DE ELECTRICIDAD AXIAL - COAXIAL.

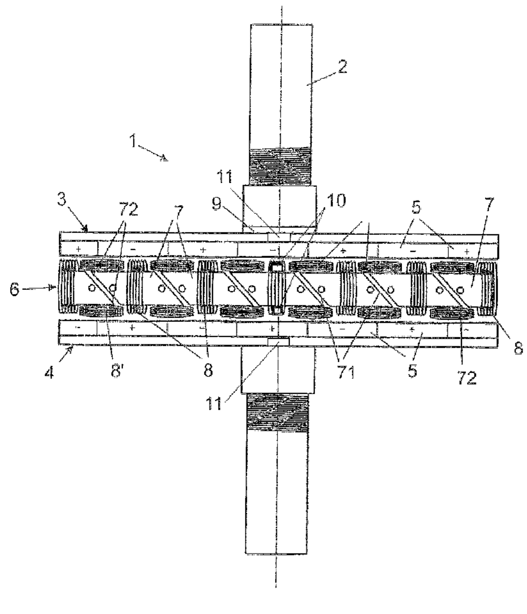

FIG. 1

(57) **Abstract:** The invention relates to an axial-coaxial motor with a shaft (2); discs (3, 4) with magnetic poles (5) of successively alternating polarity, and which can rotate with respect to the shaft (2); a central coil (6) of coils formed along a core (7) that has sloped ends (71) ending in tips (72), the ends overlapping in contiguous coils, and a winding (8) of conductive wire that also comprises an extra second winding (8') on the tips (72) of the core (7) of the coils; and, optionally, an electronic control panel (9) that decides when to provide an electrical impulse to the winding (8), and a Hall sensor for detecting the location of the magnetic poles (5) of the discs (3, 4) with respect to the central coil (6). The motor also includes, optionally, a speed sensor (11) for sensing the rotation of the discs (3, 4). The patent also relates to an axial-coaxial electricity generator.

WO 2020/208268 A1

[Continúa en la página siguiente]

TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Estados designados *(a menos que se indique otra cosa, para toda clase de protección regional admisible)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), euroasiática (AM, AZ, BY, KG, KZ, RU, TJ, TM), europea (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Publicada:
— *con informe de búsqueda internacional (Art. 21(3))*

(57) Resumen: Motor axial - coaxial con eje (2), y discos (3, 4) con polos magnéticos (5) de polaridad sucesivamente alterna y posibilidad de giro respecto al eje (2), y bobinado central (6) de bobinas formadas por un núcleo (7) con extremos inclinados (71) acabados en punta (72) que se solapan en las bobinas contiguas y devanado (8) de hilo conductor que, además, comprende un segundo devanado (8') extra en las puntas (72) del núcleo (7) de las bobinas y opcionalmente una placa de control (9) electrónico que decide cuando dar un impulso eléctrico a dicho devanado (8), y un sensor hall para detectar la situación de los polos magnéticos (5) de los discos (3,4) respecto al bobinado central (6). Opcionalmente, comprende también un sensor de velocidad (11) de giro de los discos (3,4). Es también objeto de esta patente un generador de electricidad axial - coaxial.

MEMORIA DESCRIPTIVA

MOTOR AXIAL – COAXIAL Y GENERADOR DE ELECTRICIDAD AXIAL – COAXIAL

OBJETO DE LA INVENCIÓN

La invención, tal como expresa el enunciado de la presente memoria descriptiva, se refiere a un motor axial - coaxial y a un generador de electricidad axial – coaxial que aporta, a la función a que se destina, ventajas y características, que se describen en detalle más adelante, que suponen una mejora del estado actual de la técnica.

El objeto de la presente invención recae en un motor magnético que, estando constituido, esencialmente, por un eje con dos discos de polos magnéticos giratorios y un bobinado central sin posibilidad de giro respecto al eje en el que se contemplan núcleos magnéticos con una configuración que comprende unos extremos inclinados cuyas puntas se solapan y a los que se enrollan devanados de hilo conductor, presenta una serie de perfeccionamientos que, basados principalmente en la incorporación de una placa de control electrónico y sensores hall, mejoran la efectividad de su funcionamiento, al conseguir un mayor control del impulso eléctrico que se aplica. En caso de aplicar energía cinética a uno o a ambos discos de polos magnéticos giratorios, se genera electricidad en el bobinado central constituyendo así un generador de electricidad axial – coaxial.

CAMPO DE APLICACIÓN DE LA INVENCIÓN

El campo de aplicación de la presente invención se enmarca dentro del sector de la industria dedicada a la fabricación de motores eléctricos así como en la industria de los generadores de electricidad.

ANTECEDENTES DE LA INVENCIÓN

Por el documento P201630853, cuyo titular es el propio solicitante de la presente invención, se conoce un dispositivo magnético apto para usarse como generador de electricidad si se aplica una energía cinética o bien como motor axial - coaxial si se aplica una energía eléctrica que comprende un eje al que se acoplan dos discos con al menos dos polos magnéticos y un bobinado central con bobinas formadas por un núcleo de material magnético y un devanado de hilo conductor, en el que, acoplados al eje con posibilidad de giro incorpora, al menos, un primer disco y un segundo disco con varios polos magnéticos y, sin posibilidad de giro, el bobinado central situado entre ambos discos, estando los polos magnéticos colocados radialmente en ambos discos, con la polaridad sucesivamente alterna, positiva y negativa, y el núcleo de las bobinas del bobinado central dotadas de una configuración que presenta, en ambos lados laterales, extremos de lados inclinados hacia un mismo lado respecto del eje y acabados en punta y situados a una distancia entre ellos que dichos extremos se solapan uno sobre otro en las bobinas contiguas; contemplando además un elemento externo que imprime movimiento a un primer disco de modo que genera un campo magnético que, a su vez, determina la excitación de las bobinas y, consecuentemente, el giro en sentido opuesto del segundo disco.

En consecuencia, si se aplica una corriente eléctrica al bobinado, por ejemplo mediante su conexión a una batería, el dispositivo se convierte en un motor eléctrico de impulsión magnética.

Pues bien, el objetivo de la presente invención es, en la variante del dispositivo conformado como motor de impulsión magnética, proporcionar una versión mejorada del mismo, en particular para mejorar su efectividad a través del control de la aplicación de los impulsos eléctricos al devanado, ya que la eficacia del motor depende, en gran medida, de la posición relativa de los polos de los discos.

Por otra parte, y como referencia al estado actual de la técnica, cabe señalar que, al menos por parte de los solicitantes, se desconoce la existencia de ningún otro motor que presente unas características técnicas y estructurales iguales o semejantes a las que presenta el que aquí se reivindica.

EXPLICACIÓN DE LA INVENCIÓN

El motor axial - coaxial que la invención propone permite alcanzar satisfactoriamente los objetivos anteriormente señalados, estando los detalles caracterizadores que lo hacen posible y que lo distinguen convenientemente recogidos en las reivindicaciones finales que acompañan a la presente descripción.

Concretamente, lo que la invención propone, como se ha señalado anteriormente, es un motor axial - coaxial que, de manera conocida, comprende un eje al que se acoplan, al menos, dos discos de polos magnéticos giratorios y un bobinado central fijo, en que ambos discos están dotados de polos magnéticos y dispuestos de manera adyacentemente alterna, es decir, colocados de manera alternada con polo positivo y con polo negativo sucesivamente en disposición radial al centro del disco.

De preferencia, ambos discos son exactamente iguales, o al menos, presentan el mismo número de polos magnéticos de semejante potencia magnética.

Y, por su parte, el bobinado central está dispuesto en, al menos, dos bobinas que presentan, cada una, un núcleo de material conductor magnético tal como el acero, alrededor del cual se incorpora el devanado de filamentos conductores, contando dicho núcleo con una configuración inclinada y solapada en sus extremos que determina la capacidad de provocar el movimiento en sentido contrario del segundo disco.

Más concretamente, cada núcleo posee, en ambos lados, una terminación inclinada hacia un mismo lado, respecto del eje, determinando respectivos cuerpos de configuración, en su alzado frontal, aproximadamente en forma de rombo cuyos extremos en punta quedan algo separados y solapados uno sobre el de la bobina contigua y, preferentemente, estando las puntas libres de devanado, de tal manera que dicho devanado no se solapa.

Y, a partir de dicha configuración ya conocida, los perfeccionamientos que incorpora el descrito motor comprenden, básicamente, lo siguiente:

- La inclusión de unos bobinados secundarios extra para forzar la salida de los campos magnéticos a través de ellos evitando que el campo magnético se disperse. En concreto, cada bobina comprende, al menos, un segundo devanado situado sobre una punta del núcleo con el fin de forzar la salida del campo magnético generado en la bobina a través de dicho segundo devanado.

Opcionalmente, el motor también comprende

- La inclusión de una placa de control electrónico para regular, de manera dinámica, es decir, en función de la velocidad de giro, los impulsos eléctricos que se aplican a los hilos del devanado, a los que se encuentra convenientemente conectada entre estos y una batería o fuente de alimentación eléctrica.

- Y la inclusión de unos sensores hall para detectar el cambio de polaridad y consecuentemente la polaridad de los impulsos eléctricos que se deben introducir al motor para que funcione.

La información de dichos sensores hall se procesa conjuntamente con la velocidad de giro para prever la futura polaridad o para retrasar la señal del sensor hall dependiendo de la velocidad de giro. Por este motivo, en una realización preferente el motor también comprende

- La inclusión de un sensor de velocidad instalado de modo que registra la velocidad de giro de los discos, de tal manera que la placa de control puede retrasar el envío de los impulsos eléctricos al devanado dependiendo de la situación de los polos magnéticos de los discos respecto al bobinado central y de la velocidad de los discos.

Con ello, el funcionamiento del motor es el siguiente.

El controlador o placa de control electrónica, da impulsos eléctricos (positivos o negativos) al devanado de cada bobina que genera un campo magnético que sale por la puntas del núcleo y a través del devanado secundario extra llega a los polos magnéticos de los discos provocando que estos giren.

El problema es saber cuándo dar exactamente (en qué momento) dichos impulsos eléctricos, puesto que la eficacia del motor depende de la posición relativa de los polos de los discos.

Para solucionar este problema se utilizan los sensores hall que detectan la polaridad, de tal manera que es posible detectar la polaridad de los discos y, consecuentemente, establecer el momento exacto para aplicar el impulso eléctrico.

Un problema secundario es que la velocidad de los discos afecta a las lecturas de los sensores hall. Para que la lectura sea correcta la placa electrónica retrasará la entrega del valor conseguido por el sensor hall para compensar el retraso provocado por la velocidad de los discos.

Dependiendo de la posición inicial de los discos respecto al bobinado central se consigue que los discos giren en la misma dirección o bien en direcciones opuestas. Esta decisión puede ser interesante en función del uso que se le va a dar al motor.

En una realización alternativa, cuando se aplica energía cinética a uno o a ambos discos de polos magnéticos giratorios, se genera electricidad en el bobinado central, concretamente en los devanados enrollados entorno a os núcleos de material conductor, constituyendo así un generador de electricidad axial – coaxial.

DESCRIPCIÓN DE LOS DIBUJOS

Para complementar la descripción que se está realizando y con objeto de ayudar a una mejor comprensión de las características de la invención, se acompaña a la presente memoria descriptiva, como parte integrante de la misma, una hoja de dibujos en la que con carácter ilustrativo y no limitativo se ha representado lo siguiente:

La figura número 1.- Muestra una vista esquemática en alzado de un ejemplo de realización del motor axial - coaxial, objeto de la invención, apreciándose en ella las principales partes y elementos que comprende, así como su configuración y disposición.

REALIZACIÓN PREFERENTE DE LA INVENCIÓN

A la vista de la descrita figura 1 y única, y de acuerdo con la numeración adoptada en ella, se puede apreciar un ejemplo no limitativo del motor axial - coaxial, el cual comprende las partes y elementos que se indican y describen en detalle a continuación.

Así, tal como se aprecia en dicha figura 1, el dispositivo (1) en cuestión comprende, de manera conocida, un eje (2) al que se acoplan, con posibilidad de giro, al menos, dos discos (3, 4) con polos magnéticos (5) y un bobinado central (6), situado entre un primer disco (3) y un segundo disco (4), sin posibilidad de giro, es decir, fijado solidariamente al eje (2).

Además, ambos discos (3, 4) están dotados de al menos dos polos magnéticos (5) colocados radialmente y con la polaridad sucesivamente alterna, positiva y negativa, siendo, preferentemente, ambos discos (3, 4) y sus polos magnéticos (5) exactamente idénticos.

Por su parte, el bobinado central (6) comprende, al menos, dos o más bobinas constituidas, cada una, por un núcleo (7) de material conductor magnético, cuya configuración presenta, en ambos laterales, respectivos extremos de lados inclinados (71), siempre hacia un mismo lado respecto del eje (2), acabados en punta (72), estando dichos núcleos (7) situados a una distancia tal entre ellos que sus extremos de lados inclinados (71) con punta (72), se solapan el uno sobre el otro en las bobinas contiguas, existiendo en cada una de dichas bobinas un devanado (8) principal de hilo conductor, enrollado alrededor del núcleo (7), preferentemente, sin que se solapen los hilos de los respectivos devanados (8), al estar dichas puntas (72) sin cubrir con ellos, y convenientemente conectados por sus respectivos extremos a una fuente de alimentación eléctrica (no representada).

Y, de manera innovadora, dicho motor se distingue esencialmente por comprender además del devanado (8) principal enrollado al núcleo (7), comprende al menos un segundo devanado (8') extra situado sobre una de las puntas (72) de dicho núcleo (7) con el fin de forzar la salida del campo magnético generado en la bobina a través de dicho segundo devanado (8') extra.

Opcionalmente, el motor comprende una placa de control (9) electrónico que, conectada entre la fuente de alimentación y el devanado (8) de hilos conductores, decide cuando dar un impulso eléctrico a dicho devanado (8), y un sensor hall (10) conectado a la placa de control (9) y para detectar la situación de los polos magnéticos (5) de los discos (3,4) respecto al bobinado central (6).

Preferentemente, además, el motor (1) también comprende un sensor de velocidad (11) conectado a la placa de control (9) y para detectar la velocidad de giro de los discos (3,4), de tal manera que la placa de control (9) puede retrasar el envío de los impulsos eléctricos al devanado (8) dependiendo de la situación de los polos magnéticos (5) de los discos (3,4) respecto al bobinado central (6) y de la velocidad de los discos (3,4).

En una realización alternativa, cuando se aplica energía cinética a uno o a ambos discos de polos magnéticos giratorios (3, 4), se genera electricidad en el bobinado central (6), concretamente en los devanados (8) enrollados entorno a os núcleos de material conductor (7), constituyendo así un generador de electricidad axial – coaxial.

Descrita suficientemente la naturaleza de la presente invención, así como la manera de ponerla en práctica, no se considera necesario hacer más extensa su explicación para que cualquier experto en la materia comprenda su alcance y las ventajas que de ella se derivan, haciéndose constar que podrá ser llevada a la práctica en otros modos de realización que difieran en detalle de la indicada a título de ejemplo, siempre que no modifique lo fundamental.

REIVINDICACIONES

1.- Motor axial - coaxial que, comprendiendo:

- un eje (2),

- unos discos (3, 4), con al menos dos polos magnéticos (5) de polaridad distinta colocados radialmente en ambos discos, con la polaridad sucesivamente alterna, positiva y negativa, estando cada uno de los discos (3,4) acoplados con posibilidad de giro respecto al eje (2),

- y un bobinado central (6) situado entre los dos discos (3, 4) y acoplado sin posibilidad de giro respecto al eje y que, a su vez, comprende al menos dos bobinas formadas por:

  - un núcleo (7) de material magnético cuya configuración presenta, en ambos lados laterales, extremos de lados inclinados (71), hacia un mismo lado respecto del eje (2), acabados en punta (72), estando dichos núcleos (7) situados a una distancia tal entre ellos que sus extremos de lados inclinados (71) con punta (72) se solapan el uno sobre el otro en las bobinas contiguas

  - y al menos un devanado (8) de hilo conductor enrollado alrededor de dicho núcleo (7),

está **caracterizado** por comprender en cada bobina del bobinado central (6), al menos un segundo devanado (8') extra situado sobre una de las puntas (72) de dicho núcleo (7) con el fin de forzar la salida del campo magnético generado en la bobina a través de dicho segundo devanado (8') extra.

2.- Motor axial - coaxial, según la reivindicación 1, **caracterizado** por comprender además

- una placa de control (9) electrónico que, conectada entre la fuente de alimentación y el devanado (8) de hilos conductores, decide cuando dar un impulso eléctrico a dicho devanado (8),

- y un sensor hall (10) conectado a la placa de control (9) y para detectar la situación de los polos magnéticos (5) de los discos (3,4) respecto al bobinado central (6).

3.- Motor axial - coaxial, según la reivindicación 2, **caracterizado** por comprender además un sensor de velocidad (11) conectado a la placa de control (9) y para detectar la velocidad de giro de los discos (3,4), de tal manera que la placa de control (9) puede retrasar el envío de los impulsos eléctricos al devanado (8) dependiendo de la situación de los polos magnéticos (5) de los discos (3,4) respecto al bobinado central (6) y de la velocidad de los discos (3,4).

4.- Generador de electricidad que, comprendiendo

- un eje (2),

- unos discos (3, 4), con al menos dos polos magnéticos (5) de polaridad distinta colocados radialmente en ambos discos, con la polaridad sucesivamente alterna, positiva y negativa, estando cada uno de los discos (3,4) acoplados con posibilidad de giro respecto al eje (2),

- y un bobinado central (6) situado entre los dos discos (3, 4) y acoplado sin posibilidad de giro respecto al eje y que, a su vez, comprende al menos dos bobinas formadas por:

  - un núcleo (7) de material magnético cuya configuración presenta, en ambos lados laterales, extremos de lados inclinados (71), hacia un mismo lado respecto del eje (2), acabados en punta (72), estando dichos núcleos (7) situados a una distancia tal entre ellos que sus extremos de lados inclinados (71) con punta (72) se solapan el uno sobre el otro en las bobinas contiguas

  - y al menos un devanado (8) de hilo conductor enrollado alrededor de dicho núcleo (7),

está **caracterizado** por comprender en cada bobina del bobinado central

(6), al menos un segundo devanado (8') extra situado sobre una de las puntas (72) de dicho núcleo (7) con el fin de forzar la entrada del campo magnético generado en los discos (3,4) a través de dicho segundo devanado (8') extra.

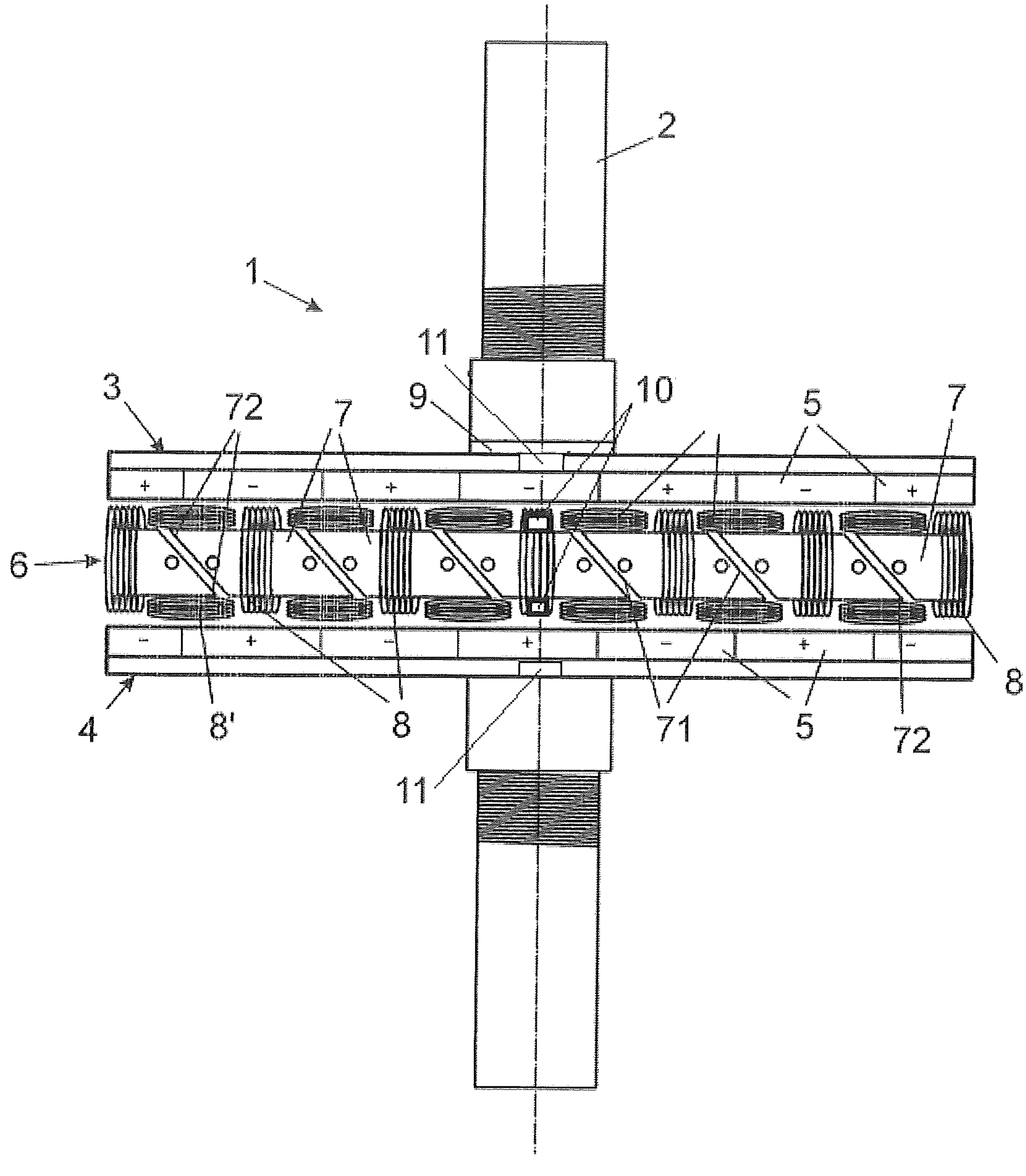

FIG. 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2019/070242

A. CLASSIFICATION OF SUBJECT MATTER

H02K1/24 (2006.01)
H02K1/27 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols).
H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, XPI3E, XPIEE, INSPEC, XPESP

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO2017220826 (TROFYMCHUK, OLEKSIY) 28/12/2017, Page 6, line 13- Page 7, line 21; figures.	1-4
A	CN 108768215 (HUAIYIN INST TECHNOLOGY) 06/11/2018, DataBase EPODOC, retrieved from EPOQUE, Abstract and figures	1-4
A	US 2012139379 A1 (GE XIAO ET AL.) 07/06/2012, Paragraphs [0023]-[0025]; figures 1, 2A, 2B.	1-4
A	US 2009295245 A1 (HONDA MOTOR CO LTD) 03/12/2009, Paragraphs [0109]-[0140]; figures 1 a 9E	1-4

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents , such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure use, exhibition, or other means.	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search	Date of mailing of the international search report
17/07/2019	**(17/12/2019)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer L. García Aparicio Telephone No. 91 3493057

C (continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	
Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WEI XUBIAO; YANG KAI; PAN ZHICHENG; XIE HONGQIN; ZHU CHENG; ZHANG YINGLI. Design of a novel axial-radial flux permanent magnet motor. . 2014 17th International Conference on Electrical Machines and Systems (ICEMS, 22/10/2014, Pages 80-84, <DOI: 10.1109/ICEMS.2014.7013441>	1-4
A	US 2005179337 A1 (HASEBE MASAHIRO ET AL.) 18/08/2005, Paragraphs [0039]-[0040]; Figures 5, 6	1-4

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ES2019/070242

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
WO2017220826 A1	28.12.2017	EP3512082 A1	17.07.2019
		ES2608468 A1	11.04.2017
		ES2608468 B1	07.02.2018
CN108768215 A	06.11.2018	NONE	
US2012139379 A1	07.06.2012	TW201225482 A	16.06.2012
		TWI422121B B	01.01.2014
		US9013082 B2	21.04.2015
		CN102487234 A	06.06.2012
		CN102487234B B	07.01.2015
US2009295245 A1	03.12.2009	JP2009296769 A	17.12.2009
		JP4470072B B2	02.06.2010
		JP2009296768 A	17.12.2009
		JP4482900B B2	16.06.2010
		JP2009296700 A	17.12.2009
		JP4573251B B2	04.11.2010
		US8049389 B2	01.11.2011
US2005179337 A1	18.08.2005	JP2005143276 A	02.06.2005
		JP4349089B B2	21.10.2009

INFORME DE BÚSQUEDA INTERNACIONAL

Solicitud internacional nº
PCT/ES2019/070242

A. CLASIFICACIÓN DEL OBJETO DE LA SOLICITUD
H02K1/24 (2006.01)
H02K1/27 (2006.01)
De acuerdo con la Clasificación Internacional de Patentes (CIP) o según la clasificación nacional y CIP.

B. SECTORES COMPRENDIDOS POR LA BÚSQUEDA

Documentación mínima buscada (sistema de clasificación seguido de los símbolos de clasificación)
H02K

Otra documentación consultada, además de la documentación mínima, en la medida en que tales documentos formen parte de los sectores comprendidos por la búsqueda

Bases de datos electrónicas consultadas durante la búsqueda internacional (nombre de la base de datos y, si es posible, términos de búsqueda utilizados)
EPODOC, INVENES, XPI3E, XPIEE, INSPEC, XPESP

C. DOCUMENTOS CONSIDERADOS RELEVANTES

Categoría*	Documentos citados, con indicación, si procede, de las partes relevantes	Relevante para las reivindicaciones nº
A	WO2017220826 (TROFYMCHUK, OLEKSIY) 28/12/2017, Página 6, línea 13- Página 7, línea 21; figuras.	1-4
A	CN 108768215 (HUAIYIN INST TECHNOLOGY) 06/11/2018, Base de datos EPODOC, recuperado de EPOQUE, Resumen y figuras	1-4
A	US 2012139379 A1 (GE XIAO ET AL.) 07/06/2012, Párrafos [0023]-[0025]; figuras 1, 2A, 2B.	1-4
A	US 2009295245 A1 (HONDA MOTOR CO LTD) 03/12/2009, Párrafos [0109]-[0140]; figuras 1 a 9E	1-4

☒ En la continuación del recuadro C se relacionan otros documentos ☒ Los documentos de familias de patentes se indican en el anexo

* Categorías especiales de documentos citados:
"A" documento que define el estado general de la técnica no considerado como particularmente relevante.
"E" solicitud de patente o patente anterior pero publicada en la fecha de presentación internacional o en fecha posterior.
"L" documento que puede plantear dudas sobre una reivindicación de prioridad o que se cita para determinar la fecha de publicación de otra cita o por una razón especial (como la indicada).
"O" documento que se refiere a una divulgación oral, a una utilización, a una exposición o a cualquier otro medio.
"P" documento publicado antes de la fecha de presentación internacional pero con posterioridad a la fecha de prioridad reivindicada.
"T" documento ulterior publicado con posterioridad a la fecha de presentación internacional o de prioridad que no pertenece al estado de la técnica pertinente pero que se cita por permitir la comprensión del principio o teoría que constituye la base de la invención.
"X" documento particularmente relevante; la invención reivindicada no puede considerarse nueva o que implique una actividad inventiva por referencia al documento aisladamente considerado.
"Y" documento particularmente relevante; la invención reivindicada no puede considerarse que implique una actividad inventiva cuando el documento se asocia a otro u otros documentos de la misma naturaleza, cuya combinación resulta evidente para un experto en la materia.
"&" documento que forma parte de la misma familia de patentes.

Fecha en que se ha concluido efectivamente la búsqueda internacional.
17/07/2019

Fecha de expedición del informe de búsqueda internacional.
17 de diciembre de 2019 (17/12/2019)

Nombre y dirección postal de la Administración encargada de la búsqueda internacional
OFICINA ESPAÑOLA DE PATENTES Y MARCAS
Paseo de la Castellana, 75 - 28071 Madrid (España)
Nº de fax: 91 349 53 04

Funcionario autorizado
L. García Aparicio
Nº de teléfono 91 3493057

INFORME DE BÚSQUEDA INTERNACIONAL

Solicitud internacional nº

PCT/ES2019/070242

C (Continuación). DOCUMENTOS CONSIDERADOS RELEVANTES

Categoría *	Documentos citados, con indicación, si procede, de las partes relevantes	Relevante para las reivindicaciones nº
A	WEI XUBIAO; YANG KAI; PAN ZHICHENG; XIE HONGQIN; ZHU CHENG; ZHANG YINGLI. Design of a novel axial-radial flux permanent magnet motor. . 2014 17th International Conference on Electrical Machines and Systems (ICEMS, 22/10/2014, Páginas 80-84, <DOI: 10.1109/ICEMS.2014.7013441>	1-4
A	US 2005179337 A1 (HASEBE MASAHIRO ET AL.) 18/08/2005, Párrafos [0039]-[0040]; Figuras 5, 6	1-4

INFORME DE BÚSQUEDA INTERNACIONAL

Informaciones relativas a los miembros de familias de patentes

Solicitud internacional nº

PCT/ES2019/070242

Documento de patente citado en el informe de búsqueda	Fecha de Publicación	Miembro(s) de la familia de patentes	Fecha de Publicación
WO2017220826 A1	28.12.2017	EP3512082 A1	17.07.2019
		ES2608468 A1	11.04.2017
		ES2608468 B1	07.02.2018
CN108768215 A	06.11.2018	NINGUNO	
US2012139379 A1	07.06.2012	TW201225482 A	16.06.2012
		TWI422121B B	01.01.2014
		US9013082 B2	21.04.2015
		CN102487234 A	06.06.2012
		CN102487234B B	07.01.2015
US2009295245 A1	03.12.2009	JP2009296769 A	17.12.2009
		JP4470072B B2	02.06.2010
		JP2009296768 A	17.12.2009
		JP4482900B B2	16.06.2010
		JP2009296700 A	17.12.2009
		JP4573251B B2	04.11.2010
		US8049389 B2	01.11.2011
US2005179337 A1	18.08.2005	JP2005143276 A	02.06.2005
		JP4349089B B2	21.10.2009

(12) SOLICITUD INTERNACIONAL PUBLICADA EN VIRTUD DEL TRATADO DE COOPERACIÓN EN MATERIA DE PATENTES (PCT)

(19) Organización Mundial de la Propiedad Intelectual
Oficina internacional

(43) Fecha de publicación internacional
28 de diciembre de 2017 (28.12.2017)

WIPO | PCT

(10) Número de publicación internacional
WO 2017/220826 A1

(51) Clasificación internacional de patentes:
H02K 53/00 (2006.01) *H02K 35/02* (2006.01)

(21) Número de la solicitud internacional: PCT/ES2017/070321

(22) Fecha de presentación internacional: 17 de mayo de 2017 (17.05.2017)

(25) Idioma de presentación: español

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(30) Datos relativos a la prioridad:
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(72) Inventor; y
(71) Solicitantes: TROFYMCHUK, Oleksiy [ES/ES]; C/. d'En Prim nº 123-125, 2º 3ª, 08911 BADALONA (ES). TROFYMCHUK, Oleksandr [ES/ES]; C/. d'En Prim nº 123-125, 2º 3ª, 08911 BADALONA (ES).

(74) Mandatario: ESPIELL VOLART, Eduardo Mª; C/.Pau Claris nº 77, 2º 1ª, BARCELONA, 08010 BARCELONA (ES).

(81) Estados designados *(a menos que se indique otra cosa, para toda clase de protección nacional admisible)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(54) Title: MAGNETIC DEVICE SUITABLE FOR USE AS A POWER GENERATOR OR DRIVE MOTOR

(54) Título: DISPOSITIVO MAGNÉTICO APTO PARA USARSE COMO GENERADOR DE ENERGÍA O COMO MOTOR DE IMPULSIÓN.

FIG. 1

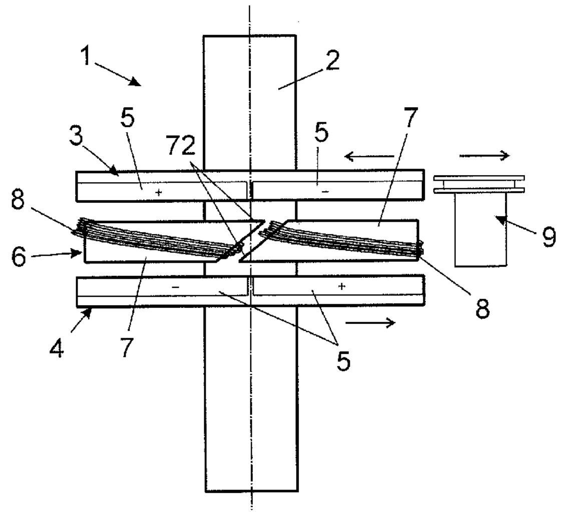
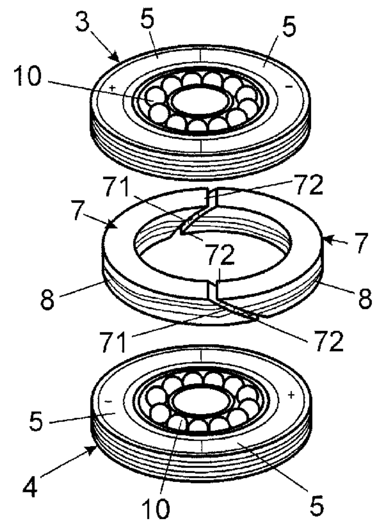


FIG. 3



(57) Abstract: The invention relates to a magnetic device suitable for use as a power generator or drive motor. The device comprises: at least one first disc (3) and one second disc (4) which are identical in shape, have a plurality of magnetic poles (5) and are rotatably coupled to a shaft (2); and a central coil (6) disposed between the two discs (3, 4) and non-rotatably coupled to the shaft (2). The magnetic poles (5) are positioned radially in both discs, with successively alternating positive and negative polarity. The central coil (6) comprises at least two windings having a core (7) with a configuration in which on both lateral sides have ends with sides (71) inclined towards a single side with respect to the shaft (2) and ending in a point (72). The cores (7) are situated at such a distance from each other that the end of the inclined sides (71) with a point (72) overlap one on top of the other. The device further comprises an external element (9) that imparts movement to a first disc (3). In each of the discs (3, 4), the magnetic poles (5) are similar in number, position and magnetic force. The cores (7) of the windings are bodies having a rhombus-shaped front elevation. The points (72) of the

WO 2017/220826 A1

[Continúa en la página siguiente]

(84) Estados designados *(a menos que se indique otra cosa, para toda clase de protección regional admisible)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), euroasiática (AM, AZ, BY, KG, KZ, RU, TJ, TM), europea (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Publicada:

— *con informe de búsqueda internacional (Art. 21(3))*

cores (7) are not covered with the wire winding (8).

(57) Resumen: Dispositivo magnético apto para usarse como generador de energía o como motor de impulsión. Comprende acoplados a un eje (2) con posibilidad de giro, al menos, un primer disco (3) y un segundo disco (4) idénticos en su forma con varios polos magnéticos (5) y, sin posibilidad de giro, un bobinado central (6) situado entre ambos discos (3, 4). Los polos magnéticos (5) están colocados radialmente en ambos discos, con la polaridad sucesivamente alterna, positiva y negativa; y el bobinado central (6) comprende, al menos, dos bobinas cuyo núcleo (7) tiene una configuración que presenta, en ambos lados laterales, extremos de lados inclinados (71), hacia un mismo lado respecto del eje (2), acabados en punta (72); Dichos núcleos (7) están situados a una distancia tal entre ellos que sus extremos de lados inclinados (71) con punta (72), se solapan el uno sobre el otro un elemento externo (9) que imprime movimiento a un primer disco (3). Los polos magnéticos (5) se incorporan en número, posición y fuerza magnética semejante en cada uno de los discos (3, 4). Los núcleos (7) de las bobinas son cuerpos de configuración en alzado frontal en forma de rombo. Las puntas (72) de los núcleos (7) no están cubiertas con el devanado (8) de hilos.

MEMORIA DESCRIPTIVA

DISPOSITIVO MAGNÉTICO APTO PARA USARSE COMO GENERADOR DE ENERGÍA O COMO MOTOR DE IMPULSIÓN

OBJETO DE LA INVENCIÓN

La invención, tal como expresa el enunciado de la presente memoria descriptiva, se refiere a un dispositivo magnético apto para usarse como generador de energía o como motor de impulsión que aporta, a la función a que se destina, ventajas y características de novedad que se describirán en detalle más adelante.

El objeto de la presente invención recae en un dispositivo que, constituido, esencialmente, por un conjunto formado por un eje con dos discos de polos magnéticos giratorios y un bobinado central, aprovecha la capacidad de repelerse de los polos magnéticos con signos opuestos y la de las bobinas para generar una corriente eléctrica al ser excitadas por un campo magnético, para, a partir de un empuje inicial externo que hace girar un primer disco de polos magnéticos, generar energía eléctrica en el bobinado con un elevado nivel de potencia ya que la particular configuración de los núcleos del devanado con extremos solapados y la disposición de los polos magnéticos en los discos, provocan que, a la vez, el segundo disco gire en sentido contrario, aumentando el campo magnético generado y, además, se genere energía cinética susceptible también de poder ser aprovechada.

CAMPO DE APLICACIÓN DE LA INVENCIÓN

El campo de aplicación de la presente invención se enmarca dentro del sector de la industria dedicada a la fabricación de aparatos, sistemas y dispositivos para la generación de energía eléctrica, centrándose particularmente en el ámbito de los generadores eléctricos o motores de impulsión magnéticos.

ANTECEDENTES DE LA INVENCIÓN

Como es sabido, un generador eléctrico es un dispositivo capaz de mantener una diferencia de potencial eléctrica entre dos de sus puntos (llamados polos, terminales o bornes) transformando la energía mecánica en eléctrica. Esta transformación se consigue por la acción de un campo magnético sobre los conductores eléctricos dispuestos sobre una armadura (estátor). Si se produce mecánicamente un movimiento relativo entre los conductores y el campo, se genera una fuerza electromotriz (F.E.M.). Este sistema está basado en la ley de Faraday.

El rotor de algunos motores eléctricos, funciona de manera inversa, aprovechando la energía eléctrica para generar movimiento, ya que en dicho tipo de motores - generadores eléctricos, el rotor es el componente que gira (rota) y que, junto con su contraparte fija, el estátor, constituye el conjunto fundamental para la transmisión de potencia.

El objetivo de la presente invención es, pues, desarrollar un nuevo dispositivo generador de electricidad magnético si se aplica una energía cinética o bien un dispositivo motor de impulsión magnético si se aplica una energía eléctrica.

Por otra parte, y como referencia al estado actual de la técnica, cabe señalar que, al menos por parte de los solicitantes, se desconoce la existencia de ningún otro dispositivo o invención de aplicación similar que presente unas características técnicas y estructurales iguales o semejantes a las que concretamente presenta el generador o motor magnético que aquí se reivindica.

EXPLICACIÓN DE LA INVENCIÓN

El dispositivo magnético generador de energía o motor de impulsión que la invención propone se configura pues como una destacable mejora dentro de su campo de aplicación, ya que a tenor de su implementación se alcanzan satisfactoriamente los objetivos señalados, estando los detalles caracterizadores que lo distinguen de lo ya conocido convenientemente recogidos en las reivindicaciones finales que acompañan la presente descripción.

Concretamente, lo que la invención propone, como se ha señalado anteriormente, es un dispositivo generador de electricidad magnético si se aplica una energía cinética o bien un dispositivo motor de impulsión magnético si se aplica una energía eléctrica que comprende un eje al que se acoplan, al menos, dos discos de polos magnéticos giratorios y un bobinado central fijo, presentando una configuración tal que, al mover uno de los discos, a través de cualquier medio externo, se genera un campo magnético que excita el bobinado provocando la generación de energía eléctrica, a la vez que el movimiento giratorio del segundo disco en sentido opuesto al que gira el primero y, con ello, provocar la formación de un campo magnético mayor que aumenta la potencia de la energía eléctrica generada en el bobinado central.

Para ello, ambos discos están dotados de polos magnéticos y dispuestos de manera adyacentemente alterna, es decir, colocados de manera alternada con polo positivo y con polo negativo sucesivamente en disposición radial al centro del disco.

De preferencia, ambos discos son exactamente iguales, o al menos, presentan el mismo número de polos magnéticos de semejante potencia magnética.

Y, por su parte, el bobinado central está dispuesto en, al menos, dos bobinas que presentan, cada una, un núcleo de material conductor magnético tal como el acero, alrededor del cual se incorpora el devanado de filamentos conductores, cuya configuración inclinada y solapada en sus extremos es la que determina la capacidad de provocar el movimiento en sentido contrario del segundo disco.

Más concretamente, cada núcleo posee, en ambos lados, una terminación inclinada hacia un mismo lado, respecto del eje, determinando respectivos cuerpos de configuración, en su alzado frontal, aproximadamente en forma de rombo cuyos extremos en punta se solapan es decir, quedan algo separados pero uno sobre el de la bobina contigua y, preferentemente, estando las puntas libres de devanado, de tal manera que éste no se solapa.

Con ello, al hacer girar el primer disco, el campo magnético generado por sus polos magnéticos alternativamente, provoca un campo magnético que, al mismo tiempo provoca el movimiento del segundo disco en sentido opuesto..

Mediante la correspondiente conexión de bornes y cableado al bobinado para conectarlo a un acumulador o transformador, preferentemente a través del eje, se podrá aprovechar la energía eléctrica generada.

Para ello, y evitar en lo posible la pérdida de energía por efecto del roce, entre el eje y los discos se interponen unos correspondientes rodamientos que minimizan dicho roce.

Además, opcionalmente, mediante el correspondiente acople de medios de transmisión, también se podrá aprovechar la energía cinética generada por el giro del segundo disco de polos magnéticos.

El descrito dispositivo generador de electricidad magnético si se aplica una energía cinética o bien un dispositivo motor de impulsión magnético si se aplica una energía eléctrica consiste, pues, en una estructura innovadora de características desconocidas hasta ahora para el fin a que se destina, razones que unidas a su utilidad práctica, la dotan de fundamento suficiente para obtener el privilegio de exclusividad que se solicita.

DESCRIPCIÓN DE LOS DIBUJOS

Para complementar la descripción que se está realizando y con objeto de ayudar a una mejor comprensión de las características de la invención, se acompaña a la presente memoria descriptiva, como parte integrante de la misma, una hoja de dibujos en la que con carácter ilustrativo y no limitativo se ha representado lo siguiente:

La figura número 1.- Muestra una vista esquemática en alzado de un ejemplo de realización del dispositivo magnético generador de energía, objeto de la invención, apreciándose en ella las principales partes y elementos que comprende, así como su configuración y disposición;

la figura número 2.- Muestra una representación esquemática de la forma en alzado frontal que presentan los núcleos del bobinado central del dispositivo, y su solape en las bobinas contiguas; y la figura número 3.- Muestra una vista esquemática en perspectiva del despiece de los discos y el bobinado central, según el mismo ejemplo del dispositivo de la invención mostrado en la figura 1.

REALIZACIÓN PREFERENTE DE LA INVENCIÓN

A la vista de las descritas figuras, y de acuerdo con la numeración adoptada en ellas, se puede apreciar un ejemplo no limitativo del dispositivo magnético, el cual comprende las partes y elementos que se indican y describen en detalle a continuación.

Así, tal como se aprecia en la figura 1, el dispositivo (1) en cuestión comprende un eje (2) al que se acoplan, con posibilidad de giro e interponiendo correspondientes rodamientos (10), al menos, dos discos (3, 4) con polos magnéticos (5) y, sin posibilidad de giro, es decir, fijado solidariamente al eje (2), un bobinado central (6), situado entre un primer disco (3) y un segundo disco (4).

Además, ambos discos (3, 4) están dotados de varios polos magnéticos (5) los cuales van colocados radialmente y dispuestos con la polaridad sucesivamente alterna, positiva y negativa, siendo, preferentemente, en número, posición y fuerza magnética iguales o, al menos, muy semejantes en cada uno de dichos discos (3, 4), si bien, preferentemente, ambos discos (3, 4) y sus polos magnéticos (5) son exactamente idénticos.

Por su parte, el bobinado central (6) comprende, al menos, dos bobinas constituidas, cada una, por un núcleo (7) de material conductor magnético, tal como el acero, con un devanado (8) de hilo conductor, cuya configuración, de dicho núcleo (7), presenta, en ambos laterales, respectivos extremos de lados inclinados (71), siempre hacia un mismo lado respecto del eje (2), acabados en punta (72), de modo que determinan respectivos cuerpos con una configuración, cuyo desarrollo en alzado frontal, es aproximadamente en forma de rombo, tal como se observa en la representación de la figura 2.

En las figuras 1 y 3, el ejemplo representado tiene solamente dos polos magnéticos (5) por disco y, por tanto, sólo dos núcleos (7) de bobinas.

En cualquier caso, es importante destacar que dichos extremos de lados inclinados (71) de los núcleos (7) de las bobinas están situados a una distancia tal entre ellos que sus respectivas puntas (72) se solapan una sobre la otra en las bobinas contiguas y, preferentemente, sin que se solapen los hilos de los respectivos devanados (8) al estar dichas puntas (72) sin cubrir con ellos, tal como se aprecia claramente en la representación de la figura 2.

El dispositivo (1) prevé, además, un elemento externo (9) que, siendo de cualquier índole, imprime movimiento a un primer disco (3), haciendo que se genere un campo magnético que, a su vez, provoca la excitación de las bobinas y, a la vez, el giro, en sentido opuesto del segundo disco (4).

Descrita suficientemente la naturaleza de la presente invención, así como la manera de ponerla en práctica, no se considera necesario hacer más extensa su explicación para que cualquier experto en la materia comprenda su alcance y las ventajas que de ella se derivan, haciéndose constar que, dentro de su esencialidad, podrá ser llevada a la práctica en otros modos de realización que difieran en detalle de la indicada a título de ejemplo, y a las cuales alcanzará igualmente la protección que se recaba siempre que no se altere, cambie o modifique su principio fundamental.

REIVINDICACIONES

1.- Dispositivo magnético apto para usarse como generador de electricidad si se aplica una energía cinética o bien como motor de impulsión magnético si se aplica una energía eléctrica que, comprendiendo un eje (2) al que se acoplan discos (3, 4) con al menos dos polos magnéticos (5) y bobinado central (6) de bobinas formadas por un núcleo (7) de material magnético con un devanado (8) de hilo conductor, esta **caracterizado porque** comprende, acoplados al eje (2) con posibilidad de giro, al menos, un primer disco (3) y un segundo disco (4) con varios polos magnéticos (5) y, sin posibilidad de giro, un bobinado central (6) situado entre ambos discos (3, 4); **porque** los polos magnéticos (5) están colocados radialmente en ambos discos, con la polaridad sucesivamente alterna, positiva y negativa; **porque** el bobinado central (6) comprende, al menos, dos bobinas cuyo núcleo (7) tiene una configuración que presenta, en ambos lados laterales, extremos de lados inclinados (71), hacia un mismo lado respecto del eje (2), acabados en punta (72); **porque** dichos núcleos (7) están situados a una distancia tal entre ellos que sus extremos de lados inclinados (71) con punta (72), se solapan el uno sobre el otro en las bobinas contiguas; **y porque**, además, presenta un elemento externo (9) que imprime movimiento a un primer disco (3), lo cual genera un campo magnético que, a su vez, determina la excitación de las bobinas y, a su vez, el giro, en sentido opuesto del segundo disco (4).

2.- Dispositivo magnético, según la reivindicación 1, **caracterizado** porque los polos magnéticos (5) se incorporan en número, posición y fuerza magnética semejante en cada uno de los discos (3, 4).

3.- Dispositivo magnético, según las reivindicaciones 1 a 3, **caracterizado** porque ambos discos (3, 4) son exactamente idénticos.

4.- Dispositivo magnético, según la reivindicación 1, **caracterizado** porque los núcleos (7) de las bobinas son cuerpos de configuración en alzado frontal en forma de rombo.

5.- Dispositivo magnético n, según cualquiera de las reivindicaciones 1 a 4, **caracterizado** porque las puntas (72) de los núcleos (7) no están cubiertas con el devanado (8) de hilos, de modo que, cuando los extremos de lados inclinados (71) se solapan el uno sobre el otro en las bobinas contiguas, los hilos de los respectivos devanados (8) no se solapan.

FIG. 1

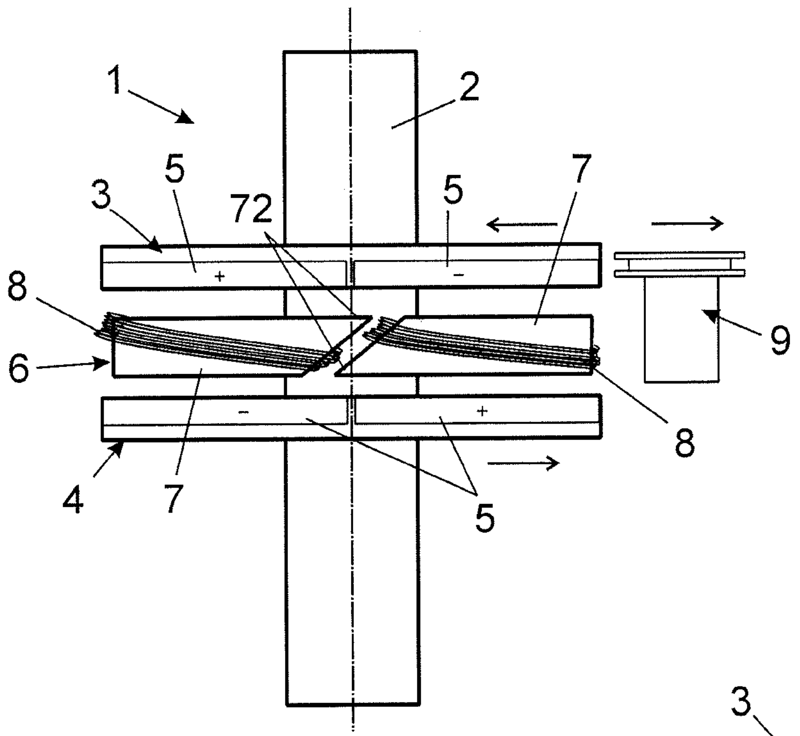


FIG. 2

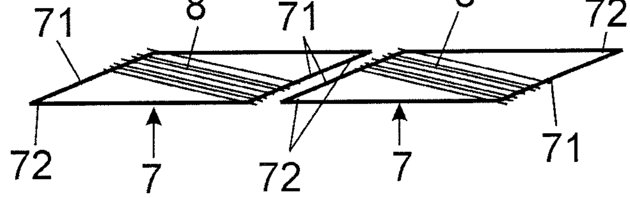
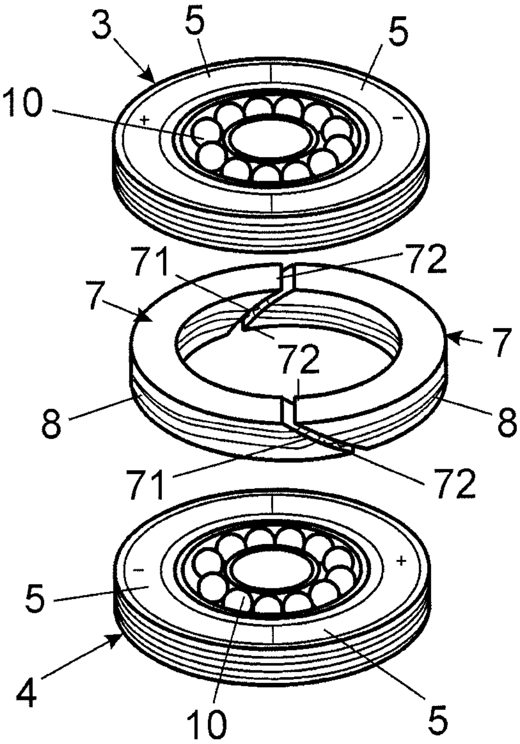


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2017/070321

A. CLASSIFICATION OF SUBJECT MATTER

H02K53/00 (2006.01)
H02K35/02 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2012104877 A1 (ISAACS BLAKE L) 03/05/2012, abstract WPI; abstract EPODOC; figures; paragraphs 10, 15, 25-27 and 31.	1-5
A	KR 20160028688 A (JUNG HYUN BAE ET AL.) 14/03/2016, abstract WPI; abstract EPODOC; figures.	1-5
A	US 2008042506 A1 (LIAO CHIN-LUNG ET AL.) 21/02/2008, abstract; figures; paragraphs 3, 6, 11 and 20.	1-5
A	WO 2015155249 A2 (ZAG TECHNOLOGIES IRELAND LTD) 15/10/2015, abstract; figures; page 1, lines 3-19; page 1, line 29 a page 2, line 12; page 19, lines 13-15; page 22, line 16 a page 23, line 8.	1-5

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19/06/2017	**(22/06/2017)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer A. López Ramiro Telephone No. 91 3495322

INTERNATIONAL SEARCH REPORT

International application No.
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C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 9270149 B1 (CASAS RAMIRO) 23/02/2016, abstract; figures; column 1, line 66 a column 2, line 12; column 3, lines 25-57.	1-5
A	KR 20140126853 A (SONG SIN HEUB) 03/11/2014, abstract WPI; abstract EPODOC; figures.	1-5

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ES2017/070321

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
KR20160028688 A	14.03.2016	NONE	
US2012104877 A1	03.05.2012	NONE	
US2008042506 A1	21.02.2008	TW200811363 A US7605500 B2 JP2008048596 A	01.03.2008 20.10.2009 28.02.2008
WO2015155249 A2	15.10.2015	JP2017511118 A US2017033645 A1 AU2015243283 A1	13.04.2017 02.02.2017 24.11.2016
US9270149 B1	23.02.2016	US2012086293 A1 US8754558 B2 WO2012048018 A2 WO2012048018 A3	12.04.2012 17.06.2014 12.04.2012 19.07.2012
KR20140126853 A	03.11.2014	NONE	

INFORME DE BÚSQUEDA INTERNACIONAL

Solicitud internacional nº

PCT/ES2017/070321

A. CLASIFICACIÓN DEL OBJETO DE LA SOLICITUD
H02K53/00 (2006.01)
H02K35/02 (2006.01)
De acuerdo con la Clasificación Internacional de Patentes (CIP) o según la clasificación nacional y CIP.

B. SECTORES COMPRENDIDOS POR LA BÚSQUEDA

Documentación mínima buscada (sistema de clasificación seguido de los símbolos de clasificación)
H02K

Otra documentación consultada, además de la documentación mínima, en la medida en que tales documentos formen parte de los sectores comprendidos por la búsqueda

Bases de datos electrónicas consultadas durante la búsqueda internacional (nombre de la base de datos y, si es posible, términos de búsqueda utilizados)
EPODOC, INVENES

C. DOCUMENTOS CONSIDERADOS RELEVANTES

Categoría*	Documentos citados, con indicación, si procede, de las partes relevantes	Relevante para las reivindicaciones nº
A	US 2012104877 A1 (ISAACS BLAKE L) 03/05/2012, resumen WPI; resumen EPODOC; figuras; párrafos 10, 15, 25-27 y 31.	1-5
A	KR 20160028688 A (JUNG HYUN BAE ET AL.) 14/03/2016, resumen WPI; resumen EPODOC; figuras.	1-5
A	US 2008042506 A1 (LIAO CHIN-LUNG ET AL.) 21/02/2008, resumen; figuras; párrafos 3, 6, 11 y 20.	1-5
A	WO 2015155249 A2 (ZAG TECHNOLOGIES IRELAND LTD) 15/10/2015, resumen; figuras; página 1, líneas 3-19; página 1, línea 29 a página 2, línea 12; página 19, líneas 13-15; página 22, línea 16 a página 23, línea 8.	1-5

☒ En la continuación del recuadro C se relacionan otros documentos ☒ Los documentos de familias de patentes se indican en el anexo

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Fecha en que se ha concluido efectivamente la búsqueda internacional.
19/06/2017

Fecha de expedición del informe de búsqueda internacional.
22 de junio de 2017 (22/06/2017)

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OFICINA ESPAÑOLA DE PATENTES Y MARCAS
Paseo de la Castellana, 75 - 28071 Madrid (España)
Nº de fax: 91 349 53 04

Funcionario autorizado
A. López Ramiro

Nº de teléfono 91 3495322

C (Continuación). DOCUMENTOS CONSIDERADOS RELEVANTES

Categoría *	Documentos citados, con indicación, si procede, de las partes relevantes	Relevante para las reivindicaciones nº
A	US 9270149 B1 (CASAS RAMIRO) 23/02/2016, resumen; figuras; columna 1, línea 66 a columna 2, línea 12; columna 3, líneas 25-57.	1-5
A	KR 20140126853 A (SONG SIN HEUB) 03/11/2014, resumen WPI; resumen EPODOC; figuras.	1-5

INFORME DE BÚSQUEDA INTERNACIONAL

Informaciones relativas a los miembros de familias de patentes

Solicitud internacional nº

PCT/ES2017/070321

Documento de patente citado en el informe de búsqueda	Fecha de Publicación	Miembro(s) de la familia de patentes	Fecha de Publicación
KR20160028688 A	14.03.2016	NINGUNO	
US2012104877 A1	03.05.2012	NINGUNO	
US2008042506 A1	21.02.2008	TW200811363 A US7605500 B2 JP2008048596 A	01.03.2008 20.10.2009 28.02.2008
WO2015155249 A2	15.10.2015	JP2017511118 A US2017033645 A1 AU2015243283 A1	13.04.2017 02.02.2017 24.11.2016
US9270149 B1	23.02.2016	US2012086293 A1 US8754558 B2 WO2012048018 A2 WO2012048018 A3	12.04.2012 17.06.2014 12.04.2012 19.07.2012
KR20140126853 A	03.11.2014	NINGUNO	

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06 April 2021 (06.04.2021)

(25) Filing Language: English

(26) Publication Language: English

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63/146,619	06 February 2021 (06.02.2021)	US

(71) Applicant: **DUPLICENT, LLC** [US/US]; 521 Latimer Road, Santa Monica, California 90402 (US).

(72) Inventor: **KRASNOFF, Curren Emmett**; c/o FOLEY & LARDNER LLP, 777 E. Wisconsin Avenue, Milwaukee, Wisconsin 53202 (US).

(74) Agent: **MCKENNA, Richard J.** et al.; FOLEY & LARDNER LLP, 3000 K Street, N.W. Suite 600, Washington, District of Columbia 20007-5109 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

(54) **Title:** CENTRIPETAL MAGNET ACCELERATOR

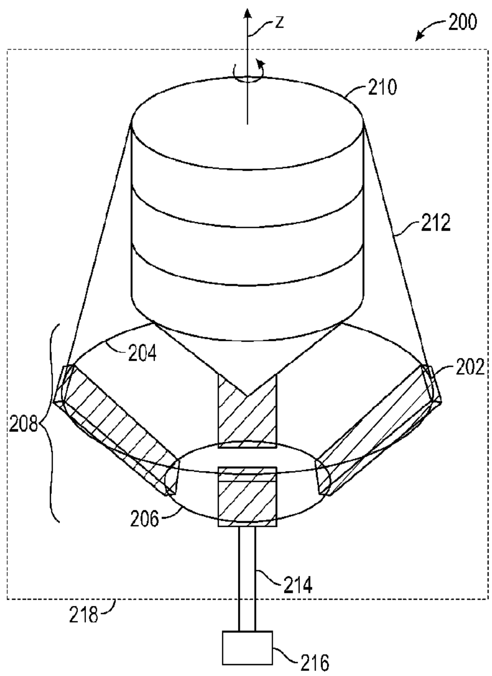


FIG. 2

(57) Abstract: An assembly for generating electricity includes a circular track configured to rotate about a first axis of rotation, the circular track comprising a first magnet having a face that is at an angle with respect to the first axis of rotation, a second magnet positioned at a center of the circular track, wherein a face of the second magnet is an opposite polarity to the face of the first magnet such that the second magnet repels the first magnet to rotate the circular track, and a device for converting rotational motion from the circular track into electricity.

WO 2021/207248 A1

CENTRIPETAL MAGNET ACCELERATOR

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

[0001] This application claims the benefit of and priority to U.S. Provisional Patent Application No. 63/005,538, filed April 6, 2020, and U.S. Provisional Patent Application No. 63/146,619, filed February 6, 2021, both of which are incorporated herein by reference in their entireties.

BACKGROUND

[0002] The present disclosure relates generally to a device for generating electricity. More specifically, the present disclosure relates to a device that utilizes the attraction and repulsion of magnets to produce rotational motion for generating electricity.

[0003] In today's day and age, we face an ever-increasing demand for clean and renewable sources of electrical energy. Clean and renewable energies can help to reduce pollution and carbon dioxide (CO2) emissions, and can even provide energy to people and/or places that current lack access to safe and reliable electricity. Thus, technologies that can generate clean energy with little to no resource consumption may be desirable to meet global energy demands.

SUMMARY

[0004] One embodiment of the present disclosure is an assembly for generating electricity. The assembly includes a circular track configured to rotate about a first axis of rotation, the circular track comprising a first magnet having a face that is at an angle with respect to the first axis of rotation, a second magnet positioned at a center of the circular track, wherein a face of the second magnet is an opposite polarity to the face of the first magnet such that the second magnet repels the first magnet to rotate the circular track, and a device for converting rotational motion from the circular track into electricity.

[0005] In some embodiments, the circular track further includes a plurality of magnets in addition to the first magnet, and each of the plurality of magnets and the first magnet are equally spaced around the circumference of the circular track.

[0006] In some embodiments, the assembly further includes a plurality of magnets in addition to the second magnet, and the plurality of magnets are stacked on a top side of the second magnet to increase a magnetic strength of the second magnet.

[0007] In some embodiments, the second magnet is in the shape of a cone, a pyramid, a hemisphere, a conical frustum, or a cylinder.

[0008] In some embodiments, the second magnet is formed by a plurality of magnets positioned on an outer surface of a support member, the support member in the shape of a cone, a pyramid, a hemisphere, a conical frustum, or a cylinder.

[0009] In some embodiments, the first magnet is triangular in shape such that the face of the first magnet is at an angle with respect to the first axis of rotation and a side of the first magnet opposite the face is perpendicular to the first axis of rotation.

[0010] In some embodiments, the assembly further includes one or more support members extending from the circular track to the second magnet to support the second magnet.

[0011] In some embodiments, the assembly further includes a housing configured to enclose the circular track and the second magnet, and the housing is structured to maintain a vacuum.

[0012] In some embodiments, the assembly for converting rotational motion from the circular track into electricity is an electromagnetic device including a rotor and a stator. In some embodiments, other movement harnessing devices may be used to convert rotational motion from the circular track into electricity.

[0013] In some embodiments, the assembly further includes a shaft extending from the device for converting rotational motion from the circular track into electricity to the circular track, the shaft defining the first axis of rotation.

[0014] In some embodiments, the assembly further includes a gear set positioned between the device for converting rotational motion from the circular track into electricity and the shaft, the gear set configured to increase or decrease a rotational speed of the device for converting rotational motion from the circular track into electricity according to one or more different gear ratios.

[0015] In some embodiments, at least one of the first magnet or the second magnet are electromagnets, and a portion of the electricity generated by the electromagnetic device is utilized to power the at least one of the first magnet or the second magnet.

[0016] In some embodiments, the circular track is constructed from a conductive material such that the portion of the electricity utilized to power the first magnet is provided to the first magnet via the circular track.

[0017] In some embodiments, the circular track further includes an upper track and a lower track, and the first magnet is positioned between the upper track and the lower track.

[0018] In some embodiments, the lower track has a smaller radius than the upper track.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Objects, aspects, features, and advantages of the disclosure will become more apparent and better understood by referring to the detailed description taken in conjunction with the accompanying drawings, in which like reference characters identify corresponding elements throughout. In the drawings, like reference numbers generally indicate identical, functionally similar, and/or structurally similar elements.

[0020] FIG. 1 is a block diagram of a system for generating electricity, according to some embodiments.

[0021] FIG. 2 is a diagram of a centripetal magnet accelerator, according to some embodiments.

[0022] FIGS. 3A-3D are example configurations of a magnets along a track of the centripetal magnet accelerator of FIG. 2, according to some embodiments.

[0023] FIGS. 4A-4C are example configurations for coupling magnets to the track of the centripetal magnet accelerator of FIG. 2, according to some embodiments.

DETAILED DESCRIPTION

[0024] Before turning to the figures, which illustrate certain exemplary embodiments in detail, it should be understood that the present disclosure is not limited to the details or methodology set forth in the description or illustrated in the figures. It should also be understood that the terminology used herein is for the purpose of description only and should not be regarded as limiting.

[0025] Referring generally to the FIGURES, a device for generating electricity using the effects of magnetic attraction and repulsion is shown, according to some embodiments. In particular, the device may include a first magnet or a set of magnets positioned around a circular track assembly, with a second magnet or set of magnets at or near the center of the circular track assembly. As described herein, the first and second magnets, or sets of magnets, may be permanent magnets (e.g., neodymium), electromagnetics, or superconducting magnets. The first and second magnets or sets of magnets may be positioned such that the faces (e.g., a side of the first magnet substantially facing the second magnet, or vice versa) of these magnets have opposite polarities. For example, a face of the first magnet may constitute the north pole of the magnet, while a face of the second magnet may constitute the south pole of the magnet. Thus, the first and second magnets may repel each other.

[0026] In some embodiments, the second magnet may be fixed in position with respect to the first magnet and/or the circular track assembly, such that the force of the second magnet repelling the first magnet causes at least one of the first magnet or the entire circular track assembly to rotate about an axis of rotation (e.g., at the center of the circular track assembly). This rotational motion may be harnessed to rotate a shaft connected to an electromagnetic device (e.g., a generator), and the electromagnetic device may be configured to convert this rotational motion into electrical energy. Advantageously, this device may require little to no energy to operate, instead relying on the inherent attraction and/or repulsion of two collocated magnets to produce electricity. Further, as will be made evident in the present disclosure, this device may occupy a much smaller footprint than other electricity producing devices.

[0027] Referring first to FIG. 1, a block diagram of a system 100 for generating electricity is shown, according to some embodiments. Unlike many other systems for generating electricity, system 100 may provide clean and renewable electricity while requiring little to no input energy (e.g., electricity, natural gas, coal, etc.) to operate. Instead, as mentioned above, system 100 may harness the attraction and repulsion of magnets to rotate an electromagnetic device for generating electricity. In particular, system 100 includes an accelerator 102, as referred to herein as a centripetal magnet accelerator, which includes at least two magnets positioned such that opposing poles (e.g., north and south) of the magnets are at least partially facing each other. Thus, the opposing poles cause a repulsive force between the two magnets, driving the magnets away from each other.

[0028] Accelerator 102 may include a circular track assembly, or other similar track assembly, to which at least one of the magnets can be coupled. In some embodiments, the circular track assembly is configured to rotate about a central axis of rotation. In other embodiments, the magnet is movably coupled to the circular track assembly, such that the magnet may travel around the circular track. In either case, the remaining magnet or magnets may be positioned in a center of the circular track assembly, opposing the magnet coupled to the circular track and thereby "pushing" (e.g., by a repulsive force) the first magnet around the track and/or rotating the circular track assembly. Accelerator 102 is described in greater detail below with respect to FIG. 2.

[0029] Accelerator 102 may be coupled to gears 104, such as by a connecting shaft (e.g., a drive shaft, a prop shaft, etc.). Gears 104 may be a gear set including one or more spur gears, helical gears, bevel gears, miter gears, worm gears, screw gears, planetary gears, etc., configured to either increase or decrease the rotational speed (i.e., increase or decrease the angular velocity) of the shaft, and in some cases configured to reverse the direction of rotation of the shaft. Accordingly, system 100 may include an input shaft that couples accelerator 102 to gears 104, and an output shaft that couples gears 104 to a generator 106. In some embodiments, gears 104 may be selectively engaged to adjust the speed of rotation of the output shaft, and thus the speed of rotation of generator 106, as discussed in greater detail below.

[0030] Generator 106 may be any electromagnetic device configured to convert rotational motion into electrical energy. For example, generator 106 may include a stator formed by a conductive wire wound on a metal core, and a rotor formed by one or more magnets positioned on a circular housing (e.g., a metal hoop or flat-bottomed bowl). The rotor may be rotated by the output shaft of gears 104, thereby generating a rotating magnetic field that induces a voltage difference between the windings of the stator, producing alternating current (AC). In some embodiments, generator 106 may include a voltage regulator for regulating the output voltage of the device, and/or may include a converter for converting the output AC of generator 106 to direct current (DC). A generator that uses a coper coil may be used. The generator may be a turbine generator. The generator may be rotated by a device other than the gears and connecting shaft 214. In some embodiments the bottom of the circular track assembly 208 defines a single gear that rotates and another gear(s) may fit into the bottom circular track assembly 208 gear perpendicularly, where the perpendicular gear(s) may be attached to a rod that rotates a generator to produce electricity.

[0031] In some embodiments, as discussed in greater detail below, one or more of the magnets included in accelerator 102 may be electromagnets, which produce a magnetic field with the application of an electric current. For example, a basic electromagnet can be formed by wrapping a length of conductive wire (e.g., copper) around a metal core. An electric current can then be applied to the conductive wire, producing the magnetic field. In some such embodiments, generator 106 may be configured to provide at least a portion of the produced electricity to accelerator 102, in order to power the electromagnets.

[0032] Referring now to FIG. 2, a diagram of a centripetal magnet accelerator 200 is shown, according to some embodiments. Accelerator 200 may be the same as, or nearly the same as, accelerator 102 described above, for example. Accordingly, accelerator 200 may be configured to produce rotational motion, which can be converted into electricity by an electromagnetic device (e.g., generator 106). Advantageously, accelerator 200 may consume little to no energy to produce said rotational motion, and may therefore be more cost and energy-efficient than other devices for generating electricity. Additionally, as mentioned above, accelerator 200 may produce little to no emissions, resulting in clean and renewable energy.

[0033] Accelerator 200 is shown to include a plurality of first magnetic units 202. In some embodiments, first magnetic units 202 may be individual magnets, or may include a plurality of magnets (e.g., stacked, positioned side-by-side, etc.). For example, first magnetic units 202 may include a single, rectangular bar magnet as shown in FIG. 2, though it will be appreciated that first magnetic units 202 may include any number, shape, and/or size of magnets. In the example shown, accelerator 200 includes at least four of first magnetic units 202, although it will also be appreciated that accelerator 200 can include any number of first magnetic units 202. Additional configurations of first magnetic units 202 are described in greater detail below, with respect to FIGS. 3A-3D.

[0034] Each of first magnetic units 202 is coupled (e.g., permanently, movably, or removably) to an upper circular track 204 and/or a lower circular track 206. Together, upper circular track 204 and lower circular track 206 form a circular track assembly 208 configured to support first magnetic units 202. In some embodiments, upper circular track 204 and lower circular track 206 are fixedly or removably coupled by one or more support members (not shown). For example, support members may extend from upper circular track 204 to lower circular track 206, or may extend from one or both of upper circular track 204 and lower circular track 206 to another mounting surface (e.g., a housing 218, as described below). In some embodiments, circular track assembly 208 is configured to rotate about a central axis of rotation *z*, as discussed in greater detail below. In other embodiments, circular track assembly 208 is fixed in rotation, and first magnetic units 202 are configured to rotate around circular track assembly 208.

[0035] In some embodiments, such as the embodiment shown in FIG. 2, lower circular track 206 has a smaller radius that upper circular track 204. In other embodiments, upper circular track 204 and lower circular track 206 have a similar or identical radius. One or both of upper circular track 204 and lower circular track 206 may be formed from lightweight materials, such as aluminum, thereby reducing the weight of circular track assembly 208 and accelerator 200. In some embodiments, upper circular track 204 and/or lower circular track 206 are formed of a conductive material (e.g., aluminum, iron, etc.) such that electricity may be passed through upper circular track 204 and lower circular track 206, and provided to first magnetic units 202.

[0036] Accelerator 200 is also shown to include a second magnetic unit 210. Second magnetic unit 210 may include one or more magnets and may be positioned at a center of circular track assembly 208 (e.g., and thereby accelerator 200). Second magnetic unit 210 may be configured to provide a repulsive force against first magnetic units 202, thereby causing first magnetic units 202 and/or circular track assembly 208 to rotate. Accordingly, a face of second magnetic unit 210 may be an opposite polarity of a face of each of first magnetic units 202. For example, the face of second magnetic unit 210 may be configured as a north pole, while the face of each of first magnetic units 202 may be configured as a north pole. In this manner, when first magnetic units 202 and second magnetic unit 210 are brought in close proximity, the magnetic fields of first magnetic units 202 and second magnetic unit 210 may oppose one another, causing a repulsive force. Additionally, rotational motion may be at least partially sustained due to the centripetal force of the rotating first magnetic units 202 and/or circular track assembly 208.

[0037] This repulsive force, caused by the opposing polarities of the faces of first magnetic units 202 and second magnetic unit 210, causes either the first magnetic units 202 or the circular track assembly 208 to rotate about an axis of rotation. The axis of rotation, *z*, may be defined by a connecting shaft 214, configured to transfer the rotational motion of first magnetic units 202 and/or circular track assembly 208 to an electromagnetic device 216 (e.g., a generator). In other words, the rotation of first magnetic units 202 and/or circular track assembly 208 may cause connecting shaft 214 to rotate, thereby causing components (e.g., a rotor) of electromagnetic device 216 to rotate to produce electricity. Accordingly, connecting shaft 214 may be coupled to one or more of first magnetic units 202 and/or circular track assembly 208, depending on a configuration of accelerator 200.

[0038] In some embodiments, as discussed above with respect to FIG. 1, accelerator 200 may include more than one connecting shaft 214. In such embodiments, accelerator 200 may also include a gear set (e.g., gears 104) positioned between accelerator 200 and electromagnetic device 216, in order to increase or decrease the speed at which electromagnetic device 216 rotates. For example, a first connecting shaft may couple first magnetic units 202 and/or circular track assembly 208 to the gear set, while a second connecting shaft couples the gear set to electromagnetic device 216. In some embodiments, a ratio of the gear set may be selectively modified to adjust the rotational speed of electromagnetic device 216.

[0039] In some embodiments, such as the embodiment shown in FIG. 2, second magnetic unit 210 includes at least one cone-shaped magnet at the lowermost portion of the unit. A cone-shaped second magnetic unit 210 may provide an even magnetic field, and thus an evenly distributed repulsive force against first magnetic units 202. However, it will be appreciated that second magnetic unit 210, or at least the lowermost portion of second magnetic unit 210, may be any suitable shape. For example, at least a portion of second magnetic unit 210 may be shaped as a cone, a pyramid, a hemisphere, a conical frustum, a cylinder, etc.

[0040] In some embodiments, second magnetic unit 210 may include a lightweight support structure (e.g., an aluminum cylinder or cone) to which a plurality of smaller magnets may be mounted. Accordingly, in such embodiments, the face or surface of second magnetic unit 210 may be formed of multiple individual magnets, rather than one continuous magnet. Additionally, in some embodiments, the lightweight support structure may be shaped in any of a cone, a pyramid, a hemisphere, a conical frustum, a cylinder, etc. In some embodiments, the conical portion of second magnetic unit 210 may be formed from a plurality of wedge-shaped magnets having a common strength and size.

[0041] In some embodiments, second magnetic unit 210 includes multiple magnets that are stacked or otherwise positioned such that the magnetic fields of the magnets combine to increase the overall strength of second magnetic unit 210. As shown, for example, a plurality of cylindrical magnets may be stacked on a cone shaped magnet to form second magnetic unit 210. Thus, in some embodiments, second magnetic unit 210 is stronger than first magnetic units 202 (e.g., second magnetic unit 210 has a stronger magnetic field). In this manner, the force provided by second magnetic unit 210 against first magnetic units 202 may be significantly stronger than the force provided by first magnetic units 202 against second magnetic unit 210, causing first magnetic units 202 and/or circular track assembly 208 to rotate.

[0042] In some embodiments, second magnetic unit 210 is supported by one or more support arms 212. Support arms 212 may extend from second magnetic unit 210 to one or more portions of circular track assembly 208 (e.g., upper circular track 204) as shown, or may extend to housing 218 or to another support structure (not shown). Support arms 212 may be configured to position second magnetic unit 210 at the center of circular track assembly 208, and/or above circular track assembly 208. As shown, for example, second magnetic unit 210 is above circular track assembly 208 such that the cone portion of second magnetic unit 210 extends into the center of circular track assembly 208, thereby positioned in close proximity to first magnetic units 202.

[0043] In some embodiments, support arms 212 are adjustable, allowing second magnetic unit 210 to be raised and/or lowered. Raising second magnetic unit 210 away from first magnetic units 202 may decrease the repulsive force between the two components, causing first magnetic units 202 and/or circular track assembly 208 to rotate more slowly, thereby producing less energy. Lowering second magnetic unit 210 toward first magnetic units 202 may increase the repulsive force between the two components, causing first magnetic units 202 and/or circular track assembly 208 to rotate more quickly, thereby producing more energy.

[0044] In some embodiments, second magnetic unit 210 may be lowered such that all or at least a significant portion of second magnetic unit 210 is within circular track assembly 208, and thereby in close proximity to first magnetic units 202. Like circular track assembly 208, support arms 212 may be constructed of lightweight and/or conductive materials, such as aluminum, to reduce the weight of accelerator 200 and/or to provide electricity to any of first magnetic units 202 and second magnetic unit 210.

[0045] In some embodiments, as mentioned above, either one or both of first magnetic units 202 and second magnetic unit 210 may be electromagnets, rather than permanent (e.g., neodymium) magnets. In such embodiments, at least a portion of the electricity produced by electromagnetic device 216 may be provided to first magnetic units 202 and/or second magnetic unit 210 to power the electromagnets. In some such embodiments, electricity may be provided via connecting shaft 214, lower circular track 206, upper circular track 204, and/or support arms 212, and thus, as mentioned above, any of these components of accelerator 200 may be constructed from lightweight but conductive materials.

[0046] Housing 218, as mentioned briefly above, is configured to enclose at least a portion of the device. In the example shown, housing 218 may enclose everything other than electromagnetic device 216, and a portion of connecting shaft 214. However, it will be appreciated that in other cases, additional or fewer components of accelerator 200 may be enclosed by housing 218. For example, in some cases, electromagnetic device 216 may also be enclosed. In some embodiments, housing 218 is formed of a lightweight material such as aluminum, plastic, etc. In some embodiments, components of accelerator 200 such as support arms 212 may be coupled to housing 218, and thus housing 218 may be formed of a material strong enough to support these components and to withstand the forces (e.g., rotation motion) produced by accelerator 200 during operation.

[0047] In some embodiments, housing 218 is air-tight such that housing 218 may hold a vacuum. Enclosing the components of accelerator 200 in a vacuum can help to reduce the effects of wind resistance (e.g., drag), which may slow the rotation of first magnetic units 202 and/or circular track assembly 208, thus resulting in wasted energy. In some such embodiments, housing 218 may include a seal (not shown), through which connecting shaft 214 may pass, to allow housing 218 to maintain a vacuum without inhibiting the rotation of connecting shaft 214. In other embodiments, as mentioned above, connecting shaft 214 and/or electromagnetic device 216 may be completely enclosed or completely outside of housing 218.

[0048] In some embodiments, multiple accelerators (e.g., multiple of accelerator 200) may be operated in unison to drive (e.g., rotate) either a single connecting shaft 214, or multiple connecting shafts. In this manner, the output of each accelerator 200 may be combined to increase the electricity produced. For example, multiple accelerators may power a single electromagnetic device (e.g., electromagnetic device 216) to increase the electricity produced by the electromagnetic device. In another example, multiple accelerators may provide rotational energy to a gear set, which combines the energy from the multiple accelerators and outputs the combined rotational energy to an electromagnetic device.

[0049] In some embodiments, one or a plurality of accelerators (e.g., multiple of accelerator 200 without connecting shaft 214 and electromagnetic device 216) are positioned on a circular track assembly and configured to rotate about the circular track assembly. In such embodiments, a plurality of first magnetic units 202 and/or circular track assembly 208 may rotate about an axis of rotation, however each accelerator 200 (without connecting shaft 214 and electromagnetic device 216) may also move upwards (e.g., moving along the axis z of figure 2) and the movement of the accelerator 200 (without connecting shaft 214 and electromagnetic device 216) is harnessed to produce electricity. In some embodiments, a plurality of first magnetic units 202 and/or circular track assembly 208 may not rotate about an axis of rotation and each accelerator 200 (without connecting shaft 214 and electromagnetic device 216) may move upwards (e.g., moving along the axis z of figure 2). Second magnet units 210 may not rotate in such embodiments where the accelerator unit moves along the z axis. In some such embodiments, the accelerators are positioned horizontally on the circular track, thereby rotating about the track and/or causing the track to rotate about a second axis of rotation. In some such embodiments, the circular track may be completely filled with accelerators, such that the plurality of accelerators are positioned end-to-end in a "train." In some such embodiments, housing 218 may be an aerodynamic shape (e.g., a cone) to reduce drag on each of the plurality of accelerators as they rotate. In some embodiments, a plurality of circular tracks each including one or a plurality of accelerators may be stacked or positioned in a manner to allow each of the circular tracks and/or accelerators to turn a common shaft or other motion harnessing device, thereby increasing the rotational energy and the amount of electricity generated.

[0050] In some embodiments, a single accelerator (e.g., accelerator 200) may include multiple circular track assemblies (e.g., multiple of circular track assembly 208) and/or multiple second magnetic units (e.g., multiple of second magnetic unit 210). For example, two or more circular track assemblies, each including a plurality of first magnetic units 202, may be stacked in series. In this manner, the rotational motion from each circular track assemblies and/or the first magnetic units 202 of each circular track assemblies may be combined to drive a single connecting shaft 214. In some such embodiments, each circular track assembly 208 may be the substantially the same size (e.g., in diameter), such that the multiple circular track assemblies are aligned. In some embodiments, a plurality of stacked circular track assemblies are spaced apart such that the circular track assemblies and/or the first magnetic units 202 of each circular track assembly may rotate freely. In some such embodiments, a connecting shaft may span a length of the stacked circular track assemblies (e.g., at a center of the circular track assemblies) to transfer the rotational energy of all of the circular track assemblies.

[0051] Referring now to FIGS. 3A-3D, example configurations of magnets (e.g., first magnetic units 202) along circular track assembly 208 of accelerator 200 are shown, according to some embodiments. In particular, each of FIGS. 3A-3D may represent a top-down perspective view of accelerator 200, as described in detail above. Turning first to FIG. 3A, an example configuration is shown that includes eight of first magnetic units 202 positioned around circular track assembly 208. As shown, each of first magnetic units 202 may be equidistantly spaced around circular track assembly 208, with second magnetic unit 204 positioned at the center of circular track assembly 208. However, in other embodiments, first magnetic units 202 may not be equally spaced, or there may be no space between each of first magnetic units 202. In some embodiments, each of first magnetic units 202 are positioned at the same height along circular track assembly 208 (e.g., equidistant between upper circular track 204 and lower circular track 206). In other embodiments, each of first magnetic units 202 are positioned at different heights along circular track assembly 208.

[0052] As discussed above, in some embodiments, circular track assembly 208 may be configured to rotate about an axis of rotation, which may extend through the center of second magnet unit 210. In other embodiments, each of first magnetic units 202 may be configured to rotate around second magnet unit 210, by following circular track assembly 208. To achieve this rotational motion, second magnet unit 210 may repel first magnetic units 202. In other words, the magnetic field of second magnet unit 210 may interact with the magnetic fields of first magnetic units 202, thereby exert a force on first magnetic units 202 and/or circular track assembly 208, causing first magnetic units 202 and/or circular track assembly 208 to rotate (i.e., spin) about the axis of rotation.

[0053] In some embodiments, each of first magnetic units 202 may be constructed from a plurality of magnets that vary in strength. For example, first magnetic units 202 may be constructed from a plurality of thin, elongated, rectangular shaped magnets position next to one another to form a magnetic unit. The thin magnets or magnetic sections may increase in strength in a direction of rotation of first magnetic units 202 and/or circular track assembly 208. For example, if the device of FIG. 3A is configured to rotate counter-clockwise, the weakest magnetic section may be positioned on the rightmost side of each of first magnetic units 202, while the strongest magnetic section is placed on the leftmost side of each of first magnetic units 202. In this manner, the leftmost side of first magnetic units 202 may produce a much stronger magnetic field than the rightmost side of first magnetic units 202, resulting in an increased repulsive force due to second magnetic unit 210. The increase in repulsive force on only one side of each of first magnetic units 202 therefore causes first magnetic units 202 and/or circular track assembly 208 to rotate about the axis of rotation.

[0054] In some embodiments, rather than a plurality of individual magnets, first magnetic units 202 may include a single, ring-shaped magnet. In such embodiments, one or both of upper circular track 204 or lower circular track 206 may be replaced with the ring-shaped magnet, or the ring-shaped magnet may be mounted to another support surface (not shown). In some embodiments, the ring-shaped magnet may not rotate, but rather accelerator 200 (without connecting shaft 214 and electromagnetic device 216) may move upwards along the z axis of figure 2.

[0055] In some embodiments, first magnetic units 202 are positioned at an angle Θ with respect to the axis of rotation, as shown in FIG. 3B. Specifically, first magnetic units 202 may be positioned such that a face of each magnet is at an angle other than perpendicular with the axis of rotation. By angling at least the face of first magnetic units 202 in this manner, a portion of the force applied to each magnet due to the repulsion from second magnetic unit 210 may be directed towards the direction of rotation of the device. In other words, at least a portion of the force applied to each of first magnetic units 202 is perpendicular to the axis of rotation, thereby causing the device to rotate. For example, in FIG. 3B, the force applied to each of first magnetic units 202 is shown as an arrow that is pointing at least partially counter-clockwise, rather than directly outwards from the center of accelerator 200. Accordingly, the force of repulsion due to the opposing poles of first magnetic units 202 and second magnetic unit 210 may cause first magnetic units 202 and/or circular track assembly 208 to rotate in a counter-clockwise direction.

[0056] It will also be appreciated that first magnetic units 202 may be any suitable shape, and thus the examples shown and described above are not intended to be limiting. For example, first magnetic units 202 may be shaped as right triangular prisms, as shown in FIG. 3C, or first magnetic units 202 may be any other polygonal shape. As right triangular prisms, a face of each of first magnetic units 202 may be positioned at an angle with respect to the axis of rotation (e.g., other than perpendicular), without having to angle first magnetic units 202 themselves. Thus, the force of repulsion due to the opposing poles of first magnetic units 202 and second magnetic unit 210 may cause first magnetic units 202 and/or circular track assembly 208 to rotate in a counter-clockwise direction in a similar manner to the configuration of FIG. 3B, described above.

[0057] As shown in FIG. 3C, for example, a face of each of first magnetic units 202 (e.g., the hypotenuse of the triangular shaped magnets) is at an angle to the axis of rotation, while the two remaining sides of the first magnetic units 202 are parallel and/or perpendicular to the axis of rotation. In this manner, a force applied to the face of first magnetic units 202 may result in a force at least partially perpendicular to the axis of rotation, causing the device to rotate. Additionally, first magnetic units 202 as shown in FIG. 3C may have a larger amount of magnetic (e.g., ferrous) material along one side of the magnet (e.g., the leading edge), thus increasing the repulsive force at the leading edge of the magnet. In some embodiments, the increased repulsive force in the configuration of FIG. 3C may result in an increased rotational speed of first magnetic units 202 and/or circular track assembly 208, which can result in increased electricity production.

[0058] In some embodiments, a position of each of first magnetic units 202 may be rotated and/or flip (e.g., horizontally or vertically) with respect to the configuration shown in FIG. 3C, such that either the opposite or adjacent sides of the triangular magnets is closest to second magnetic unit 210 (e.g., rather than the hypotenuse). In such embodiments, the repulsive force from second magnetic unit 210 may be stronger on one side of first magnetic units 202 (e.g., the widest side, with more magnetic material), causing first magnetic units 202 and/or circular track assembly 208 to rotate.

[0059] In some cases, it is also advantageous for first magnetic units 202 to be aerodynamic, to reduce the effects of drag due to wind resistance as first magnetic units 202 and/or circular track assembly 208 rotate. As shown in FIG. 3D, for example, first magnetic units 202 may have an aerodynamic edge or tip (e.g., a pointed cone, a triangular prism, etc.) configured to reduce the effects of wind resistance, thus reducing the loss of angular momentum as first magnetic units 202 and/or circular track assembly 208 rotate.

[0060] Referring now to FIGS. 4A-4C, example configurations for coupling magnets (e.g., first magnetic units 202) to circular track assembly 208 of accelerator 200 are shown, according to some embodiments. As discussed above, for example, first magnetic units 202 may be permanently, removably, and/or movably coupled to upper circular track 204 and/or lower circular track 206 depending on a configuration of accelerator 200. While a number of configurations are shown in FIGS. 4A-4C, it will be appreciated that other suitable methods or systems for coupling first magnetic units 202 to circular track assembly 208 are also contemplated herein. Thus, the examples described below are not intended to be limiting.

[0061] Turning first to FIG. 4A, a configuration of permanently and/or fixedly coupling first magnetic units 202 to circular track assembly 208 is shown. The configuration shown may be utilized in a configuration of accelerator 200 where circular track assembly 208 rotates and first magnetic units 202 remain stationary with respect to circular track assembly 208. In particular, one of first magnet units 202 is shown to be coupled directly to upper circular track 204 and lower circular track 206. In some embodiments, this configuration is achieved by welding or bolting first magnetic units 202 to upper circular track 204 and lower circular track 206. In other embodiments, another method of fixing first magnetic units 202 to upper circular track 204 and lower circular track 206 is utilized.

[0062] In some embodiments, as discussed above, first magnetic units 202 may rotate about circular track assembly 208, while circular track assembly 208 remains relatively stationary. Accordingly, first magnetic units 202 may be coupled to upper circular track 204 and lower circular track 206 by one or more brackets 402, as shown in FIG. 4B. In some embodiments, brackets 402 may be separated from upper circular track 204 and lower circular track 206 by roller assemblies 404. Roller assemblies 404 may include wheels, bearings, or any other component that can support brackets 402 on upper circular track 204 and lower circular track 206, while allowing first magnetic units 202 to move along upper circular track 204 and lower circular track 206. In other words, roller assemblies 404 allow first magnetic units 202 to rotate freely about circular track assembly 408.

[0063] In some embodiments, first magnetic units 202 are mounted to a mounting surface 406, rather than being coupled directed to upper circular track 204 and lower circular track 206, as shown in FIG. 4C. In some such embodiments, mounting surface 406 may be a plate (e.g., aluminum sheet metal) to which first magnetic units 202 may be bolted, welded, or otherwise secured. In the example shown, two of first magnetic units 202 are mounted on mounting surface 406, and mounting surface 406 is coupled to upper circular track 204 and lower circular track 206. In some embodiment, mounting surface 406 is directed coupled to upper circular track 204 and lower circular track 206 by welding, bolting, etc., such that first magnetic units 202 are fixed to circular track assembly 208, and circular track assembly 208 rotates about the axis of rotation. In other embodiment, mounting surface 406 is removably or movably (e.g., slidably) coupled to upper circular track 204 and lower circular track 206 such that first magnetic units 202 are free to rotate about to circular track assembly 208.

[0064] The present disclosure contemplates methods, systems, and program products on any machine-readable media for accomplishing various operations. The embodiments of the present disclosure may be implemented using existing computer processors, or by a special purpose computer processor for an appropriate system, incorporated for this or another purpose, or by a hardwired system. Embodiments within the scope of the present disclosure include program products comprising machine-readable media for carrying or having machine-executable instructions or data structures stored thereon. Such machine-readable media can be any available media that can be accessed by a general purpose or special purpose computer or other machine with a processor. By way of example, such machine-readable media can comprise RAM, ROM, EPROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to carry or store desired program code in the form of machine-executable instructions or data structures and which can be accessed by a general purpose or special purpose computer or other machine with a processor. When information is transferred or provided over a network or another communications connection (either hardwired, wireless, or a combination of hardwired or wireless) to a machine, the machine properly views the connection as a machine-readable medium. Thus, any such connection is properly termed a machine-readable medium. Combinations of the above are also included within the scope of machine-readable media. Machine-executable instructions include, for example, instructions and data which cause a general purpose computer, special purpose computer, or special purpose processing machines to perform a certain function or group of functions.

[0065] As utilized herein, the terms “approximately,” “about,” “substantially,” and similar terms are intended to have a broad meaning in harmony with the common and accepted usage by those of ordinary skill in the art to which the subject matter of this disclosure pertains. It should be understood by those of skill in the art who review this disclosure that these terms are intended to allow a description of certain features described and claimed without restricting the scope of these features to the precise numerical ranges provided. Accordingly, these terms should be interpreted as indicating that insubstantial or inconsequential modifications or alterations of the subject matter described and claimed are considered to be within the scope of the invention as recited in the appended claims.

[0066] It should be noted that the terms “exemplary” and “example” as used herein to describe various embodiments is intended to indicate that such embodiments are possible examples, representations, and/or illustrations of possible embodiments (and such term is not intended to connote that such embodiments are necessarily extraordinary or superlative examples).

[0067] The terms “coupled,” “connected,” and the like, as used herein, mean the joining of two members directly or indirectly to one another. Such joining may be stationary (e.g., permanent, etc.) or moveable (e.g., removable, releasable, etc.). Such joining may be achieved with the two members or the two members and any additional intermediate members being integrally formed as a single unitary body with one another or with the two members or the two members and any additional intermediate members being attached to one another.

[0068] References herein to the positions of elements (e.g., “top,” “bottom,” “above,” “below,” “between,” etc.) are merely used to describe the orientation of various elements in the figures. It should be noted that the orientation of various elements may differ according to other exemplary embodiments, and that such variations are intended to be encompassed by the present disclosure.

[0069] Also, the term "or" is used in its inclusive sense (and not in its exclusive sense) so that when used, for example, to connect a list of elements, the term "or" means one, some, or all of the elements in the list. Conjunctive language such as the phrase "at least one of X, Y, and Z," unless specifically stated otherwise, is otherwise understood with the context as used in general to convey that an item, term, etc. may be either X, Y, Z, X and Y, X and Z, Y and Z, or X, Y, and Z (i.e., any combination of X, Y, and Z). Thus, such conjunctive language is not generally intended to imply that certain embodiments require at least one of X, at least one of Y, and at least one of Z to each be present, unless otherwise indicated.

[0070] It is important to note that the construction and arrangement of the systems as shown in the exemplary embodiments is illustrative only. Although only a few embodiments of the present disclosure have been described in detail, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible (e.g., variations in sizes, dimensions, structures, shapes and proportions of the various elements, values of parameters, mounting arrangements, use of materials, colors, orientations, etc.) without materially departing from the novel teachings and advantages of the subject matter recited. For example, elements shown as integrally formed may be constructed of multiple parts or elements. It should be noted that the elements and/or assemblies of the components described herein may be constructed from any of a wide variety of materials that provide sufficient strength or durability, in any of a wide variety of colors, textures, and combinations. Accordingly, all such modifications are intended to be included within the scope of the present inventions. Other substitutions, modifications, changes, and omissions may be made in the design, operating conditions, and arrangement of the preferred and other exemplary embodiments without departing from scope of the present disclosure or from the spirit of the appended claims.

WHAT IS CLAIMED IS:

1. An assembly for generating electricity, the assembly comprising:

a circular track configured to rotate about a first axis of rotation, the circular track comprising a first magnet having a face that is at an angle with respect to the first axis of rotation;

a second magnet positioned at a center of the circular track, wherein a face of the second magnet is an opposite polarity to the face of the first magnet such that the second magnet repels the first magnet to rotate the circular track; and

a device for converting rotational motion from the circular track into electricity.

2. The assembly of Claim 1, the circular track further comprising a plurality of magnets in addition to the first magnet, wherein each of the plurality of magnets and the first magnet are equally spaced around the circumference of the circular track.

3. The assembly of Claim 1, further comprising a plurality of magnets in addition to the second magnet, wherein the plurality of magnets are stacked on a top side of the second magnet to increase a magnetic strength of the second magnet.

4. The assembly of Claim 1, wherein the second magnet is in the shape of a cone, a pyramid, a hemisphere, a conical frustum, or a cylinder.

5. The assembly of Claim 1, wherein the second magnet is formed by a plurality of magnets positioned on an outer surface of a support member, the support member in the shape of a cone, a pyramid, a hemisphere, a conical frustum, or a cylinder.

6. The assembly of Claim 1, wherein the first magnet is triangular in shape such that the face of the first magnet is at an angle with respect to the first axis of rotation and a side of the first magnet opposite the face is perpendicular to the first axis of rotation.

7. The assembly of Claim 1, further comprising one or more support members extending from the circular track to the second magnet to support the second magnet.

8. The assembly of Claim 1, further comprising a housing configured to enclose the circular track and the second magnet, wherein the housing is structured to maintain a vacuum.

9. The assembly of Claim 1, wherein the device for converting rotational motion from the circular track into electricity is an electromagnetic device comprising a rotor and a stator.

10. The assembly of Claim 1, further comprising a shaft extending from the device for converting rotational motion from the circular track into electricity to the circular track, the shaft defining the first axis of rotation.

11. The assembly of Claim 10, further comprising a gear set positioned between the device for converting rotational motion from the circular track into electricity and the shaft, the gear set configured to increase or decrease a rotational speed of the device according to one or more different gear ratios.

12. The assembly of Claim 1, wherein at least one of the first magnet or the second magnet are electromagnets, and wherein a portion of the electricity generated by the device for converting rotational motion from the circular track into electricity is utilized to power the at least one of the first magnet or the second magnet.

13. The assembly of Claim 12, wherein the circular track is constructed from a conductive material such that the portion of the electricity utilized to power the first magnet is provided to the first magnet via the circular track.

14. The assembly of Claim 1, the circular track assembly further comprising an upper track and a lower track, wherein the first magnet is positioned between the upper track and the lower track.

15. The assembly of Claim 14, wherein the lower track has a smaller radius than the upper track.

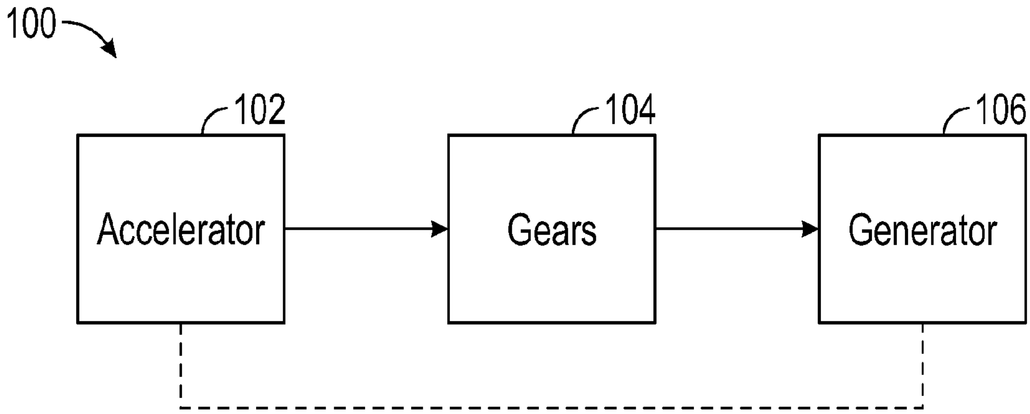
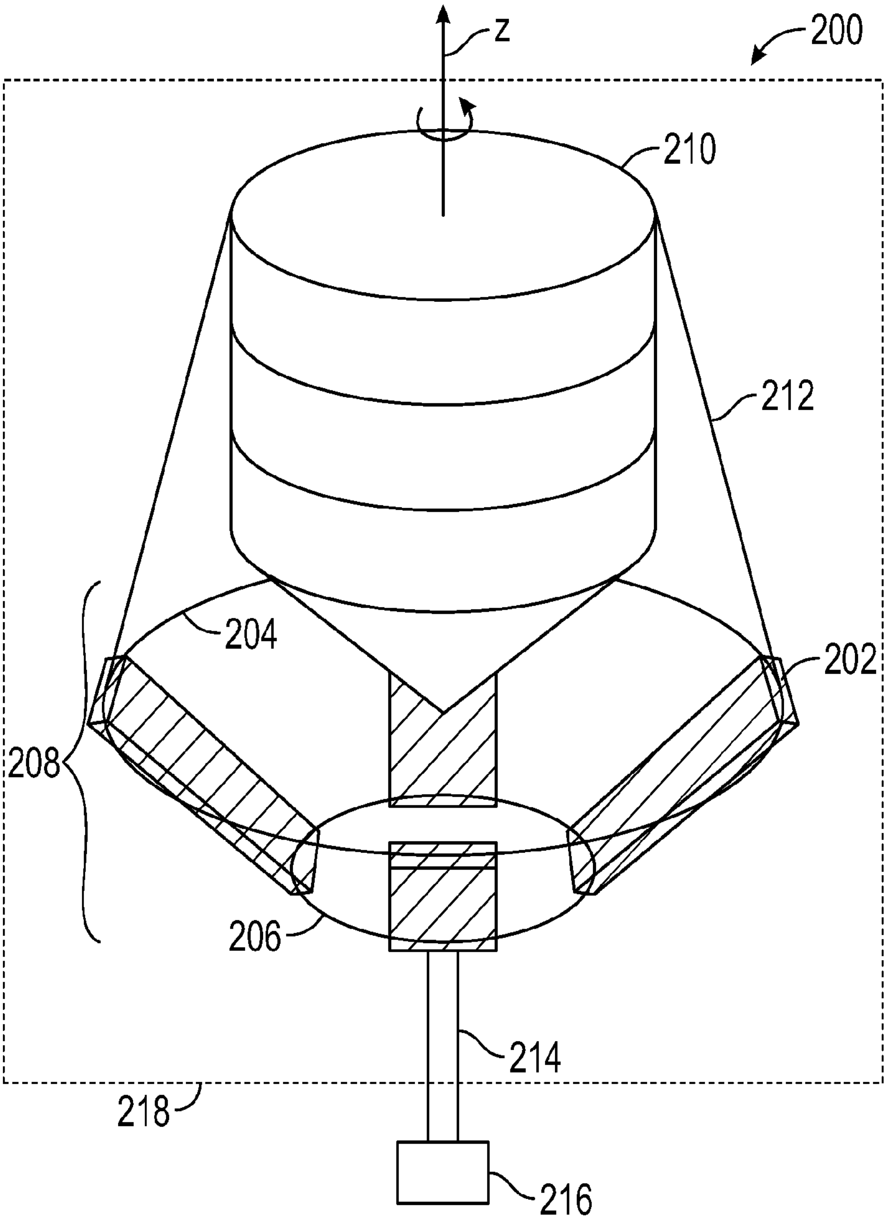

100
102
Accelerator
104
Gears
106
Generator

FIG. 1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216

FIG. 2

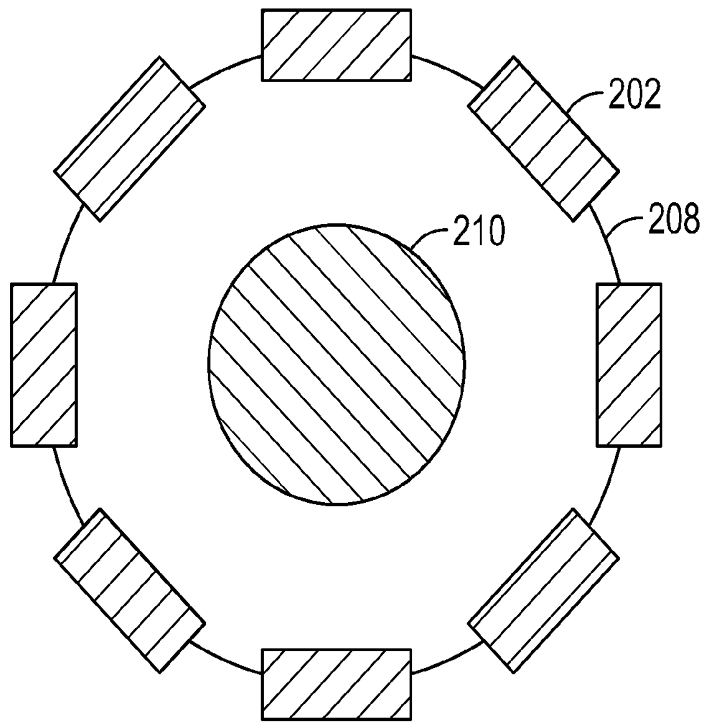

FIG. 3A

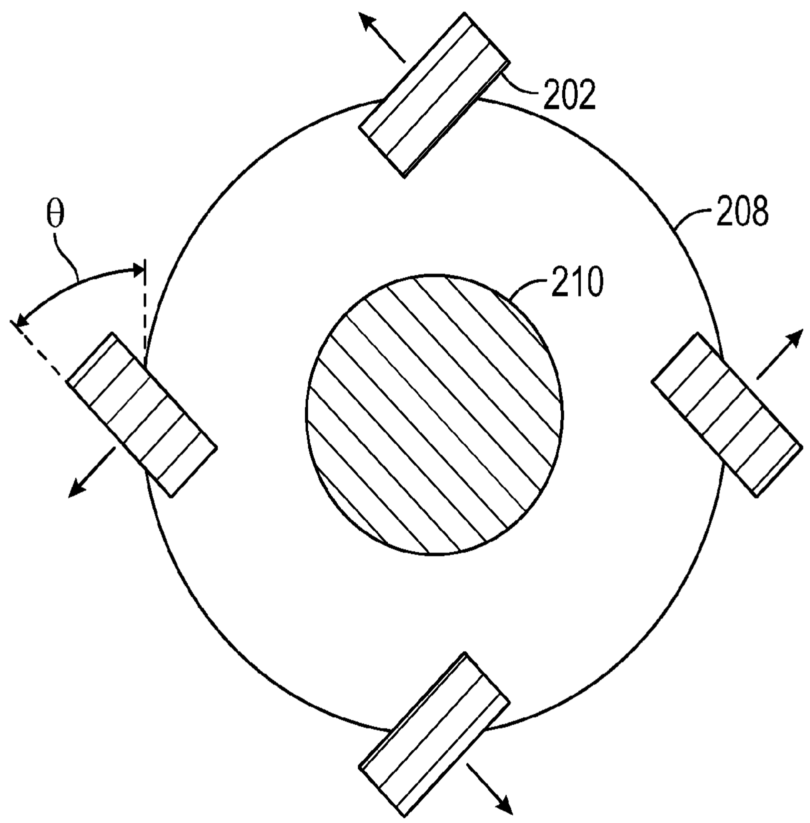

FIG. 3B

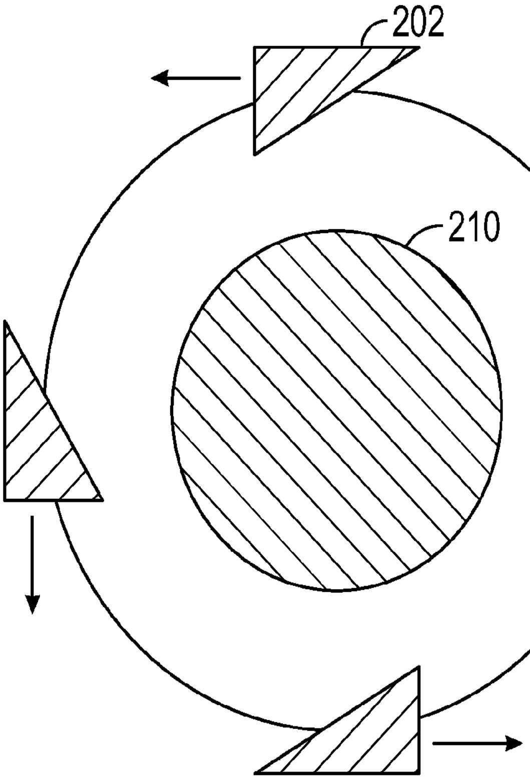

FIG. 3C

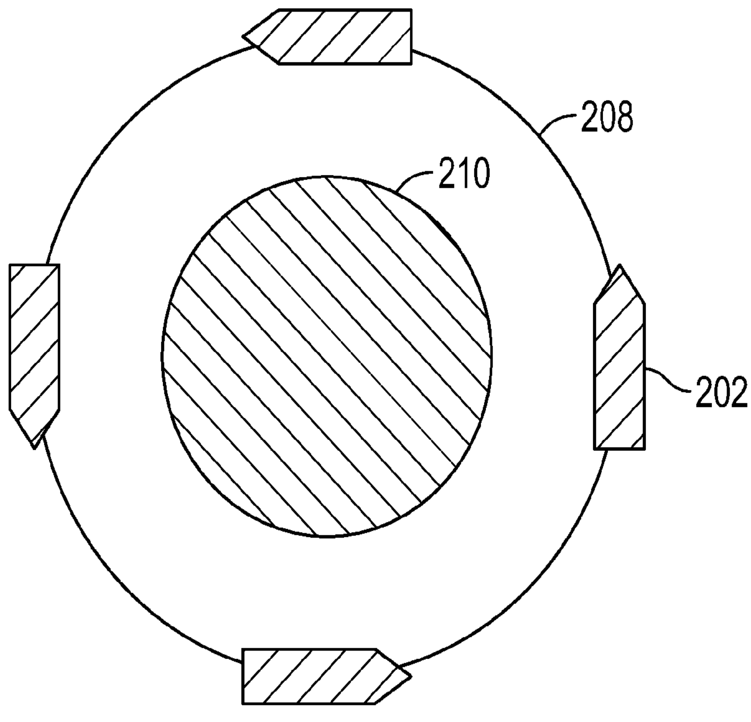

FIG. 3D

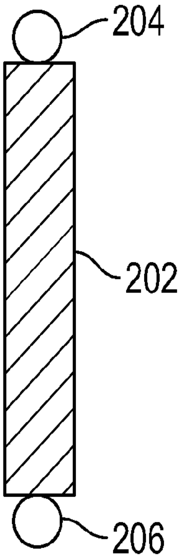

FIG. 4A

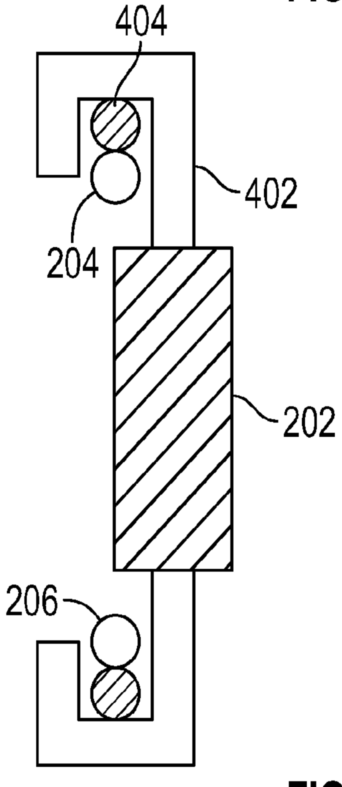

FIG. 4B

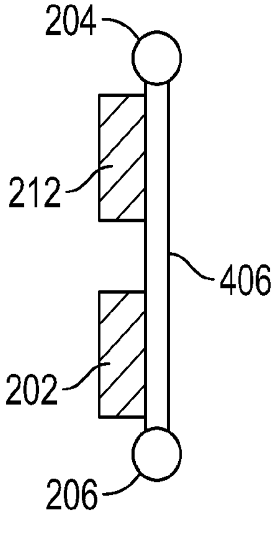

FIG. 4C

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 21/26021

A. CLASSIFICATION OF SUBJECT MATTER
IPC - H02K 5/00, H02K 5/16 (2021.01)

CPC - H02K 53/00, H02K 35/02, H02K 5/16, H02N 11/002, H02N 11/008, H02K 99/00, H02K 2201/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y --- A	US 8,810,050 B1 (REINER) 19 August 2014 (19.08.2014), Fig 1-4; col 2, ln 50-58; col 4, ln 2-3; col 3, ln 50-53; col 5, ln 50-61; col 6, ln 5-15, 29-31, 53-60	1, 2, 4-6, 10 --- 8, 9, 11, 12, 14 --- 3, 7, 13, 15
Y --- A	US 2018/0248459 A1 (AL-MAADHEEDI et al.) 30 August 2018 (30.08.2018), para [0007], [0030], [0039], [0042], [0048], [0068], [0069]. [0076]	8, 9, 11, 12 --- 13
Y --- A	US 2002/0167235 A1 (LONG) 14 November 2002 (14.11.2002), Fig. 4; para [0013], [0048]	14 --- 15
A	US 2013/0175890 A1 (ATWOOD) 11 July 2013 (11.07.2013), entire document	1-15
A	US 2019/0245423 A1 (WONG) 08 August 2019 (08.08.2019), entire document	1-15
A	US 2013/0257208 A1 (SAMUELS) 03 October 2013 (03.10.2013), entire document	1-15
A	US 2018/0262084 A1 (MCREYNOLDS) 13 September 2018 (13.09.2018), entire document	1-15
A	US 7,218,025 B1 (MCDONALD) 15 May 2007 (15.05.2007), entire document	1-15

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 June 2021	JUL 13 2021
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(72) Inventor; and
(71) Applicant : SAMUELS, Davian, A. [US/US]; 30 Nutmeg Lane, East Hartford, CT 06118 (US).

(74) Agent: PIETRANGELO, John; Tech Valley Patent, LLC, 499 Glen Street, Glens Falls, NY 12801 (US).

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Published:

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(54) **Title**: PERMANENT MAGNET ELECTRIC GENERATOR AND METHOD OF PRODUCING ELECTRICAL ENERGY

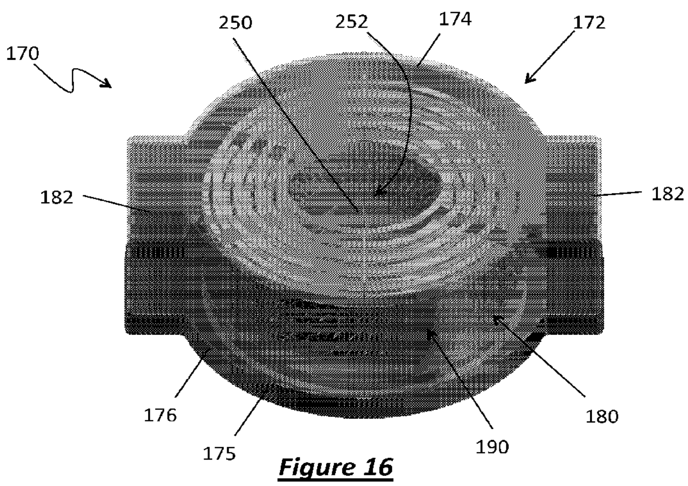


Figure 16

(57) **Abstract**: Permanent magnet electric generators (170) and methods of generating electrical energy are provided. The generators include two rack assemblies (186, 188) each including concentric circular cylindrical cores (221-228) having circular arrangements of permanent magnets (101, 131) and electrical conductors (104). The two rack assemblies (186, 188) are axially engaged wherein magnets of the concentric circular cylindrical cores repel adjacent magnets and thereby rotate the cylindrical cores. The rotation of the adjacent magnets in the cores induces an electric current within the electrical conductors (104), which can be extracted and used in a broad range of applications. Various mechanisms adapted to engage and disengage the two rack assemblies (186, 188) are provided, including the introduction of a vacuum (250) into the generator housing (172). Methods of generating electrical energy and electrical cores (100) having permanent magnets and conductors are also disclosed.

WO 2013/149242 A2

PERMANENT MAGNET ELECTRIC GENERATOR AND METHOD OF PRODUCING ELECTRICAL ENERGY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from pending U.S. Provisional Patent Application 61/618,537, filed on March 30, 2012, the disclosure of which is included by reference herein in its entirety.

BACKGROUND OF THE INVENTION

Technical Field

[0002] The present invention generally relates to electrical energy generation by employing the repulsive force of magnets. More particularly, the present invention relates to devise and method for generating electrical energy through the repulsive forces of permanent magnets arranged in multiple circular arrays of cooperating to generate electrical current in conductors positioned within the circular arrays of permanent magnets.

Description of Related Art

[0003] Alternative sources of energy, specifically alternative source of electric power, have long been sought in attempts to address the ever increasing demand for power and the ever diminishing supply of fossil fuels. One potential source of electric power that has been investigated by others includes the use of the repulsive forces of magnets to generate electrical energy. One result of these investigations is the known as the “Searl Effect Generator.” Invented in the 1940s, the Searle Effect Generator employs magnets to generate electric current, but has achieved limited acceptance in the art. Another attempt to generate electrical energy using magnets is represented what is know as the “Perendev motor,” which also has achieved limited acceptance the art.

[0004] In response to this need, the present invention was conceived and developed. The present invention overcomes the limitations of the prior art and provides electrical generators and methods for generating electrical energy.

SUMMARY OF THE INVENTION

[0005] Aspects of the present invention provide sustainable sources of electric power, for example, for vehicles, robotics, mobile devices, and electronics, among other uses. According to aspects of the invention, the repulsive forces of magnets, in particular, of permanent magnets, are used to rotate magnets and conductive coils to induce electric current. The magnets and conductive coils are positioned and oriented within rotatable cylinders, or “cores,” to enhance the generation and extraction of electric current.

[0006] One embodiment of the invention is a permanent-magnet electric generator comprising or including a first rack assembly comprising a plurality of first concentric circular cylindrical cores, each of the plurality of the first circular cylindrical cores mounted for rotation and comprising or including a plurality of circular arrangements of permanent magnets, the plurality of circular arrangements of permanent magnets spaced at a plurality of elevations within each first circular cylindrical core; and a plurality of electrical conductors, each of the plurality of conductors positioned about at least some of the plurality of the permanent magnets of the curricular arrangement of permanent magnets; a second rack assembly comprising a plurality of second concentric circular cylindrical cores, each of the plurality of the second circular cylindrical cores radially spaced from each of the plurality of the first circular cylindrical cores and comprising or including a plurality of circular arrangements of permanent magnets, the plurality of circular arrangements of permanent magnets spaced at a plurality of elevations within each second circular cylindrical core; and a plurality of electrical conductors, each of the plurality of conductors positioned about at least some of the plurality of the permanent magnets of the curricular arrangement of permanent magnets; and means for axially engaging the plurality of first concentric circular cylindrical cores of the first rack assembly with the plurality of second concentric circular cylindrical cores of the second rack assembly, wherein at least some of the permanent magnets of the plurality of first circular cylindrical cores of the first rack assembly are repelled by at least some of the permanent magnets of the plurality of second circular cylindrical cores of the second rack assembly wherein each of the first circular cylindrical cores is rotated and an electric current is generated within the plurality of electrical conductors in each of the first circular cylindrical cores and an electric current is generated within the plurality of electrical conductors in each of the second circular cylindrical cores.

[0007] In one aspect, the permanent magnets of the plurality of circular arrangements of first rack assembly and the permanent magnets of the plurality of circular arrangements of second rack assembly comprise spherical permanent magnets. In another aspect, the permanent magnets of the plurality of circular arrangements of first rack assembly and the permanent magnets of the plurality of circular arrangements of second rack assembly comprise rare-earth permanent magnets.

[0008] In another aspect, the plurality of first concentric circular cylindrical cores of the first rack assembly and the plurality of second concentric circular cylindrical cores of the second rack assembly each comprise at least three concentric circular cylindrical cores. In another aspect, the plurality of elevations within each first circular cylindrical core and the plurality of elevations within each second circular cylindrical core comprise at least three elevations.

[0009] In another aspect, the plurality of first concentric circular cylindrical cores and the plurality of second concentric circular cylindrical cores each comprise electrically conductive bearings, and wherein the plurality of electrical conductors in each of the first circular cylindrical cores and the plurality of electrical conductors in each of the second circular cylindrical cores are in electrical communication with the electrically conductive bearings. For example, in another aspect, the electrical generator further comprises an upper bearing rack adapted to engage the electrically conductive bearings, and a lower bearing rack adapted to engage the electrically conductive bearings.

[0010] In a further aspect, the electric generator further comprises a housing enclosing the first rack assembly and the second rack assembly. The housing may comprise a top enclosure and a bottom enclosure and a top enclosure, the bottom enclosure and the top enclosure may be adapted for relative translation.

[0011] In another aspect, the electric generator may further comprise a vacuum pump adapted to generate a sub-atmospheric pressure within the housing.

[0012] Another embodiment of the invention is a method of producing electrical energy comprising or including: providing a first rack assembly comprising a plurality of first concentric circular cylindrical cores, each of the plurality of the first circular cylindrical cores mounted for rotation and comprising or including a plurality of circular arrangements of permanent magnets, the plurality of circular arrangements of permanent magnets spaced at a plurality of elevations within each first circular cylindrical core; and a plurality of electrical conductors, each of the plurality of conductors positioned about at least some of the plurality of the permanent magnets of the curricular arrangement of permanent magnets; providing a second rack assembly comprising a plurality of second concentric circular cylindrical cores, each of the plurality of the second circular cylindrical cores radially spaced from each of the plurality of the first circular cylindrical cores and comprising or including: a plurality of circular arrangements of permanent magnets, the plurality of circular arrangements of permanent magnets spaced at a plurality of elevations within each second circular cylindrical core; and a plurality of electrical conductors, each of the plurality of conductors positioned about at least some of the plurality of the permanent magnets of the curricular arrangement of permanent magnets; and axially engaging the plurality of first concentric circular cylindrical cores of the first rack assembly with the plurality of second concentric circular cylindrical cores of the second rack assembly, wherein at least some of the permanent magnets of the plurality of first circular cylindrical cores of the first rack assembly are repelled by at least some of the permanent magnets of the plurality of second circular cylindrical cores of the second rack assembly wherein each of the first circular cylindrical cores is rotated and an electric current is generated within the plurality of electrical conductors in each of the first circular cylindrical cores and an electric current is generated within the plurality of electrical conductors in each of the second circular cylindrical cores.

[0013] In one aspect, the method may further comprise or include positioning the first rack assembly into a top enclosure and positioning the second rack assembly into a bottom enclosure, the bottom and top enclosures relatively translatable and wherein axially engaging the plurality of first concentric circular cylindrical cores of the first rack assembly with the plurality of second concentric circular cylindrical cores of the second rack assembly comprises translating the top enclosure relative to the bottom enclosure.

[0014] In another aspect, the bottom and top relatively translatable enclosures may include an air tight seal there between; wherein the method further comprises generating a sub-atmospheric pressure within the housing wherein the bottom and top relatively translatable enclosures translate under atmospheric pressure to axially engage the plurality of first concentric circular cylindrical cores with the plurality of second concentric circular cylindrical cores.

[0015] A further embodiment of the invention is an electrical core element comprising or including at least one circular arrangement of permanent magnets; a plurality of electrical conductors passing in proximity with at least some of the permanent magnets; and a housing adapted to retain each of the permanent magnets in the arrangement of permanent magnets in a predetermined position. In one aspect, the housing may further be adapted to retain the plurality of electric conductors in a predetermined position. In another aspect, the housing may be further adapted to retain each of the permanent magnets in a predetermined orientation. In one aspect, the predetermined orientation may comprise orienting a pole of each of the permanent magnets radially within the at least one circular arrangement. In another aspect, the at least one circular arrangement of permanent magnets may comprise a plurality of spaced circular arrangements of permanent magnets. For example, in one aspect, the at least one circular arrangement of permanent magnets may comprise at least one circular arrangement of permanent rare-earth magnets.

[0016] These and other aspects, features, and advantages of this invention will become apparent from the following detailed description of the various aspects of the invention taken in conjunction with the accompanying drawings

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The subject matter, which is regarded as the invention, is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other objects, features, and advantages of the invention will be readily understood from the following detailed description of aspects of the invention taken in conjunction with the accompanying drawings in which:

[0018] FIGURE 1 is a schematic diagram of the interaction of two permanent magnets according to an aspect of the invention.

[0019] FIGURE 2 is a schematic diagram of the interaction of a plurality of permanent magnets shown in FIGURE 1 according to an aspect of the invention.

[0020] FIGURE 3 is a schematic diagram of a plan view of three rings of permanent magnets according to an aspect of the invention.

[0021] FIGURE 4 is a schematic diagram of an elevation view of two sets of three rings of permanent magnets shown in FIGURE 4 according to an aspect of the invention.

[0022] FIGURE 5 is a schematic diagram of an elevation view of three sets of three rings of permanent magnets shown in FIGURE 4 according to an aspect of the invention.

[0023] FIGURE 6 is an elevation view of three sets of rings of permanent magnets with conductors according to an aspect of the invention.

[0024] FIGURE 7 is a perspective view of three sets of rings of permanent magnets shown in FIGURE 6.

[0025] FIGURE 8 is a perspective view of a circular core having permanent magnets with conductors according to another aspect of the invention.

[0026] FIGURE 9 is a perspective view, partially in cross section, of the circular core shown in FIGURE 8.

[0027] FIGURE 10 is a detailed view of the cross section of the core shown in FIGURE 9 identified by Detail 10 in FIGURE 9.

[0028] FIGURE 10A is a detailed view of the cross section of the core shown in FIGURE 10 identified by Detail 10A in FIGURE 10.

[0029] FIGURE 11 is a detailed view of the cross section of the core shown in FIGURE 9 identified by Detail 11 in FIGURE 9.

[0030] FIGURE 11A is a detailed view of the cross section of the core shown in FIGURE 11 identified by Detail 11A in FIGURE 11.

[0031] FIGURE 12 is a detailed view of the cross section of the core shown in FIGURE 9 identified by Detail 10 in FIGURE 9, according to another aspect of the invention.

[0032] FIGURE 12A is a detailed view of the cross section of the core shown in FIGURE 12 identified by Detail 12A in FIGURE 12.

[0033] FIGURE 13 is a detailed view of the cross section of the core shown in FIGURE 9 identified by Detail 11 in FIGURE 9, according to another aspect of the invention.

[0034] FIGURE 13A is a detailed view of the cross section of the core shown in FIGURE 13 identified by Detail 13A in FIGURE 13.

[0035] FIGURE 13B is an elevation view of the magnet shown in FIGURES 10 through 13A according to aspects of the invention.

[0036] FIGURE 13C is an exploded view of the magnet shown in FIGURE 13B.

[0037] FIGURE 14 is a perspective view of a core or ring assembly having multiple cores or rings according to one aspect of the invention.

[0038] FIGURE 15 is an exploded perspective view of the core assembly shown in FIGURE 14.

[0039] FIGURE 16 is a top perspective view of an electric generator encompassing aspects of the present invention, having a core assembly in an “engaged” position.

[0040] FIGURE 16A is a bottom perspective view of the electric generator shown in FIGURE 16, having the core assembly in an “unengaged” position.

[0041] FIGURE 17 is an exploded perspective view of the generator shown in FIGURES 16 and 16A.

[0042] FIGURE 18 is an exploded perspective view of the bearing and core assembly shown in FIGURE 17.

[0043] FIGURE 19 is a perspective view of a top bearing rack shown in FIGURE 18 according to an aspect of the invention.

[0044] FIGURE 20 is a perspective view of a lower bearing rack shown in FIGURE 18 according to an aspect of the invention.

[0045] FIGURE 21 is a cross sectional view of a portion of a typical rack core assembly and top bearing rack, prior to engagement, according to one aspect of the invention.

[0046] FIGURE 22 is a cross sectional view, similar to FIGURE 21, of a portion of a typical rack core assembly and top bearing rack, after engagement, according to one aspect of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0047] FIGURE 1 is a schematic diagram 10 of the interaction of two permanent magnets 12, 14 according to an aspect of the invention. Though according to aspect of the invention permanent magnets 12, 14 may take any convenient shape, in the aspect shown in FIGURE 1, magnets 12, 14, are shown as spherical magnets having positive poles, N, and negative poles, S, defining magnetic field vectors B_1 and B_2, respectively, designated by arrows 16 and 18, respectively in FIGURE 1. FIGURE 1 also includes electrical conductors 20, 22 (for example, copper wires) mounted about magnets 12 and 14 and carrying electrical currents I_1 and I_2, respectively, generated, for example, by the relative movement of magnets 12 and 14 and their respective magnetic fields B_1 and B_2, though for the arrangement shown in FIGURE 1, currents I_1 and I_2 may be limited or non-existent for the relative motion of magnets 12 and 14 shown in FIGURE 1. As is conventional in the art, the flow of currents I_1 and I_2 through electrical conductors 20 and 22, respectively, is represented by arrow heads (dots) and arrow tails (Xs) in FIGURE 1 where current flow in the direction from the arrow tails to the arrow heads.

[0048] As shown in FIGURE 1, and as is typical of many aspects of the invention disclosed herein, magnets 12 and 14 are arranged whereby similar poles for each magnet 12 and 14 are positioned adjacent to each other. For example, as shown in FIGURE 1, the “positive” or N pole of magnet 14 is positioned adjacent to the “positive” or N pole of magnet 12, whereby the “like poles” repel each other. (It will be understood by those in the art, that “positive” or N pole designation is a convention shown for illustrative purposes where the “negative” or S poles of magnets 12 and 14 may be positioned adjacent to each other and provide the “like poles” that repel each other.) In FIGURE 1, the electrostatic repulsive force between magnets 12 and 14, for the sake of illustration, is represented by a force F_2 on magnet 14 as magnet 14 is repelled from magnet 12. (It will be understood by those in the art that force F_2 on magnet 14 will be equal and opposite to a repulsive force on magnet 12, but, again, the force F_2 on magnet 14 is shown and used for illustrative purposes.) This repulsive force F_2 and its influence upon magnets, such as, magnet 14, will be a common and recurring phenomenon in aspects of the invention disclosed herein.

[0049] FIGURE 2 is a schematic diagram 30 of the interaction of a plurality of permanent magnets similar to magnets 12 and 14 shown in FIGURE 1 according to an aspect of the invention. As shown in FIGURE 2, three sets of magnets 32, 34, and 36 are positioned on radii R_1, R_2, and R_3, respectively, where $R_1 > R_2 > R_3$, in which like poles are positioned adjacent to each other in adjacent sets 32, 34, and 36 of magnets. For example, like positive or N poles are positioned adjacent to magnets in sets 32 and 34, and like negative or S poles lie adjacent in sets 34 and 36. Accordingly, the magnets in set 34 experience repulsive forces 38 due to magnets in set 32, and the magnets in set 36 experience repulsive forces 40 due to magnets in set 34.

[0050] As also shown in FIGURE 2, the positioning of magnets in sets 32, 34, and 36 is arranged so that the repulsive forces 38 and 40 are directed at an angle α between a radial direction 42 and the direction 44 of forces 38 and 40. Accordingly, according to one aspect of the present invention, the repulsive forces 38 and 40 generate a twist or torque (T), represented by arrow 46 in FIGURE 2, upon the collective magnets in sets 34 and 36. The effective of this resulting torque will be discussed further below.

[0051] In a fashion similar to the illustration of conductors 20 and 22 in FIGURE 1, FIGURE 2 illustrates the presence of conductors 47, 48, and 49 about magnets in FIGURE 2. According to aspects of the invention, conductors 47 about one or more magnets in set of magnets 32 at radius R_1 may carry a current, I_1, for example, substantially the same current or a different current. Similarly, conductors 48 about one or more magnets in set of magnets 34 at radius R_2 may carry a current, I_2, and conductors 49 about one or more magnet in set of magnets 36 at radius R_3 may carry a current, I_3. Again, the current in conductors 48 may be substantially the same or vary and the current in conductors 49 may be the substantially the same or vary. In one aspect, each of the plurality of conductors 47, 48, or, 49 may comprise a single continuous conductor within each set of magnets 32, 34, and 36, such as, a copper wire, and transmit substantially the same current through each set of magnets 32, 34, and 36 (with account for current losses through the conductor). The currents I_1, I_2, and I_3, may typically vary, but may be substantially the same.

[0052] In one aspect, the currents I_1, I_2, I_3,...in conductors 47, 48, 49, and those conductors not shown, may be induced by the relative motion of adjacent magnets. For example, the current I_1 may be induced by the movement of the magnets in set of magnets 34 and/or 36 relative to the magnets in set of magnets 32. Also, the current I_2 may be induced by the movement of the magnets in set of magnets 34 and/or 36 relative to the magnets in set of magnets 32. In addition, the current I_3 may be induced by the movement of the magnets in set of magnets 36 and/or magnets in one or more sets of magnets positioned at radii less than R_3 relative to the magnets in set of magnets 32 and/or 34 and/or 36. Other sources of induced current in conductors 47, 48, and 49 due to the relative movement of magnets will be apparent to those of skill in the art.

[0053] FIGURE 3 is a schematic diagram 50 of a plan view of three rings of permanent magnets 52, 54, and 56, similar to magnets 12 and 14 shown in FIGURE 1, arranged in a fashion similar to sets of magnets 32, 34, and 36 shown FIGURE 2 at varying radii, according to an aspect of the invention. In FIGURE 3 and in other figures disclosed herein, like poles of magnets are represented by like shading. For example, the shaded hemispheres of magnets in FIGURE 3 represent N (or S) poles of the magnets shown. Conductors similar to conductors 47, 48, and 49 shown in FIGURE 2 are omitted for the sake of clarity of illustration in FIGURE 3 (and in FIGURES 4 and 5), but are typically present according to aspects of the invention. Again, due to the positioning of the magnets in rings 52, 54, and 56 and the direction of the resulting repulsive forces upon the magnets in rings 52 and 56, a resulting torque, represented by arrow 58, is produced upon the collective magnets in rings 54 and 56.

[0054] FIGURE 4 is a schematic diagram of an elevation view of an arrangement 60 of two sets 62 and 64 of three rings 52, 54, and 56 of permanent magnets shown in FIGURE 3 according to an aspect of the invention. (Again, conductors typically present are omitted in FIGURE 4 for clarity.) In this aspect, sets 62 and 64 may typically be spaced, for example, vertically spaced, at a distance 66. According to aspects of the invention, sets 62 and 64 of arrangement 60 may include one or more, or two or more rings, or three or more rings 52, 54, and 56 of magnets.

[0055] FIGURE 5 is a schematic diagram of an elevation view of an arrangement 70 of three sets 72, 74, and 76 of three rings 52, 54, and 56 of permanent magnets shown in FIGURE 3 according to an aspect of the invention. (Again, conductors typically present are omitted in FIGURE 5 for clarity.) In this aspect, sets 72, 74, and 76 may typically be spaced, for example, vertically spaced, at distances 77 and 78, distances that may be equal or may vary. Again, according to aspects of the invention, sets 72, 74, and 76 of arrangement 70 may include one or more, two or more, or three or more rings 52, 54, and 56 of magnets. In other aspects, three or more sets 72, 74, and 76 may be provided, for example, four or more sets, six or more sets, or eight or more sets 72, 74, and 76 of magnets may be provided.

[0056] It will be apparent to those of skill in the art, that the arrangements 60 and 70 of permanent magnets shown in FIGURES 4 and 5 will typically increase the magnitude of the torque that can be generated according to aspects of the invention, for example, compared to the torque 58 that can be generated by a single set of magnets shown in FIGURE 3.

[0057] As also shown in FIGURE 5, magnets in sets of magnets 72, 74, and 76 in arrangement 70 may be "off set" or vertically off set or misaligned as indicated by the angle β in FIGURE 5 between sets 72, 74, and 76. According to this aspect of the invention, the off set angle β may limit or prevent the alignment of magnets in adjacent rings of magnets and limit or prevent the likelihood of magnetic "lock up" between adjacent magnets. According to this aspect, the off setting of magnets helps to ensure that at least some relative motion of magnets and their associated housings is maintained.

[0058] FIGURE 6 is a schematic diagram of an elevation view of an arrangement 80 of three sets 82, 84, and 86 of rings 91, 92, 93, 94, and 95 of individual permanent magnets 81, similar to that shown in FIGURE 5, according to an aspect of the invention. In the aspect shown in FIGURE 6, conductors 83 encircle the magnets in set 82; conductors 85 encircle the magnets in set 84; and conductors 87 encircle the magnets in set 86. Though not shown in FIGURE 6, arrangement 80 may typically include one (1) or more, two (2) or more, or three (3) or more rings 91, 92, 93, 94, and 95 of magnets 81 in each set of magnets, 82, 84, and 86, for example, 6 or more rings, or 8 or more rings of magnets 81 positioned at varying radii.

[0059] FIGURE 7 is a perspective view of the arrangement 80 of the three sets 82, 84, and 86 of rings 91, 92, 93, 94, and 95 of permanent magnets 81 with conductors 83 shown in FIGURE 6. Again, in the aspect shown in FIGURE 7, conductors 83 encircle the magnets 81 in set 82; conductors 85 encircle the magnets 81 in set 84; and conductors 87 encircle the magnets 81 in set 86. As shown in FIGURE 7, in this aspect, each set of rings 82, 84, and 86 in arrangement 80 may include one (1) or more, two (2) or more, or three (3) or more rings 91, 92, 93, 94, and 95 of varying radii of individual magnets 81.

[0060] As also shown in FIGURE 7, according to aspects of the invention, conductors 83, 85, and 87 about magnets 81 may include one or more continuous conductors, such as, copper wire, that may pass about magnets 81 and lead to external loads or storage. For example, as shown in FIGURES 6 and 7, the current induced in conductors 83,85, and 87 may be carried to output conductors 96, 97, and 98. Output conductors 96, 97, and 98 are typically in electrical communication with other conductors or conductive structures (see the discussion of conductive bearings below) to carry the induced current to external loads or storage (or for re-us). Output conductors 96, 97, and 98, may comprise one or more conductors and may be evenly distributed about rings 91, 92, 93, 94, and 95 of arrangement 80.

[0061] According to one aspect of the invention, due to the varying polarity of magnets 81 in arrangement 80, the flow of current induced in conductors 83, 85, and 87 may vary in direction between each ring 91, 92, 93, 94, and 95. According to aspects of the invention, the flow of current in any ring 91-95 may be from the top of the ring to the bottom of the ring or from the bottom of the ring to the top of ring, for example, via output conductors 96, 97, and 98, depending, for example, on the direction of polarity of the magnets in the ring and the relative motion of magnets 81.

[0062] FIGURE 8 is a perspective view of a circular cylindrical core 100 having permanent magnets 101 with conductors 104 according to another aspect of the invention. Core 100 is representative of the multiple cores of varying diameter and function that characterize aspects of the present invention. As shown in FIGURE 8, core 100 includes a housing or retainer 102 adapted to retain magnets

101 and conductors 104. In one aspect, housing or retainer 102 may also be adapted to orient magnets 101 in predetermined orientation, for example, with a pole of magnets 101 directed radially at an angle offset from a truly radial direction (that is, in a direction substantially directed toward the theoretical center of the circle defined by the circular arrangement 106, 108, or 110 of magnets 101). In the rendering of housing 102 shown in FIGURE 8, housing 102 is shown somewhat transparent to assist in illustrating aspects of the invention.

[0063] As shown in FIGURE 8, permanent magnets 101 may typically be arranged in spaced circular arrangements 106, 108, and 110, for example, in a fashion similar to arrangements 62, 64, 66, 72, 74, 76, 82, 84, and 86 described above. Permanent magnets 101, and any and all permanent magnets disclosed herein, may typically be any conventional permanent magnet, for example, a rare earth magnet as known in the art, for example, neodymium rare-earth magnets or samarium-cobalt rare-earth magnets, or their equivalent. Circular arrangements 106, 108, and 110 may be spaced, for example, axially spaced, at distances 112 and 114, which may be substantially the same or may vary. Though three (3) circular arrangements 106, 108, 110 of magnets 101 are shown in FIGURE 8; however, according to aspects of the invention, core 100 may comprise one (1) or more arrangements 106 or two (2) or more arrangements 106, 108, or three (3) or more arrangements 106, 108, 110 of magnets 101.

[0064] As also shown in FIGURE 8, as discussed previously with respect to FIGURE 5, magnets in circular arrangements 106, 108, and 110 may be "off set" as indicated by the angle β in FIGURE 8. Again, this offset angle β may limit or prevent the likelihood of magnetic "lock up" between adjacent magnets. In one aspect, the angle β may range from about 1 degree to about 20 degrees, for example, from about 5 degrees to about 10 degrees.

[0065] The conductors 104 in core 100 may comprise one or more electrical conductors positioned about magnets 101 as described and illustrated in Figures 1-7. For example, conductors 104, and any and all of the conductors disclosed herein, may comprise metallic wire, for instance, coated or uncoated metallic wire, single strand or multiple-strand metallic wire, such as, braided wire. The metallic wire of conductors 104 may typically comprise copper wire, but may also be steel, aluminum, titanium, nickel, brass, bronze, silver, or even gold wire, among other conducting materials.

[0066] Though housing 102 may comprise a transparent or a translucent material, housing 102 typically comprises an opaque material. According to aspects of the invention, housing 102 may comprise a non-ferromagnetic material, for example, a non-ferromagnetic metal, such as, an aluminum or a titanium. However, in one aspect, housing 104 also may comprise a non-electrical conducting material, for example, a plastic, rubber, a ceramic, a glass, or even wood. In one aspect, housing 102 may be fabricated from one or more of the following plastics: a polyamide (PA), for example, nylon; a polyethylene (PE); a polypropylene (PP); a polyester (PE); a polytetraflouroethylene (PTFE); an acrylonitrile butadiene styrene (ABS); a polycarbonate (PC); or a polyvinylchloride (PVC), among other plastics. In one aspect, housing 102 is preferably thermally resistant, for example, capable of withstanding temperatures of at least 100 degrees C without deforming or otherwise losing its structural integrity. In one aspect, housing 102 may be fabricated from temperate resistant polyethylene, for example, a High Molecular Weight (HMW) polyethylene, or its equivalent.

[0067] In one aspect, the core or core element 100 shown in FIGURE 8 (and any cores or core elements disclosed herein) may comprise an electrical generator core element or an electrical motor core element. In addition, the core or core element 100 shown in FIGURE 8 (and any cores or core elements disclosed herein) may comprise a stator or a rotor of a generator or a motor.

[0068] FIGURE 9 is a perspective view, partially in cross section, of core 100 shown in FIGURE 8. FIGURE 9 identifies a typical circumferential cross section of core 100 by Detail 10 and identifies a typical axial cross section of core 100 by Detail 11.

[0069] FIGURE 10 is a detailed view of the circumferential cross section of the core 100 shown in FIGURE 9 identified by Detail 10 in FIGURE 9. FIGURE 11 is a detailed view of the axial cross section of the core shown in FIGURE 9 identified by Detail 11 in FIGURE 9. As shown in FIGURE 10, housing 102 of core 100 may comprise multiple components, rings, or spacers, for example, housing rings 116, 118, 120, and 122. Housing rings 116, 118, 120, and 122 typically contain recesses or cavities 124 adapted to retain magnets 101, for example, retain magnets 101 in a desired orientation. For example, as shown in FIGURE 10 housing rings 116, 118, 120, and 122 my contain recesses 125 in mating surfaces 126, for example, semi-circular or elliptical recesses 125, that cooperate to define cavities 124 and retain magnets 101. FIGURE 10A is a detailed view of the circumferential cross section of the core 100 shown in FIGURE 10 identified by Detail 10A in FIGURE 10 illustrating a detail of one cavity 124 that can be used to retain magnets 101 according to an aspect of the invention.

[0070] As shown most clearly in FIGURE 11, housing rings 116, 118, 120, and 122 are also adapted to retain and position conductors 104, for example, in predetermined positions in housing 102. As shown in FIGURE 11, in one aspect, conductors my loop about or follow a helical path about magnets 101. In one aspect conductors 104 may be inserted through cavities in housing 102 or may be molded into position in housing 102 when rings 116, 118, 120, and 122 are fabricated. As shown in FIGURE 11, the conductors 104 may protrude through the external surfaces of rings 116, 118, 120, and 122; however, in one aspect, conductors 104 may not protrude from the rings, but may be encased within rings 116, 118, 120, and 122.

[0071] FIGURE 11A is a detailed view of the axial cross section of the core 100 shown in FIGURE 11 identified by Detail 11A in FIGURE 11. FIGURE 11A illustrates the detail of one cavity 124 that can be used to retain magnets 101 according to an aspect of the invention. FIGURE 11A also illustrates a typical orientation of magnet 101 in housing 102 according to one aspect of the invention. As noted above in FIGURE 2, according to aspects of the invention, the direction of the magnetic pole of magnets 101, represented by dashed line 128 in FIGURE 11A (either the N or S pole), is directed at an angle α to the radial direction of the arrangement of magnets 101 (typically, the radial direction of the circular cylindrical housing 102), represented by dashed line 130 in FIGURE 11A. In one aspect, the angle α may range from about 30 degrees to about 60 degrees, for example, from about 40 degrees to about 50 degrees. In one aspect, angle α may be about 45 degrees.

[0072] Housing rings 116, 118, 120, and 122 may be assembled into housing 102 by any conventional means, for example, by mechanical fasteners, soldering, brazing, welding, or an adhesive. In addition, magnets 101 may be retained in the recesses 126 in housing rings 116, 118, 120, and 122 by friction, by compression upon magnets 122, by an adhesive, or mechanically, for example, by means of a recess and a projection between cooperating surfaces, for example, a projection on magnets 101 and a mating recess in housing 102.

[0073] FIGURE 12 is a detailed view of the circumferential cross section of the core 100 shown in FIGURE 9 identified by Detail 10 in FIGURE 9, similar to FIGURE 10, according to another aspect of the invention. FIGURE 13 is a detailed view of the axial cross section of the core 100 shown in FIGURE 9 identified by Detail 11 in FIGURE 9, similar to FIGURE 11, according to another aspect of the invention. The aspects of the invention shown in FIGURES 12 and 13 include all the features and characteristics shown in FIGURES 10 and 11; however, the magnets 131 shown in FIGURES 12 and 13 include magnetic field concentrators, or magnetic shields, 133. In this aspect, shields 133 about magnets 131 function to collect and concentrate the magnetic flux of the magnetic field about magnets 131, for example, to enhance the current inducing effect of the relative movement of magnets 131 in adjacent cores. In one aspect, magnetic field concentrators may be made from a material having high magnetic permeability, for example, a conventional shield material.

[0074] As shown in FIGURE 12, housing 102 of core 100 may comprise multiple components or ring sub-assemblies, for example, housing rings 116, 118, 120, and 122, having recesses 135 in mating surfaces 136 defining cavities 134, in a manner similar that shown and described in FIGURES 10 and 10A.

[0075] FIGURE 13A is a detailed view, similar to FIGURE 11A, of the axial cross section of the core 100 shown in FIGURE 13 identified by Detail 13A in FIGURE 13. FIGURE 13A illustrates the detail of one cavity 135 that can be used to retain magnets 131 according to an aspect of the invention. FIGURE 13A also illustrates a typical orientation of magnet 131 in housing 102 according to one aspect of the invention. As noted above in FIGURE 2, according to aspects of the invention, the direction of the magnetic pole of magnets 131, represented by dashed line 138 in FIGURE 13A (either the N or S pole), is directed at an angle α to the radial direction of the arrangement of magnets 131 (typically, the radial direction of the circular cylindrical housing 102), represented by dashed line 140 in FIGURE 13A. In one aspect, the angle α may range from about 30 degrees to about 60 degrees, for example, from about 40 degrees to about 50 degrees. In one aspect, angle α may be about 45 degrees.

[0076] FIGURE 13B is an elevation view of one magnet 101, shown in FIGURES 10 through 11A, and magnet 131, shown in FIGURES 12 through 13A, having a magnetic field concentrator 133 according to aspects of the invention. FIGURE 13C is an exploded view of the magnet 101/131 shown in FIGURE 13B. As shown in FIGURES 13B and 13C, in one aspect, magnets 101 and 131 may comprise spherical magnets, for example, having opposing poles (N and S) identified by the difference in shading shown. It is understood that spherical magnets provide a magnetic field that may be optimally suited for aspects of the invention, for example, by providing a more uniform magnetic field. However, magnets 101 and 131 may take other shapes while still providing an effective magnetic field. For example, magnets 101 and 131 (and any other magnets disclosed herein) may be cylindrical in shape, for example, circular, oval, or polygonal cylindrical in shape, including triangular, square, rectangular, and pentagonal cylindrical in shape, among other cylindrical shapes. Magnets 101 and 131 (and any other magnets disclosed herein) may comprise any type of permanent magnet. In one aspect, magnets 101 and 131 (and any other magnets disclosed herein) may comprise a rare-earth permanent magnet as disclosed herein, for example, neodymium rare-earth magnets or samarium-cobalt rare-earth magnets, or their equivalent. Magnets 101 and 131 (and any other magnets disclosed herein) may be from about 0.25 to about 2 inches in diameter, but may typically be about 0.25 to about 0.5 inches in diameter, for example, about 0.375 inches in diameter.

[0077] The magnetic field concentrator or shield 133 may also comprise any suitable shape depending upon the shape of magnets 101 and 131. In the aspect shown in FIGURES 13B and 13C, concentrators 133 comprise two substantially identical halves 133A and 133B which provide a circular cylindrical profile while conforming to the external shape of magnet 101/131. For example, as shown, concentrators 133 may provide a circular cylindrical outer surface and a hemispherical or dished depression conducive to the spherical shape of magnet 101/131. It will be apparent to those of skill in the art that the shape of concentrators 133 may accordingly vary broadly.

[0078] FIGURE 14 is a perspective view of a core or ring assembly 150 of multiple cores or rings 151, 152, 153, 154, 155, 156, 157 and 158 according to one aspect of the invention. Cores 151-158 each typically include magnets 101/131 and conductors 104 (not shown) similar to core 100 and its sub-assemblies shown in FIGURES 8 through 13B, inclusive. According to aspects of the invention, cores 151-158 comprise two sets of cores, an upper or top core rack 161 and a lower or bottom core rack 162, the two sets of core racks 161 and 162 are shown engaged in FIGURE 14. The upper core rack 161 includes individual cores

151, 153, 155, and 157; the lower core rack 162 includes individual cores 152, 154, 156, and 158. FIGURE 15 is an exploded perspective view of the core assembly 150 shown in FIGURE 14 in which upper core rack 161 and a lower core rack 162 are shown separated. Though eight (8) cores having two racks of four (4) cores each are shown in FIGURE 14 for illustrative purposes, according to aspects of the invention, assembly 150 may include two (2) or more cores, and each rack 161 and 162 may contain one (1) or more cores. However, in one aspect, core assembly 150 may typically include four (4) or more cores, and each rack 161 and 162 may include two (2) or more cores each. In addition, core assembly 150 may typically include more than eight (8), for example, ten (10) or more cores or twelve (12) or more cores, and each core rack 161 and 162 may each include five (5) or more cores or six (6) or more cores. In one aspect, the number of rings or cores in assembly 150 may only be limited by the space available to accommodate the cores.

[0079] According to aspects of the invention, the two core racks 161 and 162 may be selectively engaged, for example, axially engaged, from positions shown in FIGURE 15 to the positions shows in FIGURE 14 wherein the magnetic fields of adjacent magnets 101/131 in adjacent cores of the two core racks 161 and 162 influence each other and generate a tangential acceleration, for example, as illustrated in FIGURE 2. For example, according to aspects of the invention, the individual cores 151, 153, 155, and 157 of upper core rack 161 are positioned and displaced with respect to the individual cores 152, 154, 156, and 158 of lower core rack 162 wherein individual cores 151, 153, 155, and 157 are moved into the radial spaces between individual cores 152, 154, 156, and 158 where at least some of the magnets 101/131 in upper core rack 161 are influenced by at least some of the magnets 101/131 in lower core rack 162 to provide at least some circumferential loading to at least some of the cores in upper core rack 161 and at least some circumferential loading to at least some of the cores in lower core rack 162. In one aspect, substantially all of the magnets 101/131 in upper core rack 161 are influenced by substantially all the magnets 101/131 in lower core rack 162 to provide at least some circumferential loading to at least some of the cores in upper core rack 161 and at least some circumferential loading to at least some of the cores in lower core rack 162. As shown and described above with respect to FIGURE 2, according do aspects of the invention, the circumferential loading and circumferential movement of the magnets 101/131 in the cores in upper core rack 161 and in the cores of lower core rack 162 induces electrical currents within the conductors 104 in at least some of the cores in the upper core rack 161 and in the cores of lower rack 162. This electrical current induced by the relative motion of magnets 101/131 can be extracted from assembly 150 to provide a source of electric power.

[0080] As also shown in FIGURE 15, as discussed previously with respect to FIGURES 5 and 8, magnets in circular arrangements in upper core rack 161 and/or in lower core rack 162 may be “off set” as indicated by the angle β in FIGURE 15. Again, this offset angle β may limit or prevent the likelihood of magnetic “lock up” between adjacent magnets. In one aspect, the angle β may range from about 1 degree to about 20 degrees, for example, from about 5 degrees to about 10 degrees. In one aspect of the invention, magnets in only one core rack 161 or 162 may be offset by an angle β. For example, as shown in FIGURE 15, in one aspect, substantially all the magnets in lower core rack 162 may be offset by an angle β while the substantially all the magnets in upper core rack 161 may not be offset, but may be substantially collinear with magnets in adjacent elevations within the cores.

[0081] FIGURE 16 is a top perspective view of an electric generator 170 encompassing aspects of the present invention, having the core assembly 190 in an “engaged” position. FIGURE 16A is a bottom perspective view of the electric generator 170 shown in FIGURE 16, having the core assembly 190 in an “unengaged” position. FIGURE 17 is an exploded perspective view of the generator 170 shown in FIGURES 16 and 16A. As shown in FIGURE 16, generator 170 includes a housing 172 comprising a top enclosure 174 and a bottom enclosure 176 containing a bearing and core assembly 180. In FIGURE 16, top enclosure 174 and a bottom enclosure 176 are shown translucent so that the bearing and core assembly 180 along with other components can be seen within housing 172. As shown in FIGURE 16 and 16A, bottom enclosure 176 may include a resilient base 175, for example, an elastomeric or rubber base adapted to rest upon a surface (not shown) and cushion and/or isolate generator 170 from the surface. According to aspects of the invention, bearing and core assembly 180 may typically include a core assembly 190, for example, similar to core assembly 150 shown in FIGURES 14 and 15, though the number and size of individual cores in core assembly 190 may vary from core assembly 150 may vary.

[0082] In the aspect shown in FIGURES 16, 16A, and 17 housing 172 is shown generally circular cylindrical in shape to comply with the generally circular cylindrical shape and/or size of bearing and core assembly 180; however, housing 172 may take any appropriate shape regardless of the shape and size of core bearing and core assembly 180. For example, in one aspect, as shown in FIGURE 16, 16A, and 17, housing 172 may include one or more cavities or chambers 182 adapted to housing ancillary equipment, parts, and/or supplies. For example, in one aspect, chambers 182 may be provided to house electronics adapted to operate, control, and/or monitor the operation of generator 170, for instance, any related electronics (for example, capacitors), controls, electric storage devices (for example, batteries), and related devices or equipment.

[0083] As shown most clearly in FIGURE 17, according to aspects of the invention, bearing and core assembly 180 includes core assembly 190 and a plurality of uppers bearings 191, 192, 193, 194, 195, 196, 197, 198 and a plurality of lower bearings 201, 202, 203, 204, 205, 206, 207, and 208 associated with each of the individual cores in core assembly 190. (For example, with each of the cores 151-158 of core assembly 150 shown in FIGURE 15.) FIGURE 18 is an exploded perspective view of the bearing and core assembly 180 shown in FIGURE 17.

[0084] As shown in FIGURE 18, bearing and core assembly 180 typically incudes a core assembly 190, an upper core rack 186, upper bearings 191-198, a lower core rack 188, and lower core bearings 201-208. Similar to core assembly 150 shown in FIGURES 14 and 15, core assembly 190 in FIGURE 18 typically includes an upper core rack 186 having cores 221, 223, 225, and 227, and a lower core rack 188 having cores 222, 224, 226, and 228. In the aspect shown in FIGURE 18, upper core rack 186 is shown engaged with lower core rack 188.

[0085] As also shown in FIGURE 17, generator 170 includes and upper or top bearing rack 210 and a lower or bottom bearing rack 212. According to aspects of the invention, bearing racks 210 and 212 are positioned and adapted to provide a pathway for current generated in bearing and core assembly 180 and also to provide positioning and support of bearing and core assembly 180 within housing 172. For example, in one aspect, top bearing rack 210 engages top enclosure 174, for example, rigidly or fixedly engages top enclosure 174, and bottom bearing rack 212 engages bottom enclosure 176, for example, rigidly or fixedly engages bottom enclosure 176. In one aspect, bottom bearing rack 212 is electrically coupled to bottom enclosure 176 and both may be grounded by a common ground. (Though, in another aspect, top bearing rack 210 may be electrically coupled to top enclosure 174 and both may be grounded by a common ground.) According to aspects of the invention, any structure adapted to provide the dual function of current carrying and positioning may be used for top bearing rack 210 and bottom bearing rack 212. However, in one aspect of the invention, top bearing rack 210 and bottom bearing rack 212 may take the form of the bearing racks 210 and 212 shown in FIGURES 19 and 20.

[0086] FIGURE 19 is a perspective view of one top bearing rack 210 and FIGURE 20 is a perspective view of one bottom bearing rack 212 that may be used in generator 170 according to aspects of the invention. As shown in FIGURE 19, top bearing rack 210 includes a plurality of circular top rings 214, which, as shown in FIGURES 16 and 17, are adapted to engage top enclosure 174.

Top bearing rack 210 also includes a plurality of circular bottom rings 216 adapted to engage the upper bearings 192, 194, 196, and 198 of the upper core rack 186 of bearing and core assembly 180. Similarly, as shown in FIGURE 20, bottom bearing rack 212 includes a plurality of circular top rings 218, which, as shown in FIGURES 16 and 17, are adapted to engage the lower bearings 201, 203, 205, and 207 of lower core rack 188 of bearing and core assembly 180. Bottom bearing rack 212 also includes a plurality of bottom rings 220 adapted to engage bottom enclosure 176.

[0087] As also shown in FIGURES 19 and 20, top bearing rack 210 includes a plurality of tabs or plates 230 between upper rings 214 and lower rings 216, and bottom bearing rack 212 includes a plurality of tabs or plates 232 between upper rings 218 and lower rings 220. According to aspects of the invention, in addition to providing at least some structural integrity to the top bearing rack 210 and the bottom bearing rack 212, plates 230 and 232 also function to provide a current path between adjacent cores in the upper core rack 186 and the lower core rack 188 of core assembly 190. This is illustrated most clearly in FIGURES 21 and 22.

[0088] FIGURE 21 is a cross sectional view of a portion of a typical rack core assembly 180 and top bearing rack 210, prior to complete engagement of lower core rack 188 with top core rack 186, according to one aspect of the invention. In the aspect shown in FIGURE 21 (and FIGURE 22), for the sake of illustration, only a portion of cores 223, 224, and 225 of rack core assembly 180 and only a portion of top bearing rack 210 are shown; however, this feature of the invention is common to other cores 221-228 and other portions both the top bearing rack 210 and of the bottom bearing rack 212.

[0089] FIGURE 21 shows cross sections of a portion of top bearing rack 210 and cross sections of portions core 223 (having bearing 193) and core 225 (having bearing 195) of upper core rack 186 and a cross section of a portion core 224 (having bearing 194) of lower core rack 188. As shown, the portion of top bearing rack 210 includes upper rings 214, lower rings 216, and plates 230. As represented in FIGURE 21, lower core rack 188 is not yet fully engaged with upper core rack 186. According to aspects of the invention, the relative axial engagement lower rack 188 and upper core rack 186, as indicted by arrow 240 (though upper core rack 186 may also move relative to lower core rack 188), results in the impingement of bearing 194 of lower core 224 with one or more plates 230 of top bearing rack 210. This engagement is illustrated in FIGURE 22.

[0090] FIGURE 22 is a cross sectional view, similar to FIGURE 21, of a portion of a typical rack core assembly 180 and top bearing rack 210, after engagement of lower core rack 188 with top bearing rack 210, according to one aspect of the invention. As shown in FIGURE 22, after engagement, at least bearing 194 of lower core rack 188 impinges one or more plates 230 of top bearing rack 210. However, typically, substantially all bearings 192, 194, 196, and 198 of lower cores 222, 224, 226, and 228 impinge and/or contact the multiple plates 230 of top bearing rack 210. As a result, since the components shown in FIGURES 21 and 22 are typically electrically conductive, the engagement of lower core rack 224 with top bearing rack 210 creates a pathway for current between the lower core rack 188 and the upper core rack 186, as indicated by dashed arrows 242 (though electric current may flow in the opposite direction to the direction of arrows 242).

[0091] Though only a portion of a typical rack core assembly 180 and top bearing rack 210, after engagement of lower core rack 188 with top bearing rack 210, is shown in FIGURE 22, the engagement shown in FIGURES 21 and 22 is typical of the engagement of any and all cores of upper core rack 186 and lower core rack 188 disclosed herein. In addition, though, again, not shown in FIGURES 21 and 22, this engagement of lower core rack 188 and upper core rack 186 is also typical of the engagement of the lower bearings of 202, 204, 206, and 208 of the cores of lower core rack 188 with rings 218 of bottom bearing rack 212. That is, according to aspects of the invention, with the engagement shown in

FIGURE 21 and 22, after engagement, at least one bearing 202, 204, 206, and 208 of lower core rack 188 impinges one or more plates 232 of bottom bearing rack 212. However, typically, substantially all bearings 202, 204, 206, and 208 of lower cores 222, 224, 226, and 228 impinge and/or contact the multiple plates 232 of bottom bearing rack 212. As a result, a current path is also provided between the cores of upper core rack 186, lower core rack 188, and bottom bearing rack 212.

[0092] Accordingly, top bearing rack 210 and bottom bearing rack 212 may at least partially be conductive. For example, in one aspect, all the components of top bearing rack 210 and bottom bearing rack 212 may be electrically conductive. Top bearing rack 210 and bottom bearing rack 212 may typically be made from copper, though any one or more the conductive materials disclosed herein may be used.

[0093] Returning to FIGURE 18, as noted, bearing core assembly 190 may comprise a range of cores, for example, four (4) or more cores or twelve (12) or more cores. In the aspect shown in FIGURE 18, upper core rack 186 and lower core rack 188 are engaged, and, according to aspects of the invention, the interaction of magnets 101/131 in the respective cores causes the rotation of cores and the generation of electric current. According to aspects of the invention, the number of cores may directly indicate the amount of electrical power (or current) generated by aspects of the invention. As shown in FIGURE 18, core assembly 190 may have a height 244 ranging from about 3 inches to about 6 feet, but aspects of the invention may typically have a height 224 from about 6 inches to about 24 inches, for example, about 9 inches in height. Also, core assembly 190 may have an outer diameter 246 ranging from about 3 inches to about 6 feet, but aspects of the invention may typically have a diameter 246 from about 1 foot to about 3 feet, for example, about 2 feet in diameter.

[0094] As described herein, according to aspects of the invention, the interaction of magnets 101/131 in the respective cores causes the rotation of cores and the generation of electric current. As shown with respect to FIGURES 14, 15 and 18, the interaction of magnets 101/131 is effected by engaging the cores of upper core rack 161, 186 with the cores of lower core rack 162, 188. According to aspects of the invention, upper core rack 161, 186 may be selectively engaged to generate the desired electrical current. According to aspects of the invention, this selective engagement of upper core rack 186 with lower core rack 188 may be effected by any conventional means, for example, any means for translating or moving core racks 186 and 188 relative to each other to effect the desired proximity of magnets 101/131. Several means of effecting the desired engagement may be illustrated with respect to FIGURES 16, 16A, and 17.

[0095] As shown and described with respect to FIGURES 16, 16A, and 17, generator 170 includes bearing and core rack assembly 180 enclosed within housing 172, which includes top enclosure 174 and bottom enclosure 176. According to one aspect, top enclosure 174 and bottom enclosure 176 may be translatable relative to each other, and the relative translation of top enclosure 174 and bottom enclosure 176 may be employed to effect the relative translation of upper core rack 186 and lower core rack 188. For example, as disclosed with respect to FIGURES 19 and 20, top bearing rack 210 may be mounted in top enclosure 174 and bottom bearing rack 212 may be mounted in bottom enclosure 176. As described above, top bearing rack 210 may typically engage the cores of upper core rack 186 and bottom bearing rack 212 may typically engage the cores of lower core rack 188. Therefore, according to one aspect of the invention, top enclosure 174 and bottom enclosure 176 may be translated, for example, axial translated, relative to each other to provide the desired relative engagement of upper core rack 186 and lower core rack 188.

[0096] In one aspect, any conventional means may be provided to yield a desired relative translation of top enclosure 174 and bottom enclosure 176. For example, in one aspect, the relative movement or translation of top enclosure 174 and bottom enclosure 176 may be effective by mechanical means, for example, by means of automated actuators, for example, employing gears, pulleys, sheaves, bearings, pistons, and the like. However, according to one aspect of the invention, the desired translation of top enclosure 174 and bottom enclosure 176 to effect the desired translation of upper core rack 186 and lower core rack 188 may be provided by means of vacuum.

[0097] For example, with respect to FIGURES 16 and 17, in one aspect, housing 172 may be a substantially air-tight housing whereby the translation of top enclosure 174 and bottom enclosure 176 may be provided by introducing a sub-atmospheric pressure within housing 172 whereby top enclosure 174 and bottom enclosure 176 are drawn together under the influence of the prevailing atmospheric pressure. In one aspect, the influence of atmospheric pressure upon the relative movement of top enclosure 174 and bottom enclosure 176 may be opposed or resisted by a resilient device, for example, a spring or an elastomeric device.

[0098] In one aspect, any means may be provided for introducing a sub-atmospheric pressure (for example, a vacuum) within housing 172. In one aspect, a source of sub-atmospheric pressure may be provided by one or more external sources, for example, one or more external vacuum pumps. However, in one aspect, as shown in FIGURE 17, one or more internal vacuum pumps 250 may be positioned within enclosure 172. Vacuum pump 250 may be provided anywhere within enclosure 250, for example, within the chambers 182. In the aspect shown in FIGURES 16, 16A, and 17, a vacuum pump 250 is positioned in a centrally located pump chamber 252 within enclosure 172. Vacuum pump 250 may be any conventional vacuum pump.

[0099] According to one aspect, in addition to providing a means for relatively deflecting top enclosure 174 and/or bottom enclosure 176, the presence of a vacuum in enclosure 172 may advantageously reduce the air resistance to rotation of the cores in core assembly 190.

[00100] According to one aspect of the invention, the inlet of vacuum pump 250 may be exposed to the inside of enclosure 172 and the outlet of vacuum pump 250 may be discharged out of enclosure 172, for example, through any appropriately located outlet or port in enclosure 172. In one aspect, the outlet of vacuum pump 250 may be directed to one or more discharge holes or air holes 254, for example, centrally located holes, in the bottom enclosure 176. In addition, or order to aid the flow of air from out of hole 254, when enclosure 172 is positioned on a surface (not shown), as shown in FIGURE 16A, bottom enclosure 176 may include one or more elongated recesses, channels, or grooves 256 in the bottom of bottom enclosure 176 to provide one or more paths for the air discharged by vacuum pump 250 out of discharge hole 254.

[00101] In one aspect, in order to maintain the sub-atmospheric pressure within enclosure 172 while permitting relative translation of top enclosure 174 and bottom enclosure 176, some form of gas-sealing device (not shown) may be provided between top enclosure 174 and bottom enclosure 176. For example, in one aspect, a relatively air-tight seal (not shown) may be provided between the mating surfaces of top enclosure 174 and bottom enclosure 176, for example, an appropriate elastomeric seal, such as, as wiper-type seal. In one aspect, the seal may be a lubricated seal, for example, a self-lubricated rubber skin seal. In one aspect, the seal may be located on an inner surface or outer surface of the of top enclosure 174 and/or bottom enclosure 176 depending upon the relative positions and relative geometry of the mating surfaces of top enclosure 174 and bottom enclosure 176.

[00102] As noted above, in one aspect of the invention, generator 170 may include some form of device that resists the relative translation of top enclosure 174 and bottom enclosure 176, for example, under the influence of atmospheric pressure. For example, as shown in FIGURE 17, generator 170 may include one or more springs or elastomeric materials 260 adapted to resist the collapsing movement top enclosure 174 and bottom enclosure 176, and, for example, return top enclosure 174 and bottom enclosure 176 (and their respective cores) to an unengaged position when the vacuum is removed.

[00103] In one aspect of the invention, the movement or disengagement of top enclosure 174 and bottom enclosure 176 may be limited, for example, to prevent the undesirable total disengagement of top enclosure 174 from bottom enclosure 176. In one aspect, this disengagement may be prevented by one or more mechanical stops or lips that prevent the complete disengagement of top enclosure 174 from bottom enclosure 176 . According to another aspect of the invention, the disengagement of top enclosure 174 and bottom enclosure 176 may be prevented by the use of magnets, for example, by the use cooperating magnets 177, 178 mounted on the top enclosure 174 and the bottom enclosure 176, respectively, referred to as "rim magnets," having opposite polarity that engage and minimize or prevent the disengagement of top enclosure 174 and the bottom enclosure 176.

[00104] The operation of generator 170 according to aspects of the invention is illustrated with respect to FIGURES 16 through 18. As shown most clearly in FIGURE 16 and 16A, prior to operation of activation of generator 170, top enclosure 174 and bottom enclosure 176 are separated or displaced whereby the upper core rack 186 and the lower core rack 188 (see, for example, FIGURES 15, 16A, and 18) are disengaged whereby the magnets 101/131 in core racks 186 and 188 are substantially not magnetically influenced by each other. In this discussion, it is assumed that generator 170 rests on a surface [not shown] whereby the bottom of bottom enclosure 176 is stationary and rests on the surface, and top enclosure 174 is substantially free to translate relative to stationary bottom enclosure 176. (In one aspect, bottom enclosure 176 may be free to translate relative to a stationary top enclosure 174, or both the top enclosure 174 and bottom enclosure 176 may be unrestrained and translatable.) As discussed, the relative positions of top enclosure 174 and bottom enclosure 176 may be influenced by the presence of one or more coil springs 260 between top enclosure 174 and bottom enclosure 176.

[00105] With initiation of engagement, for example, by means of the electronics and controls located in chambers 182 or by an human operator, the relative translation of top enclosure 174 and bottom enclosure 176 may be effected by the activation of vacuum pump 250 and the discharge of air from enclosure 172, for example, via air hole 254 and channels 256. The vacuum in enclosure 172 may be maintained by controlling the operation of vacuum pump 250 and/or by closing a valve, for example, a valve positioned between vacuum pump 250 and air hole 254, to isolate the inside of enclosure 172 and maintain the desired vacuum. With the introduction of vacuum within enclosure 172 and the presence of a substantially air-tight seals between the top enclosure 174 and the bottom enclosure 176, under the influence of prevailing pressure, in this aspect, top enclosure 174 translates downward toward the stationary bottom enclosure 176. With the translation of top enclosure 174, top bearing rack 186 with cores 221, 223, 225, and 227 also translates (in this case downward) into engagement with cores 222, 224, 226, and 228 of lower core rack 188.

[00106] According to aspects of the invention, as the magnets 101/131 of the cores of top core rack 186 begin to influence the magnets in lower core rack 188, under the influence of the repulsion of like poles in magnets 101/131, at least some of the cores in the upper core rack 186 and the cores in the lower core 188 begin to rotate within core assembly 190. That is, according to one aspect of the invention, generator 170 may “self-start” by engaging top core rack 186 with lower core rack 188. The speed of rotation of the cores in upper core rack 186 and lower core rack 188 may increase to at least 100 rotations per minute [rpm], but typically ranges from about 500 rpm to about 2500 rpm, or more. In one aspect, the speed of cores may be limited by bearings 191-198 and/or 201-208, for example, by friction between the bearings and the bearing racks 210, 212. This relative rotation of cores is assisted by the axial offset of magnets 101/131 (see angle β in FIGURE 5 and 8) which minimizes or prevents the likelihood of "lock up" between adjacent cores. As discussed most clearly with respect to FIGURE 2, with the relative movement of magnets 101/131 and the presence of conductors 104 about magnets 101/131, an electric current is induced in conductors 104. This electric current passes through conductors 104 and is carried to, for example, upper bearings 191-198 and then, as illustrated in FIGURES 21 and 22 from the upper bearings 191-198 through top bearing rack 210 and to an external load, for example, to power a motor, or to storage, for example, to one or more batteries. In addition, in one aspect, the electric current generated may be directed back into generator 170 in order to further increase the speed of rotation of one or more cores in core assembly 190.

[00107] According to one aspect of the invention, all cores in upper core rack 186 and lower core rack 188 may rotate. However, in another aspect, all cores in upper core rack 186 and lower core rack 188 except the outermost core in lower core rack 188 may rotate. That is, in one aspect, the outermost core in lower core rack 188, that is, core 158 in FIGURES 14 and 15 or core 228 in FIGURE 18, may be stationary or may not rotate. In addition, according to aspects of the invention, due to the relative geometry of the cores in rack cores 186 and 188, the speed of rotation of cores may vary. For example, in one aspect, the speed of rotation may increase in each core from the outer-most core 228 to the inner most core 221.

[00108] After sufficient activation and electrical energy generation, generator 170 may be deactivated by disengaging upper core rack 186 from lower core rack, for example, by deactivating vacuum pump 250 and allowing top enclosure 174 to disengage from lower enclosure 176, for example, under the influence of one or more springs 260, whereby the magnets 101/131 in respective cores are substantially displaced from each other whereby little or no relative translation of cores occurs. In addition, in one aspect, shown most clearly in FIGURE 21, with the disengagement of upper core rack 186 from lower core rack 188, the juxtaposition of opposite magnetic poles in adjacent disengaged cores may result in attraction between the opposite magnetic stops and retardation of any relative movement between cores. For example, in one aspect, the disengagement of upper core rack 186 from lower core rack 188 may initiate a braking action and retard or terminate the rotation of cores in both the upper rack 186 and the lower core rack 188.

[00109] Accordingly, the presented aspects of the invention provide permanent-magnet electric generators and methods of generating electrical energy that overcome the limitations of the existing art. Aspects of the invention may be used to generate electricity for a broad range of applications, indeed any application requiring a source of electric power. The applications of the present invention may be used, but are not limited to, vehicles, robots, and mobile devices, among many others. As will be appreciated by those skilled in the art, features, characteristics, and/or advantages of the various aspects described herein, may be applied and/or extended to any embodiment (for example, applied and/or extended to any portion thereof).

[00110] While several aspects of the present invention have been described and depicted herein, alternative aspects may be effected by those skilled in the art to accomplish the same objectives. Accordingly, it is intended by the appended claims to cover all such alternative aspects as fall within the true spirit and scope of the invention.

* * * * *

CLAIMS

1. A permanent-magnet electric generator (170) comprising:

a first rack assembly (161, 186) comprising a plurality of first concentric circular cylindrical cores (221,223, 225, 227), each of the plurality of the first circular cylindrical cores mounted for rotation and comprising:

a plurality of circular arrangements of permanent magnets (101, 131), the plurality of circular arrangements of permanent magnets spaced at a plurality of elevations within each first circular cylindrical core; and

a plurality of electrical conductors (104), each of the plurality of conductors positioned about at least some of the plurality of the permanent magnets (101, 131) of the curricular arrangement of permanent magnets;

a second rack assembly (162, 188) comprising a plurality of second concentric circular cylindrical cores (222, 224, 226, 228), each of the plurality of the second circular cylindrical cores radially spaced from each of the plurality of the first circular cylindrical cores (221,223, 225, 227), and comprising:

a plurality of circular arrangements of permanent magnets (101, 131), the plurality of circular arrangements of permanent magnets spaced at a plurality of elevations within each second circular cylindrical core; and

a plurality of electrical conductors (104), each of the plurality of conductors positioned about at least some of the plurality of the permanent magnets of the curricular arrangement of permanent magnets; and

means (250) for axially engaging the plurality of first concentric circular cylindrical cores (221,223, 225, 227) of the first rack assembly (161, 186) with the plurality of second concentric circular cylindrical cores (222, 224, 226, 228), of the second rack assembly (162, 188), wherein at least some of the permanent magnets of the plurality of first circular cylindrical cores of the first rack assembly are repelled by at least some of the permanent magnets of the plurality of second circular cylindrical cores of the second rack assembly wherein each of the first circular cylindrical cores is rotated and an electric current is generated within the plurality of electrical conductors (104) in each of the first circular cylindrical cores and an electric current is generated within the plurality of electrical conductors in each of the second circular cylindrical cores.

2. The electric generator as recited in claim 1, wherein the permanent magnets (101, 131) of the plurality of circular arrangements of first rack assembly (161, 186) and the permanent magnets of the plurality of circular arrangements of second rack assembly (162, 188) comprise spherical permanent magnets.

3. The electric generator as recited in claim 1, wherein the permanent magnets (101, 131) of the plurality of circular arrangements of first rack assembly (161, 186) and the permanent magnets of the plurality of circular arrangements of second rack assembly (162, 188) comprise rare-earth permanent magnets.

4. The electric generator as recited in claim 1, wherein the plurality of first concentric circular cylindrical cores of the first rack assembly (161, 186) and the plurality of second concentric circular cylindrical cores (162, 188) of the second

rack assembly (162, 188) each comprise at least three concentric circular cylindrical cores.

5. The electric generator as recited in claim 1, wherein the plurality of elevations within each first circular cylindrical core and the plurality of elevations within each second circular cylindrical core comprise at least three elevations.

6. The electric generator a recited in claim 1, wherein the plurality of first concentric circular cylindrical cores (221, 223, 225, 227) and the plurality of second concentric circular cylindrical cores (222, 224, 226, 228) each comprise electrically conductive bearings (191-198), and wherein the plurality of electrical conductors (104) in each of the first circular cylindrical cores and the plurality of electrical conductors in each of the second circular cylindrical cores are in electrical communication with the electrically conductive bearings.

7. The electric generator a recited in claim 6, wherein the electrical generator further comprises an upper bearing rack (210) adapted to engage the electrically conductive bearings (191-198), and a lower bearing rack (212) adapted to engage the electrically conductive bearings (201-208).

8. The electric generator a recited in claim 1, wherein the electric generator further comprises a housing (172) enclosing the first rack assembly and the second rack assembly.

9. The electric generator a recited in claim 8, wherein the housing comprises a top enclosure (174) and a bottom enclosure (176), the bottom enclosure and the top enclosure adapted for relative translation.

10. The electric generator a recited in claim 8, wherein the electric generator further comprises a vacuum pump (250) adapted to generate a sub-atmospheric pressure within the housing.

11. A method of producing electrical energy comprising:

providing a first rack assembly (161, 186) comprising a plurality of first concentric circular cylindrical cores (221, 223, 225, 227), each of the plurality of the first circular cylindrical cores mounted for rotation and comprising:

a plurality of circular arrangements of permanent magnets (101, 131), the plurality of circular arrangements of permanent magnets spaced at a plurality of elevations within each first circular cylindrical core; and

a plurality of electrical conductors (104), each of the plurality of conductors positioned about at least some of the plurality of the permanent magnets of the curricular arrangement of permanent magnets;

providing a second rack assembly (162, 188) comprising a plurality of second concentric circular cylindrical cores (222, 224, 226, 228), each of the plurality of the second circular cylindrical cores radially spaced from each of the plurality of the first circular cylindrical cores and comprising:

a plurality of circular arrangements of permanent magnets (101, 131) , the plurality of circular arrangements of permanent magnets spaced at a plurality of elevations within each second circular cylindrical core; and

a plurality of electrical conductors (104), each of the plurality of conductors positioned about at least some of the plurality of the permanent magnets of the curricular arrangement of permanent magnets; and

axially engaging the plurality of first concentric circular cylindrical cores (221, 223, 225, 227) of the first rack assembly with the plurality of second concentric circular cylindrical cores (222, 2224, 226, 228) of the second rack assembly, wherein at least some of the permanent magnets of the plurality of first circular cylindrical cores of the first rack assembly are repelled by at least some of the permanent magnets of the plurality of second circular cylindrical cores of the second rack assembly wherein each of the first circular cylindrical cores is rotated and an electric current is generated within the plurality of electrical conductors in each of the first circular cylindrical cores and an electric current is generated within the plurality of electrical conductors in each of the second circular cylindrical cores.

12. The method as recited in claim 11, wherein the method further comprises:

positioning the first rack assembly (161, 186) into a top enclosure (174) and positioning the second rack assembly (162, 188) into a bottom enclosure (176), the bottom and top enclosures relatively translatable and

wherein axially engaging the plurality of first concentric circular cylindrical cores (221, 223, 225, 227) of the first rack assembly with the plurality of second concentric circular cylindrical cores (222, 224, 226, 228) of the second rack assembly comprises translating the top enclosure (174) relative to the bottom enclosure (176).

13. The method as recited in claim 12, wherein the bottom and top relatively translatable enclosures (174, 186) include an air tight seal there between; wherein the method further comprises generating a sub-atmospheric pressure within the housing wherein the bottom and top relatively translatable enclosures translate under atmospheric pressure to axially engage the plurality of first concentric circular cylindrical cores with the plurality of second concentric circular cylindrical cores.

14. An electrical core element (100) comprising:

at least one circular arrangement (106, 108, 110) of permanent magnets (101, 131);

a plurality of electrical conductors (104) passing in proximity with at least some of the permanent magnets; and

a housing (102) adapted to retain each of the permanent magnets in the arrangement of permanent magnets in a predetermined position.

15. The core element as recited in claim 14, wherein the housing (102) is further adapted to retain the plurality of electric conductors (104) in a predetermined position.

16. The core element as recited in claim 14, wherein the housing (102) is further adapted to retain each of the permanent magnets (101, 131) in a predetermined orientation.

17. The core element as recited in claim 16, wherein the predetermined orientation comprises orienting a pole of each of the permanent magnets radially within the at least one circular arrangement (106, 108, 110) .

18. The core element recited in claim 14, wherein the at least one circular arrangement (106, 108, 110) of permanent magnets comprises a plurality of spaced circular arrangements of permanent magnets.

19. The core element recited in claim 18, wherein the plurality of spaced circular arrangements (106, 108, 110) of permanent magnets comprises a plurality of axially spaced circular arrangements of permanent magnets.

20. The core element recited in claim 14, wherein the at least one circular arrangement (106, 108, 110) of permanent magnets comprises at least one circular arrangement of permanent rare-earth magnets.

21. The core element as recited in claim 21, wherein the housing (102) comprises a non-ferrous housing.

22. The core element as recited in claim 21, wherein the non-ferrous housing (102) comprises a plastic housing.

23. The core element as recited in claim 22, wherein plastic housing (102) comprises one of a polyethylene housing.

24. The core element recited in claim 20, wherein the at least one circular arrangement (106, 108, 110) of permanent rare earth magnets comprises at least one circular arrangement of one of permanent neodymium rare-earth magnets and permanent samarium-cobalt rare-earth magnets.

25. The core element recited in claim 14, wherein the core element (100) comprises one of an electrical generator core element and an electrical motor core element.

26. The core element recited in claim 14, wherein the core element (101) comprises one of a stator and a rotor.

27. A method of producing electrical energy comprising:

providing at least one first circular cylindrical core (100) mounted for rotation and comprising:

at least one circular arrangements of permanent magnets (101, 131); and a plurality of first electrical conductors (104) positioned about at least some of the plurality of the permanent magnets of the at least one curricular arrangement of permanent magnets;

providing at least one second circular cylindrical core (100), concentric with the at least one first circular cylindrical core, the at least one second circular cylindrical core radially spaced from the at least one first circular cylindrical core and comprising:

at least one circular arrangement of permanent magnets (101, 131); and a plurality of second electrical conductors (104) positioned about at least some of the plurality of the permanent magnets of the curricular arrangement of permanent magnets; and

axially engaging the at least one first circular cylindrical core (100) with at least one second circular cylindrical core (100), wherein at least some of the permanent magnets (101, 131) of the at least one first circular cylindrical core are repelled by at least some of the permanent magnets of the second circular cylindrical core wherein the first circular cylindrical core is rotated and an electric current is generated within at least one of the plurality of first electrical conductors and the plurality of second electrical conductors.

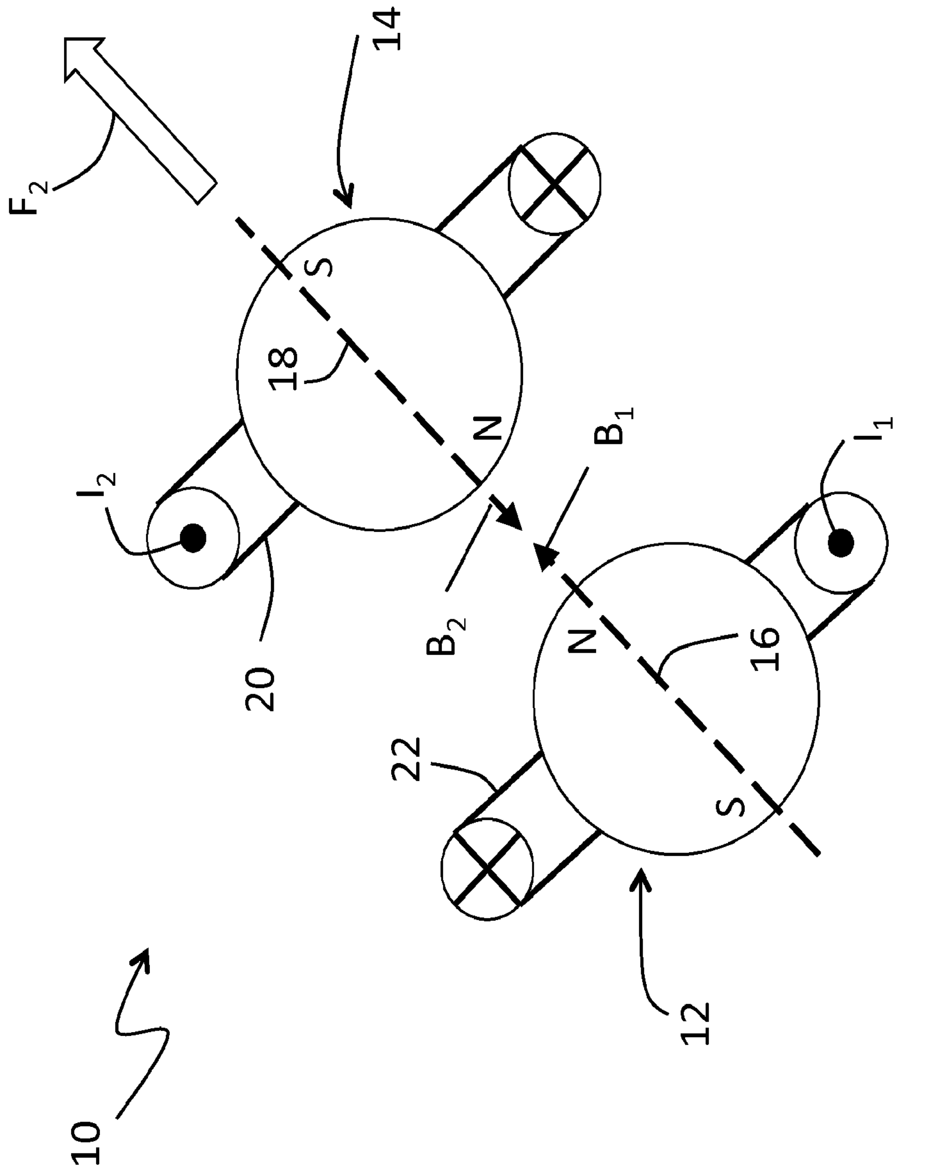


Figure 1

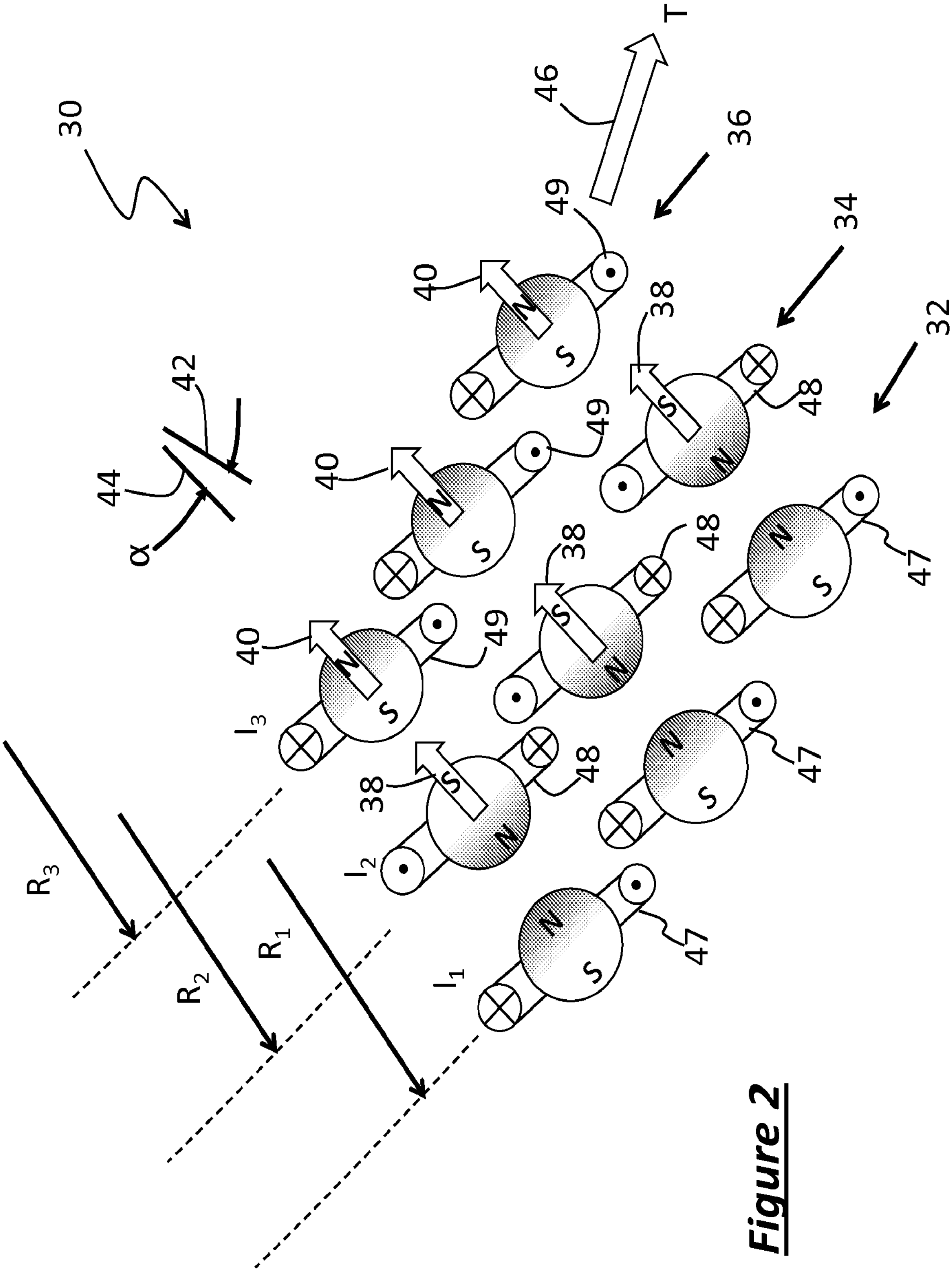


Figure 2

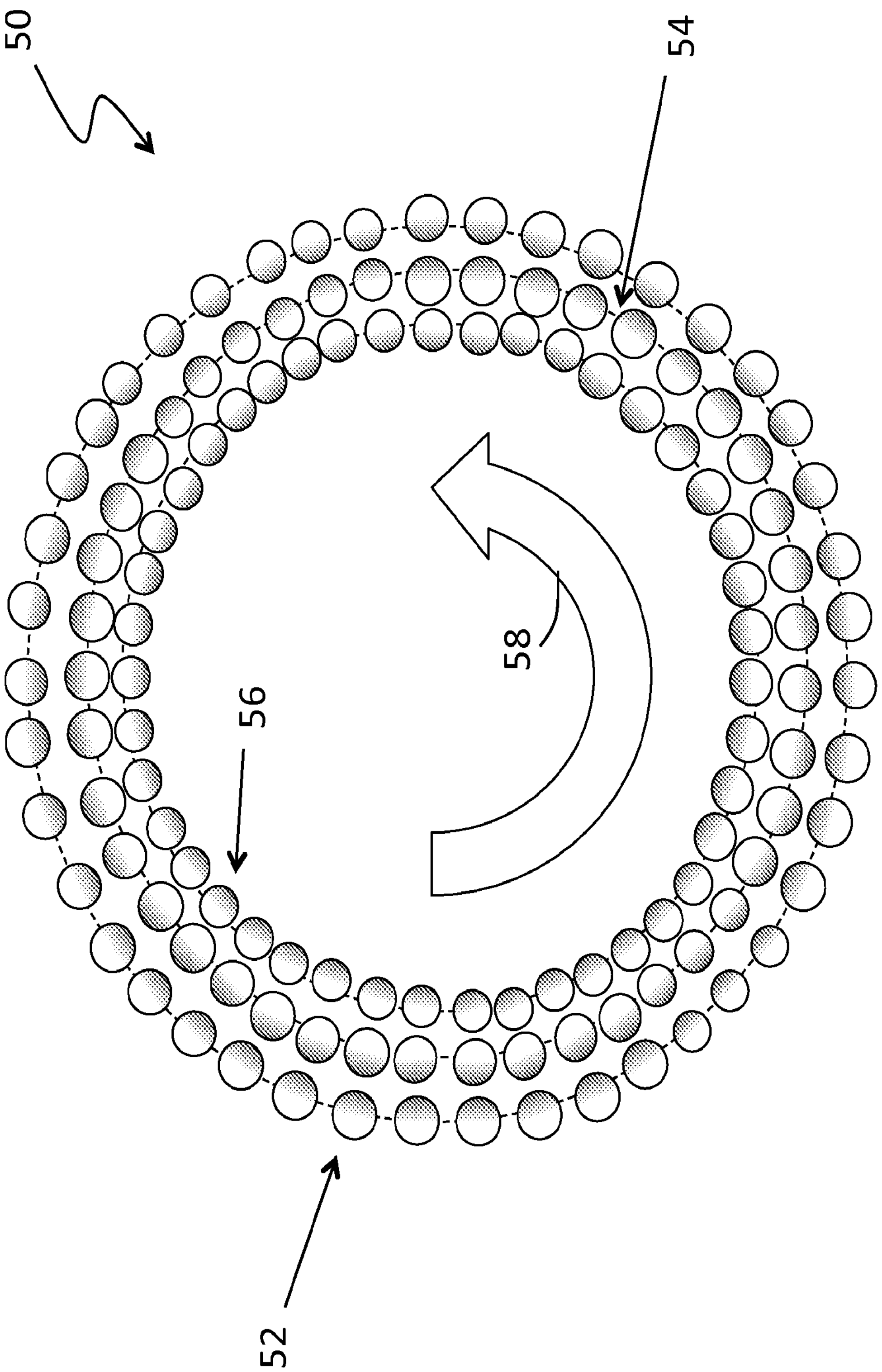


Figure 3

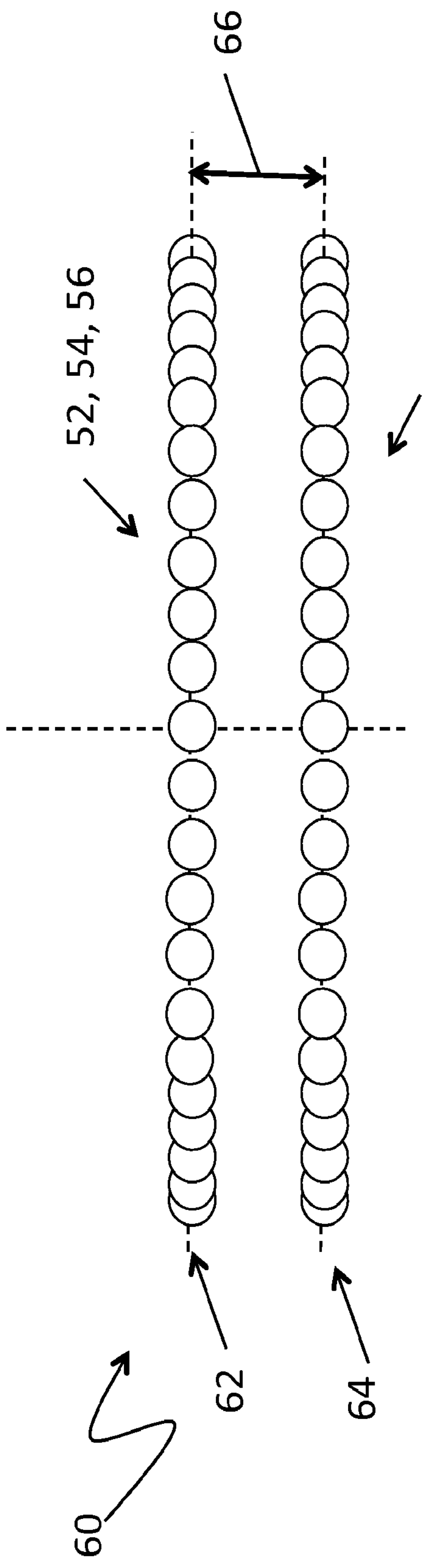


Figure 4

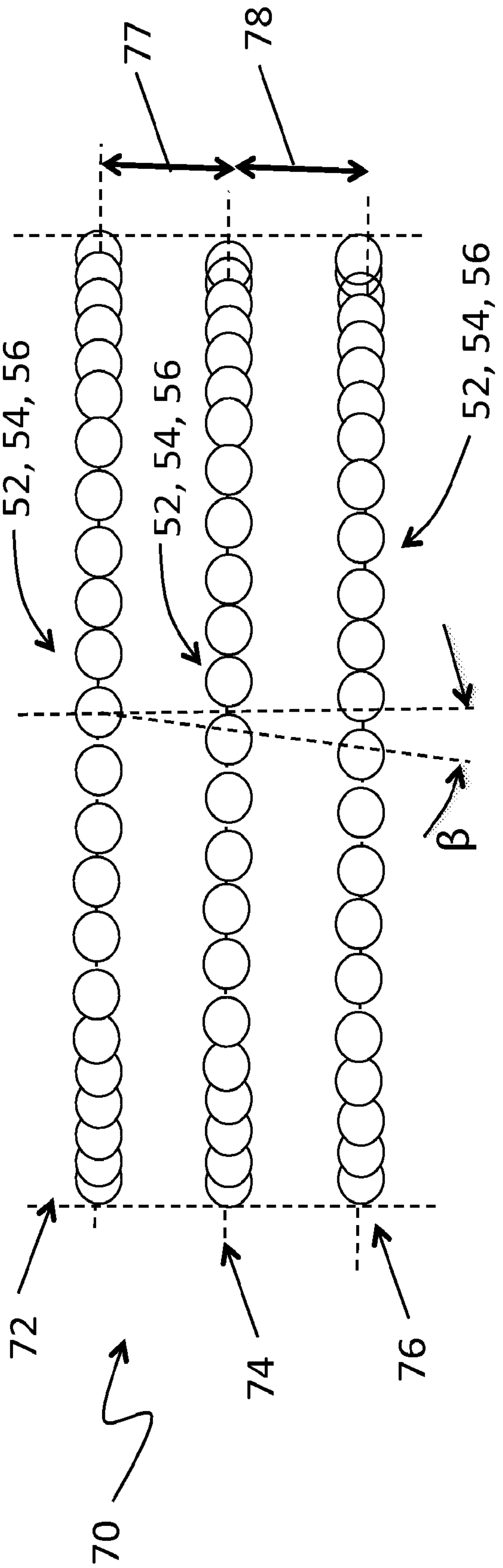


Figure 5

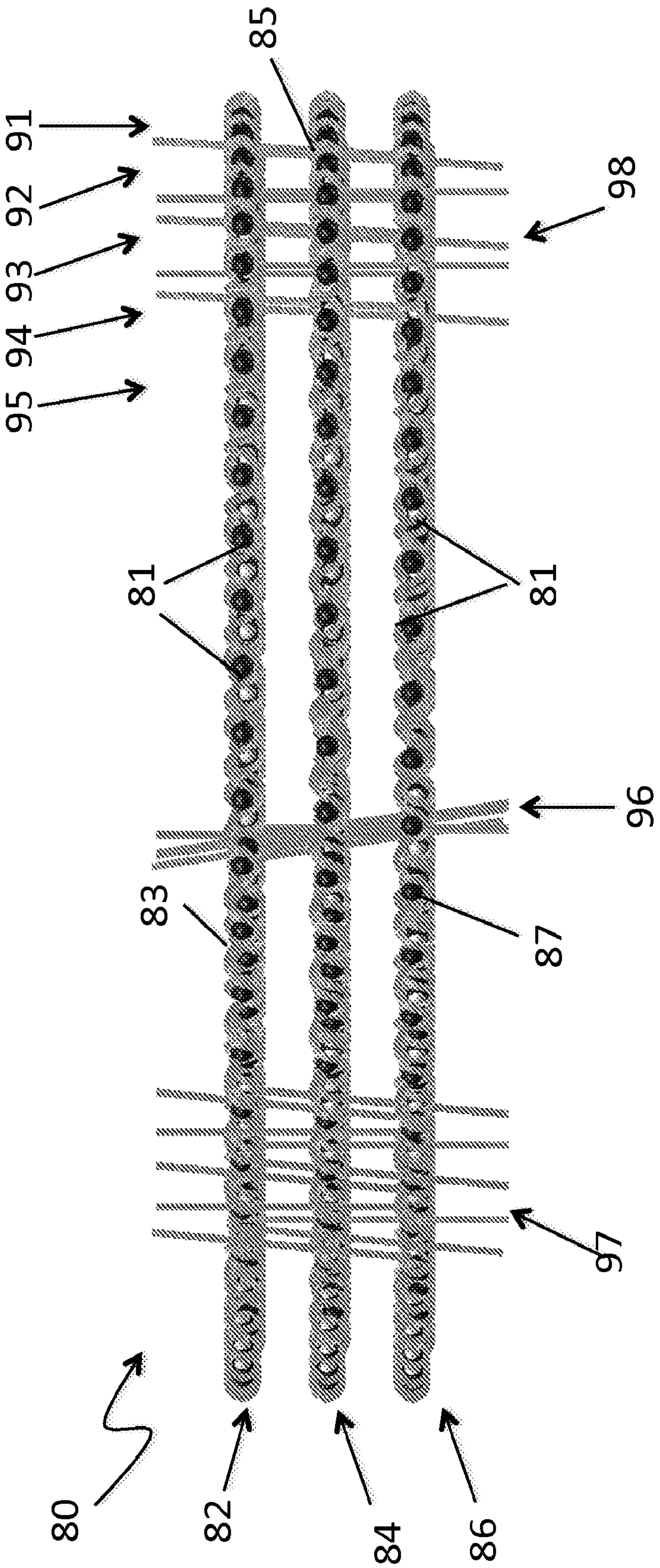


Figure 6

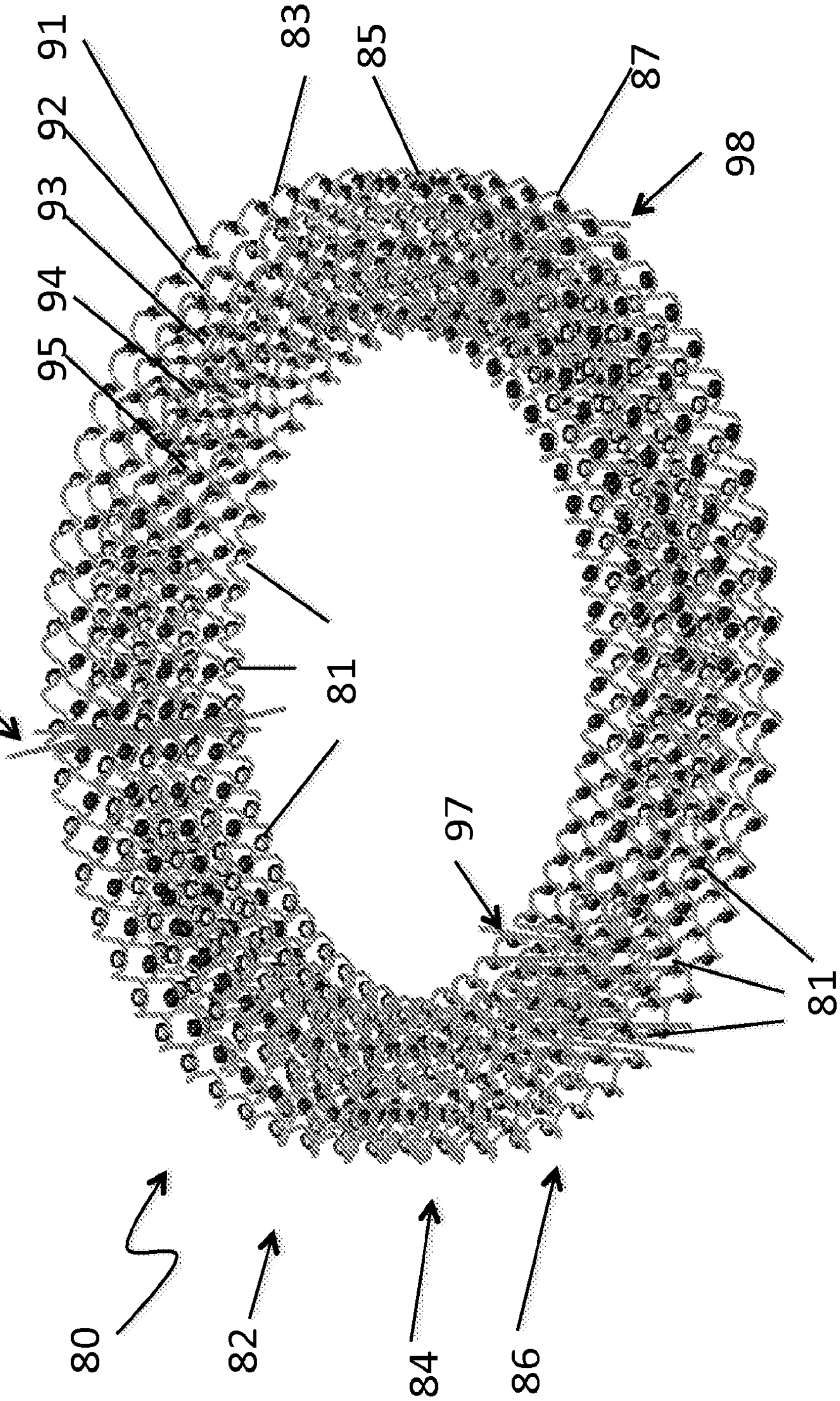


Figure 7

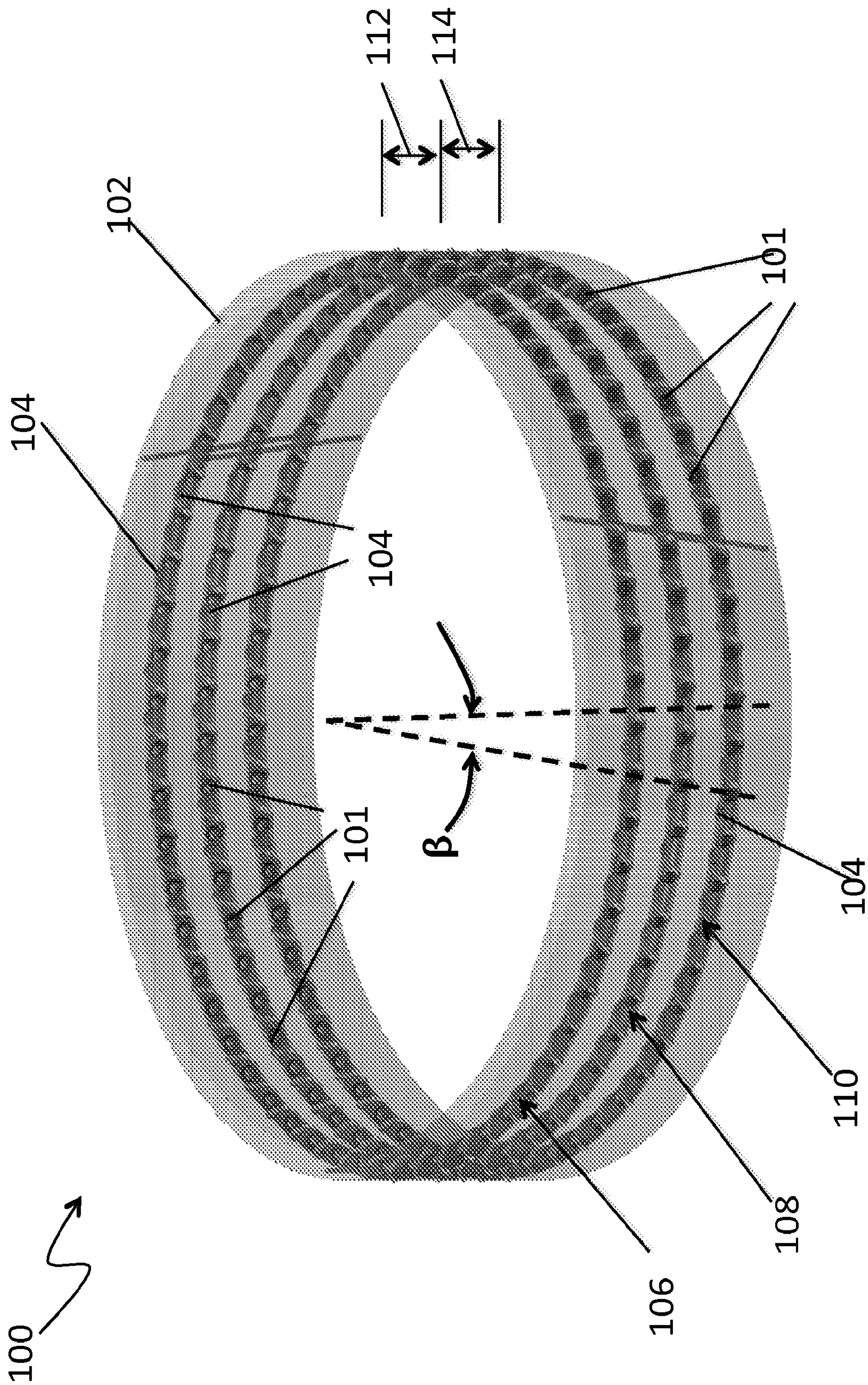


Figure 8

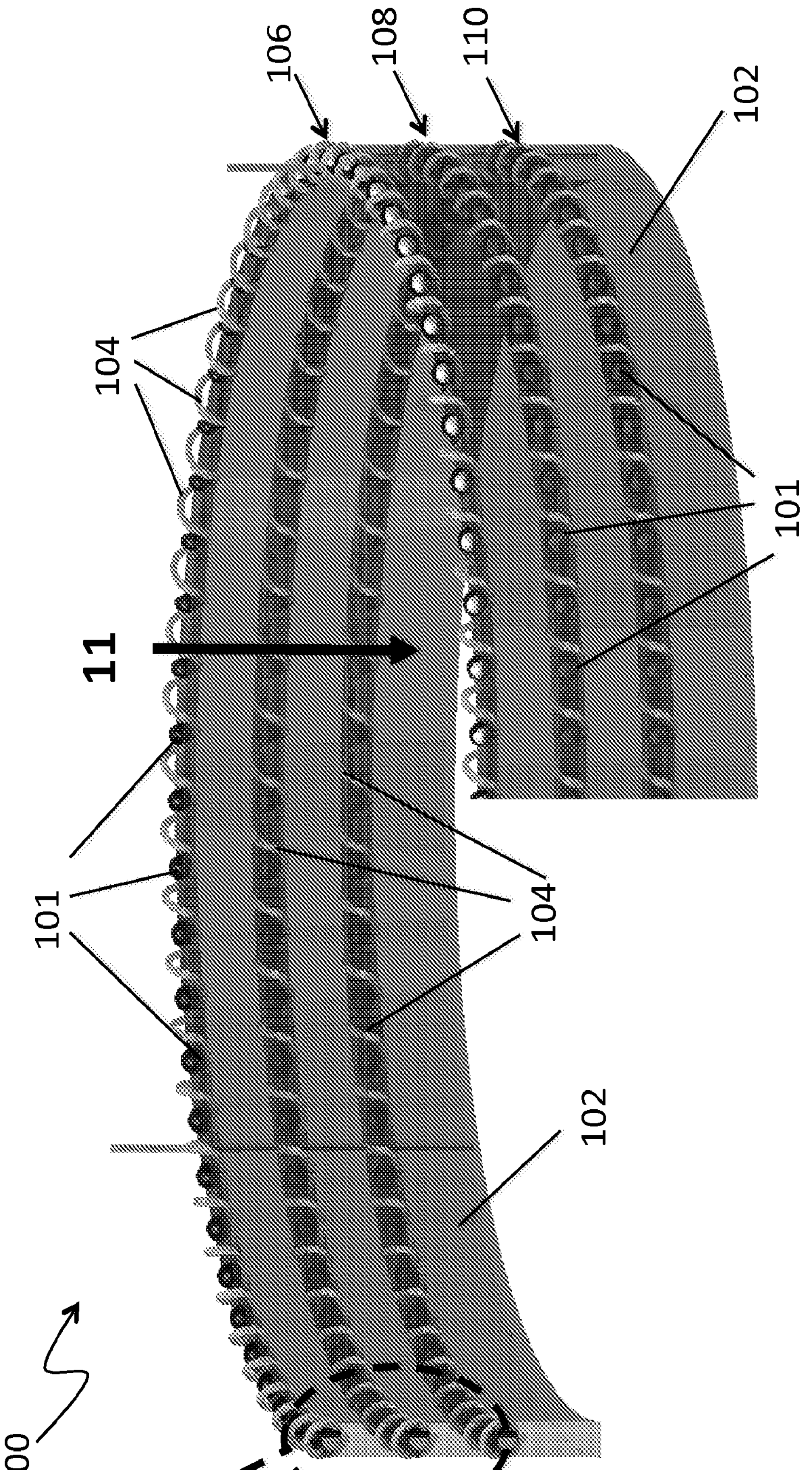


Figure 9

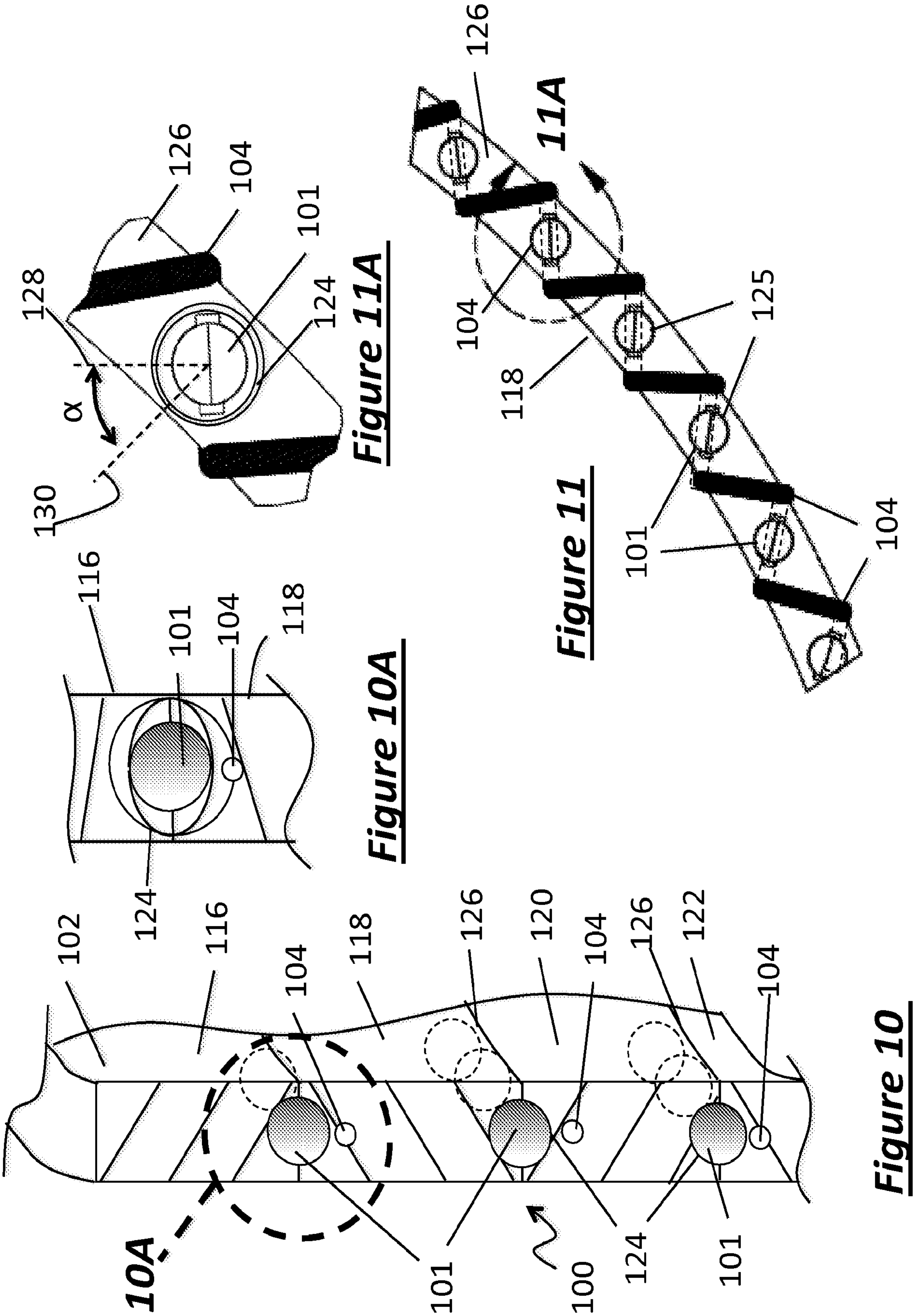


Figure 11A

Figure 11

Figure 10A

Figure 10

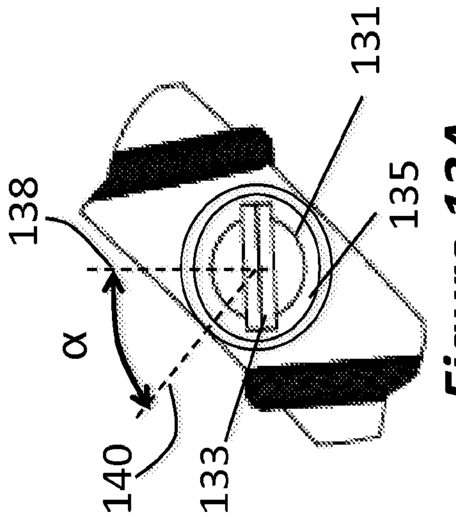


Figure 13A

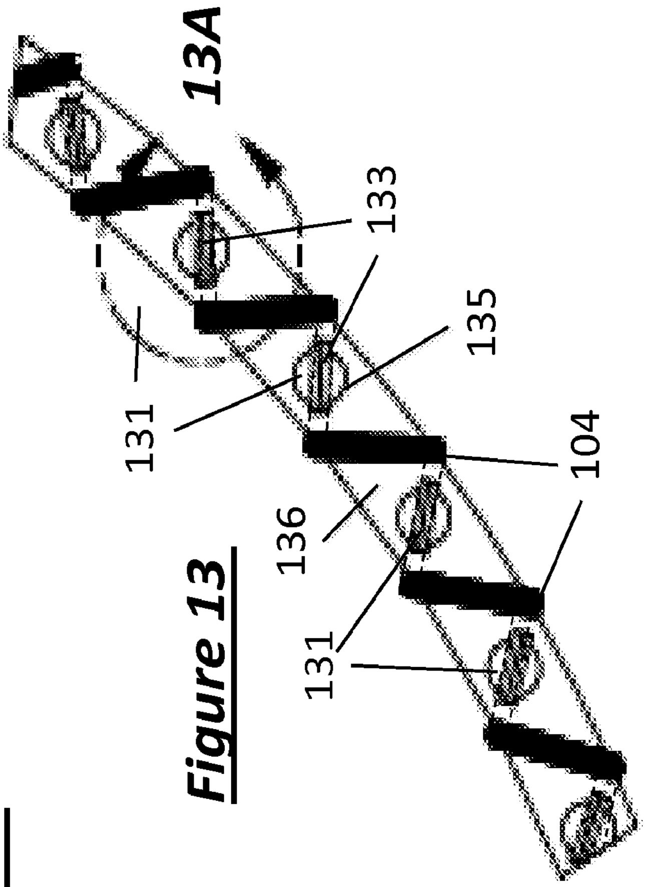


Figure 13

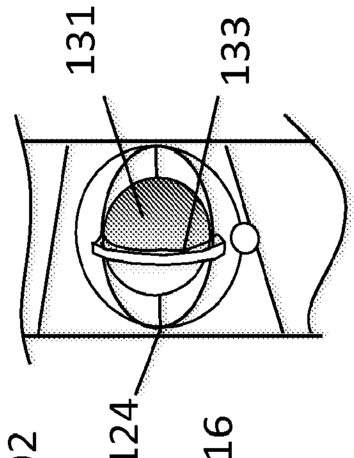


Figure 12A

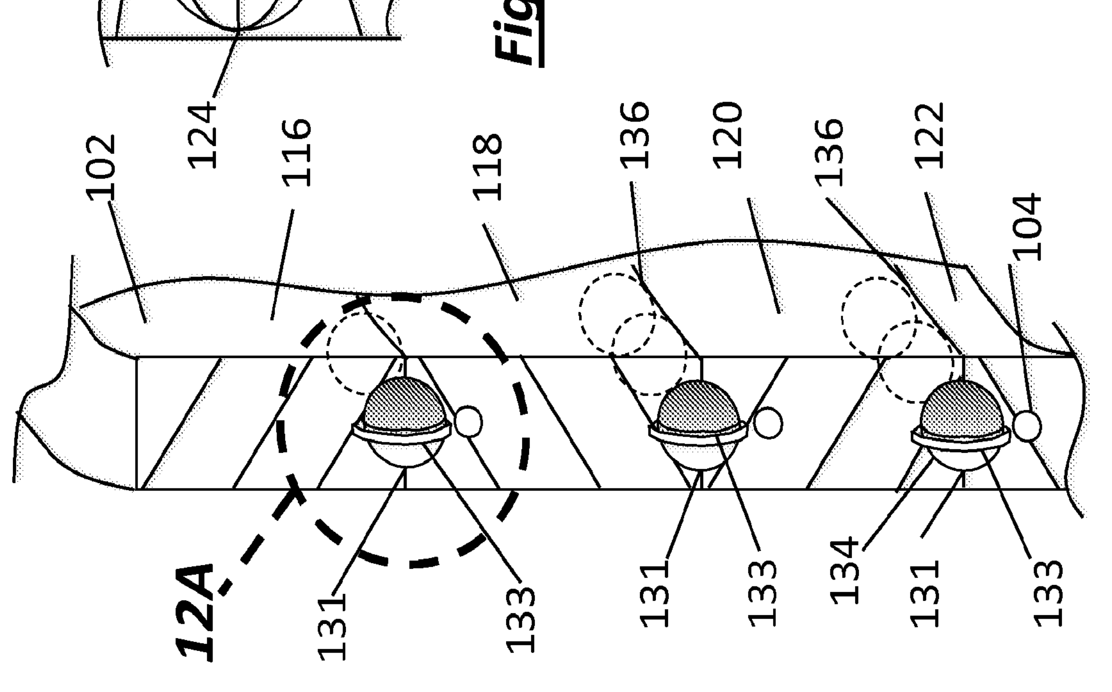


Figure 12

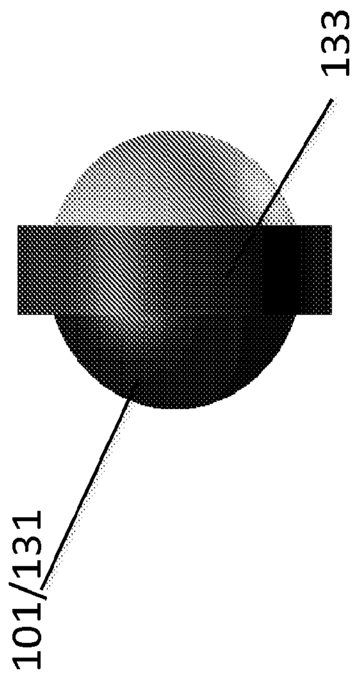


Figure 13B

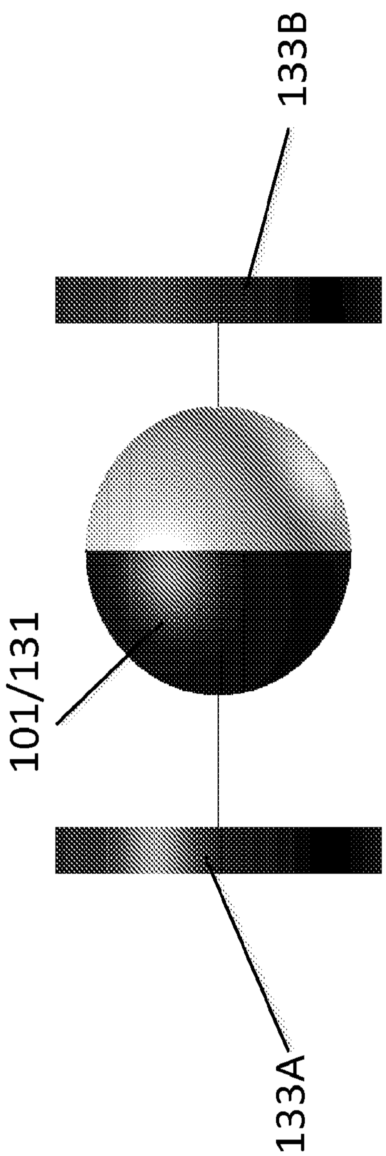


Figure 13C

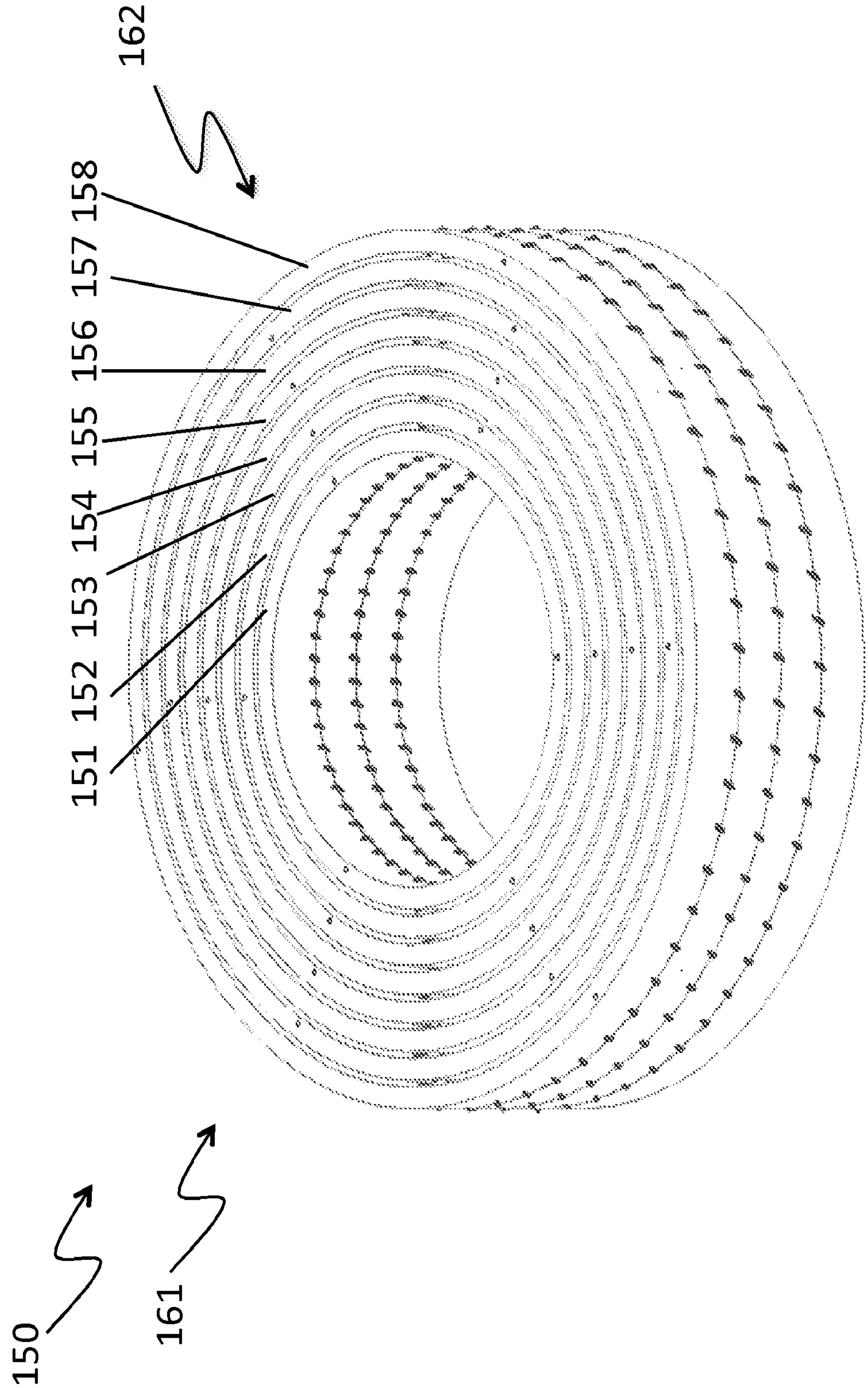


Figure 14

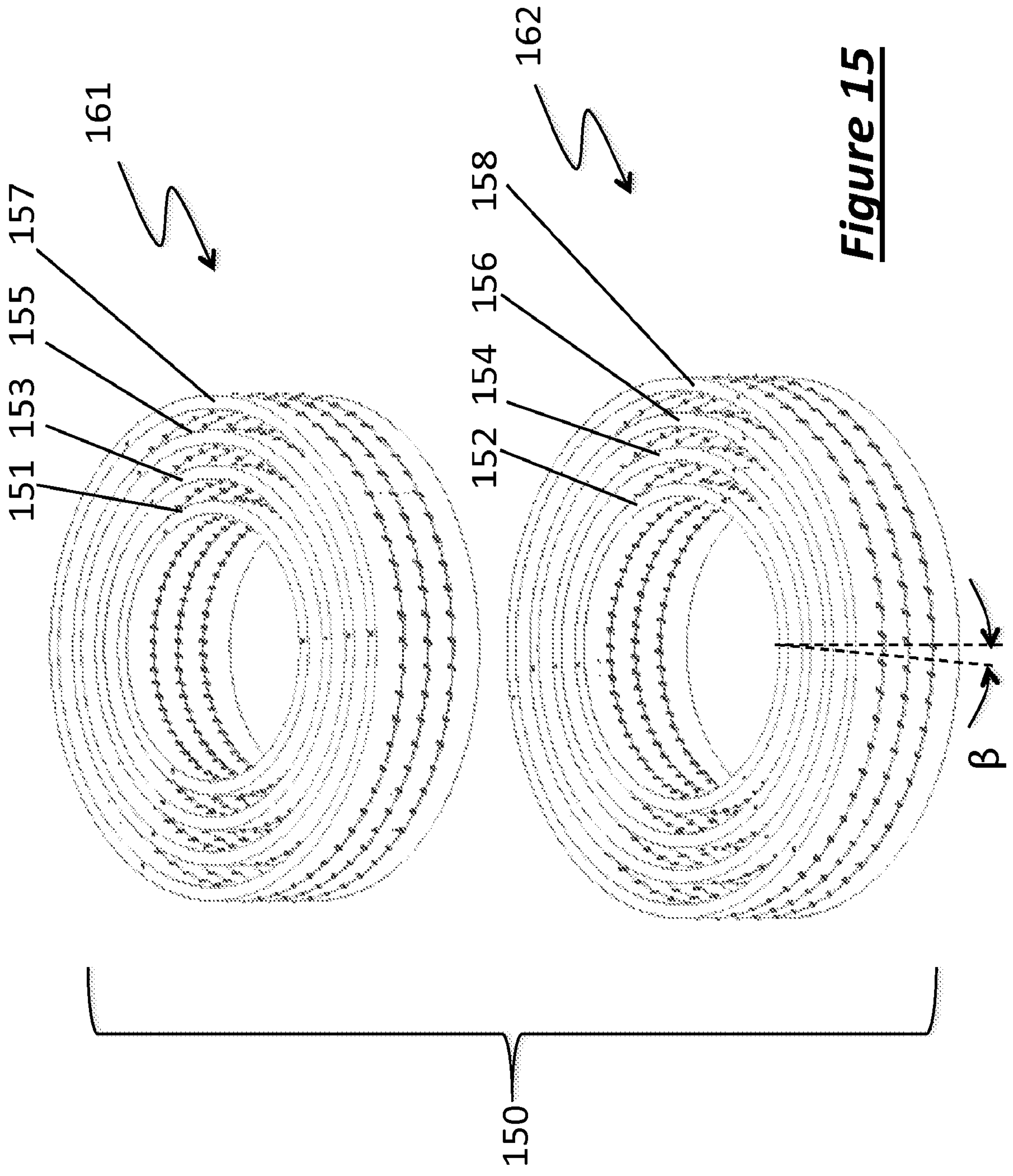


Figure 15

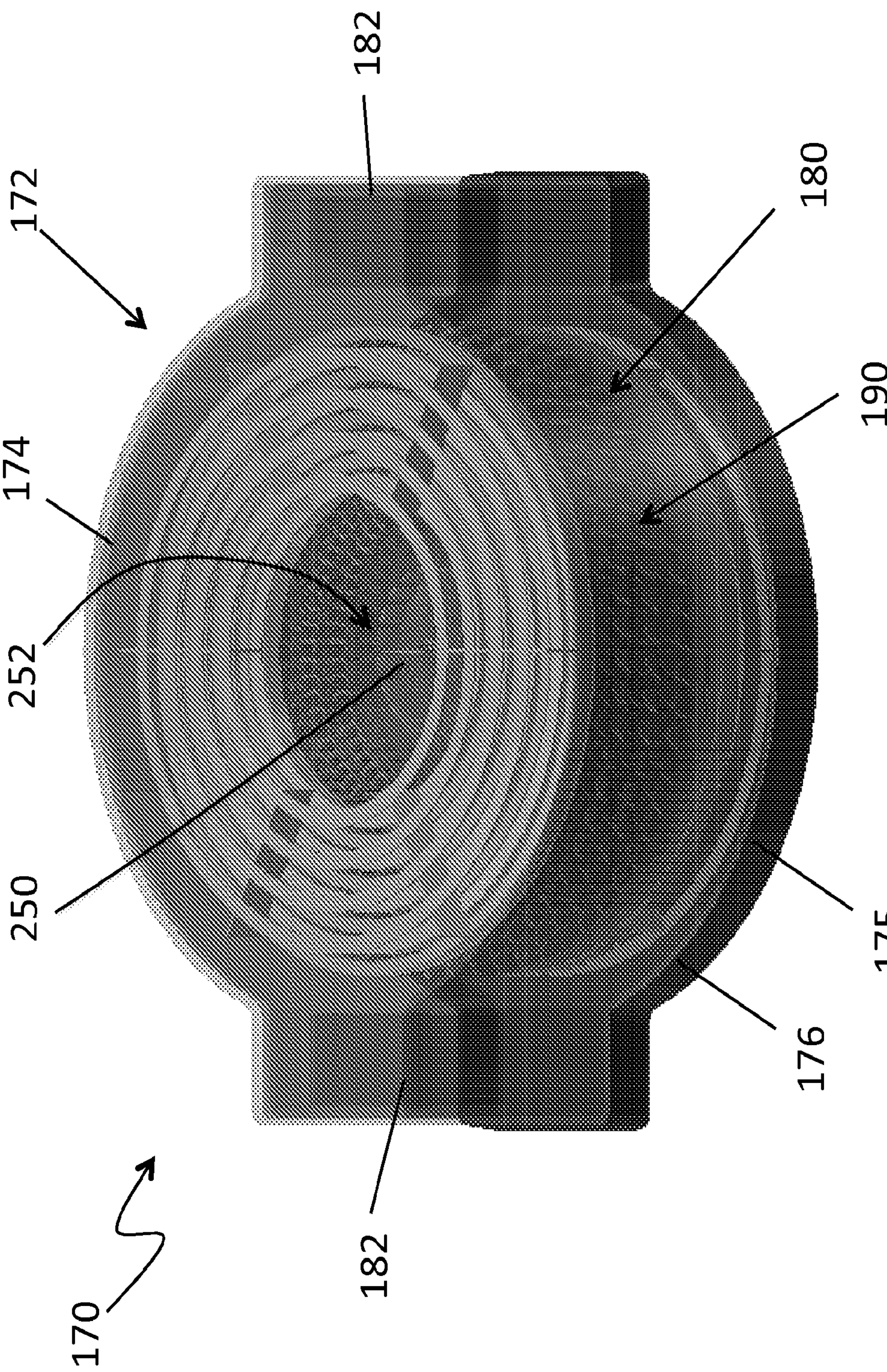


Figure 16

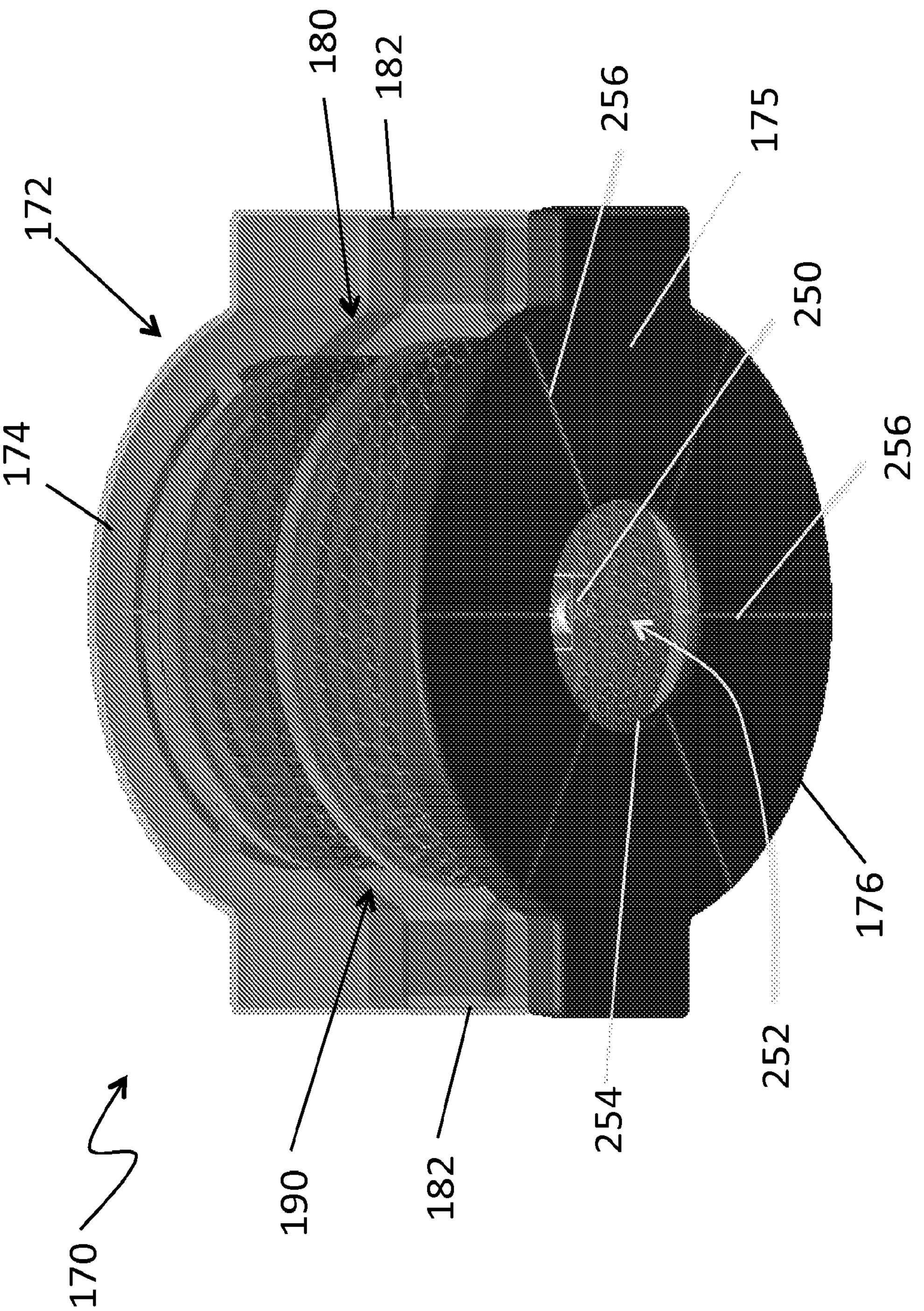


Figure 16A

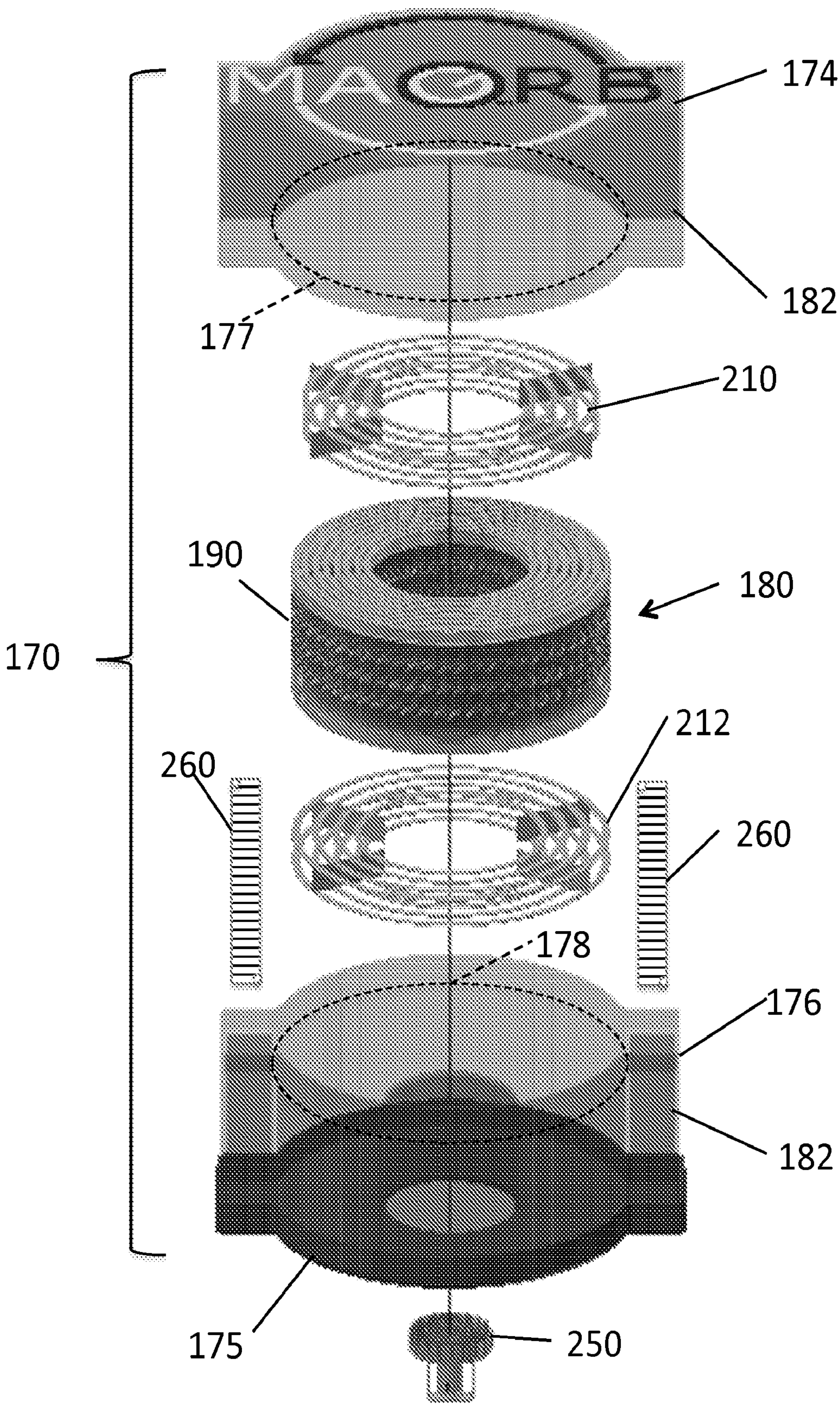

MAGORB
174
182
177
210
190
180
170
212
260
260
178
176
182
175
250

Figure 17

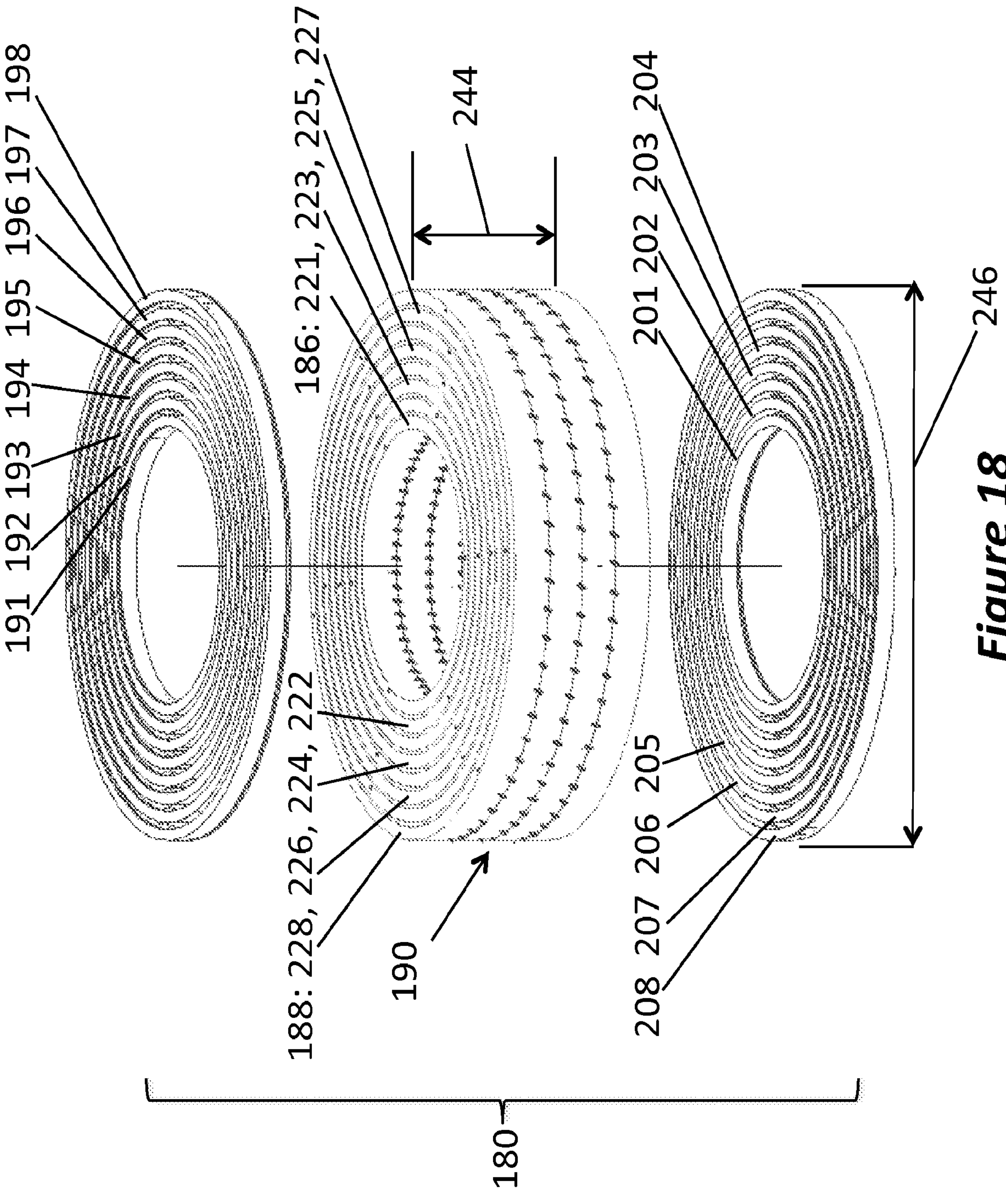

191 192 193 194 195 196 197 198
186: 221, 223, 225, 227
244
201 202 203 204
246
188: 228, 226, 224, 222
190
205 206 207 208
180

Figure 18

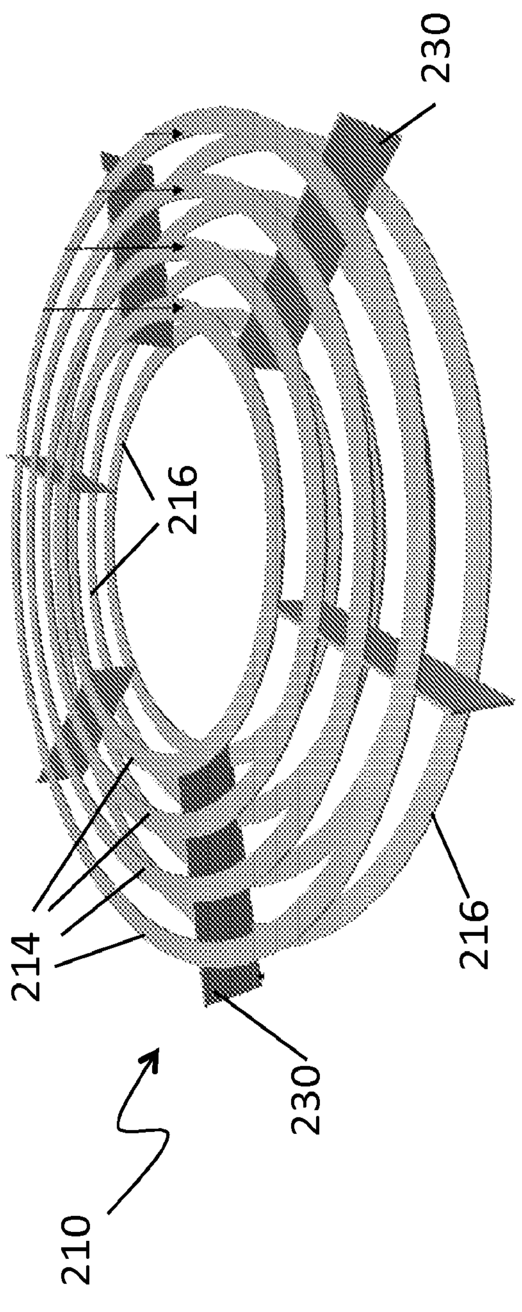


Figure 19

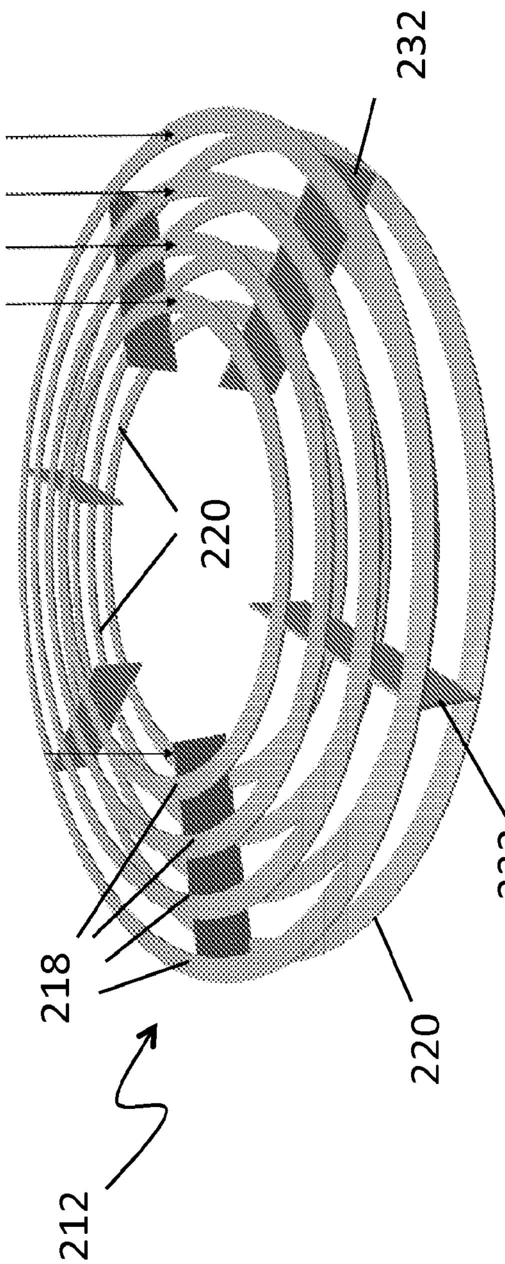


Figure 20

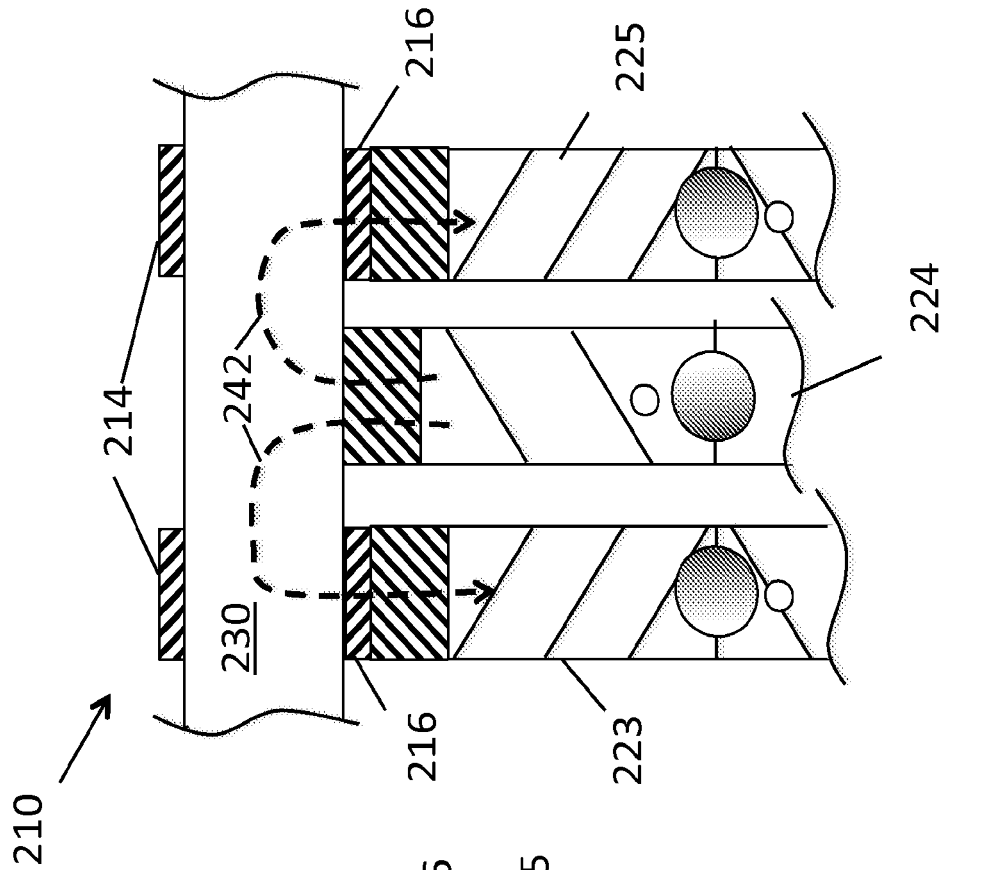


Figure 22

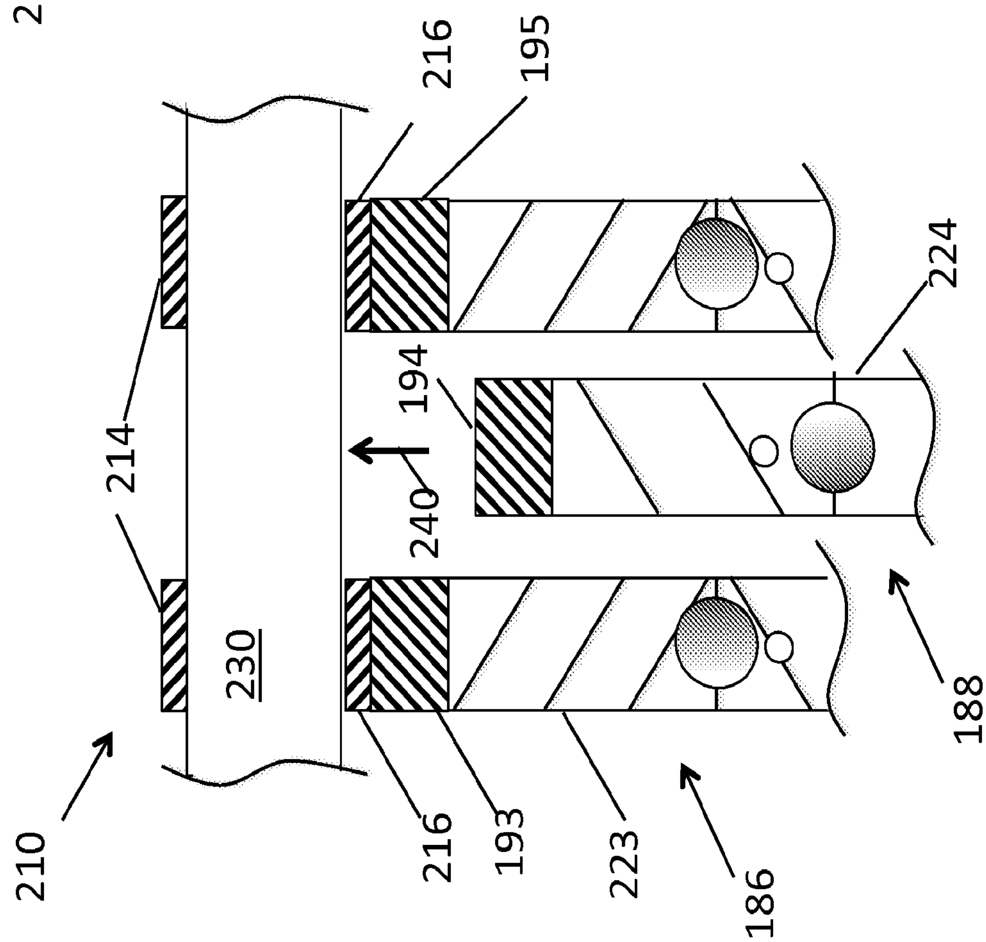


Figure 21

US008810050B1

(12) **United States Patent**
Reiner

(10) **Patent No.: US 8,810,050 B1**
(45) **Date of Patent: Aug. 19, 2014**

(54) **MAGNET POWERED MOTOR SYSTEM**

(71) Applicant: **Ben Reiner**, Brooklyn, NY (US)

(72) Inventor: **Ben Reiner**, Brooklyn, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 174 days.

(21) Appl. No.: **13/627,550**

(22) Filed: **Sep. 26, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/542,333, filed on Oct. 3, 2011.

(51) **Int. Cl.**
H02K 5/00 (2006.01)

(52) **U.S. Cl.**
USPC .... **290/1 A**

(58) **Field of Classification Search**
USPC .... 290/1 A; 335/306; 310/156.41
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,014,028 A 5/1991 Leupold
5,280,209 A * 1/1994 Leupold et al. 310/156.41
5,483,116 A 1/1996 Kusase et al.
5,790,006 A 8/1998 Abele et al.
6,252,330 B1 6/2001 Asao et al.
6,559,553 B2 * 5/2003 Yumita et al. 290/54
6,768,407 B2 7/2004 Kohda et al.
7,965,010 B2 6/2011 Froeschle et al.
8,099,964 B2 * 1/2012 Saito et al. 62/3.1

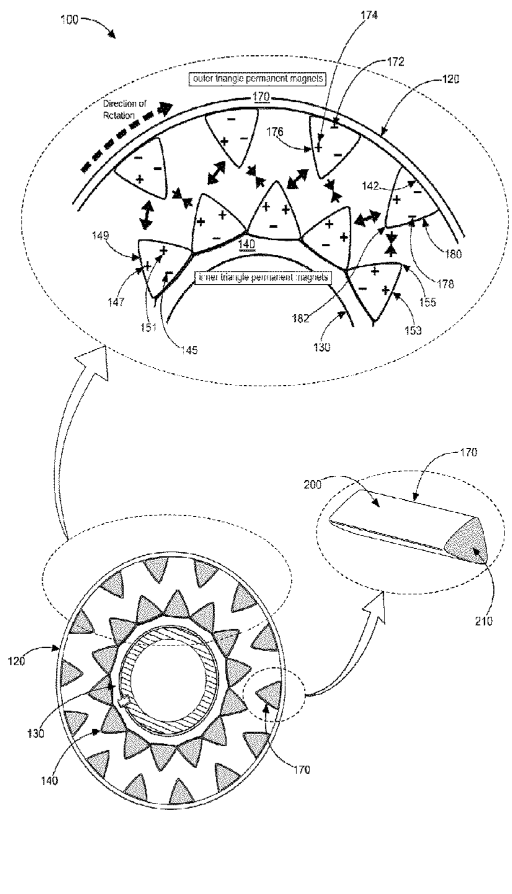
* cited by examiner

Primary Examiner — Tho D Ta
(74) *Attorney, Agent, or Firm* — RG Patent Consulting, LLC; Rachel Gilboy

(57) **ABSTRACT**

A magnet powered motor system is a motor powered by permanent magnets for inexpensively driving motorized apparatuses. The magnet bars have a triangular shaped cross-section and are adjacently mounted as a bar onto an inner and an outer carriage assembly. The inner carriage assembly may be stationary and the outer carriage assembly may rotate within a coil winding assembly having an outer housing which supports the coil, housing end plates, and bearings for the rotating element. The inner carriage assembly is rotationally locked to the cylindrical frame via a key and keyway but slides lengthwise on the cylindrical frame into and out of engagement with the outer carriage assembly to start and stop the motor. The facing inner and outer triangular shaped magnets comprise face angles that optimize magnetic force and have polarity arrangements that pull and simultaneously push the outer carriage assembly into rotation.

19 Claims, 5 Drawing Sheets



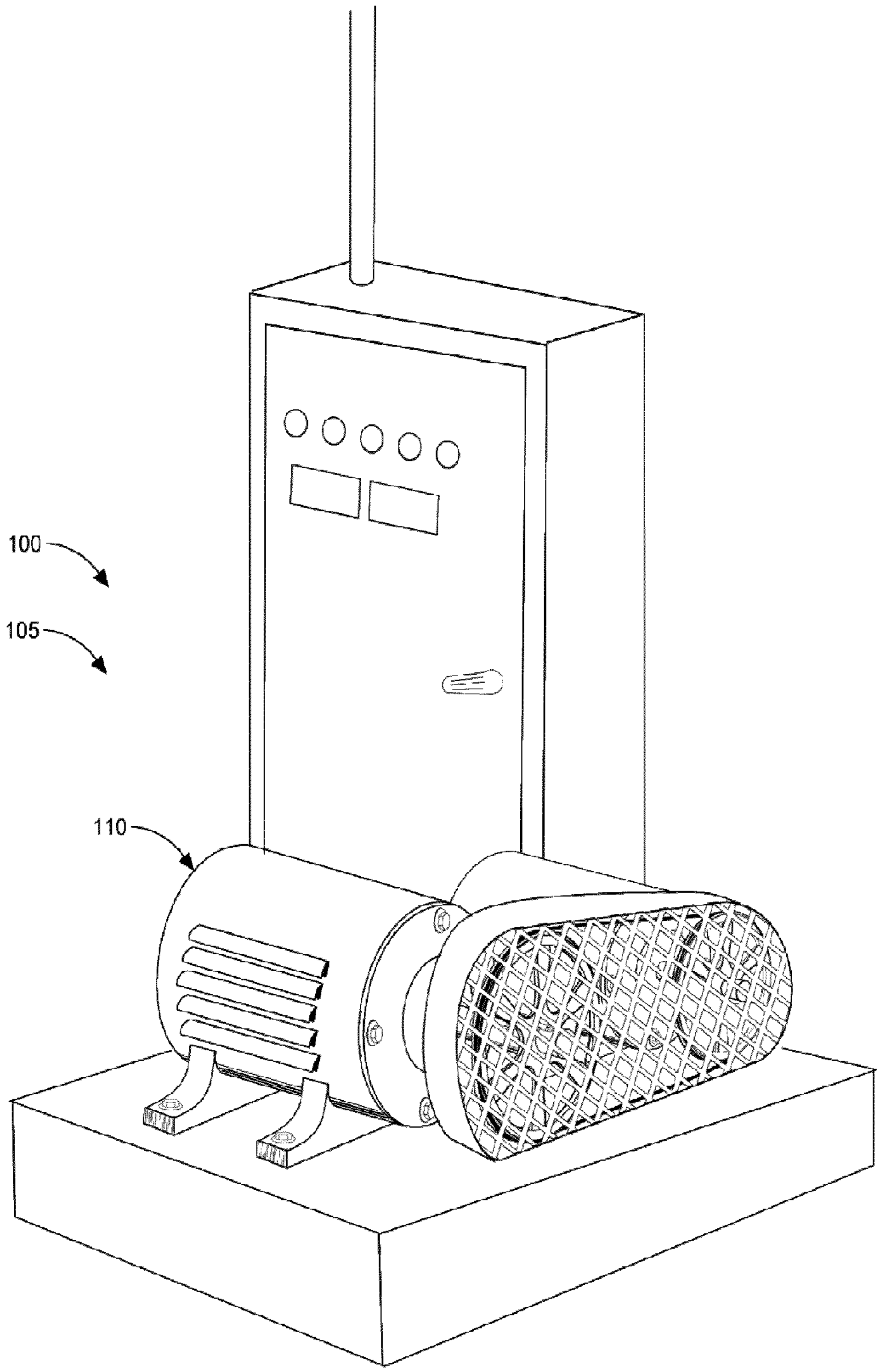


FIG. 1

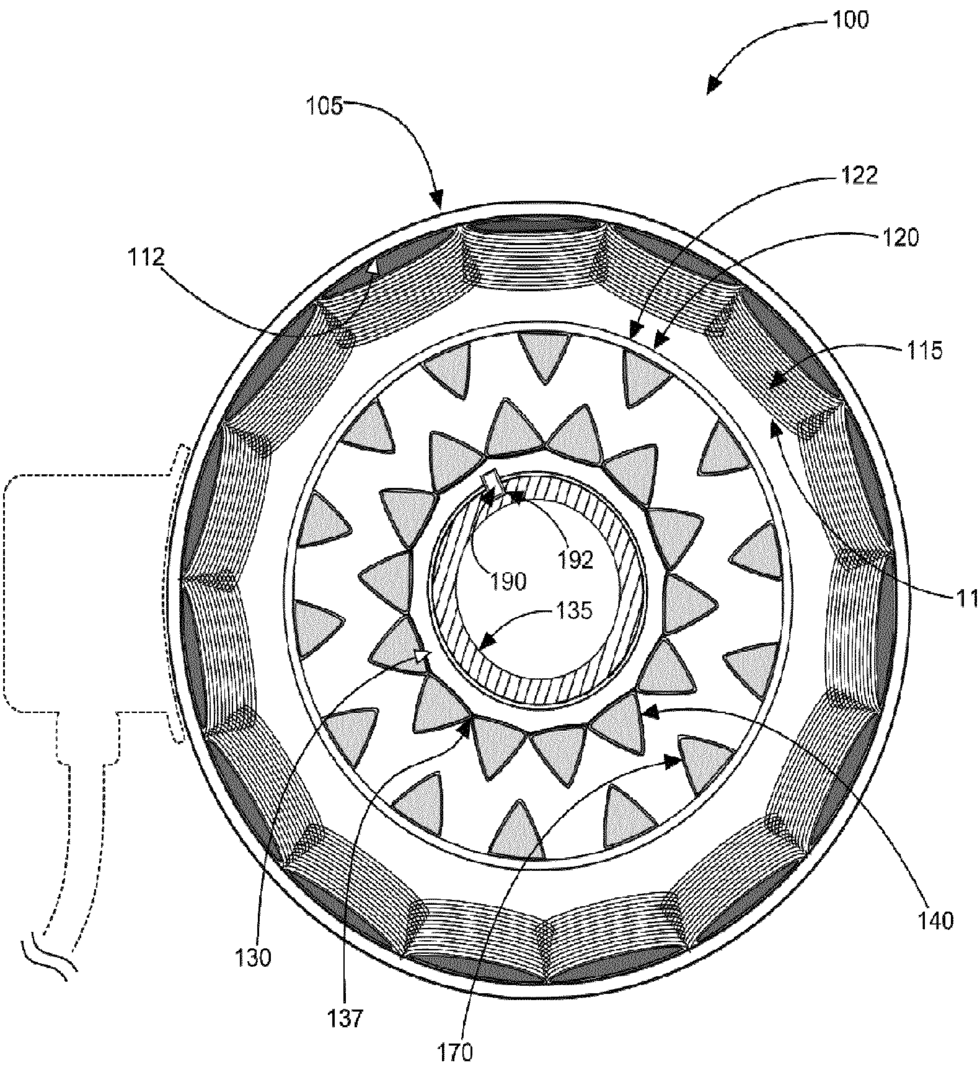


FIG. 2

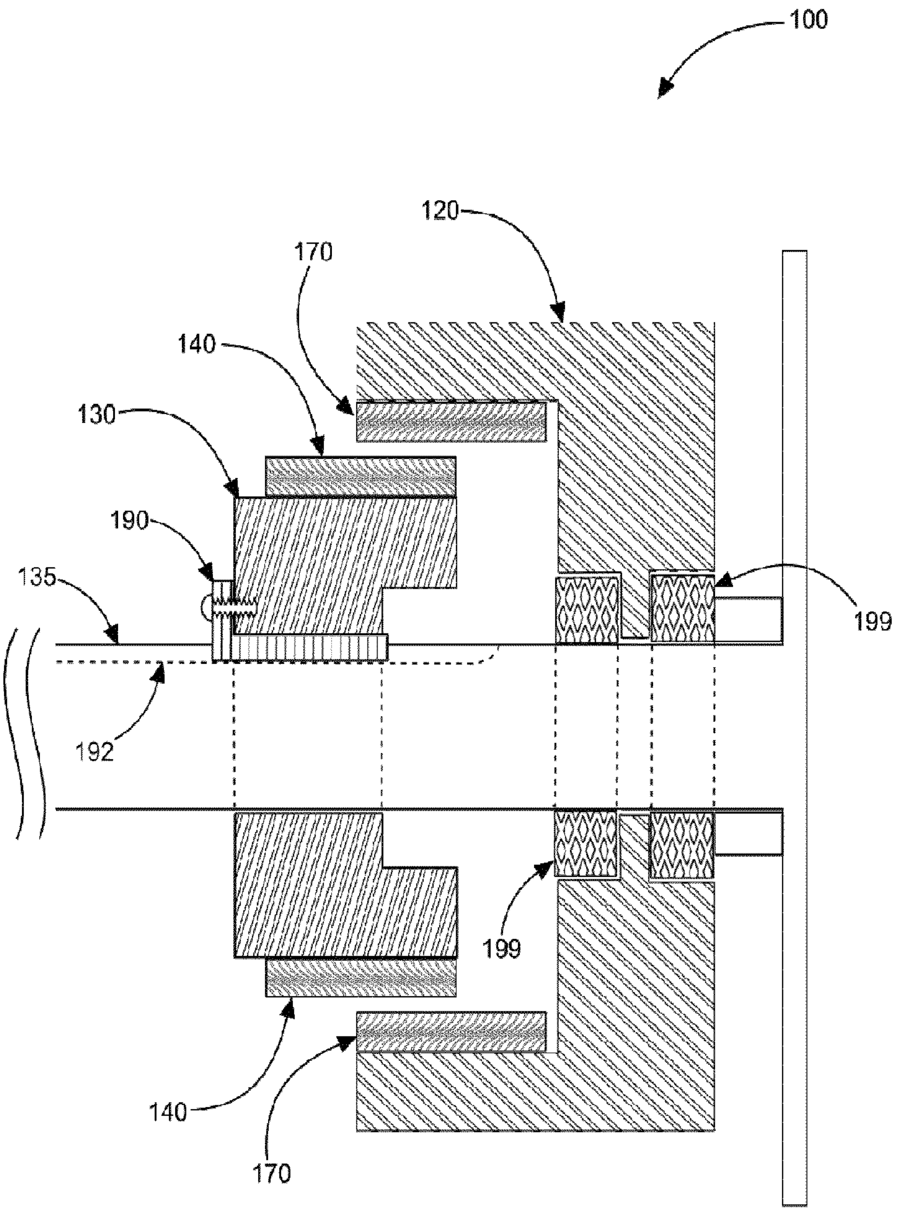


FIG. 3

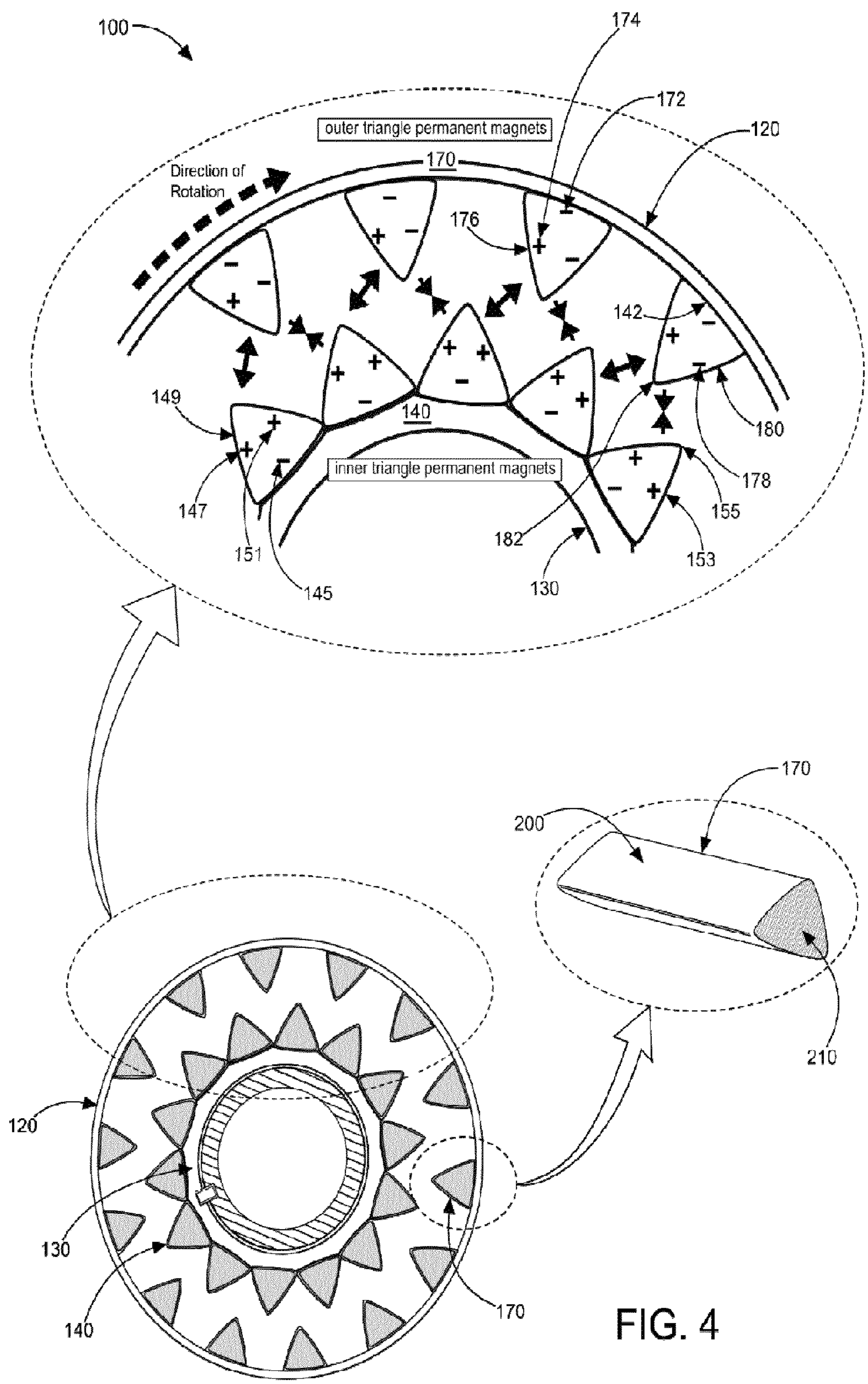

100
174
172
120
outer triangle permanent magnets
Direction of Rotation
170
176
142
149
140
180
inner triangle permanent magnets
178
147
155
182
151
153
145
130
170
200
210
120
130
140
170

FIG. 4

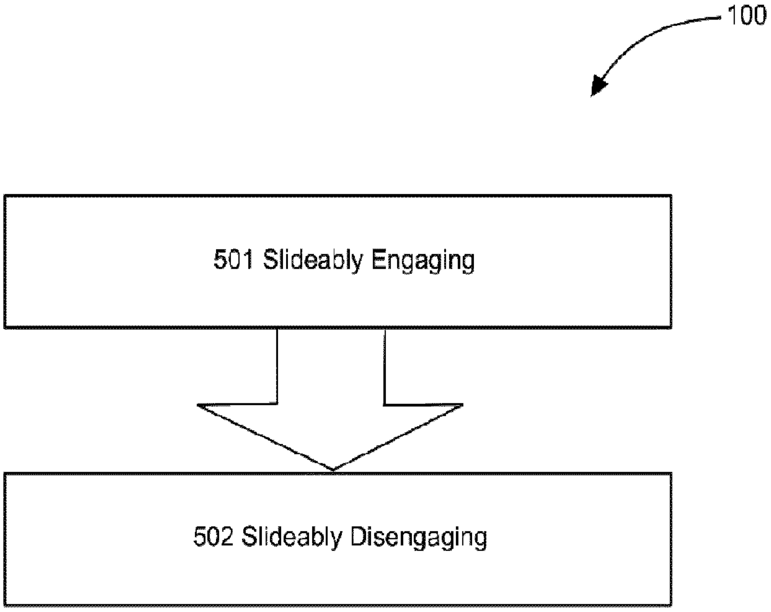


FIG. 5

MAGNET POWERED MOTOR SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

The present applications are related to and claims priority from prior provisional application Ser. No. 61/542,333 filed Oct. 3, 2011 which applications are incorporated herein by reference.

COPYRIGHT NOTICE

BACKGROUND OF THE INVENTION

The following includes information that may be useful in understanding the present invention(s). It is not an admission that any of the information provided herein is prior art, or material, to the presently described or claimed inventions, or that any publication or document that is specifically or implicitly referenced is prior art.

1. Field of the Invention

The present invention relates generally to the field of motors and more specifically relates to a magnet powered motors.

2. Description of the Related Art

A magnet is a material or object that produces a magnetic field. This magnetic field is invisible but is responsible for the most notable property of a magnet: a force that pulls on other ferromagnetic materials, such as iron, and attracts or repels other magnets. A permanent magnet is an object made from a material that is magnetized and creates its own persistent magnetic field. Permanent magnets are made from "hard" ferromagnetic materials such as alnico and ferrite that are subjected to special processing in a powerful magnetic field during manufacture, to align their internal microcrystalline structure, making them powerful and very hard to demagnetize.

It has long been desired to create an electricity generator using a magnetic field as its driving force, or the magnetic flux density of the magnets. Every magnet has a positive and a negative pole which can't be seen but the effects of it can be seen as it attracts other ferromagnetic materials or repels the like poles of other magnets. Like poles, (positive to positive or negative to negative) of different magnets repel each other while opposite poles attract. A set of magnets arranged at particular angles to each other in relation to the positive and negative poles of each magnet, may conceivably be use to create such a machine. Many individuals have tried to create an auto-rotating device to produce power. A mass produced highly developed permanent magnet electricity generator would usher in a new era in the modern world and possibly free the world a majority of the need for fossil fuels. Magnets can be made by just about anyone, even a home owner. Power and petroleum products used to drive motors are expensive, thus the status quo is not desirable. It is desirable to have an efficient motor able to run via magnetic power.

Various attempts have been made to solve the above-mentioned problems such as those found in U.S. Pat. Nos. 6,768,407; 5,014,028; 7,965,010; 5,790,006; 6,252,330; and 5,483,116. This prior art is representative of magnetic motors. None of the above inventions and patents, taken either singly or in combination, is seen to describe the invention as claimed.

Ideally, a magnet powered motor should provide efficient power, and yet, would operate reliably and be manufactured at a modest expense. Thus, a need exists for a reliable magnet powered motor system to produce electricity and to avoid the above-mentioned problems.

BRIEF SUMMARY OF THE INVENTION

In view of the foregoing disadvantages inherent in the known magnetic motor art, the present invention provides a novel magnet powered motor system. The general purpose of the present invention, which will be described subsequently in greater detail, is to provide decreased utility consumption.

In general terms, the magnet powered motor system is a motor powered by permanent magnets for inexpensively driving motorized apparatuses. The magnet bars have a triangular shaped cross-section and are adjacently mounted into an inner and an outer carriage assembly. The inner carriage assembly may be stationary and the outer carriage assembly may rotate within a coil winding assembly having an outer housing which supports the coil, housing end plates, and bearings for the rotating element. The inner carriage assembly is rotationally locked to the cylindrical frame via a key and keyway but slides lengthwise on the cylindrical frame into and out of engagement with the outer carriage assembly to start and stop the motor. The facing inner and outer triangular shaped magnets comprise face angles that optimize magnetic force, removing the guesswork for having to adjust and readjust magnet angles, having polarity arrangements that pull and simultaneously push the outer carriage assembly into rotation and help keep it in motion.

A magnet powered motor system, as disclosed herein, in a preferred embodiment may comprise: a magnetic motor assembly having an outer housing with an inner coil, an outer carriage assembly having a plurality of outer triangular permanent magnets, an inner carriage assembly having a cylindrical frame, and a plurality of inner triangular permanent magnets. The inner coil is at least one electrical winding evenly distributed and wound about an inner circumference of the outer housing to create at least one electrical circuit. The outer carriage assembly is concentrically spaced and located within an inner periphery of the inner coil. The outer periphery of the outer carriage assembly is spaced such that the outer carriage assembly is able to rotate within the inner coil. The plurality of outer triangular permanent magnets are removably affixed to the inner circumference of the outer carriage assembly so that the outer triangular permanent magnets are adjacently and evenly spaced in relation to each other about the inner circumference.

The cylindrical frame of the inner carriage assembly is concentrically located within the inner carriage assembly and may be in a stationary relationship with the inner coil and the outer housing. The plurality of inner triangular permanent magnets are mounted about the outer-periphery-surface of the inner carriage assembly such that the inner triangular permanent magnets are adjacently and evenly spaced in relation to each other having a uniform spacing that is constantly maintained between the plurality of inner triangular permanent magnets and the plurality of outer triangular permanent magnets while rotating.

The plurality of inner triangular permanent magnets comprise a negative pole located adjacent the inner carriage assembly at each base and a first positive pole located on a first face and a second positive pole located on a second face, both the first face and the second face approaching an apex (end tip). The plurality of outer triangular permanent magnets comprise a first negatively-charged-pole located adjacent the outer carriage assembly and a positively-charged-pole located on a left face and a second negatively-charged-pole located on a right face, both the left face and the right face approaching a pinnacle (end tip).

The plurality of first positive poles of the inner triangular permanent magnets are oriented parallel to the plurality of second negatively-charged-poles of the outer triangular permanent magnets and the plurality of second positive poles of the inner triangular permanent magnets are also disposed parallel to the plurality of positively-charged-poles of the outer triangular permanent magnets. This orientation is desirable such that a repelling force is caused by adjacent polarities which are alike between the left face(s) and the second face(s), the inner triangular permanent magnets and the outer triangular permanent magnets thereby causes a pushing action on one another. The polarities of the inner triangular permanent magnets and the outer triangular permanent magnets as related between the right face(s) and the first face(s) are such that the polarity is unlike causing an attracting force. The repelling force is followed by the attracting force in conjunction causing useful rotation for providing power with increased efficiency.

The left faces and the right faces of the plurality of outer triangular permanent magnets and the first faces and the second faces of the plurality of inner triangle permanent magnets each further have face angles such that during the rotation of the outer carriage assembly, the face angles of the outer triangular permanent magnets become momentarily adjacently parallel to the inner triangular permanent magnets. During the rotation of the outer carriage assembly, as the face angles of the outer triangular permanent magnets and the face angles of the plurality of inner triangular permanent magnets become adjacently parallel, wherein the repelling force is at the strongest condition. The plurality of outer triangular permanent magnets and the plurality of inner triangular permanent magnets each further comprise a bar having three longitudinal faces and two end faces. The outer triangular permanent magnets and the inner triangular permanent magnets are not interchangeable with each other and the outer magnets are greater in number than the inner so as to achieve proper desired positioning relative to each other.

The inner carriage assembly is able to slide longitudinally along the cylindrical frame such that the plurality of inner triangular permanent magnets are brought into a close adjacent relationship (to engage) and inversely out of the close adjacent relationship to the plurality of outer triangular permanent magnets (to disengage). The magnetic motor assembly is able to provide a rotational motion useable to power an electricity generator when the inner carriage assembly and the outer carriage assembly are in an engaged condition. When the plurality of inner triangular permanent magnets is slidably placed into a close adjacent relationship to the outer triangular permanent magnets, the magnetic motor assembly is thereby placed in an operating condition. When the plurality of inner triangular permanent magnets is slideably removed from the close adjacent relationship to the outer triangular permanent magnets, the magnetic motor assembly is thereby placed in a non-operating condition. In this way operation and non-operation can be controlled by an operator.

The inner carriage assembly preferably comprises a key and a keyway such that the inner carriage assembly is rotationally locked to the inner cylinder; the inner cylinder is thereby in a stationary relationship with the outer housing. The outer carriage assembly is able to rotate and the inner carriage assembly is stationary with the outer housing and coil in preferred embodiments. The inner carriage assembly is cylindrical and carried by at least one bearing. The outer carriage assembly is cylindrical and comprises a drum (shape) also carried by bearing(s). The cylindrical frame may comprise a shaft. The outer carriage assembly is rotationally supported via the bearing mounted to the cylindrical frame of the inner carriage assembly.

A method of use for the magnet powered motor system may include slideably engaging the plurality of outer triangular permanent magnets with the plurality of inner triangular permanent magnets to start the magnetic motor assembly, and slideably disengaging the plurality of outer triangular permanent magnets with the plurality of inner triangular permanent magnets to stop the magnetic motor assembly.

The present invention holds significant improvements and serves as a magnet powered motor system. For purposes of summarizing the invention, certain aspects, advantages, and novel features of the invention have been described herein. It is to be understood that not necessarily all such advantages may be achieved in accordance with any one particular embodiment of the invention. Thus, the invention may be embodied or carried out in a manner that achieves or optimizes one advantage or group of advantages as taught herein without necessarily achieving other advantages as may be taught or suggested herein. The features of the invention which are believed to be novel are particularly pointed out and distinctly claimed in the concluding portion of the specification. These and other features, aspects, and advantages of the present invention will become better understood with reference to the following drawings and detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The figures which accompany the written portion of this specification illustrate embodiments and method(s) of use for the present invention; magnet powered motor system, constructed and operative according to the teachings of the present invention.

FIG. **1** shows a perspective view illustrating an in use condition of a magnet powered motor system according to an embodiment of the present invention.

FIG. **2** is a perspective view illustrating an end view of the magnet powered motor system according to an embodiment of the present invention of FIG. **1**.

FIG. **3** is a perspective view illustrating a cutaway view of the magnet powered motor system according to an embodiment of the present invention of FIG. **1**.

FIG. **4** is a perspective view illustrating magnet arrangement and magnet polarity arrangements of the magnet powered motor system according to an embodiment of the present invention of FIG. **1**.

FIG. **5** is a flowchart illustrating a method of use of the magnet powered motor system according to an embodiment of the present invention of FIGS. **1-4**.

The various embodiments of the present invention will hereinafter be described in conjunction with the appended drawings, wherein like designations denote like elements.

DETAILED DESCRIPTION

As discussed above, embodiments of the present invention relate to a motor device and more particularly to a magnet powered motor system as used to power rotating equipment and lower the cost of utility inputs.

In greater detail now, referring to the drawings by numerals of reference, there is shown in FIG. **1**, a perspective view illustrating an in use condition of magnet powered motor system **100** according to an embodiment of the present invention.

Magnet powered motor system **100** may comprise magnetic motor assembly **105** comprising outer housing **110** having inner coil **115**, outer carriage assembly **120** having a plurality of outer triangular permanent magnets **170**, inner carriage assembly **130** having cylindrical frame **135**, and a plurality of inner triangular permanent magnets **140**. Inner coil **115** comprises at least one electrical winding evenly distributed and wound about inner circumference **112** of outer housing **110** to create at least one electrical circuit.

Outer carriage assembly **120** is concentrically spaced and located within inner periphery **117** of inner coil **115**, and outer periphery **122** of outer carriage assembly **120** is spaced such that outer carriage assembly **120** is able to rotate within inner coil **115**. The plurality of outer triangular permanent magnets **170** are removably affixed to inner circumference of carriage assembly such that outer triangular permanent magnets **170** are adjacently and evenly spaced in relation to each other about inner circumference **112**. Cylindrical frame **135** of inner carriage assembly **130** is concentrically mounted within inner carriage assembly **130** such that cylindrical frame **135** is in a stationary relationship with inner coil **115** and outer housing **110** as shown in the subsequent figures.

The plurality of inner triangular permanent magnets **140** are mounted about outer-periphery-surface **137** of inner carriage assembly **130** such that inner triangular permanent magnets **140** are adjacently and evenly spaced in relation to each other having a uniform spacing that is constantly maintained between the plurality of inner triangular permanent magnets **140** and the plurality of outer triangular permanent magnets **170** while rotating (as shown in FIG. **2**). The plurality of inner triangular permanent magnets **140** comprise negative poles **145** located adjacent inner carriage assembly **130** at base **142** and first positive pole **147** located on first face **149** and second positive pole **151** located on second face **153**, both first face **149** and second face **153** approaching an apex **155**. Apex **155** is located perpendicular to base **142**, base **142** mounted flat against inner carriage assembly **130** in preferred embodiments, as shown in FIGS. **2** and **4**.

The plurality of outer triangular permanent magnets **170** comprise first negatively-charged-poles **172** (shown in FIG. **4**) located adjacent outer carriage assembly **120** and positively-charged-pole **174** located on left face **176** and second negatively-charged-pole **178** located on right face **180**; both left face **176** and right face **180** approaching pinnacle **182**. The plurality of first positive pole(s) **147** of inner triangular permanent magnets **140** are oriented parallel to the plurality of second negatively-charged-pole(s) **178** of outer triangular permanent magnets **170** and the plurality of second positive pole(s) **151** of inner triangular permanent magnets **140** are also disposed parallel to the plurality of positively-charged-poles **174** of outer triangular permanent magnets **170** such that a repelling force is caused by adjacent polarities which are alike between left face(s) **176** and second face(s) **153**. In this way inner triangular permanent magnets **140** and outer triangular permanent magnets **170** thereby are able to cause a pushing action on one another. The polarities of inner triangular permanent magnets **140** and outer triangular permanent magnets **170** as related between right face(s) **180** and first face(s) **149** are such that the polarities are unlike, causing an attracting force and a repelling force that is followed by an attracting force in conjunction causing useful rotation for providing power with increased efficiency.

Referring now to FIG. **2**, a perspective view illustrating an end view of (looking internally into) magnet powered motor system **100** according to an embodiment of the present invention of FIG. **1**.

Left face(s) **176** and right face(s) **180** of the plurality of outer triangular permanent magnets **170**, first face(s) **149**, and second face(s) **153** of the plurality of inner triangular permanent magnets **140** each further comprise face angles such that during rotation of outer carriage assembly **120**, the face angles of outer triangular permanent magnets **170** become momentarily adjacently parallel to inner triangular permanent magnets **140**. Inner carriage assembly **130** may comprise key **190** and keyway **192** (shown in FIG. **3**) such that inner carriage assembly **130** is rotationally locked to cylindrical frame **135**, cylindrical frame **135** (which is preferably a shaft) thereby in a stationary relationship with outer housing **110**. Inner carriage assembly **130** inversely may be able to rotate and outer carriage assembly **120** may be stationary with outer housing **110** in certain embodiments. Outer carriage assembly **120** is able to rotate and inner carriage assembly **130** is stationary with outer housing **110** in a preferred embodiment. Outer carriage assembly **120** may be cylindrical and comprise a drum (shape) carried by at least one bearing **199**, also alluded to in FIG. **3**.

Referring now to FIG. **3**, a perspective view illustrating a cutaway view of magnet powered motor system **100** according to an embodiment of the present invention of FIG. **1**.

The plurality of outer triangular permanent magnets **170** and the plurality of inner triangular permanent magnets **140** each further comprise a (pyramidal shaped) bar (shown in FIG. **4**) having three longitudinal faces **200** and two end faces **210**. Magnetic motor assembly **105** is able to provide a rotational motion that is able to be used to power an electricity generator when inner carriage assembly **130** and outer carriage assembly **120** is in an engaged condition. Inner carriage assembly **130** is able to slide longitudinally along cylindrical frame **135** such that the plurality of inner triangular permanent magnets **140** are brought into a close adjacent relationship and inversely out of a close adjacent relationship to the plurality of outer triangular permanent magnets **170**. The plurality of inner triangular permanent magnets **140** is slidably placed into a close adjacent relationship to outer triangular permanent magnets **170**; magnetic motor assembly **105** is thereby placed in an operating condition.

The plurality of inner triangular permanent magnets **140** is slideably removable from a close adjacent relationship to outer triangular permanent magnets **170**; magnetic motor assembly **105** is thereby placed in a non-operating condition. Inner carriage assembly **130** may comprise key **190** and keyway **192** such that inner carriage assembly **130** is rotationally locked to cylindrical frame **135**; cylindrical frame **135** thereby is in a stationary relationship with outer housing **110**. Inner carriage assembly **130** may comprise an armature in some embodiments that is rotationally powered via a magnetic repulsion force able to generate electricity when inner carriage assembly **130** and outer carriage assembly **120** is in an engaged condition. Cylindrical frame **135** may comprise a solid shaft in some embodiments. Outer carriage assembly **120** is rotationally supported via bearing **199** mounted to cylindrical frame **135** of inner carriage assembly **130**.

Referring now to FIG. **4**, a perspective view illustrating the preferred magnet arrangement and magnet polarity arrangements of magnet powered motor system **100** according to an embodiment of the present invention of FIG. **1**.

Left face(s) **176** and right face(s) **180** of the plurality of outer triangular permanent magnets **170** and first face(s) **149** and second face(s) **153** of the plurality of inner triangular permanent magnets **140** each comprise face angles such that during a rotation of outer carriage assembly **120**, the face angles of outer triangular permanent magnets **170** become momentarily adjacently parallel to inner triangular permanent magnets **140**. During rotation of outer carriage assembly **120**, as the face angles of outer triangular permanent magnets **170** and the face angles of the plurality of inner triangular permanent magnets **140** become adjacently parallel, the repelling force is at the strongest condition. Outer triangular permanent magnets **170** and inner triangular permanent magnets **140** are not interchangeable with each other, as previously mentioned. Apex **155** is located perpendicular to base **142**, base **142** mounted flat against inner carriage assembly **130**. The present invention may comprise a powering means or a power assisting means (kinetic energy from external sources may be added in to start or maintain operation).

Referring now to FIG. **5**, showing a flowchart illustrating method of use 500 for magnet powered motor system **100** according to an embodiment of the present invention of FIGS. **1-4**. A method of use for magnet powered motor system **100** may comprise the steps of: step one **501**, slideably engaging the plurality of outer triangular permanent magnets **170** with the plurality of inner triangular permanent magnets **140** to start magnetic motor assembly **105**; and step two **502**, slideably disengaging the plurality of outer triangular permanent magnets **170** with the plurality of inner triangular permanent magnets **140** to stop magnetic motor assembly **105**.

It should be noted that the steps described in the method of use can be carried out in many different orders according to user preference. Upon reading this specification, it should be appreciated that, under appropriate circumstances, considering such issues as design preference, user preferences, marketing preferences, cost, structural requirements, available materials, technological advances, etc., other methods of use arrangements such as, for example, different orders within above-mentioned list, elimination or addition of certain steps, including or excluding certain maintenance steps, etc., may be sufficient.

The embodiments of the invention described herein are exemplary and numerous modifications, variations and rearrangements can be readily envisioned to achieve substantially equivalent results, all of which are intended to be embraced within the spirit and scope of the invention. Further, the purpose of the foregoing abstract is to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientist, engineers and practitioners in the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and essence of the technical disclosure of the application.

What is claimed is new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A magnet powered motor system comprising:

a magnetic motor assembly having:

an outer housing having an inner coil;

an outer carriage assembly having:

a plurality of outer triangular permanent magnets;

an inner carriage assembly having:

a cylindrical frame; and

a plurality of inner triangular permanent magnets; and

wherein said inner coil is at least one electrical winding evenly distributed and wound about an inner circumference of said outer housing to create at least one electrical circuit;

wherein said outer carriage assembly is concentrically spaced and located within an inner periphery of said inner coil, an outer periphery of said outer carriage assembly is spaced such that said outer carriage assembly is able to rotate within said inner coil;

wherein said plurality of said outer triangular permanent magnets are removably affixed to an inner circumference of said outer carriage assembly such that said outer triangular permanent magnets are adjacently and evenly spaced in relation to each other about of said carriage assembly;

wherein said cylindrical frame of said inner carriage assembly is concentrically mounted within said inner carriage assembly such that said cylindrical frame is in a stationary relationship with said inner coil and said outer housing;

wherein said plurality of inner triangular permanent magnets are mounted about an outer-periphery-surface of said inner carriage assembly such that said inner triangular permanent magnets are adjacently and evenly spaced in relation to each other such that a uniform spacing is constantly maintained between said plurality of inner triangular permanent magnets and said plurality of outer triangular permanent magnets while rotating;

wherein said plurality of inner triangular permanent magnets comprise a negative pole located adjacent said inner carriage assembly at a base and a first positive pole located on a first face and a second positive pole located on a second face, both of said first face and said second face approaching an apex;

wherein said apex is located perpendicular to said base, said base mounted flat on said inner carriage assembly;

wherein said plurality of outer triangular permanent magnets comprise a first negatively-charged-pole located adjacent said outer carriage assembly and a positively-charged-pole located on a left face and a second negatively-charged-pole located on a right face, both of said left face and said right face approaching a pinnacle;

wherein said plurality of first positive poles of said inner triangular permanent magnets are oriented parallel to said plurality of second negatively-charged-poles of said outer triangular permanent magnets and said plurality of second positive poles of said inner triangular permanent magnets are also disposed parallel to said plurality of positively-charged-poles of said outer triangular permanent magnets such that a repelling force is caused by adjacent polarities which are alike between said left face(s) and said second face(s), said inner triangular permanent magnets and said outer triangular permanent magnets thereby causes a pushing action on one another;

wherein said polarities of said inner triangular permanent magnets and said outer triangular permanent magnets as related between said right face(s) and said first face(s) are such that said polarity is unlike causing an attracting force; and

wherein said repelling force is followed by said attracting force in conjunction causing useful rotation for providing power with increased efficiency.

2. The magnet powered motor system of claim **1** wherein said inner carriage assembly is able to rotate and said outer carriage assembly is stationary with said outer housing.

3. The magnet powered motor system of claim **1** wherein said outer carriage assembly is able to rotate and said inner carriage assembly is stationary with said outer housing.

4. The magnet powered motor system of claim **1** wherein said inner carriage assembly is cylindrical and carried by at least one bearing.

5. The magnet powered motor system of claim **1** wherein said cylindrical frame comprises a shaft.

6. The magnet powered motor system of claim **1** wherein said left faces and said right faces of said plurality of outer triangular permanent magnets and said first faces and said second faces of said plurality of inner triangle permanent magnets each further comprise face angles such that during said rotation of said outer carriage assembly, said face angles of said outer triangular permanent magnets become momentarily adjacently parallel to said inner triangular permanent magnets.

7. The magnet powered motor system of claim **6** wherein during said rotation of said outer carriage assembly, as said face angles of said outer triangular permanent magnets and said face angles of said plurality of inner triangular permanent magnets become adjacently parallel, said repelling force is at a strongest condition.

8. The magnet powered motor system of claim **6** wherein said plurality of outer triangular permanent magnets and said plurality of inner triangular permanent magnets each further comprise a bar comprising three longitudinal faces and two end faces.

9. The magnet powered motor system of claim **8** wherein said outer triangular permanent magnets and said inner triangular permanent magnets are not interchangeable with each other.

10. The magnet powered motor system of claim **9** wherein said apex is located perpendicular to said base, said base mounted flat on said inner carriage assembly.

11. The magnet powered motor system of claim **1** wherein said inner carriage assembly is able to slide longitudinally along said cylindrical frame such that said plurality of inner triangular permanent magnets are brought into a close adjacent relationship and inversely out of said close adjacent relationship to said plurality of outer triangular permanent magnets.

12. The magnet powered motor system of claim **11** wherein said plurality of inner triangular permanent magnets is slidably placed into said close adjacent relationship to said outer triangular permanent magnets, said magnetic motor assembly is thereby placed in an operating condition.

13. The magnet powered motor system of claim **12** wherein said plurality of inner triangular permanent magnets is slideably removed from said close adjacent relationship to said outer triangular permanent magnets, said magnetic motor assembly is thereby placed in a non-operating condition.

14. The magnet powered motor system of claim **13** wherein said inner carriage assembly comprises a key and a keyway such that said inner carriage assembly is rotationally locked to said inner cylinder, said inner cylinder thereby in a stationary relationship with said outer housing.

15. The magnet powered motor system of claim **1** wherein said magnetic motor assembly is able to provide a rotational motion able to be used to power an electricity generator when said inner carriage assembly and said outer carriage assembly is in an engaged condition.

16. The magnet powered motor system of claim **15** wherein said inner carriage assembly comprises an armature and is able to rotate via a magnetic repulsion force to generate electricity when said inner carriage assembly and said outer carriage assembly is in said engaged condition.

17. The magnet powered motor system of claim **1** wherein said outer carriage assembly is cylindrical and comprises a drum carried by at least one bearing.

18. The magnet powered motor system of claim **17** wherein said outer carriage assembly is rotationally supported via said bearing mounted to said cylindrical frame of said inner carriage assembly.

19. A magnet powered motor system comprising:
a magnetic motor assembly having:
an outer housing having an inner coil;
an outer carriage assembly having:
a plurality of outer triangular permanent magnets;
an inner carriage assembly having:
a cylindrical frame; and
a plurality of inner triangular permanent magnets; and
wherein said inner coil is at least one electrical winding evenly distributed and wound about an inner circumference of said outer housing to create at least one electrical circuit;
wherein said outer carriage assembly is concentrically spaced and located within an inner periphery of said inner coil, an outer periphery of said outer carriage assembly is spaced such that said outer carriage assembly is able to rotate within said inner coil;
wherein said plurality of said outer triangular permanent magnets are removably affixed to an inner circumference of said carriage assembly such that said outer triangular permanent magnets are adjacently and evenly spaced in relation to each other about said inner circumference of said outer carriage assembly;
wherein said cylindrical frame of said inner carriage assembly is concentrically mounted within said inner carriage assembly such that said cylindrical frame is in a stationary relationship with said inner coil and said outer housing;
wherein said plurality of inner triangular permanent magnets are mounted about an outer-periphery-surface of said inner carriage assembly such that said inner triangular permanent magnets are adjacently and evenly spaced in relation to each other such that a uniform spacing is constantly maintained between said plurality of inner triangular permanent magnets and said plurality of outer triangular permanent magnets while rotating;
wherein said plurality of inner triangular permanent magnets comprise a negative pole located adjacent said inner carriage assembly at a base and a first positive pole located on a first face and a second positive pole located on a second face, both of said first face and said second face approaching an apex;
wherein said plurality of outer triangular permanent magnets comprise a first negatively-charged-pole located adjacent said outer carriage assembly and a positively-charged-pole located on a left face and a second negatively-charged-pole located on a right face, both of said left face and said right face approaching a pinnacle;
wherein said plurality of first positive poles of said inner triangular permanent magnets are oriented parallel to said plurality of second negatively-charged-poles of said outer triangular permanent magnets and said plurality of second positive poles of said inner triangular permanent magnets are also disposed parallel to said plurality of positively-charged-poles of said outer triangular permanent magnets such that a repelling force is caused by adjacent polarities which are alike between said left face(s) and said second face(s), said inner triangular permanent magnets and said outer triangular permanent magnets thereby causes a pushing action on one another;
wherein said polarities of said inner triangular permanent magnets and said outer triangular permanent magnets as related between said right face(s) and said first face(s) are such that said polarity is unlike causing an attracting force;
wherein said repelling force is followed by said attracting force in conjunction causing useful rotation for providing power with increased efficiency;

wherein said left faces and said right faces of said plurality of outer triangular permanent magnets and said first faces and said second faces of said plurality of inner triangle permanent magnets each further comprise face angles such that during said rotation of said outer carriage assembly, said face angles of said outer triangular permanent magnets become momentarily adjacently parallel to said inner triangular permanent magnets;

wherein during said rotation of said outer carriage assembly, as said face angles of said outer triangular permanent magnets and said face angles of said plurality of inner triangular permanent magnets become adjacently parallel, said repelling force is at a strongest condition;

wherein said plurality of outer triangular permanent magnets and said plurality of inner triangular permanent magnets each further comprise a pyramidal-shaped bar comprising three longitudinal faces and two end faces;

wherein said outer triangular permanent magnets and said inner triangular permanent magnets are not interchangeable with each other;

wherein said inner carriage assembly is able to slide longitudinally along said cylindrical frame such that said plurality of inner triangular permanent magnets are brought into a close adjacent relationship and inversely out of said close adjacent relationship to said plurality of outer triangular permanent magnets;

wherein said magnetic motor assembly is able to provide a rotational motion able to be used to power an electricity generator when said inner carriage assembly and said outer carriage assembly is in an engaged condition;

wherein said plurality of inner triangular permanent magnets is slidably placed into said close adjacent relationship to said outer triangular permanent magnets, said magnetic motor assembly is thereby placed in an operating condition;

wherein said plurality of inner triangular permanent magnets is slideably removed from said close adjacent relationship to said outer triangular permanent magnets, said magnetic motor assembly is thereby placed in a non-operating condition;

wherein said inner carriage assembly comprises a key and a keyway such that said inner carriage assembly is rotationally locked to said inner cylinder, said inner cylinder thereby in a stationary relationship with said outer housing;

wherein said outer carriage assembly is able to rotate and said inner carriage assembly is stationary with said outer housing;

wherein said inner carriage assembly is cylindrical and carried by at least one bearing;

wherein said outer carriage assembly is cylindrical and comprises a drum carried by at least one bearing;

wherein said cylindrical frame comprises a shaft;

wherein said outer carriage assembly is rotationally supported via said bearing mounted to said cylindrical frame of said inner carriage assembly; and

wherein said magnet powered motor system is useful for providing energy producing.

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