Adv Swapnil Jayantrao Gawande
(IN/PA-1587)

Office:Plot no 130,
C/o Dhatrak, Hanuman nagar,
Medical square, Nagpur.
Mob:9890333567

Resi:R9 harshnil, Eknath puram
near Shankar nagar, Amravati
Ph:0721-2566861
E-mail:- sjgawande@gmail.com

To
The controller of patents,
The patent office,
At Mumbai.

APPLICATION FOR PATENT ALONG WITH COMPLETE SPECIFICATION.

APPLICANT(S)

Name	Nationality	Address
Ingole Vijay Tulshiram	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Ashutosh Vijay	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Paritosh Vijay	Indian	104 Ganediwal layout, camp, Amravati-444602

Documents attached with the application:-

	Number of Pages
Form 1	3
Form 2	23
Form 3	1
Form 9	1
Form 18	1
Form 26	1
TOTAL	30 pages

Fee paid along with the application:-

1. Form 1 Rupees 1000(one thousand only)
2. Form 9 Rupees 2500(two thousand five hundred only)
3. Form 18 Rupees 2500(two thousand five hundred

TOTAL AMOUNT RUPEES 6000(SIX THOUSAND ONLY)

Mode of payment in Cash/Cheque/bank draft bearing no

FORM 1 (FOR OFFICE USE ONLY)

THE PATENT ACT 1970
(39 OF 1970)
And
The patent rules, 2003

Application number:
Filing date:
amount of fee paid:
CBR NO:

APPLICATION FOR GRANT OF PATENT
[See sec 7, 54,135 and rule20 (1)]

1 APPLICANT(S)

Name	Nationality	Address
Ingole Vijay Tulshiram	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Ashutosh Vijay	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Paritosh Vijay	Indian	104 Ganediwal layout, camp, Amravati-444602

2 Inventor(s)

Name	Nationality	Address
Ingole Vijay Tulshiram	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Ashutosh Vijay	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Paritosh Vijay	Indian	104 Ganediwal layout, camp, Amravati-444602

3. TITLE OF INVENTION

ELECTRICAL HOMOPOLAR LINEAR MOTOR.

4. ADDRESS FOR CORRESPONDANCE OF AUTHORISED PATENT AGENT IN INDIA :-

R 9 harshnil,Eknath puram
Near yogakshem coloney,
Amravati, Maharashtra

Ph: 0721-2566861
Mob: 9890333567
E-mail:-sjgawande@gmail.com

5. DECLARATION:

(i) Declaration by the inventors

We the above named inventors are the true and first inventors for this invention
Dated this 7th day of May 2010

Signature of the inventors

Name: (1) Ingole Vijay Tulshiram

(2) Ingole Ashutosh Vijay

(3) Ingole Paritosh Vijay

(ii) Declaration by the applicants

We the applicants hereby declare that:-
We are in possession of above mentioned invention.
The complete specification relating to the invention is filed with the application
There is no lawful ground of objection to the grant of patent to us.

Signature of the applicants.

Name: (1) Ingole Vijay Tulshiram

(2) Ingole Ashutosh Vijay

(3) Ingole Paritosh Vijay

6. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION

(a)Complete specification in duplicate

(b)Drawings in duplicate

(c) Statement and undertaking on form 3 in duplicate

(d) Abstract in duplicate

(e) Form number 26 Power of authorization to patent agent.

(f) Form number 9.

(g) Form number 18.

Fee Rs in Cash/Cheque/bank draft bearing no

Date on Bank.

We hereby declare that to the best our knowledge, information and belief the facts and the matter stated herein are correct and we request that the patent may be granted to us for the said invention.

Dated this 7th day of May 2010

Signature:

Name :(1) Ingole Vijay Tulshiram

(2) Ingole Ashutosh Vijay

(3) Ingole Paritosh Vijay

FORM 2

THE PATENT ACT 1970
(39 OF 1970)
AND
The patent rules, 2003

COMPLETE SPECIFICATION
(See section 10: rule 13)

1. TITLE OF INVENTION

ELECTRICAL HOMOPOLAR LINEAR MOTOR

2 APPLICANTS(S)

Name	Nationality	Address
Ingole Vijay Tulshiram	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Ashutosh Vijay	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Paritosh Vijay	Indian	104 Ganediwal layout, camp, Amravati-444602

3. PREAMBLE TO THE DESCRIPTION

COMPLETE

Following specification particularly describes the invention and the manner in which it is to be performed.

4. DESCRIPTION.

Technical field of invention:

The invention relates generally to direct current electrical s. More specifically, this invention relates to electrical homopolar linear motor, which functions on DC voltage means acyclic direct current without a commutator.

Use:

An electrical homopolar linear motor provided in accordance with the present invention render significant advantages over prior homopolar motors. The homopolar motor described here after are capable of operating on higher D. C. voltages & current without the need of a commutator and further because the armature and power carrying conductors being generally on the stator does not require power collection slip rings and brush gear, therefore the motor becomes simple and more power efficient compared to hitherto reported homopolar motors.

These and other advantages will be more readily understood by referring to the following detailed description for a typical linear homopolar motor with reference to the accompanying drawings and which are generally applicable to other homopolar m disclosed herein having typical armature and magnetic field arrangements to fulfill particular application illustrated hereinafter.

Background of the invention:

Electro-magnetic machine is classified by the purpose for which it is used, such as; for generating electrical energy from mechanical energy is known as "electrical generator," for converting electrical energy into mechanical energy is known as " electrical machine," and transforming electrical energy from one voltage-current levels to other voltage-current levels is known as " electrical transformer." Further the electrical machine is classified on the basis of its mechanical motion such as; if the electrical machine operation is related to rotating mechanical motion then it is called a " rotating electrical machine," if its operation is related to linear mechanical motion it is called " electrical linear machine" and if there is no mechanical motion involved in its operation, then it is called "static machine" or "electrical transformer." As per famous Faraday induction law " Whenever the total net magnetic flux through a closed circuit varies there is a voltage induced in the circuit whose magnitude is proportional to the rate of change of the flux through the circuit." Whether acting as a generator, or a motor, or a transformer; electrical machines also known as electro-magnetic machines function because of a relative motion between electrical conductor and magnetic field and/or rate of change of magnetic flux linkage between electrical turns and magnetic field such that the magnetic field may be physically stationary and the electric conductors/turns traverse through it, or the electrical conductors/turns may be stationary and the magnetic field may traverse through them, or electrical turns may be stationery and the associated magnetic field, being time dependent, may vary through them. It is also possible for both the conductors/turns and the acyclic or cyclic magnetic field to be in a relative motion in functioning electro-magnetic machine.

In case of a generator, the interaction due to relative motion between the electrical conductors/turns and the magnetic field produces an induced force, sometimes called "EMF" or voltage, and an associated current in the active conductors/turns. Conventionally magnetic fields are of two types that is north polarity generally known as "**N**" pole and south polarity known as "**S**" pole. An electro-magnetic machine, where magnetic fields are arranged in such a manner that electrical conductors/turns traverse through "N" pole and then "S" pole alternatively or in cyclic order, is called heteropole or multipole electrical machine. Generally, in such machines the electro-magnetic field (EMF) and current that are produced are cyclic or alternating in electrical polarity, and so sometimes a "commutator" is used to make the electrical current unidirectional in the external circuit of the electric machine; whereas an electro-magnetic machine, where magnetic fields or poles are arranged in such a manner that electrical conductors/turns traverse solely or acyclically through "N" pole or "S" pole, then it is called homopolar or unipolar electrical machine. The EMF and current that are produces are not alternating hence such machine does not have a "commutator" and these types of magnetic machines are sometimes also called "acyclic machines."

In a electro-electrical machines, having "m" coaxial electrical conductors, the instantaneous EMF "E" induced in conductors, each having a length, "l", moving with a relative velocity, "v", within and perpendicular to a magnetic flux density, 'B', is generally expressed as:

$$E = B.l.v.m,$$

which is the well-known Faraday induction law for the relative motion between the electrical conductors and magnetic flux.

A generalized voltage induction equation, applicable to all types of electrical machines including a homopolar machine, is expressed by Faraday/Lenz law of induction as:

$$E= -d\phi/dt + B.l.v.m,$$

where ϕ is the magnetic flux, which may be dependent in time,

and $\phi = B.A$ where "A" is the area of the magnet.

Because of the construction of typical homopolar motors, the turns/conductors on the armature are always adapted to interact with magnetic flux in the same direction whence voltage "E" due to a change of flux linkage associated with such interaction can be explained by:

$$E= -n.(d\phi/dt),$$

where $d\phi/dt$ is rate of change of flux and $n.(d\phi/dt)$ is rate of change of flux linkage associated with 'n' turns. It will be readily recognized by those with skill in the art that a machine where there exists a constant rate of change of flux linkage will generate a constant DC or acyclic voltage. See, e.g., L. V. Bewley, Flux linkages and Electromagnetic Induction, Chapter IV, p. 21, The Macmillan Company, 1952.

For the machine under disclosure, the induced EMF can be expressed as:

$E= -n.(d\phi/dt) = -n.A.(dB/dt) =-n.A.B.u$,

where " A " is the area of magnet and "u" is the rate of relative displacement per unit time, may be it an angular or a linear displacement/motion.

Due to the typical arrangements of the proposed homopolar machine, the generated EMF and the current flow are steady and in the same direction at all the time which eliminates the need of a commutator and which further avoids the difficulties which arise from reactance voltages.

Problem to be solved:

With the hitherto reported homopolar machines, where the lengths of several individual conductors are usually short due to mechanical constraints, only low voltages and high currents can be reproduced. Thus, such homopolar machines have had low DC voltage ratings of 2 to3 volts at high current of the order of 4000 to 6000 amps, for example. Similar homopolar machines producing higher voltages have been reported using multiple conductors, each connected by pair of current collecting slip rings with external brush-gear and it has been found to be far more difficult to collect current satisfactorily from multiple slip rings apart from being inefficient, hence not preferred in industrial application.

Thus while the homopolar machine hitherto reported has therefore been useful only in low DC voltage applications, and it has been virtually useless when high DC voltages are necessary, thereby forcing the electrical engineer to utilize a standard heteropole magnetic machines having commutator and current collecting brush-gear which are inefficient and expensive. Alternatively, electrical engineers have used rotary converters, which operate with commutator and slip rings, and also solid state electronic converters and inverters, which are complicated, unreliable, and expensive.

These options are therefore generally not realistic for many DC power generation, motion, and transmission requirements. Electrical engineers use DC motor for electrical to mechanical energy conversion where the design becomes critical due to commutator constraints, the wear and tear of current collecting brush-gear, and electromagnetic interference. Similarly the problems associated with armature reaction, armature inductance voltage and commutator sparking have forced the electrical engineers to incorporate interpoles, compensating winding in such machines. Alternatively an electronic commutator is also being used however, it generally suffers from the drawbacks of high cost, complex electronic control, power semiconductor devices and unreliability. Many ingenious methods have been reported to generate high voltage DC using homopolar motors but found to be contradicting the basic principle laid down by Faraday induction law, hence could not be put in practical use and so there does not currently exist an operational and simple magnetic motor to provide a solution for high DC voltages, and which is operable at a wide variety of DC voltage applications.

Solution provided by present invention:

The proposed electrical homopolar linear motor works within the principles of Faraday induction law and provides a simple solution to above mentioned problems since it operates on wide range of acyclic voltage and current and dispenses with interpole, compensating winding, commutator, brush-gear and power semiconductor devices with associated electronic control.

Object:

The primary object of this invention is to provide an electrical linear homopolar motor which is capable to operate on wide range of acyclic voltage and dispenses with interpole, compensating winding, commutator, brush-gear and power semiconductor devices with associated electronic control..

Further object of this invention is to provide an electrical linear homopolar motor in which armature and power carrying conductors being generally on the stator does not require power collection slip rings and brush gear, therefore the motor becomes simple and more power efficient compared to hitherto reported homopolar motors.

Another object of present invention is to provide a device which can satisfactorily work within the principle of faraday induction law and therefore provide simple solution to problems faced by present homopolar motors.

Other objects, features and advantages will become apparent from the detail description and appended claims to those skilled in the art.

STATEMENT:

Accordingly the inventors of the subject matter herein disclosed and claimed to have solved the aforementioned problems with the invention of a novel electrical homopolar linear motor hereinafter referred to as linear motor working on direct current for producing linear mechanical force. The linear motor under disclosure comprises stator means for supporting the homopolar motor, means a plurality of parallel and coaxial armature members of high magnetic permeability material, generally in the form of number of rectangular laminated bars means further such armature bar comprises plurality of separated independent armature coils, and such sectors are identical in number and size on each armature ring and opposite sectors from the armature bar are aligned such that plurality of pairs of sectors are formed, and to the ends each pair of coil segment, yokes or magnetic return paths of high magnetic permeability are attached, hereinafter called yoke, in order to provide return paths for the associated magnetic flux exclusively to that paired coil sectors thereby forming its independent magnetic circuit, and such typical arrangement of the said paired armature sectors and yokes is hereinafter referred to as armature sector to provide pluralities of magnetic paths for the magnetic flux of the field or excitation system, generally on the rotor means for supporting the excitation system generally comprises an excitation coil or a permanent magnet or combination of both, herein after referred to as plunger, for the interaction with the armature winding and further armature winding means conductors for the operation of homopolar motor, and armature winding means continuous conductor element wrapped repeatedly around the armature sector and thus plurality of such turns forming a coil around each armature bar and the successive ones of such electrically connected coils of armature sector to form a single armature winding or circuit and further plurality of multiple conductors wrapped repeatedly around the armature sectors to form multiplexed armature winding or multiple armature circuits such that an induced forces due to direct current are produced in the windings or coils when the rotor magnetic flux interacts through the coils during homopolar motor operation and disposed within the armature on a linearly moving member called plunger, means for producing magnetic flux and such magnetic flux has two opposite polarities, generally referred to as north and south polarity, wherein the opposite magnetic fluxes are disposed on the two sides of the field system respectively and exciter flux on each side is further divided into number of magnetic pole shoes, identical in number and size, made of high magnetic permeability material in the form of sectors, identical in number and size, herein after referred to as pole shoes, wherein the number of pole shoes is preferably different than the number of armature sectors, thus forming two different polarities of magnetic pole shoes and further arranged in such a manner that magnetic pole shoes of similar polarity are on one side aligned with one of the armature members bar whereas that magnetic pole shoes of remaining polarity are on the other side of exciter aligned with the remaining armature member bar. A linear force is produced due to each armature sector assembly coil based on the principle described herein and provided in accordance with the present invention, the armature and field system can be in the form of a straight segment for a straight motion, to realize a homopolar high voltage motors operating with linear motion. This has heretofore not been achievable with prior homopolar motors and so the homopolar motors provided in accordance with the present invention solve a long-felt need in the art for homopolar motors which have a simple construction having stationary armature and moving exciter, which eliminate the need for a commutator, which further eliminates a need of power carrying slip rings and brush gear and which produces high voltages for a wide variety of application.

An electrical homopolar linear motor provided in accordance with the present invention render significant advantages over prior homopolar motors. The homopolar motor described herein are capable of operating on higher D. C. voltages & current without the need of a commutator and further because the armature and power carrying conductors being generally on the stator does not require power collection slip rings and brush gear, therefore the motor becomes simple and more power efficient compared to hitherto reported homopolar motors.

These and other advantages will be more readily understood by referring to the following detailed description for a typical linear homopolar motor with reference to the accompanying drawings and which are generally applicable to other homopolar m disclosed herein having typical armature and magnetic field arrangements to fulfill particular application illustrated hereinafter.

BRIEF DESCRIPTION OF DRAWING:

The invention is described by way of example with reference to the following drawings

Sheet 1 of 2 discloses the preferred embodiment of linear homopolar motor with the help of figure-1A, figure-1B and figure 1-C;

where Figure-1A is a cross sectional top view of an electrical homopolar linear motor comprising a stator with parallel armature segments and a moving member comprising a magnet to provide magnetic flux perpendicular to the axis of motion with air gaps, provided in accordance with the present invention taken along the B--BB line of Figure-1B.

Figure-1B is a cross sectional elevation view of an electrical homopolar linear motor wherein a moving member comprising an exciter with permanent magnet type field system is provided in accordance with the present invention taken along the A--AA line of Figure-1A.

Figure-1C is a cross sectional side view of an electrical homopolar linear motor wherein a moving member comprising an exciter with permanent magnet type field system is provided in accordance with the present invention taken along the A--AA line of Figure-1A.

Sheet 2 of 2 discloses Figure-2A and Figure-2B which displays another variation of linear homopolar motor where

Figure-2A is a cross sectional elevation view of an electrical homopolar linear motor with parallel armature bars or segments arranged in a circle for linear motion having armature segment wherein magnet provides magnetic flux perpendicular to the axis of motion having air gap perpendicular to the axis of motion provided in accordance with the present invention taken along the B--BB line of Figure-2B.

Figure-2B is a cross sectional side view of an electrical homopolar linear motor with parallel armature bars arranged in a circle for linear motion having permanent magnet field system provided in accordance with the present invention taken along the A--AA line of Figure-2A.

<u>Detailed description:</u>

Figure-1A and Figure-1B show another variation of preferred embodiment of construction of the homopolar motors wherein the motion is a linear motion in place of rotary motion as referred to in Figure-1A and Figure-1B. A preferred embodiment, the model of the linear homopolar motor utilizes stationary straight armature segments or bars **303** of high magnetic permeability material and a linearly moving permanent magnet field system or magnet **305** such that the magnet provides magnetic flux perpendicular to the axis of motion. The plurality of armature sectors comprising preferably the armature conductor element **304** is disposed about the respective armature segments means **303** such that a plurality of armature conductor segments are formed and is generally called as a turn and plurality of such turns is called a coil and such plurality of conductor to form a turn and such plurality of turns hereinafter called coils comprising, each is a single length and continuous and armature electrical connections **332, 331** are brought out. Figure-1A is a cross sectional top view of a linear homopolar motor provided in accordance with the present invention taken along the B--BB line of Figure-1B. Figure-1C is a cross sectional side view of a homopolar motor with exciter with permanent magnet field system or magnet **305** provided in accordance with the present invention taken along the A--AA line of Figure-1A. Plurality of yokes **302** are preferably placed on the two ends of parallel armature segments **303** so as to provide return path **315** to the magnetic flux and to facilitate the movement of the magnet **305.** Permanent magnet field system **305** (Figure-1C) is disposed within parallel armature segments **303** separated by air gap **309.** Linearly moving member is generally attached to of the magnet **305** for its motion, comprises elements **310, 390** and **391.** The preferred embodiments recited and shown in Figure-1A and Figure-1B refer to a typical linear homopolar motor having only two parallel armature straight segments or bars with associated shunts thereby forming a single segment assembly and an exciter with permanent magnet field system, providing flux perpendicular to the axis of motion, comprising one pole shoe pairs and having a low magnetic flux in air gap and has small overall dimensions, but it will be readily recognized by those with skill in the art that a motor based on the principles described herein employing pluralities of separated armature segment assemblies, plurality of pole shoe pairs; exciter with excitation coil field system or exciter with combination of excitation coil and permanent magnet can be built for linear motion and designed for high voltage and high power without commutator on commercial scale.

Figure-2A and Figure-2B show another variation to the linear homopolar motor as described in Figure-1A and Figure-1B. Figure-2A and Figure-2B show another preferred embodiment of construction of the linear homopolar motors wherein the pluralities of parallel armature segments of high magnetic permeability material are arranged in a circle. A preferred embodiment, the model of the homopolar motor utilizes stationary straight armature segments or bars **403**, means the plurality of bars arranged in a circle such that their axes are parallel to the motion of the linearly moving member **408** comprising an exciter with permanent magnet field system or magnet **416,** such that the magnet provides magnetic flux perpendicular to the axis of motion. The plurality of armature segments **403** comprising preferably the armature conductor element **404** is disposed about the respective armature segments means **403** such that a plurality of armature conductor segments are formed and is generally called as a turn and plurality of such turns is called a coil and hereinafter called coils comprising, each is a single length and continuous and armature electrical connections **432, 431** are brought out. Figure-2A is a cross sectional view of a linear homopolar motor provided in accordance with the present invention taken along the

B--BB line of Figure-2B. Figure-2B is a cross sectional view of a homopolar motor with permanent magnet field system or magnet **416** provided in accordance with the present invention taken along the A--AA line of Figure-1A. Plurality of yokes **402** are preferably attached to the ends of parallel armature segments **403** so as to provide return path to the magnetic flux **415** and to facilitate the movement of the magnet **405.** Permanent magnet field system **416** (Figure-2B) is disposed on a nonmagnetic member **420** within armature segments **403** separated by air gap **409.** The preferred embodiments as shown in Figure-2A and Figure-2B refer to a typical homopolar motor having only four parallel armature straight segments or bars arranged and placed in a circle with associated yokes thereby forming a single segment assembly and an exciter with permanent magnet field system, providing flux perpendicular to the axis of motion, comprising a single pole shoe pairs and having a low magnetic flux in air gap and has small overall dimensions, but it will be readily recognized by those with skill in the art that a motor based on the principles described herein employing pluralities of separated armature segment assemblies, plurality of pole shoe pairs; exciter with excitation coil field system or exciter with combination of excitation coil and permanent magnet can be built for linear motion and designed for high voltage and high power without commutator on commercial scale.

There have thus been described certain preferred embodiments of homopolar motors provided in accordance with the present invention. While preferred embodiments have been described and disclosed, it will be recognized by those with skill in the art that modifications are within the true spirit and scope of the invention.

We claim:-

1. The electrical homopolar linear motor under disclosure comprises stator means for supporting the homopolar motor, means a plurality of parallel and coaxial armature bar members of high magnetic permeability material, generally in the form of rectangular laminated stack means further such armature bars comprises plurality of separated independent armature electrical sectors, and such sectors are identical in number and size on such two armature bar and opposite sectors from the armature bars are aligned such that plurality of pairs of sectors are formed, and to the ends each pair of sectors, yokes or magnetic return paths of high magnetic permeability are attached, hereinafter called yoke, in order to provide return paths for the associated magnetic flux exclusively to that paired armature sectors thereby forming its independent magnetic circuit, and such typical arrangement of the said paired armature sectors and yokes is hereinafter referred to as armature sector assembly and further the adjacent armature sector assemblies is hereinafter referred to as armature to provide pluralities of magnetic paths for the magnetic flux of the field system, generally on the rotor for the interaction with the armature winding and further armature winding means conductors for the operation of said motor, and armature winding means continuous conductor element wrapped repeatedly around the armature sector and thus plurality of such turns forming a coil around each armature sector and the successive ones of such electrically connected coils of armature sector to form a single armature winding or circuit and further plurality of multiple conductors wrapped repeatedly around the armature sectors to form multiplexed armature winding or multiple armature circuits such that a force is produced when a direct current is supplied to the windings or coils when the rotor magnetic flux traverses through the coils during homopolar motor operation; a rotor means for supporting the excitation system generally comprises an excitation coil or a permanent

magnet or combination of both, herein after referred to as exciter, disposed within the armature on a rotating member or shaft, means for producing magnetic flux and such magnetic flux has two opposite polarities, generally referred to as north and south polarity, wherein the opposite magnetic fluxes are disposed on the two sides of the field system respectively and exciter flux on each side and coaxial armature members through air gaps, provided to facilitate mechanical movement, for interacting with the armature coils provided on the armature sector assemblies, so that when the plunger traverses through the stator, each armature sector assembly is substituted one after another or sequentially by the magnetic pole with associated flux and during such operation, the armature sector assembly magnetic circuit gets divided into two sections means on either side of the exciter and due to the geometry of the sections of armature sector assembly at that instant, the quantitative distribution of the magnetic flux takes place therein means depending upon the relative position of the magnetic pole shoe pair with respect to armature sectors assembly, means the shorter section of the armature sectors assembly, means armature sector therein, generally carries more flux as compared to the longer section of armature sector therefore when pole shoe pair traverses through the armature sector assembly, the relative position between armature sector and exciter keeps on changing, thereby changing the magnetic circuit geometry and thereupon the quantitative flux distribution in the armature sector assembly, thereby causing a change of flux linkage between armature coil comprising conductor turns and the magnetic flux of exciter, and since the rate of change of flux linkage being a function of relative velocity of stator and plunger, a DC voltage or EMF is induced in each armature sector assembly coil as back EMF as per Faraday induction law, and whence the electrical homopolar linear motor can produce mechanical force when in operation and further based on the principle described herein and provided in accordance with the present invention, the armature and field system or exciter can be in the form of a straight segment for a straight motion, to realize a homopolar high voltage motors operating with linear motion.

2. The electrical homopolar linear motor under disclosure as recited in claim 1 comprises armature magnetic material laminated bars with armature winding means continuous conductor element wrapped repeatedly around the armature bar and plurality of such turns thus forming a segment of continuous coils around each armature bar and the successive ones of such electrically connected armature sector coils to form a single armature winding or circuit and plurality of multiple conductors wrapped repeatedly around the armature bar sectors to form multiplexed armature winding or multiple armature circuits such that when supplied with direct current produces force in the coil when the rotor magnetic flux traverse through the coil during the electrical homopolar linear motor operation.
3. The electrical homopolar linear motor under disclosure as recited in claim 1 comprises stator means for supporting the said motor, a plurality of parallel and coaxial armature members of high magnetic permeability material, generally in the form of bars, means each armature bar comprises plurality of separate or independent armature sectors, and such sectors are identical in number and size on each armature bar and opposite sectors from the armature bar are aligned such that plurality of pairs of sectors are formed, and to the ends each pair of sectors yokes or magnetic shunts are attached, hereinafter called yoke, in order to provide return paths for the associated magnetic flux exclusively to that pair of armature sectors thereby forming its independent magnetic circuit, and such typical arrangement of such paired armature bars and yokes is hereinafter referred to as armature bar assembly so that such that assembly of armature can produce mechanical force while interacting with plunger magnetic field.
4. The electrical homopolar linear motor under disclosure as recited in claim 1 comprises a plunger means for supporting the excitation system or exciter

generally comprises an excitation coil or a permanent magnet or combination of both, herein after referred to as exciter, disposed within the armature bars and centrally located on an axial shaft, means for producing magnetic flux and such magnetic flux has two polarities, generally referred to as north and south polarity, wherein the two types of magnetic flux are disposed on the two the sides of the field system thus forming two different polarities of magnetic pole arranged in such a manner that magnetic pole of similar polarity are on one side whereas that magnetic pole of remaining polarity are on the other side of exciter, disposed axially within the parallel and coaxial armature members of high magnetic permeability material such that the magnetic pole carrying different polarity flux face each other and thereby form plurality of pole pairs on either side of exciter and further one type of magnetic pole are aligned with one of the armature bar members and remaining type of magnetic pole aligned with the remaining armature bar member, through air-gaps provided to facilitate mechanical movement, for moving through the armature conductors or coils, provided on the armature sector assemblies, so that while the movement of the plunger, plurality of armature sector assemblies means the magnetic circuits thereof are substituted periodically by the magnetic poles thereby the electrical homopolar linear motor can produce mechanical force when in operation.

5. The electrical homopolar linear motor under disclosure as recited in claim 1 comprises an exciter or excitation system to produce magnetic flux preferably perpendicular to the conductor segment of the armature sectors and the portion of the magnetic flux thus produced passes through the pole sectors therein then the magnetic flux passes through the air gap to the armature sector of the armature bars and magnetic pole sector being smaller than armature sector the magnetic flux gets divided therein in two parts such that one portion of the magnetic flux passes through one section of armature sector to one of the magnetic yokes or

magnetic shunts and the remaining portion of the magnetic flux passes through remaining section of the armature sector to the remaining yoke or magnetic shunt and then the magnetic fluxes return in the same manner through the sections of another identically placed armature sector of other parallel and coaxial armature bars and then magnetic flux returns through air gap back to the excitation system and so when the plunger traverses through the stator, each armature sectors assembly is substituted one after another or sequentially by the magnetic pole shoe pair with associated flux and during such operation, the armature sector assembly magnetic circuit gets divided into two magnetic circuits on either side of the plunger and due to the geometry of the magnetic circuit at that instant, the distribution of the magnetic flux depends upon the relative position of the exciter on plunger with respect to armature sectors assembly, means the shorter section of the armature sectors assembly, comprising armature sector therein, generally carries more flux as compared to the longer section of armature sector therefore when pole shoe pair traverses through the armature sector assembly, the relative position between armature sector and e keeps oiterxcn changing thereby causing a change of flux linkage between armature coil comprising conductor turns and the magnetic flux of pole shoe pair and since the rate of change of flux linkage is a function of relative velocity of stator and rotor, mechanical force is created in each armature sector assembly coil, and therefore the electrical homopolar linear motor can produce direct mechanical force when in operation.

6. The electrical homopolar linear motor under disclosure as recited in claim 1 comprising plurality of armature sector assemblies arranged in the form of bars and plunger comprising magnetic poles disposed coaxially within the armature and while the movement of plunger, the plurality of armature sector assemblies means the magnetic circuits thereof, comprising armature conductors or coils, are periodically substituted by the magnetic flux of the magnetic poles thereby

causing rate of change of flux linkages so that the electrical homopolar linear motor can produce direct force when in operation.

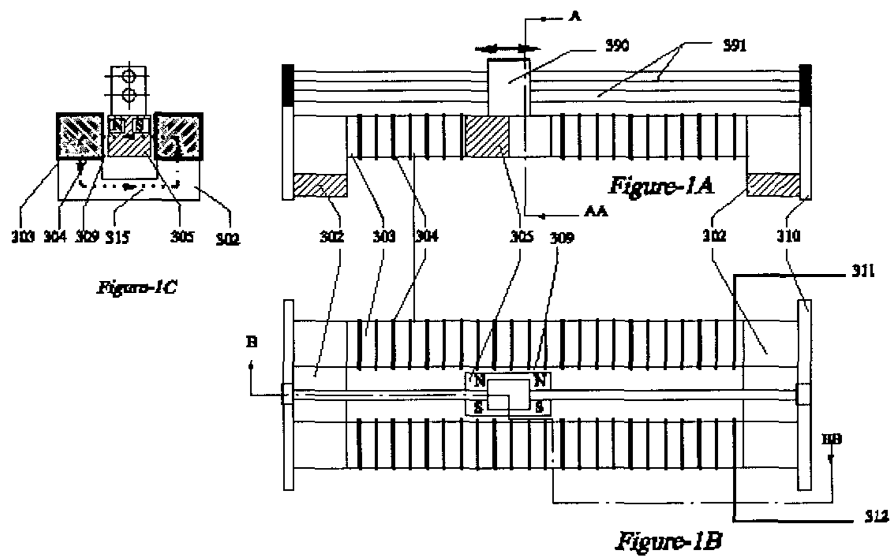
7. The electrical homopolar linear motor as recited in claim 1, claim 2, claim 3, and claim 4 and as described and illustrated in preferred embodiments in the manner to be performed wherein a preferred embodiment, the model of the linear homopolar motor utilizes plurality of parallel and stationary straight armature segments or bars of high magnetic permeability material having continuous conductor segments wrapped around and a linearly moving permanent magnet field system or magnet such that the magnet provides magnetic flux perpendicular to the conductor segments and axis of motion .
8. The electrical homopolar linear motor as recited in claim 7 and as described and illustrated in preferred embodiments in the manner to be performed wherein a preferred embodiment, the model of the linear homopolar motor utilizes plurality of parallel and stationary straight armature segments or bars of high magnetic permeability material arranged in a form of rectangular bars such that their axes are parallel to the motion, having continuous conductor segments wrapped around, and a linearly moving permanent magnet field system or magnet such that the magnet provides magnetic flux perpendicular to the conductor segments and axis of motion .
9. The electrical homopolar linear motor as recited in claim 8 and as described and illustrated in preferred embodiments in the manner to be performed and revealed that a motor based on the principles described herein employing pluralities of separated armature bar assemblies of high magnetic permeability material in the form of sector of a straight segment of a bar; plurality of straight segment of a bar; exciter with excitation coil field system, permanent magnet, combination of excitation coil and permanent magnet can be built for linear motion and designed for high voltage and high power or force without commutator on commercial scale.

10. The electrical homopolar linear motor as recited in claim 9 and as described and illustrated in preferred embodiments and ascertain the nature of this invention and the manner in which it is to be performed and revealed in diagrams of Figure-1A, Figure-1B, Figure-1C, Figure-2A, and Figure-2B can also be performed by making slight modifications, variations, assembly, reassembly, variation in the shape, size or material for obtaining similar results without making the change in the basic structure and utility of the invention.

ABSTRACT

An electrical homopolar linear motor for producing linear force comprises a stator which supports the motor, having a pluralities of stator magnetic circuits and a coil comprising continuous conductor element disposed about the stator such that a plurality of the stator magnetic circuits and conductor turns are formed wherein successive ones of the plurality of the stator conductor turns are electrically connected, a rotor or linearly moving part hereinafter referred to as rotor linearly disposed within the stator on guides or shaft hereinafter referred to as shaft, comprises excitation system means plurality of magnetic pole shoes or permanent magnets or their combination hereinafter referred to as excitation element, which means producing acyclic magnetic flux means homopolar flux such that an induced voltage or back voltage is produced in the stator winding and linear force is produced in the excitation element when the stator is excited by electrical energy during electrical homopolar motor operation. Electrical Homopolar linear motors described herein, working with DC voltage without a commutator, are useful in wide range of applications, and allow straight linear motion force in terms of mechanical energy transformation from a DC electrical energy.

Following invention is described in detail by way of example with the help of figure 1-A, figure1-B, figure 1-C, figure 2-A and figure 2-B which shows preferred embodiments of linear homopolar machine.



N
S
303 304 309 315 305 302
Figure-1C
A
390
391
Figure-1A
AA
302 303 304 305 309 302 310
311
B
N
N
S
S
BB
312
Figure-1B

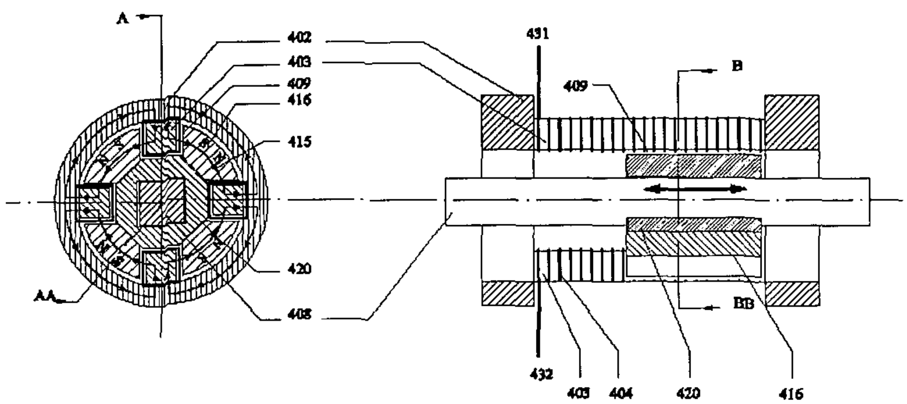


Figure-2A *Figure-2B*

FORM 3
THE PATENT ACT 1970
(39 OF 1970)
AND
The patent rules, 2003
STATEMENT AND UNDERTAKING UNDER SECTION 8
(See section 8; rule 12)

We

Name	Nationality	Address
Ingole Vijay Tulshiram	Indian	104 Ganediwal layout, camp, Amravati-444602
Ingole Ashutosh Vijay	Indian	104 Ganediwal layout,camp,Amravati-444602
Ingole Paritosh Vijay	Indian	104 Ganediwal layout,camp,Amravati-444602

Hereby declare:-
(i) That we have not made any this application for the same /substantially the same invention outside India.

Dated this 7th day of May 2010

Signature

Ingole Vijay Tulshiram

To
The controller of patents,
The patent office,
At Mumbai

FORM 9

THE PATENT ACT 1970

(39 OF 1970)

AND

The patent rules, 2003

REQUEST FOR PUBLICATION

(See section 11-A (2); rule24-A)

We

Name	Nationality	Address
Ingole Vijay Tulshiram	Indian	104 Ganediwal layout,camp,Amravati-444602
Ingole Ashutosh Vijay	Indian	104 Ganediwal layout,camp,Amravati-444602
Ingole Paritosh Vijay	Indian	104 Ganediwal layout,camp,Amravati-444602

Hereby request for early publication of our application titled "**ELECTRICAL HOMOPOLAR LINEAR MOTOR.**" attached herewith the application under section 11(a) 2 of the act.

Dated this 7th day of May 2010

Signature

Ingole Vijay Tulshiram

To

The controller of patents,

The patent office,

At Mumbai

FORM 18

THE PATENT ACT 1970
(39 OF 1970)
And
The patent rules, 2003

(FOR OFFICE USE ONLY)

Application number:
filing date:
amount of fee paid:
CBR NO:

REQUEST FOR EXAMINATION OF APPLICATION OF PATENT
[See section 11-B and rules 20(4)(ii),24-B(1)(i)]

1. APPLICANT

Name	Nationality	Address
Ingole Vijay Tulshiram	Indian	104 Ganediwal layout,camp,Amravati-444602
Ingole Ashutosh Vijay	Indian	104 Ganediwal layout,camp,Amravati-444602
Ingole Paritosh Vijay	Indian	104 Ganediwal layout,camp,Amravati-444602

We hereby request that our application for patent titled "**ELECTRICAL HOMOPOLAR LINEAR MOTOR.**" attached herewith the application shall be examined under section 12 and 13 of the act.

Address for service: - 104 Ganediwal layout, camp, Amravati-444602.

Dated this 7th day of May 2010

Signature

Ingole Vijay Tulshiram

To
The controller of patents,
The patent office,

At Mumbai

FORM 26

THE PATENTS ACT, 1970
(39 OF 1970)
&
THE PATENTS RULES, 2003

FORM OF AUTHORISATION OF A PATENT AGENT/ OR ANY PERSON IN A MATTER OR PROCEEDING UNDER THE ACT

[Section 127 and 132 and Rule 135]

We,

Name	Nationality	Address
Ingole Vijay Tulshiram	Indian	104 Ganediwal layout,camp,Amravati-444602
Ingole Ashutosh Vijay	Indian	104 Ganediwal layout,camp,Amravati-444602
Ingole Paritosh Vijay	Indian	104 Ganediwal layout,camp,Amravati-444602

hereby authorize Swapnil J Gawande, Advocate and Patent Agent No. IN/PA 1587.of R-9 Harshnil,Eknath puram, nr yogakshem colony Amravati-444607,India to act on my behalf in connection with our patents, assignments, oppositions, rectifications, renewals and request that all notices, requisition and communication relating thereto may be sent to such person unless otherwise specified.

I hereby revoke all previous authorization, if any made, in respect of same matter or proceeding.

I hereby assent to the action already taken by the said person in the above matter.

Dated this 7th day of May 2010

Name: Ingole Vijay Tulshiram

Ingole Ashutosh Vijay

Ingole Paritosh Vijay

To,
The Controller of Patents
The Patent Office

At Mumbai