

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES

SOLICITUD DE PATENTE DE INVENCION PCT

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-085507- -00000-0000

EXPEDIENTE

:

Fecha: 2014-04-22 15:08:24 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 378 FASENACIONALI
Act. 411 PRESENTACION Folios: 32

TITULO:

:

MÉTODO Y APARATO PARA OPERAR UN MOTOR
CON AIRE NATURAL

CLASE

:

F02D 13/04 (2006,01) F02N 7/00 (2006,01)
F02B 21/00 (2006,01)

INVENTOR

:

HAJIBHAI A. SUMRA

SOLICITANTE

:

HAJIBHAI A. SUMRA

DOMICILIO

:

RAJKOT, INDIA

APODERADO

:

JUAN CARLOS CUESTA QUINTERO

FECHA

:

ABRIL DE 2014

PETITORIO



Industria y Comercio
SUPERINTENDENCIA

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-085507- -00000-0000

Fecha: 2014-04-22 15:08:24 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 378 FASENACIONALI
Act. 411 PRESENTACION Folios: 31 32

FORMULARIO UNICO DE SOLICITUD DE PATENTE PCT

ENTRADA EN FASE NACIONAL

①



Patente de Invención

SOLICITUD DE:



Patente de Modelo de Utilidad



Capítulo I.



Capítulo II

②

SOLICITANTE
(71)

Nombre: Hajibhai A. Sumra

Dirección: Kalawad Road, Behind Vrandavan Socty,
Ruda 1, Plot No. 164, Rajkot 3600 005 (IN)

Nacionalidad o Domicilio: India

Lugar de Constitución:

Teléfono:

Fax:

E-mail:

IDENTIFICACION

C.C.



NIT



C.E.



Otro



Número

Cual
Ciudadano Extranjero

③

REPRESENTANTE
O APODERADO

Nombre JUAN CARLOS CUESTA QUINTERO

Dirección CALLE 72 No. 10-07 Of. 603

Teléfono: 2113097 Fax: 2554538

E-mail: contacto@cuestalawyers.com

IDENTIFICACION

C.C.



NIT



C.E.



Otro



Número

79.339.809 TP 43273

④

INVENTOR
(72)

Hajibhai A. Sumra

Dirección: Kalawad Road, Behind Vrandavan Socty, Ruda 1, Plot No. 164,
Rajkot 3600 005 (IN)

⑤

PCT (86)

Solicitud Internacional No. PCT/IN2012/000385

Fecha 01/06/2012

Publicación Internacional No. WO/2013/054336 A1

Fecha 18/04/2013

⑥

TITULO (54) MÉTODO Y APÁRATO PARA OPERAR UN MOTOR CON AIRE NATURAL

⑦

Clasificación Internacional (51) F02D 13/04 (2006,01) F02N 7/00 (2006,01) F02B 21/00 (2006,01)

⑧

Prioridad

Si ☐ No ☐

(33) País de Origen

INDIA

(32) Fecha

22/09/2011

(31) Número de Solicitud

2686/MUM/2011

⑨

Comprobante de pago No.

14-

Fecha

Abril de 2014

Instrucciones para el diligenciamiento del presente formulario, ver reverso de esta página.

5

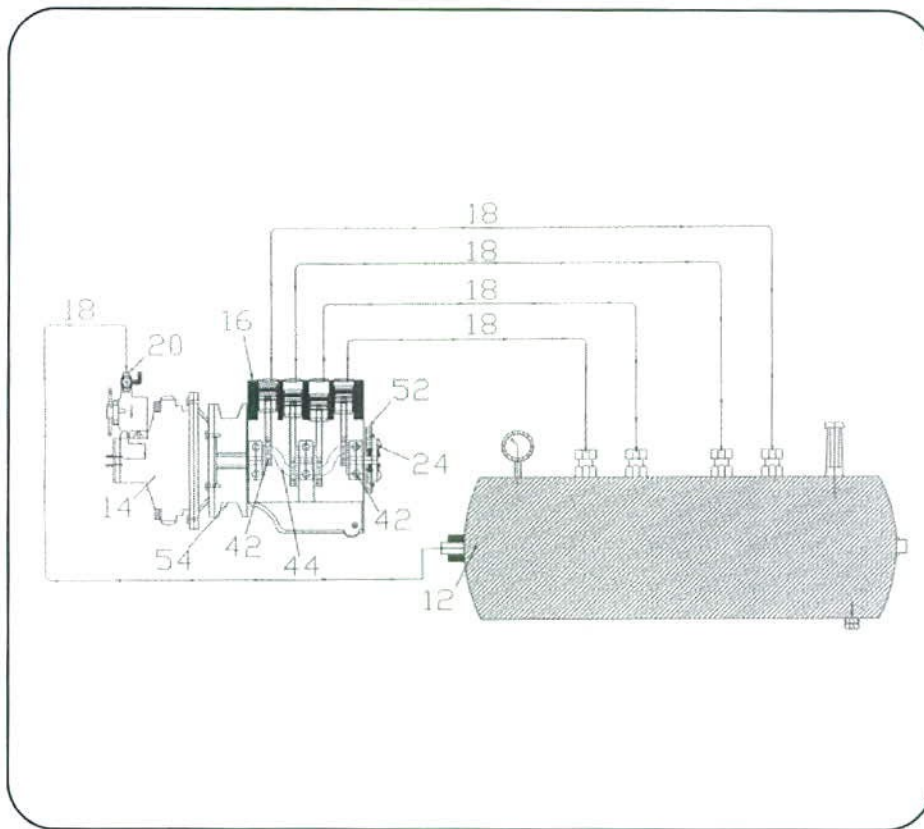
10

ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica
- ☒ Poderes si fuere el caso
- ☐ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☒ Copia de la solicitud internacional
- ☒ Traducción de la solicitud internacional al castellano.
- ☒ Copia del examen preliminar internacional efectuado por la autoridad Internacional de Examen Preliminar
- ☐ Traducción del Examen Preliminar efectuado por la IPEA
- ☐ De ser el caso copia del contrato de acceso
- ☐ De ser el caso, documento que acredite al licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas
- ☐ De ser el caso, certificado de depósito de material biológico
- ☒ Arte final 12x12
- ☐ De ser el caso información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud
- ☐ De ser el caso modificaciones efectuadas a la solicitud internacional
- ☐ Otros

11

FIGURA CARACTERISTICA:



12

Solicito la concesión de la patente,

NOMBRE: JUAN CARLOS CUESTA QUINTERO

FIRMA: *Juan Carlos Cuesta Quintero*

C.C. 79,339,809

T.P. 43,273

Instrucciones para el diligenciamiento del presente formulario, ver reverso de esta página.

Industria y Comercio

SUPERINTENDENCIA

EXTRACTO PARA PUBLICACIÓN

☐ Patente de Invención

☐ Patente modelo de utilidad

☒ PCT

(21) No. De solicitud PCT/IN2012/000385	(51) int. Cl: F02D 13/04 (2006.01) F02N 7/00 (2006.01) F02B 21/00 (2006.01)
(22) Fecha de solicitud 01/06/2012	HAJIBHAI A. SUMRA
(30) Prioridad: 2686/MUM/2011(22.09.2011)	(72) Interventor (es) HAJIBHAI A. SUMRA (IN)
(33) Pais: INDIA	(74) Apoderado (s) JUAN CARLOS CUESTA QUINTERO
(54) Título MÉTODO y APARATO PARA OPERAR UN MOTOR CON AIRE NATURAL	
Las casillas identificadas con 85, 86 y 87 sólo aplican para PCT	
(85) Fecha límite inicio Fase Nacional 22/04/2014 (86) Datos relativos a la presentación de la solicitud PCT Fecha de presentación de la solicitud Fecha: 01/06/2012 No. de solicitud PCT: PCT/IN2010/000385	(87) Publicación internacional Fecha (18/04/2013) No. Publicación WO 2013/054336 A1

Resumen reivindicación (es):

La presente invención se relaciona con una máquina que opera con aire natural a presión, más particularmente con un método y un aparato para operar un motor de un vehículo con aire natural a presión con el fin de aliviar el problema de la contaminación. La presente invención proporciona un método y un aparato confiables para operar una máquina con aire natural a una presión adecuada que es efectiva para suministrar una cantidad constantemente creciente de aire natural a una máquina conforme aumenta la velocidad de la misma, lo cual es fácilmente adaptable a un motor estándar de combustión interna para convertir el motor de combustión interna en un motor que funciona con aire natural.

4

REIVINDICACIONES:

1. Un método y un aparato para operar un motor de vehículo con
5 aire natural que se caracteriza porque el aire se dispone en
el tanque de aire del motor de aire, el cual se llena con
cerca de 310 libras de aire, y se caracteriza porque, en la
etapa inicial, el Motor comienza a moverse y al mismo tiempo
esta fuerza ayuda a arrancar la máquina, lo cual va seguido
10 de la absorción de aire por el compresor desde la atmósfera
exterior y el envío del volumen requerido de aire de vuelta
hacia el interior del tanque con el fin de completar el
almacenamiento adecuado de aire y la acumulación de presión
en el mencionado tanque de aire.
15
2. Un método y un aparato de acuerdo con la reivindicación 1,
que se caracteriza porque una conexión para el tanque de
aire se acopla con el motor de aire y una conexión con
válvula se acopla con Dirección, Embrague, Freno y
20 Acelerador, que se caracteriza porque cuando las esclusas se
abren, el aire del tanque pasa hacia el Motor, iniciando así
el motor de aire y la máquina.
3. Un método y un aparato de acuerdo con la reivindicación 1,
25 que se caracteriza porque se proveen cuatro conexiones desde
la culata de la máquina al tanque de aire que ayudan a la
transferencia de la cantidad de aire, lo cual equilibra el
aumento y la reducción continuos del suministro de aire y el

5

motor compresor de aire proporciona la cantidad de aire al interior del tanque de aire.

4. Un método y un aparato de acuerdo con la reivindicación 1,
5 que se caracteriza porque hay válvulas irreversibles fijas al tanque de aire que impiden que se salga el aire interno del tanque; así, se mantiene un consumo de aire equilibrado de cerca de 300 libras de tal manera que aunque esta cantidad de aire haya sido utilizada, siguen quedando cerca
10 de 300 libras de aire en el tanque.

5. Un método y un aparato de acuerdo con la reivindicación 1,
que se caracteriza porque en el mencionado tanque de aire, un lado de la válvula está configurado de forma tal que el
15 aire pasa del tanque de aire al motor de aire y además, en el mencionado tanque de aire se encuentra fija una válvula unidireccional que ayuda a la liberación del aire adicional hacia el exterior y cuando la cantidad de aire aumenta más que la cantidad requerida, la mencionada válvula ayuda a
20 liberar el aire adicional con el fin de evitar escapes en el tanque.

6. Un método y un aparato de acuerdo con la reivindicación 1,
que se caracteriza porque el compresor de trabajo permite el
25 enfriamiento del aire, y está conectado por ocho válvulas, cuatro de las cuales tienen la función de absorber aire en tanto que las otras cuatro válvulas se usan para expulsar el aire interno hacia el exterior.

7. Un método y un aparato de acuerdo con la reivindicación 1, que se caracteriza porque el cuerpo de la máquina tiene cuatro cilindros, cuatro bielas, y también se proporcionan cuatro piezas de pistón como juntas, en donde estos cuatro pistones de la máquina absorben el aire, lo cual hace que, cuando el pistón corre hacia abajo, el aire del exterior ingresa en la máquina y cuando el pistón corre hacia arriba, el aire depositado sale.
8. Un método y un aparato de acuerdo con la reivindicación 1, que se caracteriza porque se proporciona una bomba de aceite en el cuerpo de la mencionada máquina para suministrar el aceite a todos los circuitos de la máquina; a causa de esto, todas las partes de la máquina quedan lubricadas, lo cual a su vez ayuda a superar el problema de atasco de las partes y alarga la vida de las partes.
9. Un método y un aparato de acuerdo con la reivindicación 1, que se caracteriza porque un motor de aire está acoplado con un cigüeñal que además está provisto de una válvula de aire que permite arrancar el mencionado motor en donde se proporciona una conexión del mencionado motor de aire hacia el lado inferior la cual expulsa el aire adicional hacia el exterior lo cual a su vez ayuda a enfriar la máquina para que pueda operar a una velocidad de cerca de 0 a 100.

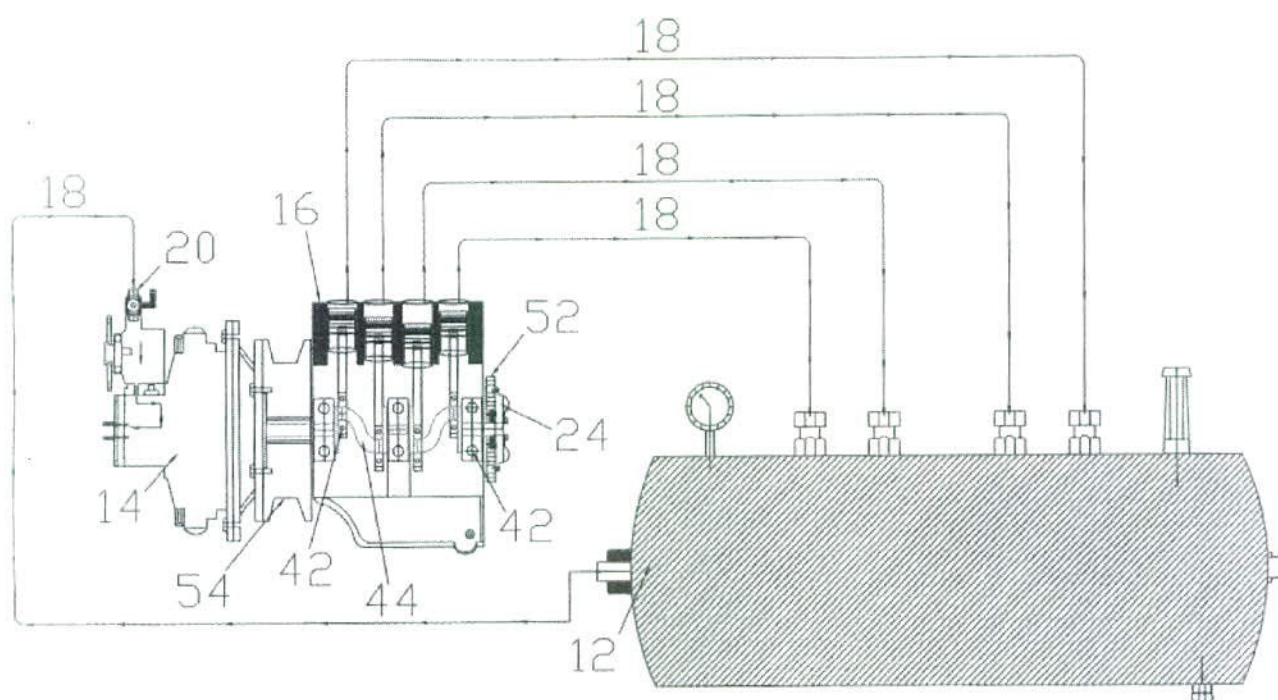
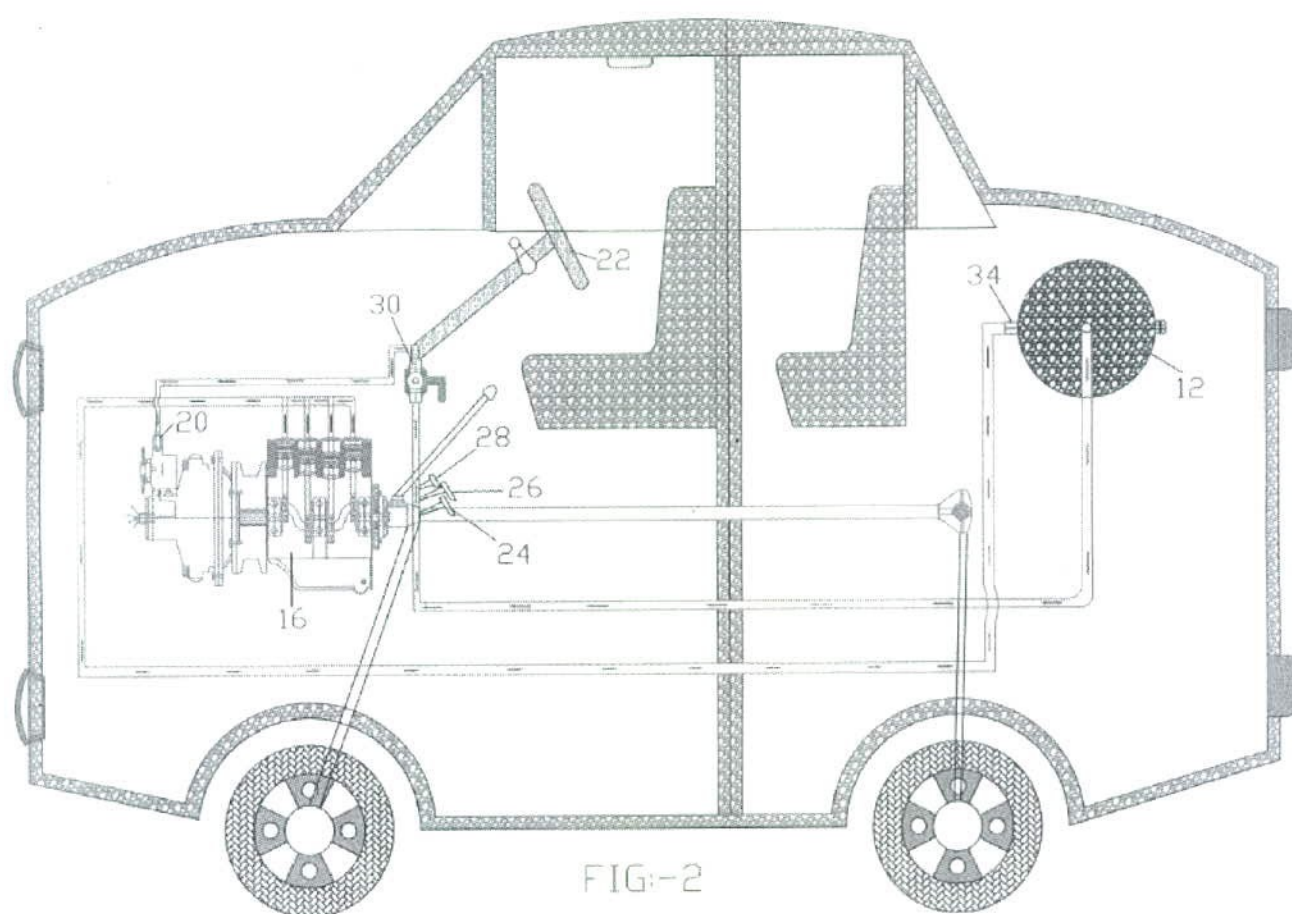


FIG: -1



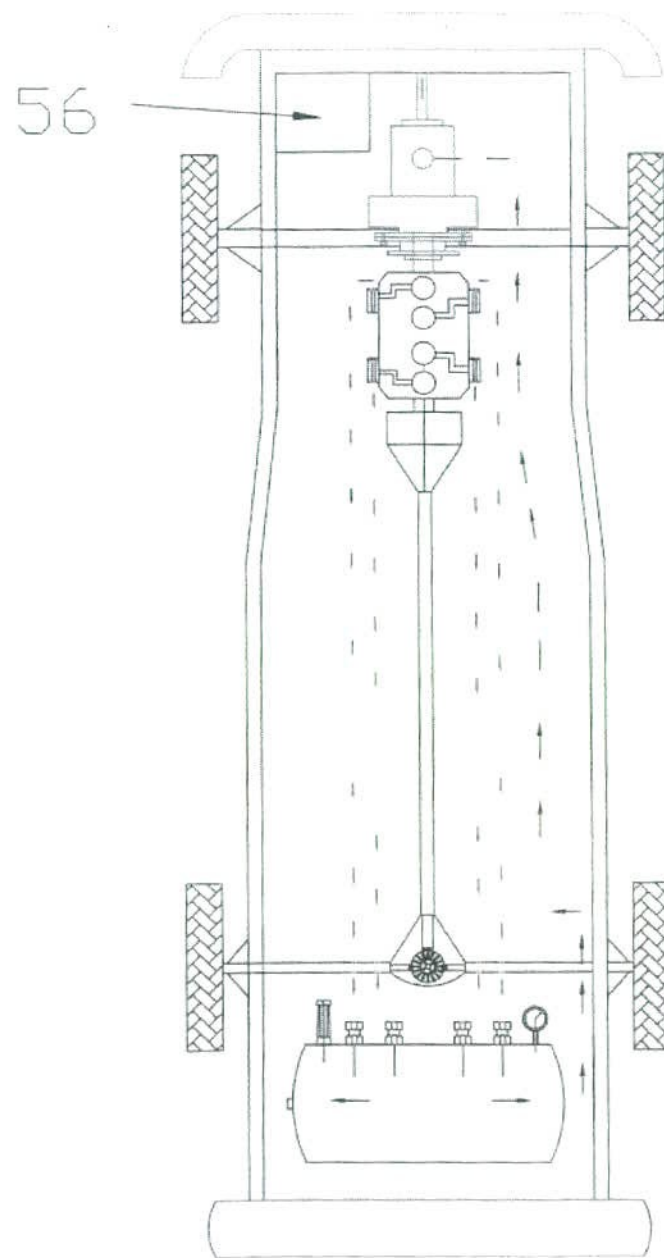
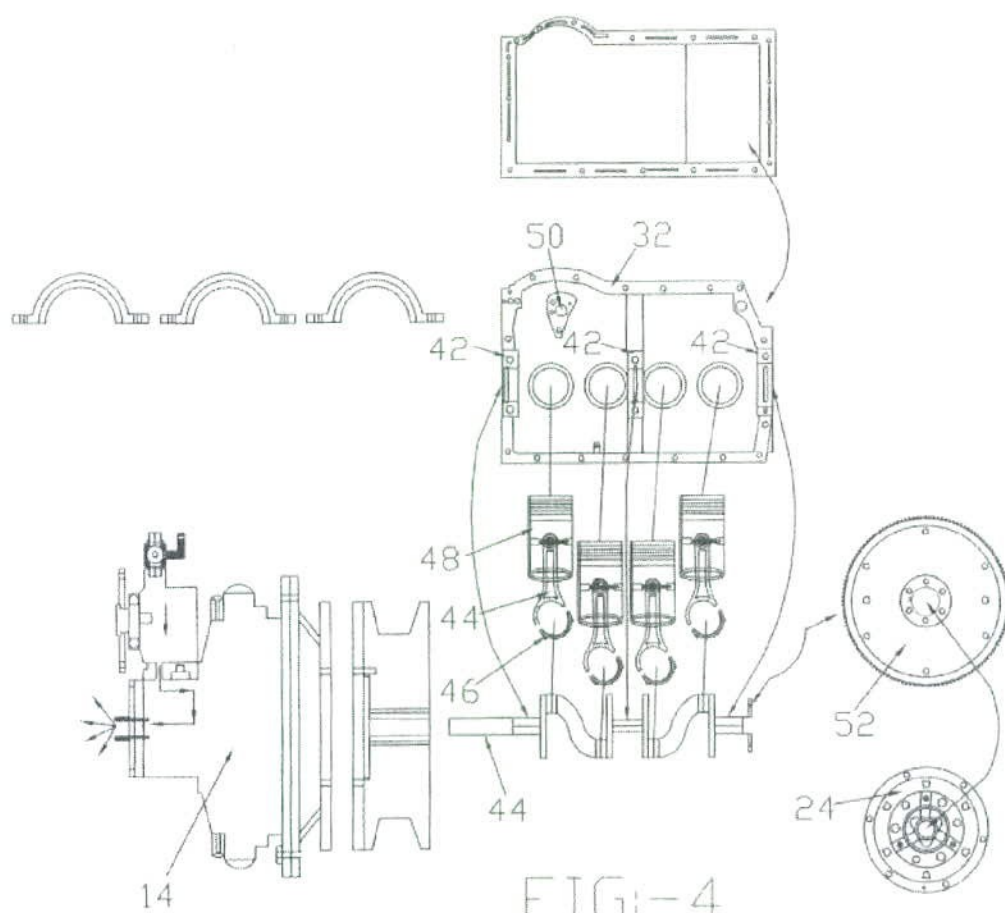
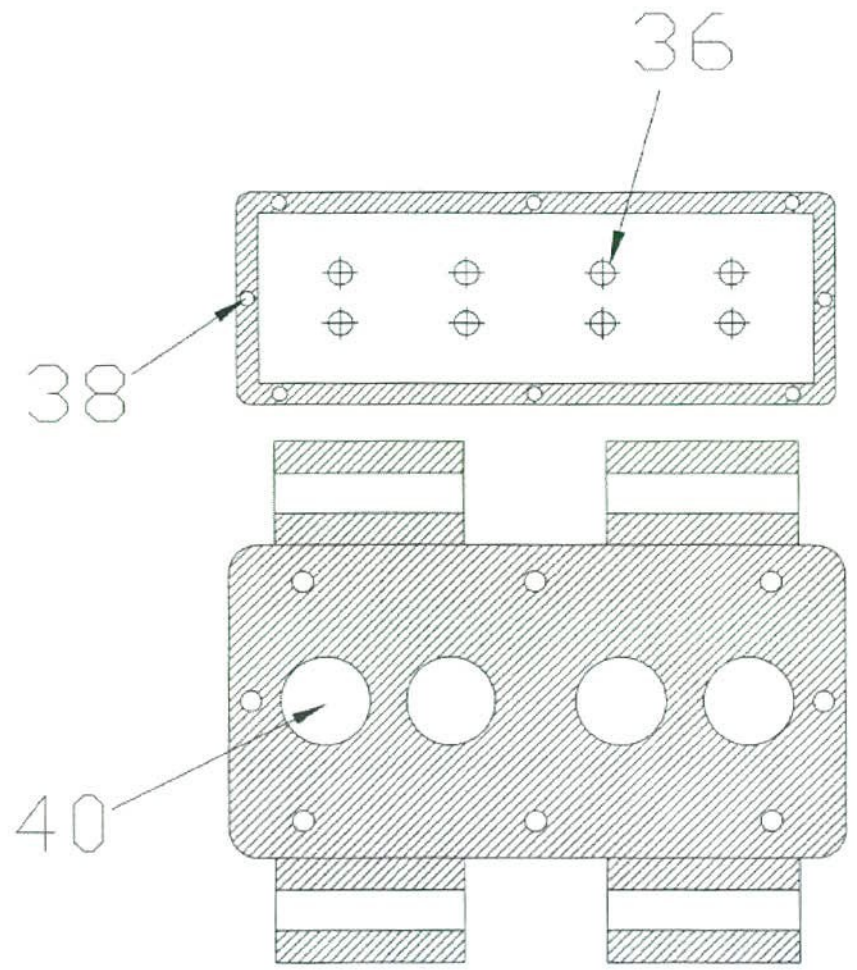


FIG: -3





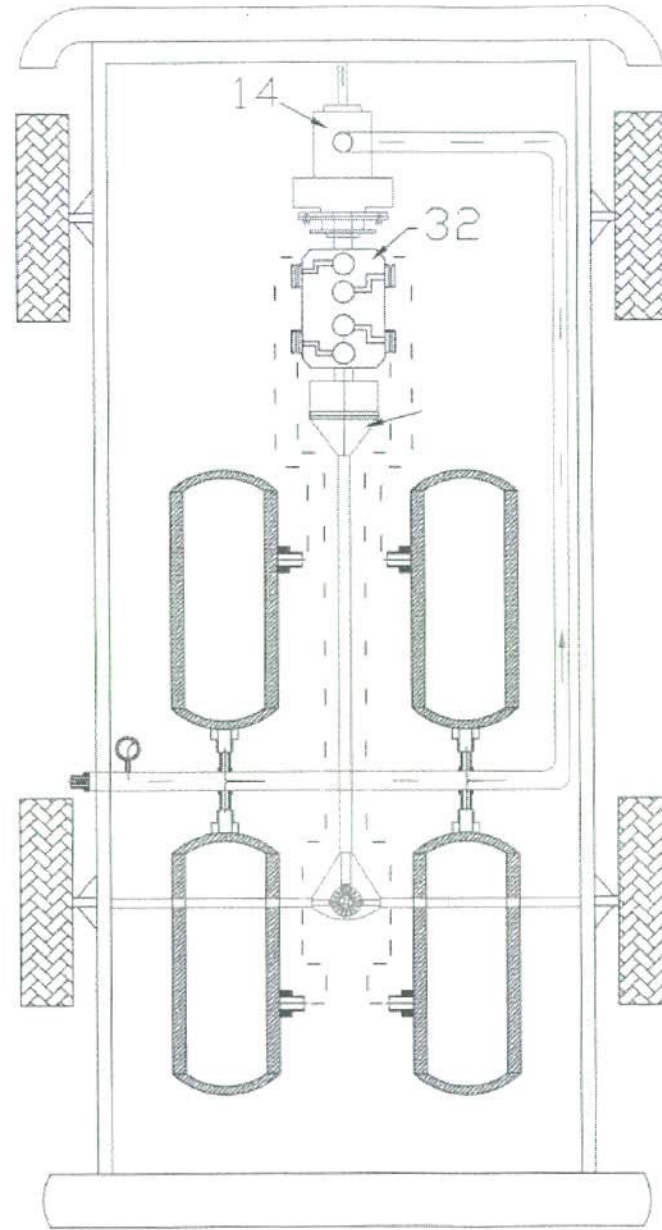


FIG: -6

RESUMEN

La presente invención se relaciona con una máquina que opera
5 con aire natural a presión, más particularmente con un
método y un aparato para operar un motor de un vehículo con
aire natural a presión con el fin de aliviar el problema de
la contaminación. La presente invención proporciona un
método y un aparato confiables para operar una máquina con
10 aire natural a una presión adecuada que es efectiva para
suministrar una cantidad constantemente creciente de aire
natural a una máquina conforme aumenta la velocidad de la
misma, lo cual es fácilmente adaptable a un motor estándar
de combustión interna para convertir el motor de combustión
15 interna en un motor que funciona con aire natural.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property

Organization

International Bureau



WIPO PCT



(10) International Publication Number

WO 2013/054336 A1

(43) International Publication Date

18 April 2013 (18.04.2013)

(51) International Patent Classification:

F02D 13/04 (2006.01)

F02N 7/00 (2006.01)

F02B 21/00 (2006.01)

(21) International Application Number:

PCT/IN2012/000385

(22) International Filing Date:

1 June 2012 (01.06.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2686/MUM/2011 22 September 2011 (22.09.2011) IN

(72) Inventor; and

(71) Applicant : SUMRA, Hajibhai, A. [IN/IN]; Kalawad Road, Behind Vrandavan Socty, Ruda 1, Plot No. 164, Rajkot 360 005 (IN).

(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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,

HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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.

(84) Designated States (unless otherwise indicated, for every

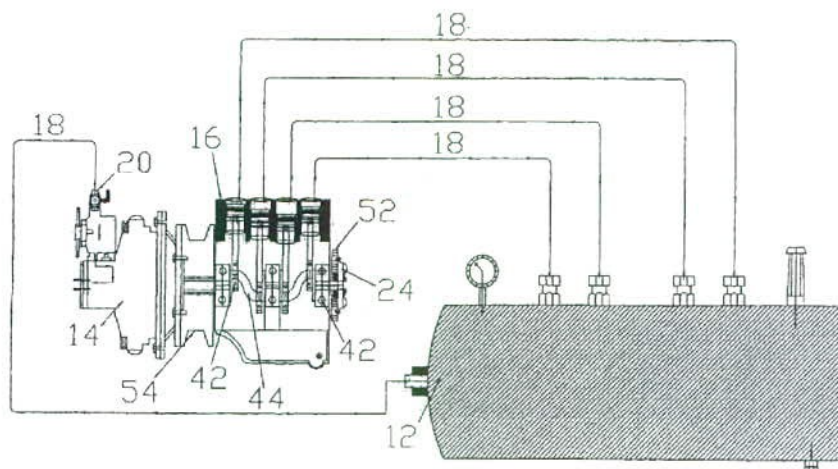
kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE,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

Published:

— with international search report (Art. 21(3))

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) Title: METHOD AND APPARATUS FOR OPERATING AN ENGINE ON NATURAL AIR



(57) Abstract: The present invention relates to an engine that runs on natural air pressure, more particularly to a method and apparatus for operating a vehicle engine on natural air pressure in order to alleviate problem of pollution. The present invention provide a reliable method and apparatus for operating an engine with a natural air with appropriate pressure which is effective to deliver a constantly increasing amount of natural air to an engine as the speed of the engine increases which is readily adaptable to a standard internal combustion engine to convert the internal combustion engine for operation with a natural air.

WO 2013/054336 A1

**METHOD AND APPARATUS FOR OPERATING AN ENGINE ON NATURAL AIR
FIELD OF THE INVENTION**

5 The present invention relates to an engine that runs on natural air pressure, more particularly to a method and apparatus for operating a vehicle engine on natural air pressure in order to alleviate problem of pollution.

BACKGROUND OF THE INVENTION

10

Air pollution is one of the most serious problems facing the world today. One of the major contributors to air pollution is ordinary internal combustion engine which are used in most motor vehicles today. Various devices, including many items mandated by legislation, have been proposed in an attempt to limit the pollutants which an internal combustion engine exhausts to the air. However, most of these devices have met with limited success and are often both prohibitively expensive and complex. A clean alternative to the internal combustion engine is needed to power vehicles and other machinery.

20 A compressed gas, preferably air, would provide an ideal motive fluid for a engine since it would eliminate the usual pollutants exhausted from an internal combustion engine. An apparatus for converting an internal combustion engine for operation on compressed air is disclosed in U.S. Pat. No. 3,885,387 issued

May 27, 1975 to Simington. The Simington patent discloses an apparatus including a source of compressed air and a rotating valve actuator which opens and closes a plurality of mechanical poppet valves. The valves deliver compressed air in timed sequence to the cylinders of an engine through
5 adapters located in the spark plug holes. However, the output speed of an engine of this type is limited by the speed of the mechanical valves and the fact that the length of time over which each of the valves remains open cannot be varied as the speed of the engine increases.

10 Another apparatus for converting an internal combustion engine for operation on steam or compressed air is disclosed in U.S. Pat. No. 4,102,130 issued July 25, 1978 to Stricklin. The Stricklin patent discloses a device which changes the valve timing of a conventional four stroke engine such that the intake and exhaust valves open once for every revolution of the engine instead of once
15 every other revolution of the engine. A reversing valve is provided which delivers live steam or compressed air to the intake valves and is subsequently reversed to allow the exhaust valves to deliver the expanded steam or air to the atmosphere. A reversing valve of this type however does not provide a reliable apparatus for varying the amount of motive fluid injected into the
20 cylinders when it is desired to increase the speed of the engine. Further, a device of the type disclosed in the Stricklin patent requires the use of multiple reversing valves if the cylinders in a multi-cylinder engine were to be fired sequentially.

OBJECT OF THE PRESENT INVENTION

Therefore, it is an object of the present invention to provide a reliable method
5 and apparatus for operating an engine with a natural air with appropriate
pressure.

A further object of the present invention is to provide a method and apparatus
which is effective to deliver a constantly increasing amount of natural air to an
10 engine as the speed of the engine increases.

A still further object of the present invention is to provide a method and
apparatus which will operate an engine using natural air at a speed sufficient
to drive a conventional automobile at highway speeds.

15 It is still a further object of the present invention to provide a method and
apparatus which is readily adaptable to a standard internal combustion engine
to convert the internal combustion engine for operation with a natural air.

BRIEF DESCRIPTION OF THE DRAWINGS

20

Preferred embodiments of a method and apparatus for operating an engine
according to the present invention will be described with reference to the
accompanying drawings wherein like members bear like reference and wherein:

FIG. 1 is a schematic representation of an apparatus according to the present invention of an engine;

- 5 FIG. 2 is a schematic view of one embodiment of an engine and air motor according to the present invention;

FIG. 3 is a plan view taken according to the present invention arranged on an engine;

10

FIG. 4 is a cross-sectional view of a vehicle having an engine that work on natural air according to the present invention arranged on a vehicle;

- FIG. 5 is a head plan view and an engine body plan view according to the
15 present invention;

FIG. 6 is a cross-sectional view of four tanks plan view according to the present invention.

20 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to an engine that runs on natural air pressure, more particularly to a method and apparatus for operating a vehicle engine on

natural air pressure in order to alleviate problem of pollution. Reference will now be made in detail to the present embodiments of the invention, examples of which are illustrated in the accompanying drawings.

- 5 As shown in Figure 1 to Figure 6, the present invention provides an engine (10) which runs with the help of High pressure of the air. Due to the pressure of the air, the motor starts to move and with the help of the said movement of the motor, the engine gets started which itself acts as a compressor.
- 10 The air is mainly placed in the air tank (12) wherein about 310 pounds of air is filled. In the initial stage, the Motor (14) starts to move and at the same time this force helps to start the engine. The compressor (16) absorbs the air form the outside atmosphere and sends the required volume of air back into the tank (18) in order to fulfill the appropriate air storage and pressure in said air tank
- 15 (18),

In one of the embodiment of the present invention about 300 Pounds of air is filled tightly in the air tank (18). One connection of the air tank (18) is joined with the air motor (14) and one valve (20) connection is pro coupled into the

20 Steering (22), Clutch (24), Break (26) and Accelerator (28). When the locks (30) are opened, the air from the tank (18) passes into the Motor (14), hence, starting the air motor and engine.

Further, four connections are provided from the engine (32) Head to the air Tank (18). These connections help in the transfer of air quantity, balancing the continuous Increase and reduction of air supply and air compressor engine provides the quantity of the air into the air tank (18).

5

Irreversible valves (34) are fixed to air tank (18) which prevents the inner air of the tank from going out; hence balancing the air consumption of about 300 pounds is maintained such that even though this amount of air has been utilized, there still remains about 300 pounds of air in the tank.

10

In said air-tank, one side of the valve (20) is arranged in a manner so that the air is passed from air tank (18) to the air motor (14) further, in said air tank, one sided valve is fixed which helps in the release of the additional air towards the outside and when the quantity of air increases than the required quantity, this said valve helps in releasing the additional air so as to avoid any breakage in the tank.

15

Yet another embodiment of the present invention provides head working compressor (16) which is useful in the engine (32) which enables air cooling and connected by eight valves wherein, four towards the left and remaining towards the right. The four valves of the Head (36) are meant to absorb air while another four valves are used to throw the inner air outside. In the said

20

head (36), six holes (38) for six connections have been given so as to help in joining the engine's body (32) with its Head (36).

In yet another embodiment of the present invention there is provided and
5 engine body (32) having four cylinders (40) also known as liners. Four brass caps (42) have been added in the body of engine (32), which helps the crank shaft (44) to get grips. In the said engine, along with the crank shaft, there are another four connecting rods (46).

10 Along with four connecting rods, four pieces of piston (48) have also been given as joints. These four pistons (48) of the engine are used to absorb the air. They are designed in such a way that, when the piston stroke goes down, the outer air enters the engine and when the piston stroke (48) goes up, deposited air goes out. In these four pistons, there are four logs which functions as per the
15 diameters. An oil pump (50) has been provided in the body of said engine. The oil pump supplies (50) the oil to all the circuits of the engine, due to this, all parts of the engine gets greased, which in turn helps in overcoming the problem of locking of parts and also helps in longer life of the parts.

20 In order to avoid the problem of loading, along with the crank shaft (44) in the engine, loading wheels (52) have also been provided. These in turn also helps in maintaining the R.P.M. of said engine (32). This crank shaft (44) is also coupled with said air motor (14) and on the rear side of the engine, there is provided a

19
clutch Plate (24), further on the upper side of the Loading Wheels; a diameter
Ring Gyrers have also been given which are connected to the alternator (54).
This alternator is useful as it enables to keep the battery charged. The Battery
(56) is used for the Lighting purpose therefore said engine doesn't need any
5 external power supply.

In yet another embodiment of the present invention is provided and air motor
(14) which is coupled with crank shaft (44) and at the upper part of air engine
(32) there is provided an air valve which enables starting of motor. One
10 connection of said air motor is given to the downside which throws the
additional air towards the outside which in turn helps in keeping the engine
cool and able to run at about the speed of 0 to 100. As this engine runs on air,
it doesn't affect the atmosphere; it does not require plug, silencer, bush rod,
tepitia, battery, radiator and carburetor.

15

The principles of preferred embodiments of the present invention have been
described in the foregoing specification. However, the invention which is
intended to be protected is not to be construed as limited to the particular
embodiments disclosed. The embodiments are to be regarded as illustrative
20 rather than restrictive. Variations and changes may be made by others without
departing from the spirit of the invention. Accordingly, it is expressly intended
that all such variations and changes which fall within the spirit and the scope

of the present invention as defined in the appended claims be embraced
thereby.

5

10

~~19~~
19**CLAIMS:**

1. A method and apparatus for operating a vehicle engine on natural air wherein,
5 the air is placed in the air tank of air motor wherein about 310 pounds of air is filled wherein, in the initial stage, the motor starts to move and at the same time this force helps to start the engine followed by absorption of air by the compressor form the outside atmosphere and sends the required volume of air back into the tank in order to fulfill the appropriate air storage and pressure in
10 said air tank.
2. A method and apparatus as claimed in claim 1, wherein one connection of the air tank is joined with the air motor and one valve connection is pro coupled into the Steering, Clutch, Break and Accelerator, wherein when the locks are
15 opened, the air from the tank passes into the Motor, hence, starting the air motor and engine.
3. A method and apparatus as claimed in claim 1, wherein four connections are provided from the engine head to the air tank helping in the transfer of air
20 quantity, balancing the continuous Increase and reduction of air supply and air compressor engine provides the quantity of the air into the air tank.

4. A method and apparatus as claimed in claim 1, wherein Irreversible valves are fixed to air tank which prevents the inner air of the tank from going out; hence balancing the air consumption of about 300 pounds is maintained such that even though this amount of air has been utilized, there still remains about 300 pounds of air in the tank.
5. A method and apparatus as claimed in claim 1, wherein in said air-tank, one side of the valve is arranged in a manner such that the air is passed from air tank to the air motor further, in said air tank, one sided valve is fixed which helps in the release of the additional air towards the outside and when the quantity of air increases than the required quantity, said valve helps in releasing the additional air in order to avoid any breakage in the tank.
6. A method and apparatus as claimed in claim 1, wherein head working compressor enables air cooling, which is connected by eight valves whereby four are meant to absorb air while another four valves are used to throw the inner air outside.
7. A method and apparatus as claimed in claim 1, wherein engine body is having four cylinders, four connecting rods, four pieces of piston have also been given as joints whereby these four pistons of the engine absorbs the air enabling in such a way that, when the piston stroke goes down, the outer air enters the engine and when the piston stroke goes up, deposited air goes out.

8. A method and apparatus as claimed in claim 1, wherein, an oil pump is provided in the body of said engine for supplying the oil to all the circuits of the engine, due to this, all parts of the engine gets greased, which in turn helps in overcoming the problem of locking of parts and also helps in longer life of the parts.
9. A method and apparatus as claimed in claim 1, wherein, an air motor which is coupled with crank shaft further there is provided an air valve which enables starting of said motor whereby, one connection of said air motor is given to the downside which throws the additional air towards the outside which in turn helps in keeping the engine cool and able to run at about the speed of 0 to 100.

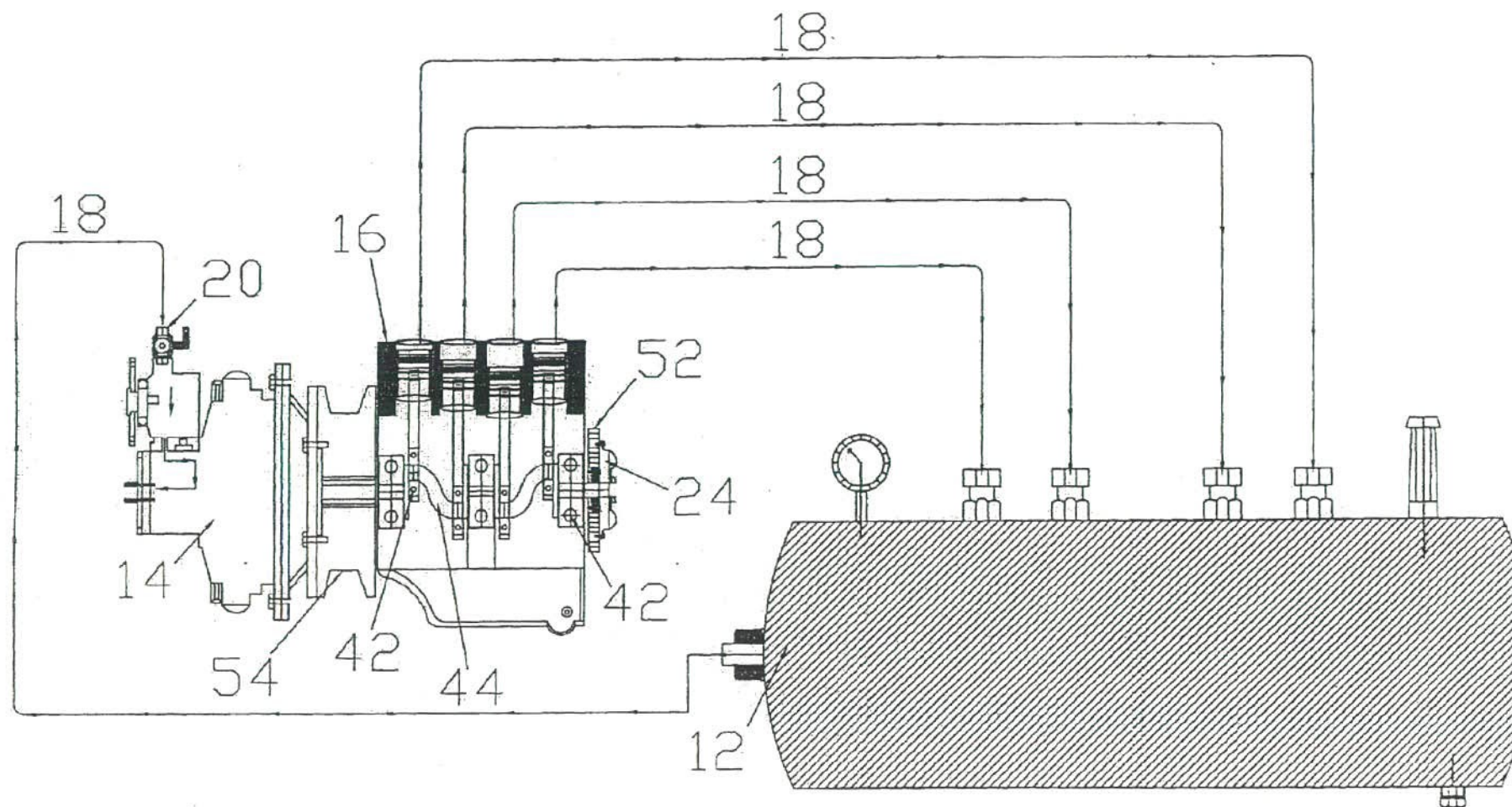
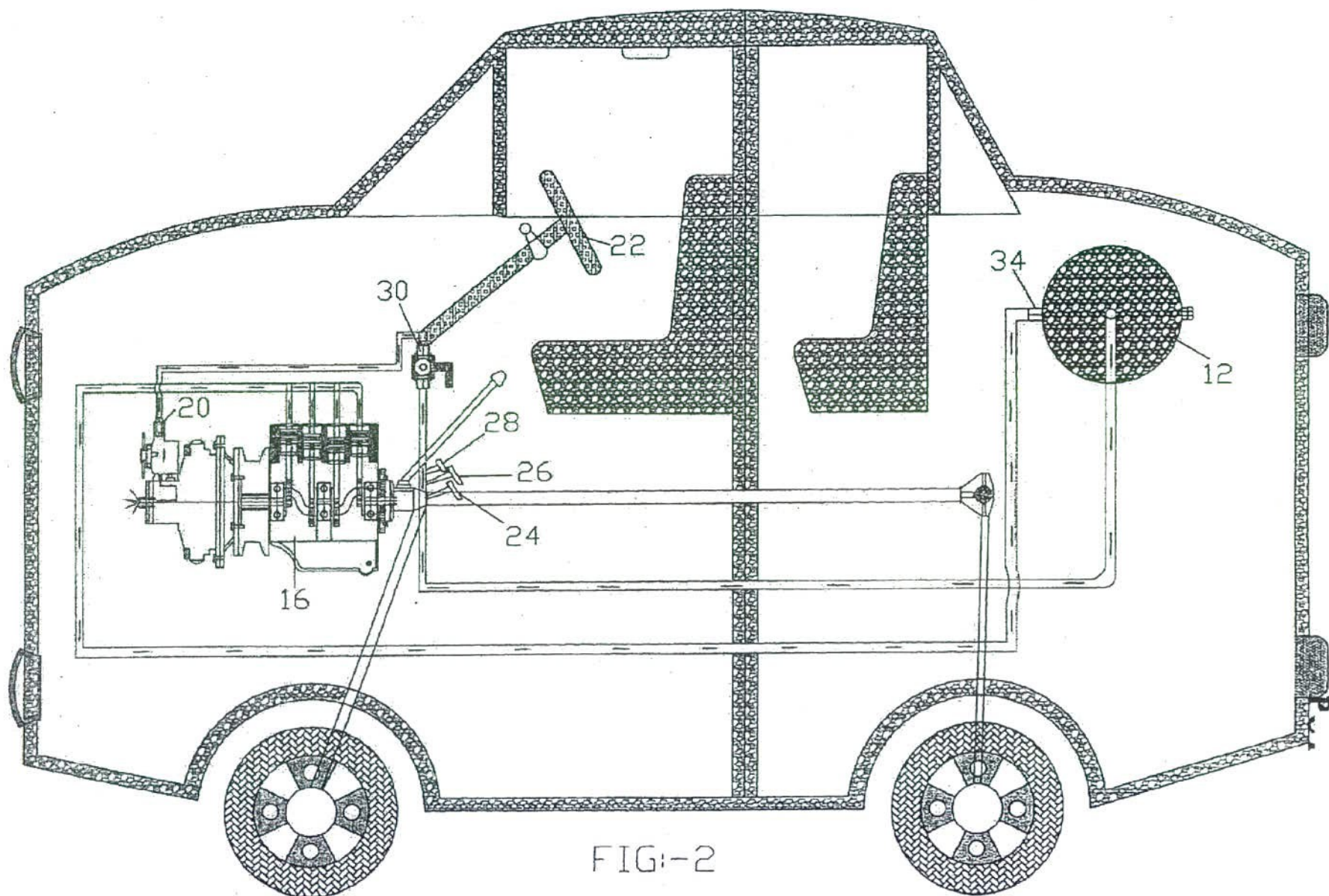


FIG-1

21



12

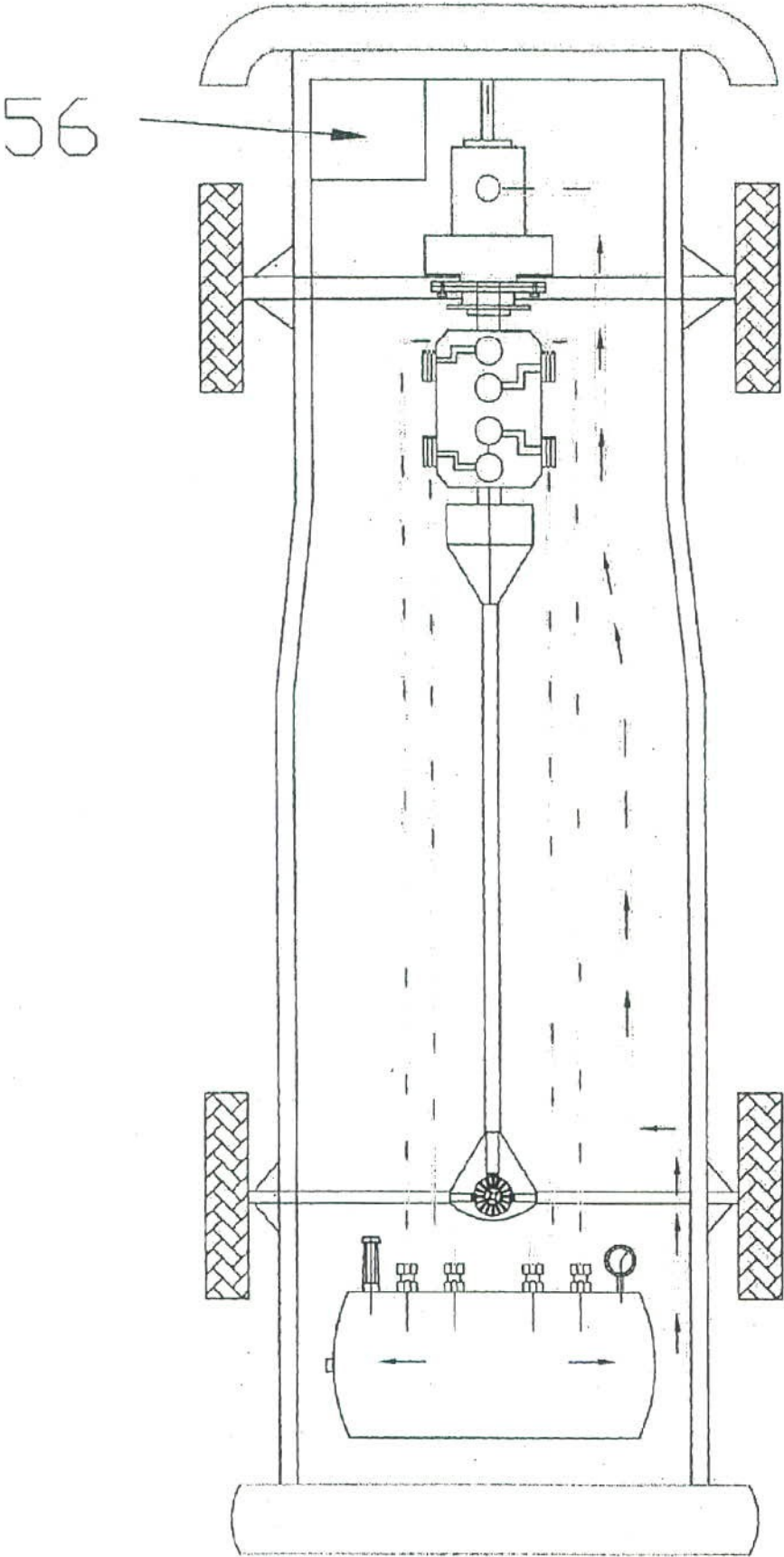
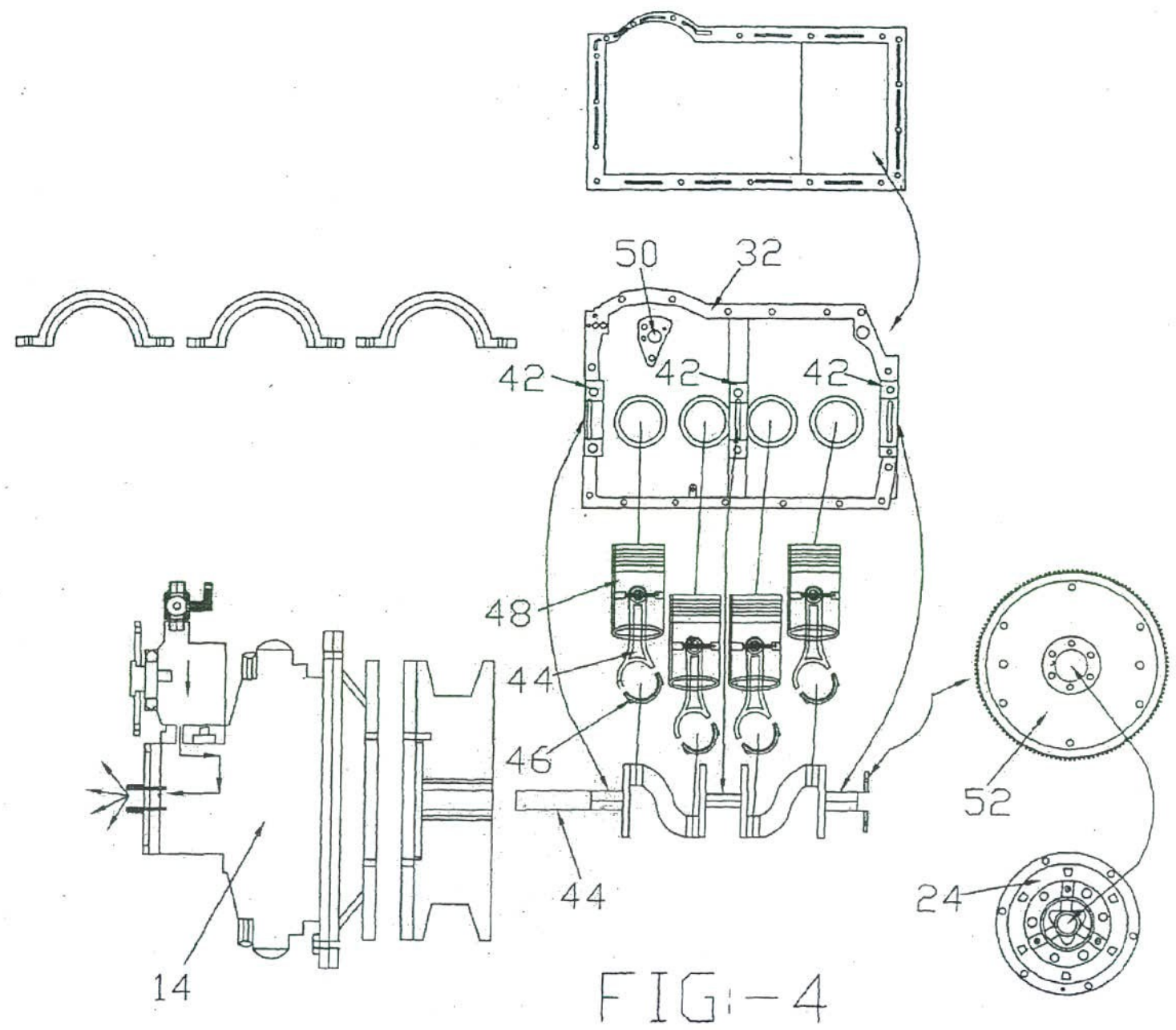
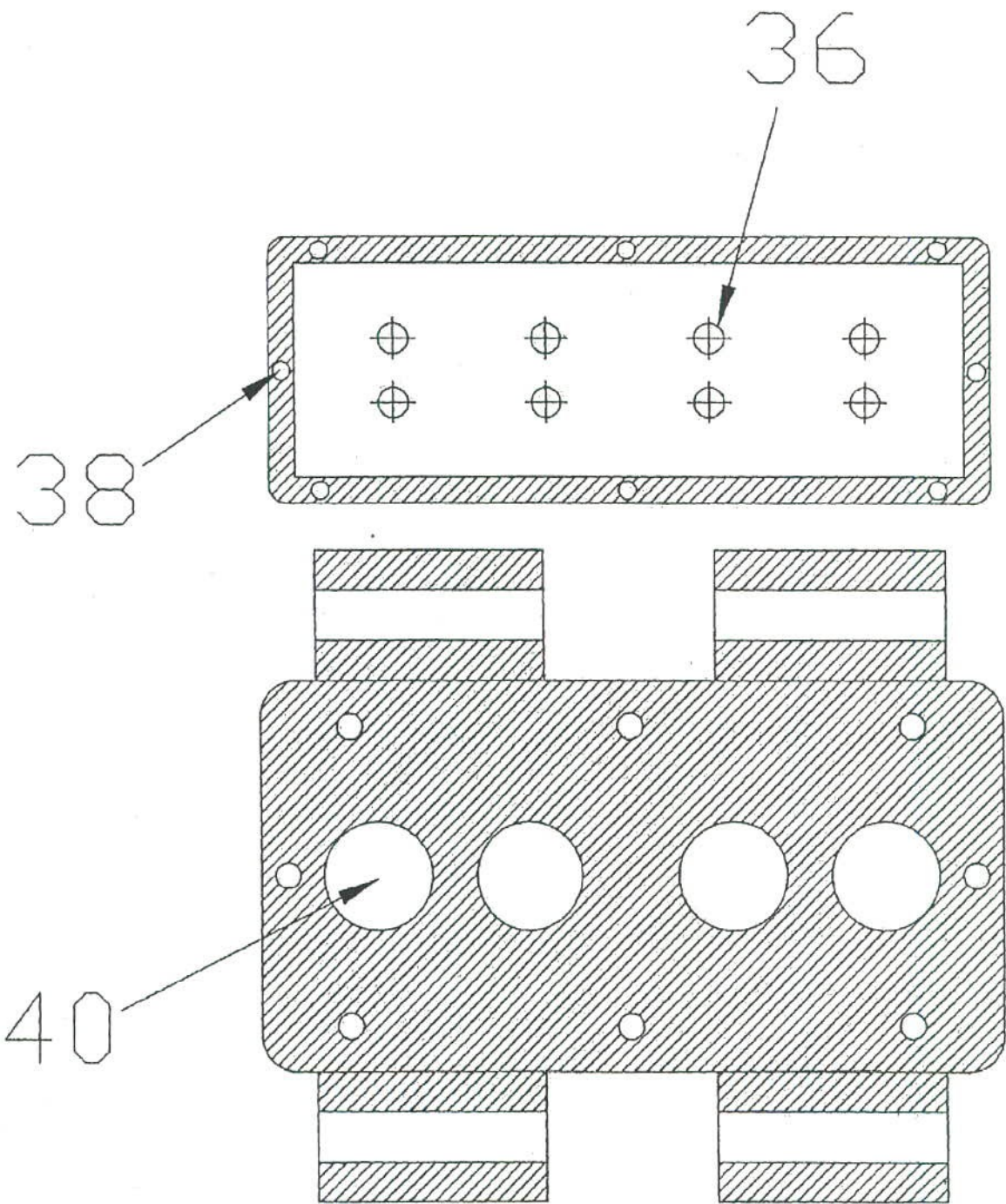


FIG-3

72



72



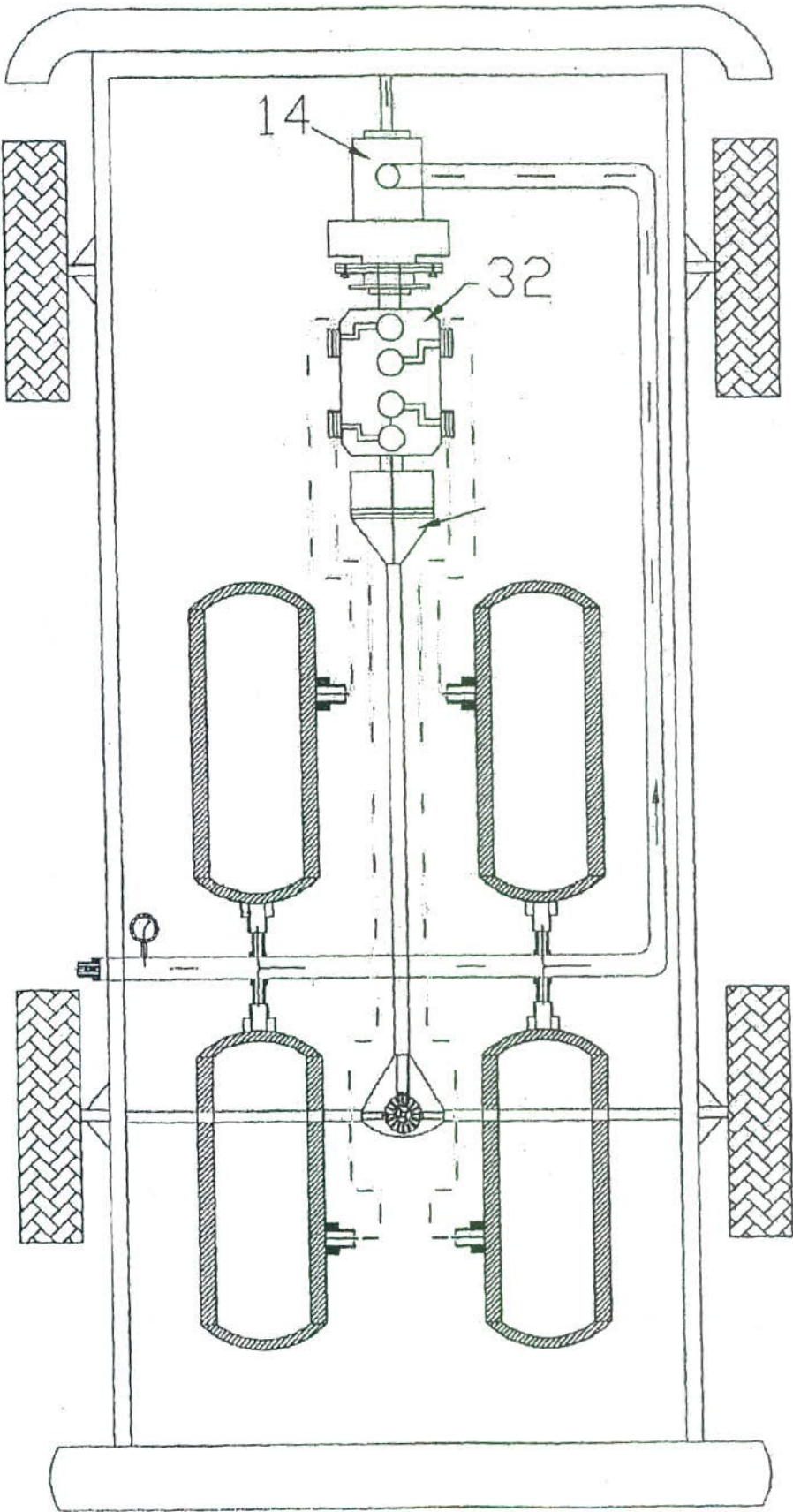


FIG-6

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2012/000385

A. CLASSIFICATION OF SUBJECT MATTER

INV. F02D13/04 F02B21/00 F02N7/00
ADD.

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)

F02D F02B F02N

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 201 891 516 U (GUANGXI YUCHAI MACHINERY CO) 6 July 2011 (2011-07-06)	1,2,6-9
Y	figures 1-7	3-5
Y	----- US 2005/182553 A1 (MILLER KENNETH C [US] ET AL) 18 August 2005 (2005-08-18) figure 2	3-5
A	----- US 1 066 649 A (PARKER HARRY [US]) 8 July 1913 (1913-07-08) figures 1-6	1



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 application or patent 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 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

15 March 2013

Date of mailing of the international search report

22/03/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Flamme, Emmanuel

22

INTERNATIONAL SEARCH REPORT
 Information on patent family members

International application No
 PCT/IN2012/000385

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
CN 201891516	U	06-07-2011	NONE	
US 2005182553	A1	18-08-2005	CA 2562743 A1 CN 1934573 A US 2005182553 A1 US 2006052930 A1 US 2007113803 A1 WO 2005079418 A2	01-09-2005 21-03-2007 18-08-2005 09-03-2006 24-05-2007 01-09-2005
US 1066649	A	08-07-1913	NONE	

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 002	FOR FURTHER ACTION	See item 4 below
International application No. PCT/IN2012/000385	International filing date (day/month/year) 01 June 2012 (01.06.2012)	Priority date (day/month/year) 22 September 2011 (22.09.2011)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant SUMRA, Hajibhai, A.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 11 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| ☒ | Box No. I | Basis of the report |
| ☐ | Box No. II | Priority |
| ☐ | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| ☐ | Box No. IV | Lack of unity of invention |
| ☒ | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| ☐ | Box No. VI | Certain documents cited |
| ☐ | Box No. VII | Certain defects in the international application |
| ☐ | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

	Date of issuance of this report 25 March 2014 (25.03.2014)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Kihwan Moon e-mail: pt01.pct@wipo.int

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IN2012/000385

International filing date (day/month/year)
01.06.2012

Priority date (day/month/year)
22.09.2011

International Patent Classification (IPC) or both national classification and IPC
INV. F02D13/04 F02B21/00 F02N7/00

Applicant
SUMRA, HAJIBHAI A

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040
Fax: +31 70 340 - 3016

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Flamme, Emmanuel

Telephone No. +31 70 340-2539



WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IN2012/000385

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
- ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
- a. (means)
- ☐ on paper
 - ☐ in electronic form
- b. (time)
- ☐ in the international application as filed
 - ☐ together with the international application in electronic form
 - ☐ subsequently to this Authority for the purposes of search
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>2-5</u>
	No: Claims	<u>1, 6-9</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-9</u>
Industrial applicability (IA)	Yes: Claims	<u>1-9</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

- D1 CN 201 891 516 U (GUANGXI YUCHAI MACHINERY CO) 6 July 2011 (2011-07-06)
- D2 US 2005/182553 A1 (MILLER KENNETH C [US] ET AL) 18 August 2005 (2005-08-18)
- D3 US 1 066 649 A (PARKER HARRY [US]) 8 July 1913 (1913-07-08)

2. The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

D1 discloses a method and apparatus for operating a vehicle engine (1) on natural air wherein, the air is placed in the air tank (8) of air motor (10) wherein about 310 pounds (unit pressure definition ist not clear and therefore not limiting) of air is filled wherein, in the initial stage, the motor starts to move and at the same time this force helps to start the engine followed by absorption of air by the compressor form the outside atmosphere and sends the required volume of air back into the tank in order to fulfill the appropriate air storage and pressure in said air tank.

3. Dependent claims 2-9 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step.

3.1. The expression in claim 2 "pro coupled" is not clear. Notwithstanding this clarity issue, the features of claim 2 are not inventive.

3.2. Claims 3-5 refer to a different arrangement to that know form D1 (i.e. a connection for each cylinder). However, such a difference is a slight constructional change which comes within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen.

3.3. Claims 6-9 are not new and are either explicitly on implicitly disclosed by D1.

4. Appendix : Automatic Translation of D1 :

© TXTCNTCN201891516U U 20110706

Automatically Translated by the Intellectual Property Publishing House of SIPO

This utility model has disclosed a kind of gas fires an engine, comprising: Engine block; The braking force control system, then the opening and closing of air inlet valve used for controlling in the said engine block carries on the brake control to the engine; The energy recovery unit, is used for collecting and storing the compressed gas produced in the engine braking course; The POE, is used for using compressed air of the energy recovery unit as the driving source in order to start the engine block. Compared with prior art, this utility model and his driving source as pneumatic motor through retrieve engine compressed air not produced in the course of braking, energy saving, prevent prior art from make obtain compress noise air generate also, save energy of but environment-friendly.

The gas fires an engine

Technical field

This utility model relates to a gas and fires an engine, especially relate to an engine capable of retrieving compressed air in engine braking course and regarding it as to retrieve incomes and compress the air and starting the power source.

Background Art

The pneumatic motors, as starting the driving source of the engine, can work under adverse conditions such as flammable, explosive, high temperature, vibration, humidity, dust, etc. normally, can be suitable for various threatening working environment, therefore is an ideal initialization mode. However, in the existing pneumatic power fires an engine, the compressed air that the pneumatic motor uses mainly relies on the air compressor to get, the air compressor needs to consume a large number of energies too in the course of working, and will produce the noise.

Content of the utility model

The technical matter to be solved of this utility model lies in in order to overcome the defect in the above-mentioned prior art, provide a kind of gas to fire an engine, the engine can retrieve the compressed air produced in the braking process and as the driving source of the pneumatic motor in order to fire an engine.

The technical matter of this utility model is to fire an engine and is solved by providing the following gas:

A kind of gas fires an engine, comprising: Engine block; The braking force control system, then the opening and closing of air inlet valve used for controlling in the said engine block carries on the brake control to the engine; The energy recovery unit, is used for collecting and storing the compressed gas produced in the engine braking course; The POE, is used for using compressed air of the energy recovery unit as the driving source in order to start the engine block.

Preferably, the said braking force control system includes fixedly mounting on rocker bearing of the engineThe body, there are flow paths in the body, are fitted with an electromagnetic valve connecting electrically with engine ECU on the flow path of the body, drive the piston assembly in the position corresponding to angry raft of pontoons of each engine on the body, flow direction and oil pressure used for flow path of controlling shell of said electromagnetic valve, under the influence of oil pressure of the flow path of body, should drive go on the movement of the above-below direction by piston assembly.

Preferably, the said energy recovery unit includes the gas cylinder and mounts to the energy recovery module between admission pipe of the engine and the cylinder head air inlet, the inside of the module of said energy recovery is a cavity pocket fitted with energy distribution, under the normal job air admission state of the engine, the fresh air enters the cylinder head air inlet from the admission pipe through the energy distribution, the cavity pocket in the said energy distribution communicates with gas cylinder through the pipeline of energy recovery, the pipeline of energy recovery is fitted with the first check valve, under the engine braking state, compress the air to discharge from the cylinder head air inlet to the module of energy recovery, said first check valve is opened at the pressure of compressing the air, compress the air to enter the gas cylinder to collect through the pipeline of said energy recovery.

Preferably, the energy distribution is a check valve, under the normal job air admission state of the engine, the unidirectional valve opening, first closed check valve; Under the engine braking state, the closed check valve, first unidirectional valve opening, is used for compressing the recovery of the air. The opening pressure of the first check valve can be 0.5MPa.

Preferably, the said actuating mechanism includes the pneumatic motor, sets up the second pipeline fitted with first pipeline and fitting with the main trigger valve of the starting control valve and is used for retrieving third of the compressed gas between gas cylinder and the pneumatic motor Pipeline.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/IN2012/000385

Compared with prior art, this utility model and his driving source as pneumatic motor through retrieve engine compressed air not produced in the course of braking, namely energy saving, prevent prior art from make obtain compress noise air generate again, save energy of but environment-friendly.

Brief description of the drawing

Fig. 1 is the principle schematic view that the embodiment gas of this utility model fires an engine;

Fig. 2 is the exploded drawing of braking force control system in the embodiments of this utility model;

Fig. 3 is the installation schematic view of braking force control system in the embodiments of this utility model;

Fig. 4 is the broken-out section view that the embodiment gas of this utility model fired an engine, mainly show the module of energy recovery and installation cooperating relationship of cylinder barrel and admission pipe assembly;

Fig. 5 is the elevation view of module of energy recovery in the embodiments of this utility model;

Fig. 6 is the gas piping connection schematic view between pneumatic motor and the gas cylinder in the embodiments of this utility model;

Fig. 7-1 is a normal job air admission state schematic diagram of this practical model engine (the direction of arrow in drawing is a novel direction of air flow);

Fig. 7-2 collects the working condition schematic diagram of the compressed gas (the direction of arrow in drawing is in order to compress the direction of air flow) for this utility model.

Combine the figure mark under the mark on it of drawing:

1-engine block, 101-air inlet valve, 102-air vent valve, 2-brake assembly, 3-module of energy recovery, 31-air inlet (connect the admission pipe 4), 32-air gate (connect the cylinder head air inlet 30), 33-air gate (connect the gas recovery pipeline 7), 4-admission pipe assembly, 5-energy distribution, 61-first unidirectional air valve, 62-second unidirectional air valve, 63-third unidirectional air valve, 7-pipeline assembly of gas recovery, 8-gas cylinder, 9-gas delivery line, 10-pneumatic motor, 12-setting screw, 13-nut, 14-brake casing, 15-ring washer, 16-the oil drainage is sold, 17-drive the piston assembly, 18-spring lamination, 19-bolt, 20-filter screen is inserted, 21-filter screen, 22-O-ring seal, 23-O-ring seal, 24-O-ring seal, 25-filter screen, 26-electromagnetic valve, 27-pressing plate, 28-bolt, 29-cylinder head, 30-cylinder head air inlet.

Concrete embodiment

The following accompanying drawing, carry on the detailed description to the concrete embodiment of this utility model, but should understand the protective range of this utility model is unrestricted by concrete embodiment.

As shown in Fig. 1, the gas fires an engine to include: Engine block 1; The brake assembly 2, as the braking force control system, then the opening and closing of air inlet valve 101 used for controlling in the said engine block 1 carries on the brake control to the engine block 1; Energy recovery module 3 and gas cylinder connected through the gas recovery pipeline assembly 7 with the energy recovery module 3, compressed gas used for collecting and storing the engine block 1 and producing in the course of braking; The pneumatic motor 10, it is the POE, is used for using compressed air of the gas cylinder 8 as the driving source in order to start the engine block 1.

As shown in Fig. 2, the brake assembly 2 includes the brake casing 14, in the up opened of brake casing Cross the setting screw 12 and nut 13 and is fitted with and driven the piston assembly 17, is equipped with the oil drainage pin 16 driving the piston assembly 17, there is ring washer 15 above the oil drainage pin 16, are equipped with screen clips 20 and filter screen 21 driving the piston assembly 17, driving the piston assembly 17 to connect with the spring lamination 18 and bolt 19, is fitted with the electromagnetic valve 26 through the pressing plate 27 and bolt 28 the brake casing 14, there is O-ring seal 22, 23, 24 on the contact surfaces of the electromagnetic valve 26 and brake casing 14, used for strengthening the leak proofness. Also there is filter screen 25 in the electromagnetic valve 26.

As shown in Fig. 3, the brake casing 14 of the brake assembly is installed on rocker bearing of the engine, assemble and fasten on the cylinder cover together with said rocker bearing with the bolt. Equipped with the flow path the said brake casing 14, the electromagnetic valve 26 is connected electrically with engine ECU and installed on flow path in the brake casing 14. Every drive piston assembly 17 on the body 14 is set up above angry raft of pontoons of each engine correspondingly. Flow direction and pressure of the flow path in the lower controlling shell of signal that ECU sends out of the said electromagnetic valve, under the influence of oil pressure of the flow path of body, should drive the piston assembly 17 and can carry on the movement of above-below direction.

The braking process of the engine is: When the engine is in compressed state, the electromagnetic valve in the brake assembly opened the flow path under the control of engine ECU, make drive 17 piston assembly move downward, drive bottom of piston assembly exert the downward pressure against air contact terrace of raft of pontoons

at inlet valve rocker, drive the air inlet valve 101 to open, the compressed air in the air cylinder is discharged from interval of the inlet valve, the negative power that the engine block 1 is made is to realize the braking of the engine, the recoverable recycling of compressed air of discharging at the same time.

Such as Fig. 4, show 5, fitted with the energy recovery module 3 between engine admission pipe 7 and air inlet 30 of the cylinder head. As shown in Fig. 5, the energy recovery module 3 is the cavity pocket that a inside is fitted with the energy distribution 5, the said energy distribution 5 is an unidirectional air pressure valve, the air can only enter the cylinder head air inlet 30 from the admission pipe assembly 4 through the energy distribution 5. The cavity pocket of the said energy recovery module 3 communicates with gas cylinder 8 through the gas recovery pipeline assembly 7, fitted with the first unidirectional air pressure valve 61 the gas recovery pipeline assembly 7. Consult Fig. 1, in engine braking, the compressed gas discharged from the inlet valve gathers from energy recovery module 3 from gas recovery pipeline assembly 7 to the gas cylinder 8. Two risers of the gas cylinder 8 are fitted with the second unidirectional air valve 62 and third unidirectional air valve 63 separately. Said 5 energy distribution and first unidirectional 61 air valve, second unidirectional 62 air valve and third unidirectional 63 pneumatic valve use for prevent the energy collect the backflow of compressed gas in the course. Energy recovery principle such as Fig. 7 shows, the normal working hour of engine (shown as in Fig. 7-1), the fresh air enters the air inlet 31 of module of energy recovery from the admission pipe 4, the energy distribution 5 is a check valve, the unidirectional valve opening at this moment, but because the pressure of the fresh air is not enough to open the first check valve 61 (the first check valve opening pressure is 0.5MPa) at this moment, therefore the fresh air enters the cylinder head air inlet 30 from the air gate 32 of the energy recovery module 3 directly, the engine realizes the air admission state of normal work; At the time of the engine braking, the compressed air refluxes from cylinder head air inlet 30 to the air gate 32 of the module of energy recovery, the energy distribution (namely check valve) is shut off at this moment, and because the opening pressure of compressing the pressure of the air to be greater than the first check valve 61 at this moment, the first check valve 61 is opened, the compressed air enters the gas recovery pipeline 7 and enters the gas cylinder 8 to retrieve.

As shown in Fig. 6, the pneumatic motor 10 is communicated with gas cylinder 8 through three pipelines. There are starting control valves in the first pipeline, the pipeline is used for motivating the meshing gear of the pneumatic motor 10, when putting through the pipeline, under the influence of compressed gas, the meshing gear travels forward to engage with flywheel ring gear of the engine block 1. The second pipeline has main trigger valves, the pipeline is used for motivating the rotation of the rotating shaft of the pneumatic motor 10, when putting through the pipeline, under the

influence of compressed gas, the rotating shaft of the pneumatic motor 10 is rotated to drive the engine start. The third pipeline is used for retrieving the residual air, after the engine starting, close first pipeline and secondary pipe, the despinning of the pneumatic motor 10, and the meshing gear regression of pneumatic motor 10 is to separate with the flywheel ring gear of the engine block 1, the remanent compressed gas returns to the gas cylinder 8 through the tertiary pipe in the pneumatic motor 10.

Compared with prior art, this utility model and its driving source as pneumatic motor through retrieve engine compressed air not produced in the course of braking, namely energy saving, prevent prior art from make obtain compress noise air generate again, save energy of but environment-friendly.

It is only a concrete embodiment of this utility model to be disclosed above, but, this utility model is not limited thereto, changes of what any those skilled in the art can think of should fall into the protective range of this utility model.

[Claims]

1. A kind of gas fires an engine, including the engine block, characterized by that, the said gas fires an engine to also include:

The braking force control system, then the opening and closing of air inlet valve used for controlling in the said engine block carries on the brake control to the engine;

The energy recovery unit, is used for collecting and storing the compressed gas produced in the engine braking course;

The POE, is used for using compressed air of the energy recovery unit as the driving source in order to start the engine block.

2. The gas as stated in Claim 1 fires an engine, characterized by, the said braking force control system includes the body fixedly mounted on rocker bearing of the engine, there are flow paths in the body, are fitted with an electromagnetic valve connecting electrically with engine ECU on the flow path of the body, drive the piston assembly in the position corresponding to angry raft of pontoons of each engine on the body, flow direction and oil pressure used for flow path of controlling shell of said electromagnetic valve, under the influence of oil pressure of the flow path of body, movement that should drive the piston assembly and can carry on the above-below direction.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/IN2012/000385

3. The gas as stated in Claim 1 fires an engine, characterized by, the said energy recovery unit includes the gas cylinder and mounts to the energy recovery module between admission pipe of the engine and the cylinder head air inlet, the inside of the module of said energy recovery is a cavity pocket fitted with energy distribution, under the normal job air admission state of the engine, the fresh air enters the cylinder head air inlet from the admission pipe through the energy distribution; The cavity pocket in the said energy distribution communicates with gas cylinder through the pipeline of energy recovery, the pipeline of energy recovery is fitted with the first check valve, under the engine braking state, compress the air to discharge from the cylinder head air inlet to the module of energy recovery, said first check valve is opened at the pressure of compressing the air, compress the air to enter the gas cylinder to collect through the pipeline of said energy recovery.

4. The gas as stated in Claim 3 fires an engine, characterized by, the said energy distribution is a check valve, under the normal job air admission state of the engine, said unidirectional valve opening, said first closed check valve; Under the engine braking state, said closed check valve, said first unidirectional valve opening, recovery used for compressing the air.

5. The gas as stated in Claim 3 or 4 fires an engine, characterized by, said The opening pressure of the first check valve is 0.5MPa.

6. The gas as stated in Claim 1 fires an engine, characterized by, the said POE includes the pneumatic motor, sets up the second pipeline fitted with first pipeline and fitting with the main trigger valve of the starting control valve and is used for retrieving third of the compressed gas between gas cylinder and the pneumatic motor Pipeline.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800.176.089-2

-/-



RECIBO DE CAJA

No. 14 - 0042207

Bogotá D.C., Abril 22 de 2014 - 14:28:06

RECIBIDO DE : CUESTA Y ASOCIADOS LTDA

NI 800.075.616

*** Soporte del Pago ***

TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	VR PAGO
CONSIGNACION	BANCO DE BOGOTA	062754387	590014051	22/04/2014	727.000.00

*** Conceptos Pagados ***

CANT.	RENTISTICO	CONCEPTO	Vr. UNIDITARIO	Vr. CONCEPTO
1	50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE INVENCIÓN	515.000.00	515.000.00
				\$515.000.00

SON: **QUINIENTOSQUINCE MIL PESOS MONEDA CORRIENTE**

Responsable: _____

Recibo de Caja Aplicado al Expediente No. _____

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-085507 - 00000-0000

Fecha: 2014-04-22 15:08:24
Tra. 11 PATENTE IYII
Act. 411 PRESENTACIONDep. 2020 DIR. NUEVAS CR
Eve: 378 FASE NACIONAL I
Folios: 3132

Sede Centro: Carrera 13 No. 27 - 00 Pisos 3,4,5 y 10 Bogotá, D.C. - Colombia

Web: www.sic.gov.co e-mail: info@sic.gov.co Conmutador: (571) 5870000 Fax: (571) 5870284 Línea: 018000-910165 Call Center: (571) 6513240

Abril 22 de 2014 - 14:28:07



No. 14-085507- -00000-0000

Fecha: 2014-04-22 15:08:24

Dep. 2020 DIR.NUEVASCR

Tra. 11 PATENTEIYII

Eve: 378 FASENACIONALI

Act. 411 PRESENTACION

Folios: 31

32

PATENTE DE INVENCION ☐

MODELO DE ☐

Art 33 Decisión 486/00

- ☐ Indicación que se solicita una patente.
 - ☐ Datos de identificación del solicitante o de la persona que presenta la solicitud
 - ☐ Descripción de la invención
 - ☐ Dibujos de ser estos pertinentes
 - ☐ Comprobante de pago de las tasas establecidas (De ser el caso formato de descuento)
- Completa ☐ Incompleta ☐

PATENTE DE INVENCION PCT ☐

MODELO DE UTILIDAD PCT ☐

Art.33 Decisión 486/00, Circular Única

- ☐ Indicación que se solicita una PCT
 - ☐ Copia de la solicitud en español, tal como fue presentada inicialmente (capítulo descriptivo, reivindicatorio, resumen)
 - ☐ Dibujos de ser estos pertinentes
 - ☐ Comprobante de pago de las tasas establecidas (de ser el caso formato de descuento)
- Completa ☐ Incompleta ☐

DISEÑO INDUSTRIAL ☐

(Art. 119 Decisión 486/00)

- ☐ Indicación que se solicita Diseño industrial
 - ☐ Datos de identificación del solicitante o de la persona que presenta la solicitud
 - ☐ Representación gráfica y fotográfica del Diseño industrial o muestra del material que incorpora el diseño
 - ☐ Comprobante de pago de las tasas establecidas
- Completa ☐ Incompleta ☐

ESQUEMA DE TRAZADO ☐

(Art. 92 Decisión 486/00)

- ☐ Indicación que se solicita un esquema de trazado
 - ☐ Datos de identificación del solicitante o de la persona que presenta la solicitud
 - ☐ Representación gráfica de un esquema de trazado
 - ☐ Comprobante de pago de las tasas establecidas
- Completa ☐ Incompleta ☐