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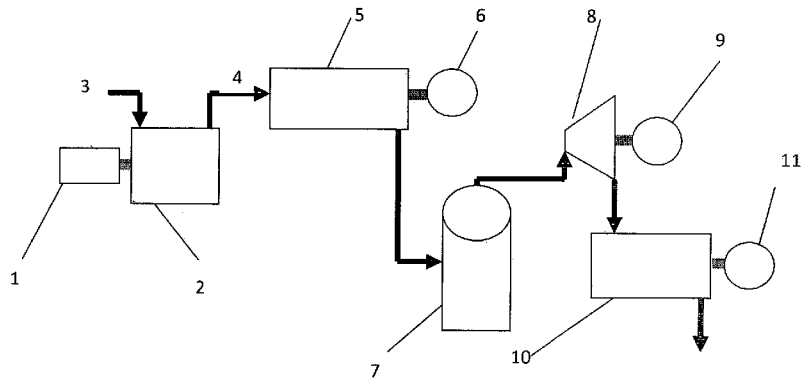
(54) **Title**: ATMOSPHERIC ENERGY TAPPING DEVICE FOR GENERATION' OF MECHANICAL AND ELECTRICAL ENERGY



(57) **Abstract**: Atmospheric energy tapping device for generation of mechanical and electrical energy comprising of a compressor for supplying hot compressed air/gas into a heat engine coupled to a generator for power generation, wherein said heat engine is provided in connection with a turbine. The gas is for ex: Nitrogen, Helium, Carbondioxide, Methane etc. However, the heat engines can be replaced with a single heat engine having high temperature source on one side and a low temperate sink on the other side. This provision enhances efficiency of conversion of heat into mechanical energy substantially. Again, the compressor and turbine can be mounted on the same shaft leading to overall improvement in efficiency. The device of the instant invention is highly useful as a means of power generation. It can be used for automobiles or stationary gen-sets and even large scale power plants. Its applications are limitless, as the energy conversion can be in the form of mechanical or electrical energy and thus can be applied wherever any of the two energies is required.

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TITLE

Atmospheric energy tapping device for generation of mechanical and electrical energy.

FIELD OF INVENTION

This invention relates to atmospheric energy tapping device for generation of mechanical and electrical energy. The energy is air/gas wherein the gas is such as Nitrogen, Helium, Carbondioxide, Methane etc.

BACKGROUND/PRIOR ART OF THE INVENTION

The process of compressing air to a certain pressure is known in the art, and with particular reference to compressors. It is known that in the process of air compression the work done on the system is converted entirely into heat energy, which is usually dissipated to the atmosphere with a certain volume of compressed air at a pressure greater than the atmospheric pressure.

Despite the well-known fact that in an air compression process the entire work supplied to the system is converted to heat, this heat is allowed to be lost to the surroundings. It has not hitherto been considered as to where

does the energy which is left in the compressed air by virtue of pressure come from. Thus the entire process requires an improvement in respect of thermal efficiency and energy conversion. The losses in the form of heat and pressure are considerable and the energy which can be tapped from the atmosphere is also lost.

OBJECTS OF THE INVENTION

The primary object of the present invention is to provide atmospheric energy tapping device for generation of mechanical and electrical energy which overcomes disadvantages associated with the prior art.

Another object of the present invention is to provide atmospheric energy tapping device for generation of mechanical and electrical energy which recovers the heat lost during compression of air and taps the atmospheric energy so as to generate electric/mechanical power.

Further object of the present invention is to provide atmospheric energy tapping device for generation of mechanical and electrical energy which is reliable and efficient.

Yet another object of the present invention is to provide atmospheric energy tapping device for generation of mechanical and electric energy which is simple in construction.

STATEMENT OF INVENTION

According to this invention, there is provided atmospheric energy tapping device for generation of mechanical and electrical energy comprising of a compressor for supplying hot compressed air into a heat engine coupled to a generator for power generation, wherein said heat engine is provided in connection with a turbine.

Further according to this invention, there is provided atmospheric energy tapping device for generation of mechanical and electrical energy comprising a compressor for supplying hot and compressed air into a heat engine coupled to a generator for power generation, wherein a turbine is provided for expansion of cooled and compressed air.

Further according to this invention, there is provided atmospheric energy tapping device for generation of mechanical and electrical energy comprising of a compressor producing high pressure hot air is connected to a heat engine and turbine for power generation, wherein said compressor and turbine are mounted on the same shaft.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

Further objects and advantages of this invention will be more apparent from the ensuing description when read in conjunction with the accompanying drawings and wherein:

Fig. 1 shows: first embodiment of atmospheric energy tapping device of the present invention.

Fig. 2 shows: second embodiment of device of the present invention.

Fig. 3 shows: third embodiment of device of the present invention.

DETAILED DESCRIPTION OF THE INVENTION WITH REFERENCE TO THE ACCOMPANYING DRAWINGS:-

The present invention discloses atmospheric energy tapping device for generation of mechanical and electrical energy

Reference may be made to figure 1, 2 and 3 which show different embodiments of the proposed device.

Now, referring to fig. 1, an electric motor 1 is provided to drive air compressor 2. Compressor 2 is supplied with atmospheric air/gas at inlet 3, compressed hot air from which is discharged from outlet 4. Hot compressed air discharged from compressor 2 through outlet 4 flows into a heat engine 5 to generate electric power by generator 6 coupled to said heat engine 5. The air after passing through the heat engine 5 is in a cooled state, which is fed into vessel 7 for storage. The cooled compressed

air is then used to drive an air turbine 8 coupled to a generator 9 for producing electric power. The air discharged from the air turbine 8 is in a much cooled state, which is supplied to a heat engine 10 wherein it picks up heat from the atmosphere and produces electric power with the help of a generator 11 coupled to said heat engine 10.

Reference may be made to fig. 2 indicating another embodiment of the instant invention, which is an improvement over the device of fig. 1. As already described hereinabove, electric motor 1 drives the air compressor 2. Atmospheric air/gas flows into compressor 2 at inlet 3 and compressed hot air is discharged from compressor 2 through outlet 4. However, the improvement over the design shown in fig. 1 constitutes replacement of heat engines 5 and 10 shown in fig. 1 with a single heat engine 12 which has high temperature source 15 on one side and a very low temperature sink 13 on the other side. The heat engine 12 is connected to a generator 14 for power generation, in which said heat engine and generator is combination of two heat engines and two generators respectively. This provision enhances efficiency of conversion of heat into mechanical energy substantially.

Now, reference may be made to fig. 3 showing yet another improved embodiment of device of the proposed application, wherein the compressor (2) and turbine (8) are mounted on the same shaft unlike the embodiment indicated in fig. 1, in which the compressor 2 is driven by an electric motor and air turbine (8) drives the generator (9).

The above provision has the result that, the power required by the compressor 2 which is to be delivered by the electric motor 1 is reduced by the amount of power generated by the turbine 8, leading to overall improvement in efficiency.

Operation of the Atmospheric Energy Tapping Device:

Referring to fig. 1, when the electric motor 1 connected with the air compressor 2 is operational, the process of compression of air from atmospheric pressure P1 and atmospheric temperature T1 is applied to compressor 2. Compressor 2 is thermally insulated so as to make the compression process as close to adiabatic compression as possible. During compression, air is compressed to pressure P2 and heated to temperature T2 and the entire work of compression i.e. the entire work done on the system during compression is converted into heat. This hot high pressure air is fed to heat engine 5 which partially converts the heat energy (depending upon its efficiency) from this compressed air into electric power through the generator 6. The compressed air loses its heat substantially to temperature T3 while the pressure reduces to P3 which is substantially equal to P2. The air at pressure P3 and temperature T3 (which is

expected to be quite close to atmospheric temperature) is supplied to an air storage vessel 7. Compressed air at pressure P3 drives the air turbine 8 which in turn drives the generator 9 to produce electric power. The compressed air undergoes an expansion process in the air turbine 8 and the final parameters at the exit of the air turbine 8 will be P4 which is near atmospheric pressure and temperature T4 which will be substantially below the atmospheric temperature. The heat engine 10 works between source temperature T1 (atmospheric temperature) and the sink temperature T4 of the highly cooled air at the exit of the air turbine. The generator 11 is coupled to the heat engine 10.

In this way, the energy input to the system is in the form of electric energy to the electric motor 1.

The output of the system comprises of the following:-

1. Electric power produced by generator 6 coupled to heat engine 5.
2. Electric power produced by generator 9 to heat engine 8.
3. Electric power produced by generator 11 coupled to heat engine 10 which converts atmospheric energy into mechanical energy.

Reference may be made to fig. 2. As already mentioned hereinabove, the hot and compressed air from the compressor is supplied into heat engine.

However, in this embodiment of the device, the hot high pressure air is fed into said heat engine through the heat source (15) so as to supply hot air into heat engine (12) and normal temperature air to storage (7).

The heat engine converts the heat energy into electric energy with the help of the generator (14) and exhausts normal pressure and low temperature air into the heat sink (13) connected thereto.

The turbine receives high pressure, normal temperature air from said storage (7) for its operation, which in turn drives the generator (9) to generate electricity. Finally, the compressed air after expansion through said turbine flows into the heat sink (13). Then, the heat sink exhausts normal pressure and low temperature air into the atmosphere.

The above provision results in substantial increase in the efficiency of conversion of heat into mechanical energy.

Similarly, with reference to fig. 3, the hot high pressure air from the compressor (2) through the heat source (5) flows into heat engine (12) for power generation and high pressure, normal temperature air flows into turbine (8) for expansion. Finally, normal pressure and low temperature air from the turbine and heat engine is allowed to pass through the heat sink (13) for being exhausted to atmosphere as normal pressure and low temperature air.

The aforesaid provision results in overall improvement in efficiency.

Depending upon the efficiencies of heat engines 5 and 10 (fig. 1) or heat engine 12 (fig. 2 and 3), and the efficiency of air turbine 8, the total electric energy produced may be more than the electrical energy input to the motor 1. In any case, the overall gain when residual heat energy is also considered may demonstrate that the device produces more energy than it consumes.

The heat engines 5, 10 and 12 are external combustion engines without restricting scope of the invention to the same because it can be replaced with for ex. Stirling engine.

Thus, a heat engine can be used to recover a substantial portion of the heat energy depending upon its efficiency. The cooled compressed air can be used to produce electric power through an air turbine. The air coming out of the air turbine is substantially below atmospheric temperature and this cold air needs to pick up heat from somewhere to come back to atmospheric temperature. This requirement is made use of by another heat engine which works between atmospheric temperature and the substantially cold air temperature and produces electric power. This way the cold air picks up energy from the atmosphere.

Thus in reality the system has input energy in the form of electric power to motor and heat energy picked up from the atmosphere by the cold air. The output energy can never be more than this total energy input but, for practical purposes, more energy output is obtained compared with energy input since the thermal energy of the atmosphere is considered free and not taken into account.

The usual method of power generation (fossil fuel, nuclear etc) results in pollution of soil, water and/or air. However, in the case of the present invention, power is generated from thermal energy picked up from the atmosphere. Thus the device can be called an environment friendly and environment regenerating device.

The device of the instant invention is applicable to air/gas, wherein the gas is for ex: Nitrogen, Helium, Carbondioxide, Methane etc

Utility of Invention

- It is highly useful as a means of power generation.
- It can be used for automobiles or stationary gen-sets and even large scale power plants.
- Its applications are limitless, as the energy conversion can be in the form of mechanical or electrical energy and thus can be applied wherever any of the two energies is required.

It is to be noted that the present invention is susceptible to modifications, adaptations and changes by those skilled in the art. Such variant embodiments employing the concepts and features of this invention are intended to be within the scope of the present invention, which is further set forth under the following claims:-

WE CLAIM:

1. Atmospheric energy tapping device for generation of mechanical and electrical energy comprising a compressor for supplying hot compressed air/gas to a heat engine coupled to a generator for power generation, wherein said heat engine is provided in connection with a turbine.
2. Atmospheric energy tapping device as claimed in claim 1, wherein said heat engine is connected to the turbine through a vessel for storing cooled compressed air/gas from the heat engine, which is used to operate the turbine coupled to a generator for producing electricity.
3. Atmospheric energy tapping device as claimed in claim 2, wherein the turbine exhausts cool air/gas to a heat engine connected thereto for producing electricity by means of a generator coupled to the engine.
4. Atmospheric energy tapping device for generation of mechanical and electrical energy comprising a compressor for supplying hot and compressed air/gas into a heat engine coupled to a generator for power generation, wherein a turbine is provided for expansion of cooled and compressed air/gas.

5. Atmospheric energy tapping device as claimed in claim 4, wherein the compressor is connected to the heat engine through a heat source and the heat engine exhausts normal pressure & low temperature air/gas into a heat sink connected thereto.
6. Atmospheric energy tapping device as claimed in claim 4 or 5, wherein the heat source is provided in flow communication with the turbine through a storage vessel for storing cooled and compressed air/gas from said heat source.
7. Atmospheric energy tapping device as claimed in claim 4, 5 or 6, wherein the turbine is coupled to a generator for power generation and exhausts normal pressure & low temperature air/gas into the heat sink.
8. Atmospheric energy tapping device as claimed in any of the preceding claims 4-7, wherein the heat engine and generator is a combination of two heat engines and two generators respectively.
9. Atmospheric energy tapping device for generation of mechanical and electrical energy comprising of a compressor producing high pressure hot air/gas is connected to a heat engine and turbine for power generation, wherein said compressor and turbine are mounted on the same shaft.
10. Atmospheric energy tapping device as claimed in claim 9, wherein the compressor is connected to the heat engine and turbine through a heat source, in which the heat engine is coupled to a generator for power generation.

11. Atmospheric energy tapping device as claimed in claim 9 or 10, wherein the turbine and heat engine are connected to a heat sink at other end.

12. Atmospheric energy tapping device as claimed in claim 1, 4 or 9 wherein said compressor is driven by an electric motor and is supplied with atmospheric air/gas.

13. Atmospheric energy tapping device as claimed in any of the preceding claims, wherein the gas is for example Nitrogen, Helium, Carbondioxide, Methane etc

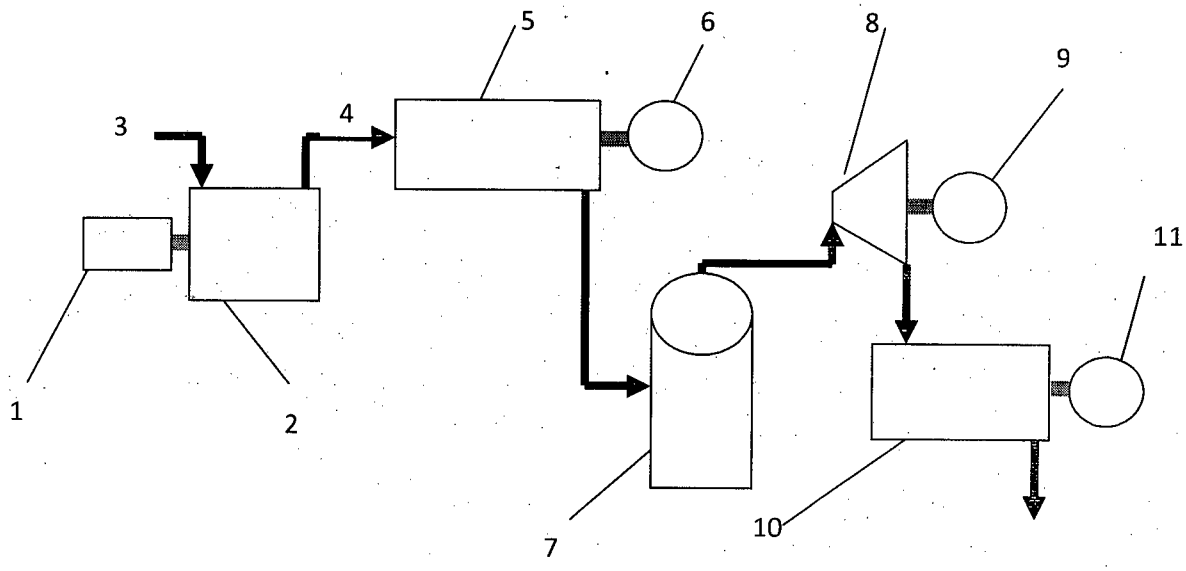

Fig. 1

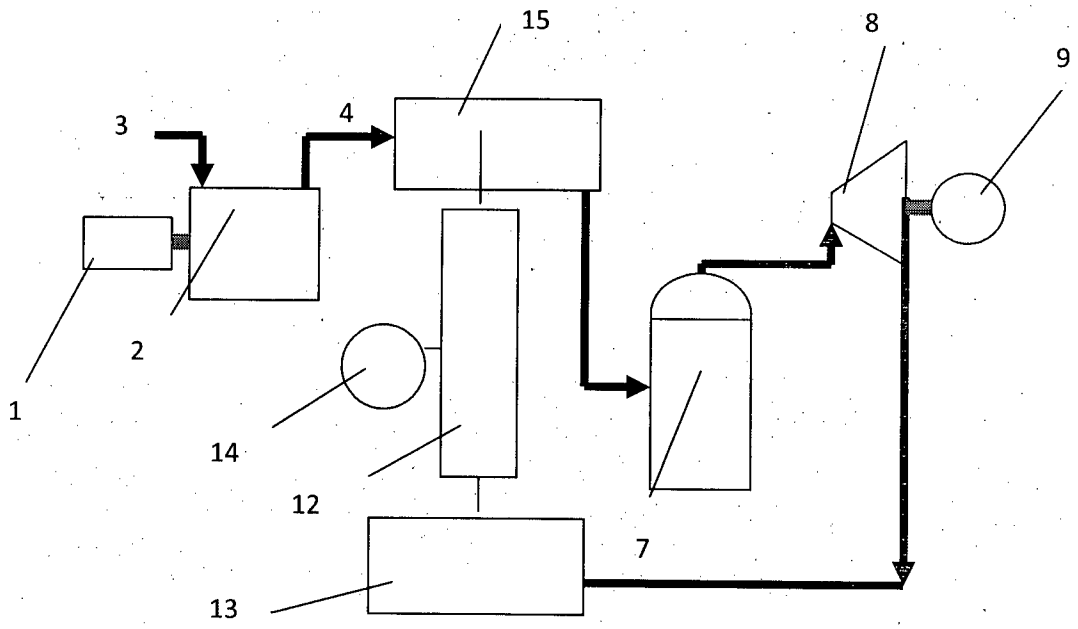

Fig. 2

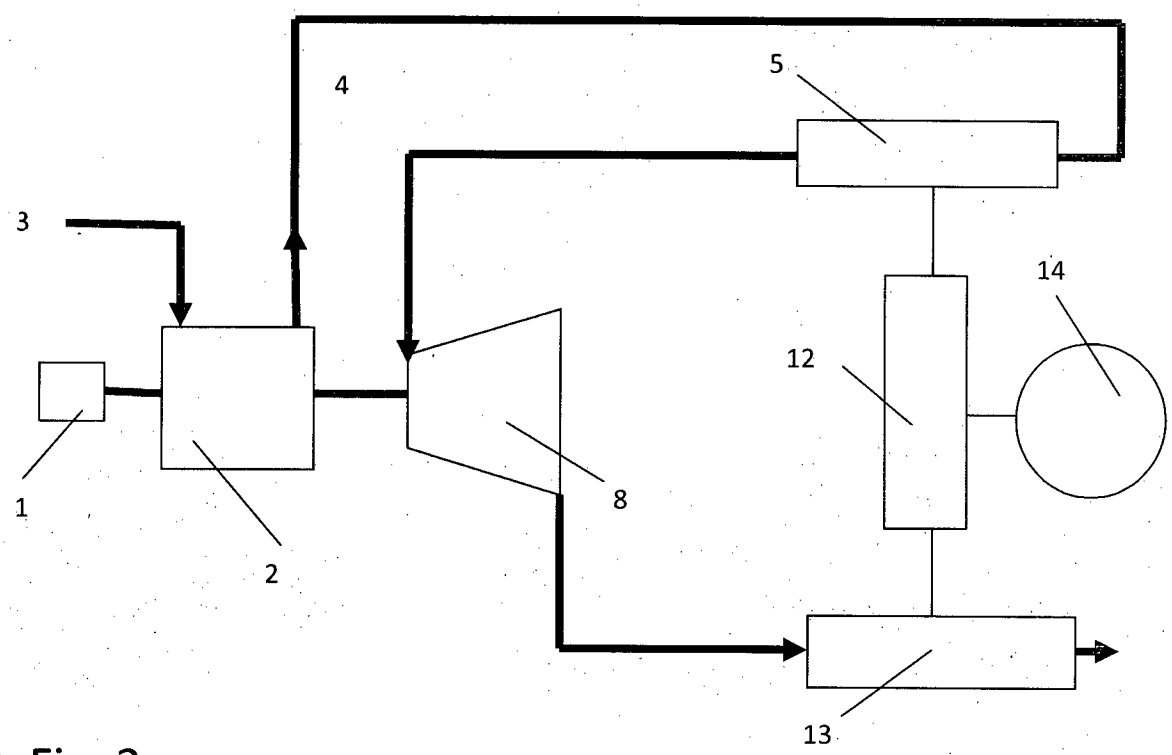

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2012/000684

A. CLASSIFICATION OF SUBJECT MATTER
INV. F03G7/00 F03G7/10
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)
F03G F16K

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, PAJ, 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	US 3 234 738 A (COOK WILFRED L) 15 February 1966 (1966-02-15) abstract figures 1,2 column 3, lines 19-42; figure 1	1-13
X	WO 2010/117299 A1 (KATCHANOV SERGEY ALEKSANDROVITCH [RU]) 14 October 2010 (2010-10-14) abstract figures 1-4	1-13
A	WO 2009/069128 A2 (BEN LOLO GILBERT GAL [IL]) 4 June 2009 (2009-06-04) the whole document	1-13
A	US 2008/127657 A1 (FANG WEI [TW] ET AL) 5 June 2008 (2008-06-05)	1-13

☐ 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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Giorgini, Gabriele

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IN2012/000684

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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