Base : FAMPAT

SEARCH STRATEGY

SS Results

6	21305	..SIMILARITY SS 5 RANKED 2

Number of documents: 11

US20030192310	Buoyant-orbicular-seesaw-system (boss) EZRA SHIMSHI SHIMSHI EZRA
US3961479	Energy converting hydraulic buoyant motor ANDERSON RAY C
US20110179784	Vertical gravity/buoyancy power generator HASTINGS DOUGLAS REYNOLDS
US20050235640	Method and means of altering a vessel or structure in order to produce a force ARMSTRONG WILLIAM
US20100154405	Buoyancy engine using a segmented chain UNDAMOTUS
US6546726	Gravity power plant GENERAL ULTRASONICS
US6935832	Portable power generating devices NATURAL FORCES NATURAL FORCES EDELSTEIN
US20110162356	Rotational gravity/buoyancy power generator HASTINGS DOUGLAS REYNOLDS
CN102913381	Floating buoy turnover hydraulic power output device WEIGO ZHANG ZHANG WEIGUO
US20100024413	Engine for energy conversion KIM SEONG WOONG
US8646267	Buoyant force power generation PEDZIWIATR EDWARD A

Buoyant-orbicular-seesaw-system (boss)
US20030192310

- Patent Assignee
  EZRA SHIMSHI SHIMSHI EZRA
- Inventor
  SHIMSHI EZRA
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CA2465690	A1	2003-10-30	[CA2465690]
AU2003241286	A1	2003-11-03	[AU2003241286]
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WO03089767	A8	2004-02-05	[WO200389767]
IL160348	A	2004-07-25	[IL-160348]
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GB2401154	A	2004-11-03	[GB2401154]
CN1646793	A	2005-07-27	[CN1646793]
AU2003241286	B2	2005-11-17	[AU2003241286]

- Abstract:
  (CN1646793)
  The present embodiment includes seesaw frame (17) with container (13) at each end; buoy (11) in each container; shaft (12) connects the buoys; pipe (10) adapted to let flow of gas (6) between the buoys; two-way air vent (15) and membrane (14) in each container. As the seesaw frame rotates with axle (21), liquid (9) in the bottom container reaches higher g force than the liquid in the upper container; the bottom buoy deflates and the upper buoy inflates. Both, the buoys and the weighty slider (18) move down and the liquid in both containers are elevated as air (7) exits the upper container and enters the bottom container. The atmospheric pressure, which elevates the liquid to reoccupy vacuum (8), causes the containers to rotate faster.

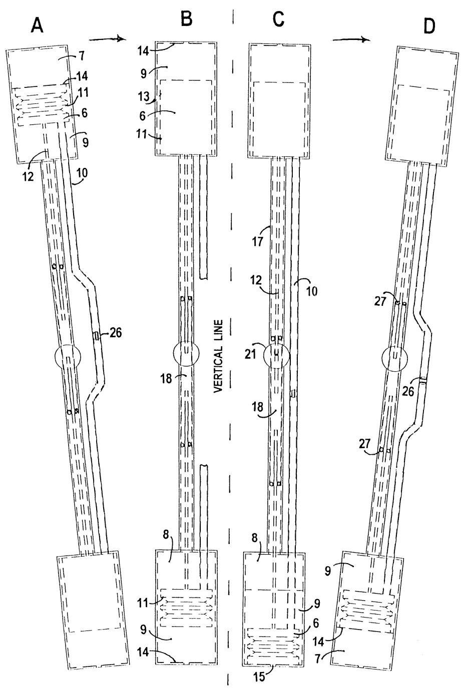


FIG. 1

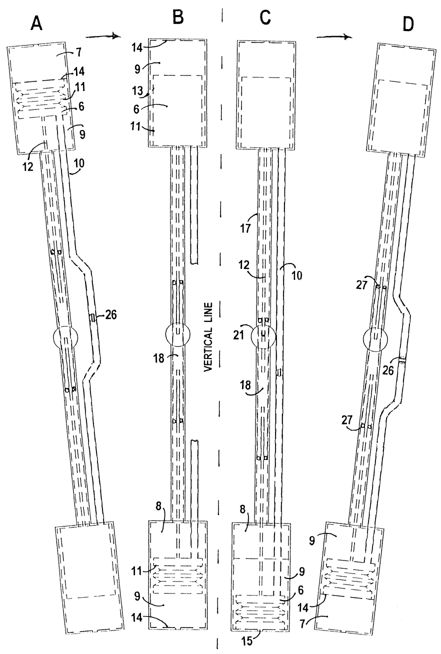


FIG. 2

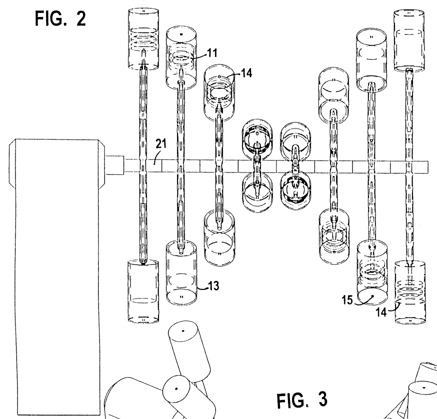


FIG. 3

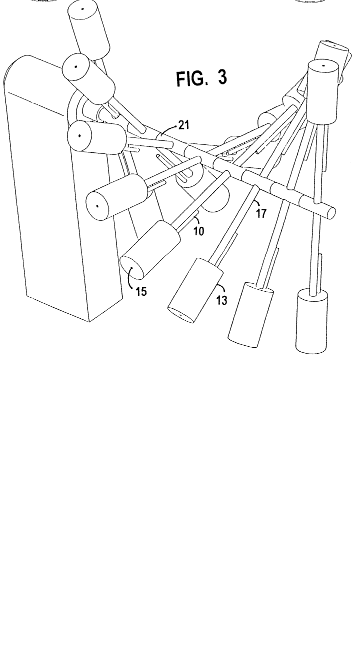


FIG. 4

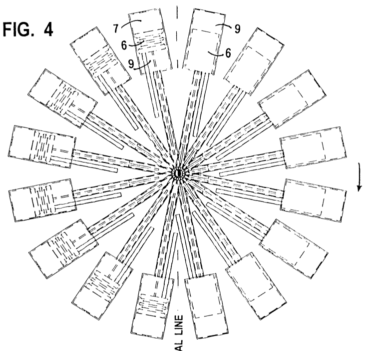
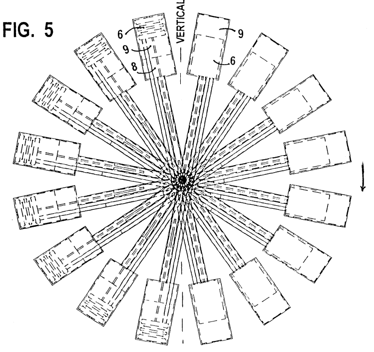


FIG. 5



Description

(WO200389767)

THE PATENT APPLICATION
OF
EZRA SHIMSHI
BUOYANT-ORBICULAR-SEESAW-SYSTEM (BOSS) BACKGROUND OF THE INVENTION a) Field Of The Invention
The present invention relates to systems and methods for lifting mass along vertical lines and for arranging the elevated mass in two radial strings, opposite to each other, at two distinct orbits and in the same defined sections on the orbicular path.
The embodiment described below combines within it physical features which include two prong pulls of gravity, buoyancy influences and the effect of atmospheric pressure. b) The Prior Art
A limited range of systems and methods are known for elevating mass at two orbits for obtaining net torque.
The prior art has provided neither the novelty of the distinct prong pulls of gravity nor the unique combination of physical concepts presented in the following embodiment.
SUMMARY OF THE INVENTION
The invention provides, in the present embodiment, means for the elevation of mass along vertical lines by buoyant influences and input of ambient energy from atmospheric pressure.
The present embodiment can include a number of long seesaw frames ; each seesaw frame with a container fixed at each of its ends; a float immersed in liquid within each container; self extended shaft, which weighs less than the weight. of the displaced liquid in the respective pair of containers; an axle, on which the seesaw frames are fixed, in tandem, and rotated ; stoppers adapted to lock each shaft so as to prevent its extension after it crosses the vertical line.
The present embodiment can also include gas in each float ; curve-flex pipes with a valve embedded in each pipe; membrane and two- way air vent in each container.
The invention, titled Buoyant-Orbicular-Seesaw- System, can be referred to its collective name, BOSS.
When the BOSS is made to rotate at speed high enough, so as to produce higher g on the liquid in the bottom container that passes the vertical line, than the liquid in the upper container, the float in the bottom container deflates and the float in the upper container inflates.
The buoyancy force of the inflated float, together with the weight of the respective shaft, elevates the liquid to the top section of the upper container.
Air exits the compartment between a membrane and the outward wall of the upper container through the respective air vent in the outward wall.
The weighty slider and the lower section of the shaft, which are adapted to extend, sink the deflated float to the bottom of the lower container.
As the bottom surface of the deflated float makes contact with the upper surface of the respective membrane, sucking force takes effect and air enters into the close compartment between the respective membrane and the outward wall of the bottom container through the respective air vent.
The membrane, with the air beneath it and together with the buoyancy force of the deflated float, rises, with the liquid, which reoccupies the top space evacuated by the deflating float.
The elevated liquid in the upper containers, which cross the upper end of the vertical lines, form a chain of units of liquid at higher orbit than the elevated units of liquid in the bottom containers.
BRIEF DESCRIPTION OF THE DRAWINGS
The present invention will be more readily understood by reference to the following description, taken with the accompanying drawings, in which:
Fig. 1 is four-stage process A, B, C, and D, illustrating a pair of containers in positions just before, during, and right after they cross their vertical line.
Fig. 2 is the side view of the BOSS, arranged in tandem on a single axle, in which the vertical line separates the high and low orbits of the units of liquid.
Fig. 3 is the view of the rotating BOSS showing random position of the seesaw frames.
FIG. 4 is the perspective view of the BOSS, in which the combined seesaw frames appear as radial arrangement, depicting the two radial strings of units of liquid, opposite each other, at two distinct orbits and illustrating the distinct two prong gravity pulls affecting downward-directed movements, one on the fast falling units of liquid at the high orbit, the other on each of the slow falling individual shafts and revealing the effect by the atmospheric pressure on the velocity of the system.
Fig. 5 is the same view as in Fig. 4, showing the individual seesaw frame, shown also in Fig. 1C, where the net torque has not yet reached its highest potential, as when the ambient energy from the atmospheric pressure have been deployed, shown in Fig. 1 D.
DESCRIPTION OF SPECIFIC EMBODIMENT
Parts in the embodiment and their designated numbers in the drawings are:
Gas 6; Air 7; Vacuum 8; Liquid 9; Pipes 10 ; Buoys 11 ; Shafts 12; Containers 13; Membranes 14; Two-ways air vents 15; Seesaw frames 17; Weighty sliders 18 ; Axle 21; Valves 26; Stoppers 27.
The invention may be implemented in a wide range of embodiments.
FIG. 1 illustrates the four-stage process just before, during, and right after a pair of buoys and their respective shaft cross the vertical line, roll and re-cross the vertical line.
At predetermined radial degrees before crossing their vertical line, valve 26 turns on, shown in Fig. 1 A, allowing gas from the bottom buoy 11 to flow through pipe 10 and into the upper buoy 11.
Fig. 1B shows the upper buoy 11, which is under the pressure of centrifugal force less the G pull of gravity, having been inflated with gas from the bottom buoy 11, which is under the pressure of centrifugal force plus the G pull of gravity and the weight of shaft 12 and its weighty slider 18.

As the upper buoy 11 inflates, its increased buoyancy force together with shaft 12, cause liquid 9 in the upper container 13 to be displaced upward.
The elevation of liquid 9 into the top section of the upper container 13 pushes membrane 14 up to the outward wall of container 13, with air 7 escaping through the respective vent in the two-way air vent 15.
At the same time the deflating buoy 11 in the bottom container 13 had evacuated the top section of the bottom container 13, which is represented by vacuum 8.
Since the bottom deflated buoy 11 is at its lowest buoyancy influence, weighty slider 18 with the lower section of shaft 12, alone, can sink it to the bottom of container 13, as they extend downward, shown in Fig. 1 C. At this stage, net torque has already been materialized when the last stage is yet to occur, which involves the input of ambient energy from the atmospheric pressure.
This ambient energy input occurs as soon as the bottom surface of the deflated buoy 11 and the upper surface of the bottom membrane 14 make contact and the sucking force between vacuum 8 and the atmospheric pressure allows air7 to pass through the respective vent of the two-way air vent 15.
The bottom compartment, which is enclosed by membrane 14 and the outward wall of the bottom container 13, can then be filled with air7.
Membrane 14, with air7 ; beneath it and with the buoyant force of the deflated buoy 11, can elevate liquid 9, which fills the top space in the bottom container 13, evacuated by the receding buoy 11, as it is seen in Fig. 1 D. The pair of stoppers 27, which are embedded in each weighty slider 18 can, then, lock the three sections of shaft 12 from extending until next 1C position.
When the respective containers 13 cross the vertical line at predetermined number of degrees thereafter, valve 26 turns off, shown in Fig. 1 D, preventing any flow of gas 6 between the respective buoys 11.
The combined physical concepts of orbicular motions, buoyant influences, two prong gravity pulls and the input of ambient energy by the atmospheric pressure, are the basic elements on which the BOSS can operate.
Fig. 2 shows seesaw frames mounted along single axle 21, in tandem, where the vertical line divides the high and the low orbits of the units of liquid.
Fig. 3 is random view of the rotating Boss.
When the BOSS rotates, each pair of buoys 11 are allowed to move in orbicular path by buoyant influences from one end of their vertical line to the other end, where they change their orbit.
Each upper container 13 can develop net torque, as shown in Fig. 4 and in Fig. 5, as soon as it crosses its vertical line.
A pair of containers 13 is fixed to each seesaw frame 17 and each container 13 is at the same distance from axle 21.
Pipe 10 can curve-flex with the movements of the pair of buoys 11 it connects.
Valve 26 can be embedded within each pipe 10 to control the flow of gas between the respective buoys 11.
Buoy 11 in each container 13 can have aerodynamic shape and other means to help it to propel effectively through liquid 9.
As it is seen In FIG. 4, the combined seesaw frames appear as redial arrangement.
The radial strings of the elevated units of liquid 9 appear at two distinct orbits, opposite to each other.
The fast falling units of liquid 9 at the high orbit makes it clear to what direction the BOSS is being pushed, provided, each shaft 12 weighs less than the respective liquid 9 displaced, and provided, the BOSS is rotating. above the required minimum speed. in both, Fig. 4 and Fig. 5, net torque has been achieved, even though in Fig. 5 the ambient energy input by the atmospheric pressure has not, yet, been deployed.
The input of the ambient energy by the atmospheric pressure, shown in Fig. 4, displaces the liquid 9 in each bottom container 13 further inward toward the axis of rotation, which can only increase the radial velocity of the system.
The kinetic energy of the radial and the fast falling units of liquid 9 at the high orbit is used only in part to lift liquid 9 to that high orbit, whereas, the kinetic energy of the vertical and slow falling of the individual shafts 12, one after the other, with their weighty sliders 18, are used entirely to elevate liquid 9 onto both the low orbit and the high orbit.
The ambient energy input by the atmospheric pressure, shown in Fig. 4, is used only and entirely to elevate the liquid 9 onto the low orbit.
The two prong gravity pulls that are affecting the downward-directed movements, one on the radial and fast falling units of liquid at the high orbit, and the other on the vertical and slow falling individual shafts, are the distinct features that make the present invention novel; whereupon, the introduction of the combined physical concepts described above make the present embodiment unique in its usefulness.
While this invention has been described with reference to the mechanism disclosed herein, it is not confined to the details as set forth and is not intended in any way to limit the broad features or principles of the system, method and apparatus, or the scope of patent monopol to be granted.
This application is intended to cover any modification or changes that may come within the scope of the following claims.

Original Description

(CN1646793)

浮力环形往复运动系统(BOSS)

技术领域

本发明涉及的系统和方法用于沿垂直线提升重物，以及在彼此相对，处 于两个迥然不同的轨道，且位于环状轨道上的相同确定部分的两个径向线上 排列被提升的重物。以下所述的实施例包括两股重力牵引力、浮力影响和大 气压力影响这些物理特性。

背景技术

目前对于在两个轨道上获取净力距以提升重物的系统和方法知之甚少。 现有技术既没有以下将述的实施例中新提出的不同股的重力牵引力，也没有 如下述实施例对物理原理进行独特的组合。

发明内容

本发明在当前的实施例中提供了一种在垂直线上使用浮力提升重物的 手段和从大气压力中输入周围能量的手段。该实施例包括多个长的往复架；每个往复架每端都具有一个固定在其上的容器；每个容器内有一个浸没于液 体中的浮子；自我延伸的轴，其重量小于各个成对容器中排移的液体的重量；一个轴杆，往复架一前一后地固定于其上，可旋转；锁住以防止每个轴在通 过垂直线后继续延伸的制动器。该实施例也可包括位于每个浮子中的气体；可曲 线弯曲的管子，具有嵌入每个管子中的阀；每个容器中具有的膜和双

向空气出 口。本发明名称为“ 浮力环形往复运动系统 ”(Buoyant-Orbicular-Seesaw-System)， 可以用英文名称的各个单词的第一个大写字母表示为“ BOSS ”。当BOSS以足 够大的速度旋转时，通过垂直线地底部容器内的液体的加速度就变大，大于 上部容器内液体的加速度，底部容器中的浮子收缩而上部容器中的浮子膨胀。 膨胀浮子的浮力同各自轴的重量一起，将液体提升到上部容器的顶端部分。 空气从上部容器的膜和外壁之间的间隔部分通过外壁的各个空气出口排出。 可以延伸的重滑子和轴的较低部分将收缩的浮子沉入下部容器的底部。当收 缩的浮子的底部表面与对应的膜的上部表面接触，吸力就开始起作用，空气 就通过对应的空气出口进入底部容器的各个膜和外壁之间的密闭隔间。这样，由于空气在膜下以及收缩的浮子的浮力，膜与重新占据由收缩的浮子排空的 顶端空间的液体一起升高。在那些穿过垂直线的上端的上部容器中的被升高 的液体形成一连串液体单元，它们处于比底部容器中被升高的液体单元更高 的轨道上。

附图说明

本发明通过以下附图描述，可使发明更易于理解：

图1为一个分A，B，C，D四阶段完成的过程，说明一对容器在刚要穿过垂 直线之前、穿越之中和刚穿过之后的过程。

图2为BOSS的侧视图，按照一前一后的顺序在单个轴杆上排列，垂直 线分开了液体单位的高处和低处轨道。

图3为旋转的BOSS在往复架上任意位置的示意图。

图4为BOSS的透视图，图中组合往复架呈放射状排列，描述了液体单 位的两个径向线在两个不同的轨道上彼此相对，两个迥异的股重力牵引力影 响向下运动的情况，一个对在高部轨道迅速下落的液体单位起作用，另一个 对每个缓慢下落单个轴杆起作用，并示出了大气压力对系统速度的影响。

图5与图4相同，示出单独的往复架，图1C也是如此，当使用大气压 力产生的周围能量时净力矩还没有达到如图1D所示的其最高的潜在值。

具体实施方式

实施例中的各个构件及其附图标记如下：

气体6；空气7；真空8；液体9；管子10；浮子11；轴12；容器13；膜 14；双向空气出口15；往复架17；重滑块18；轴杆21；阀26；制动器27。

本发明的实施例范围很广。

图1描述了一对浮子和它们各自的轴在穿过垂直线，翻转并再次穿过垂 直线的之前、之中、之后的四阶段的过程。在穿过垂直线前的预定的径向角 度，阀26打开，如图1A所示，使得底部浮子11内的气体通过管子10流到 上部浮子11内。图1B示出了顶部浮子11，其在小于重力牵引力G的离心 力作用下，因从底部浮子11流入的气体而膨胀，底部浮子11承受离心力， 加上重力牵引力G，及轴12和其重滑块18的重量的共同作用。当顶部浮子 11膨胀时，其增大的浮力和轴12一起，使得上部容器13中的液体9向上转移。液体9上升至上部容器13的顶端部分，推动膜14向上至容器13的外壁， 空气7则通过各自的双向空气出口15逸出。同时底部容器13中收缩的浮子 11使底部容器13的上部分成为真空，如真空8所表示。由于底部收缩的浮 子11受浮力的影响最小，重滑块18和轴12的下部分向下延伸时就可单独将 其沉入容器13的底部，如图1C所示。在这个阶段，净力矩已经产生，包括 从大气压得到周围能量的最后阶段即将到来。一旦收缩的浮子11的底部表面 和底部膜14的上部表面相接触，且真空8和大气压之间的吸力使得空气7 通过各自的双向空气出口排出时，这种周围能量的输入就产生了。被膜14 和底部容器13的外壁封闭的底部隔间随即充满空气7。膜14，其下具有空气 7并具有收缩的浮子11的浮力，可使得液体9上升，充满被降低的浮子11 抽为真空的底部容器13的上部空间，如图1D所示。然后，各对嵌入各个重滑块18内的制动器27能够锁住轴12的三个部分，防止其延伸直到下一个 1C位置。当各个容器13以预定角度穿过垂直线后，阀26关闭，如图1D所 示，防止各个浮子11之间的气体6流动。

环形运动，浮力影响，两股重力牵引力和大气压力产生的周围能量输入 的物理原理的组合，就是BOSS运行的基本要素。图2示出，往复架一前一 后沿单个轴杆21设置，在此垂直线将液体单元的高处和低处轨道分开。图3 为BOSS旋转时的随机图像。当BOSS旋转时，每对浮子11由于浮力影响都 可以在环形轨道上运动，从垂直线的一端运动至另一端，并在此改变轨道。 一旦各上部容器13穿过其垂直线时都可以获得其净力矩，如图4和5所示。 一对容器13固定于各往复架17上，且每个容器13与轴杆21的距离相等。 管子10可随与其相连的一对浮子11的运动而曲线弯曲。阀26可被嵌入各管 子10内，以控制各个浮子11之间气体的流动。在每个容器13中的浮子11 可以具有空气动力形态和其它方式以帮助有效推动液体9。如图4所示，合 并的往复架以辐射状排列。升高的液体9的单元的辐射线呈现两条迥异的轨 道，彼此相对。假设每一个轴12都比对应的排移的液体9轻，并假设BOSS 以大于要求的最小速度旋转，那么从高处轨道快速下落的液体单元9可清楚 的看出BOSS被推动的方向。在图4和5中都可获得净力矩，尽管在图5中 没有使用大气压力产生的周围能量输入。大气压力带来的周围能量的输入，如图4所示，由大气压力产生的周围能量输入将在每一个底部容器13内的液 体9进一步向内朝向旋转轴排移，这样仅能增大系统的径向速度。高处轨道 上的呈放射状并迅速下落的液体9单元的动能仅部分用来提升其它的液体9 至高处轨道，而垂直的缓慢的连同它们的重滑块18一个接一个下落的单个轴 12的动能完全用来提升位于高处及低处轨道的液体9。大气压力带来的周围 能量的输入，如图4所示，仅用于且完全用于提升液体9至低处轨道。两股 重力牵引力影响向下运动，一个对高处轨道径向迅速下落的液体单位产生影 响，另一个对单个轴的垂直缓慢下落起作用，这两股重力牵引力是使本发明 具有新颖性的区别特征，因此上述对于物理原理的组合的描述可看出，本发 明的实施例的有用性无可替代。

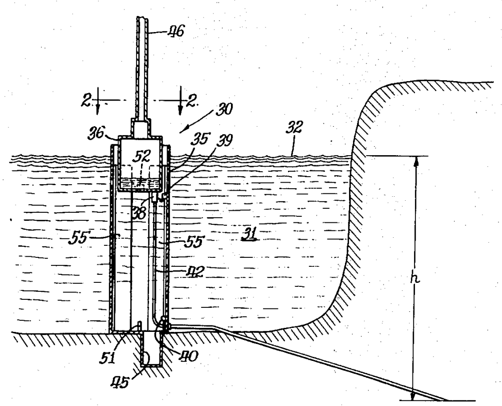
尽管参考这里公开的机构对本发明进行了描述，但本发明不局限于已列 出的这些细节，也不在任何一种方式上对系统、方法和仪器的特征和原理的 广泛性或将被授予的专利独占权产生限制。本申请意图包括任何在以下权利 要求要求保护的范围内的改进或改变。

Energy converting hydraulic buoyant motor
US3961479

• **Patent Assignee** **ANDERSON RAY C** • **Inventor** ANDERSON RAY C • **International Patent Classification** F03B-017/02 F03B-017/02 • **US Patent Classification** PCLO=060496000 • **CPC Code** F03B-017/02/5; Y02E-010/20	• **Publication Information** US3961479 A 1976-06-08 [US3961479] • **Priority Details** 1973US-05407523 1973-10-18 1974US-05425945 1974-01-31

- **Fampat family**
  US3961479 A 1976-06-08 [US3961479]

- **Abstract:**
  (US3961479)
  A hydraulic motor for converting the potential energy of a reservoir of water into mechanical or electrical energy and utilizing a reciprocating free floating piston that can be cyclically drained and filled, or floated in a cylinder that can be drained and filled, and including automatically actuated valves to permit the draining and filling, and detention devices for restraining the piston from motion for a portion of its cycle.



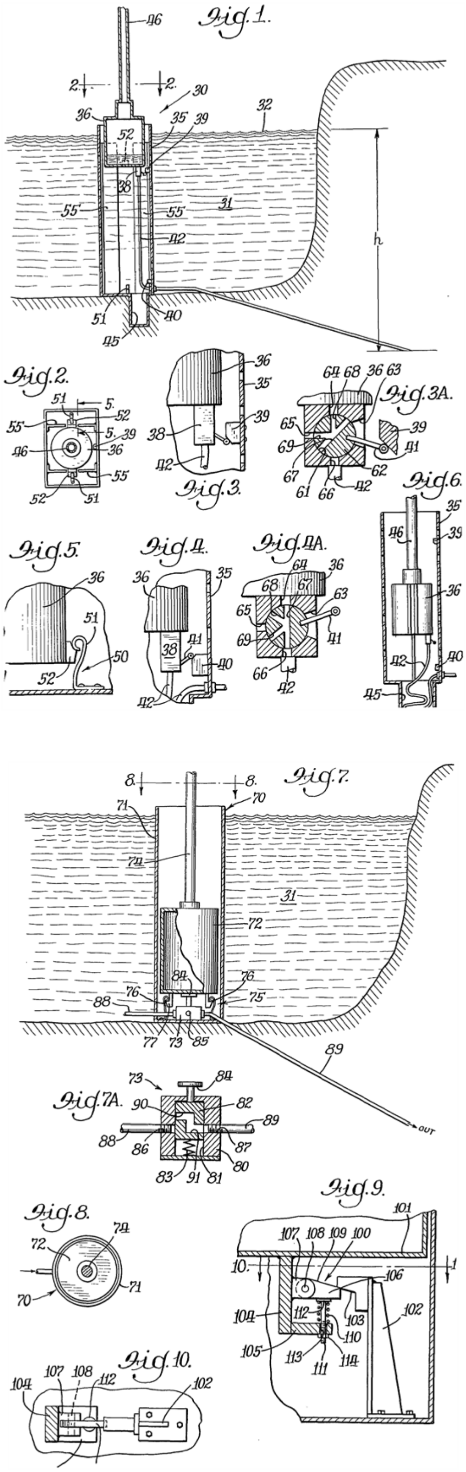


Fig. 1.
Fig. 2.
Fig. 3.
Fig. 3A.
Fig. 4.
Fig. 4A.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 7A.
Fig. 8.
Fig. 9.
Fig. 10.
OUT

Fig. 11.

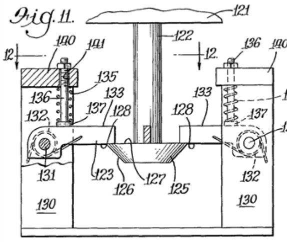


Fig. 14.

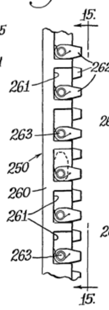
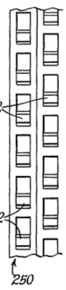


Fig. 15.



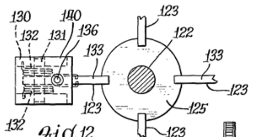


Fig. 12.

Fig. 13.

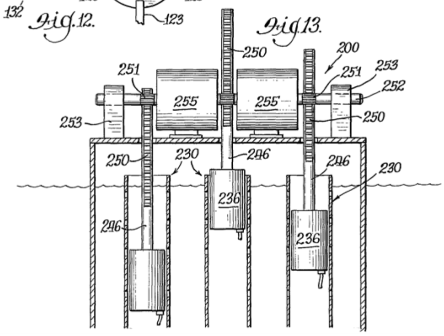


Fig. 13A.

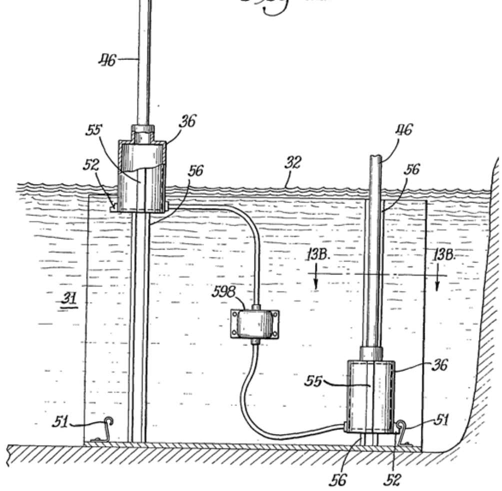
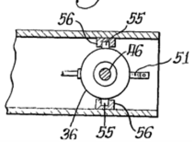


Fig. 13B.



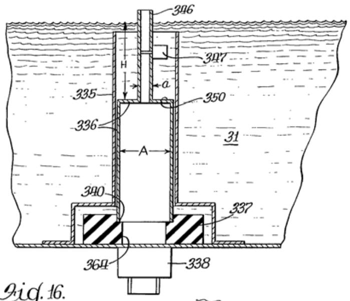
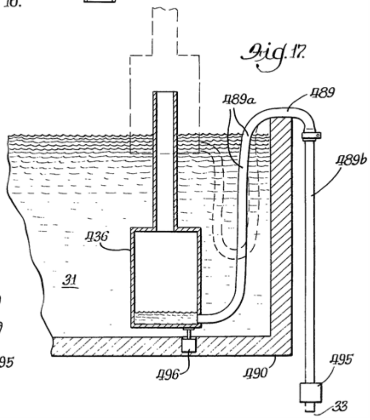


Fig. 16.

Fig. 17.



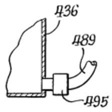


Fig. 17A.

Description

(US3961479)

This is a continuation-in-part application of Ser.
No. 407,523 filed on Oct. 18, 1973.

BACKGROUND OF THE INVENTION

The invention relates generally to power plants and more particularly to buoyancy type hydraulic motors for generating power.

Tidal motors and water power engines utilizing buoyant floats for converting a rise and fall of a water level into usable mechanical power are well known in the art.

Examples of such motors are shown in the patent to Abraham, U.S. Pat. No. 1,570,421; the patent to Perkins, U.S. Pat. No. 1,627,996; and the patent to Martin, U.S. Pat. No. 3,485,038. For the most part, such motors are the equivalent of a boat entering a lock and being raised to a higher level by the flooding of the lock.

No attempt is made to increase the thrust available due to the force of buoyancy acting on the float.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a hydraulic motor having a buoyant piston that is reciprocated due to the rise and fall of a water level and utilizes detention means to restrain the motion of the piston during a portion of its power stroke in order to increase the working force developed by the piston.

It is another object to provide a hydraulic motor of the type described including automatically actuated valves that are operated by the moving piston for draining and filling the piston, or for draining and filling a cylinder containing the piston.

It is a further object to provide a hydraulic motor including a bottomless buoyant piston having a vertical tubular extension attached to the top of said piston and incorporating a valve in said tubular extension to control the air moving into or out of the tubular extension and the piston.

It is still another object to provide a hydraulic motor having a buoyant piston which is completely sealed and is reciprocated in an enclosed tank responsive to the rise and fall of the water level in the tank.

It is still another object to provide a motor of the type described wherein the piston includes a vertical tubular extension open to the atmosphere, and wherein automatic piston detention is obtained by a differential fluid pressure acting on the top of the piston.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic overall illustration of the hydraulic buoyant motor of the present invention;

FIG. 2 is a top view taken on line 2--2 of FIG. 1;

FIG. 3 is an enlarged fragmentary view of a combined fluid inlet and release valve in its uppermost position;

FIG. 3A is an enlarged internal sectional view of the valve of FIG. 3;

FIG. 4 is a fragmentary view of the valve of FIG. 3 in its lowermost position;

FIG. 4A is an enlarged internal sectional view of the valve of FIG. 4 in the fluid release position;

FIG. 5 is an enlarged fragmentary view of the piston detention means;

FIG. 6 is a view showing the motor piston partially descended;

FIG. 7 is a schematic illustration of an alternate embodiment of the hydraulic motor of the present invention;

FIG. 7A is an enlarged internal sectional view of a combined fluid inlet and release valve;

FIG. 8 is a top view taken on line 8--8 of FIG. 7;

FIG. 9 is an enlarged fragmentary side view of a form of piston detention means;

FIG. 10 is a top view taken on line 10--10 of FIG. 9;

FIG. 11 is an enlarged side view of an alternate form of piston detention means;

FIG. 12 is a top view taken on line 12--12 of FIG. 11;

FIG. 13 is a schematic illustration of a multiple piston hydraulic motor employing the principles of the present invention;

FIG. 13A is a schematic illustration showing pump means interconnecting two pistons of a multiple piston hydraulic motor;

FIG. 13B is a top view taken along line 13B--13B of FIG. 13A.

FIG. 14 is an enlarged fragmentary side view of a portion of the hydraulic motor of FIG. 13;

FIG. 15 is a front view taken on line 15--15 of FIG. 14;

FIG. 16 is an illustration of a modified form of the buoyant motor FIG. 1;

FIG. 17 is a schematic illustration of a modified form of drain means that can be utilized with the invention; and

FIG. 17A is a fragmentary view showing an alternate position for the drain valve.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The reciprocating buoyant motor of the present invention is designated generally by the numeral 30 and is illustrated in schematic form in FIG. 1.

The motor 30 is shown as being immersed directly in a body of water 31 having a surface level 32.

The motor 30 drains to some external lower level 33.

It should be understood that the motor 30 might operate equally well externally of the body of water 31 so long as a static pressure head exists between the levels 32 and 33.

This static fluid pressure head may be designated by h.

The motor 30 comprises an upright guide or perforated housing 35, a buoyant piston 36, and a combined fluid inlet and release valve 38 mounted on the underside of the piston 36.

Two fixed valve actuating blocks 39 and 40 are mounted on the interior of the housing 35 for alternately operating the fluid inlet and fluid outlet portions of the valve 38.

A valve actuating arm 41 for operating the valve 38 is mounted thereon and adapted to co-act with the actuating blocks 39 and 40.

The interior of the housing 35 is constantly flooded with water from the body 31 being in open communication therewith through a plurality of openings 35a and the water level within is the same as 32 outside.

The valve 38 is in communication with the interior of the piston 36 and is connected to the drain 33 by means of a flexible tube 42.

A well 45 may be provided beneath the housing 35 for receiving the flexible tube 42 when the piston 36 descends, as shown in FIG. 6.

The piston 36 is formed with an upright tubular extension 46 which is open to atmosphere and the opening is never submerged.

This extension 46 may also serve as a power output shaft for the motor 30.

When the reciprocating piston 36 is in its lowermost position, as shown in FIGS. 4 and 5, detention means 50 are provided to restrain the piston 36 from rising.

This detention means 50 is shown in FIG. 5 as a spring 51 co-acting with a detent block 52 mounted on the side of the piston 36.

However, it should be understood that other detention means might be employed such as fluid pressure actuated pawls operable when the piston 36 is empty; or electrically operated or timed detention means might also be employed.

For simplicity of description, the springs 51 will be assumed as the equivalent of such other detention means 50.

FIG. 2 shows that a pair of such detention means 50 may be employed on opposite sides of the piston 36 to balance the restraining force.

Guide rails 55 may also be provided on opposite sides of the piston 36.

A functional internal construction for the fluid inlet and release valve 38 may be as is shown in FIG. 3A. The valve 38 is shown in FIG. 3A in the fill or fluid inlet position, with the arm 41 in contact with the uppermost actuating block 39.

The valve 38 comprises a solid body 60 formed with an internal cylindrical bore 61, and an arcuately movable valve cylinder 62 disposed within the bore 61.

The actuating arm 41 is attached to the cylinder 62 through an opening 63 formed in the valve body 60.

The valve body 60 is also formed with ports 64, 65, and 66, all of which open into the bore 61.

The port 64 also opens into the interior of the piston 36, the port 65 is open to the water body 31, and the port 66 is connected to the drain tube 42.

The valve cylinder 62 is formed with a transverse diametrical bore 67 and two radial bores 68 and 69.

In the position shown in FIG. 3A, the bores 68 and 69 provide a fluid passage between the ports 64 and 65.

Water flows from the body 31 through the port 65, bore 69, bore 68, and port 64 into the interior of the piston 36.

The port 66 is closed in this position by the valve cylinder 62.

In the uppermost position, the piston 36 fills with water and gradually sinks under its own weight to the bottom of the housing 35.

The detent blocks 52 engage the springs 51 and the piston 36 is restrained in this lowermost position.

In descending, the arm 41 contacts the block 40 and the valve cylinder 62 is turned to the position shown in FIG. 4A. In this latter position, the port 65 is blocked and the diametrical bore 67 provides a fluid passage between the ports 64 and 66.

Water is drained from the piston 36 through the tube 42 to the drain outlet 33.

In order to provide a faster drain, a pump may be incorporated in the drain system, for example, in the drain conduit 33a.

As water is drained from the piston 36, the latter tends to rise according to Archimedes' principle, the force of buoyancy being equal to the weight of the fluid displaced by the piston 36.

At some point, this buoyant force exceeds the combined forces of the weight of the piston 36 and the restraining force of the detention means 50.

At this point, the piston 36 breaks free and rises to the water's surface.

The piston 36 in rising is capable of doing work equal to the product of the net force of buoyancy times the distance the piston 36 rises.

In rising, the arm 41 of the valve 38 contacts the block 39 and the valve cylinder 62 is moved to the fill position of FIG. 3A, and the cycle is repeated.

Referring now to FIG. 7, there is illustrated a modified form of the hydraulic buoyant motor of the present invention.

This modified motor is designated generally by the numeral 70, and comprises an erect watertight cylinder 71, a sealed hollow piston 72 disposed to reciprocate vertically within the cylinder 71, and a combined fill and drain valve 73 mounted in the bottom of the cylinder 71.

The diameter of the cylinder 71 need be only slightly larger than the diameter of the piston 72 so as to minimize the total amount of water used in filling and draining the cylinder 71 during each cycle of the piston 72.
The cylinder 71 is shown as being immersed directly in a body of water 31 although the cylinder 71 could be mounted externally so long as the same relative fluid levels for operation are maintained.
A power output shaft 74 is mounted on top of the piston 72, and piston detention means 75 are provided on the underside of the piston 72.
The detention means 75 shown are in the form of springs 76 co-acting with detent blocks 77.
However, in this embodiment it may be desirable to provide pressure sensitive detention means responsive to the fluid pressure within the cylinder 71 so as to release the piston 72 when the cylinder 71 is full.
Alternatively, it may also be desirable to provide timed detention means responsive to a predetermined or measured fill time so as to release the piston 72 when the cylinder 71 is full.
The combined fill and drain valve 73 may comprise a valve body 80 formed with a central bore 81, a valve piston 82 disposed to reciprocate within the bore 81, and a spring 83.
The spring 83 urges the valve piston 82 toward the uppermost position, as shown in FIG. 7A, and a valve plunger 84 is mounted on top of the piston 82.
The valve body 80 is formed with three ports 85, 86 and 87.
The port 85 is always open to the water within the cylinder 71, and provides a fluid inlet and outlet opening for filling and draining the cylinder 71.
The port 86 is connected by means of a fluid conduit 88 to the water body 31.
The port 87 is connected to a drain conduit 89.
The valve piston 82 is formed with radial bores 90 and 91, and a longitudinal slot 92.
The slot 92 connects the two bores 90 and 91 and in addition is always open to the port 85.
In the position shown in FIG. 7A, the bore 91 is open to the drain port 87 thereby providing a fluid drain conduit from the port 85 through the slot 92, and bore 91 to the drain conduit 89 for draining the cylinder 71.
When the cylinder 71 drains, the piston 72 descends until it engages the detention means 75.
At the same time, the weight of the piston 72 depresses the plunger 84 and brings the bore 90 of the valve 73 into communication with the fluid inlet port 86 thereby providing a fluid inlet path for filling the cylinder 71.
Water flows from the conduit 88 through the port 86, bore 90, slot 92 and port 85 into the cylinder 71.
At some point, the detention means 75 releases and the piston 72 rises to the surface of the water within the cylinder 71.
Again, the piston 72 is capable of doing work equal to the product of the net force of buoyancy times the distance the piston 72 rises.
Since the piston 72 can displace a weight of liquid only equal to its own volume, it may be preferable to use timed detention means, or a pressure sensitive release means responsive to the fluid pressure within the cylinder 71.
When the piston 72 is released by the detention means 75, the spring 83 forces the valve piston 82 upward blocking the fluid inlet port 86 and opening the drain port 87.
The cylinder 71 is thus drained again and the cycle is repeated.
Referring to FIGS. 9 and 10, there is illustrated a type of spring detention means 100 that might be used advantageously to restrain the upward motion of a piston 101.
The detention means 100 comprises a fixed anchor member 102 formed with an angled contact surface 103, a depending mounting bracket 104, a rigid ledge 105 attached to the bracket 104, and a pivoted contact arm 106.
The arm 106 is pivotally mounted on a slotted anchor 107 by means of a pin 108.
The arm 106 is formed with an angled upper contact surface 109 adapted to engage the fixed contact surface 103.
A compression spring 110 is mounted on the ledge 105 and forms a lost motion connection with the pivot arm 106.
The spring 110 is held in place under compression by a bolt 111 and retaining cap 112.
The bolt 111 extends loosely through a hole 113 bored through the ledge 105.
A nut 114 attached to the bolt 111 limits the upward extension of the retaining cap 112 which engages the head of the bolt 111 and the spring 110.
When the piston 101 descends, the bottom of the arm 106 contacts the top of the anchor 102 and the arm 106 swings up away from the spring 110.
After the arm 106 clears the top of the anchor 102, it falls into place in contact with the top of the spring 110.
As the piston 101 tends to rise under the force of buoyancy, the surface 109 of the arm 106 engages the surface 103 and restrains the piston 101 from rising further.
At some point, the force of buoyancy exceeds the force of compression of the spring 110 and the arm 106 slips past the contact surface 103.
The piston 101 then rises to perform its working stroke.
Referring now to FIGS. 11 and 12, there is illustrated still another form of spring detention means 120 for a piston 121.
The detention means 120 comprises a central rod 122 depending from and rigidly attached to the piston 121, and a plurality of pivoted restraining arms 123.
The rod 122 is formed with an enlarged conical head 125 having a conical lower surface 126 and an upper latching surface 127.
The upper surface 127 is adapted to engage the lower contact surfaces 128 of the arms 123.
Each of the arms 123 is pivotally mounted on a fixed upright support 130 by means of a pin 131.
Torsion springs 132 surround the pin 131 engaging the support 130 and the arms 123 tending to bias the arms 123 in an upward direction.
The upper surfaces 133 of each of the arms 123 makes a lost motion connection with a compression spring 135.
The spring 135 is retained under compression by means of a bolt 136 and a retaining cap 137.
The spring 135 is mounted on the underside of an upper ledge 140 of the support 130 with the free end of the bolt 136 extending

loosely through a hole 141 drilled through the ledge 140.
A nut 142 on the free end of the bolt 136 holds the bolt 136 and spring 135 in place and rises away from the upper surface of the ledge 140 when the spring 135 is compressed by the action of the rod 122.
When the piston 121 descends, the conical head 125 contacts the upper edges of the surfaces 133 forcing the arms 123 downward against the action of the torsion springs 132.
After the downward travel of the head 125 clears the arms 123, the arms 123 swing upward into the position shown in FIG. 11 under the action of the torsion springs 132.
The springs 135 limit the upward travel of the arms 123 and stop them in the position shown.
As the force of buoyancy on the piston 121 increases, the piston 121 rises and the upper surface 127 of the head 125 engages the surface 128 of the arms 123.
The piston 121 is then restrained in this position until the force of buoyancy exceeds the combined force of compression of the springs 135.
At this point, the head 125 breaks free from the arms 123 and the piston 121 rises to perform its working stroke.
FIG. 13 illustrates in schematic form a power generator 200 wherein a plurality of buoyant motors of the types described might be employed to provide a continuous output of power.
The generator 200 comprises a plurality of separate buoyant motors 230 each having a reciprocating piston 236 and a power output shaft 246.
Each of the output shafts 246 carries a rack 250 adapted to engage respective pinion gears 251 formed on a transversely mounted rotatable output shaft 252.
The shaft 252 is journalled in upright supports 253 mounted on a supporting stand 254.
The rotatable shaft 252 is connected to drive a generator 255 or other suitable rotating machinery for converting the potential energy of the water pressure head into electrical or other usable form of energy.
FIGS. 14 and 15 show two views of a type of rack 250 that might be used to advantage in the generator 200.
Each of the racks 250 comprises a linear body 260 formed with a plurality of rectangular openings 261 and a pivoted tooth 262 mounted in each of the openings 261.
Each tooth 262 is pivotally mounted on a pin 263 and may be biased toward an outward position by a bias spring 264.
The tooth 262 abuts against a stop 265 forming one wall of the opening 261 to provide a reaction point for making a driving connection between the rack 250 and the pinion gear 251.
When the piston 236 rises during its driving stroke, the teeth 262 are biased outwardly and engage the pinion 251.
The force of the buoyant piston 236 imparts a driving torque to the shaft 252 through the pinion gear 251.
When the piston 236 sinks or retracts, the teeth 262 in contact with the pinion gear 251 are caused to retract into the openings 261 against the action of the torsion springs 264.
The rack 250 therefore imparts rotation to the shaft 252 in only one direction.
Two sets of gear teeth 262 may be provided as shown in FIG. 15 to ensure that one engaging tooth 262 is provided for each tooth on the corresponding pinion gear 251.
It should be noted that precise synchronism of operation of the separate motors 230 is not required, although reasonable synchronism is desired to ensure a balanced or steady output of power.
The separate motors 236 are capable of operation automatically and continuously so long as a fluid pressure head is maintained.
It should also be noted that no mention has been made of the size or dimensions of the components used in the invention.
It is desirable that the ports and openings in the valve be as large as feasible to ensure rapid filling and emptying of the pistons or cylinders.
It is also desirable to have as long a working stroke as possible for an available pressure head.
However, it is possible to operate the motor of the present invention with larger pistions and shorter strokes depending on the volume of working fluid available.
To further assure rapid filling and emptying of the pistons 236 there may be incorporated in the system, pump means 598 connected between an adjacent pair of pistons, one of which is normally positioned at the beginning of its power stroke while the other is at the end of its power stroke.
This is illustrated in FIG. 13A. One advantage of this arrangement is that faster filling and draining of the respective pistons can be accomplished than by merely allowing the piston to be filled by the surrounding water or drained by gravity thus allowing faster oscillation of the pistons.
Another advantage is that there need be substantially no loss of water because instead of disposing of the water by draining it to a lower level the water is in effect "drained " to another piston.
Furthermore, it should be noted that in an application where but a single buoyant hollow piston is used it is possible to provide a pump connected by conduits between the piston and a tank whereby water from the tank may be pumped from the tank to the piston to sink the piston.
Then the pump may be operated to drain the water from the piston and send it back to the tank, thus using the same water over and over again.
Appropriate valving may be incorporated at the piston and tank whereby alternate filling of the piston from the tank and draining of the piston to the tank may be accomplished.
When pump means is employed in connection with the filling and draining of one or more pistons, pump actuating means may be provided which is responsive to the position of the piston.
For example, electrical switch means for reversing the direction of pumping by the pump means may be actuated by the movement of the piston to different positions as illustrated in FIG. 1.
In an ocean or large lake environment a general arrangement as shown in FIG. 13 incorporating buoyant sealed piston units as illustrated in FIG. 7 might be used.
In such an environment it might be possible to use the force of consecutive waves to cause the rapid intermittent rise and fall of

the pistons.
The power stroke could be in either direction.
In such a case detention means would not be used since it would be desirable to accomplish as much cycling of the buoyant pistons as possible.
The modified form of buoyant motor 330 illustrated in FIG. 16 might be employed where very rapid filling and draining of the piston 336 is desired or required.
The motor 330 comprises the bottomless piston 336, a cylindrical guide 335 for the piston 336, a large diameter cylindrical fluid seal 337 at the bottom of the guide 335, and a large capacity fluid release valve 338.
The piston 336 includes an integral tubular extension 346 extending above the surface of the water, and an air sealing valve 347 mounted on the extension 346 and adapted to close off the passage of air therethrough.
The seal 337 may be formed with an annular ledge 340 and a large diameter central opening 364.
The ledge 340 serves as a valve seat and cooperates with the lower edge 341 of the piston 336 to form a fluid tight seal when the piston 336 falls to the bottom of its stroke.
The cylindrical opening 364 is in communication with the drain valve 338.
In operation, the motor 330 functions as follows: In the position shown in FIG. 16, the lower edge 341 of the piston 336 is sealed against the seal 337, and both valves 338 and 347 are open allowing water to drain from the piston 336 through the valve 338.
Air enters through the tube 346 and valve 347 to replace the water drained away.
At some point, the piston 336 breaks away from the seal 337, the valves 347 and 338 are closed and the piston 336 rises to the surface to perform its power stroke.
When the piston 336 reaches the surface, the valve 347 is opened allowing air to escape from the air pocket formed in the interior of the piston 336.
The piston 336 then fills with water and sinks to the bottom seating against the seal 337.
The valve 338 is then opened, draining the water from the interior of the piston, and the cycle is repeated.
It should be noted that this design of motor 330 provides its own detention means for the piston 336 during the draining process.
The piston 336 has a cross-sectional area "A", and the tubular extension has a cross-sectional area a. The top 350 of the piston 336 has an area equal to difference between these two "B".
Whenever the water level within the piston 336 falls below the top 350, there is a holding force applied to the piston 336 equal to the weight of a column of water directly above B. The magnitude of this detention force is directly proportional to the height "H" of this column.
The net force of buoyancy acting on the piston 336 is equal to the weight of the water displaced minus the weight of the piston 336 and its tubular extension 346 and valve 347.
As the draining of the interior of the piston 336 continues, at some point the force of buoyancy exceeds the combined forced of the weight of piston 336 and the weight of the column of water above the top 350.
At this point, the piston 336 breaks away and rises to the surface.
Additional detention means such, for example, as of the various types already described herein may be operatively associated with the piston 336, however, to further restrain the piston 336 and release it as desired.
The operation of the valves 338 and 347 should be timed or pressure responsive so as to act in unison with the motion of the piston 336.
In order to eliminate the need for drilling or tunnelling to provide a point of lower elevation for the drain 33, the modified form of drain line illustrated in FIG. 17 might be employed.
In this illustration, a drain line 489 having a flexible portion 489a is connected to the bottom of the piston 436 and extends over a dam or weir 490 to line 489b which is an extension of 489a and discharges at the drain level 33.
The drain line 489 is primed with water at all times and acts as a siphon for conveying the water from the piston 436 to the drain outlet 33.
A valve 495, which may be electrically operated, may be connected into the line 489 for controlling the discharge of water therefrom according to the position of the piston 436.
A plunger actuated switch 496 can be provided beneath the piston 436 for energizing the valve 495 when the piston 436 is at its lowermost position.
The piston 436 can be filled by any means heretofore described and any of the previously described detention means can also be employed.
The valve 495 can be positioned in the line 489 at any level that lies below the lowest level reached by water within the piston 436 in order to maintain suction in the line 489.
If the discharge end of the line 489 is maintained under water, so that the line cannot lose suction, the valve 495 may also be positioned directly on the outlet of the piston 436, as shown in the fragmentary view FIG. 17A.
The operation of this modification, as shown in FIGS. 17 and 17A, requires that the rise of the hose 489 over the dam 490 not exceed a height of 34 feet, or whatever height of water can be supported by atmospheric pressure at the particular elevation above sea level.
It will be appreciated that a pump means may be incorporated in the drainage system of any of the illustrated embodiments to provide faster drainage.
The shape of the piston members need not be limited to a generally cylindrical construction as illustrated herein.
Other shapes which present less resistance to up and down movement through the water such, for example, as tear-drop or bullet -like shapes could be used.
It will be apparent that one or more of the structures described herein may be adapted to operate in a medium other than water.
It is to be understood that the embodiments shown and described are by way of example only and that many modifications can be made thereto without departing from the spirit of the invention.
The invention is not to be construed as limited to the embodiments shown and described except insofar as the claims may be so

limited.

Vertical gravity/buoyancy power generator
US20110179784

- **Patent Assignee**
  HASTINGS DOUGLAS REYNOLDS
- **Inventor**
  HASTINGS DOUGLAS REYNOLDS
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- **Fampat family**

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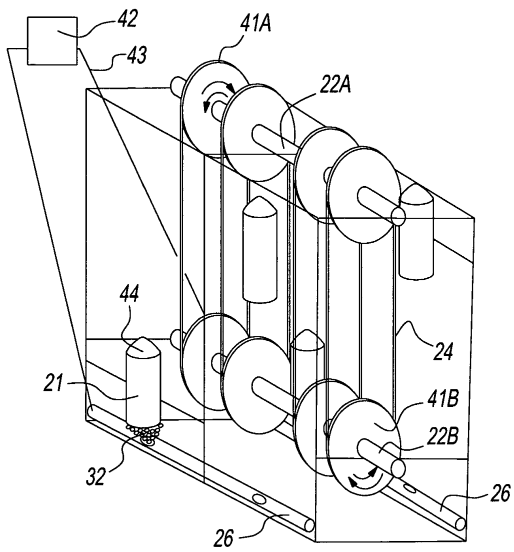
US8011182	B2	2011-09-06	[US8011182]

- **Abstract:**
  (US8011182)
  A power generator utilizing gases and the gravitational force as efficiently as the buoyant force which act on an apparatus in a natural or man-made liquid medium and convert such forces into mechanical energy. The power generator includes methods for a plurality of weighted uniquely configured variable density containers which ascend and descend in a primarily vertical plane and which drive one or more chains, belts or conveyances with rotating sprockets or pulleys on horizontally aligned shafts in primarily a vertical arrangement upon such apparatus. The chains, belts or conveyances driven by the movement of the containers rotate the sprockets or pulleys (FIG. 1) and their associated shafts in both the ascending and descending motion creating mechanical power. Such power can be used to turn electrical generators or other mechanical machines which necessitate such power input.



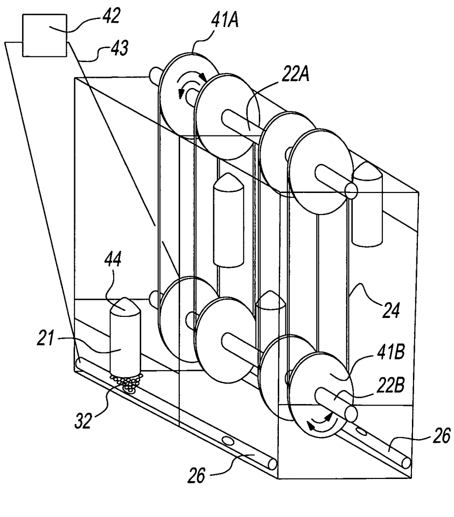
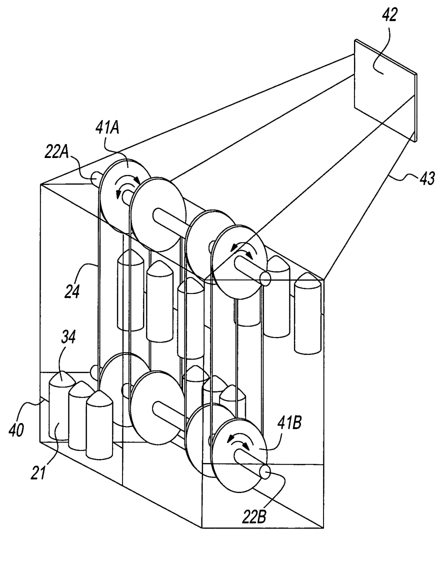

42
43
41A
22A
44
24
21
41B
22B
32
26
26

FIG. 1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41A
22A
43
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34
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41B
21
22B

FIG. 2

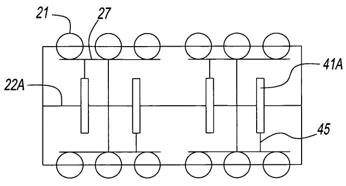

FIG. 3

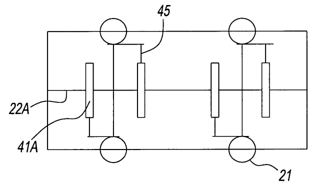

FIG. 3A

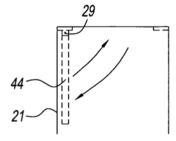

FIG. 4

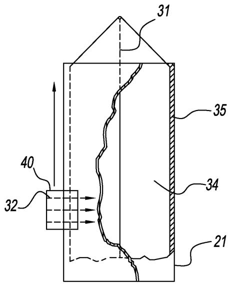

FIG. 5

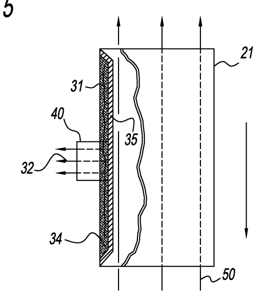

FIG. 6

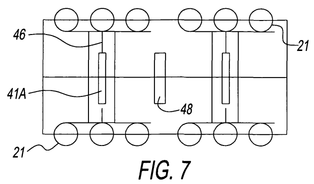

FIG. 7

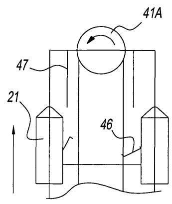

FIG. 8

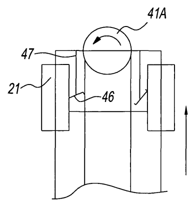

FIG. 9

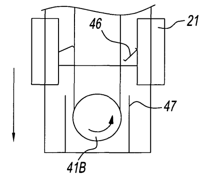

FIG. 10

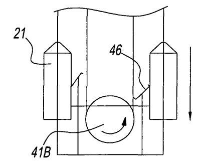

FIG. 11

Description
(US8011182)
CROSS REFERENCE TO RELATED APPLICATIONS
This application claims the benefit of Provisional Patent Application Ser. No. 61/269,749, filed Jun. 29, 2009 by the present inventor
FEDERALLY SPONSORED RESEARCH
none
SEQUENCE LISTING
none
Primary Class: 60/495; 60/496; 60/500
BACKGROUND
The vertical gravity/buoyancy power generator relates to the generation of power by harnessing the gravitational and buoyant forces which act on an apparatus in a liquid medium and converting such forces into mechanical energy.
There exists a profound and continued interest around the world in the development of alternative energy from sources that are renewable and do not deplete resources or pollute the environment.
Further, in the United States and many net oil importing countries, there is a need to develop and harness local energy resources to reduce dependence on foreign sources of energy, namely oil.
As a consequence, alternative energy exploration and development proceeds apace to harness energy produced by wind, solar, bioenergy, geothermal, and wave/tidal to name the most scrutinized.
Providing a reasonable, steady, continuous and sufficient energy from these sources mostly focuses on their use for generating electricity.
However, there are issues with each of these alternative energy sources not the least of which is scalability, efficiency, cost, aesthetics, weather, location and day to day variances in local environments.
Present alternative energy problems solutions include planned: large scale wind farms which cost billions of dollars utilizing thousands of acres and stand still on windless days; huge solar panel arrays, whether for electricity or heat that remain ineffective on cloudy or cool days; bioenergy, with ethanol as an example, does not truly result in a net carbon return and is considered a contributor to driving up global food costs, and geothermal installations which can take years to test and develop with no guarantee of successful energy production.
The concept of energy production from water sources and/or buoyancy dates back to the earliest waterwheels and further back to Archimedes exclaiming "Eureka" when finding a method to define principles of buoyancy.
However, as will be shown in the Description of Prior Art, not until now has energy production from gravity and buoyancy, acting through an appropriate apparatus, been effectively rendered viable.
Gravity and buoyancy are the essential scientific principles at stake in the vertical gravity/buoyancy power generator.
A body in a liquid medium which has a greater density than the liquid it displaces will sink in that medium.
Conversely one with a lesser density will rise.
For the sake of example, a gallon of common fresh water at a normal temperature, at sea level, has a mass of 8.34 pounds and a volume of 231 cubic inches.
Therefore, combining these two concepts, an object which has a mass of say 10 pounds, with a volume of 231 cubic inches will sink in the referenced liquid medium as it is denser than the liquid is displaces and the force of gravity "pulls" it downward.
An object which occupies 231 cubic inches with a mass of say 7 pounds will rise in the liquid medium as it is less dense than the liquid it displaces and the buoyant force will "push" it through the liquid medium.
Therefore it is not the "weight" of the buckets or pods or containers which must change to be acted on by gravity or buoyancy but their density relative to the liquid medium which must become greater and lesser in the sinking and rising phases.
The vertical gravity/buoyancy power generator utilizes both of these principles by configuring weighted containers which have the purposely designed capacity to have a much greater density than the liquid they displace on the downward, sinking, or gravity phase and a much lower density than the liquid they displace on the upward, rising or buoyant phase.
Of particular note, the vertical gravity/buoyancy power generator efficiently utilizes containers which are purposely designed to have a greater density than the liquid they displace and pass through the liquid medium -- as the liquid medium passes through them -- with minimal friction.
As a result, the plurality of the containers, in total, produces a significant amount of power during their descent phase.
The vertical gravity/buoyancy power generator does not require the sun, wind, monopolize massive tracts of land or sea, or redirect scarce food resources.
It can operate in almost any environment, can be located directly in the path of existing power grids, can generate distributed electricity for localized consumption, is not offensive to the eye or local environment and can operate around the clock, day and night without fluctuating output or unreliable operation as is the case with both wind and solar power.
DESCRIPTION OF PRIOR ART
U.S. Pat. No. 2,135,110 to Platt exemplifies commonalities found in buoyancy styled energy generators.
A series of buckets are mounted to an endless vertically aligned chain which rotates around sprockets which, in turn, rotate shafts.
The buckets are pointed, closed on one end and open on the other.
They face point down on the descent and are filled with water which rushes into the upper, open end.
On their ascent the buckets are filled with air which causes them to rise.
The problem in Platt and others is best illustrated by the statement "The buckets thus are lighter during their upward movement than during their downward movement filled with water, and this causes the chain to move and turn the wheels on which it is mounted." In fact, the "buckets" in Platt or any similar configurations are not lighter or heavier at any time during their ascent or descent (providing they do no leave the liquid medium as some configurations show).
The mass or weight of the buckets is constant.

The only physical property which changes in Platt is the volume of space which the bucket and its injected gas occupy in the ascent.
As a result they may have a lesser overall density than the liquid displaced and be "pushed" upward due to the buoyant force.
U.S. Pat. No. 212,186 to Burwell, in some ways similar to Platt, also attempts to utilize the "weight of water" as adding to the downward motion of the buckets.
The problem here is that one gallon of water displaces one gallon of water.
The net affect, when looking at water as a "weight" alone is that it has a neutral density when immersed in a like liquid.
U.S. Pat. No. 3,934,964 to Diamond shows a plurality of piston-filled cylinders, in hose linked pairs, mounted on an endless chain or rotational member.
As the cylinders point downward the weighted piston slides to the bottom of the cylinder expelling air through the hose which flows into its mated cylinder pointing upward whose sliding piston drops thereby filling the cylinder with the same air.
This process is supposed to repeat itself as the paired cylinders rotate in a fluid medium.
Once again, Diamond is flawed in that it purports to "vary (ing) the weights of the cylinders from less than the weight of the displaced fluid to more than the weight of the displaced fluid whereby the cylinders may selectively rise and fall within the fluid medium".
Again, injecting water or air into the cylinders, when immersed in a fluid medium will not change the "weight" or mass of the cylinders causing them to rise or fall.
There is not an explanation for the overall density of the cylinders.
If, for example, they were made of styrofoam, they would never sink no matter how much like fluid were injected into them.
Conversely, if made of iron they would hardly rise without a huge volume of injected gas.
The vertical gravity/buoyancy power generator, in any embodiment or configuration, is superior to Diamond since it allows the containers to change their density offering a more efficient use of energy for that purpose and producing a greater net amount of useable energy.
U.S. Pat. No. 4,054,031 to Johnson calls for collapsible buckets mounted on a vertical belt on a rotating shaft mounted in a tank of water.
The buckets are inflated with air at the beginning of their ascent and collapse against the belt during their descent.
This model may actually produce some amount of energy.
However, Johnson only seeks to capture energy produced by the buoyant force and does not utilize more than 50% of its cycle when merely routing the collapsible buckets through the descent to make them available for inflation and utilization during their ascent.
U.S. Pat. No. 4,363,212 to Everett is somewhat similar to Diamond in that any potential energy it produces is a result of the buoyant force derived from air injected into a series of buckets rotating between two vertically aligned sets of chains, sprockets and shafts in a liquid.
While Everett may improve on similar models it only focuses on capturing energy produced during the buoyant phase.
Its buckets descend either "filled with water" or by collapsing.
Thus, the energy produced in the ascending phase is partially used to move the apparatus through the descending phase.
In Everett and Johnson above, the models are less than 50% efficient since they purposely harvest energy only in the ascent phase of their operations.
The present invention, in any embodiment or configuration, is at least twice as efficient since the containers and their sinking mass are used to create energy in their descent and, with their lessened density in their ascent, capitalize on the buoyant force acting thereon.
U.S. Patent #2006/0288698 A1 to Dentler illustrates another notion which is set forth in numerous similar models; that being a liquid filled tank with a rotating means which move buoyant bodies up through the tank, out of the liquid, through a descent phase in a non-liquid medium, then reintroducing the bodies into the lower portion of the liquid tank, in a repetitious cycle.
Dentler and similar configurations are inferior in that these models utilize varying methods to reintroduce chain-linked, buoyant bodies into the lower portion of a liquid filled tank.
In the end they all produce energy robbing friction, slow the rotation of the apparatus and introduce engineering, manufacturing and operational complications which are not found in the present invention.
U.S. Pat. No. 4,683,720 to DeShon illustrates a "buoyancy engine" comprising pistons and cylinders immersed in a vessel of liquid.
The pistons are raised by injected air and connected to a crankshaft.
The pistons have ring sets which seal the cylinder above and below the ring sets (and exert power robbing friction) to provide a compression seal for the injected air.
The most obvious advantage the present invention has over DeShon is that compression of either air or water or both is not an issue.
In DeShon the pistons must push and pull water out of their way or to fill a void as they rise and fall.
This is similar to the compression issue found in an internal combustion engine.
These engines lose much power while compressing their air gas mixture prior to ignition and sucking a new volume of the air gas mixture into their cylinders prior to compression.
If not for the significant explosive nature of the fuel, these engines would be totally impotent.
One must concede that buoyancy, while powerful if properly harnessed, does not produce the explosive, expansive power of the internal combustion engine.
As a consequence, every effort must be made to reduce the power-robbing affects of compression of either the required gasses and liquids and friction produced by the apparatus itself.
The DeShon model presents compression and friction elements that are not found in the present invention.
OBJECTIVES AND ADVANTAGES OF THE INVENTION

It is an object of the vertical gravity/buoyancy power generator to provide an efficient, environmentally friendly power generator.
It is another object of the vertical gravity/buoyancy power generator to provide an apparatus to generate power without consuming non-renewable resources and which does not generate pollution.
It is another object of the vertical gravity/buoyancy power generator to provide an apparatus of this character which can be located in almost any location on earth and operate at any time of day or night for generating power and thereby greatly increasing its potential use and application.
It is a further object of the vertical gravity/buoyancy power generator to provide an apparatus of this character that is relatively inexpensive to manufacture and maintain.
The characteristics and advantages of the vertical gravity/buoyancy power generator are further sufficiently referred to in the following detailed description of the accompanying drawings, which represent several embodiments.
After considering this example, persons skilled in the art will understand that many variations may be made without departing from the principles disclosed and I contemplate the employment of any such structure, arrangements or modes of operation that are properly within the scope of the appended claims.
SUMMARY OF THE INVENTION
The vertical gravity/buoyancy power generator apparatus harnesses the gravitational and buoyant forces which act on the apparatus, wholly or partially submersed in a natural or man-made liquid medium, and converts such forces into mechanical energy.
The vertical gravity/buoyancy power generator includes methods, systems and devices for a plurality of weighted containers which ascend and descend in a primarily vertical plane and which are attached to or engage with one or more chains, belts or conveyances with rotating sprockets or pulleys and horizontally aligned shafts in primarily a vertical arrangement upon such apparatus such that the movements of the containers generate rotational power to the shafts in a continuous and flowing movement (FIG. 1).
In the descent phase the containers are open on both ends (FIG. 5) and have greater density than the volume of liquid they displace causing them to descend freely and efficiently through the liquid medium due to the gravitational force.
In the ascent phase the containers are filled by bladders or are closed on their upper end or both ends when, in any embodiment, a volume of gas is introduced such that the overall volume of the containers have a greater overall volume and lesser density than the liquid displaced causing the containers to rise through the liquid medium due to the buoyant force.
The chains, belts or conveyances to which the containers are attached or engage rotate the sprockets or pulleys (FIG. 1) and their associated shafts creating mechanical power.
Accordingly several of the objects and advantages of the invention are to provide a means to harness an alternative energy source which is environmentally friendly, can operate without dependence on wind or rivers or the sun, has a constant, non-fluctuating power output, and is simple in construction and easily maintained.
Still other objects and advantages will become apparent from a study of the following description and the accompanying drawings.
BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the vertical gravity/buoyancy power generator apparatus with a pair of one-way sprockets or pulleys, a pair of chains, belts or conveyances and which has attached a pair of containers.
Two sets so configured are shown in the apparatus.
The containers are shown with a moveable closure means on one end.
The apparatus is illustrated with a gas pump, gas lines and a gas discharge means located near the lower portion of the apparatus.

FIG. 2 is a perspective view of the vertical gravity/buoyancy power generator apparatus with a pair of one-way sprockets or pulleys driving a pair of chains or belts and which has attached sets of containers.
Two sets so configured are shown in the apparatus.
The containers are fitted with bladders.
The apparatus is illustrated with a gas pump and gas lines which connect to the upper portion of the apparatus and onward to the containers themselves.
The use of gas ports that communicate gas between the gas lines and the bladders is also shown.

FIG. 3 is a schematic overhead view of the vertical gravity/buoyancy power generator apparatus in FIG. 2 with a pair of one-way sprockets or pulleys driving a pair of chains or belts and which has attached sets of containers.
Two sets so configured are shown in the apparatus and illustrate a connecting bracket for the container sets and a bracket connecting the sets with the chains or belts.

FIG. 3A is a schematic overhead view of the vertical gravity/buoyancy power generator in FIG. 1 with a pair of one-way sprockets or pulleys driving a pair of chains or belts and which have attached a pair of containers.
Two sets so configured are shown in the apparatus and illustrate a connecting bracket for the container sets and a bracket connecting the sets with the chains or belts.

FIG. 4 is an enlarged view of one container in the rising or ascent phase with a movable closure means in the open position.
A hinge or pivot is visible as is the motion for the movable closure means showing its travel to the closed position.

FIG. 5 is an enlarged view of one container with a cutaway so that the inflated bladder is visible within when inflated.
A bladder containment cover and a bladder retractor are also visible.
The use of gas ports that communicate gas between the gas lines and the bladders is also shown.

FIG. 6 is an enlarged view of one container with a cutaway so that the deflated bladder is visible within when deflated.
The bladder containment cover and the bladder retractor are also visible.
The use of gas ports that communicate gas between the gas lines and the bladders is also shown.
The flow of the liquid medium through the container with the bladder retracted is shown.

FIG. 7 is a schematic overhead view of the vertical gravity/buoyancy power generator apparatus with a single one-way sprocket or pulley driving a chain or belt and which has sets of containers which are able to connect and disconnect said chain or belt.
Two sets so configured are shown in the apparatus and illustrate a chain/belt catch for the container sets and the bracket connecting the sets together.
The installation of a flywheel is shown.

FIG. 8 illustrates a side view of the upper portion of the vertical gravity/buoyancy power generator apparatus showing the upper one-way sprocket or pulley driving the chain or belt and which has a set of containers which are able to connect and disconnect to and from said chains or belts.
One set so configured is shown in the apparatus and illustrates the chain/belt catch for the container set.
In this figure the set of containers are in the rising or ascent phase and are connected to the chain or belt on one side.
The bladders within the container sets are inflated.
The other side of the set of containers is disconnected from the chain or belt.
A chain/belt catch pushrod is illustrated at the top portion of the apparatus.

FIG. 9 illustrates a side view of the upper portion of the vertical gravity/buoyancy power generator apparatus showing the upper one-way sprocket or pulley driving the chain or belt and which has a set of containers which are able to connect and disconnect to and from said chain or belt.
One set so configured is shown in the apparatus and illustrates the chain/belt catch for the container set.
In this figure the set of containers have just reached the top of the rising or ascent phase.
One side of the container sets has just been disconnected to the chain or belt by the chain/belt pushrod.
The bladders within the container sets have just been deflated.
The other side of the set of containers is connected to the chain or belt by the chain/belt catch pushrod which is illustrated at the top portion of the apparatus.

FIG. 10 illustrates a side view of the lower portion of the vertical gravity/buoyancy power generator apparatus showing the lower one-way sprocket or pulley driving a chain or belt and which has a set of containers which are able to connect and disconnect to and from said chain or belt.
One set so configured is shown in the apparatus and illustrates the chain/belt catch for the container set.
In this figure the set of containers are in the sinking or descent phase and are connected to the chain or belt on one side.
The bladders within the container sets are deflated.
The other side of the set of containers is disconnected from the chain or belt.
The chain/belt catch pushrod is illustrated at the lower portion of the apparatus.

FIG. 11 illustrates a side view of the lower portion of the vertical gravity/buoyancy power generator apparatus showing the lower one-way sprocket or pulley driving a chain or belt and which has a set of containers which are able to connect and disconnect to and from said chain or belt.
One set so configured is shown in the apparatus and illustrates the chain/belt catch for the container set.
In this figure the set of containers have just reached the bottom of the sinking or descent phase.
One side of the container sets has just been disconnected from the chain or belt by the chain/belt pushrod.
The bladders within the container sets have just been inflated.
The other side of the set of containers is connected to the chain or belt by the chain/belt catch pushrod which is illustrated at the lower portion of the apparatus.
DESCRIPTION OF THE PREFERRED EMBODIMENT
The vertical gravity/buoyancy power generator apparatus is presented in two embodiments though these should not be construed as limitations on the scope of the invention but, rather, the exemplification of several preferred embodiments thereof.
FIG. 1 shows the most basic, preferred embodiment for the vertical gravity/buoyancy power generator with two sets of containers (21) operating 90 degrees out of phase with the other set.
A configuration for linking the sets is shown in FIG. 3A. An infinite number of container sets is possible with any variety of phasing.
In operation the containers (21) ascend and descend through the liquid medium as they are attached by a chain/belt bracket (45) to or engage a chains or belt drives (24) which in turn rotate one way sprockets or pulleys (41A and 41B) which in turn rotate shaft(s) (22A and 22B).
At the bottom of its travel the closure means (44) seals the upper end of the container (21).
A volume of gas (32) is introduced by the gas means (26).
The apparatus may be fitted with a gas pump (42), gas lines (43) and a gas discharge means (26) located near the lower portion of the apparatus.
The gas is introduced into the container has several consequences: it aids the closure means into place, the buoyant pressure of the gas helps hold such in place, and it displaces liquid from the container which results in a greater overall volume of space occupied by the container.
At the top of the cycle the containers release their trapped gas and begin their descent.

A movable closure means (44) moves on its hinge or pivot (29) from the opening in the container allowing the liquid to pass through the container as the container sinks through the liquid medium due to the force of gravity.
During descent the volume of the container is limited to its actual wall thickness and the volume of the closure means.
This process repeats itself indefinitely for each container and for the cumulative containers located on the vertical gravity/buoyancy power generator apparatus.
As a result of this descending and ascending phases of the containers' movements a chain or belt (24) is driven which, in turn, rotates the one-way sprockets or pulley which, in turn, rotate the upper shaft and, possibly, the lower shaft.
This rotational energy may be utilized to drive machines or generators or for other uses.
Referencing the configuration in FIG. 3A it is illustrated that the left container set is attached by the chain/belt bracket (45) to the one-way sprocket or pulley (41A) and hence to the shaft (22A).
The use of the paired sets of containers which are attached to or engage with chains or belt drives through one-way sprockets or pulleys benefits the apparatus as follows.
The one-way sprockets or pulleys are designed to engage the shaft in one direction only and to free spin in the other.
As this set sinks or descends it will transfer power to a single one-way sprocket or pulley.
The other one-way sprocket or pulley (41A) associated with that set spins freely as the set of containers descends.
Upon the ascent, the previously free spinning one-way sprocket or pulley (41A) now engages while the other one-way sprocket or pulley spins freely.
This engineering allows continuous power to be transferred to the shaft while the containers move in their vertical motion ascending and descending.
Additionally, continuous power is transferred to the shafts(s) by staggering the phasing of the paired sets in the apparatus so when one paired set is at dead top or dead bottom at least one other set is in its power phase of ascent or descent.
The movable closure means (44) claimed for this invention can be configured in a variety of ways including the closure means illustrated in FIG. 4.
However the configurations could include, but are not limited to, a bivalve from opposing sides, a bivalve from a center post, a flapper valve, a roll-up closure, an iris closure and the location of such on either or both ends of the containers etc.; each and every one of which are contemplated herein.
FIG. 2 shows the second, preferred, illustrated embodiment.
In essence, it operates in a similar fashion as the embodiment shown in FIG. 1 but it has multiple containers arranged horizontally adjacent to each other on a bracket with gas ports (40).
The overhead perspective of this configuration is illustrated in FIG. 3.
Additionally, each container is fitted with a collapsible gas retention device (34), hereinafter referred to as a bladder, though not limited in its design or function by this term, configured to alternatively hold and release a volume of gas, instead of the closure means (44).
The design, installation and use of gas retention devices can have many configurations including, but not limited to, bladders which are internal or external to the container, pod or weight.
The bladder, internal in this embodiment, in each container when deflated through gas port (40) during the descending, sinking phase is held against the inside of the container allowing the liquid medium (50) to pass through the container (FIG. 6).
Upon beginning or during its ascent the bladder is inflated so that it occupies the internal volume of the container to some degree through the longitudinal axis of the container to some length (FIG. 5).
The bladders are alternatively inflated through gas port (40) as the paired sets of containers reach dead bottom and deflated as the paired sets of containers reach dead top in their vertical cycle.
The containment means (35) and the bladder retractor (31) are utilized to reduce friction and aid in alignment of the bladder.
The gas discharge means for the bladders may be, though not limited to, the systems shown in FIG. 2 comprised of a double action gas pump (42) connecting gas lines (43) and the bracket with gas ports (40) leading to each container.
This system injects gas from the gas pump, through the connecting gas lines and through the bracket with gas ports into the bladders at dead bottom of the descent phase.
Conversely it removes gas from the bladders at dead top of the ascent phase.
There may also be a cam means which aligns itself to the passing bracket with gas ports (40) but otherwise is mounted to the top and bottom portion of the frame.
The source of gas used may include, but is not limited to, a readily available electric gas pump with its own power means, a gas source from industrial application such as waste gas or pressurized air and natural sources such as ocean gas vents.
FIGS. 7-11 illustrate an alternate refinement of this embodiment for alternatively attaching and releasing the container (21) sets with the drive chains or belts (24).
What is shown is a chain/belt catch (46) that can be moved into or out of contact with the chain or belt by the chain/belt pushrod (47).
FIG. 8 shows the chain/belt catch engaged to the chain or belt on one side of the connected container sets as the containers rise or ascend.
The chain/belt catch on the other side is not engaged.
Upon reaching dead top of the cycle (FIG. 9) one chain/belt catch is disengaged and the other is engaged by the chain/belt pushrods.
On the sinking or descending phase power continues to be transferred to the chain or belt by the now engaged chain/belt catch.
This process as appropriate for the dead bottom part of the cycle is illustrated in FIG. 10 and FIG. 11.
The containers in either embodiment may be configured on their outer surface with water flow devices to aid in the containers' stability as they move through the liquid medium.
The vertical gravity/buoyancy power generating apparatus in either embodiment may utilize a flywheel (48) on either or both shafts to assist with the smooth rotational operation of the shafts.

Additionally, as mentioned, the vertical gravity/buoyancy power generator, in any embodiment, may be used in industrial facilities where a quantity of gas is produced as a waste or by-product.
The facility may be adapted to capture this gas and route such for use as the gas source for this vertical gravity/buoyancy power generator.

Method and means of altering a vessel or structure in order to produce a force US20050235640

- Patent Assignee
  ARMSTRONG WILLIAM
- Inventor
  ARMSTRONG WILLIAM
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- Fampat family
  US2005235640 A1 2005-10-27 [US20050235640]

- Abstract:
  (US20050235640)
  A Method and Means of Altering a Vessel or Structure and in so doing a force is produced. Wherein the altering forces are Gravity, Buoyancy, or any man made or natural force. Wherein the net force produced is usable as work and is cheap, available and non polluting and in great need.

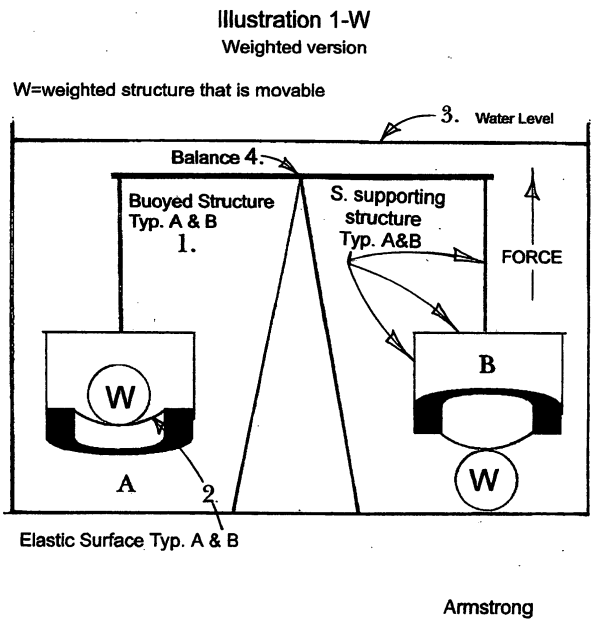

Illustration 1-W
Weighted version

W=weighted structure that is movable

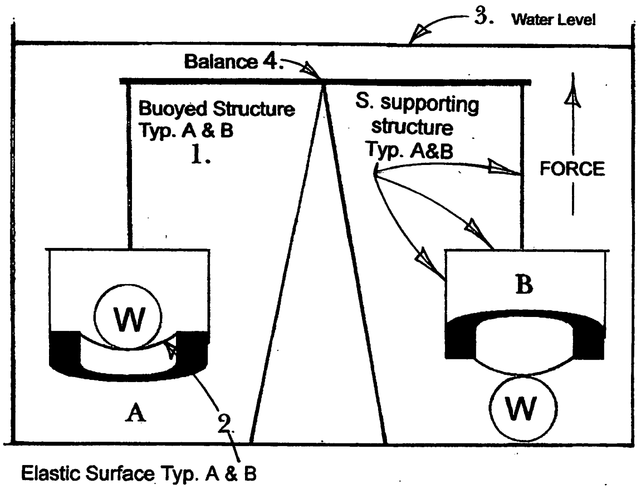

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Illustration 1-B
Buoyed Version

B=Buoyed Structure that is movable

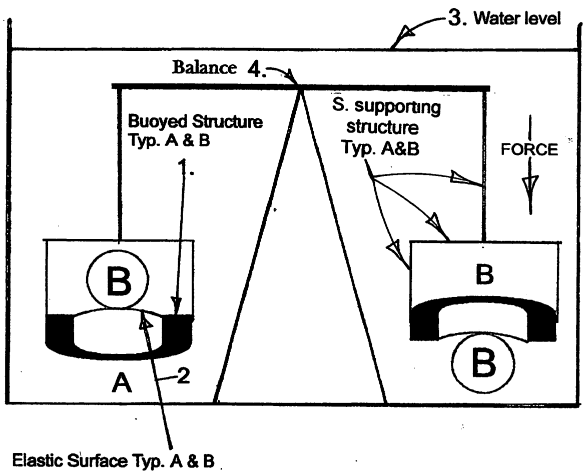

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Illustration A
BUOYED VERSION

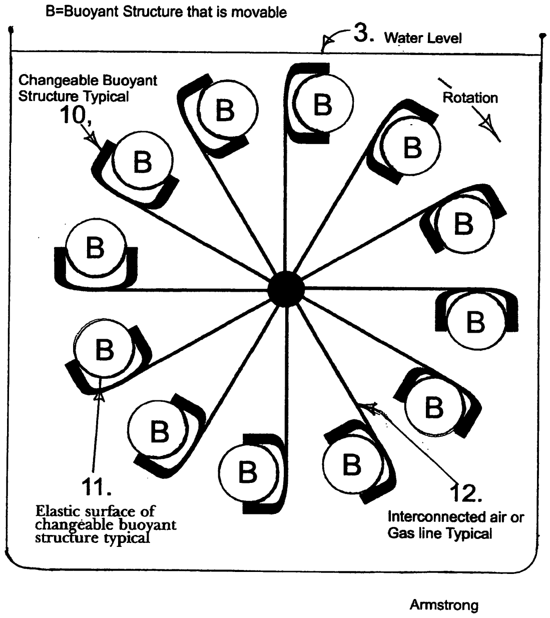


Illustration B
weighted version

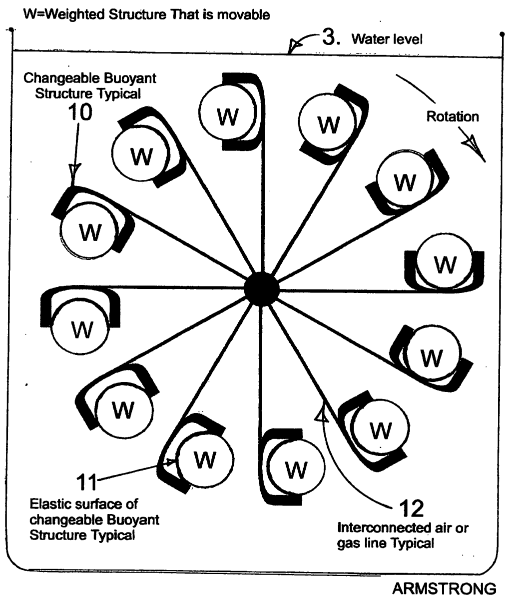
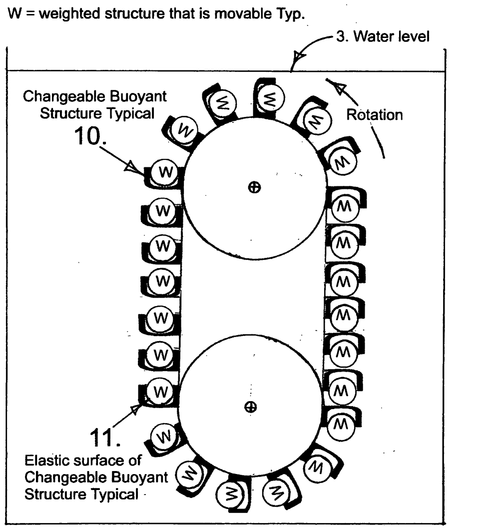


ILLUSTRATION C

A Schematic Diagram of a Derivative Form of the Wheel Embodiment
Using Weight as the Input Force



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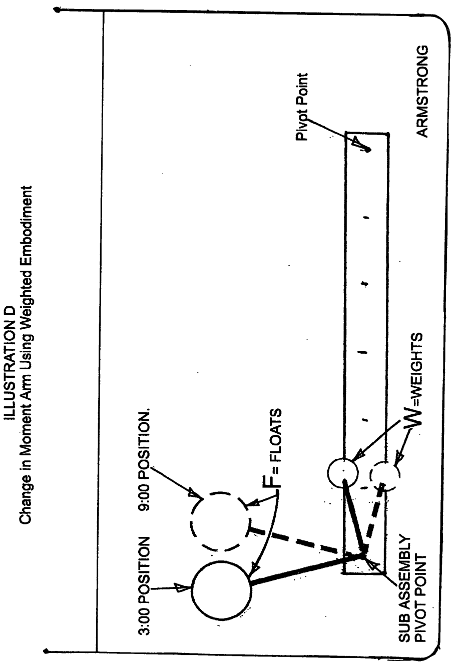

ILLUSTRATION E

Detail of Subassembly in Illustration D

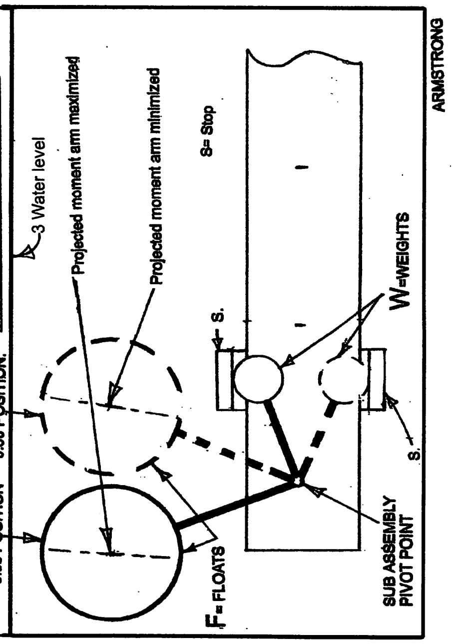

ILLUSTRATION F

A Schematic Diagram of a representitive structure demonstrating a change in both volume and moment arm using the weighted version of the embodiment

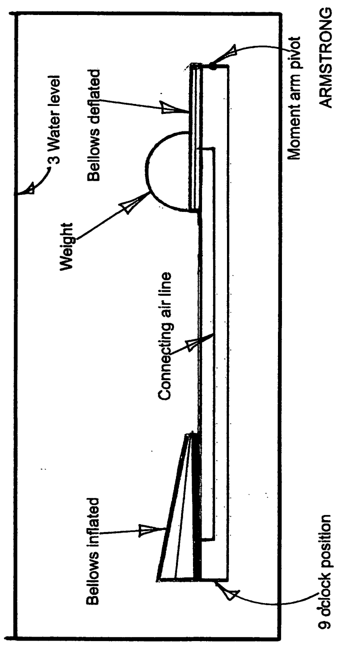

ILLUSTRATION F -1

A Schematic Diagram of a representitive structure demonstrating a change in both volume and moment arm using the weighted version of the embodiment

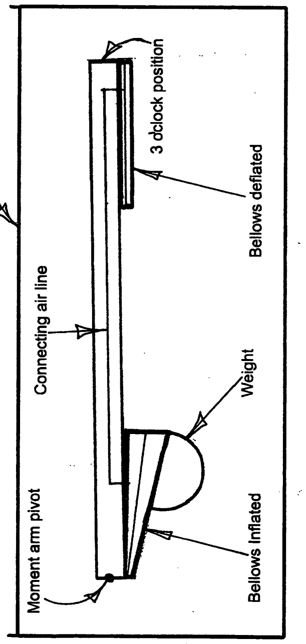

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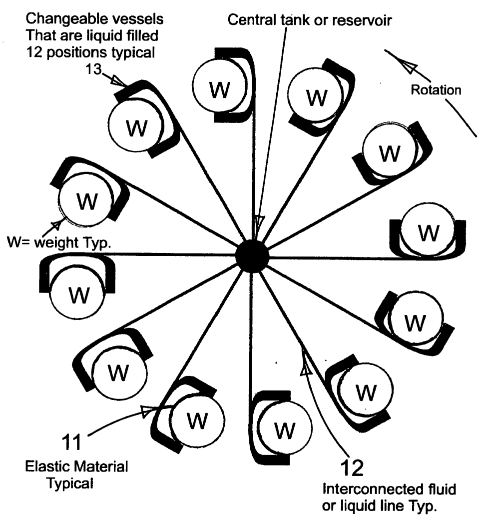
ILLUSTRATION G

A schematic diagram of a representative structure demonstrating a change in volume of a liquid mass



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Description

(US20050235640)

BACKGROUND OF THE INVENTION

[0001] This invention pertains to methods and means of generating energy and more specifically to a Method and Means of Altering a Vessel or Structure in order to Produce a Force, that may be used for work.

[0002] It has been common practice in prior art to alter a vessel or structure in order to achieve a goal.

Vessels and structures are altered to produce a change in buoyancy, volume, Weight, density, etc.

Some examples of these altered vessels or structures are: Boats are altered in order to have specific desirable characteristics.

A syringe is altered in order to fill it with liquid, and altered again in order to expel the same liquid.

A balloon is altered when it is inflated and also when it is deflated.

[0003] In this respect, the Method and Means of Altering a Vessel or Structure in order to Produce a Force, substantially departs from conventional concepts and designs of prior art, and in so doing provides in the apparatus capable of altering vessels or structures in order to produce a force.

Thus producing energy, that is useful non polluting and in great need.

BRIEF SUMMERY OF THE INVENTION

[0004] In view of the foregoing, disadvantages inherent in the known types of energy producing cycles or devices now present and in prior art, the present invention provides a new and useful method and means of producing energy.

To attain this, the invention essentially comprises an engine or devise, capable of altering a vessel or structure and in so doing produces a force.

Such that the force may be harnessed for work.

[0005] It should be noted that in the context of the present description, the method and means to alter a vessel or structure, may take any form.

The forms that can be used are: levers, wheels, belts, or any forms used in present or prior art.

In so far as they do not depart from the scope of the invention.

[0006] There has thus been outline, rather broadly, the more important features of the of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated.

There are, of course, additional features of the invention that will be described hereinafter and will form the subject matter of the claims annexed hereto.

[0007] In this respect, before explaining at least one embodiment of the invention, in detail, it is to be understood that the invention is not limited in its application to the details of construction and to arrangements of the components set forth in the following description or illustrated in the drawings.

The invention is capable of other embodiments and being practiced and carried out in various ways.

Also it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

[0008] As such those skilled in the art will appreciate that the conception, upon which this disclosure is based, may ready be utilized as a bases for the designing of other vessels, structures, methods and systems for carrying out the several purposes of the invention.

It is important, therefore, that the claims be regarded as including equivalent constructions in so far as they do not depart from the scope of the invention.

It is therefore an object of the present invention to provide a new and improved Method and Means of Altering a Vessel or Structure, in order to Produce a Force which has all the advantages of prior art and none of the disadvantages.

Still yet another object of the present invention is to provide a new and improved, Method and Means of Altering a Vessel or Structure to Produce a Force, which provides in the apparatuses and methods of prior art some of the advantages thereof, while simultaneously overcoming some of the disadvantages normally associated therewith.

It is another object of the present invention to provide a new and improved method and means of producing energy efficiently and with ease of manufacture and marketing.

It is a further object of the present invention to provide an inexpensive and non polluting source of energy.

[0009] These together with other objects of the invention, along with various features of novelty which characterize the invention, are pointed out with particularity in the specifications, illustrations, embodiments and claims annexed to and forming the parts of this disclosure.

[0010] For a better understanding of the invention, its operating advantages and specific objects obtained by its use, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF DRAWINGS

[0011] The invention will be better understood and the objects of the same, as well as those set forth above will become apparent when consideration is given to the following detailed descriptions thereof. Such description makes reference to the annexed drawings wherein:

[0012] ILLUSTRATION 1-W Is a schematic diagram which represents a balance showing the inventive concept using weights as the altering force.

[0013] ILLUSTRATION 1-B is a schematic diagram which represents a balance showing the inventive concept using buoyancy as the altering force.

[0014] ILLUSTRATION A is a schematic diagram of a wheel structure according to the buoyant embodiment.

[0015] ILLUSTRATION B is a schematic diagram of a wheel structure according to the weighted embodiment.

[0016] ILLUSTRATION C is a schematic diagram of a derivative form of a wheel structure, showing the advantages of applying multiple vessels at the 3 and 9 o'clock positions.

[0017] ILLUSTRATION D is a schematic diagram of a representative structure, illustrating a change in moment arm, using a weighted embodiment.

[0018] ILLUSTRATION E is a schematic diagram of an enlarged detail of the moment arm change using the weighted embodiment.

[0019] ILLUSTRATION F is a schematic diagram of a representative structure demonstrating, a change in both volume and relative moment arm, using the weighted embodiment.

[0020] ILLUSTRATION F-1 is a schematic diagram of a representative structure demonstrating, a change in both volume and relative moment arm, using the weighted embodiment. This diagram represents the alternate position of the lever arm represented in the 3 o'clock position.

[0021] ILLUSTRATION G is a schematic diagram of a representative structure showing a change in volume of a liquid mass.
DETAILED DESCRIPTION OF THE INVENTION
[0022] With reference now to the drawings, and in particular to illustration 1-W thereof, a new and improved Method and Means of Altering a Vessel or Structure in order to Produce a Force that may be used for work.
[0023] Illustration 1-W shows how the volume of a buoyant structure 1. is altered by the gravitational force of a weight W, acting on and attached to the elastic surface 2.
As this diagram indicates the buoyant structure 1 is suspended from a balance in an upright position A and inverted in position B. This illustrates a volumetric change.
As there is no longer a balance, a force is produced, of which there is no counteracting force.
This is caused by the weight W., acting on the second structure B. in the opposite direction from A. And causing a volume increase, whereas A., has a volume decrease.
The direction of the force is indicated by an arrow.
Both structures A and B are constructed the same, with the same weight and elastic properties.
In this illustration the only variable is the orientation of the structures to the gravitational force.
Also the entire structure to include the balance is under water indicated by the number 3. (note structure indicated by the letter S. Is supporting the Buoyed structures and is not part of that structure.)
[0024] Illustration 1-B is buoyed version of the balance.
All of the conditions previously described in illustration 1-W are the same, with the exception of W. now replaced with B=buoyed structure that is movable.
This is to demonstrate that the volumetric change will occur, due to the effect of a buoyant force, changing the volumes of the effected structures.
As indicated A., has an increase in volume and B., has a reduction in volume.
Thus the balance has an indicated force and the balance has a movement in the direction of the arrow.
Once again the only variable is the orientation of the structures.
[0025] Illustration A is a schematic diagram of a wheel structure according to the buoyant embodiment of the invention.
In this illustration we have vessels positioned around a wheel, the construction of the vessels is similar to the previous illustrations. And the wheel is also under water.
As in the previous illustrations, the principle is the same.
[0026] For the purpose of illustration I have indicated that the vessels are located at positions equivalent to a clock face 12 o'clock being the top and 6 o'clock being the bottom.
As indicated all of the vessels 7 thru 11 o'clock will have an increase in volume, whereas, the vessels from 1 thru 5 o'clock will have a decrease in volume.
I have discounted 6 and 12 as there is little change.
As is indicated, a force is produced, causing the wheel to rotate in the indicated direction.
Once again the only variable is the orientation of the vessels.
We can only conclude that as the input force is buoyancy, is a constant and the wheel continues to rotate, we have a force that may be harnessed for work. (there is a interconnected air or gas line that aids the in volume change.
This line can be for connection to each other as well as venting to a central chamber or atmosphere).
This is important because the volume of the vessels change, will be greatly reduced without it.
[0027] Illustration B is a weighted version of the wheel embodiment and as with illustration A., the conditions are the same.
So as in this illustration the input force is weights and a change in volumes will occur.
As a result the wheel rotates and there is an indicated force, which is not counteracted.
I have shortened this description so as to be brief and still understood.
[0028] Illustration C is a schematic diagram of a derivative form of the wheel embodiment using weight as the altering force.
This illustrates the concept that the volume change is most significant at the 3 and 9 o'clock positions.
Thus the maximum change can be multiplied by increasing the number of vessels using an ovoid form.

It can be appreciated that many forms of embodiments can and will be used to increase the force obtained by the invention.
So long as it does not depart from the scope of the invention.
[0029] Illustration D is a schematic diagram of a lever embodiment.
This represents a new concept, not discussed in prior illustrations.
In this illustration we see a lever which is pivoted on the right side.
Attached on the left side is a pivoting subassembly at the 6 inch location of the lever.
This subassembly has the ability, when inverted to change the position of the float F., using the force of the attached weight W. As the diagram indicates in this position representing the 9 o'clock position.
The moment arm of the assembly is minimized, causing the buoyant moment arm to be minimized, with little or no change in the moment arm of the weight W. The dashed line portion of the subassembly is the indicated position of 9 o'clock.
The solid line portion of the subassembly is the indicated position of 3 o'clock.
We see that in the 3 o'clock position, the buoyant moment arm of the subassembly is maximized.
Thus changing the buoyant moment arm of the assembly, with little or no change in the moment arm of the weight W. As we see this indicates that a gravitational force e.g.: the weight can alter the moment arm of a structure, without a volume change.
From the information in this and the previous illustrations, we can see that a buoyant version of this embodiment will also work.
(Note: Stops are required, so as not to allow the weight in the subassembly to travel beyond the indicated positions.
The stops have been omitted from this illustration, but are included in illustration E., the detail of the subassembly).
[0030] Conversely we can make an assumption given the information in the prior illustrations, that a buoyant version of the invention, will also change the moment arm of the float.
[0031] Illustration E. is a schematic diagram of the detail of the subassembly, referenced in the previous illustration.
This larger detail, helps to show the relationship between the weight and the float.
As the assembly is inverted to the 3 o'clock position the weight moves and thus the attached float changes position relative to the assemblies pivot point.
As there is little or no change in the weights moment arm and a sizable change in the floats moment arm, we have a force which is not counteracted in the embodiment.
Note, that there are stops in this illustration referenced by the letter S. These are required to limit the travel of the weight as the position of the assembly is changed.
This feature is important as the invention will not function without them.
[0032] Illustration F is a schematic diagram illustrating a change in both volume and relative moment arm.
In the illustration we see a lever, with a bellows with a weight attached thereto.
This bellows is attached to the lever at the 6 inch position from the pivot point of the same.
There is a second bellows located at the 20 inch position.
There is a tube or like structure connecting both bellows, which allows a gas or similar fluid material to pass between.
As we can see the lever is at the 9 o'clock position, indicating the bellows at 6 inches is collapsed.
Whereas the bellows at the 20 inch position is inflated, thus showing that the exertion of the weight has caused a change in both volume and relative moment arm.
Thus we have a force that is not counteracted in the corresponding lever, in the 3 o'clock position, illustrated in F-1.
[0033] Illustration F-1 is a schematic diagram of the lever in illustration F., in the relative position of 3 o'clock.
Thus we see from illustration, the bellows a the 6 inch position is now expanded, by the effort of the weight, with little or no change in the moment arm of the weight.
Also we see that the bellows at the 20 inch position is now collapsed, showing a change in both volume and moment arm has occurred.
Once again the only variable is the relative position of the vessel and structure.
[0034] Illustration G is a schematic diagram of a representative structure showing a change of volume of a liquid mass.
As we see illustration G is similar to illustration B. There are differences that must be considered. 1.
There is no water surrounding the structure. 2.
The vessels are filled with a liquid, as opposed to a gas in illustration B. The alteration of the vessels are still caused by the weights.
As we see looking at the relative position of the clock face.
The 7-11 o'clock positions show an increase in volume.
Whereas the positions representing 1-5 o'clock show a decrease in volume.
This represents a significant change in the liquid masses position.
An increase in positions 7-11 and a decrease in positions 1-5.
The positions 6 and 12 have not been considered as there is little change at these positions.
Thus an indicated force is produced with little or no change in the weights moment arms, and no counteracting force in the system.
Also we see that by altering a vessels volume, we can effect relative buoyancy and weight of a fluid mass.
This is achieved with little change in the altering force.
The indicated rotation is counter clockwise.
[0035] It is imperative to note that the principles set forth herein above in each of the forgoing embodiments may be applied to any type of engine (rotary or other) in any type of application in any type of environment.
Further uses of the foregoing invention include, but are not limited to, the harnessing of Heat, buoyancy, gravity, or any manmade or natural forces.
As to the further manner of usage and operation of the present invention, the same should be apparent from the above descriptions.
Accordingly no further discussion relating to the manner of usage will be provided.
With respect to the above descriptions then, it is to be realized that the optimum dimensional relationships for the parts of the

invention, to include variations in size, materials, shape, volume, density, form, function and manner of operation, assembly and use are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specifications are intended to be encompassed by the present invention.
Therefore, the foregoing is considered as illustrative only of the principles of the invention.
Further, since numerous modifications and changes will occur to those skilled in the art, it is no desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention:
[0036] Therefore the foregoing is to be considered as illustrative only of the principles of the invention.

Buoyancy engine using a segmented chain
US20100154405

- **Patent Assignee**
  UNDAMOTUS
- **Inventor**
  FRANK JOSHUA W
- **International Patent Classification**
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- **US Patent Classification**
  PCLO=060495000 PCLO=060496000 PCLX=060495000 PCLX=415001000
- **CPC Code**
  F03B-017/00/5; F03B-017/04
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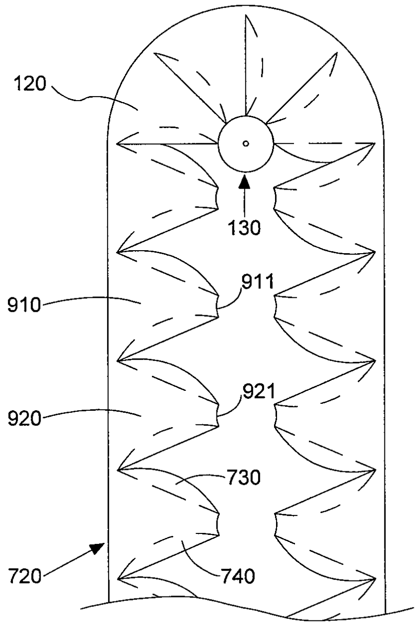
  2013US-13829299 2013-03-14

- **Fampat family**

US2010154405	A1	2010-06-24	[US20100154405]
US8397496	B2	2013-03-19	[US8397496]
US2013247556	A1	2013-09-26	[US20130247556]

- **Abstract:**
  (US8397496)
  In accordance with various aspects of the present invention, a method and system for a buoyancy engine is presented. In an exemplary embodiment, the buoyancy engine includes a divider to separate a liquid environment from a gas environment, and a reservoir aperture in the divider. A rotating element, approximately opposite the reservoir aperture, provides tension to, and helps rotate, a segmented chain. The segmented chain is configured to form a solid inner surface when transitioning between the liquid and gas environments, but separate during vertical travel. As the segmented chain travels between the liquid and gas environments, a rotary motion is created which can be captured as electrical or mechanical energy.



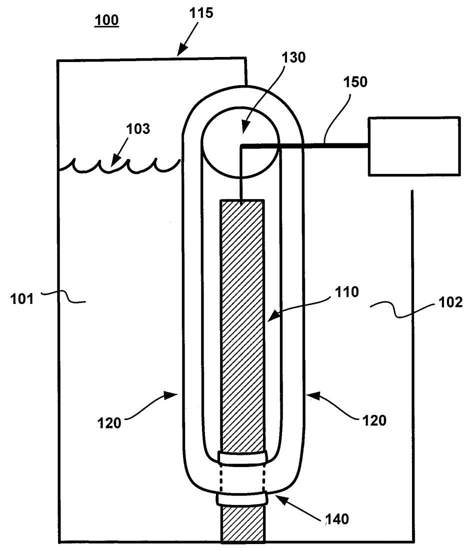


FIGURE 1A

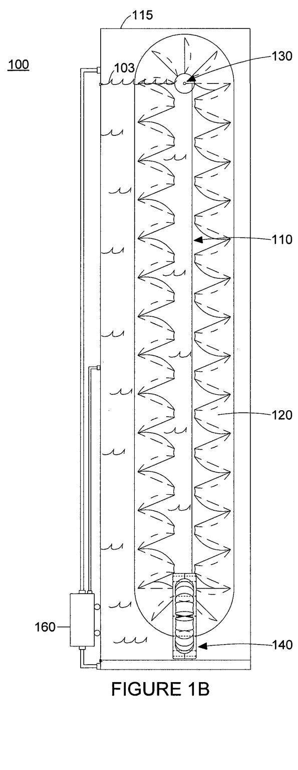


FIGURE 1B

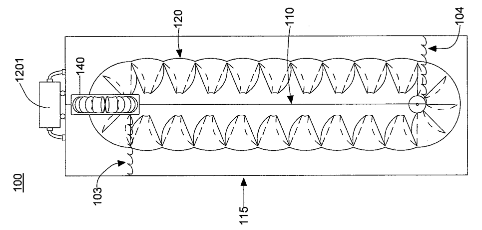


FIGURE 1D

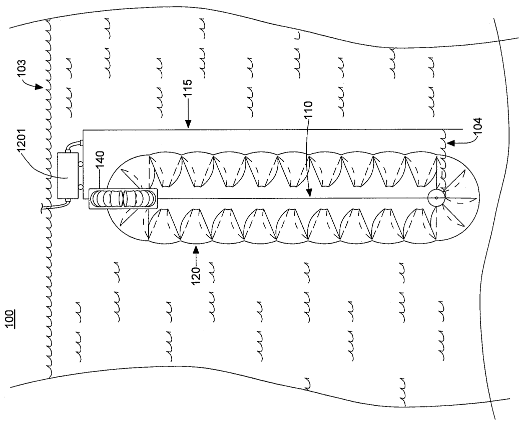


FIGURE 1C

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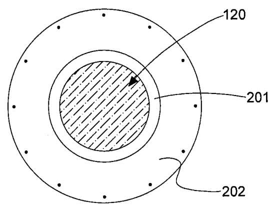

FIGURE 2

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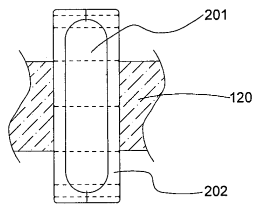

FIGURE 3

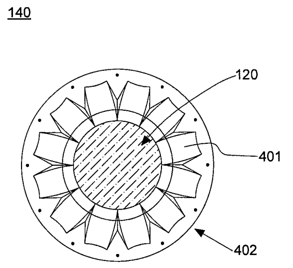

FIGURE 4

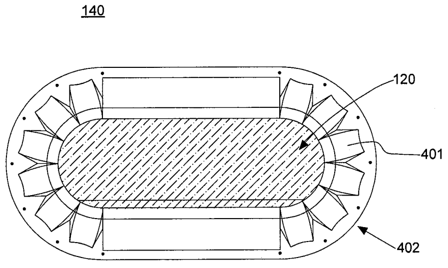

FIGURE 5

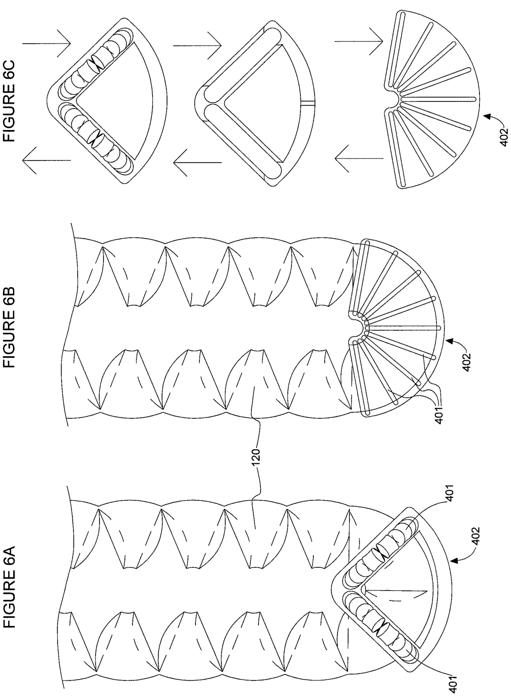

FIGURE 6C

FIGURE 6B

FIGURE 6A

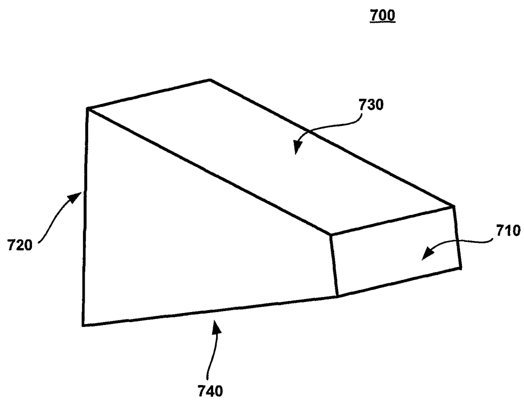

FIGURE 7

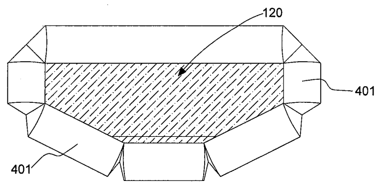

FIGURE 8A

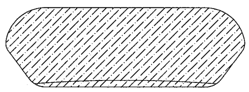

FIGURE 8B

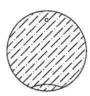

FIGURE 8C

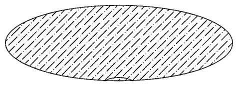

FIGURE 8D

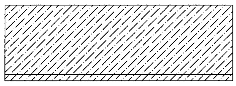

FIGURE 8E

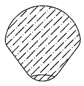

FIGURE 8F

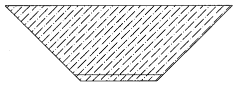

FIGURE 8G

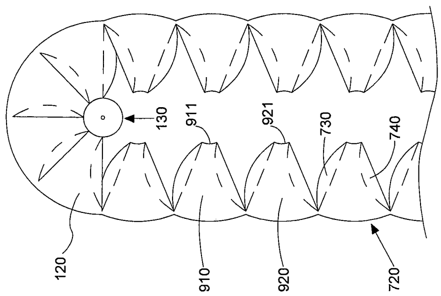

FIGURE 9B

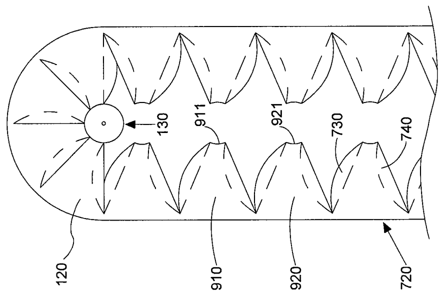

FIGURE 9A

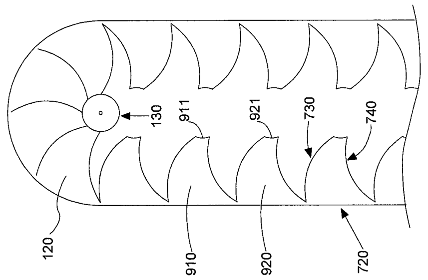

FIGURE 9D

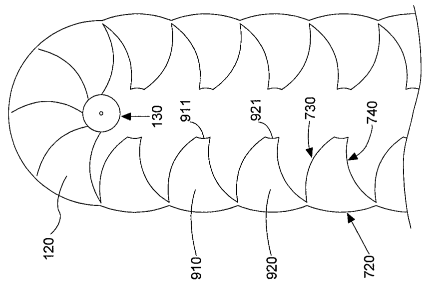

FIGURE 9C

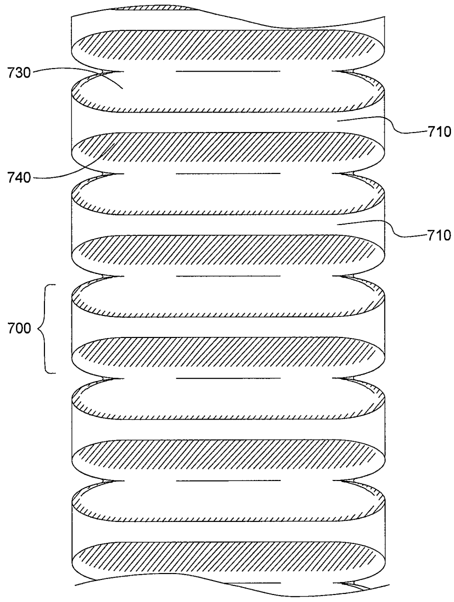

FIGURE 10A

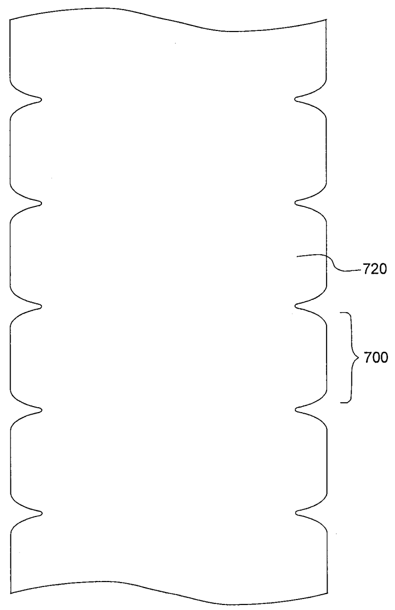

FIGURE 10B

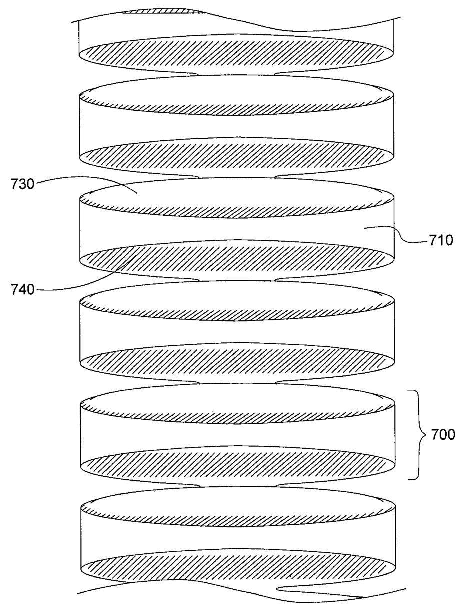

FIGURE 11A

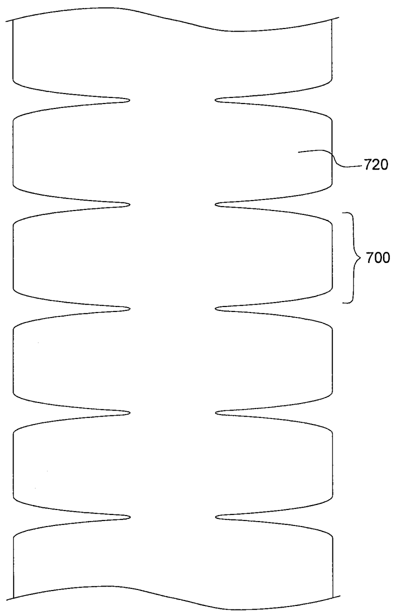

FIGURE 11B

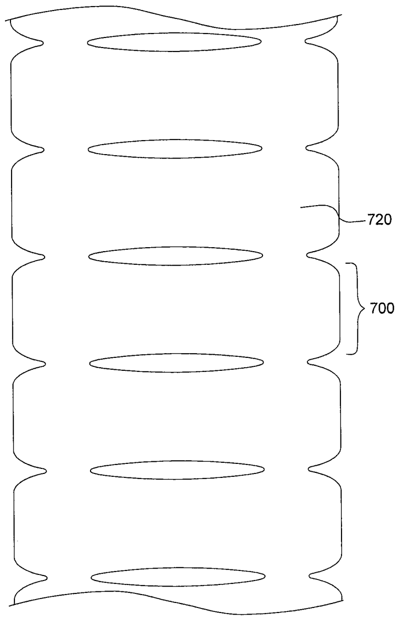

FIGURE 11C

Description
(US8397496)
FIELD OF INVENTION
The present invention relates to a mechanical buoyancy engine.
More particularly, the invention relates to the structure and operation of a segmented chain in a buoyancy engine.
BACKGROUND OF THE INVENTION
A buoyancy engine is a highly efficient means of generating energy using the natural buoyancy effect of various materials in a soluble solution to create a rotary motion.
A buoyancy engine is a well known idea and various attempts to create an efficient buoyancy engine have been attempted.
However, disadvantages exist with the typical buoyancy engine.
For example, components attempting to enter towards the bottom of a liquid environment are subject to an outward pressure.
Generally, extra components or devices are added to create a counter force or lessen the liquid's outward pressure.
However, extra components and/or devices add cost to the system and require maintenance or replacement.
Thus, a need exists for a simple buoyancy engine capable of efficiently generating energy with a minimal assembly of components.
SUMMARY OF THE INVENTION
In accordance with various aspects of the present invention, a method and system for a buoyancy engine is presented.
In an exemplary embodiment, the buoyancy engine includes a divider to separate a liquid environment from a gas environment, and a reservoir aperture in the divider.
A wheel at the top of divider provides tension to, and helps rotate, a segmented chain.
In the exemplary embodiment, the segmented chain is configured to form a substantially solid structure when transitioning between the liquid and gas environments, but separate during vertical travel.
As the segmented chain travels between the liquid and gas environments, a rotary motion is created which can be captured as electrical or mechanical energy.
BRIEF DESCRIPTION OF THE DRAWING FIGURES

A more complete understanding of the present invention may be derived by referring to the detailed description and claims when considered in connection with the drawing figures, wherein like reference numbers refer to similar elements throughout the drawing figures, and:

FIGS. 1A-1D illustrate exemplary buoyancy engines;

FIG. 2 illustrates an exemplary solid inlet gasket of a reservoir aperture;

FIG. 3 illustrates a side-view of an exemplary solid inlet gasket of a reservoir aperture;

FIG. 4 illustrates an exemplary segmented inlet gasket of a reservoir aperture;

FIG. 5 illustrates another exemplary segmented inlet gasket of a reservoir aperture;

FIGS. 6A-6C illustrate exemplary embodiments of multiple gaskets;

FIG. 7 illustrates a perspective view of an exemplary segment of a segmented chain;

FIGS. 8A-8G illustrate various embodiments of a reservoir aperture;

FIGS. 9A-9D illustrate side-views of various exemplary segmented chains;

FIGS. 10A-10B illustrate multiple views of an exemplary segmented chain; and

FIGS. 11A-11C illustrate exemplary embodiments of attached segments.
DETAILED DESCRIPTION
While exemplary embodiments are described herein in sufficient detail to enable those skilled in the art to practice the invention, it should be understood that other embodiments may be realized and that logical, electrical, and mechanical changes may be made without departing from the spirit and scope of the invention.
Thus, the following detailed description is presented for purposes of illustration only.
In accordance with an exemplary embodiment and with reference to FIGS. 1A-1D, a buoyancy engine 100 comprises a divider 110 separating a liquid environment from a gas environment, a segmented chain 120, a wheel 130 connected towards the top of divider 110, and a reservoir aperture 140 located towards the bottom of divider 110.
In another exemplary embodiment, buoyancy engine 100 may further comprise an output apparatus 150.
In an exemplary embodiment, divider 110 separates the liquid and gas environments and may comprise metal, concrete, plastic, other suitable material now known or hereinafter devised, or any combination of such materials.
In accordance with an exemplary embodiment, divider 110 is part of a reservoir 115 that holds a liquid, which is typically water but could be another suitable liquid.
In other words, divider 110 may be described as a wall of a holding tank.
In further exemplary embodiments, buoyancy engine 100 may be fully enclosed or may be open.

Also, buoyancy engine 100 may be thought of as comprising reservoir 115 with divider 110 separating a liquid environment 101 from a gas environment 102.
Or the reservoir may be thought of as containing liquid environment 101 and divider 110 is part of an outer wall of reservoir 115.
In the exemplary embodiment, reservoir 115 contains water.
However, suitable liquids other than standard water may be used.
In exemplary embodiments, suitable liquids include adding agents to change the liquid properties, such as adding saline, silicone, or equivalents to increase buoyancy and/or decrease the temperature of the liquid.
Also, alcohol or equivalents could be added to lower the freezing point of the liquid.
In one embodiment, a refrigeration or cooler system is attached to reservoir 115 to lower the liquid's temperature.
By the same token, a heating system can be used to raise the liquid's temperature to avoid freezing of the liquid.
In an exemplary embodiment, reservoir 115 is generally shaped as a cuboid or cylinder, though other shapes are also contemplated.
Reservoir 115 can be either open or closed.
Some benefits to closing reservoir 115 include eliminating or decreasing evaporation, noise damping, safety, and ultra-violet light protection.
Furthermore, reservoir 115 may be connected to a liquid source that is configured to maintain or adjust the upper liquid level 103.
The upper liquid level 103 may change due to evaporation or leakage, such as into gas environment 102.
In an exemplary embodiment, the volume of the liquid is at least equal to the displacement volume of the segmented chain.
This level of displacement provides a minimal buoyant force.
Furthermore, in an exemplary embodiment and as shown in FIG. 1A, liquid level 103 of liquid environment 101 is about at the bottom edge of wheel 130.
In another exemplary embodiment, liquid level 103 is up to the level of liquid environment 101 where segmented chain 120 begins to compress.
Moreover, upper liquid level 103 of reservoir 115 may be at any level suitable to provide enough upward force due to buoyancy to generate rotary motion.
In an exemplary embodiment and with reference to FIGS. 1C and 1D, a pressure difference is maintained between the liquid and gas environments of buoyancy engine 100.
In one embodiment, reservoir aperture 140 is located at the top of buoyancy engine 100 and a pump 1201 maintains the pressure difference by pressuring gas environment 102 and forcing any liquid substantially out of gas environment 102.
For example, pressure may be used to create a lower liquid level 104 and a corresponding upper liquid level 103.
Maintaining a pressure difference requires that reservoir aperture 140 be configured to keep the pressure differences.
In an exemplary embodiment, a control system manages the pressure difference and may include a series of valves and conductivity sensors, floats, or other pressure and level instruments.
The buoyancy engine may be comprised of alternative configurations compared to those already described.
The environment of the buoyancy engine may be any variation that maintains a segmented chain producing rotary movement through a liquid environment and a gas environment.
Various manners of the overall buoyancy engine have also been contemplated.
For example and with reference to FIG. 1C, in a different embodiment, the gas environment is pressurized and placed in a body of liquid, such as an open-water location.
The level of liquid is controlled by adjusting the level of the pressurized gas environment within the body of liquid.
FIGS. 2-5 illustrate various embodiments of the reservoir aperture.
In an exemplary embodiment, reservoir aperture 140 comprises a material with a low coefficient of friction, such as at least one of UHMW (ultra-high molecular weight) polyethylene, PTFE (polytetrafluoroethene or polytetrafluoroethylene, also known as Teflon (Registered trademark)), or other suitable material.
Furthermore, reservoir aperture 140 may have a lubricant to decrease friction and add abrasion resistance.
Decreasing the friction of reservoir aperture 140 enables more efficient motion of segmented chain 120, and thus more production of energy.
In accordance with an exemplary embodiment, a seal is created where reservoir aperture 140 is in contact with segmented chain 120.
For example and with reference to FIGS. 2 and 3, a solid gasket 201 or other similar component may be present in reservoir aperture 140.
In an exemplary embodiment, gasket 201 is inside a reservoir aperture housing 202 and has a low coefficient of friction.
The gasket 201 may rotate within reservoir aperture 140, thereby creating a seal while still allowing a low friction pass-through for segmented chain 120.
In an exemplary embodiment, gasket 201 is an o-ring.
In another exemplary embodiment and with reference to FIGS. 4 and 5, reservoir aperture 140 comprises at least one segmented gasket 401 located inside a reservoir aperture housing 402.
In accordance with an exemplary embodiment, reservoir aperture housing 402 includes multiple pieces assembled together and is a part of divider 110.
In an exemplary embodiment, reservoir aperture housing 402 is in contact with and at least partially encompasses segmented gasket 401.
Furthermore, reservoir aperture housing 402 may be lubricated and be configured to provide a suitable contact surface to facilitate rotation of segmented gasket 401.
A portion of segmented gasket 401 that is exposed and not encompassed by reservoir aperture housing 402, in an exemplary embodiment, is in direct contact with segmented chain 120.
In accordance with an exemplary embodiment, the contact between reservoir aperture housing 402, segmented gasket 401, and

segmented chain generates sufficient pressure to create a seal between the gas and liquid environments, thereby allowing the transition of segmented chain 120.
In an exemplary embodiment, segmented gasket 401 comprises multiple rotating components configured to create a sealed and low-friction pass-through for segmented chain 120.
For example, the multiple rotating components may be at least one of rollers, ball-bearings, or other suitable devices for achieving the desired low-friction motion.
Various configurations of reservoir aperture 140 have been contemplated, including different shapes and multiple rows of segmented gasket 401, and the described embodiments are not meant to be limiting.
Furthermore, in exemplary embodiments and with reference to FIGS. 6A-6C, multiple gaskets are present in reservoir aperture 140.
Multiple gaskets can provide extra sealing, which is beneficial for a liquid environment with high pressure.
In an exemplary embodiment, a minimal number of gaskets are used in reservoir aperture 140 in order to minimize friction while maintaining a substantial seal.
In an exemplary embodiment, wheel 130 is connected to divider 110 of the buoyancy engine 100.
The wheel may also be attached to another part of buoyancy engine 100, such as a frame or reservoir wall.
In an exemplary embodiment, wheel 130 provides tension to segmented chain 120 and facilitates a substantial frictional grip.
For example, wheel 130 may provide tension by implementing springs, hydraulics, or similar devices configured to provide adjustable, continuous tension to segmented chain 120.
In addition to a wheel, in an exemplary embodiment, segmented chain may traverse at least one gasket within a housing, similar to reservoir aperture 140.
In yet another embodiment, a surface with a low-coefficient of friction is present between the liquid and gas environments.
Output apparatus 150 may be connected to, or near, any of the moving parts of buoyancy engine 120.
In an exemplary embodiment, output apparatus 150 is connected to at least one of wheel 130 or reservoir aperture 140.
In accordance with an exemplary embodiment, output apparatus 150 may generate mechanical energy by implementing a shaft, such as a crankshaft.
Use of a crankshaft is well known in the art and will not be discussed in detail herein.
In another exemplary embodiment, output apparatus 150 may generate electrical energy by implementing magnets, stators, or other suitable means as now know or hereinafter devised.
As mentioned above, in an exemplary embodiment, segmented chain 120 is attached around wheel 130 and through reservoir aperture 140, which provides tension.
Segmented chain 120 is able to transition between the gas environment and the liquid environment with substantially little friction while maintaining a division between the two environments.
In an exemplary embodiment, segmented chain 120 is buoyant in the liquid environment, resulting in an upward force.
In contrast, segmented chain 120 is subject to a gravitational downward force when segmented chain 120 is in the gas environment.
The resulting upward and downward forces combine to generate a rotary motion of segmented chain 120.
In an exemplary embodiment, segmented chain 120 moves along a set path such that a portion of the set path consists of vertical travel through the liquid environment on one side of divider 110 and continues down the other side of divider 110.
For purposes of illustration and with reference to FIG. 7, a segment 700 of segmented chain 120 is described as comprising an inner surface 710, an outer surface 720, a leading surface 730, and a trailing surface 740.
In an exemplary embodiment, segment 700 may comprise various shapes, as illustrated by various leading surface viewpoints in FIGS. 8A-8G. For example, leading surface 730 and trailing surface 740 may be in the shape of at least one of a circle (8C), oval, ellipse, rounded rectangle (8D), rectangle (8E), or trapezoid (8G).
From the side viewpoint, segment 700 may be a trapezoid, triangle, or other shape such that outer surface 720 of the segment is larger than inner surface 710.
Furthermore, the edge formed by outer surface 720 and either leading surface 730 or trailing surface 740 connects to a corresponding edge of the next segment in segmented chain 120.
The connection of segments and alignment of outer surfaces 720 forms an outer circumference of segmented chain 120.
Furthermore, in an exemplary embodiment, the area of leading surface 730 is substantially equivalent to area of reservoir aperture 140.
Therefore, in the exemplary embodiment, a seal is formed between segmented chain 120 and reservoir aperture 140 without undue friction.
With reference to FIGS. 9A-9D, in an exemplary embodiment, segmented chain 120 comprises a plurality of segments that are configured to separate during vertical travel and compress during passage when transitioning between the liquid environment and the gas environment.
In word others, when the segmented chain 120 travels either around wheel 130 or through reservoir aperture 140, the inner surfaces of the segments connect and form a substantially solid structure.
In accordance with an exemplary embodiment, the leading surface of a segment comprises a convex shape and the trailing surface comprises a concave shape configured to increase the sealing ability of the segmented chain 120.
As illustrated in FIG. 9A, a segment may have a bowed leading surface 730 and a corresponding bowed matching relief on a trailing surface 740, where bowed leading surface 730 and relief trailing surface 740 are designed such that two segments of segmented chain 120 fit together to form a seal when transitioning between the reservoir and the liquid chamber.
As illustrated in FIGS. 9A and 9B, the convex and concave shapes may comprise a cupped surface.
FIGS. 9C and 9B illustrate exemplary embodiments of a curved leading surface 730 and a curved trailing surface 740 that are not cupped, but instead have curved outer edges.
The convex and concave shapes are designed to increase the hydrodynamic performance of segmented chain 120.

In one embodiment, the curved surfaces increase the ability to seal of the segments and facilitate alignment of the segments when compressing.
In another embodiment, the curved surfaces are configured to increase the hydrodynamic performance of segmented chain 120.
This is accomplished by increasing, in comparison to a flat trapezoidal segment, the surface area of the segment that is substantially perpendicular to the direction of vertical travel.
In addition and with reference to FIG. 9A, the turning radius of the segmented chain 120 is determined by the distance between the inner surface 911 of a first segment 910 and the inner surface 921 of a connected second segment 920.
The farther apart the inner surfaces of two linked segments, the tighter the turning radius of segmented chain 120.
Furthermore, segmented chain 120 may be made from various materials, including at least one of wood, fiberglass, metal, carbon fiber, foam, plastic (specifically polypropylene or polyethylene), rubber (natural or synthetic) or other suitable materials as would be known to one skilled in the art.
Also, the segments may comprise some material with a cover that provides additional rigidity.
In another embodiment, the segments comprise a rigid or solid core and a softer outer surface.
For example, the outer surface may be foam or laminate material.
The segment may comprise any combination of materials so long as the segment is lighter in a liquid than in a gas environment.
Furthermore, in an exemplary embodiment, segmented chain 120 comprises flexible foam composite with a continuous metal chain through the middle of the foam composite.
In another embodiment, the metal chain is replaced with at least one of a cable, a roller chain, a spring metal band, cross-linked fibers, or a plastic infrastructure.
In yet another exemplary embodiment and with reference to FIGS. 10A and 10B, segmented chain 120 does not comprise a continuous chain, but instead comprises individual segments that are connected at the outer surface.
In an exemplary embodiment and with reference to FIGS. 11A-11C, the segments may be connected at a single point or at multiple points along the outer surface edge of segmented chain 120.
The segments may be hinged, sewn, glued, fused, or other suitable means of attachment as now known or hereinafter devised.
In yet another exemplary embodiment, segmented chain 120 is comprised of one solid or continuous piece of material, such as molded foam for example.
Since some liquid will end up in the gas environment in actual operation, various means may be implemented to maintain as much separation as possible.
In an exemplary embodiment, excess liquid is collected from segmented chain 120 when exiting the liquid environment.
For example, at least one of brushes, an additional sealed inlet, a rubber/neoprene wiper, a hydrophobic skin on a structure such as the segmented chain or reservoir aperture, or other suitable devices may be included in buoyancy engine 100.
Furthermore, in an exemplary embodiment, liquid that is present in the gas environment is collected and transferred back to the liquid environment.
For example and with reference to FIG. 1B, a pump 160 could transfer the liquid that collects in a drain in buoyancy engine 100.
The conservation of liquid helps to enable a stand-alone buoyancy engine 100 that requires little to no maintenance.
In an exemplary embodiment, the buoyancy engine is not limited in size and the energy produced by buoyancy engine 100 is directly related to the volume of segmented chain 120.
In other words, an increase in the liquid displaced by segmented chain 120 results in more power generated.
In an exemplary embodiment, the buoyant forces are equal or substantially equal to the gravitational forces.
In an exemplary embodiment, this enables the center of gravity of buoyancy engine 120 to be located in the center, and thus less wear on the engine during operation.
In another exemplary embodiment, the angular momentum generated via rotary motion is centered and reaches an equilibrium, which facilitates less wear on buoyancy engine 120.
Furthermore, in another exemplary embodiment the overall energy production is increased by operating multiple segmented chains in same liquid environment.
Benefits, other advantages, and solutions to problems have been described above with regard to specific embodiments.
However, the benefits, advantages, solutions to problems, and any element(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as critical, required, or essential features or elements of any or all the claims.
As used herein, the terms "includes," "including," "comprises," "comprising," or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus.
Further, no element described herein is required for the practice of the invention unless expressly described as "essential" or "critical."

Gravity power plant
US6546726

- **Patent Assignee**
  GENERAL ULTRASONICS
- **Inventor**
  TOMOIU CONSTANTIN
- **International Patent Classification**
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- **US Patent Classification**
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  2002US-10108787 2002-03-28
- **Fampat family**

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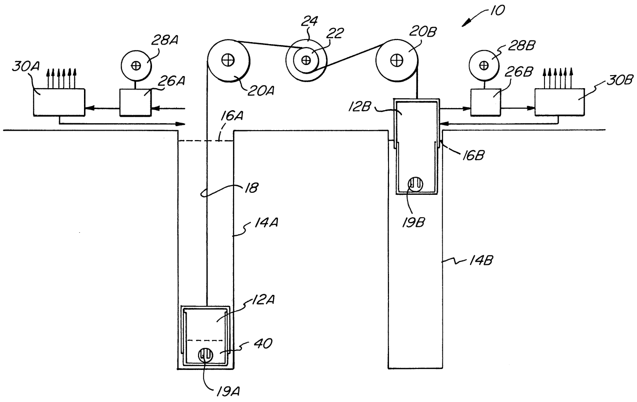
- **Abstract:**
  (US6546726)
  A power plant for producing electricity utilizing the buoyancy of a liquid. A first and second expandable chamber are each place in a liquid filled shaft are coupled together with a cable so that when one of the expandable chambers is raised, the other one is lowered. The cable is couple to a pulley for turning a generator for producing electricity. An electrode and electrolyte are placed within each expandable chamber for generating heat and steam to expand the expandable chamber when the expandable chamber is at the bottom of the liquid filed shaft. The increased volume of the expandable chamber causes it to rise in the liquid filled shaft at the same time as the other expandable chamber is reduced in volume and caused to be lowered into the other liquid filed shaft. A valve in the expandable chamber releases the steam causing the volume of the expandable chamber to be reduced. The released steam may be used to power a turbine or enter a heat exchanger.



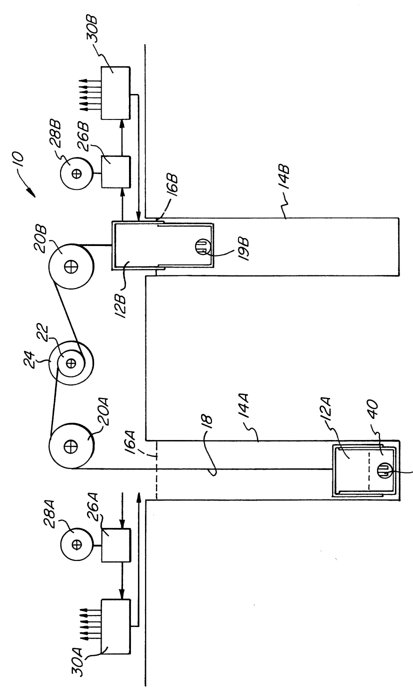

10
30B
28B
26B
16B
14B
20B
19B
12B
22
24
20A
18
14A
12A
40
16A
19A
28A
26A
30A

FIG. 1

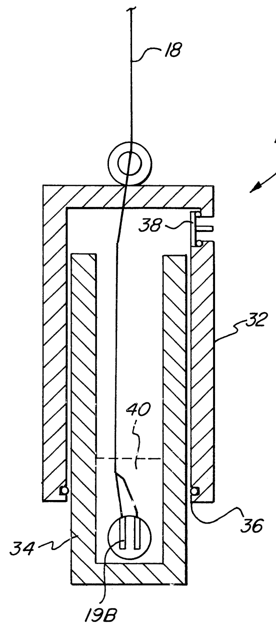

18
12B
38
32
40
36
34
19B

FIG. 2

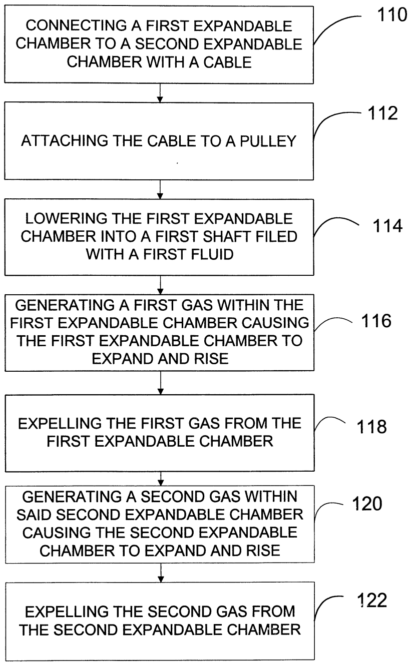

CONNECTING A FIRST EXPANDABLE CHAMBER TO A SECOND EXPANDABLE CHAMBER WITH A CABLE
110
ATTACHING THE CABLE TO A PULLEY
112
LOWERING THE FIRST EXPANDABLE CHAMBER INTO A FIRST SHAFT FILED WITH A FIRST FLUID
114
GENERATING A FIRST GAS WITHIN THE FIRST EXPANDABLE CHAMBER CAUSING THE FIRST EXPANDABLE CHAMBER TO EXPAND AND RISE
116
EXPELLING THE FIRST GAS FROM THE FIRST EXPANDABLE CHAMBER
118
GENERATING A SECOND GAS WITHIN SAID SECOND EXPANDABLE CHAMBER CAUSING THE SECOND EXPANDABLE CHAMBER TO EXPAND AND RISE
120
EXPELLING THE SECOND GAS FROM THE SECOND EXPANDABLE CHAMBER
122

FIG. 3

Description

(US6546726)

RELATED APPLICATION

This application claims the benefit of U.S. Provisional Patent Application No. 60/280,910 filed on Apr. 2, 2001.

FIELD OF THE INVENTION

The present invention relates generally to the generation of electrical power, and more particularly to a gravity assisted power plant utilizing the displacement of a fluid.

BACKGROUND OF THE INVENTION

There are many types of power plants used as a means for converting stored energy into work.

Typically, power plants must be located near sources of stored energy such as coal fields or river dams or are located near the places where work is to be performed.

Power plants generally convert the stored energy of fossil fuels, such as oil, into kinetic energy.

This kinetic energy is often a spinning shaft.

The fossil fuels are generally burned to produce steam used to drive a turbine.

The turbine is often connected to a generator for the generation of electrical energy, which is easily distributed.

Nuclear energy is also used to generate steam to drive turbines and produce electricity.

Hydroelectric power plants are also common and use elevated water supplies or the energy of moving water in a river for producing electricity.

In the effort to produce more electricity and power from the diminishing supply of fossil fuels, alternative sources of energy have been investigated, such as wind, tides, waves, geothermal sources, ocean thermal, nuclear fusion, and solar radiation.

However, most of these alternative sources of power have been of negligible commercial significance.

Therefore, there is a need for a power plant that is relatively simple and easily constructed that can use renewable resources to generate electrical power.

SUMMARY OF THE INVENTION

The present invention uses gravity and Archimedes's principle to generate power efficiently.

A first and second expandable chamber are connected by a cable and attached to a pulley.

The first and second expandable chambers are adapted to move up and down in a first and second shaft, respectively.

Each shaft is filled with a buoyant fluid, such as salt water.

Inside the first and second expandable chambers is an electrolyte and electrode.

Electrical energy supplied to the electrode causes the electrolyte to generate steam, expanding the expandable chamber.

The expandable chamber is then caused to rise within the fluid filled shaft with the other expandable chamber being lowered into the other fluid filed shaft.

Prior to being lowered, the expandable chamber releases or expels the previously generated steam or gas, causing the expandable chamber to decrease in volume.

By repeating the process of alternately raising and lowering the expandable chambers, the pulley connected to the cable rotates, producing work capable of generating electricity.

Accordingly, it is an object of the present invention to provide a power plant that uses gravity to assist in producing electricity.

It is an advantage of the present invention that it is relatively efficient.

It is another advantage of the present invention that it has a quite operation and produces no combustion gases.

It is a feature of the present invention that an expandable chamber placed in a shaft filled with fluid is used.

It is another feature of the present invention that an electrolyte and electrode are used within the expandable chamber to expand the expandable chamber.

These and other objects, advantages, and features will become more readily apparent in view of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 schematically illustrates a power plant according to the present invention.

FIG. 2 schematically illustrates in more detail the expansion chambers illustrated in FIG. 1.

FIG. 3 is a block diagram illustrating the method steps of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 schematically illustrates a power plant utilizing gravity and Archimedes' principle to efficiently generate electricity.

The gravity power plant 10 has a plurality of wells or shafts 14A and 14B.

An expansion chamber 12A and 12B is placed in each of the respective shafts or wells 14A and 14B.

A cable 18 connects the two expansion chambers 12A and 12B.

Within each of the two expansion chambers 12A and 12B is a fluid, preferably white vinegar.

Within each shaft is a fluid, such as saltwater.

The fluid or water is filled to a fluid level 16A and 16B.

Within each of the expansion chambers 12A and 12B is a heat generator or electrodes 19A and 19B, respectively.

The cable 18 goes around pulleys 20A and 20B and around a central pulley 22.

The central pulley 22 is connected to an electric generator 24.

Associated with each respective expansion chamber 12A and 12B is a steam turbine 26A and 26B.

The steam turbine 26A and 26B are each associated with an electric generator 28A and 28B.

The steam turbine 26A and 26B are also associated, respectively, with a heat exchanger 30A and 30B.

FIG. 2 illustrates in more detail a cross-section of the expansion chamber 12B, illustrate in FIG. 1.

Expansion chamber 12B comprises a top cylinder 32 and a bottom cylinder 34.

The top cylinder 32 is telescopically connected to the bottom cylinder 34.
A seal 36 seals the top cylinder 32 and the bottom cylinder 34 of the expansion chamber.
Accordingly, the volume within the expansion chamber 12B can increase and decrease by the sliding of the top cylinder 32 and the bottom cylinder 34.
Within the expansion chamber 12B is a fluid 40.
The fluid 40 is preferably white vinegar.
A heating device or electrodes 19B is placed within the liquid 40.
Cable 18 is coupled to the electrode 19B and carries electricity so as to generate heat.
A valve 38 is placed new the upper edge of the top cylinder 32.
The top cylinder 32 and the bottom cylinder 34 of the expansion chamber 12B may be made of a thermally insulated material to prevent heat energy from being lost and to improve efficiency.
Expansion chamber 12A, illustrated in FIG. 1, is similar or identical in construction to expansion chamber 12B.
Operation of the present invention can readily be appreciated with reference to FIGS. 1 and 2.
The expansion chamber 12A is initially placed at the bottom of the well 14A.
Electric current is supplied through cable 18.
A storage device attached to the electric generator 24 could provide this current.
Upon applying an electric current to the electrode 19A, the fluid 40 within the expansion chamber 12A is caused to heat up or boil, generating a gas and a pressure within the expansion chamber 12A.
Accordingly, the expansion chamber 12A is caused to increase in volume resulting in buoyancy due to Archimedes' principle.
According to Archimedes' principle, a body immersed in static fluid is acted upon by a vertical force equal to the weight of fluid displaced, and a body floating in the fluid displaces its own weight of fluids.
As a result, the expansion chamber ascends because it displaces a volume of liquid which weighs more than the weight of the expansion chamber.
Accordingly, this force, which is called the buoyant force, acts vertically upward through the centroid of the displaced volume of fluid.
As the expansion chamber 12A rises, the other attached expansion chamber 12B is lowered into the well 14B.
As a result, pulleys 20A, 22, and 20B are caused to rotate.
The rotation of central pulley 22 causes electric generator 24 to rotate generating electricity.
After the expansion chamber 12A floats to the surface, a valve releases the steam into steam turbine 26A, causing the electric generator 28A to rotate generating additional electricity.
The residual steam may be directed to a heat exchanger 30A, which can be used to provide a lower level of heat such as for heating a building, and also condenses the steam to a liquid.
The liquid is then returned to the expansion chamber 12A.
The expansion chamber 12A is then caused to sink starting the cycle again.
FIG. 3 is a block diagram illustrating the process or method steps utilized in the present invention.
Block 110 represents the step or act of connecting a first expandable chamber to a second expandable chamber with a cable.
Block 112 represents the step or act of attaching the cable to a pulley or other equivalent device for moving generator.
This pulley may be attached to a shaft, which turns a generator for producing electricity.
Block 114 represents the act or step of lowering the first expandable chamber into a first shaft filled with a first fluid.
The fluid may be saltwater or any buoyant liquid.
Block 116 represents the act or step of generating a first gas within the first expandable chamber, causing the first expandable chamber to expand and rise in the first liquid and the second expandable chamber to be lowered into a second shaft filled with a second fluid.
The second fluid is preferably the same as the first fluid.
The first gas may be generated by any means, but is preferably generated with the use of an electrode placed within an electrolyte.
The electrolyte is preferably white vinegar.
Block 118 represents the step or act of expelling the first gas from the first expandable chamber.
Upon expelling the first gas from the first expandable chamber, the expandable camber collapses and the volume of the expandable chamber is reduced.
The expelled gas may be recovered and used to drive a steam turbine to produce additional electricity or to be provided to a heat exchanger in which the heat from the expelled gas may be extracted to heat a building or for other equivalent uses.
Block 120 represents the act or step of generating a second gas within the second expandable chamber, causing the second expandable chamber to expand and rise in the second fluid and the first expandable chamber to be lowered into the first shaft.
Block 122 represents the act or step of expelling the second gas from the second expandable chamber causing the second expandable chamber to collapse and the volume reduce.
This cycle may be repeated continuously.
It should be appreciated that by practicing the method steps or acts of the present invention, the first and second expandable chambers are alternately raised and lowered within the first and second fluid column in the shafts.
The change in volume created by the steam or gas, preferably generated by the electrode placed within the expandable chambers, when at the bottom of the fluid column causes the expandable chamber to increase in volume and rise within the fluid column.
When at the top of the fluid column, the gas is expelled from the expandable chamber, causing the expandable chamber to collapse and reduce in volume, permitting it to be lowered again within the fluid column.
This process is repeated, producing work.
The expended gas or electrolyte may be replaced in liquid form when the expandable chamber is at the top of the fluid column.

As a result, the process may be continuously repeated so as to produce work and generate electricity.
Accordingly, the present invention, in utilizing Archimedes' principle, provides an efficient power generator for producing electricity.
The present invention can provide efficient and economical electricity for a variety of uses.
Additionally, the residual heat can be used to heat a building or for other uses.
The present invention therefore is a practical and useful for efficiently generating electricity or providing energy for other purposes.
The present invention can be made to as small a scale or as large a scale as desired, depending upon the power requirements.
While the present invention has been described with respect to several embodiments, it should be appreciated by those skilled in the art that various modifications may be made without departing from the spirit and scope of this invention.

Portable power generating devices
US6935832

- **Patent Assignee**
  NATURAL FORCES NATURAL FORCES EDELSTEIN
- **Inventor**
  PLATT MICHAEL D
  PLATT ERIC E
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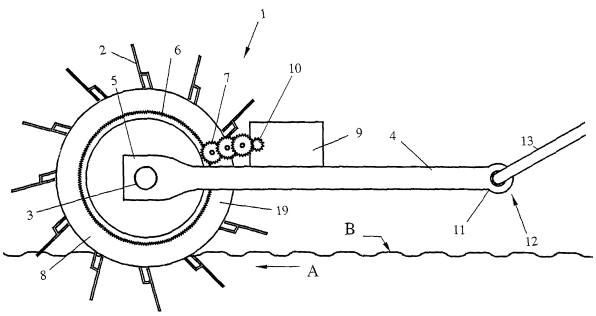
- **Abstract:**
  (US7465147)
  Portable power generating devices are provided for converting potential energy from flowing water, water current, blowing air or air current to mechanical and/or electrical energy. The potential energy is converted to a rotational movement, and the rotational energy is communicated to power conversion units for conversion, wherein the rotational movement is converted to mechanical, electrical or some other useable or useful energy.



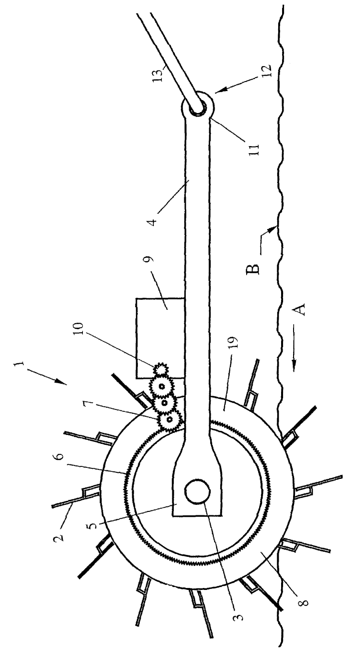


Fig. 1

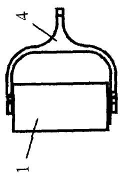


Fig. 1C

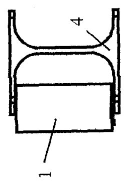


Fig. 1B

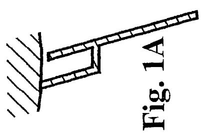


Fig. 1A

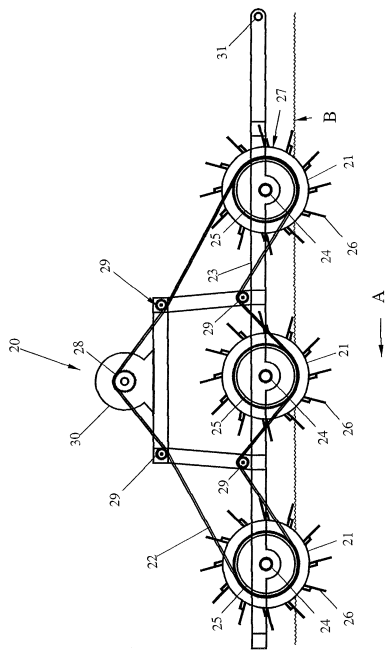


Fig. 2

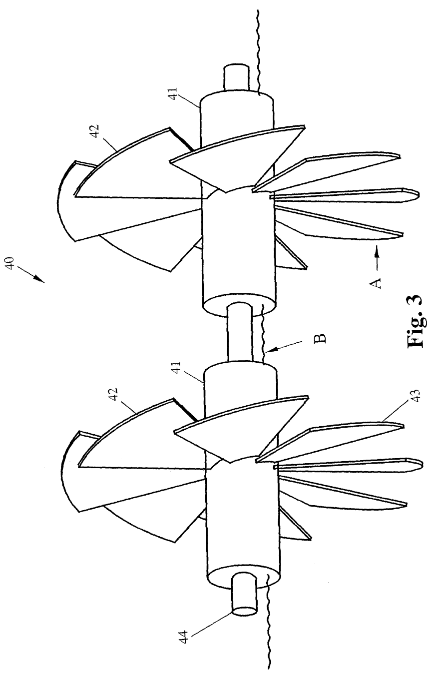


Fig. 3

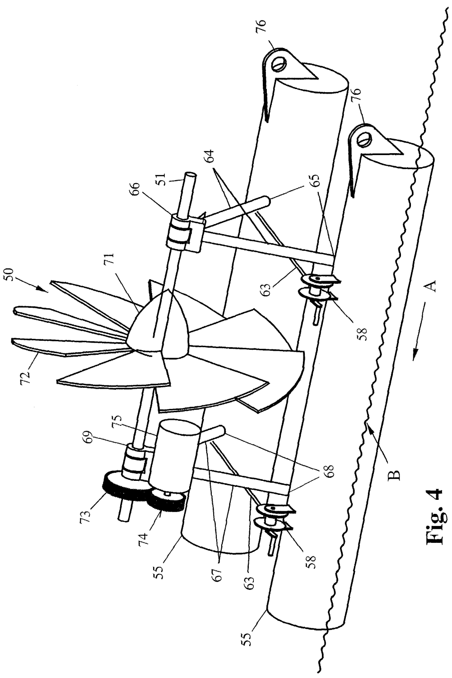

76
76
64
65
66
51
50
71
63
58
A
72
75
69
68
B
73
74
55
67
63
58
55

Fig. 4

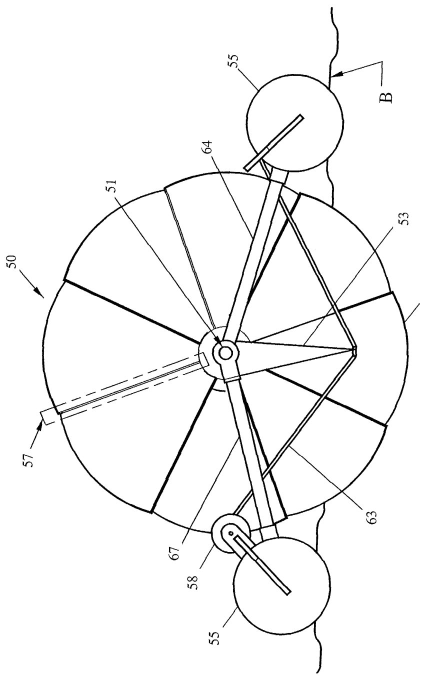

55
B
64
51
53
50
72
57
63
67
58
55

Fig. 5

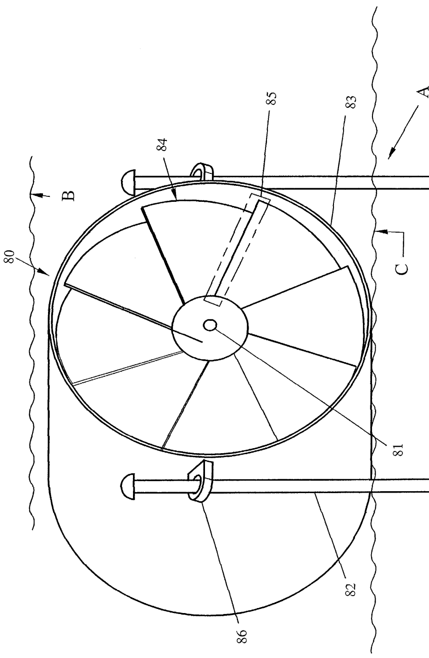


Fig. 6

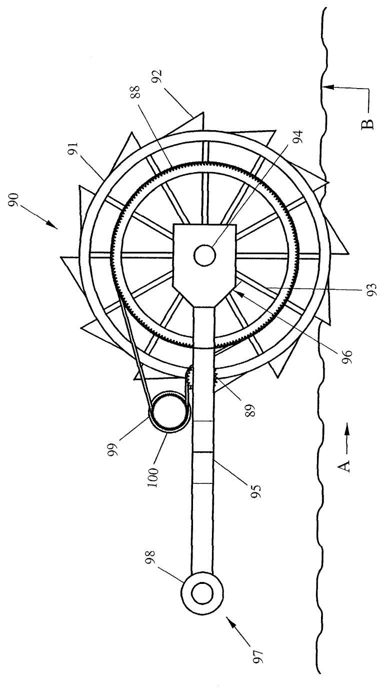


Fig. 7

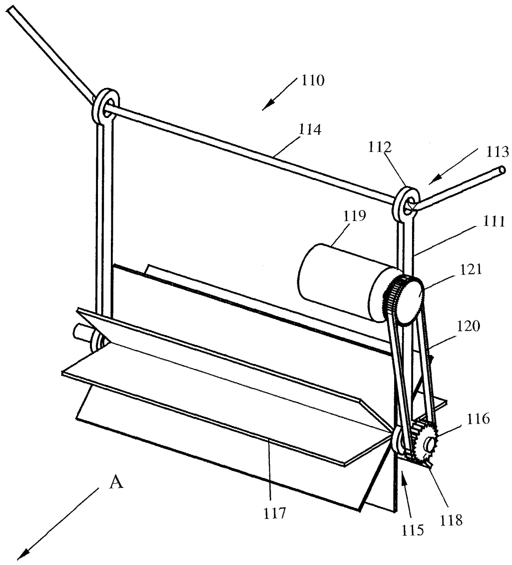

110
114
112
113
119
111
121
120
116
A
117
115
118

Fig. 8

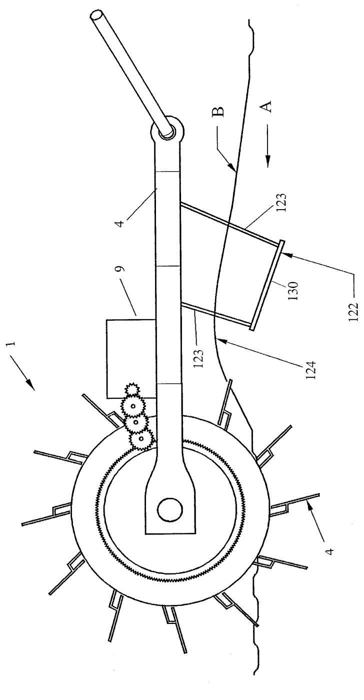

B
A
4
123
9
130
122
1
123
124
4

Fig. 9

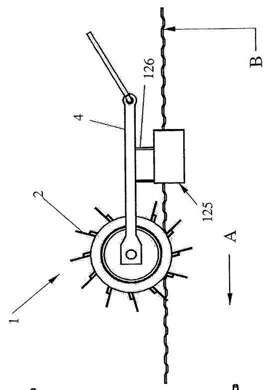


Fig. 10b

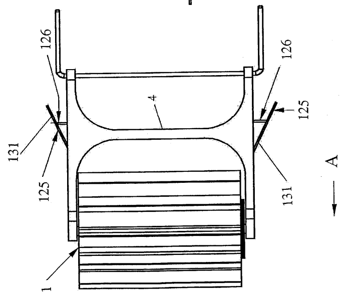


Fig. 10a

Description
(US7465147)
CROSS REFERENCE TO RELATED APPLICATIONS
This application is a continuation of U.S. Ser. No. 10/442,477, filed May 21, 2003, and claims priority of prior Provisional Application No. 60/382,247 filed in the United States of America on May 21, 2002.
TECHNICAL FIELD OF THE INVENTION
The invention relates to portable power generating devices and more particularly to portable devices for converting potential energy from flowing water, water current, blowing air or air current to mechanical and/or electrical energy.
DESCRIPTION OF THE RELATED ART
Hydropower energy is the mechanical and/or electrical energy converted from potential energy in moving water or water current.
Hydroelectric power is the electrical power converted from the potential energy in, among other things, moving water or water current.
It is important to note that a mechanical function is usually required to convert potential energy in moving water or water current to hydroelectric power.
A shortcoming of many existing hydropower or hydroelectric (hereinafter individually and collectively referred to as "hydropower") systems are the costs associated with constructing these massive structures.
These structures include, but are not limited to, dams, intakes, scrolls, bends, diffusers, or other permanent structures (hereinafter individually and collectively referred to as "permanent structures").
The purpose of these permanent structures is to manipulate the flow of water and to capture or convert the potential energy from moving water or water currents to useful mechanical and/or electrical energy.
These permanent structures have numerous negative consequences.
Permanent structures are very expensive to construct and maintain and the costs associated with decommissioning these permanent structures are very high.
Large areas of land and waterways are occupied by these large, intrusive, and foreign permanent structures.
Unique natural wildlife is sacrificed to construct these permanent structures.
Moreover, these permanent structures seriously alter the hydrology of impounded waterways creating flood hazards and safety concerns to surrounding areas.
In Oregon, Washington, and Idaho, a multi-million dollar salmon fishery was destroyed resulting in unemployment for thousands of people.
Environmental groups have created fierce opposition to the construction of new permanent structures and have lobbied for the removal of existing permanent structures.
Environmentalists have protested against these permanent structures because of their impact to the environment.
The present invention is directed to overcoming one or more of the problems set forth above.
BRIEF SUMMARY OF THE INVENTION
An aspect of the invention is to provide portable power generating devices for converting potential energy in moving water to useful energy.
In another aspect of this invention there is provided portable power generating devices for converting potential energy in moving water to mechanical energy.
Yet another aspect of this invention there is provided portable power generating devices for converting potential energy in moving water to electrical energy.
Still another aspect of this invention there is provided an inexpensive and simplistic method for converting potential energy in moving water to useful mechanical and/or electrical energy.
Another aspect of this invention there is provided portable power generating devices that have a minor impact on the environment.
Yet another aspect of this invention there is provided portable power generating devices for converting blowing air or air current to useful, mechanical and/or electrical energy.
In another aspect of this invention there is provided an inexpensive and simplistic method for converting potential energy in blowing air or air current to useful mechanical and/or electrical energy.
BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

Reference is now made to the drawings, which illustrate the best known mode of carrying out the invention and wherein the same reference characters indicate the same or similar parts throughout the views.

FIG. 1 is a side view of a single drum portable power-generating device;

FIG. 1A is an enlarged view of a vane for the single drum portable power generating device;

FIG. 1B is a top view of the single drum portable power generating device illustrating a frame arrangement;

FIG. 1C is a top view of the single drum portable power generating device illustrating a second frame arrangement;

FIG. 2 is a side view of a multiple drum portable power generating device;

FIG. 3 is a perspective view of a spiral portable power generating device;

FIG. 4 is a perspective view of a fan turbine portable power generating device;

FIG. 5 is a front view of the fan turbine portable power generating device illustrated in FIG. 4;

FIG. 6 is a perspective view of an anchored fan turbine portable power generating device;

FIG. 7 is a side view of a surface strider portable power generating device;

FIG. 8 is a perspective view of a spindle axle portable power generating device;

FIG. 9 is a side view of a single drum portable power generating device as shown in FIG. 1 having a wave generating device;

FIG. 10a is a top view of a single drum portable power generating device as shown in FIG. 1 having a wave directing device; and

FIG. 10b is a side view of a single drum portable power generating device as shown in FIG. 1 having a water directing device.

FIG. 11 is an embodiment with a wave directing device.

FIG. 12 is a wave generator.

FIG. 13 is an embodiment including a wave generator.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates a single drum portable power generating device, generally designated 1.

The portable power generating device 1 is for use in conjunction with a moving fluid, such as water.

Arrow "B" shows a surface of the moving fluid and arrow "A" shows which direction the fluid is moving in.

The single drum portable power generating device 1 has a single drum 19, which is cylindrical and has buoyancy.

The single drum portable power generating device 1 has vanes 2 operatively mounted around the outer circumference thereon.

The vanes 2 extend outwardly from the outer circumference of the single drum 19 of the single drum portable power generating device 1.

In all embodiments discussed hereinafter, the vanes can be of various configurations and designs such as straight, curved, angled, cupped, ribbed, concave, rigid, flexible, steel, plastic or any other similar structure.

The configuration and design of the vanes 2 are dependent upon many factors, such as, obtaining the maximum possible potential energy from the moving water or current.

In the preferred embodiment for the single drum portable power generating 1, the vanes 2 are angled against current or towards the water flow as illustrated in FIG. 1A. In other embodiments, the angle and length of the vanes 2 are varied.

For example, the angle of the vanes 2 may be transverse to the point of contacts with the single drum 19 of the single drum portable power generating device 1.

The length, positioning and angle of the vanes 2 determine the amount of potential energy from moving water or water current that will be captured and converted to mechanical and/or electrical energy explained hereinafter.

An axle 3 is operatively mounted through the center of the single drum 19 of the single drum portable power generating device 1.

A frame 4 is operatively connected to the axle 3 at an at least one first end 5 of the frame 4.

The axle 3 is rotatably mounted at the at least one first end 5 of the frame 4.

The axle 3 is able to rotate freely at the at least one first end 5.

The frame 4 receives the axle 3 on each side of the single drum 19 in the preferred embodiment as shown in FIG. 1B. The frame 4 receives the axle 3 on each side of the single drum 19 in an alternative embodiment as shown in FIG. 1C. The frame 4 has at least one anchoring yoke 11 at an at least one second end 12 of the frame 4.

The at least one anchoring yoke 11 is used to anchor the single drum portable power generating device 1.

At least one anchoring cable 13 is connected to at least one anchoring yoke 11 and an anchoring device (not shown) to preclude the single drum portable power generating device 1 from being carried away by the current or flowing water.

The at least one anchoring cable 13 is a cable, rope, chain or any similar device.

The at least one gear 6 is operatively mounted juxtaposed to a first side 8 of the single drum 19.

At least one gear 6 rotates as the single drum 19 rotates.

As moving water contacts the vanes 2, the single drum 19, the at least one gear 6 and the axle 3 rotate in the depicted embodiment.

In an alternative embodiment, the axle 3 is bearing mounted and does not rotate with the single drum 19.

At least one transition gear 7 is operatively mounted on the frame 4.

The at least one transition gear 7 interacts with the at least one gear 6.

As the at least one gear 6 rotates, the at least one transition gear 7 rotates.

In an alternative embodiment, a second of at least one gear 6 is located on a second side (not shown) of the single drum 19 or opposite the first side 8.

In an alternative embodiment, a number of at least one transition gears 7 interact with each other and/or the at least one gear 6 as shown in FIG. 1.

Obviously if the at least one gear 6 is placed on the first side 8 and the second side, or both sides of the single drum 19, a second or second set of at least one transition gear 7 would be required for both sides.

At least one power conversion unit 9 is operatively mounted to the frame 4.

The power conversion unit 9 is an electrical generator, hydraulic pump, air pump, or water pump.

The at least one power conversion unit 9 has at least one power conversion unit gear 10.

The at least one power conversion unit 9 is used to convert the rotational movement from the power conversion unit gear 10 to

electrical, mechanical or some other form of useful and useable energy.
The at least one power conversion unit gear 10 is operatively mounted to the at least one power conversion unit 9 and interacts with the at least one transition gear 7.
If the at least one gear 6 is placed on the first side 8 and the second side, or both sides of the single drum 19, the at least one power conversion unit 9 and at least one power conversion unit gear 10 is placed on the second side of the single drum 19 also.
The single drum portable power generating device 1 is anchored to the anchoring device via the at least one anchoring cable 13 and the at least one anchoring yoke 11 so that the single drum portable power generating device 1 is positioned in a current or moving water.
The current or moving water contacts the vanes 2 thereby causing the single drum 19 to rotate.
As the single drum 19 rotates, the at least one gear 6 and the axle 3 rotate in the depicted embodiment.
However, in other embodiments the axle 3 is bearing mounted and does not rotate with the single drum 19.
The at least one gear 6 operatively communicates with the at least one transition gear 7.
The at least one transition gear 7 operatively communicates to or rotates the power conversion unit gear 10.
The at least one power conversion unit gear 10 is rotated by the at least one transition gear 7 and operatively communicates with the at least one power conversion unit 9.
As the at least one power conversion unit gear 10 rotates, the at least one power conversion unit 9 converts the rotational energy to electrical, mechanical or some other form of useful and useable energy.
FIG. 2 illustrates a multiple drum portable power generating device 20.
The multiple drum portable power generating device 20 is similar to the single drum portable power generating device 1 but includes multiple drums 21, at least one collective 22 and various other components described hereinafter.
The multiple portable power generating device 20 has the multiple drums 21, which are cylindrical and have buoyancy.
The multiple drums 21 have vanes 26 operatively mounted around the outer circumference thereon.
The vanes 26 extend outwardly from the outer circumference of the multiple drums 21 of the multiple portable power generating device 20.
In the preferred embodiment, the vanes 26 are angled against current or towards the water flow as illustrated in FIG. 1A. In other embodiments, the angle and length of the vanes 26 are varied.
For example, the angle of the vanes 26 may be transverse to the point of contacts with the multiple drums 21.
The length, positioning and angle of the vanes 26 determine the amount of potential energy from moving water or water current that will be captured and converted to mechanical and/or electrical energy explained hereinafter.
The multiple drums 21 are operatively connected to multiple frames 23 on each end via multiple axles 24.
The multiple axles 24 are operatively mounted through the center of the multiple drums 21.
The multiple axles 24 are rotatably mounted to the multiple frames 23.
Multiple gears 25 are operatively mounted juxtaposed to a first side 27 of the multiple drums 21 of the multiple drum portable power generating device 20.
The multiple gears 25 rotate as the multiple drums 21 rotate because of the at least one collective 22 connection.
As moving water contacts the vanes 26, the multiple drums 21 and multiple gears 25 of the multiple portable power generating device 20 rotate thereby rotating the multiple axles 24 because the multiple axles 24 are able to rotate freely at the ends in contact with the frame 23.
The multiple gears 25 are operatively connected to at least one power conversion unit gear 28 via the at least one collective 22.
Multiple transition gears 29 are operatively connected to the multiple frames 23 and are used to transfer the rotation from the multiple gears 25 to the power conversion unit gear 28 via the collective 22.
As the multiple gears 25 rotate, the conversion 22 is actuated or moved thereby moving the multiple transition gears 29 and the at least one power conversion unit gear 28.
In the preferred embodiment, the collective 22 is a chain.
The at least one power conversion unit gear 28 is operatively connected to at least one power conversion unit 30.
The power conversion unit 30 is an electrical generator, hydraulic pump, air pump, or water pump.
The at least one power conversion unit 30 is used to convert the rotational movement to electrical, mechanical or some other form of useful and useable energy.
It is obvious to those skilled in the art that the at least one power conversion unit 30, the at least one power conversion unit gear 28 and associated components could be placed on each end of the multiple drums 21 of the portable power generating device 20.
At least one anchoring yoke 31 is located at one end of and is operatively connected to the multiple frames 23.
The at least one anchoring yoke 31 is used to anchor the multiple drum portable power generating device 20.
At least one anchoring cable (not shown) is connected to the at least one anchoring yoke 31 and an anchoring device (not shown) to preclude the multiple drum portable power generating device 20 from being carried away by the current or flowing water.
The anchoring cable is a cable, rope, chain or any similar device.
The multiple drum portable power generating device 20 is anchored to the anchoring device via the at least one anchoring cable and the at least one anchoring yoke 31 so that the multiple drum portable power generating device 20 is positioned in a current or moving water.
The current or moving water contacts the multiple vanes 26 thereby causing the multiple drums 21 to rotate.
As the multiple drums 21 rotate, the multiple gears 25 and multiple axles 24 rotate such that the multiple gears 25 rotate, in this example, clockwise causing the at least one collective 22 to move thereby rotating the multiple transition gears 29 counterclockwise.
In other examples, the multiple axles 24 are each bearing mounted such that they do no rotate with the multiple drums 21.
The multiple gears 25, multiple transition gears 29, and at least one collective 22 operatively communicate with the power conversion unit gear 28.
The at least one power conversion unit gear 28 is rotated and operatively communicates with the at least one power conversion

unit 30.
As the at least one power conversion unit gear 28 rotates, the at least one power conversion unit 30 converts the rotational energy to electrical, mechanical or some other form of useful and useable energy.
FIG. 3 illustrates a spiral portable power generating device 40 used for converting potential energy from flowing water or water current to mechanical and/or electrical energy.
The spiral portable power generating device 40 has at least one drum 41.
The at least one drum 41 is cylindrical and has buoyancy.
In alternative embodiments, the at least one drum 41 is a cylindrical tube or axle of variable length having buoyancy.
The at least one drum 41 has vanes 42 operatively mounted around the outer circumference thereon.
The vanes 42 extend outwardly from the outer circumference of the multiple drums 41 of the spiral portable power generating device 40.
However unlike the FIGS. 1 and 2, the vanes 42 do not extend along the longitudinal of the at least one drum 41.
Rather, the vanes 42 are substantially transverse to the at least one drum 41.
The thickness section 43 of the vanes 42 substantially face the current or moving water.
The vanes 42 are angled so that the current or moving water will cause the vanes 42 and the at least one drum 41 to rotate.
The at least one drum 41 is operatively mounted on a collective output 44.
As the at least one drum 41 rotates, the collective output 44 rotates.
The collective output 44 is operatively connected to a collective (not shown).
For all embodiments contained herein, the collective is any arrangement of axles, gears, pulleys, chains, belts sprockets, shafts, pumps, plates, clutches or cables that transfers rotational force from any axle or collective output.
Specific embodiments illustrated herein are the best mode operation and not meant to be limiting to said illustration.
The collective transfers the rotational movement to at least one power conversion unit (not shown), wherein the at least one power conversion unit converts the rotational movement to electrical, mechanical or some other form of useful and useable energy.
The power conversion unit is an electrical generator, hydraulic pump, air pump, or water pump.
The spiral portable power generating device 40 is anchored by at least one anchoring cable (not shown) attached to an anchoring device (not shown).
The spiral portable power generating device 40 is anchored to the anchoring device via the at least one anchoring cable or the collective, and the at least one anchoring yoke so that the spiral portable power generating device 40 is positioned in a current or moving water.
The current or moving water contacts the vanes 42 thereby causing the vanes 42 and the at least one drum 41 to rotate.
As the at least one drum 41 rotates, the collective output 44 rotates.
The collective output 44 operatively communicates with the collective.
The collective operatively communicates to the at least one power conversion unit, and the at least one power conversion unit converts the rotational energy to electrical, mechanical or some other form of useful and useable energy.
FIGS. 4 and 5 illustrate a fan turbine portable power generating device 50 used for converting potential energy from flowing water or water current to mechanical and/or electrical energy.
Moreover, when the fan turbine portable power generating device 50 is in an upright position, it is used for converting potential energy from blowing wind or air current to mechanical and/or electrical energy.
The fan turbine portable power generating device 50 is mounted on a plurality of pontoons 55.
The plurality of pontoons 55 are substantially cylindrical and have buoyancy.
In alternative embodiments, a plurality of drums, axles or similar devices having buoyancy are used in place of the plurality of pontoons 55.
The plurality of pontoons 55 have a plurality of anchoring yokes 76.
Referring now to FIG. 4, the plurality of anchoring yokes 76 are used to anchor the fan turbine portable power generating device 50.
Anchoring cables (not shown) are connected to the plurality of anchoring yokes 76 and an anchoring device (not shown) to preclude the fan turbine portable power generating device 50 from being carried away by the water current, flowing water, blowing wind or air current.
The anchoring cables are cables, ropes, chains or any similar devices.
At least one cable and winch 63 connect the plurality of pontoons 55.
The at least one cable and winch 63 control the depth of a plurality of vanes 72 that will be submerged in the water.
The at least one cable and winch 63 is used to vertically raise and lower the plurality of vanes 72 so that the depth of submersion of the plurality of vanes 72 can be controlled.
Front struts 64 have bottom ends 65 rotatably mounted on the plurality of pontoons 55 and angled inwardly and front top ends 66 of the front struts 64 are rotatably connected together such that when the cable and winch 63 are moved so too does the angle of the front struts 64.
Rear struts 67 have rear bottom ends 68 rotatably mounted on the plurality of pontoons 55 and angled inwardly and rear top ends 69 of the rear struts 67 are rotatably connected together such that when the cable and winch 63 are moved so to does the angle of the rear struts 67.
An axle 51 is rotationally and operatively mounted from the top ends 66 of the front struts 64 to the top ends 69 of the rear struts 67.
A collective gear 73 is operatively mounted around the axle 51.
A power conversion unit gear 74 is operatively mounted to a power conversion unit 75.
The power conversion unit 75 is an electrical generator, hydraulic pump, air pump, or water pump.
As the axle 51 and the collective gear 73 rotate, the collective gear 73 interacts and rotates the power conversion unit gear 74.
A nose cone 71 is operatively mounted between the front struts 64 and the rear struts 67.

The plurality of vanes 72 are operatively mounted around the circumference of the axle 51 and operatively mounted to the nose cone 71.

The plurality of vanes 72 are arranged to rotate when acted on by water current, moving water, blowing wind or air current.

When the plurality of vanes 72 rotate, the axle 51, the collective gear 73 and power conversion unit gear 74 rotate.

The power conversion unit 75 receives and converts the rotational energy from the power conversion unit gear 74 to electrical, mechanical or some other form of useful and useable energy.

FIG. 5 illustrate a close up of a front view of the fan turbine portable power generating device 50 shown in FIG. 4 without the nose cone 71 attached thereto.

The axle 51 is rotatably mounted to at least one middle section 53.

The at least one middle section 53 is operatively connected to the front struts 64 and/or rear struts 67.

The plurality of vanes 72 are operatively mounted to a circumference of the axle 51.

The plurality of vanes 72 are angled so that the water current, moving water, blowing wind or moving air causes the plurality of vanes 72 to rotate.

At least one space 57 is provided between each of the plurality of vanes 72.

The plurality of vanes 72 are transverse to the water current, moving water, blowing wind or moving air.

The depth of submersion of the plurality of vanes 72 of the fan turbine portable power generating device 50 in the water is adjustable.

In an alternative embodiment, the fan turbine portable power generating device 50 is placed in the upright position, wherein the plurality of the vanes 72 are not submerged in the water and the fan turbine portable power generating device 50 is used for converting potential energy from blowing wind or air current to mechanical and/or electrical energy.

The upright position is desirable when water surfaces freeze not allowing submersion of the plurality of the vanes 72 therein.

In the preferred embodiment, a cable and winch 63 are used to control the depth of submersion of the plurality of the vanes 72 of the fan turbine portable power generating device 50 in the water.

The cable and winch 63 are used to move the plurality of pontoons 55 toward and away from each other thereby controlling the depth of submersion of the plurality of vanes 72 of the fan turbine portable power generating device 50 in the water.

The cable and winch 63 are for illustration purposes, and are not meant to be limiting.

Other embodiments are able to perform the same function and are known by those skilled in the art.

Referring once again to FIG. 4, the fan turbine portable power generating device 50 is anchored to the anchoring device via the anchoring cables and the anchoring yokes 76 so that the fan turbine portable power generating device 50 is positioned on a body of water with the plurality of vanes 72 submerged in the water facing the direction of the water current or flowing water or when the plurality of vanes 72 are completely removed from the water, in the direction of the blowing wind or moving air.

The water current, flowing water, blowing wind or moving air contacts and causes the plurality of vanes 72 to rotate.

As the plurality of vanes 72 rotate, the axle 51 and the collective gear 73 rotate.

As the collective gear 73 rotates, it interacts with the power conversion unit gear 74 causing it to rotate.

The power conversion unit gear 74 operatively communicates with the power conversion unit 75.

As the power conversion unit gear 74 rotates, the power conversion unit 75 converts the rotational energy to electrical, mechanical or some other form of useful and useable energy.

FIG. 6 illustrates a below surface fan turbine portable power generating device 80 used for converting potential energy from flowing water or water current to mechanical and/or electrical energy.

The below water fan turbine portable power generating device 80 has an axle 81.

The axle 81 is rotatably mounted to a housing 83.

Vanes 84 are operatively mounted to a circumference of the axle 81.

The vanes 84 are angled so that the when the current or moving water contacts the vanes 84, it causes the vanes 84 to rotate.

Space 85 is provided between each of the vanes 84.

The vanes 84 are transverse to the current or moving water.

The below water fan turbine portable power generating device 80 is anchored to the bottom surface of a body of water, such as a channel, river, stream or the like, by spikes 82.

Anchoring yokes 86 are operatively connected to the housing 83.

The anchoring yokes 86 receive the spikes 82.

The spikes 82 go though the anchoring yokes 86 and are placed into the bottom surface of the body of water providing an anchoring effect for the below water fan turbine portable power generating device 80.

The axle 81 is operatively connected to a collective (not shown).

The collective is any arrangement of axles, gears, pulleys, chains, belts sprockets, shafts, pumps, plates, clutches or cables that transfers rotational force from any axle or collective output.

Specific embodiments illustrated herein are the best mode operation and not meant to be limiting to said illustration.

The vanes 84 of the below water fan turbine portable power generating device 80 move when the water current or moving water contacts the vanes 84 causing it to rotate along with the axle 81.

The rotational movement from the axle 81 is transferred to the collective.

The collective transfers the rotational movement to at least one power conversion unit (not shown), wherein the at least one power conversion unit converts the rotational movement to electrical, mechanical or some other form of useful and useable energy.

The power conversion unit is an electrical generator, hydraulic pump, air pump, or water pump.

The power conversion unit is located remote from the water but is capable of being submerged in the water in a waterproof design.

FIG. 7 illustrates a surface strider portable power generating device 90 used for converting potential energy from flowing water or water current to mechanical and/or electrical energy.

The surface strider portable power generating device 90 has an outer rim 91.

The outer rim 91 is substantially circular and has buoyancy.

Vanes 92 are operatively mounted around the circumference of the outer rim 91.
The vanes 92 have buoyancy and are substantially rectangular.
Spokes 93 operatively connect the outer rim 91 and the vanes 92 to an axle 94.
At least one frame 95 receives the axle 94 at an at least one first end 96 of the at least one frame 95.
The axle 94 is rotatably mounted in the at least one frame 95.
At least one second end 97 of the at least one frame 95 has at least one anchoring yoke 98.
At least one axle gear 88 is operatively attached to the spokes 93.
A frame gear 89 is operatively mounted to the at least one frame 95 and is operatively connected to the at least one axle gear 88.
The frame gear 89 is operatively connected to at least one power conversion unit gear 99.
The at least one power conversion unit gear 99 is operatively connected to at least one power conversion unit 100.
The at least one anchoring yoke 98 is used to anchor the surface strider portable power generating device 90.
At least one anchoring cable (not shown) is connected to the at least one anchoring yoke 98 and an anchoring device (not shown) to preclude the surface strider portable power generating device 90 from being carried away by the water current or flowing water.
Similar to FIG. 1, the water current or moving water contacts the vanes 92 thereby causing the axle 94 to rotate.
As the axle 94 rotates, the at least one axle gear 88 rotates, and the at least one axle gear 88 causes the frame gear 89 to rotate.
The frame gear 89 causes the at least one power conversion unit gear 99 to rotate.
The at least one power conversion unit gear 99 is rotated and operatively communicates with the at least one power conversion unit 100.
The power conversion unit is an electrical generator, hydraulic pump, air pump, or water pump.
The at least one power conversion unit 100 converts the rotational energy to electrical, mechanical or some other form of useful and useable energy.
The transfer of rotational movement from the surface strider portable power generating device to the at least one power conversion unit is similar to that shown in FIG. 1.
There are numerous embodiments that can capture the rotational movement from the axle 94, the spokes 93 or the vanes 92.
FIG. 8 illustrates a spindle axle portable power generating device 110 used for converting potential energy from flowing water or water current to mechanical and/or electrical energy.
The spindle axle portable power generating device 110 has at least one frame 111.
The at least one frame 111 has a carrying yoke 112 at a first end 113.
The carrying yoke 112 has an opening for receiving an anchoring cable 114.
The anchoring cable 114 is operatively connected to an anchoring device (not shown).
The at least one frame 111 has a second end 115 connected to an axle 116.
The axle 116 is rotatably mounted to the second end 115 of the at least one frame 111 and is free to rotate therein.
Vanes 117 are operatively connected to the axle 116.
The vanes 117 are operatively mounted to the circumference of the axle 116 along the horizontal direction as shown in FIG. 8.
At least one collective gear 118 is operatively mounted on the axle 116.
The at least one collective gear 118 rotates along with the axle 116.
At least one power converting unit 119 is operatively mounted on the at least one frame 111.
At least one power converting unit gear 121 is operatively mounted to the power converting unit 119.
At least one collective 120 connects the at least one collective gear 118 to the at least one power converting unit gear 121.
As the axle 116 and the at least one collective gear 118 rotates, the at least one collective 120 transfers the rotation to the at least one power conversion unit gear 121.
The power conversion unit gear 121 transfers the rotation to the power conversion unit 119, which converts the rotational movement to electrical, mechanical or some other form of useful and useable energy.
The power conversion unit 119 is an electrical generator, hydraulic pump, air pump, or water pump.
The spindle axle portable power generating device 110 is anchored to the anchoring device via the at least one anchoring cable 114 and the at least one anchoring yoke 112 so that the vanes 117 of the spindle axle portable power generating device 110 are positioned in a current or moving water.
The current or moving water contacts the vanes 117 thereby causing the axle 116 to rotate.
As the axle 116 rotates, the at least one collective gear 118 rotates causing the collective 120 to move thereby causing the power conversion unit gear 121 to rotate.
The at least one power conversion unit gear 118 is rotated and operatively communicates with the at least one power conversion unit 119.
As the at least one power conversion unit gear 118 rotates, the at least one power conversion unit 119 converts the rotational energy to electrical, mechanical or some other form of useful and useable energy.
FIG. 9 illustrates a wave generating device 122 as described in Disclosure Document 494764, Jun. 4, 2001, which is hereby incorporated by reference and attached hereto.
The wave generating device 122 is used to increase the power of the flowing water delivered into any one of the previously discussed portable power generating devices.
The wave generating device 122 has a flat or curved member 130, which is placed upstream of the portable power generating device.
The flat or curved member 130 angled upward or transverse to the direction of the water's current and below the surface of the water.
The flat or curved member 130 directs the flowing water upward thereby causing a standing wave 124.
The standing wave 124 rises above the water surface and contacts the wave generating device 122 with more force than the "normal current." The vanes 2 of the portable power generating device receive the standing wave 124.
The standing wave 124 created by the wave generating device 122 increases the kinetic energy of the water's flowing current by

adding the weight of the falling water in the collapsing wave 124 to the speed of the current driving the vanes 2 of the portable power generating device.
The wave generating device 122 is operatively mounted to the frame 4 of the portable power generating device by at least one strut 123.
FIGS. 10a and 10b illustrate a water directing device 125 as described in Disclosure Document 494831, Jun. 4, 2001, which is hereby incorporated by reference and attached hereto.
The water directing device 125 is used to increase the power of the flowing water delivered into any one of the previously discussed portable power generating devices.
The water directing device 125 has a flat or curved support 131, which is placed upstream from the portable power generating device.
The flat or curved support 131 extends from above to below the normal surface elevation of the flowing water.
The flat or curved support 131 is preferable operatively mounted to both sides of the portable power generating device.
The flat or curved support 131 of the water directing device 125 are angled inward (toward the vanes 2) and increases the speed and volume of the current moving toward the water directing device 125.
The flat or curved support 131 of the water directing device 125 is attached to the frame 4 of the portable power generating device 1 by at least one strut 126.
This Water Directing Device disclosed in FIG. 11 is placed in front, below and to the sides of the aforementioned Power Generating Devices and by doing so, increases the kinetic power of the flowing water delivered into the Power Generating Devices by several ways.
First, the amount of water interacting with the collectors on the Power Generating Device is increased in volume and speed.
Second, the increase in the volume and speed of this flowing water increases the efficiency of any Wave Generating Device that may be deployed in conjunction with the Power Generating Device.
Third, stabilizes the Power Generating Device in its operational location within the flowing current of water.
The Wave Generating Device is placed in front of the aforementioned Power Generating Devices, and by doing so, a standing wave higher than the surface of the water is created.
The creation of this standing wave increases the kinetic power of the flowing water delivered into the Power Generating Device by several ways.
First, the speed of the water flowing down the wave slope is increased due to the fact that the wave slope is at a steep angle relative to the surface of the water.
Second, this downward fall of water creates a gravitational weight force that increases the power delivered to the collectors on the Power Generating Device.
Third, the shape and flow characteristics of the standing wave smoothes out the delivery of water into the collectors on the Power Generating Device, thereby reducing drag and increasing the ability of the collectors to extract energy from the moving current of water.
In view of the foregoing, it will be seen that the several advantages of the invention are achieved and attained.
The embodiments were chosen and described in order to best explain the principles of the invention and its practical application to thereby enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated.
As various modifications could be made in the constructions herein described and illustrated without departing from the scope of the invention, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative rather than limiting.
For example, while the vanes are illustrated as being fixed, the vanes could equally be of moveable design, such as a variable pitch design.
Thus, the breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims appended hereto and their equivalents.

Rotational gravity/buoyancy power generator
US20110162356

• **Patent Assignee** **HASTINGS DOUGLAS REYNOLDS** • **Inventor** HASTINGS DOUGLAS REYNOLDS • **International Patent Classification** F03B-017/02 F03B-017/02 • **US Patent Classification** PCLO=060495000 • **CPC Code** F03B-017/02 F03B-017/04;	• **Publication Information** **US2011162356 A1 2011-07-07 [US20110162356]** • **Priority Details** 2009US-61269747 2009-06-29 2010US-12803229 2010-06-22

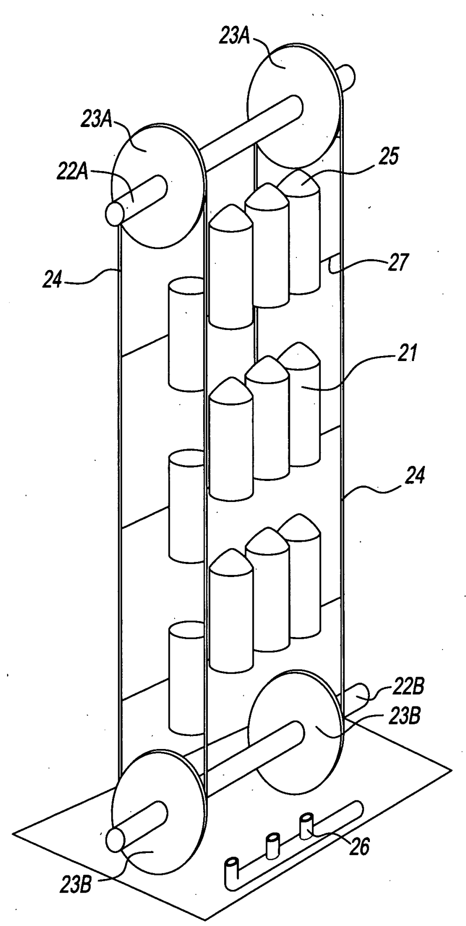
• **Fampat family**

US2011162356	A1	2011-07-07	[US20110162356]

• **Abstract:**

(US20110162356)

The rotational gravity/buoyancy power generator relates to the generation of power by harnessing the gravitational and buoyant forces which act on an apparatus in a natural or man-made liquid medium and converting such forces into mechanical energy. More specifically, the rotational gravity/buoyancy power generator improves on operably different, fluid medium power generators by efficiently utilizing the gravitational force as efficiently as the buoyant force is harnessed. The rotational gravity/buoyancy power generator includes methods, systems and devices for a plurality of weighted containers with a movable closure means on one or both ends, attached to one or more chains, belts or conveyances with one or more rotating sprockets or pulleys on horizontally aligned shafts which form a continuous loop in primarily a vertical arrangement comprising ascending and descending phases upon such apparatus in a continuous and flowing movement (FIG. 1). In the descent phase the containers are open on both ends (FIG. 2) and have greater density than the volume of liquid they displace causing them to rapidly sink through the liquid medium due to the force of gravity. In the ascent phase the containers have either their upper ends sealed, both ends sealed or are filled by internal bladders when, in any embodiment, a volume of gas is introduced such that the overall volume of the containers have a lesser density than the liquid displaced causing the containers to rise through the liquid medium due to the buoyant force. The chains, belts or conveyances to which the containers are attached rotate the sprockets or pulleys and their associated shafts creating mechanical power. Such power can be used to turn electrical generators or other mechanical machines which necessitate such power input.



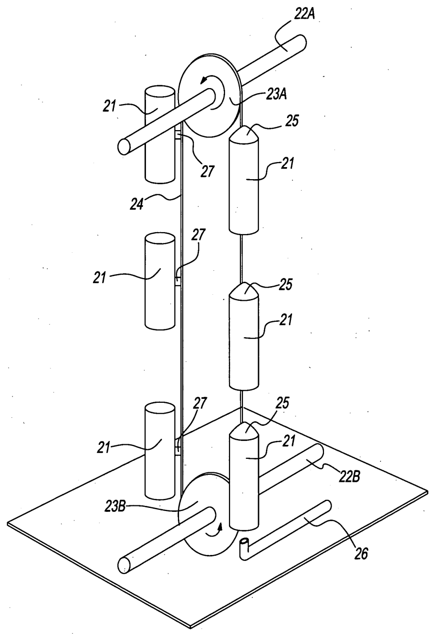


FIG. 1

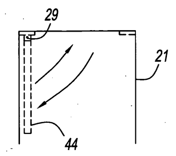


FIG. 2A

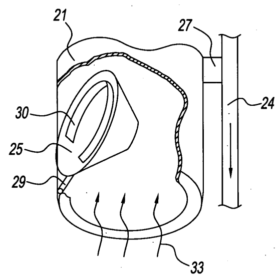


FIG. 2

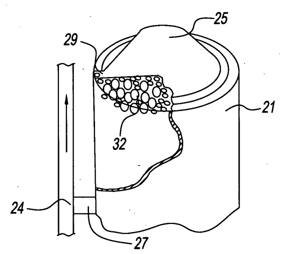


FIG. 3

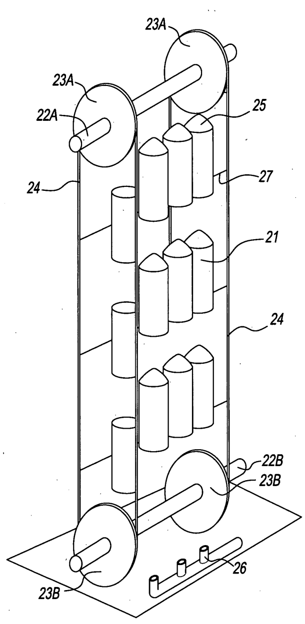


FIG. 4

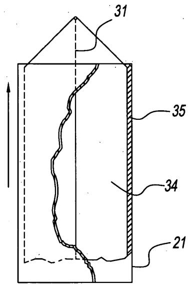


FIG. 5

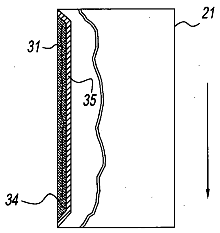


FIG. 6

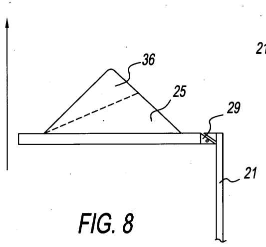


FIG. 8

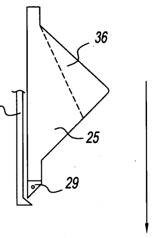


FIG. 7

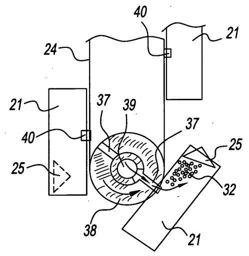


FIG. 9

Description

(US20110162356)

CROSS REFERENCE TO RELATED APPLICATIONS

[0001]This application claims the benefit of Provisional Patent Application Ser. No. 61/269,747, filed Jun. 29, 2009 by the present inventor

FEDERALLY SPONSORED RESEARCH

[0002]none

SEQUENCE LISTING

[0003]none

[0004]Primary Class: 60/495; 60/496; 415/5

[0000]renewable and do not deplete resources or pollute the environment.

Further, in the United States and many net oil importing countries, there is a need to develop and harness local energy resources to reduce dependence on foreign sources of energy, namely oil.

[0005]As a consequence, alternative energy exploration and development proceeds apace to harness energy produced by wind, solar, bioenergy, geothermal, and wave/tidal to name the most scrutinized.

Providing a reasonable, steady, continuous and sufficient energy from these sources mostly focuses on their use for generating electricity.

However, there are issues with each of these alternative energy sources not the least of which is scalability, efficiency, cost, aesthetics, weather, location and day to day variances in local environments.

[0006]Present alternative energy solutions include: proposed large scale wind farms which cost billions of dollars utilizing thousands of acres and stand still on windless days; huge solar panel arrays, whether for electricity or heat that remain ineffective on cloudy or cool days; bioenergy, with ethanol as an example, does not truly result in a net carbon return and is considered a contributor to driving up global food costs, and geothermal installations which can take years to test and develop with no guarantee of successful energy production.

[0007]The concept of energy production from water sources and/or buoyancy dates back to the earliest waterwheels and further back to Archimedes exclaiming "Eureka" when finding a method to define principles of buoyancy.

However, as will be shown in the Description of Prior Art, not until now has energy production from gravity and buoyancy, acting through an appropriate apparatus, been effectively rendered viable.

[0008]Gravity and buoyancy are the essential scientific principles at stake in the rotational gravity/buoyancy power generator.

A body in a liquid medium which has a greater density than the liquid it displaces will sink in that medium.

Conversely one with a lesser density will rise.

For the sake of example, a gallon of common fresh water at a normal temperature, at sea level, has a mass of 8.34 pounds and a volume of 231 cubic inches.

Therefore, combining these two concepts, an object which has a mass of say 10 pounds, with a volume of 231 cubic inches will sink in the referenced liquid medium as it is denser than the liquid is displaces and the force of gravity "pulls" it downward.

An object which occupies 231 cubic inches with a mass of say 7 pounds will rise in the liquid medium as it is less dense than the liquid it displaces and the buoyant force will "push" it through the liquid medium.

Therefore it is not the "weight" of the buckets or pods or containers which must change to be acted on by gravity or buoyancy but their density which must become greater and lesser in the sinking and rising phases.

[0009]The rotational gravity/buoyancy power generator utilizes both of these principles by configuring weighted containers which have the purposely designed capacity to have a much greater density than the liquid they displace on the downward, sinking, or gravity phase and a much lower density than the liquid they displace on the upward, rising or buoyant phase.

Of particular note, the rotational gravity/buoyancy power generator efficiently utilizes containers which are purposely designed to have a greater density than the liquid they displace and pass through the liquid medium -- as the liquid medium passes through them -- with minimal friction.

As a result, the plurality of the containers, in total, produces a significant amount of power during their descent phase.

[0010]The rotational gravity/buoyancy power generator does not require the sun, wind, monopolize massive tracts of land or sea, or redirect scarce food resources.

It can operate in almost any environment, can be located directly in the path of existing power grids, can generate distributed electricity for localized consumption, is not offensive to the eye or local environment and can operate around the clock, day and night without fluctuating output or unreliable operation as is the case with both wind and solar power.

DESCRIPTION OF PRIOR ART

[0011]U.S. Pat. No. 2,135,110 to Platt exemplifies many commonalities found in buoyancy styled energy generators.

A series of buckets are mounted to an endless vertically aligned chain which rotates around sprockets which, in turn, rotate shafts.

The buckets are pointed, closed on one end and open on the other.

They face point down on the descent and are filled with water which rushes into the upper, open end.

On their ascent the buckets are filled with air which causes them to rise.

The problem in Platt and others is best illustrated by the statement "The buckets thus are lighter during their upward movement than during their downward movement filled with water, and this causes the chain to move and turn the wheels on which it is mounted." In fact, the "buckets" in Platt or any other configuration are not lighter or heavier at any time during their ascent or descent (providing they do no leave the liquid medium as some configurations show).

The mass or weight of the buckets is constant.

The only property which changes in Platt is the volume of space which the bucket and its injected gas occupy in the ascent.

As a result they may have a lesser overall density than the liquid displaced and be "pushed" upward due to the buoyant force.

[0012]U.S. Pat. No. 212,186 to Burwell, in some ways similar to Platt, also attempts to utilize the weight of water as adding to the downward motion of the buckets.

The problem here is that one gallon of water displaces one gallon of water.
The net affect, when looking at water as a "weight" alone is that it has a neutral density when immersed in a like liquid.
[0013]U.S. Pat. No. 3,934,964 to Diamond shows a plurality of piston-filled cylinders, in hose linked pairs, mounted on an endless chain or rotational member.
As the cylinders point downward the weighted piston slides to the bottom of the cylinder expelling air through the hose which flows into its mated cylinder pointing upward whose sliding piston drops thereby filling the cylinder with the same air.
This process is supposed to repeat itself as the paired cylinders rotate in a fluid medium.
Once again, Diamond is flawed in that it purports to "vary weights of the cylinders from less than the weight of the displaced fluid to more than the weight of the displaced fluid whereby the cylinders may selectively rise and fall within the fluid medium".
Again, injecting water or air into the cylinders, when immersed in a fluid medium will not change the "weight" or mass of the cylinders causing them to rise or fall.
There is not explanation for the overall density of the cylinders.
If, for example, they were made of Styrofoam, they would never sink no matter how much like fluid were injected into them.
Conversely, if made of iron they would hardly rise without a huge volume of injected gas.
[0014]The rotational gravity/buoyancy power generator, in any embodiment or configuration, is superior to Diamond since it allows the containers to change their density offering a more efficient use of energy for that purpose and producing a greater net amount of useable energy.
[0015]U.S. Pat. No. 4,054,031 to Johnson calls for collapsible buckets mounted on a vertical belt on rotating shafts mounted in a tank of water.
The buckets are inflated with air at the beginning of their ascent and collapse against the belt during their descent.
This model may actually produce some amount of energy.
However, Johnson only seeks to capture energy produced by the buoyant force and does not utilize more than 50% of its cycle when merely routing the collapsible buckets through the descent to make them available for inflation and utilization during their ascent.
[0016]U.S. Pat. No. 4,363,212 to Everett is somewhat similar to Diamond in that any potential energy it produces is a result of the buoyant force derived from air injected into a series of buckets rotating between two vertically aligned sets of chains, sprockets and shafts in a liquid.
While Everett may improve on similar models it only focuses on capturing energy produced during the buoyant phase.
Its buckets descend either "filled with water" or by collapsing.
Thus, the energy produced in the ascending phase is partially used to move the apparatus through the descending phase.
[0017]In Everett and Johnson above, the models are less than 50% efficient since they purposely harvest energy only in the ascent phase of their operations.
The present invention, in any embodiment or configuration, is at least twice as efficient since the containers and their sinking mass are used to create energy in their descent and, with their lessened density in their ascent, capitalize on the buoyant force acting thereon.
[0018]U.S. Pat. No. 2006/0288698 A1 to Dentler illustrates another notion set forth in numerous other models; that being a liquid filled tank with a rotating means which move buoyant bodies up through the tank, out of the liquid, through a descent phase in a non-liquid medium, then reintroducing the bodies into the lower portion of the liquid tank, in a repetitious cycle.
Dentler and similar configurations are inferior in that these models utilize varying methods to reintroduce chain-linked, buoyant bodies into the lower portion of a liquid filled tank.
In the end they all produce energy robbing friction, slow the rotation of the apparatus and introduce engineering, manufacturing and operational complications which are not found in the present invention.
OBJECTIVES AND ADVANTAGES OF THE INVENTION
[0019]It is an object of the rotational gravity/buoyancy power generator to provide an efficient, environmentally friendly power generator.
[0020]It is another object of the rotational gravity/buoyancy power generator to provide an apparatus to generate power without consuming non-renewable resources and which does not generate pollution.
[0021]It is another object of the rotational gravity/buoyancy power generator to provide an apparatus of this character which can be located in almost any location on earth and operate at any time of day or night for generating power and thereby greatly increasing its potential use and application.
[0022]It is a further object of the rotational gravity/buoyancy power generator to provide an apparatus of this character that is relatively inexpensive to manufacture and maintain.
[0023]The characteristics and advantages of the rotational gravity/buoyancy power generator as well as methods, systems and devices for effective utilization and effectiveness thereon, are further sufficiently referred to in the detailed description of the accompanying drawings, which represent several embodiments and are incorporated herein by reference.
[0024]After considering this example, persons skilled in the art will understand that many variations may be made without departing from the principles disclosed and I contemplate the employment of any such structure, arrangements or modes of operation that are properly within the scope of the appended claims.
SUMMARY OF THE INVENTION
[0025]The rotational gravity/buoyancy power generator apparatus harnesses the gravitational and buoyant forces which act on the apparatus, wholly or partially submersed in a natural or man-made liquid medium, and converts such forces into mechanical energy.
The rotational gravity/buoyancy power generator apparatus has a plurality of weighted containers with a movable closure means on one or both ends attached to one or more chains, belts or conveyances with rotating sprockets or pulleys and horizontally aligned shafts which form a continuous loop in primarily a vertical arrangement comprising ascending and descending phases upon such apparatus in a continuous, rotating movement.

Upon their sinking or descent phase the containers are open through their vertical axis allowing them to descend freely and efficiently through the liquid medium as a result of the containers being denser than the liquid they displace allowing gravity to act on the containers.
Upon their rising or ascent phase a moveable closure means that is capable of an air tight seal closes the upper end or both ends of the container or a bladder is inflated as the apparatus introduces a gas directed into containers.
The trapped gas filled containers increase in overall volume resulting in them having a lesser density than the liquid displaced and produce a resulting rise or ascent in the containers due to the buoyant force.
The chains, belts or conveyances to which the containers are attached rotate the sprockets or pulleys and their associated shafts creating mechanical power.
[0026]Accordingly several of the objects and advantages of the invention are to provide a means to harness an alternative energy source which is environmentally friendly, can operate without dependence on wind or rivers or the sun, has a reasonably constant, non-fluctuating power output, and is simple in construction and easily maintained.
Still other objects and advantages will become apparent from a study of the following description and the accompanying drawings.
BRIEF DESCRIPTION OF THE DRAWINGS

[0027]FIG. 1A is a perspective view of the rotational gravity/buoyancy power generator apparatus with a single pair of sprockets or pulleys on two shafts driving a single chain or belt and which has attached a series of single containers.
The containers are shown with a movable closure means in the form of a highly buoyant flapper valve mechanism on one end and a gas discharge means located near the lower sprocket or pulley.

[0028]FIG. 2 is an enlarged view of one container in the sinking or descent phase with the highly buoyant flapper valve in the open position.
A hinge or pivot is visible as is a gas catchment device which is located on the underside of said valve.
The chain or pulley is shown as is a bracket attaching the container.
Liquid is shown passing through the container.

[0029]FIG. 2A is an enlarged view of one container with the movable closure means in the open position.
The hinge or pivot is visible as is the motion for the movable closure means showing its travel between the open and closed positions.
The gas catchment device in FIG. 2 may also be employed on the movable closure means.

[0030]FIG. 3 is an enlarged view of one container in the rising or ascent phase with the highly buoyant flapper valve closing the upper end of the container.
The trapped gas and hinge or pivot are visible in the cutaway view.
The chain or pulley is shown as is the bracket attaching the container.

[0031]FIG. 4 is a perspective view of the rotational gravity/buoyancy power generator apparatus with multiple pairs of sprockets or pulleys on two shafts driving a multiple chain or belt configuration and which has attached a series of sets of containers.
The containers are shown with the highly buoyant flapper valve mechanism on one end and a gas discharge means located near the lower sprocket or pulley.
A bracket attaching the container sets is shown.

[0032]FIG. 5 is an enlarged view of one container in the rising or ascent phase with a cutaway so that an inflated bladder is visible within.
A bladder containment cover and a bladder retractor are also visible.

[0033]FIG. 6 is an enlarged view of one container in the sinking or descent phase with a cutaway so that the deflated bladder is visible within.
The bladder containment cover and the bladder retractor are also visible.

[0034]FIG. 7 is a fragmentary view of one container, in partial view, in the sinking or descent phase with details for its attached, highly buoyant flapper valve and hinge or pivot in the open position.
A highly buoyant flapper valve air chamber is exposed.

[0035]FIG. 8 is a fragmentary view of one container, in partial view, in the rising or ascent phase with details for its attached, highly buoyant flapper valve and hinge or pivot in the closed position.
The highly buoyant flapper valve air chamber is exposed.

[0036]FIG. 9 is a partial view with the lower shaft with a longitudinal gas port, a gas inlet passage in the lower sprocket or pulley and a gas port in the bracket attaching the containers to the chain or belt -- collectively referred to here as a gas injection system.
The descending container on the left has its flapper valve open and has yet the engage the gas injection system.
The lowest container is finishing its passage around the lower sprocket or pulley and is engaged with the gas injection system.
Gas is shown passing from the axle, through the sprocket or pulley's gas inlet, through a bracket's built in gas port and into the container where the flapper valve is almost into its closed position in the upper end of the container.
This gas injection system can also be utilized near the upper sprocket or pulley in a relative mirror image of that portrayed in this description for the purposes of depleting gas from the containers.

Further, the gas injection system at either or both upper and lower sprockets or pulleys can be utilized for the bladders described herein such that the bladders are inflated and deflated efficiently and at the appropriate times.
DESCRIPTION OF THE PREFERRED EMBODIMENT
[0037]The rotational gravity/buoyancy power generator apparatus is presented in two embodiments though these should not be construed as limitations on the scope of the invention but, rather, the exemplification of several preferred embodiments thereof.
[0038]FIG. 1A shows the most basic, preferred, embodiment for the rotational gravity/buoyancy power generator.
In operation the containers (21) -- as they ascend and descend through the liquid medium -- are attached by brackets (27) to and drive the chain or belt (24) which rotates sprockets or pulleys (23A and 23B).
As the container rounds the lower sprocket or pulley (23B) the movable closure means (44) or highly buoyant flapper valve (25) seals what becomes the upper end of the container (FIG. 3).
Said closure means or highly buoyant flapper valve may be fitted on its underside with a gas catchment device (26) such that the gas discharge collects primarily in said catchment device to further aid in the air tight sealing capacity of the closure means.
The use of a highly buoyant flapper valve (25) aids in the ascent and descent phases of the apparatus.
In the ascent it tries to rise back to the surface of the liquid medium thus sealing the container's upper end.
In the descent it moves out of its seal for the same reason.
A gas is introduced into the container through the gas discharge means (26).
The introduction of gas into the container has several consequences: it aids the flapper valve into place, the buoyant pressure of the gas helps hold the flapper valve in place (FIG. 3), and it displaces liquid from the container.
During the ascent the container, closure means and gas results in a greater overall volume of space occupied relative to its mass.
The displaced liquid has a greater density than the gas filled container and the buoyant force pushes the container towards the surface.
[0039]At the top of the apparatus the container rounds the upper sprocket or pulley (23A), releases its trapped gas and begins its descent.
The movable closure means (44) or highly buoyant flapper valve (25) acting as one type of movable closure means moves from the downward facing opening in the container allowing the liquid (33) to pass through the container (FIG. 2) as the container sinks through the liquid medium due to the force of gravity.
During descent the volume of the container is limited to its actual wall thickness and the volume of the closure means.
[0040]A different gas discharge means, as illustrated in FIG. 9, may be utilized to introduce gas into the container through an axle with a longitudinal gas port, a bracket with a gas port and a matching sprocket or pulley with its own gas ports.
In this manner gas is injected at the precise moment most advantageous to the passing of the containers.
[0041]The source of gas used may include, but is not limited to, a readily available electric gas pump with its own power means, a gas pump driven by the apparatus, a gas source from industrial application such as waste gas or pressurized air and natural sources such as ocean gas vents.
[0042]The movable closure means claimed for this invention can be configured in a variety of ways.
Two examples or illustrated herein -- the closure means in FIG. 2A (44) and the highly buoyant flapper valve illustrated in FIG. 2 (25).
However the configurations could include, but are not limited to, a bivalve from opposing sides, a bivalve from a center post, a roll-up closure, an iris closure and the location of such at either or both ends of the containers etc.; each and every one of which are contemplated herein.
[0043]As a result of this descending and ascending phases of the containers' movements a chain or belt (24) is driven which, in turn, rotates the upper and lower sprockets or pulleys (23A and 23B).
This rotational energy may be utilized to drive machines or generators or for other uses.
[0044]FIG. 4 shows the second illustrated, preferred embodiment.
In essence, it operates in a similar fashion as the embodiment shown in FIG. 1 but it has multiple containers arranged horizontally adjacent to each other on a bracket (27) at each point along the vertically aligned chains, belts or conveyances (24).
This embodiment is also shown with multiple chains or belts which are operably arranged over multiple sprockets or pulleys.
One notable advantage of this embodiment is the increase in the total mass of the containers as sets and their cumulative arrangement on the rotational gravity/buoyancy power generator apparatus.
The use of container sets increases the need for greater gas discharge means.
This may be accomplished through the gas discharge means (26) if a movable closure means is employed or the use of the gas injection system indicated in FIG. 9 to ensure the greatest efficiency for the gas utilized.
[0045]As an additional efficiency, each container may fitted internally with a collapsible gas retention device (34), hereinafter referred to as a bladder, though not limited in its design or function by this term, configured to alternatively hold and release a volume of gas, instead of the closure means (44) or highly buoyant flapper valve (25).
The bladder in each container when deflated during the descending, sinking phase (FIG. 6) is held against the inside of the container allowing the liquid medium to pass through the container.
The bladder may utilize a bladder containment device (35) that allows the bladder to deflate completely and be held in a relatively fixed manner against the interior wall of the container and, when inflated, conform to and maintain position with the opposite interior wall of the container.
The bladder may utilize a bladder retractor (31) with elastic properties that aids in aligning the bladder inside the bladder containment device to reduce friction and aid in alignment of the bladder.
Upon beginning or during its ascent the bladder is inflated so that it occupies the internal volume of the container to some degree (FIG. 5) The bladders are alternatively inflated as they pass the lower sprockets or pulleys (23B) and deflated as the pass the upper sprockets or pulleys (23A).
Alternatively the apparatus may employ a cam means which aligns itself to the passing container but otherwise is mounted to the frame of or proximate to the apparatus (not shown).

Said cam means or the gas injection system (FIG. 9) can be easily adapted to operate near the lower sprocket or pulley to inflate the bladders and near the upper sprocket of pulley to deflate the bladders.
[0046]FIG. 7 and FIG. 8 show the highly buoyant flapper valve (25) in greater detail and illustrate a flapper valve air chamber (36) which is situated off center to aid the valve to align itself as quickly as possible on its pivot or hinge (29) with the container (21) in the ascent and descent.
[0047]The containers in either embodiment may be configured on their outer surface with water flow devices to aid in the containers' stability as they move through the liquid medium.
[0048]The rotational gravity/buoyancy power generating apparatus in either embodiment may utilize a flywheel on either or both shafts to assist with the smooth rotational operation.
[0049]Additionally the present invention, in any embodiment, may be used in industrial facilities where a quantity of gas is produced as a waste or by-product.
The facility may be adapted to capture this gas and route such for use as the gas source for rotational gravity/buoyancy power generator.

Floating buoy turnover hydraulic power output device
CN102913381

- **Patent Assignee**
  WEIGO ZHANG ZHANG WEIGUO
- **Inventor**
  ZHANG WEIGUO
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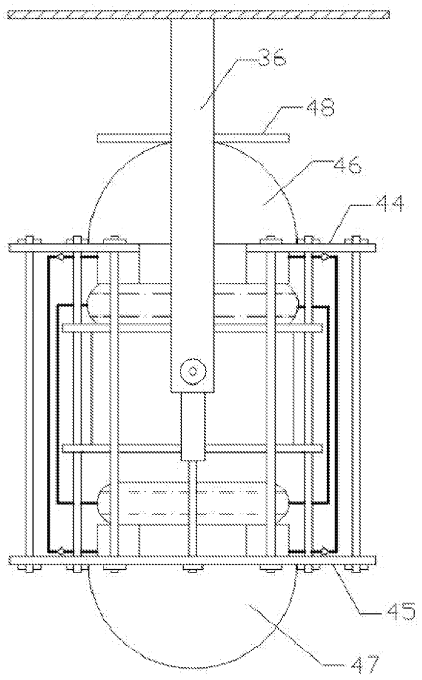
- **Abstract:**
  (WO201471826)
  A floating buoy turnover hydraulic power output device, comprising a buoy (1), an outer frame support (2), support stands (35, 36), a power turnover mechanism (27), and a hydraulic actuator (41). The upper end and lower end of the buoy (1) are respectively provided with an upper connecting rod (5) and a lower connecting rod (6) respectively connected with pistons (7, 8) of two hydraulic cylinders (3, 4) on the upper part and lower part of the outer frame support (2). Oil inlets and outlets of the hydraulic cylinders (3, 4) are respectively installed with one-way valves (13, 14, 15, 16). The one-way valves (13, 14, 15, 16) are respectively connected to a hydraulic oil tank (40) and a high pressure accumulator (42) via high pressure oil pipes (17, 18). The outer frame support (2) has a pass-through structure. Rotary shafts (23, 24) are installed in the middle of the outer frame support (2), and are slidably connected to the outer frame support (2). The power turnover mechanism (27) is connected to the rotary shafts (23, 24). The device can continuously and circularly rotate around the rotary shafts (23, 24) under little external force, and can release the buoy (1) during the rotation to convert buoyancy potential energy into hydraulic energy. Combined use of a set of the devices can continuously force hydraulic oil into the high pressure accumulator (42) for direct use.



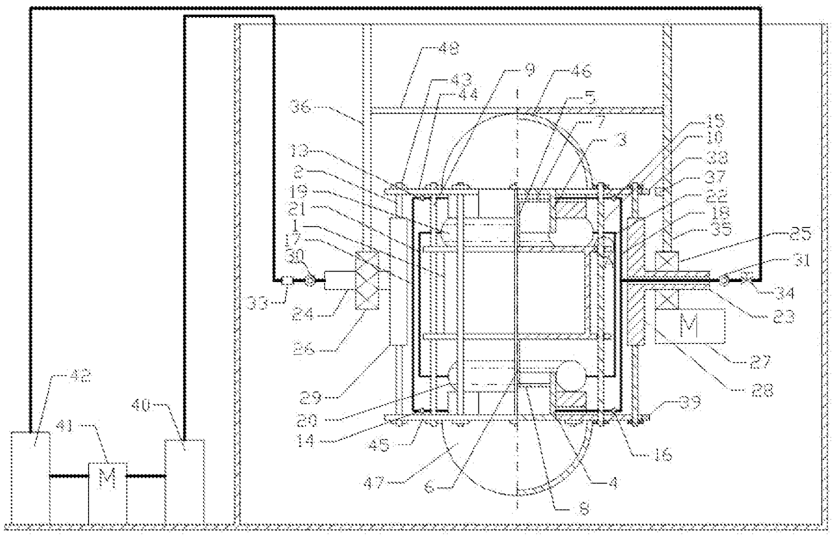


Figure 1

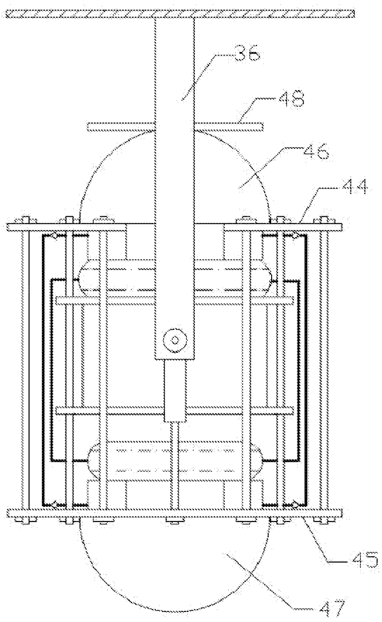


Figure 2

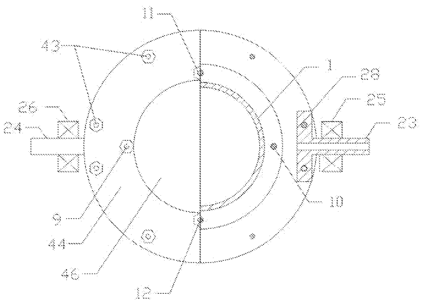


Figure 3

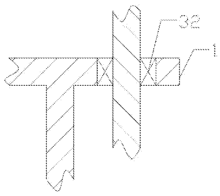


Figure 4

Description
(EP2918822)
FIELD OF THE TECHNOLOGY
[0001] The present application relates to a power source conversion device, and in particular to a floating buoy turnover hydraulic power output device for converting buoyancy potential energy into hydraulic energy.
BACKGROUND
[0002] There are a lot of solar, wind, hydro, tidal and other renewable energy sources in the nature.
However, those energy sources have high energy dispersion, low level of utilization, and low efficiency in energy conversion.
Nowadays, hydraulic power basically uses water as gravitational potential energy to generate energy.
The above-mentioned renewable energy sources are not controllable.
Hydro power generation is often limited by natural condition.
Their construction and utilization are not very convenient.
However, water as a clean energy can contain a huge buoyancy potential energy.
If the buoyancy potential energy is utilized, it can greatly improve the efficiency.
In response to national energy strategy to vigorously promote energy conservation and efficient energy technology innovation, the present invention is a pioneer of new thoughts on energy development and improvement of efficiency of energy conversion.
[0003] Chinese Patent CN201210110047.4 provides a device for converting buoyancy potential energy of a non-traditional power source into power output.
It discloses a strong submerge-type energy conversion power output apparatus.
The apparatus includes a buoyancy tank, a buoyancy conversion power unit, a turnover track, a guide rail, a submergence drive control shaft, a submergence position lock, and an anti-buoyant position lock.
The control mechanism can be turned over by the buoyancy conversion power unit.
This achieves the conversion of buoyancy energy to mechanical energy.
Weight adjustment can make it possible to use little energy input to generate a lot of buoyancy potential energy.
Instant mechanical energy conversion can be utilized or can be used to generate electricity.
However, the structure of the buoyancy potential energy conversion device is complicated.
Friction and wearing of various components are large, and efficiency of energy conversion is not high.
The buoyancy potential energy conversion device is difficult to control and become industrialized.
SUMMARY
[0004] The technical problem to be solved is to provide a high efficient output device which is simple in structure, easy to operate, less in friction and wearing, high in energy conversion efficiency, more stable and reliable, able to more fully convert buoyancy potential energy to industrialized hydraulic power.
[0005] The device of the present application can solve the above-mentioned technical problems by implementing the following technical solutions.
The device of the present application may include a buoy, an outer frame support, support stands, a power turnover mechanism, and a transmission mechanism.
An upper end and a lower end of the buoy may be provided respectively with an upper connecting rod and a lower connecting rod, which may be connected with pistons of hydraulic cylinders provided on upper part and lower part of the outer frame support respectively.
The outer frame support may be provided at a periphery of the buoy and formed by bottom plates and a plurality of fixing rod.
The outer frame support may be provided with rotary shafts, and may be connected to the support stands through the rotary shafts.
The power turnover mechanism may be connected to the rotary shaft.
Oil inlets and oil outlets of the hydraulic cylinders are respectively installed with one-way valves.
The transmission mechanism may include hydraulic cylinders, one-way valves, high pressure oil pipes, a hydraulic oil tank, a hydraulic actuator and a high pressure oil accumulator.
[0006] For better results, the device of the present application can also implement the following technical measures.
The rotary shafts can be formed on slidable connectors slidably connected to the outer frame support, and a pushing device may be provided between the support stands.
Pushing device can be a pressing plate or a pushing rod.
Rotary shafts can be provided with bearings and connected with support stands through the bearings.
The rotary shafts may have a hollow portion, and high pressure oil pipes can pass through the hollow portions of the rotary shafts, and connected to a hydraulic oil tank and a high pressure oil accumulator through rotary couplers respectively.
A flow switch may be provided between the rotary coupler and the hydraulic oil tank.
A hydraulic control valve may be provided between the rotary coupler and the high pressure oil accumulator.
The buoy may be movably connected with at least a pair of guide rods provided on corresponding positions on an inner side of the outer frame support.
Turnover buoys may be provided on the bottom plates respectively.
Air dynamic balancers may be provided around outer sides of the hydraulic cylinders respectively.
The air dynamic balancers may be connected by at least one air-venting pipe.
The air dynamic balancers may be in the form of air bags.
The support stands may be provided with a magnetic induction switch, and magnets may be provided on corresponding positions on the outer frame support.
Middle portion of the fixing rod may be provided with a counter weight.
[0007] The device of the present application uses counterweight to suspend the device in water in microgravity state.
Under the action of a little force, continuous rotation of the device about rotary shafts can be achieved.

During rotation, buoy is released to realize the conversion of buoyancy potential energy to hydraulic energy, A combination of a set of devices can be used to continuously press hydraulic oil into high pressure oil accumulator for direct use or for use in hydraulic generators.
BRIEF DESCRIPTION OF THE DRAWINGS
[0008]
Fig. FIG. 1 is a partial sectional front view of an embodiment of the device of the present application;
Fig.
FIG. 2 is a side view of the device of the present application;
Fig.
FIG. 3 is a half sectional top view of the device of the present application; and
Fig.
FIG. 4 is an enlarged view of embodiment A of the present application.
DETAILED DESCRIPTION
[0009] The device of the present application will be described in detail below with reference to an embodiment thereof.
[0010] The device of the present application may include a buoy 1, an outer frame support 2, support stands 35, 36, a power turnover mechanism 27 and a transmission mechanism.
The transmission mechanism may include hydraulic cylinders 3, 4, one-way valves 13, 14, 15, 16, high pressure oil pipes 17, 18, a hydraulic oil tank 40, a hydraulic actuator 41 and a high pressure oil accumulator 42.
The outer frame support 2 may have a pass-through structure.
The outer frame support 2 may be provided at the periphery of the buoy 1, and formed by upper and lower bottom plates 44, 45 and a plurality of fixing rod 43.
The buoy 1 can be movably connected to two pairs of guide rods 9, 10, 11, 12 provided at corresponding positions at an inner side of the outer frame support 2.
An upper end and a lower end of the buoy 1 may be provided respectively with upper and lower connecting rods 5, 6, which may be connected with pistons 7, 8 of hydraulic cylinders 3, 4 provided on the upper and lower bottom plates 44, 45 of the outer frame support 2 respectively.
The upper and lower bottom plates 44, 45 may further be provided with turnover buoys 46, 47.
Oil inlets of the two hydraulic cylinders 3, 4 may be provided with one-way valves 13, 14 respectively.
Oil outlets of the two hydraulic cylinders 3, 4 may be provided with one-way valves 15, 16 respectively.
Air dynamic balancers, such as air bags 19, 20 may be provided around outer sides of the hydraulic cylinders 3, 4 respectively.
The air bags 19, 20 may be connected by two air-venting pipes 21, 22.
Slidable connectors 28, 29 may be slidably connected to the outer frame support 2.
Rotary shafts 23, 24 can be provided on the slidable connectors 28, 29 respectively.
The rotary shafts 23, 24 may be connected to support stands 35, 36 through bearings 25, 26 respectively.
The rotary shafts 23, 24 may have a hollow portion.
High pressure oil pipe 17 connected to the one-way valves 13, 14 may pass through the hollow portion of the rotary shaft 24 and connect with hydraulic oil tank 40 through rotary coupler 30 and flow switch 33.
High pressure oil pipe 18 connected to the one-way valves 15, 16 may pass through the hollow portion of the rotary shaft 23 and connect with high pressure oil accumulator 42 through rotary coupler 31 and hydraulic control valve 34.
High pressure oil pipes 17, 18 may take the form of soft pipes.
Pressing plate 48 may be provided between the support stands 35, 36.
The pressing plate 48 may be arc-shaped.
Except for the support stands 35, 36, the weight of the entire device can be the same as the buoyancy of the buoy 1.
This renders the entire device, except for the support stands 35, 36 and the arc-shaped press plate 48, to reach a suspending microgravity state in water.
The power turnover mechanism 27 may be connected with the rotary shafts 23, 24.
The support stand 35 may be provided with a magnetic induction switch 37.
Magnets 38, 39 may be installed on corresponding positions on the outer frame support 2.
Hydraulic actuator 41 can be connected with the high pressure oil accumulator 42 and the hydraulic oil tank 40 through oil pipes.
[0011] The device of the present application can be realized in the following way.
When the device is running, support stands 35, 36 can be fixed in a vertical position.
The entire device can be submerged in water.
Except for the support stands 35, 36, the weight of the entire device can be the same as the buoyancy of the buoy 1.
Except for the support stands 35, 36, the entire device can be in a suspending microgravity state.
Little external force can be exerted by the power turnover mechanism 27 to drive the outer frame support 2 to rotate about the rotary shafts 23, 24.
Under the action of the arc-shaped pressing plate 48, the turnover buoys 46, 47 mounted on the bottom plates 44, 45 causes the outer frame support 2 and rotary shafts 23, 24 to slide simultaneously when they are rotating.
This makes the entire device in the suspending microgravity state to sink easily.
When the outer frame support 2 rotates to a vertical position, the entire device sinks to the lowest position.
The rotary shafts 23, 24 slide to the highest position of the outer frame support 2 by means of the slidable connectors 28, 29.
At this moment, the magnet induction switch 37 receives a sensing signal from the magnet 38.
The power turnover mechanism 27 stops rotating.
At this moment, the buoy 1 is located at the lower half portion of the entire device.
When the magnetic induction switch 37 senses the signal from the magnet 38, it opens the hydraulic control valve 34 at the same time.

Under the action of the strong buoyancy, the buoy 1 moves upwards and pushes piston 7 of the hydraulic cylinder 3.
Leading by the one-way valve 13, hydraulic oil is pressed into the high pressure oil accumulator 42 through high pressure oil pipe 18 and hydraulic control valve 34.
At the same time, under the pulling force of the buoy 1, piston 8 of the lower hydraulic cylinder 4 is pulled.
Leading by the one-way valve 14, hydraulic oil is sucked from the hydraulic oil tank 40 into the hydraulic cylinder 4 through flow switch 33 and high pressure oil pipe 17.
When the buoy 1 moves to the piston near the maximum end of the journey, the upward moving force of the buoy 1 presses the air bag 19, making the air inside the air bag 19 to be discharged into air bag 20 through the two air-venting pipes 21, 22.
This completes a working journey.
[0012] When the buoy 1 pushes the piston 7 of the upper hydraulic cylinder 3 to reach the maximum end of the journey, hydraulic oil stops flowing.
The flow switch 33 sends out a signal.
The turnover mechanism 27 starts to work, and the entire device rotates.
At the same time, the magnetic induction switch 37 receives an induced signal from the magnet 38 and closes the hydraulic control valve 34 so that the buoy 1 cannot move up or down but rotate together with the outer frame support 2.
The buoy 1 and the outer frame support 2 turn over together with the aid of the air-filled air bag 20 and the buoyancy of the turnover buoy 47 mounted on the bottom plate 45 as well as the little external force of the power turnover mechanism 27.
When the buoy 1 and the outer frame support 2 rotate, the turnover buoy 47 mounted on the bottom plate 45 is acted upon by the arc-shaped pressing plate 48, and the outer frame support 2 and the rotary shafts 23, 24 slide when they are rotating.
This makes the entire device in the suspending microgravity state to sink easily.
When the entire device rotates 180 degrees to a vertical position, the entire device in the suspending microgravity state sinks to the lowest position.
The rotary shafts 23, 24 slide to the highest position of the outer frame support 2 by means of the slidable connectors 28, 29.
The buoy 1 is again located at the lower half portion of the entire device.
The buoy 1 reaches secondary buoyancy energy storage.
At this moment, the magnetic induction switch 37 receives a sensing signal from the magnet 39.
The power turnover mechanism 27 stops rotating.
The hydraulic control valve 34 is opened at the same time and the buoy 1 moves upwards.
It then enters into the next cycle working state.
As it continues, the floating buoy turnover hydraulic power output device repeats its motion and continues to generate hydraulic power.
[0013] Through the combination of a set of the devices, high pressure hydraulic oil continues to enter the high pressure oil accumulator 42.
Outlet of the high pressure oil accumulator 42 connects to the hydraulic actuator 41.
Hydraulic oil discharged from the hydraulic actuator 41 regulates the back pressure and returns to the hydraulic oil tank 40, and completes the close cycle system of the hydraulic oil.
Hence, it completes a power transmission cycle.
The power turnover mechanism 27 can adopt wind, light, electricity, hydraulic, air pressure as its power.
The pressing plate 48 can take the form of a pressing rod.
When the entire device rotates to a vertical position, the pressing rod can move and press the entire device downwards.
This has the same technical effect of the pressing plate 48.
The hydraulic actuator 41 can be a hydraulic power generator for converting hydraulic power to electrical power.
The hydraulic actuator 41 can also be a hydraulic motor or a hydraulic tank for converting hydraulic power to mechanical power.

Original Description

(WO201471826)

TECHNICAL FIELD
本发明属于动力能源转换设备领域，具体涉及一种能够将浮力势能转换为液压能的悬浮式浮筒翻转液压动力输出装置。
BACKGROUND ART
在自然界存在大量的太阳能、风能、水力能、潮汐等可再生能源，但是这类能源存在分散度高，利用水平低，能量转换效率低等不足。
目前，水力能基本上都是利用水的重力势能进行发电，以上再生能源都存在着不可控性。
水力发电往往受自然条件的限制，其建造和使用上都不是很方便。
但水作为清洁能源，其还蕴涵着巨大的浮力势能，该浮力势能加以利用可大幅度提高效率。
为响应国家能源战略，大力促进节能减排和高效节能的技术创新，本发明开拓了能源开发新思路和提高了能源转变的效率。
中国发明专利CN201210110047.4提供了一种将非传统能源的浮力势能转换动力输出的装置，公开了一种强沉式浮力能转换动力输出装置，装置包括浮力池、浮力转换动力器、翻转轨道、导引轨道、沉降传动控制轴、沉降定位锁、防浮升定位锁，通过浮力转换动力器翻转控制机构，实现了浮力能向机械能的转换，通过配重调整使得可以用较小的能量输入即可产生较大的浮力势能，并可在瞬间转换为机械能加以利用或用于发电。
但是类似浮力势能转换设备结构复杂，各零部件之间摩擦、损耗较大，转换效率不高，可控差和产业化难等缺点。
DISCLOSURE
本发明要解决的技术问题是提供一种结构简单，操作简便，摩擦、损耗较小，能量转换效率更高且工作更稳定可靠，能够更充分地将液体浮力势能转换为产业化液压动力的高效输出装置。
本发明可以通过实施以下技术方案来解决上述现有技术问题：
本发明包括浮筒、外框支架、支座、动力翻转机构和传动机构，浮筒的上、下两端分别设有上、下连接杆，其分别与设在外框支架上、下部的液压缸之活塞相连接；外框支架设在浮筒的周边，并由底板和固定杆构成；外框支架上安装有旋转轴，并通过旋转轴与

支座相连；旋转轴与动力翻转机构相连接；液压缸的进、出油口管路上分别装有单向阀。
传动机构由液压缸，单向阀，高压油管，液压油箱，高压油蓄能器和液压执行元件组成。
为了获得更佳的使用效果，本发明还可以实施下列技术措施：
旋转轴安装在与外框支架滑动连接的滑动连接器上，支座间装有推压装置，推压装置是压板或是推压杆；旋转轴上安装有轴承，并通过轴承与支座相连；旋转轴中间空心，高压油管穿过旋转轴的空心部位并通过旋转接头分别与液压油箱和高压油蓄能器相连；旋转接头与液压油箱之间接有流量开关；旋转接头与高压油蓄能器之间接有液压控制阀；浮筒与设置在外框支架内侧相应位置的至少一对导杆活动连接；底板上安装有翻身浮筒；液压缸外侧分别套有空气动态平衡器；空气动态平衡器是气囊；空气动态平衡器之间通过至少一根通气管相连接；支座上装有磁感应开关，外框支架的相应位置装有磁体；固定杆中部安装有配重块。
本发明通过配重使装置悬浮水中处于微重力状态，在较小外力的作用下使装置以旋转轴为中心发生连续循环旋转，在旋转过程中通过释放浮筒实现了浮力势能向液压能的转换，通过多组该装置组合使用，连续将液压油压入高压油蓄能器内即可直接利用或用于液压发电机发电。
DESCRIPTION OF DRAWINGS
图1 本发明实施例主视局部剖视图；
图2 本发明实施例左视图；
图3 本发明实施例俯视半剖视图；
图4 本发明实施例A局部放大图。
BEST MODE
下面结合实施例具体对本发明进行说明。
本发明装置包括浮筒1，外框支架2，支座35、36，动力翻转机构27和传动机构；传动机构由液压缸3、4，单向阀13、14、15、16，高压油管17、18，液压油箱40，液压执行元件41和高压油蓄能器42组成；外框支架2为通透结构，外框支架2设在浮筒1的周边，并由底板44、45和固定杆43构成；浮筒1与设置在外框支架2内侧相应位置设置的两对导杆9、10、11、12通过直线轴承32活动连接；浮筒1的上、下两端分别设有上、下连接杆5、6，其分别与设在外框支架2上、下底板44、45上的两只液压缸3、4之活塞7、8相连接；上、下底板44、45上还安装有翻身浮筒46、47；两只液压缸3、4的进油口上分别装有单向阀13、14，出油口上分别装有单向阀15、16；两只液压缸3、4外侧分别套有气囊19、20，气囊19、20通过两根通气管21、22相连；滑动连接器28、29与外框支架2滑动连接，滑动连接器28、29上安装有旋转轴23、24，旋转轴23、24分别通过轴承25、26与支座35、36相连，旋转轴23、24中间空心，与单向阀13、14连接的高压油管17穿过旋转轴24的空心部位通过旋转接头30和流量开关33与液压油箱40相连，与单向阀15、16连接的高压油管18穿过旋转轴23的空心部位通过旋转接头31和液压控制阀34与高压油蓄能器42相连，高压油管17、18是软管结构；支座35、36间装有压板48，压板48呈弧形结构；除支座35、36外的装置整体受到的重力与浮筒受到的浮力相等，使得除支座35、36和弧形压板48外的装置整体在水中达到悬浮呈微重力状态；动力翻转机构27与旋转轴23、24相连；支座35上装有磁感应开关37，外框支架2的相应位置装有两个磁体38、39；液压执行元件41通过油管与高压油蓄能器42和液压油箱40相连。
本发明是这样实现的：在装置运行时，支座垂直固定，装置整体沉入水中，除支座外的装置整体在水中的重力和受到浮力相等，除支座外的装置整体处于悬浮的微重力状态，通过动力翻转机构27施加比较小的外力使外框支架2绕着旋转轴23、24旋转，底板44、45上安装的翻身浮筒46、47在弧形压板48的作用下，使得外框支架2与旋转轴23、24在转动的同时发生滑动，使处于微重力悬浮状态的装置整体轻松下沉，当外框支架2旋转达到垂直状态时，装置整体下沉到最低处，旋转轴23、24通过滑动连接器28、29滑到外框支架2的最高处，此时磁感应开关37接收到磁体38的感应信号，动力翻转机构27停止运转，此时浮筒1处装置整体内的下半部，磁感应开关37感应磁体38信号的同时打开液压控制阀34，浮筒1在强大浮力作用下向上运动，推动上面液压缸3的活塞7，液压油在单向阀13引导下通过高压油管18经液压控制阀34压入高压油蓄能器42中；同时下面液压缸4的活塞8在浮筒1的拉力作用下，液压油在单向阀14引导下经流量开关33通过高压油管17从液压油箱40中吸入到液压缸4中，当浮筒运至活塞接近行程最大端时，浮筒1向上运动的力量压缩气囊19，使气囊19中的气体通过两根通气管21、22排入至气囊20中，这样就完成了一个做功行程。
当浮筒1推动上面液压缸3的活塞7到达行程最大端时，液压油停止流动，流量开关33发出信号，翻转机构27开始工作，整体装置旋转，同时磁感应开关37接收到磁体38的离开感应信号后关闭液压控制阀34，使浮筒1不能发生上下位移并随外框支架2一起旋转运动，借助充满气体的气囊20和底板45上安装的翻身浮筒47的浮力和翻转机构27施加比较小的外力使外框支架2和浮筒1一起翻转，外框支架2和浮筒1旋转时底板45上安装的翻身浮筒47又受到弧形压板48的作用，外框支架2与旋转轴23、24在转动的同时发生滑动，使处于微重力悬浮状态的装置整体轻松下沉，当旋转到180度装置整体又转到垂直位置时，处于微重力悬浮状态的装置整体再下沉到最低处，旋转轴23、24通过滑动连接器28、29滑到外框支架2的最高处，浮筒1又处于装置整体内的下半部份，浮筒1达到二次浮力蓄能；此时磁感应开关37接收到了磁体39的感应信号，动力翻转机构27停止运转，同时打开液压控制阀34，浮筒1又向上运动，进入下一循环工作状态，周而复始，悬浮式浮筒翻转液压动力输出装置重复运动连续产生液压能。
通过多组装置优化组合使用，高压液压油将连续进入高压油蓄能器42中，高压油蓄能器42的高压油出口连接上液压执行元件41做功，液压执行元件41排出的液压油调好背压又回到了液压油箱40中，也完成了液压油的循环闭式系统，由此完成一个动力传递循环。
翻转机构27可以采用风、光、电、水、液压、空压等为动力。
压板48也可以是推压杆，当装置整体旋转到垂直位置后，推压杆运动将装置整体下压，实现与压板48相同的技术效果。
液压执行元件41可以是液压发电机，将液压能转化为电能；液压执行元件41也可以是液压马达或液压缸，将液压能转化为机械能。

Engine for energy conversion
US20100024413

- **Patent Assignee**
  KIM SEONG WOONG
- **Inventor**
  KIM SEONG WOONG
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  2013US-13841137 2013-03-15

- **Fampat family**

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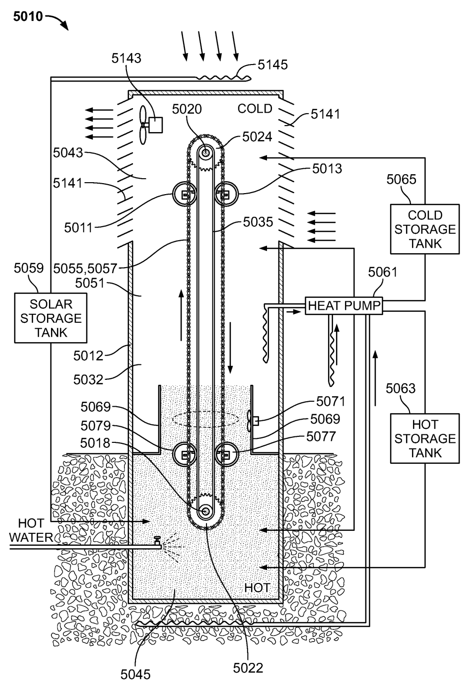
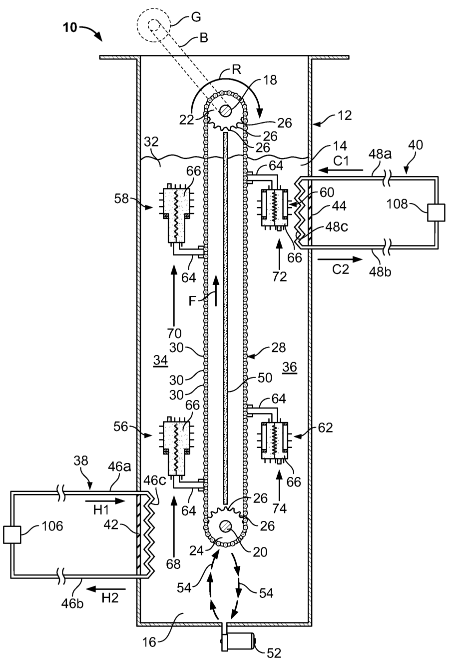
WO2010017127	A2	2010-02-11	[WO201017127]
WO2010017127	A3	2010-05-06	[WO201017127]
US2013205768	A1	2013-08-15	[US20130205768]
US9267489	B2	2016-02-23	[US9267489]

- **Abstract:**
  (WO201017127)
  AP engine (10) is powered by a hot liquid zone (34) and a cold liquid zone (36). A plurality of fluid-tight containers (56, 58, 60, 62), each containing a working find (66) which expands when exposed to the hot liquid zone (34) and contracts when exposed to the cold liquid zone (36), are attached to a loop (28) which rotates over sprockets (22, 24) attached to shafts (18, 20). The difference in the buoyant forces (68, 70) acting on the containers (56, 58) exposed to the hot squid zone (34) versus the buoyant forces (72, 74) acting on the containers (60, 62) exposed to the cold liquid zone (36) produces motion in the loop (28) which imparts rotational kinetic energy to the shafts (18, 20).




10
G
B
R
18
22
26
26
26
12
32
14
C1
48a
40
66
64
58
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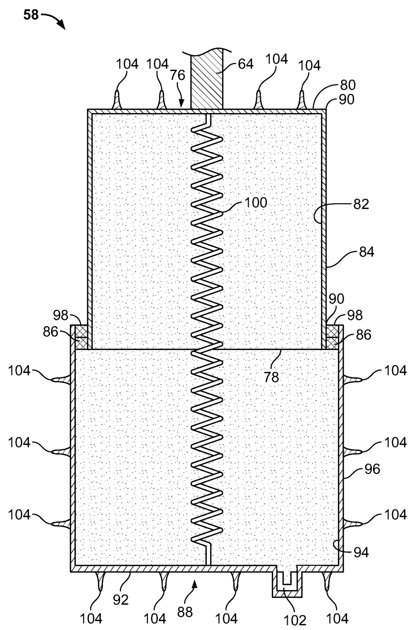
44
108
48c
66
64
72
C2
48b
F
70
30
28
34
30
36
50
30
64
66
56
62
38
46a
46c
66
64
H1
26
106
42
24
26
20
68
54
54
46b
H2
16
52

FIG. 1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104
104
76
64
104
104
80
90
100
82
84
90
98
98
86
86
78
104
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96
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104
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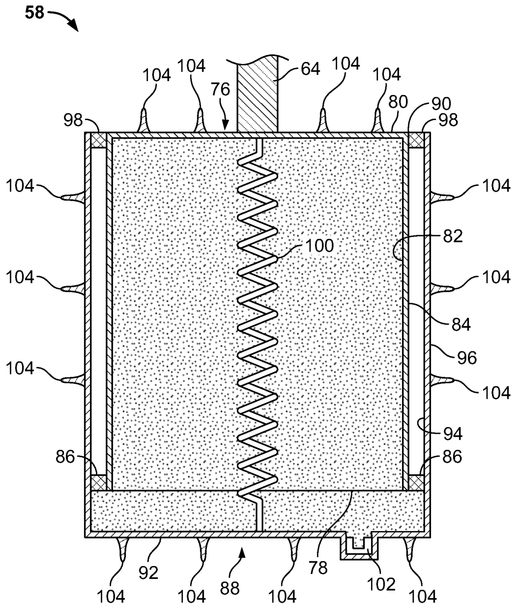
104
88
104
102
104

FIG. 2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64
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104
80
90
98
98
104
104
82
100
104
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84
96
104
104
94
86
86
92
88
78
102
104
104
104
104

FIG. 3

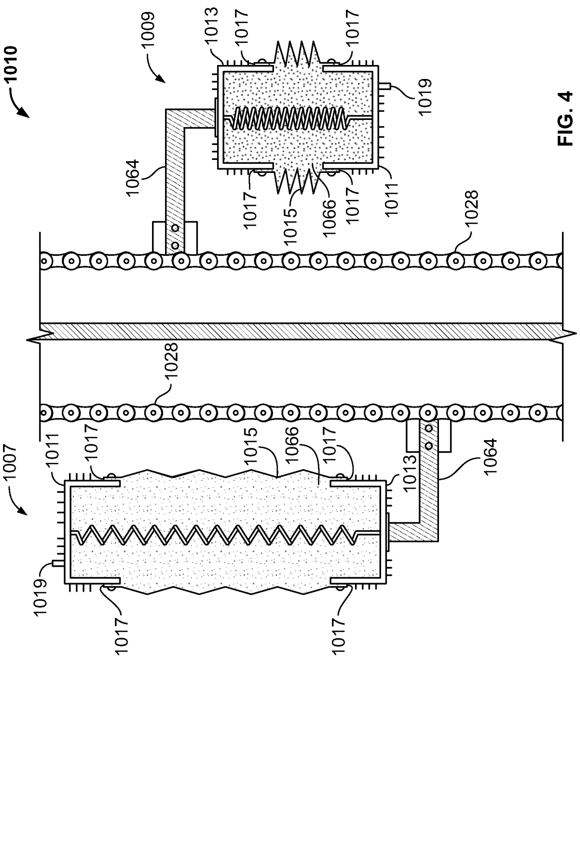
1010
1009
1013
1017
1017
1019
1064
1017
1015
1066
1017
1011
1028
1028
1007
1011
1017
1015
1066
1017
1013
1064
1019
1017
1017

FIG. 4

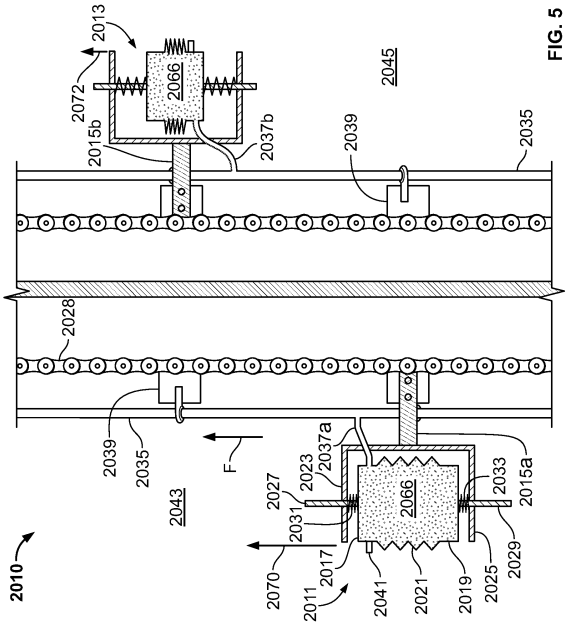
2010
2013
2072
2015b
2066
2037b
2045
2039
2035
2028
2039
2035
F
2043
2027
2023
2037a
2031
2066
2033
2015a
2070
2017
2011
2041
2021
2019
2025
2029

FIG. 5

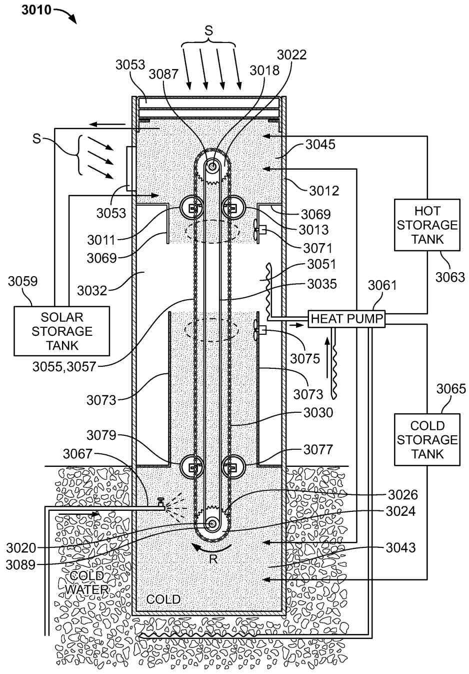
3010
S
3053
3087
3018
3022
S
3045
3012
3053
3069
3011
3013
3069
3071
3051
3032
3035
HOT STORAGE TANK
3063
3059
3061
SOLAR STORAGE TANK
HEAT PUMP
3055,3057
3075
3073
3073
3065
3030
COLD STORAGE TANK
3079
3077
3067
3026
3024
3020
3043
3089
R
COLD WATER
COLD

FIG. 6

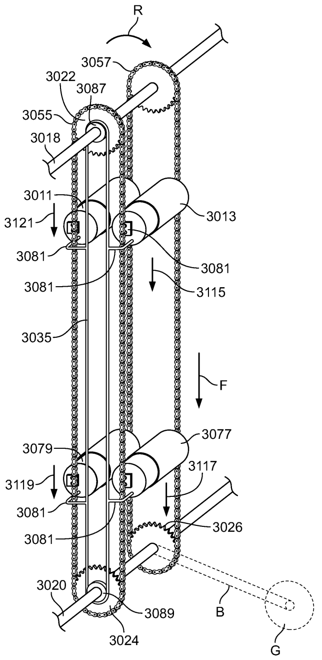

FIG. 7

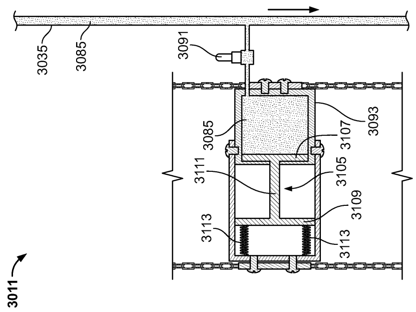

FIG. 8B

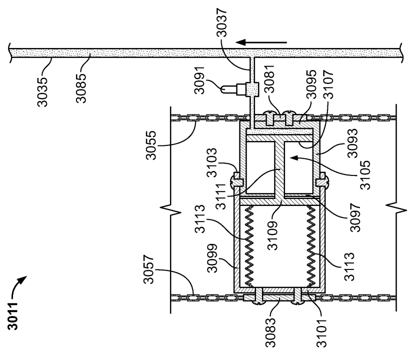

FIG. 8A

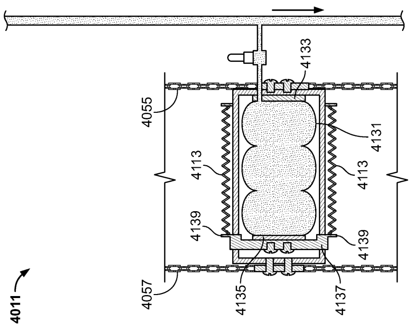

FIG. 9B

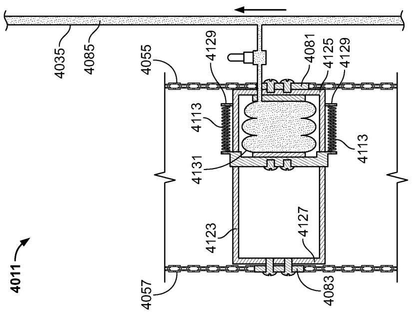

FIG. 9A

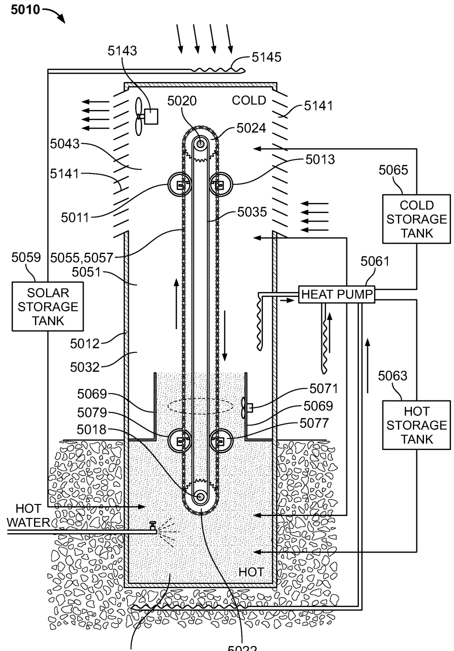

FIG. 10

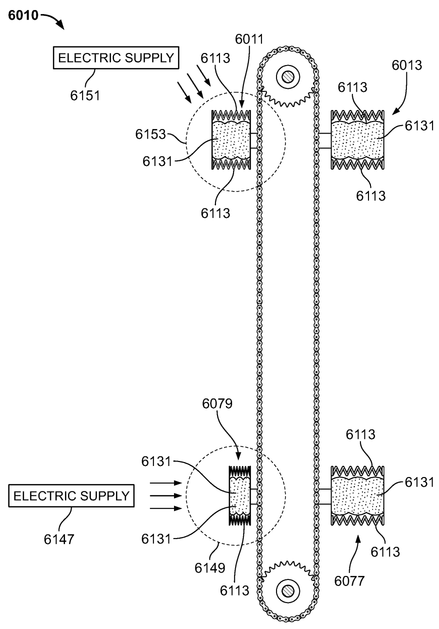
6010
ELECTRIC SUPPLY
6151
6113
6011
6013
6113
6131
6153
6131
6113
6113
6079
6113
6131
ELECTRIC SUPPLY
6147
6131
6131
6149
6113
6113
6077

FIG. 11

Description
(WO201017127)

ENGINE FOR ENERGY CONVERSION
Cross-Reference to Related Application
(-)5 The present invention claims the benefit of U S Provisional Patent
Application Sena! No 81/085,978 filed August 4 2008 and U S Non-Provisional Patent Application Sena! No 12/533,031 filed July 31, 2009, the disclosures of both of which are incorporated herein by reference in their entirety
ic Field of the Invention
The present invention relates to an engine for converting thermal energy to kinetic energy
Background of the Invention
3 b The conversion of thermal energy to kinetic energy has lorg been utilized in the production of work Many of the conversions use un-renewabie thermal energy sources such as oil, coal, and/or natural gas which pollute the environment with undesirable by-products of combustion (e g carbon dioxide) It is therefore desirable to use renewal thermal energy sources such as geothermal to .deg.'i produce kinetic energy
Summary of the Invention
An engine for converting thermal energy to kinetic energy indudes a body of fluid having a first zone and second zone A thermal energy source is / S thermally connected to the first zone for providing thermal energy to the first zone, while a thermal energy sink \s thermally connected to the second zone for removing thermal energy from the second zone A movable loop also extends between the first zone and the second zone, while fluid-tight containers are immersed m the bodyof fluid and are attached to the ioop.
Each of the containers are moveabi.beta. between the first zone and the second zone and has a working fluid therein.
The working fluid of each of the containers absorbs therma! energy and thereby causes a corresponding one of the containers to expand to a first voiume when the corresponding one of the containers is in the first zone and releases therma! energy therefrom and thereby causes the corresponding one of the containers to contract to a second voiume when the corresponding one of the containers is in the second zone, whereby the expansion and contraction of the containers cause the containers and hence the loop to move,
Brief Description of the Drawings
For a more complete understanding of the present invention, reference is made to the following detailed description of exemplary embodiments considered in conjunction with the accompanying drawings, in which: FIG. 1 is a cross-sectional schematic side view of an engine constructed in accordance with a first embodiment of the present invention, the engine having a piuraiity of fluid-tight containers depicted in sectional views for clarity;
FfG. 2 is an enlarged cross-sectiona! view of one of the gas tight containers shown in FlG. 1, the container being shown in its contracted position;
FlG. 3 is an enlarged cross-sectionai view of one of the containers shown in FlG. 1, the container being shown in its expanded position; and
F^G. 4 is partial cross-sectional schematic side view of an engine constructed in accordance with a second embodiment of the present invention.
Detailed[..]Description of the Exemplary Embodiment
FIG 1 illustrates an engine 10 constructed in accordance with an exemplary embodiment of the present invention for converting thermal energy into kinetic energy The engine 10 has a housing 12, which has an upper area 14 and a lower area 18 Upper and lower shafts 18, 20 are rotatabiy supported by the housing 12 sn the upper and lower areas 14 16, respectively and include upper and lower sprocKets 22 24, respectively which are fixedly mounted thereon and each of which ss equipped with teeth 26 A loop of chain 28 (e g, a loop of roller-chain bel; cable, etc) a plurality of links 30 is provided so as to roll over the upper arcs lower
10 sprockets 22, 24 More particularly, the links 30 of the chain 28 are adapted (()o mesh with the teeth 26 of the upper and lower sprockets 22 24 so that longitudinal movement in the chain 28 produces rotational movement in the sprockets 22, 24 and hence the upper and lower shafts 18, 20
Liquid 32 (e g water or any other suitable fluid) is contained tn the
(1) 1 housing 12 and has a hot liquid zone 34 and a cool liquid zone 36 A thermal energy source 38 and a thermal energy ssnk 40 are connected to the hot and cold hquid zones 34 36 respectively, and are retained by liquid-tight seals 42, 44, respectively The thermal energy source 38 includes pipes or tubes 46a 46b and a heat exchanger 46c which is connected to the pipes 46a, 46b, for providing thermal
/(A) energy to the hot liquid zone 34 More particularly hot liquid or gas (not shown), which is heate.alpha. by a renewable energy source 106 (e g, solar, geotherma(s) ocean- thermal, etc ()), lows through the pipe 46a into the hot liquid zone 34 (as indicated by arrow Hi in FIG 1) The hot liquid or gas then flows through the heat exchanger 46c, wherein thermal energy is transferred to the hoi liquid zone 34 and ott of the
2 ^ hot quid zone 3^ through the pipe 46b (as indicated by arrow H2 m FfG 1) S'msiar-y the thermal energy s nk 40 includes pipes or tubes 48a, 48b and a heat exchanger 48c, which ss connected to the pipes 48a 48b, for removing thermalenergy from the cold liquid zone 36 More particularly, cold liquid or gas (not shown) which ss cooled by a renewable energy s<nk 108 (e g geotnermai, ocean- thermal etc } flows through the tubing 48a into the cold liquid zone 38 (as indicated by arrow Cl sn FiG 1) The cold liquid or gas then flows through the heat exchanger 48c wherein thermal energy is removed from the cold liquid zone 36, and out of the cold liquid zone 36 through the pipe 48b (as indicated by arrow C2 sn F!G 1} The heat exchanger 46c and the heat exchanger 48c may be provided with conventional heat transfer mechanisms (e g, fins) that facilitate the transfer of heat into and out of the hot and co>d liquid zones 34, 36 respectively Moreover, to promote heat excnange efficiently, the energy source 38 is positioned proximate the lower area 16 of the housing 12 while the energy sink 40 is positioned proximate the upper area 14 of the housing 12 (e g, proximate the upper sprocket 22)

A baffle 50 is positioned in the housing 12 (e g, within the confines of an inner loop formed by the cham 28} to abate the direct intermixing of thermal energy between the hot and coo! liquid zones 34 36 A water pump 52 <s also provided to create a circulating water current 54 that may be located proximate the lower area 16 of the housing 12 (e g, below the baffle 50 and outside tne cor fines of the chain 28) The circulating water current 54 forms a water curtain so as to further inhibit the intermixing of thermal energy between the hot liquid zone 34 and Ihe cold hquia zone 36 *n the lower area 18
Continuing to refer to FIG 1, gas or fluid-tight containers 56 58 60 62 are attached to the chain 28 by brackets 64 and are immersed sn the liquid 32 The containers 56 58, 60, 62 are adapted to move sequentially through the hot and cold zones 34, 36 so as to cause the chain 28 and the sprockets 22 24 to rotate In order to cause such rotation, each of the containers 56, 58, 60, 62 is provided with a working fluid 66 which may be air, carbon dioxide, refrigerant or any othe(r) fiusd know in the art The working fluid 66 is adapted to expand and contract in order to causethe vo ume of the containers 56 58, 60 62 to increase or decrease The construction and operation of the containers 56 58, 60, 62 will be discussed below in greater detail
Refernng to FIGS 2 and 3 the container 58 includes an inner cylinder -(-)> 76 which has an open end 78 and a closed end 80 and inner and outer surfaces 82, 84 The container 58 also includes an outer cylinder 88 having an open end 90 and a ciosed en.alpha. 92, as well as inner and outer surfaces 94 96 The outer cyimcer 88 is slidabiy attached to ihe inner cylinder 76 such that the outer cylinder 88 is m.alpha.veabie relative to the inner cylinder 76 between a collapsed position in which the inner
- o cylinder 76 (1)S positioned within the outer cylinder 88 (see FIG 3), and an expanded position,n wnsch the inner cylinder 76 extends outwardly from the outer cy.inder 88 (see FlG 2) A sealing ring 86 is positioned between the outer surface 84 of the inner cy(!) nder /.delta. and the inner surface 94 of the outer cylinder 88 proximate the open eva 78 so as to make the container 58 fluid tight At least one retaining nrg 98 -) is attache.alpha. to the outer cylinder 88 proximate the open end 90 so as to prevent the outer cy> ndes 88 from sliding off the inner cylinder 76 A con spnng 100 or other suitable elastomenc urging element is also attached to the closed end 80 of the inner cylinder 78 and the ciosed end 92 of the outer cylinder 88 so as to urge the outer cylinder 88 to move towards its collapsed position A valve 102 is provided far filling o the container 58 with the working fluid 66 Fins 104 are disposed o(n) the outer surfaces 84, 96 of the inner and outer cylinders 76 and 88 respectively so as to facilitate the transfer of heat into and out of the working fluid 66 contained therewith n The inner and outer cylinders 76 and 88 may be fabricated fron any suitable corrosion resistant thermally conductive materia* (e g plastic or metal)
' (-)> Each of the containers 56, 60, 62 has a construction and operation which are identical to those of the container 58 illustrated in FIGS 2 and 3 in such circumstances the specific construction of the containers 56 60, 62 wni not bediscussed herein
The operation of the engine 10 will now be discussed with reference to FIG 1 in FiG 1 the containers 56, 58 are located in the hot iiqui.alpha. zone 34 while the containers 60 82 are located sn the cold liquid zone 38 The working fluid 86 in o each of the containers 56, 58 absorbs thermal energy from the hot liquid zone 34 and expands, causing the outer cylinders 88 to move from their contracted positions (see FlG 3) O their expanded positions (see FiG 2} and thereby causing the volume of tne containers 58, 58 to increase (i e, the containers 56, 48 expand to an expanded volume) Since the working fluid 66 in the containers 56, 58 has an i 3 increased volume but the same mass it provides increased buoyant forces 68, 70 acting on the containers 56, 58 respectively in contrast, the working fluid 66 in each of the containers 60, 62 releases its thermal energy to the cold liquid zone 36 and contract, causing the outer cylinders 88 to move from their expanded positions (see e g, F>G 2) to their contracted positions (see e g, FiG 3} and thereby
3 1 causing the volume of the containers 60 62 to decrease {s e, the containers 60 62 contract to a decreased volume) Since the working fluid 66 in the containers 60, 62 has a decreased volume but the same mass, it provides decreased buoyant forces 72, 74 acting on the containers 60 62, respectively As a result, the sum of the buoyant forces 68, 70 acting on the containers 56, 58 is greater than t^e sun of the
/0 buoyant forces 72, 74 acting on the containers 60, 62, thereby resulting sn a resultant force F which causes the chain 28 to rotate sn a clockwise direction (as indicated by arrow R in F!G 1} As a result of the continuous flow of thermal energy into and out of the hoi and cold liquid zones 34, 36 respectively the containers 56, 58, 60, 62 continuously move between the hot and cold liquid zones 34, 36, thereby imparting z (1)^ continuously motion to the chain 28 The movement of the chain 28 imparts rotational kinetic energy to the upper and lower sprockets 22, 24 and hence the shafts 18 20 A suitable mechanism may be employed to store and/or utilize therotational kinetic energy of the shafts 18, 20 For example an electric generator G (snown sn phantom in FIG 1} may be driven by the shaft 18 via a belt B Ic convert the kinetic energy to electric energy ft should be noted that the present invention can have numerous modifications and variations For instance, the containers 56, 58 80, and 62 may be fabricated from expandable and contractible components that are formed in different Sizes and shapes such as a balloon-shaped bladder fabricated from a single piece of eiastomenc material Individual engines may be fabricated with a combination of differently sized and shaped containers The retaining ring 98 may also be sized and n shaped to function as a back-up sealing ring (i e, it may function as a secondary seal to contasn the working fluid 66 in the containers 56 58 60, 62, should the sealing ring 86 leak} The surface of the liquid 32 may be set at an elevat on (not shown) in the mousing ^2 such that the upper sprocket 22 is submerged sn the liquid 32 and the containers 56, 58 60, 62 are submerged in the liquid through their movement between the hot and cold liquid zones 34, 36
FlG &- illustrates a second exemplary embodiment of the present invention The elements illustrated in FIG 4, which correspond to the elements described above with reference to FIGS 1 - 3, have been designated by correspon.alpha.ing reference numerals increased by one hundred, while new elementso are designated by odd reference numerals in the one hundreds The embodiment shown in FfG 4 operates and is constructed m a manner consistent with the embodiment of FIGS 1 - 3, unless otherwise indicated
Referring to FIG 4, an engine 110 is illustrated having gas O- liqusd- tight containers 107 and 109 that are attached to a chain 128 by brackets 164 It is(!)J noted thai FlG 4 illustrates only a portion of the engine 110, whsch may be provided with additional containers (not shown) that are identical, in construction and operation, to the containers 107 and 09 it is noted that the engine 1 10 is identical tothe engine 10 in a!! respects, except that the containers 56, 58, 80. 62 are provided with a different construction. The construction of the containers 107. 109 is discussed below.
Each of the containers 107 and 109 has a pair of rigid caps 111, 113 that are attached to a bellow 115 by seals 1 17. The bellows 115 are fabricated out of flexible material such as rubber.

The bellows 115 facilitate the movement of the containers 107. 109 from a contracted position (see the container 109 in FIG. 4) to an expanded position (see the container 107 in FIG. 4) and visa versa.
The present invention provides a number of benefits.
For instance, the conversion of renewable thermal energy to kinetic energy is performed in an environmentally friendly and cost effective manner.
The production of kinetic energy is provided in a mechanically simple manner (i e., the force F produces motion in the chain 28 which imparts rotational kinetic energy to the sprockets 22, 24 and hence the shafts 18. 20).
It will be understood that the embodiments described herein are merely exemplary and that a person skilled in the art may make many variations and modifications without departing from the spirit and scope of the invention.
All such variations and modifications are intended to be included within the scope of the invention as defined in the appended claims.

Buoyant force power generation
US8646267

- **Patent Assignee**
  PEDZIWIATR EDWARD A
- **Inventor**
  PEDZIWIATR EDWARD A
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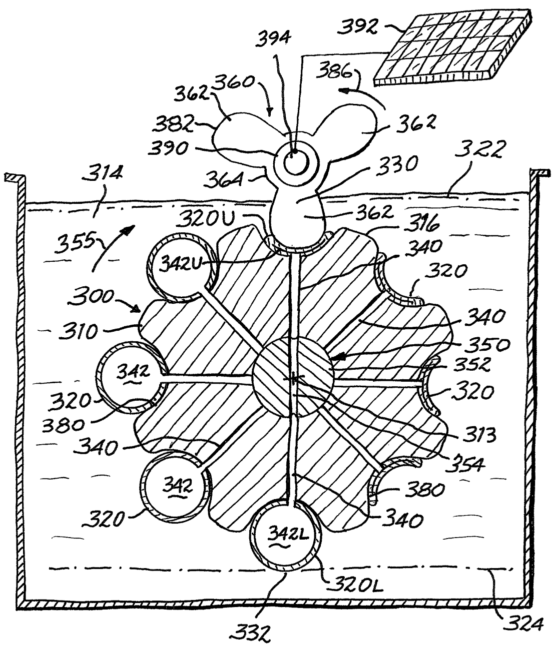
- **Abstract:**

(US8646267)
An underwater air or gas powered apparatus utilizes the buoyant force of water to generate power in the form of work or electricity. Air bags are spaced circumferentially around the perimeter of a rotary member immersed in water and are alternately inflated and deflated in a sequence enabling buoyant forces to rotate the rotary member. A generator is coupled to the rotary member for generating power in response to rotation of the rotary member.



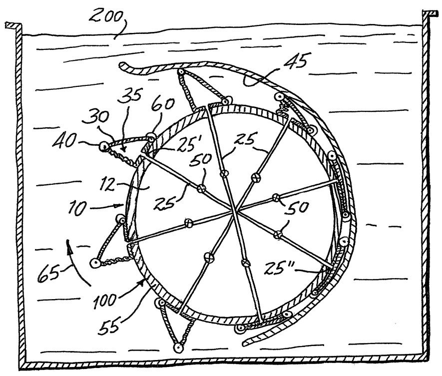
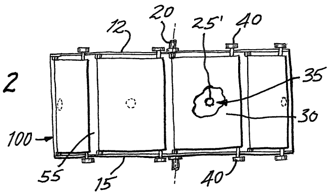


FIG. 1

FIG. 2



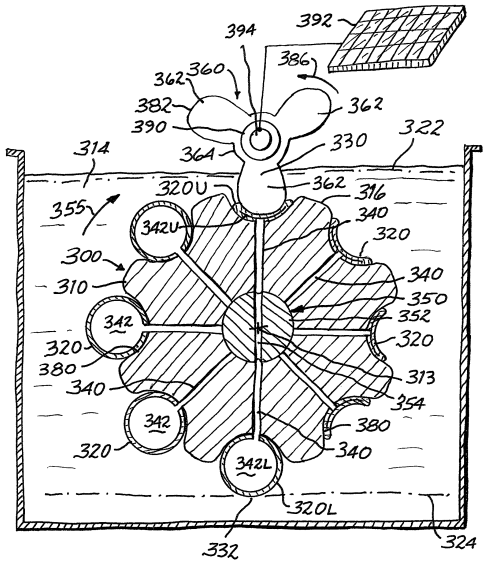


FIG. 3

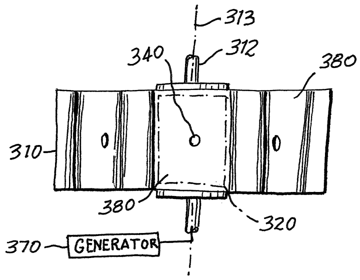

313
312
340
380
310
380
320
370
GENERATOR

FIG. 4

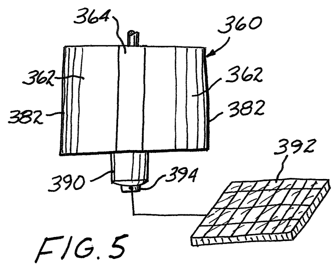

364
360
362
362
382
382
392
390
394

FIG. 5

Description
(US8646267)
CROSS-REFERENCE TO RELATED APPLICATIONS
This application claims the benefit of Provisional Patent Application Ser. No. 61/448,747, filed Mar. 3, 2010, the disclosure of which is incorporated herein in its entirety by reference thereto.
FIELD OF THE INVENTION
This invention relates to an underwater air powered apparatus utilizing the buoyant force of water for generating power in the form of work or electricity.
BACKGROUND OF THE INVENTION
Various methods and devices have been utilized to generate power in the form of electricity or mechanical work by rotating a wheel and/or an axle.
The windmill is one such device which collects air in the form of wind in its paddles, rotating one or more structural elements to produce work or store the work as electricity in a storage battery.
Similarly, a waterwheel, positioned near a running water source, collects water in its paddles, rotating one or more structural elements to produce work or electricity.
Both apparatus and methods take advantage of natural, renewable energy sources and depend upon placement dictated by natural resources.
In the case of windmills, large open areas of land in wind-dominant climates are required.
The windmills render the land upon which they are situated, and surrounding land, unsuitable for development.
Water wheels are similarly hampered by the dictates of their power source.
SUMMARY OF THE INVENTION
The present invention strives to overcome the inherent problems with windmills and related apparatus by utilizing buoyancy to rotate a wheel assembly in a limited environment, such as underwater.
Tests show that a gallon container of air contains sufficient buoyancy to lift approximately seven and one half pounds in water.
By utilizing the buoyancy of air in water to move and thereby rotate a wheel assembly, natural and unlimited renewable resources may be directed to energy production.
Furthermore, the apparatus does not rely upon running water for power, overcoming the shortcomings of certain prior art water-powered power generating devices.
Advantages of the invention over the prior art include the ability to size the generator for multiple and suitable tasks, low cost construction, simple operation and easy maintenance.
The device conserves land resources and opens up a wider range of water-based resources to generate work and power.
In one form, the invention comprises two wheels situated in tandem, with a connecting axle, establishing the wheel assembly.
Between the wheels of the assembly are platforms.
Through these platforms are protruding hollow air-tight tubes at a proximal and distal point on the wheel assembly.
These tube-ends are connected to air chambers in the form of gas bags or air bags.
Flaps are hinged onto the wheel assembly over the platforms and are biased by a spring into an open position.
Air bags or air chambers are fastened under the flaps holding a quantity of compressed air.
Wheels with ball-bearings are included to reduce friction during a depression phase while air is transferred from one air bag or air chamber into a counterpart air bag or air chamber located at an opposite side of the wheel assembly.
These ball-bearing wheels are located on an upper part of the flaps.
A flap-depressing surface is situated adjacent a portion of the outside edge of the wheel assembly, such that as the wheel assembly rotates, the flap-depressing surface depresses the spring-biased flaps toward a closed position.
This manner of flap-mounting or positioning allows the air bags or air chambers to press against the underside of the flaps to set and keep the wheel assembly in motion.
Operation of the invention is initiated by introduction of an appropriate quantity of compressed air into the tube assembly through a series of valves.
This value or quantity of supplied air is sufficient to extend a distal air chamber or air bag upon compression of a proximal air chamber or air bag.
Alternatively, gas deposits located below the ocean floor or other appropriate geographic location may serve as a supply for expanding an air chamber or air bag of the assembly.
The compressed air is directed to, and expands the air chamber or air bag fitted over a proximal tube end, thereby extending a respective flap.
Air contained within a series of such expanded air chambers or air bags provides buoyancy within the water, thereby rotating the wheel assembly.
As each flap approaches the top of the rotating assembly, the flap-depressing surface contacts the ball-bearing wheels, thus depressing the flaps.
As a flap is depressed, air is expelled from the corresponding air chamber or air bag into the proximal tube end and through its respective tube, to the distal tube end and into a second air chamber or air bag at the bottom of the rotating assembly, thereby extending its flap and providing buoyancy to enable continued rotation of the wheel assembly.
The springs connected to the flaps assist in moving the flaps during the opening procedure.
As the wheel assembly rotates, it generates work which may be transferred to an axle, a power generating device or into storage for later use.
BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partially diagrammatic, elevational cross-sectional view of an apparatus constructed and shown operating in accordance with the present invention;

FIG. 2 is a top view of component parts of the apparatus of FIG. 1;

FIG. 3 is a partially diagrammatic, elevational cross-sectional view of another apparatus constructed and shown operating in accordance with the present invention;

FIG. 4 is a top plan view of a component part of the apparatus of FIG. 3; and

FIG. 5 is a partially diagrammatic top plan view of further component parts of the apparatus of FIG. 3.

DESCRIPTION OF THE INVENTION

Shown in FIGS. 1 and 2 is a side view of an apparatus 10 constructed in accordance with the present invention.

A first wheel 12 and a second wheel 15 are situated in tandem, with a connecting axle 20 and a platform 55 placed between the wheels 12 and 15, comprising a wheel assembly 100.

Situated between the wheels are hollow air-tight tubes 25 mounted in the platform 55 which is located between the wheels 12 and 15 of the assembly 100, each tube 25 lying intermediate the wheels 12 and 15 of the wheel assembly 100 and having a proximal exit point 25' and distal exit point 25'' on the wheel assembly 100.

At each exit point 25' is mounted a hinged flap 30 of an air chamber or air bag 35 suitable for holding a quantity of gas, here in the form of compressed air.

At the outer edge of each flap 30 is mounted a friction-reducing means in the form of ball-bearing flap wheels 40, and a spring 60 biases the flap 30 radially outwardly.

A flap-depressing surface 45 is situated adjacent to and extending along a portion of the outside edge of the wheel assembly 100 such that, as the wheel assembly 100 rotates, the flap-depressing surface 45 engages the ball-bearing flap wheels 40 and depresses the spring-biased flaps 30.

Thus, the flap-depressing surface 45 and the ball-bearing flap wheels 40 comprise a drive assembly in which each ball-bearing flap wheel 40 serves as a driver for collapsing each air bag 35.

The apparatus is at least partially submerged in water 200.

Operation of the invention is initiated by the introduction of a quantity of compressed air into the tube assemblies through a series of valves 50.

The compressed air is directed to, and expands the air bag 35 fitted over its respective tube end 25' or 25'', thereby extending its respective flap 30.

Air contained within a series of expanded air bags 35 provides buoyancy within the water 200, thereby rotating the wheel assembly 100 in the clockwise direction indicated by arrow 65.

As each flap 30 approaches the top position of the rotation cycle, contact between the flap wheels 40 and the flap-depressing surface 45 depresses the flap 30.

As the flap 30 is depressed, air is expelled from the corresponding air bag 35, into the proximal tube end 25' and through its respective tube 25, to the distal tube end 25'' and into a second air bag 35 at a position at the bottom of the rotation cycle, thereby extending its flap 30 and providing buoyancy to enable continued rotation of the wheel assembly 100.

FIG. 2 is a top view of the apparatus 10.

Shown are the first wheel 12 and the second wheel 15 situated in tandem, with the connecting axle 20 and the intermediate platform 55, comprising the wheel assembly 100.

Situated between the wheels 12 and 15 are the hollow air-tight tubes 25, each tube 25 lying intermediate the wheels 12 and 15 of the wheel assembly 100 and having a proximal exit point 25' and an opposite distal exit point 25'' on the wheel assembly 100, as seen in FIG. 1.

Each of the spring-biased hinged flaps 30 is placed over an air chamber or air bag 35 suitable for holding a quantity of compressed air.

At the outer edge of each flap 30 are mounted the ball-bearing flap wheels 40.

Turning now to FIGS. 3 through 5, another apparatus constructed and operating in accordance with the present invention is shown at 300 and is seen to include a rotary member 310 mounted on an axle 312 for rotation about a axis of rotation 313, while immersed in a liquid, preferably in the form of water 314.

Rotary member 310 has a perimeter 316 spaced radially from the axle 312, and from the axis of rotation 313.

A plurality of chambers are shown in the form of collapsible gas bags and are illustrated as air bags 320 spaced circumferentially from one-another along the perimeter 316 of the rotary member 310.

Axle 312 is oriented in a substantially horizontal orientation so that rotation of the rotary member 310 about the axle 312 moves the air bags 320 between an uppermost elevation 322 and a lowermost elevation 324.

Each air bag 320 is located relative to a counterpart air bag 320 such that upon an air bag 320 reaching an upper location 330, adjacent to and preferably at the uppermost elevation 322, as illustrated by the position of air bag 320U, the counterpart air bag 320 is placed at a lower location 332, adjacent to and preferably at the lowermost elevation 324, as illustrated by the position of air bag 320L.

In the preferred construction, each air bag 320 is located diametrically opposite a corresponding counterpart air bag 320, as illustrated in FIG. 3 wherein every air bag 320 has an opposite counterpart air bag 320 spaced circumferentially away by 180 deg..

A plurality of gas passages, shown in the form of air passages 340, extend through rotary member 310 and interconnect the interior 342 of each air bag 320 with the interior 342 of a corresponding counterpart air bag 320, thereby providing communication between the interiors 342 of the opposite air bags 320.

As seen in FIG. 3, a valving system 350 includes a centrally located hub 352 having a diametric, vertically oriented conduit 354.

Hub 352 is maintained stationary while axle 312 rotates with the rotation of rotary member 310, about axis of rotation 313, in the clockwise direction indicated by arrow 355.

Each diametric passage 340 is interrupted by hub 352 such that only the air passage 340 that is registered with conduit 354 provides open communication between the interiors 342 of the air bags 320 connected by the registered air passage 340.
In this manner, only the interior 342 of air bag 320U, placed at the upper location 330, is in communication with the interior 342 of the air bag 320L, placed at the lower location 332, while communication between the respective interiors 342 of all of the other air bags 320 is closed.
Once communication between the interiors 342 of opposite air bags 320 is closed, by virtue of a corresponding air passage 340 being out of register with conduit 354, the deflated, collapsed one of the opposite air bags 340 will remain collapsed and the inflated, expanded one of the opposite air bags 340 will remain expanded as the rotary member 310 rotates through a cycle of operation.
A drive assembly 360 includes a driver juxtaposed with the upper location 330, the driver being shown in FIGS. 3 and 5 in the form of a lobe 362 carried by a lobed wheel 364 mounted for rotation in synchronism with the rotation of rotary member 310, immediately above the air bag 320U.
Air bag 320U, previously in the form of an air bag 320 having an expanded configuration, filled with a gas, preferably air, prior to reaching upper location 330, is moved by buoyant forces to the upper location 330 where air bag 320 is engaged by lobe 362 and is deflated and collapsed, into a collapsed configuration, as shown, thereby expressing air from the interior 342U of air bag 320U and passing the expressed air into the interior 342L of air bag 320L, via interconnecting passage 340 and conduit 354.
As a result, air bag 320L is filled with air, expanding air bag 320L from a collapsed configuration into an inflated, expanded configuration.
Thus expanded, inflated air bag 320 is raised by buoyant forces toward the upper location 330, thereby rotating the rotary member 310 and moving the collapsed, deflated air bag 320U to the lower location 332.
Each inflated air bag 320, in turn, reaches the upper location 330 and is engaged by a lobe 362, to be deflated and collapsed, and moved in the collapsed configuration to the lower location 332 to be re-inflated and moved once-again to the upper location 330, again by buoyant forces.
A power generator in the form of generator 370 is coupled to rotary member 310, through axle 312, and generates power in response to rotation of the rotary member 310.
In the preferred construction, lobed wheel 364 is provided with multiple lobes 362 to facilitate the engagement of each air bag 320 with a lobe 362.
Each air bag 320 has a prescribed inflated configuration, here shown as being generally cylindrical, and preferably is fitted within a recess 380 having a configuration complementary to the prescribed inflated configuration of the air bags 320.
Each lobe 362 is provided with a configuration along an air bag engaging surface 382 complementary to the configuration of each recess 380 to attain a substantially fully collapsed configuration of each air bag 320 for an effective deflation of each air bag 320U and inflation of counterpart air bag 320L.
In the preferred construction, rotation of lobed wheel 364 is effected, in the counterclockwise direction indicated by arrow 386, by a drive motor 390 coupled to lobed wheel 364 and preferably powered by a solar panel 392, through a motor controller 394, as shown in FIGS. 3 and 5.
It is to be understood that the above detailed description of preferred embodiments of the invention is provided by way of example only.
Various details of design, construction and procedure may be modified without departing from the true spirit and scope of the appended claims.