Sept. 24, 1940. M. S. QUINTE 2,215,652

CONTINUOUS VARIABLE TEMPERATURE POWER PRODUCING APPARATUS

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Fig. 1. Fig. 3.

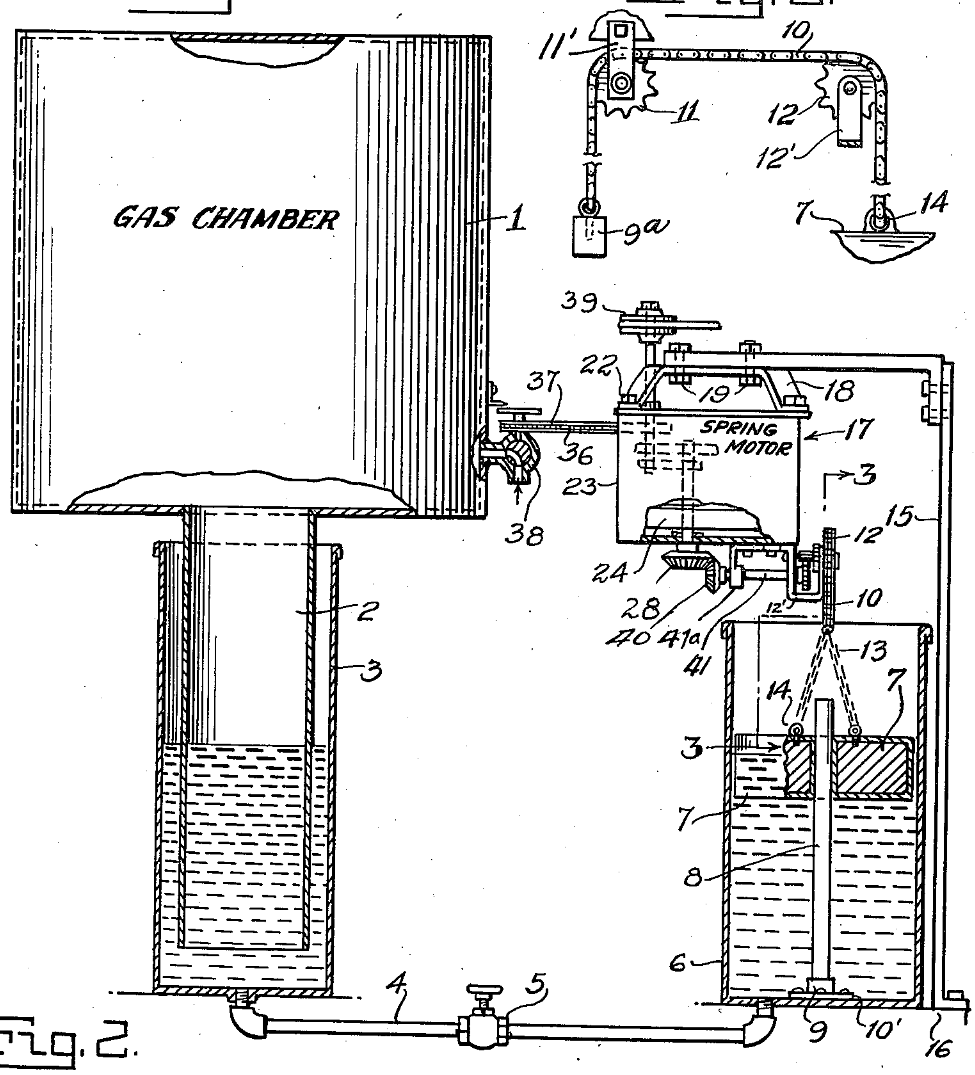


Fig. 2.

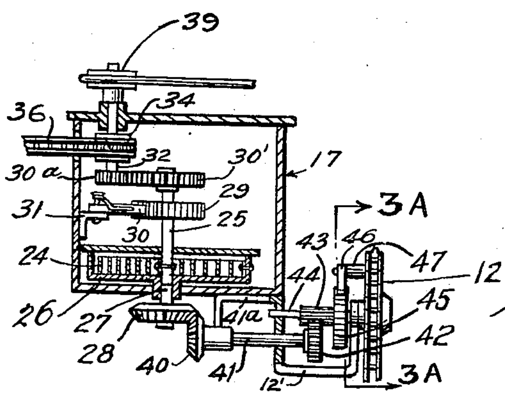
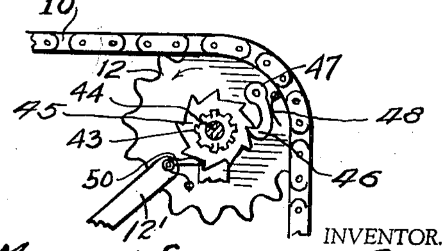


Fig. 3A.



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CONTINUOUS VARIABLE TEMPERATURE POWER PRODUCING APPARATUS

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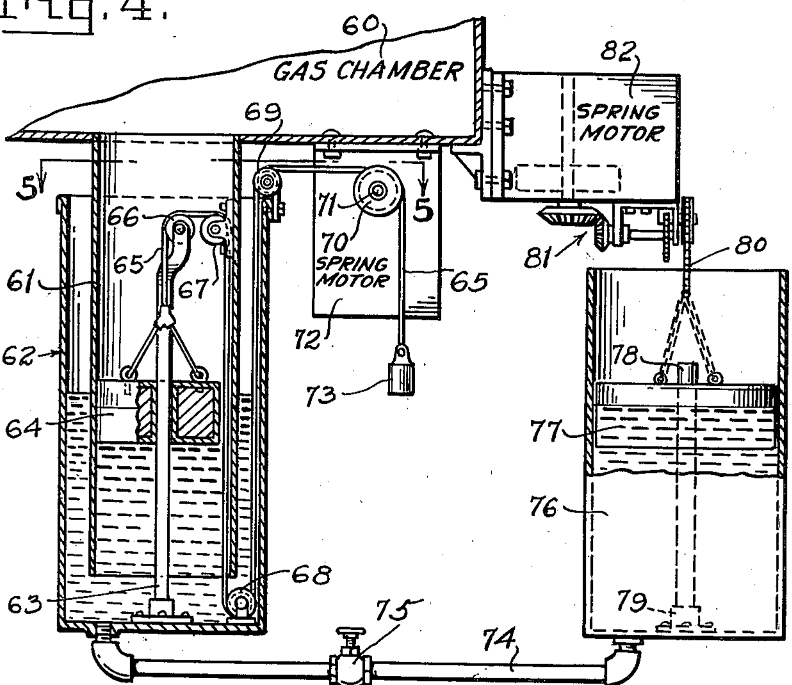
Fig. 4.



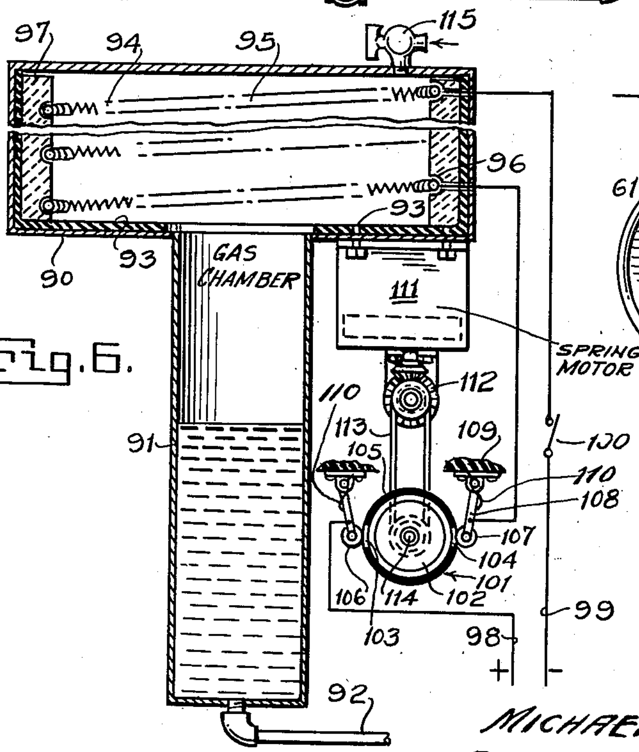
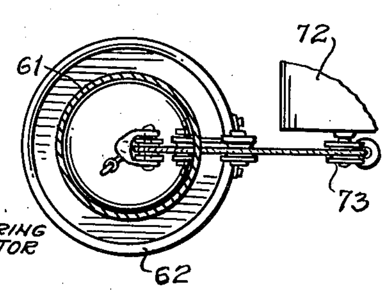


Fig. 6.

Fig. 5.



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CONTINUOUS VARIABLE TEMPERATURE POWER PRODUCING APPARATUS

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Fig. 7.

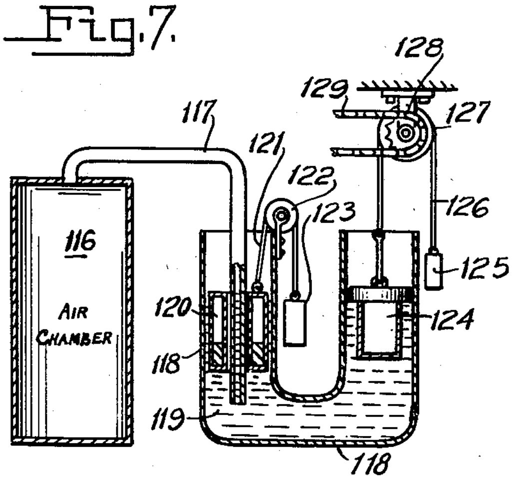
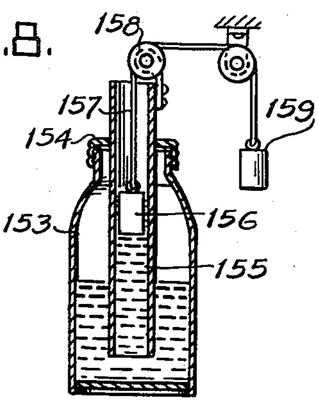


Fig. 8.



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Patented Sept. 24, 1940 2,215,652

UNITED STATES PATENT OFFICE

2,215,652

CONTINUOUS VARIABLE TEMPERATURE POWER PRODUCING APPARATUS

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Application June 22, 1937, Serial No. 149,628

8 Claims. (Cl. 60—7)

This invention relates to a device capable of delivering power continuously providing the medium surrounding the prime mover does not remain at a constant temperature for long intervals of time. An ideal location for such an apparatus is in desert or semi-desert localities in the warm latitudes of the earth's surface and, in particular the southwestern part of the United States where relatively high day and low night temperatures are the usual order of things, but the use of this invention is not limited to any particular place or locality.

Applicant utilizes the well known Law of Charles as the basis for energy to operate his apparatus. It is not necessary, however, that applicant's air chamber structure be designed to withstand exceedingly high internal or external pressures for his invention includes means to automatically relieve the structure of excessive pressures within and without.

During the rise and fall of temperature without the air chamber, pressure differentials of the air within create energy. Mechanism is provided to store this energy from which, a continual predetermined amount of power can be utilized.

An object of this invention is the provision of an apparatus and method to produce continuous power by the expansion and contraction of a gas, for instance, air.

Another object is to provide power from a varying volume of gas influenced by temperature changes.

Another object is to take advantage of heated air wherein the molecules thereof are in a high state of agitation and to utilize such molecular kinetic energy for producing power.

In this connection, it will be understood that the higher the temperature of the air or gas will result in greatly increased activity and expansion of the molecules thereof, and this increased activity and expansion produces materially increased pressure when the air or gas is confined in a container, and this increased pressure is, by suitable means, converted into power.

Another object is to build up a continuous power reserve from an inexhaustible source of varying temperatures.

Another object is the storage of energy from a continual source of supply, power being drawn therefrom at a continual predetermined rate.

Another object is to create a perpetual supply of mechanical energy from fluid energy created by varying degrees of temperature acting upon the fluid.

And a still further object is the transference of fluid energy into mechanical energy, the fluid energy being the result of temperature differentials acting upon the fluid.

Other objects will become apparent from the reading of the following specification and appended claims.

The following description and drawings disclose means and methods whereby applicant's invention can be practiced but, it is understood, that many other means and methods may be resorted to within the scope of applicant's invention and that the specific disclosure herein is not to be taken in a limiting sense except as limited by the appended claims.

In the drawings:

Figure 1 shows one form of the invention in elevation, parts being shown in section for clarity.

Figure 2 is a vertical section taken through the housing that encloses the motor.

Figure 3 shows a detail substantially along the line 3—3 of Figure 1 in the direction of the arrows.

Figure 3*a* is a detail of a sprocket wheel with ratchet elements and which view is taken on the line 3*a*—3*a* of Figure 2.

Figure 4 shows another form of the invention in elevation, parts being shown in section.

Figure 5 is a plan, partly in section, along the line 5—5 of Figure 4.

Figure 6 is an elevation, partly in section, showing an alternative form of the invention, which may be utilized in conjunction with the above forms.

Figure 7 is an elevation, mostly in section, showing still another form of the invention to operate a motor not shown.

Figure 8 is a vertical sectional view showing a further modified form of the invention.

Figures 1, 2 and 3 will now be described:

The numeral 1 designates a reservoir containing air or any other gas, air being preferred in this particular instance. The reservoir may be a tank of any suitable material, preferably metal, of sufficient strength to withstand pressures to be encountered. The size of the tank as well as the other apparatuses to be presently described, will obviously depend upon the power desired and local obstacles to be coped with, therefore, little consideration will be given to the size of the equipment described.

A portion of the tank 1 protrudes downwardly in the form of an open cylinder 2 into an open top receptacle 3 of suitable material for holding a liquid which may be water, oil or any other liquid capable of performing the purposes of this invention.

A duct 4 having a hand valve 5 connects the bottom of receptacle 3 with an open top receptacle 6, preferably metal, for transference of the liquid to and from the receptacles 3 and 6. A float 7, of predetermined weight and size is free to slide vertically along a guide rod 8 which is securely fixed to the bottom of receptacle 6 as by the flanged coupling 9 and the rivets or bolts 10'. the guide being threaded into the coupling for easy removal.

The float 7 is loaded by any suitable material 8 to give it sufficient gravity to overcome friction of associated parts therewith and for other purposes to be presently explained, so that it will fall as the level of liquid in the receptacle 6. A counter weight 9*a* of predetermined mass, (Figure 3) is connected to the float by a chain 10 which rides over sprocket wheels 11 and 12. The sprocket wheel 12 is fixed to a shaft which is journalled in a bracket 12' whereas the sprocket wheel 11 is an idler having its bearing upon an axle stud extending from a bracket 11' attached to the casing of the spring motor.

Straddled chain 13 connects the chain 10 and float, eyelets 14 being provided to afford a balancing connection of the chain with the float. Obviously, a metallic cable or other means may be employed instead of chain, pulleys being provided when cable is used.

A strong and well braced inverted L-shaped bracket 15, securely fixed to a base 16 which may be concrete or any other proper support, provides a means of support for a spring motor 17. A spider 18, fixed to the bracket by the bolts 19, holds the spring motor in a definite position with respect to the receptacle 6 and transmission parts to presently be described.

A strong metallic housing or casing 23 is secured to spider 18 and envelopes the motor to protect it from atmospheric elements and from possible accidental injury.

The spring motor that is utilized for converting the movement of the float into power and for actuating a valve that controls the admission and discharge of air or gas from tank 1 includes a strong spiral spring 24, the inner end of which is fixed to a shaft 25 and the outer end to a housing 26.

The lower end of shaft 25 is arranged for rotation in the lower portion of the housing 26 and, suitably secured to the bottom of the housing 26 below the bearing for the lower end of shaft 25 is a stub shaft 27 carrying at its lower end a beveled pinion 28. Mounted on shaft 25 above housing 26 is a ratchet wheel 29 that is engaged by the point of a spring-pressed detent 30, the latter being pivoted at 31 to a bracket that projects inwardly from the adjacent wall of the spring motor housing 17. Secured on the upper end of shaft 25 is a gear wheel 30' that meshes with a pinion 30*a* carried by the lower end of a shaft 32, the latter being journalled in a suitable bearing in the top of the spring motor housing 17. Mounted on shaft 32 is a sprocket wheel 34 and, passing around this sprocket wheel is a sprocket chain 36 that extends through an opening in the side wall of housing 17 and, said sprocket chain passes around a sprocket wheel 37 that is fixed to the stem of a ball type gas valve 38, which latter is seated in the wall of tank 1 and controls the inlet of air or gas into said tank and the outlet of air or gas from said tank (see Fig. 1).

The construction of the motor just described is such that sprocket chain 36 operates continuously in the same direction and the operation of said chain is comparatively slow, so that the valve will be intermittently opened and closed.

For the purpose of delivering power from the apparatus, the shaft 32 is extended above the top of the housing 17 and has mounted thereon a pulley 39 around which passes a belt or endless cable for transmission of the power to some device to be operated or, for the operation of an electric power generator. However, the power developed is of no moment in this application, for it is well within applicant's contemplation that substitutes may be used in the place of the pulley 39 and means connected to shaft 32 for direct operation with any suitable device.

Further, no claim is made to the particular form of spring motor herein illustrated and described, for various mechanisms may be produced for converting the movement of the float 8 in tank 6 into motion and power and causing the valve 38 to intermittently open and close and also to operate a power generator, for instance, an electric generator.

Beveled pinion 28 meshes with a beveled pinion 40 fixed on a shaft 41 that is journalled in a bracket 41*a*, the latter being secured to the lower portion of housing 17. Shaft 41 carries a pinion 42 that meshes with a smaller pinion 43, the latter being carried by a shaft 44 that is journalled in bracket 41*a*—12' and, secured to said pinion 43 is a ratchet wheel 45.

The extended end of shaft 44 provides an axis upon which the sprocket wheel 12 rotates freely and, carried by said sprocket wheel is a spring-pressed detent 46 pivoted at 47 to the sprocket wheel 12. A pawl 50, including the usual post and spring, is mounted on an extension of bracket 12' and engages the ratchet wheel 45 so as to prevent rotation thereof when it is not being turned by detent 46.

Operation of the apparatus just described is as follows:

Let us assume the tank 1, containing air, is exposed to the atmospheric air of the coastal plains in the southwestern part of the United States. It is morning and the atmosphere is gradually warming the air in the tank. Heat is absorbed by this air which increases the kinetic energy of its molecules and results in expansion of the entire body of gas. Since the gas in tank 1 is confined because of the water seal in cylinder 3, its pressure will rise. It is well known that gases and liquids exert their pressures equally in all directions except for the additional pressure in lower regions due to their respective densities. Charles' law states that the pressure coefficient of all gases is substantially the same $k_p=1/273$ at 0° C., per degree change in temperature. According to this law, 0.0538 pound per square inch pressure would be available by raising the air at atmospheric pressure in tank 1 just one degree C. Since daily temperature fluctuations along the southwestern coastal areas vary from 30° to 60° F., especially if the tank is placed where the sun can strike it a part of the day, a substantial pressure differential may be expected. By actual demonstration of a model, sufficient pressure has been generated to overcome all friction of mechanical parts with additional pressure for continuous power to do useful work.

Such a gas pressure in the tank 1 will cause the level of liquid in the cylinder 2 to fall with a rise in liquid level in the receptacles 3 and 6. The liquid level in 3 and 6 will depend upon the liquid surface areas of the receptacles 3 and 6 with respect to the liquid area in the cylinder 2. Nevertheless, the float 7 will rise and the counter weight 9a fall, turning the sprocket wheel 12 counterclockwise as shown in Figure 3a and wind or tighten the spring 24 through the various cooperating parts including ratchet wheel 45, pinions 43 and 42, beveled pinions 40 and 28, a housing 26 to which the outer end of spring 24 is secured, thus winding said spring about shaft 25, the other ratchet wheel assembly 29—30—31 during this spring winding operation merely slipping. Ratchet wheel assembly 29—30—31 operates to deliver energy to the shaft 32 when the spring is unwinding or loosening.

The purpose of the small sprocket wheel 34, is to continually but slowly turn the valve stem of valve 38 so as to open and close it at predetermined intervals of time to permit ingress or egress of air to and from the tank 1. The mechanism just described brings about a number of periodic actions that equalize the pressure of the air within the tank and the atmospheric air as distinguished from a single comparatively long equalization of the air in the tank and the atmospheric air, and which periodic short intervals have been found more effective in the development of motion and power as a result of the operation of the apparatus. The port in the rotating plug of valve 38 and the ports in the valve housing are relatively disposed so that the valve is open for only a short period of the time required for a complete rotation of the plug; for instance, in an apparatus that I have built and repeatedly operated the valve 38 is constructed so that it makes one complete revolution every three hours and the opening period of said valve is less than three minutes. Thus as long as valve 5 in duct 4 is open and the apparatus is in operation, there is an unbalanced condition of the functions produced by the tanks 1, 2 and 3, and tank 6 and its float 7, and as a result there is always a certain amount of power stored in spring 24. This valve feature also prevents excessive high pressure and partial vacuum conditions in the air tank 1.

When the water rises in cylinder 2, above normal level, air will be compressed in tank 1, and when the water in cylinder 2 lowers so that its surface is below normal, a partial degree of vacuum will be established in tank 1. Thus the periodic opening of valve 38 prevents excessive high pressures and partial vacuum conditions in the tank 1.

The apparatus shown in Figures 4 and 5 is another embodiment of applicant's invention which operates on the same principle as the form of Figure 1. In this embodiment, advantage is taken of the rise and fall of two bodies of liquid. The numeral 60 indicates the air tank which also has a depending open ended cylinder indicated by 61. An open top receptacle 62 surrounds the cylinder and is spaced from the bottom and sides thereof to form a liquid circulating space. A guide rod 63 fixed to the bottom of the receptacle provides a sliding surface for a weighted float 64. A cable 65, fixed to the float in a straddling manner as described for Figure 1, rides over pulleys 66, 67, 68 and 69, as shown, and a larger pulley 70 fixed to a shaft 71 which transmits energy derived from pulley 70 into a transmission and motor assembly 72 similar to that described for Figure 1. A counter weight 73 at the end of cable 65 keeps it taut and efficient in operation.

A pipe 74 with a hand valve 75 connects the bottom of receptacle 62 with the bottom of another open top receptacle 76 and is for the purpose of cutting off communication of water from the tank 62 to the receptacle 76 in the event that it should be desirable to operate the apparatus with out the secondary structure including the receptacle 76, the float 77 and the motor 82. This receptacle also contains a weighted float indicated at 77 which slips vertically along a guide 78 fastened to the bottom of the receptacle by a flange element 79. The level of the liquid in this receptacle is fluctuated like the liquid in cylinder 62 due to the variable gas pressure in air tank 60. Weighted float 77 will also fluctuate and operate a counter-weighted chain or cable 80 which passes around pulleys or sprocket wheels and, by transmission means 81, like that already described with reference to Figure 1, store energy in the spring motor 82, a duplicate of motor 17 shown in Figure 1.

Figure 6 shows an alternative form of air tank 90 that may be substituted for the air tank 1 of Figure 1. Tank 90 has a depending open top portion 91 partially filled with a desirable liquid; the pipe 92 leading from the bottom thereof may be connected to the pipe 4 of the form shown in Figure 1 in order to operate the float and connected mechanism of that form of the invention.

The air tank 90 of Figure 6 may be partially insulated by any suitable kind of material such as tar covered cork 93, to conserve artificial heat. A pipe coil 94 containing an electric resistance 95 connected to a source of electricity supplies heat to the confined gas in the tank whenever such a need should arise. The pipe coil 94 is supported in recesses 96 of a heat insulator 97 such as porcelain or other suitable material. The tank 91, however, is preferably metal and a good conductor of heat so that the sun rays or the temperature of the medium in which the tank is placed will be very effective in generating molecular activity of the gas and liquid within the tank.

Artificial heat may be necessary in a device of this kind in some climates where days are occasionally encountered which vary little in temperature. Such conditions are rare or never occur in many parts of southwestern United States. Since applicant does not wish to limit the usefulness of his invention to ideal locations for its successful and efficient operation, provision is made to cope with unfavorable climatic conditions.

Electric wires 98 and 99 from a suitable source of either direct or alternating electric current lead to the resistance coils 95 through switching equipment. Wire 99 leads through a single pole hand switch 100 and wire 98 through a rotary commutator-like switch 101.

The rotary switch 101 consists of a disk 102 of good conducting material such as high grade copper with copper or brass bars 103 and 104 on diametric opposite sides of the disk. These bars may be integral with the disk 102 or affixed thereto in any suitable manner to form a good conducting path with the disk. Suitable insulating material 105, hard rubber or equivalent substance, flush with the outer surfaces of the bars provide non-conducting roller surface about the disk. Rollers of good electrical conducting material 106 and 107 are provided on either side of the disk wheel 102 to close and open the circuit at predetermined time intervals to cause varying air pressure conditions in the tank 90 due to alternation of the heat from the coils 95. Arms 108 pivoted to brackets 109 support the rollers, springs 110 urging the rollers in continual contact with the disk wheel.

A spring motor 111 with associated transmission means as shown in Figure 1, receives its energy from a float receptacle like the one 76 shown in Figure 1. A pulley 112 receiving continual energy from a shaft within the spring motor, delivers power to a pulley 114, fixed to the disk 102, by means of an endless cable 113.

Rotary switch 101 may be arranged to operate or close the circuit in any desired time intervals; for instance, every 15 minutes, every half-hour or every hour.

To relieve the tank 90 of excessive pressure or vacuum conditions or, cause sudden variations of the gas pressure within the tank, a hand valve 115 is provided. This valve may be opened at any time by the operator when such action is thought best to assure continued operation of the device.

Figure 7 shows another form of the invention. The tank 116 confines a body of gas and has connected therewith a pipe 117 which transfers the pressure to a U-shaped tank 118. This U-shaped tank is partially filled with water or other liquid, the pipe 117 extending down into the liquid a sufficient distance to always have its opening immerged in the liquid. A weighted float 120 in one leg of the U-tank has a bore through its center to surround the pipe 117 and use the pipe as a guide. A cable 121 is fixed to the float and passes over a pulley 122. A counterweight 123 of predetermined mass cooperates with the float as previously explained for the other forms of the invention. The other leg of the U-tank has a weighted float indicated at 124 of a different design. This float 124 may be weighted in any suitable manner, but preferably with a liquid that has considerably greater weight than water.

When the air or gas in tank 116 expands under rising temperature, the liquid contained in the leg of tube 117 that extends downwardly into the U-shaped tank 118 is expelled into said tank thereby raising both floats 120 and 124 so as to rotate pulleys 122 and 127, thus producing rotary motion that may be converted into stored power by suitable means, for instance a spring motor as illustrated in Fig. 2.

When the air or gas in tank 116 contracts under lowering temperatures, liquid will rise in the vertical leg of tube 117, thus permitting the floats to lower with the level of the water in tank 118, and this motion may be converted into power. A counterweight 125, cable 126 and pulley 127 also being provided for the float 124. Through mechanism 128 and 129, this device operates a spring motor of the type already described.

Figure 8 is still another form of my power and motion producing apparatus. A metal container 153 contains a liquid such as water, oil, etc., and has a cover 154 through which passes an open ended tube 155. In this tube a float 156 rides upon the liquid and reciprocates a cable 157 over pulleys 158, one end of the cable having the usual counterweight 159. One of the pulleys 158 being attached to a transmission means for instance a sprocket chain operating over a sprocket wheel as illustrated in Fig. 3*a* to transfer energy from the pulley to a spring motor such as is illustrated in Fig. 2.

The various forms of apparatus herein disclosed operate upon the well known barometric principle whereby barometer changes of the earth's atmosphere changes the liquid level which in turn reciprocates the float. The float by means of cables transmits the power to a spring motor.

My invention involves the principles of contraction and expansion of the molecules of air or gas pressing on liquids as a result of atmospheric changes, either natural or artificial, and the conversion of such pressure into useful power and motion. When the chamber within tank 1 is empty of air it is negative and when said chamber is filled or partially filled with air it becomes positive, such changes taking place alternately so that the positive and negative conditions are reversed.

Thus it will be seen that I have provided simple and efficient means and a method for producing continuous motion and power as a result of the expansion and contraction of air or other gas, as a result of varying temperatures.

It will be understood that minor changes in the size, form and construction of the various parts of my improved variable temperature power producing apparatus may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. A power producing device, including an open topped container for holding liquid, a gas receptacle having a neck portion with an open lower end extending into said container so that changes of gas pressure will change the level of the liquid in its container, a second liquid container, connections between the two liquid containers, a float in said second mentioned liquid container, a spring motor, means connecting said float with said motor to transmit motion and power thereto and means actuated by said motor for delivering power therefrom.

2. A power producing device as set forth in claim 1 and with means for periodically establishing communication between the confined body of gas and the atmosphere for effecting pressure equalization.

3. A power producing device, including a plurality of open topped containers for holding liquid, means connecting said containers so as to equalize the levels of the liquid therein, a gas receptacle having a neck portion with an open bottom extending into the liquid of one container so that changes in gas pressure will change the liquid level in all of the containers, a float in one of said liquid containers, a spring motor, means actuated by the movement of said float for transmitting motion and power to said spring motor and means actuated by said motor for delivering power therefrom.

4. In a variable temperature power producing apparatus, a gas tank open at its lower end, a liquid receptacle surrounding the open lower end of said gas tank, a second liquid receptacle, a connection between the two liquid receptacles, means for controlling the flow of liquid from one receptacle to the other, a float in the second mentioned receptacle and means connected to and actuated by said float for converting the motion thereof into motion and energy.

5. In a variable temperature power producing apparatus, a gas tank open at its lower end, a liquid receptacle surrounding the open lower end of said gas tank, a second liquid receptacle,

a connection between the two liquid receptacles, means for controlling the flow of liquid from one receptacle to the other, a float in the second mentioned receptacle, means connected to and actuated by said float for converting the motion thereof into motion and energy and means for periodically establishing communication between the interior of the gas-containing tank and atmosphere.

6. A power producing device as set forth in claim 3, with means for controlling the flow of liquid through the means connecting said containers and means actuated by said motor for periodically establishing communication between the confined body of gas within said receptacle and the atmosphere for effecting pressure equalization.

7. In a power producing device, a substantially U-shaped member for holding liquid, a gas receptacle having an opening that is located in one of the vertical legs of said liquid holding member below the normal level of the liquid therein, a float within the other vertical leg of the liquid holding member, a spring motor, means connecting said float with said motor for transmitting motion and power thereto and means actuated by said motor for delivering power therefrom.

8. A power producing device as set forth in claim 7, with means for periodically establishing communication between the body of gas confined within said receptacle and the atmosphere for effecting pressure equalization.

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