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(54) **ATMOSPHERIC WATER GENERATOR UTILIZING CENTRIFUGAL HYDRAULIC AIR COMPRESSOR**

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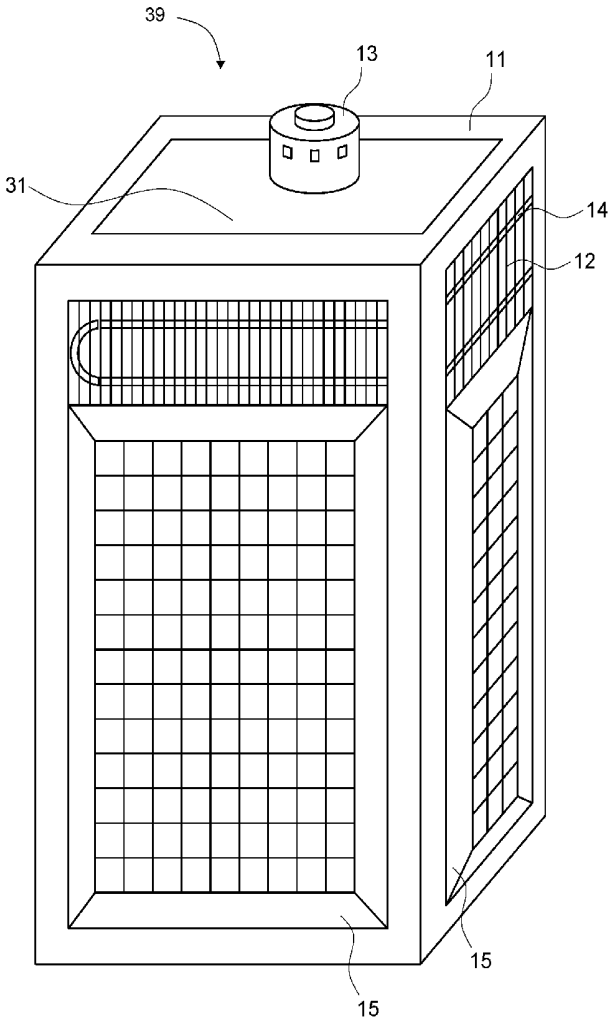
(57) **ABSTRACT**

An atmospheric water generator utilizing centrifugal hydraulic air compressor is for harvesting water from the atmosphere. The purpose of atmospheric water generator utilizing centrifugal hydraulic air compressor is to provide potable water. The atmospheric generator utilizing centrifugal hydraulic air compressor includes a housing having a reservoir, a plurality of centrifugal discs, drive components, water pump, heat exchangers, and air filters. The housing reservoir further includes an indication device to determine the water level in device. The centrifugal discs can utilize centripetal forces to hydraulically compress the air, with water, to harvest the water from the atmosphere. The drive components further comprise a hollow shaft to direct the water to the centrifugal discs. In addition, the shape of the centrifugal disc utilizes the compressed air and water exiting the discs to help rotate the discs.



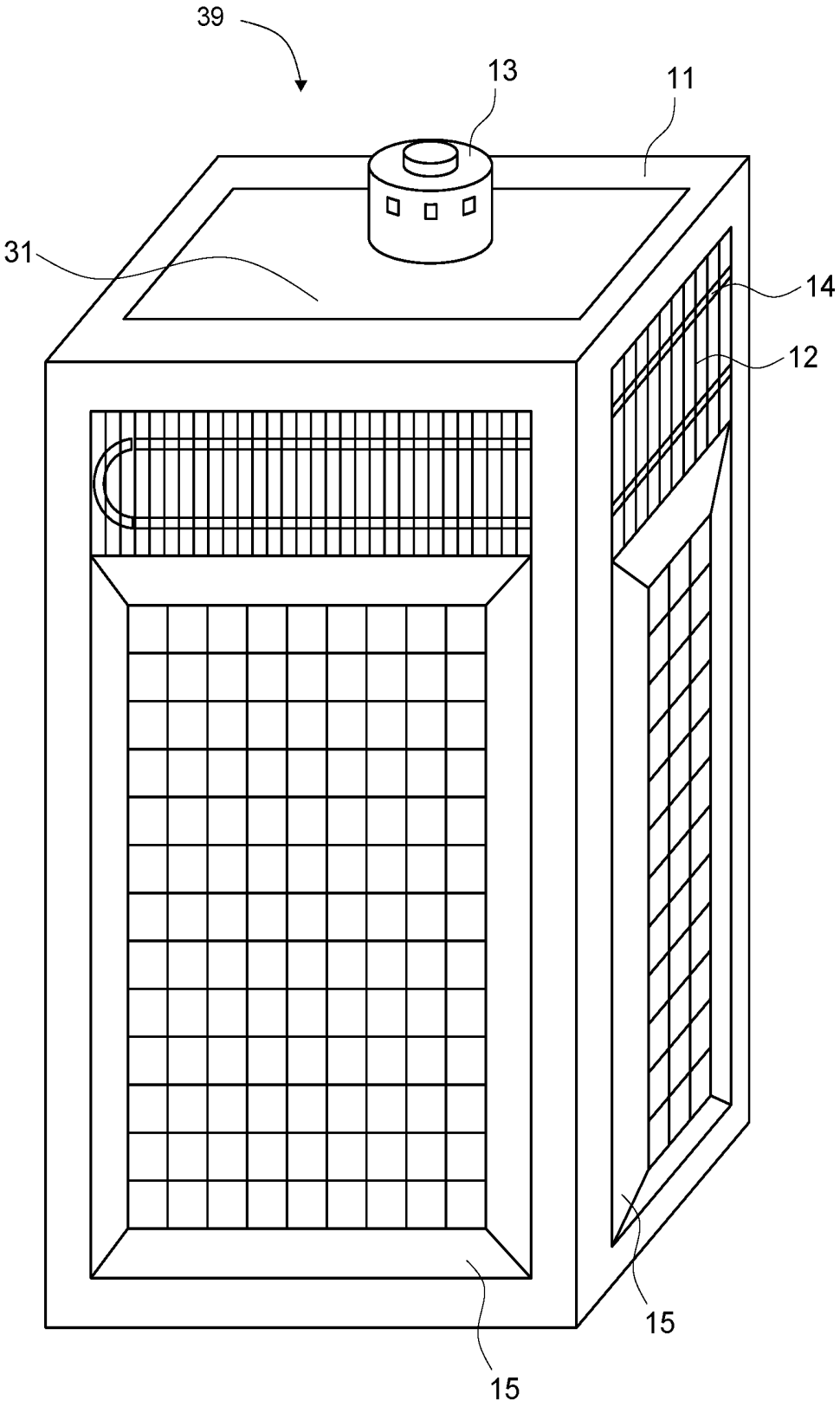


FIG. 1

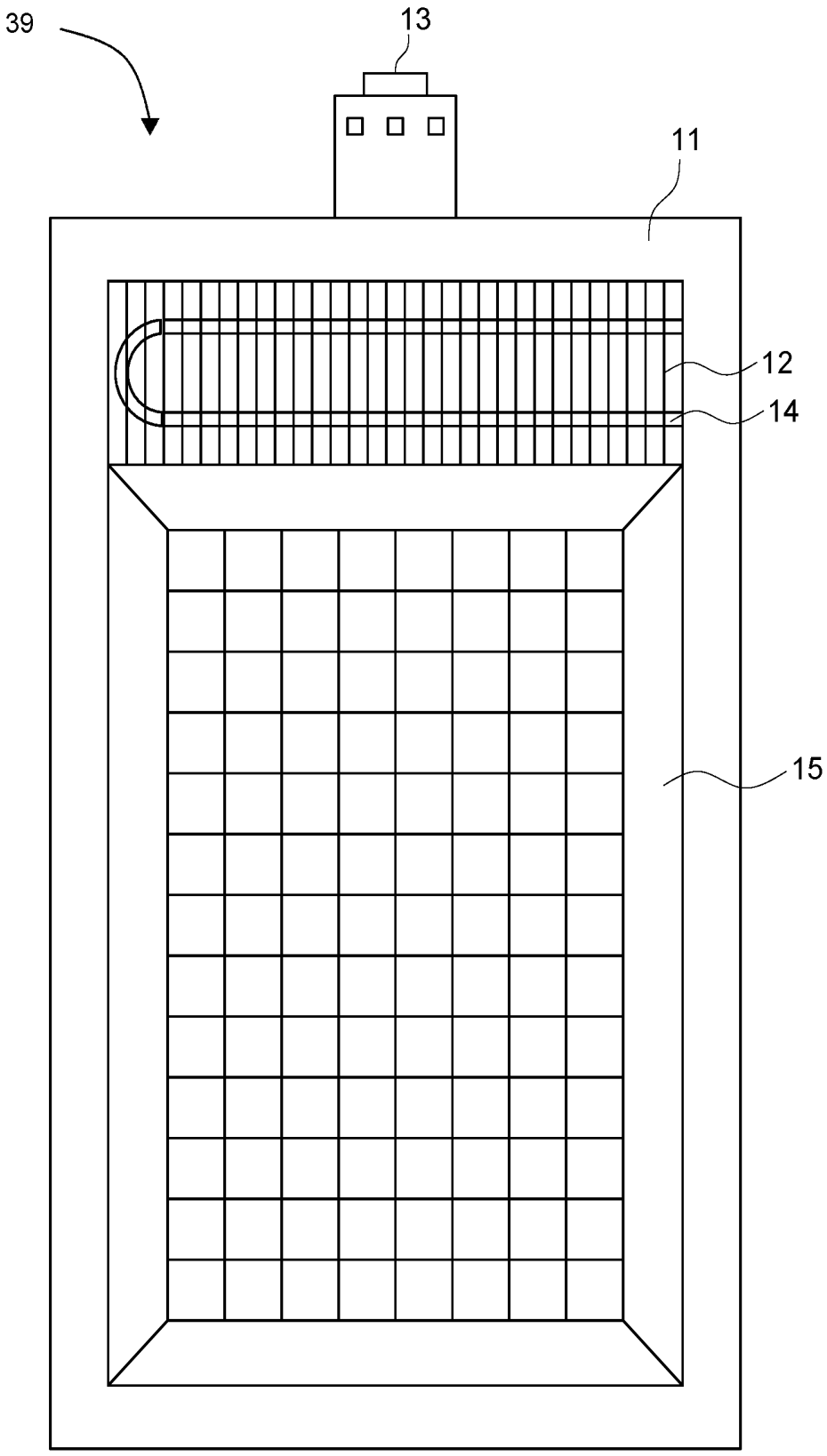


FIG. 2

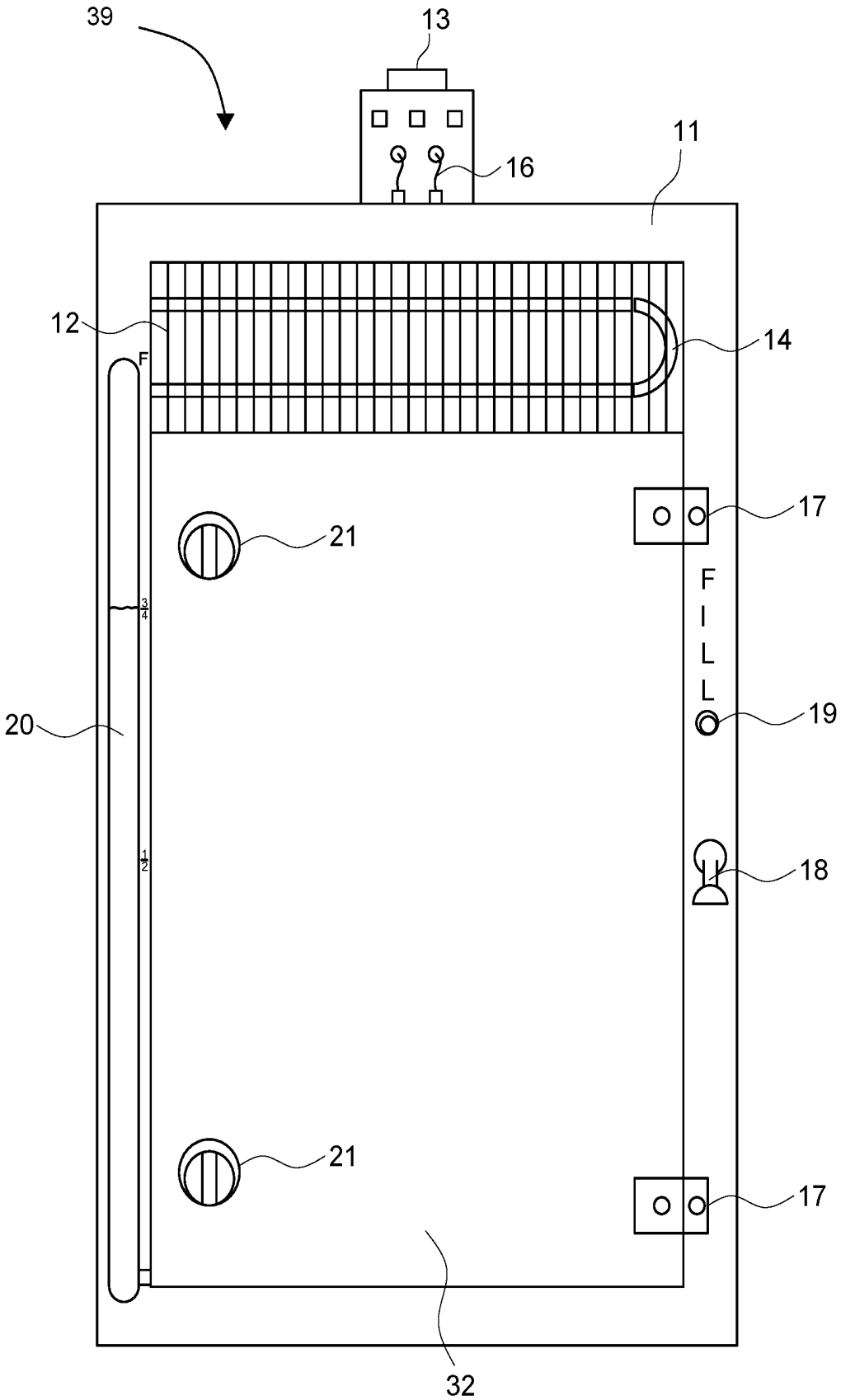


FIG. 3

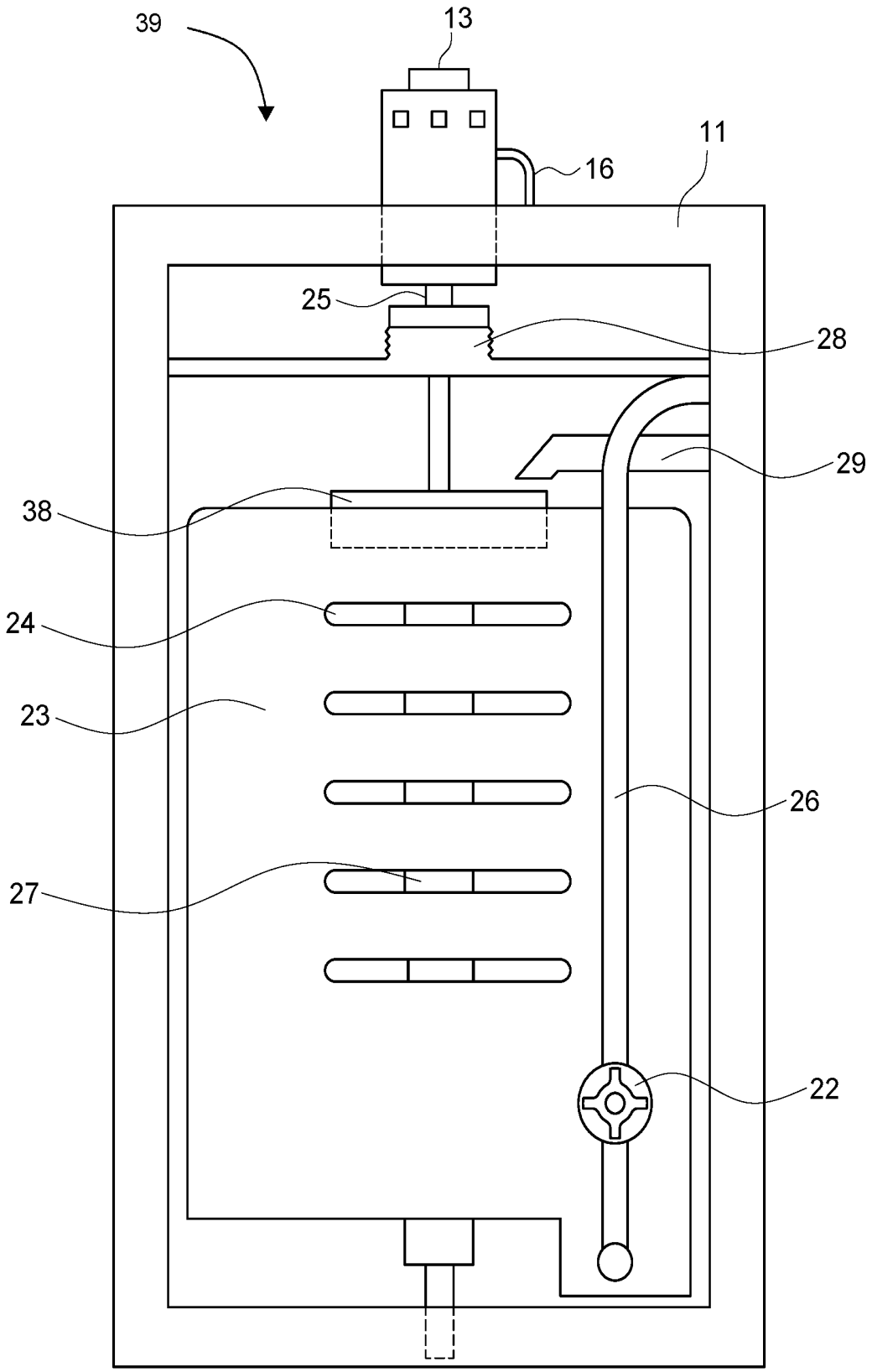


FIG. 4

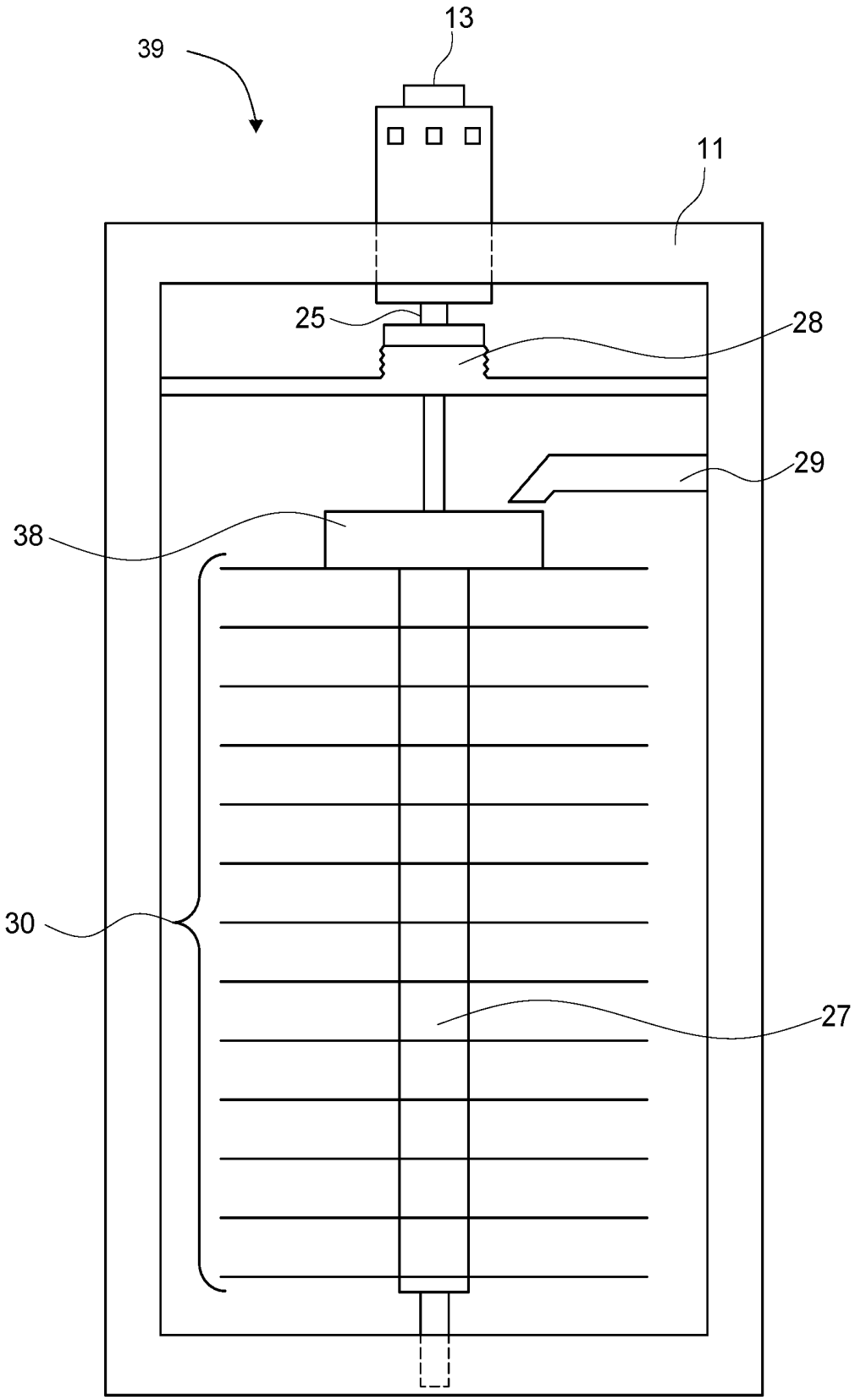


FIG. 5

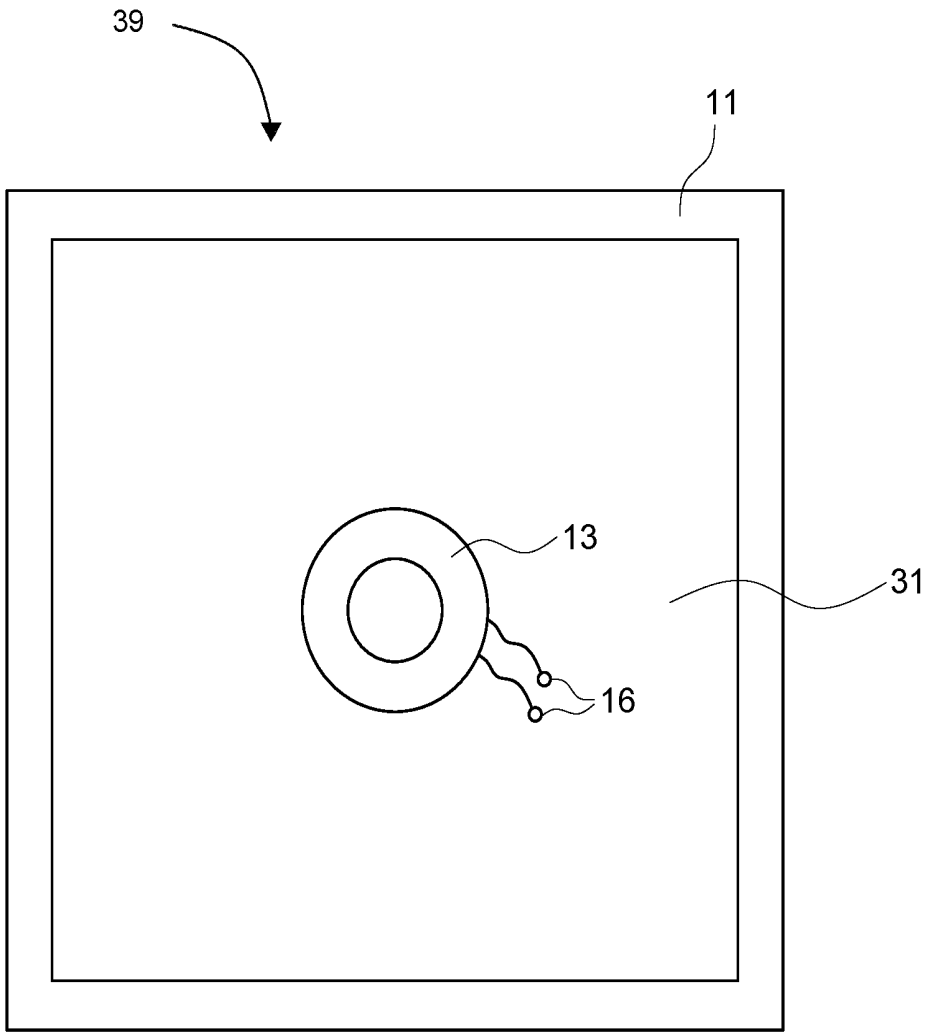


FIG. 6

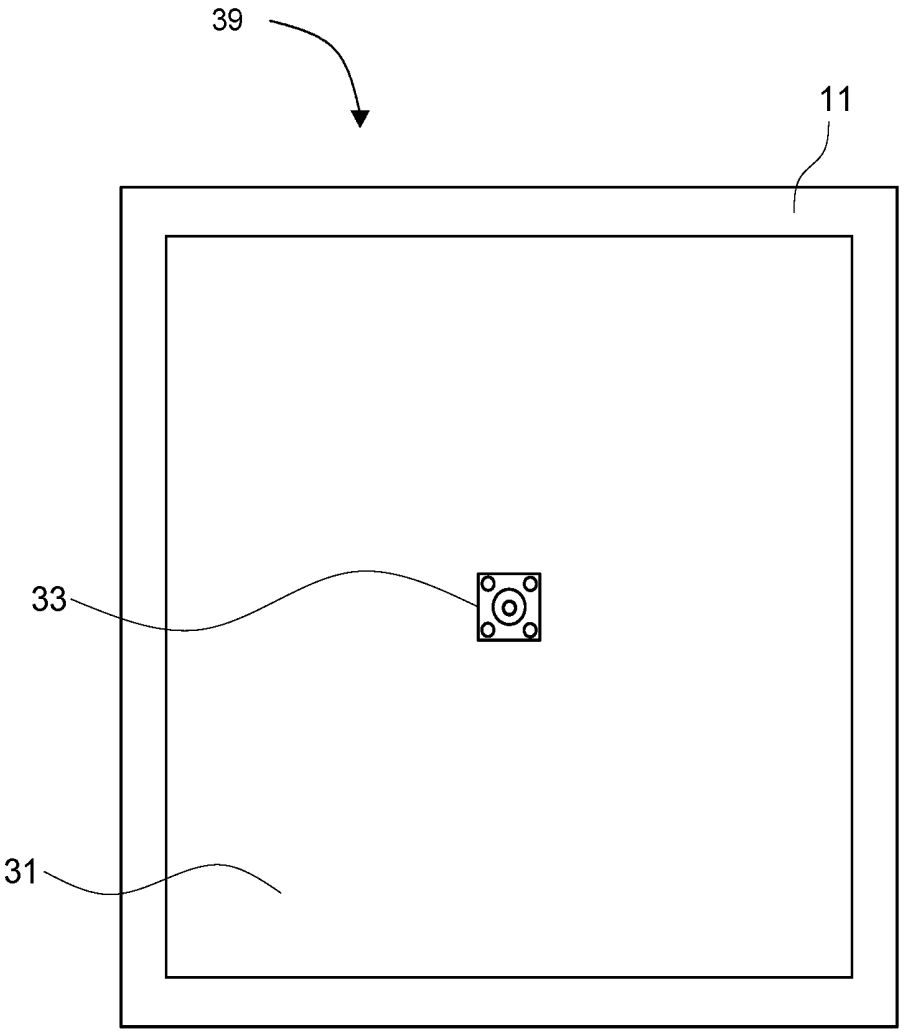


FIG. 7

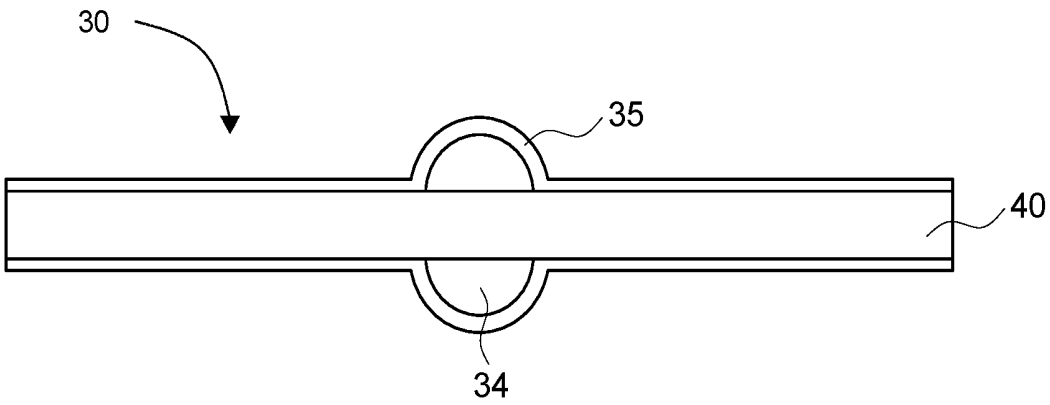


FIG. 8

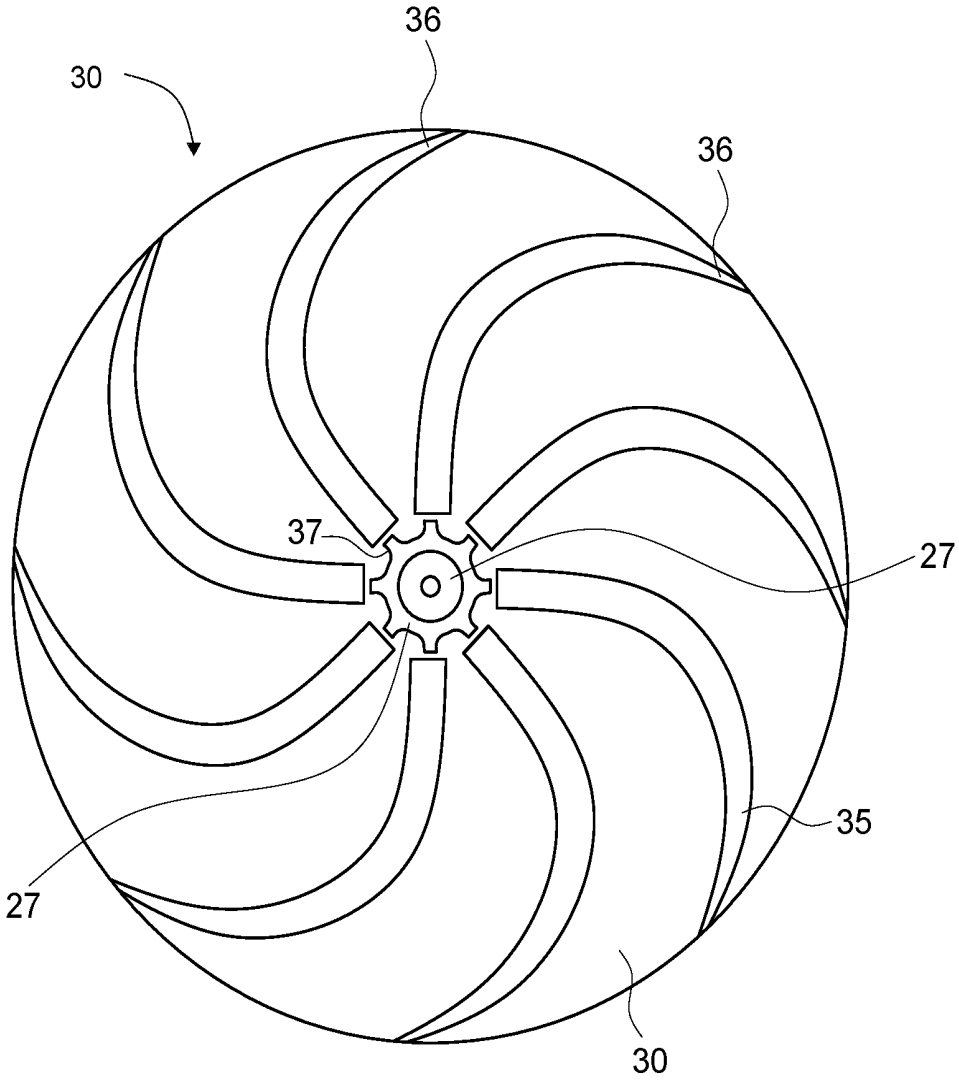


FIG. 9

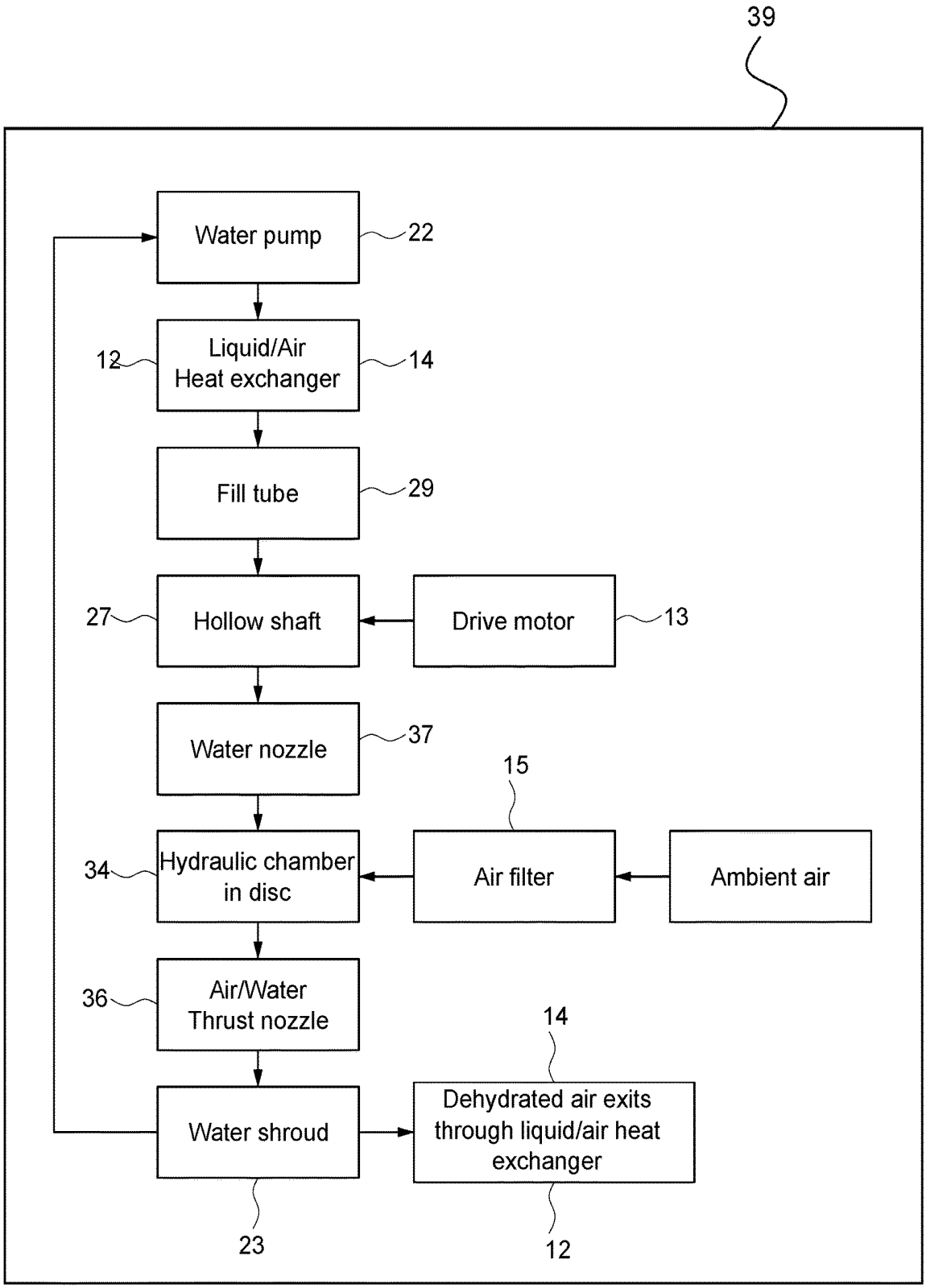

39
Water pump
22
12
Liquid/Air
Heat exchanger
14
Fill tube
29
27
Hollow shaft
Drive motor
13
Water nozzle
37
15
34
Hydraulic chamber
in disc
Air filter
Ambient air
36
Air/Water
Thrust nozzle
14
Water shroud
Dehydrated air exits
through liquid/air heat
exchanger
23
12

FIG. 10

ATMOSPHERIC WATER GENERATOR UTILIZING CENTRIFUGAL HYDRAULIC AIR COMPRESSOR

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 62/965,787 filed on Jan. 24, 2020. The above identified patent application is herein incorporated by reference in its entirety to provide continuity of disclosure.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to atmospheric water generator devices. More specifically, the present invention relates to an atmospheric water generator that utilizes centrifugal disc to hydraulically raise the pressure of the air to harvest water from the air.

[0003] Many attempts have been made to provide an atmospheric water generator that harvest water from the atmosphere. These devices offer drinking water in areas that the atmosphere is present. Atmospheric water generators are commonly used by anyone around the world that needs drinking water. Typically, these devices produce fresh drinking water from the atmosphere in a variety of different ways: absorption, adsorption, condensation, and air compression technologies. Atmospheric water generators have a multitude of different issues associated with the different ways of producing water. Some of the issues are that atmospheric water generators use a lot of energy, are bulky, need different costly water sorbents, the water sorbents require constant changing, costly reverse osmosis filters to filter the adsorbent from the water, require a desorption cycle which shortens its efficiency, and only generate water in high humidity conditions.

[0004] Atmospheric water generators are used as a device to supply fresh drinking water. These known devices, however, may be difficult to utilize do to cost, maintenance issues, and energy requirements. For example, a person wanting to harvest water from the atmosphere would have to use considerable energy resources to run the device and expend time and maintenance cost to replace the reverse osmosis filtration system.

[0005] U.S. Pat. No. 10,683,644B2 to Kim, et al, describes a sorption-based atmospheric water harvesting device. However, Kim, et al, has several known drawbacks. In particular is the Metal Organic Frameworks utilized in the adsorption of the water. The Metal Organic Framework used is costly to develop and synthesize. The present invention utilizes the hydrogen bonding of water to adsorb the water from the atmosphere. Further the Metal Organic Framework requires a reverse osmosis filtration system to insure the potability of the water. The present invention eliminates this costly need of water filtration since water does not have to be filtered from water. Further, sorption-based technologies require a specific sorption-desorption cycle. These cycles are usually based on day/night cycles to utilize thermal differences in these cycles. The present invention can harvest continually with no specific cycles increasing productivity and efficiency compared to the prior art. Further sorption-based technologies require the use of a fan to bring the air through the sorbent which utilizes energy and increases costs. The present invention utilizes the effect of water being forced through a tube to scavenge air into the system eliminating the need for a fan to force air into the system.

[0006] U.S. Pat. No. 20040040322A1 to Engel and Clasby, describes a vapor compression-based water vapor condensing unit. However, Engel and Clasby, has several known drawbacks. In particular, the system utilizes a vapor compression system that uses considerable electricity to operate. The present invention utilizes nozzles directed around the circumference of the centrifugal hydraulic disc to help return a portion of the energy required to spin the disc.

[0007] In light of the devices disclosed in the prior art, it is submitted that the present invention substantially diverges in design elements from the prior art and consequently is clear that there is a need in the art for an improvement to existing atmospheric water generator devices. In this regard the instant invention substantially fulfills these needs.

SUMMARY OF THE INVENTION

[0008] In view of the foregoing disadvantages inherent in the known types of atmospheric water generators now present in the prior art, the present invention provides an atmospheric water generator wherein the same can be utilized for producing potable drinking water from the atmosphere.

[0009] It is therefore an object of the present invention to provide a new and improved atmospheric water generator that has all of the advantages of the prior art and none of the disadvantages.

[0010] The present invention relates to atmospheric water generator comprising a housing having a reservoir, centrifugal discs, drive unit, water pump, and a plurality of components to accomplish the direction of air flow.

[0011] It is therefore an object of the present invention to have a hollow drive shaft connected to the drive motor to supply the centrifugal disc with water. This will allow the disc to utilize water for the hydraulic component.

[0012] It is therefore an object of the present invention to utilize water as a sorbent and hydraulic component of the machine reducing costs.

[0013] It is an object of the present invention to utilize a centrifugal disc to turn water into the hydraulic component.

[0014] It is an object of the present invention to use the dehydrated air exiting the discs as a way to cool down the water-ambient air heat exchangers further decreasing costs and complexity of the system.

[0015] It is another object of the present invention to use water as a thermal transfer medium to transfer the heat from one section of the device to the other. This will allow great efficiencies than a second system for heat transfer.

[0016] It is another object of the present invention uses the water to absorb the heat of compression of air which will allow thermal management of the device.

[0017] Other objects, features and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** shows a perspective view of one embodiment of the present invention.

[0019] FIG. **2** shows a front view of one embodiment of the present invention.

[0020] FIG. **3** shows a back view of one embodiment of the present invention.

[0021] FIG. **4** shows an internal component view of one embodiment of the present invention.

[0022] FIG. **5** shows an internal component view of one embodiment of the present invention.

[0023] FIG. **6** shows a top view of one embodiment of the present invention.

[0024] FIG. **7** shows a bottom view of one embodiment of the present invention.

[0025] FIG. **8** shows a component view of one embodiment of the present invention.

[0026] FIG. **9** shows a component view of one embodiment of the present invention.

[0027] FIG. **10** shows a flowchart of an embodiment of method of the present invention.

DETAILED DESCRIPTIONS OF THE INVENTION

[0028] Reference is made herein to the attached drawings. Like reference numerals are used throughout the drawings to depict like or similar elements of the atmospheric water generator utilizing centrifugal hydraulic air compressor. For the purposes of presenting a brief and clear description of the present invention, the preferred embodiment will be discussed as used for harvesting drinking water from the atmosphere. The figures are intended for representative purposes only and should not be considered to be limiting in **20** any respect.

[0029] Referring now to FIGS. **1** and **2**, there is a perspective view of one embodiment of the present invention and a front end view of one embodiment of the present invention, respectively. The present invention provides an atmospheric water generator utilizing centrifugal hydraulic air compressor **39** comprising a hollow frame **11** housing air filters **15** liquid-air heat exchanger water passage **14** metal fins **12** drive motor **13** and panel **31**. The hollow frame **11** holds all the components in a rigid fashion. In one embodiment of the present invention, the atmospheric water generator utilizing centrifugal hydraulic air compressor can have a non-rigid shape with the body being comprised of inflatable panels for compactness and portability. The drive motor **13** is positioned in the middle of the panel **31** wherein the panel **31** performs as an air dam. In one embodiment of the present invention, the drive motor **13** can be located on the bottom of the present invention. The liquid-air heat exchanger water passage **14** metal fins **12** are positioned above the air filter **15**. In one embodiment of the present invention, the liquid-air heat exchanger water passage **14** metal fins **12** can be positioned in panel **31** wherein the drive motor **13** will benefit from extra thermal management. In the shown embodiment, the hollow frame **11** has a square shape with rectangular cross sectional area. However, the hollow frame **11** can have any suitable shape. In the shown embodiment, the air filter **15** has a rectangular shape with square filter holding apparatus. However, the air filter **15** can have any suitable shape with or without the filter holding apparatus. In the shown embodiment, the drive motor **13** has a tubular shape with round cross sectional area. However, the drive motor **13** can have any suitable shape. In the shown embodiment, the drive motor **13** is an electrical drive motor. However, the drive motor **13** can be any kind of motor. In another embodiment of the present invention, the drive motor **13** can be a fossil fuel based motor for off grid water generation. Referring now to FIG. **3**, there is a back view of one embodiment of the present invention. The present invention provides an atmospheric water generator utilizing centrifugal hydraulic air compressor **39** comprises a hollow frame **11** metal fins **12** drive motor **13** liquid-air heat exchanger water passage **14** drive motor electrical connections **16** access door brackets **17** extracted water nozzle **18** hydraulic water fill port **19** extracted water reservoir indicator **20** access door latch **21** access door **32** wherein the user can access the internal components of the present invention. The drive motor electrical connections **16** attach to drive motor **13** and panel **31**. In the shown embodiment, the drive motor electrical connections **16** are attached to the panel **31** and the drive motor **13**. However, the drive motor electrical connections **16** can attach to any source of power. In another embodiment of the present invention, the drive motor electrical connections **16** attach to the drive motor **13** and solar panels. In the shown embodiment, the hydraulic water fill port **19** has a circular shape with a fill port hole. However, the hydraulic water fill port **19** can have any suitable shape. In the shown embodiment, access door latch **21** access door bracket **17** access door **32** comprise the access point to the internal structure of the present invention. In the shown embodiment, the access door **32** has a rectangular shape. However, the access door **32** can have any suitable shape. In another embodiment of the present invention, the access door **32** is left out with an air filter **15** taking place of the access door **32**. The extracted water reservoir indicator **20** is connected to the hollow frame **11** and serves as a visual indicator of the extracted water of the present invention. In the shown embodiment, the extracted water reservoir indicator **20** has a tubular shape with round transparent cross sectional area. However, the extracted water reservoir indicator **20** can have any suitable shape and opacity. In another embodiment of the present invention, the extracted water reservoir indicator **20** can be left off for the use of a digital display or other suitable means. The extracted water nozzle **18** is attached to the hollow frame **11**. The extracted water nozzle **18** can be attached to any point on the hollow frame **11** to facilitate in the emptying of the water reservoir. In the shown embodiment, the extracted water nozzle **18** has a tubular shape with round cross sectional body. However, the extracted water nozzle **18** can have any suitable shape. In another embodiment of the present invention, the extracted water nozzle **18** can be replaced with a water pump to facilitate in the emptying of the hollow frame **11**. Referring now to FIGS. **4** and **5**, there is an internal view of one embodiment of the present invention and a internal view minus the water shroud **23** of one embodiment of the present invention, respectively. The present invention provides atmospheric water generator utilizing centrifugal hydraulic air compressor **39** comprises hollow frame **11** holds the top bearing upper support **28** the drive motor **13** shaft **25** hollow shaft water funnel **38** hollow shaft **27** centrifugal discs **30** wherein comprises the centrifugal portion of the present invention. In the shown embodiment, the top bearing upper support **28** has a cross member and bearing assembly. However, the top bearing support **28** can have any suitable shape, support structure, or bearing. In the shown embodiment, the centrifugal discs **30** are plural. However, the centrifugal discs **20** can have any suitable number of discs. The water shroud **23** water pump **22** water tube to liquid-air heat exchanger **26** hollow frame **11** liquid-air heat exchanger water passage **14** hollow shaft

fill tube **29** comprises the water circulation and heat transfer components of the present invention. Filtered air holes **24** water shroud **23** comprise the air inlet portion of one embodiment of the present invention. In the shown embodiment, the filtered air holes **24** has a slit shape. However, the filtered air holes **24** can have any suitable shape. The present invention includes other water passages (not shown for clarity) to facilitate in the transfer of the water from one component to another. In another embodiment of the present invention, the water shroud **23** is shaped to not require the use of the filtered air holes **24**. In the shown embodiment, the hollow shaft water funnel **38** has a round shape with a funnel opening. However, the hollow shaft water funnel **38** can have any suitable shape to direct water into the hollow shaft **27**. In another embodiment of the present invention, the hollow shaft water funnel **38** is connected to hollow shaft fill tube **29** by a rotary water seal. Referring now to FIG. **6**, there is a top view of one embodiment of the present invention. The present invention provides atmospheric water generator utilizing centrifugal hydraulic compressor **39** comprises hollow frame **11** drive motor **13** positioned in the middle of the panel **31** wherein the drive motor electrical connections **6** pass through the panel **31** to a power source. In referring to FIGS. **1-6**, The present invention provides an atmospheric water generator utilizing centrifugal hydraulic air compressor **39** shows panel **31** located above the top bearing support **28**. However, the top bearing support **28** can be made to support the panel **31**. Referring now to FIG. **7**, there is a bottom view of one embodiment of the present invention. The present invention provides an atmospheric water generator utilizing centrifugal hydraulic air compressor **39** comprises a hollow frame **11** panel **31** with a lower bearing **33** and shaft **25** centrally positioned. In the shown embodiment, the lower bearing **33** is a generic bearing to hold the shaft. However, the lower bearing **33** can be any bearing suitable to holding the shaft **25**. In another embodiment of the present invention, the lower bearing **33** is eliminated and relies on the top bearing support **28** to dampen vibrations. Referring now to FIGS. **8** and **9**, there is a component view of one embodiment of the present invention and a component view of one embodiment of the present invention, respectively. The present invention provides an atmospheric water generator utilizing centrifugal hydraulic air compressor **39** comprising of a centrifugal disc **30** wherein the disc support **40** formed metal structure **35** forms the hydraulic chamber **34** which flows through to the air-water thrust nozzles **36** due to centrifugal force and the hollow shaft **27** shaft **25** and water nozzles **37** form the water distribution network to the hydraulic chamber **34**. In the shown embodiment, the air-water thrust nozzles **36** are tapered to make more thrust. However, the air-water thrust nozzles **36** may have any suitable shape. In the shown embodiment, the formed metal structure **35** is metal. However, the formed metal structure **35** may be made of any suitable material. In the shown embodiment, the disc support **40** is made of metal. However, the disc support **40** may be made of any suitable material. In another embodiment of the present invention, the disc support **40** is eliminated and just utilizes the formed metal structure **35** to form the hydraulic chamber **34**. In the shown embodiment, the centrifugal disc **30** have multiple hydraulic chambers **34**. However, the centrifugal disc **30** can have any number of hydraulic chambers **34** suitable to making the atmospheric water generator utilizing central hydraulic air compressor **39** to harvest water from the atmosphere. In another embodiment of the present invention, the centrifugal discs **30** can be attached at the peripheral of the centrifugal disc **30** to strengthen the centrifugal disc **30**. In another embodiment of the present invention, the centrifugal discs **30** have a shroud on the periphery of the centrifugal discs **30** to facilitate the airflow to the liquid-air heat exchanger **14** and metal fins **12**. Referring now to FIG. **10**, there is shown a flowchart of one embodiment of the present invention. In the shown embodiment of a method of the present invention, the atmospheric water generator utilizing centrifugal hydraulic air compressor **39** utilizes a hydraulic system to compress air to harvest water from the atmosphere. The present invention includes a power source (not shown) to spin the drive motor **3** and drive the water pump **22**. The present invention includes controls and wiring (not shown) to control the speed of the drive motor **3** and the water pump **22**. The controls (not shown) send power from the power source (not shown) to the drive motor **3** and water pump **22**. The drive motor **3** spins the shaft **25** which is connected to the hollow shaft **27** water nozzle **37** hydraulic chamber **34** air-water thrust nozzle **36** which is stabilized by the top support bearing **28** and lower bearing **33**. The water pump **22** pumps water from the bottom of the water shroud **23** to the liquid-air heat exchanger passage **14** where any heat is exchanged with the ambient air via the metal fins **12** to the hollow shaft fill tube **29**. The hollow shaft fill tube **29** sends water to the hollow shaft **27** via the hollow shaft water funnel **38**. The hollow shaft **27** sends water to the water nozzle **37** where the water enters the hydraulic chamber **34** in the centrifugal disc **30**. The action of the water being slung through the hydraulic chamber **34** creates negative pressure in the internal compartment of the atmospheric water generator utilizing centrifugal hydraulic air compressor **39** pulls ambient air through the air filter **15** which passes through the filtered air holes **24** in the water shroud **23** where the air mixes with the water inside the hydraulic chamber **34**. The hydraulic chamber **34** sends airwater mixture by centrifugal effect to the air-water thrust nozzles **36** which lets the air-water mixture spray unto the water shroud **23**. From the water shroud **23** the water falls due to gravity to the bottom of the water shroud **23** where it is picked up by the water pump **22** to repeat the cycle. From the water shroud **23** the dehydrated air leaves and passes through the metal fins **12** and liquid-air heat exchanger water tube **14** before passing out of the atmospheric water generator utilizing centrifugal hydraulic air compressor **39**. In one embodiment of the present invention, the speed control of the centrifugal discs **30** determine the amount of water harvested from the atmosphere. In another embodiment of the present invention, the atmospheric water generator utilizing centrifugal hydraulic air compressor **39** can be utilized to dehydrate air for food, home, **10** commercial or industrial useage.

[0030] Although the invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention.

I claim:

1) An atmospheric water generator utilizing centrifugal hydraulic air compressor comprising:

a hollow frame with panels, drive motor, water pump, liquid-air heat exchanger passage, metal fins, air filters, water nozzle, centrifugal discs, hydraulic chamber,

air-water thrust nozzles, hollow shaft, water shroud, wherein the device is configured into a centrifugal hydraulic air compressor that utilizes water to compress air to extract water from the atmosphere.

2) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: one or more air filters disposed on the surface to filter incoming air.

3) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: one or more centrifugal discs attached to the hollow shaft to hydraulically compress the air.

4) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: one or more liquid-air heat exchange devices to exchange heat to the surrounding atmosphere.

5) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: one or more drive motors disposed on the hollow frame to drive the centrifugal discs.

6) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: a drive motor to spin the centrifugal components operated electrically.

7) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: a drive motor to spin the centrifugal components operated by fossil fuels.

8) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: a power source to drive the electrical components.

9) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: the hollow frame contains the harvested water until useage.

10) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: the drive motor is connected to a shaft, hollow shaft, hollow shaft water funnel, water nozzles, centrifugal discs, hydraulic chambers, air-water thrust nozzles.

11) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: the centrifugal disc contains one or more water nozzles, hydraulic chambers, air-water thrust nozzles.

12) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: the water component is the heat transfer vehicle for thermal management.

13) The atmospheric water generator utilizing centrifugal hydraulic air compressor of claim **1**, wherein: the dehydrated air is used to cool off the water in the liquid-air heat exchangers.

14) A method of harvesting water from the atmosphere, comprising the steps of: utilizing a centrifuge to spin water, entraining air, and compressing the incoming air.

15) A method of harvesting water from the atmosphere, comprising the steps of: utilizing a centrifuge to spin water, entraining air, compressing the incoming air, releasing the pressurized air-water mixture through thrust nozzles to recover energy lost in spinning the centrifuge.

* * * * *