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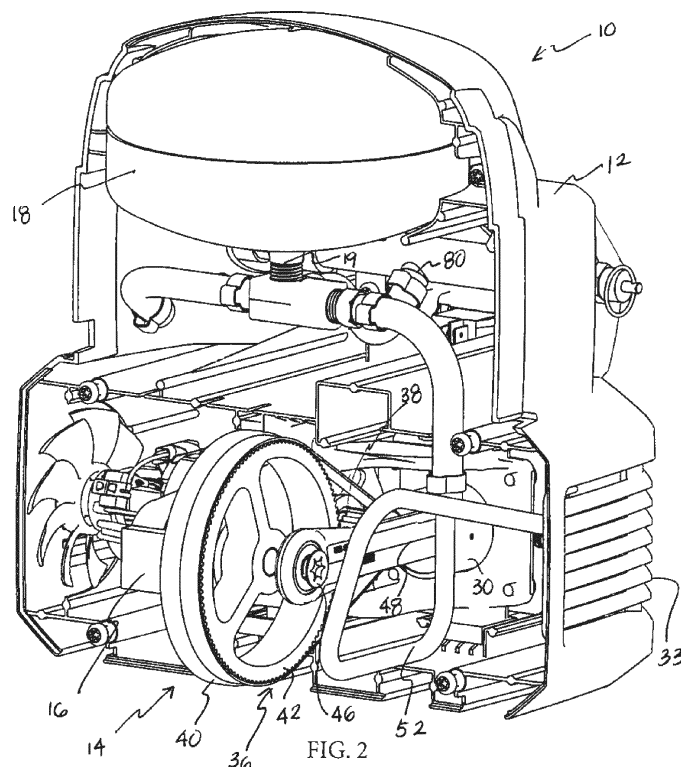
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(54) **AIR COMPRESSOR ASSEMBLY HAVING A CONDENSATE MANAGEMENT SYSTEM**

(57) An air compressor assembly (10) including a condensate management system that removes condensate from an air storage tank (18). Condensate inside the storage tank (18) descends to the lowest point in the tank, where a single port (19) is located. The port (19) can serve as both an inlet for compressed air to the stor-

age tank (18) and an outlet of compressed air from the storage tank. The condensate is drawn from the storage tank (18) to the manifold assembly (20) through an air conduit and out of the air compressor assembly (10) through a connected tool when the tool is activated.



Description

[0001] The present invention generally relates to the field of air compressors and particularly to a condensate management system for use with an air compressor assembly.

[0002] To meet instantaneous air flow demand, it is a common design practice to include a compressed air reservoir in the form of an air storage tank or other pressure vessel. The tank, usually with an output regulator, can hold a quantity of compressed air to meet peak demands from serviced loads, while allowing the use of a smaller and lighter compressor that charges the tank and is capable of meeting the average compressed air flow rate for the intended use.

[0003] Air compressor assemblies typically include an air compressor, having a motor driven pump assembly, mounted to a compressed air storage tank, a manifold assembly in fluid connection with the pump assembly, and a pressure switch assembly. This configuration allows for the operation of an air-powered tool from the reservoir of compressed air stored in the compressed air storage tank. When the supply of compressed air in the compressed air storage tank becomes depleted by the operation of the air-powered tool, the air compressor may be operated for repressurizing the compressed air storage tank. In this manner, air compressor assemblies are further used to provide compressed air for operating air-powered tools.

[0004] Traditional air compressors pump compressed air into the tank through an inlet hose, then to a manifold and out to a connected tool through a separate outlet hose. During the utilization of a compressed air tank, it is common for water and other liquids to condense from the air inside the air tank as a consequence of the pressure and temperature differences inside the tank and outside the tank. For example, due to the heat generated by the pump during compression of the air and the subsequent cooling of air in the tank, a condensate can accumulate within the tank body. A primary source of the condensate is water vapour naturally occurring in the supply of air. The condensate can cause rust to develop within the tank resulting in reduced efficiency of the compressor assembly. Air storage tanks, therefore, have a separate drain valve for draining a condensate or water from the tank. In order to remove the condensate, the operator manually opens the drain valve, allowing the water to exit from the tank.

[0005] Water and other liquids that may accumulate inside the air tank may alternatively be removed through the installation of a condensate removal device. Conventionally, a condensate removal device is placed in proximity to a low point of a compressed air tank within an air compressor assembly to remove condensate that may form within a compressed air tank. Typically, condensate removal devices known to the art are valves that may be opened and closed easily yet are capable of maintaining a constant pressure inside the air tank.

[0006] Since compressed air tanks tend to be large and heavy, they may not be easily transported. As a result, typical mobile compressed air tanks may be fitted to a frame comprising wheels and handlebars. This allows a person or persons to lift the compressed air tank and pull or push it to a desired location. While traveling on a smooth surface, the design works well. However, in many construction sites, movement to a remote location over an uneven and unpaved surface may be necessary. A frequent problem that occurs while moving the compressed air tank to a remote location is that the drain valve for removing condensate from an air tank may be damaged during transport to a remote location. Foreign objects tend to come into contact with the valve during transport causing damage to the valve. Another problem is that compressed air tanks may be moved during the day and typically are placed upon the bed of a pickup truck in order to transport the compressed air tank to another worksite. Since typical compressed air tanks are heavy, it is not easy for persons to use care and caution when placing the compressed air tanks onto the bed of a pickup truck. Thus, the compressed air tank may be lifted and pushed onto the bed in a quick manner. Often, other items located on the bed of the truck may come into contact with the drain valve damaging the valve when the compressed air tank is placed upon the bed of a pickup truck. Upon damage to the drain valve, the compressed air tank becomes non-functional.

[0007] As such, there is a need for an air compressor assembly that does not require a drain valve or the additional maintenance and care of draining the air storage tank. Specifically, it would be advantageous to have an air compressor assembly in which the condensate drains from the tank automatically, so that the operator would no longer need to manually drain water from the air storage tank. In addition, there is a need to reduce the number of holes in an air storage tank, which would improve the structural integrity of the tank.

[0008] The air compressor assembly of the embodiments described herein is designed to pump compressed air through a regulating manifold assembly and to a connected tool. If the operator does not use all of the air flowing into the manifold assembly, the excess compressed air will flow into the storage tank for later use. However, the longer the compressed air stays in the storage tank, the more likely condensation is to occur. As such, the air compressor assembly of the present invention includes a condensate management system that provides at least one storage tank having a single port at the bottom of the storage tank body that is connected to a single air hose that allows entry and exit of the compressed air to and from the air storage tank. Condensate accumulated in the storage tank during operation of the pump assembly flows to the bottom of the storage tank. Through gravity, the condensate flows out of the storage tank body into the air hose. As a result, the air compressor assembly of the embodiments described herein allows condensate removal through the air pressure hose,

thereby eliminating the need for a drain valve and a separate second air inlet in the storage tank. In addition, as a drain valve and separate air inlet are no longer necessary, the condensate management system also results in a reduction in manufacturing costs.

[0009] Accordingly, in an embodiment, the present invention is directed to a compressor assembly including a pump assembly of an air compressor, a manifold assembly, and an air storage tank of an air compressor. The present invention includes a condensate management system between the pump assembly, manifold assembly and air storage tank that directs condensate out of the compressor assembly.

[0010] In an embodiment, an air compressor assembly includes at least one storage tank configured to store compressed air; an air compressor that includes a pump assembly configured to supply the compressed air to the at least one storage tank and a motor configured to drive the pump assembly. A manifold assembly includes an inlet for receiving the compressed air from the pump assembly. A tank pressure gauge is configured to display a pressure of the compressed air entering the manifold assembly and a pressure regulator is configured to regulate a pressure of the compressed air being output from the manifold assembly. An outlet, such as a tool connect member, is provided at one end of the manifold assembly to deliver an output of the compressed air to a connected tool. An air conduit, such as a hose, is connected between the manifold assembly and the at least one storage tank to deliver the compressed air and a condensate from the at least one storage tank to the manifold assembly. A port is disposed in the at least one storage tank. The port admits the compressed air into, and releases the compressed air and the condensate from, the at least one storage tank to the air conduit and the manifold assembly. The port thereby serves as both an inlet port and an outlet port for compressed air.

[0011] The air compressor assembly can have a housing that encases the at least one storage tank, the pump assembly, and the motor. The housing can at least partially encase the manifold assembly. The housing can have a handle to assist in transporting the air compressor assembly.

[0012] A second storage tank can be added to the air compressor assembly in order to store additional compressed air.

[0013] The port can be integral with the at least one storage tank and be valve-free..

[0014] The port serves as a condensate management system and can be arranged between a lower portion of the at least one storage tank and the manifold assembly. The condensate management system provides for the removal of a condensate from the air storage tank and the entire air compressor assembly.

[0015] In another embodiment, a condensate management system is provided for removing a condensate from a compressed air storage tank of the air compressor assembly. The condensate management system includes

an air storage tank having a condensate removal member disposed below a plane passing through a horizontal centre portion of the air storage tank; and an air conduit connected to a valve-free condensate removal member.

5 The valve-free condensate removal member includes an outlet port in a bottom of the air storage tank.

[0016] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not necessarily restrictive of the invention as claimed. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and together with the general description, serve to explain the principles of the invention.

10 **[0017]** The numerous advantages of the present invention may be better understood by those skilled in the art by reference to the accompanying Figures. In the Figures, like reference numerals designate corresponding parts throughout the several views.

20 FIG. 1 is a perspective view of an embodiment of an air compressor assembly housing having the condensate management system in accordance with an embodiment of the present invention;

25 FIG. 2 is an internal rear perspective view of the air compressor assembly within the housing, in accordance with an embodiment of the present invention; FIG. 3 illustrates the pump assembly and condensate management system of the air compressor assembly in accordance with an embodiment of the present invention;

30 FIG. 4 illustrates the manifold assembly and condensate management system of the air compressor assembly in accordance with an embodiment of the present invention;

35 FIG. 5 is a left side view of the air compressor assembly in accordance with an embodiment of the present invention; and

40 FIG. 6 is a right side view of the air compressor assembly in accordance with an embodiment of the present invention.

[0018] Reference will now be made in detail to the presently preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings.

[0019] Referring generally to FIGS. 1-6, exemplary embodiments of the present invention are shown.

[0020] Briefly, as shown in FIGS. 1 and 2, the air compressor assembly 10 includes a housing 12 that encases a compressor or pump assembly 14, which is operable for intaking and compressing ambient air, a power source, such as an engine or electric motor 16, for providing power to the pump assembly. The motor 16 may be of any known type, such as an induction motor or a universal motor and, in the example provided, includes a power cord 28 that permits the motor 16 to be coupled to a source of alternating current power, such as a conventional outlet. A pressure vessel, such as a storage

tank 18 is coupled to a manifold assembly 20, and a pressure switch assembly 22 is operatively connected to the manifold assembly. The compressed air that exits the pump assembly 14 is discharged through the manifold assembly 20 and delivered to a tool connect member 24 for powering air-powered tools. Excess compressed air is delivered to the storage tank 18, which serves as a reservoir for the compressed air. The excess compressed air is delivered to the storage tank 18 through a port 19, which can serve as an inlet port. The port 19 can be a tubular member attached to or integrally formed with the storage tank. Compressed air can be drawn from the storage tank 18 through the same port 19, in this capacity, serving as an outlet port. Any condensate within the storage tank 18 is drawn out with the compressed air, allowing the port 19 to also serve as a condensate removal member.

[0021] A conduit is connected between the port 19 of the storage tank and an inlet of the manifold assembly 20. The conduit is used to deliver the compressed air and condensate from the storage tank 18 to the manifold assembly.

[0022] The manifold assembly 20 is operatively fitted to the storage tank 18 allowing compressed air to be drawn from storage tank, as needed, for inflating sports or recreation equipment, or for emergency uses such as inflating vehicle tires or powering air powered tools. Air-powered tools include, but are not limited to pneumatic fasteners or nailers, impact wrenches, ratchet wrenches, sprayers, grinders, socket driving tools, material shaping tools, sanding tools, spray painting tools, inflation chucks, and the like. Herein the term "tool" is used to designate an air-powered or pneumatic tool, or inflatable member.

[0023] The motor 16 includes a fan 17 that can be coupled to the output shaft (not shown) of the motor 16. The fan 17 can circulate cooling air over the motor 16 and the pump assembly 14 by drawing ambient air into the housing 12. Ambient air enters the housing 12 through louvered openings 25 in front of the motor fan 17. The housing 12 includes a handle 26 to facilitate portability of the air compressor assembly 10. The housing can be made from any material including, but not limited to plastic or other resinous material.

[0024] As shown in FIGS. 2 and 3, the pump assembly 14, driven by the electric motor 16, is configured to supply compressed air through the manifold assembly 20 to the tool connect member 24 and any connected tool or pressurized air member. Alternatively, the pump assembly 14 can be configured to supply compressed air only through the manifold assembly 20 to the storage tank 18, instead of directly to the air storage tank. As shown in FIG. 2, the pump assembly 14 can have a pump cylinder 30, a cylinder head 32, a valve plate assembly 34 mounted between the pump cylinder 30 and the cylinder head 32, and a piston (not shown) which is reciprocated in the pump cylinder 30 by an eccentric drive 36. The eccentric drive 36 can include a sprocket 38 which can drive a drive belt 40 which can drive a pulley 42. A bearing 44 can be

eccentrically secured to the pulley 42 by a rod bolt or a screw 46, and to a connecting rod 48. Preferably, the sprocket 38 and the pulley 42 can be spaced around their perimeters and the drive belt 40 can be a timing belt. The pulley 42 can be linked to the sprocket 38 by the drive belt 40. As the pulley 42 rotates about its axis, the bearing 44 and an attached end of the connecting rod 48 are moved around a circular path.

[0025] The ambient air 100 can be compressed in the pump cylinder 30 by the piston. The cylinder head 32 defines an inlet for the ambient air, and an outlet 50 for the compressed air 102. Compressed air 102 can exit the cylinder head 32 via the compressed air outlet 50 and can flow through a first pressure hose 52 to enter the storage tank and flow through a second pressure hose 54 to enter the manifold assembly 20. Heat generated by the pump assembly 14, and in particular, the heat from the cylinder head 32, can be exhausted through louvered openings 33 in the housing 12, adjacent to the cylinder head.

[0026] The pump assembly 14 is connected to the pressure switch 22, that can be located in a gauge header 82 (see FIG. 4) that supports the manifold assembly 20. Preferably, the pump assembly 14 is connected to the manifold assembly 20 and the pressure switch 22 via a one-way valve, such as a check valve 56, or the like. The check valve 56 ensures that the air from the storage tank 18 does not leak out toward the pump assembly 14. The pressure switch 22 operates the pump assembly 14 for supplying compressed air to a connected tool.

[0027] Excess compressed air, as determined by the pressure switch 22, is delivered to the storage tank 18. When the storage tank 18 has been fully pressurized (i.e., when the compressed air capacity has been reached), the pressure switch 22 operates to stop the pump assembly 14 from supplying compressed air to the storage tank 18, thereby preventing overpressurization of the storage tank. Specifically, the pressure switch 22 regulates pressure within the storage tank 18 by alternately starting and stopping the pump assembly 14 to supply compressed air. In one embodiment, the pressure switch 22 is coupled with the pump assembly 14 for electrically actuating the pump assembly. The pressure switch 22 causes the pump assembly to operate until the compressed air storage tank is full. When the storage tank is full, the air pressure in the tank will be sensed by sensors (not shown) within the pressure switch 22 that open sensor contacts to stop the motor 16, and trigger the pressure switch to turn off. When the pressure switch 22 is turned off, air is no longer pumped into the storage tank 18. In this manner, the pressure of the compressed air in the storage tank 18 is maintained within a range generally suitable for powering one or more air powered tools.

[0028] The stored air is available for use when a connected tool is turned on so that the air leaves the storage tank and flows out of the air compressor assembly through the tool connect member 24 of the manifold assembly 20.

[0029] The manifold assembly 20 may also include a safety pressure relief valve 58 for relieving pressure within the manifold assembly 20 and the storage tank 18. In accordance with an exemplary embodiment, the pressure relief valve 58 may be opened by an operator by pulling outward on an enlarged ring 60 having a tab or "fob" 62 attached thereto. Preferably, the ring 60 and fob 62 are sized to be easily gripped by the operator of the air compressor 10 to open the safety pressure relief valve 58.

[0030] In an embodiment of the present invention, as illustrated in FIGS. 2-6, the air compressor assembly 10 includes a plurality of air conduits or hoses for delivering compressed air throughout the assembly. The air conduits include a first pressure hose 52 disposed between the pump assembly 14 and the storage tank 18, and a second pressure hose 54 disposed between the storage tank and the manifold assembly 20.

[0031] As shown in FIG. 3, the pump assembly 14 is operatively connected to the manifold assembly 20 through the first pressure hose 52 and a second pressure hose 54. The first pressure hose 52 delivers compressed air from the pump assembly 14. A first end 66 of the first pressure hose 52 is connected to the outlet port 50 of the cylinder head 32 and a second end 68 of the first pressure hose is connected to an inlet port 70 of an adaptor assembly connector, such as a splitter valve 72. The splitter valve 72 can direct the compressed air into at least two directions. For example, the splitter valve 72 can direct one stream of compressed air to enter the second pressure hose 54 and direct another stream of compressed air to enter the storage tank 18. The second pressure hose 54 has a first end 74 that is connected to an outlet port 76 of the splitter valve 72 and a second end 78 that is connected to an inlet port 80 in the gauge header 82 of the manifold assembly 20.

[0032] The pressure hoses 52, 54 include hose couplings that attach the hoses to the splitter valve inlet port 70 and outlet port 76, and to the manifold assembly inlet port 80. In an embodiment of the present invention, the second pressure hose 54 can also have a threaded coupling that can be screwed onto the port 19 of the storage tank 18, that may also be threaded. A hose clamp 68, as shown in FIGS. 3 and 5 can further secure the second pressure hose 54 and the coupling to the storage tank 18.

[0033] Compressed air can be drawn from the storage tank 18 through the manifold assembly 20 to a connected tool. Compressed air that enters the storage tank 18 can include excess air that cannot immediately be used by a connected tool, but can be drawn out for later use. As such, the second pressure hose 54 can be arranged delivering compressed air from the pump assembly 14 and/or the storage tank 18 to the manifold assembly 20 and to a connected tool. In this arrangement, the second pressure hose 54 serves as a drain for delivering air and any liquid condensate from the storage tank 18 through the same compressed air inlet_port in the storage tank. In operation, compressed air is supplied from the pump

assembly 14 through the first pressure hose 52 to the splitter valve 72. The splitter valve 72 is connected to the tank port 19. The splitter valve 72 is also connected to the manifold assembly 20 by the first pressure hose 54. When the pump assembly 14 is operating, compressed air is pumped through the first pressure hose, through the manifold assembly 20, and out of the tool connect member 24 to the connected tool. If the connected tool requires less compressed air than is being created by the pump assembly 14, or the connected tool is not being used, compressed air will also pass from the splitter valve 72 through the port 19 and into the storage tank 18 until the pressure reaches the limit of the pressure switch 22 and the motor 16 stops. When compressed air is required again, the compressed air will flow out of the storage tank 18 through the port 19, through the splitter valve 72 and out of the port 74 and into the hose 54, leading to the manifold assembly 20 and the tool connect member 24. As compressed air flows out of the storage tank 18, any moisture that condensed while the compressor was cooling will also flow or drain out.

[0034] In an alternate embodiment of the present invention, a first pressure hose can be configured to directly deliver compressed air from the pump assembly 14 to the manifold assembly 20, and a second pressure hose can be configured to deliver compressed air from the manifold assembly to the storage tank 18. Likewise, in this arrangement, the second pressure hose can serve as both a feed for delivering air to the storage tank and a drain for delivering air and any liquid condensate from the storage tank through a same port in the storage tank.

[0035] Although a hose is disclosed, an air conduit of any material for conveying a gas or air, such as a metal pipe, can be used.

[0036] Referring to FIG. 4, the manifold assembly 20 can include a tank pressure gauge 90 and a pressure regulator or pressure adjustment knob 92. The tank pressure gauge 90 displays the pressure of the compressed air in the storage tank and the pressure regulator/pressure adjustment knob 92 adjusts and displays the pressures delivered by the air compressor 10 through the tool connect member 24 to a connected tool. The pressure regulator/adjustment knob 92 controls an internal regulator (not shown) that is set within an output pressure guide. The knob 92 is rotatable to a position that corresponds to the desired air output pressure to a connected tool. The desired air output pressure guide can be located on the face of the air compressor to be readable by the operator. Alternatively, the manifold assembly 20 can include a tank pressure gauge 90 and a separate regulator gauge.

[0037] The tank pressure gauge 90 and the regulator gauge may be configured to monitor and provide readings on storage tank pressure and manifold assembly outlet pressure, respectively. It is contemplated that the gauges 90, 92 may provide a variety of readouts, such as needle, digital readouts, plasma readouts, and the like. As shown, the pressure regulator/adjustment knob

92 has a dial or like control for selecting the pressure of air to be delivered by the air compressor assembly 10 to a connected tool. Those of skill in the art will appreciate that other dials and controls, such as a depression switch, digital controller, and the like may be provided for regulating the pressure of air delivered by the air compressor assembly and/or the pressure of the air in the compressed air storage tank.

[0038] As illustrated in FIG. 4, for example, the tank pressure gauge 90, pressure regulator/ adjustment knob 92 and tool connect member 24 are coupled to the gauge header 82. The tool connect member is located at one end of the gauge header 82. Alternatively, the manifold assembly inlet port 80 can be located at one end of the manifold assembly 20 and the tool connect member 24 can be located at an axially opposite end of the gauge header 82 and provide a means for connecting a tool.

[0039] The pressure regulator/ adjustment knob 92 is connected to the tank pressure gauge 90 and the second pressure hose 54 for delivering compressed air to the connected tool. The manifold assembly 20 includes an adapter assembly 84 providing for the functional coupling of the first and second pressure hoses, with the air compressor. In an embodiment, the adapter assembly 84 can include a connector member for coupling each of the first and second pressure hoses 52, 54 and the tank assembly with the splitter 72 and the gauge header 82 of the manifold assembly 20, respectively. It is contemplated that the adapter assembly 84 may comprise a variety of fastening assemblies, such as a threaded fastener, a compression fastener, and the like, without departing from the scope and spirit of the present invention.

[0040] As illustrated in the Figures, the air compressor assembly 10 can have a single "pancake" shaped (i.e., a relatively short and large diameter cylinder with convex ends) compressed air storage tank structure. However, it will be appreciated that other shaped tanks may be used for storing compressed air, including but not limited to cylindrical tanks having a horizontal orientation, and tanks having specialized shapes. Further, it should be noted that the air compressor assembly 10 may include more than one compressed air storage tank, such as two air storage tanks mounted top-to-bottom or side-by-side, or the like. The use of air storage tanks having configurations other than those specifically illustrated herein is well known in the art. Consequently, the substitution of such tanks in place of the compressed air storage tanks specifically illustrated in the Figures does not depart from the scope and intent of the present invention.

[0041] The storage tank 18 is appropriately sized for containment within the air compressor assembly housing 12, while providing a minimum volume to keep the pressure switch operating to supply compressed air from the pump assembly 14. In an embodiment of the present invention, the storage tank 18 can have a maximum capacity of about 1 gallon, 2 gallons, 5 gallons, 10 gallons or more. Those skilled in the art will understand that the storage tank may be configured somewhat differently, as

with a conventional cylindrical style (not shown) or with a plurality of tank structures that are coupled in fluid connection.

[0042] In the air compressor assembly 10 of an embodiment of the present invention, the storage tank 18 is provided to reserve a predetermined amount of compressed air sufficient to trigger the pressure switch 22 to turn the pump assembly 14 off. As the source of the predetermined amount of compressed air is ambient air which includes water vapour, upon pressurization, additional water vapour is introduced. Further, condensation occurs when heated gas cools, such as when the gas is exposed to a lower temperature, such as in the storage tank.

[0043] In an exemplary embodiment, when an air storage tank holds a small amount of air, such as, for example, one gallon or less, and a connected tool is drawing air from the air compressor assembly, the stored air is used quickly and exhausted before being heated by additional compressed air from the pump assembly, or before cooling down as a result of the air remaining in the storage tank. In operation, the compressed air is not given time to significantly heat up or cool down therefore, the condensate does not have an opportunity to accumulate. Due to the small size of the storage tank, the condensate is continually forced or blown out of the air compressor assembly by being drawn out to a connected tool. If compressed air remains in the storage tank, the amount of condensate is insignificant, such that when operation resumes, the condensate is blown out of the air compressor assembly by being drawn out to a connected tool.

[0044] In order to facilitate the draining of the condensate from the storage tank 18, the tank is suspended within the air compressor assembly housing 12, as shown in FIG. 2, for example. Gravity causes the condensate to flow to the bottom of the storage tank and to the port 19. In an embodiment, the port 19 can be located on the bottom centre portion of the storage tank 18. The condensate is forced out of the storage tank through the second pressure hose 54, when the connected tool is activated. When the pressure regulator/ adjustment knob 92 is rotated to its open and predetermined position, at a set point controlled by a spring-loaded piston (not shown), to maintain the desired pressure, a connected tool draws the compressed air from the storage tank. The force of the compressed air pushes the condensate through the manifold assembly 20 and out of the air compressor assembly 10. With the storage tank port 19 at the bottom centre of the storage tank 18, the tank does not have to be tilted or manipulated in order to drain the condensate. Moreover, the port 19 is valve-free allowing the condensate to be readily removable, without operator intervention by powering ON on the air compressor assembly 10 and activating the connected tool.

[0045] The amount of air drawn from the storage tank 18 is controlled by the regulator/pressure adjustment knob 92. It is commonly the case, with typical air com-

pressor assemblies, that the storage tank must comprise multiple ports and an inlet port must be physically separated from the outlet port in order to prevent the quick turn of air from inlet to outlet. With the port 19 serving as both the feed and drain hose, the storage tank 18 need only use a single port to accomplish both compressed air inlet and outlet.

[0046] An ON/OFF power switch 88 controls operation of the air compressor. As shown in FIG. 1, the ON/OFF switch 88 is illustrated as mounted on the air compressor housing, for example, and is operationally coupled with the pressure switch assembly. The ON/OFF switch 88 is located remotely from the pressure switch of the pressure switch assembly 22. The ability to remotely locate the ON/OFF switch 88 provides greater flexibility to the operator for access to the switch for turning the compressor on and off_ and increases the ease of use of the air compressor 10. It is contemplated that the ON/OFF switch 88 may be lighted to show when a circuit providing electricity to the pressure switch is complete.

[0047] For example, when the ON/OFF switch 88 is lit the operator knows that the pressure switch 22 is monitoring the pressure within the storage tank so that when the pressure passes a threshold value the pressure switch will activate or de-activate the pump assembly as indicated by the threshold value. In operation, the air compressor may have 200 PSI of air within the storage tank 18 and through use of the air compressor, the air pressure may drop to 150 PSI. The pressure switch 22 may have a threshold value of 175 PSI, whereupon the pressure switch activates the pump assembly when pressure within the storage tank drops below 175 PSI. When the ON/OFF switch 88 is not lit, the operator knows that the pressure switch 22 is not monitoring the air pressure within the storage tank, thus, by the present example, the air pressure would continue to drop below the 175 PSI value, if the pump assembly 14 is not activated to increase the pressure. It is further contemplated that the ON/OFF switch 88 may include a protective covering, such as a plastic boot for extreme environment operation. The ON/OFF switch 88 may be enabled as a two-position switch. However, it is contemplated that a variety of switch assemblies may be employed with the present invention.

[0048] The arrangement of the pump assembly 14, manifold assembly 20, and storage tank 18 works together to force water out of the air compressor assembly 10. If compressed air does condensate inside the storage tank, gravity forces the condensate to descend to the bottom of the tank. At the bottom of the storage tank, the port 19 receives the condensate and allows it to flow to the connected air conduit such that, at the initial next operation of the air compressor, the compressed air drawn from the tank forces the condensate out of the tank and through the air conduit to the manifold assembly.

[0049] While aspects of the present invention are described herein and illustrated in the accompanying drawings in the context of an air compressor, those of ordinary

skill in the art will appreciate that the invention, in its broadest aspects, has further applicability.

[0050] It will be appreciated that the above description is merely exemplary in nature and is not intended to limit the present disclosure, its application or uses. While specific examples have been described in the specification and illustrated in the drawings, it will be understood by those of ordinary skill in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the present disclosure as defined in the claims. Furthermore, the mixing and matching of features, elements and/or functions between various examples is expressly contemplated herein, even if not specifically shown or described, so that one of ordinary skill in the art would appreciate from this disclosure that features, elements and/or functions of one example may be incorporated into another example as appropriate, unless described otherwise, above. Moreover, many modifications may be made to adapt a particular situation or material to the teachings of the present disclosure without departing from the essential scope thereof. Therefore, it is intended that the present disclosure not be limited to the particular examples illustrated by the drawings and described in the specification as the best mode presently contemplated for carrying out the teachings of the present disclosure, but that the scope of the present disclosure will include any embodiments falling within the foregoing description and the appended claims.

Claims

1. An air compressor assembly comprising:

- at least one storage tank configured to store compressed air;
- an air compressor that includes a pump assembly configured to supply the compressed air to the at least one storage tank and a motor configured to drive the pump assembly;
- a manifold assembly including an inlet for receiving the compressed air from the pump assembly, a tank pressure gauge configured to display a pressure of the compressed air entering the manifold assembly, a pressure regulator configured to regulate a pressure of the compressed air being output from the manifold assembly, and an outlet configured to deliver an output of the compressed air to a pneumatic tool; and
- an air conduit connected between the manifold assembly and the at least one storage tank to deliver the compressed air and a condensate from the at least one storage tank to the manifold assembly; and
- a port disposed in the at least one storage tank, the port admitting the compressed air into, and

releasing the compressed air and the condensate from, the at least one storage tank to the air conduit and the manifold assembly.

2. The air compressor assembly according to claim 1, further comprising a housing encasing the at least one storage tank, the pump assembly, and the motor and at least partially encasing the manifold assembly. 5
3. The air compressor assembly according to claim 1, further comprising a second storage tank for storing additional compressed air. 10
4. The air compressor assembly according to claim 1, further comprising a handle coupled to the housing to assist in transporting the air compressor assembly. 15
5. The air compressor assembly according to claim 1, wherein the air conduit comprises a hose. 20
6. The air compressor assembly according to claim 1, wherein the port is integral with the at least one storage tank. 25
7. The air compressor assembly according to claim 1, wherein the port is valve-free.
8. The air compressor assembly according to claim 1, wherein the port is arranged between a lower portion of the at least one storage tank and the manifold assembly. 30
9. A condensate management system for removing a condensate from a compressed air storage tank, the system comprising: 35
 - an air storage tank having a condensate removal member disposed below a plane passing through a horizontal centre portion of the air storage tank; and 40
 - an air conduit connected to the condensate removal member. 45
10. The condensate management system according to claim 9, wherein the condensate removal member is valve-free.
11. The condensate management system according to claim 9, wherein the condensate removal member comprises an outlet port in a bottom of the air storage tank. 50

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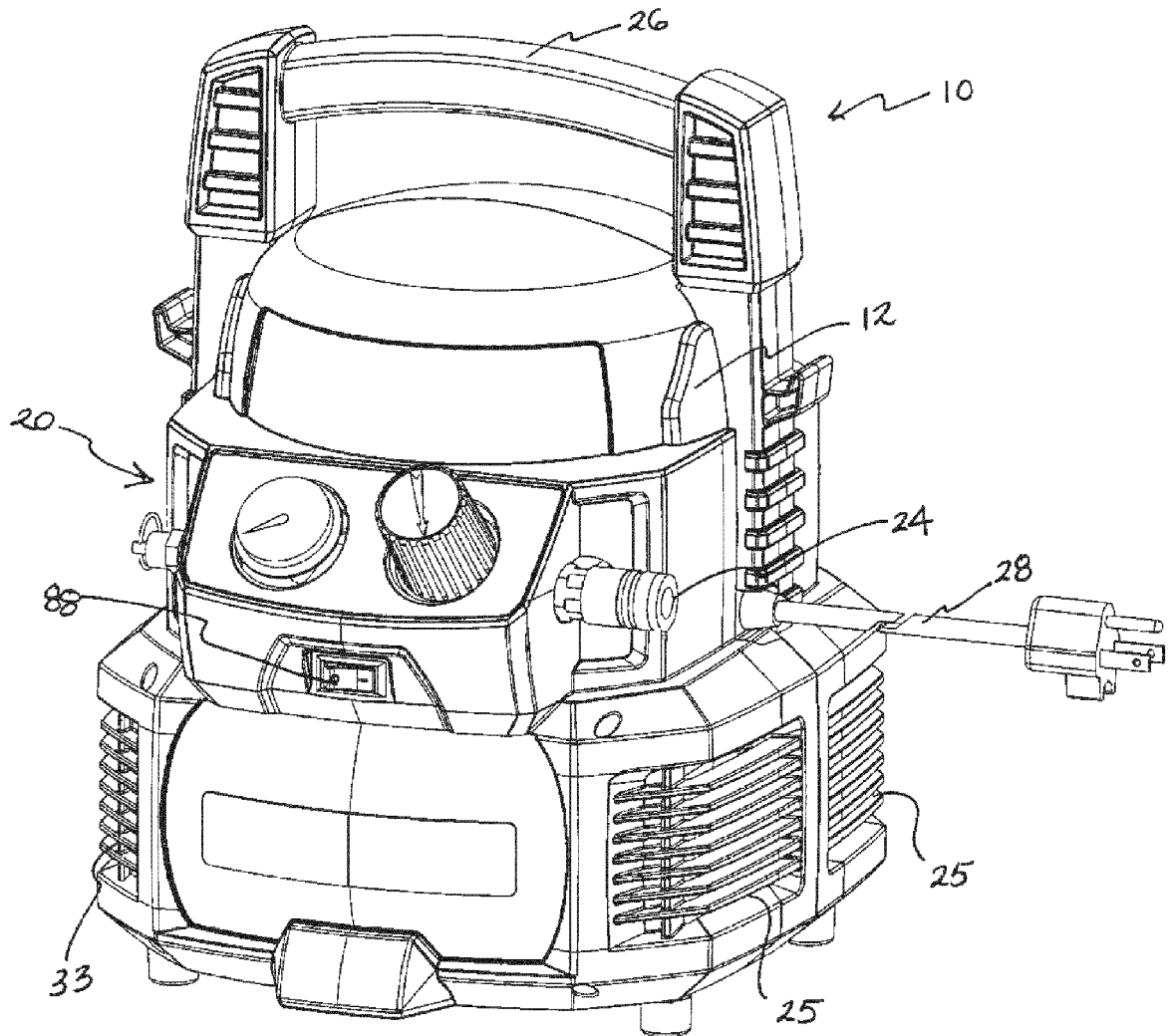
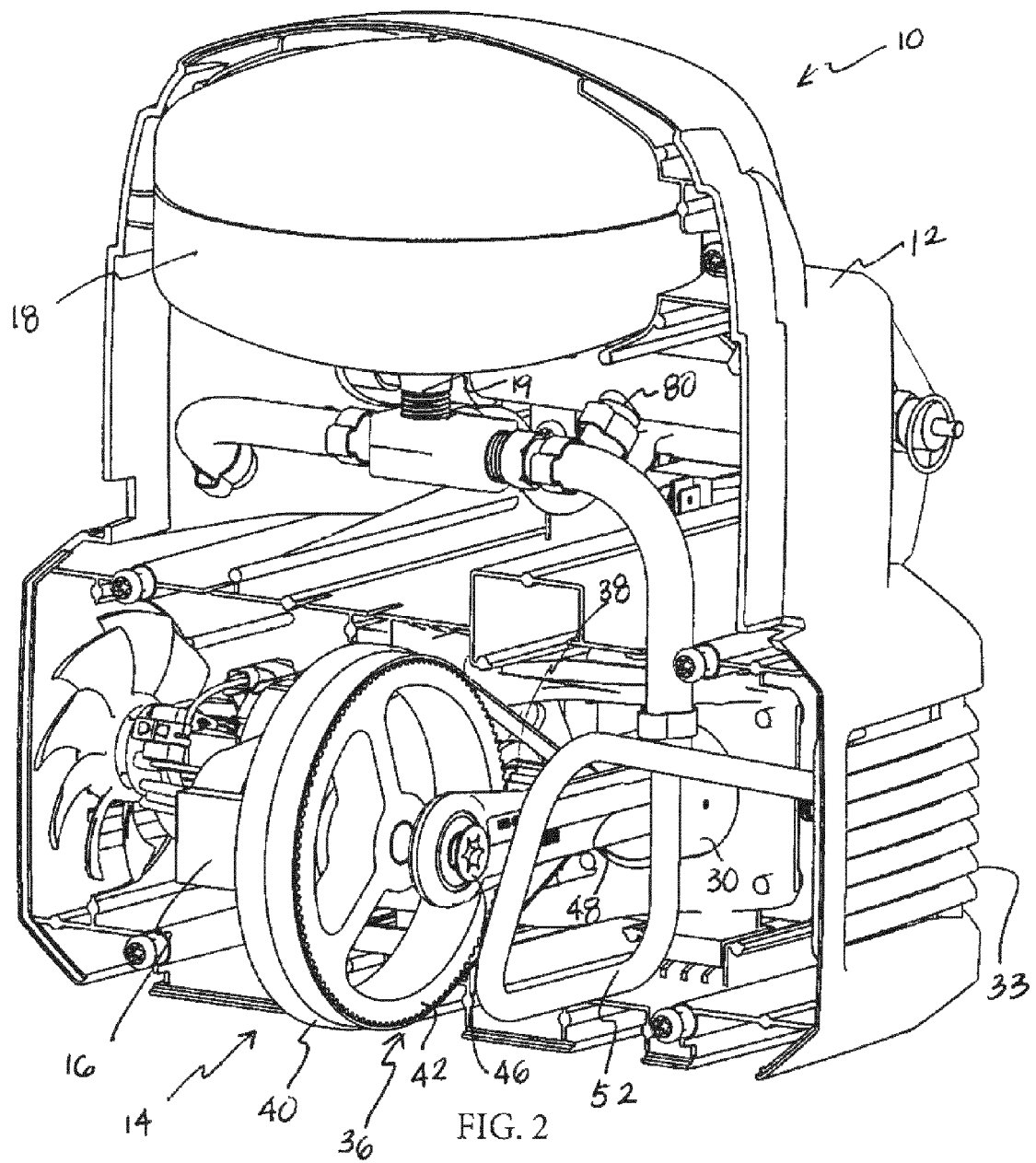


FIG. 1



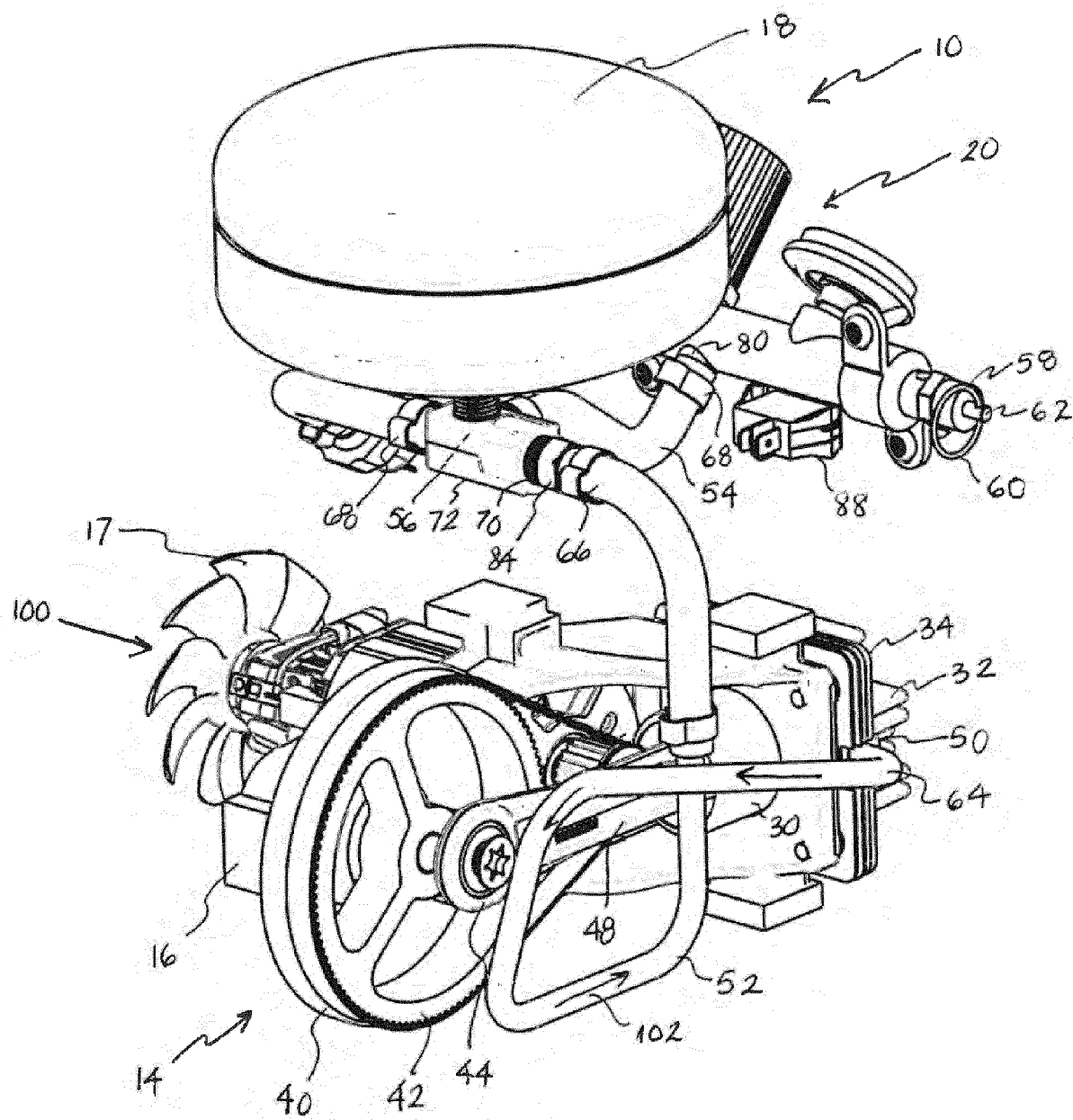


FIG. 3

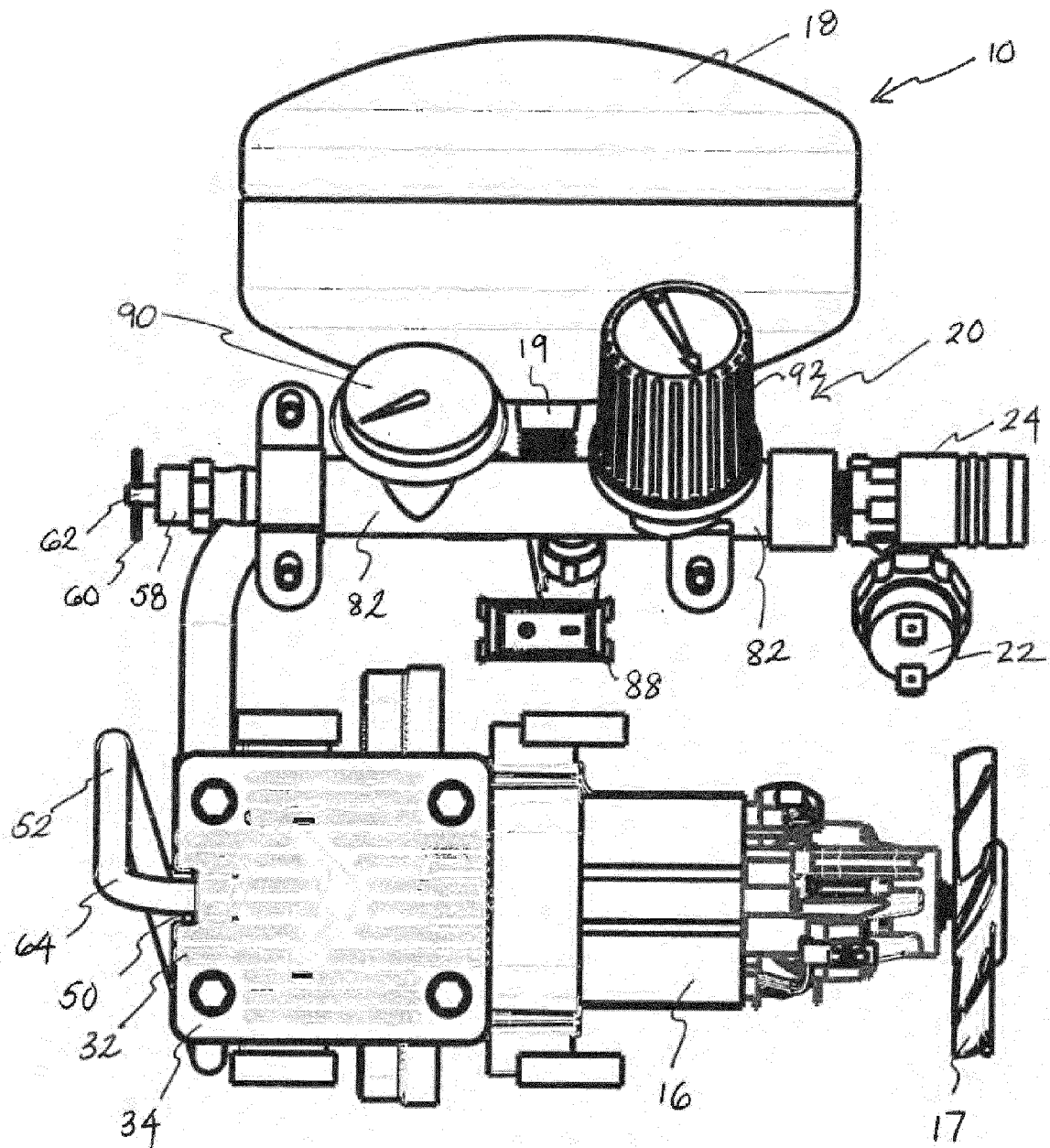


FIG. 4

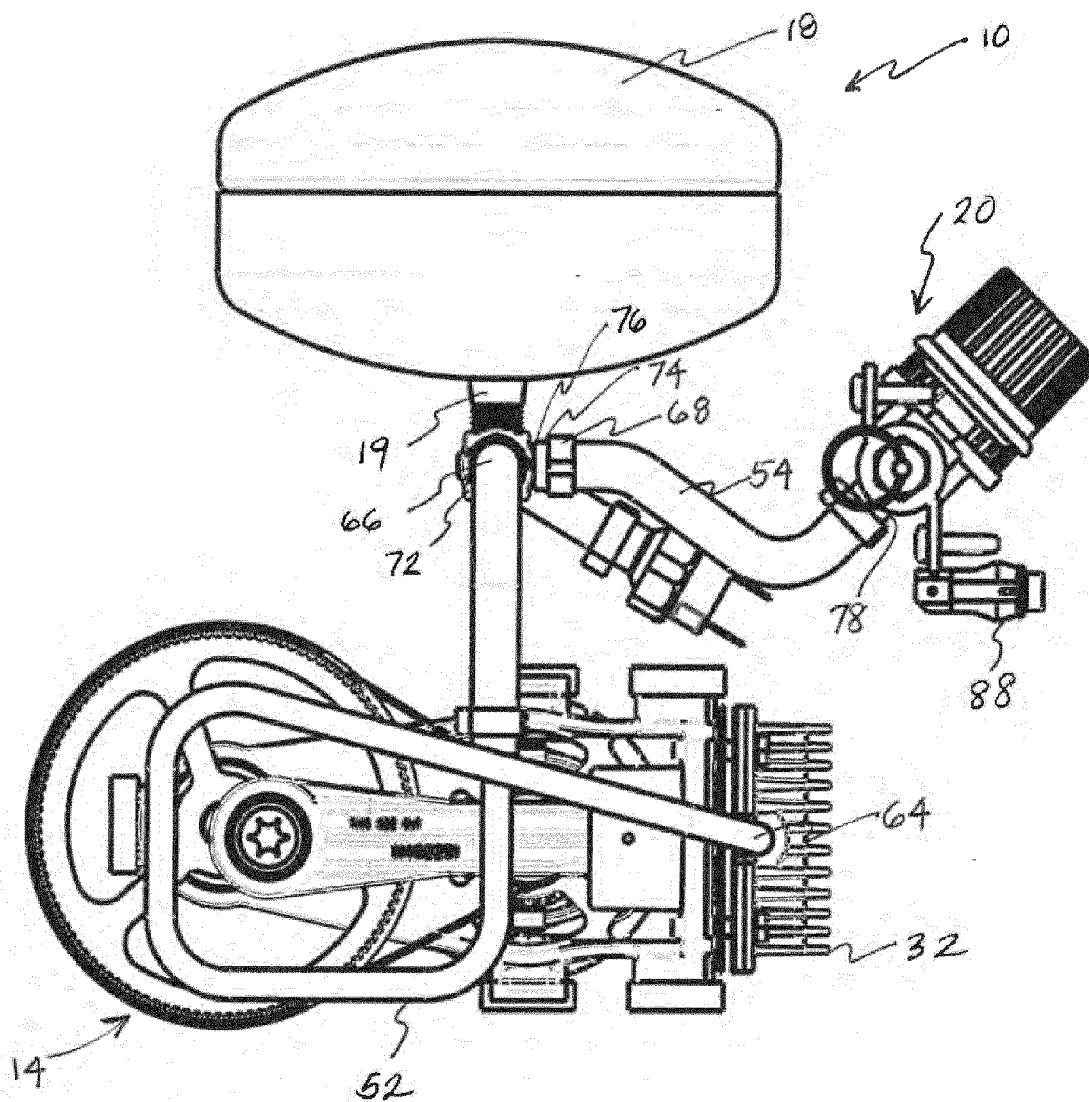


FIG. 5

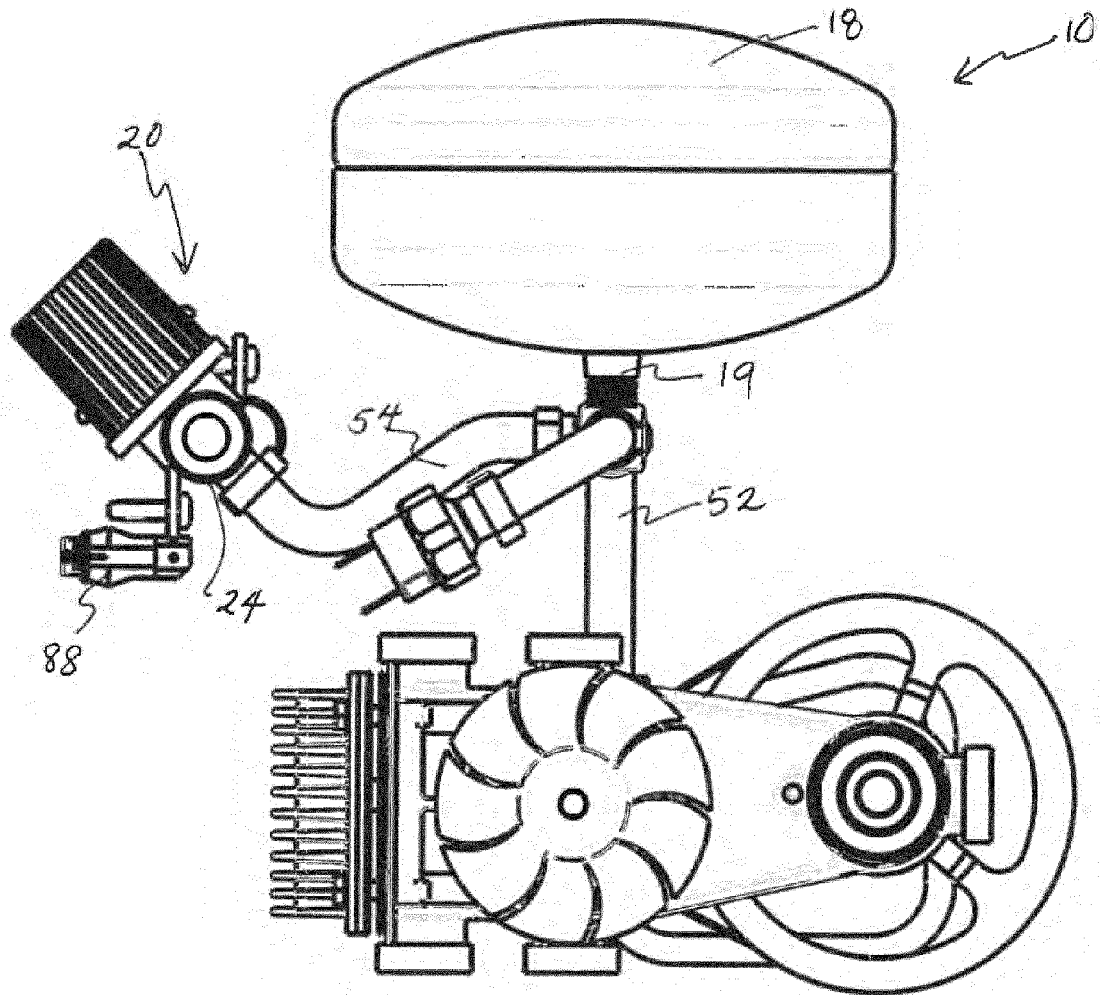


FIG. 6