



US 20090097989A1

(19) **United States**(12) **Patent Application Publication**
Santa Ana(10) **Pub. No.: US 2009/0097989 A1**(43) **Pub. Date: Apr. 16, 2009**(54) **PORTABLE HYBRID GAS COMPRESSOR****Publication Classification**(76) Inventor: **Roland Santa Ana**, Rockville, MD
(US)(51) **Int. Cl.**
F04B 53/00 (2006.01)(52) **U.S. Cl.** **417/234; 417/410.1**(57) **ABSTRACT**Correspondence Address:
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A portable, hybrid gas compressor. The hybrid characteristics of the present invention stem from the compressor's ability to offer a user: in one embodiment, multiple sources of power; in another embodiment, multiple varieties of compressed gas for distribution; and in yet another embodiment, the option to recharge the gas supply of the compressor internally.

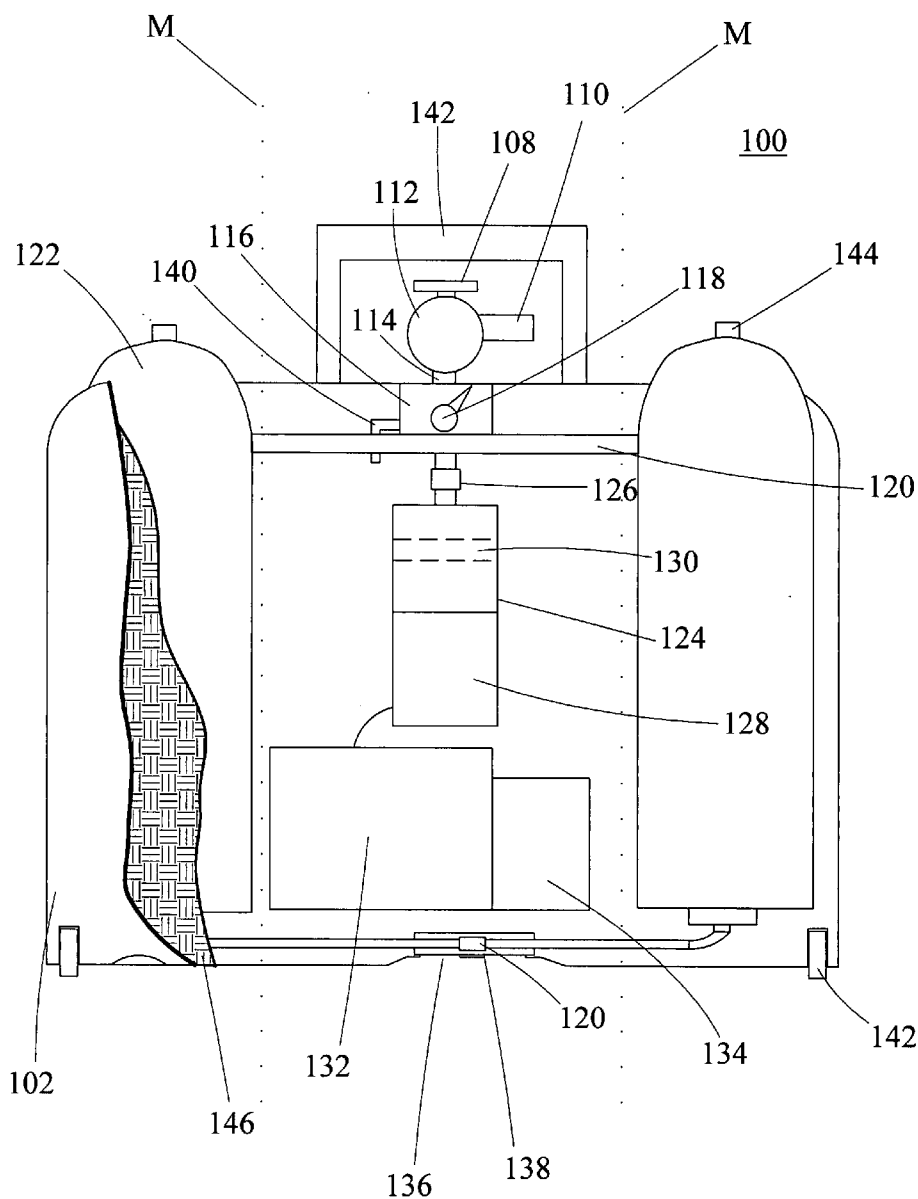
(21) Appl. No.: **11/974,625**(22) Filed: **Oct. 15, 2007**

FIG. 1

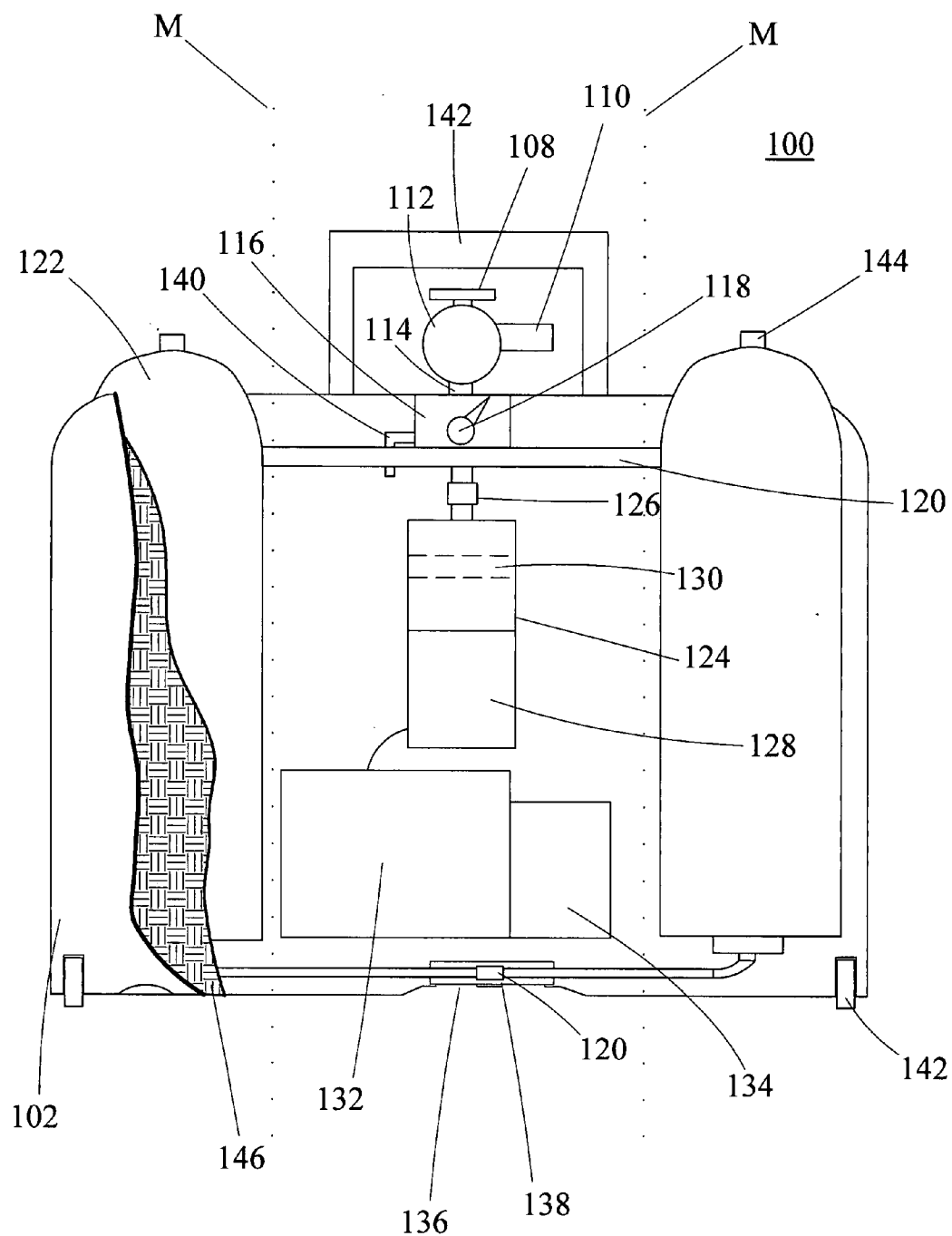


FIG. 2

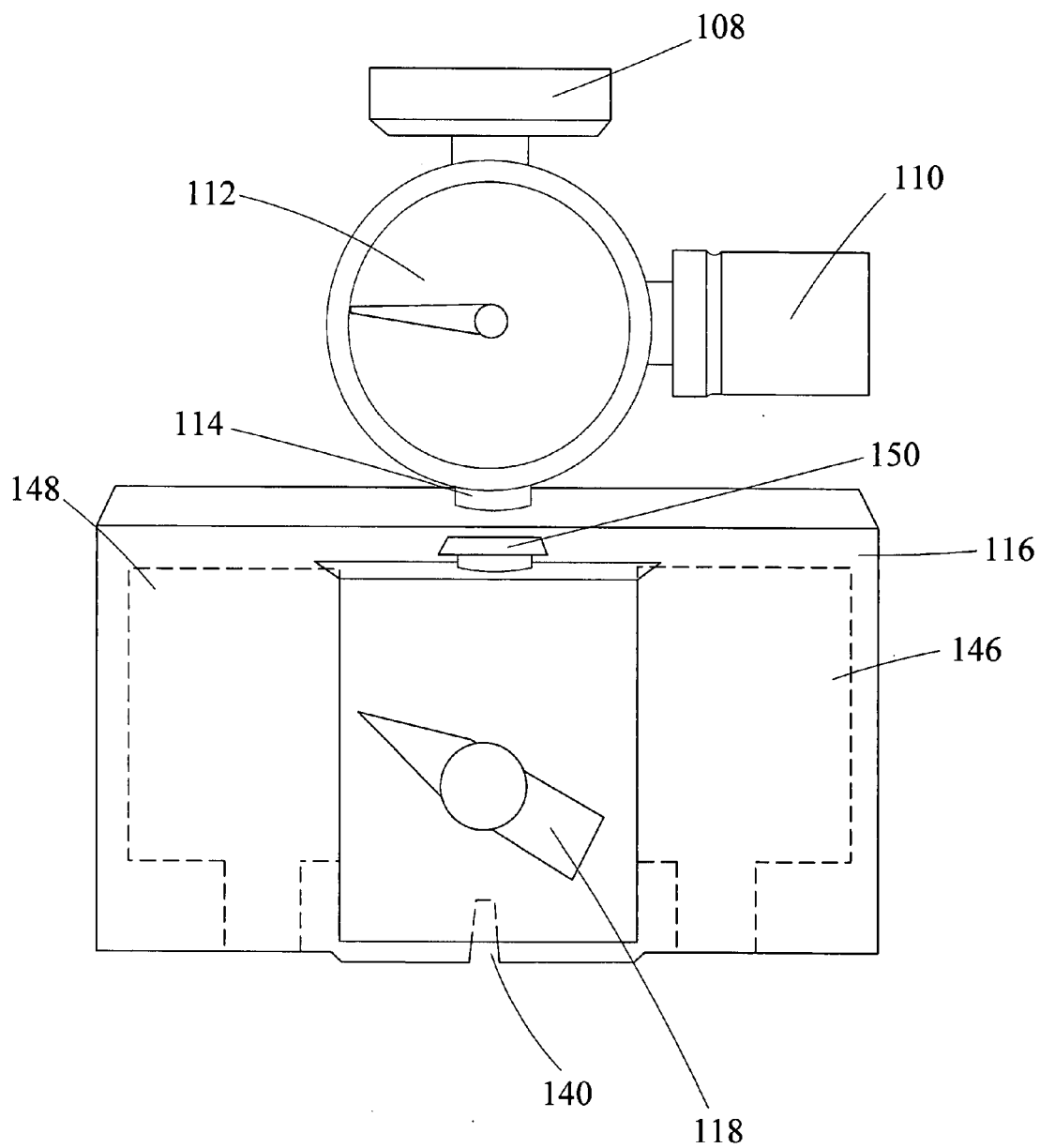


FIG. 3

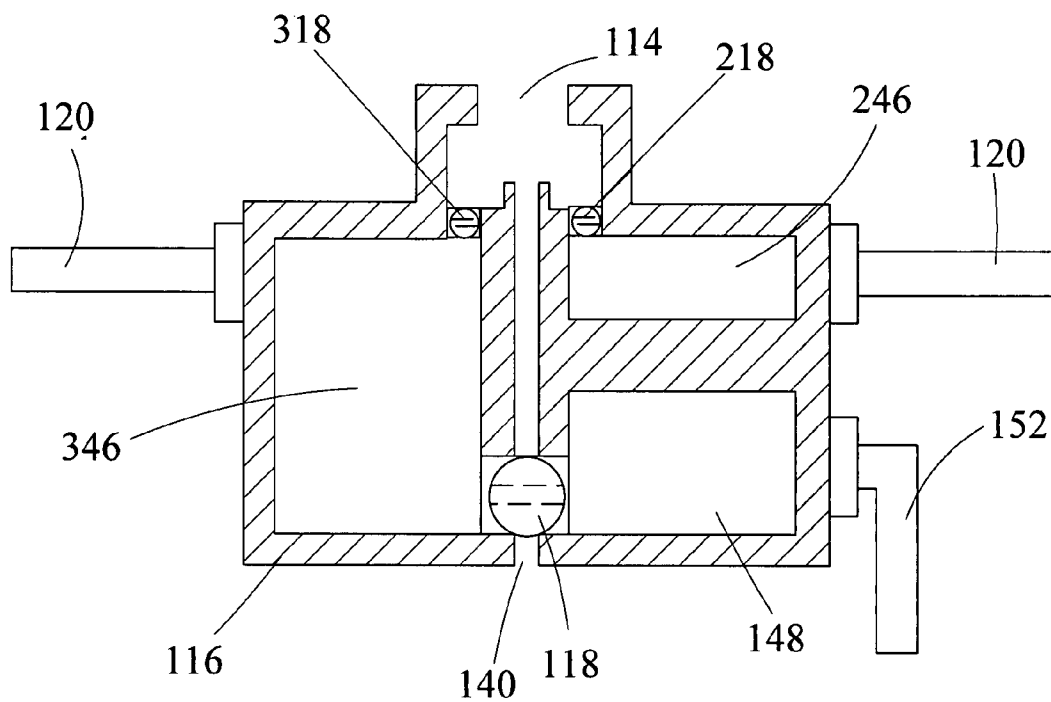


FIG. 4

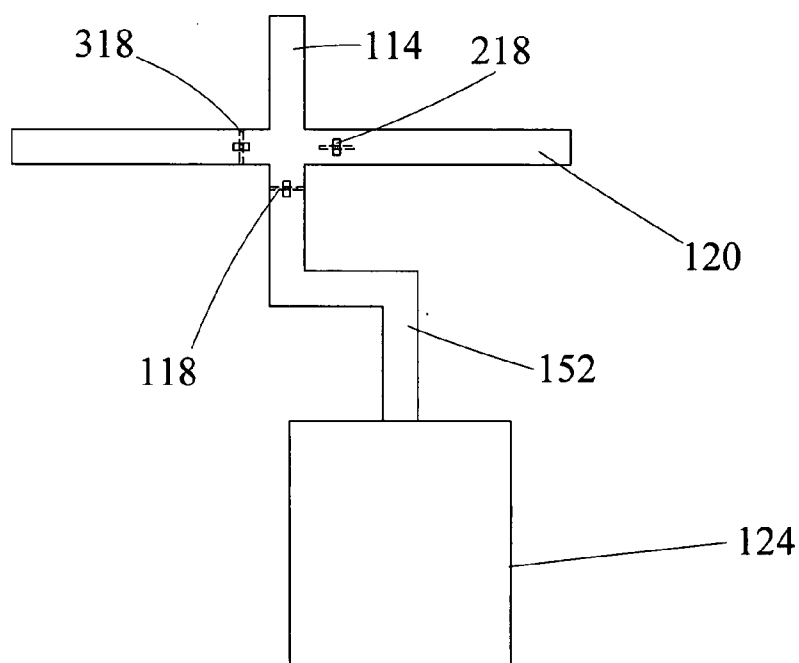


FIG. 5

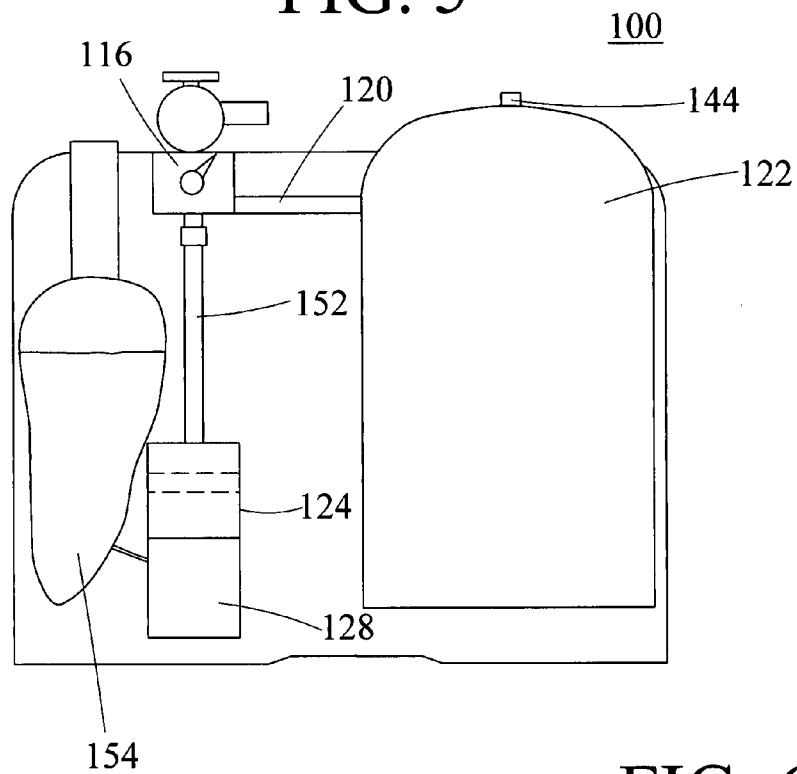


FIG. 6

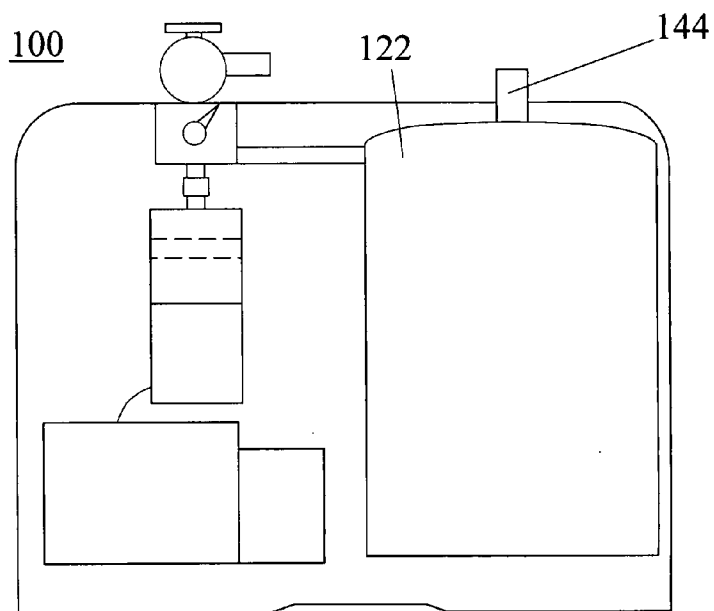
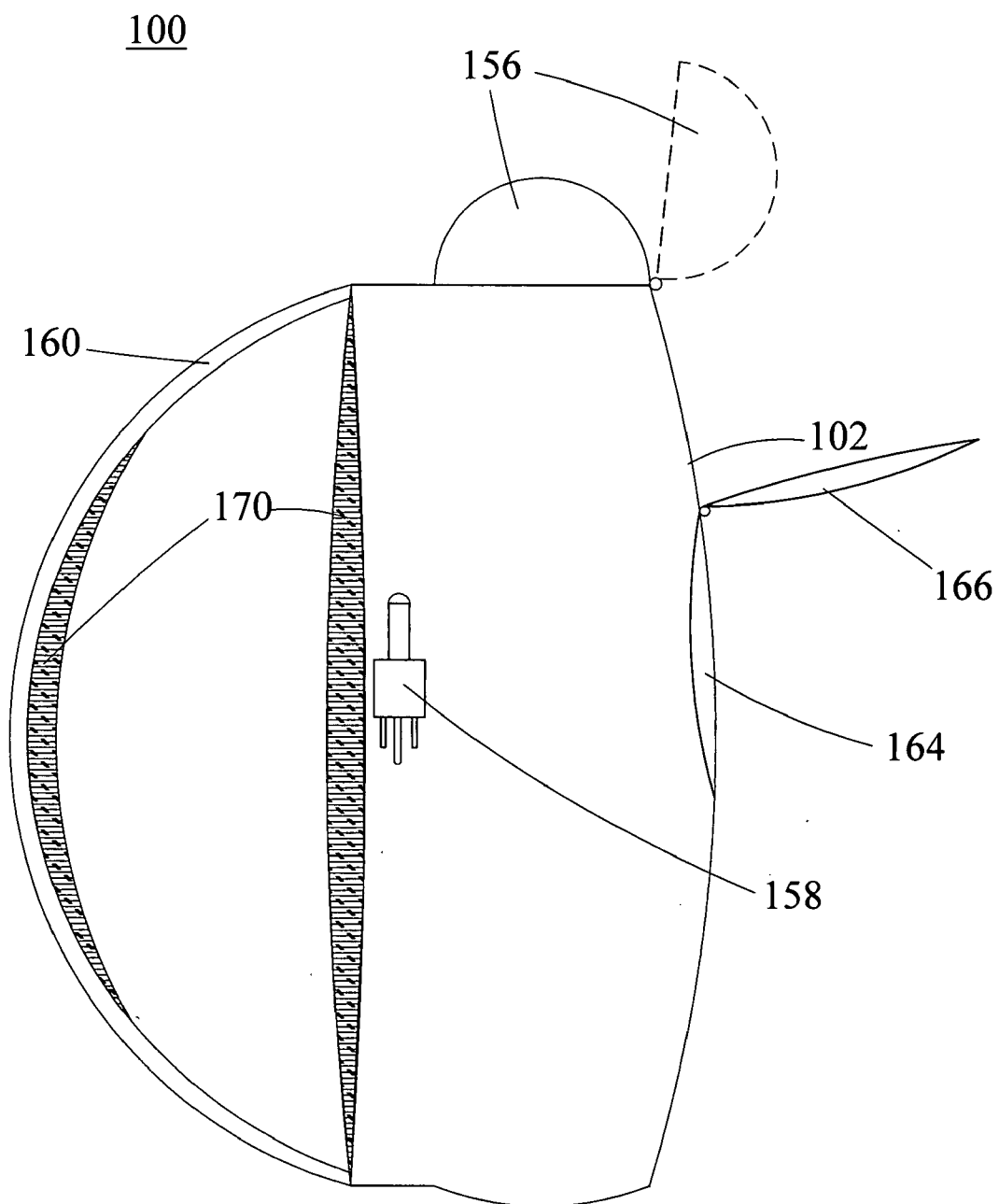
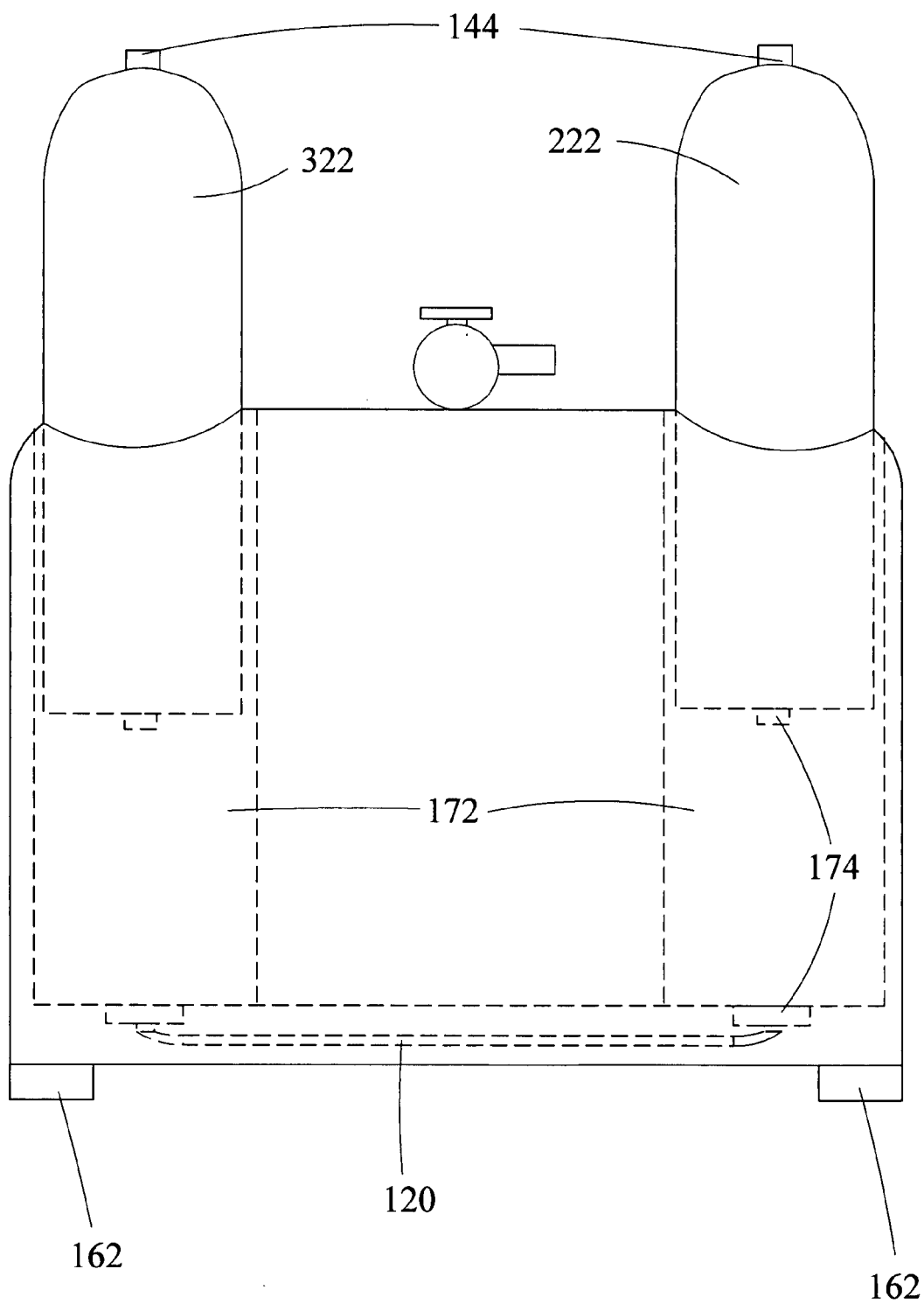


FIG. 7



100

FIG. 8



PORTABLE HYBRID GAS COMPRESSOR

FIELD OF THE INVENTION

[0001] The present invention relates to the field of gas compression and distribution, and more specifically to the field of portable, hybrid gas compression and distribution systems.

BACKGROUND

[0002] Pneumatic tools require a source of pressurized gas; such tools include spray guns, air sanders, air wrenches, air hammers, disc grinders, brad nailers, chisels, hammers, drills, sanders, framing nailers, grease guns, hydraulic riveters, impact wrenches, die grinders, needle scalers, nibblers, ratchets, shears, speed saws, and many other tool varieties. Although tools relying on a pressurized source are not as widely used as tools relying on more conventional sources of power, e.g. gas, electric, and the like; gas-compressed tools are more powerful than traditional electric power tools and offer many advantages. Pneumatic tools allow more torque and RPM than electric tools, and as the individual tools do not generally include an electric motor, they tend to be lighter and therefore more easily managed. Pneumatic tools also tend to be less expensive, more versatile, and more rugged.

[0003] Although utilizing compressed gas is often associated with larger varieties of pneumatic equipment connected to fixed, gas compressors; more mobile versions of gas compressors are arriving in the market to power portable hand tools. Two prominent varieties of gas compressors exist currently: electrical gas compressors, and gasoline-powered gas compressors. Gasoline-powered gas compressors are more popular due to their greater power, reliability, and mobility. The chief limits to the gasoline-powered gas compressor are their fume exhaustion tendencies and noise generation. One can only use a traditional, portable electric gas compressor proximate to an electrical outlet. Use of an electric gas compressor, however, allows a user to operate the compressor in confined spaces where gas fumes would generally be unacceptable.

[0004] There is a need for a pressured gas supply device: capable of operating under multiple sources of power; capable of recharging a supply of gas either internally or externally; capable of offering multiple varieties of gas for distribution; that is relatively light; that is relatively balanced; capable of recharging its power supply; and capable of offering multiple sources of power to a tool.

SUMMARY

[0005] The present invention is a portable, hybrid gas compressor. The hybrid characteristics of the present invention stem from the compressor's ability to offer a user: in one embodiment, multiple sources of power; in another embodiment, multiple varieties of compressed gas for distribution; and in yet another embodiment, the option to recharge the gas supply of the compressor internally.

[0006] The compressor includes a rigid body to protect the internal components. The body forms an air inlet that feeds air from the atmosphere to a pump within the body. A power source transmits energy to the pump, which is capable of propelling air to a gas reservoir at least partially housed within the body. The gas reservoir accepts and stores the pressurized gas derived from one of two sources: the pump, or through an external gas channel of the gas reservoir. It is preferred that the body shelters a substantial portion of the gas

reservoir within the body. Some embodiments may include a gas reservoir entirely housed within the body, other embodiments may include a gas reservoir partially housed within the body, and still other embodiments may include a gas reservoir that is removable from the body. It is preferred that the gas reservoir be divided into two portions positioned at opposite ends of the body interior.

[0007] A hybrid valve occupies a position in the airflow from the pump that either allows air from the pump access to the gas reservoir, or seals the gas reservoir from the pump. A compressed gas outlet allows compressed gas from the gas reservoir access to a pneumatic tool. It is preferred that the means for channeling the various flows of gases/air within the present invention include a plenum with an inner air chamber, gas chamber, and release chamber. To this preferred plenum, the gas reservoir is connected to the gas chamber and the pump is connected to the air chamber; and the hybrid valve occupies one of multiple positions that either permit or deny gas from the air chamber into the gas chamber, or evacuate any gas within the gas reservoir through a bleeder valve connected to the release chamber. Affixed to the body is a means for transporting the compressor that may include, for example, an embedded handle, straps, a retractable handle, wheels, and combinations thereof. A preferred handle includes a handle body on the compressor body that includes a curvature that protects the sensitive, exposed gas release equipment, e.g. regulator, gauge, etc.

[0008] The body of the compressor includes a gas exhaust to expel gas from within the body into the atmosphere. This expelled gas can include the gas used in connection with the compressor, or the simply the heated air within the body. A preferred gas exhaust directs the expelled gas in a downward direction, such that in embodiments of the gas compressor utilizing shoulder straps, the exhausted air is directed away from the head of a user.

[0009] The power source of the present invention operates the pump. The preferred power source includes a battery. The battery may be coupled to a charger/transformer. Other power sources amenable to the present invention include an internal combustion engine coupled to a gas tank within the body; of fuel cells; solar; and combinations thereof.

[0010] Thermal insulating material may be used within the body to assist in regulating internal temperatures. Noise dampening material may be affixed within the body, particularly along the interior surface of the body and upon the exterior of any motor within the body. Vibration dampening materials may be affixed within the body, particularly along the interior surface of the body and upon the exterior of any motor within the body.

[0011] Therefore, it is an aspect of the present invention to present a highly mobile gas compressor.

[0012] It is a further aspect of the present invention to present a gas compressor capable of using multiple types of gas.

[0013] It is a still further aspect of the present invention to present a gas compressor capable of using multiple sources of power.

[0014] It is a still further aspect of the present invention to present a gas compressor capable of sustained operation for substantial periods of time distant from a ready supply of compressed gas and a power outlet or source.

[0015] It is a still further aspect of the present invention to present a portable gas compressor capable of ergonomic back attachment.

[0016] It is a still further aspect of the present invention to present a portable gas compressor capable of balanced back attachment.

[0017] It is a still further aspect of the present invention to present a substantially safe gas compressor.

[0018] It is a still further aspect of the present invention to present a gas compressor possessing an air exhaust scheme amenable to back attachment.

[0019] It is a still further aspect of the present invention to increase the efficiency of pneumatic operations.

[0020] It is a still further aspect of the present invention to present a gas compressor capable of utilizing an interchangeable gas reservoir.

[0021] It is a still further aspect of the present invention to present a gas compressor capable of utilizing a removable gas reservoir.

[0022] It is a still further aspect of the present invention to present an independently rechargeable gas compressor

[0023] These aspects of the invention are not meant to be exclusive. Furthermore, some features may apply to certain versions of the invention, but not others. Other features, aspects, and advantages of the present invention will be readily apparent to those of ordinary skill in the art when read in conjunction with the following description, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. 1 is a cross-sectional view of an embodiment of the gas compressor.

[0025] FIG. 2 is a perspective view of an embodiment of the plenum of the present invention.

[0026] FIG. 3 is a cross-sectional view of an embodiment of the plenum of the present invention.

[0027] FIG. 4 is a plan, sectional view of an embodiment of the gas distribution conduits of the present invention.

[0028] FIG. 5 is a cut-away view of an embodiment of the gas compressor.

[0029] FIG. 6 is a cut-away view of an embodiment of the gas compressor.

[0030] FIG. 7 is a side, plan view of a backpack embodiment of the gas compressor detailing body cover positions.

[0031] FIG. 8 is a front, plan view of an embodiment of the gas compressor detailing the removable gas reservoir.

DETAILED DESCRIPTION

[0032] Referring first to FIG. 1, a basic embodiment of the portable hybrid gas compressor 100 is shown. The gas compressor includes a body 102 structured to protect the internal components. The body 102 is constructed of a rigid material; preferably plastic, sheet metal, or composite material. The shape of the body 102 is generally that of a box with rounded corners.

[0033] The body 102 includes apertures adapted to allow the flow of air both into and out of the body 102. An air inlet 104 formed by the body either directly allows air into the interior of the body, allows a component to the transfer of air into the body interior, allows a component to transfer air from the atmosphere to a component within the body, or some combination of the previously-mentioned air entry schemes. The embodiment disclosed in FIG. 1 displays the preferred air inlet 104 which allows air from the atmosphere to enter the gas compressor 100 through a gas distribution assembly 106.

[0034] The air distribution assembly 106 of the present invention includes components related to the controlled distribution of air. Preferred members of the assembly include a pressure regulator 108, a compressed gas outlet 110, a gauge 112, and a gas passage 114. From the gas passage 114, air may travel into the body 102 of the gas compressor 100 and preferably to a plenum 116 of the present invention.

[0035] From the plenum 116, air from the gas passage may be blocked or allowed entry via a hybrid valve 118 into a bridge 120. The bridge 120 leads directly to a gas reservoir 122. The gas reservoir 120 structure of FIG. 1 displays a preferred gas reservoir 122 configuration wherein the gas reservoir includes two portions distributed into flanking positions within the body 102. In such a configuration a bridge 120 may be used to fluidly connect the interiors of the flanked gas reservoirs to allow the compressed gas within to act as a single entity rather than as multiple, distinct volumes of gas. Multiple bridges 120 may be used with the present invention.

[0036] When so directed by the plenum 116, air enters the gas reservoir 122 from the mechanical urging of a pump 124 operated by a piston 130 in fluid communication with the gas reservoir 122. By fluid communication it is meant that a gas molecule may travel between two or more components without permanent hindrance. A component is in selective fluid communication with another component if the hindrance is adjustable, as in the case of a valve, switch, or other instrument suited to direct the passage of air. Fluid communication may similarly apply to liquids passing between components of the present invention. A preferred pump will operate to generate a pressure between 1.02 atm (15 psi) and 12 atm (175 psi). The pump 124 at the mechanical direction of a motor 128 acts in concert with a check valve 126 in fluid communication with both the pump 124 and the plenum 116 to accept and compress air into the gas reservoir 122.

[0037] Airflow generated from and compressed by the pump 124 within the gas reservoir 122 can remain indefinitely. When needed, the gas reservoir 122 may release the compressed gas to the plenum 116 which channels the gas to the compressed gas outlet 110. The compressed gas outlet 110 is dimensioned to accept hoses common to pneumatic instruments, or in some cases, the pneumatic instrument. The release of any compressed gas is controlled by the pressure regulator 108 and displayed to a user by the gauge 112.

[0038] In electrical connection to the pump 124 is the power source 132. The power source 132 of the present invention may include a battery, internal combustion engine coupled to a gas tank within the body; fuel cells; solar; and combinations thereof. The preferred power source, as shown in FIG. 1, includes a battery. When a battery is used as the power source, it is preferred that a charger is included in electrical communication with the battery such that the battery may be recharged with alternating current.

[0039] Although the protection offered by the rigid body 102 conveys many safety and portability benefits, the interior of the body 102 can also assist in trapping unwanted heat from the electrical and mechanical components of the present invention. To mitigate the tendency of the body 102 to trap heat, it is preferred that the present invention employ heat control means. Apertures upon the body 102 act as a first line of heat control and serve as a gas exhaust 136. The gas exhaust 136 includes one or more apertures in the body that preferably direct the escaping gas in a generally downward direction. A downward escape velocity is preferred as embodiments of the present invention may be portably disposed upon the back of

a user, and gases jetting from the present invention may be unpleasant and dangerous. Gases from the interior are likely to be heated, and as the device includes various outdoor uses, the heat from escaping gas would be an uncomfortable addition to the heat of, for example, a daytime construction site—particularly when directed toward a sensitive face. Backpack embodiments of the present invention may alternatively or additionally allow gases to escape in a dorsal or transverse direction. Embodiments not in close contact with a user may include the gas exhaust **136** in any position suited to exhaust gas in a meaningful manner.

[0040] Additional hazards from venting gases in the direction of a face include displacing oxygen proximate to the nose with alternative gases. It is an aspect of the present invention to include multiple safety means throughout the gas compressor **100**. A preferred safety device includes a bleeder valve **140**. The bleeder valve **140** is located within the body in fluid communication with the gas reservoir **122**. The bleeder valve **140** is calibrated to release compressed gas when the pressure within the gas reservoir reaches a predetermined unsafe value dependent upon the structural integrity of the present invention components. That is to say, the bleeder valve **140** will release gas within the reservoir before that pressure reaches a value that would cause the gas reservoir to explode. As the present invention includes the ability to store multiple varieties of gases, many of which do not include oxygen; a sustained release of gas proximate to the face of a user could displace the oxygen proximate to the nose of the user, which could cause unpleasant health effects. As the portability of the present invention allows it to be used at great heights and with potentially dangerous equipment, downward directed gas exhaust could have substantial safety implications.

[0041] The preferred bleeder valve **140** is a component of the plenum **116** that directs gas into the interior of the body **102** of the gas compressor **100**. Directing the escaping gas directly into the interior of the body **102**, rather than simply allowing the gas to escape directly external to the body, allows the body to absorb much of the shock of the highly pressurized escaping gas and escape the body through the gas exhaust **136** at a lower velocity than it would otherwise. Gas escaping at a substantial velocity directly exterior to the body **102** could generate a velocity sufficient to force a user of a backpack compressor embodiment off balance.

[0042] The present invention, which may utilize one or more bleeder valves **140**, may position the bleeder valve **140** proximate to the gas exhaust **136**. A bleeder valve so positioned allows venting of water condensation and air directly to the exterior. Embodiments bearing a bleeder valve adjacent to a gas exhaust preferably include a gas exhaust oriented to exhaust gas in a downward direction.

[0043] An additional heat control means may include thermal insulation. The insulation material **146** of the present invention includes three primary varieties: noise insulation, thermal insulation, and vibration insulation. As shown in FIG. 1, the insulation material may affix to the interior of the body **102** of the present invention, or to specific components in need of the insulation **146**. For example, thermal insulation may preferably affix to the interior of the body **102**, or around external portions of the gas reservoir **122**. Vibration insulation and noise insulation may affix to the interior of the body, or around external portions of any motors present within the body.

[0044] An additional heat control means of the present invention includes a fan **138** positioned proximate to the gas

exhaust **136**. The fan would aid in more rapidly expelling gases within the compressor **100**. By fan **138**, it is meant any device capable of dislocating air from one position to another with meaningful force, e.g. a pump.

[0045] The placement of any fan **138** as with the placement of all other electrical and mechanical components of the present invention preferably occupies a medial position **M** within the body **102**. The preferred configuration and arrangement of the present invention includes a lateral, bifurcated gas reservoir **122** flanking the other, weightier components of the compressor **100**. By placing the components in a medial position, the compressor **100** gains a center of gravity highly amenable to transport and use, particularly in backpack embodiments. It is further preferred that the components be arranged in downwardly diminishing weighted fashion such that an upper portion of the body **102** includes the lightest equipment, while the heavier equipment is placed in a lower position. Such a distribution of weight assists the compressor **100** balance on the ground, in transport, or upon the back of a user. This distribution of weight is particularly advantageous to backpack embodiments of the present invention which would place the weight distribution along the spine of a user, and the center of gravity near the hips of a wearer.

[0046] The present invention further includes wheels **142** as means for transporting the compressor **100**. The embodiment depicted in FIG. 1 includes a handle and a set of wheel as transport means. The handle of the present invention may include a static protrusion from the body, a curving handle adapted to enclose the gas distribution assembly or some other like protruding sensitive component, a handle adapted to retract into the body of the compressor, or any other handle capable of transporting equipment or containers.

[0047] The present invention is hybrid in multiple respects. Although the pump of the compressor allows a user to refill the gas reservoir with atmospheric air, the present invention is also adapted to accept prepared gases a varieties other than that of the standard earth atmosphere. For many reasons use of the present invention could feature gases such as CO₂, N₂, or other commonly used gases. A gas channel **144** on the gas reservoir **122** allows the introduction of prepared gases into the gas reservoir **122**. It is preferred that the gas channel have access to points external of the body **102** to facilitate efficient re-loading of gases. By external, it is meant that a user wishing access to the gas channel **144** need not disassemble the body to obtain access to the gas channel **144**, but that the gas channel **144** is amenable either directly or via an easily displaced component such as a cover.

[0048] The present invention includes at least two gas pathways. A first gas pathway allows a user to activate the pump of the present invention to draw in air from the atmosphere into the gas reservoir of the compressor. In this first pathway, the pump is in fluid communication with the air inlet, the compressed gas outlet, and the gas reservoir. A second gas pathway blocks access to the pump, but allows fluid communication between the gas reservoir and the compressed gas outlet. Other unlisted components may be included in either of the pathways to the extent that they do not disturb the purposes of the pathways.

[0049] Although the present invention may utilize a hybrid valve **118** in any effective portion of the internal recesses to choose the path of gas flow within the present invention, other embodiments may utilize a dedicated component as a gas passage gateway. FIG. 2 shows an embodiment of the plenum

116 in enhanced detail. The plenum **116** is a component of the present invention that centralizes the gas pathways of the present invention into a single housing.

[0050] As depicted in FIG. 2, the plenum of the present invention includes an air chamber **148** and a gas chamber **146**. The air chamber **148** is the open volume in the interior of the plenum **116** that connects directly and fluidly to the pump (not shown). The gas chamber **146** is an open volume within the plenum distinct from the air chamber **148** that allows fluid communication between the gas reservoir (not shown) and the compressed gas outlet **110**. The hybrid valve **118** regulates the gas pathways of the present invention. In the embodiment of the plenum **116** in FIG. 2, three gas pathways are present: a pathway that allows fluid communication between the gas reservoir and the pump via the air chamber **148**; a pathway that prevents fluid communication between the gas reservoir and the pump; a pathway that evacuates all gas from within the gas reservoir into the interior of the body of the gas compressor of the present invention. The evacuation pathway includes a release chamber **140** that is selectively in fluid communication with the gas reservoir.

[0051] The release chamber **140** may include an aperture in the plenum that directly leads to either the atmosphere, or directly leads to the interior of the body of the gas compressor. The latter version of the release chamber **140** is preferred as it allows any gases evacuating from the gas reservoir to be muffled within the body, and therefore evacuate the gas compressor at a lower velocity. The preferred use of the release chamber **140** includes two primary uses. The first primary use of a release chamber **140** is as a plenum bleeder valve, to evacuate a portion of gas within the gas reservoir upon the buildup of a predetermined excess pressure. The second primary use of a release chamber **140** is as a conversion moderator. By conversion moderator it is meant that upon selection of the evacuation pathway by the hybrid valve **118**, the gas within the gas reservoir is evacuated to the point wherein the gas reservoir possesses a pressure of one atmosphere.

[0052] The preferred conversion moderator scheme, which is pictured in FIG. 2, includes a plenum **116** that includes the air chamber **148**, the gas chamber **146**, and a release chamber **140**. The hybrid valve **118** selects between three positions. In the first position, the air chamber is placed in fluid communication with the gas chamber, which allows the pump direct fluid communication with the gas reservoir. In the second position, the air chamber is blocked from the gas chamber, which prevents the pump from direct fluid communication with the gas reservoir. In a third position, ideally structured such that the third position must be reached in segue from the first position to the second position; the hybrid valve opens fluid access from the gas reservoir to the release chamber. Such a position allows gas present in the gas reservoir to substantially evacuate (i.e. reach a standard pressure of one atmosphere) prior to moving to the next position—whether that next position is the second position from the first, or vice versa. The advantage of this is two-fold: when the hybrid valve closes communication to the air chamber, the user of the present invention is likely anticipating inserting prepared gas compositions into the gas reservoir and the evacuation ensures the greatest possible percentage of entry of the prepared gas into the reservoir. In instances where the air chamber is allowed access to the gas reservoir, the user of the present invention is possibly intending to use atmospheric air for the next application, and the evacuation of any, possibly

prepared, gases within the gas reservoir are flushed to ensure the greatest possible replication of atmospheric air.

[0053] As the evacuation of gases from the gas reservoir would tend to be relatively time-consuming, it is preferred that a release button **150** be included on the plenum **116** of the present invention. The release button **150** is in locking assembly with the hybrid valve **118** such that when the hybrid valve occupies a position that places the gas reservoir in fluid communication with the release chamber, the hybrid valve is temporarily locked into the position that places the gas reservoir in fluid communication with the release chamber. Pressing upon the release button **150** releases the hybrid valve to continue its motion either back to the position from which it began, or to continue to a position different from its original position.

[0054] When the present invention includes a gas reservoir (not shown) split into flanking positions, the present invention may further include the capacity to select the particular portion of the gas reservoir in fluid communication with the gas passage. The preferred means for selecting from portions of a gas reservoir is shown in FIG. 3. The plenum **116** may further include one or more division to selectively seal the bifurcated portions of the gas reservoir one from the other. The plenum **116** of FIG. 3 is adapted to selectively bifurcate a starboard tank (not shown) from a port tank (not shown), wherein both the starboard tank and port tank are portions of a bifurcated gas reservoir adapted to be selectively sealed. The plenum **116** includes an air chamber connected to a pump conduit **152** that leads to a pump (not shown). The hybrid valve **118** separates the air chamber **148** from the release chamber **140** and the gas chamber, which is divided into two components: a port gas chamber **346** and a starboard gas chamber **246**. The terms “port” and “starboard” in relation to the divisions of the gas reservoir are convenient when used with the backpack version of the present invention, but are not meant to limit the locations of either the chambers or the tanks. The port gas chamber **346** and the starboard gas chamber **246** lead to their respective portions of the bridge, which lead to their respective port tank (not shown) and starboard tank (not shown). Segmenting the starboard chamber **246** from the port chamber **346** are one or more chamber valves adapted to selectively seal their respective chambers from the gas passage **114**.

[0055] The plenum of FIG. 3 includes a port chamber valve **318** and a starboard chamber valve **218**. Actuation of the port chamber valve **318** and the starboard chamber valve **218** serve to selectively seal the port tank (not shown) and the starboard tank (not shown), respectively. Embodiments of the present invention utilize a gas reservoir bifurcated into at least two distinct tanks, and in such cases, certain preferred embodiments will be able to operate with one tank at a time. The preferred method for allowing a single tank access to the gas passage **114** is the arrangement of multiple valves. As FIG. 3 shows, it is preferred that these valves are located in the plenum **116** of the present invention; however, in other embodiments, the gas pathways of the present invention may be integrated into the conduits of the gas compressor.

[0056] FIG. 4 illustrates an embodiment of the present invention without a plenum. Rather the control of gas and air paths is embedded within the conduit portions of the present invention, specifically the bridge **120** and the pump conduit **152**. The hybrid valve **118** controls fluid access to and from the pump **124**; the port chamber valve **318** controls fluid access to and from the port tank (not shown); the starboard chamber valve **218** controls fluid access to and from the

starboard tank (not shown). In embodiments of the present invention utilizing more or less divisions of the gas reservoir; the arrangement and number of valves may be altered to suit the purposes of that particular embodiment.

[0057] Although the embodiment of the gas compressor **100** illustrated in FIG. **1** shows a medial distribution of electromechanical components; as FIG. **5** shows the electromechanical components of the present invention may be distributed in any manner either upon or within the body **102**. FIG. **5** depicts an embodiment of the present invention lacking medial distribution of electromechanical components. Such an arrangement may be preferred in non-body portable embodiments of the present invention.

[0058] The gas reservoir **122** includes a single cavity adapted to receive prepared compressed gas via the gas channel **144**. The gas channel **144** may also be configured to include pressure bleeding means to vent gases stored at a predetermined hazardous pressure. As FIG. **5** shows, it is preferred that the gas channel **144** be positioned on the gas reservoir **122**, which is external to the body **102**. Such an arrangement, however, is not necessarily preferred in certain embodiments that may employ a gas reservoir **122** completely housed within the body **102** as FIG. **6** depicts. As shown in FIG. **6**, the gas channel **144** may include any dimensioned necessary to gain access beyond the body **102**. The gas channel **144** is preferably external, which is to say that the gas channel **144** may be accessed without disassembling the body **102**. The bridge **120** includes a single conduit that leads directly to the plenum **116**. The plenum selectively allows the pump **124** access to the gas reservoir **122**.

[0059] The pump **124** is operated by the motor **128**, which is powered by a combustible liquid within a combustible material tank **154** connected thereto. The gas compressor **100** may be powered by any material capable of operating a device adapted to operate a pump. Preferred energy sources include direct current or alternating current electricity, gasoline, kerosene, hydrogen, solar power, and combinations thereof.

[0060] As FIG. **7** depicts, the body **102** of the gas compressor may include a body cover **156** adapted to selectively cover portions of the present invention. It is preferred that the body cover **156** selectively house the external gas channel (not shown); and in embodiments having portions of the gas reservoir (not shown) exposed, the body cover **156** may also cover those exposed portions of the gas reservoir. The body cover **156** may include any dimensions necessary to cover whatever portion of the present invention that the body cover has been predetermined to cover. It is preferred that the body cover is fabricated of the same material as the body **102**, e.g. a plastic.

[0061] In backpack embodiments of the present invention, such as that shown in FIG. **7**, it is preferred that the components have the medial distribution of electromechanical components; a gas reservoir bifurcated into a flanking tank arrangement, and a back strap **160**. The back strap **160** includes one or more straps connected to the body **102** that temporarily fasten the gas compressor **100** to the back of a human user. The body **102** and the back strap **160** may include padding **170** adapted to add comfort to toting the present invention. Means for making the present invention portable may include any equipment common to portable tools. Preferred means of transport include back straps, feet, handles, wheels, etc.

[0062] As the gas compressor **100** includes a power source (not shown) for operating the pump (not shown); the present

invention may further act as a portable generator to power non-pneumatic tools. In embodiments adapted to offer alternative means of tool powering, the present invention may include one or more electrical plugs **158**. The electrical plug **158** may include outlet prongs so as to recharge the power source of the present invention, or the electrical plug may be adapted to mate with prongs that would come from an electric tool.

[0063] The body **102** of the present invention may further include a port **164** and a port cover **166**. The port **164** is an aperture in the body **102** that allows a user contact with the hybrid valve (not shown) or any other user-adjustable components within the body **102**. It is preferred that the port cover **166** be dimensioned to seal the port **164**, and be hingedly attached to the body **102**. In embodiments of the present invention not having a port **164**, the hybrid valve (not shown) may be positioned externally upon the body **102**—as well as any other user-adjustable components.

[0064] As FIG. **8** illustrates, embodiments of the present invention may further feature a removable gas reservoir, shown as bifurcated starboard gas tank **222** and port gas tank **322**. The gas tanks fit into their respective body recesses **172**, which are cavities within the body **102** adapted to hold a portion of a removable gas reservoir. It is preferred that each gas tank is independently removable and fits into the gas reservoir via a reservoir nub assembly **174**. The reservoir nub assembly **174** includes a gas reservoir portion and a bridge portion, one having a nub and the other having a recesses dimensioned to accept the nub. The reservoir nub assembly may attach via mating threading or interference fit. Other means for selectively removing a portion of the gas reservoir may similarly be used with the present invention. The pictured embodiment of FIG. **8** utilizes feet **162** as transport means. Feet **162** are protrusions of the body adapted to contact an environment surface. Preferred feet include protrusion of deformable plastic.

[0065] Although the present invention has been described in considerable detail with reference to certain preferred versions thereof, other versions would be readily apparent to those of ordinary skill in the art. Therefore, the spirit and scope of the appended claims should not be limited to the description of the preferred versions contained herein.

What is claimed is:

1. A portable hybrid gas compressor comprising:

- a rigid body defining an air inlet;
- a pump, in fluid communication with said air inlet, for receiving air from said air inlet;
- a power source in electrical communication with said pump;
- a gas reservoir, at least partially housed within said body, having an internal gas inlet in selective fluid communication with said pump, for storing a pressurized gas and said gas reservoir having an external gas channel;
- a hybrid valve having at least two positions including: a first position sealing said gas reservoir from said pump, and a second position allowing fluid communication from said pump to said gas reservoir;
- a compressed gas outlet in fluid communication with said gas reservoir; and
- transport means affixed to said body.

2. The compressor of claim **1** wherein said body further defines a lower gas exhaust positioned to direct gas in a downward direction relative to said body.

3. The compressor of claim 2 wherein said body further defines a pair of flanked tank recesses having upper recess apertures; and said gas reservoir includes a pair of flanked gas reservoir tanks dimensioned to be removably housed within said recesses.

4. The compressor of claim 3 wherein said compressor further comprises a bridge, within said housing, in fluid communication with said flanked gas reservoir tanks.

5. The compressor of claim 4 wherein said bridge further comprises a safety bleed valve positioned proximate to said gas exhaust.

6. The compressor of claim 1 wherein said power source includes a battery and said compressor further comprises a charge port in electrical communication with said battery.

7. A portable hybrid gas compressor comprising:
a rigid body defining an air inlet;
a plenum, within said body, defining an air chamber and a gas chamber;
a hybrid valve positioned to selectively seal said air chamber from said gas chamber;
a pump, within said body, in fluid communication with both said air inlet and said air chamber;
a power source in electrical communication with said pump;
a gas reservoir, at least partially housed within said body, in fluid communication with said gas chamber, for storing a pressurized gas and said gas reservoir having an external gas channel;
a compressed gas outlet in fluid communication with said plenum; and
transport means affixed to said body.

8. The compressor of claim 7 wherein said gas reservoir tank includes a pair of flanked gas reservoir tanks fluidly connected via a bridge.

9. The compressor of claim 7 wherein said plenum further comprises a release chamber; and wherein said hybrid valve is adapted to expose said gas reservoir to said release chamber.

10. The compressor of claim 9 wherein said gas reservoir tank includes a pair of flanked gas reservoir tanks; and a bridge fluidly connecting said flanked gas reservoir tanks.

11. The compressor of claim 10 wherein said body further defines a pair of flanked tank recesses, dimensioned to house said flanked gas reservoir tanks, having upper recess apertures; and said flanked reservoir tanks releasably connect to said bridge.

12. The compressor of claim 7 wherein said gas chamber comprises a port chamber and a starboard chamber, and said hybrid valve is adapted to form positions to: expose said port

chamber to said compressed gas outlet; expose said starboard chamber to said compressed gas outlet; and expose both said port chamber and said starboard chamber to said compressed gas outlet.

13. The compressor of claim 12 wherein said plenum further comprises a release chamber; and wherein said hybrid valve is further adapted to expose said gas reservoir to said release chamber.

14. The compressor of claim 15 wherein said engine further comprises vibration dampening material affixed thereto.

15. The compressor of claim 10 wherein said body further comprises temperature insulation material affixed thereto.

16. A portable hybrid gas compressor comprising:
a rigid body defining an air inlet and a pair of flanked tank recesses having upper recess apertures;
a pump, in fluid communication with said air inlet, for receiving air from said air inlet;
a power source in electrical communication with said pump;
a pair of flanked, removable gas reservoir tanks, at least partially housed within said pair of flanked tank recesses, each of said gas reservoir tanks having a gas channel in selective fluid communication with said pump;
a selection valve having at least two positions including: a first position sealing said gas reservoir tanks from said pump, and a second position allowing fluid communication from said pump to at least one of said gas reservoir tanks;
a compressed gas outlet in fluid communication with said gas reservoir; and
transport means affixed to said body.

17. The compressor of claim 16 wherein said compressor further comprises a bridge, within said housing, in fluid communication with said flanked gas reservoir tanks.

18. The compressor of claim 17 wherein said body further defines a lower gas exhaust positioned to direct gas in a downward direction relative to said body.

19. The compressor of claim 17 wherein said bridge further comprises a safety bleed valve positioned proximate to said gas exhaust.

20. The compressor of claim 19 wherein said body further comprises noise dampening material affixed thereto.

21. The compressor of claim 17 wherein said body further comprises temperature insulation material affixed thereto.

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