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PORTABLE AIR/GAS COMPRESSOR RELATED APPLICATION DATA

This application claims the benefit of priority of United States Provisional Patent Application No. 60/780,236, entitled GAS COMPRESSOR and co-invented herewith and hereby incorporates such application, in its entirety, by reference. United States Patent No. 6,932,128, entitled APPARATUS AND METHOD FOR USING A LIGHTWEIGHT PORTABLE AIR/GAS POWER SUPPLY and co-invented herewith, is further incorporated in its entirety by reference.

FIELD OF INVENTION

This invention relates to a portable air/gas compressor capable of compressing air/gas. In at least one embodiment, this invention relates to compressors capable of producing clean, dry, compressed air/gas (e.g., either in naturally occurring atmospheric nitrogen/oxygen ratios or as purified nitrogen or in alternative ratios therebetween) employing atmospheric air as a starting material. In at least one additional embodiment, this invention relates to compressors which are compact, lightweight, portable and/or mechanically non-complex. In certain embodiments, this invention relates to compressors useful in conjunction with portable pneumatic power supplies (e.g., for powering pneumatic tool systems).

BACKGROUND OF THE INVENTION

A tremendous variety of tools types and the like have been developed over the centuries to address the many numbers of construction and manufacturing arts which have evolved during civilization's technological progress through modern times. For example, in a single industry such as the construction industry, dozens of different tools types may be used on a single construction site. In particular, the number of such tool types which are used has increased due to the various specialties and sub-specialties of carpentry and other construction techniques which continue to develop as modern buildings become more complex.

Throughout the modern evolution of tools, substantial efforts have been made to automate tool operation, principally, to improve job efficiencies by improving tool operation speeds and by reducing fatigue of tool operators. In recent decades, such automation efforts have typically involved the development or innovation of compressor



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powered pneumatic tools or tools powered by electricity. In this regard, due to their improved efficiencies, the use of automated tools has become so commonplace that one would be hard-pressed to not find a pneumatic nail gun or an electrically powered drill at a typical construction job site. Nevertheless, conventional pneumatic or electrically operable tools suffer various disadvantages or drawbacks.

For example, pneumatic or electrically powered tools which are directly connected to a compressor via a hose or to an electrical outlet via a power cord are limited in their portability or mobility due to their attachment to their respective power sources (e.g., their portability is limited to the length of the hose or cord and/or they may be difficult or unsafe to carry up a ladder for example). Moreover, the longer the cord or hose, the greater the overall weight as well as the chance that such hose or cord will become entangled or otherwise act as a safety hazard (e.g., as a tripping hazard). Although battery operated tools address some of these disadvantages, such tools are burdened by their own drawbacks such as their increased weight and reliance on the finite charge of a battery (and, after battery depletion, one must wait for the battery to be recharged or have additional batteries available, for example).

The present inventor has addressed the aforementioned problems and drawbacks in his U.S. Patent No. 6,932,128, entitled APPARATUS AND METHOD FOR USING A LIGHTWEIGHT PORTABLE AIR/GAS POWER SUPPLY. The present invention is intended to further improve on the apparatus and methods disclosed therein.

In addition to the aforementioned problems related to portability and mobility of pneumatic tools such as discussed above, such tools' reliance on the use of conventional air compressors for providing pneumatic air "power" further compounds their drawbacks. In this regard, known compressors are generally bulky and heavy and exhibit other related drawbacks. More specifically, known air compressors are too large and unwieldy to safely use in many work environments (e.g., on a rooftop in a construction project). Moreover, known compressors are noisy, complicated in mechanical structure and/or expensive to maintain or manufacture, or cannot safely pressurize air/gas past certain threshold "psi's". Certain other known compressor types utilize fossil fuels for power, require the use of oil (for lubrication), and/or employ disposable filters. In this regard, such known air/gas compressor types are environmentally unsound as they either produce

significant pollution or they rely on finite natural resources for fuel, or both.

In view of the above, it is apparent that there exists a need in the art for methods and/or apparatus and/or systems which overcome or, at least, ameliorate one or more of the above or other drawbacks. It is a purpose of this invention to fulfill this need, as well as other needs in the art which will become apparent to the skilled artisan once given the above disclosure.

SUMMARY OF THE INVENTION

Generally speaking, this invention fulfills the above-described needs in the art by providing: compressors, with or without filtration and/or cooling systems, which are compact, lightweight, portable and/or mechanically non-complex.

In at least one embodiment, this invention provides:

an air/gas compressor comprising:

a motor operably connected to a flywheel and capable of rotating the flywheel;

a linearly actuated pump having a first end and a second end, the first end pivotally connected to the flywheel at a pump mount location and the second end pivotally connected to a frame member, the pump including a piston which is linearly actuated when the flywheel is caused to rotate;

a counterweight connected to the flywheel at a location on the flywheel generally opposite the pump mount location, the counterweight being so located such that when the flywheel is caused to rotate, the counterweight imparts momentum to the flywheel;

the linearly actuated pump including an air/gas pump input for receiving air/gas and an air/gas pump output for outputting air/gas which is pressurized by the linearly actuated pump when the piston is linearly actuated.

In an alternative embodiment, this invention provides:

a high pressure air/gas compressor employing a single, linearly actuated pump comprising:

a motor operably connected to a flywheel and capable of rotating the flywheel during motor operation;

a single, linearly actuated pump having a first end and a second end, the first end pivotally connected to the flywheel at a pump mount location and the second end pivotally connected to a frame member, the pump including a piston which is linearly

actuated to compress air/gas in an air/gas compression chamber when the flywheel is caused to rotate by the motor operation;

the linearly actuated pump including an air/gas pump input for inspiring gas at an initial input pressure and an air/gas pump output for expiring gas at a pressure increased relative to the initial input pressure; and

wherein the single, linearly actuated pump, operated by the flywheel and motor combination, is capable of independently powering pressurization of air/gas up to pressures of at least 500 psi, more preferably at least 1500 psi, and most preferably at least 3000 psi.

In certain preferred embodiments, during a push stroke of the piston, the counterweight assists in effecting a completion of the push stroke and during a pull stroke of the piston, the counterweight adds resistance to effecting a completion of the pull stroke.

In yet additional preferred embodiments, the position and location of the counterweight causes the counterweight, during directional motion of the flywheel, to alternately assist and resist push and pull strokes of the piston thereby to effect a generally consistent rotational velocity of the flywheel during compressor operation.

In some embodiments, the system is provided with a linearly actuated pump which includes a coolant fluid path through which a coolant can be transmitted thereby to temperature regulate the linearly actuated pump during operation. In at least one of such embodiments, the coolant fluid path is a fluid passageway located internal to the shell housing in proximity to the linearly extendable and retractable piston. In at least one preferred embodiment, the system further includes a coolant reservoir in fluid communication with the coolant fluid path and a coolant pump for transmitting coolant from the coolant reservoir and through the coolant fluid path.

In at least one embodiment, it is an object to provide a compact and/or lightweight and/or portable and/or mechanically non-complex compressor which is capable of pressuring air/gas. In preferred embodiments of such compressors, such compressors are capable of filling an air storage reservoir to pressures of at least 500 psi, more preferably at least 1500 psi, still more preferably at least 3000 psi, and most preferably to pressures selected from between at least 0 and 5000 psi. In alternative preferred embodiments,

such compressors are capable of filling an air storage reservoir to pressures selected from between 0 and 10,000 psi or more.

IN THE DRAWINGS

FIG. 1 is a three-dimensional, perspective view of one embodiment of a compressor according to the subject invention.

FIG. 2 is an alternative, three-dimensional, perspective view of the embodiment of the compressor illustrated in FIG. 1.

FIG. 3 is a two-dimensional, diagrammatic view of one embodiment of a compressor according to the subject invention.

FIG. 4 is an alternative, two-dimensional, diagrammatic view of the embodiment of the compressor illustrated in FIG. 3.

FIG. 5 is a three-dimensional, perspective view of one embodiment of a compressor according to the subject invention shown housed in a free-standing portable casing and with a separate air/gas vessel to be filled by the compressor.

FIG. 6 is a three-dimensional, perspective view of one embodiment of a compressor according to the subject invention shown housed in a free-standing, portable, wheeled cart.

FIG. 7 is two-dimensional, diagrammatic view of one embodiment of a filtration system according to the subject invention useful in connection with the herein described compressors.

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS

Definitions

Fluid: The term "fluid" as is used herein in the specification and claims is intended to retain its accepted art and/or scientific definition. In this regard, the term "fluid" includes gases within its scope (in addition to liquids) and, therefore, a component described as being in fluid communication (or in fluid connection), is, in some circumstances, in gas-flow communication (or in gas-flow connection).

Air/gas: The term "air/gas" as used herein in the specification and claims is defined as a fluid in a gaseous state having neither independent shape nor volume. As non-limiting examples, the term "air/gas" includes within its scope atmospheric air, purified atmospheric air, purified nitrogen, various ratios of mixtures of nitrogen and

oxygen and other such fluids in the gaseous state not otherwise specifically described herein.

For a more complete understanding of the present invention and advantages thereof, reference is now made to the following description of various illustrative and non-limiting embodiments thereof, taken in conjunction with the accompanying drawings in which like reference numbers indicate like features

Referring initially to Figs. 1-2, an example embodiment of a unique, portable air/gas compressor according to the subject invention is depicted as compressor 101. In this regard, as illustrated, compressor 101 generally comprises a frame 103 housing a motor 105 and drive assembly 107 which operates a piston driven pump 113 for compressing air inspired or input into the compressor system (e.g., from the surrounding atmosphere). More specifically, in the embodiment which is illustrated, motor 105, when operated, drives a small pulley 109 (e.g., approximately 2 inches in diameter) which, in turn, drives flywheel 111 (e.g., approximately 10 inches in diameter) which is connected to pulley 109 by a drive belt 115. Furthermore, as illustrated in the figure, linearly actuated pump 113 is connected at its first end, via a conventional pivot type connection, to a shaft 117 extending from a lateral surface of flywheel 111 located at a select distance from the center or rotational axis of the flywheel (e.g., here, where employing a 10 inch diameter flywheel, shaft 117 is located approximately 3.0 inches from the axis/center thereof). At its second end, pump 113 is connected, also via pivot type (or rocker type) connection, to mount member 119 (e.g., immovably attached to frame 103). Assembled as such, as flywheel 111 is rotationally driven (by operation of motor 105 powering drive assembly 107), piston 121 of pump 113 is caused to alternate between generally linear push and pull strokes to effect a pressurization of air (i.e., in a compression chamber in pump 113, not shown). More specifically, in a "pull stroke", piston 121 is withdrawn from shell housing 123 (of pump 113) upon which air is inspired into the compression cavity of the pump (e.g., at air/gas input 125). Conversely, in a "push stroke", piston 121 is driven into shell housing 123 upon which air is pressurized in the compression cavity and thereafter expired via air/gas output 127 (e.g., for subsequent transmission to a filtration system).

Although the embodiment described above employs drive belt trained about a pair

of unequally sized "pulleys" (i.e., including flywheel 111) as a pump "drive" (the size relationship of the pulleys thus being in an approximately 1:5 ratio so that pump 113, at full operational speed, operates at or within its approximate optimized parameters i.e., at or below 1350-1400 pump cycles per minute, and preferably at or below 1380-1385 pump cycles per minute), alternative embodiments by which pump 113 is differently or alternatively driven are, of course, contemplated. In one such envisioned embodiment, motor 105 directly drives flywheel 111 without a separate pulley or drive belt being employed. In particular, such an embodiment is simpler in construction and reduces the overall number of working parts (however, due to the potential mechanical advantage lost, a larger or more robust motor or different pump type may need be employed).

Through diligent experimentation with various iterations of the above described compressor system, in addition to having evolved a uniquely compact and portable compressor which utilizes a simple construction and few mechanical parts, Applicant has discovered that particularly advantageous compressor performance can be achieved through the use of one or more structural variations of a heretofore unknown flywheel structure employing a specifically located and/or sized counterweight. In this regard, in preferred embodiments of the subject invention, a flywheel utilizing such a counterweight 129 is employed in the subject inventive compressor(s).

Specifically, as can be seen most clearly in Figs. 3 and 4, in such preferred (albeit optional) embodiments, a counterweight 129 (shown in "phantom" or dotted lines) is integrated into flywheel 111 such as by molding, casting, machining, or other conventional tooling methods or mechanisms (alternatively, counterweight 129 can be affixed to flywheel 111 as an separately manufactured part). More particularly, in the most efficacious embodiments, counterweight 129 (e.g., a 10.3 oz. counterweight as illustrated, or, more generally, a counterweight sized between approximately 6 and 16 oz. or between approximately 10-20 % of the flywheel's mass) is located directly opposite the flywheel mount location of pump 113 i.e., opposite shaft 117 on the other or opposite side of rotational axis "a" of the flywheel.

Still more specifically, counterweight 129 is located as described so that it provides a counterbalance to the force or resistance imparted by pump 113 on the flywheel as push and pull strokes of pump 113 are effected by the directional rotation of

the flywheel (thought of differently, counterweight 129, in part, adds momentum to the flywheel to propel its rotation against the resistance of a push stroke of piston 121 into pump 113). In this regard, during a push stroke of piston 121, as the piston is being driven into the compression cavity to compress air/gas, the resistance of the air/gas being compressed impedes the stroke of the piston and thus the rotation of flywheel 111 (thus tending to decrease the rotational speed of the flywheel). Conversely, during a pull stroke of piston 121, the lack of air compression related resistance results in a piston stroke which is relatively unimpeded. As a result, as compared to during a push stroke, the rotational speed of flywheel 111 tends to increase. Nonetheless, alternating changes in rotational velocity of the flywheel are generally not desired and contribute to rapid part wear and mechanical breakdown and thus limit the upper operational speed of the pump (and thus the upper limit pressurization capabilities of the compressor).

Therefore, by locating counterweight 129 as shown in Figs. 3 and 4 (e.g., relative to the mounting location of pump 113), during a push stroke, counterweight 129 is located such that gravity acts on the counterweight in a direction which is generally co-directional with the rotational direction of the flywheel (i.e., clockwise as shown in the figure). In this manner, the gravitational force on the counterweight aids in completion of the push stroke thereby minimizing or eliminating any decrease in rotational velocity which would otherwise occur. Conversely, during a pull stroke (the end of which is illustrated in Fig. 4), counterweight 129 is located so that gravity acts on the counterweight in a direction which is generally opposite the rotational direction of the flywheel. In sum, the position and location of counterweight 129 causes the counterweight, during directional motion of flywheel 111, to alternately assist and resist push and pull strokes of the piston thereby to effect a generally consistent rotational velocity of flywheel 111 during compressor 101 operation. In such manner, the aforementioned drawbacks related to mechanical reliability and/or upper limit operational speeds are substantially eliminated or at least ameliorated. As a result, at least one prototype of a compressor such as described herein has produced end pressures as high as approximately 5000 psi (and still higher pressures, e.g., above 6000 psi, or, possibly, even above 10,000 psi, are expected to be achieved through further optimization and/or experimentation).

Although, as described herein, the use of a counterweight, such as 129, offers or enables distinct and significant advantages to compressor performance or operation, alternative embodiments by which similar advantages are achieved are contemplated. For example, instead of using a counterweight on flywheel 111, a flywheel with increased mass as compared to a conventional flywheel could be utilized. In such manner, the increased momentum achieved by the use of a high mass flywheel should, in theory, substantially overcome the resistance of piston 121 as it compresses the air/gas (moreover, the lack of resistance during a "pull stroke" would not be comparatively sufficient, relative to the high mass flywheel, to impart significant increased rotational velocity). In sum, such a sufficiently massed flywheel should not experience significant/detrimental changes in velocity due to resistance and non-resistance of piston 121 during push and pull strokes, respectively.

In addition to the above described advantages, certain embodiments of compressor 101 employ filtration systems comprising one or more filter types such as for drying and/or cleaning air/gas (or, in certain embodiments employing so-called molecular sieves, isolating one gas molecule type from another). Referring now again to Figs. 1-4, and most particularly to Fig. 7, one embodiment of such a filtration system is illustrated therein.

As is detailed most clearly in Fig. 7, filtration system 135 generally comprises a filter column constructed from a combination of a desiccant filter 137 and a coalescent filter 139. More specifically, desiccant filter 137 is in fluid communication (i.e., gas-flow communication) with air/gas pump output 127 via a valve 144 connected to air/gas pump output line 128 (e.g., conventional high pressure tubing). Moreover, coalescent filter 139 is connected physically and fluidly (i.e., in gas-flow communication) in series with desiccant filter 137. Coalescent filter 139, in turn, is physically and fluidly connected to one end of air/gas output line 141 which is connected at its other end to manifold 147 (which includes a fill port 151 for connecting to and filling/pressurizing an air/gas vessel 3).

In exemplar embodiments of filtration system 135, the entire filter system is generally hermetically sealed but permits air/gas flow through its connections to line 128 and line 141 and selectively via vent port 145 as desired (as will be described in the text

which follows). Thus, when compressor 101 is operated to manufacture pressurized air/gas, such air/gas is flowed through both desiccant filter 137 and coalescent 139 at generally full system pressures. In such manner, condensation (e.g., water condensation) and/or particulate matter is filtered from the air/gas flowed through the filter system (e.g., thus resulting in clean, dry air/ gas).

In an example operation to fill an air/gas vessel, then, a vessel 3 is first connected to fill port 151 via a conventional or proprietary valve type connection. Then, compressor 101 is powered on (e.g., by operation of on/off switch 131) and air/gas is inspired and compressed as compressor 101's systems operate pump 113 as described above. As compressor 101 compresses or pressurizes inspired air/gas, the compressed air/gas flows from pump 113 through air/gas outlet 127. Then, in embodiments of the compressor which employ filtration system 135, the compressed or pressurized air/gas is caused to first flow through desiccant filter 137 which removes moisture from the compressed air/gas, and, afterwards, through coalescent filter 139 which removes certain types of particulates.

In certain particularly preferred embodiments, compressor 101 additionally includes an auto-shut-off switch (not shown) which functions to shut down compressor 101 upon detection of a pre-selected pressurization or fill pressure. During a fill operation in embodiments which employ such auto-shutoff features, then, as compressed air/gas fills vessel 3, pressure gauge 143 (see Fig. 2) monitors the pressure of the air/gas being provided and automatically turns off compressor 101 (e.g., by switch relay) once the desired air/gas pressure is reached (e.g., which has been pre-selected by a compressor operator utilizing a pressure selection switch or dial, not illustrated). In this way, compressor 101 is able to automatically provide desired fill pressures (e.g., commensurate with storage and/or safety limits of particular air/gas storage vessels) without requiring that a pressure gauge be actively or constantly monitored. Non-automated embodiments, nonetheless, are certainly contemplated.

In certain preferred embodiments, after a desired fill pressure is achieved, compressor 101 is shut down either automatically as described immediately above, or manually by operation of switch 131. Thereafter, before disconnecting vessel 3 from fill port 151, vent port 145 (e.g., operated by thumbscrew or similar mechanical mechanism)

is opened and residual pressurized air/gas purges from the vent port and simultaneously causes the desiccant and coalescent filters to purge collected/filtered condensation and particulate matter, respectively.

In still further alternative embodiments, it has been determined through certain additional innovation and experimentation, that employing a cooling system to cool pump 113 during compressor operation substantially improves the performance of compressors such as those described herein principally by reducing wear rates of internal pump parts. Thus, as an optional feature in certain compressors such as illustrated as preferred embodiments in Figs. 1-4, a coolant system 201 for cooling pump 113 during operation is provided.

As illustrated in various views in Figs. 1-4, coolant system 201 generally includes a coolant reservoir 205 storing a liquid or gaseous coolant of conventional composition (e.g., an "anti-freeze" type liquid), a pump 203 (e.g., a conventional water pump) for pumping coolant from the reservoir and through the coolant system, and a radiator 215 for removing absorbed/adsorbed heat from the coolant fluid/gas prior to returning the coolant to coolant reservoir 205 by return path 213.

More specifically, and in example operation of system 201 during compressor operation, as pump 203 is actuated, coolant fluid (or gas) is first drawn from reservoir 205 into and through internal conduits of pump 203 and then, afterwards, flowed into pump 113 via coolant ingress line 207. As coolant enters pump 113, it circulates within shell housing 123 along the length of and proximal piston 121 (e.g., via a conduit circumferentially surrounding piston 121) thereby absorbing/adsorbing heat generated by the piston during pump 113 operation. After circulating within the internal components of pump 113, the coolant is then caused to exit or flow from pump 113 (by continued operation of pump 203) via coolant egress line 211 whereby it is transmitted to radiator 215 (e.g., of conventional radiator construction). After passing through radiator 215 where heat "carried" by the coolant is substantially removed or reduced (e.g., actively or passively), the coolant is returned to reservoir 205 via coolant return path 213 (e.g., for recirculation through the coolant system). Alternative methods and mechanisms for cooling pump 113 during operation are, of course, envisioned.

Although compressor 101 is believed to be particularly advantageous when used

in combination with portable pneumatic power systems such as described in my United States Patent No. 6,932,128, compressor 101 is capable of producing clean, dry compressed air/gas for many other end uses. Moreover, compressors such as described herein exhibit significant performance improvements over known compressors. In this regard, compressor 101 is capable of filling large air/gas supply vessels with high air/gas pressures all the while having a heretofore unknown compact and simple structural design. In particular, compressor 101's compact and lightweight structure allows it to be uniquely portable for a compressor with such high performance compression capabilities. Furthermore, certain embodiments of compressor 101, relative to known compressors, are remarkably simply in structural design. In this regard, in preferred embodiments, compressor 101 utilizes a single drive belt 115 to minimize maintenance and extend longevity, does not require the changing and discarding of oil, does not require gas, oil, or filters, and/or generally uses no parts which are vulnerable to rusting or degradation. Certain additional embodiments (alternatively, or in combination with the immediately previously described improvements), exhibit low operational noise levels (typically about 55 dBA or less), are virtually maintenance-free, operate on standard power/electrical sources (e.g., 110-volt electrical power), do not emit toxic fumes or exhaust, and/or are self-cleaning (e.g., because moisture and dust particles are purged from the system at the conclusion of each use such as described above).

Once given the above, non-limiting disclosure, many other features, modifications, and improvements will become apparent to the skilled artisan. Such other features, modifications, and improvements are therefore considered to be part of this invention, the scope of which is to be determined by the following claims:

I claim:

1. An air/gas compressor comprising:
a motor operably connected to a flywheel and capable of rotating said flywheel;
a linearly actuated pump having a first end and a second end, said first end pivotally connected to said flywheel at a pump mount location and said second end pivotally connected to a frame member, said pump including a piston which is linearly actuated when said flywheel is caused to rotate;
a counterweight connected to said flywheel at a location on said flywheel generally opposite said pump mount location, said counterweight being so located such that when said flywheel is caused to rotate, said counterweight imparts momentum to said flywheel;
said linearly actuated pump including an air/gas pump input for receiving air/gas and an air/gas pump output for outputting air/gas which is pressurized by said linearly actuated pump when said piston is linearly actuated.
2. The air/gas compressor according to claim 1 wherein said compressor further comprises a drive wheel and a drive belt, said drive belt being trained about said drive wheel and said flywheel; and wherein said motor is connected to said drive wheel such that when said motor is in operation, said drive wheel is caused to rotate, and wherein when said drive wheel is caused to rotate, said drive wheel drives said drive belt causing said flywheel to directionally rotate thus causing alternating push and pull strokes of said piston of said linearly actuated pump.
3. The air/gas compressor according to claim 2 wherein, during operation, said flywheel has a rotational direction which causes alternating push and pull strokes of said piston and wherein said counterweight is connected to said flywheel in such a location generally opposite said pump mount location such that when said flywheel is rotating to cause a push stroke of said piston, said counterweight is located such that gravity acts on

said counterweight in a direction which is generally co-directional with said rotational direction of said flywheel; and

when said flywheel is rotating to cause a pull stroke of said piston, said counterweight is located such that gravity acts on said counterweight in a direction which is generally opposite said rotational direction of said flywheel.

4. The air/gas compressor according to claim 3 wherein during a push stroke of said piston, said counterweight assists in effecting a completion of said push stroke and during a pull stroke of said piston, said counterweight adds resistance to effecting a completion of said pull stroke.

5. The air/gas compressor according to claim 4 wherein said position and location of counterweight causes said counterweight, during directional motion of said flywheel, to alternately assist and resist push and pull strokes of said piston thereby to effect a generally consistent rotational velocity of said flywheel during compressor operation.

6. The air/gas compressor according to claim 5 wherein said linearly actuated pump comprises a shell housing and a linearly extendable and retractable piston, said piston being linearly translatable to effect a pressurization of air/gas in an air/gas compression chamber.

7. The air/gas compressor according to claim 6 further comprising a coolant fluid path through which a coolant can be transmitted thereby to temperature regulate said air/gas compressor during operation.

8. The air/gas compressor according to claim 7 wherein said coolant path extends proximal the perimeter of said piston thereby to cool said piston during pump operation.

9. The air/gas compressor according to claim 7 wherein said coolant fluid path is a fluid passageway located internal to said shell housing and in proximity to said linearly extendable and retractable piston thereby to cool said pump during operation.

10. The air/gas compressor according to claim 9 wherein said air/gas pump output is selectively connectable and disconnectable to one or more filters.

11. The air/gas compressor according to claim 10 wherein said one or more filters are selected from the group consisting of: a coalescent filter, a desiccant filter, a carbon dioxide filter, and a molecular sieve.

12. The air/gas compressor according to claim 9 further including a filtration system comprising:

- a hermetically sealed desiccant filter in fluid communication with said air/gas pump output;

- a hermetically sealed coalescent filter in fluid communication with said air/gas pump output and in fluid communication with said desiccant filter;

- an air/gas filtration system output in fluid communication with a manifold, said manifold being fluidly connected to an air/gas compressor output for connecting to an air/gas vessel for storing pressurized air/gas;

- a pressure gauge in communication with said manifold capable of detecting an air/gas vessel fill pressure;

- a pressure selector mechanism which permits a compressor operator to pre-select a desired end fill pressure for filling an air/gas vessel; and

- a compressor shut-off switch; and

wherein, during compressor operation, when said pressure gauge detects an air/gas fill pressure which approximately equals a pre-selected desired end fill pressure, pre-selected with said pressure selector mechanism, said compressor shut-off switch stops compressor operation.

13. The air/gas compressor according to claim 12 further comprising a vent port selectively openable to vent excess pressurized air/gas from said filtration system, said vent port being in fluid communication with said hermetically sealed desiccant filter and said hermetically sealed coalescent filter; and

wherein when said vent port is operated to vent excess pressurized air/gas from said filtration system, said excess pressurized air/gas purges from said vent port and causes said hermetically sealed desiccant filter and said hermetically sealed coalescent filter to purge collected/filtered condensation and particulate matter, respectively.

14. The air/gas compressor according to claim 13 wherein said hermetically sealed desiccant filter is physically connected to said air/gas pump output, and wherein said hermetically sealed coalescent filter is in-line connected between said hermetically sealed desiccant filter and said air/gas filtration system output.

15. A high pressure air/gas compressor employing a single, linearly actuated pump comprising:

- a motor operably connected to a flywheel and capable of rotating said flywheel during motor operation;

- a single, linearly actuated pump having a first end and a second end, said first end pivotally connected to said flywheel at a pump mount location and said second end pivotally connected to a frame member, said pump including a piston which is linearly actuated to compress air/gas in an air/gas compression chamber when said flywheel is caused to rotate by said motor operation;

- said linearly actuated pump including an air/gas pump input for inspiring gas at an initial input pressure and an air/gas pump output for expiring gas at a pressure increased relative to said initial input pressure; and

- wherein said single, linearly actuated pump, operated by said flywheel and motor combination, is capable of independently powering pressurization of air/gas up to pressures of at least 3000 psi.

16. The high pressure air/gas compressor according to claim 15 further including a drive wheel and a drive belt, said drive belt being trained about said drive wheel and said flywheel; and wherein said motor is connected to said drive wheel such that when said motor is in operation, said drive wheel is caused to rotate, and wherein when said drive wheel is caused to rotate, said drive wheel drives said drive belt causing said flywheel to

directionally rotate thus causing alternating push and pull strokes of said piston of said linearly actuated pump.

17. The high pressure air/gas compressor according to claim 16 wherein, during operation, said flywheel has a rotational direction which causes alternating push and pull strokes of said piston and wherein said counterweight is connected to said flywheel in such a location generally opposite said pump mount location such that when said flywheel is rotating to cause a push stroke of said piston, said counterweight is located such that gravity acts on said counterweight in a direction which is generally co-directional with said rotational direction of said flywheel; and

when said flywheel is rotating to cause a pull stroke of said piston, said counterweight is located such that gravity acts on said counterweight in a direction which is generally opposite said rotational direction of said flywheel.

18. The high pressure air/gas compressor according to claim 17 wherein during a push stroke of said piston, said counterweight assists in effecting a completion of said push stroke and during a pull stroke of said piston, said counterweight adds resistance to effecting a completion of said pull stroke.

19. The high pressure air/gas compressor according to claim 18 wherein said position and location of counterweight causes said counterweight, during directional motion of said flywheel, to alternately assist and resist push and pull strokes of said piston thereby to effect a generally consistent rotational velocity of said flywheel during compressor operation.

20. The high pressure air/gas compressor according to claim 19 wherein said linearly actuated pump comprises a shell housing and a linearly extendable and retractable piston, said piston being linearly translatable to effect a pressurization of air/gas in an air/gas compression chamber.

21. The high pressure air/gas compressor according to claim 20 further comprising a coolant fluid path through which a coolant can be transmitted thereby to temperature regulate said air/gas compressor during operation.

22. The high pressure air/gas compressor according to claim 21 wherein said coolant path extends proximal the perimeter of said piston thereby to cool said piston during pump operation.

23. The high pressure air/gas compressor according to claim 21 wherein said coolant fluid path is a fluid passageway located internal to said shell housing and in proximity to said linearly extendable and retractable piston thereby to cool said pump during operation.

24. The high pressure air/gas compressor according to claim 23 wherein said air/gas pump output is selectively connectable and disconnectable to one or more filters.

25. The high pressure air/gas compressor according to claim 24 wherein said one or more filters are selected from the group consisting of: a coalescent filter, a desiccant filter, a carbon dioxide filter, and a molecular sieve.

26. The high pressure air/gas compressor according to claim 23 further including a filtration system comprising:

- a hermetically sealed desiccant filter in fluid communication with said air/gas pump output;

- a hermetically sealed coalescent filter in fluid communication with said air/gas pump output and in fluid communication with said desiccant filter;

- an air/gas filtration system output in fluid communication with a manifold, said manifold being fluidly connected to an air/gas compressor output for connecting to an air/gas vessel for storing pressurized air/gas;

- a pressure gauge in communication with said manifold capable of detecting an air/gas vessel fill pressure;

a pressure selector mechanism which permits a compressor operator to pre-select a desired end fill pressure for filling an air/gas vessel; and

a compressor shut-off switch; and

wherein, during compressor operation, when said pressure gauge detects an air/gas fill pressure which approximately equals a pre-selected desired end fill pressure, pre-selected with said pressure selector mechanism, said compressor shut-off switch stops compressor operation.

27. The high pressure air/gas compressor according to claim 26 further comprising a vent port selectively openable to vent excess pressurized air/gas from said filtration system, said vent port being in fluid communication with said hermetically sealed desiccant filter and said hermetically sealed coalescent filter; and

wherein when said vent port is operated to vent excess pressurized air/gas from said filtration system, said excess pressurized air/gas purges from said vent port and causes said hermetically sealed desiccant filter and said hermetically sealed coalescent filter to purge collected/filtered condensation and particulate matter, respectively.

28. The high pressure air/gas compressor according to claim 27 wherein said hermetically sealed desiccant filter is physically connected to said air/gas pump output, and wherein said hermetically sealed coalescent filter is in-line connected between said hermetically sealed desiccant filter and said air/gas filtration system output.

29. The high pressure air/gas compressor according to claim 15 wherein said compressor is capable of pressuring air up to a pressure of at least approximately 5000 psi.