



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.04.2011 Bulletin 2011/14

(51) Int Cl.:
F04B 35/06^(2006.01) F04B 41/02^(2006.01)

(21) Application number: **10006906.1**

(22) Date of filing: **12.12.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR

(30) Priority: **02.04.2007 US 731999**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
07254794.6 / 1 978 252

(71) Applicant: **Techtronic Industries Company Limited**
Tsuen Wan New Territories
Hong Kong (CN)

(72) Inventors:
• **Ritterling, Douglas Kent**
Anderson, South Carolina 29621 (US)
• **Brazell, Kenneth M.**
Piedmont, South Carolina 29673 (US)

- **Sutter III, Howard Eugene**
Fountain Inn, South Carolina 29644 (US)
- **Strack, Richard L.**
Anderson, South Carolina 29621 (US)
- **Thomas, Benjamin J.**
Anderson, South Carolina 29625 (US)
- **Difrenza, Robert**
Greenville, South Carolina 29607 (US)

(74) Representative: **Stevenson-Hill, Jack Patrick et al**
Marks & Clerk LLP
Sussex House
83-95 Mosley Street
Manchester M2 3LG (GB)

Remarks:

This application was filed on 05-07-2010 as a divisional application to the application mentioned under INID code 62.

(54) **Portable air compressor**

(57) A wheelbarrow compressor has a base; first and second reservoirs spaced apart and located at the base; and a handle assembly attached with a first portion of the at least one of the first and second reservoirs. A wheel assembly is provided which is attached with a second portion of the least one of the first and second reservoirs. The wheel assembly includes at least one wheel. A plurality of air compressor components including a pump assembly and a motor assembly are provided, wherein

the plurality of the air compressor components is at least partially disposed on a top portion of the at least one of the first and second reservoirs. A flywheel is rotatably connected to said motor assembly, the flywheel extending between the first and second reservoirs and below the top portion of at least one of the first and second reservoirs;. At least one of the first and second reservoirs is angled with respect to a central axis defined by the orientation of the at least one wheel.

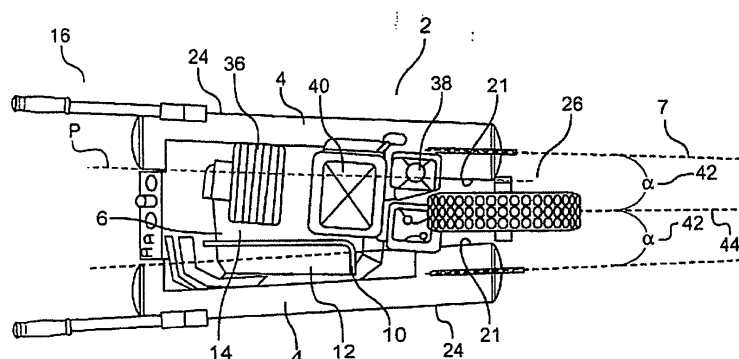


Fig.4

Description

BACKGROUND

[0001] The present invention relates to compressor assemblies, and, in particular, relates to portable compressor assemblies.

[0002] Several types of compressors exist in the prior art. Some prior-art air compressors are portable and often include an air storage tank that normally includes either one or two air reservoirs for storing compressed air and, with respect to the longitudinal axis of the tank, a wheel located at one end of the air tank and a handle at the opposite end of the tank. The compressors with two air reservoirs generally utilize one wheel while the single reservoir compressors of this type generally utilize two wheels. These single and double reservoir types of compressors are often referred to as a wheelbarrow compressors. The compressor will also include components to compress the air. These components generally include a motor assembly and a pump assembly. Due to space constraints, these components typically are mounted on top of the air tanks. One example of such a compressor is made by Campbell Hausfeld, model number GP90135, which is shown in Figure 12. Another example of such a compressor is disclosed in US5087824.

[0003] Mounting the components on top of the air tanks results in several disadvantages. One disadvantage is the high center of gravity that results from mounting the components on top of the air tanks. The high center of gravity is particularly inconvenient for a user manually transporting the compressor and may result in a user losing control of the compressor. This is particularly the case in the two-reservoir wheelbarrow-style compressors used at worksites that are often transported in a wheelbarrow type manner up and down narrow wooden ramps. Additionally, the high center of gravity may cause the air compressor to be unstable and prone to tipping or tilting when being used.

[0004] Moreover, such compressors may be difficult to package and store for, by way of example, shipping, warehousing or retail purposes. When packaged, the air compressors are often shipped, stored or displayed by being stacked atop one another on shelves. Prior-art compressors tend to have high profiles (i.e., are of a taller height). Thus, when packaged, a large amount of storage space may be necessary. Likewise, if the compressors are shipped in large shipping containers, the height limits the number of units that can be packed into a container. Moreover, a greater amount of packaging materials may be necessary due to the high profile of the compressor.

[0005] Additionally, the handles on such prior-art tanks also can cause difficulties when storing the compressors. The handles on such compressors often project outwardly and upwardly from the compressor. Such a configuration again results in an increased height and length and the need for a greater amount of storage space and packaging material. US2006/0245937 discloses a hand car-

ried compressor in which two reservoirs are attached to a pair of skid bars comprising a base. An air compressor mechanism is attached to a frame coupled to the top surfaces of the two reservoirs such that the air compressor mechanism extends partially into the space between the two reservoirs and is supported at approximately its midpoint by an intermediate support plate, the edges of which rest on upper portions of the two reservoirs.

BRIEF SUMMARY

[0006] According to an aspect the invention provided is a wheelbarrow compressor comprising a base, a first reservoir and a second reservoir having bottom portions located at opposite sides of the base, and wherein the base is located below an uppermost surface of the first and the second reservoirs, a handle assembly attached with a first portion of at least one of the first and second reservoirs and a wheel assembly attached with a second portion of at least one of the first and second reservoirs, and a pump and a motor operatively connected with the reservoirs, the motor and pump disposed on the base and between the reservoirs.

[0007] The wheelbarrow preferably has a centre of gravity no greater than an uppermost surface of the first and second reservoirs.

[0008] The base may include a recess that passes partially through the base. A flywheel may be operatively connected to the motor, wherein the flywheel is partially received in the recess.

[0009] The at least one handle assembly may include a movable handle, which may be rotatable, in which case it may further comprise a rotating joint attached with the first portion of at least one of the first and second reservoirs and the rotating handle.

[0010] A first secondary handle may be attached to a top portion of at least one of the first and second reservoirs. A second secondary handle may be attached to the top portion of at least one of the first and second reservoirs. One of the first and second secondary handles may be located closer to the second portion of the first and second reservoirs with the secondary handles offset from each other such that the height of the first or second secondary handle located closer to the second portion of the first and second reservoirs is less than the height of the other first or second secondary handle.

[0011] Alternatively, the first secondary handle may be located at a horizontal distance that is closer to the center of gravity than the second secondary handle, with the first and second secondary handles offset from each other such that a vertical height of the first secondary handle is greater than a vertical height of the second secondary handle.

[0012] Skids may be further provided, attached with at least a portion of a bottom surface of the first and second reservoirs. Two skids may be provided each attached with at least a portion of a bottom surface of the first and second reservoirs. The skids may be made of an elasto-

meric material.

[0013] The handle assembly may further comprise a first sleeve each attached with the first portion of at least one of the first and second reservoirs and a handle configured to slidably engage the sleeve in a telescoping manner.

[0014] In a further aspect the invention provides a portable compressor comprising a base, first and second reservoirs spaced apart and located at the base, a handle assembly attached with a first portion of the at least one of the first and second reservoirs and a wheel assembly attached with a second portion of the least one of the first and second reservoirs, wherein the wheel assembly includes at least one wheel, and a plurality of air compressor components including a pump assembly and a motor assembly, wherein the plurality of the air compressor components is at least partially disposed on a top portion of the at least one of the first and second reservoirs, a flywheel rotatably connected to said motor assembly, the flywheel extending between the first and second reservoirs and below the top portion of at least one of the first and second reservoirs, and wherein at least one of the first and second reservoirs is angled with respect to a central axis defined by the orientation of the at least one wheel.

[0015] In a further aspect the invention resides in a wheelbarrow compressor comprising an air storage tank including first and second air reservoirs, a plurality of compressor components operatively connected to the air reservoirs, a handle assembly located at a first portion of the air reservoir, a wheel assembly located at a second portion of the air reservoir, and having a center of gravity whose height is no greater than an uppermost surface of the first and second reservoirs.

[0016] In a further aspect the invention resides in a wheelbarrow compressor, comprising a first reservoir and a second reservoir, a pump and a motor operatively connected with the reservoirs and disposed between the reservoirs, wherein bottom-most portions of the pump and the motor are no higher than uppermost quadrants of the first and the second reservoirs.

[0017] The portable compressor may include movable handles that may rotate, fold, slide, telescope, retract or be removable and stored in a separate location on or near the compressor.

[0018] In a further aspect the invention resides in a wheelbarrow compressor comprising a first reservoir and a second reservoir, a handle assembly attached with a first portion of at least one of the first and second reservoirs and a wheel assembly attached with a second portion of at least one of the first and second reservoirs, at least one first secondary handle attached to one of a top portion and a side portion of at least one of the first and second reservoirs, at least one second secondary handle attached to one of a top portion and a side portion of at least one of the first and second reservoirs, and wherein one of the first and second secondary handles is located closer to the second portion of the first and second res-

ervoirs and wherein the first and second secondary handles are offset from each other such that the height of the first or second secondary handle located closer to the second portion of the first and second reservoirs is less than the height of the other first or second secondary handle, and wherein the handle assembly is not either of the first and second secondary handles.

[0019] In a still further aspect the invention resides in a wheelbarrow compressor comprising a first reservoir and a second reservoir, a handle assembly attached with a first portion of at least one of the first and second reservoirs and a wheel assembly attached with a second portion of at least one of the first and second reservoirs, a first secondary handle attached to one of a top portion and a side portion of the first reservoir and to one of a top portion and a side portion of the second reservoir, a second secondary handle attached to one of a top portion and a side portion of the first reservoir and to one of a top portion and a side portion of the second reservoir, and wherein one of the first and second secondary handles is located at the second portion of the first and second reservoirs and the other of the first and second secondary handles is located at the first portion of the first and second reservoirs, and wherein the first and second secondary handles are offset from each other such that the height of the first or second secondary handle located at the second portion of the first and second reservoirs is less than the height of the other first or second secondary handle located at the first portion of the first and second reservoirs, and wherein the handle assembly is not either of the first and second secondary handles.

[0020] In a still further aspect the invention resides in a wheelbarrow compressor comprising a first reservoir and a second reservoir, a handle assembly attached with a first portion of at least one of the first and second reservoirs and a wheel assembly attached with a second portion of at least one of the first and second reservoirs, at least one first secondary handle attached to one of a top portion and a side portion of at least one of the first and second reservoirs, at least one second secondary handle attached to one of a top portion and a side portion of at least one of the first and second reservoirs, wherein one of the first and second secondary handles is located at a horizontal distance that is closer to a center of gravity than the other of the first and second secondary handles, and wherein the first and second secondary handles are offset from each other such that a vertical height of the first or second secondary handle that is closer to the center of gravity is greater than a vertical height of the other of the first and second secondary handles, and wherein the handle assembly is not either of the first and second secondary handles.

[0021] Before turning to the drawings and the detailed description, it should be noted that although the detailed description describes an air compressor, those skilled in the art will recognize that the novel compressor disclosed herein may be used with other types of compressed gas.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] Figure 1 is a side view of an embodiment of a compressor assembly.

[0023] Figure 2 is a top view of the compressor assembly of Figure 1.

[0024] Figure 3 is a bottom view of the compressor assembly of Figure 1.

[0025] Figure 3a is a bottom view of an alternate embodiment of a compressor assembly.

[0026] Figure 4 is a top view of an additional alternate embodiment of a compressor assembly.

[0027] Figure 5 is top view of the compressor assembly of Figure 4.

[0028] Figure 6 is a perspective view of an additional alternate embodiment of the compressor assembly having a movable handle assembly.

[0029] Figure 7 is a top view of an additional alternate embodiment of the compressor assembly having a movable handle assembly.

[0030] Figure 7a is a partial view of the embodiment of Figure 7, showing a handle inserted in a sleeve.

[0031] Figure 7b is a partial view of a handle having a plurality of nesting portions.

[0032] Figure 8 is a perspective view of a compressor assembly having skids and lifting handles.

[0033] Figure 9 is a front view of the embodiment of the compressor of Figure 1.

[0034] Figure 10 is a cross-sectional view of an air reservoir.

[0035] Figure 11 is a view of a pump and motor.

[0036] Figure 12 is a view of a prior-art air compressor.

[0037] Figure 13 is a schematic diagram of a compressor having secondary handles.

DETAILED DESCRIPTION OF THE DRAWINGS AND THE PRESENTLY PREFERRED EMBODIMENTS

[0038] Turning now to Figures 1-3, a novel air compressor 2 is disclosed. The novel compressor has an air storage tank that includes at least one air reservoir 4 for storing a pressurized gas, with there preferably being two air reservoirs 4 included. With reference to Figures 1 and 2, the air reservoirs each include a top portion 23, two side portions, i.e., an outer side portion 24, an inner side portion 21 and a bottom portion 8. The air reservoirs 4 are attached to a base 6 and are oriented such that a longitudinal axis 7 of each reservoir is substantially parallel to a horizontal plane 9 upon which the air compressor rests. The reservoirs 4 preferably are located at opposite sides of the base 6.

[0039] The base may be a one-piece base, or, alternatively and as shown in Figure 3, the base may be more than one piece. As shown in one preferred embodiment, the base may include a support 6a and a bracket 6b mounted to the bottom portion 8 of each air reservoirs 4. In an alternate embodiment, and as shown in Figure 3a, the base need not include a support 6a, and instead may

be comprised of a plurality of tabs 78. In additional alternate embodiments, the base may be comprised of brackets, weldments, tubes or the like. In such embodiments, the air reservoirs 4 and other compressor components are mounted or otherwise supported by the tabs, brackets, weldments, or tubes. Alternatively, the compressor components may be attached to the inner side portions 21 of the air reservoirs 4.

[0040] The base also includes a recess 10, which, in a preferred embodiment, is a through-hole in the base. The recess 10 accommodates a flywheel 12 so that the compressor can be mounted in an ultra-low profile manner on the base. That is, a portion of the flywheel 12 may pass through the recess 10. The air reservoirs 4 are positioned on the base 6 such that there is a space 14 between them. As explained further below, additional components of the air compressor are supported in the space 14 and on the portion of the base between the reservoirs.

[0041] A handle assembly 16 is attached to a first portion 18 of at least one of the air reservoirs 4 and a wheel assembly 26 attached to a second portion 20 of at least one of the air reservoirs 4. The first and second portions 18, 20 are the portions to the left and right of the reservoir 4 length midpoint indicated by the line M in Fig. 1, respectively.

[0042] Although Figures 1-3 show the handle assembly and wheel assembly directly mounted to the air reservoirs 4, in alternate embodiments they need not be directly attached to an air reservoir. Preferably, the handle assembly includes two handles 22, each of which projects outwardly from the first portion 18 of the air reservoir 4 and is attached to the outer side portion 24 of each air reservoir 4. More preferably, and as shown in Figure 1, the handles 22 are substantially horizontal with respect to the horizontal plane 9, with the exception of an end portion 28 of each handle 22, which, for ergonomic purposes, may angle towards the horizontal plane 9. Optionally, the end portion 28 of the each handle includes a grip 30 for the ease of a user to grasp the handles 22.

[0043] The wheel assembly 26 includes a wheel 28 that is mounted to a pair of brackets 32, each of which connects the wheel 28 to the air reservoir 4. As with the handle assembly, the wheel assembly need not be directly mounted to the air reservoirs. As disclosed above, the wheel assembly is attached to the second portion 20 of the air reservoirs 4, opposite the first portion 18, such that a user may grasp the handles and transport the air compressor, such that the air compressor rolls on the wheel. The configuration of such an air compressor is known as a "wheelbarrow" style air compressor.

[0044] Compressor components 34 to compress gas to be stored within the air reservoirs are operatively connected with the air reservoir and generally are located in the space 14 between the air tanks and supported by the base. The components may include a pump assembly 36 and a motor assembly 38. The motor assembly 38 may include an electric motor or a gas engine 38a, and, furthermore, embodiments that include a gas engine may

also include a fuel tank 40, depending on the design of the motor assembly. A flywheel 12 is attached to the motor assembly. The pump assembly 36 includes a pump 36a. The pump assembly 36 is fluidly connected to the air reservoirs 4 and the motor assembly 38 is operatively connected to the pump assembly 36. In addition, and as described above, the flywheel 12 is positioned so as to be at least partially within the recess.

[0045] The compressor components may be located anywhere in the space along the base. In one preferred example, the motor may be located in the space approximately four inches behind the wheel. In another embodiment, the pump may be located in the space immediately behind the wheel.

[0046] Having the compressor components 34 disposed on the base 6 between the air reservoirs 4 results in the air compressor having a center of gravity lower than prior-art air compressors, and more preferably, results in the novel air compressor having a center of gravity lower than an uppermost surface 27 of the air reservoirs. As shown in Figures 1, 9 and 10, the uppermost surface 27 of the air reservoirs is part of the top portion 23 and is the highest part of the reservoir from the ground when measured in its normal operating position. For the air reservoirs 4, which are generally cylindrical reservoirs having a generally circular cross section, the uppermost surface 27 generally will be identified by the tangent, indicated as T in Figures 9 and 10, to the cross section that is the farthest distance from the ground during normal operating conditions.

[0047] Referring now to Figures 9-11, in alternate embodiments, the benefits of the present invention may be realized based on the position of bottom-most portions 37, 39 of the pump 36a and the motor 38a with respect to the air reservoirs 4. The bottom-most portions are the lowest portions of the pump and motor from the ground when measured in their normal operating positions. With reference to Figure 10, which shows a cross-section of a circular air reservoir 4, the reservoir may be divided into quadrants: an uppermost quadrant 70, an upper-mid quadrant 72, a lower-mid quadrant 74 and a lower-most quadrant 76. Preferably, the bottom-most portions 37, 39 of the pump 36a and the motor 38a, respectively, are no higher than the uppermost quadrant 70 of the air reservoirs 4. Even more preferably, in order of ascending preference: the bottom-most portions 37, 39 of the pump 36a and the motor 38a are no higher than the upper-mid quadrant 72; the bottom-most portions 37, 39 of the pump 36a and the motor 38a are no higher than the lower-mid quadrant 74; and most preferably, the bottom-most portions 37, 39 of the pump 36a and the motor 38a are no higher than the lower-most quadrant 76. In alternate embodiments that do not include air reservoirs with circular cross-section, the reservoirs nonetheless may be similarly divided into quadrants.

[0048] Unlike the embodiments described herein, prior-art air compressors such as the Campbell Hausfeld model number GP90135 compressor (Figure 12) typical-

ly mount air compressor components on an upper portion of an air reservoir, resulting in air compressors that have a higher center of gravity. This results in a higher center of gravity that contributes to the instability of the air compressor and makes it more prone to tipping or tilting, especially when being transported, resulting in an inconvenience to a user transporting the compressor.

[0049] In contrast, having the pump and motor assemblies of the present air compressor on the base 6 between the air reservoirs 4, as opposed to an upper portion of the air reservoir, lowers vertical height of the compressor and, in turn, the center of gravity. Lowering the vertical height of the compressor adds stability to the compressor and further discourages tipping or tilting. Preferably, and as described above, the center of gravity is below the uppermost surface of the air reservoirs. In an alternate embodiment, and as also been described above, it also is preferable to have the bottom-most portions of the pump and the motor be no higher than the uppermost quadrant of the air reservoirs. Such embodiments highly reduce the likelihood of having the air compressor tip or tilt while being transported and make transporting the compressor much easier.

[0050] Optionally, and to add further stability to the air compressor, the wheel 28 of the compressor may be enlarged to a size approximately equal to or greater than the air compressor profile, as shown in Figure 1. As compared to compressors with smaller wheels, the enlarged wheel 28 reduces the amount of pivoting about the central axis of the wheel needs to be pivoted in order to lift the compressor with the handle assembly. Advantageously, the smaller amount of pivoting results in less force being exerted on a user's arms and makes the compressor easier to transport with the wheel over a rough terrain.

[0051] Moreover, having the air compressor components disposed on the base results in an air compressor having a height or profile, measured with respect to the horizontal plane, lower than the profile of prior art compressors. This provides benefits with respect to the shipping and packaging of the air compressor. The lower height profile requires less packaging material. Also, the lower profile requires less storage space when being packaged. When packaged, the air compressors are often stored or displayed by being stacked atop one another on shelves. With the lower profile, more units may be stacked on top of one another within the same space. This is particularly advantageous when shipping the compressors. Shipping often is done by using large containers that are transported on boats, trains, or trucks. The low profile allows for more compressors to be packed into a container, thereby reducing the shipping costs.

[0052] Figures 4 and 5 show an alternate embodiment of an air compressor, which is similar to the embodiments described in Figures 1-3 and with like components having like numerals. As with the embodiments described with respect to Figures 1-3, the air compressor includes at least one air reservoir 4, and, more preferably, includes two air reservoirs 4. Moreover, the compressor compo-

nents, the base, handle assembly and wheel assembly generally are the same as the embodiments described with respect to Figures 1-3 and use the same reference numbers.

[0053] However, with respect to the air reservoir longitudinal axis 7, at least one air reservoir is oriented on the base so that it is angled with respect to a central axis 44 that passes through the wheel 26, with the central axis thus being defined as being generally perpendicular to the rotational axis of the wheel. Preferably, the reservoir 4 will be positioned at an angle α , labeled in Figure 4 as 42, in a range of about one and one-half through five degrees, although in other embodiments the angle α may have a lesser or greater value depending on design specifications. Because the air reservoirs are angled, the width of the compressor 2 near the wheel assembly 26 will be less than the width of the remainder of the air compressor in the direction toward the handle assembly 16, with the width increasing towards handle assembly 16.

[0054] The pump assembly 36 and motor assembly 38 are at least partially disposed on the top portion 23 of one of the air reservoirs 4 and are positioned so that the profile P of these air compressor components, when viewing Figure 4, is substantially parallel to the longitudinal axis 7 of the air reservoir. Having the profile P substantially parallel to the longitudinal axis of the air reservoir leaves room for a flywheel 12 to be disposed in the space 14 and attached to the base 6. The space 14 is large enough to accommodate flywheels of a variety of sizes, so that a flywheel of a larger size does not need to be disposed on the reservoir. Thus, and advantageously, a larger flywheel will not greatly increase the height of the compressor, so that the disadvantages described above associated with compressors having high profiles may be avoided. Although not required, the present embodiment preferably contemplates incorporating a flywheel larger than the flywheel disclosed in the embodiments illustrated in Figures 1-3. As shown in Figure 5, the flywheel 12 may be covered by a housing 46. Optionally, and as described above, the base may include the recess 10 for partially receiving the flywheel.

[0055] As with the embodiments described above, the present embodiment of the air compressor results in a compressor having a lower-center of gravity than prior-art compressors. This is because prior-art air compressors typically mount the flywheel on an upper portion of the reservoir, thus raising the center of gravity. Moreover, angling at least one air reservoir results in the air compressor having a lower profile than prior-art compressors due to the flywheel being lower, thus providing the additional packaging benefits described above.

[0056] The embodiments described above may incorporate additional features without departing from the scope of the invention. One such feature includes movable handles 22 that may ergonomically accommodate a user transporting the compressor with the handle assembly and wheel assembly. Additionally, the movable

handles 22 may be storable so that they facilitate the convenient storage of the handles. The movable handles may rotate, fold, slide, telescope, or retract in order to facilitate ergonomic adjustments or storability. Additionally, the movable handles may be removable. Handles that are removable may be stored in a separate location on or near the compressor.

[0057] Referring to Figures 6 and 7, each handle 22 of the handle assembly may be attached to the air reservoir with a joint 48 so that the handle may be rotated. The joint 48 may be of the type to allow movement about a horizontal axis H and/or a vertical axis V, or alternatively, may include be a U-joint that allows an unlimited degree of freedom of movement. The joint preferably is attached to the outer side portion 24 or the top portion 23 of the air reservoir. Alternatively, the joint 48 and handle 22 may be mounted to the inner side portion 21 of the reservoir. Such an alternate embodiment may be particularly desirable for the embodiments of Figures 4 and 5, although the joint and handle may be mounted in such a way for any of the embodiments described herein. In yet alternate embodiments, the joint and handle may be attached to the bottom portion 8. The handle 22 may be rotated as shown by the dashed line R so that it stores in a position parallel and adjacent to the reservoir 4 (shown in phantom in Figure 6 as 22a).

[0058] In yet alternate embodiments, each handle may be modified to be slidably movable. Referring to Figure 7, a sleeve 50 is mounted to the first portion 18 of the air reservoir, and may be mounted on either of the outer side portion 24, the top portion 23, the bottom portion 8 or the inner side portion 21 of the air reservoir. The handle 22 is slidably engaged with the sleeve 50. The handle 22, upon the release of a lock 52, may move freely within the sleeve 50, thus facilitating a telescoping action of the handle. In one preferred embodiment, the lock 52 includes a hole 54 in the handle and a hole 56 in the sleeve 50. When the holes are aligned, a pin 58 may be inserted into the holes to prevent the handle from moving within the sleeve. Advantageously, multiple holes may be provided along the handle so that the handle can be locked into multiple positions with respect to the sleeve.

[0059] As shown in Figure 7, the handle 22b may be removed from a first end 66 of the sleeve 50 and inserted into a second end 68 of the sleeve so that the handle 22b does not project outwardly from the air reservoir. Additionally, and as shown in Figure 7a, the handles 22b may be fully inserted into the sleeves 50. Advantageously, both of these positions reduce the amount of space required to store the compressor and the amount of packaging required for prepurchase shipping and storage. Alternatively, stops on the handle may prevent the handle from separating from the sleeve. Additionally, the sleeves 50 may be incorporated into the joint 48 so that the handles may be both rotated and telescoped.

[0060] In another alternate embodiment shown in figure 7b, each handle 22c may include a plurality of nesting portions 80 that allow telescopic movement by collapsing

or nesting within each other, as compared to Figure 7a, where the handle 22b is able to slide in and out of the sleeve 50. The nesting portions 80 may be partially nested so that less than all of the nesting portions are collapsed or entirely nested. Detents or other commonly known release mechanisms may be incorporated to selectively retain the nesting portions 80 in a nested or partially-nested position. Moreover, such nested handles may be removable so that they do not project outwardly from the air reservoir as described above.

[0061] The movable handles provide several benefits. The handles may be rotated or telescoped so that they do not project outwardly from the first portion of the compressor, resulting in a compact air compressor, which provides further benefits with respect to shipping, storage and packaging as described above. Moreover, the handles may be readily adjusted to multiple positions so as to be more comfortable for a user. In fact, as those skilled in the art will recognize, the handles may be modified to both telescope and rotate as described above.

[0062] Referring to Figure 8, each reservoir 4 may include a skid 60 attached to the bottom portion 8 of the reservoir 4. The skids 60 facilitate the sliding of the air compressor that under certain circumstances may be useful. For example, the skids may be used when loading the compressor into the back of a vehicle, or other situations where it may not be desirable to use the wheel assembly to transport the compressor. Specifically, when the compressor is lifted off the ground to be loaded into the back of the vehicle (e.g., the bed of a pick-up truck), the skids may be used to slide the compressor once they have made point contact with the edge of the back of the vehicle.

[0063] The skids preferably are of a material conducive to sliding, such as an elastomeric material. While the skids preferably extend across nearly the entire bottom portion 8, in alternate embodiments, the skids may extend across less than nearly the entire length of the bottom portion. Moreover, in yet alternate embodiments, a skid may be made up of several pieces of material, which may be either continuous or not continuous, attached across the bottom portion 8 of the air reservoir.

[0064] Optionally, the air compressor may include secondary handles 62, disposed on the air reservoirs 4. The secondary handles 62 are helpful for lifting the compressor. Preferably, the secondary handles are rollbar-style handles as shown in Fig. 8, and may additionally serve to protect compressor components in the event the compressor tips over. However, in alternate embodiments, the secondary handles 62 may have other shapes as well, and may not provide both benefits depending on their shape. Preferably, each secondary handle is partially disposed on the top portion 23 of each air reservoir, although in other embodiments the secondary handles may be otherwise disposed. For example, at least one secondary handle may be disposed on each reservoir. Moreover, the secondary handles may be disposed on the outer side portion 24 of the air reservoir. Optionally,

grips 64 may be disposed on the handles to further facilitate the lifting of the compressor.

[0065] Preferably, the secondary handles will be offset from each other such that the handle 62a disposed on the second portion 20 is shorter than the handle 62b disposed on the first portion 18. In a preferred embodiment, the offset will be about 3.875 inches, although in other embodiments the offset may be more than or less than this number. However, handles that differ in height as a result of manufacturing tolerances, i.e., handles that are not meant to be offset, are not secondary handles. Manufacturing tolerances for such handles are most often less than 3/4 inch and usually are closer to 1/4 inch.

[0066] As a result, if each secondary handle is used to lift the air compressor, the second portion 20 is raised higher than the first portion 18, which usually will aid in the loading of the air compressor into the back of a truck or other vehicle. When the offset handles and skids are both used, loading the compressor (e.g., loading the compressor into the back of a pick-up truck) is particularly facilitated. Specifically, when lifted, the second portion 20 will be higher than the first portion 18. The operator may then easily rest the skids 60, which are on the bottom surface 25 of the second portion 20, on the truck bed and easily slide the compressor into the truck.

[0067] In another preferred embodiment, and referring to Figure 13, the secondary handles 62a, 62b are arranged relative to the compressor's center of gravity, depicted as CG. The secondary handles 62a, 62b may be disposed on the air reservoirs as described in the above embodiments. The first secondary handle 62a is located at horizontal distance Y1 from the center of gravity CG and second secondary handle 62b is located at a distance Y2 from the center of gravity CG. If the first distance Y1 is less than the second distance Y2, then a vertical height Z1 of the first secondary handle 62a should be greater than a vertical height Z2 of the second secondary handle 62b so that the secondary handles 62a, 62b are offset as described above. Arranging the secondary handles in such a fashion will provide the benefits associated with lifting the compressor described above.

[0068] The compressor shown in Figure 8 is particularly advantageous when it is used in a compressor having reservoirs with a capacity less than two and one-half gallons each, which capacity allows the compressor to be easily transported and lifted by a single user. In other embodiments, however, the air reservoirs may have a greater capacity. For example, in an alternate preferred embodiment the air reservoirs may have a capacity in a range of four to four and one-half gallons each, although the air reservoirs are not required to be limited to such a capacity.

[0069] The air compressor may include alternate embodiments without departing from the scope of the present invention. For example, rather than a single wheel assembly, a wheel assembly may be attached to the first portion of each air reservoir. Moreover, the handle assembly may have other shapes, including a unitary,

u-shaped handle, without departing from the scope of the invention. Also, referring to Figure 8, the handles 22 may rotate and/or telescope and/or lock, and may use the skids 60 as sleeves, in the manner described above with respect to Figure 7. Furthermore, the compressor components may be enclosed within a housing or shroud and the shroud may be located in the space between the air reservoirs.

[0070] It is therefore intended that the foregoing detailed description be regarded as illustrative rather than limiting, and that it be understood that it is the following claims, including all equivalents, that are intended to define the scope of this invention.

Claims

1. A portable compressor comprising:

a base;
first and second reservoirs spaced apart and located at the base;
a handle assembly attached with a first portion of the at least one of the first and second reservoirs and a wheel assembly attached with a second portion of the least one of the first and second reservoirs, wherein the wheel assembly includes at least one wheel; and
a plurality of air compressor components including a pump assembly and a motor assembly, wherein the plurality of the air compressor components is at least partially disposed on a top portion of the at least one of the first and second reservoirs;
a flywheel rotatably connected to said motor assembly, the flywheel extending between the first and second reservoirs and below the top portion of at least one of the first and second reservoirs; and
wherein at least one of the first and second reservoirs is angled with respect to a central axis defined by the orientation of the at least one wheel.

2. The portable compressor of claim 1, wherein the base includes a recess that passes partially through the base, and wherein the recess receives at least a portion of the flywheel.

3. The portable compressor of claim 1 or 2, wherein the handle assembly further comprises a first sleeve attached the first portion of at least one of the first and second reservoirs and a handle configured to slidably engage the sleeve.

4. The portable compressor of any one of claims 1 to 3, wherein the handle assembly includes a movable handle.

5. The portable compressor of any one of claims 1 to 4, wherein the handle assembly includes a rotating handle.

5 6. A wheelbarrow compressor comprising:

a first reservoir and a second reservoir;
a handle assembly attached with a first portion of at least one of the first and second reservoirs and a wheel assembly attached with a second portion of at least one of the first and second reservoirs;
at least one first secondary handle attached to one of a top portion and a side portion of at least one of the first and second reservoirs;
at least one second secondary handle attached to one of a top portion and a side portion of at least one of the first and second reservoirs; and
wherein one of the first and second secondary handles is located closer to the second portion of the first and second reservoirs and wherein the first and second secondary handles are offset from each other such that the height of the first or second secondary handle located closer to the second portion of the first and second reservoirs is less than the height of the other first or second secondary handle, and wherein the handle assembly is not either of the first and second secondary handles.

7. The wheelbarrow compressor of claim 6, wherein the first and second secondary handles are attached to the top portion of each of the first and second reservoirs.

8. A wheelbarrow compressor comprising:

a first reservoir and a second reservoir;
a handle assembly attached with a first portion of at least one of the first and second reservoirs and a wheel assembly attached with a second portion of at least one of the first and second reservoirs;
a first secondary handle attached to one of a top portion and a side portion of the first reservoir and to one of a top portion and a side portion of the second reservoir;
a second secondary handle attached to one of a top portion and a side portion of the first reservoir and to one of a top portion and a side portion of the second reservoir; and
wherein one of the first and second secondary handles is located at the second portion of the first and second reservoirs and the other of the first and second secondary handles is located at the first portion of the first and second reservoirs, and wherein the first and second secondary handles are offset from each other such that

the height of the first or second secondary handle located at the second portion of the first and second reservoirs is less than the height of the other first or second secondary handle located at the first portion of the first and second reservoirs, and wherein the handle assembly is not either of the first and second secondary handles. 5

9. A wheelbarrow compressor comprising: 10

a first reservoir and a second reservoir;
a handle assembly attached with a first portion of at least one of the first and second reservoirs and a wheel assembly attached with a second portion of at least one of the first and second reservoirs; 15
at least one first secondary handle attached to one of a top portion and a side portion of at least one of the first and second reservoirs;
at least one second secondary handle attached to one of a top portion and a side portion of at least one of the first and second reservoirs; 20
wherein one of the first and second secondary handles is located at a horizontal distance that is closer to a center of gravity than the other of the first and second secondary handles, and 25
wherein the first and second secondary handles are offset from each other such that a vertical height of the first or second secondary handle that is closer to the center of gravity is greater than a vertical height of the other of the first and second secondary handles, and wherein the handle assembly is not either of the first and second secondary handles. 30
35

40

45

50

55

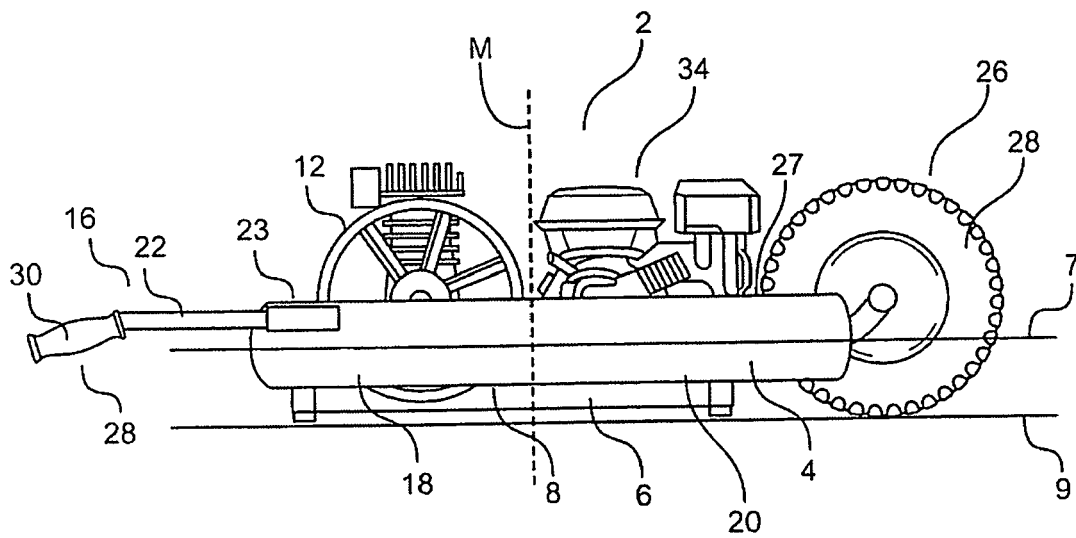


Fig.1

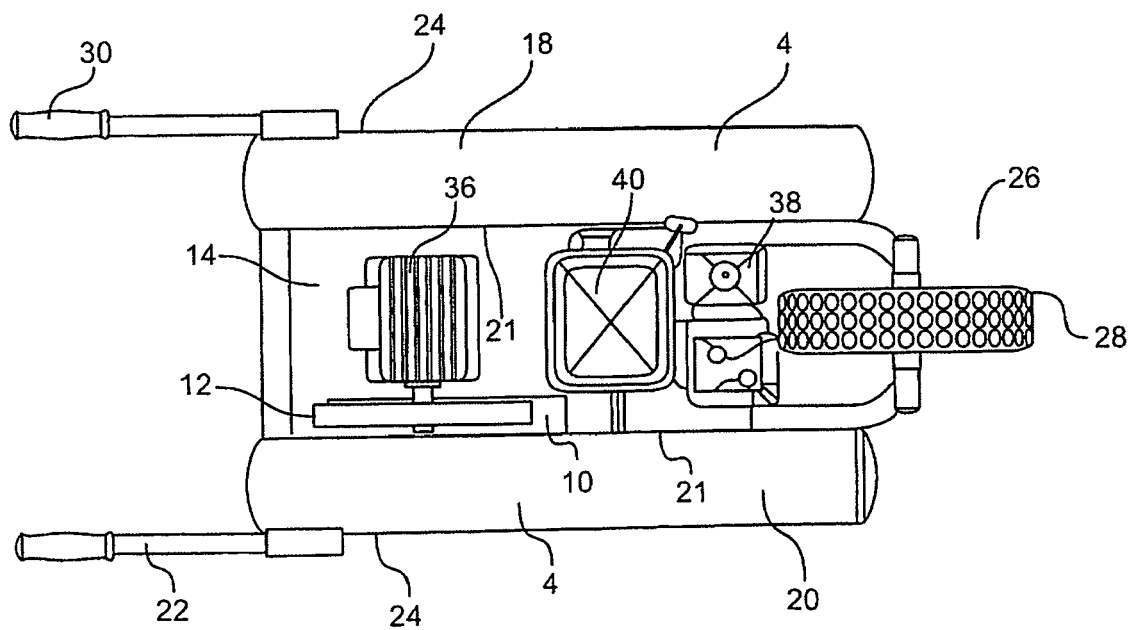


Fig.2

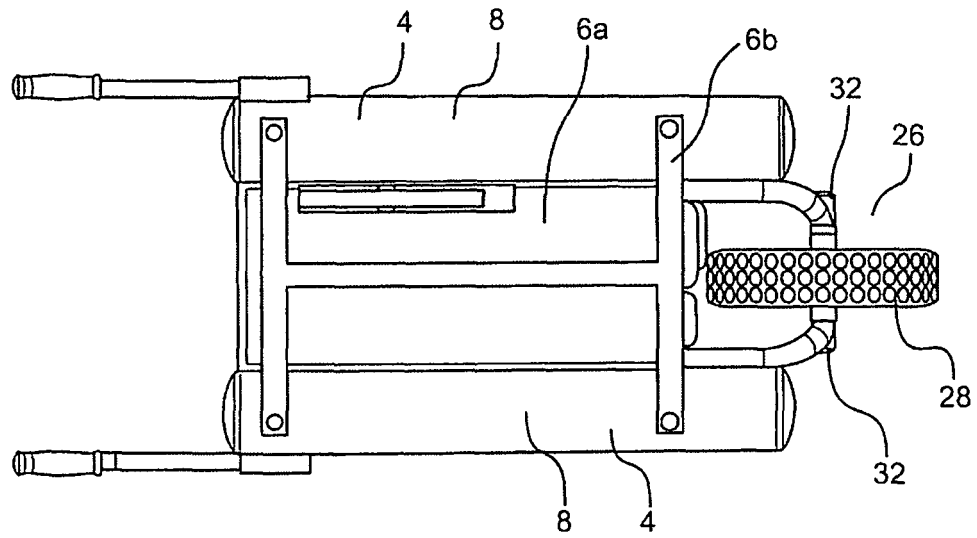


Fig. 3

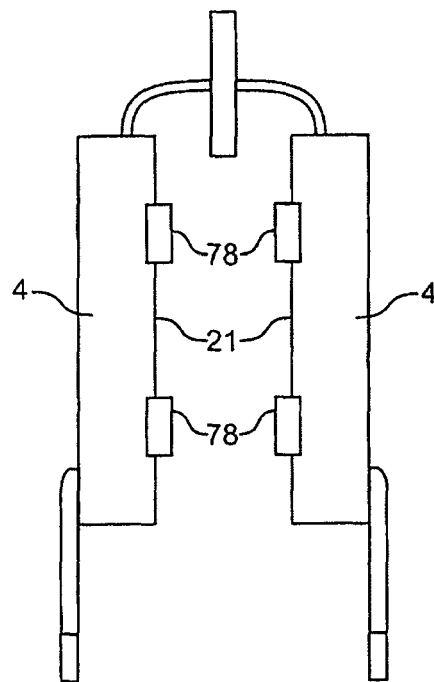


Fig. 3A

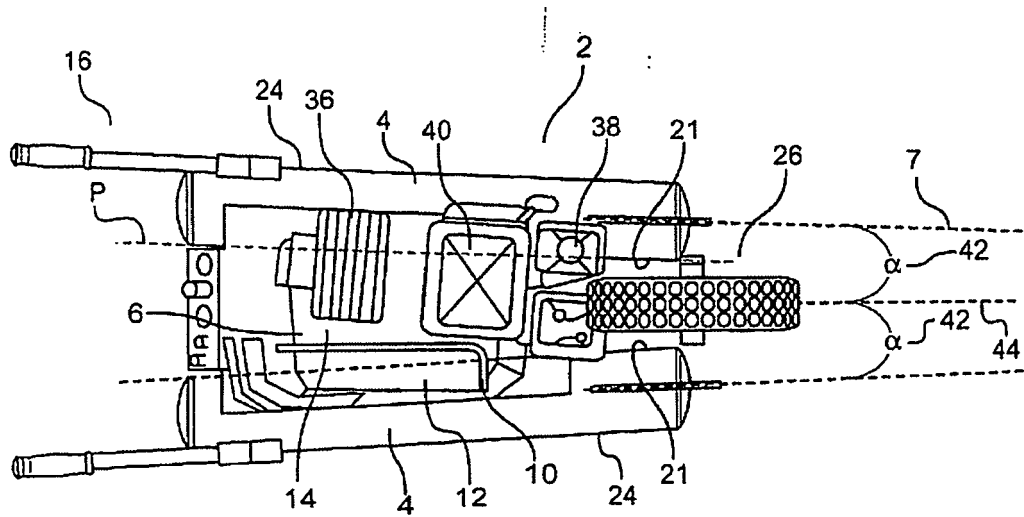


Fig. 4

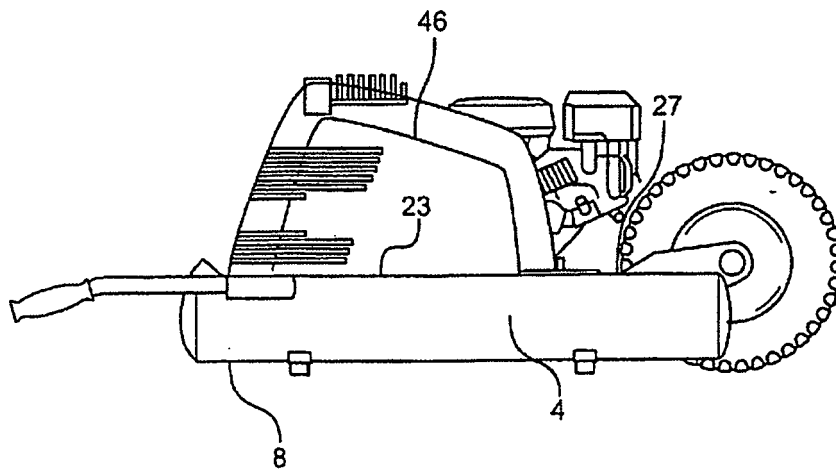


Fig. 5

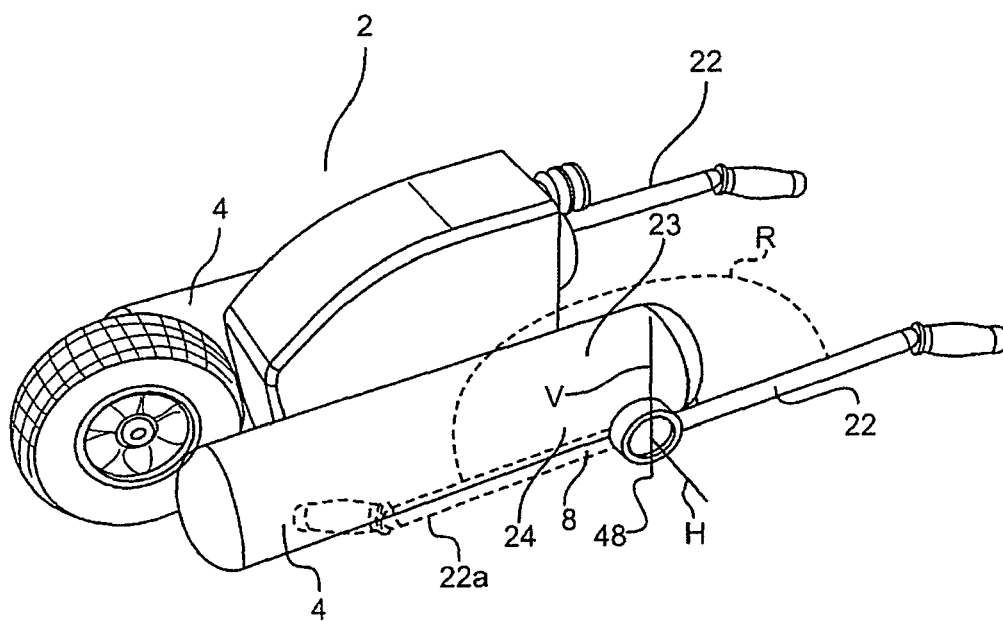


Fig.6

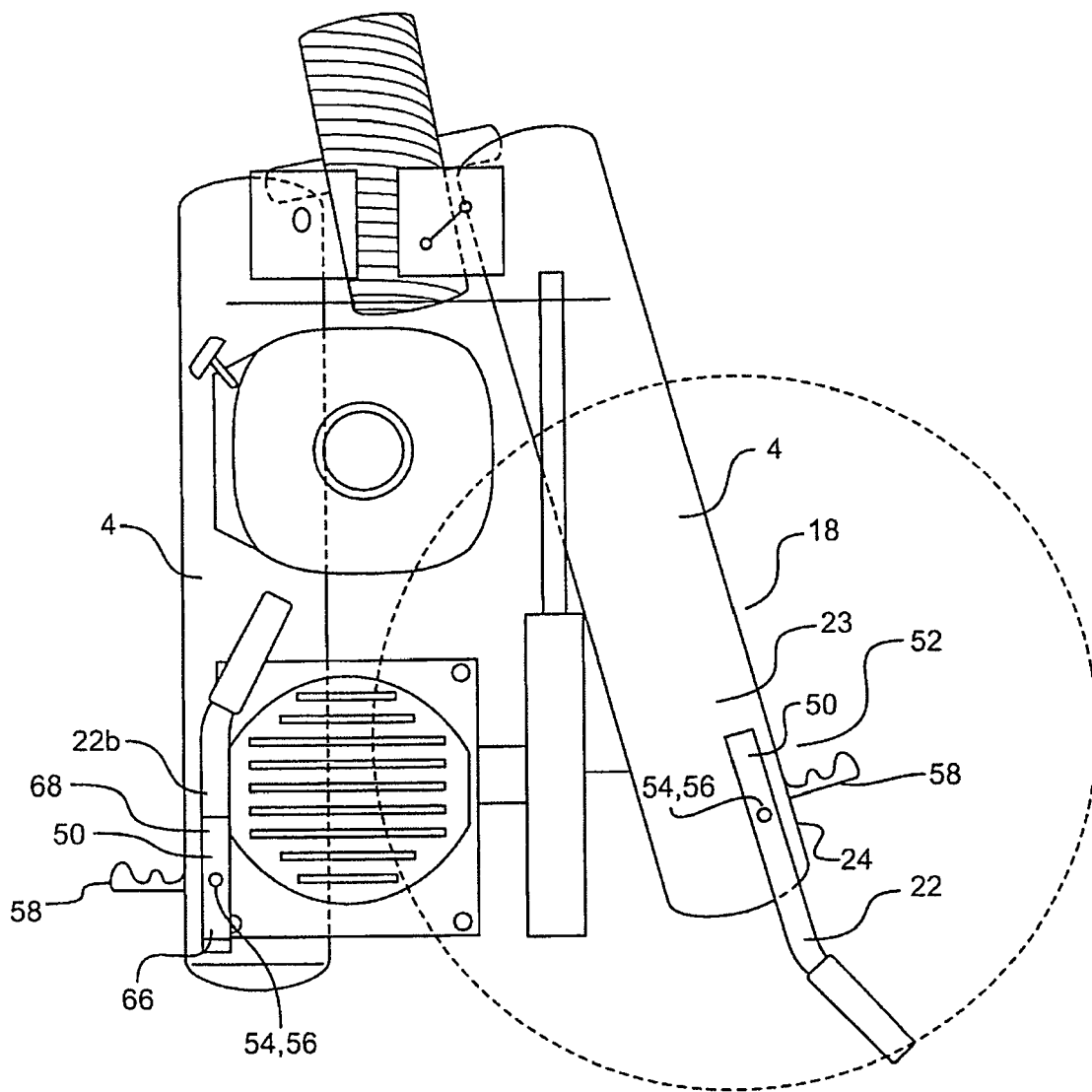


Fig. 7

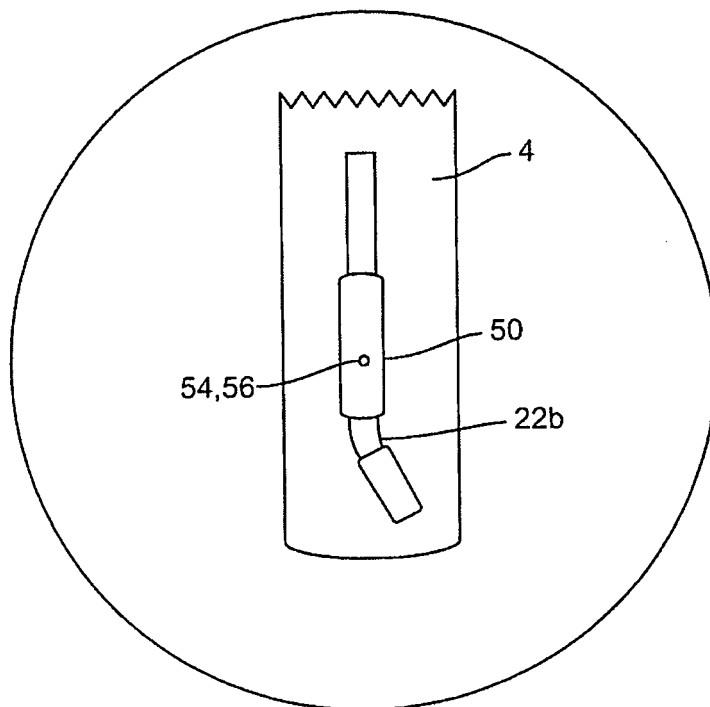


Fig.7a

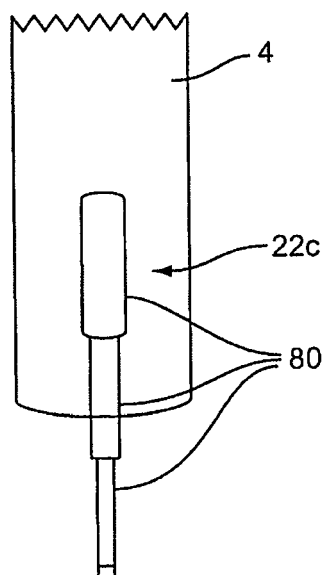
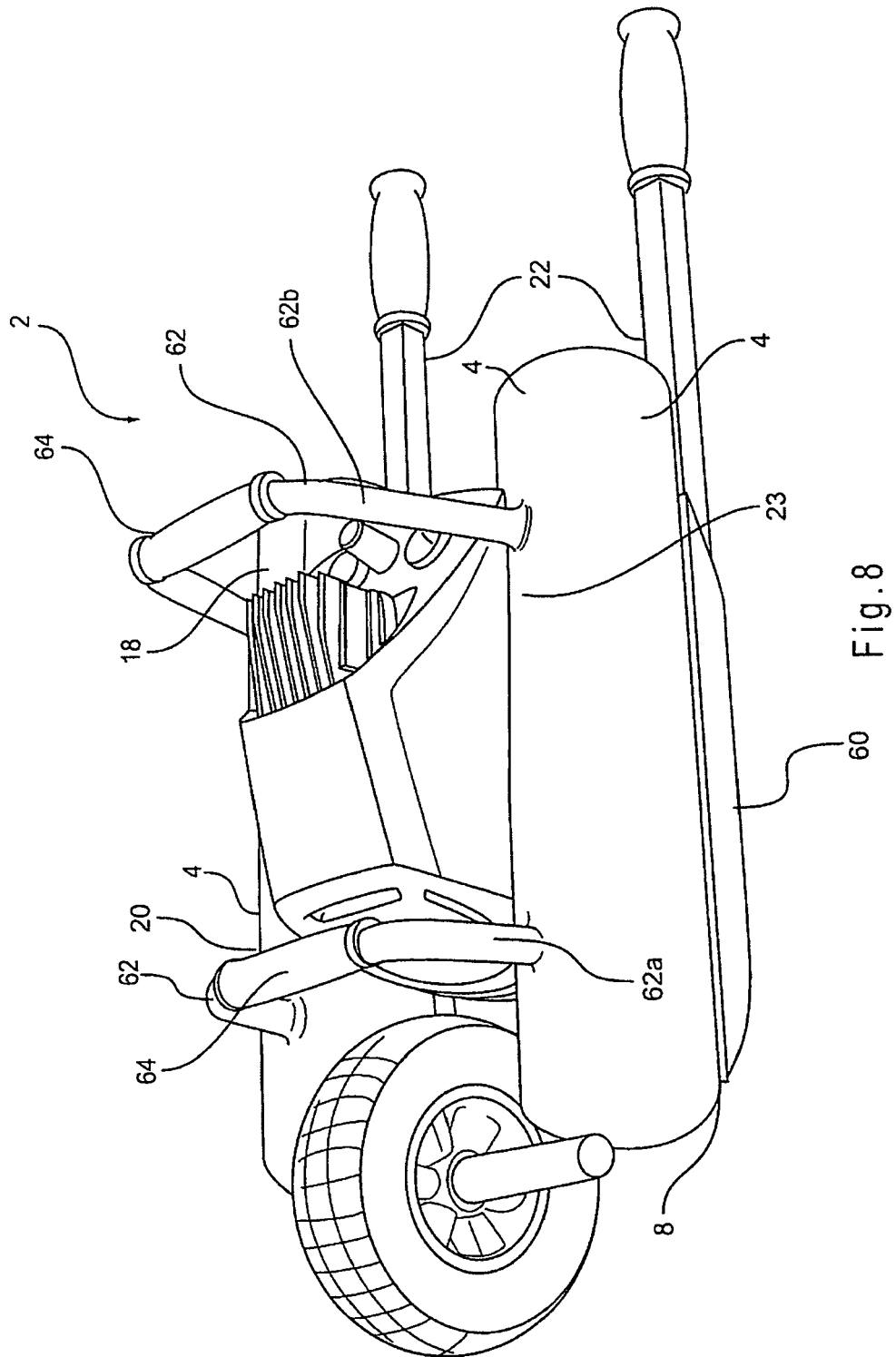


Fig.7b



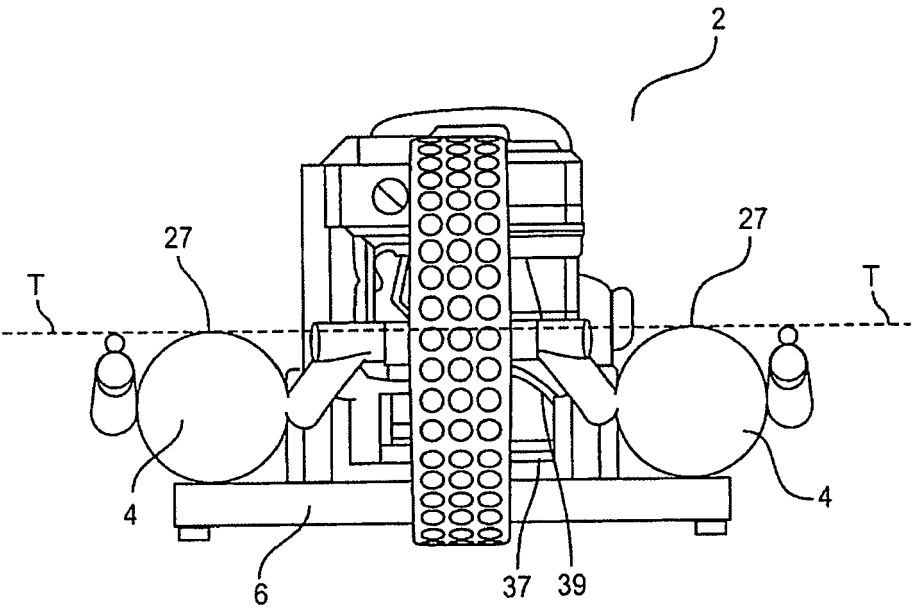


Fig.9

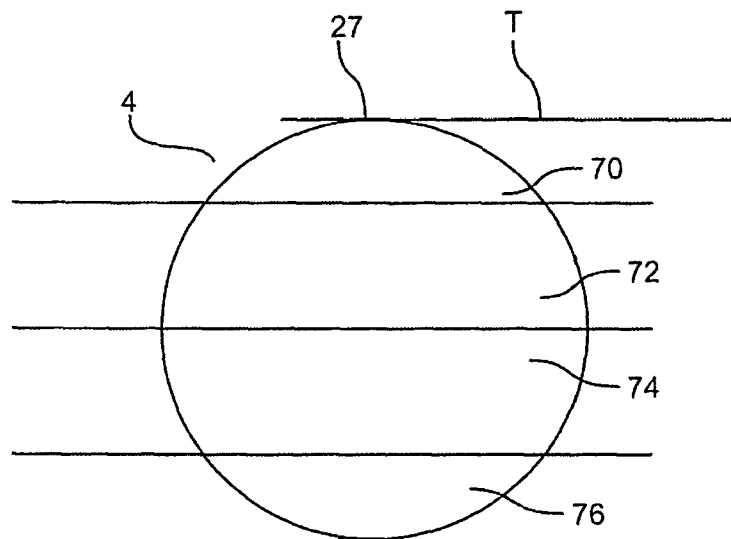


Fig. 10

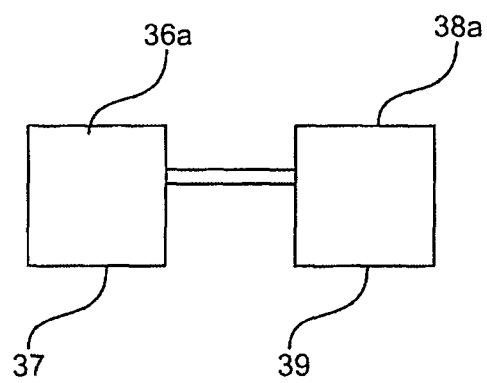


Fig. 11

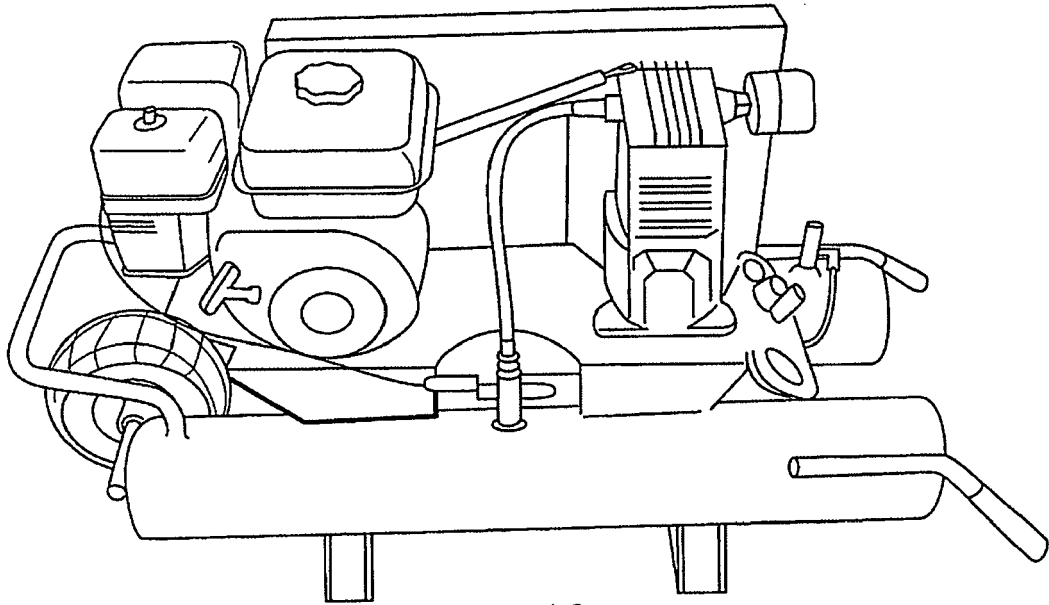


Fig. 12
Prior Art

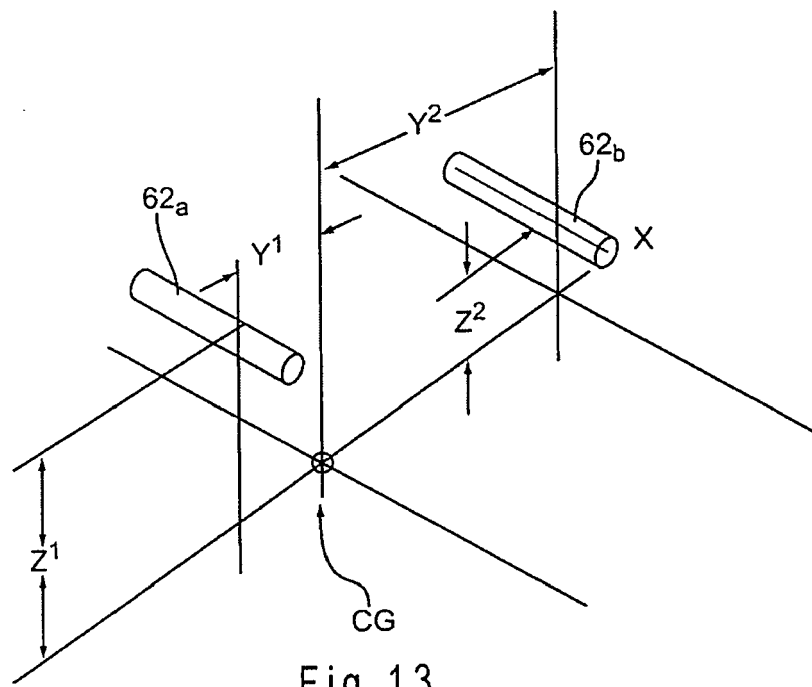


Fig. 13



EUROPEAN SEARCH REPORT

Application Number
EP 10 00 6906

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 532 990 B1 (DEVILBISS AIR POWER COMPANY; WOOD, M.W. ET AL. [US]) 18 March 2003 (2003-03-18) * column 1, line 13 - column 2, line 10 * * column 6, line 12 - line 46 * * figures 3,12 *	6-9	INV. F04B35/06 F04B41/02
A	US 2004/213679 A1 (R. CONRADER COMPANY; CORNWELL, J.P. [US]) 28 October 2004 (2004-10-28) * paragraph [0085] - paragraph [0086] * * figure 1 *	1-5	
A	US 2003/154703 A1 (LAWRENCE, ROBERT C. [US]) 21 August 2003 (2003-08-21) * paragraph [0032] - paragraph [0040] * * figure 2 *	1-5	
A	US 6 468 048 B1 (DEVILBISS AIR POWER COMPANY; BURKHOLDER ROBERT F [US] ET AL) 22 October 2002 (2002-10-22) * figures 2-5 * * column 1, line 13 - column 2, line 15 * * column 3, line 11 - column 4, line 26 *	6-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			F04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 February 2011	Examiner Gnächtel, Frank
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

1
EPO FORM 1503 03/02 (P04C01)



Application Number

EP 10 00 6906

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☒ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 10 00 6906

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-5

A wheelbarrow compressor having a first reservoir and a second reservoir, a base, a wheel assembly, a handle assembly, a pump and a motor, wherein a flywheel is rotatably connected to said motor in a manner to extend between said reservoirs and below the top portion of one of said reservoirs, and wherein at least one of said reservoirs is angled with respect to a central axis defined by the wheel.

2. claims: 6-9

A wheelbarrow compressor having a first reservoir and a second reservoir, a wheel assembly, and a handle assembly, wherein a first secondary handle is attached to at least one of the first and second reservoirs, and wherein a second secondary handle is attached to at least one of the first and second reservoirs, the first and second secondary handles differing from said handle assembly, the first and second secondary handles being offset from each other, and the first and second secondary handles having different heights from each other.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 00 6906

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-02-2011

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6532990	B1	18-03-2003	NONE	
US 2004213679	A1	28-10-2004	NONE	
US 2003154703	A1	21-08-2003	NONE	
US 6468048	B1	22-10-2002	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 5087824 A [0002]
- US 20060245937 A [0005]