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Havlock(10) **Pub. No.: US 2009/0184007 A1**(43) **Pub. Date: Jul. 23, 2009**(54) **GAS CYLINDERS AND TANKS****Related U.S. Application Data**(75) Inventor: **Christopher Havlock**, Kalamazoo,
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B65B 3/00 (2006.01)(52) **U.S. Cl.** **206/6**(57) **ABSTRACT**(73) Assignee: **Flare Fittings Incorporated**,
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The cylinder includes a hollow body of resilient material having a lower supporting base, a sidewall extending upwardly from the lower base, and an upper portion extending upwardly from the sidewall. The upper portion includes at least one opening therein. The cylinder also includes an integral grip portion that is applied as a coating on the exterior of the cylinder. The grip portion improves stability when handling or transporting the cylinder.

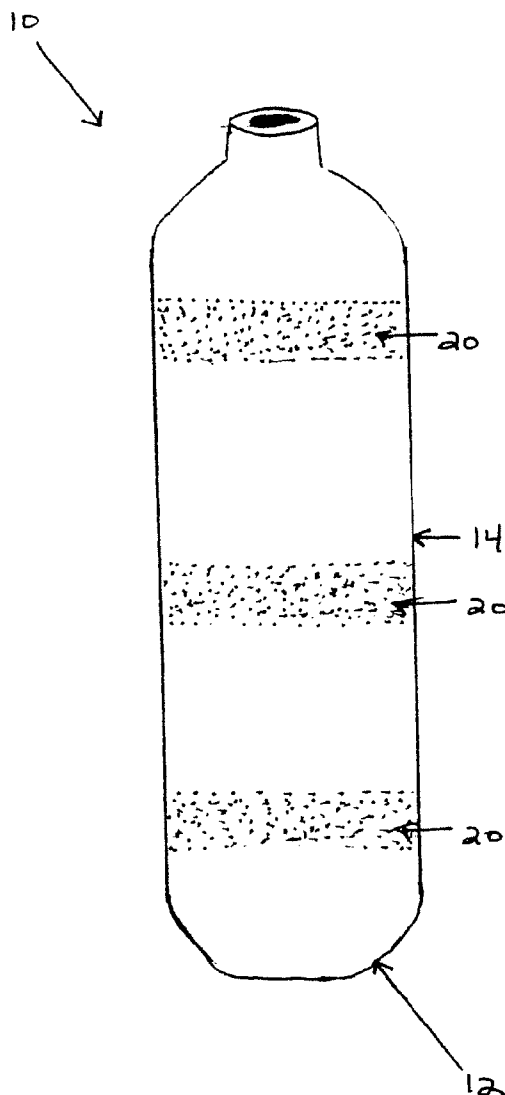
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Figure 1

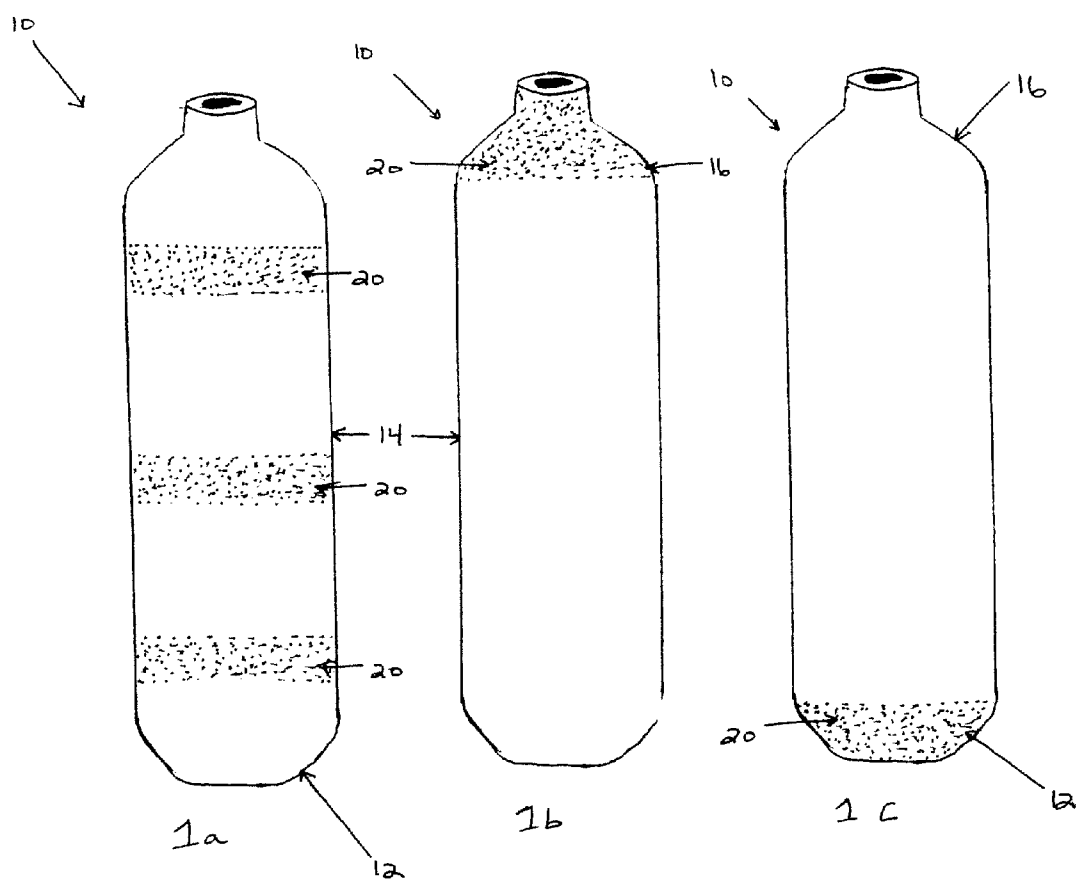


Figure 2

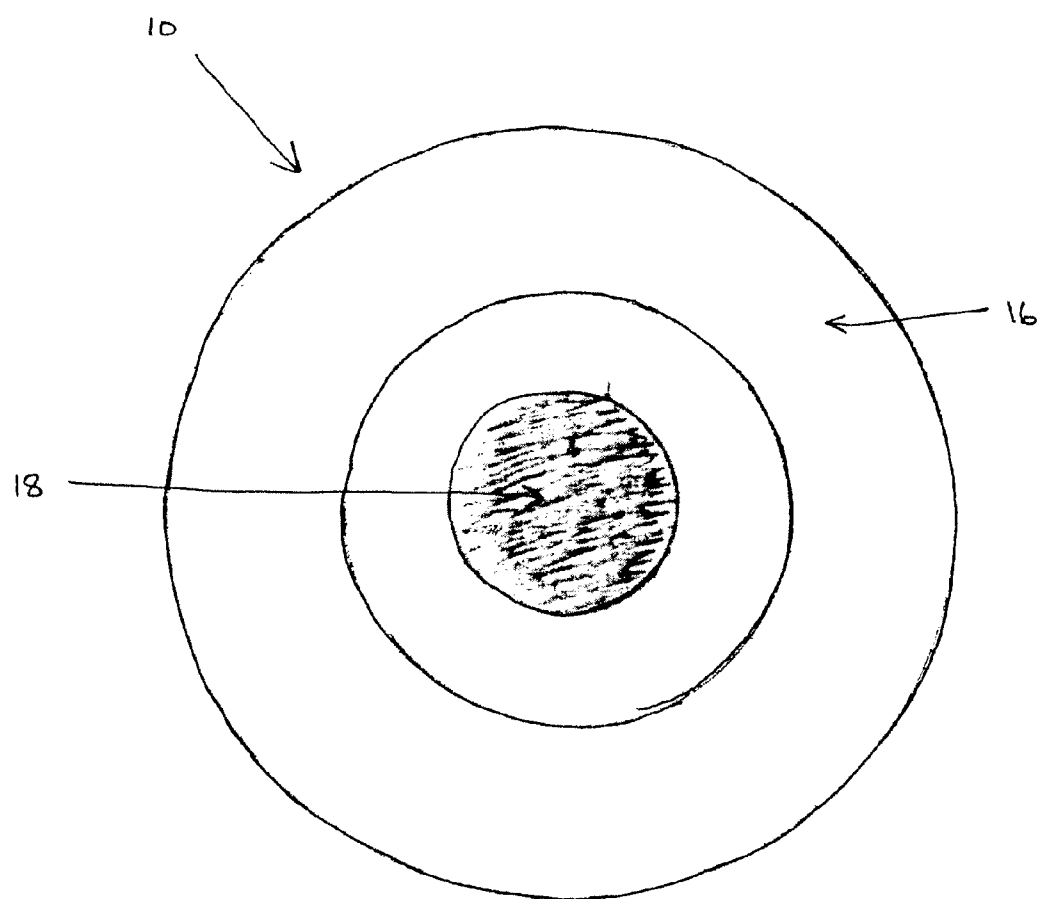


Figure 3

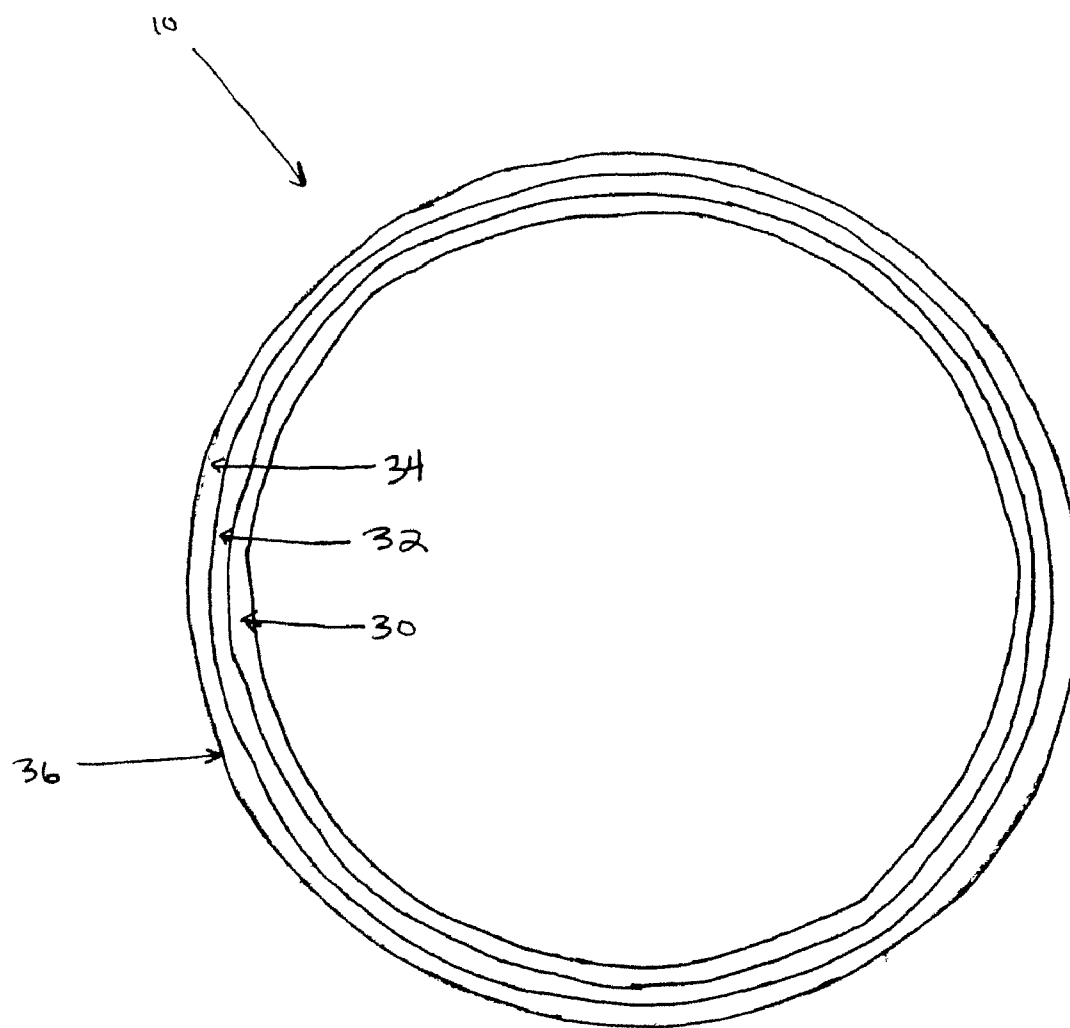
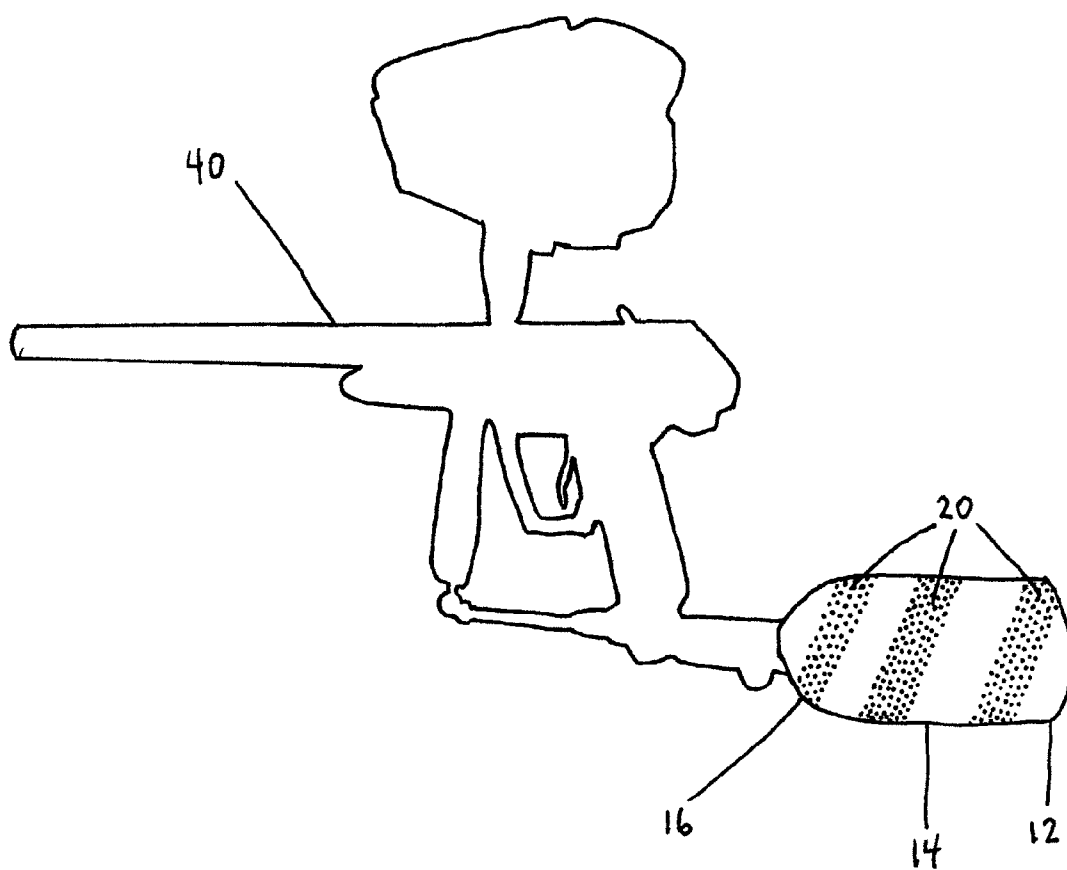


Figure 4



GAS CYLINDERS AND TANKS

RELATED APPLICATION DATA

[0001] This application asserts priority from U.S. application 61/021,598, filed Jan. 16, 2008, which is incorporated herein by reference.

BACKGROUND

[0002] The present disclosure generally relates to the field of the manufacturing gas cylinders, and more specifically to methods and apparatus for improved gas cylinders and canisters including anti-slip coatings and compositions.

[0003] Gas cylinders, especially cylinders in larger or portable sizes, are frequently desired to be moved and carried in safe and controllable means. For example, it may be desirable to move and exchange gas cylinders for refilling, or it may be desirable to transport cylinders for use in paintball markers, medical, emergency, fire or automobile applications.

[0004] In all these applications, it is desirable to provide a cylinder that is readily suitable for safe and controlled handling. Currently, gas cylinders are made from a variety of resilient materials that provide structural integrity but lack the means for gripping and handling them in safe ways. Many manufacturers have tried to overcome these limitations by producing cylinders with integral handles, but these embodiments are not compatible with current storage and handling requirements for these particular applications.

[0005] In addition, cylinders that are modified to overcome the limitations with after-market technologies often suffer from compromised integrity.

[0006] Therefore, it is desirable to manufacture cylinders that overcome the stated limitation and maintain good wall structure suitable for filling without wall bulging, with good wall rigidity, and most importantly meeting regulatory standards for their intended application.

[0007] Accordingly, it is a principal objective of the present disclosure to provide an improved cylinder suitable for improved handling and portability for different applications.

[0008] It is a further objective of the present disclosure to provide a cylinder as aforesaid with exterior surfaces that are anti-slip coatings that aid in their handling.

[0009] It is a further objective of the present disclosure to provide a cylinder as aforesaid with a good wall structure suitable for pressurized gas filling and meeting regulatory requirements.

[0010] Further objects and advantages of the present disclosure will appear herein below.

BRIEF SUMMARY

[0011] In accordance with the present disclosure, the foregoing objects and advantages are readily obtained.

[0012] The tank of the cylinder of the present disclosure is made of metal alloys or composite materials and includes: a hollow body of material having a lower supporting base, a sidewall extending upwardly from the lower base, an upper portion extending upwardly from the sidewall, and a grip portion on either the upper portion, supporting base, or side wall as described herein. The upper portion, which includes at least one opening therein, is defined by a raised area and a recessed area adjacent to the raised area to allow a pressure regulator to be fixedly attached and sealed thereto.

[0013] The grip portion is located on the exterior of the cylinder where handling and contact with the cylinder occurs

most frequently. The grip portion may consist of an exterior coating and includes a clear-coat epoxy that can be stamped, roughed, or mixed with rubber, sand, or other materials that would produce greater frictional resistance on the surface of the cylinder. The grip portion may extend outwardly from the sidewall, upper portion, or lower supporting base and may cover the entire area or be confined to partial areas as mentioned above. In general, the cylinder of the present disclosure can be of any size or shape. In some embodiments, the cylinder is a hand held cylinder used in medical applications, such as a portable oxygen cylinder. In still other embodiments, the cylinder is a portable cylinder used in sporting applications, such as a compressed air cylinder used in paintball applications.

[0014] Other features and advantages of the present disclosure appear herein below.

BRIEF DESCRIPTION OF THE FIGURES

[0015] The present disclosure will be more readily understandable from the accompanying drawings, which are not meant to limit the scope of the invention and are merely provided to illustrate various aspects of the grippable cylinders.

[0016] FIG. 1 is a side view illustrating three embodiments of a cylinder showing the upper portion, sidewall portion, lower base portion, and grip portion;

[0017] FIG. 2 is a top plan view of cylinder 1c of FIG. 1;

[0018] FIG. 3 is a bottom plan view of a cross section of cylinder 1a of FIG. 1;

[0019] FIG. 4 is a side view of an alternate embodiment of a cylinder showing the upper portion, sidewall portion, lower support base, and grip portion as used in connection with a paintball marker.

DETAILED DESCRIPTION

[0020] FIGS. 1-4 show cylinder 10 with a lower supporting base 12, sidewalls 14 extending upwardly from the lower base 12, and upper portion 16 extending upwardly from the sidewalls. FIG. 3 shows a cylinder 10 made with an aluminum liner 30 surrounded by a carbon composite 32, wrapped with fiber glass 34, and coated with polyurethane epoxy 36 for added strength and support. Manufacturing and production of gas cylinders without the improvements described herein are readily known to the skilled artisan. The present disclosure includes cylinder 10 shown in FIGS. 1-4 and variations thereof including a grippable portion applied during manufacturing.

[0021] In the embodiment of FIG. 2, the upper portion 16 includes a single opening 18 located on the top side of upper portion 16. The opening 18 allows a pressure regulator to be fixedly attached to the cylinder 10. However, if desired, one could provide more than one opening, as for example, a second opening on the lower supporting portion 12.

[0022] As shown in FIG. 1, cylinder 10 includes opposed, relatively larger sidewalls 14 sections. The cylinder 10 has an essentially circular configuration with the sidewall sections joined to lower base 12 and upper portion 16.

[0023] As shown in FIG. 1, the sidewalls 14 include at least one and preferably more than one grip portions 20. Naturally, other sidewall constructions can be used if desired in addition to the exemplificative embodiment shown. In the embodiment of FIG. 1, three distinguishing embodiments of these grip portions are shown. The exact number and location of

grip portions **20** will depend on the size, shape, use and contents of the cylinder. In the embodiment of FIGS. **1-4**, the grip portions **20** may include a clear-coat polyurethane epoxy that is air sprayed on the cylinder **10** surface. Then sand is applied to the coated cylinder surface in particular locations prior to curing or drying the epoxide to produce greater frictional resistance for the cylinder **10**. The clear-coat polyurethane epoxy and sand mixture is allowed to air dry to form a resilient and non-slip coating of the grip portion **20** on the cylinder **10**. However, other embodiments include grip portions that comprise of an exterior coating made from other epoxy materials including acrylic, cyanoacrylate, and other common chemistries that can be stamped, roughed, or mixed with sand, crumbled rubber, or other materials that would produce greater frictional resistance on the surface of the cylinder. The depth and width of the grip portions **20** will also depend on the size and use of the cylinder.

[0024] It is a particularly advantageous feature that the cylinder includes a grip portion **20** on the upper portion **16** or lower supporting base **18** as shown in FIGS. **1b** and **1c**. This provides an effective means for stabilizing the cylinder when one dispenses contents therefrom, or when the cylinder is moved from one location to another. This is particularly useful in the larger size cylinders used for medical and industrial applications.

[0025] Thus, one can hold the cylinder by the grip portions **20** with one hand and stabilize the cylinder while dispensing contents or transporting to other locations.

[0026] The alternate embodiment of FIG. **4** shows a cylinder **10** attached to a paintball marker **40** with a lower supporting base **12**, sidewalls **14** extending upwardly from the lower base **12**, upper portion **16** extending upwardly from the sidewalls, and grip portions **20** that are circumferentially and spirally applied to the exterior of the side walls **14**.

[0027] The essential difference between embodiments in FIG. **1-4** lies in the location of grip portions. However, it is contemplated that the grip portion **20** covers the whole exterior of the cylinder **10** in a continuously and circumferentially applied coating.

[0028] Thus, the cylinder of the present disclosure offers considerable advantages. The cylinder of the present disclosure is quite convenient and compatible with storage requirements and offer the benefits of safe handling and transportation by various individuals. Grip positioning permits easy maneuvering of the cylinder. The cylinder is not compromised in its wall construction and maintains its integrity. The present disclosure eliminates the use of undesirable aftermarket modifications to the cylinders. The cylinder and grip portions are manufactured in one continuous process that can be certified by regulatory agencies.

[0029] A method of forming a grippable cylinder may include providing a gas cylinder comprising a hollow body having a lower supporting base, a sidewall extending upwardly from the lower supporting base, an upper portion extending upwardly from the sidewall, the upper portion including at least one opening therein; coating a portion of the gas cylinder with an epoxy residue; and applying a frictional enhancing agent to at least a portion of the epoxy residue. The frictional enhancing agent can be applied to the side wall, the upper portion, the supporting base or a combination thereof. The epoxy residue and the frictional enhancing agent can be applied prior to cylinder pressure and integrity testing.

[0030] In sum, the grip portion is particularly advantageous and provides stability in handling cylinders.

[0031] It is to be understood that the invention is not limited to the illustrations described and shown herein, which are deemed to be merely illustrative of the best modes of carrying out the invention, and which are susceptible of modification of form, size, arrangement of parts and details of operation. The invention rather is intended to encompass all such modifications which are within its spirit and scope as defined by the claims.

What is claimed is:

1. A gas cylinder comprising:
 - a hollow body of resilient material having a lower supporting base;
 - a sidewall extending upwardly from the lower supporting base;
 - an upper portion extending upwardly from the sidewall, the upper portion including at least one opening therein; and
 - an exteriorly applied grip portion.
2. The cylinder of claim 1, wherein the grip portion circumferentially extends over the side wall, the upper portion, or the supporting base.
3. The cylinder of claim 1, wherein the grip portion comprises epoxy resin.
4. The cylinder of claim 1, wherein the grip portion comprises polyurethane resin.
5. The cylinder of claim 3, wherein the resin is mixed with sand.
6. The cylinder of claim 4, wherein the resin is mixed with sand.
7. The cylinder of claim 3, wherein the resin is mixed with crumbled rubber.
8. The cylinder of claim 4, wherein the resin is mixed with crumbled rubber.
9. The cylinder of claim 1, wherein the grip portion is applied over an entire exterior surface of the cylinder.
10. The cylinder of claim 1, wherein the cylinder is a molded metal cylinder.
11. The cylinder of claim 1, wherein the cylinder comprises of an aluminum liner surrounded by a carbon composite.
12. The cylinder of claim 11, wherein the carbon composite is coated in fiber glass.
13. The cylinder of claim 1 wherein the exteriorly applied grip portion is applied circumferentially and spirally applied to a portion of the side wall and the grip portion is applied to a portion of the lower supporting base.
14. A method of forming a grippable cylinder, comprising:
 - providing a gas cylinder comprising a hollow body having a lower supporting base, a sidewall extending upwardly from the lower supporting base, an upper portion extending upwardly from the sidewall, the upper portion including at least one opening therein;
 - coating a portion of the gas cylinder with an epoxy residue; and
 - applying a frictional enhancing agent to at least a portion of the epoxy residue.
15. The method of claim 14, wherein the epoxy residue and the frictional enhancing agent are applied prior to cylinder pressure and integrity testing.
16. The method of claim 14, wherein the frictional enhancing agent is applied to the side wall, the upper portion, or the supporting base.
17. The method of claim 14, wherein the epoxy residue includes polyurethane.

18. The method of claim **14**, wherein the frictional enhancing agent includes sand.

19. The method of claim **14**, wherein the frictional enhancing agent comprises crumbled rubber.

20. The method of claim **14**, wherein the frictional enhancing agent is applied over an entire surface of the cylinder.

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