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(54) **FIREARM SUPPORTS AND GAS-ASSISTED METHODS OF FILLING FIREARM SUPPORTS**

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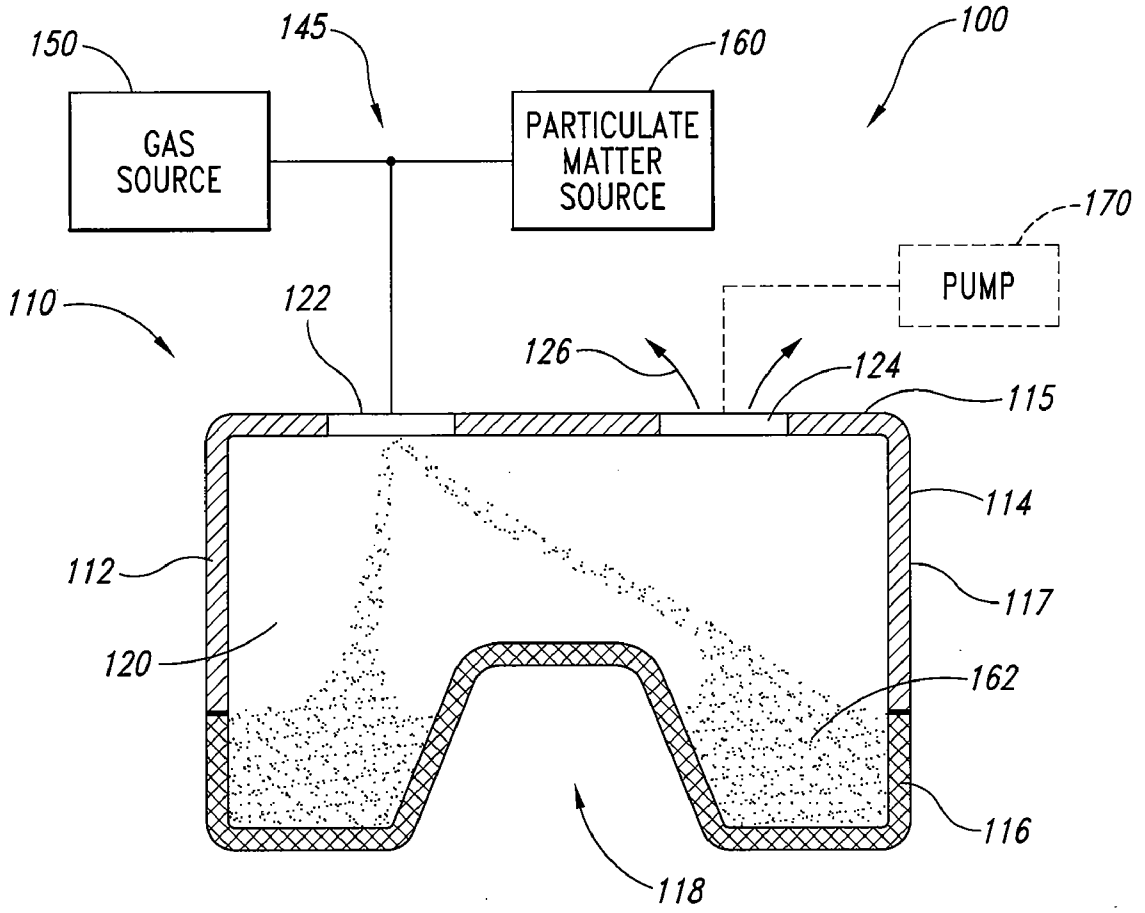
(57) **ABSTRACT**

A firearm support configured for gas-assisted filling with particulate matter having an enclosure with a cavity, first and second portions, and particulate matter disposed in the cavity. The enclosure has an inlet through which the particulate matter is introduced in the cavity during a gas-assisted filling process, and an outlet configured to generally retain the particulate matter and allow gas to escape from the cavity during the gas-assisted filling process. Alternatively, the enclosure includes a vent having a porosity configured to permit gas to escape from the cavity during the filling process.



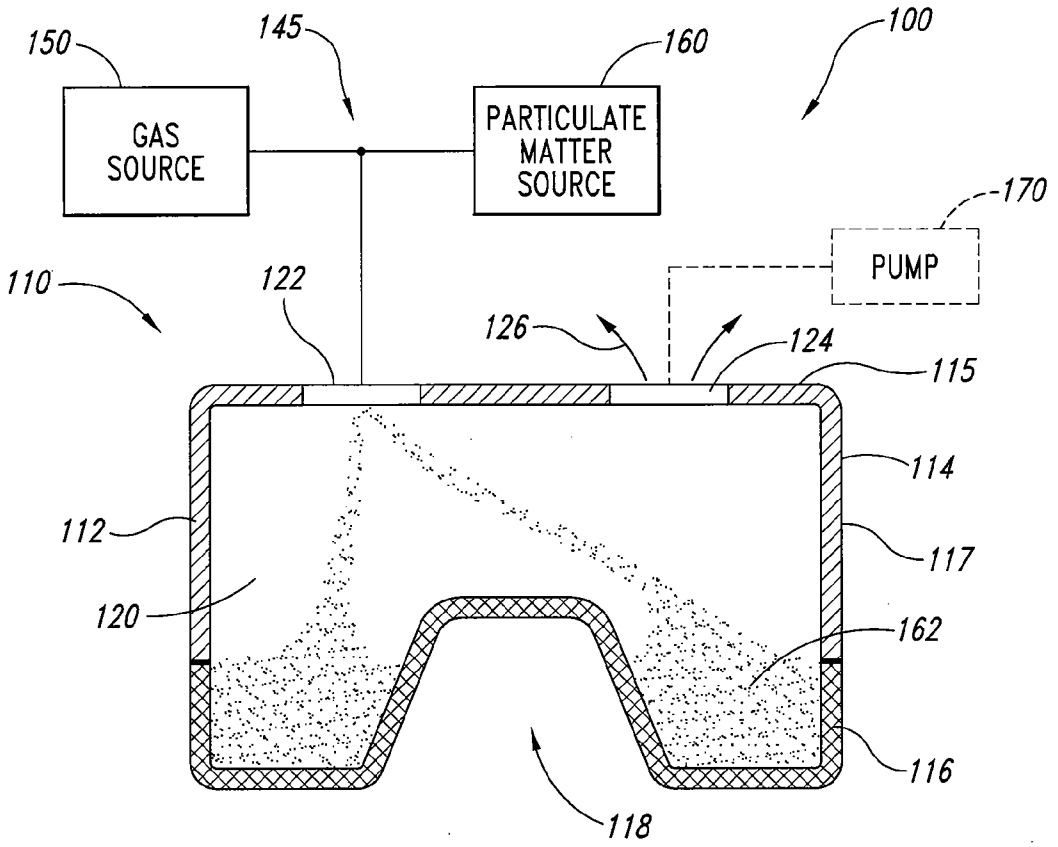

150
145
160
100
GAS SOURCE
PARTICULATE MATTER SOURCE
170
PUMP
110
122
126
124
115
114
112
117
120
162
116
118

Fig. 1

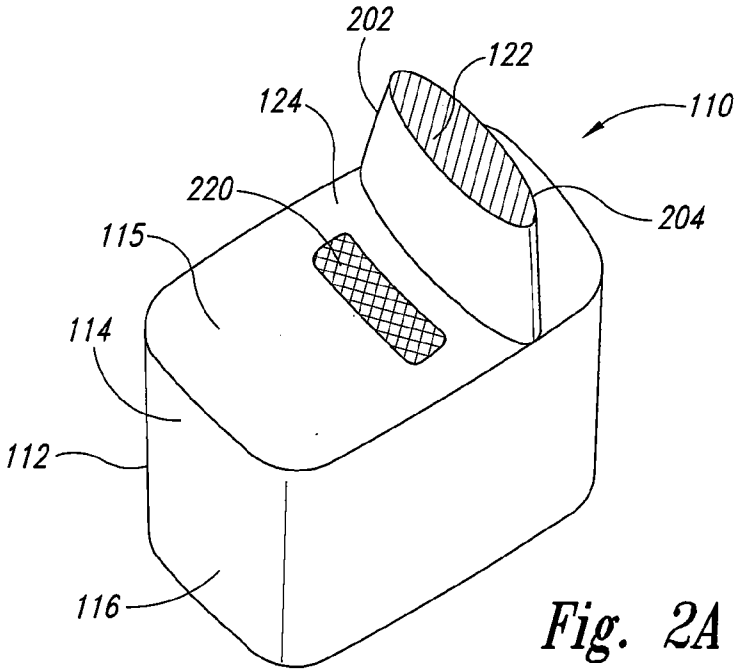

202
122
124
110
220
204
115
114
112
116

Fig. 2A

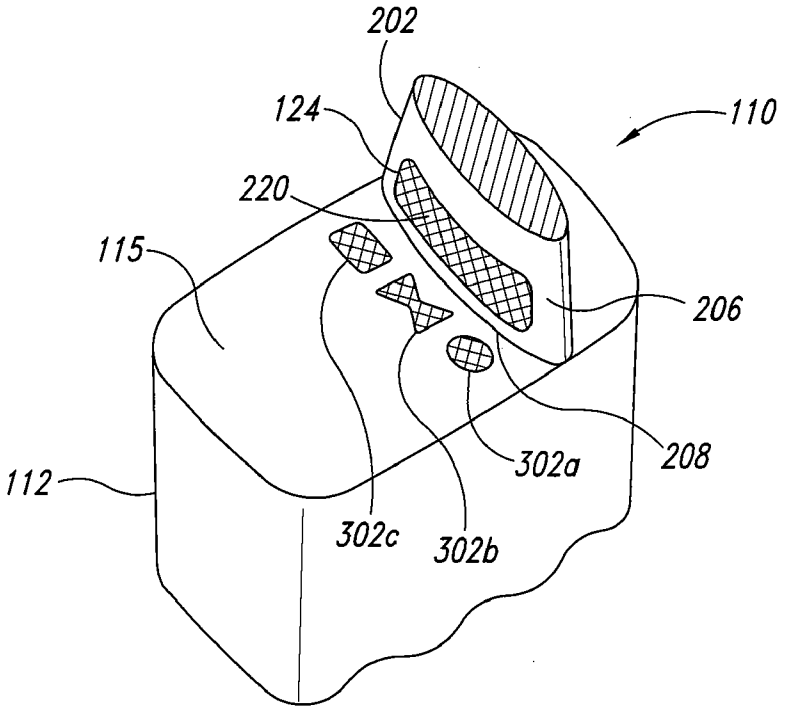

202
124
110
220
115
206
208
302a
112
302c
302b

Fig. 2B

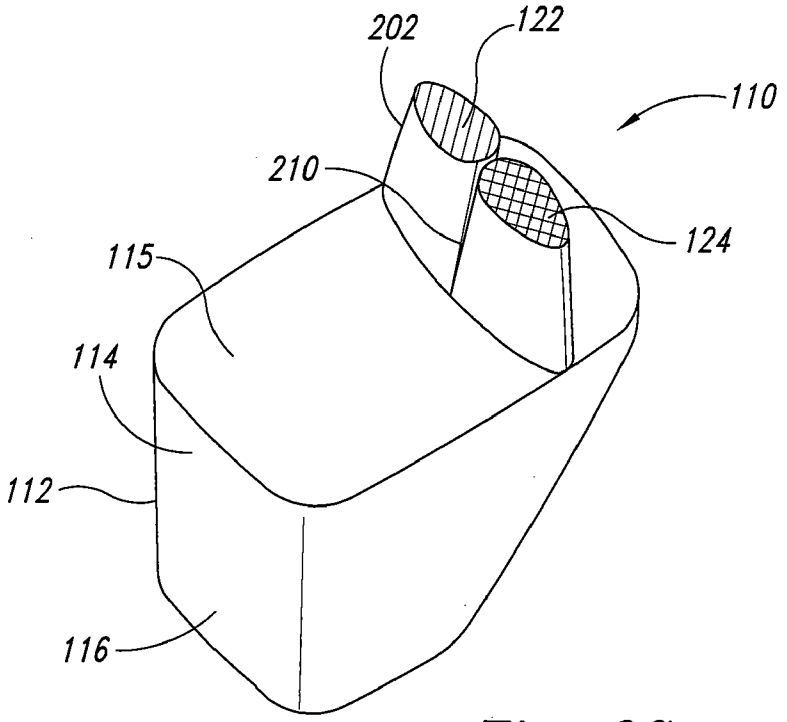

202
122
110
210
124
115
114
112
116

Fig. 2C

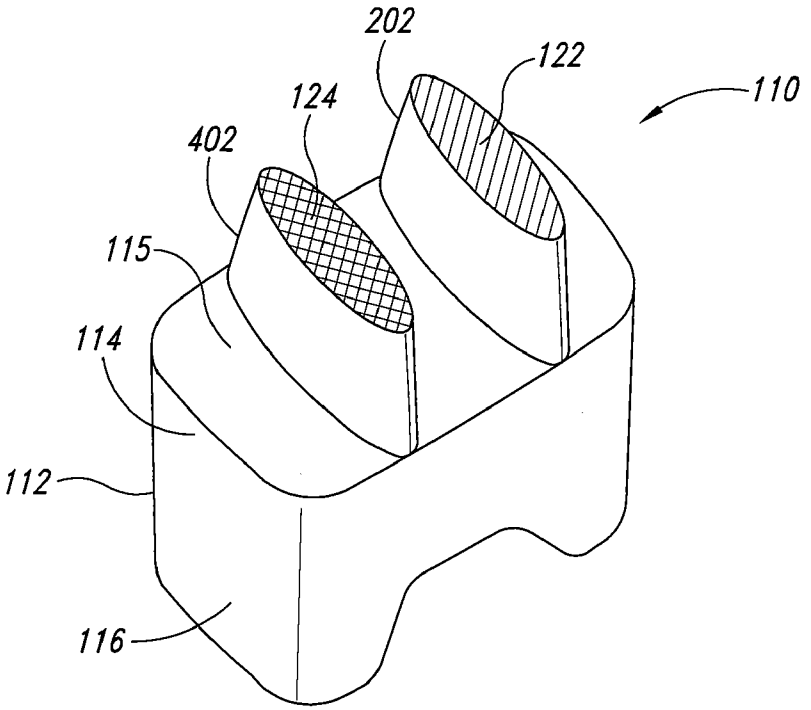

202
122
110
124
402
115
114
112
116

Fig. 2D

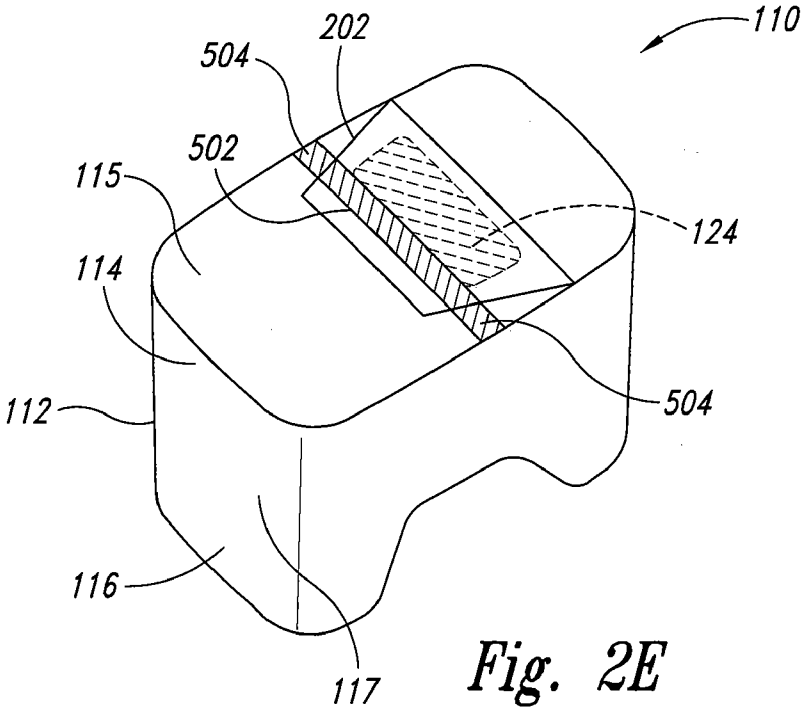

110
202
504
502
115
124
114
112
504
116
117

Fig. 2E

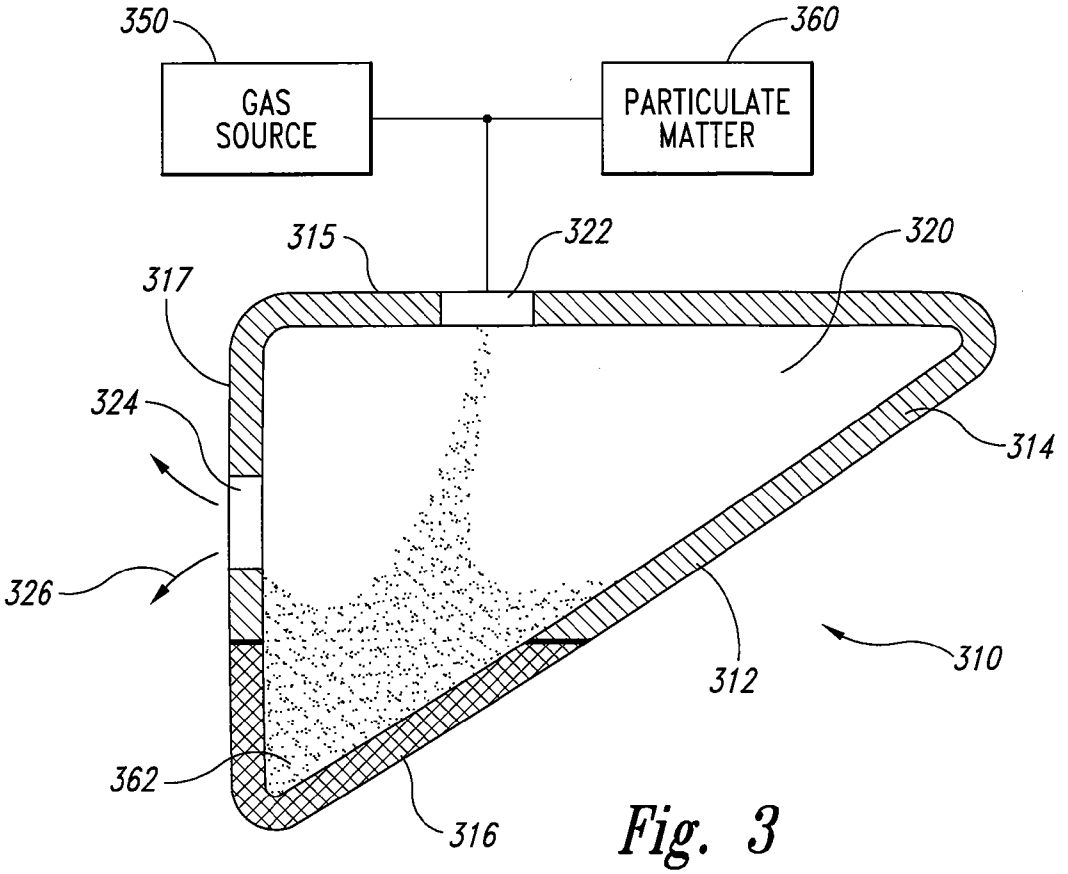

350
GAS SOURCE
360
PARTICULATE MATTER
315
322
320
317
324
314
326
312
310
362
316

Fig. 3

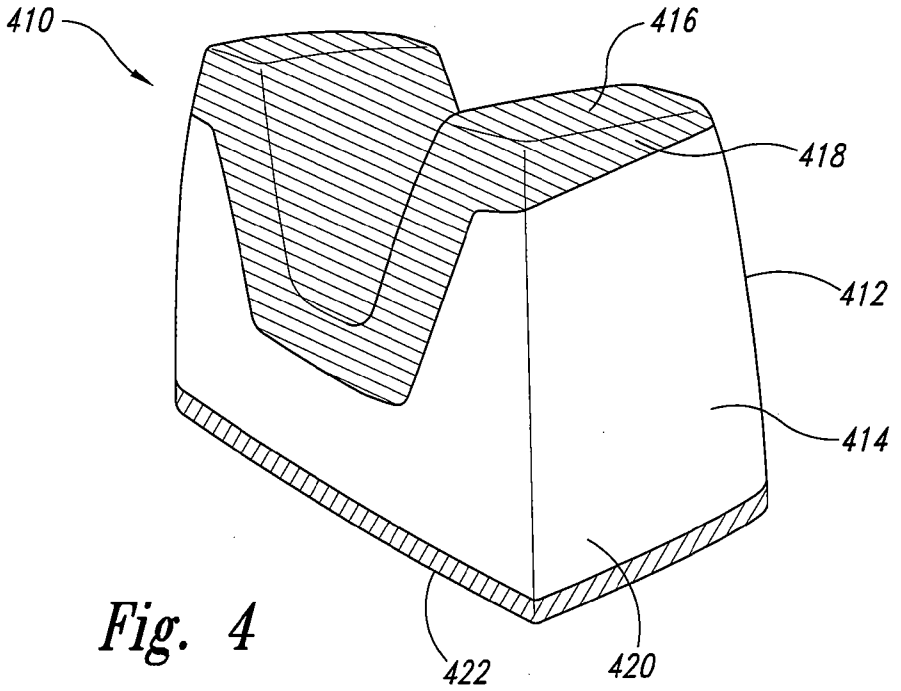

410
416
418
412
414
422
420

Fig. 4

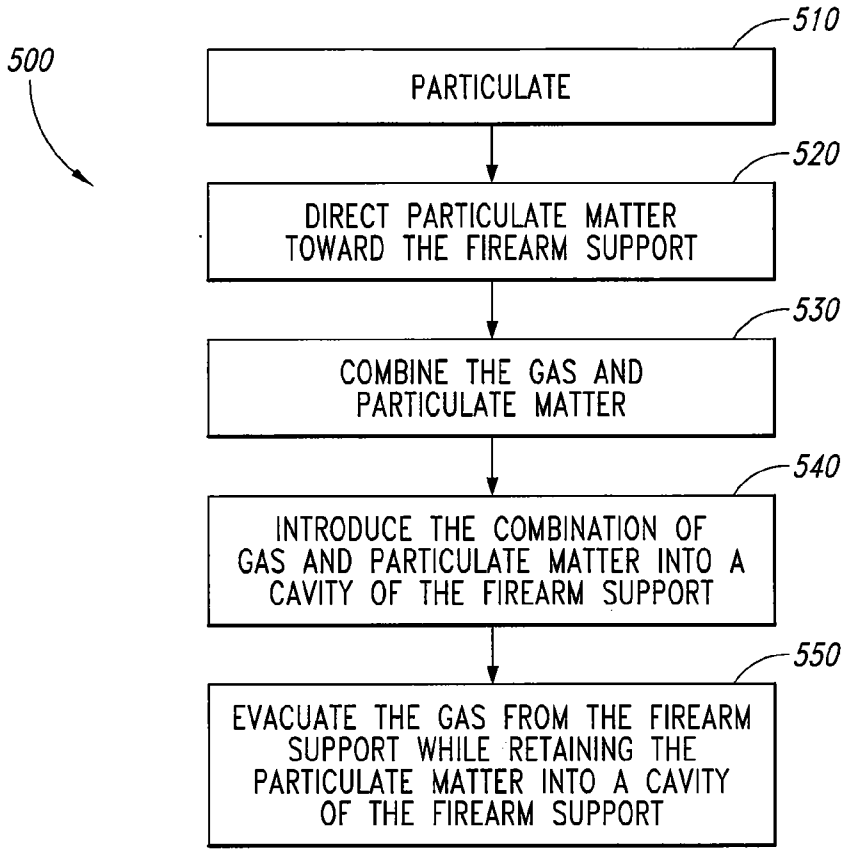

500
510
PARTICULATE
520
DIRECT PARTICULATE MATTER TOWARD THE FIREARM SUPPORT
530
COMBINE THE GAS AND PARTICULATE MATTER
540
INTRODUCE THE COMBINATION OF GAS AND PARTICULATE MATTER INTO A CAVITY OF THE FIREARM SUPPORT
550
EVACUATE THE GAS FROM THE FIREARM SUPPORT WHILE RETAINING THE PARTICULATE MATTER INTO A CAVITY OF THE FIREARM SUPPORT

Fig. 5

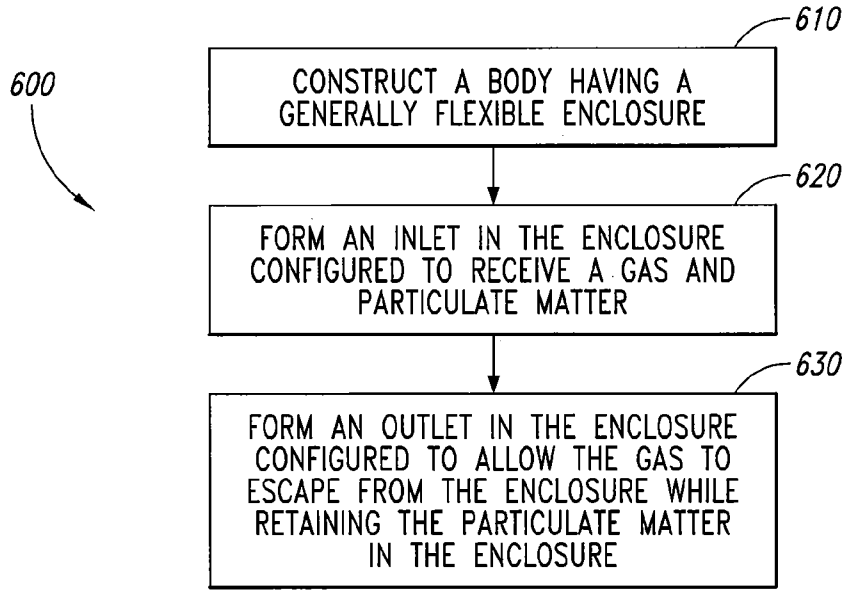

600
610
CONSTRUCT A BODY HAVING A GENERALLY FLEXIBLE ENCLOSURE
620
FORM AN INLET IN THE ENCLOSURE CONFIGURED TO RECEIVE A GAS AND PARTICULATE MATTER
630
FORM AN OUTLET IN THE ENCLOSURE CONFIGURED TO ALLOW THE GAS TO ESCAPE FROM THE ENCLOSURE WHILE RETAINING THE PARTICULATE MATTER IN THE ENCLOSURE

Fig. 6

FIREARM SUPPORTS AND GAS-ASSISTED METHODS OF FILLING FIREARM SUPPORTS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority under U.S. C. § 119(e) of U.S. Provisional Application No. 60/891,687, filed Feb. 26, 2007, the disclosure of which in incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure is directed to firearm supports, such as firearm shooting bags, configured for gas-assisted filling, and methods of filling firearm supports.

BACKGROUND

[0003] Shooters often use shooting bags to support a firearm during target practice and accuracy testing. For example, shooters can place the forestock of a rifle on a front bag and the buttstock of a rifle on a rear bag. The front bag is typically larger than the rear bag and can include an arcuate or v-shaped top surface sized to support the forestock of the rifle. The rear bag may include an arcuate or v-shaped surface sized to support the buttstock of rifle. Other shooting bags are sized to support the entire rifle or a portion of a rifle so that a second bag is not needed. For example, one such shooting bag includes a long U- or V-shaped opening sized to receive several inches of a rifle stock to support the entire rifle. Additional shooting bags have different shapes designed for other applications.

[0004] Conventional shooting bags include (a) a fabric or leather cover that encloses an internal cavity, and (b) particulate matter filling the entire internal cavity. One drawback associated with filling conventional shooting bags is the time and effort required to sufficiently pack the internal cavity with the particulate matter. A shooting bag should be firmly packed with the particulate matter so that the shooting bag retains its shape and provides a stable support for the firearm. Accordingly, filling conventional shooting bags often requires human interface to evenly distribute the particulate matter and ensure that the bags are firmly packed. For example, shooting bags that are mechanically filled often require a dowel or similar device to tamp the particulate matter in the internal cavity. Gravity assisted methods of filling the internal cavity are also used, however gravity-assisted methods generally do not pack the bags firmly enough to provide adequate stability when supporting a firearm. The mechanical or gravity assisted methods of filling the bags therefore require additional steps and/or human interface that increase the time and expense of filling the bags. Accordingly, there exists a need to improve conventional shooting bags and the method of filling conventional shooting bags.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. **1** is schematic side cross-sectional view of a firearm support and a method of filling a firearm support in accordance with one embodiment of the invention.

[0006] FIG. **2**A is schematic isometric view of the firearm support in accordance with another embodiment of the invention.

[0007] FIG. **2**B is schematic isometric view of a firearm support in accordance with another embodiment of the invention.

[0008] FIG. **2**C is schematic isometric view of a firearm support in accordance with another embodiment of the invention.

[0009] FIG. **2**D is schematic isometric view of a firearm support in accordance with another embodiment of the invention.

[0010] FIG. **3** is schematic side cross-sectional view of a firearm support and a method of filling a firearm support in accordance with another embodiment of the invention.

[0011] FIG. **4** is a schematic isometric view of a firearm support in accordance with another embodiment of the invention.

[0012] FIG. **5** is a flow diagram illustrating a method of gas-assisted filling of a firearm support in accordance with one embodiment of the invention.

[0013] FIG. **6** is a flow diagram illustrating a method of constructing a firearm support in accordance with one embodiment of the invention.

DETAILED DESCRIPTION

A. Overview

[0014] The following disclosure describes several embodiments of firearm support (e.g., firearm shooting bags) and methods of filling firearm supports. One aspect of the invention is directed to a firearm support configured for gas-assisted filling with particulate matter. In one embodiment, a firearm support includes an enclosure having a cavity, first and second portions, and particulate matter disposed in the cavity. The enclosure includes an inlet through which the particulate matter is introduced in the cavity during a gas-assisted filling process, and an outlet configured to generally retain the particulate matter and allow gas to escape from the cavity during the gas-assisted filling process.

[0015] In another embodiment, a firearm support includes a flexible body defining a cavity and filler material disposed within the cavity. The body includes an opening for receiving a filling mechanism during a gas-assisted filling process, and a vent having a porosity configured to permit gas to escape from the cavity while retaining filler material in the cavity during the filling process.

[0016] Another aspect of the invention is directed to a firearm support configured for a gas-assisted filling with a filler material. The firearm support includes a cover having first and second portions defining an enclosure. The first portion is composed of a first material having a first porosity and a second material having a second porosity different from the first porosity. The second portion is also composed of a third material having a third porosity different from the first and second porosities The first portion includes an inlet configured to receive a mixture of a gas and particulate matter. The combination of the first, second and third porosities is configured to allow the gas to flow through the first portion and exit the enclosure during a gas-assisted filing process while retaining the filler material in the enclosure.

[0017] Another aspect of the invention is directed to a method of filling a firearm support with filler material. The method includes flowing a mixture of gas and particulate matter into a cavity in the firearm support through an inlet and evacuating the gas via a vent from the cavity while flowing the mixture in the cavity.

[0018] Another aspect of the invention is directed to a method for constructing a firearm support bag for gas-assisted filling with a filling material. The method includes constructing a body having a generally flexible enclosure and forming an inlet in the flexible enclosure. The inlet is configured to introduce particulate matter in the flexible enclosure during a gas-assisted filling process. The method further includes forming an outlet in the enclosure. The outlet is configured to allow gas to exit the flexible enclosure while retaining particulate matter during the gas-assisted filling process.

[0019] Specific details of several embodiments of the invention are described below with reference to firearm supports and methods of filling firearm supports. One skilled in the art will appreciate that the firearm supports configured for gas-assisted filling are also suitable for use with gravity assisted filling. Several details describing well-known structures or processes often associated with firearm supports and methods of filling firearm supports are not set forth in the following description for purposes of brevity and clarity. Also, several other embodiments of the invention can have different configurations, components, or procedures than those described in this section. A person of ordinary skill in the art, therefore, will understand that the invention may have other embodiments with additional elements, or that the invention may have other embodiments without several of the elements shown and described below with reference to FIGS. **1-6**.

[0020] Where the context permits, singular or plural terms may also include the plural or singular term, respectively. Moreover, unless the word "or" is expressly limited to mean only a single item exclusive from other items in reference to a list of at least two items, then the use of "or" in such a list is to be interpreted as including (a) any single item in the list, (b) all of the items in the list, or (c) any combination of the items in the list. Additionally, the term "comprising" is used throughout to mean including at least the recited feature(s) such that any greater number of the same features and/or other types of features and components are not precluded.

B. EMBODIMENTS OF FIREARM SUPPORTS CONFIGURED FOR GAS-ASSISTED FILLING

[0021] FIG. **1** is a schematic side cross-sectional view of a system **100** including a firearm support configured for gas-assisted filling in accordance with one embodiment of the invention. The illustrated system **100** includes a firearm support **110** that can be used to support a firearm (not shown) individually or with other firearm supports. For example, the firearm support **110** can be configured for supporting a barrel, forestock and/or buttstock of the firearm. The firearm support **110** can also be configured for supporting one portion of the firearm in conjunction with another firearm support configured to support a different portion of the firearm. In other applications, the firearm support **110** can be configured to support a firearm without the use of other firearm supports.

[0022] The firearm support **110** includes a body **112** generally configured for supporting a firearm. The body **112** can be composed of an inorganic material, such as fabric, or an organic material such as leather. The body **112** can include multiple portions attached together forming the body **112**. For example, the illustrated body **112** includes a first portion **114** attached to a second portion **116** configured to at least partially support a portion of the firearm. The first and second portions **114** and **116** can be composed of different materials and attached together by sewing, gluing, riveting or other suitable attachment methods. In several embodiments, the first portion **114** can be composed of a fabric, and the second portion **116** can be composed of leather, plastic, rubber or other non-marring materials. Although the first portion **114** and the second portion **116** are composed of generally flexible materials, in several embodiments the first or second portions **114** or **116** may include a relatively inflexible material.

[0023] The second portion **116** illustrated in FIG. **1** includes a recess **118** configured to at least partially receive a portion of the firearm. The recess **118** has a generally U-shaped configuration to inhibit side-to-side movement of the firearm and support the firearm in an upright position. In other embodiments, the second portion **116** may include different shaped configurations, or the second portion **116** may not include a recess **118** for receiving a portion of the firearm. In other embodiments, the general shape of the body **112** may differ and is not limited to the embodiment illustrated in FIG. **1**.

[0024] The body **112** further defines a cavity **120** configured for receiving and being filled with a filler material such as particulate matter **162**. The particulate matter **162** can include sand, dried rice, kitty litter or other suitable granulated media. The body **112** also includes an inlet **122** for introducing a combination of gas and particulate matter **162** into the cavity **120**. The inlet may be configured for receiving a nozzle (not shown) for introducing the gas and particulate matter **162** in the cavity **120** during a gas-assisted filling process. The body **112** also includes an outlet **124** configured to allow the gas to flow out of the cavity **120**, as disclosed in more detail below. In the embodiment of the firearm support **110** illustrated in FIG. **1**, the inlet **122** and the outlet **124** are located on a bottom surface **115** of the body **112**, however the locations of the inlet **122** and the outlet **124** are not limited to the bottom surface **115**. For example, the inlet **122** and/or the outlet **124** can be located on the second portion **116** or on a side surface **117** of the body **112**.

[0025] The outlet **124** is configured to retain the particulate matter **162** in the cavity **120** and to allow gas to flow or escape from the cavity **120** during the gas assisted filling process. As indicated by arrows **126**, gas can escape from the cavity **120** through the outlet **124** simultaneously as the gas and particulate matter **162** enter the cavity through the inlet **122**. In several embodiments, the outlet **124** may be composed of a material that is permeable to the gas but not to the particulate matter **162**. For example, the outlet **124** may be composed of a material having a porosity that allows the gas to pass through the outlet **124** while retaining the particulate matter **162** in the cavity **120**. Accordingly, the outlet may comprise a vent, valve, screen, mesh or other material.

[0026] The system **100** further includes a delivery system **145** for delivering gas and particulate matter **162** to the firearm support **112**. The delivery system includes a gas source **150** and a particulate matter source **160**. A gas from the gas source **150** is combined with particulate matter from the particulate matter source **160** and introduced in the cavity **120** through the inlet **122**. For example, the particulate matter **162** may be combined with the gas downstream from the gas source **150**. According to alternative embodiments, a gas line from the gas source **150** can include a regulator **152**, and a gas line from the particulate matter source **160** can include a regulator **154**. The regulators **152** and **154** allow a user to control the fill rate by controlling the amount of gas or particulate matter dispense. The regulators further allow differ-

ent combinations and mixtures of gas or particulate matter for different bags. As the combination of gas and particulate matter **162** enters and fills the cavity **120**, the outlet **124** permits the gas to escape from the cavity **120** as indicated by the arrows **126** while retaining the particulate matter **162** in the cavity **120**.

[0027] The system **100** also includes an optional pump **170**, indicated by broken lines, that may be operably coupled to the outlet **124** of the body **112**. The pump **170** may consist of a vacuum or suction mechanism that evacuates the gas from the cavity **120** as the combination of the gas and the particulate matter is introduced in the cavity **120**. Accordingly, in embodiments with the pump **170** coupled to the outlet **124**, the pump **170** may assist in removing the gas more quickly from the cavity **120** resulting in a faster filling time.

[0028] The disclosed system **100** and firearm support configured for gas-assisted filling with particulate matter enables adequately filling of the firearm support bag with little or no human interface. For example, during a gas-assisted filling process where the particulate matter **162** enters the cavity **120**, gas is permitted to exit the cavity **120** through the outlet **124**, thus allowing the bag to fill with the particulate matter such that the firearm support **110** is packed firm enough to support a firearm in a stable manner. The system **100** also provides for a less-expensive and time consuming process, as additional steps of tamping or repacking the bag may not be required to adjust the amount of particulate matter **162** that fills the cavity **120**. One skilled in the art will appreciate that the firearm support **110** is also configured and suitable for use with gravity-assisted filling methods. For example, when the particulate matter **162** enters the cavity **120** under the force of gravity, the configuration of the outlet **124** allows air in the cavity **120** to escape as the particulate matter **162** fills the cavity.

[0029] FIG. **2**A is a schematic isometric view of a firearm support **110** similar to the firearm support illustrated in FIG. **1**. In FIG. **2**A and the following Figures, similar reference characters are used to indicate similar features of the embodiments. Referring to FIG. **2**A, the second portion **116** of the body **112** does not include a recess **118** as shown in FIG. **1**. Moreover, in FIG. **2**A the body **112** includes a third portion **202** extending away from the first portion **114** of the firearm support **110**. The third portion **202** may be formed of a flexible material that is the same as or different from the material that makes up the body **112**. For example, the third portion **202** may be a sleeve or similar structure that contains the inlet **122** for introducing particulate matter **162** in the cavity **120**. In several embodiments, the third portion **202** is configured to receive a nozzle **207** for introducing a combination of gas and particulate matter **162** in the cavity **120**. In certain embodiments, the nozzle **207** includes a positional indicia (shown in broken lines) **209** that indicates the depth of the nozzle insertion in the third portion **202**. For example, the indicia **209** can include a line or marking on the nozzle **207** that will align with a top end of the third portion **202**. In other embodiments, the indicia **209** is not used when the nozzle **207** is inserted in the third portion **202**. For example, a portion of the nozzle **207** can be sized to be approximately equal to the size of the inlet **122**, such that the third portion **202** will receive the appropriate insertion depth of the nozzle **207**. The third portion **202** may also be configured to be closed after the gas-assisted filling process, such that particulate matter **162** cannot exit the cavity **120** through the inlet **122** after the third portion **202** is closed. For example, a closure mechanism **204** located in or on the third portion **202** may close the third portion **202**, thus effectively closing the inlet **122**, following the filling process. The closure mechanism **204** may include, but is not limited to, hook and loop mechanisms such as Velcro, buttons, snaps, a zipper, being sewn shut, or any other suitable mechanism for closing the third portion **202**. Alternatively, the third portion **202** may not include a closure mechanism **204** in several embodiments where the third portion **202** is retained proximate to the body **112**, as described in more detail below.

[0030] The embodiment illustrated in FIG. **2**A also shows the outlet **124** positioned proximate to the third portion **202** on the bottom surface **115** of the first portion **114**. It will be appreciated that the inlet **122** and the outlet **124**, as well as the third portion **202**, can be positioned at other locations around the body **112**. Similar to FIG. **1**, the outlet **124** may be composed of a material that retains the particulate matter **116** in the cavity **120** while allowing a gas to flow through the outlet **124**. For example, such a material may consist of, but is not limited to, a mesh or screen material **220** that has a porosity different from the material of the first and second portions **114** and **116**. Accordingly, the material **220** may be less durable than the materials of the other portions of the body **112**.

[0031] FIG. **2**B is a schematic isometric view of a firearm support **110** similar to the firearm supports illustrated in FIGS. **1** and **2**A, according to another embodiment of the invention. FIG. **2**B illustrates several different shapes of the body **112** and configurations and placements of the outlet **124**. Referring to FIG. **2**B, the second portion **116** does not include a recess **118** as shown in FIG. **1**, but rather a plurality of shallow recesses **119***a*, **119***b* and **119***c*. It will be appreciated that the number or configuration of recesses may differ from that illustrated in FIG. **2**B. Referring specifically to FIG. **2**B, the outlet **124** is shown as positioned on a sidewall **206** of the third portion **202**. The outlet **124** may also be positioned to cover a portion of the sidewall **206** of the third portion **202** in addition to an area proximate to the third portion **202**. For example, the outlet **124** may be positioned on a portion of the sidewall **206** of the third portion **202** while also positioned on at least part of the **115** bottom surface of the first portion **114**, such that the outlet **124** covers an interface **208** of the sidewall **206** and the bottom surface **115**. In other embodiments the outlet **124** may also cover the entire sidewall **206** of the third portion **202**. FIG. **2**B also illustrates a plurality of outlets **302***a*, **302***b* and **302***c* configured to retain particulate matter **162** in the cavity **120** while allowing gas to flow through the outlets **302***a*-**302***c*. In several embodiments the outlet(s) may be shaped according to ease of manufacture and ability to retain the particulate matter **162** while allowing sufficient airflow out of the cavity **120**. For example, the shape and size of the outlet(s) may differ according to the size and shape of the firearm support **110** and the location of the outlet(s). Accordingly, one skilled in the art will appreciate that single or multiple outlets **124** having varying shapes may be placed in different locations around the body **112**.

[0032] FIG. **2**C is a schematic isometric view of a firearm support **110** similar to the firearm supports illustrated in FIGS. **1**-**2**B, according to another embodiment of the invention. FIG. **2**C illustrates a configuration of the body **112** and placement of the outlet **124** with respect to the third portion **202**. Referring to FIG. **2**C, the second portion **116** does not include a recess **118** as shown in FIG. **1**, but rather, the body **112** illustrates another shape suitable for supporting firearms. One side of the body **112** may generally taper form the first portion **114** to the second portion **116** such that the first

portion **114** is generally larger than the second portion **116**. In the embodiment illustrated in FIG. **2**C, the third portion **202** can include both the inlet **122** and the outlet **124**. For example, the third portion **202** may be divided between the inlet **122** and the outlet **124** by fastening the third portion **202** to itself, as represented by the seam **210** extending from the base to the top of the third portion **202**. In several embodiments, the third portion **202** may be divided as described, or alternatively as separate portions or sleeves formed to contain the inlet **122** and the outlet **124**. As described above, a closure mechanism **204** (illustrated in FIG. **2**A) may be used to close the third portion **202** containing the inlet **122** and the outlet **124**. Moreover, other outlets **124** located proximate to the third portion **202** or on other portions of the body **112** may be used.

[0033] The embodiment illustrated in FIG. **2**C also includes a nozzle **211** having a first nozzle portion **213** and a second nozzle portion **215**. The first portion **213** introduces the gas and particulate matter into the inlet **122**, and the second portion **215** vents the gas from the outlet **124**. In certain embodiments, the second portion **215** of the nozzle **211** includes a porous cover over the end of the second portion **215** to prevent the particulate matter from escaping from the support **110**. The first and second portions **213** and **215** can be positioned in a larger housing **217** (shown in broken lines), or in alternative embodiments the first and second portions **213** and **215** can be secured together by a belt or band **219** (shown in broken lines). Moreover, in certain embodiments, the second portion can vent the gas from the support **100**. For example, the second portion can be coupled to a pump or a vacuum source **221** (shown schematically) to remove the gas from the outlet **124** of the support **110**. FIG. **2**C also illustrates a second nozzle **223** configured for gas-assisted filling of firearm supports. The nozzle **223** is inserted in a portion **225** that is configured similar to the third portion **202** described above. Multiple nozzles and/or locations of nozzles enables uniform and sufficient filling of firearm supports. For example, supports having different shapes and sizes may require more than one nozzle to sufficiently pack the particulate matter during the filling process.

[0034] FIG. **2**D is a schematic isometric view of a firearm support **110** similar to the firearm supports illustrated in FIGS. **1**-**2**C, according to another embodiment of the invention. FIG. **2**D illustrates a configuration of the outlet **124** located in a fourth portion **402** extending away from the first portion **114**. In several embodiments, the fourth portion **402** may have a similar structure to the third portion **202** described above. For example, the fourth portion **402** may be a sleeve type structure containing the outlet **124** for allowing the gas to escape from the cavity **120** while retaining particulate matter **162**. Moreover, the fourth portion **402** may be configured to be closed after the gas-assisted filling process with closure mechanisms similar to the closure mechanism **204** described above regarding the third portion **202**.

[0035] FIG. **2**E is a schematic isometric view of a firearm support **110** similar to the firearm supports illustrated in FIGS. **1**-**2**D, according to another embodiment of the invention. In FIG. **2**E, the third portion **202** (and/or the fourth portion **402** which is not shown) may be configured such that the third portion **202** is folded proximate to the bottom surface **115**. When the third portion **202** is in a folded position, the third portion **202** forms a generally planar surface with the bottom surface **115** to provide a stable support for a firearm. In additional, the third portion **202** at least partially covers the outlet **124** (shown in broken lines) when the third portion **202** is folded. Covering the outlet **124** protects the outlet **124** which may be composed of a material less durable than the material of the other portions of the body **112**. One skilled in the art will appreciate that the third portion can be located and folded at other positions on the body **112**, such as the side surface **117**. In several embodiments, the fourth portion **402** of FIG. **2**D may also be folded in a manner similar to the third portion **202** as illustrated in FIG. **2**E. Accordingly, the third portion **202** may at least partially cover the fourth portion **402** and form a substantially planar surface when the portions are folded proximate to the back surface **115**.

[0036] In addition to folding the third portion **202** proximate to the back surface **115**, the third portion **202** may also be at least partially retained proximate to the back surface **115** (or other surfaces where the third portion **202** is located). In several embodiments, a strap **502** may be used to retain the third portion **202**. The strap **502** may be connected to the first portion **114** of the body **112** at the ends **504** of the strap **502**. Accordingly, the third portion **202** may be tucked under the strap **502** after the gas-assisted filling process. If a fourth portion **402** is used, the fourth portion may also be retained by the strap **502** (not shown in FIG. **2**E). Other holding mechanisms may be used to retain the third portion **202** proximate to the body **112**. For example, the third portion may be retained against the back surface **115** by a hook and loop mechanism such as Velcro, buttons, snaps, a zipper, being sewn shut, or any other suitable mechanism for retaining the third portion **202**. In other embodiments, a pocket (not shown) may be formed with the material of the back surface **115** such that the third portion **202** may be tucked into and retained by the pocket.

[0037] FIG. **3** is a schematic side cross-sectional view of a firearm support **310** according to another embodiment of the invention. FIG. **3** illustrates a firearm support **310** having a body **312** defining a cavity **320**. The body **312** has a first portion **314** and a second portion **316** suitable for supporting a firearm (not shown). In the firearm support **310** illustrated in FIG. **3**, the body **312** includes an inlet **322** for introducing a combination of a gas and particulate matter **362**, and an outlet **324** for allowing the gas to escape from the cavity as indicated by arrows **326** while retaining particulate matter in the cavity **320**. The firearm support **310** illustrates that the inlet **322** and the outlet **324** may be positioned in separate surfaces of the body. For example, the inlet **322** may be positioned in a bottom surface **315** and the outlet may be positioned in a side surface **317** of the body. One skilled in the art will appreciate that the inlet and outlet **322** and **324** may accordingly be positioned at different locations in the body. Moreover, the inlet and outlet **322** and **324** may also include other embodiments described above, including but not limited to portions that extend away from the body **312** and that may be closed and retained proximate to the body following the gas-assisted filling process.

[0038] FIG. **4** is a schematic isometric view of a firearm support **410** in accordance with another embodiment of the invention. The firearm support **410** is generally similar to the firearm supports described above. For example, the firearm support **410** includes a body **412** defining a cavity, and a first portion **414** and a second portion **416**. In several embodiments, the first portion **414** may be composed of a first material **420** having a first porosity and a second material **422** having a second porosity different from the first porosity. For example, the second material **422** may comprise a relatively small portion of the first portion **414** in relation to the first

material **420**. Accordingly, the second material may comprise a gas exit region (not shown). The second portion **416** may be composed of a third material **418** having a third porosity different from the first and second porosities. The third material **418** may be suitable for contacting a firearm, such as leather or other non-marring materials. Similar to the firearm supports described above, the firearm support **410** may include an inlet (not shown) for receiving a combination of a gas and particulate matter, and an outlet for allowing the gas to escape from the cavity while retaining the particulate matter. In several embodiments, the combination of the first, second and third porosities is configured to allow the gas to flow through the first portion and exit the cavity during a gas-assisted filling process while retaining the filler material in the enclosure. For example, the third porosity may be configured to generally not be permeable to the gas. In addition, the second porosity may be configured such that the majority of the gas will exit the cavity through the second material **402**.

C. EMBODIMENTS OF METHODS OF FILLING AND CONSTRUCTING FIREARM SUPPORTS CONFIGURED FOR GAS-ASSISTED FILLING

[0039] FIG. **5** is a flow diagram illustrating a process **500** that can be used to fill the firearm support **110** described above. The process **500** can include flowing a gas toward a firearm support at a block **510**. At a block **520**, particulate matter is also directed toward the firearm support. The gas and the particulate matter can be combined at a block **530**. In some embodiments, a particulate matter source may be positioned downstream from a gas source. Accordingly, particulate matter may be combined with the gas downstream from the gas source. Those skilled in the art will appreciate that the gas and particulate matter can be combined using other methods. At a block **540**, the combination of the gas and particulate matter is introduced in the firearm support and into a cavity defined by a body of the firearm support. In some embodiments the combination of gas and particulate matter may be introduced into an opening in the firearm support configured to receive the combination of gas and particulate matter. While the combination of gas and particulate matter is being introduced into the firearm support, at a block **550** the gas may be evacuated from the firearm support while retaining the particulate matter in the cavity. In some embodiments, evacuating the gas may comprise allowing the gas to flow through an outlet of the cavity during the filling process. The outlet may be configured to allow the gas to flow out of the cavity while retaining the particulate matter. For example, the outlet may comprise a valve or a screen or mesh material. Moreover, in some embodiments the gas may also be removed from the cavity. For example, a pump may be operatively coupled to the outlet of the cavity. The pump may create a suction to remove the gas while retaining the particulate matter.

[0040] The process **500** accordingly provides for an efficient method of filling firearm supports with particulate matter. Evacuating the gas from the firearm support while the combination of gas and particulate matter is introduced into the firearm support provides for efficient and adequate packing of the particulate matter. The process **500** enables a bag to be completely filled without using other devices or means to tamp or evenly distribute the particulate matter throughout the cavity to sufficiently fill the cavity and form a stable firearm support.

[0041] FIG. **6** is a flow diagram illustrating a process **600** that can be used to construct the firearm support **110** described above. The process **600** can include constructing a body having a generally flexible enclosure at a block **610**. The body may be composed of one or more portions attached together according to the embodiments of the firearm supports described above. The body also defines a cavity that may be filled with filler material, such as particulate matter. At a block **620** an inlet in the cavity is formed. The inlet is configured to receive a gas and particulate matter into the cavity to fill the cavity. At a block **630** an outlet in the cavity is formed. The outlet is configured to allow the gas to escape from the cavity while retaining the particulate matter in the cavity. The outlet may consist a material having a porosity that is permeable to the gas but not to the particulate matter. The process **600** accordingly provides a method of constructing a firearm support that is configured to be efficiently and adequately filled with particulate matter requiring little human interface.

[0042] From the foregoing, it will be appreciated that specific embodiments of the invention have been described herein for purposes of illustration, but that various modifications may be made without deviating from the invention. Furthermore, aspects of the invention described in the context of particular embodiments may be combined or eliminated in other embodiments. Further, while advantages associated with certain embodiments of the invention have been described in the context of those embodiments, other embodiments may also exhibit such advantages, and not all embodiments need necessarily exhibit such advantages to fall within the scope of the invention. Accordingly, the invention is not limited, except as by the appended claims.

I/We claim:

1. A firearm support configured for gas-assisted filling with particulate matter, the support comprising:

an enclosure having a cavity, a first portion configured to support a firearm, and a second portion attached to the first portion;

an inlet in the enclosure through which the particulate matter is introduced in the cavity during a gas-assisted filling process; and

an outlet configured to generally retain the particulate matter in the cavity and allow gas to escape from the cavity during the gas-assisted filling process.

2. The firearm support of claim **1** wherein the enclosure comprises a flexible enclosure.

3. The firearm support of claim **1** wherein the inlet comprises a third portion, the third portion being configured to extend away from the second portion in an open position when the particulate matter is introduced in the cavity and be retained against the second portion in a closed position after the gas-assisted filling process.

4. The firearm support of claim **3** wherein the closed position comprises closing the inlet and folding and retaining the third portion against the second portion.

5. The firearm support of claim **3** wherein the outlet is positioned proximate to the third portion and is at least partially covered by the third portion when the third portion is placed in the closed position.

6. The firearm support of claim **3** wherein the outlet is positioned on the third portion and is at least partially covered by the third portion when the third portion is placed in the closed position.

7. The firearm support of claim 3 wherein the outlet is positioned in the third portion proximate to the inlet.

8. The firearm support of claim 1 wherein the inlet comprises a third portion that extends away from the cavity when the particulate matter is introduced in the cavity, and the outlet comprises a fourth portion that extends away from the cavity when the gas is allowed to escape from the cavity, wherein the inlet and the outlet are folded and retained against the second portion after the gas-assisted filling process.

9. The firearm support of claim 1 wherein the outlet is configured to receive a suction mechanism for removing the gas during the gas-assisted filling process.

10. The firearm support of claim 1 wherein the outlet is configured to allow the gas to exit from the enclosure at least as fast as the gas is received into the enclosure.

11. The firearm support of claim 1, further comprising a plurality of outlets.

12. A firearm support configured for gas-assisted filling, the firearm support comprising:

a flexible body defining a cavity;

an opening in the body sized to receive a filling mechanism during a gas-assisted filling process; and

a vent in the body having a porosity configured to permit a gas to escape from the cavity while retaining the filler material in the cavity during the filling process.

13. The firearm support of claim 12, further comprising a plurality of vents having porosities configured to permit the gas to escape from the cavity while retaining filler material in the cavity during the filling process.

14. The firearm support of claim 12 wherein the flexible body further comprises an upper portion composed of a first material for supporting the firearm and a lower portion composed of a second material and containing the opening and the vent, wherein the opening is composed of the second material and the vent is composed of a third material.

15. The firearm support of claim 12 wherein:

the opening comprises an inlet sleeve that is configured to be closed and retained proximate to the body after the filling process.

16. The firearm support of claim 15, further comprising a strap attached to the lower portion, wherein the strap retains the inlet sleeve proximate to the body.

17. The firearm support of claim 15 wherein the vent is positioned proximate to the inlet sleeve such that the inlet sleeve at least partially covers the vent when the inlet sleeve is retained proximate to the body.

18. The firearm support of claim 15 wherein the vent is positioned on the inlet sleeve and is at least partially covered by the inlet sleeve when the inlet sleeve is retained proximate to the body.

19. The firearm support of claim 15 wherein the vent is positioned in the inlet sleeve and is configured to be closed after the filling process.

20. The firearm support of claim 12 wherein:

the opening comprises an inlet sleeve that is configured to be closed and retained proximate to the body after the filling process; and

the vent comprises an outlet sleeve that is configured to be closed and retained proximate to the body after the filling process.

21. The firearm support of claim 12 wherein the filler material comprises particulate matter.

22. A firearm support containing a filler material, the support comprising:

a cover having first and second portions defining an enclosure, wherein the first portion is composed of a first material having a first porosity and a second material having a second porosity different from the first porosity, and the second portion is composed of a third material having a third porosity different from the first and second porosities; and

an inlet at the first portion, the inlet being configured to receive a mixture of a gas and particulate matter, wherein the combination of the first, second and third porosities is configured to allow the gas to flow through the first portion and exit the enclosure during a gas-assisted filling process while retaining the filler material in the enclosure.

23. The firearm support of claim 22 wherein the cover comprises a flexible cover.

24. The firearm support of claim 22 wherein the inlet is composed of the first material and further comprises an open position extending away from the second portion and a closed position folded and retained against the second portion, the support further comprising:

a gas exit region of the first portion positioned proximate to the inlet, wherein the gas exit region is composed of the second material and configured to allow the gas to flow through the gas exit region at a greater rate than through the second portion and to be at least partially covered by the inlet when the inlet is in the closed position.

25. The firearm support of claim 22 wherein the third porosity does not allow the gas to flow through the second portion and the second porosity at least partially allows the gas to flow through the second portion.

26. The firearm support of claim 22 wherein the third material comprises leather.

27. The firearm support of claim 22 wherein the filler material comprises particulate matter.

28. A method of at least partially filling a firearm support with filler material, the method comprising:

flowing a mixture of gas and particulate matter into a cavity in the firearm support through an inlet; and

venting the gas from the cavity while flowing the mixture in the cavity.

29. The method of claim 28 wherein evacuating the gas from the cavity comprises allowing the gas to exit from the cavity at a rate at least as fast as the rate of the gas entering the bag.

30. The method of claim 28 wherein:

the cavity comprises first, second and third materials each being non-permeable to the particulate matter; and

evacuating the gas from the cavity comprises allowing the gas to exit through at least the first and second materials.

31. The method of claim 30 wherein the first and second materials are permeable to the gas.

32. The method of claim 28 wherein evacuating the gas from the cavity comprises removing the gas from the cavity using a vacuum source.

33. A method of constructing a firearm support bag for gas-assisted filling with a filling material, the method comprising:

constructing a body having a generally flexible enclosure;

forming an inlet in the flexible enclosure, the inlet being configured to introduce particulate matter in the flexible enclosure during a gas-assisted filling process; and

forming an outlet in the flexible enclosure, the outlet being configured to allow gas to exit the flexible enclosure while the retaining particulate matter during the gas-assisted filling process.

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