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(54) Title: MANUAL VENTILATION BAG LOCK

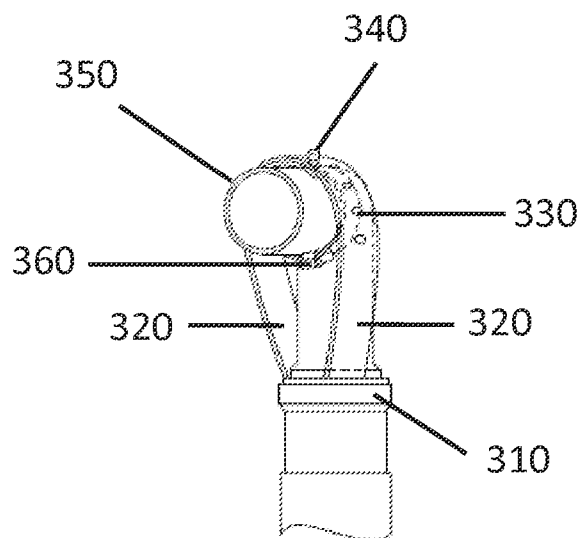


FIG. 3

(57) Abstract: A releasable mechanical coupling is employed for securing a manual ventilation bag to the arm of an anesthesia gas machine or transport circuit. The secured coupling prevents unintentional dislocation of the manual ventilation bag from the machine or transport circuit during manual ventilation.



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MANUAL VENTILATION BAG LOCK

RELATED APPLICATIONS

The present application claims priority to U.S. Provisional Patent Application No. 62/028,544, filed July 24, 2014. The disclosure of U.S. Provisional Patent Application No. 62/028,544 is hereby incorporated by reference in its entirety herein.

FIELD

The subject matter of this disclosure relates to manual ventilation in providing anesthesia.

BACKGROUND

Anesthesia gas machines incorporate the delivery of oxygen and other natural air components with anesthetic and sedative gases to a patient. A manual ventilation bag is typically attached to an anesthesia gas machine or transport circuit for use in certain situations during anesthetic administration, including induction, emergence, maintenance and transport.

Some medical situations or events lead to increased positive pressure ventilation as well as physical force applied by the anesthesia provider's hand during manual ventilation. These factors may cause the ventilation bag to unintentionally detach from the anesthesia gas machine. Thus a more secure connection, wherein the manual ventilation bag is releasably coupled to the machine arm, may be desirable and beneficial in a variety of circumstances.

SUMMARY

In some aspects, a more secure coupling system includes an extending member for a manual ventilation bag, wherein the extending member is configured to releasably secure the manual ventilation bag to an anesthesia gas machine or transport circuit, the extending member comprising a band or strap with at least one fastening element.

In some aspects, an extending member projects or extends from the opening of the manual ventilation bag and is configured to couple with an anesthesia gas machine or transport circuit so as to prevent unintentional dislocation or detachments of the manual ventilation bag from the anesthesia gas machine under increased positive pressure or manipulation by a healthcare provider.

In some aspects, an extending member includes at least one strap or flange extension attached to the opening of the manual ventilation bag. In some aspects, an extending member for modifying a manual ventilation bag includes two or more straps or extensions attached to the manual ventilation bag.

5 In some aspects, an extending member(s) is comprised of the same elastic material as the manual ventilation bag. In some aspects, the extending member has at least one hole that may be stretched over a nub or protruding element attached to the arm of the anesthesia gas machine or transport circuit.

10 Brief Description of Figures

The present invention may be better understood by referring to the following non-limiting figures.

Fig. 1 shows a typical anesthesia gas machine with a manual ventilation bag attached to an arm of the machine, such as may be appropriate for use with various aspects of the invention.

Fig. 2 shows a typical connection between an anesthesia gas machine arm and a manual ventilation bag.

Fig. 3 shows a manual ventilation bag having two extending members projecting from the flange of the bag and stretched over a nub attached to the arm of an anesthesia gas machine, according to an aspect of the invention.

Fig. 4 shows a manual ventilation bag having two extending members projecting from the flange of the bag and stretched over two different nubs attached to the arm of an anesthesia gas machine, according to one aspect of the invention.

Fig. 5 shows a manual ventilation bag having a single extending member projecting from the flange of the bag and fastening to a component on the opposite side of the flange.

Fig. 6 shows a prototype of a separate extending member with a strap that wraps around the mouth of the manual ventilation bag, just below the flange, and another strap that wraps around the arm of a gas anesthesia machine, according to another aspect of the invention.

Fig. 7 shows a different prototype of an extending member that replaces the mouth and flange of the manual ventilation bag, according to another aspect of the invention.

DETAILED DESCRIPTION

5 An anesthesia gas machine typically accommodates a removable ventilation bag for manual ventilation. This ventilation bag is used during various times of the anesthesia including induction, emergence, maintenance and transport. During anesthesia (e.g., general anesthesia or sedation/MAC anesthesia), emergency situations may arise that require increased positive pressures, such as during laryngospasm, bronchospasm, acute oxygen
10 desaturation etc. Sometimes during manual ventilation, increased positive pressure and/or physical forces (e.g., pull on the bag) caused by the manipulation of the bag by the anesthesia provider's hand can cause the manual ventilation bag to "pop" or fall off the arm of the ventilator (i.e., disconnect from the anesthesia gas machine arm), disrupting the process. When this happens, it may put the patient at risk of further desaturation and possible negative
15 outcomes from the desaturation. An additional concern is the potential contamination (added infectious potential) of a bag that is picked up off the floor after unintentional dislocation.

 Altering existing manual ventilation bags and (possibly also) the arm of the gas machine may allow for a more secure connection. A connection that is both secure and removable may better ensure patient safety so that positive pressures can be maintained
20 during manual ventilation without interruption. The ability to remove the bag easily may also protect the patient if the ventilator bag needs to be removed due to malfunction, to facilitate transport, or for a variety of other reasons.

 Thus, in some aspects a more secure coupling includes a mechanical connection designed to prevent dislocation of a manual ventilation bag from an anesthesia gas machine or transport circuit. This may include modification of the ventilation bag, the anesthesia gas
25 machine (or transport circuit), or both. In some aspects the modification may be permanent. In other aspects the modification may be removable.

 Therefore, the coupling described herein serves as a kind of "lock" to attach a manual ventilation bag more securely to an anesthesia gas machine or transport circuit. Ideally, the
30 lock is easily removable but when in use prevents the manual ventilation bag from popping or falling off the arm of the anesthesia gas machine at unintended times, such as when positive

pressure increases (e.g., as a result of bronchospasm or laryngospasm) or the anesthesia provider's hand inadvertently adds lateral pressure to the connection with the bag during manual ventilation.

The following description recites various aspects and embodiments of the present invention. No particular embodiment is intended to define the scope of the invention. Rather, the embodiments merely provide non-limiting examples of various methods and systems that are at least included within the scope of the invention. The description is to be read from the perspective of one of ordinary skill in the art; therefore, information well-known to the skilled artisan is not necessarily included.

Definitions

Where the definition of terms departs from the commonly used meaning of the term, applicant intends to utilize the definitions provided below, unless specifically indicated.

For purposes of the present disclosure, it should be noted that the singular forms, "a," "an" and "the," include reference to the plural unless the context as herein presented clearly indicates otherwise.

As used herein, "positive pressure" refers to higher internal pressure as compared to external pressure, in circumstances in which air is delivered into the airways and lungs, usually via an endotracheal tube, laryngeal air mask, or face mask, producing positive airway pressure during inspiration. Increases in pressure may occur as a result of various medical events.

As used herein, an "arm of anesthesia gas machine" or "ventilator arm," refers to the gas-conducting tube of an anesthesia gas machine designed for connection with a manual ventilation bag.

As used herein, a "nub" or "protruding element" for a coupling or fastening mechanism refers to a protruding element that may be added to existing part(s) of an anesthesia gas machine, transport circuit, or parts of the coupling mechanism itself, providing a projecting component, such that the modification allows more secure attachment for a manual ventilation bag extension.

As used herein, an "extending member" of a manual ventilation bag refers to a removable or permanent modification of existing manual ventilation bags so as to comprise at least one additional part that projects from the opening of the bag. As used herein, a "flange"

or “flange extension” may refer to the ring surrounding the opening of the bag or some extension of that ring. In some examples, fastening elements are applied to the section of a manual ventilation bag just below the flange.

As used herein, “transport circuit” refers to a bag mask system with tubing connected to an oxygen source designed to facilitate delivery of oxygen during the transportation of a patient from one location to another for recovery after a procedure or surgery. Such transport circuits are designed for use in transporting patients to areas of recovery and supplying a source of oxygen and manual ventilation, should respiratory depression, arrest, or airway and other emergencies occur. Such transport circuits are used in conjunction with a manual ventilation bag (i.e., the same manual ventilation bag that was used during the anesthetic). In some examples the invention may facilitate substitution of an Ambu bag with a transport circuit.

Configurations

In some aspects of an extending member for more secure coupling of a manual ventilation bag to an anesthesia gas machine or transport circuit described herein, modifications may be made to existing equipment. In some aspects, an anesthesia gas machine (e.g., Drager Narkomed, Ohmeda, Penlon Prima, or GE) may be modified to accommodate components for better securing a manual ventilation bag. In some aspects, a manual ventilation bag (e.g., Vital Signs, Inc.) may be modified to accommodate components for a more secure attachment to an anesthesia gas machine or transport circuit. In some examples, a separate (third) component may be added to modify a manual ventilation bag or to an anesthesia gas machine to facilitate a more secure attachment.

In some aspects, an arm of an anesthesia gas machine may be altered such that it includes a metal or plastic nub or other protruding element at points distal to a manual ventilation bag attachment (or the nub may comprise other appropriate materials). A manual ventilation bag may also be altered such that there is one strap or flange extension on either side with a small hole or a plurality of holes. The straps may then overlap onto the nub at the top of the ventilator arm. In some examples, extending members made of various materials may be tied to secure the bag in place.

In some examples an extending member may be utilized in conjunction with a transport circuit. A transport circuit typically includes some rigid components, such as hard

plastic tubing configured at a right angle. A mask may be connected to one end of the right angle of the transport circuit as used during the anesthetic. A manual ventilation bag may be attached the other end of the right angle to act as a reservoir of oxygen to allow the patient to breath oxygen spontaneously. An extending member for the manual ventilation bag may be configured to anchor or attach to a protruding element (e.g., a nub) on the rigid portions of the transport circuit. Alternatively, a strap could wrap around a rigid portion of the transport circuit, or other configurations are possible. This assembly allows the anesthesia provider to ventilate the patient should an emergency occur.

In some aspects, the straps or flange extensions of an extending member for a manual ventilation bag may be made from the same kinds of materials such as rubber, neoprene, polyurethane, or other elastic material such as that from which existing manual ventilation bags are made. In some aspects, an extending member may comprise the same elastic composition as the ventilator bag. In some aspects, materials with elastic properties would ideally allow the straps or flange extensions to stretch over the nub on the machine arm. In some aspects, straps may comprise a less elastic material than the body of the bag, such that the straps or extending members provide additional strength for adequate pull on the bag (i.e. more resistance). In some aspects, an extending member may also comprise harder materials, such as hard plastic or metal. For example, a protruding element such as a nub may comprise rigid materials. In some examples, a male/female connection on the gas anesthesia machine arm outlet may clamp over the arm of the ventilator to expose a bump or nub alteration on existing machine arms.

In some examples, a coupling mechanism for securing a manual ventilation bag to a gas machine or transport circuit may comprise a separate component (i.e., a third component that is not a permanent part of the gas machine arm or the manual ventilation bag). A “lock” that is not manufactured as a part of the manual ventilation bag or the anesthesia gas machine (or even permanently incorporated into those pieces) may be more readily adaptable to existing systems.

A separate coupling/locking mechanism may comprise, for example, a strap that wraps around the section below the flange at the mouth of the ventilation bag, so as to secure it to the bag. Thus a mechanism that is separate from the ventilation bag may also be called an “extending member for a manual ventilation bag,” as it becomes an extending member once it is attached to the bag. An additional strap may extend around the arm of the gas

machine to secure the bag to the machine with, for example, a belt-like attachment. A belt-like fastener may include a nub or other protruding feature or a longer protruding piece that inserts into holes in a strap. The prototype shown in Figure 6 is a separate extending member for a ventilation bag, shown without the arm of the anesthesia gas machine.

5 Other examples include straps that wrap around the arm of the gas anesthesia machine like a belt. One strap may include holes and the other may include a protruding element for insertion into one of the holes to fasten the flange extensions of the bag around the gas anesthesia machine arm. An extending member could also include a string (or string-like extension) around the opening of the manual ventilation bag with a releasable tie to the top of
10 the arm of the gas anesthesia machine, much like the O-ring attachment on the arm of the anesthesia gas machine, but around the section of the bag just below the flange.

 Another example includes a slit in the top lip or flange of the manual ventilation bag that allows removable straps to be threaded through the slit(s). The straps may wrap around the arm of the ventilator with various fastening elements such as a belt-like attachment or a
15 hook-and-loop (VELCRO®-like) attachment or a string/bow-type attachment or a button-type attachment or a twist-tie attachment. Adhesives and various other configurations are also possible, as will be readily appreciated.

 In some aspects, extending members or straps may include a textured underside surface to ensure a good grip and prevent the straps from slipping. In some aspects,
20 extending members or straps may include a fastening system wherein a first surface of the extending member attaches to a second surface of the extending member, such as a hook-and-loop system like VELCRO® or another similar system. Various combinations are also possible, such as some combination of textured underside and VELCRO®.

 In some aspects, an anesthesia gas machine is modified to have a protruding element or nub for attachment to the modified manual ventilation bag. A nub may be added to an arm
25 or other part of an anesthesia gas machine in a variety of ways. In some examples, a nub may be permanently affixed to the arm of the machine (e.g., a permanent metal material that is part of the ventilator arm). In some examples, a nub may be part of a clip or clamp removably affixed to the arm of the machine (i.e., such as may be added onto the gas machine
30 arm of existing machines) or transport circuit. In some examples, a clip or clamp comprising a nub wraps around or encompasses an arm of an anesthesia gas machine. In some examples, a nub may be attached to a clip or clamp removably or permanently affixed to the arm of an

anesthesia gas machine. In various aspects, many different designs of current gas machines may be altered to accept the new concept. In some examples, the arm of an existing gas machine may be replaced with a new arm incorporating the appropriate features. That is, on many different designs of current machines, an existing arm may be replaced with an arm having a permanent nub.

In some examples, a nub may be attached to an arm of an anesthesia gas machine or transport circuit in a washer/bolt type formation. A hole/washer may fit over the perpendicular tube that attaches to the bag. A washer may additionally have two smaller arms that flip up and screw to the top of the arm of the gas machine, thereby creating a nub at the top.

In some examples, a protruding element or nub attached to an arm of an anesthesia gas machine may be broader at some distal point from the arm than at a narrower point more proximal to the arm. In some aspects, the most distal tip of a nub is pointed or comprises a hook. In some aspects, a nub may be angled away from the bag (i.e. the distal tip of a nub may be farther from the bag than the proximal end of the nub).

In some examples, the end of the arm of the anesthesia gas machine may have an extruded texture with a recessed interior texture on the interior lip of the arm. In some aspects, an extending member from a manual ventilation bag may extend parallel to the manual ventilation bag. In some aspects, an extending member may extend parallel to a plane defined by the arm of the anesthesia gas machine. In some examples, the arm of the gas machine may be flexible, such that the configuration of the “lock” or fastener must accommodate the flexible arm.

In some aspects, the modifications described herein may be useful for administering anesthesia via laryngeal mask airway (LMA), endotracheal tube (ETT), or general mask anesthesia.

The experienced anesthesia provider will appreciate that adjustments to the anesthesia gas machine and other equipment may be made based on the individual patient. As such, safety measures may include various strategies for preventing increased positive pressure from reaching a level that may be dangerous to a patient’s lungs (e.g., peak inspiratory pressure > 35, 40, 45, 50, 55, or 60 cm H₂O). Peak inspiratory pressure is set by the provider on an anesthesia gas machine, and an alarm sounds if the pressure exceeds the set peak inspiratory pressure (i.e., Adjustable Pressure Limiting valve) to prevent barotrauma. As an

added optional measure to protect against excessively high peak inspiratory pressure, all varieties of extending members or fastening elements described herein may include points (e.g., a nub as part of a fastening element) that are designed to shear off at specific high pressures, thereby providing an additional mechanism to prevent damaging pressures from being applied to the patient's lungs. Specific examples are noted in the detailed figure descriptions.

Thus, an extending member for a more secure coupling described herein may include modifications to a manual ventilation bag and/or modifications to an anesthesia gas machine. In some aspects, the improved coupling includes mechanical connection means designed to secure a bag to an anesthesia gas machine or transport circuit, so as to securely affix the bag in place and prevent unintentional dislocation of the ventilation bag from the anesthesia gas machine or transport circuit.

Detailed Description of Figures

Figure 1 illustrates one type of anesthesia gas machine (or ventilator), having a machine arm 110, leading to a manual ventilation bag 120. Different types of anesthesia gas machines have slight structural differences with respect to these features, and the more secure coupling described herein may be adapted to many different configurations to accommodate various machine designs. For example, the arm may curve directly into the opening of the bag, or the arm may be made of different materials. Some gas machines have a flexible arm, and some machines have removable parts for sterilization. The connection between machine arm 110 and bag 120 is further detailed in Figure 2.

Figure 2 illustrates a coupling between the anesthesia gas machine arm 210 and the connecting part (i.e., the opening) of the manual ventilation bag 220. The bag 250 is somewhat inflated in this illustration. In some examples of the present invention, a disposable manual ventilation bag is modified at the mouth of the manual ventilation bag, e.g., at the flange 230 where it couples with the arm extending from the gas machine 210, or at the section just below the flange 240, or other parts of the bag, machine, or transport circuit. Figures 3-7 illustrate potential extending member modifications to better secure the coupling.

Figure 3 illustrates an example of the coupling having two extending members from the bag flange and one nub attached to the gas machine arm according to one aspect of the

invention. The flange of the disposable bag 310 is modified to include two strap extensions 320. The straps may comprise a series of holes 330 similar to those on a belt. The holes are designed to slip over or stretch over a nub 340 affixed to the arm of the gas machine 350 by an adjustable ring 360 or other suitable attachment. In this example, when both straps are in place to secure the connection, one strap 320 overlaps the other strap 370 where the straps both contact the nub 340. In some aspects, the nub 340 may be designed to shear off if the positive pressure reaches levels that may be dangerous to the patient's lungs. In some aspects, straps or extending members comprise a textured underside surface to ensure a good grip and prevent the straps from slipping.

Figure 4 illustrates another configuration for a more secure coupling, having two extending members from the bag flange and two nubs extending laterally from the gas machine arm according to one aspect of the invention. The flange 410 is modified to include two strap extensions 420 that stretch over nubs 450 on opposite sides of the arm 430. An adjustable ring 440 or other suitable attachment adds the nubs 450 to the gas machine arm 430. In some aspects, the nubs 450 may be designed to shear off if the positive pressure reaches levels that may be dangerous to the patient's lungs.

Figure 5 illustrates yet another configuration for a more secure coupling, having a single extending member from the bag flange according to one aspect of the invention. The gas machine arm is not depicted in this figure. The flange 510 of the bag is modified to include a single strap 520 extending from one side of the flange such that it may wrap around the arm and slip over a nub 530 extending from the opposite side of the flange. In some aspects, the nub 530 may be designed to shear off if the positive pressure reaches levels that may be dangerous to the patient's lungs.

Figure 6 shows an example of a separable extending member for modifying a manual ventilation bag according to one aspect of the invention. Panel A of Figure 6 shows the extending member separated from the manual ventilation bag, Panel B shows the extending member attached to the manual ventilation bag (partially assembled), and Panel C shows the strap that wraps around the arm of the gas anesthesia machine arm or transport circuit fastened to the bag (fully assembled). This polyurethane example is T-shaped, such that a horizontal strap 610 wraps around the mouth of the manual ventilation bag just below the flange 620. A hole 630 in the horizontal strap 610 slides over a nub 640 that protrudes from a

pin 650 that is embedded in the opposite end of the horizontal strap, to fasten the extending member to the bag .

When the horizontal strap is secured, as in panel B, the manual ventilation bag may be coupled to the arm of a gas anesthesia machine or transport circuit (not shown) by wrapping a vertical strap 670 over the arm and securing it by sliding a hole 680 in the vertical strap over the same nub 640 that protrudes from the embedded pin 650, thereby fastening the manual ventilation bag 660 more securely to the gas anesthesia machine or transport circuit. In some aspects, the nub 640 may be designed to shear off if the positive pressure reaches levels that may be dangerous to the patient's lungs.

Figure 7 shows an example of an extending member for a manual ventilation bag according to another aspect of the invention. Panel A shows the extending member permanently attached to the manual ventilation bag, and Panels B and C show front and side views, respectively, with the strap that wraps around the arm of the gas anesthesia machine arm or transport circuit fastened to the bag (fully assembled). In this polyurethane example, the mouth and flange of the manual ventilation bag 710 are permanently replaced with the extending member 720 (or the bag may be manufactured with the extending member). When the manual ventilation bag 710 is coupled to an anesthesia gas machine or transport circuit (not shown), the vertical strap 730 of the extending member 720 is wrapped over the arm of the machine or transport circuit and fastened by sliding one of the holes in the strap 740 over a nub 750 that protrudes from the extending member 720. In some aspects, the nub 750 may be designed to shear off if the positive pressure reaches levels that may be dangerous to the patient's lungs.

In still other examples, alternative means for securing the manual ventilation bag attachment may be employed, such as a button-type fastener, a twist-tie fastener, VELCRO® that has a 'hook' component and a 'loop' component, or other fasteners. For example, the flange of the ventilator bag may be modified to include straps comprising one part of the VELCRO®, while the other part of the VELCRO® may be attached to the gas machine arm with adhesive. Alternatively, a larger hook may be paired with a larger loop as a fastening system (e.g., where one is stretched a bit to join the other), or a plurality of hooks and loops may be employed. In other examples various other types of adhesives may be used as a fastening element for an extending member (or a combination of an adhesive with other elements is possible).

Having described many examples and aspects of an extending member with a more secure locking/coupling mechanism in detail, it will be apparent that modifications and variations are possible without departing from the scope of the present invention defined in the appended claims. For example, various combinations of features could include a belt-like fastening system. Furthermore, it should be appreciated that all examples in the present disclosure (including figures), while illustrating many configurations of the present invention, are provided as non-limiting examples and are, therefore, not to be taken as limiting the various aspects so illustrated.

While the present invention has been disclosed with references to certain examples and aspects, numerous modifications, alterations and changes to the described examples are possible without departing from the scope and spirit of the present invention, as defined in the appended claims. Accordingly, it is intended that the present invention not be limited to the described examples, but that it have the full scope defined by the language of the following claims, and equivalents thereof. References cited herein, such as references to existing products, are also incorporated by reference as though fully set forth herein. The present invention may be better understood by referring to the following non-limiting examples.

Example 1

A manual ventilation bag may be modified in a variety of ways, such as illustrated in Figures 3-5. At least one strap of an extending member may be added to the bag for extending over a portion of the arm and anchoring the bag to the arm. Two straps of an extending member may be anchored to either a single nub (as in Figure 3) or nubs on either side of the arm (as in Figure 4), or a plurality of nubs. Another configuration could utilize two straps of an extending member that are tied together on the appropriate spot on the arm of a gas anesthesia machine or transport circuit. Alternatively, a single strap of an extending member may be looped around and/or anchored to the arm via a nub or other securing means (as in Figure 5, where the arm and nub are not shown).

An anesthesia gas machine is modified by adding an adjustable metal clamp or ring (similar to a hose clamp) of similar diameter as the arm of the anesthesia gas machine or the opening of the manual ventilation bag (e.g., 24 mm or 15/16 in.). The adjustable metal ring comprises at least one nub for anchoring the extending member of the bag to the arm. Alternatively a washer/bolt type attachment may be employed.

Having modified both a manual ventilation bag and an arm of an anesthesia gas machine, the notches or holes of the bag's extending member(s) is/are slipped over the nub(s) on the machine arm to secure the extending member to the arm.

5 **Example 2**

In some adaptations according to the more secure coupling disclosed herein, the fastening attachment of an extending member employs a hook-and-loop system. In such examples, the flange of the ventilator bag may be modified to include straps having the hook component while the loop component may be applied to the ventilator arm with adhesive (or
10 vice-versa). Such a hook-and-loop system may be used in similar configurations to those depicted in Figures 3-7, as well as other configurations not shown.

Example 3

A prototype of an extending member that is separable from the manual ventilation bag
15 is shown in Figure 6. This example of an extending member is separable from the ventilation bag and comprises a first (horizontal) strap that surrounds the mouth of the ventilation bag below the flange and a second (vertical) strap that wraps around a portion of the anesthesia gas machine or transport circuit.

The fastening element includes a pin embedded in the horizontal strap that protrudes
20 on one side as a nub. The other end of the horizontal strap includes at least one hole and that horizontal strap is secured to the anesthesia gas machine or transport circuit by wrapping the vertical strap over the arm of the machine or transport circuit and stretching at least one hole on the strap over the nub affixed to the manual ventilation bag via the horizontal strap.

A protruding element (e.g., nub) may also be affixed to an arm of the anesthesia gas
25 machine or transport circuit by an adjustable clamp or ring, so as to prevent the vertical strap from slipping on the arm of the machine or transport circuit. The nub may be narrower at the end proximal to the arm than at some distal point of the nub (i.e., expand as it protrudes away from the arm). The nub may be angled away from the manual ventilation bag, such that a proximal point of the nub is closer to the manual ventilation bag than a distal point of the
30 nub.

Example 4

A prototype extending member including a belt-like fastener (as shown in Figure 7) was tested in simulations of increased pressure and manipulation of the manual ventilation bag by a healthcare provider. This prototype successfully held the manual ventilation bag more securely to the arm of an anesthesia gas machine while the healthcare provider manipulated the bag, whereas comparative testing without the extending member resulted in repeated unintentional dislocation of the bag from the anesthesia gas machine.

Claims

1. An extending member for a manual ventilation bag, wherein said extending member is configured to releasably secure the manual ventilation bag to an anesthesia gas machine or transport circuit, the extending member comprising a band or strap with at least one fastening element.
2. The extending member of claim 1, wherein said extending member extends from the opening of said manual ventilation bag and is configured to couple with said anesthesia gas machine so as to prevent unintentional dislocation of said manual ventilation bag from said anesthesia gas machine or transport circuit.
3. The extending member of claim 1 or 2, wherein the fastening element comprises at least one hole in a strap.
4. The extending member of any of claims 1-3, wherein the fastening element comprises a plurality of holes.
5. The extending member of any of claims 1-4, wherein the fastening element comprises a protruding element.
6. The extending member of claim 5, wherein the protruding element fits into a hole on the strap so as to fasten or secure the strap.
7. The extending member of any of claims 1-6, wherein a protruding element is affixed to a portion of the anesthesia gas machine or transport circuit.
8. The extending member of any of claims 1-7, wherein a protruding element is a nub that is removably or permanently affixed to an arm of the anesthesia gas machine or transport circuit.
9. The extending member of any of claims 1-8, wherein the extending member is separable from the ventilation bag and comprises a first strap that surrounds the mouth of the ventilation bag below the flange and a second strap that wraps around a portion of the anesthesia gas machine.
10. The extending member of any of claims 1-9, wherein said extending member comprises at least one component of a fastening system wherein a first surface of the extending member attaches to a second surface of the extending member, such as a hook-and-loop system.

11. The extending member of any of claims 1-10, wherein a component of the fastening element is designed to shear at positive pressures that would endanger a patient's lungs.
12. The extending member of any of claims 1-11, comprising two opposing straps attached to the opening of said manual ventilation bag.
13. The extending member of any of claims 1-12, further comprising an adhesive element.
14. The extending member of any of claims 1-13, wherein the extending member is able to maintain the connection between said manual ventilation bag and said anesthesia gas machine under increased positive pressure or manipulation of said manual ventilation bag by a healthcare provider when fastened, wherein said increased positive pressure or manipulation would cause dislocation of said manual ventilation bag from said anesthesia gas machine without the extending member first being applied and fastened.
15. A system for releasably securing a manual ventilation bag to an anesthesia gas machine or transport circuit, comprising an extending member component attached to said manual ventilation bag and a fastening component.
16. The system of claim 15, wherein said fastening component comprises a protruding element.
17. The system of claim 15 or 16, wherein said fastening component comprises a hole.
18. The system of claim 15, wherein the system comprises a hook-and-loop system.
19. The system of claim 18, wherein a part comprising hooks is attached to said manual ventilation bag and a part comprising loops is attached to said anesthesia gas machine.
20. The system of claim 18, wherein a part comprising loops is attached to said manual ventilation bag and a part comprising hooks is attached to said anesthesia gas machine.
21. The system of any of claims 15-20, wherein said extending member component comprises a strap-like extension attached to one side of the opening of said manual ventilation bag.

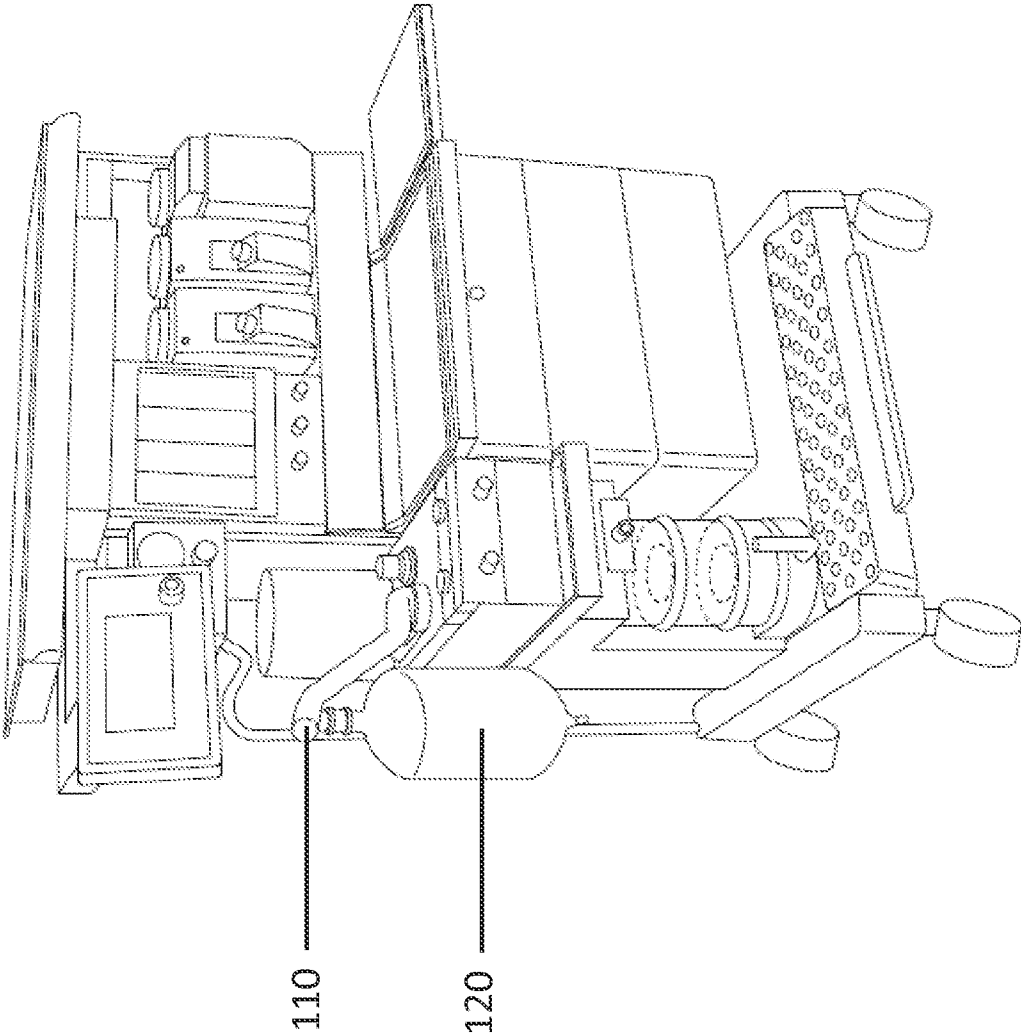


FIG. 1

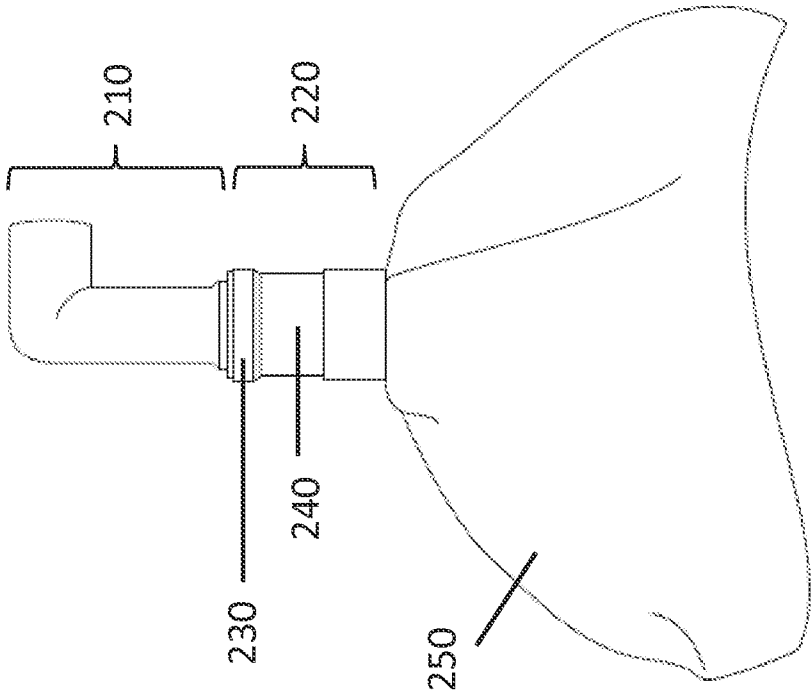
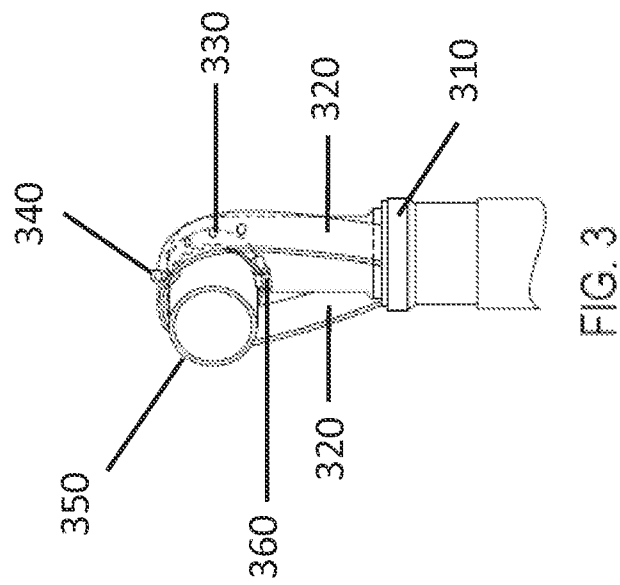


FIG. 2



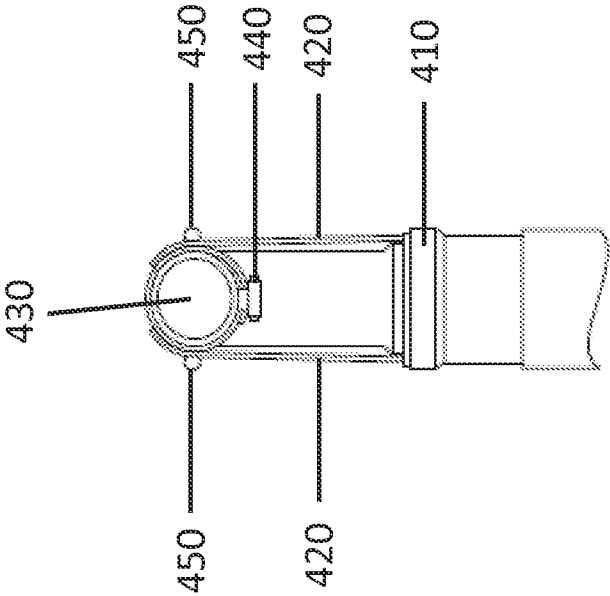


FIG. 4

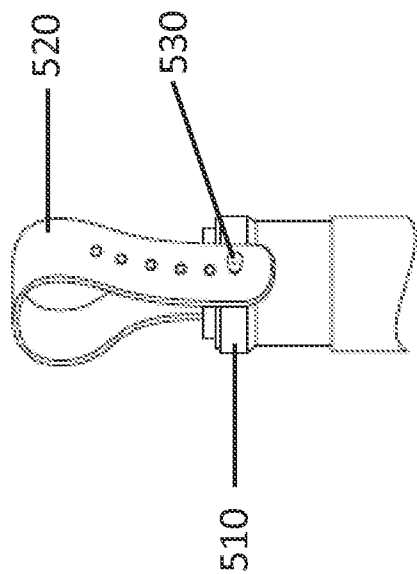
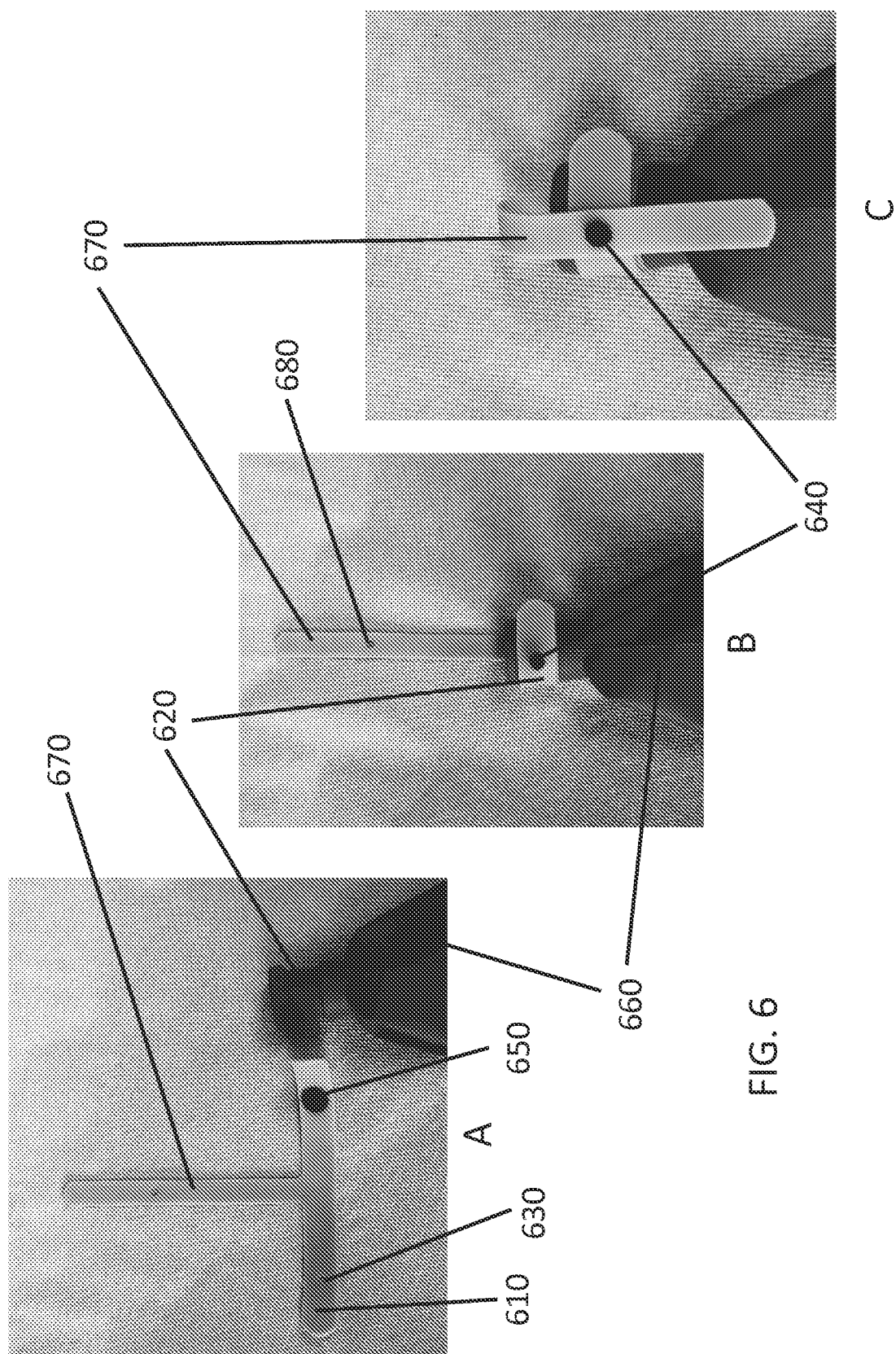


FIG. 5



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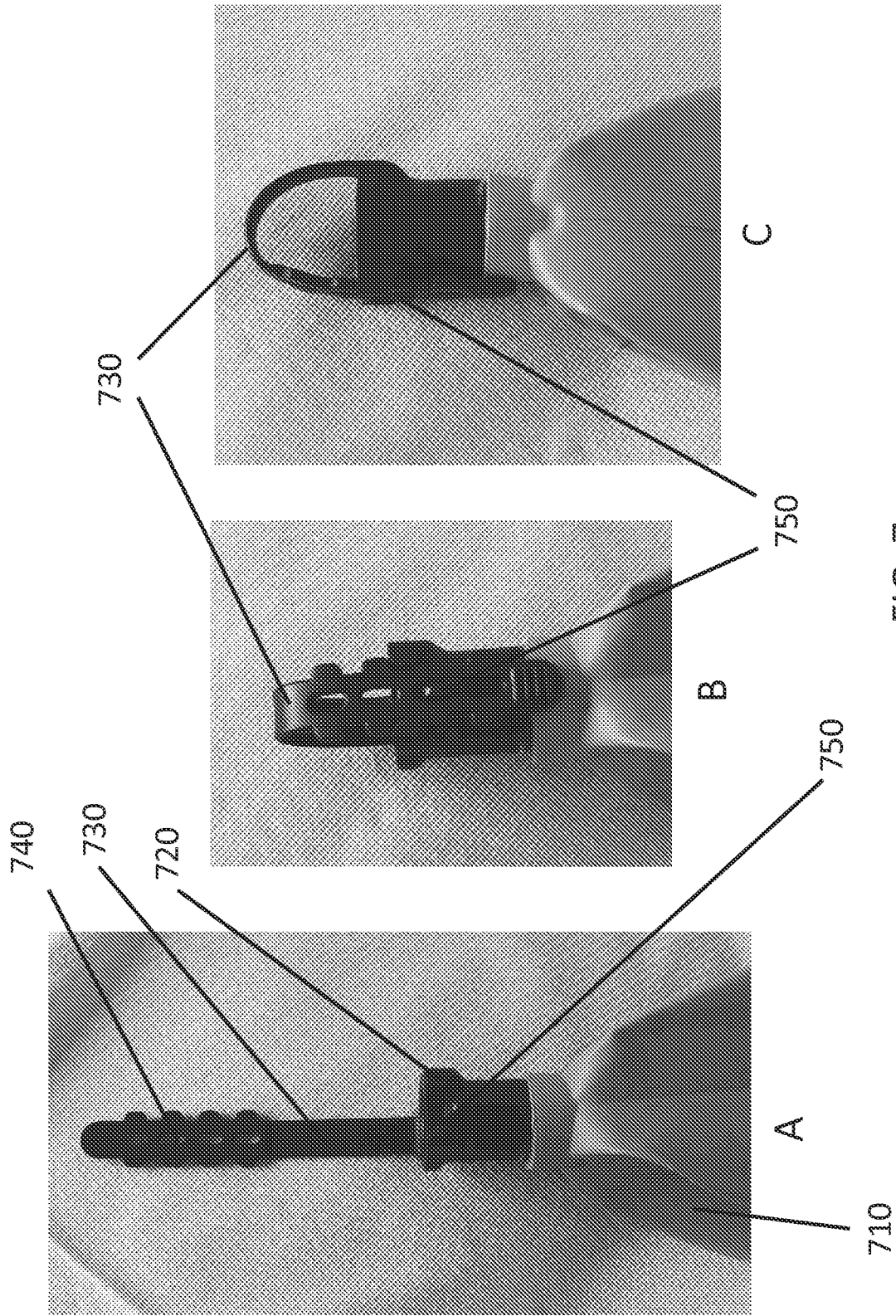


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2015/041995

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61M16/00

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/087285 A1 (KUO TZONG-FUH [TW]) 17 April 2008 (2008-04-17)	1-8, 11-15, 17,21
Y	paragraphs [0015] - [0017]; figure 6	10,16, 18-20
Y	----- US 2008/210238 A1 (HUDDLESTONE MARK JAMES [GB]) 4 September 2008 (2008-09-04) paragraph [0015]; figures 1, 2	10,18-20
X	----- US 2012/145151 A1 (BERGMAN ROBERT TODD [US]) 14 June 2012 (2012-06-14) paragraph [0127]; figures 11A, 11B	1,10,14
X	----- US 2007/068896 A1 (MONTGOMERY JACYLYN [US]) 29 March 2007 (2007-03-29)	1-6,9,10
Y	paragraphs [0017] - [0020]; figure 3 -----	16,18-20



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

21 September 2015

Date of mailing of the international search report

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Authorized officer

Böttcher, Stephanie

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2015/041995

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US 2008087285	A1	17-04-2008	NONE
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US 2012145151	A1	14-06-2012	NONE
US 2007068896	A1	29-03-2007	NONE