(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 March 2022 (24.03.2022)

WIPO | PCT

(10) International Publication Number
WO 2022/058701 A1

(51) International Patent Classification:
A61G 10/00 (2006.01)

(21) International Application Number:
PCT/GB2020/052243

(22) International Filing Date:
17 September 2020 (17.09.2020)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant: **AEROSOLSHIELD LIMITED** [GB/GB]; The Bizzinn, Birmingham Research Park, 97 Vincent Drive, Birmingham West Midlands B15 2SQ (GB).

(72) Inventor: **CAMPBELL-HILL, Matthew James**; c/o AerosolShield Limited, The Bizzinn, Birmingham Research Park, 97 Vincent Drive, Birmingham West Midlands B15 2SQ (GB).

(74) Agent: **FORRESTERS IP LLP**; Rutland House, 148 Edmund Street, Birmingham West Midlands B3 2JA (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: ISOLATION APPARATUS

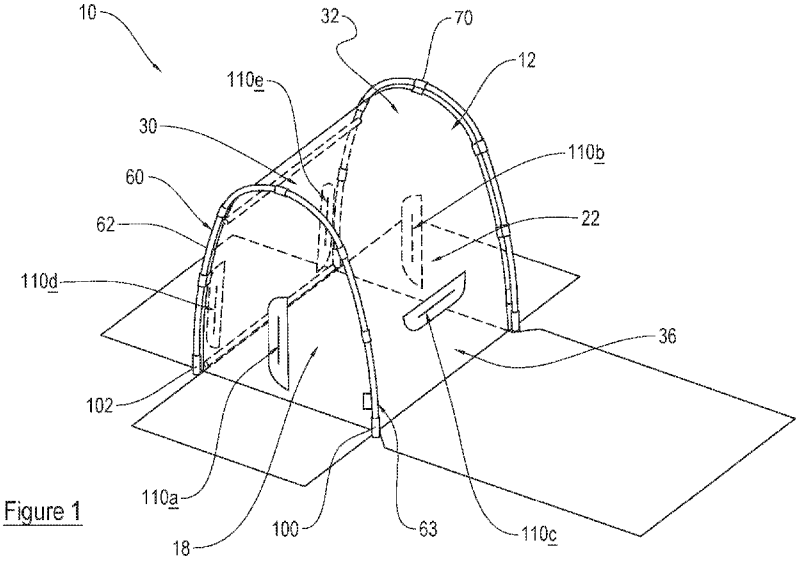

Figure 1

(57) **Abstract:** An isolation apparatus to isolate a user from transmitting aerosols to the environment, including: a barrier expandable from a first, stored, condition to a second, deployed, condition in which the barrier defines a chamber having an opening for receiving a user during use, wherein the barrier isolates the chamber to inhibit the transmission of any aerosols in the chamber to the environment; and a support structure connected to the barrier for supporting the barrier in the second condition relative to a surface on which the apparatus is positioned during use.

WO 2022/058701 A1

[Continued on next page]

Published:
— *with international search report (Art. 21(3))*

Title: Isolation apparatus

Description of Invention

The present invention relates to an isolation apparatus, particularly, but not exclusively to an isolation apparatus for use in preventing transmission of aerosols from a user to the environment.

Humans are susceptible to a number of illnesses and/or infections. These illnesses and/or infections can be transmitted in a number of ways, e.g. through contaminated water supplies, carriers such as rodents or through the air via aerosols. The present invention is particularly concerned with illnesses transmitted via aerosols. Within this document, the term "aerosol" is used to denote airborne droplets of varying sizes, from relatively small through to relatively large sizes (as may be produced when a person coughs or sneezes, for example) and/or any gases that may emanate from a person including those emanating from open wounds, e.g. during operating procedures or otherwise.

If a person is suspected of having an illness, e.g. a viral infection, that can be transmitted by aerosols produced by the person, e.g. because the illness creates respiratory symptoms including coughing, then in situations where the person is receiving a treatment or service that involves other people being in close proximity to provide that treatment or service, then those people are susceptible to contracting the illness. An example of such a virus is SARS-CoV-2 (otherwise known as Covid-19).

For example, in a caregiving environment, caregivers, e.g. nurses, doctors, care home staff, are susceptible and will often wear personal protective equipment (PPE) to protect themselves from contracting the illness due to the

transmission of aerosols from the patient. Typically this will take the form of face masks, shields, goggles, aprons and other garments which act as a barrier to aerosols contacting the caregiver.

Illnesses or infections of this nature can include phases whereby the affected person is asymptomatic in the initial stages of the illness and/or asymptomatic throughout the period the person has been infected. This can be problematic because the person may not be displaying any symptoms but may still be able to spread the illness or infection to other people, particularly through aerosols the person may produce. This can be particularly problematic in environments such as a dentist surgery, and beautician salons or the like, because those providing the treatment or service may become infected if the person receiving the treatment or service is asymptomatic at the time and so precautions must be taken.

In a caregiving environment where a patient may be initially diagnosed or treated in the community for another condition without having been diagnosed and then require hospital treatment, there is a real risk that the transmission of aerosols from the patient to other people could occur before a diagnosis has been confirmed and/or whilst the patient is being transported to a hospital and through the patient journey.

The present invention seeks to ameliorate issues arising from the illnesses or infectious diseases described.

According to an aspect of the invention we provide an isolation apparatus to isolate a user from transmitting aerosols to the environment, including: a barrier expandable from a first, stored, condition to a second, deployed, condition in which the barrier defines a chamber having an opening for receiving a user during use, wherein the barrier isolates the chamber to inhibit the transmission of any aerosols in the chamber to the environment; and a

support structure connected to the barrier for supporting the barrier in the second condition relative to a surface on which the apparatus is positioned during use.

The barrier may be deformable.

The barrier may be, optionally or preferably, resiliently deformable.

The barrier may be retracted from the second condition to the first condition.

The support structure may be in a compact state in the first condition and in an expanded state in the second condition.

The barrier may include first and second generally opposed barrier portions which are spaced apart along a transverse axis A in the second condition.

The first and second barrier portions may be generally planar.

Optionally or preferably the first and second barrier portions may be parallel.

The barrier may include an intermediate barrier portion that connects the first barrier portion to the second barrier portion.

Optionally or preferably the intermediate barrier portion may extend in a direction along axis A in the second position.

The intermediate wall may be in a compact state in the first condition.

The intermediate wall may be in an expanded state in the second condition.

The first and second barrier portions may be provided by first and second walls respectively.

The intermediate barrier portion may be provided by an intermediate wall.

The intermediate wall may have first and second ends adjacent to the first and second walls respectively, and first and second opposing sides which extend from the first to the second side ends.

Optionally or preferably the intermediate wall may connect the first wall to the second wall.

The intermediate barrier portion may have a concave cross-section.

Optionally or preferably the intermediate barrier portion may have an arcuate, cross-section.

The first, second and/or intermediate barrier portions may define an elongate-shaped chamber in the second condition.

The support structure may include first and second support members connected to the first and second barrier portions respectively.

Optionally or preferably the first and second support members may be arcuate members.

Optionally or preferably the first and second support members may be a convex shape.

Optionally wherein the first and second support members may define first and second openings respectively

The first and second barrier portions may extend across the first and second openings respectively.

The apparatus may include connecting elements for connecting the first and second support members to the first and second barrier portions.

Optionally, or preferably, the connecting elements may be fixed to the barrier.

The or each connecting element may include a formation through which the first or second support member extends.

The or each connecting element may include a connection portion connected to the barrier for holding the barrier relative to the first or second support member.

The apparatus may include a first plurality of connecting elements fixed to the first barrier portion.

The apparatus may include a second plurality of connecting elements fixed to the second barrier portion.

The first support member may include first and second ends.

The apparatus may include first and second retaining formations connected to first and second corners of the first barrier portion for retaining the first and second ends of the first support member respectively.

The first and second retaining formations, in use, may be positioned adjacent the surface.

The second support member may include first and second ends.

The apparatus may include third and fourth retaining formations connected to third and fourth corners of the second barrier portion for retaining the first and second ends of the second support member respectively.

The third and fourth retaining formations, in use, may be provided adjacent the surface.

The support structure may include a third support member for use in the second condition.

The third support member may extend between the first and second barrier portions for keeping the first and second barrier portions spaced apart relative to each other in the second condition.

Optionally or preferably the third support member may be an elongate member.

Optionally the third support member may be selectively connectable to, or receivable by, the barrier, optionally or preferably connectable to or receivable by the intermediate barrier portion.

Optionally the apparatus may include a vertical plane P which intersects the first and second barrier portions about respective midlines thereof.

The third support member may be positioned to a first side of the plane P.

The support structure may include a fourth support member for use in the second condition.

The fourth support member may extend between the first and second barrier portions for keeping the first and second barrier portions spaced apart relative to each other in the second condition.

Optionally the fourth support member may be an elongate member.

Optionally the fourth support member may be positioned to a second side of the plane P.

Optionally wherein, in use in the second condition, the fourth support member may be positioned closer to the plane P than the third support member.

Optionally wherein, in use in the second condition, the fourth support member may be positioned above the third support member.

The support structure may include a fifth support member which is selectively connectable to the first and second support members, in use in the second condition, to maintain said support members in the second condition.

Optionally the fifth support member may include first and second connecting formations for connecting the fifth support member to the first and second support members respectively.

The barrier may include an access opening for permitting access to the chamber.

Optionally the access opening may be a slot provided in the barrier.

Optionally the apparatus may include a sealing wall for sealing the access opening, wherein the sealing wall is moveable between a first sealing wall

condition in which it seals the opening and a second sealing wall condition in which it does not seal the opening.

Optionally or preferably the sealing wall may be biased to the first sealing wall condition.

Optionally or preferably the sealing wall may be resiliently deformable.

Optionally the sealing wall may include a connection portion connected to the barrier and a sealing portion which extends from the connection portion over the access opening for sealing the opening.

Optionally the barrier may include an interior surface and an exterior surface.

The sealing wall may be connected to the interior surface of the chamber so as to seal the opening from within the chamber.

Optionally the apparatus may include a fastening device for fastening respective portions of the barrier which define the access opening together so as to prevent separation thereof.

One or a plurality of access openings may be provided in the first barrier portion.

One or a plurality of openings may be provided in the second barrier portion.

The apparatus may include a vertical plane P which intersects the first and second barrier portions about respective midlines thereof.

One or a plurality of openings may be provided in the intermediate barrier portion positioned to a first side of the plane P.

One or a plurality of openings may be provided in the intermediate barrier portion positioned to a second side of the plane P.

The apparatus may include a stencil which may be positioned on an exterior surface of the barrier for providing an indication to user where to cut an opening in the barrier.

The apparatus may include a CO2 sensor positioned in the chamber for indicating whether a predetermined level of CO2 is present in the chamber.

The apparatus may include a coupling member for coupling the apparatus to a surface; said coupling member for coupling to a first end of a holding member which is connectable at its second end to a fixed structure.

The apparatus may optionally include a further coupling member for coupling the apparatus to a surface; said further coupling member for coupling to a first end of a holding member which is connectable at its second end to a fixed structure.

The apparatus may include one or more barrier extension members which are connected to the barrier and extends in an external direction away therefrom.

Optionally or preferably the one or more barrier extension members may be formed from a different material than the barrier.

Optionally or preferably the barrier extension members may be flexible.

Optionally or preferably the barrier extension members may be resiliently flexible.

The barrier extension member(s) may be connected to respective one(s) of:

the first barrier portion;

the second barrier portion;

the first side of the intermediate barrier portion;

the second side of the intermediate barrier portion.

The apparatus may include a barrier fastening device for fastening the one or more barrier extension members together to close a remainder of the opening during use to inhibit the transmission of any aerosols in chamber to the environment.

Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings, of which:

Figure 1 is a first perspective view of a first embodiment of an isolation apparatus in accordance with the present invention;

Figure 2 is a further perspective view of the apparatus of figure 1;

Figure 3 is a schematic figure showing certain component parts of the apparatus of figure 1;

Figure 4 is a further perspective view of the apparatus of figure 1;

Figure 5 is a further perspective view of the apparatus of figure 1;

Figure 6 is a schematic figure showing certain component parts of the apparatus of figure 1;

Figure 7 is a close up view of showing certain component parts of the apparatus of figure 1;

Figure 8 is a further perspective view showing a portion of the apparatus of figure 1 with certain internal components of the apparatus shown in broken lines;

Figure 9 is a further perspective view showing a portion of an apparatus according to embodiments of the present invention;

Figure 10 shows a further perspective view of the apparatus of figure 1 in a certain condition;

Figure 11 shows a perspective view of the apparatus of figure 1 in a certain condition;

Figures 12a to 12e are schematic diagrams of the apparatus of figure 1 in various states;

Figure 13 is a diagram illustrating use of the apparatus of figure 1 in relation to a user's journey; and

Figure 14 is a perspective view of an apparatus according to embodiments of the present invention in a certain use position.

Referring to the figures there is shown an isolation apparatus 10 according to embodiments of the invention for use in isolating a user from transmitting aerosols to the environment.

The apparatus 10 includes a barrier 12. As shown in figures 10 and 11 the barrier 12 is expandable from a first, stored, condition (fig. 11) to a second, deployed (fig. 10), condition in which the barrier 12 defines a chamber 14 having an opening 16 for receiving a user during use. The term "user" denotes

the person who will be receiving a treatment, e.g. medical treatment, or service, e.g. cosmetic, complementary health, or dental services, from a third party that may need to physical interact with the person during the course of the treatment or service. The apparatus 10 may include a support structure 60 connected to the barrier 12 for supporting the barrier 12 in the second condition relative to a surface on which the apparatus 10 is positioned during use. The support structure 60 may be in a compact state in the first condition (fig. 11) and in an expanded state in the second condition (fig. 10). The apparatus 10 may be stored within a bag or similar packaging whilst in the first, stored, condition, as shown in figure 12a and then removed therefrom prior to deployment into its second condition.

The apparatus 10 may be used in different configurations whilst in the second condition. For example, figure 12e shows the apparatus 10 in a first position suitable for when the apparatus is for use in a caregiving environment and/or whilst the patient is being transported to a hospital and through the patient journey.

Figure 14 shows an apparatus 10 according to embodiments of the invention in a second position suitable for use in a dental surgery or beautician salon.

The barrier 12 may be retracted from the second condition to the first condition. The barrier 12 is advantageous as it isolates the chamber 14 from the environment. This inhibits the transmission of any aerosols in the chamber 12 to the environment.

The barrier 12 may be deformable so as to permit expansion of the apparatus 10 from the first condition to the second condition, e.g. unfolding of the barrier 12 out of a folded state the barrier 12 is in the first condition and/or retracting, e.g. folding of the barrier 12, from the second (deployed) condition to the first (stored) condition. Optionally or preferably the barrier 12 may be resiliently

deformable. This may be advantageous in assisting the barrier 12 in expanding from the first condition.

The barrier 12 may include first and second generally opposed barrier portions 18, 20 which are spaced apart along a longitudinal axis A in the second condition. The first and second barrier portions 18, 20 may, in embodiments, have different characteristics from the rest of the barrier 12, e.g. they may not be resiliently deformable or deformable without departing from the scope of the present invention. The first and second barrier portions 18, 20 define respective left and right sides of the apparatus 10.

The barrier 12 may also include an intermediate barrier portion 22 that connects the first barrier portion 18 to the second barrier portion 20, e.g. so that the barrier 12 forms a single unit that is supported by the support structure 60. The intermediate barrier portion 22 may be provided as a wall.

The apparatus 10 may include a vertical plane P which intersects the first and second barrier portions 18, 20 about respective midlines thereof as determined by the apparatus 10 in its second deployed condition and the apparatus 10 resting on a horizontal surface such that the opening 16 lies in the same plane as the horizontal surface. The intermediate barrier portion 22 may have first (left) and second (right) ends 30, 32 adjacent to the first and second barrier portions 18, 20 respectively. The intermediate barrier portion 22 may have opposing first (rearward or forward of plane P depending on the use configuration), and, second (the other of rearward or forward of plane P depending on the use configuration) sides 34, 36 that are spaced apart from one another in a direction transverse, e.g. perpendicular, to axis A. The sides 34, 36 are parallel to one another and form straight lines.

The intermediate barrier portion 22 extends in a direction along axis A in the second position and may form an elongate shape. The intermediate barrier

portion 22 may have a concave, or arcuate, cross-section. The cross-section of the intermediate barrier portion 22 may be substantially uniform, or constant. The intermediate barrier portion 22 is in a compact state, e.g. folded or compressed state, in the first condition and is an expanded state, e.g. unfolded or stretched state, in the second condition. The intermediate barrier portion 22 may be deformable or resiliently deformable to assist with storage of the apparatus 10 and deployment of the apparatus 10 ready for use. In embodiments the intermediate barrier portion 22 may have different cross-sectional shapes. For example, the intermediate barrier portion 22 may have a rectangular, triangular, square, or trapezoidal cross-section without departing from the scope of the present invention. In embodiments the cross-section of the intermediate barrier portion 22 may not be substantially uniform, or constant. For example, a cross-section of a portion of the intermediate barrier portion 22 may increase as it extends from the first barrier portion 18 towards the second barrier portion 20. A cross-section of a portion of the intermediate barrier portion 22 may increase as it extends from the second barrier portion 20 towards the first barrier portion 18. A largest cross-section of the intermediate barrier portion 22 may be at a position along the axis A equidistant between the first and second barrier portions 18, 20.

The first, second and/or intermediate barrier portions 18, 20, 22, e.g. one or more of the respective inner surfaces thereof, may define the chamber 14 in the second condition. The chamber 14 may be generally elongate shaped, e.g. a shape corresponding to a shape defined by an inner surface of the intermediate barrier portion 22.

In embodiments, the first and second barrier portions 18, 20 may share one or more features in common, e.g. their shape and size. The first and second barrier portions 18, 20 may be provided as walls that are generally planar and/or parallel to each other. The first and second barrier portions 18, 20 may be generally convex shaped and/or correspond to the same shape of the

intermediate barrier portion 22 in cross-section. In other embodiments, the first and second barrier portions 18, 20 may not be planar, and could, for example, have outwardly curved surfaces with respect to the chamber 14.

The intermediate barrier portion 22 has a surface area which is greater than a combined surface area of the first and second barrier portions 18, 20.

Respective bottom edges 27, 29 of the first and second barrier portions 18, 20, and the first and second sides 34, 36 of the intermediate barrier portion 22 may define the opening 16. The opening 16 may be generally rectangular.

The first and second barrier portions 18, 20 may be separate pieces that are connected to the ends 30 and 32 of the intermediate barrier portion 22 respectively by stitching, e.g. by stitching extending around respective perimeters of the first and second barrier portions 18, 20 and respective perimeters of the ends 30, 32 .

The barrier 12 may be generally transparent and/or see-through, i.e. optically clear. The barrier 12 may be formed of polyvinyl chloride (PVC), though other materials could be used without departing from the scope of the present invention. In particular one or more or all of the first barrier portion, second barrier portion, and intermediate barrier portion 18, 20, 22 may be generally transparent and/or see-through, i.e. optically clear. In other embodiments, one or more or all of the first barrier portion, second barrier portion, and intermediate barrier portion 18, 20, 22 may be generally translucent. In other embodiments, one or both of the first and second barrier portions 18, 20 may be opaque. One or more or all of the first barrier portion, second barrier portion, and intermediate barrier portion 18, 20, 22 may be formed of PVC. The barrier 12 may be formed of a material having a thickness of 1mm. In other embodiments, the barrier 12 may be formed of a material having a thickness of between: 0.10mm and 1mm; 0.25mm and 0.75mm; or

approximately 0.50mm without departing from the scope of the present invention.

The support structure 60 may have a height H, a width W, and a depth D. The depth D may be between: 35cm and 70cm; 40cm and 65cm; 45cm and 60cm; and 50cm and 55cm. The width W may be between: 35cm and 75cm; 40cm and 70cm; 45cm and 65cm; and 50cm and 60cm. The height H may be between: 35cm and 75cm; 40cm and 70cm; 45cm and 65cm; and 50cm and 60cm. The depth D, width W and height H are the same in the embodiments shown in the figures. In embodiments, the depth D may be 50cm, the width W may be 50cm and the height H may be 50cm. In other embodiments, the depth D may be 55cm, the width W may be 60cm and the height H may be 60cm. However, in other embodiments the depth D and/or width W and/or height H may differ according to the end application. For example, the depth D may be less than the width W and the height H may be the same as the width W.

The support structure 60 may form a hollow frame or skeletal structure formed of elongate and/or shaped rod like members which support and/or provide rigidity to the barrier 12 when in its second position. For example, the support structure 60 may include first, second, third, fourth and fifth support members 62, 64, 80, 82, 90, that are variously shaped and variously connected to the barrier 12. The support members 62, 64, 80, 82, 90 may be formed from a relatively rigid plastic and may be tubular. However, they may be formed from other materials that are sufficiently rigid to support the barrier 12 during use in embodiments. The barrier 12 may enclose a space between elements of the support structure 60 e.g. support members 62, 64.

First and second support members 62, 64 may be positioned adjacent first and second ends 30 and 32. The first and second support members 62, 64 may be connected to the first and second barrier portions 18, 20 respectively. In

particular, the first and second support members 62, 64 may be connected to respective peripheral portions of the first and second barrier portions 18, 20 respectively.

In the embodiments shown the first and second support members 62, 64 are generally arcuate and may be convex in embodiments. The first and second support members 62, 64 may define inwardly thereof first and second openings 66, 68. The first and second openings 66, 68 are thus generally arcuate or convex shaped in embodiments. In embodiments the first and second support members 62, 64 and/or the openings 66, 68 defined by them may be different shapes, e.g. rectangular or square.

The first and second barrier portions 18, 20 extend across the first and second openings 66, 68 respectively. The first and second support members 62, 64 may also include first and second ends 63, 65, and 67, 69 respectively. The first and second members 62, 64 each extend generally transversely with respect to the axis A. The respective first ends 63, 67 are positioned forward of plane P and the respective second ends 65, 69 are positioned rearward of plane P in the second position as shown in figure 5.

With reference to figure 2, the third support member 80 may be generally elongate and extend longitudinally between the first and second barrier portions 18, 20 for keeping the first and second barrier portions 18, 20 spaced apart relative to each other in the second position. In particular, the third support member 80 assists in preventing collapse of the intermediate barrier portion 22, i.e. a portion, e.g. upper portion, of the intermediate barrier portion 22 positioned to a first (e.g. rearward) side of the plane P, so that the apparatus 10 remains stable during use and a user can more easily access the chamber 14 without hindrance from the barrier 12.

The third support member 80 may have first and/or second ends which have a greater diameter than a remainder of the third support member 80. In particular, the first and/or second ends may be flared. The third support member 80 may be selectively connectable to, or receivable by, the barrier 12, in particular the intermediate barrier portion 22. The intermediate barrier portion 22 may include a sleeve 23 in which the third support member 80 is received to hold the third support member 80 relative to the first and second barrier portions 18, 20 and/or the first and second support members 62, 64.

With reference to figure 2, the support structure 60 may further include a fourth support member 82 for use in the second condition. The fourth support member 82 may be generally elongate and extend longitudinally between the first and second barrier portions 18, 20. The fourth support member 82 may extend alongside the first side 34.

The fourth member 82 assists in keeping the first and second barrier portions 18, 20 spaced apart relative to each other in the second condition. The fourth support member 82 may have first and/or second ends which have a greater diameter than a remainder of the fourth support member 82. In particular, the first and/or second ends may be flared. The fourth support member 82 may be selectively connectable to, or receivable by, the barrier 12, in particular the intermediate barrier portion 22. The intermediate barrier portion 22 may include a sleeve 25 in which the fourth support member 82 is received to hold the fourth support member 82 relative to the first and second barrier portions 18, 20 and/or the first and second support members 62, 64. In the second condition in the first position, i.e. when the opening 16 faces the surface on which the apparatus 10 lies as shown in figure 11, the fourth support member 82 is positioned to the second, rearward, side of the plane P and is positioned closer to the plane P than the third support member 80. In other embodiments the fourth support member 82 may be positioned on the first, forward, side of the plane P. In other embodiments the third support member 80 may be

positioned closer to the plane P than the fourth support member 82. In use in the second condition in the first position, the fourth support member 82 is positioned above the third support member 80, i.e. further from the opening 16 than the third support member 80. In other embodiments, however, the fourth support member 82 may be positioned below the third support member 80, in in the first position. In further envisaged embodiments the fourth support member 82 may be positioned at the same height as the third support member 80 in the first position.

As shown in figure 14, the support structure 60 may include a fifth support member 90 which is selectively connectable to the first and second support members 62, 64, in use in the second condition, to maintain said members in the second condition. The fifth support member 90 may be generally elongate and extend longitudinally between the first and second support members 62, 64. The fifth support member 90 may be positioned to the outside of the intermediate barrier portion 22. The fifth support member 90 can be positioned anywhere along the respective first and second support members 62, 64 so as to provide additional support as required. The fifth support member 90 may include first and second connecting formations 92, 94 for connecting the fifth support member 90 to the first and second support members 62, 64 respectively. The first and second connecting formations 92, 94 may be provided as clip formations which clip onto the first and second support members 62, 64. The clip formations may be resiliently deformable. In other embodiments each of the first and second connecting formations 92, 94 may be provided as hook and loop fasteners which connect to each other once looped around the first and second support members 62, 64.

With reference to figures 1 and 7, the apparatus 10 may include connecting elements 70 for connecting the first and second support members 62, 64 to the first and second barrier portions 18, 20. The connecting elements 70 may be fixed to the barrier 12 and receive the first and second support members

62, 64. In embodiments the connecting elements may be releasably connected to the barrier 12.

A first plurality of connecting elements 70 may be fixed to the first barrier portion 18, e.g. about the perimeter thereof and extend outwardly away therefrom, and a second plurality of connecting elements 70 may be fixed to the second barrier portion 20, e.g. about the perimeter thereof and extend outwardly away therefrom. The first and second plurality of connecting elements 70 may be evenly distributed along the first and/or second barrier portions 18, 20. For embodiments in which the barrier portions 18, 20, 22 are connected together about connections formed at the respective ends 30, 32 of the intermediate barrier portion 22 respectively, the connecting elements 70 may be attached to the barrier 12 along the same connections. In more detail, the first plurality of connecting elements 70 may be stitched into position between the first barrier portion 18 and the first end 30 of the intermediate barrier portion 22. The second plurality of connecting elements 70 may be stitched into position between the second barrier portion 20 and the second end 32 of the intermediate barrier portion 22. The connecting elements 70 provide a connection between the barrier 12 and the support members 62, 64 so that the barrier 12 is retained relative to the members 62, 64.

In further detail, each connecting element 70 may include a formation 72 through which the first or second support member 62, 64 extends, e.g. a loop through which the first or second support member 62, 64 may extend; and a connection portion 74 connected to the formation 72, e.g. the connection portion 74 may be in the form of a tab portion, connected to the barrier 12 for holding the barrier 12 relative to the first or second support member 62, 64. The connecting elements 70 may be flexible to permit some limited movement of the barrier 12 in relation to the support structure 60. The connecting elements 70 may be made from PVC, and may in particular be made from the same material as the barrier 12. In other embodiments the connecting

elements 70 may be made from a different material, such as a fabric or textile or other plastic, without departing from the scope of the invention.

Referring to figures 1 and 2, the apparatus 10 includes retaining formations 100, 102, 104, 106 for retaining the support structure 60 relative to the barrier 12. In embodiments, the retaining formations 100, 102, 104, 106 may be fixed to the barrier 12.

In more detail, first and second retaining formations 100, 102 are for retaining the first and second ends 63, 65 of the first support member 62. Thus, the first and second retaining formations are positioned to lie adjacent respective first and second corners 101, 103 defined between the sides 34, 36 and the ends 30, 32 of the intermediate barrier portion 22 respectively, i.e. the first and second retaining formations 100, 102 are positioned at the first and second corners 101, 103.

The retaining formations 100, 102 may take the form of a formation in which the first and second ends 63, 65 of the first support member 62 are received, e.g. a pocket in which the first or second end 63, 65 may be received; and a connection portion, e.g. a tab portion, connected to the barrier 12 for holding the barrier 12 relative to the first and second ends 63, 65 of the first support member 62, e.g. a remainder of the pocket which is connected to the barrier 12. In the present embodiment the retaining formations 100, 102 are stitched to the barrier 12 between the first barrier portion 18 and the intermediate barrier portion 22 adjacent the first and second corners 101, 103.

Third and fourth retaining formations 104, 106 include the same features as the first and second retaining formations 100, 102 except that they receive respective ends 67, 69 of the second support member 64. Thus, the third and fourth formations 104, 106 are connected to the second barrier portion 20 and positioned at third and fourth corners 105, 107 opposite corners 101, 103

respectively. In other embodiments the third and fourth retaining formations 104, 106 may differ from the first and second retaining formations 100, 102.

The retaining formations 100, 102, 104, 106 may be flexible to enable a secure fitment of the respective first and second ends 63, 65, and 67, 69 in relation to the barrier 12. The retaining formations 100, 102 may be made from PVC, and may in particular be made from the same material as the barrier 12. In other embodiments the retaining formations 100, 102 may be made from a different material, such as a fabric or textile or other plastic, without departing from the scope of the invention.

The fourth support member 82 may extend between the first and third 101, 105 or the second and fourth 103, 107 corners in the second, deployed, condition of the apparatus 10.

The apparatus 10 may include access openings 110a-f for permitting access to the chamber 14 and which may be provided on the barrier 12.

As shown in figures 1, 2 and 3, in embodiments, the apparatus includes a plurality of access openings 110a-e An access opening 110a, b is provided in each of the first barrier portion 18, the second barrier portion 20; an access opening 110c in the intermediate barrier portion 22 at a first, forward, side of the plane P, i.e. adjacent the side 36; and two access openings 110d, e are provided in the intermediate barrier portion 22 at a second, rearward, side of the plane P, i.e. adjacent the side 34. The two access openings 110d, e provided at the second side of the plane P are spaced apart in a longitudinal direction so that access to opposite ends of the chamber 14 is permitted.

In embodiments, the access openings 110a – e may have an elongate shape. Furthermore, the access openings 110a,b in the first barrier portion 18 and the second barrier portion 20, and the access openings 110d, e in the intermediate

barrier portion 22 positioned to a second side of the plane P may be oriented generally vertically, i.e. in a direction generally perpendicular to the opening 16. In other embodiments one or more of the access openings 110a, b, d, e may be inclined at an acute angle to the opening 16 and/or the plane P.

The access opening 110c in the intermediate barrier portion 22 positioned to a first side of the plane P is oriented generally horizontally, i.e. generally parallel to the opening 16. In other embodiments the access opening 110c may be oriented generally vertically or inclined to the opening 16 and/or the plane P without departing from the scope of the present invention.

A combination of access openings as envisaged for embodiments is advantageous as it permits multiple caregivers or service / treatment givers to access the chamber 14 at any one time and also permits access to different parts of the chamber 14 as required, e.g. during an intubation procedure. In other envisaged embodiments more than one access opening may be provided in each of the first barrier portion 18, second barrier portion 20 and the intermediate barrier portion 22 positioned to a first side of the plane P. For example, two access openings may be provided in each of the first barrier portion 18, second barrier portion 20 and the intermediate barrier portion 22 positioned to a first side of the plane P. In other embodiments the intermediate barrier portion 22 positioned to a second side of the plane P may be provided with only a single opening, or it may be provided with three or more openings without departing from the scope of the present invention.

For certain embodiments, in general terms, the access openings 110a-e may be configured to have a self-sealing or closing effect so that once a caregiver or treatment / service giver has accessed the chamber through the access openings 110a-e and then removed his or her hands from the chamber 14, the access openings 110a-f seal or close so as to maintain a relatively sealed environment within the chamber.

In the present embodiment the access openings 110a-e are substantially the same. Therefore, only one of the access openings 110a will be described in detail. However, it should be appreciated that the access openings 110a-e may be different to each other without departing from the scope of the present invention.

With reference to figure 8, the access opening 110a may be in the form of a slot provided in the barrier 12 defined by respective portions 112, 114 of the barrier 12. In embodiments for which the barrier 12 is resiliently deformable, the portions of the barrier surrounding the access opening 110 may deform so that the opening enlarges on a person's hand being inserted through the opening 110.

The apparatus 10 may include a sealing wall 120, e.g. a planar member, for sealing the access opening 110a. The sealing wall 120a is moveable between a first sealing wall condition in which it seals the opening 110a and a second sealing wall condition in which it does not seal the opening 110a. The sealing wall 120 may be biased to the first sealing wall condition. The sealing wall 120 may be resiliently deformable. This may be advantageous in permitting a user greater access to the chamber 14 through the opening 110a.

The sealing wall 120a may include a connection portion 122 connected to the barrier 12 and a freely extending sealing portion 124 which extends from the connection portion 122 over the access opening 110 for sealing the opening 110. In particular, the barrier 12 includes an interior surface and an exterior surface. The sealing wall may be connected to the interior surface of the barrier 12 so as to seal the opening 110a from within the chamber. However, in other embodiments the sealing wall 120 may be connected to the exterior surface of the chamber 12. The sealing wall 120 is flexible to enable easy movement of the sealing wall 120 when a hand is inserted through the opening

110a. The sealing wall 120 may be made from PVC, and may in particular be made from the same material as the barrier 12. In other embodiments the sealing wall 120 may be made from a different material, such as a fabric or textile or other plastic, without departing from the scope of the invention.

Referring to figure 9, in embodiments, the apparatus 10 may include fastening devices 130a-e for each of the access openings 110a-e. The fastening devices 130a-e may be the same in embodiments and so for the purpose of describing them, only fastening device 130a will be described in detail.

Fastening device 130a is for fastening respective portions 112, 114 of the barrier 12 which define the access opening 110a together so as to prevent separation thereof. For example, the fastening device 130a may include first, second and third fastening portions 132, 134, 136. The third fastening portion 136 is shown in an exploded position relative to the access opening 110a. The first and second portions 132, 134 may be positioned adjacent the first and second portions 112, 114. The first and second portions 132, 134 may be connected to an exterior surface of the barrier 12 exposed to atmosphere. The third portion 136 is releasably connectable to the first and second fastener portions 132, 134. The third portion 136 may overlie the first and second portions 132, 134 to secure the first and second portions 132, 134 relative thereto. The third portion 136 may be shorter than the first and second portions 132, 134 to assist in the removal thereof. Alternatively, the third portion 136 may be longer than the first and second portions 132, 134 or the same length as the first and second portions 132, 134 without departing from the scope of the present invention. The fastening device 130 may be a distributed mechanical engagement fastener, e.g. Velcro. Alternatively, the fastening device 130 may be an adhesive type fastener.

In embodiments, the first and second portions 132, 134 may be connected to an interior surface of the barrier 12 or the first portion 132 may be connected

to an interior surface of the barrier 12 and the second portion 134 may be connected to the sealing wall 120. In these embodiments the third portion 136 may be omitted.

Referring to figure 4, the apparatus 10 may include a coupling member 220 and a further coupling member 230 for coupling the apparatus 10 to a surface by coupling to respective first ends of a holding member and a further holding member (not shown) e.g. a flexible tying cord or lead. The coupling members 220, 230 are fixed to the longitudinal ends of the apparatus to one side thereof.

The provision of coupling members 220, 230 permits additional stability to be achieved during use of the apparatus 10. Respective second ends of the holding member and the further holding member are connectable at their second ends to a fixed structure, e.g. to the frame of a bed on which the user is rested. The coupling member 220 and further coupling member 230 are substantially the same and so only one will be described. However, in other embodiments the coupling member 220 and further coupling member 230 may differ without departing from the scope of the present invention.

The coupling member 220 may include a formation 222 (shown in figure 9) to which the first end of the holding member may be coupled, e.g. a loop through which the first end of the holding member may extend. The coupling member 220 may also include a coupling connection portion 224, e.g. a tab portion, connected to the barrier 12 for holding the barrier 12 relative to the fixed structure, e.g. a remainder of the loop which is connected to the barrier 12.

The coupling member 220 is provided to the second, front, side of the plane P and the intermediate barrier portion 22 adjacent the front side 36 of the intermediate barrier portion 22 and/or adjacent the surface. The coupling member 220 is connected to the barrier 12 between the first barrier portion 18

and the intermediate barrier portion 22 by the coupling connection portion 224 being stitched between the first barrier portion 18 and the intermediate portion 22 at or near the first retaining formation 100.

The further coupling member 230 is provided to the second, front, side of the plane P and the intermediate barrier portion 22 adjacent the front side 36 of the intermediate barrier portion 22 and/or adjacent the surface and is otherwise similarly connected to the barrier 12 about respective second barrier portion 20 and the intermediate barrier portion 22 close to the second retaining formation 102.

The coupling members 220, 230 may be flexible and/or made from PVC, and may in particular be made from the same material as the barrier 12. In other embodiments the coupling members 220, 230 may be made from a different material, such as a fabric or textile or other plastic, without departing from the scope of the invention.

As shown in figures 1 and 2 the apparatus includes a plurality of barrier extension members 240, 242, 244, 246 which are connected to the barrier 12 and extend in an external direction away therefrom. The barrier extension members 240, 242, 244, 246 may be in the form of drapes for use in sealing and/or covering a portion of the user's body as will be described.

A barrier extension member 240, 242, 244, 246 is connected to each of the first barrier portion 18, the second barrier portion 20, the intermediate barrier portion 22 at a first, forward, side of the plane P, i.e. adjacent the side 36, and to the intermediate barrier portion 22 at a second, rearward, side of the plane P, i.e. adjacent the side 34. In envisaged embodiments only the first barrier portion 18, second barrier portion 20 and the intermediate barrier portion 22 at a second rearward side of the plane P may be connected to a barrier extension member 240, 242, 244, 246. In further envisaged embodiments

only the intermediate barrier portion 22 at a first forward side of the plane P may be connected to a barrier extension member 246.

The barrier extension members 240, 242 connected to the first and second barrier portions 18, 20 respectively are connected at or near to bottom edges 27, 29 thereof. The barrier extension members 240, 242 extend, preferably completely, along the bottom edges 27, 29 respectively. The barrier extension members 244, 246 are connected at or near to the first and second sides 34, 36 of the intermediate barrier portion 22. The barrier extension members 244, 246 extend, preferably completely, along the first and second sides 34, 36. Such a construction in respect of the barrier extension members 240, 242, 244, 246 is advantageous in ensuring an effective seal between the chamber 14 and the external environment.

The barrier extension member(s) 240, 242, 244, 246 are connected by stitching between respective edges of the barrier extension member(s) 240, 242, 244, 246 and the edges/sides 27, 29, 34, 36 of the first, second and intermediate barrier portions 18, 20, 22. In other envisaged embodiments the barrier extension members 240, 242, 244, 246 may be connected to the barrier by alternative means, for example adhesive, without departing from the scope of the present invention.

The one or more barrier extension members 240, 242, 244, 246 may be deformable and/or resiliently deformable.

The barrier extension members 240, 242, 244, 246 are advantageous. In the first position shown in figure 12e the barrier extension members 240, 242, 244 are folded underneath a user to assist in fluidly isolating the chamber 14 from the external environment. The barrier extension member 246 extends over a remainder of a user's body in use also to assist in fluidly isolating the chamber 14 from the external environment.

In the second position shown in figure 14 the barrier extension members 240, 242, 244 overlie the opening 16, as shown in figure 14, and assist in preventing the transmission of aerosols to the external environment by acting as a barrier thereto.

In the present embodiment, as shown in figures 1 and 2, the barrier extension member 246 connected to the intermediate barrier portion 22 at the first side of the plane P is longer than the other barrier extension members 240, 242, 244. This is advantageous as it enables in the first position, a more air-tight fitment of the apparatus around a user.

As shown in figure 14, barrier extension member 246 is also advantageous in the second position as it provides a disposable surface on which a user can lie. In other embodiments, the barrier extension members 240, 242, 244, 246 may be the same length without departing from the scope of the present invention.

The barrier extension members 240, 242, 244, 246 are formed from a different material than the barrier 12. The material from which the barrier extension members 240, 242, 244, 246 are formed may be denser than the material from which the barrier 12 is formed. In other embodiments, the material from which the barrier extension members 240, 242, 244, 246 are formed may be less dense than the material from which the barrier 12 is formed.

The barrier extension members 240, 242, 244, 246 in the present embodiment are opaque, e.g. formed of a blue material. In contrast the barrier 12 may be formed, at least partially, of a transparent, i.e. optically clear, material. In other embodiments one or more or all of the barrier extension members 240, 242, 244, 246 may be translucent or transparent without departing from the scope of the present invention. In further envisaged embodiments one or more or all

of the barrier extension members 240, 242, 244, 246 may be formed of the same material as the barrier 12. In particular, one or more or all of the barrier extension members 240, 242, 244, 246 may be integrally formed with the barrier 12.

In the present embodiment the barrier extension members 240, 242, 244, 246 in plan view are generally rectangular in shape. The barrier extension member 246 includes a generally trapezoidal portion adjacent the barrier 12. A width of the trapezoidal portion increases as it extends away from the barrier 12. A generally rectangular portion extends away from the trapezoidal portion. The purpose of these portions will be described. In embodiments each of the barrier extension members 240, 242, 244, 246 may include a generally trapezoidal portion adjacent the barrier as described above. It should be appreciated that the barrier extension member(s) 240, 242, 244, 246 may be other shapes without departing from the scope of the invention. For example, the barrier extension member(s) may be triangular or arcuate without departing from the scope of the present invention.

Figure 14 shows a further embodiment of the invention in a second, in use, position in the second condition. The same reference numerals have been adopted for common features between the apparatus 10 shown in the other figures.

The main differences include the provision of a barrier fastening device 250 for fastening the barrier extension members 240, 242, 244 together to close the opening 16 during use to inhibit the transmission of any aerosols in the chamber 14 to the environment. When the barrier fastening device 250 is fastened to the barrier extension members 240, 242, 244 portions of the barrier extension members 240, 242 proximate the user may be able to be deformed by the user to provide enhanced user comfort whilst continuing to provide a barrier to aerosols.

The apparatus 10 also only includes first and second access openings 110a, b in the first and second barrier portions 18, 20 respectively. As described with reference to the first embodiment, additional access openings could be provided in the first and second barrier portions 18, 20 and in the intermediate barrier portion 22 as required. Furthermore, the apparatus includes one or more stencils 200 which, when required, is positioned over an exterior surface of the barrier 12 to permit a predetermined opening size and position thereof to be formed in the barrier 12 according to the intended use of the apparatus 10. In embodiments each stencil 200 may be in the form of an adhesive cutting guide formed of one or more members that are applied to the barrier 12, or it may be printed onto the barrier 12. In particular the stencil 200 is aligned as desired by being positioned in line with the or each access opening 110a, b in use and then the barrier 12 could be cut using, for example, scissors, along the indicated lines provided on the stencil 200. In embodiments, the access openings 110a, 110b can be extended through cutting of the barrier 12 along a predetermined line as indicated by the stencil 200. In embodiments for which the stencil 200 is made from a plurality of members, the members could include reference markings that indicate how the members should be positioned on the barrier 12 relative to one another to ensure a predetermined opening size, shape and/or position can be made. Once the required cuttings have been made, the stencil 200 can be removed from the barrier 12. In other embodiments the stencil 200 may be aligned using other features of the apparatus 10 as reference points, for example the first and second support members 60, 62 without departing from the scope of the invention.

The stencil 200 permits the opening 110 to be extended along a predetermined line or shape to allow particular treatments to be conducted, e.g. for a routine dental inspection where access to a patient's mouth is required for dental tools. This is completed by cutting the barrier 12 where the stencil 200 indicates. This is advantageous as it permits greater access to a

user positioned in the chamber 14 whilst maintaining a barrier between a caregiver and the user.

In more detail, in the present embodiment the stencil 200 includes a first stencil portion 202 which, in use, is positioned adjacent access opening 110a so to run alongside the opening, and a second stencil portion 204 which provides an indication to a user where to cut an opening in the barrier 12, or in which direction the opening 110a should be extended. For example, the opening 110a may be extended along a 45 degree angle upwardly and away from a midway point along the opening 110a. The indication to the user may provide first and second lines which intersect, as shown in figure 14. In alternative embodiments, the indication provided may be annular, rectangular, ovular or stadia shaped without departing from the scope of the present invention.

The apparatus 10 may include a CO_2 sensor 210, as shown in figure 14. The CO_2 sensor 210 may be positioned in the chamber 14 for indicating whether a predetermined level of CO_2 is present in the chamber 14. The sensor 210 may change colour to indicate a predetermined level has been reached. This is advantageous in ensuring that a user of the apparatus 10 does not suffer breathing difficulties and/or CO_2 poisoning whilst using the apparatus 10.

A method of deploying the apparatus 10 from its first, stored, position, to its second, deployed, position will now be described with reference to figures 12a-e.

The apparatus 10 is firstly removed from a bag in which it is stored in its first condition as shown in figure 12a. In the first condition, the first and second members 60, 62 are already connected to the barrier and the apparatus 10 is in a folded state with the first and second support members 60, 62 resting

adjacent one another. The other support members are provided within the bag for connecting to the apparatus 10. Once the apparatus 10 has been removed, the first and second members 60, 62 are pulled apart as shown in figure 12b, thereby expanding the support structure 60 and similarly expanding the barrier 12 to an expanded deployed condition. The barrier 12 is expanded from the first, compact, condition to the second expanded condition. In more detail, the first and second support members 60, 62 move apart along the longitudinal axis A until the intermediate portion 22 is in an expanded state.

Referring to figure 12c, the third support member 80 is removed from the bag and then inserted into the sleeve 23 by sliding the third support member 80 along the sleeve 23. This is done until the third support member 80 is received in the sleeve 23 and positioned between the first and second support members 60, 62.

Referring to figure 12d, the apparatus 10 is placed onto its side and the fourth support member 82 is removed from the bag before being inserted into the sleeve 25 by sliding the fourth support member 82 along the sleeve 25. This is done until the fourth support member 82 is received in the sleeve 25 and positioned between the first and second support members 60, 62. The fourth support member 82 may be inserted into sleeve 25 before the third support member 80 is inserted into the sleeve 23 without departing from the scope of the present invention.

The apparatus 10 is now ready for use.

Further use will now be described with reference to a patient journey as shown in figure 13. The patient may be initially treated in a GP surgery or another environment such as a hospice or care home in relation to a condition whereby the patient is displaying symptoms consistent with a known virus such as

SARS-CoV-2 (otherwise known as Covid-19) or suffering from another illness that requires the patient to be resuscitated in the environment.

The apparatus 10 may be placed into its first position with the apparatus 10 being positioned over the head, neck and shoulders of the patient so that the head, neck and shoulders extend through the opening 16 and are positioned within the chamber as shown in figure 12e. The barrier extension members 240, 242, 244 are folded underneath the apparatus 10, e.g. under the patient's head / or cushion, to overlie the opening 16. The barrier extension member 246 is positioned so as to overlie a remainder of the body of the patient. Collectively, the barrier extension members 240, 242, 244, 246 fluidly isolate the chamber 14 from the external environment. In more detail, in this first position the opening 16 faces generally downwardly toward the surface on which the apparatus is positioned during use. Barrier extension members 240, 242, 244, 246 are positioned to effectively isolate the chamber 14 from the environment. In particular barrier extension members 240, 242, 244 may be folded underneath a user's head and shoulders to overlie the opening 14 and barrier extension member 244 may be positioned to overlie a remainder of a user's body, e.g. in a direction away from the barrier 12.

The care giver may now access the chamber 14 through the access openings 110a-e as necessary to perform resuscitation procedures / other treatments involving the airways of the patient whilst the apparatus 10 has effectively isolated the airways to contain any aerosols that could be produced within the chamber 14 and away from the environment. The access openings 110a-e advantageously are also effectively sealed through the use of the sealing walls 120 and fastening devices 130.

In a situation whereby emergency service paramedics and ambulance are required to transport the patient to the hospital, the apparatus 10 can be kept within the ambulance in its first condition and then deployed similar to that

shown in figure 12e once the patient has been placed upon a gurney for transportation to hospital. The patient is thus fluidly isolated from the environment and can be safely transported to the hospital whilst preventing transmission of the illness.

Coupling member 220 and further coupling member 230 are then used to couple the apparatus 10 to the gurney to ensure that the apparatus 10 stays in position in respect of the gurney and the user. As the patient continues his or her medical journey, they may require intubation and/or other breathing aids and these may be administered whilst the apparatus 10 is *in situ* through the access openings 110a-f or through a corner 101, 103, 105, 107 of the apparatus 10. Similarly, the apparatus 10 can remain in place should the patient be required to be transported to another department within the hospital, require treatment in theatre, whilst staying on a ward, and/or end of life care. For any part of this journey, the patient may require CPAP, BiPAP, Nebuliser, and oxygen treatment. Advantageously, the apparatus 10 captures large, medium and small droplets within it, and any gases emanating from the patient, and prevents leakage of them which causes any virus to dry up thus reducing the chances of infection occurring to those in proximity to the patient. The provision of the trapezoidal recesses at the corners of the barrier extension members may be advantageous as it enables a greater overlap of the barrier extension members when folded over each other, thus providing a more secure sealing of the chamber 14. It is also advantageous as breathing aids may be passed into the chamber 14 and any tubing associated therewith may be passed through the corners 101, 103, 105, 107 without substantially breaking the seal of the chamber 14 e.g. if a nebuliser or CPAP machine is required or if a laryngoscope required to assist with intubation of a patient needs to be provided in the chamber 14.

Once the apparatus 10 has completed its use, it may retracted into its first condition and disposed of in the usual way for hazardous or bio-hazard

materials. Advantageously, the apparatus 10 is a compact size in its first condition and so can be disposed of without having to use larger vessels.

A use of the apparatus 10 as shown in figure 14 in a dental surgery will now be described.

The risk of contamination is generally considered less in these environments and there is a general assumption that the user is not infected with an illness that may be transmitted through an aerosol. However, because a user may be asymptomatic, the user may still transmit a virus or illness in such environments.

The apparatus 10 can be moved to its second condition in the same way as described in relation to the previous embodiments.

Optionally, the fifth support member 90 may be connected to the first and second support members 60, 62 to provide additional stability given that the apparatus 10 is orientated differently in the second position. The fifth support member 90 may be positioned to lie along an upwardly facing surface of the intermediate barrier portion 22.

The dentist then applies the stencils 200 over each opening 110a, b if required for a particular treatment being administered to the patient or in line with the dentist's preference. Incisions are made in the barrier 12 following the predetermined line or shape defined by the stencils 200.

The apparatus 10 is then laid on the dentist's chair and fixed in position. This is achieved using the coupling members 220, 230 to couple the apparatus 10 to the chair. The barrier extension member 246 is positioned on top of the chair in this position ready for a patient to lie on it.

A user receiving the dentist's attention then lies in the dentist's chair and positions their head, neck and shoulders within the chamber 14 with the barrier extension member 246 positioned underneath them.

The dentist then collects together the barrier extension members 240, 242, 244 and fastens them together using the barrier fastening device 250. This provides a barrier between the userand the dentist.

The main difference in the second position compared to the first position shown in figure 12e, is that the apparatus 10 generally rests on its side with a side of the intermediate barrier portion 22 lying adjacent and/or abutting the surface on which the apparatus 10 rests. In this second position, the opening 16 faces generally forwardly in a direction generally parallel to the surface on which the apparatus 10 is positioned during use. The opening 16 is in particular positioned forward of the user's head as viewed from the side. The side 34 of the intermediate barrier portion 22 is in a raised position relative to the user's head and the side 36 rests on the surface. The barrier 12 thus generally extends from above the user's head to beneath the user's head. The apparatus 10 is thus orientated in the opposite sense to the first position with the barrier extension member 246 positioned underneath the user on the surface. The barrier extension members 240, 242, 244 are shown fastened by the fastening device 250, e.g. a hook and loop fastener, so that they generally close opening 16 to substantially isolate the chamber 16 from the environment.

The dentist is then able to carry out the dental examination as has been done previously.

It will be appreciated that the apparatus 10 can be deployed very quickly with little training being required and that it is suitable for use in a variety of environments.

When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Although certain example embodiments of the invention have been described, the scope of the appended claims is not intended to be limited solely to these embodiments. The claims are to be construed literally, purposively, and/or to encompass equivalents.

Claims

1. An isolation apparatus to isolate a user from transmitting aerosols to the environment, including:

a barrier expandable from a first, stored, condition to a second, deployed, condition in which the barrier defines a chamber having an opening for receiving a user during use, wherein the barrier isolates the chamber to inhibit the transmission of any aerosols in the chamber to the environment; and

a support structure connected to the barrier for supporting the barrier in the second condition relative to a surface on which the apparatus is positioned during use.

2. An isolation apparatus according to claim 1 wherein the barrier is deformable, optionally or preferably resiliently deformable.

3. An isolation apparatus according to claim 1 or claim 2 wherein the barrier may be retracted from the second condition to the first condition.

4. An isolation apparatus according to any preceding claim wherein support structure is in a compact state in the first condition and is in an expanded state in the second condition.

5. An apparatus according to any preceding claim wherein the barrier includes first and second generally opposed barrier portions which are spaced apart along a longitudinal axis A in the second position.

6. An apparatus according to claim 5 wherein the first and second barrier portions are generally planar;

optionally or preferably wherein the first and second barrier portions are parallel.

7. An apparatus according to claim 5 or claim 6 wherein the barrier includes an intermediate barrier portion that connects the first barrier portion to the second barrier portion, optionally or preferably the intermediate barrier portion extends in a direction along axis A in the second position.

8. An apparatus according to claim 7 wherein the intermediate portion is in a compact state in the first condition and is an expanded state in the second condition.

9. An apparatus according to claim 7 or claim 8 wherein the first and second barrier portions are provided by first and second walls respectively and the intermediate barrier portion is provided by an intermediate wall;

wherein the intermediate wall has first and second ends adjacent to the first and second walls respectively, and first and second opposing sides which extend from the first to the second side ends;

optionally or preferably the intermediate wall connects the first wall to the second wall.

10. An apparatus according to any one of claims 7 to 9 wherein the intermediate barrier portion has a, concave, optionally or preferably an arcuate, cross-section.

11. An apparatus according to any one of claims 5 to 10 wherein the first, second and/or intermediate barrier portions define an elongate-shaped chamber in the second condition.

12. An apparatus according to any one of claims 5 to 11 wherein the support structure includes first and second support members connected to the first and second barrier portions respectively;

optionally or preferably the first and second support members are arcuate members,

optionally or preferably the first and second support members are a convex shape;

optionally wherein the first and second support members define first and second openings respectively; and

wherein the first and second barrier portions extend across the first and second openings respectively.

13. An apparatus according to claim 12, including connecting elements for connecting the first and second support members to the first and second barrier portions;

optionally, or preferably, wherein the connecting elements are fixed to the barrier.

14. An apparatus according to claim 13 wherein the or each connecting element includes:

a formation through which the first or second support member extends; and

a connection portion connected to the barrier for holding the barrier relative to the first or second support member.

15. An apparatus according to claim 13 or claim 14 including:

a first plurality of connecting elements fixed to the first barrier portion; and/or

a second plurality of connecting elements are fixed to the second barrier portion.

16. An apparatus according to any one of claims 12 to 15 wherein the first support member includes first and second ends; and

wherein the apparatus includes first and second retaining formations connected to first and second corners of the first barrier portion for retaining the first and second ends of the first support member respectively;

wherein the first and second retaining formations, in use, are positioned adjacent the surface; and/or

wherein the second support member includes first and second ends and wherein the apparatus includes third and fourth retaining formations connected to third and fourth corners of the second barrier portion for retaining the first and second ends of the second support member respectively;

wherein the third and fourth retaining formations, in use, are provided adjacent the surface.

17. An apparatus according to any preceding claim when dependent, directly or indirectly, on claim 5 wherein the support structure includes a third support member for use in the second condition; wherein the third support member extends between the first and second barrier portions for keeping the first and second barrier portions spaced apart relative to each other in the second condition;

optionally or preferably wherein the third support member is an elongate member;

optionally wherein the third support member is selectively connectable to, or receivable by, the barrier, optionally or preferably connectable to or receivable by the intermediate barrier portion;

optionally including a vertical plane P which intersects the first and second barrier portions about respective midlines thereof and wherein the third support member is positioned to a first side of the plane P.

18. An apparatus according to claim 17 wherein the support structure includes a fourth support member for use in the second condition;

wherein the fourth support member extends between the first and second barrier portions for keeping the first and second barrier portions spaced apart relative to each other in the second condition;

optionally wherein the fourth support member is an elongate member;

optionally wherein the fourth support member is positioned to a second side of the plane P;

optionally wherein, in use in the second condition, the fourth support member is positioned closer to the plane P than the third support member;

optionally wherein, in use in the second condition, the fourth support member is positioned above the third support member.

19. An apparatus according to any preceding claim, when dependent, directly or indirectly, on claim 5 wherein the support structure includes a fifth support member which is selectively connectable to the first and second support members, in use in the second condition, to maintain said members in the second condition;

optionally wherein the fifth support member includes first and second connecting formations for connecting the fifth support member to the first and second support members respectively.

20. An apparatus according to any preceding claim wherein the barrier includes an access opening for permitting access to the chamber;

optionally wherein the access opening is a slot provided in the barrier;

optionally including a sealing wall for sealing the access opening, wherein the sealing wall is moveable between a first sealing wall condition in which it seals the opening and a second sealing wall condition in which it does not seal the opening;

optionally or preferably the sealing wall is biased to the first sealing wall condition;

optionally or preferably the sealing wall is resiliently deformable;

optionally wherein the sealing wall includes a connection portion connected to the barrier and a sealing portion which extends from the connection portion over the access opening for sealing the opening;

optionally wherein the barrier includes an interior surface and an exterior surface; wherein the sealing wall is connected to the interior surface of the chamber so as to seal the opening from within the chamber;

optionally including a fastening device for fastening respective portions of the barrier which define the access opening together so as to prevent separation thereof.

21. An apparatus according to claim 20 when dependent, directly or indirectly, on claim 5 wherein one or a plurality of access openings is provided in the first barrier portion; and/or

wherein one or a plurality of openings is provided in the second barrier portion; and/or

including a vertical plane P which intersects the first and second barrier portions about respective midlines thereof wherein one or a plurality of openings is provided in the intermediate barrier portion positioned to a first side of the plane P; and/or

wherein one or a plurality of openings is provided in the intermediate barrier portion positioned to a second side of the plane P.

22. An apparatus according to any preceding claim including a stencil which may be positioned on an exterior surface of the barrier for providing an indication to user where to cut an opening in the barrier; and/or

including a CO2 sensor positioned in the chamber for indicating whether a predetermined level of CO2 is present in the chamber.

23. An apparatus according to any preceding claim including a coupling member for coupling the apparatus to a surface; said coupling member for

coupling to a first end of a holding member which is connectable at its second end to a fixed structure;

optionally including a further coupling member for coupling the apparatus to a surface; said further coupling member for coupling to a first end of a holding member which is connectable at its second end to a fixed structure.

24. An apparatus according to any preceding claim wherein the apparatus includes one or more barrier extension members which are connected to the barrier and extends in an external direction away therefrom;

optionally or preferably wherein the one or more barrier extension members are formed from a different material than the barrier;

optionally or preferably the barrier extension members are flexible, even more preferably resiliently flexible.

25. An apparatus according to claim 24 when dependent, directly or indirectly, on claim 5 wherein the barrier extension member(s) may be connected to respective one(s) of:

the first barrier portion;

the second barrier portion;

the first side of the intermediate barrier portion;

the second side of the intermediate barrier portion; and/or

including a barrier fastening device for fastening the one or more barrier extension members together to close a remainder of the opening during use to inhibit the transmission of any aerosols in chamber to the environment.

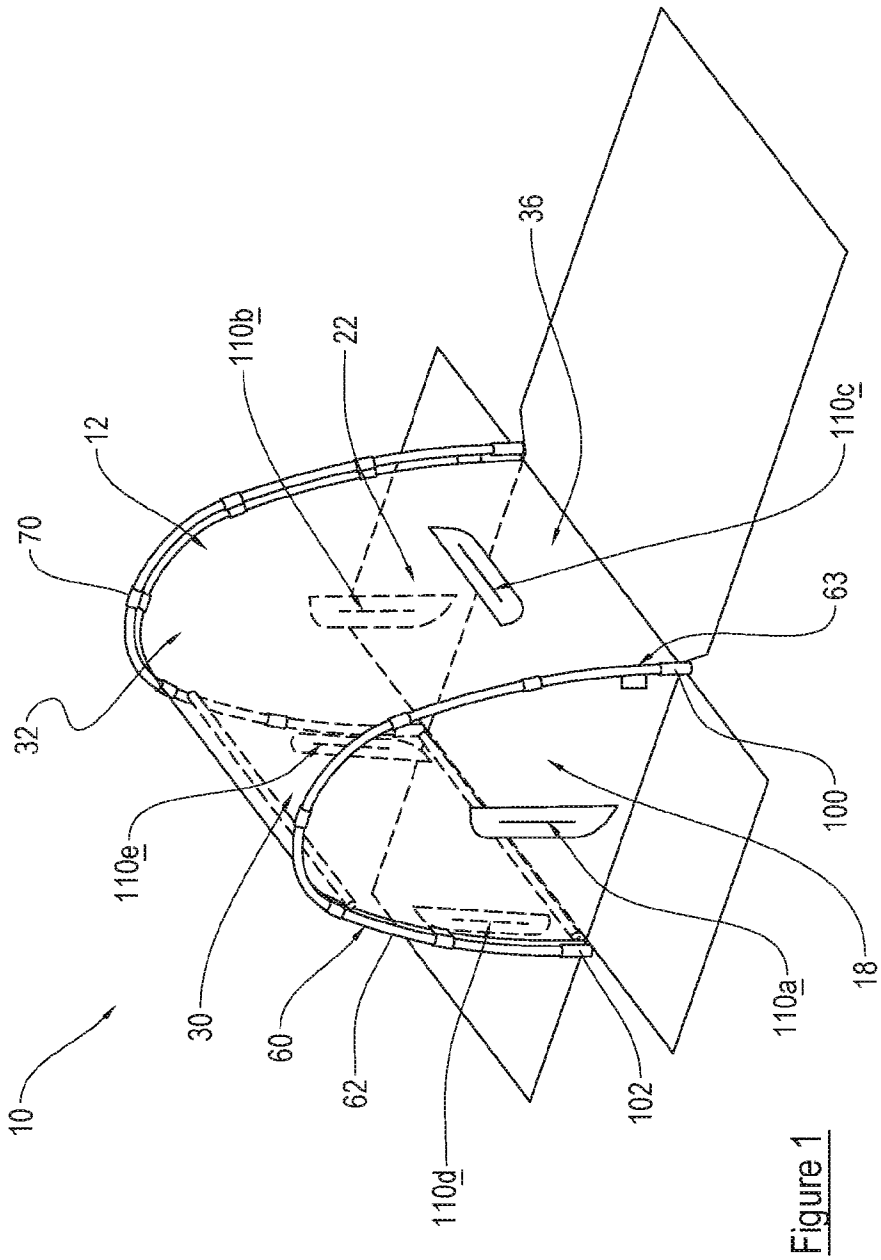

Figure 1

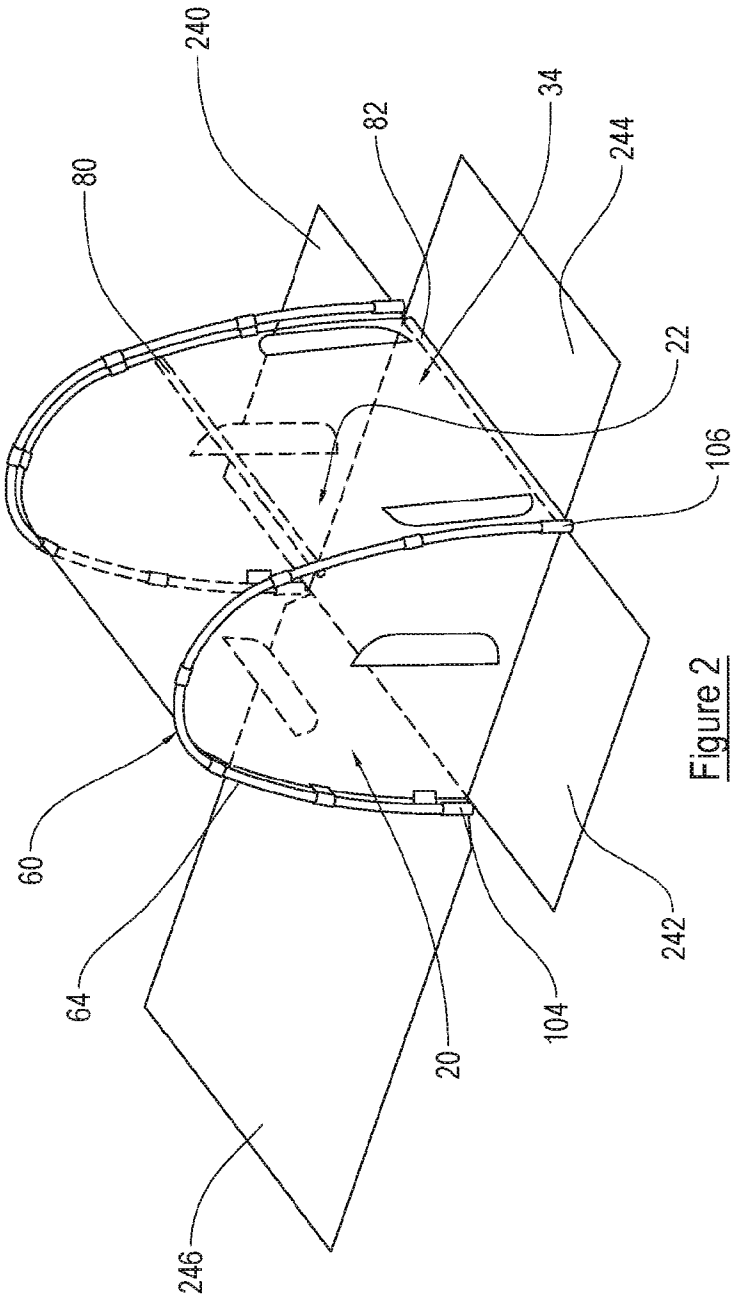

Figure 2

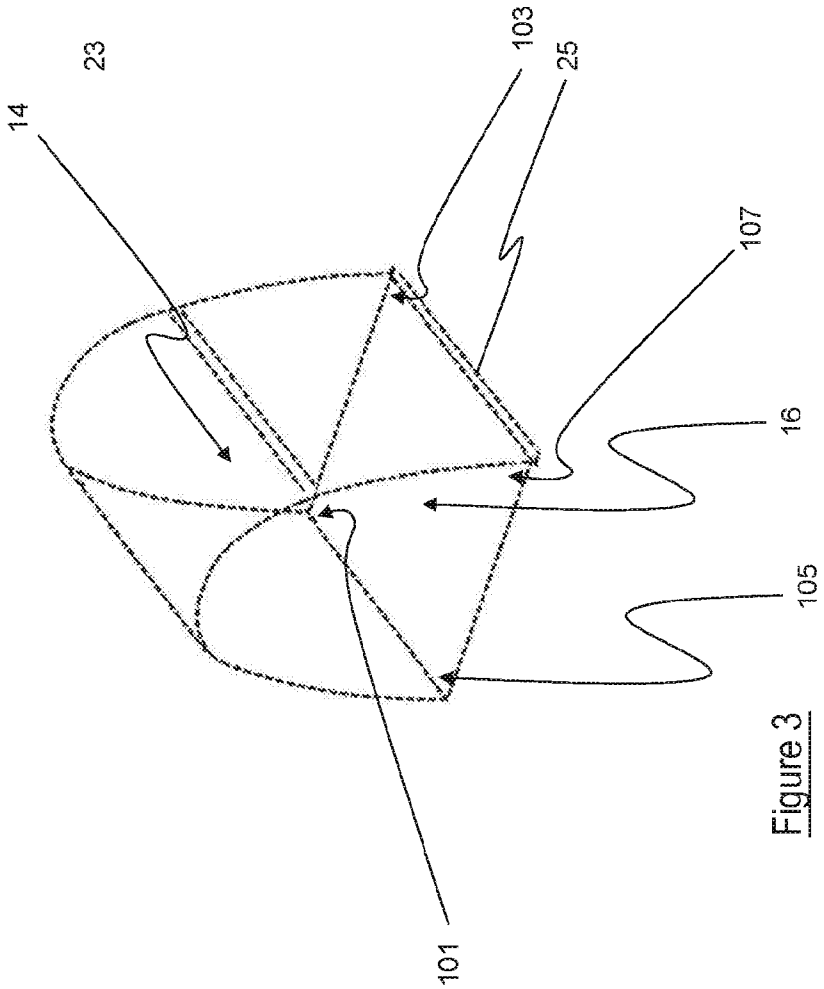

Figure 3

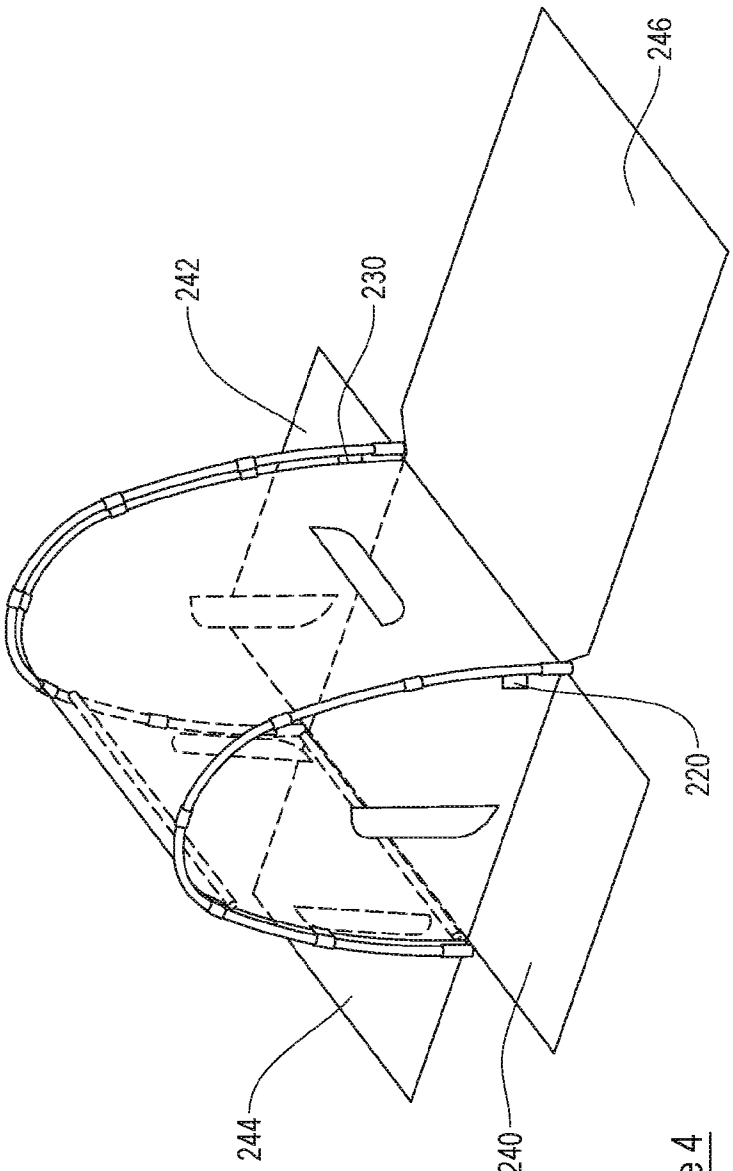

Figure 4

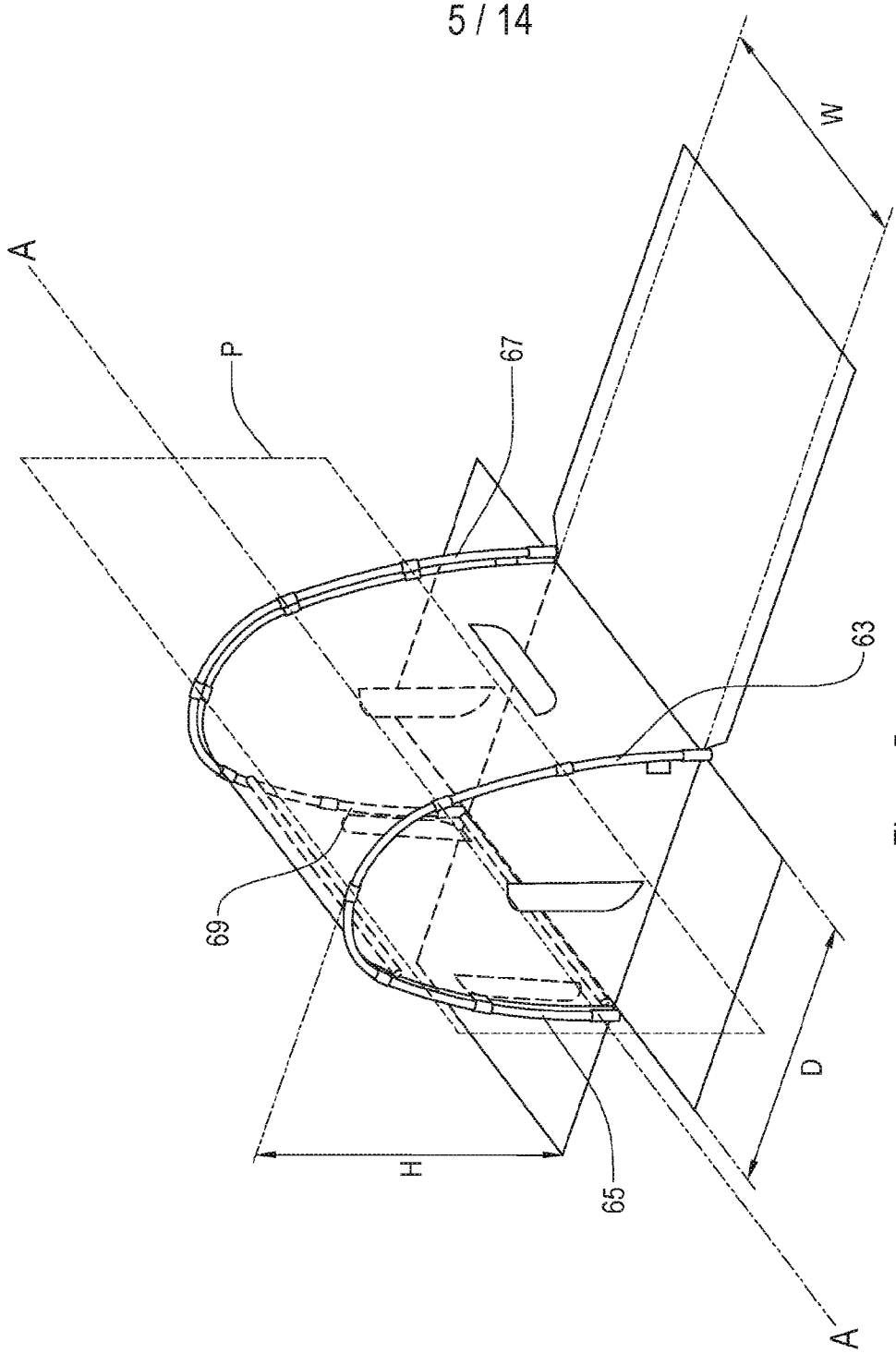

Figure 5

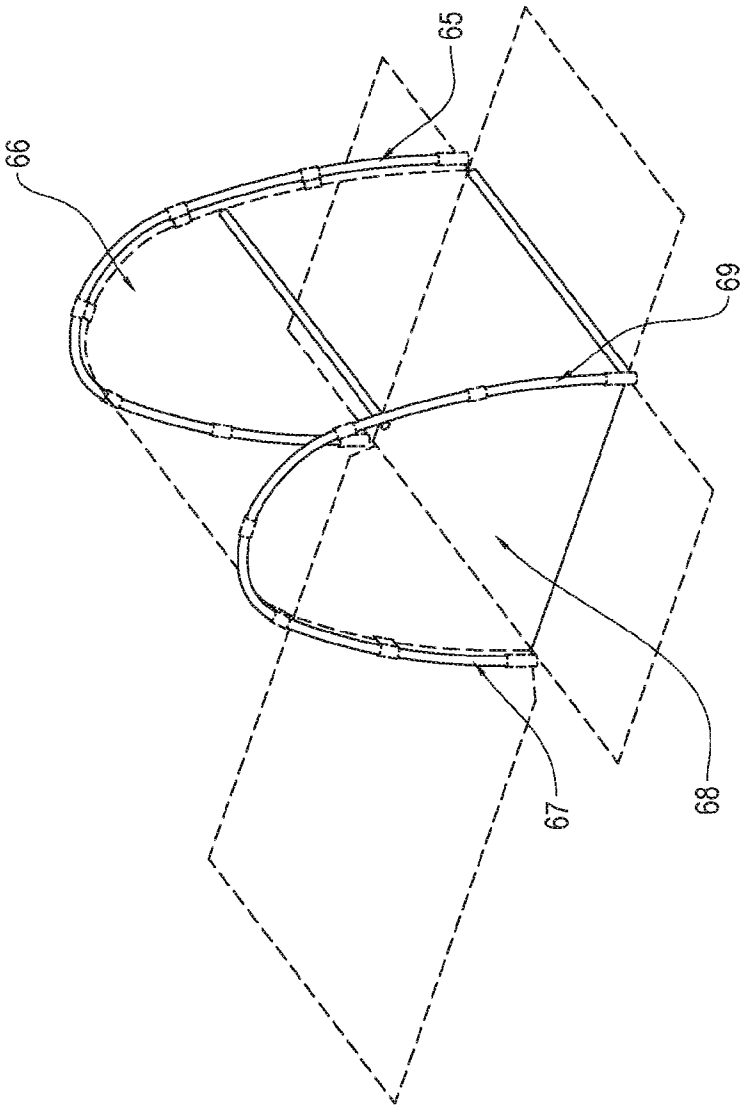

Figure 6

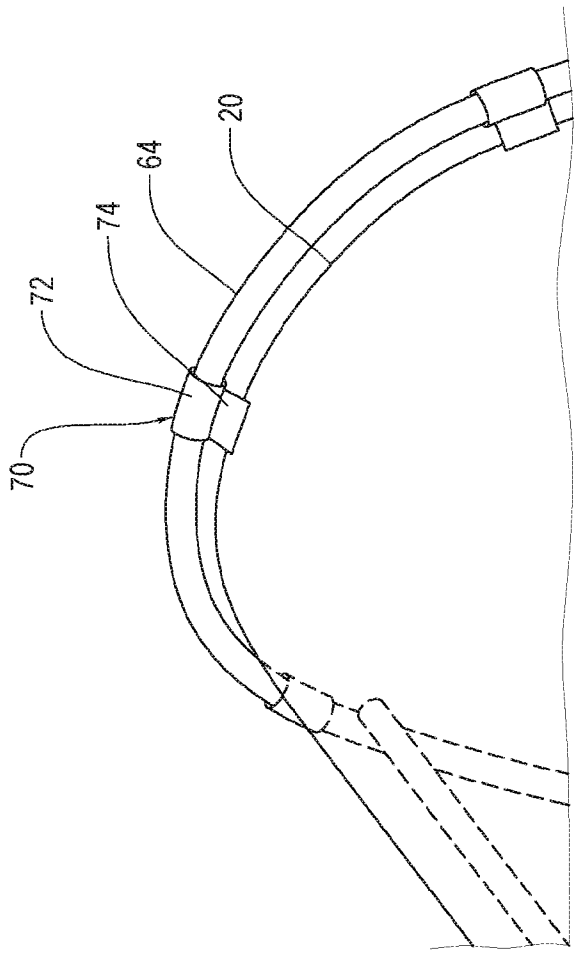

Figure 7

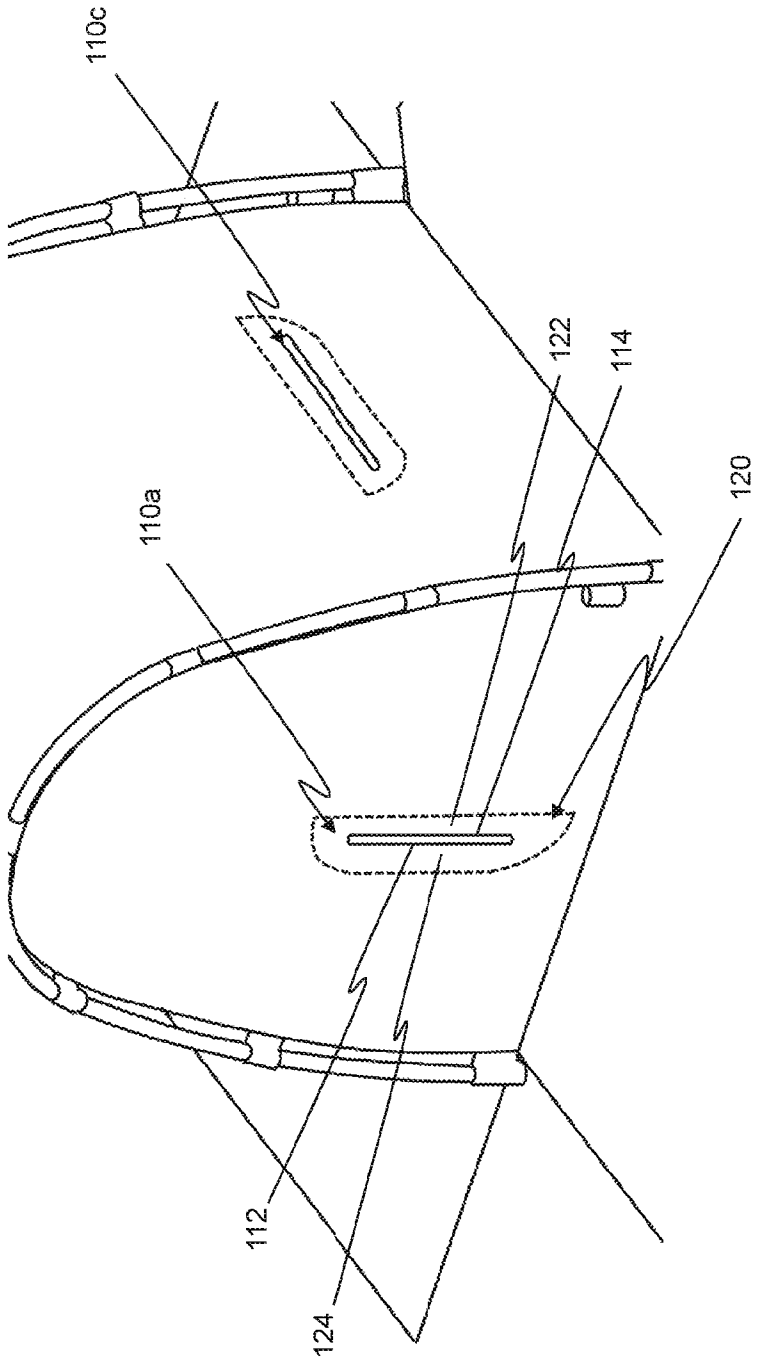

Figure 8

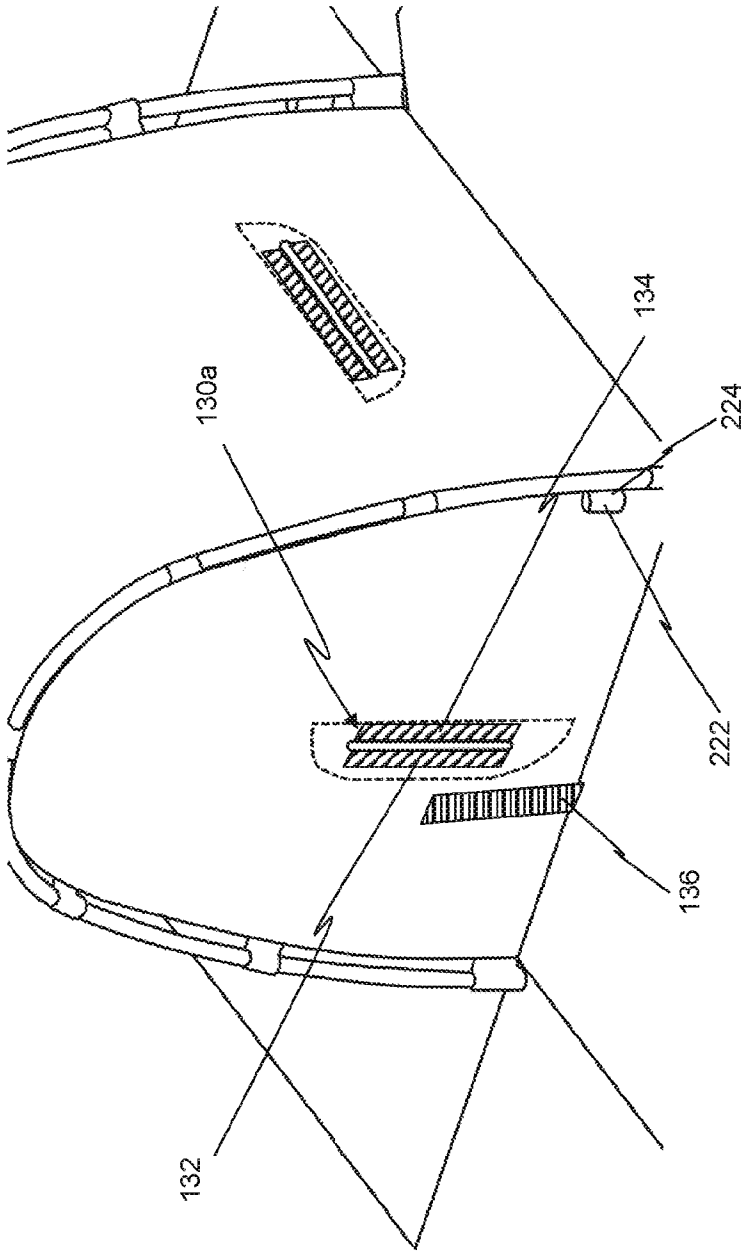

Figure 9

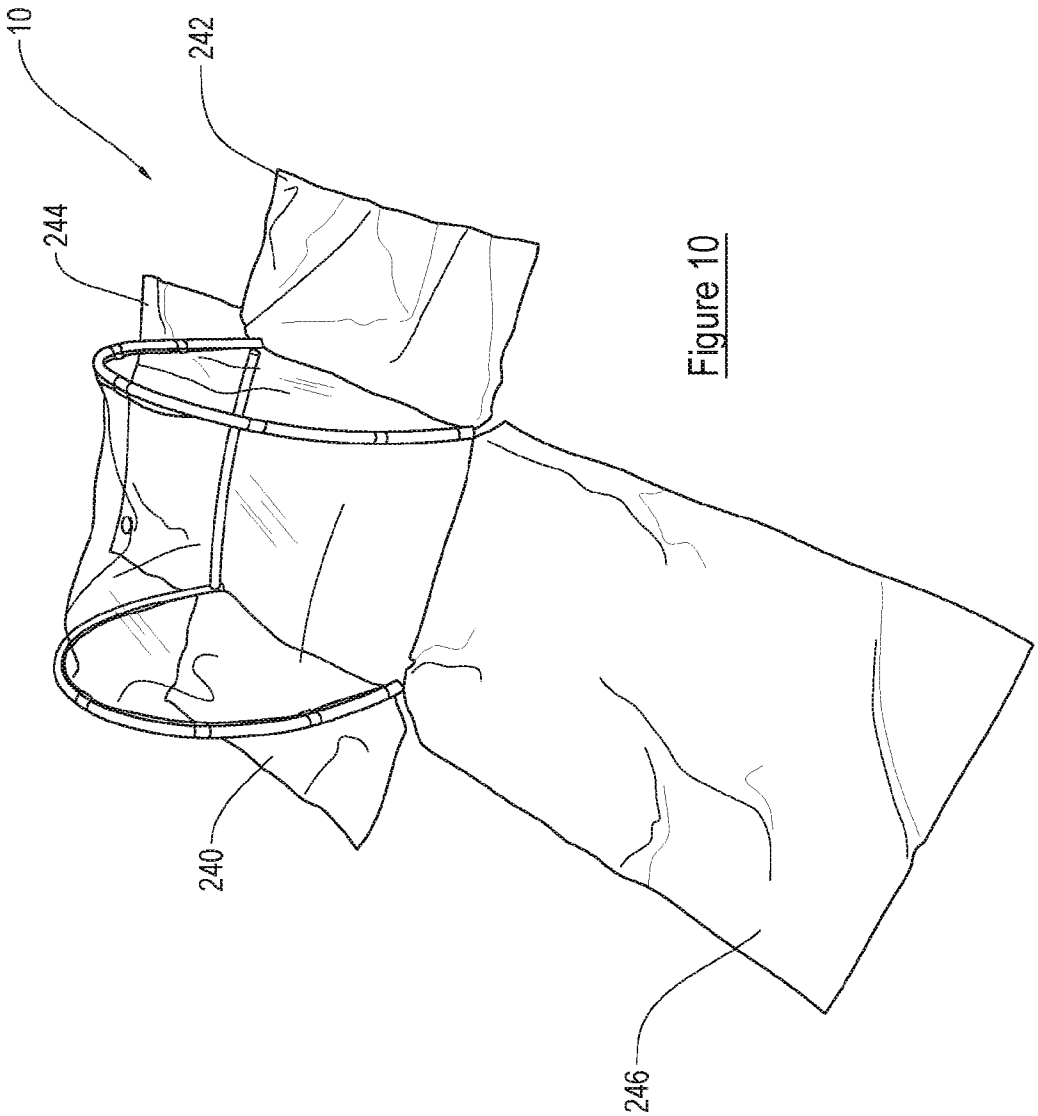

Figure 10

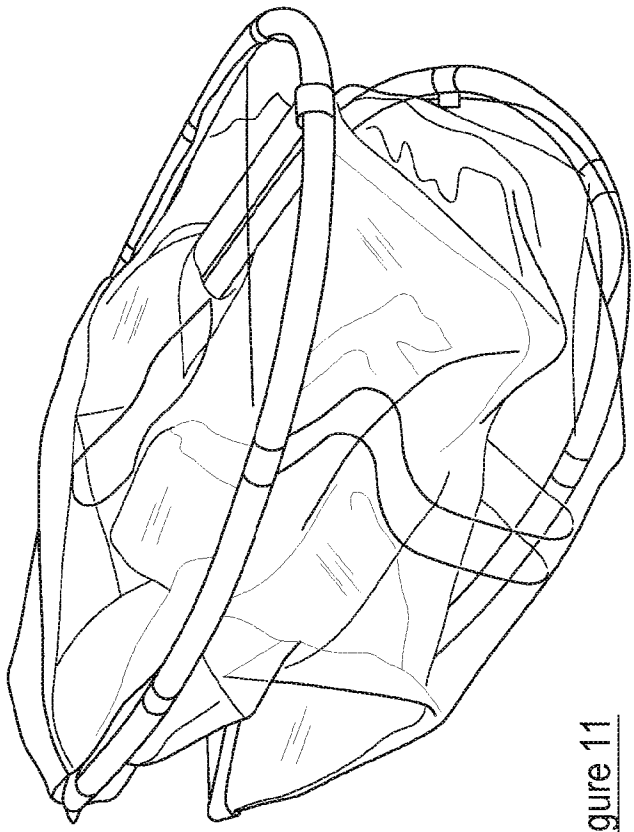

Figure 11

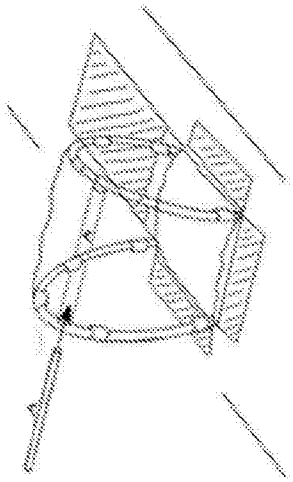

Figure 12c

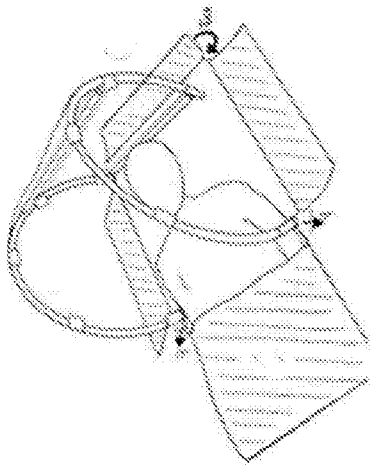

Figure 12e

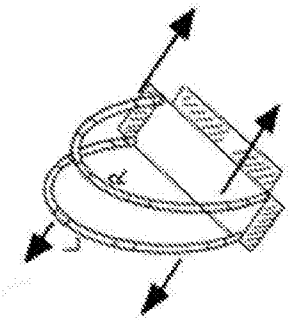

Figure 12b

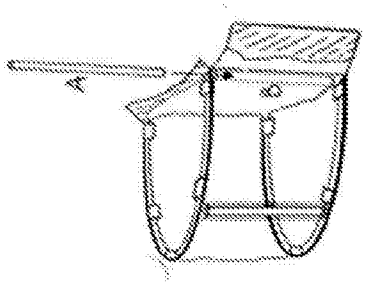

Figure 12d

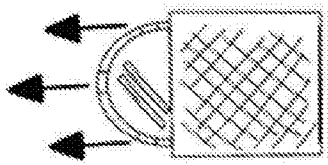

Figure 12a

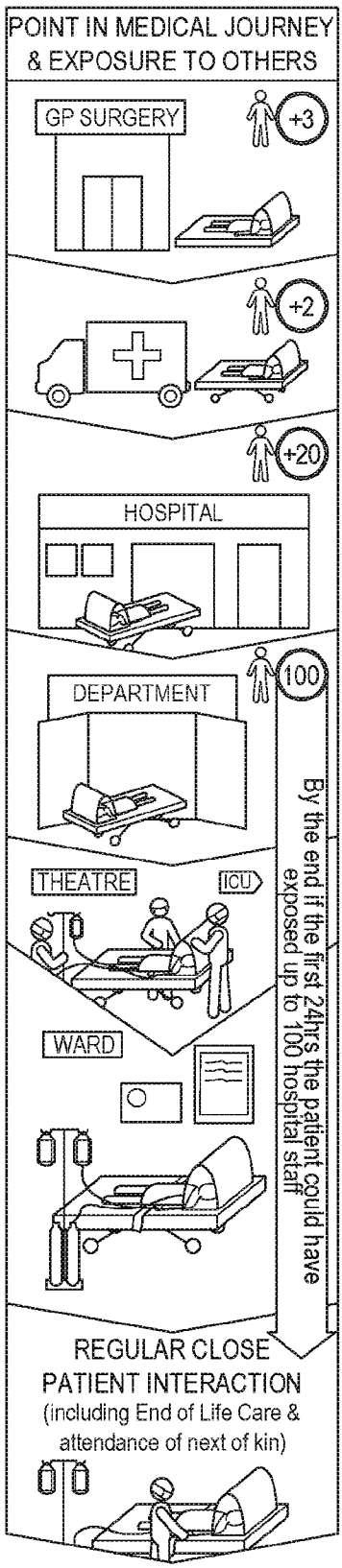
POINT IN MEDICAL JOURNEY & EXPOSURE TO OTHERS
GP SURGERY
+3
+2
+20
HOSPITAL
100
DEPARTMENT
THEATRE
ICU
WARD
By the end if the first 24hrs the patient could have exposed up to 100 hospital staff
REGULAR CLOSE PATIENT INTERACTION
(including End of Life Care & attendance of next of kin)

Figure 13

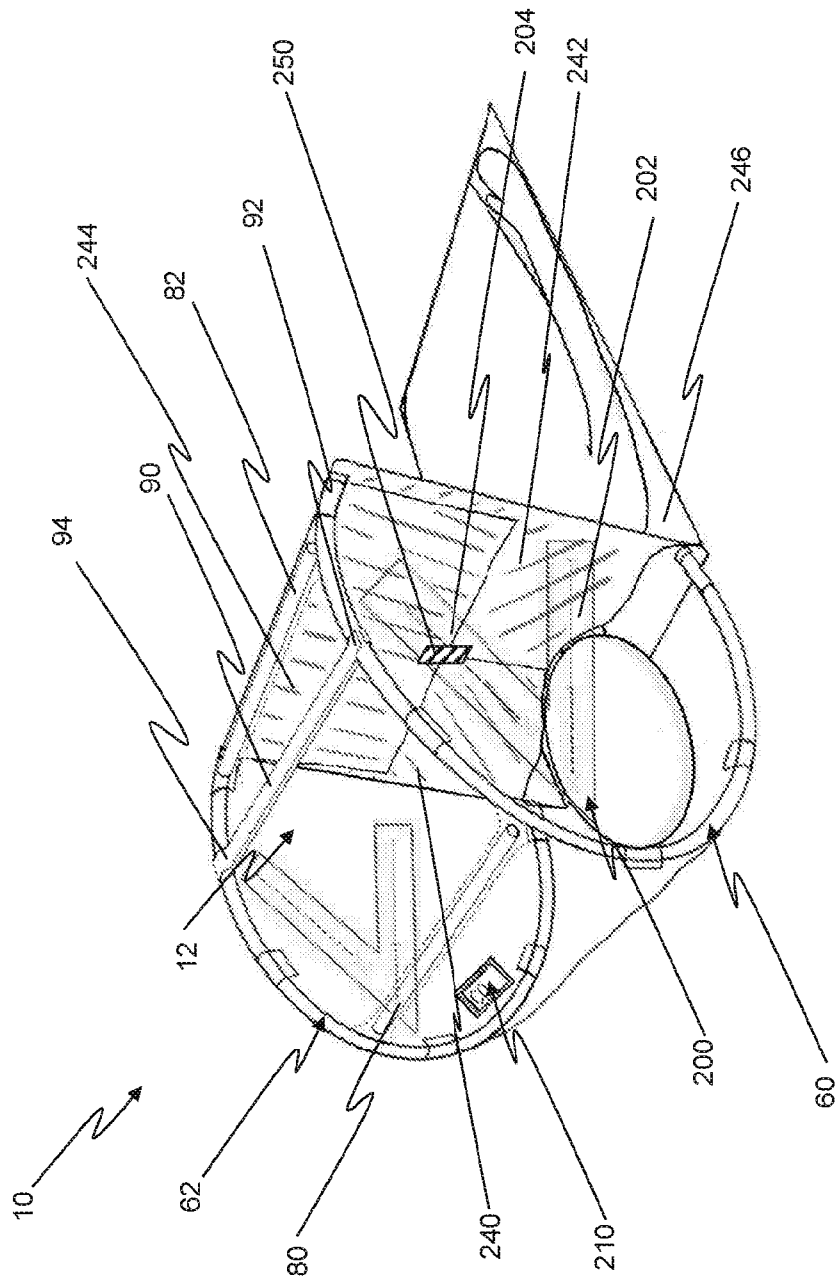

Figure 14

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2020/052243

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61G10/00
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)
A61G

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	WO 2014/189874 A1 (BREEGI WISAM K [US]) 27 November 2014 (2014-11-27) page 6 - page 13 figures 1-19	1-25
X	WO 2018/232371 A1 (UNIV CALIFORNIA [US]; PETERSEN JOHAN CASPER GROVE [US]) 20 December 2018 (2018-12-20) paragraph [0020] - paragraph [0089] figures 1-11	1,5, 12-19
X	US 2 915 074 A (ROBERT CAMETO LEON) 1 December 1959 (1959-12-01) column 2, line 29 - column 5, line 35 figures 1-11	1

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 May 2021	02/06/2021

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Schiffmann, Rudolf

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2020/052243

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 832 919 A (KANO YOSHIMI [JP] ET AL) 10 November 1998 (1998-11-10) column 4, line 13 - column 5, line 62 figures 1-6 -----	1
X	US 3 710 791 A (DEATON D) 16 January 1973 (1973-01-16) column 4, line 33 - column 13, line 57 figures 1-19 -----	1

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2020/052243

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014189874 A1	27-11-2014	US 2016074268 A1	17-03-2016
		US 2020337922 A1	29-10-2020
		WO 2014189874 A1	27-11-2014
WO 2018232371 A1	20-12-2018	US 2020179219 A1	11-06-2020
		WO 2018232371 A1	20-12-2018
US 2915074 A	01-12-1959	NONE	
US 5832919 A	10-11-1998	CA 2172929 A1	29-09-1997
		US 5832919 A	10-11-1998
US 3710791 A	16-01-1973	NONE	