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(54) Hyperbaric chamber for high-pressure medical treatment, with no structural obstacles

(57) A hyperbaric chamber (3) presenting a main chamber (4), an air lock (5), and a floor (6) flush with the outside floor (7). The hyperbaric chamber (3) presents rectangular doors, of which a first (10) enables access to the main chamber (4), a second (11) enables access to the air lock (5), and a third and fourth (12, 13) enable communication between the main chamber (4) and the air lock (5). At least the first door (10) presents a floor portion (21) which is lowered when opening and closing the door (10); and, between the floor portion (21) and the threshold (19), there is provided a strip of floor (22) which is also lowered when opening and closing the door (10), and which remains lowered when the door (10) is closed.

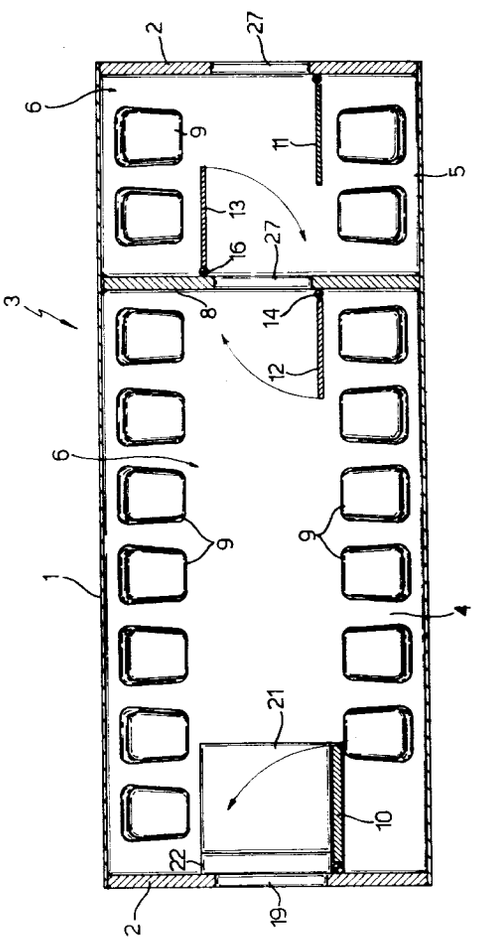

Fig.1

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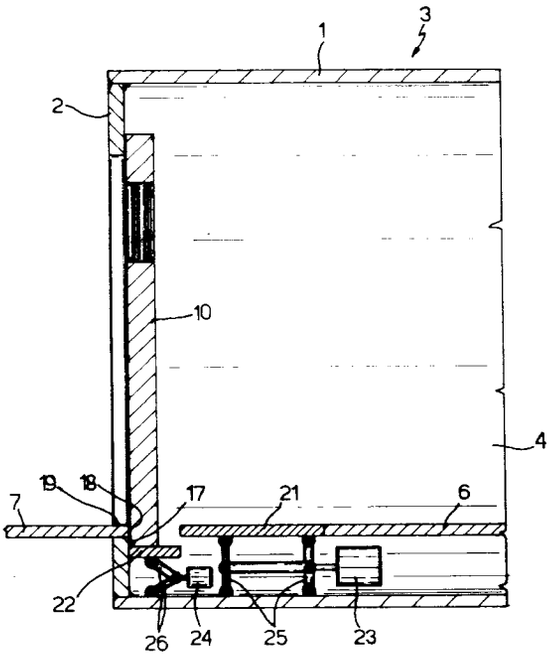

Fig. 2

Description

The present invention relates to a hyperbaric chamber for high-pressure medical treatment, with no structural obstacles.

As is known, a hyperbaric chamber substantially comprises a large vessel in which a given pressure, greater than the atmospheric pressure outside, is formed by external compressors, and which is normally divided into two compartments: a main chamber, and an air lock.

The main chamber is normally maintained at the treatment pressure, and is designed to accommodate a number of patients and staff at the same time; while the air lock enables passage of patients or staff into the main chamber while treatment is in progress.

For this purpose, incoming patients or staff enter the air lock; the air lock is closed and brought up to pressure; and the communicating door between the main chamber and the air lock is then opened to allow access to the main chamber. The same procedure is repeated in reverse when leaving the main chamber.

In known hyperbaric chambers, the doors between the main chamber and the air lock and between the air lock and the outside are normally small, e.g. about 800 mm, and round in shape; and the door to the main chamber is normally round, oval, or in the form of a porthole, and opens either partly or fully. All the doors therefore present major structural obstacles seriously hindering passage to and from the chamber.

To enable troublefree, direct access to the main chamber, hyperbaric chambers have been proposed wherein the door to the main chamber is rectangular and opens inwards. As pressure sealing, however, is assured by a door stop on the flat wall, for the door to open, the inside and outside floors can never be flush; and, though small, the step between the two floors poses problems when, as is usually the case, transferring patients in wheelchairs or on stretchers.

It is an object of the present invention to provide a hyperbaric chamber featuring doors with no structural obstacles, and designed to overcome the aforementioned drawbacks typically associated with known chambers.

According to the present invention, there is provided a hyperbaric chamber comprising a floor, and at least one door enabling access to the chamber; characterized in that said door is rectangular and opens inwards of the chamber; said floor being flush with the outside floor, and comprising a portion located at said door and which is lowered when opening or closing the door.

A preferred, non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a topside longitudinal section of a hyperbaric chamber in accordance with the present invention;

Figure 2 shows a larger-scale partial vertical section of the door to the Figure 1 chamber;

Figures 3 to 5 show schematic views of three different positions of the Figure 2 door.

Number 3 in Figure 1 indicates a hyperbaric chamber for medical treatment, e.g. treating divers for embolisms, or similar. Chamber 3 is cylindrical with a curved wall 1 and two flat walls 2, and is divided by a flat intermediate wall 8 into a main chamber 4 and an air lock 5, which present a floor 6 flush with the floor 7 (Figure 2) outside chamber 3.

Main chamber 4 (Figure 1) presents two rows of seats 9, is normally maintained at the treatment pressure, and may accommodate a number of patients and staff at the same time, whereas air lock 5 presents only four seats 9, and provides for enabling passage by patients or staff into main chamber 4 while treatment is in progress.

Main chamber 4 presents a rectangular door 10 opening inwards in any known manner; and, similarly, air lock 5 presents a rectangular door 11 also opening inwards in any known manner.

Main chamber 4 and air lock 5 communicate via two rectangular doors 12 and 13 located in wall 8 and hinged at opposite sides 14 and 16 so as to swing in the same direction (anticlockwise in Figure 1) and open inwards of main chamber 4 and air lock 5 respectively.

For airtight closing door 10 (Figure 2), the bottom edge 17 of door 10 must close against the edge 18 of a threshold 19 flush with the outside floor 7; and, to open and close door 10, provision is made, at door 10, for a preferably rectangular portion 21 of floor 6, which is lowered when opening and closing door 10 (Figure 4), and which is flush with floor 6 when door 10 is closed (Figure 3) and when it is fully open (Figure 5).

Between portion 21 of floor 6 and threshold 19, there is also provided a strip 22 of floor 6, slightly wider than the thickness of door 10, and which is also lowered when opening and closing door 10 (Figure 4), but remains lowered when door 10 is closed (Figures 2 and 3), and is only flush with floor 6 when door 10 is fully open (Figure 5) to eliminate any structural obstacles hindering access to the chamber.

Portion 21 and strip 22 are controlled vertically by respective pneumatic actuators 23 and 24 (Figure 2) which are activated in response to two sensors (not shown) for respectively indicating when door 10 is fully open and fully closed, and which may, for example, comprise respective pneumatic pistons connected to respective portion 21 and strip 22 by respective toggle joints 25 and 26.

Door 10 operates as follows.

When door 10 is closed as in Figure 3, portion 21 is flush with floor 6, and may therefore be used as part of the floor by patients and staff inside chamber 4; and strip 22 is in the lowered position enabling door 10 to shut

against threshold 19. In view of the narrow width of strip 22, this in no way impedes movement inside chamber 4 when in the lowered position.

When door 10 starts to open, actuator 23 (Figure 2) is activated to lower portion 21 (Figure 4) so that it is flush with strip 22 and slightly below the bottom edge 17 of door 10; and, when door 10 is fully open, actuators 23 and 24 are activated to raise portion 21 and strip 22 (Figure 5) so that floor 6, portion 21 and strip 22 form an unbroken surface with the outside floor 7, with no structural obstacles,

Following entry through door 10, and as soon as door 10 starts to close, actuators 23 and 24 are activated to lower portion 21 and strip 22 (Figure 4); and, when door 10 is fully closed, actuator 23 raises portion 21, while strip 22 remains in the lowered position shown in Figures 2 and 3.

Door 11 (Figure 1) of air lock 5 and/or doors 12 and 13 between air lock 5 and main chamber 4 may also present a movable floor portion similar to portion 21, and a movable strip similar to strip 22, to eliminate any structural obstacles hindering access to air lock 5 or passage between air lock 5 and main chamber 4.

However, since access to air lock 5 and passage between this and main chamber 4 are relatively limited, as opposed to a movable portion 21 and strip 22, door 11 to air lock 5 and/or inner doors 12 and 13 may be provided with a threshold 27 slightly higher than floor 6.

The advantages of hyperbaric chamber 3 according to the present invention will be clear from the foregoing description. In particular, rectangular doors 10-13 provide for troublefree passage to and from chamber 3, and between air lock 5 and main chamber 4.

Moreover, portion 21 and strip 22 eliminate any structural obstacles hindering access to and/or transfer within chamber 3, and also increase the usable area of floor 6 inside chamber 3.

Clearly, changes may be made to the hyperbaric chamber as described and illustrated herein without, however, departing from the scope of the present invention. For example, portion 21 may be trapezoidal as opposed to rectangular.

Claims

1) A hyperbaric chamber for high-pressure medical treatment, comprising a floor (6), and at least one door (10) enabling access to the chamber (3); characterized in that said door (10) is rectangular and opens inwards of the chamber (3); said floor (6) being flush with the outside floor (7), and comprising a portion (21) located at said door (10) and which is lowered when opening or closing the door (10).

2) A hyperbaric chamber as claimed in Claim 1, characterized in that said floor (6) of the chamber (3) also comprises a strip (22) located between said portion (21) and the threshold (19) of said door (10); said strip (22) also being lowered when opening and closing the door (10); and said strip (22) remaining in the lowered position when the door (10) is closed, to enable the door (10) to shut against said threshold (19).

3) A hyperbaric chamber as claimed in Claim 2, characterized in that said portion (21) and said strip (22) are operated independently by respective pneumatic devices (23, 24) activated in response to the position of said door (10).

4) A hyperbaric chamber as claimed in one of the foregoing Claims, and comprising a main chamber (4) and an air lock (5); characterized in that said door (10) is located between said main chamber (4) and the outside atmosphere.

5) A hyperbaric chamber as claimed in Claim 4, characterized in that a further rectangular door (11) presents a floor portion (21) which is lowered when opening and closing the relative door (11), and which is located between said air lock (5) and the outside atmosphere.

6) A hyperbaric chamber as claimed in Claim 5, characterized in that said main chamber (4) and said air lock (5) are separated by two rectangular doors (12, 13) opening inwards of the main chamber (4) and the air lock (5) respectively; each of said two doors (12, 13) presenting a floor portion (21) which is lowered when opening and closing the relative door (12, 13).

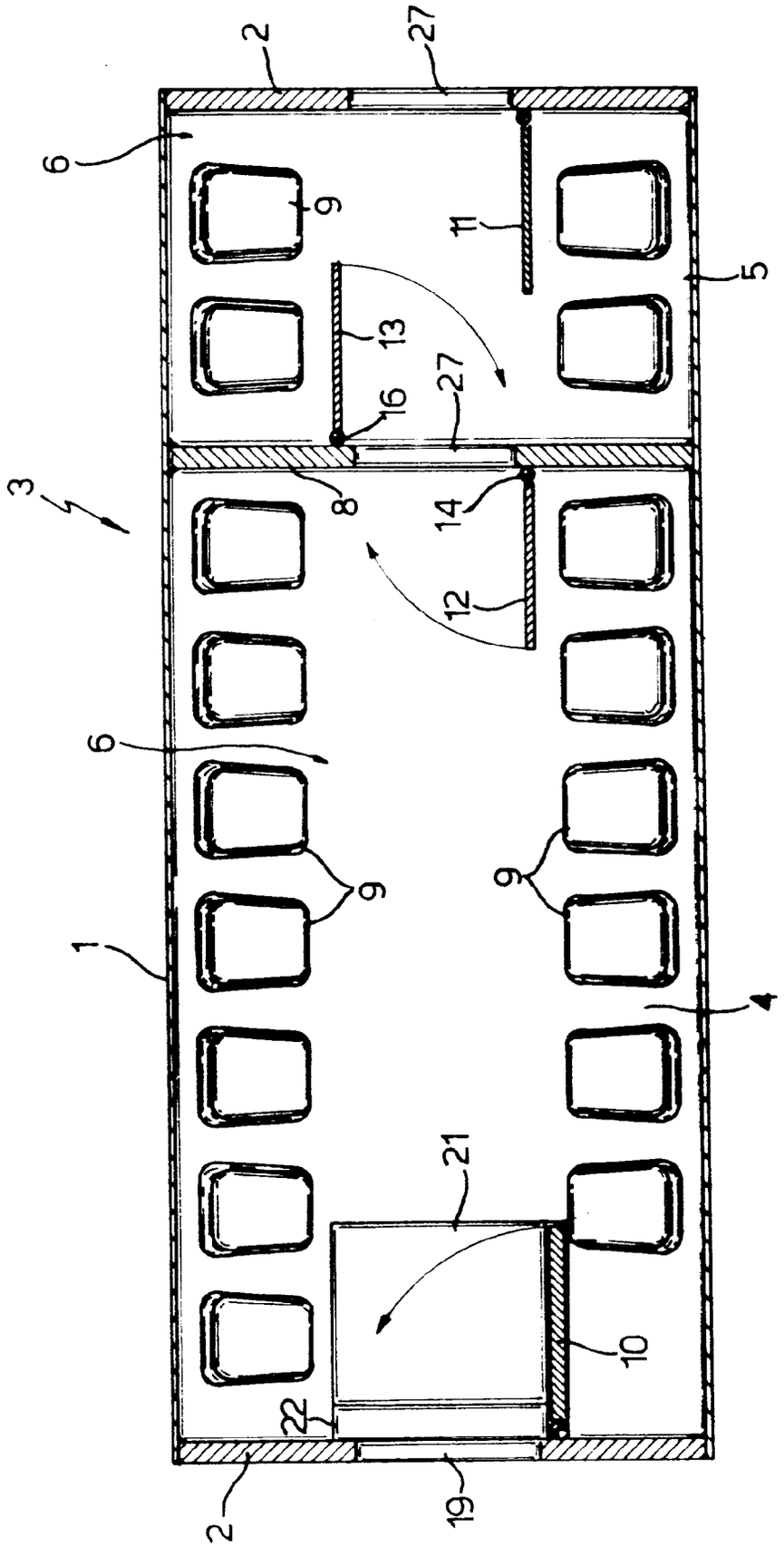

Fig.1

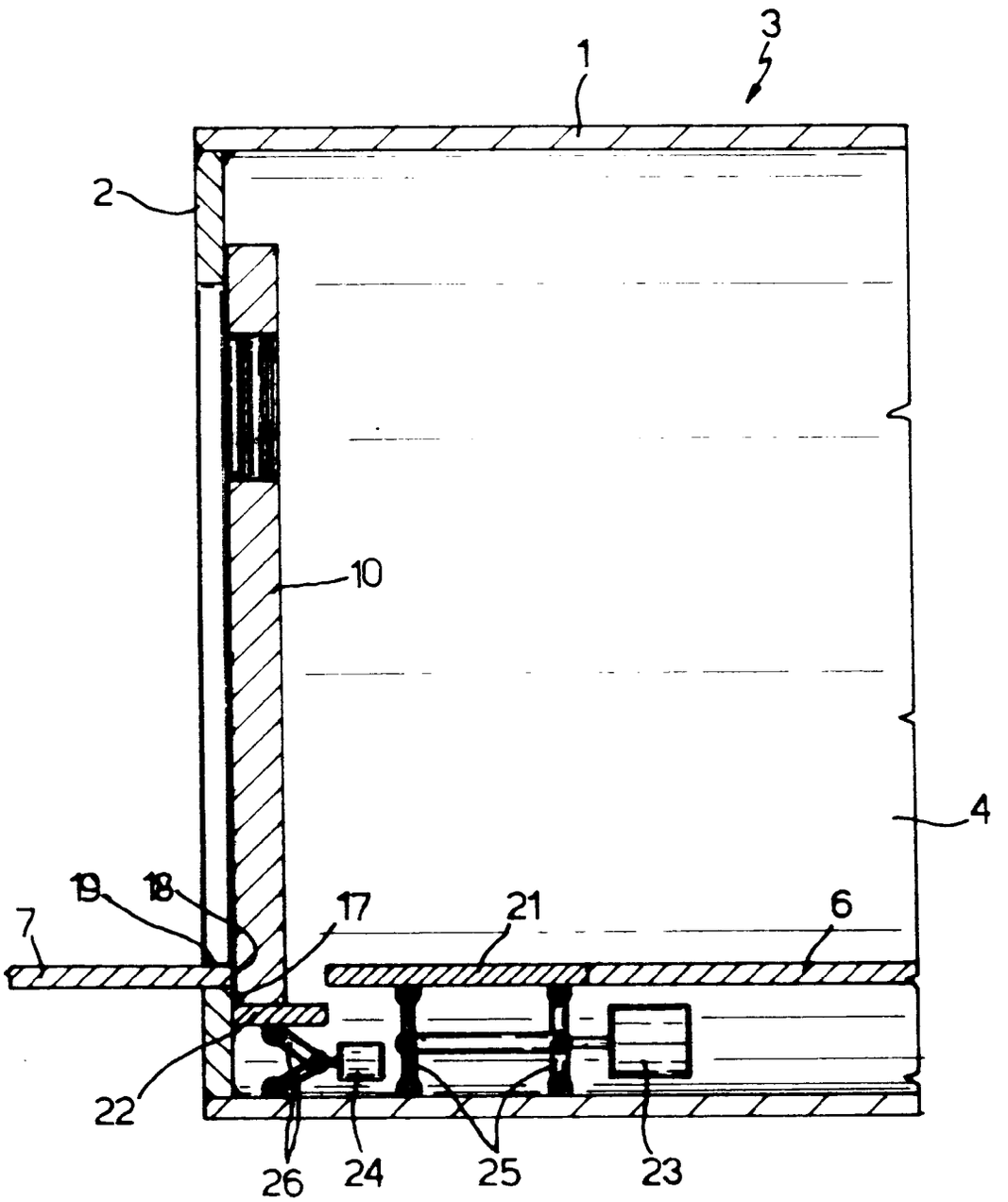

Fig. 2

Fig.3

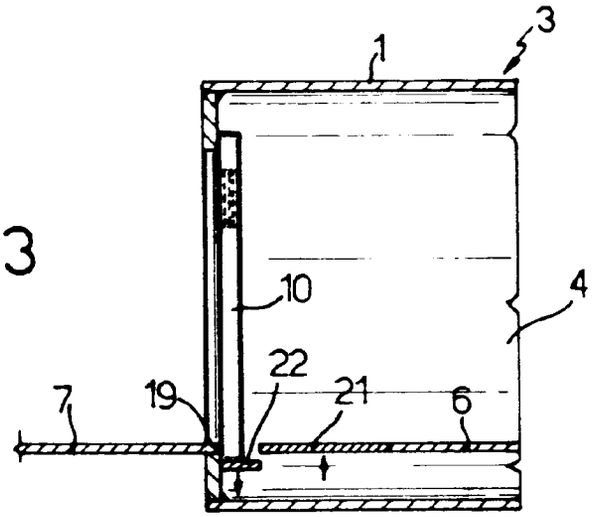

Fig.4

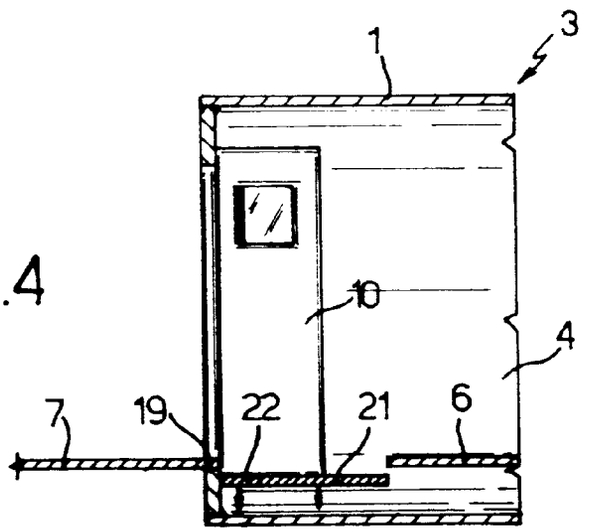

Fig.5