Dec. 22, 1959 S. HANSEN ET AL 2,917,987

HOSE COMMUNICATION SYSTEM

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Fig. 1

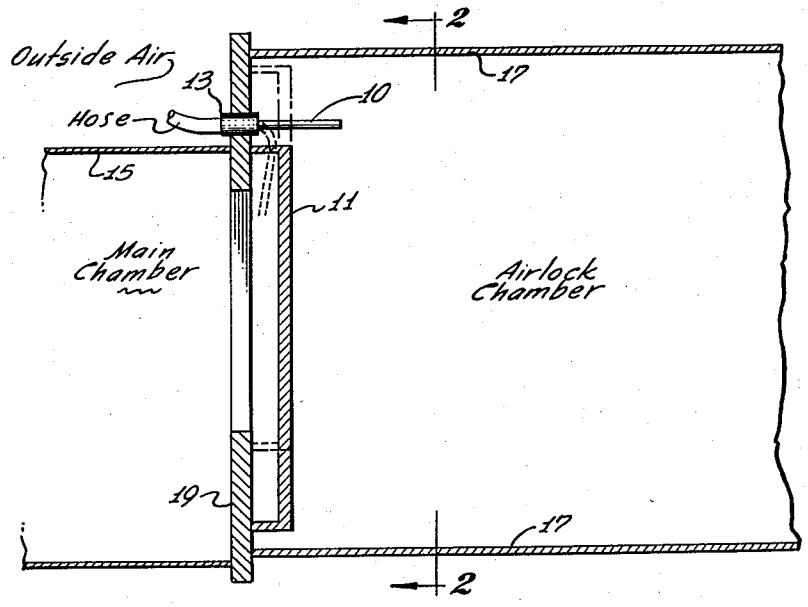
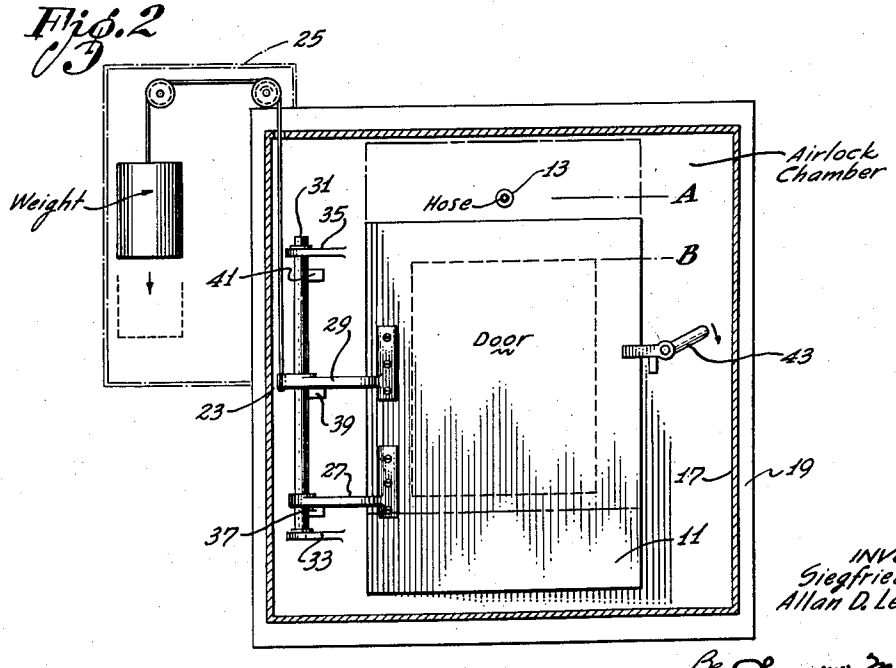


Fig. 2



INVENTORS:
Siegfried Hansen
Allan D. LeVantine

By Seymour M. Rosenberg
Attorney

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Fig. 3

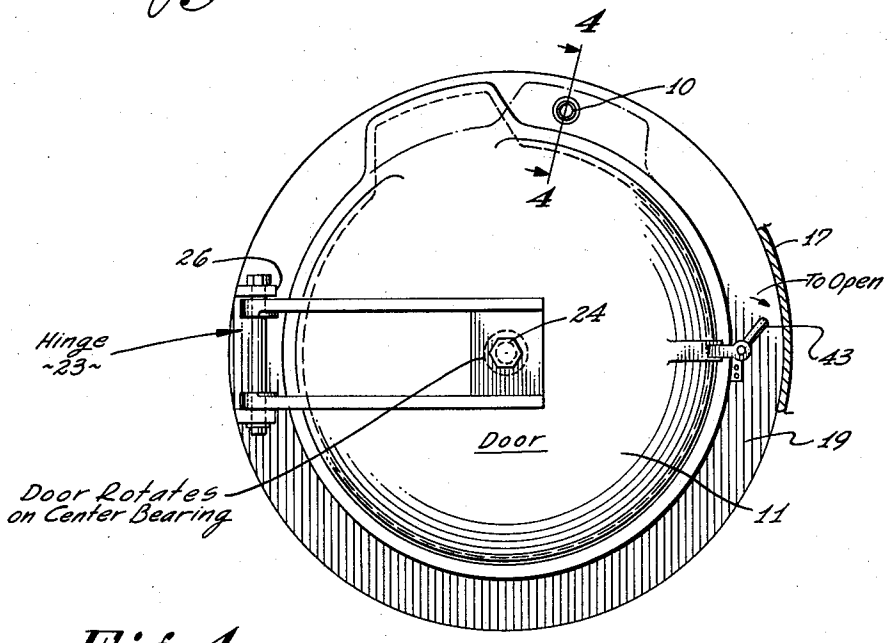
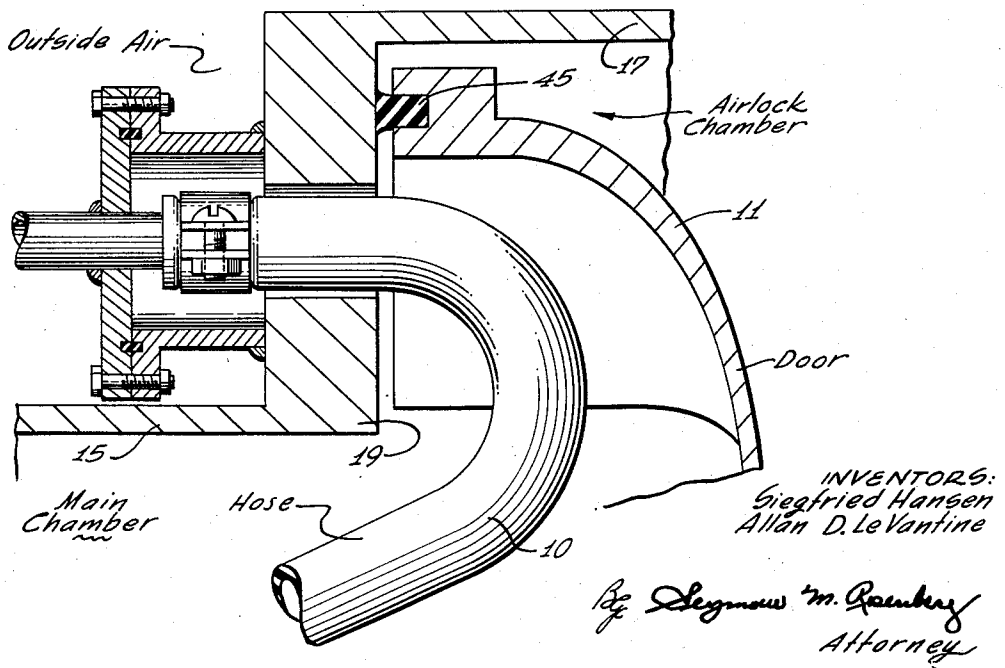


Fig. 4



INVENTORS:
Siegfried Hansen
Allan D. LeVantine

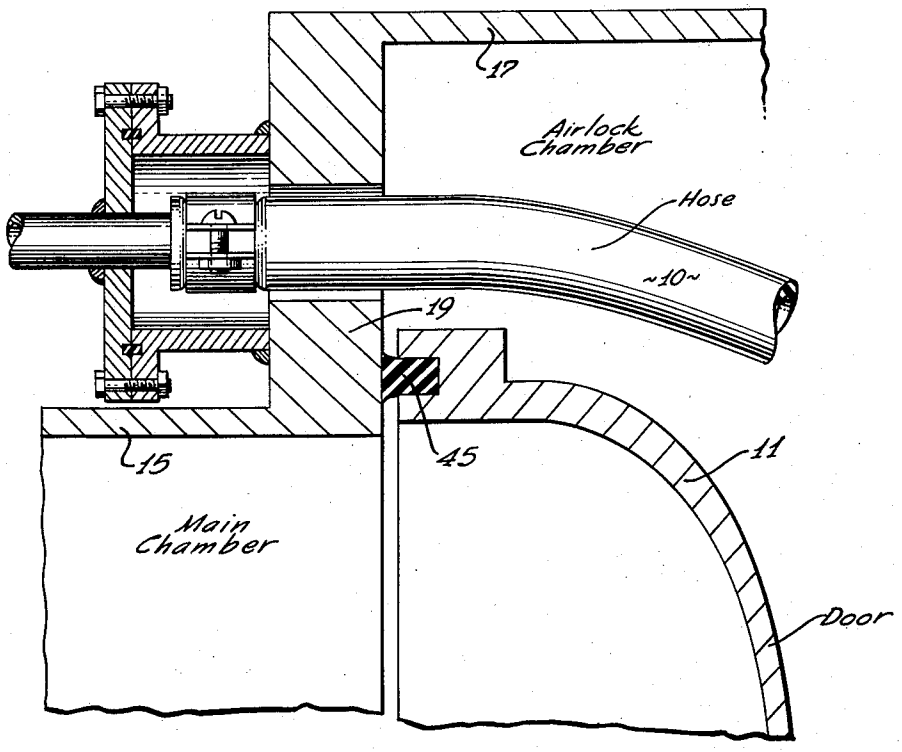
By Seymour M. Rosenberg
Attorney

Dec. 22, 1959 S. HANSEN ET AL 2,917,987

HOSE COMMUNICATION SYSTEM

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Fig. 5



INVENTORS:
Siegfried Hansen
Allan D. LeVantine

By Seymour M. Rosenberg
Attorney

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HOSE COMMUNICATION SYSTEM

Siegfried Hansen, Los Angeles, and Allan D. Le Vantine, Tarzana, Calif., assignors to Litton Industries of California, Beverly Hills, Calif.

Application February 4, 1957, Serial No. 638,055

8 Claims. (Cl. 98—1)

The present invention relates to a hose communication system for pressure chambers, and more particularly to a hose communication system for pressure chambers wherein a door is utilized to seal-off two areas of normally different pressure, the door being closeable in at least two different positions to thereby selectively either include or exclude the hose and its associated connections from either area.

As herein utilized, the term pressure chamber will be considered generic to both vacuum chambers and high pressure chambers. However, for purposes of simplicity the invention will be disclosed with reference to vacuum or low pressure chambers, it being understood that the motivating concepts of the invention are equally applicable to high pressure chambers.

In the past it has been proposed that a vacuum chamber be constructed which would be capable of allowing a man to enter and work therein for a period of time; unfortunately, however, the construction of such a facility has posed several serious problems which were heretofore thought insurmountable, not the least of which is the fact that no gases could be discharged within the chamber without materially decreasing the quality of the vacuum.

In the prior art, low pressure chambers large enough to allow a man to enter have been known, as for example, the Air Force high altitude chambers utilized for high altitude tests and indoctrination. However these chambers are maintained at pressures sufficiently high that the waste gases produced by a man's breathing may be discharged in the tank without affecting materially the pressure maintained therein. Therefore, a man may stay for a period of time in such a chamber by taking an oxygen bottle into the chamber with him and discharging the waste gases within the chamber. It is clear, however, that this technique offers no solution to the high vacuum chamber problem owing to the fact that the gases discharged in the chamber would for all practical purposes destroy the high vacuum.

The solution to the problem of supplying gas to a man or other instrumentality within a high vacuum chamber is further complicated by another problem, namely, that the high vacuum chamber should be maintained at a high vacuum continuously, since each time the chamber is raised to atmospheric pressure, gas is absorbed on the surface of the material which constitutes the walls of the chamber, thereby necessitating a rigorous and lengthy outgassing procedure to again provide a high vacuum within the chamber. Accordingly the high vacuum chamber should ideally be entered through a smaller anterior or airlock chamber which may be exhausted rapidly to a pressure approximating the pressure within the main vacuum chamber.

One technique which has been offered as a solution to the foregoing problem is to provide a hose receptacle in both the anterior chamber and the main chamber, each receptacle being equipped with a quick disconnect coupling. In theory then, a person entering the main vacuum chamber would connect his breathing apparatus to the airlock's receptacle while it was being exhausted, and thereafter disconnect from the airlock receptacle, and reconnect to the main vacuum chamber's receptacle after entering therein. Although this method appears to provide a feasible solution, it is inherently limited by the fact that even the relatively small burst of gas which enters the chamber during the connecting and disconnecting of the apparatus is sufficient to destroy the quality of the vacuum.

The present invention overcomes the foregoing and other problems encountered in the prior art by providing a hose communication or by-pass system wherein a hose is permanently affixed to an associated receptacle and may be selectively included in either one of two areas which may be sealed off from each other at different pressures. According to the basic concept of the invention the hose by-pass systems herein disclosed include a door for sealing off the two areas of normally different pressure, the door being selectively closeable in any one of a plurality of positions to thereby selectively include or exclude the hose from either area.

More specifically, the hose by-pass systems of the invention include a door which is selectively closeable in any one of a plurality of positions against a mating flange, the door having a concave or three-dimensional configuration such that the door and a plane taken through the door flange define an enclosed cavity. The hose is in turn affixed to a receptacle mounted in the mating flange so that the hose receptacle may be included within the area defined by the door, in which case the hose terminates in one of the areas of differential pressure, or excluded from the area defined by the door flange, in which instance the associated hose terminates in the other area of differential pressure.

According to one embodiment of the invention, the door has a rectangular traylike configuration and is movable translationally while open to thereby permit closure in two or more positions. According to still another embodiment of the invention, the door has a bowl-like configuration and is eccentrically mounted to permit rotational movement thereof while open to thereby provide a plurality of closure positions.

It is therefore an object of the invention to provide a hose by-pass system which permits a permanently connected hose or conduit to be selectively included in either one of two areas of normally different pressure.

Another object of the invention is to provide a hose by-pass system which includes a door for sealing off two areas of normally different pressure, the door being selectively closeable in any one of a plurality of positions to thereby selectively include a permanently connected hose in either of the two areas.

A further object of the invention is to provide a translatable door capable of being closed selectively in a plurality of positions to thereby selectively include or exclude a hose from an area on one side of the door.

Another object is to provide a rotatable door capable of being selectively closed in a plurality of positions to thereby selectively include or exclude a hose from an area on one side of the door.

Still another object of the invention is to provide a rotatable door whereby a hose can be taken from an area on one side of the door to an area on the other side of the door and thereafter be able to close the door without disturbing the continuity of the air hose connections.

A still further object of the invention is to provide a translatable door whereby a hose can be taken from an area on one side of the door to an area on the other side of the door without disturbing the continuity of the air hose connections.

The novel features which are believed to be characteristic of the invention, both as to its organization and method of operation, together with further objects and advantages thereof, will be better understood from the following description considered in connection with the accompanying drawings in which several embodiments of the invention are illustrated by way of example. It is to be expressly understood, however, that the drawings are for the purpose of illustration and description only, and are not intended as a definition of the limits of the invention.

Fig. 1 is a sectional side elevation of one form of hose by-pass system, according to the invention;

Fig. 2 is a front elevation of the structure shown in Fig. 1;

Fig. 3 is a front elevation view of another embodiment of a hose by-pass system in accordance with the invention; and

Figs. 4 and 5 are fragmentary sectional side elevation views of the embodiment of Fig. 3 illustrating the manner in which the hose by-pass system functions.

Referring now to the drawings, wherein like or corresponding parts are designated by the same reference characters throughout the several views, there is shown in Fig. 1 one embodiment of a hose by-pass system, in accordance with the principles of the invention, wherein a door **11** having a tray-like configuration is selectively closeable in either of two positions for selectively including or communicating a hose **10** and receptacle **13** in or with either a main chamber **15** or an anterior or airlock chamber **17**. As shown in Fig. 1 the hose by-pass system includes an apertured wall **19** upon which hose receptacle **13** is mounted adjacent the aperture, door **11** being moveable when open so that it may be closed in either of two positions against wall **19** to selectively include hose receptacle **13** and hose **10** either in main chamber **15** as shown by the broken line in Fig. 1, or in airlock chamber **17** as shown by the solid line. In this embodiment of the hose by-pass system door **11** is moveable in a vertical translational manner when open to selectively include or exclude hose receptacle **13** and hose **10** when the door **11** is subsequently closed as will hereinafter be described in detail.

Referring now to Fig. 2, there is shown one method whereby door **11** may be hung and yet still allow the required translational movement hereinbefore described. As shown in Fig. 2 the mounting structure of door **11** includes a hinge generally designated **23** and a pullied counterweight **25** which functions to permit translational movement of the door when it is open. Hinge **23** includes a pair of hinge arms **27** and **29** which are journaled over a hinge pin **31**, the pin in turn being fixed securely to wall **19** by a pair of brackets **33** and **35**. The hinge further includes a pair of slots (not shown) cut in the hinge arms so that when door **11** is rotated open hinge arms **27** and **29** rotate around hinge pin **31** until the slots are aligned with three studs **37**, **39** and **41** which are fixedly mounted on the hinge pin. These studs normally function to support door **11** in either the solid or broken line positions illustrated in Fig. 2, and when aligned with the slots in the hinge arms permit the door to move in its translational manner. In operation the door is moved in its translational manner until the hinge arms **27** and **29** are just above either studs **37** and **39** or studs **39** and **41**, depending upon whether it is desired to close the door in the position shown by the solid or broken lines in Figs. 1 and 2, respectively. When the door is then closed the hinge arms will rotate in a counterclockwise direction around hinge pin **31** until the slots cut in the hinge arms are no longer above the respective studs, thereby giving the door support in its new position.

As shown in Figs. 1 and 2, when the door is supported in the position shown by the broken line, hose receptacle **13** and hose **10** are within main chamber **15**, whereas when the door is supported in the position shown by the solid line, hose receptacle **13** and hose **10** are within the airlock chamber. To positively close door **11** in the desired position a latch **43** is provided which may be operated from either side of door **11**. Hose **10** can thereby be taken from one chamber to the other without disconnecting the hose and thereby discharging a burst of gases into the chamber.

It should be emphasized that the basic concept of the invention is not restricted to the embodiment of Figs. 1 and 2 or to mere translational movement of the door. For example there is shown in Fig. 3 another embodiment of the invention wherein an eccentric circular door **11** having a bowl-like shape is hinged and secured to a wall **19** by a hinge generally designated **23**. Hinge **23** in this instance includes a center bearing **24** upon which door **11** is rotatably mounted, and a conventional hinge element **26** which is employed for opening and closing the door. As shown in Fig. 3, door **11** may be opened or closed from either of its sides by use of a latch **43**, the door being rotatable about center bearing **24** when open to provide a plurality of closure positions, two of which are shown in Fig. 3. When the door is rotated to the position shown by the broken line in Fig. 3, and then closed against wall **19**, hose **10** is included in the main chamber. A fragmentary sectional side elevation along line 4—4 of Fig. 3 when the door is in this position is shown in Fig. 4.

As shown in Fig. 4, in this position hose **10** is included within the main chamber by door **11** which is closed against wall **19** and sealed by circular gasket **45**. When the door is rotated to the position shown by the solid line in Fig. 3, on the other hand, hose **10** is included in the airlock chamber and excluded from the main chamber. A fragmentary side elevation along line 4—4 of Fig. 3 when the door is in this position is shown in Fig. 5. Thus it is possible to take hose **10** from one chamber to the other and close the door thereafter without disconnecting the hose and thereby discharging a burst of gases into the chamber.

It is to be expressly understood, of course, that numerous other modifications and alterations may be made in the hose by-pass system herein disclosed without departing from the basic concept of the invention. For example, it will be recognized that a pair of hose receptacles could be employed with the second embodiment of the invention to selectively include either one or both of two hoses in either the main chamber or the anterior chamber. Accordingly, it is to be expressly understood that the scope of the invention is to be limited only by the spirit and scope of the appended claims.

What is claimed as new is:

1. A hose communication system for selectively introducing a hose into the interior of either of two adjacent pressure chambers, said system comprising: an apertured wall separating said chambers, said wall having a conduit therein extending from the exterior of the chambers to a preselected point on one side of said wall adjacent the aperture; means for connecting the hose to said conduit at the preselected point adjacent the aperture in said wall; a door having a lateral periphery larger than the aperture in said wall; hinge means for hingedly mounting said door in the chamber on said one side of said wall to close against said wall and seal shut the aperture therein, said hinge means being adapted to permit movement of said door in the plane of said door; and means for moving said door in the plane of the door when said door is open to provide a plurality of closure positions for said door against said wall, at least a first one of said closure positions excluding said preselected point from the area defined by the lateral periphery of said door, whereby the hose communicates with the interior of the chamber in which the door is mounted, and at least a second one of said closure positions including said preselected point within the area defined by the lateral periphery of said door, said door having a three dimensional configuration

defining a cavity therein such that the other of said chambers communicates with said preselected point when said door is in said second closure position, whereby the hose communicates with the interior of the other chamber.

2. The hose communication system defined in claim 1 wherein said door is translationally movable in the plane of said door when open to thereby provide said plurality of closed positions.

3. A communication system for selectively introducing a hose into the interior of either of two adjacent pressure chambers separated by an apertured common wall, said system comprising: means forming a conduit within the common wall extending from the exterior of the chambers to a preselected point on one side of the wall adjacent the aperture; means for attaching one end of the hose to said conduit at said preselected point; a substantially circular door having a concave three dimensional configuration; first means for mounting said door to permit closure thereof against said common wall to seal the aperture therein; and bearing means for rotatably mounting said door on said first means in a manner such that a portion of the periphery of said door extends radially from said bearing means a distance larger than the remainder of the periphery of said door whereby said door can be closed against said wall in any one of a plurality of closure positions to thereby selectively include or exclude the hose and said preselected point within the area defined by the periphery of said door.

4. A hose communication system for selectively introducing a hose into the interior of either of two pressure chambers, the hose coupling the interior of the selected chamber with a region outside the chambers, said system comprising: an apertured wall separating said chambers, said wall having a passageway therein extending from the exterior of the chambers to a preselected point on one side of said wall adjacent the aperture; means for coupling the hose to said passageway at said preselected point, whereby the hose communicates with the region outside the chambers; a door located in the chamber on said one side of said wall; hinge means for mounting said door to close against said wall and seal the aperture therein, said hinge means including apparatus selectively operable to close said door against said wall in at least first and second closure positions for respectively including said preselected point within the area defined by the periphery of said door, or excluding said preselected point from the area defined by the periphery of said door, said door having a three dimensional configuration such that said door and a plane taken through its outermost periphery define a cavity in said door, said hose communicating with said one chamber when said door is closed in said second closure position, and communicating with the other of said chambers through said cavity in said door when said door is closed in said first closure position.

5. The hose communication system defined in claim 4 wherein said door has a circular bowl-like configuration and which further includes bearing means for rotatably mounting said door in a manner such that a portion of the periphery of said door extends radially from said bearing means a distance larger than the remainder of the periphery of said door to permit rotation thereof when open to positions which when projected against said wall define said first and second closure positions.

6. The hose communication system defined in claim 4 wherein said door has a rectangular tray-like configuration and is translationally movable when open to positions which when projected against said wall define said first and second closure positions.

7. A hose communication system for selectively introducing a hose in either of two pressure chambers, said system comprising: an apertured wall separating said chambers; a door located in one of said chambers; mounting means for movably mounting said door to close against said wall selectively in at least first and second closure positions for sealing the aperture in said wall; means for introducing the hose at a point in said wall which is within the area defined by said door when said door is in said first closure position and outside the area defined by said door when said door is in said second closure position, said door having a depression in the side thereof which faces the other of said two chambers when said door is closed whereby the hose communicates with said one chamber when said door is closed in said second closure position, and communicates with the other chamber when said door is closed in said first closure position.

8. In a pressure chamber having an adjacent air lock chamber, means for selectively introducing an air hose into the interior of either of the adjacent pressure chambers, said means comprising: an apertured wall separating said chambers and having a conduit therein extending from the exterior of the chambers to a preselected point on a predetermined side of said wall adjacent the aperture; means for connecting the air hose to said conduit at said preselected point; a three dimensional door having a cavity therein and a lateral periphery larger than the aperture; hinge means for hingedly mounting said door on the predetermined side of said apertured wall to close against said wall to seal the aperture therein, said hinge means including apparatus for closing said door against said wall in first and second closure positions for selectively including or excluding the preselected point within the area defined by the periphery of said door, respectively, said cavity in said door being operative when said door is in said first closure postion to introduce said hose into the chamber on the side of said wall opposite said predetermined side of said wall.

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