

March 31, 1970

L. F. HOTZ ET AL

3,503,394

MODULIZED PASSENGER MASK ASSEMBLY

Filed July 22, 1968

3 Sheets-Sheet 1

Fig. 1

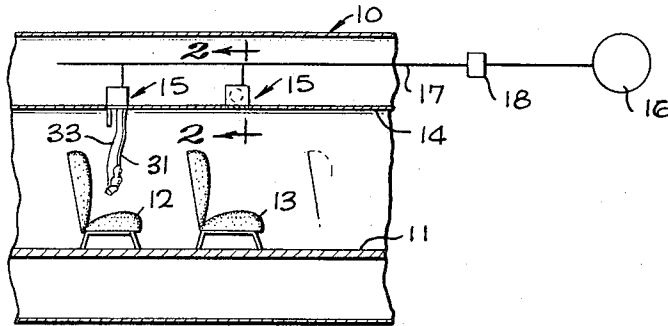


Fig. 2

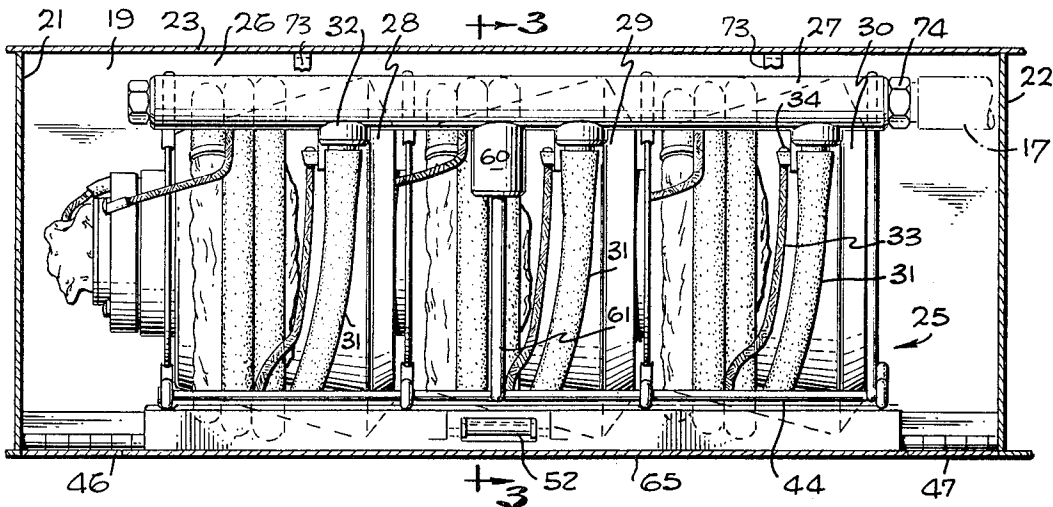


Fig. 3

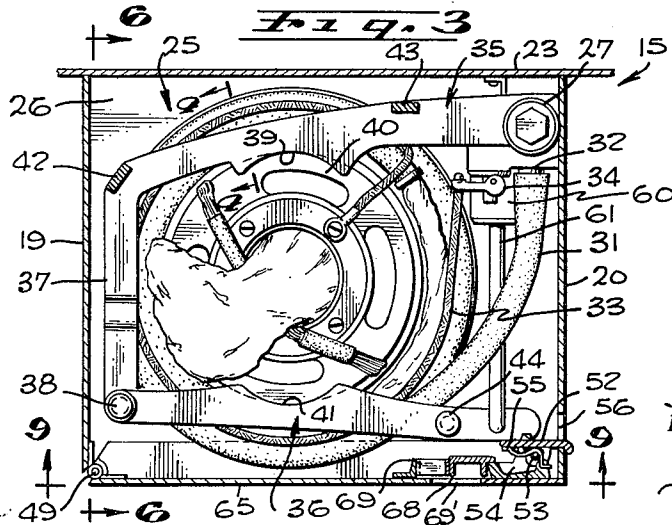
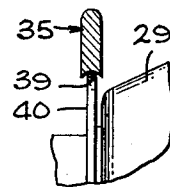


Fig. 4



INVENTORS
LEO F. HOTZ
SHERMAN S. WATTS
BY

Beehler & Arant
ATTORNEYS

March 31, 1970

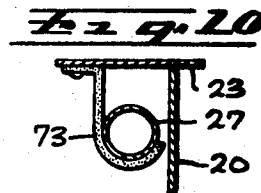
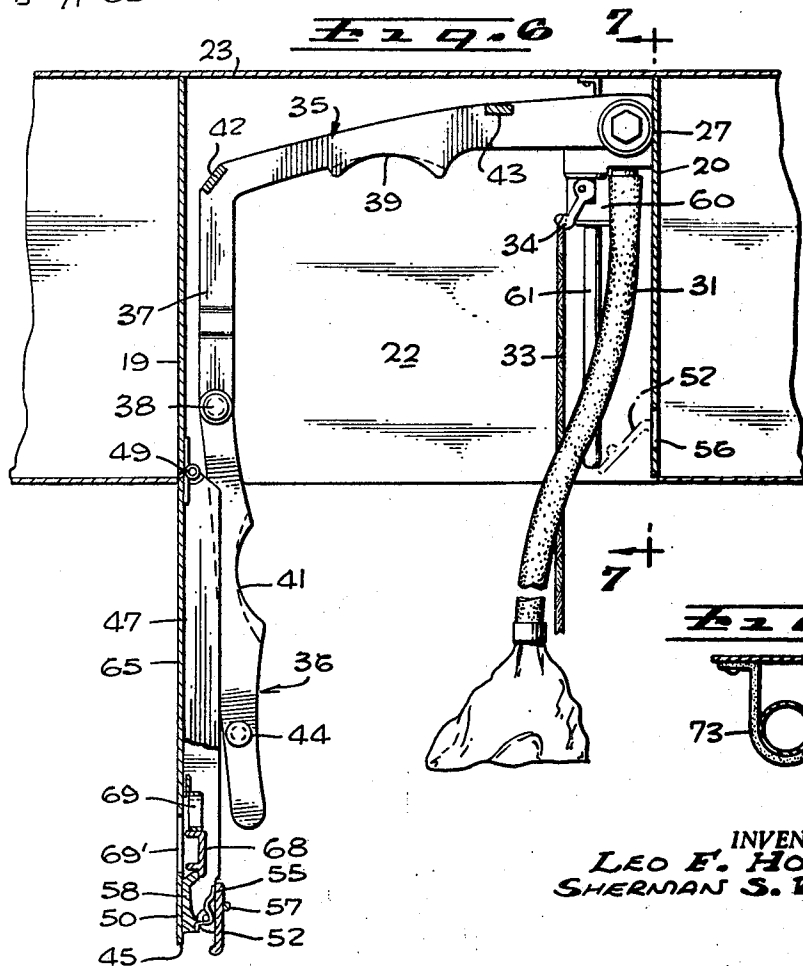
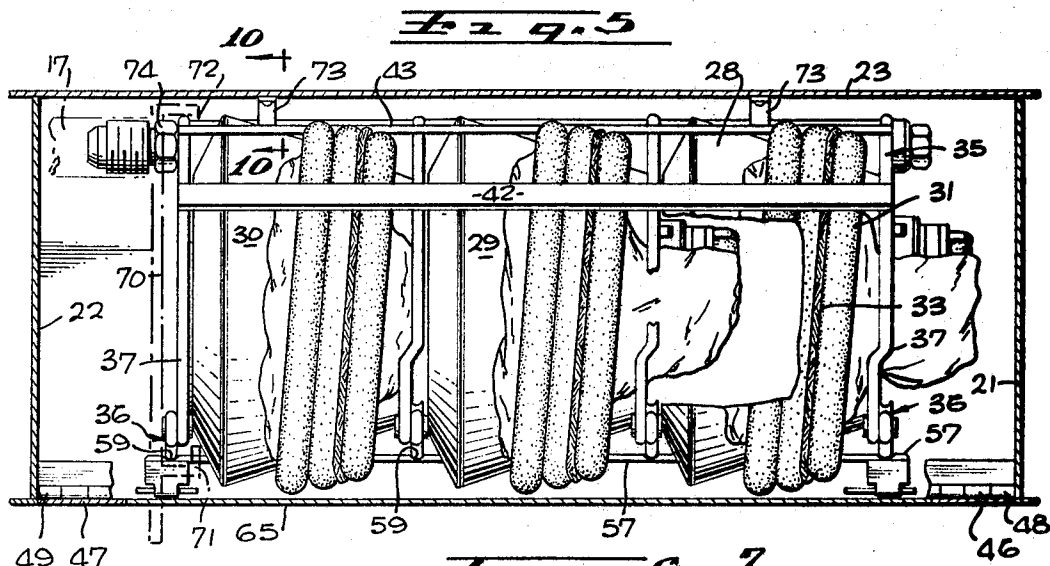
L. F. HOTZ ET AL

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INVENTORS
LEO F. HOTZ
SHERMAN S. WATTS

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L. F. HOTZ ET AL

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Fig. 7

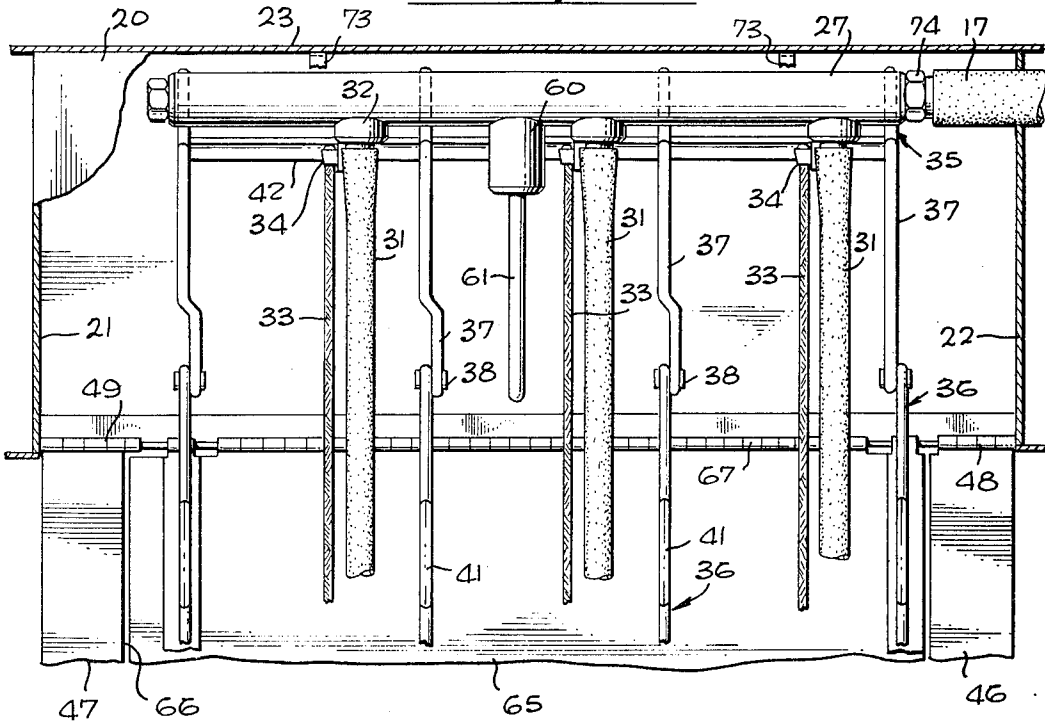


Fig. 9

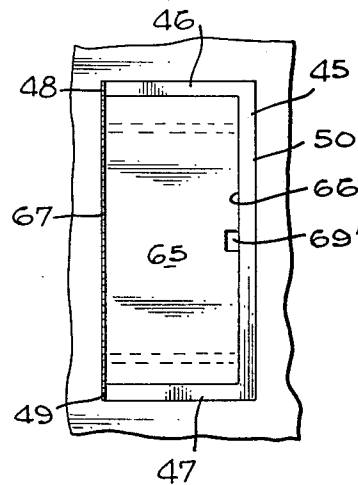
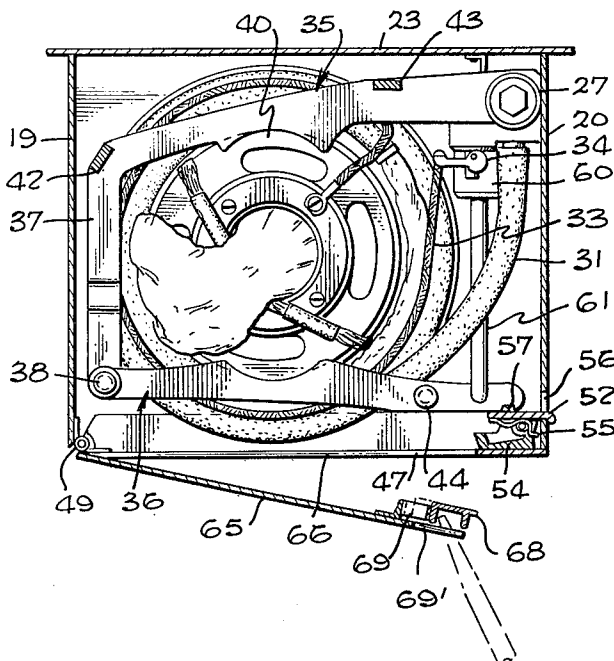


Fig. 8



INVENTORS
LEO F. HOTZ
SHERMAN S. WATTS
BY

Bechler & Grant
ATTORNEYS

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3,503,394

MODULIZED PASSENGER MASK ASSEMBLY

Leo F. Hotz, Burbank, and Sherman S. Watts, Upland, Calif., assignors to Sierra Engineering Co., Sierra Madre, Calif., a corporation of California

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U.S. Cl. 128—146.4

9 Claims

ABSTRACT OF THE DISCLOSURE

A removable and replaceable fixture mounting three passenger masks comprises an oxygen supply manifold acting as a strongback upon which is mounted a series of fixed upper mask retaining cradles with lower mask retaining cradles pivotally secured to respective upper cradles. There is a downwardly open door frame hinged to one side of a housing in which the module is releasably retained. The door frame serves to hold all of the lower cradles in mask retaining position, the frame being secured to the housing by a latch which can be tripped by remote control acting through a solenoid end plunger. A separate door hinged to the housing opens and closes an opening in the door frame, the separate door having its own releasable catch so that it can be opened for inspection purposes without releasing the masks.

When individual passenger masks are provided for each seat in an airplane, care must be taken that such masks and the mechanism for releasing them to operative position is always in proper working order. On some occasions, heretofore, individual masks have been individually mounted in their respective housing requiring that each mask be inspected individually at periodic intervals to be certain to have it in good working order. When a mask has been found to be not in good working order, such mask has needed to be individually removed and replaced by another and then inspected and tested for working order in place. Where attempts have been made to mount a plurality of such masks at one location, inspection has posed a continuous problem in that to be certain of the release mechanism being operative, the release mechanism has had to be actually set in release position physically releasing the mask and then in each instance the mask and its accompanying tubing and valve lanyards have had to be repacked and replaced in position. On the site inspection and testing by methods heretofore available has been very time consuming and unsatisfactory, as has also been the operation involved in replacing masks or groups of masks which have been found to be in unsatisfactory operating order.

It is therefore among the objects of the invention to provide a new and improved compact module for a multiple number of masks wherein the masks are mounted individually in the module but wherein the module as a unit can be placed in an overhead housing in position in the airplane, and thereafter removed as a module whenever replacement becomes necessary.

Another object of the invention is to provide a new and improved compact module for a multiple number of individual breathing masks for an airplane of such design and construction that the module can be effectively and quickly loaded on a bench, then mounted as a unit on the airplane, and then subsequently removed as a unit for reloading on the bench, while in the meantime the module can be promptly replaced by another similar module already tested and found to be in good working order.

Another object of the invention is to provide a new and improved module for mounting a multiple number of pas-

senger masks which incorporates substantially a minimum of structural parts in that the oxygen supply manifold serving all of the masks acts also as a structural member upon which holding and releasing means are attached.

Still a further object of the invention is to provide a new and improved modulized passenger mask assembly which when mounted in an overhead housing is confined by a double closure means one of which holds the individual masks in retained position subject to release from a central control and the other of which can be separately opened to permit inspection of the masks and their mounting without it being necessary to release any of the masks.

Still further among the objects of the invention is to provide a new and improved modulized passenger mask assembly in which a common control for releasing all of the masks simultaneously is positive acting and provided with an overtravel, whereby to insure against any hanging up of the release mechanism.

Also included among the objects of the invention is to provide a new and improved modulized passenger mask assembly which, although adapted to be bench assembled with auxiliary apparatus, is of such construction that it cannot be mounted in place in operative condition on the airplane without prior removal of auxiliary equipment used in the bench assembly operation.

With these and other objects in view, the invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a fragmentary longitudinal schematic view of the interior of an airplane showing the environment in which the invention is operative.

FIGURE 2 is a longitudinal sectional view of the modulized passenger mask assembly in place in an overhead housing ready for operation.

FIGURE 3 is a cross-sectional view on the line 3—3 of FIGURE 2.

FIGURE 4 is a fragmentary partially sectional view on the line 4—4 of FIGURE 3.

FIGURE 5 is a side elevational view of the modulized passenger mask assembly with the housing shown in section.

FIGURE 6 is a cross-sectional view on the line 6—6 of FIGURE 3, showing the assembly in released position.

FIGURE 7 is a longitudinal sectional view on the line 7—7 of FIGURE 6.

FIGURE 8 is a cross-sectional view similar to FIGURE 3, showing a door opening for inspection of the release mechanism.

FIGURE 9 is a bottom view taken on the line 9—9 of FIGURE 3.

FIGURE 10 is a fragmentary cross-sectional view showing a means for releasing mounting the mask assembly in the housing.

In an embodiment of the invention chosen for the purpose of illustration there is shown by way of example a fragment of air frame 10 having a floor 11 on which are rows of seats 12 and 13. A ceiling panel 14 has mounted in it over each respective row of seats a modulized passenger mask unit indicated generally by the reference character 15, all of which are supplied from a common oxygen source 16 through an oxygen line 17 in which is a pressure control valve 18. By way of example, the modulized passenger mask unit on the left is shown in released position and that on the right in closed position.

Each of the modulized passenger mask units 15 is shown as being contained within a housing consisting of side walls 19 and 20, end walls 21 and 22, and an upper

wall 23. The modularized passenger mask assembly, indicated generally by the reference character 25, is shown mounted in a chamber 26 formed by the walls.

More particularly, the passenger mask assembly includes a fixture or manifold 27 which serves simultaneously as a strongback as well as to provide a supply of oxygen or breathing gas mixture to individual passenger masks 28, 29, and 30. Each mask is provided with a tube 31 for oxygen attached to a connection 32 on the manifold and a lanyard 33 attached to its individual control 34, as shown to good advantage in FIGURES 2 and 3. When the masks are contained within the housing, the tubes and lanyards are customarily wound around the body of the mask as shown.

For holding each of the masks there is provided an upper cradle 35 and a lower cradle 36. Each upper cradle 35 is fixed in position by attachment to the manifold 27 by some appropriate means, as for example by welding or brazing. The lower cradle 36 in each instance is pivotally attached to an extension 37 of the upper cradle 35 by means of a pivot pin 38. In the upper cradle 35 is an arcuate recess 39 adapted to engage around a mask back-up plate 40. A similar recess 41 is provided on the lower cradle 36 for the same purpose. Spacer bars 42 and 43 extend between the respective upper cradles 35 and serve the double purpose of properly spacing the cradles one from another and also that of retaining the tubes 31 and lanyards 33 in their coiled position about the masks. A spacer rod 44 serves a similar purpose in spacing the lower cradles 36 one from another as well as retaining the tubes and lanyards.

For holding the lower cradles 36 in the masks retaining positions of FIGURES 2, 3, 5, and 8, there is provided a door frame 45 which is substantially U-shaped as readily seen in FIGURE 9. The door frame 45 has legs 46 and 47 hinged at respective locations 48 and 49 to the lower edge of the side wall 19 of the housing, and a cross bar 50 connects opposite ends of the legs 46, 47. For holding the door frame 45 upwardly in closed position, as shown for example, in FIGURES 3 and 8, there is provided a spring latch 52 pivoted at point 53 upon a lug 54, and spring urged to horizontal position by means of a spring 55. An outer end of the catch extends through an opening 56 in the side wall 20 of the housing. A longitudinally extending member 57 carried by a mounting 58 on the cross bar 50 is provided with a series of pockets 59 in which rest respective ends of the lower cradle 36.

For tripping the spring latch 52 in order to release it, there is provided in the present embodiment by way of example a hydraulic ram 60 from which extends a plunger 61, the lower end of which is adapted to be driven against the adjacent end of the spring latch 52 moving against the pressure of spring 55 to tilt the spring latch in a counterclockwise direction as viewed in FIGURES 3, 6, and 8. For purposes of assuring against any hang-up of the releasing action, the plunger 61 is provided with a limited amount of overtravel so that following release of the spring latch 52 it will drive against the door frame 45 and cause it to open. Through conventional means (not shown) the hydraulic ram 60 in each instance can be operated by remote control.

There is additionally provided a separate relatively flat door 65 which fits in and fills a door opening 66 in the door frame 45. The door 65 is hinged by means of a hinge 67 to the side wall 19 on the same pivot axis as the locations 48 and 49 at which the door frame 45 is also hinged.

For holding the door 65 in closed position, there is provided a releasable catch 68 which is spring urged by a spring 69 in a direction from left to right, as viewed in FIGURES 3 and 8, to a retained position overlying a portion of the mounting 58. An access opening 69' adjacent the releasable catch admits a tool such as a screwdriver for releasing the catch and opening the door

65 independently of release of the door frame 45, as shown by the solid lines of FIGURE 8. By opening the door 65 the condition of the masks and the spring latch 52 can be visually inspected without the necessity of releasing the door frame 45 or any of the individual masks from their retained positions.

Normally, it is found advisable to pack the mask assembly in upside down position on an appropriate work bench. To accomplish this, each mask in turn has its tube and lanyard wrapped around it and is placed in its respective compartment portion of the chamber 26 upon one of the upper cradles 35. The lower cradle 36 is then lowered in position upon it and a keeper 70 is temporarily applied with one end 71 of the keeper overlying the lower cradle 36 and another end 72 of the keeper overlying the upper cradle 35. The keeper applied to retention of one of the masks is left in place while the succeeding two masks are similarly packed. The assembly is then placed within the chamber 26 of the housing and the manifold 27 slipped into place over resilient brackets 73, as shown in FIGURE 10, these resilient brackets being anchored to the side wall 20. Once in place, a coupling 74 is applied to interconnect the adjacent end of the manifold 27 to the oxygen line 17.

It is important to note that the end 71 of the keeper 70 is made extra long so that when the assembly is placed in the chamber 26 of the housing, the keeper will protrude downwardly below the lower ends of the walls of the housing thereby preventing the door frame and door from being closed. This makes certain that the keepers will be removed and the assembly assured of operation before the housing is closed by the closing of the door frame and the door.

After the assembly is made up as described and installed within the housing, followed by a closing and latching of the door frame and door, release is accomplished by energizing the hydraulic ram 60. When this occurs, the spring latch 52 is released and the door frame 45 and door 65 swing downwardly together as shown in FIGURE 6. This movement releases all of the lower cradles 36 and all of the masks then fall out of the assembly. When it comes time to replace the masks, the preferable procedure is to remove the assembly framework entirely from the housing and replace the assembly with one already packed, so that the assembly which has had the masks released can be taken to an appropriate convenient bench and there repacked.

Although the modular mask concept as herein described has been related to a central oxygen supply for an airplane, modification is contemplated to adapt it to a system in which the individual mask module has its own supply. This would include individually mounted high pressure tanks or chlorate candle (not shown) which could handle the entire module, or in the alternative each mask could be individually supplied by its own separate source and actuated by an actuator mechanism comparable to the lanyard and its control. The holder for the tank or chlorate candle could be comparable to the resilient bracket 73 described as the means for releasably holding the manifold 27 in position. Inspection in such event could be handled in the same fashion as herein described by opening the door 65. For inspection and repair the entire assembly would be removable in the same fashion as herein described.

Although a conventional coupling 74 has been made reference to, a quick disconnect could also be advantageously employed at the same location.

While the invention has herein been shown and described in what is conceived to be a practical and effective embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

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Having described the invention, what is claimed as new in support of Letters Patent is:

1. A modulized breathing mask assembly having compartments for mounting a plurality of individual masks in an aircraft interior overhead housing comprising a fixture and releasable attachment means in cooperative engagement with said housing and said fixture, said fixture comprising a relatively stiff structural member extending to positions occupied by all said masks, a plurality of upper cradles set in said fixture adapted to engage upper sides of respective masks, a plurality of lower cradles movably mounted relative to said upper cradles and adapted to engage lower sides of said respective masks, and release means adapted to act between said housing and said respective lower cradles jointly and an actuator for said release means.

2. A modulized breathing mask assembly as in claim 1 wherein the stiff structural member is a manifold.

3. A modulized breathing mask assembly as in claim 2 including mounting said upper cradles on said manifold.

4. A modulized breathing mask assembly as in claim 1 including pivotally mounting said lower cradles on said respective upper cradles.

5. A modulized breathing mask assembly as in claim 2 including separate hoses and gas control means on said manifold for each mask and common auxiliary retainers extending between said respective upper cradles and between said respective lower cradles for confining said hoses and gas control means at locations adjacent said masks.

6. A modulized breathing mask assembly as in claim 1 wherein said release means comprises a door frame having a pivotal mounting on the housing and having a door opening therein, said frame having a supporting

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engagement with said lower cradles and a latch on said frame having a releasable engagement with said housing subject to control by said actuator.

7. A modulized breathing mask assembly as in claim 6 including a door pivotally mounted on the same pivotal mounting as said frame for movement into and out of position in said door opening and a separately releasable catch in operating relationship with said door and said frame.

8. A modulized breathing mask assembly as in claim 6 wherein said release means comprises a power actuated plunger mounted on said frame having a position of potential engagement with said latch and an overtravel position in engagement with said frame.

9. A modulized breathing mask assembly as in claim 1 including a plurality of temporary keepers adapted to hold respective upper and lower cradles of certain of said compartments while others of said compartments are being set in mask retaining relationship.

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RICHARD A. GAUDET, Primary Examiner

J. B. MITCHELL, Assistant Examiner

U.S. Cl. X.R.

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