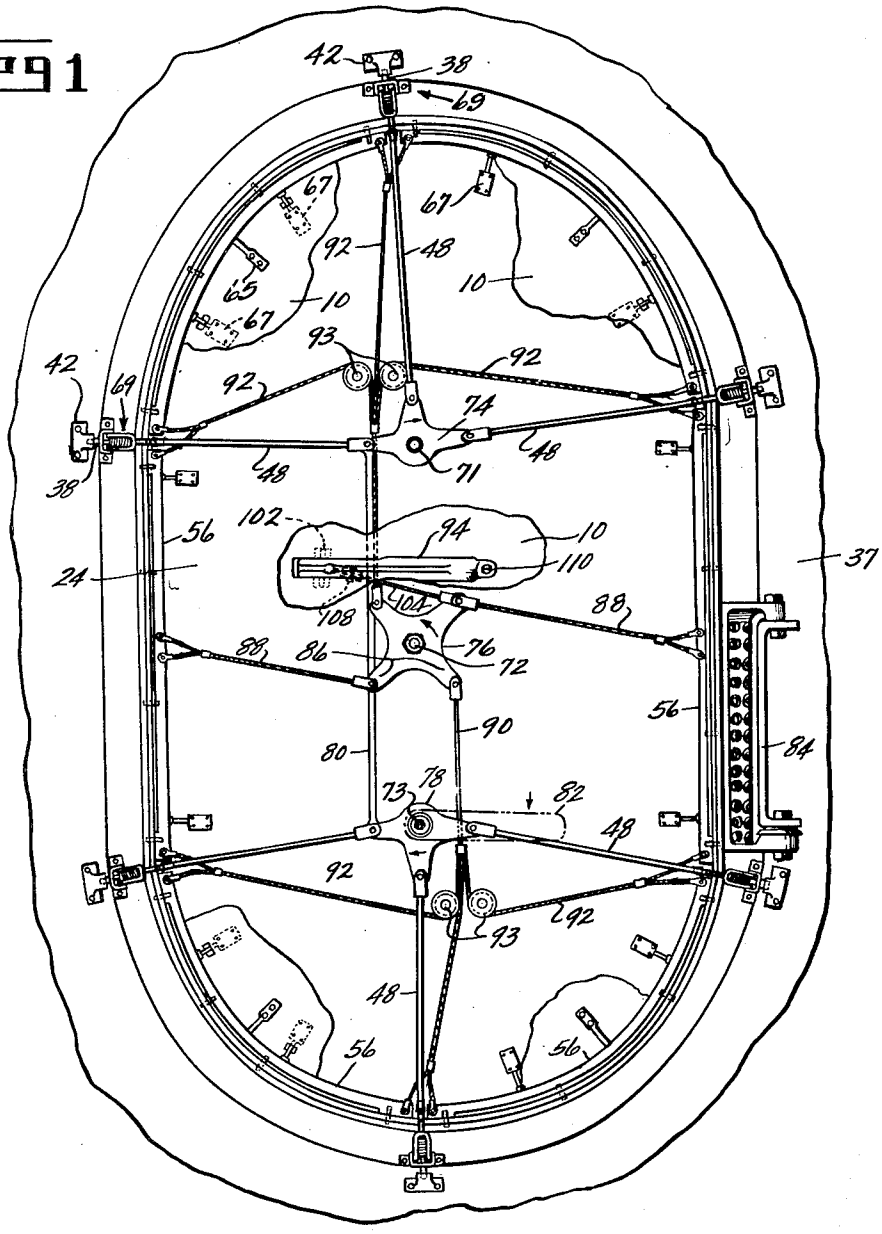
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EMERGENCY RELEASE FOR PRESSURE CABIN DOOR

Filed March 20, 1952 4 Sheets-Sheet 1

Fig 1




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EMERGENCY RELEASE FOR PRESSURE CABIN DOOR

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Fig 2

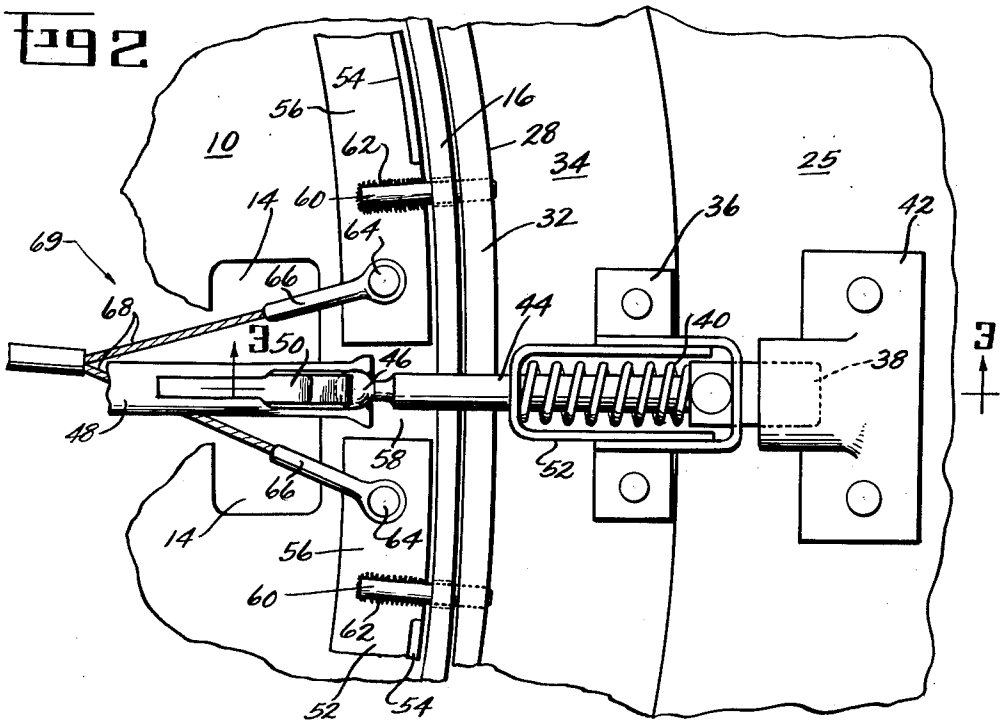
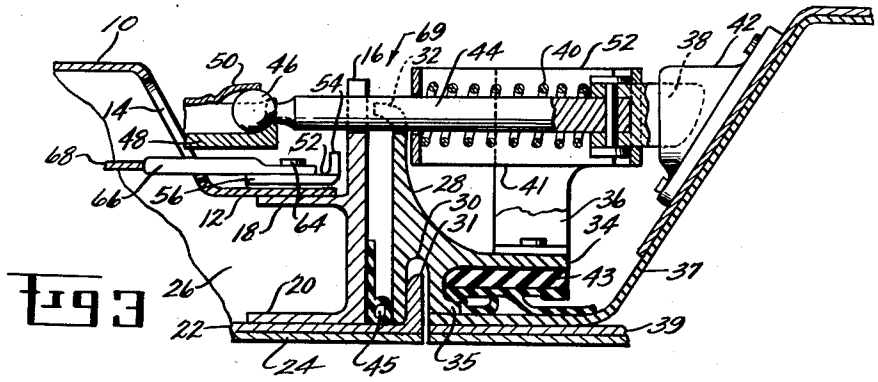



Fig 3




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Fig 4

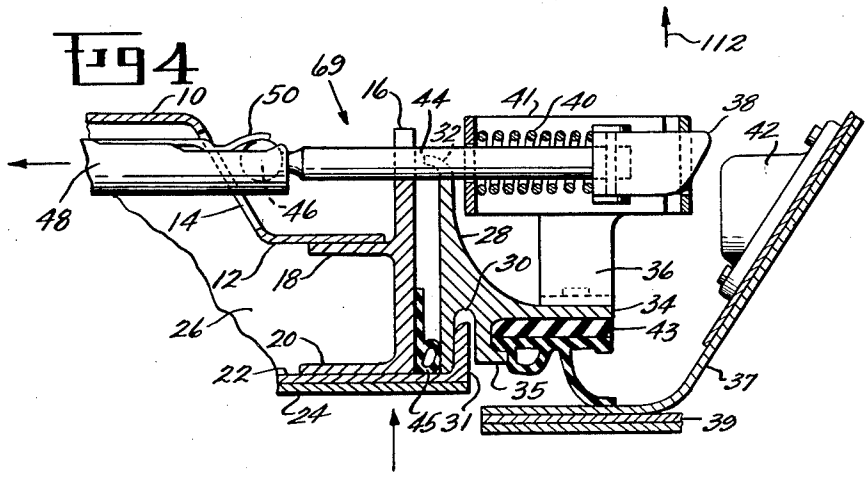
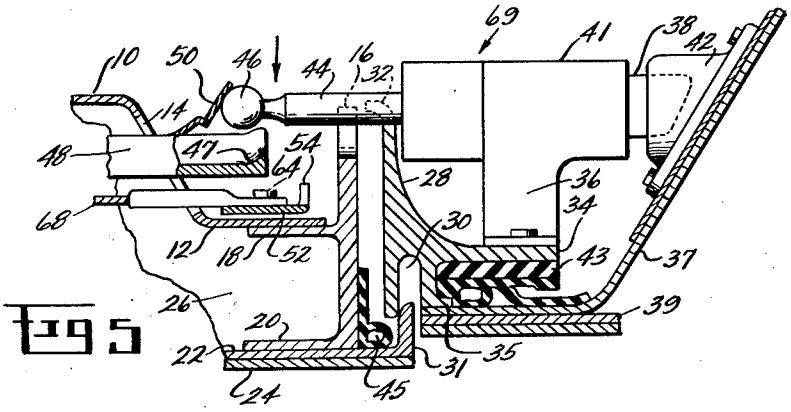



Fig 5




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EMERGENCY RELEASE FOR PRESSURE CABIN DOOR

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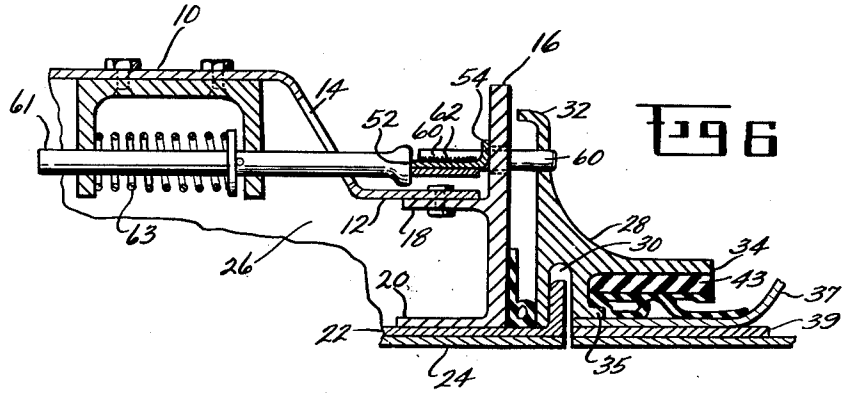



Fig 6

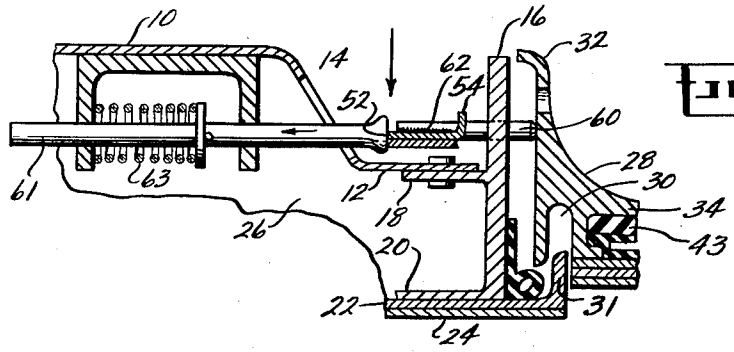
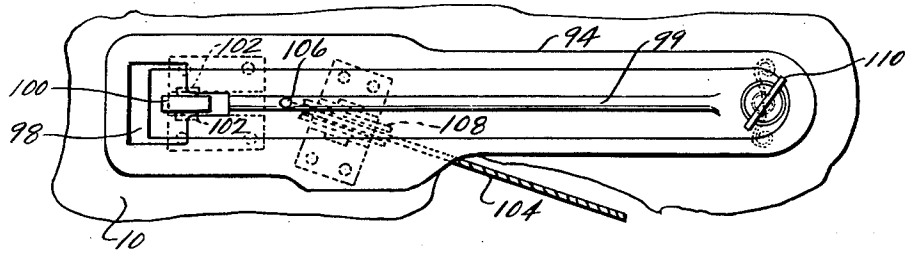



Fig 7

Fig 8



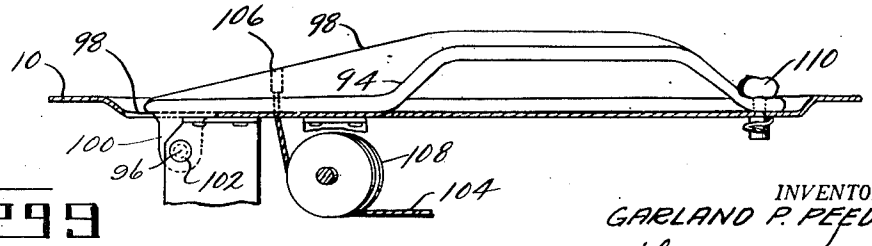




Fig 9

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# EMERGENCY RELEASE FOR PRESSURE CABIN DOOR

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Application March 20, 1952, Serial No. 277,603

3 Claims. (Cl. 244—129)

This invention relates to pressure cabin doors for aircraft and particularly to a door structure which is a combination of service door and emergency exit.

The pressure cabin door which is the subject of this invention consists of a relatively large oval panel surrounded by a narrow frame which is in turn freely fitted to another narrow frame which is hinged to swing inwardly in an appropriate opening in the skin of an aircraft. A second oval panel is spaced apart from the first making a hollow door structure within which the necessary mechanism for operating the door may be contained.

When used as a service door, the door is arranged to open inwardly but includes means whereby the panels and inner frame may be released and jettisoned outward thereby providing an emergency exit when the situation requires.

Two separate latching means are provided, both operable from within the aircraft, the one said latching means being adapted for manually unlatching the entire door to permit it being swung inward on its hinges when being used as a service door, and the other being adapted for manually releasing the inner from the outer frame whereby the panels may be jettisoned by pushing them outwardly from the opening.

An object of the invention is to provide a structure having the above characteristics with maximum effectiveness at minimum cost. I attain this object in the structure hereinafter described, reference being had to the drawings wherein—

Fig. 1 is an elevation of the complete door and frame assembly viewed from the inside of the aircraft.

Fig. 2 is an enlarged fragmentary view of one of the six units used in latching the service door in closed position.

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 2 showing one unit of the latching means in the fully engaged position.

Fig. 4 is a view similar to Fig. 3 except that the latches have been moved to open position by means of the service handle and the pull rods.

Fig. 5 is another view similar to Fig. 4 except that the cables have been drawn by the emergency handle whereby the panel and its frame are released.

Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 1 showing the spring loaded plungers for holding the segments in their locked position.

Fig. 7 is a view similar to Fig. 6 except that the emergency door handle has been rotated thereby compressing the spring loaded plunger and releasing the panel.

Fig. 8 is an enlarged full line view of the emergency handle viewed from the inside of the aircraft.

Fig. 9 is an elevational view of the emergency handle.

Referring to the drawing, an oval door panel 10, largely broken away in Figs. 1, 2 and 3, is formed inward as at 12, Fig. 3, around its perimeter, the inwardly formed portion being provided with a number (preferably six) of peripherally spaced openings 14.



A rolled peripheral section 16 having laterally extending ribs 18 and 20 is fabricated to form an oval frame corresponding in contour to the outer edge of the formed-in position 12 of the panel 10, to which it is fastened by joining the flange 12 to the ribs 18 by riveting, welding, or other appropriate means.

Another rolled section 22 is similarly secured to the rib 20 and an outer panel 24 follows the contour of the skin of the aircraft, whereby the inner panel 10 and outer panel 24 enclose a space 26 in which most of the operating mechanism of the service door and some of that of the emergency door may be contained (see Fig. 1).

Surrounding the rolled peripheral section 16 and very slightly spaced apart therefrom is a rolled section 28 grooved as at 30 for the flange 31 of the rolled section 22, flanged over as at 32, and having a laterally extending flange 34, and a shorter flange 35 to which the skin 37 and several reinforcing members 39 are attached. Packing material 43 makes a tight seal between the member 28 and the skin 37 of the aircraft. Packing material 45 makes a tight seal between the rolled peripheral section 16 of the panel and the main section 28 of the frame.

Peripherally spaced about the flange 34 are a number of latch bolt supporting brackets 36, each of which carry a latch bolt 38 and a bolt projecting spring 40 in a housing 41 whereby the latch bolts 38 are normally projected into the strikes 42, the strikes being fast on the skin 37 of the aircraft. The latch bolts 38 are carried on the front end of a rod 44 which, on the end opposite the latch bolt, have a ball 46 formed thereon. Balls 46 rest in appropriate ball sockets 47 (see Fig. 5) formed in the ends of the service door operating rods 48. These sockets for the balls 46 are open on one side and the balls 46 are kept in place by leaf springs 50 but may be removed from the sockets by movement of the rods 44 transversely to the axis thereof, the leaf springs 50 flexing sufficiently to permit the balls to leave their sockets.

An oval strip 52, flanged upwardly as at 54 for strength, lies above the formed-in portion 12 of the panel 10 at its inner periphery and is divided into segments 56 (see Fig. 2) by cutting out sections as at 58. Each segment has a number of pins 60 (4 in the instant case) welded thereto as at 62, the overhanging ends of the pins extending first thru the rolled section 16 loosely then thru the member 28 of the frame somewhat more closely. Push rods 61 are urged outwardly by springs 63 against the segments 56, thereby normally keeping the pins 60 in the member 28. Studs 64 are provided, two in each segment for attaching cable ends 66 of the cables 68 for withdrawing the pins 60 from the frame member 28. Light leaf springs 65 are provided as retaining means for the several arcuate segments 56. The assembly shown in normal condition in Figs. 2 and 3 may collectively be referred to by the numeral 69. The parts shown assembled in Figs. 6 and 7 may collectively be referred to by the numeral 67.

A sufficient pull on the service door operating rods 48 toward the center of the panel 10 will withdraw all of the latch bolts 38 from the strikes 42 so that the service door and its frame may be swung on its hinges inwardly to open position. Also a sufficient pull on the emergency door operating cables 68 toward the center of the panel 10 will withdraw all of the pins 60 from the flange 32 thereby allowing the pressure in the cabin to push the panel outward free of the aircraft but leaving the frame, of which the member 28 is the main element, in place around the door opening. The mechanism for pulling the rods 48 and cables 68 is shown in Fig. 1.

Pivoted at 71, 72 and 73 on the back panel 24 is an upper bell crank 74, a middle bell crank 76 and a lower bell crank 78 respectively. A connecting rod 80 joins one limb of the upper bell crank 74 to one limb of the

lower bell crank 78. A handle 82 is provided and is fastened on to the lower bell crank 78, whereby turning the handle to rock the lower bell crank 78 also rocks the upper bell crank 74 thereby, thru activation of the pull rods 48, withdrawing all six of the latch bolts 38 from the strikes 42 simultaneously, whereupon the service door may be swung inward on its hinges 84, inward being toward the observer in Fig. 1.

The middle bell crank 76 has four arms 86, two opposite arms 86 being connected to segments 56 by the two cables 88. The other pair of opposite arms 86 are each provided with a single cable 90 having three branches 92 each of which is connected to two ends of segments 56 as seen in Fig. 2, pulleys 93 being provided for guiding the cables in operation.

An emergency handle 94, shown to an enlarged scale in Figs. 8 and 9, is rockable about vertical axis 96 which is parallel to the panel 10. The panel 10 is slightly depressed as at 98 to receive the handle 94, the handle being ribbed as at 99. A hinge lug 100 carries the hinge pin 102 upon which the handle 94 may be swung toward the observer, see Figs. 1 and 9. A short cable 104 has one end anchored at 106 thence passes under the small pulley 108 and has the other end connected to an arm 86 of a bell crank 76 (see Fig. 1). A quick release 110 is provided to prevent inadvertent operation of the emergency handle 94.

The operation of subject invention is substantially as follows:

The combination service and emergency door is shown closed in Fig. 1 which shows the door from within the aircraft. If it is desired to open the door for taking on or discharging passengers, the handle 82 is pressed downward. This operates the six pull rods 48 and the connecting rod 80 to simultaneously pull the latch bolts 38 inward toward the center of the panel 10, thus changing the assemblies 69 from the condition shown in Figs. 2 and 3 to the condition shown in Fig. 4, where the latch bolts 38, against the resistance of the springs 40, are withdrawn from the strikes 42 and the service door latching assembly 69 slightly opened by moving it on its hinges inwardly in the direction of the arrow 112 away from the skin 37 of the aircraft.

If, on the other hand, it is desired to open the door as an emergency exit, the safety device 110 is first released, then the emergency handle 94 is pulled inward toward the operator, whereby the cable 104 which passes under the pulley 108 is drawn up to rotate the bell crank 76. This in turn pulls inward on the two cables 90, whereby the six branch cables are drawn inward, thereby withdrawing the segments 56 which contain the pins 60 from the positions shown in Fig. 6 to the position shown in Fig. 7, where the panel is already pushed part-way out of the frame member 28.

I claim:

1. A service door and emergency exit structure for aircraft having an outer surface formed with a service door opening therein, an annular service door receivable in said service door opening having an emergency exit opening therethrough surrounded by said door, flange means projecting from the periphery of said door in overlapping relation to the inner face of the surface portion of the aircraft surrounding said service door opening, resilient sealing gasket means carried by said door intermediate the overlapping portion of said flange and said inner face of the surface portion, hinge means within the aircraft connected between said door and the inner face of said surface portion for swinging said frame inwardly out of said service opening and outwardly into said service opening, retractable latch means carried by said door, strike members therefor carried on the inner face of the said surface portion receiving said latch means for retaining said door in said service door opening, an emergency door panel overlapping the outer surface of the door around its periphery, an annular panel supporting frame secured to the inner face of said door panel, receivable in, and removable out of said emergency exit opening in said service door, sealing gasket surrounding said emergency exit opening between the service door and the periphery of the emergency exit panel, said latching means comprising retractable locking bolts each having an actuator receiving recess at its inner end facing inwardly of the aircraft, a plurality of bolt retracting actuators slidably carried by said emergency exit door panel structure each having an actuating head received in one of said recesses, leaf spring means carried by said bolts for yieldably retaining said heads in said recesses, manually openable actuator means carried by said emergency door panel and connected to bolt retracting actuators for retracting said actuators to unlock said service door, separate locking members carried by said emergency door panel for locking engagement with said service door, emergency exit panel release actuator means carried by said emergency exit panel for unlocking said separate locking members to release said emergency exit panel from said service door including flexible actuating connectors connected between said last mentioned actuator means and said separate locking members, whereby release and outward displacement of said emergency exit panel from said service door disengages the said heads of said bolt retracting actuators from the recesses in the retractable service door locking bolts.

2. A combined service door and emergency exit structure for a pressurized aircraft cabin having a service door receiving opening therein, a service door framework swingably mounted within the aircraft for movement into and out of said opening, said framework having an annular pressure sealing stop flange overlapping the inner portion of the aircraft surrounding said opening, annular pressure sealing gasket means surrounding said framework intermediate said flange and said inner face of the aircraft portion surrounding said opening sealing the space between the flange and the opening, said framework having an emergency exit opening therethrough and formed with an annular stop flange thereon extending into the emergency exit opening, an emergency exit door panel having an annular reinforcing framework around its periphery freely movable into said exit opening from the exterior of the aircraft and formed with an annular stop flange thereon disposed for interengagement with said stop flange on said service door framework, annular pressure sealing gasket means interposed between the service door and the emergency door annular flange, a plurality of retractable locking bolts carried by said service door annular flange in retractable locking engagement with the aircraft structure surrounding said service door opening, spring means between said bolts and said service door annular flange for projecting said bolts beyond the periphery of said service door opening, strike members fixed on the aircraft structure surrounding said service door opening for receiving engagement with the ends of said bolts, service door release means carried by said emergency door panel for retracting the service door locking bolts from said strikes to release said service door framework for inward swinging movement away from said opening, separate retractable locking bolt means carried by said emergency door panel for projection, in the plane of said flanges, into interlocking engagement with said service door flange, spring means connected between said emergency exit door panel framework and said last mentioned retractable locking bolt means for projecting the same into locking engagement with said service door flange to retain the emergency exit panel flange in the service door flange, actuating lever means pivoted at the rear of the emergency exit door panel and swingably inwardly, cable means connected between the lever means and the last mentioned retractable bolt means for retraction thereof by said lever means, and separable interconnecting means between the retractable locking bolts carried by said service door flange and said service door release means carried by said emergency door panel,

separable by outward movement of the emergency exit door panel and its flange from the service door flange, to prevent retracting of said service door locking bolts by its actuating means on the emergency exit door panel when the emergency door panel is removed from the emergency exit door opening.

3. In a combined service and emergency door exit for an internally pressurized aircraft having a service door opening formed in the outer surface thereof, a service door framework disposed in said opening, hinge means mounted within the aircraft and connected to said framework for swinging said framework inwardly of the aircraft out of said opening, said framework having an annular flange overlapping the inner face of said surface surrounding said opening when said service door framework is positioned in said opening, pressure sealing gasket means surrounding said service door framework intermediate said flange and said inner surface, said service door framework having an opening therethrough forming an emergency exit opening, annular stop flange means projecting inwardly from said framework into said emergency exit opening, an emergency exit door framework receivable in said emergency exit opening from the exterior of said aircraft having an emergency exit closure panel thereon, stop flange means projecting from said emergency exit framework into said emergency exit opening and facing inwardly for inward movement limiting engagement with the stop flange on said service door framework, annular pressure sealing gasket means surrounding said emergency exit opening between the stop flange on the emergency exit closure panel framework and the stop flange therefor on the service door framework, in pressure sealing relation there between when said emergency exit door framework and its panel are positioned within said emergency exit door opening, retractable service door locking bolt means carried by said service door framework in the plane thereof, locking bolt receiving sockets carried by the interior of the aircraft surface adjacent the edge of the service door opening for receiving the outer ends of the locking bolt means, spring means for projecting said



locking bolt means into retaining engagement with said sockets, said locking bolt means comprising retractable bolts, each having a bolt actuating recess therein adjacent its inner end facing inwardly of the aircraft, a locking bolt retractor rod for each bolt, slidably carried on the emergency exit panel framework in alignment with each of said retractable bolts formed with an actuating head at its outer end removably disposed in said recess for disengagement therefrom by outward movement of said emergency exit closure panel framework and panel from said emergency exit opening, common actuating means for said locking bolt retractor rods mounted on said emergency door panel connected to said retractable bolt means for simultaneously retracting of said locking bolts from said sockets to unlock said service door framework, a plurality of latching bolt members slidably carried on said emergency exit closure panel framework and panel having their outer ends in interlocking engagement with the service door framework at spaced points around the emergency exit opening therein, actuating lever means carried on the emergency exit panel for retracting said latching bolts including a plurality of flexible actuators connected between said lever means and said latching bolts for simultaneous actuation thereof by said lever means, whereby release and outward displacement of the emergency exit closure panel framework and panel from said emergency exit opening separates the service door retractable locking bolts from their retractor rods.

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