

July 16, 1929.

J. F. RISHER

1,721,039

SUBMARINE ESCAPING APPARATUS

Filed May 31, 1928

3 Sheets-Sheet 1

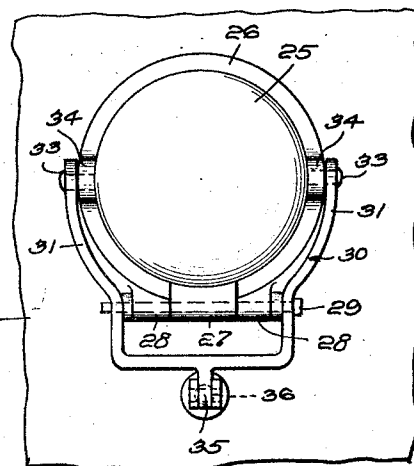
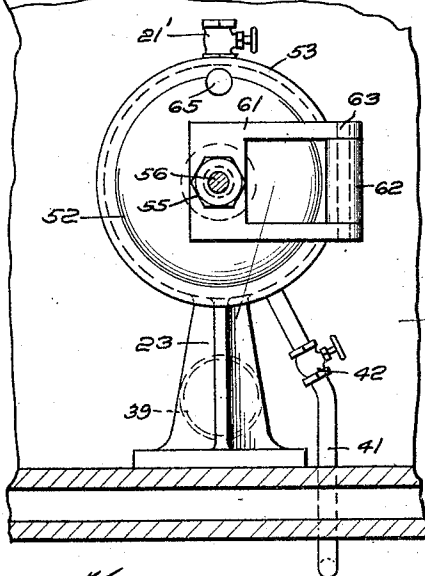
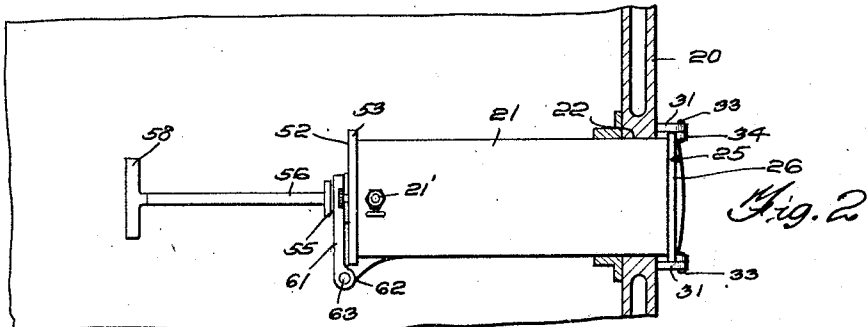
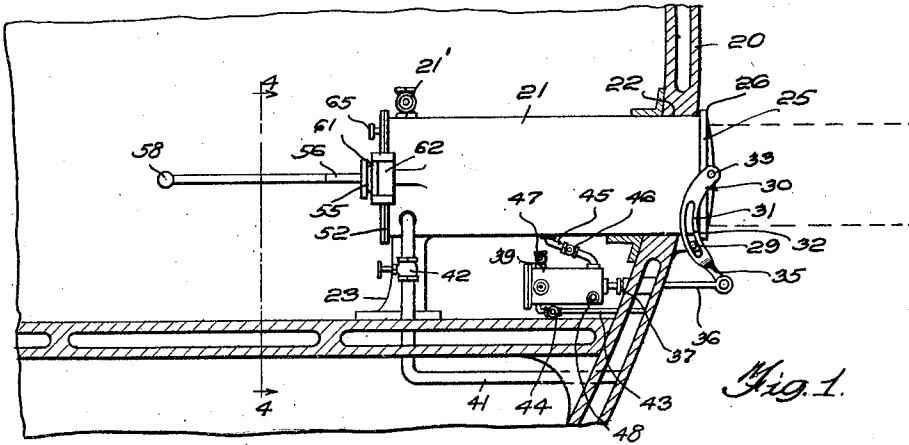


Fig. 3.

INVENTOR.

JAMES F. RISHER,

BY

BR

ATTORNEY.

July 16, 1929.

J. F. RISHER

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3 Sheets-Sheet 2

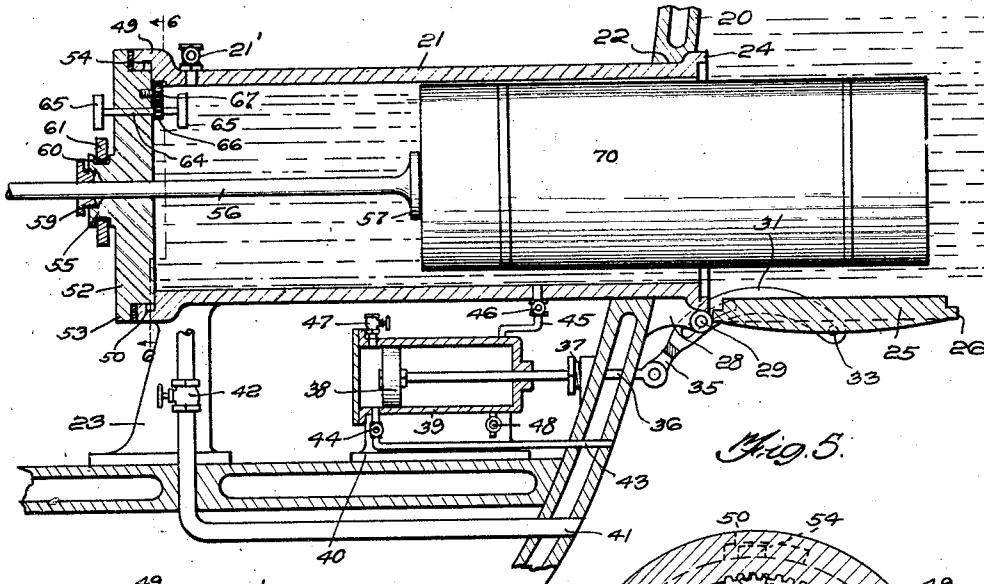


Fig. 5.

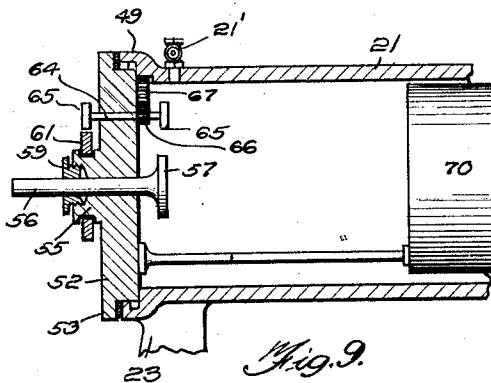


Fig. 9.

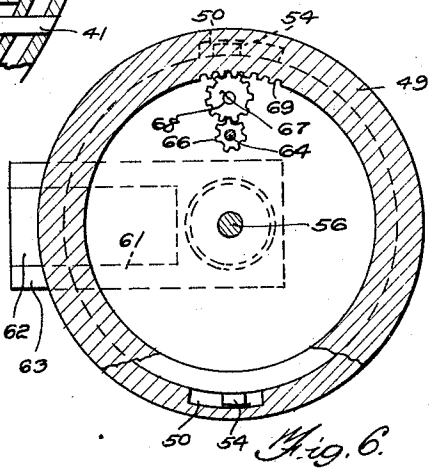


Fig. 6.

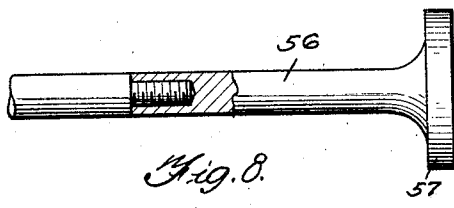


Fig. 8.

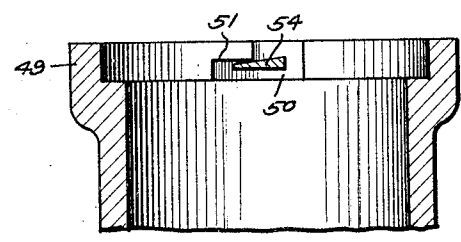


Fig. 7.

INVENTOR.
JAMES F. RISHER,
BY *B. M. McNamee*
ATTORNEY.

July 16, 1929.

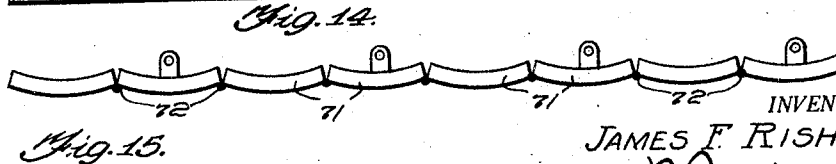
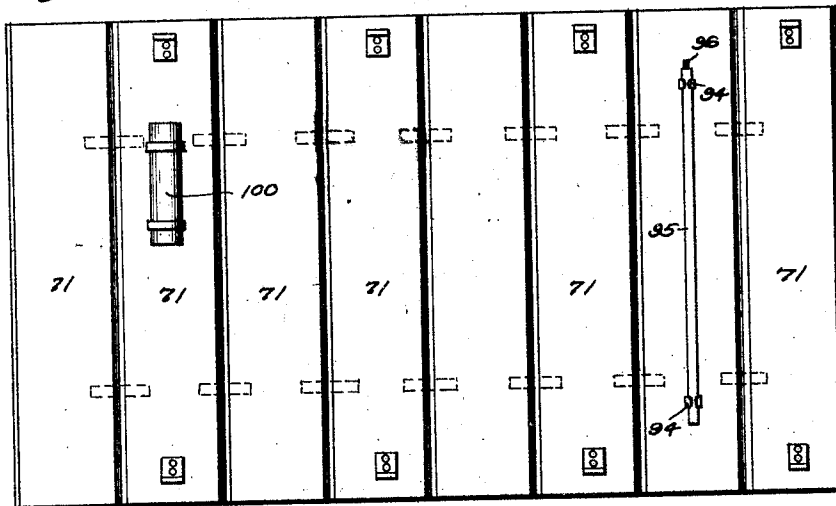
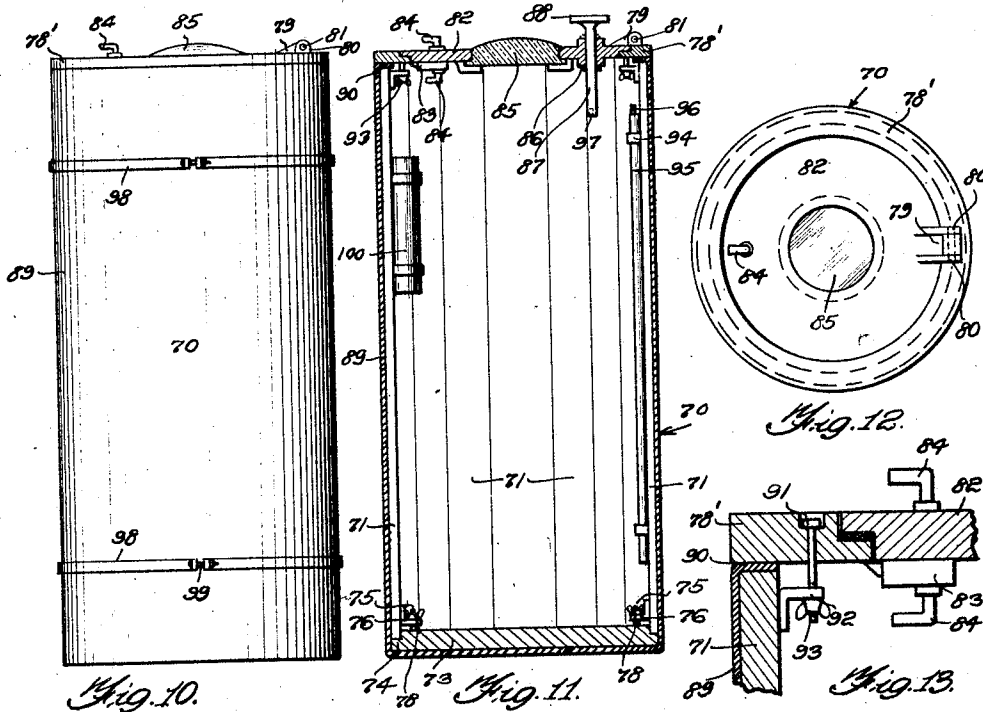
J. F. RISHER

1,721,039

SUBMARINE ESCAPING APPARATUS

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3 Sheets-Sheet 3



INVENTOR.
JAMES F. RISHER,
BY *B. M. Williams*
ATTORNEY.

Patented July 16, 1929.

1,721,039

UNITED STATES PATENT OFFICE.

JAMES F. RISHER, OF BAMBERG, SOUTH CAROLINA.

SUBMARINE ESCAPING APPARATUS.

Application filed May 31, 1928. Serial No. 281,904.

My invention relates to a safety appliance for submarines, whereby the occupants of a sunken submarine may escape from the same and rise to the top of the water.

5 In accordance with my invention, the hull of the submarine is provided at suitable points, with any suitable number of cylinders or casings, preferably permanently built into the same. For co-action with these perma-
10 nent cylinders or casings, I provide any number of floating buoys or containers, within which a man may be stored. The buoy or container is introduced into the cylinder, and is then forced from the cylinder into the water, and will float to the top of the water, where
15 the occupant may be rescued. Means are provided to equalize pressure upon the opposite sides of the movable door of the cylinder, and means are also provided whereby
20 the water pressure may be employed in opening the door of the cylinder. The buoy or container is forced from the cylinder by means of a rod, which is pushed by an occupant within the submarine, or the container
25 may be pushed out of the cylinder by a rod operated by the occupant of the buoy or container. An important feature of the invention is the construction of the buoys or containers, whereby they may be stored in a flat
30 condition, in the form of a strip, whereby they will occupy the minimum storage space. This is an important feature, as the storage space in a submarine is an important factor. The buoy or container embodies a collapsible section or strip, including a plurality of hinged
35 segments, made of suitably stiff and rigid material. These hinged sections are assembled about ends or heads, and secured thereto by bolts. The buoy or container is made water-
40 proof by means of a bag, preferably formed of rubber. One head or end is equipped with a hinged door, whereby a man may readily enter the same, and lock the door behind him.

45 In the drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

50 Figure 1 is a side elevation of apparatus embodying my invention, the hull of the submarine being shown in section,

Figure 2 is a plan view of the same,

Figure 3 is an elevation of the outer end of the cylinder or casing included in the apparatus,

55 Figure 4 is a transverse section taken on line 4—4 of Figure 1,

Figure 5 is a central vertical longitudinal section through the cylinder and associated elements, the outer door being open,

Figure 6 is a transverse section taken on 60 line 6—6 of Figure 5,

Figure 7 is a longitudinal section through the inner end of the stationary cylinder, showing the locking means for the inner door,

Figure 8 is a side elevation of a sectional 65 push rod,

Figure 9 is a central vertical longitudinal section through the stationary cylinder, parts broken away, showing the manner in which the buoy or container is pushed from within 70 the cylinder by the occupant therein.

Figure 10 is a side elevation of the buoy or container,

Figure 11 is a central vertical section 75 through the same,

Figure 12 is a plan view of the same,

Figure 13 is a fragmentary longitudinal section through the outer end of the buoy,

Figure 14 is a plan view of the body portion of the buoy, showing the same in the 80 flat condition, and,

Figure 15 is an edge elevation of the same.

In the drawings, wherein for the purpose of illustration, is shown a preferred embodiment of my invention, the numeral 20 designates the hull of a submarine, of any well known or preferred type. The numeral 21 designates a horizontally arranged ejecting cylinder or casing, which is permanently attached to or built into the hull, the outer end 90 of the cylinder passing through an opening 22 and its inner end being supported by a rigid leg 23, or the like. The outer end of the cylinder is preferably provided with a flange or bell 24, for receiving therein a vertically 95 swinging door or cover 25, having a flange 26. This door or cover is mounted to swing vertically at its bottom, and carries a depending knuckle 27, arranged between knuckles 28, and these knuckles are connected by a pin 29. 100 The door is swung upon its pivot by means of a yoke or U-shaped member 30, embodying curved arms 31, having longitudinally curved slots 32. The slots 32 receive the ends of the pin 29, as shown, and the yoke, therefore, 105 turns upon this pin and also slides longitudinally. The free ends of the arms 31 are apertured for pivotally receiving pins 33, carried by lugs 34, formed upon the door 25, at its horizontal diameter. The yoke extends down- 110 wardly beyond the pin 29 and is provided with a crank 35, which is pivotally connected

with a plunger rod 36, operating through a stuffing box 37. The inner end of this rod is attached to a plunger 38, slidable within a horizontal power cylinder 39, rigidly mounted upon a stationary base 40.

The numeral 41 designates a pressure equalizing pipe, the outer end of which extends through the hull 20, to the exterior thereof and this pipe leads into the rear or inner end of the ejecting cylinder 21, and is equipped with a cut-off valve 42. The cylinder 21 has an air vent valve 21'. A pressure supply pipe 43 passes through the hull 20 and leads to the exterior thereof and leads into the inner end of the cylinder 39 and is equipped with a cut-off valve 44. A pressure supply pipe 45 leads into the outer end of the cylinder 39 and into the ejector cylinder 21 and is equipped with a cut-off valve 46. An exhaust valve 47 is connected with the inner end of the cylinder 39 and an exhaust valve 48 is connected with the outer end of the cylinder 39.

The inner end of the ejector cylinder 21 is provided with a bell 49, Figures 5 and 7, and this bell is provided, preferably at diametrically opposite points with L-shaped grooves 50, forming shoulders 51. The bell 49 is adapted to receive an inner door or cover 52, having a flange 53. This door 52 is provided at diametrically opposite points, with beveled bolts 54, rigidly attached thereto. The door 52 is provided centrally thereof, with a pivot trunnion 55, having an opening formed therethrough for receiving a pusher rod 56, having a flat head 57 and a handle 58. The pivot trunnion is also equipped with a stuffing box 59. The pivot trunnion is provided with an annular groove 60, which is pivotally mounted within the inner end of a horizontally swinging arm 61, the outer end of which is pivoted to a stationary vertical knuckle 62, as shown at 63. The knuckle 62 is rigidly carried by the ejectory cylinder, as shown. When the cover or head 52 is introduced into the bell 49, the lugs 54 enter the longitudinal portions of the L-shaped grooves, and the head 52 is locked in the bell, by a turning movement thereof, which is effected by a rotatable shaft 64, extending through an opening in the door, and equipped with hand wheels 65, arranged within and outwardly of the ejector cylinder, as shown.

The shaft 64 carries a gear 66, to turn therewith, and this gear engages a gear 67, which is pivoted upon the door 52, at 68. The gear 67 engages a set of gear teeth 69, formed upon the inner side of the bell 49, as shown. The door 52, may, therefore, be locked in the closed position from the interior or exterior of the ejector cylinder.

Any number of buoys or containers 70 are adapted for use in connection with the ejector cylinder 21. These buoys or containers are collapsible and are adapted to be stored away in a flat condition. Each buoy embodies a

body portion comprising segmental sections 71, hinged together at their outer surface, as shown at 72. When folded over upon themselves, these segments produce a cylindrical structure, of the desired diameter and length. The segments 71 are formed of stiff and rigid material, to withstand the pressure of the water, and when assembled, produce a rigid structure. The outer end of the assembled body portion, receives a head 73 having a flange 74. This head carries bolts 75, which are inserted through apertured brackets 76, secured to selected segments 71 and clamped thereto by winged nuts 78. The opposite end of the buoy or container is covered by a head including a ring 78', having a knuckle 79, positioned between knuckles 80, and pivoted thereto by a pin 81, or the like. The knuckles 80 carry a swinging door or cover 82, having interfitting engagement with the ring 78', as shown. The cover is adapted to be locked in the closed position by a self-closing latch 83, which may be opened by handles 84, arranged upon the inner and outer sides of the cover 82. The cover 82 is preferably provided with a heavy glass section 85, held in a socket therein, as shown. The cover 82 may be equipped with a stuffing box 86, for slidably receiving a pusher rod section 87, having a head 88. This stuffing box is provided when the user of the buoy is to eject himself when arranged within the buoy, but when the buoy is ejected by an operator exteriorly of the ejector cylinder, the stuffing box 86 is omitted as illustrated in Figure 12.

The assembled body portion and end 73 is covered by a waterproof sack 89, which may be formed of strong canvas with or without a coating of rubber, or the sack may be made of several layers of canvas and rubber, like the walls of a hose. The free end of the sack is bent inwardly over the end of the assembled body portion, as indicated at 90, and is positioned between the ring 78' and the body portion, and the ring is clamped in place by bolts 91, carried thereby, and passing through apertured brackets 92, secured to selected segments 71, such bolts carrying winged nuts 93.

The buoy to be used by the last occupant of the submarine, and which is equipped with the stuffing box 86, has one of its segments 91 provided with resilient catches 94, to receive a rod extension 95, having a screw-threaded shank 96, to enter the screw-threaded socket 97 in the rod section 87. The sack 89 is encircled by bands 98, the ends of which are detachably connected by bolts 99 or the like, in any well known or preferred manner. The buoy may also carry a receptacle 100, for containing oxygen, water or food.

The operation of the apparatus is as follows:

For the crew to escape from the sunken submarine, the buoys are assembled as needed. With the buoy assembled, the cover 82 re-

mains open, and the man enters the buoy, and the spring latch 83 locks the cover closed. The outer door 25 of the ejector cylinder is now closed and the inner door 52 is open. The buoy containing the man is now slid into the ejector cylinder, the end 73 being arranged in the forward position. The head 82 may not now be equipped with the stuffing box 86 and ejector rod, but is plain, as shown in Figure 12. When the buoy is inserted into the cylinder 21, the inner door 52 is closed and the valve 42 is opened, air vent valve 21' being also slightly opened. Water now enters through the pipe 41 and passes into the cylinder 21, and about the buoy 70, which is of smaller diameter, and adapted to float therein. When the cylinder 21 is filled with water, valve 21' being closed, the pressure upon the inner and outer sides of the door 25 is equalized. The valve 46 is now opened, valve 44 closed, and exhaust valve 47 opened. Water under pressure within the cylinder 21 now flows through the pipe 45 and enters the cylinder 39, forcing the plunger 38 rearwardly which will swing the outer door 25 to the open position. As this door opens the men within the submarine exteriorly of the ejector cylinder 21 force the pusher rod 56 forwardly and the buoy is ejected from the cylinder 21 into the water, and floats to the top of the water, whereby the occupant of the buoy may be rescued. After the buoy has thus discharged from the ejector cylinder, the door 25 is again closed, and to accomplish this, valve 45 is closed, valve 47 closed, valve 48 opened and valve 44 opened. Water pressure will now pass into the cylinder 39 through the pipe 43, forcing plunger 38 forwardly closing the door 25. With the valve 42 closed, the door 52 is now opened and the water contained in the ejector cylinder will discharge into the hull of the submarine. The operation is repeated until all of the occupants of the submarine have been liberated, except the last man. This last man places the assembled buoy partly into the ejector cylinder and leaves the cover 82 partly or wholly open so that he may crawl into the buoy. The door 25 is, of course, closed. Valve 46 is opened, valve 48 closed, valve 47 opened and valve 44 closed. The last man now partly opens the valve 42 so that the equalizing water pressure will begin to slowly enter the ejector cylinder. The head 82 is now equipped with the ejector rod section 87. The last man now crawls into the buoy 71 and reaches out the same and pulls the door 52 closed and turns the wheel 65 to lock the door 52 closed. He then crawls completely into the buoy and slams the door 82 after him, which locks closed. He now removes the rod section 95 and secures it to the rod section 87. As soon as the water pressure fills the ejector cylinder 21, pressure

will equalize upon opposite sides of the door 25 and this water pressure will pass into the cylinder 39 and shift plunger 38 to the left, opening the door 25. The occupant within the buoy may now push the rod against the door 52, thus ejecting his buoy from within the cylinder 21, and this buoy will now rise to the top of the water.

It is to be understood that the forms of my invention, herewith shown and described, are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In a submarine escaping apparatus, an ejector cylinder mounted within the hull of the submarine, a movable outer door arranged near one end of the ejector cylinder, a movable inner door arranged near the opposite end of the ejector cylinder, means for equalizing the pressure upon the opposite sides of the movable outer door when it is closed, and means operated by the pressure within the closed ejector cylinder for moving the outer door to the opened position.

2. In a submarine escaping apparatus, an ejector cylinder mounted within the hull of the submarine, a movable outer door for the ejector cylinder, a movable inner door for the ejector cylinder, a pressure equalizing pipe leading to the exterior of the hull of the submarine and leading into the ejector cylinder, a power cylinder arranged within the hull, a plunger within the power cylinder, a pipe connecting the ejector cylinder and the power cylinder so that pressure from the ejector cylinder may pass into the power cylinder, and operative connecting means between the outer door and the plunger.

3. In a submarine escaping apparatus, an ejector cylinder mounted within the hull of a submarine, a movable outer door for the ejector cylinder, a movable inner door for the ejector cylinder, a pressure equalizing pipe leading from the exterior of the hull to the interior of the ejector cylinder, means receiving pressure from the interior of the ejector cylinder and connected with the outer door to open the same, a buoy for receiving a man adapted for insertion within the ejector cylinder, and means for forcing the buoy out of the ejector cylinder.

4. In a submarine escaping apparatus, an ejector cylinder mounted within the hull of a submarine, a movable outer door for the ejector cylinder, a movable inner door for the ejector cylinder, a pressure equalizing pipe leading from the exterior of the hull to the interior of the ejector cylinder, means receiving pressure from the interior of the

ejector cylinder and connected with the outer door to open the same, a buoy for receiving a man adapted for insertion within the ejector cylinder, and means for forcing the buoy out of the ejector cylinder.

5. In a submarine escaping apparatus, an ejector cylinder mounted within the hull of a submarine, a movable outer door for the ejector cylinder, a movable inner door for the ejector cylinder, a pressure equalizing pipe leading from the exterior of the hull to the interior of the ejector cylinder, means receiving pressure from the interior of the ejector cylinder and connected with the outer door to open the same, a buoy for receiving a man adapted for insertion within the ejector cylinder, and means operated by the occupant within the buoy to force the buoy out of the ejector cylinder.

6. In a submarine escaping apparatus, an ejector cylinder mounted within the hull of a submarine, a movable outer door for the ejector cylinder, a movable inner door for the cylinder, a pressure equalizing means leading into the ejector cylinder, means receiving pressure from the interior of the cylinder to open the outer door, a buoy receiving a man and adapted for insertion within the ejector cylinder, and a pusher rod extending through one end of the buoy whereby the occupant within the buoy may force the same out of the ejector cylinder.

7. In a submarine escaping apparatus, a collapsible man receiving buoy including a body portion formed of hinged segments, ends for co-action with the hinged sections when assembled, and means for detachably connecting said ends with certain segments, the body portion when collapsed being

adapted to be arranged in a generally flat relation.

8. In a submarine escaping apparatus, an ejector cylinder carried by the hull of a submarine, an outer door for the cylinder, an inner door for the cylinder, means operated from the outer and inner sides of the inner door to lock the same in the closed position, means to equalize the pressure within the cylinder and to automatically open the outer door, a man receiving buoy for insertion within the cylinder, a door for closing one end of the buoy, means operated from the outer and inner sides of the last named door to lock the same closed, and means operated from the interior of the buoy to force the same out of the cylinder.

9. In a submarine escaping apparatus, an ejector cylinder mounted within the hull of the submarine, a movable outer door for the ejector cylinder, a movable inner door for the ejector cylinder, a pressure equalizing pipe leading to the exterior of the hull of the submarine and leading into the ejector cylinder, a power cylinder arranged within the hull, a plunger within the power cylinder, operative connecting means between the outer door and plunger, a pipe connecting the ejector cylinder and the power cylinder so that pressure from the ejector cylinder may pass into the power cylinder and shift the plunger in one direction to open the outer door, and a pipe leading to the exterior of the hull and connected with the power cylinder to supply water pressure to the power cylinder for shifting the plunger in the opposite direction to close the outer door.

In testimony whereof I affix my signature.

JAMES F. RISHER.