A. J. GRIFFIN.

SUBMARINE BOAT.

APPLICATION FILED JULY 20, 1910.

1,103,958.

Patented July 21, 1914.

3 SHEETS—SHEET 1.

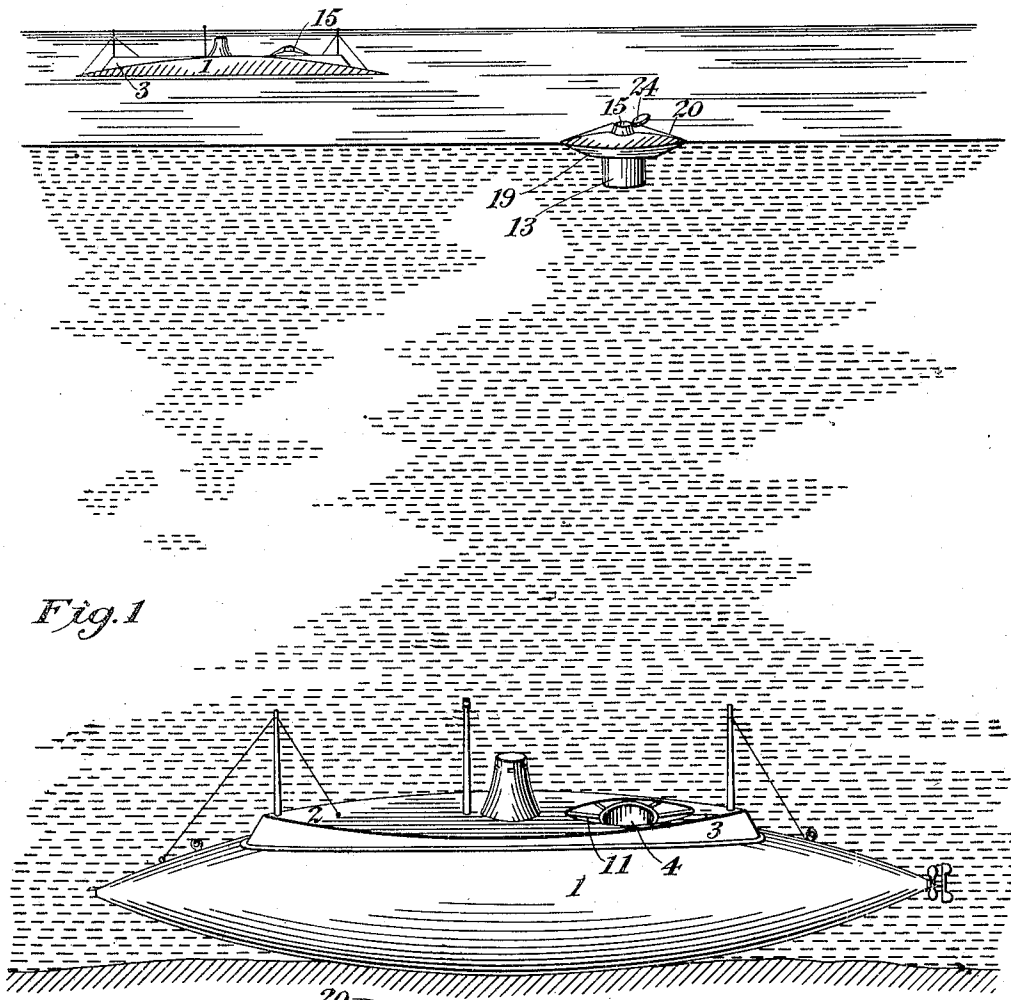


Fig. 1

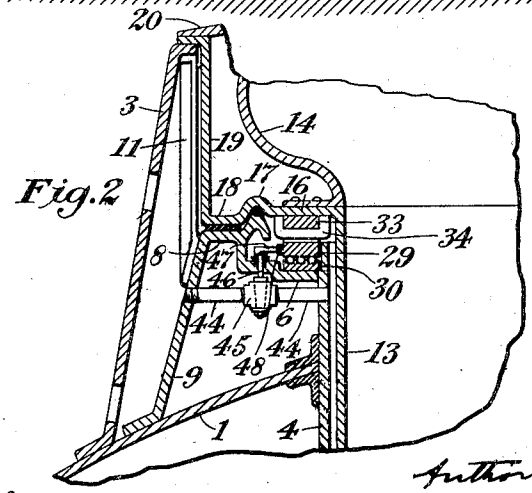


Fig. 2

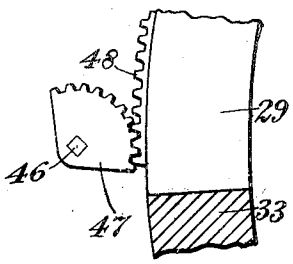


Fig. 2a

Witnesses:

Wm. Ashley Kelly

Victor D. Bond

Inventor:

Anthony J. Griffin

by Henry D. Williams

Attorney.

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3 SHEETS—SHEET 2.

Fig. 3

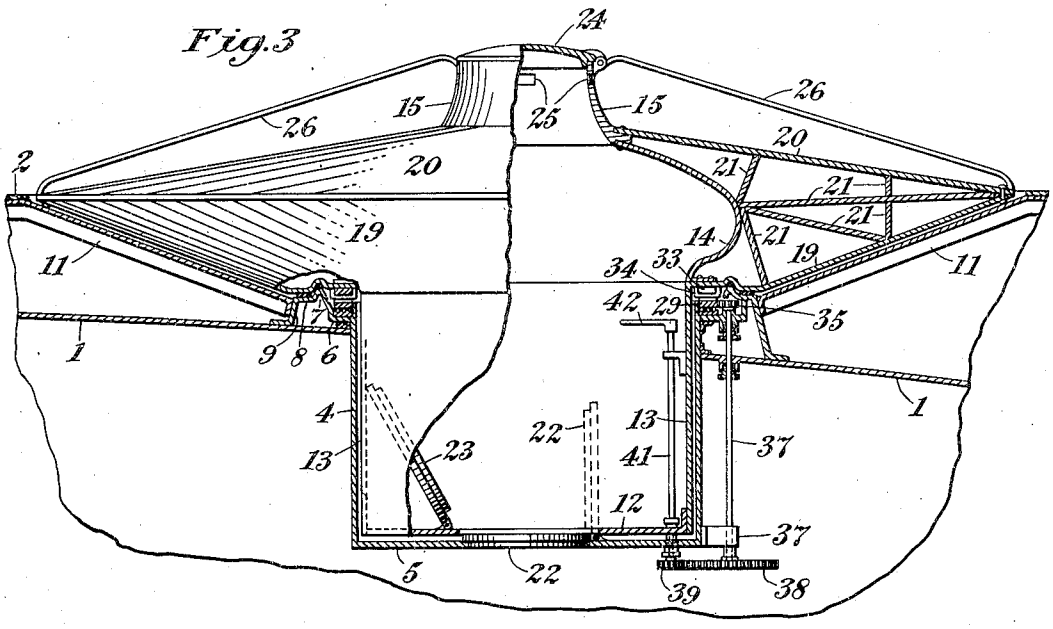
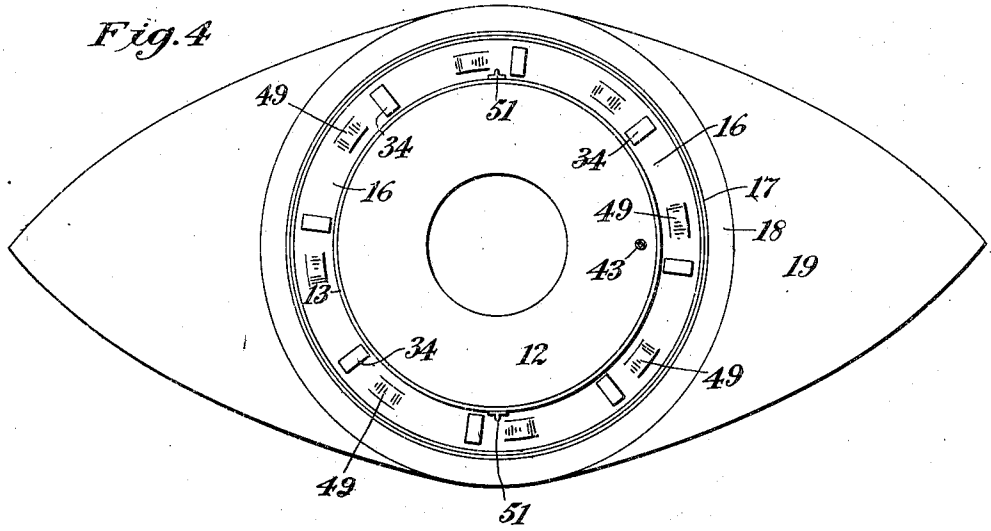


Fig. 4



Witnesses:

Wm. Ashley Kelly

Victor D. Borst

Inventor:

Anthony J. Griffin

by Henry B. Williams

Attorney.

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3 SHEETS—SHEET 3.

Fig. 5

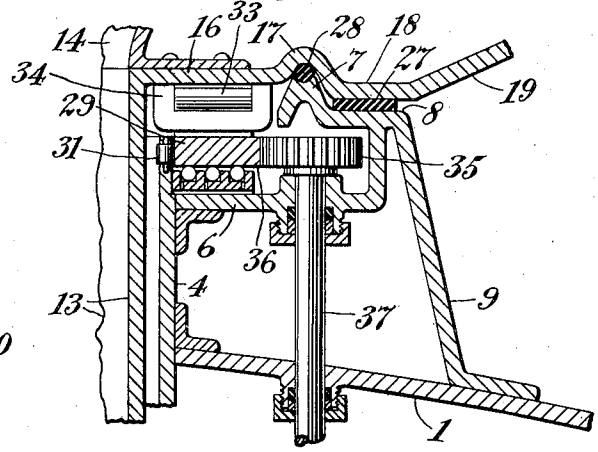


Fig. 7

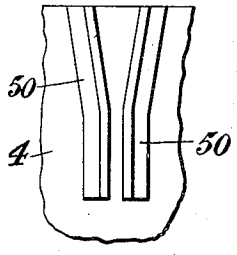


Fig. 8

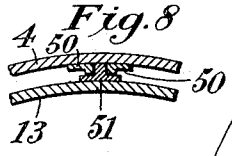


Fig. 6

Fig. 11

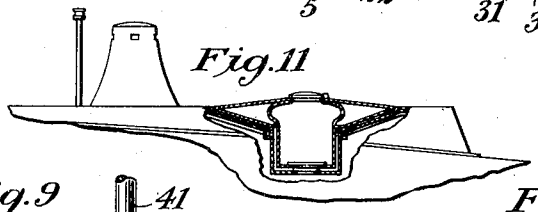


Fig. 9

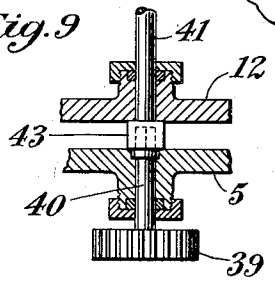
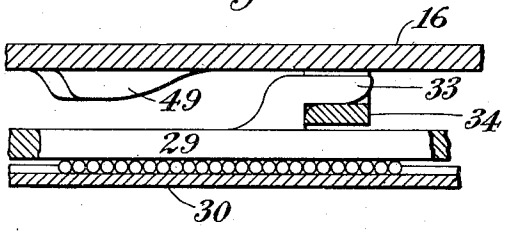


Fig. 10



Witnesses:
Wm. Ashley Kelly
Victor J. Evans

Inventor:
Anthony J. Griffin
by Henry D. Williams
Attorney.

UNITED STATES PATENT OFFICE.

ANTHONY J. GRIFFIN, OF NEW YORK, N. Y.

SUBMARINE BOAT.

1,103,958. Specification of Letters Patent. Patented July 21, 1914.

Application filed July 20, 1910. Serial No. 572,836.

To all whom it may concern:

Be it known that I, ANTHONY J. GRIFFIN, a citizen of the United States of America, residing in the borough of the Bronx, city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Submarine Boats, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to submarine boats and particularly to means to enable the occupants to safely leave such a boat while it is submerged.

An object of my invention is to provide a wholly detachable safety chamber which may be capable of containing all of the occupants of the boat and which will occupy a minimum of space within the boat and not project appreciably from the outside of the boat.

Another object of my invention is the complete separation of the safety chamber from the conning tower and its mechanism and appliances.

Another object of my invention is to secure maximum buoyancy and stability of the safety chamber when detached and set separately afloat, and to provide also a maximum of free deck space upon the safety chamber and an enlarged head space within the chamber.

Other objects have to do with forming a tight seal between the chamber and the body of the boat, and with facilitating the detachment and separation of the safety chamber through means controlled from within the chamber, and also with facilitating the reattachment of the safety chamber to the boat, so that the operations of detaching the safety chamber when the submarine is submerged permitting the safety chamber to rise to the surface, raising the submarine and re-attaching the safety chamber, may be repeatedly performed as a drill for the crew of the submarine.

Other objects relate to strength and simplicity in the several parts and mechanisms.

Other objects and advantages will appear from the following description.

I shall now describe my invention with reference to the accompanying drawings, and shall thereafter point out my invention in claims.

Figure 1 is a perspective illustration showing two submarine boats embodying my invention, one of these boats being shown at the surface of the water with the safety chamber attached and the other boat being submerged and the safety chamber detached and risen to the surface. Fig. 2 is an enlarged partial transverse vertical section of a submarine boat embodying my invention. Fig. 2^a is an enlarged detail plan of the actuating means for the pressure equalizing valve. Fig. 3 is a less enlarged partial longitudinal vertical section with the safety chamber partly in elevation. Fig. 4 is an inverted plan view of the safety chamber. Fig. 5 is a further enlarged view of parts shown at the right in Fig. 3. Fig. 6 is a partial plan view of what is shown in Fig. 3 with the safety chamber omitted. Fig. 7 is an enlarged elevation and Fig. 8 a horizontal section showing the vertical guides for the safety chamber which appear in Figs. 4 and 6. Fig. 9 is a further enlarged view of parts shown in Fig. 3 at the bottom and right. Fig. 10 is an elevation partly in vertical section and drawn to the same scale as Fig. 5, of the interlocking mechanism as viewed from the left in Fig. 5. Fig. 11 is a partial side elevation and partial longitudinal vertical section of a submarine boat showing a slightly modified embodiment of the invention.

My invention in its general aspects comprises a safety chamber having a central part or compartment for containing the occupants and an enlarged combined buoyancy and stability and deck-providing part or compartment projecting from the sides of the upper portion of the occupants-containing part or compartment, the latter part projecting downward a considerable distance below the former. Submarine boats of the type to which my invention is more particularly applicable are usually provided with a flat deck which, due to the usual transversely rounded and longitudinally tapering shape of the outer shell or hull of the boat is, in the places most convenient for the location of my safety chamber, spaced upwardly from the hull or outer shell. In applying or attaching the safety chamber to the submarine, the upper enlarged portion of such chamber flares outward and upward with its upper margin substantially flush with the deck and occupies the otherwise unused space between the deck and the main shell or outer wall of the boat, and the de-

pending portion of the central occupants-containing part extends downward into a well provided for the purpose in the upper portion of the body of the boat. More particularly, my invention provides for sealing together the safety chamber and the boat around the top or mouth of the well, and includes simple and strong interlocking mechanism, adapted to releasably secure the safety chamber in place, and releasable from inside the safety chamber, provision being made for admitting pressure equalizing water to the well at the outside of the safety chamber, and positively acting means being provided to impart an initial detaching impulse or separating movement to the safety chamber after the securing mechanism has been released.

In the illustrated embodiment of my invention the submarine boat has an outer shell or hull 1 of the usual transversely rounded and longitudinally tapered form upon which is superimposed in the usual manner a flat deck 2, which because of the rounded and tapered form of the shell 1 is spaced upwardly from such shell at the edges, the edges of the deck 2 being supported and united to the shell 1 by a framework which includes slightly sloping side walls 3. Upon the boat the usual masts, periscope, and conning tower are provided, as shown in Fig. 1.

In carrying out my invention the space between the deck 2 and the outer shell 1 is utilized to contain the greater portion of the enlarged upper part of the safety chamber, thereby minimizing both the outer exposure of the safety chamber and the extent of its encroachment upon the space within the hull 1, as, because of the utilization of this otherwise waste space between the shell and the deck, the downward projection of the lower part of the safety chamber into the body of the submarine is greatly reduced. The advantageous results of this construction are manifest in not providing the vessel with any substantial projections or enlargements such as would make it a larger target or object of attack, in presenting no obstruction or additional friction to the navigation of the boat, in not disturbing or altering the conning tower of the boat, and in not being in the way of or in any way impeding the action of the crew within the submarine.

For receiving the lower part of the safety chamber I have provided a well shown as of cylindrical form and having its side wall 4 joined to the shell 1 and as extending slightly above the shell 1 but mostly extending below the shell down into the body of the boat and closed at the bottom by a flat bottom or head 5. A combined supporting and sealing member for the safety chamber surrounds the upwardly projecting portion of the side wall 4 at the top or mouth of the well above the shell 1, such member being shown as comprising an annular locking-mechanism-carrying ledge or shelf 6 which extends outwardly and upwardly to form a continuous annular V-shaped sealing and alining tongue 7, a horizontal continuation from the base of which forms, at a higher level than the ledge 6, a flat annular combined sealing and safety-chamber-supporting ledge 8 from the outer edge of which a brace wall 9 extends downwardly at a slightly sloping angle and is provided at its lower edge, as shown, with a foot or base flange supported by the shell 1. The ledge 6 for carrying the locking mechanism, the sealing tongue 7, the flat supporting ledge 8 and the brace wall 9, are shown in the drawings as formed integrally and this would probably be the construction used, but it is evident that if found desirable in practice these parts could be formed of a plurality of pieces properly joined.

The deck opening for receiving the enlarged upper part of the safety chamber is longitudinally elongated, being substantially a pointed ellipse arranged longitudinally of the deck. From this opening a plurality of inclined braces 11 extend downward and inward from the deck 2 toward the top of the well to the upper portion of the brace wall 9. These sloping braces 11 both strengthen the deck and act as guides to facilitate the replacement of the safety chamber in position on the submarine.

The safety chamber is adapted to be substantially contained in the space between the deck and the shell of the submarine. As hereinbefore mentioned, the safety chamber consists in the main of two parts, namely, a part for containing the occupants and a part for providing buoyancy and stability, and deck space for the occupants. The occupants-containing portion has a floor 12, a cylindrical side wall 13, a dome 14 which bulges outwardly above the cylindrical wall 13, and a turret 15 surmounting the dome 14. In forming the buoyancy and stability and deck-providing part of the safety chamber, the cylindrical wall 13 of the occupants-containing part at its junction line with the dome 14 is shown as extended outward to form a flat annular locking-mechanism-carrying flange 16, which in turn extends outward to form an upwardly curved portion 17 forming at its lower side a continuous annular sealing and alining groove, a horizontal continuation from the outer edge of the curved portion 17 forming, at a somewhat lower level than the flange 16, a flat supporting base 18 having a lower sealing surface; and from the outer edge of the base 18 integrally extends outwardly and upwardly the lower upwardly flaring wall 19 of the upper en-

largement of the chamber. It is to be understood that the several parts just described as formed integrally could be made of a plurality of joined pieces if found preferable. The uper enlarged part of the chamber is provided with a slightly upwardly dished top wall or cover 20 which slopes downwardly and outwardly at a gentle angle from the base of the turret 15 and at its periphery is joined to the periphery of the lower upwardly flaring wall 19. The walls 19 and 20 surround the dome 14, projecting, however, to a much greater distance at two opposite sides, so that the upper part of the safety chamber is horizontally elongated to form substantially a pointed ellipse, as perhaps best seen in the inverted plan view of Fig. 4. The shape or contour of the upper enlarged part of the safety chamber corresponds to that of the deck opening into which it fits, while the cylindrical lower part of the occupants-containing part of the chamber freely enters and substantially fills the well in the upper portion of the body of the boat, as clearly shown in Fig. 3. The upwardly flaring wall 19 together with its inward extensions, and the sloping wall 20, form a buoyancy compartment at the sides of the dome 14. For additional safety, this buoyancy compartment should be subdivided into a plurality of smaller compartments, as indicated by the partitions 21 shown at the right in Fig. 3.

When the safety chamber is in place on the boat the safety chamber may be entered by coinciding hatches 22 and 23 in the bottom 5 of the well and in the floor 12 of the occupants-containing compartment of the safety chamber, respectively. The hatch 23 is slightly larger than the hatch 22, so that when the upper hatch 23 is open the lower hatch 22 can freely open upward, as indicated in broken lines in Fig. 3. By reason of the upward opening of the hatch 22 it will be kept closed by the external water pressure when the safety chamber is detached. The bulge of the dome 14 provides abundant free and unobstructed head space for the occupants. The uper wall or top 20 serves as a deck which may be reached through a hatch 24 in the top of the turret 15. The turret 15 is also provided with windows or peep holes 25, as shown in Fig. 3. When the safety chamber is in place on the boat the upper outer margin of the top wall 20 is substantially flush with the top of the deck 2, in fact the top 20 of the upper enlarged part of the safety chamber may be considered as forming a part of the deck 2. The hatches 22, 23 and 24 constitute means for reaching the deck 2 of the boat in place of or in addition to other usual means that may be provided.

By reason of the construction of the safety chamber just described, the well for containing the lower part thereof does not extend far enough into the body of the boat to be in the way of the crew, and the upper part of the safety chamber rises only slightly above the deck 2, the greater part of the bulk of the safety chamber being contained in the space below the level of the deck 2 and above the shell 1. The projecting turret 15 is protected from injury, such as might result from scraping another vessel while submerged, by means of inclined deflectors or guard rails 26 extending from the top of the turret 15 fore and aft to the outer edges of the top wall 20 of the chamber.

Should a projecting turret be deemed objectionable the construction shown in Fig. 11 could be employed wherein the turret is omitted and the dome is surmounted simply by a hatch.

Gaskets 27 and 28, of rubber or other suitable yielding and elastic packing material, are carried respectively by the upper surface of the supporting ledge 8 and at the tongue 7 and upon which the chamber rests at its supporting base 18 and upwardly curved portion 17, the safety chamber being sealed to and supported upon the submarine at these points.

The locking mechanism or means for releasably securing the safety chamber in place on the boat will now be described.

A rotatable locking ring 29 is supported upon the ledge 6 by interposed antifriction devices shown as bearing balls carried by a grooved ball race 30. The locking ring 29 lies just at the outside of the upward extension of the cylindrical wall 4 and is guided horizontally by antifriction rollers 31 shown as carried by such wall at intervals around the mouth of the well and engaging the inner edge surface of the ring 29. The locking ring 29 is movably secured in place at the top of the well and is shown as held down by loops or straps 32 which prevent its upward movement but through which it can freely slide in its rotative movements. On its upper side the locking ring 29 is provided with overhanging latches 33 which are curved or tapered upwardly on their lower sides toward their free ends or points, and at the rear are rounded to form cam-faced shoulders as clearly seen in Fig. 10. The latches 33 by reason of the rotation of the locking ring 29, are releasably engageable with loop-shaped keepers 34 carried by the lower side of the flange 16 on the safety chamber, the upper latch-engaging surfaces of these keepers being rounded at their edges where engagement first takes place with the latches 33, so as to coöperate with the rounded or tapered ends of the latches and thereby exert a wedging effect to draw together the opposed surfaces upon gaskets 27 and 28

to bring about a tight seal between the safety chamber and the body of the submarine, as shown in Fig. 3.

The means for releasing the securing means or locking mechanism are actuatable from within the safety chamber. A pinion 35 engages a rack 36 formed on the outer edge of the locking ring 29, and this pinion is fixed on a vertical shaft 37 which passes downward through packed bearings in the ledge 6 and in the shell 1 and is held in place at its lower end by a bearing bracket 37 attached to the lower edge of the cylindrical well wall 4. A spur gear 38 fixed on the lower end of the vertical shaft 37 meshes with a spur pinion 39 fixed on the lower downwardly projecting end of a stub shaft 40 which passes upward through a packed bearing in the bottom head 5 of the well on the upper side of which it is provided with a retaining collar and terminates below the floor 12 of the chamber in an upwardly projecting squared end portion, as most clearly shown in Fig. 9. Within the occupants-containing compartment of the safety chamber is a rotatable actuating rod 41 provided at its upper end with a handle lever 42 and steadied near its upper end by a bracket attached to the side wall 13, as shown in Fig. 3. The actuating rod 41 extends downward through a packed bearing in the floor 12 beneath which it is provided with a terminal socket 43 adapted to freely slip over and rotatably engage the upper squared end of the stub shaft 40 (Figs. 3 and 9). When the safety chamber is detached from the boat the socket 43 will freely slip from and become disengaged from the squared upper end of the stub shaft 40. It is evident that by rocking the handle lever 42 the locking ring 29 will be rotated to engage or to disengage the latches 33 in relation to the keepers 34 to thereby either lock in place or release the safety chamber.

The means for admitting water to the well around the part of the safety chamber contained therein concurrently with the release of the securing means will now be described.

A water inlet conduit or pipe 44 is shown as extending from the outside of the brace wall 9 beneath the frame 3 to the inside of the side wall 4 of the well, the side walls 4 and 13 and the bottom walls 5 and 12 being respectively spaced apart as shown in the drawings to provide free clearance and initial water space in the well around the lower part of the safety chamber. The water admission pipe 44 is provided with a turn-cock or plug valve 45 having a stem 46 extending upward through a packed joint in the ledge 6 above which it carries a valve-actuating sector 47 engaged by a rack 48 formed on the adjacent outer edge of the locking collar 29, as most clearly seen in Fig. 2a. The valve 45 is so arranged as to be in closed position when the latches 33 are fully engaged, as shown in Fig. 10, and is so connected as to gradually open during the disengaging movement of the locking ring 29. Only one water admission pipe 44 and its adjuncts are fully illustrated in the drawings, but a plurality of these pipes would preferably be employed. Another such pipe at the other side of the boat from the pipe 44 is indicated by the sector 47 and rack 48 at the upper side of Fig. 6, the arrangement being the same as that illustrated for one side of the boat at Fig. 2.

When the latches 33 have been disengaged from the keepers 34 and the valves 45 have been opened to equalize the pressure in the well upon the safety chamber with the external water pressure, then the safety chamber is free to separate itself and float upward from the submarine body, but, as hereinbefore mentioned, in order to facilitate such disengagement and to obviate any possibility of sticking, positively acting means are provided for imparting an initial disengaging movement to the safety chamber after the release of the securing means. Such positively acting disengaging means comprise cam-faced projections or lugs 49 carried by the lower side of the flange 16 in rear of the keepers 34 and having gradually sloping cam-faces in the path of the rounded shoulders formed at the rear of the latches 33. The latches 33 in their unlocking movement, after becoming disengaged from the keepers 34, by further movement in the same direction, engage the lugs 49 and impart a positive initial detaching movement to the safety chamber.

Each pressure equalizing valve 45 is so connected as to begin its opening at the time when the latches 33 are almost free from the keepers 34 and so as to reach its most widely open position at the time when the rear cam-faces of the latches 33 have, by engagement with the lugs 49, raised the safety chamber. When the safety chamber has been released and detached it will immediately rise to the surface and will float at the surface, as illustrated in the case of one of the boats shown in Fig. 1.

The general shape of the safety chamber, consisting of the depending cylindrical part and the upwardly flaring longitudinally elongated upper part, together with the correspondingly shaped well and deck opening, greatly facilitate replacement of the safety chamber on the boat, after any separation from the boat, whether for drill or in case of necessity. The more particular means for facilitating the replacement and reëngagement of the safety chamber are coöperating guides carried respectively at the outer side of the cylindrical side wall 13 of the safety chamber and at the inner side of the cylindrical side wall 4 of the well. These

guides comprise pairs of spaced upwardly flaring vertically arranged guide bars 50 secured to the inside of the well wall 4 adjacent to its upper edge and extending downward from the edge, and vertical guide bars 51 secured to the outside of the chamber wall 13, the upward flare of the pairs of bars 50 facilitating entrance between them of the cooperating bar 51. Two sets of these guide bars are indicated in the drawings, one at the port and one at the starboard side of the boat.

It is obvious that various modifications may be made in the constructions shown in the drawings and above particularly described within the principle and scope of my invention.

I claim:

1. In combination, a submarine boat having an outer shell and a deck above the outer shell, the deck having an opening therein, and the shell having a well therein located within the margin of the deck opening; a safety chamber for containing occupants of the boat, the safety chamber having a lower portion entering the well and having an enlarged upper part flaring outward within the deck opening with the outer upper margin of the chamber substantially flush with the adjacent portions of the deck of the boat; means for releasably securing the safety chamber in place on the boat, and means for releasing the securing means.

2. In combination, a submarine boat having an outer shell and a deck above the outer shell, the deck having a longitudinally elongated opening therein and the shell having a well therein located within the margin of the deck opening; a safety chamber for containing occupants of the boat, the safety chamber having a lower part entering the well and having an enlarged upper part flaring outward within the deck opening and substantially fitting therein with the upper outer edges of the walls of such enlarged portion substantially flush with the deck; means for releasably securing the safety chamber in place on the boat, and means for releasing the securing means.

3. In combination, a submarine boat provided with a well extending inwardly and downwardly from its upper surface, a detachable safety chamber for occupants of the boat, such chamber comprising an occupants-containing compartment adapted to enter the well and to project therefrom in its upper portion, and a buoyancy compartment projecting outwardly from the upper portion of the occupants-containing compartment at the outside of the well, the largest horizontal dimension of the safety chamber through the occupants-containing compartment and the buoyancy compartment being at least twice as great as any horizontal dimension of the portion of the occupants-containing compartment in the well and the greatest vertical dimension of the buoyancy compartment being no greater than the greatest vertical dimension of the portion of the occupants-containing compartment in the well, whereby the lower portion of the occupants-containing compartment has unobstructed access to the well and a substantial amount of buoyant stability is imparted to the safety chamber when detached.

4. In combination, a submarine boat having an outer shell and a deck above the outer shell, the deck having an opening therein and the shell having a well therein located within the margin of the deck opening; a detachable safety chamber for occupants of the boat, such chamber comprising an occupants-containing compartment adapted to enter the well and having an unobstructed circumferentially enlarged upper portion projecting from the well to provide free head space for occupants, and a deck-providing buoyancy compartment at the sides of the enlarged upper portion of the occupants-containing compartment within the deck opening largely below the deck of the boat and entirely at the outside of the well.

5. In combination, a submarine boat provided with a well extending inwardly from the outer surface, a safety chamber adapted to enter the well, sealing means at the mouth of the well coöperative with the outer walls of the chamber, means for releasably securing the safety chamber in place on the boat, means for releasing the securing means, and means for admitting water to the well to equalize the pressure therein upon the safety chamber with the external water pressure, such water admitting means being connected for actuation concurrently with the release of the securing means.

6. In combination, a submarine boat provided with a well extending inwardly from the outer surface, a safety chamber adapted to enter the well, sealing means at the mouth of the well coöperative with the outer walls of the chamber, means for releasably securing the safety chamber in place on the boat, means for releasing the securing means, and positively acting means for imparting initial disengaging movement to the safety chamber after the release of the securing means, such disengaging means being connected for actuation successively by the further movement of the releasing means after the release of the securing means.

7. In combination, a submarine boat provided with a well extending inwardly from the outer surface, a safety chamber adapted to enter the well, sealing means at the mouth of the well coöperative with the outer walls of the chamber, means for releasably securing the safety chamber in place on the

boat, means for releasing the securing means, means for admitting water to the well to equalize the pressure therein upon the safety chamber with the external water pressure, such water admitting means being connected for actuation concurrently with the release of the securing means, and positively acting means for imparting initial disengaging movement to the safety chamber after the release of the securing means, such disengaging means being connected for actuation successively by the further movement of the releasing means after the release of the securing means.

8. In combination, a submarine boat, a safety chamber for occupants of the boat; and means for detachably connecting together the boat and the safety chamber comprising a rotatable locking ring carried by the boat and provided with latches, and keepers carried by the safety chamber with which the latches are releasably engageable by reason of the rotation of the locking ring, coacting cam-faces being provided on the locking ring and on the safety chamber, such cam-faces being engageable on further movement of the locking ring after unlatching has taken place to impart an initial detaching movement to the safety chamber.

9. In combination, a submarine boat, a safety chamber for occupants of the boat; and means for detachably connecting the safety chamber to the boat, such means comprising keepers carried by the safety chamber, a rotatable locking ring carried by the boat and provided with latches releasably engageable with the keepers, antifriction devices interposed between the locking ring and the boat, and cam-faced projections carried by the safety chamber in the path of the latches in their unlatching movement and with which the latches are engageable after unlatching from the keepers has taken place to impart an initial detaching movement to the safety chamber.

10. In combination, a submarine boat provided with a well extending inwardly and downwardly from its upper surface, a safety chamber adapted to enter the well, coöperating guides carried respectively at the outer side of the wall of the safety chamber and at the inner side of the wall of the well, such guides having a flaring initial engagement to facilitate entrance, means for releasably securing the safety chamber in the well, and means for releasing the securing means.

11. In combination, a submarine boat having an outer shell and a deck above the outer shell, the deck having an opening therein and the shell having a well therein located within the margin of the deck opening; a safety chamber having a lower part entering the well and having an enlarged upper part flaring outward within the deck opening and with the outer upper margin of the chamber substantially flush with the adjacent portion of the deck of the boat; means for releasably securing the safety chamber in place on the boat, means for releasing the securing means, a turret projecting upwardly from the top of the chamber, and inclined deflectors extending from the top of the turret, to the top of the chamber at points outwardly from the base of the turret.

12. In combination, a submarine boat provided with a well extending inwardly and downwardly from its upper surface, a detachable safety chamber for occupants, such chamber comprising an occupants-containing compartment adapted to enter the well and to project therefrom in its upper portion, such upper projecting portion being circumferentially enlarged to provide free head space for occupants, and a buoyancy compartment projecting outwardly from the enlarged upper portion of the occupants-containing compartment at the outside of the well.

In testimony whereof I have affixed my signature in presence of two witnesses.

ANTHONY J. GRIFFIN.

Witnesses:

HENRY D. WILLIAMS,

WM. ASHLEY KELLY.