Feb. 15, 1944. S. G. KOTELEV ET AL 2,341,923

SAFETY DEVICE FOR SUBMARINE CREWS

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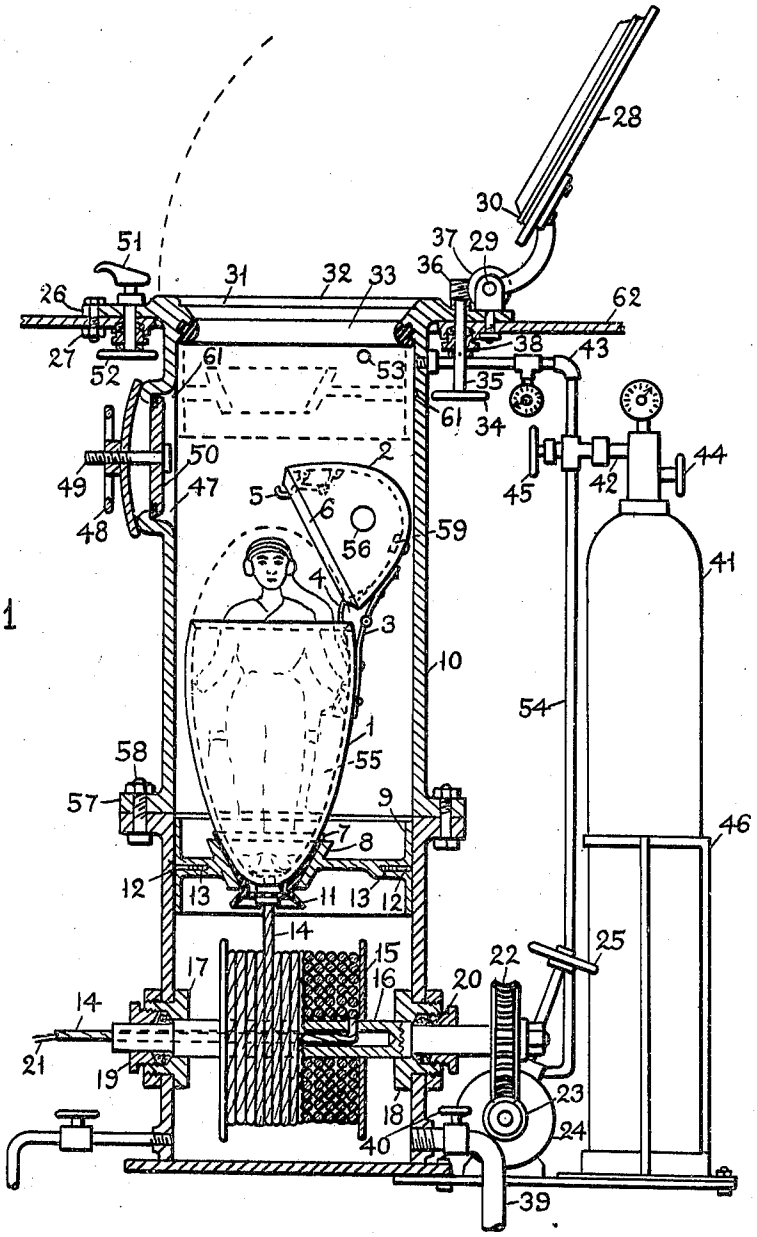


FIG. 1

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FIG. 2

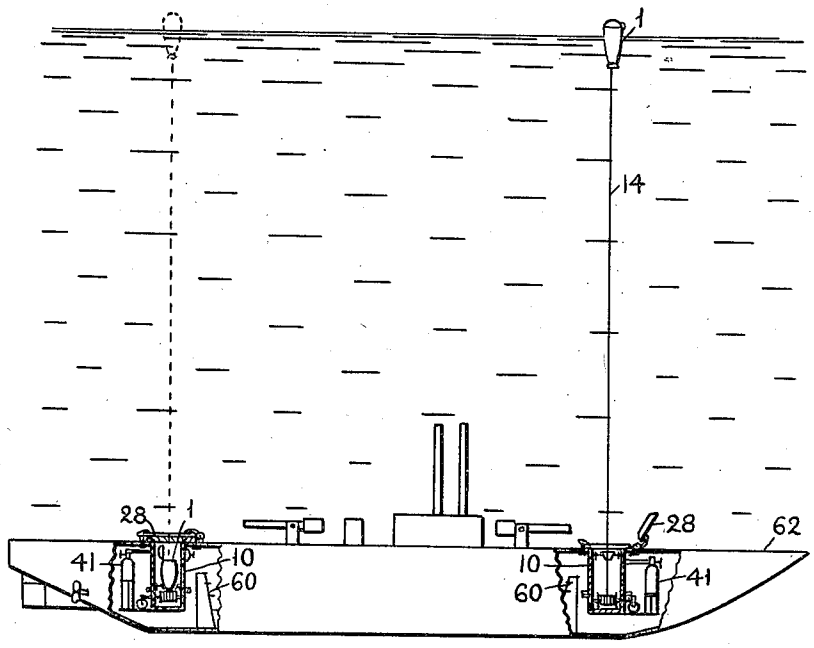
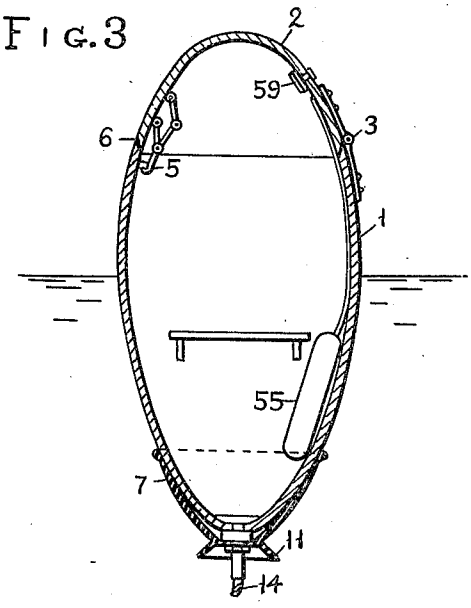


FIG. 3



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SAFETY DEVICE FOR SUBMARINE CREWS

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6 Claims. (Cl. 114—16.7)

Our invention relates to safety devices for submarine crew and has particular reference to devices in the form of airtight shells or bells, forming a part of submarine equipment.

Our invention has for its object to provide means for members of submarine crew to escape to the surface of water when the submarine is lying at the bottom, and to return again, or for all members to successively escape from a submerged submarine. We provide for this purpose an air-tight shell or bell held on a cable in a special launching compartment in the submarine, and adapted to hold one man. We also provide means to enable the man to enter the shell when water is excluded from the surrounding space, and to let the shell to rise by its own buoyancy when sealed with the man inside, the cable being provided with means of communication with the rest of the crew. The shell can be opened by the man at the surface of water for his escape, and the man, if he wishes, can reenter the shell to be hauled back into the submerged submarine.

Our invention is more fully described in the accompanying specification and drawings in which:

Fig. 1 is a sectional elevational view of my device in a diving chamber in a submarine; and

Fig. 2 is a view of a submarine at the bottom of the sea, with safety devices in operation.

Fig. 3 is a detail view of the shell.

Our safety device for submarine consists of a shell or bell 1 which may be egg-shaped in its outline and provided with a hollow lid 2, supported on hinges 3. A strap 4 limits the movement of the lid when opened. The shell is of a sufficient size to hold a man, who can close the lid from the inside, locking it in a closed position by a latch 5. A rubber gasket 6 provides an air-tight seal for the lid.

The bottom of the shell has a rubber cap 7 resting in a cradle 8 supported inside a sleeve 9 which slides up and down a tube 10 forming a launching device for the shell. The rubber cap has a flaring out flange 11 of a larger diameter than the opening in the cradle 8 so that the shell, when moved upward, entrains the cradle by the flange 11 until the cradle reaches the top position as shown in dotted lines in Fig. 1. Here the cradle is stopped and is temporarily locked by pins 12 with springs 13, the pins engaging corresponding holes 61 in the walls of the tube. The cradle with the sleeve provides partial closure for the tube 10, preventing large sea animals, such as squids, etc. from entering the tube when it is open. The pins 12 will yield, however, when sufficient pressure is applied as by the shell being pulled in by the cable.

A strong cable 14 is attached to the bottom of the shell and is wound on a drum 15 mounted on a hollow shaft 16. The cable is of sufficient length to enable the man in the shell to rise to the surface of water when the submarine is lying at the bottom in a deep water. The shaft is journaled in bearings 17, 18 with air-tight packing glands 19, 20. The cable extends through the shaft at one end into the hold of the submarine where electric wires 21 in the cable are connected to a telephone or telegraph apparatus (not shown) or other suitable signalling device.

The other end of the shaft 16 is connected by a worm gear 22 and a worm 23 with a suitable motor 24 preferably operated by compressed air with a control handle 25 for reversing its rotation.

The tube 10 has a flange 26 at the top bolted to the deck of a submarine 62 at 27. A lid 28 is provided for the opening at the top of the tube 10, the lid being hinged at 29 and provided with a rubber ring 30 engaging a corresponding recess 31 in the tapered seat 32 at the top of the tube 10. An additional rubber ring 33 is provided in the opening of the tube for protecting the cable 14. A cam-shaped latch 51, operated by a handle 52 from inside, clamps tightly the lid in its place.

The lid 28 can be operated from inside the submarine hull by a handle 34 at the end of a shaft 35 having a worm 36, connected with a worm gear 37 on the hinge shaft 29. A packing gland 38 provides an air-tight seal for the shaft 35.

When it is desired to send a man to the surface when the submarine is submerged as, for instance, to reconnoiter the vicinity and to ascertain if it will be safe for the submarine to rise, or to save the crew of the submarine if the latter cannot be raised, then the lid 28 is tightly closed, and water is expelled from the launching tube 10 through pipe 39 extending to the outside and having a valve 40. Air at a high pressure is admitted for this purpose into the tube 10 from a steel cylinder 41, the cylinder being connected with the space in the tube 10 by pipes 42, 43 and valves 44, 45. The cylinder is held in a cradle 46.

When all water is expelled from the tube 10 and the valve 40 closed, a port 47 is opened by turning a handwheel 48 on a screw 49 until a cover 50 is released and can be then removed, being of an oval shape for this purpose. A man climbs through the port 47 into the tube, feet first, raising at the same time the lid 2. The

man, once inside the shell 1, closes the lid 2 and tightly clamps the same by the latch 5. He is now ready to rise to the surface of water.

Water is then admitted into the tube 10 by opening the valve 40. Air is released from the tube 10 through a valved vent pipe 53.

When the tube 10 is full of water and the pressure inside and outside is equalized, the lid 28 is opened and the air for the motor 21 turned on by the handle 22 for unwinding the cable 14. The air is admitted from the cylinder 41 by pipe 54. The volume of the shell 1 is so proportioned that it will have a positive buoyance with the man inside and, consequently, will rise as the cable is unwound. The cradle 8 will slide upward to the top of the tube, ensuring proper position of the shell in the tube until the shell entirely emerges through the opening at the top. The cradle will be held at the top by spring pins 12.

For short trips to the surface when the submarine lies in a shallow water, the shell may contain sufficient amount of air for the man to breathe when he rises to the surface. For deeper submergence the man may be provided with an oxygen tank 55.

A glass window 56 may be provided in the cap or the latter may be made of glass or other transparent material.

The man in his shell at the surface can perform various functions; he may watch the horizon for enemy ships, watch skies for airplanes, send radio signals from the submarine; swim out to the nearest shore to summon help if there is no other means available; or he may use the shell as a means to escape from the submarine when the latter is damaged and cannot be raised.

Several such devices can be provided on a submarine as shown in Fig. 2. The shells can be raised and lowered alternately, or one shell can be used for raising auxiliary equipment such as a rubber boat for the man to make a short trip to the shore, etc.

In the event of a loss of the shell, another shell can be fitted in its place through the lower portion of the tube 10. The latter for this purpose is split at the middle and provided with flanges 57, fastened together by bolts 58. The lower half of the tube can be dropped upon releasing the bolts and a new shell inserted and attached to the cable 14.

The cap 2 of the shell may be provided with a pressure gauge 59, calibrated in units of depth, to enable the man in the shell to know at what depth he is at any particular moment.

Step ladders 60 may be used to facilitate entrance into the tube 10 for the man.

It is understood that our safety device may be further modified within the scope of our invention, as set forth in the appended claims.

We claim as our invention:

1. A safety device for submarine crew, consisting of a shell adapted to hold a man; a lid on the shell adapted to be opened and closed by the man in the shell; a cable extending from the shell; a launching tube in a submarine for the shell; means in the tube to support the shell; a lid on the tube; means to open and close the lid from inside the submarine; a port for admitting the man into the tube and into the shell; means to close the port; means to expel the air from the tube and to admit water therein for releasing the shell into the surrounding water; and means to release the cable for allowing the shell with the man to rise to the surface of water and an elastic ring at the upper end of the launching tube for protecting the shell against abrasion.

2. A safety device for submarine crew, consisting of a shell adapted to hold a man; a lid on the shell adapted to be opened and closed by the man in the shell; a cable extending from the shell; a launchilng tube in a submarine for the shell; means in the tube to support the shell; a lid on the tube; means to open and close the lid from inside the submarine; a port for admitting the man into the tube and into the shell; means to close the port; means to expel the air from the tube and to admit water therein for releasing the shell into the surrounding water; means to release the cable for allowing the shell with the man to rise to the surface of water; and an elastic ring at the opening of the tube, the inner diameter of the ring being smaller than the inner diameter of the tube.

3. A safety device for submarine crew consisting of a shell adapted to hold a man; a lid on the shell adapted to be opened and closed by the man in the shell; a cable extending from the shell; a launching tube in a submarine for the shell; a sliding cradle in the tube for supporting the shell; a lid on the tube; means to open and close the lid from inside the submarine; a port for admitting the man into the tube and into the shell; means to close the port; means to expel the air from the tube and to admit water therein for releasing the shell into the surrounding water; means to release the cable for allowing the shell with the man to rise to the surface of water; and means on the shell to releasably engage the cradle for raising the cradle to the top of the tube when the shell is raised.

4. A safety device for submarine crew consisting of a shell adapted to hold a man; a lid on the shell adapted to be opened and closed by the man in the shell; a cable extending from the shell; a launching tube in a submarine for the shell; a sliding cradle in the tube for supporting the shell; a lid on the tube; means to open and close the lid from inside the submarine; means to tighten the lid from inside the submarine for rendering the lid air-tight; a port for admitting the man into the tube and into the shell; an air-tight closure for the port; means to admit water from the outside into the tube and to release the air therefrom thereby equalizing water pressure inside the tube with the water pressure outside the submarine; means to release the cable when the lid is opened for allowing the shell with the man to rise to the surface of water outside the submarine; yieldable means on the shell to engage the cradle for lifting the cradle to the top of the tube when the shell is raised; and means to limit the upward movement of the cradle.

5. A safety device for submarine crew, consisting of a shell adapted to hold a man; a lid on the shell adapted to be opened and closed by the man in the shell; a cable extending from the shell; a launching tube in a submarine for the shell; a sliding cradle in the tube for supporting the shell; a lid on the tube; means to open and close the lid from inside the submarine; means to tighten the lid from inside the submarine for rendering the lid air-tight; a port for admitting the man into the tube and into the shell; an air-tight closure for the port; means to admit water from the outside into the tube and to release the air therefrom thereby equalizing water pressure inside the tube with the water pressure outside

the submarine; means to release the cable when the lid is opened for allowing the shell with the man to rise to the surface of water outside the submarine; yieldable means on the shell to engage the cradle for lifting the cradle to the top of the tube when the shell is raised; and means to yieldably retain the cradle in the raised position at the top of the tube.

6. A safety device for submarine crew consisting of a shell adapted to hold a man; a lid on the shell adapted to be opened and closed by the man in the shell; a cable extending from the shell; a launching tube in a submarine for the shell; a sliding cradle in the tube for supporting the shell; a lid on the tube; means to open and close the lid from inside the submarine; a port for admitting the man into the tube and into the shell; means to close the port; means to expel the air from the tube and to admit water therein for releasing the shell into the surrounding water; means to release the cable for allowing the shell with the man to rise to the surface of water; means to seal the cradle in the tube; and means to seal the bottom of the shell in the cradle.

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