

ENGINEERING

Steel Jar Will Rescue Men Imprisoned in Submarines

Apparatus Developed by U. S. Navy Permits Crews to Be Raised From Sea Bottom Without Risk of Having "Bends"

NEW SUBMARINE rescue chambers developed by the U. S. Navy have made it possible at last to bring men up from a disabled submarine without subjecting them to the immense pressures existing in the ocean depths or requiring their exposure to the extreme cold of deep sea water.

This new device, a great steel jar looking very much like a counterpart of the Arabian Nights' jars in which the forty thieves took refuge, can be lowered into the depths by its own machinery. After it is attached to the submarine hatch, the trapped men can step directly into the jar or be lifted into it if unconscious. The men are subjected to only atmospheric pressure as in the submarine and they require no decompression. They make the trip to the surface in a dry lighted chamber.

The new type of rescue chamber is the latest development of a series of devices recently invented for the purpose of saving the crews of disabled submarines. Until very recently, the only known method for rescue of the men was to bring one end of the submarine above the surface of the water or to raise the vessel completely by means of pontoons.

Bow Raised

When the S-48 was sunk in Long Island Sound on Dec. 7, 1921, the water was blown out of the forward ballast and fuel tanks, raising the bow far enough above water to let the crew escape through that end. But the S-48 sank in only 67 feet of water; had she been in water deeper than her length, or had her hull been damaged, this scheme would not have worked.

The raising of the vessel by means of pontoons requires tunnels to be blown out by divers under the hull, the reeving of chains through these tunnels, and the connection of these chains to the submerged pontoons. The water is then blown out of the pontoons after which they are buoyant and tend to lift the hull.

The capacity of these pontoons is 80

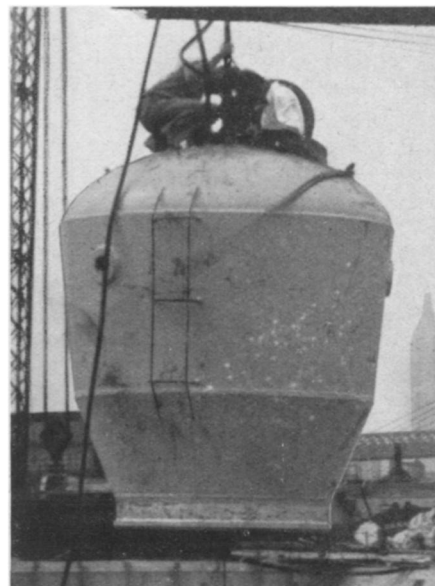
tons each. Only six of them can be used at one time in raising a submarine. Therefore the total lifting power of all the pontoons which it is practical to use in such operations is only 480 tons. As the smallest submarines we now have are about 900 tons displacement, they can be raised in this manner only when the various compartments, ballast tanks, and so on, are made water tight and, if flooded, the water blown out of them to obtain the additional buoyancy required.

Whether or not a submarine hull can be successfully raised by this method depends upon the availability of salvage ships and favorable weather conditions. It is now discarded as a means for saving life and is used only for salvaging property, because even under the most favorable conditions the method is very slow and susceptible to failure.

Since the tragic sinking of the S-4 in December, 1927, when divers worked desperately but vainly to raise her in time to save the men pleading for their lives within, Navy Department experts have been hard at research to devise successful methods to permit the safe escape of crews from the compartments of a sunken sub. Many plans were devised and more than 4,000 suggestions from outside the Navy were considered, but only two principal methods have passed the severe tests demanded and been found satisfactory—the "lung," by which men can emerge and ascend without aid from the surface, and the rescue chamber which must be lowered by a rescue ship.

Six mine sweepers of the type named for birds—the Falcon, Widgeon, Pigeon, Mallard, Chewink and Ortolan have been outfitted as submarine rescue ships. Five of these will be equipped with the new rescue chamber.

The operation of the rescue chamber is quite simple, and requires no effort on the part of the men in the submarine. In addition to ballast tanks, it consists of two compartments, the upper one—air tight, water tight, and dry—gives the chamber just enough buoyancy to keep it on the surface if left



LIKE AN ARABIAN NIGHTS' JAR
—the new submarine rescue chamber of the U. S. Navy being prepared for a descent to a stricken submarine. It will bring up a maximum of fourteen trapped sailors at each trip.

alone. The lower compartment is open.

When the chamber is to be lowered, a diver must first go down to the submarine and attach a steel guide cable to a ring beside the hatch on the deck. Air motors within the chamber then reel up this cable and draw the chamber down until the round lower edge rests on the metal flange around the hatch. As soon as it is in place, the water is blown out of the lower compartment, after which the sea pressure from without will hold the chamber securely in place as though it were a vacuum cup. The hatch between the compartments and the one into the submarine may then be safely opened, allowing easy exit from the submarine into the dry chamber. When the men are removed both hatches are again closed, water is allowed to fill the lower compartment and the ballast tanks are blown, creating the buoyancy necessary to carry the chamber up to the surface.

Two men are required to go down in the chamber to operate it, and in addition to these it will hold from twelve to fourteen others. Repeated trips below may be made until all hands are safely on the rescue ship.

The bell, in addition to its electric lights, is equipped with telephones of the battery-less type, by means of which communication can be maintained at all times between the rescuers in the bell, the personnel in the submarine and the crew of the rescuing surface ship.

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