"Lung" to Prevent Submarine Disasters

Navigation—Invention

By James Nevin Miller

When the S-4 sank a few months ago, causing one of the greatest submarine tragedies of modern times, Navy officials gathered together and decided that drastic steps must be taken soon to restore the prestige of America with respect to making our undersea craft as safe for human beings as possible.

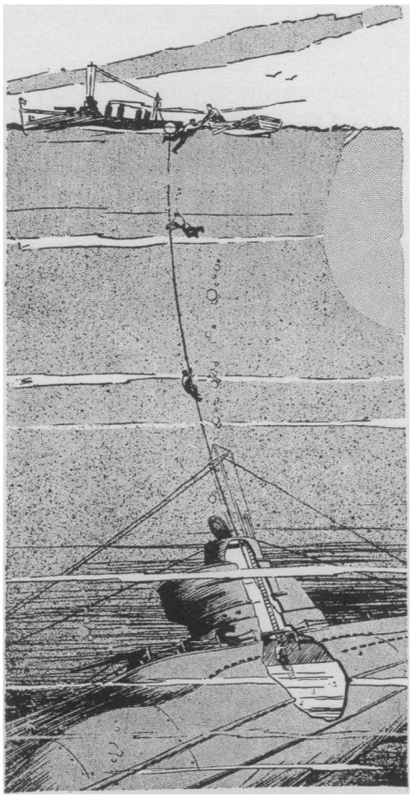
Now it seems that the efforts of the experts have not been in vain. Announcement has just been made that the disabled S-4 has been recommissioned and will be put into service again for the purpose of making final tests on a new device that promises to revolutionize completely the present measures for saving the lives of men submerged in sunken submarines.

The invention is an oxygen helmet resembling a cross between a gas mask and a gunny sack. For lack of a better name it has been christened temporarily the "Lung" and it is expected that after a short while of perfecting the device it will be used as a regulation part of standard American submarine equipment.

In days gone by the accepted rescue procedure in time of submarine accident has been to send divers down to the wrecked craft to size up the situation, meantime dividing their attention between endeavoring to save the lives of the crew and attempting to lift the submarine to the surface. All too many times the result has been that such division of purpose has been non-productive of the best kind of results. Either the craft was not salvaged in efficient fashion, or else members of the submarine crew were forced to undergo undue hardships, some dying, perhaps, who should have survived.

With the use of the "Lung", however, the procedure may assume an entirely different turn. Salvage and rescue operations need not interfere with each other to the slightest degree, for the new device enables the submarine crew to rescue themselves. Weighing but two pounds and requiring only a few seconds to put on, it is worn with bathing suit or ordinary light clothing—a welcome contrast to certain standard European types of rescue apparatus whose average weight is around 21 to 26 pounds and which require a good while to adjust and put on.

The inventors of the "Lung" are three of the most up-and-coming young men in the Navy—Lieut. C. B. Momsen, Chief Gunner C. L. Tibbals and F. M. Hobson, civilian engineer in the Naval Bureau of Construction and Repairs. Momsen is a typical product of the Naval Academy, a well set-up, athletically disposed youth on the safe side of thirty, whose unfailing rule is to try out devices of his own invention on himself rather than risk the lives of others with them. Tibbals needs no introduction to the American public. Although young in years, he is old in point of experience, having tried out probably every recent life-saving invention devised by submarine experts. One of his latest achievements was to help supervise the diving procedure at the time of the S-4 tragedy. Under the most severe and unflagging criticism of the nation's press he carried on in such fashion as to further strengthen his already enviable record. Hobson is a quiet, modest young man whose technical ability is ranked with that of the best-known submarine experts in the country.



HOW SUBMARINE CREWS, wearing the newly invented "lung" will escape to the surface should another S-4 disaster be threatened

For more than six months both Momsen and Tibbals have been making exhaustive tests with the "Lung", first of all in a tank located indoors at the submarine school in the Washington Navy Yard. The water there is crystal clear, giving excellent opportunity for experimentation under close observation of other experts. While the tank is small, only 60 feet deep, it is so constructed that pressure conditions may be applied that are equal to those prevailing at a depth of 300 feet—as far down as the submarine ordinarily dives. On one occasion the venturesome Tibbals remained in the tank while such a pressure was brought about. Not the slightest discomfort did he suffer, a definite indication that the device was worth a trial in the out-of-doors waters, where the diver would have to feel his way more or less blindly around the bottom.

The next procedure was to try out the device in the lower waters of the flood-swept Potomac River, not far from Washington. Clad only in bathing suits and the "Lung", the two men descended slowly into a regulation diving lock fastened by block and tackle to the stern of the experimental boat, "Crilley." Thereupon the men on deck lowered the block to the river bottom, all the while blowing more air pressure into the lock. When the bottom was reached the men above released a small cork lifebuoy, such as is used ordinarily to sustain a diver's weight in the water.

Just now the purpose of the two men was to test the facility of a diver's ascent with the aid of the "Lung". Wherefore, slipping out of the lock, they began, one after the other, to climb the life line attached to the buoy which bobbed along the surface. Certainly their climb was rapid—the buoyancy of their oxygen bags tended to make them well-nigh hurtle through the water, though they were well able, by merely grasping the line, to regulate their ascent as they chose. None the worse for their experience, the two experts and other divers made the tests many times, ultimately going down as deep as 110 feet. Thereafter, a few days later, they were able to go down some 10 feet further.

The inventors laughingly admit that the "Lung" is pretty much the product of frequent invasions into various and sundry (*Turn to next page*)

"Lung" to Prevent Submarine Disasters—*Continued*

scrap heaps. Indeed, were it not for certain intricate valves, whose secrets are known only by the three experts, and the fact that the device's only face covering is a mouthpiece clipped tightly over the lips, one might well suppose that it is a sort of crude gas mask. The tubing is of the gas-mask type of material, the breathing valve is from an old automobile tire, the rubber hose is like that used in the making of siphons, and there is a tiny canister containing soda lime. This chemical works very much like those used in some of the heavier European "safety devices", serving to purify the carbon dioxide continually being exhaled by the wearer. The oxygen bag and the rubber mouthpiece are connected by means of two tubes.

Chief Gunner Tibbals brings out some highly interesting facts about the intended use of the new apparatus under actual rescue conditions. Says he:

"If we briefly review what happened to the S-4 not long ago we perhaps can understand the precise purpose of the 'Lung'. As almost everyone knows, most submarines are divided into five water-tight compartments—the control room, the battery room, torpedo room, motor room and engine room. Moreover, every bulkhead is provided with hinged doors containing heavy 'dogs' that serve to keep them closed tightly.

"Now, the ramming of the S-4 by the Paulding produced only a relatively small hole in the battery room. Of course, the water tended to come rushing in at a fairly fast rate. But nevertheless the members of the crew were able to close the door at the forward end of the battery room, whereas the men in the control room were able also to shut the after door of the compartment. Under such circumstances there is every reason to suppose that the rest of the submarine should have remained dry, since the damaged compartment was thus exceedingly well isolated.

"Take note. however, of what actually happened: Lieutenant Commander Jones, looking after the control room, was forced to leave his station because chlorine gas was leaking in through the forward bulkhead, and seek safety aft, where he and his crew managed to close the door leading to the control room.

"Had Commander Jones been able to remain in the control room the S-4 tragedy might have been averted. No doubt he would have been able to feed air from the compressed air tanks to his crew, and thereafter to pass his 33 men one by one through the escape hatch to the ocean's bottom where divers were on hand to help them gain the surface.

"But the men did not have access to that life-preserving store of air—which point serves to illustrate how the 'Lung' might have saved the situation. Not only the control room, but every submarine compartment as well has an escape hatch, so that if a 'Lung' had been conveniently at hand, one for each man, the hatch where the men were imprisoned should have been emptied of its human cargo in short order."

Chief Gunner Tibbals explains how it is that men wearing the "Lung" will be able to combat the great pressure conditions that exist down around 200 feet below the surface: "Normally the human body is under a pressure of about 14.7 pounds. At 200 feet it is around 88 pounds. However, we must bear in mind that pressure conditions are relative. Which is to say that they are distributed equally throughout all parts of the body. Nor should the fact be forgotten that men in an entrapped submarine have had a few moments at least whereby to get used to the new pressure conditions.

"But probably the most important point is that the men do not remain very long in the water once they have donned the 'Lung'. The buoyancy of the oxygen container, plus that of their bodies, tends to hurtle them to the surface in time to avoid serious injury to the ear drums due to the terrific pressure."

Science News-Letter, November 24, 1928