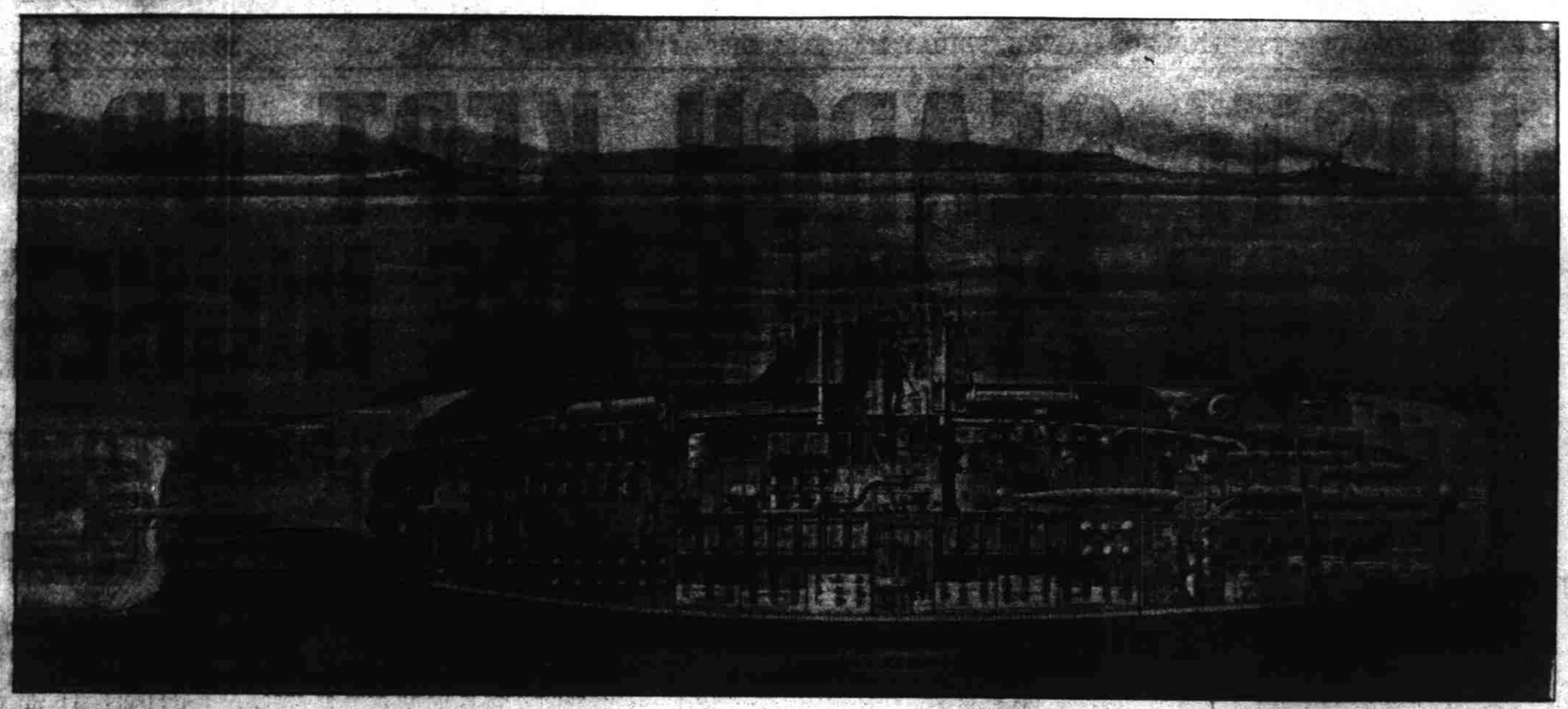
HUMAN INGENUITY IS TAXED TO GET SAFE SUBMARINE



The photographed drawing above shows a submarine which in all material respects is similar to the F-4. The contour is the same, minor interior features being different. The boat is divided into three compartments, fore, midships and aft. The small room amidships, where the lower of the two men is shown standing, holds the men when the vessel is under water.

How F Class Submarines Are Constructed; Each of Three Compartments Independent

Submarines of the F class are divided into three watertight compartments. The forward third of the ship is the torpedo room; the midships compartment contains the storage batteries, periscope and instruments, while the engine room is aft. Ordinarily four men are stationed in the torpedo room, and four in the engine room, while the officers and balance of the crew are in the midships compartment.

While submerged the bulkhead doors are not kept closed, as it is necessary for the navigation of the ship to transmit orders throughout the entire length. Men are stationed at the doors, however, and in case of accident to any compartment, the men in that section are expected to make good their escape before the doors are locked. If, however, the men in a damaged compartment were unable to get to safety, the doors would be closed on them to insure the safety of the others.

The greatest depth to which any submarine has ever been submerged is 287 feet, made by a boat of this group, the F-1, before coming to these waters, but although soundings at the spot where the F-4 is supposed to be reach almost those figures, it is not generally believed that the submarine has been destroyed by excessive pressure. The opinion among those in the best position to judge is that some minor accident has rendered the boat helpless, and that she lies on the bottom of the ocean with her imprisoned crew in hourly hope of rescue.

This thought is the spur by which officers and men above have outdistanced exhaustion during the incessant labors of the past 24 hours.

The greatest danger to men imprisoned in a submerged submarine is from the chlorine generated by the action of salt water on the batteries. If sea water has entered the midships compartment, the chances of finding any of the crew alive, even though the craft can be located and raised, are very slim.

GAMBLING WITH FATE IN A U. S. SUBMARINE; DANGER UNDER WATER

"Gambling With Fate in a Submarine" is graphically described in the Technical World Magazine by Robert G. Skerrett, a well-known expert. He says:

Can the submarine be made safe?

This question is asked whenever anything happens to one of these vessels, and, unfortunately, the query has been justified a good many times since this modern order of fighting craft came into being.

For ordinary navigation the submarine is designed to travel upon the surface of the water very much as any other craft, and in this condition it would take a good many tons of water to sink her. When prepared for under-water navigation she actually has in her ballast tanks almost enough water to carry her to the bottom. We say "almost" because the added amount necessary in her remaining margin of safety—a measure of floating ability which the technical man calls "reserve of buoyancy." This reserve of buoyancy is the inherent impulse to rise to the surface should the motors stop, and it is against this lifting force that the propellers exert themselves in driving and in keeping the boat beneath the sea.

A submarine which displaces on the surface 390 tons would be a boat about 150 feet long. When the ballast tanks of this vessel are filled and she is ready for submerged service, her deadweight or displacement becomes a matter of 520 tons, and holding this craft to the surface is a reserve buoyancy representing a space that would take just about 800 pounds of sea water to fill. In other words, she is suspended by a buoyant thread that is to the total weight of the submarine what seven ten-thousandths is to one. It would take less than 100 gallons of water, entering by some chance leak to start the vessel bottomward like a shot. Thus was the A-7 of the British navy lost a few months ago; and in this fashion a boat of the Russian service and one of the German navy were sunk but, fortunately, their crews were rescued with a sacrifice of only three lives. Both of these boats sank in moderate depths.

Perhaps you will ask why the margin of safety represented by the reserve buoyancy is not increased when these vessels are made ready for submerged navigation? In return I ask if you have ever tried to swim under water when sustained by a life preserver? If so, you will appreciate the fact that much of your energy was required to get your body beneath the surface, and that this left but little power to drive you forward. A submarine is a composite vessel; she must be able to run both on and below the surface of the sea. This has naturally created difficulties in successful planning and, at best, any submarine or submersible is a compromise.

Perhaps the most skilful solution of this duplex problem is that evolved by the distinguished Italian engineer, Maj. Cesare Laurenti. He has given his submersible a ship-shaped outer body which makes it possible to provide his boat with an unusual measure of buoyancy when running on the surface and, incidentally, permits the hull to be so formed that his boat can be driven upon the sea at high speed with moderate engine power. In this, his design differs from the submarine which has less buoyancy in surface trim and, while capable of higher speed under water, is not so seaworthy nor so fast on the surface as the submersible. Inside the outer hull of the Laurenti boat is a sturdy inner hull capable of resisting water pressure when deeply submerged. Between this strong shell and the ship-shaped structure is a large air space which furnishes the desired surface-going buoyancy. The moment water ballast is admitted to the tanks in the lower part of the boat, the vessel settles deeper into the sea, and then by opening certain ports or doors in the superstructure the submersible sinks much deeper, thus automatically surrendering the greater part of her ordinary factor of safety. Because of this greater expanse of superstructure, however, the submersible is not capable of traveling so fast as the submarine, for the same power, under water. These are the two forms that modern under-water craft have followed.

As a general rule the submarines in the United States' service are towed on long trips and are invariably accompanied by another ship when venturing for any distance over the sea. In striking contrast to this state of affairs is the really extraordinary voyage of a submersible built after the design of Maj. Laurenti for the Swedish government. The Hvalen is a boat of only 185 tons displacement, and yet without an escort of any sort she traveled practically 3000 miles from the shipyard at Spezia, Italy, to Stockholm. During that journey she encountered a good deal of rough weather, and yet she went steadily onward, making her port of call like any other seagoing craft of much larger size.

The French have done notable things of late in keeping the sea and in running long distances in their submersibles, but it must not be forgotten that their boats range all the way from 400 tons to nearly 1000 tons in displacement. The closest approach to this character of vessel are the under-water craft developed by Mr. Simon Lake, the G-1, built by him for our navy, being a fine example of the

Can Aviator Fly Over Sea And Locate F-4?

Plan Is Proposed to Thomas Bradshaw and He Gets Up From Sick-Bed to Make Ready Partly-Assembled Aeroplane—Make Take Day For Preparation

Will an aviator of Honolulu be able to soar over the sea just beyond the harbor and see to the bottom where the F-4 is believed to be lying?

That is a possibility that arose last night and which human energy and skill today are striving to transform into an actuality.

Frantic hopes of the wives and relatives of the 21 men imprisoned in the F-4 are put in the ability of William Bradshaw, an amateur aviator, to get his partly-assembled aeroplane into the air before the lives of those in the submarine are snuffed out 25 fathoms beneath the surface.

Scientists and aviators agree that an aviator flying a certain height over 35 fathoms of water off the harbor can plainly see objects of the size of the F-4 at the bottom of the sea. On the ability of Bradshaw to get his machine into condition and to locate the submarine from his aerial viewpoint probably rests the lives of 21 men.

Bradshaw, it will be recalled, purchased a partly-wrecked aeroplane from the war department several months ago. He repaired the machine and was about to demonstrate his aviation powers when a mandate from the government enjoined all from flying. The amateur birdman took the machine apart and stored it in the Lewis stables on King street.

Early this morning, after the plan to fly over the outer harbor in search of the submarine's location had been discussed, Bradshaw and E. H. Lewis hurriedly packed the aeroplane parts on a truck and hauled the air machine to Ainahau, where both men, assisted by several mechanics, are now busy striving to beat the pace of death.

It was given out today to the Star-Bulletin that it will take 24 hours to assemble the machine. On that estimate it will be at least 9 o'clock tomorrow morning before the flight can be started. Bradshaw is suffering from the dengue fever and he voluntarily left his sick bed to aid in the rescue of the F-4 and its crew. The governor has promised to give his consent to the flight, it was announced today.

A law has just been passed by the legislature prohibiting flights unless with the consent of the governor. This law was passed for military defense reasons.

SUBMARINE BELL HELP TO CRAFT, SAYS AN EXPERT

The use the "submarine bell," which has come into comment with the loss of the submarine F-4, is explained by an expert as follows:

"The submarine bell, as perfected, consists of a bell rung under water, and an apparatus aboard ship for hearing it and locating the direction whence it comes. It is used on lightships, exposed reefs, and buoys for the guidance of ships in darkness and thick weather. The equipment of vessels with its telephonic receivers extends through the great liners down to the smallest coasting vessels. A number have been installed in China and Japan and these waters will soon be as well protected as any in the world.

"The striking of the bells is automatic. A pneumatic mechanism operates those at the lightships. An electrical device through a cable from shore rings those which mark dangerous reefs and an automatic mechanism, operated by the waves, is suspended from buoys, where there are no lightships and the distance from shore is too great for the use of an electric cable.

"For receiving the signal on each side of the ship, near the bow and well below the water line, is a small cast-iron tank filled with water, in which hang two microphones. The sound waves from the bell coming through the water passes through the skin of the ship, enters the water in the tank and is picked up by the microphones. From the tank to the bridge or chartheuse an electrical connection is maintained. When the sound of the bell is picked up the exact direction is easily ascertained by swinging the ship toward the side on which the sound is louder until it is equally loud on both sides. The ship is then pointing directly at the bell. Water is a trustworthy messenger and it never fails to deliver the message.

"So mighty is the modern ship that the buffeting of the storm itself can hardly delay its passage, providing the navigator can be sure of his whereabouts. The submarine signal gives him this assurance and its saving of life, property and time makes it, like the compass, the chart and the wireless, a mighty factor in the comfort and profit of the world's shipping."

Two Sisters, Wives of Men on F-4, Cruelly Torn With Anxiety

In a small cottage at the corner of Alapai and Beretania streets, Mrs. Frank C. Pierard was found consoling her younger sister, Mrs. Archie H. Lunger, a bride of one month, this morning. Both are wives of members of the F-4's crew.

When a representative of the Star-Bulletin inquired at the cottage this morning he saw a sight that left an impression which will not be forgotten. Mrs. Lunger, who looked more like a child than a wife and who married the gunner's mate of the F-4 on February 6, 1915, at Honolulu, rested in the arms of her older sister, Mrs. Pierard.

"Oh, if I only knew Frank and Archie weren't suffering, that they had met a sudden and easy death, it would be such a relief," sobbed Mrs. Pierard. Her sister was too much overcome to speak. The older sister picked up her two twin babies, whose innocent faces looked on with manifest curiosity.

According to the story told the Star-Bulletin by friends, Mrs. Pierard married the gunner's mate of the F-4 five years ago. When her husband was removed to Honolulu a few months ago and they had taken up their residence at 615 Beretania street, Mrs. Pierard invited her younger sister, Mrs. Lunger, to visit her. While here the sister was introduced to Archie Lunger and soon afterwards, on February 6 of this year, Lunger married the "little sister."

"We were so happy out here in Honolulu," Mrs. Pierard added, "and it comes very hard on my sister to lose her husband of a few weeks."

TWO MEN OWE THEIR LIVES TO MERE CHANCE

James M. Hogget of Macedonia, Missouri, escaped the fate of his mates the crew of the F-4 by being on shore duty yesterday. Whenever the submarines go out for target practise or maneuvers one man is left on the wharf as watchman. By chance it happened that yesterday was the day for F-4 to furnish the guard and Hogget was chosen. To that chance he probably owes his life.

Another who escaped is Arthur Mellen, who was until recently chief machinist of the F-4 but was transferred to the P-3.

SOME SUBMARINE FEATS ACCOMPLISHED IN U. S.

On September 20, last, the submarine E-1, at Newport, R. I., running 12 feet below the surface, accomplished a wonderful feat of torpedo marksmanship by scoring two center hits with torpedoes on a 10-foot moving target 3000 feet distant.

An item published in this paper on June 24, last, stated that it was known that the plans for three submarines authorized by the previous Congress contemplated vessels much larger than any now in commission, adding: "Although the pioneers in the art of submarine navigation, as in the field of aviation, the United States navy has been outstripped by European engineers in the matter of size, speed and offensive power of the submarines. So the naval designers now are planning much larger and more formidable vessels of that type. Some of them prophesy the development of the submarine into a giant battleship that will replace the dreadnoughts in the first line of defense, and be capable of temporarily disappearing beneath the surface of the sea to escape a return fire after discharging its great 12-inch rifles at an enemy."

LIEUT. EDE NEW IN SUBMARINE SERVICE

Lieut. Alfred L. Ede, commander of the missing F-4, was justly recently appointed to the submarine service and received his commission as a junior lieutenant. He was born at Truckee, Nevada, 27 years ago and was appointed to Annapolis in 1905. Later, as an ensign, he was appointed to the West Virginia. Soon afterwards he was detailed to the submarine service and before coming to Honolulu eight months ago, he was in command of the sunken F-4 at Mare Island and Vallejo, Cal.

Mrs. Ede has remained at their residence, 1269 Lunalilo street, since the announcement of the disappearance of the submarine. She is distracted and could not talk to the Star-Bulletin. Friends in the naval service are in attendance. Mrs. Ede is the daughter of an ex-state treasurer of Nevada. Her maiden name was Miss Margaret McMillan.