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POPULAR MECHANICS MAGAZINE

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"COURAGE"
By Comm.
Edward Ellsberg
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COURAGE!

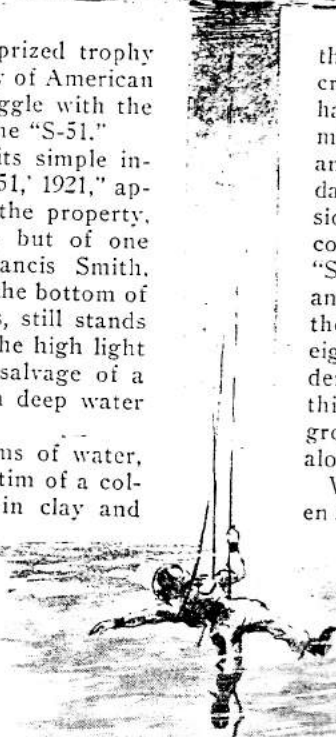
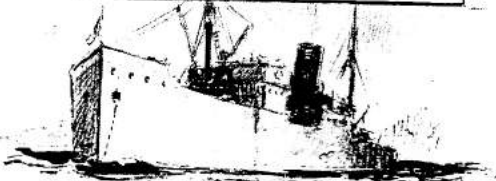
by Commander
EDWARD ELLSBERG

SOMEWHERE in Pittsburgh, looking a little strange in unfamiliar surroundings, is a submarine's bell, a prized trophy symbolizing the victory of American divers in a bitter struggle with the sea for possession of the "S-51."

And that bell with its simple inscription; "U. S. S. 'S-51,' 1921," appropriately enough is the property, not of some museum, but of one outstanding diver, Francis Smith, whose cold courage at the bottom of the sea, after six years, still stands out in my memory as the high light in the first successful salvage of a large submarine lost in deep water in the open ocean.

In twenty-two fathoms of water, the smashed "S-51," victim of a collision, lay half buried in clay and sand, some fifteen miles to seaward from Block island. Straining at six anchors, spread out fanwise to moor her in position over the submarine, was the salvage ship "Falcon." Near by tossed the rest of the salvage flotilla, four more ships and a thousand seamen, ready at the flutter of a signal to run hawsers, tow pontoons or send over boats loaded with sailors to relieve the weary men struggling on the "Falcon's" crowded decks with diving gear.

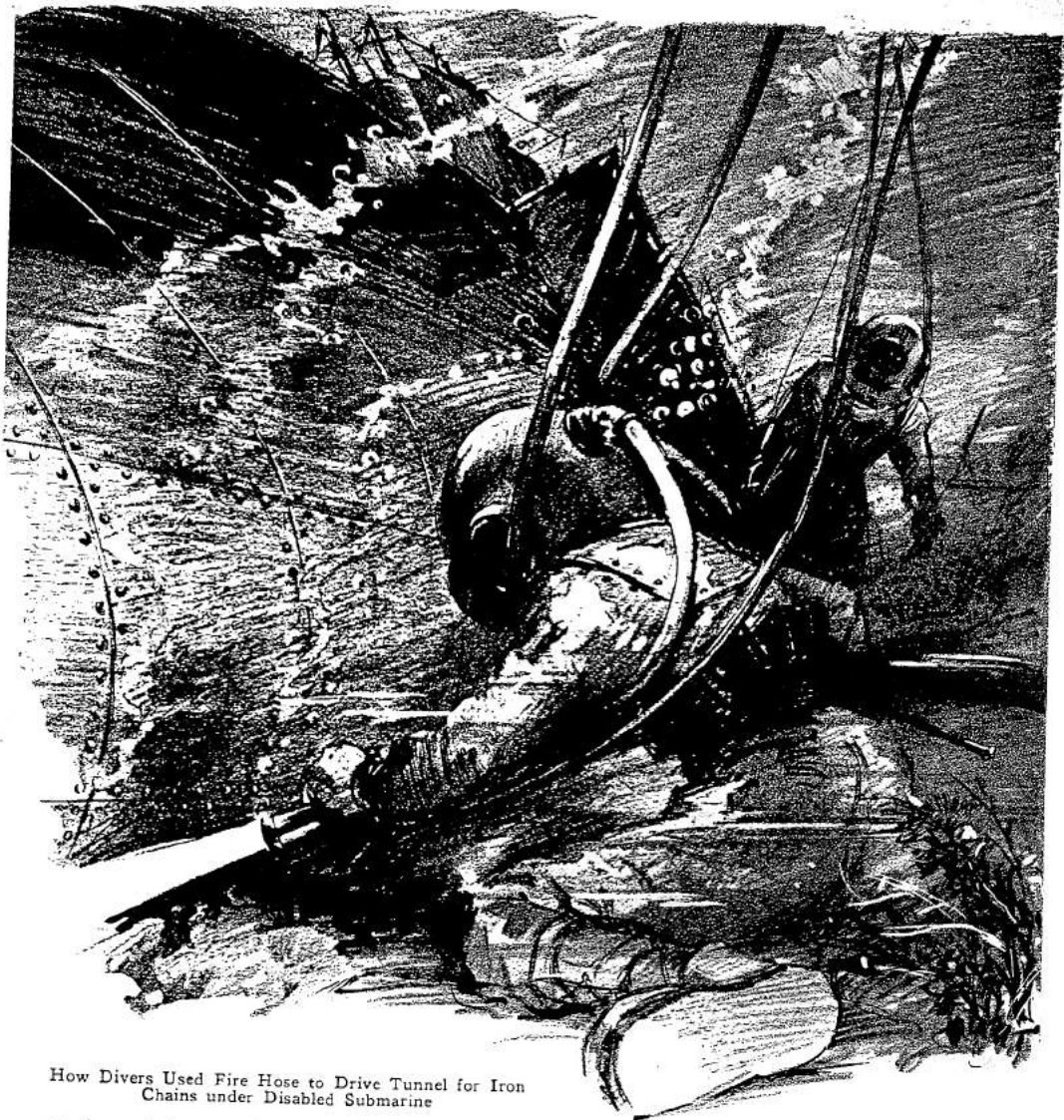
The problem was difficult. On the bottom was the waterlogged submarine, a dead weight of 1,000 tons, with a huge



gash punched in her port side where she had been rammed. Ordinary lifting means were out of the question. The largest floating crane in the world might lift perhaps 250 tons, but four such floating monsters did not exist in America, and even if they had, because of the danger of capsizing if caught outside a harbor in heavy weather, they could never have been kept over the "S-51" long enough to make the lift and tow it into shallow water. So the job had to be done mainly by eight pontoons, gigantic steel cylinders fourteen feet in diameter and thirty-two feet long, each with a gross lift of 120 tons when secured alongside the sunken sub.

When secured alongside the sunken sub—that was the difficulty. There was nothing on the "S-51," or any American submarine then, strong enough to stand a dynamic pull of even half the lift of one pontoon. There were no lifting eyes; the shell plating of the submarine was fragile, the framing too thin to hold a hook even if at the bottom of the sea the divers were to cut the necessary holes with that scientific paradox—the torch that burns steel under water.

A hundred and twenty tons is a tremendous pull; to transfer its lift to the submarine, each pontoon was fitted through hawsepipes with two battleship-

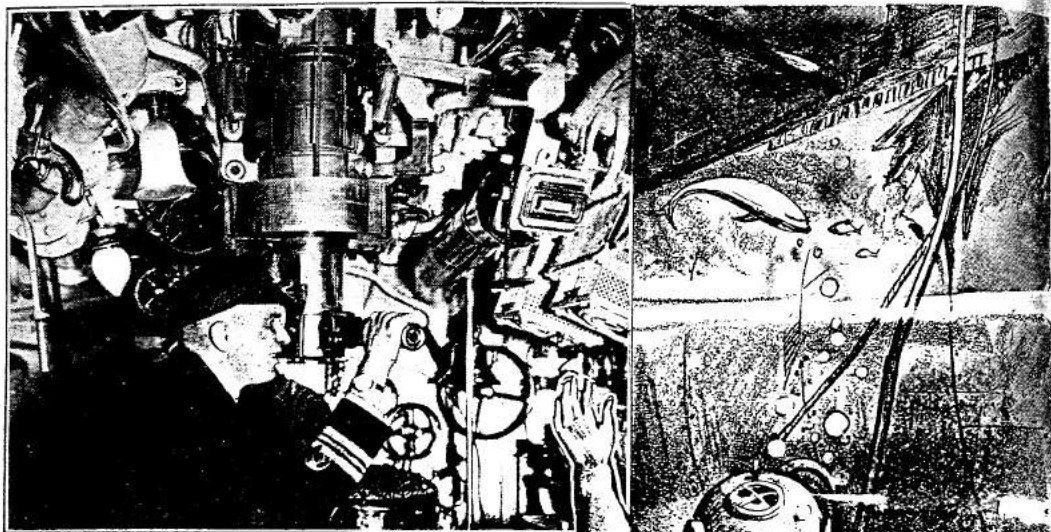


How Divers Used Fire Hose to Drive Tunnel for Iron Chains under Disabled Submarine

anchor chains, each chain link over a foot long, made of wrought iron two and a half inches thick. Somehow those chains, two from every pontoon, had to be secured to the "S-51."

Every solution was canvassed; only one offered any real chance. The chains must form a cradle in which the submarine could ride between the pontoons. But to form that cradle, those heavy chains must be got under the "S-51," and we faced the fact that, practically from stem to stern, it was buried six feet deep in the hard blue clay of the ocean floor.

So twenty-two fathoms beneath the wintry Atlantic waves, our little band of divers started to dig a tunnel under the submarine. Pick and shovel were out of the question; in a cumbersome diving rig, a man could not handle such tools; under the heavy pressure at that depth, his panting lungs and strained heart could not long withstand such exertion. So, when Bailey, gunner's mate, first-class, the first man to tackle that tunnel, slid down a line to the sand-covered bottom, he dragged with him, tied to his wrist, one end of a fire hose, its brass nozzle gleaming faintly

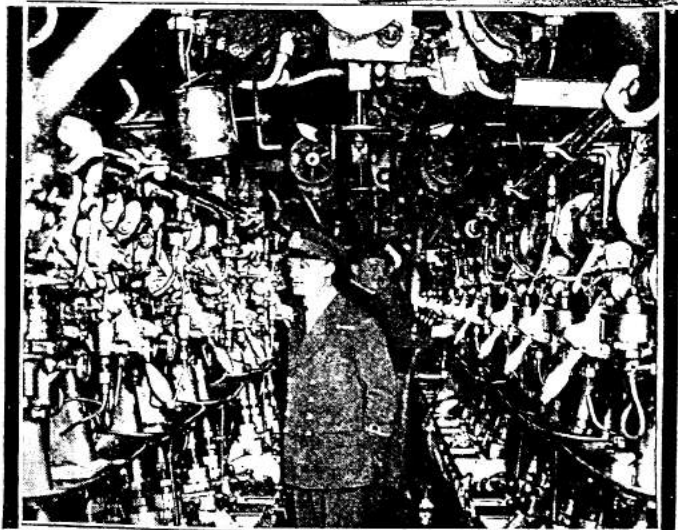


in the dim light of the ocean floor. With the pressure from that nozzle, Bailey was to wash a hole under the submarine through which we could haul the anchor chains for the cradle.

Laboriously dragging his hose to the spot alongside the hulk where he was to start, Bailey grasped the nozzle firmly, pointed it at the line where the steel plates of the submarine vanished in the clay, and sang out into the diving telephone: "On deck! Turn on the water!"

On the "Falcon," the telephone tender repeated the call and a boatswain's mate twisted a valve wide open. The limp canvas hose became hard as iron, then throbbed rhythmically against the rail as the pulsating fire pump drove the stream through. Tensely we watched the huge clusters of air bubbles, the exhaust from Bailey's helmet, froth the surface and wondered how Bailey was making out with his tunneling.

Soon enough we found out. A call rang in the telephone tender's ear:



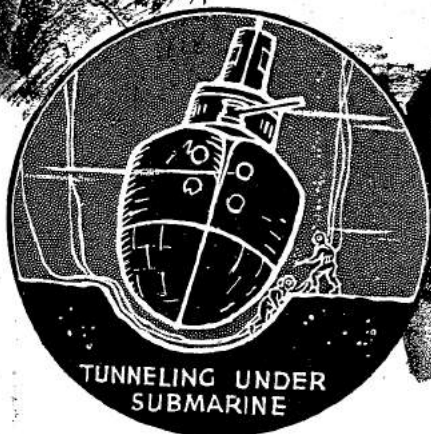
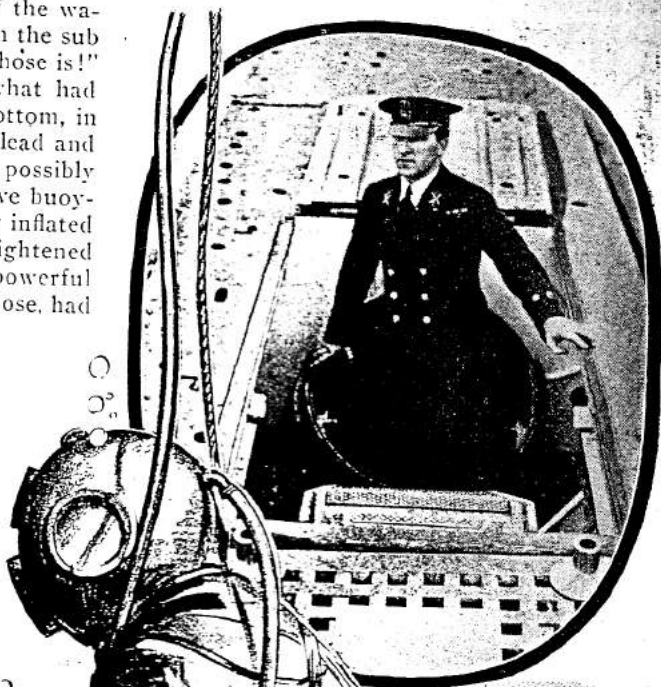
Top, at the Periscope in the Control Room of a Submarine; Bottom, Engine Room of a Modern British Sub

Photos © Keystone

"On deck there! Turn off the water! I'm about fifty feet from the sub and I don't know where the hose is!"

It was easy to visualize what had happened. A diver on the bottom, in spite of some 200 pounds of lead and copper ballast in his rig, has possibly not over forty pounds negative buoyancy when his suit is properly inflated for working. And in that lightened condition, the kick from the powerful stream rushing from the fire hose, had torn the nozzle from his hands and sent Bailey sprawling backward on the ocean bottom.

We shut off the water. Bailey groped about till he found the hose, dragged it back alongside the "S-51" and once more telephoned

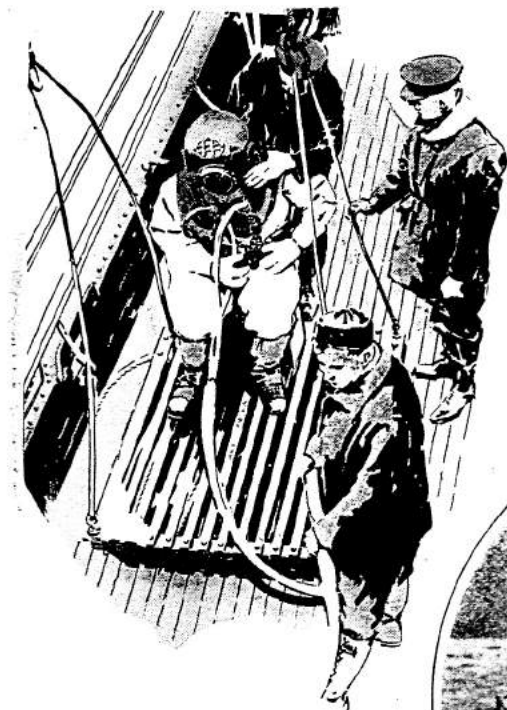


TUNNELING UNDER
SUBMARINE

Photo © Keystone

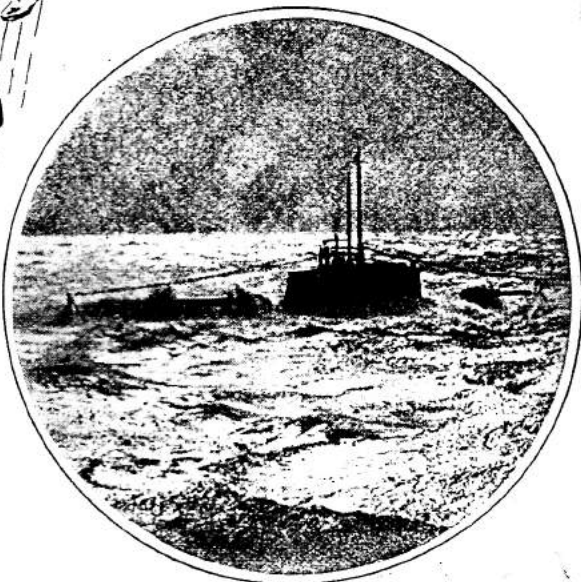
the surface, telling us to go easy this time. The boatswain's mate opened the valve gently till at last Bailey called, "That's enough!" The hose had hardly swelled sufficiently to take out the kinks, but that was as much pressure as Bailey could stand and still hang on to his nozzle. He worked an hour, then, leaving the hose below, we started him

Top, Emerging from Forehatch of a Submarine; Bottom, Diagram Showing Path of Tunnel



There was nothing for it but to keep on. Day after day, one after another, our best divers struggled with that tunnel, taking their turns in the depths, to fight with the mud. With more experience, the men were able to handle a little more pressure, but the going was terribly slow. Because of time lost in changing divers, it was impossible to get more than six men down on the job on a good day. And because of our exposed position, days on which the ocean let us dive were few—hardly one day out of three was our average.

Other conditions were bad. The wash-



up, pausing at each stage in his ascent to allow him to "decompress." And so, for the next hour and a half, Bailey dangled in the icy water of the North Atlantic, swinging his arms, kicking out his lead-weighted feet to keep from freezing as he rose—a trying ordeal for a man after his exhausting period of work on the bottom, but the only safe way of avoiding the diver's most dreaded disease, "the bends."

At last Bailey was heaved in over the rail and explained the difficulties he had encountered. It was going to be a tough job. Under a layer of a few inches of close-packed sand, the bottom was very hard. With the reduced pressure, he found cutting the clay exceedingly difficult and doubted whether the hole he had started was more than six inches deep.



Photos © Keystone

In Circle, Undersea Boat Descending; Below, a Craft Similar in Type to One Above in the Navy Yard at Washington

ing hoses, constantly surging to and fro in the seaway, fouled in the superstructure of the "S-51" and frequently were cut in half or torn apart when we tried to pull them free. Precious hours were lost replacing them. Divers lost their sense of direction and wasted nearly their whole dive trying to locate the tunnel entrance. Storms would drive us from the scene and for days at a time prevent diving altogether and we would come back to find that the sweep of the currents had completely filled our tunnel again with sand, and we had to wash that clear before we could drive ahead.

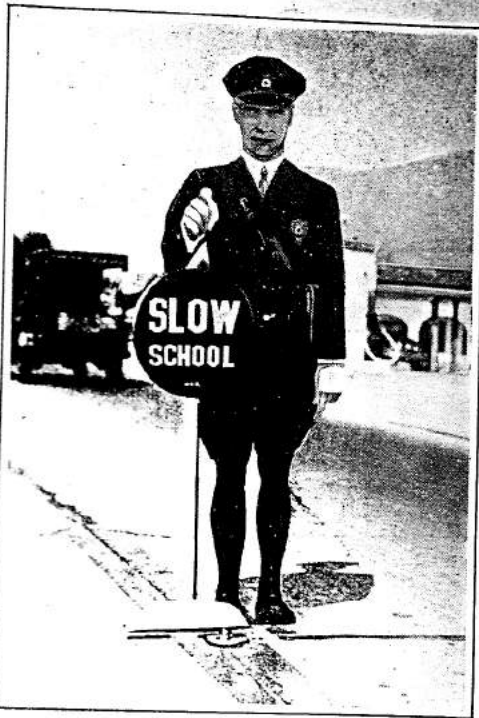
The clay was so heavy that, when cut, it would not stay in suspension in the water, but would settle in the tunnel around the diver, who had to stop and wash the sediment all the way out to the tunnel mouth before he could advance again. And finally, some of the divers, lying down in the tunnel, had their suits fill with water and were dragged up, half frozen and nearly drowned.

A desperate drive over several weeks advanced the tunnel till it reached sixteen feet under the port side—an average of five almost a foot for each day's work. We were then two feet from the keel on the port side, under the deepest point of the "S-51." Francis Smith was taking his turn with the hose in the tunnel, worming his way along. Imagine his situation. In ice-cold water, utter solitude, total blackness, he was buried 135 feet below the heaving surface of the Atlantic. No sight, no sound, no sense of direction except the feel of the steel hull of the "S-51" against his back as he lay stretched out flat in a narrow hole scarcely larger than his body, not big enough for him to turn around in. Closely against his body pressed the throbbing hose while, ahead in his outstretched arms, he gripped the nozzle, burrowing deeper, all around him a black stream of freezing water heavy with clay and mud coursing backward.

Twenty minutes went by, then the telephone tender got a call from Smith. He could not make it out and passed the telephone headset to me. I heard Smith's voice saying, "I'm in a very bad position, Mr. Ellsberg. Send some one to help!"

Fortunately, Joe Eiben, another fine

(Continued to page 122A)



This Figure Looks Like That of a Policeman, But Is Only a Dummy Warning Auto Drivers

LIFE-SIZED DUMMY POLICEMAN GUARDS SCHOOL ZONE

Warning motorists to drive slowly in school zones, life-sized dummy policemen are guarding the lives of children in Santa Barbara, Calif. The figures are constructed of plate steel and pipe bracings and painted in vivid natural colors. When set in the middle of the street near schools, they can be seen for many blocks, giving auto drivers plenty of time to slow up.

SHIVERING HELPS WARM BODY WHEN YOU'RE COLD

When the body is chilled, muscle spasm or shivering is nature's way of producing heat. Chilling of the surface of the body causes the muscles of blood vessels to contract. This forces the blood from smaller blood vessels to the larger. Since the latter must expand, the spasmodic contraction and expansion is the shiver. Dr. F. E. Harrington, in this explanation of why we shiver, says that deep breathing through the nose increases oxidation of the blood, producing heat.

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COURAGE!

(Continued from page 399)

diver, was already on the bottom, working aft on the other side of the submarine. I ordered him to climb over the boat to the tunnel and help Smith.

Meanwhile I tried to figure out what had happened. The fire hose leading over the rail was throbbing violently. Perhaps the nozzle, having torn itself from Smith's grasp, was thrashing him to death.

I seized Smith's phone again and called: "Shall I turn off the water?"

Almost a scream was the reply:

"No! For God's sake keep it going! The tunnel has caved in behind me!"

I felt faint. Hastily we coupled up another hose and slid it down to the submarine for Eiben's use. But it had taken weeks of work to drive the tunnel to where Smith lay buried in the mud!

On deck, we looked at each other silently and gazed hopelessly at the other vessels of the salvage squadron tossing near by. Five ships and 1,000 men standing by as helpless to lend a hand to that man struggling for his life only 135 feet below us, as if he had been transported to a distant star!

No further messages came, but over the telephone, I listened to Smith gasping for breath as he struggled in the mud and the darkness. The sailors clustered silently round me, waiting for Eiben to arrive at the tunnel.

Eiben clambered up the starboard side of the submarine, cut loose the hose we had lowered, dragged it forward with him and slid over the port side to the bottom, then started to look for the tunnel. After what seemed to us an age, he reported that he had found it.

More minutes went by while, on deck, we waited with leaden hearts. Then a startling thing happened. Over Smith's phone, I heard Smith talking through the water at the bottom of the sea to Eiben: "I'm all right now, Joe. Had a little accident. You go on back to your own job."

Though he could not turn round, Smith had managed to pass the nozzle back between his legs, and guiding it with his feet, he had washed his way out backward through the cave-in!

On deck, the tenders waited for the signal from Smith to start him on his slow

(Continued to page 124A)



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COURAGE!

(Continued from page 122A)

rise to the surface. On the bottom, Eiben made sure Smith's lines were all clear, then clumsily climbed back over the submarine to the job he had so hastily left. Smith, alone again, sat down on the ocean floor a few minutes to rest, then, instead of signaling to rise, picked up his hose, crawled back into the tunnel and for half an hour more continued to work!

Months later, through a silent crowd of hundreds of thousands of people, the "S-51," still the coffin of its dead crew, passed down the East river toward the Brooklyn navy yard, borne between pontoons in a cradle of chains passed through that tunnel and through other tunnels. But we who had struggled off Block island, knew it was the faith of men like Smith, not the pontoons, which had lifted the submarine. And in recognition of that victory and cold courage over the sea, the bell of the "S-51," proud symbol of our success, went to Francis Smith.

NEW SOURCES AND USES OF POWER

(Continued from page 379)

and bound in a steel frame well reinforced. When laid under a concrete floor, these mats absorb the vibration of machinery. Where heavy machines deliver terrific impacts against a floor, the engineers have made a spring device, which, when placed beneath the legs of the machine, also reduces vibratory motion.

A combination thermostat and air valve on the ordinary steam radiator make it possible to govern the temperature of individual rooms merely by the touch of a finger. Once the device is set, the room temperature controls the operation. It can be attached to the common one-pipe steam system and can provide a separate temperature for every room in the house.

COIN-IN-THE-SLOT TYPEWRITER

Coin-operated typewriters have been installed in German post offices. Use of the machine is obtained by depositing three cents, and for three cents more paper, envelope and carbon copy may be procured. The typewriter is installed on a small table to which a chair is attached.



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