

Stirring Stories of the Sea by Morgan Robertson

FIFTY FATHOMS DOWN

Strange Tale of a
Submarine That Sank

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THE United States submarine torpedo boat Diver had come to the surface to blow out, to recharge her storage battery and to restore her supply of compressed air to its working pressure of 2,000 pounds to the square inch.

Breen, temporary commander, raised his beak face up through the conning tower hatch, the hinged lid of which was held upright by a strong spring, and looked around at the night. The lid prevented a view astern. The engine exhaust drowned the lesser sounds of the sea.

A curious rushing sound mingled with the puffing of the exhaust, a voice high above and astern sang out, "Something under the bow, sir!" and a huge bulk of blacker darkness struck the small semi-submerged craft a glancing blow from astern, heeled it a little and bore it under. Breen was washed downward by the rush of water, but held a grip on the conning tower ladder and found voice to call out:

"Stop the engine! Shut off the gas!"
Against that almost solid column of descending salt water he fought his way upward until, face above the hatch again, but looking now in the blackness of the deep sea, he seized the hand hold of the hatch lid and pulled it down. It closed with a force that would have shivered anything but armor steel, and Breen, half drowned, fell to the floor of the handling room.

"Run down!" he gasped. "Anything carried away?"
"Seems not, lieutenant," answered the chief electrician—"nothing but the auxiliary motor. I've turned it out. Had my hand on the switch when the jar came. But we're sinking, sir."

"We've taken in more than the reserve buoyancy surely," said Breen, looking at the depth indicator, which already marked forty feet. The hand moved as he looked to fifty, sixty—and more.

"Blow out every tank!" he ordered. The ballast and trimming tanks were emptied, but the boat was still sinking.

"Start the motor and connect up the pumps!" said Breen.

"Can't, sir," answered a machinist. The motor's soaked through.

Breen looked and became thoughtful of face. The depressed engine com-



Breen Was Washed Downward by the Inrush of Water.

partment now held the water taken in, and the lower half of the armature was immersed. A sunken submarine with main motor short circuited by water and auxiliary motor burned out, without means to pump, to move or to compress air for power is in a serious plight.

"By God!" exclaimed Breen, glancing at the indicator. It marked 100! "Out with the torpedoes!" Breen had fifteen days' supply of food and water for a crew of eight, 120 days' supply for himself. His air supply was short, but suffocation is a long death.

The lower part of the armature and fully half the height of the field magnets were still immersed. He needed more weight forward or less aft, and as his eye roved about the maze of fixtures—pipes, valves and machinery—it rested upon the useless gasoline engine, a 2,000 pound weight. Removing his coat, he first made sure that the gas feed valve was screwed tight, then, delving for wrenches, spanners and hammers in the engineer's locker, attacked the engine.

Two weeks later he dragged forward

with bleeding hands the connecting rod of the after cylinder and piled up a scrap heap of similar fragments beside the torpedo tube in the bow.

The engine was stripped to the supporting column that bore the weight of the motor and the pump, and the boat was not yet on an even keel, but the last lower coil of the field magnet was lifted from the water by the shifting of the weight, and when he had cleared the storage battery wires from all contact with water he rewarded himself with a few deep inhalations from his nearly exhausted compressed air supply and sat down to wait until the insulation was dry.

He had kept the log and knew the flight of time by this and the clock, and in another week he realized with sinking heart that the motor was not drying out. A little reflection told him why. In the sealed up hull the atmosphere was saturated with moisture, and no more evaporation could take place. A drying agent for gases?



He Dragged Forward With Bleeding Hands the Connecting Rod.

What was it? Then it came to him out of the forgotten chemistry in his subconscious mind—"sulphuric acid." He had ninety jars of it under his feet. He had lead and copper piping in his scrap heap forward. He had two electric fans used for ventilation on the surface and a blower fixed in the air pipe, but available on a pinch, all four wired and ready with a 3,600 ampere hour battery to drive them.

In three hours he had constructed from the back of his coat a cone shaped funnel that stretched around the wire guard of a fan wheel, and this he fitted on to the end of a length of lead pipe, the other end of which was all but immersed in the acid of a battery jar in the hold. With the fan buzzing and blowing into this funnel and a stream of air ruffling the surface of the acid he yet went on contriving, and with another fan, unscrewed from its shaft and rewired to a new location, he caught this dried air as it rose and drove it aft over the motor.

The air was again very bad. His head was aching, and he needed no clear recollection of the forgotten science to know that the dominant irritant was the carbonic acid gas from his lungs. This boat was not equipped with the apparatus for purifying air that he had read of in plans, and all the chemistry that would come to him was the old, familiar classroom test for carbonic acid gas or carbon dioxide. This testing reagent was lime-water, but the chemical term for it was beyond him.

Again as he slept fitfully, with intervals of half waking thought, chemical terms long forgotten and bearing no seeming relation to lime-water, ran jumblingly through his head—potassium chlorate, manganese dioxide, chloride of sodium, chlorhydric acid. These persisted through the jumble and remained when he awakened.

But what had they to do with lime-water? Nothing that he could remember. Chloride of sodium was common salt, he knew, and he had plenty of it, dissolved in water—more than he wanted. Chlorhydric acid—hydrochloric acid—muriatic acid—an acid containing no oxygen, the one gas that he needed so badly, formed of hydrogen and chlorine—chlorine, chlorine, gas. Good so far. Chlorine—also a constituent of the salt in his big water. But what of it? It was oxygen that he wanted. Potassium chlorate—chlorate of potassium. This contained chlorine. Manganese dioxide contained oxygen. But what did it mean? Why should these elements and compounds come to his mind? He had something of blind faith in the relevancy of thought, but he wanted to know only of lime-water, with which he could catch the carbon dioxide in the air and free the oxygen. This last thought was an advance, but he could go no further, in this direction. His mind returned to chlorhydric acid, to hydrogen, to chlorine.

How were they made? They were all there—in this sea water. His waking thought of sulphuric acid as a drying agent meant something. Sulphuric acid, one of the most powerful chemical reagents, the most powerful electrolyte—electro—electrolysis—"Hurrah!"

He bounded to his feet. He had it. Electrolysis of sea water yielded oxygen and hydrogen. But why had manganese dioxide and potassium chlorate so persisted in his mind? And lime-water—what had that to do with his problem, now solved by electrolysis?

Slowly the memory of school day lessons learned by rote filtered up from the past—the test tube manufacture of oxygen by the union of these chemicals in the presence of heat, and lime-water, with its affinity for carbon dioxide? There was no lime on board, hence no lime-water. But there was water—too much. Where

was the affinity? It was slower in coming, but it came—the old lesson learned by rote and forgotten. "Carbon dioxide is soluble in water, volume for volume." "Oxygen is but slightly soluble in water—about three parts in a hundred."

"I see how it is," he said, with the infinite smile that had come to his boy's face in this trouble. "It's the subliminal self that remembers everything, and when you've guessed all around the subject it pops out and hits you when you're touched it."

He found some spare insulated wire among the stores and rigged two lengths from the poles of the battery, scraping the ends and immersing them in the salt water. A few bubbles arose, then ceased.

"Funny how things come back when you need them," he said as he pulled up the wires. "I want platinum electrodes and solder and soldering fluid—chloride of zinc—zinc out by hydrochloric acid. Wonder if I'll have to make my acid?"

He did not. He found a soldering outfit in the locker, then rummaged his scrap heap forward for platinum spikers and, finding very little of the precious metal, ruthlessly smashed all but three of the electric bulbs that lighted his prison, robbing them of the platinum wires that led the current into the carbons.

Clumsily, for he was but a theoretical mechanic, he soldered the ends of the platinum wires and fragments to the copper ends of his terminals, about half to each, making brushlike electrodes of the largest possible surface exposure. Then he immersed them and was gratified at the result. Bubbles arose in generous quantity.

"Now which is which?" he said as he leaned over them. "Let's think. Water—hydrogen and oxygen—H₂O—two parts of hydrogen to one of oxygen. But the bubbles seem about the same size."

He stopped and inhaled deeply of the air over one column of bursting bubbles. A little of this brought on a curious feeling of faintness, with a desire to draw a longer breath.

"Hydrogen surely," he said. "Now the other."

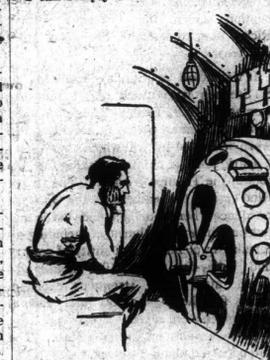
A half inhalation over the other bubbles sent him back, coughing and choking, with a bitter, astringent taste in his throat.

"No," he said as he pulled up the wire, "that is not oxygen. It's some other gas. I must separate them somehow."

He racked his brains. He knew that he was using up the existing oxygen by combining it in his lungs with carbon to form carbon dioxide, 10 per cent of which in the air might be fatal; that the hydrogen which he would make, with his oxygen, was nonpoisonous, like the nitrogen of the air, but that, there being less of it as a dilutant, he might suffer from a preponderance of oxygen, and that this astringent gas that would also evolve from the salt water was a deadly poison to be got rid of. But how? Was it carbon dioxide?

He did not need to sleep on the problem. He had already slept upon and solved it. It came to him suddenly in the formulated sentences of the morning. Water would absorb carbon dioxide, volume for volume, while oxygen would only give up three parts to a hundred.

"What a fool I am!" he muttered. "I can simply blow the whole mixture



He Knew That He Was Using Up the Existing Oxygen.

back into the water again and again and get rid of everything but the oxygen and hydrogen."

Breen now constructed a supplementary pneumatic feed system that was a triumph of driven genius to a man dying of headache at the bottom of the sea.

First he reversed the polarity of the forced blower in the air pipe overhead, so that it worked downward, then he propped up and secured a section of gas feed piping that would catch the mixed bubbles as they burst and deliver the mixture to this blower.

Below this fan he suspended a fairly air tight funnel formed of the seat and one leg of his trousers and to the funnel secured another length of copper piping, the lower end of which he hammered flat, so that it would spread the flow of gases to a fan shaped stream, conducive to a large number of smaller bubbles.

This end he immersed in the deepest part of the flooded engine room, sacrificed his shirt to form a hood over the bubbles and under this hood arranged his original funnel and fan that drove air through the lead pipe to the sulphuric acid.

He had contrived an apparatus to manufacture two volumes of hydrogen to one volume of oxygen, with an unknown quantity of poisonous gas, that would suck into itself the foul air of the closed hull and drive it, with the mixed gases, in a divided stream into the purifying water, and that would

force the oxygen which arose on to the drying sulphuric acid, to be then sent back over the damp motor. Arranging his battery wires in the water, he turned on all the fans and tested the result by his sense of smell.

There was but the slightest bad odor in the blast from the last fan. Breen went to sleep happy. When he awakened his face still buzzed merrily, his headache was gone and the motor much dryer. Yet as he felt of the damp motor and noticed the hydrogen bubbles rising and escaping into the air without going through the drying process he obeyed a strong impulse to turn them into the pipe that caught the others.

"Can't do any harm to dry the hydrogen," he mused, "and it would mix with the oxygen later, in any case, while the water won't absorb it, only the carbon dioxide." A few moments later he noticed an utter absence of the bad odor in the blast from the acid to the motor.

He knew that the seventy horsepower motor when thoroughly dry could pump out the water and bring her to the surface. He waited a full week longer, and then, uncoupling the motor from the shaft, and turning on the switch, he carefully moved the controller and gave it momentary contact. A thin cloud arose from the motor and the armature moved an inch. He inspected the cloud. It seemed to be steam, not smoke, and he tried it again with longer contact. The armature moved farther, and again he shut off the current, assured himself that there was no burning and turned it on.

This time he left it on and stood watching the steaming armature slowly turn, while the commutator brushes threw out sparkings six inches long. These sparkings indicated a waste of current, and he noticed that when his body interposed between the motor and the blast of dried air from the last fan in his system the sparkings were reduced to minute points, hardly visible.

He hustled himself in constructing a hood that would inclose the commutator and brushes, using his undershirt for material. His hood was a success. It stopped the extravagant sparking, but did not save enough current to work the pump. The armature moved faster, but stopped short against the small resistance of the inert water in the induction pipe. Nothing to do but wait now and sleep.

Years later, as it seemed, he awakened in pitch black darkness, with an irritating, pungent odor in his nostrils, a burning sensation in his throat and a waching pain in his head. His last light had burned out. His air plant was still working, but the poisonous gas was escaping. How and why?

He crawled to the different parts of his pipe and fan system, inspecting them by the sense of touch. Everything was as he had left it—the wires still fed bubbles into the pipe to the upper fan, the last fan still caught the air as it rose from the acid and sent it over the motor. Perhaps the motor would now work the pump. He found the switch and controller in the darkness, turned on the current and felt his way back. The armature was turning just a little faster than before.

Shutting off the current, he coupled on the pump and again gave power to the motor, only to find that the pump stopped it. The solid, inert, incompressible water in the induction pipe could not be stirred.

Yet there was power in the motor. He had tried to stop the armature with his hands, but could not. Two men could not nor three, by the way it felt. If he could multiply that power? If he could give it purchase? If the water were more yielding, compressible, so that the motor, once started, would go on—compressible, like air?

Air—compressible air. He had too much air—bad air too. It gave him the pain in his head.

Could he turn that rotary bilge pump into an air pump? Could he make an aperture in the induction pipe above the water? Crawling aft into the stifling atmosphere near the motor, he found an elbow in the induction pipe made up of a T joint and a plug. Securing a wrench, he removed the plug. Then he turned on the current, assured himself that the motor was turning over and crawled forward.

Here he remained, and after a long time, when a new sound as of the clapping of an outlet valve came to his burdened ears over the uproar, he shouted approval and again was happy. He was pumping bad air out of the boat, and all was well with him. He was not even hungry nor thirsty, but after a time, when the clapping of that valve in the outlet pipe had become a familiar sound, he felt sleepy, and he crawled a little, where the greasy oilcloth flooring was softer. He went to sleep here, face upward, directly beneath the conning tower hatch.

He awakened once or twice, listened to a far away roaring sound punctuated by the clapping of a valve and went to sleep again. At last a new sensation came to him, one that affected not his ears nor his organs of taste or smell. These were dead, killed long ago by that terrible, blistering gas. The sense of touch was lost in the all pervading pain that saturated his whole body. The sense of light was but a memory, lost in the darkness that had engulfed him with the burning out of the last bulb. But now, as he lay there on his back, the sense of light and sight seemed returning.

Through his half closed eyelids a dim glimmer of yellow and gray came into his brain. He opened them wide and took in the details of the conning tower ladder, the circular lower just above or ladder, and an occasional flickering image of the starboard deadlight moving up and down, back and forth, on the port inner surface of the tower. Light!

Where did it come from? The boat was afloat. He slowly climbed the

ladder and found the hatch. He pushed upward, but could not budge it. He was on the surface, but with the top of his conning tower awash all below it was buried.

He looked at the motor burning astern, and working a rotary pump that pumped—air.

Weakly he descended and crawled aft to where he had left the 2 foot plug and the wrench and turned that air pump back into a bilge pump, heard the gurgling sound of water in the pipe that accompanied the last few heaves he gave to the wrench and crawled forward to where the air burned and choked him—just a little less. Here he waited, listening to the blessed sound of gurgling water in the pipe, while the light above grew stronger and the growing hope of life strove vainly to formulate itself into words of prayer. Then the burning of fans and motor softened, the gurgling sound of water ceased and, though the fans still whirled slowly, the pumping came to an end. The 3,600 ampere hour battery was exhausted, but the work was done.

Breen again climbed the ladder and pushed upward on the hatch. It yielded, and when the lifting spring was past the center it flew upright. He now looked across a dark, heaving sea at a full moon hanging above the horizon. He had seen it last a month before.

Three members of the board of inquiry, that later exonerated Breen from misgave of government property, met, at the Army and Navy club long before he was able to answer questions and unofficially discussed him. One



He Had Seen It Last a Month Before.

was a captain, another a surgeon, and a third an engineer, who was also a naval constructor and an electrical expert.

"One thing we'll have to find surely," said the captain—"that is, that the course in chemistry at Annapolis is not thorough. I passed in the subject. But what did I know? What do I know now? Who but a specialist like Breen could save the boat and his life in that manner—if he did save his life? How about that, doctor?"

"He'll pull through," said the doctor. "His hair will turn dark again, and the wrinkles will go in time. Lord, how he looked—sixty years old, gray haired, and emaciated! Shows what an excess of oxygen will do even diluted with all those poisonous gases. His lungs and throat are just so much raw meat."

"But it's funny," said the engineer. "No one can deny Breen's knowledge of chemistry—that's understood. Yet Breen just pulled through his exams by the skin of his teeth. Chemical symbols were worse than Greek to him and chemical equations a deep, dark mystery. And yet down there in the dark he took a chance that nothing but utter desperation would induce me to take and made a great discovery in chemical reactions not down in any textbook."

"What chance? What discovery?"
"Well, this. Electrolysis of water is easy, as we all know, and the product is oxygen and hydrogen, which can be breathed for a time, but it is an explosive mixture that would have blown him to eternity had enough of it touched a spark from either of those three fans."

"But he had inclosed the commutators."
"Yes, but that was his chance nevertheless. Here is another: He turned both wires into the pipe leading into his fan system. He was evolving large quantities of chlorine gas from the salt in the water, and this is equally explosive when in contact with hydrogen not only from sparks, but from strong light."

Now, he was in pitch darkness, of course, and every pipe feed led directly in front of the next fan, so that the mixed gases did not touch the sparks and explode. But what he risked was the poisoning effect of that free chlorine before he made his discovery."

"And it did poison him," said the surgeon; "ripped his mucous membrane to shreds and smothered him. But what did he discover?"
"That hydrogen and chlorine gas mixed in utter darkness and violently agitated—will combine without explosion into hydrochloric acid gas," said the engineer. "Water takes up 450 volumes of this gas, but only two and a half volumes of free chlorine and less of hydrogen. His discovery saved his life."

"But," said the captain dryly, "he made a much greater practical demonstration. He has proved that men may safely be ejected from torpedo tubes and that a Whitehead will support two men in the water."

The engineer concluded thoughtfully: "I must ask Breen about the new reaction. It's not quite clear."

But Breen did not enlighten him.

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