

MARINE ENGINEERING

# New Aid for Deep Sea Divers Adopted by British Navy

## Steel Cylinder With Doors Top and Bottom Serves As Combined Diving Bell and Decompression Chamber

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AS THE diver descends in the sea he is subjected to increasing pressure which is transferred to the air in his suit, and thence to the lungs. This causes a corresponding increase in the amount of gases in the body. The pressure of abnormal amounts of nitrogen gas from the air in the body causes no inconvenience while the gas is in solution, but should the pressure be released too rapidly for the gas to escape through the lungs, bubbling occurs. This bubble formation is the cause of caisson disease—the bugbear of all who work under increased air pressure. Prevention of caisson disease, the “bends,” depends upon the gradual reduction of pressure by bringing the diver up slowly by stages.

The time taken in bringing to the surface a diver who has been working at a depth, say of 204 feet for one hour, is 124 minutes, implying a considerable waste of working time, and a considerable feat of endurance when it is considered that he is hanging on a rope suspended in mid-water, often in winter, or even in summer at a temperature possibly of 40 to 50 degrees Fahrenheit and in a strong tideway.

### Diving Decompression Bell

In order to overcome this difficulty Sir Robert H. Davis of the British Admiralty Diving Committee has designed and produced a steel chamber which when submerged acts as a diving bell and when closed as a decompression chamber. The device is known as the Davis Submersible Decompression Chamber and has been adopted by the British Navy.

The Davis device is a steel cylindrical chamber which is fitted with doors at the top and bottom. An attendant goes down in the chamber and waits to receive the diver at a depth corresponding to his first stop if he were ascending in the standard way. If the depth were 300 feet, this would be 66 feet. The lower door is kept open and water kept out of the chamber by compressed air pumped into it. The diver ascends

and enters the chamber on completion of his job, the lower door is closed and he is hoisted aboard the diving vessel without releasing the air pressure from his body. A long decompression can then be conducted in warmth and dryness instead of under water in the cold and comparative darkness.

### Minimizes Exposure

As a result, it is possible for the diver to go safely to greater depths and he is relieved of the discomfort and monotony of waiting on the ascending line for the decompression periods. It reduces to a minimum his exposure to cold and strong currents. The period of decompression can be reduced 40 per cent. by the breathing of oxygen by the diver during decompression and it is thus made possible to extend the period of useful work on the bottom.

Where the diving operations are on a large scale, as in extensive salvage work, it is proposed to install in the diving vessel special stationary decompression chambers to which the divers in the submersible chambers will be transferred in order to complete their schedule of decompression. In this way, a number of divers can be kept going whenever diving is possible. In diving operations one has to take advantage of favorable weather to speed up the work.

There is no doubt that the device here described represents a conspicuous advance in the art of deep-sea diving, thus making another milestone in the history of its development.

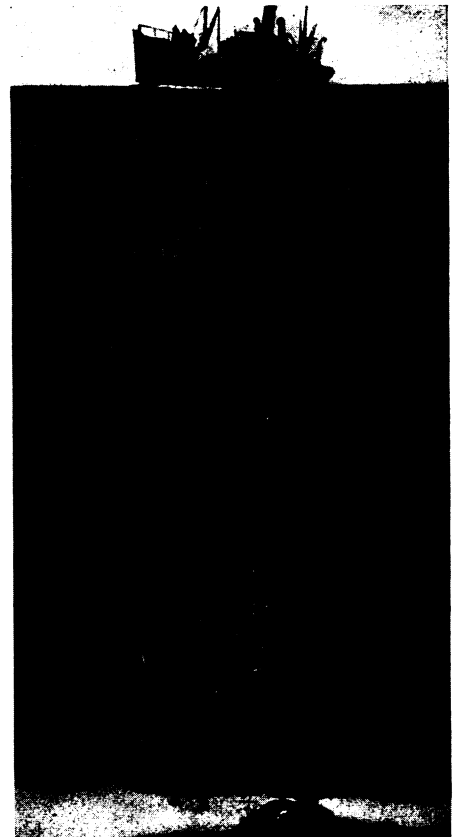
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MARINE ENGINEERING

## Less Roll For Liners In New Ship Design

SUGGESTIONS for the design of ocean liners with less roll than present ones were offered to the meeting of the Society of Naval Architects and Marine Engineers.

The potential boon to seasick passengers was the result of studies on the



### HALF WAY DOWN

*The small object on the line half way between the ocean's surface and the diver below is a decompression tank—new aid to divers.*

gyro-stabilized Italian liner Conte di Savoia by P. R. Bassett and F. P. Hodgkinson of the Sperry Gyroscope Co.

Three years of study and operation of the three great 110-ton gyroscope stabilizers aboard the ship, the Sperry engineers declared, indicate that roll is reduced from between fifteen and twenty degrees to not more than six degrees with the gyro equipment in operation.

The investigations indicated, however, for the first time that all the oscillating inclinations of the ship's deck were not due to roll alone. Superimposed on the roll was yaw-heeling, a motion quite similar to roll in its action but due to waves quartering on the vessel from the stern.

In ordinary ships, Messrs. Bassett and Hodgkinson point out, roll and yawing are never separated. With the Conte di Savoia yawing alone was allowed.

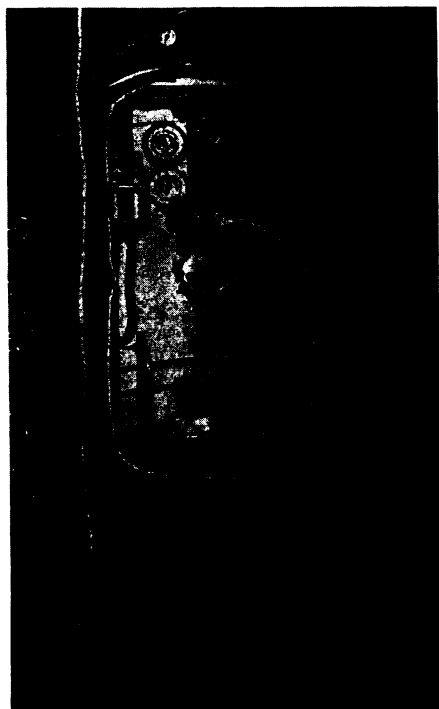
“So far as we know,” they stated, “this is the first time that any mention has ever been made of the fact that all periodic inclinations are not roll.

"As a result of our studies," the speakers added, "we have attempted to outline the requirements for a more naturally comfortable and steadier ship than that of usual design. The principal requirements are that the ship must have a long period of roll and a low center of gravity. The problem of steering must also be considered with the purpose of reducing yawing to an absolute minimum.

"While we do not presume to say that a ship can actually be designed in accordance with these requirements, we do feel that improvement in sea qualities can be obtained if attention is paid to these requirements."

"In the usual design of present-day ships the center of gravity is considerably above the center of the vertical water plane. Consequently, each yaw causes a centrifugal force which manifests itself in heeling of the ship, or causing what we have termed 'yaw-heel.' Unfortunately, the direction of this yaw-heel invariably augments the normal rolling and will even cause rolling when theoretically none should exist. We believe this is why some ships for no apparent reason have turned out to be notorious rollers."

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#### TO PREVENT BENDS

*This decompression tank makes it possible for the deep sea diver to rise to the surface in much less time than usual without developing the dreaded bends. The diver, entering the tank, has removed air and telephone lines shown outside the tank on the left.*

METALLURGY—MEDICINE

# Tungsten Alloy Aids Cancer Treatment by Radium Rays

## Combined With 5 to 10 Per Cent. Copper or Nickel, Shield Can Be Made Much Smaller Than Lead Bomb

A NEW tungsten alloy which effectively takes the place of more bulky lead as a "screen" when massive doses of radium rays are being administered has been developed for use at the Westminster Hospital, London.

The bomb-shaped containers in which large packs of radium are shielded in hospitals can be made much smaller with the new alloy and yet have the same screening effect. A volume reduction to nearly half the former size is attained.

More compactness means that the patient can be placed closer to the source of the radium rays, if need be, and receive more intense radiation.

The new tungsten alloy resulted from the researches of Sir John McLennan while he was scientific advisor of the Radium Beam Therapy Research Company and of Dr. C. J. Smithells of the (British) General Electric Company. Sir John recently died while on a vacation on the continent.

When massive doses of gamma rays from radium are administered to cancer patients, a large amount of radium is necessary. Many authorities believe not less than four grams of radium, valued at close to \$200,000 is the minimum. This potent radium pack is shielded so that its piercing gamma rays do not strike doctors and nurses or any parts of the patient's body except the afflicted area.

The complete equipment, radium and its shield, is known as a radium bomb. Although lead is easily shaped and machined, and is relatively cheap, it takes a somewhat unwieldy size of lead bomb to provide adequate screening for four or more grams of radium.

The screening effect of lead is due to its high density (11.35), the degree of absorption of gamma rays by metals being nearly proportional to the density of the metal.

Plainly, a smaller quantity of a denser metal than lead would have an equivalent screening effect, but the only suitable metals in this category are gold, platinum and tungsten. Of these the first two are prohibitively expensive.

There remained tungsten, best known

in the form of electric lamp filaments.

Tungsten's high theoretical density (19.3) is only found when the metal has been treated by expensive metallurgical processes.

The difficulty of cost was overcome by the tungsten alloy. By adding from 5 to 10 per cent. of either copper or nickel, an alloy of a density in the neighborhood of 17 could be successfully evolved on the desired scale, and for about \$5.00 per pound.

The tungsten alloy radium bomb is only 64 per cent. as large as the lead bombs previously used. The size is in the ratio of the densities of the two materials, 11 to 17.

The new tungsten alloy has been adopted for use by the Westminster Hospital for its 4-gram radium bomb now being constructed under the direction of Dr. H. T. Flint and C. W. Wilson. It is also to be used for the radium bomb at Birmingham, England.

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RADIO

## Sending Facsimiles by Radio Possible Soon

HIGH-SPEED radio transmission of complete facsimiles of any written, typed or printed material will be inaugurated on an experimental, non-commercial service between New York and Philadelphia before the end of the year, General James G. Harbord, chairman of the board of the Radio Corporation of America, indicated in an address at Princeton University.

The facsimile service and television are linked hand-in-hand, declared General Harbord, for research in one aids the other because of the similar problems.

Television is nearer today, he added, than was the possibility of sending a telegram across the ocean with wires on the eve of Marconi's first transatlantic wireless test.

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Leprosy attacks far more men than women.