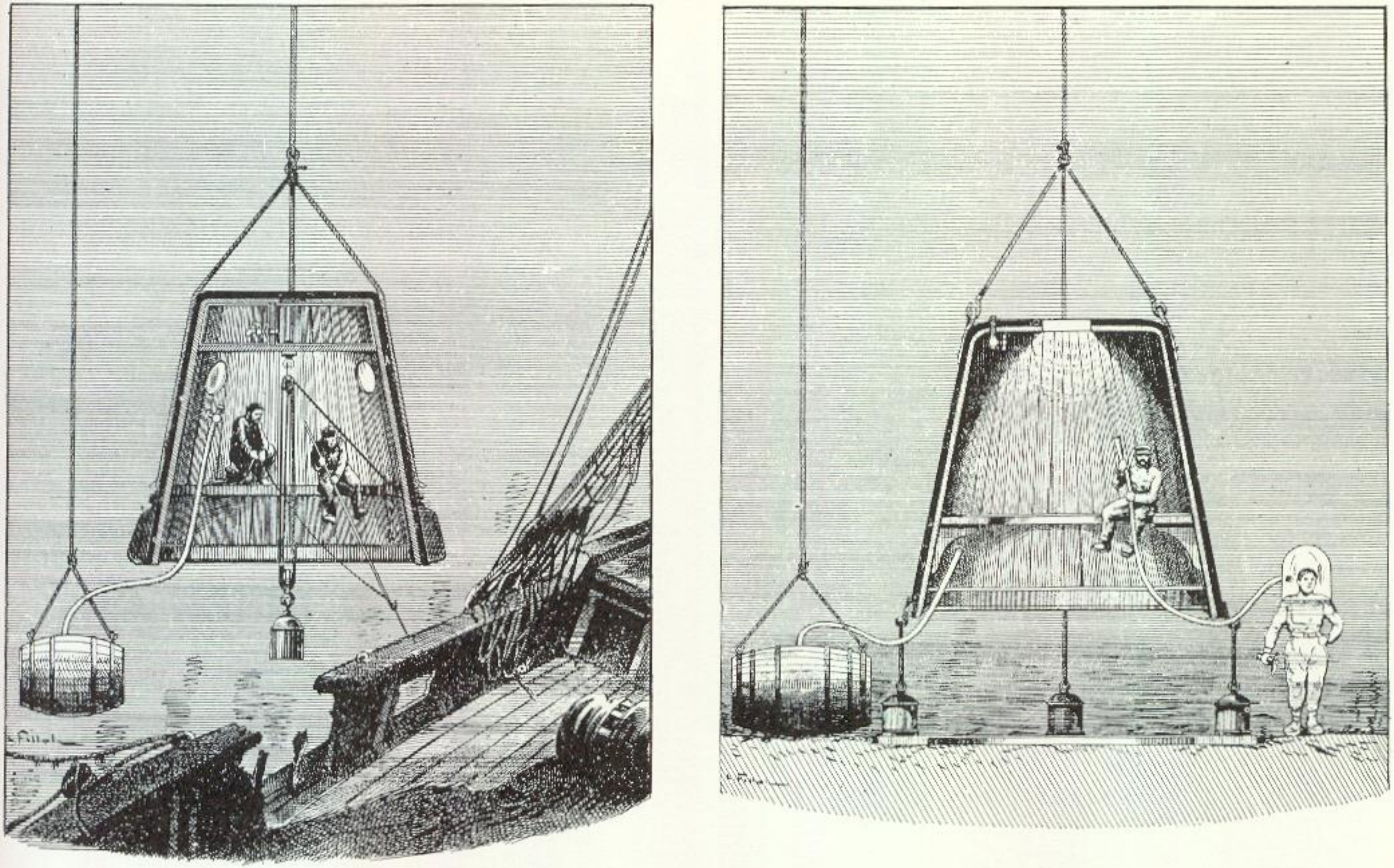
History of Diving

Hans Örnhagen 2005

This illustration of Alexander the Great in a glass barrel (bell) 300 years b.c. is often cites as the first example of diving without the use of breath-holding.

The barrel of Guglielmo de Lorena. Probably one of the first well documented diving bells. It was used in lake Nemi in Italy 1535 in an salvage operation. It was claimed that the endurance was 1 hour, which seems impossible.



Two variations of Halley's diving bell as presented by Brezé-Fradin in *Chimie pneumatique*. Both were used successfully for salvage work.

How long could they stay in a diving bell?

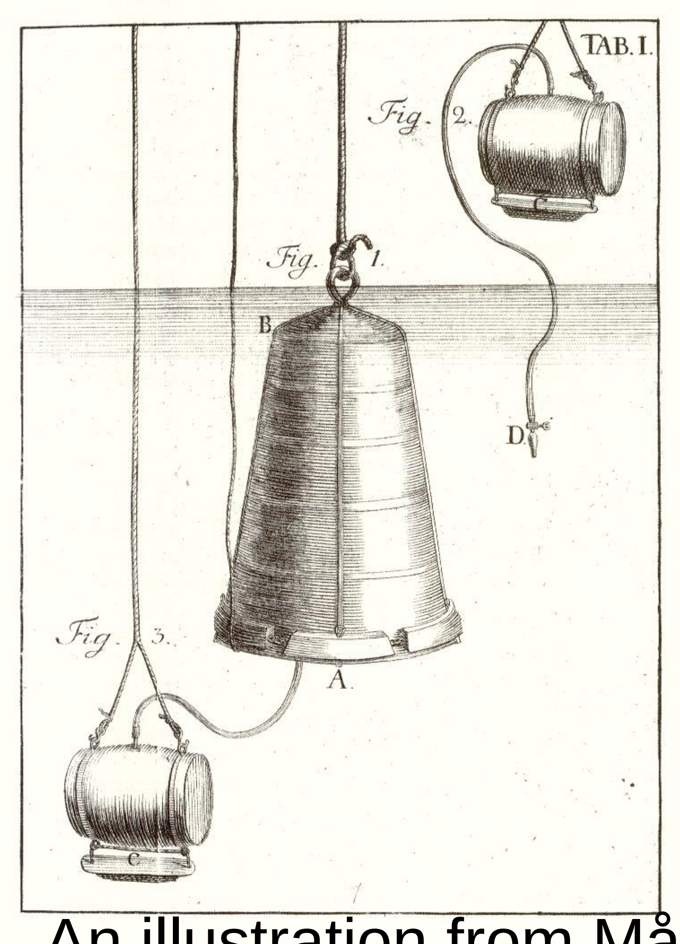
Let us assume 5% CO_2 is the maximum limit.

	de Lorena	Halley	Treileben
Air volume of the bell	150 liter	15000 liter	450 liter
CO_2 production			
Rest 0.5 l/min	15 min	20 tim	45 min
Work 1.5 l/min	5 min	6 tim	15 min

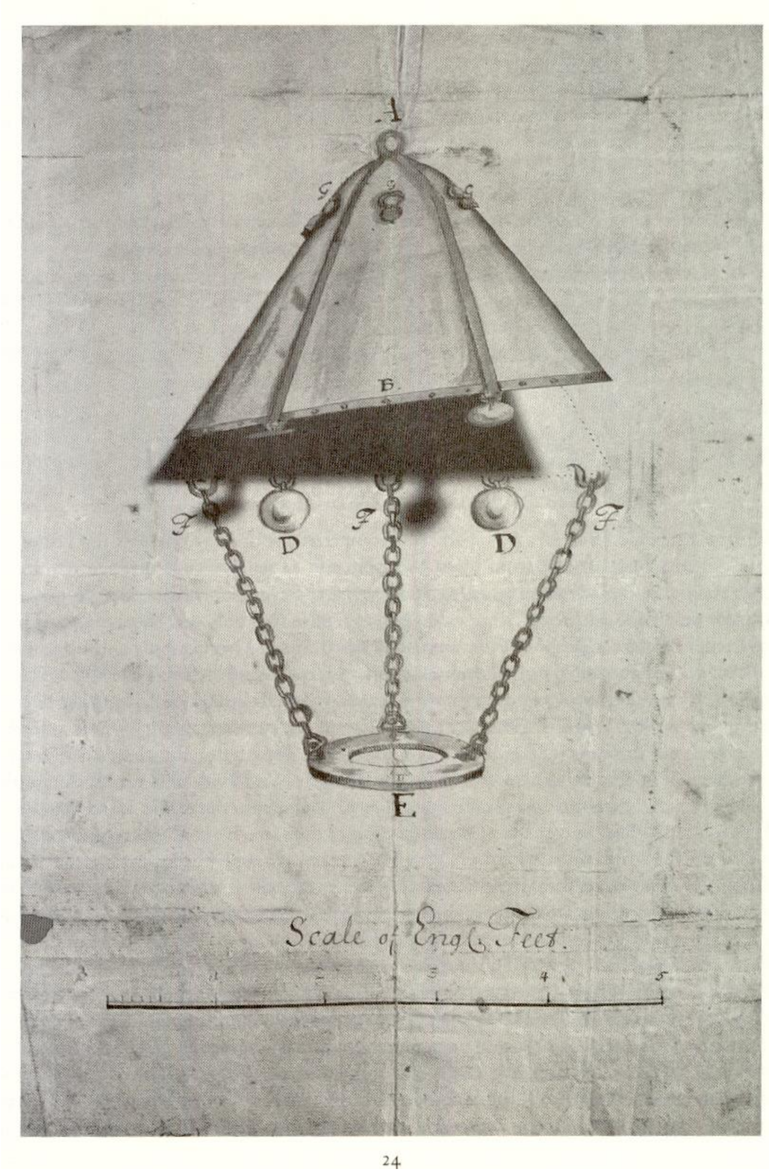
If you want to maintain a steady CO_2 level of 1 % in a bell with one working man you need to add at least 150 liters of air per minute

Mårten Triewald´s summer house at Kungsholmen in Stockholm

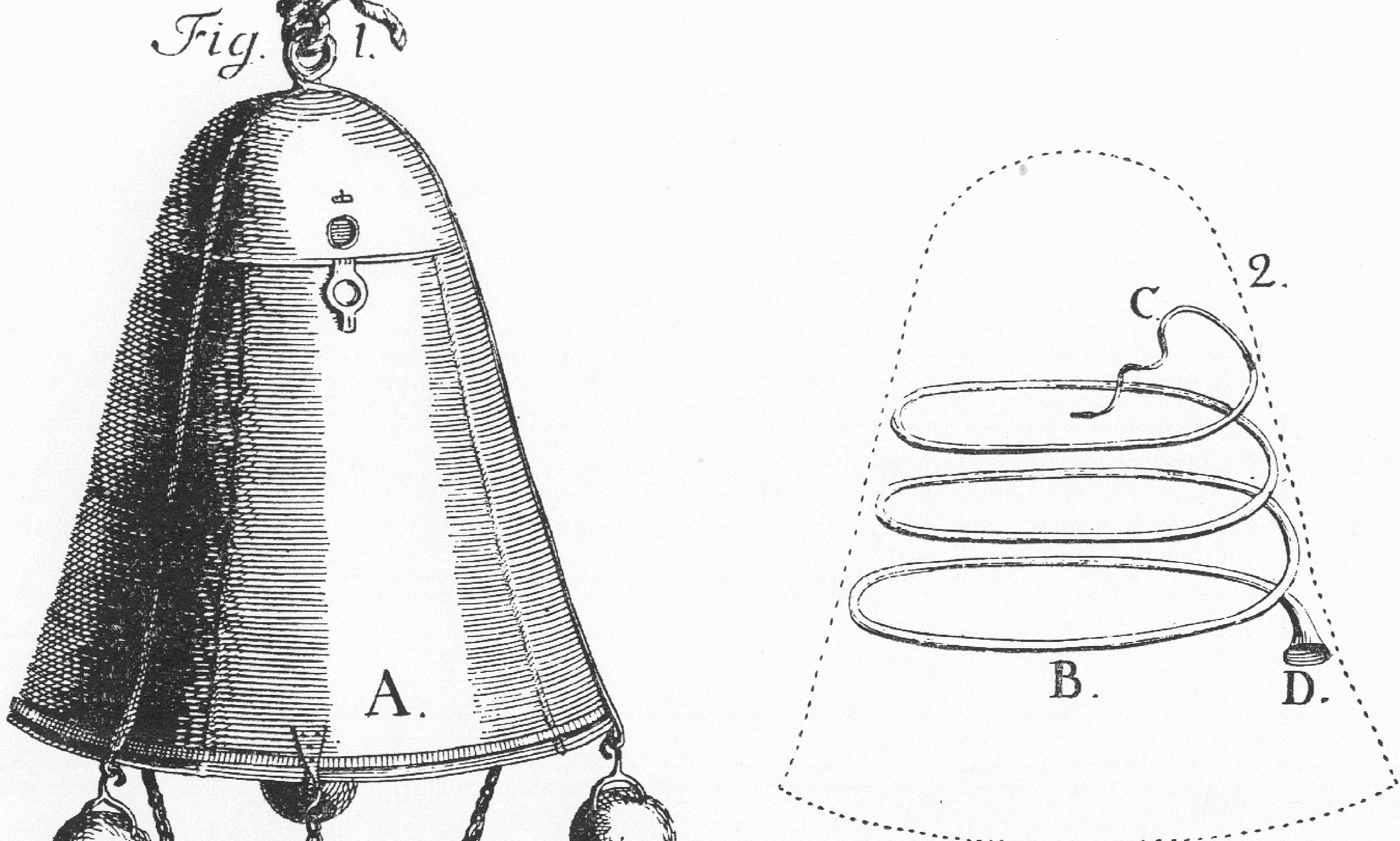
Mårten Triewald, Swedish scientist 1691 - 1747
Author of “Konsten att lefwa under watn”



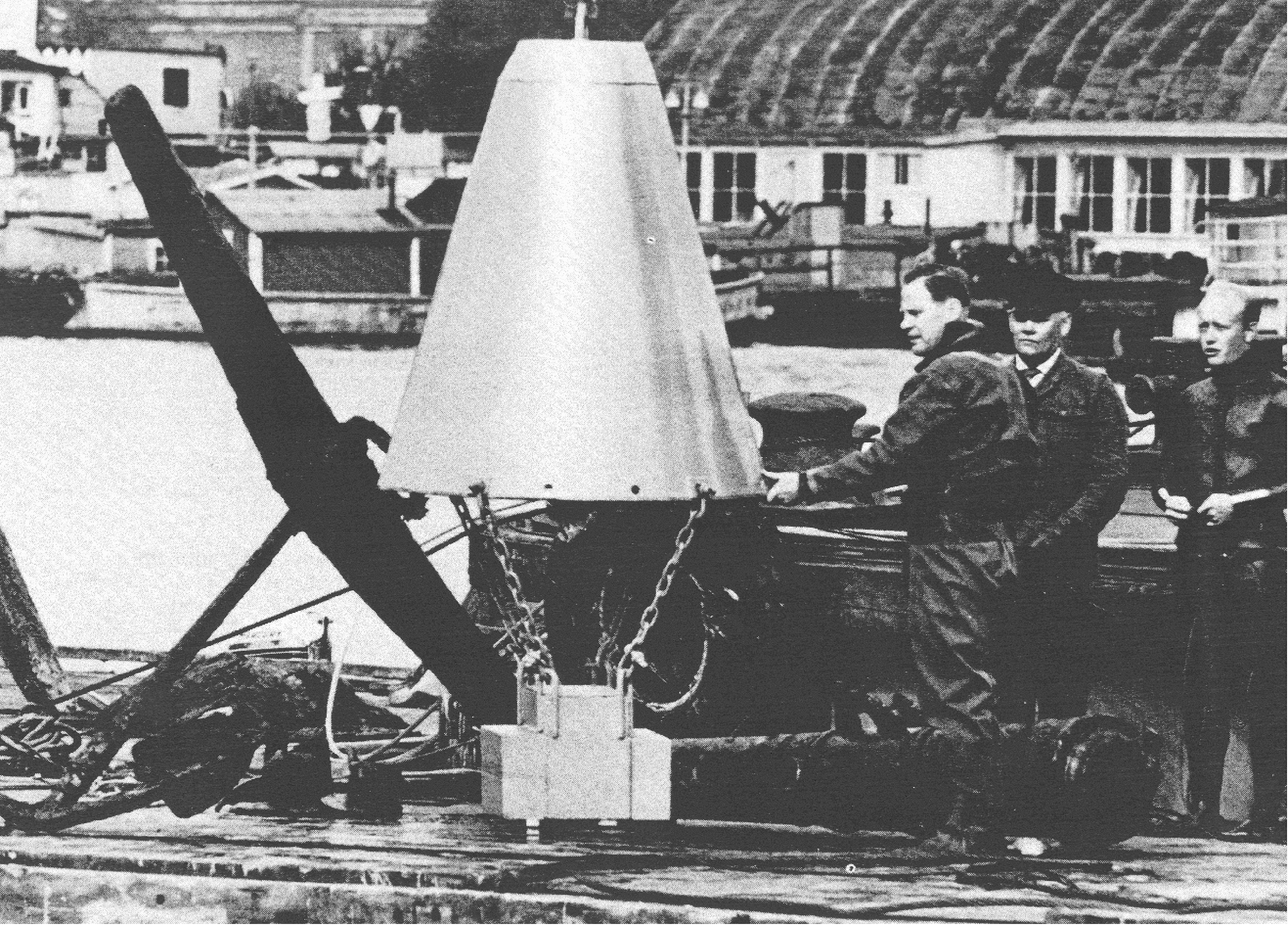
An illustration from Mårten Triewald "Konsten att lefa under watn"



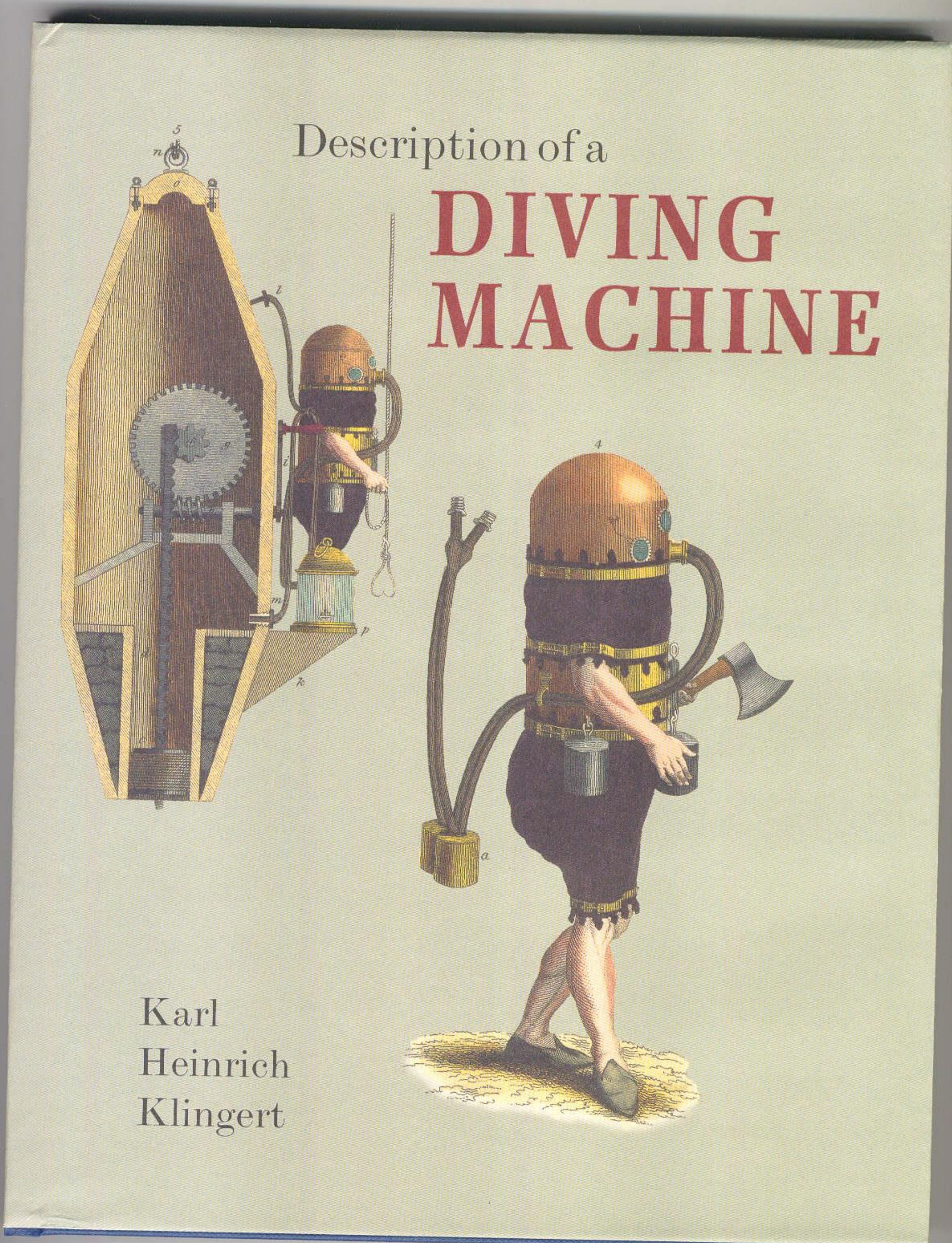
A drawing by Triewald in a letter to his friend Desaguliers. The interior of the bell is shown under a raised flap



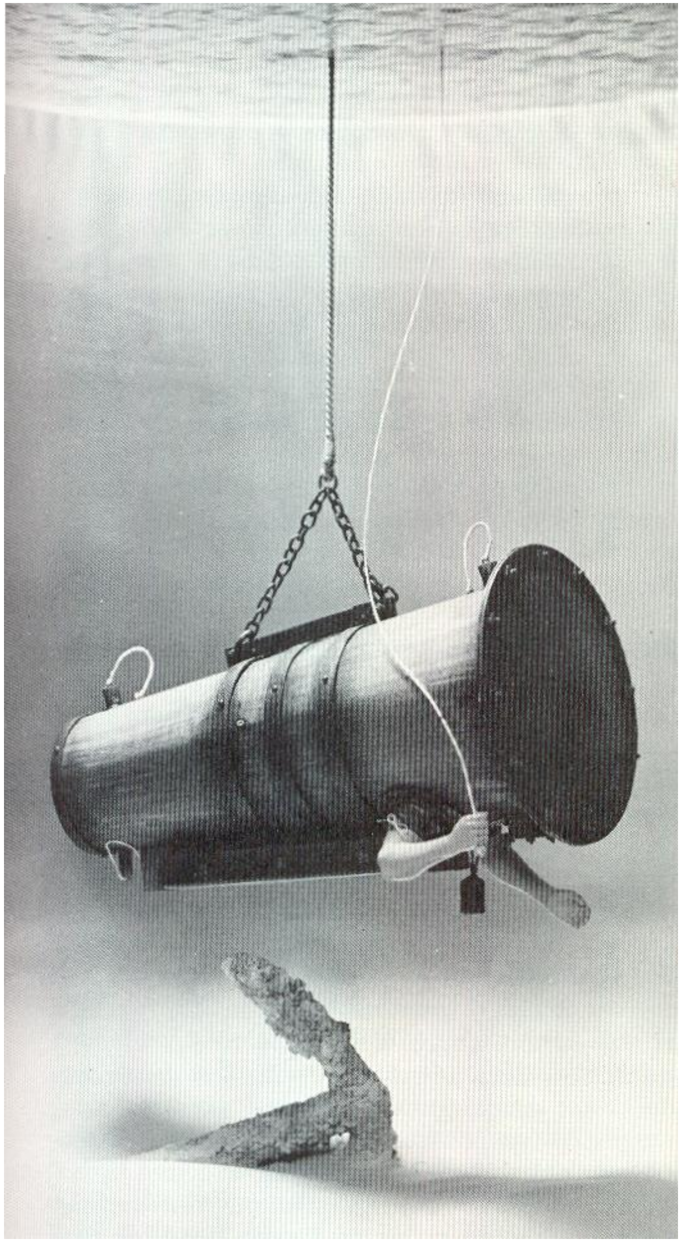
Triewald´s diving bell, 1731. The bell had a stop cock at the top to allow ”used air” to be released when new air from a barrel was added.



Captain Bo Cassel, Swedish navy, trying a replica of the Treileben diving bell

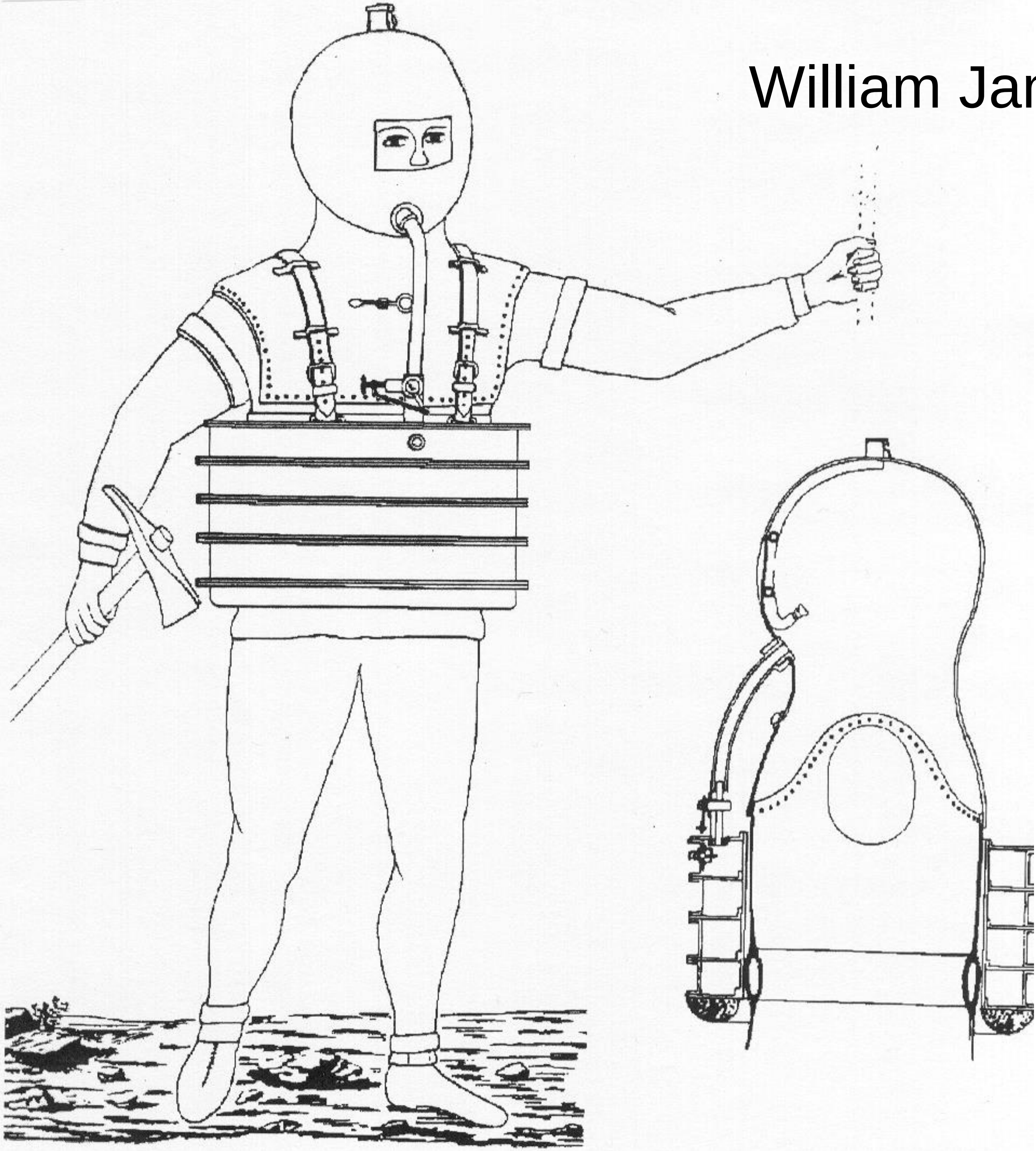


The Historical Diving Society in UK supports knowledge regarding diving history and the development of diving through translation and reprinting of old books on diving.

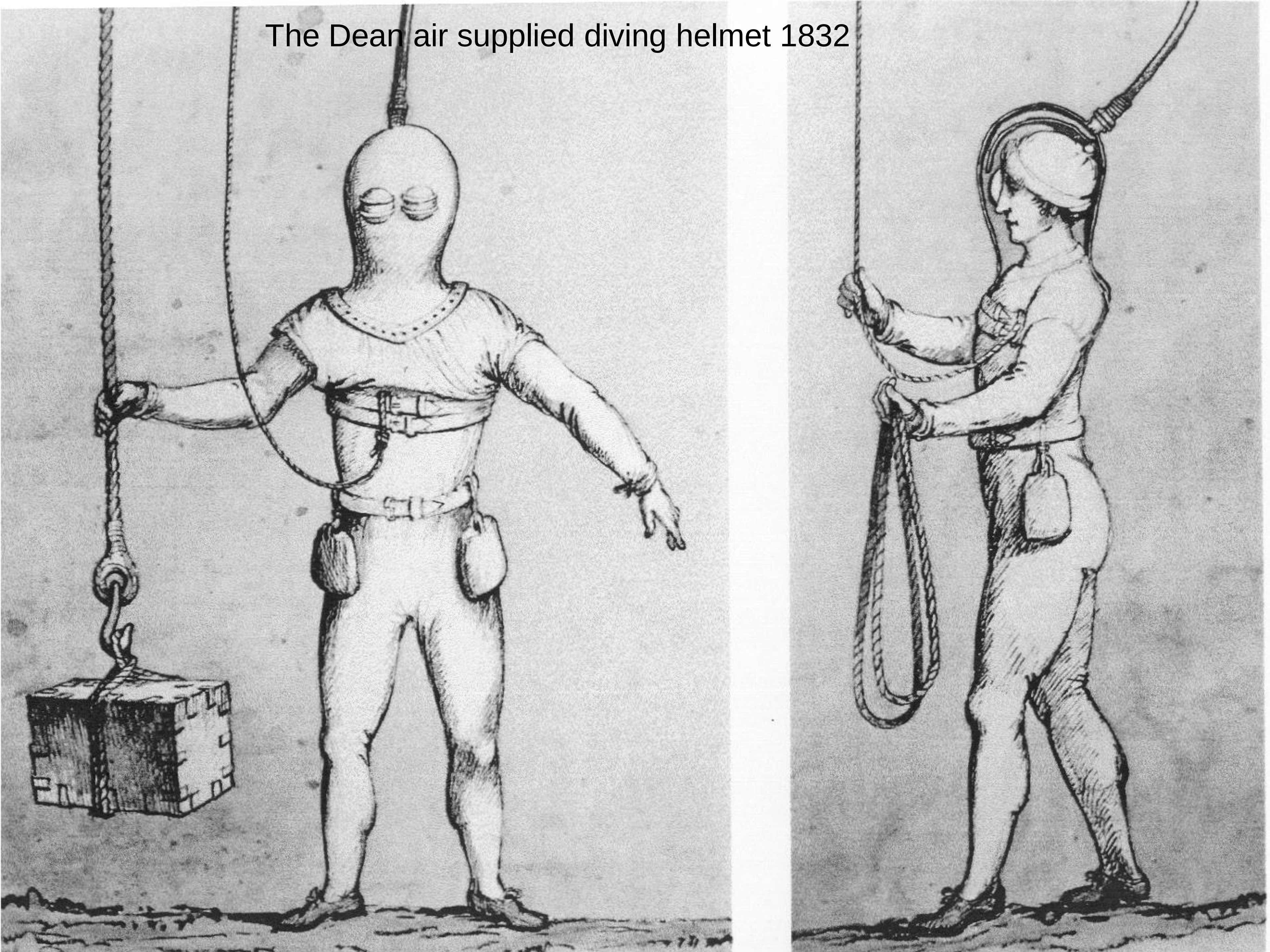


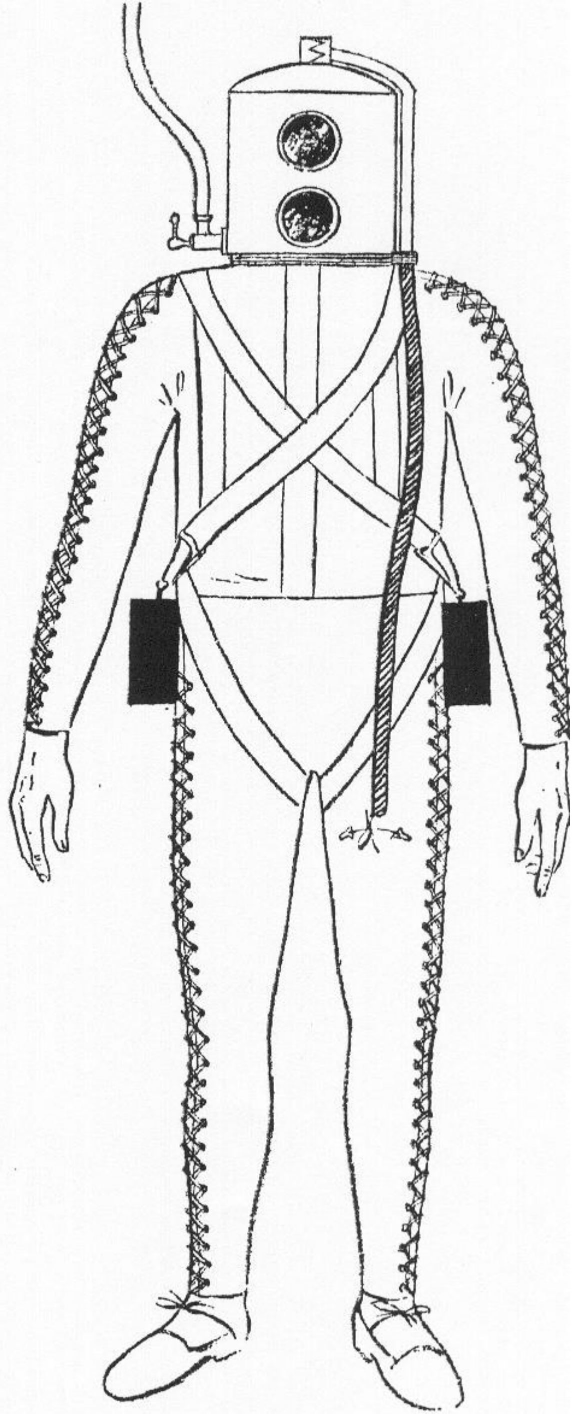
Lethbridge´s barrel (1749) made it possible to “dive” (work) at depths down to circa 10 meters. Already at a depth of 1.5 m (100mmHg) the hands were ischemic. At greater depths it was difficult to push the arms against the outside pressure.

William James patent 1825



The Dean air supplied diving helmet 1832





The Fahnehjelm diving equipment 1859. A number of these helmets with a suit were manifactured for the Swedish navy, but unfortunately no unit excist today.

A typical hard hat (Copper helmet) diver in equipment that has looked the same from mid 1800 till today. Hard hat equipment have been manifactured in many countries. Among the more known are Siebe Gorman, London. The helmet on the photo is made in Sweden and is usually referred to as a ”Karlskrona helmet”.

This helmet is a Danish 2-bolt helmet used by the Danish navy diving school.

Hard hat equipment was used together with hand operated pumps like these.

Two examples of modern professional diving equipment.
In front a Dräger free flow air helmet and in the back a Kirby-Morgan demand band mask that can be used with air or heliox.

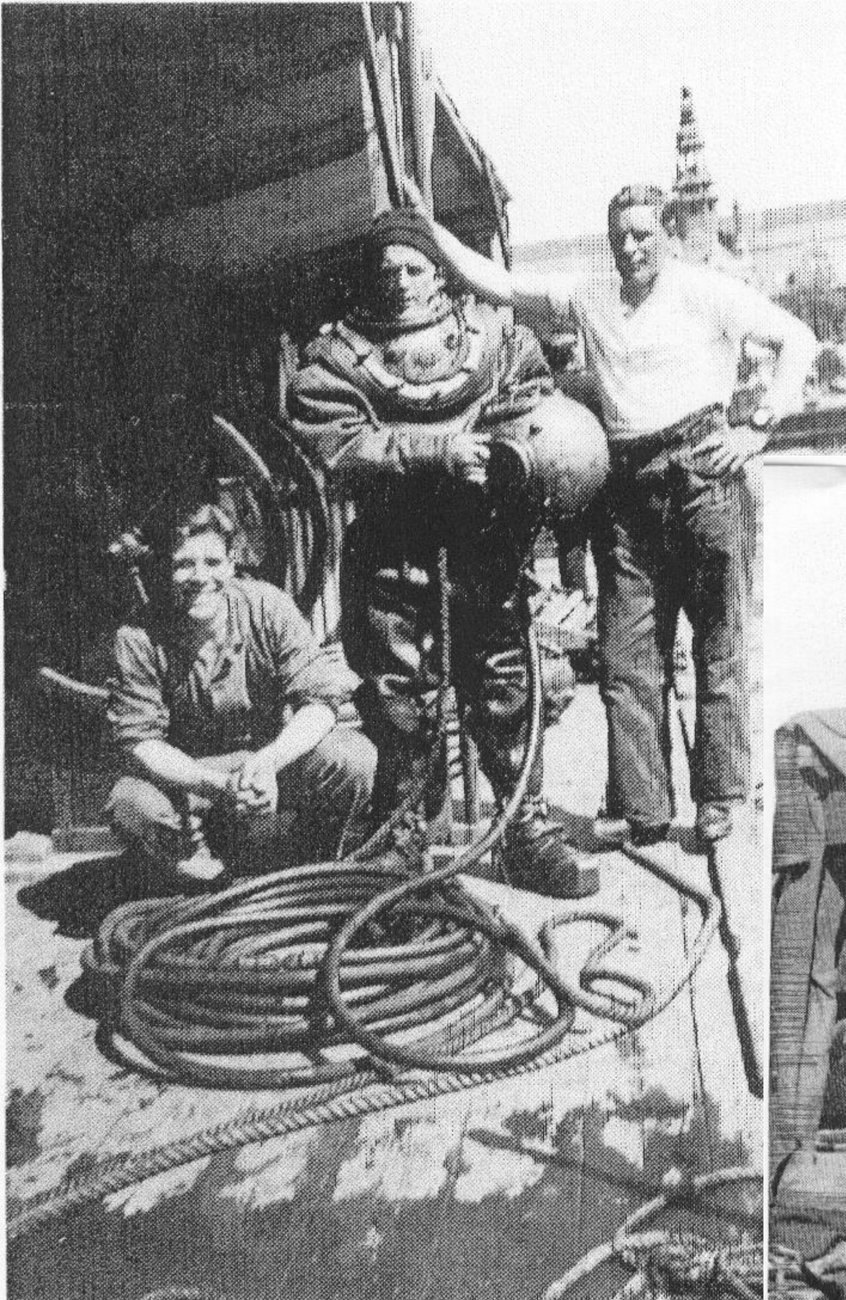
John Haldane in a coal mine, wearing his prototype breathing apparatus
(By permission of Professor J. M. Mitchison)

John Haldane, working with occupational medicine, became interested in diving medicine and made some of the first decompression tables known (1905).

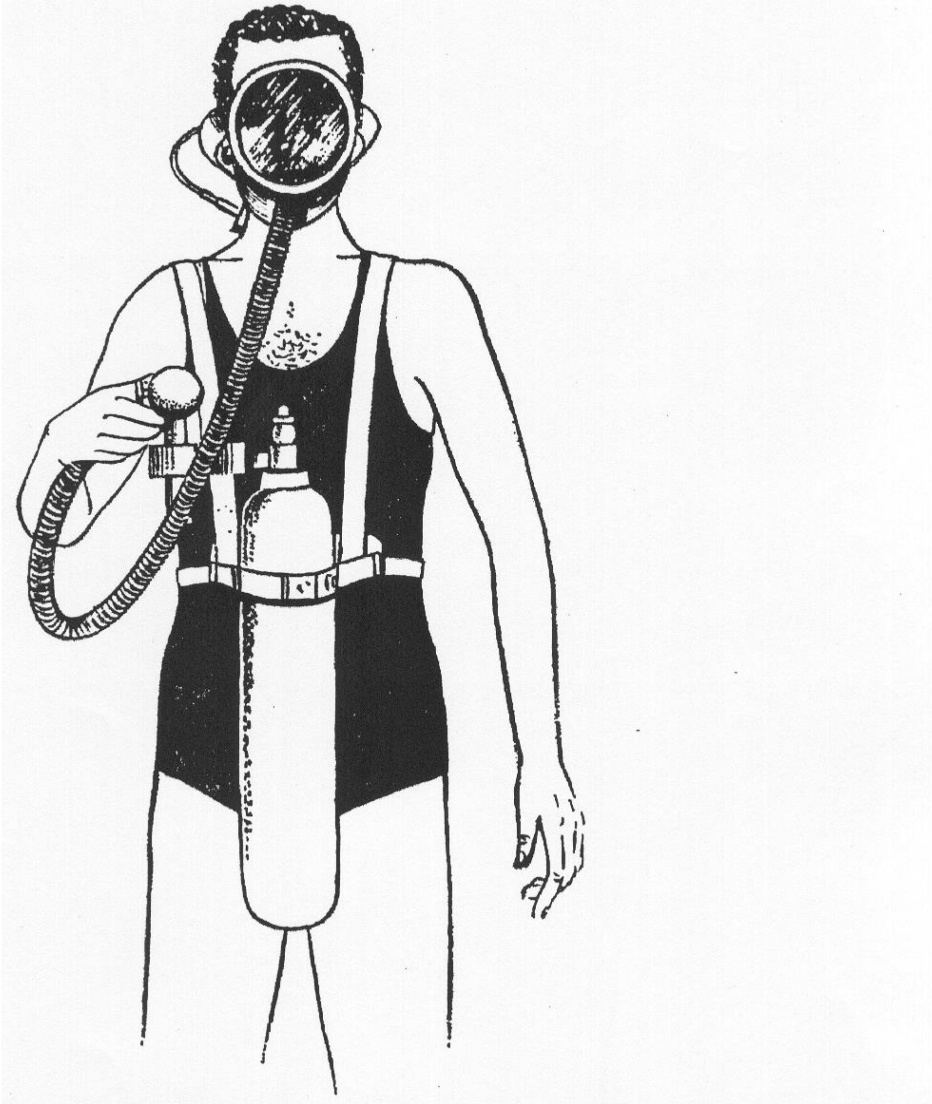
J. B. S. (right) with Martin Case in the 'Chamber of Horrors', ca. 1940

(From the Siebe Gorman archive by permission of Siebe plc)

Thirty years of diving.
Who is on both photos?



Dykarkursen 1932.



Göteborgs amatördykarklubb

The Gothenburg amateur diver club was first in Sweden with scuba. Here a ”Scaphandre Le Prieur, 1938.

The old escape training house at Djurgården. Today a diving museum in central Stockholm.

Built 1934 to hold a 6 m escape training tank and a vertical, 10 atm pressure chamber, with a wet pot.

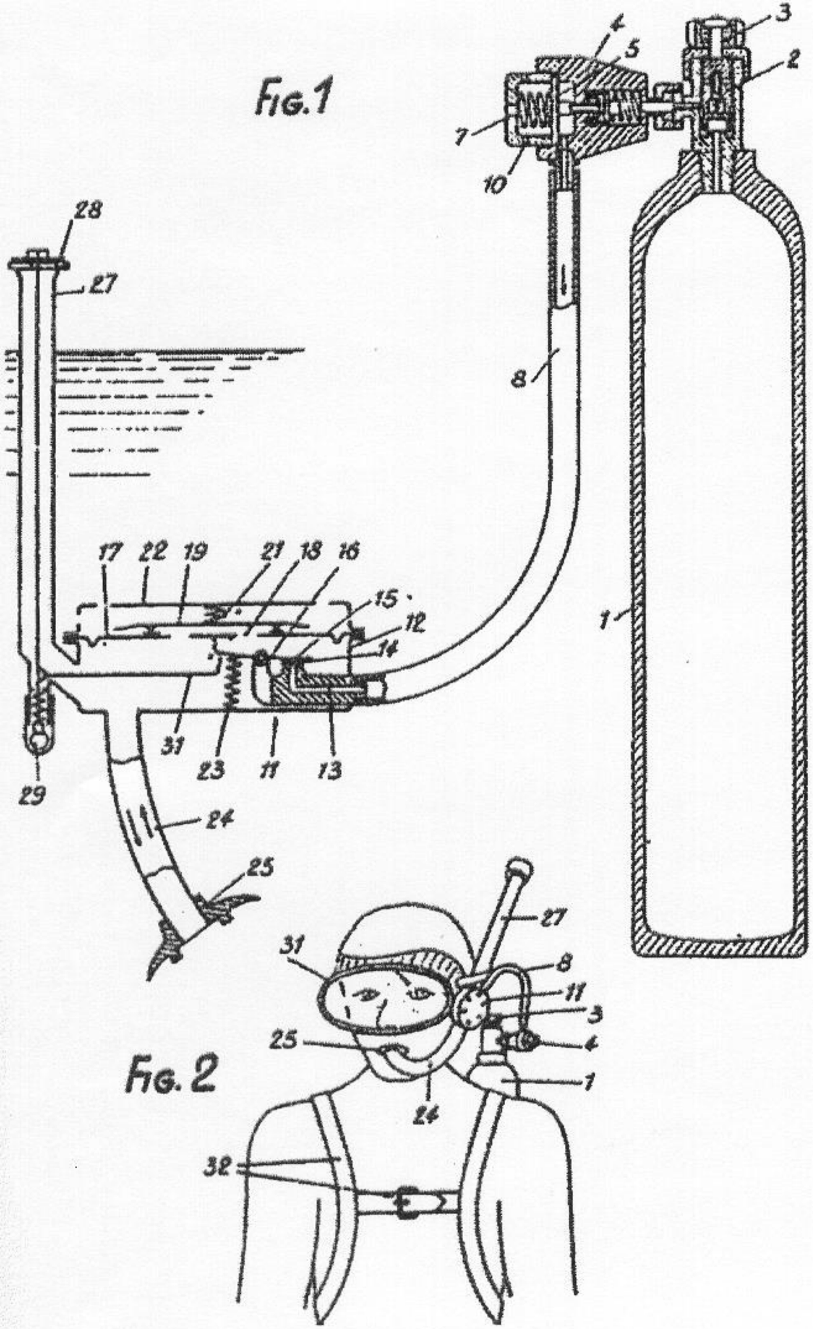
The old escape training tower was the site for advanced hyperbaric medical research up to 1978 when the activities were moved to the new navy diving center at Hårsfjärden 30 km south of Stockholm

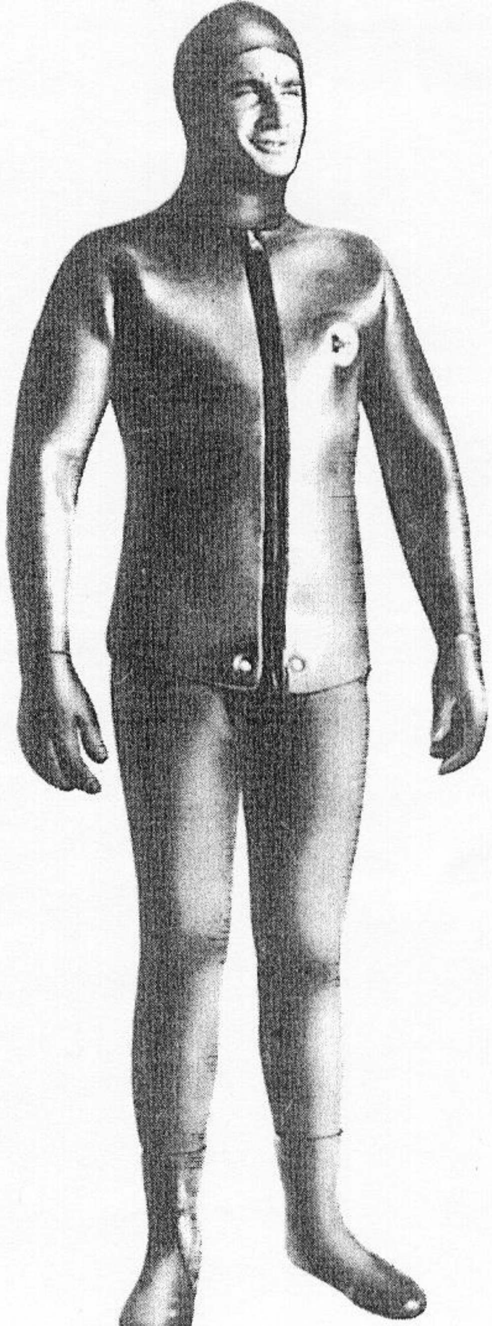
Foto H Örnhagen, 990428

The young student of technology Arne Zetterström proved hydrogen/oxygen to be a possible diving mix for great pressures. Here photos taken before his record dive to 165 m in 1945.

Inventions after 2nd WW.

The Brommec and Gautier single hose regulator and the neopren wet suit.

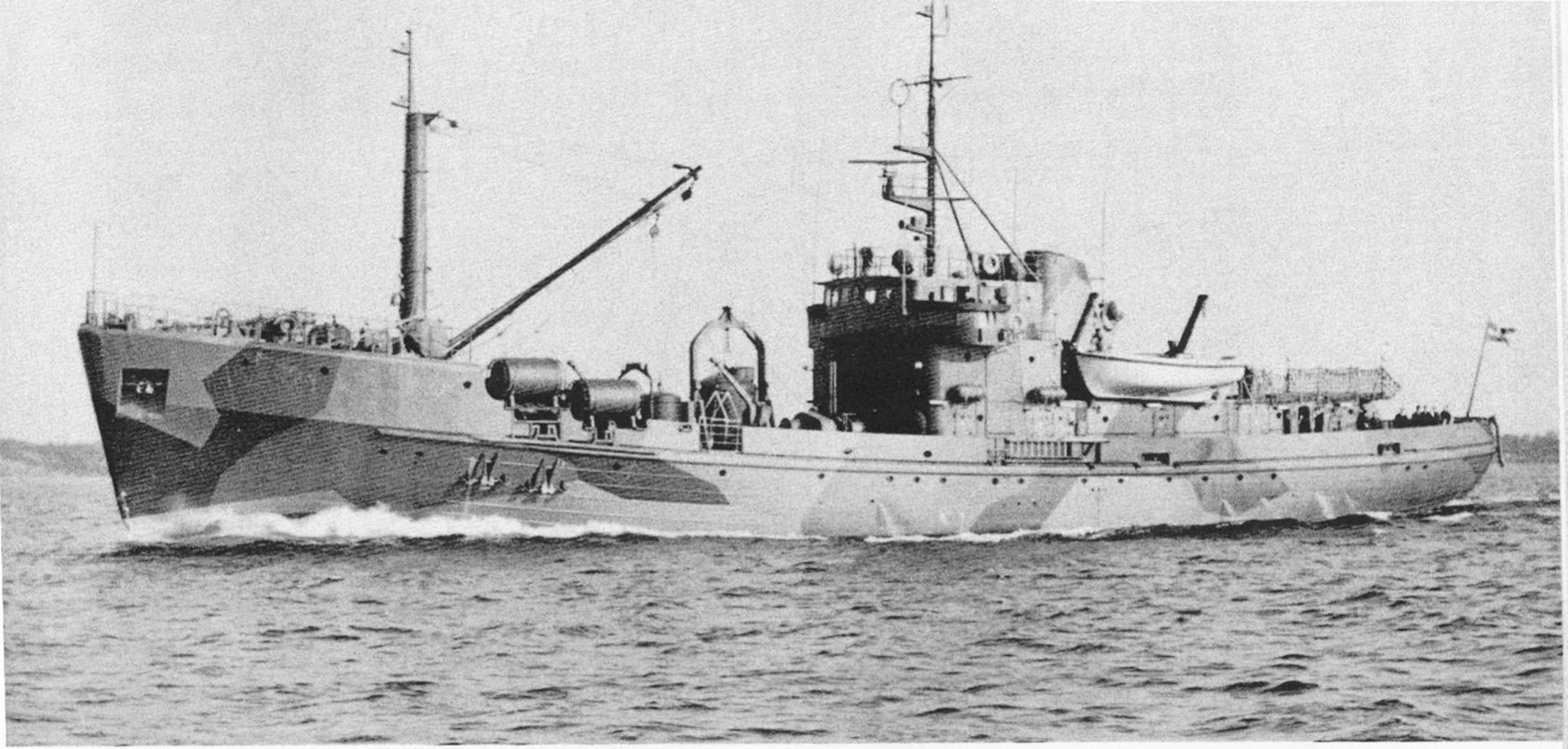




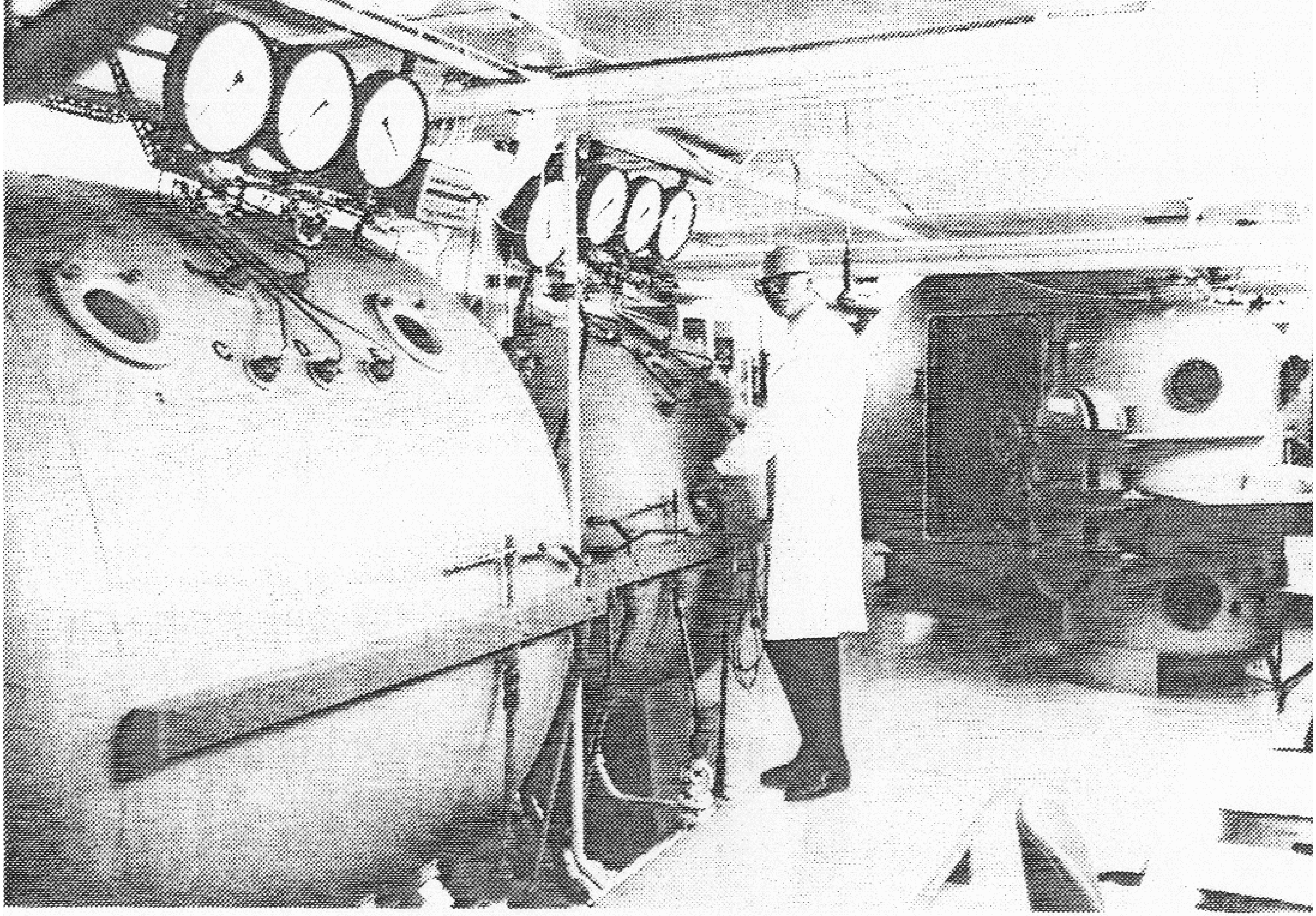
Ritning på Brommec och Gautier´s enslangsregulator och bild på en av de första våtdräkterna.

Snorkling grew popular after ww2 and many strange designs of facemasks and snorkels were seen.

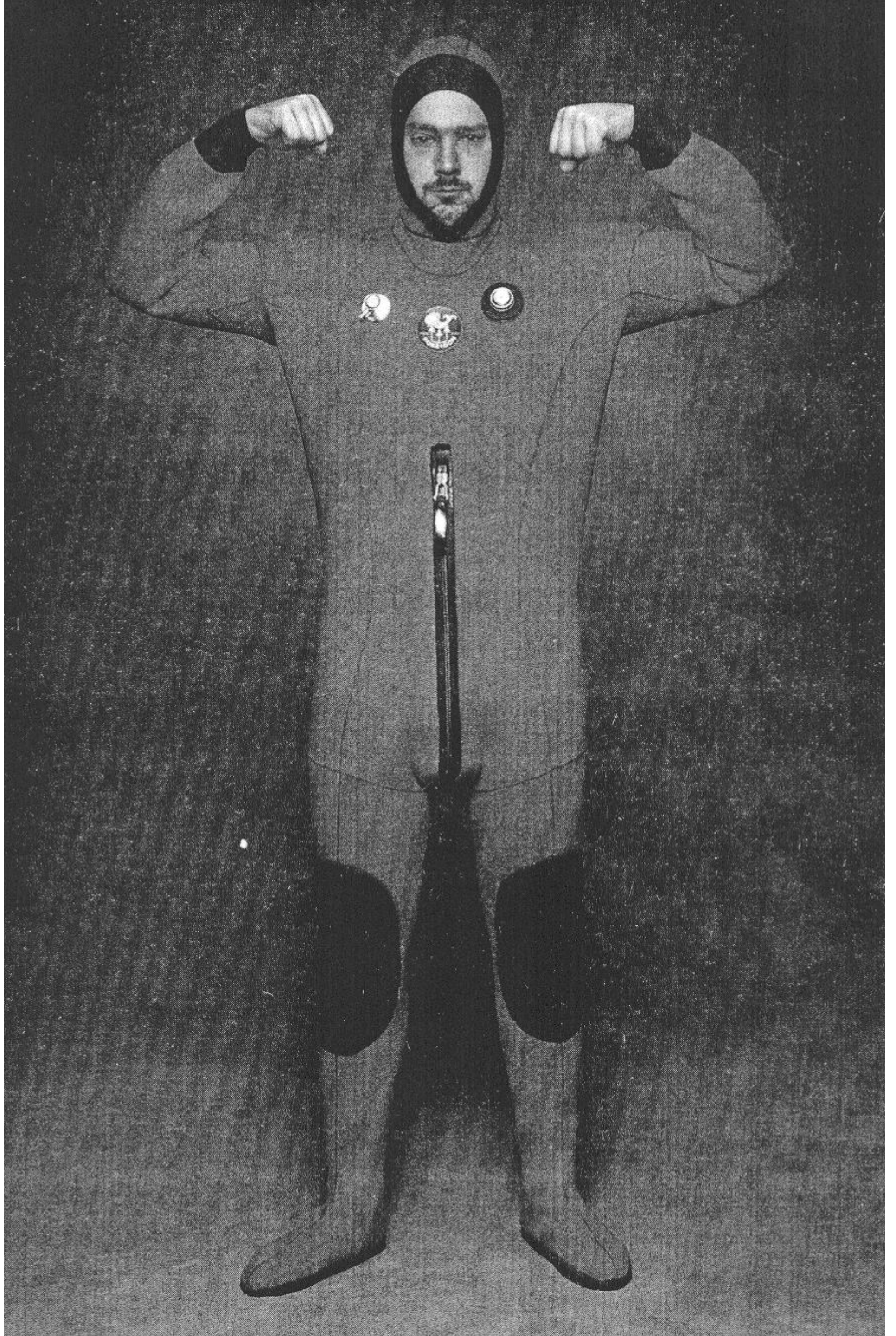
Ingvar Elfström with his first Poseidon regulator.
His interest in diving later became the Poseidon Industries in Gothenburg, Sweden.



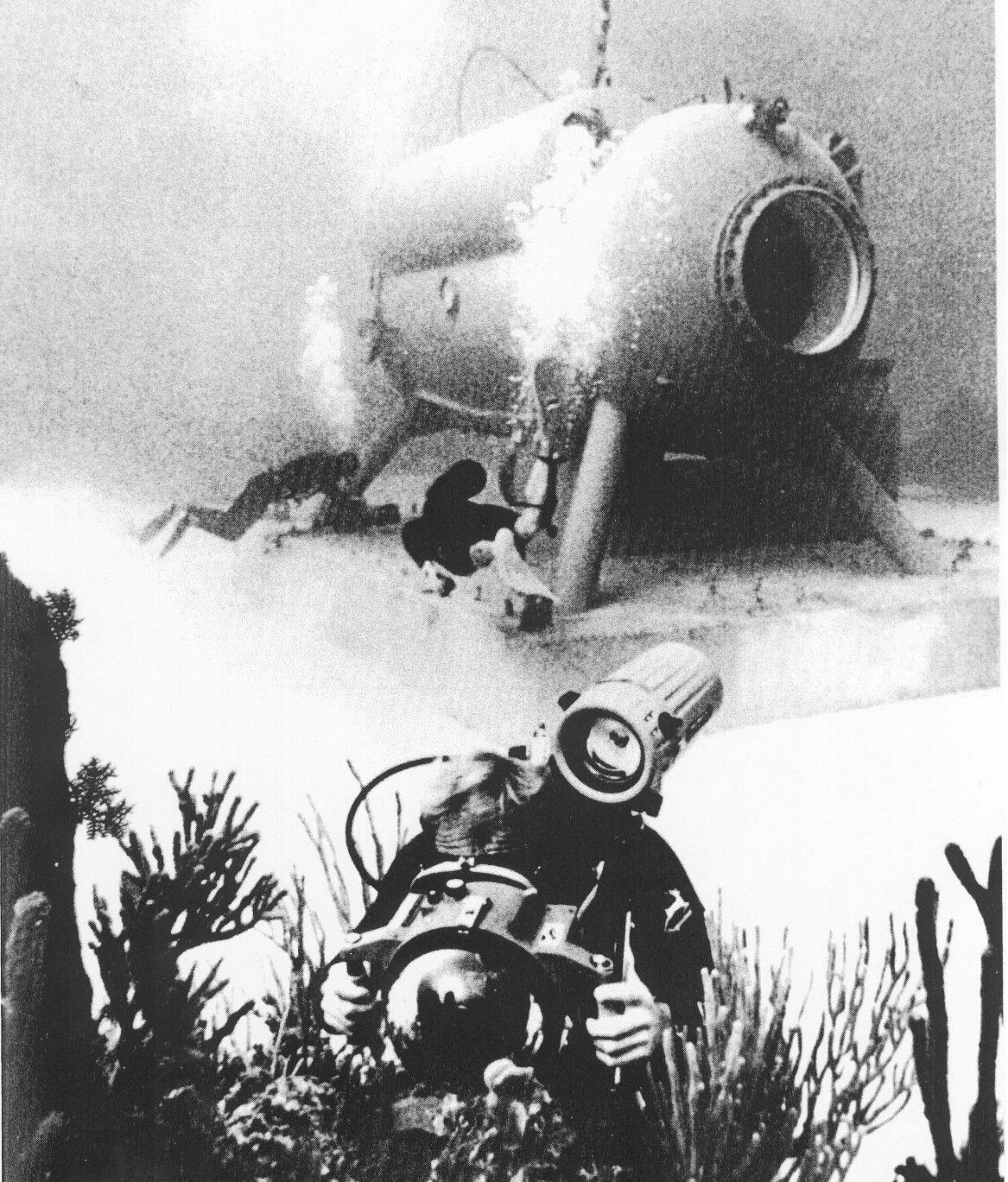
HMS Belos the Swedish navy submarine rescue and diving platform 1963



A dry pressure chamber with a simulating capacity of 500 m was installed at the lab of aviation and naval physiology, Lund 1964.



The Unisuit from Poseidon Industries. The first neopren constant volume dry suit 1968.



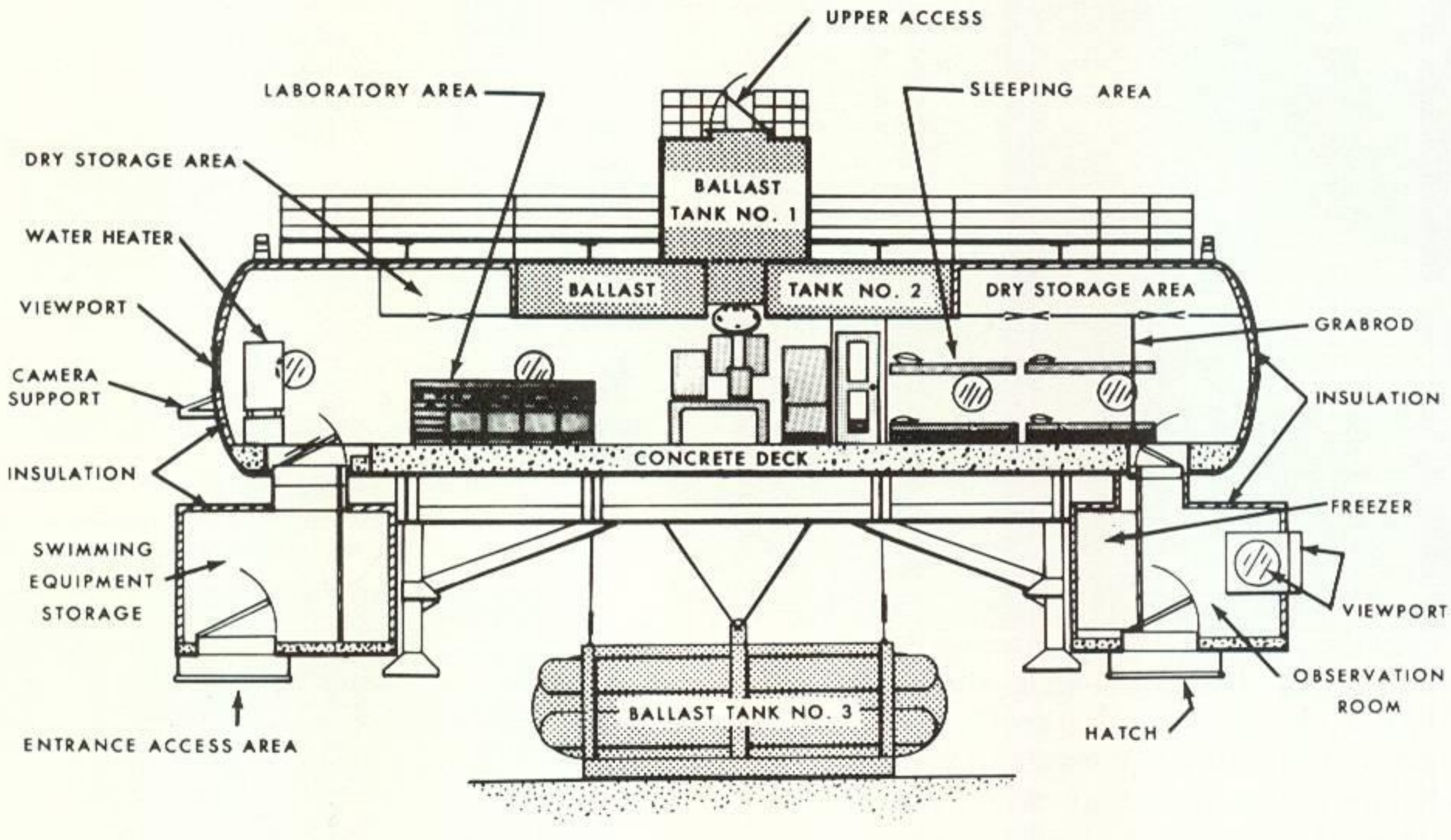
An under water habitat.

In the 1970-ties this was the dream of future aquanauts living on the bottom. The development later showed it to be extremely difficult to provide good service to the divers inside and the saturation system at the surface and a pressure proof diving bell to transport the divers to their work was invented.

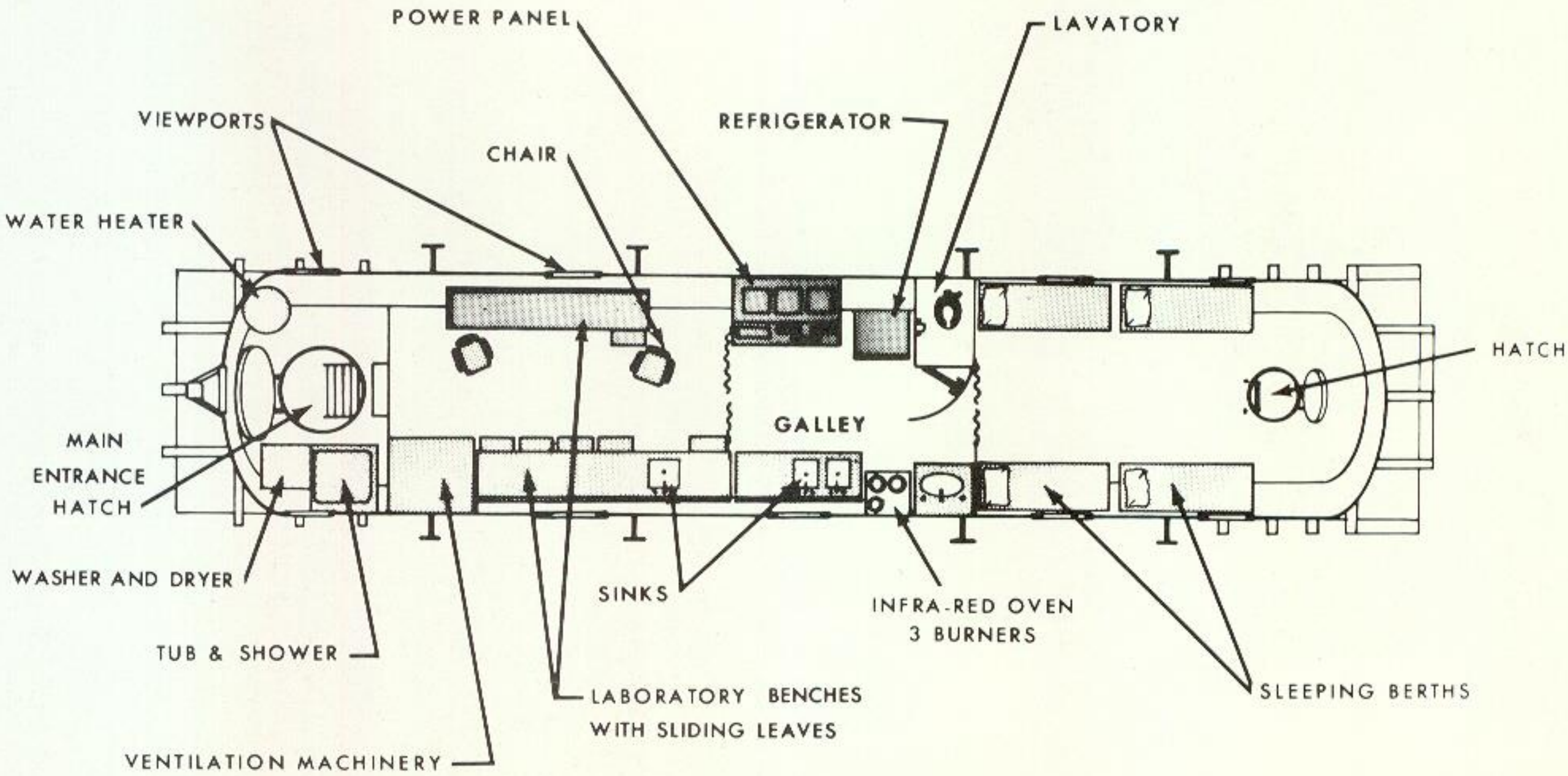

U.S.NAVY

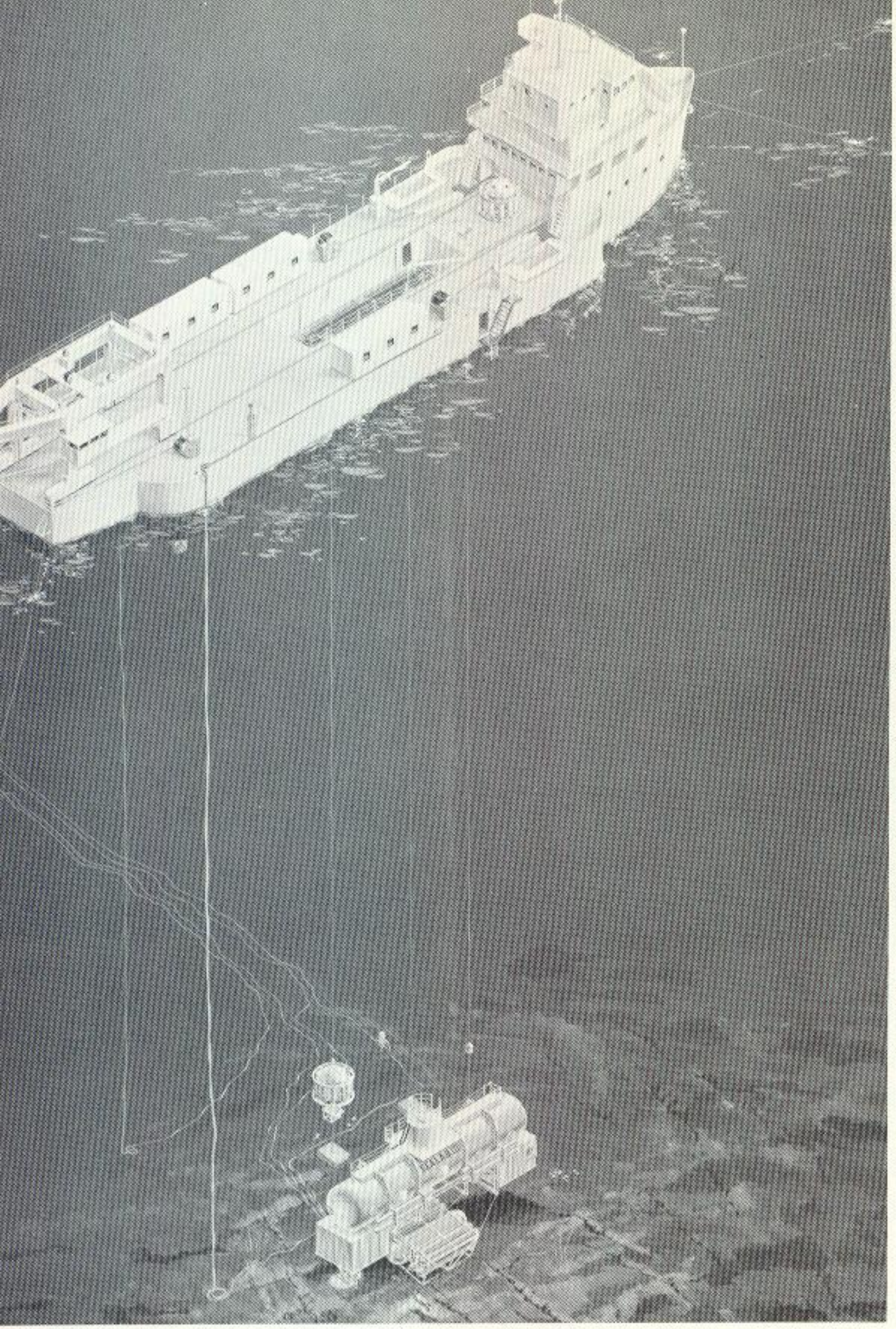
Aquanauts Eaton and Carpenter go through check list of experiments scheduled for the first team of SEALAB II.

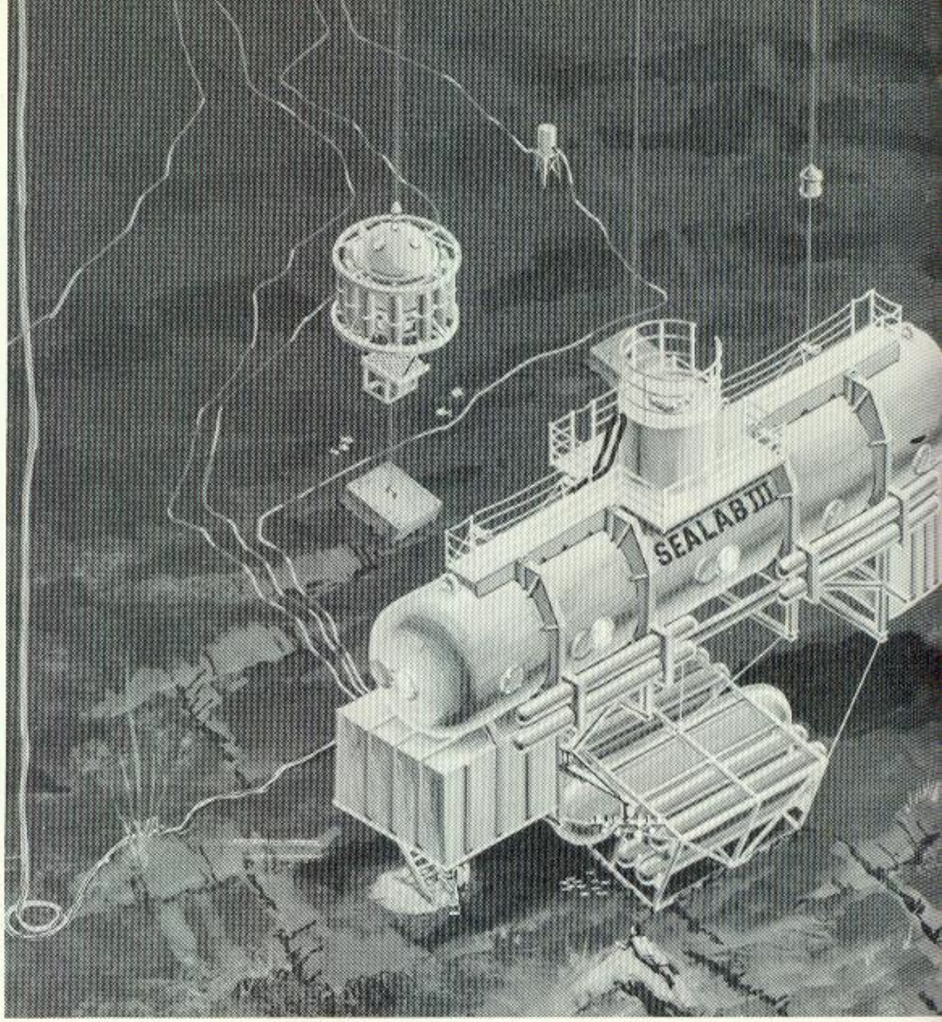
SEALAB III INTERIOR - SIDE VIEW



SEALAB III INTERIOR - TOP VIEW





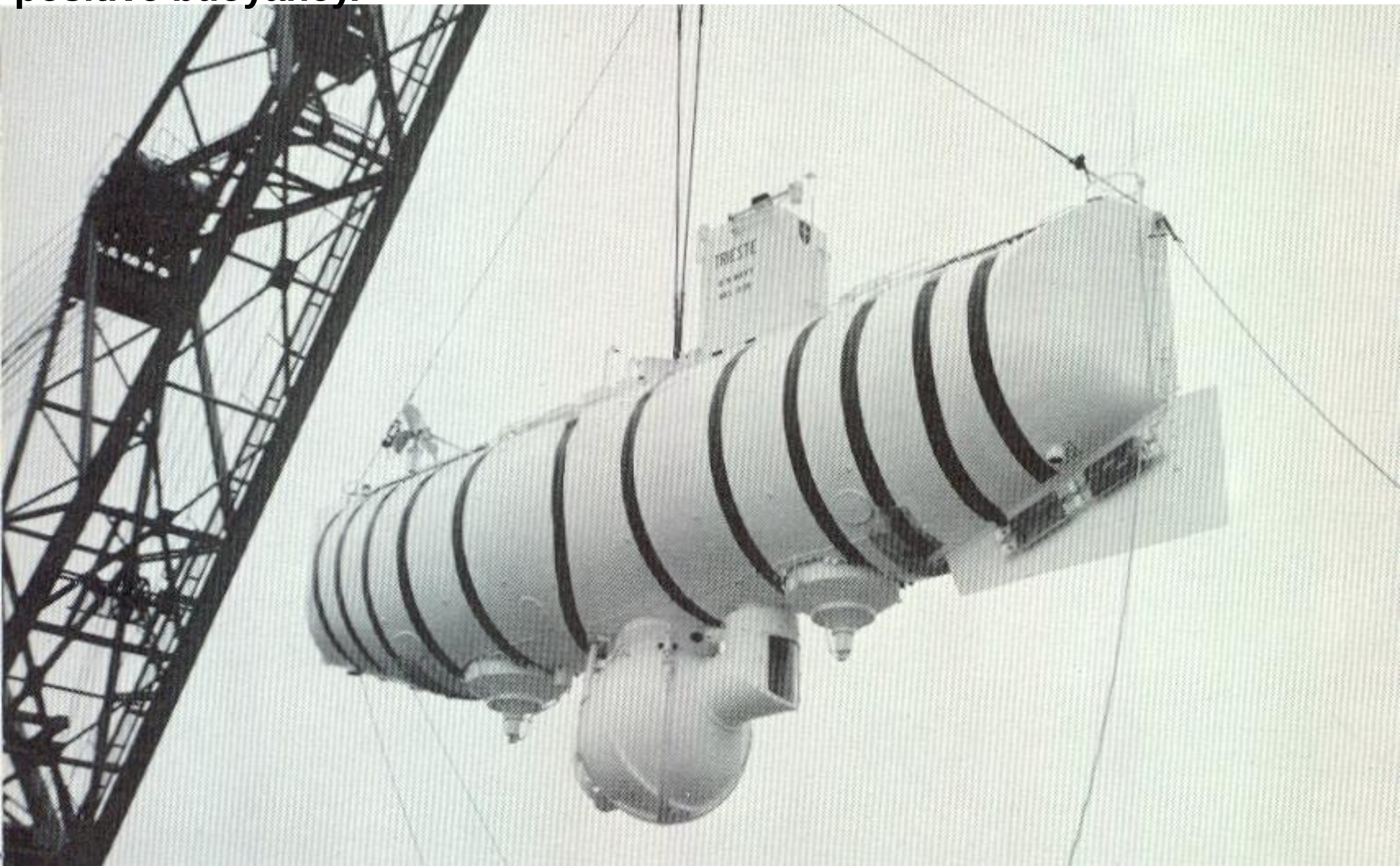


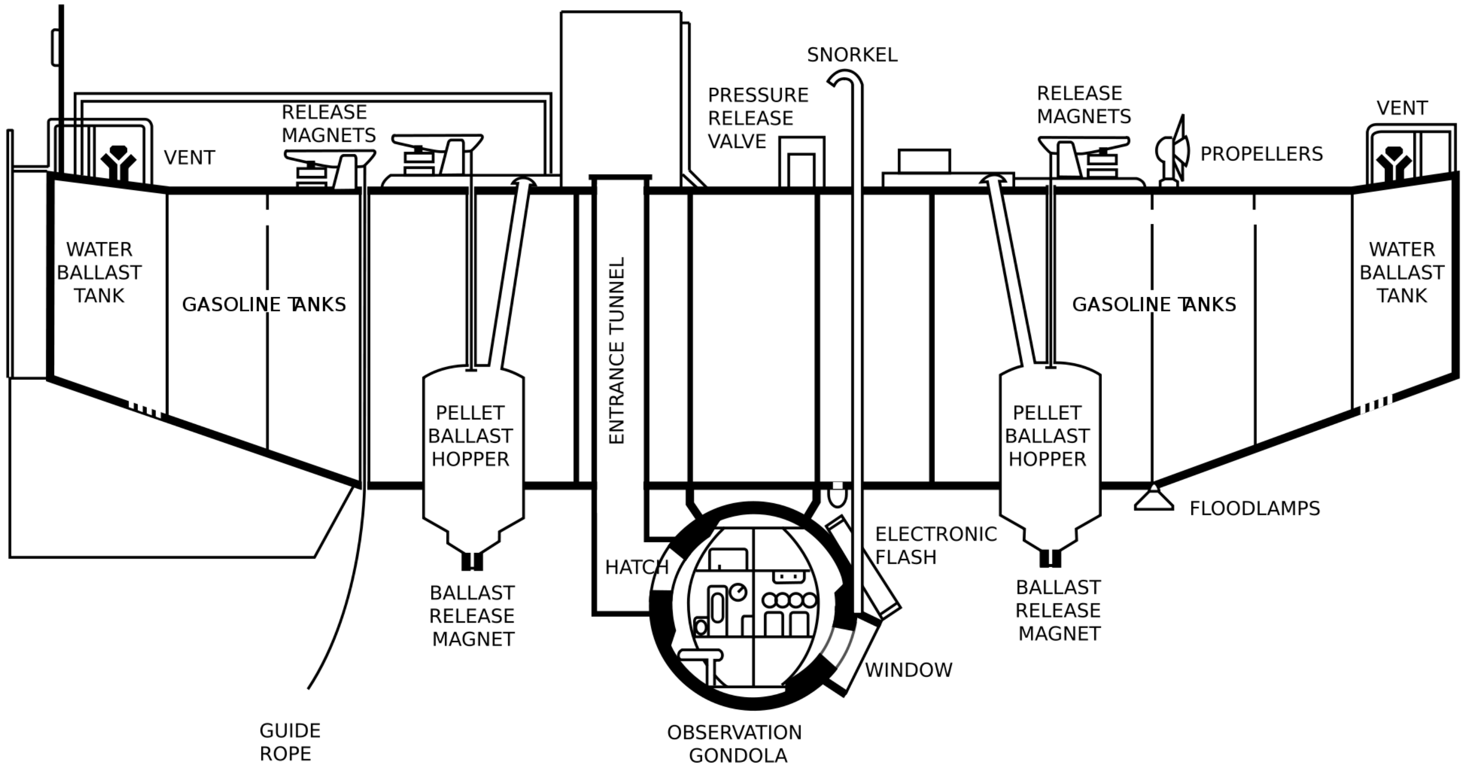
SEALAB III has a cylindrical body twelve feet in diameter and fifty-seven feet long, with two rooms each eight feet high and 12 feet square.

SEALAB III is depicted on the ocean floor with its support ship overhead.

The Bathyscaph Trieste I

The observation sphere is seen under the huge flotation tanks filled with more or less incompressible gasoline. Lead ballast was released to get positive buoyancy.





GENERAL ARRANGEMENT DRAWING OF TRIESTE, CA. 1959

85 000 L gasoline.

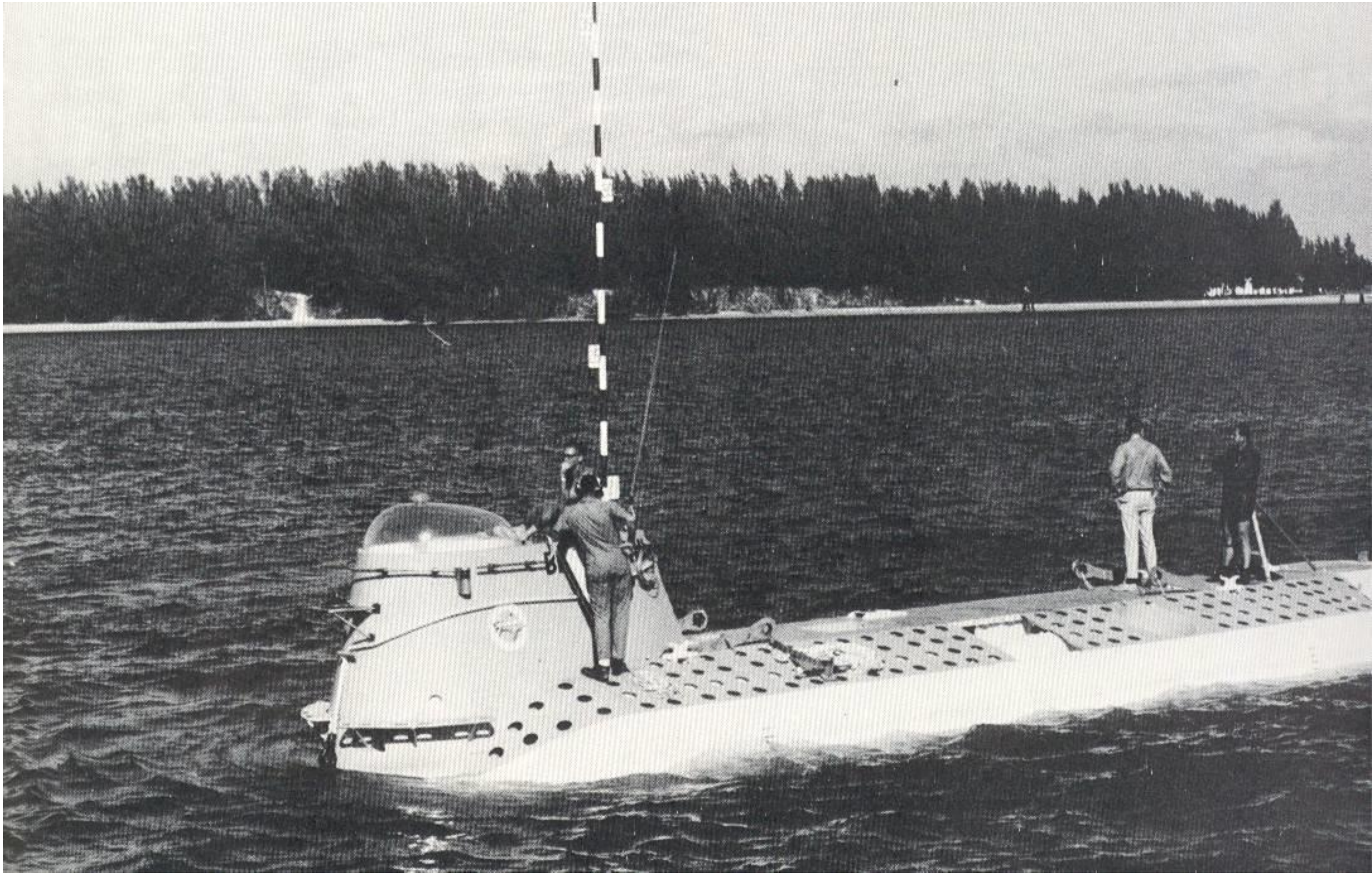
13 ton steel ball with 13 cm thick walls

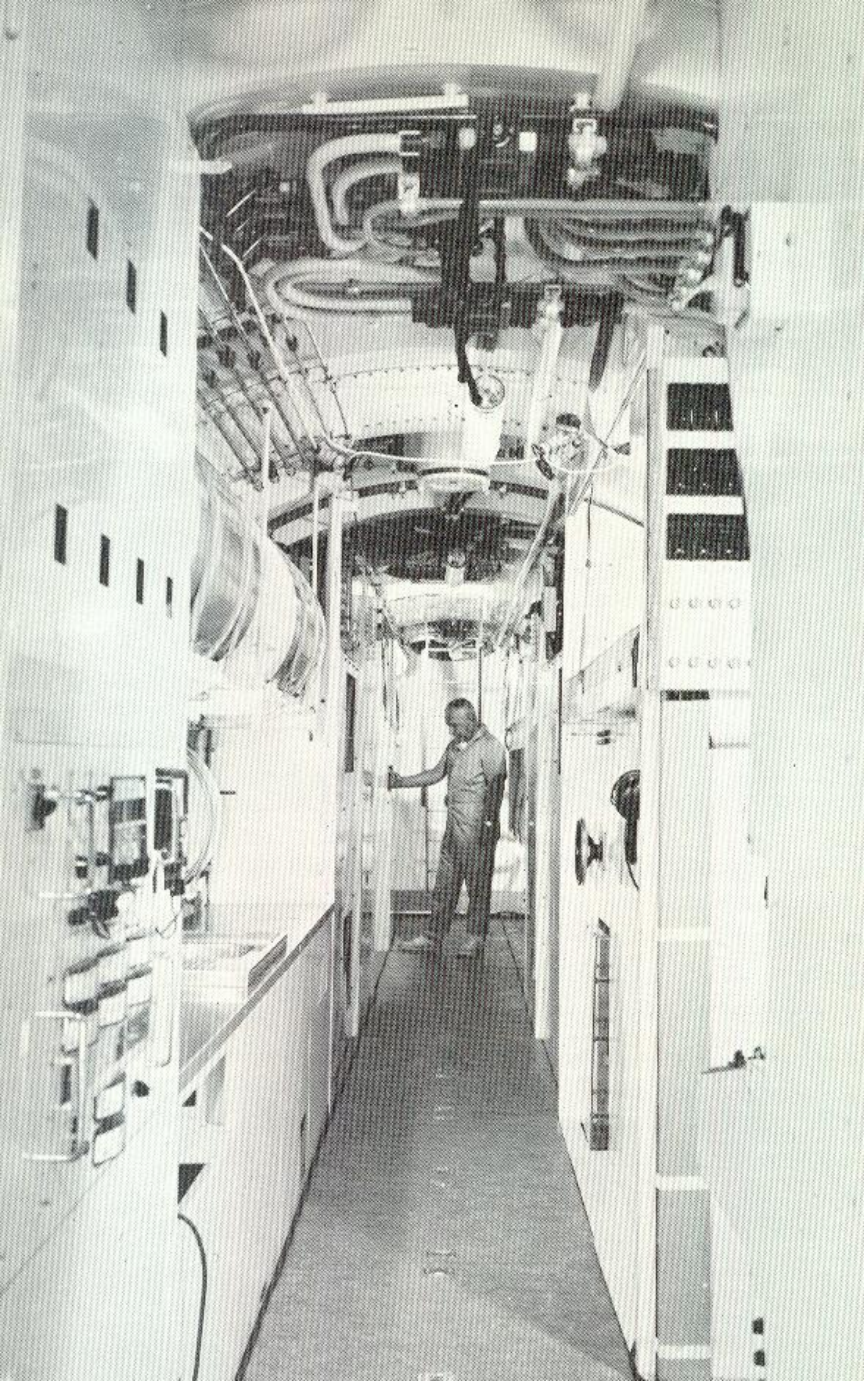
9 tons of iron pellets balast

Lieutenant Don Walsh, USN, and Jacques Piccard in the bathyscaphe TRIESTE.
Location: Marianas Trench
Photo Date: 1960

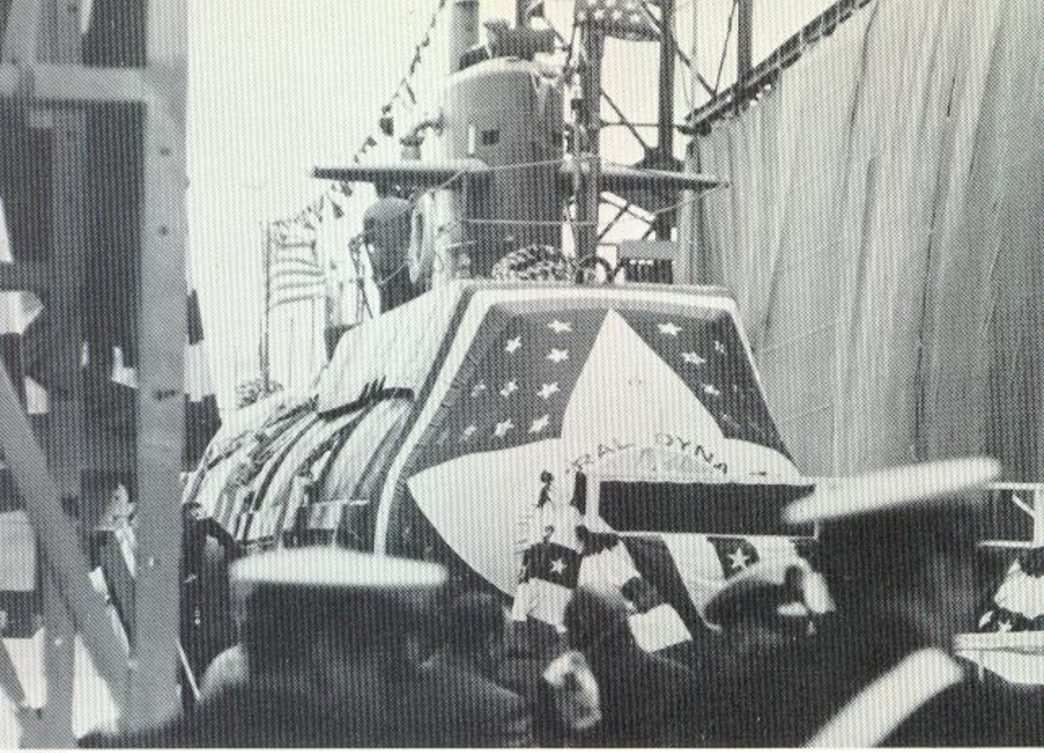
The research submarine Benjamin Franklin used for oceanographic research by the US Navy

The US Navy research submarine Benjamin Franklin at surface





The interior of the American research submarine Benjamin Franklin.



The nuclear-powered submarine NR1 decorated for her launching on January 25, 1969.

Doppingen, a one man minisubmarine for observations designed and built by the Swedish inventor Håkan Lans 1967.

Experiments with various types of diving gear are never ending. Here a man emerges after training with the Mark VIII semiclosed breathing apparatus, primary and secondary umbilical, and Kirby-Morgan helmet.

Dr. Bradley in the water for aquanaut training at Point Magu, California, in connection with the Man-in-the-Sea program.

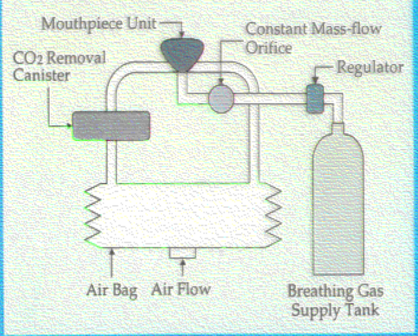
The rebreathers developed in the 70-ties were not any new inventions. As a matter of fact the first scuba used already in the 19th century were rebreathers. This Cressi unit is younger than that.



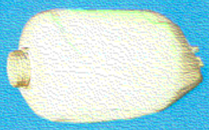
Save your breath.

Vith a variety of features, the Fieno helps you to safely and omfortably get the most out of your breath. The Fieno's nouthpiece is designed to prevent water from entering the ystem when it is released from the diver's mouth. A onvenient purge lever can be used to clear the mouthpiece self. The system employs a special canister containing an nvironmentally safe, calcium carbonate compound to absorb O_2 from exhaled gas. When the diver draws a breath from he mouthpiece, cleaned and filtered gas that has already been ressured through the filter is supplemented with a fresh nixture of 40% oxygen and 60% nitrogen from a supply ylinder. A secondary gas supply mechanism has been ncorporated into the system to meet any extraordinary lemand for air that may be required. This is particularly seful during periods of extra physical exertion. Another afety feature is an automatic gas exhaustion mechanism that ctivates should the breathing bags become too full to take in he diver's exhalation. Finally, a factory-set depth warning levice activates at 30 meters, to keep the diver within the ecommended safety zone.

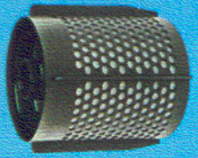
Rebreather System Flow Chart:



Supplies:



Air Bag: Replace once a year or every 50 dives.



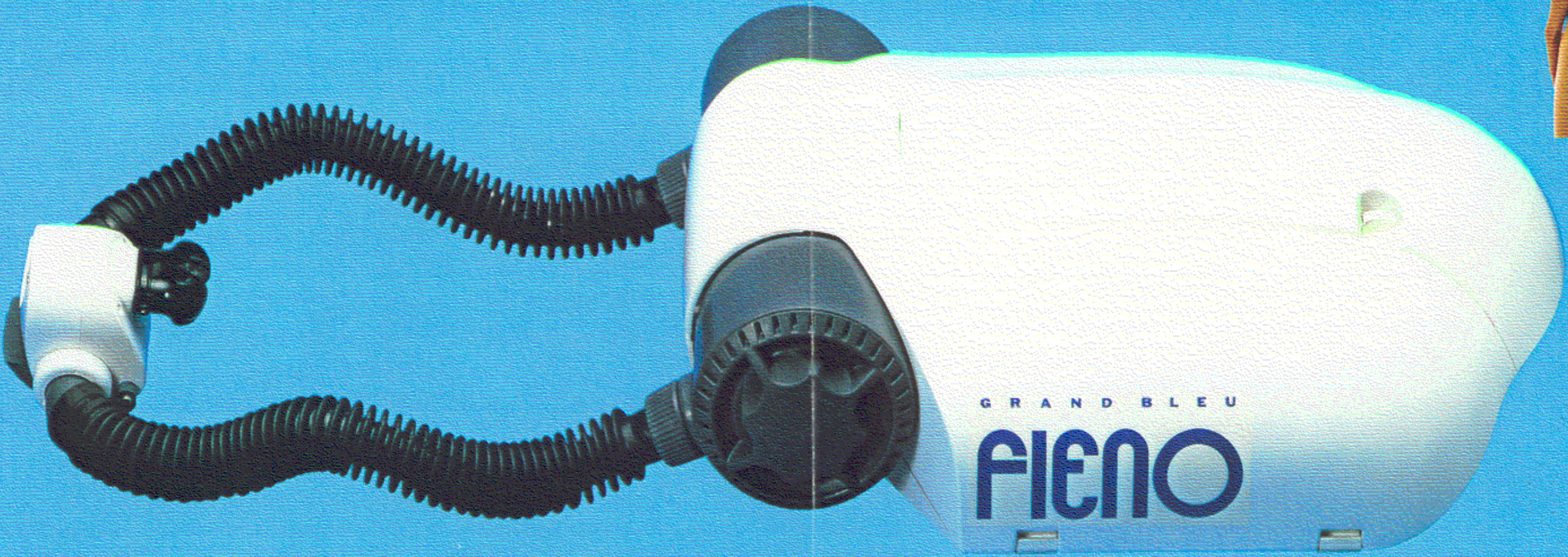
Canister: Replace with every use.

Replaceable portion of mouthpiece: Replace when worn.

Attachment:

Depth Warning Device: Separate attachment provided with main unit.

The Grand Bleu Fieno Rebreather System, Buoyancy Compensation Jacket and Depth Warning Device are sold as a set.



Dive into the **Dolphin** and **DrägerRay** technology.

Dive into the Dolphin and DrägerRay technology

You are diving with a Dräger rebreather. The semi-closed rebreather allows you to experience diving as never before. What is special about rebreather systems is that your exhaled gas is not released into the water as in conventional open circuit systems, but is purified and returned to the breathing circuit. As a result, you can enjoy your dive to the fullest - not only a longer dive, but also a completely undisturbed adventure.

Dräger Rebreathers – a quite new diving experience

The Dräger rebreathers remove carbon dioxide from the exhaled gas through a sodalime cartridge and then channel it into the inhalation bag, where it is enriched with fresh Nitrox from the supply cylinder.
This constant supply of fresh gas ensures that you will always be provided with enough oxygen. If, however, you should need more gas - for example if you are subjected to great physical strain or wish to clear your mask - a bypass valve opens automatically to supply additional fresh gas. For very shallow breathing, for instance if you are 'lying in wait' for a photo opportunity, the circuit opens and little air bubbles escape almost silently through the positive pressure valve behind you.

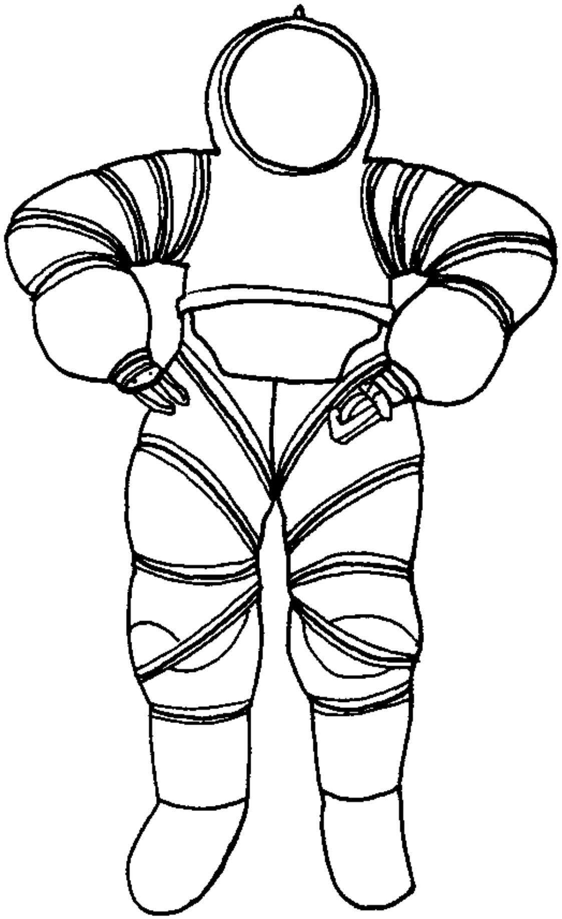
Another aspect of rebreather diving that you will enjoy is that the inhaled air is pleasantly warm and moist.

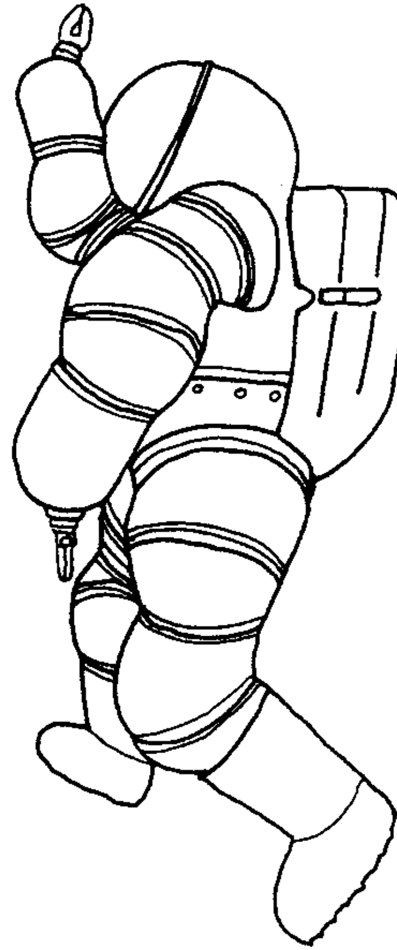
This is because the chemical reaction involved in the absorption of carbon dioxide generates warmth and moisture, and as a result even diving in cold water can become a real joy.

Since there is optimal reuse of the exhaled gas, your gas consumption drops by up to 90%. Thus the mixed gas cylinder can last for a whole weekend of diving.

Dräger Dolphin, also marketed as the Atlantis
A semiclosed rebreather for recreational diving

The ”Newt-suit

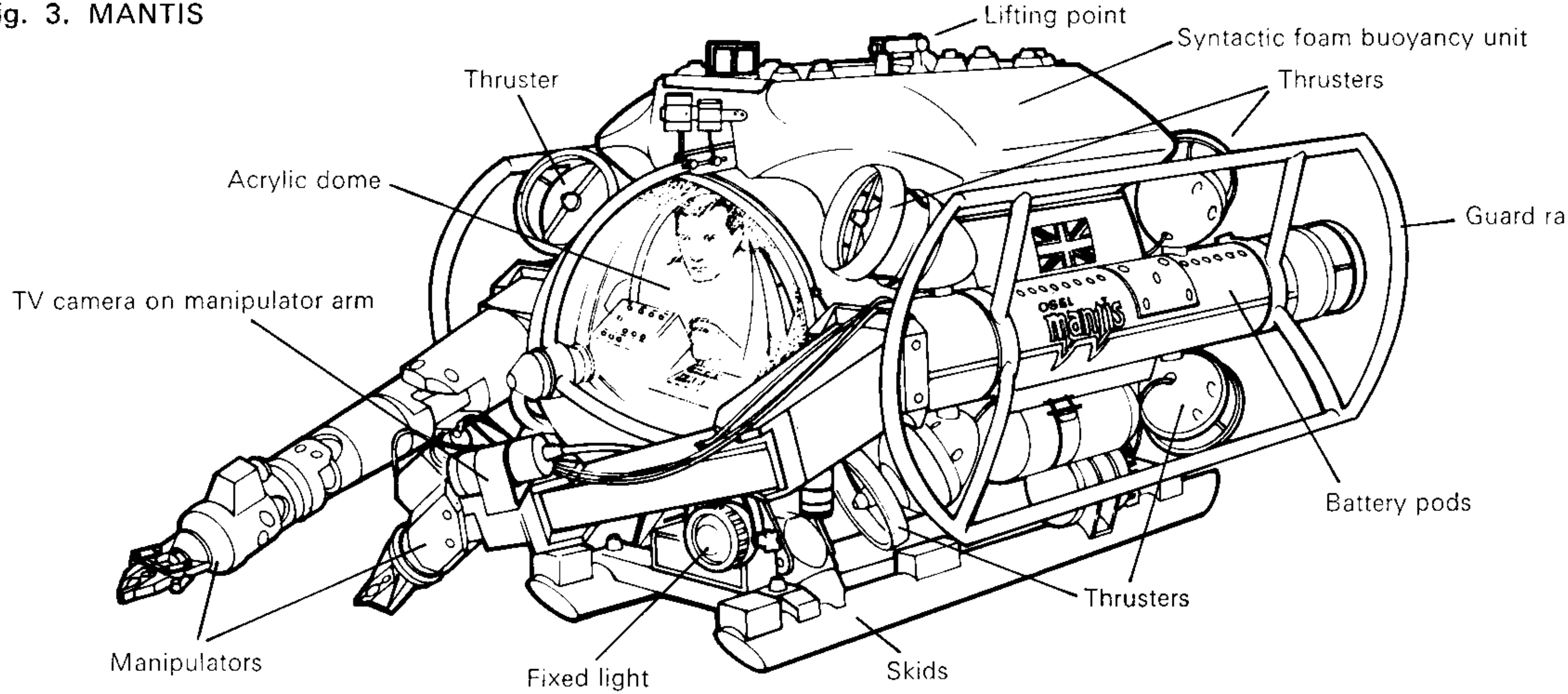




The ”Newt-suit

A 1 atmosphere dive suit for work down to 400 m without the problems of decompression, HPNS and cooling. Decreased dexterity and mobility is the trade off for this comfort.

Fig. 3. MANTIS



MANTIS
A minisubmarine for one person