Dear Franz,

A few years back I made a deeply research for the Møller Brothers Diving Machine. Among the many documents I the national archive was the brother explanation of the diving principle. You can read what the brothers have written about the principle in Dykkehistorisk Tidsskrift no. 55 and in The International Journal of Diving History vol. 9.

The Møller brothers also used a bellows to ventilate the diver. They could do that because the diving suit was a ridged harness which covered the diver head and breast and both hoses leading air to and from the suit was reinforced to withstand the water pressure. I will like to refer to the drawing in DHT 55 page 18. As the diver arms and legs was covered with leather or any other suitable material and in tight connection to the harness which prevented water access to the harness and there were an open connection from the harness to the atmosphere trough the hoses the pressure inside the harness was 1 bar. The bellows could easily ventilate the diver as there was only a small resistance from the air flow to overcome.

The exhaust pipe could be used as a speaking tube for communication with the diver.

It was essential that the opening of the exhaust pipe was above water. If it for instance have been 1 meter below the surface the bellows had to overcome 1 meter of water pressure.

The pressure on the divers' arms and legs would try to force the arms and legs into the harness. The force applied to especially the diver backbone was increasing with the depth. On page 19 I have estimated the force at a depth of 9 meter, which was the deepest dive the brothers have reported. A that depth the force on the backbone would have been around 330 kg without any special arrangement in the harness. I believe that the brother have made a special arrangement in the harness to take up the force from the water pressure on the backbone. This could have been a strong leather belt around the diver waist and attached to the harness which could take up the force before the divers shoulders was forces against the top of the harness.

The brother have never revealed which arrangement the have made, but they have mentioned that they have made something as they have reported that they nearly have risked their life in a more simple harness.

The same principle was used by Klingert. However, Klinger never dive to a depth where he really have felt the force.

Back to Kreeft. On the drawing you have sent me reinforcement in the hood is seen. However, I cannot see any reinforcement that can protect the divers' breast from the water pressure.

In 1997 The Medieval Centre in Denmark built a diving suit and helmet supplied with air from a bellows. This construction was working as an open helmet. The Centre has used 3 small bellows instead of one large bellows as it was impossible to operate the large bellows even at a limited depth. (Please see DHT no. 6: Diver from The Dark Age, by David Lazenby).

The apparatus was tested at the Royal Danish Navy Diving School to a depth of 3 meter. It worked well but it was a hard work to operate the bellows.

In 1998 the apparatus was tested at greater depth in Jutland waters. David was going down a ladder to greater depth. At a depth at 4 meter one of the bellows exploded due to the internal pressure.

My suggestion is that Kreeft have used the same principle as the Møller brothers and that he has not shown the reinforcement around the breast as he do not want other to copy his invention.

Concerning the leather suit I will like to draw your attention to Jens Riise Knudsens' article in Dht no. 31: Duckeren er klædt udi Læderklæder fra top til taa.

Venlig hilsen

Sven Erik Jørgensen

Fra: Franz Rothbrust [mailto:franz.rothbrust@historische-tauchergesellschaft.de]
Sendt: 6. september 2017 10:00
Til: Sven Erik Jørgensen
Emne: Re: SV: diving bell article

Hi Sven Eric,

thanks for your support. I thought the drawing was from the 18th century and it could show some interesting details for us. We will not publish the drawing, it is for our research use only. If we ever intend to publish it, we will pay royalties to the author.

Up to now, we have three theories how the exhalation/communication hose could have worked:

1) By a thinner exhalation outlet (2 or 3 mm diameter) than the 1" inlet. But then communication would not have been possible because of the noise caused by airflow.

2) By an additional hanging hose or a duck bill valve for exhalation below the helmet. The communication hose would have to be closed by a diaphragm. When speaking air supply had to be interrupted.

3) See the attached sketch. There is a constant air flow leaving through the nozzle. If the diver wants to speak, he closes the exhalation nozzle with his cheek, the surface crew has to stop pumping air. It will be quiet then inside the helmet and the diver or crew can speak.
I tried to imagine how a person without diving experience would solve the problem. The outlet nozzle with thin inner diameter is an obvious solution. Kreeft just had to combine the nozzle with communication by diaphragm.

I think "2" is realistic, "3" may have been possible, but there is not anything to see in the drawings. On the other hand, Kreeft may intentionally not have disclosed his secrets. The eye witnesses report gives a hint on this.

My idea is to make versions 2 and 3 and to prove that both could have worked.
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:)
Franz

Erster Vorsitzender / Chairman Historische Tauchergesellschaft e.V. Historical Diving Society Germany Villenstrasse 6, 67433 Neustadt/ Wstr. Deutschland / Germany Tel: + 49 (0) 6321 80923 Email: franz.rothbrust@historische-tauchergesellschaft.de www.historische-tauchergesellschaft.de

Am 06.09.2017 um 08:43 schrieb Sven Erik Jørgensen:

Dear Franz,

The use of dual pressure suits is an area I have looked deeply into. In the evening I will find what you need and send it to you.

However the use of the drawing of the bell diver will require approval from the artist. I might arrange that.

Thank you for moving your meeting north.

Venlig hilsen

Sven Erik Jørgensen

Fra: Franz Rothbrust [mailto:franz.rothbrust@historische-tauchergesellschaft.de]
Sendt: 5. september 2017 07:25
Til: Sven Eric Jorgensen
Emne: diving bell article

Hello Sven Eric!

thanks a lot for sending your latest issue. In the article about diving bells, there is a picture on page 26 showing men using leather suits. I could not find any information about the suits in the article text. Please send me the picture in higher resolution.
We are working on a replica of a diving suit from 1800 made by Peter Kreeft, see the attached pictures. It has to be built using materials and methods from that time. If our replica works, it will be the proof that the first closed helmet diving suit was made at the Baltic coast in the

city of Barth near Stralsund about 30 years before the Deane construction. We are supported by the Meeresmuseum in Stralsund and the Leather Museum in Offenbach. As you can see in one of the pictures, Kreeft used two hoses, one for inhalation, the other for exhalation. There is an eye witness report explaining most details. But there is nothing to read or to see in the picture about how Kreeft constructed the exhalation valve. There must have been one because it is proven that he dove at least 5 meters deep to salvage a load of copper. So we have to guess. It could have been a hanging hose but such is not to see in the drawings. From the eye witness report we know that the exhalation hose was used for language communication between Kreeft and his crew. This makes everything more complicate for us to reconstruct. I have an idea how it could have worked. If you are interested, I can send a sketch.

Our next international meeting will be held in Stralsund or Flensburg, so HDS Denmark members can attend. It should be on June 16th & 17th. We hope to be able to show the Kreeft suit reconstruction until then.

Best wishes,

Franz

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