IV. *TESTS CARRIED OUT AND RESULTS OBTAINED :*

The object of these tests was the adjustment of the parts and the verification of estimated ranges.

The results were as follows :–

The transmitter apparatus and the receiving apparatus carry an aerial fitted with a cylindro-parabolic projector, the pencil of waves has an effective angle of 7°. The transmitting and receiving instruments were mounted independently of each other on board ship at a height of some 8 metres above sea level; the distance between the two instruments was about 6 metres. The projector of the transmitting group was directed towards the coast and the projector of the receiver could be shifted so as to record the reflected wave.

The voyage was as follows :– Havre - Dunkerque - Rotterdam - Antwerp - Havre. The first series of tests was made while the coast was at distances varying between 3 and 7 km. (1.8 and 4.2 miles).

The transmitted pencil of waves was directed towards a point on the coast. By suitable orientation of the receiver the reflected wave was found. In directing the receiver on each side of the point aimed at by the transmitter, reception of the echo was lost at a difference of angle of the order of 5°.

The same tests were continued in the same conditions, and echoes on the coast were received up to a distance of 10 km. (6 miles).

With the same device a few echo tests were made on ships, and it was possible to distinguish and fix them to distances of some 7 km. (4.2 miles).

A device was then constructed by means of which the two projectors could be oriented at the same time towards the obstacle to be revealed.

The two projectors were connected to a shaft *A B* which could turn in two bearings situated at the ends. The two projectors *P1* and *P2* were on axes and a copper screen prevented the direct radiation of the transmitter aerial to the receiver aerial.

With this device, echoes from ships situated at distances of some 7 km. (4.2 miles) were received.

At the height at which the aerials were placed, sea-waves did not give sharp echoes capable of falsifying the observations.

Tests carried out from a point of the coast situated at St Marc near St Nazaire allowed us to detect the buoys in the entrance to the harbour channel of St Nazaire when at about 3 km. distance (1.8 miles), as well as the Tour du Charpentier at 5 km. (3 miles).

These first tests have thus demonstrated the fitness of the material to reveal obstacles up to distances of from 7 to 10 km. (4.2 – 6 miles) and to give their bearings to within less than 5 degrees.

Similar tests have been made on board other ships and have yielded identical results.

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Note. — The *Compagnie Générale Transatlantique* intends to carry out further trials with the PONTE Detector during the year 1936 on board the liner *Normandie.*

THE INSULATING WATER BOTTLE.

AS USED IN THE BRITISH HYDROGRAPHIC SERVICE.

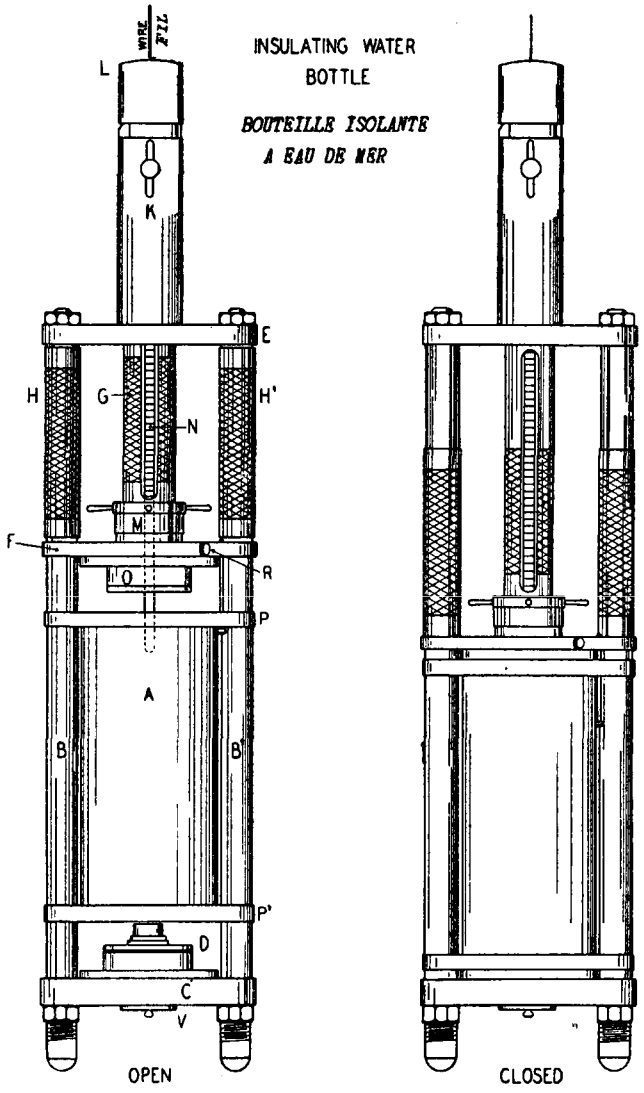
1. The *Insulating Water Bottle* is used for measuring temperatures and collecting samples of water at moderate depths. As a general rule it is not used at depths greater than 500 fathoms.

2. *Construction.* It consists of a metal cylinder *A* (see figure), open at each end, which slides freely on the tubular guides *B, B'* by means of holes in the flanges *P, P'*. It contains a number of concentric cylinders also open at each end.

The guides are connected at the bottom by the metal plate *C* which carries a draw-off valve *V* and a number of rubber washers *D*, and at the top by the plate *E*.

A cover-plate *F* provided with rubber washers *O* also slides freely on the guides. It carries on its upper side the thermometer guard *G* which is slotted so that the graduations of the thermometer *N* can be read; it is fixed to *F* by the collar *M*. Its upper end is spherical and engages with a catch (not shown) inside the head *K*.

A special thermometer *N*, protected against pressure by an outer glass sheath, is fixed in the washer *O*.



3. *Method of Operation.* The bottle is lowered to the required depth open, so that the water passes through it freely. A messenger is then allowed to slide down the line. It strikes the head *L* and actuates the catch inside *K* releasing the thermometer guard. The plate *F* and the cylinder *A* fall and the whole is closed by the rubber washers *O* and *D* and the sleeves *H* and *H'*, which are pressed down by springs inside the guides *B*, *B'*.

The thermometer bulb is now surrounded by a number of concentric jackets of water which prevent any change of temperature for six minutes.

4. *To insert a Thermometer.* The thermometer supplied is graduated on the stem and has a long narrow cylindrical bulb. It is enclosed in a strong glass sheath to protect it against pressure and has some mercury round the bulb to hasten the transfer of heat.

Care should be taken to use the right kind of thermometer and not the "surface thermometer" also supplied. This latter has a very fine stem fixed against a strip of white glass on which the graduations are marked, and the outer sheath is of thin glass and only encloses the stem, not the bulb. Unfortunately this is sometimes called an "insulated thermometer" by the makers.

Before inserting a thermometer, press the sleeves *H* and *H'* upwards and turn them to the right until they engage with the catches at the top of the guides. They are now out of action.

Press the top plate *L* and close the bottle.

Unscrew the collar *M* and remove the thermometer guard *G*.

Unscrew the nut below it, by means of the pin wrench provided, and remove it and the metal ring beneath it. In some models this ring, which is rounded on the under side and flat on the upper side, is made in one piece with the nut above it.

Pass the thermometer through the washer *O* and press it down cautiously until it touches the ebonite valve at the bottom.

Replace the metal ring, if fitted, rounded side downwards and the nut; leave the nut slack.

Pass the guard over the thermometer and press it up into the head *K* until it is held by the catch.

Adjust the thermometer to the proper height.

Tighten up the nut.

Release the guard and fix it to the cover by tightening up the collar *M*.

Examine the position of the thermometer and see that all graduations are visible through the slot in the guard.

Caution. Do not allow the water bottle to close violently in the air; the shock may break the thermometer.

5. *To make an observation.* The water bottle may be used on any good wire of several strands such as KELVIN Sounding Machine wire. Single wire should not be used. An eye should be spliced in the end, preferably with a thimble. Care should be taken that the splice is small enough for the messenger to pass over it.

Pass the eye through the slot in *L* and fix it by means of the screw pin.

Pull the sleeves *H*, *H'* upwards and turn to the right to lock them.

Push the thermometer guard up until it engages and the bottle is held open.

Press the valve *V* at the bottom upwards. If it is felt to move upwards against a spring it is ready for use and will close as soon as the pressure is removed. If it does not move, turn it to the left until it is free.

Close the air-valve *R*.

Release the sleeves *H*, *H'* gently.

Lower the bottle to the required depth.

If the depth is not less than 50 metres, drop a messenger down the wire at once. If the depth is less than 50 metres, wait one minute and then drop a messenger.

Feel the wire with the hand. If the bottle works properly the shock of the messenger striking will be felt first, and then the shock of the bottle closing.

Heave up and read the thermometer to the nearest hundredth of a degree. Thermometers are divided to tenths and it is not expected that great accuracy can be reached in the hundredths except in a special pattern, with a very open range, not generally supplied. Some of the graduations are carried right round the tube as an aid to avoiding parallax.

Record the temperature and the number of the thermometer.

Press the valve *V* upwards. If no water runs out, the air-valve *R* being closed, the bottle is in good order and a sample of water may be collected. If water runs out, the bottle is leaking and the observation must be repeated. Leaks are generally due to grit on the washer or a cut washer.

To collect a sample, open the air valve *R* and press the mouth of one of the sample bottles on to the valve *V* so as to open it. Collect half a bottle of water, rinse the bottle out, repeat this, and then collect a sample of water. Close the sample bottle and see that the stopper sits straight. The rinsing of the bottle twice should not be omitted.

About half an inch of air space should be left under the stopper.

Extract from Hydrographic Publication H. D. 307, *Admiralty, London,* 15-1-1932.

A tag label should be tied to the bottle, giving the name of the ship and the date; both of these should be given on every label. The depth, time, position and temperature should also be entered on the label, or they may be entered in the return and some identifying mark made on the label. The number of the thermometer should also be given in the return.

6. *General Notes :*

(*a*) *Caution.* If the bottle is lowered closed it will collapse under the pressure.

(*b*) The frame may be lengthened downwards by removing the lock nuts at the bottom, if provided (they are not shown in the diagram), and fixing on the metal extension pieces and sinker provided. This is often useful in a strong current.

(*c*) The working parts should be kept *lightly* oiled, but no oil or grease should be allowed to get on to the washers or the inside cylinders.

(*d*) When the bottle is not in use the springs in the guides should be thrown out of action.

(*e*) In case of need a "surface thermometer" may be used in the water bottle, but the results are not satisfactory and the thermometer may collapse.

(*f*) The bottle will not hold its temperature with certainty for more than six minutes and it should not be used if the time between the beginning of heaving in and reading the temperature is more than this.

(*g*) The water in the bottle and the material of which the bottle is made are decompressed and cooled by expansion as they are brought up. It is not possible to calculate the correction for the bottle accurately if the depth is great, and the bottle should therefore not be used at depths greater than 500 fathoms. At 500 fathoms and at high temperatures the correction is considerable, 0.2° in the Red Sea.

All corrections are applied at the Admiralty.

(*h*) In the absence of other instructions, observations should be made at the following standard depths : surface, 5, 10, 20, 30, 50, 75, 100, 150, 200, 300, 500, 750 and 1,000 metres.

(*j*) The bottle weighs about 26 lbs.

7. *Surface Observations.* Surface observations should be made as near in time to the 5 m. observation as circumstances allow.

If the state of the sea permits, the surface observations are made with the water bottle. Care should be taken that the bottle is completely under the surface when it is closed, so that it is full of water. The temperature observation is useless unless the bottle is full.

In rough weather a bucket may be used for the surface observation. It may be made of pulp, wood, metal or leather, but not of canvas. The evaporation and cooling from the surface of a canvas bucket are large, especially in a wind, so that the temperature observed is too low and the salinity too high.

To make a surface observation, rinse the bucket well over the side, draw it full of water, put one of the surface thermometers supplied into it and stir it about for a quarter of a minute and then read the temperature to the nearest tenth of a degree, *keeping the bulb still in the water.* If the bulb is removed from the water the observation is *quite useless.*

The same bucket of water may be used for bottling off a sample if the bucket is large and there has been no delay which may have allowed evaporation. Otherwise the bucket should be rinsed and filled again. The glass bottle should be rinsed twice before filling and a small air space should be left. Care should be taken that the stopper sits straight.

ON A NEW APPARATUS FOR TRANSFORMATION BY DRAWING.

by

PROF. Dr. A. BUCHHOLTZ.

(Extract from *Bildmessung und Luftbildwesen*, Liebenwerda, 1935, Heft 3, p. 141).

Within recent times various types of apparatus have been proposed for transformation by drawing — i.e. instruments for drawing maps from the optically produced projection of air photographs. In comparison with the optical photographic rectifying appliances in normal use, these transformers have certain disadvantages inherent in their nature against