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# A non-metallic water sampler

by
Folke Koroleff and Kauko Hälvä
Institute of Marine Research, Helsinki

## Introduction

For the determination of metal ions in trace amounts in sea water at various depths, ordinary water bottles cannot be used. Coating, plating or painting the bottles used hitherto with materials isolating the metal parts from the sample cannot be achieved with full assurance that the sample would not be contaminated. Water samplers consisting of evacuated glass flasks as used in biological studies either do not stand the pressure at the depths in question or bring back a sample to small for trace metal analysis.

Water bottles for trace metal analysis have been constructed before. The authors are acquainted with the following:

1) A syringe type water sampler made of lucite (Thompson and Chow 1955). This has a tripping mechanism of stainless steel. Besides, it is weighted down by a lead collar encased in lucite. Both, but especially the former, may contaminate the sample. Only one sample may be obtained at each lowering.
2) The Frautschy bottle marketed by the Hytech Corporation, California. This has a metal tripping mechanism, metal stopcocks and should be fastened to a metal hydrographic wire. The metal parts are listed as cadmium plated irradiated brass and stainless steel. The danger of obtaining a contaminated sample is obvious.
3) The Van Dorn water bottle. This is the model in which the metal parts have been eliminated almost altogether, only a small spring in the tripping mechanism remaining. The tripping mechanism and the means for securing the water bottle to the wire may not have the mechanical strength required by us.

The wxter bottle described here looks in some respects like the Frautschy bottle and in some respects like the Van Dorn bottle. The tripping mechanism and the means for securing the bottle to the hydrographic cord are new. Only the pegs of the tripping mechanism contain metal, and this

has been baked into the plastic.

Description of the sampler.

A line drawing of the new water bottle is shown in fig. 1. The body (A) is a tube of heavy wall, high impact polyvinyl chloride (trade name Trovidur, W.Germany). The tripping mechanism (B) and (H) is of the same material, as are the ball stoppers (C). These latter, however, have been covered with soft PVC (trade name Mipolam) to insure tight closing. The closing force is excerted by sixfold bycicle valve rubber (D). The "stalks" of the ball stoppers should be long enough to provide the laverage for turning the balls over the rim of the body. The balls are secured in the set position by nylon cords (E) both passed behind the same peg of the tripping mechanism and on either side of the pin (J). This pin makes setting the mechanism easier and prevents the cords from getting entangled in the parts protruding from the body.

The water bottle is fastened to the hydrographic nylon cord by means of a cleat embracing a stop on the cord. As an alternative the cord may be made fast on the prongs of the cleat, but this is rather difficult when the cord is taut. We use a stop consisting of heavy-walled plastic tubing stitched to the cord with nylon wire or melted fast permanently. The stop is pressed into the cleat and stays locked as long as the cord is taut. The upper end of the water bottles is locked to the hydrographic cord by passing the latter through a left-hand slot in the guide (H) and a right-hand slot in the tripping mechanism (B). The hydrographic cord is held taut by a iron weight encased in plastic at the end of the cord, several meters below the bottle.

The water bottle is tripped by a polyvinyl chloride messenger with encased lead rods. We use a Z-slot messenger 120 millimeters high and of 35 mm:s diameter weighing 250 grams. When the messenger strikes the tripping mechanism (B) this moves downward and the cords to the ball lids are lifted from the right-hand peg by the corresponding peg guide on the body. The left-hand peg is for the cord to the next messenger.

Discussion

The new water bottle has been used for collecting samples at a variety of depths in many parts of the Baltic last summer. The deepest sample was taken from 400 meters. Details of the sampling technique will be found in paper № 140 presented at this meeting. The water bottle has funcioned properly every time.

The volume of the water bottle may be varied according to need, but the volume of the present model, 2 liters, is sufficient for duplicate analyses of Zn, Cu, Mn, and Fe. The sampler may easily be fitted with a plastic stopcock if necessary.

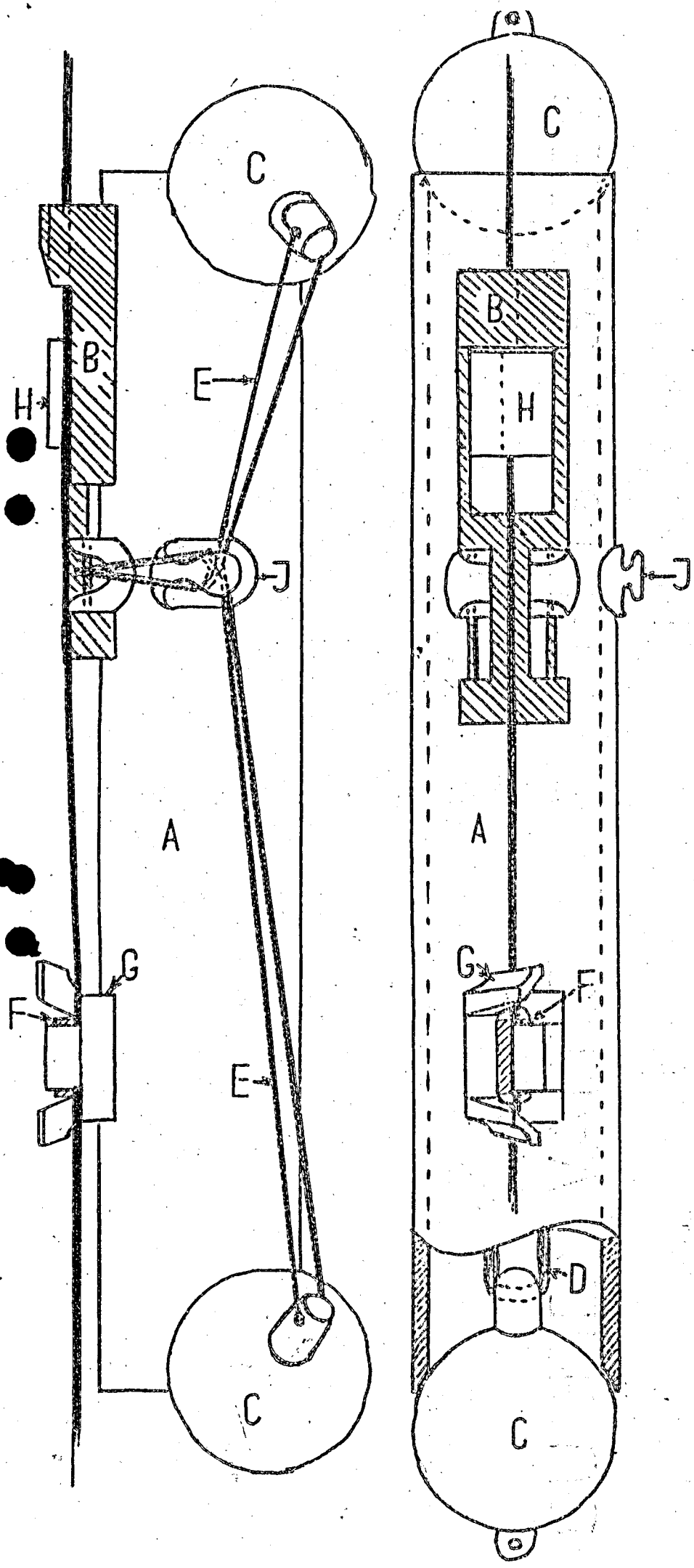


Fig. 1

A Body

B Tripping mechanism, locked to the body by the hydrographic cord

C Ball stoppers

D Rubber tubing

E Setting cords, nylon

F Stop on the hydrographic cord

G Cleat for fixing the bottle on the hydrographic cord

H Guide for tripping mechanism

J Setting pin

Scale 1:4