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A CLOSING, MULTI-SAMPLING NET SYSTEM FOR THE STUDY OF THE DEEP SCATTERING LAYER

by

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ABSTRACT

A system has been devised to allow practically simultaneous biological sampling of the ocean at a number of different depths. It consists of a single rope from which are suspended a number of net frames that can be completely closed in quick succession by means of messengers. The system works satisfactorily at a towing speed of 3 knots and at depths down to 800 metres, and gives reliable results because the nets do not collect stray samples during descent or recovery.

INTRODUCTION

The acoustic and biological problems connected with the deep scattering layer (DSL) have led a number of researchers to build equipment for collecting marine organisms, which more and more researchers are identifying as the source of the DSL [Refs. 1,2 and 3].

Early observations in the Mediterranean showed that the DSL is also present there, though not as noticeably as in the Atlantic Ocean [Ref. 4]. It was also found that it often consisted of more than one stratum [Ref. 5].

Examination of many precision-depth-recorder (PDR) recordings made on many cruises in the Mediterranean, as well as the biological sampling done in a DSL study campaign [Ref. 6], clearly showed the need for simultaneous sampling of the various strata of the DSL. Consideration was therefore given to the possibility of directly attaching a number of open nets to the same rope, without bridle lines, and closing them at the required time and depths by means of messengers.

1. THE MULTI-SAMPLING NET SYSTEM

1.1 Description

For taking simultaneous samples a special collapsible four-sided net frame was designed [Fig. 1]. It measures 141.5 cm x 141.5 cm and is made of steel tube. The 2.5 cm vertical members are pivoted to allow them to fold about their midpoints [Fig. 2]. They have similar pivots at each end to permit rotation of the horizontal members, which are made of 3 cm tube backed with a bracing of 2.5 cm tube [see Fig. 1 and Fig. 3]. The frame can thus be closed completely.

Shackles are welded outside and to the rear of the horizontal members. The upper shackle [Fig. 3a] runs down the rope when the net-closer is operated. The pin of the lower shackle [Fig. 3b] carries the sliding pin of the messenger release.

The upper rope clamp incorporates the net-closer and is shown in Fig. 4. It is made of steel to withstand heavy loads.

The lower rope clamp, of similar construction, incorporates the messenger trigger and is shown in Fig. 5. The eye of the sliding pin is mounted on the lower shackle, and the catch carries the messenger's retaining wire.

Each messenger [Fig. 6] weighs about 2 kg and is of standard type except that the head is locked to the body by a phosphor-bronze strip, to prevent loss of the messenger due to severe rope vibration. The retaining wire passes through a hole drilled in the head of the strip's fixing bolt.

1.2 Mounting Instructions

Bolt the lower clamp [Fig. 5] to the rope and mount the messenger trigger pin on the lower shackle [Fig. 3b].

Secure the upper shackle [Fig. 3a] round the rope, and fit the upper clamp [Fig. 4] loosely on the rope above the upper shackle.

Open the frame almost completely, hook the ring [Fig. 3a] on the net-closer catch, and tighten the upper clamp on the rope.

Mount the messenger [Fig. 6] on the rope below the lower clamp, and loop its retaining wire over the catch of the release.

Force the net frame fully open so as to lock the catches of the net-closer and messenger release. Take care that the frame is really taut, to prevent premature closing of the net when towed.

1.3 Results

This system has been successfully used for towing nets at a speed of 3 knots and depths down to 800 metres. (To avoid pressure effects two holes were drilled in each tube of the frame.)

Samplings of biological material in the various strata of the DSL are becoming quantitatively reliable, because the nets do not filter water during the descent with the ship stopped, and because the top and bottom members of the frame mate perfectly during hauling, even if the ship is under way.

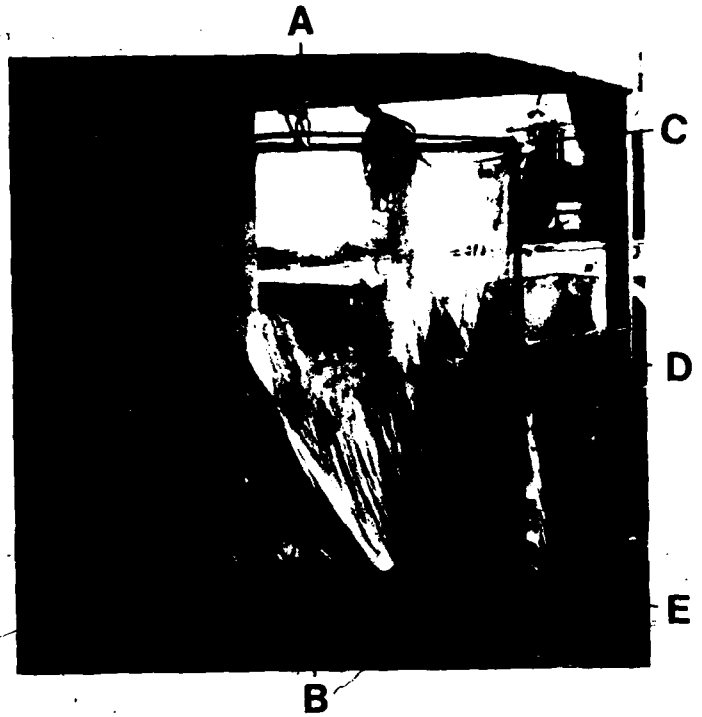

FIG. 1 NET FRAME OPEN

A Upper shackle and securing ring (see Fig. 3a)
B Lower shackle (see Fig. 3b)
C Top pivot
D Side hinge (see Fig. 2)
E Bottom pivot

FIG. 2 SIDE MEMBER HINGE

FIG. 3a TOP MEMBER SHACKLE (with ring in background)

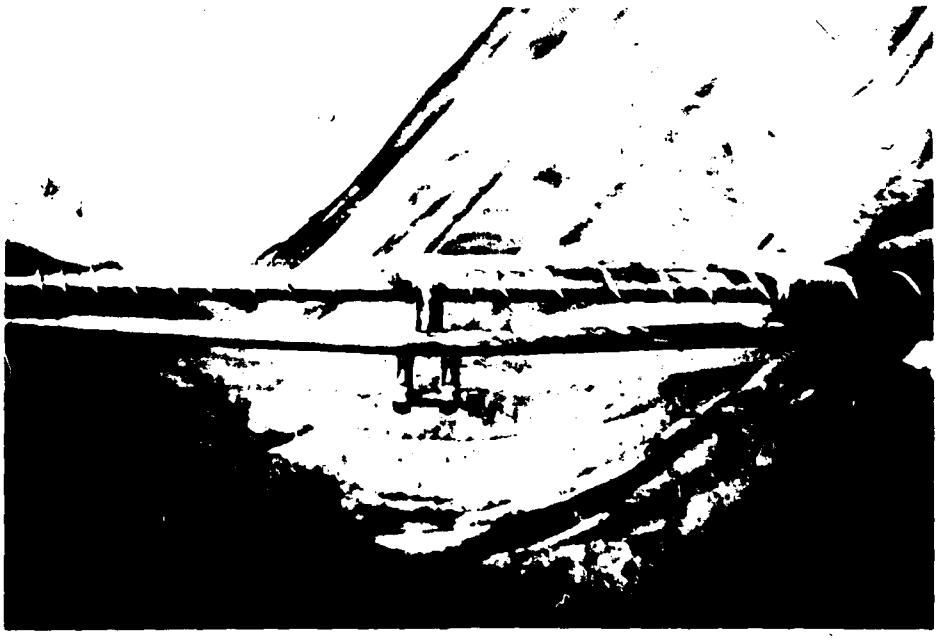

FIG. 3b BOTTOM MEMBER SHACKLE

FIG. 4 UPPER ROPE CLAMP (CLOSED AND OPEN) SHOWING NET-CLOSER

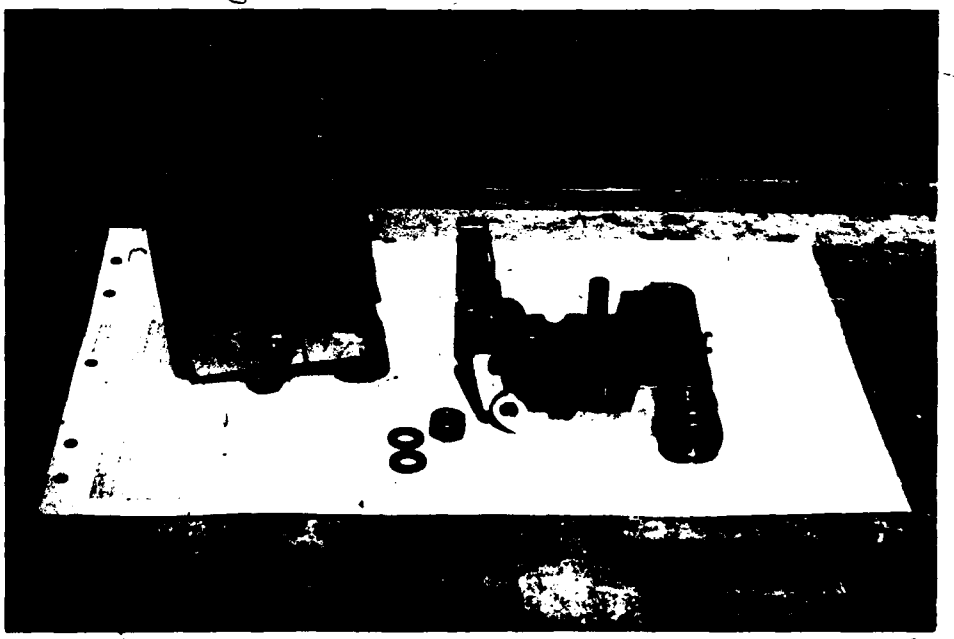

FIG. 5 LOWER ROPE CLAMP (CLOSED AND OPEN) SHOWING MESSENGER RELEASE

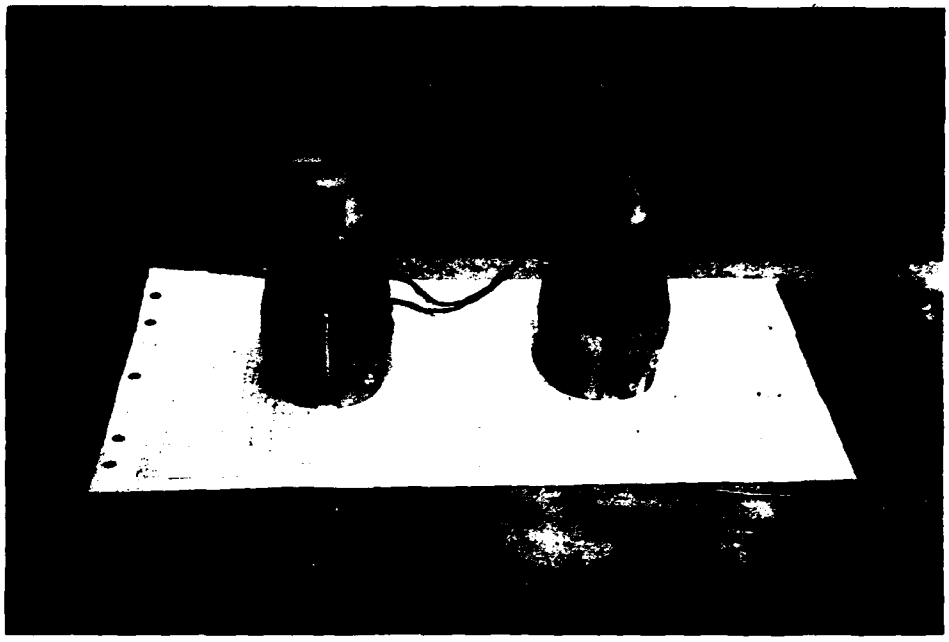

FIG. 6 MESSENGER (CLOSED AND OPEN)

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