XVII. SAMPLING TEST WITH PROTO-TYPE SAMPLING INSTRUMENTS

Norio Yamakado and Keiji Handa

Large dredge bucket

The large dredge bucket tested in this cruise had been originally designed and developed for the continuous line bucket mining system (C.L.B. mining system) to mine manganese nodules on the basis of the experimental data obtained in the indoor test tank and on the field test by the NRIPR. The bucket has a length of 125 cm, the height is 50 cm and the width is 90 cm as shown in Fig. XVII-1. It is characterized by the aluminum frame and synthetic fiber net of 0.7 m^3 in volume. Therefore, it is very light, having the weight of 36 kg.

Bulk sampling tests with this bucket were carried out at two stations of St. 722A and St. 733A. The bucket was towed as illustrated in Fig. XVII-2. The weight of 100 kg was attached to the wire rope at 100 m ahead of the bucket and a bundle of chains of 50 kg in weight was attached to the rope which passed through the net and was fastened to the end of the bucket frame in order to make the bucket heavier at descending. And the pinger was attached to the wire rope at 10 m above the weight. From the informations of the pinger records, the vessel speed and/or the wire rope length were adjusted to keep the distance between the pinger and the sea bottom in about 37 m, or to keep the towing angle of the bucket in about 16°.

As the results, the bucket collected the manganese nodules of some 180 kg at St. 722A and some 300 kg at St. 733 A.

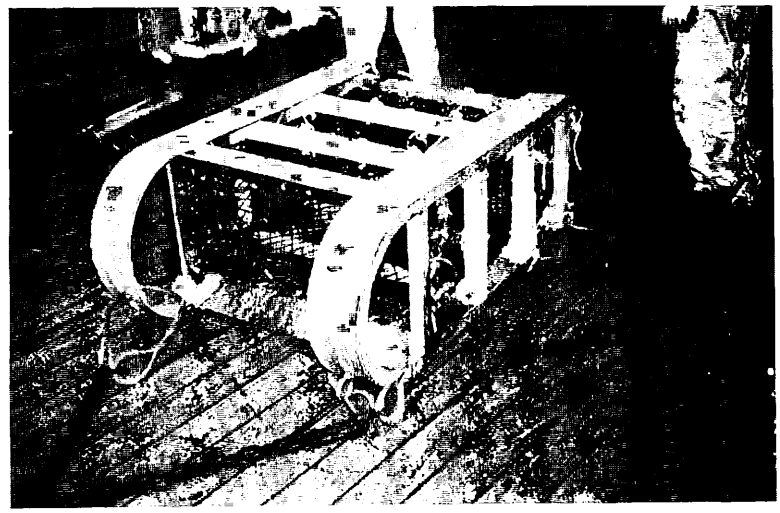

Fig. XVII-1 Oblique view of large dredge bucket.

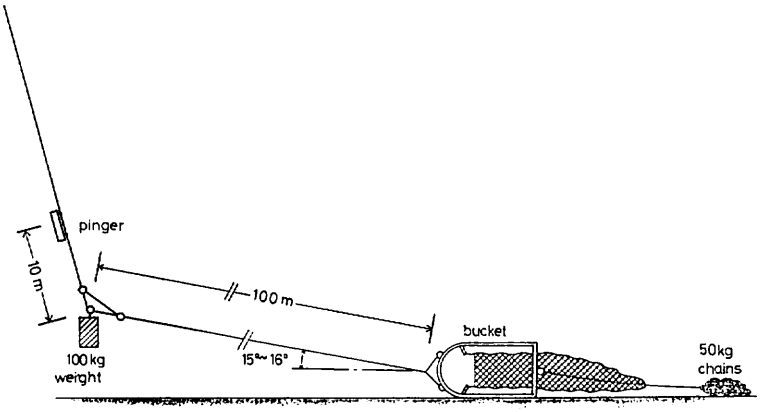

Fig. XVII–2 Schematic diagram of towing system of large dredge bucket.

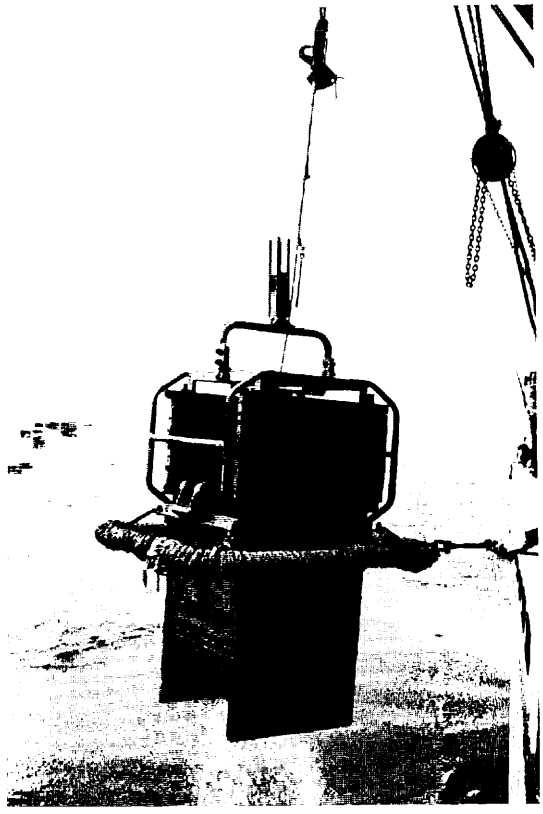

Fig. XVII–3 Box corer.

Box corer

The box corer, which could take the bottom sediments of 0.25 m^2 (0.5 m × 0.5 m) in area and about 80 cm in depth and had a bottom closure apparatus functioned by a shutter mechanism (Fig. XVII–3), had been designed by the NRIPR as a trial for sampling undisturbed bottom sediments.

This corer had showed desirable results at the sampling tests previously carried out in shallow water. It was the first time to test this corer in deep sea in this cruise. Tests were carried out at two stations of St. 733 and St. 734, and ended in failure at both stations. It was inferred as a cause of these failures that the safety pin to prevent the shutter from being tripped acted undesirably under the rough conditions of wave height of 3–4 m.