NEW TYPE OTTER-BOARDS FOR MID-WATER TRAWL

Kiichiro KOBAYASHI and Naoichi INOUE
Faculty of Fisheries, Hokkaido University

It is well-known that the wider the mouth of a trawl net opens, the better the catch of fish. But the mouth of the trawl net is apt to be shut by fluid resistance of the net while being towed. A pair of otter-boards is the only device which has been employed up to now to make the mouth of the trawl net open horizontally, though many inventions have succeeded to make it open vertically. Various devices and contrivances on otter-boards themselves, especially on otter-boards for a mid-water trawl, have been brought into use.

The authors have hitherto studied mid-water trawl fishing and made practical tests on it in sea water. One kind of otter-board used in practice by them is a new type; it is confirmed to be suitable for the small scale mid-water trawl net within 100 m^2 mouth areas. The construction and performance of this otter-board are herein reported.

Photos. 1 and 2 show the whole structure of this otter-board, of which Photo. 1 is a top view, Photo. 2 a rear view. Each board is set up with several thin cedar plates, 27 mm in thickness, to form an S-shaped curvature. The device measures 2 m in length and 1 m in height. The curvature is held by two bent angle iron strips on the upper and lower edges, and steel pipes, 27 mm in diameter, are respectively installed to the front and rear edges to protect from injuries caused by striking floating objects. Two steel plates, having nearly equivalent weight to the buoyancy of the board in sea water, are fitted to the lower part of the board, so the net weight of this board in sea water becomes nearly zero. Thus two good results are obtained of the device not arbitrarily rising up or sinking down in the sea and of the easy hauling of a trawl gear. When the otter-boards are thrown in the sea, they are easily apt to stand upright because of the center of gravity being at the lower part of them. The big radius curvature at the front of the board is made to resemble closely the Clark-Y aerofoil which easily generates a big thrust, on the other hand, the small radius curvature at the rear part serves as a rudder which offers an adequate attack angle to the otter-boards while being towed.

A small tail wing, about 800 cm^2 in area, set in the back center of the rudder, serves as a stabillizer and decreases harmful oscillations of the boards. As the net weight of the board in the air is no more than 40 kg, a single man can easily operate it by himself on the fishing vessel.

This otter-board is towed by only one pennant wire rope shackled to the L-shaped angle-iron, 40 cm in length, which has several holes for the purpose of changing the setting point of the pennant wire and is bolted near the front edge on the center line of the board.

In a preliminary test the writers found the most suitable hole to which to shackle

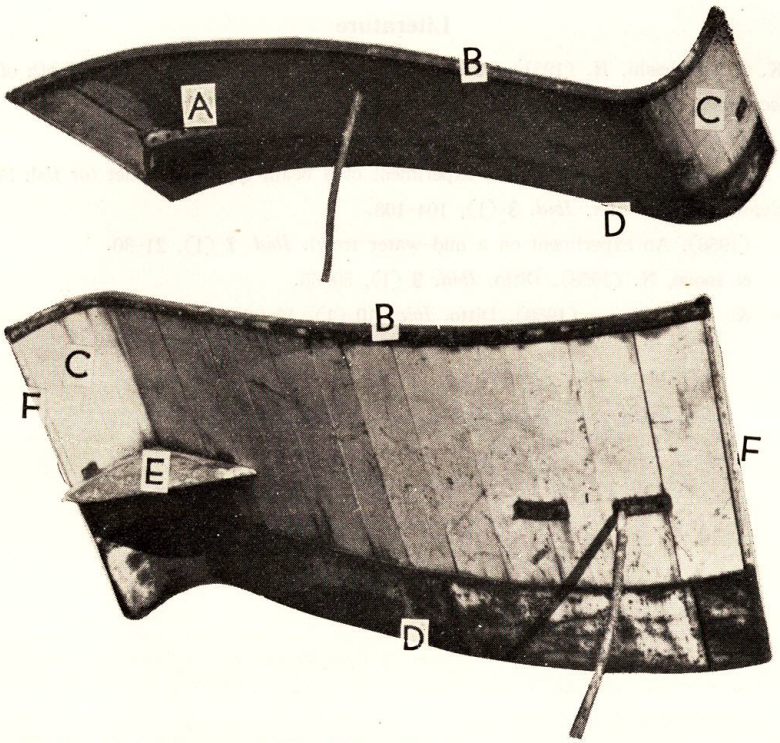

Photo. 1. A top view of this otter-board
Photo. 2. A rear view of this otter-board
A : L-shaped angle-iron to which to shackle the pennant wire
B : Angle-iron strips
C : Rudder
D : Steel plates
E : Tail wing
F : Steel pipes

the pennant wire, which gave the maximum thrust to the otter-board. That hole was at about 35 cm distance from the front edge of the otter-board. If area and curvature of the rudder are altered, attack angle of the board may be changed, then thrust and resistance may also be changed, so the preliminary test is necessary in order to find the suitable point for the hole to which to shackle the pennant wire. Also in the preliminary test it was found that the thrust force produced by this otter-board was about 210 kg and the resistant force was about 140 kg at speed 3 knots.

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