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New Ground Rope for 238 Ton Stern Trawlers

BY

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Introduction

The sea bottom of the Wadge and Pedro Banks is not even and extensive areas are covered with hard corals and rocks, which cause frequent damages to the net and sometimes total loss of the gear (Hamuro, 1966). This has been one of the main reasons why trawling had been restricted to a small area of the Wadge Bank until recent years. Hamuro (1966**b**) after studying the fishing grounds, designed a ground rope equipped with rubber rollers for use with his Four Seam Trawl Net. Fernando (1968) gives the details and description of the net and ground rope.

Okonski (1969**a** and **b**) designed three rubber bobbins of different sizes and shapes for constructing a ground rope to protect the net from corals and rocks. The author constructed the ground rope and carried out trawling trials using a net equipped with the new ground rope. During the first trials the rubber bobbins were fixed to the bosom part of the ground rope only. Subsequently, a complete ground rope was turned out and experiments were successfully carried out.

Conventional Manila Ground Rope.

The trawlers operating from Ceylon have been using a $1\frac{1}{2}''$ steel wire served with manila rope as the ground rope. This type of ground rope easily gets entangled with rocks and corals causing damage to the net. It produces vibrations changing the shape of the mouth of the net. Due to the rough nature of its surface it gives rise to a high frictional force opposing the direction of motion which in turn decreases the towing speed. The manila rope covering the wire gets easily dissipated due to constant rubbing against the sea bottom and must be frequently replaced.

The New Rubber Ground Rope

Designs of rubber bobbins are as shown in Fig. (1). They are made out of natural rubber having a shore hardness of 75°–80° B. S. They have no reaction with sea water, can withstand very high pressures and absorb shocks. Specific gravity of rubber is about 1.28 compared to the specific gravity of sea water 1.04. The composition of the ground rope is given in Table 1.

Table 1—Composition of the Ground Rope

	Bosom	Middle	Wing
Length of Steel Wire ($1\frac{1}{2}''$)	21′	2×21′	2×28′
No. of large rubber bobbins	20	14	29
No. of medium rubber bobbins	20	27	29
No. of small rubber bobbins	41	41	59
180 mm. Dia. Iron Balls	2	—	1
Iron Rings	—	—	1
Thimbles	2	2	2
Iron Clamps	3	4	3

The ground rope was made by passing a $1\frac{1}{2}''$ circumference steel wire through rubber bobbins. The complete ground rope (119 feet) consists of five parts and the arrangement of rubber bobbins is shown in Fig. (2) and (3). Four iron balls (diameter 180 mm.) were added (two to the bosom part

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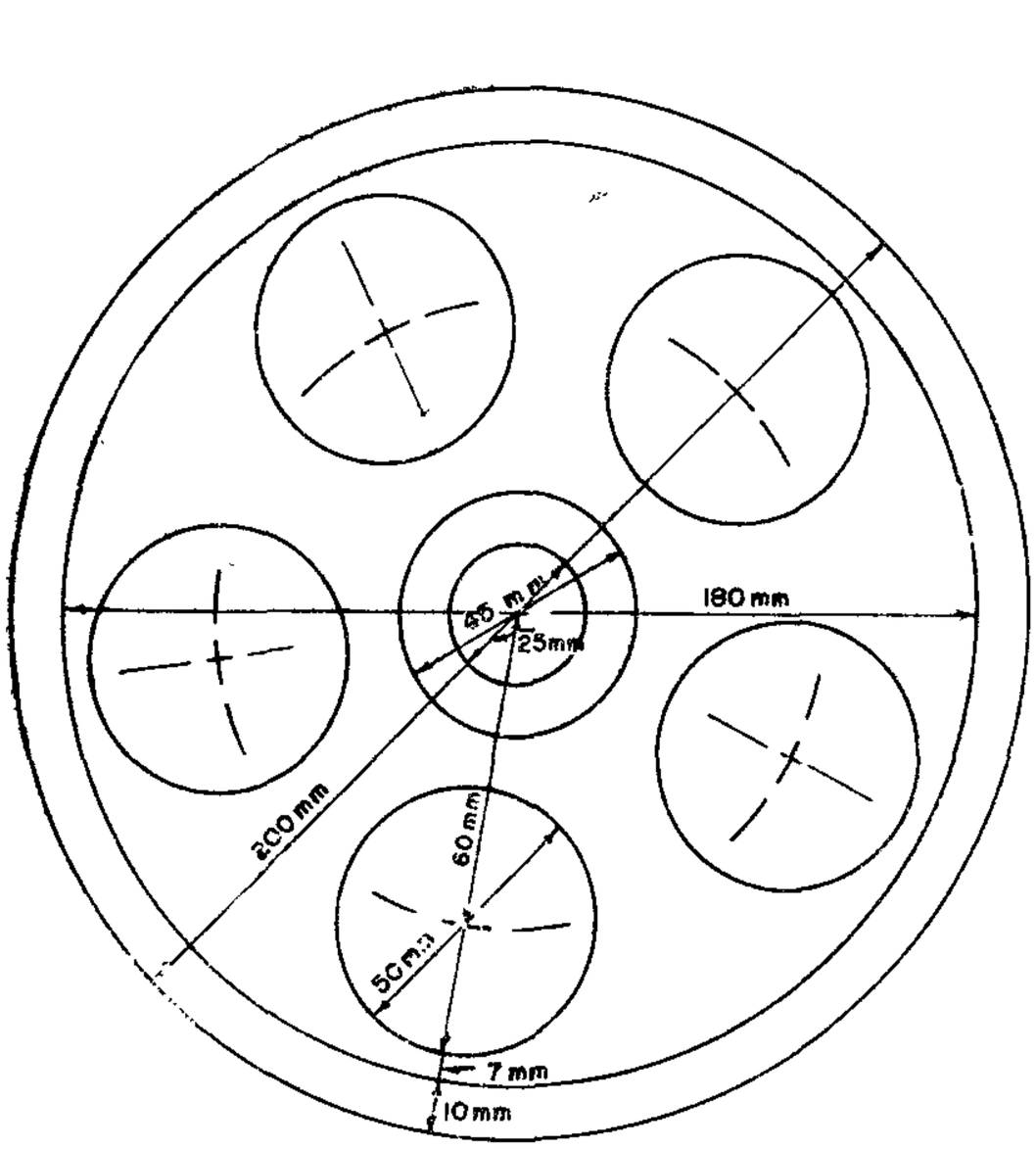
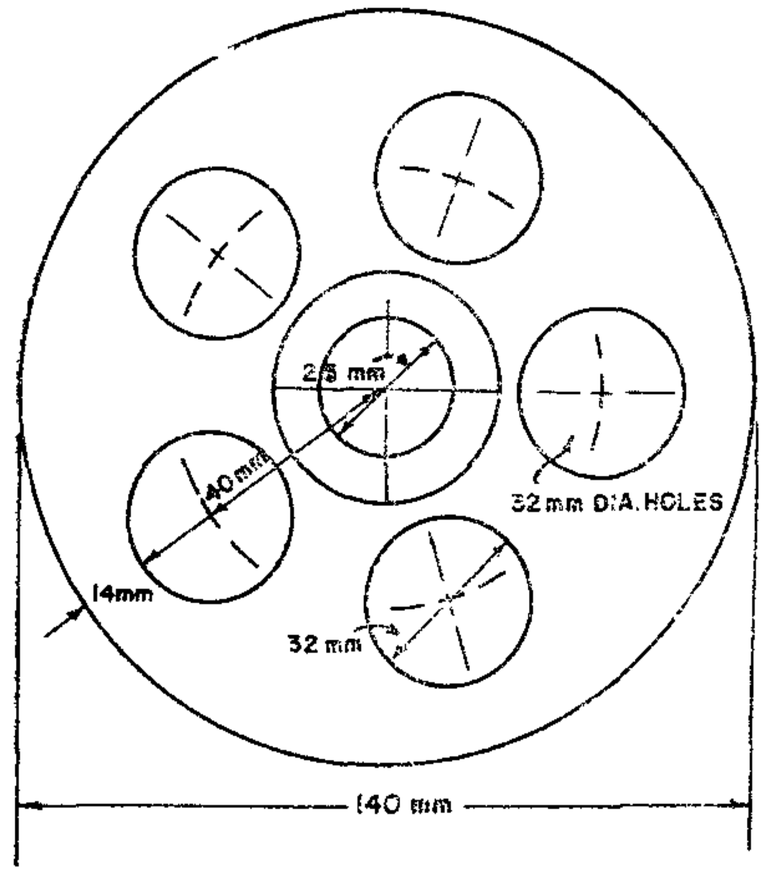
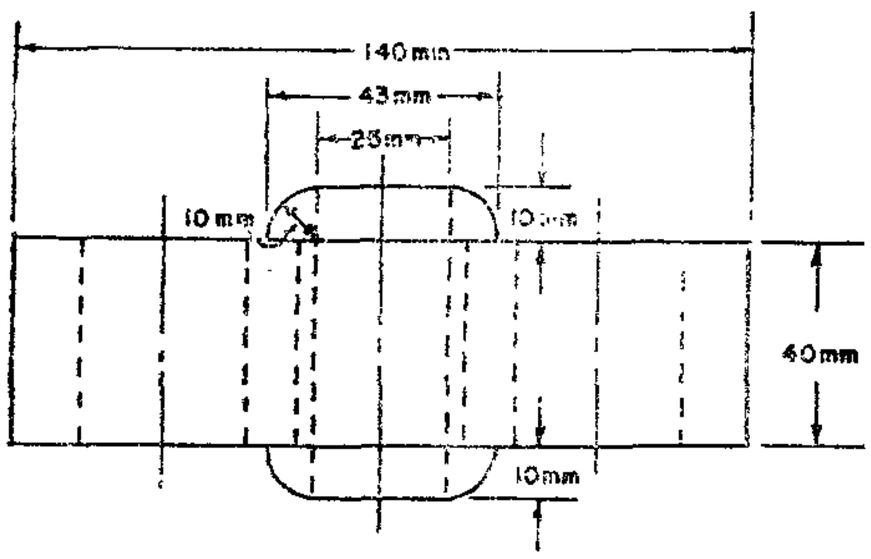
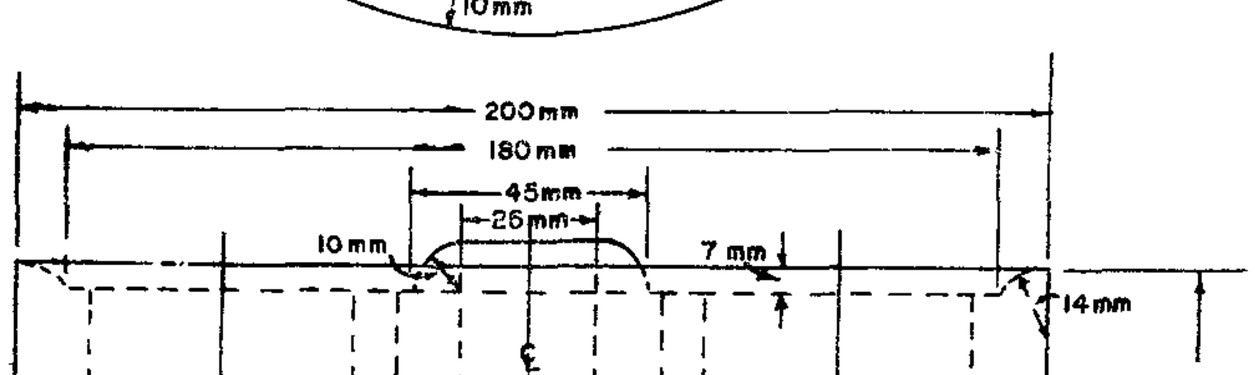


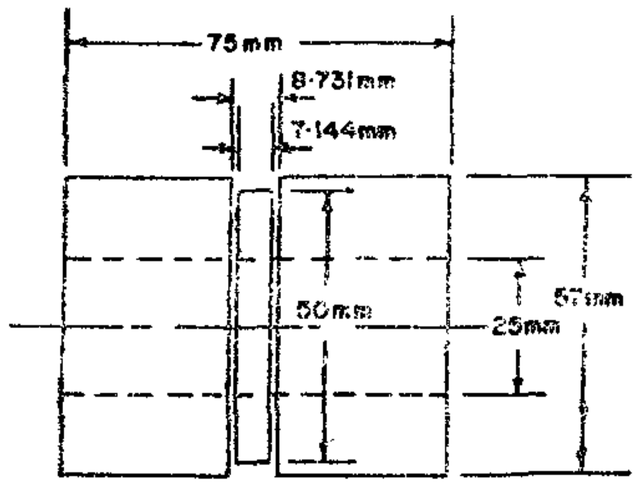




RUBBER BOBBIN 'B'



RUBBER BOBBIN 'A'



RUBBER BOBBIN 'C'

Fig. 1—Design of Rubber Bobbins

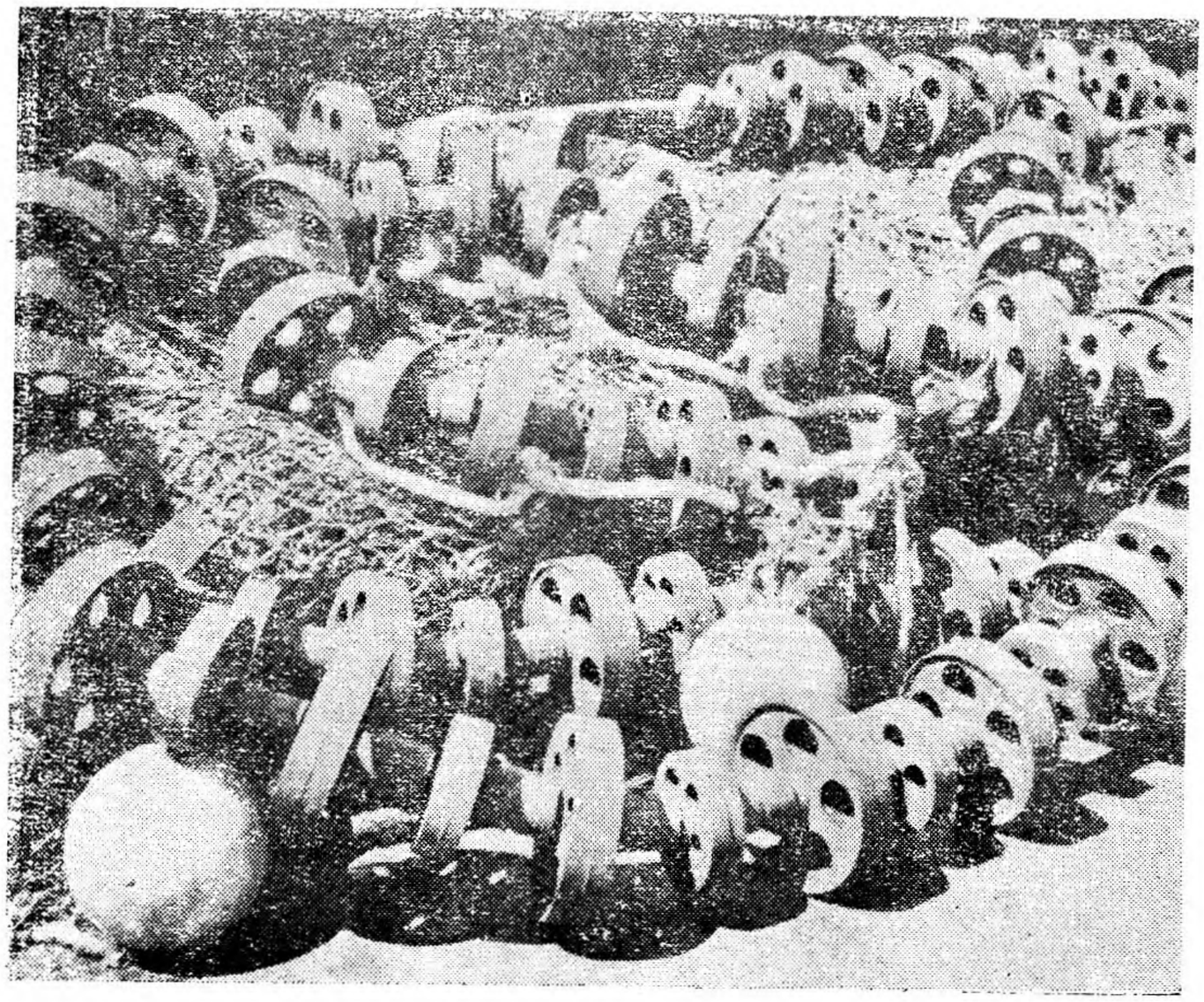


Fig. 2

Complete Ground Rope Constructed with Rubber Bobbins

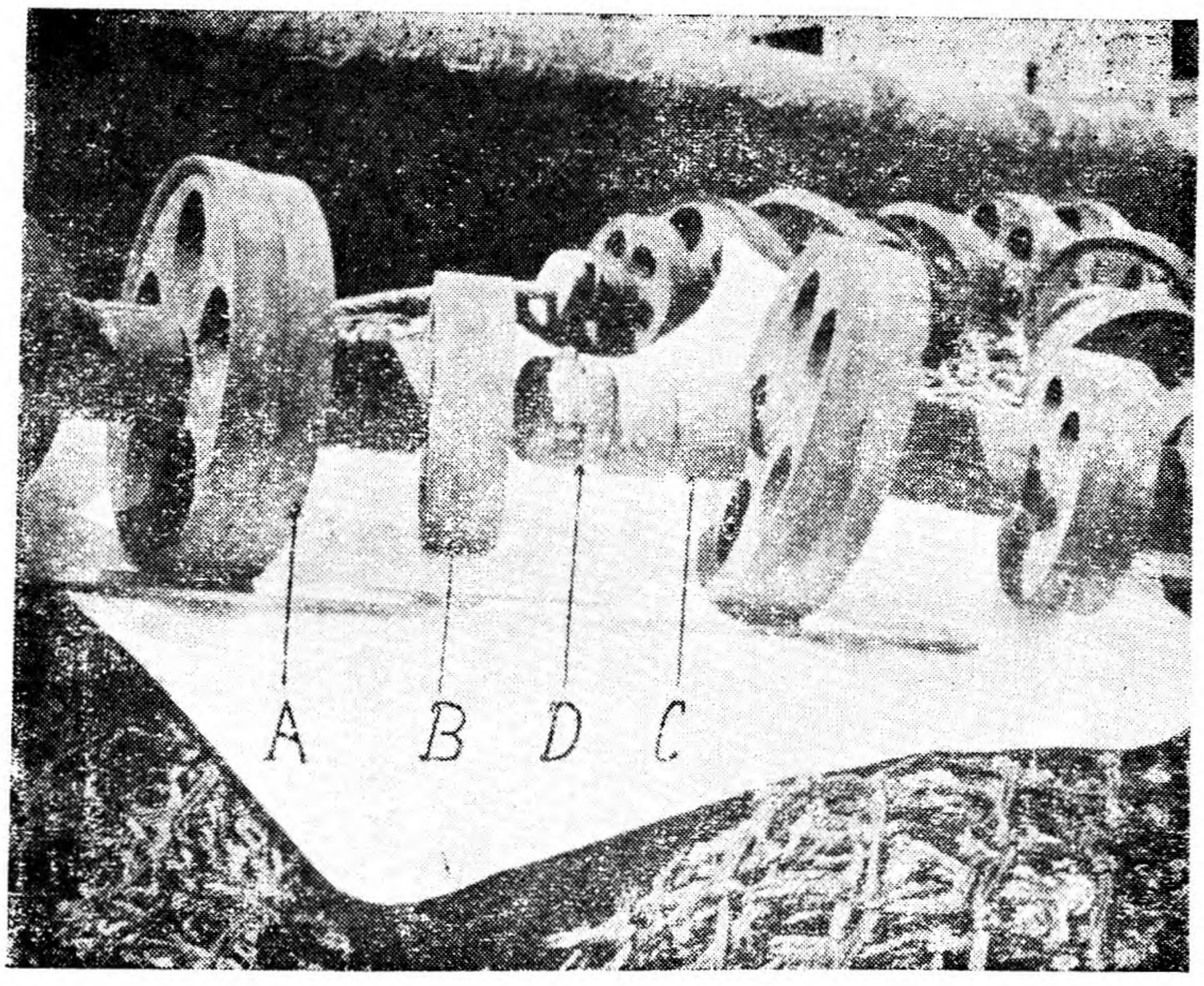


Fig. 3

Closeup of a Portion of the Ground Rope to show the Arrangement of the Rubber Bobbins. A. Large Bobbin. B. Medium Bobbin. C. Small Bobbin. D. Iron Clamp.

and the other two to the two wing ends) to increase the total weight of the ground rope. Special iron clamps as used in Hamuro's ground rope were used for the following reasons :—

(1) The rubber bobbins are not heavy enough to keep the ground rope in contact with the sea bottom. The iron clamps provide the required weight and keep the ground rope in touch with the bottom.

(2) Due to their firm grip on the wire, they keep the rubber bobbins in position and prevent them from sliding along the wire.

(3) The rubber bobbins could be recovered even if the steel wire breaks while in operation.

Experiments with the Bosom Part of the Ground Rope

The bosom part of the rubber ground rope was rigged in February, 1969, and observations made during an experimental trip indicated that the bosom part of the ground rope was functioning well. The bosom part of the net did not sustain any damages during the first few days of fishing with the net. The net got entangled on a few occasions, but in every case the damages were to the wings while the bosom part remained undamaged.

Experiments with the complete Ground Rope

A complete ground rope was constructed as the trials with the bosom part proved to be a success. A Granton trawl of head line length 24.1 m. (79 ft.) made out of synthetic twine with the new ground rope was used during an experimental trip of the m/t Beruwala during May/June, 1969. The normal danleno rig was applied, 50 fathom, $1\frac{1}{2}''$ circumference steel wires were used as bridles. A direct comparison of the two ground ropes was difficult. The normal manila ground rope was used during the first three days of fishing and then replaced by the rubber ground rope. The same rigging method except for an increase of the number of aluminium floats from 26 to 28 was used with the rubber ground rope. The towing speed was measured using the board log. The horizontal opening of the net was achieved with two rectangular otter doors, of dimensions 2.85 m. $\times$ 1.35 m. $\times$ 0.08 m. The net was first used with the manila ground rope and subsequently with the rubber ground rope. The horizontal opening or the spread at wing ends and the towing speed were measured in each case (Okonski 1968).

Advantages of the New Rubber Bobbin Ground Rope

The horizontal opening of the net with the manila ground rope was 12.1 m. which is nearly 50% of the headline length. There was no change in the horizontal opening with the rubber ground rope. But the average towing speed increased from 3.22 knots to 3.41 knots at 320 r.p.m. Some of the advantages of the ground rope over that of the old type manila covered steel wire are :—

(1) Rubber bobbins usually slip or roll over the obstacles and provides protection to the net and the ground rope.

(2) The resistance of the ground rope becomes low due to the rolling effect of the rubber bobbins. This in turn increases the towing speed (as was observed). This is accompanied by an increase in the efficiency of the net or the area traced by the net in unit time as the horizontal opening remains unaltered.

(3) Limited vibrations are produced and the fish detect the net at a comparatively shorter distance.

(4) It reduces the amount of corals and other bottom fauna going inside the net.

(5) It is easier to be handled on deck and easier to repair.

(6) Manila ground rope normally has to be replaced very frequently (about one ground rope per trip) but the rubber ground rope could be used over a longer period.

Conclusion

It is evident from the experiments that this ground rope is suitable for fishing grounds like the Wadge Bank, Pedro Bank and other trawlable patches where the sea botton is very rough. Further trials will be carried out using bobbins made out of harder rubber.

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