



BAY OF BENGAL PROGRAMME
DEVELOPMENT OF SMALL-SCALE FISHERIES



IMPROVED DECK MACHINERY AND
LAYOUT FOR
SMALL COASTAL TRAWLERS

BOBP/WP/21

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Executing Agency:
Food and Agriculture Organisation
of the United Nations

Funding Agency:
Swedish International
Development Authority

Development of Small-Scale Fisheries in the Bay of Bengal
Madras, India, June 1983.

Some 15,000 trawlers operate all along the east and west coasts of India. This working paper presents details of innovations to improve the deck machinery and layout of small coastal trawlers in Tuticorin and Nagapattinam. They are also applicable to coastal trawlers elsewhere in the region.

The innovations were tried out during fishing trials of high-opening bottom trawls begun in 1980 in Palk Bay and the Gulf of Mannar. They led to more efficient handling of trawls and to safer and more comfortable working conditions for the fishermen in pursuance of the objectives of BOBP. The design, testing and demonstration of the innovations were therefore undertaken as an activity supplementary to the fishing trials. The two activities are consequently reported in separate working papers (BOBP/WP/20 and BOBP/WP/21).

The work was done in co-operation with the Tamil Nadu Directorate of Fisheries, which provided two trawlers and counterpart staff for the trials; and private boat-owners on whose boats new equipment was installed.

The Project for Small-Scale Fisheries Development of the Bay of Bengal Programme, GCP/RAS/040/SWE, is funded by the Swedish International Development Authority (SIDA) and executed by the Food and Agriculture Organisation of the United Nations. Five countries—Bangladesh, India, Malaysia, Sri Lanka and Thailand—are members of the Programme. Its main aims are to develop, demonstrate and promote technologies and methodologies to improve the conditions of small-scale fisherfolk and the supply of fish from the small-scale sector in the Bay of Bengal region.

This report is a working paper and has not been cleared by the Government or by the FAO.

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1. INTRODUCTION

To explore the possibilities of deploying a part of the fleet of small coastal shrimp trawlers of Tamil Nadu in the food fishery, BOBP started fishing trials in 1980. The main aim was to reduce the fishing effort exercised in the shrimp fishery and to improve the economy of the trawlers. The first trials, conducted March—July 1980 from Mandapam, were reported in Working Paper BOBP/WP/10. A second series of trials at different locations took place April 1980—May 1981. These trials were described in Working Paper BOBP/WP/20. From the beginning of the fishing trials, staff and consultants identified ways by which the gear handling could be improved to increase the efficiency of fishing operations and ensure safer and more comfortable working conditions for the crew.

During the second series of trials, it was therefore decided to modify the vessels provided by the Directorate of Fisheries (Appendix 1) and test the innovations during the fishing trials.

2. VESSELS

The vessels used are of local construction and of standard design quite common for prawn inshore trawling off Tamil Nadu using otter-trawls. The principal characteristics are:

Construction material	Wood
LOA(m)	10
Beam (m)	2.9 to 3.5
Draught (m)	1.1 to 1.2
Engine (hp)	65 to 75

The vessels are normally equipped with mechanically driven trawl winches installed on the deck aft of the engine housing. The towing warps are lead to the hanging sheaves supported by the mast and then on to the sheaves of the trawl gallows from which the otter boards are suspended when the trawl is brought aboard. The net and cod-end are handled manually with the help of a lifting boom attached to the mast (Appendix 1).

3. NEW EQUIPMENT

To improve the working conditions on deck and to make the fishing more efficient, the following components were developed and demonstrated.

Gantry	Appendix	2
Net-drum mounted on gantry	..	3
Net-drum on deck	..	5
Three-drum winch	..	7
Tiltable-drum winch	..	8
Swivel-cum-split links	..	10
Cod-end clip	..	11

All components were manufactured in Madras and Tuticorin in co-operation with local workshops. They were initially installed on the Directorate's vessels for testing and demonstration and subsequently on private boats.

3.1 Gantry

The 32 footers are always provided with a wooden mast, a boom and two trawl gallows for shooting and hauling of the net and for lifting the cod-end of the net.

During the initial trials of high-opening trawls, much difficulty was experienced on days of good catches. When full of fish the cod-end suspended in the boom was swinging violently at the transom while hauling before it could be brought on deck.

A gantry would obviate this hazard and would eliminate the need for the mast and boom, the stays of the mast and boom, and the trawl gallows. The gantry designed and introduced is shown in Appendix 2. It costs about Rs. 4,500—about Rs. 1,000 more than the conventional equipment of mast, boom, gallows, etc. Considering the advantages of the gantry—fuel-saving and reduced time for gear handling—the fishermen were quickly convinced about its merits. About a dozen of the new boats built after the demonstration have been equipped with the gantry.

3.2 Net-drums and three-drum winch

The usual practice of hauling the net on board a 32-footer in this region is manual—by the deckhands. It would be advantageous to use mechanical power not only for hauling the trawl warps up to the otter boards, but also for the complete net till the cod-end comes to a position ready for hauling through the gantry. Time is saved by heaving the net mechanically. The boat can be kept in the forward motion, always driving the fish to the cod-end and preventing escape of fish that had entered the mouth, and also reducing the risk of the net getting fouled with the propeller. There is less physical strain on the crew since they are only to guide the net and sweeps on to a net drum.

Keeping these advantages in view, the BOBP initially designed a “net drum” mounted on the gantry (Appendices 3 and 4). The net drum is driven by a warp connected to an additional third drum of the winch developed in co-operation with local winch manufacturers (Appendix 7).

The fishermen experienced heavy rolling of the boat in rough weather conditions with the net drum mounted on the gantry; the stability was affected. The existing boats are not wide enough to carry such an installation. In these circumstances the net drum was mounted on the deck. This modification proved effective. (Appendices 5 and 6).

The cost of the net drum works out to Rs. 1,500 and the entire third drum provision on the winch costs Rs. 2,000.

3.3 Tiltable drum winch

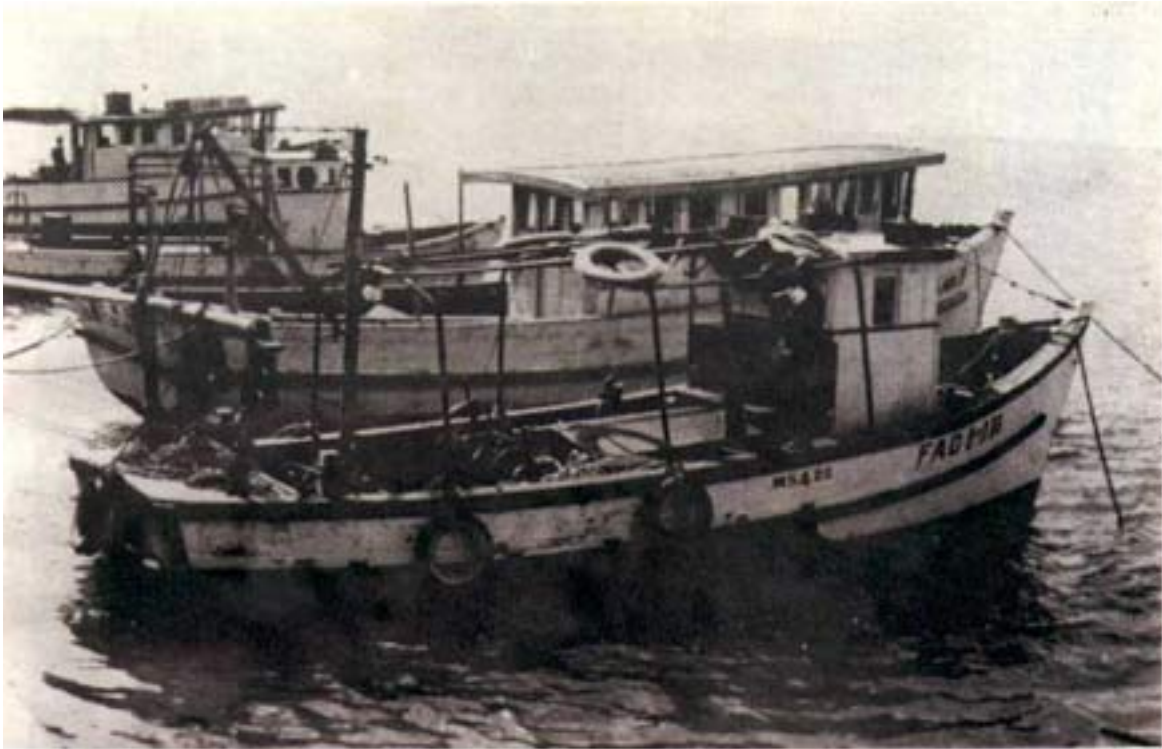
Locally constructed boats are normally equipped with a mechanically driven two-drum trawl winch. The winches are mounted aft of the engine room hatch. The drive for the winch is taken from the power take-off unit of the engine through a 8' to 9' transmission shaft mounted on a wooden beam with three plumber-block-units.

From the winch drums the trawl warps are led to the hanging sheaves, once at the mast and again by a sharp turn to the hanging sheaves at the trawl gallows.

During the experiments the following improvements were introduced. The position of the winch was moved forward by about 2 m, placing the winch right on top of the power take-off unit (Appendix 9). This eliminates the need for transmission shaft and connected plumber blocks and beams. It also leaves more free working space on the deck.

A new winch with tiltable drums by means of universal joints was developed (Appendix 8). By this arrangement the warps can be led directly to the sheaves at the gallows/gantry, eliminating sharp bends on the wire, and thereby prolonging the life of the warp. This arrangement also clears the deck from obstructing wires and facilitates easier handling of gear and fish. Another advantage is that the tiltable-drum winch has a self-winding system. No manual or mechanical guide is required to wind the wires uniformly on the drums, as the angle of the tiltable drum is in line with the gallow-pulley.

Improved deck machinery and layout for small coastal trawlers

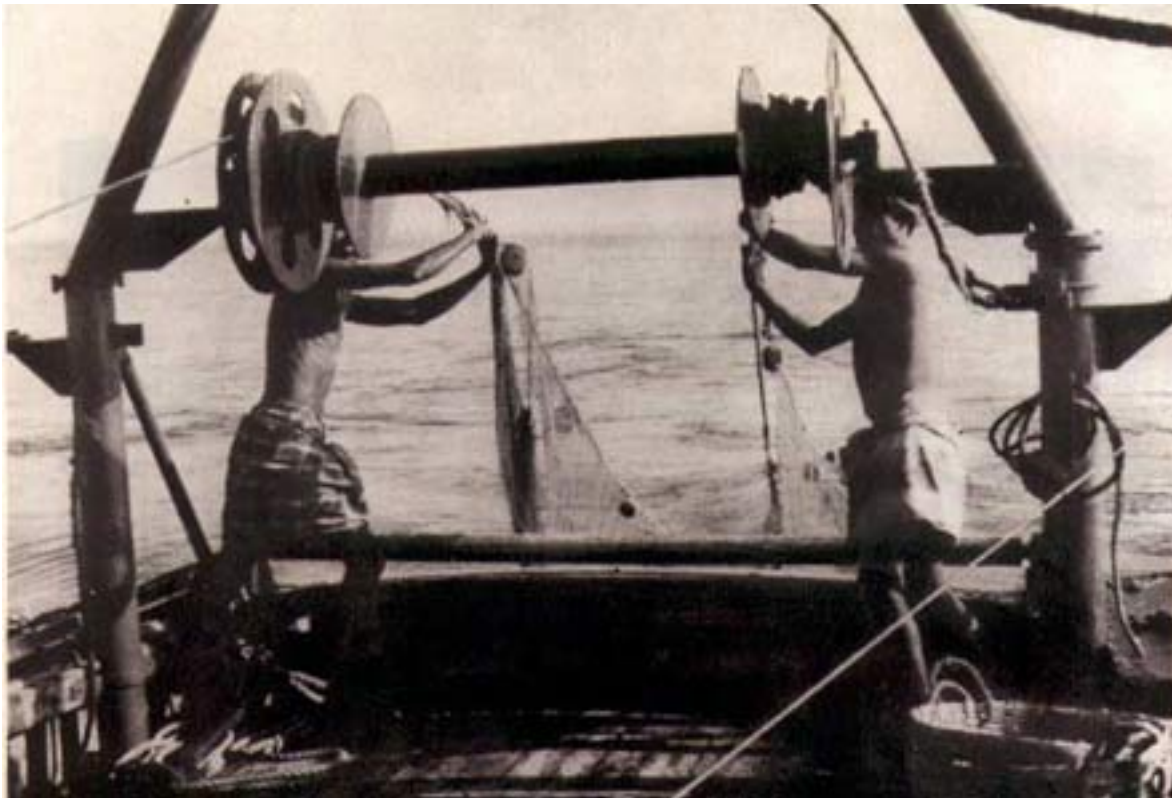


Above: Standard 32 foot trawlers used by the BOBP during experimental trials. Below: Trawler with gantry and other deck machinery introduced by BOBP to improve gear handling.

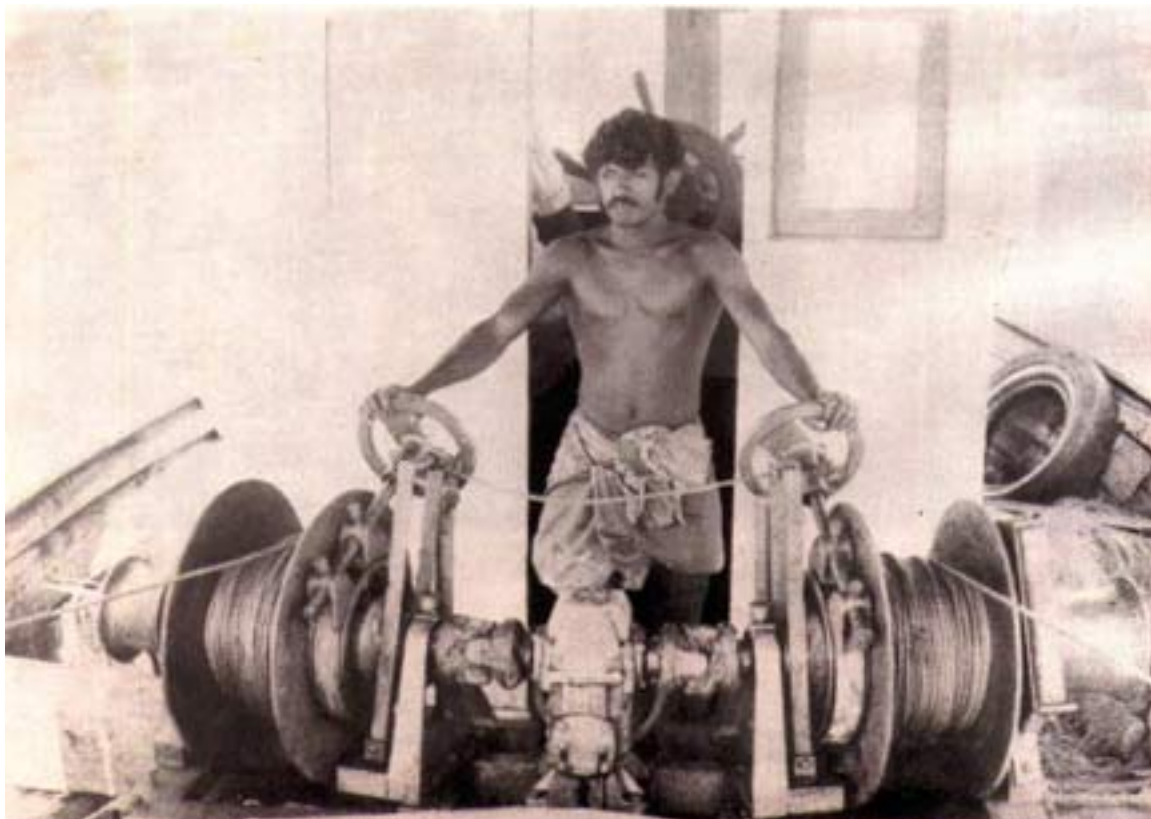




Net being hauled through a net-drum mounted on the deck.



Above: Net-drum mounted on gantry. Sweepilnes and net are being hauled through the net-drum. Just two men guide the net Below: A tiltable two-drum winch being operated by a single person. This is a "self-winding" system – no guide is required to wind wires on drums.



Keeping all this in view, tiltable winches were made under the direct supervision of BOBP at a local manufacturing workshop. About a dozen newly constructed boats of Tuticorin have been equipped with this type of winch and arrangement. It seems that most future boats will adopt this solution. The cost of a tiltable drum winch is about the same as that of a traditional winch – Rs. 6,500. Additional items are two universal joints; the use of transmission-shaft and plumber blocks is eliminated.

3.4 Swivel-cum-split links and split links

In the course of the trawling trials, many problems were encountered with hardware such as 'D' shackles and swivels, which were of poor quality. The operation was cumbersome even with the help of such tools as spanners, spikes and hammers.

To overcome this, the shackles were replaced by split links and swivel-cum-split links for connecting the trawl-warp to the otter doors, the otter doors to bridles and sweeplines, and sweeplines to the legs of the trawl (Appendix 10). The adoption of these devices saves considerable time in the fishing operation, and ensures easy handling – particularly when a complete net is replaced out at sea.

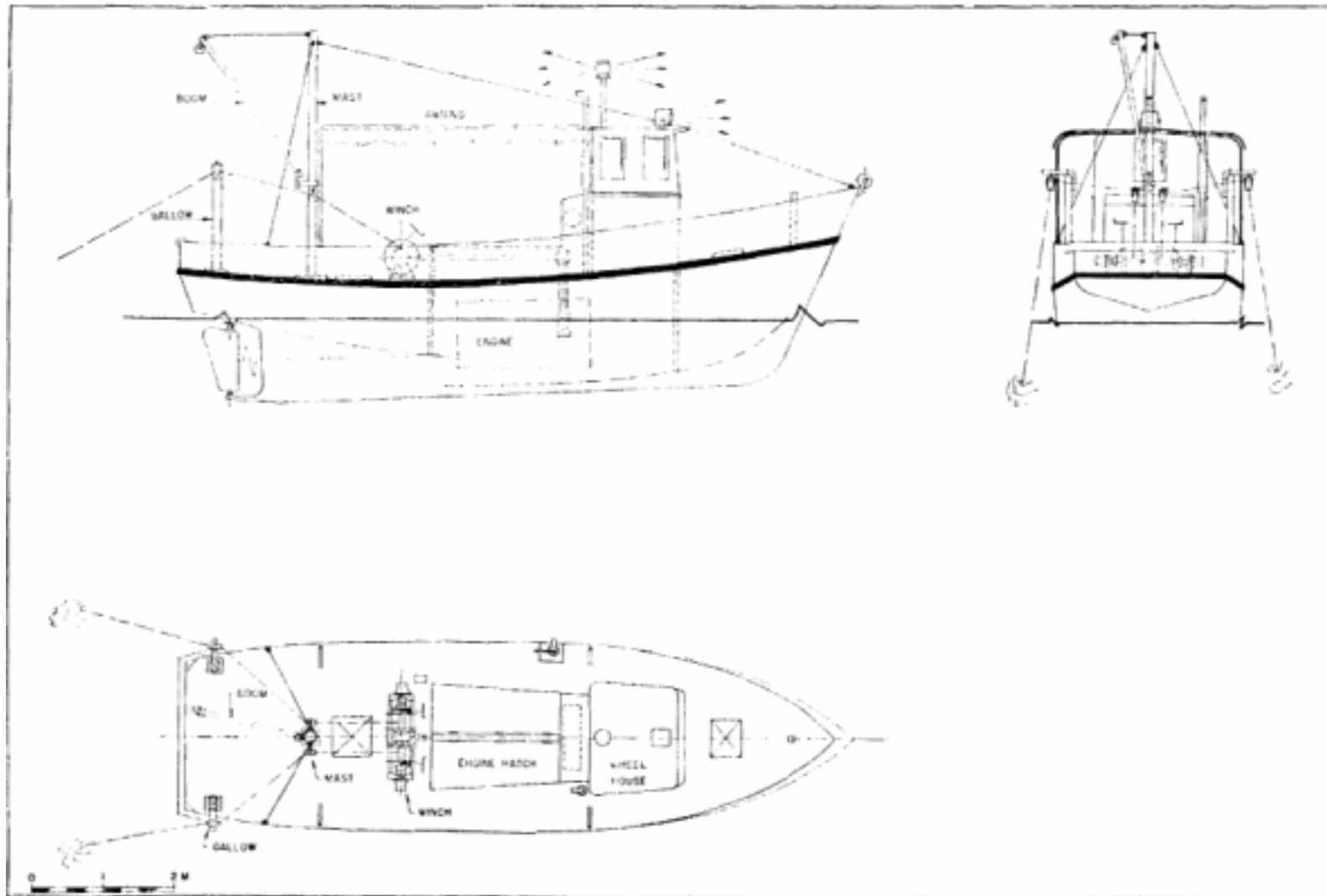
The devices are both cheap (Rs. 10 for a split link and Rs. 40 per swivel-cum-split link) and durable.

3.5 Cod-end clip

The cod-end of a trawl is normally closed by passing a cord through the meshes and by using slip-knots on the cord.

Sometimes, when the cod-end is full, it is difficult to release the cord of the cod-end as the knot gets jammed. To remedy this shortcoming and save time, a cod-end-clip was locally manufactured and its application demonstrated to fishermen (Appendix 11). They found it very useful. The cost of one cod-end clip is Rs. 75. Most of the boat operators of Tuticorin and Rameswaram are now using this in their trawls.

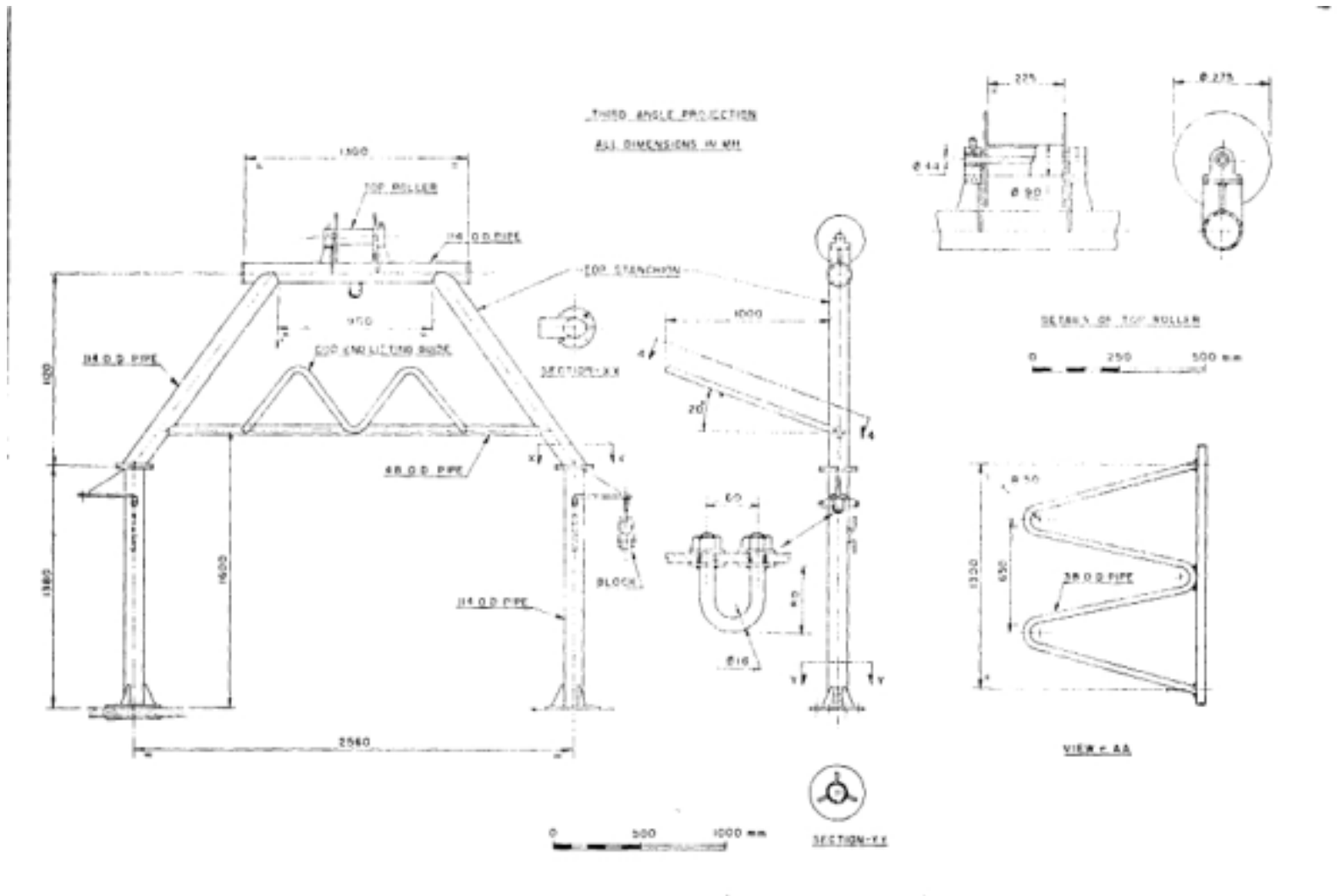
Appendix 1: LAYOUT OF TRADITIONAL TRAWLER



[8]

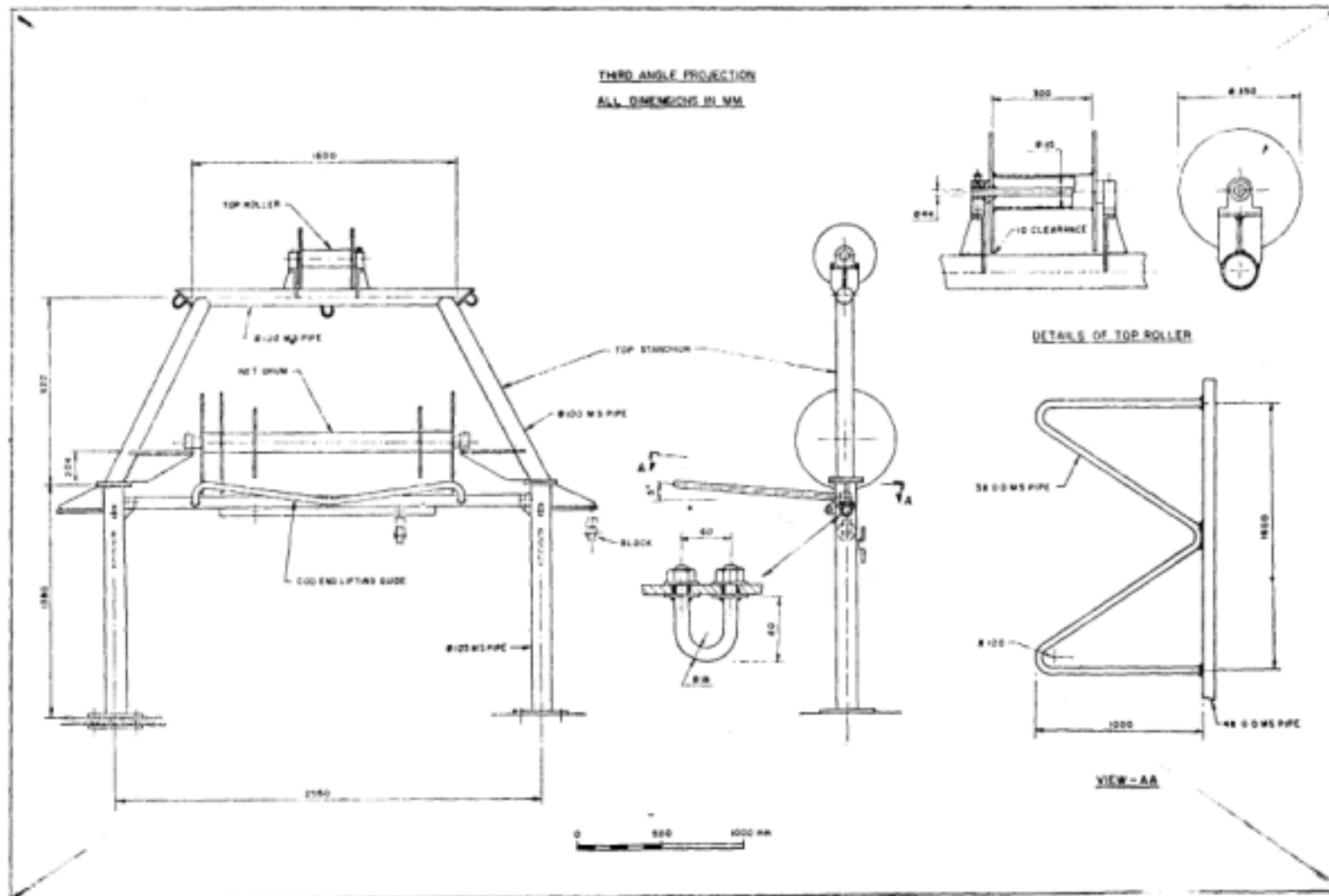
Appendix 2: DETAILS OF IMPROVED GANTRY FOR INSHORE TRAWLER

[6]



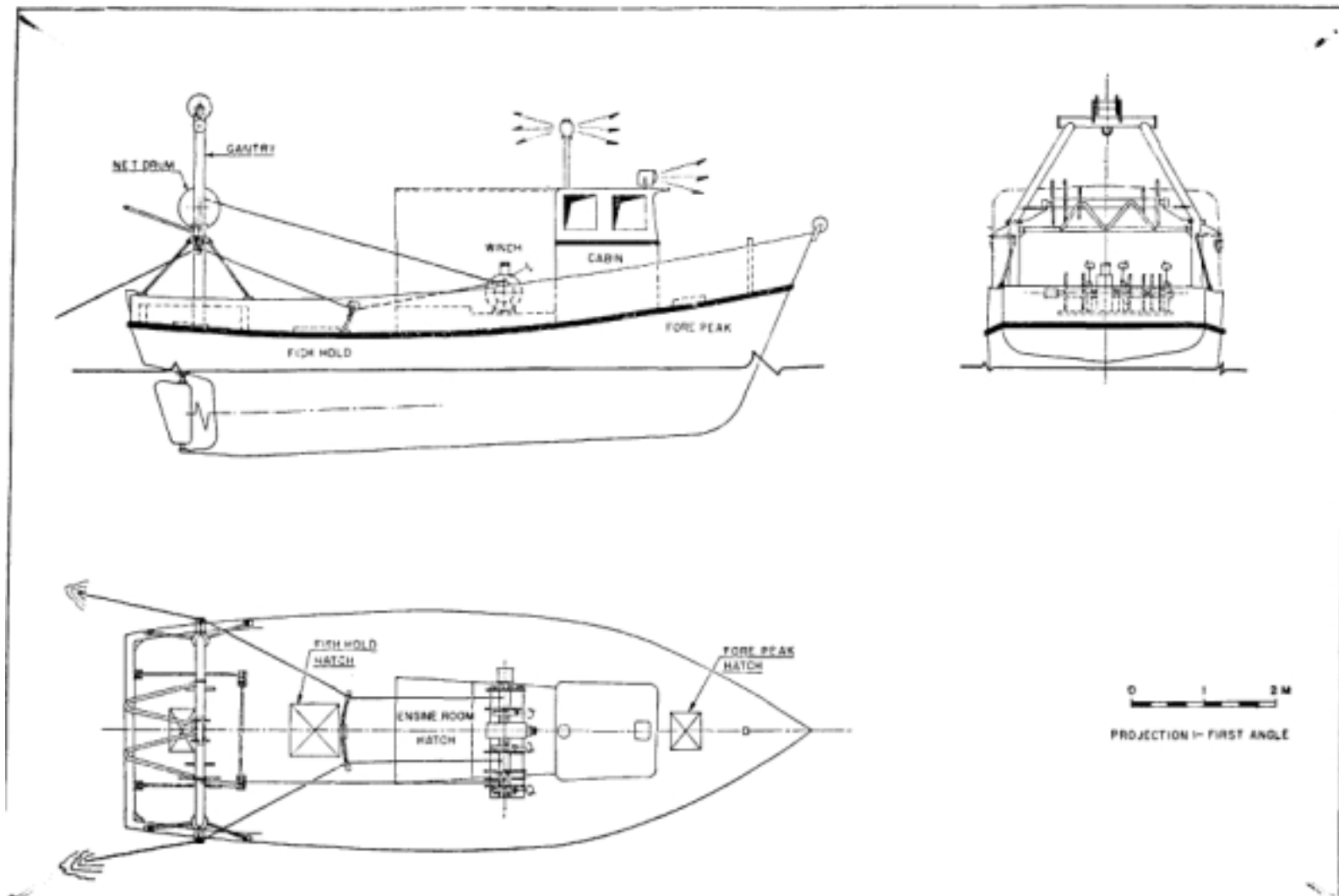
Appendix 3: DETAILS OF NET-DRUM MOUNTED ON GANTRY

[10]



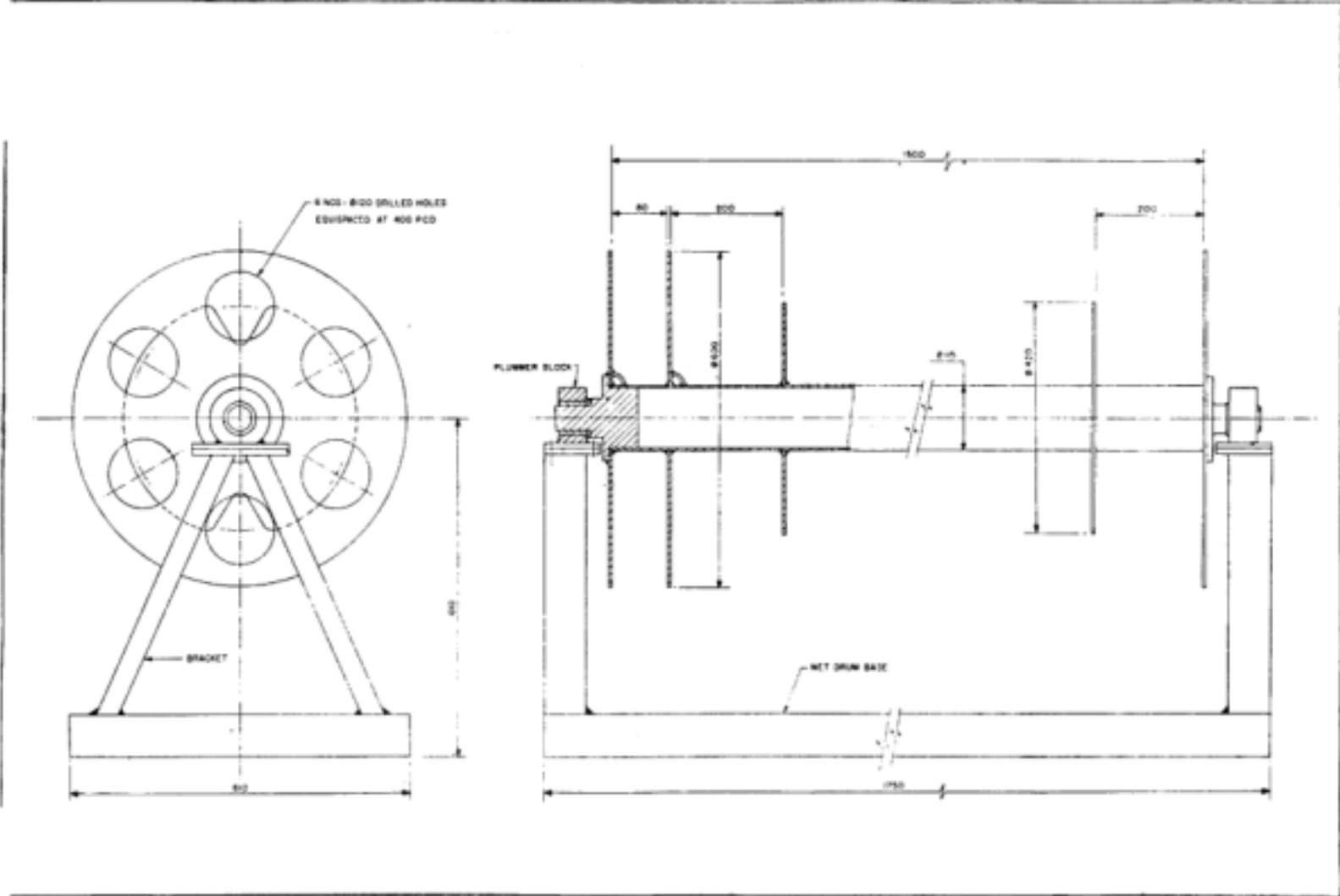
Appendix 4: LAYOUT OF WORKING DECK: NET-DRUM MOUNTED ON GANTRY

[11]

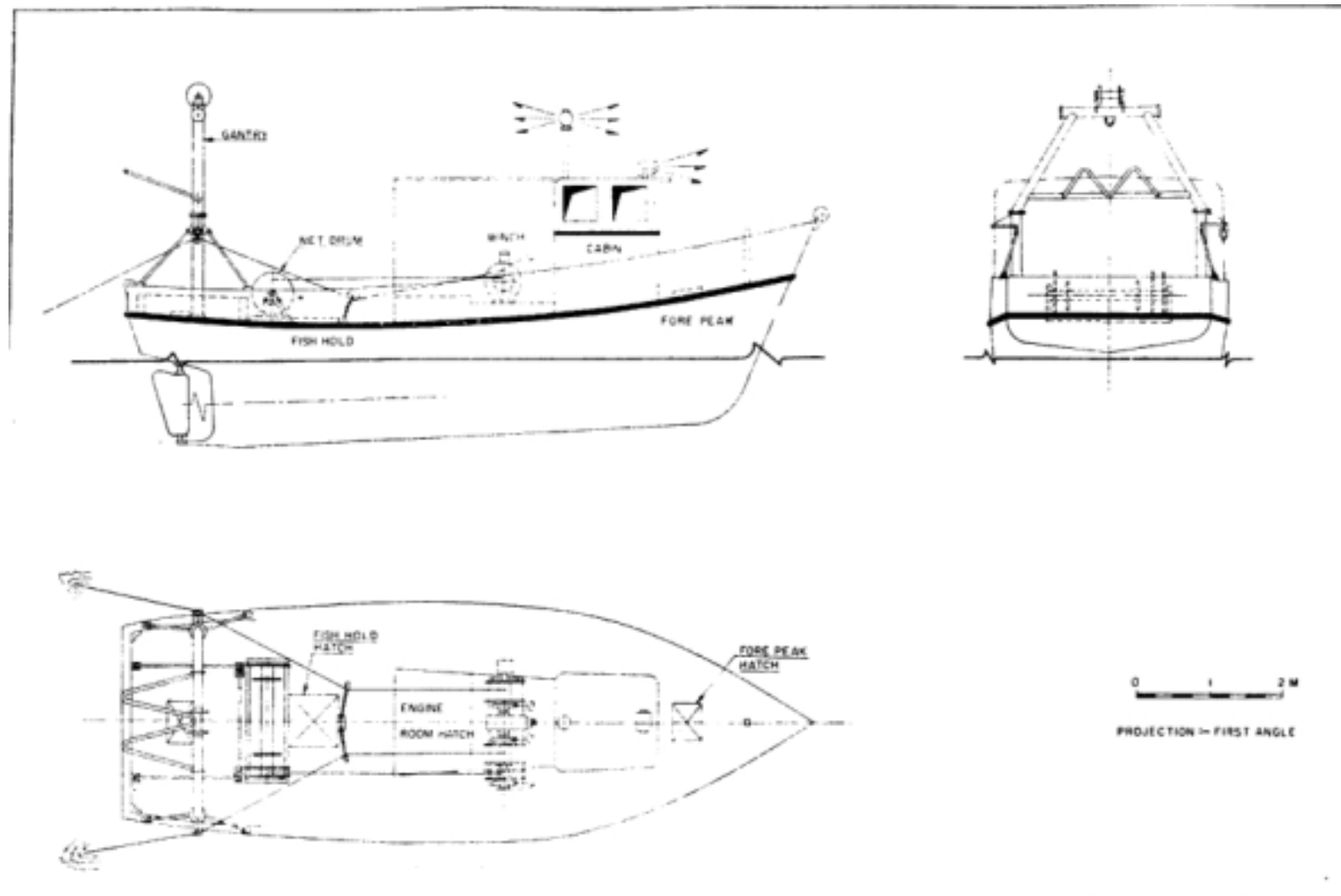


Appendix 5: DETAILS OF NET-DRUM MOUNTED ON DECK

[12]

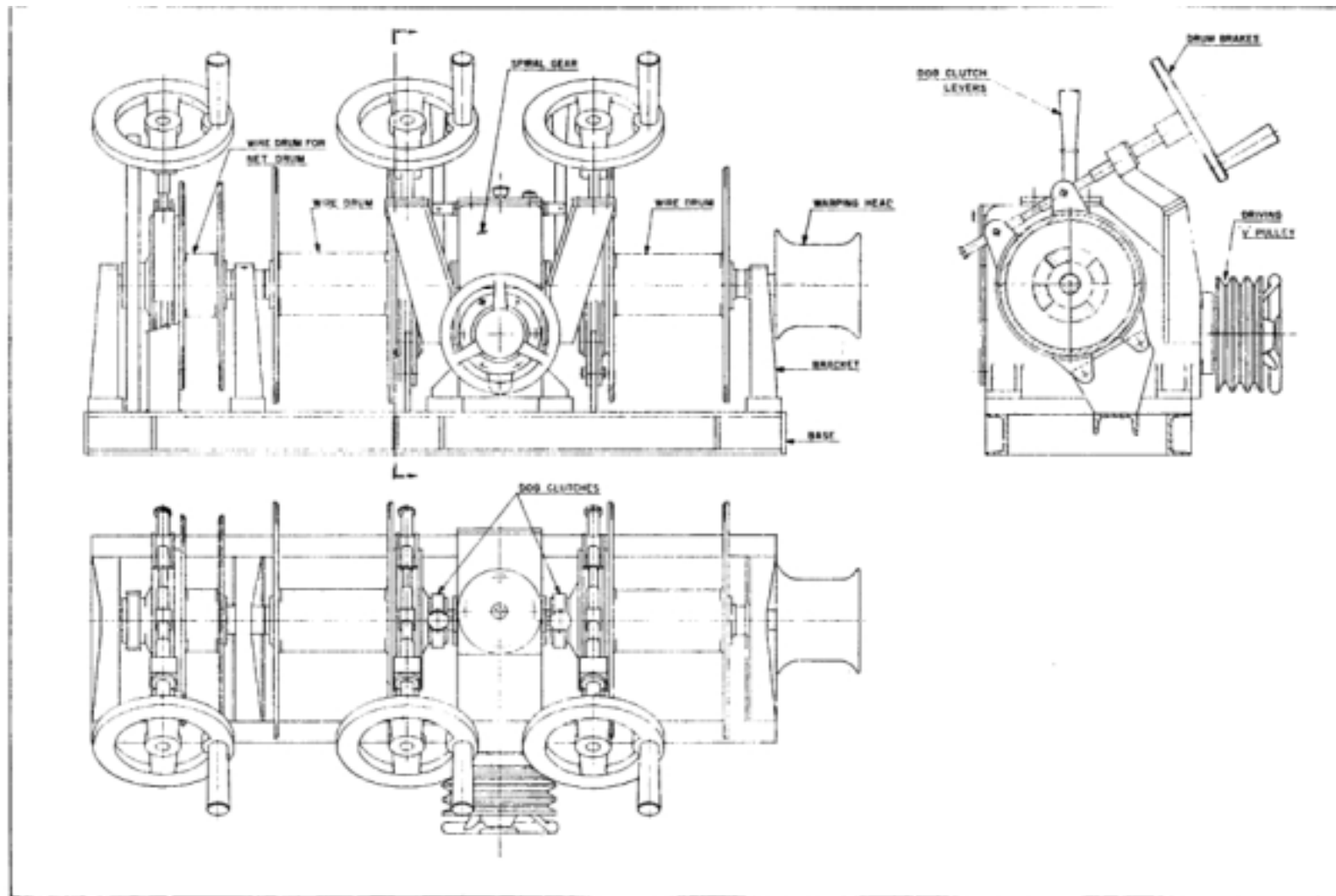


Appendix 6: LAYOUT OF WORKING DECK: NET-DRUM MOUNTED ON DECK



[13]

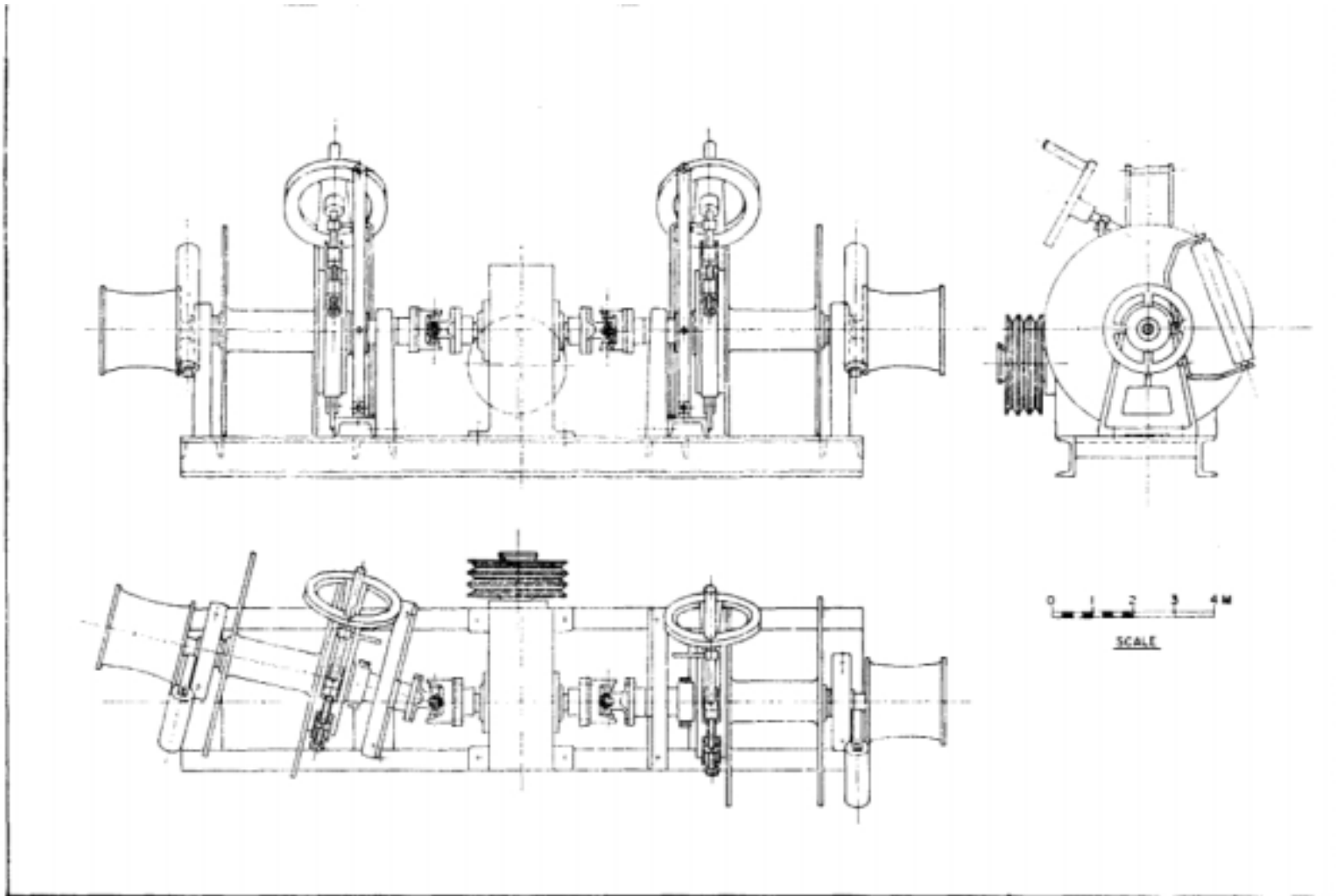
Appendix 7: THREE-DRUM WINCH



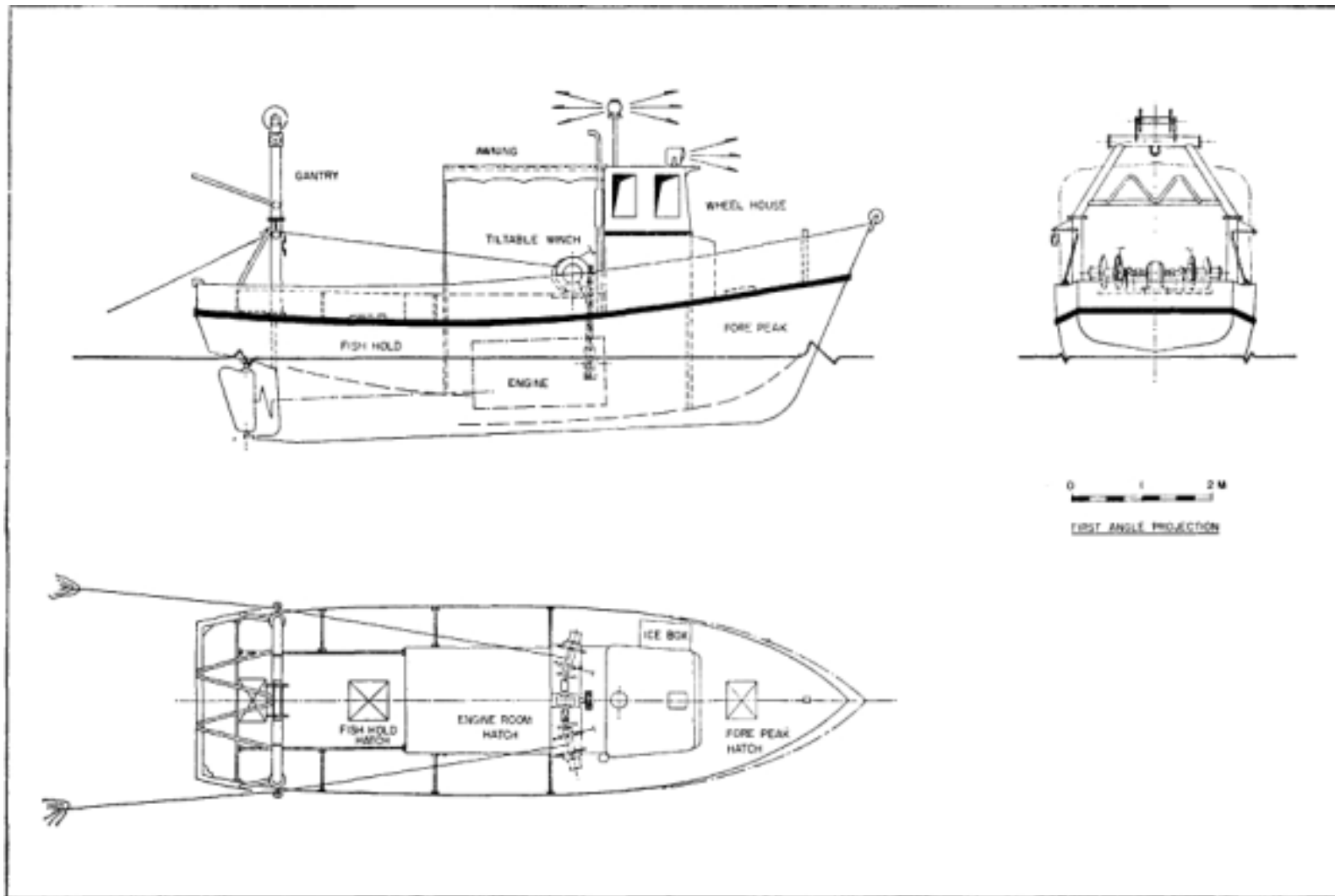
[14]

Appendix 8: TILTABLE-DRUM WINCH

[15]



Appendix 9: LAYOUT OF WORKING DECK WITH GANTRY AND TILTABLE-DRUM WINCH



[16]

Appendix 11: COD-END CLIP



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Development of Small-Scale Fisheries (GCP/RAS/040/SWE)

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(Published as Appendix 1 of IOFC/DEV/78/44.1, FAO, Rome, 1978)
2. Report of the Second Meeting of the Advisory Committee.
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(Published as Appendix 2 of IOFC/DEV/78/44.1, FAO, Rome, 1978)
3. Report of the Third Meeting of the Advisory Committee.
Chittagong, Bangladesh, 1—10 November 1978. Colombo, Sri Lanka, 1978.
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4. Role of Women in Small-Scale Fisheries of the Bay of Bengal.
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5. Report of the Workshop on Social Feasibility in Small-Scale Fisheries Development.
Madras, India, 3—8 September 1979. Madras, India, April 1980.
6. Report of the Workshop on Extension Service Requirements in Small-Scale Fisheries.
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7. Report of the Fourth Meeting of the Advisory Committee.
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8. Pre-Feasibility Study of a Floating Fish Receiving and Distribution Unit for Dubla Char,
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9. Report of the Training Course for Fish Marketing Personnel of Tamil Nadu.
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- 10.1 Report of the Consultation on Stock Assessment for Small-Scale Fisheries in the
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16. Report of the Seventh Meeting of the Advisory Committee. New Delhi, India, January 17—21, 1983. Madras, India, March 1983.

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2. Inventory of Kattumarams and their Fishing Gear in Andhra Pradesh and Tamil Nadu. T. R. Menon. Madras, India, October 1980.
3. Improvement of Large-Mesh Driftnets for Small-Scale Fisheries in Sri Lanka. G. Pajot. Madras, India, June 1980.
4. Inboard Motorisation of Small G.R.P. Boats in Sri Lanka. Madras, India, September 1980.
5. Improvement of Large-Mesh Driftnets for Small-Scale Fisheries in Bangladesh. **G. Pajot. Madras, India, September 1980.**
6. Fishing Trials with Bottom-Set Longlines in Sri Lanka. G. Pajot, K. T. Weerasooriya. Madras, India, September 1980.
7. Technical Trials of Beachcraft Prototypes in India. Ø Gulbrandsen, G. P. Gowing, R. Ravikumar. Madras, India, October 1980.
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12. Trials in Bangladesh of Large-Mesh Driftnets of Light Construction. G. Pajot, T. K. Das. Madras, India, October 1981.
13. Trials of Two-Boat Bottom Trawling in Bangladesh. G. Pajot, J. Crockett. Madras, India, October 1981.
14. Three Fishing Villages in Tamil Nadu. Edeltraud Drewes. Madras, India, February 1982.
15. Pilot Survey of Driftnet Fisheries in Bangladesh. M. Bergstrom. Madras, India, May 1982.
16. Further Trials with Bottom Longlines in Sri Lanka. Madras, India, July 1982.
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18. Review of Brackishwater Aquaculture Development in Tamil Nadu. Kasemsant Chalayondeja and Anant Saraya of the Department of Fisheries, Thailand. Madras, India, September 1 982.
19. Coastal Village Development in Four Fishing Communities of Adirampattinam, Tamil Nadu, India. FW Blase. Madras, India, December 1982.
20. Further Trials of Mechanized Trawling for Food Fish in Tamil Nadu. G. Pajot, J. Crockett, S. Pandurangan, P. V. Ramamoorthy. Madras, India, December 1982.
21. Improved Deck Machinery and Layout for Small Coastal Trawlers. G. Pajot, J. Crockett, S. Pandurangan and P. V. Ramamoorthy, Madras, India, June 1983.
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1. Women and Rural Development in the Bay of Bengal Region: Information Sources. Madras, India, February 1982.
2. Fish Aggregation Devices: Information Sources. Madras, India, February 1982.
3. Marine Small-Scale Fisheries of India: A General Description. Madras, India, March 1983.
4. Marine Small-Scale Fisheries of Andhra Pradesh. A General Description, Madras, India, June 1983.