Chapter 14

Gear Handling Equipments onboard Fishing Vessels

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14.1 Introduction

Deck equipments for handling of fishing gears onboard fishing vessels vary in sophistication depending on the size of the vessel and the type of fishing. It comprises gear handling equipment, such as winch and drums which are used to pay out and haul the fishing gear (Fyson, 1986; Ben-Yami, 1994; FAO, 2009). Major categories of mechanised fishing vessels include trawlers, seiners, gillnetters, liners, trap setters and multipurpose vessels.

14.2. Trawler

Major deck equipments on board trawlers for handling fishing gear are trawl winch, gallows and stern ramp. The mast and boom arrangement is provided for handling the codend of the trawl net in small trawlers. Stern trawling and outrigger trawling are the most popular methods of operating trawl nets. The deck equipments are located in the aft deck of the vessel. The gallows are fitted on the aft deck for guiding the warp. The trawl winch is used for shooting and hauling the trawl gear system and is positioned in the deck allowing enough deck space for handling gear and catch. The mast is just behind the trawl winch and the boom is attached with freedom to move from port to starboard side horizontally. Arrangements of the deck equipment may vary depending on the type of trawler. The stern ramp is provided in larger vessels at the aft end of the deck in port starboard direction. This is a quarter round shaped plate which helps the codend with catch to come overboard smoothly. Gilson winches, net drums and other auxiliary winches are commonly installed to handle the gear and the catch.

14.2.1 Winch

Very small trawlers use manually operated hand winch for shooting and hauling the gear. In medium and large trawlers, power assisted winches are installed. Medium size trawlers use mechanical or hydraulic winches and larger vessels use hydraulic or electrically driven winches.

Mechanical winch

The trawl winches can be split type or two drum type. The basic components are the main drive unit with worm gear, main shaft and bearings, clutches, brakes and an arrangement for guiding the warp. In deep sea trawlers, dog clutches are used. In larger winches, automatic spooling gear is fitted. The mechanical winches are driven by the power take-off from main engine.

Hydraulic winch

The hydraulic winches are very efficient and popular in fishing trawlers, as the control on speed and brake are very accurate (Fig. 14.1). Moreover the efficiency is very high and the maintenance is relatively low. The power source for driving the hydraulic pump can be either from the power take-off from the main engine in smaller trawlers or from an auxiliary engine in the case of larger trawlers. There will be a control valve, hydraulic oil tank, oil filter, hydraulic motor and high pressure piping.

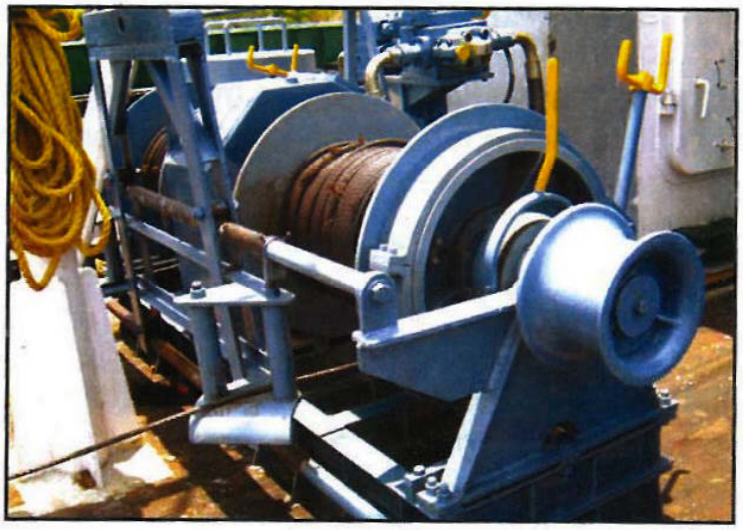

Fig. 14.1 Hydraulic trawl winch

Electric winch

Electric trawl winches are used in large deep sea trawlers. Electric power from the alternator is used for the operation of the winch.

14.2.2 Gallows

The purpose of the gallows is to facilitate shooting and hauling of the trawl warp connected to the trawl system (14.2). Trawl warps run out from

the winch to the gallows, through pullies. Gallows are fitted on the aft deck of the trawlers. Different types of gallows are used in trawlers.

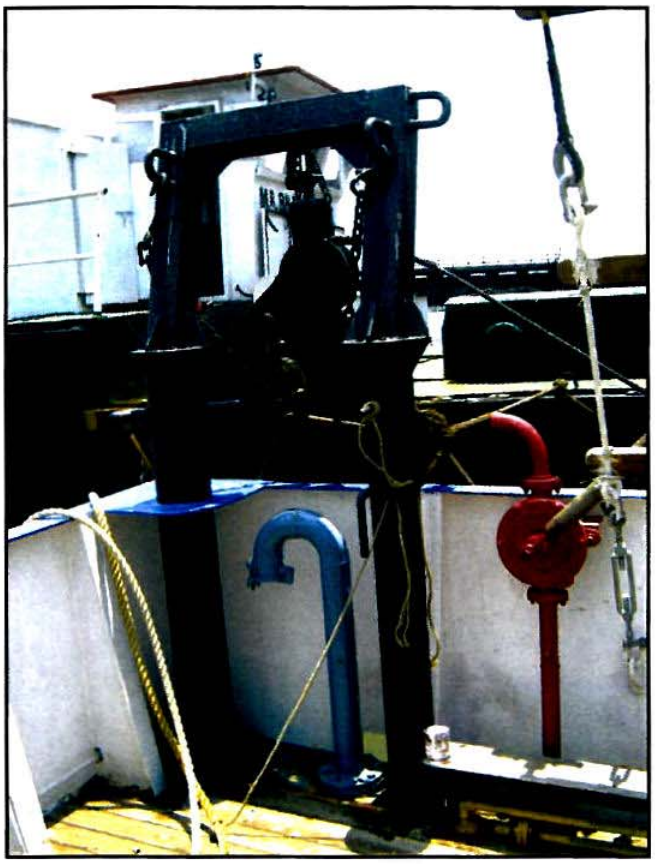

Fig. 14.2 Stern gallows in a medium size trawler

T-frame

T frame is used in medium size trawlers. It is fitted on the aft end of the fishing deck at the centre line. On either side of the T section, pulleys are attached at top side.

Rectangular frame

In larger vessels, inverted U-type or A-bracket type gallows are fitted. One such gallows is on the port side and the other will be on the starboard side. Each side pulleys can be attached and facilities are provided to hang the otter boards.

Gantry

In very large vessels, gantry type or goal post type gallows are fitted. The pulleys are attached from the top beam.

14.2.3 Mast and boom

The mast is fitted in front of the trawl winch in small and medium size trawlers (Fig. 14.3). The boom is attached to this mast. The connection will be at about head level of the crew operating the boom. The mast will be permanently welded to the deck. The boom is attached in such a way that it can be moved port or starboard horizontally.

Fig. 14.3 Mast and boom arrangement in the aft deck of a small trawler

14.2.4 Stern ramp

A ramp is fitted in the stern side of the vessel at deck level to facilitate the smooth hauling of the trawl on to the fishing deck. Stern ramp will minimise the damage to the catch. One type of ramp for trawler is a quarter round plate permanently welded to the deck. Another type is smaller pipe of approximately 150 mm dia fitted on the aft at deck level at stern end which is free to rotate. This will enable the smooth hauling of the codend.

14.2.5 Net drum

These are powerful equipment for hauling and storing the large midwater trawls and demersal trawls in large trawlers. Net drums are

mounted at the stern or on the aft of first deck and are hydraulically powered.

14.3 Purse seiner

Gear handling equipment onboard purse seiners may include purse line winch, one power block or triple roller (triplex) and storage equipment for hauling and stowing the net aboard. According to the size and weight of the seine, gear handling requires a number of equipments. In larger purse seiners, the fish is pumped on board while in smaller purse seiners, brailers are commonly used while in large seiners operating for small pelagic species fish pumps are used to transfer catch from the net to the fishing deck. In small purse seiners operating small seines in the traditional sector, all operations are performed manually.

14.3.1 Puretic power block

Power blocks are used for hauling the purse seine net. Pueretic power block introduced in 1950s is a significant development in the mechanisation of purse seine operation (Fig. 14.4). The single sheave type is most common. The net is allowed to slip when the tension is excessive. Power blocks are driven by hydraulic power and their rpm, pull and direction can be controlled according to the requirements.

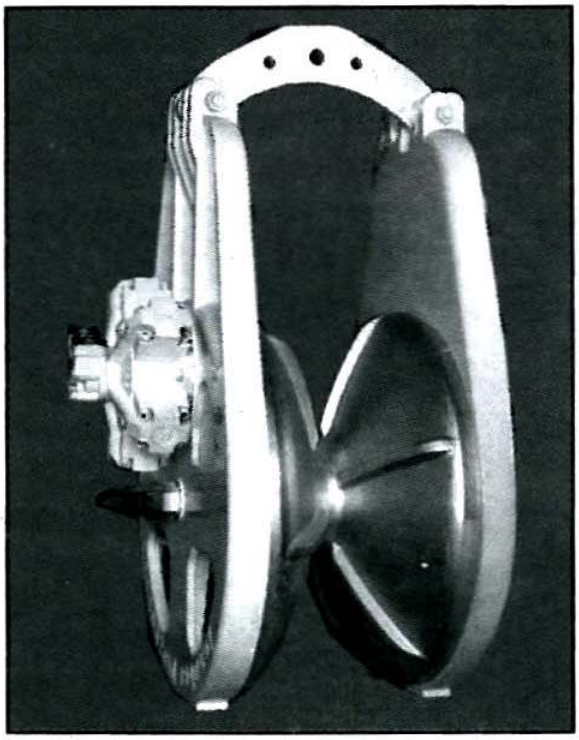

Fig. 14.4 Power block

14.3.2 Triplex drum

The triple roller net winch, also known as triplex drum (Fig. 14.5) hauls the net through three synchronously powered rollers, in which the central one turns in the opposite direction to the other two. The rollers are tiltable and hauling speed can be adjusted.

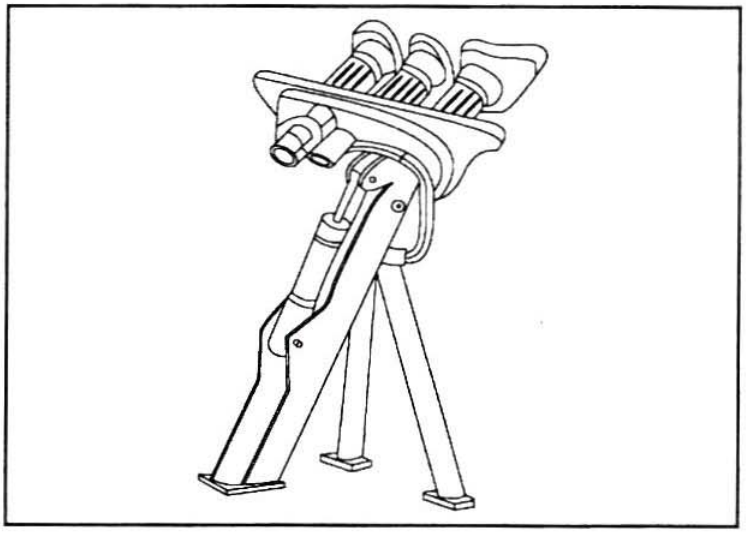

Fig. 14.5 Triplex drum

14.3.3 Purse line winch

Purse line winch located in the fishing deck is used to haul the purse line rope (Fig. 14.6). This is either mechanically or hydraulically operated. Form this winch the purse line will go to the line reel.

Fig. 14.6 Purse line winch in a small-scale seiner

14.3.4 Purse line reel

A hand operated line reel is fitted on smaller purse seiners (Fig. 14.7). Lines pulled up from the winch is wound on to the reel.

Fig. 14.7 Purse line reel

14.3.5 Purse block davit

Davit is used for lifting the purse line with rings to the deck from the sea. The davit is fitted on the starboard side of the deck slightly projecting outside, to facilitate the easy hauling of the rope and rings.

14.3.6 Brailing boom

This is fitted on the deck to brail out the fish from the closed purse seine.

14.3.7 Hydraulic boom

Hydraulic booms are used in large seiners for handling the net on board. The net is generally very heavy and requires power for proper stowing on the deck.

14.3.8 Skiff

The skiff is positioned at the aft deck. This is used for carrying one end of the purse seine during encircling of the fish shoal.

14.4 Longliner

In long line fishing, the shooting of the lines are done from the aft deck. The hauling of the main line and detaching the branch lines, removal

of fish from the hook and coiling the main line to the winch drum are done in the forward deck.

In small-scale longliners, the line hauled in manually or by using a hand operated line drum. In larger vessels, line setters, line haulers and monoline spoolers are provided. In large scale operations, semi-automatic or automatic systems are provided for baiting the hooks, shooting and hauling the lines which may extend to several kilometres.

14.4.1 Line hauler

The line hauler is an essential equipment in a long liner which hauls up the main line with the branch lines and catch (Fig. 14.8). The position of the hauler is to suit the detaching of the branch lines as well as to remove the fish safely. This is fitted on the starboard side of the vessel in the forward deck. The line hauler works with the help of the main line drum (Fig. 14.9 and 14.10). It is a pulley or a roller arrangement which helps the hauling of the lines to the forward deck of the vessel.

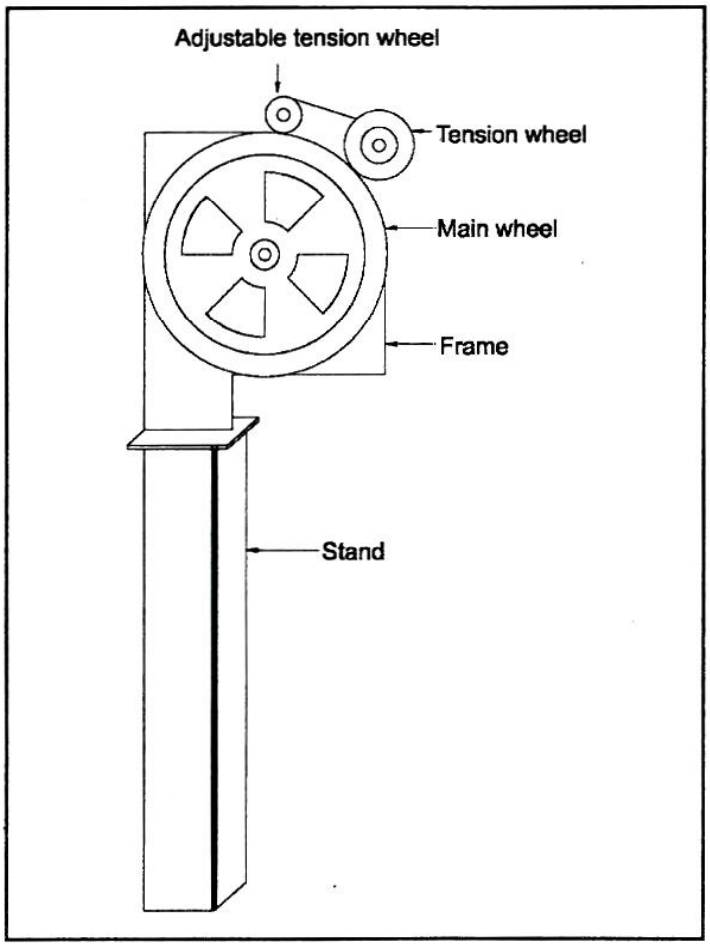

Fig. 14.8 Hydraulically driven long line hauler

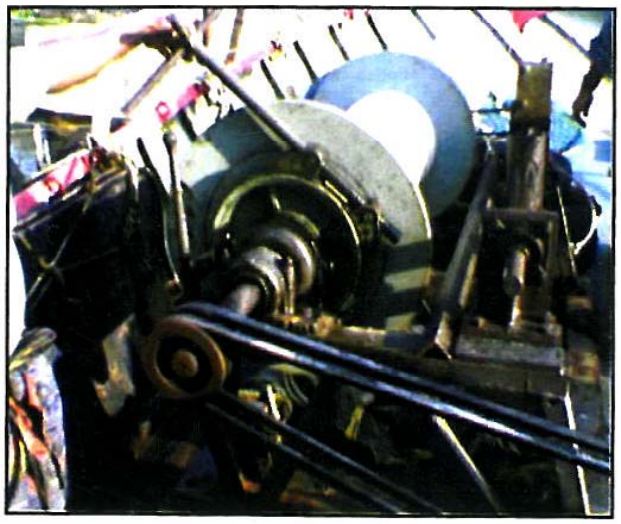

Fig. 14.9 Mechanically driven long line drum

Fig. 14.10 Hydraulically driven long line drum

14.4.2 Monoline spooler

This is basically a drum with a guide on spooler and the drum is driven from the hydraulic motor (Fig. 14.11 and 14.12). A lever for controlling the speed and changing the direction of rotation of the drum is provided on the side of the drum.

14.4.3 Line setter

The line setter is fitted on the aft deck of the vessel. This is also driven hydraulically from the pump and consists of 4 to 5 tension relieving

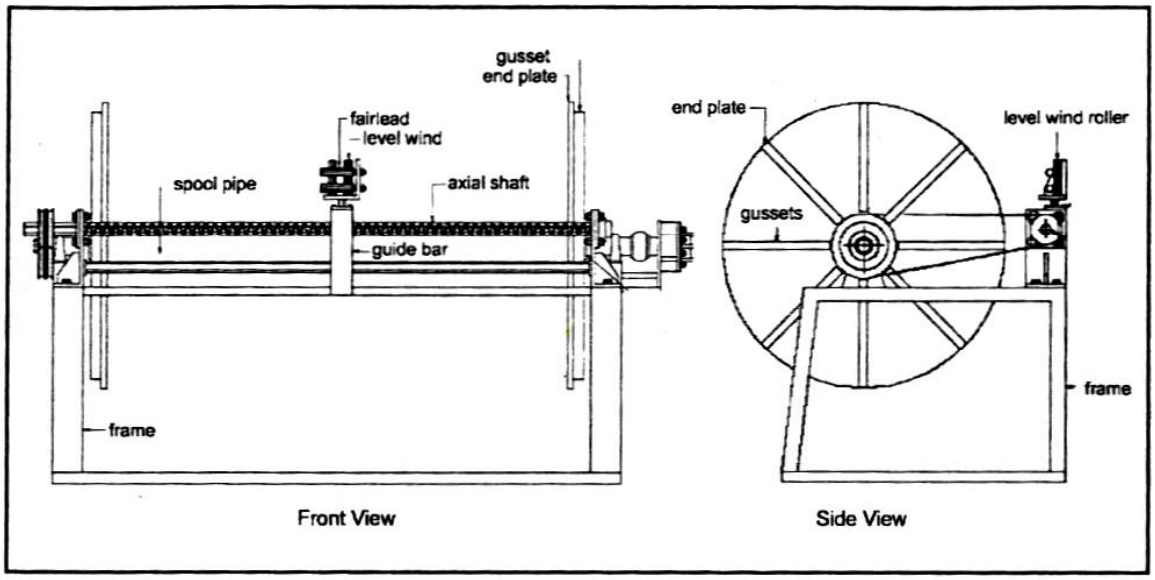

Fig. 14. 11 Diagrammatic views of a monoline spooler

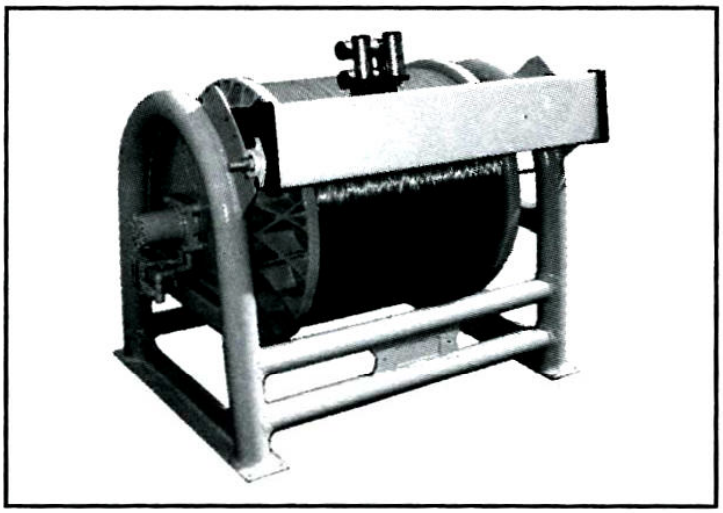

Fig. 14. 12 A monoline spooler

rollers and a main roller with rubber lining (Fig. 14.13). The main line from the drum is lead to the setter through the small rollers and finally comes along the periphery of the larger roller and comes out over a channel to the sea. The branch line is attached with bait at this position.

14.4.4 Conversion of trawlers to long liners

In the Indian fishing fleet, conversion of trawlers to tuna long liners has been encouraged by the Government of India and the Marine Products Exports Development Authority (MPEDA) has been subsidising the cost of such conversions. In the converted vessels, the trawl winch is replaced by the long line winch. The first few boats were fitted with mechanical winches

Fig. 14.13 Line setter

driven by the power take off from the main engine (Fig. 14.9). A clutch and brake are used for the control of the winch. The main line drum was installed on the forward deck at port side. The line hauler was fitted on the forward deck at starboard side. Later hydraulically operated long line system became popular, in converted vessels greater than 14 m L_{OA}. In these vessels the main line drum is used as a hauler fitted on the aft deck. In larger vessels of 15 m L_{OA} and above, the main line drum is fitted on the forward deck at port side. A pipe frame with pulley is used to lead the line to the main drum during the hauling. The main line reaches the drum with the help of a guide on the spooler. The line setting is done using a setter fitted in the aft. The main line is guided to the setter from the main line drum through pulleys.

14.5 Gillnetter

Gillnetters range from simple open boats operating in coastal waters to large sophisticated vessels operating gillnets extending to several kilometres in the high seas. Setting and hauling of gill nets are performed by manually in small gillnetters operating in the coastal waters. Large gillnetters operating in the offshore and high seas are often equipped with hydraulic or occasionally mechanical net haulers.

Net drum, which is a wide powered spool, may also be used for hauling and storing the nets in large gillnetters.

14.5.1 Net hauler

Net hauler is a mechanically or hydraulically driven sheave for hauling the gillnets and drift nets (Fig.14.14).

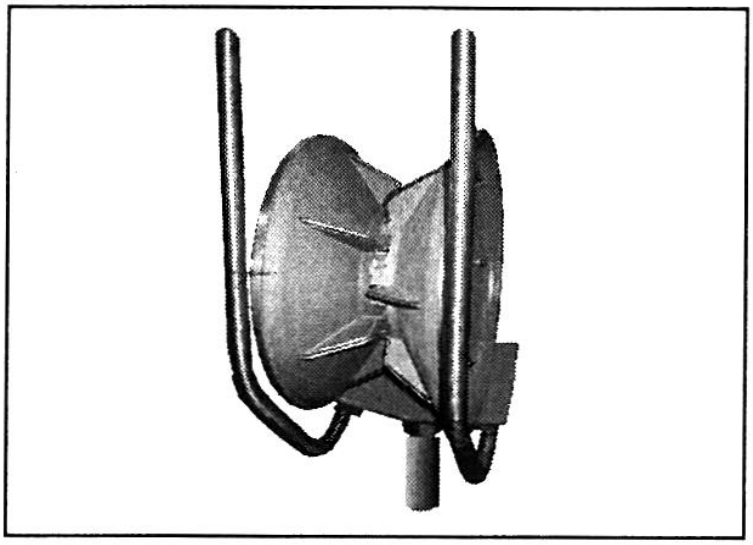

Fig. 14.14 Net hauler

14.5.2 Net rollers

The net roller helps shooting and hauling the net easily and safely from the boat. This is fitted on the aft end bulwark breadth wise.

14.5.3 Net drum

Net drum is a wide hydraulically powered spool on which the net is wound when hauling. The advantage of a net drum is that it reduces the possibility of net snagging or fouling while setting. These are mounted horizontally on the deck.

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