

DOUBLE-RIG SHRIMP TRAWLING IN THE GULF OF MEXICO



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DOUBLE-RIG SHRIMP TRAWLING IN THE GULF OF MEXICO

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INTRODUCTION

A recent major development in the shrimp fisheries of the Gulf of Mexico and the South Atlantic Coast is the widespread conversion of conventional trawlers from single-trawl to two-trawl rigs. In this development a vessel tows two small nets simultaneously rather than a single large one as has been the practice in the past. This new method is generally referred to as "double-rig trawling".

The immediate purpose of this leaflet is to provide owners of conventionally rigged shrimp trawlers with basic information required for conversion to double-rig trawling. For this reason the material is presented with the assumption of a thorough knowledge of conventional shrimp vessel rigging and fishing practices. Information given here does not necessarily apply to vessels equipped for other types of fishing.

It is reported that first attempts to develop the double-rig method in the Gulf were made by shrimp fishermen at Rockport, Texas, late in 1955. Following these initial efforts, others in the industry became interested and many have subsequently contributed to the successful development of the method. The evolution of the double-rig method, while necessarily one of trial and error, has been marked by free exchange of ideas.

The benefits inherent in this method of shrimp trawling were early and rapidly recognized and accepted, and by 1957 a major trend toward conversion was under way at Aransas Pass and other Texas ports. The popularity and acceptance of conversion soon spread to Florida and to Mexico, where many conversions to the double rig have been made.

Although this method of shrimping has reached a successful stage in its development, it is still evolving, and improvements are frequently made by members of the shrimp industry.

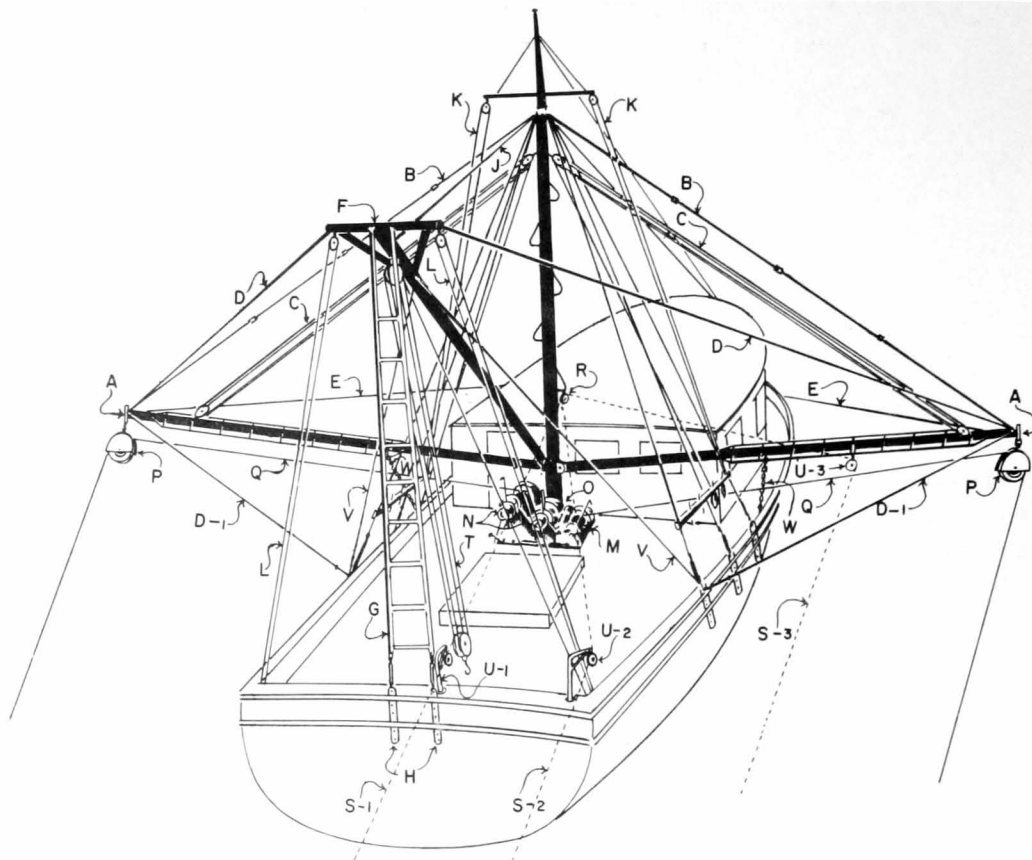


Figure 1 - Details of the rigging arrangements required for double-rig shrimp trawling.

- | | |
|---|--|
| A. Towing boom or outrigger. | M. Modified trawl winch. |
| B. Towing boom topping stay (topping lift preventer). | N. Gypsy heads (two) on trawl winch. |
| C. Topping lift tackle. | O. Center drum for try net wire. |
| D. or D-1. Towing boom (outrigger) back stay; either one may be rigged, but not both. | Q. Towing wire. |
| E. Towing boom (outrigger) bow stay. | R. Leading block for try net. |
| F. Modified boom superstructure. | S-1, S-2, S-3. Try net lead, any one may be used. |
| G. Boom back stays-ratline structure. | T. Main fish tackle (tail block). |
| H. Boom back stay plate on transom. | U-1, U-2, U-3. Try net lead block; any one may be used to accord with selection of S-1, S-2, or S-3. |
| J. Boom Topping lift stay. | V. Boom shrouds. |
| K. Single block tackle. | W. Chain stoppers for outriggers. |
| L. Single block tackle. | |

DOUBLE-TRAWL METHOD

Rigging

The major changes required to effect a conversion from a single to a double-trawl rig are:

1. Replacement of the towing boom and the try-net boom with two outrigger booms having special blocks.
2. Modifications of the main boom.
3. Modifications of the winch.
4. Replacement or modification of existing trawling warps.
5. Replacement of the single large net and its doors with two smaller nets and their doors.
6. Relocation of the try-net hauling point.

In reading the following detailed descriptions of rig modifications, the reader is referred to figure 1 which shows a vessel that has been converted to a double rig.

Outrigger booms. - Figure 1 shows the two outrigger booms (A) which replace the original single towing boom and the try-net boom. These outriggers, usually 24-feet long, are mounted on the mast pad eyes or are fitted to a gooseneck. Materials, construction details, and rigging arrangements vary throughout the shrimp fleet.

In Texas, outrigger booms have been fashioned from discarded drill-stem pipe, which is available there at a cost of approximately \$1 a lineal foot. These pipes, which are used in the oil fields, measure 24-feet in length, 4-inches in diameter, and from about five-eighths of an inch to three-fourths of an inch in wall thickness when new. With continued use in the oil fields their wall thickness decreases; when about one-half of an inch in wall thickness they are discarded for drilling purposes. When purchased for use as outrigger booms these pipes are strengthened with braces or stiffeners; figure 2 shows two different strengthening designs that have been used.

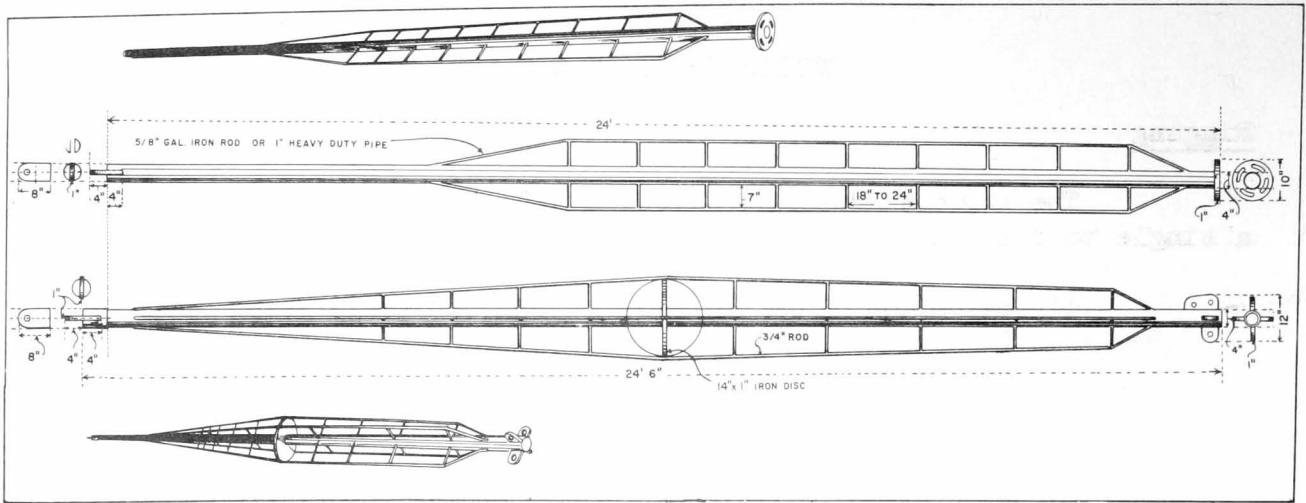


Figure 2 - Two outrigger boom designs as used in Texas.

Materials commonly used for the braces have been 1-inch outside diameter heavy duty (ammonia type) pipe or three-fourths of an inch iron rod. In ports where discarded drill stem pipe is not available, outriggers have been made of heavier pipe which does not require the use of stiffeners. A vessel equipped with this pipe without bracing is shown in figure 3.

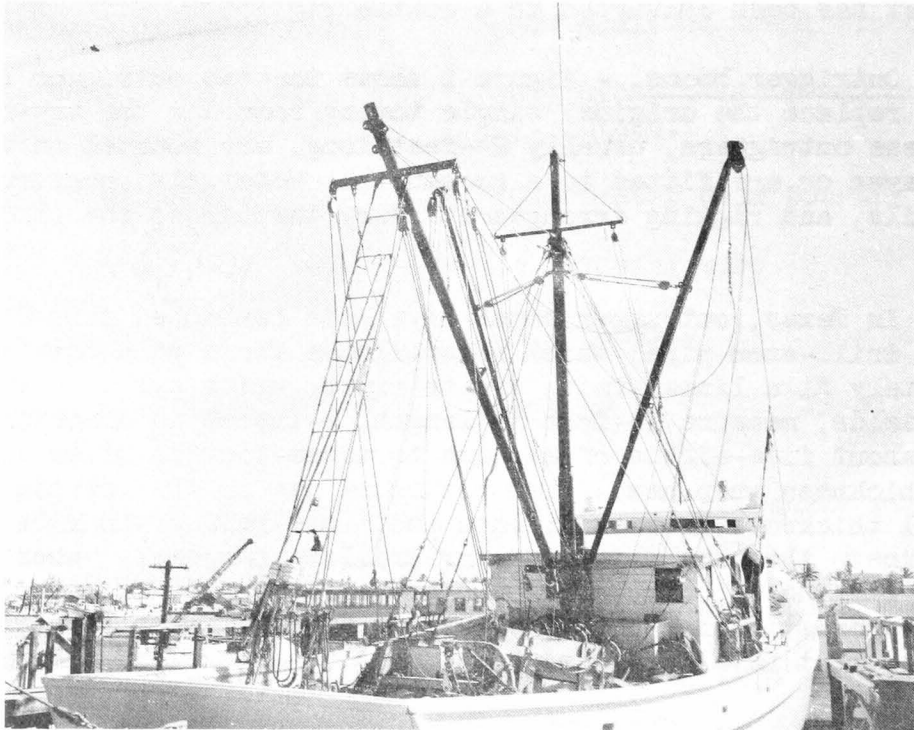


Figure 3 - A double-rigged Key West shrimp vessel without additional trawling boom strengthening.

Topping lifts, figure 1 (C), for the outriggers are provided by double-block tackles with the hauling parts secured at the pinrails. Usually the outriggers are set for fishing at an angle of 20° above horizontal or so that their towing blocks lie about 10-feet to 12-feet above the water in a smooth sea. A slightly higher angle of set is preferred by some captains; a lower set is seldom used.

In addition to the topping lift, a preventer stay is provided which passes from the mast to the head of each outrigger. In figure 1 (B) this preventer is made of iron rods in three sections interlocked by welded eyes, but chain or wire rope may also be used.

Figure 1 (E) shows the bow stay for each outrigger leading forward; each such stay is secured at the rail by a turnbuckle to a welded eye. As the after stays of the outriggers may vary, two types are shown in figure 1. One type (D-1) leads from the outrigger to the shroud plates, and the other (D) leads to the "T" bar on the head of the main boom. Either type may be rigged, but not both. Some captains have also fitted the outriggers with a chain strap to prevent the boom from jumping upward. Figure 1 (W) shows these leading from the deck to the outriggers.

Towing blocks are attached to the heads of the outriggers as shown in figure 1 (P). These blocks must have a wide sheave so as to allow the splicing and bridle of the trawl warp to pass through freely. To serve this purpose special blocks have been fabricated using automobile wheels for the sheaves and 1-inch iron plate for the housing. Standard blocks of wide-sheave construction have also been used.

Main boom. - In a conversion the main boom is set rigidly amidships, from which position the main fish tackle or tail block (T) may be used to equal advantage from either side. As illustrated, the modified boom has a cross member (F) of 4-inch pipe about 6-feet long welded to its head to form a "T". Single-block tackles (L) for hanging nets are secured to pad eyes which are welded to each end of the "T". The boom shrouds (V) are shown leading from near the head of the boom to just aft of the shroud lines. A ladder (G) which may be made of iron rods is shown at the stern - a shift from its usual position where it serves as a back stay. The vertical rods of the ladder are welded to the "T" and made fast to the deck with turnbuckles to metal plates (H) located centrally at the transom.

One variation used in rigging the main boom eliminates the "T" construction from the boom head. Single-block tackles are still provided, however, by welding pad eyes directly to the head of the boom. Other versions, usually used when cleats are provided on the boom for climbing, eliminate the ladder construction entirely, or may merely have two vertical iron rods, without crossbars, welded to the head of the boom and secured to the transom to serve as bracings. Other bracings and guys, which vary from vessel to vessel, are made of chain, wire rope, or iron rods.

Winch modification. - To fish the double rig it is necessary to have two gypsy-heads on the winch (figure 1) with which to handle the two lazy lines. On vessels equipped with a Stroudsburg three-drum winch a longer drum shaft is required to enable mounting an additional gypsy-head. In addition to this change the try-net towing warp is placed on the center drum of the winch.

Towing Warps. - For double-rig trawling warps, wide use is made of 7/16-inch and 1/2-inch wire. The usual length of warp is 150 fathoms to each drum. A bridle is spliced to an eye at the end of each warp, a thimble being used in the splice. Bridle ends are attached to the trawl-door bridle chains with shackles and swivels in the usual manner.

Lengths of bridles used in the fleet are not fixed but vary from 18 to 25 fathoms. Commonly a new bridle requires several tows to remove its twists and turns, after which it will work well.

Nets and Doors. - Both the trawls and the doors used to replace preconversion equipment are of smaller sizes. Actual sizes used depend on size and power of the vessel, and the preferences of captains. To date there is no standard combination of gear but table 1 lists some combinations used as related to vessel power. Most commonly 40-foot to 42-foot flat trawls have been used, but some net makers have been supplying 45-foot trawls for double-rig vessels.

Table 1. - Combinations of sizes of trawling gear related to vessel Power

Horse Power	Trawl Size	Trawl Door Size
120	38' - 42'	7' x 32" to 8' x 36"
150-170	38' - 42'	7' x 40" to 8' x 36"
200-250	48' - 60'	8' x 40"

Try Net. - Figure 1 shows three choices of leads (S-1, S-2, and S-3) which have been used by fishermen for handling the try net. A davit located at the stern may be used, or one of the outriggers may be fitted with a block which can serve as a lead and towing point for the try-net warp. If the outrigger hookup is used for this purpose it must be on the outrigger which handles the longer trawling warp as described below. The function and use of the try net are the same as with the single-rig; figure 4 shows the position of the try net when it is fishing.

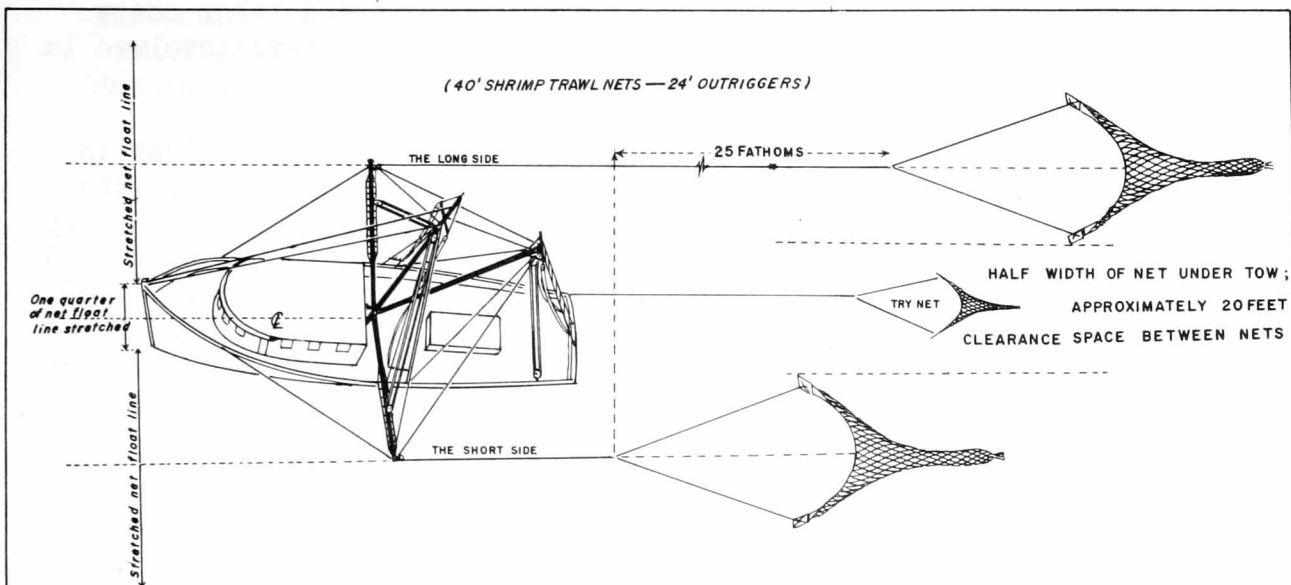


Figure 4. - A diagrammatic representation of a double-rigged shrimp trawler

Operation

The procedures for fishing a double rig necessarily differ from those used for a single rig. To prevent fouling of the two trawls, one trawl is set out and fished about 25 fathoms farther astern than the other. Usually the starboard trawl is given the longer scope, and it is set out first.

After the first trawl is set out, about 25 fathoms of warp are paid out before the second trawl is set. When the second trawl is properly set out and clear, both trawls are lowered simultaneously to the desired depth of operation. This procedure gives the trawl first set a longer scope, by about 25 fathoms, than the other. Figure 4 shows the relative positions of the trawls when they are fishing.

At the end of a drag, usually about 3 hours in duration, the trawling warps are brought aboard by hauling them simultaneously. The trawl with the shorter warp comes in first and as soon as possible a fisherman retrieves its lazy line by using a long-handled pole hook. This line is then carried to the gypsy-head of the winch and

heaved in to haul it clear of the propeller. By this time the other trawl is alongside and its lazy line is retrieved and heaved clear. A strap is then made fast around one of the bags and it is brought on deck by use of the main fish tackle on the main boom. The other bag is landed in a similar manner.

COST OF CONVERSION

The funds required to convert a single-rig shrimp trawler to the double rig generally run between \$1,500 and \$2,000 but may be lower depending upon materials used and labor costs. Listed below are some typical costs for various items involved in the conversion:

Items involved in double rig conversion:	Cost in Dollars	
Modification of main boom - - - - -	100	125
Two outrigger booms - - - - -	250	350
Stays and guys - - - - -	220	325
Two towing blocks - - - - -	80	150
Two bridles - - - - -	100	100
Two sets of trawl doors - - - - -	200	250
Two flat shrimp nets - - - - -	400	450
Hardware - - - - -	50	100
Miscellaneous - - - - -	100	150
	-----	-----
Total - - - - -	1,500	2,000

ADVANTAGES AND DISADVANTAGES

Several advantages are attributed to double-rig trawling as compared to the single-trawl method, the most important claim being that it will catch more shrimp. While only estimates of increased catches can be made, many vessel operators consider that a 15 to 30 percent greater catch is possible.

Some reasons advanced for the fishing superiority of the double-rig method are (a) that a 40-foot to 42-foot net is more efficient, size for size, than 80-foot to 100-foot nets, (b) that two smaller nets fish more efficiently over an uneven bottom than one larger net, and (c) that the total towing resistance of two 40-foot nets is less than the resistance of one 80-foot net and therefore faster towing speeds can be attained.

Another advantage claim for the double rig is that losses of time, labor, and money spent on gear are lessened. This is possible in that, in many instances where gear is damaged, only one small trawl need be repaired or replaced rather than a large one. With a reduction in gear repair time, fishing time can be gained.

Vessel crews favor the double rig because they too benefit financially from larger catches and because less effort is required to work this gear than with the larger single trawl. The double rig is safer for them since some of the hazards of the single rig are eliminated such as the towing point on the after deck and the mass of overhead rigging.

Certainly the cost of conversion from a single to a double rig must be considered as a disadvantage but, would be negligible for a new vessel being rigged for the first time.

The double rig effects vessel maneuverability adversely for turns cannot be made as readily or as tight as with a single rig. This factor would likely be more of a disadvantage in the inshore white shrimp fisheries than in the other offshore operations.

The ability of a vessel's skipper to judge the spread of his net from the angle of separation of the towing warps is of course entirely lost in the double-rig method as each trawl has but a single warp with bridle.

In respect to safety, the main possible disadvantage of the double rig is that it may tend to make a vessel top heavy when the outrigger booms are topped. Such a situation could contribute to capsizing a vessel in a rough sea and some industry members attach importance to this factor. To reduce this potential hazard some owners have recently relocated the heel of the outrigger booms at the rails. In this method not only are these booms shorter and therefore lighter but also efforts are being made to rig these shorter booms so that when not in use they can be swung forward to lie horizontally in cradles along the rails. If this latter step can be effected the problem of top-heaviness will be materially reduced.

With the double-rig method of trawling, as with others, there is always the danger of fouling nets in the vessel's propellers.

For owners planning to convert to or to install the double rig on a new vessel, care should be taken to insure that materials such as booms, plates, chains, and braces are sufficiently strong and safe for the intended service. Until some degree of standardization of materials and construction is realized, a margin for safety greater than that presently in practice on some vessels should be allowed.

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- FL-343 Floating Trawls
- FL-373 Atlantic Coast Mackerel Purse Seine
- FL-379 New England Sink Gill Net
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- FL-394 Gulf of Mexico Shrimp-Trawl Design
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- FL-437 Assembly Methods for Otter-Trawl Nets
- FL-442 Sea Scallop Boats and Gear
- FL-445 Operation of North-Atlantic Type Otter-Trawl Gear
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- Sep. 400 The Pound-Net Fishery in Virginia
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