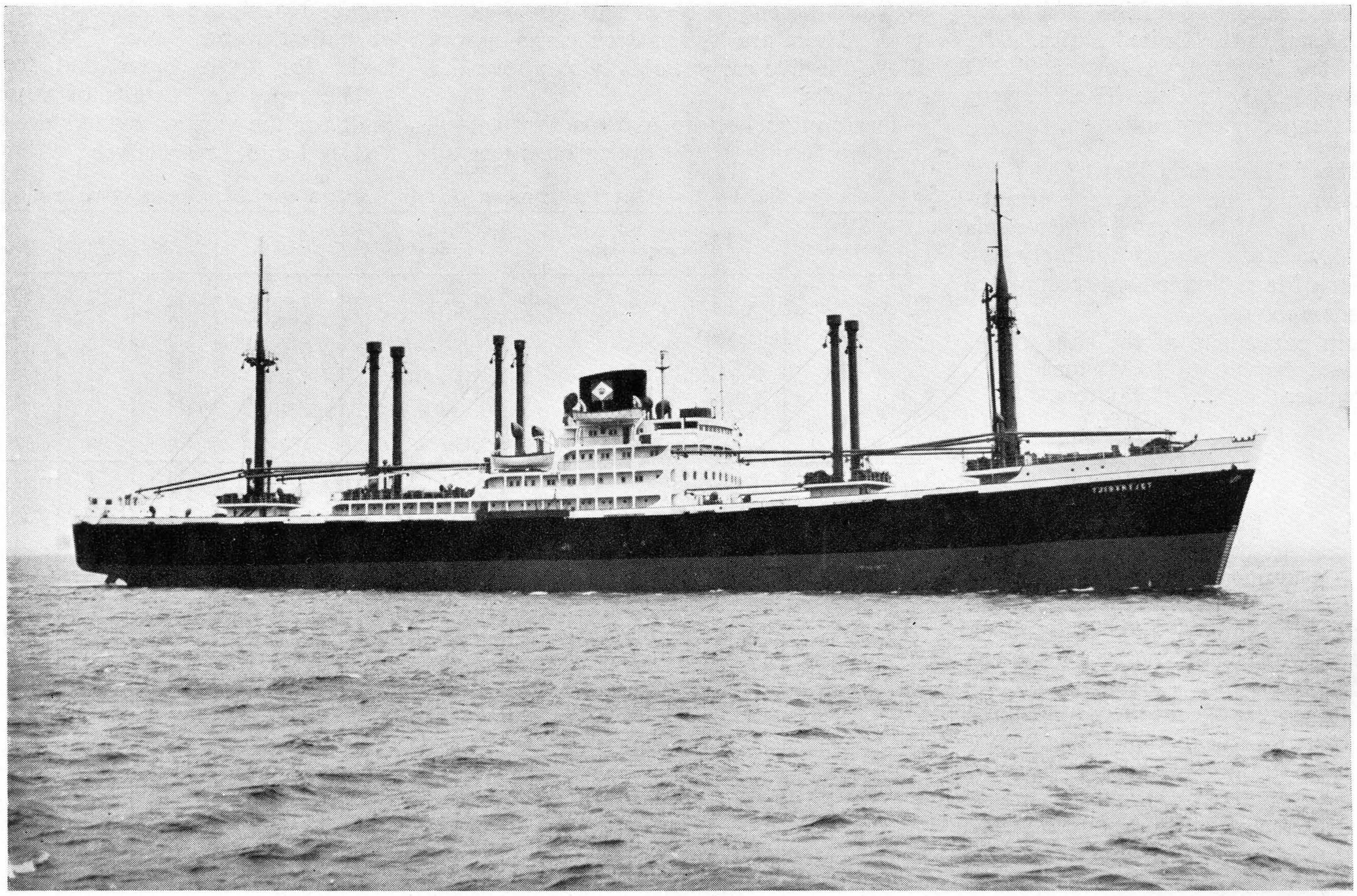


THE 15½-KNOT CARGO LINER "TJIBANTJET"

8,900-ton, 6,800-b.h.p. Motor Ship for Asia-Africa-South American Service

THE latest ship to enter the services of the Royal Interocean Lines, Amsterdam, is the British-built 8,900-ton d.w.c. motor cargo liner "Tjibantjet," the trials of which we attended last month on the Newbiggin Mile. Built at the South Dock, Sunderland, shipyard of Bartram and Sons, Ltd., and propelled by an N.E.M.-Doxford 6,800 b.h.p. six-cylinder engine, the ship was subjected in the course of her extensive trials to 16 runs on the measured mile, followed by two engine duration trials each of 24 hours.

Designed and constructed for the company's Asia-Africa-South American service, the "Tjibantjet" is the second Doxford-engined vessel in the fleet of 22 ships operated by these owners. Although not intended to run on boiler fuel at this stage, special arrangements have been incorporated in the machinery installation to facilitate the use of residual oil, should it be required at a later date. These provisions are discussed later. The form of the vessel is the result of tank tests in Holland, and the hull was built to the requirements and under the survey of Lloyd's Register for their Class 100 A1 for an open-shelter decker with complete superstructure, and with scantlings increased to obtain full scantling draught when the tonnage hatches and openings are closed. The principal characteristics of the ship are as follow:—

Length overall ...	474 ft.
Length b.p.	440 ft.
Breadth moulded ...	61 ft. 3 ins
Depth to second deck ...	29 ft. 9 ins.
Depth moulded to shelter-deck	38 ft. 3 ins.
Extreme draught as closed shelter-decker...	29 ft. 2½ ins.
Maximum deadweight capacity	10,800 tons
Summer draught as open shelter-decker ...	26 ft. 3⅝ ins.
Deadweight capacity ...	8,900 tons
Bale capacity, including cargo oil tanks ...	512,000 cu. ft. (approx.)
Block coefficient ...	0.680
Designed loaded trial speed	16¼ knots
Service speed	15½ knots

The ship has a raked, round-nosed stem, a cruiser stern and is rigged as a two-masted schooner. There is a forward sheer of 9 ft. 8 ins. and an after sheer of 3 ft. 8 ins. Two distinctive features are that the masts and derricks are unrigged, i.e., without shrouds or stays, and the forecastle extends beyond the after end of No. 1 hatch; it is 7 ft. high, increasing to 7 ft. 6 ins. at the after end. The hull is of both welded and riveted construction and is divided into 10 compartments. Four deep tanks are fitted for the carriage of vegetable oil, dry cargo or water ballast, and these are in No. 4 hold alongside the shaft tunnel. The cellular double bottom tanks extending between the forward and after bulkheads are arranged for the carriage of either fuel or water ballast. Ample spaces are provided for special cargo, there being, in addition to two spaces of about 3,100 cubic ft., a compartment aft of the tonnage well in the upper 'tween decks, and space in the two winch deckhouses between Nos. 2 and 3 and 5 and 6 hatches.

Accommodation Arrangements

A high standard of accommodation is provided for the native crew, European officers and a limited number of passengers. Although the general arrangement plans show only two double-berth passenger cabins and the owner's stateroom, it is possible by a slight readjustment to carry 10 passengers in five cabins.

The crew accommodation is placed around the engine casing on the upper deck and around the trunked hatch to No. 4 hold, the port side being allocated for the most part to galleys and messrooms. Cabins for boys are interposed between the galley for the crew and that for the officers. At the forward port side of this deck house is the office for the chief officer, the remainder of the bridge front being taken up with cabins for the bos'n and talleymen. The starboard side is completely allocated to accommodation for the seamen and engine-room hands, the hospital being at the after end. On the bridge deck above are cabins for the engineer officers and the chief steward. At the fore end of the house are the officers' dining saloon to port and the smoke-room

(Above) The officers' smoke-room, seen from the dining saloon.

(Above) Part of the captain's dayroom.

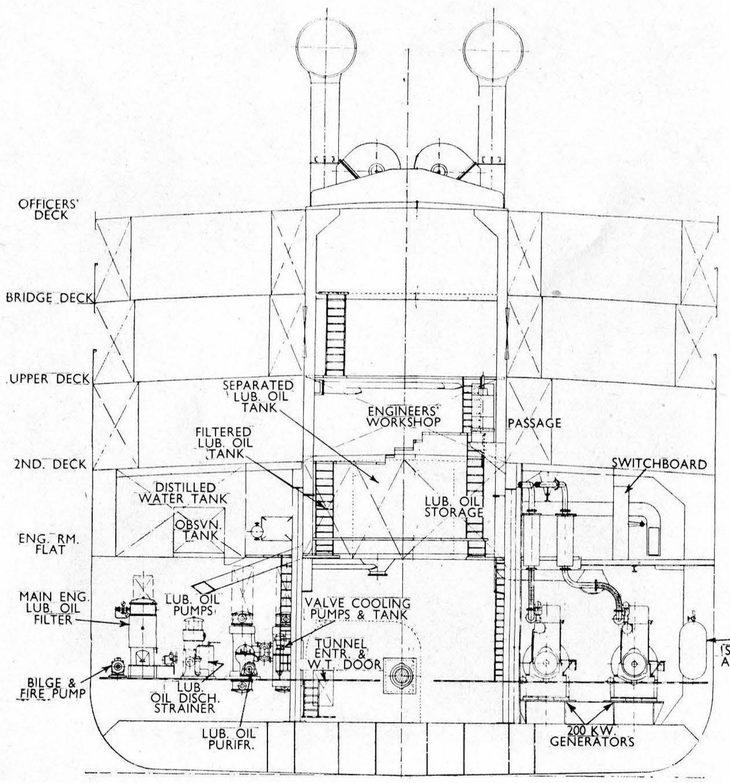
(Right) The chart room.

ACCOMMODATION IN THE "TJIBANTJET"

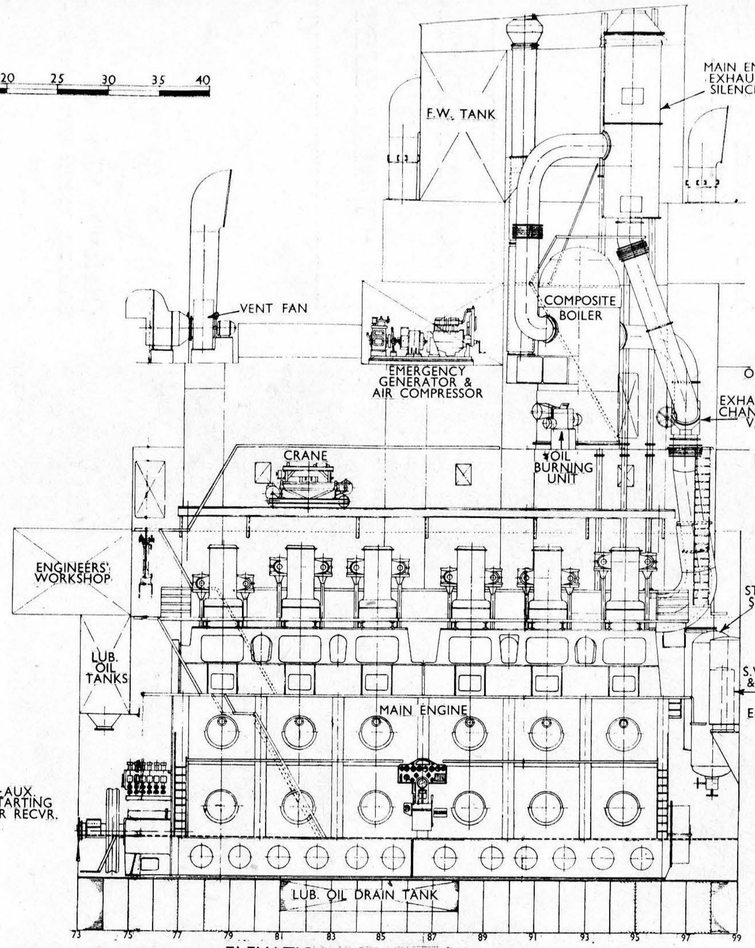
(Below) The crew's messroom.

(Below) View of the dining saloon, from the smoke-room.

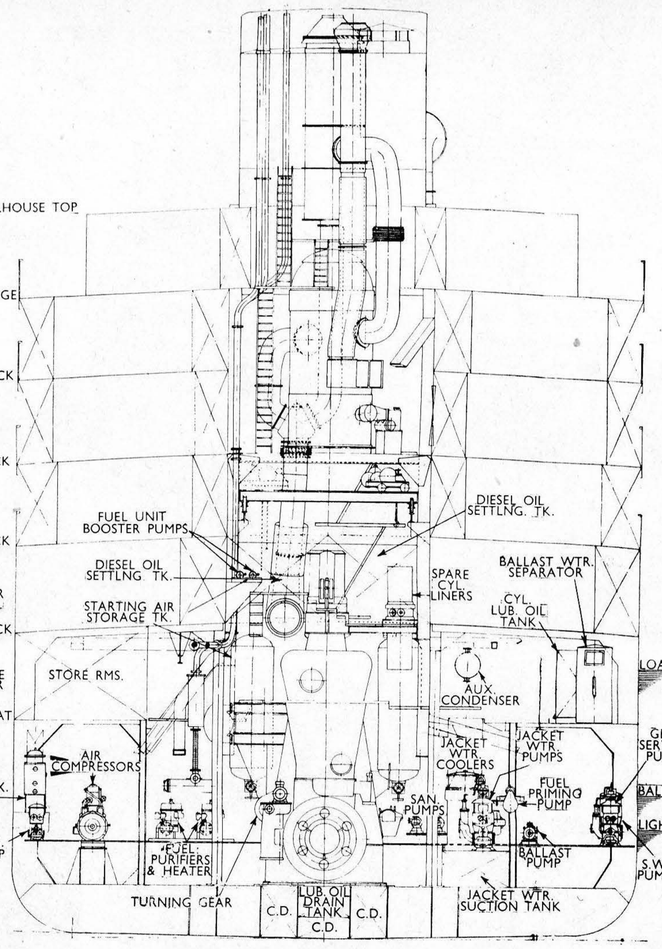
Photographed by "The Motor Shi



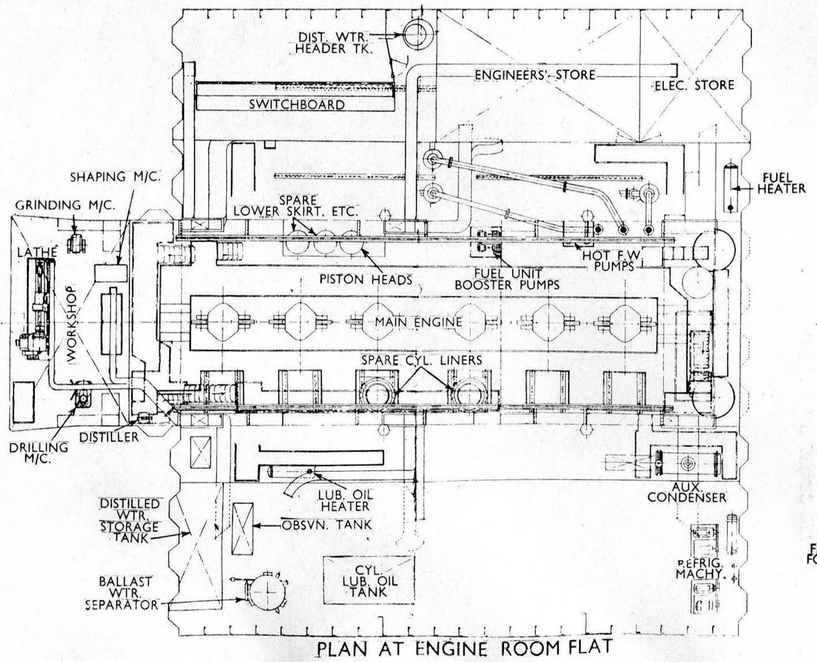
SECTION LOOKING AFT



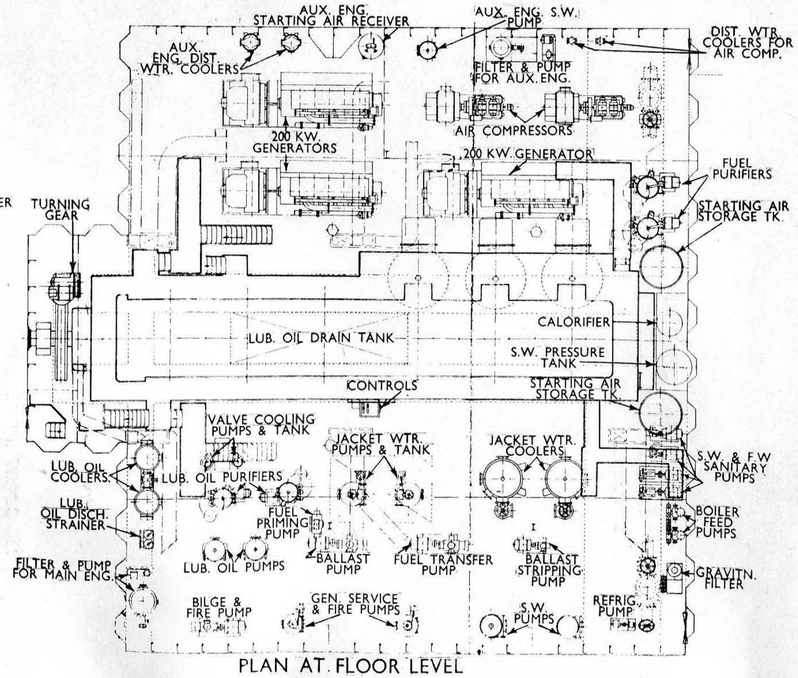
ELEVATION LOOKING TO PORT



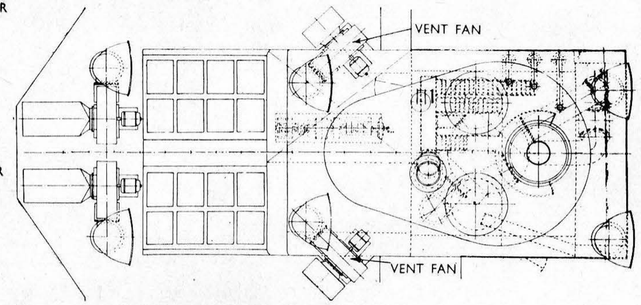
SECTION LOOKING FORWARD



PLAN AT ENGINE ROOM FLAT



PLAN AT FLOOR LEVEL



PLAN ON ENGINE AND BOILER CASINGS

ENGINE-ROOM PLANS OF THE M.V. "TJIBANTJET"

to starboard. There is ample deck space abaft this house, above which is the officers' deck with quarters for four deck officers, a pilot and two cadets. On this deck also are the two double-berth passenger cabins and the owner's stateroom. An extension of this house contains the emergency generator-compressor set. The radio operators are berthed on the navigation bridge, on the port side of the chart room, while the captain's suite, comprising a dayroom, bedroom and bathroom, is on the starboard side. The gyro room and the CO_2 room are at the after end of this deck.

Light-coloured hard wood panelling is a feature of most of the rooms. Messrs. Robson and Sons, Newcastle, were responsible for the entire upholstery and furnishings of the vessel. As the reproductions from photographs taken by one of our staff show, the dining and smoking rooms are particularly spacious for a ship of this class, and the two are interconnected by an archway. In each of these rooms the walls and tables are covered in coloured Formica—pale green in the smokeroom and beige in the dining saloon. Vynide P.V.C. leathercloth and Dunlopillo seating on wood frames has been used extensively in the cabins and main rooms, their colours being selected to blend with the colour schemes required by the owners. The Bull's windows include vertical sliding, hinged and fixed types. Those on the bridge deck are rack and pinion-operated, sliding, pressure-tight windows, 3 ft. high and 2 ft. wide, and incorporate a special arrangement whereby full watertightness can be obtained by an extra turn of the handle after the window has reached the closed position. Several of the hinged windows have a single side-hinged glass door constructed in two sections, each opening independently and hinged from a central vertical astragal.

The flooring throughout the accommodation is covered with either Semtex flexiner composition or, in the passageways, dining saloon, etc., with special decorative linoleum. In the laundry, hospital and galleys, however, Bitumastic enamel was applied to the steel decks prior to the laying of Semtex ceramic tiles. The crew's and officers' galleys are fitted with Henry Wilson equipment, and certain of the utensils had to be specially designed to allow the preparation of Javanese foods. The officers' galley contains two two-oven electric ranges with an exterior finish of vitreous enamelled ivory, a bench-type mixer and other electrical equipment, while in the crew's galley are a similarly constructed range and three electrically heated tilting roasting pans. These are heated by spiral elements. There are also two electrically heated rice boilers with a maximum loading of 8 kW. The pantry equipment contains the usual hot press, hot plate and other equipment.

The mechanical ventilation system was designed and installed by the Winsor Engineering Co., Ltd., air being delivered to, and extracted from, the accommodation, toilets, etc., by centrifugal supply and exhaust fans. Air distribution in the accommodation is mainly by Zephyr louvres. For the ventilation of the machinery spaces, holds, 'tweendecks and special cargo spaces, Bronswerk mechanical ventilation is installed. Telescopic extensions carry the air to the lower 'tweendecks and holds. At No. 4 hold the derrick posts are used to exhaust the cargo spaces.

Cargo-handling Arrangements

The six cargo hatches, which are fitted with movable beams, are served by Stewarts and Lloyds tubular steel derricks and are as follow:—

Six 6-ton derricks, 54 ft. long.
Six 10-ton derricks, 54 ft. long.
Six 3-ton derricks, 54 ft. long.
Two 3-ton derricks, 40 ft. 6 ins. long.

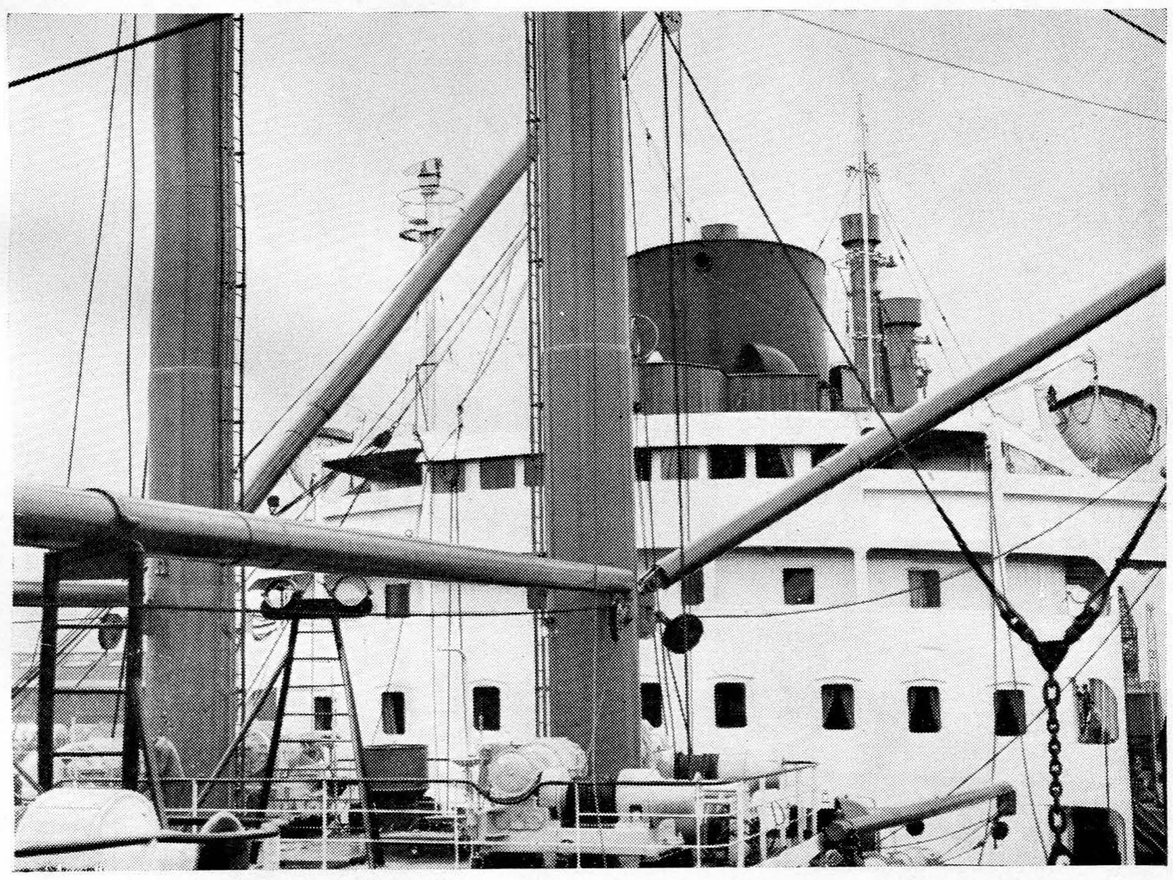
There is one 30-ton derrick for No. 2 hatch. These derricks are served by six 5-ton and 14 3-ton Laurence, Scott electric winches, which are a modification of the standard self-contained winch adopted by these owners. The winches in some cases are on deckhouses and on the extended forecastle. The usual master controller hand lever, and the hand lever for releasing the magnetic brake for gravity lowering are replaced by one large signal-type hand lever, which is considered more suitable for handling by native labour. This is situated immediately above the normal footbrake. The speed of the winches at full load is about 100 f.p.m., rising to 200 f.p.m. at half-load and to about 450 f.p.m. with light hook.

The windlass, also electrically driven, is of the Stothert and Pitt five-snug-type for $2\frac{1}{8}$-in. Tayco stud-link chain cable, which is equivalent to $2\frac{7}{16}$-in. iron chain cable. The 300 fathoms of cable are shackled in 15-fathom lengths, and fitted with 18 Kenter joining shackles. There are also 45 fathoms of $2\frac{1}{8}$-in. Tayco chain cable shackled in 15-fathom lengths and fitted with two Kenter joining shackles. Two 77-cwt. stockless bower anchors and one of $65\frac{1}{2}$ cwt. are carried, these being of the Byers type. The electric capstan aft is also of the Stothert and Pitt manufacture.

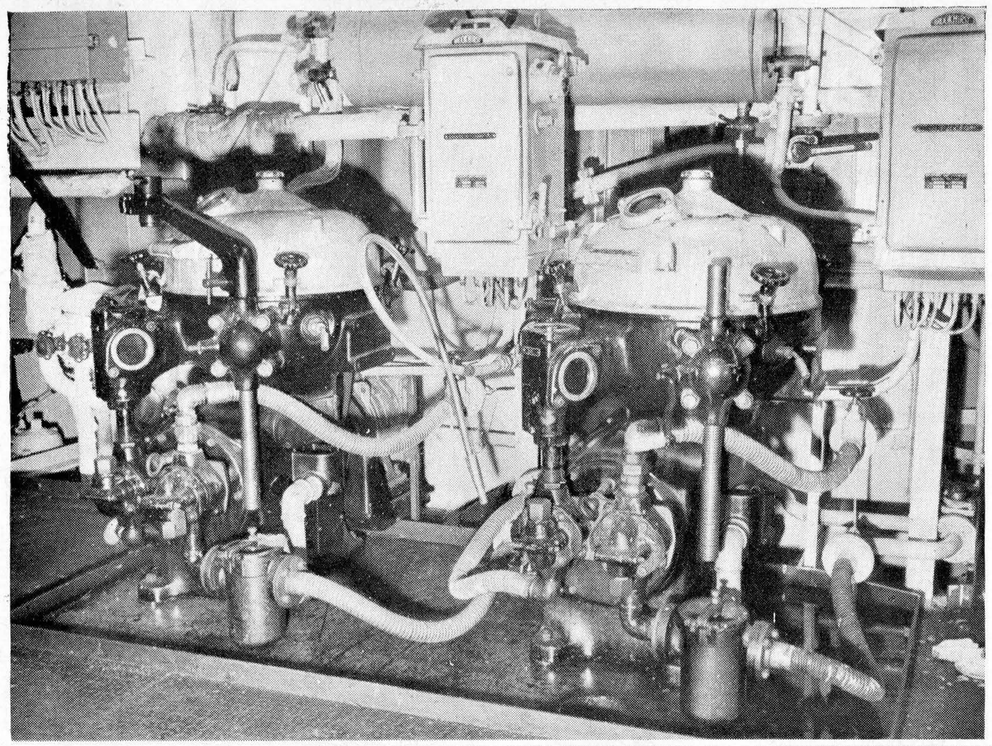
Steering Gear on Upper Deck

The Hastie electro-hydraulic steering gear is contained in a house on the upper deck. It is of the four-ram-type with two pumping units arranged so that they can work either independently or together. The two motors are L.S.E. 30 h.p. units. The gear is controlled from the bridge and the telemotor is arranged to work in conjunction with a Sperry gyro pilot of the single-unit type. When the vessel is proceeding ahead at full speed, the gear is capable of putting the rudder from hard-over to hard-over in 30 seconds. The rudder stock, 26 ft. $7\frac{1}{2}$ ins. long and $12\frac{5}{8}$ ins. diameter and having a vertical scarphed coupling, has an approximate weight of 6 tons. This rudder stock is stated to be the largest yet supplied by the Sunderland Forge and Engineering Co., to these shipbuilders.

The four wooden lifeboats on the vessel



View of a winch deckhouse and the bridge from forward and (above) cargo-handling arrangements, looking forward.



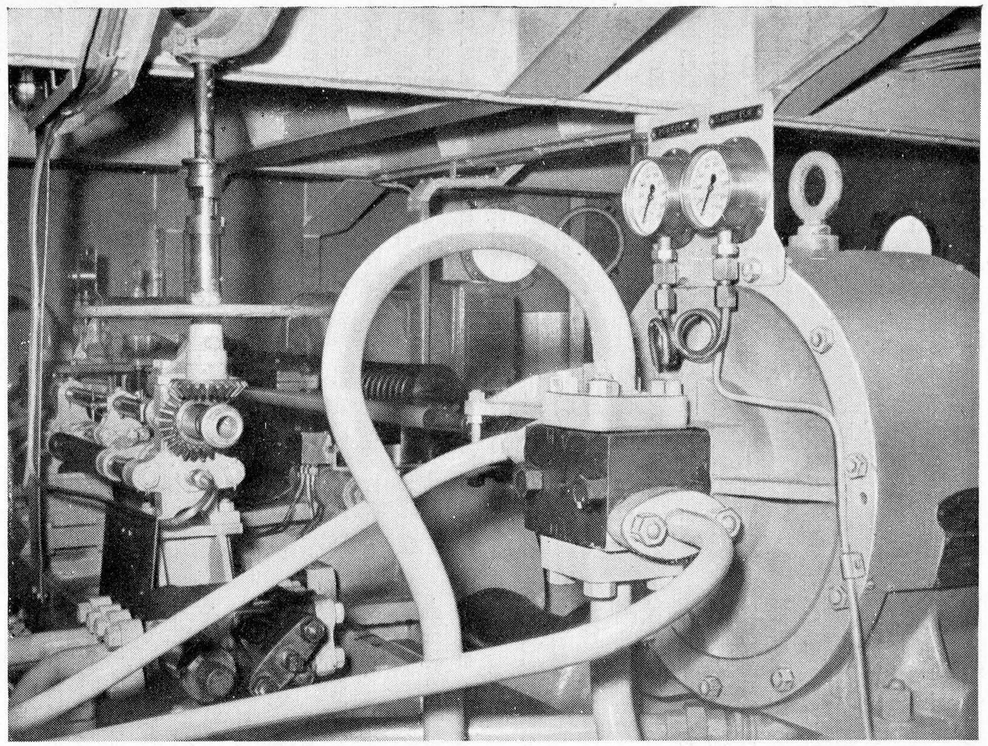
(Top, left) Part of the centrifuging equipment.

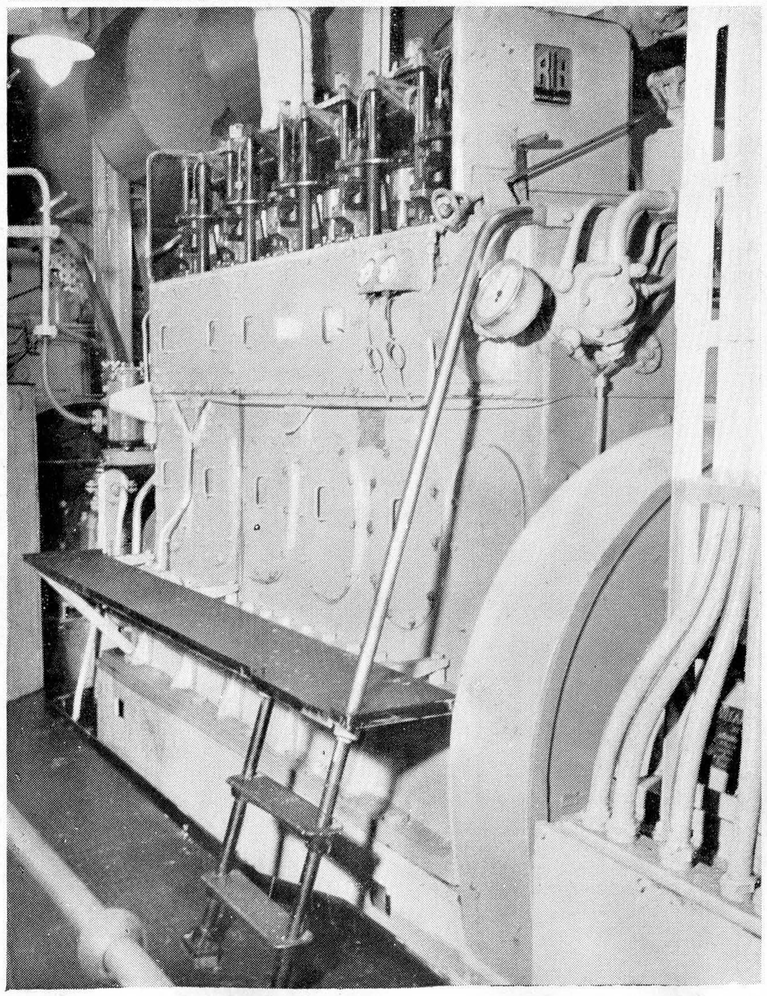
(Top, right) The steering gear.

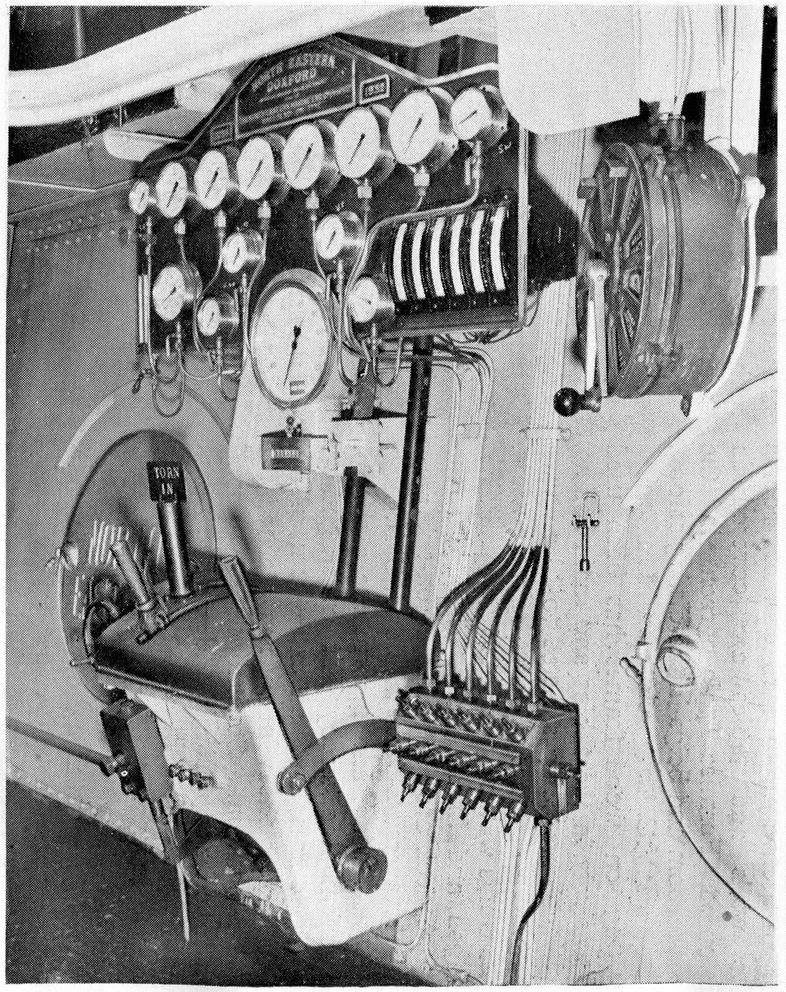
(Bottom, left) A 200-kW Diesel generator.

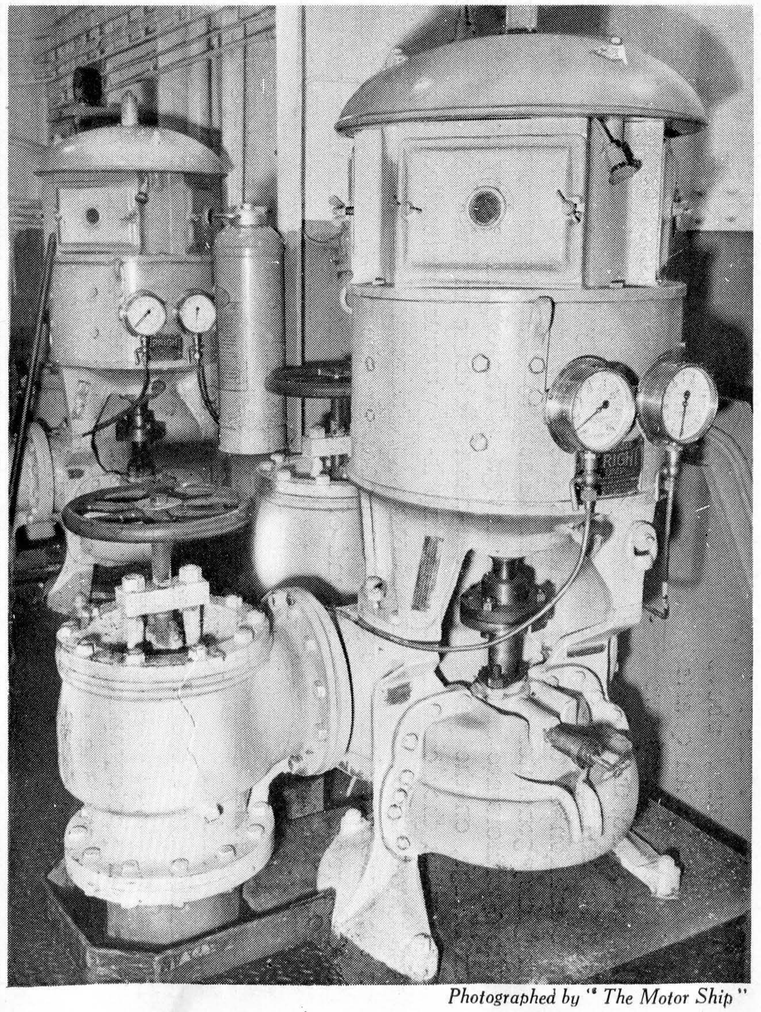
(Bottom, centre) The engine controls with gauge board above.

(Bottom, right) One of the electrically driven pumps.



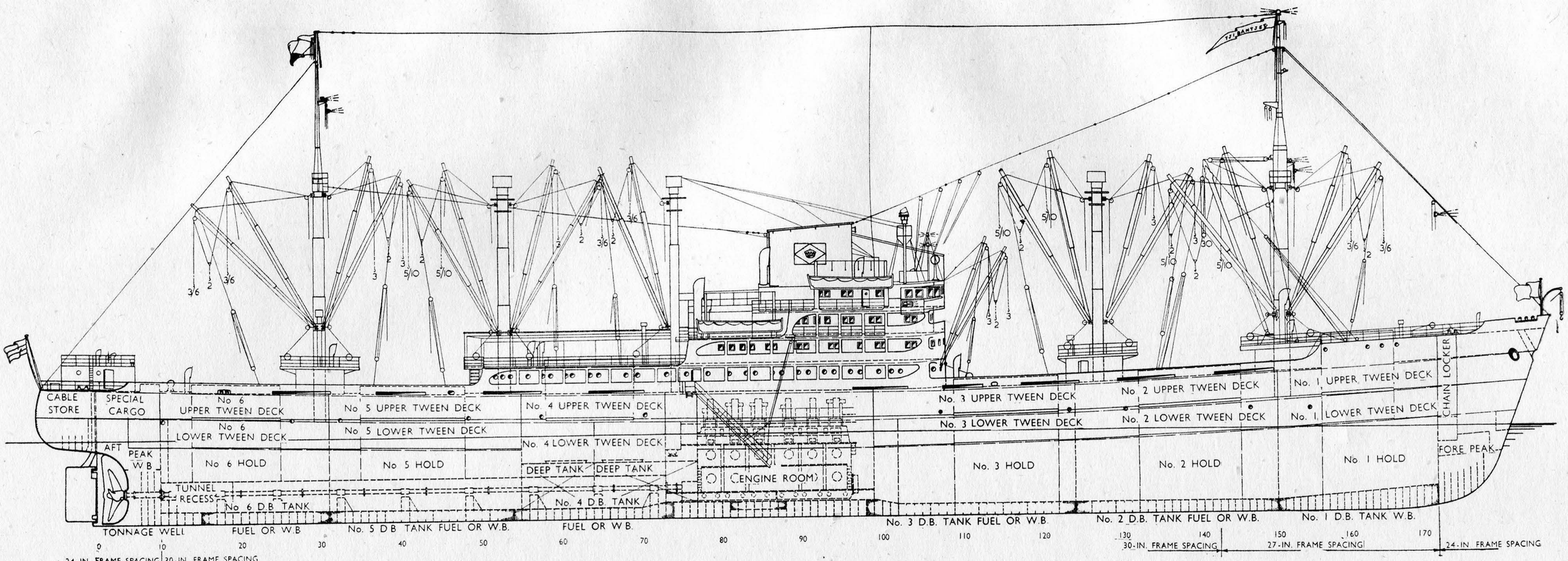


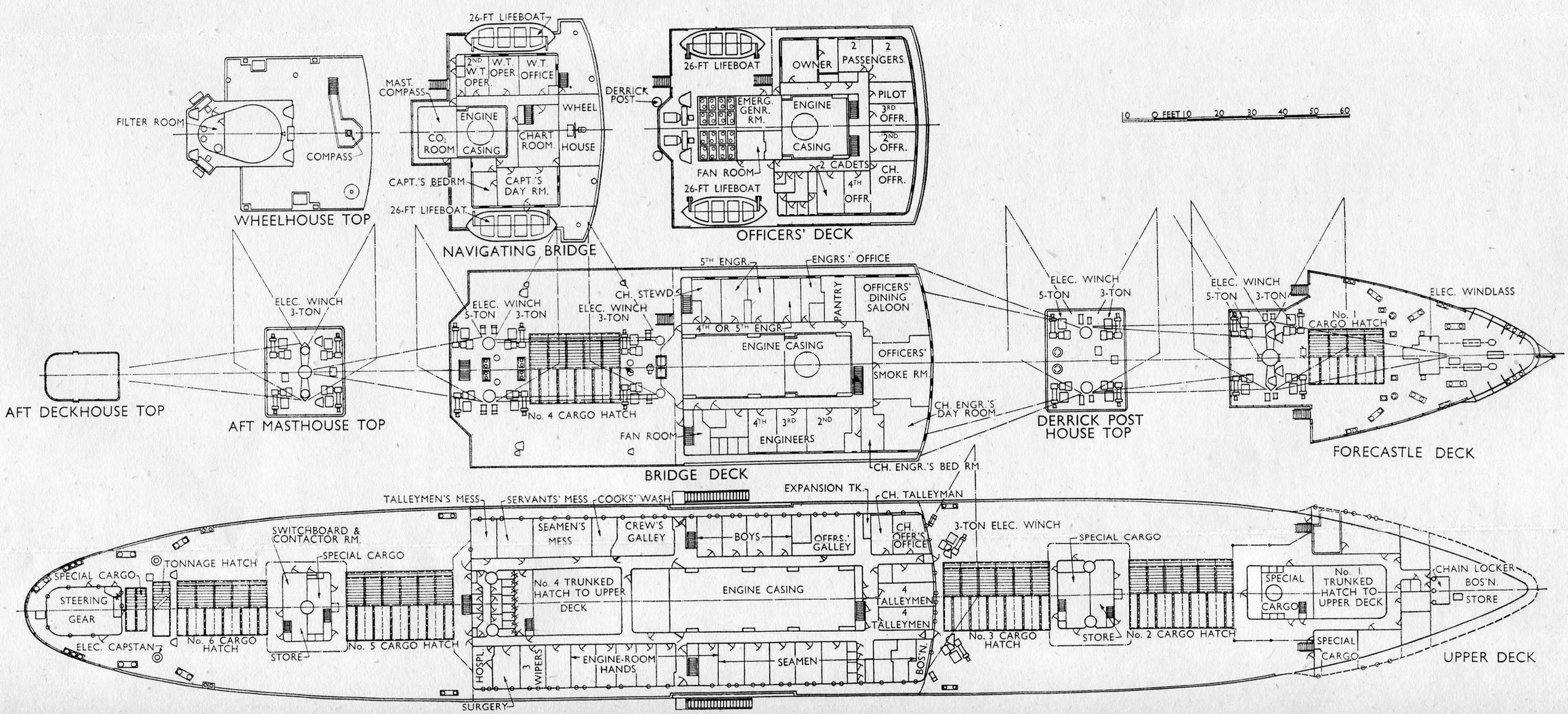


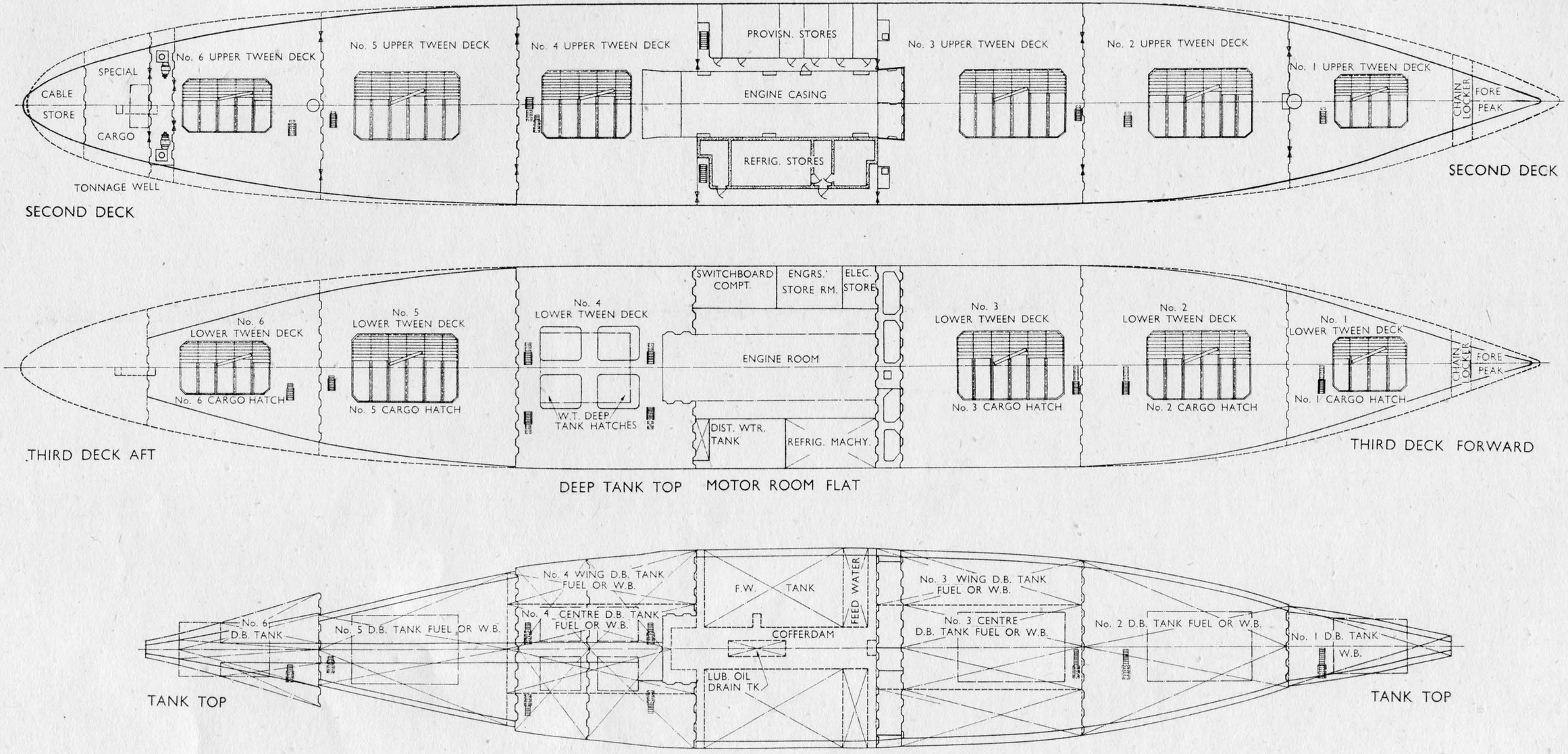


Photographed by "The Motor Ship"

MACHINERY OF THE "TJIBANTJET"


CABLE STORE
SPECIAL CARGO
No 6 UPPER TWEEN DECK
No 5 UPPER TWEEN DECK
No 4 UPPER TWEEN DECK
No. 3 UPPER TWEEN DECK
No 2 UPPER TWEEN DECK
No. 1 UPPER TWEEN DECK
CHAIN LOCKER
No 6 LOWER TWEEN DECK
No 5 LOWER TWEEN DECK
No. 4 LOWER TWEEN DECK
No. 3 LOWER TWEEN DECK
No. 2 LOWER TWEEN DECK
No. 1 LOWER TWEEN DECK
AFT PEAK W.B.
No 6 HOLD
No 5 HOLD
DEEP TANK
DEEP TANK
ENGINE ROOM
No. 3 HOLD
No. 2 HOLD
No. 1 HOLD
FORE PEAK
TUNNEL RECESS
No 6 D.B. TANK
No. 4 D.B. TANK
TONNAGE WELL
FUEL OR W.B.
No. 5 D.B. TANK FUEL OR W.B.
FUEL OR W.B.
No. 3 D.B. TANK FUEL OR W.B.
No. 2 D.B. TANK FUEL OR W.B.
No. 1 D.B. TANK W.B.
24-IN FRAME SPACING
30-IN FRAME SPACING
30-IN. FRAME SPACING
27-IN. FRAME SPACING
24-IN FRAME SPACING


WHEELHOUSE TOP
FILTER ROOM
COMPASS
NAVIGATING BRIDGE
26-FT LIFEBOAT
2ND W.T. OPER.
W.T. OPER.
W.T. OFFICE
MAST. COMPASS
WHEEL
ENGINE
CO2 ROOM
CASING
CHART ROOM
HOUSE
CAPT.'S BEDRM.
CAPT.'S DAY RM.
OFFICERS' DECK
DERRICK POST
EMERG. GENR. RM.
OWNER
2 PASSENGERS
PILOT
3RD OFFR.
2ND OFFR.
FAN ROOM
2 CADETS
CH. OFFR.
4TH OFFR.
10 0 FEET 10 20 30 40 50 60
AFT DECKHOUSE TOP
ELEC. WINCH 3-TON
AFT MASTHOUSE TOP
ELEC. WINCH 5-TON
3-TON
CH. STEWD.'S
5TH ENGR.
ENGRS.' OFFICE
OFFICERS' DINING SALOON
PANTRY
4TH OR 5TH ENGR.
ENGINE CASING
OFFICERS' SMOKE RM.
No. 4 CARGO HATCH
FAN ROOM
4TH 3RD 2ND ENGINEERS
CH. ENGR.'S DAY ROOM
CH. ENGR.'S BED RM.
BRIDGE DECK
DERRICK POST HOUSE TOP
ELEC. WINDLASS
No. 1 CARGO HATCH
FORECASTLE DECK
TALLEYMEN'S MESS
SERVANTS' MESS
COOKS' WASH
EXPANSION TK.
CH. TALLEYMAN
SEAMEN'S MESS
CREW'S GALLEY
BOYS
OFFRS.' GALLEY
CH. OFFR.'S OFFICE
3-TON ELEC. WINCH
SWITCHBOARD & CONTACTOR RM.
SPECIAL CARGO
TONNAGE HATCH
STEERING GEAR
ELEC. CAPSTAN
No. 6 CARGO HATCH
No. 5 CARGO HATCH
STORE
No. 4 TRUNKED HATCH TO UPPER DECK
ENGINE CASING
4 ALLEYMEN
4 TALLEYMEN
No. 3 CARGO HATCH
STORE
No. 2 CARGO HATCH
SPECIAL CARGO
No. 1 TRUNKED HATCH TO UPPER DECK
CHAIN LOCKER
BOS'N. STORE
SPECIAL CARGO
HOSPL.
3 WIPERS
ENGINE-ROOM HANDS
SEAMEN
BOS'N.
SURGERY
UPPER DECK



GENERAL ARRANGEMENT PLANS OF THE MOTOR CARGO LINER "TJIBANTJET."

(*For description see pages* 134-140)

are carried under Welin-MacLachlan overhead gravity davits. All davits are fitted with standard hand-operated winches, and there are two portable electric hoisting winches to facilitate rapid recovery of the lifeboats.

Among the navigating aids in the chart-room is the Sperry gyro compass equipment with a valve follow-up amplifier system. This compass operates a steering repeater of the enlarged-scale type mounted on the single-unit gyro pilot in the wheel-house. It also operates two bearing repeaters, each mounted in a bridge wing. A further standard repeater is mounted on the bulkhead in the wireless D/F room, to indicate the true heading for use in conjunction with the direction finding equipment. The gyro pilot can also be used for hand-electric control from a small steering wheel on the bridge unit. Other equipment includes a Siemens navigation light indicator, and one Supertyfon compressed air syren in the funnel and another on the fore mast. These may be operated by a Kockums Tyfon automatic signal. T.M.C. loud speaking telephones provide communication from the bridge to the poop and forecastle. A second system allows communication from the bridge to the gyro room, chief engineer, deck office and engine-room, and these instruments operate from the ship's 24-volt low-power supply. For emergency purposes there are batteryless telephones communicating between the chief engineer and the engine-room, and on a separate circuit, from the bridge to the engine-room. R.C.A. radar is fitted, and there is also a Hughes echo-sounder. A Kidde-Rich fire-extinguishing and smoke-detecting system is provided to give protection to the 21 cargo spaces; the detecting cabinet for this is in the wheel-house and 58 80-lb. CO_2 bottles are carried.

The emergency generator set comprises a Gardner four-cylinder 42 b.h.p. Diesel engine running at 1,100 r.p.m. and direct-coupled to an Allen 25-kW 220-volt d.c. generator. It also drives a clutch-engaged Hamworthy two-stage air compressor with an output of 30 cubic ft. per minute. The engine is water-cooled by a radiator and fan, and the entire unit comprising the engine, generator and compressor is mounted on a single cast-iron bedplate.

Main and Auxiliary Machinery

The main engine, built under survey and to the requirements of Lloyd's Register and to comply with Dutch Ship Inspection and Dutch Steam Law (Boiler Control) is a standard N.E.M.-Doxford six-cylinder unit with a bore of 670 mm. and a combined stroke of 2,320 mm. It develops 6,800 b.h.p. in service at 116 r.p.m., and has a maximum combustion pressure of 640 lb. per sq. in. The mean piston speed is about 883 ft. per min. at the designed service rating.

There are three lever-driven scavenging air pumps, and these are driven from Nos. 1, 2 and 3 centre connecting rods; each pump has a cylinder diameter of 1,700 mm. with a stroke of 548 mm. These pumps have steel pistons and discharge direct into the entablature, which forms a continuous air receiver. Distilled water cooling is used for the air starting valves, fuel injection valves and cylinder relief valves. The six plunger fuel pumps are driven by a roller chain wheel attached to the crankshaft, and all deliver to a common rail, but are arranged so that each pump delivery can be kept isolated to its respective cylinder. A Michell-type thrust block is attached to the after main bearing girder on the tank top, and is lubricated from the engine forced lubricating system through a special fine filter. At the forward end of the crankshaft is fitted a Doxford-Bibby detuning flywheel, and the engine drives a Manganese Bronze and Brass Co.'s solid bronze four-bladed propeller.

The turning gear for the main engine is actuated by L.S.E. 22 h.p. reversible drip-proof, enclosed-ventilated constant-speed motor, which is connected to a set of double-worm reduction gear for gearing into teeth cast in the flywheel rim. Control of the motor is by a Brookhirst starter.

Electric Generators

Electrical power throughout the ship is supplied from three 200-kW open-type, drip-proof, compound-wound generators, all of which are arranged for parallel running. Each of these is driven by a Ruston and Hornsby five-cylinder engine, developing 300 b.h.p. at a speed of 500 r.p.m. The engines are arranged for fresh water cooling and each is mounted with the generator on a common bedplate, which is bolted upon Coresil resilient mountings to the seating. Each engine drives its own distilled water cooling pumps and lubricating oil pumps, and there are independent oil coolers. The distilled water is cooled in a closed circuit, but it is stated that it is the owners' intention to adopt, eventually, fresh water cooling.

Starting air for the main engines is supplied from two motor-driven, three-stage, two-crank, Hamworthy air compressors, each with an output of 175 cubic ft. of free air per minute compressing to a working pressure of 600 lb. per sq. in. These sets are also distilled water cooled in a closed circuit, the pumps being driven from the compressor crankshaft. The compressors discharge to the starting air receivers, which have a capacity of 175 cubic ft.

Electrically driven Auxiliaries

Almost all the auxiliary machinery is electrically driven and the majority is of Drysdale manufacture, with L.S.E. motors. There are two jacket and piston water-cooling circulating pumps, one of which is a standby, and each is capable of delivering 310 tons per hour against a pressure of 40 lb. per sq. in. These are mounted on top of the distilled water section tank, and may discharge either direct or through a Serck cooler to the cylinder jackets and pistons. The casing of each is of cast-iron, and the impellers are of bronze. A Monitor alarm is fitted in the main discharge line to indicate if the pressure is not being maintained. The two forced lubricating oil pumps will each deliver 68 tons per hour with a delivery pressure of 50 lb. per sq. in. and draw through a suction filter from the lubricating oil drain-tank in the double bottom and then through an Auto-Klean filter and Serck cooler to the engine. There is a connection for a leak-off to a Stream-Line filter. Each pump has a cast-iron casing and a steel rotor, the drive being a 23 h.p. variable-speed motor. A Monitor pressure alarm is fitted in the main discharge line.

Two Hamworthy non-self-priming centrifugal pumps are fitted for fuel valve cooling, one of these being a standby, and each has an output of five tons per hour.

Each of the jacket and piston distilled water coolers has sufficient cooling surface to enable it to reduce the temperature of 310 tons of cooling water from 150°F. to 135°F. when supplied with sea water at 90°F. The two lubricating oil coolers are each capable of reducing the temperature of 68 tons of lubricating oil from 126°F. to 112°F. with the sea water at 90°F. The two salt water cooling pumps for the main engine are 410-tons per hour units, and draw from the sea to the salt water cooling main, viz., jacket and piston distilled water coolers, lubricating oil coolers, top guides, fuel valves, distilled water tank, stern tube, auxiliary condenser and starting air compressor coolers. These pumps are driven by 52-h.p. enclosed-ventilated, drip-proof, constant-speed motors. The salt water cooling pump for the auxiliary engines is capable of delivering 35 tons an hour against a total head of 40 ft. There are two Drysdale general service pumps, and these deliver 105/53 tons an hour against an equivalent head of 80/150 ft., and draw from the sea, bilges, or ballast line, excluding the oil and water tanks, and they can also draw from the fore peak and discharge to the after peak, or vice-versa.

Horizontal-screw Ballast Pump

The ballast pump is a Houttuin horizontal screw-displacement, 50-ton set, having a bronze casing and stainless steel shaft. It is driven by a 10 h.p. constant speed motor, and in emergency this pump can take over the duties of the fuel transfer pump. A Houttuin horizontal screw-displacement pump is also used for ballast stripping duties, and this has an output of up to five tons an hour against a delivery head of 18 ft. A Turbulo 50 tons per hour ballast water separator is installed.

The fuel transfer pump is a 50-ton screw-displacement unit, and the motor and shaft of this are interchangeable with those of the ballast pumps. The fire and bilge pump is a 20-ton horizontal screw-displacement unit, which is driven by a 10 h.p. L.S.E. motor.

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Two De Laval heavy oil purifier-clarifier units are installed, with Laurence Scott motors and Brookhirst switchgear, and there is also one De Laval lubricating oil purifier fitted with two pumps and with similar electrical equipment. The Diesel oil purifier with two pumps is of a similar design. A Stream-Line filter is incorporated in the suction line from the lubricating oil drain tank.

The exhaust gases from the main engine are utilized in a Cochran composite exhaust-gas oil-fired boiler, having a diameter of 8 ft. and a height of 19 ft. 3 ins. This boiler is constructed for a working pressure of 100 lb. per sq. in., and the tube nest for the exhaust gases has special Sinuflo tubes arranged to give maximum heat extraction. The heating surface section of the boiler is 760 sq. ft., and that of the oil-fired section 590 ft. Laidlaw Drew manually controlled pressure-jet oil-firing equipment is fitted, having its own forced-draught fan and an electrically operated pump, driven by a 1½ h.p. electric motor on a common shaft. This unit is self-contained and incorporates the fan, pump, electrically operated oil heater, necessary strainer valves and interconnection pipe on the main burner casing. With this controlled-pressure jet system, the oil is circulated and surplus oil is passed back from the boiler and returned to the suction side of the oil pump. The feed water filter is of the Carruthers's gravitation type and is designed for 600 gallons per hour and receives the drains from the auxiliary condenser, observation tank and steam auxiliaries. There are two Weir direct-acting 4-in. by 6-in. by 7-in. feed pumps, one of which is a stand-by, and these are regulated by a float valve in the feed water tank.

Arrangements for Future Operation on Heavy Oil

As previously stated, it is the owners' intention that the engine will operate on Diesel oil, but, like many other owners, they have made provisions to facilitate subsequent fitting of heavy-oil equipment, so that the installation can be readily adapted to operate on high-viscosity fuel. The provisions which have been made are as follows:—

1. Each main engine fuel-injection valve is fitted with a circulating outlet valve to enable heated fuel oil to be circulated through the boiler body.

2. Each main engine fuel pump oil bottle is fitted with a circulating valve outlet.

3. The plugs fitted in the main engine fuel oil filters are arranged with thermometer pockets.

4. Seating and sufficient space have been provided for another fuel oil purifier.

5. Space has been left for a steam heater in the line between the dirty heavy oil tank and the heavy oil purifier.

Space has also been left for a filter and steam heater in the line between the clean heavy oil tank and the main engine. A 30-ton dirty heavy oil tank has already been built in the cross bunkers.