

# REPORT ON OIL ENGINE MACHINERY.

No. 1686

Received at London Office 14 OCT 1929

Writing Report 9th Sep 29 When handed in at Local Office 9th Sep. 29 Port of NAGASAKI.

Survey held at NAGASAKI. Date, First Survey 6th Nov. 1928. Last Survey 20th Aug. 1929. Number of Visits 147.

on the <sup>Single</sup> ~~Twin~~ ~~Triple~~ ~~Quadruple~~ Screw vessel "HEIYO MARU". Tons { Gross Net

at Osaka. By whom built Osaka Iron Works. Yard No. 1127. When built

Lines made at Nagasaki. By whom made Mitsubishi Zosen Kaisha, Engine No. 464. When made 1929.

Boilers made at By whom made Boiler No. When made

Net Horse Power 8000. Owners Nippon Yusen Kabushiki Kaisha. Port belonging to

Net Horse Power as per Rule 2004. Is Refrigerating Machinery fitted for cargo purposes Is Electric Light fitted

Use for which vessel is intended

ENGINES, &c.—Type of Engines Mitsubishi-Sulzer. 2 or 4 stroke cycle 2 Single or double acting Single.

Maximum pressure in cylinders 40 atm. Diameter of cylinders 680 m/m. Length of stroke 1000 m/m. No. of cylinders 16. No. of cranks 16.

Distance of bearings, adjacent to the Crank, measured from inner edge to inner edge 890 m/m. Is there a bearing between each crank Yes.

Revolutions per minute 120. Flywheel dia. 2100 m/m. Weight 8 tons. Means of ignition Compression Temp due to Kind of fuel used Heavy fuel oil.

Crank Shaft, dia. of journals as per Rule 442.4 m/m. as fitted 450 m/m. Crank pin dia. 450 m/m. Crank Webs Mid. length breadth shrunk Thickness parallel to axis 280 m/m. Mid. length thickness Thickness around eyehole 204 m/m.

Flywheel Shaft, diameter as per Rule 442.4 m/m. as fitted 450 m/m. Intermediate Shafts, diameter as per Rule 350.9 m/m. as fitted 1478. Thrust Shaft, diameter at collars as per Rule 368.4 m/m. as fitted 450 m/m.

Screw Shaft, diameter as per Rule as fitted Is the tube screw shaft fitted with a continuous liner

Liner thickness in way of bushes as per Rule as fitted Thickness between bushes as per rule as fitted Is the after end of the liner made watertight in the

After end of the liner If the liner is in more than one length are the junctions made by fusion through the whole thickness of the liner

When the liner does not fit tightly at the part between the bearings in the stern tube, is the space charged with a plastic material insoluble in water and non-corrosive

When no liners are fitted, is the shaft lapped or protected between the liners Is an approved Oil Gland or other appliance fitted at the after

End of the tube shaft Length of Bearing in Stern Bush next to and supporting propeller

Propeller, dia. 15'-0". Pitch 16'-1 1/2". No. of blades 4. Material N.M. whether Moveable Yes. Total Developed Surface 67.5 sq. feet

Method of reversing Engines Direct. Is a governor or other arrangement fitted to prevent racing of the engine when declutched Yes. Means of lubrication

Thickness of cylinder liners 53 m/m. Are the cylinders fitted with safety valves Yes. Are the exhaust pipes and silencers water cooled or lagged with

conducting material Yes. If the exhaust is led overboard near the waterline, what means are arranged to prevent water from being syphoned back to the engine

Is the sea suction provided with an efficient strainer which can be cleared within the vessel

Are the Main Engines, No. Diameter Stroke Can one be overhauled while the other is at work

No. and Size How driven

Lubricating Oil Pumps, including Spare Pump, No. and size

Are independent means arranged for circulating water through the Oil Cooler Suctions, connected to both Main Bilge Pumps and Auxiliary Bilge

Pumps, No. and size:—In Machinery Spaces

Independent Power Pump Direct Suctions to the Engine Room Bilges, No. and size

Are the Bilge Suction pipes in Holds and Tunnel Well fitted with strum-boxes Are the Bilge Suctions in the Machinery Spaces

Are easily accessible mud-boxes, placed above the level of the working floor, with straight tail pipes to the bilges

Are the Sea Connections fitted direct on the skin of the ship Are they fitted with Valves or Cocks

Are they fixed sufficiently high on the ship's side to be seen without lifting the platform plates Are the Overboard Discharges above or below the deep water line

Are they each fitted with a Discharge Valve always accessible on the plating of the vessel Are the Blow Off Cocks fitted with a spigot and brass covering plate

How are they protected

Have they been tested as per Rule

Are all Pipes, Cocks, Valves, and Pumps in connection with the machinery and all boiler mountings accessible at all times

Is the arrangement of valves and their connections such as to prevent the possibility of water passing from the sea or from water tanks into the cargo or machinery spaces, or from one

Department to another Is the Shaft Tunnel watertight Is it fitted with a watertight door worked from

When in a wood vessel, what means are provided to prevent leakage of either fuel oil or of lubricating oil from saturating the woodwork

Auxiliary Air Compressors, No. Four (2 each eng) No. of stages Three. Diameter 570/480/150 Stroke 400 m/m. Driven by Main engine.

Auxiliary Air Compressors, No. One. No. of stages Three. Diameters 340/295/75 Stroke 180 m/m. Driven by Elec. motor.

All Auxiliary Air Compressors, No. No. of stages Diameters Stroke Driven by

Arbo Blower. Two. (Single). Capacity 1200 cu. m/min. (each) Driven by Elec. motor.

Exhausting Air Pumps, No. Diameter Stroke

Auxiliary Engines crank shafts, diameter as per Rule as fitted

RECEIVERS:—Is each receiver, which can be isolated, fitted with a safety valve as per Rule Yes.

Are the internal surfaces of the receivers be examined Yes. What means are provided for cleaning their inner surfaces Handhole- H.P. Receivers

Is there a drain arrangement fitted at the lowest part of each receiver Yes.

High Pressure Air Receivers, No. Two. Cubic capacity of each 150 litres. Internal diameter 300 m/m. thickness 16 m/m.

Are they seamless, lap welded or riveted longitudinal joint Seamless. Material S.M. Steel. Range of tensile strength 28-35 tons sq. in. Working pressure by Rules 97.2 Kg/cm<sup>2</sup>

Are they riveted longitudinal joint Total cubic capacity Internal diameter thickness

Are they seamless, lap welded or riveted longitudinal joint Material Range of tensile strength Working pressure by Rules

604711-009220-0126

**IS A DONKEY BOILER FITTED?**

If so, is a report now forwarded?

PLANS. Are approved plans forwarded herewith for Shafting Crank shaft only Receivers 150 litres. Separate Tanks

Donkey Boilers General Pumping Arrangements Oil Fuel Burning Arrangements

**SPARE GEAR**

- 2 Working cylinder covers, consisting of centre & outer pieces and internal pipe fitting.
- 8 Combined starting air & fuel valves complete.
- 2 Safety valves complete for Working cylinder.
- 1 Working piston complete with rings, rods and inner cooling tube.
- 112 Working piston packing rings.
- 8 Outer cooling water pipes.
- 1 Cast iron gear wheel for Counter shaft.
- 1 Steel bevel wheel for Vertical shaft.
- 2 Bronze spiral wheel for Cam shaft.
- 2 Upper connecting rod bolts and nuts.
- 4 Main bearing bolts with double nuts.
- 24 Piston rings for H.P.Piston.
- 20 Piston rings for Bottom L.P.Piston.
- 2 H.P.delivery valves.
- 8 75 m/m dia. I.P.suction and delivery valves.
- 24 46 m/m dia. L.P.suction & delivery valves.
- 24 105 m/m dia. L.P.suction & delivery valves.
- 4 Plungers with bush for fuel pump.
- 4 Delivery valves with spring for fuel pumps.
- 1 Additional jacket cooling water pump.
- 4 Advance starting air valves complete.
- 16 Fuel needle valves.
- 8 Inner cooling water pipes.
- 1 Steel gear wheel for Crank shaft.
- 1 Steel bevel wheel for Counter shaft.
- 2 Steel spiral wheel for Vertical shaft.
- 18 Cylinder cover studs and nuts.
- 4 Lower connecting rod bolts and nuts.
- 16 Coupling bolts for Working cyl.crank shaft
- 20 Piston rings for Top L.P.Piston.
- 2 H.P.suction valves.
- 8 46 m/m dia. I.P.suction & delivery valves.
- 8 105 m/m dia. I.P.suction & delivery valves.
- 24 75 m/m dia. L.P.suction & delivery valves.
- 24 135 m/m dia. L.P.suction & delivery valve
- 4 Suction valves with spring for fuel pumps.
- 1 Addition scavenge blower.
- 1 Additional piston cooling water pump.

The foregoing is a correct description,

NAGASAKI WORKS, MITSUBISHI ZOSEN KAISHA, LTD.

*J. Hirota* Manufacturer.

Dates of Survey while building	During progress of work in shops -	1928. Nov. 6. 13. 15. Dec. 11. 14. 15. 20. 21. 29. 1929. Jan 7. 10. 17. 19. 21. 23. 24. 25. 26. 28.
	During erection on board vessel -	Feb 1. 4. 6. 7. 8. 15. 19. 20. 21. 22. 23. 25. 26. 27. 28. Mar 1. 2. 4. 5. 6. 7. 8. 9. 11. 12. 13. 18. 19. 22. 23. 25. 26. 27. 28. 29. 30. Apr 1. 2. 4. 5. 6. 8. 10. 11. 13. 15. 16. 19. 20. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. June 1. 3. 4. 5.
	Total No. of visits	20. 23. 24. 29. 30. 31. Aug 5. 6. 8. 13. 14. 20.

Dates of Examination of principal parts - Cylinders 8-3-29 to 25-4-29. Covers 28-3-29 to 5-4-29. Pistons 22-2-29 to 31-5-29. Rods 28-1-29 to 30-3-29. Connecting rods 6-12-28 to 11-1-29. Crank shaft 6 & 13-12-28. Flywheel shaft and Thrust shaft 6-12-28. Intermediate shafts Tube shaft 11 & 18-1-29. Prague.

Screw shaft Propeller Stern tube Engine seatings Engines holding down bolts P-10.11-7-29 S-21-22

Completion of fitting sea connections Completion of pumping arrangements Engines tried under working conditions in Shop

Crank shaft, Material Ingot Stl. Identification Mark P-LLOYDS No. 8041 & 8042. Flywheel shaft, Material Ingot Stl. Identification Mark PK 11-1-29. Thrust shaft, Material Ingot Stl. Identification Mark S-LLOYDS No. 8039 & 8040. (Spare Crank shaft Identification Mark PK 6-12-28. Intermediate shafts, Material LLOYDS, No. 8043, PK 8-2-29) Identification Marks PK 6-12-28.

Tube shaft, Material Identification Mark Screw shaft, Material Identification Mark

Is the flash point of the oil to be used over 150° F. Yes.

Is this machinery duplicate of a previous case No. If so, state name of vessel.

General Remarks (State quality of workmanship, opinions as to class, &c. The machinery has been constructed under supervision in accordance with the requirements of the Society's Rules and Approved plans.

The materials and workmanship are good and the machinery has been examined under working conditions on test bed in Shop, found satisfactory, and is eligible in our opinion for the notation of **CLASS** (with date) when installed in the vessel.

The two main engines covered by this report have been forwarded to Osaka for installation in the vessel.

Note:- The following articles supplied by Messrs, Mitsubishi are being forwarded direct to Messrs Iron Works from their respective makers.

- Two Jacket cooling water pumps 350 cu.m/hr.
- Two Lubricating oil pumps (bearings) 58 cu.m/hr.
- Two Lubricating oil coolers.
- One Small auxiliary compressor.
- Two Piston cooling water pumps 80 cu.m/hr.
- Two Lubricating oil pumps (crosshead) 8 cu.m/hr.
- Twelve H.P. Air bottles (800 litres).

The amount of Entry Fee ...	£ 60:00	When applied for,	20. 8. 1929.
Special 4/5. Fee.	£ 180:20	When received,	9. 9. 1929.
Donkey Boiler Fee ...	£ :		
Travelling Expenses (if any)	£ :		

*George Anderson & K. Kishigawa*  
Engineer Surveyor to Lloyd's Register of Shipping

Committee's Minute Assigned  
TUE. 29 APR 1930 TUE. 13 MAY 1930  
See Kob. Rpt. 6879 FRI. 17 APR 1931  
Lloyd's Register Foundation