

# REPORT ON MACHINERY

No. 1324  
FRI. JUL. 29 1921

Received at London Office

Date of writing Report 6th June 21 When handed in at Local Office 6th June 21 Port of NAGASAKI.

No. in Survey held at Nagasaki, Date, First Survey 7th Jan'y '20. Last Survey 25th May, 1921.  
Reg. Book. (Number of Visits 109)

on the Steel Twin Geared Turbine "RAKUYO MARU."  
Tons { Gross 9418.57  
Net 5678.29

Master J. Yawata. Built at Nagasaki. By whom built Mitsubishi Zosen Kaisha, Ltd. When built 1921.  
Engines made at Nagasaki, By whom made Mitsubishi Zosen Kaisha, Ltd., when made 1921.  
Boilers made at Nagasaki, By whom made Mitsubishi Zosen Kaisha, Ltd., when made 1921.  
Registered Horse Power 1153 NHP. Owners Toyo Kisen Kabushiki Kaisha, Port belonging to Yokohama.  
Shaft Horse Power at Full Power 7121 Is Refrigerating Machinery fitted for cargo purposes No Is Electric Light fitted Yes

TURBINE ENGINES, &c.—Description of Engines Single Reduction Geared Turbine No. of Turbines 4  
Diameter of Rotor Shaft Journals, H.P. 5 3/4" L.P. 8" Diameter of Pinion Shaft 5 1/2" H.P. & L.P.  
Diameter of Journals 5 1/4" Distance between Centres of Bearings 2'-3 3/4" Diameter of Pitch Circle 6.65607"  
Diameter of Wheel Shaft 14 1/4" Distance between Centres of Bearings 5'-8 1/2" Diameter of Pitch Circle of Wheel 144.2864"  
Width of Face 16 1/2" Diameter of Thrust Shaft under Collars 14 1/4" Diameter of Tunnel Shaft as per rule 13.1  
as fitted 13 1/2"  
No. of Screw Shafts 2 Diameter of same as per rule 14.7" Diameter of Propeller 16'-0" Pitch of Propeller 17'-0"  
as fitted 15 1/2"  
No. of Blades 4 State whether Moveable yes Total Surface 75.85 sq. ft. Diameter of Rotor Drum, H.P. 19 1/2" L.P. 35" Astern 28"  
Thickness at Bottom of Groove, H.P. 1 5/8" L.P. 2 3/8" Astern 1 3/4" Revs. per Minute at Full Power, Turbine 2236 Propeller 103

## PARTICULARS OF BLADING.

	H.P.			L.P.			ASTERN.		
	HEIGHT OF BLADES.	DIAMETER AT TIP.	NO. OF ROWS.	HEIGHT OF BLADES.	DIAMETER AT TIP.	NO. OF ROWS.	HEIGHT OF BLADES.	DIAMETER AT TIP.	NO. OF ROWS.
EXPANSION	1 3/16"	1'-9 7/8"	12	1 1/2"	3'-2"	2	5/8"	2'-5 1/4"	2
"	1 1/4"	1'-11"	12	1 7/8"	3'-2 1/2"	2	1"	2'-6"	2
"	2 1/8"	2'-0 1/2"	12	2 3/8"	3'-3 1/2"	2	1 1/8"	2'-7"	2
"	3 1/2"	2'-2 1/2"	12	2 7/8"	3'-4 1/2"	2	2 3/8"	2'-8 1/4"	2
"				3 1/2"	3'-6"	2	3 1/8"	2'-11"	2
"				4 1/8"	3'-7 1/4"	2	3 1/2"	2'-11"	1
"				5 1/4"	3'-9 1/2"	2	3 1/2"	2'-11"	1
"				6 1/2"	4'-0"	2			
"				8"	4'-3"	2	(7/8" 1 1/4" 1 5/8" 2 2/8" for Impulse)		
"				8"	4'-2"	1			
"				8"	4'-3"	1			

and size of Feed pumps Main 3, 13 1/2" x 10" x 24", Aux. 1, 7" x 5" x 12".  
and size of Bilge pumps 4. 6" x 15".  
and size of Bilge suction in Engine Room 2'-3 1/2" from wings, 2'-3 1/2" from hat, 2'-3 1/2" from gear case pocket.  
In Holds, &c. No. 1, 2'-3 1/2". No. 2, 2'-3 1/2". Cofferdam 2. 2"  
No. 3, 2'-3 1/2" No. 4, 2'-3 1/2" No. 5, 2'-3 1/2" Tunnel bilge hat 1'-3 1/2", Tunnel well 1'-3 1/2".  
of Bilge Injections 2 sizes 10" Connected to circulating pump yes Is a separate Donkey Suction fitted in Engine Room & size yes, 6"  
all the bilge suction pipes fitted with roses yes Are the roses in Engine room always accessible yes  
all connections with the sea direct on the skin of the ship yes Are they Valves or Cocks both.  
they fixed sufficiently high on the ship's side to be seen without lifting the stokehold plates yes Are the Discharge Pipes above or below the deep water line both  
they each fitted with a Discharge Valve always accessible on the plating of the vessel yes Are the Blow Off Cocks fitted with a spigot and brass covering plate yes  
all pipes are carried through the bunks Bilge pipes. How are they protected wood ceiling.  
all Pipes, Cocks, Valves, and Pumps in connection with the machinery and all boiler mountings accessible at all times yes  
the Bilge Suction Pipes, Cocks, and Valves arranged so as to prevent any communication between the sea and the bilges yes  
the Screw Shaft Tunnel watertight yes Is it fitted with a watertight door yes worked from top platform (shelter deck)

BOILERS, &c.—(Letter for record S.) Manufacturers of Steel the Steel Co of Scotland, Ltd.  
Total Heating Surface of Boilers 12065 Is Forced Draft fitted yes No. and Description of Boilers 5 single end Cylindrical  
Working Pressure 200 lbs Tested by hydraulic pressure to 400 lbs Date of test 2nd Nov. 1920 No. of Certificate 106  
each boiler be worked separately yes Area of fire grate in each boiler 57.75 sq. ft. No. and Description of Safety Valves to  
boiler 2 spring loaded Area of each valve 9.62 Pressure to which they are adjusted 205 lbs Are they fitted with easing gear yes  
least distance between boilers or uptakes and bunks or woodwork 16" Mean dia. of boilers 14'-6" Length 11'-6" Material of shell plates steel  
Thickness 1 3/8" Range of tensile strength 28 to 32 tons Are the shell plates welded or flanged No Descrip. of riveting: cir. seams DR lap  
seams T.R.D.B.S. Diameter of rivet holes in long. seams 1 1/2" Pitch of rivets 5" & 10" Width of butt straps 22"  
Percentages of strength of longitudinal joint rivets 95.6 Working pressure of shell by rules 215 lbs Size of manhole in shell 16" x 12"  
plates 85.0  
of compensating ring 36 1/2" x 32 1/2" x 1 3/8" No. and Description of Furnaces in each Boiler 3 Morison Material steel Outside diameter 46 1/4"  
Thickness of plates top 21" crown 21" bottom 32" Description of longitudinal joint Welded No. of strengthening rings None  
Working pressure of furnace by the rules 231 lbs Combustion chamber plates: Material steel Thickness: Sides 11/16" Back 11/16" Top 11/16" Bottom 15/16"  
of stays to ditto: Sides 7 1/2" x 10" Back 8 1/2" x 8 7/8" Top 9" x 8 1/2" If stays are fitted with nuts or riveted heads Nuts Working pressure by rules 209 lbs  
Material of stays steel Diameter at smallest part 1.6 Area supported by each stay 75.5 sq. Working pressure by rules 246 lbs End plates in steam space  
Material steel Thickness 1 7/32" Pitch of stays 17 1/2" x 19" How are stays secured D. Nuts & Washers Working pressure by rules 211 lbs Material of stays steel  
Diameter at smallest part 3" Area supported by each stay 325.5 sq. in Working pressure by rules 223 lbs Material of Front plates at bottom steel  
Thickness 3/4" Material of Lower back plate steel Thickness 3/4" Greatest pitch of stays 18 1/2" x 6" Working pressure of plate by rules 215 lbs  
Diameter of tubes 3" Pitch of tubes 4 1/8" x 4 3/8" Material of tube plates steel Thickness: Front 3/4" Back 3/4" Mean pitch of stays 8 1/2"  
used across wide water spaces 13.5 Working pressures by rules 222 lbs Girders to Chamber tops: Material steel Depth and  
Thickness of girder at centre 10" x 7/8" dble Length as per rule 2'-5 13/16" Distance apart 8 1/2" Number and pitch of stays in each 2 @ 9"  
Working pressure by rules 354 lbs Steam dome: description of joint to shell / % of strength of joint / Diameter /  
Thickness of shell plates / Material / Description of longitudinal joint / Diameter of rivet holes / Pitch of rivets /  
Working pressure of shell by rules / Crown plates: Thickness / How stayed /

W1067-010

**SUPERHEATER.** Type **Esaky's** Date of Approval of Plan **18 - 5 - 15.** Tested by Hydraulic Pressure to **1000 lbs**  
 Date of Test **17 - 1 - 21.** Is a Safety Valve fitted to each Section of the Superheater which can be shut off from the Boiler **yes**  
 Diameter of Safety Valve **2"** Pressure to which each is adjusted **210 lbs** Is Easing Gear fitted **No**

IS A DONKEY BOILER FITTED? **No** If so, is a report now forwarded? **/**

**SPARE GEAR.** State the articles supplied:— **As per Rules & in addition, 1 propeller shaft, 2 propeller**  
**10 bolts & nuts for flexible coupling. 12 white metal packing rings for stern tube, 135 main co**  
**ser tubes, 404 feuules, 30 tubes for oil cooler, 4 evaporator coils, 2 air pump rods, 1 set ea**  
**suction & delivery valves for Donkey feed, Circulating, Ballast, general service, & ash injecto**  
**1 Imperller with shaft, 2 crosshead brasses for Circulating pumps, 5 boiler safety valve spring**  
**1 set of main check vakve, 1 set of Aux. check valve, 36 assorted stay nuts, 1 blow down valve,**  
**and spindle, 1 superheater safety valve spring and 15 tubes, etc.,**

The foregoing is a correct description,  
**NAGASAKI WORKS, MITSUBISHI ZOSEN KAISHA, LTD,**

*J. Whigham*  
 GENERAL MANAGER.

Manufacturer.

1920. **Jany. 7, 12, 17, 19, 23, 24, 27, 30, Feb. 2, 4, 5, 9, 14, 16, May. 21, June, 11, 14, 19,**  
 Dates of Survey while building { During progress of work in shops -- **July. 2, 5, 8, 12, 19, 20, Aug. 3, 9, 11, 12, 16, 18, 24, 26, 28, Sep. 3, 4, 6, 13, 15, 17, 20,**  
 { During erection on board vessel --- **25, 28, 30, Oct. 1, 11, 12, 18, 21, 25, 28, 29, Nov. 2, 3, 12, 16, 17, 20, 26, 29, 30, Dec. 2,**  
 { Total No. of visits **109.** Is the approved plan of main boiler forwarded herewith **yes**

Dates of Examination of principal parts—Casing **P.H.P. 20-8-20.** " " " donkey " " " "  
**S.H.P. 16-9-20.** Rotors **22-1-21.** Blading **31-3-21.** Gearing **28-6-21.**  
 Rotor shaft **22-1-21.** Thrust shaft **5-7-20. 11-8-20** Tunnel shafts **4-8-20 to 25-9-20** Screw shaft **30-11-20 25-9-20.** Propeller **8-1-21.**  
 Stern tube **24-2-21.** Steam pipes tested **3-5-21** Engine and boiler seatings **E. 9-3-21. B. 25-2-21.** Engines holding down bolts **8-4-21.**  
 Completion of pumping arrangements **3-5-21.** Boilers fixed **27-2-21** Engines tried under steam **7-5-21.**  
 Main boiler safety valves adjusted **3-5-21** Thickness of adjusting washers **Lock nuts,**  
 Material and tensile strength of Rotor shaft **Forged stl. P.H.P. 36.4 tons S.H.P. 35 tons** Identification Mark on Do. **No.178, W. B. 3**  
**P.L.P. 36.8 " S.L.P. 36.4 "** Identification Mark on Do. **No.178, W. B. 3**  
 Material and tensile strength of Pinion shaft **Nickel steel, P. 44.6 - 43.6 tons.** Identification Mark on Do. **No.178, W. B. 3**  
**S. 45.2 - 45.6 tons.** Identification Mark on Do. **No.178, W. B. 3**  
 Material of Wheel shaft **steel** Identification Mark on Do. **No.178, W. B. 3** Material of Thrust shaft **steel** Identification Mark on Do. **No.178, W. B. 3**  
 Material of Tunnel shafts **steel** Identification Marks on Do. **No.178, W. B. 3** Material of Screw shafts **steel** Identification Marks on Do. **No.178, W. B. 3**  
 Material of Steam Pipes **steel** Test pressure **600 lbs**  
 Is an installation fitted for burning oil fuel. **yes** Is the flash point of the oil to be used over 150°F. **yes**  
 Have the requirements of Section 49 of the Rules been complied with **partly, see note.**

Is this machinery a duplicate of a previous case **yes** If so, state name of vessel **"Anyo - Maru" Report No.826.**

**General Remarks** (State quality of workmanship, opinions as to class, &c. **The boilers have been fitted with Esaky's Superheaters in accordance with the Society's requirements.**

**All the necessary piping for the oil fuel installation has been fitted to No. 2, 3, & 4, tanks & settling tanks, & all these tanks have been tested & are equipped in accordance with in**  
**tions contained in section 49, of the Rules & Regulations & in the Secretary's letter dated 17-**

**The vessel has left this port burning coal & on arrived at Yokohama, oil burners, & gauge settling tanks are to be fitted, & the installation completed. The Surveyors there have been adv**

**These Engines and Boilers have been constructed under Special Survey in accordance with Rules, & of good materials and workmanship. They have been securely fitted on board, and have satisfactory tried under steam.**

**The Machinery of this vessel is eligible, in my opinion, for the record of LMC 5 in the Register Book, the record of "Fitted for oil fuel F. P. above 150° F". being deferred un**  
**the installation is completed.**

**Main speed on Trial in half loaded condition 16.204 knots.**

The amount of Entry Fee	Yen 60:00	When applied for, 26-5-1921
Special	Yen 1292:00	
Donkey Boiler Fee	£ :	When received, 4-6-1921
Travelling Expenses (if any)	£ :	

*U. Boylan*  
 Engineer Surveyor to Lloyd's Register of Shipping.

Committee's Minute THE 17 JAN. 1922

Assigned *+ L.M.C. 5-21 J.D.*  
*alised for oil fuel 6.21*  
*S.P. above 150°F.*

Certificate (if required) to be sent to Registrar of Shipping (The Surveyors are requested not to write on or below the space for Committee's Minute.)