

REPORT ON STEAM TURBINE MACHINERY.

No. 96890
15 NOV 1938

Rpt. 4a.

Received at London Office

Date of writing Report 19 When handed in at Local Office 14/11/38 Port of **NEWCASTLE-ON-TYNE**
 No. in Survey held at **Newcastle** Date, First Survey **2/2/38** Last Survey **11/11/1938**
 Reg. Book. **87009** on the **Twin Sc. S/S "AMRA"** (Number of Visits **113.**)
 Built at **Newcastle** By whom built **Swan Hunter & Wigham** Yard No. **1570** When built **1938-11**
 Engines made at **do** By whom made **Parsons Marine Steam Turb. Co. Ld.** Engine No. **318** When made **1938**
 Boilers made at **Ranfrew & Newcastle** By whom made **Paterson & Wilson and S. H. & W. R. Ld.** Boiler No. **1570** When made **1938**
 Shaft Horse Power at Full Power **9700.** Owners **British India Steam Nav. Co. Ld.** Port belonging to
 Nom. Horse Power as per Rule **2155** Is Refrigerating Machinery fitted for cargo purposes **Yes** Is Electric Light fitted **Yes**
 Trade for which Vessel is intended **Open sea service**

STEAM TURBINE ENGINES, &c. — Description of Engines **Six Steam Turbines, S.R. Geared to 2 Screw shafts.**

No. of Turbines Ahead **6** Astern **4** **Single reduction geared** to **Two** propelling shafts. No. of primary pinions to each set of reduction gearing **3**
 direct coupled to **Alternating Current Generator** phase **✓** periods per second **✓** Direct Current Generator **✓** rated **✓** Kilowatts **✓** Volts at **✓** revolutions per minute;
 for supplying power for driving **✓** Propelling Motors, Type **✓**
 rated **✓** Kilowatts **✓** Volts at **✓** revolutions per minute. Direct coupled, single or double reduction geared to **✓** propelling shafts.

| TURBINE BLADING. | H. P. | | | I. 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. | HEIGHT OF BLADES. | DIAMETER AT TIP. | NO. OF ROWS. |
| 1ST EXPANSION | | | | | | | | | | | | |
| 2ND | | | | | | | | | | | | |
| 3RD | | | | | | | | | | | | |
| 4TH | | | | | | | | | | | | |
| 5TH | | | | | | | | | | | | |
| 6TH | | | | | | | | | | | | |
| 7TH | | | | | | | | | | | | |
| 8TH | | | | | | | | | | | | |
| 9TH | | | | | | | | | | | | |
| 10TH | | | | | | | | | | | | |
| 11TH | | | | | | | | | | | | |
| 12TH | | | | | | | | | | | | |

SEE SEPARATE REPORT ON STM. TURBINES.

Shaft Horse Power at each turbine { H.P. 1590 ✓ I.P. 1470 ✓ L.P. 1790 ✓ } Revolutions per minute, at full power, of each Turbine Shaft { H.P. 2872 ✓ I.P. 2872 ✓ L.P. 2462 ✓ } 1st reduction wheel ✓ main shaft 134. ✓

Rotor Shaft diameter at journals { H.P. ✓ I.P. ✓ L.P. ✓ } Pitch Circle Diameter { 1st pinion ✓ 2nd pinion ✓ } 1st reduction wheel ✓ main wheel ✓ Width of Face { 1st reduction wheel ✓ main wheel ✓ } 1st reduction wheel ✓ main wheel ✓

Distance between centres of pinion and wheel faces and the centre of the adjacent bearings { 1st pinion ✓ 2nd pinion ✓ } 1st reduction wheel ✓ main wheel ✓

Flexible Pinion Shafts, diameter { 1st ✓ 2nd ✓ } Pinion Shafts, diameter at bearings External 1st ✓ 2nd ✓ Internal 1st ✓ 2nd ✓ diameter at bottom of pinion teeth { 1st ✓ 2nd ✓ }

Wheel Shafts, diameter at bearings { 1st ✓ 2nd ✓ } diameter at wheel shroud, { 1st ✓ 2nd ✓ } Generator Shaft, diameter at bearings { 1st ✓ 2nd ✓ } Propelling Motor Shaft, diameter at bearings { 1st ✓ 2nd ✓ }

Intermediate Shafts, diameter as per rule 13.23" as fitted 13 3/4" Thrust Shaft, diameter at collars as per rule 13.89" as fitted 14 3/8" ✓

Tube Shaft, diameter as per rule ✓ as fitted ✓ Each Screw Shaft, diameter as per rule 14.46" as fitted 15" ✓ Is the screw shaft filled with a continuous liner? Yes ✓

Bronze Liners, thickness in way of bushes as per rule .74" as fitted 25/32" Thickness between bushes as per rule .56" as fitted 23/32" Is the after end of the liner made watertight in the propeller boss? Yes ✓ If the liner is in more than one length are the junctions made by fusion through the whole thickness of the liner? C.L. is in one piece. ✓

If 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? tight fit. ✓

If two 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? ✓ Length of Bearing in Stern Bush next to and supporting propeller. 67" ✓

Propeller, diameter 14'-9" Pitch 14'-9" MEAN. No. of Blades 4 State whether Moveable Yes ✓ Total Developed Surface 77 square feet. ✓

If Single Screw, are arrangements made so that steam can be led direct to the L.P. Turbine? ✓ Can the H.P. or I.P. Turbine exhaust direct to the Condenser? Yes ✓ No. of Turbines fitted with astern wheels 4 Feed Pumps { No. and size 2 Main 45 tons/hr each; 1 Aux. 6.75 tons/hr } How driven by Steam Turbines ✓

Pumps connected to the Main Bilge Line { No. and size Five: 1 of 300 tons/hr, 1 of 170 tons/hr Bilge, 2 of 100 tons/hr Ash, 1 of 100 tons/hr Emergency } How driven by Electric Motors ✓ Lubricating Oil Pumps, including Spare Pump, No. and size Two 5" Drysdale Vertical 12,000 galls/hr. ✓

Ballast Pumps, No. and size One 8" Drysdale R. 200 tons/hr ✓ Oil Cooler Yes ✓ Suctions, connected to both Main Bilge Pumps and Auxiliary Bilge Pumps, No. and size: In Engine and Boiler Room In ER. 2 of 3"; In Blk. Rm. 2 of 3" & 1 of 2 1/2" In Pump Room ✓

In Holds, &c. No 1 Hold, 2 of 3"; No 2 Hold, 2 of 3"; No 3 Hold, 2 of 3"; No 4 Hold, 1 of 3"; Tunnel Well 2 of 2 1/2" ✓

Main Water Circulating Pump Direct Bilge Suctions, No. and size Two 12" ✓ Independent Power Pump Direct Suctions to the Engine Room Bilges, No. and size 2 of 5" in ER. & 2 of 5" in Blk. R. Are all the Bilge Suction pipes in Holds and Tunnel Well fitted with strum-boxes? Yes ✓

Are the Bilge Suctions in the Machinery Space led from easily accessible mud-boxes, placed above the level of the working floor, with straight tail pipes to the bilges? Yes ✓

Are all Sea Connections fitted direct on the skin of the ship? Yes ✓ Are they fitted with Valves or Cocks? Both ✓

Are they fitted sufficiently high on the ship's side to be seen without lifting the stokehold plates? Yes ✓ Are the Overboard Discharges above or below the deep water line? Both ✓

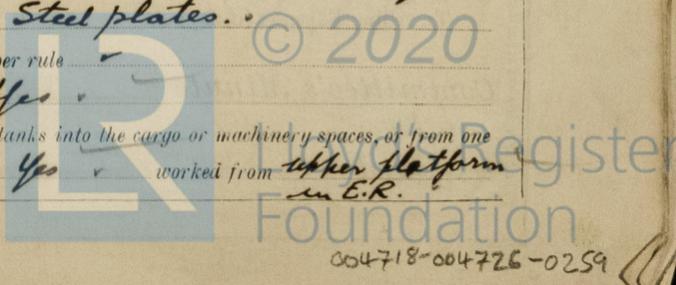
Are they each fitted with a Discharge Valve always accessible on the plating of the vessel? Yes ✓ Are the Blow Off Cocks fitted with a spigot and brass covering plate? Yes ✓

What pipes pass through the bunkers? Bilge pipes to Forward Holds. ✓ How are they protected? Steel plates. ✓

What pipes pass through the deep tanks? ✓ Deep Tank not fitted. ✓ 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? Yes ✓

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 compartment to another? Yes ✓ Is the Shaft Tunnel watertight? Yes ✓ Is it fitted with a watertight door? Yes ✓ worked from upper platform in E.R. ✓



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BOILERS, &c.—(Letter for record) Total Heating Surface of Boilers **17895 sq ft** ✓
 Is Forced Draft fitted **Yes** ✓ No. and Description of Boilers **THREE Babcock & Wilcox Water-tube Boilers** Working Pressure **450 lbs/sq in**

Is a Report on Main Boilers now forwarded? **Yes** ✓
 Is { a Donkey } Boiler fitted? **No** ✓ If so, is a report now forwarded? ✓
 { an Auxiliary }

Is the donkey boiler intended to be used for domestic purposes only ✓
 Plans. Are approved plans forwarded herewith for Shafting **No 22/5/38** Main Boilers **See Rpt on Boilers** Auxiliary Boilers Donkey Boilers

Superheaters **See Rpt on Boilers** General Pumping Arrangements **27/7/38; 29/11/37** Oil Fuel Burning Arrangements ✓
SPARE GEAR.

Has the spare gear required by the Rules been supplied **Yes** ✓
 State the principal additional spare gear supplied **25-4" dia Inclined tubes, 25-1 1/16" dia Inclined tubes, 25-4" dia return tubes, 24-1 1/2" dia Superheater tubes, 10-2 3/4" dia Air heater tubes, 12. Gauge glasses, 4 Safety Valve Springs for boilers; 1 set turbine bearings and 1 armature for Turbo-Generators; 1 Armature of each size for main Circ pumps, forced draught & induced draught fans, main & Auxy Water extraction pumps, ballast, bilge, ash ejector & fresh water pumps, lub. oil pumps & ash hoist; 1 set pump impellers, and 1 set bearings for each size main & Auxy. turbo feed pumps; 10% feed heater tubes; 50 tubes & ferrules and 100 packings for main Condensers 1 spare propeller shaft & unit.**

The foregoing is a correct description,

E. J. Sweeney Manufacturer.

Dates of Survey while building { During progress of work in shops -- } **14/38 Feb. 2, 23, Mar. 4, 8, 9, 10, 14, 15, 16, 17, 18, 21, 22, 25, 28, 30, 31, Apr. 4, 5, 6, 7, 8, 11, 13, 19, 20, 21, 22, 28, May 2, 3, 9, 10, 11, 16, 18, 23, 25, 26, 27, 31, June 1, 2, 7, 10, 14, 15, 16, July 1, 5, 6, 7, 8, 11, 15, 18, 20, 22, 25, 26, 28, 29, Aug. 3, 8, 10, 11, 15, 17, 18, 19, 22, 24, 25, 30, 31, Sep. 5, 7, 8, 9, 12, 13, 14, 15, 16, 19, 20, 22, 26, 28, 29, 30, Oct. 3, 6, 7, 10, 13, 14, 17, 19, 20, 21, 28, 2. 8, 9, 11.**
 Total No. of visits **113**

Dates of Examination of principal parts—Casings **See Separate Report on Turbines** Rotors Blading Gearing **P. 17/3/38**
 Wheel shaft ✓ Thrust shaft **P 4/4/38** Intermediate shafts **13" & 21" 4/38** Tube shaft — Screw shaft **5.5. 31/3/38**
 Propellers **20/4/38** Stern tube **P 8/4/38** Engine and boiler seatings **6/4/38** Engine holding down bolts **1/7/38**
 Completion of fitting sea connections **20/4/38** Completion of pumping arrangements **14/10/38** Boilers fired **12/9/38** at day **14/10/38** at sea **11/38**
 Main boiler safety valves adjusted **For P 15 14/10/38** Thickness of adjusting washers **Port Valve 35/64 9/16 9/16 35/64 35/64**
 Rotor shaft, Material and tensile strength **See Separate Rpt on Turbines** Identification Mark
 Flexible Pinion Shaft, Material and tensile strength Identification Mark
 Pinion shaft, Material and tensile strength Identification Mark
 1st Reduction Wheel Shaft, Material and tensile strength Identification Mark

Wheel shaft, Material Identification Mark Thrust shaft, Material **R Steel** Identification Mark **P 15. 7661 HAI**
 Intermediate shafts, Material **F Steel** Identification Marks **7661 HAI** Tube shaft, Material Identification Marks
 Screw shaft, Material **F Steel** Identification Marks **7661 HAI** Steam Pipes, Material **S D Steel** Test pressure **1350 lbs/sq in**
 Date of test **17/6/38 & 13/10/38** Is an installation fitted for burning oil fuel **No**

Is the flash point of the oil to be used over 150° F. ✓ Have the requirements of the Rules for the use of oil as fuel been complied with ✓
 Is the vessel (not being an oil tanker) fitted for carrying oil as cargo ✓ If so, have the requirements of the Rules been complied with ✓
 If the notation for ice strengthening is desired, state whether the requirements in this respect have been complied with ✓
 Is this machinery a 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 & installed under special survey. The main Condensers, which are hung directly below each L.P. Turbine are supported on springs (4 for each). The machinery has been satisfactorily tested under working conditions and the vessel is eligible in my opinion for record + LMC 11.38

The amount of Entry Fee ... £ **6** : 0 : 0 When applied for, **15 NOV 1938**
 Special **153** : 18 : 0
 Donkey Boiler Fee ... £ : : : When received, **19/11 1938**
 Travelling Expenses (if any) £ : : :

A. Watt
 Engineer Surveyor to Lloyd's Register of Shipping.

Committee's Minutes **TUE 22 NOV 1938**
 Assigned **See FE machy rpt.**



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