

REPORT ON STEAM TURBINE MACHINERY.

MoB. 177310
No. 18568

Received at London Office 27 JUL 1944

4a.

1944

of writing Report 24th July 1944 When handed in at Local Office 26th July 1944 Port of *W. Hartlepool*
 in Survey held at *Hartlepool* Date, First Survey *April 1st 1943* Last Survey *14th July 1944*
 Book. (Number of Visits *89*)
 on the *S/S "EMPIRE PROTECTOR"* Tons { Gross *8148* Net *4609*
 at *Haverton Hill* By whom built *Furness S.B. Co* Yard No. *360* When built
 lines made at *Hartlepool* By whom made *Richardson Westgarth & Co* Engine No. *2446* When made *1944*
 ers made at " By whom made " " " Boiler No. *2446* When made "
 ft Horse Power at Full Power *6800* Owners *Ministry of War Transport* Port belonging to *Undertaken*
 Horse Power as per Rule *1215* Is Refrigerating Machinery fitted for cargo purposes *No* Is Electric Light fitted *Yes*
 de for which Vessel is intended

STEAM TURBINE ENGINES, &c.—Description of Engines *Double Reduction Geared Turbines*

of Turbines Ahead *2* Direct coupled, single reduction geared } to *1* propelling shafts. No. of primary pinions to each set of reduction gearing *2*
 Astern *1* double reduction geared }
 coupled to { Alternating Current Generator phase periods per second } rated Kilowatts Volts at revolutions per minute;
 Direct Current Generator }
 applying power for driving Propelling Motors, Type
 Kilowatts Volts at revolutions per minute. Direct coupled, single or double reduction geared to propelling shafts.

EXPANSION	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.
	1.23	17.46	7				1.875	39.75	3	Rotor 4	49.5	1
	1.52	18.04	7				1.324	<i>cup</i>	1	" 7	52.75	1
	1.68	18.36	6				1.896	<i>hose</i>	1	" 9	55	1
	2.07	19.14	6				2.468	<i>tapered</i>	1	<i>Impulse Blading</i>		
	2.58	20.16	6				3.109	<i>between</i>	1			
	<i>Above blading proceeded by 2 Rows impulse fitted as per particulars below</i>						3.824	<i>first</i>	1			
							4.539	<i>and</i>	1			
							5.3	<i>twelfth</i>	1			
	1.715	30.47	1				6.13	<i>expansion</i>	1			
	1.68	31.69	1				7.047		1			
							8.185		1			
							9	56	1			

NOTE—All dimensions in inches

H.P. 3500 I.P. 3969 L.P. 2863
 Horse Power at each turbine
 I.P. 3300
 L.P. 2863
 Shaft diameter at journals H.P. 5" I.P. 4.426" L.P. 3.068"
 Pitch Circle Diameter 1st pinion 13.068" 2nd pinion 19.789"
 1st reduction wheel 51.204" main wheel 124.647"
 Width of Face 1st reduction wheel 20 1/2 + 3 9/16" main wheel 39 + 2 1/2"
 Distance between centres of pinion and wheel faces and the centre of the adjacent bearings
 1st pinion 10 1/8" 1st reduction wheel 2'-8 1/8"
 2nd pinion 16 3/4" main wheel 20"
 Pinion Shafts, diameter at bearings External 1st 6" 7 1/2" 2nd 11" diameter at bottom of pinion teeth 1st 8.91" 12.552" 2nd 18.941"
 Internal 1st 1 1/2" 2 1/2" 2nd 5"
 Generator Shaft, diameter at bearings 1st 3'-11" main 9'-11 3/4"
 Propelling Motor Shaft, diameter at bearings 1st 16.31" main 17 1/2"
 Thrust Shaft, diameter at collars as per rule 15.54" as fitted 16"
 Tube Shaft, diameter as per rule 17.04" as fitted 14 3/4"
 Bronze Liners, thickness in way of bushes as per rule 8.21" as fitted 7/8"
 Shaft fitted with a continuous liner *Yes*
 If the liner is in more than one length are the junctions by fusion through the whole thickness of the liner *Yes*
 If the liner does not fit tightly at the part between the bearings in the stern tube, is the space charged with a material insoluble in water and non-corrosive *Yes*
 If two liners are fitted, is the shaft lapped or protected between the liners *Yes*
 Is an approved Oil Gland appliance fitted at the after end of the tube shaft *Yes*
 Length of Bearing in Stern Bush next to and supporting propeller 5'-10"
 Propeller, diameter 18'-0" Pitch *Varying* No. of Blades *4* State whether Moveable *No* Total Developed Surface *121* square feet.
 Single Screw, are arrangements made so that steam can be led direct to the L.P. Turbine *Yes* Can the H.P. or I.P. Turbine exhaust direct to the sea *Yes*
 No. of Turbines fitted with astern wheels *one* Feed Pumps No. and size *2-3" Turbo Feed Pumps (Weiss)* How driven *Steam*
 Pumps connected to the Main Bilge Line No. and size *1-10" x 9" x 10" Fire & Bilge + 1-10" x 9" x 10" Ballast* How driven *Steam*
 Bilge Pumps, No. and size *1-10" x 9" x 10"* Lubricating Oil Pumps, including Spare Pump, No. and size *2-9" x 8" x 18"*
 Two independent means arranged for circulating water through the Oil Cooler *Yes* Suctions, connected to both Main Bilge Pumps and Auxiliary Bilge Pumps, No. and size:—In Engine and Boiler Room *4-3 1/2" + 2-2 1/2" E. & B. Space, 1-2 1/2" Tunnel Well*
 Floods, &c.
 Main Water Circulating Pump Direct Bilge Suctions, No. and size *1-13 1/2"* Independent Power Pump Direct Suctions to the Engine Room No. and size *1-5" Ballast Pump*
 Are all the Bilge Suction pipes in Holds and Tunnel Well fitted with strum-boxes *Yes*
 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*
 All Sea Connections fitted direct on the skin of the ship *Yes* Are they fitted with Valves or Cocks *both*
 Are they fixed 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 *below*
 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*
 Do pipes pass through the bunkers } *none* How are they protected
 Do pipes pass through the deep tanks } Have they been tested as per rule *Yes*
 All Pipes, Cocks, Valves, and Pumps in connection with the machinery and all boiler mountings accessible at all times *Yes*
 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

BOILERS, &c. — (Letter for record *S*) Total Heating Surface of Boilers *6840 Sq. ft.*
 Is Forced Draft fitted *Yes* No. and Description of Boilers *2 Foster Wheeler "D" Type* Working Pressure *480*
 Is a Report on Main Boilers ~~sent~~ forwarded? *Yes* *See Mdb. 16/6/44* Increased to *490 lb.*
 Is ~~a Donkey~~ *an Auxiliary* Boiler fitted? *Yes* If so, is a report now forwarded? *NO*
 Plans. Are approved plans forwarded herewith for Shafting *25/6/42* Main Boilers *18/6/42* Auxiliary Boilers _____ Donkey Boilers *25/7/42*
 (If not state date of approval)
 Superheaters *22.7.42* General Pumping Arrangements *30.9.43* Oil Fuel Burning Arrangements *13.9.43*
 Spare Gear. State the articles supplied:—

For RICHARDSONS, WESTGARTH & Co. LIMITED.

W. J. Downing
 Director

The foregoing is a correct description,

Dates of Survey while building
 During progress of work in shops --- *1943 April 1, 2, 24, 28, July 14, Aug. 30, Oct. 28, Dec. 3, 14, 21, 22, 24, 1944 Jan. 4, 7, 8, 11, 13, 20, 24, 28, Feb. 10, 11, 12, 14, 21, 22, 24, 25, Mar. 1, 2, 6, 7, 13, 14, 16, 17, 21, 23, 25, 31, April 3, 5, 12, 15, 17, 19, 20, 21, 22, 28, 29, 8, 14, 17, 19, 20, 23, 24, 25, 26, June 1, 5, 6, 7, 8, 9, 12, 13, 15, 16, 20, 22, 23, 24, 28-30, July 3, 5, 10, 11, 13, 14*
 During erection on board vessel ---
 Total No. of visits *89*

Dates of Examination of principal parts—Casings *28/10/43* Rotors *26/11/43* Blading *24/11/44* Gearing *24/11/44*
 Wheel shaft *1/2/44* Thrust shaft *8/2/44* Intermediate shafts *13/7/44* Tube shaft _____ Screw shaft *8/6/44*
 Propeller _____ Stern tube *6/7/44* Engine and boiler seatings _____ Engine holding down bolts _____
 Completion of pumping arrangements *See Mdb 17/3/44* Boilers fixed _____ Engines tried under steam _____
 Main boiler safety valves adjusted _____ Thickness of adjusting washers _____

Rotor shaft, Material and tensile strength *Steel 34/38* Identification Mark *HP2423 J*
 Flexible Pinion Shaft, Material and tensile strength *Steel, stars 28/32, sleeves 34/38* Identification Mark *LPS6170, J*
 Pinion shaft, Material and tensile strength *Nickel Steel 40* Identification Mark *1403/4 C*
 1st Reduction Wheel Shaft, Material and tensile strength *Nickel Steel 40* Identification Mark *6706*
 Wheel shaft, Material *steel* Identification Mark *6501 W.H.* Thrust shaft, Material *steel* Identification Mark *54184 W*
 Intermediate shafts, Material *steel* Identification Marks *INTER SHAFT 8211 C.P.* Identification Marks *INTER SHAFT 12934 W*
 Screw shaft, Material *steel* Identification Marks *12934 HAI.* Steam Pipes, Material *steel* Identification Marks *54102 W*
 Date of test *1/5/44* Test pressure *1290*
 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 the Rules for carrying and burning oil fuel been complied with? *Yes*
 Is this machinery a duplicate of a previous case? *Yes* If so, state name of vessel *R.W. 2445*

General Remarks (State quality of workmanship, opinions as to class, &c.) *The engines & boilers of this vessel have been constructed under Special Survey & in accordance with the approved plans & Specification. The workmanship & materials have been found good. The machinery has been forwarded to Haverton Hill for fitting on board Messrs Furness Co's Yard No 360. The machinery of this vessel will be eligible, in my opinion, to have a certificate of + L.M.C. - with date - on completion.*

NOTE - See London Lt. 12/6/43 to Mdb. regarding thrust shaft for R.W. 2444 which has been fitted on this ship.

The amount of Entry Fee ...	£ 6 : - : -	When applied for,
Special <i>2 LMC fees</i> ...	£ 102 : 4 : -	<i>25/7/44</i>
Donkey Boiler Fee ...	£ : : -	When received,
<i>Supervision</i>	£ 28 : 13 : 8	
Travelling Expenses (if any)	£ : : -	

Clive Bell
 Engineer Surveyor to Lloyd's Register of Shipping.

Committee's Minute *FRI. 17 NOV 1944*

Assigned *see minute on JERpt*



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