

REPORT ON MACHINERY.

Port of *West Hartlepool*

Received at London Office

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No. in Survey held at *West Hartlepool* Date, first Survey *2nd June* Last Survey *19th Dec 1892*

Reg. Book.

on the *Steamer Cardinal*(Number of Visits *44*)Gross *2302.92*
Tons Net *1474.25*Master *C. Kemp* Built at *Hartlepool* By whom built *Suness Wither & Co.* When built *1892*Engines made at *Hartlepool* By whom made *S. Richardson & Sons* when made *1892*Boilers made at *Hartlepool* By whom made *S. Richardson & Sons* when made *1892*Registered Horse Power *200* Owners *Chadwick Steamship Co. Ltd.* Port belonging to *Newcastle*Horse Power as per Section 28 *200*

ENGINES, &c.— Description of Engines *Inverted, Triple Expansion, 3 Cranks* No. of Cylinders *3*
 Diameter of Cylinders *21", 35", 57"* Length of Stroke *39"* Revolutions per minute *65* Diameter of Screw shaft *as per rule 10.15"*
as fitted 10.2" Diameter of Tunnel shaft *as fitted 10"* Diameter of Crank shaft journals *10.2"* Diameter of Crank pin *10.2"* Size of Crank webs *15.4" x 7"*
 Diameter of screw *15.0"* Pitch of screw *15.6"* No. of blades *4* State whether moveable *no* Total surface *59 sq. ft.*
 No. of Feed pumps *2* Diameter of ditto *2 3/4"* Stroke *23"* Can one be overhauled while the other is at work *yes*
 No. of Bilge pumps *2* Diameter of ditto *3 3/4"* Stroke *23"* Can one be overhauled while the other is at work *yes*
 No. of Donkey Engines *2* Sizes of Pumps *(8 1/2" x 7") (3 1/2" x 7")* No. and size of Suctions connected to both Bilge and Donkey pumps
 Engine Room *Fire, Three 2 1/2" dia, Two 4 1/2" dia* In Holds, &c. *Light, 2 Sn. hold 2 1/2" dia, 2 main hold 2 1/2" dia, 2 after hold 3 1/2" dia, 1 Aftermost hold 2 1/2" dia, 1 After well 2 1/2" dia*
 No. of bilge injections *One size 4 1/2" dia* Connected to condenser, or to circulating pump *as a separate donkey suction fitted in Engine room & size yes, 4 1/2" dia.*
 Are all the bilge suction pipes fitted with roses *yes* Are the roses in Engine room always accessible *yes* Are the sluices on Engine room bulkheads always accessible *yes*
 Are all connections with the sea direct on the skin of the ship *yes* Are they 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 discharge pipes 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*
 What pipes are carried through the bunkers *none* How are they protected

Are all pipes, cocks, valves, and pumps in connection with the machinery and all boiler mountings accessible at all times *yes.*
 Are the bilge suction pipes, cocks, and valves arranged so as to prevent any communication between the sea and the bilges *yes.*
 When were stern tube, propeller, screw shaft, and all connections examined *in dry dock 24.10.92* Is the screw shaft tunnel watertight *yes*
 Is it fitted with a watertight door *yes* worked from *Top platform of engine-room.*

BOILERS, &c.— (Letter for record *(S)*) Total Heating Surface of Boilers *2979 sq. ft.*
 No. and Description of Boilers *Two, Cyl. Mult. Single Ended* Working Pressure *160 lb.* Tested by hydraulic pressure to *320 lb.*
 Date of test *20.8.92* Can each boiler be worked separately *yes* Area of fire grate in each boiler *36.25 sq. ft.* No. and Description of safety valves to
 each boiler *Two, Spring* Area of each valve *4.94 in.* Pressure to which they are adjusted *165 lb.* Are they fitted
 with easing gear *yes* Smallest distance between boilers or uptakes and bunkers *on ground track 15 1/2"* Mean diameter of boilers *13.0"*
 Length *10.0"* Material of shell plates *steel* Thickness *1 1/8"* Description of riveting: circum. seams *double rivet lap* long. seams *double butt straps*
 Diameter of rivet holes in long. seams *1 9/16"* Pitch of rivets *long 7/8", trans 3 1/8"* Lap of plates *or width of butt straps 9 3/4"*
 Per centages of strength of longitudinal joint *85.6* Working pressure of shell by rules *160 lb.* Size of manhole in shell *none*

Size of compensating ring *6"* No. and Description of Furnaces in each boiler *2, horizontal* Material *steel* Outside diameter *3.9 3/4"*
 Length of plain part *top 6"* Thickness of plates *crown 19 3/32"* Description of longitudinal joint *welded* No. of strengthening rings *none*
 bottom *7"* Working pressure of furnace by the rules *164 lb.* Combustion chamber plates: Material *steel* Thickness: Sides *19 3/32"* Back *19 3/32"* Top *19 3/32"* Bottom *7 1/8"*
 Pitch of stays to ditto: Sides *8 1/2" x 8 1/2"* Back *8 1/2" x 8 1/2"* Top *8 1/2" x 8"* If stays are fitted with nuts or riveted heads *nuts* Working pressure by rules *163 lb.*
 Material of stays *steel* Diameter at smallest part *1 3/8"* Area supported by each stay *72.14 sq. in.* Working pressure by rules *164 lb.* End plates in steam space:
 Material *steel* Thickness *1 1/16"* Pitch of stays *18 x 16 1/8"* How are stays secured *double nut & washers* Working pressure by rules *160 lb.* Material of stays *steel*
 Diameter at smallest part *2 5/8"* Area supported by each stay *303.7 sq. in.* Working pressure by rules *160 lb.* Material of Front plates at bottom *steel*
 Thickness *1 1/16"* Material of Lower back plate *steel* Thickness *2 7/8"* Greatest pitch of stays *12 1/4"* Working pressure of plate by rules *164 lb.*
 Diameter of tubes *3 1/2"* Pitch of tubes *4 3/4" x 4 3/4"* Material of tube plates *steel* Thickness: Front *1 5/16"* Back *3/4"* Mean pitch of stays *9 1/2" x 9 1/2"*

Pitch across wide water spaces *14 3/8"* Working pressures by rules *163 lb.* Girders to Chamber tops: Material *steel* Depth and
 thickness of girder at centre *6 1/2" x 1 3/4"* Length as per rule *26"* Distance apart *8 1/2"* Number and pitch of Stays in each *2 - 8"*
 Working pressure by rules *184 lb.* Superheater or Steam chest; how connected to boiler *none* Can the superheater be shut off and the boiler worked
 separately — Diameter — Length — Thickness of shell plates — Material — Description of longitudinal joint — Diam. of rivet
 holes — Pitch of rivets — Working pressure of shell by rules — Diameter of flue — Material of flue plates — Thickness —
 If stiffened with rings — Distance between rings — Working pressure by rules — End plates: Thickness — How stayed —
 Working pressure of end plates — Area of safety valves to superheater — Are they fitted with easing gear —

2 DONKEY BOILER— *S* Description *Vertical, Cylindrical, 3 Cross water tubes*
 Made at *Stoke Newington* By whom made *S. Richardson & Co.* When made *8.9.92* Where fixed *In stoke newington*
 Working pressure *60 lbs.* Tested by hydraulic pressure to *120 lbs.* No. of Certificate *570* Fire grate area *16 sq. ft.* Description of safety valves *Spring*
 No. of safety valves *one* Area of each *8.30* Pressure to which they are adjusted *60 lbs.* If fitted with easing gear *yes* If steam from main boilers can enter the donkey boiler *no* Diameter of donkey boiler *5.6"* Length *11.0"* Material of shell plates *steel* Thickness *11/32"*
 Description of riveting long. seams *double rivet lap* Diameter of rivet holes *13/16"* Whether punched or drilled *punched* Pitch of rivets *2 3/4"*
 Lap of plating *4 1/4"* Per centage of strength of joint *93* Rivets *10.4* Thickness of shell crown plates *7/16"* Radius of do. *5.9"* No. of Stays to do. *5*
 Dia. of stays *1 1/2"* Diameter of furnace Top *4.4"* Bottom *4.10"* Length of furnace *4.6"* Thickness of furnace plates *7/16"* Description of joint *single rivet lap* Thickness of furnace crown plates *7/16"* Stayed by *5 stays 1 1/2" dia.* Working pressure of shell by rules *69 lbs.*
 Working pressure of furnace by rules *63 lbs.* Diameter of uptake *12"* Thickness of uptake plates *3/8"* Thickness of water tubes *3/8"*

SPARE GEAR. State the articles supplied:— *One propeller, a set of bolts & nuts for a connecting rod, main bearing, and shaft coupling; a set of valves for the feed & bilge-pumps, a set of piston springs, 13 bolts, nuts & iron assorted*

The foregoing is a correct description,

P. PRO T. RICHARDSON & SONS Manufacturer. of Engines & Main boilers

J. J. Morris

General Remarks (State quality of workmanship, opinions as to class, &c.)

Main steam pipes tested by hydraulic pressure to 320 lbs. per square inch and found tight.

The engines and boilers of this vessel have been constructed under Special Survey and of a good quality of workmanship they have been tried under steam, the safety valves adjusted and found to work well and are now in safe and efficient working condition and, in my opinion, eligible to have
 L.M.C. 12.92. recorded in the Register of this Society.

The photo. prints of the main and donkey boilers accompany this Report.

It is submitted that
 this vessel is eligible for
 THE RECORD + L.M.C. 12-92

N.A.
24-12-92

Certificate (if required) to be sent to

The amount of Entry Fee..	£ 2 : 0 :	When applied for,
Special	£ 30 : 0 :	22.12.18.92.
Donkey Boiler Fee	£ :	When received,
Travelling Expenses (if any)	£ :	23.12.18.92.

Committee's Minute : TUES. 27 DEC 1892

Assigned

+ L.M.C. 12.92

J. Stoddart
 Engineer Surveyor to Lloyd's Register of British & Foreign Shipping.



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 Foundation