

REPORT ON MACHINERY.

Port of West Hartlepool

Received at London Office 24 DEC 92

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)

Master C. Kemp Built at Hartlepool By whom built Sirress Witley & 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

Com. 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"

Diameter of Tunnel shaft as fitted 10" Diameter of Crank shaft journals 10 1/2" Diameter of Crank pin 10 1/2" Size of Crank webs 15 1/4" 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 Sa. 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 Cyl. 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 4.99 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 15/16" 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 — No. and Description of Furnaces in each boiler 2, Morrison's Material steel Outside diameter 3.9 3/4"

Length of plain part top 6" Thickness of plates crown 19/32" Description of longitudinal joint welded No. of strengthening rings none

Working pressure of furnace by the rules 164 lb. Combustion chamber plates: Material steel Thickness: Sides 19/32" Back 19/32" Top 19/32" Bottom 7/8"

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 1/2" How are stays secured double nuts & 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 3/16" 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 1/4" 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 *Stockton* By whom made *S. Hudson & Co.* When made *8.9.92* Where fixed *In stockton*
 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 Rivets *93* Plates *70.4* 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

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
 W.A.
 24-12-92

[Handwritten signature in blue ink]

[Handwritten signature: R. Stoddart]
 Engineer Surveyor to Lloyd's Register of British & Foreign Shipping.

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



The Surveyors are requested not to write on or below the space for Committee's Minute.