

## REPORT ON MACHINERY.

Port of *Greenock*

WED. 3 FEB 1897

No. in Survey held at *Greenock & Port Glasgow* Date, first Survey *11th August 1896* Last Survey *15th January 1897*  
 Reg. Book. *39.* on the *Twin screw Steamer "Bhadra"*  
 Master *Hewat* Built at *Port Glasgow* By whom built *Russell & Co.*  
 Engines made at *Greenock* By whom made *Rankin & Blackmore* when made *1896 & 7*  
 Boilers made at *do* By whom made *do* when made *1896 & 7*  
 Registered Horse Power *104* Owners *Duncan McNeill & Co.* Port belonging to *London*  
 Nom. Horse Power as per Section 28 *141. - 146* Is Electric Light fitted *yes.*

ENGINES, &c.—Description of Engines *Inverted Direct Acting Triple Exp.* No. of Cylinders *Six* No. of Cranks *Six*  
 Diameter of Cylinders *Two 12" Two 20" Two 32"* Length of Stroke *2' 4"* Revolutions per minute *134* Diameter of Screw shaft *as per rule 6" 18"*  
 Diameter of Tunnel shaft *as fitted 5 1/2"* Diameter of Crank shaft journals *6 1/4"* Diameter of Crank pin *6 1/2"* Size of Crank webs *8 1/2" x 4 3/8"*  
 Diameter of screws *8" 0"* Pitch of screws *10" 0"* No. of blades *4* State whether moveable *no* Total surface *24 sq in each*  
 To. of Feed pumps *Two of Wais special pumps* Stroke *12"* Can one be overhauled while the other is at work *yes*  
 To. of Bilge pumps *one on each engine* Diameter of ditto *2 1/2"* Stroke *11 1/2"* Can one be overhauled while the other is at work *yes*  
 To. of Donkey Engines *One duplex* Sizes of Pumps *5" x 6" stroke* No. and size of Suctions connected to both Bilge and Donkey pumps  
 Engine Room & Stokehold. *Four 2"* In Holds, &c. *Three 2"*

To. of bilge injections *one sizes 5"* Connected to condenser, or to circulating pump *as pump* Is a separate donkey suction fitted in Engine room & size *yes 2"*  
 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  
 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 *above*  
 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*  
 That pipes are carried through the bunkers *Scupper pipes* How are they protected *Wood casing*  
 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 *on slip before launching* Is the screw shaft tunnel watertight *no, bottom door to hold*  
 Is it fitted with a watertight door *yes* worked from *2nd platform*

BOILERS, &c.— (Letter for record *S*) Total Heating Surface of Boilers *2103 sq ft* Is forced draft fitted *yes*  
 No. and Description of Boilers *one cylindrical Multitubular* Working Pressure *180 lbs* Tested by hydraulic pressure to *360 lbs*  
 Date of test *23.12.96* Can each boiler be worked separately *yes* Area of fire grate in each boiler *64 1/2 sq ft* No. and Description of safety valves to  
 each boiler *Two Direct Spring* Area of each valve *9.62 sq in* Pressure to which they are adjusted *184 lbs* Are they fitted  
 with easing gear *yes* Smallest distance between boilers or uptakes and bunkers or woodwork *14"* Mean diameter of boilers *15" 0"*  
 Length *10" 6"* Material of shell plates *Steel* Thickness *1 3/8"* Description of riveting: circum. seams *Lap double long. seams 2 1/2" strap treble*  
 Diameter of rivet holes in long. seams *1 1/4"* Pitch of rivets *9 1/8" & 4 9/16"* Lap of plates or width of butt straps *20 7/8" straps*  
 Percentages of strength of longitudinal joint *92* Working pressure of shell by rules *187 lbs* Size of manhole in shell *16 x 12"*  
 Size of compensating ring *30 x 26 x 1 3/8"* No. and Description of Furnaces in each boiler *Three ribbed* Material *Steel* Outside diameter *48 1/4"*  
 Length of plain part *top 9 between ribs* Thickness of plates *crown 7/8"* Description of longitudinal joint *Welded* No. of strengthening rings  
 Working pressure of furnace by the rules *192 lbs* Combustion chamber plates: Material *Steel* Thickness: Sides *9/16"* Back *9/16"* Top *19/32"* Bottom *3/4"*  
 Pitch of stays to ditto: Sides *7 3/4" x 7 3/4"* Back *7 1/4" x 7 1/4"* Top *8" x 8"* If stays are fitted with nuts or riveted heads *Nuts* Working pressure by rules *182 to 190 lbs*  
 Material of stays *Steel* Diameter at smallest part *1 3/8" & 1 1/2"* Area supported by each stay *544 sq in* Working pressure by rules *80 to 190 lbs* End plates in steam space:  
 Material *Steel* Thickness *2 3/32"* Pitch of stays *16" x 16"* How are stays secured *Double nuts* Working pressure by rules *180 to 190 lbs* Material of stays *Steel*  
 Diameter at smallest part *2 5/8"* Area supported by each stay *256 sq in* Working pressure by rules *186 lbs* Material of Front plates at bottom *Steel*  
 Thickness *7/8"* Material of Lower back plate *Steel* Thickness *1 5/16"* Greatest pitch of stays *12 1/2"* Working pressure of plate by rules *194 lbs*  
 Diameter of tubes *2 3/4"* Pitch of tubes *3 7/8" x 3 7/8"* Material of tube plates *Steel* Thickness: Front *7/8" & 5/8"* Back *7/8"* Mean pitch of stays *9.68"*  
 Pitch across wide water spaces *13 1/2"* Working pressures by rules *277 lbs* Girders to Chamber tops: Material *Steel* Depth and  
 thickness of girder at centre *9 1/2" x 3 1/4" double* Length as per rule *33* Distance apart *8"* Number and pitch of Stays in each *Three 8"*  
 Working pressure by rules *184.5 lbs* Superheater or Steam chest; how connected to boiler *—* 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  
 Pitch of rivets *—* Working pressure of shell by rules *—* Diameter of flue *—* Material of flue plates *—* Thickness *—*  
 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 casing gear *—*



**DONKEY BOILER**— Description *see Newcastle Surveyor's report attached hereto*

Made at \_\_\_\_\_ By whom made \_\_\_\_\_ When made \_\_\_\_\_ Where fixed \_\_\_\_\_

Working pressure \_\_\_\_\_ tested by hydraulic pressure to \_\_\_\_\_ No. of Certificate \_\_\_\_\_ Fire grate area \_\_\_\_\_ Description of safety valves \_\_\_\_\_

No. of safety valves \_\_\_\_\_ Area of each \_\_\_\_\_ Pressure to which they are adjusted \_\_\_\_\_ If fitted with easing gear \_\_\_\_\_ If steam from main boilers can enter the donkey boiler \_\_\_\_\_

Description of riveting long. seams \_\_\_\_\_ Diameter of donkey boiler \_\_\_\_\_ Length \_\_\_\_\_ Material of shell plates \_\_\_\_\_ Thickness \_\_\_\_\_

Lap of plating \_\_\_\_\_ Per centage of strength of joint \_\_\_\_\_ Rivets \_\_\_\_\_ Thickness of shell crown plates \_\_\_\_\_ Radius of do. \_\_\_\_\_ No. of Stays to do. \_\_\_\_\_

Dia. of stays \_\_\_\_\_ Diameter of furnace Top \_\_\_\_\_ Bottom \_\_\_\_\_ Length of furnace \_\_\_\_\_ Thickness of furnace plates \_\_\_\_\_ Description of joint \_\_\_\_\_ Stayed by \_\_\_\_\_ Working pressure of shell by rules \_\_\_\_\_

Working pressure of furnace by rules \_\_\_\_\_ Diameter of uptake \_\_\_\_\_ Thickness of uptake plates \_\_\_\_\_ Thickness of water tubes \_\_\_\_\_

**SPARE GEAR.** State the articles supplied:— 1 Crank Shaft. 2 propeller shafts. 2 propellers. 2 top & 2 bottom end bolts & nuts. 2 Main bearing bolts. 1 set Coupling bolts. 1 set of air feed & bilge pump valves. 1 set piston packing rings. 1 H.P. I.P. & L.P. Valve spindle. 20 junk ring bolts. 1 Escape Valve <sup>spring</sup> for Cylinder. 1 do for feed pump. 1 set Beldamer packing for piston rods & valve spindle.

The foregoing is a correct description,

*Ransom & Macmillan* Manufacturer.

Dates of Survey while building	During progress of work in shops—	1896 Aug. 21. 26. Sept. 1. 4. 7. 11. 14. 20. Oct. 2. 5. 7. 9. 12. 16. 19. 22. 26. 28. 29. 31. Nov. 2. 4. 5. 9. 10. 13. 16. 18. 20. 23. 25.
		27. 30. Dec. 2. 5. 7. 8. 10. 12. 16. 18. 21. 23. 24. 25. 29. 30.
		1897 Jan. 7. 8. 9. 11. 12. 14. 16. 19. 20. 22. 23. 25. 26. 28. 29.
Total No. of visits	During erection on board vessel—	30. Feb. 1. = 65 visits.

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

These Engines and Boilers have been specially surveyed during Construction. workmanship of good quality. Shafts examined when being turned and found apparently sound. Main Steam pipes satisfactorily tested by hydraulic pressure to 360 lbs per square inch. The Engines & Boilers are satisfactorily fitted in vessel and have been tested under full steam. They are now in good order and safe working condition, and are in my opinion eligible to be noted in Register Book; **LMC 2, 97**.  
This vessel's Main Boiler is fitted with forced draught. Closed Mokehold system.

*Spare gear Continued.*

20 tubes & 100 ferrules for surface Condensers. 20 tubes for Main Boiler. 2 Stay tubes. 1 set Donkey pump valves. 1 Centrifugal Valve spindle & eccentric with rod complete. 2 piston rod bolts. 2 Connecting rod bolts. 1 set piston springs. 1 set furnace bars for Main & Donkey boilers. a quantity of bolts nuts & wire assorted.

It is submitted that this vessel is eligible for **THE RECORD. + L.M.C. 2. 97. F.D.**

*H.S.*  
14. 2. 97  
*R.B.*  
4/2/97  
Elec. Light.

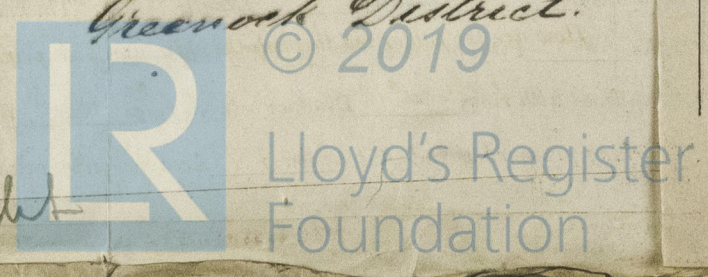
The amount of Entry Fee..	£ 7 : 0 : 0	When applied for, 28. 1. 18. 97
Special .. .. .	£ 21 : 0 : 0	
Donkey Boiler Fee .. .. .	£ 1 : 0 : 0	When received, 30. 1. 18. 97
Travelling Expenses (if any) £	1 : 0 : 0	

Committee's Minute

Assigned

**+ LMC 2. 97**  
**F.D.**  
*Elec. Light*

*A. C. Newn*  
Engineer Surveyor to Lloyd's Register of British & Foreign Shipping.  
*Greenock District.*



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