

No. 1784

*Rapier & Miller Lt.*  
*237*

THE BRITISH CORPORATION FOR THE SURVEY  
AND  
REGISTRY OF SHIPPING.

Report No. *1653* No. in Register Book *2912*

S.S. *"Cardena"*

Makers of Engines *D. Rowan & Co. Ltd*

Works No. *441*

Makers of Main Boilers *Babcock & Wilcox, Ltd*

Works No. *6/1149*

Makers of Donkey Boiler

Works No.

MACHINERY.



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*28*



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S.S. "Cardena"

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No.

THE BRITISH CORPORATION FOR THE SURVEY  
AND  
REGISTRY OF SHIPPING.

Report No. *1653* No. in Register Book *2912*

Received at Head Office *June 1923*

Surveyor's Report on the New Engines, Boilers, and Auxiliary  
Machinery of the ~~Single Triple~~ ~~Twin Quadruple~~ Screw Steamer  
"Cardena"

Official No. Port of Registry *Vancouver, B.C. Ltd.*  
Registered Owners *Union S. S. Co. of British Columbia,*  
*Vancouver.*

Engines Built by *David Rowan & Co. Ltd.*  
at *Elliot St. Glasgow.*

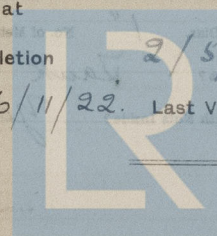
Main Boilers Built by *Babcock & Wilcox, Ltd.*  
at *Renfrew.*

Donkey " " *(none.)*  
at

Date of Completion *2/5/23.*

First Visit *6/11/22.* Last Visit *2/5/23.* Total Visits *36*

*Captain*



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Works No.	No. of Sets	Description
441	2	Twin screw recip- rocating vertical surface condensing.

No. of Cylinders each Engine	3	No. of Cranks	3
Diars. of Cylinders	16", 26½" and 43"	Stroke	30"
Cubic feet in each L.P. Cylinder	25.2		71.48

Cubic feet in each L.P. Cylinder

Are Spring-loaded Relief Valves fitted to Top and Bottom of each Cylr?

" " " each Receiver?

Top H.P.  
Bottom H.P., M.P. & L.P.  
Yes, (except H.P. of course)

Type of H.P. Valves,

1st I.P. ,,  
MP  
2nd I.P. ,,

" L.P. "

" Valve Gear

" Condenser

Diameter of Piston Rods (plain part)

### Material

Diar. of Connecting Rods (smallest part)

" Crosshead Gudgeons 4 1/4 Length of Bearings 4 1/4 Material

No. of Crosshead Bolts (each)	4	Diar. over Thrd.	2"	Thrds. per inch		Material	Steel
-------------------------------	---	------------------	----	-----------------	--	----------	-------

Crank Pin      2      22      61

.. Main Bearings 6 Lengths (1, 5 + 6)  $9\frac{1}{2}$ ; (2, 3 + 4)  $8\frac{1}{2}$

„ Bolts in each 2 Diam. over Thread 2 Threads per inch 4½ Material Steel

.. Holding Down Bolts, each Engine	46	Diar.	1"	No. of Metal Chocks	76
------------------------------------	----	-------	----	---------------------	----

Are the Engines bolted to the Tank Top or to a Built Seat?

Are the Bolts tapped through the Tank Top and fitted with Nuts Inside?

If not, how are they fitted?

### Piston

Crossheads,

### Connecting Rods, Finished by

### Piston

Crossheads,

Date of Harbour Trial

" Trial Trip

Trials run at

Were the Engines tested to full power under Sea-going conditions?

If so, what was the I.H.P.?

Pressure in 1st L.P. Receiver, 165 lbs., 2nd I.P., 63 lbs., L.P., 8 lbs., Vacuum, 26 ins.

### Speed on Trial

If the Conditions on Trial were such that full power records were not obtained give the following estimated

data:—

Builders' estimated I.H.P. 1000 each eng. Revs. per min. 140

Estimated Speed

H. P. Cylinders Tested.

Port, 5/3/23 Starb'd., 22/2/23.

270 lbs/□"

← (Crank pin bushes by Springfield Steel Co. <sup>Inc.</sup> ~~Inc.~~)  
Tested Condenser, 19/3/23 <sup>18/6/23</sup>

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# TURBINE ENGINES.

Works No. Type of Turbines

No. of H.P. Turbines No. of L.P. No. of L.P. No. of Stern

Are the Propeller Shafts driven direct by the Turbines or through Gearing?

Is Single or Double Reduction Gear employed?

Diam. of 1st Reduction Pinion } Width Pitch of Teeth  
 " 1st " Wheel }

Estimated Pressure per lineal inch

Diam. of 2nd Reduction Pinion } Width Pitch of Teeth  
 " 2nd " Wheel }

Estimated Pressure per lineal inch

Revs. per min. of H.P. Turbines at Full Power S.H.P.

If the Conditions on Trial were such that full power records were obtained " L.P. " " " " 1st Reduction Shaft " " 2nd " " " " Propeller Shaft

Total Shaft Horse Power

Date of Harbour Trial

" Trial Trip

Trials run at

Speed on Trial Knots. Propeller Revs. per min. S.H.P.

Turbine Spindles forged by

" Wheels forged or cast by

Reduction Gear Shafts forged by

" Wheels forged or cast by

# TURBO-ELECTRIC MACHINERY. DESCRIPTION OF INSTALLATION.

No. of Turbo-Generating Sets Capacity of each

Type of Turbine employed

Description of Generators

No. of Motors driving Propeller Shafts

Are the Propeller Shafts driven direct by the Motors or through Gearing?

Is Single or Double Reduction Gear employed?

Description of Motors

Diam. of 1st Reduction Pinion } Width Pitch of Teeth  
 " 1st " Wheel }

Estimated Pressure per lineal inch

Diam. of 2nd Reduction Pinion } Width Pitch of Teeth  
 " 2nd " Wheel }

Estimated Pressure per lineal inch

Revs. per min. of Motors at Full Power S.H.P.

If the Conditions on Trial were such that full power records were obtained " L.P. " " " " 1st Reduction Shaft " " 2nd " " " " Propeller Shaft

Total Shaft Horse Power

Date of Harbour Trial

" Trial Trip

Trials run at

Speed on Trial Knots. Propeller Revs. per min. S.H.P.

Turbine Spindles forged by

" Wheels forged or cast by

Reduction Gear Shafts forged by

" Wheels forged or cast by



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## TURBO-ELECTRIC PROPELLING MACHINERY.

No. of Turbo-Generating Sets Capacity of each

Type of Turbines employed

Description of Generators

No. of Motors driving Propeller Shafting

Are the Propeller Shafts driven direct by the Motors or through Gearing?

Is Single or Double Reduction Gear employed?

Description of Motors

Diam. of 1st Reduction Pinion

Width

Pitch of Teeth

" 1st " Wheel

Estimated Pressure per lineal inch

Diam. of 2nd Reduction Pinion

Width

Pitch of Teeth

" 2nd " Wheel

Estimated Pressure per lineal inch

Revs. per min. of Generators at Full Power

" Motors "

" 1st Reduction Shaft

" 2nd "

" Propellers at Full Power

Total Shaft Horse Power

Date of Harbour Trial

" Trial Trip

Trials run at

Speed on Trial

Knots. Propeller Revs. per min.

S.H.P.

Makers of Turbines

Generators

Motors

Reduction Gear

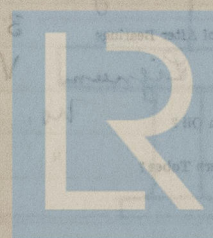
Turbine Spindles forged by

" Wheels forged or cast by

Reduction Gear Shafts forged by

" Wheels forged or cast by

## DESCRIPTION OF INSTALLATION.



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## SHAFTING.

Are the Crank Shafts Built or Solid?

*Built*

No. of Lengths in each

3

Angle of Cranks

120°

BALANCED  
WEBS.

Diar. by Rule

8.28"

Actual

8½"

In Way of Webs

8¾"

" of Crank Pins

8½"

Length between Webs

8½"

Greatest Width of Crank Webs

1'-8½"

Thickness

5½"

Least

1'-0¾"

"

"

Dowels

1½"

Length

3½"

Diar. of ~~Keys~~ in Crank Webs

" Dowels in Crank Pins

1"

Length 2½"

Screwed or Plain

No. of Bolts each Coupling

6

Diar. at Mid Length

2"

Diar. of Pitch Circle

1'-2¼"

Greatest Distance from Edge of Main Bearing to Crank Web

¼"

Type of Thrust Blocks

*Horse shoe.*No. " *Shoes*

4

Diar. of Thrust Shafts at bottom of Collars

8¾"

No. of Collars

4

" " Forward Coupling

8½"

At Aft Coupling

8½"

Diar. of Intermediate Shafting by Rule

4.86"

Actual

8½"

No. of Lengths

3 aside

No. of Bolts, each Coupling

6

Diar. at Mid Length

2"

Diar. of Pitch Circle

1'-2¼"

Diar. of Propeller Shafts by Rule

8.4"

Actual

9½"

At Couplings

8½"

Are Propeller Shafts fitted with Continuous Brass Liners?

*Yes.*

Diar. over Liners

10½"

Length of After Bearings

3'-0"

Of what Material are the After Bearings composed?

*Lignum Vitae.*

Are Means provided for lubricating the After Bearings with Oil?

*No.*

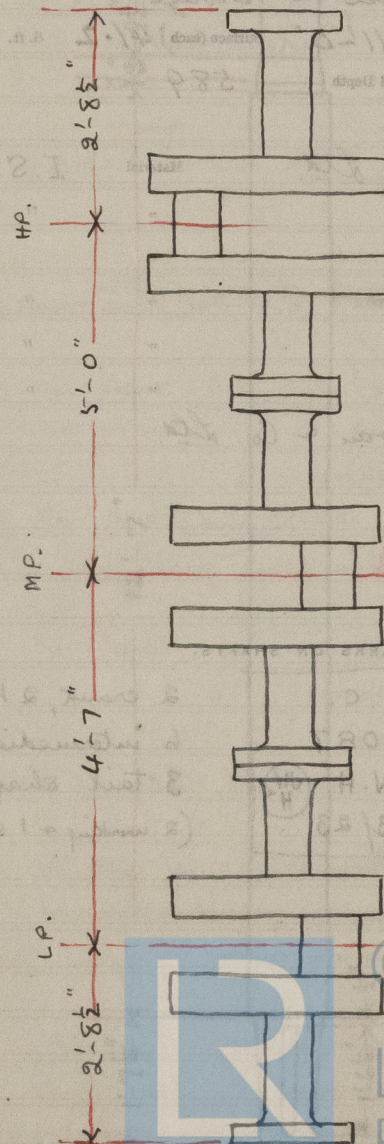
" " to prevent Sea Water entering the Stern Tubes?

"

If so, what Type is adopted?

✓

## SKETCH OF CRANK SHAFT.





No. of Blades each Propeller

4

Fitted or Solid?

Solid.

Material of Blades

" Manganese ~~Br~~ Bronze

Diam. of Propellers

10'-0" Pitch

11'-0"

Surface (each)

41.2

S. ft.

Coefficient of Displacement of Vessel at ½ Moulded Depth

.589

Crank Shafts Forged by

Vickers Ltd.

Material

I.S.

" Pins "

"

"

"

" Webs "

"

"

"

Thrust Shafts "

"

"

"

Intermed. "

"

"

"

Propeller "

"

"

"

Crank " Finished by

D. Rowan &amp; Co. Ltd.

Thrust " "

"

Intermed. "

"

Propeller "

"

## STAMP MARKS ON SHAFTS.

B.C.

No 6087

J.W.H.

14/3/23

JW  
H

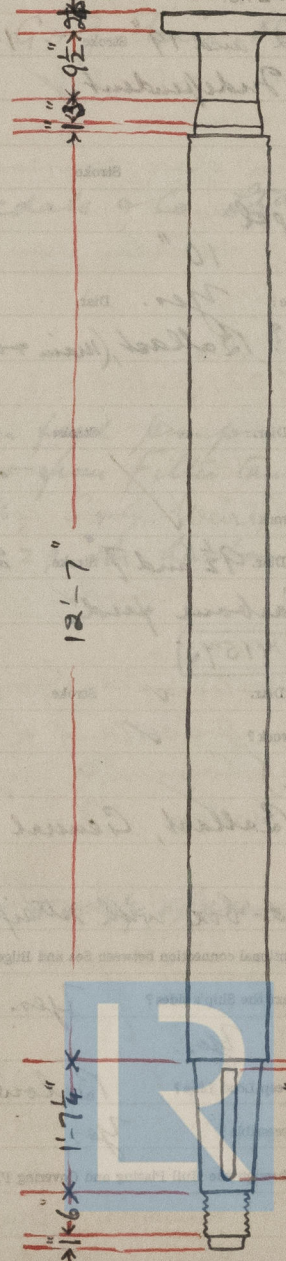
2 crank, 2 thrust,

6 intermediate, 2

3 tail shafts;

(2 working &amp; 1 spare).

## SKETCH OF PROPELLER SHAFT.



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## PUMPS, ETC.

No. of Air Pumps *One* ✓ Diar. *12" and 19"* Stroke *12 3"*

Worked by Main or Independent Engines? *Independent.* ✓

No. of Circulating Pumps *One* ✓ Diar. \_\_\_\_\_ Stroke \_\_\_\_\_

Type of " *Centrifugal*

Diar. of " Suction from Sea *10"*

Has ~~each~~ Pump a Bilge Suction with Non-return Valve? *Yes.* Diar. \_\_\_\_\_

What other Pumps can circulate through Condensers? *Ballast (main + aux.) G.S.*

*(aux. only)*

No. of Feed Pumps on Main Engine *(none)* Diar. ✓ Stroke ✓

Are Spring-loaded Relief Valves fitted to each Pump?

Can one Pump be overhauled while the others are at work? ✓

No. of Independent Feed Pumps *2* Diar. *9 1/2" and 7"* Stroke *21"*

What other Pumps can feed the Boilers? *Harbour feed,*

*G. & J. Weir, Ltd. 41545*

No. of Bilge Pumps on Main Engine *(none)* Diar. ✓ Stroke ✓

Can one Pump be overhauled while the others are at work? ✓

No. of Independent Bilge Pumps *(none.)* ✓

What ~~other~~ Pumps can draw from the Bilges? *Ballast, General Service,*

Are all Bilge Suctions fitted with Roses? *Mud-box with straight-thro'*

Are the Valves, etc., so arranged as to prevent unintentional connection between Sea and Bilges? *Yes.*

Are all Sea Connections made with Valves or Cocks next the Ship's sides? *Yes.*

Are they placed so as to be easily accessible? *Yes.*

Are the Discharge Chests placed above or below the Deep Load Line? *Below*

Are they fitted direct to the Hull Plating and easily accessible? *Yes.*

Are all Blow-off Cocks or Valves fitted with Spigots through the Hull Plating and Covering Plates or Flanges

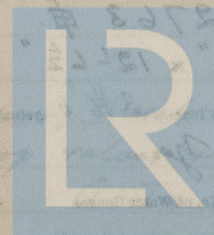
on the Outside? *yes.*

*G. & J. Weir, Ltd. 41540*

*Drysdale & Co. Ltd.*

*Main feed pumps  
draw from Filter tank, Main Condenser, No. 4  
tank, G. & J. Weir, Ltd. 41542 (1) and (2)  
(see p. 29 for harbour feed pump.)*

*pipe in machinery space. Roses in holds.*



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## BOILERS.

Works No.

6/1149

No. of Boilers

2

Type

Marine water-tube of  
Babcock & Wilcox type.

Single or Double ended

No. of Furnaces in each

Combustion space common to

Type of Furnaces

4 Oil fuel sprayers.

Date when Plan approved

(Taken from Stock)

Approved Working Pressure

180 lbs/sq"

Hydraulic Test Pressure

320 "

Date of Hydraulic Test

19/3/23.

" when Safety Valves set

23/4/23.

Pressure at which Valves were set

185 lbs/sq"

Date of Accumulation Test

23/4/23 (Boilers coupled) →

Maximum Pressure under Accumulation Test

192 lbs/sq"

System of Draught

Forced. (Howden's.) →

Can Boilers be worked separately?

Yes.

Makers of Plates (Shells)- Stewart & Lloyd's Ltd (Drum ends &  
mud drums) Steel Co. of Scotland Ltd.

(Heads) D. Colville &amp; Sons, Ltd.

" Stay Bars

" Rivets Babcock &amp; Wilcox Ltd.

" (Sprayers) " "

" Furnaces

Greatest Internal Diam. of Boilers

Steam drum 4'-0" mud drum 6" sq.

" " Length "

" " 11'-7 3/4" " " 13'-5"

Square Feet of Heating Surface each Boiler

2763 sq. ft.

" " Grate

7'-5" x 12'-6 1/2"

No. of Safety Valves each Boiler

One pr. Rule Diam. 3 1/16" Actual

3 3/8"

Are the Safety Valves fitted with Easing Gear?

Yes.

No. of Pressure Gauges, each Boiler

One

No. of Water Gauges

2

" Test Cocks

(none)

" Salinometer Cocks

One

(previously passed by Lloyd's Register)

Rings

Port boiler. Starboard boiler.  
 Port, 1/2" Starboard, 1/4" Port, 5/16" Starboard, 7/16"  
 ← Closed (Port) 143 lbs. (Starboard) 145 lbs.  
 Lost 3" water in 9 mins.

Eng. 9393

← 1/32" thick Siemens-Martin lapwelded steel.

T. Adams, West Barton

Stop valves &amp; feed check valves

A. Turnbull &amp; Co.

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Are the Water Gauges fitted direct to the Boiler Shells or mounted on Pillars?

Direct

Are the Water Gauge Pillars fitted direct to the Boiler Shells or connected by Pipes?

✓

Are these Pipes connected to Boilers by Cocks or Valves?

✓

Are Blow-off Cocks or Valves fitted on Boiler Shells?

Valves on mud-drums.

No. of Strakes of Shell Plating in each Boiler

One

Plates in each Strake

2

Thickness of Shell Plates Approved

$\frac{14}{32}$ " and 1" (latter in way

" " in Boilers

Steel.

Are the Rivets Iron or Steel?

Are the Longitudinal Seams Butt or Lap Joints?

Lap, with inner butt-  
strap - Single.

Are the Butt Straps Single or Double?

Are the Double Butt Straps of equal width?

✓

Thickness of outside Butt Straps

✓

" inside "

$\frac{7}{16}$ "

Are Longitudinal Seams Hand or Machine Riveted?

Are they Single, Double, or Treble Riveted?

Treble.

No. of Rivets in a Pitch

3

Diar. of Rivet Holes

$\frac{27}{32}$ "

Pitch

$3\frac{3}{16}$ "

No. of Rows of Rivets in Centre Circumferential Seams

✓

Are these Seams Hand or Machine Riveted?

✓

Diar. of Rivet Holes

✓

Pitch

✓

No. of Rows of Rivets in Front End Circumferential Seams

2

Are these Seams Hand or Machine riveted?

Diar. of Rivet Holes

$\frac{27}{32}$ "

Pitch

No. of Rows of Rivets in Back End Circumferential Seams

2

Are these Seams Hand or Machine Riveted?

Diar. of Rivet Holes

$\frac{27}{32}$ "

Pitch

Size of Manholes in Shell

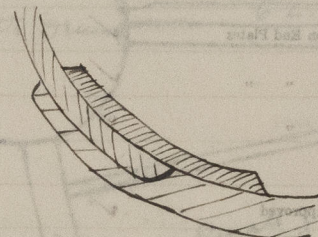
15" x 11"  
2'-4 $\frac{3}{4}$ " x 1'-10"

Dimensions of Compensating Rings

Dewrance & Co.

Dewrance & Co.

of tubes.)



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Thickness of End Plates in Steam Space Approved

 $\frac{13}{16}$ "

" " " " " in Boilers

Pitch of Steam Space Stays

Diar. " " " " Approved

Threads per Inch

" " " " " in Boilers

Material of " " "

How are Stays Secured?

Diar. and Thickness of Loose Washers on End Plates

" " " " Riveted " " "

Width " " Doubling Strips

Thickness of Middle Back End Plates Approved

" " " " " in Boilers

Thickness of Doublings in Wide Spaces between Fireboxes

Pitch of Stays at

Diar. of Stays Approved

Threads per Inch

" " " in Boilers

Material "

Are Stays fitted with Nuts outside?

Thickness of Back End Plates at Bottom Approved

" " " " " in Boilers

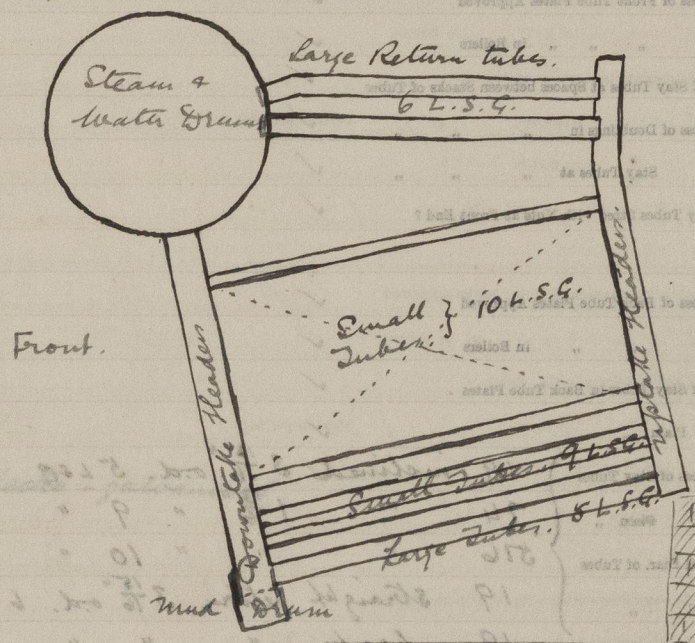
Pitch of Stays at Wide Spaces between Fireboxes

Thickness of Doublings in

Thickness of Front End Plates at Bottom Approved

" " " " " in Boilers

No. of Longitudinal Stays in Spaces between Furnaces



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Diar. of Stays Approved ✓ Threads per Inch ✓

" " in Boilers ✓

Material " ✓

Thickness of Front Tube Plates Approved ✓

" " " in Boilers ✓

Pitch of Stay Tubes at Spaces between Stacks of Tubes ✓

Thickness of Doublings in " " " ✓

" Stay Tubes at " " " ✓

Are Stay Tubes fitted with Nuts at Front End? ✓

Thickness of Back Tube Plates Approved ✓

" " " in Boilers ✓

Pitch of Stay Tubes in Back Tube Plates ✓

" Plain " ✓

Thickness of Stay Tubes

19 inclined  $3\frac{15}{16}$ " o.d. 5 L.S.G.

" Plain "

74 "  $1\frac{13}{16}$ " " 9 "

External Diar. of Tubes

576 " " 10 "

Material "

19 straight return  $3\frac{15}{16}$ " o.d. 6 L.S.G.

19 bent " " " "

Thickness of Furnace Plates Approved ✓

" " " in Boilers ✓

Smallest outside Diar. of Furnaces ✓

Length between ~~Sub~~ Headers

8'-4"

Width of Combustion Chambers (Front to Back)

(see under "Grate" p. 14)

Thickness of " " Tops Approved

" " " in Boilers

Pitch of Screwed Stays in C.C. Tops ✓

Threads per Inch

Diar. of Screwed Stays Approved

" " in Boilers

Material " "

Thickness of Combustion Chamber Walls Approved

" " in Boilers

Pitch of screw stays in C.C. tops

Threads per Inch

Diar. " Approved

" " in Boilers

Material " "

Thickness of Combustion Chamber Backs Approved

" " in Boilers

Pitch of screw stays in C.C. backs

Threads per Inch

Diar. " Approved

" " in Boilers

Material " "

Are all screw stays fitted with Nuts inside C.C.?

Thickness of Combustion Chamber Bottoms

No. of studs over each Wing Chamber

Centre " "

Depth and Thickness of Grates

Material of Grates

No. of stays in each

No. of stays in each

Size of lower flange



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Diarr. of Screwed Stays Approved ✓ Threads per Inch ✓

" " " in Boilers ✓

Material " " ✓

Thickness of Combustion Chamber Sides Approved ✓

" " " " in Boilers ✓

Pitch of Screwed Stays in C.O. Sides ✓

Diarr. " " Approved ✓ Threads per Inch ✓

" " " in Boilers ✓

Material " " ✓

Thickness of Combustion Chamber Backs Approved

" " " " in Boilers

Pitch of Screwed Stays in C.O. Backs

Diarr. " " Approved Threads per Inch

" " " in Boilers

Material " "

Are all Screwed Stays fitted with Nuts inside C.O.?

Thickness of Combustion Chamber Bottoms ✓

No. of Girders over each Wing Chamber

" " " Centre "

Depth and Thickness of Girders

Material of Girders

No. of Stays in each

No. of Tubes, each Boiler

Size of Lower Manholes

# VERTICAL DONKEY BOILERS

No. of Boilers Type  
Greatest Int. Diam. Height  
Height of Boiler Crown above Fire Grate  
Are Boiler Crown Flat or Dished?  
Internal Radius of Dished Ends  
Description of Seams in Boiler Crown  
Diam. of Rivet Holes  
Height of Rivet Crown above Fire Grate  
Are Rivet Crown Flat or Dished?  
Internal Radius of Dished Crown  
Diam. of Crown Stays  
Material  
Internal Diam. of Firebox at Top  
Thickness of Plates  
No. of Water Tubes  
Material of Water Tubes  
Size of Manhole in Shell  
Dimensions of Compensating Ring  
Number sections each Boiler

## SUPERHEATERS

Description of Superheaters  
When situated?  
Which boilers are connected to Superheaters?  
Can Superheaters be shut off while boilers are working?  
No. of Safety Valves on each Superheater  
Date of Test  
Date when Safety Valves set



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## VERTICAL DONKEY BOILERS.

No. of Boilers	Type	Height
Greatest Int. Diar.		
Height of Boiler Crown above Fire Grate		
Are Boiler Crowns Flat or Dished?		
Internal Radius of Dished Ends		Thickness of Plates
Description of Seams in Boiler Crowns		Width of Overlap
Di. of Rivet Holes	Pitch	
Height of Firebox Crowns above Fire Grate		
Are Firebox Crowns Flat or Dished?		
External Radius of Dished Crowns		Thickness of Plates
No. of Crown Stays	Di. of	Material
External Di. of Firebox at Top	Bottom	Thickness of Plates
No. of Water Tubes	Ext. Di. of	Thickness
Material of Water Tubes		
Size of Manhole in Shell		
Dimensions of Compensating Ring		
Heating Surface, each Boiler		Grate Surface

## SUPERHEATERS.

Description of Superheaters *Incorporated in main boiler.*

Where situated? *(None)*

Which Boilers are connected to Superheaters? *✓*

Can Superheaters be shut off while Boilers are working? *✓*

No. of Safety Valves on each Superheater *2*

Are " " fitted with Easing Gear? *✓*

Date of Hydraulic Test *19/3/23*

Date when Safety Valves set *✓*

Test Pressure *320 lbs/sq in*

Pressure on Valves *✓*

## MAIN STEAM PIPES.



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## EVAPORATORS.

No. *One* Type *Vert. merch. Service.* Tons per Day *10*  
 Makers *Temporary - for outward voyage only.*  
 Working Pressure Test Pressure Date of Test  
 Date of Test of Safety Valves under Steam

## FEED WATER HEATERS.

No. *One* Type *Multiflow Surface* 78 *hp.*  
 Makers *G. & J. Weir Ltd*  
 Working Pressure *skell ... 60 lbs/sq* Test Pressure *60 lbs ... 432* Date of Test *21/2/23.*

## FEED WATER FILTERS.

No. *One* Type *Suction* Size  
 Makers *Rowan & Co.*  
 Working Pressure Test Pressure Date of Test

## STEERING ENGINE.

No. *One* Type *Two-cyl. horizontal.*  
 Makers *J. Hastie & Co. Ltd. Greenock.* 2863

## OIL FUEL PLANT.

*2 vert. pumps; 2 vert. heaters; all in one unit; interchangeable. One pump & heater can be overhauled while the other is at work. Made by Babcock & Wilcox.*

6/3/23 for nos.

## LIST OF DONKEY PUMPS.

*Ballast, 6½" and 7" x 15", G. & J. Weir Ltd. draws from Tanks, Sea, Special bilge, Main bilge; & discharges to Main & Aux. Condensers, O'board, Deck, Tanks, & E.R. hose.* 41546

*Gen. Service, 6½" and 4" x 15", Weir, draws from Sea, aft Peak, fore Peak, Main bilge; & disch. to Aux. cond., Deck, O'board, Peaks, & Filter tank.* 41544

*Harbour feed, 4" and 5" x 12", Weir, draws from Sea, Main Cond., Filter tank, no. 4 tank; & disch. to Boilers.* 41545

*Sanitary, 3½" and 4" x 9", Weir, draws from Sea; & disch. to Sanitary tank.* 41548

*Freshwater, 3½" and 4" x 9", Weir, draws from F.W. tanks; & disch. to F.W. Gravity tank & O'board.* 41544

*Oil transfer, 5½" x 6" x 1-3", Weir's, also* 41543

*Oil band, 1" discharge, Babcock & Wilcox.*

*Downton,*



## SPARE GEAR

No. of Top End Bolts.	2	No. of Bot. End Bolts.	2	No. of Cylinder Cover Studs	6
" Coupling Bolts	2 sets	" Main Bearing Bolts	2	" Valve Chest	✓
" Junk Ring Studs	12	" Feed Pump Valves	1 suction 1 disch.	" Bilge Pump Valves	1 suction 1 disch.
" H.P. Piston Rings	1 set	" I.P. Piston Rings	1 set	" L.P. Piston Rings	1 set
" " Springs	for each engine	" " Springs		" " Springs	
" Safety Valve	1 set (for one boiler)	" Fire Bars	✓	" Feed Check Valves	✓
" Piston Rods	✓	" Connecting Rods	✓	" Valve Spindles	✓
" Air Pump Rods	1	" Air Pump Buckets	1	" Air Pump Valves	1 set.
" Cir. "	✓	" Cir. "	✓	" 1 impeller, air. and spindle.	
" Crank Shafts	✓	" Crank Pin Bushes	1	" Crosshead Bushes	1
" Propeller Shafts	1	" Propellers	2 (c.i.)	" Propeller Blades	✓
" Boiler Tubes	* (19)	" Condenser Tubes	50	" Condenser Ferrules	150

OTHER ARTICLES OF SPARE GEAR:

- 100 assorted bolts + nuts.  
 5 " bars round iron.  
 3 " flat "  
 3 top and bottom plates, iron.  
 12 brass bolts  
 50 " steel "  
 4 glasses for oil level gauge.  
 1 guide shoe  
 1 H.P. piston valve.  
 100 packings for condenser tubes.  
 1 head valve, seat + guard for air pump.

## Boilers

- 4 air distributing cones.  
 4 sets bricks for burner openings.  
 4 bricks for closing "

- \* { 6 inclined tubes  $3\frac{5}{16}$ " dia  
 1 return " "  
 12 inclined "  $1\frac{13}{16}$ " "  
 12 handhole fittings for headers.  
 1 " " mud drum.  
 24 gauge glasses.  
 4 gaskets for manhole doors.  
 200 " " handhole fittings.  
 1 thermometer.  
 4 oil fuel sprayers, with  
 2 caps. for same.  
Engine.  
 1 set M.P. piston valve packing.  
 9 relief valve springs.



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## REFRIGERATORS.

No. of Machines

Capacity of each

Makers

Description

No. of Steam Cylinders, each Machine

No. of Compressors

No. of Cranks

Particulars of Pumps in connection with Refrigerating Plant and whether worked by Refrigerating Machines or Independently

System of Refrigeration

" Insulation

Are Brine and other Regulating Valves placed so as to be accessible without entering the Insulated Spaces?

Are all Pipes, Air Trunks, &amp;c., well secured and protected from risk of damage?

Are all Bilge, Sounding, and Air Pipes in Insulated Spaces properly insulated?

Are Thermometer Tubes so arranged that Water cannot enter and freeze in them?

Date of Test under Working Conditions

## RESULTS OF TRIALS.

COMPARTMENT.	Temp. at beginning of Trial.	Temp. at end of Trial.	Time required to obtain this Result.	Rise of Temp. after hours.
Navigation	52	5	1/100	1.5
Eng. room	28	16	12 1/2	1.5
Holds	14	7	5 1/2	1.5
Bridge	28	20	7 1/2	1.5
Wardroom	84	22	7 1/2	1.5
Galley	88	22	7 1/2	1.5

Articles of Spare Gear for Refrigerating Plant carried on board:—



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Direct-coupled to single cyl. steam eng.  
 48829 9" x 4", 22 B.H.P. at 400 revs.  
 with 100 lbs./sq. steam press. (Same makers.)

(2.) Auxiliary set by same makers; -  
 One 4.5 Kw. compound wound 48833  
 68 amps. at 110 volts, 500 revs./min.  
 direct-coupled to single-cyl. steam eng.  
 48832 8" x 3", 11 B.H.P. at 500 revs. with  
 100 lbs. steam press. (Same makers.)

## ELECTRIC LIGHTING.

Installation Fitted by

Cland Hamilton, Ltd.

No. and Description of Dynamos

One 15 Kw. Compound wound

48830

Makers of Dynamos

W.H. Allen, Son &amp; Co. Ltd. Bedford.

Capacity

135 Amperes, at 110 Volts, 400 Revs. per Min.

Current Alternating or Continuous

Continuous.

Single or Double Wire System

Double.

Position of Dynamos

Starboard, bottom platform.

Main Switch Board

"

"

"

No. of Circuits to which Switches are provided on Main Switch Board

10

Particulars of these Circuits:—

Circuit.	Number of Lights.	Candle Power.	Current Required. Amps.	Size of Conductor.	Current Density.	Conductivity of Conductor.	Insulation Resistance per Mile.
Navigation.	4	32	5	3/036	I.E.E.	100 mps. 600 meg.	
Eng. room.	28	16	12.6	7/	Standard	"	"
Holds.	14	"	7.65	7/029	"	"	"
Bridge.	28	30 W.	7.6	7/036	"	"	"
Awning deck, Fd.	84	"	22	7/064	"	"	"
" " Aft.	88	"	24	"	"	"	"
Upper " Forward	30	"	8.2	7/036	"	"	"
" " Aft.	32	"	8.7	"	"	"	"
W/T.	✓	✓	15	7/064	"	"	"
Searchlight.	✓	✓	40	"	"	"	"

Total No. of Lights

318

No. of Motors driving Fans, &amp;c.

(none)

No. of Heaters (none)

Current required for Motors and Heaters

✓



Positions of Auxiliary Switch Boards, with No. of Switches on each

(none)

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Are Out-outs fitted as follows?—

On Main Switch Board, to Cables of Main Circuits

On Aux. " " each Auxiliary Circuit

Wherever a Cable is reduced in size

To each Lamp Circuit

To both Flow and Return Wires of all Circuits when the Double-Wire System is adopted

Are the Fuses of Standard Sizes?

Are all Switches and Out-outs constructed of Non-inflammable Material?

Are they placed so as to be always and easily accessible?

Smallest Single Wire used, No. 3/029 S.W.G., Largest, No. 34/072 S.W.G.

How are Conductors in Engine and Boiler Spaces protected?

" Saloons, State Rooms, &amp;c., " ?

What special protection is provided in the following cases?—

(1) Conductors exposed to Heat or Damp

(2) " passing through Bunkers or Cargo Spaces

(3) " " Deck Beams or Bulkheads

Are all Joints in Cables properly soldered and thoroughly Insulated so that the efficiency of the Cables is unimpaired? *No joints.*Are all Joints in accessible positions, none being made in Bunkers or Cargo Spaces? *✓*Are all Hull Connections for Single-Wire Systems made with Screws of large Surface? *✓*Are the Dynamos, Motors, Main and Branch Cables, so placed that the Compasses are not injuriously affected by them? *yes.*Have Tests been made to prove that this condition has been satisfactorily fulfilled? *yes.*Has the Insulation Resistance over the whole system been tested? *yes.*What does the Resistance amount to? *154 meg Ohms.*Is the Installation supplied with a Voltmeter? *yes.*" " " an Ampère Meter? *"*

Date of Trial of complete Installation

*2/5/23.*

Duration of Trial

*6 hours.*Have all the requirements of Section 42 been satisfactorily carried out? *yes.**Governor trials.**Small plant, 68 amps. at 110 volts.**Main switch OUT, momentary 114 " } and per-*  
*" " IN " 106 " }manent 110 v.**Large plant, 78 amps. at 110 volts.**Main switch OUT, momentary 116 volts } do.*  
*" " IN, " 105 " }do.**Braided, enclosed in galvanized steel conduit.*Lloyd's Register  
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## GENERAL CONSTRUCTION.

Have the Machinery and Boilers been constructed in accordance with the requirements of the Rules and the

Approved Plans? *Yes.*

If not, give details of the points of difference, and state when these were sanctioned by the Chief

Surveyor. *Yes.*

## Fees—

## MAIN BOILERS.

		£	s.	d.	
H.S.	552 6	Sq. ft.	32	14	5 1/2
G.S.		"			

*including + 25% for F.D. = 6907.5*

## DONKEY BOILERS.

		£	s.	d.
H.S.		Sq. ft.		
G.S.		"		

## ENGINES.

		£	s.	d.
L.P.C.	50.4	Cub. ft.	45	6
Testing, &c.				
Expenses				
Total		£		

*(Combined, plus 140/120 for extra revs. = 70.6)*

It is submitted that this Report be approved,

Chief Surveyor.

Approved by the Committee for the Class of M.B.S.\* on the

Fees advised

Fees paid



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Secretary.

*Glenn Harrington*  
Engineer Surveyor to the British Corporation for the  
Survey and Registry of Shipping.



## Visits.

23-10-22.

6-11-22.

11-12-22.

19-12-22

21-12-22

26-12-22

12-1-23

17-1-23

22-1-23

29-1-23

30-1-23.

1-2-23.

15-2-23

70-2-23.

22-2-23.

2 - 3 - 23

5-3-23

6-3-23

7-3-23

8-3-23

14-3-23

15-3-23.

16-3-23

19-3-23

20

26

514/23

6

Renfrew (R.L.G.)

13-12-22.

(ship)

(ship)  
(W<sup>r</sup> Macfarlane)

(ship.)

(also exp. M. Macfarlane)

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9-4-23

12 "

(16) "

17 "

23 "

27 "

2/5/23

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4-11-33

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