

## REPORT ON REFRIGERATING MACHINERY AND APPLIANCES.

(Received at London Office)

20 JUN 1928

Date of writing Report

10

When handed in at Local Office

18 JUNE 1928

Port of

LIVERPOOL

No. in

Reg. Book. Survey held at

4476

73228

Date: First Survey

Feb'y 17<sup>th</sup>/28

Last Survey

June 15<sup>th</sup> 1928

Belfast: Last Survey

September 22<sup>nd</sup> 1928.

on the Refrigerating Machinery and Appliances of the S.S. 'Highland Monarch'

Tons

Gross 1444.50

Net 1111.50

Vessel built at

Belfast

By whom built

Harland &amp; Wolff, Ltd.

Yard No.

751

When built

1928

Owners

H. W. Nelson Ltd. Mgrs

Port belonging to

London Belfast

Voyage

Refrigerating Machinery made by

Liverpool Refrigeration Co. Ltd.

Machine No. 770/1

When made

1928

Insulation fitted by

B.C.

When fitted

1928

System of Refrigeration

Ammonia

Method of cooling Cargo Chambers

Brine

Insulating Material used

Bark &amp; Silicate cotton

Number of Cargo Chambers insulated

38+2=40

Total refrigerated cargo capacity

547000

cubic feet.

## DESCRIPTION OF REFRIGERATING MACHINERY. Where placed Upper dx.

Refrigerating Units, No. of

2

Single, double, or triple

double

Cubic feet of air delivered per hour

✓

Total refrigeration or ice-melting capacity in tons per 24 hours

300

Are all the units connected to all the refrigerated chambers

Yes

Compressors, driven direct or through

single

reduction gearing.

Compressors, single or double acting

Yes

No. of cylinders

2

Diameter of cylinders

11½"

Diameter of piston rod

2¾"

Length of stroke

15"

No. of strokes per minute

360

Motive Power supplied from

Dead Engines

Steam Engines, high pressure, compound, or triple expansion, surface condensing. No. of cylinders

Diameter

Length of stroke

Working pressure

Diameter of crank shaft journals and pins

Breadth and thickness of crank webs

No. of sections in crank shaft

Revolutions of engines per minute

Oil Engines, type

Premier, horizontal

4 stroke cycle

Yes

Single or double acting

Yes

No. of cylinders

4

Diameter

16½"

Length of stroke

24"

Span of bearings as per Rule

2'-6"

Maximum pressure in cylinders

240 lbs. 0" abs.

Diameter of crank shaft journals and pins

11"

Breadth and thickness of crank webs

13" x 6½"

No. of sections in crank shaft

1

Revolutions of engine per minute

180

Electric Motors, type

No. of

Rated

Kilowatts

Volts at

revolutions per minute.

Diameter of motor shafts at bearings

Reduction Gearing, maximum shaft horse power at 1st pinion

Revolutions per minute at full power at 1st pinion

2nd pinion

1st reduction wheel

main shaft

Pitch circle diameter, 1st pinion

2nd pinion

1st reduction wheel

Main wheel

Width of face, 1st reduction wheel

Main wheel

Distance between centres of pinion and wheel faces and the centre of the adjacent bearings, 1st pinion

2nd pinion

1st reduction wheel

Main wheel

Flexible pinion shafts, diameter 1st

2nd

Pinion shafts, diameter at bearings, External, 1st

2nd

Internal, 1st

2nd

Diameter at bottom of teeth of pinion, 1st

2nd

Wheel shafts, diameter at bearings, 1st

Main

Diameter at wheel shroud, 1st

Main

Gas Condensers, No. of

2, twin

Cast iron or steel casings

Yes

Cylindrical or rectangular

Yes

No. of coils in each

18

Material of coils

S.D. steel

Can each coil be readily shut off or disconnected

Yes

Water Circulating Pumps, No. and size of

1 centrif. 6000 galls. per hr.

how worked

electric motor

Gas Separators, No. of

2

Gas Evaporators, No. of

2, twin

Cast iron or steel casings

Yes

Pressure or gravity type

Yes

No. of coils in each casing

22

Material of coils

S.D. steel

Can each coil be readily shut off or disconnected

Yes

Direct Expansion or Brine Cooled Batteries, No. of

Are there two separate systems, so that one may be in use while the other is being

cleared of snow

No. of coils in each battery

Material of coils

Can each coil be readily shut off or

disconnected

Total cooling surface of battery coils

Is a watertight tray fitted under each battery

Air Circulating Fans, Total No. of

each of

cubic feet capacity, at

revolutions per minute

Steam or electrically driven

Where spare fans are supplied are these fitted in position ready for coupling up

Brine Circulating Pumps, No. and size of, including the additional pump

one 9x9, 4 centrif. 30,000 galls. per hr.

how worked

electric motor

Brine Cooling System, closed or open

Yes

Are the pipes and tanks galvanised on the inside

No

No. of brine sections in each chamber

Total 164:- nos. 1, upper &amp; lower dxs 7 each, hold. 9. nos. 2, shelter, upper, lower &amp; hold. 7 each.

nos. 3, upper, lower, orlop dxs &amp; hold. 8 each. nos. 4, upper, lower, orlop &amp; hold. 8 each. nos. 5, upper &amp; lower dxs 7 each, hold. 8. nos. 6, upper &amp; lower dxs 7 each, hold. 6.

Can each section be readily shut off or disconnected

Yes

Are the control valves situated in an easily accessible position

Yes

NOTE: THE WORDS WHICH DO NOT APPLY SHOULD BE DELETED.

Im 524-1



**Steam-Condensing Plant.** *State what provision is made for condensing steam, in terms of Section 4, Clauses 13 and 14*

## HYDRAULIC AND OTHER TESTS.

DESCRIPTION.	Date of Test.	Working Pressure.	Hydraulic Test Pressure.	Air Test Pressure.	Stamped.	REMARKS.
ENGINE CYLINDERS (IF TESTED) ... ..	-	✓	✓	✓	-	
GAS COMPRESSORS ... ..	18.4.28	150 lbs	700 lbs	✓	£	
" SEPARATORS ... ..	15.6.28	"	1000 lbs	✓	£	
" CONDENSER COILS ... ..	19/3/28	"	1500 lbs	500 lbs		
" EVAPORATOR COILS ... ..	{ 17.2.28, 2/28 1.3.28	"	1500 lbs	500 lbs		
" CONDENSER HEADERS AND CONNECTIONS	9.2.28	"		500 lbs		
" CONDENSER CASINGS ... ..	19/4/28, 3/5/28	5 lbs	20 lbs	✓		
" EVAPORATOR CASINGS ... ..	19/4/28, 3/5/28	-	25 lbs	✓		
NH <sub>3</sub> CONDENSER, EVAPORATOR AND AIR COOLER COILS AFTER ERECTION IN PLACE					£	
BRINE PIPING AFTER ERECTION IN PLACE...				936		

**Cooling Test.** Has the refrigerating machinery been examined under full working conditions, and found satisfactory Yes

Dates of test 20<sup>th</sup> & 22<sup>nd</sup> September 1928 Density of Brine Hg by Zwaddell's hydrometer

**Temperatures** (when the cargo chambers are cooled down to the required test temperatures) of air at the snow box and of the return air — & —, or, delivery and return air at direct expansion or brine cooled batteries — & —, outflow and return brine -3°F & 0°

atmosphere 58°F cooling water inlet and discharge 56°F & 63°F gas in condensers 67°F and evaporators -15°F, N<sup>o</sup> 1 44°C 9<sup>th</sup> N<sup>o</sup> 2 44°C 10<sup>th</sup> N<sup>o</sup> 3 44°C 8<sup>th</sup> N<sup>o</sup> 4 44°C 10<sup>th</sup> N<sup>o</sup> 5 44°C 10<sup>th</sup> N<sup>o</sup> 6 44°C 9<sup>th</sup> N<sup>o</sup> 7 44°C 10<sup>th</sup>

the average temperature of the refrigerated chambers 9<sup>th</sup> and the rise of temperature in these chambers upon the expiration of 18 hours

time after the machinery and cooling appliances have been shut off 8.135°F = .45°F per hour

SPARE GEAR.

ARTICLES SUPPLIED AS PER ROUTE.	ADDITIONAL SPARE GEAR SUPPLIED.
1 compressor front cover, 1 back ditto.	1 long th fuel pump discharge piping.
1 " piston rod, piston & rings.	1 " air starting piping.
1 set of suction & delivery valves, cages & springs, for 1 compressor.	2 flanges or unions for air & fuel oil piping.
1 compressor crank shaft.	
Brasses & bolts for 1 main bearing, 1 crank pin & 1 crosshd. of compressor.	
Boric pump:- 1 unipeller & spindle, thrust bearing, 1 pair bearing brasses, $\frac{1}{2}$ set brushes, controller gear.	
air. pump:- 1 " " , 1 " " , 1 " " , $\frac{1}{2}$ " " , " "	
1 2 metallic joint rings for each size pipe, valve, separator, compressor & other N.H. joints.	
Complete sets of packings for compressors & pumps - 1 each.	
1 hydrometer; 2 ammonia gauges; 2 boric pump gauges; 1 engine room thermometer.	
1 set dies for boric piping; 1 set stocks & dies.	
washings & back nuts, lengths of piping, bends, pressure gauge piping etc.	
6 boric pipe flanges, 6 hatch grid covers.	
1 ammonia regulating valve & spindle, 1 ammonia coil for cond. or wrap.	
Assorted bolts & nuts.	
Oil Motors:- 1 piston & rings; 1 cyl. liner; 1 cyl. cover; 6 cyl. cover studs; 2 air inlet valves, chests & springs; 4 exhaust valves, chests & springs; 1 starting valve, chest & springs; 6 fuel valves, & 2 chests; 4 fuel oil pump plungers, 4 air del. valves; 1 set governor springs; 1 engine crank shaft; brasses & bolts for 1 main bearing, 1 crank pin & 1 crosshd. of motor; 6 joint rings for each cyl. cover & 2 each valve on cover.	

ARTICLES REQUIRED BY RULES AND NOT YET SUPPLIED

**The foregoing is a correct description of the Refrigerating Machinery.**

For THE LIVERPOOL REFRIGERATION CO., LTD.

*Manufacturer.*

Managing Director.

### DESCRIPTION OF INSULATION.

BULKHEADS.

IN LOWER HOLD CHAMBERS.						IN 'TWEEN DECK CHAMBERS.					
	Air Space.	Outer Lining.	Non-conducting Material.	Thickness of ditto.	Inner Lining.	Air Space.	Outer Lining.	Non-conducting Material.	Thickness of ditto.	Inner Lining.	
FRAME No. 104 (Fore Peak)	A	✓	✓	Gran. Cork	10"	2-¾ boards	✓	✓	Gran. Cork	10"	2-¾ boards
FRAME No. 74	F	✓	✓	do	8¼"	do	✓	✓	do	4¼" - 5¼"	do
	A	✓	✓	do	3½"	do.	✓	✓	do	3½" - 4'	do
FRAME No. 48	F	✓	✓	do	8¼"	do	✓	✓	do	4¼" - 6¼"	do
	A	✓	✓	do	3½"	do	✓	✓	do	3½" - 4'	do
FRAME No. 19	F	3"	1-1" board	Silicate Cotton	8"	do.	3"	1-1" board	Silicate Cotton	8"	do
	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FRAME No. (Boiler Room)	A										
FRAME No. 28 (Engine Room)	A	3	1-1" board	Silicate Cotton	8"	2-¾ boards	3'	1-1" board	Silicate Cotton	8"	2-¾ boards
FRAME No. 57	F	✓	✓	Gran. Cork	3½"	do	✓	✓	Gran. Cork	3½" to 4"	do
	A	✓	✓	do	7¼"	do	✓	✓	do	4½" to 5½"	do
FRAME No. 80	F	✓	✓	do	3½"	do	✓	✓	do	3½" to 4"	do
	A	✓	✓	do	6¼"	do	✓	✓	do	4½" to 5½"	do
FRAME No.	F										
	A										
FRAME No. 107 (After Peak)	F	✓	✓	Gran. Cork	10"	2-¾ boards	✓	✓	Gran. Cork	10"	2-¾ boards
SIDES ...	3"	1-1" board	do	6"	do	3"	1-1" board	do	6"	do	Below 3" Deck Above 3" Deck
OVERHEADING ...	✓	✓	do	9½"	do	✓	✓	do	9½" - 10" + 10¾"	do	
FLOORS OF CHAMBERS ...	✓	✓	Slab Cork	6"	2-1¼ boards	✓	✓	✓	✓	✓	
TRUNK HATCHWAYS ...	✓	✓	Gran. Slab Cork	2"	1-½ board each side						
THRUST RECESS, SIDES AND TOP ...	3"	1-1" board	Silicate Cotton	8"	2-¾ boards						
TUNNEL SIDES AND TOP ...	✓	✓	Gran. Cork	9"	1-½ board 1-¾"						
TUNNEL RECESS, FRONT AND TOP...	✓	✓	do	10"	2-¾ boards						

FRAMES OR REVERSE FRAMES, FACE	2" Cork W/ Chamber	3" Cork elsewhere
BULKHEAD STIFFENERS, TOP	All Stiffeners are in Bulkhead	
	BOTTOM	Insulation. AND FACE

BULKHEAD STIFFENERS, TOP *all stiffeners are in bulkhead insulation.* BOTTOM AND FACE

RIBBAND ON TOP OF DECKS ✓

SIDE STRINGERS, TOP 3" oak 1-1/2" and 1-3/4" board BOTTOM Same as top AND FACE Same as top

[illegible]

HATCHWAY COAMINGS, MAIN 6" Pitch Pine BILGE 2 1/4" Pitch Pine  
HOLD PILLARS 1" Hair Felt, 1-2" board bound with hoop iron

MASTS	✓	VENTILATORS	No fixed vents fitted.
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Are insulated plugs fitted to provide easy access to bilge suction roses *yes* tank, air, and sounding pipes *✓* heels of pillars *✓*  
and manhole doors of tanks *yes* Are insulated plugs fitted to ventilators *yes* cargo ports *✓* and side lights *yes*

Is the insulation of the lower hold floor and tunnel top in way of the hatchways protected yes if so, how 2" Glen doubling

**Oil Storage Tanks**, where adjacent to the insulated chambers, state what provision has been made for ventilating the air space between the insulation and the bulkhead plating

**Coal Bunker Bulkheads, and Brine Outflow and Return Pipes** *passing through coal bunkers. Is the insulation, so far as practicable, fireproof*

Where **Cooling Pipes** pass through watertight bulkheads or deck plating, are the fittings and packing of the stuffing boxes both watertight and fireproof? Yes

Cargo Battens, Dimensions and spacing, sides  $2'' \times 2''$   $13\frac{1}{2}''$  pitch floors ☒ tunnel top  $3'' \times 3''$   $13\frac{1}{2}''$  pitch  
fixed or portable *Fixed* Are screens fitted over the brine grids at chamber sides *Yes* hinged or permanently fixed *Portable*

Thermometer Tubes, No. and position in each chamber 2 in each Hatch Tank. 2 in each of 3 chambers for No. 4 hold. & 4 in all other chambers 2 p. 25. 122 small diameter 2 1/2" nominal bore are they fitted in accordance with Section 3, Clause 8 Yes.

**Protection of Pipes.** *Are all pipes, including air and sounding pipes, which pass through or into insulated chambers, well insulated*

**Draining Arrangements.** *Where the chambers are situated below the load water line, what provision is made for draining the inside of the chambers*

2 1/2" bronze sealed scuppers (Turn Sk.) Where sluices, scupper pipes, and drain pipes are fitted are means provided for blanking them off yes

What provision is made for draining the refrigerating machinery room 4" pipe snappers overboard with brass screw down plug (2 p 4 25)

brine return room	2½" rubber overboard	fun room	✓	water circulating pump room
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Are all air spaces behind insulation arranged to drain to the bilges, bilge wells, or gutterways of the respective chambers.

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