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H2423

No. 2434

Rpt. 17.

# REPORT ON REFRIGERATING MACHINERY AND APPLIANCES.

(Received at London Office 27 APR 1931 22 JAN 1931)

Date of writing Report 15 January 1932 When handed in at Local Office 7 APR 1931 Port of London

No. in Reg. Book. 95211 Survey held at Barrow Date: First Survey 19<sup>th</sup> Dec. 1930 Last Survey 13<sup>th</sup> February 1931 (No. of Visits 9)

on the Refrigerating Machinery and Appliances of the *Yankee "Strathaird"* Tons { Gross 225,744 Net 13621

Vessel built at *Barrow* By whom built *Vickers Armstrongs Ltd* and No. *6664* When built *1931*

Owners *P & O Steam Nav Co* Port belonging to *London* Voyage *Australia*

Refrigerating Machinery made by *J. E. Hall Ltd.* Machine No. *8421, 8422, 8423* When made *1931*

Insulation fitted by *Vickers-Armstrongs Ltd* When fitted *1932* System of Refrigeration *CO<sub>2</sub> + Brine*

Method of cooling Cargo Chambers *Brine Grids* Insulating Material used *Slab & Granulated Cork*

Number of Cargo Chambers insulated *8* Total refrigerated cargo capacity *156,000* cubic feet.

## DESCRIPTION OF REFRIGERATING MACHINERY. Where placed *on tank top fore of Eng. Rm.*

Refrigerating Units, No. of *3* Single, double, or triple *Single* Cubic feet of air delivered per hour *✓*

Total refrigeration or ice-melting capacity in tons per 24 hours *144* Are all the units connected to all the refrigerated chambers *yes*

Compressors, driven direct or through *single* reduction gearing. Compressors, single or double acting *single* No. of cylinders *3 per mach. total 9*

Diameter of cylinders *3 5/16"* Diameter of piston rod *1 5/8"* Length of stroke *4"* No. of strokes per minute *375 each*

Motive Power supplied from *Electric motors - direct coupled.*

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 *5"*

Breadth and thickness of crank webs *3 1/8" x 3 1/8"* No. of sections in crank shaft *one* Revolutions of *CO<sub>2</sub> machine 375*

Oil Engines, type *✓* 2 or 4 stroke cycle *✓* Single or double acting *✓* B.H.P. *✓*

No. of cylinders *✓* Diameter *✓* Length of stroke *✓* Span of bearings as per Rule *✓*

Maximum pressure in cylinders *✓* Diameter of crank shaft journals and pins *✓*

Breadth and thickness of crank webs *✓* No. of sections in crank shaft *✓* Revolutions of engine per minute *✓*

Electric Motors, type *Enclosed drip proof* No. of *1 per mach.* Rated *95 H.P.* Kilowatts

Volts *at 220 at 375* 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 *1 per mach.* Cast iron or steel casings *cast iron* Cylindrical or rectangular *cylindrical*

No. of coils in each *9* Material of coils *S.D. Copper 3/4" h x 1" o.d.* Can each coil be readily shut off or disconnected *yes*

Water Circulating Pumps, No. and size of *2 - 4" centri.* how worked *electrically* Gas Separators, No. of *6*

Gas Evaporators, No. of *1 per mach.* Cast iron or steel casings *Steel* Pressure or gravity type *pressure*

No. of coils in each casing *8* Material of coils *S.D. Steel 1" h x 1 5/16" o.d.* 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 *2 - 55" Aeroto - 35,000 - 400* Is a watertight tray fitted under each battery *✓*

Air Circulating Fans, Total No. of *2 - 20" do.* each of *2,100* cubic feet capacity, at *1600* revolutions per minute

Steam or electrically driven *electrically* 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 *3 - 4" centrifugal* how worked *electrically*

Brine Cooling System, closed or open *open* Are the pipes and tanks galvanised on the inside *no*

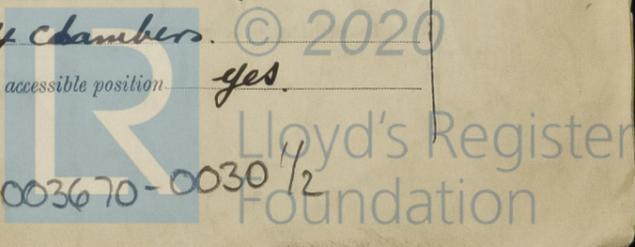
No. of brine sections in each chamber *N<sup>o</sup> 2 hold = 11, N<sup>o</sup> 3 hold = 12, N<sup>o</sup> 2 Lw. Dk. = 9*

*N<sup>o</sup> 3 Lw. Dk. = 6, Special cargo = 2 sections to each of 4 chambers.* 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.

See allocation 1935/39

Im. 12.28.-T.



003659-003670-003012

Are thermometers fitted to the outflow and to each return brine pipe yes Where the tanks are closed are they ventilated as per Rule Open Tank

Where the tanks are not closed is the compartment in which they are situated efficiently ventilated Yes

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

**HYDRAULIC AND OTHER TESTS.**

DESCRIPTION.	Date of Test.	Working Pressure.	Hydraulic Test Pressure.	Air Test Pressure.	Stamped.	REMARKS.
ENGINE CYLINDERS (IF TESTED)	16-1-31					
GAS COMPRESSORS	23-1-31	1000 lb. □	3000 lb. □	1500 lb. □	B4	
SEPARATORS	13-2-31	do.	do.	do.	B4	
CONDENSER COILS	20-1-31	do.	do.	do.	B4	
EVAPORATOR COILS	24-1-31	do.	do.	do.	B4	
CONDENSER HEADERS AND CONNECTIONS	16-1-31	do.	do.	do.	B4	
CONDENSER CASINGS	9-2-31	do.	do.	do.	B4	
EVAPORATOR CASINGS	19-12-31	do.	do.	do.	B4	
NH <sub>3</sub> CONDENSER, EVAPORATOR AND AIR COOLER COILS AFTER ERECTION IN PLACE	5-2-31	1500 lb. □	30 lb. □	-	B4	
BRINE PIPING AFTER ERECTION IN PLACE	11-2-31	20 to 25 lb. □	50 lb. □	-	B4	
	12/19/10/31	15 lb. □	90 lb.	-		Valid by Hydraulic pressure to Current Requirements
	10/11/31	15 lb. □	90 lb.	-		

**Cooling Test.** Has the refrigerating machinery been examined under full working conditions, and found satisfactory Yes  
 Dates of test 23<sup>rd</sup> and 26<sup>th</sup> November 1931 Density of Brine 48 by Sundell 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 -4° F & -6° F  
 atmosphere 50° F cooling water inlet and discharge 44° F & 51° F gas in condensers 65° and evaporators -12° F  
 the average temperature of the refrigerated chambers 8° F and the rise of temperature in these chambers upon the expiration of 24 hours  
 time after the machinery and cooling appliances have been shut off 14.6

**SPARE GEAR.**

Are the machines in accordance with Section 4, Clause 2 of the Rules Yes  
 Are the working parts of the machines, pumps and motors respectively, interchangeable Yes

**ARTICLES SUPPLIED AS PER RULE.**

1 Crankshaft  
 3 pistons & rods for compressor  
 1 set of piston rings for each compressor piston  
 1 impeller and shaft for water circulating pump  
 1 do do do do do  
 1 additional brine pump in engine room  
 2 pair bolts & nuts for main bearing  
 2 do do for connecting rod big ends  
 2 do do for crosshead  
 1 set of 2 leather moulds  
 3 lengths each 1 1/2" x 1 1/4" N.P. piping + 3 bends each size  
 12 sockets and backnuts each size 1 1/2" x 1 1/4"  
 2 pair CO<sub>2</sub> pipe flanges  
 1 set of ratchet dies to screw 1 1/2" x 1 1/4" pipes & taps.  
 Sundry brine cocks & valves.  
 Assorted bolts & nuts  
 1 regulator spindle  
 6 lubricator piston leathers  
 6 do do do do do  
 2 sets copper joint rings throughout  
 1 extra set do do for each compressor  
 1 set special metal rings for each compr. gland.

**ADDITIONAL SPARE GEAR SUPPLIED.**

1 set suction seats, valves & springs  
 1 set delivery do. for each compr.  
 24 addl. springs for compr. valves  
 3 springs for water relief valves  
 3 do do do do do  
 3 do CO<sub>2</sub> safety valves  
 1 pair crank pin shells and N.M.  
 1 pair crosshead brasses  
 1 pump for pressure lubricator  
 24 safety valve discs  
 1 leather cutter  
 2 CO<sub>2</sub> pressure gauges.  
 2 hydrometers  
 6 brass cased thermometer  
 1 length copper gauge pipe  
 2 CO<sub>2</sub> gauge valves with spare pipe  
 4 set charging valves  
 4 valves for separator drain  
 2 N° 2 Wells oil filter  
 1 pair rings for brine pipe connections  
 1 fitted bolt  
 3 coupling bolts + 3 sets leather washers for machine coupling

**ELECTRICAL SPARES.**

MACHINE MOTORS	BRINE & WATER PUMP MOTORS	FAN MOTORS EACH SIZE.
1 Armature packed for storage	1 Armature packed for storage	1 spare armature packed
1 set brushes for each motor	1 set brushes for each motor	1 set brushes for each motor
1 set brush holders	1 set brush holders	1 set brush holders
1 complete interior for controller.	1 complete interior of controller.	1 complete interior of controller.

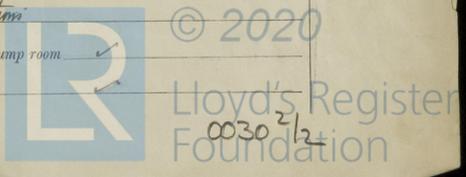
ARTICLES REQUIRED BY RULES AND NOT YET SUPPLIED

The foregoing is a correct description of the Refrigerating Machinery.

FOR J. & E. HALL LTD  
 Manufacturer.  
 Liverpool

**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. (Fore Peak) A										
FRAME No. 201 {										
A	✓	✓	Gran Cork	13"	1 1/4" 4/8" 4/8"	✓	✓	Gran Cork	8"	1 1/4" 4/8" 4/8"
F										
FRAME No. 144 {										
F	✓	✓	"	15"	"	✓	✓	"	4"	"
A	✓	✓	"	4"	"	✓	✓	"	4"	"
FRAME No. 164 {										
F	✓	✓				✓	✓	"	5"	"
A	✓	✓				✓	✓	"	4"	"
FRAME No. 156 {										
F	✓	✓	Gran Cork	10"	1 1/4" 4/8" 4/8"	✓	✓	"	8"	"
A	✓	✓	Gran Cork	10" + 4"	4 1/2" Cement					
FRAME No. (Engine Room) A										
FRAME No. {										
F										
A										
FRAME No. {										
F										
A										
FRAME No. (After Peak) F										
SIDES			Gran Cork	11"	1 1/4" 4/8" 4/8"		✓	Gran Cork	11"	1 1/4" 4/8" 4/8"
OVERHEADING			"	9"	"			"	9"	"
FLOORS OF CHAMBERS	1 1/2"	1 1/4" 4/8" 4/8"	"	8"	2 1/2" 4/8"			2 1/2" Oregon Pine Deck Sheathing		
TRUNK HATCHWAYS										
THRUST RECESS, SIDES AND TOP										
TUNNEL SIDES AND TOP										
TUNNEL RECESS, FRONT AND TOP										
FRAMES OR REVERSE FRAMES, FACE					1" Cork and 1 1/4" 4/8"					
BULKHEAD STIFFENERS, TOP										AND FACE 1" Cork and 1 1/4" 4/8"
BOTTOM										
RIBBAND ON TOP OF DECKS					2 1/2" Oregon Pine					
SIDE STRINGERS, TOP										AND FACE ✓
BOTTOM										
WEB FRAMES, SIDES										AND FACE ✓
BRACKETS, TOP					6" Gran Cork and 5" 4/8"					AND FACE ✓
BOTTOM										
INSULATED HATCHES, MAIN					6" Gran Cork + Pitch Pine	BILGE		6" Gran Cork + Pitch Pine	MANHOLE	6" Gran Cork + Pitch Pine
HATCHWAY COAMINGS, MAIN					Pitch Pine faced with Galv. Iron	BILGE		Pitch Pine + Sheat Pine		
HOLD PILLARS					1" Galv. Cork and 1 1/4" 4/8"			1" Velt and 2 1/2" manilla rope		
MASTS										VENTILATORS 8" Gran Cork and 1 1/4" 4/8"
Are insulated plugs fitted to provide easy access to bilge suction roses					Yes	tank, air, and sounding pipes	Yes	heels of pillars	Yes	
and manhole doors of tanks					Yes	Are insulated plugs fitted to ventilators	Yes	cargo ports	None	and side lights
Is the insulation of the lower hold floor and tunnel top in way of the hatchways protected					Yes	if so, how	2" Elm doubling			
Oil Storage Tanks, where adjacent to the insulated chambers, state what provision has been made for ventilating the air space between the bulkhead plating								None adjacent to chamber		
Coal Bunker Bulkheads, and Brine Outflow and Return Pipes passing through coal bunkers. Is the insulation, so far as practicable, fireproof								None		
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					3" x 3" x about 11"	floors		3" x 3" x about 11"	tunnel top	✓
fixed or portable					Both	Are screens fitted over the brine grids at chamber sides	Yes	hinged or permanently fixed	Portable	
Thermometer Tubes, No. and position in each chamber					4 in each compartment supplemented by Electrical thermometer					
diameter					2 1/2" Galvanised	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								Yes		
Draining Arrangements. Where the chambers are situated below the load water line, what provision is made for draining the inside of the chambers					Brine traps & Scuppers	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					Into Pump direct and main suction					
brine return room					Scuppers	fan room	Scuppers	water circulating pump room	✓	
Are all air spaces behind insulation arranged to drain to the bilges, bilge wells, or gutterways of the respective chambers										



**Sounding Pipes**, No. and position in each chamber situated below the load water line *Three in lower holds at Aft end: two on deck by the main bulkhead*  
 Diameter *2 1/2"* Are all sounding pipes in way of insulated chambers fitted in accordance with Section 3, Clause 11 *Yes*  
 Are all wood linings tongued and grooved *Yes or 1/2 checked* Are cement facings reinforced with expanded steel lattice *Yes*  
 How is the expanded metal secured in place *Staples*  
 How are the cork slabs secured to the steel structure of the vessel *Jambed and stapled to grounds and adjacent slabs*  
**Air Trunkways in Chambers**, inside dimensions, main *Screen over line ends* and branch *✓*  
 Are they permanently fixed or collapsible, or portable *Portable* State position in chambers *Sides & Ends*  
 Where air trunkways pass through watertight bulkheads, are they fitted with watertight doors *None* Are the door frames efficiently insulated *✓*  
 Are insulated plugs supplied for the doorways *✓* Where are the doors worked from *✓*  
**Cooling Pipes in Chambers**, diameter *1 3/4"* Are they galvanised externally *No*  
 How are they arranged in the chambers *Overhead, Sides and Ends*  
**Thawing Off**, what provision is made for removing the snow from the cooling pipes in the chambers *Warm Brine*

The foregoing is a correct description of the Insulation and Appliances. *J. Hallander* Builders. DIRECTOR.

**Plans**. Are approved Plans or Specifications forwarded herewith for the Refrigerating Machinery *No* and Insulation *Yes*  
 (If not, state date of approval)  
 Is the Refrigerating Machinery and Appliances duplicate of a previous case *Yes* If so, state name of vessel *"Shattinover"*  
 If the survey is not complete, state what arrangements have been made for its completion and what remains to be done *Complete*  
 Survey Dates: ~ 1931 ~ March 12, April 13, 29, June 2, 26, July 15, 31, August 24, Sept. 25, Oct. 12, 19, Nov. 5, 25, 26, Dec. 8, Jan. 4, 6, 12, 14. (17 visits)

**General Remarks** (State quality of workmanship, opinions as to class, etc.) *The refrigerating machinery has been constructed under special survey and the materials and workmanship are good. The machinery and insulation has been efficiently fitted on board. The tests have been carried out in accordance with the Rules and proved satisfactory. In our opinion the vessel is eligible to have the notation of Lloyd's R.M.C. 1.32 made in the Register Book.*

It is submitted that this vessel is eligible for THE RECORD + Lloyd's R.M.C. 1.32.  
*MJ* 22/1/32  
 CERTIFICATE WRITTEN 22.1.32

**PARTICULARS TO BE ENTERED IN REGISTER BOOK.**

REFRIGERATING MACHINES.					System of (1) Refrigerating (2) Insulating the Chambers.	POWER.		INSULATED CARGO CHAMBERS.	
No. of Units.	No. of Compressors.	System.	Makers.	Date of Construction.		Cubic feet of air delivered per hour.	Ice melting capacity per 24 hours. Tons.	No.	Capacity. Cubic ft.
3	9	Castlinby	J. E. Hall Ltd.	1931	(1) Brine from Cork	✓	144	8	156,000

LON. A/c 16-0-0  
 BRW. A/c 13-0-0  
 Fee £ 18: : : { Fee applied for 21st Jan 1932  
 LETTER BRW 27/1/31  
 Travelling Expenses £ : : { Received by me, 22-1-1932

*D. Gemmell*, Surveyor to Lloyd's Register.

Committee's Minute TUE. 26 JAN 1932.  
 Assigned + Lloyd's R.M.C. 1.32



Certificate to be sent to