

Date of writing report.....7.12.60

Received London

Port H A M B U R G

No. 10093

29 DEC 1972

Survey held at.....Hamburg

No. of visits in shop.....44

First date 29.1.60

Last date...9.11.60

Name of Ship "INDIAN NAVIGATOR"

Owners India Steamship Co. Ltd., Calcutta

Hull built at Los Angeles

by California Shipbuilding corp. Yard No

Year 1944

Main engines made at Pittsburgh

by Westinghouse Elec. + Mfg. Co., Engine No.

Year 1944

Reduction gearing made at Hamburg

by Howaldtswerke Hamburg A.G. Gear No 739 027

Year 1960

Type of engine with which gearing is to be used HP- and LP turbine

...State if for Class 1 or 2 ice strengthening ☐ no

*The following particulars are to be given as fully and clearly as possible. Wording not applicable should be cancelled by a black line.*

Description of gearing, including reversing arrangements and clutches, if any, and No. of sets (*state if ball or roller bearings*)

Non articulated, split secondary.

double reduction gear with HP and LP

primary pinions. Mainwheel shaft integral with

with thrust shaft.

If single helical, what is the position of the gear thrust bearing?

double helical

Helix angle, primary  $29^{\circ}20'54''$  LP secondary  $17^{\circ}56'$   
 $27^{\circ}40'21''$  HP

Type of involute tooth form  $20^\circ$  pressure angle

Approved maximum total S.H.P. 8500 at 88 R.P.M. of main wheel

## PINIONS

PINIONS	PRIMARY			SECONDARY		
	HP	MP	LP	HP	MP	LP
Maximum S.H.P. to be delivered to primary pinions ...	4250	-	4250			
Revolutions per minute ... ..	5358	-	4422	608	-	608
Diameter of pitch circle, inches/mm. ... ..	231,48	-	281,07	536,04	-	536,04
No. of teeth ... ..	41	-	49	85	-	85
Total width of face, parallel to axis, inches/mm. ...	534	-	534	950	-	950
Width of gap, inches/mm. ... ..	50	-	50	610	-	610
Diameter of shaft at bearings, inches/mm. ... ..	127	-	127	406	-	406
No. of bearings ... ..	2	-	2	2	-	2
Span of bearing centres, inches/mm. ... ..	822	-	822	1998	-	1998
Material, state nominal composition and heat treatment	EN 25	-	EN 25	EN 25	-	EN 25
Tensile strength, tons per sq. in./kg. per sq. mm. ...	88-85,4	-	88-92,9	86,7-89,2	-	86,7-90,4
QUILL SHAFTS						
Diameter, inches/mm. ... ..	none					
Material, state nominal composition ... ..	-					
Tensile strength, tons per sq. in./kg. per sq. mm. ...	-					
FLEXIBLE COUPLINGS						
Type of coupling ... ..	Fine tooth coupling, as previously installed					
Material, driving member... ..						
Tensile strength, tons per sq. in./kg. per sq. mm. ...						
Material, driven member ... ..						
Tensile strength, tons per sq. in./kg. per sq. mm. ...						

Do couplings permit axial float of pinions?.....yes

Have primary pinions been dynamically

balanced?.....yes

Have secondary pinions been dynamically or statically balanced? dynamically

# WHEELS

	PRIMARY			MAIN
	HP	MP	LP	
Revolutions per minute ... ..				88
Diameter of pitch circle, inches/mm. ... ..	2111.52	-	2110.93	3708.16
No. of teeth... ..	374	-	368	588



WHEELS (continued)

	PRIMARY			MAIN
	HP	MP	LP	
Material of rims, state nominal composition	EN 8	-	EN 8	EN 8
Tensile strength, tons per sq. in./kg. per sq. mm.	69.5	-	68.2	65.0-66.3
Diameter of shaft at bearings, inches/mm.	see 2nd pinion	-	see 2nd pinion	533
Material of shaft	EN 25	-	EN 25	SM-Steel
Tensile strength, tons per sq. in./kg. per sq. mm.	86.7-89.2	-	88-92.2	44.0-44.2

Have wheels been statically balanced? yes, 1st wheels dynamically Are wheel bodies of cast or welded construction? welded construction

Are wheel bodies connected to the shafts by bolts? no, by welding Material of wheel bodies SM-Steel

Are rims shrunk on, or bolted to bodies, or attached by welding? attached by welding Are radial or axial dowels fitted? -

If shrunk, has the shrinkage allowance been checked and found as approved? - How were the teeth cut? hobbing

If hobbed, name and serial no. of hobbing machine Schiess RF 40/55 What post-hobbing process was applied? lapping

Name and serial no. of machine used for finishing process No. 43 148 If teeth are surface hardened, state method not hardened Were teeth cut under conditions of temperature control? yes, 20° C.

Is gearcase of cast or welded construction? welded If welded, has it been stress relieved? gear case as fitted 1944 Have trammels or other means been supplied for verifying that gearcase is free from distortion when secured in ship? - Diameter of shaft at thrust collar 406.5mm/339.7mm

Has gearing been run light/under load in the shop and the tooth contact found satisfactory? yes

What is the backlash? (state whether measured circumferentially or normal to the teeth) circumferentially 0.6 mm

If undulation records were taken, state maximum height from crest to trough and wave length, pinions -

wheels -

Maximum adjacent pitch error normal to teeth, if measured, pinions -

wheels 7611 over 204 teeth Date of approval of plans 4.2.1960

If gearing is a duplicate of a previous case, state name of ship replace gear

The foregoing description of reduction gearing is correct.

HOWALDTSWERKE HAMBURG A.-G.

*W. Duglath*

*H. V. E. E. E. E.*  
Manufacturer

GENERAL REMARKS

State if the gearing has been constructed under special survey in accordance with the Rules, approved plans and Secretary's letters. State quality of materials and workmanship. This report should be forwarded to the Head Office with the First Entry report on the machinery. When gearing is made at a Port other than the Port of installation, the Surveyors at the former should send this report to the Surveyors at the Port of installation as soon as possible after completion of the gearing. The latter should complete the Declaration below and send the report to the Head Office with their First Entry report on the machinery.

This reduction gear has been constructed under Special Survey in accordance with the Society's Rules and Regulations, the approved plans and the Secretary's letters. The materials and workmanship are good.

Survey fee see Hamburg Rpt. 3311

Expenses -

Date when a/c rendered -

*W. Duglath*  
Engineer Surveyor to Lloyd's Register of Shipping

IDENTIFICATION MARKS

PRIMARY PINIONS HP:- LLOYD'S HNO 621 GS 11.3.60, LP:- LLOYD'S HNO 588 GS 11.3.60

PRIMARY QUILL SHAFTS -

SECONDARY PINIONS HP:- LLOYD'S HNO 526 GS 2.3.60, LP Lloyd's HNO 395 GS 20.1.60

SECONDARY QUILL SHAFTS -

FLEXIBLE COUPLINGS -

PRIMARY WHEEL RIMS HP:- LLOYD'S HNO 387 GS 11.1.60, LP:- LLOYD'S HNO 386 GS 11.1.60

PRIMARY WHEEL SHAFTS see 2nd pinions

MAIN WHEEL RIMS LLOYD'S HNO 287 + 288 GS 21.12.59 MAIN WHEEL SHAFT LLOYD'S HNO 189 GS 9.11.59

All above parts in addition to the identification marks HAM 3311 RFK 9.11.60

DECLARATION TO BE COMPLETED AND SIGNED BY THE SURVEYOR AT THE PORT OF INSTALLATION

The above reduction gearing has been fitted on board the S.S. "INDIAN NAVIGATOR" at HAMBURG

in a proper manner and found satisfactory when tested on the (date) 11.12.60 under full-power working conditions for 8 hours and when examined subsequently.

DATE OF COMMITTEE See casualty report

DECISION -

*W. Duglath*  
Engineer Surveyor to Lloyd's Register of Shipping

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