

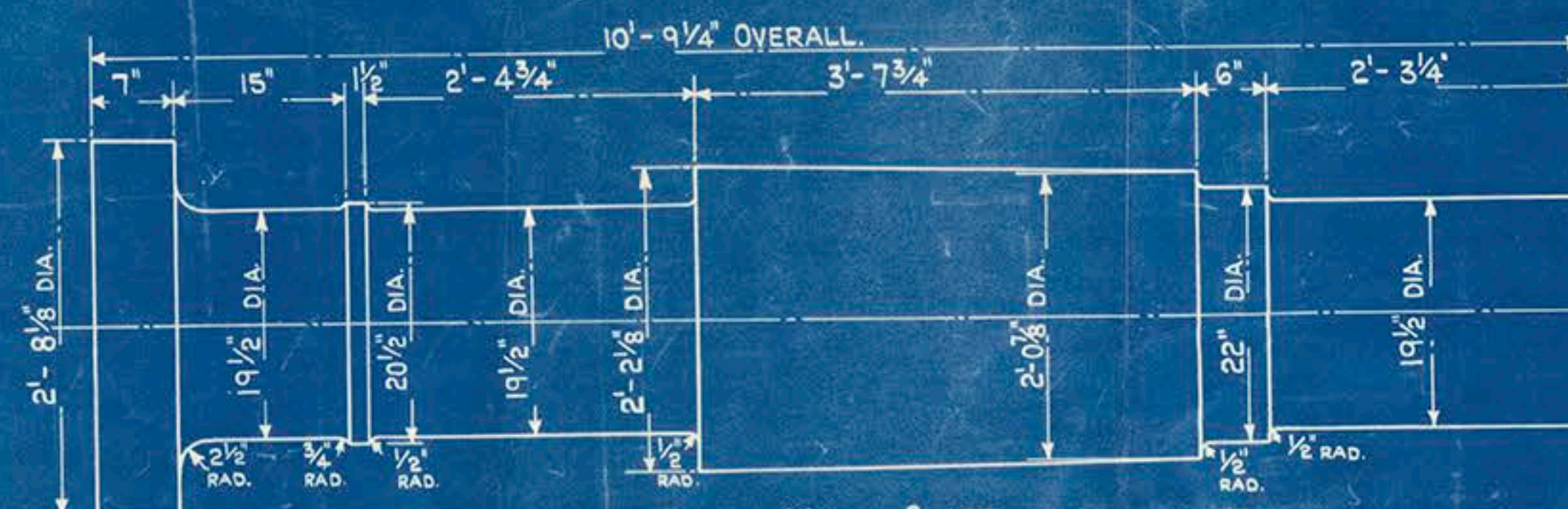


APPROVAL NOTED IN ACCORDANCE  
WITH LETTER DATED 28-8-36

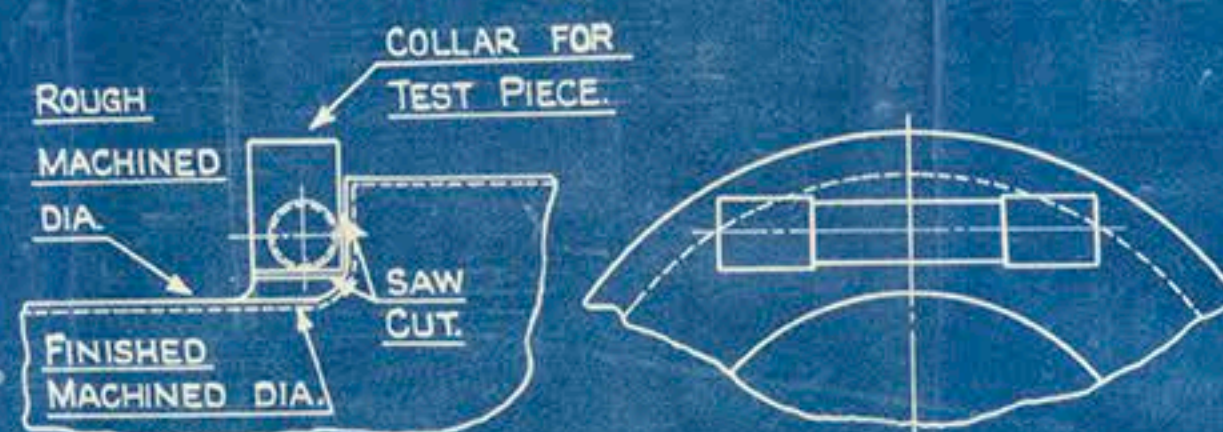
Verified Copy  
of Plan Approved  
27th August 1936  
31



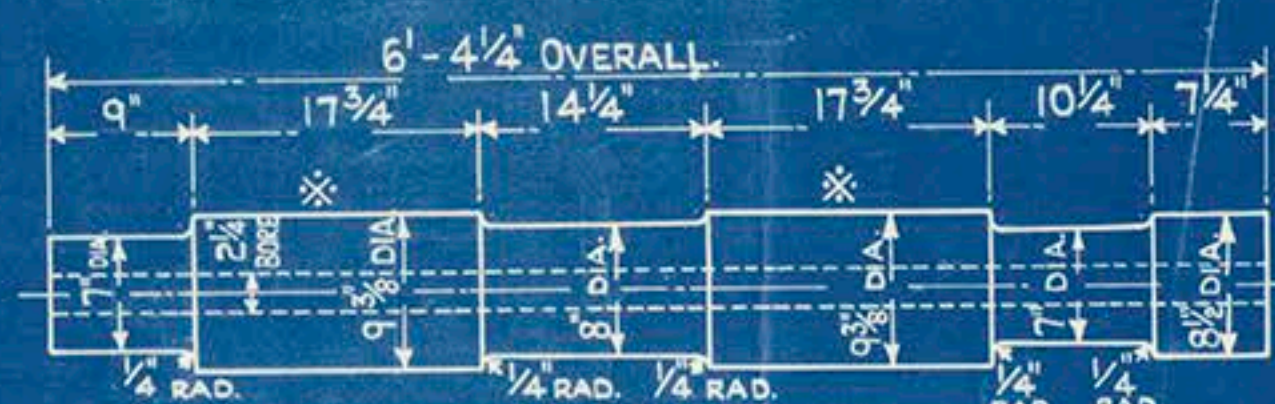
GEAR WHEEL RIM.  
SCALE: 1/2" TO 1 FOOT.



GEAR WHEEL SHAFT.  
SCALE: 1" TO 1 FOOT.



SKETCH SHOWING COLLAR ON PINION FORGINGS FOR  
OBTAINING TRANSVERSE TEST PIECES.



H.P. & I.P. PINION SHAFT.  
SCALE: 1" TO 1 FOOT.



L.P. PINION SHAFT.  
SCALE: 1" TO 1 FOOT.

NOTE:-  
TO BE FORGED FROM SOLID STEEL INGOTS, COMPRESSED, SOUND & FREE FROM FLAW. ITEMS A, B & C TO BE ROUGH MACHINED TO WITHIN 1/4" OF DIMENSIONS GIVEN i.e. 1/8" ON ALL FLAT SURFACES & RADII & 1/4" ON ALL DIAMETERS. THE HOLE IN ITEMS A & B TO BE FINISHED BORED TO DIMENSION GIVEN. ITEM D TO BE ROUGH MACHINED TO WITHIN 3/8" OF DIMENSIONS GIVEN i.e. 3/16" ON ALL FLAT SURFACES & RADII & 3/8" ON ALL DIAMETERS & BORES. SPECIAL CONSIDERATION TO BE GIVEN IN THE PROCESS OF MANUFACTURE OF GEAR WHEEL RIM & PINIONS TO ENSURE THAT A MAXIMUM UNIFORMITY OF MATERIAL & AS EQUAL A DEGREE OF HARDNESS OVER THE SURFACES AS IS POSSIBLE TO BE MAINTAINED AT THE PLACES MARKED THUS \* ALL PARTS TO BE PERFECTLY SMOOTH & FREE FROM FLAWS OR DEFECTS WHEN FINISH MACHINED BY VICKERS-ARMSTRONGS LTD. BARROW.  
TO BOARD OF TRADE & LLOYDS REQUIREMENTS, TESTS & INSPECTION.

#### SPECIFICATION OF NICKEL STEEL FORGINGS.

NICKEL STEEL TO CONTAIN FROM 3.25% TO 3.75% NICKEL WITH CARBON CONTENT FROM .27% TO .35%. PHOSPHORUS & SULPHUR NOT TO EXCEED .05%. MANGANESE NOT TO EXCEED .7%. SILICON NOT TO EXCEED .25%. EVERY PRECAUTION TAKEN TO EXCLUDE OXYGEN, NO CONSTITUENTS BEING ADDED SUBSEQUENT TO THE DE-OXIDISATION OF THE BATH. PINION BLANKS TO BE REDUCED AT LEAST 1" IN DIAMETER & 1" ON EACH SIDE OF EACH PINION BLANK BY MACHINING FROM THE FINISHED FORGINGS. PINION TO BE HEAT TREATED TO BETWEEN 825° & 875° C & THEN QUENCHED IN OIL. THIS TO BE FOLLOWED BY TEMPERING BETWEEN 580° & 650° C. CARE TO BE TAKEN THAT THESE UPPER TEMPERATURES ARE NOT EXCEEDED & THAT SOAKING PERIODS ARE NOT MORE THAN NECESSARY. BRINELL IMPRESSIONS ARE TO BE TAKEN AFTER HEAT TREATMENT AT EACH END ON TWO DIAMETERS AT RIGHT ANGLES IN THREE DIFFERENT POSITIONS OVER EACH TOOTHED PORTION OF PINION. A RING OF METAL AS SHOWN IN SKETCH TO BE LEFT ON END OF NICKEL STEEL PINION, CONCENTRIC WITH THE TEETH SO THAT TEST PIECES CAN BE CUT OFF FOR TRANSVERSE TESTS. THESE TEST PIECES SHOULD SHOW A TENSILE STRENGTH OF NOT LESS THAN 40 TONS/D" & AN ELONGATION OF 16% ON TEST PIECE C. LONGITUDINAL TESTS:- ULTIMATE TENSILE STRENGTH 40 TONS/D" ELONGATION 23% ON B.S. TEST PIECE, C D OR E AS APPROVED. BENDING TEST:- TEST PIECE 3/4" WIDE & 3/8" THICK TO BE BENT OVER A RADIUS NOT MORE THAN 3/4", THE PLANE OF THE BEND BEING PARALLEL TO 3/8" SIDE. IMPACT TESTS TO BE MADE ON THE NICKEL STEEL FORGING. TEST PIECES IN ACCORDANCE WITH BRITISH ENGINEERING STANDARD ASSOCIATION DIMENSIONS MUST ABSORB NOT LESS THAN 35 FT. LBS. WHEN TESTED IN A 120 FT. LBS. IZOD MACHINE.

NOTE: GREAT CARE TO BE TAKEN IN THE MANUFACTURE & HEAT TREATMENT OF THESE FORGINGS PARTICULARLY THOSE FOR THE PINION & GEAR WHEEL RIMS ON WHICH WILL BE FORMED THE TEETH OF THE GEARING

COPY OF PLAN APPROVED. 27/8/36

31/9/36

MR.

ITEM.	DESCRIPTION.	No OFF	MATERIAL.	TESTS.		
				TENSILE STRENGTH.	ELONGATION.	BENDING.
A.	H.P. & L.P. PINION SHAFT.	4 2	NICKEL STEEL.	SEE SPECIFICATION.		
B.	L.P.	2 1	"			
C.	GEAR WHEEL SHAFT.	2 1	FORGED STEEL.	34 TO 38 TONS/D."	23% ON B.S. TEST C.D. OR E.	180°
D.	" RIM.	4 2	"	"	"	"

QUANTITIES GIVEN ARE TOTAL REQD.

Signatures: H.A.S. 25/8/36  
V.L.

#### FORGINGS FOR EXPERIMENTAL GEARING.

SCALE:- AS MARKED.



TSS. AWATEA

PINION & GEAR WHEEL  
FORGINGS

Verified Copy of Plans  
approved 27/8/86

8yd 15,742



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Lloyd's Register  
Foundation

LK-FAF-1621-P25