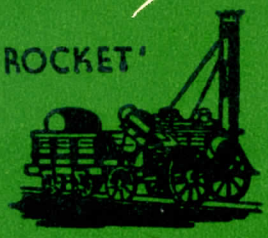
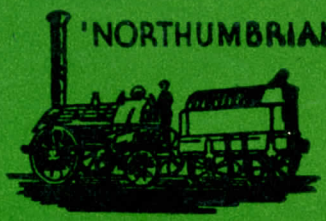
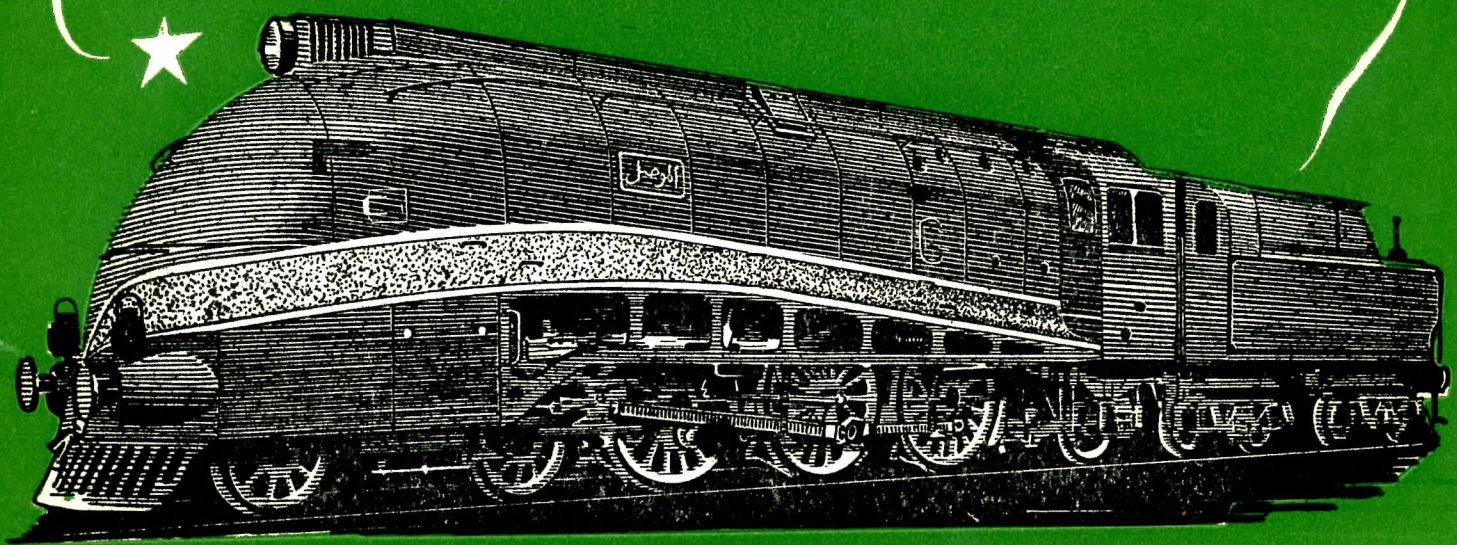




ROBERT STEPHENSON AND HAWTHORNS LTD.

Products



DARLINGTON & NEWCASTLE

ENGLAND

TYPICAL EXAMPLES OF

LOCOMOTIVES

BY

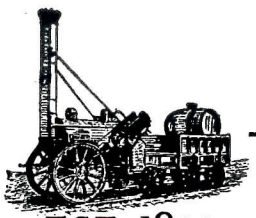
ROBERT STEPHENSON

AND

HAWTHORNS LTD.

DARLINGTON AND NEWCASTLE

ENGLAND



EST: 1823

HEAD OFFICE AT DARLINGTON

LONDON OFFICE AT 82 VICTORIA STREET, S.W.1

WORKS AT . . DARLINGTON AND NEWCASTLE

TELEPHONES:

Darlington 5331

Newcastle 22431

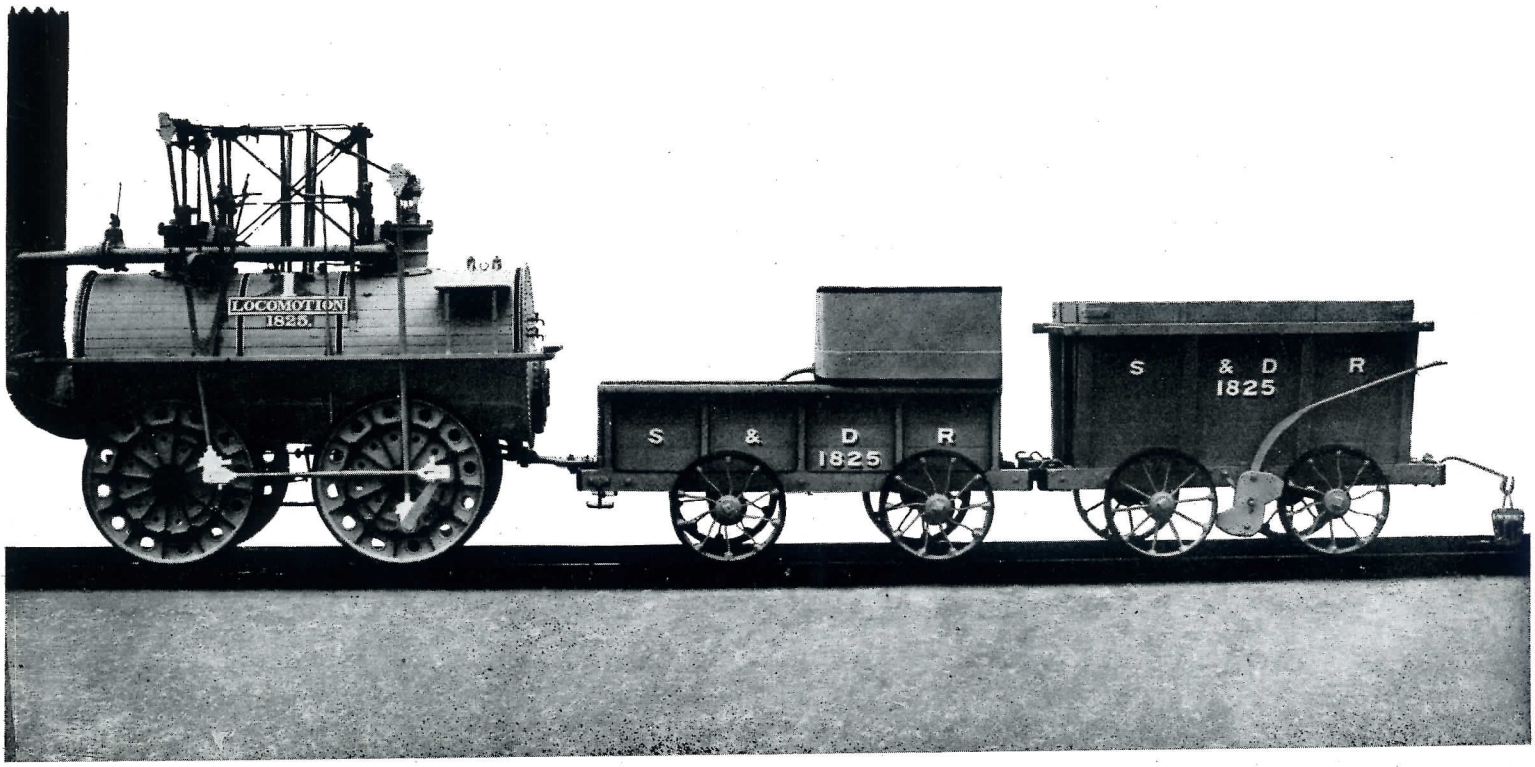
London . . . Victoria 5572

TELEGRAMS:

Rocket, Darlington

Locomotive, Newcastle

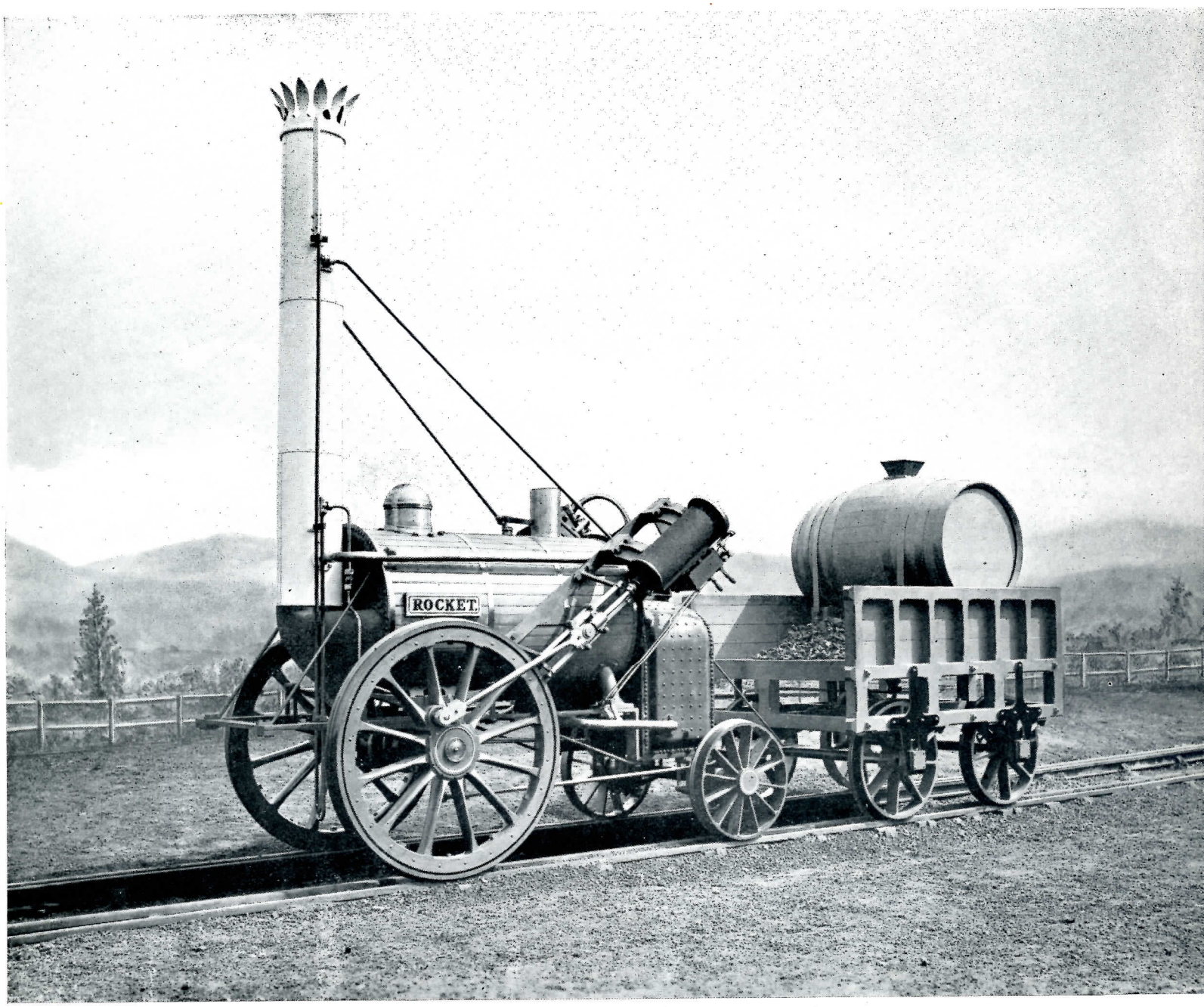
Locoengin, Sowest, London



LOCOMOTION No. 1, 1825

Built by Robert Stephenson & Co. for the Stockton and Darlington Railway—the first Public Railway in the world.

This engine can still be seen standing on the platform at Bank Top Station, Darlington—a lasting monument to progress.



"THE ROCKET"

A replica built for Mr. Henry Ford of America, in 1929, conforming to the design of Robert Stephenson & Co.'s original engine built in 1829. The most famous Locomotive in History—the prototype and parent of the present day locomotive.

It won the £500 prize at the Rainhill Trials in 1829, and is the first locomotive to be fitted with the locomotive type of boiler, but with an independent firebox. The engine with tender, in working order weighs 7½ tons.

Foreword

THE composite title "Robert Stephenson & Hawthorns, Limited," was assumed in 1937, and records the fusion of the locomotive interests of Robert Stephenson & Co. Ltd., of Darlington, and Messrs. R. & W. Hawthorn Leslie & Co. Ltd., Newcastle-upon-Tyne. This step was noteworthy as both firms were pioneers in the locomotive world, and both intimately associated with the early history and development of the locomotive.

The firm of R. & W. Hawthorn, as it was originally called, was already in existence, when, in the early days of the last century the railway locomotive in practical form was presented to the world by George and Robert Stephenson. Their works, founded in 1817 by Robert Hawthorn, joined later by his brother William, occupied a site close to the River Tyne known as Forth Banks, where they carried on a business of Marine and other Steam Engine Builders and Engineers.

When in 1823, the firm of Robert Stephenson & Co. was formed with George and Robert Stephenson, Edward Pease and Michael Longridge as partners, the site chosen for their works was one in South Street, Newcastle-upon-Tyne, adjoining the existing Hawthorn Works. It was here in 1825 that the first locomotive used on a public railway was produced, the old "Locomotion No. 1" of the Stockton & Darlington Railway. During the next four years a total of fifteen locomotives were built, after which came the famous "Rocket," the prototype and parent of the present day locomotive, followed by many other engines now of historic interest, but too numerous to mention here.

Our frontispiece shows how the newly formed concern of Robert Stephenson & Company, inspired by the two Stephensons—father and son—virtually defined within a comparatively short space of time, viz.:—from 1823 to 1830, the familiar characteristics of the Steam Locomotive.

It might appear to the casual observer that the modern engine differs greatly from its prototype of say 1830 to 1835, but the differences are more apparent than real, being mainly those of size, form, weight and, last but not least, present day restrictions which have accustomed us to a somewhat "compressed" constructional technique, which fortunately did not apply in 1830. It should of course be remembered that George Stephenson had since 1813 been occupied, particularly at Killingworth Colliery, in developing and manufacturing locomotives, and by 1823 had been mainly instrumental in establishing beyond all question, their commercial success, and what is more, his enlightened vision had foreseen their great future possibilities; hence doubtless the decision to establish, what was in fact, the first locomotive building works in the world.

The brothers Hawthorn entered the locomotive business in 1831 when they delivered their first engine "The Coronation" to the Stockton and Darlington Railway. In 1835 they produced the celebrated "Comet" for the Newcastle and Carlisle Railway, the striking feature of this engine being the employment of four fixed eccentrics instead of two loose eccentrics hitherto in general use with the old 'Gab' reversing motion. It may well be that this happy invention of Hawthorns paved the way to that stroke of genius, the well-known "Link Motion" introduced by Stephensons seven years later, and in use to the present day.

In 1901 the works of Robert Stephenson & Co., having been close neighbours of Hawthorns for nearly eighty years, were moved to Darlington. During their long period as neighbours, the employees of both firms appear to have been on the best of terms, indeed it is recorded by some of our older members, that in times of stress they were always ready to extend a helping hand to each other. It seems only fitting, therefore, that the two friendly rivals should now be working as one Company. The removal of the Stephenson works gave Hawthorns the opportunity to extend and improve their own factory, part of the Stephenson premises being taken over for this purpose.

The Stephenson shops were transferred to a new site at Darlington where an extensive modern factory was built and ample land acquired for future extension. The first locomotive to be built in the new factory was steamed in 1902.

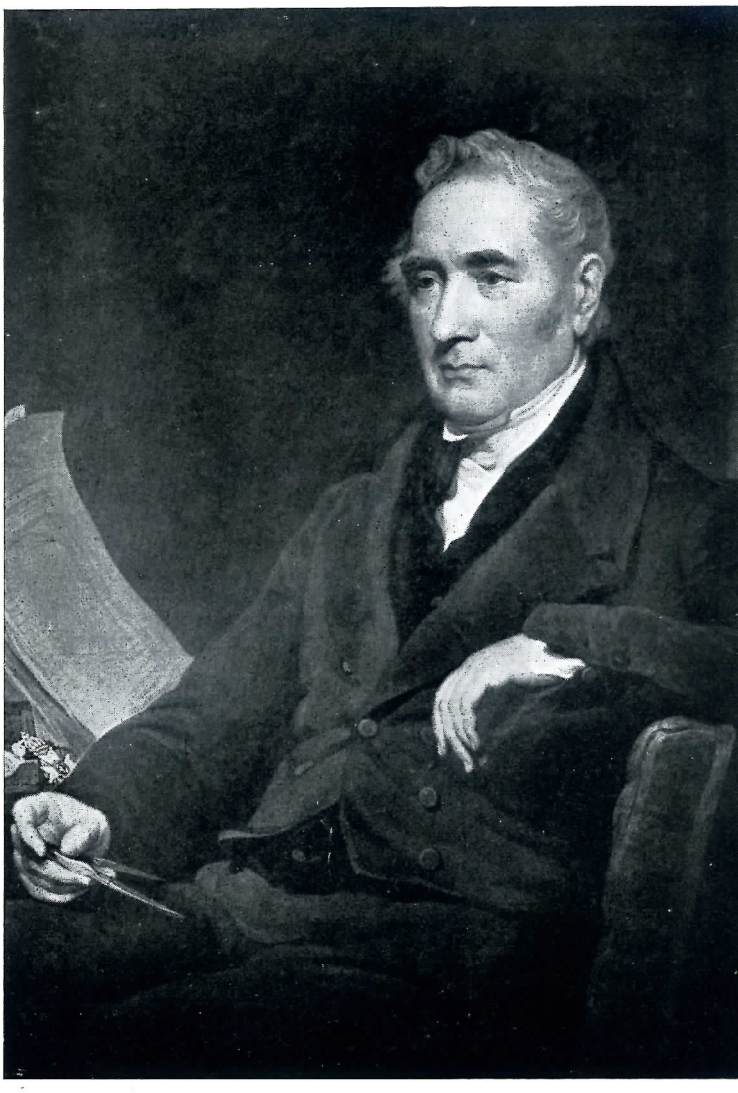
Since the amalgamation of the two firms in 1937, the Company's policy has been to concentrate its main line Locomotive Products at Darlington, and to continue at Forth Banks the well-established business of the Hawthorn Industrial Locomotive. In recent years the Company has also engaged in the manufacture of Diesel Mechanical Locomotives, and in conjunction with the well-known electrical manufacturing firms, the building of all-electric main line and shunting locomotives.

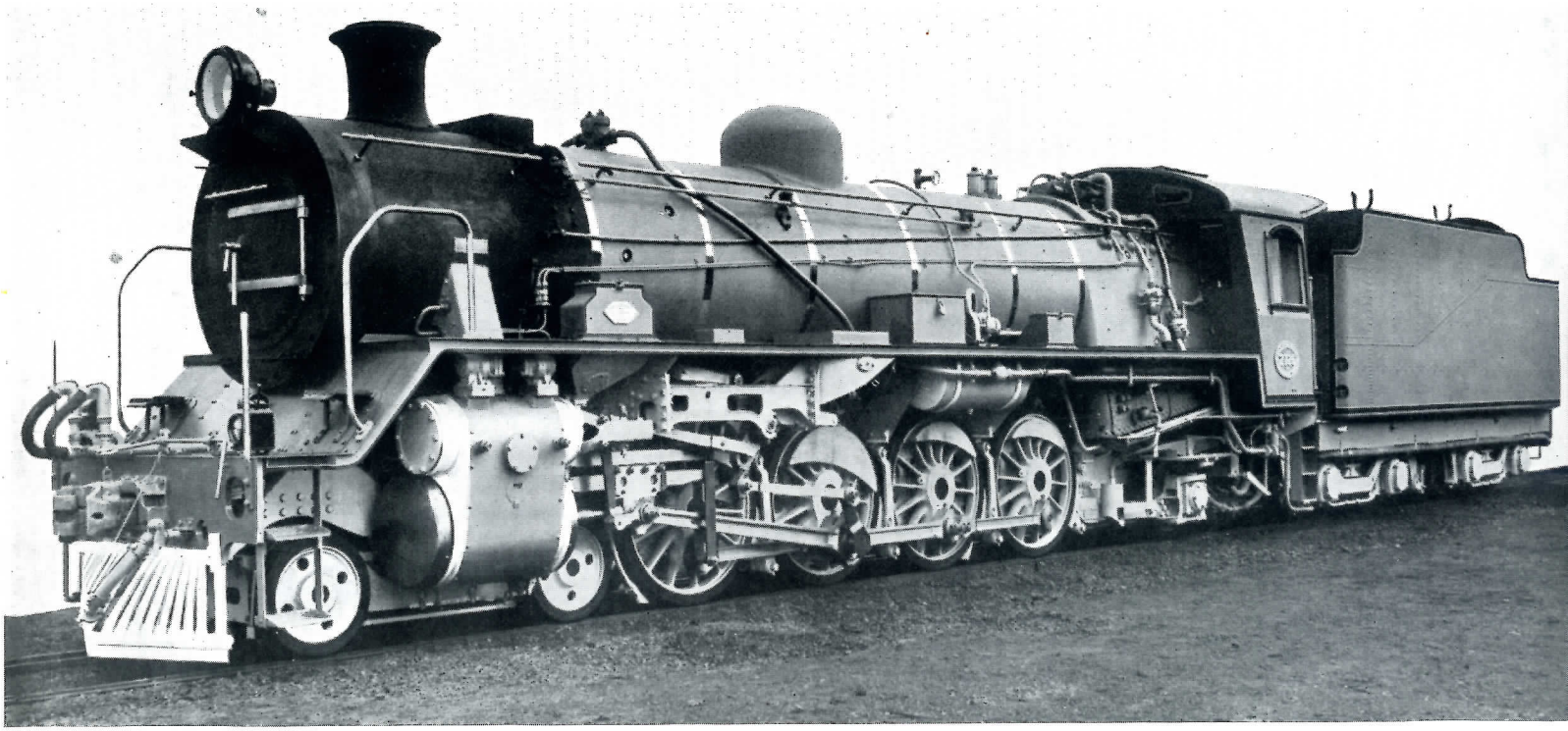
In the pages which follow, illustrations and particulars are given of some of the Company's recent products. Both firms have of course built many other engines of great interest, but lack of space prevents mention of all but a few.

GEORGE STEPHENSON

ROBERT STEPHENSON

M.P., D.C.L., F.R.S.



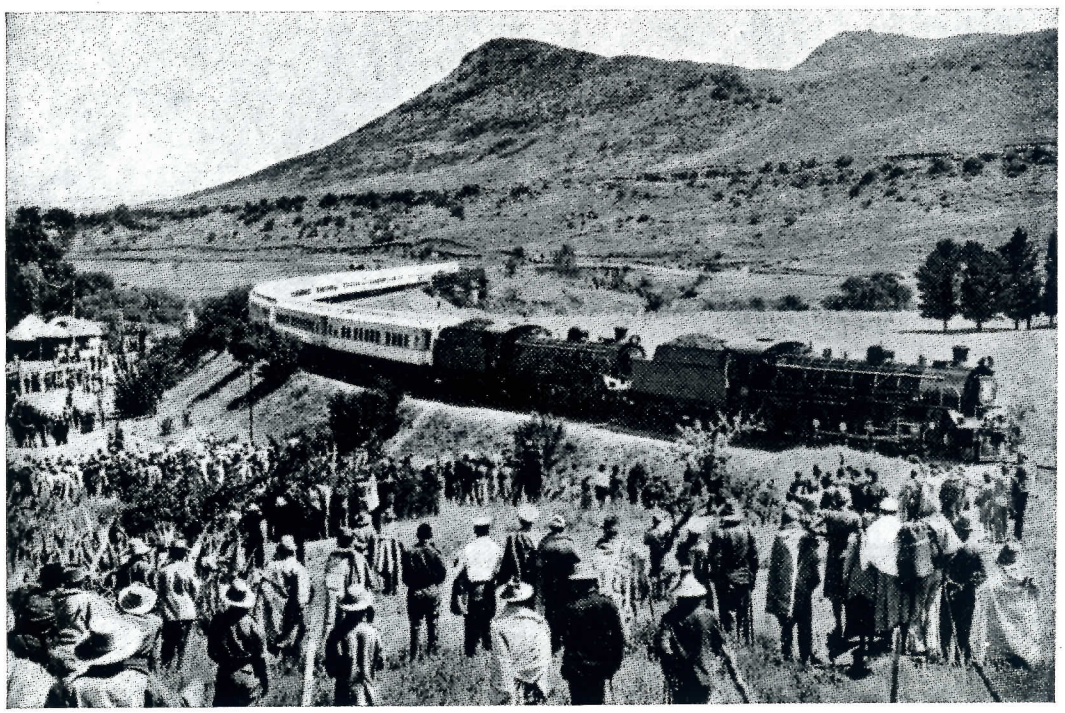


E7191 Type 4–8–2 Gauge 3′ 6″ 19D Class

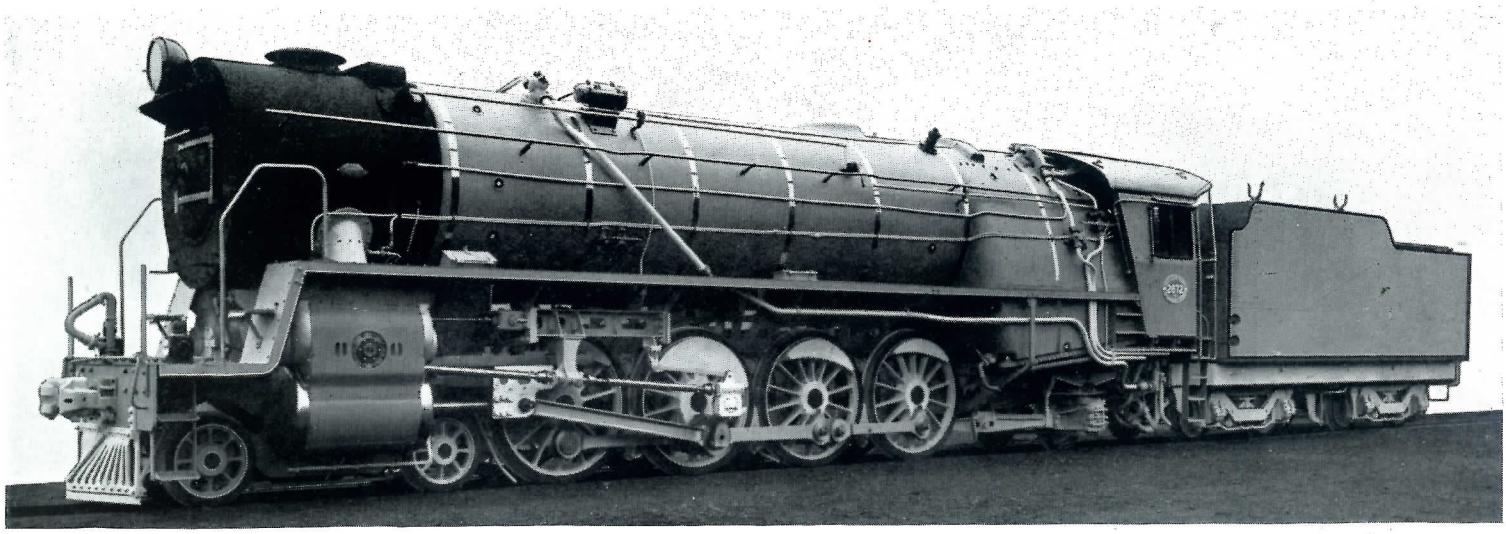
SOUTH AFRICAN RAILWAYS

DIMENSIONS

Cylinders (2) Diam. × Stroke	21″ × 26″	Working Pressure	200 lbs./sq. in.
Coupled Wheel Diam.	4′—6″	Weight on Coupled Wheels (loaded)	57.65 tons
Wheel Base, Fixed	14′—5″	Weight Engine total (loaded)	84.3 tons
Wheel Base, Engine total	32′—3″	Water Capacity	6,000 galls.
Heating Surface, Evaporative	1,839 sq. ft.	Fuel Capacity	14 tons
Heating Surface, Superheater	390 sq. ft.	Weight of Tender (loaded)	68.8 tons
Grate Area	36 sq. ft.	Tractive Force at 85% B.P.	36,096 lbs.



19D LOCOMOTIVES HAULING THE ROYAL TRAIN, 1947.

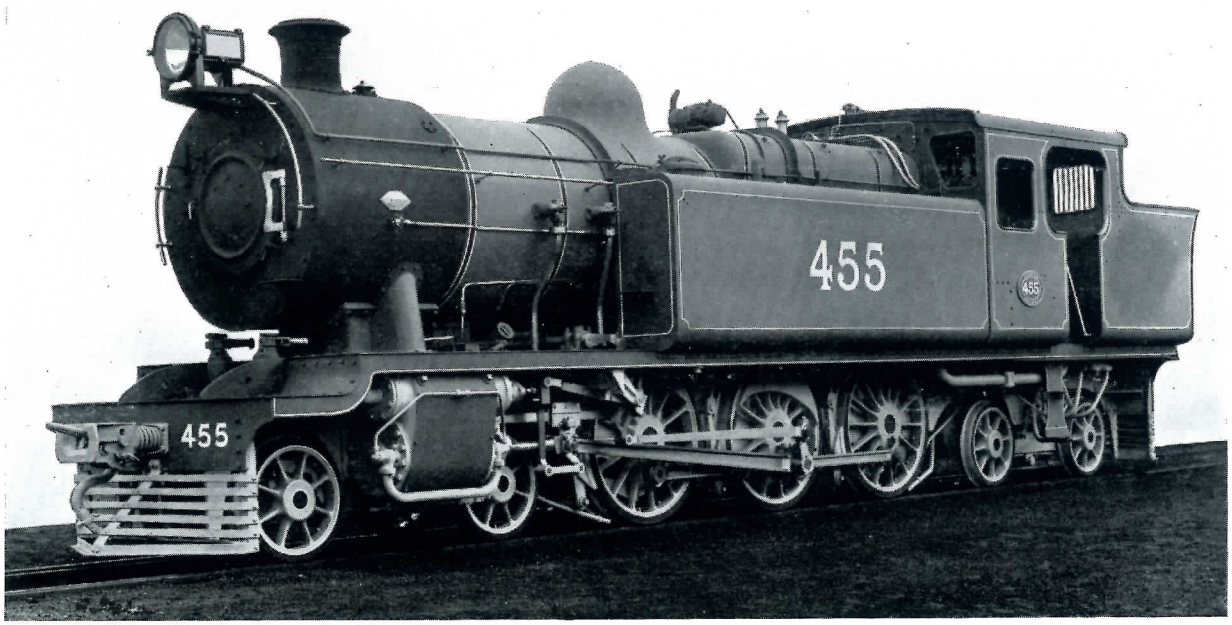


E156 Type 4–8–2 Gauge 3′ 6″ 15E Class

SOUTH AFRICAN RAILWAYS

DIMENSIONS.

Cylinders (2) Diam. × Stroke	24″ × 28″	Working Pressure	210 lbs./sq. in.
Coupled Wheel Diam.	5′—0″	Weight on Coupled Wheels (loaded)	71.6 tons
Wheel Base, Fixed	15′—9″	Weight, Engine total (loaded)	107.7 tons
Wheel Base, Engine total	35′—8″	Water Capacity	6,000 galls.
Heating Surface, Evaporative	3,415.5 sq. ft.	Fuel Capacity	12 tons
Heating Surface, Superheater	661 sq. ft.	Weight of Tender (loaded)	66.15 tons
Grate Area	62.5 sq. ft.	Tractive Force at 85% B.P.	47,980 lbs.



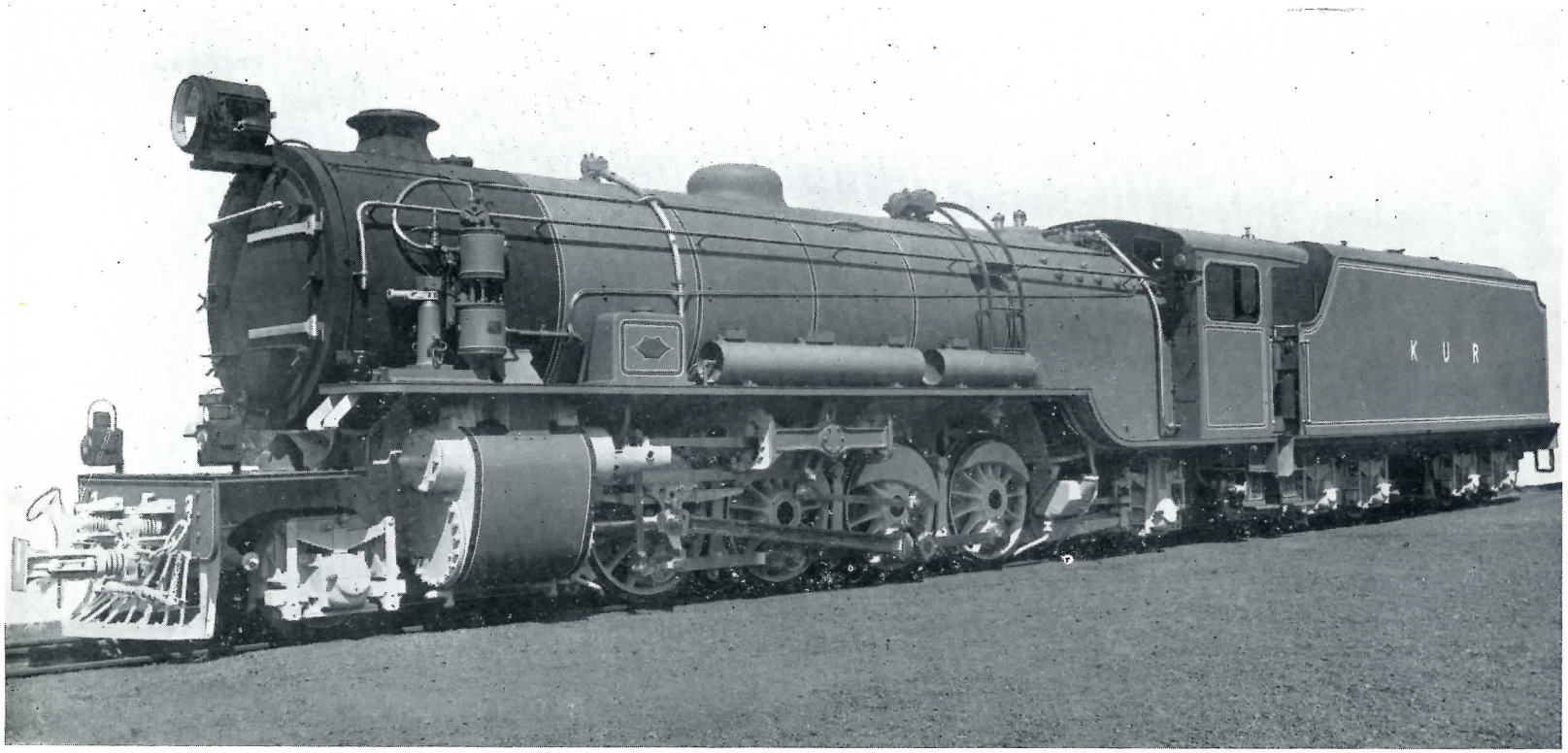
E144 Type 4–6–4 Gauge 3′ 6″

NIGERIAN RAILWAY

DIMENSIONS.

Cylinders (2) Diam. × Stroke	18″ × 22″	Grate Area	18 sq. ft.
Coupled Wheel Diam.	4′—6″	Working Pressure	160 lbs./sq. in.
Wheel Base, Fixed	11′—0″	Weight on Coupled Wheels (loaded)	36.6 tons
Wheel Base, Engine total	34′—9″	Weight, Engine Total (loaded)	71.75 tons
Heating Surface, Evaporative	952 sq. ft.	Water Capacity	2,000 galls.
Heating Surface, Superheater	178 sq. ft.	Fuel Capacity	3½ tons

Tractive Force at 85% B.P. ..... 17,952 lbs.



E126 Type 2–8–2 Gauge 3′ 3⅜″

KENYA—UGANDA RAILWAYS

DIMENSIONS.

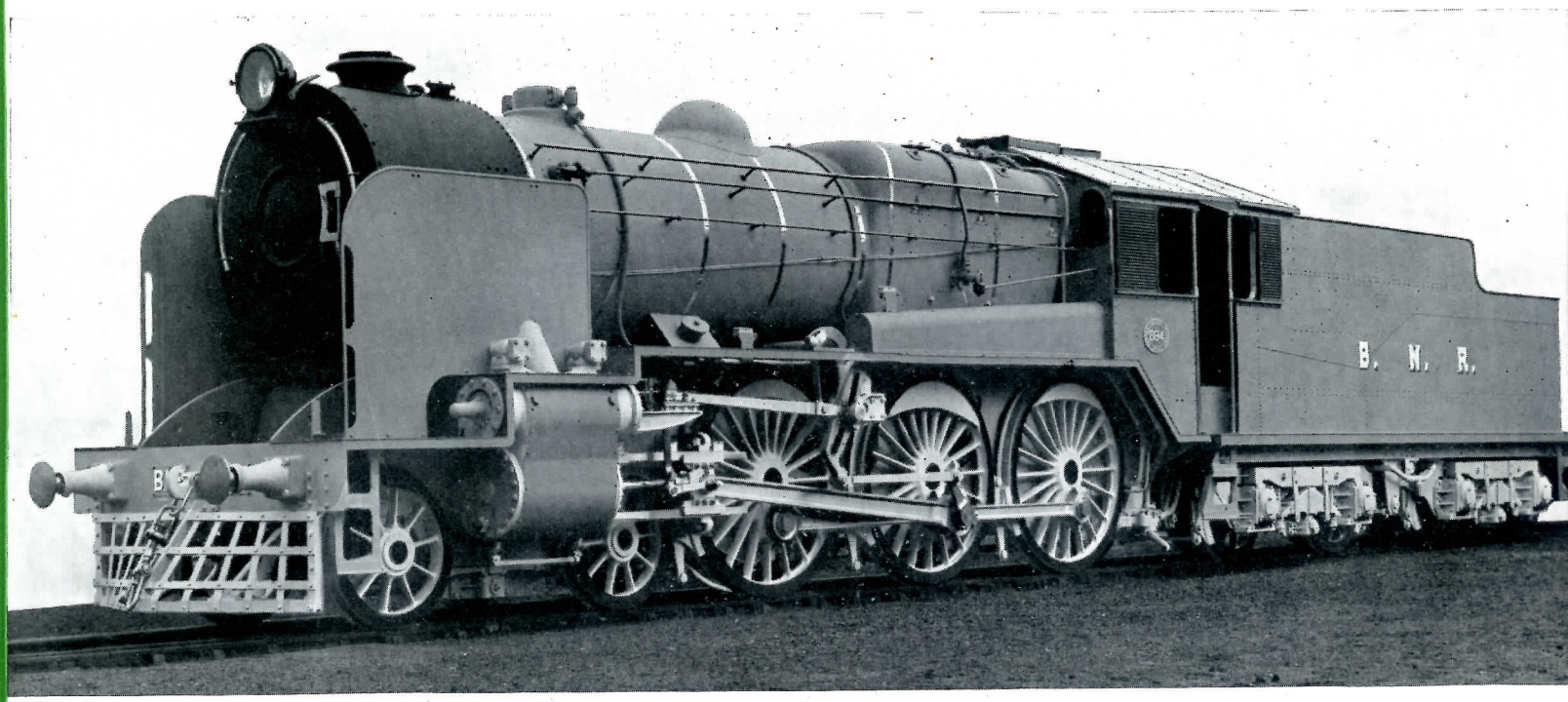
Cylinders (2) Diam. × Stroke	21¼″ × 28″	Working Pressure	180 lbs./sq. in.
Coupled Wheel Diam.	4′—3″	Weight on Coupled Wheels (loaded)	69.55 tons
Wheel Base, Fixed	13′—6″	Weight, Engine total (loaded)	90.7 tons
Wheel Base, Engine total	30′—4″	Water Capacity	5,000 galls.
Heating Surface, Evaporative	2,310 sq. ft.	Fuel Capacity	3,000 galls. oil
Heating Surface, Superheater	574 sq. ft.	Weight of Tender (loaded)	65.2 tons
Grate Area	40.5 sq. ft.	Tractive Force at 85% B.P.	37,938 lbs.

E118 Type 2–8–2 Gauge 3′ 6″

SUDAN GOVERNMENT RAILWAYS

DIMENSIONS.

Cylinders (2) Diam. × Stroke	19″ × 24″	Working Pressure	165 lbs./sq. in.
Coupled Wheel Diam.	4′—3″	Weight on Coupled Wheels (loaded)	43.75 tons
Wheel Base, Fixed	14′—0″	Weight, Engine total (loaded)	61.1 tons
Wheel Base, Engine total	28′—1″	Water Capacity	4,000 galls.
Heating Surface, Evaporative	1,165 sq. ft.	Fuel Capacity	8 tons
Heating Surface, Superheater	260 sq. ft.	Weight of Tender (loaded)	48.25 tons
Grate Area	26 sq. ft.	Tractive Force at 85% B.P.	23,826 lbs.

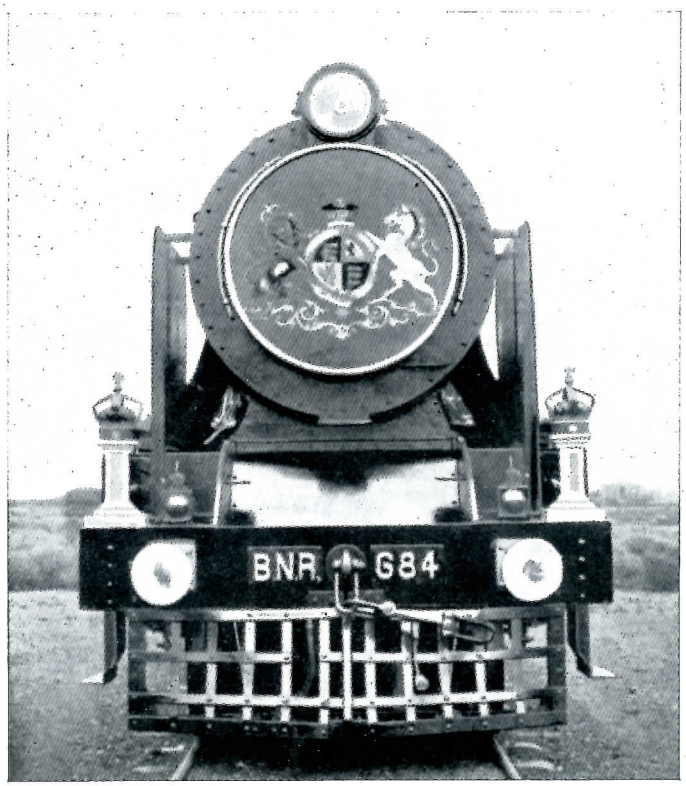


E162 Type 4–6–0 Gauge 5′ 6″

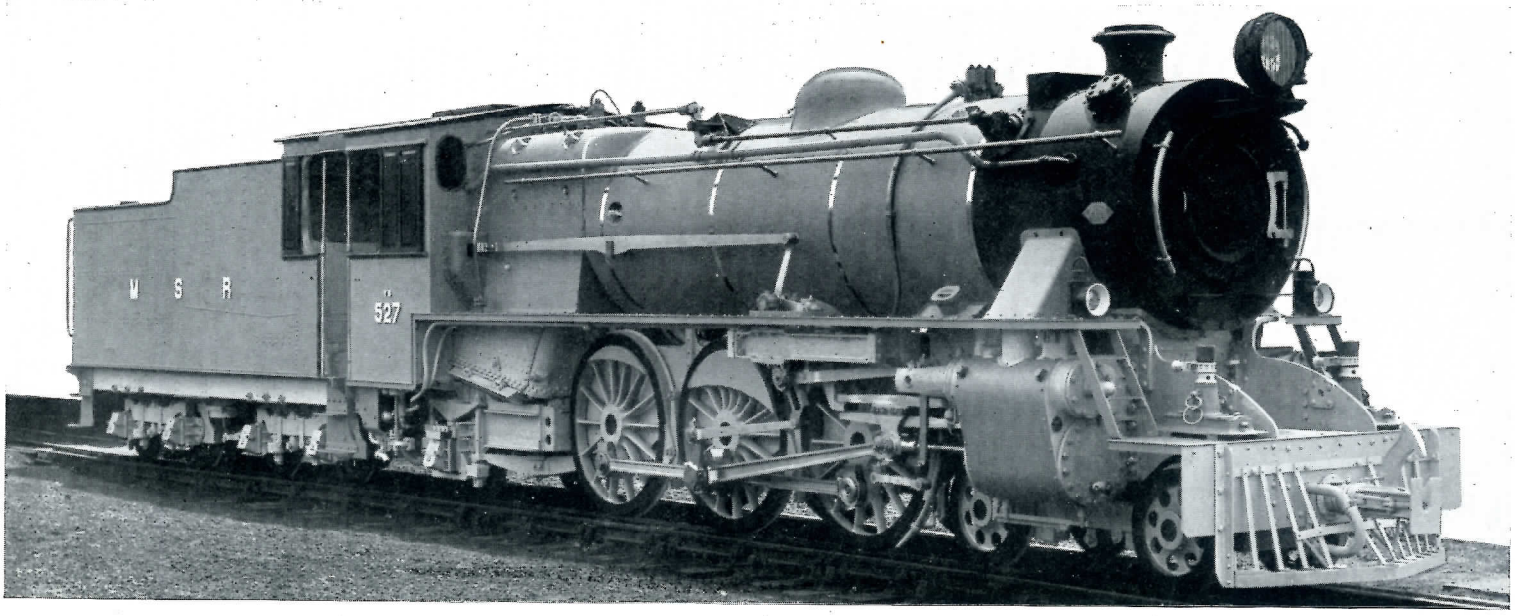
BENGAL NAGPUR RAILWAY

DIMENSIONS.

Cylinders (2) Diam. × Stroke	21½″ × 26″	Working Pressure	200 lbs./sq. in.
Coupled Wheel Diam.	6′—1½″	Weight on Coupled Wheels (loaded)	50.8 tons
Wheel Base, Fixed	13′—0″	Weight, Engine total (loaded)	74.9 tons
Wheel Base, Engine total	26′—7″	Water Capacity	4,750 galls.
Heating Surface, Evaporative	1,600 sq. ft.	Fuel Capacity	10 tons
Heating Surface, Superheater	317 sq. ft.	Weight of Tender (loaded)	65.65 tons
Grate Area	38 sq. ft.	Tractive Force at 85% B.P.	27,787 lbs.



Head-on view of above Locomotive No. 684, decorated for the Viceroy's train.

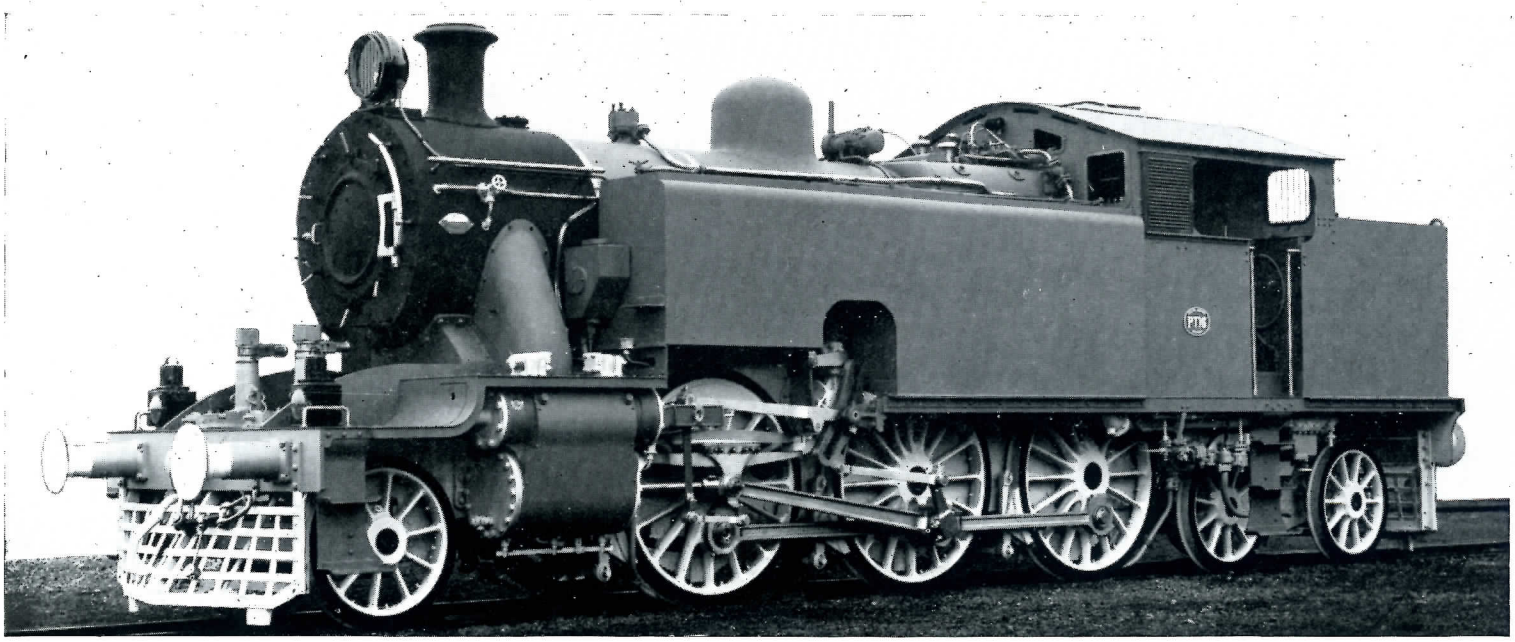


E163 Type 4–6–2 Gauge 3′ 3⅜″

MYSORE STATE RAILWAY

DIMENSIONS.

Cylinders (2) Diam. × Stroke	16″ × 24″	Working Pressure	180 lbs./sq. in.
Coupled Wheel Diam.	4′—9″	Weight on Coupled Wheels (loaded)	29.15 tons
Wheel Base, Fixed	10′—6″	Weight, Engine total (loaded)	50.5 tons
Wheel Base, Engine total	27′—10″	Water Capacity	3,000 galls.
Heating Surface, Evaporative	1,169 sq. ft.	Fuel Capacity	7 tons
Heating Surface, Superheater	265 sq. ft.	Weight of Tender (loaded)	38.05 tons
Grate Area	23.1 sq. ft.	Tractive Force at 85% B.P.	16,492 lbs.

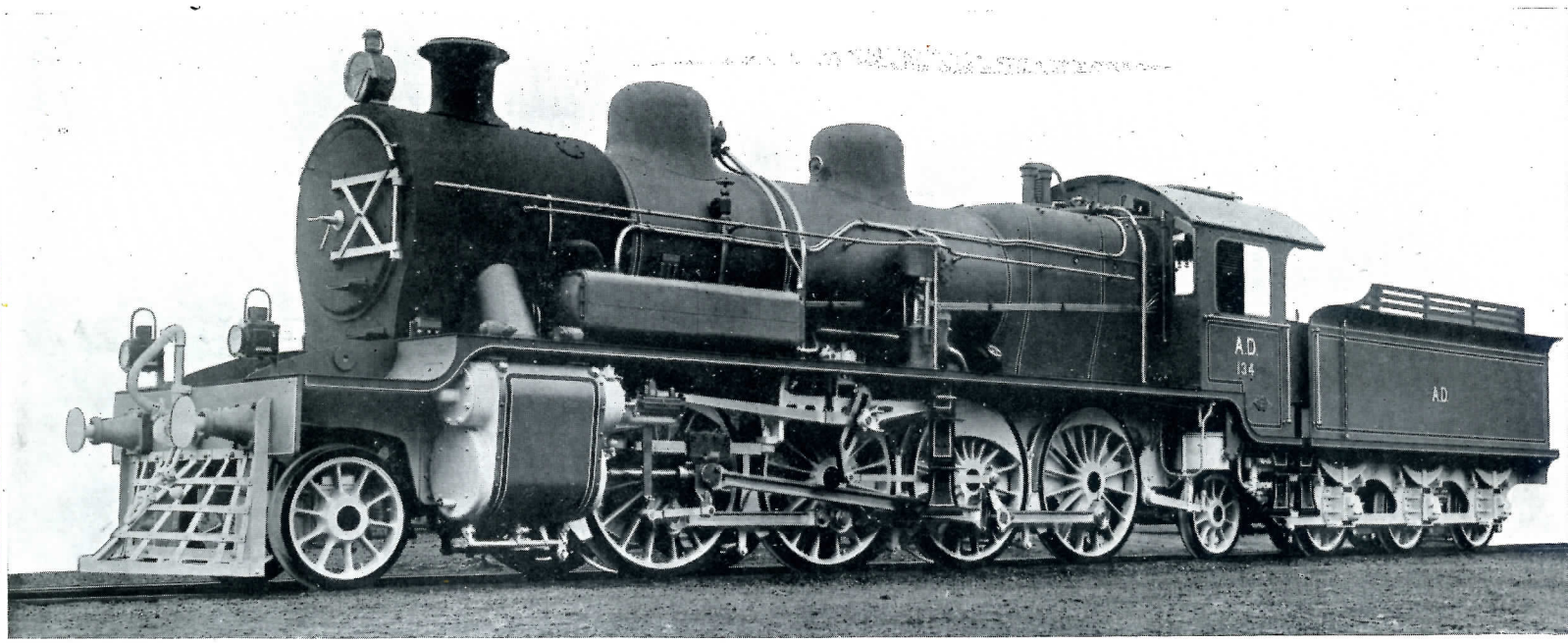


E168 Type 2–6–4 Gauge 5′ 6″

SOUTH INDIAN RAILWAY

DIMENSIONS.

Cylinders (2) Diam. × Stroke	18″ × 26″	Grate Area	22 sq. ft.
Coupled Wheel Diam.	5′—6″	Working Pressure	180 lbs./sq. in.
Wheel Base, Fixed	13′—0″	Weight on Coupled Wheels (loaded)	48 tons
Wheel Base, Engine total	33′—6″	Weight, Engine total (loaded)	82.45 tons
Heating Surface, Evaporative	893 sq. ft.	Water Capacity	2,800 galls.
Heating Surface, Superheater	215 sq. ft.	Fuel Capacity	3 tons
Tractive Force at 85% B.P.	19,528 lbs.		

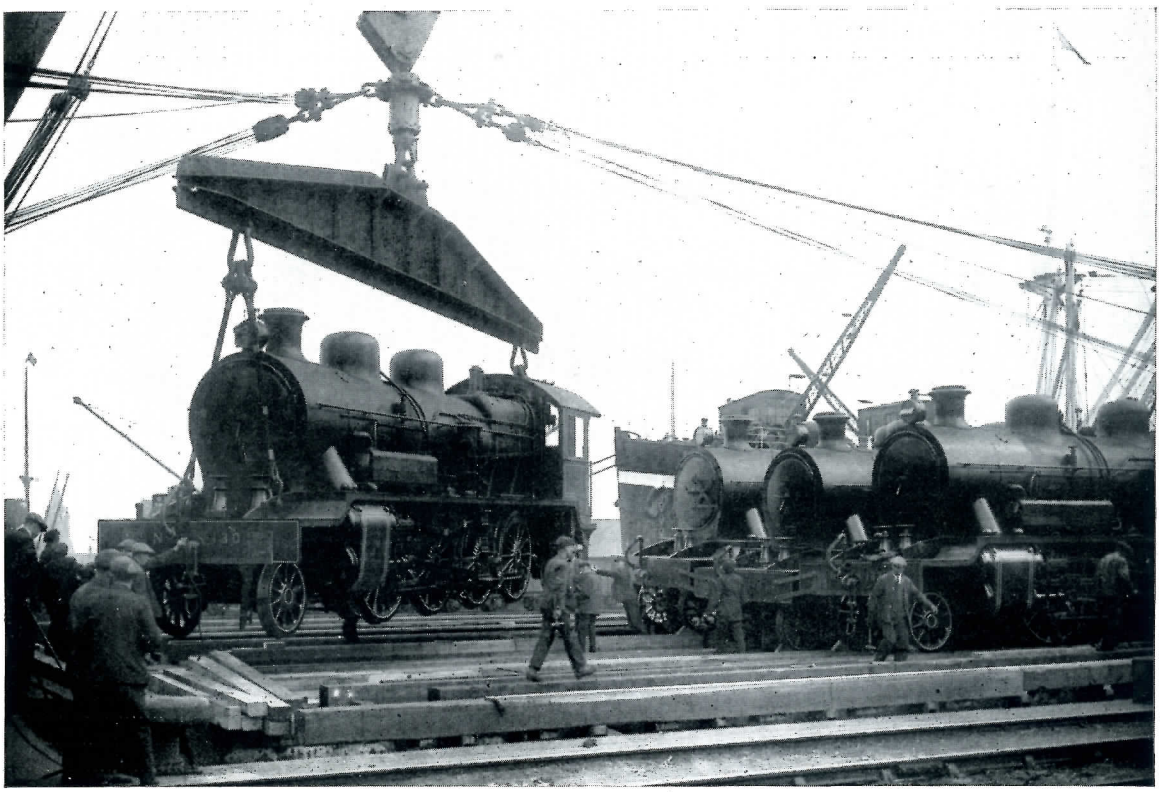


E151 **Type 2–8–2** **Gauge 4′ 8½″**

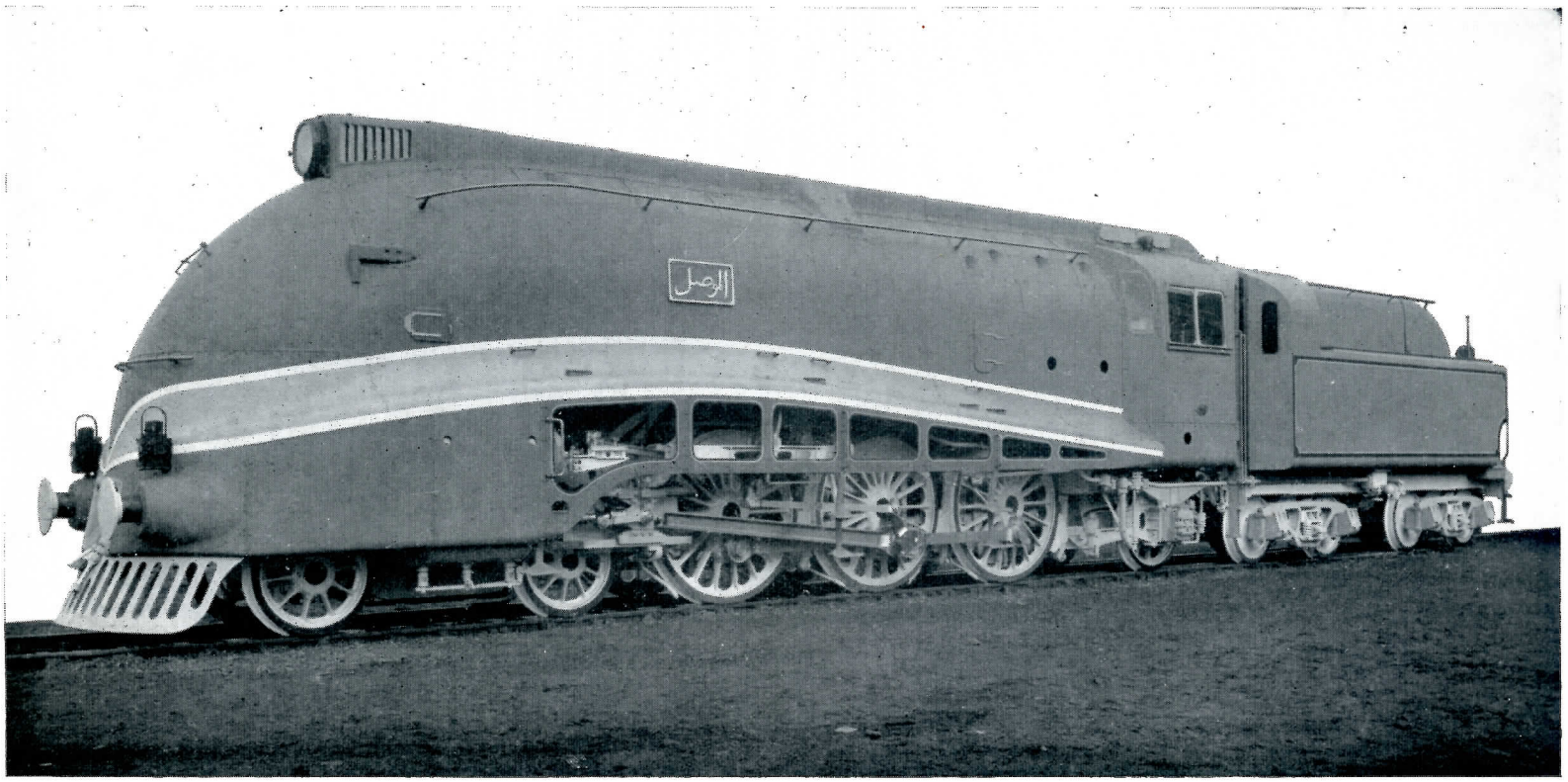
OTTOMAN RAILWAYS

DIMENSIONS.

Cylinders (2) Diam. × Stroke	19½″ × 26″	Working Pressure	170 lbs./sq. in.
Coupled Wheel Diam.	5′—2″	Weight on Coupled Wheels (loaded)	45.7 tons
Wheel Base, Fixed	16′—10½″	Weight, Engine total (loaded)	68.5 tons
Wheel Base, Engine total	32′—1½″	Water Capacity	3,000 galls.
Heating Surface, Evaporative	1,437 sq. ft.	Fuel Capacity	7 tons
Heating Surface, Superheater	308 sq. ft.	Weight of Tender (loaded)	37.25 tons
Grate Area	25.35 sq. ft.	Tractive Force at 85% B.P.	23,042 lbs.



LOADING ABOVE LOCOMOTIVES AT MIDDLESBROUGH.

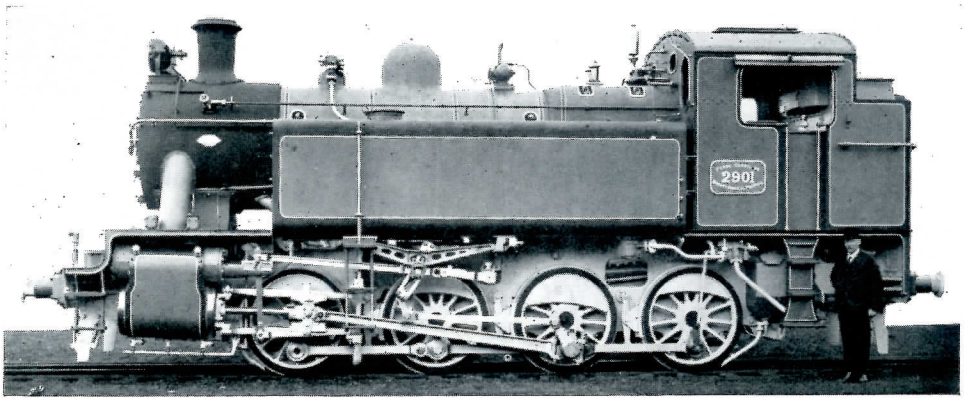


E6982 Type 4–6–2 Gauge 4′ 8½″

IRAQI STATE RAILWAY

DIMENSIONS.

Cylinders (2) Diam. × Stroke	21″ × 26″	Working Pressure	220 lbs./sq. in.
Coupled Wheel Diam.	5′—9″	Weight on Coupled Wheels (loaded)	52.425 tons
Wheel Base, Fixed	13′—0″	Weight, Engine total (loaded)	98.675 tons
Wheel Base, Engine total	35′—0″	Water Capacity	6,000 galls.
Heating Surface, Evaporative	2,184 sq. ft.	Fuel Capacity	1,750 galls. oil
Heating Surface, Superheater	522 sq. ft.	Weight of Tender (loaded)	60.237 tons
Grate Area	31.2 sq. ft.	Tractive Force at 85% B.P.	31,080 lbs.

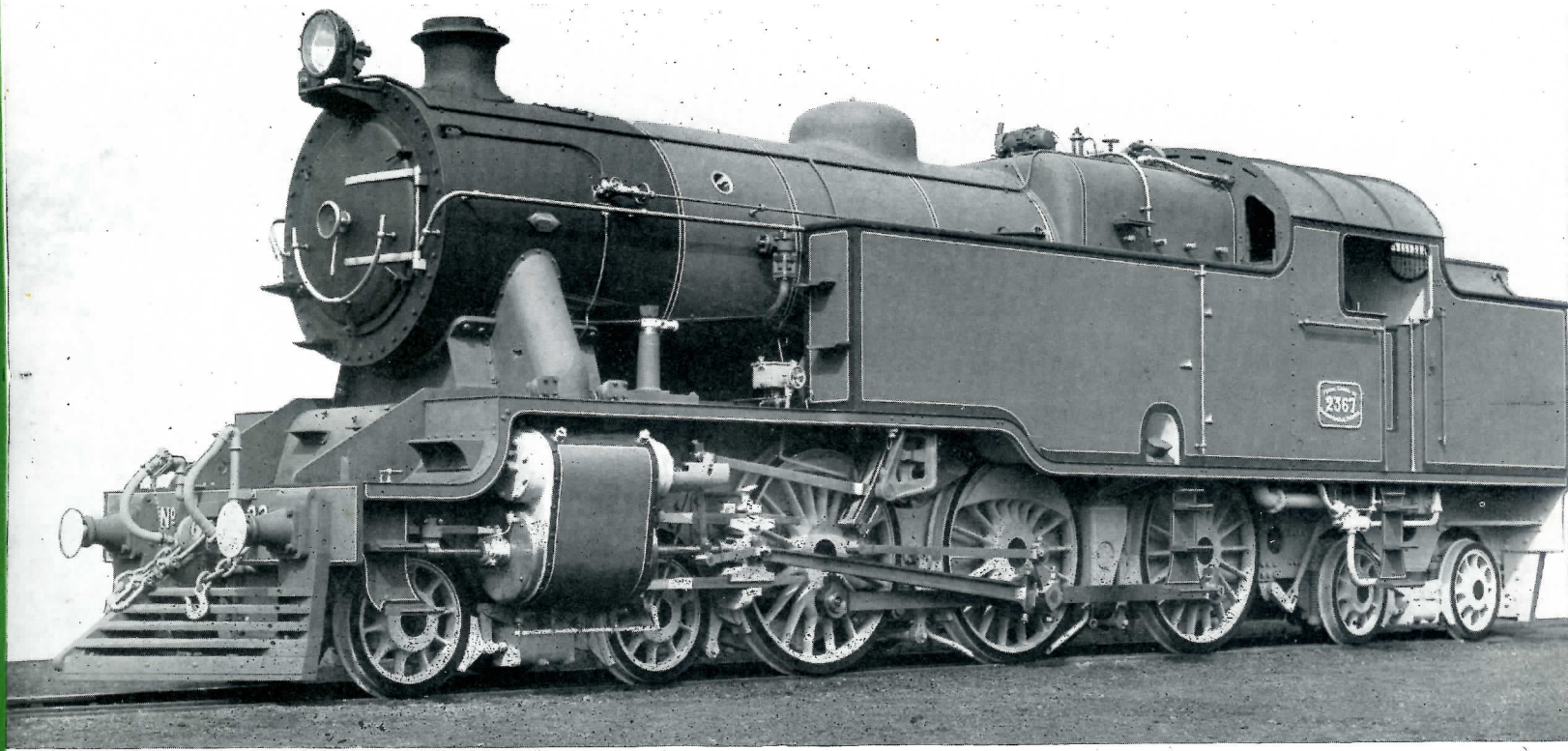


E148 Type 0–8–0 Gauge 5′ 6″

BUENOS AIRES PACIFIC RAILWAY

DIMENSIONS.

Cylinders (2) Diam. × Stroke	18″ × 26″	Working Pressure	200 lbs./sq. in.
Coupled Wheel Diam.	4′—1″	Weight on Coupled Wheels (loaded)	65.35 tons
Wheel Base, Fixed	15′—4½″	Weight, Engine total (loaded)	65.35 tons
Wheel Base, Engine total	15′—4½″	Water Capacity	1,250 galls.
Heating Surface, Evaporative	990.2 sq. ft.	Fuel Capacity	2 tons
Grate Area	19 sq. ft.	Tractive Force at 85% B.P.	29,226 lbs.

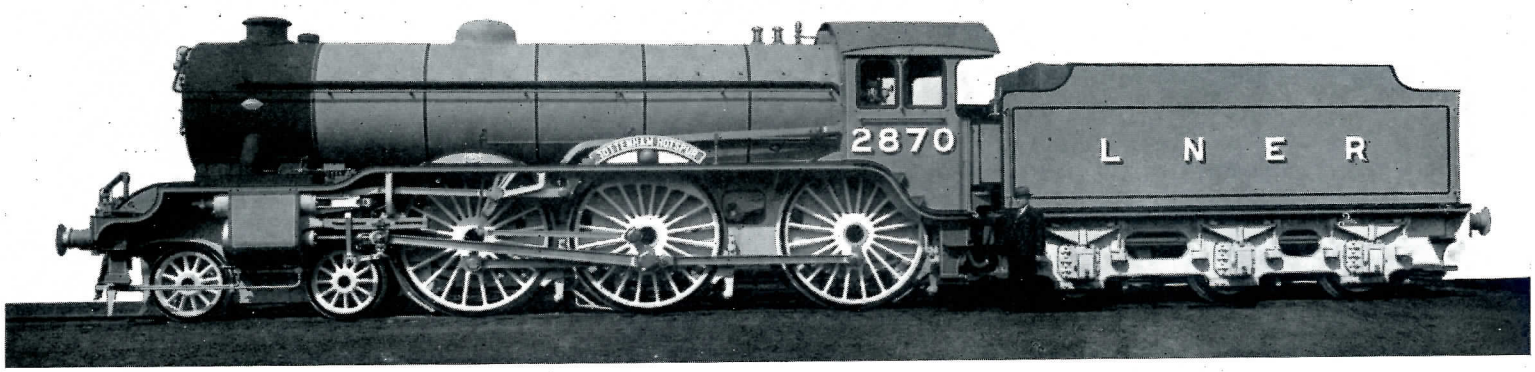


145 Type 4–6–4 Gauge 5′ 6″

BUENOS AIRES & PACIFIC RAILWAY

DIMENSIONS.

Cylinders (3) Diam. × Stroke	19″ × 26″
Coupled Wheel Diam.	5′—7″
Wheel Base, Fixed	15′—0″
Wheel Base, Engine total	41′—4″
Heating Surface, Evaporative	1,700 sq. ft.
Heating Surface, Superheater	354 sq. ft.
Grate Area	27 sq. ft.
Working Pressure	200 lbs./sq. in.
Weight on Coupled Wheels (loaded)	64 tons
Weight, Engine total (loaded)	128.35 tons
Water Capacity	3,380 galls.
Fuel Capacity	5 tons
Tractive Force at 85% B.P.	35,722 lbs.

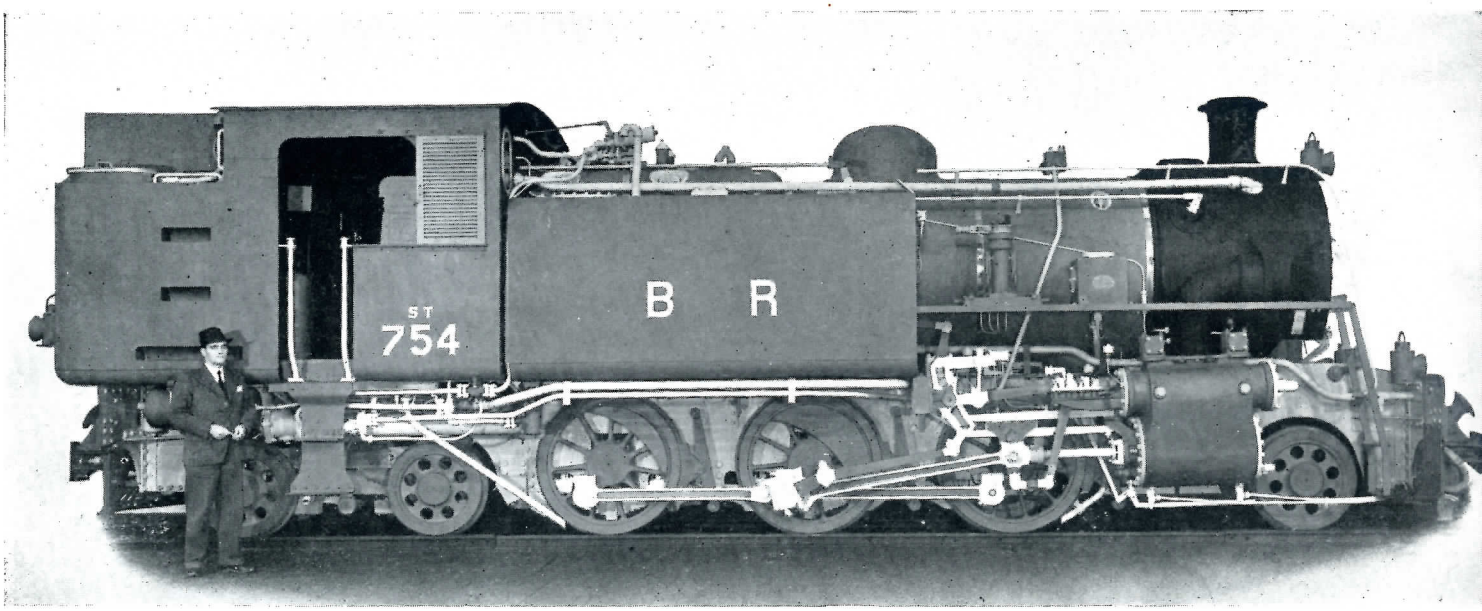


E161 Type 4–6–0 Gauge 4′ 8½″

L. N. E. R.

DIMENSIONS.

Cylinders (3) Diam. × Stroke	17½″ × 26″
Coupled Wheel Diam.	6′—8″
Wheel Base, Fixed	16′—3″
Wheel Base, Engine total	27′—9″
Heating Surface, Evaporative	1,676 sq. ft.
Heating Surface, Superheater	344 sq. ft.
Grate Area	27.5 sq. ft.
Working Pressure	200 lbs./sq. in.
Weight on Coupled Wheels (loaded)	53.5 tons
Weight, Engine total (loaded)	76.8 tons
Water Capacity	4,200 galls.
Fuel Capacity	7½ tons
Weight of Tender (loaded)	50.55 tons
Tractive Force at 85% B.P.	25,380 lbs.

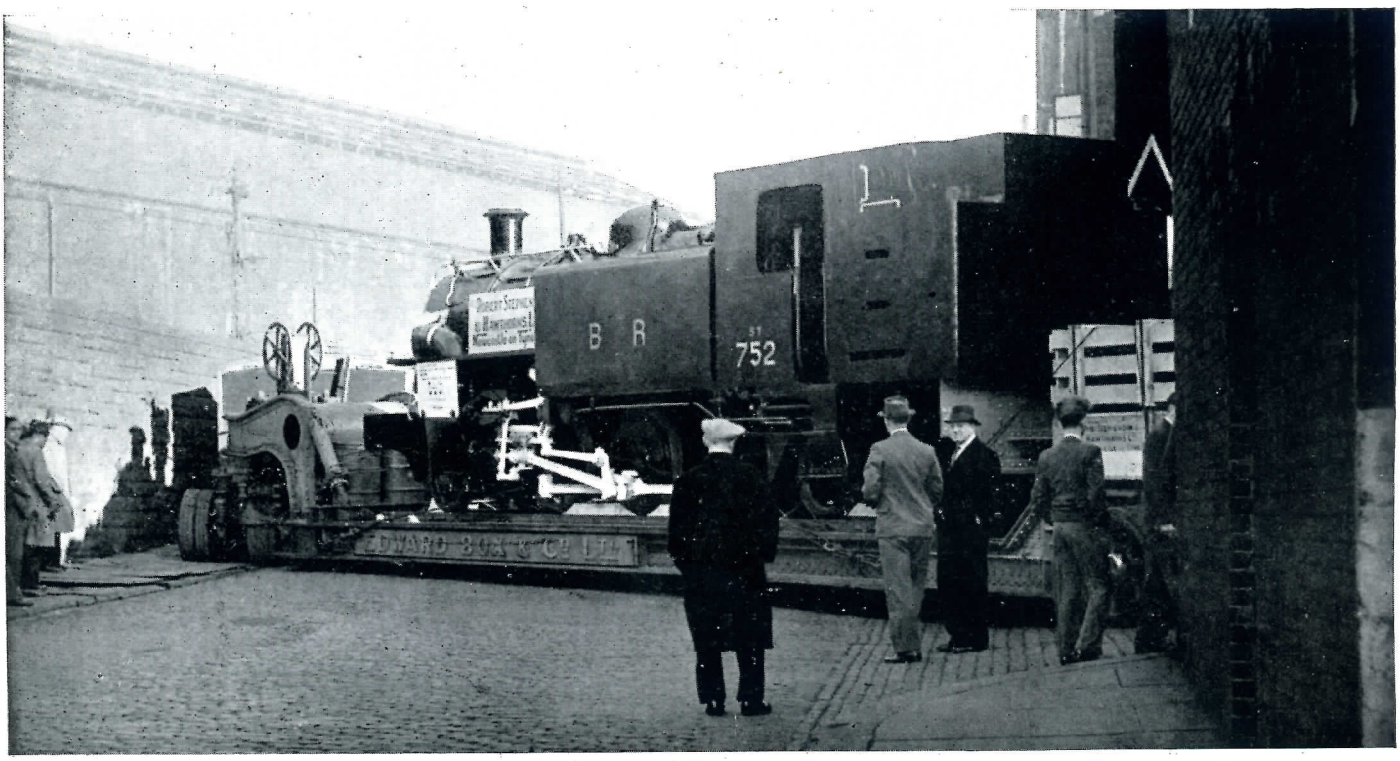


E7312 Type 2-6-4 Gauge 3′ 3⅜″

BURMA RAILWAYS

DIMENSIONS.

Cylinders (2) Diam. × Stroke	15″ × 22″	Grate Area	12.75 sq. ft.
Coupled Wheel Diam.	3′—7″	Working Pressure	180 lbs./sq. in.
Wheel Base, Fixed	10′—0″	Weight on Coupled Wheels (loaded)	28.85 tons
Wheel Base, Engine total	26′—2½″	Weight, Engine total (loaded)	55.7 tons
Heating Surface, Evaporative	754 sq. ft.	Water Capacity	1,550 galls.
Heating Surface, Superheater	178 sq. ft.	Fuel Capacity	3 tons
		Tractive Force at 85% B.P.	17,613 lbs.



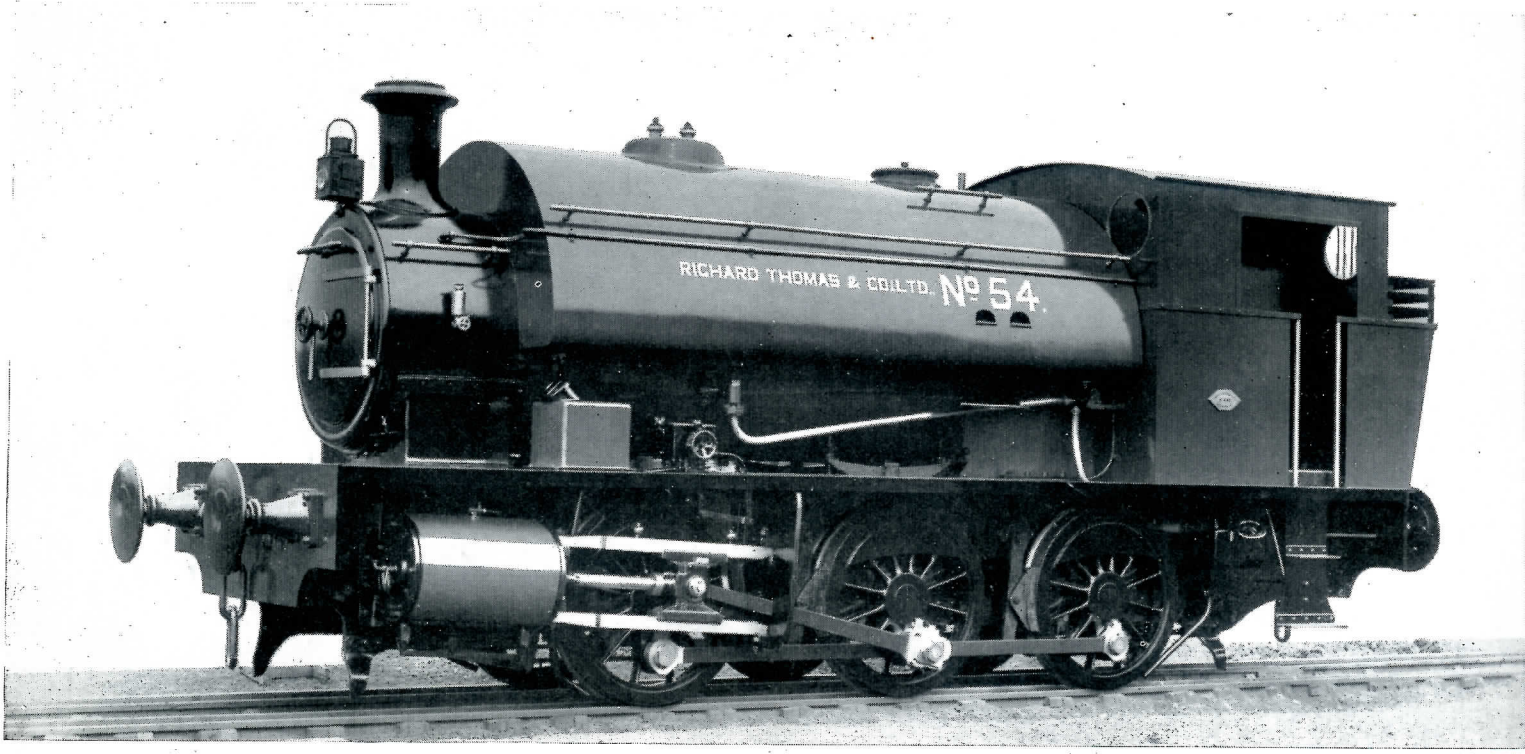
ROAD TRANSPORT

" Newcastle Chronicle & "Journal"

Illustration shows above Locomotive for Burma leaving the Newcastle works of Robert Stephenson & Hawthorns, Ltd., en route for the port of Liverpool.

PASSING OVER KING GEORGE V. BRIDGE, NEWCASTLE. *"Newcastle Chronicle & Journal" Photo.*

PASSING THROUGH THE CITY OF YORK *"Yorkshire Evening Press" Photo.*

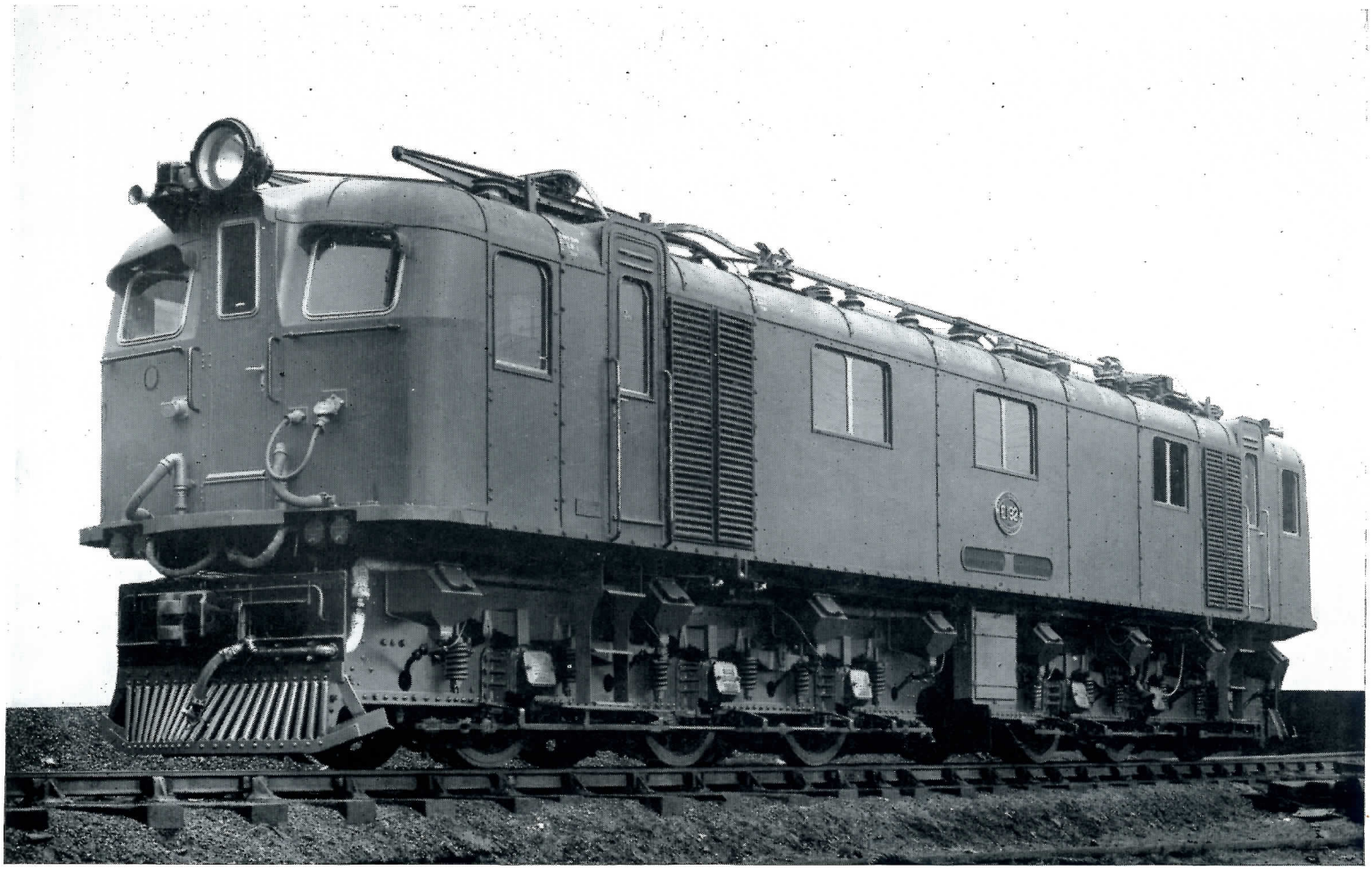


E166 **Type 0–6–0** **Gauge 4′ 8½″**

DIMENSIONS.

Cylinders (2) Diam. × Stroke	16″ × 24″
Coupled Wheel Diam.	3′—11″
Wheel Base	11′—0″
Heating Surface, total	821.5 sq. ft.
Grate Area	14.7 sq. ft.
Working Pressure	180 lbs./sq. in.
Weight (loaded)	42.5 tons
Water Capacity	1,100 galls.
Fuel Capacity	1½ tons
Tractive Force at 85% B.P.	20,000 lbs.
Hauling Capacity on level	1,624 tons
Hauling Capacity on incline 1 in 200	901 tons
Hauling Capacity on incline 1 in 100	575 tons
Hauling Capacity on incline 1 in 50	322 tons
Hauling Capacity on incline 1 in 33.3	216 tons

One of the above Locomotives at work at Richard Thomas and Baldwin's, Ebbw Vale, South Wales.



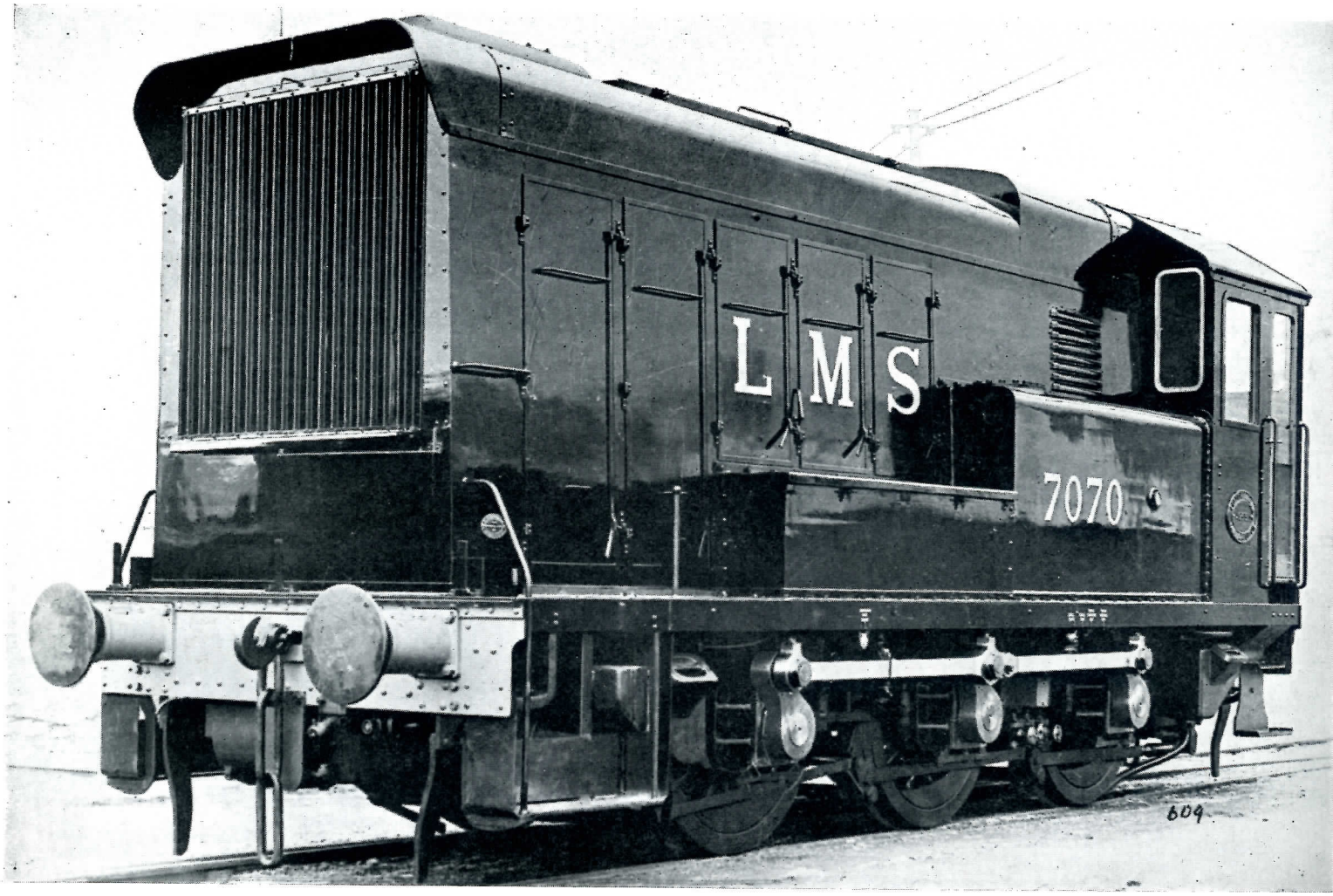
E7215 **Type 0-6-0 + 0-6-0** **Gauge 3′ 6″**

Built at our Newcastle Works and supplied by Metropolitan Vickers Electrical Co. Ltd. to

SOUTH AFRICAN RAILWAYS

DIMENSIONS.

Gauge of Railway	3′—6″	Line voltage	3,000 D.C.
Wheels, diameter	4′—0″	H.P. at hourly rating	2,500 b.h.p.
Wheelbase, fixed	14′—0″	H.P. at continuous rating	2,160 b.h.p.
Wheelbase, total	41′—11″	Speed at hourly rating	30 m.p.h.
Total width over platform	9′—6″	Speed at continuous rating	32 m.p.h.
Total length over couplers	56′—5⅛″	Normal maximum running speed	75 m.p.h.
		Total weight, loaded	110 tons



E3841

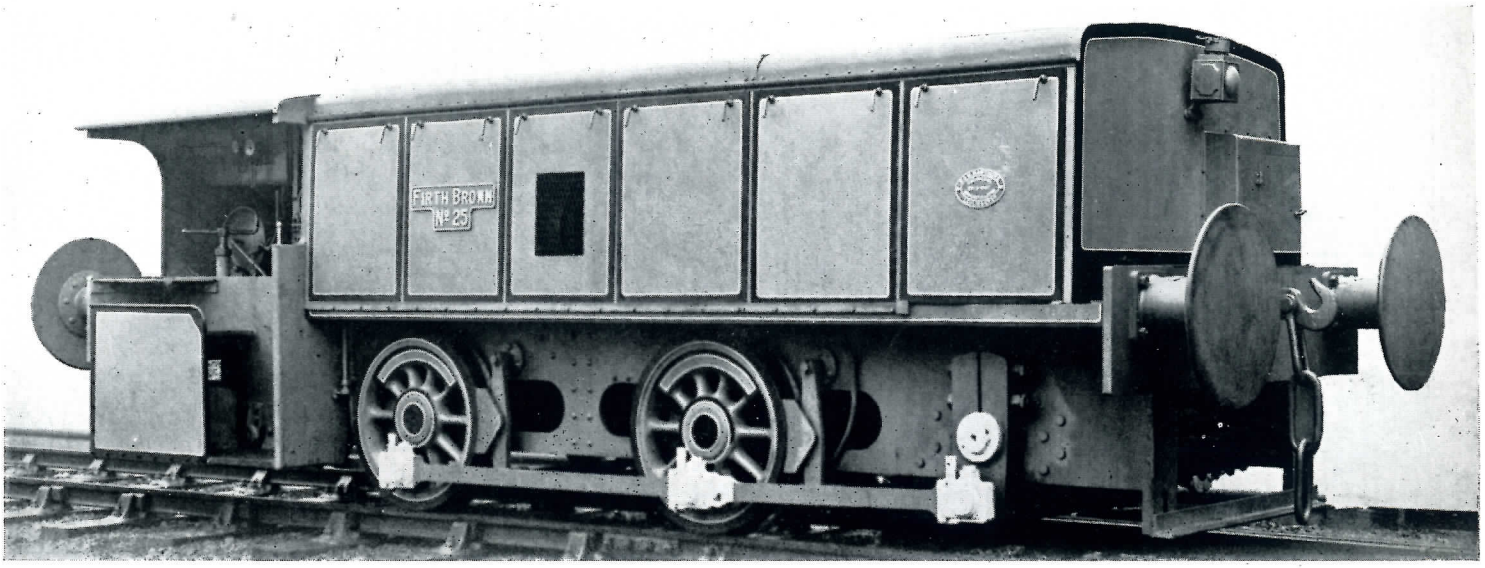
Built at our Newcastle Works and supplied by The English Electric Co. Ltd. to

LONDON, MIDLAND & SCOTTISH RAILWAY COMPANY

DIMENSIONS.

Gauge of Railway	4′—8½″
Wheels, diameter	4′—0½″
Wheelbase	11′—6″
Diesel engine 6 cylinders 12″×10″, 300/350 H.P. at 650/700 r.p.m.	
2 Motors each 175 H.P.	
Fuel oil capacity	500 galls.
Westinghouse and hand brakes.	
Maximum tractive effort	30,000 lbs.
Total weight, light	48.6 tons
Total weight, loaded	51.9 tons

Diesel Locomotive of the Stephenson - Crossley type built for Messrs. Thos. Firth and John Brown Ltd.



E3913

THOS. FIRTH AND JOHN BROWN LTD.

DIMENSIONS.

Gauge of Railway ..... 4′—8½″
Wheels, diameter ..... 3′—1″
Wheelbase ..... 6′—3″

Crossley 4 cylinder direct reversing 2 stroke oil engine, 110 B.H.P. at 500 r.p.m., with built-in air compressor for charging air starting bottles.

Auxiliary Petrol-Paraffin compressor for initial starting.

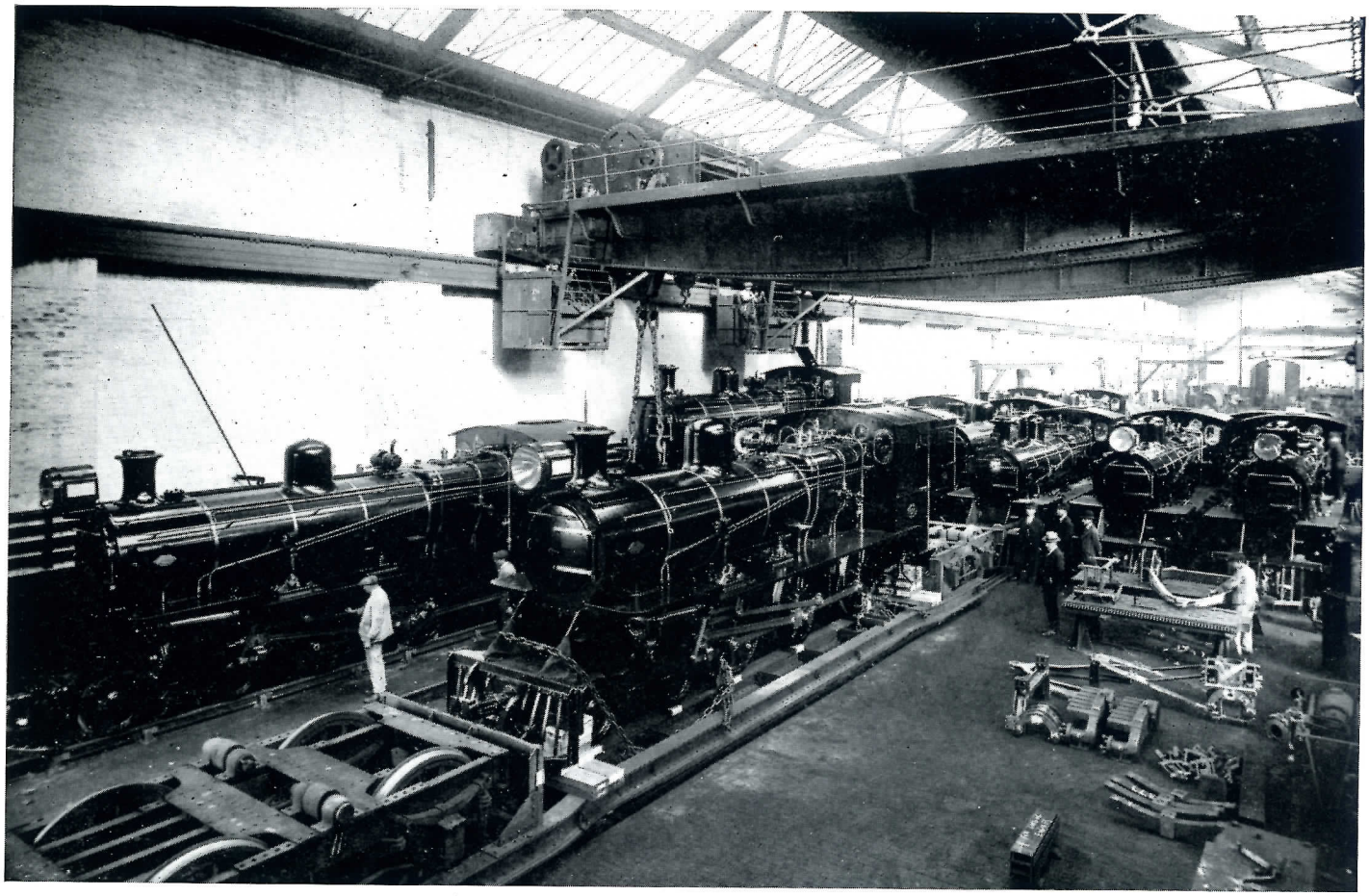
" Vulcan-Sinclair " fluid coupling.

S.H. 2 speed gearbox giving rail speeds of 3 and 6 m.p.h.

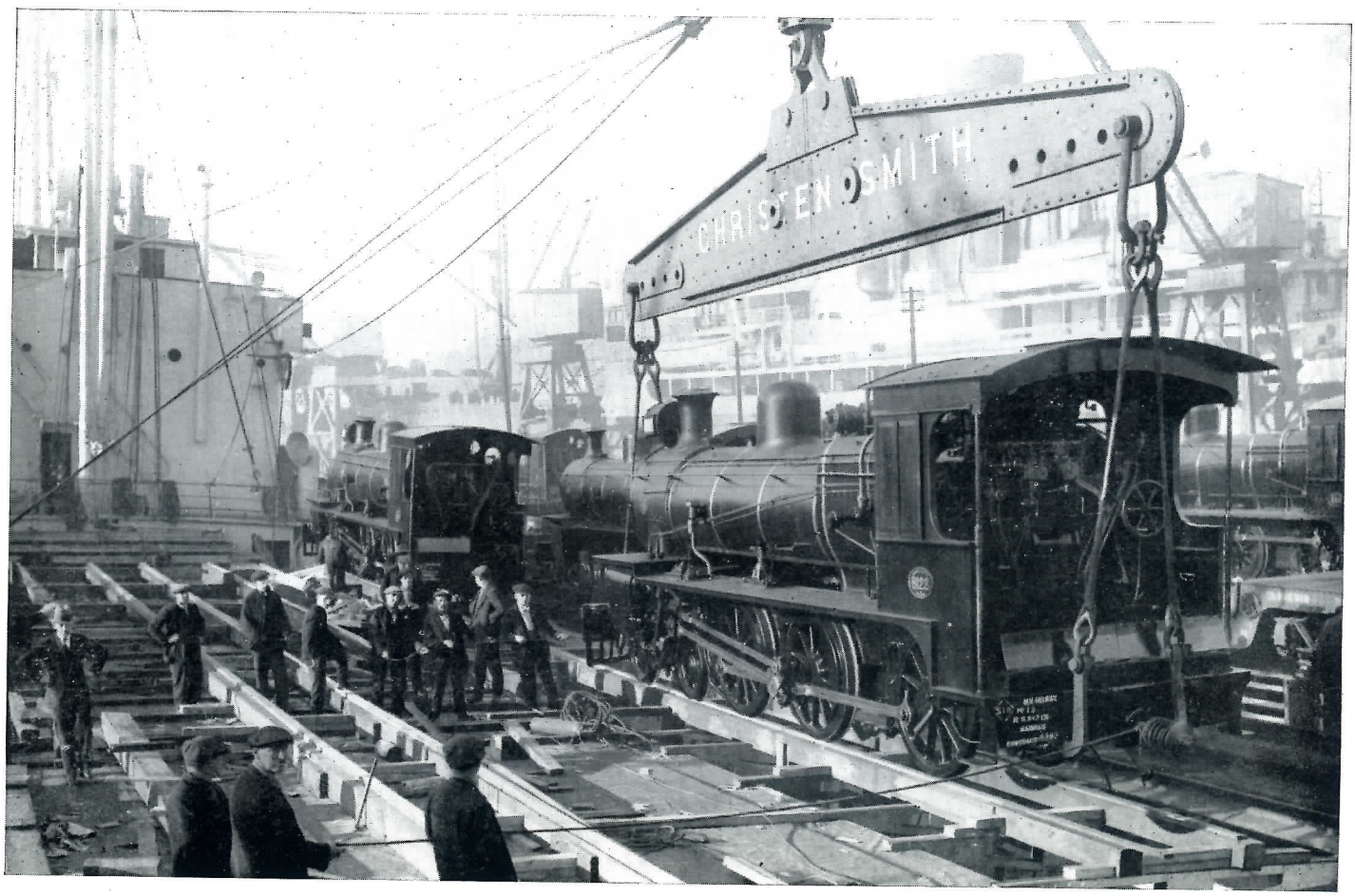
Air and hand brakes.

Fuel oil capacity ..... 52 galls.

Total weight, loaded ..... 22.4 tons

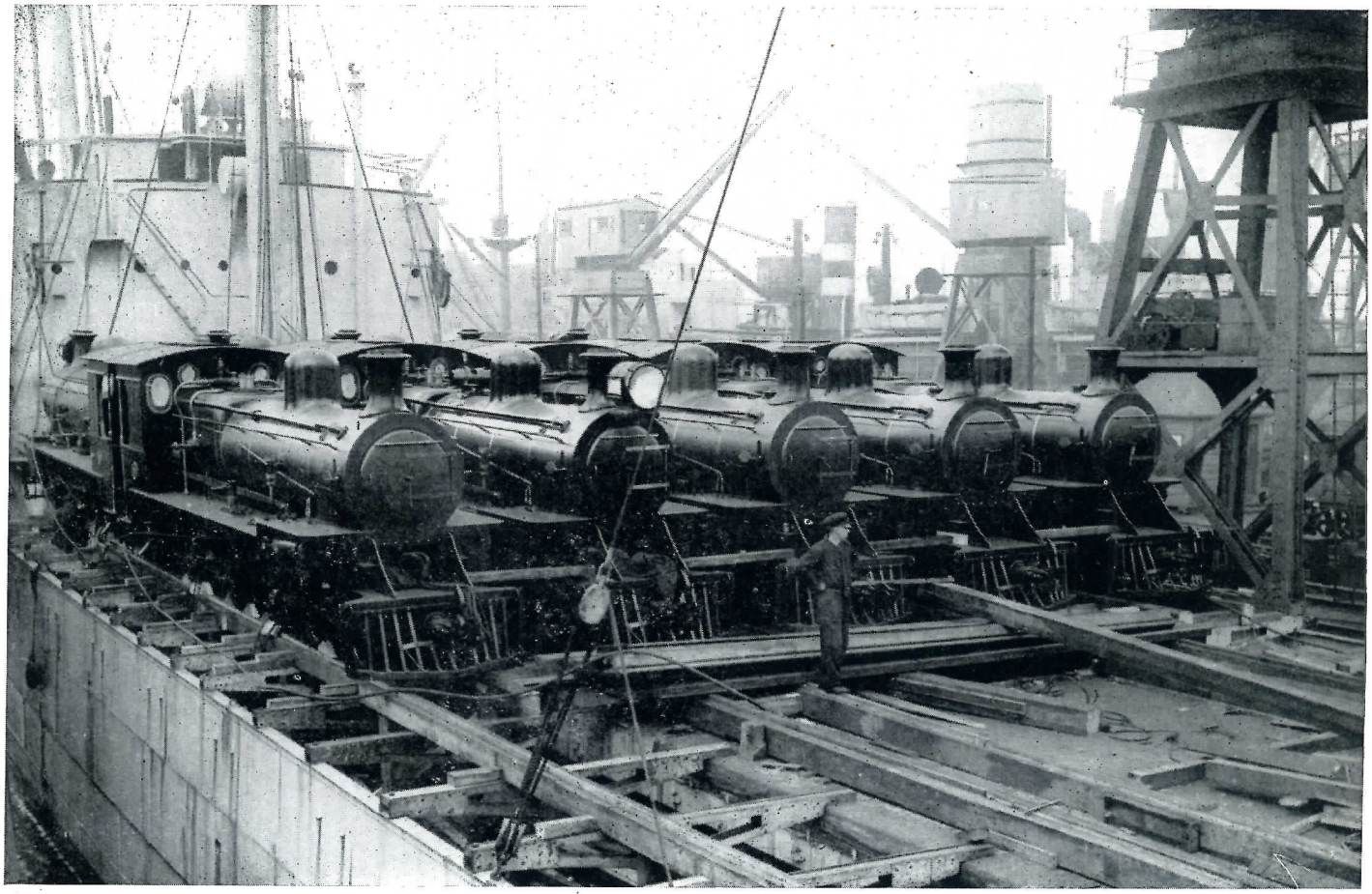


Scene in the Erecting Shop at the Darlington Works of Robert Stephenson and Hawthorns, Ltd., showing locomotives ready for despatch to the Port of Middlesbrough.

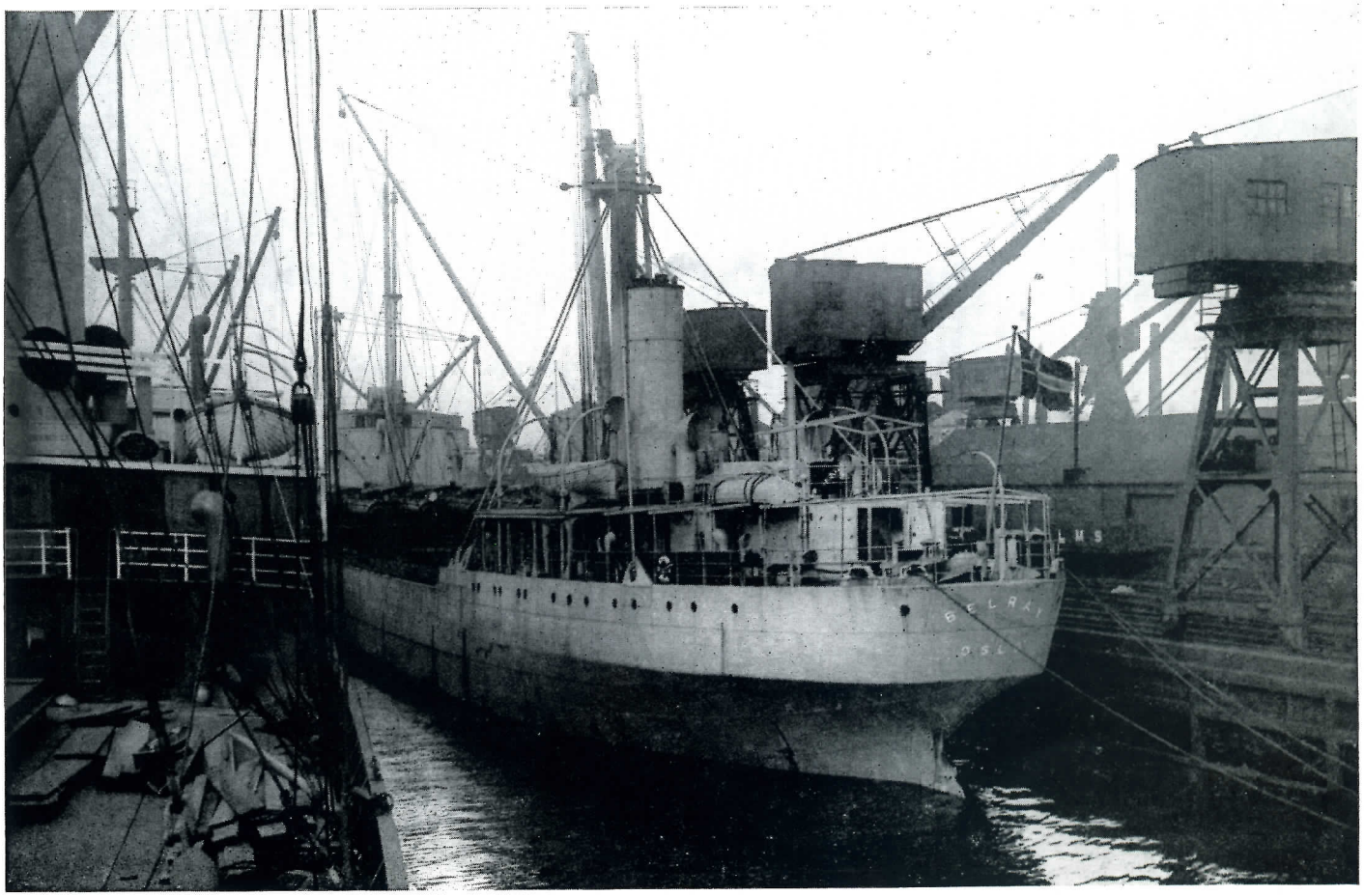


LOADING OPERATIONS AT MIDDLESBROUGH.

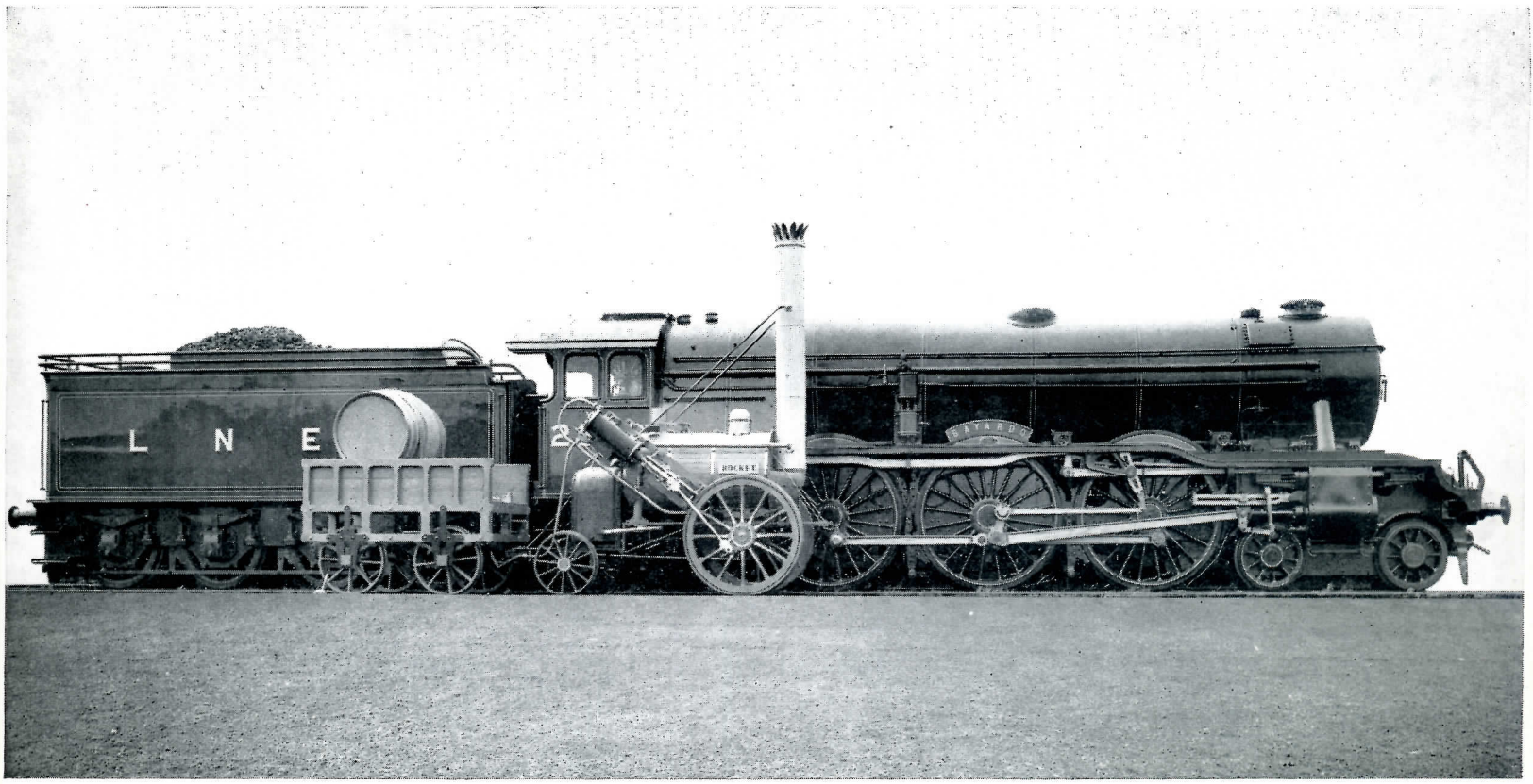
FOR INDIA



LOADING COMPLETED.



READY TO SAIL.



" THEN AND NOW."

The " ROCKET " alongside an L.N.E.R. Class A3, 4–6–2 Locomotive.