SEPTEMBER 1925.

MECCANO MAGAZINE

VOL. X No. 9

3d.

Railway Centenary Number

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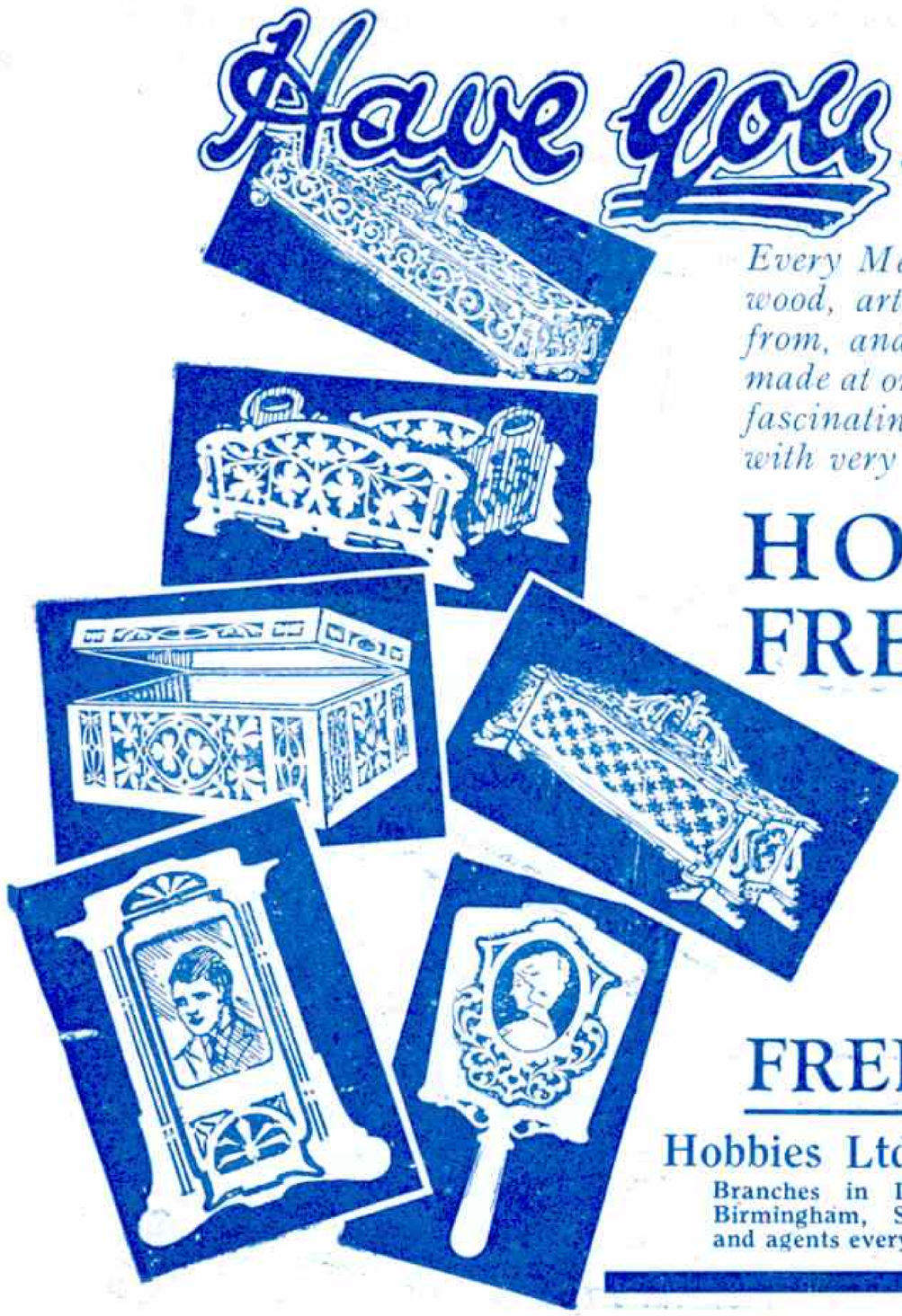

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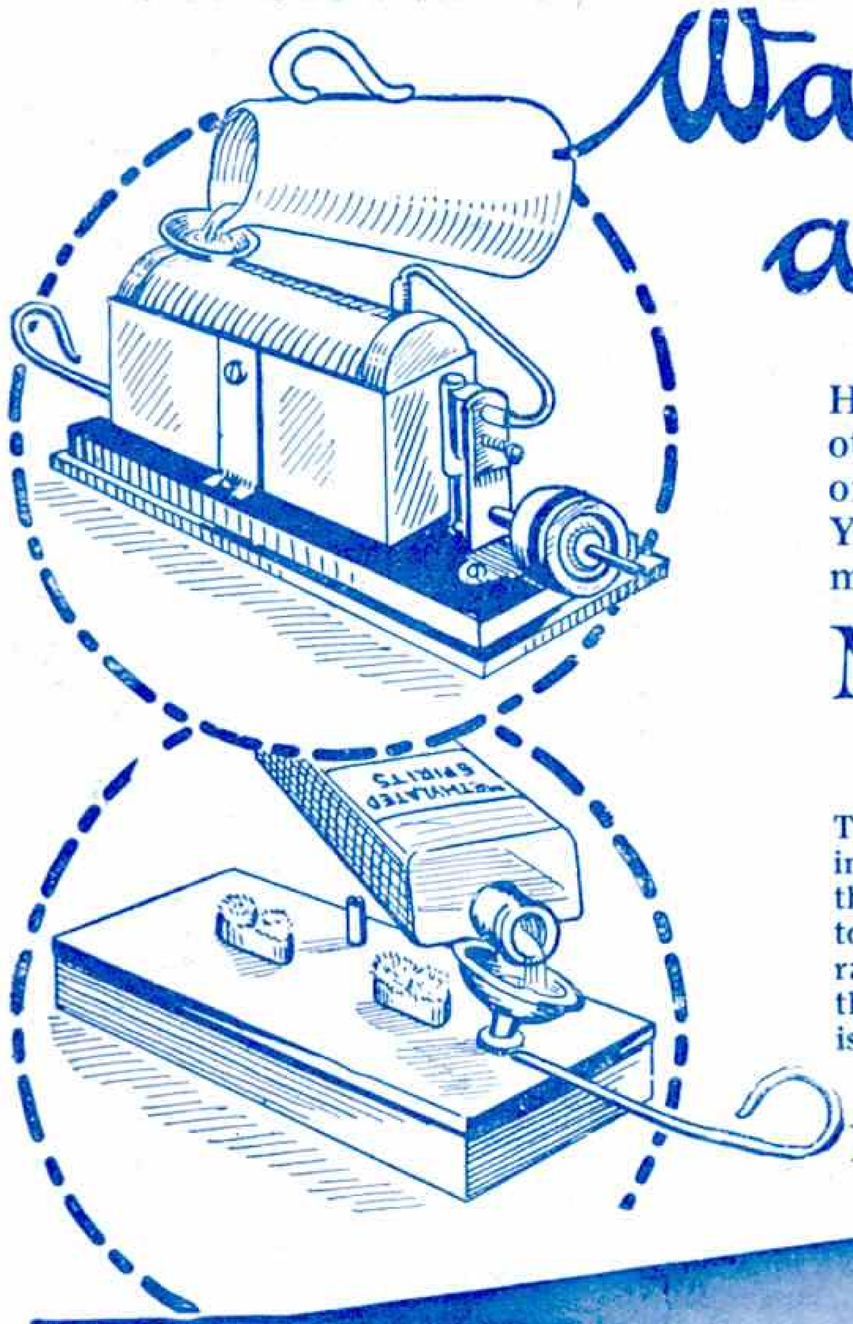

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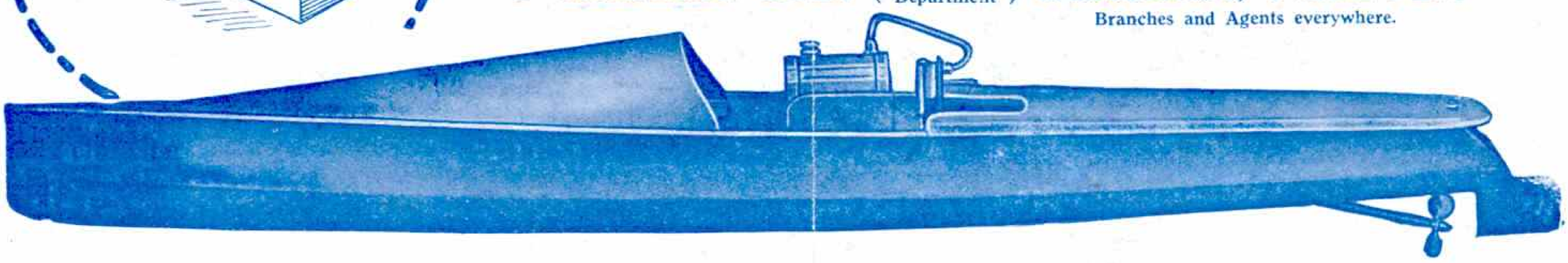

EDITORIAL OFFICE
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Vol X, No. 9

MECCANO MAGAZINE

PUBLISHED
IN THE INTERESTS
OF BOYS

September 1925

With the Editor

The Current Issue

As previously mentioned—and as our cover denotes—this issue of the "*M.M.*" is a special Railway Centenary number and deals throughout, as far as possible, with railway matters. Although the number of our pages has been increased so as to include more articles than usual, there are still several interesting articles that necessarily have had to be omitted. Among these are "Steam Locos without Fires," and "The Story of Bradshaw's Railway Guide." These articles will appear as soon as space permits in the near future—possibly in next month's issue. Some of our regular features have also been crowded out, including the "Story of Metals: Aluminium," the third instalment of Mr. Coles-Finch's interesting article "How to Make an Aquarium," and the XIXth instalment of the series of Electricity articles, "Lord Kelvin and Cable Working." The "Stamp Tour Round the World" has given place to a special article on railways as depicted on stamps, but the "tour" series—which seems very popular—will be continued next month, when we shall deal with West Asia. "The Conquest of the Air" series will also be resumed next month with an article on a new all-metal Flying-Boat.

An Incredible Train Load

In a recent address at the Institute of Mechanical Engineers, Newcastle-on-Tyne, Sir Vincent Raven, the Chief Engineer of the L.N.E.R., stated that "every day the railways carry into London alone 600,000 tons of meat, 500,000 tons of fish, 13,000,000 tons of farm produce, and 280,000,000 gallons of milk."

I should be the last person in the world to suggest that this eminent engineer had made a miscalculation, but it certainly seems as though some mistake had been made—perhaps by the reporters who took notes of Sir Vincent's speech, or by the printers who set up the type.

I know that my readers are particularly interested in investigating all statements of fact, and each month, on this account alone, I have to be very careful to see that every fact appearing in this magazine is accurate! Should there be a printer's error in the number of a certain locomotive, or should a particular class of locomotive be given two more wheels than the number to which it is entitled, I very soon get "hauled over the coals" by my sharp-eyed readers, who proceed to deluge me with letters and postcards and sometimes telephone messages and personal visits as well! I do not object to this in the least—in fact, the contrary is the case, and I rather delight in occasionally introducing little and relatively unimportant errors with a view to seeing whether my readers are intelligently following what is written in these pages!

I feel sure, therefore, that the majority will be interested—as I was—in trying to account for Sir Vincent Raven's figures. To start with, it surely must be quite impossible even for all the railways running into London to carry in 24 hours this tremendous quantity of foodstuffs. Even if this were possible, the people of London could never consume all these products in one day—they would have to have prodigious appetites to do it! If it is assumed that there are seven million people in London—not allowing even for the fact that, say, one half of this number are children—how on earth could they drink 280 million gallons of milk each day? That is equal to 40 gallons each, and most individuals would find it difficult to drink only one gallon of milk a day—if only on the grounds of expense!

Then again, I do not think that such a huge quantity as 280 million gallons of milk ever existed at one and the same time. If anyone has sufficient interest and time to do so, he could probably find out the number of cows in the country and work out how much milk they yielded daily. At a rough guess I doubt whether more than 20 million gallons are produced in the United Kingdom in 24 hours. That is less than one tenth the quantity that Sir Vincent Raven has told us the railways carry into London every day.

The matter need not be carried further, but it would be interesting to ascertain the explanation of the extraordinary statement. If any of my readers are able to throw light on the matter I shall be glad to hear from them.

Thank You!

I feel that I must express my thanks to the many hundreds of my readers who have written in appreciation of the continued improvement in the "*M.M.*" Although I always reply to every letter received from my readers, the large amount of correspondence on hand, and the fact that half my staff are on holiday, may prevent me from replying for a few weeks to those who have written recently. I hope they will accept this assurance that their letters have been read with interest and that their helpful suggestions for further improvements in the "*M.M.*" are received with appreciation. As I have previously explained, being an Editor is no light task—it is so difficult to please everybody! I am always glad to have helpful suggestions from my readers, either commenting on published articles or making suggestions for new subjects to be dealt with in future numbers.

I think we may claim that every succeeding issue of the "*M.M.*" has been an improvement on the previous issue and it will be my endeavour to maintain this record. In this connection I may mention that there are some very interesting articles in store. There is a constantly increasing demand for the "*M.M.*," and as we print only as many copies as will fill the orders on our books, it is with a view to avoiding disappointment that I advise all readers who have not done so to place at once a regular order with their Meccano dealer or newsagent. There is a Meccano dealer in every town, and if you have any difficulty in obtaining the "*M.M.*" from your dealer write to me and I will send you a list of Meccano dealers who stock the Magazine. If you prefer to order the Magazine through your newsagent, and if he cannot obtain it through his wholesaler, ask him to write to me and I will arrange that he receives supplies direct. Those who are not able to obtain the "*Meccano Magazine*" either from a Meccano dealer or newsagent may have it posted to them direct from this office, 2/– for six issues and 4/– for twelve issues, post free.

The Hornby Book of Trains

I hope all my readers will order their "Hornby Book of Trains" within the next week or two. This publication was announced last month and tens of thousands of copies have already been ordered. In view of the cost of production the edition must be limited, and as the demand is already very great my readers are urged to place their orders at once for despatch as soon as the book is ready.

The announcement regarding the publication of this book is made in good time in order to give all readers of the "*M.M.*" an opportunity of placing their orders now, and avoiding disappointment should they not be able to obtain a copy when the book is actually ready for distribution. Unless ordered now, delivery of this fine book cannot be guaranteed. Further particulars will be found on page 453.

Lives of Famous Engineers

XX Richard Trevithick and his STEAM ENGINES

RICHARD TREVITHICK was born on 13th April 1771 in the parish of Illogan in Cornwall. He was descended from a very ancient Cornish family and his father was a mine manager and mining engineer. Shortly after Richard's birth the family removed to Penponds near Camborne, where later the boy attended his first and only school. He seems to have been a somewhat dull scholar and his master described him as being disobedient, obstinate and very inattentive ! He would spend hours drawing lines and figures on his slate when he should have been doing lessons and his education never extended beyond reading, writing and arithmetic.

An incident that occurred during Trevithick's boyhood showed that, in spite of his master's poor report, the boy had a keen brain and a perception beyond his years. Trouble arose among certain mine agents in regard to some underground levels, and Trevithick offered to put the matter right. At first his offer was not taken seriously, but after a while he was allowed to make an attempt. His instinctive ability enabled him to understand at once the crude surveying instruments of that day and to realise how untrustworthy the indications of the magnetic needle were when near iron tools or machinery. He quickly solved the problem and laid down a course that was followed with complete success.

Trevithick's Great Strength

Trevithick inherited the great strength for which his family was famous. He was 6 ft. 2 in. in height and his feats of wrestling and weight-lifting were unequalled in the district. One day the local athletes, in the course of a trial of strength, attempted to lift from the ground a cast iron pump weighing some 7 or 8 cwt. When Trevithick's turn came he lifted the pump on to his shoulder and carried it off. Another of his feats was to write his name on a beam 6 ft. above the floor with a 56 lb. weight suspended from his thumb, his arm being extended at full length. His feats of strength indeed became almost legendary. On one occasion he threw a sledge hammer weighing about 14 lb. over the chimney of the mine engine house, and it was commonly said that the hammer never came down again !

At the age of 18 he began to assist his father as mine manager, and on his father's death in 1797 he succeeded him as the leading engineer in Cornish mining. In that year also he married.

First Mechanical Production

Trevithick's earliest practical mechanical production was an improved form of pumping engine designed for use in deep mines. The invention of this type of engine was probably due to William Bull, but Trevithick improved it in many important respects.

Richard Trevithick

In construction it differed greatly from the engines of Boulton and Watt, notably in the absence of the heavy beam and parallel motion. The engine house surrounded the pump shaft, over which the steam cylinder was placed, supported on strong beams, the piston rod going direct to the pump rods. The usual balance-bob attached to the pump rods gave motion to the air-pump bucket and to the plug-rod for working the valves. Condensation of the steam took place in the exhaust pipe, in which the injection-valve was fixed. The valves were worked by tappets and toothed segments.

This engine was simple, durable and economical, and probably would have come into more general use if it had not been for the restrictions imposed by the Watt patents.

High-Pressure Engines

For many years various Cornish engineers had been trying to produce stationary engines that would not be infringements of Watt's patent regarding the condensing engine. Trevithick soon decided to dispense with condensation and to compensate for the resulting loss by using steam at high pressure. He constructed a number of high-pressure engines that came into considerable favour locally for pumping and other purposes.

It is rather remarkable that Watt, although he had experimented with high-pressure steam in 1761 and had included its use in a patent of 1769, consistently opposed its introduction and restricted himself to pressures of not more than 1 lb. or 2 lb. above the atmosphere, owing to the risk of explosion. At a later period Boulton and Watt actually tried to get an Act of Parliament passed to prevent the construction of any more engines on the high-pressure principle. It is fortunate for the progress of the steam engine that these efforts failed.

A Model Loco

From his early days Trevithick had contemplated the production of a locomotive engine and during the years 1797–1800 he made a number of interesting and ingenious working models.

One of these models, illustrated on the next page, may be seen to-day in the South Kensington Museum. In this model high-pressure steam was employed as in his stationary engines. The engine has a vertical double-acting cylinder, 1.55 in. in diameter by 3.6 in. stroke, sunk in the boiler. The piston-rod terminates in a guiding crosshead, provided with connecting rods reaching down to crank-pins in the two driving wheels, which are 4 in. in diameter.

There is a spur wheel on this crank shaft driving a pinion on the shaft of a flywheel which it rotates at three times its speed. The steam distribution to the cylinder is controlled by a four-way cock driven by a tappet motion from the crosshead.

The boiler is cylindrical with a removable end, and contains a large oval flue, closed at the further end and fitted with a cast iron block which, after being heated in an external fire and replaced, supplies the

heat for generating steam. There is also a small safety valve.

Passenger-Carrying Locos

The success of his various models induced Trevithick to build a steam carriage capable of carrying passengers, and this he successfully tried on the road at Camborne in 1801. This steam carriage is believed to have weighed 1½ tons and to have attained a speed of from 4 to 9 miles per hour. The working of this road loco was so encouraging that in 1802 Trevithick and a relative, Andrew Vivian, patented various inventions concerning the high-pressure engine and its application to locomotion.

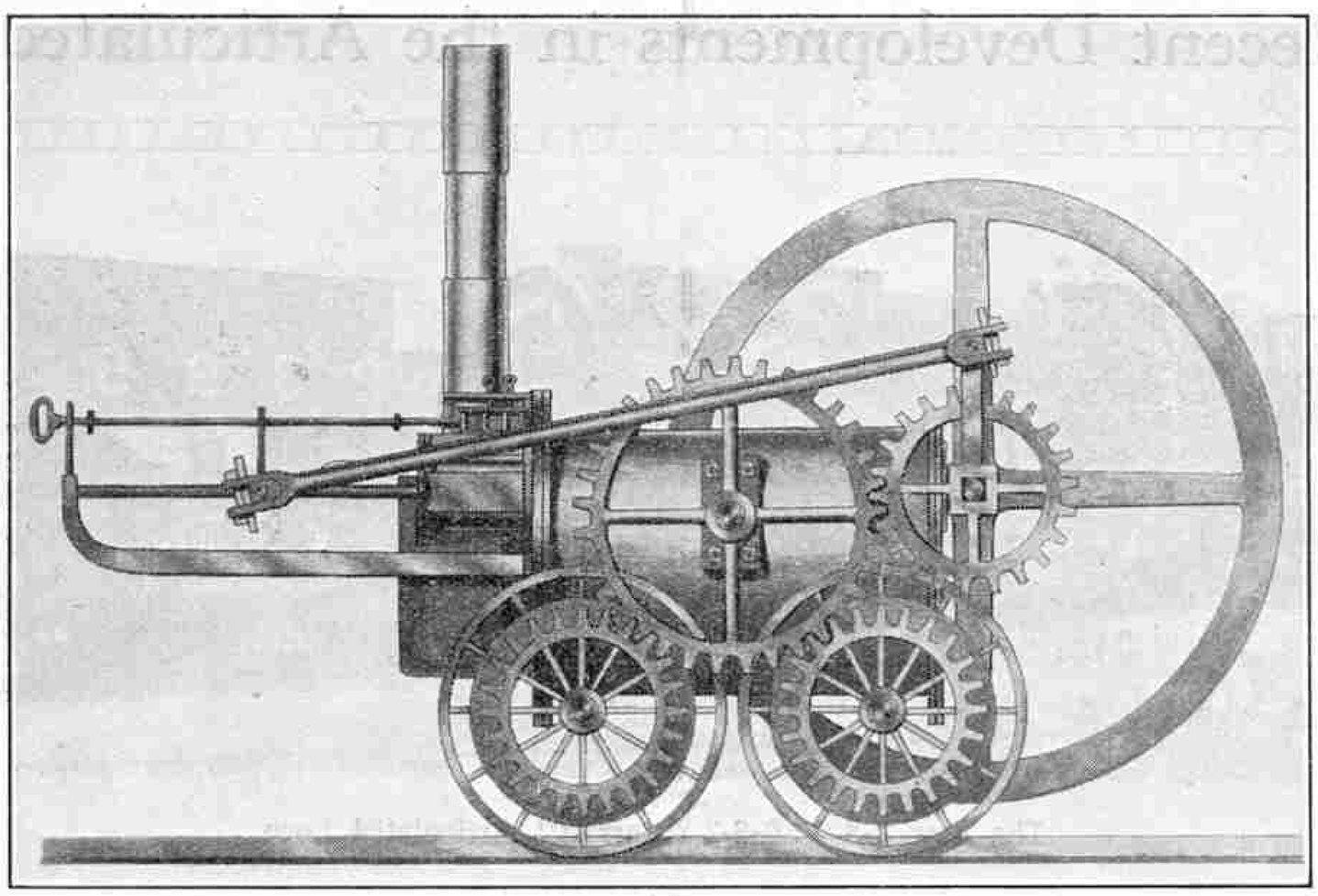
In 1803 Trevithick produced a passenger-carrying loco that proved very successful. After trials at Camborne it was taken to London, where it accomplished some successful journeys through the streets. This loco proved beyond doubt that the steam carriage could be made a really practical means of passenger-carrying, but by this time Trevithick had become disheartened on account of the large amount of money he had spent without any return. He had learnt from the trials, however, that a rough road provided by no means an ideal surface for a steam vehicle, and his thoughts then began to turn in the direction of the railway and the smooth iron track.

By 1804 he had completed his locomotive engine to work on a railway at Pen-y-Darran in South Wales. This loco had a cylindrical flue boiler and a single steam cylinder, set vertically into the steam-space of the boiler and driving the outside cranks on the rear axle of the loco by very long connecting rods attached to its crosshead. No attempt was made to condense the exhaust steam, which was discharged into the smoke pipe.

The engine in working order weighed about 5 tons and proved capable of hauling five wagons containing 10 tons of coal and 70 passengers a distance of 9 miles at the rate of nearly 5 miles per hour. A few days later the loco was tried successfully with 25 tons of iron.

The Steam Blast

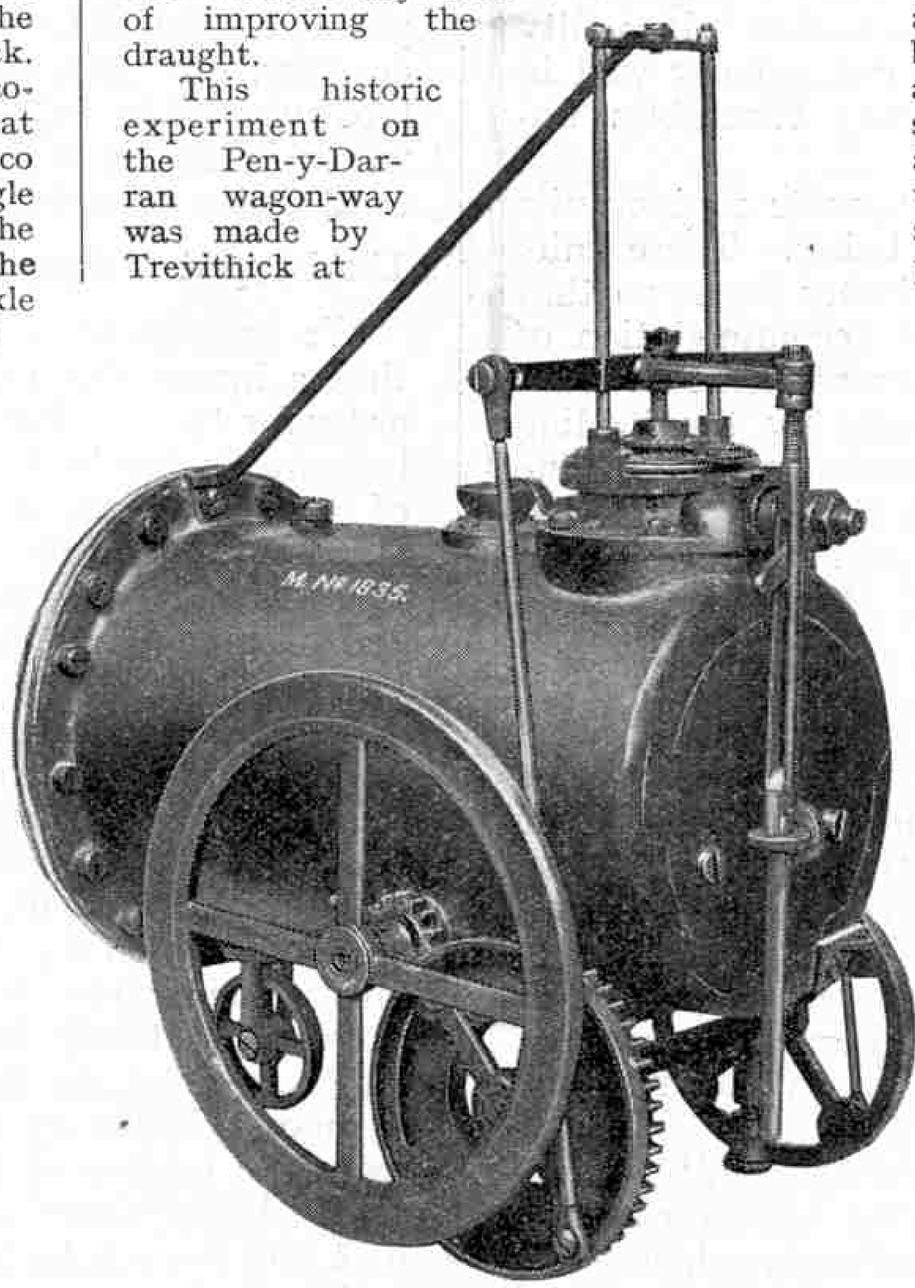
A letter written by Trevithick on 20th February 1804 contains an interesting description of the trials of this loco, and in regard to the controversy as to the real inventor of the steam-blast these words are of considerable interest :—"The steam that is discharged from the engine is turned up the chimney about 3 ft. above the fire. The fire burns much better when the steam goes up the chimney than when the engine is idle." In another letter Trevithick wrote :—"The steam is delivered into the chimney above the damper ; when the damper is shut the steam makes its appearance at the top of the chimney but when opened none can be seen. It makes the draught much stronger by going up the chimney ; no flame appears."



Trevithick's Pen-y-Darran loco, the first steam loco to run on a railway

If any one man can be regarded as the inventor of the locomotive it is Trevithick, and the passages just quoted give strong support to the contention that he was also the inventor of the steam blast, which was used later by George Stephenson with such great effect. These two letters of Trevithick seem to dispose effectually of the argument that he turned the steam up the chimney merely to get rid of it, and without any idea of improving the draught.

This historic experiment on the Pen-y-Darran wagon-way was made by Trevithick at his own expense, in the confident belief that it would prove a sufficient demonstration of the power of the steam engine and that it would attract public attention and approval. In this Trevithick was disappointed. The weight of the loco was too great for the road, and as the owners were not prepared to incur the heavy cost of the reconstruction that would have been necessary, it was decided to take the loco off the road and use it for other purposes. Accordingly it was dismounted from its wheels and used for some time with great success as a pumping engine.



Model of Trevithick's Road Engine, now in South Kensington Museum

Loco ordered for Wylam Colliery

Although the Pen-y-Darran trials had made little impression in South Wales, they had not passed unnoticed by the North of England. Christopher Blackett, the owner of Wylam Colliery, was so impressed by these trials that he gave Trevithick an order for a loco. The inventor sent drawings and patterns to a Gateshead iron and brass founder, John Whinfield, and commissioned him to manufacture the loco.

The engine was built between October 1804 and May 1805. It was similar in general outline to the Pen-y-Darran loco but was superior in many respects. It had a wrought iron boiler with return flue and a horizontal cylinder fixed in the boiler at the opposite end to the firebox and chimney, with a flywheel to secure a rotary motion in the crank at the end of each stroke. Its four wheels were coupled together by spur-gear and it had a regulating blast-pipe.

The total weight of the loco was 4½ tons and it was designed to haul a load of 10½ tons over wooden rails at the rate of four miles an hour. A temporary track was laid down in the works for the purpose of testing the loco, which ran forward and backward quite successfully. For some reason or other the loco was never delivered however, and it remained in the foundry as a stationary engine.

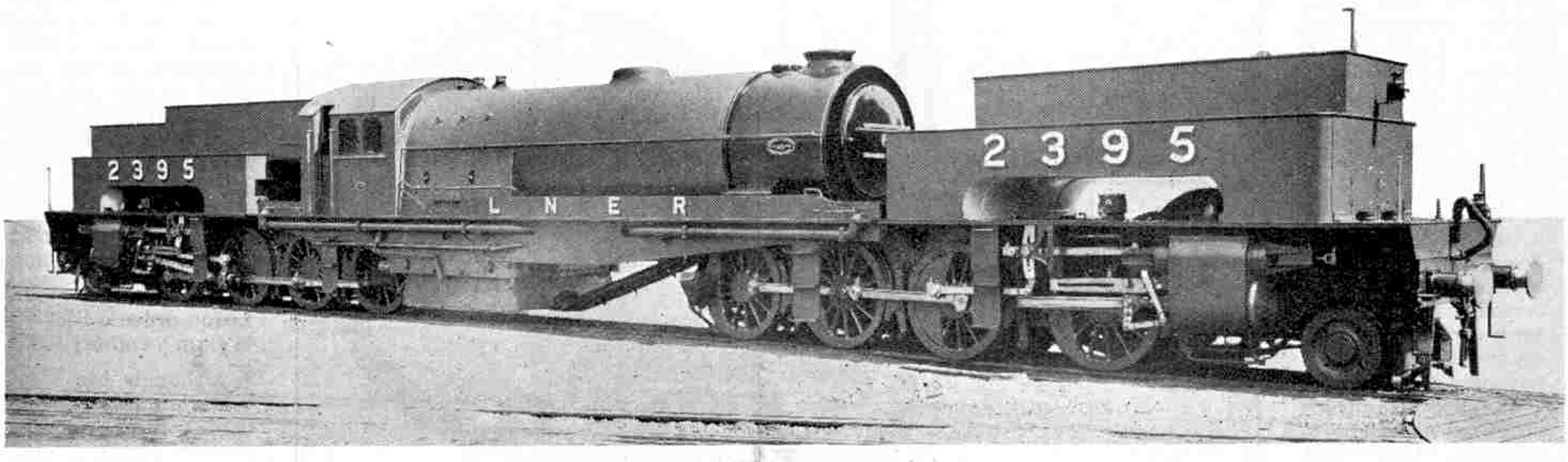
Circular Railroad in London

In 1808 Trevithick built a circular railroad in London on what is now Euston Square, and set to work a steam loco which he named "Catch-Me-Who-Can." This loco weighed about ten tons and travelled at the rate of some twelve miles an hour. It was exhibited to the public at the rate of 1/– per head, including a ride for those who were sufficiently adventurous. After running successfully for some weeks the loco was thrown from the track by the sudden breaking of a rail, and as the shillings had not been coming in fast enough to pay expenses the scheme was then

(*Continued on page* 486)

Latest and Largest "Garratt" Loco

The Recent Developments in the Articulated Type



The New 2-8-0 : 0-8-2 "Garratt" Articulated Loco

AMONG the many special types of locomotives developed in recent years to meet unusual or abnormal requirements, one of the most important and at the same time most interesting is the "Garratt" articulated.

The primary purpose of articulated locos in general is to provide for safe and easy negotiation of difficult curves. The "Garratt" loco possesses this valuable feature to the full, but its main object is to provide a range of power that cannot be attained with locos of the conventional type. Another point of importance is that "Garratt" locos are "double-enders" in reality as well as in appearance, for they run equally well in either direction and thus make long turntables unnecessary.

The "Garratt" consists of two separate engine units connected by a frame carrying the boiler. These units are placed one at each end of the boiler frame so that the latter is left quite free for the accommodation of the boiler. The result of this arrangement is that the size of the boiler is limited only by the loading gauge, as the fuel and water are carried on the engine frames. There are no axles beneath the firebox, so that this can be made of any depth and volume within reason, with correspondingly good steaming qualities and fuel economy.

Development Since 1909

Coal and water are carried in a bunker surmounting the engine unit at the footplate end of the loco, while the front unit carries only a water tank. The two water tanks are connected by a levelling pipe carried along the outside of the frame. This pipe, together with the main steam pipes from the boiler to the engine units, is fitted with a special swivel-jointed connection, an essential feature when the loco is passing round a curve.

The first "Garratt" was designed and built in 1909 by Messrs. Beyer, Peacock & Company Ltd., for service on the Tasmanian Government Railways, which have a gauge of 2 ft. This pioneer loco was necessarily of small size and was of the 0–4–4–0 type with compound cylinders and a total weight in working order of 33½ tons.

The Tasmanian loco having proved extremely satisfactory for hauling heavy loads on a line abounding in sharp curves, it was followed by larger locos of the same type for other colonial railways. In many cases the problem of designing a loco with a very restricted axle-load and wheel-base was solved by the introduction of the "Garratt," and the necessity for installing at great expense a heavier type of permanent way was obviated. At the present time representatives of this peculiar class of locos are to be found in nearly every country, but with the exception of one moderate-sized loco supplied in 1923 for service in and around a private works in South Wales there was none in this country until quite recently.

The Largest "Garratt" in the World

We announced in our columns last year (October) that a locomotive on the "Garratt" principle was on order for the London and North Eastern Railway. The loco was being built at the Gorton (Manchester) works of Messrs. Beyer, Peacock and Co. Ltd. and a great effort was made to complete the loco in time for it to take part in the Railway Centenary celebrations at Darlington. This object was achieved, although the loco had to appear in a roughly-painted condition. This fact, however, rather added to its impressiveness and there was no more striking or popular loco present.

No. 2395 is the largest "Garratt" type loco yet built. It consists virtually of two 2–8–0 locos each with three cylinders of 18½ in. diameter by 26 in. stroke, the steam for which is generated by a boiler 7 ft. in diameter and considerably larger than any boiler previously fitted to a British loco. The great size of this boiler, which involves the almost total extinction of the funnel, is made possible by its low mounting and its clearance from the motion of the engine units.

The boiler works at a pressure of 180 lb. per square inch and has a total heating surface of 3,578 square feet.

The engine units are interchangeable in every way with the standard 2–8–0 mineral locos built at Doncaster

with coupled wheels 4 ft. 8 in. in diameter and leading pony-truck wheels 2 ft. 8 in. in diameter. It thus possesses six cylinders and is the first loco of this type to have more than four. The front engine unit, that is the one at the smoke-box end of the loco, carries a water tank of 2,800 gallons' capacity, which is arched to provide access to the one inside cylinder and valve motion. The rear unit carries a second tank of 2,200 gallons' capacity and has space for seven tons of coal.

The boiler and the footplate occupy the central section of the loco and under the boiler, in a special box where it is easy of access, is carried the steam reversing gear. The steam brake is applicable to all coupled wheels and the hand screw brake to the coupled wheels at the firebox end only.

The loco is equipped with a vacuum brake and has steam sanding apparatus to front and rear of each group of coupled wheels. The full loaded weight of the loco is 178 tons.

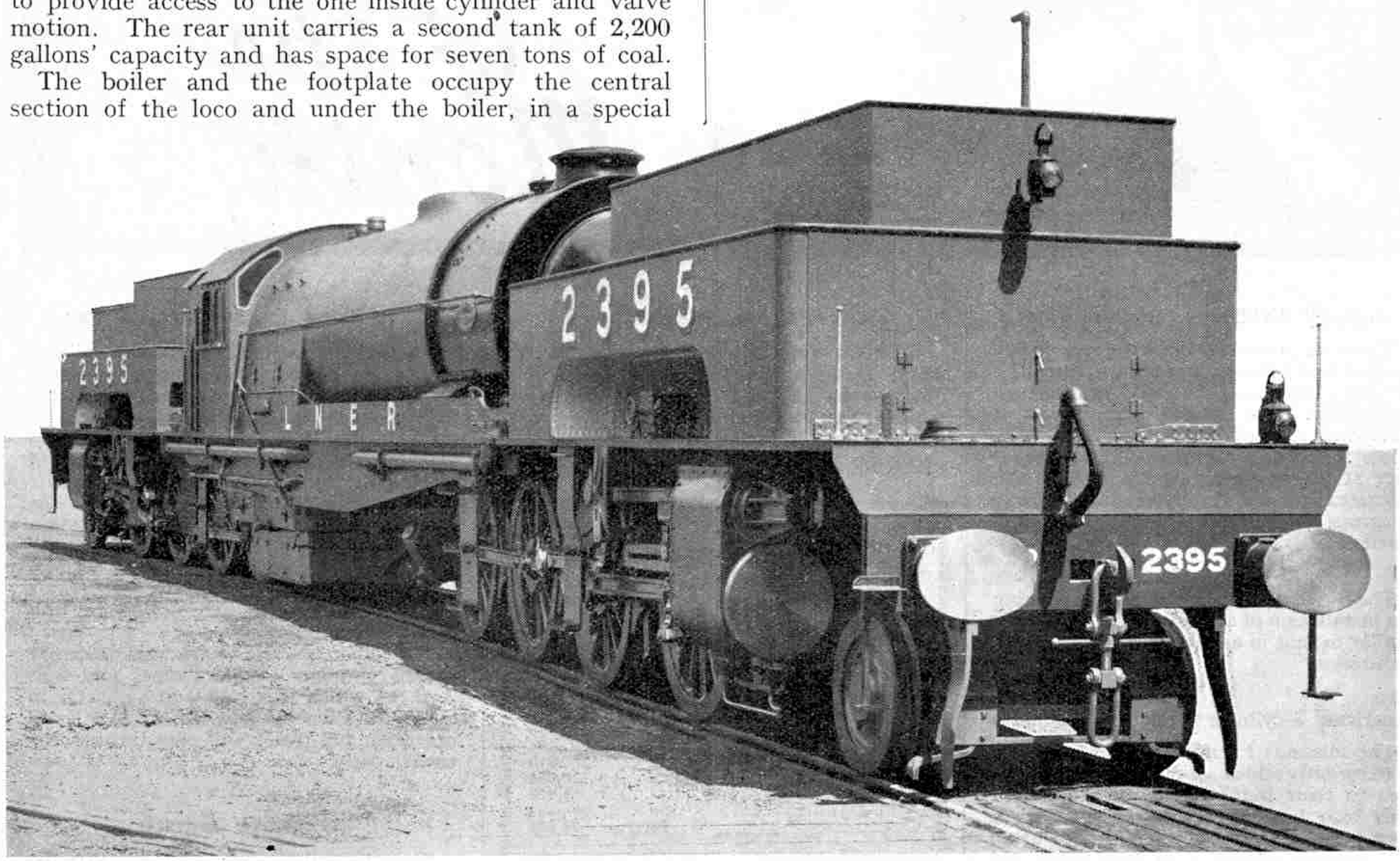
"Garratts" for Heavy Mineral Traffic

Between Wath and Penistone, on the original Great Central section of the L.N.E.R., there is an exceptionally difficult stretch of 7 miles, two of which have a gradient of 1 in 40. Heavy coal trains have to be operated over this branch, 1,000-ton trains being normally hauled by two locos in front and two or even three banking in rear. The latter are now to be replaced by the new "Garratt," and great economy in working is anticipated.

The steadiness at which a loco of "Garratt" design runs, even at comparatively high speeds and where sharp curves abound, is very notable, and further interesting developments in the passenger locomotive direction should be likely.

After the loco was delivered by her builders to the L.N.E.R. Locomotive Headquarters at Doncaster a trial trip was made to Retford and back, when a speed of 35 miles per hour was attained. Of course, the new loco was worked under very easy steam on this occasion.

Through the courtesy of the builders, Messrs. Beyer, Peacock & Co. Ltd., we are able to reproduce two photographs to supplement the description of this fine loco.



The Most Powerful "Garratt" Loco in the World

Principal Dimensions of L.N.E.R. No. 2395

Gauge of Rails	4′ 8½″
Cylinders (Six, four outside, two inside) diameter and stroke ...	18½″ ×26″
Wheels coupled, diameter ...	4′ 8″
,, bogie, ,, ...	2′ 8″
Tractive Force (85% boiler pressure)	72,940 lbs.
Working pressure	180 lbs.
Boiler, Length	12′ 11″
,, diameter outside at back	7′ 0″
Firebox, Length outside ...	9′ 4″
,, Width ,, ...	7′ 6½″
Superheater, Robinson Type ...	
Tubes. Large number and Outs. diameter	45 5¼″
,, Small ,, ,, ,,	259 2″
,, Superheater ,, ,,	45 sets 1⅜″
Heating Surface Tubes 2644·5 sq. ft.	
Firebox 223·5 ,, ,,	
2868·0 ,, ,,	
Superheater 710·0 ,, ,, (inside)	
Total 3578·0 ,, ,,	
Grate area	56·5 sq. ft.
Wheel base rigid	17′ 10½″
,, ,, each engine unit ...	26′ 6½″
,, ,, total	79′ 1″
Water capacity	5,000 gallons.
Fuel ,, ...	7 tons of coal.
Weight Full	178 tons.

Origin of the Name

The "Garratt" design owes its name to its originator the late Mr. H. W. Garratt, who served his time as an apprentice in the Bow works of the old North London Railway. He went to South America to take up an appointment on the Central Argentine Railway, and afterwards became locomotive superintendent of the Cuban Central and the Lagos Government Railways successively. Subsequently he took charge of the locomotives of the Lima Railway in Peru, but his health broke down and he died abroad on 25th September 1913.

Railway Exhibition at Darlington

Up to the evening of 13th July, 50,000 persons had passed through the turnstiles at the historical Railway Exhibition, Darlington. The record attendance of 8,279 was reached on Sunday 12th July. These figures are exclusive of the attendance at the opening day, the visit of the delegates to the International Railway Congress, and of other specially invited parties.

* * * *

The Swansea Corporation are considering the installation of a " never-stop " railway, similar to that in use at the British Empire Exhibition.

* * * *

American 3-cylinder Freight Locomotive

The Missouri Pacific Railroad Company have recently added a 3-cylinder " Mikado" loco to their freight-handling equipment. This loco has been built largely with a view to obtaining experimental data as to the relative efficiency of 2-cylinder and 3-cylinder types. It is unique in so far as the United States are concerned, the invariable practice having been to build only 2-cylinder locos of simple type.

The boiler is conical and works at a pressure of 200 lb. per sq. in. The three cylinders are not cast in one part, but consist of two separate castings, one comprising the inside and right-hand outside cylinders, and the other the remaining left outside cylinder. The valves of all three cylinders are actuated by the usual Walschaerts gear.

The tender is of great size, its capacity being 14 tons of coal and 10,000 gallons of water, while a special trainman's cabin is fitted to the top of the tank.

* * * *

Improved Metropolitan Service

The Metropolitan Railway have commenced an altered train service that embodies many improvements. Trains are being extended farther into the country, others are being retimed and strengthened, and a general quickening of the service has also taken place.

* * * *

New Russian Railway

A new line has been opened between Valdai and Krestsy in the government of Novgorod. This line is a section of the new railway from Leningrad to Orel, which will be of great economic importance, not only to the province, but also to the whole of the north-west region of Russia.

Electrifying the Arlberg Tunnel

Electric traction was inaugurated in May, through the Arlberg Tunnel, and later as far as Bludery on the West side. Single-phase current is used, and the goods locomotives of this line, of 2-6-6-2 type, were built in Switzerland.

Railway Mileage in Asia

Asia Minor, Syria and Arabia (incl. Cyprus)	3,829
British East Indies	40,490
Ceylon	732
China	6,838
Cochin China, Cambodia, Anam Tonkin	1,490
Japan (incl. Chosen and Formosa) ...	12,284
Malay States (Borneo, Celebes, etc.)	1,163
Dutch East Indies	1,882
Persia	351
Pondicherry	59
Portuguese Indies	54
Philippines	810
Russia (Asiatic)	6,556
Siam	1,423
Total	77,961

New Pullman Services

A new L.N.E.R. Pullman train is now running from King's Cross to Edinburgh. The service, which is an extension of the present Harrogate Pullman leaving King's Cross at 11.15 a.m. and reaching Harrogate at 3.15 p.m. and Newcastle at 5 p.m. is now to be called the London-Harrogate-Edinburgh Pullman.

The new train will leave King's Cross at 11.15 a.m. as before and will arrive at Edinburgh at 7.50 p.m. It will offer Pullman facilities, mostly to third-class passengers, having two first-class cars and six third-class.

In Ireland the advantage of running third-class Pullman cars on the important expresses has also been realised, and the Great Southern Railways have entered into contract with the Pullman Company in this connection.

* * * *

A New Station Clock

A large clock of novel design has been fitted at Waterloo Station, London (Southern Railway). In place of the ordinary dial the clock has two large panels bearing the hour and minute figures. These figures change at the end of each minute and hour respectively. The minute figure shows " 50 " at one second past 49 minutes past the hour, so that travellers should soon learn that to the railway official one second after the minute is the next minute.

Electrifying the Southern Railway

The longest electric run on any railway in the United Kingdom was inaugurated on 9th July. This day marked the opening for through electric traction of the two routes from Waterloo to Guildford and Dorking North, representing 67 miles of track which have been fitted up for electric traction at a total cost of £833,000. The new regular service came into operation on the following Sunday. Guildford will now have electric trains at 20 minute intervals throughout the day, with three extra trains during the morning and evening rush hours.

The first electric train has recently passed through Penge Tunnel (old S.E. & C.R.) which is a mile-and-a-quarter in length. When the new service is fully in operation 150 trains will pass through the tunnel daily.

* * * *

Locomotive Contracts

The Bengal-Nagpur Railway (India) have ordered from Sir W. G. Armstrong Whitworth & Co. Ltd. (Scotswood-on-Tyne), 31 heavy 2-8-0 type locos.

Messrs. Beyer, Peacock & Co. Ltd. Manchester, have received orders for two tank locos for a timber railway in Australia, and one tank loco for the Isle of Man Railways.

The Crown Agents for the Colonies have awarded to Messrs. Beyer, Peacock & Co. Ltd. a contract for three locomotives of the "Garratt" articulated type, weighing 76 tons, designed for the 2 ft. 6 in. gauge for service on the Sierra Leone Government railways.

Contracts for 50 locos for the Egyptian State Railways have been allotted as follows :—35 to the North British Locomotive Company (Glasgow) at £6,254 each, and 15 to a German group of firms at a slightly less cost per loco.

* * * *

Rook Applies Vacuum Brake

Sometimes expresses are stopped by most unusual causes and it is a puzzle for the officials to discover the reason. Some time ago a Great Western Express from Paddington to Worcester came to a standstill through the brakes being suddenly applied. On examination it was found that a rook had flown against the front of the loco, striking the pipe and causing it to become separated from the plug, which admitted air to the brake pipes throughout the length of the train.

L.M.S. Loco Notes

The loco building programme of the company for 1925 is published below, although much of the new stock will not be in service until next year :—

4-4-0 Midland type superheater compounds, similar to Nos. 1065-1084 now running, except that left-hand driving is to be incorporated. Of these, 20 (Nos. 1115-1134 inclusive) are being built at Horwich, 30 at Derby, 25 by Vulcan Foundry, Newton-le-Willows, and 25 by the North British Locomotive Co., Glasgow.

2-6-0 (Mogul) mixed traffic locomotives, with 5 ft. 6 in. driving wheels and 21 in. by 26 in. outside cylinders. This class will be of an entirely new (L.M.S.) design and 100 are on order, of which 30 will be built at Horwich.

4-6-0 Caledonian type superheated express locos. Twenty of this type are to be built at St. Rollox (Glasgow). They will be identical with Nos. 14650-5 now running, with two outside cylinders 20 in. by 26 in. and 6 ft. 1 in. coupled wheels.

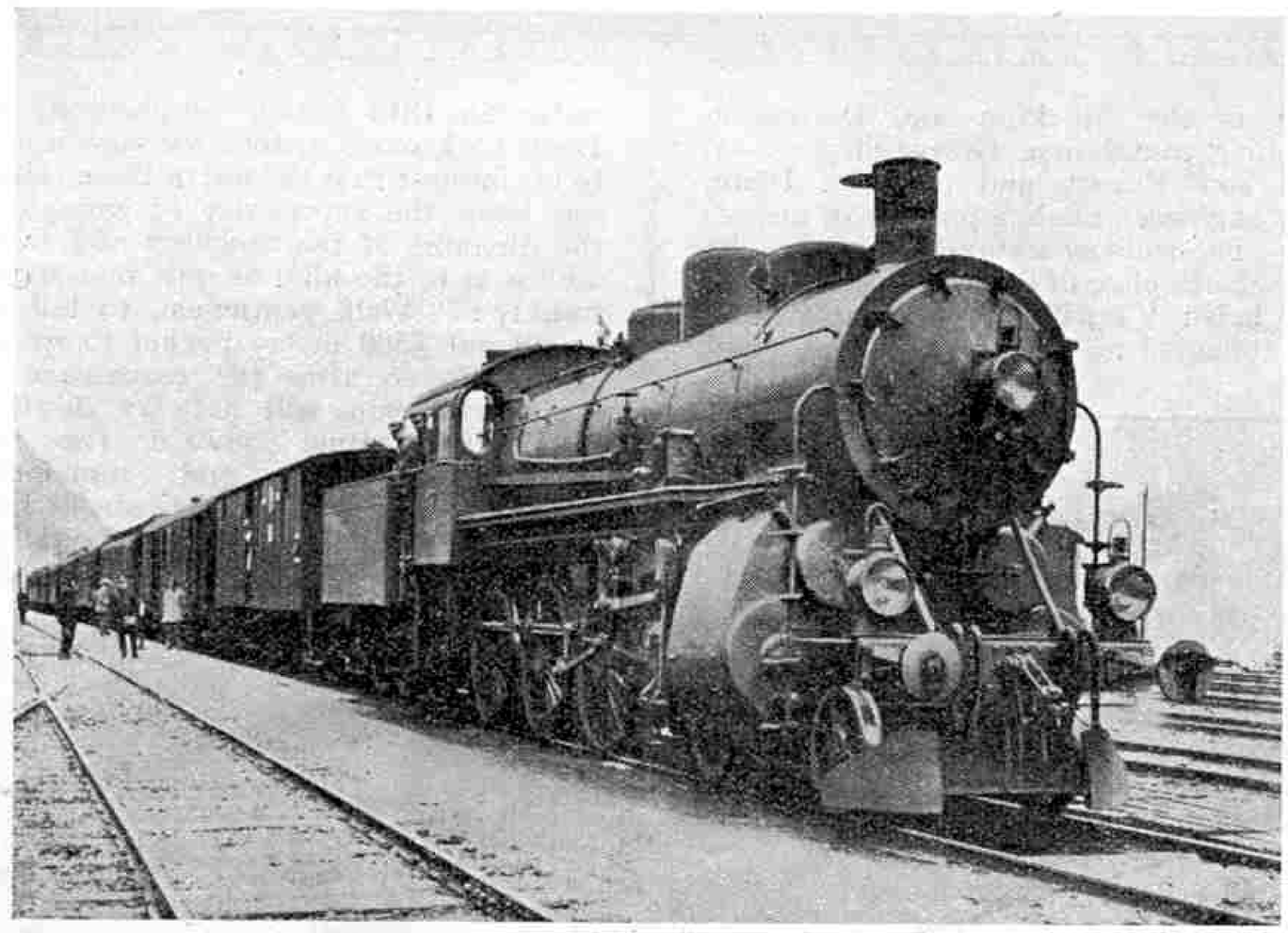
0-6-0 Midland type class 4 goods locos, similar to former locos of class 4 but fitted with shortened chimneys and domes for service anywhere on the former Caledonian Railway. By the end of 1925 the following 180 are expected to be in traffic :—70 building at Crewe ; 30 building at Derby ; 30 building at St. Rollox and 50 by private firms. Of these Nos. 4027-40 (inclusive) 4107, 4108, and 4177-80 (inclusive) are now in traffic.

New tank locos figuring in the 1925 programme are as follows :—0-6-0 T shunting locos, 50 (all in service) ; 4-4-2 T passenger locos for the Tilbury line, 5 ; 0-4-4 T Caledonian type for Cathcart suburban services, Glasgow, 10.

The total number of new locos already built or on order for the present year thus reaches 405, and in addition, five 2-8-0 type (Midland design) locos have been ordered from Messrs. R. Stephenson & Co., Darlington, for the Somerset and Dorset Joint Railway. They will be similar to existing locos of this type.

Some curious effects have been observed as a result of the practice of keeping a loco's tender in service when the loco itself is off duty for repairs. The new Midland-red livery has not yet been adopted for all the passenger classes of the former London and North Western system, and black-painted locos are frequently to be seen attached to Midland-red tenders. To add to the confusion, the newly-painted tenders bear a number in large gilt letters on their side panels, while the locos temporarily using them retain their old L.N.E.R. numbers and, in many cases, their nameplates. It would be interesting to know which of the two numbers is officially accepted in such cases, and whether the shed staffs have any difficulty in restoring to a newly-repaired loco its original tender!

Locomotives of the former L.N.W.R. section are being fitted with Belpaire fireboxes and "Ross" pop safety valves in accordance with the standard decided upon. The cab roofs also are being cut down to enable working on the Midland and Caledonian systems. Various classes of goods locos, including the old "18 inch" 0-6-0's are being thus rebuilt, together with express locos of the various 4-4-0 and 4-6-0 types.



A 4-6-0 Express Loco of the Swiss Federal Railways

* * * *

A Single-Phase Electric Express Loco

After experiments with various types of electric locos the German State Railways have accepted as the standard a single-motor design of the 4-6-4 type. This wheel arrangement, which has so successfully been adopted for steam tank locos in this country, adds considerably to the easy running of the loco in either direction.

The new electric loco, which is capable of hauling express trains up to 660 tons, weighs 116½ tons in working order and has driving wheels 5 ft. 3 in. in diameter. Its total length is 51 ft. 8 in. and extreme width 10 ft. 2 in. Current is collected from overhead cables by two bows mounted on pantagraph frames. The loco is totally enclosed and presents a neat appearance.

* * * *

New Railway for Mont Blanc

A new aerial "funicular" railway is being built up the side of Mont Blanc, and although not the first of its kind, as there are several in Switzerland, the new line is the first in French territory.

Cars with accommodation for 18 passengers are to be carried by a system of four cables raised above the ground on girder columns mounted upon reinforced concrete. The cars run on a pulley upon one of these cables, another cable helps to steady them, a third provides the emergency brake, while the fourth is the tractor, this being operated by a 100 h.p. electric motor. A station called La Para, 1,790 metres up from the start, has already been built, and by next year the second station, to be known as The Glaciers, will be open to the public.

A Shunting Loco for Persia

An interesting shunting loco of 0-4-0 T type has recently undergone successful trials at the Burton-on-Trent works of its makers, the Drewry Car Co. Ltd. This loco is of the internal-combustion type, and has been supplied for special service at the depots in Persia of the Anglo-Persian Oil Co. Ltd. The new loco has a wheel-base of 3 ft. 6 in. and is built for the 3 ft. gauge. It weighs 7 tons in working order, and has four cylinders, 5 in. bore and 6 in. stroke, using petrol as fuel and developing 45/50 B.H.P. Ignition is by high-tension magneto, and the cooling arrangements include a rotary pump taken by the engine, circulating the water through a large tank, and radiators with fans. A special mechanical lubricator is fitted.

Power is transmitted by bevel reverse, spur wheels, and direct to the driving wheels by coupling-rods. The change gear is by a compound clutch operated by one lever. The loco has two speeds in each direction of 3 and 6 M.P.H. The main frame is of ¾ in. steel plate, stayed by cross-stays and angles, with buffer beams at each end 1 in. thick. The wheels are 2 ft. 3 in. in diameter, and a screw hand brake operates on all four of them. The cab is lined with teak and on account of the hot climate has a double roof. The water and fuel tanks have capacities for 100 gallons and 40 gallons respectively.

Special precautions have been taken in designing this loco to make it fire-proof and safe for working in the oil depots. The exhaust pipe is finned, and is carried right up on to the roof of the cab where it ends in a large silencer. The air inlet to the carburetter is connected to an air vessel having a non-return valve in the head, in order to prevent any possibility of fire or explosion due to a blow-back from the carburetter. The ends of the H. T. leads to the sparking plugs are threaded through light spiral springs attached to a vulcanite board, so that in the event of the sparking plug terminals becoming loose, the leads would fly up to the board and so avoid coming into contact with any part of the engine and thus causing sparks.

* * * *

New Sleeping Cars

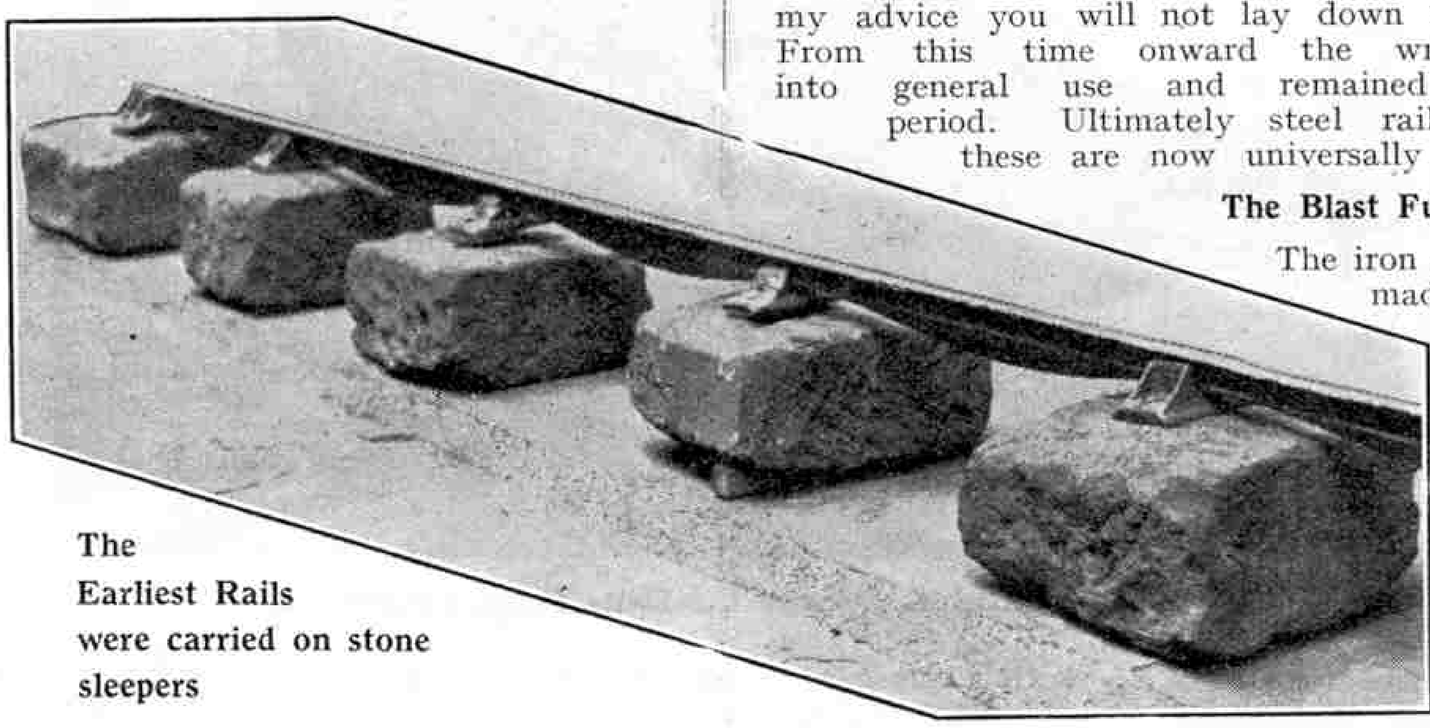
A contract for building 25 new sleeping-cars for service on long-distance Continental expresses has been divided between two English firms. The Birmingham Carriage & Wagon Co. Ltd., will build 15, the remaining 10 being allotted to the Metropolitan Carriage, Wagon & Finance Co., also of Birmingham. All the vehicles are to be delivered in a complete state before the end of 1925 by means of the Harwich-Zeebrugge train ferry. An order for 31 dining car saloons for the International Sleeping Car and European Express Trains Company is already in course of delivery from the Birmingham Carriage & Wagon Co. Ltd.

HOW THINGS ARE MADE.

II—STEEL RAILS

From Iron Ore to Finished Product

WHEN the construction of the Stockton and Darlington Railway was approaching completion, George Stephenson, accompanied by his son Robert and by John Dixon (afterwards a famous railway engineer), made a journey of inspection and dined at Stockton. The railway naturally was the one subject of discussion and towards the close of the dinner Stephenson said impressively to the two lads: "I will tell you that I think you will live to see the day, though I may not live so long, when railways will come to supersede almost all other methods of conveyance in this country—when mail coaches will go by railway and railroads will become the great highway for the King and all his subjects." From these words it is evident that even at that early period Stephenson foresaw the ultimate triumph of the steam loco and the resulting enormous growth of railways.



The Earliest Rails were carried on stone sleepers

Photo courtesy "Northern Echo"

George Stephenson's Foresight

Another instance showing that Stephenson from the first anticipated the general extension of railways throughout England, is provided by his remark when consulted about the gauge of the Canterbury and Whitstable Railway and the Leicester and Swannington Railway. Stephenson's reply was emphatic: "Make them all the same width. Though they may be a long way apart now, depend upon it they will be joined together some day."

Even the far-seeing Stephenson could not have dreamed of the enormous development that railways have reached to-day. The civilised nations of the world have covered their countries with a network of thousands upon thousands of miles of rails and the total is still growing.

First Metal Rails

Rails are apparently the least interesting part of a railway. They simply lie on the ground, mile after mile of them, and as we speed over their smooth surface in an express train we are apt to forget that they exist. Yet each of these rails was at one time a piece of iron ore somewhere in the ground, which has only reached its present form after passing through a series of most interesting processes.

The earliest metal rails were made of cast iron, and although they were a great improvement upon wooden rails, they were unsatisfactory in many ways. Before long they were superseded by wrought or malleable iron rails. In 1816 George Stephenson, in conjunction with a Mr. Losh, took out a patent for cast iron rails and therefore it was to his interest that the use of these rails should continue. Stephenson knew the superiority of wrought iron, however, and when the directors of the Stockton and Darlington Railway asked his advice as to the kind of rails that should be laid down he replied frankly: "Well, gentlemen, to tell you the truth, although it would put £500 in my pocket to specify my own patent rails, I cannot do so after the experience I have had. If you take my advice you will not lay down a single cast iron rail." From this time onward the wrought iron rail came into general use and remained for a considerable period. Ultimately steel rails were introduced and these are now universally employed.

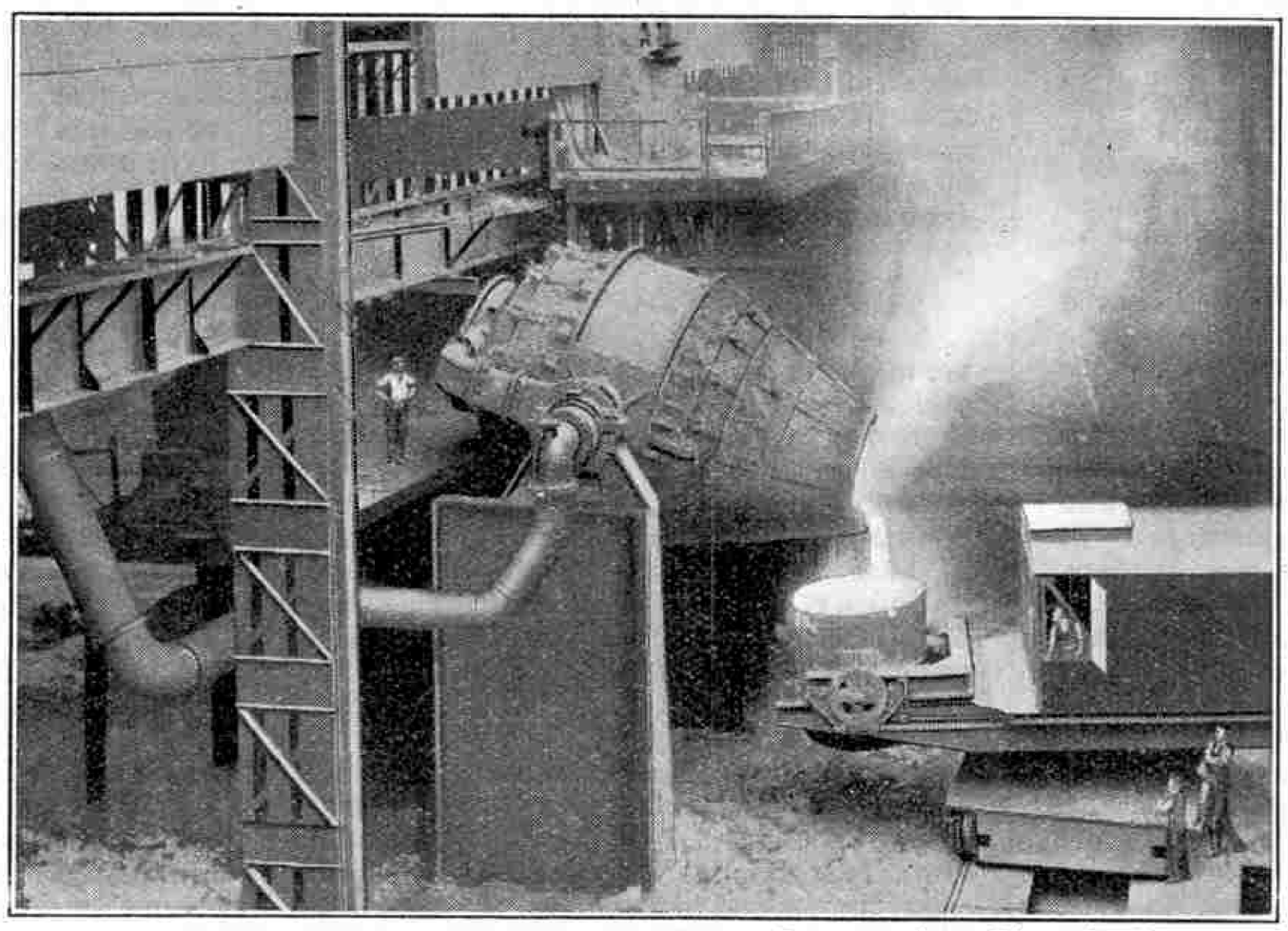
The Blast Furnace

The iron ore that is destined to be made into steel rails is taken from the mine to the blast furnace to be smelted. A blast furnace consists of a circular shaft lined with firebrick capable of standing an enormous amount of heat. A blast of hot air is conveyed to the interior of the furnace by nozzles, called "tuyeres," connected with a blast pipe running round the furnace. At the bottom of the furnace are two openings, the upper one for withdrawal of the slag and the lower for drawing off the molten metal.

The top of the furnace is closed by a conical stopper that may be lowered to allow material to be shot into the furnace. There is also an opening near the top of the furnace to lead off the hot gases produced.

Coke is used as the fuel and to the iron ore is added a certain amount of limestone, which acts as a "flux" and mixes readily with the unwanted materials in the ore.

When the furnace has been in action for a sufficient time the molten iron is drawn off, and is either run into special vessels to be made into steel immediately or run into a collection of sand moulds known as a "pig bed" in which it solidifies and is afterwards broken up into "pigs" weighing about 1 cwt. each.



A Bessemer Converter Pouring its Molten Contents into Giant Ladle

Making Bessemer Steel

The subsequent conversion into steel of the iron thus produced may be effected by the Bessemer process or by the Open Hearth process.

In the former process the pig iron from the sand moulds is melted in a cupola furnace—except where the molten iron comes direct from

the blast furnace—and then is poured into a "converter." The converter, which is well shown in the accompanying photograph, consists of a vessel suspended so that it is free to swing either horizontally or vertically, the swing being controlled by hydraulic mechanism. The vessel has an outer casing of malleable iron plates and an inner lining of ganister, which is a compact and hard variety of sandstone. At the bottom of the converter several tuyeres carry an air blast into the interior of the vessel in a similar manner to the tuyeres in the blast furnace.

When the converter has received its charge of molten iron the blast is turned on and passes through the mass of metal with a loud roaring sound. A fierce flame, at first pale but rapidly growing brighter, issues from the neck of the converter, and showers of sparks stream out, accompanied by fragments of molten slag. Presently the flame begins to drop and becomes quieter, showing that the last of the carbon has burned away. Exactly at the correct moment the blast is shut off, a small amount of molten "*spiegeleisen*" or "mirror iron" (a form of pig iron containing known quantities of carbon and manganese) is added, and the whole mass of molten metal is then poured into a huge bucket or ladle.

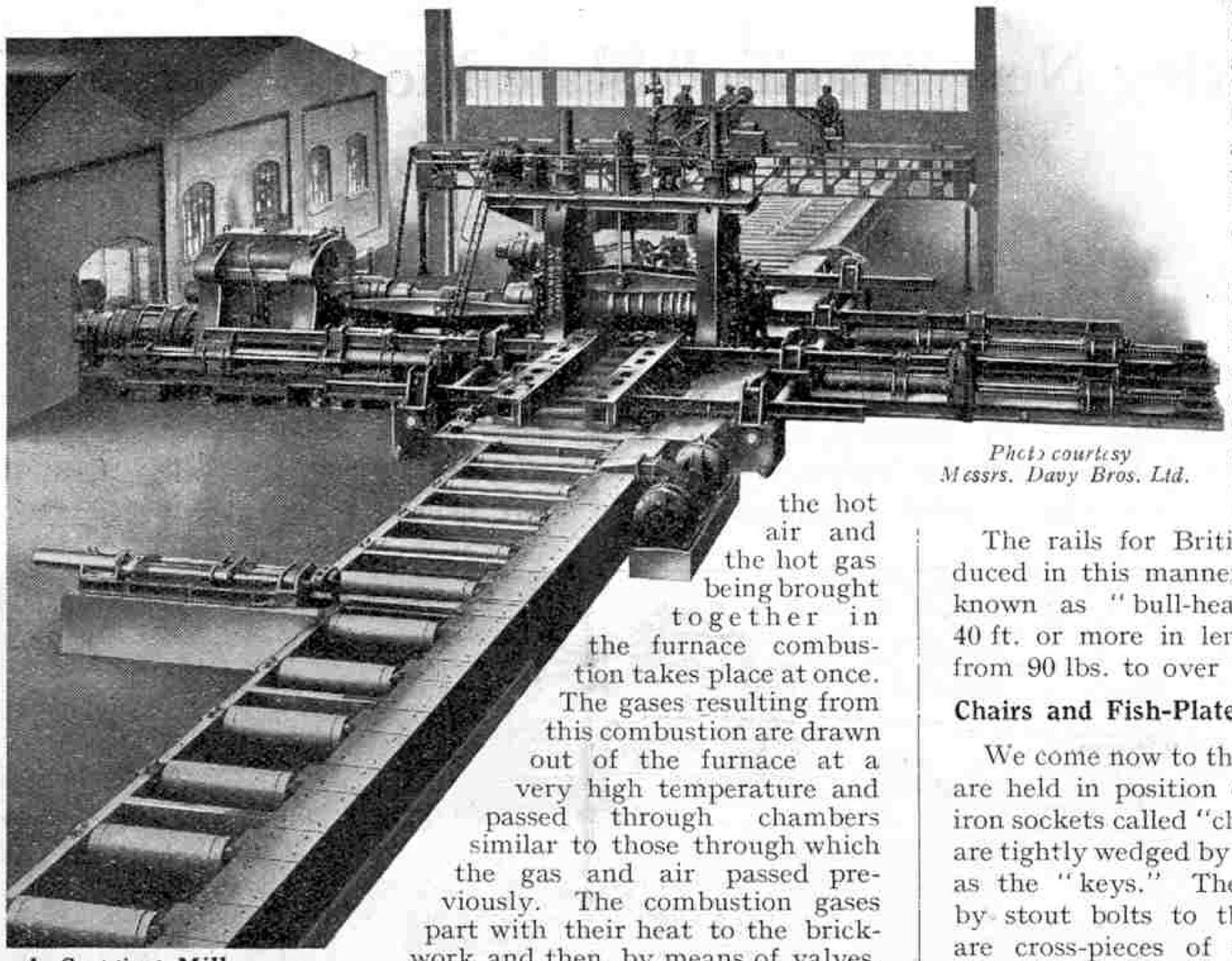


Photo courtesy Messrs. Davy Bros. Ltd.

A Cogging Mill

Electrically-driven Cogging Mill for rolling steel ingots up to five tons. Capacity 100 tons per hour

The Ingots in the Soaking Pits

The ladle containing the molten metal is carried on a truck and brought in turn over a number of "ingot moulds" about 6 ft. in height and 16 in. square at the top and broadening out gradually towards the bottom. The moulds are open at both top and bottom and stand on an iron plate. As the ladle comes over each mould a hole in the bottom is opened and the metal pours out until the mould is filled. The moulds are then allowed to stand until their contents, known as ingots, have formed a solid shell outside although they are still liquid inside.

Each mould is then "stripped" from its ingot by means of an overhead travelling crane with chains and hooks. If the ingots are to be used immediately they are lowered into a chamber known as a "soaking pit." This chamber is lined with firebrick and fitted with a lid, its purpose being to bring the ingot to a uniform temperature throughout. The ingot gives off heat to the firebrick until the whole chamber and the ingot itself are at the same temperature.

Open Hearth Steel

In the open hearth process the furnace is heated by a process of regeneration. Hot gas produced by burning coal with a limited supply of air is passed through a chamber of chequered brickwork. This chamber is previously heated, and in passing through it the temperature of the already hot gas is further raised. Air is passed through a similar chamber and raised to a very high temperature, and on the hot air and the hot gas being brought together in the furnace combustion takes place at once. The gases resulting from this combustion are drawn out of the furnace at a very high temperature and passed through chambers similar to those through which the gas and air passed previously. The combustion gases part with their heat to the brickwork and then, by means of valves, the whole process is reversed—the air and the unburned gas passing through the chamber heated by the gases produced by combustion and the latter gases passing through the chambers that have become cooled by giving up their heat in the first place to the air and active gas. This reversal is continued at regular intervals, and results in a gradual increase in the furnace temperature up to the required point.

The charge of pig iron and other materials is placed on the hearth of this furnace and heating continued until the carbon is reduced. Samples of the molten metal are drawn off at intervals and tested, and when the conditions are right the metal is run off into ingot moulds as in the case of the Bessemer process. After about half-an-hour the moulds are stripped off and the ingots are placed in gas-fired, or coal-fired reheating furnaces, which serve the same purpose as the soaking pits used in the Bessemer process.

The Rolling Mills

Whichever process has been adopted, the ingot, while still intensely hot, is lifted from the soaking or reheating furnace as the case may be and passed through what is called a "cogging mill." This consists of two massive steel rolls of large diameter placed horizontally one above the other and each having at intervals grooves of various sizes. The rolls act in a similar manner to the household wringing machine. They seize the ingot and draw it in between them just as the rolls of a wringer draw in a cloth.

First of all the ingot passes through the largest groove and is squeezed slightly narrower and flatter, while at the same time it becomes longer. After this it is passed in succession through the remaining grooves until, on leaving the smallest one, it is a great deal longer and thinner than when it entered the mill. At this stage also it takes a new name and is known as a "bloom."

From the cogging mill the bloom is passed to a similar mill known as the "roughing mill," in which it passes through a further series of grooves. The grooves in the roughing mill, however, are specially shaped so as to begin to form the bloom into a rail, and on leaving this machine a rail has been produced, but of a very rough shape. Finally the rail passes through more grooves in a "finishing mill," and from the last groove it emerges a perfectly-formed rail, which only needs to be straightened and cut to length.

The rails for British railways are produced in this manner and are of what is known as "bull-head" type. They are 40 ft. or more in length and they weigh from 90 lbs. to over 100 lbs. per yard.

Chairs and Fish-Plates

We come now to the final step. The rails are held in position on the track by cast iron sockets called "chairs" into which they are tightly wedged by blocks of wood known as the "keys." The chairs are fastened by stout bolts to the "sleepers," which are cross-pieces of timber treated with creosote or other preservative to enable them to resist the weather. These sleepers are laid about 30 in. apart upon a bed of ballast about 1 ft. deep. The ballast is packed tightly under and around the sleepers to prevent lateral movement and it consists of gravel or slag or other material that will allow water to drain away readily.

The rails are connected end to end by means of "fish-plates" weighing 33 lb. per pair, bolted through the rails. A small space, generally from $\frac{1}{4}$ in. to $\frac{1}{2}$ in., is left between the ends of the rails to allow for expansion and contraction, due to changes in temperature.

Origin of the name "Plate-layers"

The men who lay down railway lines and attach them to the sleepers are known as "platelayers," and it is interesting to know that this name has come down to us from the earliest days of railways.

The iron rail may be said to have developed to meet the requirements of the English coal industry, particularly in the north-eastern counties. In the early days coal was transported to its place of shipment on horseback, in sacks or otherwise. Later, wagons came into use and to make running easier a "tramway" of flagstones was provided. Wooden rails were later introduced but it was found that they quickly wore away and so thin plates were nailed to them to protect them. Still later, cast iron rails were introduced to avoid trouble with the rotting of the wooden rails. A cast iron road of this kind was called a "plateway" on account of the plate-like form in which the rails were cast, and from that time to the present day, the men employed on the permanent way have been called "platelayers."

Model Loco Trials at Eskdale

Interesting New "Pacific" Scale Model, "Green Goddess"

by Henry Greenly, A.I.Loco.E.

(Author of "Model Railways" etc.)

FOLLOWING the recent exchange of locomotives by the London and North Eastern and Great Western Railway Companies, an interesting series of trials of the largest working model locomotive yet built were made on the 15 in. gauge line that runs between Ravenglass and Eskdale in the Cumberland mountains. The new locomotive is a "Pacific" type model, the external design of which is similar to the L.N.E.R. 4-6-2 type "*Flying Scotsman*" exhibited at Wembley, and to that tried on the Great Western hauling the "Cornish Riviera" express. The model is one-third full size and is nearly 25 ft. in length. It is one of two locos designed by the writer, for Captain J. E. P. Howey, the well-known racing motorist, and was built at the works of Messrs. Davey, Paxman & Co. Ltd., Colchester.

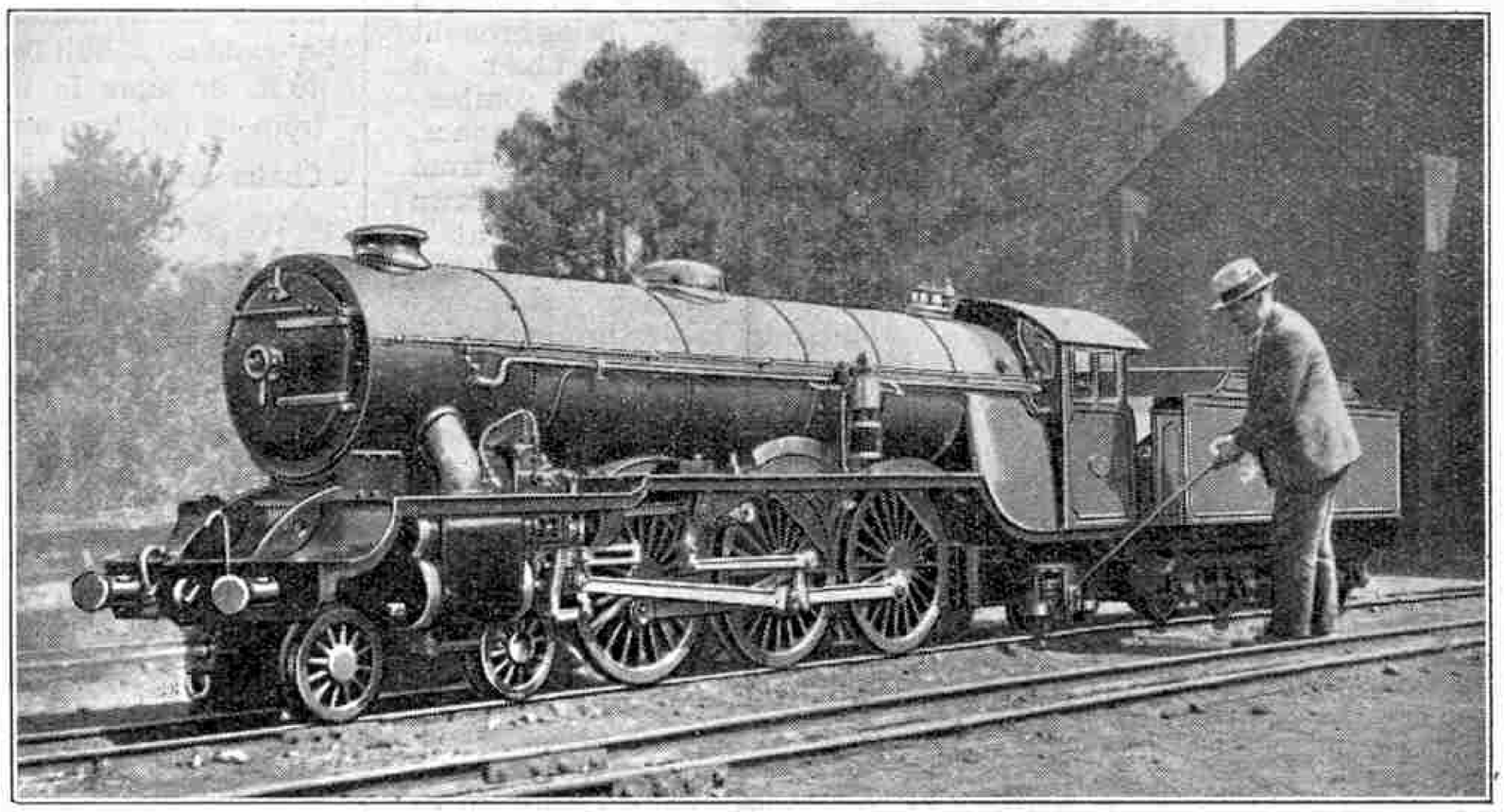


Photo courtesy] [*Miss Mary Fair, Eskdale*]

The Largest Working Model Locomotive, with its Designer, Mr. H. Greenly

The main idea in adopting so large a scale has been to obtain perfect "cab comfort." The loco is large enough to carry two men seated below the cab roof. Speed was considered as well as hauling power, and extreme care was exercised to eliminate all out-of-balance periods.

The Eskdale track abounds in steep gradients and sharp curves and therefore a high average speed is not possible. Notwithstanding this, 35 miles per hour was attained over one part of the line without any extreme effort on the part of the loco. When a suitable railway is available a speed of 40 miles an hour is confidently expected. The load test was a stone train of 34 tons gross. This would represent in a full-size loco a train weight of 918 tons, which is 50 per cent. more than the heaviest load ever put behind the prototype of the engine. Altogether, owner, designer and builder are very well satisfied with the results obtained during the trials.

The loco has two outside cylinders of $5\frac{1}{4}$ in. bore by $8\frac{1}{2}$ in. stroke with 3 in. piston valves. The motion — that is the connecting rods, coupling rods and other moving parts—is made of high-grade nickel steel, every means being taken to make these details as light as possible. The balance is therefore excellent and not the slightest vibration was observed at top speed. The coupled wheels are $25\frac{1}{2}$ in. in diameter, the bogie trailing and tender wheels being 12 in. in diameter. All the wheels are of cast steel, the coupled wheels having separate tyres.

Principal Dimensions of "Green Goddess"

Length	24′ 9″
Width	3′ 1″
Height to top of chimney ...	4′ 7″
Height of boiler centre	3′ $1\frac{3}{4}$″
Boiler barrel	1′ $10\frac{5}{8}$″ diameter
Firebox	2′ $8\frac{1}{4}$″ long by 2′ 6″ wide
Heating Surface	
Tubes	14,500 sq. in.
Firebox	2,800 sq. in.
Superheater ...	1,580 sq. in.
Total ...	18,880 sq. in.
Grate area	687 sq. in.
Boiler pressure	180 lb.
Tractive effort	1,470 lb. at 160 lb. pressure
Adhesive weight	6,600 lb.
Total weight of loco	5 tons 5 cwt.
Total weight of tender	2 tons 10 cwt.
Total weight in working order	7 tons 15 cwt.
Tender capacity	150 gals. water and 5 cwt. coke and coal

The valve gear is the complete Walschaerts type, the primary motion being taken from a return crank on the driving crank pin. The reversing lever in the cab can be operated by a direct push and pull with a screw "vernier" adjustment, and at the trials it was found practicable to haul a heavy train with the gear linked up to give a valve cut-off of 35 per cent. of the stroke.

The tender runs on two boxes with equalised axle-boxes and duplex springs. In order to allow the enginemen to sit as low as possible, a well is sunk in the front part of the

floor of the tender to accommodate their feet and legs below footplate level.

The brake arrangement is unique, both the vacuum and the Westinghouse air pressure brakes being fitted to the engine and tender.

The cab fittings include two water-gauges, vacuum brake gauge, steam pressure gauge, two Westinghouse air brake gauges and a steam-chest pressure gauge that indicates to the driver how much steam he is letting into the cylinders. The whole of the operating gear in the cab is in front of the driver.

The loco is painted the standard "Great Northern" green, with black and white lining, the cylinder casing and footplate edgings being painted a deep red with yellow lining.

The loco is named the "*Green Goddess*," and its appearance on the Eskdale Railway created a great amount of interest among the holiday visitors using the line.

The "*Green Goddess*" will traverse curves of 120 ft. radius, and if a similar model were used on the Eskdale line trains of 250 passengers could be operated regularly. Possibly the results of the trials may induce the management of the Eskdale Railway to adopt locos of the same type.

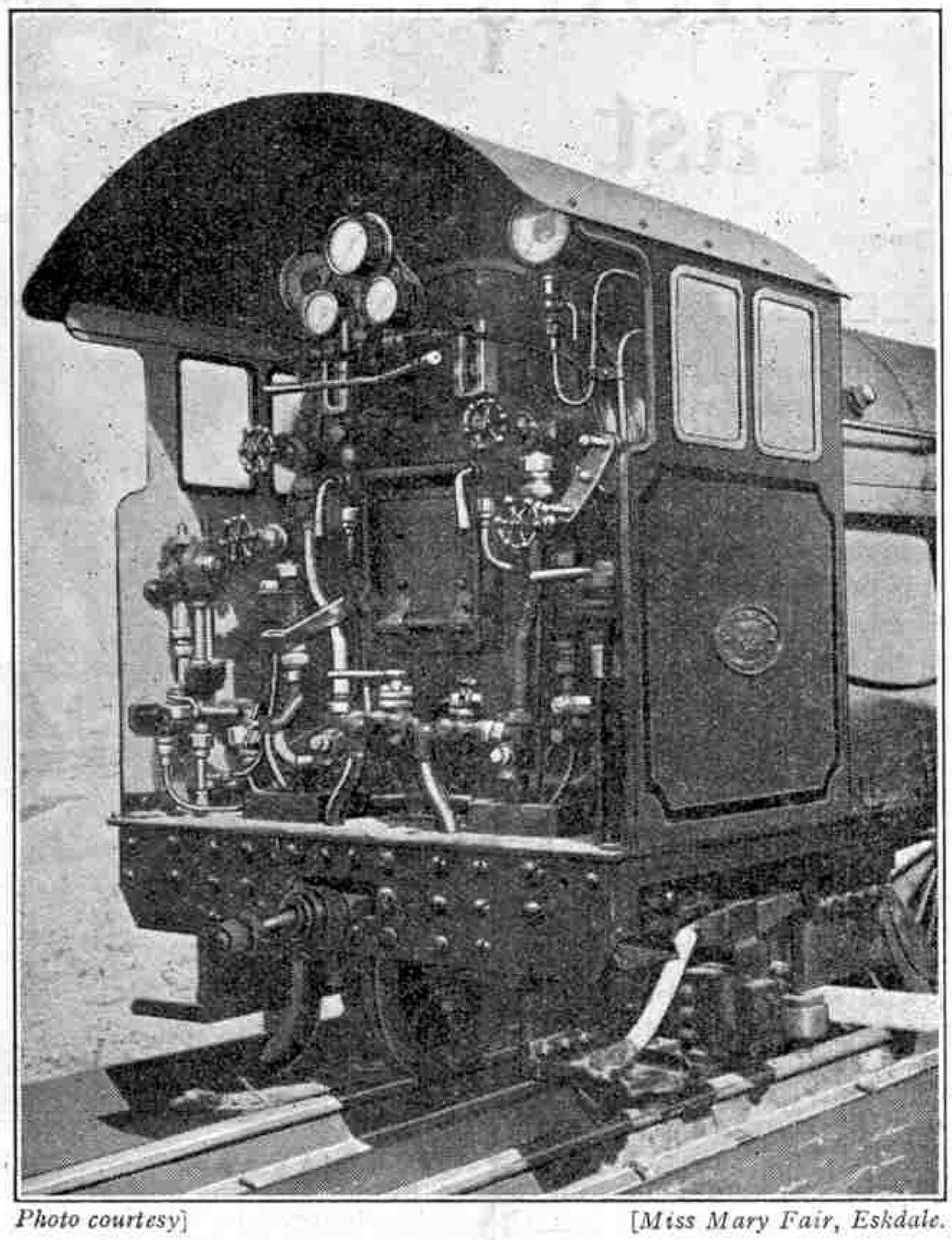
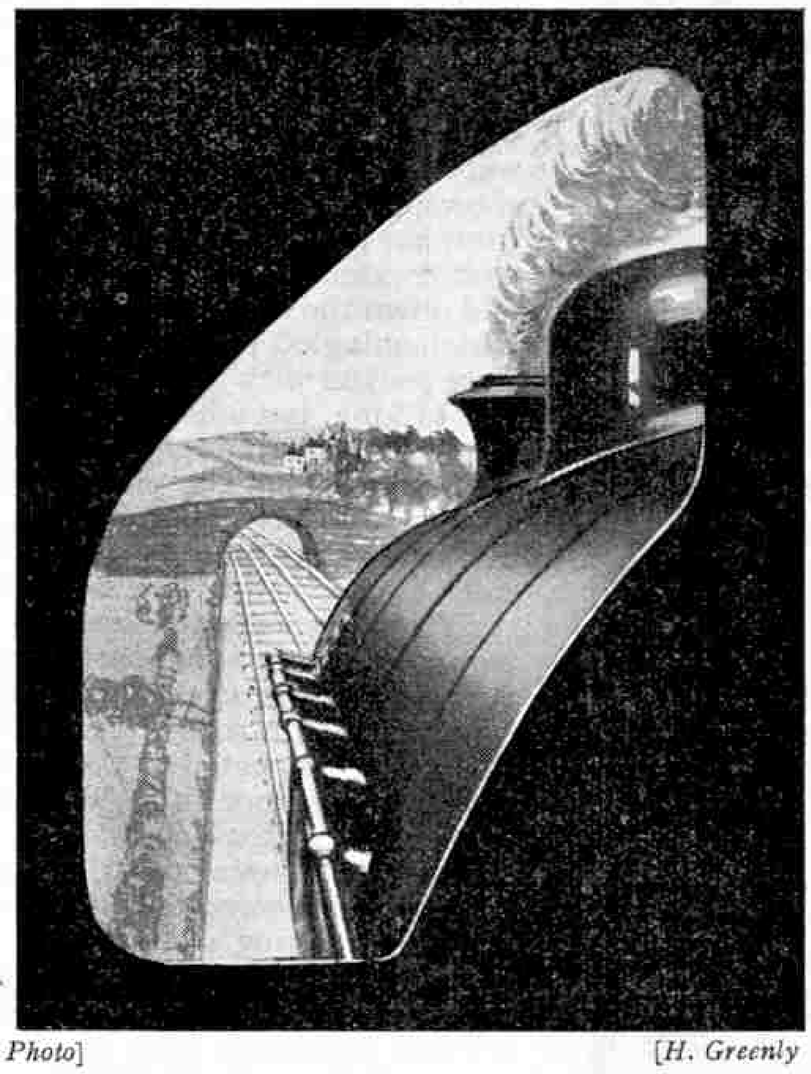


Photo courtesy] [*Miss Mary Fair, Eskdale.*

The Cab of the Model "Pacific" Loco

The ordering of the "*Green Goddess*" and her sister loco "*Northern Chief*" was the direct result of a visit of the late Count Louis Zborowski and Captain J. E. P. Howey—both well-known Brooklands motor racers—to Eskdale in the summer of 1924. The visit was made for the special purpose of inspecting the then new Eskdale Railway 2–8–2 type loco, "*River Esk*," built at Colchester, and comparing it with the pre-war model quarter-size locos running on the same line. There was no doubt whatever about the superiority of the larger one-third size loco in power and comfortable driving, and in the general workmanlike style in which it handled traffic.

On a small railway like the 15 in. gauge Ravenglass-Eskdale line, the limitations of loading gauge are not present as is the case on a full-size railway. There are no tunnels or bridges to clear, and the use of a scale of 4 in. instead of 3 in. to the foot, embodied in the "*River Esk*," "*Green Goddess*" and "*Northern Chief*," is equivalent to using the American loading gauge, or more strictly speaking that employed by our South African railway engineers. In South Africa the standard gauge is 3 ft. 6 in., but many of the locos are quite as big and powerful as, if not more so than, the *average* loco used on the 4ft. 8½ in. gauge in this country.



Photo] [*H. Greenly*

The Driver's View from the Cab and Window of the "*Green Goddess*"

In these engines the cab is big enough for the seated engineman to look through the window ahead

The larger scale of course produces a bigger and heavier engine—8 tons as against 3 tons—but this tends to make the loco steadier in running as well as capable of hauling a full load with greater ease. Cab comfort, which has been mentioned already, is also a very important item in all these three new 15 in. gauge locos. The more spacious cab and the fitting of a well in the tender for the feet allow the engineman to sit down and look through the cab windows in proper style. In the older models the driver was perched up above the cab and was annoyed both by the smoke and by the steam from the safety valve.

The "*Green Goddess*" and the "*Northern Chief*" represent perhaps the nearest approach to the "real thing" that has ever been attempted in model locomotive engineering. It should be added that, owing to the death of Count Zborowski, Capt. Howey now owns both these locos.

The Eskdale Railway

The Eskdale Railway, upon which the trials of the "*Green Goddess*" took place, was formerly the Ravenglass and Eskdale Railway, opened on 24th May 1875. The line failed to pay its way, traffic came to an end, and for a considerable time it remained abandoned and derelict. On 24th July 1911, the present company was incorporated and the line was re-laid on the 15-inch gauge and re-opened on 20th August 1915.

To-day the Eskdale Railway not only carries a steady stream of passengers, but also hauls coal, food and other stores to the villages through which the line passes, besides conveying His Majesty's mails. In short, in spite of its small size this line is thoroughly capable of earning its own living and it has attained the dignity of having the times of its trains recorded in "Bradshaw."

Three Visions of the Past

By Harold Simpson

ONE hot July evening I leaned over the parapet of the bridge that spans the Olive Mount cutting.* Down below in the cutting lay the four sets of rails along which thunder many main-line expresses. Sunshine seldom reaches the bottom of the cutting, and the sides rear themselves black and slimy to a height of nearly 100 ft. from the permanent way. In one part the rails are joined by a branch line, which issues out of a gaping black tunnel cut in the side of the rock. At this point stands a lonely signal box.

As I stood and watched I saw a cloud of billowing smoke in the distance, and with a hollow roar an express drawn by a huge 4–6–0 'Sir Gilbert Claughton'-type locomotive thundered through the cutting, looking almost like a toy from the great height above. As I saw it vanish round a curve and wondered how the great Stephenson could possibly have cut this path through the solid rock, the scene seemed to change and another took its place.

I was standing in the country. Here and there were cottages and farms, and a white and dusty road took the place of the stone bridge on which I stood. A group of men, each clad in white trousers and dark-coloured coats, stood at the side of the road. Round their throats they wore white scarves, and on their heads tall, queer-shaped top-hats. They carried surveying instruments, and one of their number, who seemed to be the leader, was looking at a map and pointing to various places. Another was making notes on large sheets of paper, while others took observations with the instruments. I dreamily realised that the tall man was Stephenson, and that he and his party were mapping out the route that his Liverpool to Manchester railway was to follow.

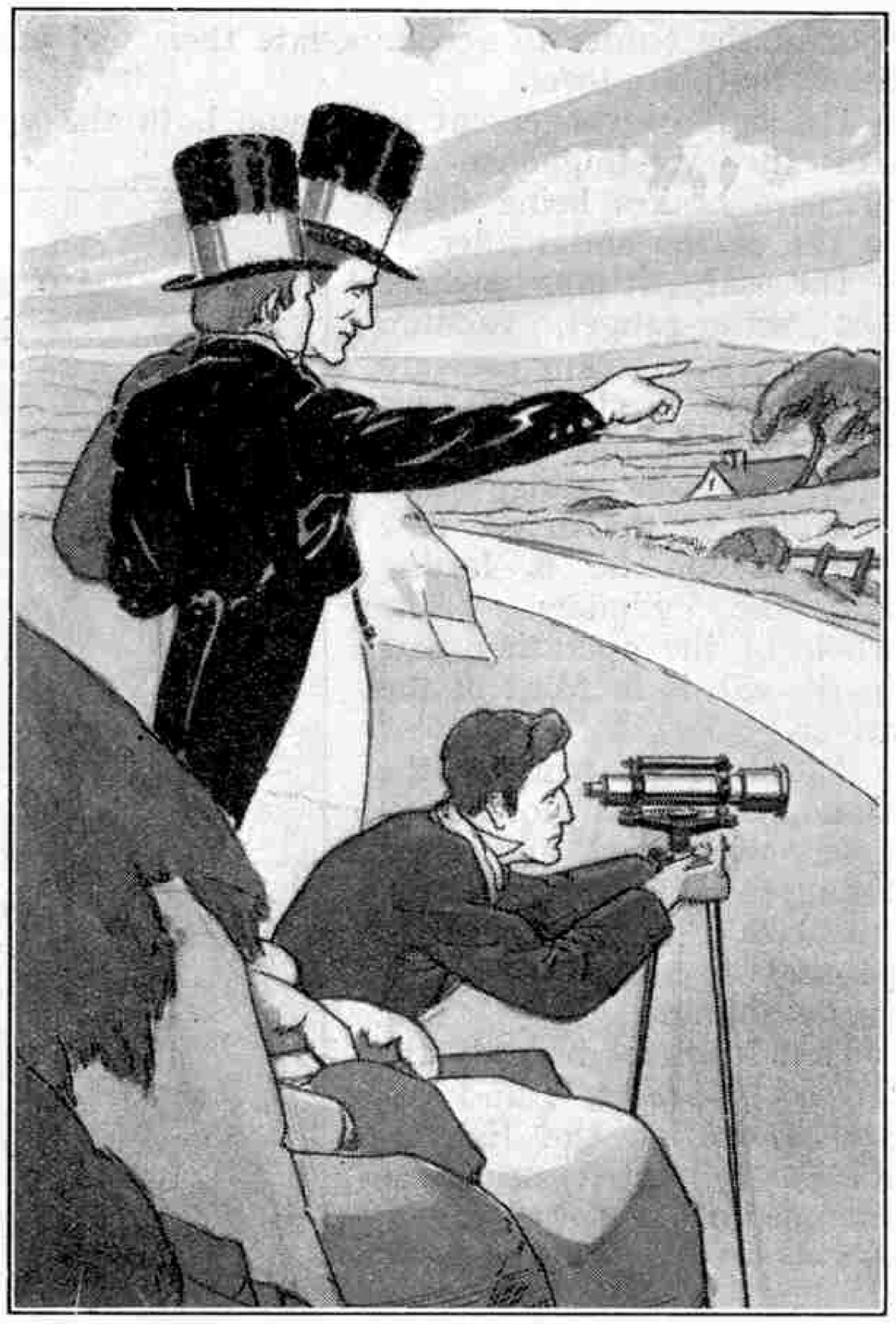
Even as I looked the vision gradually faded, and I became aware of another rising before me. This time it was a scene of great activity on the land where the surveying party had been. Gangs of men were hauling huge blocks of red sandstone on to trucks and leading them away with the help of horses. Down in what was to be the cutting, crowds of men were swinging their pick-axes and using shovels and crowbars. Trains of wagons were being loaded and drawn along temporary rails by horses and ropes. Hoarse shouts, the sound of falling stone, and the clank of the trucks as they bumped buffer to buffer, filled the air. Hundreds of people were clustered on the stone bridge with high parapets that preceded the present-day stone and iron bridge. Crowds of people lined the banks, watching the men straining and working below.

This scene faded away in its turn and a third took its place. It was the opening day of the railway. Hundreds of people lined the banks, and all were eagerly looking down into the finished cutting. The sandstone showed clean and red, and the iron rails below looked thin and spidery from the great height above. The bridge was thronged with spectators and near by stood numbers of coaches and carts. Ladies and gentlemen rode up and down the dusty road on frisky horses, and the sound of creaking carriage wheels mingled with the neighing of horses. Again the banks of the cutting were packed with an excited throng of spectators. Everybody was laughing and talking, but a hush fell on the crowd when at last the firing of guns and the sound of distant cheering was heard. Louder and louder grew the cheers, as they heralded the progress through the Olive Mount Cutting of the first train on the Liverpool to Manchester Railway. The crowd became frantic with excitement, and the people swayed forward and craned over the steep sides of the cutting to view the wonderful train.

The locomotive resembled nothing so much as a round iron barrel mounted on four small cast-iron wheels. It was surmounted by a long chimney, which was nearly red hot, and an intricate assortment of iron bars acted as piston-rods. The cylinders and pistons were on the side of the boiler and connected to the rear pair of wheels. On a little platform behind stood the engineer and his assistant, dressed in white trousers and what looked like a frock coat and a top hat. Steam issued from the numerous joints and the weird contrivance ambled along at about eight miles per hour.

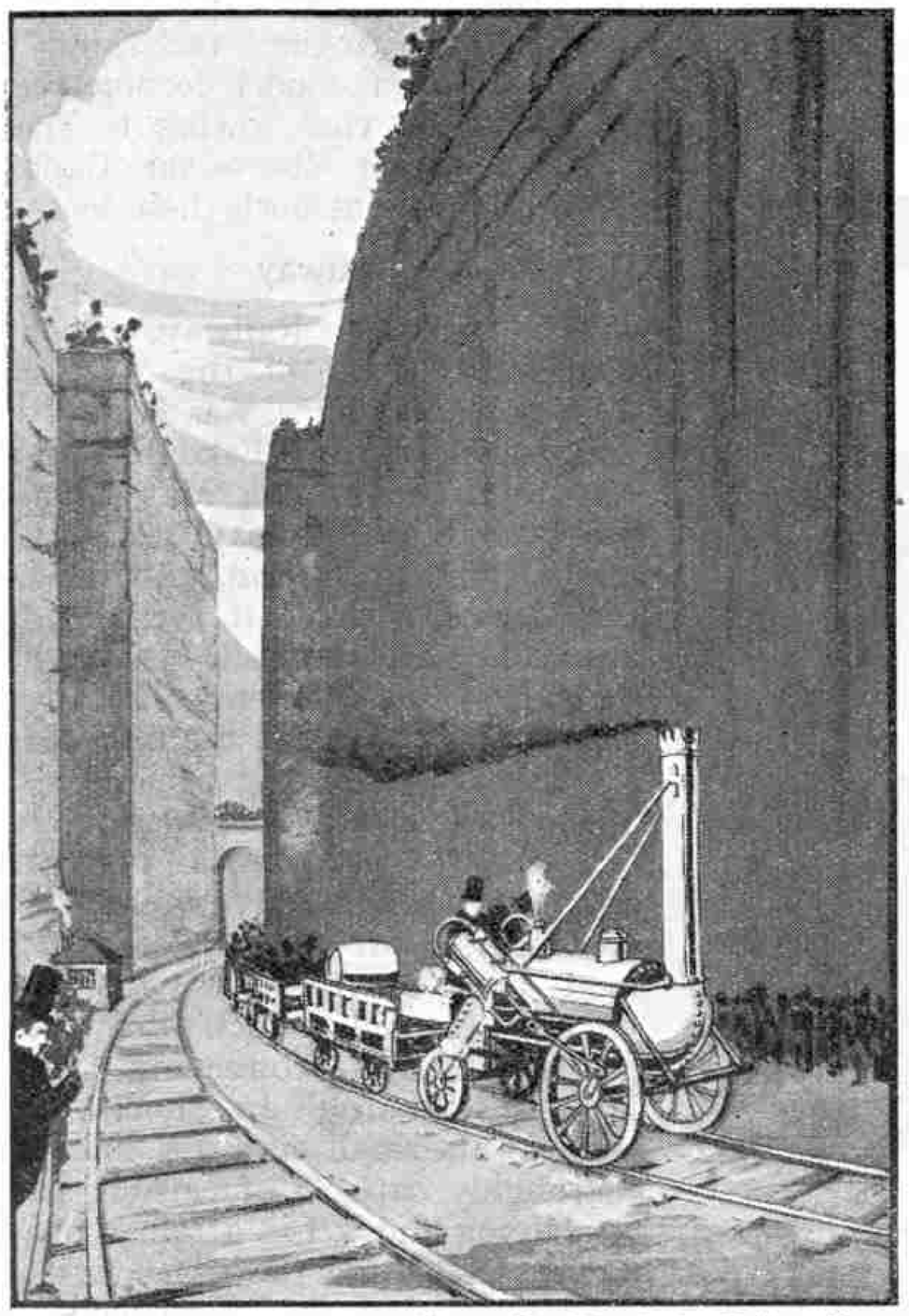
The tender consisted of a kind of wagon surmounted by a water barrel, on four creaking iron wheels. The carriages were like cattle-trucks and were fitted with striped awnings. The guard, perched in a little box on the top of the last carriage, waved a greeting as the train rounded the curve.

I was awakened from my reverie by the scream of a shrill whistle in my ears, and I came back from the realm of fancy to see a long empty "goods" rumble past and disappear into the tunnel. It was growing dusk and a light summer wind moaned through the depths of the cutting. The signal lamps were lighted and gleamed blood-red on the metals, marking the path of the steel monsters that steam by the lonely signal box in Olive Mount Cutting.



"A group of men . . . looking at a map and pointing to various places"

* This is the famous cutting near Liverpool made by George Stephenson.



". . . . the first train on the Liverpool to Manchester Railway"

The Fastest Train in Britain

G.W.R. Swindon to Paddington Non-Stop

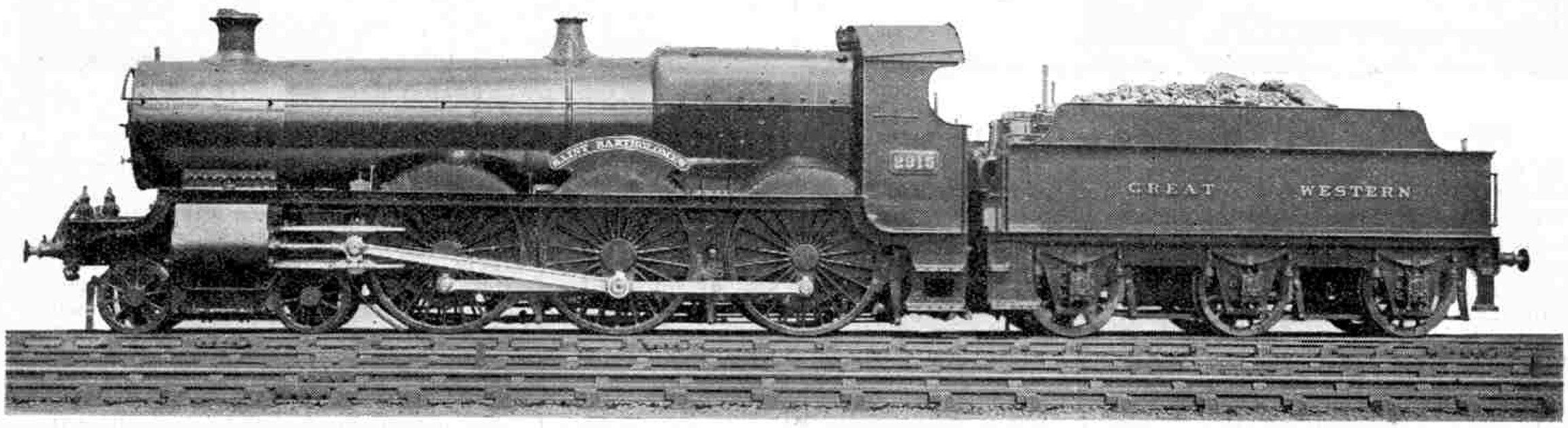


Photo courtesy] [*G.W.R.*

G.W. "*Saint Bartholomew*"

IN the Great Western Railway Company's summer service, the 2.30 p.m. train from Cheltenham is scheduled to make the fastest non-stop run in the British Isles. The train performs the journey from Swindon to Paddington, a distance of 77¼ miles, in 75 minutes. On the first journey from Swindon, by a remarkable piece of good timing, the booked duration of the journey was reduced by three minutes, so that an average speed of over 64¼ miles an hour was attained.

Reaches 83 Miles an Hour

The booked times and actual performance of the train are given in the panel on this page and we feel sure these will prove of interest to the large number of our readers who so closely follow locomotive practice and performance.

Distance from Paddington.		Booked times.			Actual running.		
		Arr.	Pass	Dep.	Arr.	Pass	Dep.
M. C.		p.m.	p.m.	p.m.	p.m.	p.m.	p.m.
77 24	Swindon ...	—	—	3·45	—	—	3·45
53 10	Didcot ...	—	4·9	—	—	4·9½	—
35 78	Reading ...	—	4·25	—	—	4·24	—
24 15	Maidenhead	—	4·35½	—	—	4·33½	—
18 36	Slough ...	—	4·40½	—	—	4·38½	—
9·6	Southall ...	—	4·49	—	—	4·47	—
—	Paddington	5·0	—	—	4·57	—	—

The loco that draws this famous train is "*Saint Bartholomew*," 4–6–0. With a load of nine coaches, weighing 250 tons, the train ran into Swindon station from Cheltenham at 3.40 p.m. Departing from Swindon at 3.45 p.m. left the 77¼ miles to be run in 75 min. This was accomplished, however, in 72 min., and at some points of the journey a speed of 83 m.p.h. was reached.

Seventy miles from London the train dropped into its stride. At Didcot, 53¼ miles from home, the train was ½-min. late, owing to a permanent way restriction. At Reading, however, 36 miles from London, the train was 1 min. to the good. Paddington was reached at 4.57 p.m.

The engine was in charge of Mr. G. H. Flewellen, the chief locomotive inspector of the Great Western Railway, who travelled on the footplate with the driver.

Driver Philip Hopkins had the train under perfect control the whole time. He has been in the service of the Company for 38 years. Fireman F. Bailey was kept fairly busy with the shovel to maintain the requisite amount of steam for such fast running.

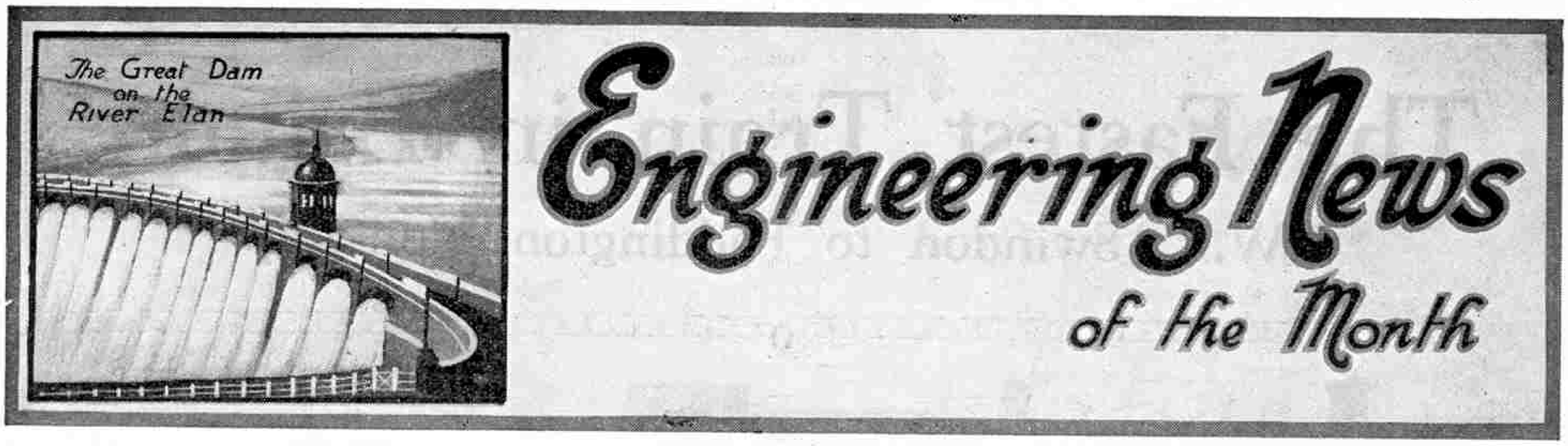
"Ocean" Specials

The above is by no means the only fast train on the G.W.R which rightly enjoys a reputation for speedy running. Recently, for instance, 160 signal boxes between Plymouth and Paddington were linked up in a chain 227 miles in length sending each other the code "Line clear for Plym B." Then the special train conveying the new American Ambassador thundered along on its way to London. Its load of 350 tons was drawn at a speed of 60 miles an hour by the G.W.R. giant "*Shooting Star.*"

It is interesting to learn that to facilitate signalling all the ocean specials leaving Plymouth are coded as "Plyms," the letters A, B, C, etc. being added according to the weight and route of the train.

"Plym A" is the fastest schedule and is timed to do the non-stop run of 227 miles in 4 hours 4 minutes. "Plym B" worked under a schedule of 4 hours 10 minutes, but knocked 10 minutes off her handicap and so beat the fastest schedule by 4 minutes.

On a subsequent occasion passengers who landed from the "*Mauretania*" did the 227 miles' train journey in 243 minutes, or seven minutes under schedule, in spite of three minutes delay by signals.



Future of the Steam Engine

In dealing with the future of coal and steam as motive agents, Dr. J. S. Haldane, F.R.S., recently pointed to the time when the steam engine will displace the internal combustion engine in many of its present uses. This will occur, he stated, even in the case of motor vehicles and aeroplanes. Being a cheaper source of heat, coal will largely displace oil as a fuel for heat engines, and will find many new uses as a primary source of power, particularly when electrical distribution of this power is further developed.

Dr. Haldane drew attention to the present uncertain position as to the use of coal and steam engines for ship propulsion and remarked that it had recently been declared that steam engines were to be more or less superseded, reasons being advanced for concluding that the efficiency of the internal combustion engine, or at any rate the Diesel engine, must necessarily be greater than that of a steam engine. In Dr. Haldane's opinion, however, "steam will beat internal combustion hollow, if lighter and smaller engines and boilers were designed, and this would occur in the almost immediate future."

Dr. Haldane added that in expressing his views he had taken his courage in his hands and thrown academic teaching to the winds. He thought engineers had been prevented from seeing clearly the maximum efficiency of a heat engine, where that efficiency was being needlessly lost, and how the steam engine could be modified to suit varying circumstances without loss or with the minimum loss in efficiency.

In conclusion, he said the subject was one on which depended the future of the great British industries, and particularly the immediate future of the South Wales steam coal and shipping industries.

* * * *

Electrophone Superseded by Wireless

For many years the music, songs, and words of the majority of plays produced in London theatres have been brought to the homes of subscribers on the telephone service by the Electrophone. The service will come to an end at the close of the present month, however, as the electrophone has been "killed" by wireless. A large number of the subscribers have in the past year or two given up the "hearings" in favour of wireless, and as the revenue has in consequence largely decreased, the Postmaster-General has decided to withdraw the licence granted to the Electrophone Company, and has given notice that the service is to be terminated.

A Pioneer of Electric Lighting

The death took place recently in Glasgow of Mr. William Arnot, one of the pioneers of electrical lighting in Glasgow. When the post of Electrical Engineer was instituted in Glasgow in 1890, Mr. Arnot applied and received the appointment. He was responsible for the installation of the system of street lighting, and on the growth of the demand for the new form of illumination he advised the laying down of power stations at St. Andrew's Cross and at Port-Dundas.

* * * *

Big Electric Contracts

The Mersey Power Company are installing additional plant at their Cheshire power station at Runcorn, in order to cope with extensive demands for electricity for industrial purposes.

In this connection the following orders have been placed, involving the expenditure of over £200,000 :—one 12,500 k.w. turbo-generator (Messrs. C. A. Parsons and Co. Ltd.), four 45,000 lb. boilers (Messrs. Babcock and Wilcox Ltd.), and engine room and boiler-house buildings and condensing plant (Messrs. G. and J. Weir Ltd.)

* * * *

New White Star Liner

Messrs. Harland & Wolff, at their Belfast yard have commenced on a large new passenger and cargo vessel for the White Star Line. The new vessel is to be of the "*Regina*" class, only about 1,500 tons larger in her register—viz., about 18,000. She will be of the same length, 575.3 feet, but her beam will be slightly larger. Her speed will be the same as that of the "*Regina*," about 16 knots at sea. She is to be a steel triple-screw steamer and will be built to accommodate a large number of passengers and carry a considerable volume of cargo. She will carry two classes of passengers, and is intended for the North Atlantic service—whether U.S.A. or Canada, or both, is not yet decided. Her passenger accommodation will be of an improved description and embody new features. No date has yet been fixed for the launch.

* * * *

"*Aquitania's*" Record Speed

During a voyage from New York to Southampton the Cunard Liner "*Aquitania*" beat her previous eastbound steaming performances, covering a distance of 575 miles and 579 miles on two successive days.

The average speed for the whole crossing was only a fifteenth of a knot less than her record, which would have been beaten comfortably had not some hours' fog delayed her.

Burst Flywheel Havoc

Five minutes after the engineer had started the engine supplying the power for the North End Cotton Mill, Stalybridge, the flywheel burst, wrecking the engine-room. The engineer had a narrow escape from serious injury and the damage caused a complete stoppage of the mill, throwing about 200 employees out of work. One large fragment, weighing about 20 cwt., shot upwards through the roof into the room above and numerous large pieces were hurled through the outer wall of the engine-room into the canal.

* * * *

Bridge Improvements

The Ministry of Transport have sanctioned a grant of £13,000 towards the cost of improving Clopton Bridge, the grant to be made from funds set aside for the improvement of road bridges. It is understood that the actual scheme approved by the Ministry will cost £20,000.

Outwell Bridge, situated where the Birmingham-Yarmouth road joins the Outwell-Littleport road at Outwell Church, Norfolk, is to be closed for six months for the purpose of reconstruction, a temporary bridge being erected for the use of vehicles with axle loads not exceeding five tons.

* * * *

Government Floating Dock's Voyage to Malta

As mentioned in last month's "*M.M.*" the Government Floating Dock recently arrived at Malta after being towed from the Medway. The Dock originally belonged to Germany, and was one of those surrendered to Great Britain after the war, having previously been stationed at Kiel. The dock is 720 ft. in length and 180 ft. in breadth but a new section (at present being built at Chatham at a cost of £400,000) will increase its length, whilst the lifting capacity will be increased from 40,000 tons to 65,000 tons. When it is completed, therefore, the dock will exceed in size the huge Southampton floating dock and deprive it of its title of the largest floating dock in the world.

From the Medway to Malta is a distance of approximately 2,300 miles, and the dock was towed at an average speed of 3¾ knots. The weather during the journey was fairly good but a long Atlantic swell and strong cross wind was encountered crossing the Bay of Biscay.

Although floating docks have been towed considerably longer distances than this—such as the 14,000 ton dock towed from Rotterdam to Sourabaya, a distance of 8,500 miles—no floating dock approaching the Malta one in size has ever made such a long journey.

G.W.R. Contracts

It is officially announced by the G. W. Railway that contracts have been placed with Messrs. John Brown & Sons Ltd., of Clydebank, for the installation of geared turbines on the S.S. "*St. David*" and "*St. Patrick*" and with Messrs. H. Covington & Sons Ltd., Railway Wharf, Battersea, for dredging at Chelsea and Brentford Docks and Chelsea Creek.

* * * *

New Preston High Power Station

The new Ribble Power Station at Preston has been officially opened by Sir John Snell, Chairman of the Electricity Commissioners. The first steps to secure municipal control over the Preston electricity supply were made in 1922, when the corporation purchased the undertaking of the National Electric Supply Company, which had supplied the town with electricity since 1891. Plans were immediately put into execution for the erection of a big power station of the latest design at Penwortham, about a mile and a half from the centre of the town. The site covers 33 acres and provides ample space for future extensions.

The main turbo-generating plant consists of two sets, each with a normal rating of 12,500 kilowatts at .9 power factor, delivering 3-phase current at 50 cycles, 6,600 volts. The sets run at a speed of 3,000 revolutions per minute, and the guaranteed steam consumption at 10,000 kilowatts output is 9.6 lbs. per kilowatt hour. Provision has been made for a third set and a possible fourth set. Although the normal flow of water alongside the site is sufficient for the first section of the station, by constructing a weir across the river it will be possible to impound sufficient water for condensing purposes for a plant of 150,000 kilowatts capacity.

It is intended that the new station shall eventually supply not only Preston, but coast and inland towns over a considerable area. The scheme provides for the laying of an underground transmission line of 10,000 kilowatts from Blackburn to Preston, which is expected to be in operation before the end of the year. Negotiations have also been taking place between the Preston Corporation and the Lancashire Electric Power Company for bulk supplies for Leyland and Walton-le-Dale, and with the coast town authorities for supplies commencing at 5,000 kilowatts and increasing to 10,000 kilowatts to be given from Preston by the winter of 1926-27 to Blackpool, Lytham, St. Annes, and Fleetwood.

* * * *

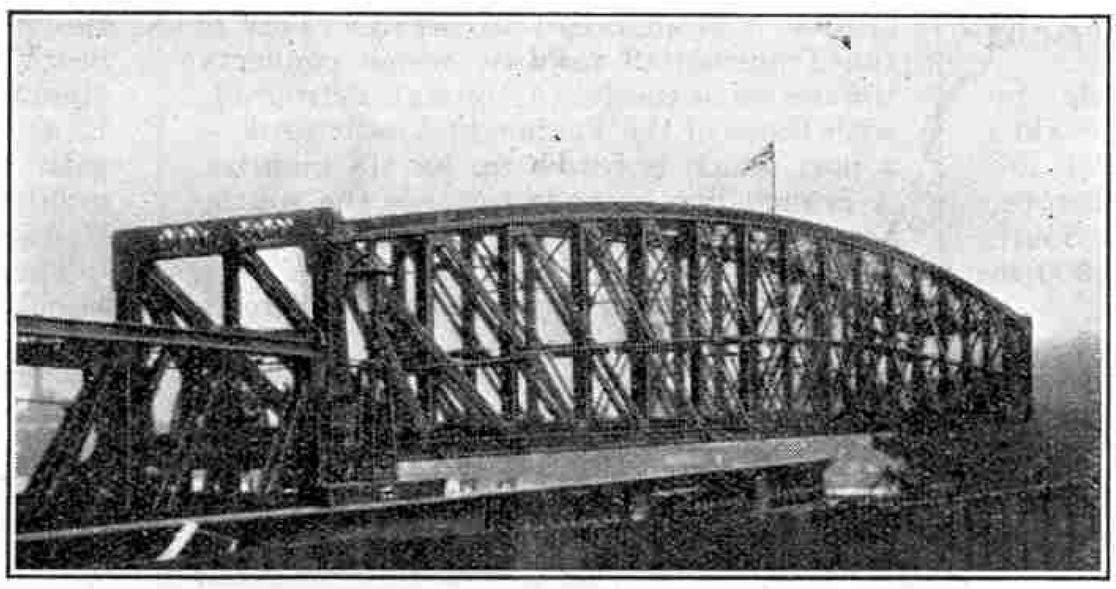
Middlesex Arterial Road

The Middlesex County Council recently approved the construction of an arterial road about seven miles in length from Sudbury Spur to Watford. The total cost is estimated at approximately £360,000, and of this amount a considerable portion will be contributed by the Ministry of Transport.

Big Road Transport Feat

Messrs. Norman Box Ltd., of Rusholme Road, Ardwick Green, Manchester, recently transported a 25,000 k.w. generator stator by road from the works of the Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester, to the new power station of the Liverpool Corporation at Lister Drive, a distance of 40 miles. The stator weighed 90 tons, 13 cwt. and was loaded on a specially built eight-wheeled truck of a tare weight of 16 tons. The road, therefore, had to bear a total load of 106 tons, 13 cwt. The stator was conveyed by three rubber tyred Fowler road locomotives in 15 hours actual running time.

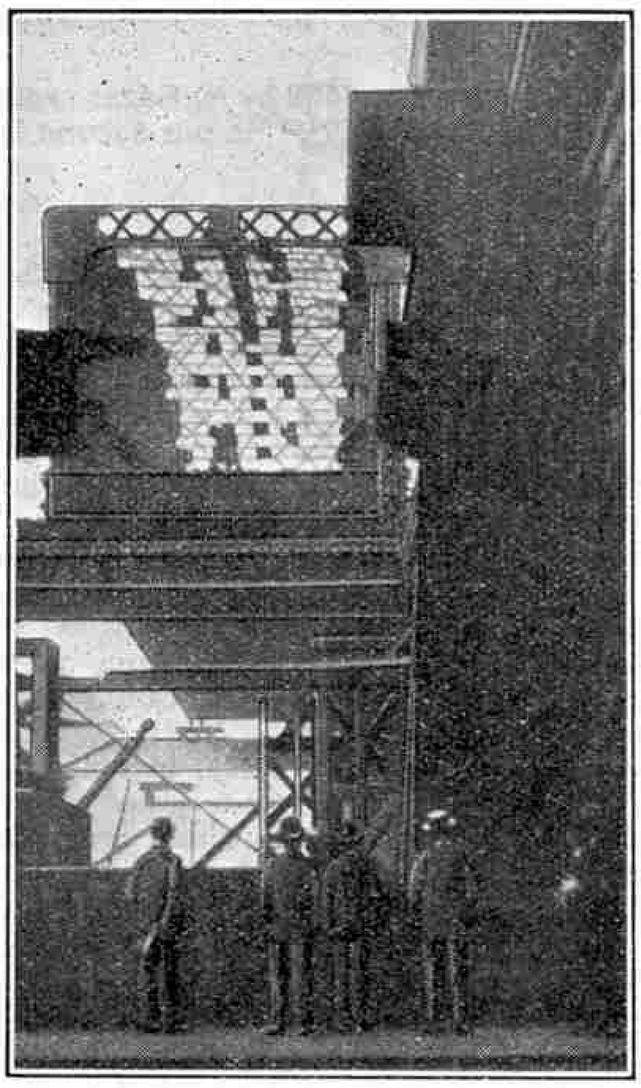
Waterloo Bridge



It has already been mentioned on this page in a previous issue of the "M.M.," that the Waterloo Bridge across the Thames has had to be temporarily repaired owing to a defect. A new span was recently placed in position and the two accompanying photographs, showing this work in progress, have been submitted by one of our readers, S. Shearing of London.

Above is shown the new span raised on two girders midway between the two bridges, and below is the span in position ready to be lowered, as seen from the parapet of the old Bridge.

Next month we hope to publish an account and full particulars of this great engineering feat.



Russia's New Ships

Within the next five years Russia proposes to build 207 vessels, totalling 697,000 tons. In addition contracts will be placed abroad for the building of seven other ships. Both the Germania and Deutsche yards and the British yards hope to participate in these contracts. The German yards would be content with a cash payment of 10 per cent., the balance to be paid out of the profits of Russian shipping in a series of instalments spread over ten to fifteen years. It is expected the English companies will unite to meet this competition, but political reasons are expected to play a part in the giving out of the contracts.

* * * *

Australian Navy

Considerable satisfaction is felt in the ship-building industries at the announcement that the contracts for new cruisers and submarines, amounting to nearly £3,500,000, have been placed with British shipbuilders.

The two cruisers will be built at Clydebank by Messrs. John Brown & Co. Ltd., and each will be of 10,000 tons. These vessels are to be similar to those of the "County" class under construction for the Royal Navy. The main armament for one of the vessels is to be supplied by Messrs. Vickers Ltd., and for the other by Sir W. G. Armstrong Whitworth & Co. Ltd. Contracts for gun mountings have already been placed with each of these firms, at a cost of approximately £350,000, and further requirements will shortly be ordered. The contracts for armour plating have been placed with Messrs. William Beardmore & Co. Ltd., of Glasgow, Messrs. Cammell Laird & Co. Ltd., of Sheffield, and Messrs. David Colville & Sons Ltd., of Motherwell. The new cruisers will be the largest in the southern seas, as the four at present belonging to the Royal Australian Navy are of only 5,800 tons each.

The two submarines forming part of the present programme have been ordered from Messrs. Vickers Ltd., of Barrow-in-Furness.

* * * *

New Hull Bridge

A new North Bridge, which is estimated to cost £275,000, is to be built at Hull.

* * * *

Repairs to Canal Swing Bridge

Owing to the base upon which it turns having shown signs of wear, the 1,200 tons steel swing bridge over the canal at Stockton Heath is to be closed to traffic for six weeks, commencing in September. The bridge connects the Warrington-Northwich main road leading to the heart of Cheshire and thence to the midlands, and has been in constant use since the opening of the Ship Canal in 1894. A ferry service is to be instituted for the use of passengers who normally use the bridge.

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for this page are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

The Railways of the World

According to a summary made by authorities in New York, of the world's 740,000 miles of railways, 260,000 are found in the United States. In Europe, 220,000; 77,000 in Asia; 60,000 in South America; 30,000 in Africa and 26,000 in Australia.

The proportion of miles of railway per thousand square miles area is 89 miles in the United States; 57 in Europe; 8 in South America; 8 in Australia; 4 in Asia and 2½ in Africa.

A great part of the prosperity of the United States has arisen from the activities of the eight transcontinental lines that connect the Pacific Coast with that of the Atlantic. By means of the junctions in the Mississipi Valley freights may be taken to any of the Atlantic or Mexican Gulf ports.

Canada has two distinct transcontinental lines, and Mexico two also:—the Tehuantepec line, and the Veracruz to Mexico line, this latter afterwards continuing to the Pacific.

Nicaragua has its line, as also has Costa-Rica, connecting the waters of the Pacific with those of the Caribean Sea, and the Panama railway, which runs parallel to the Canal.

Strangely enough, South America, with such fertile territory, has only one line, which extends from Valparaiso, on the Pacific, to the Argentine system. This is centralized in Buenos Aires, and is often paralized for weeks on end on account of winter snowstorms.

Africa, with an area 50% greater than South America, does not yet possess any transcontinental lines. The joining-up of the German South-west African lines, with the railway systems across British South Africa and the Transvaal, makes transport by railway possible over the southern portion of that continent, from the Atlantic to the Indian Ocean.

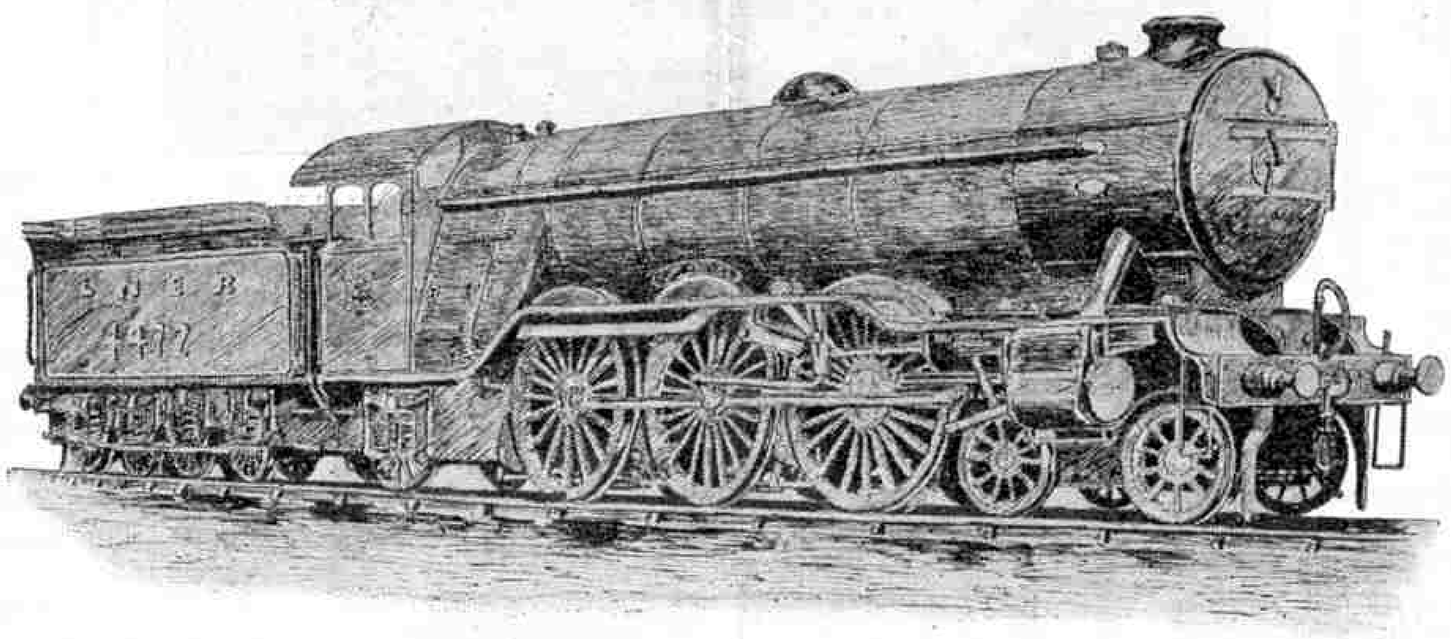
Another undertaking, in one-time German Africa, is being brought to a head. This is the railway from Dar-es-Salâm, on the Indian Ocean, to Lake Tanganyika. Another line of interest will be the railway which will connect Beira (Portuguese East Africa) with Lake Nyasa, crossing the River Zambesi.

Europe possesses only one line that crosses it from ocean to ocean. This is the Transiberian railway, which connects the waters of the Baltic through Petrograd, with those of the Pacific, at Vladivostok—a port which is frozen up for six months. A branch line extends towards the south, across Manchuria to Port Arthur, which is always free from ice.

In the Southern part of Eurasia there is another important transcontinental system under projection, and it is nearer to completion than is generally known. This continuous system will take advantage of the great European systems, which centre on Constantinople, and from there will connect with Bagdad, from where passengers will proceed by steamer to Karachi, the western terminus of the railway system of India. From this place they will cross India to Kin-Long, on the south-west coast of China, from which point another line as far as Chung-King, at which spot the River Yang-tse-Kiang commences to be navigable, is projected.

The construction of 150 miles of railway will see the completion of direct communication, in ten or twelve days, by rail and water from London to Shanghai.

H. Ellis, (Leeds).



This drawing of L.N.E.R. 4-6-2 Loco No. 4472 by N. Edgar (age 16) of Blaydon-on-Tyne, was awarded First Prize, Class A (Tie), in our Second Drawing Contest.

A Loco Mystery Solved

At some time or other many Meccano boys have taken, or now take, the names and numbers of railway locomotives, and doubtless in doing so have seen some peculiar names. But what would they think if they saw a London, Midland and Scottish loco named "*Cash or Hire*"? Probably they would rub their eyes and look again! However, this particular loco was seen recently by the writer in the round-house of the L.M.S. (Midland Section) Locomotive Shed at Belle Vue, Manchester. She is a six-coupled tank loco, L. & Y. type, wheel classification 0–6–0 T, with outside cylinders. She bears the number 499, and was built by the L. & Y. Railway at Horwich in 1897.

The mystery of the unusual title of this loco is now revealed. Originally the owners of No. 499 were the Lancashire and Yorkshire Railway before absorption in the London Midland and Scottish, and in its old L. & Y. livery the loco had the name of the company painted on the side tanks in full. At a later date some humorist had blacked out all the letters in the double name until the legend ran "Cash or Hire"!

Regarding names, the writer was travelling on the L. & N. W. Section of the L.M.S. a short time ago, and just before running into London Road (Manchester) station he saw three 4–4–0 type L. & N. W. locos coupled together and running parallel with his train. They were all of the George V. class and bore the names, "*Wild Duck*," "*Pheasant*" and "*Partridge*"—a curious coincidence.

A. Dean (Manchester).

Adopting the Midland Style

In travelling on various sections of the London Midland and Scottish Railway I have been struck by the number of new locos of the familiar Midland type as previously built at Derby. A recent run from Crewe to Carlisle was made behind a 4–4–0 compound built at Derby, and instead of one of the famous Caledonian locos taking charge at the Citadel Station, another Midland 4–4–0 compound continued the run to Glasgow. Large numbers of this class are being built, some of them in Scotland, and they are exactly like the original Derby engines except for having shortened chimneys and being driven from the left-hand side of the footplate like the North-Westerns.

The large numbers of admirers of the handsome crimson-painted locos are much pleased at this tendency to keep "Midland" very much to the fore in "London Midland and Scottish."

W. Roberts (Carlisle).

HOW TO MAKE

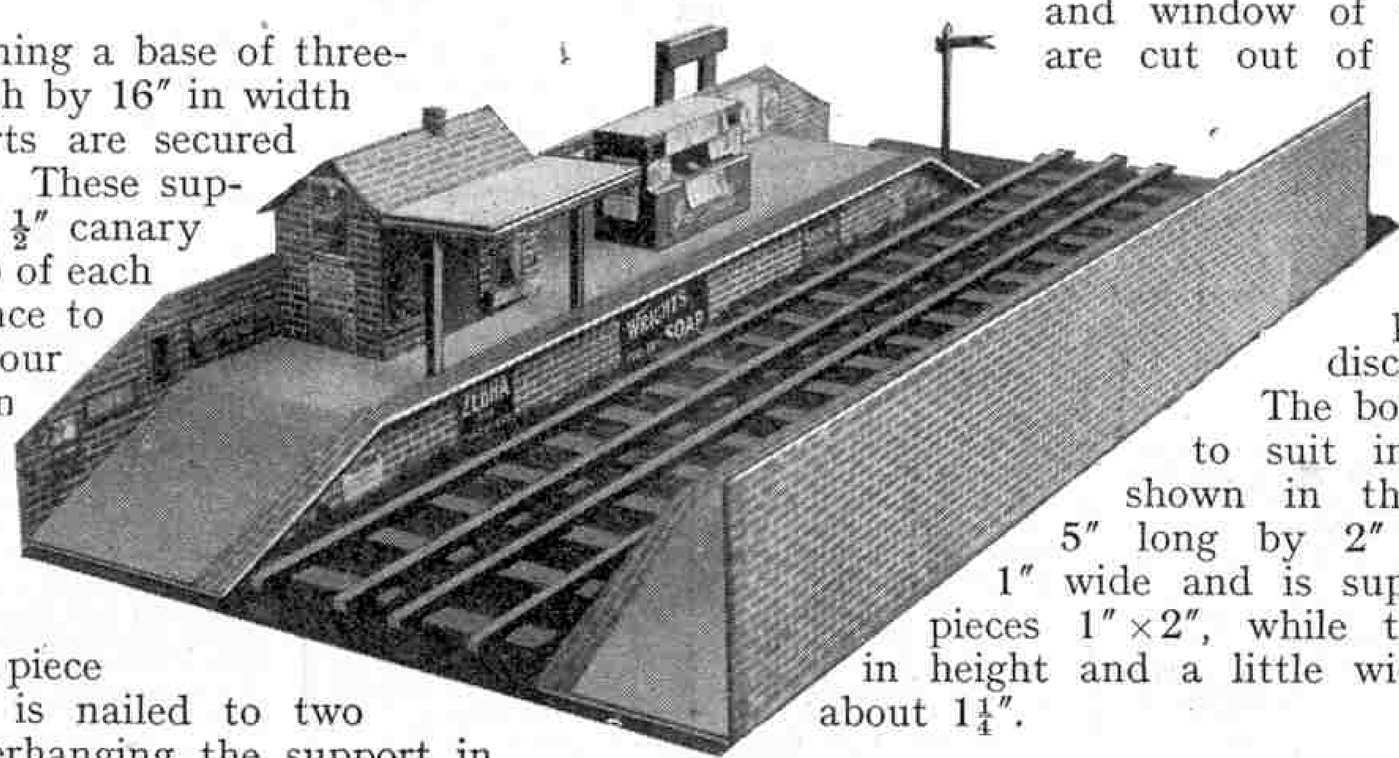
A Model Railway Station

by

W. H. Chapman

READERS who are fond of carpentry will be interested in building the railway station shown in the accompanying photograph. Its construction is quite simple.

Commence by fashioning a base of three-ply wood, 38½″ in length by 16″ in width Four platform supports are secured length-wise upon this. These supports may be made of ½″ canary wood, 36″ × 2″. The top of each support should commence to taper downward about four inches from the ends in order to take the sloping ends of the platforms.

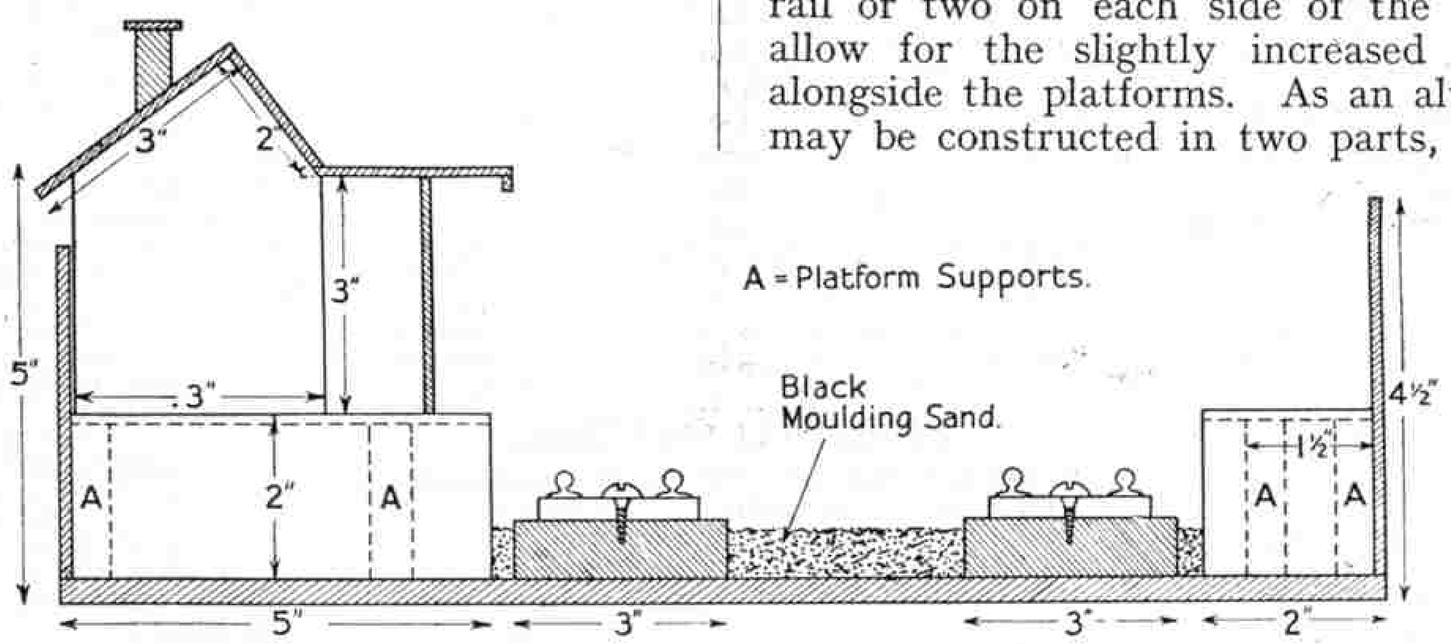


Making the Platforms

The main platform, a piece of three-ply, 28″ × 5″, is nailed to two supports, one inch overhanging the support in the front, or rail side, of the platform. Two further pieces of the same wood, 4½″ × 5″, are placed on the supports at each side of the platform to form the sloping ends. The smaller platform measures 28″ × 2″ and is constructed with sloping ends in a similar manner.

As will be seen in the photograph, the base of the model exceeds the length of the platforms by 2½″ at the further end. The side walls of the station may now be placed in position, and these should be about 4″ in height.

The main station building is in canary wood. The back and front measure 3″ × 6″, and the dimensions of the sides are shown in the accompanying drawing. The awning is made of three-ply wood clamped in position by the roof, and a small piece of wood glued to the latter represents the chimney. When the building is completed it may be held in position by screws passed through the wall of the station.



Adding a Realistic Touch

The whole is given a very realistic appearance by pasting down brick-paper on the walls of the station house, the backs of the platforms and on the front platform supports, as shown in the photograph. Brick-paper suitable for this purpose may be obtained from any "Hobbies" dealer.

Sand-paper glued to the platforms makes very good imitation asphalt, and the effect is completed by edging with blue or other light-coloured brick-paper. The door and window of the "waiting-room" are cut out of coloured paper and pasted in position.

Finally, miniature advertisements may be pasted on the walls at various points at the builder's discretion.

The bookstall may be made to suit individual tastes. As shown in the photograph it is 5″ long by 2″ high. The roof is 1″ wide and is supported by two side pieces 1″ × 2″, while the bookstand is 1″ in height and a little wider than the roof—about 1¼″.

"Bolster-up" the Sleepers

All that now remains to be completed is the track. For this, sleepers are carefully secured to the base as shown, and over these the ordinary rails are carried. By laying down black moulding sand, leaving the sleepers half buried, the model is given a still more realistic appearance.

In laying down rails with this model it may be necessary to "bolster-up" the sleepers of the first rail or two on each side of the station, in order to allow for the slightly increased height of the rails alongside the platforms. As an alternative the station may be constructed in two parts, separating the platforms and so dispensing with the centre track portion. Although this arrangement may be useful for some purposes, it does not, of course, make such an effective model.

The photograph and sectional drawing here reproduced should show any detail not fully explained.

A railway station is always a fascinating model to construct, and that described above will prove very useful to every owner of a Hornby Train, for it is in proper proportion to the Hornby rolling-stock and accessories.

Many other improvements that may be readily added will probably occur to the builder, such as the addition of seats, nameplates, etc., all of which may be easil fashioned from wood.

"The Protection of Birds"
By Lewis R. W. Loyd.
(Longmans, Green & Co., 3/6 net).

All those who are fond of wild birds are intereste l in their protection and they will find much that is worth reading in Mr. Loyd's book. A great deal of enthusiasm has been worked up recently for the work of the Royal Society for the Protection of Birds. The aims of this Society are, of course, excellent, but Mr. Loyd points out that in certain respects the Society has shown enthusiasm in the wrong direction and produced effects exactly opposite from those intended. He instances the indiscriminate protection of all sea birds, large and small alike, which in some cases has resulted in a great decrease of the smaller, less fierce but decidedly more interesting birds, owing to the increase in their gull enemies. Mr. Loyd also makes a spirited reply to the accusation that collectors are responsible for the diminishing numbers of the rarer birds.

"Bauxite and Aluminium"
By W. G. Rumbold.
(John Murray, 6/- net).

This volume, one of the Imperial Institute monographs of mineral resources, gives an up-to-date account of the sources, preparation and uses of aluminium, which in many respects is one of the most interesting of metals. Aluminium is more abundant in the earth's crust than any other metallic element, but its existence as a metal has only been proved within comparatively recent years. In this short period, however, a gigantic industry has been built up and it would be difficult to imagine the world to-day without aluminium and its alloys.

"Electricity for Everybody"
By R. Borlase Matthews.
(The Electrical Press Ltd., Fisher St., London, W.C.2, 7/6 net).

The third edition of this valuable little book contains much that is new and at the same time the old matter has been brought up to date. It covers practically every point that is of interest to users of electricity, and is written in a clear non-technical style. The book is, indeed, a miniature encyclopædia of electricity as used in lighting and heating our homes and in driving the machinery of factories and workshops.

"The Elements of Mechanics"
(By F. S. Carey & J. Proudman.
(Longmans, Green & Co.)

This volume is one of Messrs. Longmans' modern mathematical series. It deals exhaustively with mechanics, largely from the mathematical point of view, and therefore is of particular value to students in technical schools and elsewhere. One of its most valuable features is a series of worked examples which are of great assistance in solving other problems. The answers to the examples in each chapter enable the students to test the accuracy of his work.

"Wireless World and Radio Review"
(Wireless Press, London. Price 4d. weekly).

During the past month the "*Wireless World*" has contained an even larger number of interesting articles than usual. For instance, No. 311 contains a description of the new sodion valve, which is specially efficient in the detection of weak signals, and a review of recent broadcasting developments in Holland. No. 313 includes a very valuable survey of American developments in wireless transmission of pictures. The illustrations in this article are very striking and enable one to realise the progress that has already been made in this fascinating side of radio.

"Stamp Collecting Year Book"
Publishers—89, Farringdon Street, London, E.C.4.
Price 1/-. Cloth 2/-.

The first edition of the "*Stamp Collecting Year Book*" contains particulars of Philatelic books issued during the past year, a very useful table of the world's currency in which the nominal equivalents are given, a glossary defining philatelic terms, a list of Philatelic Societies and Exchange Clubs both at home and abroad, and similar information.

The book will be of interest to all serious collectors and more particularly to stamp dealers and members of Philatelic Societies.

"The Wonder Book of Railways"
(Ward Lock & Co. Ltd., London. Price 6/- net).

The latest edition of "*The Wonder Book of Railways*," edited by Harry Golding, F.R.G.S., comes at a very opportune moment in relation to the railway centenary. It is certainly a remarkable volume covering practically the whole ground of railways. Any boy who reads through it cannot fail to acquire a sound working knowledge of every branch of railway practice. Perhaps the most striking feature of the book is the manner in which the various technical and mechanical details are explained in the simplest possible language that can be understood by the youngest reader without effort. At the same time there is nothing whatever childish about the book.

Illustrations are provided on an exceptionally lavish scale. There are twelve excellent coloured plates and nearly 300 other illustrations, all of which have been carefully selected in relation to the text.

Advantage has been taken of this new edition to bring the book completely up to date and the information it contains is thoroughly reliable and accurate. The book should be in the possession of every Meccano boy, and in fact of everybody, from the youngster who "wants to be a driver" to the elderly season-ticket holder.

"The Railways of Great Britain"
By G. Gibbard Jackson
(Boys' Own Paper Office, London, 5/- net).

Mr. G. Gibbard Jackson's name is already familiar in connection with his earlier book, "*All About British Railways*." In the present volume he tells the story of the rise and progress of British Railways from their earliest days up to the date of their grouping. Each of the great pre-grouping lines has a section to itself in which its story is told in a most interesting manner. The whole book is well illustrated by excellent photographs and can be recommended to all who wish to know something of the railways on which they travel day by day.

"The New Photographer"
(41, North John Street, Liverpool, 2d. weekly).

This weekly paper, although comparatively young, ranks high in the estimation of the photographic world. Perhaps its greatest value lies in its articles specially written to help the beginner. An interesting feature is a page devoted to beginners' prints, a selection of which are illustrated and criticised in a most helpful manner. The more advanced amateur is also well catered for. In the issue for 15th August, for instance, we find an article on the photography of golf; the first of a series of articles on photography in the Zoo; and an article on portraiture, one of a series of talks on free-lance photography.

"*The New Photographer*" has struck out a line for itself in regard to competitions, for these are so graded that even the youngest beginner will find a section in which he may compete with every hope of success, and without feeling that he has no chance against more experienced workers. In short, this interesting journal provides expert advice and tuition in all branches of photography at the modest cost of 2d. per week.

"Conquest"
(Iliffe & Sons, London. Price 1/- monthly).

The most striking feature of the August issue of "*Conquest*" is a well-illustrated article on the forest elephants of Africa, in which Mr. R. I. Pocock, F.R.S., discusses the evidence for the existence of true pygmy elephants. The recent excavation work in Palestine forms the theme of an article by Mr. H. J. Shepstone, F.R.G.S., in which we are told how the site of Capernaum has been definitely located and the remains of a synagogue found that is believed to be the one in which Christ preached. Other articles deal with the life stories of furniture beetles, the uses of vegetable ivory and the possibilities of short wave wireless. Another article, which no doubt will be particularly interesting to lady readers, deals with the new industry of Angora rabbit wool farming.

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FOYLES,

121-5, CHARING CROSS ROAD, LONDON, W.C.2

In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives hundreds of letters each day, but only those that deal with matters of general interest can be dealt with here.

Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.

N. Ward (Halifax).—We congratulate you upon your generous gift of your prize to the Royal Halifax Infirmary for the benefit of young sufferers. This shows the real Meccano spirit and we are sure the thought that the poor little chaps in the infirmary are enjoying Meccano will give you a great deal of pleasure. We agree with you in wondering how boys can read rubbish of the "Deadwood Dick order" when they can get the "*M.M.*" Your suggestion that we should publish books for boys is very interesting, but we are afraid that we cannot adopt it at present.

P. Bromley (Exeter).—Now that you have "taken the bull by the horns," as you put it, we hope you will write to us regularly. We appreciate your enthusiasm about the growth and improvement of the "*M.M.*" since 1923 and we hope to more than maintain this improvement in the future. The short story you thought of in bed is quite good:—"Boy Nile, Had swim, Crocodile, Did for him," but you know you really ought to have been asleep!

J. A. Webster (Hartlepool).—We shall be glad to hear from you once a week as you promise. This should help to improve your handwriting, which, in spite of what you say, is not bad. The Boys' Brigade is a fine movement and we are pleased you enjoy the drill.

C. Jolliffe (Holt).—We welcome you as a newcomer to Meccanoland and we hope to hear from you often. We hope shortly to illustrate models made with the lower outfits

C. Longland (Songea, Tanganyika).—Your photograph is an interesting one, and if you had sent us a good print we should probably have published it. The storm evidently had no effect on either yourself or your native helper, judging by your smiles. We will find an English correspondent for you.

W. Wagner (Kimberley, S.A.)—We keep a special album for photos of overseas Meccano boys and yours now adorns one of its pages. Thanks, William, we are all quite happy and contented.

D. Rowberry (Amblecote, Stourbridge).—"There are only two boys in my class who are not Meccano boys, and they generally get bumped!" We were delighted to hear that you had won a scholarship and particularly to know that you had derived so much useful knowledge from the "*M.M.*" It is an excellent plan to take your Magazine to school, but we are not quite sure that we can approve your method in dealing with the "outsiders." Perhaps a little gentle persuasion might be more effective than "bumps."

E. R. Shaw (Calcutta).—We hope you will be successful with your model of a warship. Send us details and a photograph. In your part of the world you must have various experiences that would be of interest to our home readers, so do not forget our "Readers'" page.

F. J. Koot (Rotterdam).—Many thanks for your interesting letter. You write English remarkably well and we are not at all surprised to hear that you are able to read English books on your favourite subject, aeroplanes. We shall be glad to receive your article and, if it is of sufficient interest, to publish it. Do not worry about any deficiencies in your English for we are always glad to put readers' articles into shape for publication.

A. Lansdell (Montreal).—Your river trip must have been very interesting and we should like to have been with you. The boat you saw without a funnel was most likely driven by internal combustion engines. Many ocean-going motor liners have already been built and several quite large ones fitted with Diesel engines are now in course of construction. We are glad to hear that you are a Scout and we are sure that your various camps and outings must be very pleasant. Write again soon and tell us of your doings.

T. Maston (Otley, N.S.W.)—We are always glad to receive letters from "down under." The floods you describe must have been very terrible. We get floods here occasionally but they are small compared to those in your country. We are interested to hear that your outfit has now grown to a No. 4. It gives us great pleasure to feel that the "*M.M.*" is giving pleasure to readers so far away. If you are a photographer we should like to see a few snapshots of scenes in your part of the world.

New Series of 2-6-4 Tank Locos

For the Metropolitan Railway

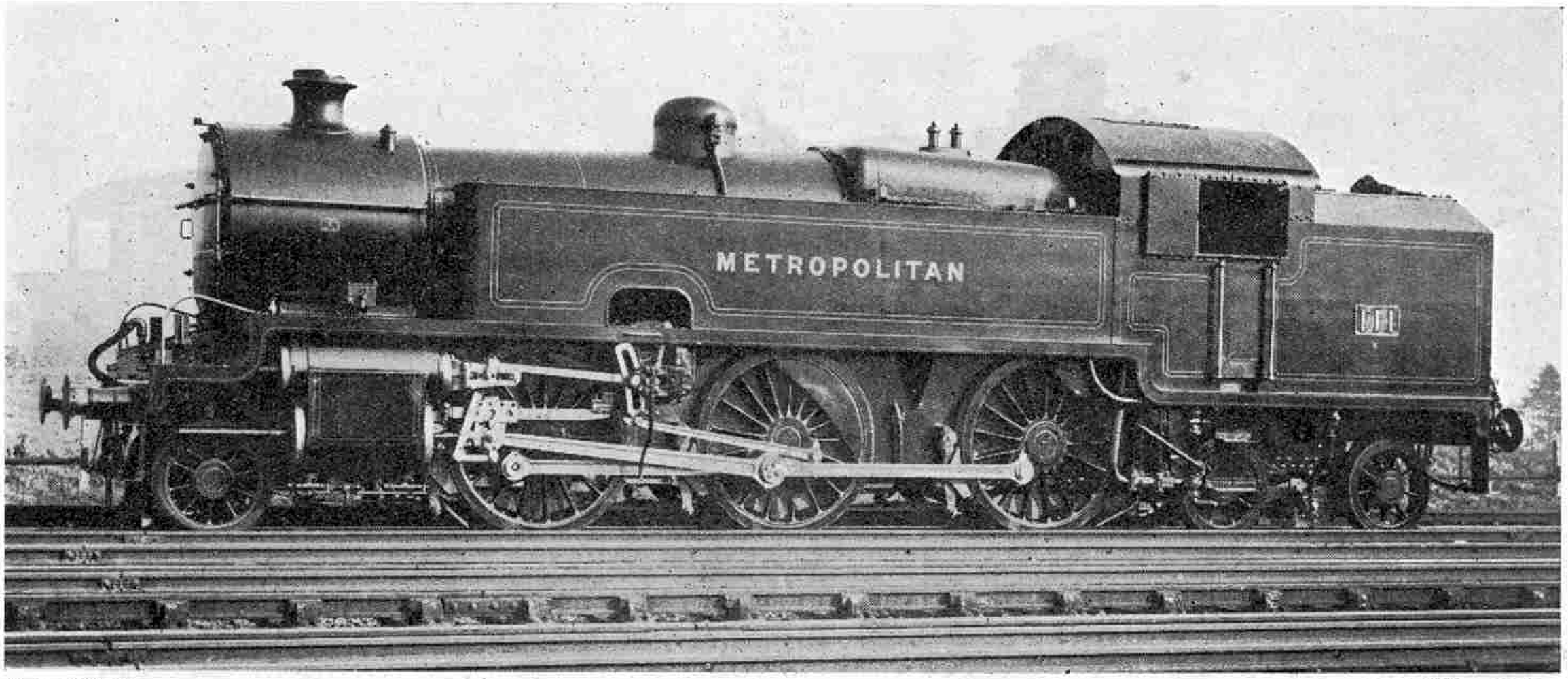


Photo courtesy] [*Metropolitan Railway*

Metropolitan 2-6-4 Tank Loco for Main Line Goods Traffic

BY the courtesy of the Metropolitan Railway we are able to illustrate one of a new series of six Tank locomotives, now in service and engaged in hauling goods traffic between Finchley Road and Verney Junction. These locos, which are of considerable size and power, were supplied by Messrs. Armstrong Whitworth & Co. Ltd., of Elswick, Newcastle-on-Tyne, some of whose locos were described in our May issue.

Certain parts of the new Metropolitan locos were supplied by Woolwich Arsenal from the stock of locomotive components manufactured there in 1920, whilst other parts were manufactured by Messrs. Armstrong Whitworth & Co. Ltd., themselves.

Special Cylinder-Release Gear

It will be seen from the photograph that although the new locos are of the 2–6–4 type, the spacing of the driving wheels is the same as that of the 2–6–0 tender locos. This was necessary in order that the new locos could use the existing frames and other parts available at Woolwich, which were those of tender engines only. The frames were lengthened, however, to take the bunker supported by the trailing bogie. The total overall length of the locos is 44 ft. 10¾ in.

The cylinders are 19 in. in diameter and 28 in. in stroke. They are placed outside the frames, steam being distributed by piston valves actuated by Walschaerts gear. The cylinder-release gear has been specially designed to clear the third rail in the Metropolitan electrified lines.

The boilers are each fitted with a live steam re-starting injector and one exhaust steam injector, the mountings being of the standard type. The firehole door is of the Metropolitan standard pattern.

The Enclosed Cab

The cab is fitted with lockers and tool chest and has sliding windows so that it may be completely enclosed.

The side tanks and rear tanks are of sheet steel $\frac{5}{16}$ in. thick. The draw-hooks, screw-couplings, lamp and destination board brackets, hand-brake gear, and trailing sand boxes, are all designed to conform with the Metropolitan Railway requirements.

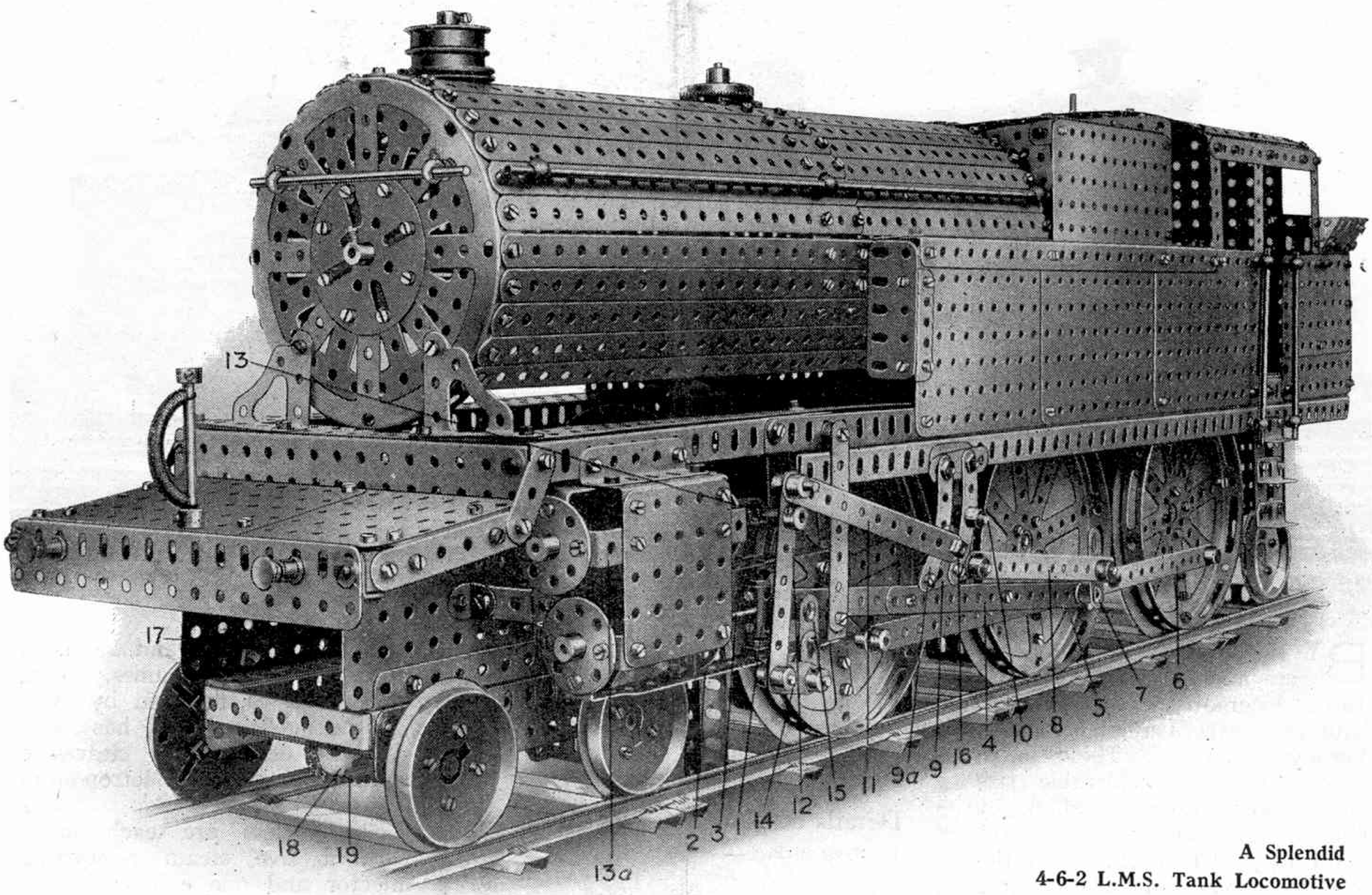
The trailing bogie is a duplicate of those already in service on the Metropolitan Railway, and the wheels, tyres, axles, and axleboxes are exactly similar to those used on the leading pony truck.

Details of New 2-6-4 Tank Locos

Heating surface—	
Small tubes	1,034 sq. ft.
Large ,, ...	356·6 ,,
Firebox	135 ,,
Total	1,525·6 ,,
Superheater	285 ,,
Grate area	25 ,,
Boiler pressure	200 lbs. sq. in
Adhesive weight	54 t. 16 cwt.
Tractive force at 85 per cent. working pressure	26,040 lbs.
Adhesive factor	4.33
Cylinders	19 in. diam. 28 in. stroke
Tank capacity	2,000 galls.
Full ,, ...	4 tons
Weight in running order	87 t. 7 cwt.
Weight, empty ...	70 t. 15 cwt.
Width (over footplate)	8 ft. 4 in.
Length over buffers	44 ft. 10¾ in.
Diam. of driving wheels	5 ft. 6 in.
Diameter of bogie wheels	3 ft. 1 in.

Loco-Building with Meccano

A New Meccano Loco fitted with Walschaerts Valve Gear



A Splendid 4-6-2 L.M.S. Tank Locomotive constructed entirely with Meccano

THE construction of a locomotive in Meccano not only provides an exacting test as to the adaptability of the system, but also requires no little ingenuity on the builder's part to make the model a working success. Several of the recently designed Meccano parts lend themselves more readily to this type of model-construction, however, and we are pleased to note the increased number of Meccano boys who are busy designing models of locos and other railway subjects. It would appear that new parts proving most valuable in this connection are Face Plates, Wheel Flanges, Circular Girders, Circular Plates, and Hub Discs. These are supported, of course, by such old friends as Flat Plates, Cranks and Couplings.

Our Model Department, also, have been very busy loco-building, and the result of their efforts appears on this page in the form of a "super" model of an L.M.S. Tank Engine. This is a very complete and realistic model, which is a delight to see in motion. Boys who are the fortunate possessors of a sufficiently-elaborate Outfit would do well to copy it as closely as possible.

The cylinder and valve mechanism—undoubtedly the most striking feature of the model—affords an opportunity of a very interesting study of Walschaerts valve gear. All the essential elements are faithfully reproduced, and the Meccano boy who builds this model will thereafter be in possession of a thorough knowledge of the operation of this intricate valve gear. The following brief explanation should help to make clear any details in its construction not fully shown in the illustrations.

How to Build the Model

The piston, connecting, and coupling rods should be placed in position first. The crosshead (1) is composed of a Coupling mounted between Eye Pieces sliding on guide strips (or slide bars) (2), and an additional Strip Coupling, mounted on the end of the piston rod (3) carries the connecting rod (4). The latter is pivoted to the crank pin on the centre driving wheel (5). The coupling rod (6) is also journalled on this crank pin and on the crank pins of the leading and trailing driving wheels, thus imparting the motion of the piston over the three wheels.

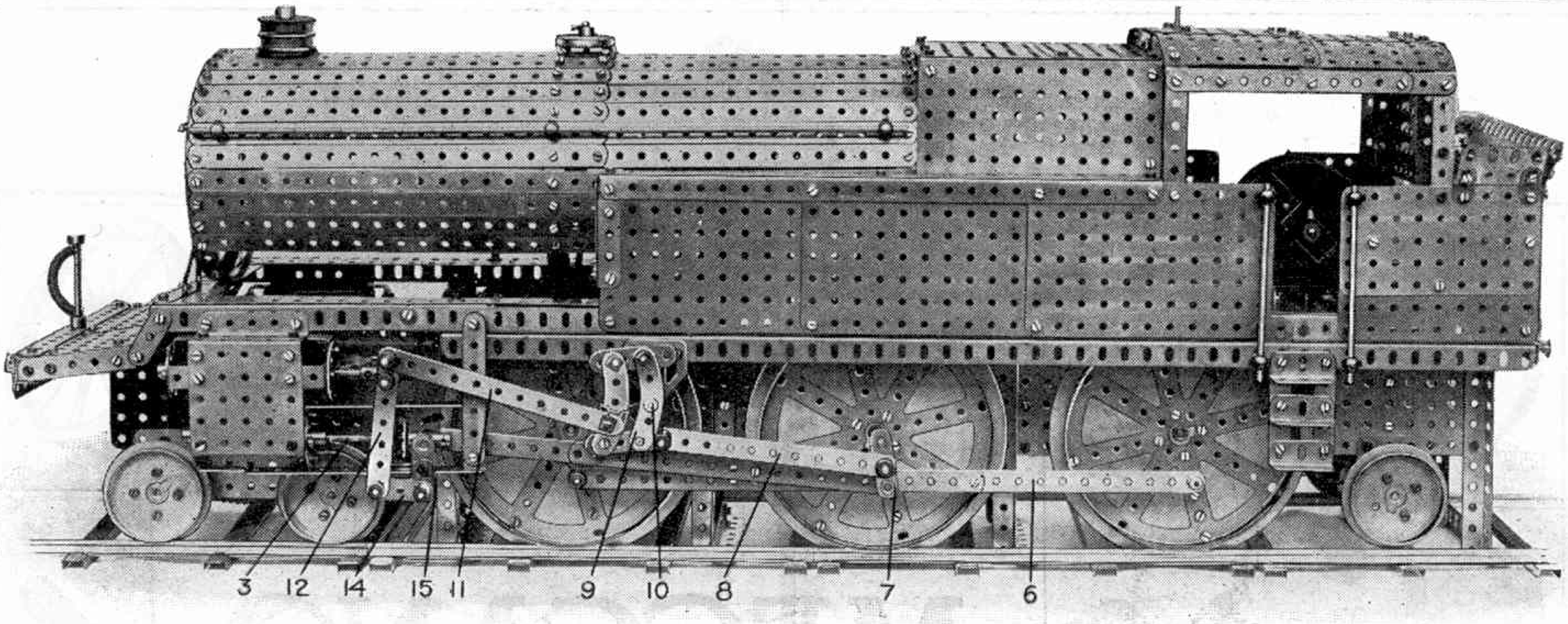


Fig. B. Another view of the New 4-6-2 Tank Loco

The crank pins consist of short Rods passed through the driving wheels and secured in Cranks bolted to their inner sides. A Crank (7), rigidly secured to the pin of the centre driving wheel (5), pivotally carries the return crank rod (8), and the latter, in turn, is pivoted to the outer end of a short Slotted Strip forming the base of the link (9), which is constructed from $2\frac{1}{2}''$ Curved Strips. The link rocks about a pivot (10) and pushes to and fro the radius rod (11), which is pivoted to the upper hole of the combining lever (12). This lever (12) is journalled on a short Rod secured in a Coupling (13) mounted on the end of the piston valve rod sliding in the valve chest (13A), and is connected pivotally to a guiding link (14). The latter is pivoted to a Crank (15) secured to a short Rod mounted in the Strip Coupling on the end of the piston rod.

It will now be seen that, as the piston (3) moves to and fro, the combining lever (12) is rocked in different directions by the radius rod (11) and guiding link (14), and imparts a sliding movement to the valve rod (13). The radius rod (11) is pivoted at (16), by means of bolt and lock-nuts, to an Eye Piece, representing the link block, sliding on the strip (9A) of the link (9), and by moving this link block up or down the strip (9A), the direction and "throw" of the piston valve is altered. In actual practice the link block is connected to a lever in the cab, so that the driver may move the link block to any position in the link that he may desire. For example, by moving the block (16) towards the pivot (10), the throw of the radius rod (11) is diminished, until it reaches its minimum when the block (16) is at the centre of the link (9). Further movement of the block to any point above the pivot (10) reverses the direction of the valve rod (13), and consequently reverses the order in which the cylinder valves open, so causing the locomotive to run in an opposite direction.

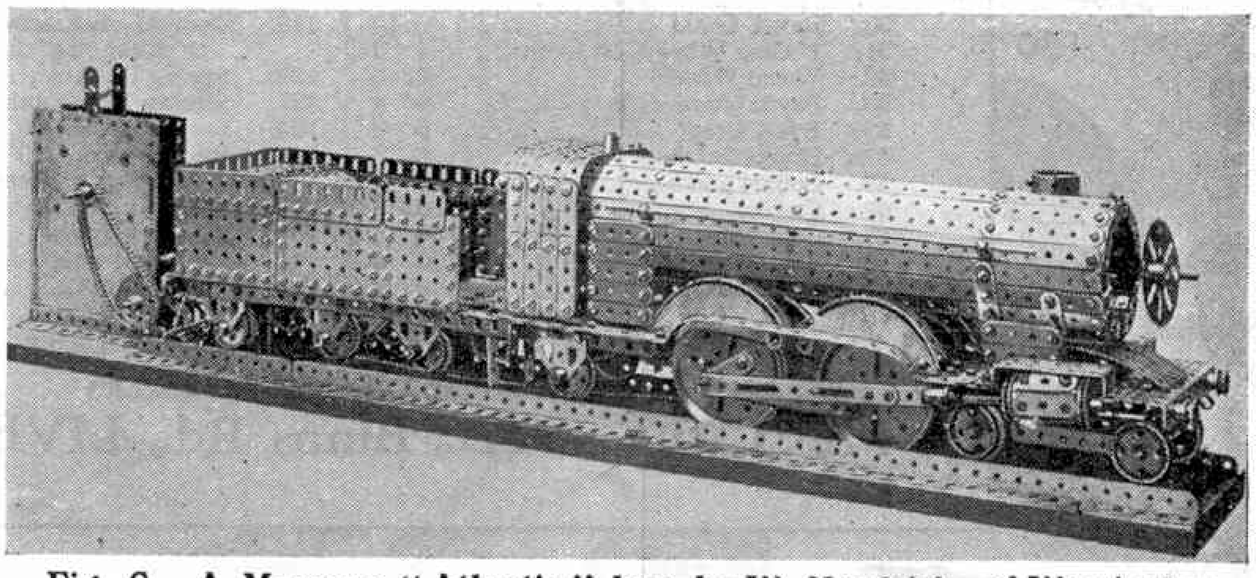


Fig. C. A Meccano "Atlantic" loco by W. Kendrick, of Warrington

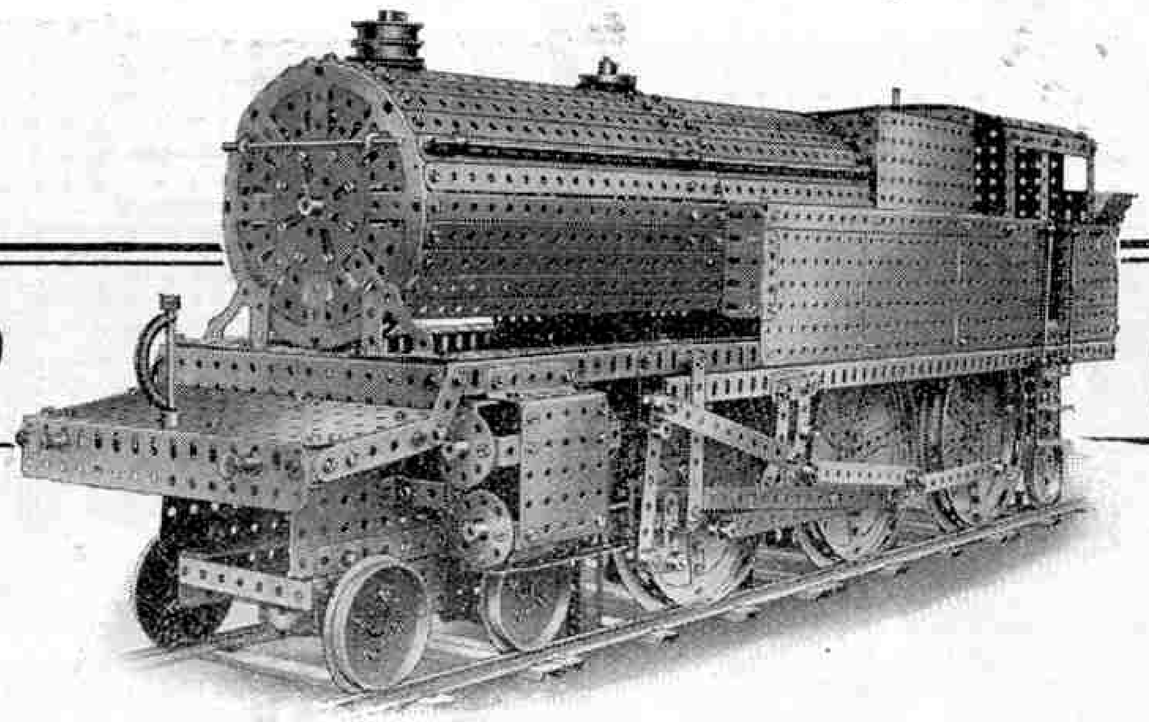
Unfortunately, space does not permit a detailed explanation of the steam "cut-off," which is effected by the alteration to the throw of the radius rod (11). It must suffice to remark that the inlet valve of the cylinder is held open for a period varying with the throw of the radius rod. Thus when the combining lever (12) is rocked to its fullest extent, the maximum amount of steam is admitted to the cylinder; as the loco increases in speed, however, the radius rod is moved towards the centre of the link, so admitting a much smaller amount of steam to the cylinder.

Constructional Details

An interesting feature in the construction of the model will be noticed in the boiler assembly; this is built up from a series of $9\frac{1}{2}''$ Strips bolted together with five holes overlapped and secured at either end, and in the centre, to Hub Discs. The front of the boiler is composed of eight Flat Trunnions, bolted from the inner side of the Hub Disc to a Face Plate on the outer side. The side water tanks, fire box, coal bunker and cab roof are constructed from Flat Plates, and the sides of the wheel base, through which the driving axles are journalled, are built up from a number of $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates (17) bolted to Angle Girders. The large driving wheels consist of Hub Discs and Circular Plates bolted together, while the bogie and trailing wheels are made from Face Plates and Wheel Flanges.

How the Loco Works

The loco is shown lifted clear of the rails and resting upon short Girders secured to different points in the frame. The driving, bogie, and trailing wheels are all driven from an Electric Motor bolted to the footplate in the cab, and the piston, valve gear, and connecting rods are set in motion as the driving wheels revolve. The drive from the Motor is led through reduction gearing, consisting of three 57-teeth Gear Wheels and three $\frac{1}{2}''$ Pinions, on to a shaft carrying a $\frac{3}{4}''$ Sprocket



MECCANO

ACCESSORY PARTS

SPECIALLY SUITABLE
FOR LOCOMOTIVE BUILDING

Imagine the fun to be obtained from designing and building your *own* locomotive! It is only Meccano boys who have this opportunity of putting their ideas on loco construction to a practical test. You can build a real working model in Meccano of whatever type of engine you may choose—it may be a 4-2-2 Express or a "Mastodon" freight loco—for Meccano parts adapt themselves readily to either class.

The fine Loco illustrated above contains many novel uses for Meccano parts, and it pays excellent tribute to the adaptability of such parts as Hub Discs, Cranks, Flat Plates, Couplings, etc.

			s.	d.
20.	Flanged Wheels	...each	0	6
24.	Bush Wheels	... "	0	6
25.	¾" Pinion Wheels	... "	0	6
26.	½" " "	... "	0	4
27.	Gear Wheels, 50 teeth	... "	0	9
27A.	" " 57 "	... "	0	9
28.	1½" Contrate Wheels	... "	0	9
29.	¾" " "	... "	0	6
30.	Bevel Gears	... "	0	10
31.	1" Gear Wheels, 38 teeth	"	1	0
32.	Worm Wheels	... "	0	6
33.	Pawls (complete)	... "	0	4
50.	Eye Pieces	... "	0	2
57B.	Hooks (loaded)	... "	0	5
59.	Collars and Set Screws	... "	0	2
62.	Cranks	... "	0	3
63.	Couplings	... "	0	6
63B.	Strip Couplings	... "	0	8
63C.	Threaded Couplings	... "	0	6

			s.	d.
64.	Threaded Bosses	... each	0	2
94.	Sprocket Chain	per length	0	6
96.	Sprocket Wheels, 1"	... each	0	3
109.	Face Plates, 2½" diam.	"	0	4
114.	Hinges	... per pair	0	4
115.	Threaded Pins	... each	0	2
116.	Fork Pieces	... "	0	3
118.	Hub Discs (5½" diam.)	"	1	3
119.	Channel Segments (8 to circle, 11½" diam.)	"	0	4
120A.	Spring Buffers	... per pair	0	8
127.	Simple Bell Cranks	...each	0	3
128.	Boss Bell Cranks	... "	0	4
129.	Rack Segments, 3" diam.	"	0	6
130.	Triple Throw Eccentrics	"	1	3
136.	Handrail Supports	... "	0	3
137.	Wheel Flanges	... "	0	4
140.	Universal Couplings	... "	0	9
144.	Dog Clutch	... "	0	6

ASK YOUR DEALER FOR A COMPLETE LIST
OR WRITE FOR ONE DIRECT TO
MECCANO LTD., Binns Rd., LIVERPOOL

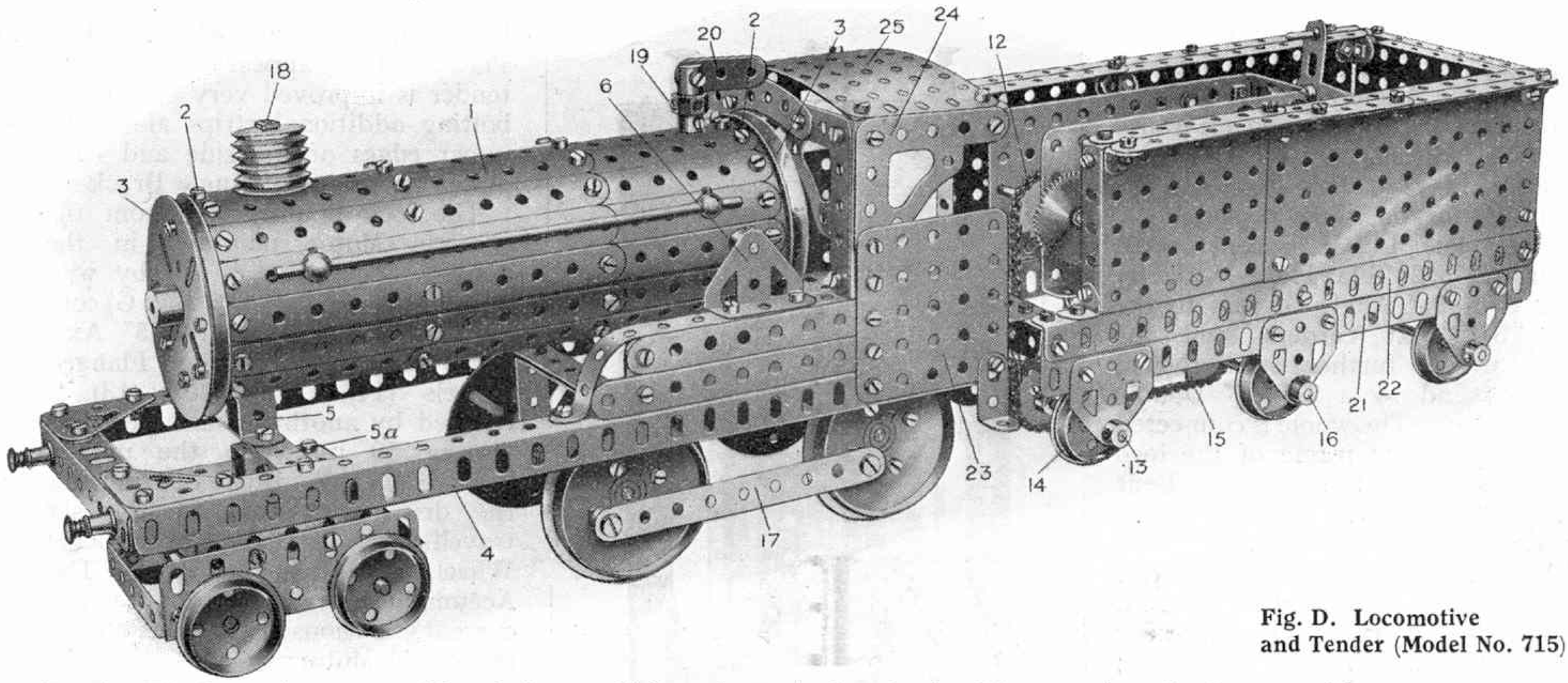


Fig. D. Locomotive and Tender (Model No. 715)

Wheel. The latter is connected by chain to a 2″ Sprocket Wheel secured to the axle of the trailing driving wheels; this axle also carries a 1″ Sprocket Wheel gearing by chain with a similar Sprocket on the centre driving axle, which in turn is connected to the leading driving axle by the same method.

The trailing wheels are rotated by means of Sprocket Chain engaging between a ¾″ Sprocket Wheel on their axle and a 1½″ Sprocket secured to the axle of the trailing drivers. The rear axle of the bogie is driven in the same way from the leading driving axle, while the front bogie wheels are caused to rotate by means of a 1″ Sprocket Wheel (18) engaging a length of chain (19) gearing with a similar Sprocket on the rear bogie axle.

The Sprocket Chains driving the trailing and bogie wheels should be disconnected if the loco is required to run upon the rails. A suitable length of track for this model may be constructed from Angle Girders, bolted down to shorter Girders representing the sleepers.

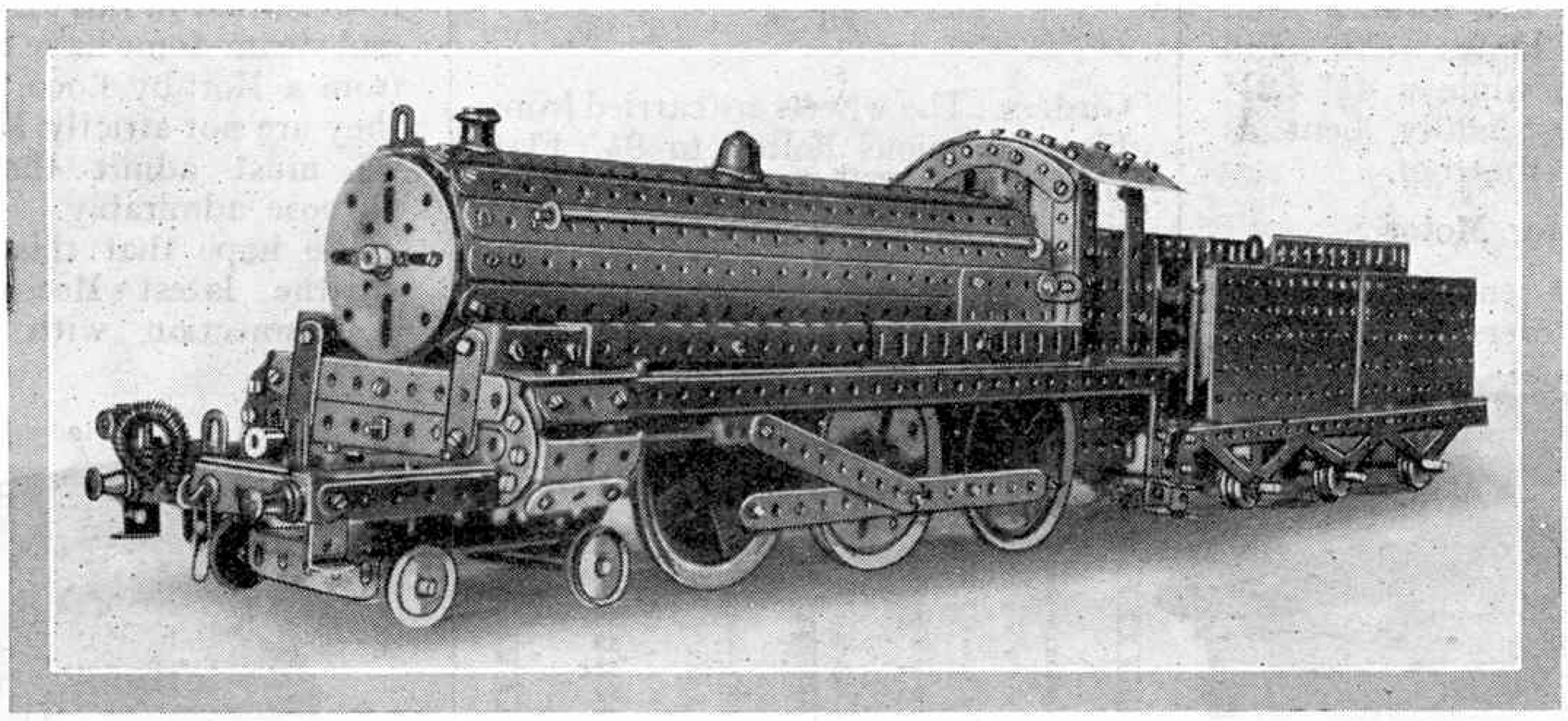


Fig. E. Another excellent Meccano Loco sent in by a reader of the "*M.M.*"

Another Fine Model (No. 715)

The 4–4–0 engine and tender shown in Fig. D will be included in the new 1925 Manual of Instructions, and is built with Outfit No. 7. Directions for its construction are given below, and Meccano boys will find this splendid model quite simple to build. A length of suitable Meccano track may be formed from Angle Girders, as already described, and many hours of enjoyment may be obtained by running the loco on this.

Each end of the boiler is formed from a 5½″ Strip bent to the curvature of a 3″ Pulley (3) and bolted to the latter by means of Angle Brackets. The shell of the boiler, built up from a series of 5½″ Strips (1) overlapped six holes, is bolted at each end round the bent 5½″ Strips attached to the Pulleys 3. It will be seen from the underside view of the loco shown in Fig. F that the ends of the bent 5½″ Strips do not meet below the boiler, but two further 5½″ Strips, bolted together and overlapped six holes, are secured to Angle Brackets carried from the lowest holes of the 3″ Pulleys (3).

The base frame of the loco consists of 12½″ and 4½″ Angle Girders, and supports the boiler on two Double Bent Strips (5) bolted to transverse 4½″ Strips (5A, Fig. F). Two Trunnions (6, Fig. D), one on either side of the boiler, are bolted to the wheel guards, and support the ends of a 3½″ Rod which, passing through the 5½″ Strips (1) and secured at either side by a Collar and set-screw, rigidly holds the boiler in position on the Double Bent Strips.

Cab, Bogie and Connecting Rods

The foot-plate of the cab is formed by bolting a 4½″ × 2½″ Flat Plate to the frame, and to the underside of this is bolted a 2½″ × 1½″ Double Angle Strip (7), which forms a bearing for one of the driving axles, while the forward driving wheels are carried from a similar Double Angle Strip (8) bolted to a 4½″ Strip secured to the frame.

(*Continued overleaf*)

(*Continued from page 451*)

Two $2\frac{1}{2}''$ Strips are placed between the Double Angle Strip (7) and the foot-plate, in order to give clearance to the wheels, and a Washer is placed on each bolt beneath the strip (8) for the same reason.

The bogie, Fig H, is constructed from a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate, bolted by means of $2\frac{1}{2}''$ Angle Girders to the side $3\frac{1}{2}''$ Flat Girders, and the structure is further strengthened at each end by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The whole is connected pivotally to the frame of the loco by means of the Double Bent Strip (9), into the hole of which is entered the end of a 1″ Rod (10, Fig. F) and retained by two Collars (11) on the end of the rod.

Two $4\frac{1}{2}''$ Strips (17) represent the coupling-rods of the loco; these are carried on Pivot Bolts, secured by a nut on each side of the driving-wheels. A Collar is slipped on the bolts immediately behind the coupling-rods to enable the latter to clear the flanges of the wheels. It will be seen from the illustration that the driving wheels consist of Face Plates and Wheel Flanges bolted together.

The smoke-stack is represented by five 1″ loose Pulleys bolted to the boiler by means of a short Threaded Rod (18), while the safety-valve consists of a Strip Coupling (19) and $1\frac{1}{2}''$ Strip (20).

The cab sides are formed from $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates (23) and Architraves (24), while a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate (25), slightly bent as shown, serves as the roof.

Accommodation for Motor

The base of the tender is built up from two $9\frac{1}{2}''$ Girders and two $4\frac{1}{2}''$ Girders. The wheels are carried from Flat Trunnions bolted to $9\frac{1}{2}''$ Flat Girders (21, Fig. D) secured to the side $9\frac{1}{2}''$ Angle Girders (22) of the base frame. The sides of the tender are constructed from $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates, while the back consists of one $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. The appearance of the tender is improved very greatly by bolting additional strips along the upper edges of the side and back plates by means of Ang'e Brackets.

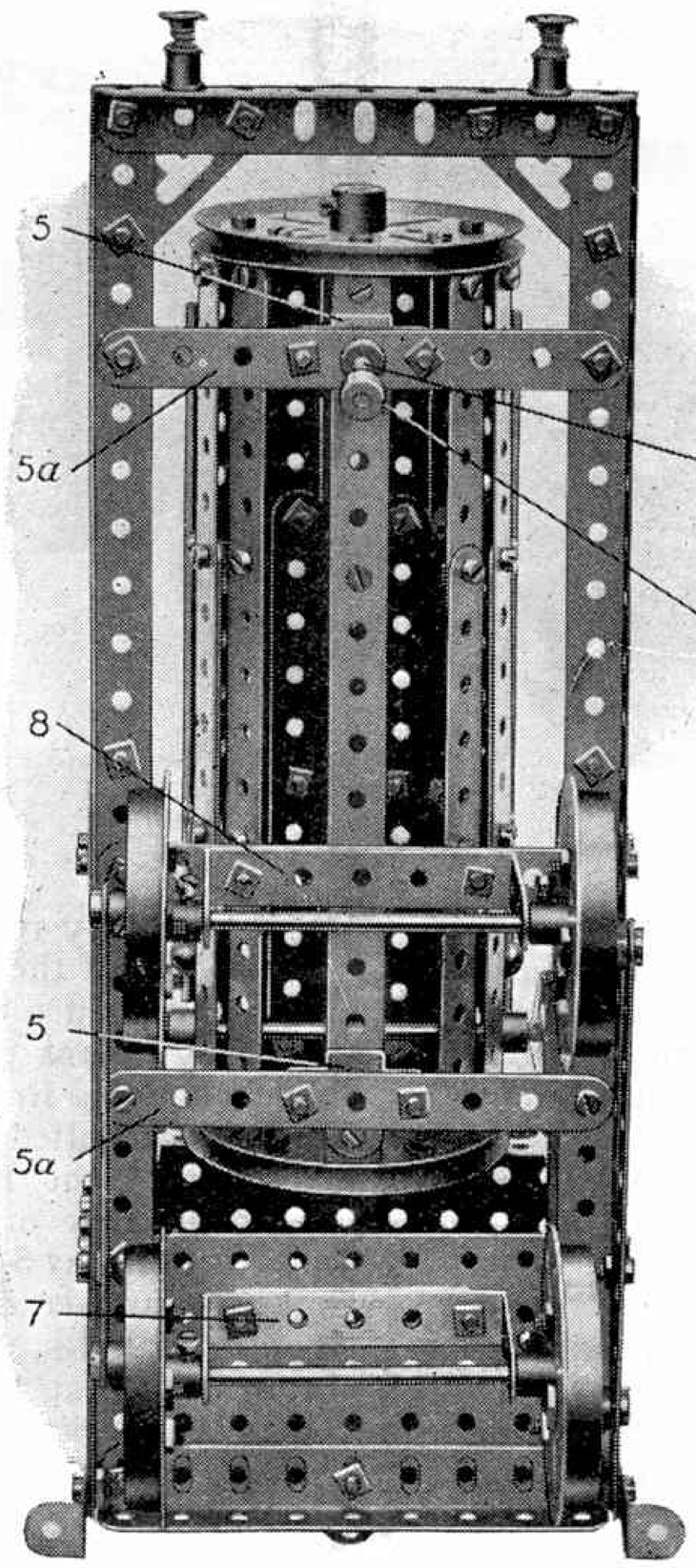


Fig. F

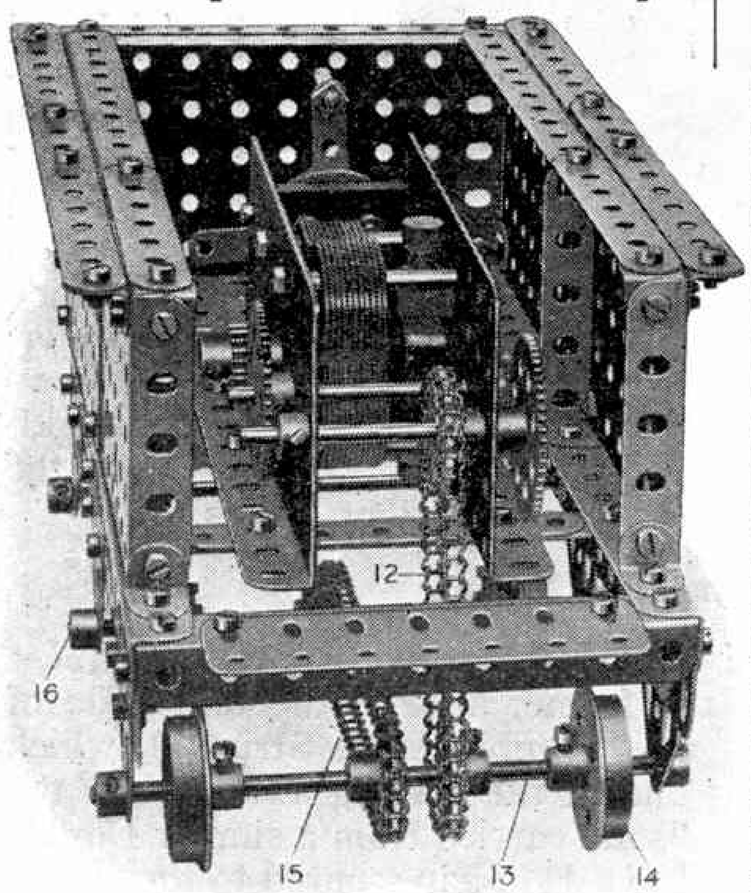


Fig. G

The loco is propelled from the Electric Motor mounted in the tender. The drive is led by way of a Sprocket Chain (12, Fig. G) containing 52 links and the 5″ Axle Rod (13) carrying the Flanged Wheels (14). The Rod (13) is coupled by another chain (15) containing 59 links, to the middle Axle Rod (16), thus distributing the drive over four of the six travelling wheels. The four Sprocket Wheels are 1″ in diameter. The Accumulator, which supplies the current, is housed in the tender behind the Motor.

Meccano Boys' Efforts

We have included in this article illustrations of two very fine locos built by Meccano boys. It will be recalled that the model illustrated in Fig. C was described in the "*M.M.*" some months ago, but its merits are such that it must not be omitted from this article dealing with Meccano locomotive construction.

Fig. E, another very fine effort sent in by a reader, represents a 4–6–0 express passenger engine with six-wheel tender. It will be noticed that in this case the chimney and steam-dome have been borrowed from a Hornby Loco, and although they are not strictly Meccano parts, we must admit they serve the purpose admirably.

We hope that this short review of the latest Meccano activities in connection with loco-building will bring forth still further models from our readers. This subject offers a very wide scope to the inventive Meccano boy, and we shall endeavour to publish in the Magazine particulars of any models received of special interest.

Parts required for Model No. 715 :

37	of	No.	2	2	of	No.	47
10	„	„	2A	1	„	„	48
2	„	„	3	2	„	„	48A
2	„	„	5	2	„	„	52
1	„	„	6A	1	„	„	52A
2	„	„	8	2	„	„	53
2	„	„	8A	3	„	„	53A
4	„	„	9A	16	„	„	59
4	„	„	9D	1	„	„	63B
1	„	„	10	3	„	„	72
31	„	„	12	1	„	„	82
4	„	„	12B	1	„	„	90
2	„	„	14	1	„	„	94
3	„	„	15	4	„	„	96
4	„	„	16	2	„	„	103A
2	„	„	16A	3	„	„	103D
1	„	„	18A	4	„	„	108
2	„	„	18B	4	„	„	109
2	„	„	19B	1	„	„	115
10	„	„	20	4	„	„	120A
5	„	„	22A	2	„	„	126
1	„	„	25	6	„	„	126A
1	„	„	27	1	„	„	128
1	„	„	27A	2	„	„	133
4	„	„	33A	4	„	„	136
230	„	„	37	4	„	„	137
12	„	„	38				
3	„	„	45	Electric Motor			

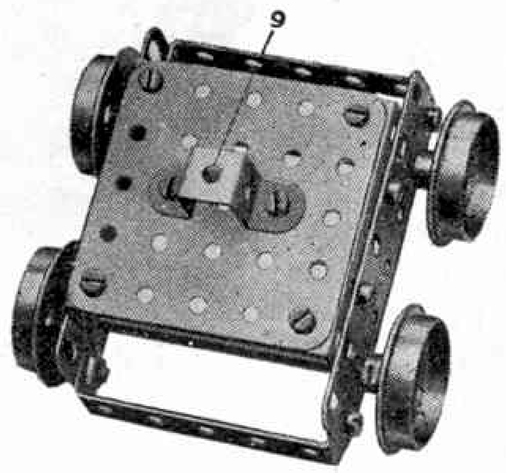
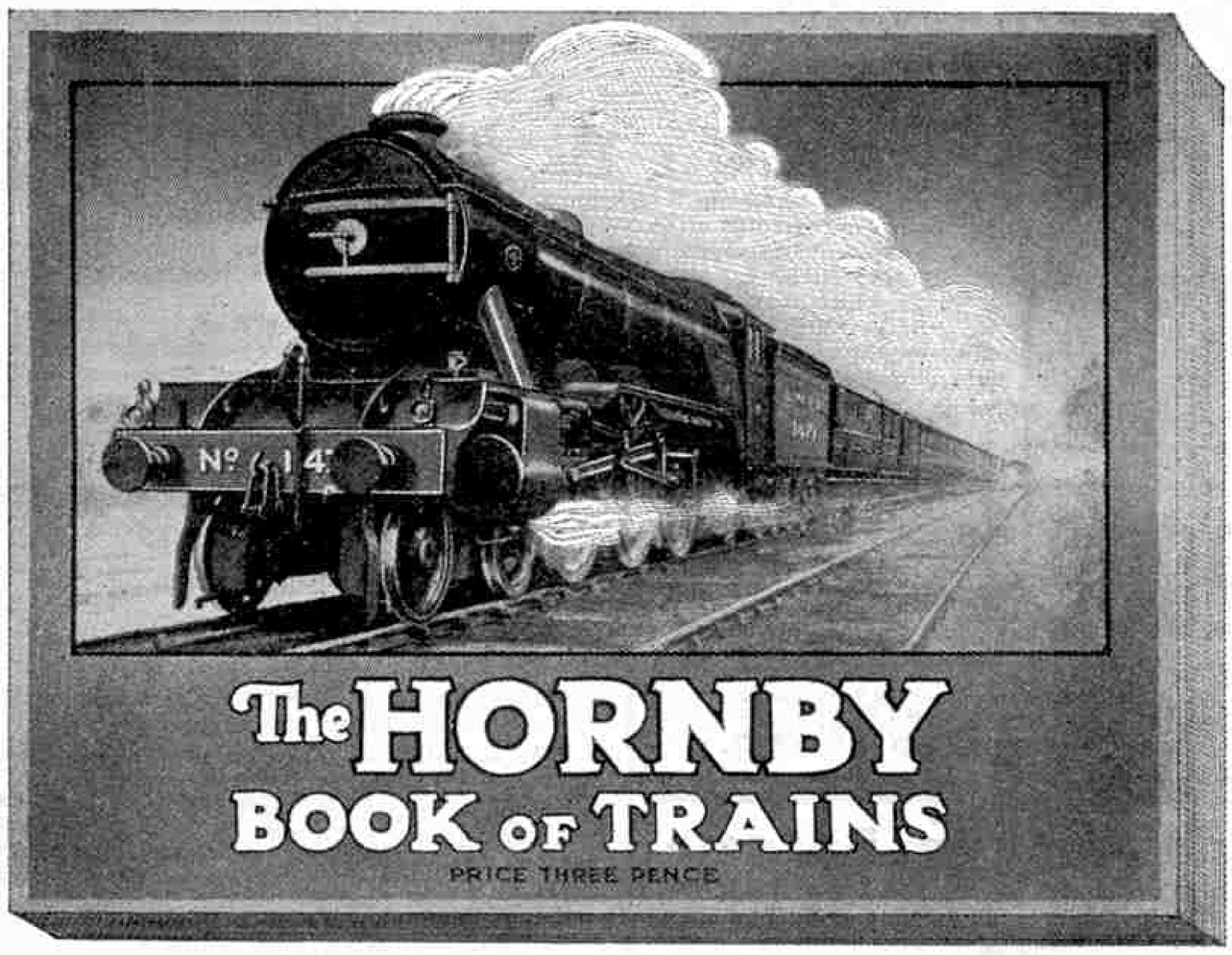


Fig. H



A Splendid Train Book

As already announced we have in active preparation a special publication, entitled "*The Hornby Book of Trains.*" This will be a splendid production in every way, and we are sparing no effort to make the publication worthy of the name it bears. It will consist of 40 pages (11″ × 8¼″) of special art paper. The cover, illustrated above, will be a magnificent reproduction in colour of the L.N.E.R. "*Flying Scotsman*" at speed. It is well worth framing.

The first half of the book will contain the story of the locomotive from its earliest days, dating back to before the time of the opening of the Stockton and Darlington Railway; details of the pioneer work of Trevithick, Murdock, and Stephenson will be given, and illustrations will contrast the early locomotives with the present-day giants; the story of the Railway Carriage, from the earliest Chaldron Wagons to the present-day Pullman; how locomotives are classified; some account of the rise and growth of the great railway companies; a description of the Famous Trains of the World—and other matters of interest to railway enthusiasts.

The second half of the book will be devoted to a beautifully illustrated description of all the Hornby Trains and the latest Hornby Series Rolling Stock and Accessories. These illustrations will be printed in four colours and the reproduction of the Hornby Trains will be most realistic.

How to Order the Book

Already over 40,000 copies of the "*Hornby Book of Trains*" have been ordered and readers who have not already done so are advised to order their copy at once, and thus prevent disappointment by being unable to obtain a copy when the book is issued. Owing to the great cost of production and distribution, the number of copies printed will be limited, and orders will be executed in strict rotation. It will be a case of "first come—first served!"

Address your orders to "Hornby Book," Meccano Limited, Binns Road, Liverpool, and please write your name and address clearly.

The price of the book is 3d. (post free), which may be sent in stamps. There is no reduction if more than one copy is ordered. Orders will not be acknowledged.

Publication Date: October

We hope to have the Hornby Book of Trains ready for delivery some time in October, but a definite publication date will be announced next month. Meantime, orders will be entered and executed in the rotation received.

Orders from Overseas

There will be a special edition of the "*Hornby Book of Trains*" for Overseas readers, and we hope that copies of this special edition will be ready for dispatch from Liverpool towards the end of September. The price for all orders from outside the United Kingdom is 6d. Overseas orders should be addressed to our Overseas agencies as below.

AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.

NEW ZEALAND: Messrs. Browning, Ifwersen Ltd., P.O. Box 129, Auckland.

SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis Street, Johannesburg.

Railways on Stamps—(*cont. from page* 457)

The Beira railway in Mozambique has already been mentioned in the "Tour" series and is illustrated here. This railway connects with the Cape Town railway at Salisbury, Northern Rhodesia.

Brazil issued a stamp in 1920 printed at the Mint, Rio de Janeiro showing an old type of 4–4–0 locomotive, possessing a huge funnel and head-lamp, and also a cow-catcher. The first railway in Brazil and also in the South American continent was a short section only 30 miles in length of the Dom Pedro II. Railway, which runs from Rio de Janeiro to Queimades. This was opened in 1858. The train shown on the stamp has just passed over a steel lattice-girder bridge.

More recently railway stamps have been issued by the Saar, in 1921, and Russia in 1922. The former is of the value of 50pf. and shows a large number of railway tracks and a signal gantry. The 1922 Russian stamp shows a very peculiar train leaving a tunnel whose portal shows the "P.C.C.P.," the monogram of the new Russia.

The most recent railway stamp to be issued is that of Monaco, issued in January 1924. This stamp shows an excellent view of the railway bridge at Monte Carlo and through one of the arches we obtain a glimpse of the Church of S. Devote. It was one of the series issued by Monaco between 1922 and 1924 showing views of various parts of the principality and also a portrait of Prince Albert I. The series was designed by H. Cheffer and engraved and printed by Enschedé and Sons, Haarlem, Holland, and the stamp sets a standard that it will be difficult for future railway stamps to maintain, unless they employ the photogravure method of printing.

New Gibbons' Catalogues

We are informed by Messrs. Stanley Gibbons Ltd. (391, Strand, London, W.C.2) that the new edition of their catalogue will be ready for publication early next month. As before, it will be issued in two parts, for the British Empire and Foreign Countries respectively. By the use of a special thin paper the bulk of each part has been greatly reduced. The two parts may also be obtained bound together forming a compact "Whole World" volume. The interleaved edition will also be continued. The illustrations have been greatly improved and in the course of revision many thousands of prices have been altered.

Model Steam Locomotives

Most Meccano boys have longed to possess a model locomotive that really works under its own steam, and it will be good news for our readers to learn that a steam-operated loco can be obtained from the Clyde Model Dockyard (Argyle Arcade, Glasgow) at the reasonable price of 12/6. We are informed that every loco is tested singly under steam to ensure satisfactory working before leaving the factory. The various accessories with which they are equipped give them a most realistic finish, and the makers rightly lay special stress on the fact that they are British made throughout.

Igranic Honeycomb Coils

The Igranic Electric Company Ltd. (147, Queen Victoria Street, London, E.C.4) announce that their well-known duolateral coils will be obtainable by the public during the coming wireless season at a considerable saving in price. The term 'honeycomb' as applied to these coils indicates the formation of the windings, in which each wire crosses and re-crosses its neighbour at an angle, thus forming cellular air spaces between adjacent turns and layers. These coils are British-made under De Forrest patents and are made in nineteen different sizes for varying wavelengths with the usual Igranic perfection of workmanship and finish. An interesting and valuable publication on "*Efficient Tuning Inductances as an Aid to Better Radio Reception*" will be sent post free to any reader who mentions the "*M.M.*"

Stamps for Sale (See also page 492)

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10	Argentine	3d.	150	" ...	2/-
20	"	6d.	25	United States	3d.
30	"	9d.	50	"	6d.
40	"	1/-	75	"	9d.
50	"	1/3	90	"	1/-
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30	" ...	9d.	50	Dantzig ...	1/-
40	" ...	1/-	25	Greece ...	9d.
25	Czecho Slovak	4d.	20	India ...	1/-
50	"	9d.	9	N. Zealand	6d.
75	"	1/-	12	Irish ...	1/-
100	"	1/3	10	Mexico ...	6d.

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Railways on Postage Stamps

The World's Locomotives Depicted by Stamps

by R. K. Gresswell

WHILE celebrating the Centenary of the first railway it is interesting to look at the various stamps that have been issued from time to time bearing views of locomotives and scenes connected with railways. It is somewhat surprising to find the poor quality of the designs of these stamps from an engineering point of view. Judging by the designs alone it would almost seem that most countries have portrayed only their earliest and most primitive types of locomotive. If this is actually the case, they should certainly have explained this on the stamps, for stamp collectors who are not also railway enthusiasts will naturally take it for granted that the various locomotives depicted are representative of the finest locomotives in the various countries at the time of the stamp issues. This being so, they might easily be tempted to cancel a trip to any of these countries, if they thought the railway arrangements were so primitive as the stamps would appear to indicate!

United States (1912-3)

The First Locomotive Stamp

To New Brunswick, one of the eastern provinces of Canada, falls the honour of having issued (on 15th May 1860) the first railway stamp in the world. The 1 cent value of the "cents" series depicts a locomotive with a leading four-wheeled bogey and four driving wheels, its classification thus being 4–4–0. The smoke stack is supplied with a spark-arrester of considerable size, and there appears to be a high railing round the boiler so that the driver may take a walk around his engine with no fear of falling off! There are three shades and the stamp also exists accidentally imperforate.

Brazil (1920)

United States (1901)

The American continent seems to have led the way as far as railway stamps are concerned, for we find that the second to be issued was the work of the United States Post Office. It appeared in April 1869, forming the subject for the 3 cents value of a series designed to illustrate American history and also the methods by which her mails were transported. This locomotive is a 4–4–0, the leading wheels being very small and the drivers about three times the size. It is provided with a spark arrester, headlight, and cow-catcher, and has a railing round the boiler similar to that already mentioned in connection with the New Brunswick loco. The first railway in the United States was opened on 17th April 1827, so that they had had 42 years' railway experience before this stamp was issued.

Ecuador (1908)

Paraguay issued a stamp on the 20th August 1886 showing a locomotive as an inset, but unfortunately it was only issued with the word "OFICIAL" overprinted across the view. The first railway in Paraguay was opened on 1st October 1863.

Railway Stamps of Belgian Congo

Fourth on the list we find Belgian Congo, which issued (on 27th November 1894) a view of a railway bridge over the M'pozo River, illustrated on page 457. This view was used in two later series, issued in June 1909 and on 1st January 1910 respectively. The chief difference in these three issues is the wording of the name of the country. This in the first issue was "État Independant du Congo," in the second "Congo Belge," and in the third the name in the two languages "Congo Belge—Belgisch Congo."

Next comes Uruguay, which, on 5th April 1895, issued a 5c. value showing a most unusual type of engine surrounded by several interested spectators (see page 457). The classification of this loco is 4–2–0—which is itself unusual, for very few engines have more idle wheels than drivers. Add to this the fact that the driving wheels appear to be about 12 ft. in diameter, and the unique qualities of the machine are apparent!

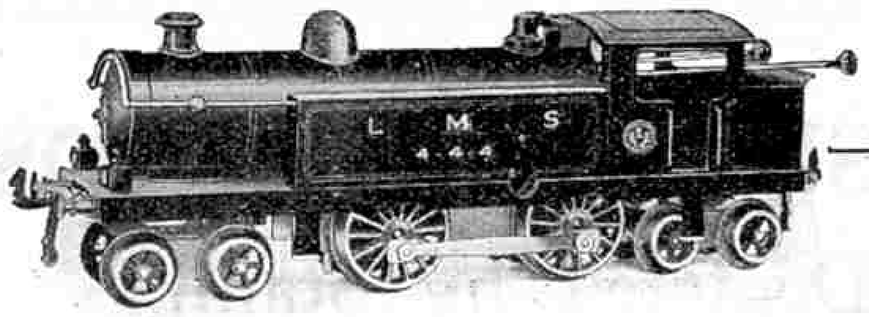
Salvador (1896)

When this stamp was issued Uruguay had had twenty-six years' experience of locomotives, her first railway being opened on 1st January 1869.

South American Railway Stamps

In the same year (1895) Mexico issued a series showing the various methods by which her mails were transported. The peso values show a mail train, the engine with a very low boiler compared with the gauge of the running track, and provided with a spark-arrester, a head-lamp, and a cow-catcher.

(*Continued on page* 457)



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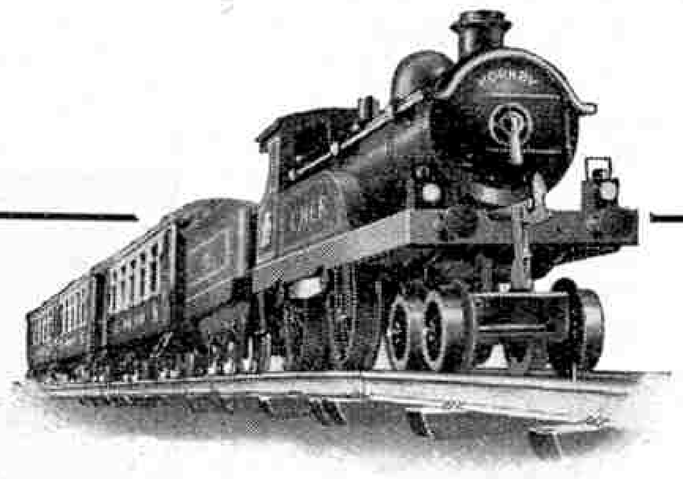

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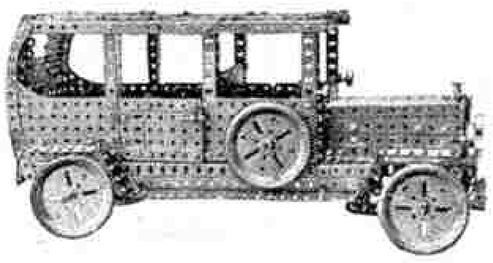

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The first railway in Mexico was a line 2½ miles in length between Mexico City and Guadalupe, this being finished in 1854. Other small lines were built shortly afterwards but it was not until 1878 that the longer lines were begun.

Salvador followed Mexico in 1896 when it issued a new series of stamps, the 3 centavos (illustrated here) showing the locomotive, a 4–4–0 with cow-catcher, headlamp and tall smoke stack.

The first railway in Salvador was opened in 1882 between the port of Acajutla and Sonsonate. It was a narrow gauge railway and since the original line was built it has been extended considerably.

Belgian Congo (1894)

Uruguay (1895)

In 1898 Honduras issued a stamp showing a view of a train. The loco is provided with spark-arrester, headlamp and cow-catcher, but otherwise little can be made out as the stamp is lithographed and has not come out at all well. The same type was used for the whole series and there are varieties on laid paper, imperforate between, and errors of colour.

The only public railway in Honduras is that between Puerto Cortes and La Pimienta.

A United States Pullman

The United States was the first country to issue a railway stamp in the twentieth century when, in 1901, they issued a series commemorative of the Pan-American Exhibition at Buffalo. Two of the values of the series (the 5c. and 8c.) have been described already in the Stamp Tour ("*M.M.*" October and November 1924) and a third, the 2c., we illustrate here. This shows a 4–4–0 express engine of what was then the latest type hauling a train consisting of four large Pullman coaches.

Honduras (1898)

Belgium (1921)

The second and to date the last British colony to issue a railway stamp was North Borneo, which in 1902 showed a view of a Borneo railway train. This was followed in July 1909 by another showing a view of the railway track near a village. It is interesting to note that the former stamp shows the locomotive provided with a head-lamp nearly as large as the driver's cabin! Perhaps it is very dark in Borneo making exceptional head-lights necessary!

To commemorate the 25th anniversary of the opening of the railway from Guayaquil to Quito in Ecuador, this country issued a series of stamps in June 1908. The 1c. value shows a handsome railway locomotive which is by far the best drawing of a locomotive that had appeared on a stamp to that date. It is a 4–4–0, has two domes with bell between, a head-light and a cow-catcher. The other values of this series show portraits of Garcia Moreno, Gen. Eloy Alfaro, Abelardo Moncayo, Archer Harman and Sivewright, and the 1 sucre value shows Mount Chimborazo, which was illustrated and described during our tour of South America ("*M.M.*," February 1925).

Monaco (1924)

The Finest Railway Stamp

Two excellent views of railways were issued by the United States as parcel post stamps in 1912-13. In addition to illustrating various methods of transporting mails, the series shows several of the country's methods of employment. The two railway stamps were the 3c. and the 5c. values, the former showing a railway postal clerk leaning out of a doorway in the mail train, hanging a sack of mails on the projecting arm from which it is snatched by the basket at the wayside station without the train stopping. The 5c. shows the train approaching a mail apparatus which stands on the side of the track with a bag of letters ready to be caught by the net of the passing train. The locomotive is either a 2–6–2 or a 4–4–2, the leading wheels being the same size as the driving wheels and the connecting rod not being visible on the stamp and it is unlikely that it will be a 0–8–2. This is probably the finest railway stamp yet issued.

Mozambique Co. (1918)

In the same year Nicaragua issued a series of stamps having for their design an old locomotive, for use in places on the Atlantic coast using currency on a silver basis. The locomotive shown is a 4–4–0 with very large driving wheels, spark-arrester and headlamp. The cab appears to be rather too far forward of the back driving axle.

The First Railway in Brazil

In 1916 Belgium followed its colony's early lead when a parcel post series appeared with the franc values showing a 2–4–0 locomotive with tall smoke box and peculiar domes. This was followed in 1920 by a very poor effort—this time a train. The loco is a 4–4–0, has a huge boiler and a cab little larger than the funnel, which is of normal size. This stamp was redrawn in 1921 but the attempt was little better. Belgium's first railway was opened on 5th May 1835. The country now has 2,900 miles of railway and 2,500 miles of light railways.

North Borneo (1909)

(*Continued on page* 453)

New Loco in a Novel Test

An Interesting "King Arthur" Film

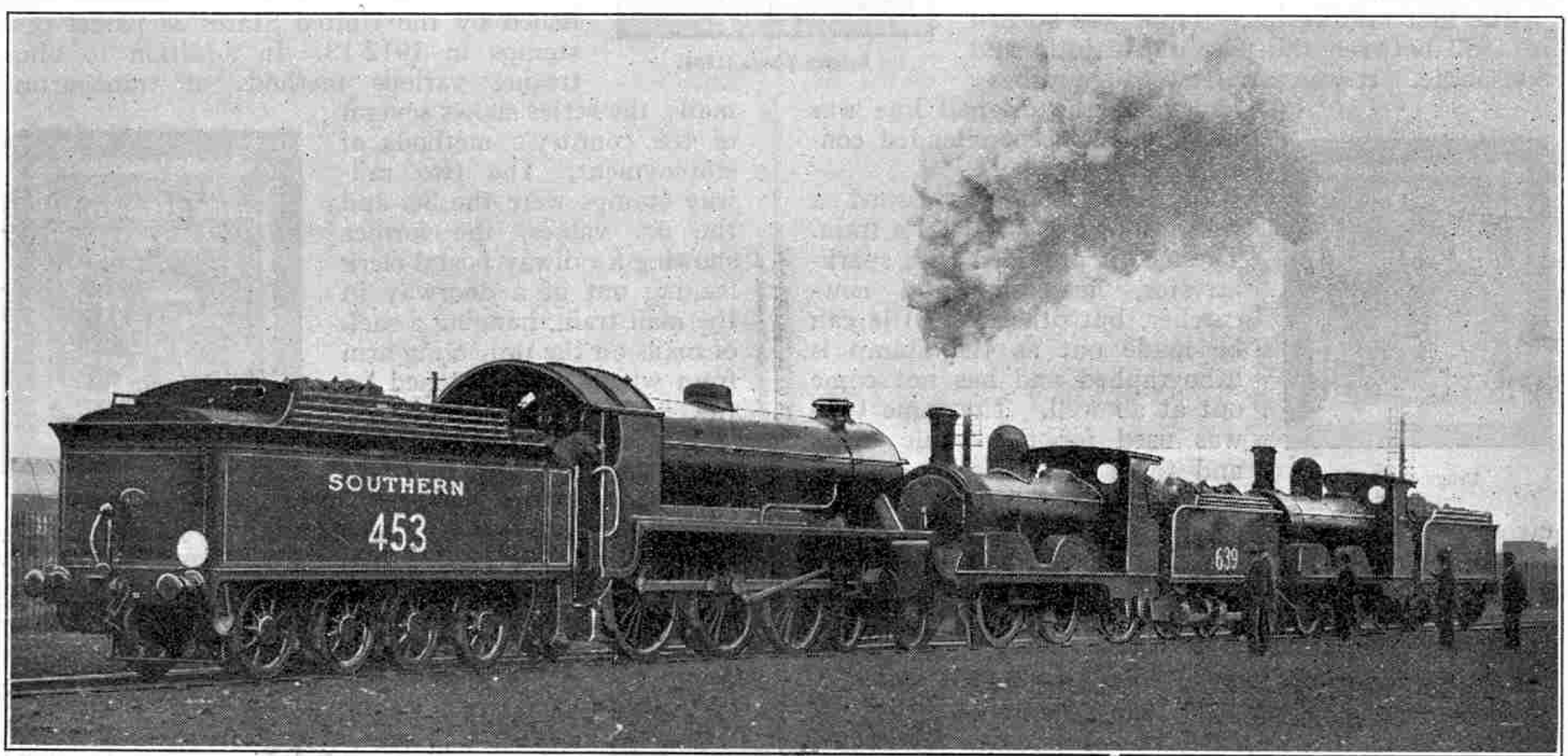


Photo courtesy] [*Southern Railway*

Loco No. 453, "*King Arthur*" in a Novel "Push-of-War" against two 0–4–2 Locos of an older type

THERE is always an intense fascination about the erection and trials of a new locomotive, and to visit a large railway works is the ambition of everybody interested in railway engineering. This chance does not often come, however, and the next best thing to such a visit is to see the various processes of loco-building with the help of the cinematograph.

Built-up Axle Eliminated

Through the courtesy of Messrs. Pathé Frères we have recently had the privilege of attending an exhibition of a new film dealing with this subject, and incorporated in the Pathé Pictorial No. 367.

The film, made in the workshops of the Southern Railway, shows the assembly of parts and the erection of an express loco of the "*King Arthur*" Class, described in the "*M.M.*" last month.

First the massive frames and cylinder castings are built up on a timber support, the four bogie wheels and six great coupled wheels (6 ft. 7 in. in diameter) standing correctly spaced on a parallel set of rails. As the outside cylinders in this class are actuated by Walschaerts valve gear, the heavy built-up crank axle is eliminated and thus all three pairs of coupled wheels have simple, straight axles.

An electric overhead travelling crane brings the boiler and with great precision slowly lowers it to be bolted to the framing, while mechanics busy themselves in putting in the footplate controls, piping, and boiler fittings. The overhead crane is used again to lift the body of the loco into position on the wheels, after which the motion and springs are completed and the valves set.

After final fitting-up, testing and painting, one morning sees the new giant glide out into the open, the workmen looking on with obvious pride.

Superior Adhesive Power

Before commencing duty on the West of England expresses, the loco was subjected to a unique test. Two light passenger locos of an older type were coupled together, the leading buffers of the front one touching those of the 4–6–0. At a given signal, steam was applied in all three locos and a mighty "push-of-war" ensues. Amid volumes of steam and smoke the stationary locos commence to move, and despite their forward-spinning wheels and belching funnels the two veterans are pushed back into the shed, the new loco thus proving the value of her superior adhesion, an important factor in the handling of the huge trains of to-day.

The final scene shows the "King Arthur" hauling a long express westward-bound from Waterloo, at seventy miles an hour. Altogether it was a very enjoyable film and we feel sure our readers will look out for it with interest.

Drivers Who Love Their Engines*

By The Right Hon. J. H. Thomas, P.C., M.P.

LOOKING back I cannot but feel that the most memorable day is when, for the first time, the young engine-driver is booked out in charge of a train. To say he is proud, to say he is full of importance, to say he is alert and anxious to do well, is to do less than justice to the great occasion. When we remember that there are thousands of men who have done perhaps five or six years as cleaners, twelve and upwards as firemen, and all through that long and arduous apprenticeship have met their difficulties and dangers cheerfully, consoling themselves with the thought that the day must surely come when they will have full charge of the regulator, we get an idea of what it means to be selected for the coveted job.

I really believe that even my first entrance to the House of Commons as a newly-elected member was not so eagerly anticipated as my first experience in charge of a train!

Fully to understand the feelings and position of an engineman, one must realise that there is really a warm affection between the driver and his engine. In fact, it is said that sometimes an engine-driver thinks more of his engine than of his wife! Anyhow, I have known a man to leave his comfortable home at night and go down to the shed in order to see that certain repairs which he had booked were being properly and efficiently carried out. In thousands of engine-drivers' homes you will see a brass oil-feeder and torch lamp, showing that they like to have some reminders of their work about them.

I remember a very pathetic incident of an engine-driver who, after forty years of arduous work, was, through old age, asked to retire. For some weeks after he left the service he visited the engine-shed every day to see his beloved engine taken out by another man, and he was frequently seen caressing the engine with tears in his eyes. One morning after his usual visit he went away and committed suicide.

I need not trouble the reader with the many difficulties encountered on the road. There is the irritation caused by bad coal; then sometimes the engine will not steam, or the injectors fail, or some part is running hot. But the passengers enjoying a good meal in the dining-car, or comfortably smoking in a first-class carriage, little imagine that the driver may be spending his time between the footplate and the front end of the engine, anxiously and carefully attending to some part of the machinery that has gone wrong. When I read that a coroner's jury have returned a verdict of "Accidental death" in the case of an engine-driver who fell from the footplate, and the whole case is dismissed in half-a-dozen lines, I wonder whether there has passed away another industrial warrior, a martyr to duty, a man who has lost his life in saving others.

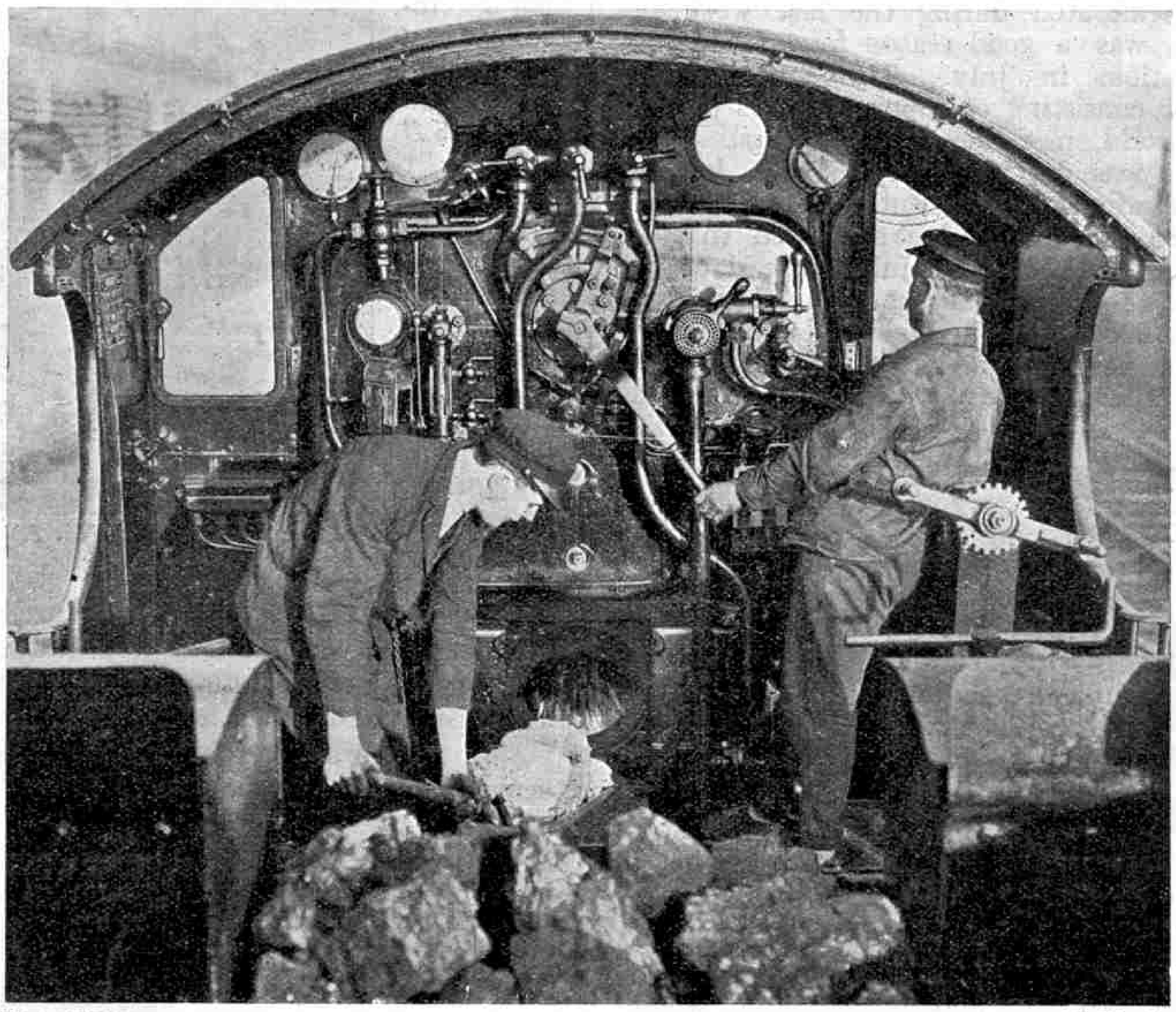


Photo courtesy [G.W. Rly.

The Engine Driver and his mate the Fireman

* Reprinted, by permission, from the "Home Messenger."

From Engine Driver to Privy Councillor

The Rt. Hon. J. H. Thomas commenced work as an engine cleaner with the Great Western Railway and eventually became an engine-driver. He has always taken an interest in work outside his usual duties, however, and whilst still an engine driver was elected to the Swindon Town Council. Here he held the office of Chairman of the Finance and Tramway Committee. In 1910 he was elected President of the Amalgamated Society of Railway Servants, and when the N.U.R. was formed he became its General Secretary, a position he holds to-day.

In 1910 he was elected Labour M.P. for Derby, and has represented this constituency in Parliament ever since. In 1917 he was made a Privy Councillor and in 1919 he was elected one of the four union members of the Railway Advisory Committee, established by the Ministry of Transport.

His career is a splendid example of how, by hard work, a working man can rise to one of the highest and most influential Labour positions in the land. We feel sure that Meccano boys will read this article with interest and join us in wishing Mr. Thomas a long and useful life.—EDITOR.

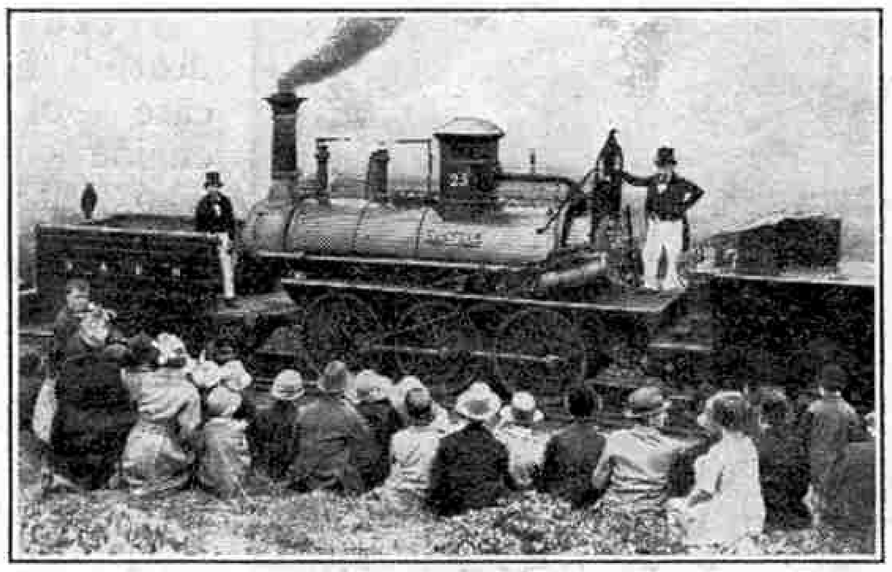
Railway Centenary Celebratio

Historic Procession of Veteran Locomotives or

By the

EVERY reader of the "*M.M.*" knows that the 27th September 1825, was a memorable day in the history of the locomotive, for on that day a train made its first journey on the Stockton and Darlington Railway. To commemorate the hundredth anniversary of this historical event, special celebrations were held in Darlington during the first week in July.

Although, strictly speaking, the anniversary should have been commemorated during the last week in September, there was a good reason for holding the centenary celebrations in July. The International Railway Congress, consisting of representatives of the railways of the world, meets every five years. This year the Congress was due to meet in Spain, but in view of the celebration of the centenary of British Railways, the Congress Committee suggested that if the celebrations could be held in July, instead of on the actual date of the anniversary in September, they would hold their 1925 session in London instead of in Madrid. Matters were so arranged and delegates representing the railways of every country journeyed



"*The Derwent*" (1845) with driver and fireman in the "uniform" of the period
Note that the firebox is at the front of the loco

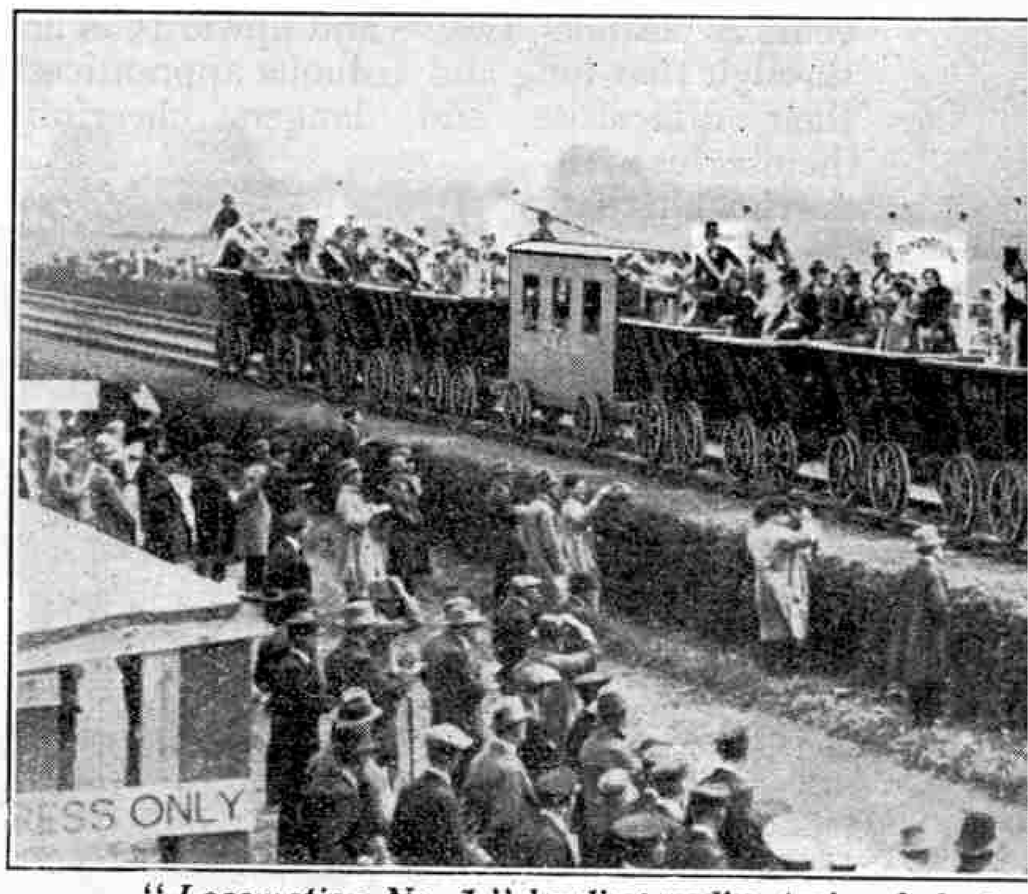
to London, and later to York and to Darlington, where the hundredth birthday of the railway was celebrated on the site of the original Stockton and Darlington Railway.

The Celebrations at Darlington

Knowing that readers of the "*M.M.*" would be interested in this historic event I made a special journey to Darlington to obtain some photographs of the procession and, more particularly, some first hand details of the veteran locomotives and rolling stock and the other interesting exhibits that were on view at the Faverdale Works of the L.N.E.R.

When I arrived in Darlington I found the town "*en fête*"—the streets were gaily decorated with flags and bunting, the shops were closed, and everyone seemed to be having a holiday in honour of the event. There were special bands and entertainments in the public parks, and everything possible was being done to make the anniversary an event to be remembered—more especially, perhaps, by the boys and girls.

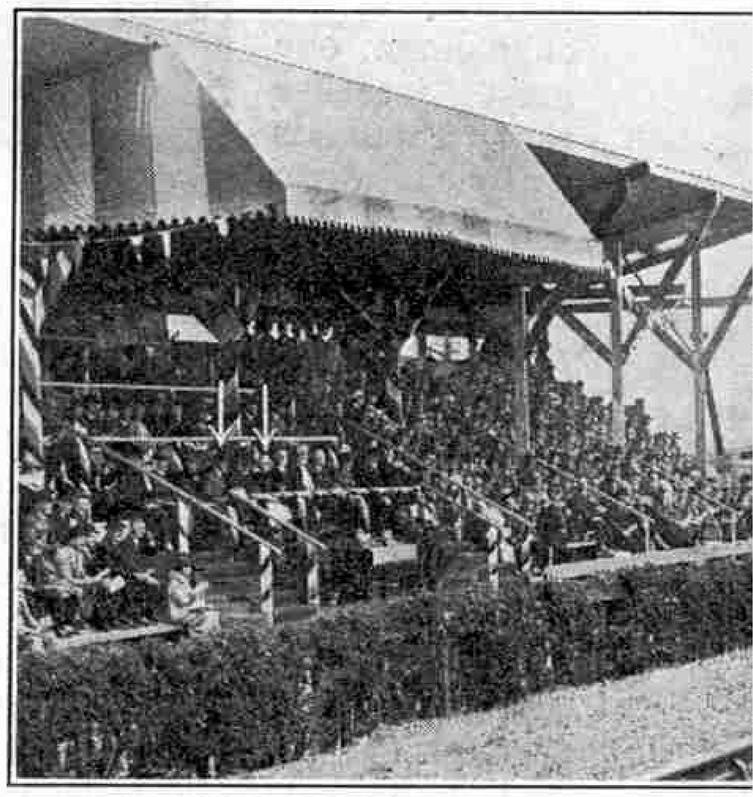
Everywhere one saw evidence of the spirit of the week—in the Park, for instance, was a huge flower-bed designed in the form of a locomotive, with a suitable floral inscription "Centenary : 1825—1925." Almost every shop window was suitably set out—there were locomotives in cardboard, in soap, in chocolate, and even in fruit ; old prints dealing with early railways and dozens of books—old and new—on locomotives and railways. Even the hatters and tailors entered into the spirit of the thing and displayed in their windows hats and suits of the period, as worn by the passengers of the trains of a century ago.



"*Locomotion No. 1*" hauling replica train of chaldro
accommodated in "the long

Spectators Estimated at Quarter-of-a-Million

The great event of the week was the procession of locomotives and rolling stock, which was to travel over the old railway, from Stockton to Darlington. From a very early hour on the morning of the 2nd July, visitors from all parts of the surrounding district poured into Darlington by train and bus, motor and cycle, and even on foot. Many hours before the procession was due, the streets of the town and the main road between Darlington and Stockton were thick with traffic and the police had a very busy time. Fields along each side of the railway, had been engaged for the occasion, and the spectators



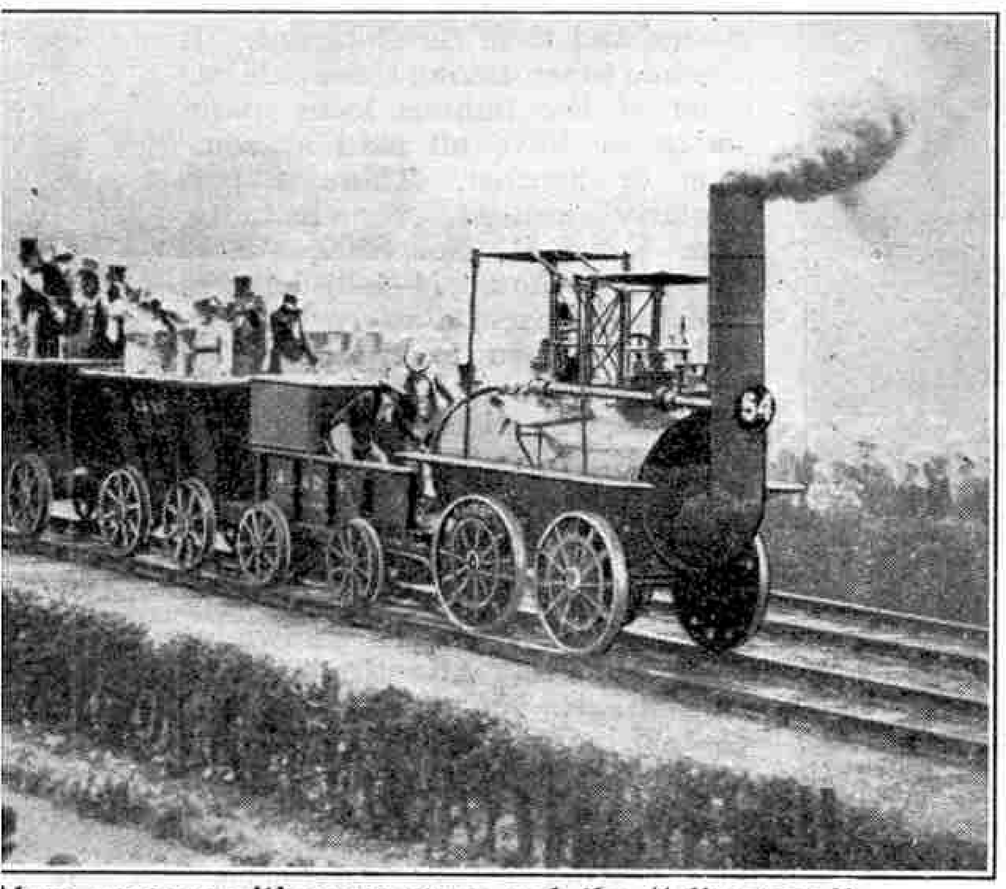
The Hetton Colliery Locomotive (built
The arrows point to the Duke and Duchess of Yo

ons: Contrast of Old and New

on the Original Stockton and Darlington Line

e Editor

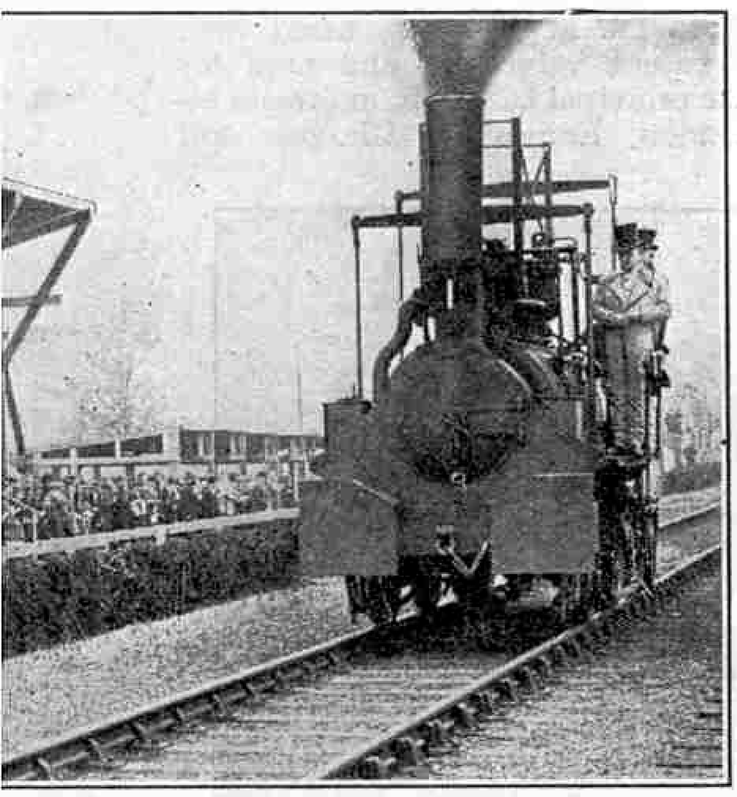
took advantage of the beautiful weather to make a picnic of the event. In one of the fields there were over 4,000 boys and girls from the Darlington schools and it is estimated that a quarter of a million people lined the edge of the railway between Darlington and Stockton. Every point of vantage was occupied by the spectators, —even the roofs of railway coaches that had been shunted on to side lines off the route were used as grandstands—and every bye-lane and field-road was used as a park for the visitors' cars.



ldron wagons with passengers, and the "directors"
ong coach of the company"

Duke and Duchess of York inaugurate Centenary Celebrations

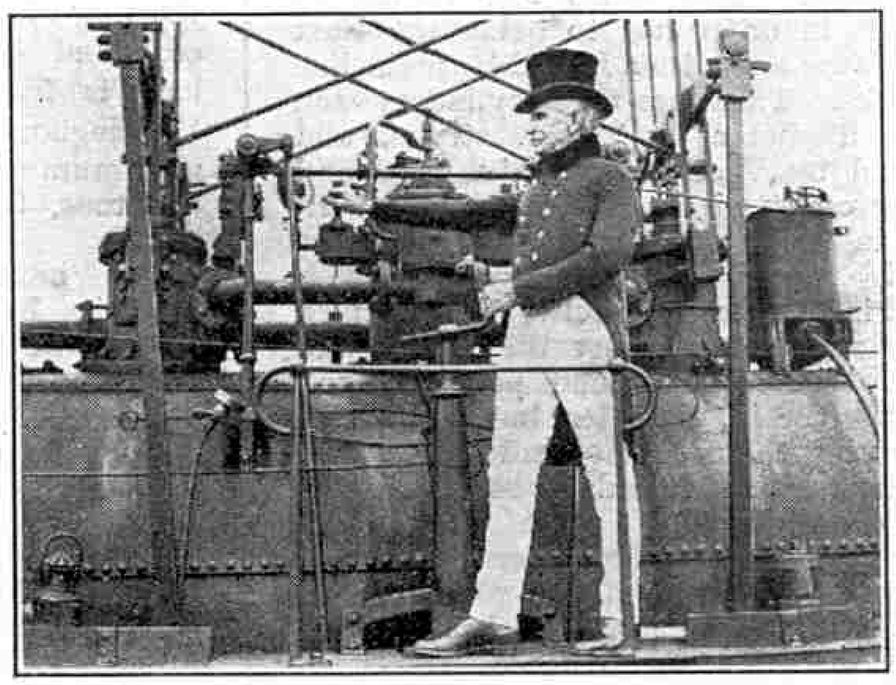
Between the villages of Dinsdale and Urlay Nook, grandstands had been erected for the accommodation of the Royal party and the distinguished visitors, guests of the L.N.E.R. Company. They were brought to the grandstand by special trains direct from Hull, York, Newcastle and elsewhere. Many thousands of people congregated on the side of the railway opposite the grandstand, and there was great eagerness to see the Duke and Duchess of York, who were paying a special visit to inaugurate the Centenary Celebrations. Their train, the progress of which had been reported by telephone and announced to the spectators by loud-speakers, arrived at 10.45 a.m. and the Royal couple were received by Viscount Grey of Falloden, Sir Hugh Bell, and Sir Ralph Wedgewood, the General Manager of the L.N.E.R.



uilt 1822) which led the Procession
f York, interested spectators of the procession

Old-time Locos take the Rail Again

There was an interval of ten minutes after the arrival of the Royal party before the head of the eagerly-awaited procession came in sight. The first indication we had of its approach was a cloud of black smoke, away down the line towards Stockton. We soon saw that the smoke came from one of the early locomotives, which was slowly approaching. In the distance the overhead mechanism could be seen rising and falling, as the old engine cheerfully "chuffed" along the line at a speed of six miles an hour. It turned out to be the Hetton Colliery engine (0–4–0) built in 1822 by George Stephenson and Nicholas Wood, at Hetton Colliery workshops before Stephenson's locomotive works at Newcastle-on-Tyne were established. The veteran was rebuilt in 1857 and again in 1882, when it was fitted with its present link motion. As it reached the grandstand, this famous old engine, which was in daily use at Hetton Colliery until 1912, was greeted by a loud burst of cheering from the spectators. This tumultous reception seemed to greatly please the driver, who was himself a veteran of the railway and was attired in the dress of a century ago, for he beamed on the spectators with conscious pride.



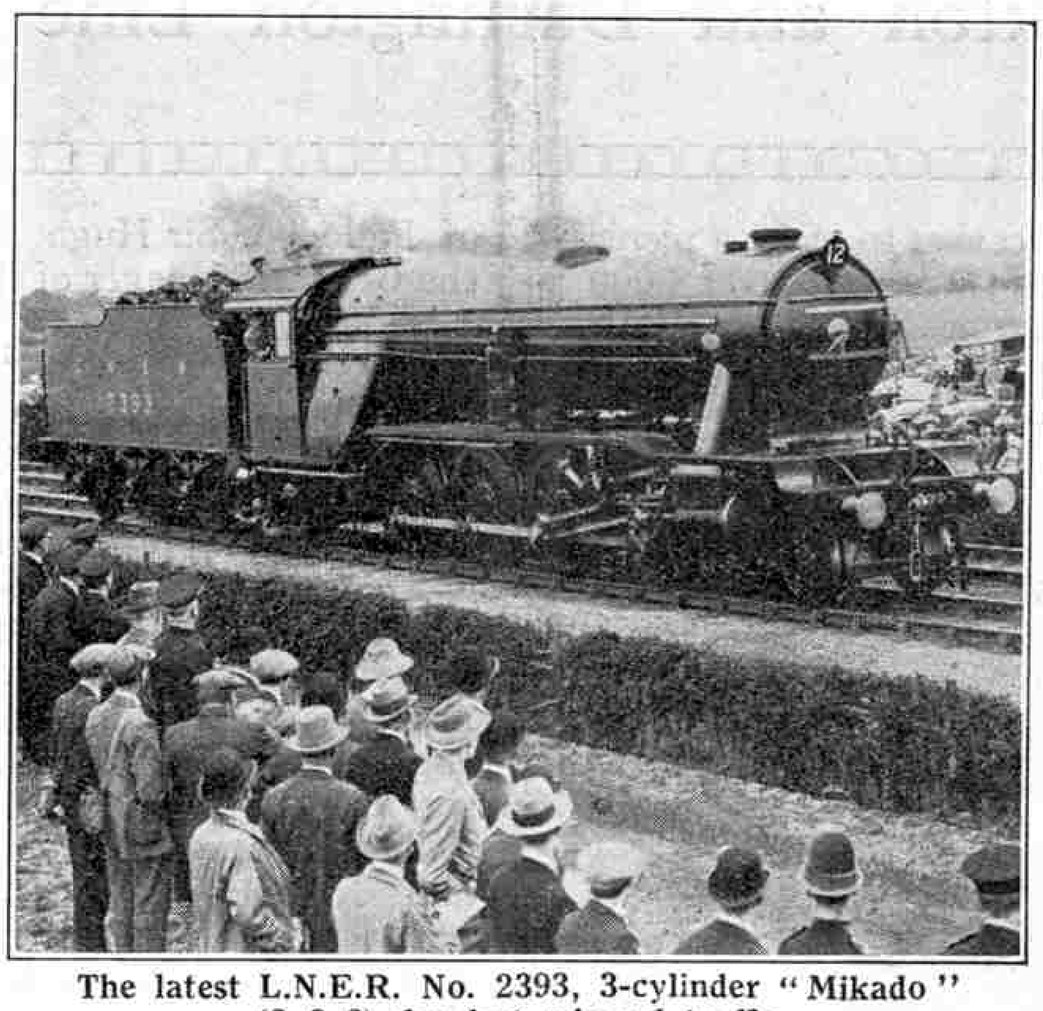
On board the Hetton Colliery Loco
The drivers of the early locos were exposed to the weather

The next to appear was the "*Derwent*" (0–6–0) a typical mineral engine, designed by Timothy Hackworth and built in 1845 by Wm. and Alf. Kitching at the Hopetown Foundry, Darlington. It served the Stockton and Darlington Railway for many years before it was sold to Peases' West Collieries at Crook. After doing good service there it was "retired" and stood, with the famous "*Locomotion No. 1*," on a pedestal in Darlington station, where, no doubt, many of our readers have seen it when they have passed through by train. The "*Derwent*" was driven by George Danby, and both he and his fireman were attired in white trousers, frock-coats, and tall hats, as worn in the time of Stephenson.

Following the "*Derwent*" came a number of goods and mineral train engines, illustrating various types

and including L.N.E.R. No. 10114 (0–6–0) goods engine built by Neilson & Co., of Glasgow in 1868, for the North British Railway. L.N.E.R. No. 1275 (0–6–0), built in 1874 for the Stockton and Darlington Railway. L.N.E.R. No. 517 (0–6–0) built in 1905 at Gateshead for the North Eastern Railway. L.N.E.R. No. 934 (4–6–0) a 3-cyl. express goods loco, built at Darlington in 1921. L.N.E.R. No. 203 (2–6–0) also a 3-cyl. express goods loco built at Darlington in 1925, and fitted with Gresley's patent valve-gear. L.M.S. No. 1881 (0–8–0) a 4-cyl. compound mineral loco, built by the London & North Western Railway at Crewe in 1901. L.M.S. No. 9446 (0–8–0) also built at Crewe in 1922. L.N.E.R. No. 3499 (2–8–0) 3-cyl. mineral loco, built at Doncaster and fitted with Gresley's patent valve-gear, which loco represented a class of engine used for hauling mineral trains from the northern coal fields to the London area. G.W.R. No. 4700 (2–8–0) loco, built at Swindon in 1919 and used for hauling express goods and heavy excursion trains over the G.W. main lines.

Then came a particularly interesting loco, L.N.E.R. No. 2393 (2–8–2) the new type 3-cyl. "*Mikado*," the first of its class and built at Doncaster this year. This "Mikado" loco has been designed for working heavy coal trains between Peterborough and London, which load up to 100 trucks weighing approximately 1,600 tons. The trains run to a fast schedule in order not to delay the East Coast route and other L.N.E.R. main line expresses. There are three cylinders each 20 in. diameter by 26 in. stroke, and actuated by Walschaerts valve gear and driving on to eight coupled wheels 5 ft. 3 in. in diameter. The forepart of the loco is carried on a pony-truck with 3 ft. 2 in. diameter wheels. The coupled wheels are spaced under the boiler, and behind them is a second pair of small wheels 3 ft. 8 in. diameter, but in addition to carrying the footplate end of the loco this latter axle is actually a second engine unit, or "Booster." The booster-axle is driven by two small cylinders each 10 in. in diameter by 12 in. stroke, placed below the footplate. The addition of the booster engine increases the tractive power of the loco from 38,500 lb. to 47,000 lb. and thus makes it nominally the most powerful loco in the country, with the exception of the new "Garratt" loco, to be mentioned later. The boiler of No. 2393 is of large size and is of the type fitted to Mr. H. N. Gresley's "Pacifics," while the various other fittings of the loco are of the design now being made standard for the heavy locos of the L.N.E.R. The loco was coupled to a large six-wheeled tender of the new standard type to carry 7 tons of coal and 4,700 gallons of water. The loco is fitted with both vacuum and Westinghouse brake system and its maximum weight in full working order is 100 tons, the tender alone weighing 51½ tons.



The latest L.N.E.R. No. 2393, 3-cylinder "Mikado" (2–8–2) for fast mineral traffic

The next exhibit was a L.N.E.R. Electric Freight loco (0–4–4–0) built in 1914 at Darlington for hauling freight trains over the Shildon-Newport electrified section of the L.N.E.R. This loco is fitted with four motors, the power being transmitted through spur-gearing to wheels 4 ft. in diameter.

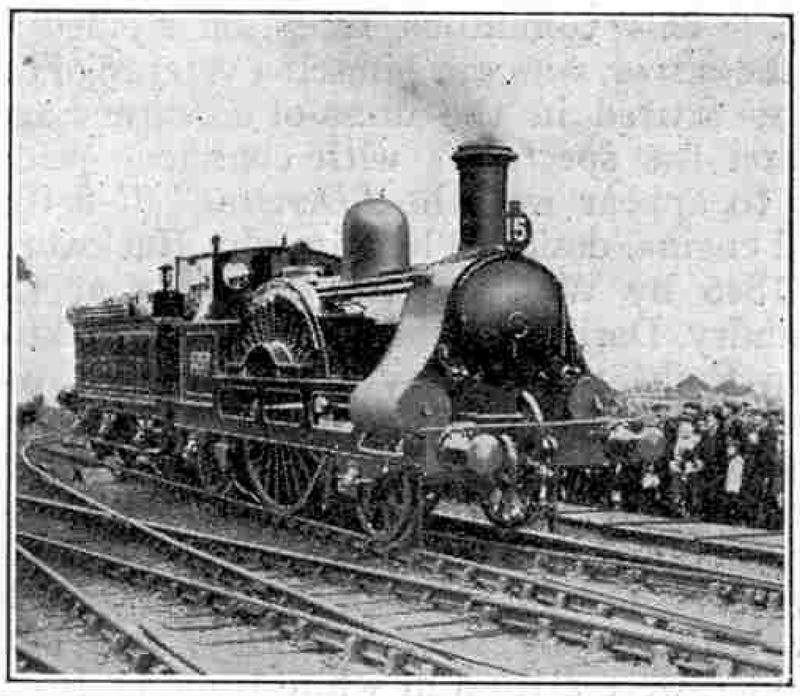
A burst of cheering greeted the appearance of a full sized model of the famous "*North Star*" (2–2–2) built in 1837 by Robert Stephenson & Co. This veteran was mounted on a crocodile wagon and drawn by the small tank engine E. 1. The original "*North Star*" was intended for a foreign railway, the gauge of which was 6 ft., but subsequently it was altered to suit I. K. Brunel's 7 ft. gauge of the G.W.R. The "*North Star*" was taken over by that Company and remained in traffic until 1870.

Then there came four examples of the Single Driver Express Engines so popular in the latter half of the last century, including the L.M.S. "*Cornwall*" (2–2–2) built at Crewe by the London & North Western Railway to the design of Trevithick's son, Francis. The principal feature of the "*Cornwall*" is the huge driving wheels, 8 ft. 6 in. in diameter and the largest loco driving wheels in the world. As originally built the "*Cornwall*" had its boiler underneath the driving axle and was thus shown at the Great Exhibition in London in 1851.

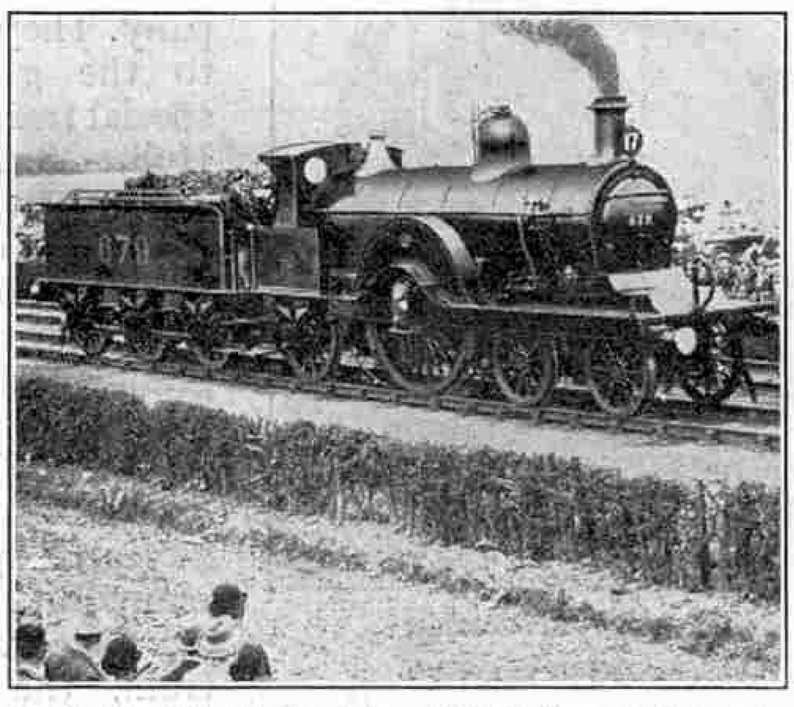
Next we saw L.N.E.R. No. 910 (2–4–0) built in 1875 at Gateshead, an Express Passenger loco of a type used for working the principal trains between Newcastle and Edinburgh and also between Edinburgh and York. This loco took part in the Newark Brake Trials of 1875 and was also included in the Jubilee celebrations of the Stockton and Darlington Railway in the same year.

Eleven express passenger engines followed, illustrating in a most interesting manner the different classes and their development. It was fine to see among these exhibits some of the famous locos about which we have all read at some time or another. Those I particularly noticed, for instance, were L.N.E.R. No. 8900, "*Lord Claud Hamilton*" (4–4–0) built in 1900 by the Great Eastern Railway and well-known to travellers between London (Liverpool Street), Harwich, Ipswich, and Cromer. L.N.E.R. No. 3990 (4–4–2), an Express Passenger loco built at Doncaster by the Great Northern Railway in 1898 for hauling the East Coast expresses between York and London, and well known as being the first of the "Atlantics" in this country. L.N.E.R. No. 9902 "*Highland Chief*" (4–4–2) built for the North British Railway in 1911 for the East Coast route and used for hauling expresses between Glasgow, Edinburgh and Aberdeen. L.N.E.R. No. 6169 "*Lord Farringdon*" (4–6–0) a 4-cyl. Express Passenger loco built by the Great Central Railway, and used between Marylebone and Manchester.

Then came an old friend, behind whom I have often travelled—L.M.S. No. 5900, "*Sir Gilbert Claughton*" (4–6–0) built in 1913 by the London and North Western Railway at Crewe—a 4-cyl. Express Passenger loco used for hauling the principal expresses between Euston, Crewe and Carlisle. She was followed by the famous L.N.E.R. "Pacific" No. 2563 "*William Whitelaw*" (4–6–2) a 3-cyl. Express Passenger loco built last year by the North British Loco Co. at Glasgow, fitted with Gresley's patent valve-gear and used for hauling the principal L.N.E.R. expresses between London, Edinburgh, Glasgow and



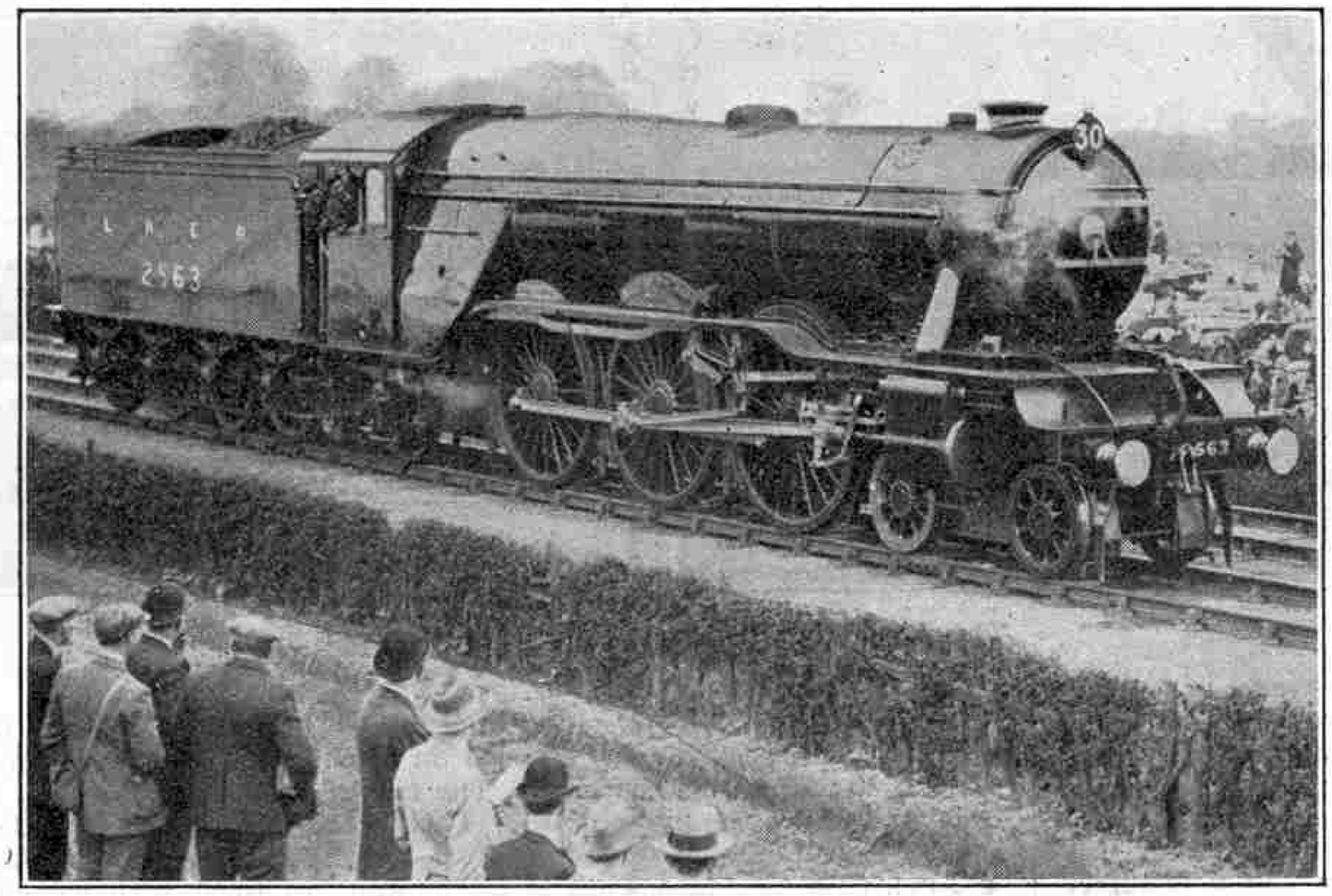
L.M.S. 3020 The "Cornwall" (2-2-2). A Single Driver Express Passenger Engine, with the largest driving wheels in the world (8 ft. 6 in.)



L.M.S. No. 679 Single Driver (4-2-2) Express Passenger Engine (1899). A speed of 90 miles per hour was attained by an engine of this class

Aberdeen. Particulars of this engine are :—cylinders 20 in. in diameter and 26 in. stroke ; driving wheels 6 ft. 8 in. in diameter ; boiler 6 ft. 5 in. diameter, 19 ft. in length ; grate area 41.25 sq. ft. ; heating surface 3,455 sq. ft. ; boiler pressure 180 lbs. per sq. in. ; tractive effort 29,835 lbs.

Another Electric loco now came into view. This was L.N.E.R. No. 13 (4–6–4) a Passenger loco built at Darlington in 1922 and originally intended for use on the main line of the North Eastern Railway between Newcastle and York. No. 13 has again proved an unlucky number, for the electrification of the line has not yet been carried out and so the loco is "out of work." She is equipped with three motors with twin armatures andtransmitting power through spur-gearing and quill-drive to wheels 6 ft. 8 in. in diameter. Following this came No. 66 "*Aerolite*" (2–2–4) a compound loco built in Leeds in 1851, and 407B a Great Central Saddle-Tank Shunting loco (0–6–0) built in 1876.



L.N.E.R. No. 2563 "*William Whitelaw*" (4–6–2)

A burst of laughter and cheering greeted the next exhibit, which for all the world resembled a cross between a bathing machine and a guard's van ! Trundling along quite merrily to the accompaniment of a clanging bell, it turned out to be No. 7133 (0–4–0), a shunting engine built by the Great Eastern Railway in 1897. The type was first introduced in 1883 and is used chiefly for shunting and working trains on public highways, docks, and quay-sides. Six Tank locos followed, including No. 11112 a L.M.S. "Baltic" (4–6–4), which type was illustrated on the cover of the April "*M.M.*" and described in a special article in the same issue.

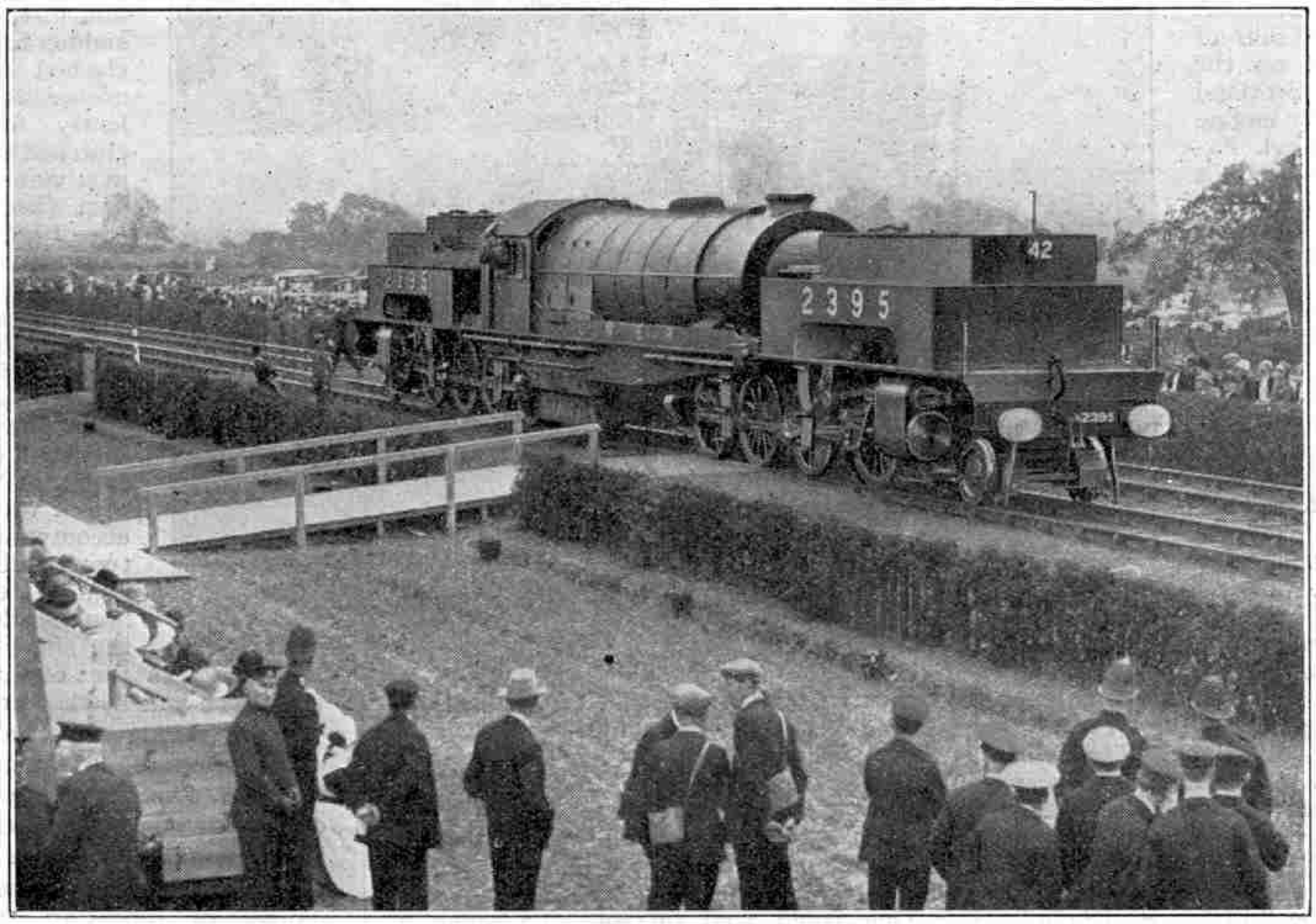
The next exhibit — the new "Garratt" Articulated loco (2–8–0 : 0–8–2) — filled me with delight and was the finest piece of mechanism I had seen for many a long day. Built by Messrs. Beyer, Peacock & Co. Ltd., of Manchester, this huge monster was only delivered to the L.N.E.R during the previous week. It is fitted with Gresley's Valve-gear, and is the most powerful "Garratt" yet constructed for any part of the world and also the heaviest. The type does not need any description to readers of the "*M.M.*" for these engines have often been mentioned and described, but it certainly did thrill me to see this wonderful example slowly gliding along the line, looking so full of power. Its hauling power is claimed to be equal to two of the 3-cyl. eight-wheels-coupled locos of the 3499 class and where possible the loco details are interchangeable with that class. As this "Garratt" has two sets of three cylinders, it is the first six-cylinder loco to be constructed. To supply the necessary steam to the six cylinders requires a boiler of no less than 7 ft. in diameter, this being a much larger boiler than any in service—or even possible—on the ordinary type of loco.

Quite a contrast to the previous part of the procession was provided by the next three exhibits—Petrol 'Bus No. 130 built by the North Eastern Railway in 1922—really a road vehicle converted for rail service—with accommodation for 26 passengers and driving controls at each end ; Petrol Auto Car No. 2105, built in 1923 for the L.N.E.R., with a bogie at one end and a single pair of wheels at the other, accommodation for 40 passengers and equipped with electric light and Westinghouse brakes ; and a Sentinel Cammell Coach—a handsome steam-motor rail-coach mounted on bogies, accommodation for 60 passengers, of all-steel construction and with boiler and engine carried at one end over the bogie, the ultimate drive being by chains.

Then followed a L.N.E.R. mineral train composed of 10½, 20 and 40-ton self-discharging wagons, illustrating the gradual development of the high capacity wagon for mineral traffic. The train was drawn by engine No. 904 (0–8–0) a 3-cyl. eight-wheels-coupled, built at Darlington in 1919 and used for hauling heavy trains.

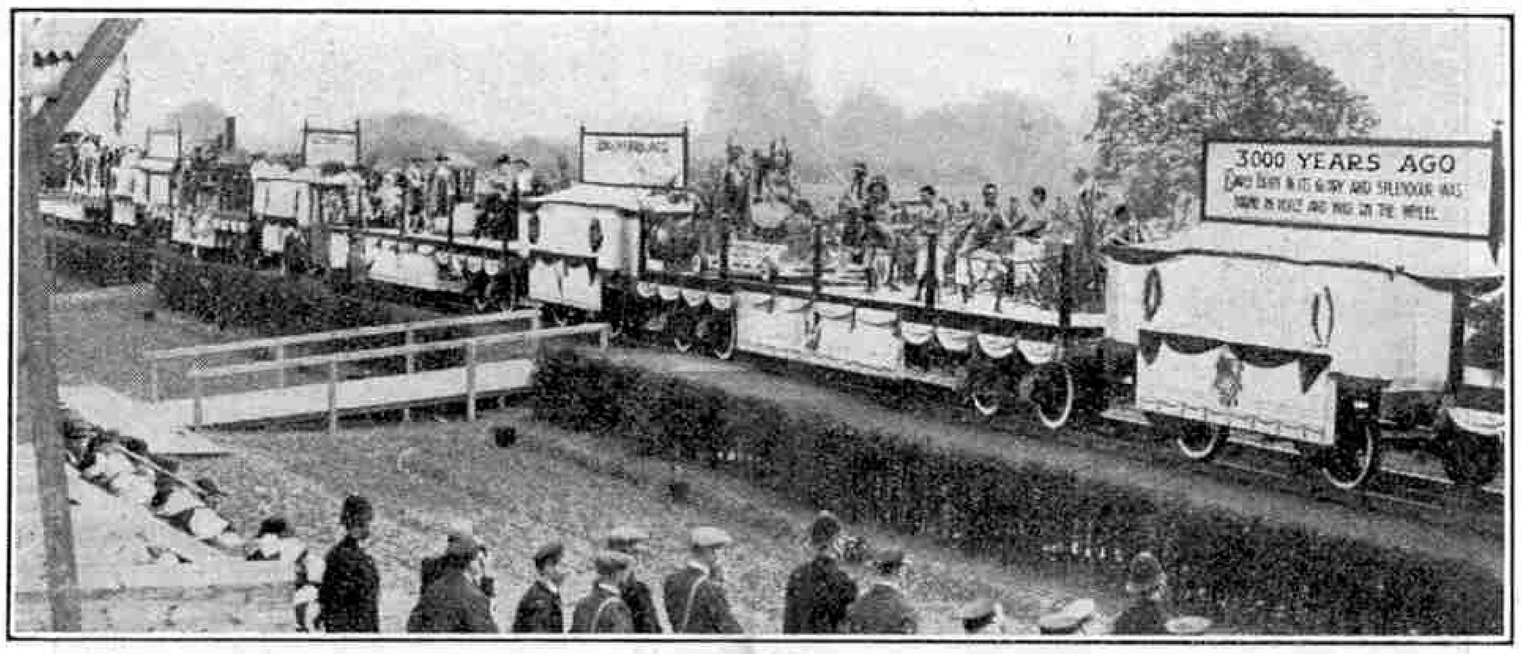
A pleasing change to the long procession of locos was the Tableaux Train illustrating the history of the wheel in transport. The train was drawn by engine No. 130 (0–8–0) an eight-wheels-coupled mineral loco built at Gateshead in 1902. This was one of the 50 locos of this type used in France during the War and its honourable war service was recognised by the chevrons it carried.

The tableaux consisted of six wagons each carrying a separate "picture." The first was allegorical and depicted a number of astrologers grouped at one side of a symbolic wheel, with a scene showing modern engineering practice on the other. The two scenes were joined through the spokes of the wheel by a huge chain, representing the links of time. The second



L.N.E.R. No. 2395, the huge Garratt Articulated loco (2–8–0 : 0–8–2)

tableau showed a tribe of prehistoric men, who, having felled a tree with their flint axes, were shown transporting the trunk on logs used as rollers—the earliest form of the wheel. Then came an Egyptian scene in which one of the royal Pharaohs was being drawn on a wheeled platform by slaves, showing how the Egyptians started the wheel in its manifold forms so that, through the ages that followed, progress successively moved on the wheels of chariot, wain, and coach. This was followed by the fourth tableaux showing how the wheel was discarded for a time when Sedan chairs were used, and the fifth depicting the story of the wheel in transport opening its most famous chapter when Stephenson mounted an engine on wheels and steam locomotion began. On one side of this wagon Stephenson was explaining the working of a model of "*Locomotion No. 1*" to a group of friends and workmen, whilst on the other side modern mechanics were working with present-day materials and tools. The final tableau showed how the railways of the world have grown from the few miles of permanent way uniting Stockton and Darlington.

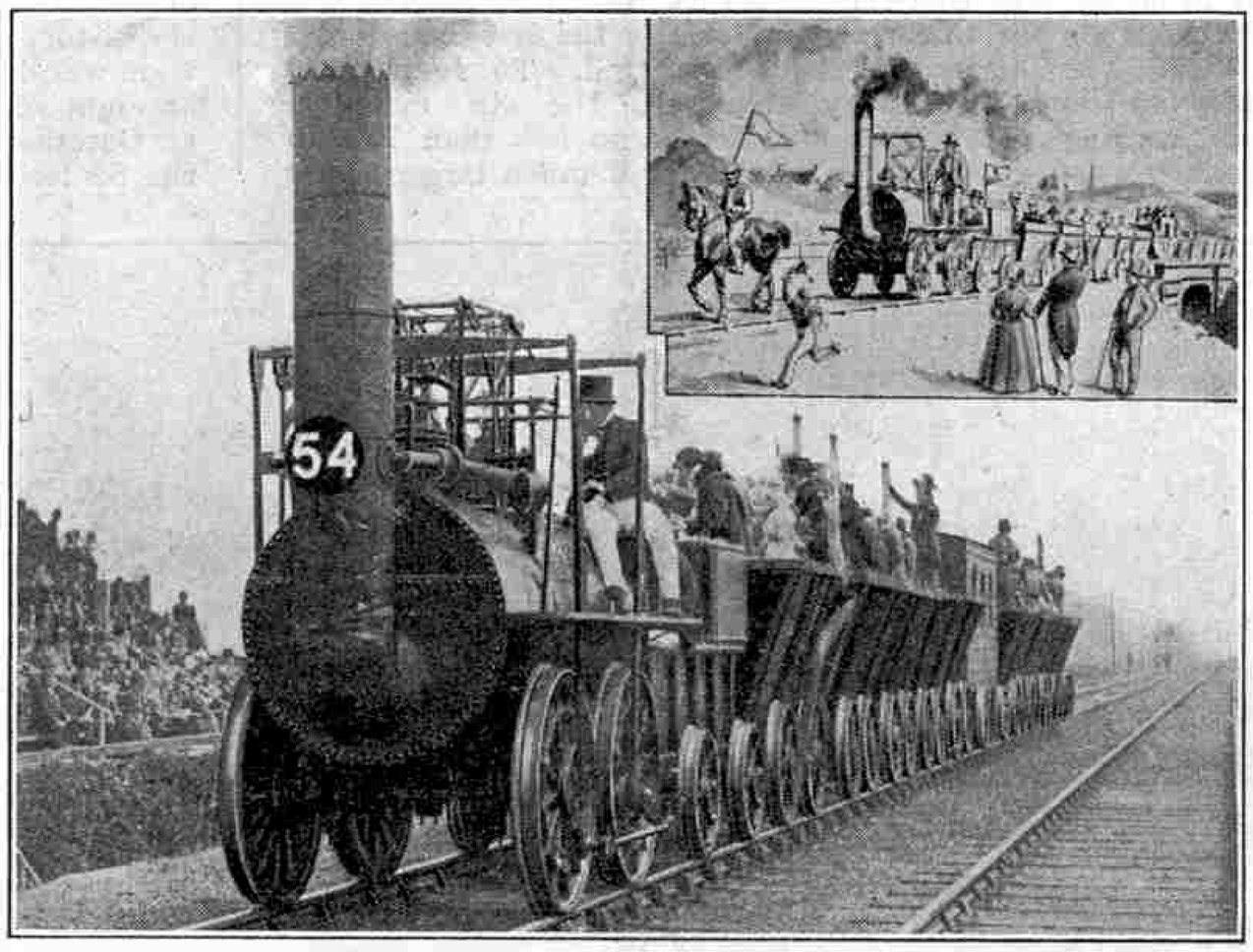


The Tableaux Train passing the Grandstand

The Tableaux Train was followed by a train of old four-wheeled carriages built in 1865, formerly used on the Great North of Scotland Railway, and drawn by engine No. 45A (4–4–0) built by Neilson & Co., of Glasgow in 1865. In striking contrast to this were the next five exhibits—splendid modern trains, cleaned and polished and looking their best. A L.M.S. Vestibuled-Train of nine vehicles used on the West Coast to Scotland route and drawn by engine 10474 (4–6–0), a 4-cyl. Express Passenger loco built at Horwich by the L.M.S. to the design of Mr. Hughes, their Chief Mechanical Engineer. This was followed by the Royal Train, drawn by G.W. No. 4082 "*Windsor Castle*" (4–6–0), a 4-cyl. Express Passenger engine, built at Swindon by the G.W.R. and driven on one occasion by the King with the Queen on the footplate.

Next came a fine example of an articulated train, built at Swindon by the G.W.R. and used on that Company's service between London and Plymouth. This train was drawn by the famous G.W. 4-cyl. engine No. 111 (4–6–0) originally of the "Pacific" type, built in 1908 and named "*The Great Bear*," but rebuilt at Swindon last year to conform to the "Castle" class and re-named "*Viscount Churchill*." Then came a Southern Rly. train, drawn by a 4–6–0 "King Arthur" express passenger engine. Finally, the "Flying Scotsman" came into sight—a vestibuled train, with triplet-articulated Dining Car and electrically-equipped Kitchen, as used on the East Coast Route to Scotland. The train was hauled by the magnificent "Pacific" No. 2400 "*City of Newcastle*" (4–6–2) a 3-cyl. passenger loco, built at Darlington in 1922 and typical of the class of loco used for hauling the heavy East Coast expresses between York, Newcastle, and Edinburgh.

The last exhibit in this wonderful railway pageant was, perhaps, the most eagerly awaited by the spectators. It was "*Locomotion No. 1*," the original engine that drew the first train over the Stockton and Darlington Railway on the 27th September 1825. Someone humorously suggested that it had been arranged for the "*Locomotion*" to bring up the rear of the procession because it was by no means certain that it would not break down!



"*Locomotion No. 1*" and Replica Train

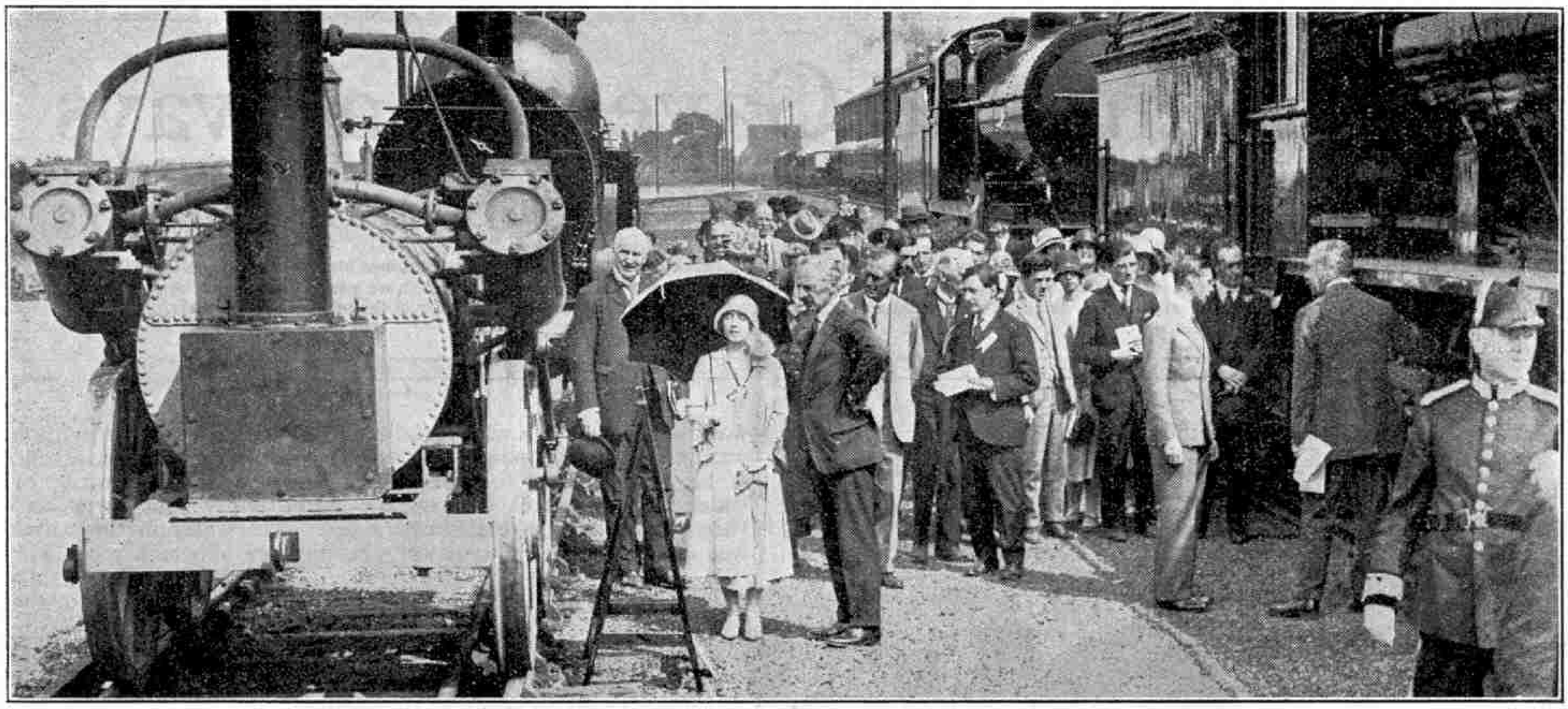
Inset : An old drawing of the same engine and train as it appeared on the opening day of the Stockton and Darlington Railway, a century ago

If this was the reason that the famous old engine came last, the fears of the authorities were groundless, for the "*Locomotion*," hauling a replica of the original train that made the same journey one hundred years ago, ran as well as it did on that memorable occasion, with its overhead mechanism rhythmically rising and falling.

One could well imagine the scene a century ago, and indeed everything possible had been done to make the resemblance as realistic as possible. On that memorable occasion in 1825 the train was made up of chaldron wagons, as the coal wagons of the period were called, and a man on horseback rode in front. The train carried many passengers and also a band, and the directors of the Stockton and Darlington Railway travelled in the only coach in existence, which was specially described as "the long coach belonging to the Company."

In the centenary procession the train was preceded by a man on horseback with a red flag, and the replicas of the chaldron wagons and the directors' coach were filled with passengers attired in the same style of dresses as was worn by the original passengers a century ago. The men wore frock-coats and tall beaver hats, and had side whiskers and wigs. The ladies wore sun-bonnets, and skirts with flounces and ribbons, as worn by their great grandmothers on the opening day. The band were accommodated in two of the wagons near the engine, and while the conductor in a white wig proudly wielded his baton, the gaily uniformed bandsmen played the same tunes as were played a century ago.

It had been arranged that the train should stop for a few moments near the grandstand and that the band should provide a musical interlude. As the old "*Locomotion*" drew near, emitting clouds of black smoke from its tall funnel and covering the be-ribboned lady passengers with soot and dirt, it came to such a sudden halt that the wagons clashed together and the occupants were thrown violently forward. They clutched wildly at each other in a vain endeavour to support themselves, and even the "Directors" in "the long coach belonging to the Company" looked extremely alarmed as they were jostled to one end of the coach in a confused heap. Sorting themselves out, however, the bandsmen collected enough breath to strike up "Auld Lang Syne," which was rendered to the accompaniment of tumultuous and prolonged cheering. As the strains of the famous old tune rang out, the Duke and Duchess and the other guests rose to their feet and heads were bared until the veteran engine departed. As the train disappeared round a bend on its way to Darlington the band struck up the famous old north country hunting song, "John Peel," and although the engine jerked so that the bandsmen were in imminent danger of repeating their earlier experience, their departure from the



The Duke and Duchess of York inspect the exhibits at the Faverdale Works, Darlington

The "Invicta" (0-4-0) built for the Canterbury & Whitstable Railway, 1830, is seen on the left, and "Coppernob" (2-2-2, built 1846), a loco with a huge copper dome-like firebox, is immediately behind. "Coppernob" was built for 5 ft. 3 in. gauge

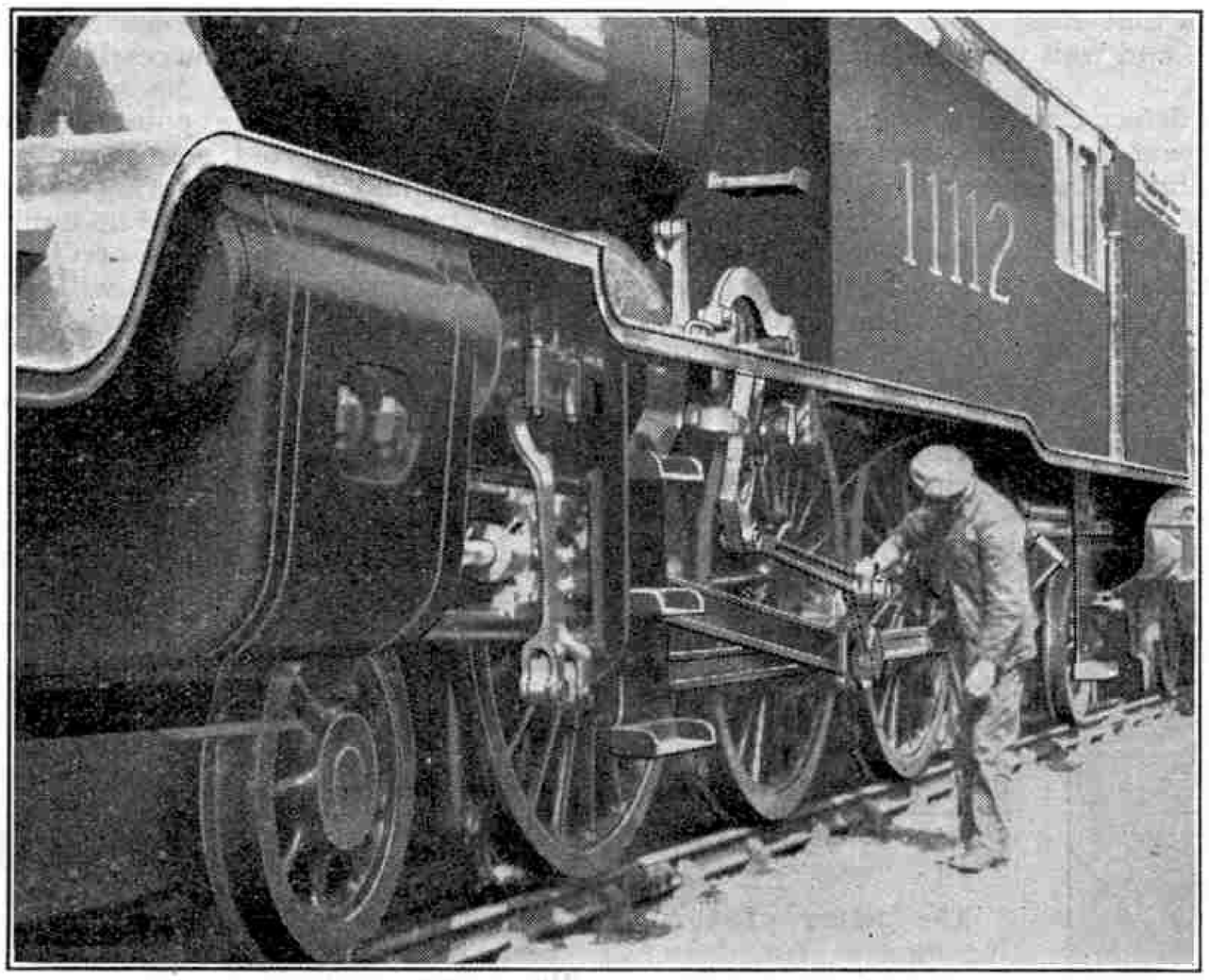
grandstand was as triumphant as their approach and the strains of old English airs floated down the line, even for a long time after the be-wigged musicians had disappeared from view!

After the procession had passed, Viscount Grey presented the Duke of York with a silver replica of "*Locomotion No. 1*" and tender, and the Duchess with a silver replica of the historical Stockton and Darlington passenger carriage. The Royal pair then proceeded through dense crowds of cheering spectators to Stockton, where they and over 300 guests were entertained to lunch. The Mayor, in proposing the health of the Royal visitors, said:—"You meet us in celebrating the enterprise of a past age and in celebrating the achievements of George Stephenson, Timothy Hackworth and Edward Pease—to name only three of those who were responsible for the first public railway using steam locomotion. You encourage their successors to probe still further into the wonders of transport engineering and science."

The Duke, in returning thanks for the kind welcome extended told a humorous story that evoked great laughter.

"We all fully appreciate that no small amount of courage was required to face the oppositions that the opening of the Stockton and Darlington Railway evoked," he said. "I understand that there was at least one doleful prophet who made the rash offer to eat all the coal the railway would carry! Had that prophet lived in 1923, he would have had to have eaten 217 million tons of coal!"

After lunch, the Duke and Duchess of York proceeded to St. John's Crossing, Stockton, where they unveiled a tablet on the building from which the first railway ticket was issued. The tablet bears the inscription, "*Here the Stockton and Darlington Railway Company issued the first passenger railway ticket thus marking an epoch in the history of mankind.*"



The L.M.S. 4-6-4 Baltic Tank No. 11112 on view in the sidings at the Faverdale Exhibition

Returning to Darlington, I paid a visit to the Faverdale Works of the L.N.E.R. where a great collection of railway relics was on exhibition. Here were objects that would delight the heart of every reader of the "*M.M.*"—pictures and prints, documents and books regarding the early railways; early forms of signalling apparatus; permanent way materials—early railway lines, points, stone sleepers, etc.,—models of locos; early railway carriages, and hundreds of other things of equal interest. On the sidings outside the Exhibition buildings were the locomotives and rolling stock that had taken part in the morning's procession. Although the public were not allowed amongst the locos until the following day it was only necessary for me to whisper the magic words "*Meccano Magazine*" to the friendly policeman on guard to enable me to pass the closely-guarded barriers and inspect the veteran locos at my leisure. Here I closely examined with great interest the "*Meteorite*," "*Hetton*," "*Invicta*," "Baltic Tank," "Garratt"—and dozens of others.

It was here, too, that I was fortunate enough to have a few minutes' chat with Mr. W. Smith, the driver of "*Locomotion No. 1*" who had just brought his charge to a standstill in the sidings, fresh from its triumphant progress in the procession. In reply to my enquiry as to how she ran, he said:—"She is a steady old thing but bumps a bit over the points. But what can you expect with springs like they made in those days!" "Yes," he continued, "I have been with the Railway Company for 51 years, so that you can almost say I have seen the modern locomotive grow up." With this claim I could not but agree!

"What do you think of my coat, Sir?"

I was bound to admit that Mr. Smith's tail-coat and top hat was a pleasing change from the usual "uniform" of drivers to-day. On the other hand, as Mr. Smith

(*Continued on page* 471)

The Men who Gave us Railways

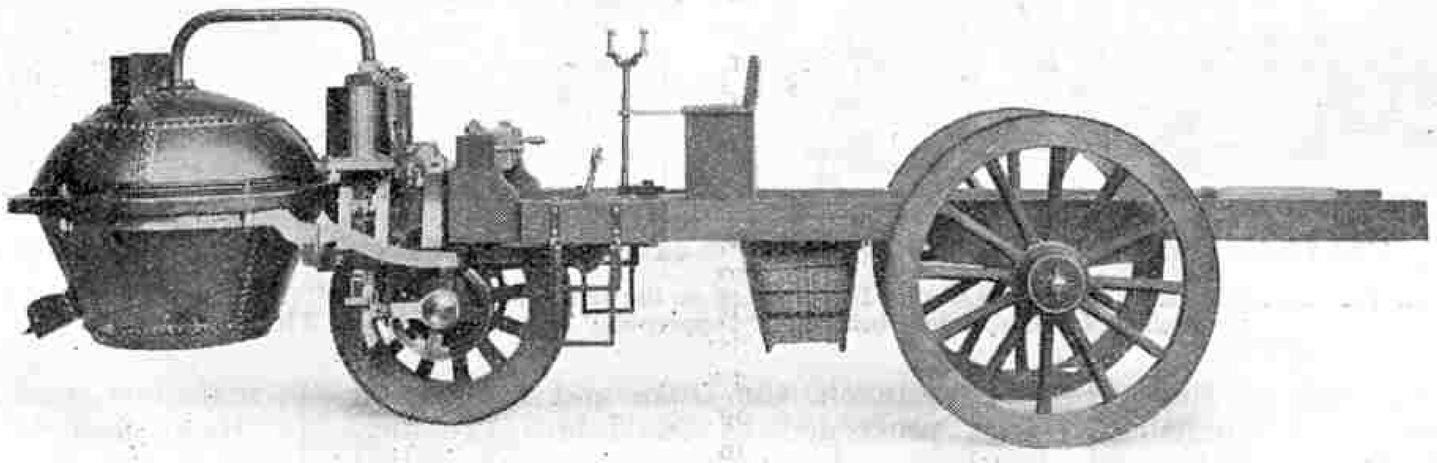
Some Account of the Work of the Pioneers of the Steam Locomotive

In the early development of the railways, which to-day extend in a marvellous network throughout the world, certain men stand out prominently. These were the pioneers, and in this, the Railway Centenary year, we are honouring their memory and acknowledging how much we owe to their work. A complete survey of the work of every pioneer would fill many volumes, but in this article we deal very briefly with a few of the most important facts.

Nicholas Joseph Cugnot, 1725-1804

The first locomotive steam vehicle that actually worked appears to have been constructed by a Frenchman, Nicholas Joseph Cugnot, a native of Vaud in Lorraine.

Cugnot served both in the French and German armies and his steam carriage appears to have been intended for the transportation of artillery. The first model of this machine was made in 1763 and the famous Marshal Saxe was so impressed with it that he strongly urged the inventor to build a full-sized engine. The necessary funds for the purpose were provided and in 1769 the machine was completed and tried in the presence of the then French Minister of War and many prominent officers. This engine was quite successful up to a certain point, but it was only capable of travelling some two-and-a-half miles per hour when loaded with four people. Another great defect was that the boiler was so small that after about fifteen minutes' working it was necessary to stop and wait until the steam pressure rose sufficiently.



Cugnot's Steam Engine (1770)

In order to remedy the latter defect Cugnot constructed another steam carriage in the following year, and this was more successful. It consisted of two beams of timber extending from end to end, supported by one small wheel in front and two larger wheels behind. The front wheel was driven by two single-acting engines supplied with steam by a boiler suspended in front of the machine. The steam cylinders were 13 in. in diameter. The connection between the engines and the wheels was effected by means of pawls which could be reversed when it was desired to drive the machine backward. A seat for the driver was mounted on the carriage body, and steering was carried out by means of a train of gearing which turned the whole frame carrying the machinery 15 or 20 degrees in either direction.

Cugnot's second engine appears to have alarmed the Paris authorities, for after overbalancing itself on turning a corner it was promptly locked up in the Arsenal in order to prevent it from getting into further mischief! Cugnot received a pension of 600 livres from the French Government and lived to the age of 79.

Matthew Murray

Oliver Evans, 1755-1819

The name of this ingenious American mechanic is seldom mentioned in reference to the development of the steam locomotive, but actually his influence was very marked in demonstrating the possibilities of the non-condensing high-pressure engine. He was born at Newport, Del., in 1755 or 1756, and was apprenticed to a wheelwright. While still a boy his attention was turned to the power of steam by a favourite prank of one of his comrades. This consisted of placing a small quantity of water in a gun-barrel, stopping the barrel tightly with a wad, and then placing it in a blacksmith's fire. The water in the barrel was quickly turned into steam, the pressure of which soon blew out the wad with a loud report, to the great joy and excitement of the boys!

Evans subsequently joined his brothers, who were flour millers, and soon proved himself a very expert millwright. In 1786 he applied to the Pennsylvania Legislature for a patent for the application of the steam engine to mill turning and to the steam carriage, but the patent was refused. Four or five years later he commenced the construction of a steam carriage to be driven by a non-condensing engine, but he changed his plans and modified the engine so as to make it suitable for driving mills. This engine was a beam engine having a kind of parallel motion very similar to one designed by Watt.

Evans afterwards successfully applied his steam engine to driving a dredger but he was not successful in developing his inventions up to the point of commercial success. His ideas undoubtedly exerted considerable influence on later inventors, however, and it is interesting to notice that, in spite of his own comparative failure, he had no doubt as to the future of the steam engine, as is shown by his prediction made about 1808:—"The time will come when people will travel in stages moved by steam engines from one city to another, almost as fast as birds can fly, fifteen or twenty miles an hour."

William Murdock, 1754-1839

William Murdock was the first maker of a model locomotive in this country. He was also the introducer of coal gas for lighting purposes, and the inventor of many valuable contrivances in the working of steam engines in general.

Murdock's father was a millwright and miller at old Cumnock, Ayrshire, and the boy was brought up to the same trade. He soon aspired to something wider than the experience acquired at his father's little mill, and hearing of the fame of the Birmingham firm of Matthew Boulton and James Watt and the success of their new engine, he set out for the Midlands. On arrival at the Soho Foundry he saw Boulton and was informed that every place was filled up. During the interview the young Scot had fidgetted con-

William Hedley

tinually with his hat and had unconsciously drawn Boulton's attention to it. The hat struck Boulton as being of unusual appearance and he asked about it. Murdock replied that he had made it himself out of wood, turning it in a lathe of his own contriving. This so impressed Boulton that Murdock was told to call again and when he did so he found a place ready for him. Murdock soon showed undoubted gifts and great promise and before long he was sent to Cornwall by his firm to supervise the steam pumping engines installed by them in the tin mines.

As has always been the case with engineers of note, Murdock's work was also his hobby, and all his waking hours were spent studying James Watt's inventions and devising improvements. After a while his thoughts turned towards the possibilities of steam locomotion and he devised a model steam carriage which he took out for a trial run one summer night in 1784. For a track the inventor chose a well-rolled length of lonely road leading to the Parish Church at Redruth, where he was living at the time. The tiny loco ran very successfully, indeed it outstripped its pursuing owner, and the worthy parish rector, on turning a corner, encountered the hissing, fire-belching little machine, and is said to have been nearly scared to death!

Timothy Hackworth

Murdock lost no time in setting out for London to take out a patent for his model. Boulton happened to meet him at Exeter, however, and as it did not coincide with the ideas of the firm to lose the services of their best engineer in this fashion, Murdock was persuaded to return. Writing to his partner, Boulton said:—"He hath unpacked his carriage and made it run a mile or two up and down in River's great room, making it carry the fire shovel, tongs and poker. I think it fortunate that I met him as I am persuaded I can cure him of his disorder or turn the evil to good." From this letter it is clear that Boulton had no great opinion of steam-carriages and their possibilities, and the result was that Murdock's idea was left undeveloped.

Robert Stephenson

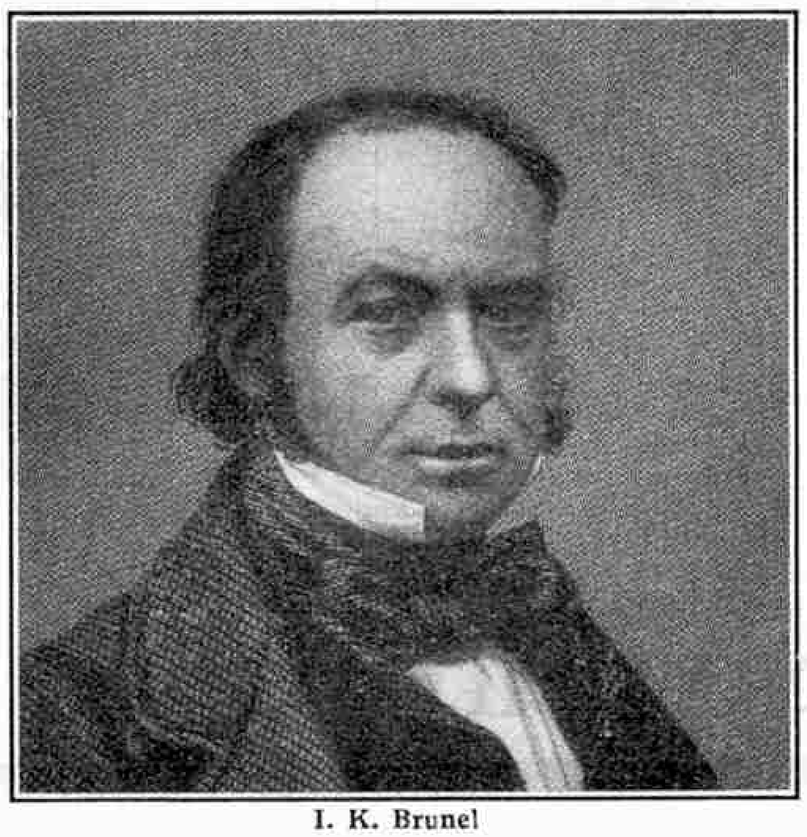
Murdock was a man of splendid physique and he lived to the age of 85. His death took place at his home at Handsworth, Birmingham, in November 1839.

Richard Trevithick, 1771-1833

Richard Trevithick, who is generally regarded as the "Father of the Locomotive," was a pupil of Murdock and began life as an overseer or "captain" in a Cornish tin mine. His career as an engineer is dealt with elsewhere in this issue (see pages 430-1).

John Blenkinsop, 1783-1831

The name of John Blenkinsop will always be associated with the first steam locomotive that drew a train as a commercial undertaking. He was agent to the owners of the Middleton Colliery, Leeds, and he designed a loco, in conjunction with its builder, Matthew Murray, for hauling coal from the colliery to the coal staith some 3½ miles distant. He adopted a rack and pinion system, with the idea of improving upon Trevithick's 1803 loco, the first steam railway engine in the world, which was prone to slip on the rails. Blenkinsop's loco weighed 5 tons and made its first triumphant journey in 1812, hauling a load of 25 tons of coal and 40 passengers at a speed of about 3½ miles per hour. When the "Blenkinsop" settled down to work its load was increased, and for something like 24 years it ran regularly on the short colliery railway, and sometimes worked up to 10 miles an hour. At least four of these locos were made. Two of them blew up with fatal results in 1818 and 1834 respectively, and as the remaining locos became worn out they were broken up and replaced by horse traction.



I. K. Brunel

Blenkinsop's rails were smooth at the top, but half an inch below the upper edge of one of them, and outside it, was a series of lugs, or teeth, almost semi-circular in shape, upon which worked the 20 rounded projections of the spurred driving wheel of the loco. The remaining four carrier wheels of the loco were smooth. It will be readily understood that one of the disadvantages of this system was the heavy expense of laying suitable track, and the friction to be overcome by the loco itself was considerable.

Great curiosity was shown by the public in the performance of Blenkinsop's locos and the colliery line was a centre of attraction. It is on record that visitors used to cheer lustily as the snorting little locos clanged along at their very slow speed! In 1816 the then Grand Duke Nicholas of Russia, who afterwards became Emperor, inspected the railway, and on this day "Blenkinsop" rose to the occasion and hauled thirty loaded wagons at 3¼ miles per hour.

Matthew Murray, 1765-1826

Matthew Murray was born at Stockton in 1765 and embarked on the career of a mechanic. Prospects were not very good in his native town and while quite a young man he walked to Leeds to look for work. On reaching Leeds he had not enough money to pay for a bed, but he told an innkeeper that he expected to get work at Marshall's Mill next morning, and the landlord agreed to trust him.

George Stephenson

Murray obtained the work he sought at the mill, which was then beginning the manufacture of flax, and he was able to suggest improvements in the machinery that soon led to his being appointed chief mechanic in the workshop. About 1795, with the assistance of others, he established an engineering works in Leeds and brought out inventions that were the means of saving the flax trade from the ruin with which it was then threatened.

Murray extended his engineering operations to include engine building and it was he who built the Blenkinsop locos. When the colliery agent drew up the design for his first loco, Murray suggested that two cylinders should be fitted as an improvement upon the single cylinder employed by Trevithick. This suggestion was adopted, and to it was due much of the success of the four Blenkinsop locos.

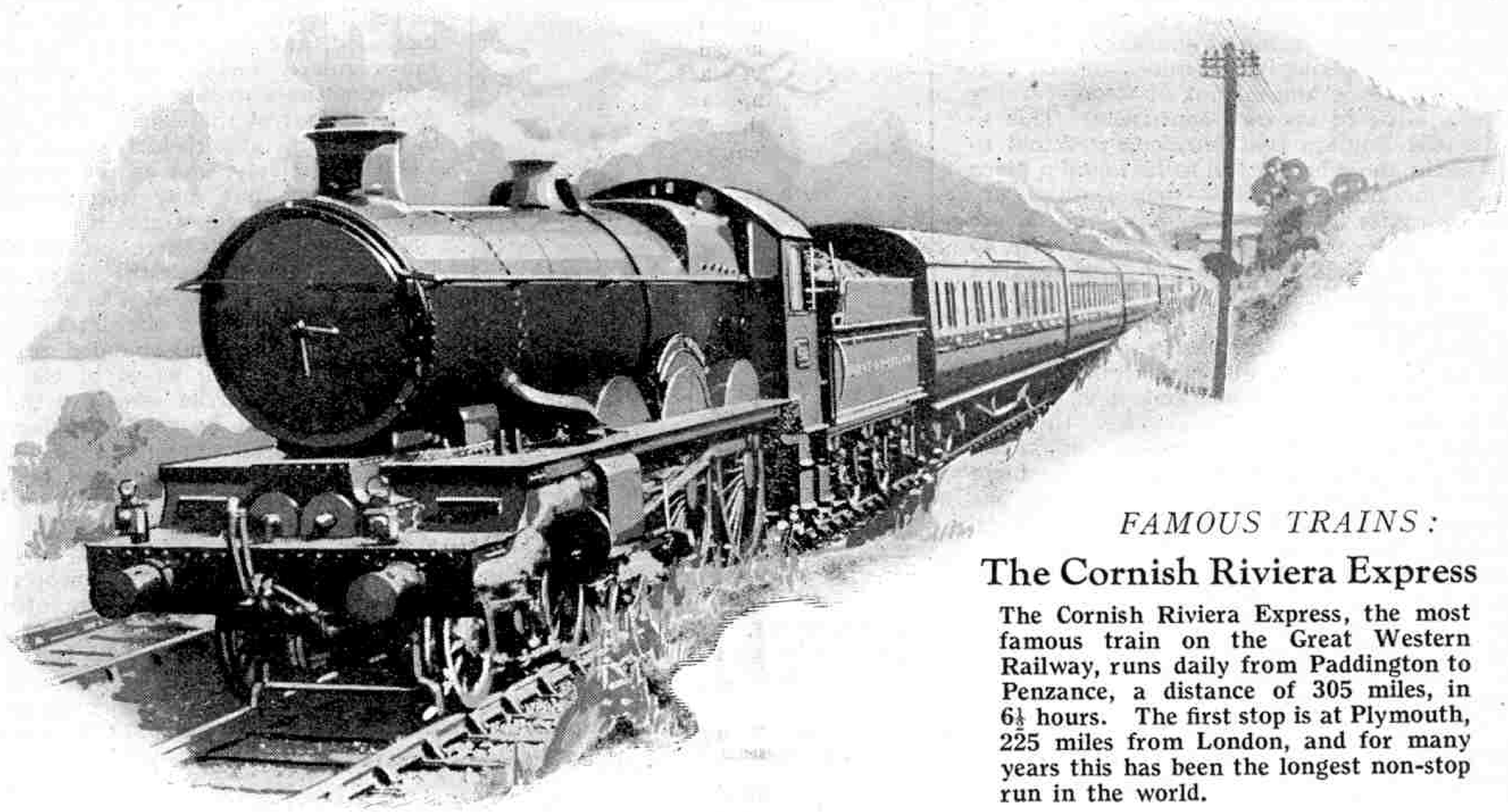
We are told that Murray was so successful in the engine-building business that the famous firm of Boulton & Watt became uneasy and purchased a large plot of land adjoining his works to prevent any further extension!

Murray died on 20th February 1826, at the age of 61.

William Hedley, 1779-1843

William Hedley was born at Newcastle in 1779. He played an important part in the early developments of locos, notably in showing that the rack and pinion systems of Blenkinsop and others

(*Continued on page* 469)



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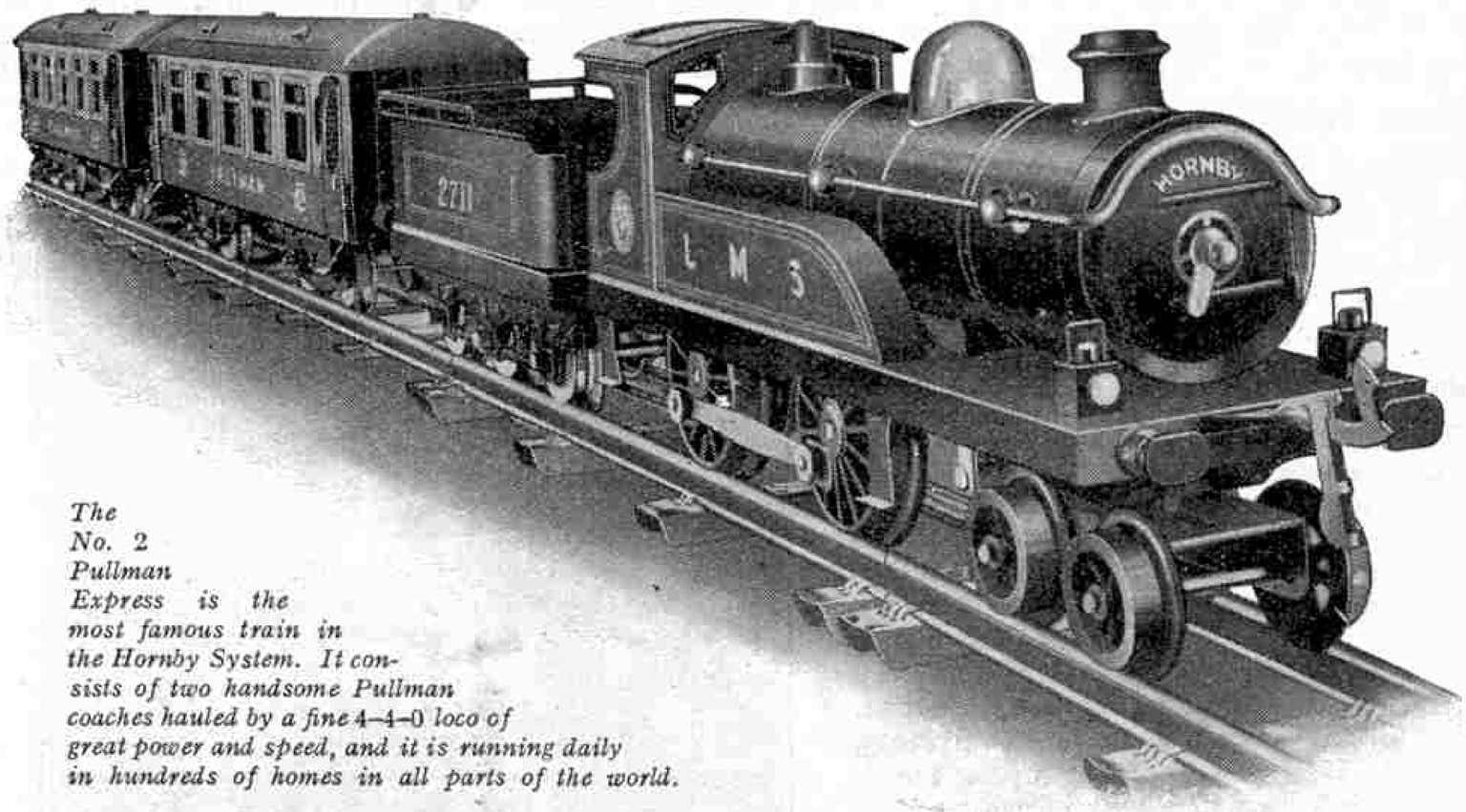

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The Men who gave us Railways—*cont. from p. 467*

were unnecessary, as the weight of the loco itself provided the necessary adhesion.

After holding various positions at local collieries he ultimately attained a responsible position at Wylam Colliery in Northumberland. At that time this colliery was handicapped by the heavy expense incurred in transporting its coal to the Tyne five miles distant, and Hedley turned his attention to finding a cheaper and more efficient means of transport. A wooden railway was then in use upon which the wagons were hauled by horses, and it was evident that little improvement could be effected on these lines.

Mr. Blackett, the colliery manager, had been so impressed by the success of Trevithick's first loco at Pen-y-Darran in 1804, that in the following year he ordered a loco from Trevithick. This loco was built, but for some reason was never delivered. Blackett did not abandon the idea, however, and Hedley was commissioned to build a suitable loco. Having established by practical experiment that any kind of rack arrangement was unnecessary, Hedley set to work and constructed his first loco which commenced working on the Wylam Colliery line in 1813.

This loco regularly hauled 8 loaded wagons at the rate of 4 or 5 miles per hour, and subsequent locos built by Hedley, embodying various improvements, were even more efficient. In later life Hedley became a successful colliery owner and died a wealthy man.

These early locos are often referred to as "Puffing Billies." This name is a corruption of "Puffing Dillies," the earlier horse-drawn wagons having been called "Dillies."

It is interesting to remember that at this time George Stephenson was employed at Killingworth Colliery, only a short distance from Wylam.

Timothy Hackworth

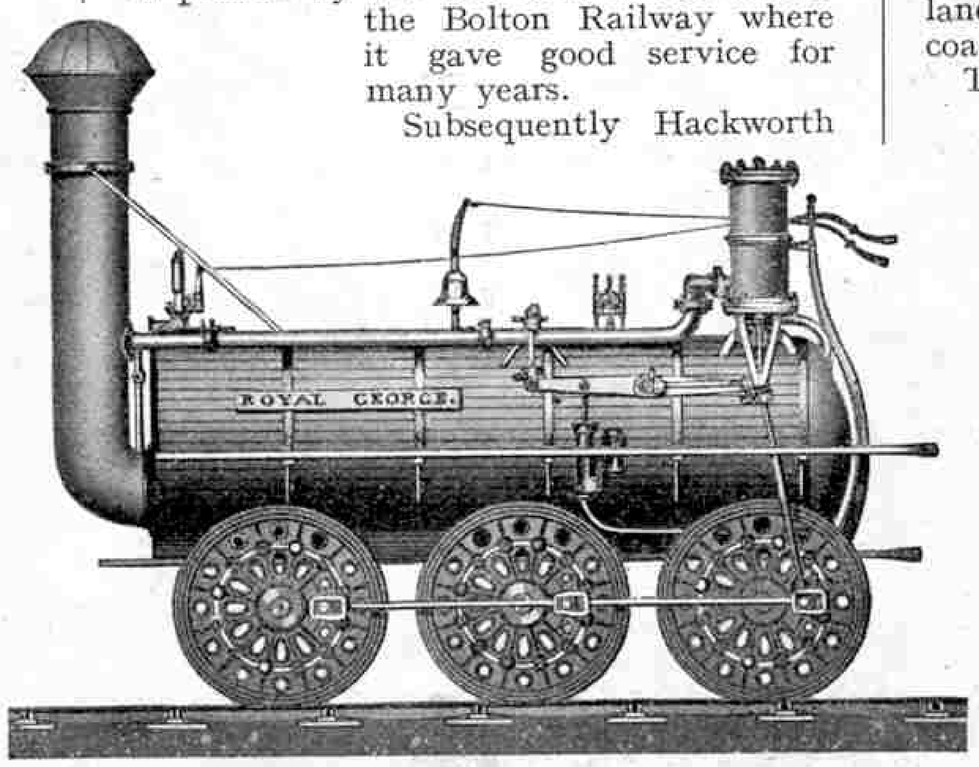
Among those who assisted in the construction of Hedley's first loco was Timothy Hackworth, then foreman blacksmith at Wylam. While at Wylam, Hackworth showed that he possessed quite unusual engineering abilities, and in 1823 George Stephenson appointed him manager of the newly-established locomotive works of Robert Stephenson and Co., at Newcastle. This was a position of great responsibility, as Stephenson was frequently absent in connection with the building of the Stockton and Darlington Railway and later the Liverpool and Manchester Railway. Hackworth supervised the building of the Hetton colliery locos and the famous "Locomotion No. 1" of the Stockton and Darlington Railway.

In 1827 Hackworth built for the Stockton and Darlington Railway the famous loco "Royal George." At that time there was a possibility of reversion to horse traction on this railway, and the fate of the steam loco hung in the balance. Before definitely coming to a decision the directors agreed to give Hackworth a chance of building an improved loco, and "Royal George" was the result. This was the first loco with six coupled wheels, and the exhaust steam from the cylinders was utilised for heating the feed water and increasing the draught of the furnace. This loco, for constructing which Hackworth received a bonus of £20, had great hauling capacity and was so successful that the situation was saved for steam traction.

Timothy Hackworth's "Sanspareil," now standing in the Science Museum, South Kensington

In 1829 Hackworth's loco "Sanspareil" took part in the famous Rainhill trials. This loco was beaten by the "Rocket," but it attracted great attention as a "marvel of mechanism" and its efficiency is proved by the fact that it was sold to the Bolton Railway where it gave good service for many years.

Subsequently Hackworth built the Soho engineering works at Shildon, from which he turned out a great number of the most efficient locos of his day.



The "Royal George," 1827. The first loco with six coupled wheels

George Stephenson, 1781-1848

The most outstanding figure in the early days of railways is unquestionably George Stephenson. The main events of his career are well known to all railway enthusiasts and particularly to readers of the "*M.M.*," and therefore there is no need to cover the ground again here.

Perhaps the turning point of Stephenson's career is to be found in his first visit to the Wylam Colliery railway to inspect the earliest loco working there. Undoubtedly before this Stephenson had dreamed of the possibilities of steam traction, but here he saw a steam loco, cumbersome, slow and inefficient, but none the less actually working and hauling loads. We can imagine how his ambition was fired, and it is not surprising to find that shortly afterwards he had built a successful loco of his own for use at the colliery where he was employed, Killingworth. From this time Stephenson's life work was definitely decided and his subsequent career was a series of triumphs.

George Stephenson occupies such a commanding position among his contemporaries that there is a danger of overestimating his work and at the same time failing to give due credit to others. Stephenson did not invent the steam locomotive and this honour undoubtedly belongs to Trevithick, but while Trevithick was the "Father of the Locomotive," Stephenson was the "Father of Railways." By means of his "Rocket" he demonstrated to an unbelieving world the fact that the steam loco was vastly superior to any other means of haulage upon railways, and having done this he went on to develop the railway in all its branches, in spite of the combined opposition of land-owners, farmers and canal and coach proprietors.

The opposition to railways at that time was incredibly fierce and Stephenson threw himself heart and soul into the fight. In addition to his mechanical and engineering knowledge he possessed remarkable organising ability and indomitable perseverance. For many years the fight centred round him and at times he was hard pressed, but his sheer dogged determination always pulled him through. Brilliantly clever as were such men as Trevithick and Hackworth, they could never have accomplished what Stephenson did, and to him more than to any man we owe the wonderful railway system of the world to-day.

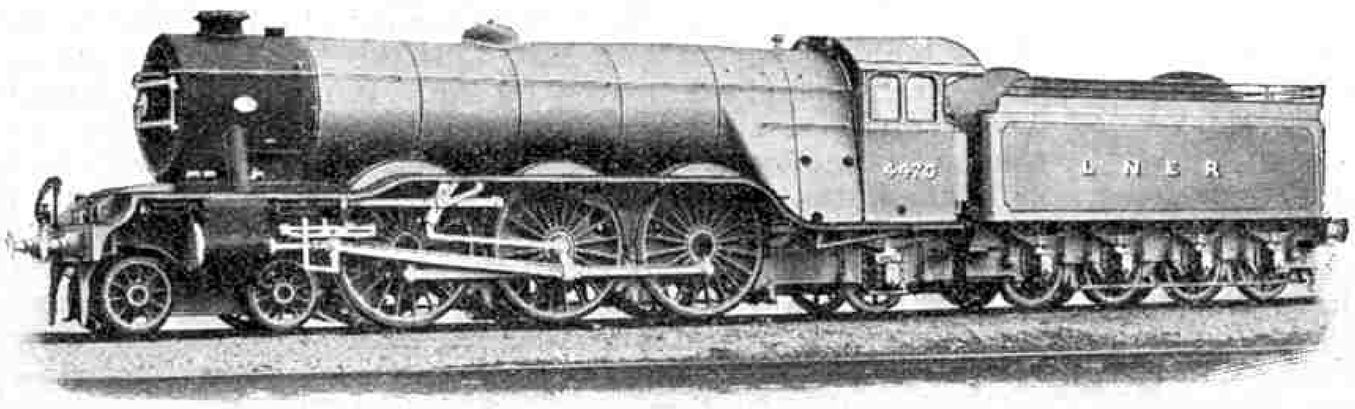
Stephenson withdrew from professional work in 1840 and spent his retirement quietly and peacefully at Tapton House near Chesterfield, until his death in 1848.

Robert Stephenson, 1803-1859

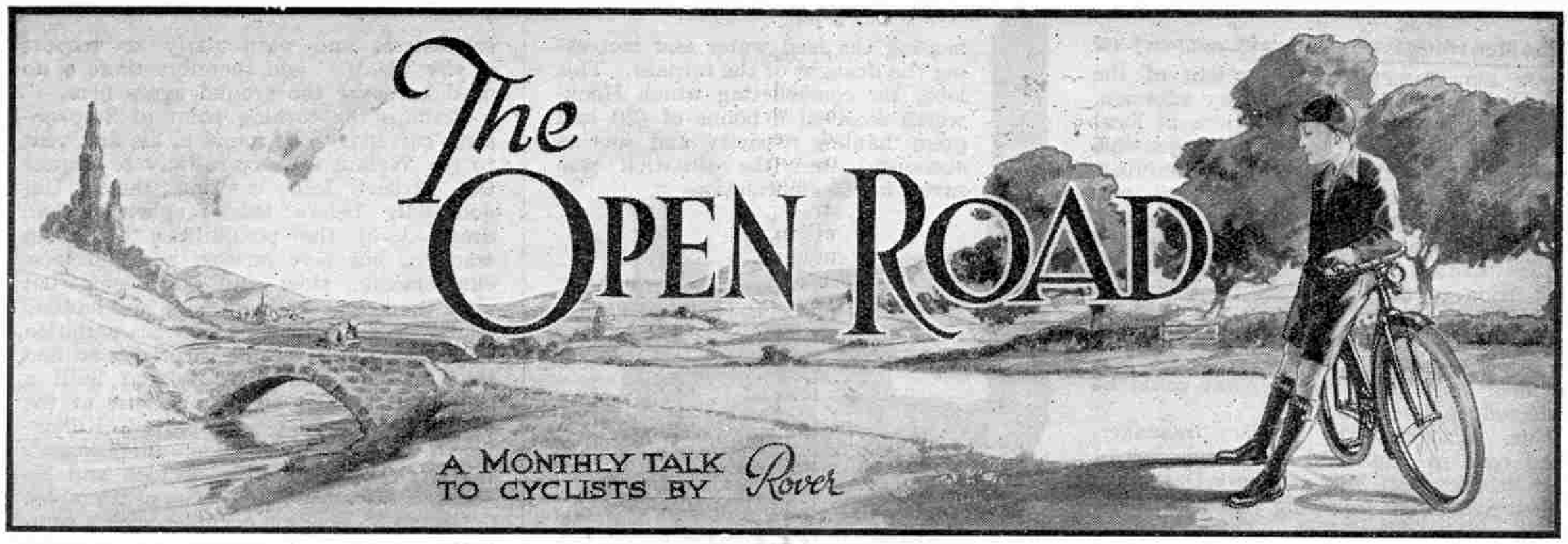
Robert Stephenson was not so prominent a figure in the railway world as his father, but none the less he carried out work of the utmost importance, first in conjunction with his father and later alone. The importance of his work lay more in the building of railways, with the necessary bridges, viaducts, cuttings, and tunnels, than in the purely locomotive or mechanical side. Probably he is most commonly remembered as the engineer of the Britannia Tubular Bridge across the Menai Straits, the Newcastle High Level Bridge and the Royal Border Bridge at Berwick-on-Tweed.

Robert Stephenson died in 1859 and was buried in

(*Continued on page 475*)



It is a far cry from Hackworth's locomotives to the latest L. & N.E.R. 4-6-2, and even the most optimistic of the pioneers could never have imagined the great strides that would be made in 100 years



III. A TOUR THROUGH SOMERSET AND DEVON: GLASTONBURY ABBEY

In this article, the third of the series, "Rover" con inues on the imaginary tour with our cycling readers. Our contributor is an ardent cyclist and a few days ago rode from Bristol to the Lake District, via Liverpool. On the last day of his ride he pedalled over 170 miles!—EDITOR.

* * * *

THE road from Wells to Glastonbury is beautifully level and the "going" is delightfully easy. There is something about a really flat road that always reminds me of a calm sea—especially when it follows a run through the hills, which might well be compared to a stormy sea.

The scenery now is typical of the Somerset "flats," the pasturage of which is very fine and luxuriant. Look at those cows over there—they are almost buried in the deep rich-looking grass. What a beautiful golden tone the millions of buttercups give to the whole picture, too!

That object on the hill is called St. Michael's Tower and locally known as "the tor." It is quite a well-known landmark and is visible for miles around. There in the distance is the ruined Abbey, which is, of course, the sight of Glastonbury. At one time the ruins were not thought so much of as they now are, for cart-loads of the fine sculptured stones from the Abbey were used to make the very road we are on at present.

The Glastonbury abbots were at one period quite "the big noise" and many good stories have been told about them. . . . We will have a look round the ruins now, and rest for half an hour under those trees.

Glastonbury is a wonderful place, with a wonderful history. It had a well advanced civilisation 300 to 500 years B.C. and there are many wonderful specimens of arts and crafts from the Lake Village of that era in the museum in the Market Place. I am told by those who know, that they equal in interest the finds at Pompeii.

Glastonbury is known all over the world as being the birthplace of British Christianity. It is one of the four English sites where, tradition tells us, Joseph of Arimathea brought Jesus in our Saviour's youth. Joseph came back and planted his staff here. It miraculously grew and blossomed every Christmas on Wirral Hill, near what is now the station. Joseph built the first Christian church here, too, and buried the Holy Grail. He founded the earliest settlement of Anchorites or Christian Monks and Christian worship has been perpetual here ever since.

This guide book of mine says that the Abbey became one of the greatest and most wealthy abbeys in the kingdom and that in 433 St. Patrick formed the Anchorites into a regular monastic establishment. St. Bridget worked here on the Isle of Beshery and in 546 David of Menevia built a new church, which was afterwards destroyed by the Danes and subsequently restored by St. Dunstan who brought it under the Benedictine rule. Successive abbots added greatly to the size and beauty of the building but on 25th May 1184 the Abbey was entirely destroyed by fire. It was rebuilt soon afterwards and from that time until the dissolution of the monasteries in 1539 additions were continuously made. Those ruins in front of us are all that remains of the great abbey and they give little or no idea of its former great glory.

Photo courtesy] [*G.W. Rly.*

St. Joseph's Chapel, Glastonbury Abbey

I think it is about time that we considered the "inner-man." Fortunately for us the town is well prepared for visitors who, like ourselves, have a "rare appetite," so we have a choice of cafes. Here is one that looks just the thing—and there's a place for our cycles at the side, too! That's capital! I am sure we are not very particular as to what we have, so long as it is good—and plenty of it! Yes, of course, we will have fruit and cream afterwards—there's nothing like fruit when you are "on the road," and you should never miss an opportunity of having cream in this part of the world.

Food is an important item when cycling—perhaps not so much on a ride like this—when we are taking things pretty easily and can afford to stop fairly long and often—as on a longer and more strenuous ride. A golden rule for cycling generally is—never let yourself get very hungry. Some sort of nourishment should be taken at fairly regular intervals—and each of us soon finds out by experience just what suits us best. But on a big ride you don't feel as though you want to stop long anywhere and besides it would be a mistake to have a big meal during a long ride.

I am a great believer in milk in small quantities—say a glassful—taken at frequent intervals, and you will also find that a little chocolate is splendid for staving off that "sinking feeling." My veteran friend, whom I mentioned this morning, is also an enthusiast on milk—and with reason. He tells me that he often rides from 60–80 miles on nothing else, and on one particularly long ride of over 100 miles he got through with a modest three pints and then finished strongly and not at all hungry! Of course, we cannot all do this kind of thing, but it proves just how helpful milk can be.

Breathing through the nose is as essential in cycling as anywhere else. Correct breathing certainly will prevent to a large extent, dryness and the kind of thirst that "doesn't listen to reason." Riding with the mouth open causes a parched mouth and throat, so that the rider will often drink anything in liquid form that is obtainable, which—needless to say—is wrong.

Now that we have finished our meal

(*Continued on next page*)

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The Open Road—

(*Continued from page* 470)

we might have a stroll round. I'm not going to suggest that we climb the "Tor"—Oh no ! Instead, we will content ourselves with a "close up" on a post card. Much interesting information may be obtained from picture post cards and you often learn something new about the locality. Sometimes it is something of historical interest. Occasionally little gems of scenery not a stone's-throw off your route, are brought to your notice. Then again, the post card is a most convenient means of making a record of your ride—the details of which can easily be written on the back of each card. In after years much pleasure may be obtained from looking over your collections. It is surprising how, after the lapse of time, ordinary things become quite important and make excellent reading.

Now, I think it is time we got on our way to Langport, so we will go back for our machines and make another advance. There's no hurry—we have most of the afternoon in front of us and only 12 or 13 miles to go to our next point. . . . How are the tyres ? . . . . Just as hard as when we started . . . . then we need not anticipate any trouble.

Our map proves useful here. The route to Langport is via Street and Somerton, but this signpost at the cross-road gives neither name, but shows Taunton instead. We shall have to follow that direction for nearly two miles and then I think we shall find Street at the point when we turn off the road. They evidently think that Street is not important enough to put on a sign-post ! There is our road to Somerton, so we do not need to go through the town of Street at all.

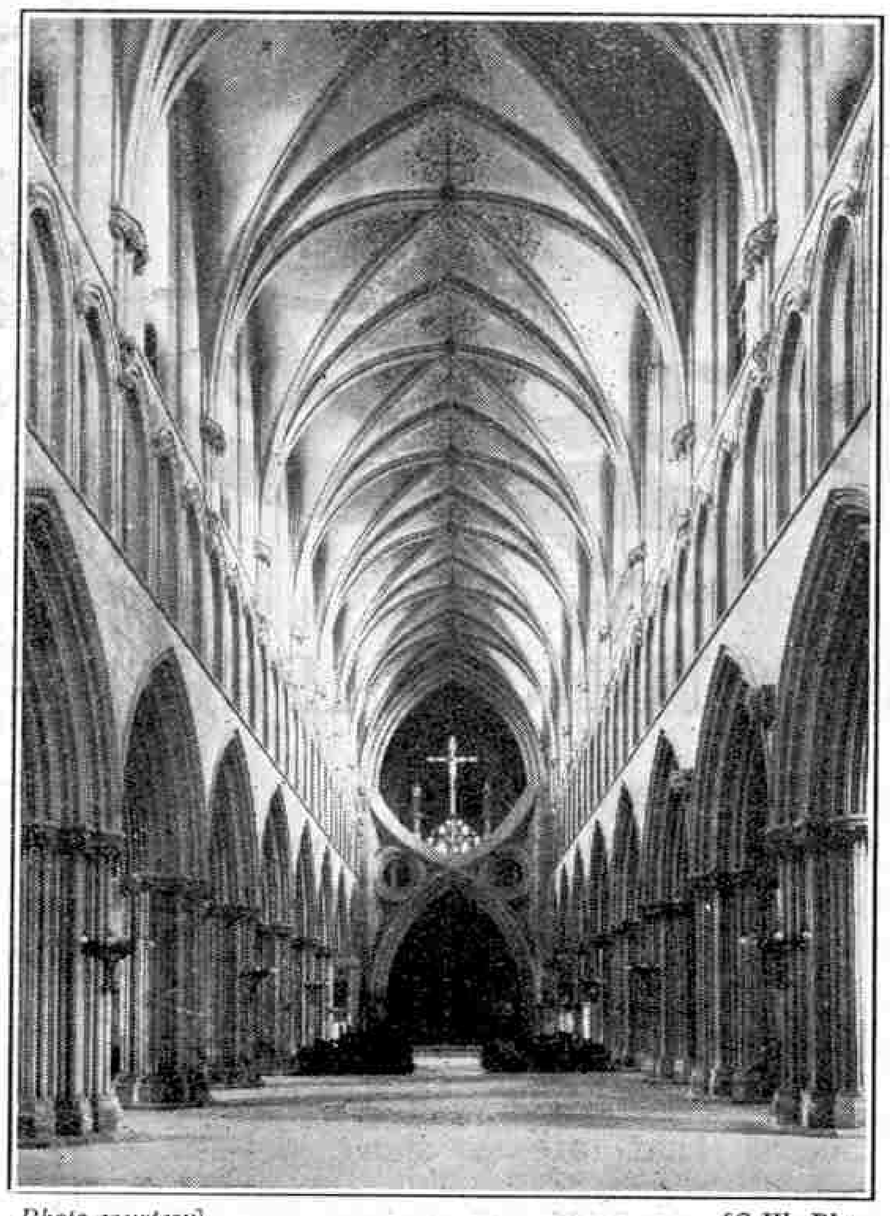

Photo courtesy] [*G.W. Rly.*

The Nave, Wells Cathedral

It is advisable at this period of our journey to take things very easily. The "old hand" does so quite mechanically from long experience, while the novice is rather inclined to "get on with it." This feeling is partly contributed to by the good meal and the rest afterwards, and also by a somewhat exultant state, due to the fact that he is now well beyond the usual limit of his rides. He is eager for "fresh fields and pastures new," and in these circumstances a knowledge of "victories past and won" makes restraint very difficult.

The afternoon and evening should be the most enjoyable part of the day in some respects, especially when one has an agreeable companion, so we will go easily for the time being. To prove my words, and to illustrate also something of the frame of mind we are in, listen to this and note the moral !

A speedy young "merchant" of Street
Held records—unpaced—quite "some feat !"
'Till one day—what a fuss !
He rode clean through a bus !
A "stunt" he will sure not repeat !

I shall have to send that along to our Editor for the "Fireside Fun" page !

(*To be continued*)

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Railway Centenary Celebrations—

(*Continued from page* 465)

agreed with a hearty laugh, it would indeed cause much merriment to see the "*Flying Scotsman*" travelling along at 70 miles per hour with a driver and fireman in top hats and tail coats !

"I am not so sure about this shirt front," said my friend pointing to the dickie he was wearing. "It is a bit uncomfortable and I was so hot at one time that I nearly took it off, but I remembered I had not passed the grandstand !"

Thus ended my visit to Darlington, and I returned to Liverpool with only one regret—that I was not able to share my pleasure and interest with every reader of the "*M.M.*" I know that many of our readers did see the procession—I can always tell a Meccano boy when I see one and I saw quite a number of boys wearing Guild badges ! But if I owned Aladdin's lamp—or even "Alf's Button"—I would have put up a huge grandstand, run hundreds of special trains from all parts of the country and entertained the jolliest and liveliest party of boys the world has ever known ! And wouldn't we all have cheered when the "*Locomotion*" came past ! However, such a gathering was not possible so I have done the next best thing, which is to tell you something about it in these pages.

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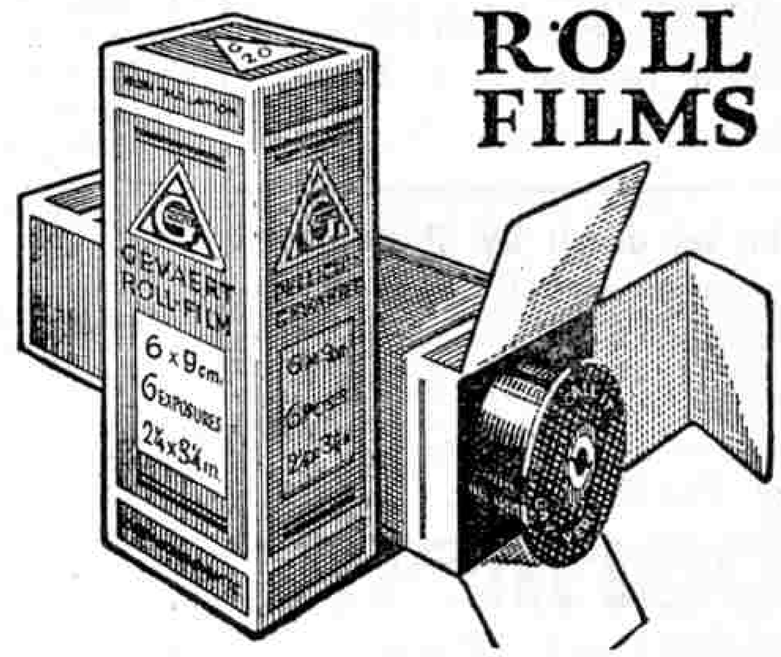

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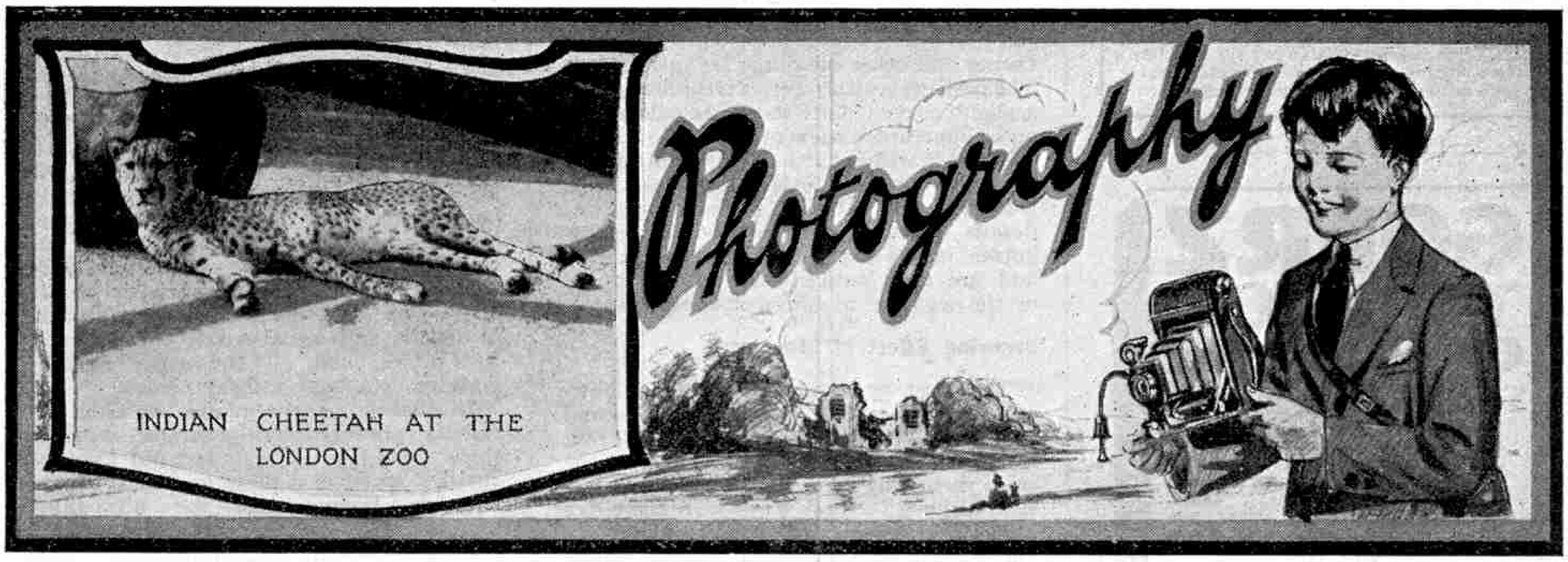

VI. RAILWAY PHOTOGRAPHY

SINCE their earliest days, railways have always appealed to the boyhood of our nation, and this year, in which we are celebrating the centenary of the opening of the Stockton and Darlington Railway, we find that the old fascination shows no signs of diminishing, but actually appears to increase in spite of the counter-attractions of ships, motor-cars, aeroplanes, and radio.

Perhaps the most remarkable feature of railways is that their appeal is universal. Even those who have little or no interest in things mechanical are able to raise a temporary enthusiasm as they watch a train with its trailing column of smoke and steam rushing across country, over hill and dale and bridge and viaduct, to disappear from sight at last as it enters a tunnel. Even then they do not give up the train as lost, but strain their eyes in the hope of catching still another glimpse of it. Unfortunately the memory of such a scene as this is apt to fade quickly and ultimately to be lost entirely unless some permanent record is made, and this can be done by means of the camera.

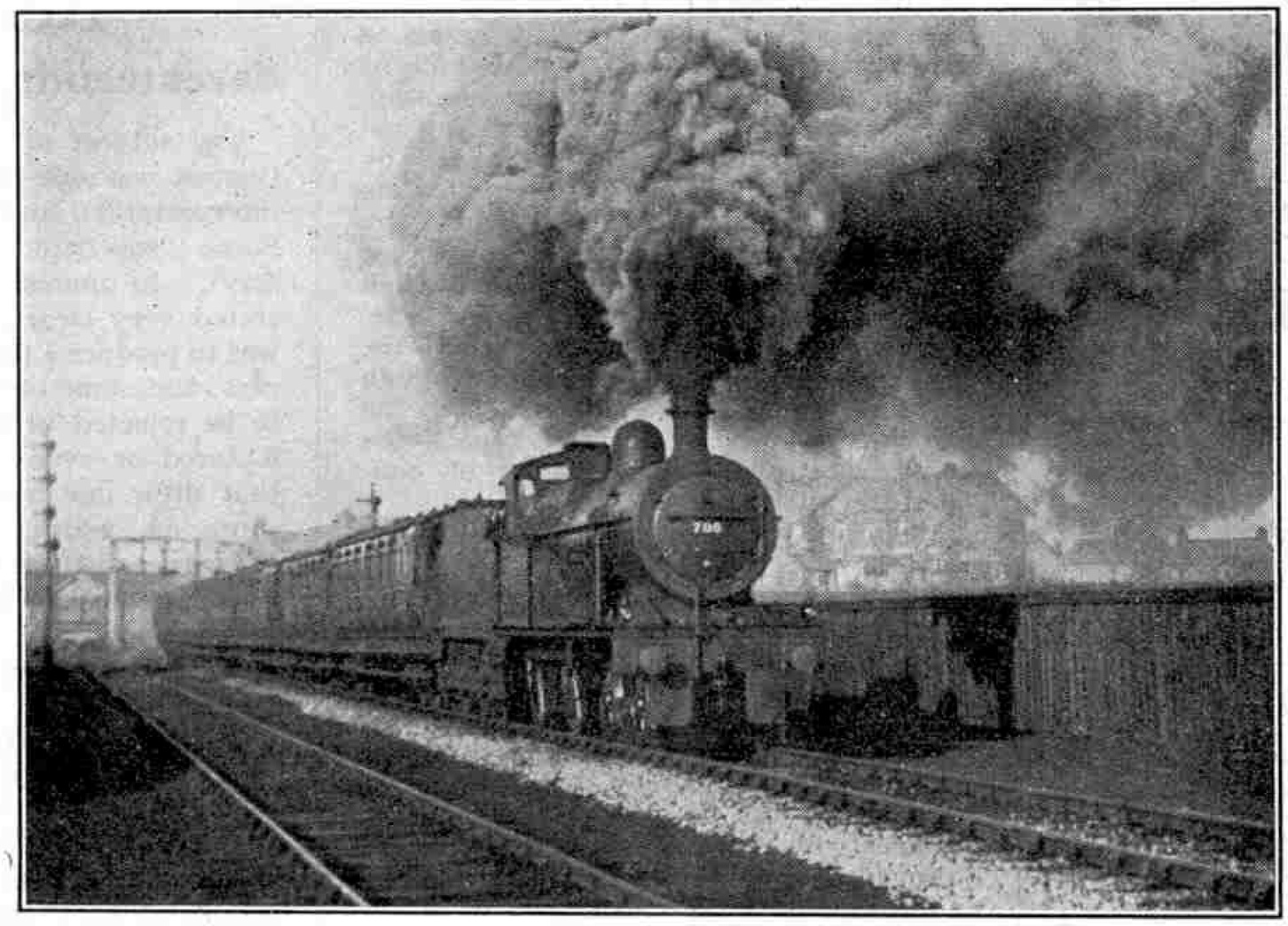

Photo by] [*J. M. Tomlinson, Poulton-le-Fylde*

"Getting up Speed"

Railway Photography may be approached from two entirely different points of view—the mechanical and the pictorial. The boy whose interest is mainly in the locos themselves requires a photographic record showing every possible part of the mechanism and therefore to him the most important consideration is sharpness of focus. If a loco is to be photographed for record purposes it is better that it should be stationary. There are three principal view points—broadside on, three-quarters front, and three-quarters rear in order to show the cab.

The most suitable type of camera for this purpose is a stand camera, which enables the loco to be carefully and accurately focussed by observation of the image on the ground-glass screen. A further great advantage of a stand camera is that a small stop may be used in the lens if desired, as length of exposure is of no importance when the camera is on a stand. In the absence of a stand camera, excellent photographs may be obtained with practically any type of hand camera, including even the least expensive models.

Bearing in mind the fact that a loco photograph is useless unless it is sharply focussed, operations should be carried out with much greater care than is usually given to landscape snapshots. If the camera is of a focussing type with a graduated scale of distances, sharp focus may be ensured by setting the pointer to a suitable number of yards or feet and carefully pacing out that distance from the loco. In the case of small fixed-focus cameras, the distance at which it will be necessary to stand in order to include in the view finder the whole of the loco and tender will ensure that the focus is approximately sharp.

The photography of trains in motion presents more complications but it is not so difficult as is often supposed. In order to obtain a satisfactory result, the first point is to select a suitable place along the line. If possible the background should be a natural one of trees or rocks,

(*Continued on page* 474)

Messrs. Taylor Bros., Art Printers and Publishers, Leeds, are always glad to have submitted to them Photos of attractive subjects suitable for publication, and invite correspondence.

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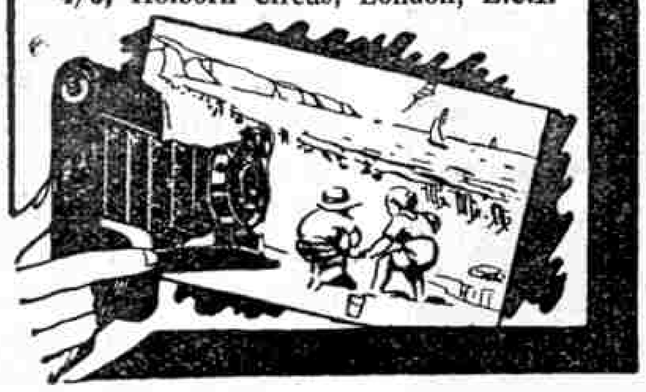

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Photography—(*continued from page* 473)

houses and other buildings being avoided. The position is all the better if the line makes a slight curve. Care should be taken that an uninterrupted view of the whole train is afforded, without the intervention of telegraph poles or other obstacles. This warning may appear unnecessary, but details of this kind are apt to be forgotten in the excitement of the moment, and are only noticed when they appear on the negative, to our great annoyance.

Securing Effect of Movement

The most important point of all, however, is to secure an impression of actual movement. If a photograph of a train shows no trace of smoke or steam, the train generally appears to be standing still, although it may have been travelling at a high speed. For this reason every effort should be made to include smoke and steam, and the photograph on this page shows a striking effect so obtained. A good tip is to select a point on a rising gradient where the loco will be putting out its full strength and, so to speak, breathing hard.

There is a common impression that in order to photograph trains in motion it is necessary to possess a reflex or focal-plane camera fitted with an expensive lens of wide aperture. The great feature of these two types of camera is that they are fitted with focal-plane shutters capable of giving exposures as short as 1/1000th of a second, and for obtaining more or less broadside views of trains running at very high speed such shutters are essential. Excellent snaps of trains running at moderate speeds may be obtained by means of an ordinary hand camera, having a speed of, say, 1/100th of a second, by taking the train at a sharp angle, not more than 45°, and standing well back and being content with a small image. The further we stand from the train the longer may be the exposure, and although the train will look very small on the resulting negative, this will usually be found sharp enough to allow of considerable enlargement.

Many of the cheapest types of hand cameras have shutters giving a minimum exposure of 1/25th of a second and unfortunately this is frequently the case even though the marked speed is 1/100th of a second. This limitation makes snapshots of rapidly moving trains impossible, but a considerable amount of interesting work may be done with such cameras in the immediate vicinity of stations. Excellent snapshots may be obtained of trains emerging from a station and before they have had time to attain much speed. Snapshots of this kind are often particularly effective on account of the smoke and steam produced as the loco pits its giant strength against the weight of the train.

One point to be observed in photographing locomotives, whether separately or hauling trains, is if possible to catch the coupling rod in the lowest position.

Other Railway Features

Quite apart from individual locos and trains in motion there are numbers of interesting railway features to be photographed. Any large station provides enough material to keep a photographer busy for many weeks. Most station subjects are easy to photograph on account of their lack of movement, and the only difficulty that occurs is due to insufficient light.

There is an enormous difference between the photographic value of the light out in the open and in even the best lighted stations, and allowance must be made for this. In some cases it will be found that certain objects can only be photographed by means of a stand camera and a time exposure. Beyond the covered portions of the station this difficulty does not exist and a series of extremely interesting snapshots may be obtained of signals and signal-boxes, engine-sheds, turn-tables, and all the other familiar features of a busy railway centre.

In regard to the plates or films for railway photography, generally speaking these should be of high but not extreme speed. Speed in a plate or film is a very valuable feature but the ultra-rapid brands are so sensitive as that sometimes they are difficult to manipulate. The old advice, to use the second fastest plate or film made by any particular firm, certainly holds good in railway photography. Negatives of individual locos or of details of railway mechanism are most effective when printed on glossy paper, for the glossy surface shows up detail better than a matt or rough surface. Negatives of trains in motion, however, often look best on a smooth matt paper.

Result of Seventeenth Photo Contest

The subject of our Seventeenth Photo Contest was one that lent itself to broad interpretation and "A Happy Holiday Scene" was depicted in many and various ways. In announcing this contest it was stated very clearly that the main object was to produce a picture of holiday happiness, and some excellent photographs had to be rejected because happiness was not featured or even suggested. The efforts that drew our immediate attention were those in which spontaneous joy was obvious, and these were in most cases odd snapshots on the beach or cliff or among the delights of a farmyard or hayfield. Many competitors snapped sections of the great crowds at the more popular seaside resorts, and some of these snapshots caught the spirit of the competition perfectly.

First prizes (Photographic goods value £1 1s. 0d.)—Section A, N. Spurgeon (Bury); Section B, M. I. Rowlands (Trawsfynydd). Second prizes (Photographic goods value 10/6)—Section A, J. Sandham (Preston); Section B, R. W. Jardine (Wallasey).

We have pleasure in announcing the winners of two special prizes announced in our July issue:—

Messrs. Amalgamated Photographic Mfrs. Ltd. award one of their "Altrex" folding film cameras, value £2 10s. 0d., to M. I. Rowlands (Trawsfynydd), whose excellent snapshot of a joyous paddling scene was taken on Rajar Roll Film and printed on Paget Self-Toning paper.

Messrs. Gevaert Ltd. award a prize of their photographic goods to the value of 5/- to N. Spurgeon (Bury), whose print was made on Gevaert Gaslight Paper.

Nineteenth Photo Contest

The subject of railways has been brought into great prominence by the recent Centenary celebrations at Darlington, of which we publish in this issue a number of interesting photographs. Many of our readers have written recently to ask for hints on how to achieve success in railway photography and this month our Photographic article deals with this subject. We hope that this article will stimulate many of our photographic readers to turn their attention to railway photography and in order to provide a stimulus in this direction we have chosen as the subject of our Nineteenth Photo Contest: "AN INTERESTING RAILWAY PHOTOGRAPH."

It should be understood that this competition is not confined to photographs of locos or even of trains. Anything of interest connected with railways is eligible and each photograph will be judged from the point of view of its railway interest. The scope of the competition is thus very wide and it gives a chance to every reader who is within reach of a railway, and as far as home readers are concerned this means practically everybody. Competitors should not overlook the possibilities of the life and activity of stations, particularly at this time of the year when so many holiday-makers are travelling. Another hint may be given, and that is that many extremely interesting snapshots may be obtained from the open window of a railway carriage, particularly when the train happens to come to a standstill just outside a station, where railway activity is great and there is not the handicap of poor light which so frequently makes photography in a station really difficult.

The conditions for this contest are the same as for previous ones. If the work has not been done entirely by the competitor himself, this should be stated on the back of the print. We believe by this time our readers know that each print must bear clearly written the name, address and age of the competitor. We would point out in addition that it adds greatly to the interest of the print, and in some cases to its chance of winning a prize, if the competitor states where the photograph was taken and exactly what it represents. Prints may be of any size and made by any process.

The competition will be divided into two sections (A) for competitors of 16 and over —(B) for those under 16. Four prizes are offered—Photographic goods to the value of £1/1/- and 10/6, to be chosen by the winners, as first and second prizes respectively in each section.

Closing date: 31st October. Overseas: 31st January.

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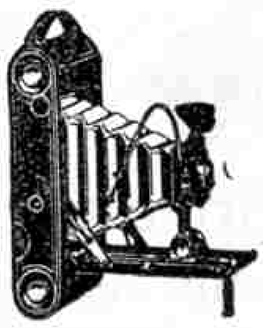
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Overseas Result
Thirteenth Photo Contest

This competition proved no less attractive to Overseas readers than to home readers. Naturally, there was a greater variety in the types of trains and stations, and every kind of train seemed to be included, from the luxurious "Calais-Mediterranean" or "Blue" express to obscure locals at wayside halts on remote Indian, Malayan or African lines. Fine effects were secured by snapping trains starting up a gradient, the clouds of smoke and steam being given great prominence. As a matter of interest apart from photography, it was remarkable to note the extent to which British-built locos and rolling stock are to be found abroad, and the similarity between many of the signals and those to be seen at stations in this country. On the whole, the entries were of exceptionally high standard, and the winning photographs were of real merit.

First Prizes (Photographic goods value 10/6)—Section A, TIRATH SINGH NAGI (Amritsar, India); Section B, ROBERT BANDIERA (Rome). Second Prizes (Photographic goods value 5/-)—Section A, ALY A. SHAWKY (Cairo, Egypt); Section B, L. STEVENSON (Karachi, India).

A Handy Camera

We have recently been able to try out an A.P.M. No. 2 Box Camera and are able to recommend those who want a really reliable camera at a low price to purchase one of these A.P.M. models (price 13/6).

The cameras are particularly well made and finished, being constructed entirely of wood covered with morocco-grained leatherette, and they are absolutely light-proof. They take pictures 2¼"×3¼" and the single achromatic lens enables excellent results to be obtained. Any of the standard films may be used in this camera, but the makers claim that by using the Rajar films (to the excellence of which reference has already been made in these pages) better pictures are obtainable than with any other films. Certainly both films and cameras are the very best of their kind, and I have no hesitation in saying that for a boy who wants a simple camera, yet one that will give really first-class results, there is no finer investment.

A British-Made Film

We recently had an opportunity of testing some spools of the British-made Rajar films in a small pocket camera and we were interested to notice how speedy these films are. They are certainly faster than any other films we have tried and make it possible to give a quicker shutter exposure than is the case with an ordinary film. On the other hand, when particularly fine definition was required we were able to stop down to F.12 or F.16 and still get a fully exposed negative even though the exposure was a "snapshot"—of course the light was particularly good when this test was made.

The speed of the Rajar film is one of its most remarkable features and the makers claim it to be the fastest roll film made. In fact, Rajar Films make it possible to take snapshots even when the sun is not shining., their great speed compensating for the small aperture of the lens generally fitted to most popular-priced cameras. The films are fully isochromatic and therefore give good colour correction.

Every film is guaranteed to be made of the finest quality materials that science can produce and the makers guarantee that if there is the slightest fault in any film, the roll will be at once replaced or the cost refunded. This guarantee has given confidence to many photographers, both amateur and professional, and it should undoubtedly increase the confidence of readers both in their own powers and in the capacity of their equipment to give entirely satisfactory results.

Cash for Photographs

The attention of our photographic readers is drawn to the competition announced on "Sunny Jim's" page (p. 482) in which cash prizes are offered for photographs of harvesting scenes

This competition presents an excellent opportunity for those on holiday or in the country, of winning a cash prize.

The Men who gave us Railways—

(*Continued from page* 469)

Westminster Abbey by the side of another great engineer and builder of bridges, Thomas Telford.

It is interesting to note that both Stephensons, father and son, were offered knighthood, and both declined the honour.

Isambard Kingdom Brunel, 1806-1859

No account of the men who gave us railways would be complete without reference to I. K. Brunel the son of Sir Marc I. Brunel, engineer of the first Thames tunnel.

Brunel ranks with George Stephenson as a railway engineer, but unlike Stephenson he had little influence upon the development of the locomotive.

In 1833 he was appointed engineer to the Great Western Railway Company and he determined that this should be the greatest of all railways. Up to that time the gauge adopted for railways was 4 ft. 8½ in., this gauge having been adopted by George Stephenson apparently for the reason that it was the distance between the wheels of the carts commonly used in the north of England. Brunel was convinced that there were many advantages to be gained by using a broader gauge and he finally decided that the Great Western gauge should be 7 ft. and the track was laid accordingly. Then began what is known as the "Battle of the Gauges."

Brunel speeded up his trains, the narrow-gauge engineers followed suit, and in a few years an enormous improvement in the efficiency of locomotives took place. Other great advances took place during the same period, for Brunel boldly challenged his narrow-gauge rivals and forced them to exert themselves to the utmost. The mixture of gauges was obviously inconvenient to the travelling public as it necessitated a change of trains wherever the two gauges met. It was clear that one or other of the gauges must finally triumph, and in 1845 the question was referred to a Royal Commission. The Commission finally decided in favour of the narrow gauge, but in their report they paid a very high tribute to Brunel, in the course of which they said: "The present rate of speed and the increased accommodation of railway carriages is owed by the public to the genius of Brunel."

In the course of his railway work Brunel built a large number of bridges and viaducts. Many of these have since been demolished to give place to modern structures, but among the remaining few is the Royal Albert Bridge crossing the river Tamar at Saltash.

Brunel died in 1859 following a seizure while superintending work upon what was in some respects his greatest and boldest achievement—the steamship "Great Eastern."

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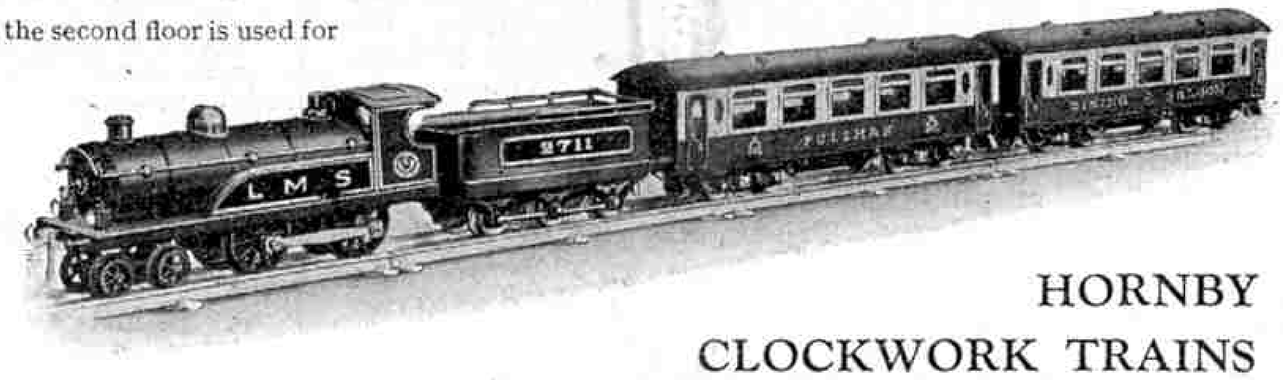

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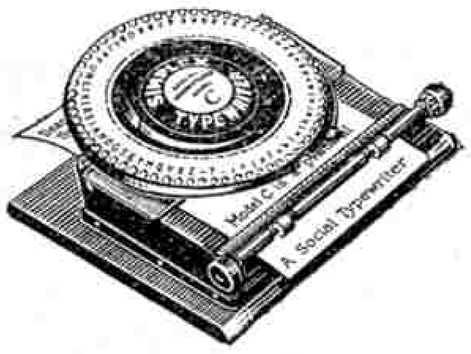

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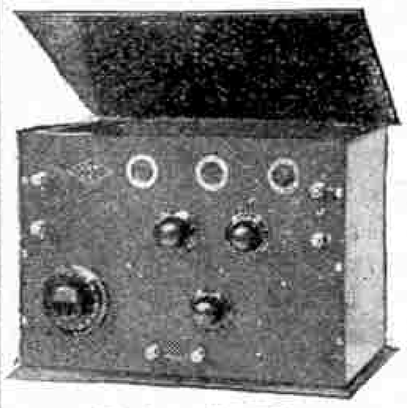

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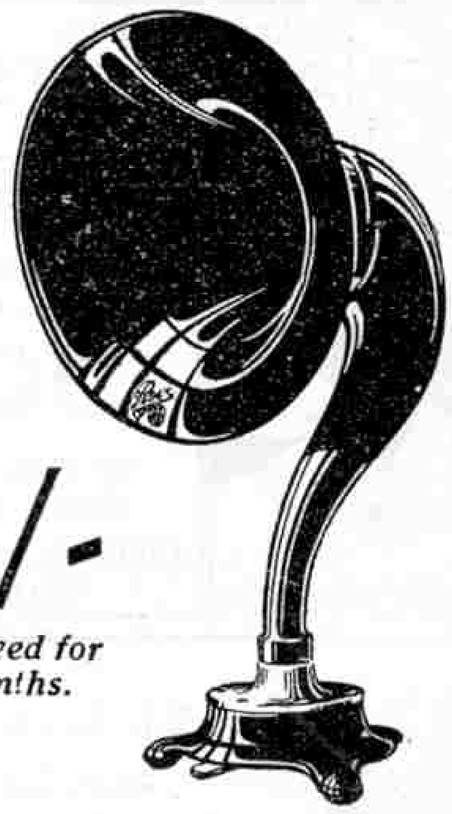

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September Puzzle Competition

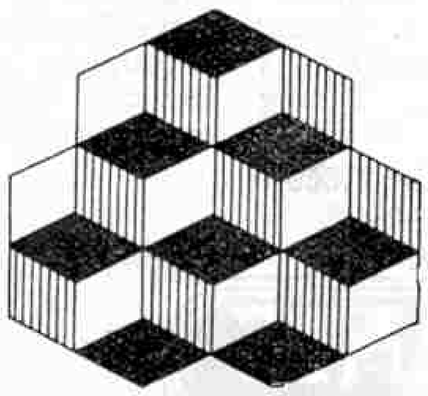
LAST month I made a special appeal to readers to try to collect new jokes and puzzles from among the people they met with during their holidays. It is, of course, too early yet to expect a big response, but already I have received a number of quite interesting puzzles and several readers have written to say they are sending contributions along later.

I wish to impress upon all readers who intend to send in puzzles the importance of writing their name and address on the back of every sheet of paper they use. If this is not done and the sheets become separated, I have absolutely no clue to the sender and consequently, if I decide to use a puzzle contained on one of these pages, I am unable to forward the 2/6, or the 5/– if the puzzle is the best of the month.

This month I am offering a special prize of £1/1/– for the *Best Puzzle Connected with Railways.* From time to time I have published on this page many interesting railway problems, but there must be large numbers of others in existence, and I want my readers to send in the best railway puzzles or problems they know. Entries for this competition must reach this office on or before 30th September, or 31st December for Overseas Readers.

In addition I am offering three prizes of Hornby Trains or accessories to the value of £1/1/–, 10/6 and 5/– respectively, for the three best sets of solutions of the whole of the puzzles on this page, numbers 117 to 124. The closing date of this competition is 31st August and there is no Overseas Section.

Puzzle No. 117.
How many cubes are there in the following diagram ?



* * * *

Puzzle No. 118.
A body of Crusaders went forth to fight. Their number was such that they formed a solid square. On the way a stranger joined them and they then rearranged themselves into thirteen smaller squares of equal size. How many Crusaders were there originally.

* * * *

Puzzle No. 119.
The following jumble of letters may be formed into a sentence by the addition at suitable points of a certain vowel, the same vowel being used throughout :—
LDPRTFRMPRTGDFRRTHDXXFRDDNS.

Puzzle No. 120.
A warehouse was over-run by mice. Cats were obtained to exterminate them and the record was kept. At the end of a year all the mice, totalling 999,919, were killed. Each cat had killed the same number of mice and this number was greater than the number of cats. How many cats were there ?

* * * *

Puzzle No. 121.
"What Am I ?"

My mouth is bigger than my head,
And I am always in my bed.
Now that is where the mystery lies,
For I've been often known to rise.
Although in bed I am not still,
But always moving down the hill,
And though I never leave my place,
I sometimes take part in a race.
Though this may seem plain contradiction,
Yet I assert it is not fiction.

* * * *

Puzzle No. 122.
The members of a certain Meccano Club were going to a football match and a charabanc driver had agreed to take them for 9d. each. Just as they were about to start two other boys came along on their way to the match, and as there were two spare seats in the charabanc the Meccano boys asked the driver if he would take the two and charge them all 8d. each. The driver thought for a moment and then said "Yes. I will do so because I shall gain 4d." How many boys went to the match ?

* * * *

Puzzle No. 123.
A cup of tea and two boiled eggs cost 8½d. Two cups of tea and one boiled egg cost 9½d. What would be the cost of two cups of tea and two boiled eggs ?

* * * *

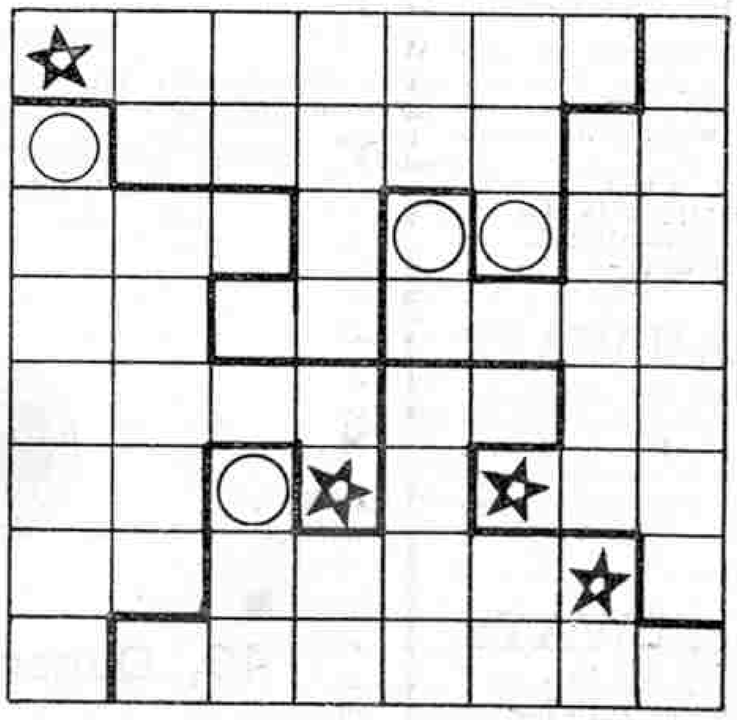
Puzzle No. 124.
The gaps in the following lines are to be filled with words of similar sound to give sense to the rhyme.

No ..... will ..... before the wind,
The ..... will ..... before it.
We cannot ..... the ..... or find
That earthly powers ..... o'er it.

The two missing words in line one have the same sound, and the same applies to the two missing words in line two and the three missing words in lines three and four.

Answers to Last Month's Puzzles

No. 109. The figure is divided as shown below.

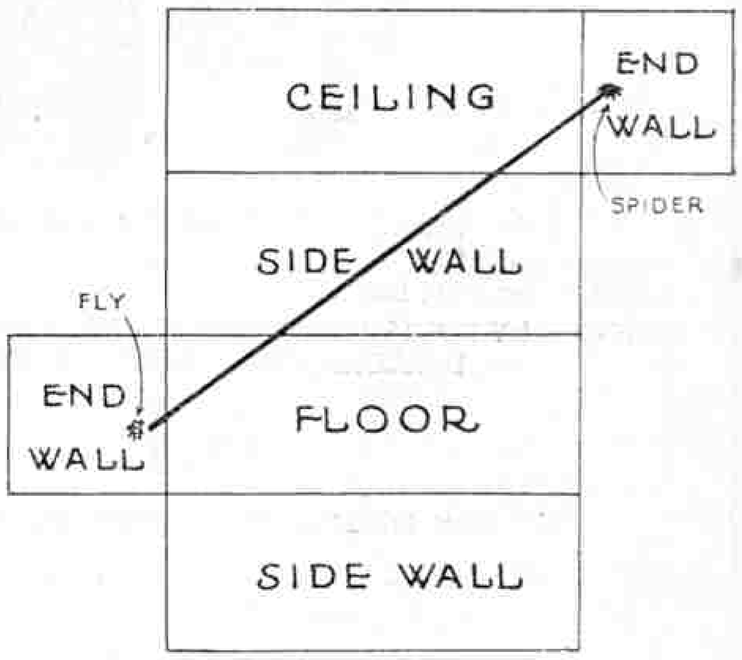


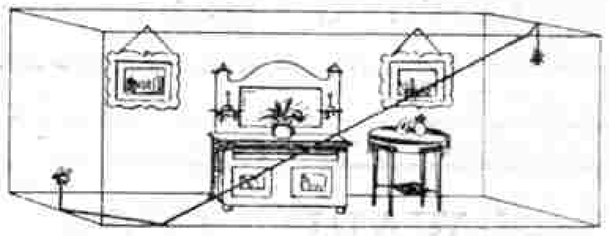
* * * *

No. 110.

Around me shall hover,
In sadness or glee,
Till life's dreams be over,
Sweet mem'ries of thee.

No. 111. We give below a sketch of the room as it would be were it flattened out. The route the spider took to reach the fly in the shortest possible time is shown by the line. The second diagram shows, by means of the line, how the spider's path would look if the room were made of glass and we could see through.





* * * *

No. 112. The milkman took three gallons out of the eight gallon can and poured then into the five gallon measure. Next he took another three gallons from the large can and with this proceeded to fill up the five gallon measure. This left five gallons in the five gallon measure, one in the three gallon measure and two in the eight gallon can. Next the milkman poured the five gallons into the eight gallon can and the one gallon into the five gallon measure. This left one gallon in the five gallon measure, seven in the eight gallon can and none in the three gallon measure. Then he took three gallons from the seven in the large can, poured them into the five gallon measure, and thus made up his four gallons exactly.

* * * *

No. 113. Roland ; Arnold ; Ronald.

* * * *

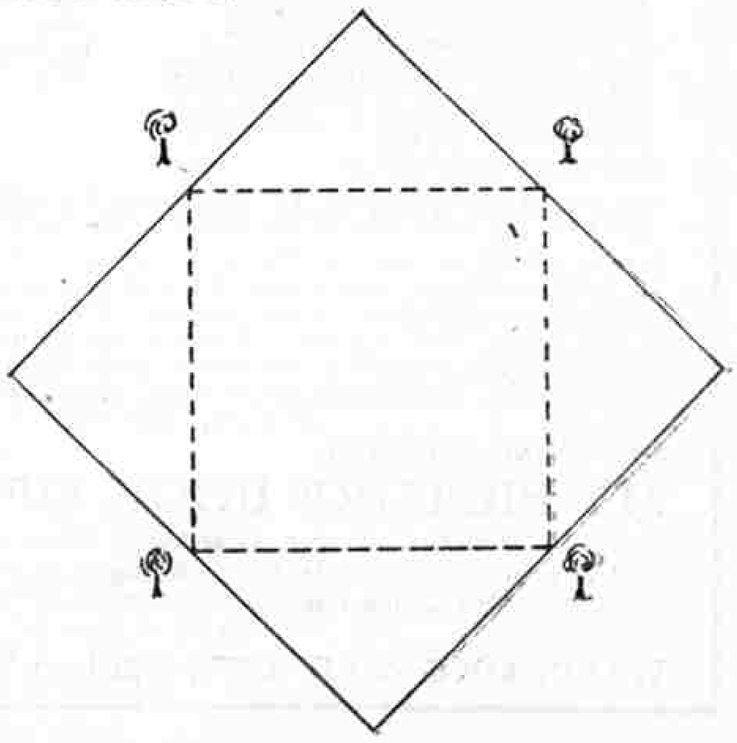
No. 114. Three pigeons ; fifteen larks and two sparrows.

* * * *

No. 115. Scare ; Care ; Are.

* * * *

No. 116. The pond is enlarged as shown in the following diagram. The dotted lines indicate the original size of the pond.



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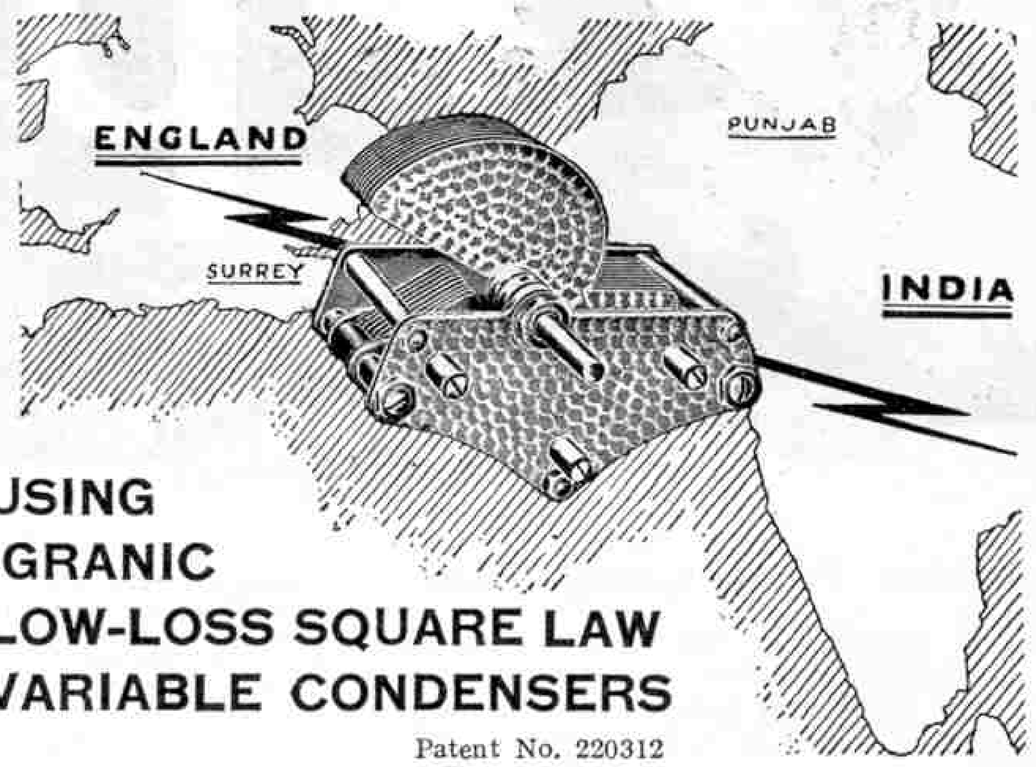

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G2DX. INDIA, 8/6/25.

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Competition Corner

"MY FAVOURITE LOCO AND WHY I PREFER IT"

Every boy who takes a keen interest in railways—and this includes the majority of our readers—has his own ideas of which is the best type of loco, and in addition has his own favourite among locos of that type. The recent trials between G.W.R. and L.N.E.R. locos resulted in our receiving a deluge of interesting letters from readers all over the country giving us their opinion of the respective locos and discussing the results of the trials. From these letters it was quite evident that our readers hold very strong opinions in regard to their favourite locos.

Our Essay Competition this month on the subject "My Favourite Loco" is specially designed to give our readers the chance of putting forward their views. In addition it affords an opportunity of finding out the relative popularity of the various locos with our readers. In announcing the result of this competition we shall publish the names of the different locos chosen in order of their popularity and we feel sure that the result will be very interesting.

Readers who wish to enter for this competition must send in a short essay stating which is their favourite loco and the reasons for their choice.

Prizes will be awarded to the four competitors who send in the most interesting essay, and as usual in our essay competitions, spelling mistakes and bad writing will not prevent a competitor from winning a prize—although this latitude is not to be taken as any excuse for not sending in the best work of which you are capable.

The contest will be divided into Section A for those of 16 and over and Section B for those under 16, and the prizes will be Hornby train goods or accessories to the value of £1/1/- and 10/6 for the first and second in each section respectively.

Entries must be written on one side of the paper only and the competitor's name, address and age must appear on the back of each sheet used.

Closing date: 31st October. Overseas: 31st January 1926.

Ninth Drawing Competition

The keen interest taken in our January Drawing Competition, the subject of which was "A Modern Locomotive," showed that large numbers of our readers are not only interested in railway matters, but are able to represent on paper what they have seen. The standard of excellence in this competition was the highest yet attained in any of our drawing competitions, and in the hope that an even higher standard may be achieved we announce this month our Ninth Drawing Competition, the subject being "A Railway Train in Motion."

This contest affords an excellent opportunity for readers to show their knowledge of the many details of train mechanism and of the general appearance of a train travelling at a considerable speed. Any kind of train may be chosen, passenger or goods, and in every case the main object should be to give an impression of movement. The surroundings of the train are of course entirely matters for the discretion of competitors and the possible variety is so great that we shall look forward with keen interest to scrutinising the entries. Any competitor may submit more than one drawing if he wishes.

The competition will be divided into two sections: (A) For those of 16 and over and (B) for those under 16. Four prizes are offered—Drawing or Painting Materials (or Meccano products if preferred), to be selected by the winners, to the value of 10/6 and 5/- respectively, for the first and second in each class.

Competitors who wish their drawings to be returned must state this at the time of sending in their entries and must also enclose a stamped addressed envelope.

Closing date: 31st October. Overseas: 31st January.

Watch the Closing Dates:

Competitors, both Home and Overseas, are particularly requested to make a careful note of the closing dates of competitions.

Results

Cricket Voting Contest "The Ideal Eleven"

The opportunity to select their ideal cricket team proved extremely attractive to our readers, and as soon as the July "*M.M.*" was on sale postcards began to pour in. All teams submitted were carefully filed until the last post on 31st July, and then the task of counting votes and working out the "Ideal Eleven" was commenced.

The striking feature of the voting was that while the favourite team of players was simple to find, as it was elected by an overwhelming majority of individual votes, only *one* competitor of the vast number who voted had this team complete in every detail.

The selection of our readers was as follows:—A. E. R. Gilligan (Captain), Hobbs, Sutcliffe, Holmes, Hendren, Hearne, Strudwick, Tate, Kilner, Woolley (F. E.) and Macaulay.

First Prize (Meccano Goods value £1/1/-) goes to B. E. Bellamy (South Norwood), whose entry tallied in every respect with the verdict of the majority. The next three prizes (Meccano Goods value 15/-, 10/6 and 5/-) go to V. Smith (Dublin), J. W. Johnson (Wimbledon) and B. Chill (Southampton) respectively.

Consolation prizes of a Meccano Magazine Binder have been sent to F. R. Lush (Southampton), C. Craven (Acton), W. S. Weaver (Stourbridge), L. V. Bradley (York), H. Beetlestone (Southampton), W. A. Fox (South Norwood), K. Atkinson (Rawdon, Leeds), P. Cannon (Ramsgate), J. Wells (Dublin) and R. Truman (King's Lynn).

June Essay Contest

In view of the exceptionally fine weather that favoured us in June and July, the number of essays submitted was most satisfactory. The subject was "Where I Should Like To Go For My Summer Holiday," and many really first-class entries were received.

A weak point in many of the essays was their tendency to wander from the subject, but a refreshing feature about the majority was the free rein given by the writers to their imaginations. For instance, we were much struck with the scheme of a boy whose ideal holiday consisted in voyaging with his pal by P. & O. liner to some uninhabited island in mid-ocean and landing there after giving the captain strict instructions to call for them on a certain date. This is certainly a fine idea, but it would be distinctly awkward if the captain had a bad memory!

Most of the more conventional holiday schemes included a visit to Wembley and many of our north-country readers were quite determined that Blackpool must be included in the programme. One reader, no doubt taking things easy on the sands in company with his "*M.M.*" during the heat wave, wrote the single word "Here," but this could scarcely be regarded as a serious attempt at essay writing!

Awards:—First Prizes (Meccano Goods value £1/1/-)—Section A, W. Mann (Grahamsley, Durham); Section B, John Astle (Enfield Highway). Second Prizes (Meccano Goods value 10/6)—Section A, A. Chivers (Beanacre, Wilts.); Section B, P. Booth (Ashton-under-Lyne).

Club Programme Suggestions

This competition, it will be recalled, was confined to club members only, and although a large number of entries came to hand, the response was naturally not so great as in the open competitions. Many of the suggestions for improving club programmes were distinctly novel, and we may be able to suggest their adoption by club secretaries. Particulars will probably be announced upon the closing of the Overseas section of this competition.

The prize of 10/6 for the best three suggestions submitted is awarded to—Charles Hare (Southport), Member of the Southport Meccano Club.

July Puzzle Contest

The three prizes offered in this competition have been awarded as follows:—

Meccano Goods to the value of £1/1/-, 10/6 and 5/- respectively to A. Evans (Seaham Harbour), H. Combe (Liverpool), G. O. Horne (Muswell Hill).

Sixth Drawing Contest

Every boy at some time or other tries his hand at drawing a great steamship, for there is no subject more fascinating, and as we expected, this competition proved extremely popular. Many of the entries were based upon the posters and other advertisements issued by the great steamship companies and the majority of these reproductions were quite good.

The most popular subjects were the largest liners engaged in the Atlantic service and the favourite view was of the huge vessel approaching, a tiny tug or fishing boat often being included by way of comparison in size. On the whole the work was exceedingly good, but many otherwise effective drawings were spoiled by careless treatment of such apparently secondary matters as the smoke from the funnels or the waves of the sea. One entry was ruined by a flock of most preposterous seagulls which, on the scale of the drawing, were about the size of small elephants!

Awards:—First Prizes (Drawing or painting materials value 10/6)—Section A, R. F. C. Lowndes (Bures St. Mary); Section B, N. Ballard (Birmingham). Second Prizes (Drawing or painting materials value 5/-)—N. Edgar (Blaydon-on-Tyne); Section B, E. Mitchell (Chester).

Overseas Result

March Essay

Overseas readers who entered for the Essay Competition on the subject "What I Should Like To Be and Why," mostly expressed a keen desire to become engineers. Those living in the Canadian Rockies, near the great Egyptian dams, or in British East Africa, where the fight against nature is being relentlessly and continuously waged, were obviously inspired by their first-hand knowledge of what engineers have accomplished. All were agreed that Meccano provides the finest possible preliminary training for an engineering career of any kind.

Awards:—Meccano Goods value £1/1/—C. O. Nanton (Port of Spain, Trinidad). Meccano Goods value 10/6—L. Fisher (Johannesburg).

The Secretary's Notes

Taking Stock

The Summer Session is rapidly approaching its close and indeed for many clubs it has already closed for all practical purposes. Last year at this time I noticed a general tendency to thrust the Summer Session hastily into the background and turn at once to Autumn preparations. This year I should like club Leaders and Secretaries to pause before taking this plunge and, as it were, take stock of the Summer Session. It is a very good plan to gather the members together to talk over the doings of the session. The various plans made at the beginning of the session should be reviewed in the light of experience while events are fresh in mind. Some of these plans turned out successful, others proved failures. The successful ones do not need much discussion. Very likely some members will be able to suggest ways and means of making them even more successful, but the main thing is for the secretary to make notes of the various details for reference next year when the time comes for preparing Summer plans. The case is quite different with the schemes that were not successful. These should be discussed thoroughly with the object of finding the cause of failure, and in such a discussion the Leader should do his utmost to obtain the views of as many members as possible. If the weak spot in a scheme can be discovered, then that scheme may be revised and modified so as to make its success next year highly probable, if not a certainty. On the other hand, if the general opinion of the members is that that particular scheme is hopeless, then no further time should be wasted over it and it should be abandoned immediately. It is far better to have a discussion of this kind while all the details of the session are fresh in the minds of the members than to allow matters to drift until next year when impressions have lost their freshness. It is only by holding such a stocktaking at the close of each session that a club can develop steadily year by year, growing in efficiency as it grows in membership.

The Autumn Programme

Having disposed of the Summer Session the next thing is to decide upon the Autumn programme, and this should be done at a general meeting of members. A very good plan, and one that has proved successful with several clubs, is for the secretary to send a postcard to each member informing him of the date and time of the meeting and asking him to send to the Leader, before the day of the meeting, one or more written suggestions for new schemes or for the improvement of old ones. The Leader should then sort out these suggestions into groups each dealing more or less with one subject, so that at the meeting he is able to put the various suggestions before the members quickly and without overlapping or repetition. The proposals should be read out and discussed, and then voted upon. Probably some schemes will receive a unanimous vote in their favour and consequently will be adopted at once. Opinion will be divided with regard to other proposals, however, and in such cases a good deal must be left to the discretion of the Leader. It is unwise to turn down any scheme too hastily, for that particular scheme may, on trial, prove to be a great success, and my advice is that the members should agree at the commencement of the meeting that any plan which receives a certain number of votes —this number depending upon the number of members present—should be given a fair trial and finally rejected or adopted permanently strictly on its merits.

Clubs and Publicity

I am afraid that the importance of obtaining the utmost possible publicity is not sufficiently realised by many clubs. Such clubs go quietly on their way, making steady progress, but without realising the greater possibilities of development that would result from bringing the club and its work into the public eye. I strongly urge every secretary to do his utmost to get reports of his club's doings published in the local papers. However short such notices may be, they attract a great deal of attention and frequently catch the eyes of boys—and adults also—who otherwise might never have been aware of the existence of the club. Recently the members of the St. James' M.C., Exeter, obtained a large amount of very useful publicity by combining together to construct a large model of Exeter Cathedral. This model was exhibited at various places in the city and wherever it went it attracted great attention. The result was that many people who saw it made inquiries as to its builders and thus, for the first time, became aware of the existence of the Meccano Guild and of the flourishing club in their midst. I commend this idea to clubs in general. By combining together, the members of a club are able to produce much more elaborate models than would be possible if they worked separately. A really big model, more especially if it is a working model, invariably attracts general attention, and indeed I know of one such model exhibited in a dealer's window that produced a state of absolute congestion on the footpath, so that a friendly policeman had to gently persuade people to "move on!"

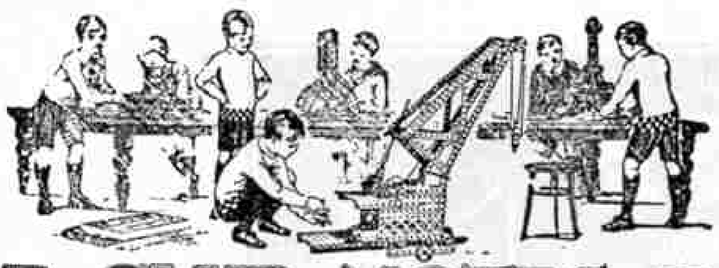
Westcliff and District M.C.

Our photograph is of the Boys' Section of the Westcliff and District Meccano Club. All the members are Boy Scouts or Wolf Cubs and the Secretary, D. S. Cecil, reports that the average attendance is close upon 100 per cent. The club has also a very flourishing "Girls' Section," of which we hope to publish a photograph later. A recent addition to the club's activities is the publication of a magazine, "The Hound," which already shows great promise.

Affiliated Meccano Clubs of the British Isles

Third List

Town.	Club.	Secretary.
STOCKTON-ON-TEES	STOCKTON M.C.	N. Middleton, 16, Victoria Avenue, Norton Road, Stockton.
BOLTON	BEVERLEY ROAD I.M.M.C.	H. Henshaw, 35, Kendal Road, Bolton.
BLAGDON (nr. BRISTOL)	BLAGDON ST. ANDREWS M.C.	K. R. Day (Miss), Seymour Arms Hotel, Blagdon.
BURES (SUFFOLK)	BURES M.C.	J. Deaves, Radio House, The Croft, Bures.
LEEK (STAFFS.)	ST. JAMES M.C.	W. Armstrong, 4, Gaunt Buildings, Derby Street, Leek, Staffs.
DUNDEE	MARYFIELD M.C.	S. Smith, 14, Maryfield Terrace, Dundee.



CLUB NOTES

Herne Bay M.C.—Has held a special "Grand Jollity" night at which 23 members were present. Thanks were accorded to Mrs. W. H. Russell who kindly looked after the catering. After the presentation of the prizes in connection with the second Annual Sports a visit was paid to Messrs. Hunt's Electrical Works. The visit was a great success and was referred to in the local press. Details of August activities are not yet to hand. It is intended to have a good display at the local Horticultural Society's Autumn Exhibition. Club roll: 29. Average attendance: 18. *Secretary*: C. W. Russell, 4, Clifton Villas, Herne Bay.

Claygate M.C.—Is temporarily without a President on account of the absence abroad of Admiral Sir Godfrey M. Paine, K.C.B., M.V.O. Special Merit Medallions have been awarded to A. Harber, F. Harber and H. Cherry. Club roll: 65. Average attendance: 50. *Leader*: Mr. J. W. Haynes, "Fontmell," Covers Road, Claygate, Surrey.

St. Mary (Bourne) M.C.—A new committee and an assistant secretary (J. H. Deacon) have been appointed. Last month the main activities were cycle trips and a successful camp. Club roll: 21. *Secretary*: D. L. White, Rosedale, Stoke, nr. Andover, Hants.

St. Barnabas (Barnetby) M.C.—An exhibition has been arranged for the last week of this month. An excellent loud speaker has been presented for use with the club wireless set. The Cricket Team has had a successful season and the general club outlook is good. *Secretary*: R. H. Ward, Laurel Villas, Victoria Road, Barnetby, Lincs.

Davenport M.C.—The second camp was held at Berestal Hall Farm, Pott Shrigley, near Macclesfield. The camp was very successful and the members wish to acknowledge the kindness shown to them by Mr., Mrs. and Miss Craggs of the farm. Lectures are to be a special feature of the Autumn Session. Club roll: 35. Average attendance: 17. *Secretary*: A. D. Stoker, 125, Bramhall Lane, Stockport.

Bures (Suffolk) M.C.—Has recently become affiliated with the Guild. A stall of models was arranged at Bures Fete, from which the club derived £1/5/- and secured useful publicity. A model of an Electric Power Station driven by small steam engines, built by J. Deaves, attracted much attention. *Secretary*: J. Deaves, Radio House, The Croft, Bures, Suffolk.

Ellesmere Port M.C.—The secretary, H. Hope, has resigned and has been succeeded by J. Boughey. A special Recruiting Campaign is to be opened shortly and good results are anticipated. *Secretary*: J. Boughey, 24, Livingstone Road, Ellesmere Port, Cheshire.

Harwich M.C.—Has been granted permission to hold a stall at the Harwich Horticultural Show, and a good display of models and literature has been arranged. A special Fretwork Section is to be run during the winter under the direction of Mr. Jeffries. Club roll: 34. Average attendance: 28. *Secretary*: A. E. W. Ward, Osborne House, Pepys Street, Harwich.

Redruth M.C.—Has been practically closed down during the summer, but activities will shortly be recommenced. Special Merit Medallions have been awarded to C. Burrows and B. Happe. Club roll: 33. *Secretary*: L. Trenberth, Tunnel Stores, Redruth, Cornwall.

Blagdon St. Andrews M.C.—Has decided to extend the membership to include girls. The club's first Exhibition was a great success. It was held at club headquarters and suitable book prizes were awarded by the Rev. Prickard of Blagdon. A concert terminated the proceedings. On the following day the members lent their models for a stall at a Sale of Work in aid of the S.P.G., and this "good turn" was very much appreciated. Club roll: 20. *Secretary*: Miss K. R. Day, "Seymour Arms" Hotel, Blagdon, nr. Bristol.

Great Baddow (Chelmsford) M.C.—The Cricket team has played many enjoyable matches. Full activities are to be resumed this month and there is a balance in hand of £3. Meccano boys in the district who wish to join should apply to the Secretary, J. Boreham, Post Office, Baddow Road, Chelmsford.

India

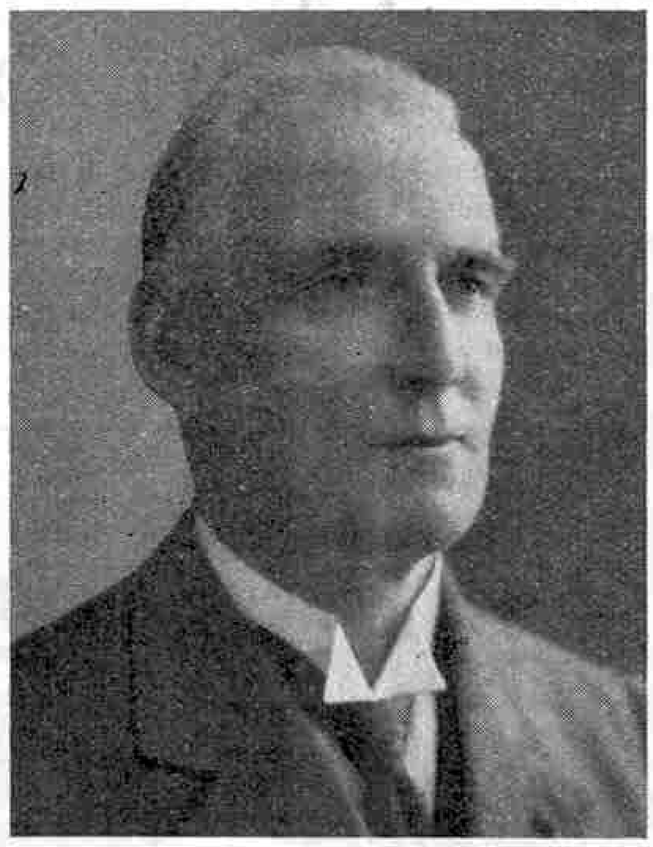
Delhi M.C.—Has recently celebrated its anniversary, but detailed particulars of the proceedings are not yet to hand. As the result of a recent re-arrangement, Mr. R. Raman, who has hitherto acted as Leader, has taken over the secretaryship, and the following two appointments have been made: Leader: L. Raghubir Singh, S/O Rai Bahadur L. Sultan Singh Rais of Delhi. Assistant Leader: Mr. A. P. Mitra S/O I. T. Mitra L.M.S. A particularly interesting monthly magazine, "The Children's News," is edited and published by Mr. Raman. This magazine covers a wide range of subjects among which Meccano takes an important place. The June number was a special Meccano issue and was most skilfully prepared and arranged. *Secretary*: Mr. R. Raman, Scout-Master, Children's Meccano Club, Charkhe Walan, Delhi, India.

New Zealand

Wiseman's M.C.—As a tribute to the late Prime Minister of New Zealand, Mr. W. F. Massey, a cenotaph was erected at club headquarters and this, together with a photograph of Mr. Massey, was draped with a Union Jack and a wreath laid at its foot. A letter of sympathy was sent to Mrs. Massey and this was courteously acknowledged. At the monthly meeting for May, at Auckland, the attendance of 65 was presided over by Mr. Frank Wiseman. Mr. A. J. Lewis late Leader of the Wynberg M.C. (South Africa), gave an interesting paper on the activities of his old club, and the comments of Mr. Millikin, M.I. (Struc.) E., on the construction and finish of the various models competing in the club competition were followed with the closest attention. The attendance at the June meeting was over 150. A great recruiting campaign is to be launched and splendid results are expected. Club roll: 754. *Secretary*: Mr. W. Shearer, Wiseman's Meccano Club Headquarters, 170–2, Queen Street, Auckland, N.Z.

Meccano Club Leaders

No. 22. Mr. G. E. Barrett



Mr. George E. Barrett, founder and Leader of the Observatory Meccano and Wireless Club, Cape Province, South Africa, has the honour of being the oldest of all Meccano Club Leaders, although one would not suspect this, for his activities and enthusiasm are so great.

The Observatory M.C. was started in July, 1921 with five members. By January of the following year its membership had increased to 33 and it was then affiliated with the Guild. To-day the club has the splendid membership of 95 and it is still growing. A special feature has been made of wireless and the radio section is now very flourishing. Cricket and football teams also have been formed.

In addition to his work in connection with the Observatory Club, Mr. Barnett has done a great deal to extend the Meccano movement in South Africa, notably by promoting and assisting in establishing clubs at Simonstown, Wynberg, Sea Point and Bellville.

Dunedin M.C.—Is to be represented by a Display of Models at the local Exhibition. A novel event held recently was a "Scooter" Race on the tennis courts. The library has grown from 20 books to 100 and is still increasing. Electric Motors and their working will form the subject of an impending lecture and special meetings. The Dunedin Club has found it valuable to elect honorary members on payment of an annual subscription and these members are a source of great strength, financial and otherwise. Club roll: 20. Average attendance: 16. *Secretary*: M. Coughlan, 27, Arthur Street, Dunedin, N.Z.

South Africa

Observatory (South Africa) M.C.—A very successful Exhibition recently held was opened by Mr. H. Spencer Jones, Astronomer Royal (S.A.), who said the club was a comparatively new institution, but was already a thriving youngster counting among its patrons some of the leading men of South Africa. He thought the Exhibition was splendid and it was his sincere hope that the club would progress even further. The President of the club, Mr. Barrett, said that as a club they were endeavouring to uphold the great ideals of the Meccano Guild. He was glad to say that they had been instrumental in finding excellent employment for several of their members. Mr. Snell, of the Department of Education, also spoke and urged Mr. Barrett to continue the good work he had begun. There were 93 models on exhibition and the standard was so high that the judges, Messrs. W. Moore, A.M.I.E.E., A.M. (S.A.) I.E.E.; H. A. Eastman, B.Sc., A.M.I.E.E.; W. J. Allan, K. Oosterberg, G. S. Morgan, W. Boyle and G. Hendrickze had a difficult task selecting the winners. A feature of the display was a Hornby Railway winding round a picturesque countryside with a replica of the Prince's white train. The exhibition was well supported by the other South African Meccano Clubs, represented as follows:—Bellville, Mr. C. H. Edwards, president and members; Wynberg, Mr. Gaven, vice-president, and members; Simonstown, Mr. Creasey, president, and members; and Sea Point, Messrs. Boyle and Versfield, vice-presidents, K. Scaife, secretary and members. The models of the Sea Point Club, representing docks and harbour, were much appreciated. *Secretary*: Mr. S. Wilson, P.O. Box 1247, Cape Town, S. Africa.

Clubs not yet Affiliated

South Norwood M.C.—Holds regular meetings on Tuesdays and Thursdays, at 6.15 p.m. in Stanley Halls, South Norwood. Club roll: 11. *Secretary*: Frank R. Dunster, 52, High Street, South Norwood, S.E.25.

Reading M.C.—Has attracted much attention in the town and the local papers have published photographs of the Leader and members, together with an account of the good work being done. Visits have been paid to the works of the Reading Ice Company (through the courtesy of the Manager), the newly installed electric pumping plant at the Corporation Pumping Station, and to St. Lawrence's Church, where members were escorted by the vicar to the top of the lofty tower. Club roll: 40. Average attendance: 18. *Secretary*: F. G. M. Wheeler, 72, Pell Street, Reading.

Louth M.C.—Regular weekly meetings have been held throughout the summer. A Leader has been secured in Mr. Birkett, and it is hoped shortly to secure affiliation. *Secretary*: H. Bell, 10, Dyas Terrace, Charles Street, Louth, Lincs.

Edinburgh Castle (Bow) M.C.—Membership continues to increase. Recent activities include Model-building and a successful Social Evening. *Secretary*: E. H. Wedon, 173, Turner's Road, Bow, London, E.3.

Chesterfield M.C.—A special demonstration of Hornby Trains is to be held this month when the club room is re-opened. One of the members has generously placed his wireless outfit at the disposal of the club. A Leader is expected to be secured shortly. Club roll: 16. *Secretary*: R. Whiteman, 319, Hasland Road, Hasland, Chesterfield.

Selby and District M.C.—The Lawn Tennis Section has been the principal feature during the summer, and the team attained second place in the local league. A special display is to be arranged at a Church Fete shortly. Dr. Todd has accepted the Presidency of the club. The handsome sum of £10 was realised at the Club's summer Carnival. A Girls' Section has been started under the Leadership of Mrs. Burton. Club roll: 31. *Secretary*: R. Bainbridge, 24, River View, Cliff Bank, Selby, Yorks.

Pinnaroo (South Australia) M.C.—This recently-formed club is proving so successful that affiliation with the Guild is shortly to be applied for. Although there were originally only six members, the Meccano outfits included a No. 6, a No. 5, a No. 3, and two No. 2's. A new No. 3 for the club has been purchased out of funds, together with the nucleus of a club Library. A Cycling Section has also been started. Next month the club will have a stall at the local Exhibition, and it is hoped that this will help its progress considerably. *Secretary*: Maynard R. Pocock, Box 178, Pinnaroo, South Australia.

Keynsham M.C.—Is making very good progress. A successful stall was held at the Keynsham Flower Show, and the many visitors admired the Meccano and Fretwork models. The secretary is building a Meccano Racing Car of his own invention. *Secretary*: Denis Lea, 2, The Avenue, Keynsham, Somerset.

East Dulwich M.C.—Accommodation has now been found for the club, and intending members should apply to the Leader, W. Pay, 297, Lordship Lane, East Dulwich, London S.E. 22.

Barnes M.C.—A Club has been started and additional members are required for the coming Winter session. The secretary is a keen young engineer and has also made some useful suggestions for the running of Meccano clubs. *Secretary*: L. W. Vinall, 21, Cambridge Road, Barnes, London S.W. 12.

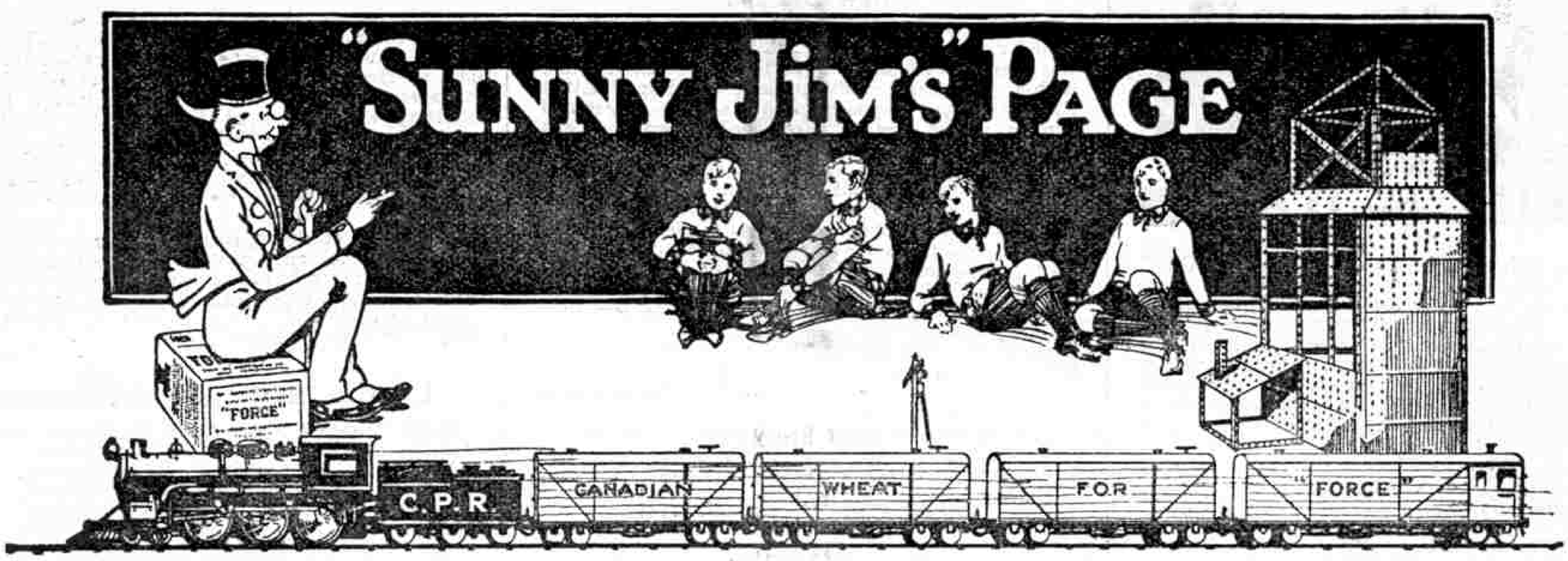
Proposed Clubs

Sutton Bridge.—A group of Guild members have decided to start a club and have secured the services of their school-master, Mr. Baxter, as Leader. Applications for membership should be addressed to H. Harpley, 23, Princess Street, Sutton Bridge, Lincs.

Hertford.—Twelve boys have joined and a room has been secured at the Cowper School, London Road. An adult Leader is still required. *Secretary*: D. Church, 13, Cromwell Road, Hertford.

Wavertree.—Strenuous efforts are being made to form a club and those interested should apply to Paul A. Dickinson, 50, Lawrence Road, Wavertree, Liverpool.

Manor Park (London).—A club is being formed with Mr. Wolfe as Leader, and the nucleus of a good membership has been secured. Meccano boys living within convenient distance should apply to the *Secretary*: E. Hooper, 5, Swinburne Avenue, Manor Park, London, E.12.



MAKE THIS WORKING MODEL OF "FORCE" MILLS

"Ease her!" "Stop her!" The grain ceases its headlong course up the conveyor from truck to mill. No. 1 truck has unloaded. No. 2 truck is running up to take its place. "Right away there!" No. 1 is shunted on to the siding. Already No. 2's load of wheat is diminishing, for the golden grain is racing in a steady stream to the topmost floor of the "FORCE" mills. Here it is cleaned preparatory to being turned into "FORCE."

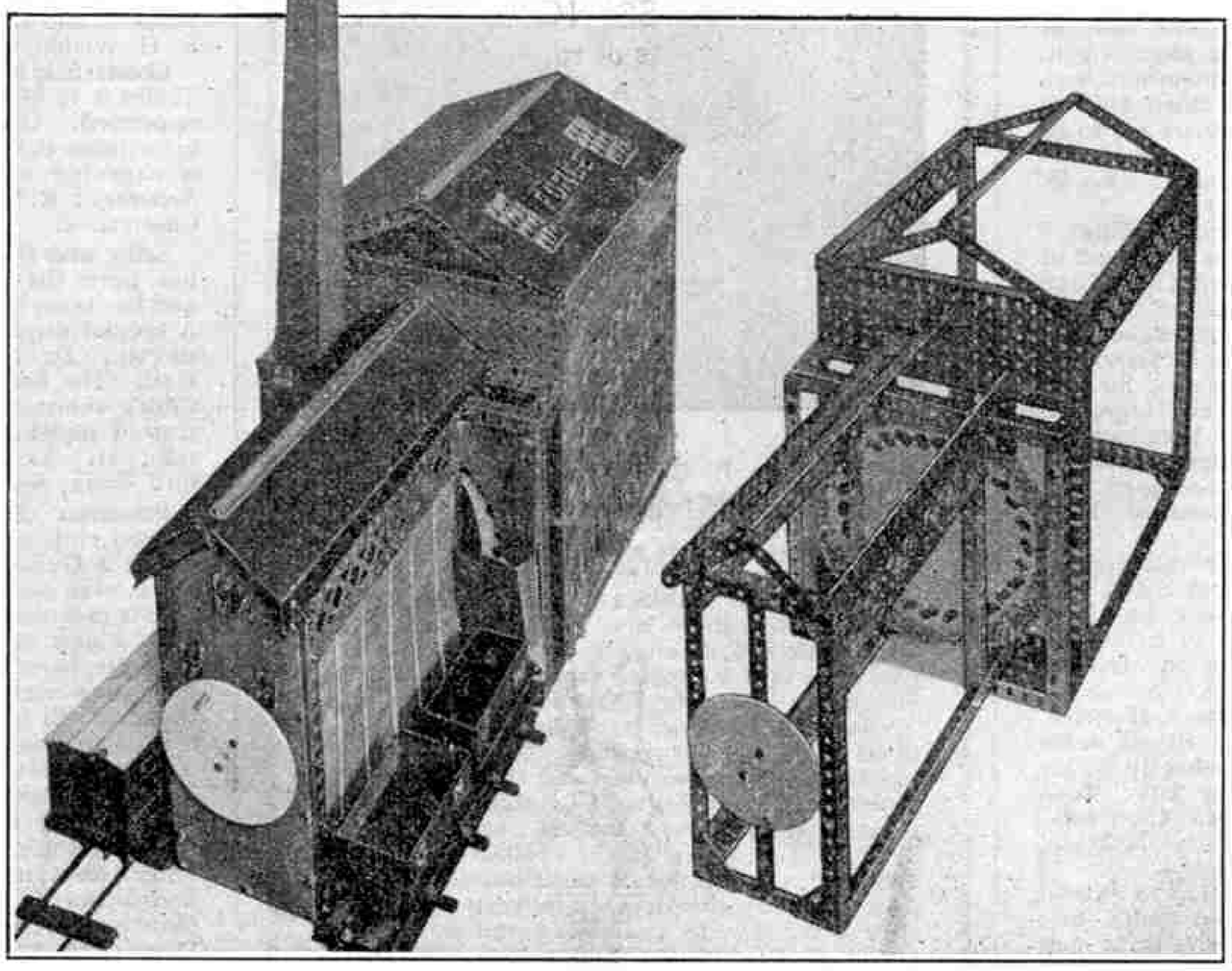
As this work proceeds men are busily engaged on the other side of the mill loading "FORCE" for shipment to England. The last truck is loaded. The hubbub momentarily ceases. "All right!" comes faintly from the guard back in the rear of the train.

"Let her go!" shout the men, and with a great hissing and chuffing the big Canadian Pacific locomotive gets under way. Thch–thch–thch–ch-ch-hhhhhhh–Thch–thch–ttthch–chhhhhhhhh Shirrip-pip! "Good bye!" "Non-stop Montreal." "Dick!" "Yes, Mother!" "You'll spoil your shoes if you sit on your heels in that way!" "All right, Mother!" "It's tea time, Dick. I have a special treat for you and Harry, 'Force' and, what do you think?" "'Force' and Peaches?" "No!" "'Force' and stewed fruit?" "No, not quite!" "'Force' and cream?" "No, try again, Dick!" "'Force' and tinned pears?" "No, something warm." "Give it up, Mother, but I did hope there was some fruit in it." "Ah! you gave up too soon, Dick. It's 'Force' with stewed plums and rich creamy custard. Come along, boys."

While Dick and Harry are away at tea, let us take a tour of inspection round their model and see what kind of a jolly game they have been playing. "Ah! Here's the 'FORCE' mills! Quite realistic, too. Framework of Meccano parts and a covering of cardboard bolted into position and painted with brick red walls and a black roof. Let us make a list of the parts they have used so that we can make a model like this, too. Take this down on a piece of paper. Ready?

"Two No. 1. Two No. 1a. Four No. 2 Three No 3. Twelve No. 8. Fourteen No. 8a. Two No. 9a. Two No. 9d. Two No. 9e. Ten No. 12. One No. 13a. One No. 14. Two No. 24. Hundred and twenty-one No. 37. Nine No. 38. One No. 59. One No. 63. Two No. 70. Two No. 72. Ten No. 133. Two No. 99. Four No. 100. One No. 115.

"Now! How are the parts put together? H'm! This is going to be difficult." "Can I help?" "Hello, Dick! Yes, you can. We want to show other Meccano boys how to make a model like yours. What's the best way to do it?" "Why, show them a photograph of it, of course." "That won't show them the inside." "Give them two photographs, then. After you have taken the first I'll take off the walls and roof and then you can take a picture of the 'skeleton.'" "Good idea, Dick. I'll get my camera."



The "FORCE" Mills are soon photographed and on this page we are able to print the result so that other Meccano boys can build this model, too.

Now let's see how the model works! This handle on the cardboard disc at the end of the mill turns the disc in the middle of the mill. That disc has two circles on it. One has wheat glued on and the other is a circle of tiny "FORCE" packets. In front of this disc is a "screen" of cardboard cut so that through the left-hand slot only the wheat can be seen, and through the right-hand slot only the "FORCE" packets appear. Now when we turn the handle we get the effect of wheat being conveyed up into the mill from the left-hand side, and "FORCE" packets pouring out on the right-hand side. Dick has fixed a "baffle" in front of each slot so that no one can see where the wheat comes from or where the "FORCE" goes to.

A model truck loaded with wheat grains placed under the left baffle appears to be unloading into the mill, and a model truck placed under the right baffle seems to be taking on a load. Dick has made some realistic miniature "FORCE" packets by painting tiny labels and sticking them on to little wooden blocks cut to the right shape. The "FORCE" packets that pour out from the mill are these tiny "FORCE" labels pasted to the cardboard disc.

Dick is now starting his Canadian Pacific train on its return trip from Montreal, while Harry is coming up with the wheat freighter. Let us leave them to the fun, and see if we can use the photographs to make a similar model for ourselves. Some of us haven't all the parts, but we all will manage somehow.

"What do you think? Harry so enjoyed his 'FORCE' tea that he wants me to tell everyone who reads this paper that 'FORCE,' the whole wheat flake food, is just delicious. In cold weather, of course, we eat 'FORCE' with hot milk. Eaten this way it makes a delicious warming dish, and, of course, needs no cooking, because it is cooked at the mills. Eat 'FORCE' *every* day, you'll like it, same as I do."

Sunny Jim

FREE TO MECCANO BOYS

A sheet of 66 miniature "FORCE" packets ready gummed for making models will be sent to any boy who sends "Sunny Jim" a top from a real "FORCE" packet and his name and address. Mark your envelope "Packet" in top left-hand corner, and post to "SUNNY JIM,"

197, Gt. Portland Street, LONDON, W.1.

"Sunny Jim" Offers Prizes

for the best photos of Harvesting Scenes taken by Meccano boys. **1st Prize £1. 2nd Prize 15/–. 3rd Prize 10/–.**

CONDITIONS.

(1) Name and address must be written on back of prints. (2) All prints must arrive by Sept. 30th 1925. (3) Competitors must send 1 Force packet top with their prints. (4) "Sunny Jim's" decision is final. (5) Copyright of all pictures winning prizes shall rest with A. C. Fincken & Co., who in consideration of the payment of the prize money shall be entitled to possession of negatives and assignment of copyright. (6) "Sunny Jim" cannot promise to return prints sent in for competition.

Post to "SUNNY JIM,"
197, Gt. Portland Street, LONDON, W.1.
and mark your envelope "Harvesting."

OBVIOUSLY !

Tommy: "This is machine oil in this bottle, isn't it mother ?"

Mother: "Of course not Tommy, it's liquid glue."

Tommy: "Then that's why your sewing machine won't work !"

* * * *

Tourist (paying his bill): "Well, I am square now."

Hotel keeper: "Yes sir, and I hope you will be round again shortly."

* * * *

IN LIGHTER VEIN

Have you ever noticed that although a guard travels in the "rear" you often find him "in the van."

That he often puts up the "white flag" and surrenders to "rule."

That although he has a splendid "carriage" and "traps" yet he "carries himself" well.

That he signals "right," hops into his van or he would be "left."

That every day is his "flag day."

That he will get you a "pillow" before starting, although he may not give you the "slip" until the next junction.

That you may ram a "tip" into his hand, yet he doesn't look "sheepish."

That he always "expresses" himself in most "Parliamentary" language.

That he is a man of "letters" and is "capped" by the "L.M.S."

Have you also noticed :—

That an engine driver has always got his eyes "glued" to the "sticks."

That he is neither a "crank" nor an "eccentric" although he keeps a "donkey" on his engine.

That he sits in a "cab" but it taxi's all his energies to drive his "iron steed."

That he dabbles in "oils" and is an expert in "colours."

That he must economise, although he never drives without "waste."

The "platelayer," too, "bolts" "fishplates," yet is fairly healthy.

He makes a good chair-man, and can keep the rail-ers in "check."

The signalmen may be called "Lever Brothers." They "pull" very well together, although at different "points." In fact, they are constantly pulling down their "homes"—and houses so scarce !

Were I a signalman myself, Mr. Editor, I might say here that I trust this finds you in a good "frame" of mind, "ready" to "accept" without "delay" or "obstruction" this MSS.

W. ADAM (in the "*L.M.S. Magazine.*")

This Month's Short Story

Angry bull
Bella met.
Up went Bella
Not down yet.

* * * *

There was a long queue at the booking office window and the train was due to depart in one minute.

"Three third-class returns," said the man who was last in the queue.

"Returns where to ?" asked the harassed clerk.

"Why, here of course," was the unexpected reply.

* * * *

MISSING!

In the early years of railways a loco one day came noisily to a standstill at a signal policeman's railside hut.

"Where's your tail lamp ?" demanded the official.

The driver looked round and a strange expression overspread his honest countenance.

"Tail lamp be blowed," said he, "Where's my train ?"

* * * *

Q. What men ought to be strongest ?
A. Photographers, because they are always developing.

* * * *

Q. Why is a horse an amiable animal ?
A. Because it can stand a lot of chaff.

HANDICAPPED!

On a country branch line noted for its slow travelling and its delays, an exasperated traveller leaned out of the front coach and shouted to the driver on his diminutive tank engine: "Can't you go any faster ?"

"I could," was the reply, "but I've got to drive this engine !"

* * * *

"Ticket sir," said an inspector at a city railway terminus to a gentleman who, having been a season ticket-holder for some time, believed his face was so well known that there was no need for him to show his ticket.

"My face is my ticket" replied the gentleman, a little annoyed.

"Indeed," said the inspector, rolling back his sleeve and displaying an arm like a leg of mutton. "Well, my orders are to punch all tickets passing on to the platform."

* * * *

Old Lady: "Porter, does this train stop at Cinderford ?"

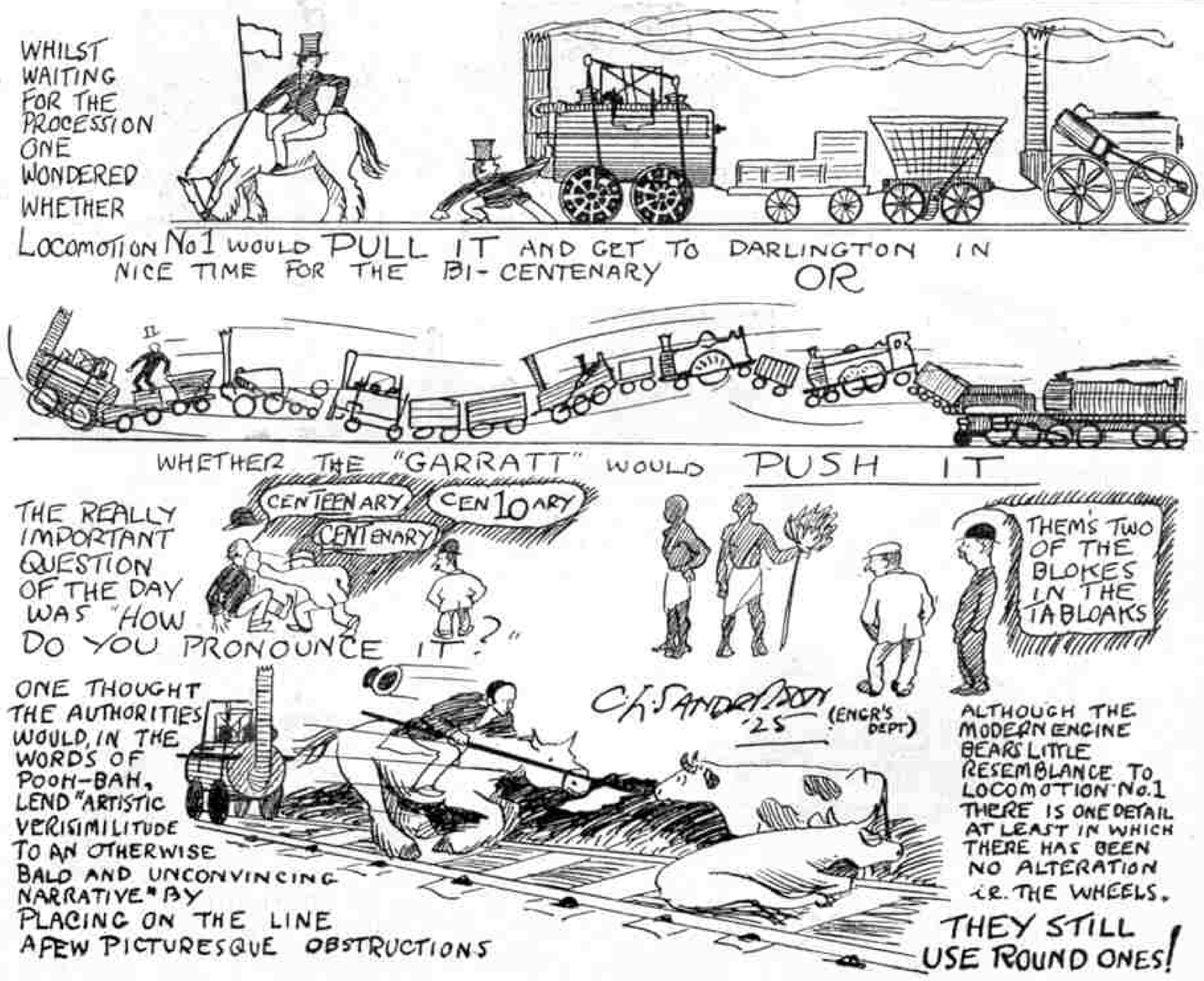
Porter: "No madam, it doesn't even hesitate."

* * * *

Q. When driving a nail how can you make sure of not hitting your thumb ?
A Hold the hammer with both hands.

* * * *

Q. Why did the pillar-box ?
A. Because it saw the garden fencing.



Courtesy] [*L.N.E.R. Magazine*

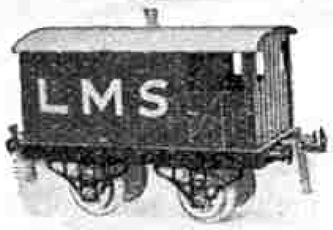
The Great Procession

ROLLING STOCK AND ACCESSORIES

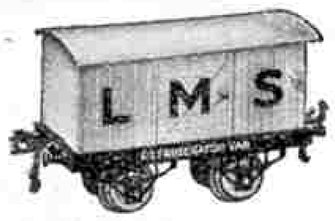
(HORNBY SERIES)

There are now 50 different train accessories—Stations, Signal-boxes, Lamps, Wagons, Level-Crossings, Foot-Bridges, Turntables, etc. Further accessories will be added to the system from time to time, and will be announced in the pages of the "*M.M.*"

All Hornby Rolling Stock and Accessories are built in correct proportion to the size, gauge, method of coupling, etc., of the Hornby Trains and all have the uniformly beautiful finish that is the great feature of the Hornby series. With these accessories you can build up a most realistic railway system, and the splendid range of rails, points, and crossings make possible endless variety in rail layout. Hornby Trains are British made, and your dealer will be able to show you specimens of the new products.

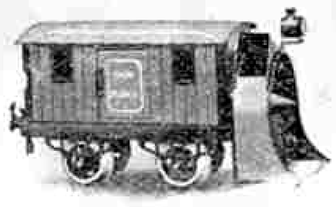


BRAKE VAN
Finished in grey, with opening doors. Price **4/–**

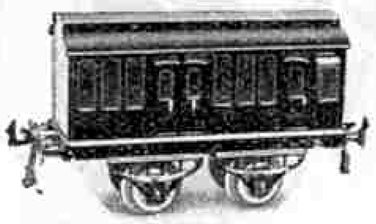


***REFRIGERATOR VAN**
Enamelled in white, with opening doors. Price **4/–**

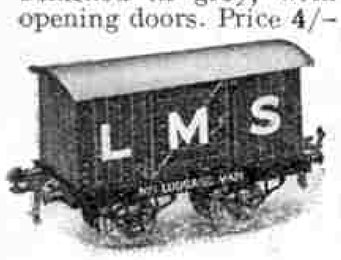
BRAKE VAN
Finished in grey, with opening doors. Price **4/–**



***SNOW PLOUGH**
With revolving plough driven from front axle. Price **5/6**



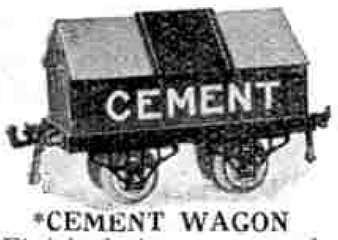
***GUARD'S VAN**
Realistic design, fitted each side with opening doors. Price **3/6**



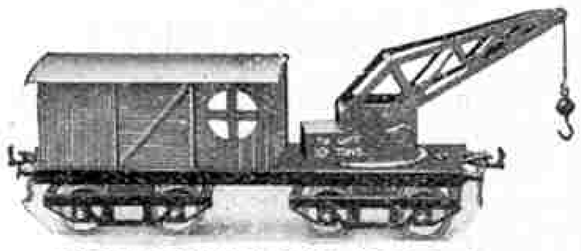
***No. 1 LUGGAGE VAN**
With opening doors. Price **4/–**

***No. 2 LUGGAGE VAN**
Finished in blue and green. Fitted with double doors. Suitable for 2-ft. radius rails only ... Price **6/6**

***MILK TRAFFIC VAN**
Fitted with sliding door, complete with milk cans. Price **4/6**

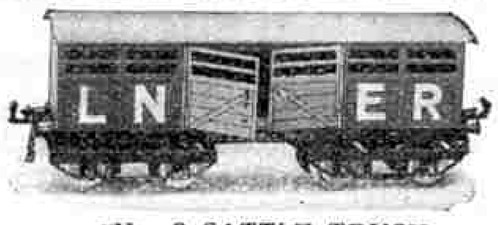


***CEMENT WAGON**
Finished in grey and black. Price **4/–**

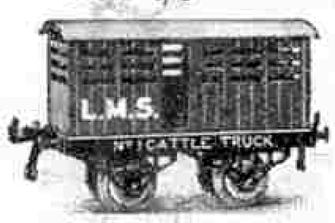


***BREAKDOWN VAN AND CRANE**
Beautifully coloured in grey and black, with opening doors. Suitable for 2-ft. radius rails only ... ... Price **7/–**

SECCOTINE WAGON
Beautifully finished in blue, with opening doors. Price **4/–**



***No. 2 CATTLE TRUCK**
Splendid model fitted with double doors. Suitable for 2-ft. radius rails only ... ... Price **6/6**



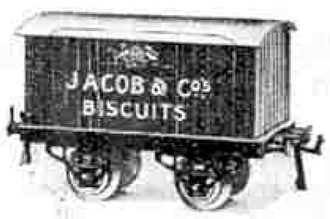
***No. 1 CATTLE TRUCK**
Fitted with sliding door. Very realistic design Price **4/–**

SIDE TIPPING WAGON
Excellent design and finish. Price **3/6**

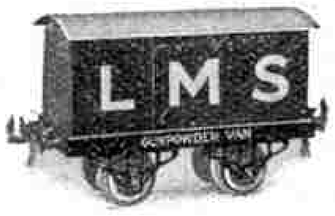
ROTARY TIPPING WAGON
Finished in grey and green. Price **4/–**

CRAWFORD'S BISCUIT VAN
Finished in red, with opening doors ... Price **4/–**

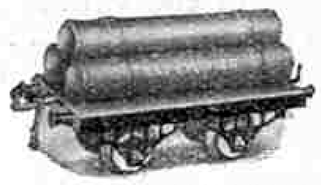
CARR'S BISCUIT VAN
Finished in dark blue, with opening doors. Price **4/–**



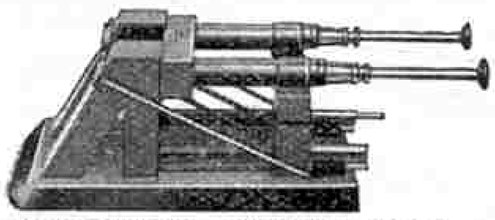
JACOB'S BISCUIT VAN
Finished in crimson lake, with opening doors. Price **4/–**



***GUNPOWDER VAN**
Finished in red, with opening doors. Price **4/–**

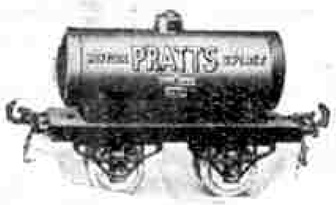


***GAS CYLINDER WAGON**
Finished in red, lettered gold. Price **3/–**



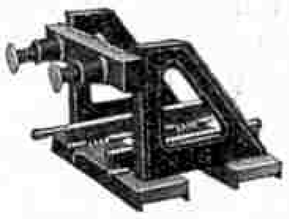
HYDRAULIC BUFFER STOP
Price **5/–**

PETROL TANK WAGON "SHELL"
Finished in red. Price **3/–**

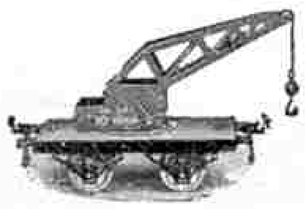


PETROL TANK WAGON "PRATTS"
Finished in green. Price **3/–**

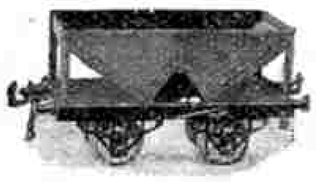
PETROL TANK WAGON "NATIONAL BENZOLE"
Price **3/–**



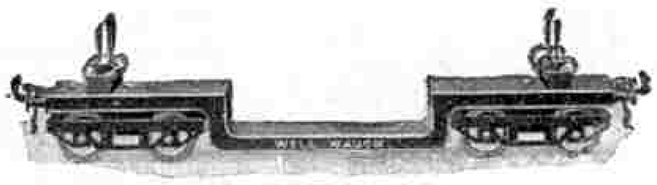
SPRING BUFFER STOP
Price **1/6**



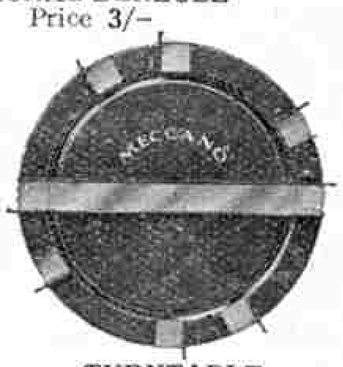
***CRANE TRUCK**
Finished in grey and black ... Price **4/6**



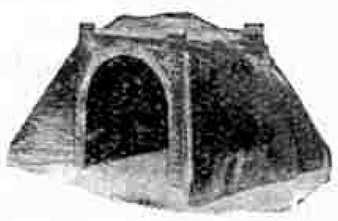
***HOPPER WAGON**
Mechanically unloaded. Finished in grey and black ... Price **4/–**



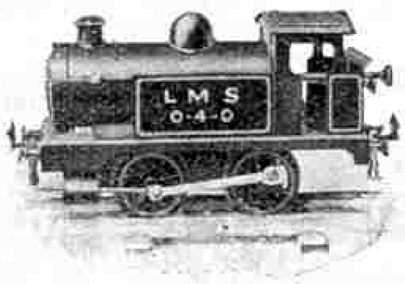
***TROLLEY WAGON**
Finished in grey and red. Suitable for 2-ft. radius rails only ... Price **6/–**



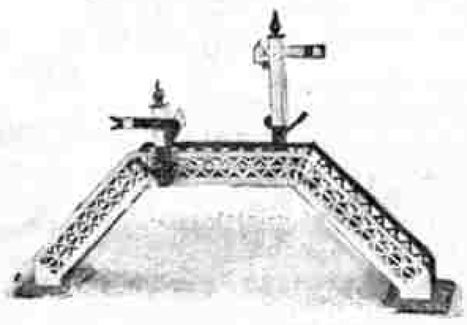
TURNTABLE
Price **5/–**



TUNNEL
Realistic and finished in colours ... Price **7/6**



HORNBY No. 1 TANK LOCO
Gauge 0, in colours to represent L.M.S. or L.N.E.R. Companies' locos. Price **12/6**



FOOTBRIDGE
No. 1. With detachable Signals Price **6/–**
No. 2. Without Signals ... ,, **3/6**
Signals only ... per pair **2/9**

HORNBY No. 2 TANK LOCO
Beautifully finished in colours to represent L.M.S. or L.N.E.R. Companies' locos. Fitted with reversing gear, brake and governor ... ... Price [illegible]

**Lettered L.M.S. or L.N.E.R.*

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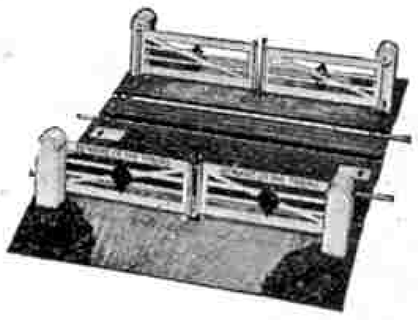
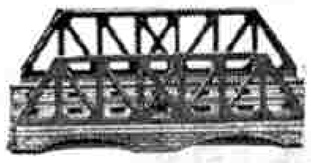
Dimensions: Height 6½-in., Width 3½-in., Length 6½-in. Finished in colour and lettered "Windsor." Roof and back open to allow signal-levers to be fitted inside cabin if desired.
Price **6/6**

RAILWAY STATION. Excellent model, beautifully designed and finished. Dimensions: Length 2-ft. 9-in., breadth 6-in., height 7 in. Price **12/6**

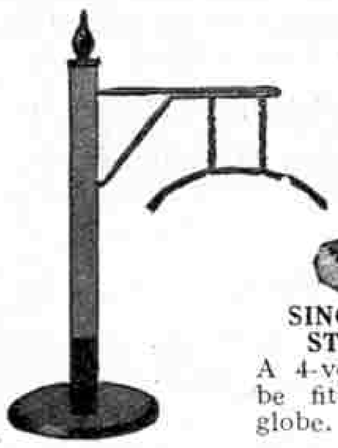


LEVEL CROSSING
Beautifully designed in colour. Measures 11½ × 7¼-in. with Gauge 0 rails in position.
Price **6/6**

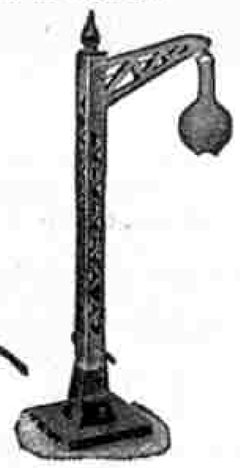
VIADUCT. Price **7/6**
ELECTRICAL VIADUCT. Price **8/-**



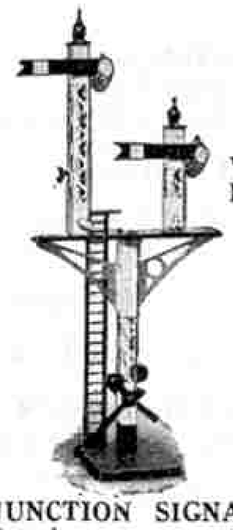
VIADUCT (Centre Section only) Price **4/6**
ELECTRICAL VIADUCT (Centre Section only) Price **5/-**



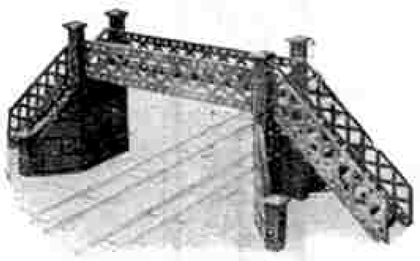
LOADING GAUGE
Price **1/9**



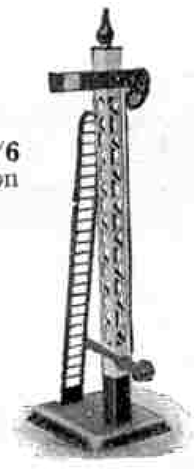
SINGLE LAMP STANDARD
A 4-volt bulb may be fitted into the globe. Price **3/-**



JUNCTION SIGNAL
Signal arms operated by levers at base. Very realistic model standing 14-in. in height.
Price **5/6**

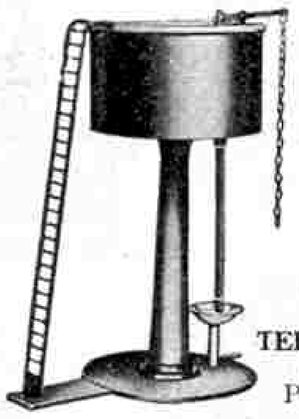


LATTICE GIRDER BRIDGE
Constructional type. Strong and well proportioned.
Price **10/6**



SIGNAL
Price **2/6**

DOUBLE LAMP STANDARD
Four-volt bulbs may be fitted into the globes
Price **4/-**



WATER TANK
Brightly coloured in red, yellow and black, 8½-in. in height, with flexible tube and pump lever.
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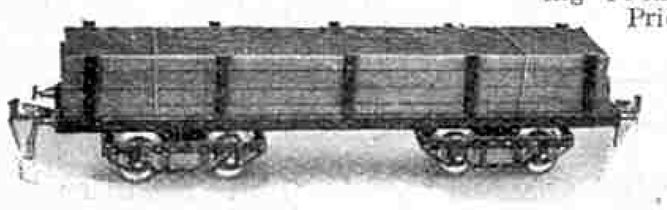
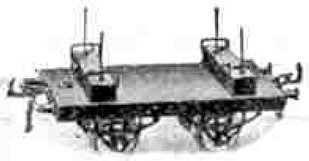
TELEGRAPH POLE
Price **2/6**



***No. 2 TIMBER WAGON**
Beautifully enamelled in green. Suitable for 2-ft. radius rails only ... ... Price **4/6**

No. 1 TIMBER WAGON
Beautifully enamelled in green.
Price **2/-**



***No. 1 LUMBER WAGON**
Fitted with bolsters and stanchions for log transport.
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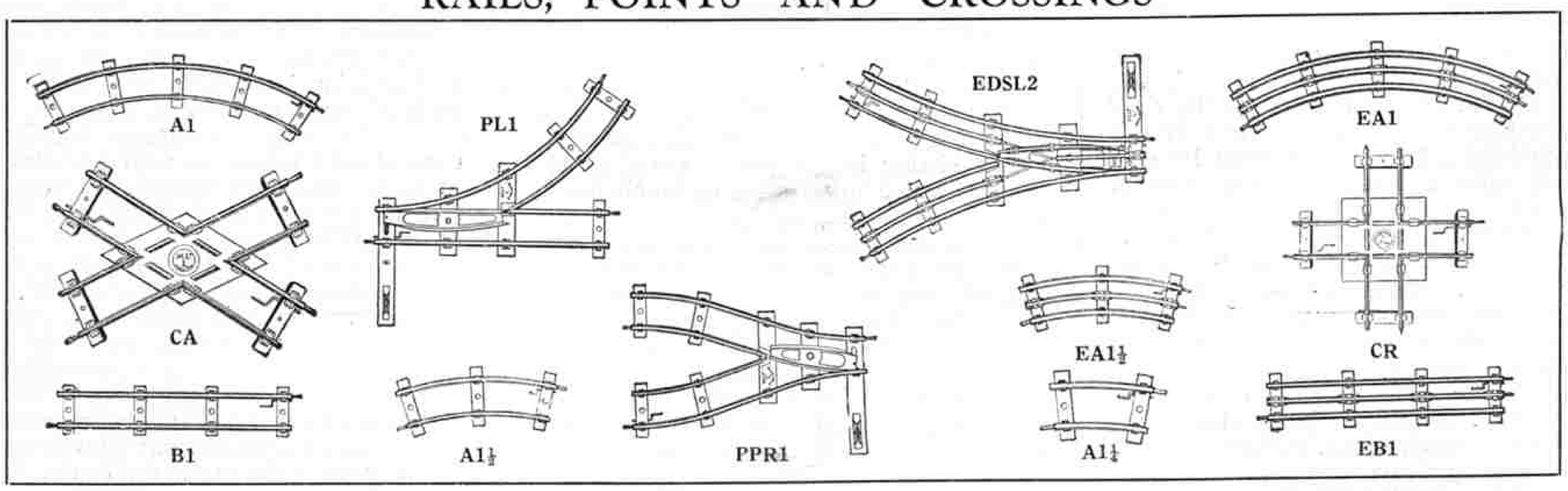
RAILS, POINTS AND CROSSINGS



Hornby Rails, Points and Crossings are built for hard wear and for smooth running. They are made of the finest materials and hold together rigidly and strongly, for real workmanship is put into them. Note the great superiority both in quality and appearance of the Hornby rails compared with other rails and note also the extra sleepers, giving added strength and steadiness to the track. All Hornby Rails, Points and Crossings are Gauge 0, 1¼″, and the Electric rails are fitted with a third rail for collecting shoe.

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Price 1/-
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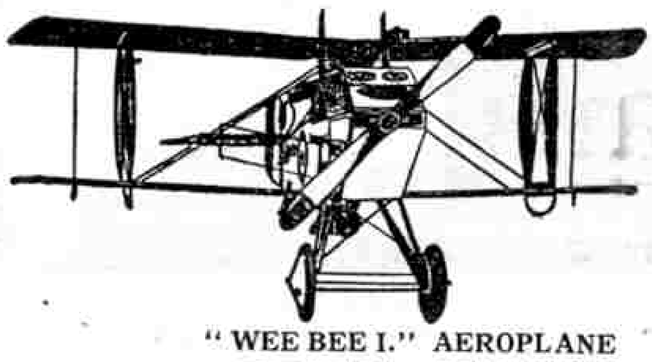

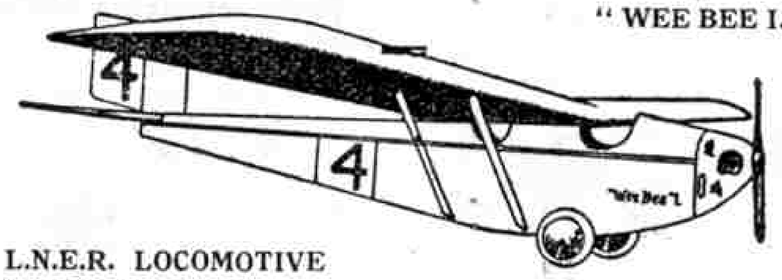

"WEE BEE I." AEROPLANE
A model with wooden propeller, elastic motor and correct to scale. (Span 21"). Set of parts and instructions.
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L.N.E.R. LOCOMOTIVE
Set of coloured cardboard parts to make this fine L.N.E.R. locomotive.
Price 1/-
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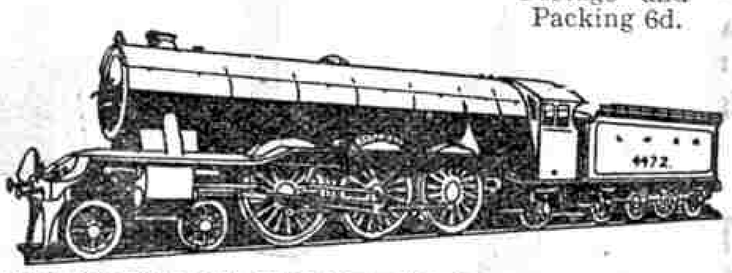
Above Three Models in Large Box Price 3/6 Post Free.



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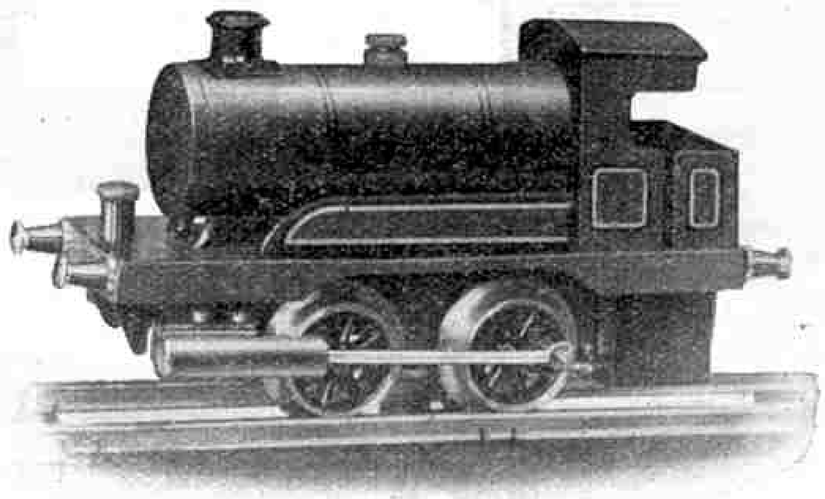

Fitted with **Brass Tube** Boiler with Safety Valve, etc. **Pair Brass Cylinders** with Lubricator with lid for oiling cylinders. **Correct Section** Cast Metal Loco Wheels with flanges and tread turned and polished.

Painted and lined in correct railway colours, **L.M.S.** or **L.N.E.R.**

Complete with Spirit Lamp and full directions as illustrated.

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These Engines can be run on the Hornby Rails, etc.
Send for one to-day.

CLYDE MODEL DOCKYARD
ARGYLE ARCADE, GLASGOW, N.B.

Lives of Famous Engineers—

(*Continued from page* 431)

abandoned. This loco had a cylinder 14½ in. in diameter with a stroke of 4 ft. and the scene at Euston is illustrated in the title block on page 430.

High-Pressure Stationary Engines

Trevithick did not confine his high-pressure engine to locomotives but adapted it to all kinds of purposes as opportunity arose. In 1803 he applied his engine successfully to driving rock drills and three years later he entered into a contract with the Trinity Board for dredging in the Thames. For the latter purpose he constructed steam dredging machines of the chain-and-bucket type. In 1809 he was engaged upon the first and unsuccessful attempt to bore a tunnel under the Thames, and when this scheme was abandoned he devoted his attention mainly to various schemes for the propulsion of ships.

Shortly afterwards Trevithick constructed a steam threshing machine and followed this by a steam plough. It is interesting to note that in 1812 he wrote a letter to the Board of Agriculture stating his belief that every branch of agriculture could be carried out by steam, and that such a use of the steam engine would "double the population of the kingdom and make our markets the cheapest in the world."

Adventures in Peru

In 1814 Trevithick became interested in a scheme for operating mines in Peru, and he constructed at Hayle nine pumping engines and shipped them to Lima. These engines proved very successful and late in 1816 he set out for Peru taking with him additional engines. He was received with the wildest enthusiasm on his arrival at Lima and it was actually proposed to erect a statue to him in solid silver! The War of Independence broke out, Trevithick's engine houses and pumping machines were smashed up and he barely escaped with his life.

After a terrible journey across country, during which he had many narrow escapes from death, he arrived at Cartagena in an exhausted and penniless condition. A remarkable meeting then took place. Robert Stephenson, who had been engaged as a mining engineer on the eastern slopes of the Andes, had arrived at Cartagena on his way home to England via New York. While sitting in the public room of the hotel at which he was staying, Stephenson's attention was attracted by a tall thin man, shabbily dressed and apparently in poverty. Stephenson saw at once that the man was English and on inquiry was astonished to learn that that was Trevithick. "Is that Bobby?" asked Trevithick, "I have nursed him many a time." Stephenson lent Trevithick £50 to enable him to complete his journey and eventually he arrived safely at his home in Cornwall.

Later Years

The story of Trevithick's later years is one of repeated disappointments. In spite of the proved value of many of his inventions these had brought him little or no profit, and his petition to Parliament for a reward for them was unsuccessful. Later he made attempts to induce the Admiralty to afford him facilities for demonstrating certain improvements in methods of steam navigation, but this endeavour also failed.

Trevithick died in poverty on 22nd April 1833 at the age of 62, without having succeeded in bringing about the general introduction of any of his inventions. As an inventor pure and simple he was extremely brilliant. He had a thorough knowledge of mechanical principles and he had the necessary courage to strike out on absolutely new lines. The cause of his failure may be attributed largely to the absence of that quality which brought about George Stephenson's rise to fame—dogged perseverance. Having perfected an invention Trevithick apparently made little attempt to press it forward to the stage of commercial success, but almost immediately began to turn his attention to some other invention. As was well said by Smiles, his whole life was "but a series of beginnings."

The value of Trevithick's work in regard to the steam locomotive has been seriously under-estimated and many of his original ideas were afterwards used by other inventors, who in some cases ultimately claimed them as their own. George Stephenson must always be regarded as the father of railways, but Trevithick was undoubtedly the father of the steam locomotive.

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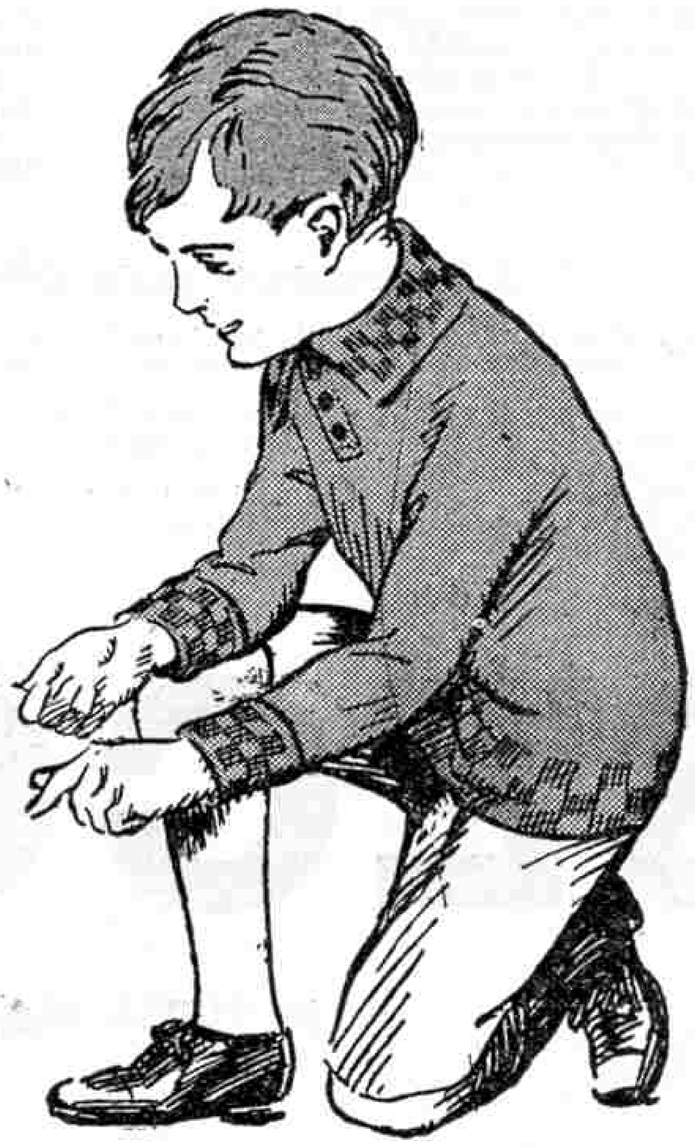

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The following are SOME of the uses to which Seccotine has been put :—

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Affixing fringe.
Repairing pipes.
Repairing glass shades.
Making glass boxes.
Making ash trays.
Mending shirt studs.
Mending pearl buttons.
Making ladies' belts.
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Mounting opalines.
Patching umbrellas.
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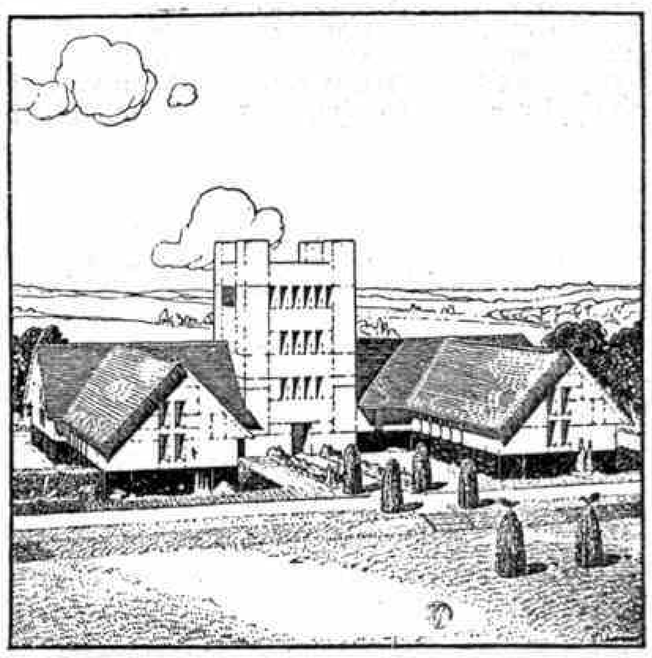
Box No. 6	,, 71 ,,	...	42/–



College Building. Boxes 3 and 4, or Boxes 1, 2 and 4

TUDOR BLOCKS

Box 1	(builds 6 Models)		3/6
Box 2	,, 12	,,	7/6
Box 3	,, 18	,,	21/–

KINDERGARTEN

Box 1	... 2/–
Box 2, 18 designs	... 5/–

GARDEN SETS

Box 1	... 4/–
Box 2	... 6/–

Containing Fences, Trees, Shrubs, Shells, etc.

SOME PROVINCIAL STOCKISTS

BIRMINGHAM – W. H. Hull & Son.
BLACKPOOL – J. Bateson.
BARROW-IN-FURNESS – Townson & Ward.
BROMSGRAVE – Shrimpton & Cooke.
BRISTOL – – Haywards Ltd.
,, – – Maison Stephens et Cie.
BOURNEMOUTH J. E. Beale Ltd.
CHELTENHAM – Pantoys Ltd.
CLACTON-ON-SEA H. D. Simmonds.
DARLINGTON – A. Lascelles.
DUNDEE – – Draffen & Jarvie Ltd.
DERBY – – Midland Drapery Co. Ltd.
EDINBURGH – Jenner's.
FOLKESTONE – Upton Bros.
GLASGOW – – R. Wylie Hill & Co. Ltd.
GRIMSBY – – W. A. Haw.
GLOUCESTER – Bon Marche Ltd.
HUDDERSFIELD Rushworths Ltd.
HOVE – – – M. & E. Dench.
KIDDERMINSTER The Castle Motor Co. Ltd.
LIVERPOOL – Lewis's Ltd.
LEICESTER – Midland Educational Co. Ltd.
LEICESTER – Robothams Ltd.
LEEDS – – A. Brown.
MANCHESTER – H. Wiles Ltd.
MAIDSTONE – W. E. Thorpe & Sons.
MARYPORT – Thomas Mandle & Sons.
NOTTINGHAM – Beecroft & Son.
NEWBURY – W. H. Smith & Son.
NEWCASTLE – Alfreds'.
OXFORD – – G. H. Sykes.
READING – – Heelas & Son.
ROTHERHAM – W. Cooper.
SWINDON – – Tompkins & Barrett
SOUTH SHIELDS Fowler & Brock Ltd.
SUNDERLAND – Saxon's.
SHEFFIELD – Wilson Gumpert & Co. Ltd.
SOUTHSEA – Handleys Ltd.
,, – – Percy Kiln Ltd.
WEYMOUTH – Pates Bros.
WORCESTER – E. Bayliss & Son Ltd.
WESTON-SUPER-MARE – – S. Coulsting.
WALSALL – – W. Sherwood Millar.
WOLVERHAMPTON – – Harris Bradley.

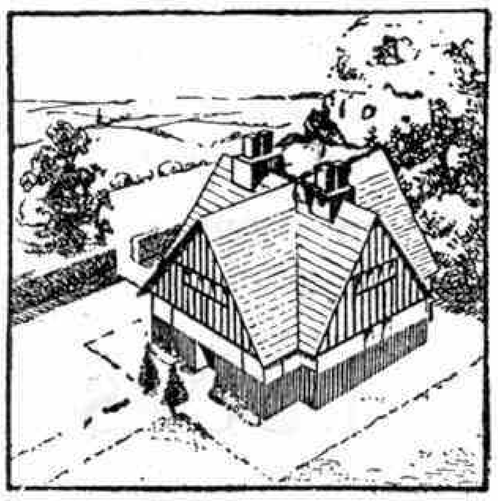
RESULTS JUNE AND JULY BRIDGE COMPETITION.

1st Prize
DEREK BROUGH,
WORCESTER PARK, SURREY.

2nd Prize
W. S. BERRY,
PUDSEY, YORKS.

1st Prize
JAMES WIGSTON,
LEVEN, FIFE.

2nd Prize
A. E. EVANSON,
POULTON,
WALLASEY (CHES.)



A Model from Box 2
Tudor Blocks

New Bridge Competition

We have pleasure in announcing a further competition for the construction of Bridges built of Lott's Bricks of artificial stone, and "Meccano." Any style of bridge may be devised. Drawings should show the various sized bricks and "Meccano" parts used. Those sending in selected designs may be asked to submit actual models, which would be returned.

The competition will be divided into two classes :

A. Over 16 years of age.
B. Under 16 years of age.

Three prizes will be awarded in each class consisting of Lott's Bricks to the value of £2/2/– 1st Prize, £1/10/– and 10/6 second and third prizes.

The Competition will close on Jan. 31st. Overseas Feb. 28th.

Model from Box OA
Signal Cabin

WRITE FOR ILLUSTRATED LIST AND NAME OF NEAREST AGENT

LOTT'S BRICKS LTD., WATFORD, England

THE AUTOMATIC PEA REPEATER

The most reliable pistol on the market. Takes 25 shots at one loading, best black finish, each in box with instructions and supply of ammunition, post free 2/3.
New model 17-shot Pea Repeater, black finish, post free 1/3.

R. DILNOT, 125, Chiswick High Rd., London, W.4.

THE WORLDS' LOCOMOTIVES portrayed on postage stamps. Unique Packet containing grand complete mint set 8 Honduras (all depicting locomotives) cat. 6/–, Transvaal (train), Uruguay (single-driver locomotive), Mozambique (train), Ecuador (locomotive), U.S.A. (mail train), Brazil (train), and 36 other superb stamps, many unused, making up 50 all different. Bargain price 1/–, post 1½d. extra. Unbeatable value.

D. P. SOAR, 65, Baxter Avenue, Southend-on-Sea.

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Obtain your supplies of Books, Collecting Apparatus and Specimens from

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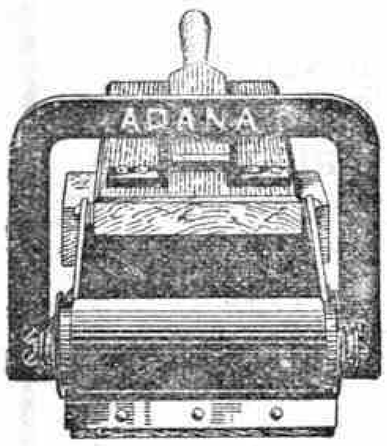
36, Strand, London, W.C.2. (P.O. Box 126).

'Phone: Gerrard 9451. Full Catalogue Post Free.

ADANA AUTOMATIC SELF-INKING

PRINTING MACHINE



45/-

COMPLETE PLANT

This massively constructed Printing Machine is the most wonderful of its kind, being sold at a tenth the price of any other of the same size with similar advantages. It is capable of turning out every class of printed matter

FROM A CHEMIST'S LABEL TO AN ILLUSTRATED MAGAZINE

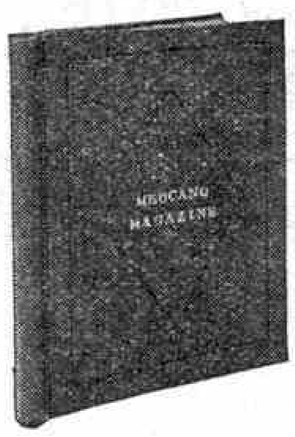
including Perforating, Creasing and Box-making. The finest malleable iron and mild steel used in its construction. Smooth running, speed, accuracy and simplicity are maintained to the highest efficiency. Standard printer's metal type, case and complete accessories, together with excellently illustrated instructional book, are included in the above-quoted price. Full illustrated particulars in two colours, together with samples of work, sent on receipt of a stamped addressed envelope.

THE "ADANA" AGENCY (Dept. M.M.)
34, King Street, Twickenham, Middlesex.

Most compact Printing Plant in the World.
Can be purchased by small weekly instalments. Ask for terms.

Bind your "*M.Ms.*"

In the advertisement columns of the "*M.M.*" a reader recently offered 2/6 per copy for certain early numbers of the "*M.M.*" in order to complete his file. This offer indicates the value placed upon the "*M.M.*" by some readers, and we suggest that you should see that your file of copies is complete. Keep the Magazines in the special spring-back binder illustrated here. This binder has a strong stiff back, holds a large number of copies, and keeps them neat and clean. Covered in black imitation leather, tastefully tooled, lettered gold, its price is 3/- (post free).



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training for 1/- per week.
(Text Books FREE.)

Big positions carrying large salaries are open to men with thorough business training. Acquire a sound knowledge of Commercial Arithmetic, Bookkeeping, Accountancy, Commercial Correspondence, and Business Training for 1/- per week. Elementary, Intermediate, & Advanced Courses. Send for full particulars to:—

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BOYS MAKE YOUR OWN LEAD SOLDIERS

Cowboys, Indians, Animals, Zulus, Model Station Staff, Rodeo, etc. Our CASTING MOULDS make thousands from any scrap lead WITHOUT PREVIOUS EXPERIENCE. Send stamp to-day for illustrated catalogue.
Complete mould ready for work 2/6
RODWAY, 102, Long St., Birmingham
Mention "Meccano."

MAKE GRAMOPHONES.

Our 64 page Catalogue tells you for **3d. how to do it** and what accessories to choose. **Motors** in 25 sizes, from **12/–**; Tone arms, **4/6**; Speakers, **2/6**; Headphones, **10/6** pair, Cabinets from **9/–**. Gramophones from **33/–**. Carr. paid.

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Gent.'s Solid Nickel Silver Pocket Watches.
THE "BRITON" LEVER.
Interchangeable Keyless Movement. Smart Dustproof Cases.
The only Watch with a **guaranteed Main Spring.**
2 Years' written warranty.
Satisfaction or cash refunded after 7 days' trial.

ESWEY WATCH CO.,
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7/6 Post Free

FOR THE HOLIDAYS

New 15 Shot Pea Repeating Pistol ...	1/3
The 25 Shot Pea Repeating Pistol ...	2/-
Plate Camera, with plates and developing materials, full instructions, Pictures 3½ × 2½ in.	1/3
Miniature Ice Cream Freezer. Makes real Ice Cream. Full instructions	2/6

Postage on each of above 3d.
Postal Orders or 1½d. Stamps accepted.
HERBERTS', 27, Adys Road, Peckham, London, S.E. 15.

1/6 THE BULLY BOY 1/6

The Pea Pistol you have been looking for! 20-Shot Repeater. Perfect action; fires a pea 25 feet; bright nickel finish; each in box with Ammunition. A better Shooter than you have ever had before. Send **1/6** and don't miss our latest and best pistol.
Foreign and Colonial postage 9d. extra.

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MECCANO DOUBLE HEADPHONES

(4,000 ohms resistance).
BRITISH MADE

British made and of the highest quality. Give loud, clear, undistorted reception and add greatly to the efficiency of any type of receiver. Comfortable to wear and easily adjusted. Only a limited number available.

Price, each 15/6 (post free).

MECCANO LIMITED LIVERPOOL

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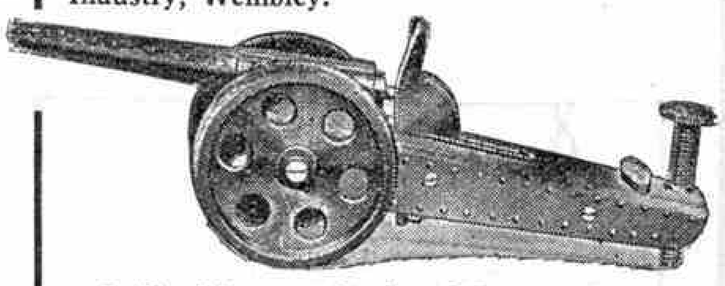
75 Shots cost 1½d.

7½ in. long.

This ingenious toy uses a Swan Vesta for ammunition which is secured in a charge chamber, thereby rendering the toy safe.
Effective with toy soldiers or target shooting. Can be seen and tried at our stand, Palace of Industry, Wembley.



Built of Bronze, Steel and Brass. A British toy, an engineering job. Spare parts obtainable.

4/9 post free.

Money returned if not approved. Trade inquiries invited.

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CYCLISTS! SAY GOOD-BYE to Retailers' inflated prices. Buy your Bike where it is made. Purchase your Tyres Wholesale, and save 30 per cent. For proof, write for our Gigantic 200 page Bargains Book. ABSOLUTELY FREE. Unparalleled value in Royal Winchester Cycles from 75s. Wonderfully Easy Payments. Tyres innumerable from 2/3. Chains 1/11, Horns 1/-, Puncture Cure 3d. Saddles 2/6. Thousands more surprises. Start buying better. The catalogue costs you nothing. Write NOW.—MOORHOUSE, LTD. Dept. 60, Padiham, Burnley.

Keep your Boys at Home with a Riley Billiard Table.

Send now for Price List

By sending **14/-** you may have a 6ft. 'Home' Table (Cash Price £11 15s.) delivered carriage paid to your door, and pay the balance in easy payments while you play. 7 days' free trial given. See price list for various sizes and designs.

E. J. RILEY LTD., Deal Works, Accrington. ⊕ 5.1.

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Something you will want very soon.

Hobbies 1926 Catalogue, 9d,
with free design of
Cabinet Bookcase
(Now Ready) Post free 1/–

Doll's House Paper,
Brick, Roof, Tile, Lino and Wall.
Beautiful designs.
Samples post free 2d.

Send post card for Free List of Ship Fittings and Boats.

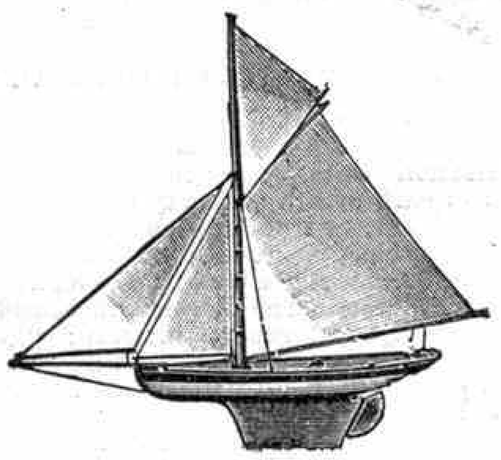
READY SHORTLY:
Our new wireless price list (sent free).

C. LUCAS

Agent for
Hobbies Ltd., Meccano Ltd., Bassett-Lowke Ltd., Stuart Turner Ltd.
35, Manchester St., Liverpool

This Space is set to ½ inch s.c. and costs 5/- per month. This sum is the 64th of £16, the price of a whole page advertisement. Over 50,000 copies of the July number were distributed all over the world. You therefore reach this exclusive public for about one penny a thousand.

KENSINGTON MODEL DOCKYARD



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ELECTRIC & MECHANICAL TOYS
CINEMATOGRAPHS CAMERAS
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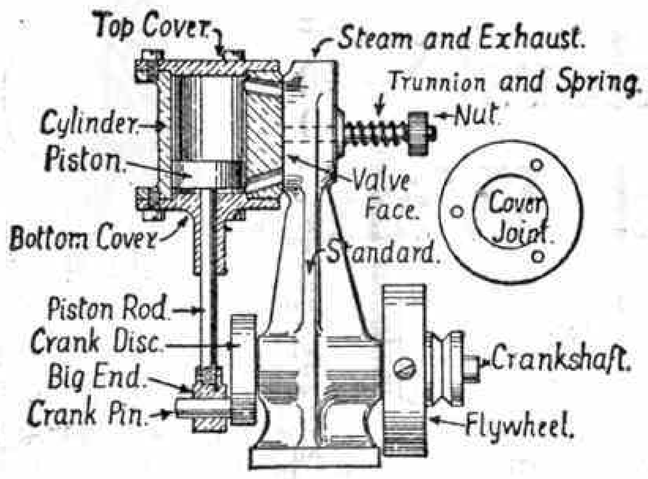
OUTDOOR SPORTS FRET OUTFITS
AIR GUNS FISHING TACKLE
HORNBY TRAINS
MECCANO OUTFITS & PARTS
Always in Stock.

Send 1½d. Stamp for List "M."

C. H. LORBERG
185, Kensington High St., London, W.8.



The only Engine in the world you can build yourself and absolutely guaranteed to work perfectly.

This is due to first-class materials and extremely accurate machining.

The engine has therefore plenty of power.

A customer writes:—

"Thank you for sending the S.T. Boiler. The engine, bought at Wembley, was soon coupled up and ran perfectly. My little boy was so pleased to see that it was powerful enough to drive a Meccano Crane."

S.T. Engine Parts ... 5/- } *Post*
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Send stamp for list 12M or 6d. for complete "Engine" catalogue, 80 pages.

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EDINBURGH AGENTS for MECCANO and HORNBY TRAINS
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Boys!—

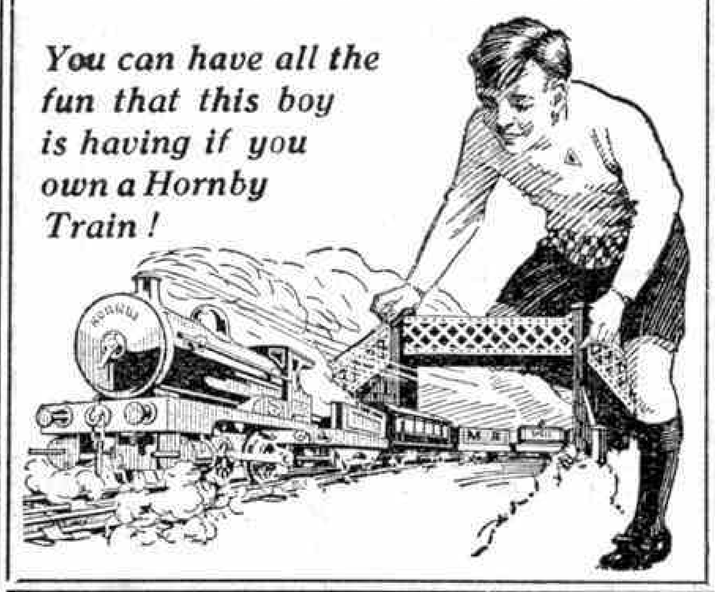
Have a Railway Centenary on your own! You can have a real miniature railway of

HORNBY TRAINS

for every part is the real thing. There are over 50 different Hornby Trains and accessories and you can get them all from the

Arundel Cycle & Sports Stores
"The Hornby Train Shop"
58, CHURCH ROAD, UPPER NORWOOD, S.E.19

You can have all the fun that this boy is having if you own a Hornby Train!



ROLLER SKATING BOOM

Fine Weather, Fine Roads, & Fine Quality Skates at the **lowest prices** in the trade, have all combined to create a **record demand** for **ROLLER SKATES.**

They provide **ideal outdoor exercise** for growing **boys** and **girls**, and to use the words of one of our delighted customers,

"They are a joy to own and a pleasure to use."

No. 3 with Threaded Clamps and Case-hardened Steel Wheels are only **5/-** pair
No. 5 with best Ball-bearing Wheels, **10/-** "
No. 6 " " " and Block Heels, as illustrated **11/-** "
Postage and Packing 9d. per pair extra.

Send at once to
Bateson's Sports Depôt, Blackpool

BUY YOUR HEAD-PHONES DIRECT.

The World's Best Headphones Guaranteed

Specification.—4,000 ohms. Adjustable Diaphrams. Double leather covered Head Springs. Heavily nickelled. Made throughout of the finest quality materials. Diaphrams cannot be over wound. Each pair in separate box.

Twelve Months' Guarantee.

Test them on your Set.

Compare them with others costing Treble, if not found superior we refund deposit in full, plus postage.

Sent on receipt of 2/6 Deposit and three further Payments of 2/6 each.

Do not pay more.

Obtainable only from
H. B. FOSTER & SON,
170, Garratt Lane, S.W.18.

THE GENUINE SYSTEM.

BE TALLER!

Results Speak for Themselves.

THE ROSS SYSTEM OF HEIGHT INCREASE

Has increased my own height to 6 ft. 3¾ ins.

FIRST IN 1907. FIRST TO-DAY.

No appliances, no drugs, no dieting.

ROSS SYSTEM NEVER FAILS.

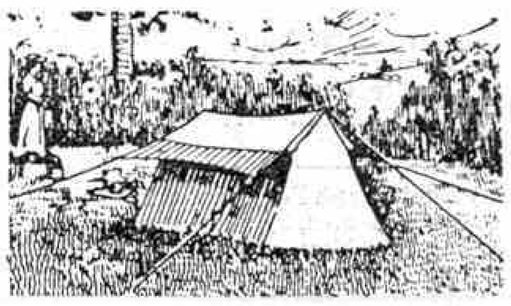
Fee :—ONE GUINEA complete.

A Client, aged 37, reports : "I have increased my height nearly an inch, and I have not been a full month yet!"

Lady writes (after 5 weeks) : "I have grown two inches, and feel much better. Thanking you for your Treatment, which I found a wonderful success."

Further particulars, if desired, 1½d. stamp.

(N.) Malcolm Ross, Height Specialist
40, Victoria Rd., Scarborough, Eng.



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Also Sleeping Bags as supplied to Mount Everest Expedition.
Send 3d. Stamp for List.

LIGHTWEIGHT TENT CO.,
(Dept. M.M.)
70, High Holborn, LONDON, W.C.1.

Readers' Sales and Wants

If you have anything to sell or wish to buy anything take advantage of the service offered by a small advertisement in these columns.

The "*M.M.*" is read by approximately 100,000 people every month. It circulates in every country where the English language is spoken. If you wish to sell your duplicate stamps, your rabbits, or your tools, or to purchase a loud speaker, a steam engine, a model yacht, or a hundred-and-one other things, you will be able to do so through the columns of the "*M.M.*"

The rates are one penny per word, with a minimum of 1/- (cash with order).

Your advertisement must be received before the 10th of the month for insertion in the following month's issue.

If a Box Number is used, 4d. should be added to cover the cost of postage of the letters to the advertiser from this office. The letters will be posted one week after the advertisement appears, and a second batch a month after the advertisement appears. They will be sent more frequently if additional postage is included with the advertisement.

IMPORTANT.—Advertisements dealing with any article in the Meccano catalogue cannot be accepted.

READERS' SALES

(*Rate: 1d. per word, min. 1/-*).

Fellow readers! Owing to moving, all my private possessions are offered at ridiculous prices for quick sale. Musical, Electrical, Books, Cinema Films, etc. I must clear everything. Send postcard for list.—John Appleby, 59, Fairmount Road, Brixton, London.

415 Cigarette Cards and Small Album, 6/6.—Apply, Sidley, Mendip Lodge, Clevedon.

500 Cigarette Cards, 1/- for 50.—Alan Bradfield, 77, St. Clements, Oxford.

Miniature Railway, gauge 00, three engines (one new), four passenger coaches, two guard's vans, two stations, tunnel, buffers, signal box, signals, engine shed, about 85 curved and straight rails, three points, diamond crossing. Price 32/6.—Jerram, 63, Boundary Road, E.13.

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Railway Photographs. Scottish Locos. Specimen free for postage.—Cunningham, The Glint, Annan.

Meccano Magazines, back numbers from No. 8 (Dec. 1918) to No. 27. What offers?—Harmar, Pasture Farm, Gilberts Green, Hockley Heath.

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(*Rate: 1/- per line*).

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CINEMATOGRAPHS fitted rewind and acetylene. Film library. Second-hand bargains.—Pictures, 109, Kenlor Road, Tooting.

FREE. Stamp Albums, Send Stamp to-day. Tepan, 25, Bedford Row, Glasgow, C.5.

CINEMA FILMS, Machines, Accessories; 100 ft. film and lists 1/-. Stamp brings Wireless list:—J. Humphreys, 40, Davenant Road, London, N. 19.

"Dixie" Cycle Lighting Dynamos easily made by any boy, without lathe, castings, etc., at cost of ordinary oil lamp. Full plans and instructions, etc., with complete armature windings—**2/6** post free. **DEBCO, Engineers, 6, Loampit Vale, London, S.E. 13.**

Clean Cigarette Cards wanted, issues before 1920. Also Foreign, Colonial.—Wallis, Riddings, Alfreton, Derbyshire.

Railway Photograph Postcards of Engines and moving trains of all Companies, 2/6 per dozen. Sample and list 4d.—Norman Embley, "Westcliffe," Lytham.

CUT THIS OUT. **'Meccano' Pen Coupon, Value 3d.**
Send 5 of these coupons with only 2/9 direct to the **Fleet Pen Co., Fleet Street, E.C.4.** You will receive by return a splendid British 14-ct. Gold Nibbed Fleet Fountain Pen value 10/6 (Fine, Medium, or Broad Nib). If only 1 coupon is sent the price is 3/9. 3d. less for each extra coupon up to 4 (Pocket Clip 4d.) Satisfaction guaranteed. Your own name gilt letters, either pen 1/- extra. **Lever Self-Filling Model with Safety Cap, 2/- extra.**

STAMPS FOR SALE

(*See also page* 454)

FREE.—50 Different Hungarian Postage, 1½d.—Howell, 20, Trilby Road, Forest Hill, London.

STAMP APPROVALS. Fine selections at lowest prices. About 1,000 foreign at ¼d., Colonials from ½d. —Wyk, Bolehill, Flixton, Manchester.

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200 DIFFERENT, including 100 unused or grand set of 50 different Czecho Slovakia to approval applicants enclosing 1½d. postage. Guaranteed best and cheapest selections.—A. Clarke, 2, Esplanade, Dover.

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BIG BARGAIN. 250 Stamps including Nigeria, Rhodesia, Mauritius, Malay Straits, Cape, Natal, Bulgaria, Finland, Persia Straits, Angola, Cape Verde, Guiné, Poland, post free, 6½d. 5 Cochin included if approvals required.—Morris & Co., Stamp Dealers, Bletchley.

100 DIFFERENT STAMPS FREE. Send for ½d. approvals.—Cox, 135, Cambridge Road, Seven Kings.

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50 FREE
to approval applicants, including Gueden, Holland and Rupee India. 25% discount. **Cheap Sets**—Denmark, Holland, Dutch Indies, China, Portugal, Belgium, France, India. **Packets.** 50 6d., 100 1/-, 250 2/6. No rubbish. **Betts, 49, Durham Rd., London, S.W.20.**

"THE PHILATELIC MAGAZINE," 46, Victoria St., London, S.W.1. Best stamp newspaper. Order from your newsagent. 3d. fortnightly, or send 4d. for specimen and bonus form worth 2/6. Album catalogue free.

YOU WILL LIKE THIS—FREE. 100 diff. picked stamps, including British Colonials, N. & S. American, China, European, but NO NEW EUROPE. To applicants for my famous Approvals, including stamps from ½d., and enclosing 1½d. for postage.
Fleming, St. Winifred's, Christleton Road, Chester.

APPROVAL SHEETS Colonial and Foreign
Take any 1/- worth for 6d. Take any 7/6 worth for 2/6
" " 2/6 " 1/- " " 20/- " 5/-
Free packet including war and mint to first Twenty applicants mentioning "Meccano Magazine."
Miss M. Saunders, 16, Kent Road, East Molesey, Surrey.

OPPORTUNITY NOT TO BE MISSED
Bargains for all. Giving up approval business. Whole stock to be cleared in packets of 250 unpicked. Price 1/- postal order. Worth up to 10/-.
SCOTT, 154, Wellesley Road, ILFORD.

MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICES:—
BINNS ROAD, LIVERPOOL.
Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 3d. per copy. It will be mailed direct from this office, 2/- for six issues and 4/- for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest; payment will be made for those published. Whilst every care will be taken of those submitted, the Editor does not accept responsibility for any loss or damage. A stamped addressed envelope should be sent where the contribution is to be returned if unacceptable.

Binding Cases. Spring-back Binders to take a number of "*M.M.'s*" are supplied, covered with imitation leather and lettered in gold, price 3/- each (post free).

Meccano Writing Pads. Fifty sheets of tinted bank paper, each printed with Meccano boy at head, 1/- (post free) large size, and 6d. (post free) smaller size.

Advertisements

Readers' Sales and Wants. Private advertisements (*i.e.*, not trade) are charged 1d. per word, minimum 1/-. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/- per line (average seven words to the line), or 10/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest circulation figures, will be sent on request.

Press Day, etc. Copy must be received not later than 10th of each month for publication in following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of not less than half-an-inch.

Voucher Copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 4d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Obtaining the "*M.M.*" Overseas

Readers Overseas and in foreign countries may order the *Meccano Magazine* from regular Meccano dealers, or direct from this office. The "*M.M.*" is sold Overseas at 3d. per copy, or mailed (post free) direct from Liverpool, 2/- for six issues, or 4/- for twelve issues.

IMPORTANT.

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the home market. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms.

CANADA: Meccano Ltd., 45, Colborne Street, Toronto.
AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
NEW ZEALAND: Messrs. Browning, Ifwersen Ltd., P.O. Box 129, Auckland.
SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis St., Johannesburg.

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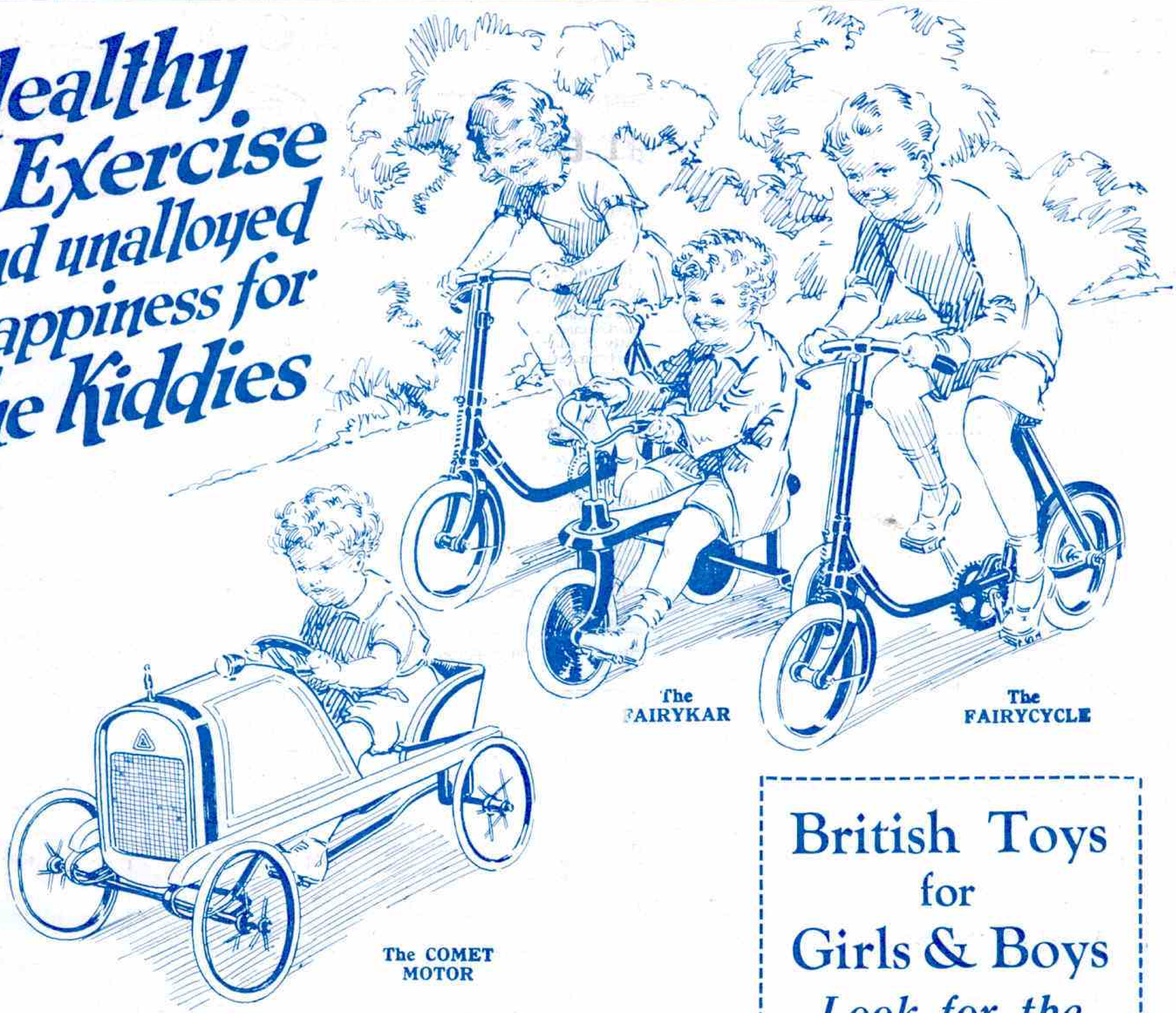
Healthy Exercise and unalloyed Happiness for the Kiddies



The COMET

This natty little racing model is the very thing for the youngsters. It is built for sturdy boys and girls, and will stand any amount of rough wear. The double crank movement makes it very speedy. For ages 2½–5 yrs.

Only **27/-** each

with wired-on rubber tyres. Many other models up to enclosed Saloons with ball-bearing pedals and balloon size tyres.

The FAIRYKAR

Regd. Trade Mark.

Baby will love this Pedal Fairykar. There is nothing to beat it. It is beautifully painted a bright red with nickel-plated handle bar and stem, rubber pedals, etc. A splendid health-giving toy.

Size 4, **15/-** Size 5, **22/6**

The FAIRYCYCLE

Regd. Trade Mark.

If only you had a Fairycycle just think what fun you could have, and what splendid exercise you would get in riding it. The Fairycycle is a real Cycle—not a make-believe. It is beautifully constructed, and runs with remarkable ease, and is SAFE because the low riding position makes it easy to control, and it is BRITISH.

BE SURE YOU RIDE A FAIRYCYCLE

49/6

Usual Standard Model also with ⅞" Ribbed Cushion Tyred Ball-bearing Tangent Spoke Wheels, De Luxe Model, 61/6

British Toys for Girls & Boys

Look for the Triangle Trade Mark. It is your only guarantee!

L. BROS. LTD. LONDON BROS ENGLAND

OBTAINABLE FROM ALL GOOD TOY SHOPS

Sole Manufacturers:

LINES BROS. LTD., 9, Fore Street, LONDON, E.C.2.

Are *You* Ready for Football?

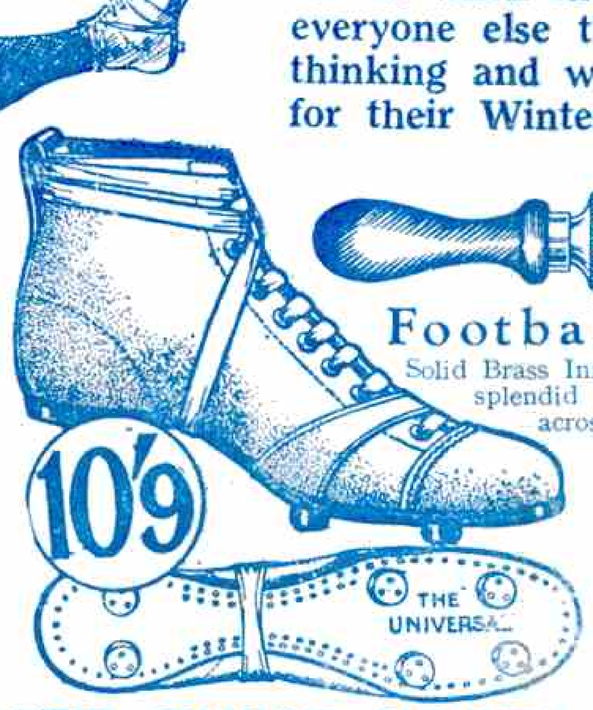
GAMAGES

have been preparing for months so that you could be best served when the time came. All through sultry Summer months, when everyone else thought of Cricket and Holidays, Gamages Experts were thinking and working—considering what Britain's Youth really wanted for their Winter Sports. Is it surprising, therefore, that Gamages can serve you better for your every need?

Write NOW!

If you would have a copy of the splendid handbook that Gamages have prepared! 30 pages, some of them in colours, are packed tight with every need for Football (Soccer and Rugger), Hockey and every Winter Sport. Club Secretaries and Sportsmen all over England are writing for our lists. If requests continue at the same rate we shall soon be compelled to draw upon the supply reserved for "Meccano Magazine" Readers. A postcard is all that is necessary and this splendid List is yours.

It Comes Post Free!!



GET THESE BOOTS

The Universal Football Boots. Uppers of Finest Quality Brown Russet Leather, Solid Blocked Butt Leather Toes.

A BOOT WITH A MOVE IN IT.

Made to stand the wear and tear of a whole season and to ensure greatest possible comfort whilst playing.

Men's Sizes, 6–11 per pair **10/9**
Youths' Sizes, 2–5 ... per pair **9/9**
Boys' Sizes, 11–1 ... per pair **9/3**
Post 9d.

Football Inflators

Solid Brass Inflators (only one of Gamages splendid range), 6½" long × ⅞" across. Post 3d. Price **1/-**

Football Equipment

BOYS' JERSEYS. Vertical Stripes, from **3/-**, Halves, from **3/3**, Aston Villa, from **3/-**, Manchester United, from **3/3**. Other Colours always stocked.

SHORTS. White Twill Shorts, Elastic Waist. Boys' sizes, per pair, **1/11, 2/9, 4/3.** Navy, **2/6, 3/-** and **4/6.**

STOCKINGS. Hose for football, coloured stripe tops. Boys' sizes, pair **1/9, 3/-, 3/9** and **4/6.**

Shin Guards

All first-class footballers wear Shin Guards—follow their example and play with greater confidence. Cane protected.

Made of American Cloth, Linen lined ... **1/-**

MATCH BALLS

A good hard-wearing ball, suitable for Junior Matches. Handsewn. Fitted with best red rubber bladder. No. 4, **12/6** No. 5 Match **13/6**

If you need your football to stand the wear and tear of a whole series of matches, make sure that it is a Gamage Defiance. Unbeaten by balls at far higher prices.

and Indoor Pastimes too!

Box Games, Table Tennis, Chemical Cabinets. Anything that you want to help you while away the long Winter evenings is here. We carry a full stock of Meccano Accessories and Sets, and there is always a full Hornby train system in full working order.

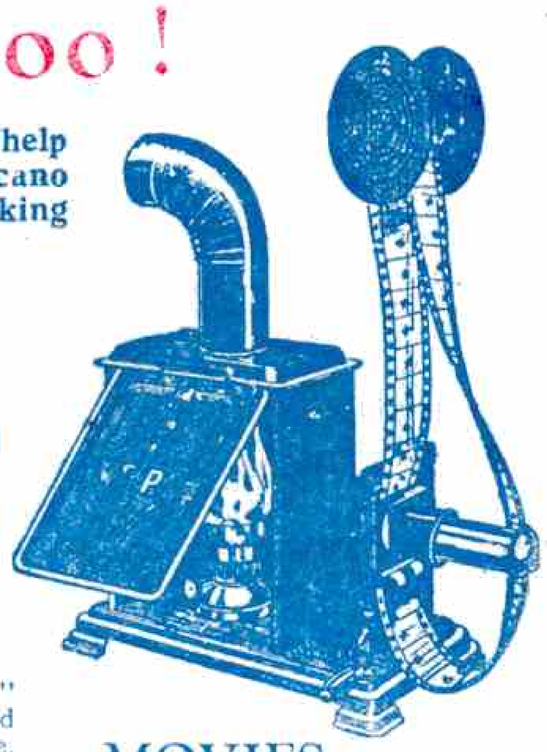
CHEMISTRY

Take up Chemistry as a hobby! Not the stuff you learn at school, but really interesting chemical experiments, carried out the Statham way. Set to carry out 50 experiments, complete with all apparatus. Post 6d. **3/3**

Electric Model Locomotive

L.N.W.R. George V. Type

The "George the Fifth," the most popular of the 4–4–0 engines is considered to be the "premier" locomotive of England's "premier" line. Frames and super-structures are made of best tinned steel plate, stamped out with powerful press tools. The Motor is of the permanent magnet type, which can be automatically reversed from the track. Voltage 4–5. Enamelled and lined in correct L. & N.W.R. colours. Gauge 0—1¼". Length of locomotive including tender 16¾". Price **36/-**



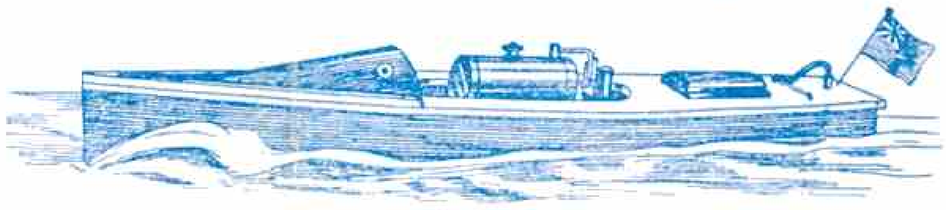
MOVIES IN THE HOME

Think what it means, you can see the films that *you* want shown, and **SAVE ENTRANCE MONEY.** What you save in that way will soon pay the cost of the Cinematograph. Can be used for either films or slides. Cinema as illustrated. 7" high, including chimney, with 1 film and 1 slide. **5/6** Post 9d.

Extra Films—36', **1/-**; 72', **2/-**; 150', **3/6**. Coloured Circular Band Films, 40" long, **1/-**; shorter ones **7½d.** Extra Slides **8d.** per doz. Acetylene Lamp, giving better light, **3/6**.

Ever tried Conjuring?

Ever so easy with the right things and a little practise. A fellow who can conjure gets a fine time. Invitations to parties, etc., that he would never get otherwise. This fine set will put you on the way. All the apparatus and instructions for several mystifying tricks. Only **3/-** Post 4d.



GET THIS FINE STEAM LAUNCH

The Motor Hydroplane "Maple Leaf V."

The hull of "Maple Leaf V." is constructed of selected Yellow Pine and has mahogany spray hood and deck fittings. Brass Rudder Tiller and Rack and strong Wire Guard to protect the brass propeller. Enamelled in a beautiful shade of green, the Hood, Deck and Fittings being varnished. 26½" long. Fitted steam engine and boiler. "Maple Leaf V." will run for 30 minutes and cover a long distance. Price, Post Free **22/6**

A. W. GAMAGE LTD., HOLBORN, LONDON, E.C. 1.

City Branch: BENETFINKS, CHEAPSIDE, E.C. 2.

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