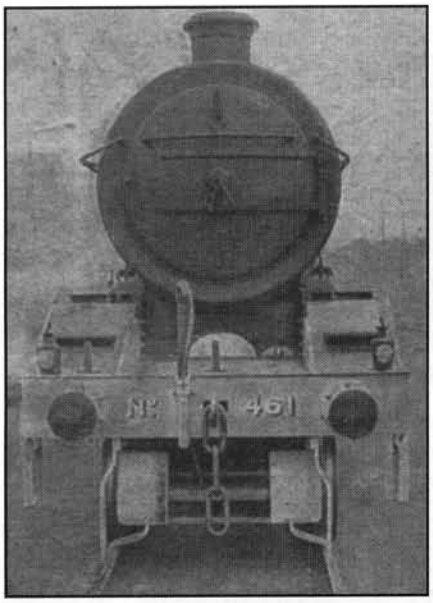
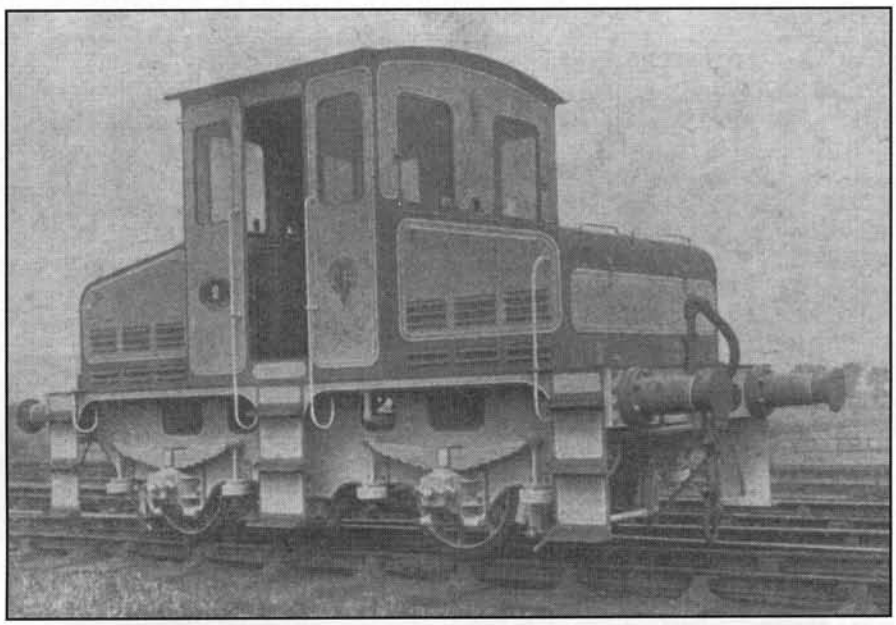


NEW 3-CYLINDER GNR LOCOMOTIVE.

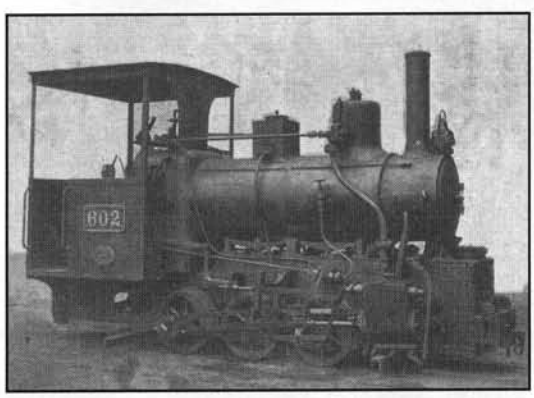
1918:NEW 3-CYLINDER G.N.R. LOCO.

There has been completed, at the Doncaster Works of the *GNR* a new locomotive of the 2-8-0 type, having three single expansion cylinders and a special form of valve gearing. The company already has five 2-8-0 engines in service. These, however, are of the two-cylinder pattern with the third pair of coupled wheels as drivers, whereas in the new locomotive the second pair of coupled wheels are utilised for driving purposes with the additional cylinder inside the frames operating the crank-axle. *Walschaerts* gear is used for actuating the piston valves. The gears are directly applied to the outside cylinders, which have their valves mounted above them, whilst the inside steam chest is placed on the left-hand side of the cylinder. The piston valve of the inside cylinder is operated by a system of levers direct from the two outside valve gears. In its simplest form, that is when the three piston valves are in the same plane, *Mr. Gresley* uses only two levers to operate the central valve. Owing to the inclination of the cylinders in this engine, it was not possible for the inside piston valve to be above its cylinder, and the valve gear is therefore not quite so simple. Instead of horizontal levers operated directly from the outside cylinders, vertical levers are used and worked from motion shafts connected to the *Walschaerts* gearing. To one of the outside valve spindles is attached a 2 to 1 horizontal lever working about a fixed fulcrum. The longer end of this lever is attached to the valve spindle and the shorter end is attached by a pin to the centre of the second lever, the ends of which are attached to the other outside and centre valve spindles respectively. This second lever has therefore a moving fulcrum. By this simple arrangement the movements of the outside valve gears are correctly reproduced and timed for working the central valve for all positions of cut-off both in forward and backward gear. The boiler is identical to those of the five of the same general class. The cylinders are 18 by 26ins., tractive force 32,605lb. **(Once again, history in the making, although only one of this conversion was made, it proved the viability of the system and in 1921 a batch of 02 class 2-8-0's were started with the simplified version of the conjugated gear, which was fitted to all subsequent *Gresley* 3-cylinder engines. From the side it's almost identical with the two cylinder O1, only the change of drive to second pair of coupled wheels and the additional linkage gives it away. The article, [39/1] is worth reading in full, it has photos of the cylinders and drawings of the gear. Everything you always wanted to know about conjugation, but never dare ask).**

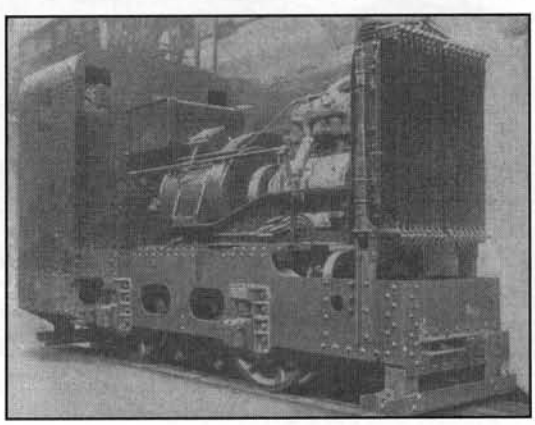
A rather neat electric shunter, (which would make a rather nice model). The 0-6-0 came from *Andrew Barclay*, and was one of a large variety of locos originating from the UK, France, and USA. One of which, *Mountaineer*, is still going strong on the Festiniog). The petrol-electric was built by *Messrs Dick, Kerr & Co., Ltd.,* and again, was one of several I/C types, including *Simplex of Bedford.* (Some of which found service after the war, on industrial narrow gauge lines. (One of these was at Leighton Buzzard, 2¼ miles of which has survived as The *Leighton Buzzard Railway*, with a variety of preserved locos. One of the W.D. Simplex's survived until 1955. The line still has *Simplex's* on their roster, but of later vintage).



New Electric Shunting Locomotive, L & Y.R.



Narrow gauge locomotives FOR USE ON THE 60 cm. gauge light railways in France. Having a total weight of nearly 6½ tons, this loco had during it's tests to be able to ride over steel bars 1-inch diam. placed at intervals across the rails, without derailing.



A 60 cm. gauge petrol-electric locomotive with panelling removed, built for service abroad.

1919: THE WRITER AS A VOLUNTEER ENGINEMAN. At the outbreak of the rail strike, *Mr.Lake* volunteered as an engineman on the *GWR*. Initially as a fireman, and then as a driver, he worked for the 9 days of the strike. The work was unusually hard, as much of the work normally done by the shed staff had to be done by the amateurs entirely. Thus, they had to coal and water the engines prior to a trip, and clean and dump the fire on reaching the sheds. On two successive nights, it was 1 a.m. before they could book off.

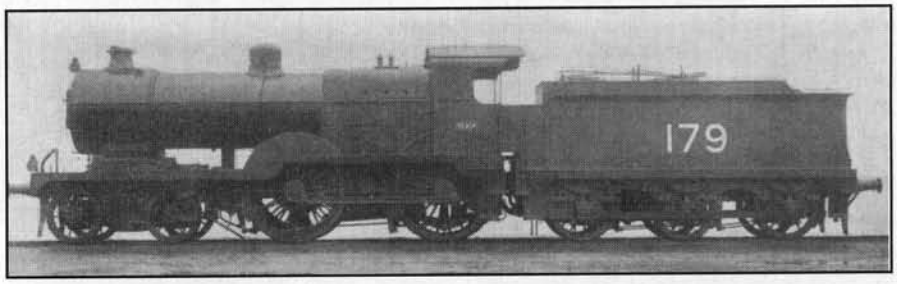
1920: There was a lot of interest in different types of fuel, such as oil and pulverised coal at this time, and several of the companies were carrying out experiments.

The SE&CR requiring more power for their boat trains, and the L series 4-4-0's being too heavy for that section of the line, *R.E.L. Maunsell* had rebuilt some of the E series *Wainright* locos with superheaters, enlarged the firebox and grate area, and changed from slide to piston valves. The increase in weight is only 5cwt but the increase in power has been such that ten more are under construction, to be followed by a further ten.

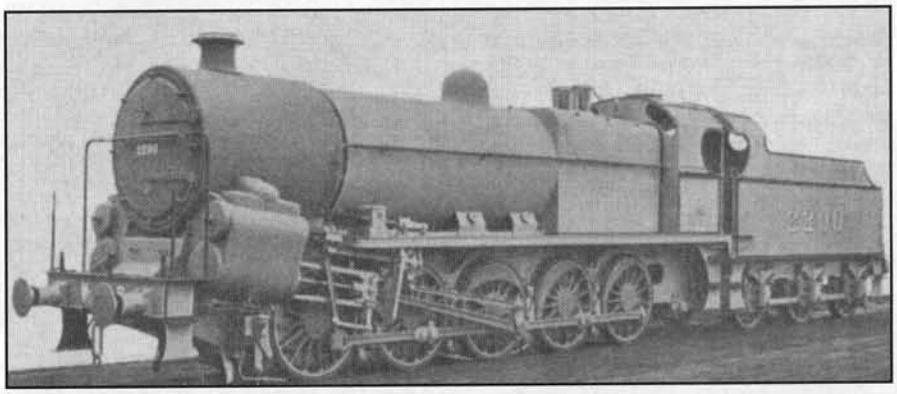
Sir Henry Fowler has introduced a new 0-10-0 banking engine for the Lickey Incline. It has four cylinders and Walschaerts valve-gear. The cylinders are 16¼ by 28 ins., pressure 180lb, tractive force at 85% pressure, 43,312lb.

An updated version of the "Director" class on the *GCR* has been introduced with a new type of cab and other modifications. The first of the series is No. 506 "Butler-Henderson". They are also at present building some new 4-6-0 engines of the four-cylinder "Lord Faringdon" class. The engine illustrated, No.1165 bears the name "Valour" in commemoration of the *GCR* employees who lost their lives in the late war. The cylinders are 16 by 26ins. with piston valves actuated by *Stephenson* link motion, wheels 6ft. 9ins., pressure 180psi.

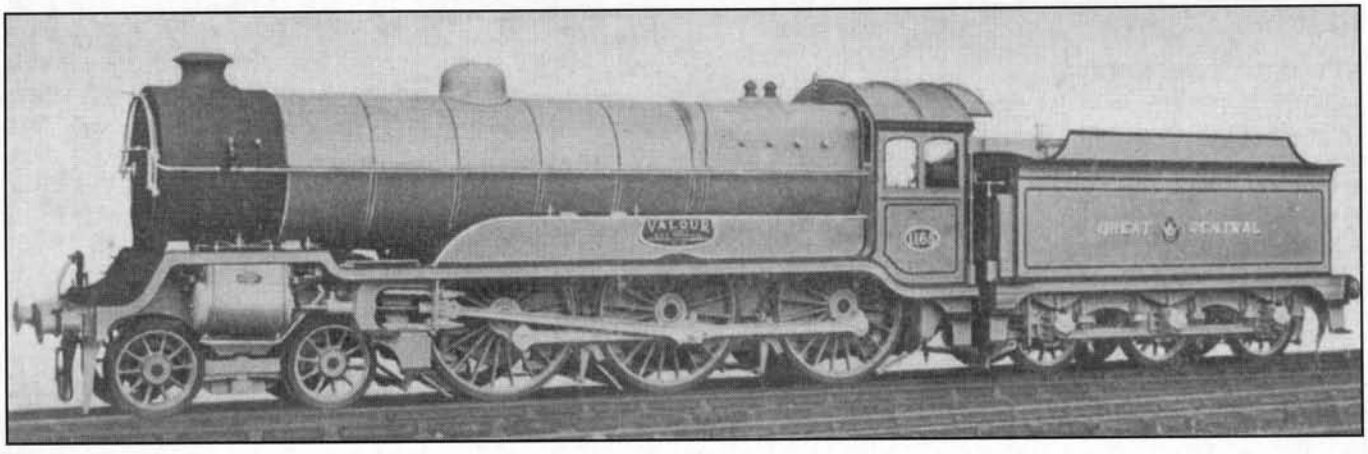
C.S. Lake on the Footplate of a G.W. Railway 2-6-0 Type Engine.



The SE&CR Superheater Locomotive recently Rebuilt by Beyer, Peacock & Co., Ltd.



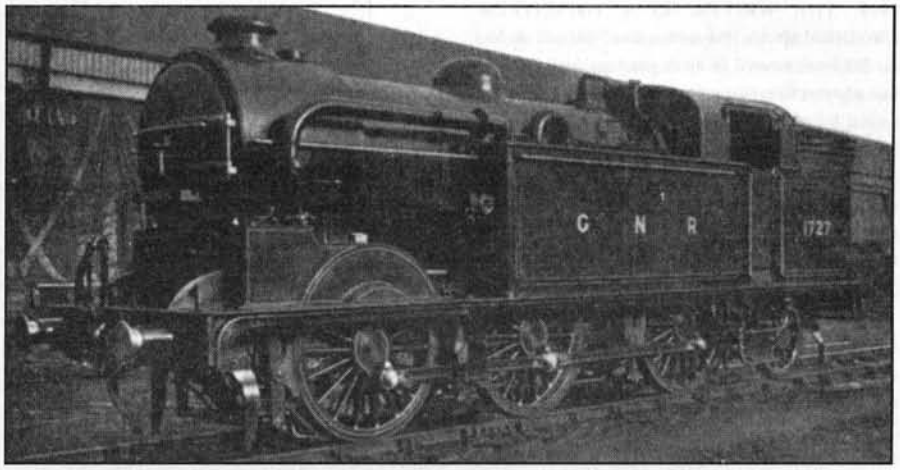
The New Midland Railway 0-10-0 Banking Locomotive.



New 4-cylinder 4-6-0 Express Locomotive "Valour", Great Central Railway.

1921: NEW 0-6-2 TANK LOCO; GNR.

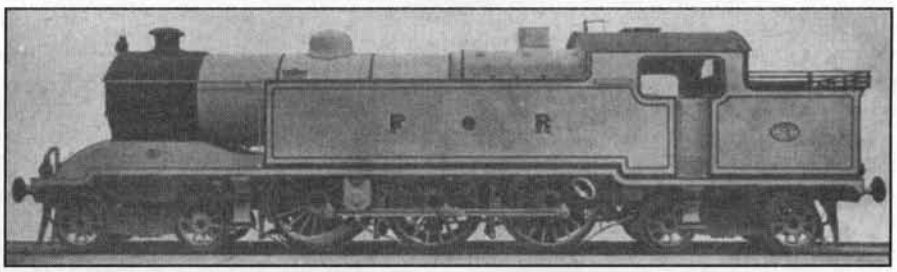
Mr.H.N. Gresley has introduced new passenger tank engines for working suburban trains in the London and Yorkshire areas. The engines differ from their predecessors, mainly in the boiler, which is superheated and has its centre line higher. The cylinders and tank capacity are larger, and the engine is heavier. The cylinders are 19 by 26ins., wheels 5ft. 8ins., weight 70 tons 6cwt.



The New G.N.R. 0-6-2 Tank for Heavy Suburban Traffic.

A NEW TANK ENGINE FOR THE FURNESS RAILWAY.

By courtesy of *Mr. David L. Rutherford*, engineer and locomotive superintendent of the *Furness Railway*, the writer is able to give illustration and details of the new and powerful 4-6-4 tank loco recently delivered by *Kitson & Co.,* Ltd. The engines are noteworthy for their overall proportions, wheel arrangement and general design, and are the only locos having the 4-6-4 grouping, in this country, with inside cylinders. They have been introduced to deal with the heavy traffic between Carnforth, Barrow and Whitehaven. The cylinders are 19½ by 26ins. with piston valves actuated by *Stephenson* link motion, wheels 5ft. 8ins. pressure 170 lb., not superheated, tractive force at 85% boiler pressure is 21,066lbs.



A New 4-6-4 Tank Engine for the Furness Railway.

ELECTRIC LOCOS FOR THE METROPOLITAN.

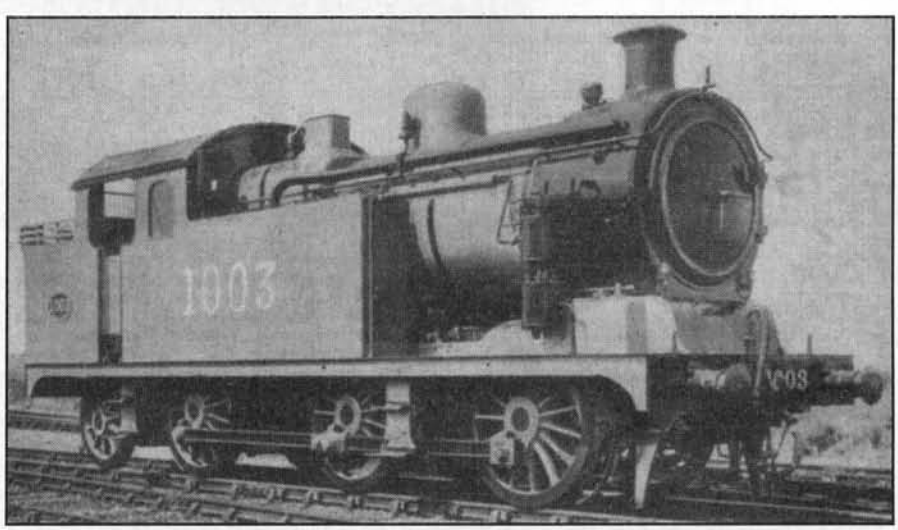
The reconstruction of 20 of the company's existing electric locos, the capacity of which is considerably improved, has recently been undertaken at the Barrow Works of *Messrs Vickers*, whilst the electrical equipment is being supplied and erected by the *Metropolitan-Vickers Electrical Co.* under the direction of *Mr. Charles Jones*. The cab windows are fitted with wipers for use in wet weather, both vacuum and air brake working is available. In order to give more even haulage the loco is fitted with power connectors to couple through to the rolling stock which has been provided with collector shoes on the first and last coaches. This allows better current collecting continuity when the shoes on the loco itself are bridging gaps in the conductor rails. There are four motors contained in the two bogies, 300 h-p, (series wound traction type), each, which are geared to the axles by means of single reduction gearing. The control is of the "all-electric automatic multiple unit type", with sufficient stops in the master controller to allow of easy shunting.

Side View of New 1,200 h. -p. Electric Locomotive for the Metropolitan RAILWAY.

NEW G.E.R. TANK LOCOS.

Recently introduced by *Mr.A.J. Hill*, C.M.E. of the *Great Eastern Railway*, a series of 0-6-2 tanks, recently completed at the company's works at Stratford, E., one of which is pictured here, No.1003. They have inside cylinders 18 by 24 ins. with piston valves actuated by link motion, pressure, wheels 4ft. 10ins., weight 60 tons 13cwt., tractive force at 75% boiler pressure is 18,199lbs.

(After the grouping in 1923, they became part of the *LNER* and were designated N7. Together with the N2, above, they were everywhere, always busy, and a delight to the eye).

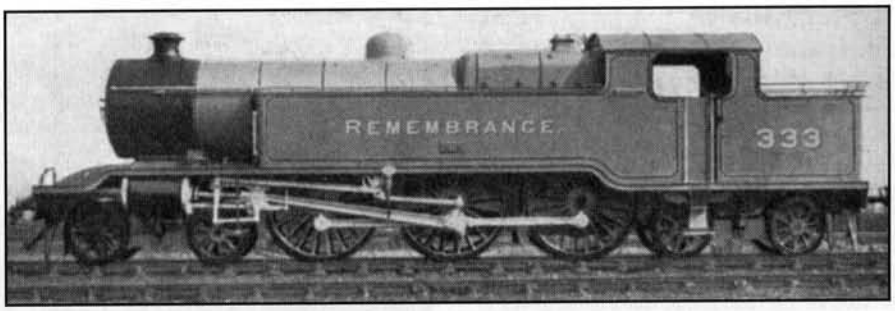


The New 0-6-2 G.E.R. Tank Locomotive.

1922: NEW BALTIC EXPRESS TANK—LBSCR.

Until recently only two Baltic tanks were in service on the *LBSCR*, conditions arising out of the war having interfered with the construction of others at the Brighton works. Recently, the first of a series of five has just been completed, No. 329 "Stephenson", at the request of the *Stephenson Locomotive Society*. The locos are noteworthy for their large proportions. The cylinders are 22 by 28 ins., working pressure 170 psi., wheels 6ft 9ins., weight 98½ tons, tractive effort at 85% boiler pressure 24.176lbs.

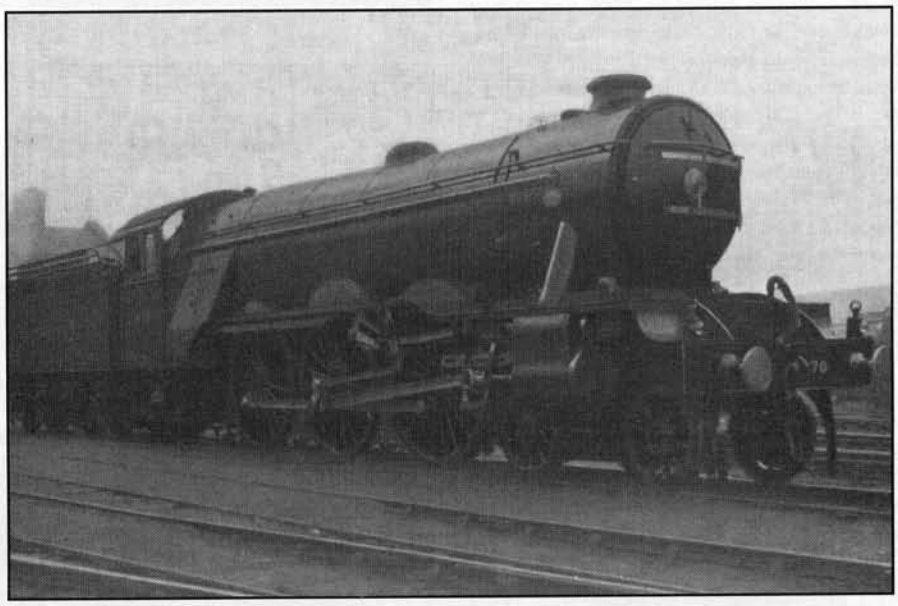
(I have taken artistic licence here by showing a photo of "Remembrance", since although this loco did not appear until 1923, it is the one most folk think of out of the Brighton Baltic's. It had a bronze tablet below the name with the words:— "IN GRATEFUL REMEMBRANCE OF THE 532 MEN OF THE L.B.& S.C. RLY. WHO GAVE THEIR LIVES FOR THEIR COUNTRY 1914-1919.").



The Southern Railway Dedication Locomotive: One of its Latest 4-6-4 Express Tank Locomotives.

NEW PACIFIC TYPE LOCOMOTIVE FOR THE G.N.R.

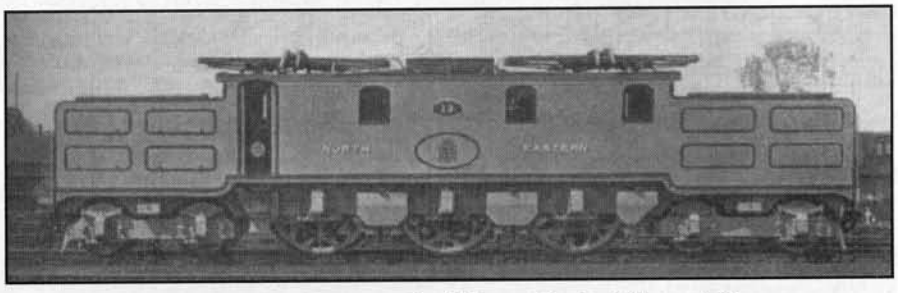
The latest type of locomotive produced at the Doncaster Works of the *GNR* is a Pacific with three cylinders. The locomotive, No. 1470, is of very large over-all proportions, and altogether of striking yet symmetrical appearance. The outside cylinders are placed horizontally and drive the middle pair of coupled wheels, the central cylinder being at an inclination of 1 in 8 and placed somewhat further back, this also drives the middle wheels by means of a balanced crank axle. The steam chests of the outside cylinders are above, and that of the inside cylinder at one side, all three being in one plane. The valve motion is *Walschaerts,* the inside valve spindle being coupled to the outside gear via a simple arrangement of levers. The cylinders are 20 by 26in., working pressure 180lbs., wheels 6ft 8ins., tractive effort 29,835lbs. The new locomotives, of which a second is in hand, are classed A1.



A General View of the New G.N.R. "Pacific" Type 3-Cylinder Locomotive.

HIGH SPEED ELECTRIC PASSENGER LOCO, N.E.R.

Sir Vincent Raven, C.M.E. of the *North-Eastern Railway*, has kindly sent details and a photograph of a high-speed electric loco, designed by him and recently completed at the company's Darlington works. The electrical equipment was supplied by the *Metropolitan-Vickers Electrical Co*. The loco has been designed for experimental purposes to run from a 1500V dc supply. It has a 4-6-4 wheel arrangement and three pairs of motors. Each pair of motors is mounted immediately above the corresponding driving axle. Each motor has a capacity of 300 h.p. and can be grouped in three combinations of series, and series/parallel, together with varying degrees of excitation, allowing a wide range of speed control, up to the maximum 1,800 h.p., giving speeds up to 90 mph, and tractive effort up to 28.000lbs. **(Sadly, it all came to nought, at the grouping *Sir Vincent's* plans for electrifying the Newcastle to Edinburgh route were scrapped and only one was built, but survived until 1950 before being scrapped. It is, nonetheless, an interesting and handsome loco, an excellent prototype for an unusual model).**



New High Speed Passenger Electric Locomotive, North-Eastern Railway.

The 0-6-4T Steam and Old Type Electric Locomotives, Metropolitan Railway.

STEAM AND ELECTRIC LOCOS ON THE MET. (I put this one in since we hadn't seen a photo of a "Camel" before it became a "Growler". In addition, the 0-6-4T looked rather handsome. They too, had been around for a while, and were sharing the work with the new 4-6-4 tanks.)

1923: THE GROUPING. By far and away the most important event of 1923. At the stroke of midnight 1922, 120 odd railways vanished, and in their place appeared "The Big Four". They were the; *London, Midland & Scottish, London & North Eastern , Great Western and Southern; Railways*. There were, originally, going to be six groups, one of which was Scotland, but the Scots protested that they would be cut off from the English lines with whom they had been in close working partnership. Therefore, they were divided between the *LMS* and *LNER*, reducing the groups to five. The fifth group was to have been the "London" railways. However, most of the "tubes" were already amalgamated as "The Underground", leaving the *Metropolitan* and *North London* lines. The latter had been, for some years, to all intents and purposes a portion of the *LNW*, and what the 'premier line' has it holds. The Northern extremities of the *"Met"* were already a joint line with the *GCR* and the rest became part of the "Underground", despite being largely overground, but it still retained its individuality. And then there were Four. (Back to *Mr.Lake*) :—

NEW 3-CYLINDER PACIFIC EXPRESS LOCO, N.E.R.

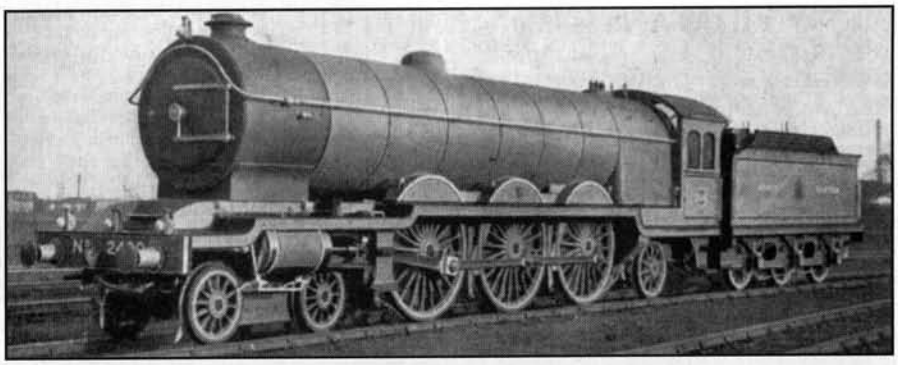
Reference was made on a previous occasion that *Sir Vincent Raven* was intending to introduce a "Pacific" locomotive on the North-Eastern Railway. The cylinders are 19 by 26ins. *Stephensons* link motion is applied direct to each of the cylinders. Wheels 6ft. 6ins., pressure 200psi, tractive effort 29,918lbs. **(Introduced in 1922, 5 were built, they were tested, after the grouping, against the *Gresley* Pacific's and were found to be less economic. Although no more were built, they continued to do good work for several years, as did the N.E. Atlantic's).** *Mr. H.N. Gresley* **is now C.M.E. of the L.N.E.R.**

NEW 4-6-0 EXPRESS LOCOS, L.M.S.

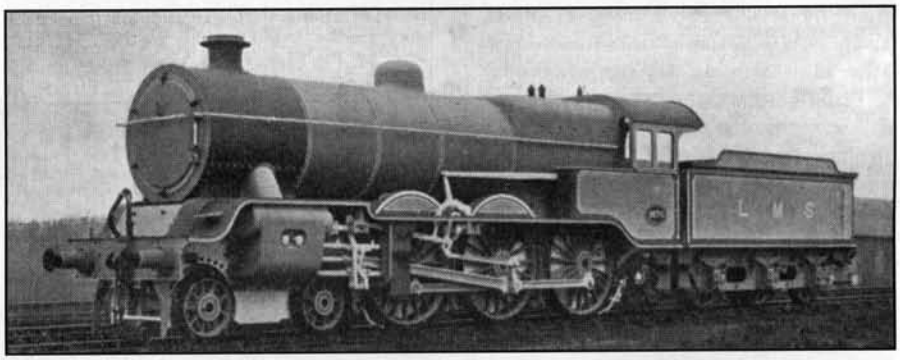
By courtesy of *Mr. George Hughes*, Chief Mechanical Engineer, *L.M.& S.R.*, Herewith a photo of one of the new 4-6-0 4-cylinder locomotives recently built in the Horwich Works. These locos are practically identical with the previous ones of the same class, (*L&Y.* 1921), but are equipped with larger tenders. The outside *Walschaerts* gear also actuates the inside valves, via rocking levers behind the cylinders. The drive is divided, the outside cylinders driving the middle pair of coupled wheels, the inside driving the leading pair. Cylinders 16½ by 26ins., pressure 180psi., wheels 6ft. 3ins., tractive effort 29,470lbs.

NEW 4-CYLINDER, 4-6-0 EXPRESS LOCO, G.W.R.

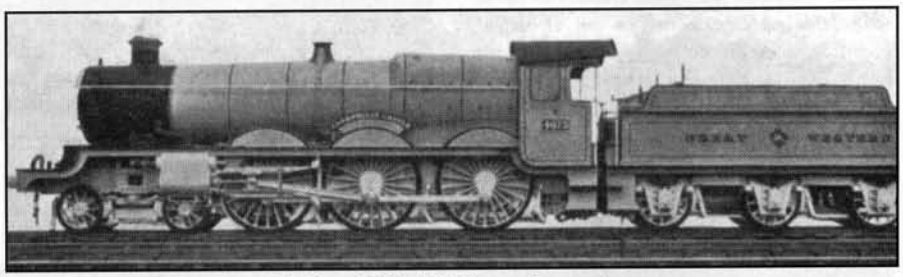
By courtesy of *Mr. C.B. Collett*, C.M.E. of the *Great Western Railway*, it is possible to illustrate herewith the first of a new series of ten, 4-6-0, 4-cylinder locomotives, to be known as the "Castle" class. The first, No.4073, is *Caerphilly Castle*. It has a larger boiler and cylinders than existing *GW* locos of the same type. The cylinders are 18 by 26ins., wheels 6ft 8½ ins., pressure 225 psi., weight 79 tons 17 cwt., tractive effort 31,626lbs at 85% boiler pressure. This is the first engine to be turned out of the Swindon shops since the war with lined out panels, boiler bands, etc., as in pre-war days.



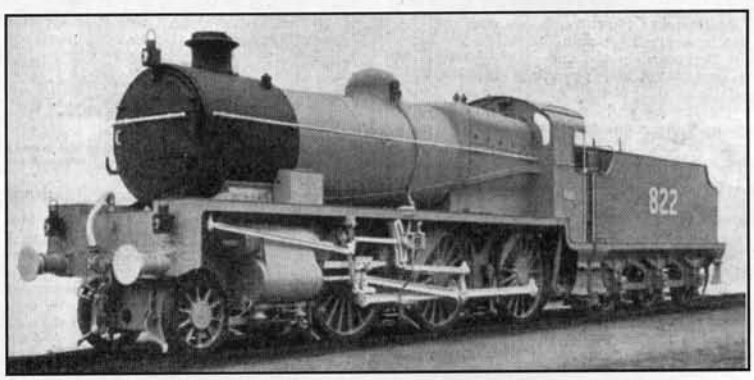
The New 3-Cylinder Pacific Express Locomotive for the N.E.R.



One of the New 4-6-0 Express Locomotives for the L.M.& S.R.



The New G.W.R. 4-6-0 Express Locomotive.



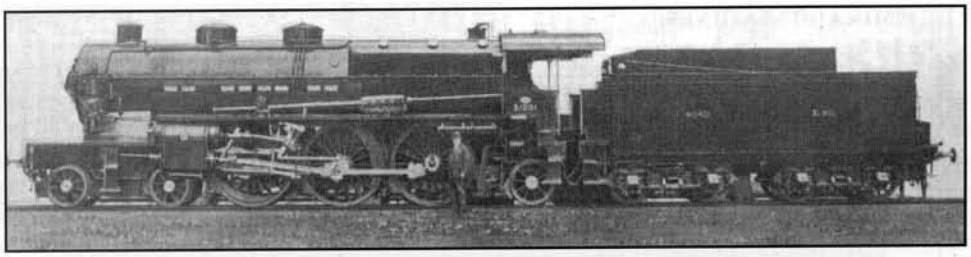
General View of New 2-6-0 Locomotive for the S.R.

NEW 3-CYLINDER 2-6-09 ENGINE FOR THE S.R.

Of an order for 15 2-6-0 locos, 2-cylinder N type, now being built at Ashford, (for the SE&C section), to the designs of *Mr. R.E.L. Maunsell*, C.M.E. of the *Southern Railway*, No. 822 has just been turned out as a 3-cylinder version. The cylinders all drive the middle axle of the coupled wheels. The outside piston valves are actuated direct by *Walschaerts gear*, the inside valve is actuated via a large 2-½ to 1 cross-lever with its 1-½ to 1 floating lever arranged horizontally across the front of the engine, thus giving the motion to the inside valve. This device has already been used by *Mr. Gresley*, and on the Continent, but in this loco the motion is taken from each outside pendulum lever to the cross-levers instead of from an extension of the front end of the valve spindles. In this way the valves of the outside cylinders are kept horizontal, and any variation, due to wear is not transmitted to the valve of the middle cylinder. Cylinders; 16 by 28ins, (2-cyl.-19 by 28ins.), wheels 5ft 6ins. pressure 190psi. (2-cyl-200psi), (tractive efforts not quoted).

1924: NEW FRENCH LOCOMOTIVE.

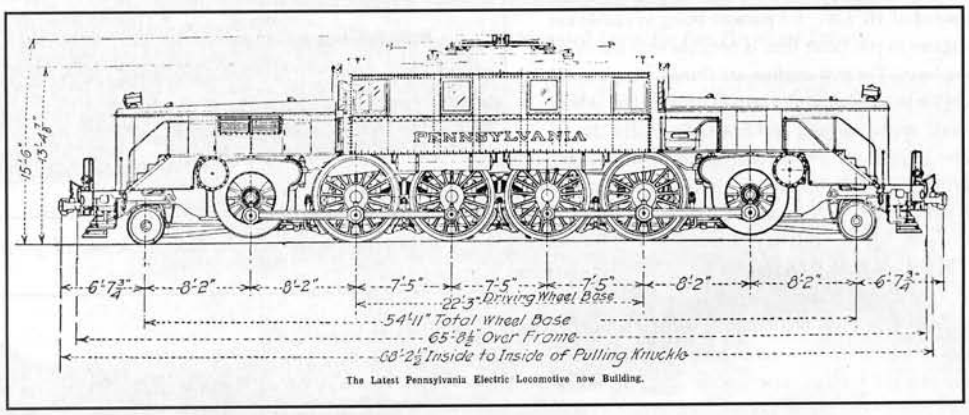
The express passenger traffic between Calais and Paris is of a heavy description, and high speeds are attained with trains of considerable weight. Just recently, some new locos of the Pacific 4-6-2 type have been introduced for working this traffic. The engines are 4-cylinder compounds, the H.P. cylinders are outside the frames and drive the middle pair of wheels, the L.P. cylinders are between the frames, set further forward, and drive the leading pair of coupled wheels. *Walschaerts* gear is used, and by means of a "change" valve live steam can be used in all four cylinders at starting, or whenever required for extra heavy traction. The boiler is of ample proportions, with a *Belpaire* firebox, superheated, 227psi. Cylinders: HP 17½ by 26⅛ ins, LP 25 by 27⅛ ins., wheels 6ft. 3⅛ ins., weight 84½ tons, tractive effort 35,190lbs. compound, 47,848 lbs. simple.



Express 4-6-2 Passenger Locomotive for the Northern Railway of France.

NEW ELECTRIC LOCOS FOR THE PENNSYLVANIA R.R.

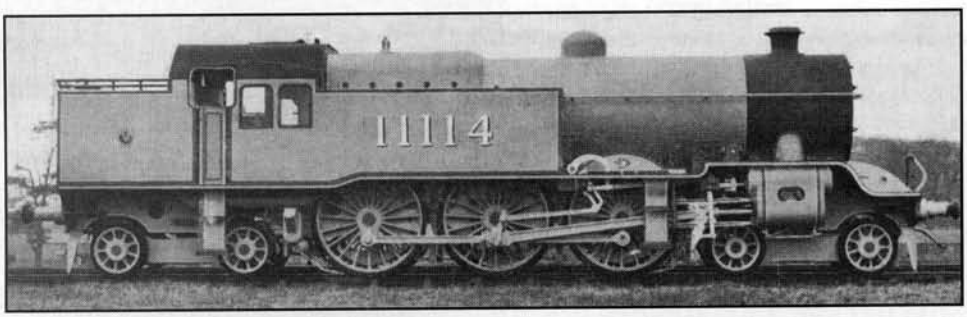
The railway has under construction some new electric locomotives, these being designed for operation from an overhead line at 11,000 volts, 25 cycle. They are of the 2-8-2 type, gear and side rod drive. Although designed primarily for heavy freight service, they are to be tried on passenger service also. Each jackshaft is driven by two 760 h.p. motors and geared so as to develop the full tractive effort of 50,000 lbs. at 23 mph.



The Latest Pennsylvania Electric Locomotive now Building.

The Latest Pennsylvania Electric Locomotive now Building.

(On the home front there was a lot going on. A new turntable at Kings Cross, large enough, at 70ft. to take the new Pacific's, which had, hitherto, been sent out to Hornsey for turning. The *Midland* compound was modified, and became the *LMS* Standard Compound. The cylinders were made larger and the driving wheels smaller, giving a tractive effort improvement from 21,840 to 24,295 lbs. The *GWR* carried out dynamometer car tests on *Caldicot Castle*, with a 500-ton train. The *LNER* built a batch of 3-cylinder 2-6-0's at Darlington, basically the same as the 1000 class of 1920 (K3), but with *N.E.* style cab and reduced height, to enable them to run over the North British section of the *LNER.* Another loco updated to run on this section was the "Director" class of the *GCR*, 24 were built *by Kitson and Armstrong Whitworth).*

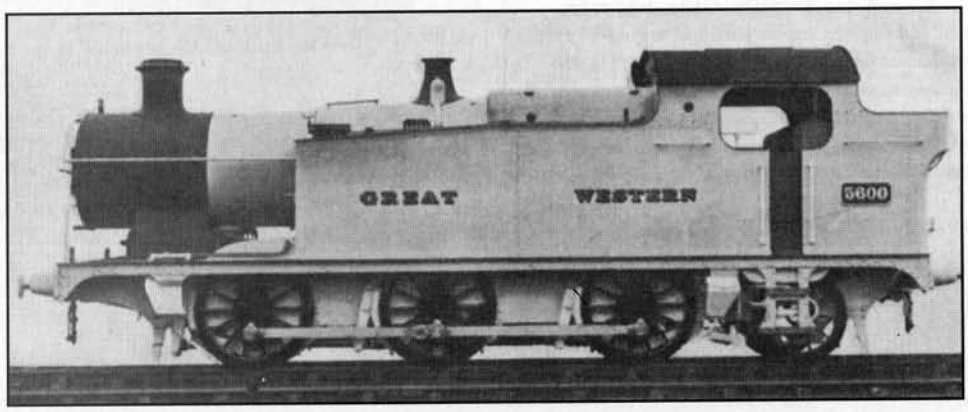


Profile of the 4-6-4 Four-Cylinder Tank Engine for the L.M.S. Railway.

LMS "BALTIC" TANK.

This engine was a 4-6-4 tank version of the *Hughes* 4-6-0, 4-cylinder passenger loco, originally designed for the L&Y. Cylinders 16½ by 26ins., wheels 6ft 3ins., pressure 180psi., weight 99 tons 17cwt., (tractive effort not quoted, but presumably higher than the 29,470lbs of the tender loco).

(Although a handsome and powerful loco, they proved to be too massive and expensive to maintain, and only ten were built).



0-6-2 Tank Engine for heavy Coal Traffic, G.W.R.

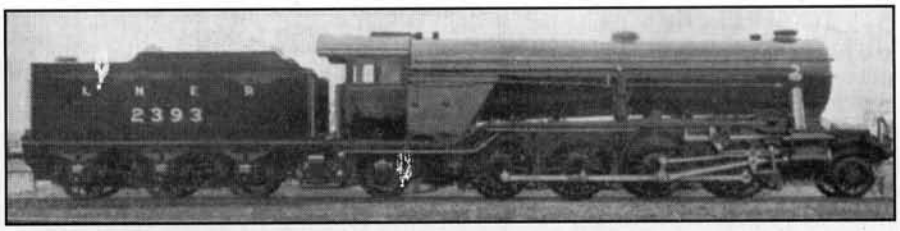
1925: NEW TANK ENGINES FOR THE G.W.R.

One of the recent types of engine produced at Swindon is a 0-6-2 tank, 5600 class. This is the first Swindon-built engine having this wheel arrangement, of which 50 are being put into service, and have been designed to deal with the heavy traffic of the South Wales coal fields. Cylinders 18 by 26ins., wheels 4ft. 7½ ins. pressure 200psi. tractive effort 25,800lbs.

(Another event at Swindon was the conversion of "*The Great Bear*" Pacific to a Castle class, *Viscount Churchill*. An interesting result of this conversion was the improvement from 27,800 to 31,625lbs in tractive effort).

THE "MIKADO" ENGINES.

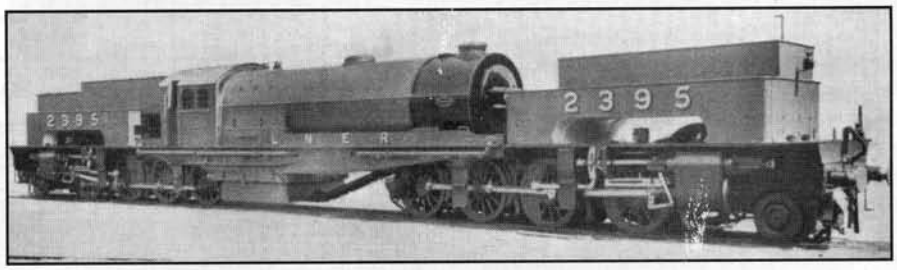
The 2-8-2 engines, (class P1), have been built at the Doncaster works. They also constitute a new type for this country. They are being introduced in the heavy mineral train service between Peterborough and London, handled at present by 2-8-0 engines of smaller though not inconsiderable size. The coal trains which these new locomotives will handle consist of 100 wagons, the weight of the train exclusive of engine and tender being 1600 tons. Larger wheels have been fitted to the Mikado's, namely, 5ft. 2ins. instead of 4ft. 8ins., the purpose being to enable the engines to run faster than is possible with the existing locos. The new engines are fitted with a booster engine to enable them to start quickly and be able to work trains up long gradients. Cylinders 20 by 26ins., pressure 180psi., weight 100 tons, booster cylinders 10 by 12ins, tractive effort 38,500lbs plus 8,500lbs from the booster, when required.



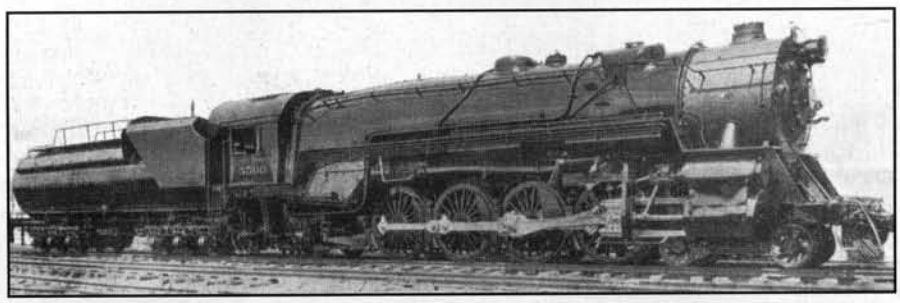
Profile of the L.N.E.R. "Mikado" Locomotive.

THE L.N.E.R. GARRATT.

The LNER "Garratt" is unique, in that it is the largest yet built on that principle for any railway in the world, and is also noteworthy as being a six-cylinder locomotive, all cylinders using high-pressure steam. The engine has been produced for banking service with heavy coal trains on the Worsborough branch of *LNER* between Wath and Penistone, a distance of 7 miles all on a rising gradient, of which 2 miles is 1 in 40. At present two or three banking engines are required. These will be replaced by the "Garratt" working by itself at the rear of the train. Steam is distributed to the six cylinders by four sets of *Walschaerts*, motion being transferred to the inside valve via the usual *Gresley* lever arrangement. Cylinders 18½ by 26ins. wheels 4ft. 8ins., pressure 180psi., weight 179 tons, tractive effort 72,940lbs.



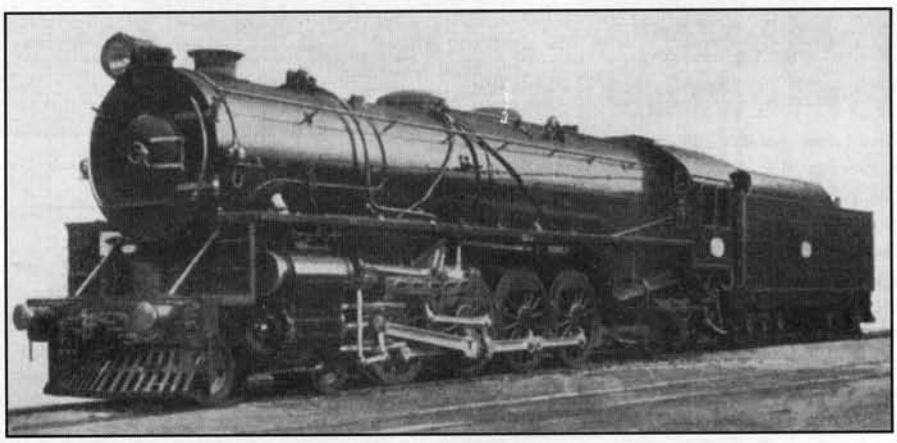
Garratt Locomotive for the L.N.E.R.



The New Locomotive for the B & O Railroad, claimed to be the largest Railway Passenger Engine in the World.

WORLDS LARGEST PASSENGER LOCO.

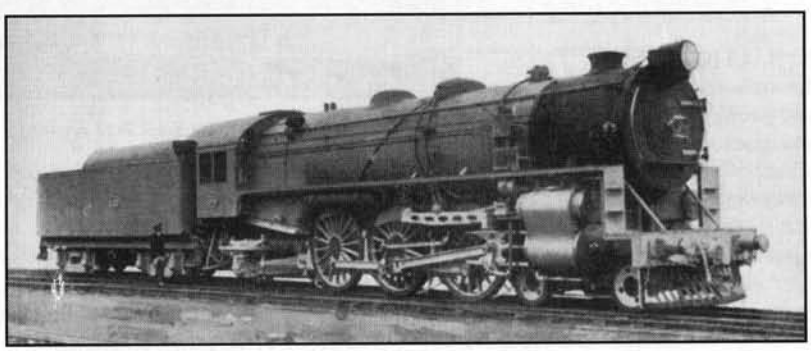
A Locomotive, for which is claimed the distinction of being the largest passenger engine in the world, has recently been placed in service on the *Baltimore and Ohio R.R.* The wheel arrangement is 4-8-2 and the engine develops a tractive power of 65,000lbs. The cylinders are 30 by 30ins. wheels 6ft. 2ins. pressure 210psi. weight with tender 294 tons.



One of the New 4-8-2 Locos for the South Australian Railways

1926: NEW LOCOS FOR THE AUSTRALIAN RAILWAYS.

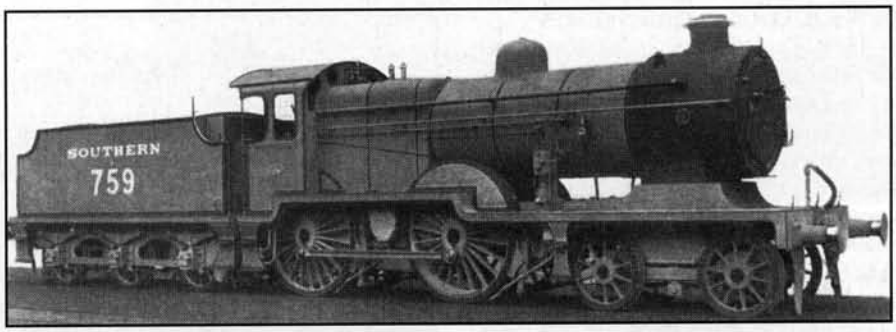
Some new and powerful locomotives have just been completed by *Sir W.G. Armstrong Whitworth & Co., Ltd.*, for the *South Australian Railways*. There are three types, 4-6-2, 2-8-2, and 4-8-2. The Pacific develops 36,600lbs., the Mikado 40,400lbs., and the Mountain 51,000lbs., tractive effort respectively. They are all built to 5ft 3in. gauge, but so constructed to be adaptable, should circumstances demand, to 4ft 8½ins. The 4-8-2 cylinders are 24 by 28ins., wheels 6ft 3ins., pressure 200psi., total weight 218 tons.



One of the 4-6-2 Locos for the South Australian Railways.

NEW EXPRESS ENGINES FOR THE S.R.

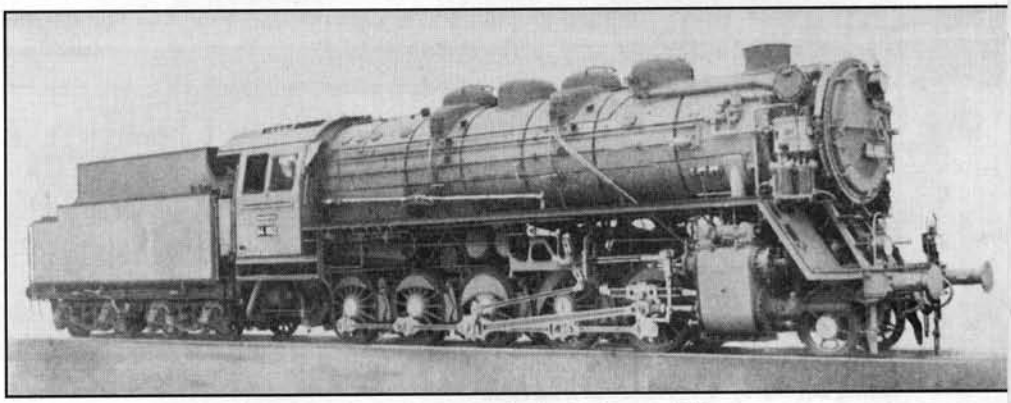
A new class of 4-4-0 express engine has recently been introduced by *Mr. Maunsell* as part of the policy of modernising and standardising the loco stock. The boiler pressure has been increased from 160 to 180psi and the *Stephenson* link motion entirely remodelled. The cylinders are 19½ by 26ins., wheels 6ft. 8ins., tractive effort 18,905.



One of the new S.R. (Eastern Section) 4-4-0 Maunsell Locos for Fast Passenger Service.

NEW STANDARD LOCOS FOR THE GERMAN RAILWAYS.

The writer, who recently made a trip over a large area in Germany, was enabled to inspect some new types of locomotives just completed. These rank as standard designs, and comprise a Pacific four-cylinder compound and a 2-10-0, 3-cylinder simple. The 4-6-2 has H.P. cylinders of 18-⅜ in. diameter, L.P. 26-⅜, by 26in, wheels 6ft 6¼ in. pressure 228psi., tractive effort 26,400lb. The 2-10-0 cylinders are 23-⅛ by 26in., wheels 4ft. 7-⅛ in., pressure 200psi., tractive effort 47.100lb.

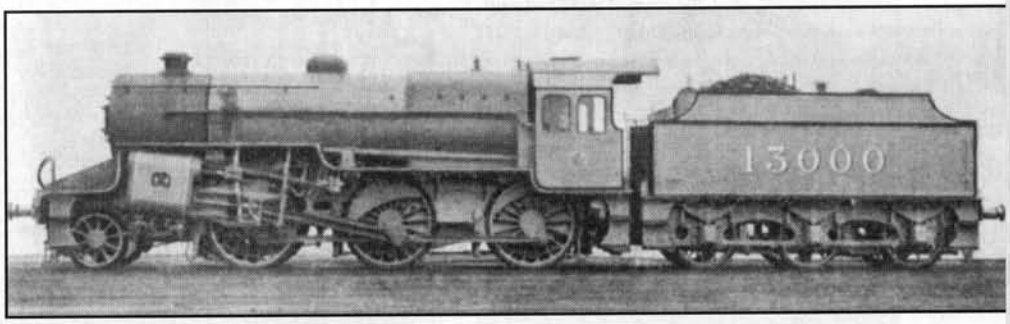


New Standard 3-Cylinder 2-10-0 Locomotive for the German Railways

NEW MIXED TRAFFIC LOCOS—L.M.S.

The writer has been favoured by *Sir Henry Fowler*, C.M.E. of the *L.M &.S.R.*, with a photograph and particulars of a new 2-6-0 locomotive recently placed in service. 100 are being built, 30 at Horwich Work and 70 at Crewe. The engine was originally designed by *Mr. G. Hughes* when C.M.E. at Horwich, but the first engine was not completed until recently and therefore figures as a new introduction, for which *Sir Henry*, the present C.M.E is responsible. The cylinders are steeply inclined and the running boards raised to clear them, the piston valves, mounted above them are actuated by Walschaerts gear. The boiler is of a large size with Belpaire firebox and 180 psi., cylinders 21 by 26in., wheels 5ft. 6in., tractive effort 26,580lb.

(Interesting to note that although most were built at Crewe they were usually known as Horwich "Crabs").

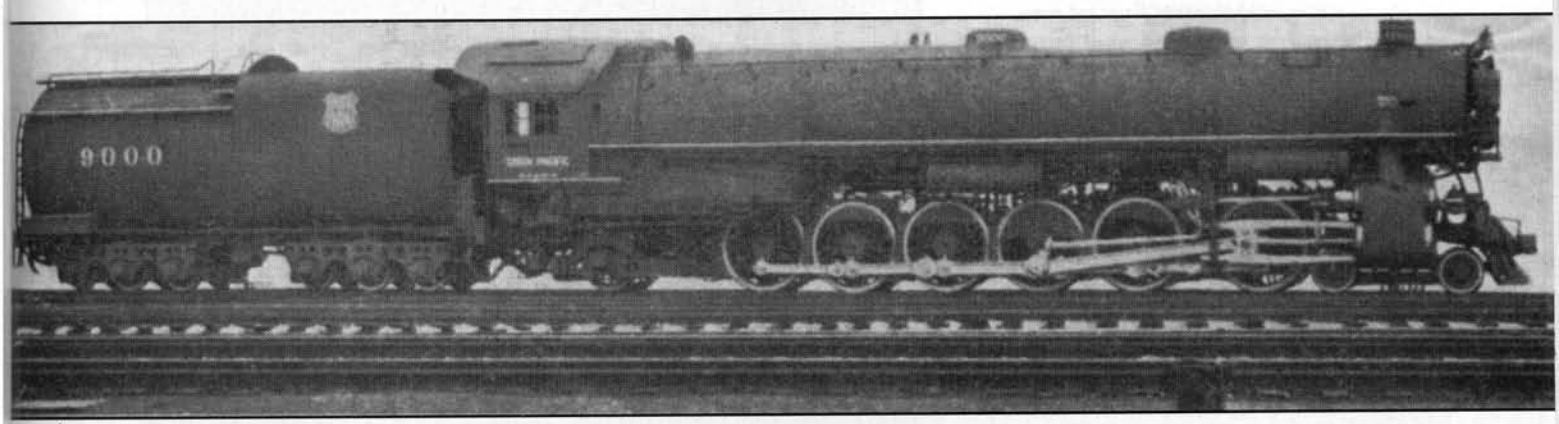


New L.M.S. Superheated 2-6-0 Locomotive.

A REMARKABLE AMERICAN LOCO.

The locomotive shown has just been completed for the *Union Pacific Railroad*. Its wheel arrangement is 4-12-2, with 3-cylinders of 27in. the stroke of the outside is 32in. and that of the inside 31in. Coupled wheels 5ft. 7in., pressure 220psi., tractive effort 96,600lb.

(I couldn't resist including the *U.P. 9000* class since, apart from being an important loco, it was the one that inspired *LBSC, "Curly"*, to build his 2½in. gauge *Caterpillar*).



New 4-12-2 Type 3-Cylinder Locomotive by the American Locomotive Co. for the Union Pacific Railway.

NEW S.R. LOCO "LORD NELSON".

The latest locomotive built for fast passenger service on the *Southern Railway* is the "Lord Nelson", which is a 4-6-0 with four cylinders. The cylinders are placed approximately in line at the centre of the bogie. Those inside the frames drive the leading pair of coupled wheels and those outside, the middle pair. Four separate sets of *Walschaerts* gear are utilised, the inside motions derive their movement from single eccentrics, whilst for those outside return cranks are employed. A feature of the engine is that there are eight exhaust beats for each turn of the driving wheels. The crank angles being arranged to bring about this result. About two years ago *Mr. Maunsell* experimented with this arrangement of cylinders and cranks by altering one of the older four-cylinder engines. Having turned the cranks of the inside engine through 45 deg., and re-balancing the wheels to suit, the improvement was so marked that it was decided to embody the arrangement in the new class. A large boiler is provided, with a *Belpaire* firebox. The cylinders are 16½ by 26 in., wheels 6ft 7in. pressure 220psi., tractive effort 33.500lbs.

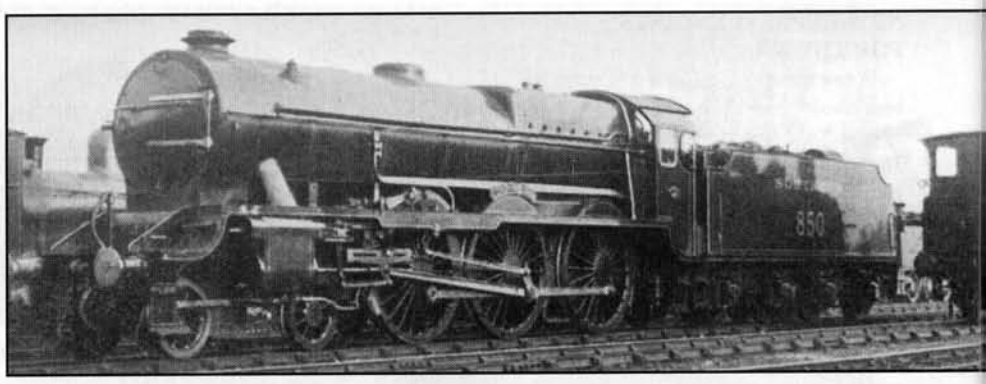
(1926 was a prolific year and I have already exceeded the space restriction. Other locos I would have liked to add were; the *LNER* J39 0-6-tender goods, one of my favourites, the short-lived but nonetheless fascinating, *"Ljungstrom"* turbo-condensing loco built by *Beyer, Peacock* for trials on the LMS, a mainline diesel loco built in Germany for Russian railways, etc. I also realised that I had omitted to include the "King Arthur" class in 1925! However, I think I have given *"The Southern"* a good run).

1927: LMS GARRATT.

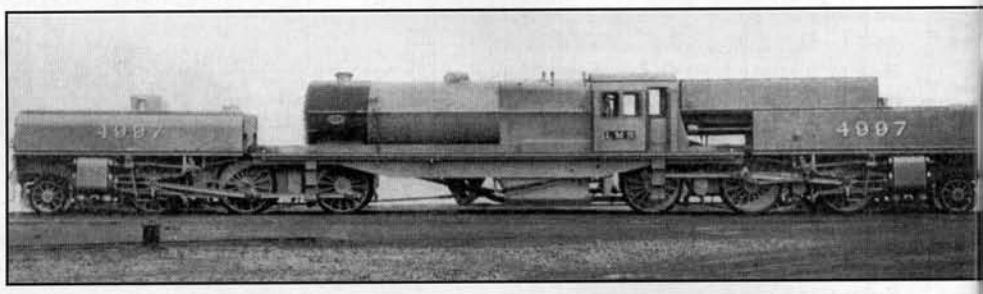
The *LMSR* have recently introduced for heavy freight hauling between Toton yards, near Derby, and Brent Sidings, London, three *Garratt* locomotives. These engines have the 2-6-0 + 0-6-2 wheel arrangement with four cylinders 18½ by 26in., wheels 5ft. 3in., pressure 190psi., tractive effort 45,620lb.The use of these engines will enable the operating company to increase the length and weight of freight trains whilst dispensing with double heading. Although these are not the first to be delivered for use in this country, they are the first to be used in mainline haulage.

NEW 4-6-0 EXPRESS LOCOS, G.W.R.

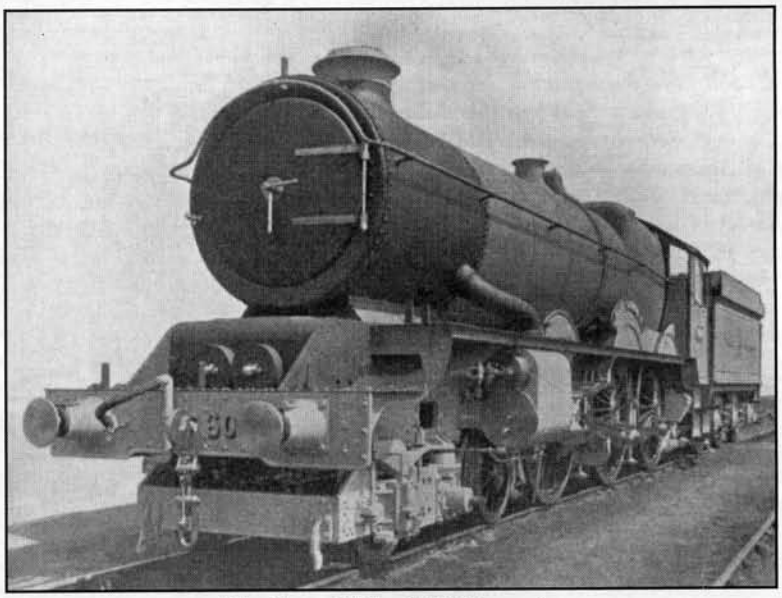
There was recently completed at Swindon the first of a new series of express locomotives, larger and more powerful than any other engine of the same type yet built in this country. **(na na ne na-na, and sucks-boo to the *S.R.*)**. The new series will bear the names of Kings of England, the first, No.6000, being named "King George V." The usual arrangement of cylinders is employed, but owing to the fact that the inside cylinders have been place further forward than usual, it has been found necessary to place the axle boxes and springs outside the frames in the case of the leading wheels of the bogie, whilst the trailing wheels have inside springs and axle boxes, this being equally necessary due to the location of the outside cylinders. **(Oops!)**. The boiler is exceptionally large and carries a working pressure of 250psi. The cylinders are 16½ by 28in., wheels 6ft. 6in., weight 89 tons, tractive effort 40,300lb.



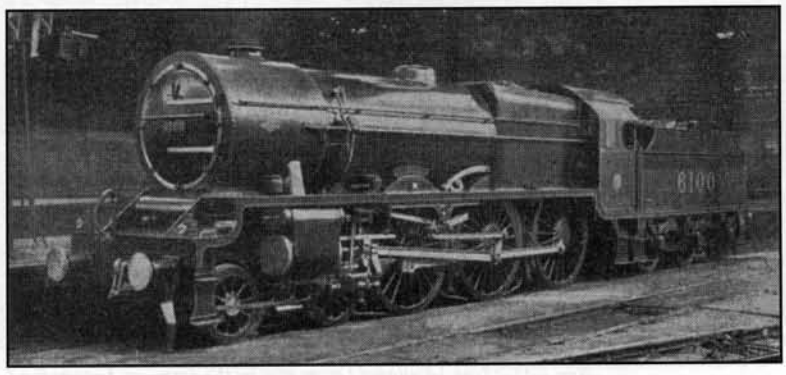
The Southern's New Giant—"Lord Nelson"—stated to be the most powerful Passenger Locomotive in the country. Tractive effort 33500lb.



Broadside View of L.M.S. Garratt Locomotive



"King George V," New G.W.R. Locomotive.



One of the New 3-Cylinder Express Locomotives, L.M.S.

NEW L.M.S.R. EXPRESS ENGINES.

The first of a series of new 3-cylinder express locomotives has recently appeared on the *LMSR*. The cylinders are arranged with the inside located in advance of the outside ones, and driving the leading pair of coupled wheels, whilst the outside cylinders drive the middle pair. Separate *Walschaerts* gearing is applied to each cylinder, the piston valves being superimposed. This is a very large engine the boiler being conspicuous for its size and the fact that it carries a working pressure of 250psi. The Belpaire firebox has a sloping crown-plate, and, owing to its height, the safety valves, of the *Ross* type, have been sunk through the sheathing with a view to reducing the height, for the same reason the whistle is set in a horizontal position. Cylinders 18 by 26in. wheels 6ft 9in., weight 85 tons, tractive effort 33,150lb.

RAISING *THE BOILER* PRESSURE ON THE LNER.

One of the *Gresley* Pacific's, No. 4480, "Enterprise," has recently left the Doncaster shops with a boiler carrying 220psi. in place of the 180psi. of the original boiler. The superheater has been enlarged from 32 to 43 elements and the *Walschaerts* gear slightly modified. The strengthening of the boiler and additional superheat had increased the weight 3 tons 16cwt. Overall, the changes have improved the tractive effort from 29,835 to 36,465lb. It is understood that as each of the Pacific's go into the works for re-boilering they will be fitted with the new boiler.

1928: NEW 4-4-0 EXPRESS LOCOS, L.N.E.R.

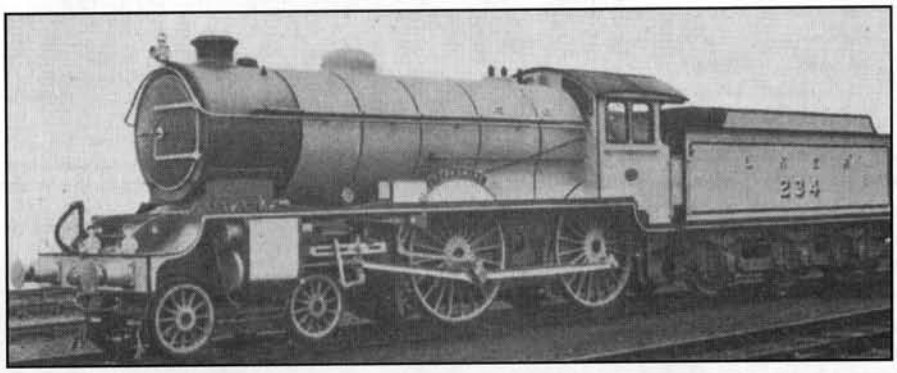
At a time when the 4-4-0 locomotive is, except for renewals, receiving little attention in this country, it is of unusual interest to note that *Mr. Gresley* has introduced an entirely new class of engine having this wheel arrangement. The engines rank as the largest and most powerful of their class in Great Britain. They have 3-cylinders driving the leading pair of coupled wheels, the valves being actuated by the usual *Gresley* arrangement, except that the operating levers for the centre cylinder being located behind instead of in front. This has the effect of eliminating factor of expansion on the valve spindles. Cylinders 17 by 26in., wheels 6ft. 8in., pressure 180psi., weight 66 tons, tractive effort 21,556lb.

NEW TANK LOCO, L.M.S.R.

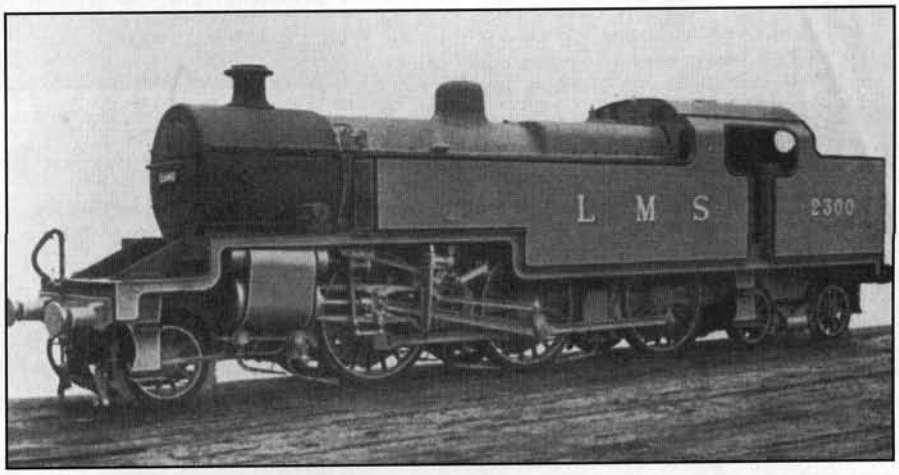
25 tank engines of an entirely new type were put in hand at Derby works last year, and a few are all ready in service. They are intended for heavy local passenger trains and are working on the "Midland" section between London and Bedford. They are fitted with water scoops, to pick-up while running in either direction. Cylinders 19 by 26in., wheels 5ft. 9in., pressure 200psi., weight 86½ tons, tractive effort 23,125lb.

CORRIDOR TENDERS, L.N.E.R.

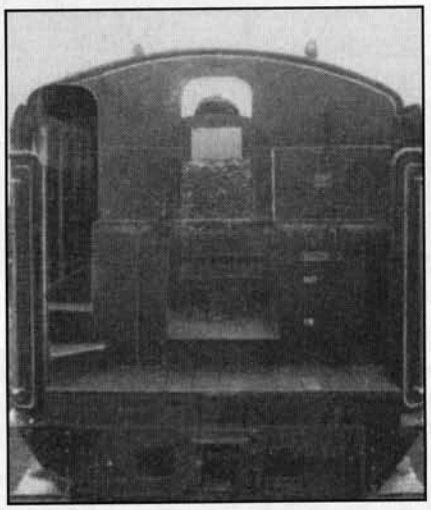
The LNER inaugurated, on May 1st, a new service of trains between London and Edinburgh, and the outstanding feature has been that the train makes the journey of 392 miles non-stop. This represents the longest non-stop run in the world, and to make it possible some method of changing the engine crews en route had to be devised. This problem has been overcome by building some new tenders at Doncaster provided with a corridor on the right-hand side, and a vestibuled connection



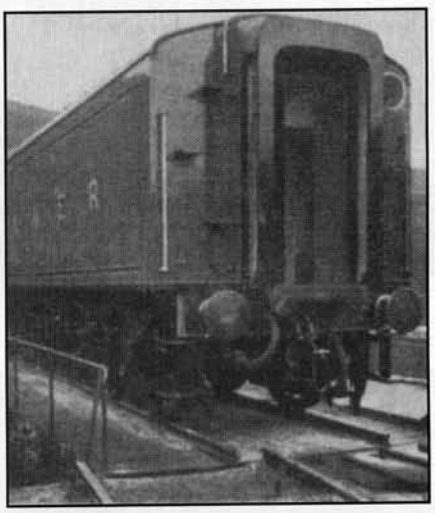
New Class of 4-4-0 Locomotive, L.N.E.R.



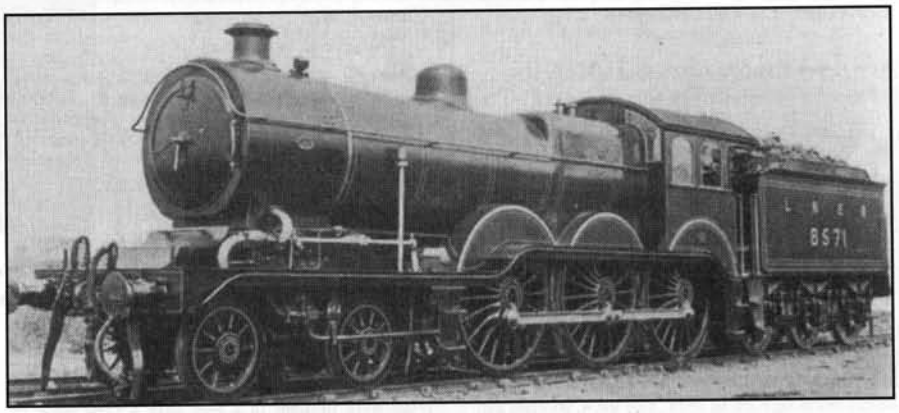
One of the New L.M.S. Tank Engines for Heavy Local Passenger Traffic.



Front End of Tender showing Entrance to Corridor.



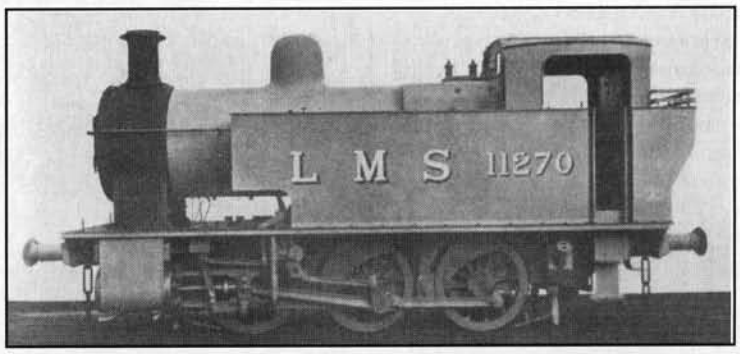
Loco Fitted with Vestibule Corridor Tender on Turntable at Kings Cross.



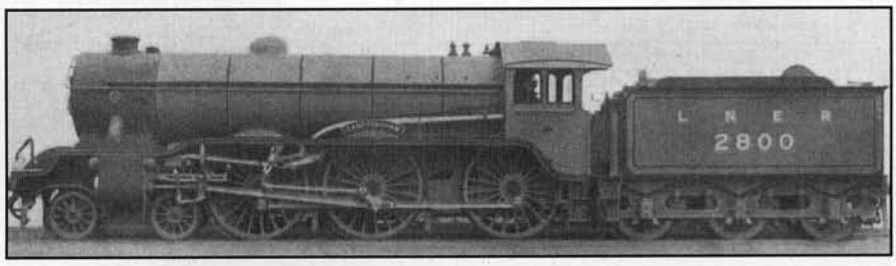
A New L.N.E.R. Express Passenger Loco Fitted with Lentz Valves.

between the tender and train. The corridor is completely closed in and has a width of 18in. and height of 5ft. **(From where I live, it is only a short distance to Salisbury Hall, where *Gresley* resided for a while. It was during this time that the tender was designed, and there is a persistent story that he placed the dining room chairs in a row, adjacent to the wall, in order to ascertain the minimum width needed for the corridor. I have not seen this confirmed in print, but it sounds right).**

A New LNER 4-6-0. Just recently the loco stock of the *LNER* has been added to by ten 4-6-0 engines, built *by Beyer, Peacock*, for service on the *Great Eastern* section. They accord, in their main features, with the original ones built at Stratford, to the designs of *Mr. Holden*. Modifications include the fitting of *Lentz* poppet-valves instead of piston, a more extended smokebox and the raising of the running board over the coupled wheels. **(I would not have described the 1500/B12/2 as new, but since it is another of my favourites, and it didn't get a mention in 1912, I thought I would include it). p35**



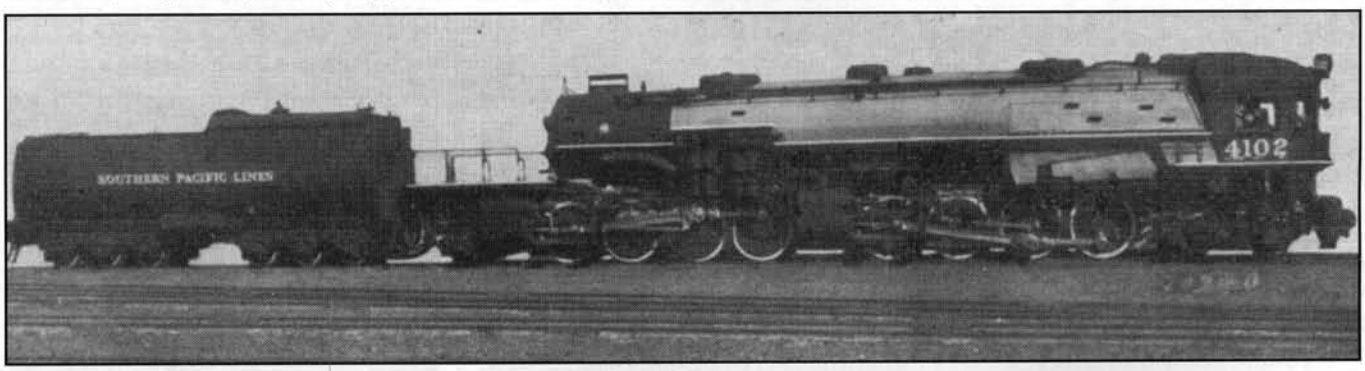
One of the New Shunting Locos for the L.M.S.



One of the New Three-Cylinder 4-6-0 L.N.E.R. Locomotives for the G.E. Section

1929: New Shunting Locos for the LM&SR.

The writer suggests that the new shunting engine, the first of which has just been completed at the Derby works of the *L.M.S.*, is a particularly suitable prototype on which model engineers can exercise their skill. They represent an entirely new class, (2F), and have been specially designed for operating in docks and goods yards. Flexibility is one of the principle considerations, and to meet this, the engines have their wheels grouped closely together, whilst the trailing axleboxes are of the *Cartazzi* type. With the same object in view, the coupling rods are ball jointed. The loco can traverse curves as small as 2½ chains (165ft. radius), and although the engine is small, a tractive effort of 18,400lbs. is achieved.



Mallet Locomotive (Oil Fired) for the Southern Pacific Railroad.

New 4-6-0 Express Engines, L.&N.E-R.

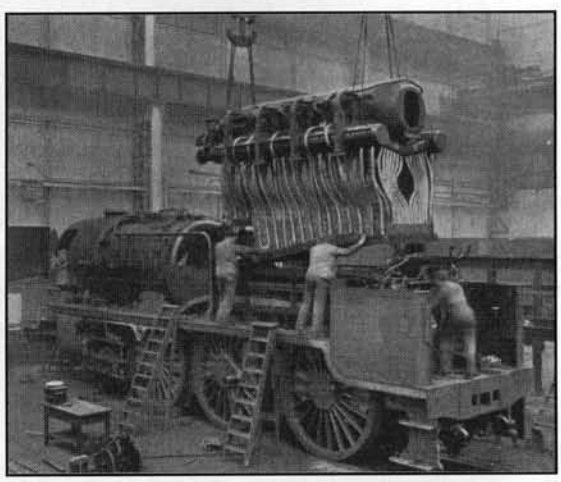
The latest express engine to be introduced on the *LNER* is a 4-6-0 with three cylinders, and the first of this class, No.2800, "Sandringham," (B17) is, by the courtesy of *Mr. H.N. Gresley*, illustrated herewith. Ten of these engines are being built by the *North British Co.* and are intended for working on the *G.E.* section. Cylinders 17½ by 26in., wheels 6ft. 8in., pressure 200psi., tractive effort 25,389lbs.

Mallet Loco for the Southern Pacific R.R.

A glimpse of progress, another photo of the cab-forward introduced back in 1911. Still the 4200 class and still the same basic layout. The main change, apart from cosmetic, is from compound to simple working. All cylinders are now 24 by 32in and the tractive effort is 102,760lbs. (These locos continued to work, in this form, until the end of steam, and maybe a bit beyond, in the U.S. Their particular stamping ground was the Donner Pass).

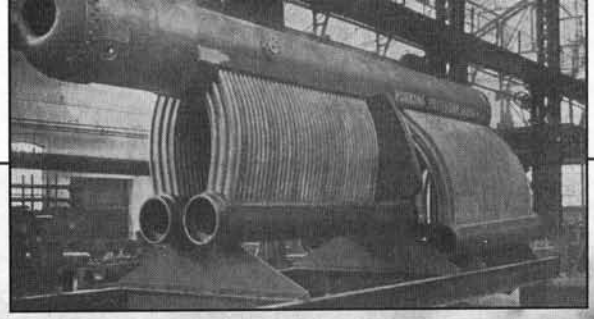
1930: LMS High Pressure Compound.

The general arrangement of the 3-cylinder H.P. compound, No.6399, "Fury", (basically a "Royal Scot)", and the three section boiler. The first portion is a closed circuit 1400-1800psi. firebox and heats the 900psi steam drum above via heat exchanger coils, (a bit like a domestic hot-water tank), the L.P. boiler, at 250psi, is a conventional firetube type. The 900psi drum supplies the cylinders, the exhaust to the L.P. cylinders being supplemented by the L.P. boiler.



Lowering the Water-Tube Firebox into Place during the Building of the L.M.S.R. Double-pressure Locomotive "Fury".

(After a lot of teething troubles, the trials were brought to a halt after a tube burst in February 1930, killing one man and seriously injuring another. Later, it was rebuilt with a taper boiler and called *British Legion*).

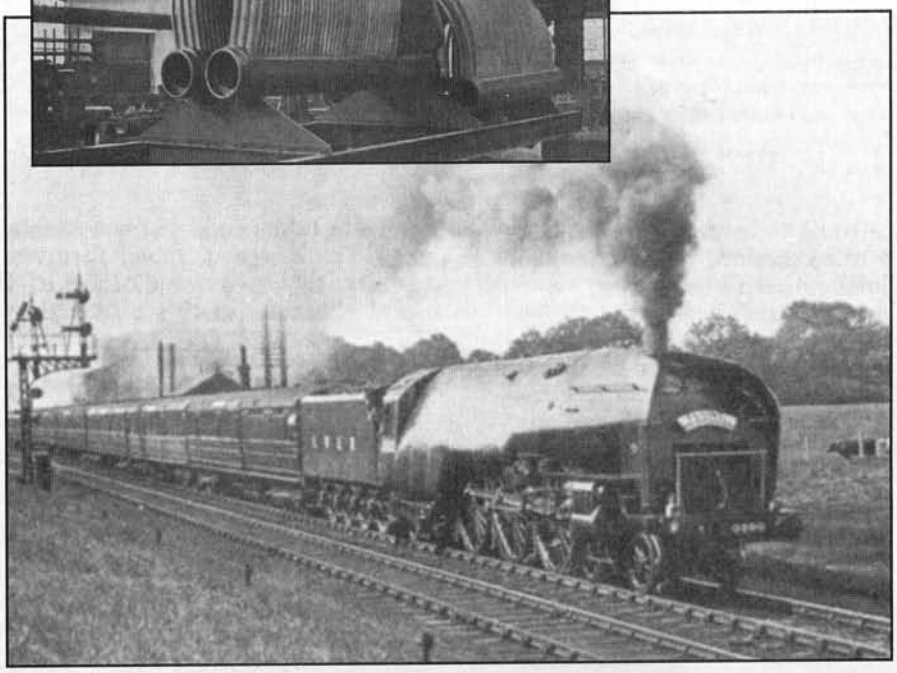


The high-pressure water tube boiler of No. 10,000.

LNER High Pressure Compound.

The high-pressure locomotive with water-tube boiler built on the *Yarrow-Gresley* system which has recently made its appearance, is shown in the photograph. The wheel arrangement is nominally 4-6-4, but as the two pairs of trailing wheels are separate units, strictly speaking it should be a 4-6-2-2. The engine is a four-cylinder compound with two inside H.P. cylinders at 12in. (later reduced to 10in.) and outside L.P. at 20 in., both with 26in. stroke. Steam is distributed by piston valves actuated by *Walschaerts* gear with intermediate mechanism for operating the inside valves. The boiler carries a working pressure of 450psi. Separate regulators are provided for H.P. and L.P., although the reversing lever is common to both, there is a separate lever to control the H.P. cylinder cut-off. Since the streamline casing had to be high in order to accommodate the top steam drum, the chimney had to be at a lower level. This problem was overcome, in conjunction with wind tunnel tests on a wooden model, by bringing the casing forward and sloping the smokebox front to deflect the exhaust upwards. How successful this arrangement has been can be seen in the photo of No. 10000 with the smoke going well clear of the cab.

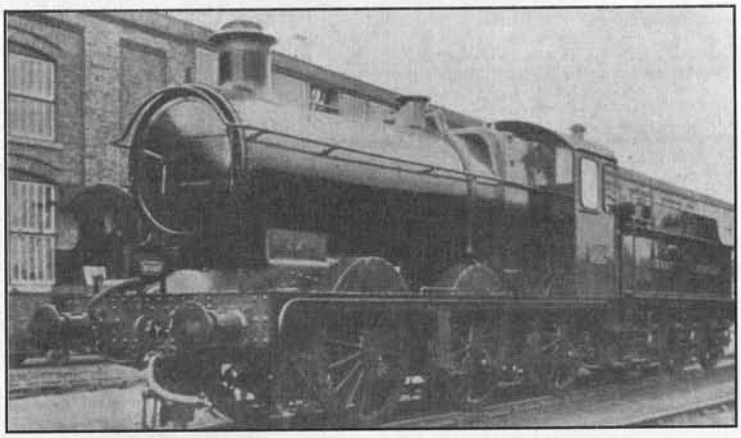
(Although the loco performed very well in service it was troublesome to maintain and was eventually rebuilt as a conventional "streamliner", class W1, the only 4-6-4 tender loco. No. 10000 was intended to be called *British Enterprise*, but it never got its plates. *Ron Price*, of the *NLSME*, has built a beautiful 3½ in. gauge model, and has rectified that error).



L.N.E.R. No. 10000, ascending Hadley Wood bank at 45mph, with "Flying Scotsman."

New G.W. 0-6-0.

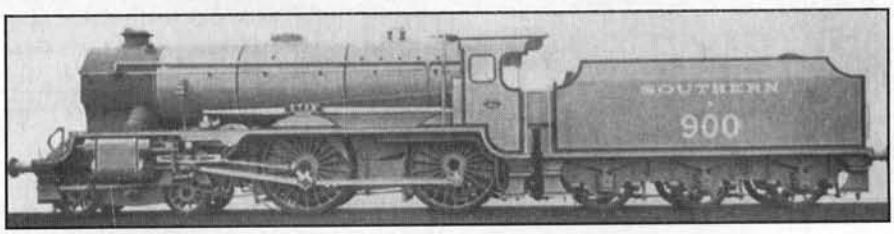
The new series is designated the 2251 class and develops a tractive effort of 20,155lbs at 85% boiler pressure, which latter is 200psi. It has two inside cylinders 17½ by 24in. stroke, driving the centre axle, valves actuated by *Stephensons* gear.



One of the New G.W.R. 0-6-0 Goods and Mixed Traffic Engines.

Latest British 4-4-0.

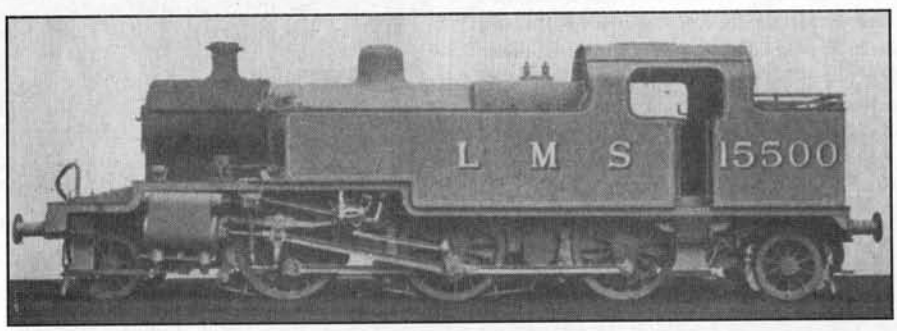
The new "Schools" class three-cylinder express locomotive, the first of which has recently been completed at Eastleigh, to the designs of *Mr. Maunsell*, is depicted herewith. The boiler is similar to the "King Arthur" class, but has a shorter barrel and carries a working pressure of 220psi. The tractive effort of the three cylinders amounts to 75% of that of the "Lord Nelson", making it the most powerful 4-4-0 engine in Great Britain. A separate set of *Walschaerts* is provided for each of the piston valves. Ten of the engines are being built at Eastleigh and will bear the names of public schools in the South of England. The first, No.900, is named "Eton."



One of the New "Schools" Class Locomotives.

A Workmanlike 2-6-2.

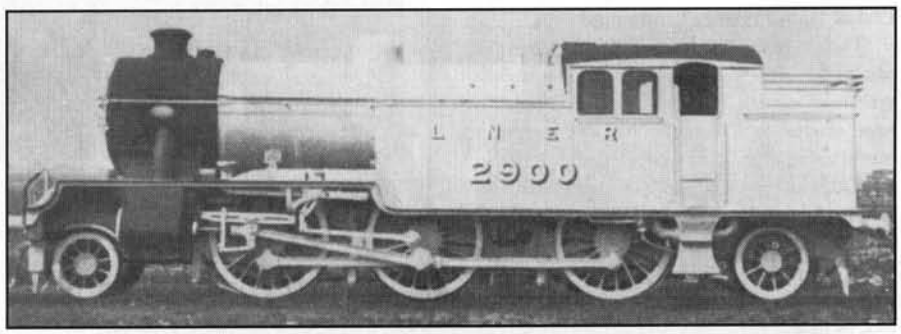
At the Derby works of the *LMS* the writer was enabled to inspect the first of a new series of two-cylinder, 2-6-2 tanks, 50 of which are to be built there. Some of them are intended for the London district and as such will be fitted with condensing apparatus, also a special vacuum trip cock to enable them to over the *Metropolitan* lines. The example illustrated, No.15500, is one of the non-condensing series. This is quite a modern type of tank engine, well adapted for the purpose of working suburban trains. They have been designed to give a tractive effort of 21,486lbs at 85% of the 200psi. boiler pressure and have the following dimensions: — cylinders 17½ by 26in.,wheels 5ft. 3in., weight 70½ tons.



One of the New Series of L.M.S. 2-6-2 Tank Locos.

1931: New LNER Tank Engine.

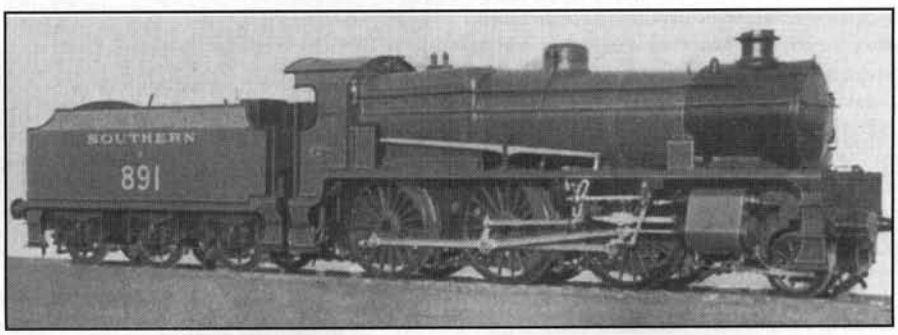
Hitherto, the 2-6-2 wheel arrangement has not been associated with the *LNER* or any of its constituent companies. Just recently, the first of a number of such engines has been completed at Doncaster. These locos, which will be known as the V1 type, have three cylinders of 16 by 26in., all three cylinders and valve chest being cast in one piece. The general arrangement is very similar to that of other 3-cylinder engines of the *LNER*, all cylinders driving on the second pair of coupled wheels. A feature of this class of engine is that its wheels are of a fair size, viz., 5ft. 8in. This ensures that the engine will be able to handle fairly heavy loads at relatively high speeds. The boiler pressure is 180psi., weight 84 tons, tractive effort 22,404lbs.



New 2-6-2 Type 3-Cylinder Tank Engine, L.N.E.R.

New " 2-6-0 Locos for the S.R.

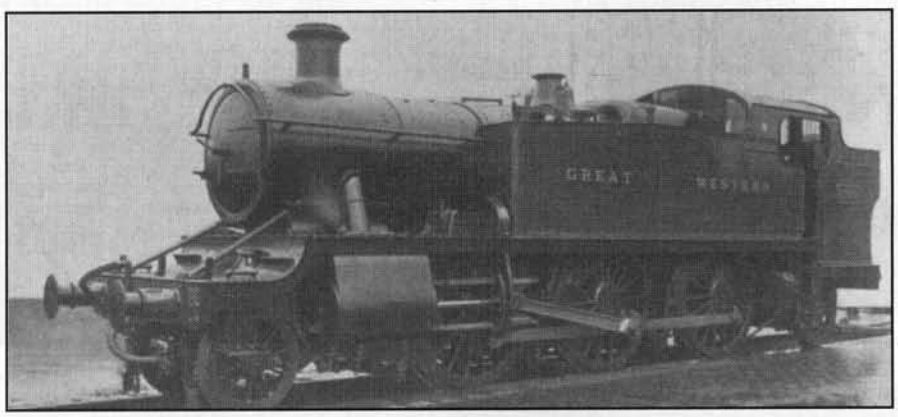
A new series of 20 three-cylinder passenger locos have recently been completed at the *Southern Railway* work at Eastleigh. They are known as the U1 class. All cylinders drive the middle pair of wheels and have three sets of *Walschaerts* gear. They have taper boilers with *Belpaire* firebox at 200psi. Many of the parts are interchangeable with the N1 class already in service. Cylinders 16 by 28in., wheels 6ft., weight 65 tons 6 cwt., tractive effort 25,387lbs.



One of the New 2-6-0 Locomotives now in Service on the S.R.

New Metropolitan Tank Locos for the G.W.R.

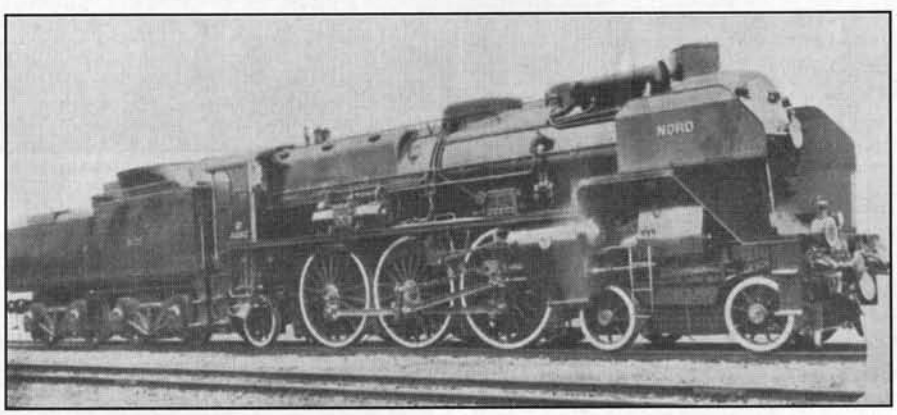
There are now in course of construction 60 new tank engines especially adapted for working in London on what is termed Metropolitan suburban traffic. They are 2-6-2 type (6100 class) with outside cylinders driving the middle pair of wheels, with inside *Stephensons* link gear. They have a tractive effort of 27,340lbs as compared with 24300lbs of the 5100 class. Cylinders 18 by 30in., wheels 5ft. 8in., pressure 225psi., weight 78½ tons.



New "Metropolitan" or "London Suburban" Type Tank Engine, G.W.R.

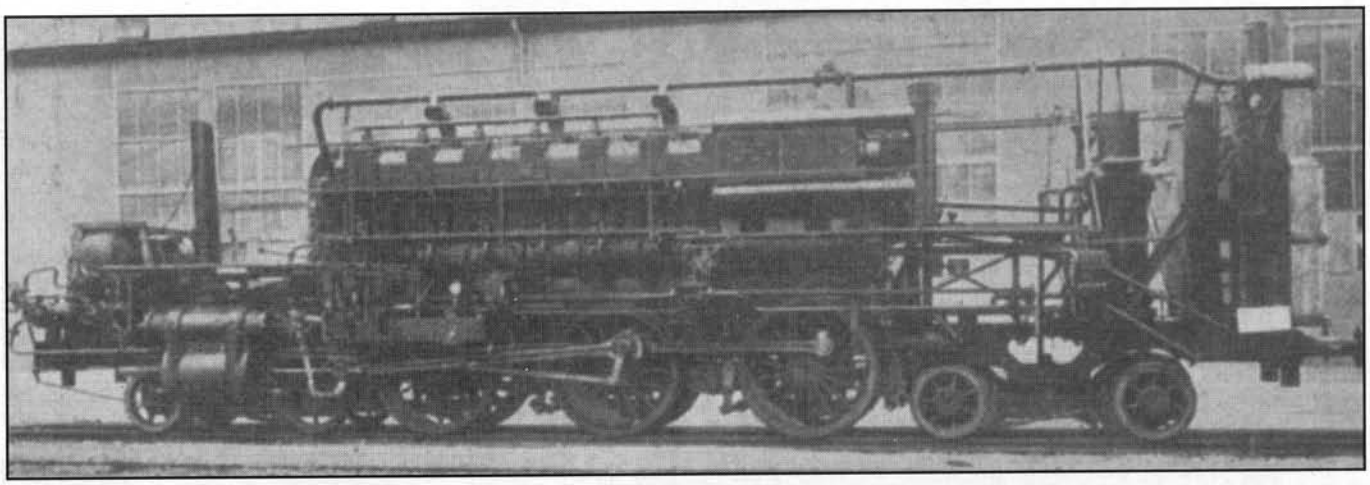
Other Events included: Two of the *LNER* Shire class being fitted with Lentz poppet valves, the *Raven* Pacific's being converted and fitted with *Gresley* boilers, *City of Truro* went to the *LNER* Museum in York, the **LMS Garratt's** were equipped with *Beyer-Garratt* self trimming coal bunkers, these were of a tapering circular form with the smaller end of the cylinder attached to a bearing at the rear of the tender and resting on rollers at the front. Having filled the bunker via the three double doors provided, the bunker can be rotated by a small steam engine to bring the coal forward, as required, on the run.

1932: NORD Super-Pacific. During a recent visit to France the writer was permitted to make an inspection of some of the latest locomotives, among them being the "Super-Pacific" of the *Northern Railway*. Test runs have proved these engines to be capable of averaging speeds of 60 to 64 mph with trains of 500-540 tons, exclusive of engine and tender, and of maintaining a speed of 60 mph up the long 1 in 200 bank outside Paris. The engines are four-cylinder compounds, the L.P. cylinders between the frames drive the leading axle, and the outside H.P. drive the middle pair. Boiler pressure is 246psi and there are two regulator valves, placed in separate domes, enabling steam to be admitted direct to the L.P. cylinders to overcome starting resistance with heavy trains. Cylinders; H.P. 17.32 by 26 in., L.P. 24.41 by 27.17in., wheels 6ft 3¼ in., weight 99 tons, tractive effort; compound 37,840, simple 50780 lbs.



Super-Pacific Compound Express Locomotive, NORD, France.

Railway Accidents. The provisional returns for 1931 show that 205 collisions and the same number of derailments were reported, compared with 242 collisions and 173 derailments in 1930. Eight passengers and thirteen servants were killed in train accidents.



Chassis of Compressed Air Diesel Locomotive, German Railways.

In "movement" accidents 146 servants lost their lives, as against 204 in 1930. While this last is a gratifying reduction, number of servants injured in "movement" accidents did not fall in proportion, as that figure was 2,633 as against 2,874. (A chilling reminder of the danger of railway work, particularly in shunting yards)

Compressed Air Diesel Loco for the German Railways.

It is usual in Diesel locomotives to utilise electric transmission, especially for the larger sizes, whilst smaller ones are equipped either with mechanical or hydraulically operated mechanism. The decision to adopt compressed air was partly come to owing to the fact that the loco could be built very largely on the lines of one operated by steam. The motor output is 987 bhp, running continuously at 400rpm. The tractive effort is 26400lbs, the coupled wheels having a diameter of 5ft. 3in. The cylinders are 27.56 by 27.56in., weight 122.6 tons.

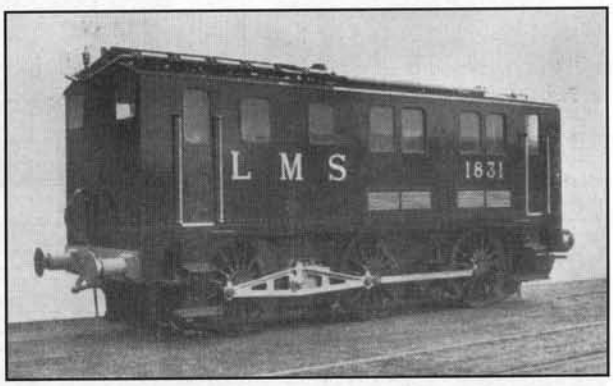
1933: New LMS Heavy Oil Shunting Loco.

The *LMSR* announce that, with a view to ascertaining whether economies can be secured by the use of heavy fuel oil, they have assembled at their Derby works a shunting engine of unique design. The engine, from *Davey, Paxman,* is of the six-cylinder type, 4-stroke, with solid injection. The transmission is hydraulic and is capable of infinite variation from 0 to 25mph. For the purpose of enabling tests to be carried out, the units were built onto the frames of a 3F steam loco, with a suitable casing and cabs.

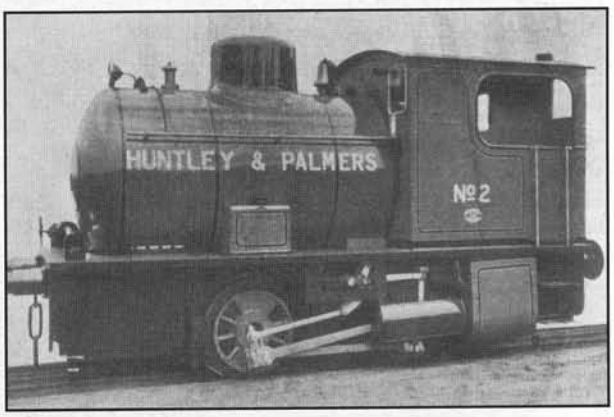
Fireless Shunter. The firm of *W.G. Bagnall* recently supplied to *Huntley & Palmers*, Reading, two 0-4-0 fireless shunting locos. As there is a large amount of steam available from waste heat boilers, the running costs will be low. The loco has outside cylinders driving on the forward pair of wheels with *Walschaerts* gear. The reservoirs have been made as large as possible, to prolong the intervals between charging, and to conserve heat, a 4in.coating of asbestos compound. It takes 25min. to charge from cold to full working pressure of 80psi, on average this will give 3 to 4 hours of shunting work. The time taken to re-charge is only 7min. The cylinders are 18½ by 18, wheels 3ft. 0½ in., reservoir pressure 250psi, tractive effort 11,400lbs.

New Pacific Locomotive, L.M.S.R.

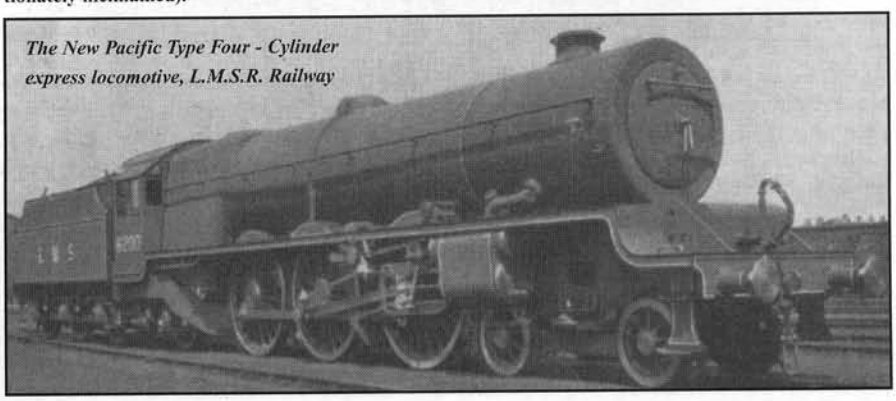
Everyone interested in locomotives is on the *qui vive* just now about the new Pacific engine turned out of Crewe works this week. The locomotive is now completed and the following is a brief description. The cylinders are arranged in pairs, the inside being over the front pair of bogie wheels, driving the crank axle of the first coupled wheels, whilst the outside cylinders are alongside the hind pair of bogie wheels and drive the middle pair of coupled wheels. Steam is distributed by four sets of *Walschaerts*. The boiler is of very large proportions and carries 250psi. Cylinders 16¼ by 28in., wheels 6ft. 6in., tractive effort 40,300lb. **(The first two locos were called *Princess Royal and Princess Elizabeth*, hence the "Princess" class, or 'Lizzies', as they were affectionately nicknamed).**



The new LMS oil-engined shunting loco with hydraulic transmission.



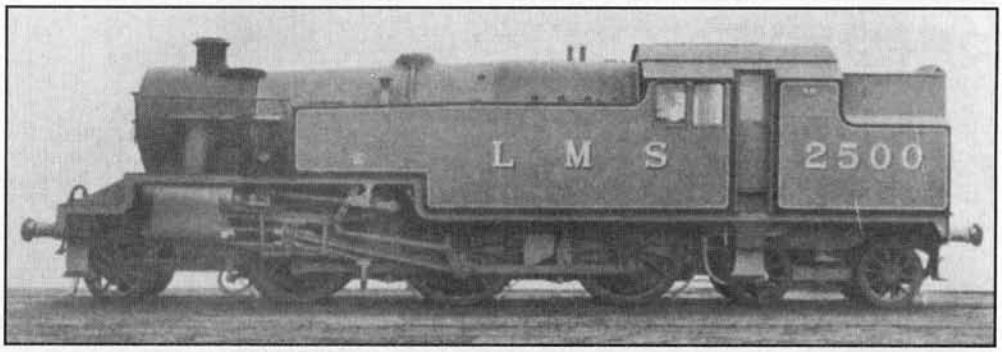
The Bagnall fireless locomotive for an industrial railway.



The New Pacific Type Four - Cylinder express locomotive, L.M.S.R. Railway

1934: New Three-Cylinder Tank, LMSR.

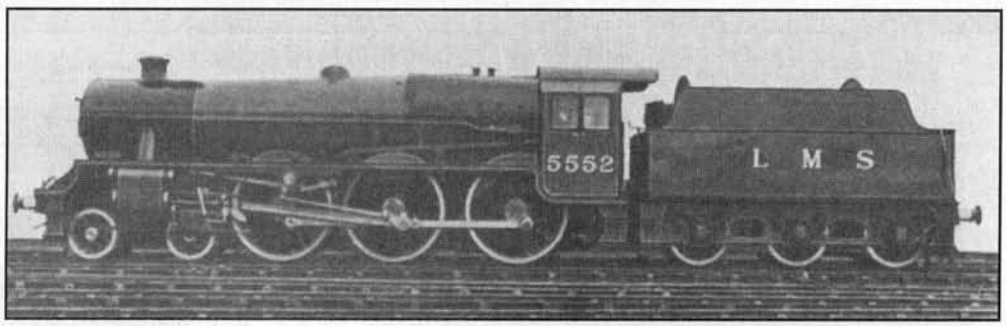
For working fast passenger trains on the *Tilbury* and other sections of the *LMSR*, 37 new 3-cylinder 2-6-4 tank locos are being built at Derby to the designs of *Mr. W.A. Stanier*. The three cylinders are placed in line below the smokebox and drive on the middle pair of coupled wheels. Three sets of *Walschaerts* gear are employed. The boiler has a tapered barrel with Belpaire firebox and top feed. The cab is all enclosed and the coal bunker is narrowed at the top to give better vision when running bunker first. Cylinders 16 by 26in., wheels 5ft. 9in., pressure 200psi, weight 92 tons, tractive effort 24,600lb.



New 3-cylinder 2-6-4 Tank Engine, L.M.S.R.

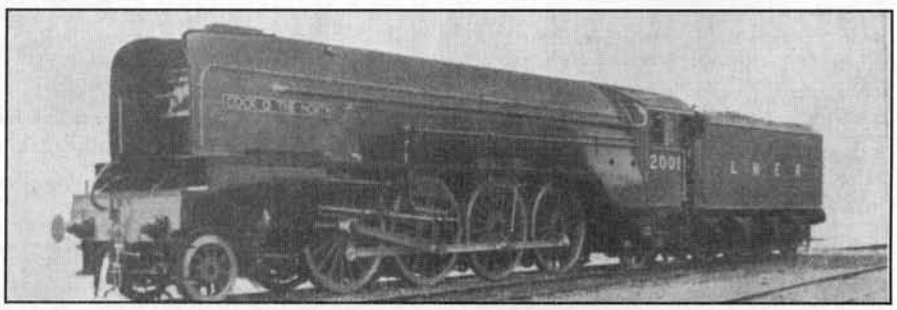
New LMS Express Locomotives.

In April the first of a new series of three-cylinder 4-6-0 express locomotives, No.5552 was turned out of the Crewe works, and proceeded on its steam trials prior to being sent to Euston to take part in the exhibition of locos and rolling stock to be held there. The writer was able to make an inspection of the engine and was particularly impressed by the excellent arrangement of the footplate. Everything being very accessible, while the engine-mens comfort and convenience has been studied by the provision of tip-up seats, ample cab ventilation and plenty of window space. Hinged glass flaps have been fitted on either side of the cab to give protection to the eyes when looking out from the side. The locomotive is of the 5XP class, the cylinder arranged so that the outside ones drive the middle pair of coupled wheels and the inside one the leading pair. Three sets of *Walschaerts* are employed. Cylinders 17 by 36in., Wheels 6ft. 9in., pressure 225lb., weight 80 fl tons, tractive effort 26,610lb.



New 4-6-0 3-cylinder Express Locomotive, L.M.S.R.

(Initially unamed, No. 5552 was given the name "Silver Jubilee", to commemorate the Silver Jubilee of King George the Fifth. I remember it passing the end of our garden, in 1935, with the Royal Train and being disappointed, having confused the *LMS* Silver Jubilee loco with the *LNER* "Silver Jubilee" train, and expecting to see a streamlined silver set!).

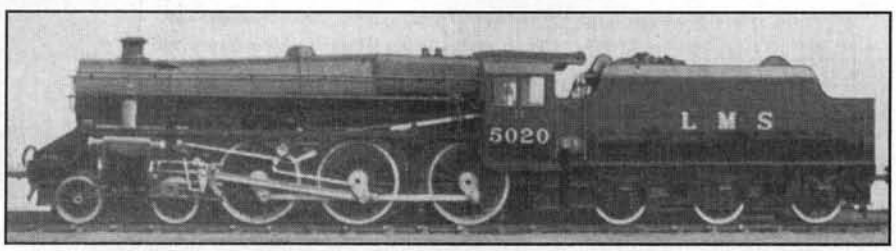


General view of New 3-cylinder 2-8-2 Express Engine, L.N.E.R.

A Remarkable British Locomotive.

Having been permitted to inspect under privileged conditions the 2-8-2 locomotive at Doncaster Works, the writer is in a position to state at first hand that this is one of the most remarkable locomotives ever produced for working on a British Railway. The idea in introducing the type, is to provide an engine that will be capable of dealing with the heavy loads on the difficult stretch of line between Edinburgh and Aberdeen and possibly between Edinburgh and Carlisle via the Waverley route.

Mr. Gresley decided to build a new type entirely, and in order to obtain maximum cylinder volume and adhesion has resorted to the 2-8-2 wheel arrangement. The wheels being large enough for fast running, the single leading and trailing axles affording an especially favourable means of disposing of the weight of the engine. The three cylinders are cast in monobloc form, and the first engine of the series, No.2001, is fitted with poppet valves. The second engine will have piston valves and *Walschaerts* so that comparisons can be made of the performance. The boiler is tapered and the front-end arrangement, known as the *K.C.*, having a double blast pipe and chimney, has been utilised. It is based on an invention of a French engineer, *Monsieur Andre Chapelon,* and is extremely effective in service. The front plate of the cab slopes forward and large windows are provided. The driver and fireman are accommodated with seats upholstered in leather, and everything about the footplate suggests space, freedom of movement and general accessibility. Cylinders 21 by 26in., wheels 6ft 2in., pressure 220psi., weight 110 tons 5cwt., Tractive effort 43,462lb. The whistle is placed in front of the chimney; it is of the chime pattern and produces a very pleasing note



The First of the Class 5, mixed-traffic engines, LMSR.

New Locomotives for the L.M.S.R.

The *LMS* is taking delivery of some new 4-6-0 locomotives, built at the *Vulcan Foundry*. They have two cylinders and are intended for mixed traffic, designated Class 5. Similar in appearance to the Class 5XP, another batch of which is being built by *North British*, but with smaller wheels of 6ft. diameter. The cylinders are 18½ by 28in., pressure 225psi., tractive effort 25,455lb.

The combination of a well-planned boiler with six coupled wheels of 6ft. diameter, and cylinders having a lengthened stroke, should make the engines very useful under a variety of circumstances. **(A rather low-key introduction to what was to become, probably, one of the most useful and best-loved engines ever produced. Even the photo was small!).**

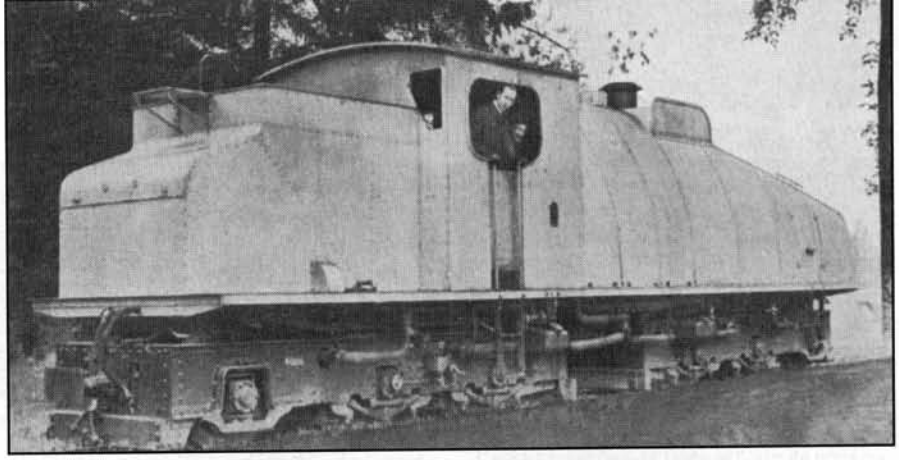
New "Sentinel" Locomotives. These locos were designed and built for a metre gauge line in South America. They are of the twelve-wheeled type, each six-wheel bogie being driven by three compound steam engines, one for each axle. The boiler, which is of the *Woolnough* water-tube type, works at 550psi. The tractive effort is 17,500lb. **(At first glance I took it to be an ex-WW1 armoured loco, perhaps they chose the shape so that it didn't alarm the local Armadillo population? It would make a very unusual model), [73/158].**

1935: German Streamlined Locomotives. The German Company *Borsig* brought out a good-looking loco, apart from the chimney. It was a 4-6-4, 3-cylinder with 7ft. 6in. wheels, designed to run at 112mph with a 250 ton train, seating 250-300 passengers. *Henschel* also brought one out, same wheel size and arrangement, but a tank version.

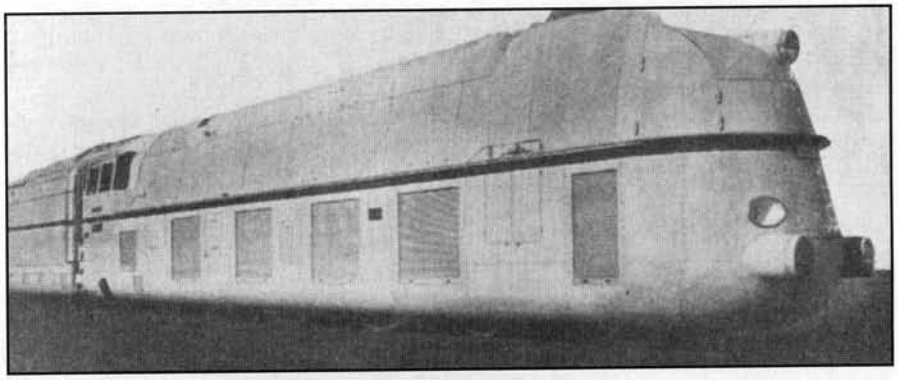
Turbomotive. The 3rd Pacific of the *LMS* "Princess" class, No. 6202, was modified and fitted with a turbine from *Metro-Vick* designed for an output of 2,000 hp, giving a tractive effort of 40,00lb. The main turbine was on the left-hand front of the loco with a smaller reverse turbine on the right. The drive is via a reduction gearbox to the front axle. The turbine runs with full regulator, the speed being controlled by six nozzle groups at the high-pressure end of the turbine, each of which has a control valve in the cab. The main turbine is permanently connected, the reverse turbine is connected via a dog clutch, which can only be operated when the loco is at a standstill.

LMS 2-8-0, 8F. Another new loco from the *LMS*, this time a freight engine, is the *Stanier* 2-8-0, similar in lines to the "Jubilee" and class 5, it has Two cylinders of 18½ by 28in., wheels 4ft 8½in., pressure 225psi, weight 70½ tons, tractive effort 32,438 lb.

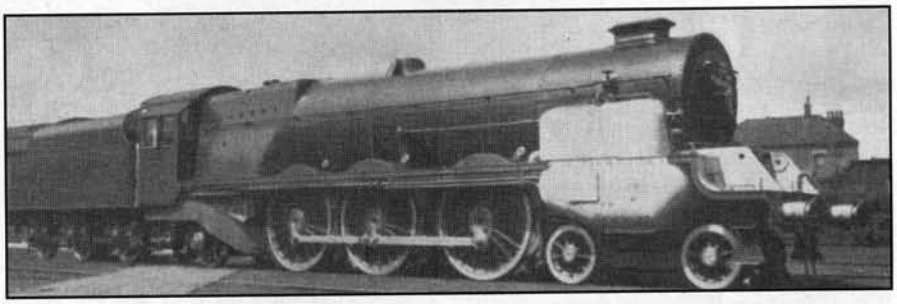
LNER Streamlined Loco and Train. Doncaster has just turned out the first of a new series of streamlined Pacific's, designated A4. No. 2509 bears the name "Silver Link". Under the casing, the three cylinders are 18½ by 26in., Wheels 6ft. 8in., pressure 250psi, tractive effort 35,455lb. It has a corridor tender with disc wheels and a special matching train built to accompany it, the whole known as "The Silver Jubilee". It consists of seven vehicles, of the articulated pattern, two twin sets at the front and rear, two restaurant cars and kitchen as a triple set in the middle. The bodies are panelled in steel and has a total tare weight of 220 tons with seating capacity of 198. To further reduce the air resistance, a skirting was fitted between the bogies, and the spaces between the ends of the vehicles closed by means of a special rubber sheeting with aluminium finish.



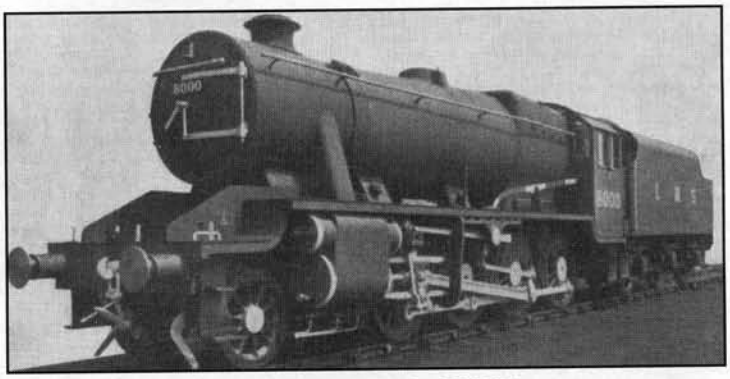
The "Sentinel" twelve-cylinder steam locomotive for South America.



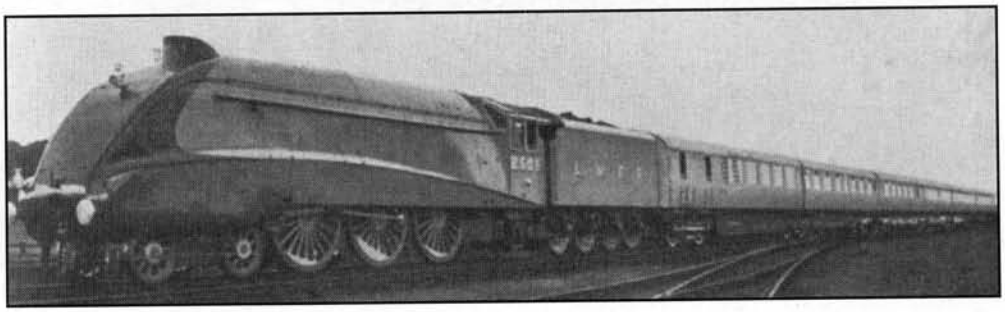
German fully streamlined 4-6-4 locomotive, with 7ft. 6in. coupled wheels.



LMS Turbine locomotive from front end (reverse turbine side).

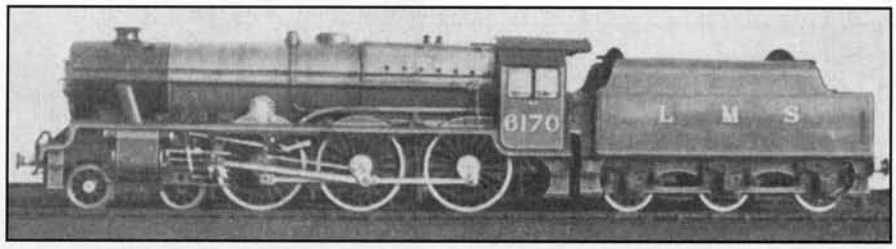


New 2-8-0 Freight Engine L.M.S.R.



New Streamlined Locomotive and "Silver Jubilee" train, L.N.E.R.

Rebuilt Royal Scot. Engine No. 6170, "British Legion", has just been turned out of Crewe Works fitted with a taper boiler. In the opinion of the writer, the appearance of the engine is much improved. It is intended to rebuild other engines of the class in the same manner.

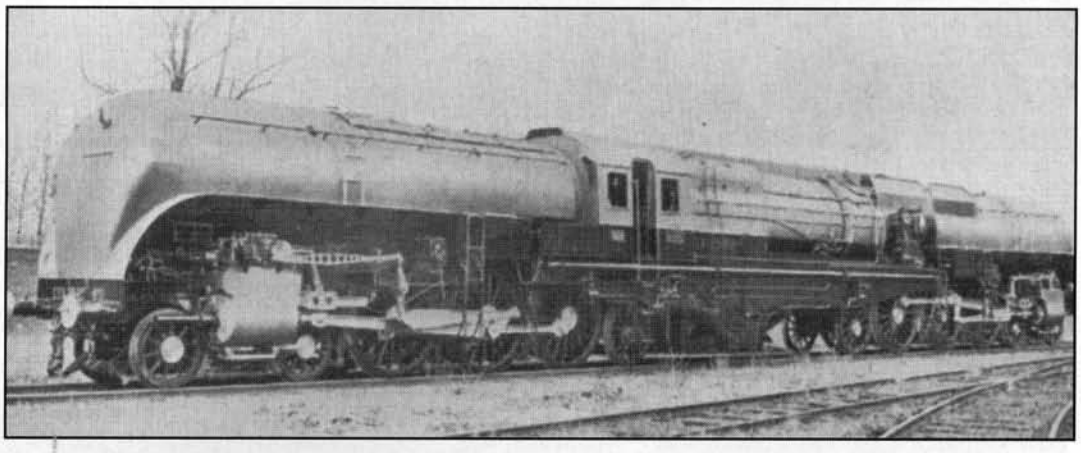


The Rebuilt L.M.S. "Royal Scot" No. 6170.

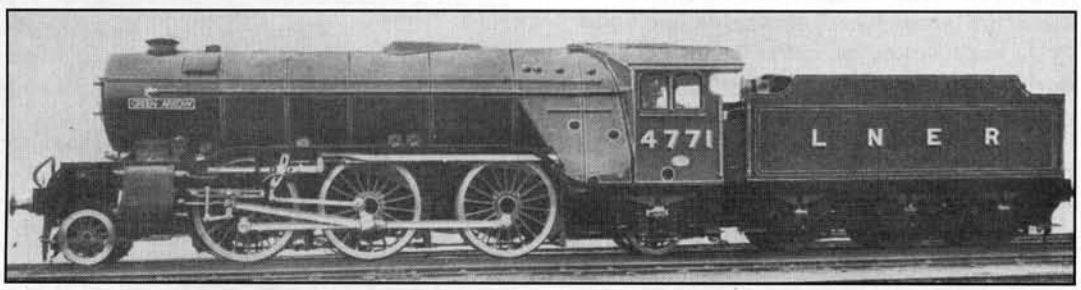
1936: Super-Garratt for Algeria. There has recently been completed, by the *Franco-Belge Co.*, at Raismes, France, the first of a series of twelve *Beyer-Garratt* express locomotives especially designed for service in Algeria. The wheel arrangement is 4-6-2 + 2-6-4. Semi-streamlining has been resorted to and the engine is equipped with *Cossart* valve mechanism with vertical piston valves, in which the valves and cam gear remain stationary whilst the engine is running with steam shut off. Electric motors are employed for reversing the valve motions of the four cylinders. This is operated by a small lever in the cab which can be adjusted, on the "infinitely variable" system, to the most minute points. These arrangements make it possible for the engine to work at a very early cut-off, and it is anticipated that this may be as low as 5% for long periods of running. The four cylinders each measure 19¼ by 26in. stroke. With a boiler pressure of 284psi, and twelve coupled wheels of 5ft. 11in., this represents a very powerful design. The boiler, though relatively short as is customary and indeed, one of the advantages of the *Garratt* system, has a large superheater area, there being 48 elements. The chimney is of the double pattern with variable blast pipes, unusual in that they are placed across the smokebox rather that in line. The total weight of the engine is 212 tons 8cwts.The tractive effort is 58,102lb. at 75% of boiler pressure. The engines have been designed to run safely at 75mph on the level and on curves over 2460ft. They can also run over curves of 656ft. radius at 31.1mph without danger. The writer, during the trials held in France, was particularly impressed by the smooth running of the locomotive, the manner in which it accommodated itself to the variations of the track, and the very rapid acceleration. The cab is commodious, and the reversing of the engine so easy and simple to effect, that it appeared to be not far removed from the adjustment of an ordinary wireless set.

New LNER Locomotive. The first of an entirely new class of loco has just been completed at Doncaster. It is a 2-6-2, numbered 4771 and named "Green Arrow". It has three cylinders driving the middle pair of wheels, and a large boiler with wide firebox. The dome cover is of a streamlined form, and the cab front plates and roofing are curved to form a prow along the top of the firebox, and incorporating the safety-valves. Cylinders 18½ by 26in., wheels 6ft. 2in., pressure 220psi, tractive effort 43,462lb.

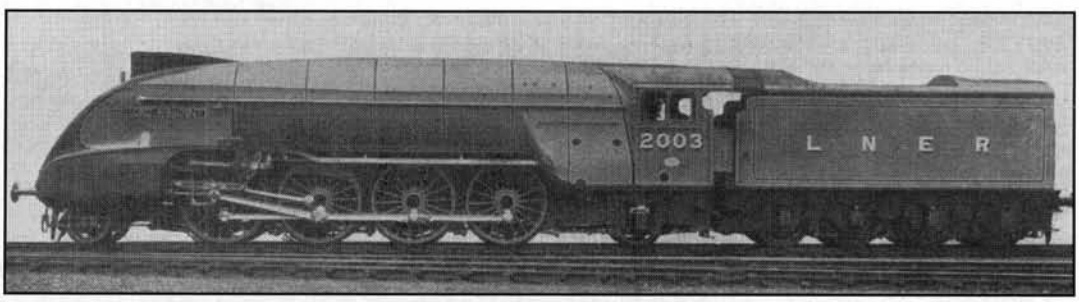
The LNER "Lord President." With further reference to the new series of 2-8-2 engines built at Doncaster, the first of the series, No.2003, "Lord President," class P2, is illustrated herewith. The front end is designed similar to that of the "Silver Link" engines. Of the four engines to be constructed, three will have boilers identical with *Cock O' the North*, but the boiler of the fourth will be altered in its proportions. It will have a longer combustion chamber, giving an increased heating area, extra superheat and various other changes. The chimney and blast pipes are of the double pattern, fitted in conjunction with *"Kylchap"* cowls. (Dimensions as for *Cock O' the North*). **(The name *"Kylchap"* was derived from a combination of Finland's Kyälä blast pipe and Chapelon of France, "not a lot of people know that").**



New Super-Garratt Locomotive, built in France for the Algerian Railways.



Three-cylinder 2-6-2 Locomotive, "Green Arrow."



New 2-8-2, 3-cylinder streamlined locomotive, "Lord President."

G.W.R. "Grange" class.

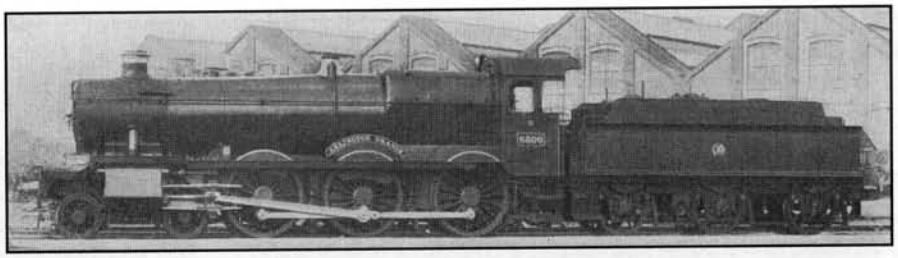
A new class of 4-6-0 locos being built at Swindon is the "Grange" class. The first to be completed is No.6800, "Arlington Grange." Cylinders 18½ by 30in., wheels 5ft. 8in., pressure 225psi, tractive effort 28,875lb.

1937: New Streamlined Locomotives.

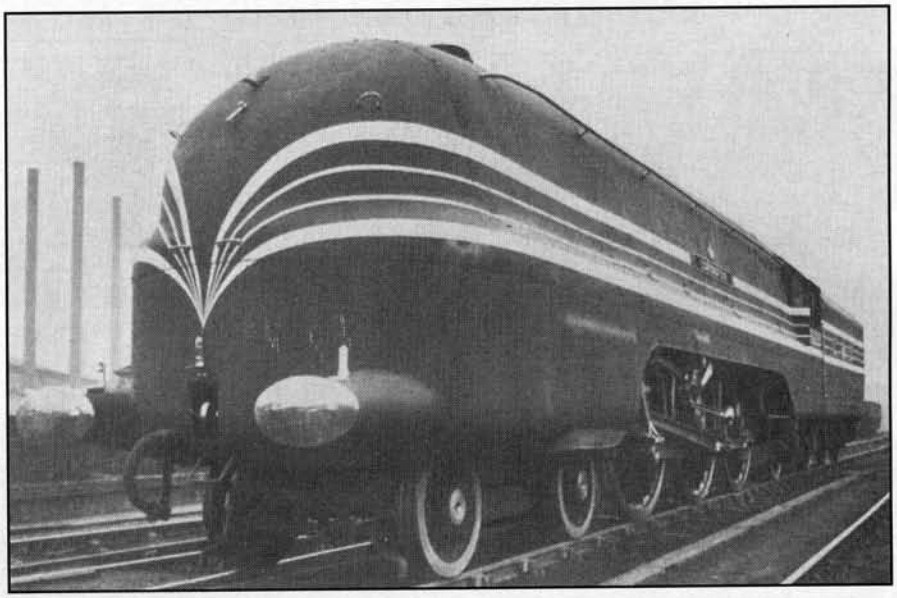
The first of a new class of streamlined 4-6-2 locomotives recently left Crewe works, No.6220, "Coronation". Four others are in hand. The cylinders are larger than those of the "Princess" class, and steam distribution is effected by two sets of *Walschaerts* instead of four. The motion being transferred from the outside to the inside piston valves by rocking levers mounted on needle roller bearings. The coupled wheels are also larger and the boiler has a larger grate and increased superheater area. The firebox is extended into the boiler to form a combustion chamber, and particular care has been taken to arrange the steam and exhaust pipes so that the smokebox is free, as possible of all obstructions to removal of ashes. The bulbous front of the streamline cover is formed in two parts with hinges, to give access to the door and interior of the smokebox. A steam driven "coal-pusher" is fitted to the tender to facilitate bringing the coal forward. Cylinders 16½ by 28in., Wheels 6ft. 9in., pressure 250psi, tractive effort 40,000lb. This, it should be noted, is lower than the "Princess" class due to the increased wheel diameter. The engines are painted in a medium shade of blue with silver striping, and the trains, now being built at Wolverton, have the same finish.

L.N.E.R. K4. To meet the conditions of the heavily graded West Highland section of the *LNER* a new 3-cylinder 2-6-0 has been built at Darlington, to be followed by others of the same design. The engine is similar to the K3 but has smaller coupled wheels and certain other modifications. The photo shows the general appearance of the loco, Which bears the No.3441, and the name "Loch Long." Cylinders 18½ by 26in., wheels 5ft. 2in., pressure 180psi, tractive effort 32,939lb., (K3 30,031lb.).

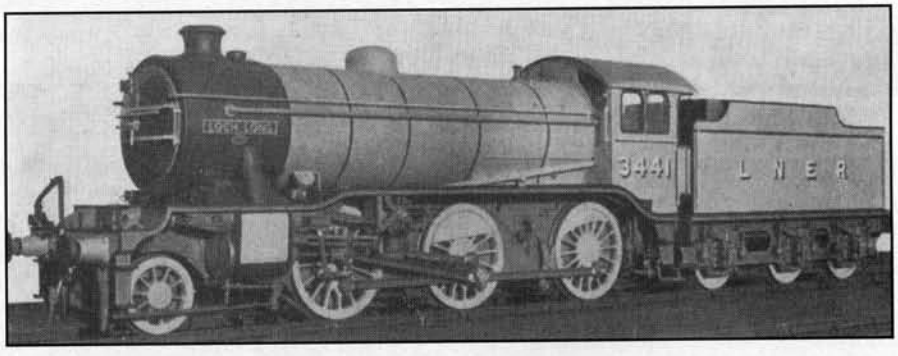
Heaviest Tank Engine in Germany. Some very heavy and powerful tank engines have been constructed in Germany over the past few years, the largest of them being for service on the *Deutsche Reichsbahn*. During a recent visit to the *Borsig Works* at Hennigsdorf, the writer was able to inspect what ranks as the largest tank engine yet built in Germany. It weighs 136 tons and has the unusually high maximum axle loading of 22½ tons. It is a 2-10-2, with two cylinders driving the centre pair of coupled wheels. It develops a maximum of about 2,468 h.p. and has been designed for a maximum speed 31mph. Cylinders 27½ by 26in., wheels 4ft. 3¼in., pressure 227psi, maximum tractive effort 66,150lb.



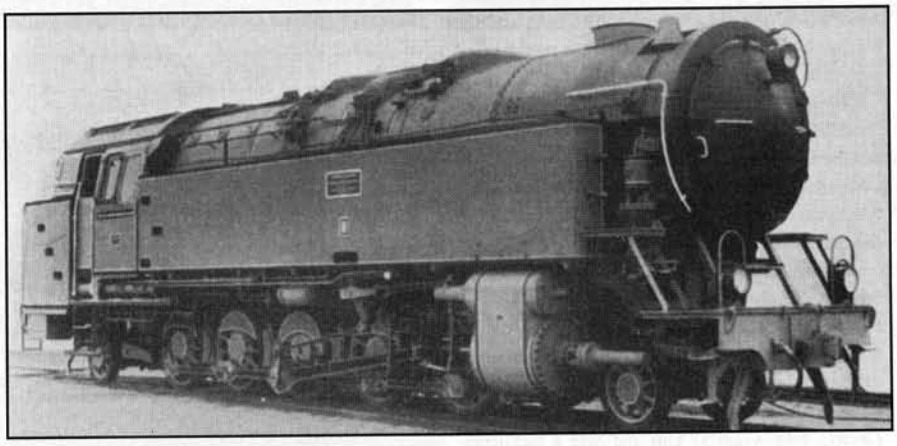
New "Grange" class 4-6-0 Fast Freight Engine, G.W.R.



A striking view of the new LMS streamlined locomotive at Crewe Works.

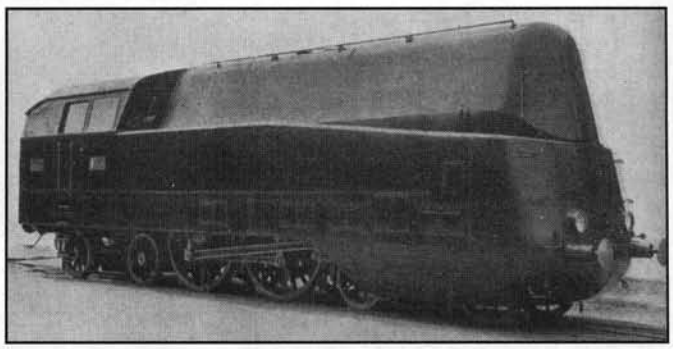


New 3-cylinder 2-6-0 engine, L.N.E.R.

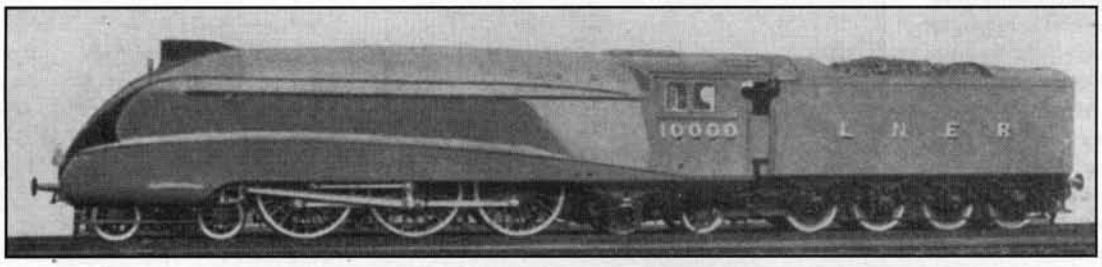


New 2-10-2 Tank Engine built by Borsig, of Berlin, weight 136 tons.

New Streamlined Tank Engine. The locomotive herewith illustrated is of the 4-4-4 type; built at the *Royal Hungarian State Ironworks* at Budapest for working light trains on fast schedules between the capital and some of the more distant towns in Hungary. It was necessary to keep down the weight on the individual axles, since the track, on many sections, is of a fairly light character. It is a two-cylinder engine, driving the rear pair of coupled wheels, with inside admission worked by outside *Walschaerts*. Cylinders 17 by 25½ in., Wheels 6ft 6¼ in., pressure 270psi, Weight 85,3 tons, tractive effort 14,300lb. Under test, the engines have shown themselves capable of maintaining a speed of 75mph, and of working quite smoothly at speeds of 95 to 100mph. The equipment includes a water purifier, speed recorder and turbo-generator for electric lighting. **(Looking at the *Henschel* experimental tank in 1935, I would have guessed that a streamlined tank was unique. Just goes to show. I wonder why British companies were loath to have turbo-generators and electric lighting?).**



New 4-4-4 high speed streamlined tank engine



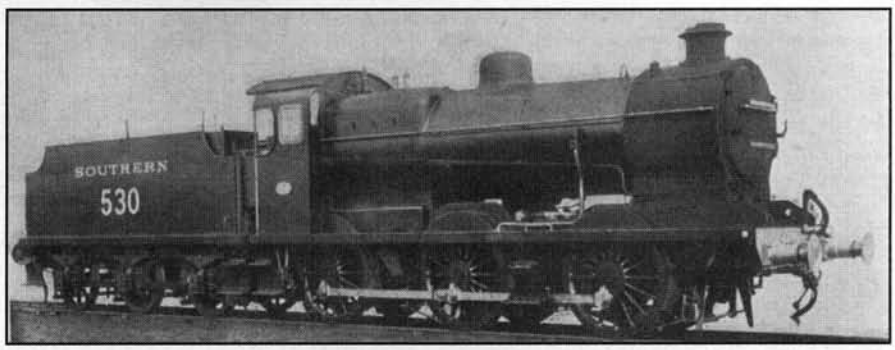
L.N.E.R. engine No. 10000 as recently converted.

1938: An Interesting Loco Conversion. Just recently, No. 10,000 has been converted from a four-cylinder compound to a three-cylinder simple. It now has a boiler similar to the 2-8-2, P2. With its 20 by 26in. cylinders and 250psi, it is capable of 41,437lb. tractive effort. It is designated W1, the only one of its class.

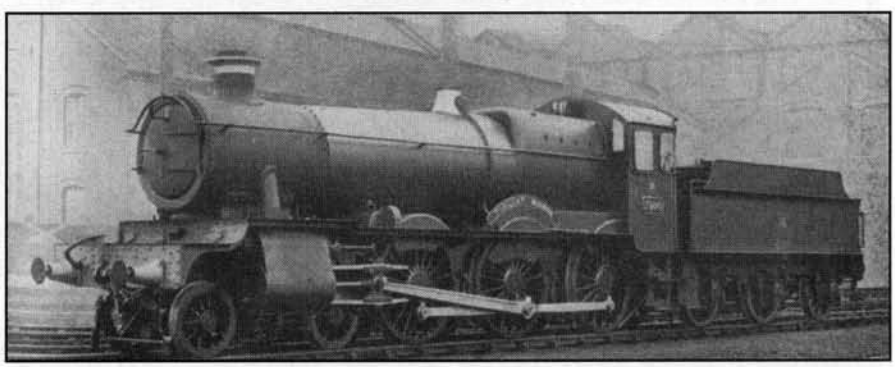
New Goods Engines for the S.R. Ten new goods engines of the 0-6-0 type with inside cylinders are being built at Eastleigh and the first of the series is illustrated herewith. They were the last engines to be designed by *Mr. Maunsell*, who vacated the position of C.M.E. at the end of 1937. The new series is known as the Q class, and has the following particulars: — Cylinders 19 by 26in., wheels 5ft. 1in., pressure 200psi, tractive effort 26,157lb. The cylinders have long-travel piston valves, operated by *Stephenson* valve motion, and steam reversing is provided.

New GWR 4-6-0 Engines. Locomotive No. 7800, "Torquay Manor," is the first of a series of 20 now being built at Swindon. Although very similar to other classes on the *GW*, particularly the "Grange" class, they have slightly smaller boilers and cylinders, and weigh 5 tons less. This will allow them a wider range of activity. Cylinders 18 by 30in., wheels 5ft. 8in., pressure 225psi, weight 68 tons 18cwt., tractive effort 27,340lb.

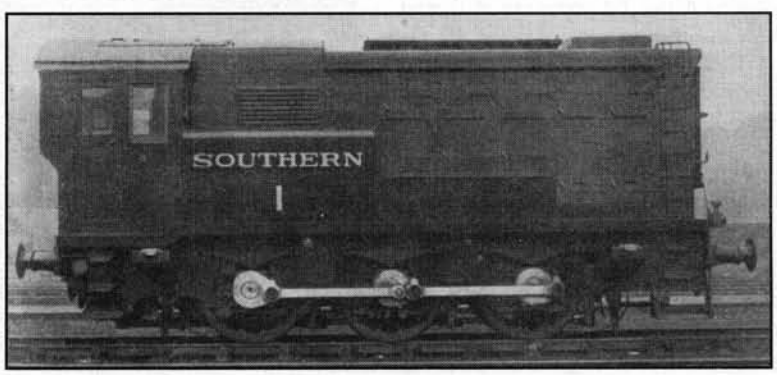
Diesel Shunters for the S.R. The loco illustrated is an oil-electric shunter recently put into service by the *S.R.* at their Norwood yards. Made by *English Electric,* they weigh 55 tons and have a maximum tractive effort of 30,000lb.



New 'Q' class goods engine, Southern Railway.



The first of the new "Manor" class engines, G.W.R.



New Diesel shunting locomotive, S.R.

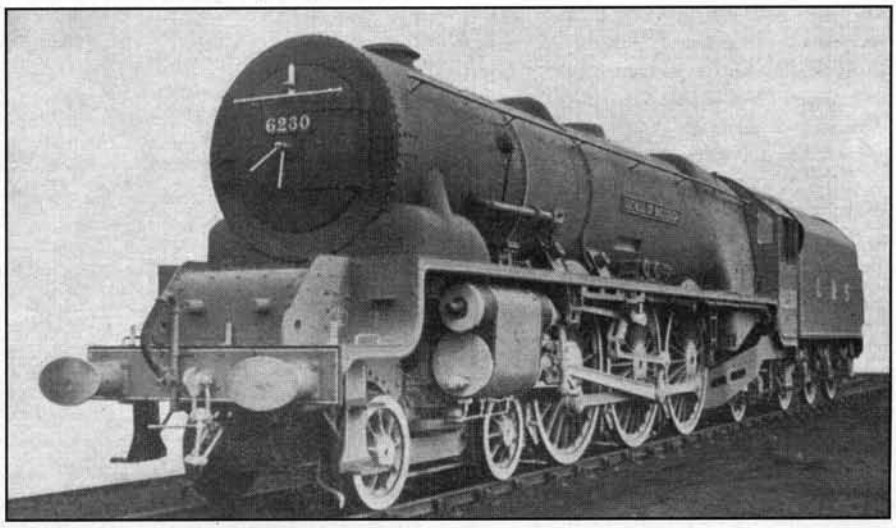
New Express Engines, LMSR. Five new streamlined locos are being turned out of Crewe Works, the first is No. 6225, "Duchess of Gloucester", in addition, five non-streamline versions are in course of delivery, the first of which is No. 6230, "Duchess of Buccleuch". Apart from one or two details, they conform to the same design as the "Coronation" class.

1939: New American Turbine Locomotive.

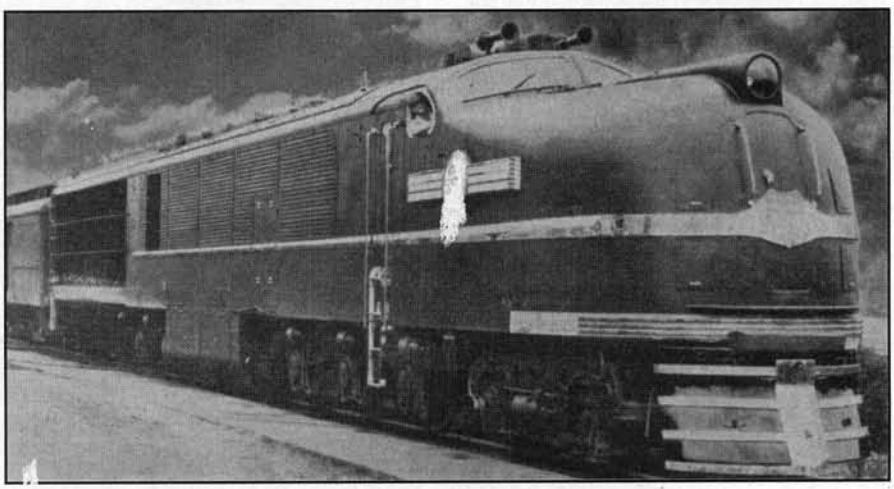
One of the most interesting developments of recent times is that carried out in America, where a turbo-electric condensing locomotive has just been completed by the *General Electric Company* for the *Union Pacific Railroad*. It has what is known in electric loco practice as the 2-C-C-2 arrangement. The loco is designed for single-end operation with streamlining to minimise wind resistance. An oil-fired boiler supplies steam for the main and auxiliary turbines. It is fully automatic and runs at 1500psi. The steam, as generated, passes to a separator where excess water is removes by centrifugal action and drained to the hot well. The steam then passes through the superheaters to the turbines, the exhaust goes to the condensers and the water returns to the hot well. Since it is a closed system, distilled water is used, thus reducing corrosion to a minimum. Although there must be some loss in the system, it can run 500 to 700 miles without stops for water or fuel. The 2500 h.p. turbo-generator drives the six axle-hung traction motors, controlled by varying the generator voltage by controlling the current in the exciter field. Electric braking is provided, in addition to a high-speed air brake, suitable for new and conventional trains. The locomotive consists of two identical units capable of multiple or independent operation under the control of one driver. Each unit weighs 236 tons, maximum operating speed 125mph. **(Not bad for 1939, sounds like Nirvana, I wonder what happened to it. I could not find any further reference to it, but noted that *U.P.* came out with a similar loco in 1951, again from *General Electric*, but powered by a 4500hp gas turbine, so perhaps it had problems).**

Streamline train in France. The loco is of the "Atlantic" type with compound cylinders. It was re-built and streamlined and has the latest form of superheat and the *PLM* variable blast pipe. In carrying out the alterations, the engine was fitted with electric lighting so that the various parts of the mechanism covered by the sheathing can be examined by the driver with ease.

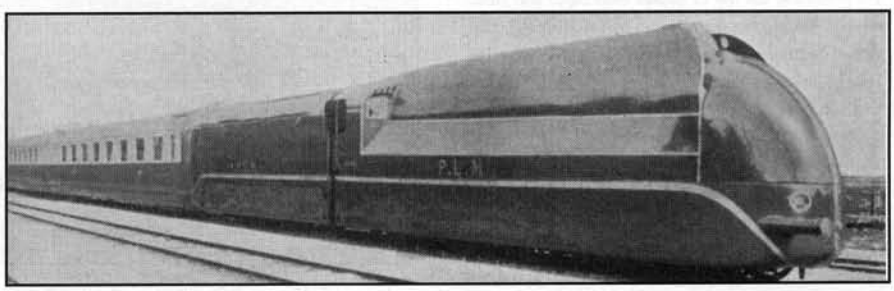
New German Streamliner. Claimed to be the largest and most powerful locomotive in use on any railway in Europe, **(tomorrow the world),** recently completed by *Fried, Krupp A.G.* of Essen. It is a 4-8-4 with three cylinders, the inside driving the leading pair and the outside the second pair of coupled wheels. Cylinders 20½ by 28¾ in., wheels 6ft. 6¼ in., pressure 284psi, weight 141½ tons, tractive effort not quoted. The locos are designed to haul passenger trains of 650 tons at 75mph on the level and 37 mph up 1 in 100.



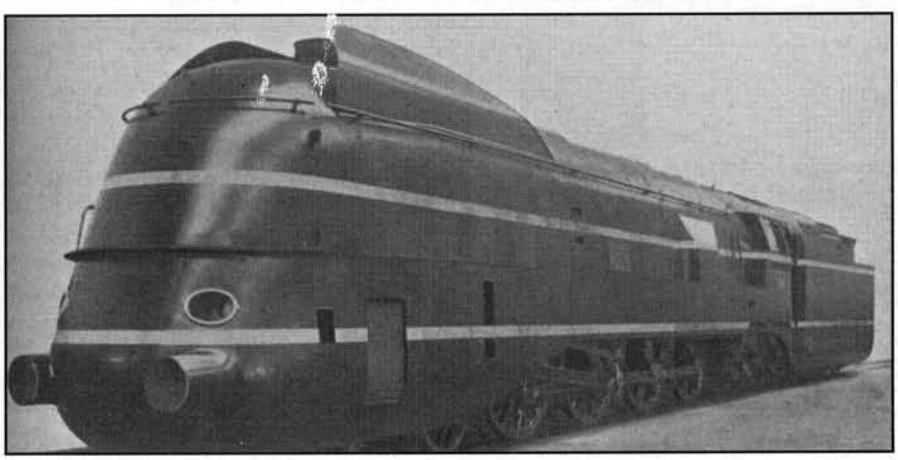
New non-streamlined locomotive, No. 6230, "Duchess of Buccleuch," L.M.S.R.



New Turbo-Electric Condensing Locomotive for the Union Pacific R.R.



Streamlined train on P.L.M. Railway, France. Engine 4-4-2 compound.



New streamlined 4-8-4 ocomotive with tender-wheeled tender. German State Railways.

Coronation Scot Train for America. One of the three new trains, provided for the Coronation Scot service from Euston, has been despatched to New York where it will appear at the Worlds Fair from April to October. It differs from the previous trains in that it is built on the articulated principle with three bogies instead of four per pair of coaches. The weight has been kept down by use of high tensile steel and welding on an extensive scale. Both locomotive and train are finished in standard *LMS* red with gold lining and lettering. During its stay, (which was to be extensive), an exhibition tour will be made of 38 cities.

Observation Cars. The type of coach known as an observation car is largely used in the U.S., but in this country there are few examples. One of these is the "beaver tail" saloon of the *LNER* used on the Streamlined "Coronation" express. **(More confusion, at least there was for me, now we had "Coronation Scot "on *LMS* and "Coronation" on the *LNER!*).**

1940: "Put that light out!" (Something of a blight descended on topical news and photos of British railways. From September 1939, there was a ban on news items, "likely to assist the enemy". At the same there were restrictions on photos of anything of a strategic nature, the railway companies asked holders of lineside permits to return them. From then on, the only news and photos was of overseas railways, not a lot from Germany. All the British contributions were re-hashes, in response to an editorial request for, "drawings of prototype locos of the more obsolescent varieties, many of which are readily adaptable to the needs of model loco enthusiasts," [81/314], and series on rail practice, such as signalling and loco lamps of bygone companies. After 1940, there was nothing, apart from the odd Editorial comment and "LBSC" snippets on *Channel Packet* and *Q1*.

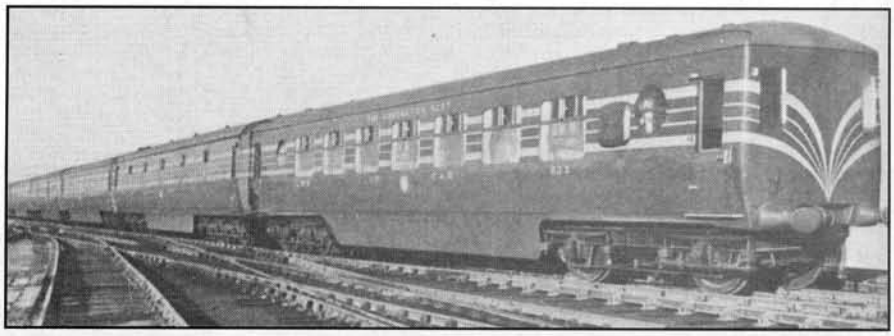
I suspect it was a combination of shortage of news and newsprint).

Blast pipes. A Warrington reader asks for an opinion respecting the use of double blast pipes and chimneys on locomotives. This opens up the fairly big question of front-end design and draughting arrangements. Briefly stated, the claim for duplicated fittings is that it produces a more regular exhaust from the cylinders and a more even draught through the tubes. Each cylinder of a two-cylinder engine has its separate means of getting rid of the exhaust steam through an independent outlet. Where there are three or four cylinders the same applies although not in quite such an individual sense. It is sometimes debated whether the full advantage of even draught is obtained when the blast pipes are placed in tandem in the smokebox, and it has been suggested that it would be better if they were set abreast of one another so as to be equidistant from the tubeplate, when, of course, the two chimneys would have to be similarly disposed on the smokebox top. This chimney arrangement was adopted for the Super-Garratt built for the Algerian railways, but the writer is not able to say what the results were.

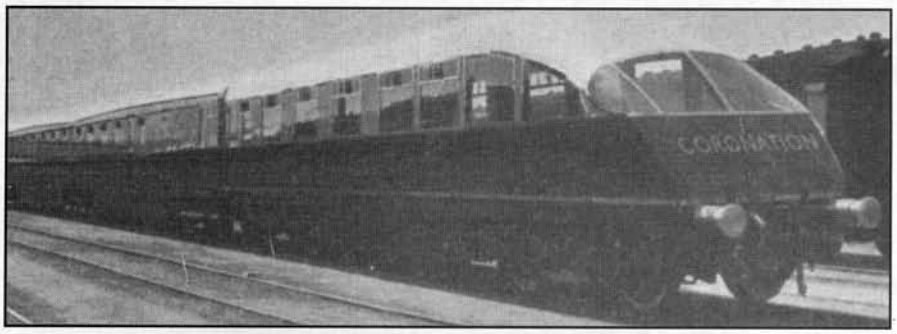
LMSR 2-6-2 Tanks. Back in 1930 a new class of tank engine, 3P, was introduced. These all had parallel boilers, later; *Mr. Stanier* brought out a modified version with a tapered boiler, a photo of which is shown. Both versions have continued to be produced, each having the same dimensions and tractive effort.

British-built Locos for New Zealand. A number of locos has recently, (1939), been shipped to New Zealand. The engines, 40 in number, are of the 4-8-2 type, and are to be known as the J class. They have been built by the *North British Co.* and are for mixed traffic working on the 3ft. 6in. gauge *Government Railway* system. All the wheels have roller bearing axle-boxes, also the return cranks, and the valve motion pins have needle roller bearings. Baker valve gear is used, with compressed air operated reverser, the firedoor can be air or hand operated. Electric lighting is provided. Cylinders (2) 18 by 26in., wheels 4ft. 6in., pressure 200psi, tractive effort 26,520lb.

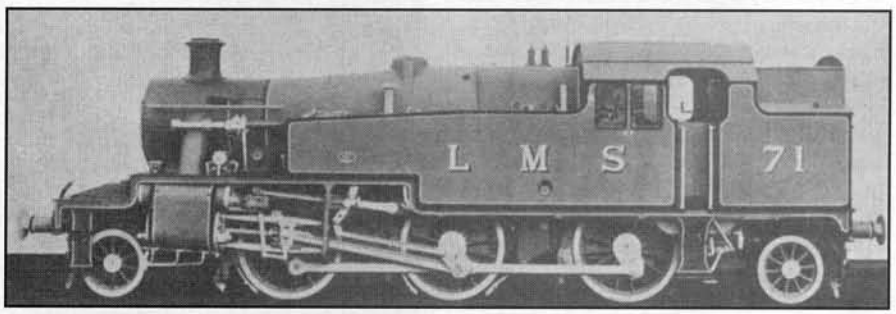
LMS 2-6-0 Loco. This class was first introduced in 1933, and could be described as the *Stanier* version of the Horwich "Crab". Cylinders 18 by 28in., wheels 5ft. 6in., pressure 225psi, tractive effort 26,288lb. ("Crab" 26,580lb.).



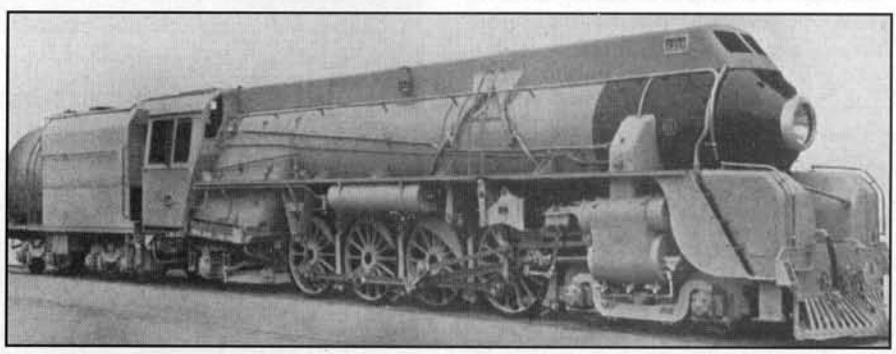
Streamlined articulated train, the Coronation Scot to be exhibited by the LMSR at the New York World's Fair



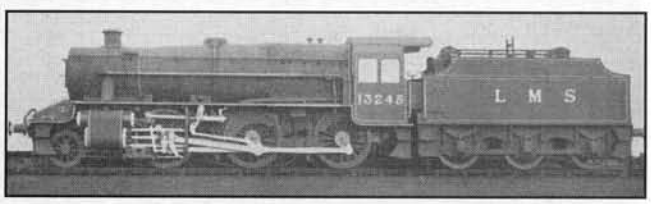
Observation car at rear of "Coronation" train, L.N.E.R.



One of the later class 2-6-2 tank, with tapered boiler, LMSR.

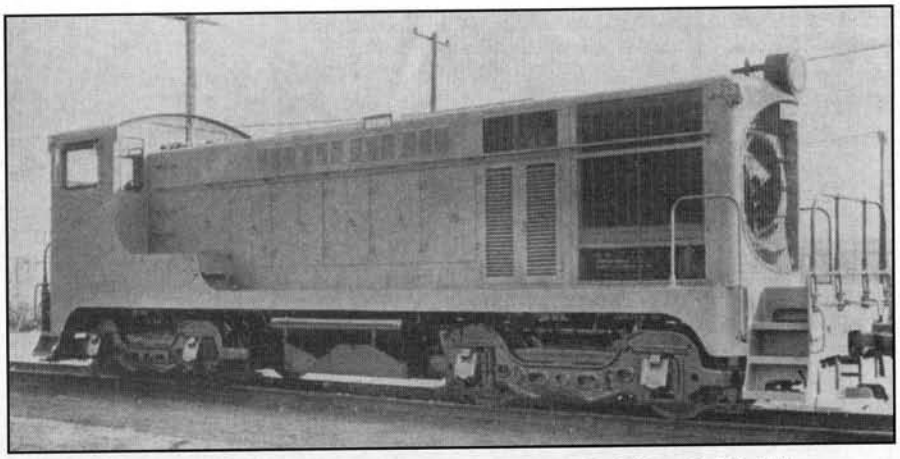


New "light" 4-8-2 locomotive, New Zealand Government Railways.



Stanier 2-6-0 mixed traffic engine, LMSR.

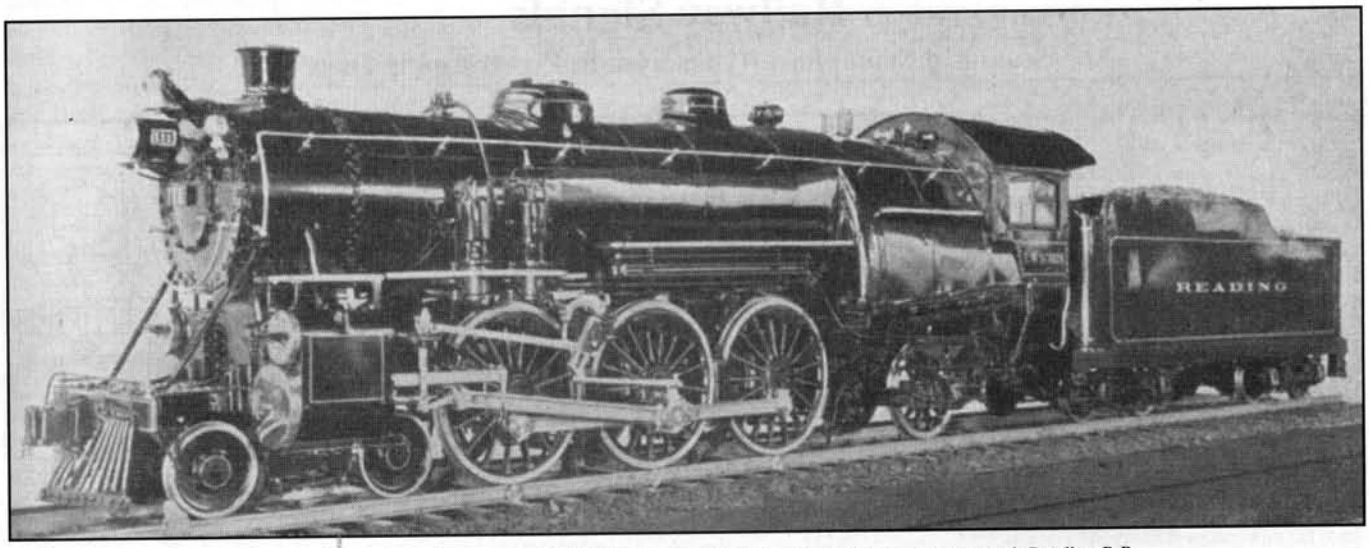
Interesting Diesel Locomotive. There was recently completed at the Eddystone Shops of the *Baldwin Works*, the first of 28 powerful Diesel electric locos for shunting service in the yards of the *Atchison, Topeka & Santa Fe Railway*. These are divided into two separate groups, one with eight-cylinder, the other with six-cylinder, developing 1000 and 660 h.p. respectively. The 1000 h.p. unit has a continuous rating of 33,600lb. tractive effort at 8.3mph. The engine is directly coupled to a *Westinghouse* generator, supplying power to the four axle hung series-wound force ventilated traction motors.



One of the 1,000 h.p. Diesel locomotives, Atchison, Topeka & Santa Fe R.R., USA

Built by Apprentices————By Chas. S. Lake, M.I.Mech.E M.I.Loco.E.

Through the good offices of *Mr. Roy V. Wright*, Managing Editor of *Railway Age*, and the courtesy of Mr. A.K. Galloway, Superintendent of Motive Power and Rolling Stock, *Philadelphia & Reading R.R.*, the writer is enabled to deal in these notes with the subject of the interesting model locomotive shown in the accompanying illustration. It has been constructed by some of the apprentices at the company's loco works at Reading, Pa., who term themselves the "Junior Boosters", in their own time and with the approval of the management. The apprentices felt that the project would be a valuable addition to their shop training and provide a good deal of pleasure as well. It was decided to build an exact one-eighth scale model of the P&R 4-6-2 class G-1-sa. The finished engine, now on display, is the result of their perseverance in the work of planning and building the model. It bears the name of *E.W. Scheer*, President of the company. They made their own drawings and patterns, machining parts and building the boiler complete, together with the task of assembling the components to form the finished locomotive. The result is a complete working model of a modern 4-6-2 locomotive. Cylinders 3⅛ by 3½in., wheels 10in., pressure 40psi, 1712lb., tractive effort 116lb.

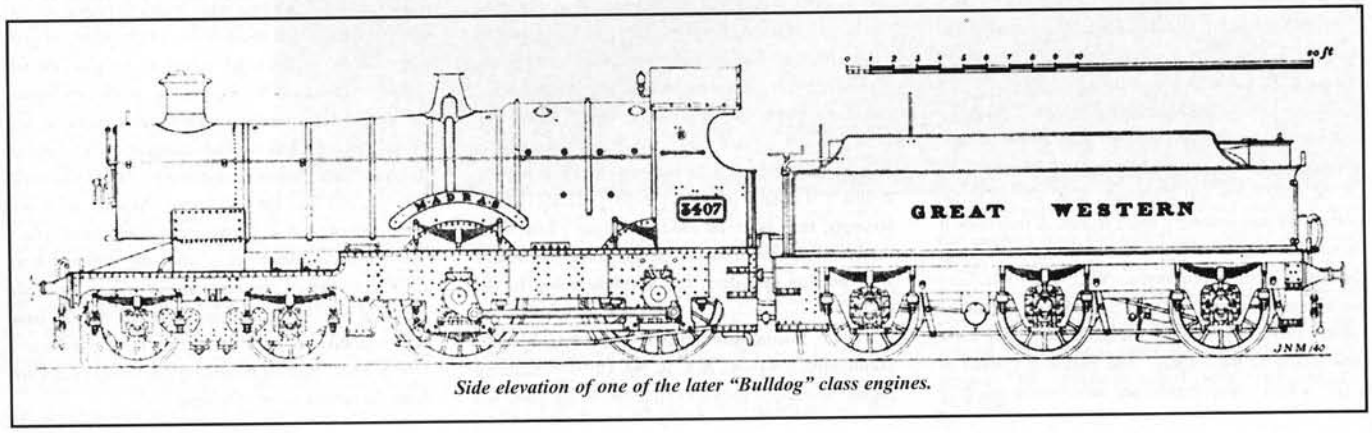


A one-eighth scale working model of a 4-6-2 engine built by apprentices of the Philadelphia & Reading R.R.

(I appreciate that this is not prototype, but it is *Mr. Lake's* last article for ME, and I felt I should give him full rein).

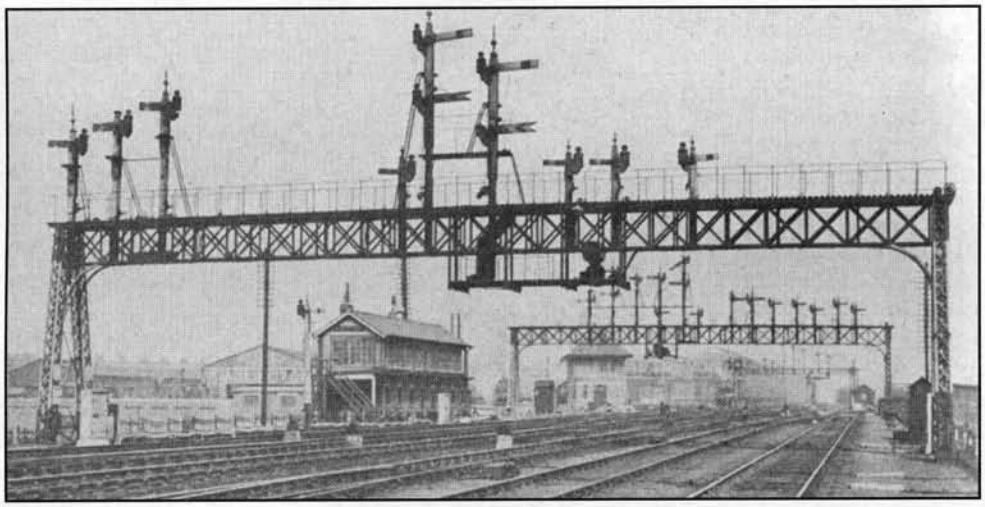
GWR "BULLDOG" by J.N. Maskelyne

In the ME for Oct. 10th last, there was an article by *LBSC* entitled "Outside Cranks", headed by a photo that has caused quite a lot of comment from our readers. I have been asked if I could find one that would have done more credit to a "Bulldog". In the hope that it may serve to placate those readers who have expressed some disappointment, I am publishing a drawing that I have recently completed. **(Shades of things to come).**



Side elevation of one of the later "Bulldog" class engines.

Introducing a new Series of descriptive articles



By O.S. Nock, B.Sc., A.M.I.Mech.E., m.i.r.s.e.

Railway Signals

Standard Semaphore Types used in Pre-grouping Days

Railway Signals. *O.S. Nock* began an interesting series on signals, covering a history of signalling and the way in which the companies chose to go, how they evolved, together with descriptions of operating systems, lamps, etc., up to the then current systems. [from 83/188].

May 1941: LBSC's Lobby Chat, new "Merchant Navy" class. The Southern Railway's "Channel Packet." "Since the above engine left the shops, I have received some correspondence and queries about her. I have no information to offer, beyond that which has already appeared in the technical press. Only her performance on the road in actual service will decide whether she comes up to full expectations or otherwise. However, many enginemen have been highly amused, to say the least, at the various descriptions that have been published. It is a treat to find, at long last, that some of the things that drivers have been coveting for years have been incorporated. Those of us who have gone around oiling up, or looking for faults, with a smoky torch-lamp on a windy night, will welcome the long overdue electric lighting (hear, hear) already extensively adopted in the USA and elsewhere". (he goes on at length, [84/428] "Just one point before leaving the subject. The question of streamlining, as applied to locomotives, is a debatable subject that I propose to steer clear of; but the majority of enginemen prefer to see 'sweet beauty unadorned' and a number of the *LMS* Pacific's are running about minus the casing. Many of us would like 2-C-1 of the new *Southern* engines likewise in its natural state; I wonder if there is any hope?"

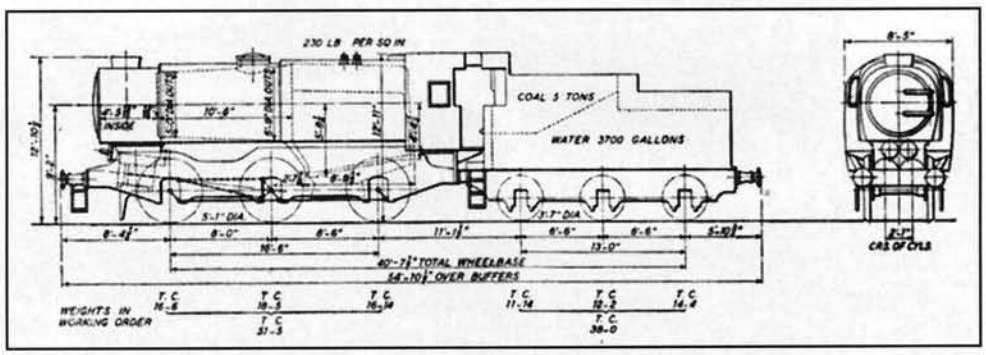
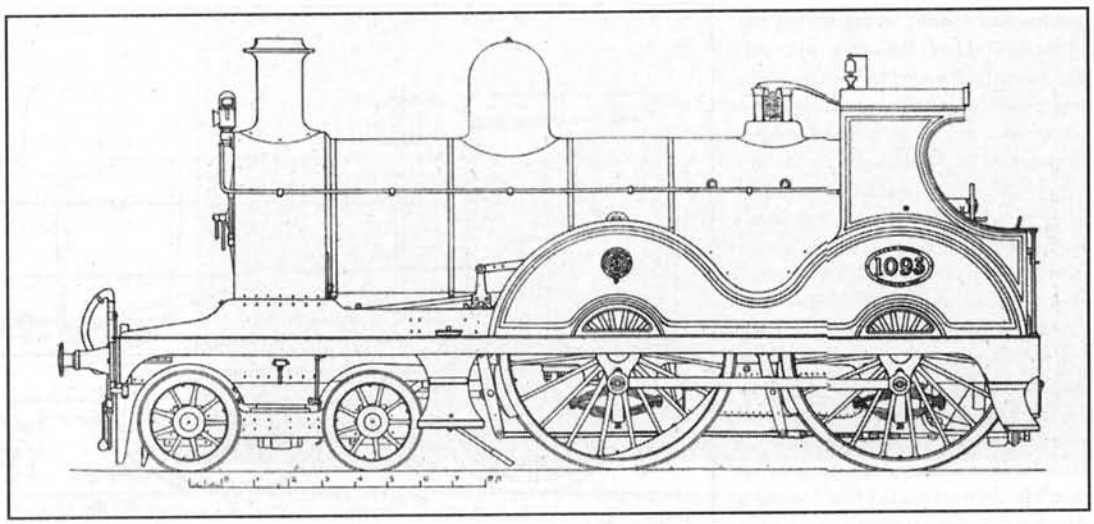


Diagram of the S.R. "Q1" Class 0-6-0 engine, reproduced by courtesy of "Modern Transport."

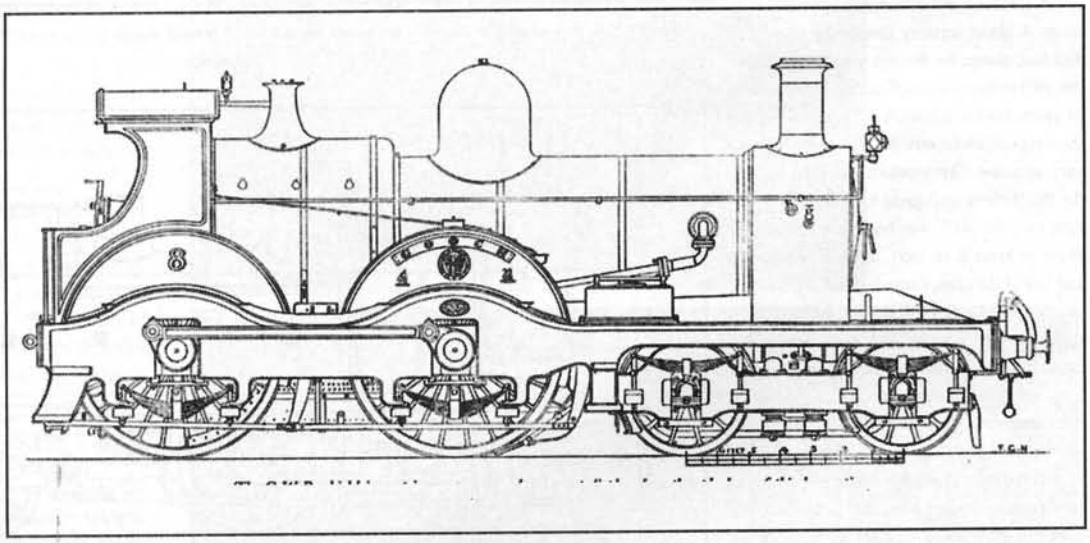
June 1942: THE SOUTHERN "Q1" By LBSC. "Some of the followers of these notes will have seen pictures of the new *Southern* goods engine, *No "C1,"* in the daily press and elsewhere, have written in for some information about a small replica, as they think it would be an easy subject to copy, having no running boards or other impedimenta. Well, some folk have curious tastes, surely! But as I'm here to do my best to please everybody wherever possible, here goes for a few words on the subject. The engine is classed as *"Q1,"* which in your humble servants opinion might be interpreted as standing for "queer one," which she certainly is; and the company calls it a freight engine. That is just one letter too many, leave out the "e" and you have a word that fits the engine exactly. I saw the pictures in the daily press and also read the various notices accompanying them. When the said daily press 'lets itself go' on technical matters, it beats comic papers to a frazzle. One journal vouchsafed the information that by leaving off the running-boards, cylinder flap and 'brass dome,' a total of *twenty tons* had been saved in weight!! We live and learn, surely; it is news to me that running-boards and cylinder flaps were made from armour plating as used in battleships, tanks and so forth; and I *did* think that I knew a little about full-sized locomotive construction! Also, the last brass domes on the Southern lines were, to the best of my knowledge, fitted to the *Wainwright* engines of the *S.E. & C.R.* in the early years of the century. Readers who want to build a small *"Q1"* can refer to the outline drawing which can be "scaled up" to whatever size engine it is desired to build. [86/567]. **(*LBSC* felt so strongly, that later in 1942 he began "Iris—The Antidote", a G.W. freelance 3½ in. gauge, like a 2251 with outside cylinders, the antidote being to the Q1!).**

1945: Locomotives Worth Modelling by F.C. Hambleton No.1—L. & Y. R. No. 1093. Wandering round the various model exhibitions in the good old days, I was frequently struck by the great variety of locomotive types that were on view. "What made that fellow choose that particular engine?" was a question I found often arising in my mind. Whatever the reason for the choice, one thing is certain: what a lot of types have at some time or another been perpetuated by the model engineer. And another thing is equally certain: what a wealth of locomotive design, both old and new, still awaits the attention of the enthusiast. Think for a moment of those delightful *L. & Y.R.* 4-4-0's, built by *Sir John Aspinall* at Horwich. They were fitted with *Joy's* valve-gear, that refuge and trusty friend of the little "live-steamer." I confess any engine so fitted always attracted me. Those two valve levers swinging up and down delighted one much drawn to the poetry of geometric motion. The employment of this gear, the tall 3ft. dome-cover, the black paint, etc., really proclaimed the fact that these engines traced their ancestral line from Crewe, for had not their designer been a pupil of the great John Ramsbottom himself. And if you could have peeped into the tall dome—"doom," as it was often pronounced at Crewe—you could have seen a double-beat regulator valve, and only different from *LNWR* practice in one respect; that when "shut," the regulator handle reclined over towards the left-hand side, a detail enough to have given heart disease to a *GW* or *LBSC* man on beholding this strange defection from the natural order of things!

No. 2, GWR, No. 8 *Gooch*. Everyone loves a contest, be it a Boat Race, a Cup Final, or a railway Race-to-the-North. Admirers of *GWR* engines must have been very thrilled, when, early in the spring of 1894, the first 4-4-0 express locomotive made its appearance. This newcomer, No. 7, *Armstrong*, was a four-coupled version of the already famous 7ft. 8in. single wheelers. Since it was seen that she carried an identical boiler, at 160 psi, could it be that she would prove a competitor to the wonderful "Singles" There is no doubt that *William Dean*, the designer of all these most attractive locomotives, was an engineer *par excellence*, and an artist into the bargain. And the competition? Well the truth of the matter is that these four new engines were the harbingers of things to come, not indeed at once, but from henceforth the single-wheeler type was to gradually decline, giving place, as the old must always to the new, to the four and six-coupled engines. True, no more *Armstrongs* were built, but three years later the next version of the 4-4-0, the *Badmintons*, with slightly smaller 6ft. 8½ in. wheels appeared, to be quickly followed by the unique *Waterford*, followed in 1900 by the *Atbaras*, which in turn led to the renowned *City of Bath* class. The contest was finished, leaving the four-coupleds the victors.



Aspinall's No. 1093 could be truly called a "Joy-to-behold!"



The G.W.R. shield in cast-iron was a grand ornament displayed on the splasher of this magnificent locomotive.

Light 4-6-2 Locomotives, S.R. SEVENTY 4-6-2 mixed-traffic locomotives are under construction for the S.R. The engines are designated "West Country class and are very similar in appearance to the well-known, but larger, "Merchant Navy" class.

The design has been specifically prepared by the CME *Mr. O.V. Bulleid*, to suit the restricted areas west of Exeter, where "Merchant Navy," "Lord Nelson," and other heavy, powerful locomotives are not allowed to go, owing to the load limitations on bridges and track. In view of this, therefore, the retention of the air-smooth casing is somewhat surprising, as it must add something like 3 tons of weight which apparently might have been avoided. These engines are three cylinder, and despite their light weight they can develop a high tractive power. Their equipment includes Mr. Bulleid's patent valve-gear, clasp brakes, thermic syphons in the boiler, automatic lubrication, (I never said a word), B.F.P. cast wheel centres, (similar to Boxpok), a turbo-generator for headlamps, cab lights and illumination of parts of the motion. Principal dimensions; cylinders 16½ by 24in, wheels 6ft. 2in., pressure 280psi, weight 86 tons, tractive effort 31,000lb. **(An interesting sidelight on the comment regarding retention of the casing. When the engines were re-built, they weighed four tons more. I suspect that the difference between conventional cleading, plus running boards, in weight was small, and the additional weight due to three sets of conventional valve motion was relatively large. The tractive effort was reduced to 27,740lb.).**