

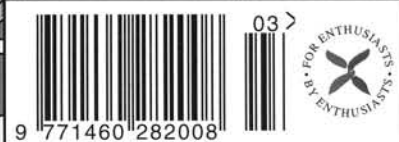
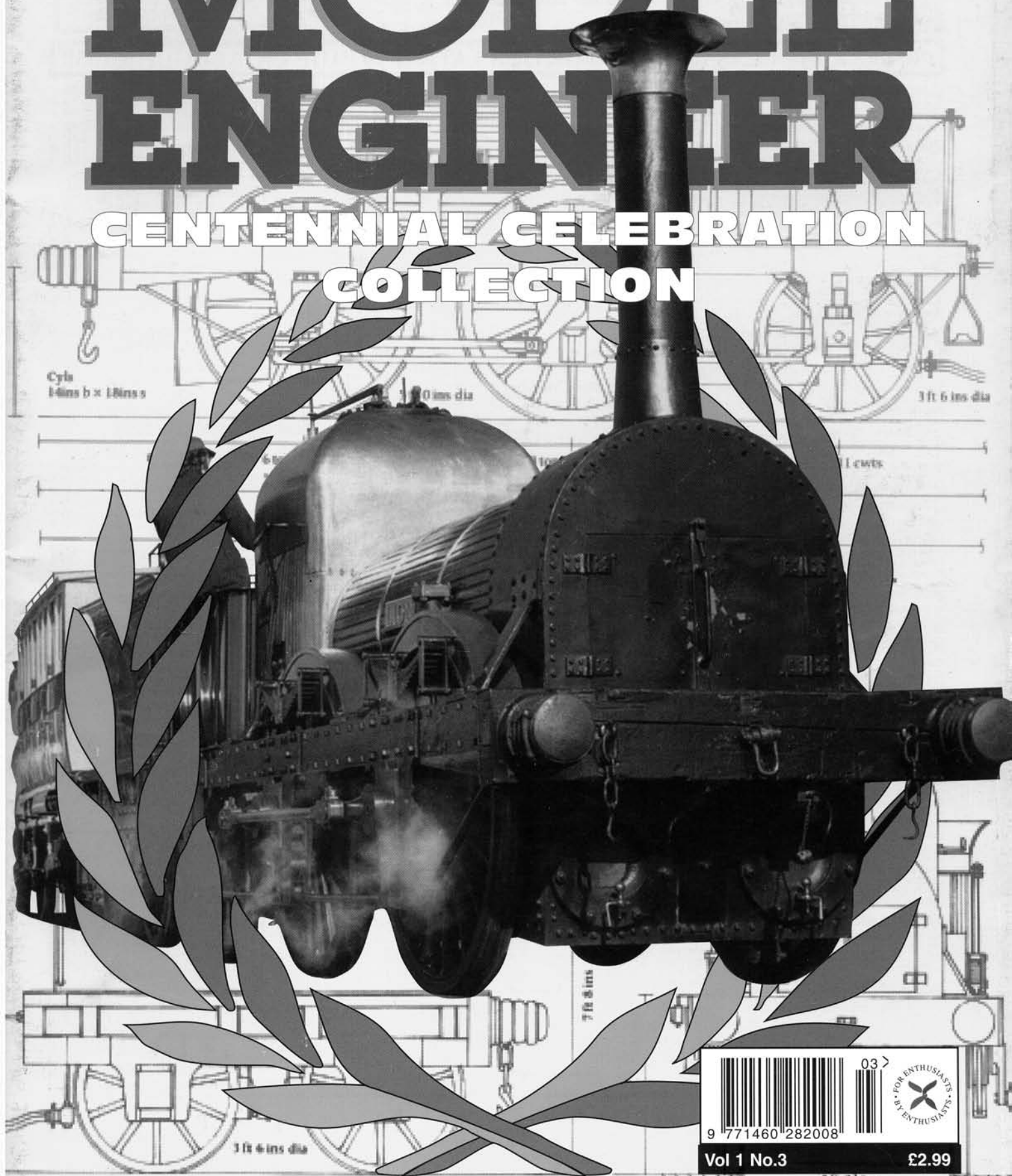
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Prototype Locomotives and Railway Practice- -As gleaned by Jim Robson.

Ever since I can remember, I have loved railways. I was born in 1928 in a house which had the L.M.S. passing the end of the garden, opposite the engine sheds, on the Up side of St. Albans City station. It is said that babies can hear sounds while still in the womb. If this is so, it might explain my early interest, and love of the sound of trains. I never tired of watching the trains go by, the folk four doors up had a shed at the end of their garden, from which vantage point I had an unobstructed view of the station, the coaling stage and the engine shed approach. There was always something to see: passenger, goods, mixed, trains, you name it. The coaling stage was always busy with its little crane swinging the four-wheel skips over the tender or bunker. Each skip held 5-6 cwt, very labour intensive. Although the Compounds were my favourite, for sheer good looks and dash, the *Stanier* 2-6-4 tanks ran them a close second. There were also; Fowler tanks, 2-6-4 and 2-6-2, 0-6-0 4F tender freights, 3F "Jinty" tanks, and later on, Class 5's, Jubilees, and Class 8's. But for spectacle, the Garratts, with their long coal trains of private owners trucks were fascinating. You could hear them coming from quite a distance, especially at night. Sometimes when I shut my eyes I could swear I can hear the tinkle of their valve-gear. On New Years Eve the night shift at the engine shed would sound all available whistles at midnight, and run a loco over a row of fog signals for good measure! Happy days.

I hope that this resume of snippets and photos from the pages of the *Model Engineer* will revive a few memories and/or give some idea of current railway events in those halcyon days. Unless you are fortunate enough to have all the issues of ME, or have access to a set, and to have closely studied them, there is only one way to research a related subject, and that is by scanning them. This is what I did with the Miniature Locomotive Centenary issue and now again with the full size locomotive issue. I should have more than a nodding acquaintance with the journal by the time I have finished.

One of the immediate differences I noticed was the time taken to have a firm basis of reporting on full size practice. With the miniature versions, although it took a while to have fully described models, with drawings, similar to those in current issues, there was at least, full reporting from issue one on existing models, as one might expect from a model magazine. On the full size front there was, initially, little reporting of railway news and development. I suspect that they were a little diffident about doing so, partly because they felt, as a model magazine, it was not their function. Possibly, they felt that the long established *Engineer* and *Engineering* journals were already covering that field, also, in 1897 the *Railway Magazine* had started publishing.

However, reports did start to appear, usually small snippets with acknowledgement to their source.

Much the same was true of other segments, marine, etc. Gradually the reports became larger, and of direct source and in 1904 the first article by the

famous *Charles S. Lake* was published, together with a brief biography of the author. These articles, "Locomotive Notes and News" were to continue for many years and are probably the best remembered of the full size loco contributions. His series continued until June 1940. His last article, in July, concerned an American model loco built by apprentices at the *Philadelphia and Reading R.R.* He died in November 1942, aged 70. [87/529].

There was a bit of a lull for a while, after September 1939, with just the odd snippet, sometimes in the Editorial, occasionally from *LBSC*, and other contributors. *O.S. Nock* did a series on railway signals, starting in 1940, [83/188].

There was nothing on a continuous basis until 1945 when "Locomotives Worth Modelling" by *C. Hambleton* started, [92/247]. These took the form of line drawings of locos dear to the authors heart, including excellent detail drawings. They continued until 1948.

In 1956, *J.N. Maskelyne* began his well-loved series, "Locomotives I Have Known," [114/265], and continued until 1961, the last ones published posthumously. *J.N.M.* died in 1960.

Robin Orchard had the last series while steam was still topical in the mainline service sense. Similar to "Locos Worth Modelling, but with photos instead of drawings, with photos and reports of the railway scene. Chock-a-block with detail shots, they are a goldmine for anyone making one of the locos he covered. They ran from 1961, [125/512], until 1962.

R.M.E. (or Martin Evans, as he is more familiarly known), produced "Locomotive Library" from 1986, [156/423], to 1990, and before then, there was "Famous Locomotives of the World," and "Railway Topics. In addition, there have been, and still are, lots of individual contributors on the 12in. to the foot scene, particularly the preserved lines and projects like *Duke of Gloucester* and the *Peppercorn A1, Tornado*.

(There is also a continuous stream of articles on the Isle Of Man in general and the Manx railways in particular from a well known editor, whose name escapes me. Fortunately this is one of my favourite areas so I am always pleased to read them).

I firmly believe that there is a need for articles, and particularly photographs, of prototypes of any of the models included in the ME, since the majority of the models are close representations of the original, and although, at the start of most series on a particular model, there are usually some photos of the prototype, and close-ups of details, it is always nice to see photos from another angle and read a few comments on it.

Taken collectively, the articles form a history of railway practice from 1898, and I hope to be able to present them as such, hopefully without being too boring. (As before, ME = *Model Engineer*, or as it was known to faithful readers, "Ours". Comments within brackets are my own opinions and, hopefully, not to be taken too seriously. References thus [6/123], are [Vol./page]. ■

Back in 1898, the ME had a column called "Jottings" which had a series of small paragraphs on varied facets of engineering. In March it mentioned that the *Atchison, Topeka, and Santa Fe* Railway were having burglar-proof mail cars built in their shops at Topeka. They have no end platforms, and the doors are fitted with heavy bolts, bars, and chains. A secret receptacle has been provided for the safe carriage of registered letters.

(This was the first mention of railway news that I had come across so far).

In May there is an excerpt saying that: "The *Richmond Locomotive Works* have recently presented to *Purdue University* a full sized model of the front end of one of their two-cylinder compound locomotives, the intercepting valve of which is sectioned so that its operation may be seen. The cylinders are 20ins. and 30ins. in diameter respectively, and the saddle is surmounted by a full-sized smoke-box and stack. According to the *American Machinist*, the whole makes a very complete and impressive exhibit."

In August: Part III of "*London and North-Western Locomotives*" has just reached us from the publishers....This contains some capital illustrations and reading matter relating to the "Teutonic" and "Greater Britain" classes. The price as usual is 6d (2 ½p).

The December issue: A very striking illustration of concentration of power was afforded recently by a train hauled over the *Pennsylvania Railway* between Altoona and Columbia, which consisted of 130 cars, was nearly three-quarters of a mile long, and that weighed 5,339 tons. It was made up as follows: Locomotive 118 tons, other rolling stock 1,519 tons, freight (coal) 3,693 tons.

The number of locomotives owned by the *North-Eastern* was 1,963, of which 573 were passenger engines, 1,166 goods, and 224 engines for shunting.

(That is the sum total for 1898. The USA seems to be getting a good press. Of course, it wasn't always that exciting.)

Only one comment for 1899, from the *Engineer*, two new 4-6-0 express locos for the *North-Eastern*,

200 psi, built at Gateshead, 20ins. by 26ins. stroke.

1900, October: A method of treating road-beds of railways with non-combustible oil for laying the dust was introduced about three years ago on one of the New Jersey divisions of the *Pennsylvania Railway*, and has since been adopted by a number of companies in the Eastern States. It has been found that when a track ballasted with gravel or cinders is well sprinkled with oil, the dust is practically got rid of, and the oil at the same time destroys weeds, preserves the ties to some extent, and renders the track waterproof.

The *Boston and Albany* line used 4000 galls. of oil per mile of double track in the first year, and half that quantity when the treatment was repeated. The oil is of low combustible grade, so that there is little or no danger of fire.

(They don't make any comment on wheel slip. I wonder what the environmentalist lobby would have to say today!)

In the same "Jottings": "The largest locomotive by far which has yet been constructed was recently completed by the *Pittsburg Locomotive Works*, of Pittsburg, Pa., for the *Pittsburg, Bessemer and Lake Erie Railroad Co.* It is intended, says *The Engineer*, for hauling loads of ore and coal from the company's docks on Lake Erie to the smelters at Pittsburg. The total weight of the locomotive is 111 tons English and with the tender nearly 174 tons.....The locomotive is carried on eight driving wheels and a pony, also has a steel cab, and is calculated can pull a load of 2500 tons readily upon the steepest grades of the lines where it is in use. The outside diameter of the driving wheels is 54 ins.

(This is the first of several similar snippets, "THE LARGEST, THE HEAVIEST, THE MOST POWERFUL, etc. It almost seems like at least once a year that some company in America has outdone some other company.)

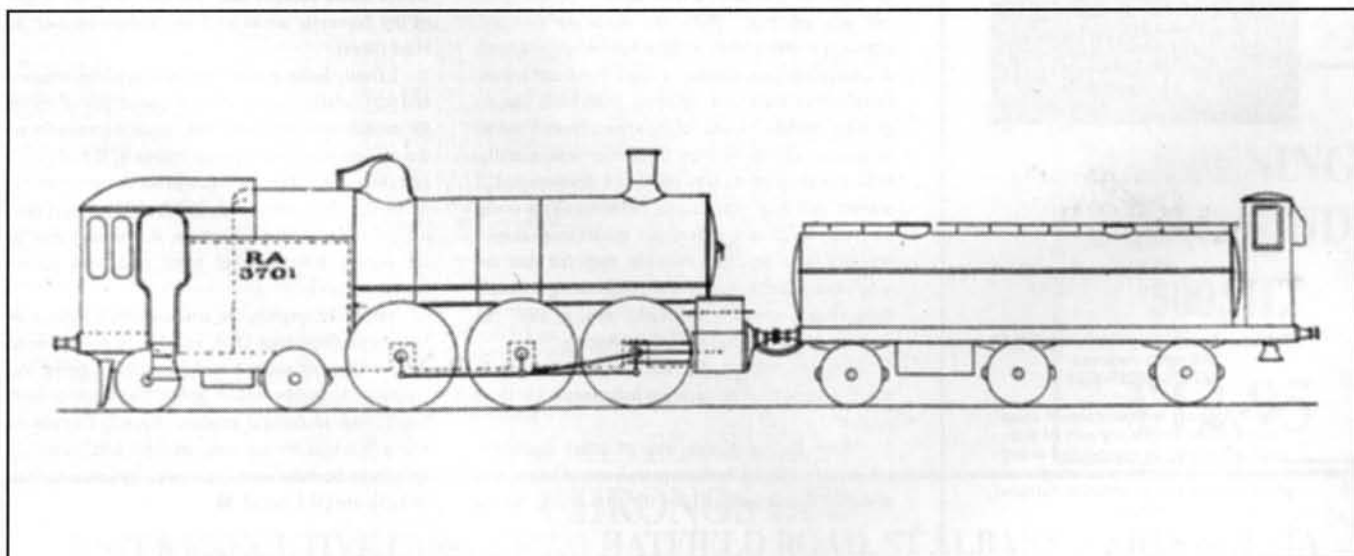
There were other areas in the ME which had the occasional piece of information or news, among these were; "Practical Letters from Our Readers, *SME*, "Queries and Replies" and quite a lot with no heading or indication of source, presumably from a stock of space fillers kept by the Editor. Some of

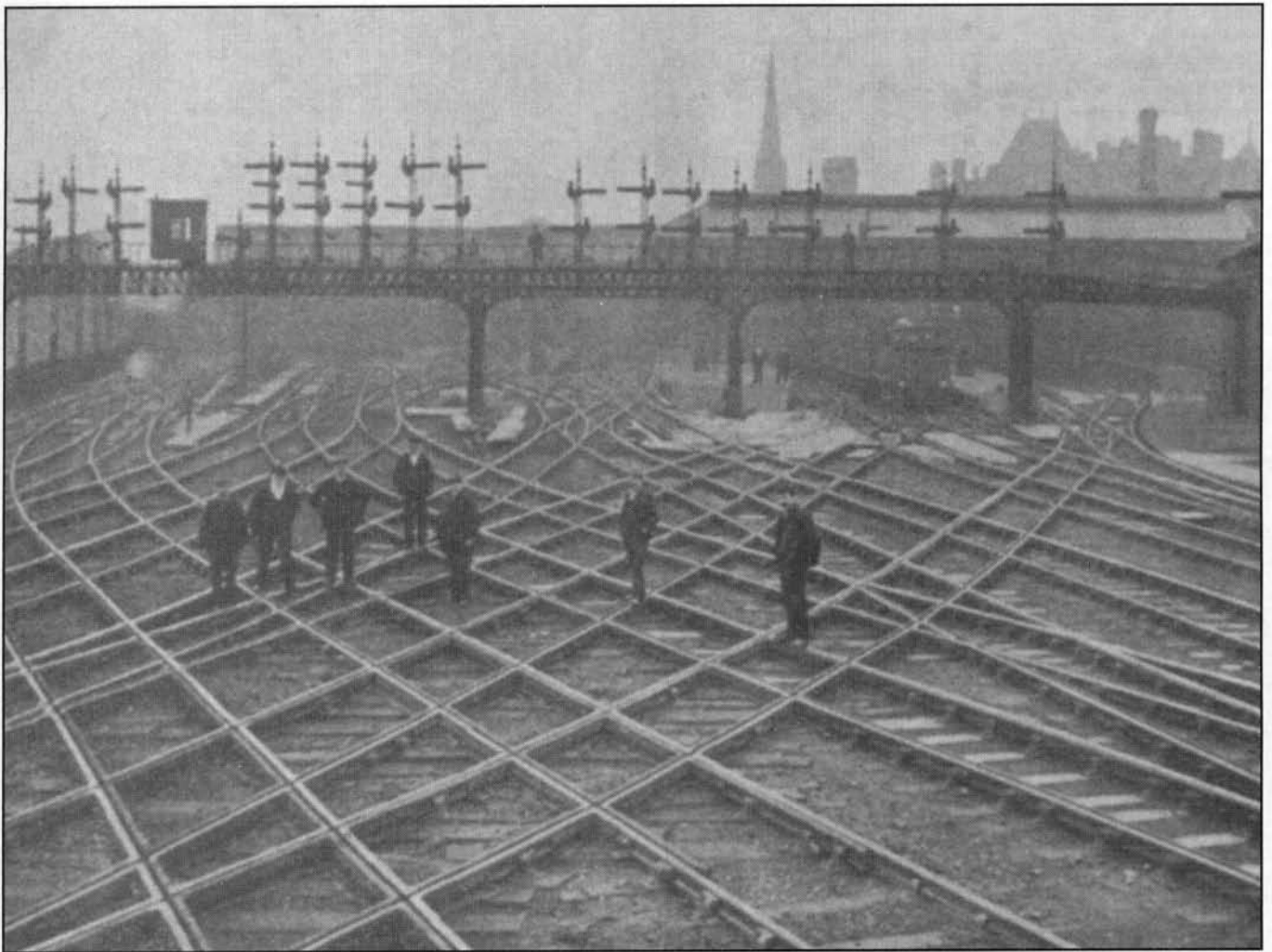
these had line drawings and the occasional photo, mostly in reply to some query, such as "I want to build a *Caledonian* 4-6-0, can you assist?" But still nothing collective.

In December "Practical Letters" there was a letter from C.D.M. of Florence with details and a line drawing of a new four-cylinder compound exhibited by the Italian Adriatic Railway at the Paris Exposition, where it obtained the gold medal. He says, "The principle feature is that the loco runs backwards—that is, the V-shaped cab is on the front, allowing the driver a clear view of the line and preventing him from being stifled by the smoke in long tunnels. The ME added a footnote consisting of further details from the *Engineer*.

(I have always been intrigued by this loco, which seemed to me to be well ahead of its time and a precursor of one of my favourite American engines, the *Southern Pacific* "cab-forward" *Mallet*.)

Also in December, there was a report on the new railway in the Wupper Valley, Germany. "This railway runs from Vohwinkel to Elberfeld and Barmen. Its entire novelty lies in the fact that it is, firstly, a one line railway, and secondly, a suspended railway. The carriages travel literally hanging from a single rail running exactly above the centre line of the roof. These carriages, not unlike those of the "two-penny tube" in general scope and plan, each have two pairs of bicycle bogie wheels, one at each end of the roof, from which the whole car depends. The wheels have electric motor attachments, which develop energy sent along a second rail in the usual manner, and support the car by means of stout hooked bars....The railroad itself, consisting of two distinct lines—for up and down traffic—is rigidly held by cross girder work. The whole superstructure is supported a suitable height above road and river traffic A and O shaped trestles.....Trains on the upside-down railway travel smoothly, with very little vibration and practically no noise. They are amply provided with brakes and usual safety appliances, and by a somewhat novel provision regulate the signals automatically." (Yet another intriguing line, the Wuppertal, still going strong, having survived two world wars.)





The Largest Railway Crossing in the World — Newcastle-Upon-Tyne Central Station.

May 1901, **"The Largest Railway Crossing in England"** with a familiar view of the famous crossing, signal gantry, and seven potential casualties. The caption under the photo has expanded the boundaries of its excellence beyond that of England. We may not have the biggest locos, but we have got the biggest crossing.

Only one other item for 1901, December, **"Electric Power for Railways in Europe"**

"In Italy the Lecco-Sondrio and Colico-Chiavenna lines will be entirely propelled by electricity, the latter line, about 70 miles long, being capable of carrying freight trains of over 250 tons. On the Milan-Porto Ceresio line of 63 miles, electric traction will be employed for passenger traffic, at a speed of 54 mph.

In France a commission has been appointed for investigating the problems connected with electric railway traction. It is hoped to make use of water-power for generating purposes.

In Austria and Norway similar projects are being prepared."

"A syndicate of Russian bankers proposes to connect St. Petersburg and Moscow with trains running at 93 miles per hour, at 10 minutes intervals, from each end, each train consisting of five 35-passenger cars—*Railway Review* (Chicago)."

"The new electric locomotive for the *Central London Railway* differs from its predecessors in having lighter armatures, which run at three times the speed of those used in the old engines. (Who said we were lagging behind Europe?).

1902 contained a plethora of items covering some twelve facets of railways. "Jottings" had now become "The Latest in Engineering" but most of the items appeared individually.

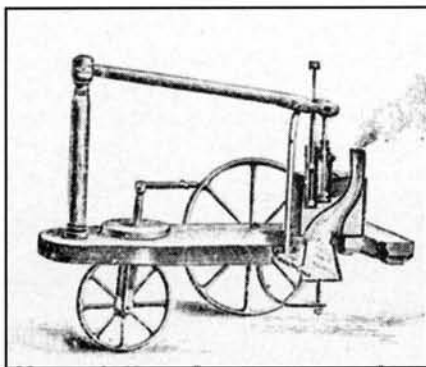
Starting in February with a small paragraph on the hundredth anniversary of the first successful loco run, in the streets of Camborne, Cornwall, in 1801. A number of Cambornians assembled in procession through the town.....a public lantern exhibition in Commercial Square was given and incidents and places in connection with these notable events were depicted upon the screen. Unfortunately the weather was anything but propitious.

There was a short comment, followed by a longer article, on a new valve gear being tested by the *Great Northern Railway*, the invention of Mr. J. T. Marshall which was also being reported on in the daily Press. The consensus of opinion was that the valve gear operation, while ingenious, does not justify the startling statements, made on its behalf in the newspaper press. In the later article a resume of the claims which had appeared in the press was given.....the

Chairman of the *GNR* announced that the figures were published without the authority of the company.

In August we have, **"The Heaviest Locomotive in the World"**. This time it was the *Baldwin* tandem compound decapod built for the *Atcheson* and weighing in at 267,800lbs or just over 119 tons for the loco, the weight of the tender is not given. The boiler pressure is 225psi, its nearest neighbour in terms of weight was built at Schenectady for the same road, but was some 8000lbs lighter, the tractive power of that engine was over 62,000lbs.

Also in August was an article on the model locomotive built and run by *William Murdock* in 1784. At the time *Murdock* was at Redruth, erecting pumping engines for *Messrs Boulton and Watt*. "One night, after returning from his duties at the mine at Redruth, *Murdock* went out with his model locomotive to the avenue leading to the church. The walk was narrow, straight and level. Having lit the lamp, the water soon boiled and off went the engine, with the inventor after it. Shortly after, he heard shouts of terror. It was too dark to perceive objects, but he found on following up the machine that the cries had proceeded from the worthy vicar, who had met the hissing and fiery little monster, which he declared he took to be the Evil One in 'propria persona'."



Murdock's Model Locomotive, AD 1784

"There is good evidence that, altogether, Murdock constructed three locomotives, the last of considerable size: but, under pressure from *Boulton and Watt*, he ultimately abandoned the invention."

(Although this was intended to be a road locomotive, or steam carriage, there is little doubt that, had he been allowed to proceed, it could equally well have been adapted to railway locomotion.)

October: "**A Magnificent Run on the Midland Railway:** There has recently been turned out, from the Derby Works of the *Midland Railway*, one of the largest locomotives in Great Britain. It is a compound, and weighs 112 tons in working order.

The record to hand of its fine unbeaten performance is as follows: The 1.30pm from St. Pancras, with 13½ vehicles on the train for St. Enoch, Glasgow, and Waverley, Edinburgh, reached Hellfield, the stop prior to Carlisle, 17 min. late. The 25½ miles from Hellfield to Hawes Junction was covered in 36 min., giving a speed of 42½ mph on the ascent. Then came the sensational part of the journey. The descent of 20½ miles from Hawes Junction to Appleby was negotiated in 16min., that is an average speed of 76.8mph. The last section of the journey, from Appleby to Carlisle, 30½ miles, took 27min., making an average speed of 68.3mph.....The details of the record of this night's run are given below, and as the record "one engine, platform to platform" performances of the world, considering the weight of the train, the height of the summit, and the average speed :

Hellfield to Hawes, 25½ miles in 36min.—42½ mph.

Hawes to Appleby, 20½ miles in 16min.—77 mph.

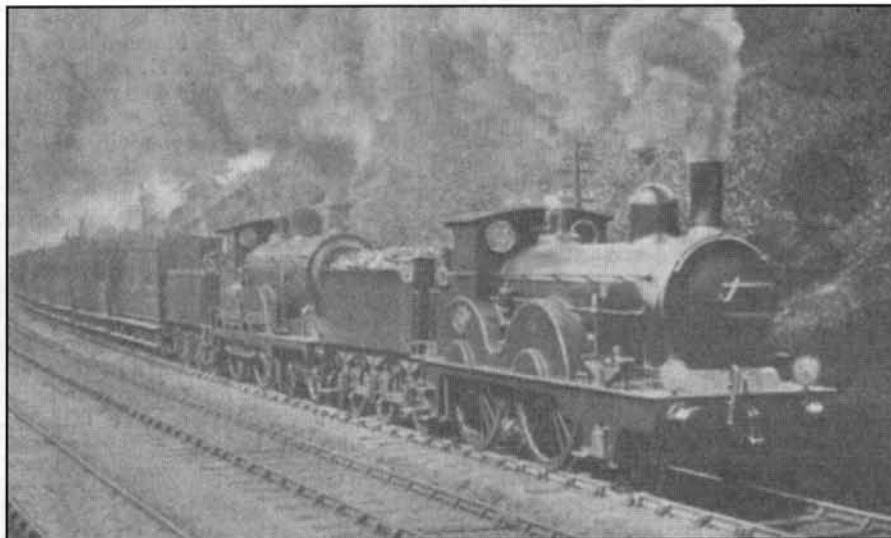
Appleby to Carlisle, 30½ miles in 27min.—68 mph

Hellfield to Carlisle, 76½ miles in 79min.—58.3 mph

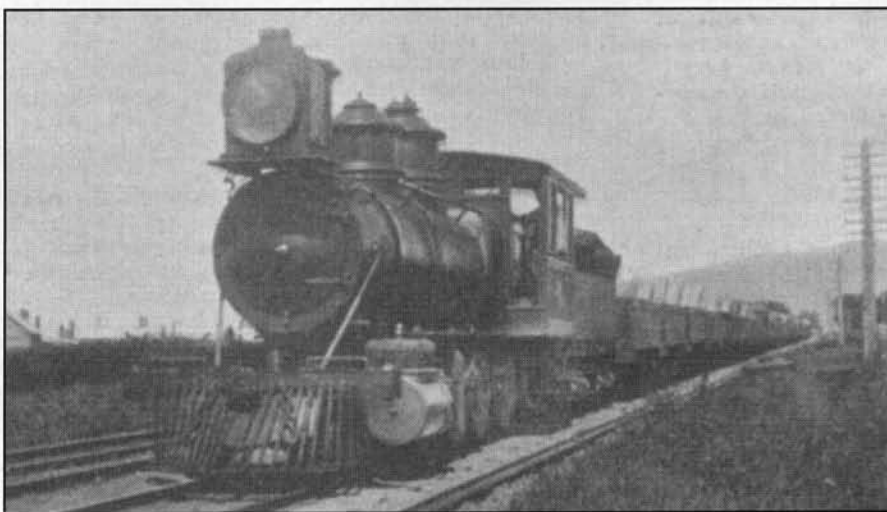
There were also accounts of: - **A Large Locomotive for the North Western:** A **Notable Locomotive**, being an account of the Charles Dickens on the *LNWR* which had just completed its second million miles, and the use of superheated steam on the *Prussian State Railways*.

RAILWAY PHOTOGRAPHY

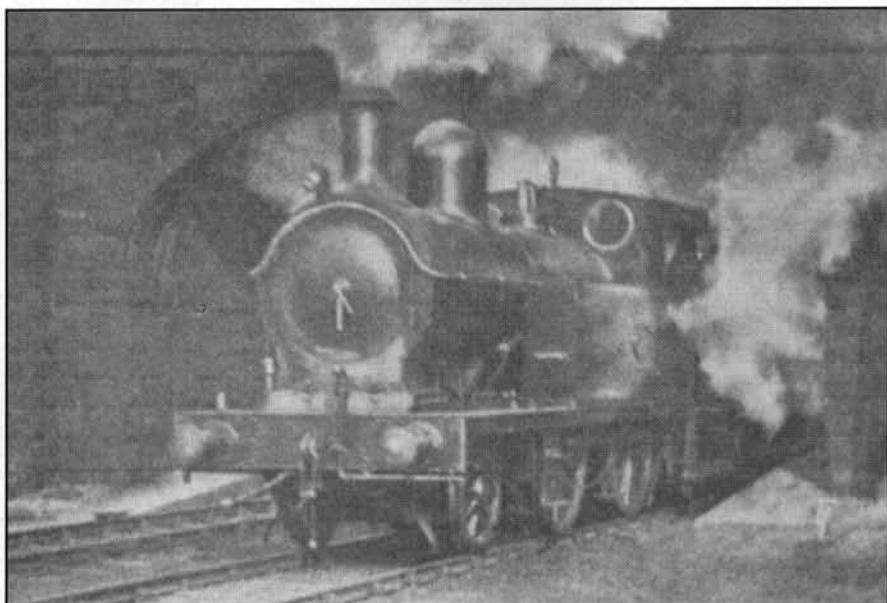
We reproduce herewith the prize photos, supplemented by two other interesting pictures, received in connection with our recent competition, No.19.



G.E.R. YARMOUTH EXPRESS; by Dr. Tice F. Budden. First Prize in Competition No. 19.



An American Locomotive in New Zealand. Snapshot by A.C.M'Intyre Christchurch N.Z. Honorably mentioned.



Lancashire and Yorkshire Railway engine, at Copley. Snapshot by Herbert Bairstow. Honorably Mentioned.

The London to Brighton Electric Railway : "Mr. Robert Hammond, the electrical engineer-in-chief, in his report says: With reference to the proposed line, it would, in my opinion, be quite possible, with due regard to safety, to run trains at a speed of 100 mph; but such a rate of speed would involve very heavy working expenses, and, taking into account the question of economy, I recommend that the normal should be 75 mph.

(In my view, the highlight of the year was in September when results of the Railway Photography Competition, No.19, were published, which were probably the first snaps of the quality, which was later to become the norm, were seen.)

1903; January: **An Outside Cylinder GWR Express Locomotive**—the probable appearance of

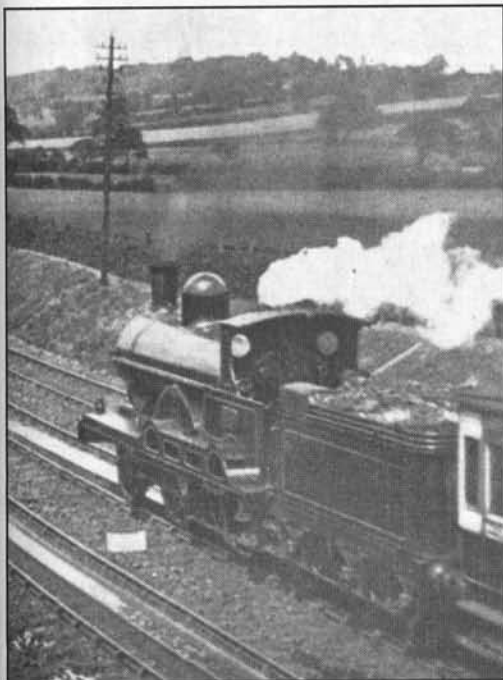
an outside cylinder locomotive on this railway was, in a practical way, notified some long time ago by the fact that templates imitating these features were placed upon one of the single express engines. We are this week able to give a scale drawing of the new No.100, at first named "Dean", now "William Dean", in honour of the late locomotive engineer of the company, who is responsible for the design of this huge machine. The chief peculiarity in the engine is the length of stroke of the cylinders, which is no less than 30ins. Many years ago 30in. strokes were tried and abandoned, the largest stroke in every day use before the advent of this locomotive being 28ins. — that of the GNR 8ft. singles. The diameter of the cylinders is 18ins., and the heating surface of boiler 2,410 sq. ft. The weight of the engine and tender in working order is 104 tons, 52½ tons being available for adhesion.

February: **A Showman's Locomotive.** By "THE WANDERER" "There is no doubt that, in this age of engineering, things mechanical interest the old and young of every class, and the popularity of miniature railways at exhibitions, fairs, and circuses tends only to make this fact all the more evident even to the unobservant mind.

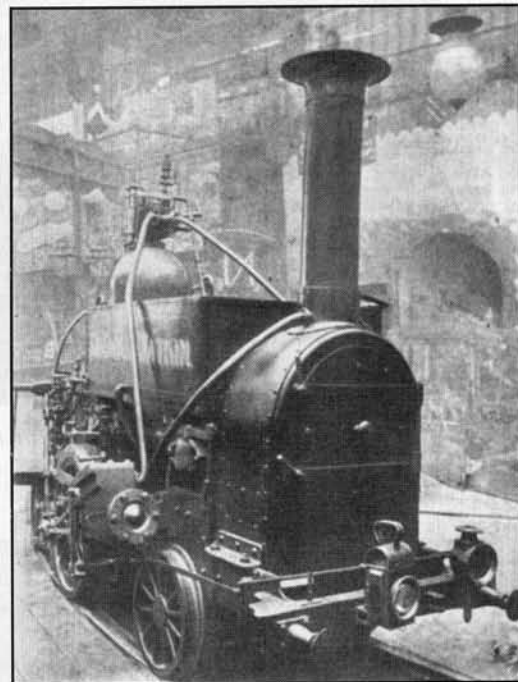
The locomotive illustrated herewith, with its railway, formed part of the many side shows at the "World's Fair", an annual event at the Agricultural Hall, Islington,The railway, which is to rather a large scale as these things go, being 2ft. 6ins. gauge, and 250ft. long, is laid in a circle, and bears the important title, "Channel Tunnel Railway", this, I suppose accounting for the name, "Sir Edward Watkin" painted on the side of the locomotive. The engine is 10ft. long, weighs about 3 tons, with the drivers about 2ft. in diameter, the most notable feature being the difference in the diameter of wheels running on the inside and those outer rail, which difference, in the case of the driving wheels amounts to 2ins.. The stroke of the piston of the smaller (inner) wheel is, at the same time, shorter—presumably to equalise the tractive efforts on either side.....The engineer—Barton—is quite proud of his charge, and speaks highly of its capabilities as regards load pulling. Very often, he said, on a busy day—a Bank Holiday, for instance—his locomotive is continuous-

ly at work four trips without a stop, hauling the four cars chock full of merry passengers, and except for the brief intervals for loading and unloading, both driver and engine get no rest for perhaps eleven hours. The wisdom of providing the three injectors, which I discovered at various parts of the engine, will be seen by all. There is always likely to be one to fall back on..... The time of my visit being a quiet one, I was able to hire a "special", which whirled me round the track at an average speed of 13 mph; but this, I was assured is not by any means the maximum speed obtainable, nothing higher could be attempted with an empty train for fear of derailment.

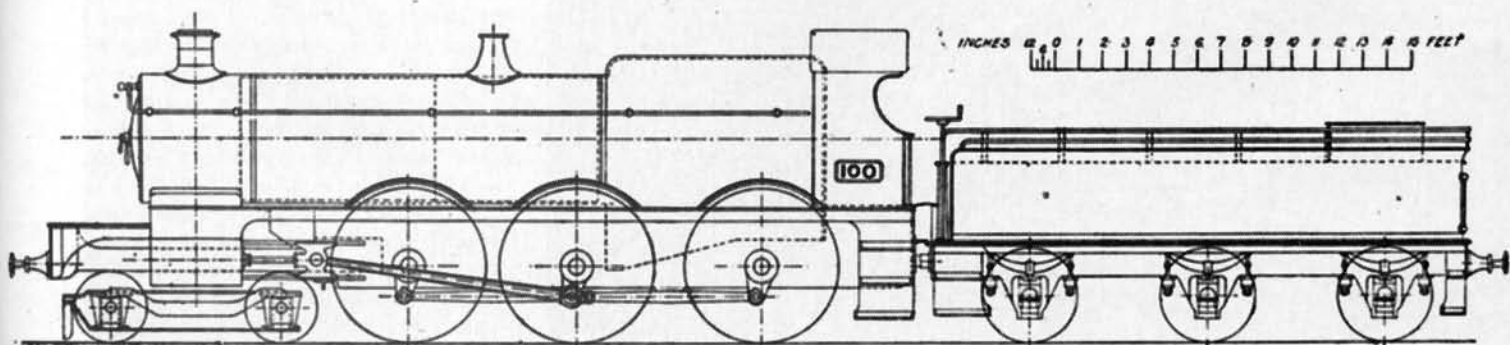
[We are indebted to the Locomotive Publishing Company for the loan of the photograph reproduced herewith.—Ed., M.E. and E.]



L. & N.W.R. NORTH WALES EXPRESS
(No.1303, "OCEANIC"); by P.W. Pilcher. Second Prize in Competition No. 19.



A Showman's Locomotive—
—"SIR EDWARD WATKIN."



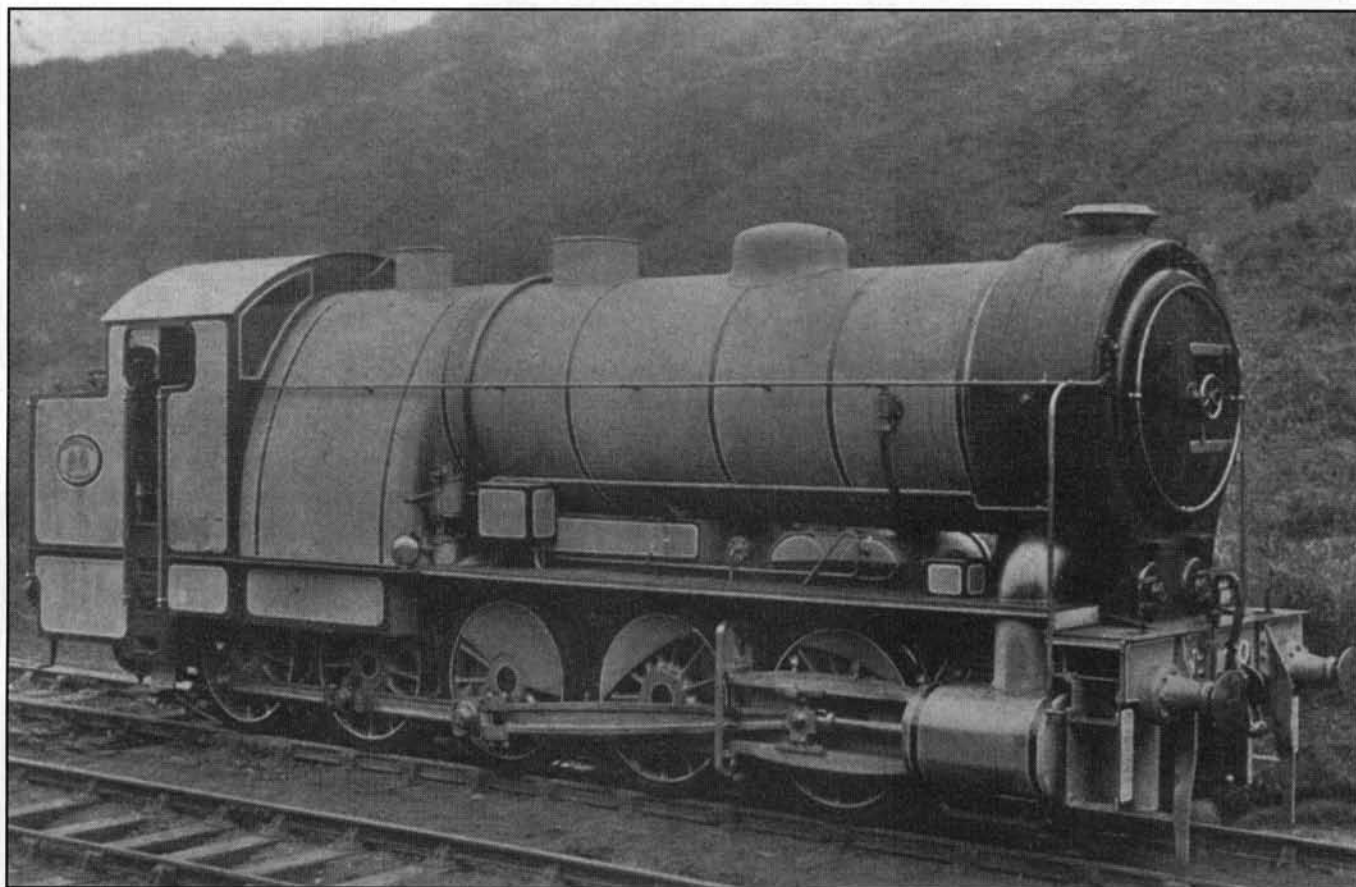
THE NEW GREAT WESTERN RAILWAY SIX-COUPLED EXPRESS LOCOMOTIVE:

"WILLIAM DEAN" No.100.

[Scale: 1/8 in. To The Foot.]

Built at Swindon Works]

Driving Wheels, 6FT. 8½ ins. Diameter. Cylinders, 18 by 30. Grate Area, 2,410 SQ. FT.



THE NEW GREAT EASTERN "DECAPOD" TANK LOCOMOTIVE.

Weight in working order, 78½ tons.

Wheels 4ft. 6ins. diameter. Cylinders (three high pressure), 18½ by 24.

Grate area, 42 sq. ft

Total heating surface, 3,010 sq. ft.

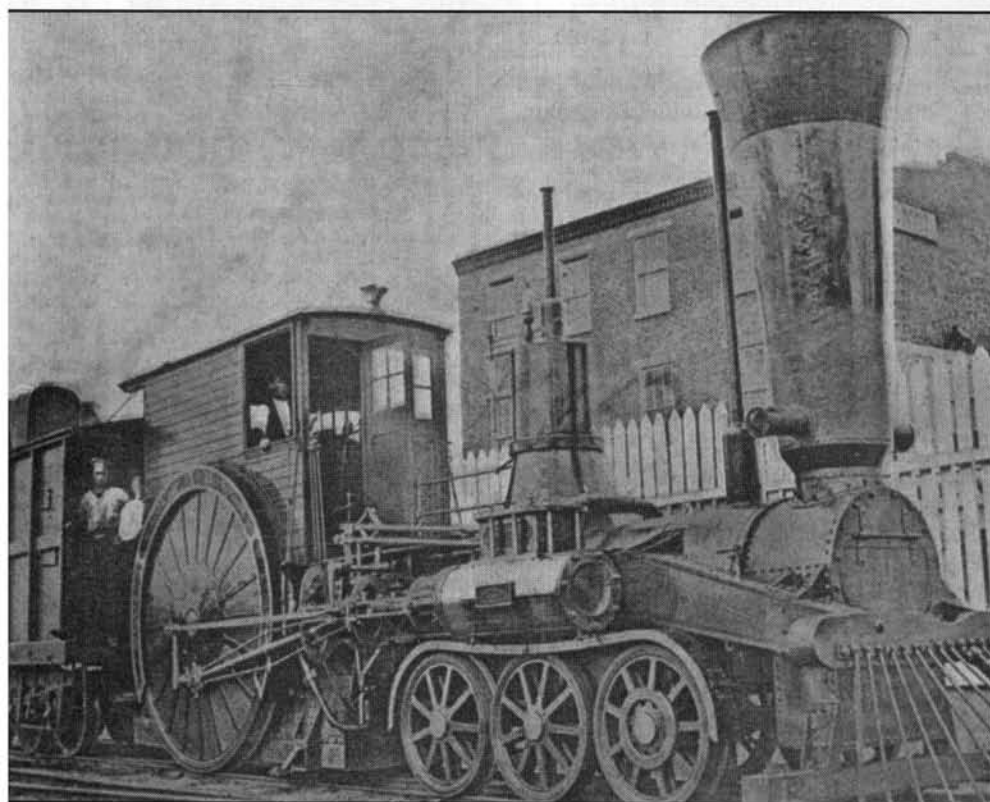


Photo by AN OLD AMERICAN "CRAMPTON" LOCOMOTIVE.

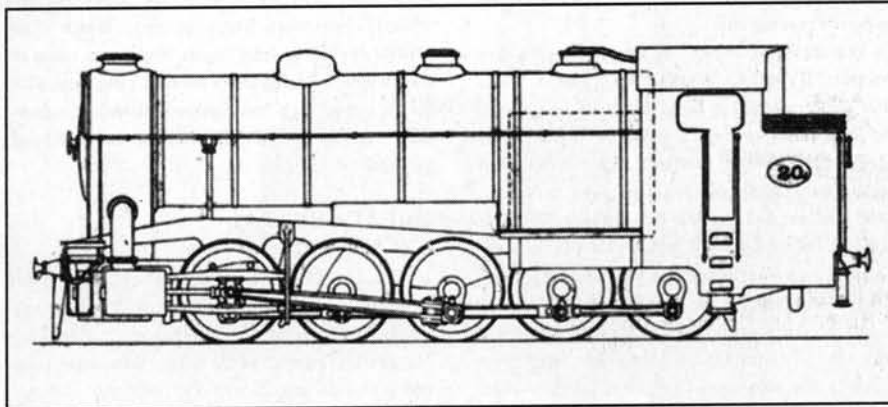
Messrs Schreiber.

April: A photo of James Holden's "Decapod" for the GER., (no acknowledgement, but it is, probably, an official GER snap, since it appears to be in that shade of grey used for works photos, normal livery not showing up too well on the photographic material available at that time).

July : An "Eight-Footer" of Fifty Years Ago. By courtesy of the Editor of the *Locomotive Magazine*, we are able to publish a photograph taken as far back as 1848, of an interesting old Crampton locomotive, one of several built in America by the *Norris Works*, in the year 1845, for the *Camden and Amboy Railroad*. No.28 had cylinders 13 by 34 ins., and driving wheels 8 ft. diameter. The firebox was 6 ft. long, and the carrying wheels were 3 ft. diameter, the middle wheel having no flanges. All the engines had separate cut-off valves operated by a hook motion. The huge chimney and covered-in cab require little pointing out, but a noteworthy object will be seen at the back of the tender—viz., a hooded seat for the guard, who looked back along the train in a similar manner to those originally placed in the same position on the old GWR broad gauge engines. Altogether, the picture is a most interesting relic of a bygone race of locomotives.

November: **The Great Eastern Railway "Decapod"**. "Some little time ago we published a photo of Mr. James Holden's unique experiment in the way of a tank locomotive for suburban traffic. He has lately sent us a working drawing, from which we have made the accompanying sketch.

drawing, however, shows that the dome is not directly open to the boiler, but is cased in at the bottom, and is fed by two perforated tubes which extend along the barrel of the boiler. Another point in connection with the design is that the Ramsbottom safety valves are provided with compression springs



THE GREAT EASTERN TEN-WHEELED COUPLED LOCOMOTIVE.

The ten-wheels coupled engine has proved itself capable of attaining the required speed in the given time, and has a very high acceleration. However, we understand from reports which have been circulated, that no more of the same type are yet to be built, presumably due to permanent way difficulties.....Mean tractive effort (mean effective pressure taken at 80% of boiler pressure)..36,507 lbs., Adhesion at 500 lbs. per ton..39,125 lbs. Besides the peculiar design of connecting-rod for the inside cylinder and the cranked leading axle, one thing strikes us as a new development in locomotive practice. The engine, as it will be seen, has a dome and this contains the regulator in the usual way. The

instead of the usual pattern where the spiral springs are attached at each end and are in tension."

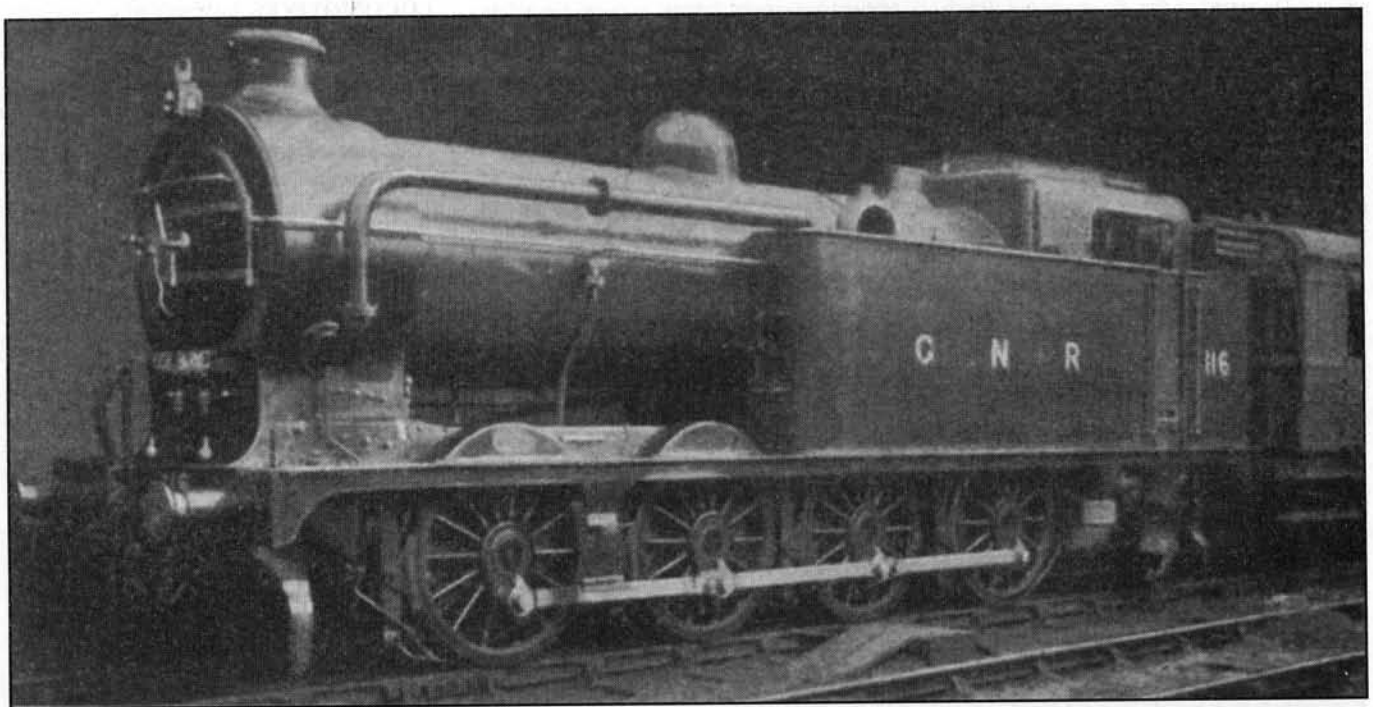
(Although no mention was made in ME, at the time, I think it is generally accepted that this loco was just a "political" expedient, built to prove a point, but never intended to go into service. It was created to prove that a steam loco could equal the acceleration of electric traction, which it duly did. E.L. Ahrons says, in his book "The British Steam Locomotive", "The engine was built experimentally to ascertain whether a steam locomotive could accelerate as well as an electric locomotive, since electrification had been suggested for the suburban services. The electric people said that a train of 315 tons

could be accelerated to 30 mph from the start in 30 sec., equivalent to 1.46 ft. per second per second. Holden's engine actually accelerated a new train of 18 coaches, weighing 335 tons, at a rate of 1.4 ft. per second per second in very windy weather.

It should be added that, when the ten-coupled engine was designed, it was recognised that the scheme which proposed the use of such engines involved the strengthening of many bridges, especially between Liverpool-street and Stratford, and although the cost of the steam scheme was said to have been less than that of the electric proposals, both were abandoned subsequently on account of the great outlay involved and a falling-off of traffic which had since taken place.")

November: **The New GNR Suburban Locomotive.** —Mr. H.A. Ivatt, the enterprising Locomotive Superintendent of the GNR, has recently brought out a new class of eight-coupled tank locomotives for suburban traffic. The engine is, to some extent, a modification of the eight-coupled tender goods engines in regular use on this railway, and has cylinders 20 by 26, with driving and coupled 4ft. 7ins. in diameter..... With an average cylinder pressure of 160 lbs., the tractive effort of the engine is approximately 30,000 lbs., which it was calculated should suffice to "accelerate" at the rate of 1.5 ft. per second a load of 250 tons, so that a speed of 30 mph may be attained within half a minute of the starting of the engine. The photograph reproduced herewith, was taken at Kings Cross Station just before starting with the 3.18 p.m. train, and it demonstrates, by comparison with the carriage shown, the large dimensions of the locomotive.

(For a while the side tanks of these locos were used for advertising, and plastered with posters, to the chagrin of those who thought it rather undignified.)



THE NEW G.N.R. EIGHT-COUPLED TANK LOCOMOTIVE



MR. CHAS. S. LAKE

1904 : In January, in "The Latest in Engineering" column, we have **Locomotive Practice**, by Chas. S. Lake, [10/4], pre-empting his regular slot by one month. He begins : "As most readers of THE MODEL ENGINEER are aware, the *Great Western Railway* are experimenting at the moment with a "De Glehn" Four-cylinder compound locomotive, which was built for them in France, and delivered in this country in November of last year. The engine is identical in all its principal features with those in use on the Northern of France and other continental railways.....The mere fact that engines of this pattern have proved uniformly successful abroad, and will, in all probability, be found equally efficient under the conditions that govern British railway working, has little interest to those who view these from an engineering standpoint. At the time of writing, the engine has not been put into the regular express services of the line, and therefore little is known of its individual capabilities, but, judging from what has been achieved with similar locomotives across the channel, we may expect to hear of some remarkable performances in the near future upon the home railway in question. (He then goes on to discuss the relative merits of the *De Glehn* system, and touches upon developments on UK. lines, particularly the new 3-cylinder *Smith* compounds on the *Midland* and "*Alfred the Great*" series on the *LNWR*.)

(As I have already stated, we have a 37 year run of C.S. Lake's series, more than 640 articles with a lot of photos. I have to try to cram this into some 37 pages. I should like to include almost all of them, but obviously I can't. I hope you will like my choice, and not be too harsh if I've left your favourite out. In addition, although I love Lake's lyrical, slightly pedantic style, and would not leave out a syllable if space permitted. Due to the fact that it doesn't, I have had to compromise. Sometimes I have shortened his

text, and sometimes taken the facts, as he presented them, but put them into my words. The articles are not always in step with the event. E.g. the *Shire* class was introduced in September 1927, but didn't get reported until January 1928, a reasonable gap in view of the fact that these were periodic reports, but the purist might see it as an error. Let's hope there are no purists reading this).

February 4th Notes on Recent Locomotive Practice. BY CHAS. S. LAKE Mr. Chas. S. Lake, after being educated in London and Berlin, entered the locomotive, carriage and wagon works of the Great Northern and Midland Joint Railways at Melton Constable, as a premium pupil under Mr. M.W. Marriott, M.I.C.E., the loco superintendent. He passed through the shops and drawing office, and then had a six months spell on the footplate as fireman. He then entered the drawing office of Messrs Humphrys, Tennant and Co., the well-known marine engineers, of Deptford, and after nearly three years with this firm he went to Glasgow to join the 'Clan' line of steamships, first as a member of the shore staff, and subsequently as an engineer at sea, making voyages to India, Egypt, and the Cape. He afterwards returned to England to become chief draughtsman with an engineering firm in London, but is now devoting his time exclusively to investigating locomotive practice and railway engineering, and contributing on this subject to the technical press. We give below the second of a series of notes on modern locomotive matters, which he will contribute regularly to our pages.

LNWR COMPOUNDS.

A correspondent, who states that he has been a consistent reader of THE MODEL ENGINEER during the last three years, writes expressing a wish that information bearing upon the relative merits of the Midland compounds, referred to in the last article, and the three-cylinder passenger engines designed by Mr. Webb for the LNWR may appear in these columns. It is unusual to compare a type of locomotive, the construction of which was discontinued in May 1898, nearly 5 years ago, with one which was still in the "experimental" stage in 1903, but apart from the question of dates, there are no grounds for comparison between the respective designs, as they bear no practical similarity towards one another.

True, both are compound locomotives, and both have three cylinders, but there the likeness is at an end. The Midland engines have one high and two low pressure cylinders, arranged with the high pressure between, and the low pressure, of necessity, outside the frames, all driving the same axle. There are also four-coupled wheels. In the Webb engines this practice is reversed in every particular, the cylinder ratio is totally different, and, in fact, the whole design differs very widely in all its essentials from that of other engines in question.If it is desired to draw comparisons between Midland and LNWR compounds, the only fair way is to consider the "Alfred the Great" class engines as the true representatives of the latter railway, and then, judging principally by the results obtained with them before the "17-coach rule" came into force, there can be little doubt that

they are fully equal to the task of performing anything which the Midland compounds are capable of. Great interest attaches to the illustration reproduced herewith, which shows one of the "Alfred the Great" locomotives approaching Crewe from the South, with a load considerably in excess of the 17-coach limit, and including four of the heavy twelve-wheeled dining-cars. The photograph, which is an official one issued from Crewe Works, was taken as the train was slowing down for the Crewe stop, after having run through from Euston without an intermediate halt in two minutes under the scheduled allowance. (see p11)

GREAT CENTRAL ENGINES.

The Great Central Railway is now in much the same position as the North Eastern with regard to its locomotive types. Mr. J. G. Robinson, the able Chief Mechanical Engineer of the former line, has recently added new locomotives of the "Atlantic" and six-coupled bogie types, so that upon this most recent addition to the number of British "trunk" lines all the recognised patterns of locomotives for main line passenger and goods traffic are to be found.

The Company possess the most up-to-date examples of the single-driving, and four-coupled bogie express engines; two classes of six-coupled bogie engines; the "Atlantic" locomotives already referred to, and a recent class of ten-wheeled tank locomotive in passenger and similar service, whilst six- and eight-wheel coupled goods engines of the most modern description are employed on the goods traffic. The North Eastern is the only other railway upon which each of these types are running at present, but if it is probable that another of the "great" Companies will be in a similar position before long.

SCOTCH LOCOMOTIVES.

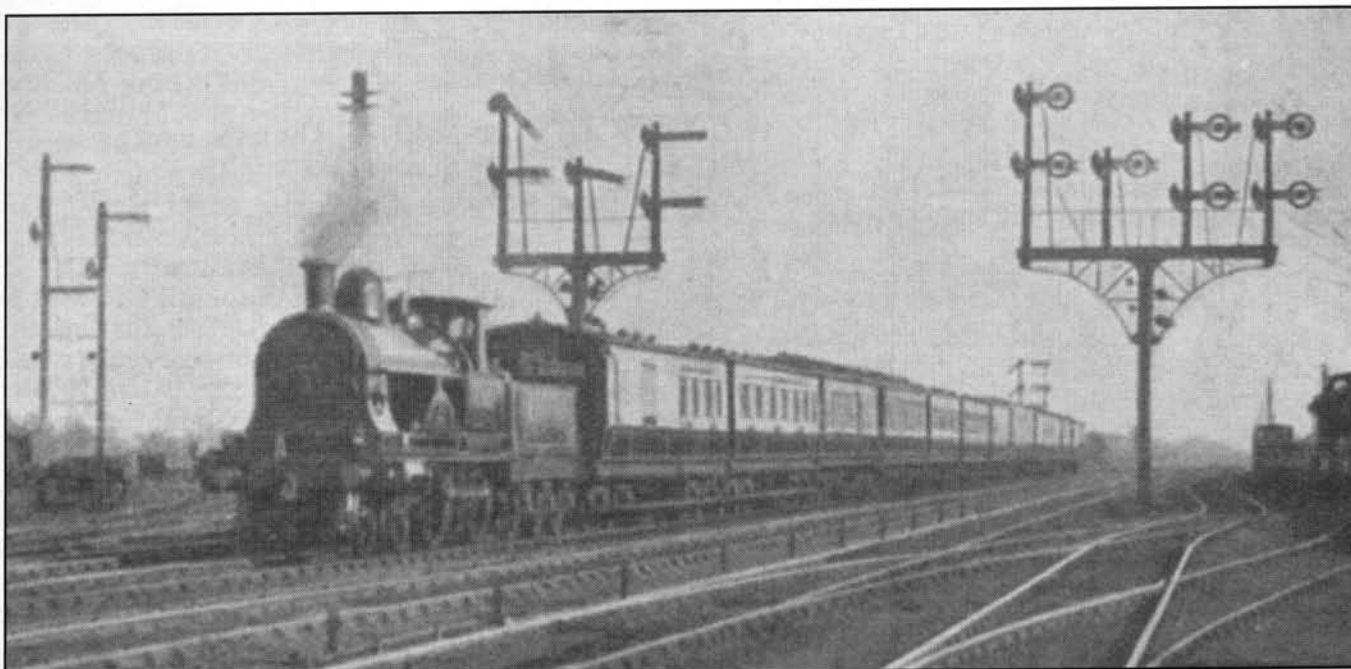
The two six-coupled bogie express locomotives, Nos. 49 and 50, designed by Mr. J. F. McIntosh for the Caledonian Railway, have not, so far, been followed by, others of similar pattern. These engines are of exceptional size, and are noteworthy on account of : their being provided with inside cylinders of no less than 21 ins. diameter, in conjunction with ,six-coupled wheels, 6 ft. 6 ins. diameter.

A similar class on the neighbouring line—the Glasgow and South Western—are fitted with outside cylinders, 20 ins. diameter by 26-in. stroke; and coupled wheels, 6 ft. 6 ins; diameter.

The writer recently noted the work performed by locomotives of both designs, and found them capable of hauling the heaviest loads over the most trying sections of the Carlisle-Glasgow route.

On one occasion the G. & S.W. engine was piloted, but the load was equal to 22½ coaches, and, therefore, it was not surprising that assistance should be required on certain portions of the through run, although there can be no doubt that the pilot could have been dispensed with except at the steepest gradients had it been deemed advisable to make a special stop for the purpose of detaching it.

Further reference to the Caledonian engines will be made in the next article.



A SNAPSHOT OF A L.N.W.R. CORRIDOR TRAIN FROM LONDON, APPROACHING CREWE STATION

MARCH 3 1904:-

**CALEDONIAN 6FT. 6INS. SIX-
COUPLED EXPRESS LOCOMOTIVES
(Nos. 49 AND 50).**

In continuance of the matter referring to the above engines, which appeared in the February article, a few remarks bearing upon the remarkable locomotive illustrated herewith will, perhaps, be of interest. The necessity of employing locomotives possessed of exceptional hauling capacity, has long been felt upon the Caledonian railway, and especially has this been the case during recent years, when the gross loads to be transported over the heavy gradients which abound in the Company's system have been continuously upon the increase to the accompaniment of closer time allowances and the introduction of other restrictions—all having the effect of rendering the task allotted to the locomotives a harder and more difficult one to perform. For some years the famous "Dunalistair" class of four-coupled express locomotives have been employed upon the best of the "through" traffic, and they are still engaged on this work, but it is frequently the case that they have to be piloted when working the heaviest and most important trains over the more trying portions of the route, and therefore, *Mr. J.F. McIntosh*, the locomotive superintendent, decided upon the construction of a new and more powerful type of engine, which would be capable of dealing with the heaviest class of traffic unassisted.

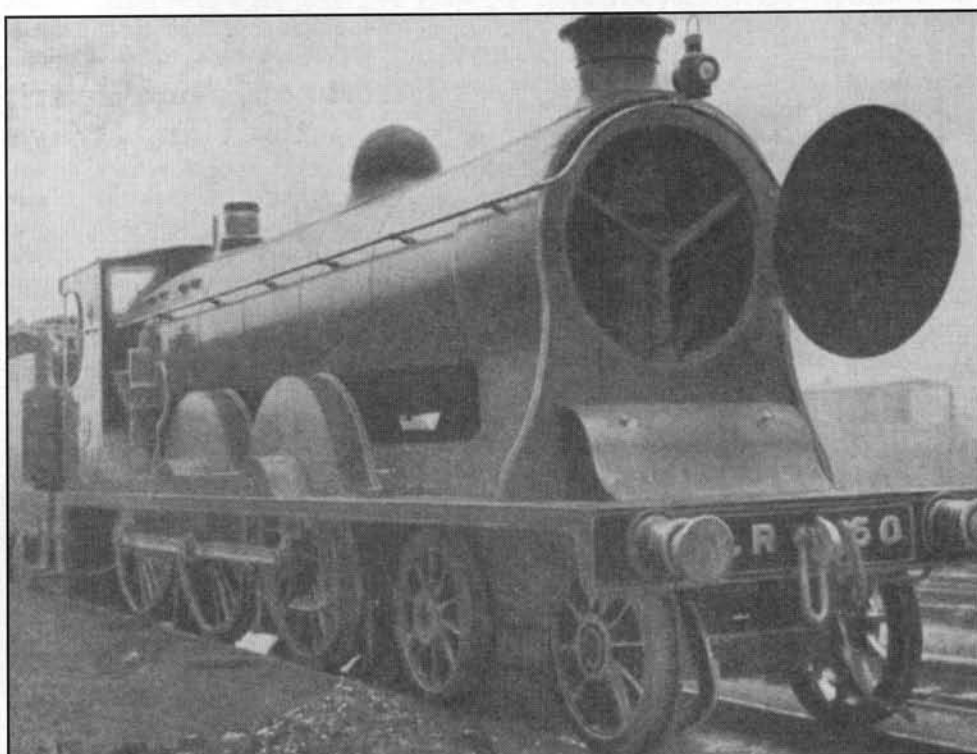
The result was the introduction of Nos. 49 and 50, which, up to the present, constitute the only representatives of the class. The engines are unique in that they are provided with inside cylinders in conjunction with three pairs of coupled wheels of a diameter exceeding six

feet; in fact, the previous largest wheel diameter was the 5ft. employed by *Mr. McIntosh* himself in a previous class of 4ft. 6ins. Type engines. The cylinders in Nos. 49 and 50 are of exceptional diameter, viz., 21ins. by 26ins. stroke.

There are certain points in the design which—in the light of modern conditions and requirements—may be legitimately criticised. In the first place it seems that the design might have been improved by adopting outside cylinders. This would have resulted in a material reduc-

tion in the total wheel-base, and also what is still more to the point, would have brought the length of the boiler barrel down to a figure more in keeping with what is usually considered desirable. In spite of statements to the contrary it is quite possible to employ cylinders 21ins. diameter outside the frames of a British locomotive. It would, no doubt, entail some inconvenience; but it can be done, if it is considered really necessary to use such a large diameter as 21ins.—a point on which much diversity of opinion is known to exist.

CALEDONIAN 6 FT. 6 INS. SIX-COUPLED EXPRESS LOCOMOTIVE.



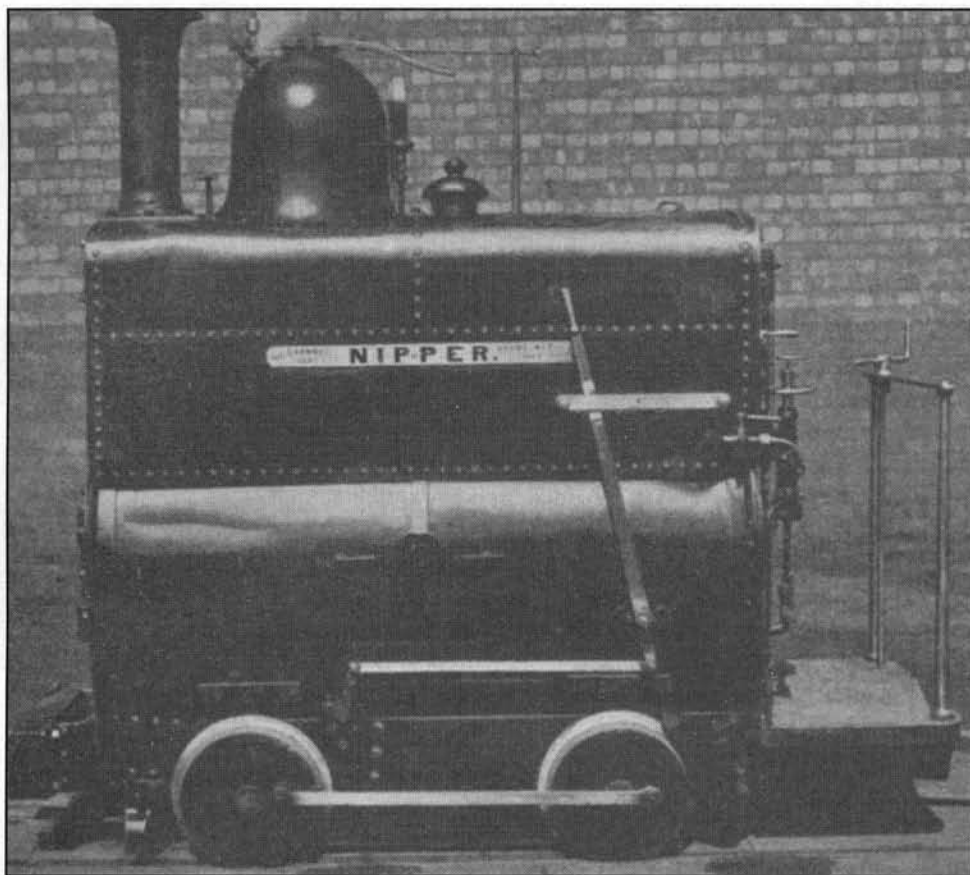


FIG. 1.—THE LONDON & NORTH-WESTERN RAILWAY LOCOMOTIVE, "NIPPER"

Had this expedient been resorted to, some 3 to 4ft., at least, might have been saved in the length of the boiler barrel—and who is there who is prepared to say that the efficiency of the engine, as a whole, would have been impaired by the adoption of such a course? Excessive length of tubes, as the writer has frequently pointed out, produces a fine show of heating surface *on paper*; but in actual practice, it has been amply demonstrated that a 15ft. tube is to all intents and purposes, as efficient from a steam raising point of view, as a 20ft. one.—The Caledonian engines, Nos. 49 and 50, are doing some remarkably good work—but the writer has, on more than one occasion, heard the remark passed by competent critics of locomotive practice, "What a pity those engines did not have outside cylinders."

THE G.E.R. "DECAPOD" ENGINE.

In the course of his speech to the G.E.R. shareholders, the Chairman, Lord Claud Hamilton, made some interesting remarks with reference to the 10-wheel-coupled tank locomotive designed by Mr. J. Holden for working the heavy suburban traffic on this railway. It appears, from what was stated, that the engine is not to be placed in regular service, at all events, on the class of work for which it was originally intended, although,

to use the Chairman's own words, "It will be utilised, at a reduced weight, for other purposes." As an alternative measure, the platforms are to be lengthened at certain stations, and the trains made up with seventeen coaches in place of the fifteen as at present. Presumably a more powerful type of tank engine will be introduced. What is to become of the "Decapod" did not transpire; but in any case, the class is not to be multiplied. The experiment was a bold one, and exemplified the resourceful ingenuity of its designer; but in the opinion of most people who follow these matters, the question all along has been whether the track and bridges could sustain the constant weight which would have been thrown upon them by this engine and this reason seems to have been the cause for the abandonment of this method of dealing with the suburban traffic question, which owing to the popularity of the

G.E.R. services and conditions is becoming a very pressing matter on that line.

July 7 : TWO PRODUCTIONS OF CREWE WORKS.

The scope and capabilities of Crewe Works are, in a general sense, understood by the majority of those who are in anyway interested in railways, and more particularly, locomotives; and the accompanying illustrations will serve to emphasise the wide field of operations existing there during the last forty years. The first photo shows one of the "tram" engines built at Crewe in 1867, for running about the works loaded with material from one department to another. The gauge of the works railway is 18ins., and it is surprising to see these little engines dealing with considerable loads, while negotiating curves and switches with ease and celerity. The second illustration represents the latest type of express passenger locomotive, and shows "Precursor", the first of the class turned out of Crewe Works to the designs of Mr. G. Whale. It is noteworthy that, whereas Mr. Webb, the late locomotive superintendent, adhered to the last to compound locomotives, his successor's first design is a "simple" engine.

August 25 :- THE MIDLAND COMPOUNDS.

Reference to these engines has already been made in these columns, but the accompanying illustration (see next page) shows No. 2635 in a position not usually adopted when engines are being photographed. Owing to this fact, it will be noticed that the suspension links on the weighbar shaft are exposed to view, and the fact that the reversing gear of the high-pressure cylinder (which is inside the frames) is located immediately alongside that of the right-hand low-pressure cylinder outside the frames becomes apparent. Both links can be plainly discerned close together, whilst that for the left-hand L-P cylinder can also be seen just inside the framing on the near-side of the engine. Other points are brought out by reason of the position in which the engine has been taken. The chimney cap, which in this case is cast in one with the chimney itself, is plainly noticeable, whilst the arrangement of the tender is laid open to view. It is evident that the blower was very much "on" judging from the discharge from the chimney.

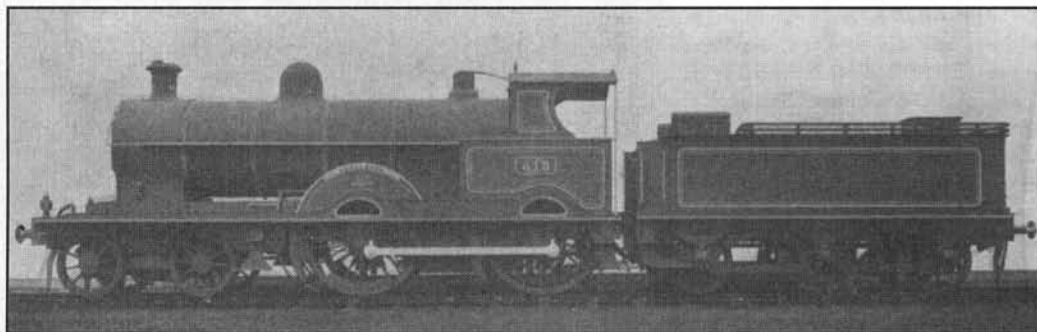
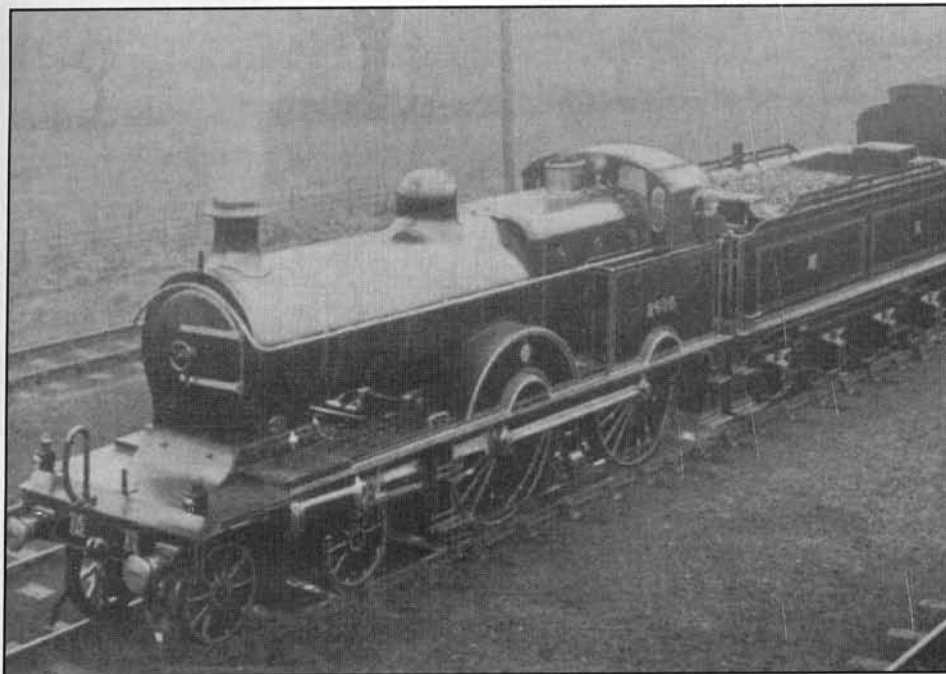


FIG. 2.—FOUR-COUPLED L. & N.W.R. EXPRESS LOCOMOTIVE, "PRECURSOR"



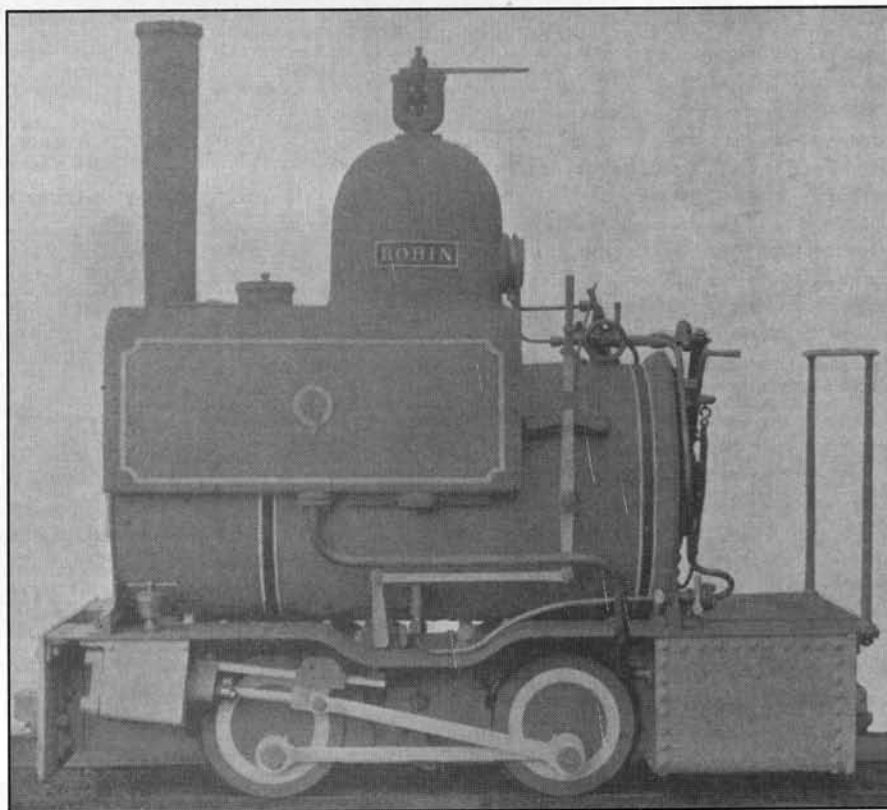
September 1 : THE LARGEST LOCOMOTIVE IN THE WORLD.

From time to time, and with persistent regularity, locomotives to which the above imposing title is applied, are produced in the United States, and although it is fully recognised as impracticable that in any European country an engine can be built (to run on any line *in* that country) which can compete in any point of size with the remarkable productions of America, the process of building exceptionally large locomotives goes on apace across the Atlantic. The latest example of this tendency to surpass all others is to be found in the huge "Mallet" compound, built at the Schenectady Works of the *American Locomotive Company* at present on exhibition at St. Louis. The H.P. cylinders drive the rear group of wheels and the steam then passes to the L.P., which are situated ahead of the smokebox and drive the leading group.....
(See page 14).

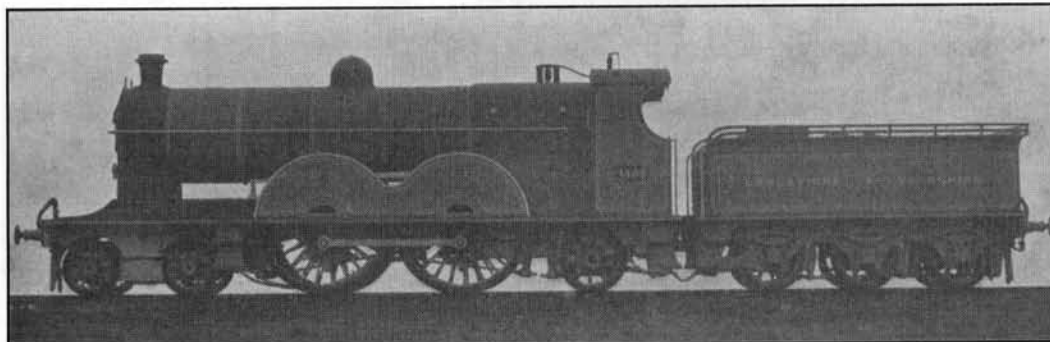
MIDLAND 3-CYLINDER COMPOUND EXPRESS LOCOMOTIVE, No. 2,635.

September 22 : LANCASHIRE AND YORKSHIRE LOCOMOTIVES.

Another example of the largest and smallest locomotives possessed by a railway company are illustrated herewith, in this case showing two L & Y Railway engines, one of the Atlantic type express passenger series, and the other a diminutive saddle-tank engine, used for hauling trucks about the narrow gauge tracks at Horwich Works. The Atlantic is one of a number built to the designs of *Mr. J.A.F. Aspinall*, shortly before that gentleman relinquished the post of Chief Mechanical Engineer to the L. & Y.R., to become General Manager of that line.



NARROW GAUGE LOCOMOTIVE, HORWICH WORKS, L. & Y. RAILWAY.



THE LATEST CLASS OF "ATLANTIC" TYPE EXPRESS LOCOMOTIVE ON THE L. & Y.R.

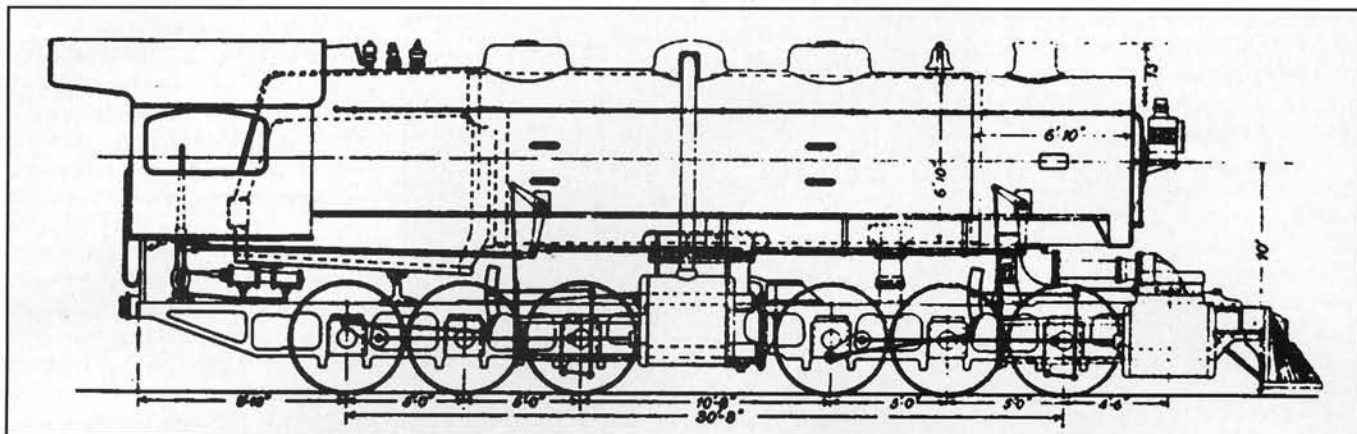


FIG 6—A "MALLET" COMPOUND ARTICULATED LOCOMOTIVE, BALTIMORE & OHIO RAILROAD.

1905: TANK LOCOMOTIVES ON BRITISH RAILWAYS.

Figs. 21 and 22 illustrate large tank engines of the 2-6-2 type employed on the *G.W. and L. & Y. Railways* respectively. In the first-named case the cylinders are outside the frames, and the engine generally is of decidedly original design. It is quite a recent addition to the locomotive stock of the railway referred to, and has all the latest features coincident with the practice of the line—viz., taper boiler, extended smokebox carried in a cast-iron saddle, long-stroke cylinders, solid bushed big-end connecting-rod, cylinder centre line *higher* than the wheel centres, and other features not usually met with on home railways. The *L. & Y.R.* locomotive (fig.22) is of especially large proportions, and it, with others of its class, were specially designed for dealing with the very heavy suburban traffic around Manchester, Liverpool, and other centres on the line. In this design the cylinders are inside, and *Joy's* gear is employed for actuating the valves which work above them.....Perhaps, the best example of the 0-6-2 type of locomotive to be found on a British railway is that illustrated in fig.23, which shows one of the most recent additions of its kind to the locomotive stock of the *London, Brighton & South Coast Railway*. Engines of this class are performing meritorious service on the suburban services of the line, and are not infrequently employed for hauling heavy excursions between London and Brighton, etc., at respectable rates of speed.....The *G.E.R.* possesses a large number of small 0-6-0 tanks, especially designed by *Mr. Holden* for working the Enfield branch traffic, in which trains of 17 coaches, equivalent (loaded) in weight to 277 tons, have to be hauled a distance of 10¼ miles in 40 minutes, with 14 intermediate stations to call at.

GREAT NORTHERN RAILWAY LOCOMOTIVE No.251.

Our well-known contributor on locomotive subjects, *Mr. Lake*, has kindly placed at our disposal a very fine photograph of *Mr. H.A. Ivatt's* famous "Atlantic" type express locomotive No.251. These engines (for there are now several of the same class now running) are a development of the "900" Atlantic's, the principal difference being in the boiler, cylinder dimensions staying the same in each class. The firebox is of the "Wooten" type.

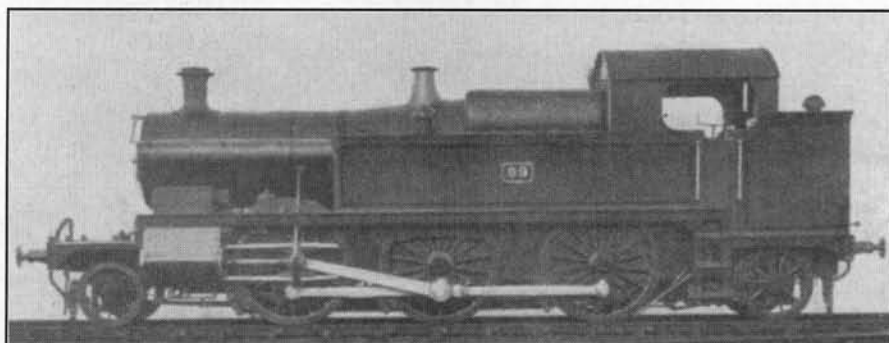


FIG.21—GREAT WESTERN RAILWAY 2-6-2 TYPE TANK ENGINE.



FIG.22—HEAVY 2-6-2 TYPE TANK ENGINE, LANCASHIRE & YORKSHIRE RAILWAY.



FIG.23—L.B. & S.C.R. SIX-COUPLED PASSENGER TANK LOCOMOTIVE.

NEW MIDLAND EXPRESS LOCOMOTIVES.

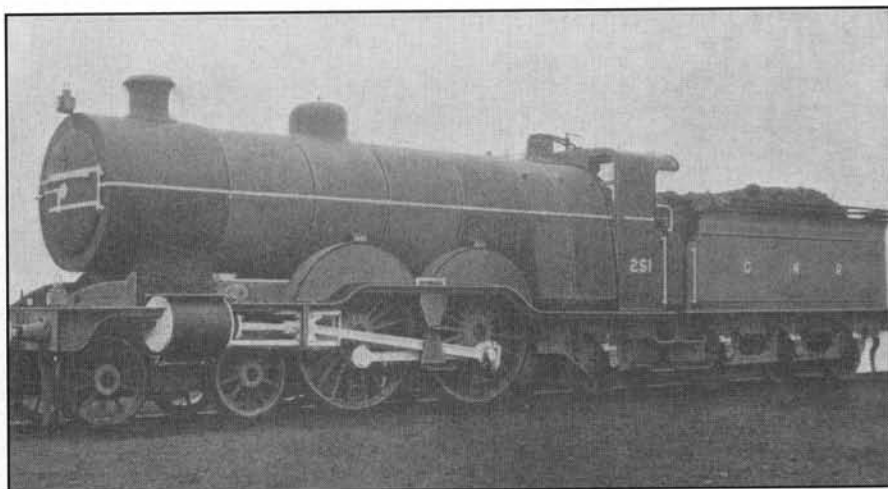
Reference is made to the new series of inside cylinder 4-4-0's by *R.M. Deeley* which ultimately evolved into 999, *Mr. Lake* deprecates the "huge numbers on the tender sides, which are only for identification and have no interest to the travelling public. Quite small figures on the cab sides would have sufficed."

1906 : NEW COMPOUND LOCOMOTIVES, MIDLAND RAILWAY.

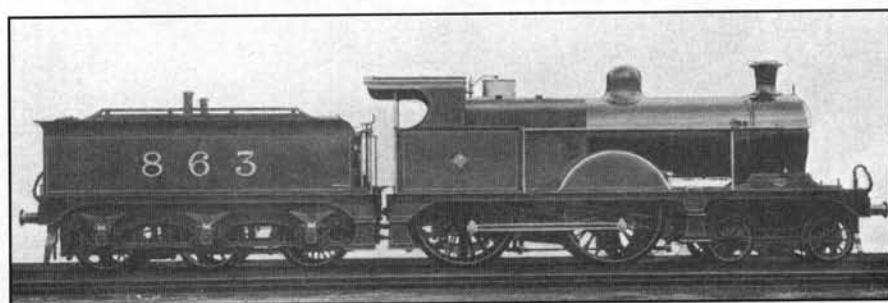
Those who favour the compound principle will find encouragement in the fact that the M.R.C. are increasing the number of such engines, having recently added ten 3-cylinder *Smith* compounds to the five already in use. One of the new series is, by courtesy of *Mr. Deeley*, shown in the accompanying illustration, from which it will be seen that the same general design has been adhered to as the previous loco of this type. The cylinder arrangement remains the same, all driving the first pair of coupled wheels; the outside cranks are set at right-angles to one another, while the inside crank bisects the obtuse angle between them. Slide-valves of the ordinary D pattern are used for distributing steam to the low- pressure cylinders, and a 10in. diameter piston valve, working below the cylinder, is used for the high-pressure; each valve being actuated by separate gearing of the link-motion type, all three sets of gear being reversed off one shaft by a hand-wheel and screw. Steam may be admitted through an auxiliary pipe to the L.P. cylinders from the boiler for the purpose of augmenting the power at times of stress. The boiler is of the *Belpaire* type, with three safety-valves adjusted to blow off at the high working pressure of 220 psi. The new pattern of cab with extended roofing is fitted, and the smokebox has the flat door with "dogs" for securing it, as in all of *Mr. Deeley's* engines.

COUNTY TANKS:

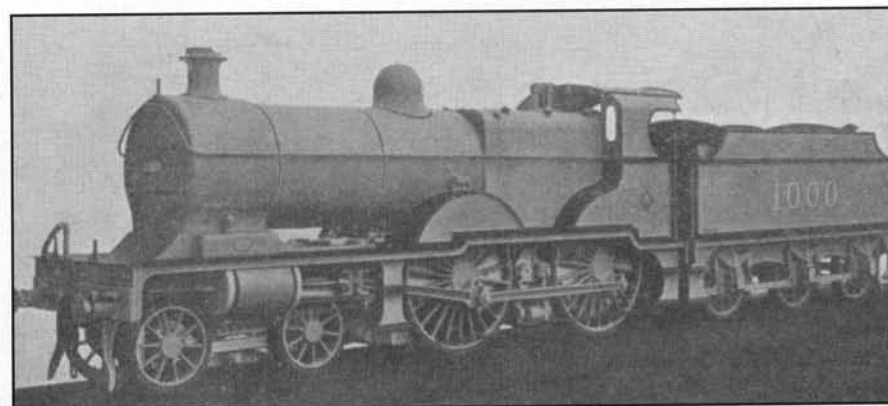
The first series of 4-4-2 type *G.W.* tank engines left Swindon recently and one of the number is illustrated herewith. The design is practically a repetition of the "County" class express engines, with the addition of side tanks, bunker, and extra carrying wheels. The new engines will be capable of working fast passenger trains, and as they are fitted with both-direction water scoops, there will be no restriction on the distance run without stops, except that imposed by the limits of coal supply. The writer is not aware of any other instance in which a tank engine has been fitted with coupled wheels as large in diameter as the present case, viz., 6ft 8½ins.



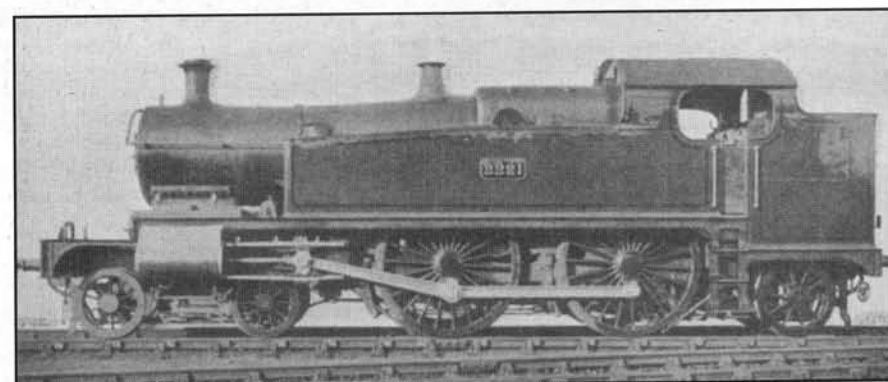
ONE OF MR. IVATT'S LARGE "ATLANTIC" TYPE LOCOMOTIVES ON THE G.N.R.



NEW 4-4-0 TYPE EXPRESS LOCOMOTIVE: MIDLAND RAILWAY.



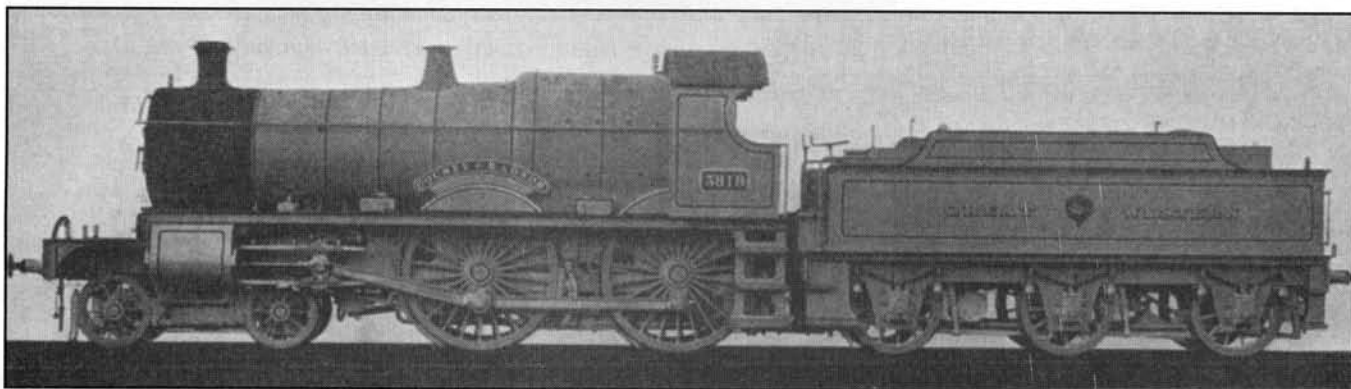
THREE CYLINDER COMPOUND LOCOMOTIVE: MIDLAND RAILWAY.



NEW EXPRESS TANK ENGINE: GREAT WESTERN RAILWAY



4-6-0 TYPE FAST GOODS LOCOMOTIVE: LONDON & NORTH-WESTERN RAILWAY.



NEW 4-4-0 TYPE LOCOMOTIVE, "COUNTY" CLASS: GREAT WESTERN RAILWAY.

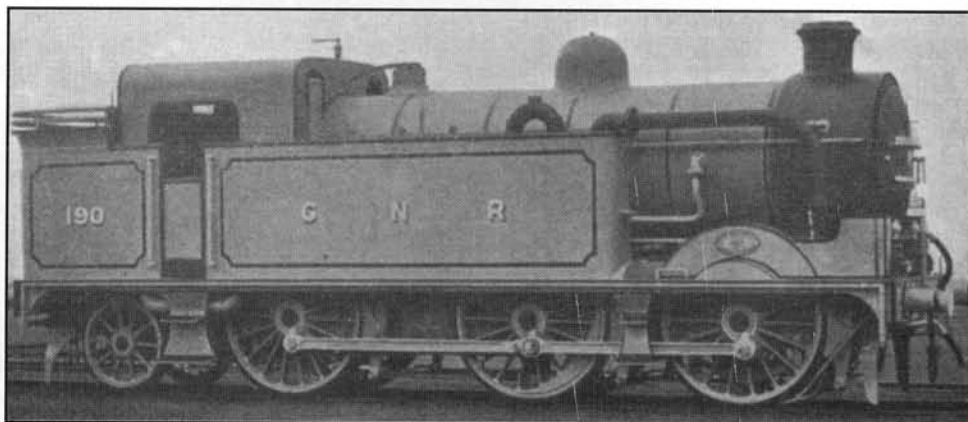
1907: NEW L. & N.-W.R. LOCOMOTIVES.

The writer has been favoured by Mr. George Whale, CME of the LNWR, with a photograph and particulars of the new 4-6-0 type locomotive, No.285, which is the first of the latest series built at Crewe Works. The photograph shows that in general design the new locomotives are a repetition of the "Experiment" class, the principal difference between the two designs being a substantial variation in the diameter of the coupled wheels.

MORE 4-4-0's ON THE GREAT WESTERN.

Quite recently, some further additions were made to the number of "County" class engines already in service, one of which, *County of Radnor*, is illustrated herewith.

(Although introduced in 1904, I could not find a write-up on the "County", apart from a brief comment in September 1904, that; "nothing new in the way of design is being carried out, but at many of the railway shops, locomotives of large size and recent pattern are building at the present time. On the G.W., for instance, the "County" class engines, which are, to all intents and purposes, of the "City" series, but differ therefrom in having outside cylinders, are being multiplied." I must admit to being biased, but I thought there was a bit more to a "County" than



THE NEW SIX-COUPLED RADIAL TANK ENGINE: G.N.R.

that. However.)

"No differences of an essential nature have been introduced in bringing out these supplementary engines, the first series of "County's" having proved very successful and as economical as a high-speed simple express locomotive can be expected to be."

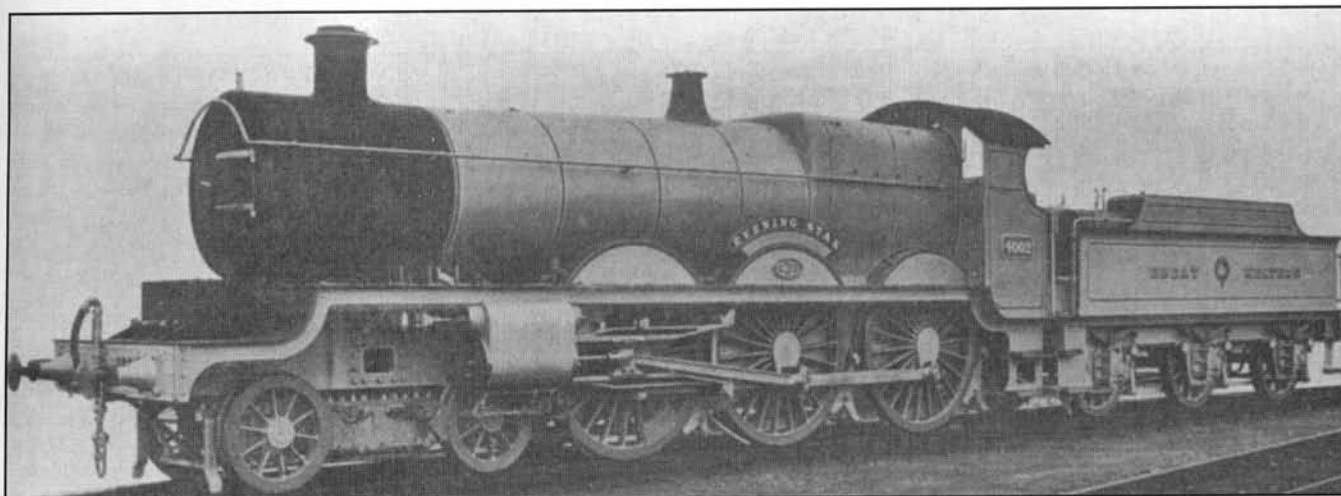
(Praise from Caesar, albeit with a sting in the tail, implying that it would have been that much better if the GWR had had as much faith in compound-ing as the author).

There is so much going on in 1907 that I have included more photos, at the expense of text from Mr. Lake.

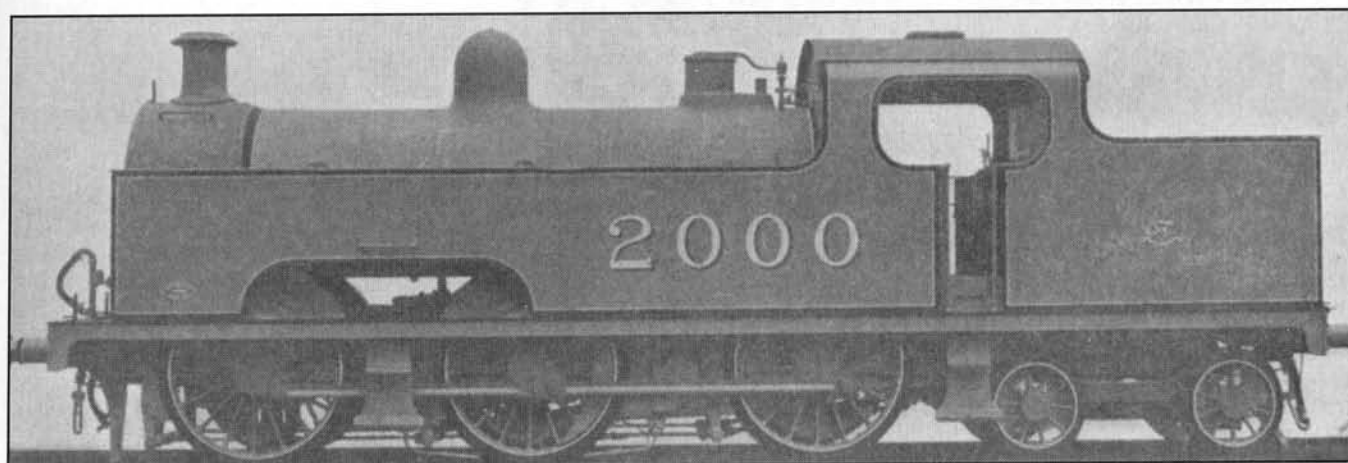
Herewith, a brief précis: H.A. Ivatt put into ser-

vice a 0-6-2 radial tank, No.190., for the heavy sub-urban traffic out of Kings Cross.

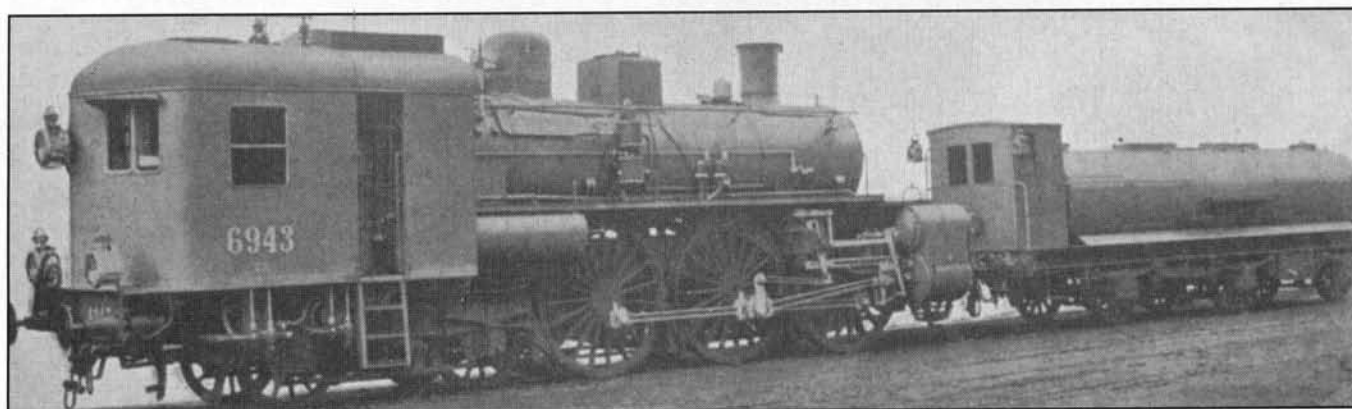
The GW introduced the "Star" class, with inside Walschaert's actuating the two inside cylinders direct, and the outside via a lever connected to the closest inside valve rod rocking about a vertical pin and passing through a slot in the frame, as can be seen in the photo. Mr. Deeley sent a photo and details of a new Midland 0-6-4 tank, (which became affectionately known as the flatiron). A photo of the latest version of the Italian "cab-forward" of the Adriatic Railway. In addition, to round off, No.999, a later version of the loco previously mentioned in 1905.



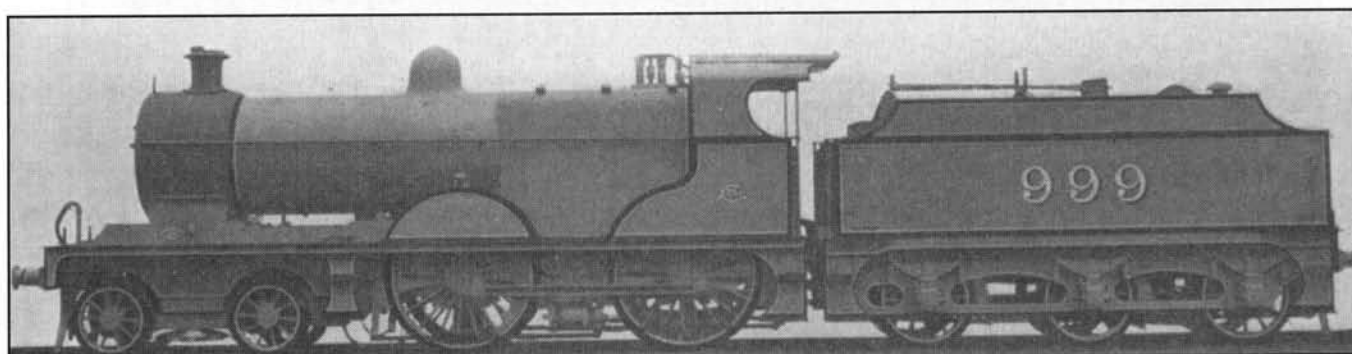
NEW 4-6-0 TYPE EXPRESS LOCOMOTIVE, WITH FOUR CYLINDERS: G.W.R.



NEW SIX-COUPLED BOGIE TANK ENGINE: MIDLAND RAILWAY



COMPOUND EXPRESS LOCOMOTIVE: ADRIATIC RAILWAY, ITALY



NEW EXPRESS LOCOMOTIVE: MIDLAND RAILWAY

"A marked difference is found in the method of steam distribution. This is effected by piston valves actuated by a special valve gear designed by *M. Deeley*, the principle feature of which is that no eccentrics, or return crank, are employed. The travel for the valve lead is derived from a pendulum link, and a rod attached to the crosshead of the adjacent motion is utilised to oscillate the expansion link. The arrangement gives an excellent steam distribution, and the absence of eccentrics on the driving axle is a great advantage". Mention is made of a new Pacific now building at Swindon. "To those who have not seen the drawings, the excellent model shown at the MODEL ENGINEER EXHIBITION, formed an opportunity of gauging the proportions of the coming leviathan which otherwise would have been impossible. The engine will undoubtedly rank among the finest looking express locomotives in the United Kingdom".

1908: THE NEW LSWR 4-6-0 TYPE LOCOMOTIVE.

The first of a new series of 4-6-0 type locos with four simple cylinders was completed at the Nine Elms Works of the LSWR at the end of last year and is illustrated below. (I think one can see, amongst others, the forerunner of the "Paddlebox" here).

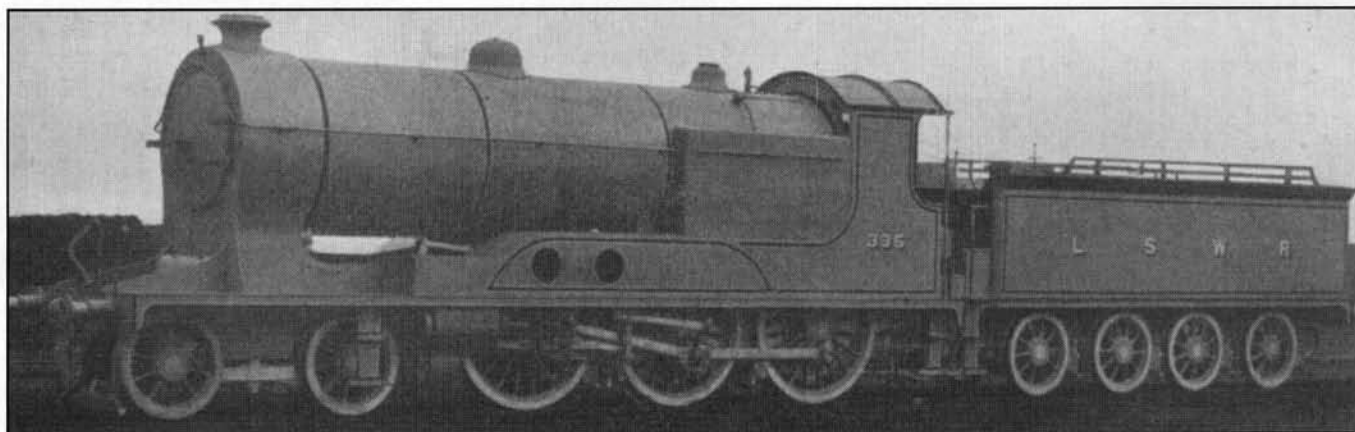
THE GWR PACIFIC:

The long looked for "Pacific" locomotive of the GWR is now in service and a very fine engine she appears to be. The design is practically an enlargement of the "Star" class introduced by *Mr. Churchward* during 1907, and the engine may be regarded as nearing the ultimatum in steam locomotive construction for the British gauge, at any rate, while present standards exist. The tender is an eight-wheeled double bogie pattern, an innovation for the GWR. The tractive effort is 29,430 lbs.

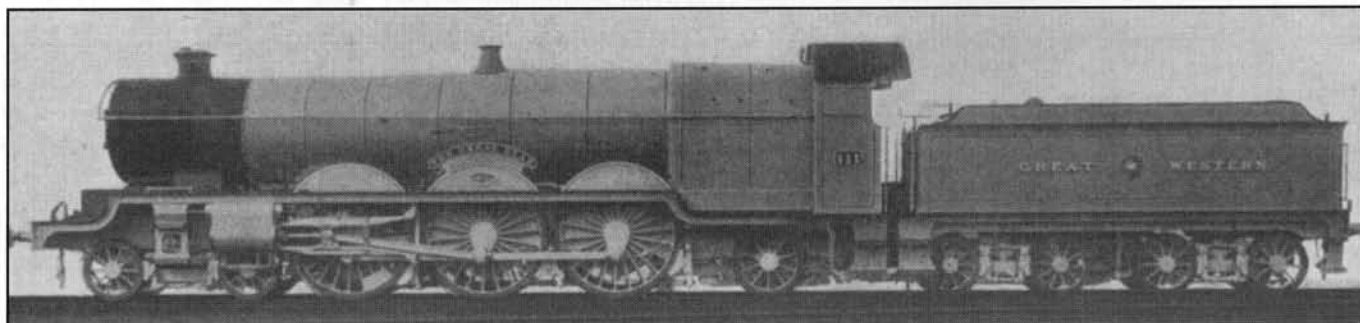
NEW FRENCH COMPOUNDS:

The Western of France Railway has just put into service two new types of four-cylinder compound locomotives, one for express passenger and the other for heavy suburban service. The express loco, illustrated, is of the "Pacific type, and other, a 2-6-2 tank. The cylinders on the Pacific are; H.P. 16ins., L.P. 26 1/2 ins., 25 1/2 ins. stroke with 6ft.6ins. drivers, and the tank; H.P. 13 1/2 ins., L.P. 22ins., 24ins. stroke with 5ft. 1 1/2 ins. drivers.

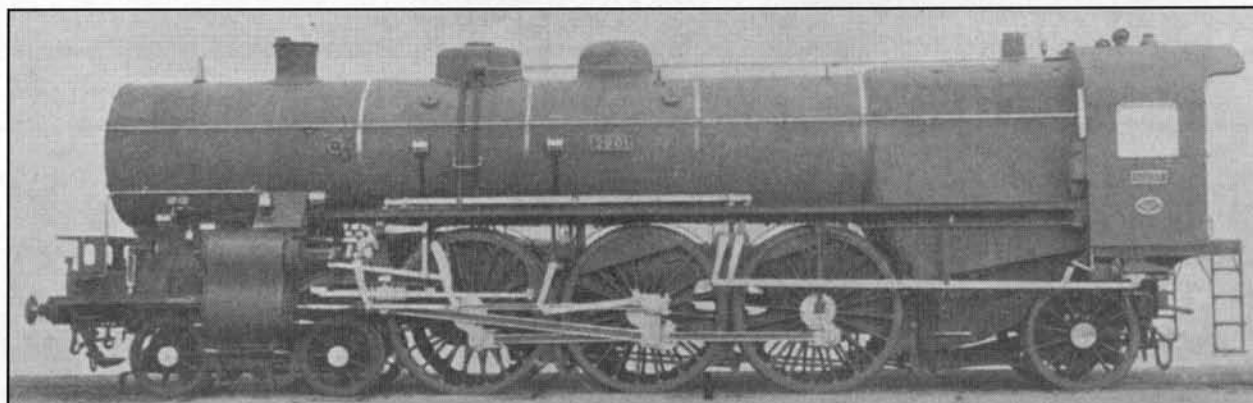
(Unfortunately, it does not give tractive effort, which is a pity, since it looks like they could both be pretty lively. I am struck by how modern the Pacific looks for 1908. But perhaps that is because they looked that way for such a long time. One could make the same comment about the *GW* Star class, which set the pattern for the remainder of their express loco design life. Thank heaven).



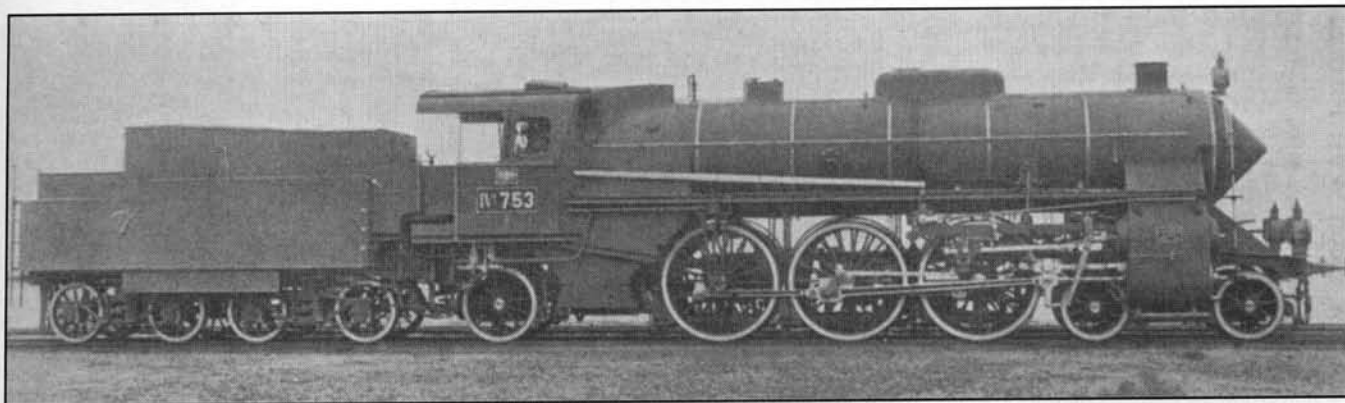
FOUR-CYLINDER, 4-6-0 TYPE PASSENGER LOCOMOTIVE: LONDON & SOUTH-WESTERN RAILWAY.



NEW "PACIFIC" TYPE LOCOMOTIVE, "THE GREAT BEAR" G.W.R.



THE NEW FOUR-CYLINDER COMPOUND "PACIFIC" TYPE LOCOMOTIVE: WESTERN RAILWAY OF FRANCE



THE FIRST GERMAN PACIFIC TYPE LOCOMOTIVE.

THE FIRST GERMAN PACIFIC:

The credit for having first introduced the "Pacific" class into Europe belongs to France, and England and Germany have about tied for second place. The German engine is illustrated by courtesy of the builder, *J.A. Maffei* of Munich. As regards size, it easily eclipses both the Paris-Orleans Pacific and the Great Bear.

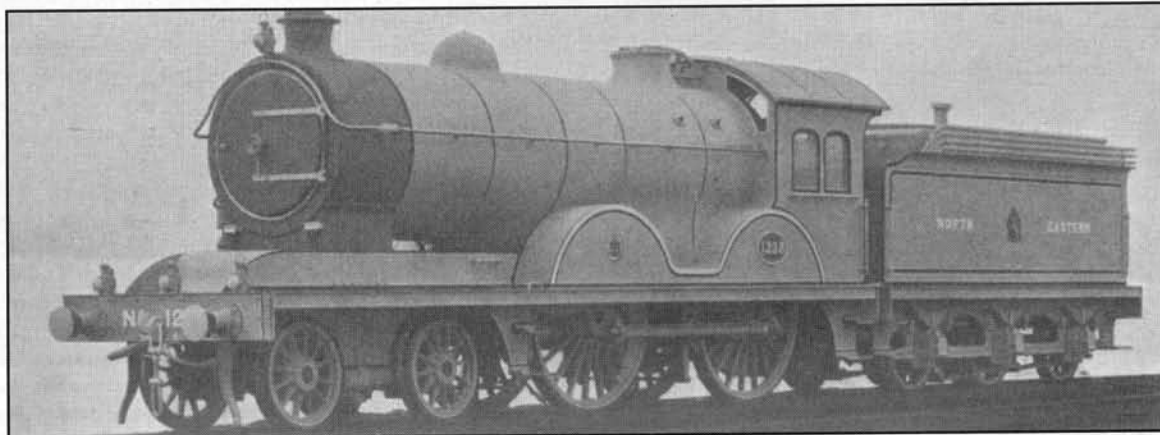
It is a compound, and the four cylinders are placed in line below the smokebox—all drive the middle and not the leading coupled wheels. The boiler is of immense proportions and contains a Schmidt smoke-tube superheater. The H.P. cylinders are 17ins; L.P. 26ins., 24 $\frac{1}{4}$ and 26 $\frac{1}{2}$ ins stroke with 6ft drivers.

1909: NEW 4-4-0'S ON THE N.E.R.

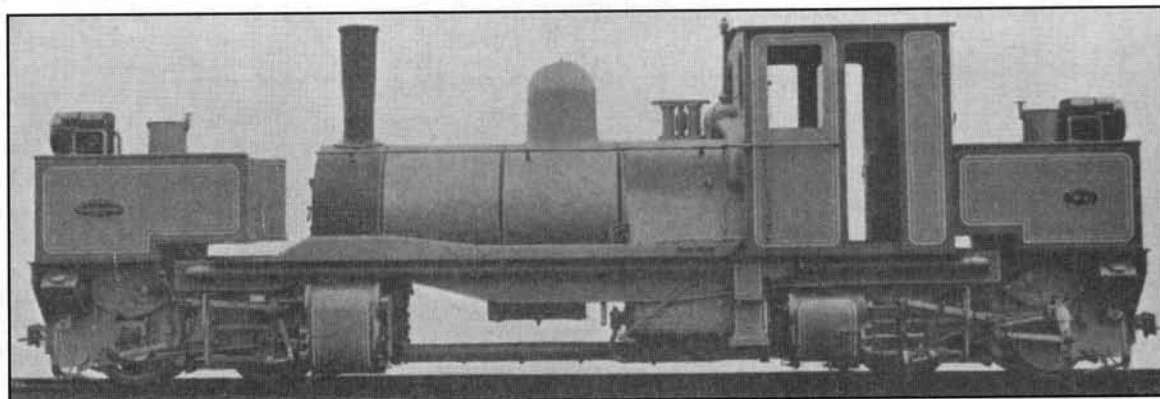
Mr. Wilson Worsdell, C.M.E. of the *North-Eastern Railway*, finds a very good use on that line for engines of the 4-4-0 type, dealing with some of the fastest and heaviest passenger traffic in the country. The locomotive here illustrated and described is the first of a new series built at the company's Works at Darlington. As regards outside appearances, it would be difficult to distinguish new "R1" class from the well-known "R". It has a larger boiler, the chimneys are cast with a projecting rim for deflecting the wind. The ten engines of this class are fitted with the patent variable blast-pipe and ash-ejector. The cylinders are 19 by 26ins. with 6ft 10in coupled wheels.

THE GARRATT LOCOMOTIVE:

Reference was made in a previous note to the trials, attended by the writer, of the first locomotive built on the new principle invented by *Mr. Herbert Garratt*, late locomotive superintendent of the *Lagos Railways*. It is now on its way to Tasmania. It is a four-cylinder compound, with a steam bogie at each end, and the boiler placed between them, the purpose being to obtain a very flexible wheelbase, and at the same time to allow the designer free to employ a boiler of exceptionally large proportions. By courtesy of *Messrs Beyer, Peacock & Co., Ltd.*, the writer is enabled to submit a photograph for publication. The H.P. bogie is at the rear of the cab and a water tank located over the L.P. at the front, with a combined



NEW 4-4-0 TYPE EXPRESS LOCOMOTIVE, R1 CLASS : N.E.R.



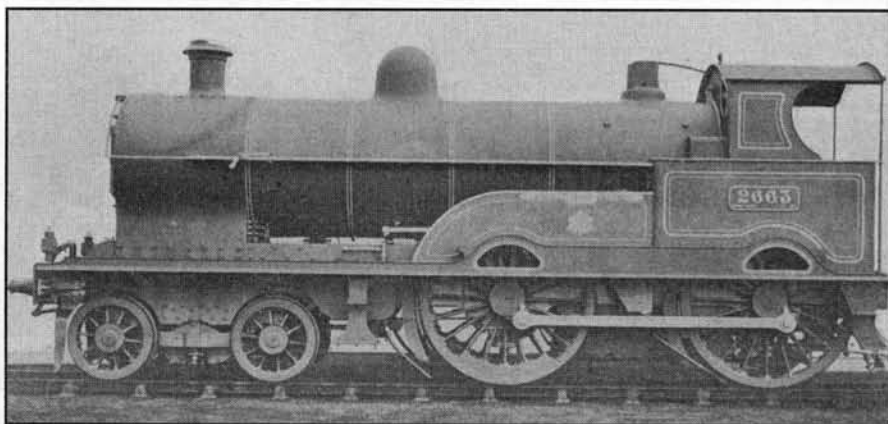
THE FIRST GARRATT LOCOMOTIVE. (Built by *Beyer, Peacock & Co., Ltd.*, for the *Tasmanian Railways*)

tank and coal bunker over the rear bogie. A large pipe, with ball joints, carries the exhaust steam from the H.P. to the L.P. cylinder, and a change valve is fitted so that the engine may be worked as a four-cylinder simple when desired. *Walschaerts* gear is employed in conjunction with piston valves working above the cylinders. The boiler is fitted with the Belpaire type of firebox and is believed to be the largest boiler yet fitted to an engine for the 2-ft. gauge. Cylinders; H.P. 11ins, L.P. 17ins., stroke 16ins with 2ft. 7 $\frac{1}{2}$ in. wheels.

1910: IS THE SINGLE DRIVER REALLY DEAD?

This question has been addressed to the writer by a correspondent who recently travelled from Doncaster to Kings Cross in a heavy corridor train drawn by a "single" engine—not one of *Mr. Ivatt's* large and modern examples of the type, but by a 7ft. 6in. *Stirling*, with inside cylinders—"comparatively a small engine and surely out of date for this important work. The time allowed was 3hr. 1min., with stops at *Grantham* and *Peterborough*, and on asking the driver what he reckoned the load at, he replied, 'about 320 tons.' Punctuality was observed."

The performance is distinctly a good one, but in no way superior, and indeed not so good as the locomotives of the class mentioned were expected to do every day when they occupied a position in the front rank of *GNR* locomotive standards, only, comparatively speaking, a few years ago. Then they had to deal with even heavier trains than this one and in all weathers, and they gave satisfaction on the whole. In these days of fierce competition, when punctuality and regularity in running are all-important factors in the conduct of a great main line, engines capable of the most consistent reliability are indispensable, and no company can take the risk of employing, as a regular thing, on the principle services, locomotives possessing the characteristic of small adhesion weight, with the uncertainty such a feature entails. The result is that engines often heavier and more powerful than is actually necessary, except for dealing with maximum loads, have to be built in large quantities, and in any case there must not be less than four coupled wheels, so as to make sure of a suitable adhesion factor. Large cylinders using bigger volumes of steam also demand higher adhesion ratios to allow of their being fully effective, and as the amount of load which may be placed on any single axle is strictly limited, the only way is to increase the number of coupled wheels and so



THE NEW "PRECURSOR" TYPE 4-4-0 SUPERHEATED EXPRESS LOCOMOTIVE:
L. & N.W.R.

distribute the weight.

As to the query with which the letter of the Bradford correspondent concludes, viz:—"If the *GNR* were to return tomorrow to the use of the 'single-driver' for working, as in days gone by, all their principal express trains, can anyone say that either reputation of the services or the convenience of the public would suffer thereby?" Well, the writer cannot say what the result "tomorrow" might be, but for every day working it would certainly not be a wise step.

ON THE NORTH-WESTERN.

Mr. *C.J. Bowen-Cooke* has built an enlarged "Precursor" type engine named "George the Fifth" which he has fitted with *Schmidt's* superheating apparatus. Outwardly, this locomotive resembles very closely its predecessors built by the late Mr. *George Whale*, but the smokebox is longer and the coupled wheel splashers are now of the semi-continuous pattern. The engine has 20 in. diameter cylinders in place of the 19 in. ones fitted to the earlier engines....It is noteworthy that the "George the Fifth" has already signalled its capabilities by hauling a train made up to the maximum load for one engine, viz: "equal to 20 $\frac{1}{2}$ coaches, from London to Crewe at an average speed of practically sixty miles per hour; this having been done with a special train run on a Sunday late in July last.

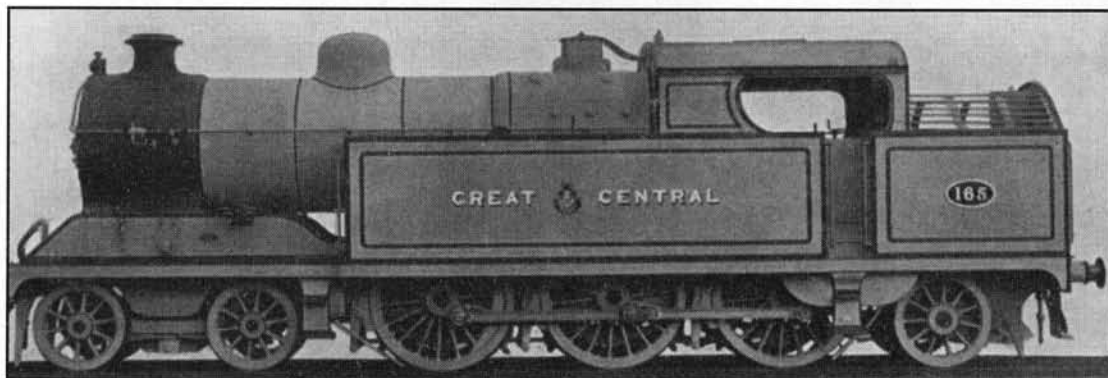
A "PACIFIC" RUMOUR.

A semi-official statement—amounting, however,

to nothing much more than a rumour—has reached the writer to the effect that a large railway company—not the *G.W.*—is about to put in hand the construction of several "Pacific" type locomotives. The engines, so it is said, will have two exceptionally large simple cylinders, fed by a boiler fitted with *Schmidt's* superheating apparatus. The design aims at getting the most possible from a two-cylinder simple locomotive. Outside cylinders will be employed in conjunction with *Walschaerts* valve gear and piston valves. The firebox will be of the wide type with a special design of firegrate. Altogether the engine should prove an object of interest—if it ever puts in an appearance. ("Curiouser and curiouser," said Alice).

1911: NEW GREAT CENTRAL TANK ENGINES.

The first of the new "Pacific" type tank engines built at Gorton Works for heavy suburban and stopping long-distance trains on the *GCR* has been running trial trips for the past few weeks. The design has been based on lines which allow a of a high starting effort without necessitating abnormal strain in the crank-axle, hornblocks, etc., this being due to the relatively small diameter of the six coupled wheels and large size of the cylinders, which are designed to use highly superheated steam, distributed to them by 10 in. diameter piston valves, working above the ports. The valve motion is of the ordinary *Stephenson* type with rocking shafts...The writer is indebted to Mr. *J.G. Robinson*, Chief Mechanical Engineer of the *GCR*, for the above information.

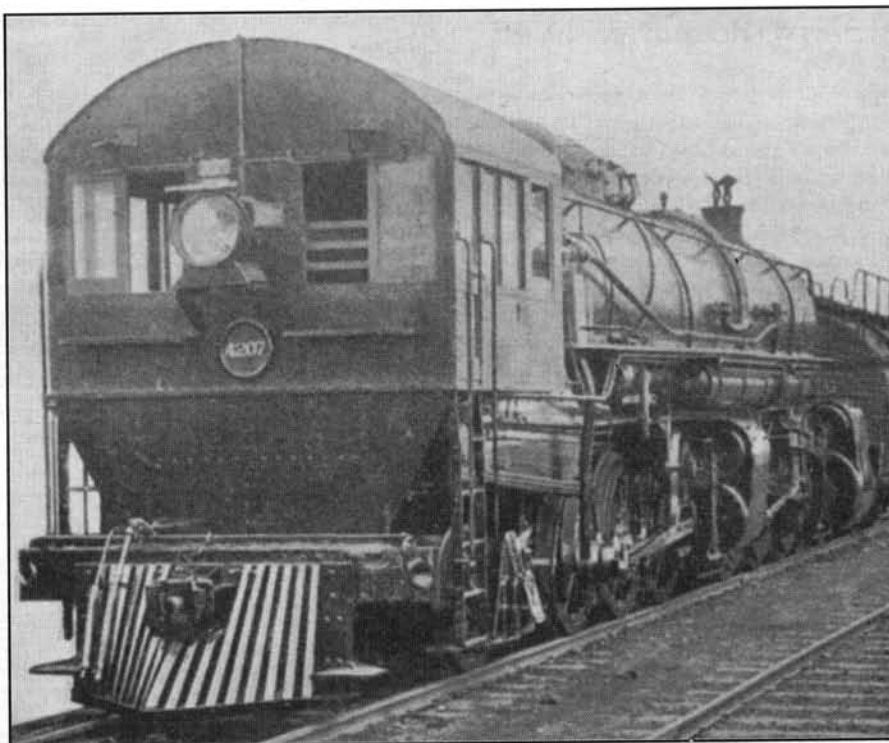


THE FIRST OF THE
NEW PACIFIC TYPE
TANK ENGINES OF
THE GREAT CENTRAL
RAILWAY

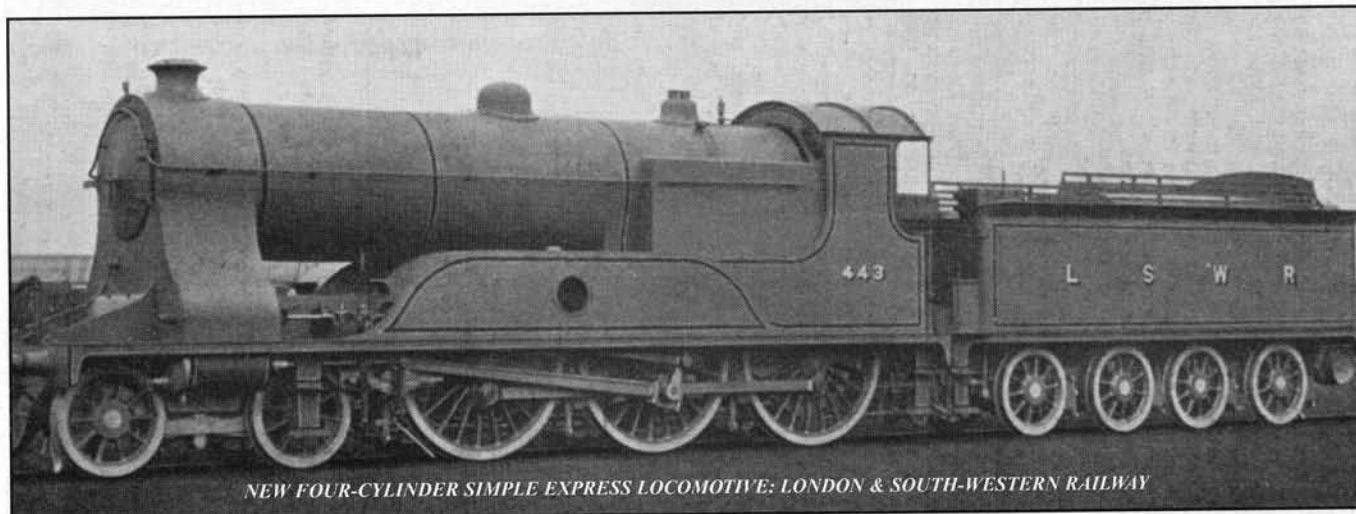
(I was intrigued by the "Pacific Rumour" 'report'. I was unable to find any further mention, but it is easy to miss a comment among so many articles. Since we would have to wait until 1922 to see a further tender Pacific, I wondered if it might refer to one of the tank versions. But, apart from other non-conformities, the 'wide firebox' seems to rule the average tank out. So I suppose its as Mr. Lake opines, "just a rumour".)

THE NEW LSWR EXPRESS ENGINES.

The latest production of the Eastleigh Works of the L.S.W.R. is a series of four-cylinder express engines, one of which, by the courtesy of Mr. Dugald Drummond, is illustrated herewith. The new locomotives differ from their predecessors in that they have larger coupled wheels, and the cylinders, instead of being divided, are now placed in line below the smokebox. The inside cylinders drive the leading coupled wheels, while the outside ones actuate the second pair, and the one set of Walschaerts gear suffices to move both piston valves on each side of the engine, with Stephenson's link for the inside pair. Mr. Drummond adheres in these new locomotives to the use of his well-tried water-tube firebox and feed-water heating apparatus. He is not, as yet, a convert to the prevailing fashion of superheating, although



FRONT END OF THE SOUTHERN PACIFIC OIL BURNER.



NEW FOUR-CYLINDER SIMPLE EXPRESS LOCOMOTIVE: LONDON & SOUTH-WESTERN RAILWAY

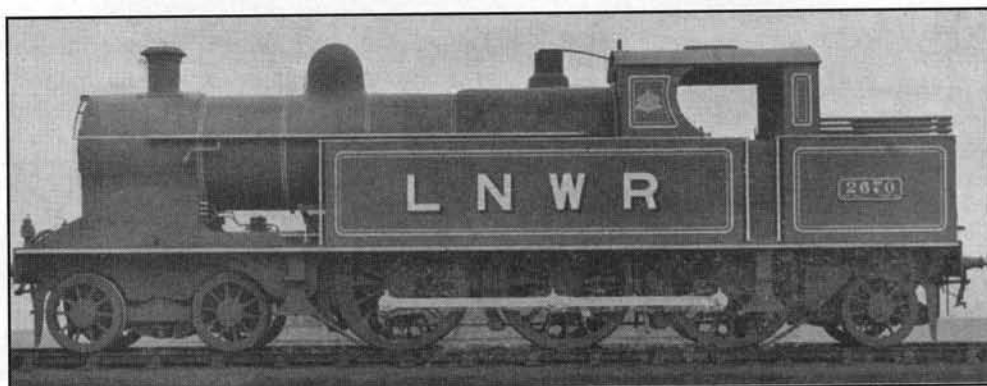
closely following results obtained on other railways. The cylinders are 15ins., coupled wheels 6ft. 7ins., boiler pressure 200 lbs., and tractive effort 25,177 lbs. (These loco's had a bit of a mixed career, loco-men either loved or hated them, depending on whom you were talking to. They were nicknamed "Paddleboats" according to some sources, "Paddleboxes" according to others. I always thought they were "Paddleboxes". Bert Mead built a beautiful 3 1/2 in. gauge model of one, which appears in Martin Evans' "Manual of Model Steam Locomotive Construction").

ANOTHER REMARKABLE AMERICAN LOCOMOTIVE.

From the Baldwin Works at Philadelphia the writer has received photographs and particulars of a remarkable locomotive recently built there for the Southern Pacific Railway.

The engines are of the Mallet type, but arranged for running with the cab in front. The engines are equipped for oil-burning and the tender is coupled at the smokebox end, the tanks have respective capacities of 3,200

gallons of oil and 10,000 gallons of water. The valves are operated by Walschaerts motion, H.P. cylinders are 25ins. diameter, L.P. 38 ins., stroke 28 ins., boiler 200 psi., (tractive effort not quoted).



NEW SUPERHEATED TANK LOCOMOTIVE : L. & N.W.R.

1912: NEW LOCOMOTIVE FOR L.B. & S.C.R.

The *LBSCR*, with its promised improvement in the Brighton service, has turned out of the Brighton workshops a second heavy tank loco of the 4-6-2 type, similar in general proportions to the prototype "Abergavenny", designed by Mr. D. Earle Marsh, but with *Walschaerts* gear. The accompanying illustration is from a photograph kindly provided by Mr. L. Billington, Locomotive Superintendent of the *LBSCR*.

THE NEW MIDLAND RAILWAY GOODS ENGINES.

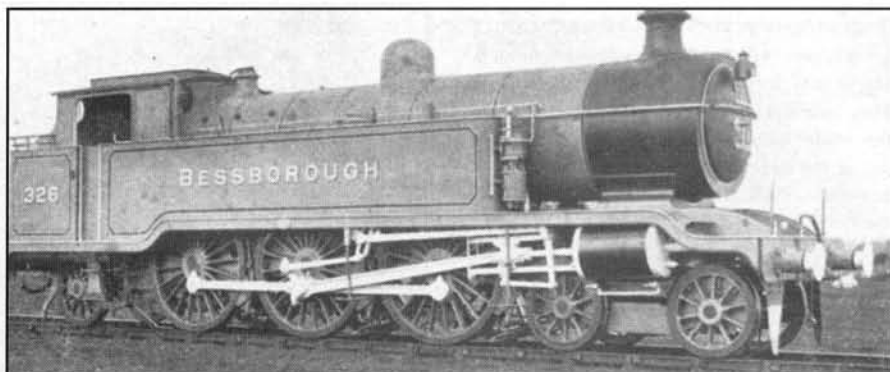
By courtesy of Mr. Henry Fowler, C.M.E. of the Midland Railway, the writer is enabled to illustrate and describe the type herewith. It is an inside cylinder 0-6-0. The boiler is of the *Belpaire* type and is fitted with a *Schmidt* fire-tube superheater. The cylinders are fitted with piston valves operated by *Stephenson* type gear. Steam reversing gear is provided. Cylinders are 20ins. by 26ins., wheels 5ft. 3ins., pressure 160 psi., tractive power 0.0736 ton per lb. steam pressure in cylinder, weight 49 tons 2cwt. (Later to become familiar as the 4F, 191 were built up to 1924, and a further 580 thereafter).

SUPERHEATED GOODS ENGINES, G.N.R.

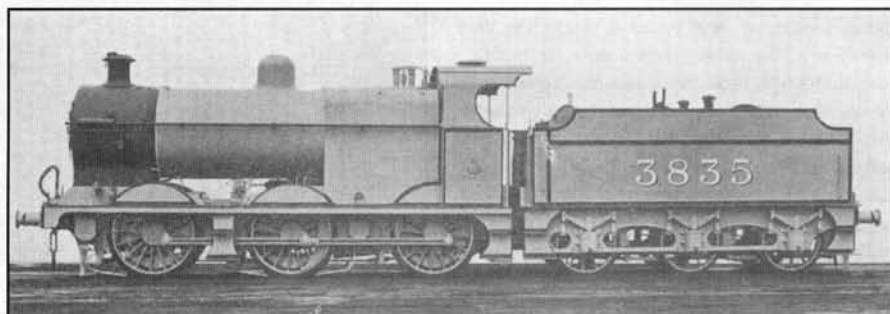
Mr. H.N. Gresley, the newly appointed Locomotive Engineer of the *Great Northern Railway*, has built at Doncaster Works some 0-6-0 type superheated goods engines of the same general type to that described above. In many respects the engines have smaller dimensions than those of the *Midland*. Piston valves worked by *Stephensons* motion are employed, but the boiler has the ordinary type of firebox. The cylinders are 19 by 26ins., wheels 5ft. 2ins., pressure 160 psi., weight 52 ft tons.

"GARRATT" LOCOMOTIVES FOR TASMANIA.

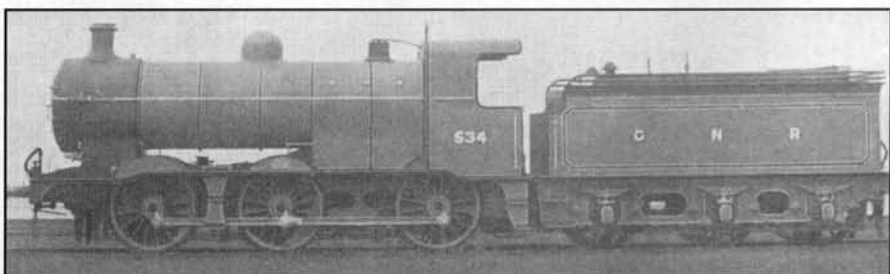
Messrs. Beyer, Peacock & Co., Ltd. have recently delivered to the Tasmanian Government two locomotives built on the *Garratt* principle. One is designed for express passenger, and the other for goods traffic. The gauge is 3ft. 6ins. and there are many sharp curves and steep gradients to be negotiated. The boilers are superheated, and are the same for each engine, but the passenger version, illustrated, has four cylinders each unit, in a simple form, and is the most powerful *Garratt* built so far. The goods engine has two cylinders each unit. Cylinders; 12 by 20ins on the passenger engine, 15 by 22ins. on the goods, coupled wheels; 5ft. and 3ft. 6ins respectively, pressure 170 lbs.



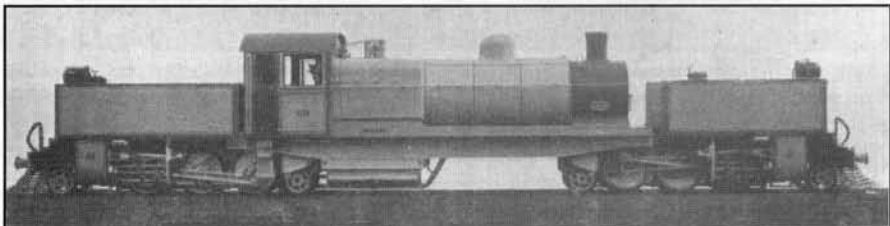
NEW 4-6-2 TANK LOCOMOTIVE: L.B. & S.C. RAILWAY.



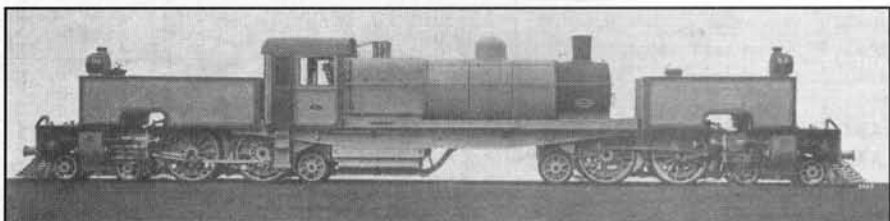
SUPERHEATED GOODS LOCOMOTIVE FOR THE MIDLAND RAILWAY



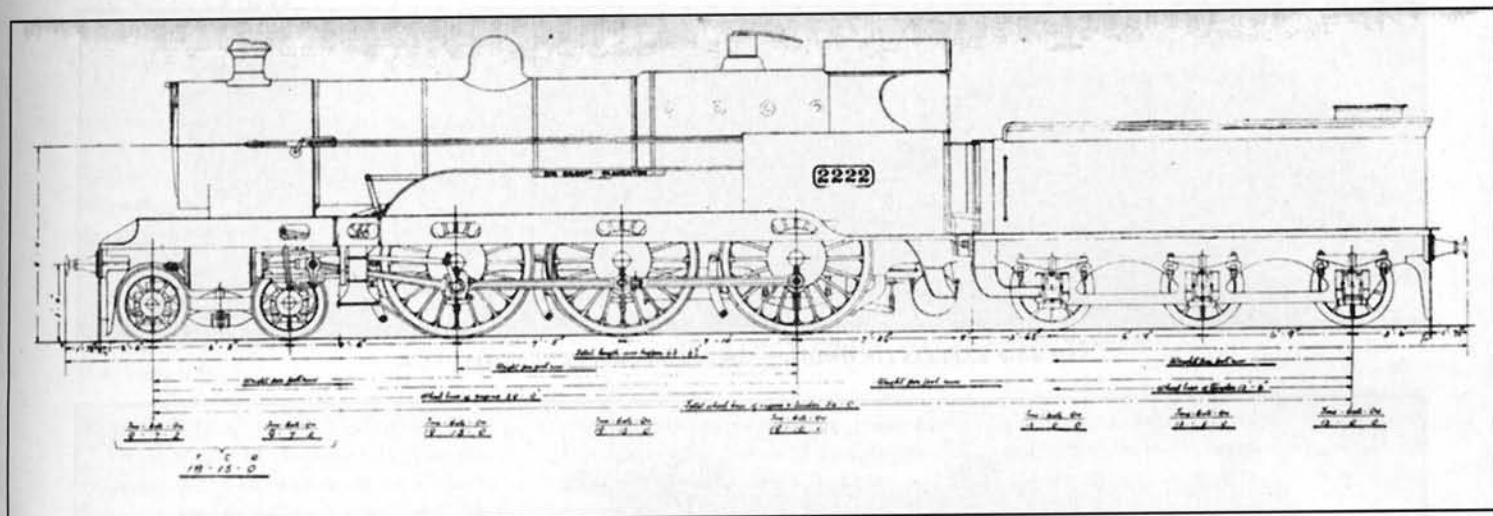
SUPERHEATED GOODS LOCOMOTIVE : GREAT NORTHERN RAILWAY



GARRATT GOODS LOCOMOTIVE: TASMANIAN GOVERNMENT RAILWAY



EIGHT CYLINDER, SIMPLE LOCOMOTIVE, GARRATT SYSTEM: TASMANIAN GOVERNMENT RAILWAY.



FOUR-CYLINDER SIMPLE 4-6-0 TYPE EXPRESS LOCOMOTIVE "SIR GILBERT CLAUGHTON": L&NWR.

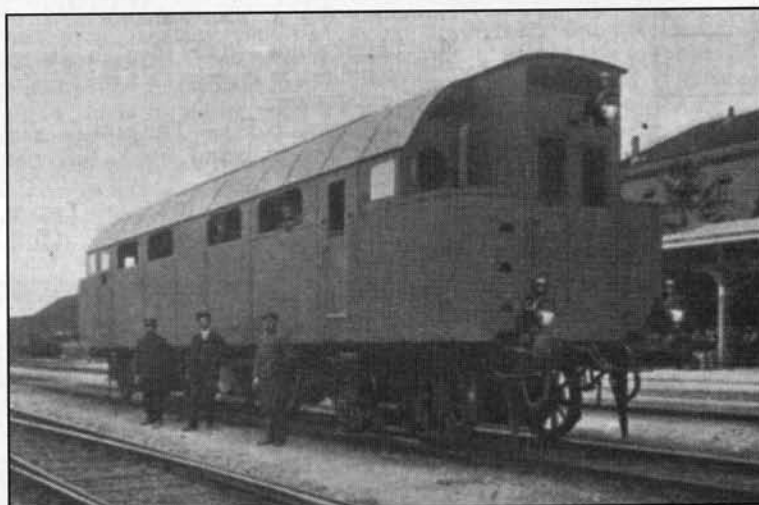
1913: THE "SIR GILBERT CLAUGHTON" LOCOMOTIVE.

The four-cylinder simple-superheated express locomotive, "Sir Gilbert Claughton", designed by Mr. C.J. Bowen-Cooke, CME of the L. & N.W. R., and constructed at Crewe Works, is putting up some highly satisfactory performances on the main-lines of that company, and will shortly be followed by other engines of the same class. This week we are enabled, by the courtesy of Mr. Cooke, to reproduce an interesting drawing of the engine. The cylinders are placed in line below the smokebox, and the four connecting rods drive the leading pair of coupled wheels. The cylinders are cast, together with steam chests, in two sections bolted together on the centre line of the engine, each section comprising an inside and an outside cylinder, and the two piston valve chests; also half the smokebox support. The valves work above the cylinders and are actuated by *Walschaerts* motion, only two gears being employed for working the four valves. These gears are carried outside the wheels and the valves of the inside cylinders derive their motion from transverse rocking levers connected with the valve spindles of the outside cylinders.

This arrangement it will perhaps be recollected, was employed by the late Mr. Webb for his four-cylinder compound engines, and is, of course, employed elsewhere as well. The boiler is of fairly large proportions, and in accordance with the latest LNW practice is fitted with the *Belpaire* type of firebox. It is equipped with a *Schmidt* superheater and the working pressure is 175lb. Cylinders 16ins. by 26ins., coupled wheels 6ft 9ins., weight 78 tons, with tender, 117 tons, tractive effort 23000lb.

DIESEL-ENGINED EXPRESS LOCO.

Messrs Sulzer Bros., of Winterthur, Switzerland have kindly provided photographs of the larger diesel-engined locomotive which they have recently delivered to the *Prussian State Railways* at Berlin. The locomotive frames, running gear and body were furnished by Messrs A. Borsig of Berlin-Tegel. The drive from the engine is transmitted to the wheels through coupling-rods from outside disc-pattern cranks carried on the end of the engine crankshaft.



GENERAL VIEW OF DIESEL-ENGINED EXPRESS LOCO.



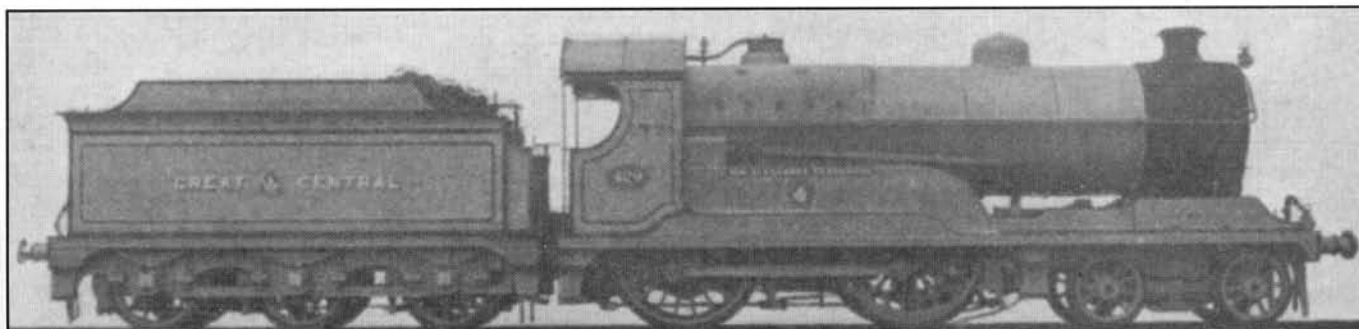
NEW TYPE OF TANK ENGINE, WITH THREE SINGLE-EXPANSION CYLINDERS: N.E.R.

Speeds of from 12 to 60 mph were attained during trials.

NEW N.E.R. TANK ENGINES.

There has recently been introduced on the North-Eastern Railway a new class of tank engine, the distinctive feature of which is the combination of three high-pressure cylinders with the 4-4-4 wheel arrangement. The writer is indebted to Mr. Vincent L. Raven, the C.M.E., for a photograph, reproduced herewith, of the first of these locos, of which twenty

are under construction at the Company's Darlington Works. A large boiler has been provided, equipped with *Schmidt's* superheating apparatus. (There's a surprise!) Piston valves $7\frac{1}{2}$ ins. diameter are employed for the distribution of steam, via *Stephensons* valve gear. Mechanical lubricators are used for the valves and cylinders, and steam-reversing gear is provided, also an exhaust steam injector and compressed air sanding apparatus. Cylinders $16\frac{1}{2}$ by 26ins., coupled wheels 5ft. 9ins., Weight $84\frac{1}{4}$ tons.



NEW 4-4-0 EXPRESS LOCOMOTIVE "SIR ALEXANDER HENDERSON; G.C.R.



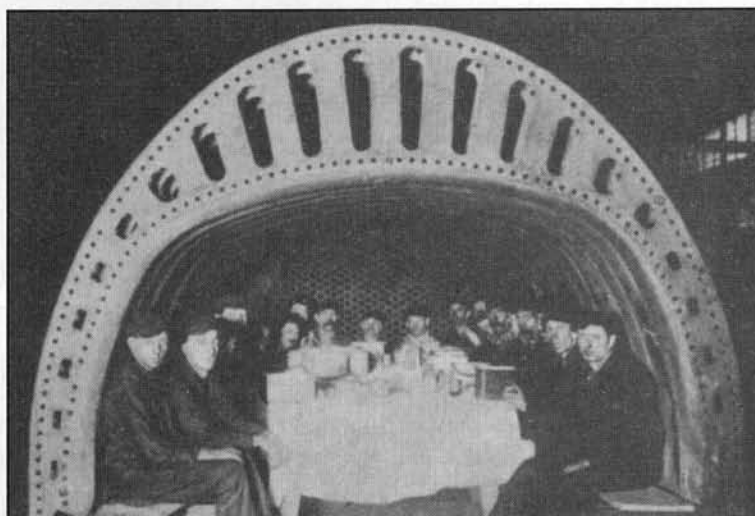
NEW 2-8-0 TYPE MINERAL LOCOMOTIVE: GREAT NORTHERN RAILWAY.

1914: BRITISH LOCOMOTIVES IN 1913.

The past year, so far as locomotive engineering in this country is concerned, has been chiefly noteworthy for the continued advancement of the superheater as a feature of equipment. The apparatus has, in fact, become standardised on certain British railways for all new locomotive construction.

NEW EXPRESS PASSENGER LOCO: G.C.R.

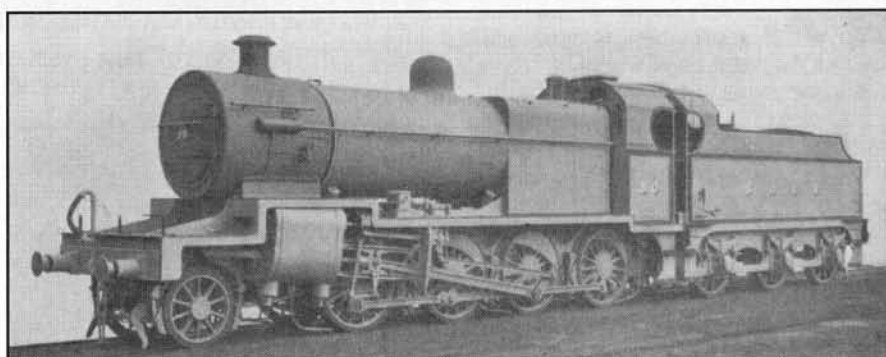
On the Great Central Railway, Mr. J.G. Robinson has introduced some large superheated locos of the 4-4-0 type having inside cylinders 20 by 26 ins. These are the largest of their type on that railway and equal those of any yet built for any main-line in this country. The first of the class is named "Sir Alexander Henderson" and numbered 249. (From their names, they were to become known as the "Director" class).



DINING IN A LOCOMOTIVE FIREBOX

NEW MINERAL LOCO: G.N.R.

Reference has already been made to the fact that new locomotives of the 2-8-0 type were in the course of construction at the Doncaster Works of the Great Northern Railway. The photo on this page shows the first of these engines to be turned out, and as will be seen, outside cylinders with piston valves above are fitted and the third pair of coupled wheels are utilised as the drivers. Walschaerts valve gear is employed, and the boiler is superheated. Cylinders 21 by 21 ins., coupled wheels 4ft. 6ins., working pressure 170lb., weight 76 tons.



NEW 2-8-0 TYPE ENGINE: SOMERSET & DORSET JOINT RAILWAY.

DINING IN A LOCO FIREBOX.

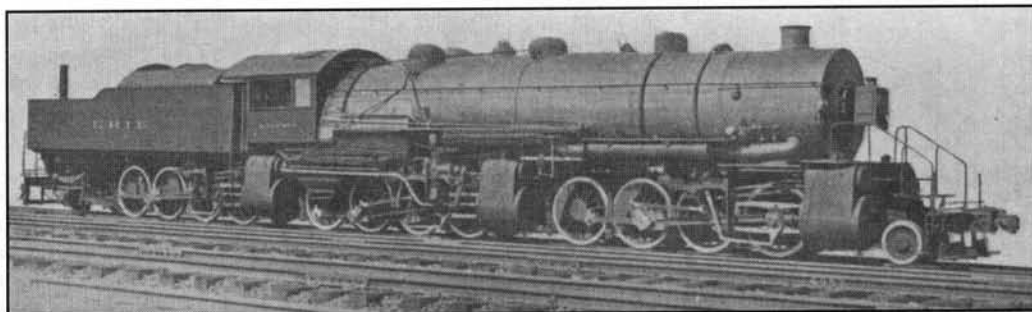
Perhaps no other method could be devised for demonstrating the huge proportions of certain American locos than by that adopted by the *Jacobs-Schupert U.S. Firebox Co.*, who sent this photo of twenty workmen partaking of a meal inside a firebox intended for a loco of the 2-8-0 type for the *Philadelphia and Reading Railway*. The firebox is 13ft. 2ins. long and 8ft. 8ins. wide, i.d., the height at the centre of the crown is 5ft. 1in.

NEW 2-8-0 LOCO BUILT AT DERBY.

The large 2-8-0 type superheated goods and mineral locomotives, which have been under construction for some time past in the Derby Works of the *Midland for working heavy coal and other trains on the Somerset & Dorset Joint Railway*, have now been delivered. Outside cylinders with piston valves and Walschaerts gear are employed, and the boiler is equipped with an extended smokebox and *Belpaire* type firebox. Owing to the fact that the engines will have to perform a fair amount of running tender first, the tenders have been fitted with cabs. Cylinders 21 by 26 ins., coupled wheels 4ft. 7½ins., pressure 190lb., weight 64½ tons.

A REMARKABLE AMERICAN LOCO.

America is the home of the monster loco, and in the past we have witnessed a succession of "largest and most powerful locos in the world" originated in that country. All previous records would now appear to have been broken by the introduction on the *Erie Railroad* of a locomotive, built by *Baldwin*, having three groups of eight-coupled wheels and belonging to the classification of 2-8-8-2, a somewhat unwieldy notation. The engine is an articulated compound with steam tender, the wheels of the latter being ten in number, eight of which are coupled and driven by a pair of L.P. cylinders. All six cylinders are of the same size but two are fed with H.P. steam and the other four with L.P. Steam passes from the superheater to the H.P. (middle) cylinders through outside pipes fitted with a ball joint and a sliding joint. The H.P. cylinder saddle has two passages cored in it, one leading from the right-hand exhaust chamber to the front receiver pipe, the other from the left exhaust chamber to the rear receiver pipe. These receiver pipes are flexible, having the usual ball and sliding joints. They convey the H.P. exhaust steam to the two sets of L.P. cylinders. The front L.P. cylinders exhaust to the chimney in the usual manner through a flexible pipe, but the rear L.P. cylinders exhaust through a vertical pipe at the rear of the tender. This exhaust steam is made use



THE NEW "TRIPLEX-COMPOUND" MALLET LOCOMOTIVE: ERIE RAILROAD. 24 WHEELS COUPLED: 2 H.P. AND 4 L.P. CYLINDERS: STREAM DRIVEN TENDER.

of to pre-heat the tender water supply to the boiler. The frames are vanadium steel castings, 6ins. thick. Cylinders 36 by 32ins., wheels 5ft. 3ins., total weight 381 tons, tractive effort 160,000lb. The firebox is 13ft. 6ins long, 9ft. wide at the foundation ring, it has a mechanical stoker; (the pressure is not quoted).

ALSO INTRODUCED: On the *LBSCR*, two 4-6-4, "Baltic" tanks, by *Mr. L.B. Billinton*, the first one named "Charles C. Macrae". On the *LSWR*, the first of a batch of 4-6-0 tender engines from *Mr. R.W. Urie*. (More about these later).

1915: NEW TANK ENGINES AT SWINDON:

Whilst in the Swindon Works recently, the writer noticed several locomotives of the 2-6-2 tank pattern under construction. One of these is now illustrated, by courtesy of *Mr. G.J. Churchward*. The engines have outside cylinders to which steam is distributed by piston valves working above them; the valves being actuated by *Stephensons* link motion between the frames through the medium of a rocking shaft. The boiler has a top feed, now adopted as standard on this railway—the water being delivered at the top of the boiler; instead of at the lower level. A superheater is fitted, and in contradistinction to the usual plan when that is the case, a high working pressure is carried. Cylinders 17 by 24ins., wheels 4ft. 7½ ins., pressure 200lb, weight 57tons, tractive effort 21,250lb.

1916: A quiet year, (on the railway news front, but not on the *Somme!*), conversions of *Webb* compounds and *Metropolitan* locos, sold to *Cambrian Railways*, converted into 4-4-0 tender locos.

1917: Another relatively quiet year. The *Virginian Railway* took delivery of a triplex compound Mallet type loco, similar to the one described on the *Erie R.R.* More details of the "Brighton" Baltics. An experimental 2-8-8-2 electric on the *Pennsylvania R.R.*, operating on 11,000v, single phase, 25 cycles, it has a capacity of 4800 h-p. Production of "Cloughton's" is now well into its stride at Crewe. There was some dissertation from *Mr. Lake* as to how the *LNWR* could justify the official tractive force figure of 23,000lb, when the pressure/cylinder/wheel diameter formula only works out to 22,288lb. "At Crewe they take the diameter of the wheel with ¼ in worn off the tyre, thus reducing the size to 79.5ins. and they then get 22,710 lb., still, be it noted, below the official 23000lb. This last-named figure is adopted as a rough estimate for the engine after it has been running for a time, when the cylinders will have become slightly larger and the tyres reached a stage which has reduced the size of the wheel still more. Taking the figure as 78.75ins, we then get 22,920lb, or in round figures 23,000lb tractive force". (For several years I was involved in the writing of sales specifications and I think we would have called that a "fiddle factor". Not that we ever had any need to resort to such devices!).



NEW 2-6-2 TYPE TANK ENGINE: GREAT WESTERN RAILWAY.