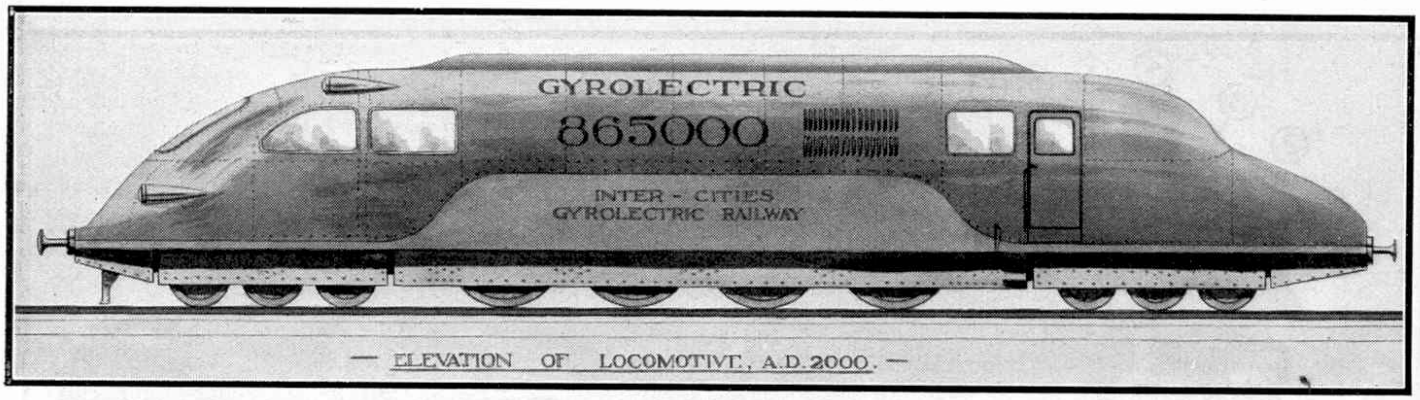
Transport Methods of the Future

Developments by Air, Rail and Sea

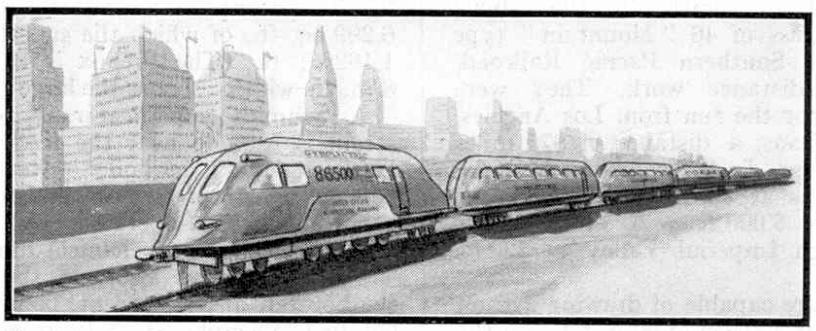


— ELEVATION OF LOCOMOTIVE, A.D. 2000. —

THE progress made in methods of transport during the past 100 years has been so great that it is difficult to believe that it can be maintained. It is probable, however, that the new methods of transport that will be developed will be as startling to those who live to see them as the mechanical and electrical methods now in use were to our ancestors. It is interesting to look back upon some of the changes that have taken place. The substitution of railways for stage coaches, for instance, was regarded as an absolute revolution. The spread of the iron road was thought to indicate a conquest that involved the complete decay of road travel; yet eventually there came a time when the development of the motor car made roads more important than they had ever been before.

Many surprises of this kind are probably in store for us. We are apt to visualise the future as bound up with the aeroplane, and to imagine that the time is coming when passengers and goods will be carried through the air almost to the exclusion of present-day methods. No doubt aeroplanes will be so greatly improved that flights round the world will be less exciting than a trans-Atlantic voyage in a 50,000-ton liner is to-day; but it is probable that greater use than ever will be made of methods of transport on land and sea, based upon those now in use.

It has been suggested that some form of moving way will provide the means of travelling in the future; and that it will be possible to travel from, say, London to Liverpool, by simply stepping on to one of a series of platforms moving between the two cities like endless belts. These platforms would travel at varying speeds, in order that passengers might first board the slowest and work up to the fastest by stages that did not involve any sudden and uncomfortable increase in speed. Methods of this kind undoubtedly would prove very valuable, especially within the restricted areas of large cities; but it is doubtful whether they would ever be developed for long distance communication. They would involve the construction of enormous power plants, together with bearings and flexible joints possessing a capacity at present undreamed of for resisting wear and tear. These requirements may be met as the result of further experiment and research, but it seems probable that more economical and satisfactory results will be obtained by developments of the existing moving vehicle and stationary road systems.



(Top) A gyro-electric high-speed monorail locomotive of A.D. 2000. (Below) A train of gyro-electric monocars passing through a city of skyscrapers.

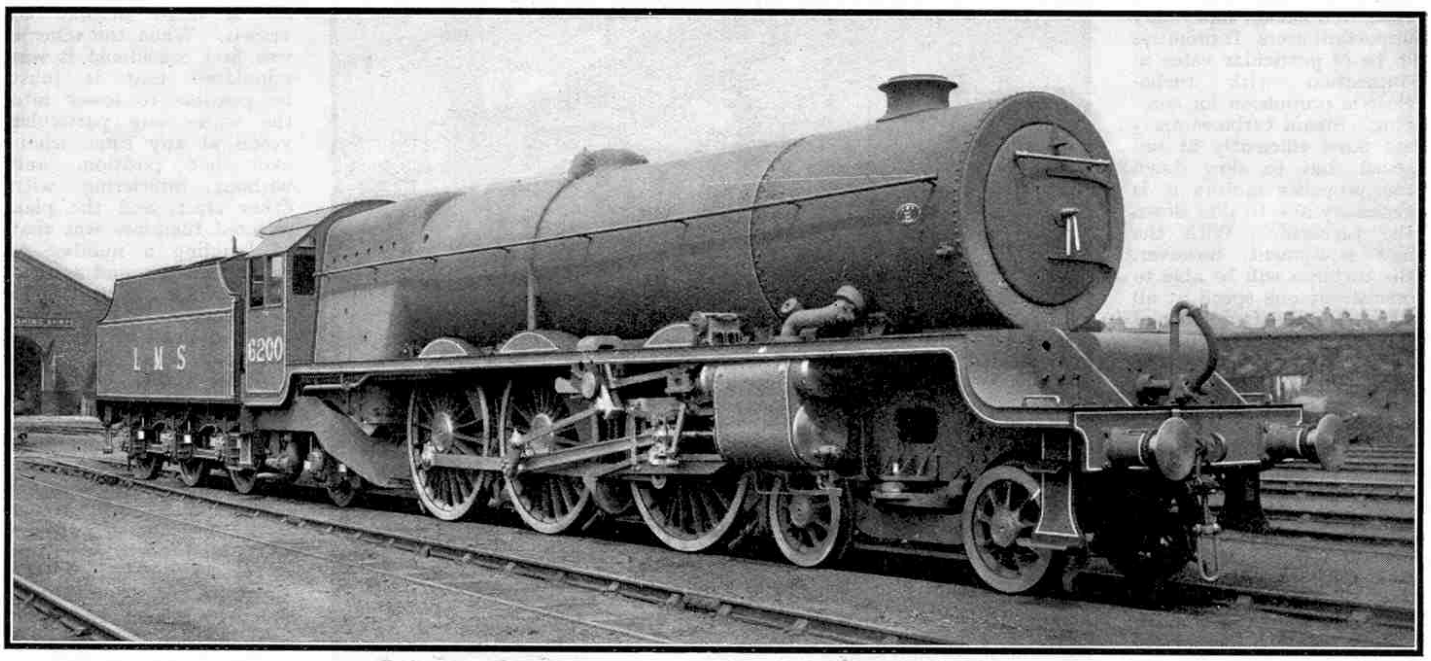
There is little doubt that rail transport will be improved enormously. The present steam locomotive, even in its most perfect form, is an extremely inefficient machine, and there is little doubt that vast improvements will be brought about either by the use of condensation or high steam pressures, or both. There may also be a tendency to abolish the double rail in favour of the single rail, with streamlined mono-cars balanced by a gyroscope and propelled by electric power.

Difficulties of transmission of power over long distances will have been overcome in one way or another by the time that mono-cars have been fully developed, and the single rail may be made to serve as a medium for the supply of electrical power to the gyroscope and to the motor that drives the car. The latter would seem absurdly small to a motorist of the present day, who is accustomed to the heavy masses of metal constituting the petrol engines, gear-boxes and back axles of the cars that now rank as the last word in engineering. But the reduction in weight brought about by the use of light alloys, and by the absence of dead weight in the shape of gearing, fuel and cooling water, will make a very small-powered motor quite sufficient to propel the mono-car

Britain's Mightiest Express Engine

New "Pacific" Locomotive for the L.M.S.R.

By "Observer"



The photograph above, reproduced by courtesy of the L.M.S.R., shows the massive appearance of the new "Pacific" locomotive, No. 6200. The wide fire-box and tapered boiler barrel are important innovations in L.M.S.R. practice.

WITH the completion of "No. 6200," the first of the three 4–6–2 "Pacific" locomotives that are being built at Crewe, the L.M.S.R. can now claim to possess the most powerful express passenger engine in Great Britain. It had been expected that the new engine would be finished early in July, but actually it emerged from the works a few days sooner, the final stages of erection having been carried through with exceptional rapidity. The boiler was not lowered into its place on the frames until 20th June, yet within a week of that time the work of erection had been completed, the engine had been painted grey, with white lettering and lining, and was in steam. To get in advance of schedule time in this manner was surely a good omen, and prophetic of what will frequently happen when "No. 6200" is put into regular express working.

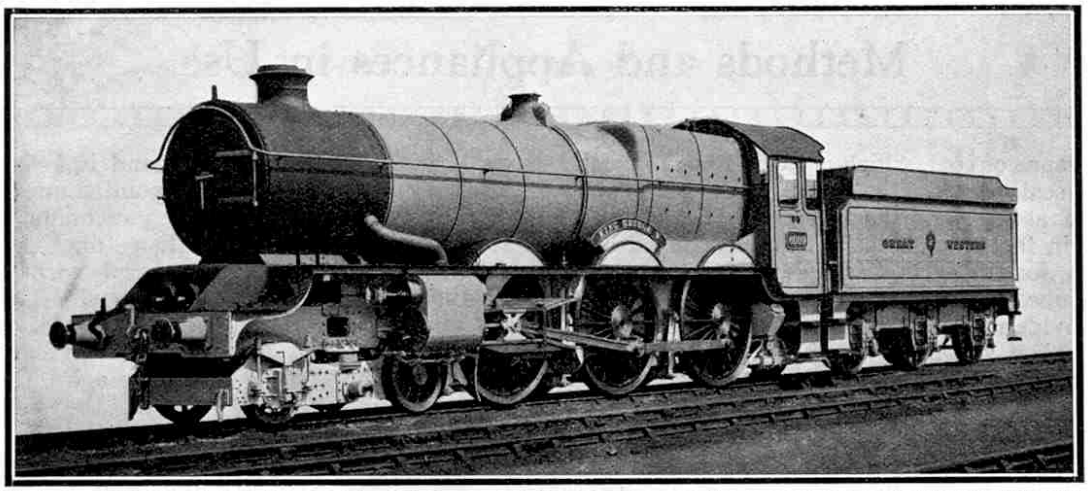
Almost immediately after its completion the new "Pacific" travelled up to London, and on Wednesday, 28th June, was placed for exhibition at a platform in Euston Station. Only a few persons were privileged to make the inspection, but in that favoured group I was numbered as representing the hosts of keenly-interested "*M.M.*" readers. Mr. W. A. Stanier, Chief Mechanical Engineer of the L.M.S.R. and designer of the new locomotive, met us at Euston Hotel and explained to us the reason for building an engine of so much greater size than the standard express locomotives of the "Royal Scot" type. These latter, he said, were doing excellent work, but increasing loads demanded increased power. In particular it was found that, for the long runs that modern locomotives were called upon to make, bigger fire-boxes were necessary, so that an engine that had travelled through from London might still have a sufficiency of power when the stiff gradients at Shap on the fells of Westmorland had to be tackled. The new engine, which had been designed in the chief drawing office at Derby and built in the works at Crewe, would be able to take 500 tons over Shap unaided. Mr. Stanier added that it practically reached the limit of what was possible in size and power on the British standard track and within the restrictions imposed by the loading gauge.

After Mr. Stanier had spoken to us we were taken to the railed-in enclosure on the platform by the side of which "No. 6200" was standing. I was thrilled as at last I gazed upon this long-looked-for super-locomotive. What a giant it seemed—a veritable monarch of the iron road! But no sooner had I noted the massiveness of its proportions than I was impressed by the gracefulness of its lines. Mr. Stanier had evidently been at pains to produce not only a thing of power but of beauty too. The engine as a whole and in its many details bears the unmistakable stamp of its designer's long connection with the G.W.R. It might almost be called a "super-King!" The long, tapered boiler with top-feed but no steam dome, the chimney and its moulded top, the cylinders with their curved steam pipes, and the leading bogie with its side bolsters, are all suggestive of well-tried G.W.R. practice. The cab is different, however, and might be said to be of the Lancashire and Yorkshire pattern. When I was on the footplate nothing surprised me more than that, in spite of the huge dimensions of the boiler and fire-box—the maximum width of which exceeds 7 ft.—Mr. Stanier has contrived to give the enginemen such large look-out windows, affording an excellent view of the line ahead. I was pleased, too, to discover that the engine did not carry side sheet smoke deflectors, which at best are unsightly and mar the appearance of any locomotive. I asked Mr. Stanier whether he intended to fit them, and he answered with a decided "No," adding that he did not think they would be necessary. The flush smoke-box and tapering boiler will doubtless help to make them unnecessary and, in addition, Mr. Stanier has managed to fit a chimney of quite considerable length, in spite of the size of the boiler, the centre line of which is 9 ft. 1 in. from the rail level. This is $1\frac{3}{4}$ in. higher than the centre line of a G.W.R. "King," and $2\frac{1}{2}$ in. lower than that of a "Royal Scot," which has driving wheels of 3 in. greater diameter. As compared with a Gresley "Pacific" on the L.N.E.R. the new engine's centre line is $3\frac{1}{2}$ in. lower; it is also 1 in. lower than that of a S.R. "Lord Nelson."

The new locomotive has few really novel features; it is rather a thoroughly sound design that embodies and develops all that is best in the past locomotive practice of both the L.M.S. and G.W. Railways. It is of interest to note that as the cylinder and driving wheel dimensions and the boiler pressure of the new "Pacific" are exactly identical with those of a G.W.R. "King," its tractive effort is also precisely the same, namely, 40,300 lb.

at 85 per cent. boiler pressure. The greatly enlarged boiler of the L.M.S.R. engine makes it decidedly more powerful than the "King," however, and there can be no doubt that in actual working it will prove itself to be Britain's mightiest passenger locomotive, capable of taking the Anglo-Scottish expresses and other famous L.M.S.R. trains and maintaining the fastest schedules even with maximum loads.

After its brief exhibition at Euston, "No. 6200" returned to Crewe, and for about a month it will be working slow trains and so getting "run in." Then, when it has been painted the standard deep red of the L.M.S.R., it will take up full express service.



The famous "King George V" of the G.W.R., which the new L.M.S.R. locomotive resembles in many respects, including its high boiler pressure and the arrangement of its four cylinders.

Some of the principal dimensions were given in the *"M.M."* for June last, but for convenience they are repeated here, and other technical details, based upon official information, are added.

The boiler barrel is 20 ft. 7 5/16 in. long and tapers from a diameter of 6 ft. 4¾ in. at the throat plate to 5 ft. 9 in. at the smoke-box tube plate. The fire-box is of the Belpaire type and its water legs have been carefully proportioned to ensure efficient circulation. The feed water is supplied through top feed valves, which are covered with a domed casing, the superheater header and regulator being a combination fitting provided in the smoke-box. The operation of the regulator is by the usual type of handle conveniently placed in the cab. An exhaust steam injector is provided on the fireman's side, and a live steam injector on the driver's side of the engine. The superheater is a special design proportioned to give sufficient superheat combined with maximum evaporation. The safety valves are of a standard pop type, and the old Caledonian design of whistle has been adopted, which gives a melodious note. As a result of the restriction of the gauge, it has been necessary for the whistle to be fitted in a horizontal position. The Company's standard type of water gauge frames and protectors and other standard boiler fittings are used wherever possible. All steam supplies to the various fittings controlled from the cab are taken from a manifold fitted at the top of the fire-box tube-plate, and this is provided with a main valve that enables the whole supply to be shut off.

Special attention has been given to the arrangement of the steam and exhaust passages from the cylinders in order to ensure maximum efficiency, and a jumper blast-pipe cap is provided so that, when working under heavy conditions, excessive back pressure is avoided. A deflector plate is also provided in the smoke-box to equalise the draught over the whole of the boiler tubes.

The provision of sufficient primary air to the large grate is controlled by three separate damper doors fitted at the front, middle and rear of the ashpan, with a separate control handle in the cab for each damper. In addition, side dampers are provided between the foundation ring and the ashpan, so that a good air supply is available at the sides of the grate to further promote efficient combustion. These side dampers are also controlled from the cab by means of a separate handle.

The two outside cylinders drive on to the middle coupled axle, and the two inside cylinders on to the leading coupled axle, which is of the built-up type. Each cylinder is provided with an 8 in. diameter piston valve operated by Walschaerts gear, the travel being 7¼ in. To ensure an efficient steam distribution to each cylinder, each valve is provided with an independent set of gear.

Principal Dimensions:

Cylinders	
Number	Four
Diameter	16½ in.
Stroke	28 ,,
Wheels	
Bogie	3 ft. 0 in. diam.
Coupled	6 ,, 6 ,, ,,
Trailing	3 ,, 9 ,, ,,
Heating Surface	
Tubes	2,523 sq. ft.
Fire-box	190 ,, ,,
Superheater	370 ,, ,,
Total	3,083 ,, ,,
Grate Area	45 ,, ,,
Working Pressure	250 lb. per sq. in.
Tractive Effort at 85 per cent. boiler pressure	40,300 lb.
Adhesive Weight	67 tons 10 cwt.
Weight of Engine in working order	104 ,, 10 ,,
Weight of Tender ,, ,,	54 ,, 2 ,,
Total weight of Engine and Tender in working order	158 ,, 12 ,,
Coal capacity of Tender	9 ,,
Water ,, ,, ...	4,000 gallons
Total length over buffers... ...	74 ft. 4½ in.

The coupling and connecting rods are made of high manganese molybdenum steel, and special attention has been given to the lubrication of the crank pins, big and little ends and other motion parts, to ensure sufficient oil capacity for long through runs. The coupled wheel centres are steel castings, and the balance weights consist of built-up steel plates, the requisite amount of weight required being provided by filling in between the plates with lead. The usual procedure of determining the correct amount of balancing in each pair of wheels is checked by testing in a wheel balancing machine.

The coupled axle-boxes are steel castings with pressed-in brasses, and ample bearing area has been provided. Oil is mechanically fed to the crown of each axle-box. The underkeeps fitted to the axle-boxes are of ample capacity, and an oil pad is provided. The intermediate and trailing axle-boxes are arranged to allow the underkeep to be withdrawn while the axle-box is in place. The leading crank axle does not permit this for the leading boxes. A 16-feed mechanical lubricator of the company's standard design has been provided to lubricate the pistons and valves, and the oil is thoroughly atomised by a jet of steam before arriving at the point to be lubricated.

Special attention has been given to the design of the laminated bearing springs that are provided on all the coupled wheels, and this, in conjunction with the bolster type bogie and truck, results in a smooth riding locomotive. A ribbed section of steel plate is used, the material being a silico-manganese steel; and the plates are fixed in the buckle by means of a wedge cotter. The spring hangers are of the screwed type with a knuckle thread, so that independent adjustment can be obtained. As an experiment, one of these engines will be provided with compensating beams, to enable observations to be made in order to ascertain whether a better running engine is thus obtained.

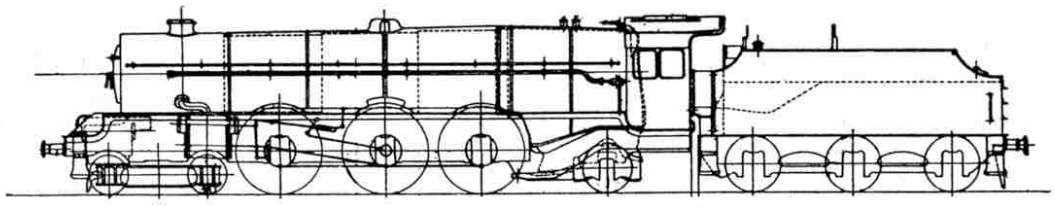


Diagram showing the chief features of "No. 6200."

The leading 4-wheeled bogie is provided with side bolsters and a carefully designed bogie side check

(*Continued on page 617*)

Ancient Treasure Port—(*Continued from p. 598*)

ammunition, and about $10,000 in coin. Eighty iron cannon were spiked and dismounted, and the fortifications were otherwise rendered useless. They were rebuilt a decade later, but by the middle of the 18th century they were no longer needed. It was no longer safe to send the treasure of the Incas and of the Peruvian mines across the Isthmus, for marauders waylaid convoys, slaughtered their guards and made off with the gold. Nor was it longer safe for the cumbersome treasure fleets to sail through the West Indian seas en route to Spain. Too many English and French rovers were about; galleons were attacked even in sight of Porto Bello. Some new route must be devised, and in the end Spain sent her dwindling fleets of treasure ships around Cape Horn. The ever trespassing jungle was closing in on the old Road of Gold, and Porto Bello began its long sleep.

Americans finally roused the old treasure port with their rock blasting on the Cape. On the completion of the Canal, great steamers began to ply in a new lane of world traffic, just over Porto Bello's westward horizon, engaged in quests no less romantic than that of the ancient galleons.

Presently there came airmen from the United States Army and Naval bases in the Canal zone to fly over Porto Bello. For a time these Government aviators had the aerial views of Porto Bello to themselves, but before long came the era of commercial aviation, and now it is possible for ordinary travellers to fly over this historic region.

Taking off at Balboa—the American town at the Pacific end of the Canal—the tourist can fly first over the ruins of Old Panama, and look down on all that was left by fire when Morgan and his men departed with their loot in February, 1671. Thence a few minutes will take him out over the islands of Tobago and Tobagilla, in the bay of Panama, where ambitious freebooters who emulated Morgan made their base, and laid unsuccessful siege to the new city of Panama. Thence the plane wings across the Isthmus in half an hour. Following the broad ribbon of the Canal and crossing Gatun Lake, it speeds down the lower valley of the Chagres, silent and wooded, to the river's mouth, seven miles from the lake, where lie the ruins of old Fort San Lorenzo. It was here Morgan landed for his march across the Isthmus to attack Old Panama, and it was here that the first of the Fortyniners were put ashore on the beach from the 1,000-ton New York steamer, to make the best of their way, by canoe and afoot, to the shores of the Pacific.

From the mouth of the Chagres the plane swings to the right, speeds across Colon bay and over the city of Colon, and thence Northeastward twenty miles along the coast—densely covered with forest, as with a tufted green carpet—to the old treasure port.

Three or four circles over the harbour and town are enough to show the utter and eloquent desolation of the place.

Then heading into the brisk trade wind, the plane wings back to Colon, and picking up the Canal, heads for the Pacific side. After less than two hours in the air it is back at its starting point, having covered land and water that in the age of romance would have called for days of wearisome travel.

Vasco Nuñez de Balboa, discoverer of the Pacific, was a month cutting his way across the Isthmus. Morgan and his men were ten days making the march from the mouth of the Chagres to Old Panama. The Fortyniners were sometimes a week getting from one side of the Isthmus to the other, by boat up the Chagres to Las Cruces, and thence by trail across the mountains. A fast plane to-day skims above their route, from end to end, in about twenty minutes. The distance is less than forty miles.

It should not be inferred that many tourists as yet make air excursions at the Isthmus. The majority prefer sightseeing, motoring about the Canal Zone's spotless towns, Uncle Sam's forts, through bright and saucy Panama, and past grass-grown savannas to Old Panama.

But in adventure outside the beaten path of travel, in which one turns back the page of history, those few who take wing to Porto Bello, slumbering in the Sun at the end of the old Road of Gold, find themselves well rewarded.

This interesting article was contributed to the "*Ocean Ferry*," the publication of the International Mercantile Marine, New York, by Winfield M. Thompson, Field Agent for the Panama Pacific Line. By courtesy of the Editor of that paper we are able to reproduce the article and the illustrations.

The Emir of Katsina and his two grandsons in a happy scene on the football field at the works of Lines Bros. Ltd., Merton, London. The two boys are driving Lines Bros. electric motor cars and their concentration on their pleasant task is evidently a source of considerable amusement to the onlookers.

H.R.C. Junior Section—(*Continued from p. 623*)

If the paper is red, so much the better; if not, it may be painted when secured in position. The name may then be put on with yellow or gold paint, and the edges of the plate picked out at the same time. It is not a bad plan to get the name typewritten on beforehand in capital letters to serve as a guide, and if the red paint used for colouring the label is thin, the letters will show through sufficiently well to enable them to be finished easily. Alternatively the type contained in the cheap printing outfits that many boys possess may be made use of. There is plenty of selection in the matter of names, all of them being places served by the line, and a typical one is given in the lower illustration on page 623.

For coaches the No. 1 vehicles will be quite suitable, as many four-wheelers are in use in the island. The service also boasts a named train bearing the title "*East and West Through Train*," which runs from Shanklin to Freshwater in the morning and returns in the evening. This is a feature not to be missed in the operation of a miniature Isle of Wight railway system. The standard No. 2S Roof Clips may be adapted to fit the No. 1 Coaches by reducing the width of the central portion of the Clip attachment. This may be done with a pair of old scissors, as the metal is fairly thin.

If the coach roof is removed it will be noticed that the top edges of the coach sides are turned over, except for the portions immediately against the ends. This fact is taken advantage of in the attachment of the roof Clips, which are laid in these little gaps from side to side. The centre part of the Clip attachment is pressed gently down between the sides, so that the right-angle bends at the ends of the centre portion are made to correspond with the top edges of the coach sides. The roof may now be sprung into position and the ends of the Clips turned up into place. The preparation of name boards will be simple, as the standard Hornby Train Name Boards exactly fit in the Clips mounted in this manner. Strips of white card of the same dimensions should be suitably lettered, and the boards are then ready for use.

One of the photographs on page 623 shows the impression of importance attaching to a train arranged as suggested. Apart from this special application of the Roof Clips, they may be made use of where No. 1 Coaches are attached to important expresses to provide a through service to some branch line, when of course the destination should be displayed on the coach concerned.

Railways and Coal Traffic—(*Cont. from p. 585*)

good use of large wagons. Double-bogie vehicles of 30 or 40 tons' capacity for locomotive coal were in use as long as 30 years ago on several railways. The Caledonian in 1901 put into service a number of all-steel bogie wagons of 30 tons' capacity, and trains of these fitted throughout with the Westinghouse brake regularly brought coal from the Lanarkshire fields. They were hauled by the remarkable "long-backed" 0-8-0 locomotives of the McIntosh "600" class, one of which could deal with 60 of these vehicles. The North Eastern also in 1901 had a train of 32-ton wagons in service, and in the following year 50 wagons of 40 tons' capacity and of patented double hopper design were added. These are still in use between Ashington and Blyth Harbour. Special arrangements were incorporated to control the rate of discharge through the hoppers, a great convenience when loading coal for shipment. Another 50 wagons of the same capacity but of different design were also put into use in 1902, and could discharge coal at the rate of one ton per second if required.

The possibilities of the use of such wagons for point-to-point traffic in the export coal trade so impressed the North Eastern management of the time that large orders for high capacity wagons were contemplated. This progressive move did not meet with the approval of the colliery owners and port authorities, however, so that an agreement was arrived at limiting the wagons to be used to 20 tons' capacity for a number of years. In such cases as this, therefore, criticism of the railway companies is without point, and moreover unfair, when the facts are borne in mind.

The side-discharging steel hopper wagons recently put into service on the L.M.S.R. must not be forgotten. These are used to bring coal to the company's electrical power station at Stonebridge Park, near Willesden, where current for the L.M.S.R. electric suburban services is generated.

Model Building Contest—(*Continued from p. 615*)

box construction is particularly neat and compact. Unfortunately details of the gears used are not available and I am unable to describe its working here.

Andrew MacLaren sent a break-down crane that he copied from an interesting machine described in the November 1931, "*M.M.*" Among the many novel ideas embodied in its construction are two brake drums, each of which is made from a Flanged Wheel with Boss Bell Cranks for the shoes. The Cranks are pivoted through their bosses, and to one end of each of them is attached an End Bearing that in turn is connected to a Small Fork Piece. Each of these is joined to the spider of a swivel bearing by means of a short Rod. The free ends of the Boss Bell Cranks bear against the insides of the Flanged Wheels, and are withdrawn or applied by rotating a Threaded Rod that is screwed into the spider, thus causing the latter to travel up and down the Rod, and so move the Boss Bell Cranks about their pivots.

Probably the finest and most intricate model of all the many wonderful examples submitted in this Contest is an electric gramophone fitted with automatic record changing mechanism, which was sent by A. W. Boeke. This model is of such general interest that I intend to describe it fully in a special article in an early issue of the "*M.M.*"

Second and Third Prizes in the Overseas Section were awarded for an electric locomotive of the type used on the Swiss Federal Railways, and a travelling crane fitted with main and auxiliary hoists, respectively.

J. B. G. Ringnalda built the beautiful model of the L.N.E.R. "*No. 10000*" shown on page 615. The boiler is built up of strips and is smoothly rounded and streamlined as in the prototype. A novel feature is to be seen in the driving wheels, which are made from Circular Plates and Artillery Wheels. The tender and driving-cab are particularly neat, and the unbroken lines of screw heads round the boiler add considerably to the appearance of the model.

New L.M.S.R. "Pacific"—(*Continued from p. 583*)

spring arrangement. In view of the long wheelbase of this bogie, 7 ft. 6 in., bar frames are provided as a means of keeping down the weight. The trailing truck is of a specially designed Bissel type.

On each side of the cab two sliding windows are provided, and on the left, or driver's side, on the outside of the cab a small window is fitted to act as a draught protector when the driver is looking out beyond the cab side. A steam brake is provided on the engine, the power being applied to the six coupled wheels only. The brake power is controlled from the driver's brake valve in the cab, which also automatically operates the vacuum brake on the train. Hand or gravity sanding is applied to the front of the leading coupled wheels, and at the front and back of the middle coupled wheels. Behind the trailing wheels is fitted a water jet that automatically comes into action when the leading sanding jets are in operation, so that after the engine has used the sand the rails are cleaned with hot water.

The new enlarged type of tender carries nine tons of coal and 4,000 gallons of water, and is fitted with "Timken" roller bearings. The intermediate buffing gear is of special design with a view to improving the riding of the engine.

As we go to press we learn that this fine locomotive is to be named "*The Princess Royal.*"