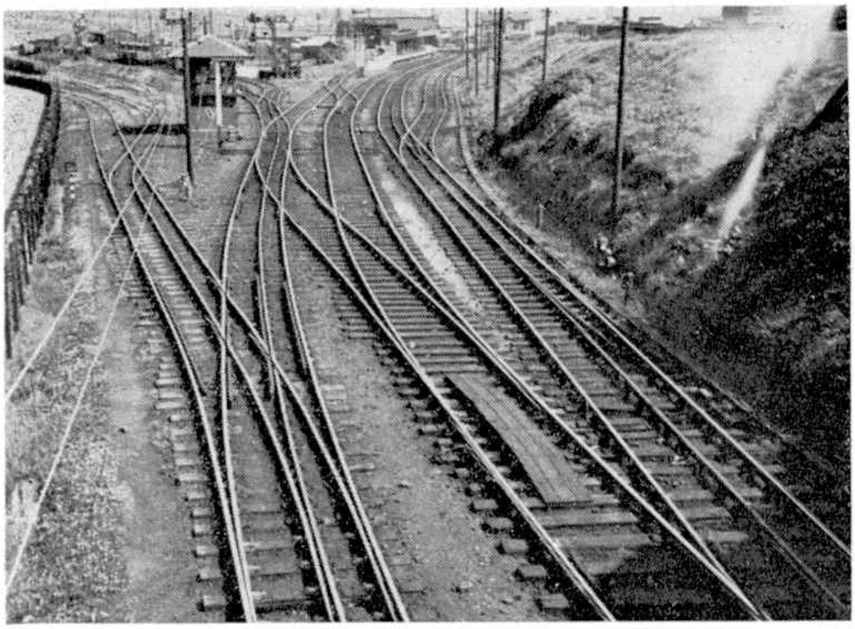


THE A.B.C. of MODEL RAILWAYS

SCALE & GAUGE

Left: Mixed narrow (3 ft.) and broad (5 ft. 3 in.) gauges in Ireland, at Larne Harbour. Below: A working party of enthusiasts ride a trolley along an intricate timber bridge on an Australian 2 ft. 6 in. gauge line. See "Australia's Puffing Billy" on page 40.

THE MODEL railway hobby, like most technical subjects, has its own language which, although it is well understood by the "experts," can be very confusing to newcomers. Some people have been so terrified by the "technical terms" that they have fled the hobby altogether, and taken up knitting or tropical fish. The purpose of this series of articles will be to explain *all* the terms used in railway modelling from a beginner's point of view, and to clarify a few common misunderstandings. Some of the terms discussed will be purely modelling terms, others will apply equally to both model and prototype.

Most MM readers will be familiar with the terms "scale" and "gauge," and, indeed, they are probably the most frequently used terms in the hobby. "Gauge" is the distance *between* the inside faces of the head of the running rails and *not*, as some people believe, between the centre line of each rail. Most main line railways in Britain, and throughout Europe, are built to the gauge of 4 ft. 8½ ins., which is known as "standard gauge" and was adopted by George Stephenson with the birth of railways in the early nineteenth century. Any line with a gauge of more than 4 ft. 8½ ins. is termed "broad gauge" and any gauge less than that figure is "narrow gauge." In fact, only one main line in England was ever built to a broad gauge; the Great Western Railway was engineered by I. K. Brunel with the magnificent gauge of 7 ft. 0¼ in., which, as might be expected, made for very roomy carriages, big and powerful locomotives, and steady high speed running. The only drawback was that all the other railways in the country were of standard gauge, which meant that passengers had to change trains and freight be transhipped wherever the Great Western met another line. This proved to be so inconvenient and uneconomical that the Great Western company was forced to slowly convert its lines to standard gauge, and by 1892 the broad gauge had disappeared altogether. All this happened so long ago that few modellers ever have the desire to model a broad gauge Great Western train but, nevertheless, the story is an important episode in the history of gauges.

Narrow gauge railways in Britain have had a happier history than the unfortunate broad gauge, and many are still operating, particularly in North Wales. Most of these were built as local industrial lines, to link remote slate quarries with the nearest standard gauge main line. In mountainous country, narrow gauge railways are cheaper and easier to construct than standard gauge lines; earthworks and bridges can be of lighter construction because of the smaller trains, and curves can be made much sharper. These factors, combined with the attractive scenic aspect of most such lines, makes the narrow gauge railway a firm favourite with many enthusiasts, but the many different gauges employed, mostly between 3 ft. and 2 ft., pose some problems to the modeller, which we will look at later.

Now we come to the term "scale," and once again we must take a trip back in time, this time not to look at real railways, but at models. Although model railways of a sort have existed for almost as long as railways themselves, it was not until the early years of the present century that reasonably accurate models were readily available from such famous firms as Bassett-Lowke, Märklin and Hornby. The smallest of these models were built to a scale of ¼ in. to the foot, and ran upon a track of 1¼ ins. gauge. This was O gauge, which survives to this day, although now the scale and gauge are expressed in metric measurement: 7 mm. = 1 ft., 32 mm. gauge. After the last war O gauge lost most of its original popularity owing to competition from the smaller gauges, but many serious modellers have always remained faithful to it, and today the introduction of the Tri-ang "Big Big Train" seems to indicate a revival.

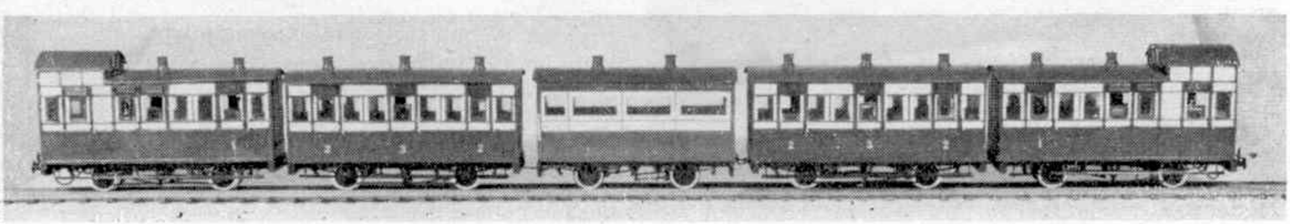
The end of O gauge popularity dates from the early 1930's, when there arrived in this country from Germany the *tiniest* model train anyone had ever seen. It was exactly half the size of an O gauge model, and ran upon a track of 16.5 millimetres. The scale was 3.5 millimetres to the foot; HO, or Half O gauge, had arrived. The newcomer sold very well indeed, because enthusiasts found that they could lay out a sizeable layout on an ordinary table-top, a thing that had been quite impossible to do with O gauge, which had really required a large loft for anything like a reasonable "main line." As the popularity of HO gauge increased, British model manufacturers took an interest in the possibilities of the new small trains, but they doubted that successful electric motors could be fitted into such small locomotives. As a result, the British models were built to a scale of 4 millimetres to the foot instead of 3.5, although the track gauge used was still the 16.5 mm. of HO gauge. In this way, OO gauge was born, and to this day it remains a uniquely British phenomenon, HO gauge being standard in America and the Continent. Although the terms "OO gauge" and "HO gauge" are in constant use by both enthusiasts and the model railway trade itself, the terms are very confusing to the newcomer, because the *gauge*, of course, is the same in both cases, that is 16.5 mm. It is really the *scale* that is different, and "OO scale" and "HO scale" would be much more sensible definitions. However, there is yet another sequel to the confusing story. Those enthusiasts who are sticklers for absolute accuracy in their models soon realised that the scale-to-gauge ratio of OO was quite wrong. The 16.5 mm. gauge, coupled to a scale of 4 mm. to the foot, gives a track gauge equivalent to only 4 ft. 1½ ins.—a scale seven inches too narrow for the standard gauge of 4 ft. 8½ ins. The "purists" had two choices open to them; to return to the more correct HO, and therefore build almost all their locomotives and rolling stock themselves, or to use a completely new track gauge, to which existing proprietary models could be converted. They decided upon the latter course, and the gauge they chose was 18 mm., or EM gauge. Although many successful layouts have been built to EM gauge, it remains very much the preserve of the die-hards, as the average enthusiast is quite prepared to "live with" the incorrect scale-to-gauge ratio of OO, which is really only apparent when locomotives and rolling stock are viewed from "head-on." No ready-to-run models are available in EM.

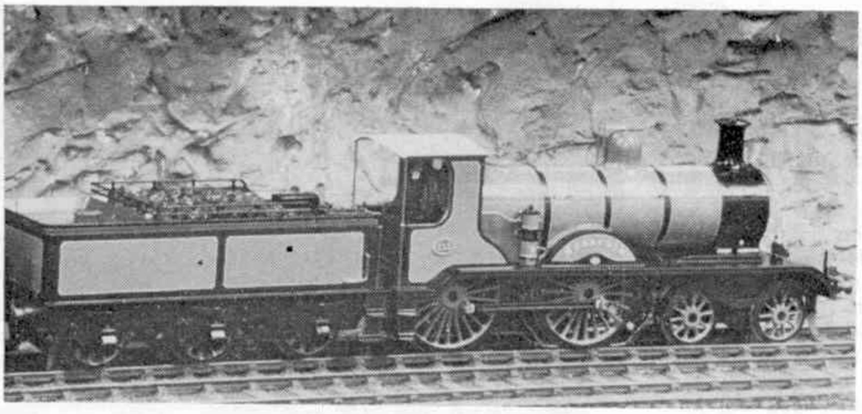
The third part of our story takes us up to the latter half of the 1950's and the introduction of TT gauge. This gauge had been popular in Europe for some years, and used a gauge of 12 millimetres with a scale of 2.5 millimetres to the foot. The small size of the models made even OO scale look enormous, and very ambitious layouts could be fitted into small spaces—an ideal characteristic in an age of small houses and flat-dwellers. Then a funny thing happened; the events of twenty years earlier, the OO/HO controversy, were almost exactly repeated. British TT appeared, using the established 12 mm. gauge, but a scale of 3 mm. to the foot. This, of course, gave a track gauge equivalent to only four feet, and a scale to gauge ratio worse even than that of OO! Oddly enough, though, this large discrepancy is hardly noticeable in so small a scale, and TT has been deservedly popular, and many fine layouts have been built using it.

When TT arrived upon the scene, many people nodded their heads wisely. "This is it" they said. "Model railways will never come any smaller. They wouldn't work properly, and anyway, you could hardly see 'em." Well, as enthusiasts sometimes are, they were wrong. On page 47 of this issue you will find reviewed some of the latest N gauge products of Wrenn/Lima, built to 1:160 scale and running on a gauge of only 9 millimetres. They *do* work, very well, and you certainly *can* see them! However, for the third time in thirty years, there is more than one scale for the same gauge. Some favour 1:148 scale instead, while a few enthusiasts have been building models to 2 mm. to the foot scale for many years. This scale was, and is, OOO. All use the 9 mm. gauge, which is a blessing!

The introduction of the very small gauges like TT and N proved a boon to those who like to model narrow gauge railways. The 12 mm. gauge of TT gives a gauge of three feet in 4 mm. scale, and many actual lines, like the Isle of Man Railway and many of the Irish lines were built to this gauge. For the two foot gauge lines of North Wales, the 9 mm. gauge of N is just the job. For those who like their models a bit bigger, 7 mm. scale using OO gauge track (16.5 mm.) is a good combination, giving a track gauge of about 2 ft. 3 ins. The formula for expressing these narrow gauge scales is quite simple. An OO *scale* model (i.e. 4 mm. to the foot) representing a three foot gauge prototype (using 12 mm. gauge) is designated OOn3. A model of the same scale modelled upon a two foot gauge original (using 9 mm. gauge) would be OOn2. Very simple really—if you're in the know!

Below: A train of tiny narrow gauge coaches by Mr. Don Boreham. They are to 7mm. scale, on 16.5 mm. gauge.





This very fine O gauge model represents one of the famous 4-4-0 express engines of the old London, Brighton and South Coast Railway. First introduced in the 1890's, they were very modern machines in their time. As the cylinders are inside the frames, only coupling rods are visible. The object alongside the boiler, between the driving wheel splashers, is the air pump, which supplied compressed air to the train braking system. The livery of the locomotive is mustard yellow.

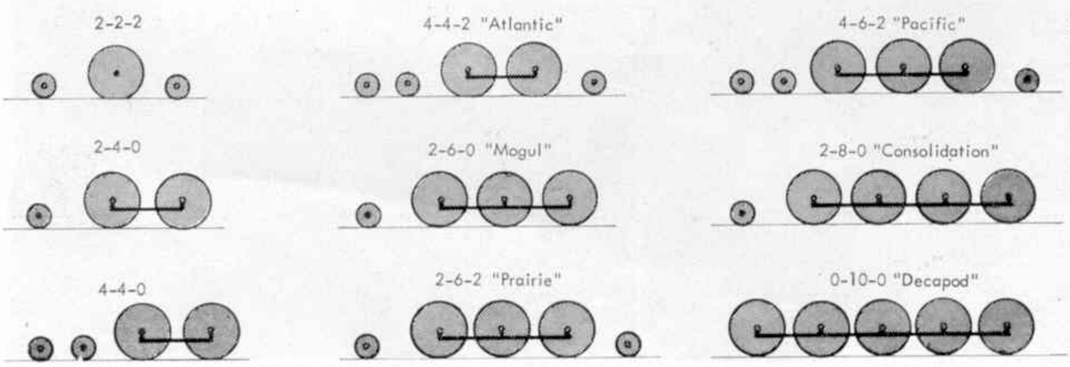
ABC of Model Railways Part 2 Steam Locomotives

LAST MONTH, we discussed the terms " scale " and " gauge " as applied to railways both real and model. In this article, we shall look at the various terms applied to locomotives, and perhaps dispel some common misunderstandings. For the moment, we shall not worry too much about the functions of the various parts of a railway engine, but will just concern ourselves with their names.

Wheel combinations

When describing a steam locomotive, a good place to start is with the wheels, which can be divided into two categories: " Driving " wheels, and " Carrying " or " Idle " wheels. The driving wheels, as the name implies, are the ones which are actually driven round, by direct connection with the cylinders, and propel the locomotive along the track. The carrying wheels do not transmit any power, but merely support part of the locomotive's weight, either in front of or behind the driving wheels. The driving wheels are always much larger in diameter than the carrying wheels; most modern express engines have driving wheels of well over 6 ft. in diameter, while the carrying wheels are usually half that size. The diagram shows some of the wheel arrangements which have been most common in the British Isles during the Age of Steam. The system of describing these wheel arrangements is known as the " Whyte Notation," an idea from America which first came into use here in the early years of this century. The first figure in the code stands for the number of carrying wheels (counting both sides of the engine) *forward* of the driving wheels. The second figure stands for the number of *coupled* driving wheels, and the last figure denotes the number of carrying wheels *behind* the driving wheels. Thus a 4-6-2 locomotive has four carrying wheels (two each side) followed by six coupled driving wheels (three each side), with two more carrying wheels (one each side) right at the back, under the cab. It is interesting to note that, on the Continent, a slight modification of the Whyte Notation is used; the number of *axles* is counted instead of the number of wheels. Thus a 4-6-2 becomes a 2-3-1.

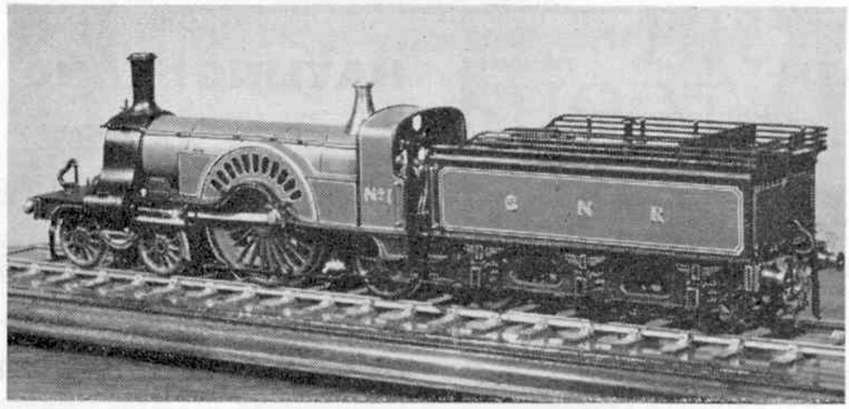
When four carrying wheels are arranged on a movable sub-frame, the whole unit, as most of you will know, is called a " bogie." However, when only two wheels are so arranged, the complete unit is correctly named a " truck "—a " two-wheeled bogie " is really a contradiction of terms. Some of the more common wheel arrangements have acquired names in addition to the usual code, and these names, which also originate in America, are widely used in railway circles. All 4-6-2's are " Pacifics," 4-4-2's are " Atlantics," 2-6-0's are " Moguls," 2-6-2's are " Prairies," 2-8-0's are " Consolidations " and the very rare 0-10-0's are " Decapods." In the very earliest days of railways, locomotives like Stephenson's " Rocket " had only one driving axle, but it was realised, even at that time, that by coupling together more than one pair of driving wheels, a great improvement in hauling power could be obtained. Strangely enough, some 60 years later, there was a revival of the use of engines with single driving wheels, which were used for hauling light, fast trains. Several types were built during the closing years of the 19th century, particularly by the London,



THE WHYTE NOTATION

One or two of the more common wheel arrangements of British steam locomotives.

The model on the right is a replica of one of the most famous " singles " ever to run in Britain. She was number one in the Great Northern Railway's fleet, and has outside cylinders and a domeless boiler. The large splashers have decorative perforations—a tricky task for the modeller ! The picture below shows one of the perky little J69 class 0-6-0 tanks which were once a familiar sight at Liverpool Street station. A typical example of a small tank engine with inside cylinders.



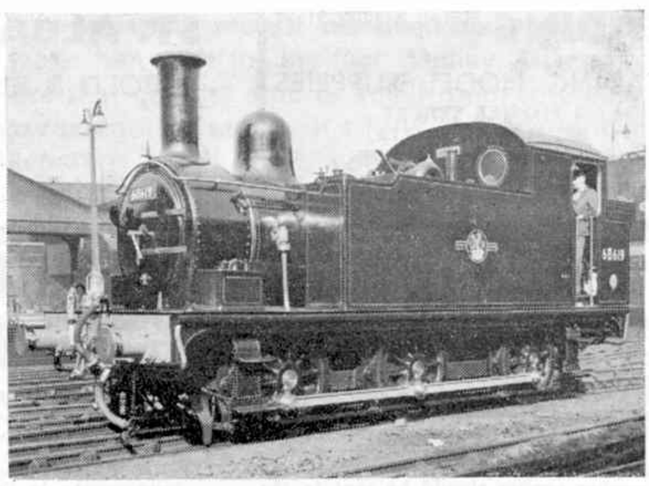
Brighton & South Coast and Midland Railways. With their large single driving wheels, unencumbered by coupling rods, they were very handsome engines indeed.

Cylinders

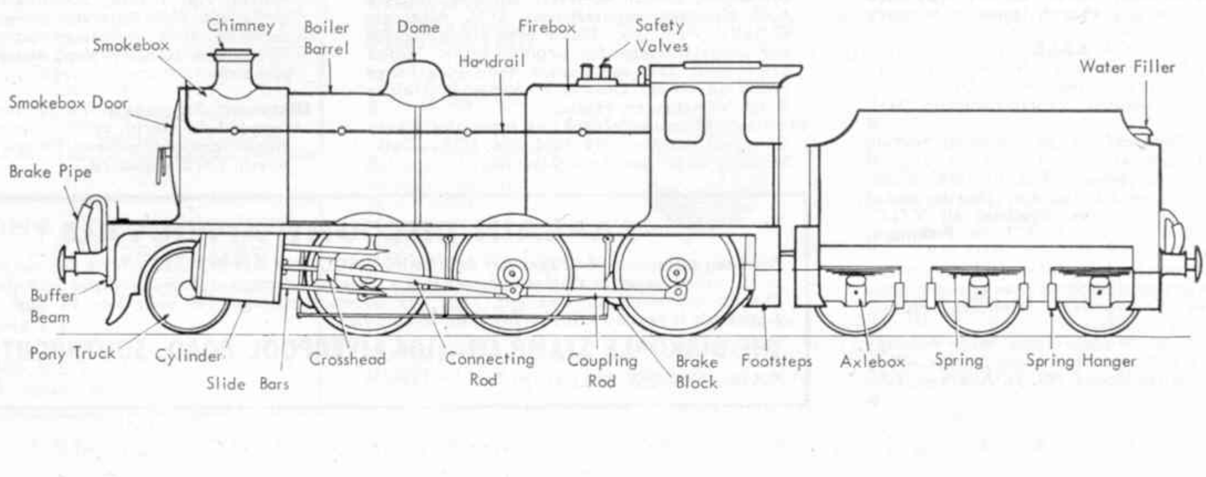
An aspect of locomotive design which has a great effect on the engine's outside appearance is the positioning of the cylinders. On the older engines, these were usually positioned between the frames, and so were quite invisible from the outside, coupling rods only connecting the driving wheels together. This meant, of course, that the connecting rods, which connect the pistons to the wheels, together with the complicated system of rods which operates the valves, all lay between the frames of the locomotive, under the boiler. This arrangement is wonderful from a modeller's point of view, as so many working parts are hidden from view, and need not be modelled; in actual practice, however, the system made maintenance difficult, and nearly all relatively modern steam locomotives have the cylinders, connecting rods and valve gear outside, and in full view. Valve gears themselves form a fascinating, but very complicated, subject, which we will talk about in a later article.

Superstructure

Having dealt with wheels and wheel arrangements, we now turn to what might be termed the " superstructure " of a steam locomotive. The time-honoured profile is so well known (we hope !) that we hardly need to describe it in detail here, and all railway-minded readers will be familiar with the difference between a tender engine and a tank engine. However, one or two terms do cause some confusion among newcomers to the hobby, and we hope to clarify these, with the aid of the drawing. The term " footplate " applies, not only to the space in the cab where the crew stands, but to the whole platform, from one end of the locomotive to the other, on which the cab and boiler rest. The boiler itself is always in three distinct parts; the smokebox at the front, the boiler " barrel " in between, and the firebox (in fact, the furnace) at the rear. The chimney is always called such, *never* a " funnel." The cab may have windows in the sides, but the circular windows in the front of the cab are always called " spectacles." The small mudguards over the driving wheels are known as " splashers." Most of the remaining terms will be made clear by referring to the drawing; they are all simple enough, but worth knowing.



Some of the more important components of a locomotive

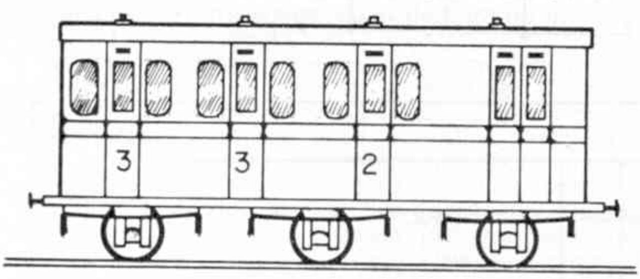


ABC of Model Railways Part 3

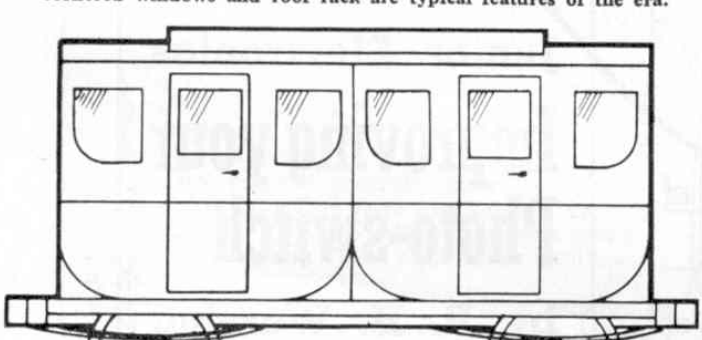
PASSENGER ROLLING STOCK

IN ORDER to fully understand the modern railway passenger coach, it is necessary to take a peep back into the very earliest days of railways themselves. The terms " coach " and " carriage " are both very old, and applied to certain types of horse-drawn road vehicles long before the coming of the first railway line in the early years of the nineteenth century. Back in those days, the pioneer railway companies found themselves faced with two definite problems; the first was to make the trains go at all, and the second to persuade people to travel upon them! These days, it is difficult to imagine the fear with which some people approached the new-fangled railway trains, but it is easier to understand when it is realised that, until the coming of steam rail traction, man could travel no faster than a galloping horse. Then, almost overnight, there were trains which could travel thirty or even forty miles in one hour! It is little wonder, really, that many were very uneasy about travelling by railway. The railway companies thought that the best way to combat this mixture of fear and ignorance in their potential customers was to make the vehicles in which they were to travel *look* as much like the familiar road coaches (or " carriages ") as possible. Thus, the very first railway coaches used on lines like the London and Birmingham Railway and the Liverpool and Manchester Railway looked exactly like slightly enlarged " stage coaches," rather like those vehicles that are familiar to us through the medium of Wild West films. These coaches were very short, with one central door in each side, and carried six or eight people, facing each other across a gangway running across the vehicle. A luggage rack was usually provided on the roof (shades of the modern motorist's roof rack) and the windows in the sides were usually of the " three-cornered " type (see drawing). It should be mentioned that coaches such as these were usually only provided for first-class passengers—second and third-class travellers had to put up with far worse things, usually with no roof at all, and often without seats!

A typical six-wheeled coach of the late nineteenth century. The vehicle is a " brake composite," as it has both second and third-class accommodation and its own guard's compartment.



A very early railway carriage. The vehicle is virtually two " stage coaches " mounted on a single underframe. The three-cornered windows and roof rack are typical features of the era.



As passenger traffic on the early railways grew, the little " stage-coach " vehicles were found to be too small; too many individual vehicles had to be attached to each train. The logical answer to the problem was to provide longer coaches and these took the form of *two* little " stage-coaches " mounted on a single underframe. Unwittingly, the well-known British " compartment " coach had been invented.

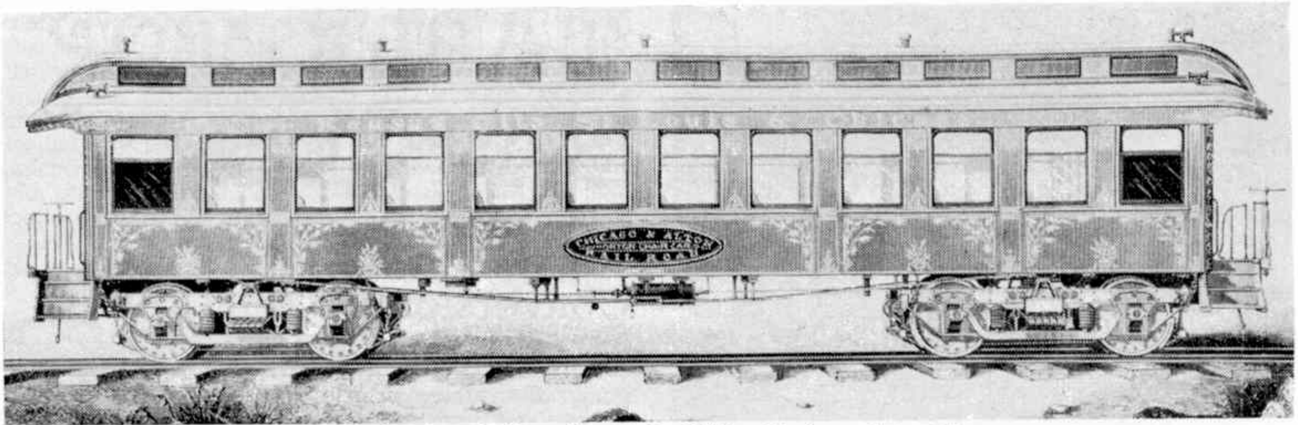
As time progressed, the two-compartment coach grew to three and even more compartments and the " stage-coach " look gradually disappeared. Longer vehicles needed extra wheels to carry their weight and provide steady running on curves. Usually one extra axle was added, midway between the other pair (see drawing) and the six-wheeled coach in this form was the most common type of vehicle found on British express trains between the years 1870-1890.

Coach lighting was, for many years, crude in the extreme, usually consisting of oil lamps which were simply fitted through holes in the roof. First-class compartments generally boasted a lamp for each compartment, but lower classes often had only one lamp shared between two compartments.

About 1880, bogie coaches as we know them today began to appear on the best main-line trains. These were not only much longer than the four and six wheelers, but also gave a much smoother ride and were safer at high speeds, having a flexible wheelbase. Gas lighting made its appearance, but was not entirely popular because of the very high fire risk involved.

During the 'nineties, corridor coaches started to become familiar, and this innovation made the restaurant car a practical proposition for the first time, and put lavatories within reach of the entire train. Electric lighting, using accumulators and belt-driven dynamos, provided a safe and satisfactory answer to the carriage lighting problem. At the turn of the century, the main-line coach, as we know it, had arrived. Since then, coaches have become much longer, and construction is of steel nowadays instead of wood. Third-class has been abolished throughout the country, leaving only first and second, and greatly simplifying passenger accommodation.

Back in the early days, continuous brakes were unknown; the engine had its own brakes, but the passenger carriages had none. As the brakes on the engine would be insufficient to pull up the whole train in a respectable distance, a " brake van " was provided,



An American Pullman Car of the 1860's. Bogie coaches made their appearance in the United States many years before they were common in Britain.

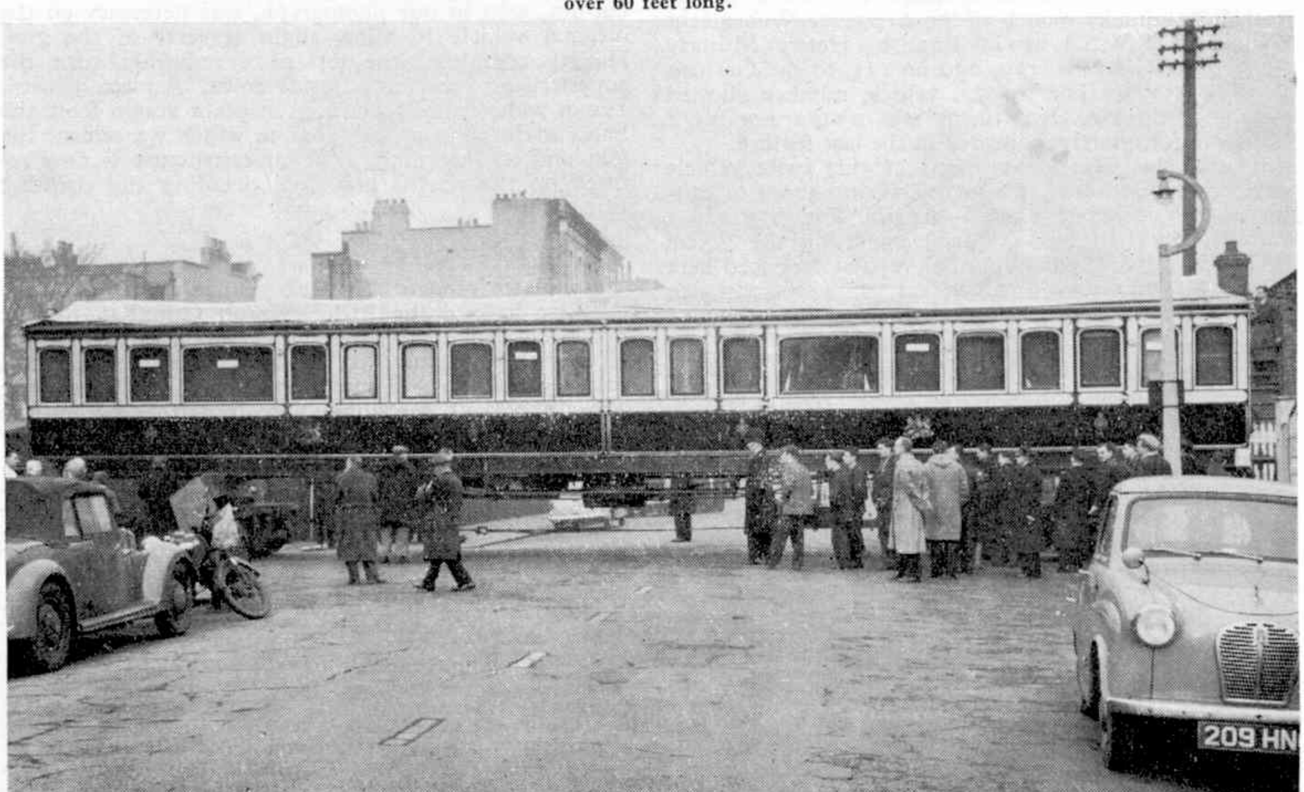
usually at the end of the train. This vehicle, as the name suggests, was a van equipped with a screw brake, which was worked by the guard. Luggage space was also provided in the brake-van, and sometimes a couple of passenger compartments as well. The term "brake-van" has stuck and it is still in use today for the guard's compartment of a modern coach, although it has really lost its true meaning.

We have briefly traced the history of the railway coach, and seen that the modern, all-steel vehicle is a direct descendent of the little vehicles of the 1830's, and even of the horse-drawn road coaches of the eighteenth century. Now we shall look at some of the terms applied to railway passenger rolling-stock, which often mystify newcomers to the railway and model railway hobbies.

Any coach which provides accommodation for more than one class of passenger is called a *composite*. Thus, a vehicle with both first and second class compartments is a *1st/2nd composite*. If the same coach included a guard's (or "brake") compartment, then it would be termed a *1st/2nd brake* composite. It must be remembered that the word *composite* only applies where more than one *class* of compartment is used in the same vehicle; therefore, a brake coach with, say, only second class accommodation is called simply a *brake second*.

Many modern coaches are designed without any compartments, as such, at all. There are no internal bulkheads, and a gangway runs between the seats, centrally, from one end of the coach to the other. Such vehicles are called *open* coaches, and most modern suburban coaches are built to this pattern.

Queen Victoria's Royal Saloon, built by the London and North Western Railway, on its way by road to an exhibition. It is over 60 feet long.



ABC of Model Railways Part 4

TRACK FORMATIONS

Left: In this picture, taken on the L.M. region of British Railways, a double-slip can be seen, partly hidden by the building in the foreground. At the foot of the page is the Peco Streamline double-slip for OO scale.

ALTHOUGH TRACKWORK is the basic necessity of any railway, a great many newcomers to the hobby find the terms used rather confusing, and in this article we hope to explain some of the mysteries of pointwork formations. We couldn't possibly cover everything in one short article, so there will be more to follow at a later date.

As mentioned in a previous article (" Scale and Gauge," January) the standard gauge in Britain, with the exception of Ireland, is 4 ft. 8½ in. Railwaymen always refer to the space between the running rails as the " four foot " and to the space between the tracks themselves as the " six foot." The minimum distance apart of two parallel tracks is, in fact, 6 ft. 6 in., measuring the distance between the two inside rails. It should be remembered that this is the minimum distance, and a little more clearance is usually provided if possible. On the Western Region of British Rail, parallel tracks are often very widely spaced; this is because the Great Western Railway was once broad gauge (7 ft. 0¼ in.) and conversion to standard gauge over 70 years ago entailed moving the innermost rails inwards to narrow the gauge; this resulted in a very wide " six foot," and accounts for the very spacious appearance of many Western Region stations.

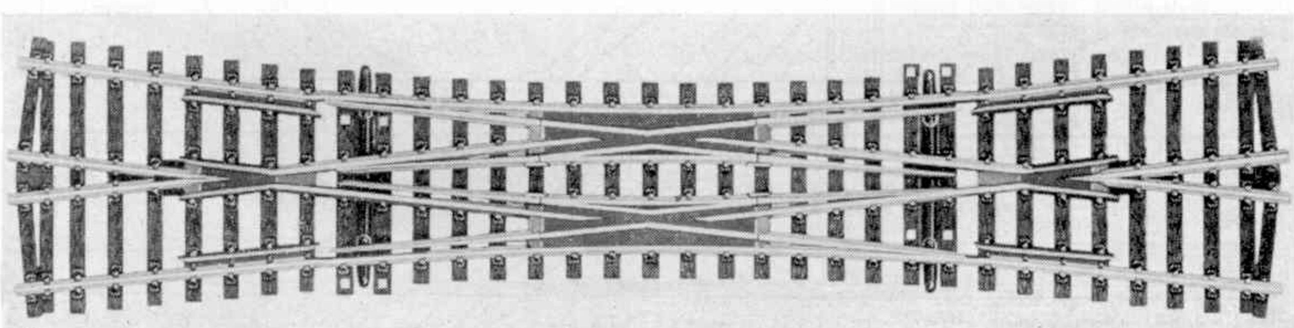
Improvements

Most railway enthusiasts will be aware of the basic construction of railway track; in recent years, however, great improvements in " permanent way " have been made, to give passengers a smoother and safer ride. The old style " bullhead " rail, held in cast chairs, is rapidly giving way to heavy-section " flat-bottomed " rail, welded in long continuous lengths, and very often carried upon concrete sleepers. The familiar " dum-de dum " sound of wheels on rail joints, which has been a feature of rail travel since railways began, is fast disappearing, greatly to the benefit of passenger comfort.

When travelling by train, many of you have probably marvelled at the extremely complicated pointwork formations used at the approaches to large stations like Waterloo or Euston. From the train, these appear to be a fantastically complicated jumble of rails and sleepers, almost impossible to " sort out " with the eye as the train speeds over them. Although this sort of trackwork *looks* complicated, it is really only a collection of individual points, which in themselves are quite simple. The basic point, which provides for one route turning off another, is known to railwaymen as a " turnout." Our diagram shows the component parts of an ordinary turnout, with the correct names for the various features. These are really self-explanatory, but it is important to remember that the term " frog," much used by model railway enthusiasts, would not be understood by a true railwayman; to him, it is a " crossing."

Useful formations

Now we shall look at some of the more common, and most useful, pointwork formations. The first diagram shows a facing crossover between two parallel main lines. It is called " facing " because, in this country, all trains run on the left-hand track, and in



this case, the crossing *faces* the train, which can run straight through on to the other track. Below it is shown a trailing crossover; in this case, in order to change tracks, the train must stop and *reverse* over the crossover. When designing a realistic model railway layout, it must always be borne in mind that, in actual railway practice, facing crossovers are avoided like the plague; they are only used when absolutely necessary, because it is always safer for trains to run at speed through trailing points, rather than facing ones. When planning pointwork for a layout, it is a good idea to remember that two left-hand turnouts make a trailing crossover, and two right-handers a facing one. In your railway is based on American practice, of course, you will run on the right, and the above rules will be reversed.

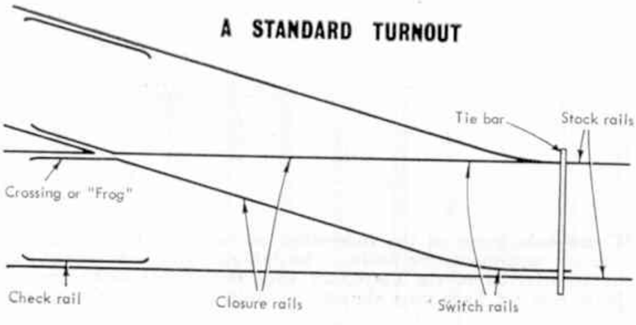
The third diagram shows a scissors crossover, which is really facing and trailing crossovers superimposed and incorporating a diamond crossing in the centre. This formation is not all that common, but can be very useful, particularly outside terminus stations, where it can give universal access to, and exit from, two platforms.

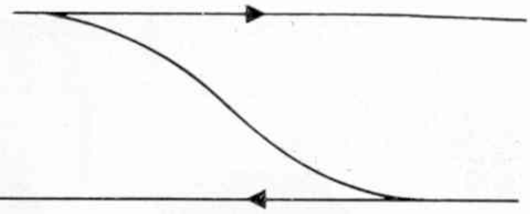
Diamond

Next we come to the simple diamond crossing, where one track simply crosses another, intersecting it, but providing no method for trains to change from one track to the other. Remember that this sort of formation is known as a crossing—*not* a crossover. A very useful development of the diamond crossing is the single slip, which is shown in the next diagram. Here, the " diamond " is interlaced with two turnouts, enabling a train to miss the " crossing " altogether. The advantages of the single slip are rather difficult to put into words, but a glance at the drawing should make things clear. The double slip is an even more useful piece of equipment, and is satisfyingly " complicated " to look at. We have included a photograph of a double slip from the Peco track range, and the picture is well worth studying. As you can see, the double slip really performs exactly the same duty as two ordinary turnouts placed back to back, but requires very much less space.

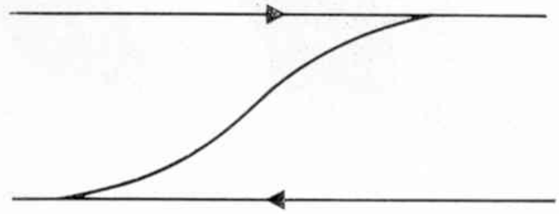
It is seldom possible for the manufacturers of model railway trackwork to build pointwork in *exactly* the same manner as the full-size article. Widths of wheel tyres, and depths of flanges on model rolling stock are usually over scale, and the radius of the curves over which we expect our model trains to run is really ridiculously sharp. If you have an oval of track, with curves of, say, 15 in. radius in OO scale, you are expecting to turn your express train round through 180 degrees in about the length of a football pitch. Because of this, most model trackwork is a compromise, and individual manufacturers often solve problems in their own way.

A STANDARD TURNOUT

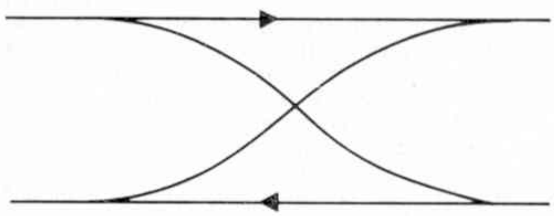




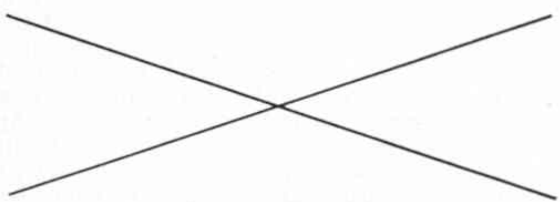
FACING CROSSOVER



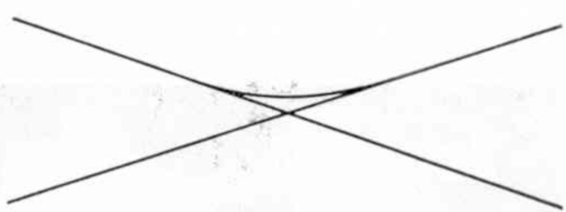
TRAILING CROSSOVER



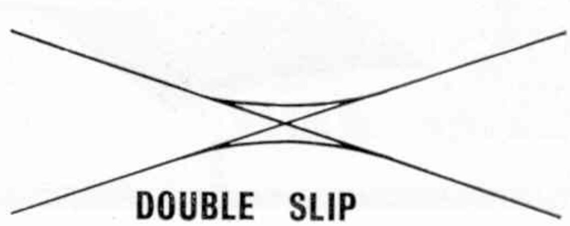
SCISSORS CROSSOVER



DIAMOND CROSSING



SINGLE SLIP



DOUBLE SLIP

A.B.C. OF MODEL RAILWAYS

PART FIVE

Goods Rolling Stock

Freight train working on real railways is a complicated business, and there are many different types of wagons and vans, each designed for specific jobs, in use on British Rail. In this article, we introduce some of the more common types of goods rolling stock, and pass on a few hints on operation to the model railway enthusiast.

GOODS TRAINS are very popular with model railway enthusiasts. This is probably because of the tremendous variety of goods rolling stock that is available from the proprietary model railway firms, and the fact that goods trains are more interesting to operate than passenger trains. Let's consider, for a start, the most common types of goods wagons to be seen on our railways.

Until very recently, the standard British open wagon was a four-wheeler, without anything in the way of continuous brakes whatsoever. The various wagons in a goods train were "loose-coupled"; that is to say, they were simply coupled together by loose three-link "chains," and when the couplings were pulled tight, the buffers of adjoining wagons did not touch. Most *Meccano Magazine* readers will have heard such a train slowing down for a signal; the distinctive "clink, clink" of the wagon buffers meeting is now becoming a thing of the past, as more and more goods trains are being fully fitted with the continuous brake, in the same manner as passenger rolling stock (see ABC of Model Railways for March). Because of the absence of continuous brakes on the wagons, these loose-coupled freight trains always had a brake van at the rear. This vehicle combined the duties of guard's van and extra "brake"; the guard himself operated a mechanical screw-brake, which worked upon the wheels of his van only, and helped the locomotive to bring the train to rest. In order to increase the braking efficiency, goods brake vans were always very heavily weighted, with concrete ballast under the floor, and most such vans weighed 20 tons. They make fascinating models, and several types are available in OO scale. Almost always of planked wooden construction, a balcony was provided for the guard either at one end of the vehicle or, more often, at both. The interior contained a coke stove to keep the guard alive on cold winter nights, as steam heating could not be provided from the locomotive in the normal manner, as all the wagons in between were not "piped." Today, the familiar goods brake is fast becoming obsolete; freight trains will soon all have continuous brakes, and the guard will ride in comfort in the rear cab of the train's diesel or electric locomotive.

Perhaps the most common type of wagon to be seen is the open mineral type. Usually seen carrying coal, these wagons are now usually of the all-steel type (very rusty) but some of the old wooden-bodied ones are still seen from time to time. Normally without continuous brakes, there were thousands of these old vehicles creaking around the country until very recent years. Although crude in some respects, they had the advantage of being very easy to repair. If one of the boards of a side became damaged, it was a very simple matter to replace it with another—that can't be done with a steel wagon! Before the war, many large firms owned their own wagons, which were painted in colourful and distinctive liveries. These "Private Owner" wagons make enchanting models; Trix make a good range, and the Peco wagon kits are well known.

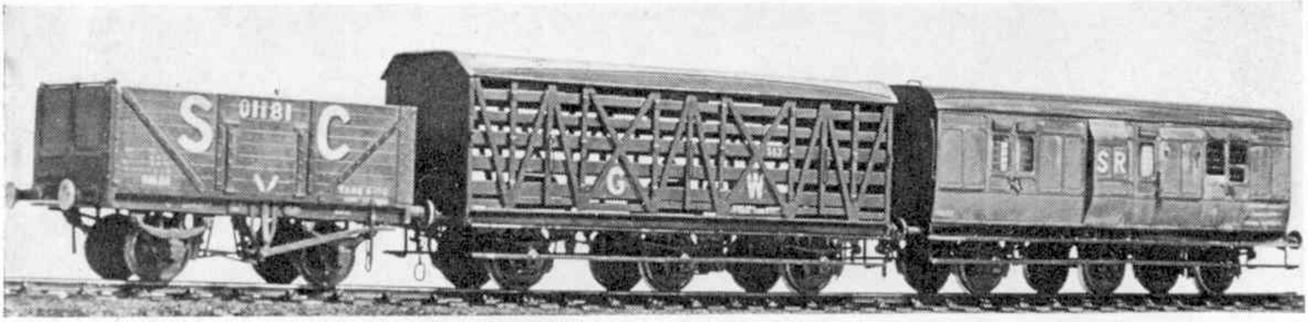
The covered van is probably the next most common type. These were also usually four-wheelers, but often had longer wheelbases than their open counterparts, as they were more often required to run in passenger trains, and consequently had to be able to travel safely at higher speeds. Only vans fitted with continuous brakes, of course, could run with passenger stock. Since Nationalisation in 1948, unbraked stock has been painted grey, while "fitted" vehicles are brown. If you are running a "mixed" branch-line train on your model railway, with a few goods vehicles attached to a passenger train, always be careful to see that your coaches are coupled next to the engine, and the "unbraked" wagons are tacked on to the rear. This is essential in actual practice, of course, as if the unbraked wagons were *between* the locomotive and carriages, the coaches would not be coupled to the continuous brake.

There are very many varieties of closed van. Some are specially adapted for carrying fish, others are insulated for perishable goods, a few are actually refrigerated (for transport of fish fingers, etc.), and some have special suspension for carrying very fragile loads. Cattle-trucks also come into the closed van category, and so do horse boxes. The latter two types nearly always run in complete trains of the same type of vehicle, in conjunction with farm sales, race meetings, etc. However, this need not worry the model railway enthusiast too much as, on the average small layout, a train of four or five of the same type of wagon looks most impressive, and quite as long as a real 20-wagon train appears.

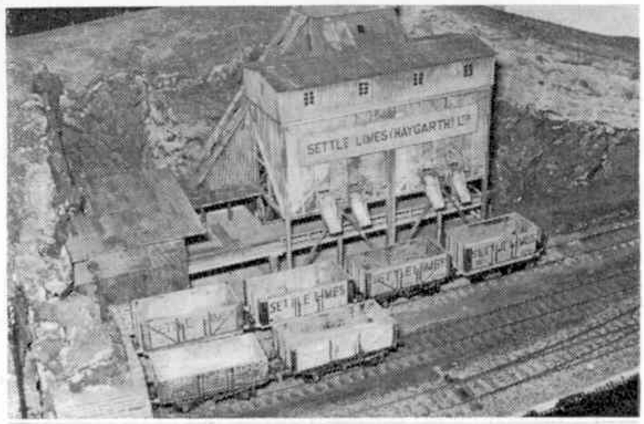
Oil and petrol tank wagons are also usually four-wheeled, although some giant bogie ones have recently entered service with British Rail. They are nearly always brightly coloured, and a complete train of them looks most attractive. Unfortunately, they are really out of place in the ordinary "general" goods yard, as they need specialist unloading equipment and storage tanks. How about a model oil depot? It's not often done. One thing to remember; never run a tank wagon next to a steam locomotive if you can avoid it; it's a fire risk, and is frowned upon in real railway practice.

Many *Meccano Magazine* readers will be aware that the pattern of freight operation has changed a good deal on British Rail in the past year or two. The Freightliners, with their huge silver containers carried on massive bogie wagons, have revolutionised long hauls, and an excellent model of one is available from Tri-ang. Most Freightliner trains do not have a container on every wagon; there are gaps every so often.

Another feature of modern freight operation is car traffic. This is of two kinds. Firstly, there are trains like the long ones carrying Fords from that company's Liverpool plant, which can be seen every day racing south along Midland Region metals. These, of course, are new cars being delivered the fast way. The other type of car trains are the holiday trains, carrying both cars and their owners who just can't face the long drive



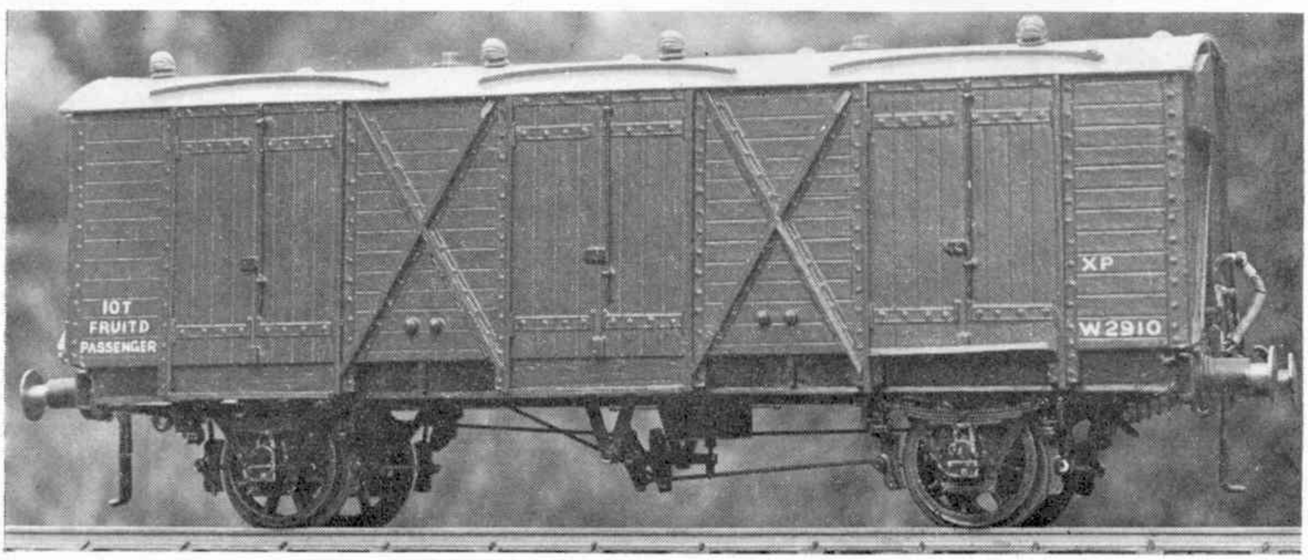
The short train depicted above includes three very different types of freight vehicle. The wagon on the left of the picture is a typical wooden-bodied "Private Owner" mineral wagon, followed by a six-wheeled slatted-slided milk van. The Southern Railway vehicle at the end is really designed to run in passenger trains, carrying milk, newspapers, etc. On the right is a model lime plant, complete with "Private Owners."



from, say, London to Scotland (who can blame them?). These people just relax in the comfort of a railway carriage, while their car rides on a railway wagon at the rear of the train, probably faster than it has ever been on the road! Such trains are easily represented in model form; a couple of main-line coaches, with two bogie "flats" with cars should look quite impressive.

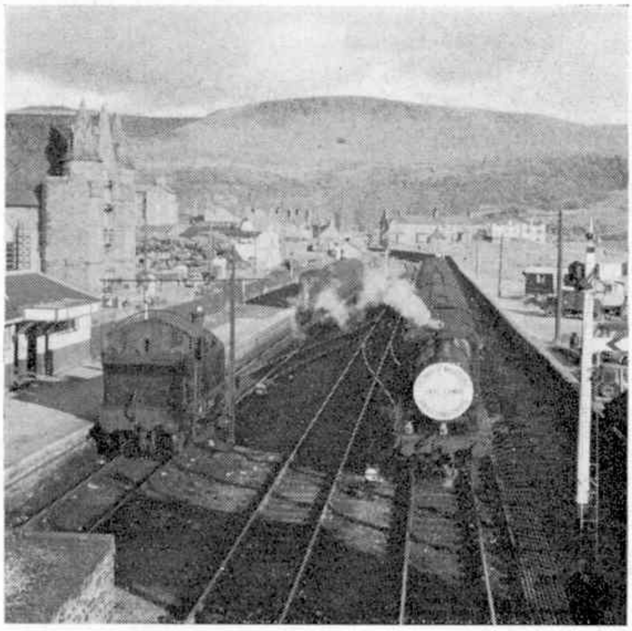
Probably the most interesting goods trains from the modeller's point of view are the "pick-up freights." These trains are becoming less common now that short distance traffic is more often going by road. As the name implies, the pick-up goods train stops at most stations on its route, and either picks up wagons from the goods yard or drops off a couple. This involves quite a bit of shunting at every stop, and the train gets longer as the journey proceeds. All this must be done, of course, without interfering with main-line traffic.

On the right is an unusual model of an unusual open wagon. It belonged to the narrow-gauge Glyn Valley Tramway, in North Wales, and was used for carrying granite from the quarries down to the canal at Chirk. The combined central buffer and coupling is usual narrow-gauge practice. The long-wheelbase van below is typical of a vehicle designed for specialist traffic; it is an ex-Great Western Fruit Van. Th "XP" on the side means that the van is suitable for running in Express Passenger trains.



A.B.C. of Model Railways

STATION TRACK LAYOUTS



Above: Interesting track work in Barmouth station with a locomotive standing in a parcels bay platform on the left. Behind the right-hand engine is a trailing crossover.

FIG 1

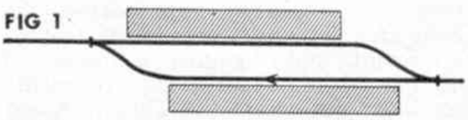
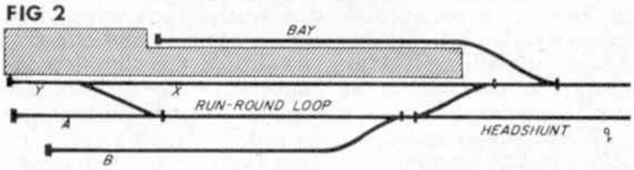


FIG 2



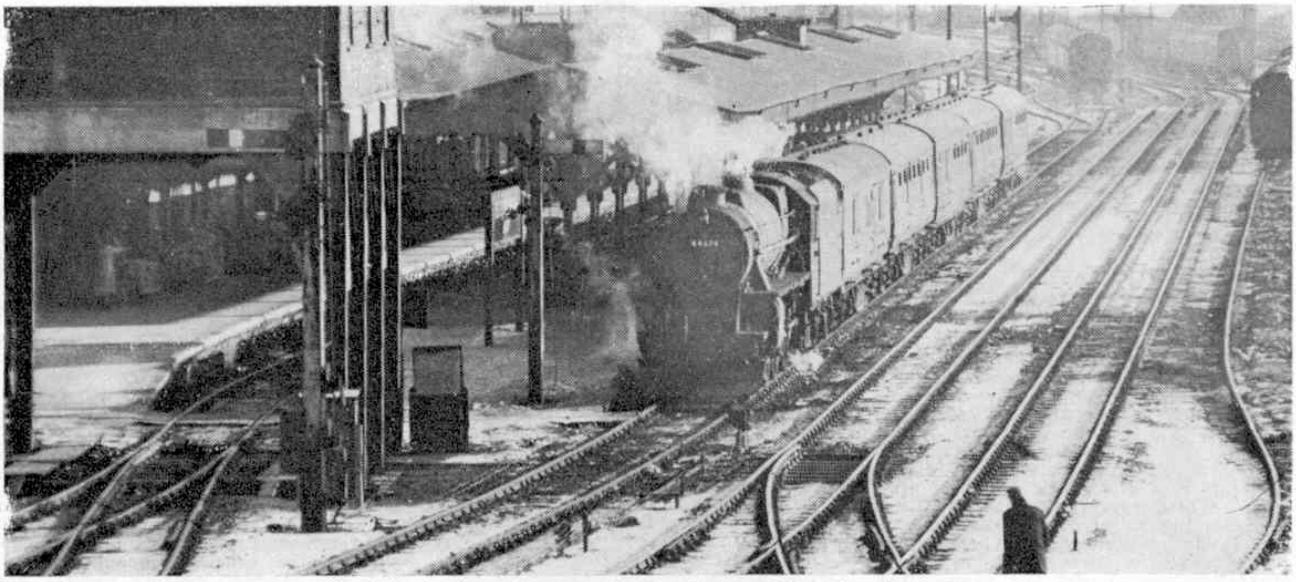
Below: A scene at a station on the layout of Mr. J. L. Holbrook. The scale is O and the station itself is characteristic of the " island ".

ALL RAILWAY stations fall into two easily defined categories; " through " or " terminal." There are a few stations which incorporate both through and terminal tracks (a good example is Blackfriars, Southern Region), but in these cases, each section of the station is usually considered separately from an operational point of view.

From the railway modeller's angle, it is difficult to say which type of station gives the most operational enjoyment. Whilst the terminus provides the necessity for turning round trains, and servicing and stabling locomotives, the through station on a single line railway can provide passing facilities and a goods yard. *Figure 1* shows a simple passing station on a single line, with a loop and two platforms. Notice how the two points are arranged, so that the straight run is taken in the facing directions (see ABC of Model Railways for April, 1968) and the curve in the trailing direction. This means that non-stop trains can run through the loop at speed with greater safety than if the points were arranged the other way round. On the sketch, we have shown the platforms set opposite each other, on the outside of the loop itself. This was the usual arrangement in the early days of railways, but many lines built towards the end of the nineteenth century and early in this century, used the " island " platform arrangement. As the name suggests, the platform was placed between the tracks; the advantages of this system was that it saved money in wages, as fewer staff were needed to deal with trains, as the trains all, in effect, called at the same platform. Only one set of station buildings and shelters was needed, and buffet facilities could be used conveniently by passengers waiting for both " up " and " down " trains.

Figure 2 shows a simple terminus layout which has become a classic with model railway enthusiasts over the years. There must be thousands of layouts based on this theme, with minor variations. This particular layout is not intended to represent Waterloo or Euston, but a small country terminus of the sort that is becoming all too rare these days. Passenger facilities are provided by just one platform, with a small " bay " behind it for parcels and milk traffic, and possibly an extra passenger train on " Summer Sundays." There is a single-siding goods yard, mainly for coal traffic, and a run round loop; the latter is an essential part of all termini, as it allows the engine of an incoming train to be released from its train, and run round it to the other end, whereupon the train can depart again with the same engine. At large termini, the situation is somewhat different, as it is unusual for the locomotive which brought a train in, to take it out again, and at some such stations, run-round loops are not provided. Instead, the empty stock is taken back to the carriage sidings by the station pilot, a locomotive which " lives " at the station all day and makes itself generally useful.

When designing a model terminus, based on Fig. B, there are several points to bear in mind. First, the " neck " of the run-round loop (y) must be long enough to accommodate your longest locomotive, to allow it to run back over the crossover and past its train. An uncoupler at point x is a good idea, as it



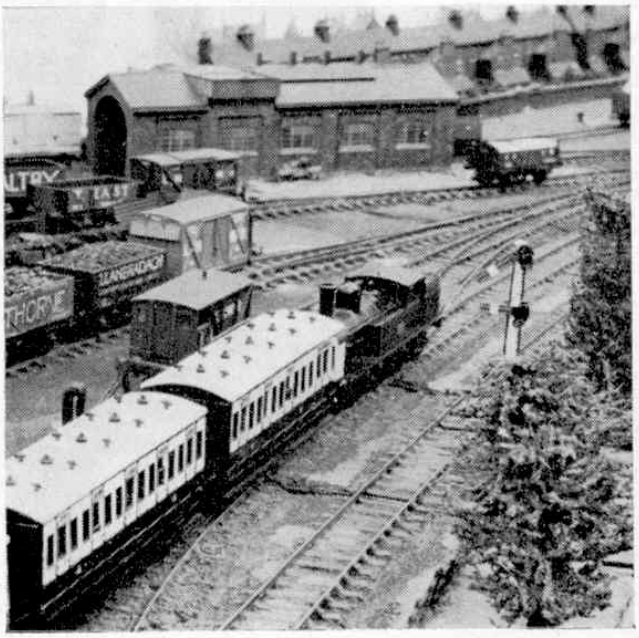
Back in the days of steam a local train starts from Peterborough station; the layout here is unusual as the left-hand track is served by two platform faces.

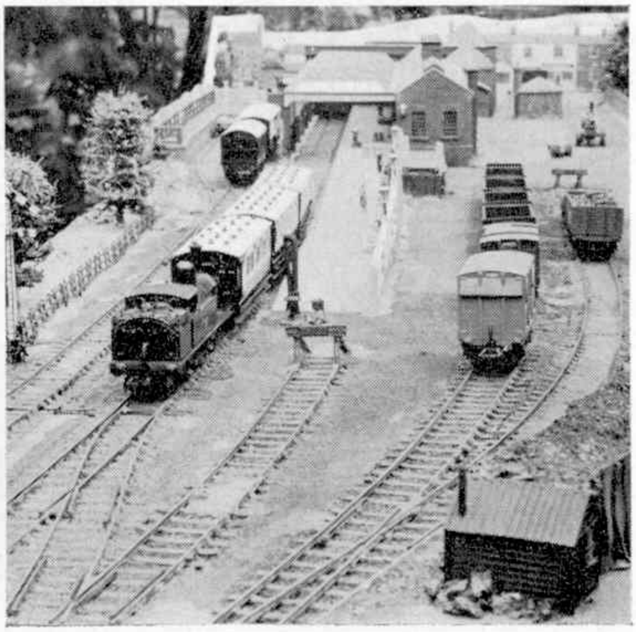
makes the whole operation of running round the train "untouched by human hand" and bound to impress visitors.

The length of the platform road itself must also be of ample length to hold your longest train without fouling the points at either end. Incoming goods trains are dealt with in a rather different way. On arrival, the train is routed, not into the passenger platform, but on to the run-round loop itself. The engine can then run round the wagons via the platform road; now it is at the back end of the goods train, ready to shunt the various wagons into either of sidings a or b. If a track q is provided, long enough to hold the complete train, then shunting operations can be carried out without interfering at all with passenger traffic. Track q is called a "headshunt."

Figures A and B are both very simple versions of typical track layouts found at stations. Both can be elaborated upon in model form; A, for instance, has no goods facilities in our sketch, but it easily could have. A simple siding, running behind one of the platforms and possibly a headshunt running parallel to the main line, would complete the picture. Do not be tempted to include too much trackwork in a small space; it is always very tempting to include just one more siding, but that siding will probably be one too many. Include only trackwork which is necessary and you will be following real railway practice.

These views of G. Williams EN gauge layout show how a typical model terminus can be developed on a baseboard little over two feet wide. Only a single platform is provided with the goods yard behind. The locomotive shed can be seen in the background of the left-hand picture.





A.B.C. of MODEL RAILWAYS

SIGNALS

Above, the "Golden Arrow" passes under three Southern Railway upper quadrant arms. The left-hand arm is of corrugated construction, for strength. At right, an ex-Great Western Railway No. 2250 hauls a special train through Barmouth Junction. The signal is a "Fixed Distant". The arms are fixed to the post permanently in the "caution" position; the driver must be prepared to bring his train to a stop at the next "Home". Below, "The Broadsman", one-time Eastern region crack express, passes an interesting double-bracket signal which incorporates "calling-on" arms.

DURING A journey by rail, few people these days ever spare a thought for the highly complex signalling system which protects their train from disaster as it speeds along. The modern railway signal is a very reliable and complicated device which has developed over many years, and has made the railways of Britain among the safest in the world.

Signals do not concern the model railway enthusiast from a practical point of view, and most layouts have signals only as part of the "scenery". Nevertheless, they are a fascinating study in themselves, and in this article we intend to describe broadly the development of the semaphore type of signal; modern "colour light" types will be dealt with at a later date.

In the earliest days of railways, signals hardly existed at all. Trains were usually despatched from stations on the "time interval" system. This meant that after one train had departed, another was not allowed to follow it until a certain time had elapsed. The dangers which were inherent in this system of operation are painfully apparent; if the first train broke down out in the country, there was nothing whatever to stop the following train from colliding

with it from the rear. It must be admitted that accidents of this kind were not very frequent, even in those far-off days, but trains travelled comparatively slowly, and drivers could often pull up in time if they saw that the line ahead was blocked.

As locomotives developed, and the speeds of trains grew greater, the need of a proper signalling system soon asserted itself. The earliest signals were human beings, in the shape of railway "policemen". These gentlemen performed much the same duties as the present day policeman on point duty; they stood by the lineside at stations and junctions, and signalled the trains with red and green flags. This system proved fairly satisfactory while traffic was light, but great reliance was placed on the human element, and it was not long before a mechanical system of semaphores was introduced, similar in basic form to that which is familiar to us today.

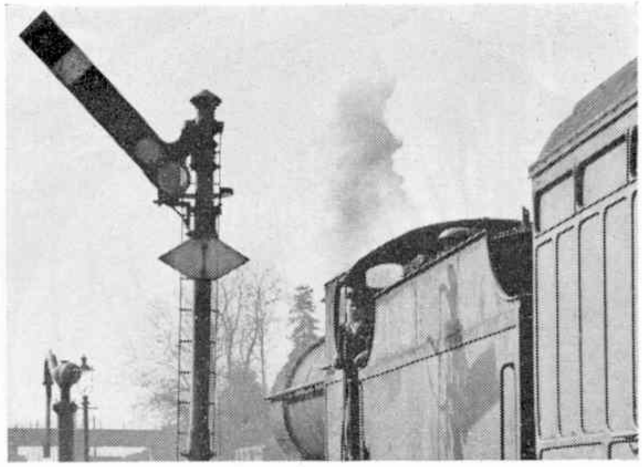
The earliest semaphore signals were arranged in a similar way to contemporary military "signalling posts". The arms of the signals were carried on high wooden posts, which sprouted from the top of a timber-built cabin, which provided shelter for the signalman. Standardisation of signalling between one railway and another was virtually non-existent; some lines used circular discs or large square boards on top of high posts, which presented their faces to the driver for the "danger" position, and rotated to an end-on aspect for "all clear". Others used a semaphore arm much like the ones we know today. This was often carried in a deep slot in the post itself: the "danger" position was indicated by the arm standing out at right-angles to the post, in the modern manner. At "all clear", the arm fell into the slot, and disappeared altogether, presenting the driver with a view of an unembellished post—a development of the old "no signal at all means all clear" philosophy. The slotted-post type of signal had one bad weakness, however. In severe winters, snow could easily block the slot in the post, and the arm was prevented from returning to the "all clear" position. Under these circumstances, the arm often hung at an ambiguous forty-five degrees, and drivers could very easily mis-read the signal, with disastrous results.

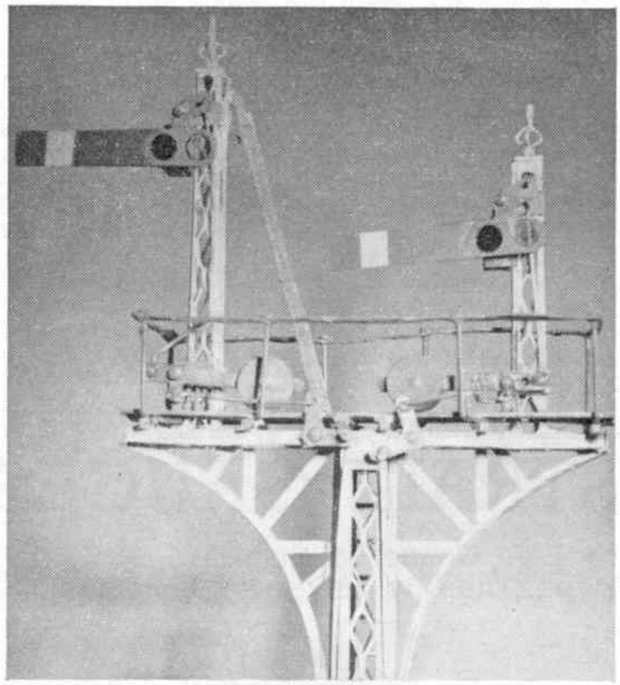
During the 1860's, the semaphore arm signal became firmly established as the standard type of railway signal. Almost all were of the "lower quadrant" type; that is, the arm in the horizontal position indicated "stop" and for the "all clear" position, it dropped to an angle of about 45 degrees. The back end of the arm, which carried the coloured glasses through which the oil lamp shined at night, was weighted so that the arm would return to the horizontal position if the controlling wires broke—a "fail safe" system, in fact. After the grouping of the railway companies in 1923, "upper quadrant" signals began to replace the older types. In this latter type, the signal arm is still in the horizontal position for "stop", but rises through 45 degrees for the "all clear" instead of falling. This made the "fail safe" action of the arm simpler and more fool proof, as it needed no weighting behind the fulcrum; the weight of the arm itself would return it to danger should the actuating wires break. The Great Western Railway never adopted the "upper quadrant" type of signal, and many of that company's very handsome "lower quadrant" semaphores can still be seen on the Western Region of British Rail to this day.

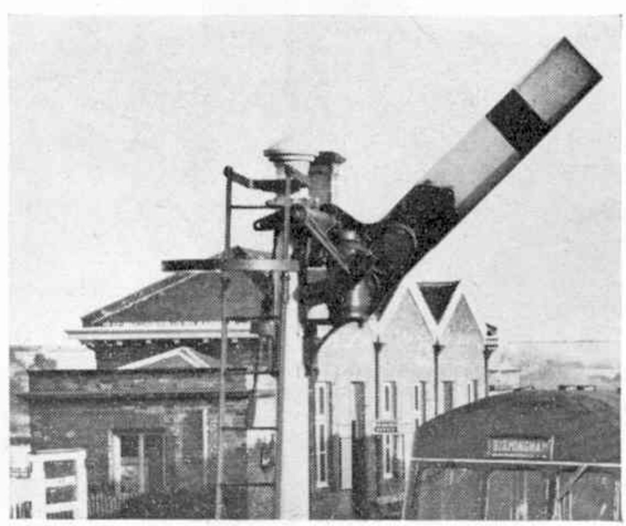
As trains began to travel faster, signalling became necessarily more complicated, and Distant signals were introduced. Most readers will be aware of the familiar yellow arm with the fishtail end and black stripe of this type of signal. Distants are placed in advance of ordinary, or "Home" signals, and give advanced warning of the indication given by the Home signal. A locomotive driver may pass a distant at "danger," but it only warns him to expect the next Home signal to be "on". "On" and "Off" in railwaymen's language mean "Stop" and "All Clear" respectively. Distant signals are rarely provided on a model railway layout, as space does not usually permit their inclusion.

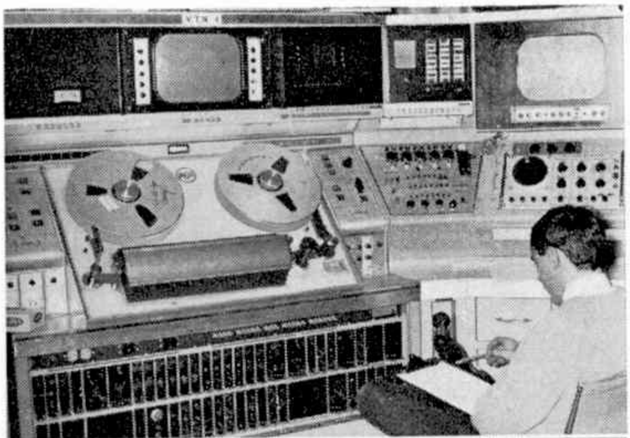
In a later article, we shall delve deeper into the workings of the railway signalling system, and discuss the manner in which stretches of line are divided into "blocks," how single lines are worked with safety, and the various systems of interlocking signals so that the signalman cannot make a mistake.

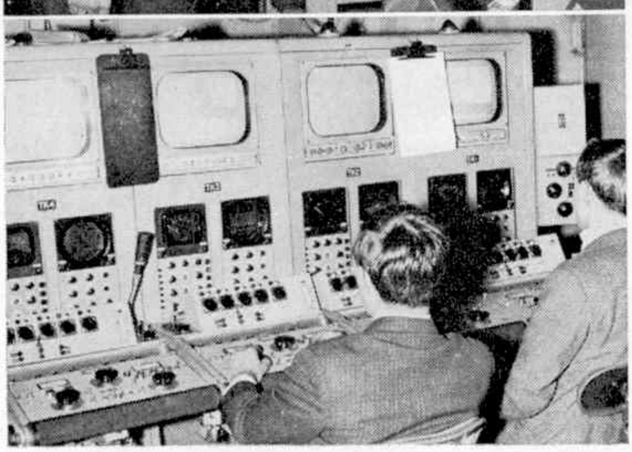
At right, top to bottom, an L.M.S. Class 4 0-6-0 gets the "Right Away" from Stamford Town station, back in 1956. The upper-quadrant signal is of standard L.M.S. design, with tubular steel post. Next, a double-bracket signal in model form, with lattice posts. Note the attractive openwork finials on top of each small post. Lastly, a close-up view of an L.M.S. style upper-quadrant arm.











A.B.C. of Model Railways

SIGNALS

Part 2

LAST MONTH, we looked at the evolution of the standard railway semaphore signal. In this article, we shall delve a little deeper into the subject of signalling from the model railway enthusiats point of view.

As mentioned last month, the rising speeds of trains in the 1840's led to the introduction of Distant signals, which warned the drivers of trains that the next Home signal they encountered was likely to be at danger. Of course, when a driver passes a Distant in the On position, the next Home signal *will* be at danger, unless something has happened in the meantime to alter things—perhaps a slow-moving goods train ahead has been shunted into a yard or relief loop, for example. The yellow and black Distant arm is well known: at night, a yellow light shines for the On position and a green light for Off.

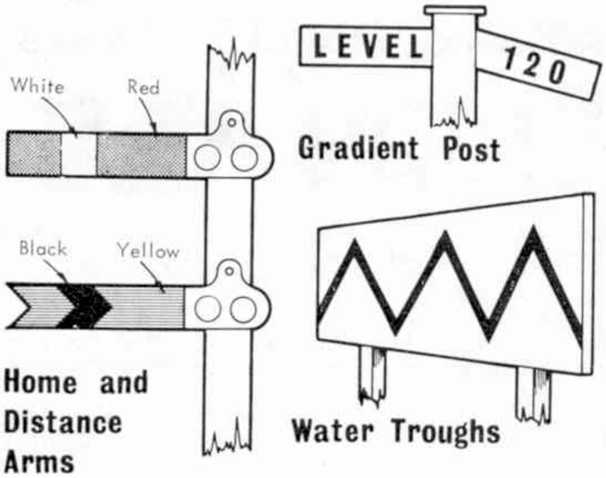
Mechanical interlocking of the signal levers in the signal box itself ensures that the Distant cannot be pulled Off until the Home signal has been set to the Off position—a valuable safety precaution against human error which has been law since an Act of Parliament of the late 1880's. Interlocking is rarely used on model railways, but never let it be seen that one of your Distants is Off while its corresponding Home is On!

Sometimes, a Home signal shares a post with the Distant arm for the *next* Home. In such cases, the Home arm is always the uppermost. This particular combination looks very attractive on a model railway, but there is one very important point to bear in mind: whilst it is quite in order for the Distant arm to be in the On position while the Home arm is Off, the Distant obviously cannot be Off while the Home arm is On. In practice, the two arms would be operated from different signal boxes: the Home arm from the local box, and the distant from the next box up the line.

The Home signals themselves protect the entry to "Blocks" or "Sections." They are also used at turnouts and junctions, where they take the form of Junction signals, which are virtually signposts, telling the driver which track he is about to take. If one of the diverging lines is more important than the other, then its signal is usually carried on a higher post.

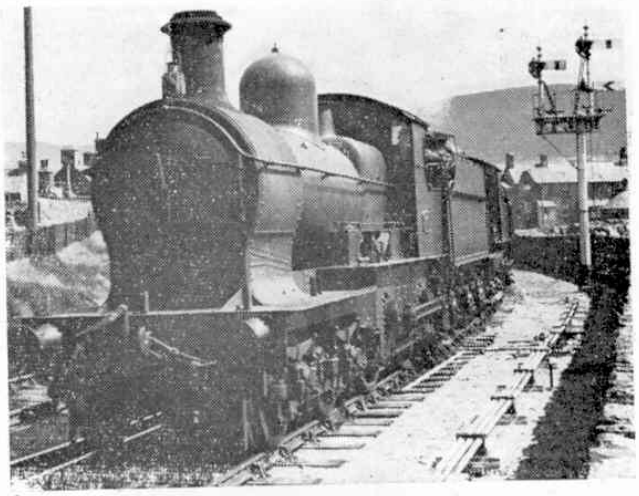
A Starter signal looks exactly like an ordinary Home signal, and the driver must stop dead if it is at danger. Starters are found at the end of station platforms, and are used to hold trains in the station while shunting and similar operations can be carried out in the section ahead. The starter is thus in advance of the next section, and the signal box up the line does not have to accept trains which are merely shunting within the station limits.

All signals stand on the left-hand side of the running track, except on lines of the old Great Western Railway, where they are positioned on the right (all G.W. locomotives were right-hand drive). Signalling is such a complicated subject, that no model railway could really hope to be fully signalled. It is a good idea to provide junction signals and Starters, but most Distants can be dispensed with.



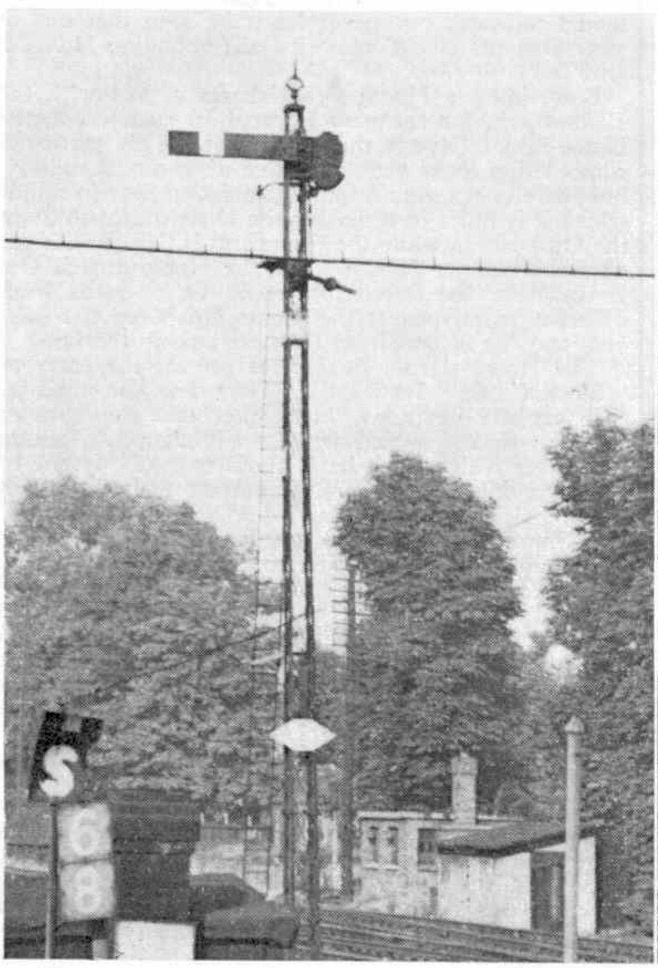
Conventional signals are not the only "signposts" which railway drivers have to obey: there are also such things as mileposts, gradient boards and water trough boards erected beside the tracks. Most readers of Meccano Magazine will be familiar with mileposts, which are situated every quarter of a mile. Usually, the quarters are marked by a simple stroke on the post, and the sequence goes like this: 27, I, II, III (for three-quarters) 28, I, II, etc., etc., etc. Mileposts are hardly ever seen on model railways, but they would be extremely easy to make from scrap balsa, painted white.

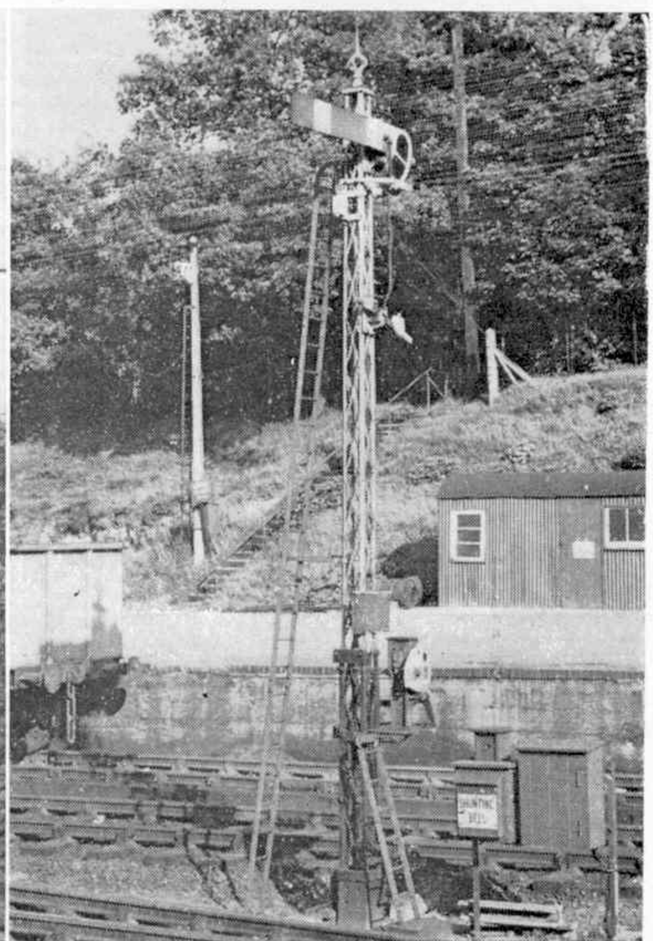
Gradient boards are also a common sight beside the line; they give the driver an idea of the steepness of the gradient he is ascending or descending. If the track is on the level, the arm of the board is parallel to the ground, with the word "Level" on it. If the arm drops at an angle (see sketch) with the number 120 on it, this means that the tracks descend at a gradient of 1 in 120. In other words, the track drops one foot in every 120 feet of length.



Above: Great Western "Dukedog" class rebuilt 4-4-0 trundles under a typical lower-quadrant bracket signal of G.W. pattern. Location is Barmouth, Mid-Wales, and the train is, in fact, double-headed (second engine behind the tender of thé first).

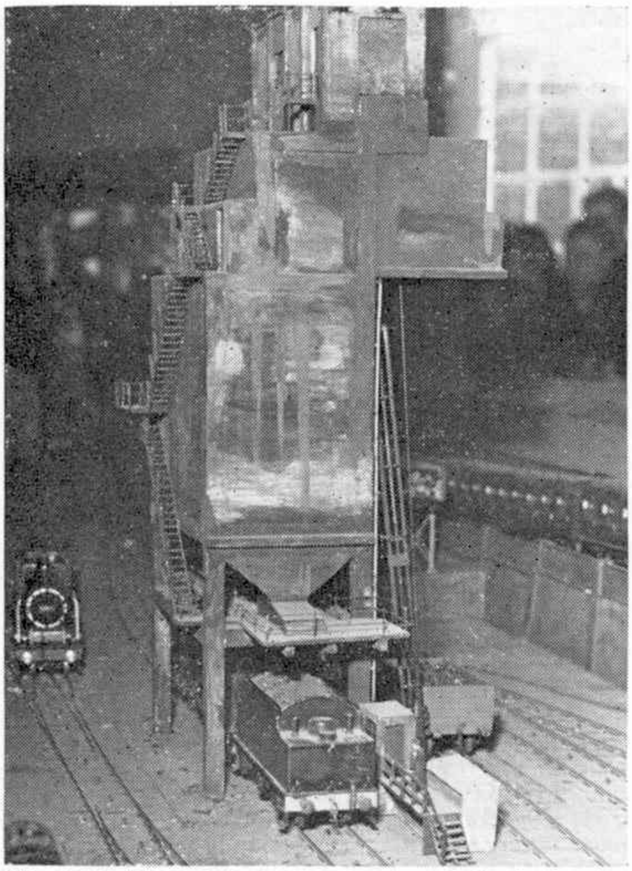
Below: two old London and South Western Railway Home signals on the Waterloo-Woking main line, very easy to model.





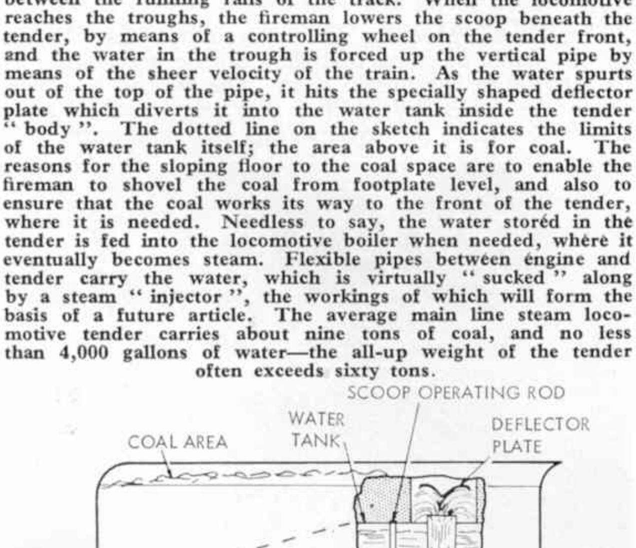
A.B.C. of Model Railways

LINESIDE FIXTURES FOR YOUR LAYOUT—BRING IT TO LIFE



A true to scale Gauge "O" coal bunker on the West Lancashire layout. This model, built by R. C. Chown really works! The coal wagons are lifted up and the coal is then tipped into the waiting tender.

The sketch below gives a cut-away view of the inside of a typical locomotive tender, fitted with water-pickup apparatus. This system was used by all the pre-Nationalisation railway companies except the Southern Railway (the Southern had no main line non-stop runs long enough to justify water troughs, although its express locomotives generally had large, high capacity tenders to compensate for their absence). As can be seen from the sketch, water is provided in a long shallow trough between the running rails of the track. When the locomotive reaches the troughs, the fireman lowers the scoop beneath the tender, by means of a controlling wheel on the tender front, and the water in the trough is forced up the vertical pipe by means of the sheer velocity of the train. As the water spurts out of the top of the pipe, it hits the specially shaped deflector plate which diverts it into the water tank inside the tender "body". The dotted line on the sketch indicates the limits of the water tank itself; the area above it is for coal. The reasons for the sloping floor to the coal space are to enable the fireman to shovel the coal from footplate level, and also to ensure that the coal works its way to the front of the tender, where it is needed. Needless to say, the water storéd in the tender is fed into the locomotive boiler when needed, whère it eventually becomes steam. Flexible pipes between éngine and tender carry the water, which is virtually "sucked" along by a steam "injector", the workings of which will form the basis of a future article. The average main line steam locomotive tender carries about nine tons of coal, and no less than 4,000 gallons of water—the all-up weight of the tender often exceeds sixty tons.



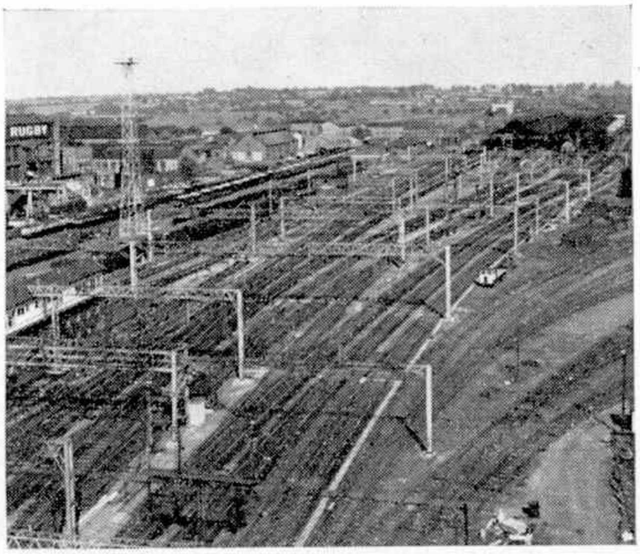
WATER PICK-UP GEAR TENDER

LAST MONTH, we looked at some of the interesting features which can be seen along the lineside and which, in model form, can be add a great deal of interest to a model railway layout. In this article, we shall take a look at some more details of much the same type.

Our first picture shows a large and complicated piece of railway equipment to be found at large motive power depots, but only very rarely seen in model form. It is a gigantic automtic coaling hopper, and the model illustrated stands on the layout of the West Lancashire O gauge group. These huge structures were built of concrete, and were able to replenish locomotive tenders with coal very quickly and entirely automatically. In the picture, the locomotive tender is in position below the tower; behind the tower can be seen a loaded coal wagon. When the controls in the small hut at the base of the structure are operated, the wagon is hoisted bodily to the top (the rails of the lift can be seen in the picture) where the wagon is turned over and its contents shot down the hopper into the waiting tender. The model in the picture actually works, but most people would be content with a non-working model, which would be quite easy to build in the usual balsa and card manner.

Our next photograph is an aerial one, of the junction just north of Rugby station on the London Midland region. This was taken during the installation of the overhead catenary equipment for the new 25,000 volt electric services, but there are all sorts of things in the picture which are of interest to us as railway modellers. In the mid distance on the right-hand side of the picture can be seen some coal staithes. These are really only huge fences made from old sleepers, used to retain heaps of coal which has been unloaded from railway wagons and await shipment by road to consumers.

BICC overhead equipment erected at the busy junction area just north of Rugby Station. The 100 foot floodlighting tower on the left is one of five supplied and erected by BICC. This photograph was taken prior to the replacement of the old signals and signal boxes by modern equipment.



Such staithes can be seen in many goods yards, although they are now fast disappearing in favour of highly mechanised centralised depots. No coal yard can be considered complete without the coal merchant's lorry, which can be seen in the picture just below the staithes themselves.

From the traditional coal yard, to the bang up-to-date. On the left of the picture is a 100 ft. tall floodlighting tower, which serves to illuminate the marshalling yard after dark, and enables operations to be carried out round the clock. Towers like this are becoming a common sight at modern yards, and would add a great deal of authenticity to a modern layout, especially if actual illumination could be arranged with miniature bulbs at the top of the tower. Has anyone tried it ? At the bottom right-hand corner of the picture can be seen the old-fashioned small lamp standards which are the forunners of the modern floodlight towers.

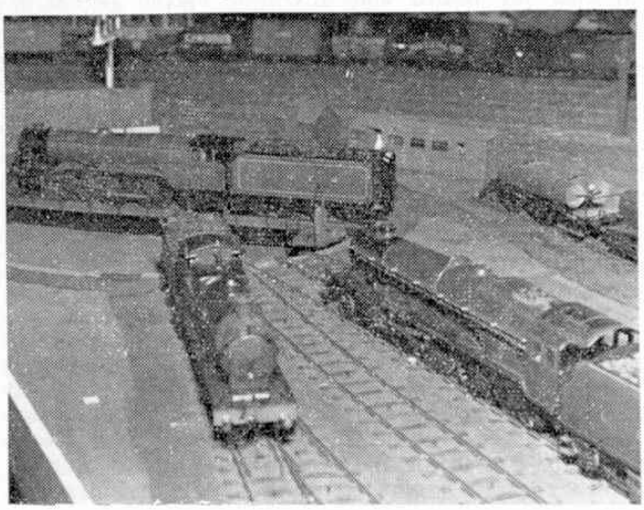
The third picture shows a shed scene on the layout of the West Lancashire O gauge Group. L.N.E.R. Pacific No. 4472 is being turned on the turntable, and the scene in general is most realistic. Just behind No. 4472's tender is an old coach body, minus its underframe, which is being used as a hut. The railways found that this was a most economical way of providing small buildings of this type, and a lot of very interesting old coaches and vans have survived for many years because of this habit. The railway modeller can take advantage of this by using old and discarded coaches for scenic effect in goods and locomotive yards. Incidentally, the coach body in the picture looks very much like an old steam railcar which was once operated by the Kent and East Sussex Railway. Does anyone know for sure ?

Here's another problem. Last month, when talking about the various "signposts" to be seen along the trackside, we described the warning board for water troughs. We have *never* seen water troughs on a model railway, and would like to hear from anyone who has tried it. Obviously they could not be made to actually work in a small scale, but there does not seem to be any reason why non-working ones should be difficult to build, on two-rail layouts at any rate. For those of you who do not know how these troughs worked, the diagram of a locomotive tender, showing the pick-up scoop should make things clear.

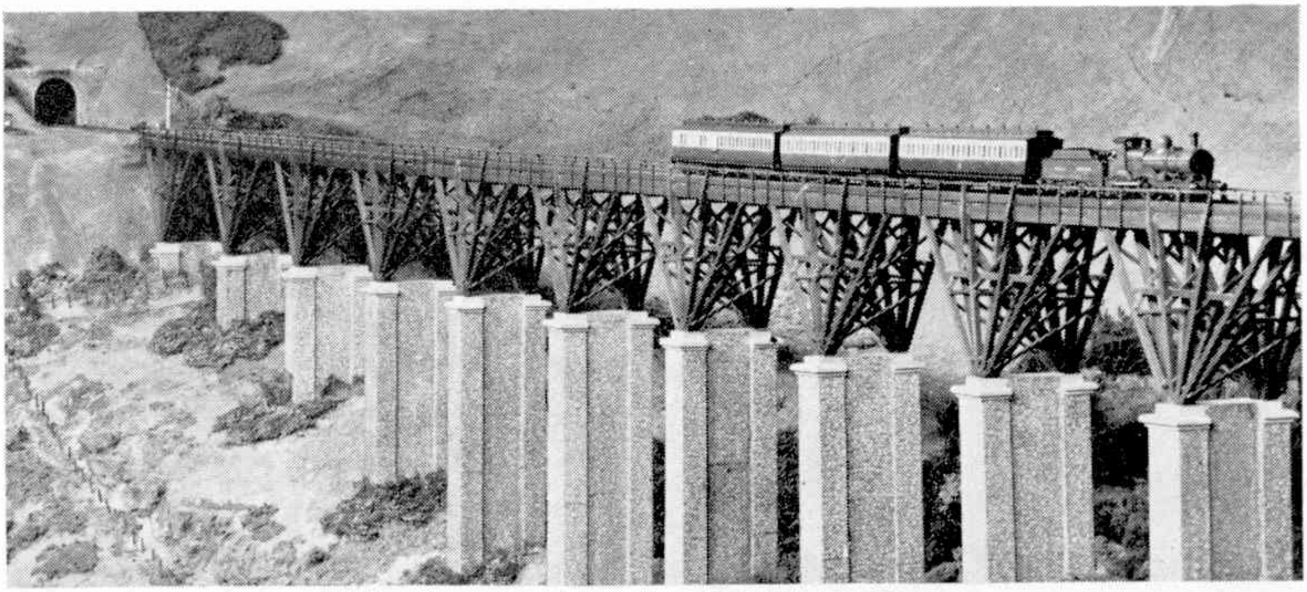
Not all railway "signposts" are entirely for the benefit of the railway crews themselves; some are intended for passengers, like the huge signs which say "LONDON 17 MILES" or "EUSTON 300 YARDS". Then there are the huge train indicators at main line termini like Waterloo and Victoria, with their scores of little enamel nameplates and polished wood surrounds. Such an indicator would make an interesting "static" model, although it would look out of place on anything but a large multi-platform station.

Station nameboards are also of interest. If your layout is "with it" enough to represent present day practice, your nameboards will have to have black letters on a white background. Have you noticed that all modern railway nameboards and notices have the words spelt in "upper and lower case" letters ? That means that both capital and small letters are used, instead of all capitals. Thus the nameboard which used to read HEMEL HEMPSTEAD now says Hemel Hempstead. This is standard modern practice, which can be seen on most official signs on Motorways etc, and there is sound thinking behind the idea. Small or "lower case" letters vary in size and shape more than do capitals, and so words composd of them are easier to read in a hurry—quite important if you want to read the name of a station through which you are passing at eighty miles an hour. Older railway nameboards were always spelt in capitals, and during the Victorian and Edwardian eras some were very ornate indeed, with separate cast iron or wooden letters fixed to a board which was often painted in the passenger livery of the railway concerned.

Other notice boards which are worth looking for are those old "warnings to trespassers". These are usually cast iron, and so have lasted very many years, and a lot of them still have the names of the old pre-grouping companies cast on them, like "South Eastern and Chatham Railway", "London and North Western Railway" etc. etc. Similar warnings, also usually in cast iron, are those to be found guarding the approaches to road bridges and giving details of the maximum weights allowed for vehicles using the bridge. Some of the terms used on these boards sound quite picturesque these days—"Heavy Locomotives", "Light Locomotives" etc. Plenty of these old notices survive to this day—there is probably one near your home.



An operating Gauge "O" turntable by the West Lancashire group. Note the old coach "shed" in the background and the detail on those locomotives.



Believe it or not, this magnificent Brunel timber bridge is a OO scale model! It can be seen at the Pendon Railway Museum at Long Wittenham, Berkshire. The surrounding countryside is typical of the Dartmoor area. Notice how the timber part of the bridge is supported by huge masonry piers; many of these piers are still standing beside newer viaducts on Western Region lines in Devon and Cornwall.

ABC OF MODEL RAILWAYS

BRIDGES

ONE OF the basic facts about a railway which gives it an advantage over other forms of transport is that the railway usually goes from A to B by a route which is not only direct, but relatively free from steep gradients. Such level routes are necessary for trains, which cannot cope with the sort of hills a car or bus can climb. When a road reaches a mountain, it must either make a lengthy detour around the foothills, or go right over the top, zig-zagging up the mountainside in order to lessen the gradient. A conventional railway may also make the detour round the mountain, but it certainly will not go over the top, unless it is one of those magnificent "rack" lines to be found in Switzerland (or, in this country, at Snowdon). If it is a main line, which was designed in the first place for fast running, then in all probability it will strike straight through the mountain by way of a tunnel. When the line reaches a deep valley, it may make another detour in order to cross the "head" of the valley, but it is more than likely it will span the valley with a bridge.

Isambard Kingdom Brunel, who engineered the Great Western Railway and several other lesser lines in the West of England, was a great believer in a fast and level "road" for his trains to run on. As most of you will know, his lines were built to the broad seven foot gauge, which gave his trains a terrific stability at high speeds. Now, Brunel was the engineer of the Cornwall Railway, which was opened in 1859, running westwards into the Duchy from Plymouth. This railway was eventually taken over by the Great Western, and today it forms part of the Western Region's main line to the Cornish resorts. Those of you who know Cornwall will realise that it is a country of hills and valleys, and will be able to appreciate the sort of task that Brunel took on when he was appointed as engineer of the Cornwall Railway. The "road" obviously had to be kept as level as possible, as the line was visualised as a western extension of the mighty Great Western, over which passengers would be able to travel direct from Paddington without changing trains; therefore, the Cornwall Railway was to be no "light railway" but a full blooded main line through difficult country. The first major obstacle to the new railway on its route westward was at Plymouth itself, in the shape of the River Tamar at Saltash. This was bridged by a magnificent iron bridge of unusual design—the Royal Albert Bridge. This still stands to this day, and the ultra-modern Western Region diesel-hydraulic locomotives pass daily under the vast iron tubes which support the bridge decking itself, and under the tall arch of the tower, on which this inscription proudly remains: "I. K. Brunel. Engineer 1859." In next month's issue, we shall be looking at some famous railway bridges in greater detail.

Back to Brunel: once over the Tamar, the Cornwall Railway traversed much very hilly country, and here the great engineer put his famous timber viaducts to good use. The photograph shows a magnificent OO scale model of one of these, which can be seen at the Pendon Museum, at Long Wittenham, Abingdon, Berkshire. Actually, the prototype for this particular model was in the Dartmoor area of Devon, but the Cornish ones were built to the same general design. The supporting piers were built of stone, but the rest of the structure was entirely of timber. Some of these viaducts lasted into the 'thirties, and to this day many original masonry piers still stand beside new viaducts as a reminder of the pioneering days of railways in the West Country.