Gauges

Model locomotives come in all sizes; let's take a look at the most popular

There is no doubt that modelling locomotives is the side of the hobby that creates the greatest interest. Making models of railway engines has been going on ever since the first full-size locomotives were themselves produced. Some of the old models were very fine indeed, others were, to say the least, somewhat crude. Over the years the interest in modelling locomotives has steadily increased, although there has been quite a change in the sizes of the models being built. Gauges have, in particular, been the main subject of change and the old 2 in. gauge, for example, is virtually extinct.

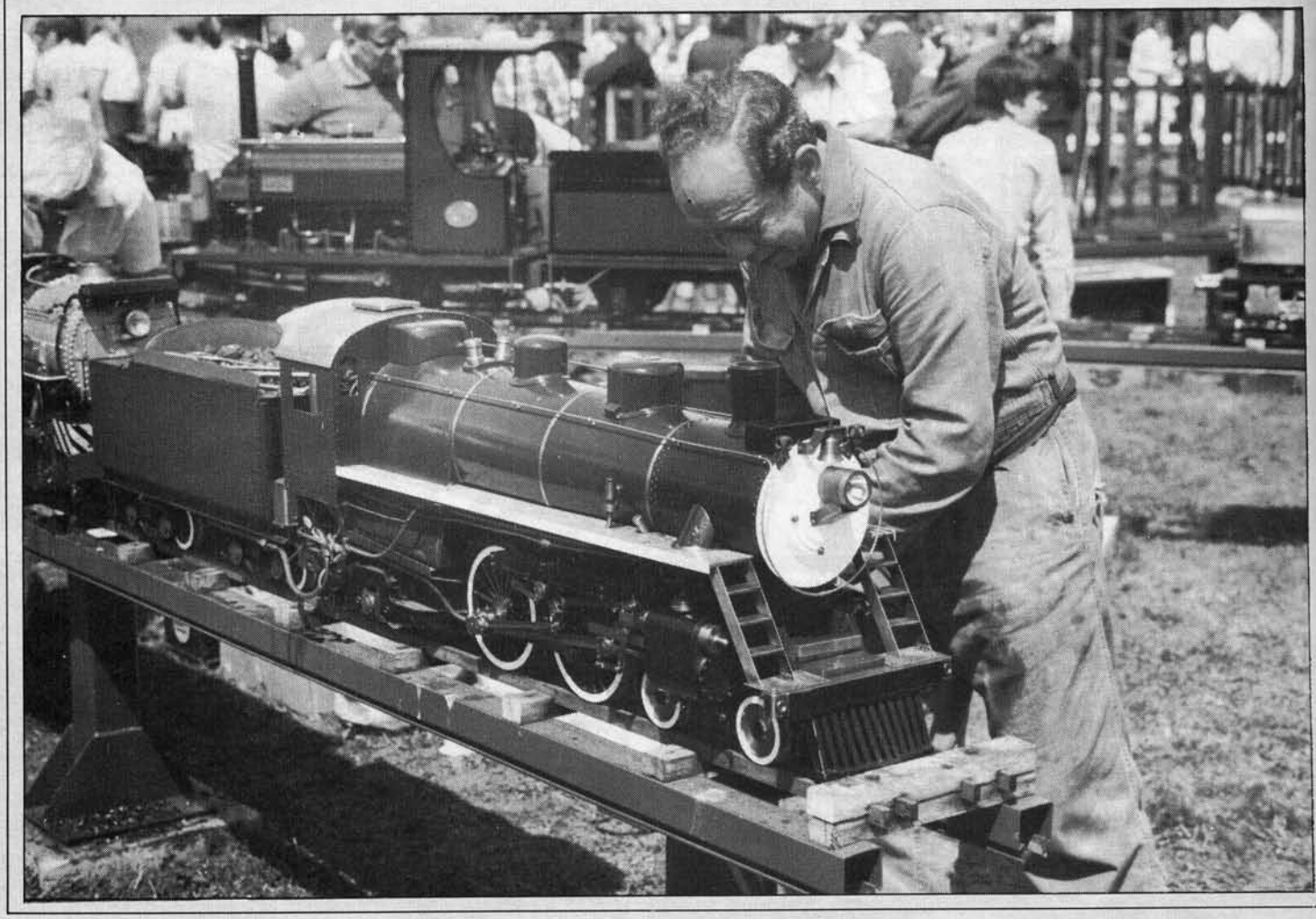
Let us first of all look at gauges — to which, of course, is related scale — and see what can be done. The first question to ask oneself is, where does railway modelling end and 'model engineering' begin? I think the answer to that must be that there is no clear dividing line! I think that we could safely say that, if the major proportion of the locomotive is fabricated, including the prime mover, then it is model engineering. I have heard of steam locomotives built in "N" gauge which is 9mm between the rails. However the smallest at which steam really becomes practical is 'HO' gauge and, whilst this is usually the gauge used for electrically driven models, there are those who build steam locomotives in that size, particularly on the continent.

The next frequently seen gauge for steam locomotive construction is "O" and here we start to see fine model engineering at its very best in locomotives of true scale proportions, some of which are even coal-fired. From here we move up to "Gauge One" which is a veritable bastion of steam locomotives and in which we see some particularly fine models. The Gauge One Association has even produced a simple basic design which can be built by the novice. The advantage of both these two gauges is the fact that one does not need a massive workshop and lots of equipment to build the locomotives and, when completed, they can be kept on the mantlepiece for all to admire, or run in a comparatively small garden for the pleasure of seeing them operate. A more recent development in both these gauges has been the radio control of such models.

As we come to "2½ in." gauge then we start to approach the sort of locomotives that can be used to haul passengers. Even quite a small locomotive in this scale will haul at least the driver and probably a couple of adults as well. Whilst not as popular as it used to be, the gauge still has plenty of devotees. Many years ago it was one of the most popular, one reason for this being that there were few club tracks available for the running, and a small track could be built in the garden. If one did want to take the locomotive to someone else's track then a trailer on a cycle would be a good means of transporting it. Remember, very few people had cars in those days when petrol was less than 1/- or 5 pence a gallon!

The gauge again allows for locomotive construction with a minimum of equipment and models are easy to store. Also, of course, the smaller the locomotive then the less it costs to build.

"3½ in." gauge has always been highly popular and still is. The locomotives can haul quite a heavy load and are ideal for passenger-hauling whilst again having the advantage of being not as expensive

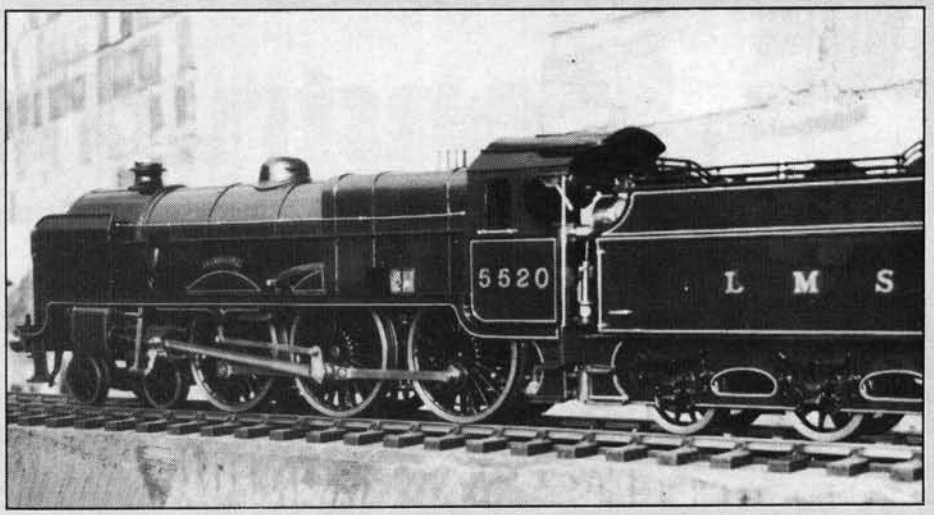


as those in the larger gauges and needing lighter equipment for construction. There are very many fine designs available in the gauge.

Whether or not " 5 in." gauge has overtaken "3½ in." in popularity is open to question. Certainly the locomotives can haul very heavy loads and it has been known for some large models to haul as many as eighty people. The gauge is quite practical for the home modeller with a large number of designs available. Quite a modest sized lathe plus hand tools are all that is really required.

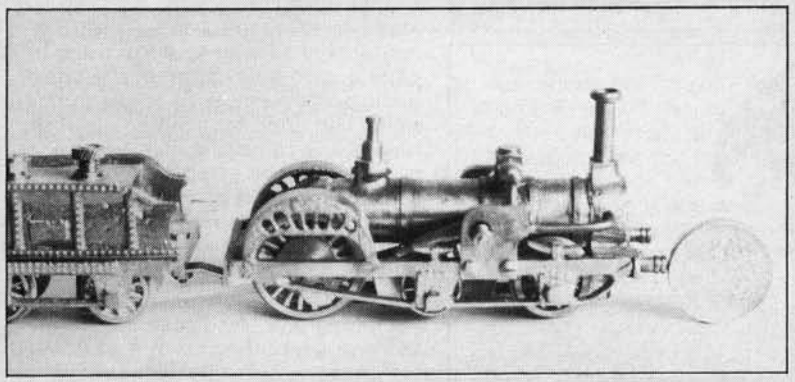
"7¼ in." is now very popular but still probably somewhat heavier than most people want to cope with. There is naturally a tendency to model small prototypes. The gauge is very practical for passenger hauling on ground level tracks and the smaller locomotives can be constructed with fairly modest equipment. Providing the models do not have to be stored in the loft when not in use, the construction of a locomotive in the gauge is a most interesting prospect. In the United States of America the gauge of "7½ in." is used in preference to "7¼ in."

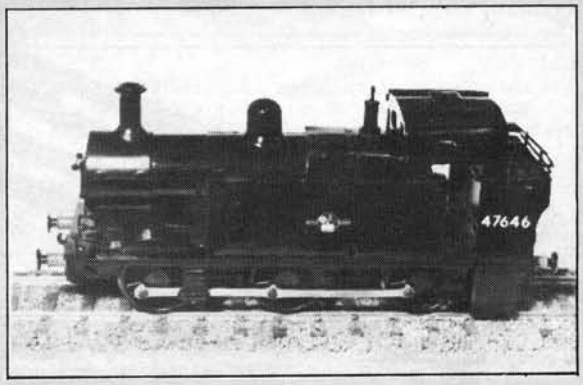
Nowadays there is little if any interest in gauges such as "9½ in." but still some in "10¼ in." We are almost getting to the stage of light engineering but, providing one has a reasonable-sized workshop, it is possible to build such models. Running them is a problem unless one owns a very large tract of land or has access to a track.



This superb model of a Patriot class locomotive is built to the popular Gauge One scale; ideal if yours is a small workshop.

Before leaving the question of gauges, narrow gauge prototype models should receive a mention. As gauge refers to the distance between the two rails, it follows that a model of a locomotive where the original runs on two-foot tracks will work out considerably larger than a model of one which runs on 4 ft. 8½ in. gauge rails. Narrow gauge modelling has become very popular and those constructing models find they have quite a range of published designs to select from. A narrow gauge locomotive built for "7¼ in." gauge track will sometimes be big enough for the driver to sit either on the tender or even, as has been known, inside the locomotive! This is probably why such models are becoming popular as they give a feeling of virtually driving a full-sized locomotive. ■





Live steam locomotive models in a smaller gauge than "O" do exist (indeed, there have been examples of steam models in diminutive "N" gauge!) but this little single cylinder tank loco above right in "O" gauge is probably as small as it's sensible to go . . . Above left, and just to prove that it can be done, how about this tiny steam powered locomotive by Frenchman Francois Laluque of Villare which is to "HO" scale. The £1 coin gives an idea of the size! Meanwhile, at the other end of the scale, here's a North American Atlantic locomotive in 5 inch gauge (opposite). Like most things US, American locos are bigger than their British counterparts and make impressive models.

Construction

Are they difficult to make? Here's some advice for beginners bitten by the steam bug

If one intends to construct a model steam locomotive and has no experience of engineering or locomotives then it is as well to read some of the serialised articles published in the modelling press. Better still, purchase one of the excellent books on the subject that are available. Joining an evening class where specialist instruction can be given is also well worthwhile. However, a few words on the subject will not go amiss I am sure.

Where to start is one problem. There are many locomotive frames that have been started and the locomotive never finished, either because the constructor tired of the project or because he or she later lacked the confidence to continue. It may be as well than to start on either the most difficult part if possible or a rather mundane task. I would therefore suggest that you start either with the boiler or the tender if a tender locomotive is being constructed. Making a tender will certainly help the builder to achieve the skill to build the locomotive and if the locomotive is built first the tender can become a chore.

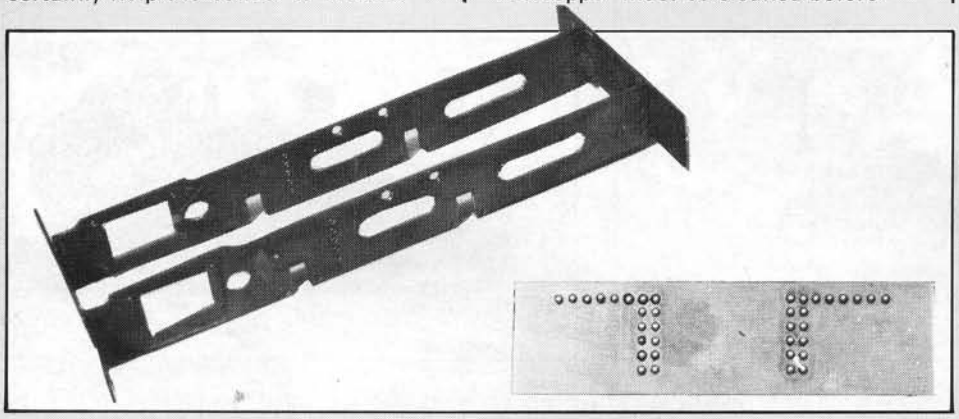
Boiler-making is a subject that people tend to be frightened of. There are many professional boiler-makers now who will make the boiler for you if that is your wish. Making the boiler is not quite as daunting as it seems and I would again recommend reading up on the subject before-hand. One thing you should not do is take advice from someone who has not made a boiler themselves. I have heard advice given by qualified engineers who knew welding and brazing backwards. It did not work on a model boiler. The sheer mass of copper involved takes the heat away so quickly that normal methods do not work. The secret of boiler-making at home is to conserve the heat that you apply. If you can do this successfully, boiler-making is not difficult. If it is not done, then disaster is just round the corner.

The other necessity is cleanliness. The copper must be cleaned before and after each operation. This is done by soaking in some form of solution, usually sulphuric acid. This can be nasty stuff to have around and a useful alternative is ordinary household vinegar. It takes longer than the acid to do the work, but is safe to handle and cheap and easy to buy.

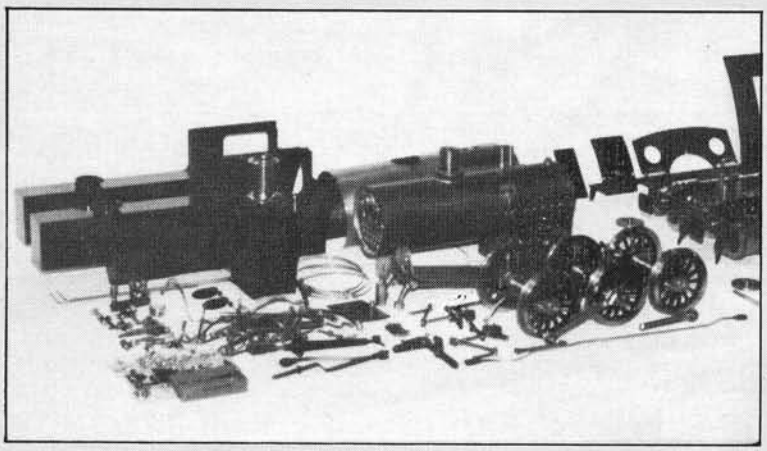
The locomotive frames on British locomotive types are usually made from steel plate. These are easily marked out and cut to shape. One frame should be marked out first of all. The two should then be joined together and cutting and drilling carried out on both at once. These days, frames can be held together for machining with cyanoacrylate adhesive rather than the old idea of riveting them. If you are lucky enough to possess a good milling machine, then it is quite possible to machine the frames without the need for marking out by using the graduations on the machine.

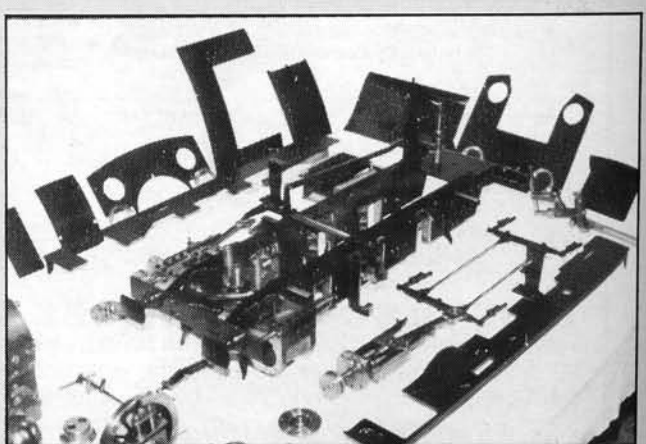
Axle boxes need to be accurately made to allow the axle to run truly. It is probably as well to make them in pairs and to bore them on the lathe using some form of jig to get things right. The important thing is that the hole is the same distance exactly from one edge of the axlebox. Whilst it is desirable to get it central, this is not so important as ensuring that both boxes in the pair are bored in line with each other.

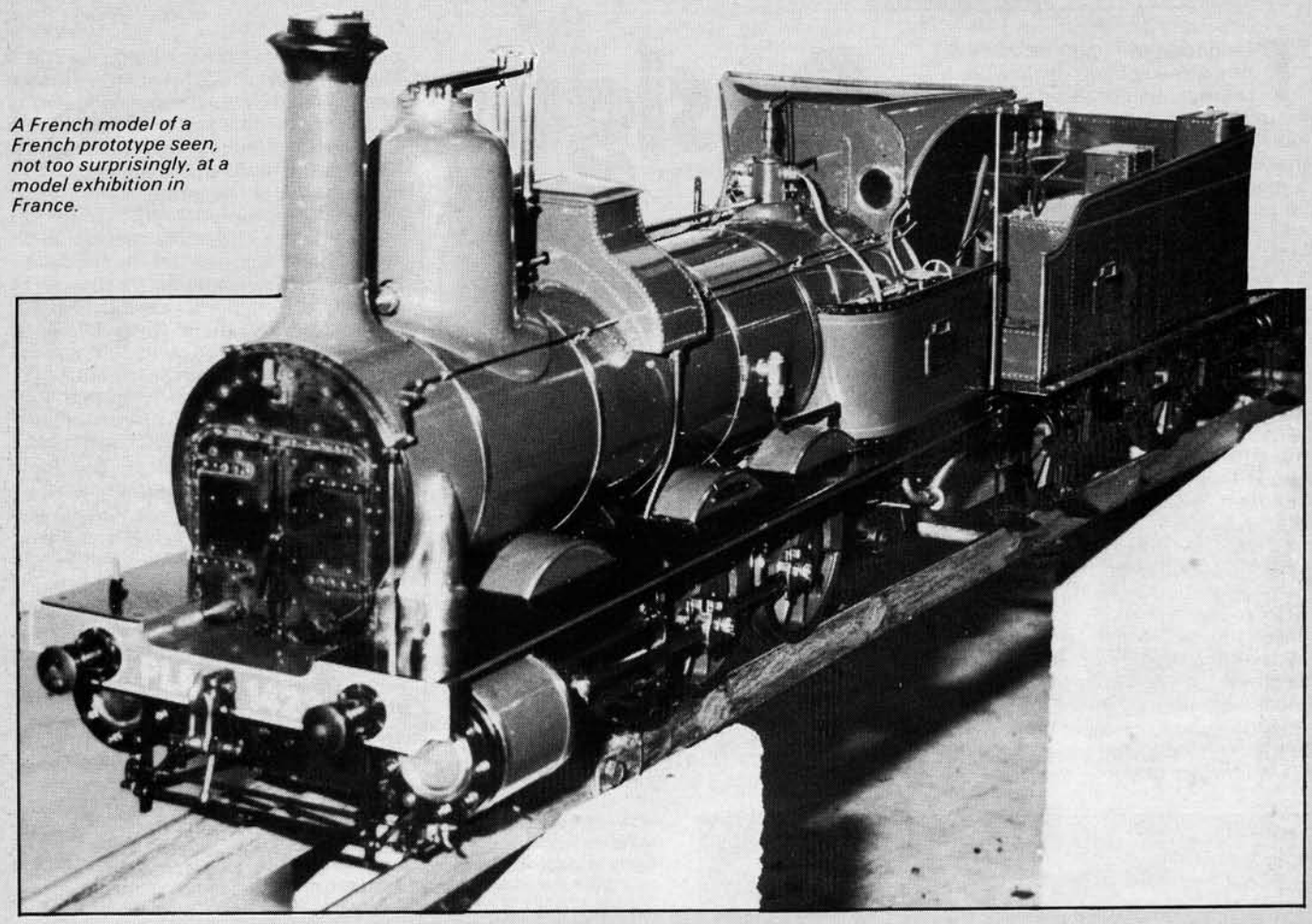
There are various ways of machining wheels. These days I would suggest the use of a tool that has a replaceable tip; these are particularly good when machining cast iron since, if they get blunt, they can be replaced without altering the tool setting. This is important when working to a graduation on the lathe



Above, the frames and buffer beam of a model Hunslet locomotive built by the author. The frames represent a cutting and filing exercise of no great complexity while the buffer beam involves a spot of simple drilling and riveting.







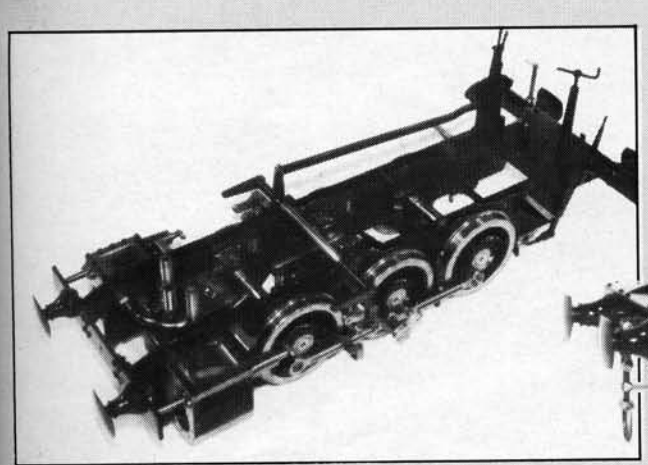
A French model of a French prototype seen, not too surprisingly, at a model exhibition in France.

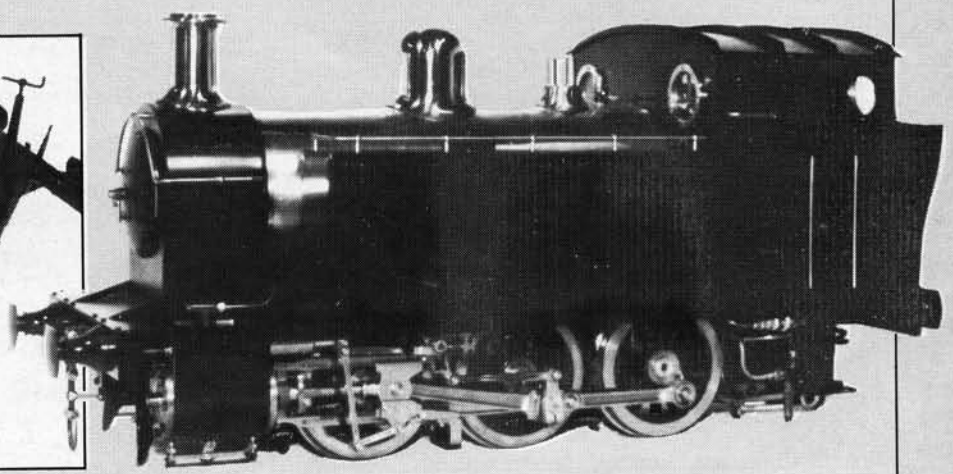
— if the tool has to be taken out for sharpening then getting it back to the same position is almost impossible, particularly as it is no longer the same size as when it started!

I also prefer, where possible, to use some sort of jig for machining the cylinders so that they can be machined exactly the same. Again, at least as far as the bore is concerned, a replaceable tip tool is worth investing in so that each bore can be identically machined using the markings on the cross-slide. Cylinders can be obtained in cast iron or bronze and it is a matter of personal choice which is used. Iron cylinders can and do rust if one is not careful and when operations are finished for the day some Ensis oil should be introduced to the cylinders. The oil separates the moisture from the metal, will prevent any rusting and can be dropped down the blast pipe if one wishes. A better alternative is to fit small plugs in the cylinders themselves into which the oil can be introduced.

Platework is usually made up by joining square corners over angle. Traditionally it has been made of brass, but there is a lot to be said for the idea of making it of steel and rustproofing any surfaces that will receive water, such as tanks, etc. Steel will take paint much better than brass and is a great deal stronger. ■

The sequence of photographs below and at the foot of the opposite page give a good indication of the volume of work involved in the construction of even a simple model locomotive. The model here is "Butch," a popular design from the drawing board of the late Charles Kennion whose firm currently markets the plans and castings for the loco. "Butch" is a 5 inch gauge model so the size of the individual components is relatively large, an advantage where the novice is concerned. And, after all that effort, the finished loco below really does represent a piece of personal craftsmanship of which to be truly proud. **Photos: Kennion Brothers.**





Designs

Right, you've decided to take the plunge! Which design will you choose?

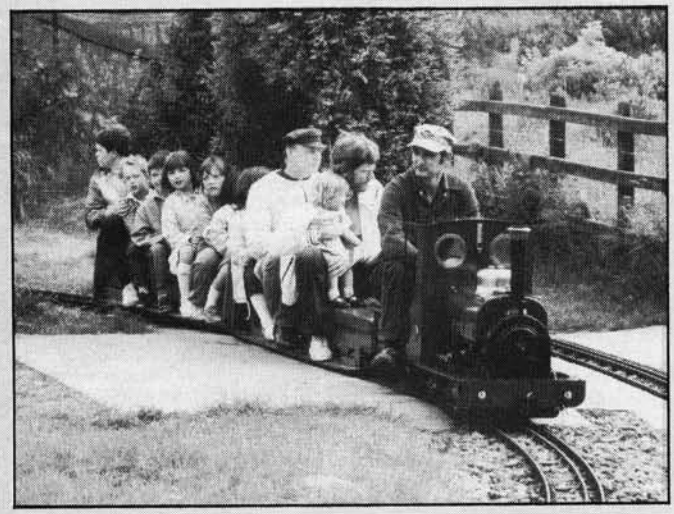
The gauge of model locomotives has already been dealt with, but the question of design is another matter. There are numerous designs available in most gauges and what to make is a matter of choice. Certainly, a model should be picked that it will be possible to build with one's own equipment and, if possible, without stretching things to the limit if you are a novice. Also if you are a novice then it is as well to start with something fairly simple.

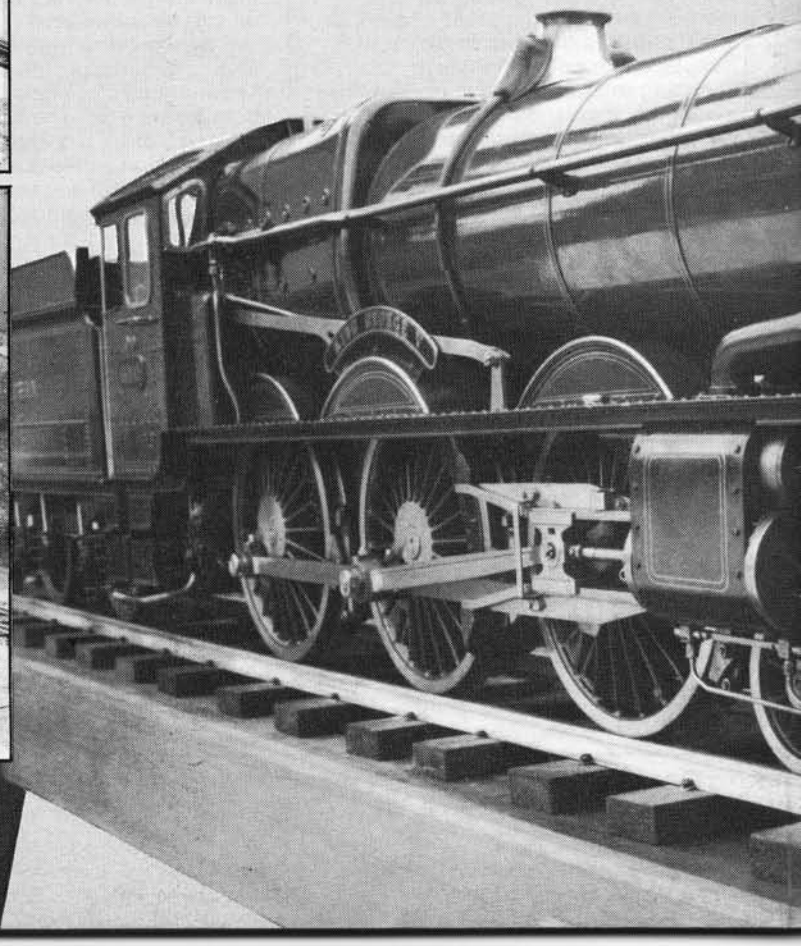
A tank engine is a good bet, since making tenders can be almost as time-consuming as making the locomotive; the tank engine therefore is quicker. Several designs spring to mind for the beginner. In 3½ in. gauge I would suggest, a choice between "William" or "Rob Roy" by Martin Evans and "Juliet" by LBSC or "George" by Don Young or any other small locomotive on these lines. For 5 in. gauge there is "Simplex" by Martin Evans, a real good workhorse when finished which had been made by the thousand. From Blackgates Engineering we have a narrow gauge model known as "Sweet Pea" and this too is a very simple engine. Drawings and castings are available for it in other gauges.

Once one has gained a little expertise or, indeed, if one already has some knowledge of engineering, then the world is your oyster. There are so many designs published that it would not be possible to discuss them all. They do however, vary in complexity and it is as well, if possible, to have a look at either a finished model or the general arrangement drawing before making a start just to make absolutely sure that it is a model you feel competent to tackle. Do not expect to finish it in a couple of weeks. Many model locomotives take years to make. The best idea is to treat each component as a separate project. But do make sure that each component will fit its neighbour — a lot of models have been spoiled by builders making parts as separate items and then finding that they do not all fit together! Fit as you go along is the name of the game. is the name of the game.

Apart from the published designs, descriptions of the construction of which have appeared in the model press over the years, many suppliers have their own particular designs that are exclusive to them. It is well worth a careful study of advertisements to see if there is anything that suits you. Such a design that easily springs to mind is the Kennion Brothers' "Butch", and there are several others quite exclusive to the firm. "Butch" is a well-proven tank engine design. Norman Spinks has a British Railways 2-10-0 and a Great Western "King", as well as a Britannia Pacific, all magnificently detailed models in 5 in. gauge. Reeves have several individual items, a particularly pretty little locomotive being "Asia" in 5 in. gauge, but they have several models in 7¼ in. as well, which are only available from them.

Brunel Models have a couple of unusual items including a Cowens Goods locomotive which makes an

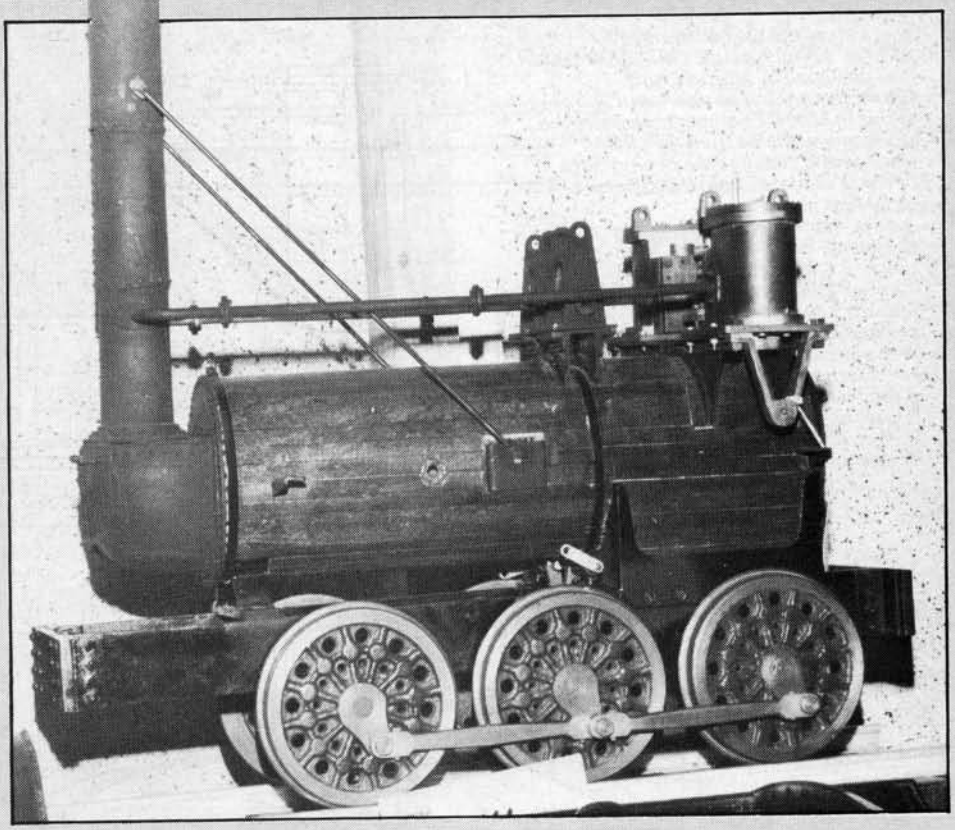




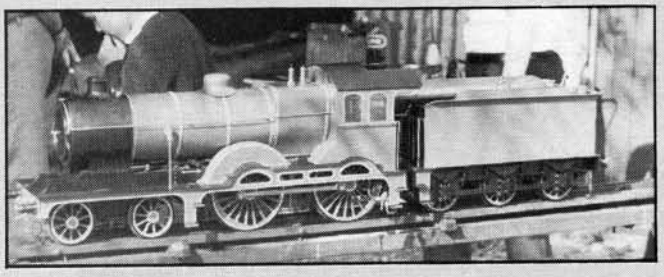
A narrow gauge prototype (left) is a good choice; easily built in the home workshop, this one is running on 7¼ gauge track and is almost big enough for the driver to sit on! Below left, George Wainwright astride the 5 inch gauge LMS Crab model he designed himself . . . now where are those blessed matches? Below, this very high standard GWR King class loco in 5 inch gauge was built from castings and drawings available from Norman Spink. Heading opposite, models can also serve to preserve history; this part-completed model of a typical locomotive from the early 1800s is a good example. You *may wish to build such a model – there are plenty of plans around.*

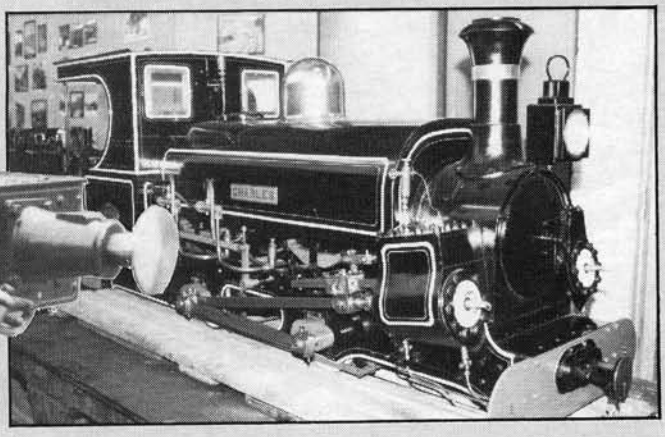
attractive model. Camden Miniature Steam Services are entirely individual with such things as the Shay, Heisler and Climax being most unusual models. Blackgates, apart from "Sweet Pea", have a new narrow gauge model coming out soon based on the Welsh Narrow Gauge engine "Linda". For the Great Western enthusiast J. Rich supplies drawings and castings for a couple of very high standard models. Another individual not be be forgotten is Ken Swan who produces usually narrow gauge locomotive types for 7¼ in. gauge track. Amongst the range is a rack locomotive for anyone with a steep garden!

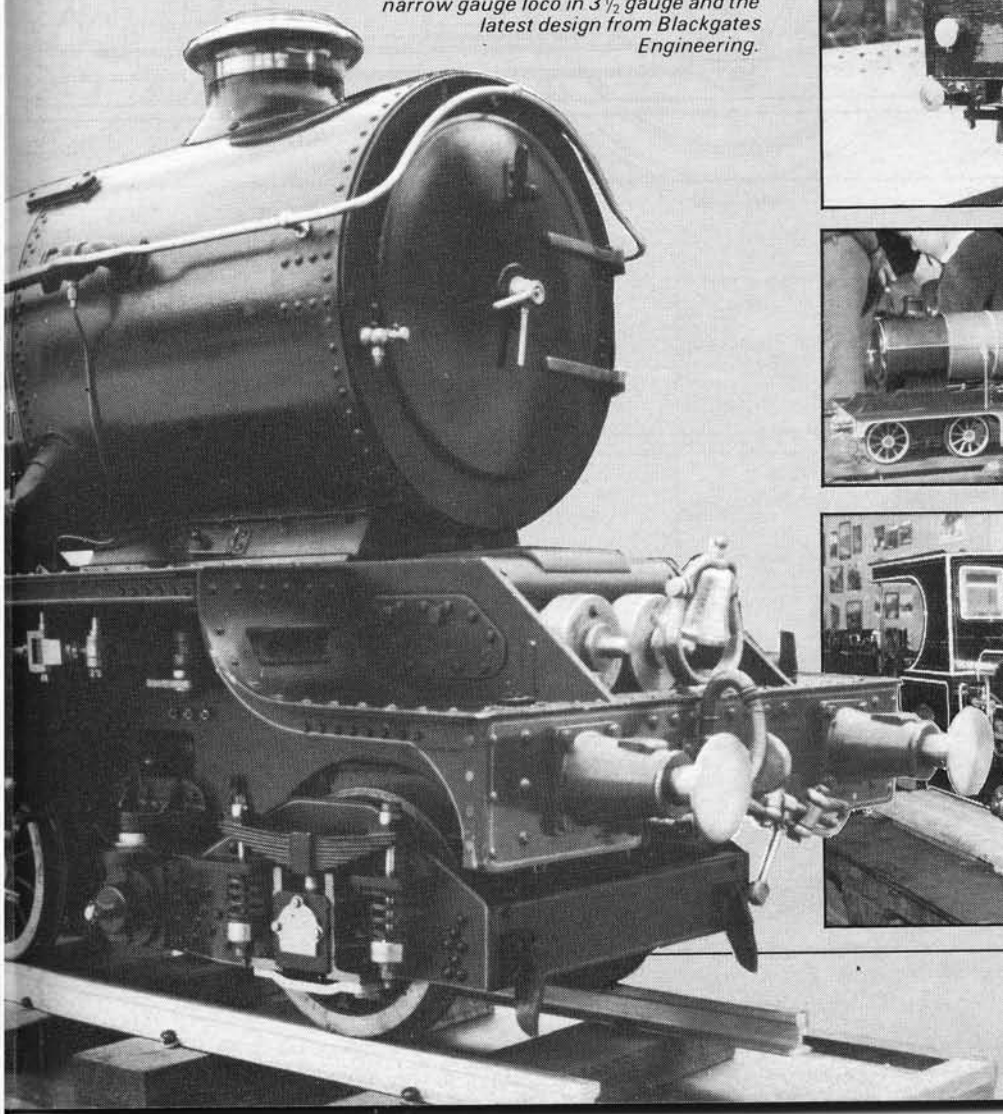
As you can see, it would not be possible to detail all the models available in a "Special" such as this; the trade directory at the back will help, but it is advisable to contact the suppliers direct. Basically I can say that the published designs which are stocked by most suppliers are good running locomotives with few frills, apart from a couple of well detailed exceptions. The specials supplied by particular firms are usually highly detailed, though not necessarily all that complicated to make. ■



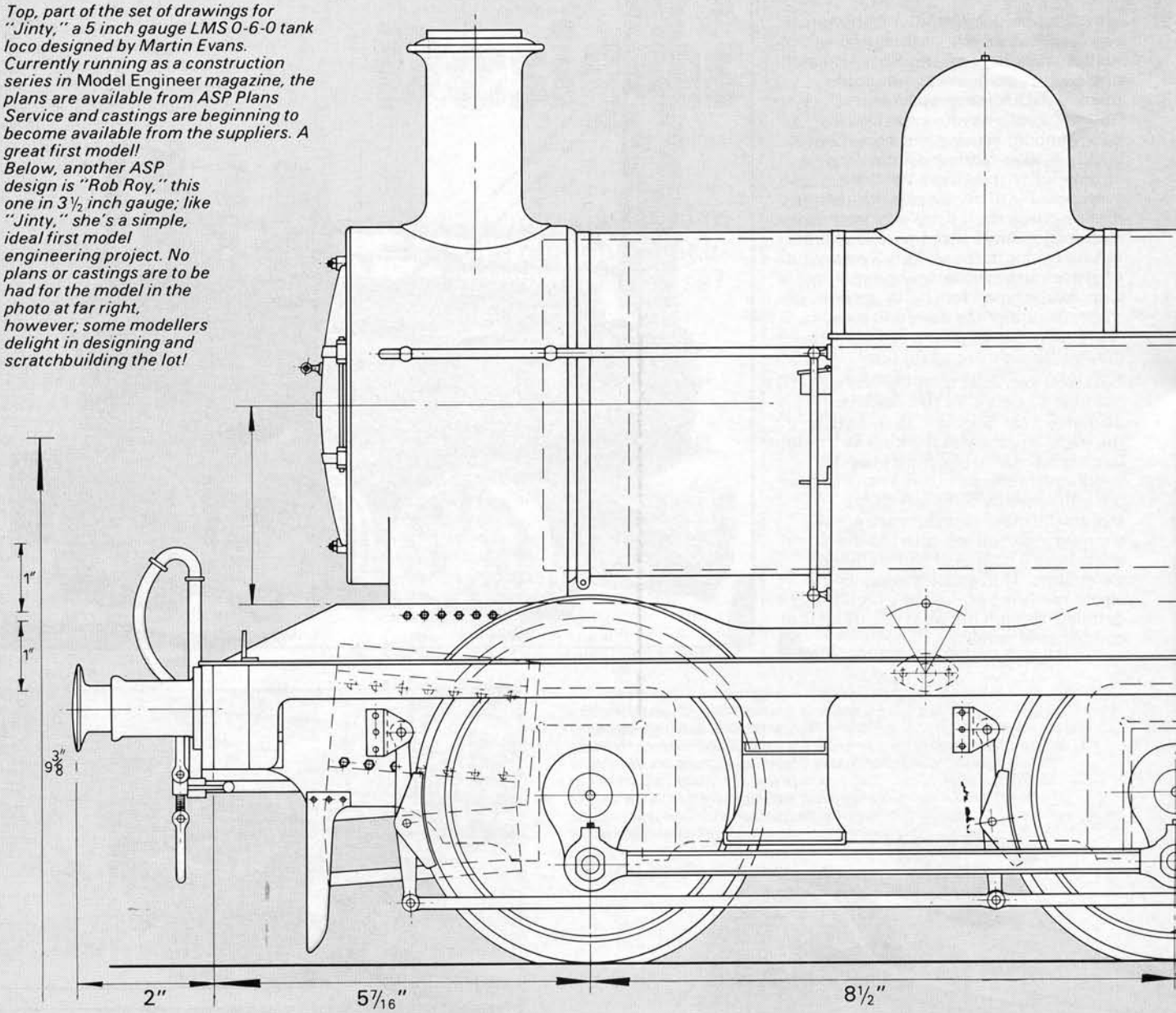
This useful electric loco (right) could be another choice; it's not too difficult to build. Below centre, castings for this 5 inch gauge Great Eastern Railway "Super Claud" design by Martin Evans are available from a number of suppliers. At bottom, meet "Charles," a narrow gauge loco in 3½ gauge and the latest design from Blackgates Engineering.

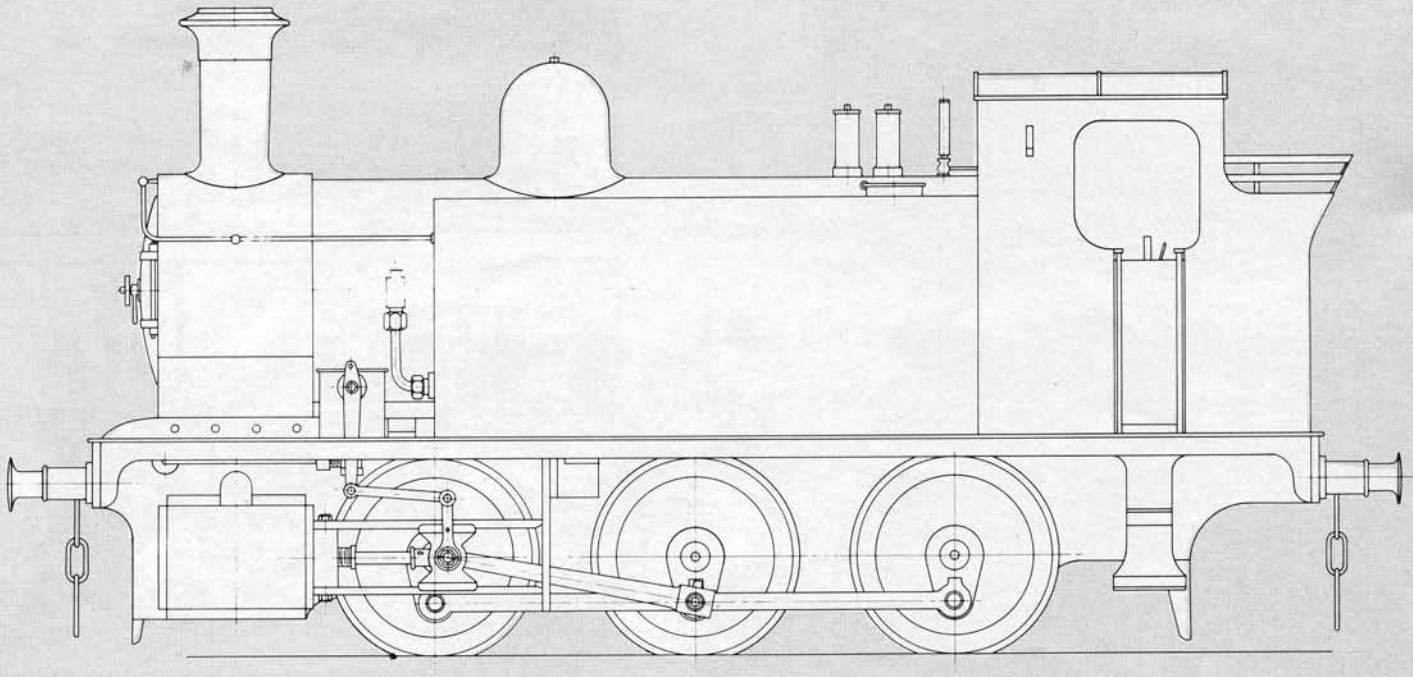


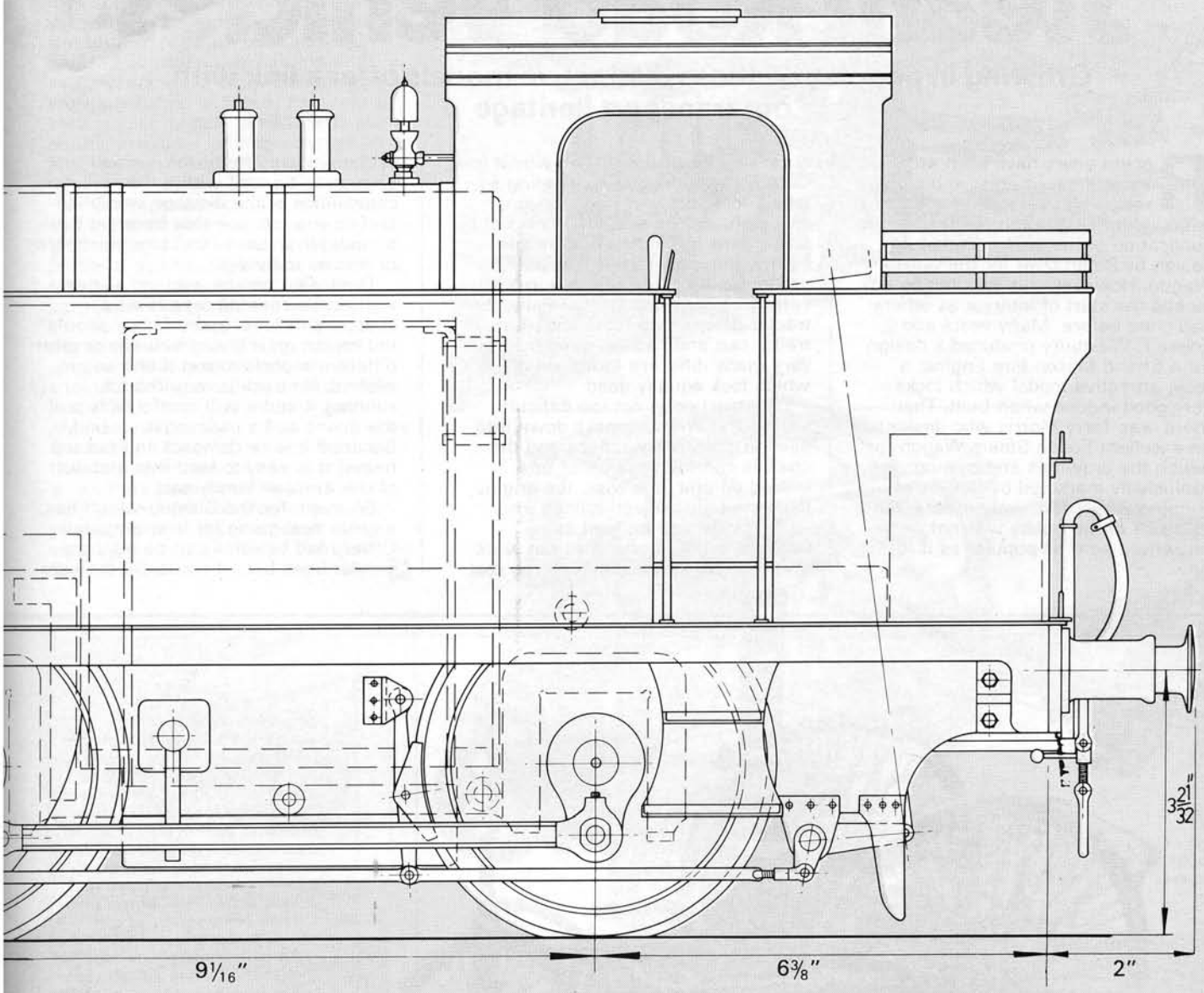




Top, part of the set of drawings for "Jinty," a 5 inch gauge LMS 0-6-0 tank loco designed by Martin Evans. Currently running as a construction series in Model Engineer *magazine, the plans are available from ASP Plans Service and castings are beginning to become available from the suppliers. A great first model!*
Below, another ASP design is "Rob Roy," this one in 3½ inch gauge; like "Jinty," she's a simple, ideal first model engineering project. No plans or castings are to be had for the model in the photo at far right, however; some modellers delight in designing and scratchbuilding the lot!



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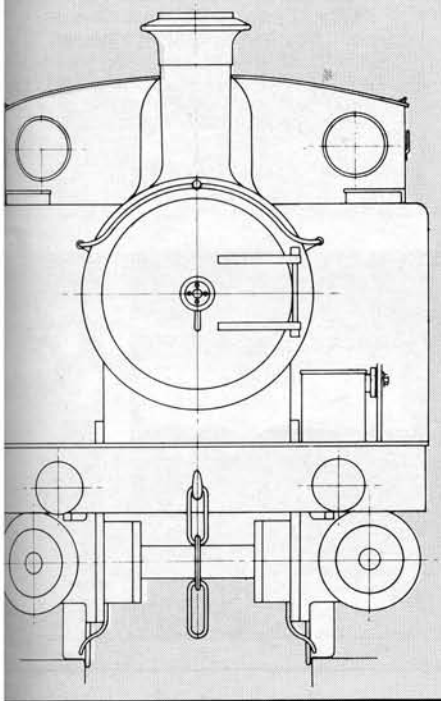
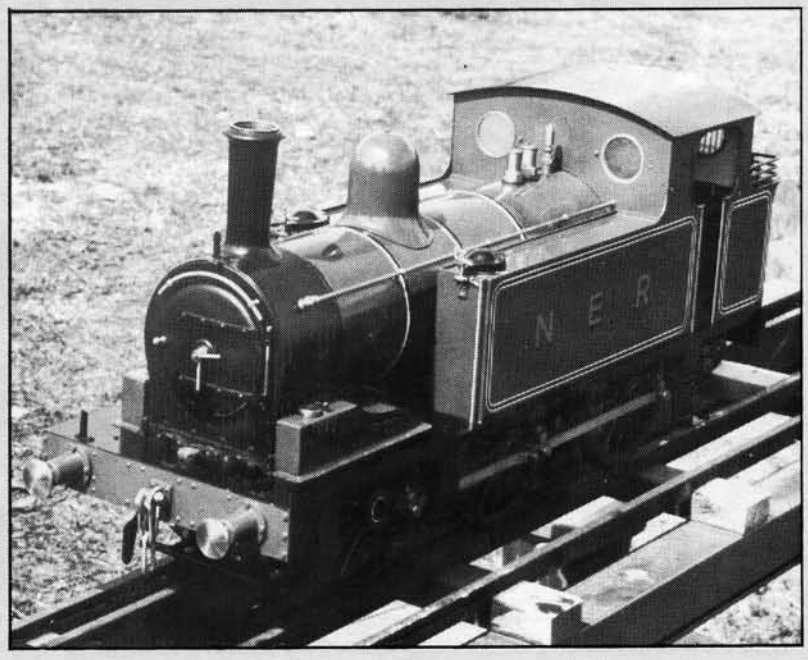



N E R

Steam Road Vehicles

Growing in popularity, these distinctive models offer a link with our transport heritage

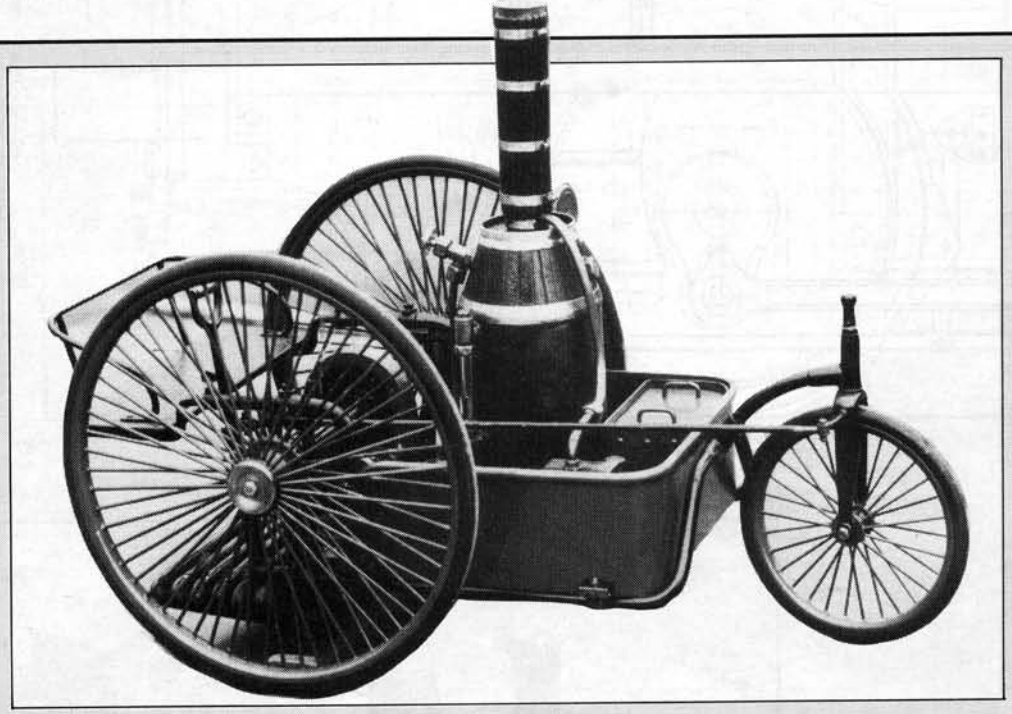
Recent years have seen an increase in interest in building model steam road vehicles, to a large extent as a result of the publication of the very successful design by Robin Dyer for the Clayton Wagon. However, this was not by any means the start of interest as others had gone before. Many years ago Edgar T. Westbury produced a design for a Shand Mason Fire Engine, a most attractive model which looks very good indeed when built. Then there was Terry Morris who designed an excellent Foden Steam Wagon for which the drawings and castings are exclusively marketed by Reeves of Birmingham. There were others, but this side of the hobby was not anywhere near as popular as it is now.

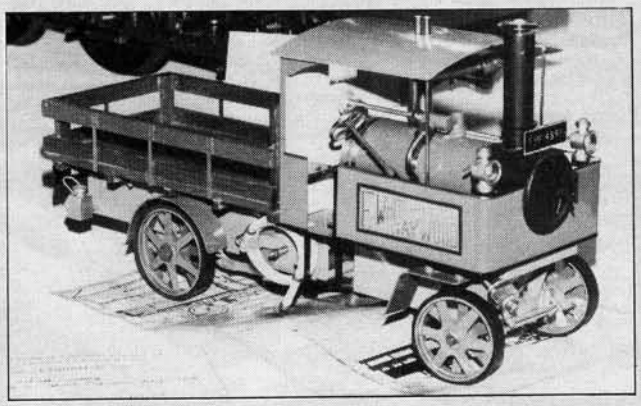
Let us look at the reason why it has become so popular and, in doing so, take a look at the Clayton design, although, as I have said, this is not by any means the only one available. Firstly, the model itself is highly authentic. It can be finished in a variety of ways; whilst, basically, the tractor part will be the same, the trailer can and has been finished in very many different forms, all of which look equally good.

Construction is not too difficult either. The wagon breaks down into easy-to-construct sections and the chassis can be made up as one individual unit. Likewise, the engine makes a little project in itself and, when made, can be kept as an individual item if one does not want immediately to proceed with the rest of the wagon. The boiler is small enough to be well within the capabilities of the average workshop and so you can see that here we have a model that can be put together more or less as individual units.

The trailer can be adapted as one wishes; there is no reason why several different types of body should not be put on it giving virtually several different models to run if one so wishes. No track is required for running it and it will comfortably pull the driver and a passenger around. Because it is so compact and not too heavy, it is easy to load into and out of the average family car.

So much for the Clayton which has a great deal going for it as a model. Other road vehicles can be built on similar lines but, of course, if they are

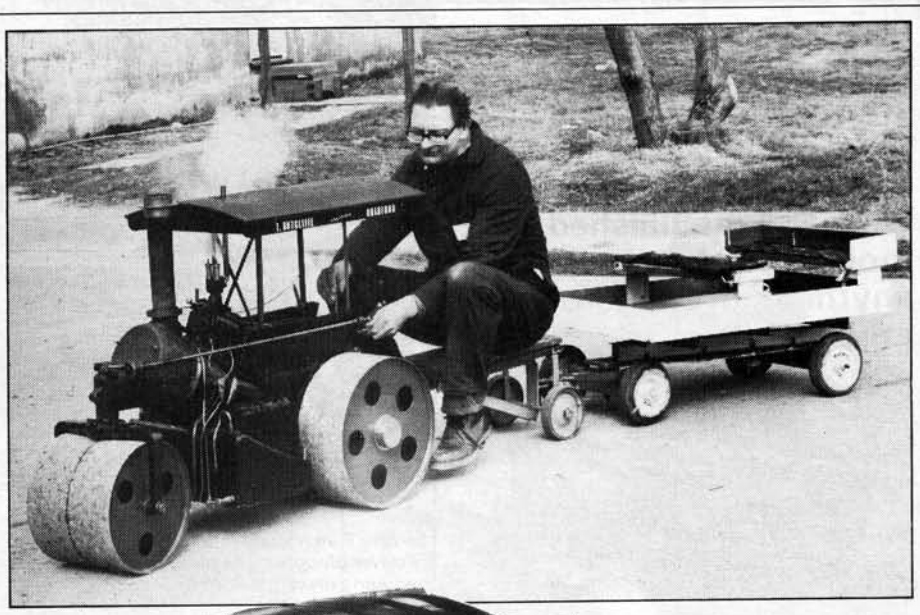


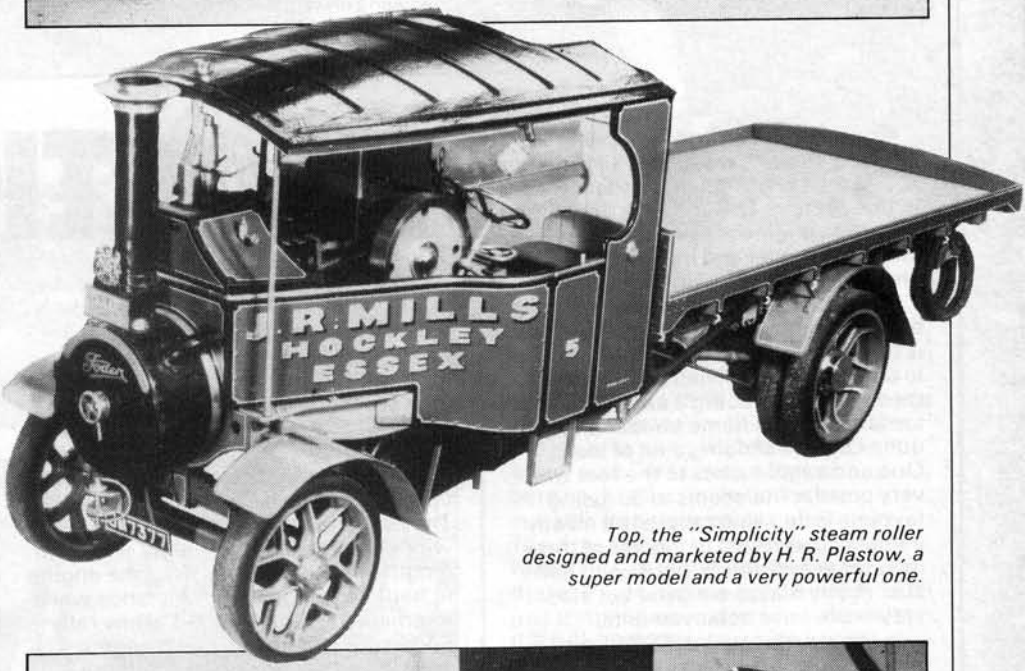


Left, something out of the ordinary, a fully working steam tricycle model in 1 inch scale by Les Harling. Below left, a fine model steam lorry built to a Model Engineer *magazine design published back in the early 1900s. Below centre, a Clayton Undertype wagon finished as a rigid box van. Below right, a variation on the same theme in the form of another Clayton Undertype, this one towing a tanker trailer. Above right, modeller John Haining's 2 inch scale Aveling & Porter steam roller, one of numerous attractive designs by this enthusiast. Centre right, another somewhat unusual choice of subject for a model road vehicle; this is a Suffolk dredging tractor (another John Haining design) built by Huw Jones.*

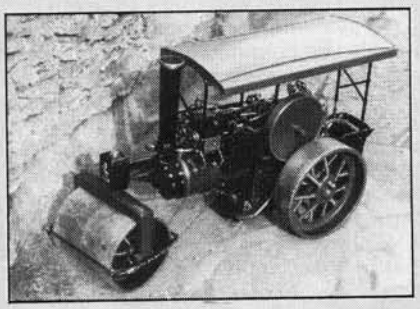
built to a larger scale then they are less portable. It is a case of you pays your money and takes your choice. Not all model steam road vehicles need to be passenger hauling and some years ago a couple of designs were published in *Model Engineer* of very simple models. Small types such as this are ideal for radio control work and, again, make attractive models to admire.

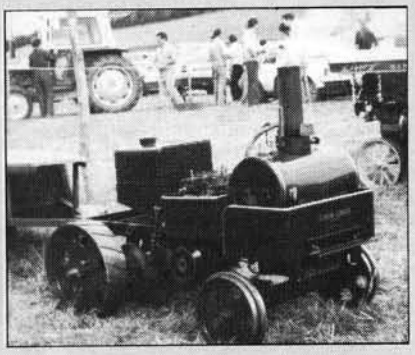
Finishing steam road vehicles is open to wide interpretation. Many modellers have invented their own personalised haulage firms and finished the vehicles to their own particular design. Others have contacted local haulage firms who in the past owned such wagons and obtained details of how the finish should be. The result is an authentic model of a lorry that actually ran, probably on the very roads where they are living. I know of several firms who have borrowed models for display when they have been finished in this way, and who also have large colour photographs of them on their office walls. True recognition of the ability of the modeller! ■

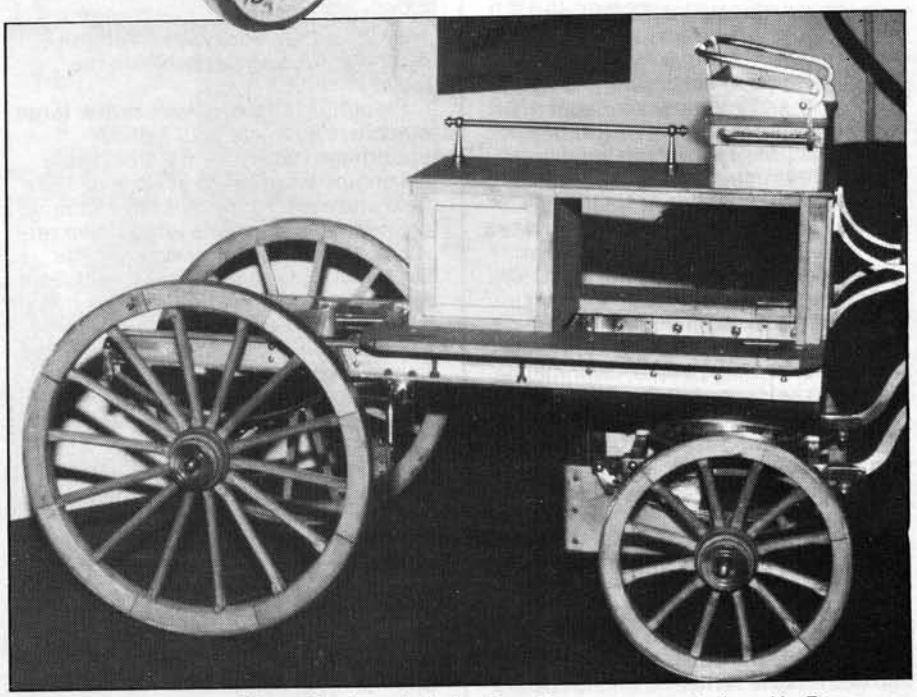




Top, the "Simplicity" steam roller designed and marketed by H. R. Plastow, a super model and a very powerful one.

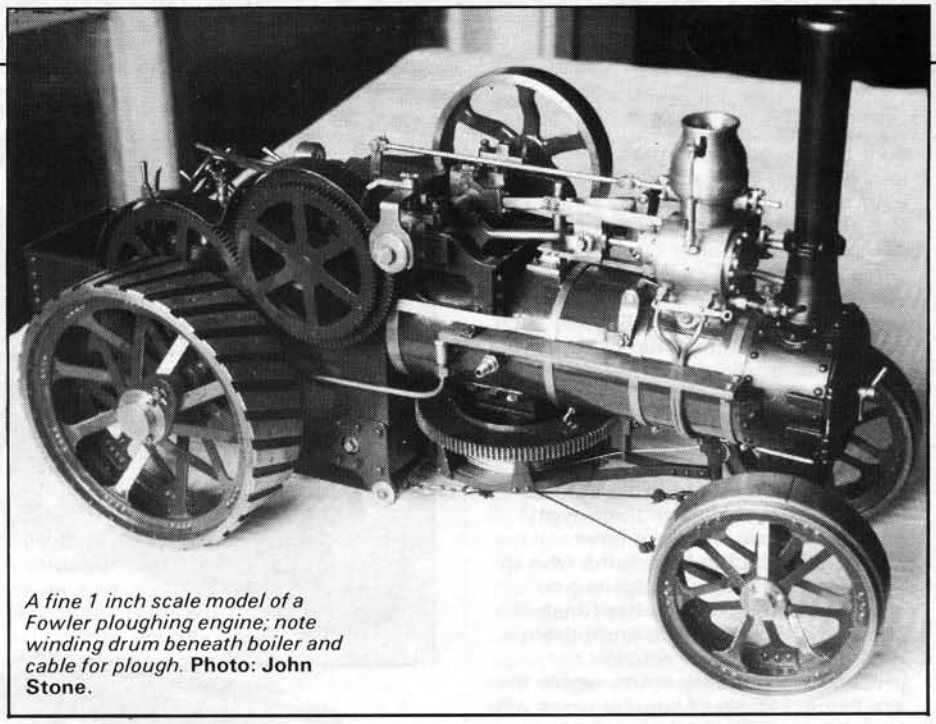






Above centre, a magnificent 3 inch scale Foden Type C steam wagon designed by Terry Morris; the drawings and castings are available from A. J. Reeves & Co. Above, a Shand Mason fire engine under construction by Michael Woolgar of South Africa.

Like model locomotives, traction engines attract an enormous following; the choice of scales and types to build is equally wide and the finished models can be, if anything, even more impressive . . .



A fine 1 inch scale model of a Fowler ploughing engine; note winding drum beneath boiler and cable for plough. **Photo: John Stone.**

TRACTION ENGI

Although entitled "Traction Engines", we should also include the construction of steam rollers in this section. There is little doubt that a traction engine makes a very attractive model and invariably will create a great deal of interest.

As in the case of locomotives, one has to decide to which scale the model is to be made. Most are probably made to a scale of two inches to the foot these days, this being a size that is not too large for the home builder and yet is quite capable of doing a lot of work. One and a half inches to the foot was very popular but seems to be losing favour a little, whilst there is a steady increase in interest in models of three inch scale and above, right up to half size. Pretty massive maybe but also very impressive achievements.

In the smaller scales ASP Plans Service produce a plan for a very small model called "Modular" which is designed to be made in sections which bolt together. Probably the model that has been built more than any other, though, is "Minnie" by the late Len Mason. "Minnie" is not a model of any particular engine but is a freelance design, although unless someone has a very detailed knowledge of traction engine design this would not be known by looking at one.

Whilst it makes up into quite a small model it is fully working but not really capable of hauling people. "Minnie" is always to be seen at exhibitions and many of the models have been altered to represent various types of traction engines including showman's engines. Drawings and castings are also available to make "Minnie" as a steam roller.

Let us, first of all, look at what traction engines were like in full-size and relate this to models. The normal engine would be used for general haulage jobs and could be seen years ago both on the farm and on the roads. Actually there were some differences in those designed particularly for road haulage as against those designed for use on the land. There were numerous sizes of engines and numerous makers.

The type of model being made will have quite a bearing on the finished size, of course, a light tractor in three inch scale probably being little different to a large Burrell at two inches to the foot. Not only did traction engines haul loads but often machinery was operated from a belt off the flywheel. They were also usually fitted with a winding drum on which went a long length of cable. This allowed the engine to haul a load for a short distance while it remained stationary. Go to any rally and usually there will be an engine working either from the belt off the flywheel or using the cable on the drum.

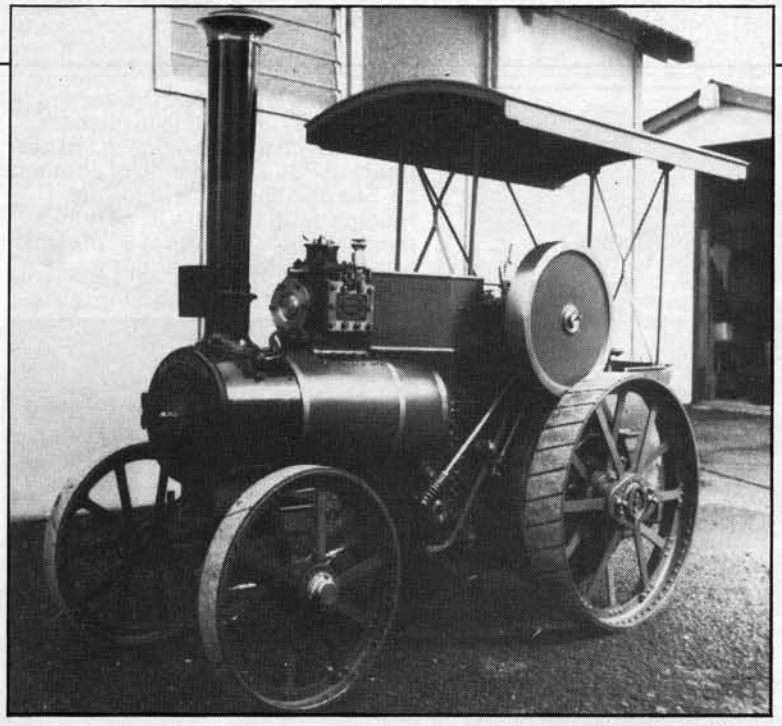
Ploughing engines were rather large machines as a rule with a drum underneath which held a steel cable. An engine was placed at each end of a field and a plough or other implement connected to the cable which then ran to the drum on another engine. The implement was wound backwards and forwards across the field and, as it travelled, it would carry out its job. Of course, after each run the engines had to move along slightly to get the plough to the next furrow.

Showman's engines went around with travelling fairgrounds and were usually instantly recognisable by the full length canopy over the engine. In addition to the flywheel for operating machinery, they also carried an electric generator, usually on the front. This was used to supply power for lighting, etc., for the various amusements. The engines themselves, more often than not, would have a number of lights worked off the generator strung along the canopy and they looked particularly attractive at night.

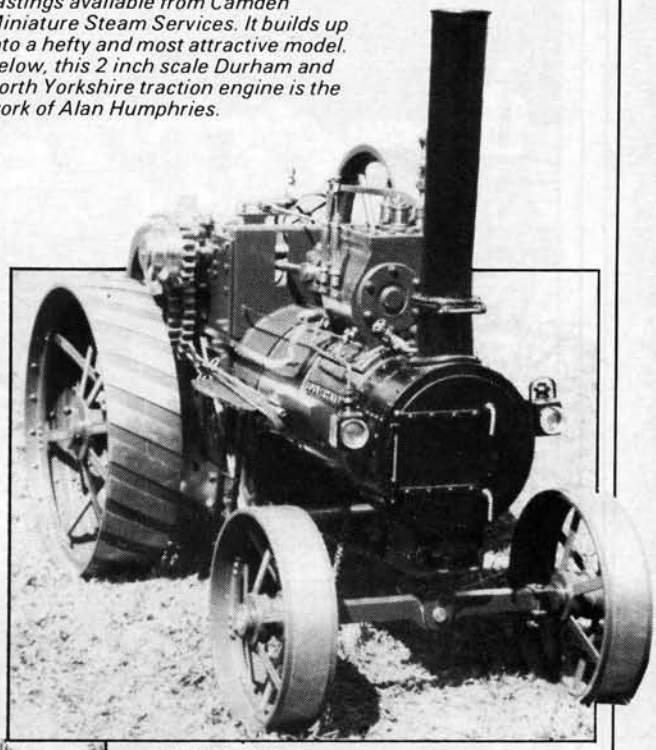
There were various other specialised forms of engine and there are even plans available for some of these. Plans can also be obtained for the many other vehicles that were associated with traction engines such as the living vans (a sort of rough caravan) that the engine might tow if the driver was likely to have to stay away overnight. as well as plans for ploughs, water carts, etc.

Whilst at first glance it might seem that traction engine construction is similar to that of a locomotive, this is not really so. First of all the boiler design has to be different and, in places, very much stronger than that of a locomotive. The reason for this is because there is no chassis and the wheels, etc., are all secured to the boiler. However, this does not mean that the boiler is necessarily any more difficult to make than a normal locomotive boiler. On the plus side, of course, you'll avoid the chores of making a chassis with things like spacers and buffer beams . . .

Because of the nature of the beast, a traction engine has to have gears — a locomotive does not. These transfer the drive from the engine to the wheels and, by changing over with a simple lever movement the shafts on which they run, speeds can be altered rather like a car gear change. The gears themselves might frighten people off but, in point of fact, ordinary spur gears are not too difficult to make at home and particularly in the case of a small engine like "Minnie" are well within the capability of the average model engineer. However, ready-made gears are available to be purchased if one wishes. Kennet in particular specialise in supplying these but they can be obtained from other suppliers and H. R. Plastow who do a range of traction engines and rollers supply gears for

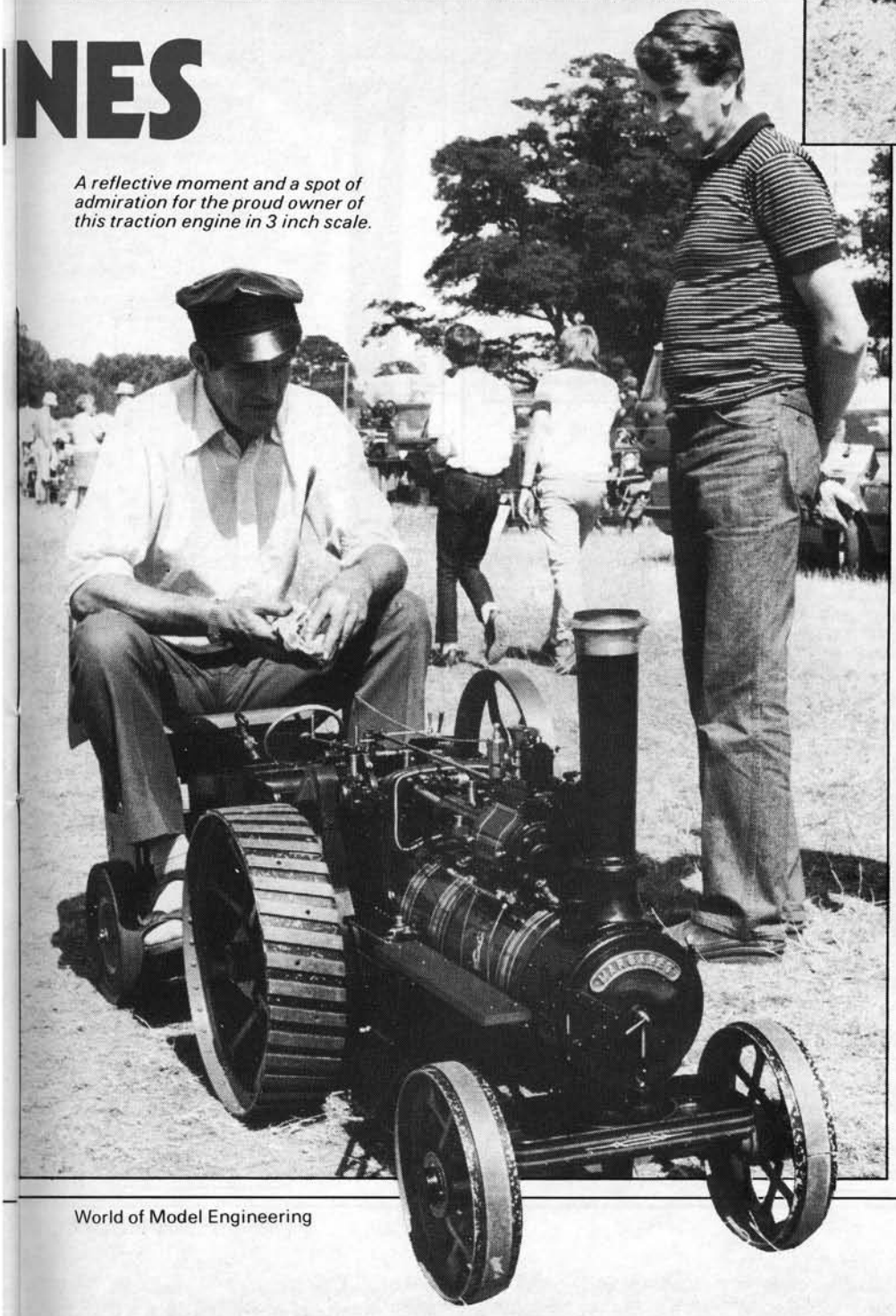


Left, a 4 inch scale Tasker Little Giant steam tractor from drawings and castings available from Camden Miniature Steam Services. It builds up into a hefty and most attractive model. Below, this 2 inch scale Durham and North Yorkshire traction engine is the work of Alan Humphries.



NES

A reflective moment and a spot of admiration for the proud owner of this traction engine in 3 inch scale.



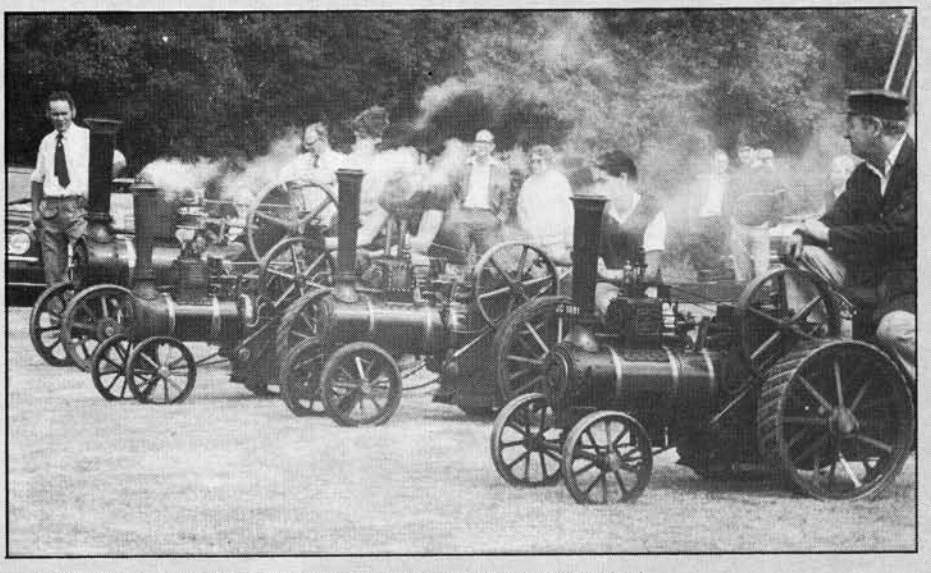
their designs.

One job which can be tedious is wheel construction. When one considers a traction engine it becomes obvious that usually the spokes are individually made and all have to be uniformly bent to fit the rim. Simple jigs have to be made for this and it is then not quite as complicated as it looks. Many suppliers have ready-cut and bent spokes available which are suitable for various types of engines. The rims are also frequently available ready-turned, although some castings that are supplied are good enough to be just trimmed up and used — after all, the full-size ones weren't turned!

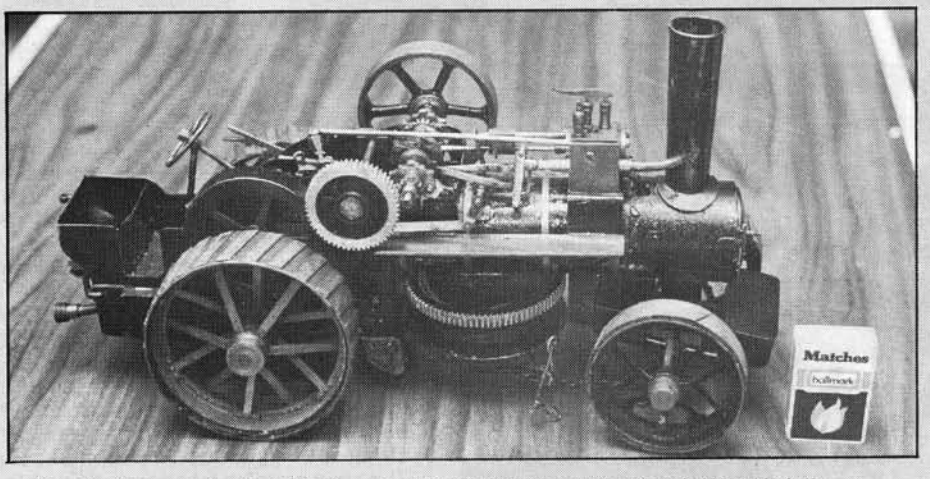
Steam rollers are very similar to traction engines apart from a very large and somewhat heavy overhang at the front under the chimney to support the roller. The front rollers, by the way, were in two parts to facilitate turning corners. The rear end may have wide, heavy wheels or there may be another roller at the back, in which case it is known as a tandem roller. One advantage of building some types of steam roller is that there is no differential gear on the rear axle.

There are quite a number of designs available, both for traction engines and steam rollers, and several suppliers specialise in engines of their own designs. A regular series of constructional articles appears in *Model Engineer* written by John Haining who also describes the various items associated with the engines from time to time. All his designs are to two inch scale and a number of firms supply the castings for the designs. Blackgates Engineering in particular specialise in the Durham and North Yorkshire engine, a very attractive engine which is one of the easier ones to construct.

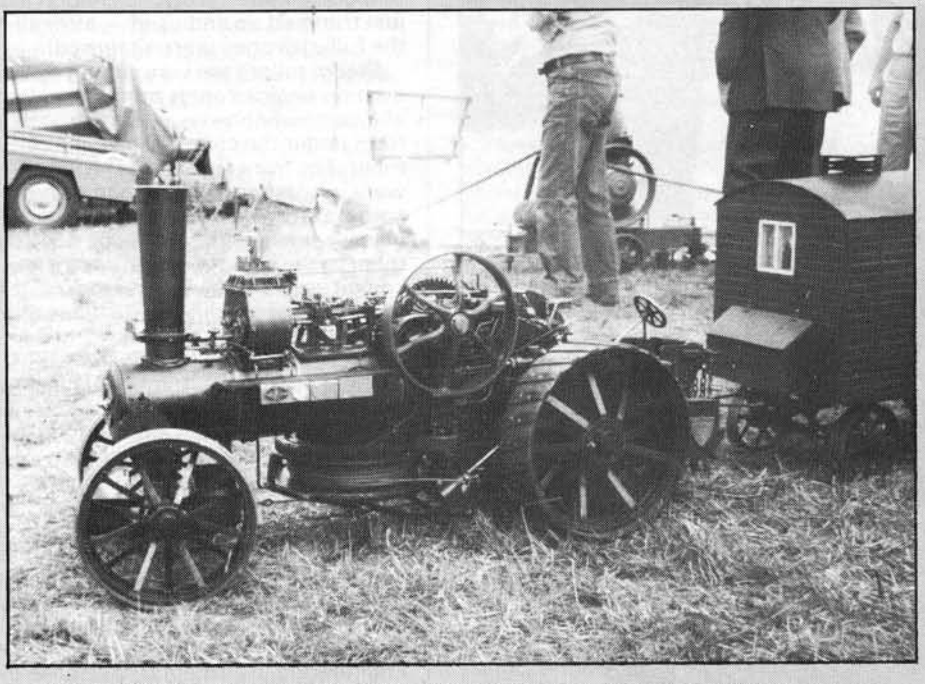
The same firm stocks drawings and castings for several designs including a



Model traction engine rallies are great fun; this line-up is typical.

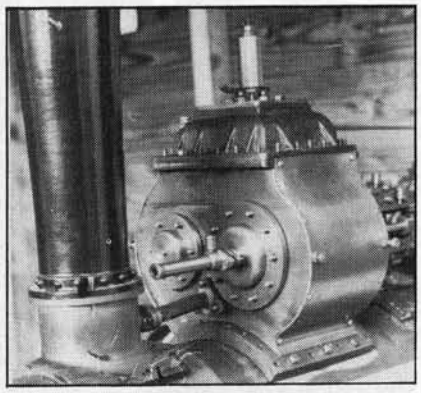


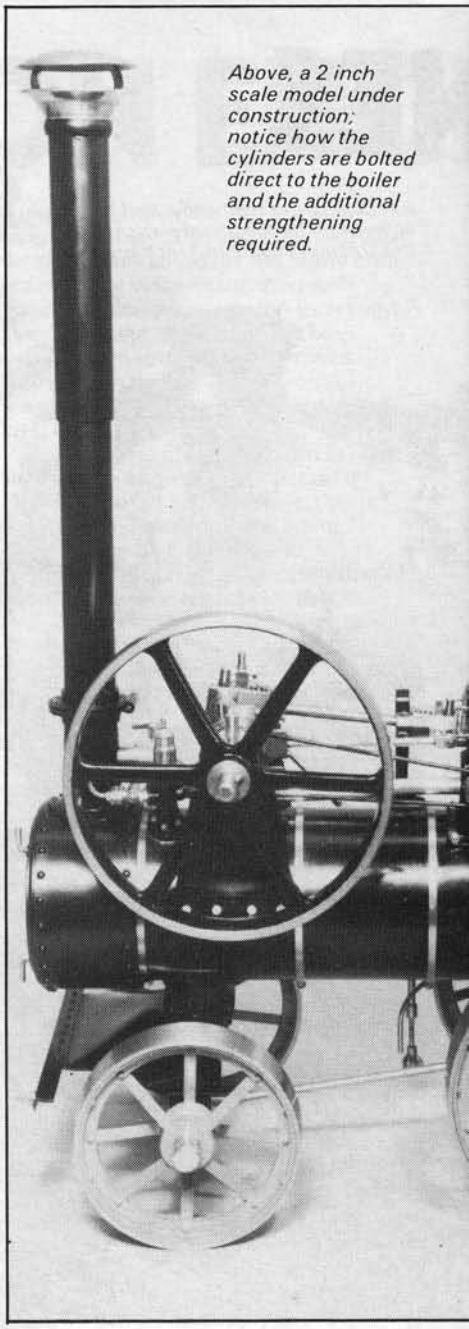
They don't have *to be big! This tiny ploughing engine model by Rennie Wood is fully working (from an external boiler) and is to 5/8th inch scale.*



This attractive 2 inch scale Fowler ploughing engine by model engineer Bill Cater tows a model living van to the same scale. The van is not merely for show; not only does it provide the driver with a comfortable seat within easy reach of the engine's controls but it also doubles as a tool store – very handy when visiting the rallies!

showman's engine and the owners tell me that they are hoping to increase their traction engine range in the near future. J.P.H. Engineering of Southend-on-Sea also specialise in the John Haining designs with a large number of them available. Reeves of Birmingham also carry a stock for various traction engines, including the showman's





Above, a 2 inch scale model under construction; notice how the cylinders are bolted direct to the boiler and the additional strengthening required.

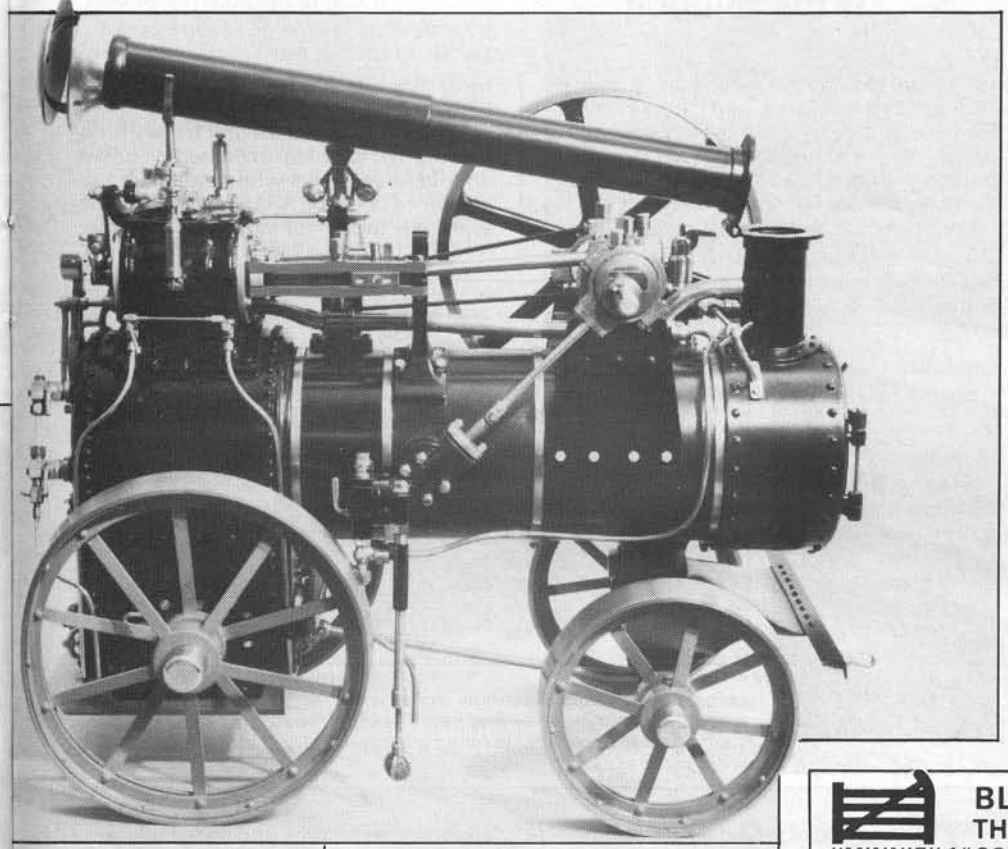
engine "Thetford Town" as supplied by Blackgates. This engine is well tried and deservedly very popular.

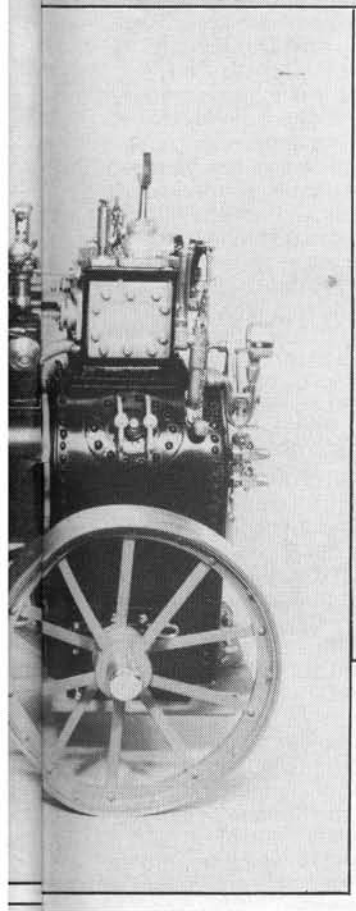
A number of firms specialise in larger scale models. H.R. Plastow offer quite a large range including a showman's engine and a very unusual "Simplicity Roller" with a sloping boiler which makes up into a very nice model and again is not too difficult to make. Models to their designs are always to be seen at events all over the country and many on the continent as well.

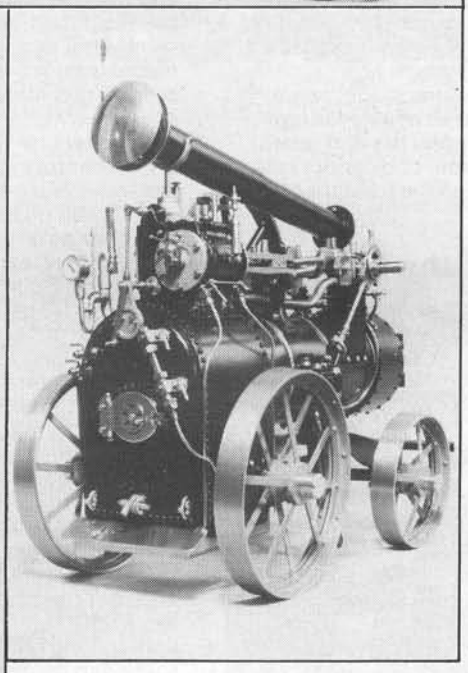
Paul Wainright of Sheffield also produces drawings and castings for larger scale engines as does P. Filby with engines in four and six inch scales. An unusual entry into the market is L.S.M. Engineering who produce a four inch scale Foster agricultural engine with particularly fine castings that save a great deal of machining. M.J. Engineering of Ringwood, Hants has an ever-increasing range of traction engine designs available from 2 inch scale upwards, and Camden Miniature Steam Services also have some unusual ones available.

There are several books on building traction engines including a complete book on the "Minnie" by Len Mason, and one by the late Bill Hughes who designed many fine engines in 1½ inch scale. John Haining has written *Introducing Model Traction Engines* while H.R. Plastow produces two very good photographic records of building models which, whilst meant to illustrate their own designs, are equally applicable to other models. The same firm offers an excellent book on building and running model traction engines and steam rollers.

When this side of the hobby is viewed as a whole there is plenty of variety from which to choose. One great advantage of traction engine building is the availability of the original engines. There are hundreds of preserved engines throughout the country and, if you are building a traction engine or steam roller, then there is every possibility that you can track down a preserved example of the type you are constructing and get detailed information by going along to rallies and examining it in the flesh. ■







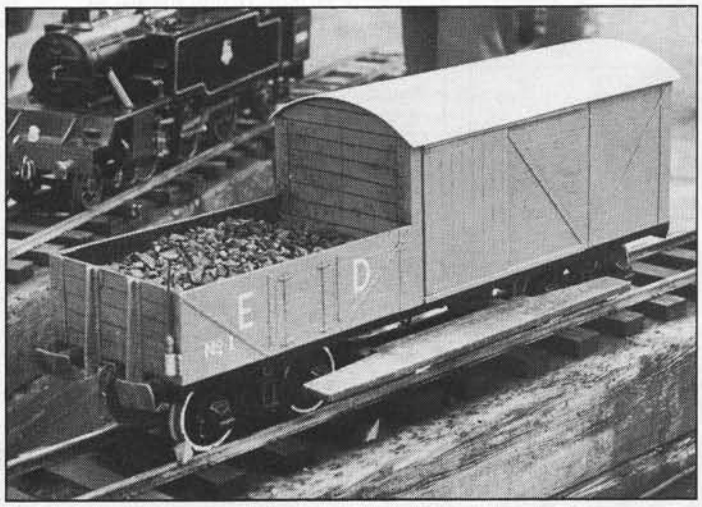
Above and at left, three excellent studies of a model "portable," designed by the late Bill Hughes. The portable was the forerunner of the traction engine as we know it and this beautiful Marshal is to 1½ inch scale. All the castings required to build one just like this are available from A. J. Reeves & Co., who also kindly supplied the photographs.

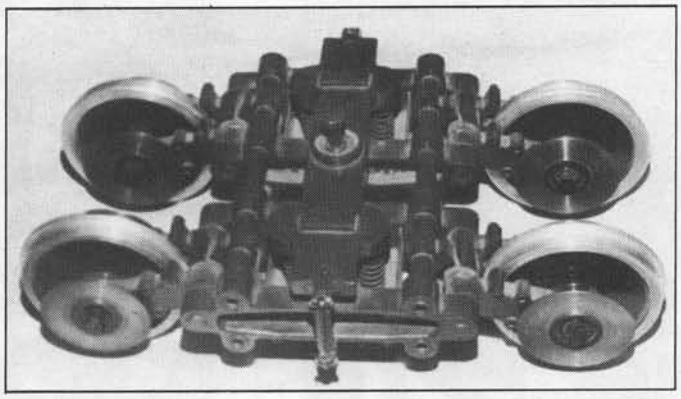
Drive & Ride

When you've built it you'll want to drive it! A passenger vehicle is the solution

Builders of both the large scale model locomotives and traction engines, if they intend to ride behind them, will ultimately need at least something for the driver to sit on and possibly something for passenger-carrying as well. Without this, trying to drive the locomotive will be an exhausting business, particularly on a very large track. Not so many years ago passenger and driver trollies were very much the poor relation of the hobby. It was a case of stick four wheels on a piece of board and that will do. Things have now changed very much for the better.

Whether or not a driving trolley for a locomotive should run on bogies or if it should have a rigid wheelbase is a matter of opinion. A long-bogie vehicle with only the driver sitting on it at one





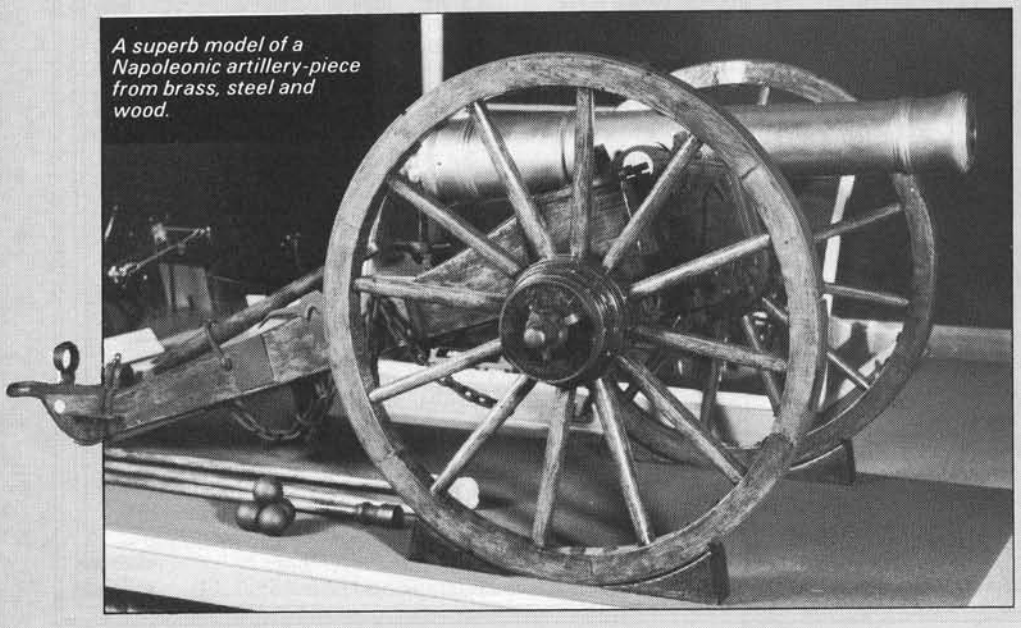
Left, a 5 inch gauge passenger trolley which also carries coal and water. Castings are to be had from Paul Wainwright. Above, a sophisticated bogie design for a passenger trolley; fully independent with disc brakes.

Model Armament

The making of model armaments is a side of the hobby that has generally decreased in popularity over the last twenty to thirty years.

Nevertheless, making model cannon and small arms can be a fascinating aspect of the hobby and the end result most rewarding. True, one cannot take the finished model to the local model engineering society and shoot all the trains off the track without becoming somewhat unpopular! The finished model is far more likely to find an ornamental place in the home than is, say, a five inch gauge locomotive.

Here's yet another fascinating branch of the hobby



A superb model of a Napoleonic artillery-piece from brass, steel and wood.

A model of a 19th century cannon, or a 17th century small-arm can be very attractive placed on the mantlepiece. It will also be unique and not at all the sort of thing one can go along to the shops to buy, except at an extremely high price. Such a model has the advantage of being relatively cheap to construct, although it will probably take almost as long as a locomotive if done properly. It can also be built on one of the small lathes such as the Toyo ML 210, the Unimat, and the various other lathes of this type.

Construction involves some turning, filing, drilling, etc., as well as, in some cases, a small amount of carpentry. To construct the model accurately there is frequently a great deal of detail to be added of the type that gives one that extra little bit of pride in the work. If light milling facilities are available then these can be used although they are not strictly necessary. It is quite probable that there will be a small amount of silver soldering involved, which can be carried out using the very small blowlamps designed for this sort of work such as the Ronson or similar types that are easily available.

A range of plans is available from the ASP Plans Service. ■

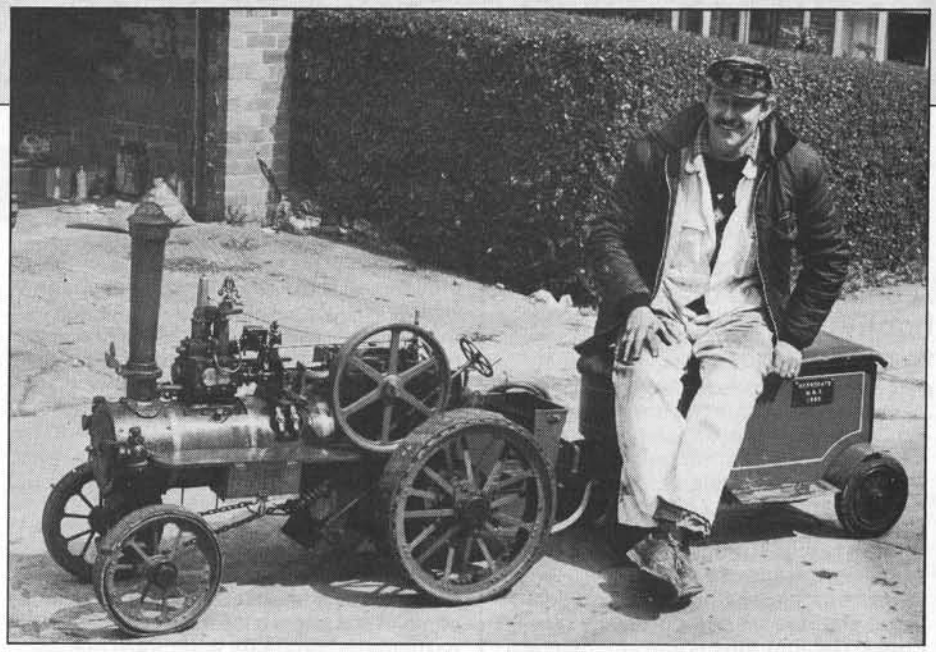
end is quite likely to tip forward, so if a bogie vehicle is to be made and there will be frequent use by the driver only, then it should not be too long. Most of the suppliers offer castings and drawings suitable for making bogies in the various gauges or they can be fabricated from sheet metal.

They should be able to articulate up and down from front to back to allow for any possible unevenness in the track. Springing of some sort is desirable but, strangely enough, not entirely necessary. There is, though, a very good case for the vehicle to be fitted with either ball races or roller bearings.

A modern trend that I think is very attractive is to make the driving and passenger vehicles represent real wagons or carriages. This gives a great deal of satisfaction to the constructor as well as looking much more convincing. Plans are available from various suppliers and some also stock castings and other parts. If the locomotive is running on a ground-level track and is in a gauge of 5 inches or more, the tender can be strengthened to act also as a driving vehicle. This is frequent practice with 7¼ inch and above but less common on the smaller gauge of 5 inches. Yet driving a locomotive at ground level when one has to lean across the tender can be awkward to say the least and to sit on the tender will bring one up closer to the controls.

Drivers of traction engines of about 4 inches to the foot and above can also sit on their vehicles to drive; with smaller engines, some form of driving trolley is needed. It should be connected to the engine with a rigid coupling and the front pair of wheels should be able to swivel in order that the trolley can be guided by the engine. Again, if possible, ball races or roller bearings are desirable and the wheels should be of as large a diameter as is within keeping with the appearance of the vehicle. They should also be as wide as possible. Fit narrow solid-type wheels like pram wheels and you will find that they quickly sink into a soft field.

Both locomotive and traction engine vehicles should be fitted with some form of braking. Simple lever type brakes are sufficient for most purposes, but it should not be beyond the ability of someone who has made a model engine to fit a hydraulic braking system using parts obtained from a motor vehicle scrapyard. ■

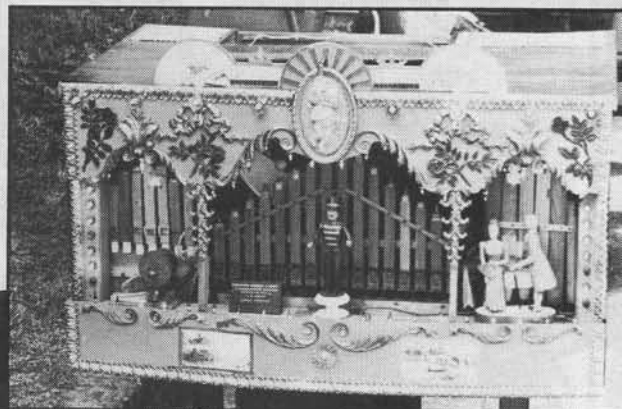


Modeller John Burchall with his 1 inch to the foot scale traction engine model "Minnie" and well constructed passenger-carrying trailer which allows a comfortable ride whilst offering minimum resistance to the engine.

Fairground Models

Colourful, exciting and distinctly different

Below, a lovely cockerel "galloper" and, at right, a fully working model fairground organ.



One always sees the fairground models at exhibitions receiving a great deal of admiration and yet it is very much a minority interest. The models when finished are most attractive and it is a side of the hobby well worth considering, particularly for those who are somewhat limited in the equipment they have available. A large part of the work involves just the use of hand tools and some patience; painting requires some skill but with modern paints and equipment should not prove too difficult for the average modeller.

One main supplier of drawings for fairground models is Model Fair Designs, 187 The Avenue, Kennington, Oxford. This firm has a wide range both of drawings and accessories. A whole range of fairground items are detailed on the drawings and most are designed as fully working models. Another is Carousel Carpentry of 10 Dorset Road, Ashford, Middlesex TW15 3BY. They can supply items like organ fronts, wheels and other embellishments like ornate cockerels, etc. ■

Internal Comb

A challenging branch of the hobby, with distinct appeal to model aircraft enthusiasts

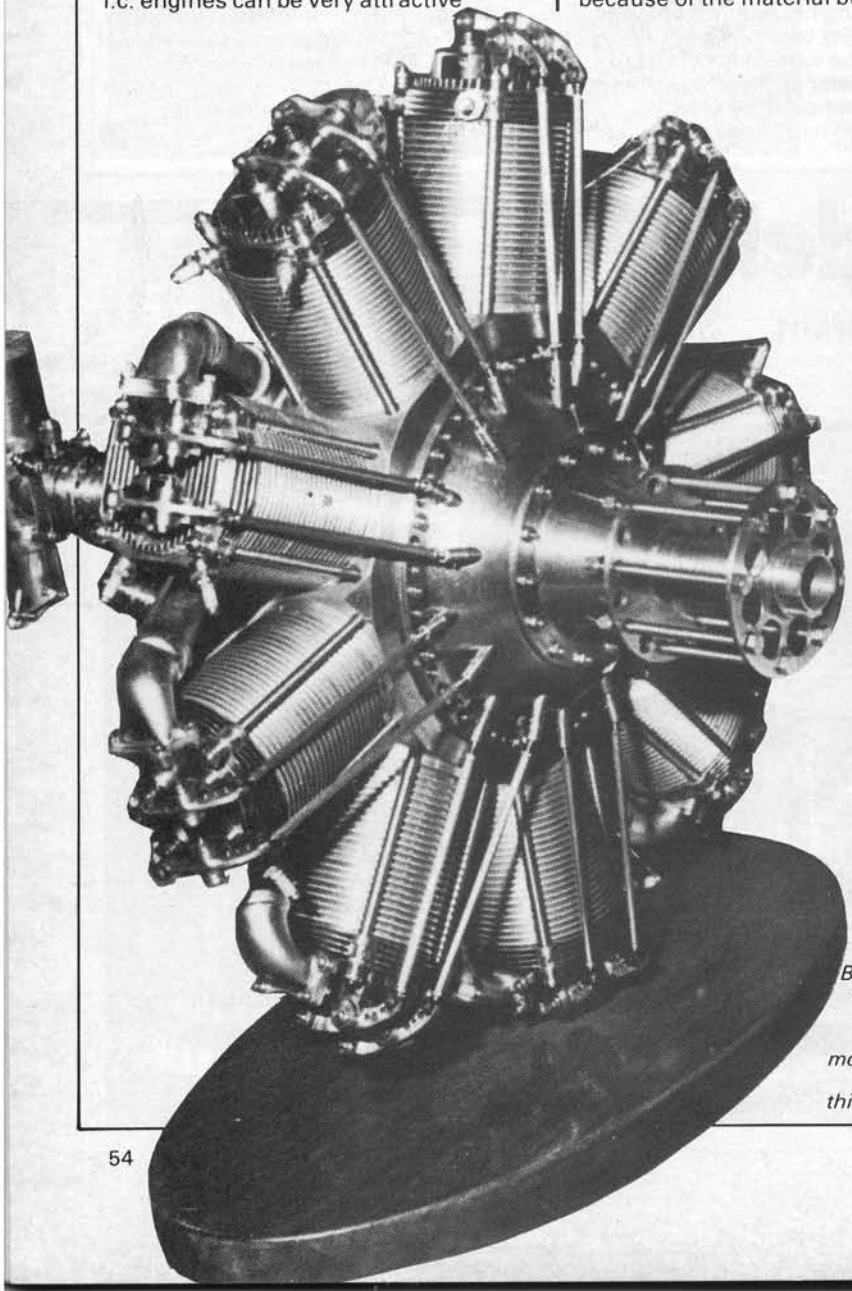
It is a rather strange anomaly that we live in the age of the internal combustion engine and yet models of these engines are comparatively rare. Could it be that the engines themselves are less attractive? Without doubt one of the attractions of the steam engine is that so many moving parts are visible. Certainly this is not the case with the majority of diesel and petrol engines; but some gas engines have all the working parts exposed and make very attractive models indeed.

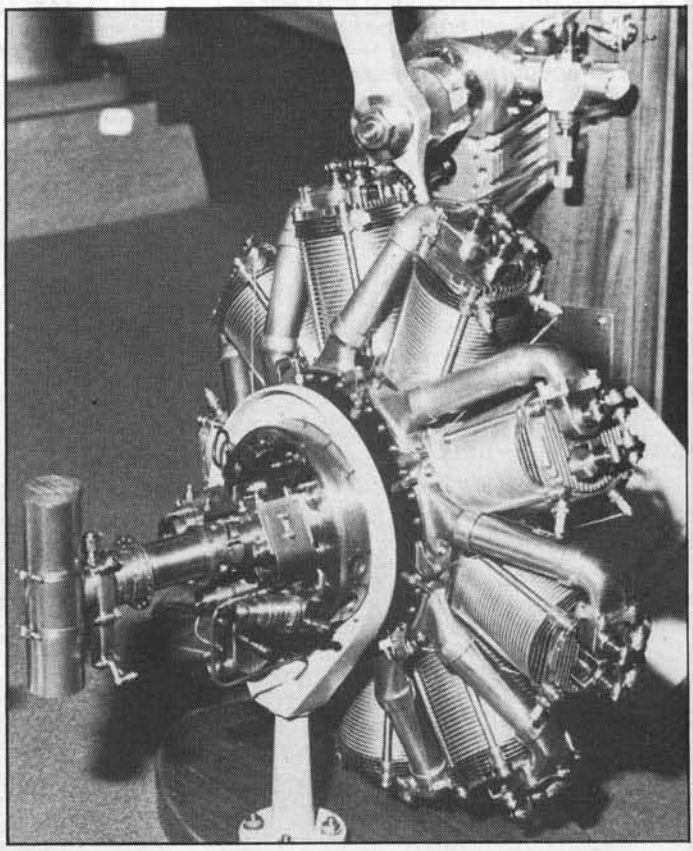
It might be because running the engines is a noisy business unless an effective silencer is fitted. Yet models of i.c. engines can be very attractive indeed and there is enormous scope for variety of two- or four-stroke, single or multiple cylinder designs. Many are readily available through the Model Engineer Plans Service. Thousands of these units have been made, and used, over the years so there is no need to have the ability to design a suitable engine, build it and bring it to practical application. The late Edgar T. Westbury introduced many designs which have stood the test of time and continue to remain popular because they are not enormously complicated. Add to these some of the superb later designs, particularly the rotary and model aircraft engines that have been made, and the model engineer soon discovers that there is a wide choice. Most suppliers stock casting and drawings, Woking Precision Models, for instance, specialising in such supplies.

The majority of i.c. models have the advantage of being small and are, therefore, well within the capability of the home workshop. Nearly all are made from alloy. Machining can be tedious because of the material building up on the tool and modellers could tend to fight shy of using it. Of course, if the engine is to be used in a boat or aircraft, there is every reason for it to be made from alloy. A design with a cast iron cylinder block might well be preferred amongst those simply wishing to make the engine as a bench running model. Certainly, gas engines are usually made from cast iron.

Less tolerance!

The actual machining of an internal combustion engine is not all that difficult. True, the tolerances are less than with a steam engine where some "slop" always helps easy running. We are, however, emulating full-size practice. There was always likely to be "slop" on a full-size steam engine but excess clearances in a car or motorcycle engine to any great degree are a disaster. One interesting design for those wishing to make a start is "Zephyr" by Edgar Westbury. This is a 2.5cc, two-stroke engine designed to be machined from solid materials





At left, this magnificent nine cylinder Bentley BR2 rotary engine is modelled to perfect quarter scale. It's the design of Australian Lew Blackmore and it won both a Gold Medal and The Duke of Edinburgh Trophy at the Model Engineer Exhibition. Lew has published a book detailing its design and construction which should prove of enormous inspirational value not only to Bentley builders but to modellers of all i.c. projects. Above, this rear view of the model shows the central induction to the crankcase; it all works just like the real thing! A set of ASP Plans is available (plan PE33).

ustion Engines

rather than from castings. As a result it gives one the idea of what is involved in constructing such a model. Similarly L. H. Sparey's 0.8 cc diesel or the 1 cc diesel (Plan MM251) are perfect little introductions to the working i.c. engine. "Seagull", which is a side-valve design, twin cylinder for marine use, is a superb project from the Westbury series. "Mastiff", a 24 cc engine designed by the late Len Mason, is another very nice model, typical of his designs in that it was created for the modeller with limited experience yet it offers the challenge of a four-cylinder water cooled four-stroke for marine application. Len had a happy knack of drawing and explaining things in such a way that anyone could understand.

The most advanced engine project now available is the Bentley BR2 Rotary Aero engine by Lew Blackmore. A set of comprehensive plans help one to make a fine model, and moreover, Lew has published his own book to describe the history of the original and how to make the working replica.

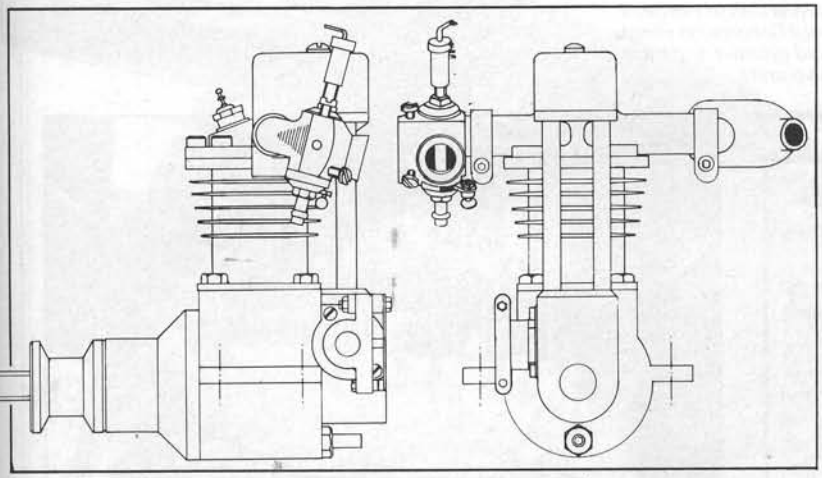
Best known of all i.c. "model" engines are those made specially for model aircraft use. In recent years, the home constructed engine has emerged to excellent standards of performance. This has been triggered by the trend of "vintage" models plus the emergence of the four-stroke engine as a powerful, and infinitely quieter method of burning petrol or methanol.

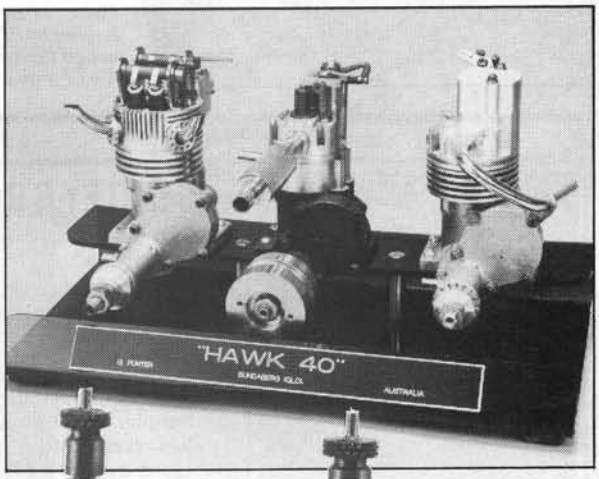
'Atom' power

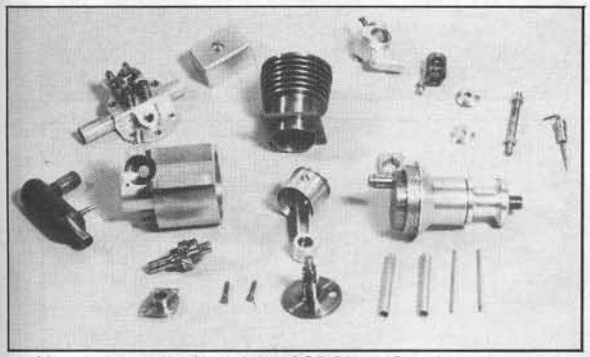
Among the early two-stroke designs, that great originator, Edgar Westbury gave us the "Atom Minor Mark III" so long ago it's almost an embarrassment to check precisely when. Yet only as recently as in the March 1987 *Aeromodeller* was it "re" featured! For an outlay of only £33 one can have drawings, castings, material and even a spark plug. This 6cc engine is in direct contrast to the Jones 10cc with its racing ports and glowplug ignition — again a set of castings makes this one easy. Then there is the "Matador" — a four-stroke, single cylinder originally designed by David Parker when still a student, revived by Derek Giles decades later and since appearing as the Vee Twin "Vega" and the flat twin "Matador" — all quite easy machining tasks and powerful enough to fly radio controlled aircraft models. At extremes, Derek Giles has taken the commercial Mills diesel and remade it in progressively smaller sizes while both John de Mott and L. W. Chenery have scaled the de Havilland Gipsy I Aero engine down to quarter scale! There are few limits to the potential of i.c.

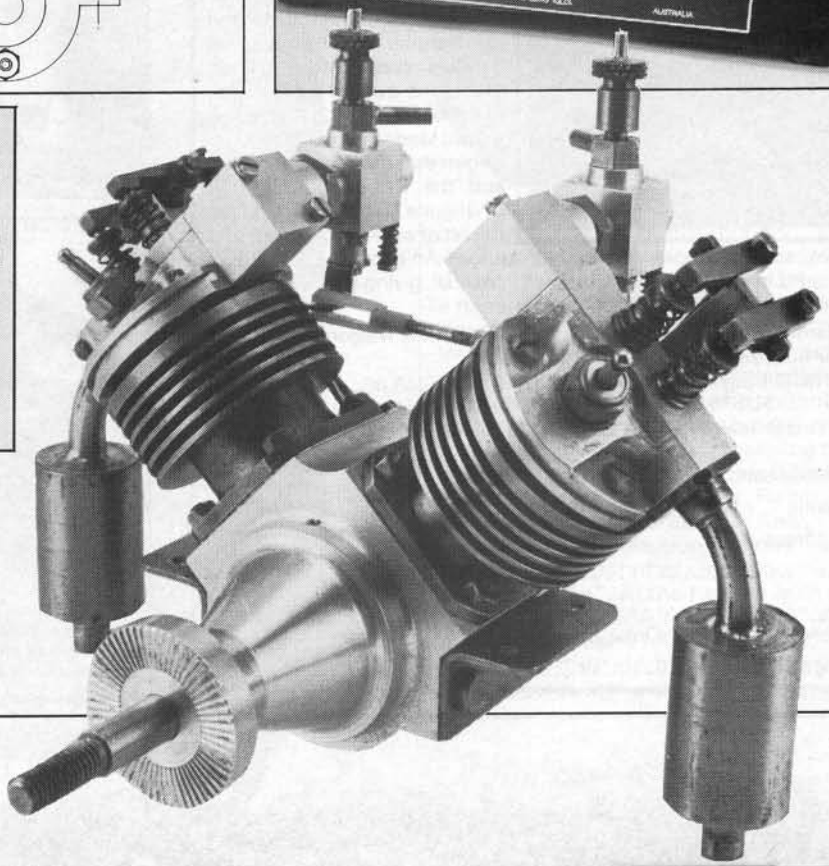
There is another form of internal combustion. Gas engines were used a great deal in industry many years ago and when models of these are made, they can be operated either from bottled or town gas. Unfortunately, plans for these are somewhat hard to come by but it is not so long ago that a full description of the R&R Gas Engine, which is a single cylinder horizontal type, appeared in *Model Engineer*.

I always feel that it is a shame when one sees nice outline models of diesel locomotives running at tracks only to find out that underneath is a lawn

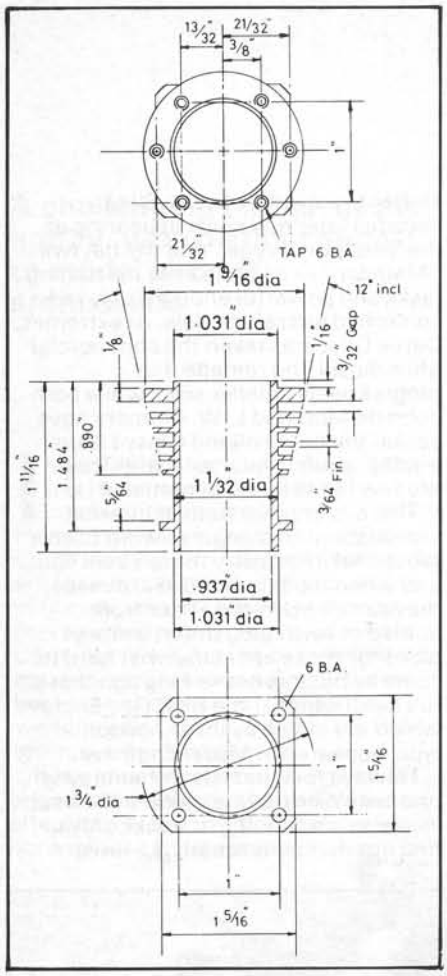








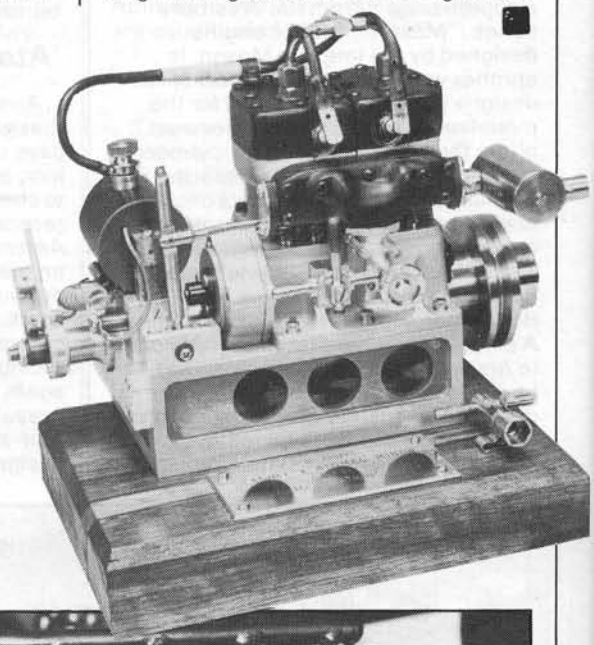
Above top, a section of the ASP Plans Service drawing for the single cylinder "Matador" engine (plan RC1498). Above, components for the "Matador" show how the four-stroke breaks down to a relatively few parts, all of them machined from the solid. Above right, the four-stroke engine comes in many variations of cylinder-valve/systems; these "Hawk 40" engines show three types by G. Punter of Bundaberg, Australia. At right, the "Vega" by David Parker is a 9cc variant of the "Matador" design which has proved very popular for radio controlled aircraft models.



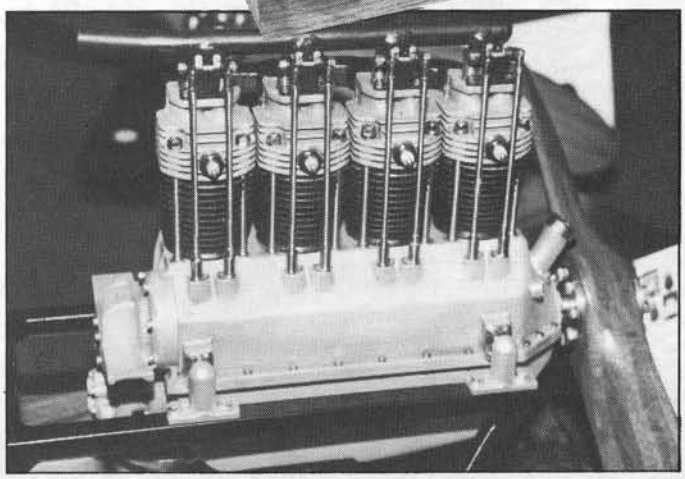
mower engine or something similar! Some years ago there was a description of a little diesel shunter called "1851". Several models of it have been made and very attractive it is too. Designed for a ½ inch gauge, Phil Hains from Harrow has, in fact, also built it in 5 inch gauge.

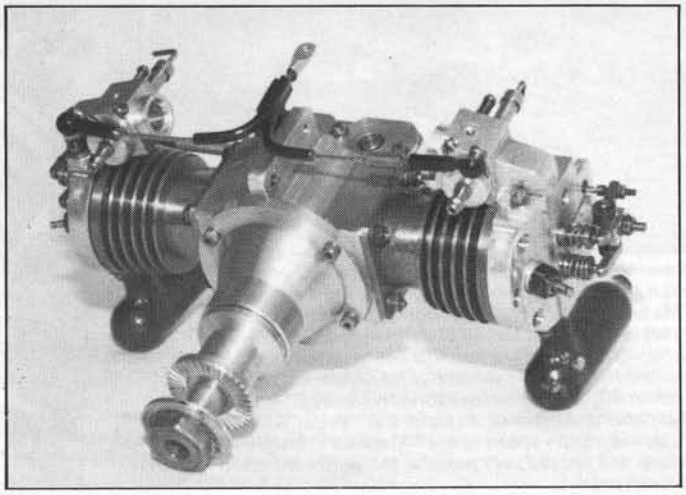
There is a need for more models of this type. I am also always rather surprised that there are not more models made of road vehicles driven by home-made four- or even six-cylinder engines. When one thinks of the vast number of lorries, cars, buses, etc., that there is to choose from it's peculiar that we do not see them modelled at all. There have been thousands of models of steam locomotives constructed and these will help in the years to come to perpetuate the memory of the originals. Alas, the humble lorry or bus seems destined to be quietly forgotten.

I hope that I have in this section given some readers food for thought. Here is a chance to get involved in an individual way in making models of something nobody else does. Some of the existing i.c. designs will adapt to fit models of road vehicles with a little thought and it is an area of model engineering well worth thinking about.



Left, a section of the working drawings for the popular "Matador" design by David Parker. Right, marine engines such as the 10cc "Seagull" with magneto ignition, clutch and flywheel offer a real challenge; this Edgar Westbury design was built by G. Atkins from ASP Plans Service drawings (plan PE25). Below right, another multi-cylinder scale example; this is John de Mott's quarter size Gypsy 1 engine, a magnificent example of research and modelling. Bottom right, the "Matador Twin," latest conversion of the basic engine by Richard Green who simply added the second cylinder and treated the engine as two units.





CLOCKS

Clockmaking has always fascinated the model engineer — and it's not hard to see why

Making clocks is a side of the model engineering hobby that everyone seems to admire, and, indeed, why not? There is also something of a tendency to fight shy of clock-making, probably due to the fact that, when one looks at a fine clock the workings all seem so very mysterious, calling for an extremely high degree of accuracy. In point of fact this is not strictly true. Far less accuracy is required in making a clock than is needed to make many models. For example, some model internal combustion engines, the quorn grinder and many other items spring to mind as needing extremely high standards of accuracy. These are certainly not needed in making clocks although, of course, watchmaking is a different matter altogether.

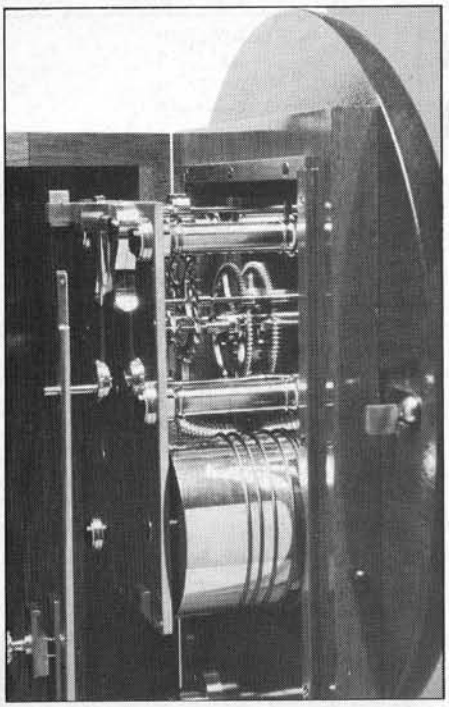
There are certain advantages in clock-making for the modeller working in the home. Firstly, the work is comparatively light, and clean! Much lighter workshop equipment is needed. For example, clocks can be made using some of the smaller lathes that are on the market, and, in fact, Cowells even made a special version of their 90 model lathe at one stage with the clock-maker in mind. But even this is not entirely necessary and the ordinary basic lathes can be used quite easily. Benches can be kept clean and, if a section can be covered with green baize, then this will facilitate things no end.

Certain special little tools and jigs will also help but these are usually easily made in the home. Some means of dividing will also be needed in order to facilitate the making of the gear wheels which are, of course, so much a part of clock-making, but even this can be something that uses the lathe change wheels. One other essential is good lighting. Visit anyone who makes clocks and you'll discover they have lights at every possible point. Such lighting need not be expensive to install; department stores supply Anglepoise lamps which cost no more than a few pounds if purchased without a base. They come with a clamp that enables them to be held to a bench exactly where required. A further aid is a magnifying form of Anglepoise light.

Many modellers have been delighted with the results when they have turned to clock-making, often not realising that it was not going to be a terribly difficult exercise. One such modeller, Ralph Ley, was mainly interested in fine locomotives and traction engines. He has built a grandfather clock, more-or-less as a "joke". At the time he built it he had not been involved in modelling and had only hand tools, hack-saw, files, hand drill, etc. It was with these that Ralph built the clock, everything

Gold Medal winner at the Model Engineer Exhibition 1986, Thomas Dance's 8 day striking Bracket Clock is a superb example in all senses.

An 8 day Drop Dial Wall Clock by P. Baker of Northampton; simple in its design, but see the interior!



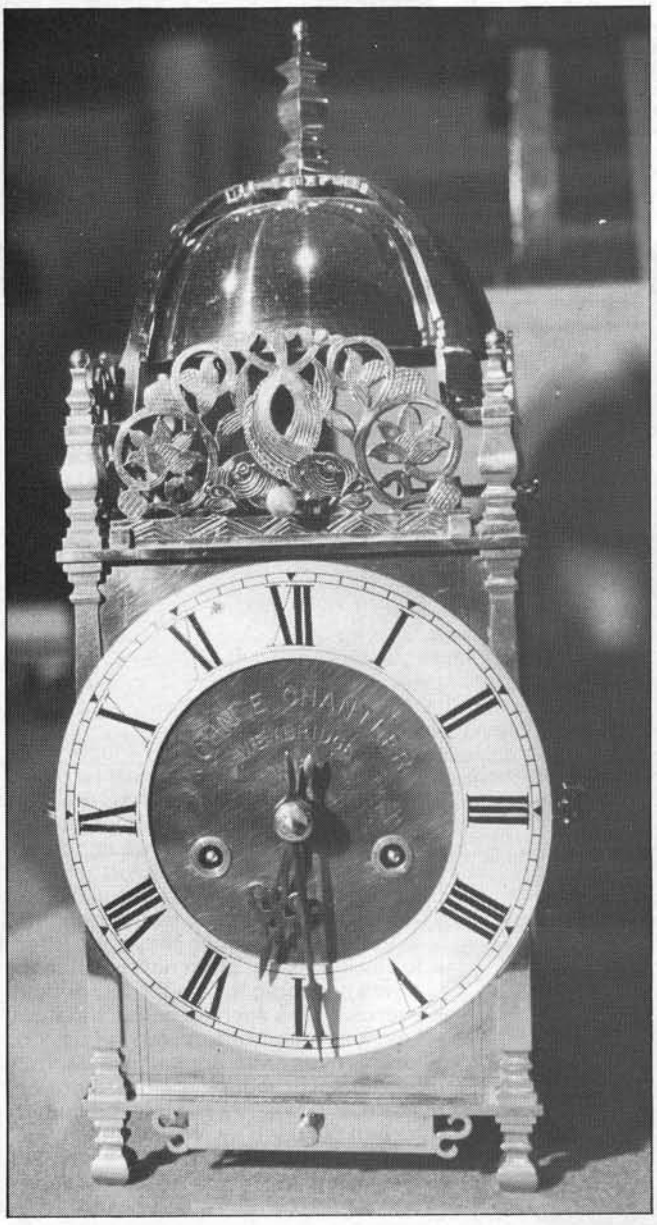
being fashioned purely by hand and the divisions on the gears being simply worked out by careful measurement. If anything is likely to offer encouragement to the would-be clockmaker then surely this story does. It proves beyond doubt that clockmaking is not some deep mystical art but simple metal-work. The clock is pretty accurate and, no doubt, has given Ralph and his family a great deal of pleasure over the years.

So there it is. For the experienced, or less experienced metal worker, clocks are a highly satisfying pastime. Perhaps those who have not attempted such things before might now be inclined to try . . . ■

Left: interior of the Wall Clock reveals the motion, and excellent workmanship.

Right: This Bracket Clock has a chronometer detent escapement seen when viewed from the rear of the glass framed case. It was made by R. Stephen.

Below: The Lantern Clock offers full opportunity to the brass worker, in this case, J. E. Chantler of Weybridge.



Jack Donaldson made this French Great Wheel Clock which is a conversation piece in more ways than one.