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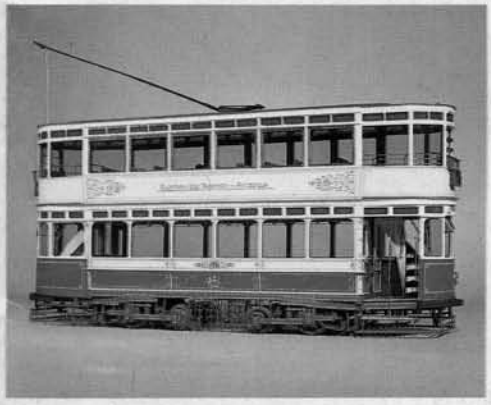
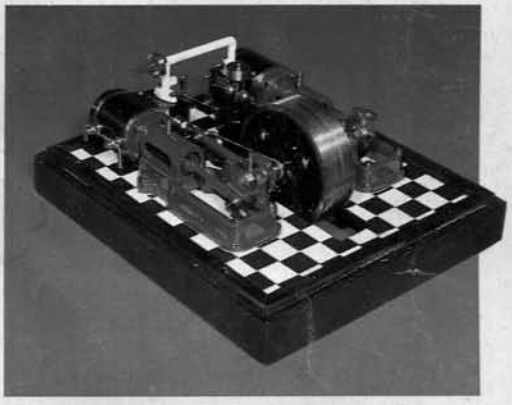
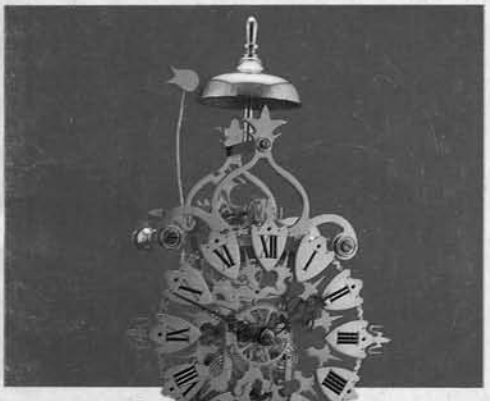
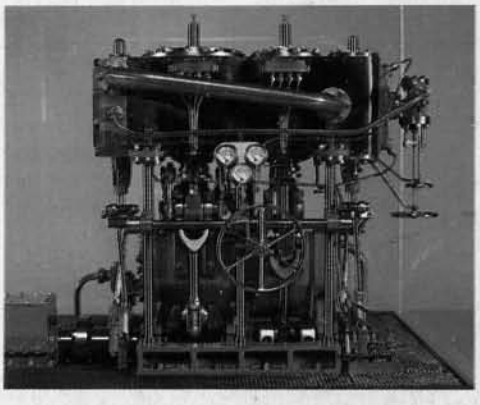
No 2

World of MODEL ENGINEERING









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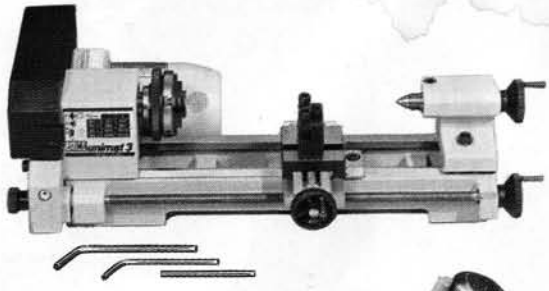

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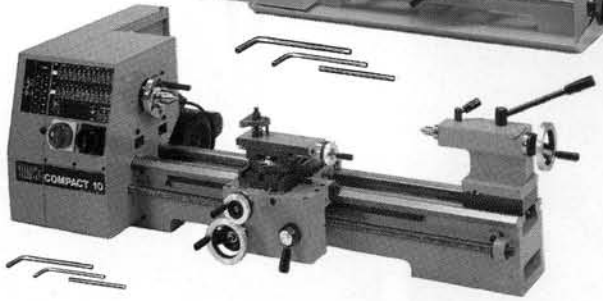

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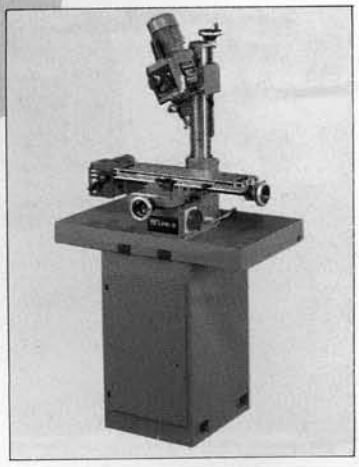

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World of MODEL ENGINEERING

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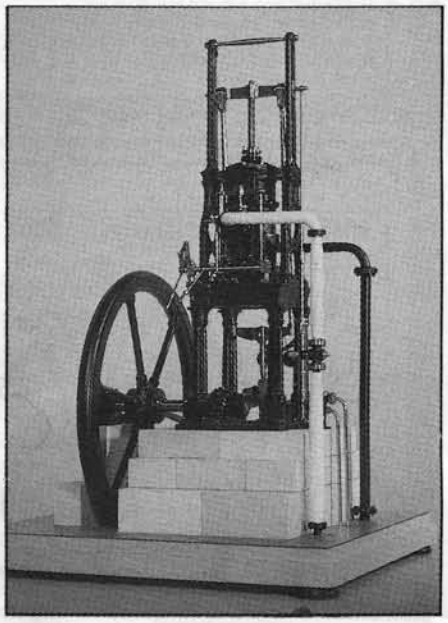

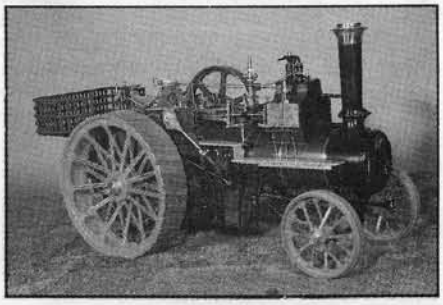

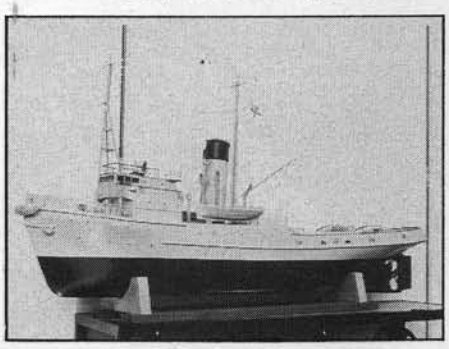

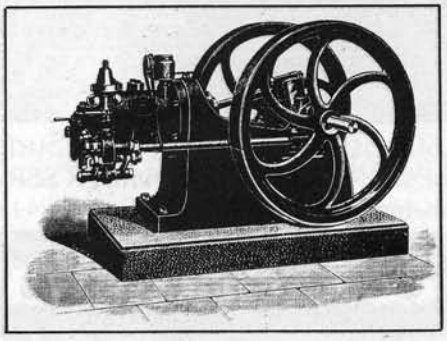

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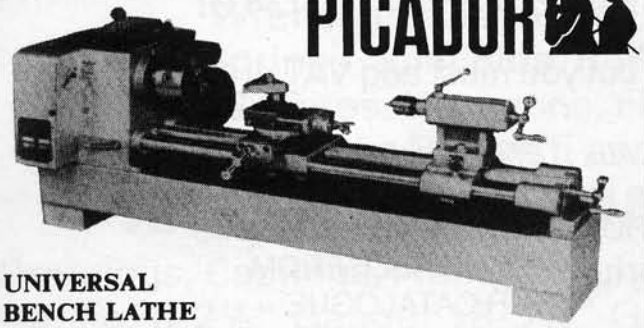

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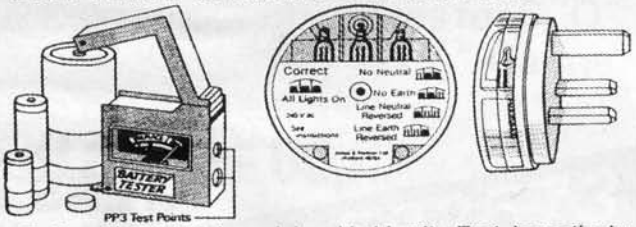

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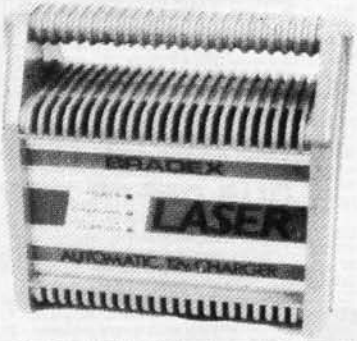

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Model engineering is for everyone! This is John Bamforth who, despite the fact that he has been confined to a wheelchair for many years, is a prolific builder of models – like this Clayton steam lorry on its way to be steamed at a recent Primrose Valley Modellers' Week. Below, this odd-looking model locomotive could be the oldest in the world; firing is achieved by placing a red-hot iron bar in the firehole. There are scores of equally interesting model ideas in the following chapters.

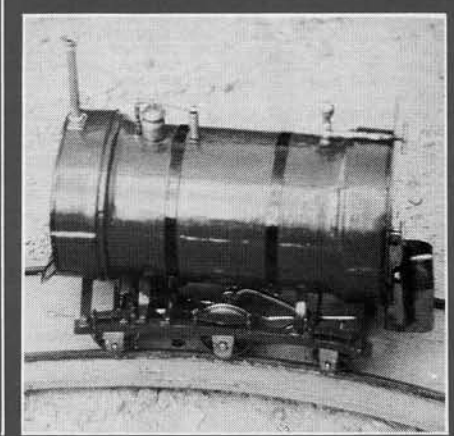
I often wonder why so many people are fascinated by the hobby of model engineering. It may be a desire to create bygones in more or less their original form; in other words, although miniaturised, they are made in the same materials and in the same way as the original, as opposed to making them in plastic or some similar material.

Not that I have anything against modelling in plastic. I am sure that the excellent kits that are available in such a wide range give endless pleasure to those who make them. There are also many who build models from sheets and strip plastic with a realism that defies the eye. But *model engineering* somehow is different.

It is hard to define what the difference is. It may be because most model engineering involves the use of machinery, or it could be that it is because the modelling is done by using the original materials as near as possible as were used in the prototype. In other forms of modelling usually a complete compromise is made on these materials. In model engineering, the feeling of satisfaction comes from the fact that, by using such materials, a really true miniaturised copy of the original is made.

We know, of course, that our history is dominated by man's ability to work with these and other materials. Our present civilisation has been largely formed as a result of the knowledge gained and passed on. Our distant past is referred to as the 'stone age', the 'bronze age', the 'iron age' and 'the industrial revolution'. Over-riding all these titles should be the 'thinking ages' for it is man's ability to think and reason that has advanced civilisation, the knowledge being passed on from generation to generation, each generation adding its own knowledge to the sum total.

When considering metal, the first thing that was learnt by our distant ancestors was the means to extract it from the ore by heating and, later, to fashion the metal into useful objects, such as weapons, axes, etc. The first metal used in this way was bronze;



not the bronze we know today and which the model engineer will keep to use for specific purposes. The early bronze seems to have been more like copper and we would not dream of using it today for modelling purposes. However, we still use plenty of modern copper in the form of tubes and sheet for making boilers, etc., and it is often used for jewellery – just as it was thousands of years ago!

After copper came iron, an altogether better material for making tools and weapons. We still use iron, but not in the same form, and, like copper it deserves a prominent place in the history of engineering.

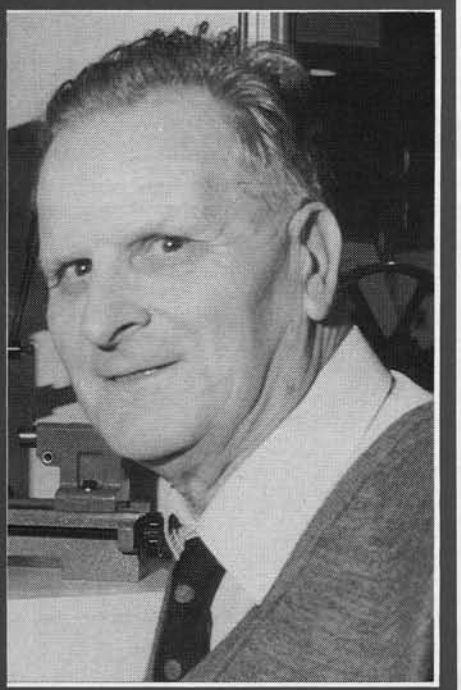
There is evidence that the first metals were forged to shape and, again, this process is still used today even if methods are more sophisticated. But when and how was it discovered that metal could be cast? I suspect that it may have been by accident, perhaps an incident as fundamental as molten metal spilling into an indentation left on the ground and subsequently cooling. We still cast metal in exactly the same way today. It is heated up and poured into an impression made in sand. Admittedly we have developed better quality sands giving better results but the principle is the same. The model engineer frequently uses castings to make various parts for the models under construction but few make their own castings. Usually they are purchased from a supplier or cast to one's own pattern at a foundry but their use in the hobby is extensive.

Later in history man discovered a great deal about the metals he used and, indeed, such discoveries are still being made. One of the most significant of these was how to mix iron with carbon to produce steel, making possible tremendous advances in engineering techniques.

WORKSHOP REQUIREMENTS

With the subsequent discovery of how to make the steel harder it became possible to cut the metal easier and, again, engineering advanced. Without the discovery of steel-making, model engineering would not be possible as a hobby. Copper, too, was alloyed with zinc to form the bronzes and brasses we know now, the amount of each material mixed with the other determining the strength of the finished product. It also meant that metal could be produced that is ductile or bendable, or possibly one that will solder easily.

This brings us to cutting metal which is what model engineering is all about – well cutting and joining it to form various shapes, anyway! Apart from hand tools which are really just metal formed in various shapes and made harder than the material they are to be used on, we use machinery. The workshop where the machinery is installed is the delight of the model engineer who will happily while away many hours there. It need not be a large area; in fact, it can be made in such a way that the equipment stored therein can be put away out of sight when not in use.



Stan Bray

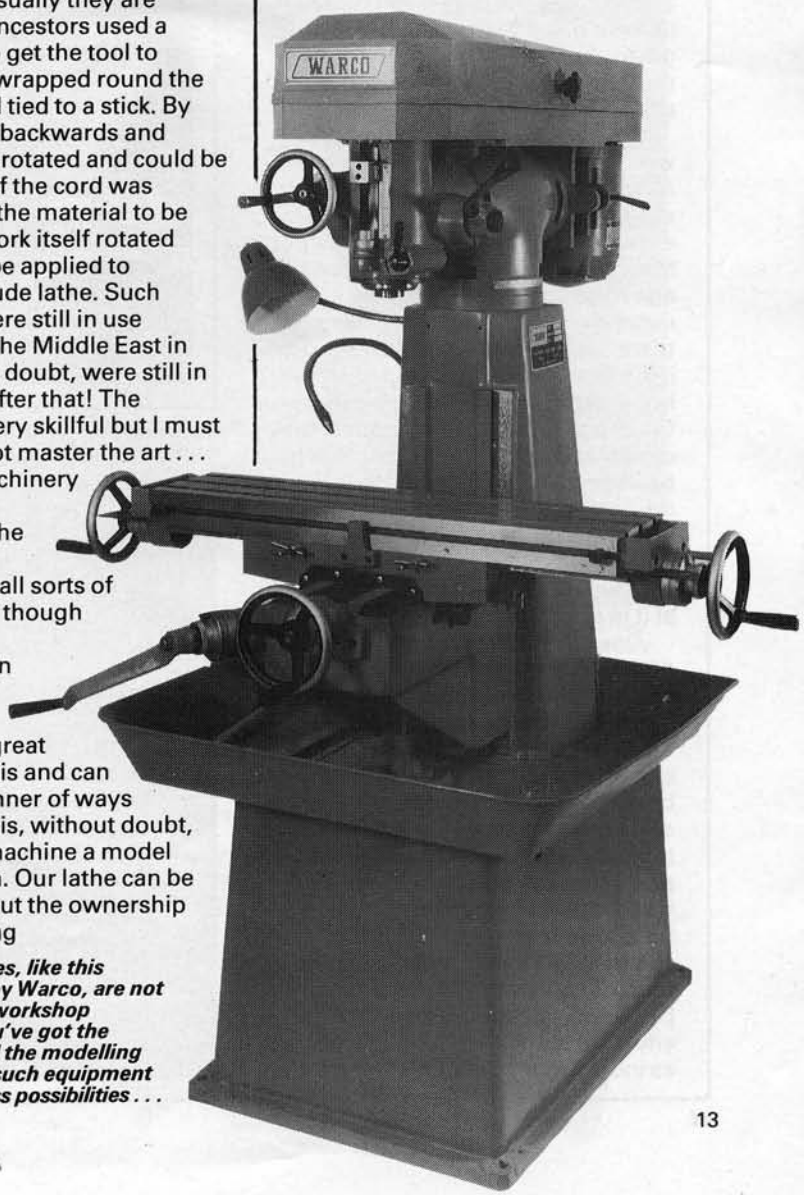
There have been examples of successful model engineering using only hand tools; however, some form of machinery is definitely desirable. The majority of enthusiasts make do, apart from the hand tools, with a drilling machine and a lathe. These machines are simply a means of rotating cutting tools, the drilling machine standing vertically and the lathe horizontally.

To get the most out of the hobby, you'll need some basic equipment

These machines have, in fact, been around for thousands of years. Lathes and drilling machines can be made at home although usually they are purchased. Our ancestors used a simple process to get the tool to rotate. Cord was wrapped round the tool and each end tied to a stick. By drawing the stick backwards and forwards the tool rotated and could be used for drilling. If the cord was wrapped around the material to be worked on, the work itself rotated and a tool could be applied to it to produce a crude lathe. Such primitive tools were still in use when I served in the Middle East in the 1940s and, no doubt, were still in use many years after that! The operators were very skillful but I must confess I could not master the art . . .

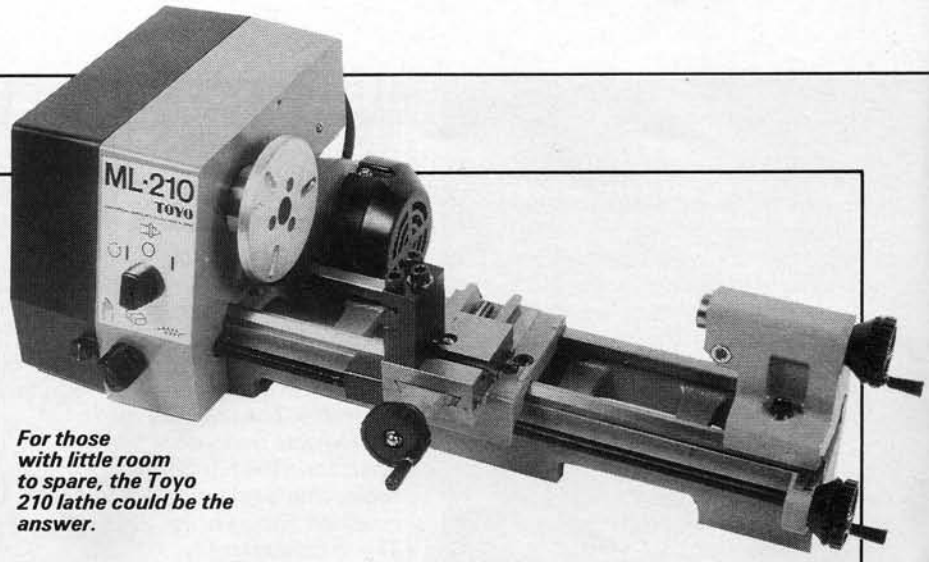
So what of machinery for the model engineer? The lathe will be the prime tool. We can turn all sorts of shapes on it even though its basic function dictates that it turn round items only. The lathe will, in fact, do a great deal more than this and can be used in all manner of ways to shape metal. It is, without doubt, the most useful machine a model engineer can own. Our lathe can be used for drilling but the ownership of a vertical drilling machine gives an added dimension to the workshop. It need only be an electric drill of the DIY type on a stand or it can be an advanced one with various adjustments. It is very useful either way because it is convenient. When it comes to accuracy, however, the lathe is still the best tool to be used for drilling holes.

'Milling' is the term applied to the operation of holding the work and allowing a rotating cutter to come into contact with it; in other words, the

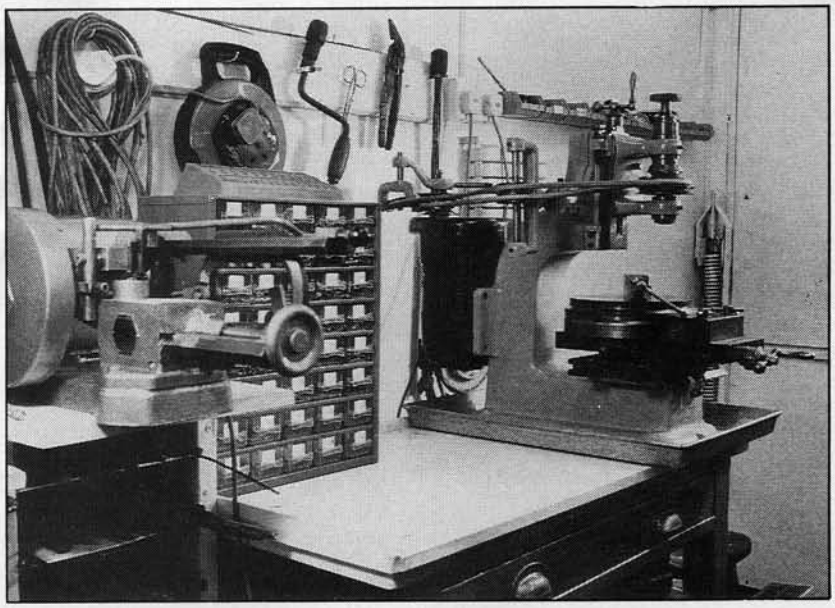


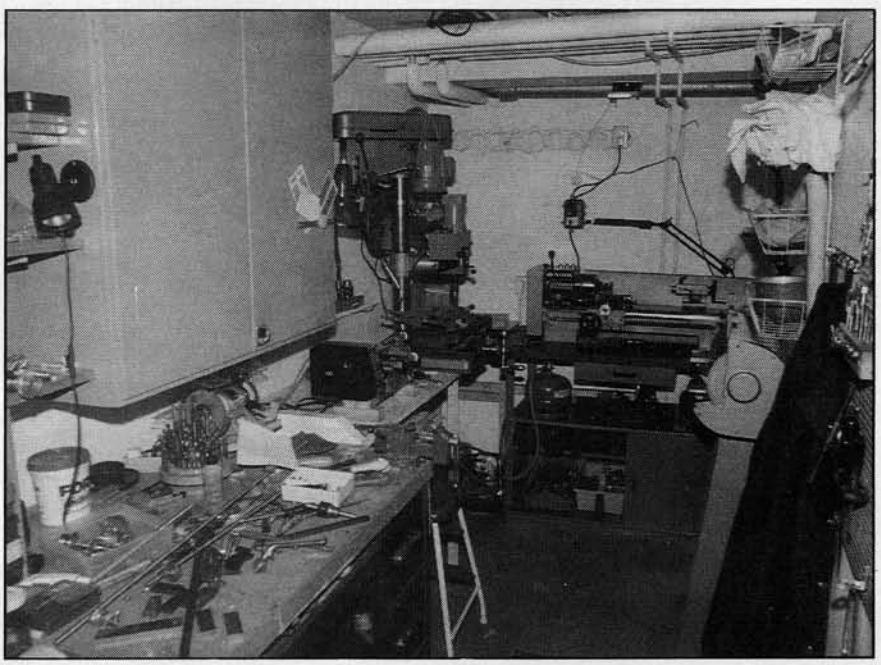
Big milling machines, like this splendid example by Warco, are not essential amateur workshop requisites but if you've got the room, the cash and the modelling bug badly enough such equipment will open up limitless possibilities . . .

WORKSHOP REQUIREMENTS



For those with little room to spare, the Toyo 210 lathe could be the answer.



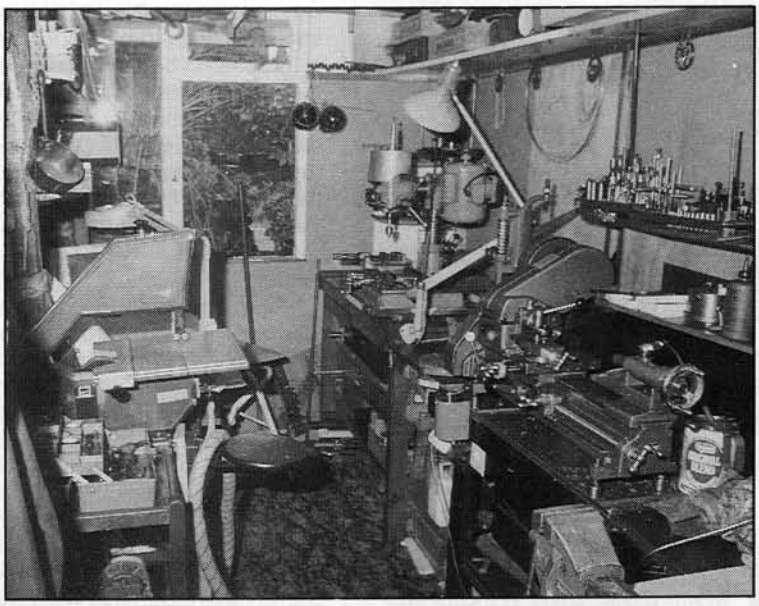


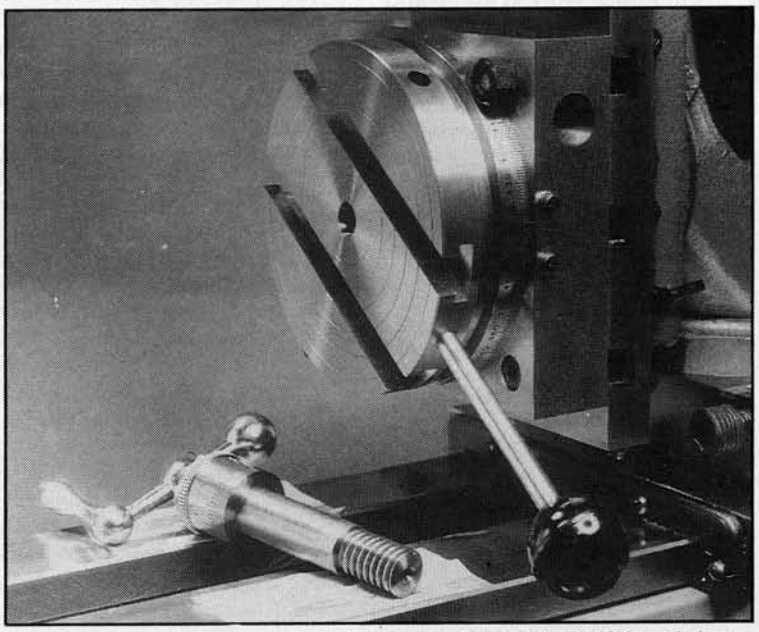
reverse of normal lathe operations. By mounting work where we usually put the tool and positioning a cutter in the lathe chuck, we can, in fact, mill with our lathe. Many model engineers do just that and have never had anything more advanced with which to do such work. It is a standard practice but one must wonder who ever had the bright idea in the first place! We can buy or make a vertical slide that allows the work to be moved in another direction and so make the lathe even more universal as a milling machine. These days many model engineers have a proper milling machine and this also adds to the workshop's versatility.

So much for our workshop. But what does the model engineer make? As the name implies, basically he or she makes models and usually they are models of machinery or transport from the past. Some do the opposite and try to advance science by experimentation, but these days there seems to be less and less such individuals about. This 'Special' will, I hope, serve as inspiration by showing the enormous variety of models that can be built, give some advice on how to make them and show how the originals have developed over the years. We have, of course, all learnt something about our industrial past, but I wonder how many have looked at it in direct relationship to modelling.

One theme will keep on recurring throughout the following chapters and this is steam. I make no apologies for its continual appearance. The discovery of steam power was the single major development which has brought us to our present state of civilisation. No matter what branch of industry we look at, steam plays a vital part – the only possible exception being clockmaking. We must, therefore, keep referring back to steam, its power and its uses. This does not mean that the 'Special' will be entirely devoted to that subject by any means but it will play a major part, as indeed it has in our history.

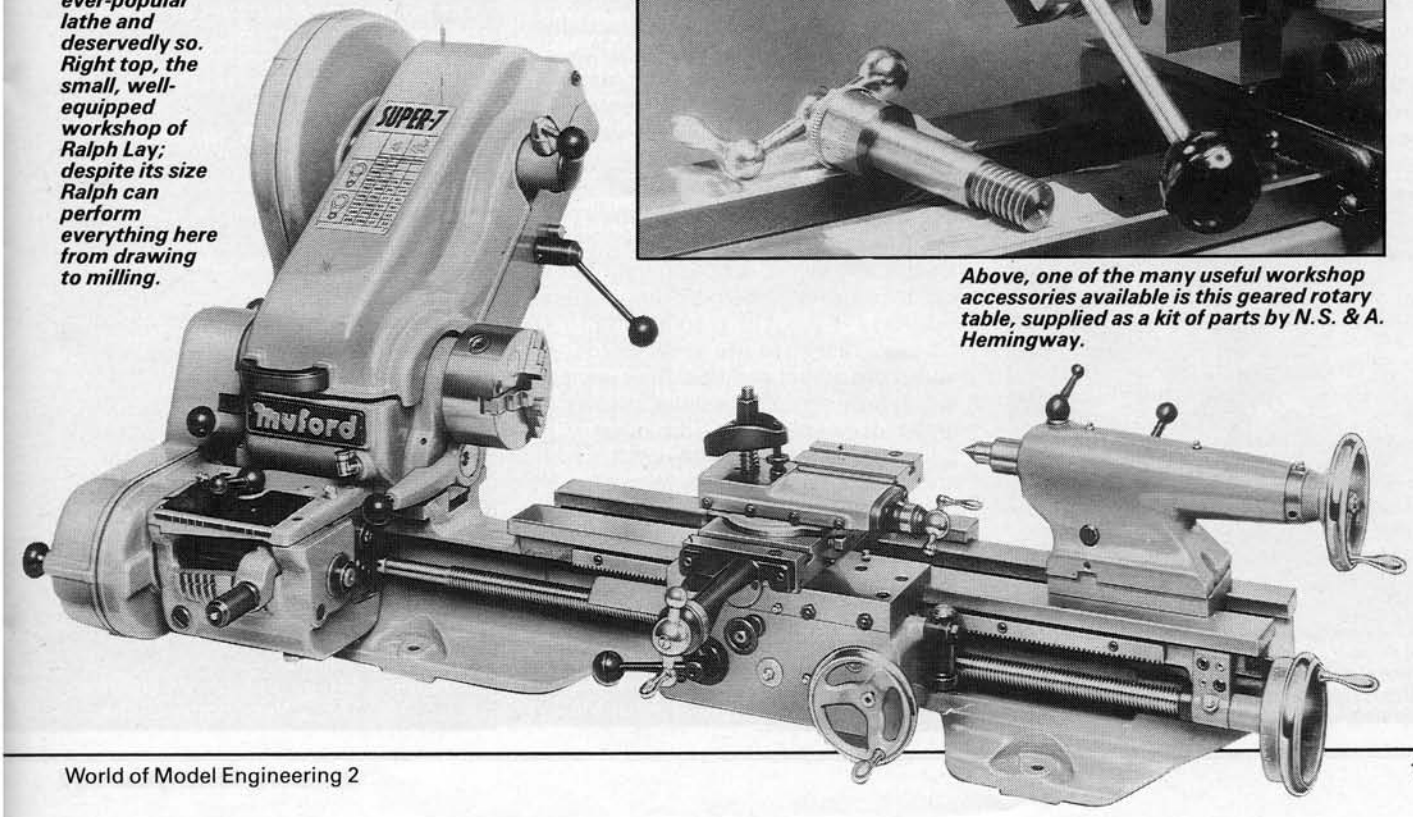
A typical, reasonably, priced drilling machine capable of performing most drilling work that the model engineer is likely to require.





Left centre, a corner of Model Engineer magazine editor Ted Jolliffe's workshop. Left bottom, the small, compact workshop of Swedish modeller Arnie Harltburg. Right, the Myford Super 7 – an ever-popular lathe and deservedly so. Right top, the small, well-equipped workshop of Ralph Lay; despite its size Ralph can perform everything here from drawing to milling.

Above, one of the many useful workshop accessories available is this geared rotary table, supplied as a kit of parts by N.S. & A. Hemingway.



SOCIETY NEWS

One way of getting into to the hobby is by joining a club or society; here's what's involved.

There is little doubt that the vast majority of enthusiasts engaged in our hobby work at home and possibly share their hobby with just their family and a few friends. They are perfectly happy in what they do and have no desire of contact with other model engineers. Others wish, for one reason or another, to become a member of a club or society and these days there are many organisations of this type scattered around the country.

I doubt if there is now a decent sized town that does not have its model engineering club and some have more than one. Overseas, the pattern of club activities varies from country to country. North America, Canada, Australia, New Zealand and South Africa have numerous clubs and societies catering for the model engineer. On the continent and in other countries there are some societies and signs that the movement is increasing but activities are certainly not as well organised as they are here. Frequently, the overseas club will, in fact, be at the home of a model engineer and his facilities will be the club's facilities. There are various reasons for this but things are moving towards the British style of activity.

A typical scene on a club track; this is Ron Hughes with his 7.1/4in. gauge Great Northern saddle tank on the Hull Society's track.

What does a club do and is there any advantage in belonging to one? That is a very difficult question to answer and it will depend largely on the individual as to whether there is any real advantage in joining a club or not. Some societies cater for all aspects of the hobby, from small scale railways and passenger-hauling ones through boating and flying activities and, possibly, model car work as well. Some have extensive workshop facilities for use by members. Other clubs are not so broadly based; a very large percentage are virtually confined to running live steam passenger-hauling locomotives and the facilities consist mainly of a track of some sort or another. This is fine for the builder of such models but not a lot of use to the person who likes building stationary engines. Even so there can be advantages in joining such a society as nearly all clubs organise talks and lectures and a great deal can be learned about machine operating from these. There is also the possibility of conversing within the society with someone with a greater knowledge than oneself and learning more about the hobby in that way.

A very popular activity within most societies is known as a 'bits and pieces evening'. It doesn't sound terribly exciting but, in fact, it can be a fascinating event. Any club member can take along something he or she is making and put it on display; the builder is asked to say a few words about the object and how they went about making it. Discussion follows and a lot can be learnt from other people's ideas on the subject. It is the sort of activity where any form of modelling is welcome and it also has the effect of encouraging production and of raising the standards of all concerned. Frequently auctions are held where members bring along surplus items for sale and this is a good way of adding to one's tool kit and, at times, odd castings, etc., become available.

Some clubs keep a stock of popular sizes of metal which they purchase in bulk and then re-sell to members at a far cheaper price that they can be bought elsewhere. Many have a library from which books can be borrowed and some keep a stock of drawings. Most organise outings, either to visit other clubs or to places of interest.

The opening of a new club track is both a happy and exciting occasion.

U.K. NATIONAL AND REGIONAL ORGANISATIONS FOR MODEL ENGINEERS

The Society of Model and Experimetal Engineers.
Marshall House, Wanless Road, London, SE24.

The Southern Federation of Model Engineering Societies.
Chairman, Mr. B. Thompson, 35, Rivershill, Watton at Stone, Ware, Herts.

The South Western Association of Model Makers.
Secretary, Mrs. P. Ambler, 8 Trevanion Road, Liskeard, Cornwall, PL14 3QN.

The Northern Association of Model Engineers.
Secretary, Mr. Bryan Cantwell, 19 Sunningdale Road, Cheadle Hulme, Cheshire, SK8 6PB.

The National 2.1/2in. Gauge Association.
Secretary, Mr. P.W. Wiese, 327 Billing Road East, Northampton, NN3 3LL.

The Association of Model Engineers Northern Ireland.
Secretary, Mr. W.J. Gilles, 28 Glen Road, Comber, Co. Down, Northern Ireland.

The Association of 16mm Narrow Gauge Modellers.
Secretary, Mr. E. Hodson, 25 Norman Road, Tall Trees, Penkridge, Staffs,

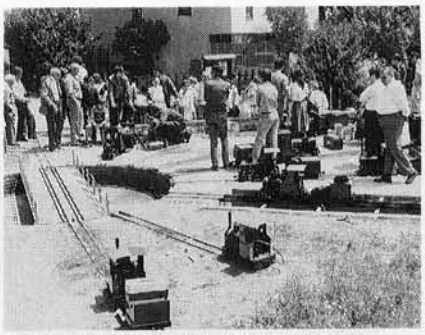
Clubs do not run themselves, however, and any society is only as good as its members. It is necessary that members put something back into the club in one way or another. Usually it is by helping out with the live steam operations or on maintenance work on the track or buildings. Most societies have a very small subscription paid annually and rely on other activities for fund raising.

For those with special interests there are a number of national organisations who cater to specialists. There are, for example, organisations for the smaller gauge railways, and also a 7¼in. gauge society. For the clock enthusiast there is the Horological Society and the Stuart International Model Engineers' Club caters for those with a leaning towards stationary engines – although, not surprisingly, with a slight bias towards models by Stuart Turner.

There is also an organisation for those interested in model steam road vehicles. All the above national organisations produce newsletters and the information in these is designed to aid the member with that specific branch of the hobby. Many produce what amounts to a well-designed book and some, like the Gauge One Model Railway Association produce a massive newsletter once a quarter which contains enough information to keep a member occupied for the next three months!

There are also organisations in the form of the Southern, Northern and Midland Federations of Model Engineering Societies to which the various clubs belong. These organise events, publish newsletters and take care of such matters as insurance. Although not available to individual members they very much form part of the club scene.

Before joining a club it is as well to make contact and ask if you can go along for a while without joining. It may be just what you are looking for



Busy club scene of turntable and steaming bays; club is the Madrid Society in Spain.

or, on the other hand, may not and there is no point in joining and then finding out that it does not suit you. For example, some societies have to open their tracks to the public every week at least once, and some more than that. This means that members often have to be put on a club rota for work at the track and such an arrangement does not suit everyone, but may be a necessity in order to keep the club running. ■

SOME USEFUL ADDRESSES

ST18 5EX.

The Gauge "O" Guild.
Secretary, Mr. P.G. Honey, 7 Sawmill Cottages, Black Park Road, Slough, Berks, SL3 6PS.

The Gauge "1" Railway Association.
Secretary, Mr. B. Hines, 3 Coniston Close, Felixstowe, Suffolk, IP11 9SW.

The Guild of U.K. Meccano Modellers.
Secretary, Mr. David B. Nye, 129 Allenby Road, Southall, Middlesex, UB1 2EZ.

The 7.1/4in. Gauge Society.
Secretary, Mrs. B.Whisstock, 149 Surbiton Hill Park, Surbiton, Surrey, KT5 8EJ.

The Society of Ornamental Turners.
Secretary, Mr. P.J. Holden, 17 Chichester Drive East Saltdean, Brighton, BN2 8LD.

Midlands Federation of Model Making Societies.
Secretary, Mr. R.E.G. Humphries, 71 Rosemary Cresc., Woodsetton, Dudley, West Midlands, DY1 3RS.

The Model Steam Road Vehicle Society.
Secretary, Mr. Graham Gardner, 24 St. Michaels Road, Warden Hill, Cheltenham, Glos. GL51 5RR.

Model Horse Drawn Vehicles Club.
Secretary, J.B. Pearce, 4 Heron Drive, Westgate, Morecambe, Lancs.

Tramway and Light Railway Society.
Secretary, H.J. Leach, 6 the Woodlands, Brightlingsea, Colchester, Essex, CO7 0RY.

MODEL ENGINEERING ORGANISATIONS ABROAD

Australian Association of Live Steamers.
President, Mr. B. Glovert, 31 Spinks Road, Corrunal 2518, New South Wales, Australia.

International Brotherhood of Live Steamers. (Canada).
Secretary, Mr. J.R. Kerr, 65 Lanark Street, Winnipeg, Manitoba, R3IK8, Canada.

International Brotherhood of Live Steamers. (European).
Secretary, Mr. Rob Van Dort, 't Veer 51, Leek, Holland.

Brotherhood of Live Steamers. (Pacific Region).
Secretary, Harry L. Dixon, 22075 Betlen Way, Castro Valley, California.

Hong Kong Society of Model and Experimental Engineers.
Secretary Mr. P. Morris, G.P.O. Box 13404, Hong Kong.

Mini Rail Corporation.
Secretary, Seymour F. Johnson, 3030 Vista Linda, Montecito, California, U.S.A.

MISCELLANEOUS ORGANISATIONS – AIRCRAFT, BOATS, CARS

British Radio Car Association.
Mr. Geoff Lindstrom, 6 Park Way, Queensbury, Bradford, W. Yorks, BD13 2HJ.
Tel: 0274 883986.

Model Yachting Association.
Mr. R. Potts, 8 Sherard Road, Eltham, London. SE9 6EP.
Tel: 01-850 6805

Model Power Boat Association.
Mrs. A. Williams, 489 Canterbury Way, Stevenage, Herts.

Society of Model Aeronautical Engineers.
Mr. R. Nudds, Kimberley House, , 47 Vaughan Way, Leicester, LE1 4SE.
Tel: 0533 518500

Society of Antique Modellers.
Mrs. A. Wiggs, 32 Oakridge Avenue, Radlett, Herts. WD7 8ER.

Large Scale Model Assoc.
Mr. L. Rawle, "Tonawanda", Berry Lane, Chorleywood, Herts.
Tel: 09237 20511

British Association of Radio Control Soarers.
Mr. A. Cooper, Hillcrest, Top Road, Wingerworth, Chesterfield, Derbyshire. S42 6RQ.

Scottish Aeromodellers Assoc.
Mr. J.E. Glen, 5 Brownhill View, Bonkle, Wishaw.

STATIONARY STEAM

'Stationary steam engine' seems a somewhat odd term to use about an engine that is anything but stationary. The reason it is used is to differentiate between the engine that remains in one place to do a job of work and that which forms part of some form of transport such as the traction engine, locomotive, etc. I suppose we are just talking about plain steam engines. The invention and development of the steam engine really took man into the industrial revolution and changed the way we live forever. Perhaps we shall see a similar situation with a new technological revolution, but who knows . . .

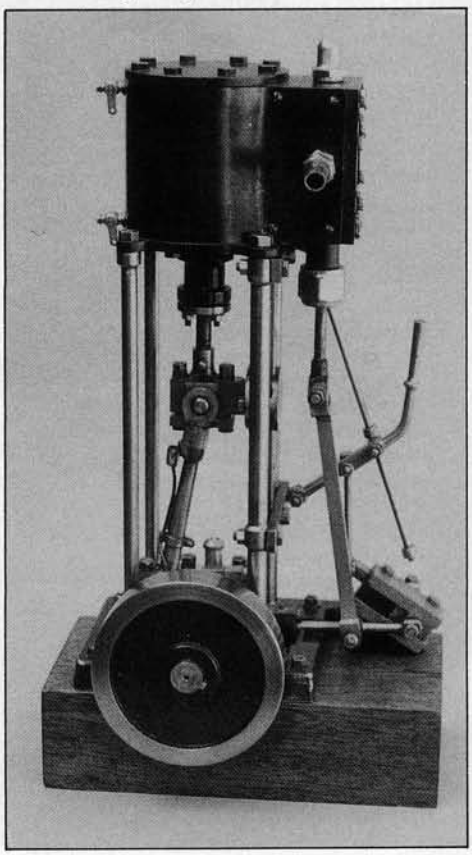
Nobody knows who invented the steam engine but certainly many people experimented in an attempt to harness the power of steam and to get it to work for man. In the first century A.D. a man called Hero made what amounts to a small steam turbine. Whether or not the power it developed was harnessed we do not know but the design was practical if somewhat crude.

The first recorded use of steam power was for pumping, and possibly the first steam pump we have details of is one built by Thomas Savery. The engine depended on the simple principle that a cubic measurement of water makes some ten or twelve times that amount of steam. The system was to fill a container with steam and then to spray water on the container and so convert the steam back into water. A partial vacuum was so created. From the container a pipe went to a well and, if a tap was opened, the water

These models represent another major area of interest for the model engineer.

then rose up to fill the space vacated by the steam.

This idea was to be the basis of steam engine operation for some years to come and various engineers worked on developing the system. One of these was Thomas Newcomen in whose works many engines were made for pumping water. All of these relied on a rocking beam and are known as 'beam engines'. Newcomen was later joined by James Watt. For some reason many people think of Watt as the inventor of the steam engine. The story goes that he sat at home watching the kettle and realised the lid was being lifted by steam and then went out and invented the steam engine!



Watt did, however, carry out many improvements on the engines built by Newcomen and, as such, had a significant influence on steam engine development. At this stage steam engines were operated on a boiler pressure of two or three pounds per square inch and relied more on the difference in air pressure than they did on the steam pressure itself.

Later developments by engineers, including James Watt, made use of higher boiler pressures and generally increased the efficiency of the steam engine. We were still at this stage only seeing the engines used for pumping water and they were still heavy beam engines that literally had to be built into an engine house, the house itself often forming part of the engine construction.

Many of these engine houses still survive, particularly in Cornwall making the Duchy seem almost the home of the pumping engine. However, this is not the case. There were many fine Cornish engineers and later they were to work on and