MODEL ENGINEER

Vol. 200 No. 4326

23 May - 5 June 2008

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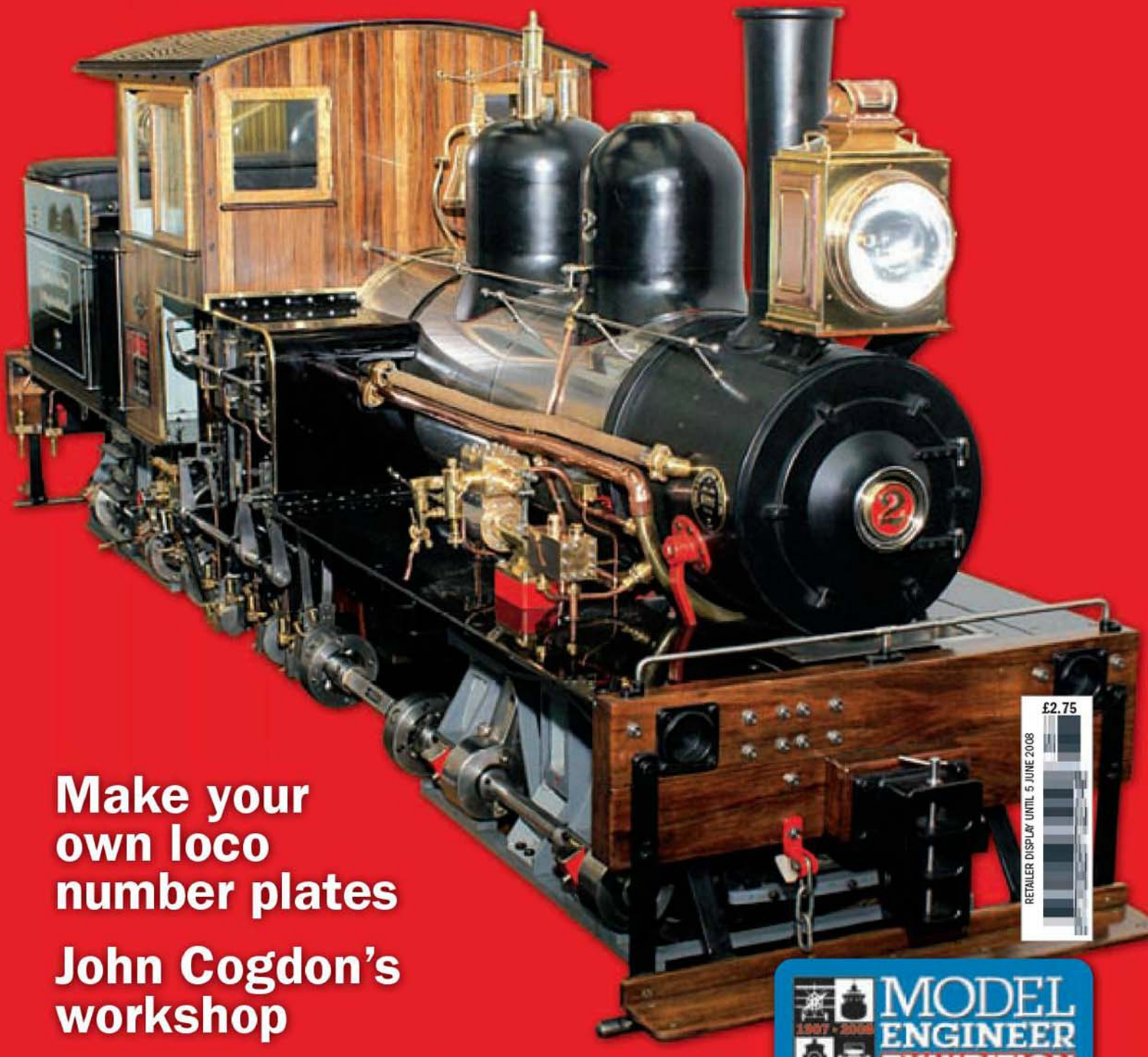

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IN THIS ISSUE

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ON THE COVER...

The magnificent Shay locomotive built by Ron Etter in South Africa on show at last year's Centenary Model Engineer Exhibition at Ascot. Locomotives will figure prominently at the 2008 event, including more great locomotives from South African builders, mainly of powerful local prototypes.
(Photograph by Michael Jones)

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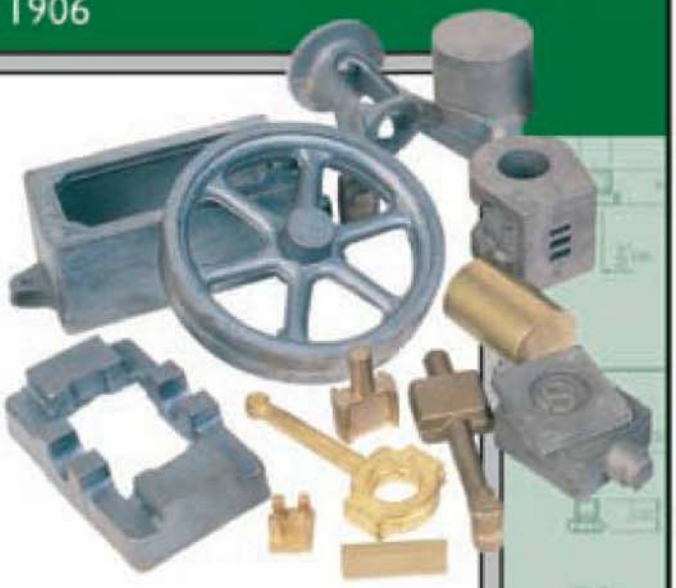

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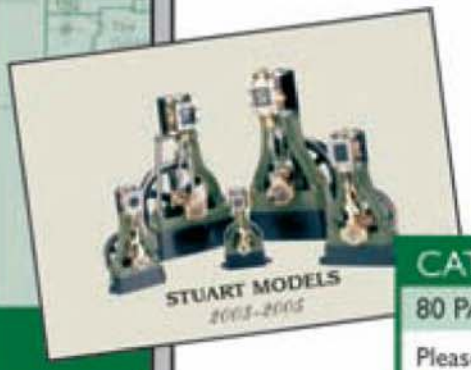

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Road steam bonanza

Melton Mowbray & District Model Engineering Society's inspirational annual steam rally will be held on Saturday and Sunday 7th and 8th June this year at Whissendine Sports Club, Melton Road, Whissendine near Oakham in Rutland. This rally is almost certainly the largest rally of its kind in the country.

No less than 90 miniature steam road vehicles (traction engines, rollers and wagons) are expected, ranging in size from 2in. scale up to half-size, together with two full-size steam wagons and a steam roller. The emphasis will be on engines working, and giving demonstrations and rides around the grounds.

One of the highlights is the road run into the village - twice on Saturday and once on Sunday. These are great opportunities to see the engines working.

More than 20 railway locomotives have been also booked in and will have the opportunity to run on the society's multi-gauge ground level track, again giving rides. In addition there will be an exhibition of model engineering and model aircraft, with some trade stands.

Refreshments will be available throughout the weekend (and the bar will be open at certain times). The event will be signposted from the A606 Melton Mowbray to Oakham road.

Admission to this super event is free. Definitely one for your diary.

Moving business

Kevin Hunter is a self-employed machine repair engineer and safety product engineer/ supplier. He started out as a hobby engineer but turned his hobby into a business as a machine repair engineer.

Readers may be interested to know that he has started a machine moving business using a 3.5 ton flatbed vehicle, fitted with a 1.2 ton lifting crane, that is ideal for getting down domestic driveways.

This service includes getting the machines out of the workshop and transporting them to the new site and getting them inside where the customer requires them. Most items will be collected and delivered the same day depending on mileage and time.

Kevin tells us he has public and product liability insurance, including goods in transit, for customers' peace of mind. Part/ shared loads and half days are sometimes possible depending on the daily schedule.

Kevin also offers to find machinery and parts and he is thinking of offering a second-hand machinery parts operation to compliment the machine moving service.

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Exhibition dates

In issue 4324 we caused some confusion over the dates for the 101st International Model Engineer Exhibition at Ascot. The full correct dates are:

Wednesday September 17 – exhibition build up and delivery of competition entries.

Thursday September 18 – exhibition build up continues.

Friday to Sunday September 19 to 21 – exhibition open to the public.

Competition entry forms must be returned by September 3.

You can find an entry form on page 641 in this issue.

Auckland beam engine restored

On Saturday April 19, a re-opening ceremony was held to mark the impressive restoration of the 1877 John Key double Woolfe compound at the Museum of Transport and Technology, Western Springs, Auckland. The engine has been completely overhauled and restored to run on steam.

The red ribbon was cut by the Prime Minister of New Zealand, Helen Clark, who then opened the valve to start the engine in motion. This engine last ran on steam more than 80 years ago. The return to steam marks the culmination of the work of a number of team over the years, most notably a team led by Warren Green between 1978 and 1988, and the current team led by Ken Pointon over the last three years. The current team includes members from the Auckland Society of Model Engineers, and the Auckland Steam Engine Society. Warren Green's team carried out an initial restoration, including un-seizing the engine and setting up an electric motor to turn it. Ken Pointon's team has built on the work of the earlier team by overhauling the valve gear, building a steam range to reduce the available steam supply to a suitable pressure, and providing a cooling tower and pipework to enable the jet condenser to operate.

Ms Clark also presented scale replicas of the control valve stands to the team leaders in recognition for their efforts over the years. Members of the restoration team and museum staff turned out in period costume for the occasion, and a good number of the general public came along. The engine ran for around four hours during the afternoon.

Some vital statistics: High pressure bore 26in. Stroke 60in. Low pressure bore 42in. Stroke 84in. Crossheads are used rather than parallel motion. Flywheel diameter 20ft 6in. Weight 16 tons. Beams 24 feet long. Power 300 HP. Operating speed 15 rpm. Pumping Capacity 3 million gallons per day. The engine was constructed by John Key and Sons of Kirkcaldy in the Kingdom of Fife.

Restored Auckland engine.

Sugar locomotive

SIRS, - Having recently acquired a partly-built example of the 2½in. gauge 0-4-0 tank locomotive *Sugar* designed by Rex Tingey, its construction having been serialised in *M.E.* back in 1978, I would be interested to find out if any other examples were ever constructed to the point of completion because being of a rather unorthodox design, (with moving sleeve valve-cum-cylinders as the most prominent novel feature) I question some of the other features of the design.

I have all the back issues of *M.E.* covering the series and find the situation is not helped by the omission of any sub-assembly drawings and certain dimensions from the odd detail. And for what was intended to be a simple, beginner's engine, Mr. Tingey's writing style was not as helpful as say that of 'LBSC'.

As I would like to complete this model, I would be most interested to hear from others who may have successfully completed and operated a *Sugar* - especially with regard to any modifications they may have made, as such information may save me from going over the same ground.

R. G. Pender, Gloucester.

Realistic cooling fins

SIRS, - While realising that I may well stir up a good deal of controversy, I feel I must finally put pen to paper about something that has been niggling me for many years - cooling fins on model air-cooled internal combustion engines.

I have been an avid motorcyclist for over 30 years and have a deep appreciation for the aesthetics of air-cooled engines, but whenever I see pictures of models of such engines, I find that the non-scale appearance of the fins spoils the overall effect and just looks wrong.

For reasons of efficient heat transfer as well as ease of casting, on full-size engines the fins were always much thinner than the air-gap between them, and tapered from root to tip.

On the models, they invariably look too thick and square. Of course I appreciate the difficulty in machining such components from solid, but feel sure that a suitable tapered cutter could be ground. A well-taken photograph of a scale model should be hard to distinguish from full-size, but with this anomaly, a model of a motorcycle engine is instantly identifiable as such - a real pity, as in every other respect these models are truly outstanding.

Jonathan Ryder, London.

Hacksaw use

SIRS, - I totally disagree with Mr. Buxton's ideas on the subject of round handle hacksaws (*Postbag M.E.* 4320, 29 February).

In my years of teacher training I was one of 1250 at college during the period. One of the training objectives was a consistent standard and a strong reason why traditional craft teachers were such a powerful group within schools. My later industrial experience added nothing as the age of using hand tools had faded away.

The reason for round handle hacksaws is that they are cheaper. Suppliers are sometimes wonderfully inventive in sales talk and such myths as inline and like a bread knife or file are invented. Phrases such as "You know how fast you can cut bread sir, think what you could do with steel!" have a magical doping effect on judgement values. A file like handle used on a hacksaw puts considerable local pressure in the palm and will cause aching hands quite quickly. Any repeated local pressure on hands can result in deformities that may lead to loss of use. Thumping a chuck key with the heel of the palm for example is not something to be repeated day in, day out. If you have a hard ball growing in your palm stop now and see a doctor.

A pistol grip type handle spreads the load and allows blade orientation to be judged and easily guided. A guiding forefinger can be extended to amplify feedback in common with correct use of a tenon, dovetail, crosscut or rip saw. One does not saw straight, there is a constant changing of direction as a skilled person follows a line. If it was possible for a saw to inherently cut absolutely straight and square then a blind man can easily prove it by following a marked line. Very small saws with equally light loading are better with a round handle. This is not the same situation at all, nor is a file handle.

I have only one pistol grip file used to dress curved metal such as automobile panels. Skilled use of files is quite different from hacksawing and easily deduced by the different form of the handle.

Ron Wallman, Fremecourt, France.

BA thread sizes

SIRS, - Although the odd sizes of BA were phased-out during the 1930s, taps and dies for these are still freely available and of great use to the model engineer.

I believe LBSC used the odd sizes because it is possible to thread directly on to stock material with 5, 7 and 9BA although, of course, with no great degree of precision (as LBSC would have pointed out – it's good enough for most purposes but don't tell Inspector Meticulous!). The same also applies for 0BA and 3BA but using 6mm and 4mm metric stock - which is now available in most DIY stores in both brass and steel.

The application is very useful when making pins etc. for valve gear, stays, supports etc. where great precision is not necessary. Additionally, the taps and dies which are available in the trade are normally made of high-speed steel as opposed to the ME sizes (40 and 32tpi) which are made from carbon steel - so when making up these items identified above one's precious ME size dies are spared the work!

I dare say most model engineers are aware of the above but the information

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may be worth reiterating for the beginner.

I list the BA sizes below which can be cut directly on stock material:

0BA 0.236in. dia. 6mm stock (0.236in.)
2BA 0.185in. dia. 3/16in. stock (0.1875in.)
3BA 0.161in. dia. 4mm stock (0.1575in.)
5BA 0.126in. dia. 1/8in. stock (0.125in.)
7BA 0.098in. dia. 3/32in. stock (0.094in.)
9BA 0.075in. dia. 1/16in. stock (0.063in.)

Finally, the practice of making BA bolt heads one size smaller may be desirable for modelling standard gauge locomotives etc. in scales up to 5in. gauge, but I believe the correct head sizes look better in the larger scales.

Terry Holland, Malaga, Spain.

A mixed bag

SIRS, - Several points arising from items in *M.E.* 4320, 29 February 2008:

1) Small Whitworth threads - John Wilson suggests 5/32in. was a special size. However, I have a set of small taps and dies - 1/8in. x 40, 5/32in. x 32, 3/16in. x 24, 7/32in. x 24 and 1/4in. x 20 all marked 'Whit.' or 'BSW'. Interestingly all are also marked 'P&W, Conn, USA'. They were passed on to me following the death of a fellow member of Taunton Model Engineers some years ago.

2) Boiler Bands - Neville Evans refers to the joints being sometimes on top, or underneath. In fact GWR practice was to put the barrel band joints underneath, but fitting to the firebox required the joints to be on top. All are adjustable to pull the cleading in against the crinolines - the frames supports off the boiler/firebox surfaces.

3) Stowe Chimney - The four holes in the rim of the chimney Neville refers to are not lifting holes, but core holes. The rim was cast hollow, the necessary sand core being extracted through these holes when fettling the casting. Lifting of chimneys in the works was normally by means of a rope or chain sling around the body under the rim.

Mike Johns, Taunton.

2-phase supplies (1)

SIRS, - I read with interest the letter from Adrian Parker (*M.E.* 4322, 28 March 2008) on 3-phase electrical supplies. He says that as far as he is aware rural 2-phase supply systems suggested are mythical. Perhaps the following, while not strictly 2-phase, may be of interest.

In the early 1980s I was given the job of installing a fish fryer in a rural school kitchen in a village on the Suffolk/North Norfolk border. When I opened the 3-phase fuse board in the kitchen I found to my surprise only two fuse banks and the usual neutral bar. Tests revealed that there was 250v between each fuse and neutral but between the two banks of fuses there was 500v present.

The village was supplied from a pole transformer just across the road from the school, with a pair of binoculars I was able to read the rating plate of the transformer and found the primary was supplied with 11Kv. but the secondary was 250 - 0 -250.Later I was able to ask a friend who was an engineer with the supply authority and was told that this was quite a common form of supply for rural areas

John Goddard, Suffolk.

2-phase supplies (2)

SIRS, - In spite of the statement by Mr. Parker (*M.E.* 4322, 28 march 2008) I can assure him that 2-phase motors do exist. Whether they are still readily available is another matter, but they certainly existed in the past.

In my hometown, the electrical supply was originally generated locally and was 2-phase, 4 wire system, phases at 90deg. with line to neutral voltage of 240 volts and phase-to-phase of 340 volts.

Later the power was bought in bulk from the CEGB. It was supplied as 3-phase, and fed into Scott-connected transformers to produce the 2-phase for distribution. Any factory using electric motors then promptly used another Scott-connected transformer to get back to 3-phase! This was in the 1930-1940s.

What the current situation is I have no idea, not having lived in the area for over 50 years. In rural areas where there is light loading it seems to be common just to distribute one phase, and then convert to 230 volts at point of use. I very much doubt that they would use two of the phases; this would necessitate using three wires instead of the two for single phase.

E. Boardman, by email.

2-phase supplies (3)

SIRS, - I read with interest the letter from Adrian Parker (*M.E.* 4322, 28 march 2008) in which he mentions rural networks. While I would agree that the main line would be 3-phase at 11Kv or 6.6Kv, any number of 'spurs' may be taken off of the main line which only use two phases of the high voltage supply.

Two types of distribution transformer may be connected to these two wire spurs. The first providing a single phase 240v supply, the second having a centre tapped 480v secondary winding, which provides 2 x 240v supplies and is known as either a two phase, or more commonly a split phase transformer.

Indeed, even on a 3-phase 11Kv feeder, both types may be found connected dependant on the load to be supplied. Having been in the employ of a regional electricity company for over 30 years, I found nothing strange in the mention of 2-phase rural network, as I deal with this type of arrangement almost on a daily basis.

John Stewart-Rixon, by email.

2-phase supplies (4)

SIRS, - In reply Adrian Parker's letter (*M.E.* 4322, 28 march 2008) regarding Eric Clark's Article on 3-phase supplies, he suggests that 2-phase systems are mythical.

Here in New Zealand the power supply grid is, like Britain, a Multiple Earthed Neutral (MEN) system using a mostly 11kV HT and 400V LT 3-phase distribution system.

However, in our remote rural areas the distribution system may be single phase to reduce the cost of the lines, i.e. 11kV between two lines stepped down to a 460V centre tapped (230V + 230V) LT. The centre tap being grounded and brought out as the Neutral. Both phases may be supplied to a customer as a 2-phase (180deg. apart) supply. And yes you can buy 460V rated '2-phase' motors to run on such a supply. They are of course higher voltage rated single-phase motors.

It is also still possible to find, in older premises, instances where two out of three phases have been supplied to the customer. In this case the phase to phase voltage is 400V with each phase to neutral voltage 120deg. apart.

This latter situation lends itself to the use of a rotary converter to supply the missing phase without the need for auto transformers to make up the voltage. One also achieves a true voltage balance about the neutral unlike converters running off a 230V input. One can also run 400V input static inverters to supply standard 400V input 3-phase motors although the inverter usually has to be de-rated by a factor of 50%.

With regard to 230V input static inverters. When operating at line frequency (50Hz here and in the UK) there is no reduction in torque providing the normally star connected motor has been re-strapped to a delta connection, i.e. 230V phase to phase, as the current through each motor phase remains the same. Note, however, that the current per supply phase increases by a factor of 1.732 and that above line frequency torque does reduce as the inverters operate the motors in a constant power mode. Below line frequency the torque remains constant but power reduces in proportion to the RPM.

And my qualifications on >>

the subject, purely practical: I am an electrical technician employed by our local electrical supply company serving a predominantly rural area and a 'converted' user of static inverters in my home work shop.
R. Brett Lilley, N.Z.C.E., EST B.

We have received many letters on this subject, all commenting that 2-phase supplies do exist and are used in many areas. We thank all those readers who wrote in. – Ed.

Balancing turbines

SIRS, - In his series on the steam turbine locomotive, Mr. Southworth mentioned vibration at 16,000rpm. The dynamic balancer used on model jet engines came to mind.

Here is a link to the Gas Turbine Builders Association: http://www.gtba.co.uk/

In the FAQs there is reference to plans for a balancer but the association may be able to put you in touch with the owner of a completed one. The shaft should be balanced as a complete assembly to eliminate any couples.
Colin Binnion, by email.

Small Whitworth threads

SIRS, - The comment by John Wilson (*M.E.* 4320, 29 February 2008) on small Whitworth threads deserves some amplification.

I suspect that the 5/32in. Whitworth size is more common and better known to most engineers than suspected, as it was the size used in the Meccano construction sets. Perhaps more 5/32in. Whitworth screws and nuts have been lost than any other size!
Paul Wiese, by email.

Ewins oil pumps

SIRS, - Reference the comments about Ewins oil pumps (*M.E.* 4323, 11 April 2008). When the piston rises it creates a depression in the cylinder and when the piston clears the top O-ring oil rushes in to fill the void. This is not a 'hydraulic lock' situation, probably the opposite.
Tony Webster, Northants.

Power factor - energy saving lamps

SIRS, – I have been reading Graham Astbury's interesting discourse on energy saving lamps (*M.E.* 4321, 14 March 2008 and *M.E.* 4312, 9 November 2007). This reminded me of a recent difficulty an acquaintance of mine, Graham, was having with trying to demonstrate to his teenage son, by practical measurement, the well known equation:

Watts = Amps × Volts

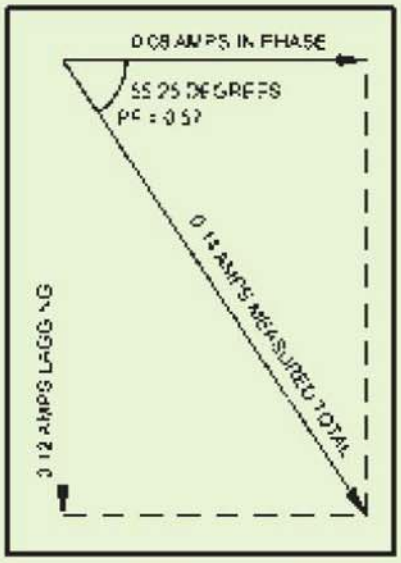
This worked fine with a circuit comprising torch bulbs and a battery, and also with mains incandescent bulbs. But when trying to demonstrate the veracity of the equation with an energy saving lamp, the equation did not seem to hold good. Graham returned his multi-meter to Maplin for exchange as he thought it had developed a fault. I was then consulted when the new meter gave exactly the same results! So I thought it might be helpful for those with little electrical knowledge to explain what was happening especially as it applies to some other electrical devices which are to be found in the model engineer's workshop.

When an alternating voltage is applied to a pure resistance, the current is at a maximum when the voltage is at a maximum and it falls to zero when the voltage falls to zero; or in mathematical speak, the current is in phase with the voltage. But, when the voltage is applied to a coil of wire, namely an inductance, then, assuming that it has zero resistance, the current lags the voltage phase by 90deg. Similarly, if the voltage is applied to a capacitor, then the current leads the voltage by 90deg. It is unnecessary to understand why this is so in order to comprehend what follows.

The cosine of the phase angle is known as the power factor (PF). So when an alternating current is flowing through a resistance, the phase angle is 0deg and the PF is 1. The resistance dissipates power which, in watts, equals volts x amps. However, if an alternating current is flowing through a pure inductance, without any resistance, then no power is dissipated and the PF is 0. In this case, the above equation no longer holds true.

An incandescent light bulb presents almost pure resistance to the supply.

However, some devices, which include most small energy saving lamps, present a mixture of resistance and inductance so that the power factor is somewhere between 1 and 0. The figure shows how the current can be resolved into two parts, that which is in phase with the applied voltage due to the resistive element of the load, and that, which is 90deg. out of phase, due to the inductive element. The figures are for a Philips 20W



Roger Castle-Smith's power factor diagram.

lamp with a supply current of 0.14 amps at 250 volts. The measured power factor was 0.57. The lamp power is 250 volts times the in-phase current component, namely (250 × 0.08) = 20 watts as printed on the lamp! But if the actual input current is multiplied by the voltage the result is an incorrect 35 watts. It will be seen that the current component at 90deg. to the in phase component is 0.12 amps. When multiplied by 250 this comes to 30. This value is often called reactive power or wattless power. A big point here is that although only 0.08 amps is doing anything useful, the electricity supply authority still has to provide 0.14 amps for the lamp. This excess of 0.06 amps is trivial for one lamp and domestic house wiring. But when multiplied by millions of lamps in a town, it would not be so.

Finally, in the workshop context, it is worth mentioning the ubiquitous small induction motor which powers many drills and lathes. When unloaded, my Myford lathe motor runs with a power factor of about 0.22 with a current of 4.36 amps. The actual power consumed is not (250 × 4.36), about a kilowatt, but equals (PF x volts x amps) = 239 watts. As the load increases with a heavy cut, the PF rises considerably as true power is absorbed by the cut. There is a strong lesson to be learned here; namely when calculating the current required for a motor to see if it will plug into a domestic 13 amp socket, the current will be more than is suggested by simply dividing watts by volts. So just remember Watts = (PF x Volts x amps)

Maplin Electronics sell an excellent little device which measures PF, current, watts, volts, amps and some other useful parameters, at a very reasonable cost of £27.99. It is described as a Mains Power and Energy Monitor with an order code L61AQ.
Roger Castle-Smith, Bucks.

McONIE'S OSCILLATING ENGINE

Anthony Mount describes how to make the flywheel.

Continued from page 495 (M.E. 4324, 25 April 2008)

Throughout this series the parts are drawn using First Angle Projection. Let's make a start quite logically with the flywheel. Why logically you ask? Well its in cast iron and it's the dirtiest material I have ever come across. It machines nicely but it contains graphite and, as this is released in the swarf, it coats everything in a grey dust that seems to get everywhere. So I like to get the job out of the way first and then spend the next hour cleaning everything down.

Flywheel (Part 01)

The first thing to do with the flywheel casting, and indeed any casting, is to check it over for flaws and to file off any sharp edges and blemishes with an old file. At this stage it is useful to go over all the spokes and file them flat and smooth and, using a round file, form nice junctions at the ends of the spokes with rim and boss, ready for painting.

The castings are formed with split patterns, which makes casting easy for the foundry. However, the mould boxes are in two halves and are fitted together with locating pins. Over the years these pins wear. Unless the foundry always twists the top box in the same direction on assembly, the finished casting can have a step in it on the joint line. This will need to be filed out at this stage.

The rough casting is shown in **photo 2**. You can see that mine was cast in gunmetal; the foundry was casting gunmetal at the time so, rather than wait for iron, I was quite happy to have gunmetal.

The casting is quite thin, so care needs to be taken to avoid bending it during the machining operations. The casting may be mounted on a large faceplate and to support the spokes a plywood ring fitted inside the rim. The spokes are clamped down onto the faceplate sandwiching the plywood disc between the spokes and faceplate. This gives a rigid setup and there was no danger of bending the spokes and putting strain on the casting.

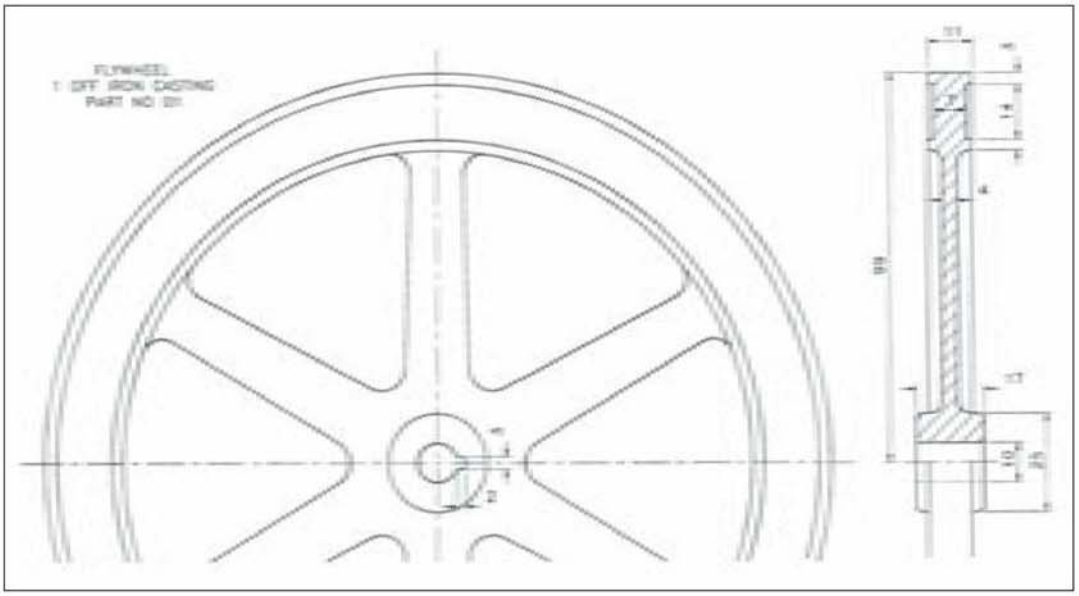
For those with a bigger lathe with say a 125mm (5in.) chuck or larger, the 200mm (8in.) flywheel can be set up in the 4-jaw independent chuck. The whole setup is shown in **photo 3**.

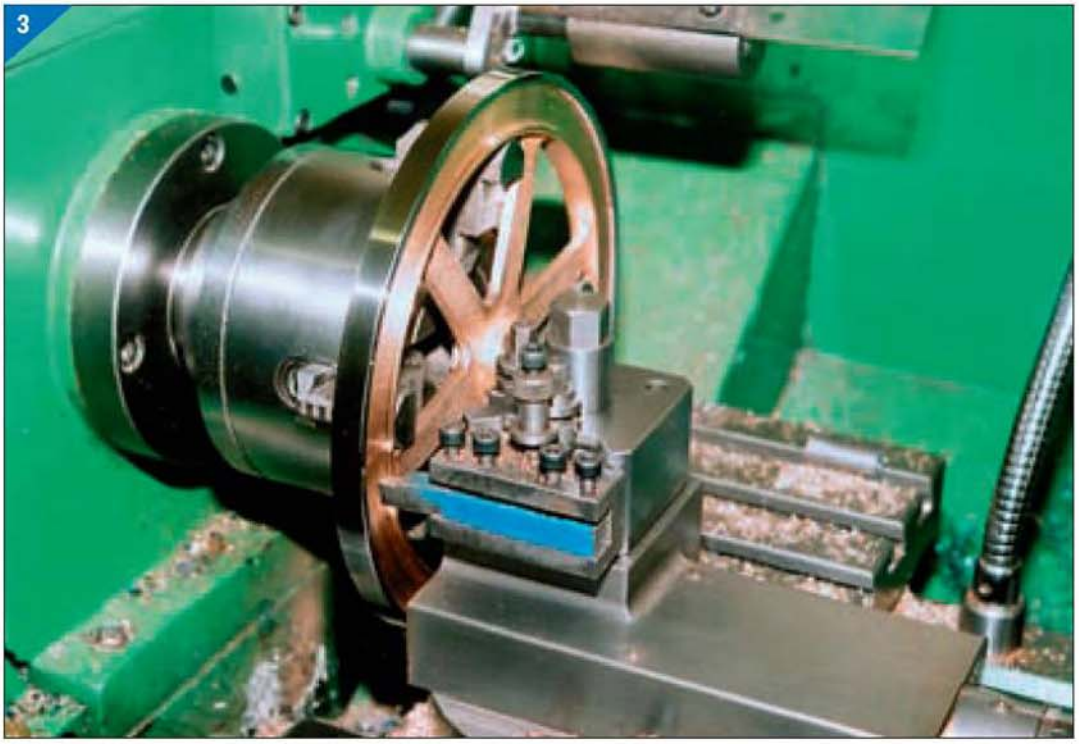

2

It is important to spend time setting up the casting as true as possible. Ignore the outside diameter and concentrate on the inside of the rim or the inner bead. Adjust the jaws by taking readings from the cross slide dial, with a tool brought up to touch the inner rim on opposite sides. Move the casting across the face of the chuck until the dial reading is the same for all four jaws.

Now look at the face of the casting and see how it lies in the vertical plane. Again, a tool can be brought up to the face of the casting and a reading taken in four positions in-line with the jaws. The casting can be tapped back so that it lies flat. Since it is a rough casting, one cannot expect to get it spot-on in all positions, but try for the best compromise. Finally, go round all four jaws and ensure they are tight.

Run the lathe and you will soon see how true the flywheel is running. If you have used a chuck, take a look at the back face and see if that is also running true. Earlier, I mentioned split patterns and joint lines in castings. A consequence of this is that the front face may be running true but there can be wobble on the back face. If it is only slight >>





it can be ignored, as there is enough machining allowance on the casting to true things up. If it is pronounced, say 1mm (0.040in.), then it might pay to split the difference and set the front 0.5mm (0.020in.) out of true so that less material needs to be taken off the casting on both sides to get a true running flywheel.

Now take a cut across the outside diameter of the rim to true it up. This may present a problem. Although we have been casting iron for thousands of years in this country, it is not an exact science and hard spots can occur. When casting the shape of a flywheel, it is often the rim that has a hard spot or skin somewhere.

I always use carbide tipped tools on cast iron and prefer the brazed type for this type of work as they are easily sharpened; the replaceable type are easily chipped and are expensive. When machining my last cast iron flywheel, I had to re-sharpen the carbide tool three times to get through the hard skin and into the soft metal underneath.

Turn the rim almost to the finished O/D. Flywheels are often outside the range of the usual measuring equipment used by model engineers – but does anybody actually check the diameter of flywheels?

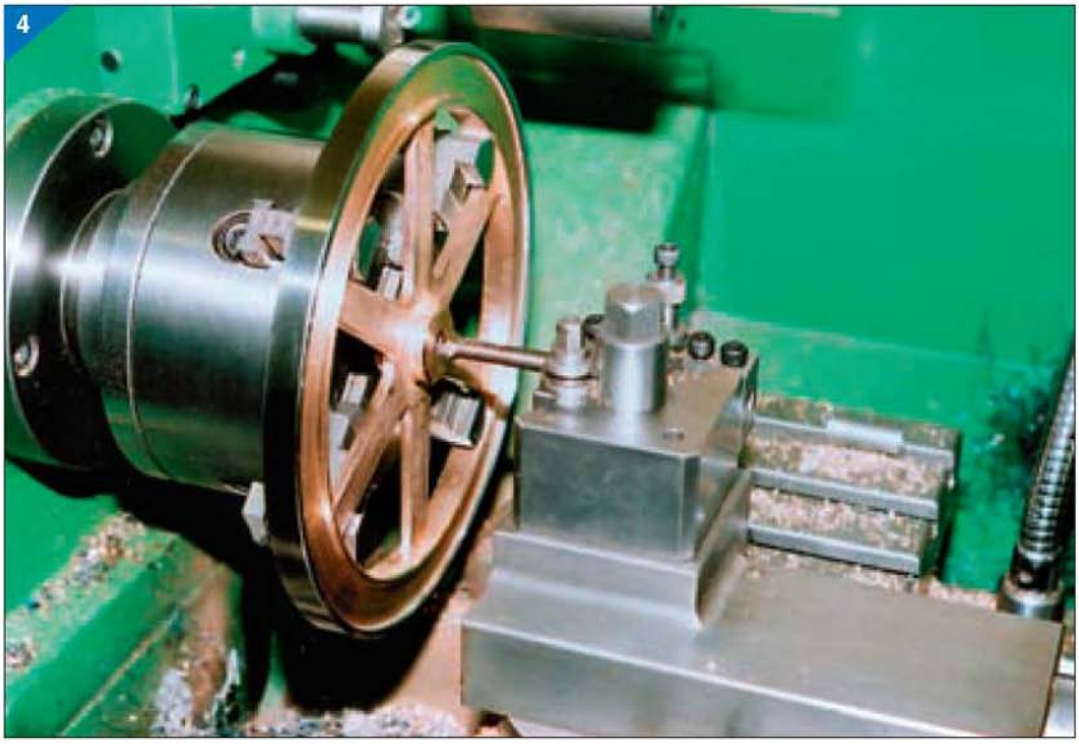
Now take a cut across the face to clean it up, having first measured the thickness of the casting so that equal amounts can be taken off each side. The recess in the rim need not be machined but, for a really good finish, a skim can be taken out of the recess. The boss can now be faced off and a generous chamfer applied.

The next operation is to bore out the flywheel boss for the crankshaft (**photo 4**). As the crankshaft has not been made, use an off-cut of bar the same diameter as the crankshaft as a gauge. Bear in mind that bright mild steel is always made slightly under nominal size, so do not ream the hole, as this will make it oversize.

Centre drill, then drill right through opening out to say 1mm undersize. Then change to a boring tool and proceed to open out in stages to the finished size. Another thing to bear in mind: Most boring tools flex a little and bore a tapered instead of parallel hole; so when nearing finished size, put the tool through three times at the same setting to minimise the spring effect.

With the 'crankshaft' about to enter, take only small cuts to get a nice close fit. If the fit is sloppy the wheel will most likely wobble. Cast iron can also play a trick on you, on the first try you may think you have got a perfect fit, a couple of tries later and the fit will suddenly feel loose. What has happened is that the bore has a coating of fine dust and, after a couple of tries with the crankshaft, you will have pushed out this fine dust and the hole is now oversize. Carefully clean out the bore before you try the crankshaft for fit.

If you are using a chuck, the back of the flywheel rim is exposed and you can machine that at the same setting, which helps towards a true running flywheel. You will see from **photo 5** that I have used a back to front boring tool to get around the rim to the back face. The reason for this is that my cross slide is the type where the feed screw is fixed, hence the movement of the cross



slide is not a great as on those machines where the feed screw moves with the cross slide.

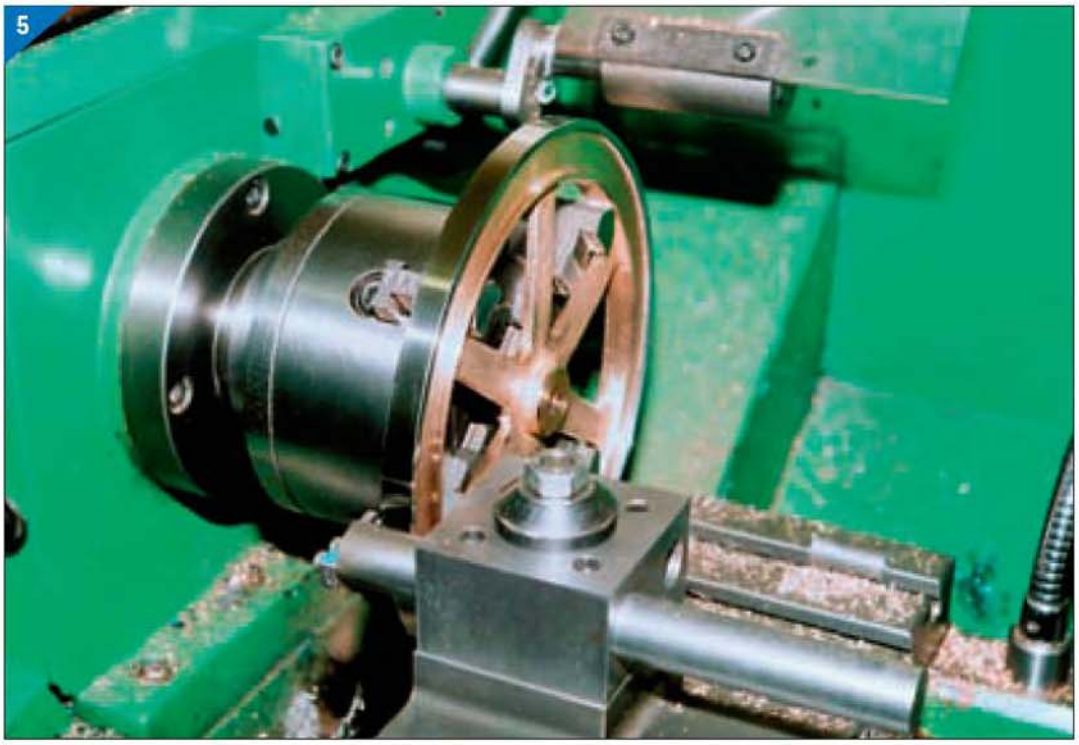
With one side completed, the flywheel can be turned round on the faceplate and re-clamped to it, or clamped to it for the first time if you used a chuck. This time there is no need for the plywood disc, the machined face of the flywheel can go directly against the faceplate. However, the spokes of this flywheel are quite thin and would bend easily with the pressure of the clamps. So, instead of using plate clamps, I turned up a large disc, bored out the centre to clear the boss and drilled a couple of holes in it for bolts (**photo 6**). The pressure of the bolts is then distributed over all the spokes for almost their whole length. Set the wheel to run true, and face off the rim edge and the boss.

The drawing shows a slot in the bore to take a key, and the key is of the saddle type. That is, the crankshaft is parallel and the bottom of the key is concave to fit around the shaft. The slot is made the full depth of the key and there is no need for a slot in the crankshaft. This form of key is simple to make and looks almost correct on the finished model. If you prefer to make the correct form of key, then the crankshaft would need to be increased in diameter where the flywheel is fits. The crankshaft and flywheel would need to be slotted so that half the depth of the key lies in the crankshaft and half in the flywheel (shallower than for the saddle key). The bore in the flywheel would also need to be bigger because of the larger diameter of the crankshaft at that position.

There are several of ways of forming the slot. You can file it if you feel confident with a file, or use a slotting tool if you have one. However, when there is only one keyway required, I usually plane it. To do this set up a 'boring tool' with the cutter ground square to the width of the key and, with the tool on its side, plane the slot taking off a few thou. at a time. The bottom of the slot is tapered 1½deg. to the axis of the hole; the shallowest slot depth is 2mm, and this is on the engine side of the flywheel boss. The slot can be cut using the top slide which needs to be set over at 1½ degrees. Alternatively, most of the slot can be cut by racking the saddle backwards and forwards, and finally the taper cut using the top slide only. It takes a lot of force to cut the slot and only about 0.025mm can be removed at one pass. You will soon get into a rhythm. It took me 5 minutes to cut a keyway in cast iron using this method.

As I mentioned earlier, my flywheel is made from gunmetal, not cast iron. I prefer gunmetal because it is much cleaner to turn. The flywheel casting supplied by Cotswold Heritage is cast iron since most model engineers prefer the authentic colour. In order to make my flywheel look more authentic, I fitted it with a steel rim. I am fortunate to have a local blacksmith who bent up a ring from 6mm thick, black, mild steel bar and welded the joint. I bored out the ring to give a clean surface, turned down the casting to fit, and fixed the rim to the casting with Araldite. From then on I just treated the flywheel as if it were a normal casting.

To be continued.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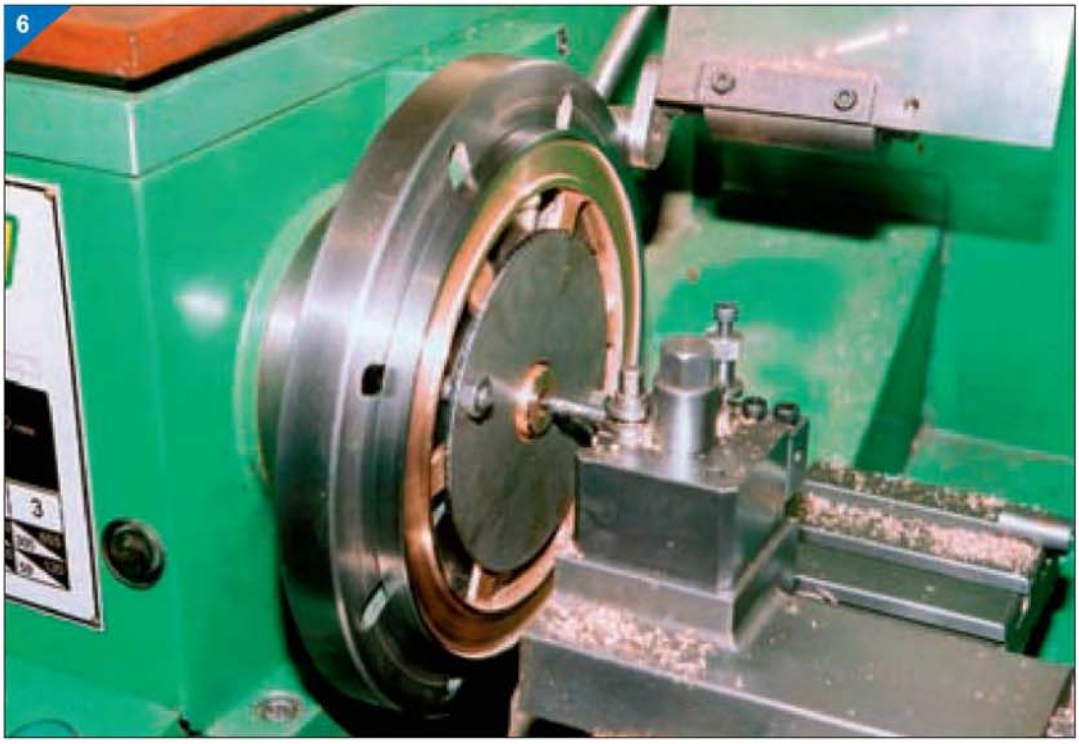

6

YET ANOTHER FILING REST - OR TWO

H. Maurice Turnbull
explains two ways of fitting his simple, low-height design of filing rest to a lathe.

There have been many filing rests described over the years, but none I think with the basic simplicity of the one I wish to describe here (**photo 1**). It was made for the production of small components such as nuts, bolts and fittings, and was so made originally to fit in one of the six stations of a tailstock turret (**photo 2**).

There is no graduated movement of the rollers. Adjustment is achieved by placing packings of various thicknesses, under the roller slide, finer settings are achieved with shims or feeler gauges. My lathe is of far-eastern origin called a Pinnacle 1018, i.e., 10in. swing by 18in. between centres.

Setting up in the turret was very successful for production runs, but was a little too fiddly for the occasional one-off, so an adapter was quickly made which allows the rest to be popped into the four-way toolpost (**photo 3**). It can be seen from **photo 4**, that the rest is small enough to clear the top slide, so can be left in position for as long as is required.

Construction notes

Dimensions are a guide only and can be altered to suit individual requirements. The only one which is important is the diameter of part 'A' which is to fit in the turret, if that is what you want, otherwise suit yourselves. Measurements are imperial, as many years ago when the rest was made, that was all we used.

Part 'A' is a simple turning job. The groove is to prevent any bruising by the clamping grub screw which might cause interference with the fit of the part into the block or the turret. The ½in. dia. spigot should be a loose fit in the hole of part 'B' to allow silver solder to run in, perhaps about 0.005 inches.

Back plate 'B' is made according to the drawing, then silver soldered to 'A'. If soldering is not possible, then screw threads could be used, but it would have to be a fine pitch as the mating part is so thin. Brass threads (BSB) with 26tpi would probably do. After fixing, chuck the round spigot and take a skim cut off the face of the backplate to make sure it is dead square to the spigot's axis.

The base plate, part 'C', is simple. The holes are counter-bored or countersunk merely to keep the overall height as low as possible.

The toolpost mounting block 'K' is 1in. sq. and must be made on the lathe on which it is to be used. A length of square bar, fastened in the toolpost, was quickly marked out from the lathe centre line, the ⅝in. dia. hole is drilled and, preferably, reamed by tools held in the spindle. A tapped hole for the grub screw can be located at any angle (see **photo 1**); it makes little difference.

Roller slide modifications

The roller slide ('E') is again a simple component, but here I would like to digress a little. After I had made the rest it occurred to me that it would be an advantage if the top of the rollers were on the centre line of the lathe at their lowest position.

I made mine to the dimensions as shown in the drawing, but if I made another one I would do it in the following way. Machine all of 'E' except the tapped holes for the rollers. Assemble the parts already made and clamp them in the lathe toolpost. With a hardened point, say a lathe centre gripped in the chuck, lightly scribe two lines using the saddle and cross-feeds. Then dismantle and re-mark the lines half the diameter of rollers lower down. Drill and tap the 2BA holes at the correct distance apart. This should put the top of the rollers on the centre height or, if not, there is no other way than to remove metal from the bottom of 'B' or add shims between 'B' & 'C' as required.

The notch in the top is merely to provide a little more clearance for long work pieces.

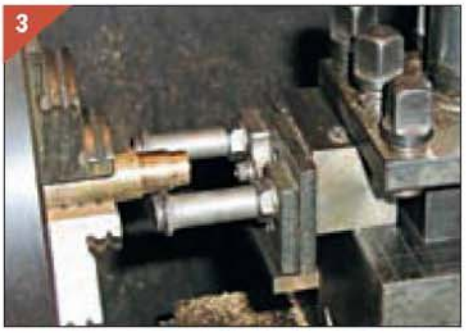
1. Filing rest, toolholder mounting block and height setting shims and feeler gauges.

2. Original design was made for mounting in a tailstock turret and used for semi-production of parts.

3. The rest is adapted for use in a toolpost holder by making a mounting block.

4. The low height of the filing rest allows it to remain mounted in the toolpost and rotated around with clearance over the cross slide.

5. The filing rest mounted on a Myford lathe with a toolpost with removable holders. The filing height is achieved with the toolholder's adjustment screw.



Making the rollers

The rollers 'G' were made from old high tensile cap screws, but mild steel would do. There has been some discussion in the past about hardening rollers; there are points for and against. I prefer not to heat treat. They should, however, be a nice running fit on 'H', without being sloppy.

Parts labelled 'H' are modified OBA cap bolts. A length of about two and a half inches should leave enough plain shank for the rollers to run on. Correct the length of thread if necessary then skim the under side of the head slightly under-cut the shank. Machine away most of the head as shown in the drawing.

Parts 'D', 'F', 'J' and I are standard nuts, bolts and washers.

Set up and ready to go to work

Assemble the parts, and your rest is ready to go to work. Slacken screws 'J' and place packings under the roller slide equal to half the across flats size required. Tighten the screws and remove the packing.

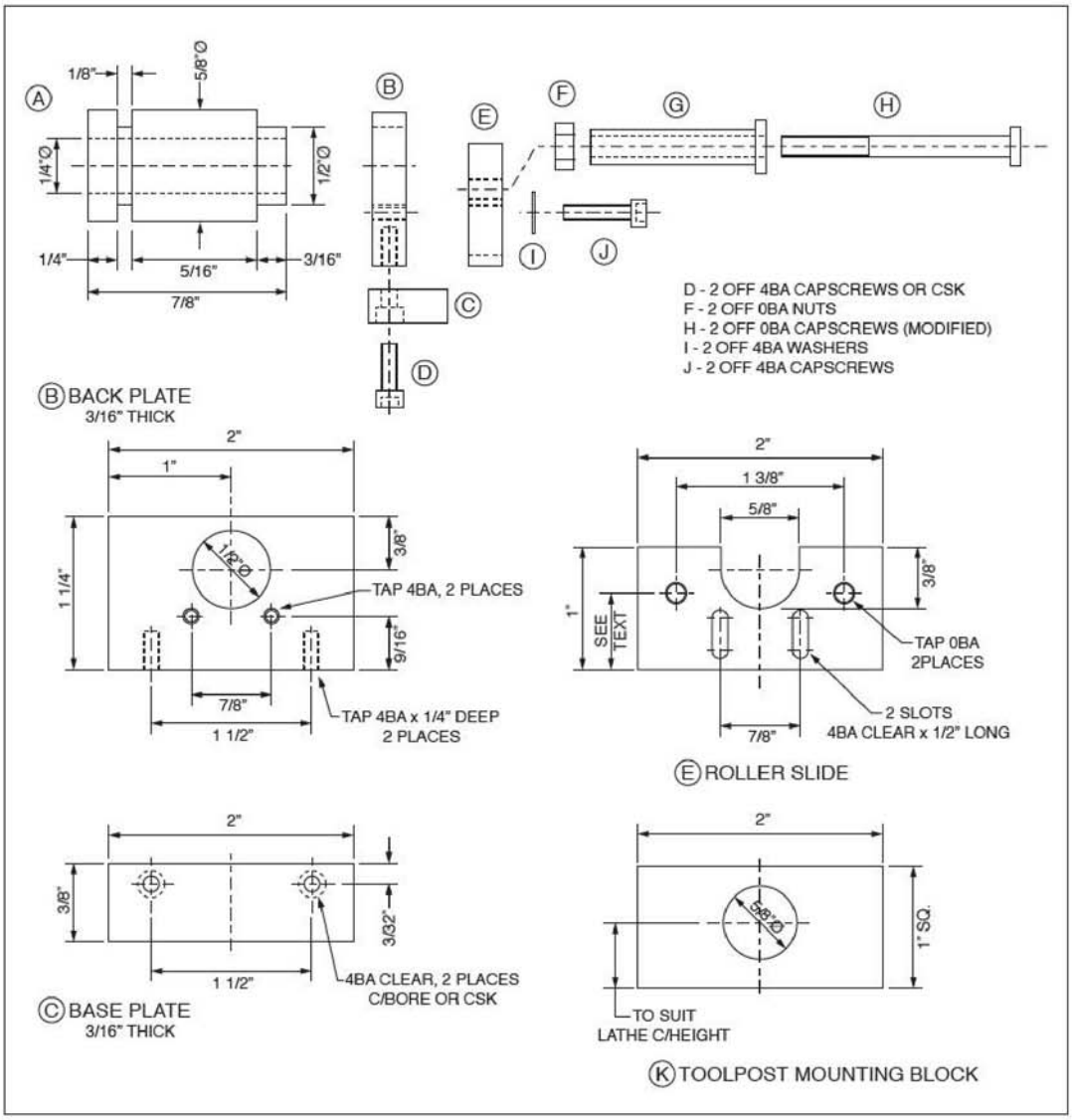
As can be seen in **photo 1**, I have a selection of packings on a key ring, augmented with standard feeler gauges, plus some others not shown. As with a graduated type of rest, it may be best to go a little higher to start with, and then lower the rollers after measuring the work. You can always take a little more off.

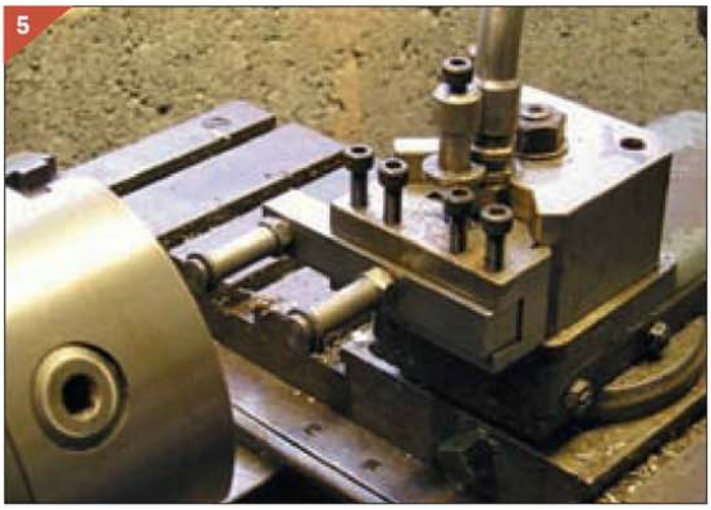
An old turner once told me that even after a lifetime in the trade, he had still not come across a putting on tool!

And then...the second filing application

While I was writing this article, I happened to spend some time looking at an old Myford Super 7, newly acquired, and fitted with a quick-change tooling system. It may have been I was still subconsciously thinking of filing rests when it clicked in my mind that a Dixon-type tool holder was well on the way to making another one (**photo 5**).

Height adjustment of the filing rest in this application would be made with the usual toolpost screw adjuster, which in my case has a pitch of 0.8mm, or 0.315in., which is only three ten-thousands off 1/32 inches. The use of this rest is, at the moment, speculative as I have not yet fitted the Myford with any dividing equipment. **ME**





15-day skeleton timepiece

John Parslow describes how to assemble the wheels and pinions, and how to make the pallet and pendulum units.

Continued from page 501 (M.E. 4324, 25 April 2008)

The train arbors are turned from 0.125in. dia. silver steel and have shoulders to provide a location for the pinions and collets (**fig 13**). If possible, machine the arbors in a collet to maintain concentricity. The pinions and wheel collets are bonded onto their arbors with Loctite 603, but this is not done until the wheel train has been planted. To allow penetration, Loctite recommend a gap of 0.002 to 0.006 inches. Use the lower limit to maintain concentricity. Alternatively, make the arbors a light push-fit and cut narrow grooves in the arbors under the pinions and collets (about 0.003in. - 0.004in. deep). This will give a satisfactory bond and maintain concentricity.

The pivots should be straight, parallel, nicely rounded at the ends, have sharp internal corners, and be highly polished. A typical pivot is shown in (**fig 14**) The pivots ends should then be hardened by heating to red and plunging vertically (to avoid distortion) into oil or water. Then carefully re-polished (very brittle after hardening), temper to blue, and finally repolish.

Wheel, pinion and arbor assemblies

(figs 15, 16, 17 and **18)**

The intermediate wheel and reverse minute wheel are both riveted to their pinions (fig 15 and fig 8 in *M.E.* 4324). The intermediate wheel is press-fitted to the pinion until it butts against the end of the pinion leaves and is riveted in position.

This can be done in the lathe as follows:

Face a short piece of ⅜in. or 5/16in. dia. brass, bore it a little larger than the tapered portion of the pinion ¼in. deep. Put this in the tailstock drill chuck. Grip a piece of ⅜in. or 5/16in. stock in the lathe chuck, turn a ⅜in. long step to be a free fit in the pinion bore (about 0.116in. dia.). Mount the pinion on this diameter with the tapered portion facing the tailstock. Locate the intermediate wheel on the pinion taper and bring up the tailstock to hold it in position. Check for correct alignment, and then gently press home the intermediate wheel, until it's shoulder butts up to the pinion leaves, using pressure from the tailstock hand wheel. Withdraw the tailstock and rotate the pinion/wheel assembly to check that the wheel runs true.

If all is well, begin the riveting with a round-nose hollow punch, to spread the undercut end of the pinion outwards, followed by a flat-ended punch. It is important to keep the punches axially in-line with the pinion to avoid displacing the wheel, and also to use light hammer blows to avoid damaging the delicate pinion leaves. Check for true running of the wheel as riveting proceeds. It does not take a lot of force to hold the wheel in position, so do not overdo the riveting! The reverse minute wheel and its pinion are treated similarly.

I have used this method on a number of occasions and it has produced a true running, unmarked, wheel every time.

The hour wheel and minute wheel are both fitted to brass bushes. They transmit no torque other than when the hands are reset, so a light press fit and light riveting are all that is required. Alternatively, the wheels can be soft-soldered to their bushes. Solder paste is best for this job. Photograph 6 (*M.E.* 4324) shows the wheel and pinion assemblies.

Pallet frame and arbor assembly

The pallet frame is cut from ⅛in. thick brass plate (**fig 19**). It is a straightforward sawing and filing job, but the piece should be well crafted, with all edges square, and corners clean and sharp – filing buttons help. The 0.062in. wide slit is

7

8

9

best left until all other work on the pallet frame has been done.

The pallets, bush and arbor are fitted to the pallet frame (**fig 20**). If gold plating is not required, this can be done permanently using press-fits or Loctite 603.

If one intends to gold plate the clock, the pallet frame assembly will need to be taken apart after testing the clock, to allow the pallet frame and bush to be plated. The pallets, of course, are not plated. If the pallet assembly is press-fitted together, simply press out the pallets and bush and press them in again after plating. If adhesives are used, fit the pallets and bush using ordinary cyanoacrylate (super glue). When the clock has been tested, the assembly can be taken apart quite easily after immersing it for a couple of minutes in boiling water. After plating, reassemble with Loctite 603. **Photograph 7** shows the escape wheel and pallet frame, and **photo 8** a close-up of the pallets.

Pendulum

The pendulum is a straightforward item to make (**fig 21**). The suspension spring (Supplier ref. 3), needs to be a

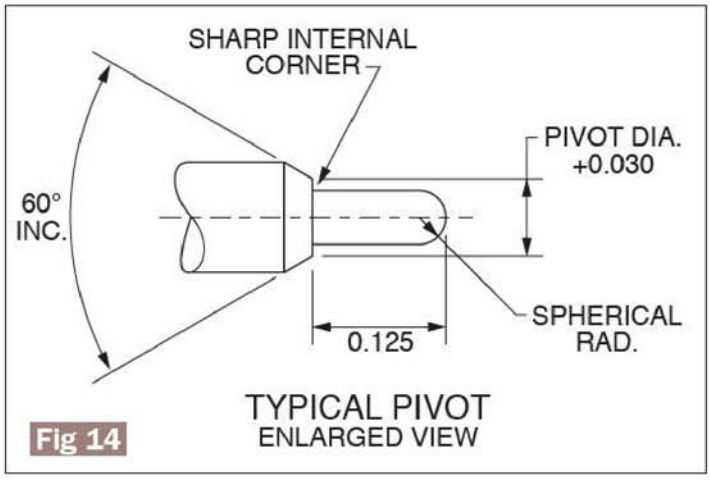


Fig 14 TYPICAL PIVOT ENLARGED VIEW

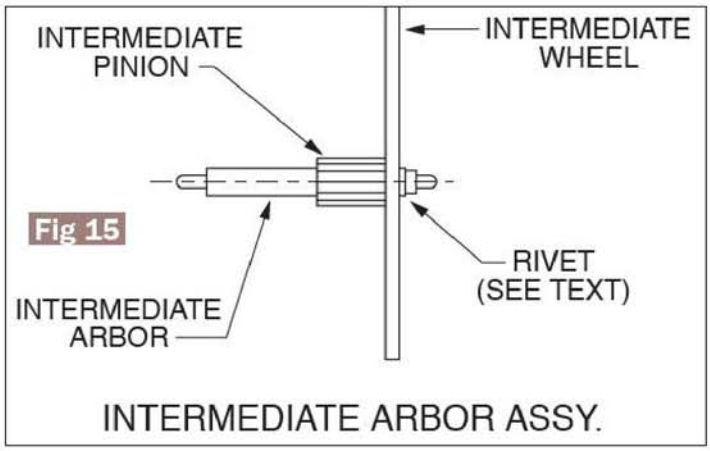


Fig 15 INTERMEDIATE ARBOR ASSY.

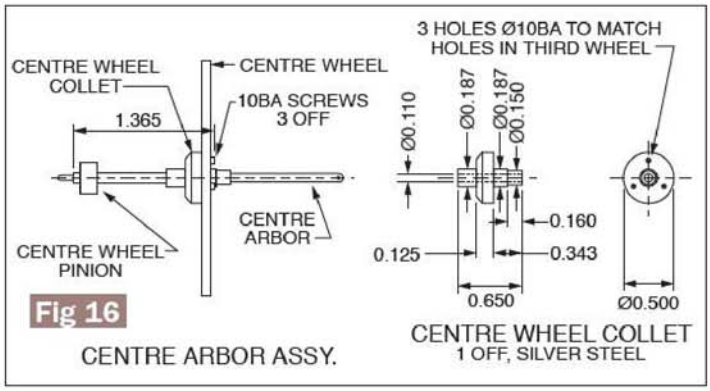
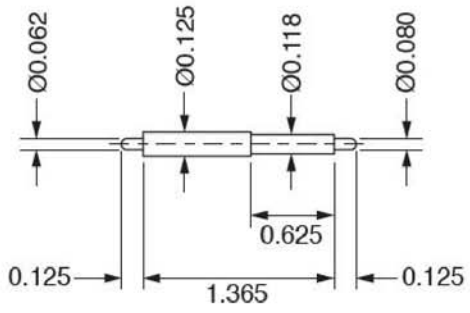


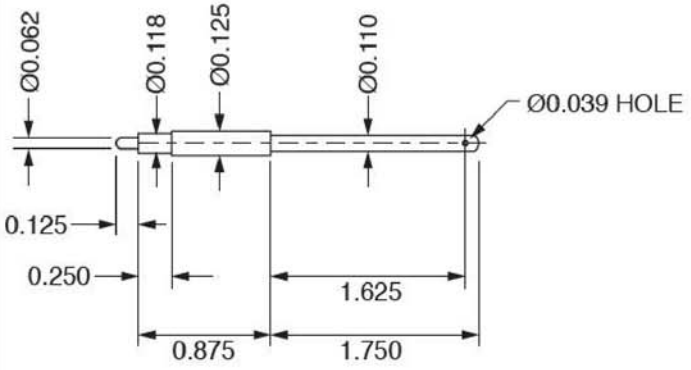
Fig 16 CENTRE ARBOR ASSY.

CENTRE WHEEL COLLET
1 OFF, SILVER STEEL

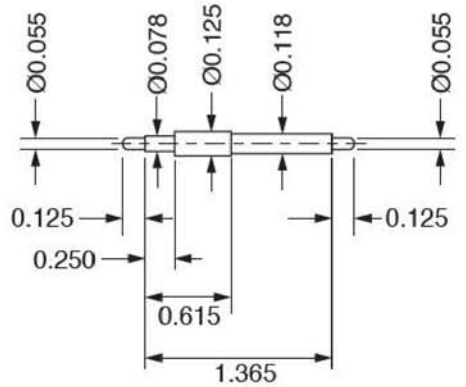
Fig 13



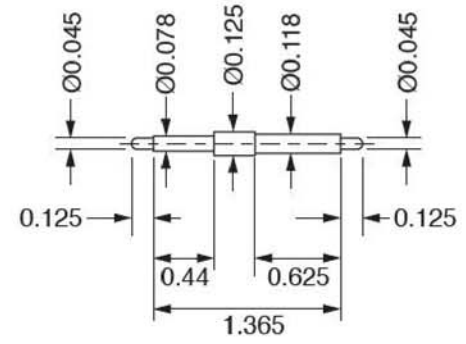
INTERMEDIATE ARBOR
1 OFF, MAT'L: SILVER STEEL



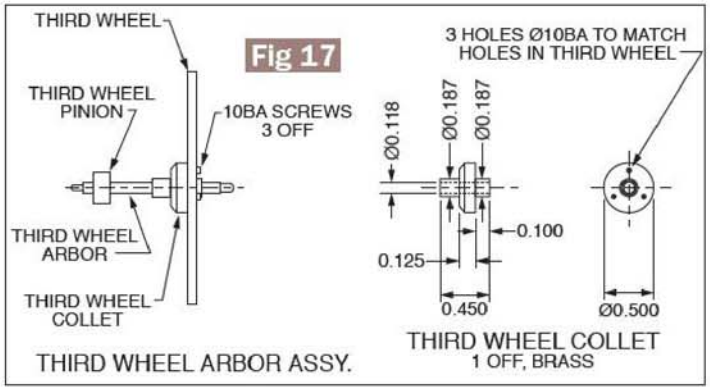
CENTRE ARBOR
1 OFF, MAT'L: SILVER STEEL

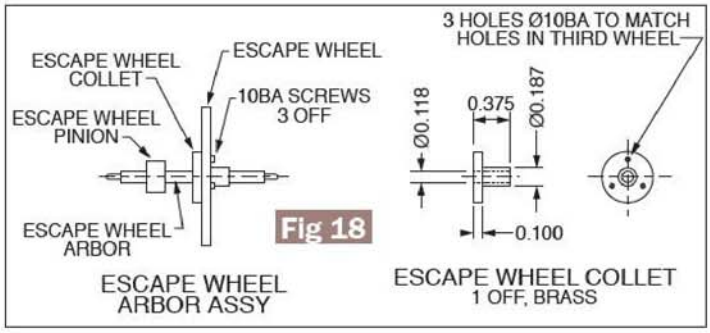


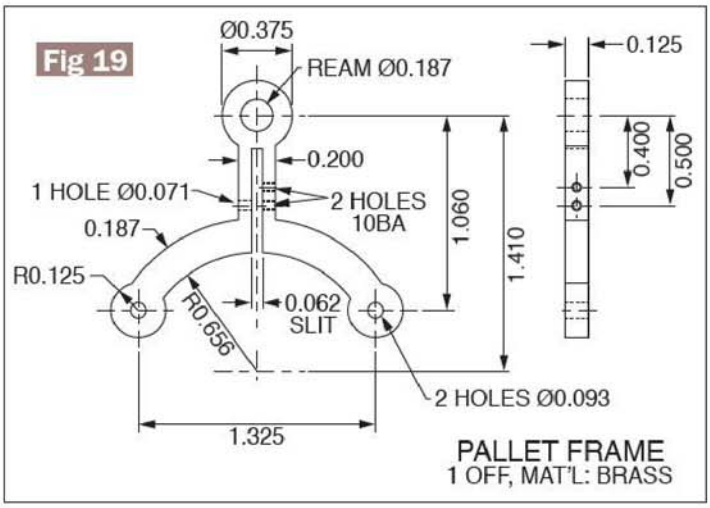
THIRD WHEEL ARBOR
1 OFF, MAT'L: SILVER STEEL

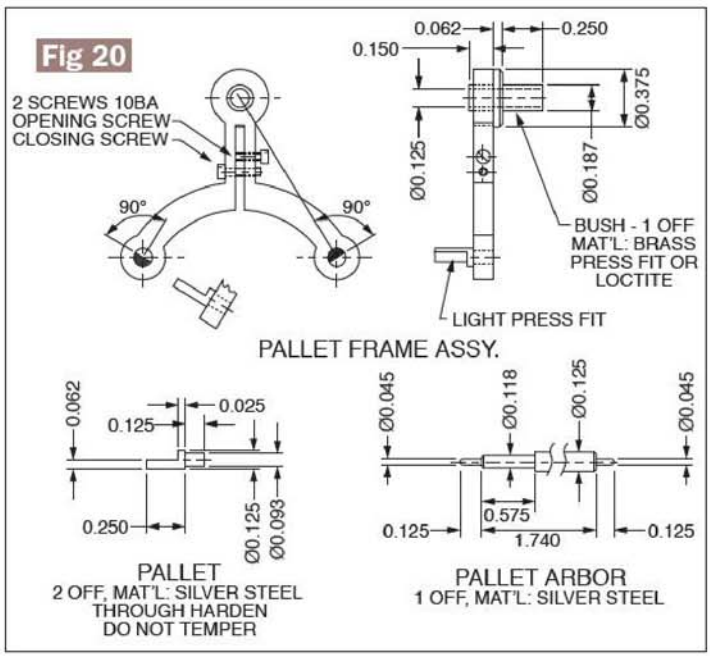


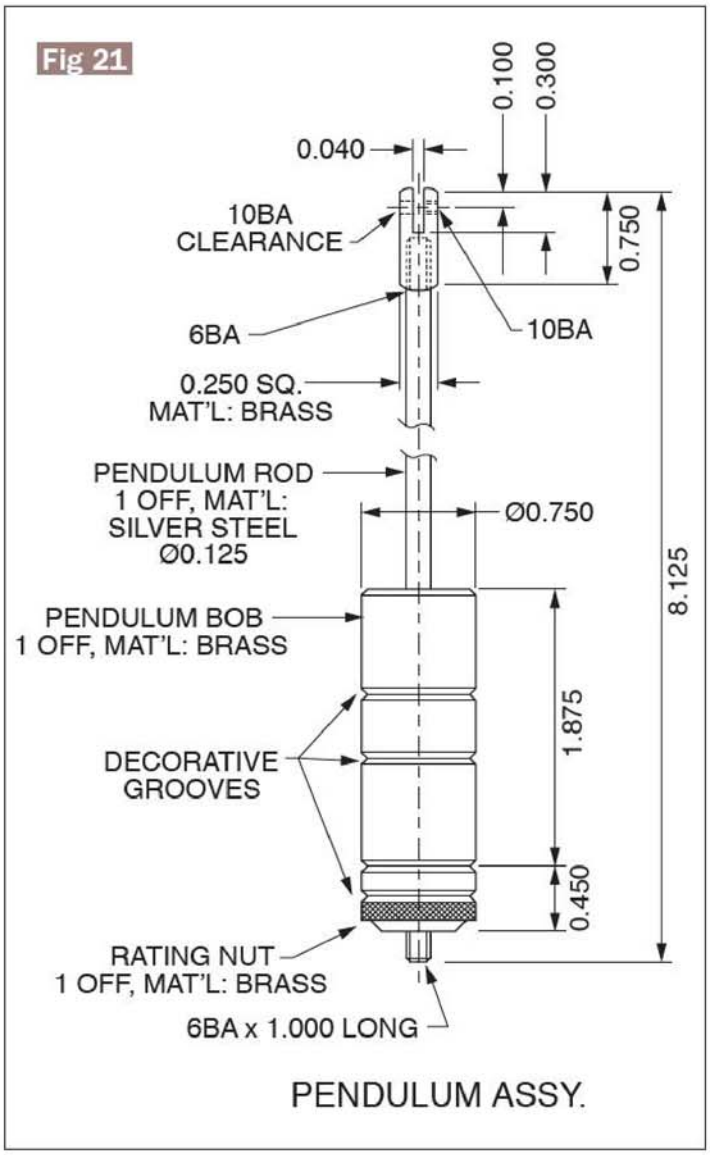
ESCAPE ARBOR
1 OFF, MAT'L: SILVER STEEL











close but free fit in the slit in the top block of the pendulum rod. The 10BA screw attaches the suspension spring to the top block. This screw must not be tightened to clamp the suspension spring to the top block. **Photograph 9** shows the finished pendulum and crutch.

To be continued.

Supplier

Laser cut frameplates,wheel crossings and escape wheels. Malcolm High, E. **malcolm.high@btinternet.com**, W. **modelengineerslaser.co.uk**

Author

John Parslow E. **john.parslow2@ntlworld.com**

Errata

M.E. 4322, 28 March 2008, p375.

- The letters A and B are missing off Fig 2: Top hole A is 0.25 diameter. Two middle holes B are 0.187 diameter. Three lower holes A are 0.25 diameter.
- Mainspring Part No. should read 0321 204515 20 x 45 x 45 not 0221… .

Material list:

- 1 - Ø 2½ x 1/16 Intermediate, centre, third & hour wheels should read 4 off.
- Add material for minute wheel: 1 - Ø 1 ½in. x 3/32in. blank
- Brass rod for Dial pillar should read Ø 3/16in. not Ø3/8in.

Catch Me Who Can:
A UNIQUE TREVITHICK LOCOMOTIVE

Allen Bellamy
describes the Kinver and West Midlands SME's collaborative work on a unique replica of a Trevithick locomotive in 5in. gauge.

In 1808, the acclaimed Cornish engineer Richard Trevithick, had his third locomotive, the *Catch Me Who Can* built by John Urpeth Rastrick at Hazeldine Foundry in Bridgnorth, Shropshire. In July of that year, the engine ran on a circular of track in Bloomsbury, London. Its demonstration became known as the Steam Circus.

Hidden from the public gaze by a tall circular wooden fence, for a shilling one could ride in a converted carriage behind the locomotive at speeds up to 12mph. The fragile cast iron rails eventually broke under the weight of the train and the project was disbanded. It is the first recorded occasion where fare-paying passengers were hauled behind a steam locomotive; the *Catch Me Who Can* secured its place in history.

At Hazeldine, only fragments of the old buildings survive on the site, but the importance of these events is recognised by the Trevithick 200 group, formed to commemorate this historic occasion on 19-20 July 2008. The bi-centenary will be celebrated with a gala weekend at Severn Park, adjacent to the locomotive's birthplace.

Full and scale size replicas

A full-size, working replica of *Catch Me* is under construction in the Severn Valley Railway's workshops at Bridgnorth, to be hopefully, completed in time. The Kinver and West Midlands Society of Model Engineers have agreed to run trains on a portable track at the gala. The society is building its own working replica of the locomotive in 5in. gauge (**photo 1**) and will run it on a 15 foot diameter raised circular track.

1. The 'Catch Me Who Can' model built by members of the Kinver and West Midlands SME.

2. Return tube boiler with the the firebox door. The tubes are covered by a plate supporting the chimney (see photo 4).

3. A finely-crafted cylinder assembly with regulator.

4. The parts of the locomotive made by various club members.

The model

Discussion was held to outline how to build a model that, while accurately portraying the original, would actually work in such a small gauge. The firing; valve gear; boiler pressure; type of track and method of operation were all taken into account.

As a plateway of the original pattern would be hard to reproduce, the locomotive will run on conventional rails.

The original boiler was a single return-flue type and it was not felt this would generate enough steam. Kinver member and professional boiler builder, John Ellis, has designed a multi-tube boiler (**photo 2**) that is to be coal fired from beneath, the firebox is between the axles.

The original locomotive had a cylinder of 6in. dia. with a plug-type valve operated from a beam by a bash lever. The cylinder size was increased from a scale ½in. to ¾in. to increase the power available to carry this single cylinder engine over its dead centres (**photo 3**).

Prototypical valve gear would not be robust in 5in. gauge and difficult to replicate, so a slide valve arrangement was designed, driven from the front axle by a single eccentric. This will be hidden from view by the footplate.

The wheels were cast from a pattern made by professional loco man, Dan Jeavons, a member of the club. Eight wheels were cast, four for the engine and four for the landau to be pulled behind it which will also hold the water supply.

Due to the position of the firebox, wheel sets are mounted on a small frame rather than on the boiler. The front pair of wheels pivot on a pin fitted to the front of this frame.

Particular thanks for their contributions go to some who have worked on the project among them: Terry Harper, Mike Stevens, Mike Harrison, John Ellis and Dan Jeavons.

Open weekend invitation

Catch Me Who Can will also be displayed on the following weekend of 26-27July when the Kinver and West Midlands SME have an open weekend at their Marsh Playing Fields site in Kinver, near Stourbridge, West Midlands. Contact Allen Bellamy for more details.
T. 01746 761008
W. http://www.kinver modelengineers.org.uk/ **ME**

A lathe attachment for CNC mills

Richard Stephen concludes his description of his lathe for a CNC mill, to make accurate, repetitive turning projects easy.

Continued from page 504 (M.E. 4324, 25 April 2008)

With the temporary machining adapters Loctited in place, set up the spindle between centres. Take light cuts, use a very sharp tool and you will have no difficulty. The ball races want to be a snug sliding fit on the spindle shaft.

The end of the spindle is turned down to 18mm dia. and threaded with a 1mm pitch (or any convenient thread) for a length of 40mm and should end just inside the rear ball race. Photograph 3 (*M.E.* 4324, 25 April 2008) shows the 50 tooth by 2.5mm pitch timing pulley and two threaded locking rings. The pulley has also been threaded with a 1mm x 18mm thread.

Locking nuts

The locking nuts to secure the spindle and take up the backlash in the bearings are made next. The nut is shown in photo 3. The nut is made from a piece of 35mm dia. mild steel bar about 12mm long. Grip the length of bar in the lathe and face off the end. Turn down the end to 26mm for a length of 1mm. Drill and bore 17mm. Now make a second nut without the 26mm flange and finally bore the timing pulley as well.

The nuts and the pulley are drilled and taped for a 3mm Allen head grub screw. To prevent the nut from loosening when in position, a brass locking plug is inserted in the threaded hole. This is in preference to a second opposing locking nut.

Turn a scrap of 3mm diameter brass rod down to about 2.5mm dia. for a length of about six millimetres. Using a fine file, reduce the diameter until it can just be forced into the threaded hole. Part off a length of about 2.5mm and push this plug into the threaded hole. Using the grub screw push the plug down until it is flush with the inside of the bore.

The nuts and the pulley can now be threaded. The thread should be constantly checked the see if the nut will screw onto the spindle. Bore a recess 18.5 mm diameter to a depth of 1mm in the flanged end of the one nut. Finally reduce the length of each nut to 10mm. Tightening the grub screw will press the plug against the threads of the spindle and very effectively prevent the nut from loosening.

8. Machining the groove in the tailstock barrel.

9. A ⅛hp, variable-speed DC motor runs the lathe when setup on the milling table.

10. The lathe toolholder is clamped on the Z-axis where the spindle would normally be.

Tailstock barrel and screw adjustment

I made my tailstock barrel out of a length of 20mm dia. silver steel. The front end of the barrel is drilled and reamed with a No. 1 Morse taper for a live centre. The rear end is drilled and tapped with a 6mm thread for the adjusting screw. A 3mm slot, 2mm deep, is milled in the side of the barrel for a length of 60mm (**photo 8**). A 3mm peg, inserted in the bronze sleeve, fits into this slot to prevent the barrel turning as the adjusting screw is turned. The screw assembly is retained in the sleeve by a 3.5mm Allen screw with the end turned down to 2.5mm dia. to fit into groove in the screw assembly. This is illustrated in photo 6 (*M.E.* 4324, 25 April 2008).

Capstan head screws

The head and tailstocks are secured to the mill table with capstan head 6mm screws and square 6mm thick nuts that fit in the T-slots. The heads of the screws are drilled with twelve, 3mm dia. holes equally spaced around the circumference of the head.

The nuts are tightened with a 3mm dia. tommy bar inserted into the holes.

Motor Drive

The set up for driving the lathe is illustrated in **photo 9**. For my X3 mill I use a ½HP, 2500rpm, Bodine Electric DC motor coupled to a KB Electronics *Whisper* speed control. The Bodine motors are about the best DC motors available and the KB speed controls are equally good. The advantage of the KB *Whisper* speed control is the 15 KHz square wave voltage output. The motor sees this square wave (because of its high frequency) as a DC voltage. The advantage of the high frequency control is that it does not produce significant eddy current losses in the motor and consequently the motor runs much cooler. After running for more than an hour at full speed the motor is only just warm to the touch.

I decided to use a Bodine ⅛HP, 2500rpm motor with the speed control I use for the mill. Both motor and lathe use the same sized pulleys.

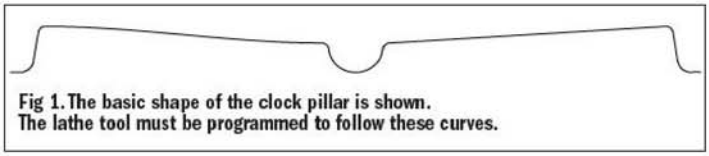


Fig 1. The basic shape of the clock pillar is shown. The lathe tool must be programmed to follow these curves.

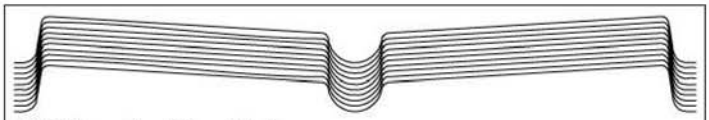


Fig 2. The copies of the original curve represent increasing depths of cut for the tool.

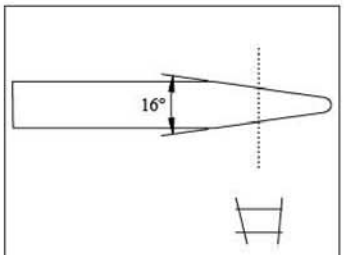


Fig 3. The radius of the tip of the lathe tool provides the fillet between curves on the pillars.

Tool post

The head on my X3 mill is one I made myself to replace the original head. A reason for the replacement was I could see the advantage of easily removing the spindle and replacing it with some other device. This facility made it very easy to fit a rigid tool holder to the head (**photo 10**). Most readers will, I am sure, be able to devise an equivalent rigid mounting for their tool holder on their mill.

Lathe software

Having completed the lathe to retro-fit on the mill, we have reached the most interesting part of the project, turning metal!

Before this we have to address the problem of software to operate the lathe. If one looks on the internet for software in contrast with what is available for CNC milling machines it is difficult to find any reasonably priced lathe software.

The only CNC controller software available for lathe work is *Mach 3* which one can download for free and use provided one does not exceed 500 lines of code. *[Purchasing the software removes this limit - Ed.]* This may, in some instances, be rather restrictive.

Model engineers who already have a CNC mill may not wish to purchase additional software. I use *DeskCNC* controller software for operating my X3 CNC mill and initially looked at this programme to see if I could adapt it to drive the lathe.

By closely examining the supported milling machine G-code, I could see no way of converting the G-code to generate an incremental Y-axis movement (actually X-axis motion on a lathe).

Honestly it was a case of not being able to see the wood for the trees! I have now realised that it is possible to use any available mill software to operate a CNC lathe.

It is simply a matter of producing the appropriate .dxf drawing which creates Y-motion on the mill as a substitute for X-motion as it would be on a lathe.

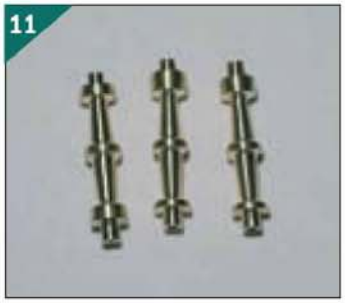
Preparing the .dxf drawing

The method of preparing the .dxf drawing is best illustrated by way of an example. Suppose that one wishes to use the lathe to make several identical clock pillars such as the one illustrated in **photo 11**.

Start by drawing half the profile of the pillar. The drawing must be placed in the negative 'X' and positive 'Y' quadrant, that is to the left of X = 0 and above Y = 0. The dimensions of the clock pillar are 40mm long from shoulder to shoulder and a diameter of 12mm. A half profile of the pillar is all that is required. Place the centre line of the pillar on the line Y = 6. Place the outside face of the right hand shoulder of the pillar on the line X = 0. These outer faces of the pillar shoulders are omitted from the drawing. The finished half profile of the pillar I made is shown in **fig 1**. Readers will observe that all internal corners of the profile have been filleted. The radius of the fillet is determined by the profile of the lathe tool used. More on this subject later.

I used TurbCAD 9 to draw my profile. Obviously it would not be possible to profile the pillar with a single cut. A series of cuts of increasing depth (i.e. indexing the Y-axis or the cross feed) are clearly required just as one would do if the pillar was being turned in the conventional manner. Unfortunately not all hobby CNC software has the facility to increment the axes correctly, in this case the Y-axis in order to generate a series of cuts as one would do conventionally. This can be achieved by modifying the drawing in the following way. The following instructions are appropriate for TurboCAD.

Other CAD programmes will



11. Sample clock pillars in brass to show the ease with which identical parts can be made.
12. The lathe in action making a clock pillar.

have equivalent facilities.

Select the profile (Crl+A with TurboCAD). Go to 'Edit' and in the drop down menu select 'copy entities' and from the drop down menu select 'linear copy'. Set the X-step equal to zero and Y-step to -0.40 mm (this will be the depth of cut as will be obvious later) and the number of sets to 10 for this example. Now hit 'return' to generate the extra copies.

Examining the result, shown in **fig 2**, you will see that the outermost two copies of the profile lie entirely below the line Y = 0, i.e. outside the work piece. If the tool moved along either of these profiles, it will not cut any metal and so they can be erased. This completes the required .dxf drawing.

The next task is to generate the G-code required to machine the pillar.

For the generation of the G-code and the resulting tool path I have used DeskCNC the software I use for all my CNC work. The tool path for turning the pillar must run from right to left i.e. from the tailstock towards the chuck and begin with the outermost profile. Open the .dxf file of the pillar.

As the profile lines are quite close together use the zoom facility to enlarge the drawing. Make sure that all the lines of the drawing are visible. In the 'Edit' drop-down menu select 'set machining order'. Using the mouse, left-click on the bottom profile (labelled 1). This will be the first entity machined. Then, click on the next profile to label it '2' followed by the profiles until you have labelled all the profiles one to eight in this example.

From the 'Select' drop-down menu, choose 'select all' to use all the profiles on the drawing. Again in the 'Edit' menu select 'reverse direction of selected regions'. Select 'Contour' from the 'tool path' drop down menu and fill in the table. Use 0.1 for the contour depth; 0.1 for the rapid height; any tool in the tool library; 0.1 for the Z step and 40 for the plunge rate. None of these entries will be used as the Z axis is not required to operate the lathe and should be disconnected.

Enter '0' for the stock to leave and a suitable value for the feed rate. The value for the feed rate depends on the material being turned, 40 mm/min is fine for brass (CZ121).

Finally, select 'None' for the tool compensation and then left-click 'Contour' to generate the .dnc G-code file. Select 'run machine' from the tool path menu and save your G-code file.

From the 'Mode' drop down menu select 'Edit' and examine the G-code you have generated. You will see that all the tool movements are from right to left as you would carry them out on a lathe in the normal way.

The reason for drawing the profile lines should by now have occurred to readers. With DeskCNC there is no facility for generating a loop function to step the Y axis (cross feed) to set the depth of cut. To get around this difficulty the series of profile lines were drawn the spacing between each line being the depth of cut, In the example above the depth of cut was made 0.40mm.

Some readers may possess more sophisticated CNC software than DeskCNC, which may have a loop facility to allow the depth of cut to be automatically indexed. If you intend to do a lot of profile turning then it would be advisable to purchase a dedicated lathe program rather than having to do the above each time you want to turn a new component. As I only have a limited use for a CNC lathe I will have to continue with the above method.

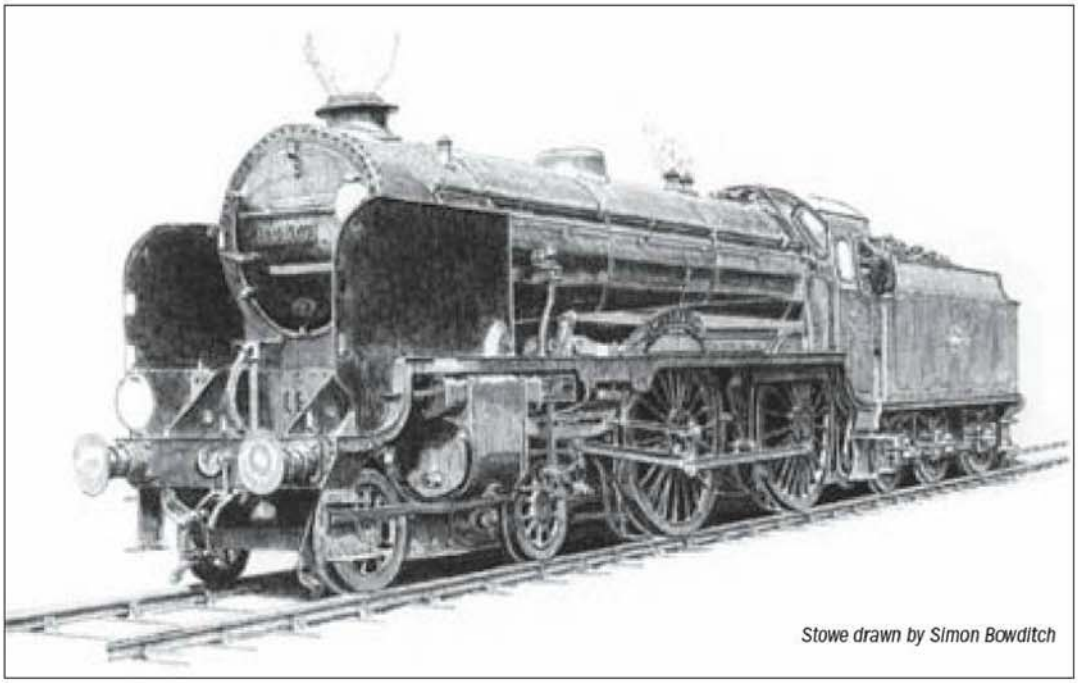
Lathe tools

The profile of the lathe tool required for any particular profile is determined by the geometry of the particular profile being turned. I have to admit that I am still learning this aspect of CNC lathe work. Nevertheless, let's examine the requirements for the tool profile to turn the clock pillars described above. Examining the profile shown **fig 1**, readers will see that the internal sides of the shoulders of the pillar slope inwards at an angle of 12deg. to the vertical. The base of the each shoulder is filleted with a radius of one millimetre as is the base of the central rounded section.

The tool requires adequate clearance on all cutting edges. The design of tool I used was a V tool with an included angle of 16deg. with the end of the tool rounded to a radius less than one millimetre. As the tool profiles the internal sides of the shoulders there will be a clearance of four degrees (12 minus 8deg.) between the side of the shoulder and the side of the tool (**fig 3**).

Photograph 12 illustrates the lathe in action. I have turned several items using the lathe and have been delighted with the accuracy and the ease of use. I hope readers, who tackle the project, will get as much fun out of the lathe as I have had designing it and subsequently using it. **ME**

STOWE - Southern Railway Schools class locomotive



Stowe drawn by Simon Bowditch

Neville Evans describes the boiler cleading, regulator handle assembly and manifold.

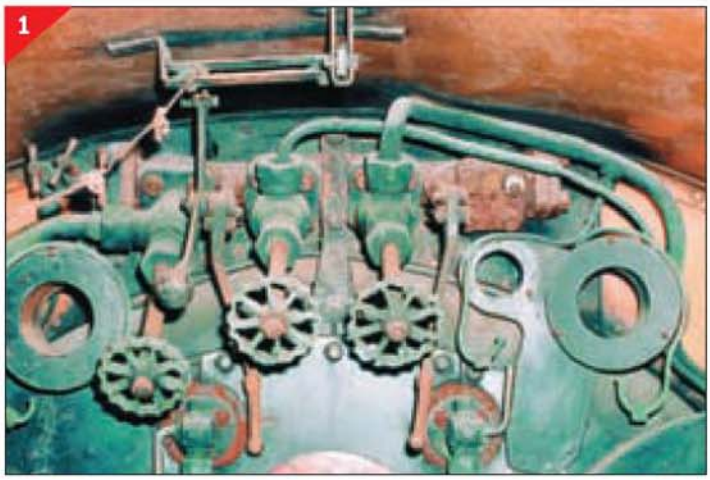
Continued from page 508 (M.E. 4324, 25 April 2008)

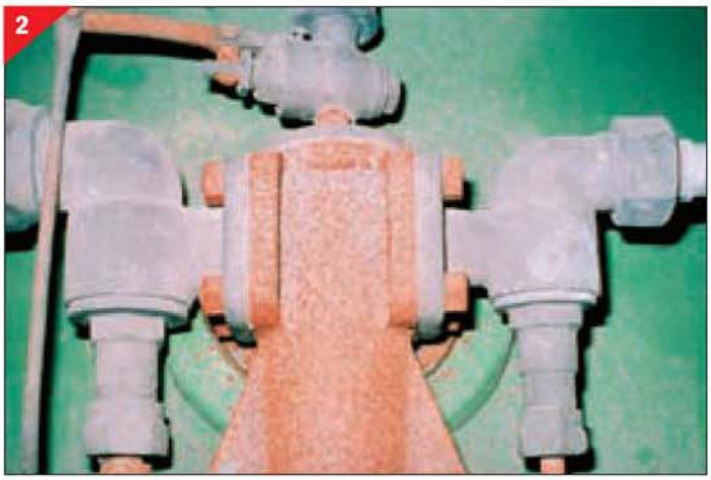
The cleading (pron. 'cladding') of any boiler is of the utmost importance, as it is to this feature that many of the boiler mountings are fixed, and it is of course the first item that is seen on a model locomotive. The Schools boiler cleading is a simple parallel cylinder with the back end spayed out at the bottom to skirt the firebox (**fig 1**). I am in fact looking, as I write, at the almost identical arrangement on my little 'Loch'. I would suggest that the cleading be made in one piece with the seam on top as the full-size locomotive, but I am mindful of the over scale thickness of the model boiler cleading. To give the illusion of thin steel plates, Mike Williams thins down the top edge with a Swiss file. Although this operation requires a little care I can't see why it should be beyond the capability of the average modeller. The two edges are held together with a line of 10BA hex. headed screws as can be seen on the photos included with last month's article.

1. View of manifold inside cab. We are using the two valves as injector steam valves.

2. Front end of manifold showing injector valves.

The cleading is carried on crinolines, as it was on the full-size boilers. These skeletons on which the cleading was erected, can be conveniently >>





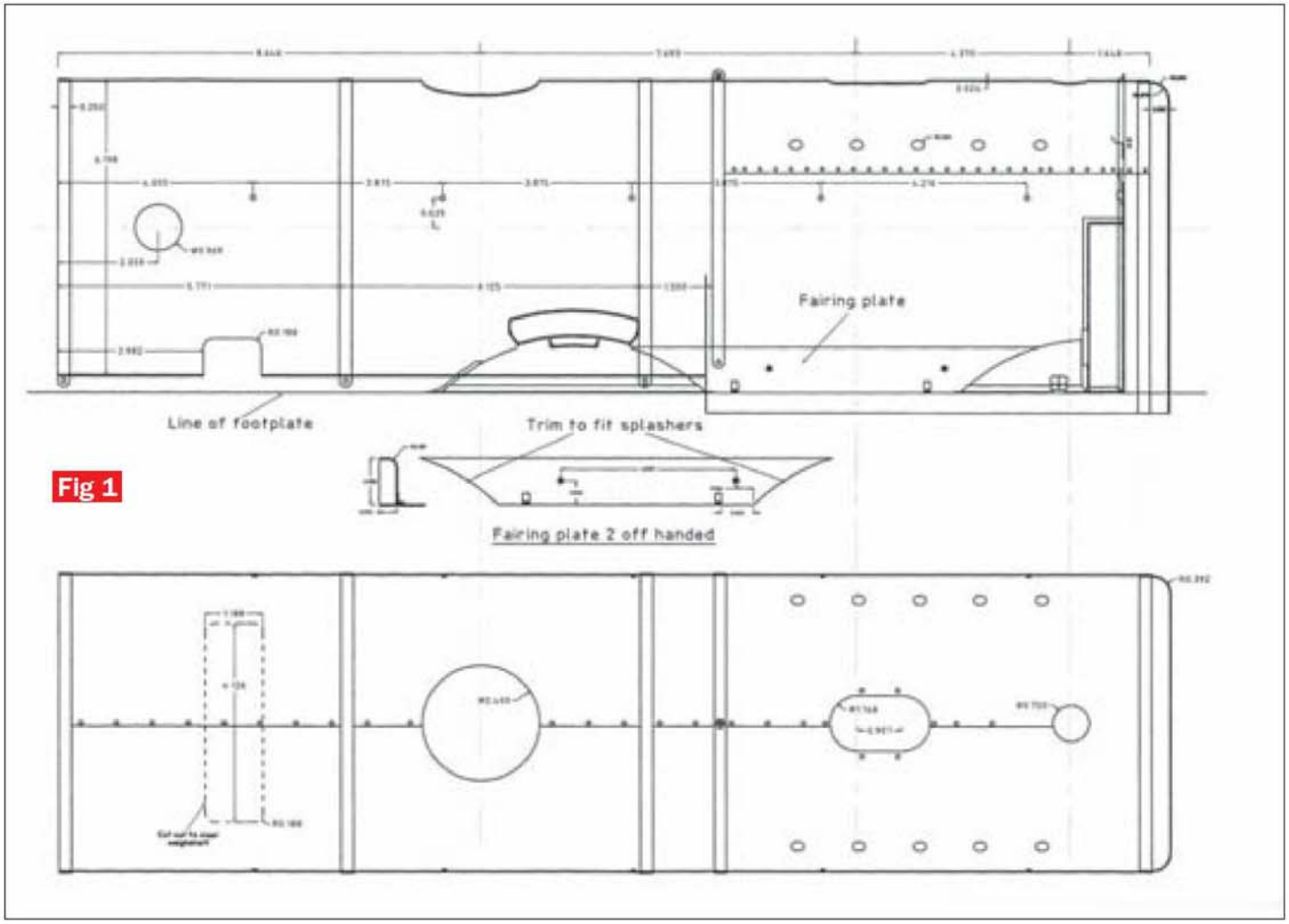


Fig 1

3. Side view of manifold, note whistle rod.
4. Safety valve detail.

reproduced in small sizes by wrapping bands of thin ply about ¼in. wide around the barrel and the firebox underneath the boiler bands. I stick the ply to itself and to the barrel with the ubiquitous Araldite. Mark the position in pencil of the plywood bands, wrap the ply around until the required depth is achieved and hold it with an elastic band. Use a straight edge laid along the top of the barrel to ensure that the bands are of uniform height. Shove your ready rolled barrel along from the front. The holes for the handrail knobs could be lined with little 1/16in. copper washers, soldered in place and tapped 8BA. The boiler back plate and its curved surround make a neat finish to the inside of the cab.

The fairing plate can be made from a piece of 24swg tinplate, or anything else that comes to hand for that matter. It simply hides the firebox cleading/footplate joint, as well as the rear mounting bracket. The rest of the fittings including the cab, clacks, ejector pipes and so on, will be detailed next month.

Regulator handle assembly

Quite straightforward, but make sure that the bushes are turned from good quality phosphor bronze (**fig 2**). The length of the regulator rod is best measured from the job, and it is inserted from the backhead end complete with the brass thrust bush which prevents the rod from popping out at unpropitious times. Please note that the hole in the regulator bush is of ample size to accept the cam plate, which is assembled on the rod and inserted until it locates in the bearing hole with the cam lifting and lowering the plate in the approved manner. I use a 1/16in. roll pin at the front end to locate the cam plate.

The manifold

A complicated casting in full size, which in small size is best reproduced by a brass fabrication (**fig 3**). The whistle and injector feed at the front end are dummies, the actual injector feeds coming from the


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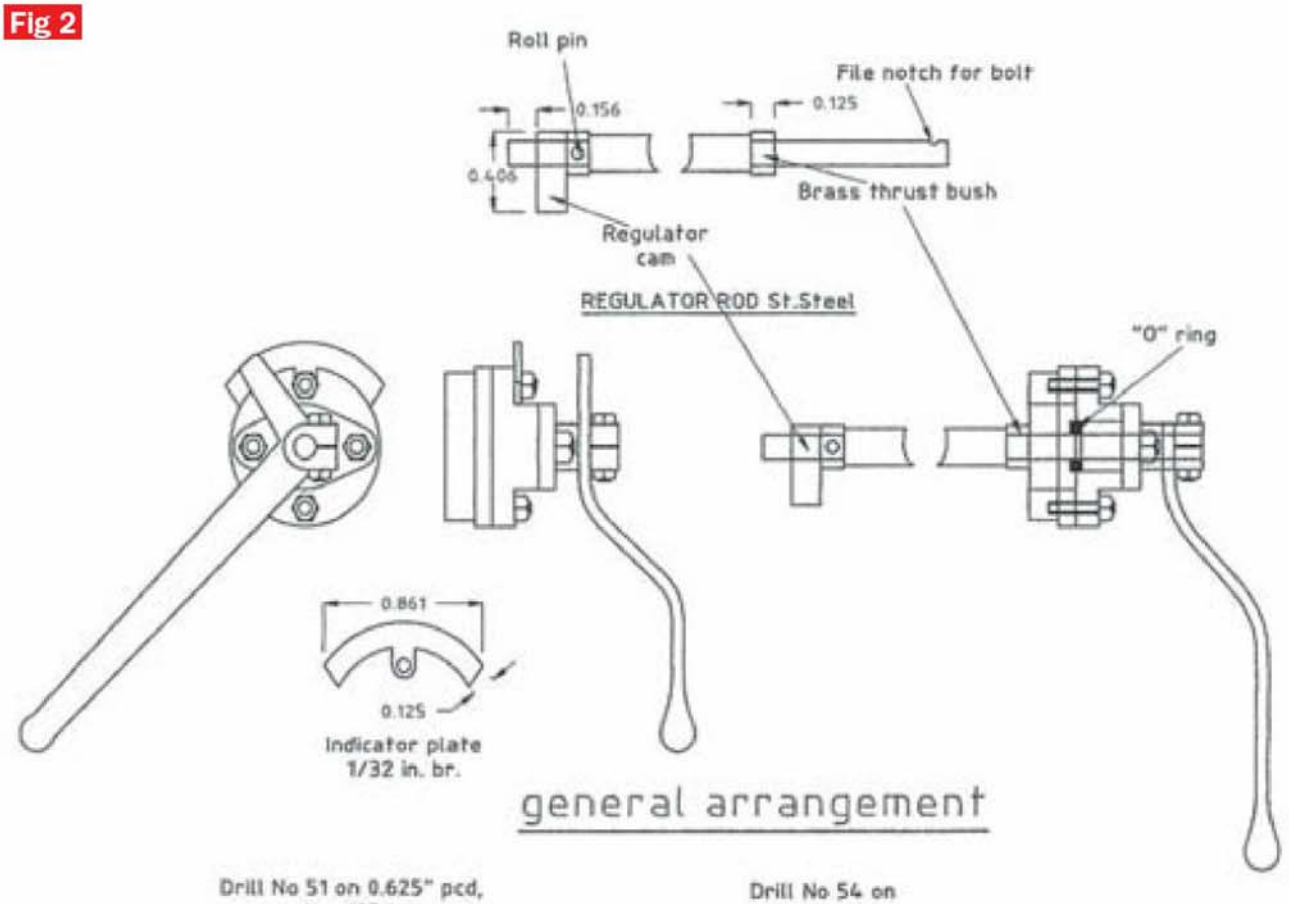
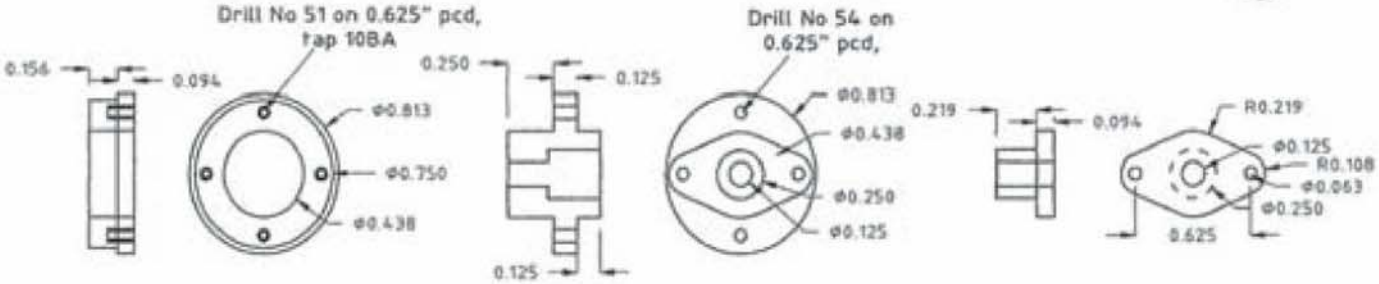
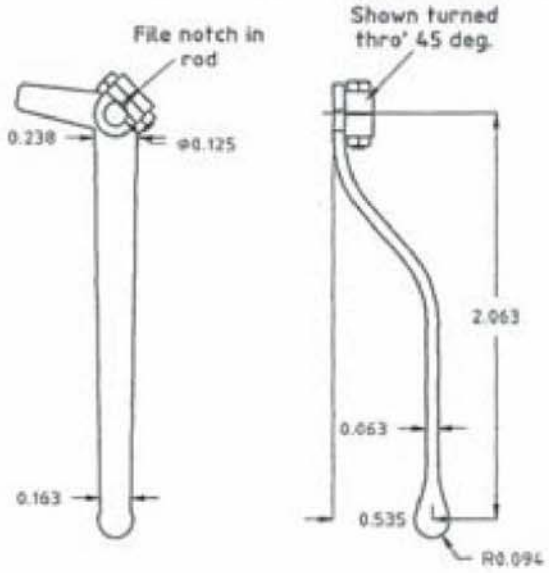
Fig 2

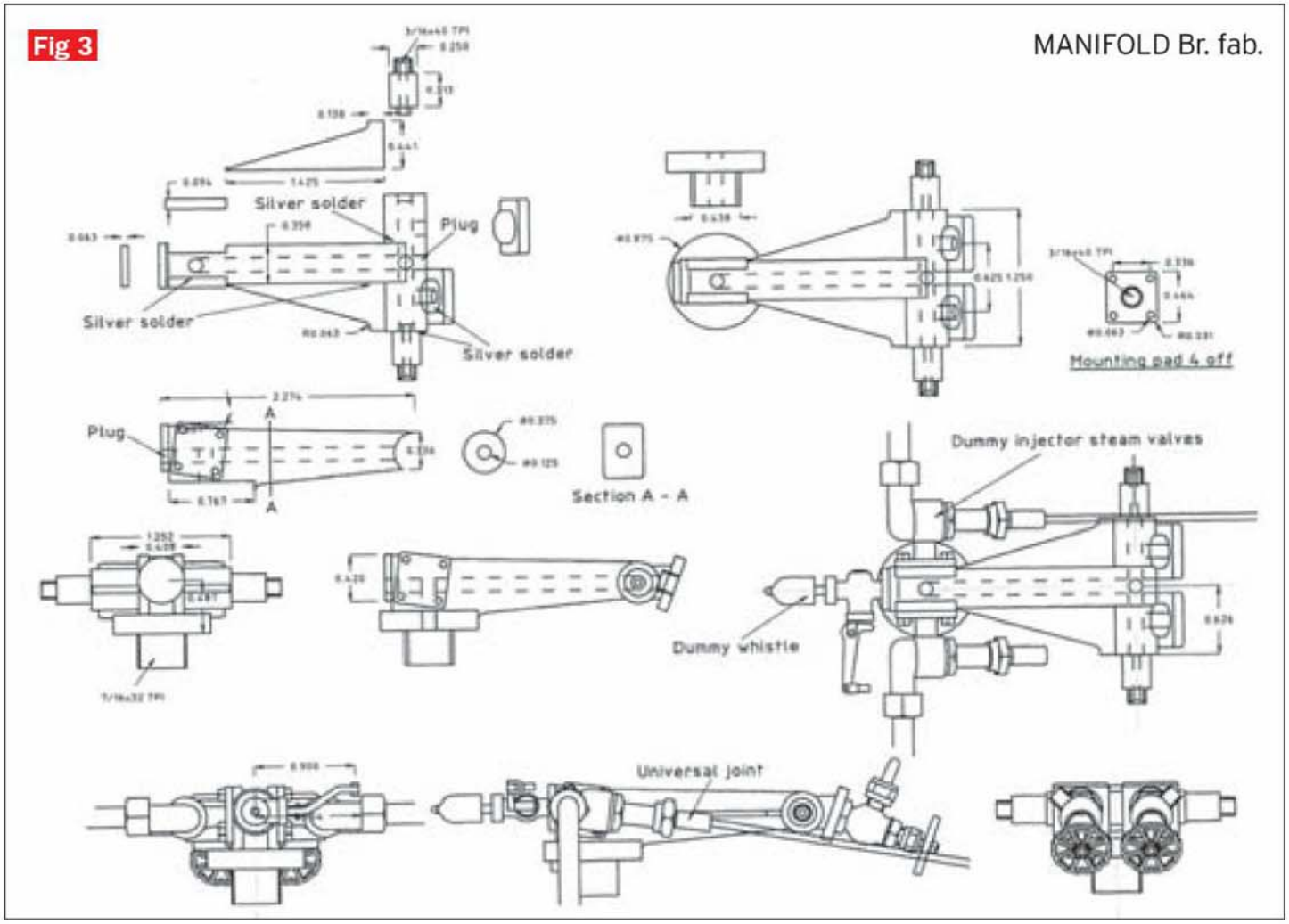


general arrangement



Regulator bushes G.M.





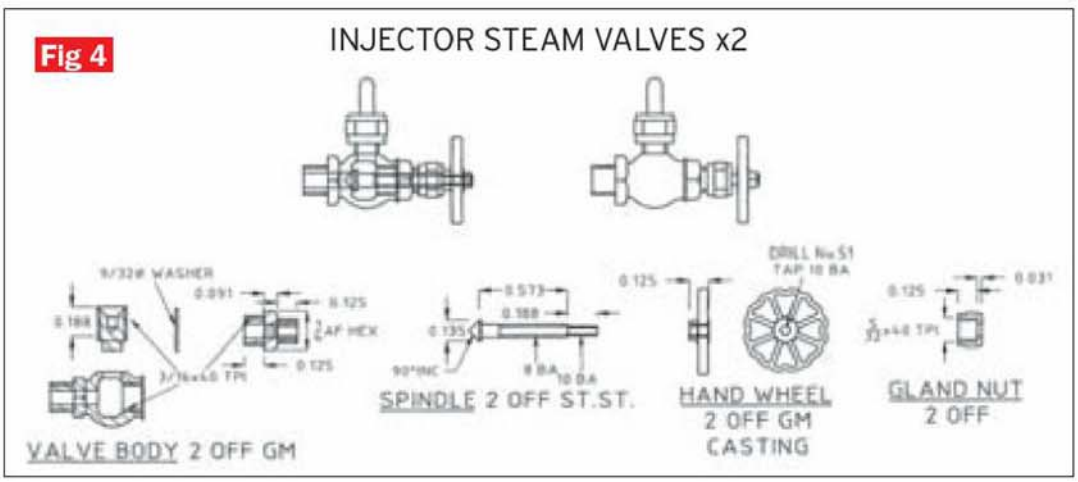
back of the manifold inside the cab (**fig 4**). The manifold has been simplified considerably, because I can't see any practical way of reproducing the injector feed valves without reducing them to flimsy objects that would give constant trouble.

Reader's letters

An interesting crop of letters over the last couple of issues, particularly *M.E.* 4323, 11 April 2008. To answer Barry Pursloe first, I am at a loss to know how the oil pipe from pump to steam pipe, can empty when the locomotive is at rest. The very fact that the outlet is located some 2in. above the pump clack should mitigate against this happening, especially as there is a No. 60 hole in the metering bush which is screwed into the steam pipe. Incidentally, I always put a small screw in the centre of the bottom banjo nut which can be removed for the purpose of priming the oil line. I can, however, see no reason why this pipe should ever be empty except in a brand new locomotive. I therefore contend that provided the oil pump is mounted below the outlet of the pipe, two clacks are an unnecessary complication. I'm rather mystified by the letter from Jack Shillings, as the Ewins pump works on exactly the same principle as any other hydraulic or pneumatic plunger pump. My thanks to Ted Wale of Canada for his kind letter, it is nice to know that somebody really 'close reads' these notes, and I hope derives some benefit from them.

I have been very pleased to see the many letters concerning the subject of high temperature superheat; I can only say that at the age of about 10, I heated the steam pipe of the slide valve mill engine, which I still possess, built for my father by his Uncle Bill in about 1910 from castings obtained I think from 'Stevens Model Dockyard' of Glasgow. I was amazed to note that the engine revs almost doubled through the addition of a small amount of extra heat energy. Please don't even consider running a small or large engine without the benefit of superheat.

To be continued.



PETE'S PAGE

ROTARY FILES AND BURRS

Peter Spenlove-Spenlove reminds beginners of the differences between tungsten carbide and steel burrs.

Many of us have bought rotary burrs and rotary files, made of tungsten carbide, from surplus stores – the normal ones are made of hardened carbon steel (**photo 1**). The carbide type, while more costly, can cut metal at a far greater rate, but only when run at high speed. The carbide rotary file in **photo 1** is bright diamond cut with gashes or notches for chip breaking; it must be run fast.

In contrast, the carbon steel burr shown should be run more slowly.

One can use carbon steel burrs at a low speed using a normal electric pistol drill. Because tungsten carbide burrs have very sharp edges, they 'dig-in' and jump out of control if used in a normal pistol drill. There is the real possibility that the sharp edges will get chipped or that the shank may snap near the chuck.

1

It is vital to run carbide burrs and files at high speed and this can only be achieved with special tools which are usually air driven. A face guard is essential. The noise is considerable and the air consumption is high.

For this reason air tools, although sold at reasonable cost, may not be suitable in a home environment. One needs a large air compressor to do a long job. I have tried to quell the high-pitched whine of the air motor by wrapping cloth around the exhaust, but it is not very effective.

Electric power

I believe it is better to use a high-speed electric die grinder to power these cutting tools. Those for ¼in. shank burrs, are costly. However, ⅛in. shank burrs can be used in one of the better quality mini tools which has good bearings to withstand the side thrust and prolonged running at high revolutions. Some of the mini tools use collets, so check the shank of the carbide burr. It may be 3mm, 6 mm, ⅛ or ¼ inches. Make sure to buy suitable burrs/collets.

Insert the shank deeply in the tool before tightening. Burrs which stick out too much may work loose and fly out, or the shank could break.

Having acquired your high speed tool, you can also use it with mounted points (**photo 2**). These are little shaped grindstones which are cemented onto steel shanks. Like rotary files and burrs, mounted points are made in various shapes, cone, ball, cylindrical, disc etc and in various sizes. The shank range is similar to burrs.

Safety

Due to the working speed of burrs, files and mounted grinding points, it is vital that good impact resistant goggles and, if possible, a face guard are worn. Tungsten carbide burrs can throw off needle sharp swarf. A mounted point can crack and fragments fly dangerously. If a mounted point shank is slightly bent, throw it away. It is too dangerous to use. Do not try to straighten it; the point will may become loose and this may not be immediately obvious!

Is it steel or carbide?

Newcomers to the hobby may wonder how to tell if the tool is tungsten carbide or steel. Tungsten carbide is the heavier material and the tool will feel unusually heavy. The teeth tend to be very precise and even. Some are finished in the factory on a grinding machine which often produces a very smooth shiny finish. Unpolished parts are often very smooth and a darkish shade of grey - quite unlike steel. Tungsten carbide tools are more costly and have a far more 'precise' look about them.

Carbon steel burrs and rotary files are often finished matt grey - like hand files - but with a bright finished shank. There are of course exceptions. Some may be dipped in a colouring material for identification purposes. Some steel burrs have milled and/or ground teeth, like the carbide type, but steel is a lighter colour. ME

2

1. Two rotary burrs or files which each weigh exactly 25 grams despite the size difference. The larger conical burr (left) is hardened carbon steel, the burr on the right is made of tungsten carbide.

2. An example of a mounted point for grinding. It should be run at high speed.

Finishing the Bristol Hydra

(THAT ALMOST FINISHED ME!)

Brian Perkins
concludes the series by describing how he made the propeller blades.

Continued from page 513 (M.E. 4324, 25 April 2008)

The engine was now almost complete but still needed a propeller. However, the rotating stand that I had used for assembly was not high enough for the propeller to clear so my friendly sheet metal shop folded a couple of pieces of aluminium plate and, after a struggle, I transferred the engine onto the new stand (The model is surprisingly heavy and awkward to handle).

Master blade

I decided to make the three blades for the propeller from glass fibre, so the first thing I needed was a master. I worked out the proportions of the blade from photographs and set out the shape using the same method I used for the full-size propeller on my Colibri (**fig 9**). I planed up some wood, for three laminations, that a friend had for pattern making. I don't know what wood it was, but it carved very nicely. It was a great advantage to carve just one blade and so avoid the problem of balancing.

The butt end of the blade was turned from aluminium to ensure that the retention groove was correct. This was fitted to the wooden blade. The master blade was then set up in a plywood box and clay used to follow the chosen split line. The first side of the mould was laid-up using a gel coat, chopped mat and polyester resin. Once this had cured, the clay was removed and the second side of the mould laid-up.

Resin

I had not yet decided what material to use for the actual blades so I visited a company who sold resins and related materials. A very helpful gentleman advised me on the use of materials mainly intended for boat building.

I had been concerned about how to fill the moulding but he introduced me to an epoxy expanding foam that dinghy sailors use for dagger boards and rudders. This foam,

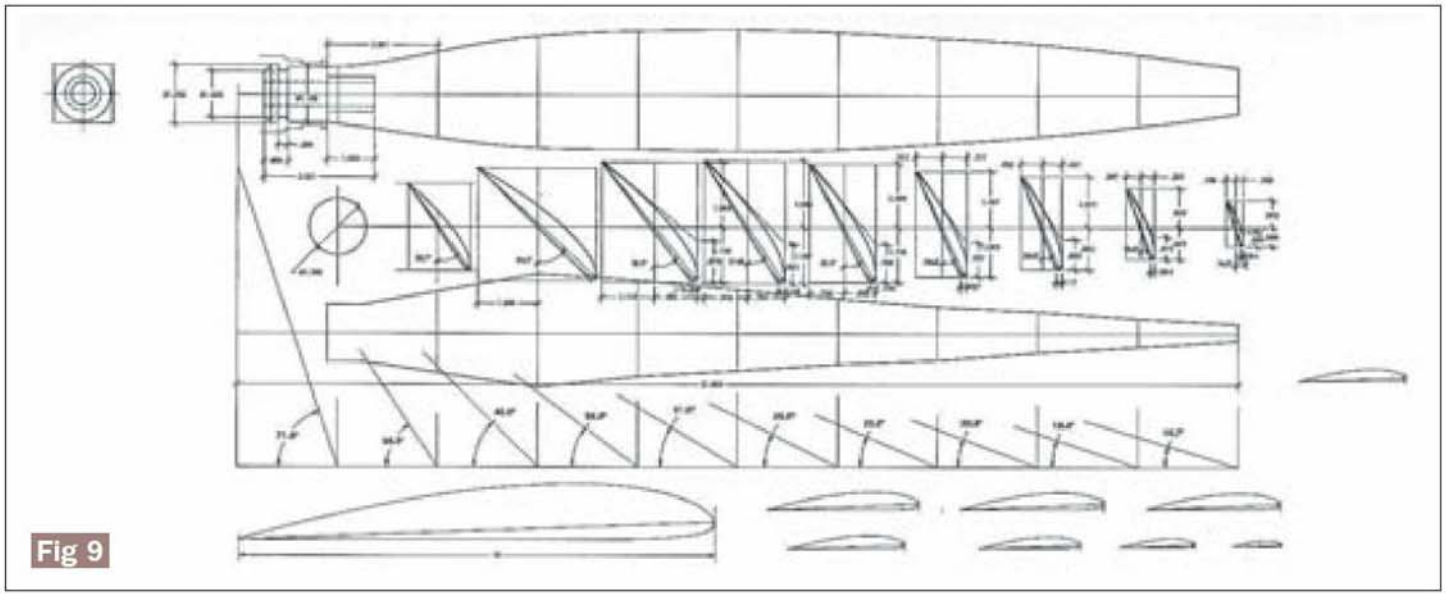


Fig 9

unlike the polyurethane foam used by builders, only has an expansion ratio of 6:1. It is very light and extremely strong, but is best incorporated into the wet moulding.

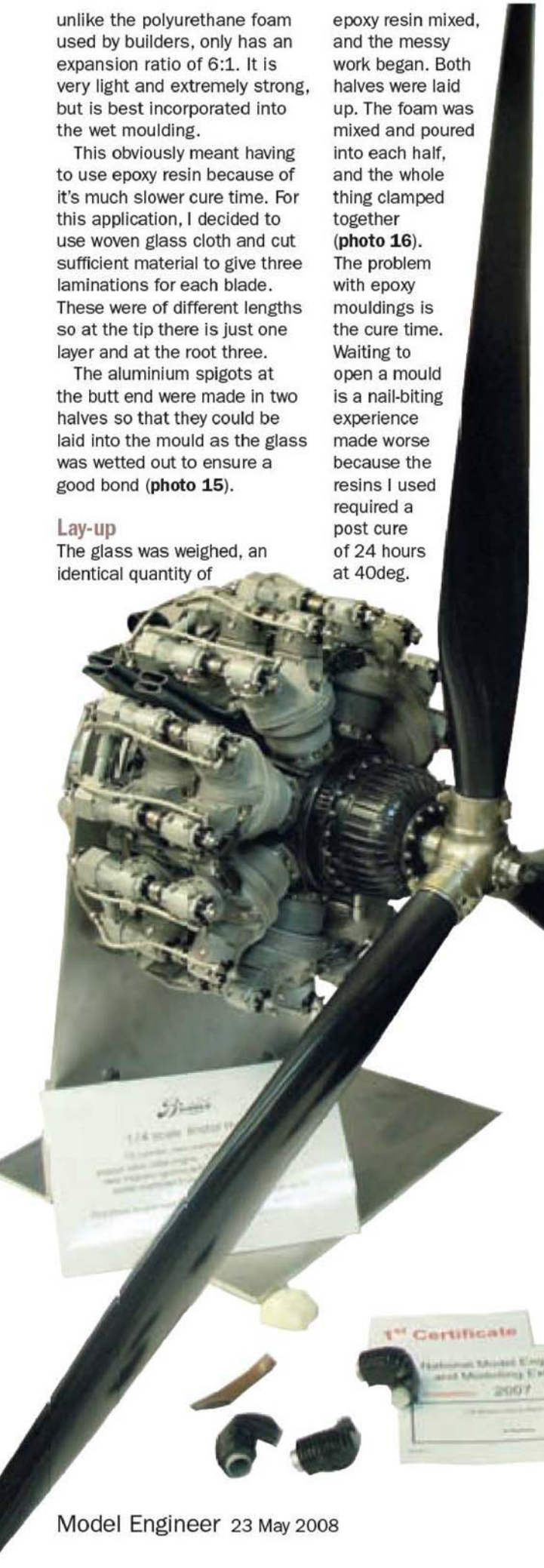
This obviously meant having to use epoxy resin because of it's much slower cure time. For this application, I decided to use woven glass cloth and cut sufficient material to give three laminations for each blade. These were of different lengths so at the tip there is just one layer and at the root three.

The aluminium spigots at the butt end were made in two halves so that they could be laid into the mould as the glass was wetted out to ensure a good bond (**photo 15**).

Lay-up

The glass was weighed, an identical quantity of epoxy resin mixed, and the messy work began. Both halves were laid up. The foam was mixed and poured into each half, and the whole thing clamped together (**photo 16**). The problem with epoxy mouldings is the cure time. Waiting to open a mould is a nail-biting experience made worse because the resins I used required a post cure of 24 hours at 40deg. Centigrade. When the time came to open the mould, to my delight, it actually come apart. And there was a propeller blade ready for trimming (**photo 17**).

It was now simply a matter of repeating the exercise two more times, cleaning up the blades, painting, and fitting the blades to the hub.



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Finished at last!

At last the engine was finished after 5 years and just under 3,500 hours work. At times it had seemed like a prison sentence, particularly the year spent putting it together. I always said that assembly was going to be far more difficult than actually making the parts and this was certainly the case.

I feel that the design of the full-size *Hydra* left a great deal to be desired, particularly from the assembly point of view. There are some nuts that seem impossible to reach. *Hydra* has been an interesting and challenging project. I would hate to take it apart again!

So, to the next project: Definitely NOT another aero engine. But, as Mr. R. Jarvis said, when asked for his recipe for a long life, 'Model Engineering' – On that, I certainly agree. ME

Micrometer Survey

David Stokes takes a look at what's on the market for this mainstay of the engineer's workshop.

Micrometers are the mainstay of accurate engineering work whether you favour our traditional imperial way of measuring things or go for the new-fangled foreign metric sort. Whatever system you use getting things down to 'thous' or tiny bits of millimetres requires something better than doing things by eye or saying "That's close enough for jazz."

For years the micrometer has been the first piece of measuring equipment one buys for a workshop.

We took a look at 0 to 1in. or for those who are all metric, 0 – 25 millimetres. We asked the main suppliers and some not so usual sources what they had for sale. We looked at price, value, and ease of use. **ME**

SEALEY AK9630M

Guide Price	£18.39
Reads to	0.01mm
Need of adjustment from new?	Yes
Case?	Yes
Contact	0870 922 4114
	www.justoffbase.co.uk

Comes in a neat wooden case with protective soft lining, easily adjusted to zero. Brushed metal finish, ratchet stop on thimble and supplied with an adjustment spanner. Free and easy action, ratchet works well and zeros nicely.

DRAPER 50604

Guide Price	£14.25
Reads to	0.01mm
Need of adjustment from new?	Yes
Case?	Yes
Contact	0845 299 0149
	www.toolsnstuff.co.uk

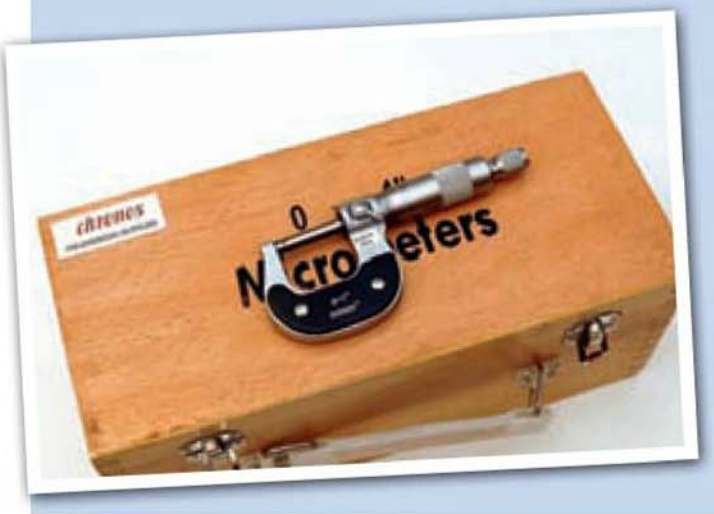
Has all the attributes one expects for a 0 – 25mm micrometer, hardened anvils, ratchet, locking lever and a spanner to adjust. Comes in a click locking plastic case with protective sponge rubber lining. Reasonable value.

SCREWFIX 36839

Guide Price	£11.49
Reads to	0.01mm
Need of adjustment from new?	No
Case?	Yes
Contact	0500 414141
	www.screwfix.com

Well priced, high quality mechanical micrometer, comes in a plastic case, has the obligatory adjustment spanner, nice smooth action, excellent value.

CHRONOS XC241



Guide Price	£7.95
Reads to	0.001in.
Need of adjustment from new?	No
Case?	Yes
Contact	01582 471900
	www.chronos.ltd.uk

Very high quality at a very low price, the price quoted is for a Christmas special but they continue well into the New Year. The test mike came as a part of a four mike set that cost £59.95 and in the rather nice box there are, a 0-1, 1-2, 2-3 and a 3-4in. mike with a 1, 2 and 3in. standards. It can be bought on its own. It has a nice smooth action and has that intangible good feeling about it.

CLARKE CM200

Guide Price	£14.09
Reads to	0.001in.
Need of adjustment from new?	No
Case?	Yes
Contact	0845 450 1800
	www.machinemart.co.uk

Almost the same product as Sealey's offering but has an enamelled finish instead of the brushed metal, other than that it is very similar. Comes in a wooden case and supplied with an adjusting spanner. Did not need any adjustment and has all the attributes one expects in a 0-1in. micrometer, hardened tungsten anvils, a ratchet stop on the thimble and a spindle lock lever. Nice free action, zeros accurately and the lock is easy to use.

SILVERLINE 282378

Guide Price	£10.32
Reads to	0.01mm
Need of adjustment from new?	No
Case?	Yes
Contact	0808 100 7211
	www.toolstation.com

Supplied in a plastic case, has an enamelled steel frame, matt chrome thimble and sleeve, locking lever and tungsten carbide measuring faces. Has a good free action, zeros nicely and locks well.

>>

LIMIT 9538-1000

Guide Price	£29.31
Reads to	0.001in.
Need of adjustment from new?	No
Case?	Yes
Contact	01525 711500
	www.iqsupplies.co.uk

This micrometer has a very smooth action indeed, enamelled finish on the frame and a brushed aluminium thimble. Unlike most micrometers the ratchet is on the larger part of the thimble and not in the normal place at the end. A good tool, well made and is supplied with an adjustment spanner and comes in a protective case.

MITUTOYO 103-137

Guide Price	£38.86
Reads to	0.01mm
Need of adjustment from new?	No
Case?	Yes
Contact	0870 240 8141
	www.tooled-up.com

When speaking of micrometers Mitutoyo is the name that always come to mind, thought by many to be the aristocrat of measuring devices this micrometer does not disappoint. Lovely smooth action, gives a positive feel to the user and comes in a plastic case along with its adjustment spanner.

TESA 00119046 0 - 25 EXTERNAL MICROMETER

Guide Price	£32.00
Reads to	0.01mm
Need of adjustment from new?	No
Case?	Yes
Contact	0800 66 3355
	www.jlindustrial.co.uk

Exceedingly high quality mechanical micrometer, feels good with very smooth action. Comes with the normal 'C' spanner plus an Allen key.

Inspiring engineer's workshop

Roger Backhouse pays a visit to the workshop of a multi-talented model engineer.

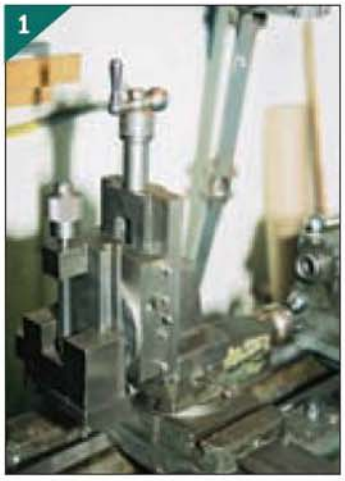
Visitors to the Model Engineer Exhibition at Ascot last year will have admired the fine models on the City of Sunderland MES stand. I was privileged to visit the home workshop of one of the makers, John Cogdon, and see other examples of his craftsmanship. John's workshop is a former scullery behind his neat terraced house. It is apparently modestly equipped with a Boxford lathe and a pillar drill. No surprises at first.

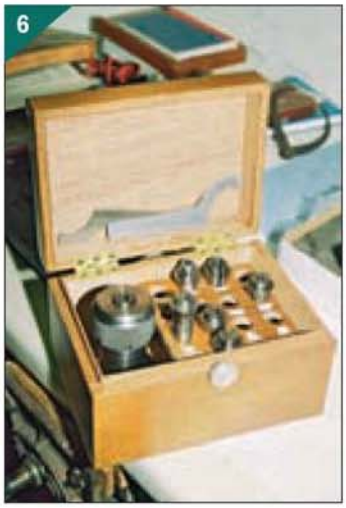
Then John pointed out the pillar drill he made himself. A tapered bearing allows some lightweight milling. Indeed, John has made almost everything to be seen including the milling attachment for the lathe and a magnifying lamp made from an old pie dish! Smaller tools include a beautifully finished height gauge made utilising a scrap micrometer.

He never uses castings, finding them expensive and often flawed. Everything is fabricated. John showed me the side for a pillar engine he's making, carefully assembled for later brazing. He was hoping to show this at the forthcoming Harrogate exhibition. John's range of model making is astounding. A locomotive, hot air engines, artillery, a clock and unusual steam engines are just a part of his output.

Multi-skilled

His early apprenticeship as a toolmaker gave him good engineering training. Like many engineers he then joined the Merchant Navy where he could improve experience and gain qualifications. After design work for a firm designing hospital laundry machinery and sterilising equipment, where he invented several patented devices, he then taught engineering at South Tyneside College for many years. This gave him access to some of the tools used, including a cylindrical grinder, to make equipment. >>





1. Vertical slide for Boxford lathe made by John Cogdon.

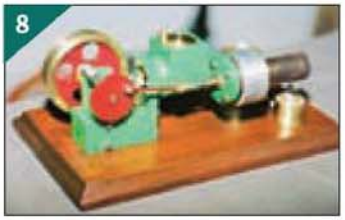
2. Boxford lathe.

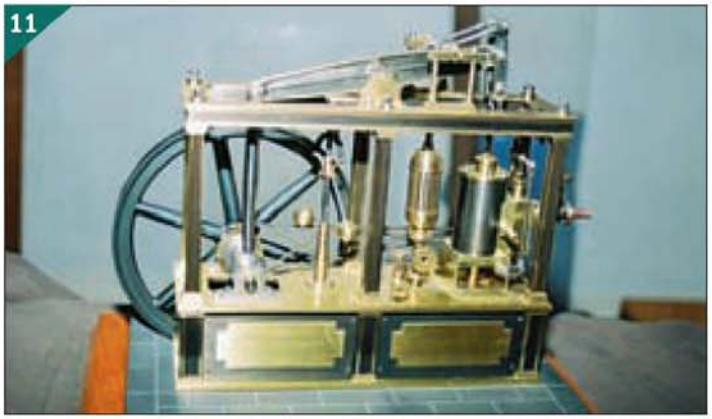
3. Pillar drill made by John Cogdon, incorporates a taper bearing to allow lightweight milling.

4. Home-made height gauge.

5. Pillar engine side under construction. All parts are fabricated, no castings are used.

6. Beautifully made collet box.





7. Attachment to allow metalworking on a woodwork bench. Bolts lock the vice to the bench.

8. Stirling engine – this began as a vacuum engine that didn't work.

9. Rotary piston engine showing piston. This rotates and reciprocates within an ovoid cylinder.

10. Rhombic drive Stirling engine.

11. Lady Stephanie *six-column beam engine – an exquisite model. Black parts are chemically blackened.*

12. Tesla turbine.

13. Underside detail of the Lion *locomotive.*

14. Titfield Thunderbolt *(*Lion*) locomotive under construction.*

15. Hipp clock and case both made by John Cogdon.

Fellow Society members joke that John should win prizes for his model cases. Every model has a carefully made wooden box using a special fastening to hold models secure in transit. Several more examples of his woodwork skills at home include furniture and a case for a Hipp clock he made.

Managing woodwork and metalwork in the same workshop can be tricky. John uses a cover on the workbench for metalworking and has a detachable panel with the metalworking vice, bolted to the bench. Brazing and silver-soldering is done in the garage.

Given the range of quality models, it is difficult to pick out particular favourites. There are Stirling engines including a rhombic drive model under construction. John adapts and invents - another Stirling began as a vacuum engine that didn't work.

Tesla turbine

Something I haven't seen modelled before is a Tesla turbine. Nikolai Tesla was the Serbian born genius who emigrated to the USA where he developed alternating current generation. John's model turbine, is on the surface, unspectacular but it hides engineering genius.

The Tesla turbine uses the boundary layer effect to drive parallel thin circular plates, rather like an ordinary turbine but without blades. It works but the metals available at the time buckled with the heat so it was not the success Tesla hoped. Tesla pioneered wireless, though his ideas were used more effectively by Marconi. However, Tesla remained a visionary engineer until his death in 1943.

John has a *Lion* (*Titfield Thunderbolt*) locomotive under construction. When complete it will be a fine model.

Remarkable engines

However, what really took my eye in John's workshop were three remarkable steam engines. The first is a six-column beam engine *Lady Stephanie*. It is an exquisitely detailed model, with many tiny parts. No wonder John's work has been praised by Cherry Hill and the late T. D. Walshaw ('Tubal Cain'). All the bright metalwork is stainless steel, not the easiest material to machine. Black parts are chemically blackened rather than painted. Capitals on the columns

were cut using miniature routing tools John made.

A rotary piston engine is an unusual subject for a model. I had trouble understanding how it works – though it does – so I quote John's description. 'The piston is an eccentric which both rotates and oscillates in the cylinder. The piston rotation is transmitted to the main shaft by two side rods connected by cranks. Two other rods centred on the main shaft maintain the eccentric centre at the mid point of the cylinder."

Seeing is believing and it is a fascinating model. John took the ideal from a diagram of the engine's geometry seen in an American magazine. He then designed a Victorian style engine around it. Tubal Cain provided the inspiration for the third unusual model. It is a 1:12 scale rotary steam engine originally designed by W. A. Coomber in 1876. Victorian engineers turned their ingenuity to improving the steam engine and sometimes tried bizarre forms of steam power. This is no exception.

The key feature is a track of constant diameter though it is not circular – the principle, though not the shape of the 50p piece. Inside this track is the cylinder with a reciprocating piston. The ends of the piston rods run on roller bearings inside the track. In the original these bearings were spring-loaded as the engineers then did not have the equipment to machine the track accurately.

In the model John cut the track from a solid disc of cast iron. He machined first from two radii set apart to give a slightly ovoid shape, then filed the junction to the approximate shape.

To finish machining John made a cutting tool with a roller on one end. He removed the lead screw from the cross slide to allow the slide to run freely. The roller then engaged on the profile with the tool cutting the other side. He hung a weight on the cross slide to hold it firm. Easy to describe but difficult to do.

Wheel jigs

John makes small jigs and tools for many jobs. This is shown by his jigs for making wheels for a model of an early 19th century artillery piece. Wooden wheels are difficult to make even in full size. The jigs enable the wheel to have the correct dish to the wheels. I picked up the thin steel tyre and commented that I couldn't see the join. John gently pointed out that he had turned the tyre from solid. Try it yourself – a surprisingly difficult task to get right. Even the wooden bucket is made up as a proper replica of the original with shaped staves and hoops.

Other interests

John contributes actively to the Sunderland Society, winning their General Engineering Trophy, but he is not only a model maker. At one time he was a keen racing cyclist and still cycles to his allotment where he is a keen fruit and vegetable grower, making wine in what remains of his spare time.

John Cogdon's work is certainly an inspiration in the design, making and presentation of fine models. Should you visit an exhibition look out for the Sunderland MES stand. They have talented engineers besides John, but I came away astonished at the quality of models he has produced over many years of creative modelling. **ME**

16. Early 19th century artillery field piece – the thin steel tyres are turned from solid, a difficult task to get right!

17. W. A. Coomber engine – the rotating cylinder has a reciprocating piston. Ends of the piston rods run on rollers inside a non-circular track of constant diameter.

18. John Cogdon with City of Sunderland MES General Engineering Trophy.

19. Workbench – top for metalworking on top of woodwork bench.

20. Jigs for making wooden wheels of artillery piece.

21. Home-made magnifying lamp – made from an old pie tin.

22. John Cogdon at work.

Realistic name and plates for locomoti

Alan Crossfield explains how drilling, filing and careful workmanship are used to make these diminutive and distinctive parts.

Producing miniature name and number plates is job normally subcontracted to commercial specialists. If like myself, you prefer the d-i-y approach, there are several methods of achieving acceptable results. The method I prefer is very basic and inexpensive. The procedure involves cutting to shape the individual letters or numerals and attaching them to a suitable back plate.

In today's world of photo etching and computer aided engraving, I suspect some readers may be surprised and others horrified at the thought of producing letters using simple hand tools. For those of us not well practiced in the use of Swiss files, broaches etc. the exercise could provide an ideal opportunity to acquire a new skill. Yes, it may take time, but this will be repaid many times over in diverse model engineering applications.

Photograph 1 shows the application of one such plate to the club locomotive of the Leyland Society of Model Engineers. Although the name is freelance (chosen by members poll), the loco itself is based loosely on a narrow-gauge diesel prototype and was built to a scale of 2 ½in. = 1ft. The back plate, letters and name plate surrounds were produced from flat brass 1/16in. thick, to make a chunky name plate sympathetic to the large scale of the locomotive.

The distinctive G.W.R style of plate shown in **photo 2** is attached to the bunker of my 5in. gauge tank locomotive. The fact that most GWR locomotives retained their original numbers throughout the nationalisation period was due mainly to them being cast in metal. Some were brass while others were of cast iron.

Smokebox number plates were carried by almost 20,000 steam locomotives of the U.K.'s nationalised fleet. These plates were of cast iron only and were fully painted.

The smokebox door shown in **photo 3** carries both the number plate and the shed allocation plate. As the full size plates were cast-iron, I felt that steel would be an appropriate choice of material from which to make the miniatures.

Work in the smaller scale of 1:16 is shown on the 3 ½in. gauge BR Class 7 locomotive (**photo 4**). The rectangular surround and plain style of lettering are typical of the 1950s B.R. image. In stark contrast is the name plate shown in **photo 5**. This is a typical GWR name plate and is carried by a 5in. gauge model locomotive.

The method I use to produce miniature plates has many applications and can be applied to many scales and gauges. Generally speaking however, the larger the scale, the easier the process becomes. My own preference is 5in. standard gauge (1 1/16in. = 1ft), and the following description is specific to the manufacture of GWR plates in that scale.

The name and number plates of the GWR locomotives were distinctive both in their appearance and in their method

2

1

3

number ves

of construction. The use of bold serifs on the letters and the numerals, made the plates instantly recognisable.

Producing number plates in miniature

Two pieces of brass (0.040in. thickness) were tinned with soft solder then sweated together back-to-back. The two connected pieces were then treated as a single strip from which four numerals could be shaped in duplicate. The length of the strip was such as to allow for a generous space between each number. After producing the longitudinal edges parallel to each other, the width was checked at 0.509inches. This dimension would produce numerals of the correct scale height (5 ¾in. full size).

The font style used by the GWR has been described as a rather chubby version of Clarendon Bold. I did consider using one of the many font styles available on the home computer as an aid to the process of marking the numerals onto the metal. However, I was disappointed to find that from a choice of over three hundred font styles provided by Microsoft, none came close to the style used by the GWR

I eventually obtained all the information concerning the dimensions of the plates and the style of the numerals from full size locomotives. Many ex-GWR locos can be seen at the various railway heritage sites and I simply took close-up photographs of plates until I had covered all the required letters and numerals. I have since been told that the correct font style can also be found on the Internet.

Marking the chosen numerals onto the brass strip was carried out with the aid of traditional engineering tools (scriber, dividers, tri-square etc.). A magnifying lamp helped with the process and I found the best approach was to mark and shape one number at a time.

Cutting the numerals

Predictably, the actual process of cutting and shaping the numerals, proved to be rather time consuming. This was mainly due to the elaborate font style used by the GWR. I made a start by drilling the number strip to create the variety of internal shapes within the numerals. Drills used varied in size from around 1/64in. up to 9/64 inches. As an example, a 9/64in. drill was used to help create the mouth within the '0' numeral, while a 7/64in. drill produced the starting point for the internal triangle within the '4' numeral. Smaller drills were used to chain-drill around the outline of the numbers and a junior hacksaw was used wherever possible.

Final shaping and finishing of the individual numbers was carried out using a selection of Swiss files. At least one file was specially adapted for the purpose of accessing some of the more awkward internal shapes. The internal triangle within the '4' numeral, for example, appears at first glance, to be a straightforward job for a three-cornered file. This proved not to be the case as two of the angles were too acute for the file in its standard form; so I ground away the cutting edge of the file on one side.

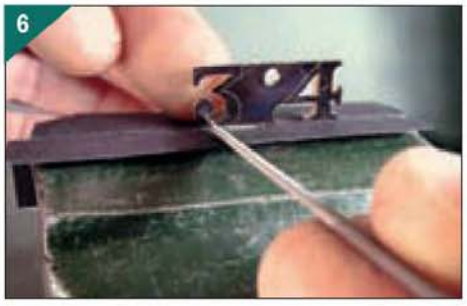
In **photo 6**, my normal pair of vice soft-jaws has been replaced by a pair made from black card. By using card jaws, I managed to avoid scratching-out the marked outline of the numerals caused by the frequent need to reposition the workpiece in the vice. Several grubby fingers can be seen working a Swiss file, the end of which has been specially ground, in order to access the tightly curved V-channel created by the number three's large serif. I remember reflecting at this stage that, had I been building a GWR pannier tank locomotive, I could have legitimately given it the identity of 7711 and, therefore, completed the number plates hours ago!

Once the paired numerals had been shaped and finished, each was then de soldered and separated using a soft flame from a medium sized blowtorch.

Back plates and frame surrounds

Two back plates were produced from brass plate 0.062in. thick. At first glance, these appeared to be simple rectangular plates with rounded corners. To model them correctly however would require a quarter-round radius to be created all around the perimeter edge of each plate. This was achieved by filing.

The previously described method of soldering two pieces back-to-back and shaping items as a pair proved to be particularly advantageous when producing the slender section (0.040 x



0.040in.) frame surrounds. The internal shape of the frame surrounds was achieved by the traditional method of chain-drilling and filing to the finished size. **Photograph 7** shows the pair of frame surrounds before separation.

Securing the numerals

Each of the back plates was, in turn, placed horizontally on two firebricks. The firebricks were arranged so as to expose most of the under surface of the back plate. One-by-one the solder-tinned numbers were placed onto the solder-tinned backplate and checked to confirm their correct spacing.

Heat from the blowtorch was then applied to the underside of the plate, while moderate pressure was applied from above using a hand-held length of thin rod. Failure to apply this pressure will result in the numeral floating to a new position once the solder became molten. After each numeral had been fused to the backing plate, its position was carefully checked once again.

Completing the number plates

With all four numerals secured to the backing plate, the frame-surround was positioned and held at two diagonally opposite corners by toolmakers' clamps. Small amounts of flux and solder were positioned just inside the frame at the corners most distant from the clamps. Localised heat was then applied from below. Once the solder was seen to run, the heat source was removed and the plate allowed to cool. The clamps were then repositioned and the process repeated until the whole frame had a neat looking fillet of solder.

Photograph 8 shows a completed number plate below its incomplete twin. The incomplete example still requires the whole perimeter edge of the back plate to be profiled.

GWR name plates

Full-size name plates of the GWR had their letters riveted to sheet-steel back plates. The ends of the back plates were rounded in order to facilitate the fitting of half-round brass beading. The beading was riveted to the face of the back plate thus providing a curved surround for the lettering.

To recreate the name plates in miniature, I start by producing the back plate and surround. The shape of the surround is marked onto a piece of brass plate 0.038in. thick. The internal shape is achieved initially by chain drilling and filing. As the surround is meant to represent half-round beading, both the internal and the external edges will eventually require rounding off. Only the internal edge needs to be completed at this stage and the method I use, is to grip the workpiece in the palm of one hand while working a small file in the other. Unconventional, I know, but it does provide the opportunity to sit down once in a while. In the next operation, I shaped the concave external edge of the surround.

During the final stages of filing the curved shape, the thin section normally becomes quite delicate and requires careful handling. Once this edge has been completed, the full surround can be silver-soldered to the back plate. Small rivets are used to hold the parts together during the silver-soldering process. Many of the holes for the rivets will be made in areas of metal that will eventually become surplus to the final shape.

Name plate surrounds

The early stages in the manufacture of two name plate surrounds are shown in **photo 9**. Dividers have been used to mark the concentric arcs while chain-drilling once again proved to be an efficient way of removing unwanted metal. Once completed, the surround-plate will be permanently attached to the back plate by silver-solder (Easyflow No. 2). Surplus material will then be cut from the workpiece using a hacksaw.

A useful tip when using a hacksaw for this purpose is to, whenever possible, arrange for the vice to grip the surplus material rather than the workpiece itself. By doing this, the vice may be tightened without fear of marking the job.

Producing the letters

The letters were produced using the same procedure used for the numerals, but the letters are smaller. The full size letters were hollow castings so that, when finished and mounted, they stood 7/16in. proud from their respective backing plates. This dimension translates into 0.038in. for a 5in. gauge name plate.

When producing miniature letters by this method, it is a great advantage if the letters can remain as part of the parent strip for as long as possible. There are several reasons for this, not least is that of minimising the risk of losing letters once they are separated. Another advantage is that a generous amount of surface can be gripped in the vice, while still permitting a reasonable amount of working area to project.

Handling the full strip is far more convenient especially when it's time to check the accuracy of the letters. First, the length of the strip allows the use of a tri-square to check that the upright edges of the letters are both straight and vertical. Secondly, the strip may be held towards the light in order to reveal the silhouette. This latter is probably the most critical test because no matter how the letters are accurately measured, they have to look correct.

Securing the letters to the back plates followed the same procedure as used on the number plates.

Photograph 10 shows the anagram formed by the letter-strip. The next operation was to separate the pairs from the strip and complete each letter individually. Two back plates are also included in the picture. The view of the incomplete example should clarify the description of the method of production.

The name plates prior to the application of etch primer are shown in **photo 11** and the completed, painted job in **photo 12**. The painted orange lines were another distinctive feature of Swindon plates.

Conclusions

If asked for the total of hours spent on the project, my answer would be "don't know." If time spent were an issue, perhaps I should not have chosen model engineering as a hobby! I can say with certainty that if the plates were for a 7 ¼in. gauge loco, the job would have been completed in less than one-quarter of the time. If I were asked to produce the same plates for a 3 ½in. gauge loco I would refuse! **ME**

THE MODEL ENGINEER EXHIBITION
19th - 21st September 2008 Ascot

ENTRY NO.

OFFICE USE ONLY

CLASS	ENTRY NO.

Please return completed form to:
Model Engineer Competition,
9 Tranmore Lane, Eggborough,
E. Yorkshire DN14 OPR

ENTRY FORM - COMPETITION & LOAN MODELS

PERSONAL DETAILS (Please print)

Surname _____ Forename(s) _____ Age: _____

Address _____

_____

_____ Post Code: _____

Home Tel No _____ Daytime Tel No _____

Model Club or Association _____

Have you entered before? (Y/N) _____

Do you purchase or subscribe to a Magicalia Publishing Ltd magazine? (Y/N) _____

How many years have you been a modeller? _____

Mail Order Protection - please tick this box if you would prefer not to receive mail from other companies which may be of interest to you ☐

MODEL DETAILS – PLEASE TICK BOX IF MODEL IS FOR LOAN ☐

Entry Class (competition entries only) _____

Model Title (to be used for catalogue and display card) _____

Model Description _____

_____

_____

Model Scale _____ Length _____ Width _____ Height _____ Weight _____

Type of construction _____

_____

Parts not made by you and commercial items _____

_____

Have you supplied a photograph? (Y/N)

Are you supplying Judges Notes? (Y/N)

Value of Model (Magicalia Publishing Ltd will not insure the model unless a value is entered) £ _____

Name and address of your local newspaper _____

_____

N.B. Please make a copy of this form and any photographs enclosed for your own reference.
Please note that Magicalia Publishing Ltd will not accept liability for any loss of documents or photographs submitted with this form.

To help you get the best from The Model Engineer exhibition

These notes are written purely for guidance. Full information is contained in the Competitors' Information booklet which is sent to every entrant as part of the information package. If you have an item and are unsure as to the Class into which it should be entered, leave that section blank and we will take care of it. The Judges have the right to move any competition exhibit into another class if they feel that by doing so its chances of gaining higher marks or a more appropriate award are improved.

If the item is offered as a Loan exhibit please indicate this by writing Loan on the form in the box identifying the Class. Loan models are not judged but carry all other privileges associated with competition entries.

Part built models are particularly welcome in the Loan Section; visitors like to see work in progress, and entry does not preclude the item being entered in competition when completed.

The classes listed below are those associated with mainstream model engineering.

Club exhibits

Where a club is exhibiting, each model should be entered on a separate entry form and clearly identified as a club exhibit by entering Loan/Club in the class section box. This ensures that we have a full record of all models on display during the show and facilitates matters of administration and insurance.

Additional forms

If you do not wish to deface your copy of the magazine we are happy to receive photocopies of the entry form, one for each model. We will be pleased to send out extra forms if required, so if you know of a modeller who is not a reader of one of our magazines but who you think may wish to participate, please advise them to contact our Exhibitions Office, or simply photocopy the entry form for them.

The success of the show depends largely on the number of models on display. Your work could well be the stimulus which inspires someone else to start in the hobby. There can be no doubt that this event is our showcase on the world of modelling in all its aspects. Every modelling discipline needs more and more participants, and it is by displaying not only the crème-de-la-crème, but also examples of work of a more achieveable standard, that people are encouraged to join into the wonderful world of modelling, in whatever aspect.

We look forward to seeing a sample of your work at the show!

Engineering Section

A1 Hot air engines.
A2 General engineering models (including stationary and marine engines).
A3 Internal combustion engines.
A4 Mechanical propelled road vehicles (including tractors).
A5 Tools and workshop appliances.
A6 Horological, scientific and optical apparatus.
A7 General engineering exhibits – not covered by the above

Railway Section

B1 Working steam locomotives 1" scale and over.
B2 Working steam locomotives under 1" scale.
B3 Locomotives of any scale, experimental, freelance or based on any published design and not necessarily replicas of full size prototypes, intended for track duties.
B4 Scratchbuilt model locomotives of any scale, not covered by classes B1, B2, B3, including working models of non-steam, electrically or clockwork powered steam prototypes.
B5 Scratchbuilt model locomotives gauge 1 (10mm scale) and under.
B6 Kitbuilt model locomotives gauge 1 (10mm scale) and under.
B7 Scratchbuilt rolling stock, gauge 1 (10mm scale) and under.
B8 Kitbuilt rolling stock, gauge 1 (10mm scale) and under.
B9 Passenger or goods rolling stock, above 1" scale.
B10 Passenger or goods rolling stock, under 1" scale.
B11 Railway buildings and lineside accessories to any recognised model railway scale.
B12 Tramway vehicles.

Marine Models

C1 Working scale models of powered vessels (from any period). Scale 1:1 to 1:48
C2 Working scale models of powered vessels (from any period). Scale 1:49 to 1:384
C3 Non-working scale models (from any period). Scale 1:1 to 1:48
C4 Non-working scale models (from any period). Scale 1:49 to 1:384
C5 Sailing ships and oared vessels of any period – working.
C6 Sailing ships and oared vessels of any period – non-working.
C7 Non-scale powered functional models including hydroplanes.
C8 Miniatures. Length of hull not to exceed, 15in for 1:32 scale, 12in for 1:25 scale, 10in for 1:16 scale; 9in for 1:8 scale. No limit for smaller scales.
C9 For any model boat built from a commercial kit. Before acceptance in this class the kit must have been readily available for at least 3 months prior to the opening date of the exhibition and at least 20 kits must have been sold either by mail order or through the retail trade.

Scale Aircraft Section

D1 Scale radio control flying models
D2 Scale flying control-line and free flight
D3 Scale non-flying models, including kit and scratch-built
D4 Scale flying radio controlled helicopters

Model Horse Drawn Vehicle Section

G1 Carriages & other sprung vehicles. (Omnibuses, trade vans etc.) Wagons, carts and farm implements. Caravans.

Junior Section

J1 For any type of model, mechanical or engineering work, by an under 14 year old.
J2 For any type of model, mechanical or engineering work, by an under 16 year old.
J3 For any type of model, mechanical or engineering work, by an under 18 year old.

All entries will be judged for standard of craftsmanship, regardless of the modelling discipline, i.e. a boat will not be competing against a military figure. Providing a model attains sufficient marks it will be awarded a gold, silver or bronze medal.

Model Vehicle Section

K1 Non-working cars, including small commercial vehicles (e.g. Ford Transit) all scales down to 1/42.
K2 Non-working trucks, articulated tractor and trailer units, plus other large commercial vehicles based on truck-type chassis, all scales down to 1/42.
K3 Non-working motor bikes, including push bikes, all scales down to 1/42.
K4 Non-working emergency vehicles, fire, police and ambulance, all scales down to 1/42.
K5 Non-working vehicles including small commercial vehicles (e.g. Ford Transit,) scale from 1/43 or smaller.
K6 Any available body shells including Concours, in any scale or material, to be judged on appearance only.
K7 Functional model cars/vehicles which must be able to move under its own power of any type. Can be either free-running, tethered radio controlled or slot car, but must represent a reasonable full size replica.

DUKE OF EDINBURGH CHALLENGE TROPHY

Rules and Particulars

1. The Duke of Edinburgh Challenge Trophy is awarded to the winner of the Championship Award at the Model Engineer Exhibition.
2. The trophy remains at all times the property of MAGICALIA PUBLISHING LTD.
3. The name of the winner and the date of the year in which the award is made will be engraved on the trophy, which may remain, at the discretion of MAGICALIA PUBLISHING LTD., in his/her possession until required for renovation and display at the following Model Engineer Exhibition.
4. Any piece of model engineering work will be eligible for this Championship Award after it has been awarded, at The Model Engineer Exhibition, a Gold or Silver medal by MAGICALIA PUBLISHING LTD
5. No model may be entered more than once.
6. Entry shall be free. Competitors must state on the entry form:
   (a)That exhibits are their own bona-fide work.
   (b) Any parts or kits which were purchased or were not the outcome of their own work.
   (c) That the model has not been structurally altered since winning the qualifying award.
7. MAGICALIA PUBLISHING LTD. may at their sole discretion vary the conditions of entry without notice.

COMPETITION RULES

1. Each entry shall be made separately on the official form and every question must be answered.
2. Competition Application Forms must be received by the stated closing date. LATE ENTRIES WILL ONLY BE ACCEPTED AT THE DISCRETION OF THE ORGANISERS.
3. Competitors must state on their form the following:
   (a) Insured value of their model.
   (b) The exhibit is their own work and property.
   (c) Parts or kits purchased.
   (d) Parts not the outcome of their own work.
   (e) The origin of the design, in the case of a model that has been made by more than one person.

NOTE: Entry in the competition can only be made by one of the parties and only their work will be eligible for judging.

4. Models will be insured for the period during which they are in the custody of MAGICALIA PUBLISHING LTD.
5. A junior shall mean a person under 18 years of age on December 31st in the year of entry.
6. Past Gold and Silver medal award winners at any of the exhibitions promoted by MAGICALIA PUBLISHING LTD. are eligible to re-enter their model for the 'Duke of Edinburgh Challenge Trophy'.
   Past winners at any of the exhibitions promoted by MAGICALIA PUBLISHING LTD. will not be eligible for re-entry into the competition unless it has been substantially altered in any way.
7. MAGICALIA PUBLISHING LTD reserve the right to:
   (a) Transfer an entry to a more appropriate class.
   (b) Describe and photograph any models entered for competition or display and to make use of any such photographs and descriptions in any way they may think fit.
   (c) Refuse any entry or model on arrival at the exhibition and shall not be required to furnish a reason for doing so.
8. Entry into the competition sections is not permitted by:
   (a) Professional model makers.
   (b) Anyone who has a financial interest in the direct supply of materials and designs to the public.

NOTE: If unsure, please contact the Competition organisers prior to the show.

9. The judges' decision is final. All awards are at the discretion of the judges and no correspondence regarding the awards will be entered into.
10. Exhibitors must present their model receipt for all models collected at the end of the exhibition and sign as retrieved.
11. The signed release for each model must be presented to security staff when leaving the exhibition complex with display model(s) after the close of the exhibition.

IMPORTANT NOTE: PLEASE MAKE COPIES, INCLUDING PHOTOGRAPHS, OF ALL INFORMATION RELATING TO YOUR MODEL, AS MAGICALIA PUBLISHING LTD WILL NOT ACCEPT LIABILITY FOR ANY LOSS.

CLOSING DATE 3RD SEPTEMBER 2008

NEWS

Malcolm Stride reports.

Notices

Bristol SMEE will be holding its annual 3½in. Gauge Locomotive Rally at Ashton Court on Sunday 20 July 2008. The event is from 10:30am until 4:00pm and it must be emphasised that only 3½in. gauge locomotives will be admitted, all others will be turned away. For more information, contact Alan Church (T. 01179 702839).

Urmston DMES is holding an open week from Sunday 3 August until Sunday 10 August to celebrate its 60th anniversary.

It is also holding an open weekend on 13/14 September.

Visitors are invited to run on the 3½/5in. gauge track and the contact for more information for both events is Secretary A. L. Fussell (T. 0161 7480160).

A cautionary tale

One of the items at a recent UK club Bits & Pieces evening was the remains of a paint aerosol can which had failed while the owner was shaking it before using it. The sudden release and ignition of the butane propellant caused an explosion in his workshop which lifted the very substantial roof, blew out the window and set fire to his trousers. The person was very lucky to escape relatively unscathed, although he still had dressings on his legs some weeks after the event. The can was apparently being warmed near a space heater before being used. This is a reminder that disasters can occur, no matter how much care is taken. Perhaps such containers should be shaken up outside where the consequences of any sudden gas release may well be minimised. The note does not say how the Butane got ignited, but this would seem to be less likely to occur out in the open.

UK club news

Bristol SMEE has appointed a new Vice President who will be familiar to many readers. The man in question is Geoff Sheppard, who was editor of our *Model Engineers' Workshop* for some years. He very much involvedf with the deservedly popular Bristol Exhibition, and with the Model Engineer Exhibition for a long time.

Don Cordall has been made an honorary life member for his work for the society which includes, among other things, serving on the committee for 23 years. Major work during the winter has been the continuation of the raised track replacement programme. This year 55 ten foot long track panels have been manufactured and installed (**photo 1**). The work was made more difficult by the fact that all but four of them were curved.

The 'bendy beam' at **Bournemouth DSME** has had an overhaul this year. The beam was removed as a unit, the stainless steel rails were replaced and some additional diagonal reinforcing members were welded in place. The beam was replaced as a unit by a group of '13 willing members' who used lengths of timber under the beam to lift it and 'walk it into place'. John Holye has completed his electric powered 16mm narrow gauge vertical boilered locomotive and it has now run successfully after several trials and tribulations including two fires. The latter are the reason for the name *Fire Queen*.

On Friday 5 April the **Colchester MES** member Mick Gipson presented a talk using glass slides and drawings which were taken from the archives recovered from the now demolished Paxman works. The content covered the steam engines and the many types of products made at the Standard Works over the last one hundred years, plus the diesel engines up to the last few years. The Norwich Model Engineers were welcomed on the Saturday at the Colchester track site. They ran five locos during the day. At the recent 'models night', the models on display included several locomotives, many part built, stationary steam engines, and a few sailing barges which were radio controlled.

Edinburgh SME has now vacated the basement at Newliston House after a lot of work by members moving club assets into storage. The first meeting at the new venue took place in January and the hall used is said to be very suitable. The first event was a film night with several interesting videos and DVDs being shown to members. Track running days are still at Newliston on the 2nd and 4th Sunday of each month. A club project has been set up to produce a freelance 7¼in. gauge petrol locomotive. The power unit will come from the club lawnmower which still has a good working 3.5hp engine and gearbox.

The foundations for the new riding truck storage shed at **Melton Mowbray DMES** have been laid. Most of the concrete slab floor has also been laid. >>

1. The raised track gang working in the sunshine at Bristol SMEE.

The shed will be a concrete sectional building and extra hands are being sought to assist with the erection.

Members of the **Model Engineers Society (NI)** at Cultra were treated to an unusual talk by Jim Briggs entitled Dental Identification of the Deceased. Jim is a dental surgeon working at the Belfast School of Dentistry. The next meeting returns to more normal model making subjects. Tom Cardwell had a successful first steaming of his Black 5 locomotive at Cultra.

The February club night of the **Saffron Walden DSME** was snappily billed as: Bring along something from your workshop that would be of interest to other club members. Among the many items on display was a 2½in. gauge Sentinel shunting locomotive with a flash steam boiler and a gauge 1 copper boiler which had been made some years ago but had been left full of water in the sun after the pressure test and suffered significant distortion. Having done this to a boiler myself, I sympathise.

Progress continues on the cable loops for the signalling system and the pneumatic point system is also being developed with a separate battery powered compressor being used for each point. This is to avoid potential problems with condensation occurring in long pipe runs.

Recent running days at **Sutton MEC** are described as "two good days, one iffy one, and one non-event" by Chairman Eric Upchurch. The February meeting took place on a beautiful spring like day and was particularly well attended with six locomotives in attendance. The March meeting preceded the 'great storm' but again attracted six locomotives. Robin Coleman was testing out his new G1 *Duchess*. In the cold, windy, showery conditions this was a steep learning curve for someone new to this gauge. The winter talks and special evenings included several 'social' type evenings such as a music night, featuring home grown talents; an indoor games night with darts, shove halfpenny, various mind games with sticks; and a quiz night. Between all these jolly evenings, the redecoration of the club house has been almost completed and various maintenance tasks have taken place on the tracks and around the site.

Tyneside SMEE members filled the clubhouse to hear Stuart Davidson give a talk on boiler making. During the very informative talk, Stuart encouraged questions and offered assistance to any budding boiler makers. Jimmy Stevenson was held up on the construction of two 5in. gauge 9F locomotives, so having most of the castings for LBSC's *Miss Ten to Eight* he took it on as a winter project. After 11 weeks work and a steam test the locomotive ran very well and was tried out by several drivers.

Improvements have been made to the signalling system at the **Vale of Aylesbury MES** track at the Buckinghamshire Railway Centre. In order to facilitate the selection of routes by engine drivers, some electronic switches have been fitted to enable the points to be changed using a key fob transmitter. There is the possibility of nine new locomotives being completed in the next twelve months and with the expected increase in locomotive numbers, it is hoped that these changes will enable more trains to be run at any time. Charlie Horwood celebrated his 90th birthday at Rewley Road when a surprise party was attended by around 70 people. First meeting of 2008 saw Ralph Ludlow talk about the Aylesbury town clock.

World club news

New Zealand

At the December meeting of the **Hutt Valley MES** members were entertained by John Howarth describing the construction of his clock. The unusual thing about the clock is that most of the parts are made from wood. The gears are all of segmented construction so that the grain is radial and the teeth were cut using a fly cutter and a dividing head. The shafts are brass and run in steel bushes.

The spring and early summer period has been 'an agreeable and quite successful time' for **Maidstone MES**. The informal club gathering and picnic tea after the early December running session was well received by members. The opportunity was taken to try out the second club locomotive which is still under construction. The new locomotive demonstrated a good capacity for work with good safe and reliable operating characteristics.

United States

The grounds and the holiday lights were in top shape on New Year's Eve as more than 30 **New Jersey Live Steamers** members and friends gathered again to bring in the New Year. It was much colder than the past two years and only the Madlinger's *Green Machine* 0-4-0 was in steam. Still, the participants had a great time enjoying the time together as 2007 passed to 2008. Once again decorations were in place and the illuminated semaphore and flagpole could be seen clearly well up and down the road. Members shared hot and cold food and drinks, and the highlights were jumbo shrimps and George Parson's fudgesicles. Both were reported as "tough to beat."

The Port Clinton shops in Port Clinton, PA. have recently restored Blue Mountain & Reading Railway 4-6-2 Pacific number 425 back to operating condition. The locomotive is not completely painted in its blue and gold scheme (the cab still needs to be painted), but the rest of the locomotive seems to be looking and sounding better than she used to.

For a video clip of the locomotive on a test day with a four-car passenger train, go to **http://www.youtube.com/watch ?v=3nz-kTs3qwd**. Appropriately enough, her 'voice' is a Reading Six Chime whistle.

Trade news

MJ Engineering

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In Memoriam

It is with the deepest regret that we record the passing of the following members of model engineering societies. The sympathy of staff at *Model Engineer* is extended to the family and friends they leave behind.

A. M. Bucci	*New Jersey Live Steamers*
Roland Crooks	*Taunton Model Engineers*
Charles Crawley	*Vale of Aylesbury MES*
Gary Garret	*Bournemouth DSME*
Allan Hawkes	*St Albans DMES*
Ron Hough	*Society of Model and Experimental Engineers*
Capt. William Long	*Model Engineers Society (NI)*
Mick Mills	*Isle of Wight MES*
Rowland Parker	*Stockholes Farm Miniature Railway*
Ken Rundle	*Model Steam Road Vehicle Society*
Peter Rushworth	*GEC (Coventry) MES*
Alfred Samuels	*Bristol SMEE*
Allen Turner	*Hutt Valley MES*
Ray Tyldesley	*GEC (Coventry) MES*

MAY

23 **North London SME.** *AGM.* Contact Rachael Chapman: 01442 275968.

24-26 **Brighton & Hove SMLE.** *Public Running.* Contact Mick Funnell: 01323 892042.

24 **Chesterfield MES.** *Public Running.* Contact Mike Rhodes: 01623 648676.

24-26 **Ryedale SME.** *Spring Mainline Rally.* Contact David Myers: 01388 661255.

24 **York City & DSME.** *Best Work of Year.* Contact Pat Martindale: 01262 676291.

25/26 **Bedford MES.** *Public Running.* Contact Ted Jolliffe: 01234 327791.

25/26 **Bristol SMEE.** *Public Running.* Contact Trevor Chambers: 0145 441 5085.

25/26 **Cardiff MES.** *Open Days.* Contact Don Norman: 01656 784530.

25 **Edinburgh SME.** *Public Running.* Contact Robert McLucke: 01506 655270.

25 **Harlington LS.** *Charity Open Day.* Contact Peter Tarrant: 01895 851168.

25 **High Wycombe MEC.** *Public Running.* Contact Eric Stevens: 01494 438761.

25/26 **Leicester SME.** *Public Running.* Contact John Lowe: 01455 272047.

25/26 **Maidstone MES (UK).** *Public Running.* Contact Martin Parham: 01622 630298.

25 **MELSA.** *Sunday in the Park.* Contact Graham Chadbone: 07 4121 4341.

25 **North Cornwall MES.** *Sunday Steam-Up.* Contact Geoff Wright: 01566 86032.

25/26 **Northern Mill Engine Society.** *Steam Days.* Contact John Phillip: 01257 265003.

25 **Norwich DSME.** *Running Day.* Contact Shirley Berry: 01379 740578.

25/26 **Nottingham SMEE.** *Public Running.* Contact Pete Towle: 0115 987 9865.

25/26 **Oxford (City of) SME.** *Running Days.* Contact Chris Kelland: 01235 770836.

25/26 **Saffron Walden DSME.** *Public Running.* Contact Jack Setterfield: 01843 596822.

25 **Taunton ME.** *Public Running.* Contact Nick Nicholls: 01404 891238.

25 **Worthing DSME.** *Public Running.* Contact Bob Phillips: 01903 243018.

26 **Lancaster & Morecambe MES.** *Bank Holiday Running.* Contact Harry Carr: 01524 411956.

26 **Leighton Buzzard NG Rly.** *Teddy Bears' Bank Holiday.* Enquiries: 01525 373888.

26 **Malden DSME.** *Public Running.* Contact John Mottram: 01483 473786.

26 **New Jersey Live Steamers, Inc.** *Memorial Day Run.* Contact Karl Pickles: 718 494 7263.

26 **Northampton SME.** *Bank Holiday Steam-Up.* Contact Pete Jarman: 01234 708501 (eve).

26 **Reading SME.** *Children's Festival.* Contact Brian Joslyn: 01491 873393.

26 **Stockholes Farm MR.** *Bank Holiday Running.* Contact Ivan Smith: 01427 872723.

26 **Westland & Yeovil DMES.** *Running Day.* Contact Gerald Martyn: 01935 434126.

28 **Bedford MES.** *School Holiday Public Running.* Contact Ted Jolliffe: 01234 327791.

28 **Hull DSME.** *Discussion Night.* Contact Tony Finn: 01482 898434.

29 **Sutton MEC.** *Chat Night.* Contact Bob Wood: 020 8641 6258.

30 **Hereford SME.** *Malcolm High: Laser Cutting for Model Engineers.* Contact Nigel Linwood: 01432 880649.

30 **Newton Abbot & District MES.** *Models Evening.* Contact Graham Day: 01626 772739.

30 **Peterborough SME.** *Peterborough Model Locomotive Rally.* Contact Lee Nicholls: 01406 540263.

31 **Aylesbury (Vale of) MES.** *Annual Miniature Traction Engine Rally.* Contact Andy Rapley: 01296 420750.

31 **Brighton & Hove SMLE.** *Public Running.* Contact Mick Funnell: 01323 892042.

31 **Hutt Valley MES.** *Manukau Open Weekend.* Contact Gavin McCabe: 567 4487.

JUNE

1 **Aylesbury (Vale of) MES.** *Annual Miniature Traction Engine Rally.* Contact Andy Rapley: 01296 420750.

1 **Birmingham SME.** *Public Gala Day.* Contact John Walker: 01789 266065.

1 **Edinburgh SME.** *Public Running.* Contact Robert McLucke: 01506 655270.

1 **Frimley & Ascot LC.** *Public Running.* Contact Bob Dowman: 01252 835042.

1 **Leicester SME.** *Public Running.* Contact John Lowe: 01455 272047.

1 **Maidstone MES (UK).** *Public Running.* Contact Martin Parham: 01622 630298.

1 **Northampton SME.** *Public Running.* Contact Pete Jarman: 01234 708501 (eve).

1 **Norwich DSME.** *Running Day.* Contact Shirley Berry: 01379 740578.

1 **Nottingham SMEE.** *Public Running.* Contact Pete Towle: 0115 987 9865.

1 **Oxford (City of) SME.** *Running Day.* Contact Chris Kelland: 01235 770836.

1 **Peterborough SME.** *Peterborough Model Locomotive Rally.* Contact Lee Nicholls: 01406 540263.

1 **Plymouth MSLS.** *Public Running.* Contact Malcom Preen: 01752 778083.

1 **Reading SME.** *Public Running.* Contact Brian Joslyn: 01491 873393.

1 **Royston DMES.** *Running Day.* Contact Jeff Dickinson: 01763 261670.

1 **Saffron Walden DSME.** *Public Running.* Contact Jack Setterfield: 01843 596822.

1 **Sunderland (City of) MES.** *Open Day.* Contact Albert Stephenson: 01429 299649.

1 **Malden DSME.** *Public Running.* Contact John Mottram: 01483 473786.

2 **Peterborough SME.** *Bits & Pieces.* Contact Lee Nicholls: 01406 540263.

3 **North Cornwall MES.** *Meeting.* Contact Geoff Wright: 01566 86032.

3 **Stamford MES.** *Noel Shelley: Small Scale Foundry Work.* Contact Derek Brown: 01780 753162.

3 **Taunton ME.** *Social & Running.* Contact Nick Nicholls: 01404 891238.

4 **Bradford MES.** *Meeting.* Contact John Mills: 01943 467844.

5 **Leyland SME.** *Hints & Tips Night.* Contact A. P. Bibby: 01254 812049.

5 **South Lakeland MES.** *Meeting.* Contact Adrian Dixon: 01229 869915.

5 **Sutton MEC.** *Bits & Pieces.* Contact Bob Wood: 020 8641 6258.

5 **Westland & Yeovil DMES.** *Meeting.* Contact Gerald Martyn: 01935 434126.

6 **Aylesbury (Vale of) MES.** *Track Night.* Contact Andy Rapley: 01296 420750.

6 **Maidstone MES (UK).** *Evening Run & Pizza.* Contact Martin Parham: 01622 630298.

6-8 **New Jersey Live Steamers, Inc.** *Spring Meet.* Contact Karl Pickles: 718 494 7263.

6 **Rochdale SMEE.** *Alf Molyneux Remembers.* Contact Bob Denyer: 0161 959 1818.

6 **Romford MEC.** *Competition Night.* Contact Colin Hunt: 01708 709302.

6 **North London SME.** *Tim Coles: A Gas Turbine for 5in. Gauge.* Contact Rachael Chapman: 01442 275968.

7/8 **Cardiff MES.** *18th Welsh Locomotive Rally.* Contact Don Norman: 01656 784530.

7/8 **Dockland & E. London MES.** *Public Running.* Contact John Slocombe: 01708 222658.

7 **Hereford SME.** *Public Running.* Contact Nigel Linwood: 01432 880649.

7 **Ickenham DSME.** *Public Running.* Contact Ian Mortimer: 01895 635596.

7-9 **MELSA.** *Queen's Birthday Run.* Contact Graham Chadbone: 07 4121 4341.

7/8 **Melton Mowbray DMES.** *Whissendine 2008.* Contact Phil Tansley: 0116 2673646.

7/8 **Oxford (City of) SME.** *Sweet Pea Rally.* Contact Chris Kelland: 01235 770836.

7 **Romford MEC.** *Trackside Afternoon.* Contact Colin Hunt: 01708 709302.

7 **SM&EE.** *Stationary Engine & Gauge 1 Day.* Contact Maurice Fagg: 020 8669 1480.

8 **Bradford MES.** *Rae Gala.* Contact J. Mills: 01943 467844.

8 **Bristol SMEE.** *Public Running.* Contact Trevor Chambers: 0145 441 5085.

8 **Canterbury DMES (UK).** *Public Running.* Contact Mrs P. Barker: 01227 273357.

8 **Carlisle DMES.** *Open Day.* Contact Geoff Routledge: 01228 530767.

8 **Edinburgh SME.** *Track Running Day.* Contact Robert McLucke: 01506 655270.

8 **Harlington LS.** *Public Running.* Contact Peter Tarrant: 01895 851168.

8 **Leeds SMEE.** *Running Day.* Contact Geoff Shackleton: 01977 798138.

8 **Leicester SME.** *Public Running.* Contact John Lowe: 01455 272047.

8 **Maidstone MES (UK).** *Public Running.* Contact Martin Parham: 01622 630298.

8 **Norwich DSME.** *Running Day.* Contact Shirley Berry: 01379 740578.

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Brierley drill point grinder + wheels and followers

Milling/Drilling ground X-Y table

Multico mortiser

PLEASE PHONE 0208 300 9070 TO CHECK AVAILABILITY OR TO OBTAIN OUR LIST

DISTANCE NO PROBLEM! DEFINITELY WORTH A VISIT ALL PRICES EXCLUSIVE OF VAT

Just a small selection of our current stock photographed!

Boxford STS 1020 lathe

Hunton Universal 12 / 12" throat press

'LO' Colchester drive/catch plates

Edwards 18" circle cutter

'LOO' face plate + we have loads more from Myford to Colchester Mascot

Myford Super 7B's with gearbox and power cross feed

RJH buffing machine 3000 revs

Myford MA99E collet chuck collets

Gabro 24" folder

EME (Elliot) swivel tilt vice

Gear involute cutters 'More just in'

More broaches metric and imperial

Q and S 6" power hacksaw + coolant

Colchester Chipmaster lathe

Flamefast double sized hearth + guns

Clarkson 40INT collet chuck + collets
(we have 2MT-5MT and 30INT to 50INT in stock!!)

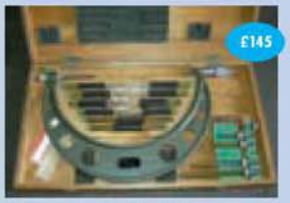
Burnerd Boxford 4jaw chuck
(more variations available)

Myford ML7R 3 1/2" x 19"
+ clutch & stand

EMG tool grinder

Please call
0208 300 9070
to check availability
or request our
list

Microball and
Chesterman
height gauges
£175
The pair!



Mitutoyo 150 - 300mm

Mitutoyo 300 - 500mm

Mitutoyo 400 - 500mm

Moore and Wright 0 -150mm

Moore and Wright 12 - 18"

CEJ (Sweden) gauge blocks / slips

Tom Senior slotting head

Harrison L5 travelling steady
(L5A, L6, Student, Master also)

Boxford 'Little Giant' toolpost grinder

Dickson toolposts to suit Colchester
Mascot (others available)

Van Norman 944 boring bar + tools

Denford Viceroy buffer's

Eclipse angle plates

Burnerd 'LO', D13 & D14 collet chucks

Engineers Flat

RJH vertical linisher + built
in extractor

CHESTER UK OPEN DAYS AT CHESTER - 12,13,14 JUNE 2008

Chester Machine Tools

DB8VS

£699

Features
Digital Spindle Speed Readout • Hardened and Ground Vee Bedways • Offset Tailstock • Variable Spindle Speed • Metric & Imperial Thread Cutting • Longitudinal Power Feed • Cast Iron Construction

Distance between Centres	400mm
Swing	210mm
Motor	750w

Shown with optional stand

H110 BANDSAW

Special Offer

£149

Features

Max Cutting Capacity @ 90°	Round 110mm Square 100x 150mm
Max Cutting Capacity @ 45°	Round 100mm Square 85 x 65mm
Blade Speed	20,30,50m/min
Motor	550w
Power	240volt
Blade Size	1640 x 0.65 x 13mm
Packing Size	965 x 410 x 500mm
Stock Code	BAN-SAW-H110

626 MILL

£1450

Features
1.5HP Motor • Metric or Imperial Machines • MT3 or R8 Spindle Taper • Head Swivels 90 degrees • Head Tilts 45 degrees • One Shot Lubrication System

Standard Accessories
Machine Work light • Central Lubrication System • Machine Stand • Table Guard • Drawbar • Manual & Parts list

Face Mill Capacity	75mm
Table Size	156x745mm
Motor	1.5hp

COBRA MILL

Features
Variable Speed
Angled milling Head
Adjustable Gib Strips
Quill Fine Feed

Standard Accessories
Drill Chuck
Spanners
Drawbar
Allen Keys

£319

Specifications

End Mill Capacity	10mm
Table	145 x 40mm
Speeds Variable	100-2000rpm
Spindle Taper	MT2
Weight	25kgs
Size	480 x 380 x 680mm

CHAMPION 16 V MILLING MACHINE

£575

Features
Variable Spindle Speed • Dovetail Column • Digital Quill Depth Readout • Column Guideway Covers • Tilting Head • Large Table Size • Wide Spindle Speed Range

Standard Accessories
Drill Chuck • Drill Chuck Arbor • Chuck Guard • Drawbar • Manual & Parts List

Face Mill Capacity	50mm
Table Size	500x140mm
Motor	600w

Shown with optional stand

12" Multiformer

Bending Capacity (Mild Steel)	1mm
Shearing Thickness (Mild Steel)	0.6mm
Max Bending Length	305mm
Rolling Thickness	1mm
Weight	45kgs

£164.50

DB10VS LATHE

- Digital Speed Readout
- T Slotted Crosslide
- Variable Speed

Supplied with full range of accessories:- 3 & 4 Jaw Chucks, Face Plate, Steadies, Machine Tray, Lathe Tools, Thread Cutting Gears

£949

Distance between centres	550mm
Swing over bed	250mm
Spindle Bore	26mm
Speed Range	50-2500rpm
Motor	1200w
Net Weight	120kgs

DB7VS LATHE

Supplied With Variable Speed

Digital Speed Readout

Hardened & Ground Bedways

Metric & Imperial Thread Cutting

£475

Distance between centres	300mm
Swing	180mm
Spindle Bore	21mm
Motor	700w
Net Weight	55kgs

Supplied with full range of accessories:- 3 & 4 Jaw Chucks, Face Plate , Steadies, Lathe Tools, Change Gears, Machine Tray

COBRA LATHE

Special Offer

Supplied With
80mm 3 Jaw Chuck • Lathe Tools, Steel Centre • Change Gears • Variable Speed • Splash Guard

Centre Height	70mm
Centres	250mm
Motor	150hp
Weight	30Kgs

£199

CRAFTSMAN LATHE

£1549

- Powered Crossfeed
- Left/Right hand thread cutting
- Large spindle Bore
- Independent Powered Feed and Leadscrew
- Supplied with:- 3 and 4 jaw Chucks, Face Plate, Steadies, Machine Stand, Splash Guard, Thread Cutting Dial

Distance between Centres	570mm
Swing over bed	300mm
Spindle Bore	38mm
Motor	1.5hp
Net Weight	390kgs

CENTURION MACHINE CENTRE

£1299

Specification	
Centre Height	210mm
Centre Distance	500mm
Spindle Bore	28mm
Drilling Capacity	25mm
End Mill Capacity	28mm
Size	1570 x 480 x 955mm
Weight	250kgs
Motor	3/4hp

Features
Powered Crossfeed • 2 Motors • 28mm Spindle Bore • Large Milling Table • Taper Roller Bearings

Standard Accessories
3-Jaw Chuck • Drill Chuck • Steel Centres • Change Gears • Lathe Tools • Vice

CHAMP 20V

£779

- Variable Speed
- Digital Quill Readout
- Dovetail Column
- Supplied with Keyless Drill Chuck & Arbor

Face Mill Capacity	63mm
Table Size	700x180mm
Spindle Taper	MT2
Motor	1hp

D13 DRILL

Special Offer

- Cast Iron Construction
- Supplied with Keyless Drill Chuck & Arbor
- 1/4 hp Motor

£49

Drilling Capacity	13mm
Chuck Size	1 - 13mm
Speeds	600 - 2500 rpm
Net Weight	17Kgs

All prices include VAT. Delivery Free to UK mainland – excluding certain Scottish postcodes. Prices valid for duration of this issue only.

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