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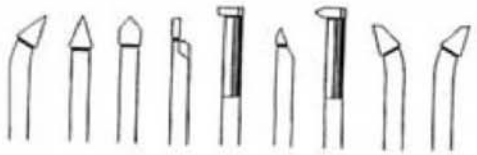

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www.nexusonline.com
Nexus Special Interests
is a wholly owned subsidiary of
Highbury House Communications plc.

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Stan Bray
Technical Consultants
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Editorial Administrator
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Printed by
Polestar Colchester Ltd.
Origination by
Atelier DataSet, St Austell, Cornwall

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Direct Subscriptions and Back Issues are available from Nexus Subscription Services, Link House, 8 Bartholomew's Walk, Ely, Cambs CB7 4ZD Phone: 01353 654422; Fax: 01353 654400 email: wss@wyvernnet.co.uk
Rates for 26 issues (annual), 13 issues (six months):
UK: £52.00 (annual) £26.00 (six months);
Europe: £66.50 (annual), £33.25 (six months);
ROW Airmail: £72.00 (annual), £36.00 (six months);
US Surface: $94.00 (annual), $47.00 (six months);
US Airmail: $109.50 (annual), $54.75 (six months).
Cheques payable to Nexus Special Interests Ltd.
Second class postage paid at Rahway NJ USA.
Postmaster, Send address corrections to
Model Engineer c/o Mercury Airfreight International Inc,
2323 Randolph Avenue, Avenue 1, NJ 07001. Usps 0011099.
US Subscription Agent: Wise Owl Worldwide Services,
1926 S. Pacific Coast Highway, Suite 204, Redondo Beach,
CA90277-6145, USA. Phone: 310 944-5093; Fax 310 944-9963.
Visa/MC/Discover accepted.
Canadian Distribution by Gordon & Gotch Periodicals
(Toll free 1 - 800 - 438 - 5005).
Model Engineer is published fortnightly.

ISSN 0026-7325

IN THIS ISSUE

Vol. 187 No. 4160

On the cover ...

Built and rallied by Terry Young, Master Potter *is seen here at the 2001 Wood Green Animal Sanctuary Rally. It is a fine 6in. scale model of a 4CD Garrett tractor once owned by the builder. Some 4 years in the building,* Master Potter *is based on the builder's full-size engine, a painstaking reconstruction made up from two derelict Garretts rescued in the nick of time from childrens' playgrounds in Essex and Hertfordshire. Turn to page 545 in this issue for a colourful review of* Road Steam *events during the 2001 season.*
(Photograph by Martin Wallis)

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SMOKE RINGS

With the Editors

Season's Greetings

If all goes according to the recently published schedule, this issue should be with you on Christmas Eve. Taking the optimistic view, Neil, Kelvin and I therefore wish each and every one of you reading these pages The Compliments of the Festive Season and hope that you enjoy spending it in the manner of your choice. On the other hand, perhaps we should simply say that we hope you had a good Christmas …

The next issue, *M.E.* 4161, is scheduled for publication on Friday 25 January 2002, so we also take the opportunity to wish all readers well for the New Year. To say the least, the year which is drawing to its close as I write these words has been eventful! The relative significance of these events depends upon your point of view, but few would argue that what has occurred during recent months has changed for ever our perception of world affairs. We should be thankful for our workshops into which we can retreat to focus our minds on the problems associated with the project in hand, a project from which we should be able to derive the satisfaction and pleasure of a job done to the best of our own personal ability. It has been said that the most effective way to deal with external pressures is to focus on another task of our own choosing, to the extent that it absorbs all our attention and eclipses matters beyond our control. What better example of this can there be than the variety of creative activities which we pursue in our workshops when undertaking the building of our own projects?

So, here's to a very pleasurable and successful New Year of model engineering — and may your tools remain keen!

ModelWorks International Ltd.

We recently spent an interesting few hours in Daventry, having been invited to visit ModelWorks, the company which has taken on the task of retrieving the situation left by Winson Model Technology which went into receivership nine months ago. We heard much about the aims and objectives of this new company, the tasks which they have identified, and some of their plans and aspirations for the future. We noted that the team involved seemed genuinely to want to resurrect the original concept of the manufacture and supply of components to enthusiasts either unable or unwilling to work from scratch in order to prepare working engineering models. We saw production components and assemblies of a much higher quality than previously. While aware that much has to be done and that some of the problems are considerable, we were encouraged by what we saw and heard and wish the new company success in its venture.

Shortly following our visit, we received the following communication from Alan Ryden, Bob Jones and Ken Burrough and present it here in full for readers' information:

"Following the purchase from the receiver last July of the assets of Winson Model Technologies, the board of ModelWorks has made a number changes to reorganise its management team. The current investors consist of Bob Jones and Ken Burrough, who first discovered Winson's plight via an advertisement in the Financial Times, *David Draper, a retired Chartered Engineer who was a Winson customer, building a Ruston tractor, and Doug Ferguson, a Hong Kong based businessman who can help us expand into Asian markets.*

"The original directors of Winson have now left the company, with immediate effect, to pursue other interests. Alan Ryden, ModelWorks' new general manager, takes overall control of day to day operations. Alan brings a wealth of financial and management experience to the company having held senior positions at a number of organisations including the British Technology Group, Hambros and Venture Founders.

"Production is in the enthusiastic hands of Dean Rogers, with consultative guidance from Tony Trim. Tony has been in engineering all his working life and in addition to his ModelWorks interests is at the helm of a major sub-contract engineering company.

"Customer service, perhaps the most difficult short term task, is in the hands of Ian Adkins, who is doing a sterling job working to resolve historical problems, mostly caused by Winson design and manufacturing issues.

"Although skeletons are still regularly emerging from various cupboards, with the new factory building owned by Jones and Burrough, no bank borrowings and many of the machine tools now owned and paid for by ModelWorks, the company has a significantly lower cost base than previously, which we all believe gives us a sound footing to build a successful future."

ModelWorks International Ltd. is at **Riley Close, Royal Oak, Daventry, Northamptonshire NN11 5QT; tel: 01327-301030; fax: 01327-300808.** Visit their website at **www.modelworks-int.com** for more information about the new business and to learn about some special offers currently available.

BHmI

Information is to hand of new company soon to join the ranks of the model engineering hobby. Any new company is an exciting prospect, and we look forward to receiving further details of them and their products. The principals have released very little information, perhaps reasonably so, bearing in mind the myriad tasks involved and the delays that could occur in both the launch of the company and the product.

We are aware that this new company has considerable experience in model engineering and manufacturing businesses upon which it can call and believe this stands it in good stead for the manufacture of a quality product, which we understand will be a 5in. gauge locomotive, tried and tested prior to launch, and painted green! With no further information, we will all have to wait until it is revealed at the end of January!

In these difficult days, the introduction of a new company into to the model engineering hobby is indeed a rarity. We have been assured that all will be ready for the day and offer them our best wishes and success for the future.

Weston Park Miniature Railway

While writing this editorial, I have just had a call from Bruce Whalley with a couple of corrections to the feature published in *M.E.* 4159. The line is $1^1/2$ miles long, not $1^1/4$ miles as stated, and my closing photograph shows Bruce himself raising steam in *Mount Kenya*, not Brett Rogers as stated in my caption. My apologies to all concerned.

This correction provides me with the ideal opportunity to pass on the information that the National Railway Museum has confirmed that their Garratt will remain at Weston Park for the 2002 season during which the locomotive will be in steam for various events and occasional Sundays from Easter onwards. So, if our article has whetted your appetite and you fancy a glimpse of these magnificent *Giants in the Park*, keep an eye on *Club Diary* as the season proceeds, or contact Weston Park Railway for information: **Weston Park Miniature Railway, Weston Park, Weston-under-Lizard, Nr. Shifnal, Telford, Shropshire TF11 8LE; tel/fax: 01952-850336; email: info@westonrail.freeserve.co.uk**

The Engineer and the Manager

Some readers will already have discovered a version of the following piece either on the Internet, in their own club news letter or, as I did recently, from Henry Kelly during one of his asides between the music being broadcast on Classic FM radio. I suspect that a good many other readers will not yet have come across it and make no apology for including it for general amusement here.

A man is flying a hot air balloon and realises that he is lost. He reduces height and spots someone below. *"Hello! I have to meet some friends but have no idea where I am; can you help me?"* he calls. The man below tells him *"You are in a hot air balloon hovering approximately 30ft above this field in a location 52 degrees 38 minutes north and 1 degree 19 minutes east."*

"You must be an engineer." said the balloonist. *"I am,"* replied the man, *"how did you know?"* *"Well,"* said the balloonist *"everything you have told me is technically correct, but I have no idea what to make of your information, I am still lost and still likely to be late for my rendezvous."*

The man below then said *"You must be a manager."* *"I am,"* replied the balloonist. *"but how did you know?"*

"Well," said the man below *"you don't know where you are or how to get where you need to be. You have made a promise which you have no idea how to keep, and you expect me to solve your problems. The fact is, you are in exactly the same position that you were before we met, but now somehow it has become my fault!"*

POST BAG

Typo bug

SIRS, - The typo bug has struck again. I refer to the top of the first column on page 333: *Letters to a Grandson, M.E.* 4156, 16 November 2001.

I would be very surprised to be able to tap a 4BA thread in a No. 54 drilled hole!

Ken Willson, Hampshire.

(Our thanks to Mr Willson for pointing out the error of our ways, a much more appropriate tapping size for 4BA is a No. 34 drill — Ed.)

Of wooden rims and blacksmith's anvils

SIRS, - I have recently found myself wondering how wooden rims were made for early racing bicycle wheels, and if any reader might know how they were held while the inside and outside surfaces were turned. I think that it was still possible to buy new ones, made by the Constrictor Tyre Company, right up to the beginning of the second world war.

Also, could anyone please tell me of what material blacksmiths' anvils were made before cheap castable steel became available with the advent of the Bessemer convertor?

I remember working on the manufacture of huge batches of anvils which were cast in high carbon steel with hardened top surfaces, and I believe that other brands were cast in mild steel and topped off with a high carbon plate fire-welded in place and hardened.

I find it difficult to believe that village blacksmiths of old could have afforded a cast steel anvil of the massive weights they used, or that so large a casting could even have been made before the days of the convertor and open hearth furnace. The obvious material would have been cast iron, but I cannot visualise that standing up to the pounding of a striker's sledge.

Basil McCoward, New Zealand.

Lathe Starting Switches

SIRS, - In his letter, C. Ordige (*Postbag, M.E.* 4156, 16 November 2001) is correct, in that putting the drum switch into reverse will not actually reverse a running induction motor with a centrifugally switched starting winding.

However, when it comes to starting and stopping the motor, there is a very valid reason for *not* using the drum switch at all. The drum switch is not a quick break switch, and if it is used for switching off, the contact springs will arc and eventually burn out, as I found out the hard way: I had to replace mine some two years ago.

A separate quick action make-and-break on/off switch should *always* be used for starting and stopping our lathe motors, and the drum switch position only altered when the current is turned off. This way, the contacts will last practically indefinitely.

For preference, the on/off switch should be a push-button contactor starter with overload protection and a no-volt release (now an EC requirement for new machinery). I have always had such a switch, but I became lazy in using the drum switch, and paid for it! Wiser now, I use the starter in exactly the manner that was intended.

Tony Finn,
East Riding of Yorkshire.

Spring Steel

SIRS, - I have read with interest the recent letters from Martin Evans, Keith Wilson and others, on the merits or otherwise of working spring steel. I am afraid it is Martin Evans who has *"... badly run off the rails"* here as we have been selling annealed spring steel in various sizes for about 20 years.

The great advantage of this material is that it can be bent, drilled cropped and shaped more or less the same as ordinary mild steel, and then hardened and tempered once it has been made into a complete spring. As for the comment that it cannot be obtained in *"... our quantities"* I would be more than happy to supply Martin Evans with a couple of inches if that is what he happened to require.

When I first enquired of the main suppliers in Sheffield about stocking spring steel I was asked if I wouldn't rather have it in the annealed condition for the above reasons. I wouldn't even think of using the hardened variety now as it sounds to me to be far too much like hard work!

While on the subject of springs, I would add that we do not use any Tufnol in our leaf springs as, despite various calculations and advice from the theorists, I have found that springs with any Tufnol leaves are pretty much a waste of time. I have now built in excess of 20 scale wagons and eight BR Mark 1 coaches, all of which run on leaf springs made with all-steel leaves, and they all work perfectly. In fact, if anything, the Mark 1 coach springs are a little too soft and we are going to have to introduce some extra curve into the springs to give them a better ride.

I have also used all steel leaves on my BR 2-6-4 tank; on trying the springs in the loco, it seems to have just the right amount of 'roll' when rocked from side to side, and I haven't yet got the boiler on.

I would certainly not wish to build any of my wagons, or a tender come to that, with coil springs in 5in. gauge, let alone in 7¼in. gauge. The wagons I have seen with coil springs bounce all over the place as there is no self-damping with a coil spring.

A friend of mine built a 9F to Les Warnett's design and made the springs with the Tufnol leaves as per the drawing; they were totally inadequate. He re-made the springs with the correct number of steel leaves and they were perfect.

Like Keith, I can only write from my own experience, but I still get the armchair types telling me that I don't know what I'm doing.

The accompanying photograph shows a selection of leaf springs which we have made recently for various projects. We find that the rolls for the spring hangers at the ends of the leaves are easily formed in the annealed spring steel and, among others, have made springs for a standard LMS 12 ton vacuum fitted van, a GWR Toad brake van, an LMS 20 ton brake van and standard five leaf springs for 12 ton wagons.

Doug Hewson (Models),
73 Victoria Road,
Barnetby-le-Wold,
North Lincolnshire DN38 6HY
tel/fax: 01652-688408

Martin Evans replies:

Evidently I was wrong about the availability of annealed spring steel in 'our' sizes. Blackgates, Reeves, etc., etc., please note!

Water cooled smokeboxes

SIRS, - I was amused to read Mr. William Willis' letter (*M.E.* 4157, 30 November, 2001) in which he refers to water cooled smokeboxes for locomotives to give them more power.

Coincidentally, I had just spent a day as a contortionist repairing a steam leak in a full-size smokebox. It would be interesting to know how Mr Willis' proposal would be implemented in such a way that enough heat would be recovered to make any difference to offset the waste of heat in the mechanical parts. The problems of getting superheater elements in and out, access to washout plugs, etc., would probably be overshadowed by the dewpoint problem and associated repair costs outweighing the money saved on fuel. Remember the Crosti boilers and their problems, which was in effect the same thing as the proposal.

The simple locomotive prospered in the age of cheap labour and fuel, so it was possible to use 90% of the heat in the fuel to keep the cows warm in the adjacent fields! Don't blame the boiler which is probably approaching 80% efficiency at its MCR. The answer lies in the use of the steam below the boiler; even the marine three-legs-up-and-down engine exhausting into a condenser at 26 inches of vacuum can only creep up to around 80% overall efficiency, and even then some ships were fitted with a turbine to get the work out of the last 4 inches of vacuum.

No sir, as far as model making is concerned, let us stick to nostalgia and leave the professionals to climb Shap on the end of a wire from a super efficient power station with its air heaters, feed heaters, combustion control, etc.

Yours covered in soot,
Tim McGaw, Kent.

Pressure gauges

SIRS, - To accompany a display of various model engineering artefacts on their stand at the Model Engineer Exhibition at Sandown Park Exhibition Centre, 29 December 2001 – 1 January 2002, the Society of Model and Experimental Engineers will present workshop demonstrations during which projects involving various aspects of turning and milling will be in progress throughout the exhibition.

There will also be regular demonstrations of the use and applications of a deadweight tester for pressure gauges of all types. Interested visitors are invited to attend the SM&EE stand with a pressure gauge whose accuracy they wish to verify.

The popular demonstrations of measurement of the performance of a locomotive in steam using a Digital Indicator and a rolling road will also be presented regularly throughout the exhibition.

George Evans, SM&EE, London.

Some of Doug Hewson's springs made up from annealed spring steel and then hardened and tempered.

Pressure Equipment Regulations (PER)

SIRS, - From 30 May 2002, all pressure equipment and assemblies placed on the market within the EEC must comply with The Pressure Equipment Regulations (PER). A meeting of professional boiler makers was held on 17 November 2001 at the headquarters of the Bristol Society of Model & Experimental Engineers to discuss these Regulations and their effect on the manufacture of commercially made copper boilers, and our customers, the model engineers.

The meeting was successful and those present decided that the way forward was to form an Association.

The aims of the Association are to correlate all the information and requirements laid down within the PER and to keep all members informed of any new changes or actions which need to be taken. This will enable members of the Association to continue with the provision of a first class service and product. Customers or clients can purchase a copper boiler from a member of the Association, safe in the knowledge that the boiler will conform fully with the PER. Furthermore, with the formation of the Association, additional costs (if any) that its members have to pass on to their customers, will be kept to an absolute minimum.

We hope that the Association will be able to allay any fears or worries that the model engineer may have and to ensure that they are correctly informed, as and when this information becomes available, in the model engineering press. However, the Association will not discuss any misdemeanours of any kind with regard to late delivery, price or disputes, other than relating to quality of work.

It was decided at the meeting that the Association would be known as The Association of Professional Copper Boiler Makers (ME). Those present at the meeting and regarded as founder members were:

Trevor Tremblen: **Swindon Copper Boilers**
Ian Stock: **Dragon Boilers**
Pete Carr: **Kingswood Copper Boilers**
John Ellis: **John M. Ellis Model Engineers**
Helen Verrall: **Western Steam Model Engineers**

Mr. John Glaze, Engineer Surveyor/Boiler Inspector was also present at the meeting and was elected by the members to act as the Association's Consultant

The Association will pass on further information as and when it becomes available.

Ian Stock, Secretary APCBM(ME).

2½in. gauge Atlantic locomotive

SIRS, - I am trying to find out as much history as I can with regard to a 2½in. gauge steam locomotive built by my father between the years of 1940-1950, with a view to having it valued for insurance purposes.

I have a copy of an article that appeared in the *Eastbourne Chronicle* dated 27 October 1950 which states: *"The model, of an express passenger type, is not intended to be a replica of any particular locomotive. It has an Atlantic type wheel arrangement. The model weighs nearly 40lb. The frame is solid steel, the boiler copper and the wheels cast iron. It runs on Welsh steam coal."*

My father was a RAF chaplain during the 1939-1945 war which explains why it took so long to complete. The model carries the number 4050 indicating that the build started in 1940 and finished in 1950.

As a young boy, I remember seeing an article written up in *Model Engineer* but can't remember the date, although I am fairly sure that this must have been around about 1950 when the model was completed. I would be most interested to see a copy of any such article as it may help establish some provenance to this particular model.

To the best of my knowledge, this locomotive has not been fired up in the last 20 years. My father carried out a re-build of the boiler in the late 70s but, since then it has been merely ornamental.

I am not a model engineer but I would welcome any information anyone can give me about my father's locomotive as I would be delighted to see it working again. I understand that a certificate of boiler worthiness is required, I would appreciate making contact with someone in my local area (South Oxfordshire) who could advise me.

Steve Froggatt,
e-mail:
steve.hyflo@FSBDial.co.uk

Dead centre lathe

SIRS, - Mr Dickenson's Mystery Object (*Postbag, M.E.* 4156, 16 November 2001) is a set of turns or a dead centre lathe used by clock and watch makers. The work is mounted between the dead centres, a brass ferrule or pulley is clamped to the spindle and rotated by a 'bow', the line being given a turn round the ferrule. The work is machined with a hand graver resting on the hand rest illustrated in the photo. Cutting only takes place on the forward stroke of course. It may appear crude and outdated but I do all my pivot repairs in the lathe driving the work with a bow. It is 100% safe, you can stop the rotation instantly.

E. J. Tyler wrote a description of the use of the turns, showing all the various accessories which accompany the tool and how to use them, in his book *How to Make a Wooden Wheeled Clock* in which four chapters cover this subject. The book can be obtained from RiteTime Publishing at 18 Woolmer Way, Bordon, Hampshire GU35 9QF; tel: 01420-474647.

John Wilding, Sussex.

The secret of The Ghost Train

SIRS, - The following is an account of a true happening; I wonder if Henry and Gordon still remember that night? Gordon and Henry were friends; they had been since schooldays. Gordon was a train-spotter, the sort who keeps a list of the number of each engine that he's 'spotted'. Henry had steam in his blood, he knew how the engines worked and liked to be near them.

Gordon left school and joined the railway to work on steam engines, but Henry studied engineering. He had read *Miniature Engine Builder* magazine since he was twelve.

Over the next few years, Henry studied further and made miniature engines in his spare time while Gordon worked on 'real' engines, and earned 'real' money doing it! Then disaster struck — the railway was to do away with its steam engines. What could they do?

At first, it was bearable. By now, Gordon was also making his own miniature engines, and locomotives were still running in France. France wasn't so far away. After several visits across the Channel, even the French railways stopped using the beloved steam engines. To find steam engines, Henry travelled to Germany and Gordon ventured into the Communist East, but it seemed that everywhere they went, the steam engines' days were numbered. However, one winter the weather was so severe that in a corner of Germany the railway had to bring back the steam engines because the diesels couldn't keep the carriages warm!

Such things don't go unnoticed; Henry and Gordon knew and as soon as they could, they went to the 'Steep Slope', a long difficult incline in the mountains. That was where the 'real' engines had returned. Gordon arrived on the train to see Henry, and the next day Henry drove them to the *Golden Lion*, a little hotel near the 'Steep Slope' where all the visiting train spotters stayed. It was the only hotel near there and reflected the fact!

It was already dark when they arrived, and it was a cold night. A foot of snow had been laying for over a month. Their room was at the back of the hotel and smelled stale. No-one had stayed there since the diesels came. As soon as they had freshened up, they opened the ill-fitting window to air the room while they ate a supper of sandwiches; the hotel only served breakfasts. Tired but full of anticipation for the next day, at first they didn't feel the cold wind blowing in through the open window to overpower the valiant efforts of the radiator beneath.

Eventually the cold began to bite at Gordon and Henry. Supper over, Gordon closed the window, drew the curtains and took to the bed by the window. Henry took the bed by the door, and they were soon both asleep. However, they weren't asleep for long. In the middle of the night the window blew open, curtains flying horizontally into the little room on an icy gale and driving rain; a winter thunderstorm!

Amid the roar of the wind, the thunder and the lightning, which had wakened both Gordon and Henry, could be heard the comforting sound of a distant train: a pair of steam locomotives assisted by a banker were struggling to drag the night express up the 'Steep Slope'. Slipping but whistling encouragement to each other, the three engines slowly made it to the summit where the banker took a rest as the express accelerated away through the stormy night. Yes, there were still giants in the land; in the hills, where they belonged! As the sound of the train died into the distance Gordon closed the window and went back to sleep in his now rain dampened bed, believing he had been witness to a drama that only he knew!

When they both awoke next morning, excited by the promise of a day watching steam trains at the 'Steep Slope', they could hardly get through their breakfast quickly enough, but Gordon had an urgent tale to tell, one that sounded more like a scene from a Hitchcock film than the true story of a winter's night in a forgotten corner of Germany.

Henry found it difficult not to show that he already knew of the drama that Gordon was recounting, for Henry had lain still in his bed and enjoyed the whole scene without letting Gordon realise that he, too, was awake ... and that was his secret of the ghost-train.

Stuart J. Gee, Germany.

A CONVERSATION PIECE FOR CHRISTMAS

Len Walker

shows how to make a festive item involving some interesting machining operations.

An odd little project this! It made quite a change from my normal, more serious activities like designing and making 'Micro-mills' and sundry tooling items. In preparing this article, I realise that you may think that the artistic side of my character is displacing that of the practical engineer. However, I shall continue, secure in the knowledge that few great artists are recognised in their own lifetime!

My original piece was on display at last year's Model Engineer Exhibition at Sandown Park where it created a good deal of interest. I have therefore prepared detailed drawings that will enable readers to construct one for themselves, or perhaps, for their good lady indoors! Construction is straightforward. All the work for mine was done on my Myford ML10 lathe equipped with a vertical slide, and a small bench-drilling machine.

Festive engineering on a small scale, almost guaranteed to earn you 'brownie points' with the love of your life!

Base (Details 1, 2 and 3)

Make a start on the wooden block (**detail 1**). I used mahogany from the side of an old drawer. This worked beautifully and, after being given three coats of satin polyurethane varnish to bring out the golden grain, it looks first-class. You may have something similar but the choice of material is not critical and almost anything will do.

Detail 2 was made from a piece of 1/8in. thick green Perspex with a side dimension the same as that of your wooden block. My Perspex was obtained from a shop making plastic signs (bless 'em!) Carefully stick the Perspex to the wooden block using Araldite and allow to dry. When set, mark out the centre of the top surface and drill and ream the 1/4in. hole.

Detail 3 is a piece of green baize glued to the underside of the base to prevent scratching your furniture. I obtained mine from a market stall selling ribbons and knitted toys, but craft shops also sell this material. Cut roughly to size and glue it to the wooden block using sparingly applied wood glue. When the glue has set, carefully trim away the surplus using sharp scissors or a craft knife.

Main body (Detail 4)

The main body was made from 1 1/2in. square section aluminium alloy. Leave an extra length (1.500in. long) to serve as a means of securely holding the item while machining and polishing. The point of having a known length of holding piece is that it enables reamed and tapped depths to be done 'blind' with confidence. The main operations used to make this item are set out below:

1: Prepare a blank of 1 1/2in. square aluminium alloy, 3.424in. long. Grip in the 4-jaw chuck and face the ends square.

2: Mark out the centre on each end and lightly dot with a centre punch. Set the marked centre to run true in the 4-jaw chuck using a telescopic 'wobble bar' (if you have one) and a DTI. Using a BS1 centre drill, very lightly centre and then drill 1/16in. dia. by 3/8in. deep.

3: Reverse the blank in the 4-jaw chuck. Once again, set the centre point to run true. Centre drill, and then drill 6.8mm (0.268in.) dia. to a depth of 2.25in. Tap the M8 thread. This task is made easier if you open up the 6.8mm hole with an 8mm (0.315in.) dia. drill to a depth of 1 1/4in. which will form a perfect guide for your tap. Pass a 9.3mm drill through the hole to a depth of 1.65in. and ream 0.375in diameter.

4: Machine the 1/8in. wide undercut to, say 1 1/4in. diameter while observing the 1.500in. length dimension. This defines the bottom edge of the 'tree'.

5: Mount an odd piece of bar material in the 3-jaw chuck and turn to a diameter which is exactly the same as the 'across flats' dimension of your embryo tree. Set up the vertical slide parallel with the chuck face and with the fixed jaw of the vice just touching the piece of bar in the chuck jaws. This will ensure that the centre line of your workpiece will lie exactly on the centre line of the lathe mandrel. Lock the vertical slide.

6: Now hold the aluminium alloy in the bench vice, mark off the tree shape and remove the bulk of the waste material with a hacksaw. Leave approximately 1/8in. stock for finishing with the fly cutter.

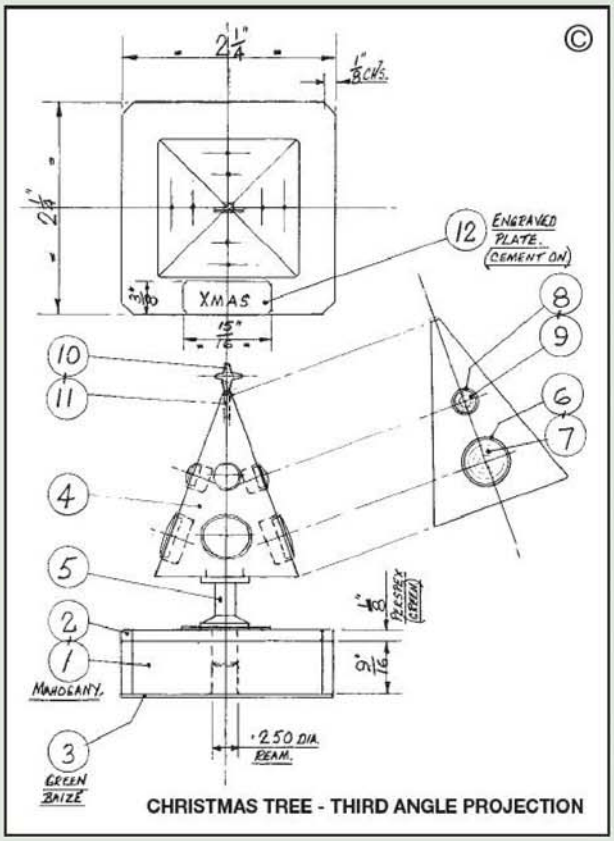
7: Put the piece back in the vertical slide vice, gripping on the 1 1/2in. long holding piece. Set the vertical slide at 20deg. to the chuck face. You can use a protractor or a template filed to an angle of 20deg. if your vertical slide is not of the swivel type. It may be necessary to vary the position of the workpiece in the vice before a position is found which provides a firm grip while allowing full access for machining.

8: Using a fly cutter in the 3-jaw chuck, machine the first 20deg. angled face. Please note that a 0.1in. square is required at the top of the 'tree'. I used a little plug gauge in the 0.062in. dia. hole, with a 0.1in. dia. shoulder, to check the position of the 0.1in. square. A sharp tool used with a little paraffin will result in a lovely finish. Go for it but beware the fumes!

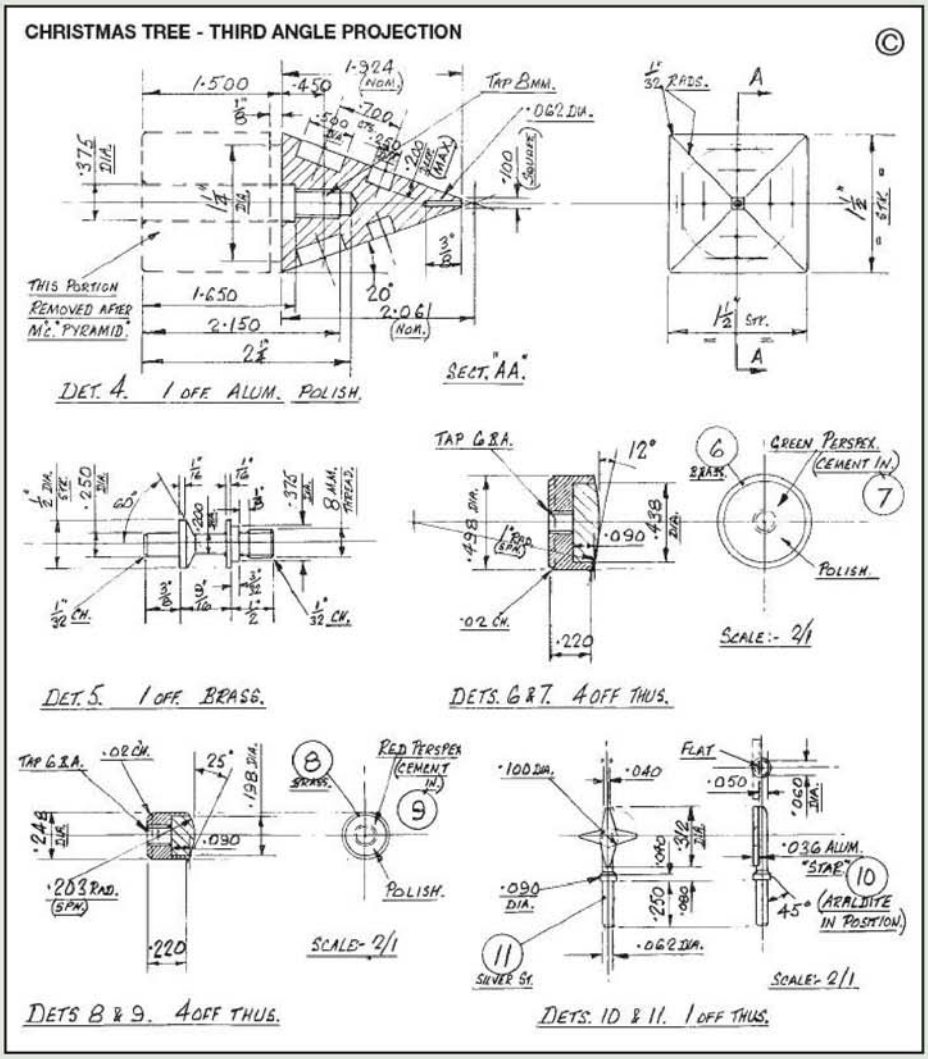
9: Without disturbing the vertical slide setting height, repeat the machining on the other faces. This will complete the outline of the 'tree'.

10: Remove the workpiece from the vice and, using a surface plate, mark off the positions of the 1/2in. dia. and 1/4in. dia. recesses. Centre dot, and scribe the diameters on all four sides. Keep the centre lines within the diameters; it will save having to polish them out later!

11: Return to the vertical slide vice, and set one of the 20deg. machined faces parallel to the chuck face. With a 1/2in. dia. slot drill in the 3-jaw chuck, align the work with the 1/2in. scribed diameter. *(This task may be easier if the centre is picked up with a 'sticky pin'—Ed.).* Just kiss the cutter to the job and then feed in exactly 0.200in. deep. Again, I made a little gauge to check the depth; just a piece of 3/16in. dia. bright mild steel (BMS) with a 0.200in. long por-



CHRISTMAS TREE - THIRD ANGLE PROJECTION



tion. Don't chamfer the hole as the square edge is essential for the final appearance of the finished article. Index the job along 0.7in. and, using a 1/4in. dia. slot drill, machine the 1/4in. dia. pocket. Use the gauge to check the 0.2in. depth. Be careful not go any deeper. Repeat the above processes on all four faces.

12: Hold the remaining 'square' portion in the 4-jaw chuck, and set the 0.062in. dia. hole to run true. Now carefully part off, using a freshly honed tool, and plenty of paraffin! If you use, say a 0.1in. wide parting blade and do most of the work on the left hand side of the groove, you can then move the blade over slightly and get a clean final part off, just kissing the right-hand face. Catch the job on something soft to avoid damage but please *don't* use your fingers. While it is still in the chuck, face off the 'holding piece' so that it is true. With an 8mm bolt through it, this piece will be used to hold the 'tree' securely during polishing and assembly of the inserts (**details 6, 7, 8** and **9**).

Stem (Detail 5)

Turn one off from 1/2in. dia. brass. Face and then turn the 0.375in. and 8mm diameters. Undercut and thread M8 using the tailstock die-holder.

Form the 0.200in. dia., the 60deg. face, and the 1/16in. shoulders. Polish to a good finish. Turn the 0.250in. dia. using a parting tool and then part off.

Large brass mounts (Detail 6)

Turn four off from 9/16in. dia. brass. Face off, then turn to 0.498in. diameter. This allows some clearance for the Araldite on final assembly.

Turn the 12deg. face angle and bore 0.438in. dia. to the depth shown. Drill and tap 6BA. This tapped hole is used only for handling purposes prior to assembly. Part off to the 0.220in. length dimension.

Large Perspex inserts (Detail 7)

Four of these are required. If you can find some 1/2in. dia., green Perspex rod you are laughing. I had to make mine from an odd piece of 1/8in. thick sheet using the following method:

1: Face a 1in. long piece of 1/2in. dia. BMS truly flat with no pip in the centre. File a 1/32in. chamfer at some point where the face meets the outer diameter. Only a small flat is required.

2: Degrease and, using Araldite, stick a scrap of green Perspex sheet (approximately 9/16in. across flats, hexagonal shape) to the flat end of the BMS. Leave overnight to set really hard with gentle pressure maintained by means of a pad in the tailstock chuck. Now, with a very sharp knife tool, gently turn the Perspex to 0.438in. dia., a slide fit in detail 6.

Note: After my first two efforts just fell off; I drilled a 1/16in. dia. hole, 1/16in. deep in the centre of the BMS and filed a tiny 'Vee' with a square needle file, across the centre line. This acted as a spigot (to centralise) and a 'drive key' between the Araldite and the BMS. This, I found, provided just enough extra anchorage to enable the Perspex to be turned to size using caution and 0.001in. deep cuts.

3: A sharp tap on a pocket knife blade, at the tiny flat you filed, will detach the Perspex and the 1/16in. pip and tiny 'Vee' can easily be removed with a needle file, leaving a flat back again.

4: Use Araldite to stick the Perspex centre into the brass cap (detail 6). Repeat for the other three sub-assemblies.

5: To hold the assemblies securely for forming and polishing the spherical portions, I made a little split collet to fit in the 3-jaw chuck. Set over the top slide to the angle shown and gently turn the Perspex until just clear of the brass rim. Round off to a spherical shape with 400 grit wet or dry paper, followed by 1200 grit and finishing with metal polish. Aim for the best finish you can achieve.

Small brass mounts and Perspex inserts (Details 8 and 9)

Four off are required and they are dealt with in a similar fashion to details 6 and 7. However, they have a different diameter, colour, and angle, so be sure to check the drawing carefully. A smaller collet is also required for mounting the parts in the 3-jaw chuck for finishing.

By this time, you will probably agree that having coloured Perspex rod available does save a lot of 'bovver'. Still, press on regardless!

When the 0.498in. dia. and the 0.248in. dia. assemblies are complete, check that you are satisfied with the finish on the aluminium alloy 'tree'. If you are not, it can be attached to the 'holding piece' using an M8 bolt and the whole mounted in a bench vice for final polishing. Clean everything down thoroughly, Araldite the mounts into their respective sockets and allow to set.

Star (Detail 10)

This item is made from 0.036in. thick aluminium alloy sheet. Mark out carefully and file to shape (he says!) After filing a notch in my left forefinger, I made up two little 'metal fingers' to hold the 'star'. These were merely two pieces of 1/4in. x 1/8in. BMS approximately 2in. long with a 124deg. included angle 'Vee' filed in one end. Two 1/16in. dia. dowels keep them in line. This enabled me to hold the 'star' under a bench light and file to final shape with the scribed shape always in full view. Highly polish the faces and edges.

Star shaft (Detail 11)

Make from 3/32in. dia. silver steel. In the 3-jaw chuck, turn the 0.060in. dia., the 45deg. chamfer and the 0.090in. diameter. Reverse in the chuck and turn the 0.062in. dia. x 0.250in. long portion. A very sharp tool set at centre height, is essential — plus patience. Polish to a good finish. File the flat to the 0.050in. dimension shown.

Details 10 and **11** can now be stuck together with Araldite, making sure that the star is accurately aligned. When set, they can be affixed to the top of the tree with a further touch of Araldite.

Screw **detail 5** into **detail 4** and then assemble detail 5 to base using a touch of Araldite in both cases. Carefully align the tree parallel to the base.

Nameplate (Detail 12)

I had a little plate engraved with the word 'Xmas' to complete the job. I must admit that my wife and I took rather a fancy to this little item. It now sits in her china cabinet which is an honour in itself!

Meantime, good luck and work safely.

BRAY'S BENCH

RANSOMES & MAY
Horizontal Engine of 1850

Stan Bray

continues the project with the eccentric straps and describes a small bore slotting tool.

●*Part XII continued from page 381 (M.E. 4157, 30 November 2001)*

The two eccentric straps are virtually identical and so both can be made at the same time (**photo 89**). As the eccentrics are of bronze the straps should be made of brass. No castings are supplied and the straps shown were machined from round bar, although they could just as easily have been cut from sheet or square bar. A short length of material was machined away to give the approximate shape; they were then sawn in half and soft-soldered back together again. From then on it was just a case of boring them (**photo 90**) and trimming them up. The only difficult piece of machining is that required to cut the recess to match the raised section on the eccentric itself (**photo 91**). This was done with a specially shaped small boring tool.

The holes for the bolts that secure the two halves together were drilled and tapped while the parts were soldered together. The screw holes for fixing the eccentric rod and the pump connecting rod were made by drilling through the bolting bar of the rods themselves after sticking them to the eccentrics; so this operation is best left until the relevant parts are made. During assembly the straps were mated with their individual eccentrics by applying a little rubbing compound (a mixture of household scouring powder and oil) and rotating them until they ran smoothly.

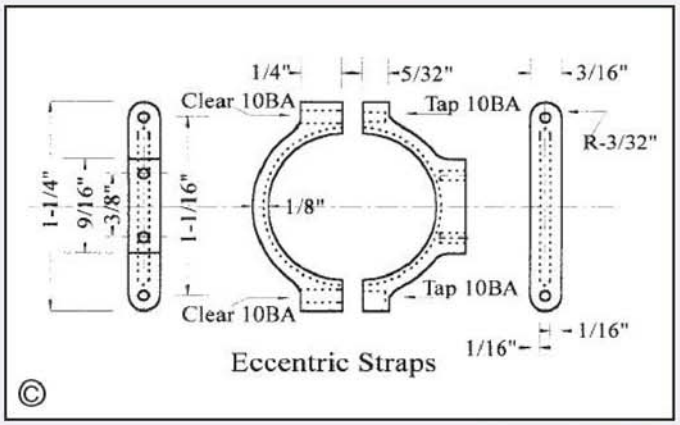
Valve connecting rod

The valve connecting rod is made from a length of flat steel with a T-piece or fixing plate silver-soldered to the end. The T-piece has holes in it to mate with the eccentric strap. It is best to start with the long flat section. Clean up one end and drill an axial hole for a dowel. The diameter is unimportant; it is just to locate the T-piece during silver-soldering. Drill the hole that will act as the bearing in the other end of the bar and then make the rounded end. This can be done on a rotary table, but if one is not available it can be filed to shape.

The use of two hardened buttons greatly facilitates filing (**photo 92**). They are simply washers made from silver-steel and hardened. The latter operation may not be quite so easy as it may first appear, as in order to harden them properly, it is important that they are quenched when they are the colour of a boiled carrot. Being so small, they loose their heat very quickly and it is quite likely that they will fall below the required temperature before being dunked. It is therefore helpful to make up some arrangement so that the heat will remain in the parts during the transfer to the cooling medium. This can simply be a piece of mild steel flat stock of about 1/8 x 1 x 1in. size. Put the washers on it to heat up, bring the flat stock to temperature first and allow the washers to take their heat from it. When the set up is dunked any loss of heat from using pliers or something similar to lift it will occur at the edges of the mild steel, while the washers will retain sufficient heat for the hardening process to take place.

Some people may find it difficult to create the transition curve at the neck of the round section. I found it best to file the neck first and then to shape the rounded end (**photo 93**). Trying to file the circular part first and then blending it in to the flat part is very difficult indeed.

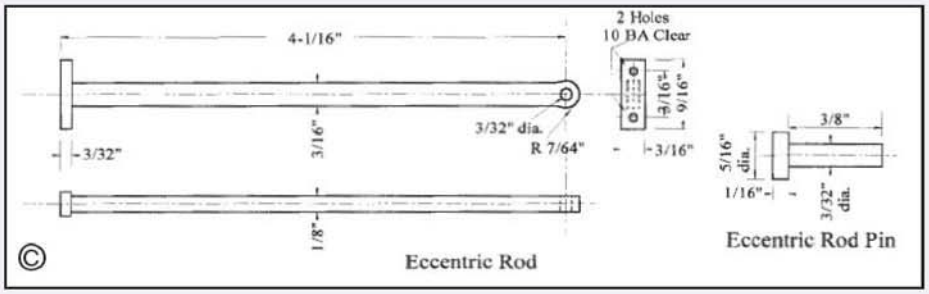
The main body of the eccentric rod can now be reduced in width. This can be done either on the



Top left: the first stage in making the eccentric straps. Sections of bar were roughed out, cut in half and soft-soldered back together.

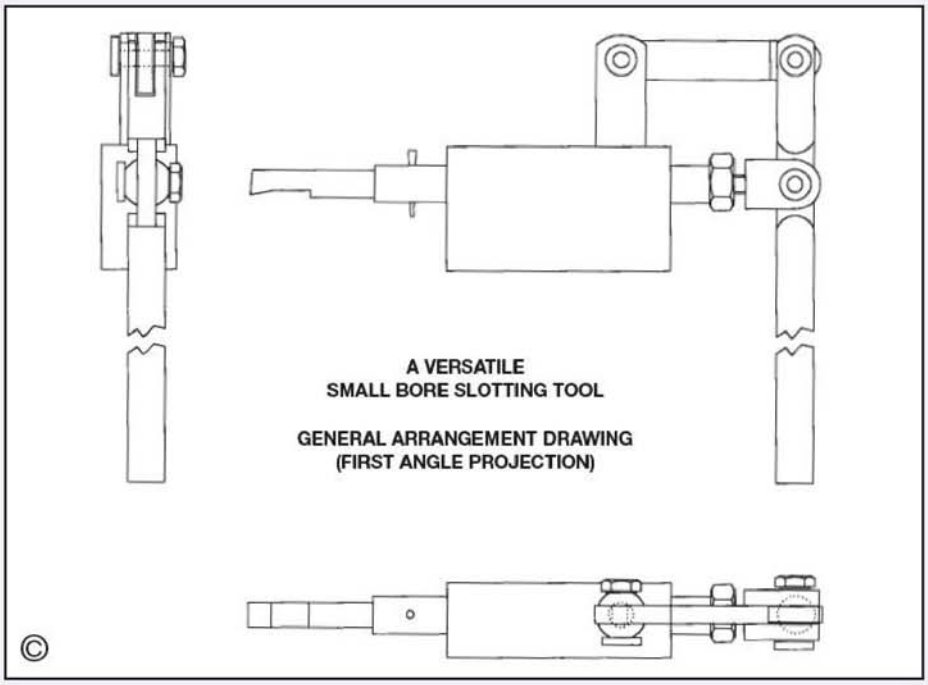
Top right: boring one of the eccentric straps. The internal groove was formed with a specially ground small boring tool.

Below: a finish machined eccentric strap is shown on the left. The one on the right has been filed to shape externally to the finished profile.



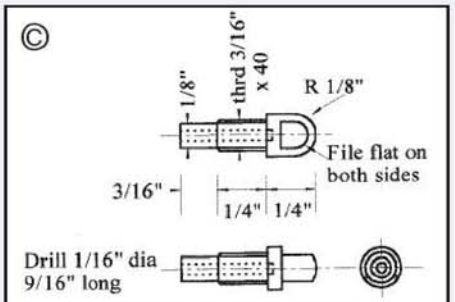
The eccentric rod with dowel and filing buttons attached.

The radiused end has been filed and the bar suitably necked ready for final machining.



A VERSATILE
SMALL BORE SLOTTING TOOL

GENERAL ARRANGEMENT DRAWING
(FIRST ANGLE PROJECTION)



STEAM CHEST TAIL PIECE
This small component guides the end of the valve rod and is a simple item. Builders will require this drawing to complete the engine.

milling machine or with a file. Finally, make up the T-piece, use it to drill the mounting holes in the valve eccentric strap and then silver-solder it in place using the dowel to locate it.

Checking it out

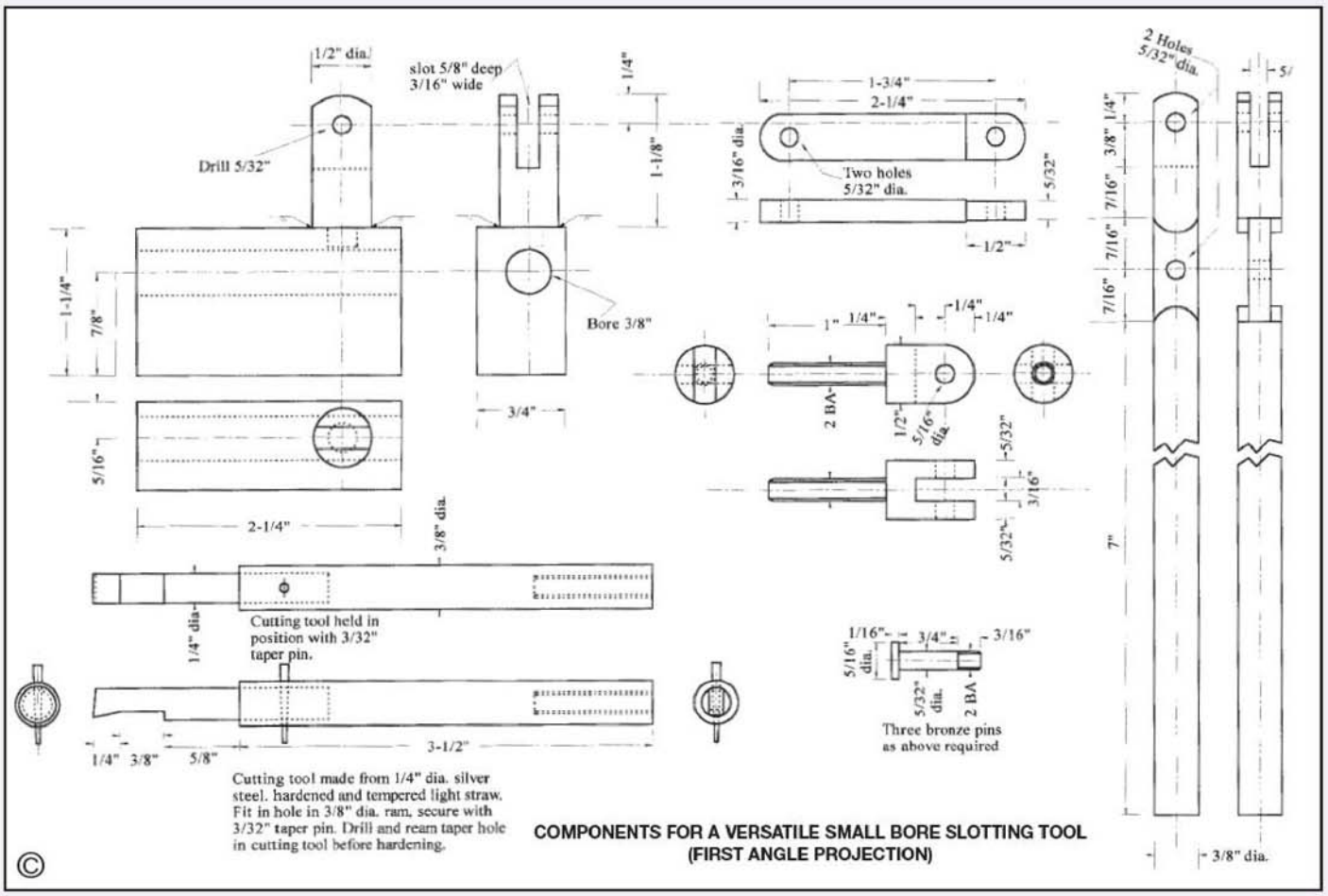
A couple of gudgeon pins will be required, one for the cylinder crosshead and one for that of the valve; making these should not require any description. When they are made, have yet another trial assembly to ensure everything fits together as it should. It is far better to check at this stage and make any necessary adjustments, rather than to wait until the engine is complete and then discover that all is not well. There is no need to fit the steam chest cover or the front cylinder cover to do the checking. Small adjustments can be made with needle files or if slight, with abrasive paper. In the unfortunate event of a major discrepancy it is perhaps better to remake rather than alter the offending part.

Slotting

As has already been mentioned, the pump eccentric and the flywheel will be keyed to the crankshaft. The keys specified are 1/8in. wide by 1/16in. deep, but as long as the width is right, any discrepancy in the depth of the keyways will not matter as the keys can be manufactured to suit.

The slots on the crankshaft are quite straightforward and nothing more than a slot drill is needed to make them. The internal keyways in the eccentric and ultimately in the flywheel too are a different kettle of fish altogether! It *is* possible to make them by very careful filing but this is not the most satisfactory of methods because it can easily result in an oversize keyway which may not even be parallel to the axis of the hole. It doesn't take long to make a small slotting tool which is well worth the effort as it is something that will always be of use in the future.

Over the years I have made several of these tools and in each case have employed a round ram, cross-drilled to accept a small cutter made from high-speed steel. These have been very successful but a snag arose when it came to this engine. The smallest ram I previously used was 5/16in. dia., which was too large to do the job since the holes in the flywheel and eccentric are ▶



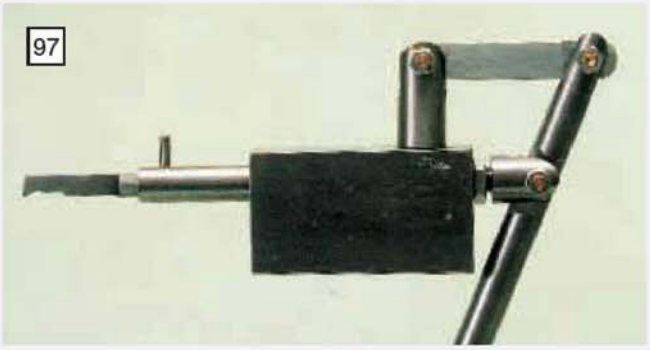
COMPONENTS FOR A VERSATILE SMALL BORE SLOTTING TOOL
(FIRST ANGLE PROJECTION)

Left: slotting tool body.

Above: slotting tool ram.

Top right: finished silver-steel slotting cutting tool.

Right: the assembled versatile small bore slotting tool.



only 5/16in. diameter. Reducing the ram size to, say 1/4in. dia. would not be all that successful either as it would leave very little space for the tool bit to protrude. Another snag is that with the round ram, the tool is invariably secured with a grub screw. If the ram is relatively thin then there would only be room for a very small grub screw which wouldn't give much grip on the tool. A lot of pressure is applied when slotting and experience has shown that the tool is inclined to twist when in use, resulting in a narrow, misshapen slot.

A fresh approach was adopted with the cutting tool made from silver-steel hardened and tempered after shaping and held in place with a taper pin so that it can be changed easily to suit any required diameter. The materials used for making the tool can be chosen to suit anything which happens to be to hand in the workshop; only the basic idea need be followed. For example, the main body (**photo 94**) could be made from a piece of 1in. square material and need not be steel; brass or aluminium would do.

The accompanying drawings show all the necessary details and it is a project that is not difficult. Cutting tools can be made to almost any size by simply machining a suitable sized spigot to fit in the ram. **Photographs 95, 96** and **97** show further details of this useful tool.

●*To be continued.*

WEIGHT DRIVEN EGG TIMER

John Wilding FBHI

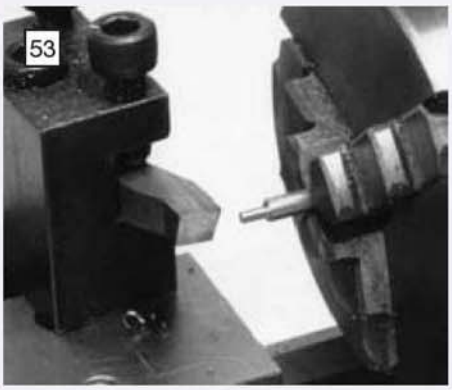
continues the construction of his novel mechanical egg timer.

●*Part V continued from page 495 (M.E. 4159, 14 December 2001)*

With the frame made we can now proceed with the components pivoted between the plates, starting with the pendulum. This is compounded with bobs above and below the suspension, and it is mounted on a steel arbor which in turn is pivoted between the two bridges. This simple but somewhat crude method of mounting a pendulum is perfectly adequate in a mechanism which has only occasional use.

We start with the arbor which is dimensioned on the drawing **fig 52** opposite. Mild steel 1/8in. dia. is used for this and it is only necessary to turn the pivots at each end to 1/16in. diameter. As in all clock pivots, the diameter is not critical, it is the polish that is important. The procedure can be to hold the stock in the lathe chuck as demonstrated in **photo 53**. It will be noticed that I am using the 3-jaw chuck but only because this is a new lathe and this chuck is absolutely 'spot-on'. If the chuck had not been accurate then I would have used the 4-jaw independent or a collet chuck. The pivot is turned with a tool having top rake, and cutting oil can be used, but a turned finish will not be good enough in this instance, the pivot must be burnished.

I show a turned pivot on the left in **photo 54**, and on the right after polishing by burnishing. It is unfortunate that the combination tool used for this work is expensive. The file is an extremely fine cut, the teeth are almost invisible to the naked eye, and extremely hard. It is designed and made to be used on hardened and tempered clock pivots. The opposite end is a burnisher. I show the two ends of this tool in **photo 55**. Also here is a roller rest which can be adapted to be fitted into the base of the hand turning rest. This will ensure that the parallel state of the pivot is retained when using the file.

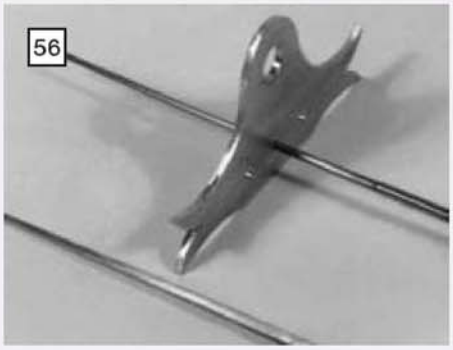


Top left: turning a pivot in the Unimat 4

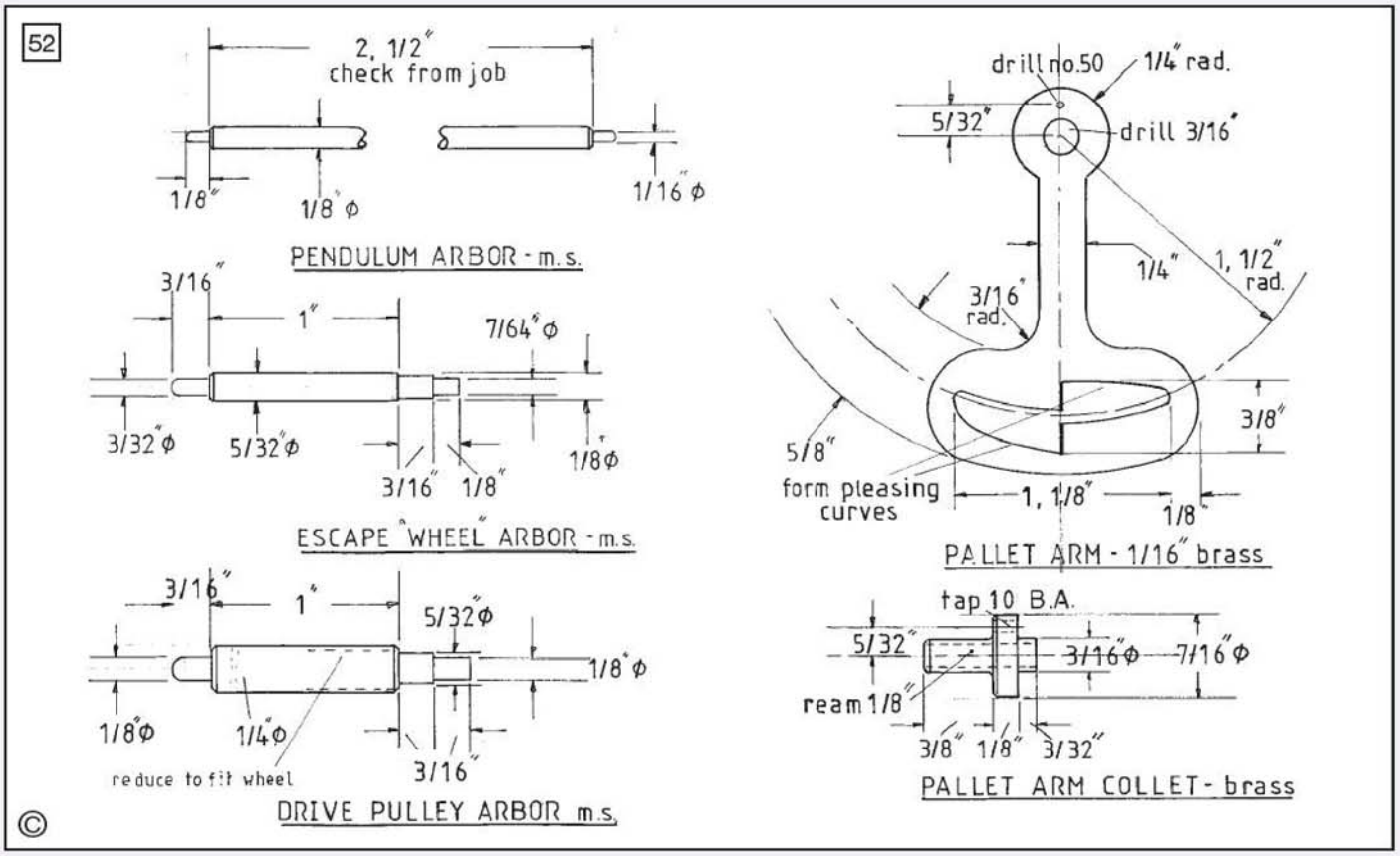
Above: showing a turned pivot on the left and after burnishing on the right.

Bottom left: top left to bottom right, a pivot roller filing rest; the file end of a pivot file and the burnishing end of a pivot file.

Below: a round broach being used to burnish a pivot hole with a cutting broach below it.



When I first used the burnisher in the shop where I worked, I did not get on well with the tool; it just didn't bring up a polish on the pivot. No one told me that a pivot burnisher has to be 'made' which is the term that the clockmaker gives to the cross graining of the surface of the tool. It is done by pushing the burnisher sideways along a sheet of coarse emery paper. It is better if the emery paper is pinned to a block of wood curved lengthways, this will help to retain the flatness of the burnisher. Many people cannot

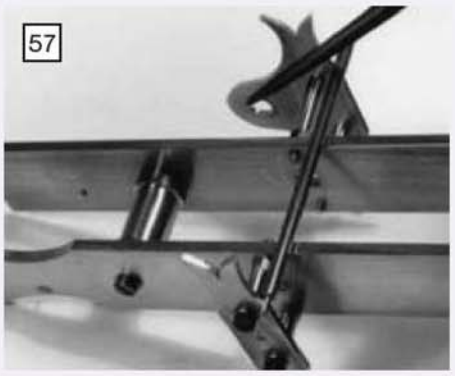


understand this procedure because they visualise a burnisher as a highly polished steel tool which it is when used on brass, but for pivots it must be given a cross grain. What you are doing is to make it into an ultra-fine file.

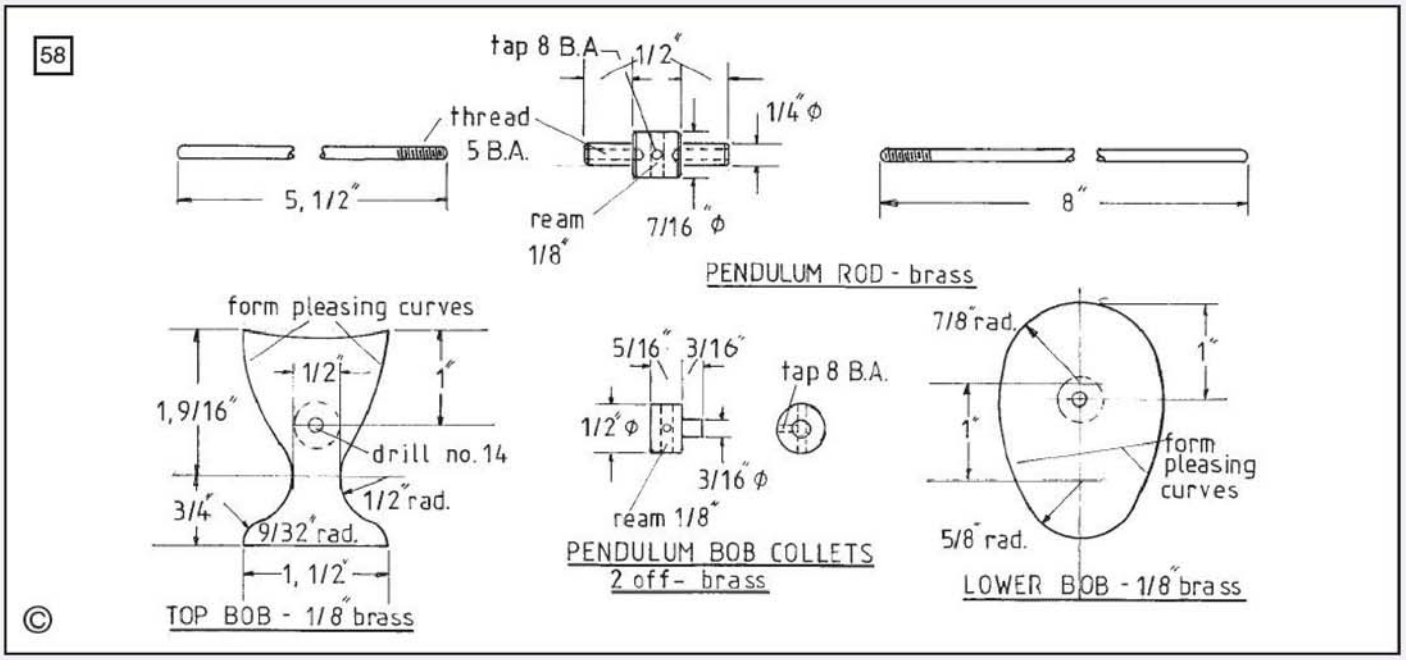
The tool should be drawn across the palm of the hand before use, which will prevent it from 'picking up'. The pivot burnisher is used with a fair amount of pressure. In some cases it is preferable to hold and rotate the work in a pin vice with the pivot resting in a groove filed in a wooden block. The polish should appear instantly. That is a general rule about polishing, if this doesn't happen then something is wrong.

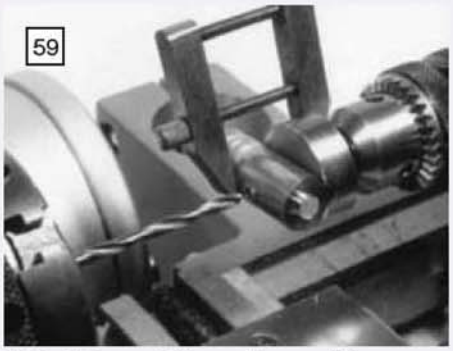
When the pivot is nicely burnished, the pivot hole can be drilled undersize. Measure the final diameter of the pivot with the micrometer and drill the pivot hole slightly less. This will probably be No. 53 or 1.5mm size. The hole is then broached from the inside using the cutting broach until the pivot will just enter. At this stage the cutting broach is changed for the round smoothing broach which should be well oiled. This tool will burnish the inside of the hole giving it a mirror polish. I show these two broaches in **photo 56**. The act of broaching, particularly with the round broach, is to swell the metal at the entry and exit to the hole. This should be removed with the hand held chamfering tool already mentioned and illustrated.

Engineers find it difficult to accept the use of broaches which of course produce slightly tapered holes. They feel that there is no point in turning a parallel pivot and running it in a tapered

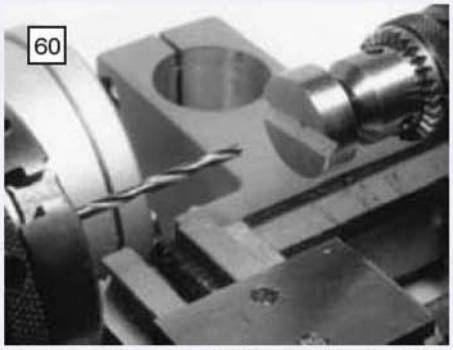


Marking the location of the second pivot shoulder on the pendulum arbor.

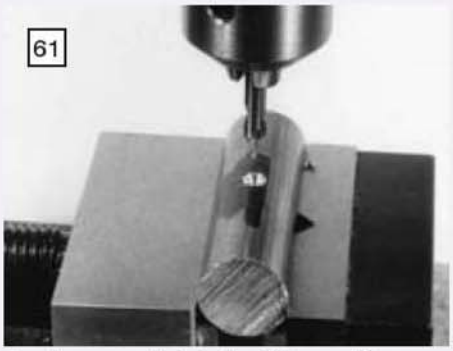




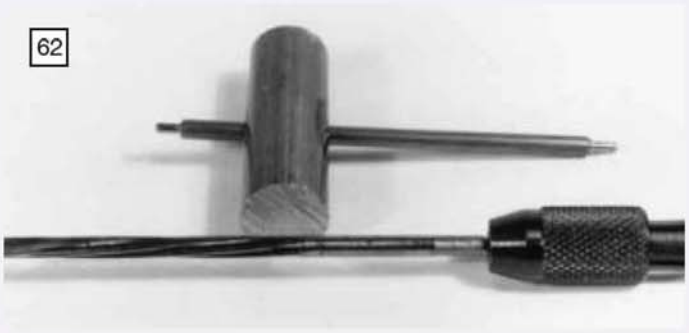
Method of cross drilling a pillar or collet.



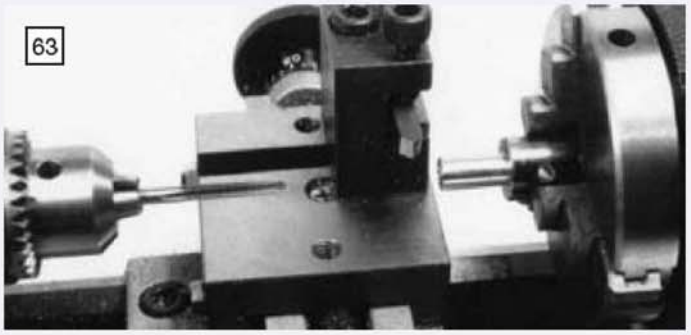
Showing the home-made 'V' pad tailstock centre.



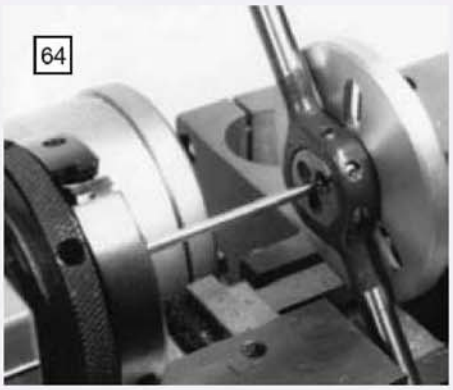
Forming a cross hole in the drilling machine.



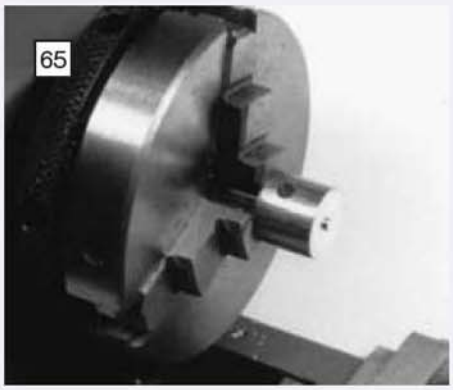
Showing a 1/8in. hand reamer.



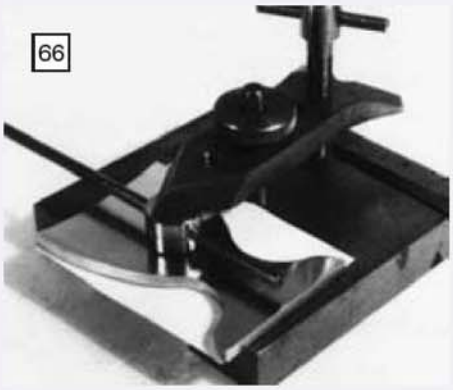
Chamfering the corners of machined work.



In the absence of a tailstock dieholder this set-up will help to maintain accuracy in the formation of the thread.



A stage in the making of the pendulum bob collets.



Using the jack screw of the holding clamp to press the collet home.

bearing. However, this is exactly what is required in horology in order to obtain the freedom of movement so essential in clock trains. The wheelwork must freewheel when set in motion. This taper fitting is also of benefit in mitigating the effects of slight misalignment due to the rather poor design of clock movements in which brass plates are spaced apart by corner pillars. When heavy weights are hung on the barrels, movement can take place.

The location of the second pivot on the suspension rod is ascertained by laying the arbor across the bridges as shown in **photo 57**. Here the shoulder of the second pivot is being marked with a half round needle file having a safe flat face which is pressed against the inside face of the bridge piece. There must be end shake to all arbors in clocks. The amount is not critical, but it must be there, about 1/64in. to 1/32in. is right. If you have accidentally made too much end shake, this can be corrected by reducing one pair of the bridge pillars.

The pendulum rods screw into a centre double ended collet shown on the drawing **fig 58**. This component is machined from 7/16in. round brass rod and has a centre cross-drilled hole reamed 1/8in. diameter. One way of forming this hole so that it passes through the diameter of the rod is illustrated in **photo 59**, where the work is supported in a tailstock 'V' pad fitting. This is not a Unimat accessory but I describe how to make it in my book *Tools for the Clockmaker*. You can see the fitting more clearly in **photo 60**, where the work has been removed.

In the absence of this accessory, then the drilling can be accomplished in the set-up shown in **photo 61**. Here a centre dot was made on the stock which was then rotated in the machine vice and aligned by eye. There are times in metal work when things have to be accurate and other times when an 'eyeball' judgement is satisfactory and this operation falls into the latter category. If a 1/8in. reamer is available then the hole can be drilled No. 31 size and finished with the reamer shown here in **photo 62**. A second 8BA tapped hole is formed in the centre of the collet. This hole is countersunk so that a similar head screw can be used to engage the arbor with the minimum amount of projection.

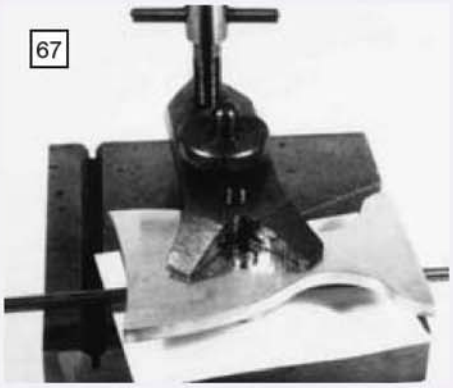
The work is now held in the 3-jaw chuck for reducing each end to 1/4in. diameter and drilling and tapping 5BA. **Photograph 63** shows a 90deg. chamfering tool in use and the 5BA tap being held in the tailstock chuck. It is normal practice to remove sharp corners on machined work by lightly touching them with a chamfering tool.

The rods are formed from 1/8in. brass rod and simply require one end threading 5BA for a short distance. Again, accuracy will be assured if the die is held in the tailstock dieholder. If this accessory is not available it may help to locate the dieholder against the face plate fitted to the tailstock which will help to keep it square with the work. The chuck is turned by hand while the loosened tailstock is moved forwards by hand pressure, **photo 64**.

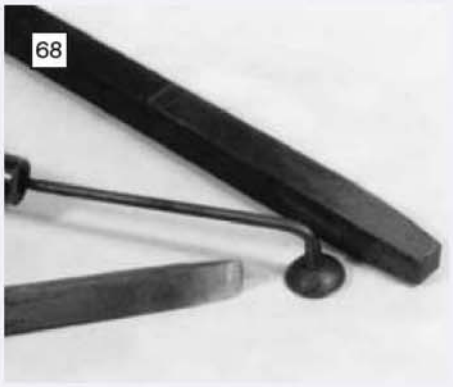
Pendulum bobs

These are also dimensioned on the drawing fig 58. They are cut out from 1/8in. brass strip, filed to shape and a No. 14 size hole drilled in each bob. Be careful when scribing the arcs not to make deep centre dots as these will be difficult to remove in the final finishing.

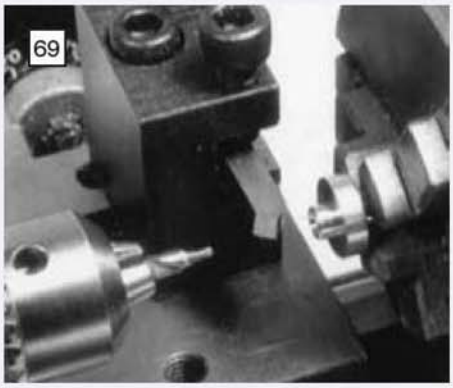
The 1/8in. holes in the collets can be formed in the same way as in the double-ended centre collet. The 3/16in. dimension is turned longer than specified and used as a chucking piece for holding the work while reducing the body to the correct length (**photo 65**). The work is now reversed in the chuck for reducing the 3/16in. diameter to just over 1/8in.



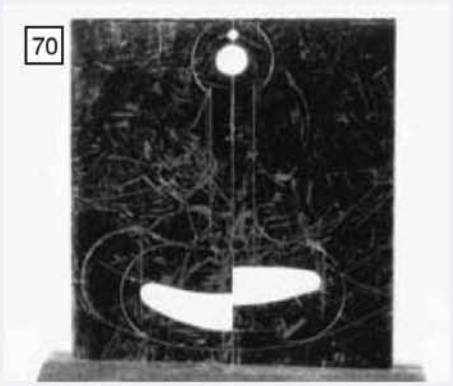
Clamping the two pieces while making the rivet.



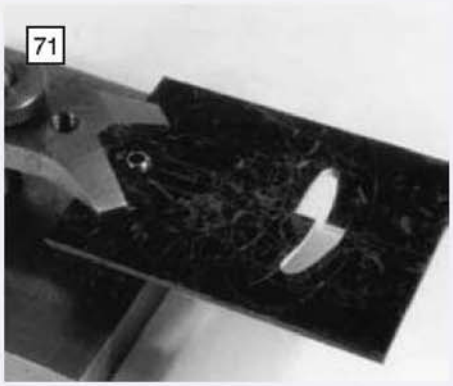
The special tools for filing flush.



The second stage in the machining of a collet.



The internal apertures of the pallet arm formed.



Using the hole in the pallet arm as a jig for forming the hole in the collet.

The pallet arm and the double ended collet at the centre of the pendulum.

in length. The collet is now pressed into the bob. The No. 14 hole in the latter should be carefully enlarged with the broach until the 3/16in. spigot will enter about one third of the way, and is then pressed in. There are several ways of doing this and I show in **photo 66** how I used the jack screw in my holding clamp to exert the necessary pressure. You can see that a short length of 1/8in. rod has been inserted to align the collet. If the inner face of the collet has been undercut it should seat closely against the back of the bob with no visible gap.

Filing flush

If the force fit has not been successful for whatever reason, then you can resort to Loctite 601 to secure the two components. Whichever method you have used it is now time to file the excess part of the spigot flush. In addition to the press fit I also riveted the spigot to expand it in the hole. The set-up for that operation is shown in **photo 67** where the two components are securely clamped together yet still exposing the spigot for riveting using a flat punch.

The actual filing can be carried out with a bull's foot file or a flat file with the teeth ground off at the extreme end. These are shown in **photo 68**. The camera film already mentioned is impaled on the rivet to protect the plate. When the filing has gone as far as the thickness of the film will allow, you can remove the film and finish off with the Water-of-Ayr stone also shown in fig 68. When the work is completed there should be no visible indication of the join. I have to admit that in mine it was possible to see the join because of the slightly different colour of the two metals. As these bobs are to be silvered this was of no consequence.

The weights of the bobs are not critical. My egg complete with the collet realised 70 grams and the egg cup 55 grams. The approximate locations of the two bobs on the rods are 5/8in. of rod exposed below the lower bob and 3/4in. rod exposed above the top bob.

Pallet arm

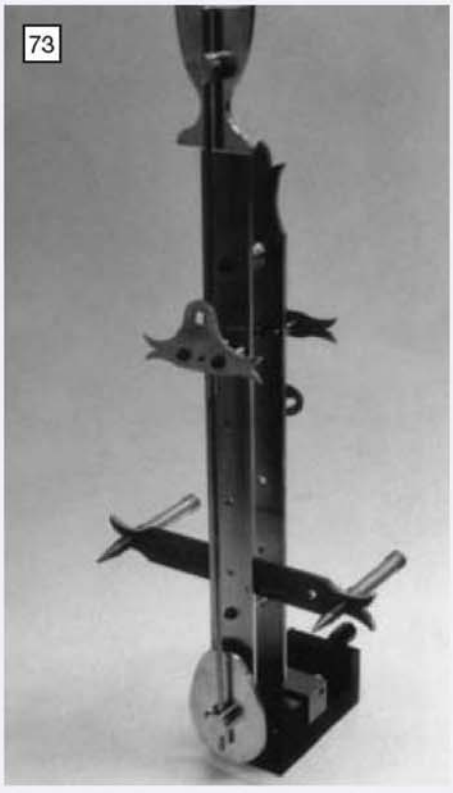
This is the final part of the pendulum assembly. It is dimensioned on the drawing fig 52 together with its mounting collet. The usual procedure for making a collet is to grip the stock in the 3-jaw chuck, turn the back of the collet first, part off the stock, reverse and hold the embryo collet by the back piece just turned, then turn the front seating. At this same setting the centre hole is drilled. This procedure ensures that the critical centre hole and the seating are concentric. In **photo 69** I illustrate the set-up for the second half of the operation where the seating has been turned and the centre drill has just been used prior to drilling the centre hole.

The pallet arm is marked out on a 2in. strip of 1/16in. brass. The centre aperture and the two holes at the top are cut out and drilled before the outside profile is cut out.

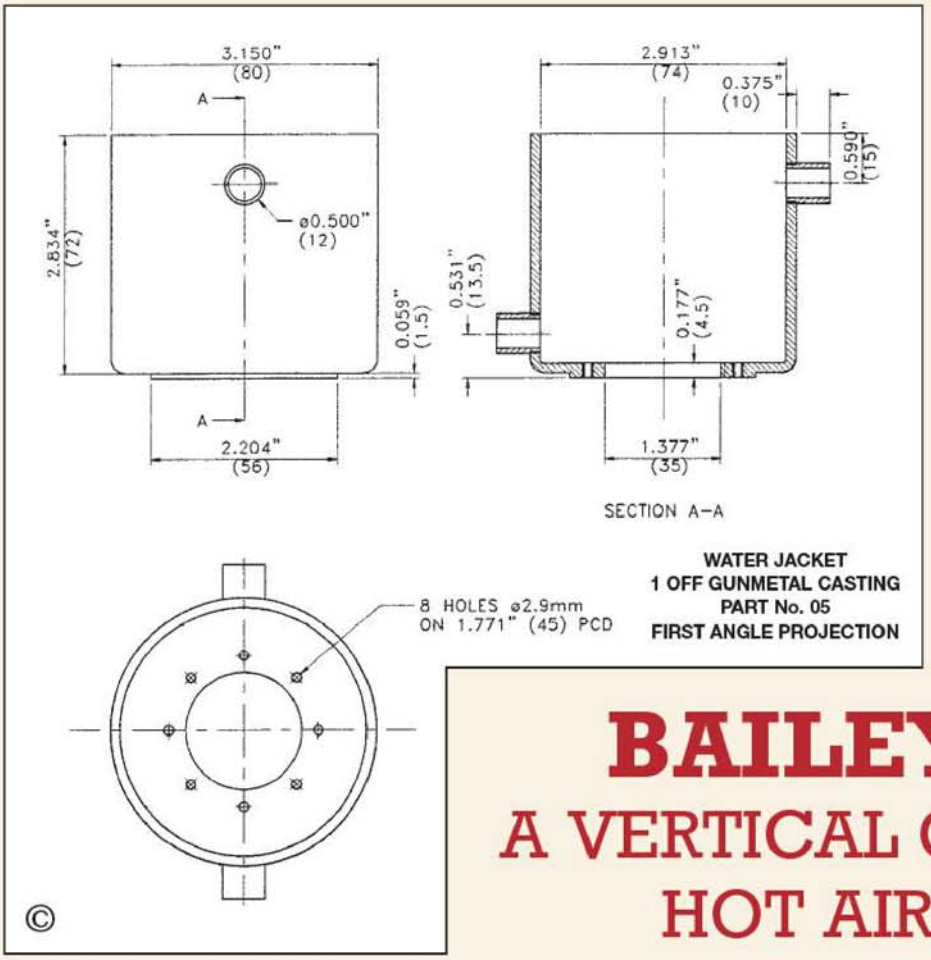
The operating radius of the pallet arm is 1 1/2in., but the two radial locking curves are slightly above and below this dimension. The main essential is that the distance between these faces is just enough for the crank pin to pass. This pin is 1/16in. diameter. The operating faces should be carefully filed to the line and draw-filed with a No. 6 cut needle file during which operation the opportunity is taken to slightly radius the surfaces to minimise the contact with the pin. Finally, these faces must be burnished. In a confined space like this a sewing needle set in a length of 1/4in. dowel rod (similar to the scriber previously described) makes a convenient burnisher. This stage of the work is shown in **photo 70** and in **photo 71.** I illustrate the set-up for holding the collet and the arm while drilling through both together for the 10BA screw. After this, the outer profile can be cut out with the piercing saw and filed up. In **photo 72** I show this assembly together with the centre double collet for the pendulum rods. You can see this stage in **photo 73.**

In the next part we shall assemble the plastic gearing in the plates and make the crank pin. This will be followed by the pulley, and then the embryo timer can be hung on the wall for testing the action with a temporary driving weight. This just leaves the motion work and the single stroke striking mechanism to complete the timer, except for the final polishing.

● *To be continued.*



The timer at this stage of the construction.



BAILEY'S *BEE*

A VERTICAL CONCENTRIC HOT AIR ENGINE

Anthony Mount

deals with the water jacket and hot cap for this interesting power plant, offering sound advice on boring and boring tools on the way.

●*Part III continued from page 376 (M.E. 4157, 30 November 2001)*

The water jacket **(Part 5)** is a cup-shaped gunmetal casting. Chuck by the inside, face off the end and turn the outside to finished diameter. Turn the seating and form the radius on the corner. Turn the shallow spigot and bore out the centre. Reverse, chuck by the outside, face off and, using a big boring bar, machine out the inside of the water jacket **(photo 13)**.

Change to the dividing head to cross drill and tap for the water inlet and outlet pipes **(photo 14)**. These pipes are short lengths of thick walled brass tube, threaded both ends. Small caps can be made up, knurled for preference, to close the ends of the pipes. The completed water jacket is shown in **photo 15**.

It did not appear on the engraving, but I expect that a continuous supply of cold water was allowed to pass through the water jacket. For short runs of a few minutes only, the model can be used without water in the jacket, but if you want to run it for any length of time, the jacket should be filled with water. I have only ever run the engine at slow speed with the smallest possible flame, so I do not know how it would perform with a large heat input.

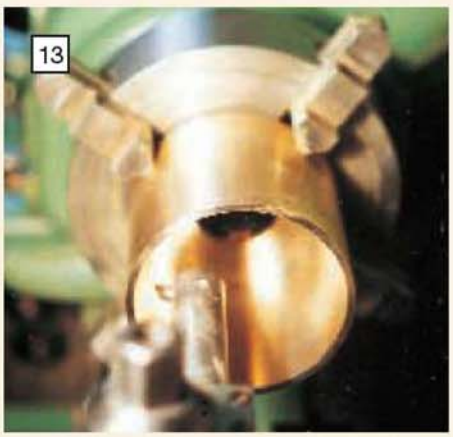
Water jacket cap (Part 6)

The top of the water jacket is closed by a cap which also carries the bearing brackets. Supplied as a gunmetal casting, this too is machined all over.

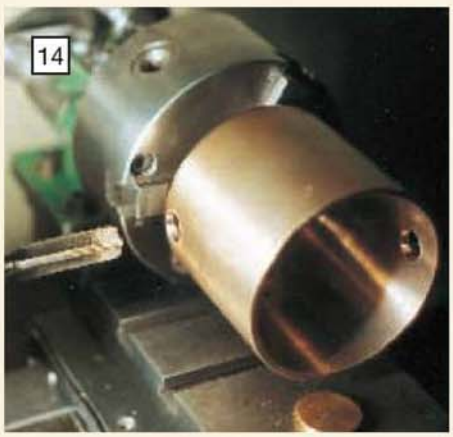
Grip by the large diameter in the 4-jaw independent chuck and set to run as true as possible. Check also the truth of the bore as there isn't much spare metal to play around with. Turn the outer diameter of the spigot and the shoulder, facing off and bringing to length. Bore out to 32mm diameter and turn the chamfer **(photo 16)**.

Reverse and grip in the 3-jaw chuck by the freshly turned spigot. Face off the end and bring to finished length. Form the seating for the water jacket; this can be done with a knife tool ground from round high speed steel and held in a small holder. G. H. Thomas describes this and other boring tools and methods in his *Model Engineer's Workshop Manual* (£22.95 + £2.15 p&p UK from TEE Publishing, 01926-614101) which I can throughly recommend.

Bore out the two steps, taking care when reading off from the dial not to count too far! Turn the large diameter to finished size, leaving only the external

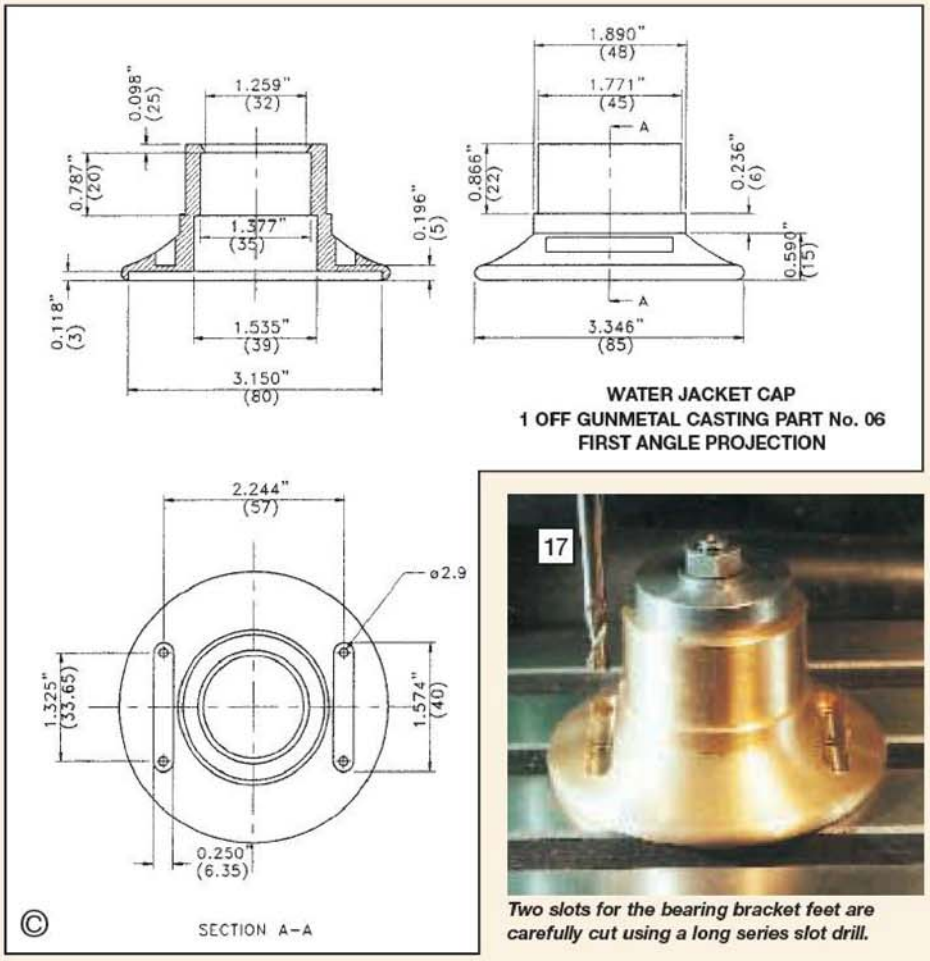


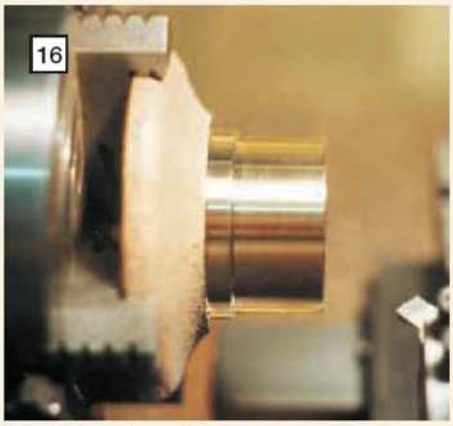
A large boring bar is used to finish the inside diameter of the cast gunmetal water jacket.



The dividing head is used when cross drilling and tapping for the water inlet and outlet tubes.

The finished water jacket is fitted with short lengths of thick wall brass tube.





The plain portions of the cast gunmetal water jacket cap are first turned and bored to size.

Two slots for the bearing bracket feet are carefully cut using a long series slot drill.

Completed water jacket cap with bearing bracket feet fitted using cheese head screws from below.

curve to do. I suppose a form tool could be ground up, but it would be a large area to cut and therefore very liable to chatter. I did a bit of free hand juggling with top- and cross-slides, finishing with emery cloth. If the emery cloth is glued to a stick with a curve matching the required radius then the finishing is quite easy and the long stick keeps one's fingers away from the chuck jaws!

The next operation is to machine the two slots for the bracket feet. Bolt the cover to the milling machine table with a long bolt and stepped washer through the middle of the cap. Be sure to place a piece of packing under the cap to protect the table of the milling machine, before bolting it down.

Pick up the outer faces of the spigot using an edge finder, and from there find the centre of the cap. Instead of trying to use a proper edge finder on a round surface, I just pop a straight length of 6mm rod in the chuck and bring it gently into contact with the edge of the cap, judging progress with the aid of an eyeglass. A sheet of white paper behind the cap makes it much easier to see when the rod is about to touch the edge of the cap. A feeler or piece of shim or paper could be used to judge the approach of the rod to the workpiece.

The dials can now be zeroed (allowing for the shim if necessary). The positions of the four end holes can now be found by the use of co-ordinates and, since we are on the curved surface of the cap, the holes should be started with a centre drill before drilling them through.

With the holes drilled, we can use the same co-ordinates to machine the slots for the bearing brackets. A long reach slot drill will be needed for this job; an end mill cannot be plunged into the workpiece. Drop in at the holes and mill out the slots. As the slot drill is long and slender, take care with the incremental depths of cut: keep them shallow. To achieve the correct total depth of cut, you might find it easier to have previously wound the cutter down onto a piece of packing the same height from the table top as the bottom of the slot. If you then zero the quill dial to that reading, there is no danger of going too far. The operation is shown in **photo 17** and the completed cap with its bracket feet in **photo 18**.

The feet are held in from underneath with two cheese head brass screws. I also used a smear of car body filler to bed in the feet and to finish off the edges around the slots. When cleaned up and painted the feet seemed part of the cap casting.

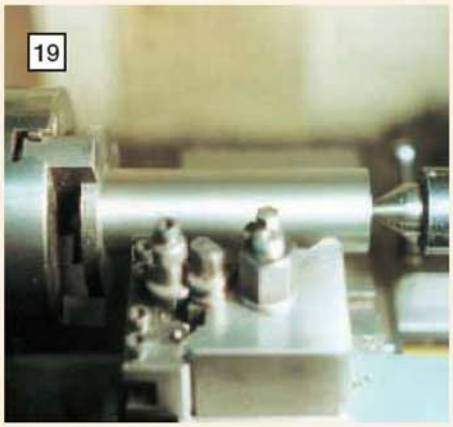
Hot cap (Part 7)

Now here's a challenge: how to make the hot cap and displacer/power cylinder. I originally drew the hot cap and cylinder as a single item using stainless steel tube with the cap and bolting ring welded on. I had difficulty in obtaining just a short length of tube even though it is a standard size. You may have better fortune.

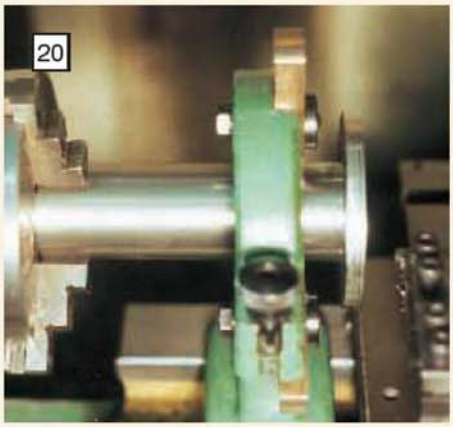
An alternative is to use mild steel and machine the lot from a solid lump of 60mm diameter bar; now, that would be an interesting exercise! Or we could use 35mm diameter bar to machine the tube and then silver-solder on a separate ring. However, it would not be easy to bore out such a long cylinder on the average model engineer's lathe. It could be drilled, but even here the lathe may not be big enough between centres. And how many model engineers have a $1^1/4$in. (32mm) drill, which would also need to be re-ground square to give a flat bottom to the hole?

If you can get hold of a piece of stainless steel tube, use it, and it may be possible for it to be supplied in the kit. I have drawn it out as **part 33**.

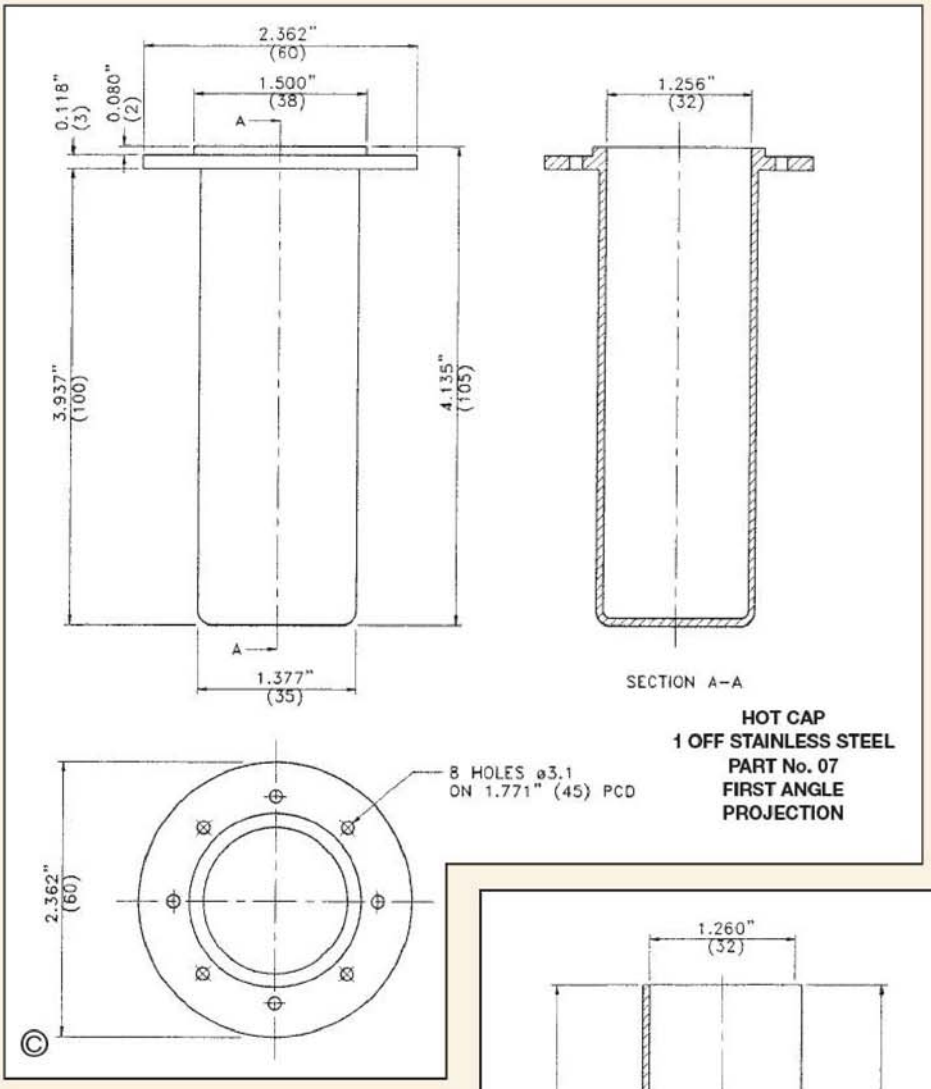
But for my own engine, I redesigned the hot cap/cylinder and made it in two parts. The hot cap, was machined from a solid billet of stainless steel, and the top section was made from a gunmetal casting, the two being joined together ▶



The hot cap for the Author's own engine was cut from a length of solid stainless steel bar.



With the O/D roughed out to 1mm oversize, the I/D could then be bored to depth and diameter.



This finished hot cap took the Author some ten hours to machine from solid stainless steel bar!

with flanges in the same location as the original bolting ring.

Stainless steel or mild steel can be used for the hot cap, and here I was fortunate in being able to obtain a length of free-cutting stainless steel which I cut to length using a bandsaw. I have a little cut-off saw which I find most useful.

The hot cap was chucked, given fixed steady support, and the ends were faced off square leaving the billet about 6mm over length. One end was centred, keeping the depth of the centre within the 6mm, supported on the tailstock, and the outside roughed down to size (**photo 19**), leaving it about 1mm oversize on diameter. The cap was reversed, given fixed steady support (**photo 20**), and the inside drilled and bored out to size. To excavate the bore, I drilled it out in stages to 3/4in. diameter, and then opened it out to 25mm diameter using a 16mm boring tool. I then changed to a 20mm boring tool to take the bore out to the finished 32mm diameter, taking care to keep to the right depth, and finished with a flat bottom.

A point to watch when boring deep holes is the propensity of the swarf to build up around the boring bar and to jam things up. So be sure to withdraw the bar often to clear the chips, and try to grind the cutter to form short chips and not long spirals of swarf.

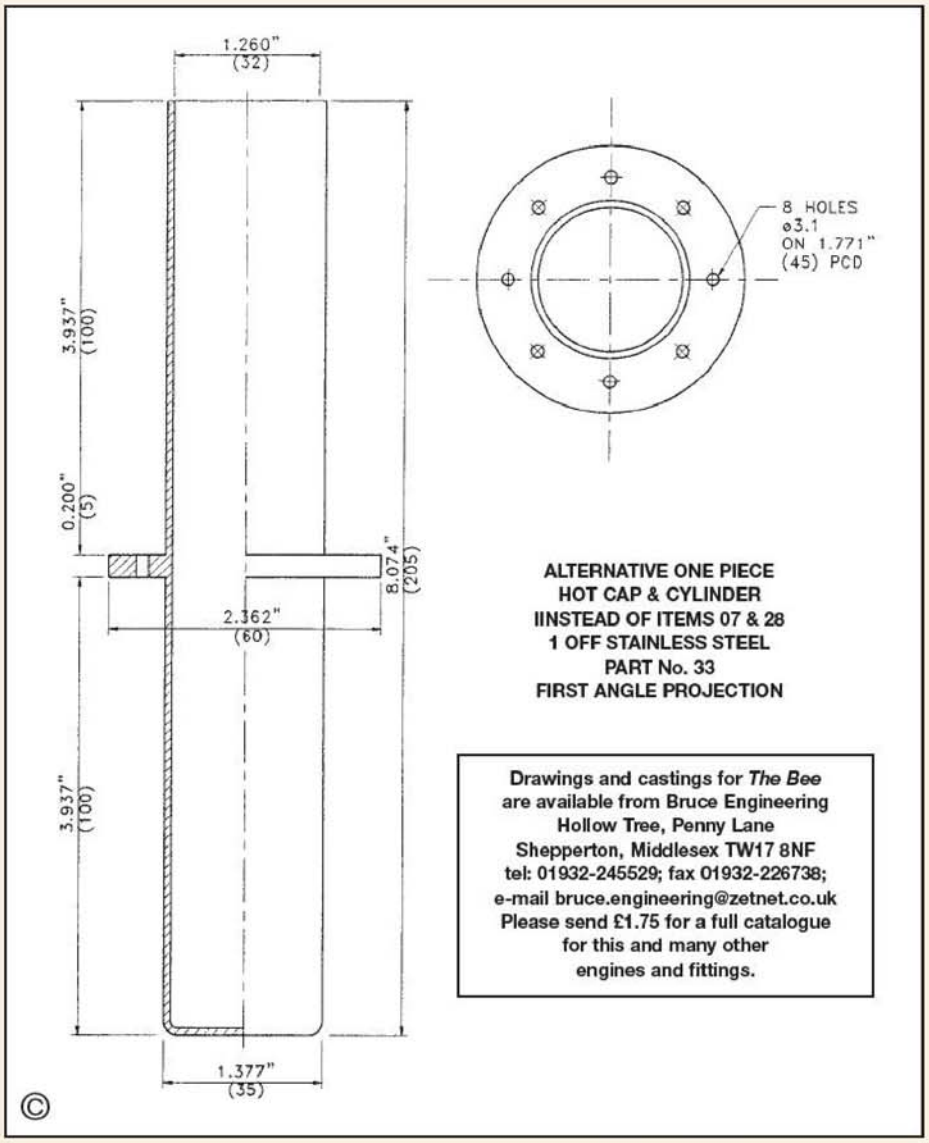
As there is considerable overhang of the boring tool I found it safer when nearing the bottom to have the boring bar protruding from the tool holder by only just the finished depth of the hole. It was then easy to see when the tool was approaching the bottom of the hole and feeding could be continued until the tool holder just rubbed against the face of the flange.

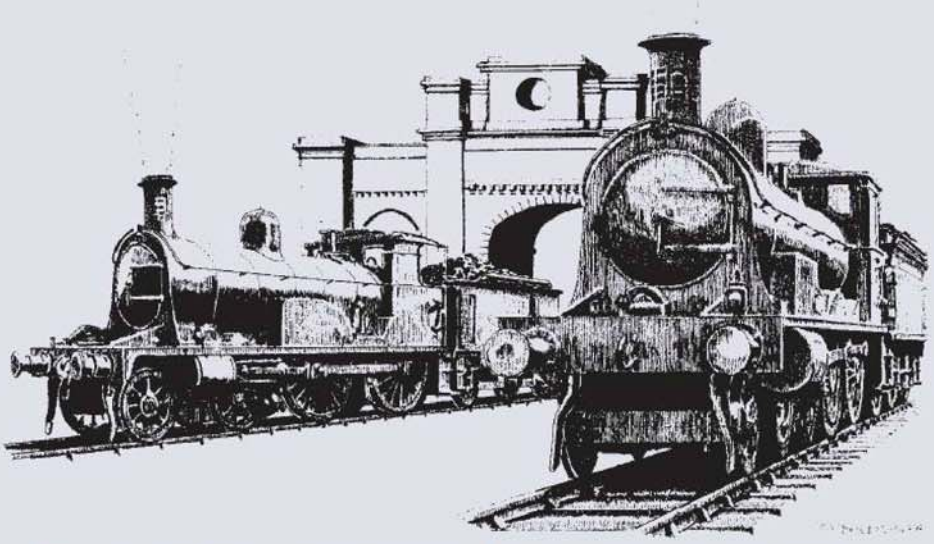
Reverse again, this time using the chuck jaws on the inside of the bore. Provide tailstock support and finish the outside diameter and flange thickness to size. Refit the fixed steady and face the end to size, removing the centre hole.

Finish off by transferring to the dividing head and drilling the stud holes.

Photograph 21 shows the completed hot cap; machining it from the solid may sound like hard work, but the job went smoothly and in all it took 10 hours — but I must admit it was a 'boring' job!

●*To be continued.*





THE HIGHLAND RAILWAY JONES 'BIG GOODS' & LOCH 4-4-0

LOCOMOTIVES IN 5in. GAUGE

Neville Evans

describes the connecting rods for his locomotives, takes time out for a digression or two and presents a couple of corrections recently encountered.

●*Part XI continued from page 385, (M.E. 4157, 30 November 2001)*

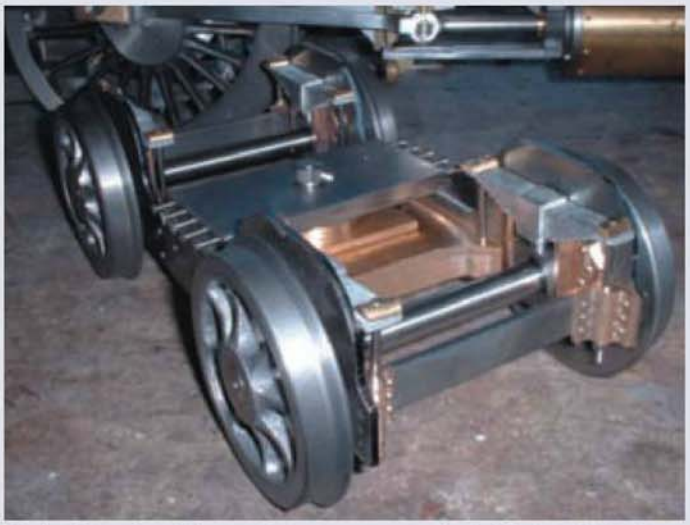
The connecting rods of our two locomotives are very similar in concept and differ only in length. The longer 'Big Goods' con-rod, however, needs to be fish bellied to give it greater strength in the centre. Fish bellying, the thickening of connecting and coupling rods in or about the centre, was a common process that was necessary in rods over a certain length, to enable them to withstand whipping stresses, while remaining as light as possible. The 'Loch' con-rods, were straight tapered as were the GWR short rods, which were fitted to everything from the outside cylindered large tanks, to the mighty 4700 2-8-0s. The con-rods on the GWR 2-cylinder 4-6-0s were 10 foot 8½in. long, fish bellied and also fluted.

Longer con-rods have the advantage over shorter rods in that they actually provide more power at the wheel rim. The shorter the rod, the more it tends to lift the front end of the loco on the back stroke and pull it down on the forward stroke, causing rolling and throwing great stresses onto the slide bars. These forces, which do nothing useful in the way of work, decrease in proportion to increase in rod length, are quite large, and have to paid for in decrease in effective work done. You don't get nothing for nothing.

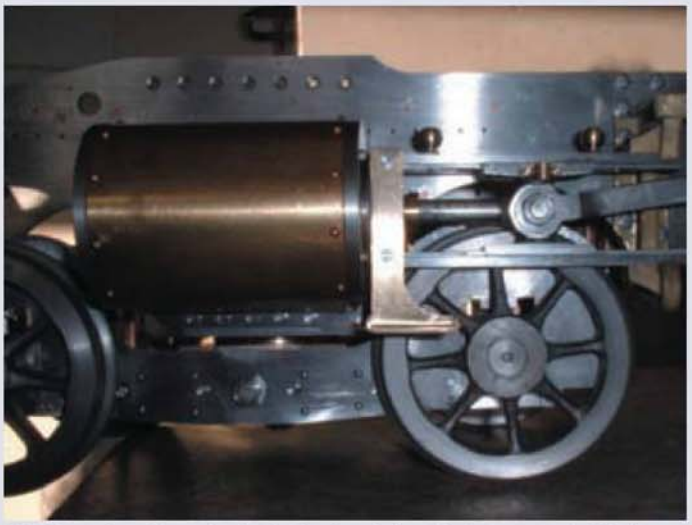
The importance of reducing reciprocating weight can hardly be emphasised too much. The balancing of a single cylinder engine, whether a motorcycle or a steam engine (yes I do know that there's another pot on the other side but as it's so far away and set at 90deg. anyway, we must treat it as two singles) can only result in a compromise solution. The problem is that while we can completely balance the horizontal forces implicit in the reciprocating weight of the piston, piston rod, crosshead and connecting rod assembly, we are left with a large vertical imbalance caused by the rotating weight used to balance the reciprocating weight. This vertical force pounds the track (the so-called hammer blow) when in a downward direction, and can actually lift the wheels off the rails when the wheel swings around to the other half of the circle.

Construction continues apace; this con-rod and crosshead is for 'Loch' but differs from that for the 'Big Goods' only in length and lack of the fish bellied profile associated with the longer rod.

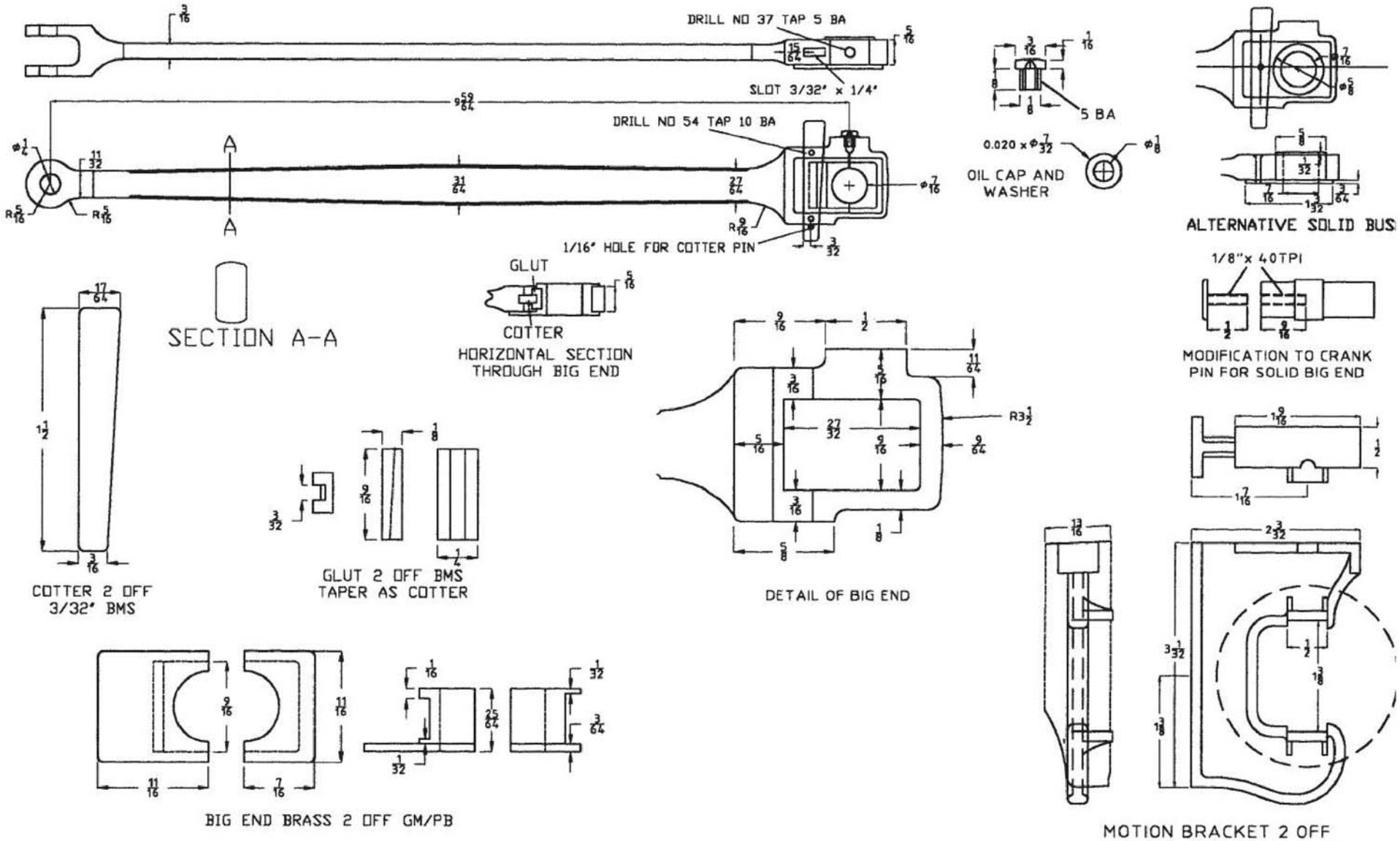
If we balance out the half weight of the con-rod, to lessen the vertical forces, we are left with an unpleasant fore-and-aft surging which transmits itself to the carriages of the train. We can only compromise by balancing a percentage of the reciprocating weight. With an 88mm stroke 4-stroke petrol engine, I used to balance 63% of ▶



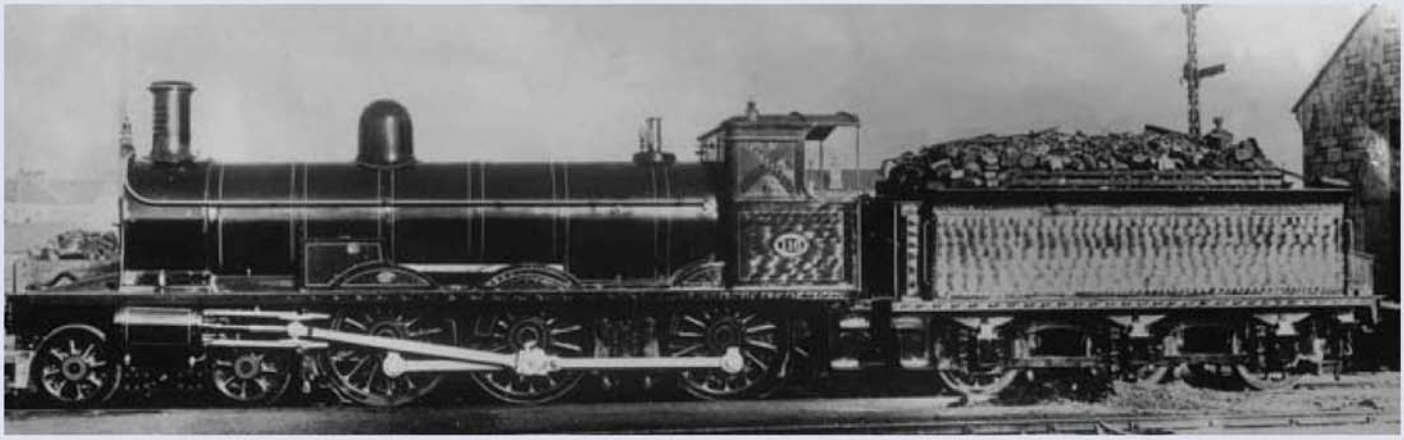
The bogie too is making good progress; prospective builders are invited to observe the close-to-scale wheel spoke profile.



This front view shows the bogie fitted and the cylinder mounted with the associated slide bars and elegant crosshead all complete with oilers.



BIG GOODS CONNECTING ROD AND MOTION BRACKET



Looking resplendent having been cleaned and polished for the photograper, this view is of Highland Railway No. 116 built by Sharp Stewart in 1894 with a works number of 4035 and renumbered by the LMSR to No. 17929. (Photograph courtesy Stephenson Locomotive Society).

the weight of the piston, gudgeon pin and con-rod assembly. This resulted in a smooth running engine up to about 8000rpm, provided that the cylinder head was anchored tightly to the head stock to prevent fore-and-aft shake.

One further thought on balancing, or should I say, reducing the horizontal imbalance, is that compression forces between piston and cover, which are a product of the valve lap and the clearance volume, might have a lot to do with it. Although I have never seen it discussed in print, there must surely be a correlation between the two. Locos with small clearance volumes and big laps, such as the 'Halls' and the 'Black Fives' for instance, seem to have been harsher in running than the 'Granges', which had larger clearances.

I was talking the other day to George Carpenter, who translated the Bible, *aka "Le Locomotive a Vapeur"* by 'he to whom we doff our caps.' George told me that after its wild dash down Stoke bank, *Mallard* threw its centre big end bearing up the road, because the driver disobeyed instructions and shut off steam completely at high speed, therefore there were no cushioning compressive forces, resulting in the big end thrashing itself to bits. I have a theory that the Southern could have beaten the record by merely shoving a 'Terrier' tank off Beachy Head, which wasn't such a bad idea anyway.

As I said in the previous article, it is almost certain that the 'Big Goods' and 'Loch' rods were manufactured from forged billets, probably of circular section. They were then machined on their sides and hand-finished on top and bottom to leave the shape that we can see in the photographs and in the small sketch, which appears with the connecting rod drawings.

Please remember that if you decide to start with nice bright mild steel, you will have to anneal the rods before making the first cut, so as to relieve the stresses that were worked into the piece during the cold rolling operation. A better alternative is to start with so called black bar, which brings me to a point in Peter Lewis' very informative articles on how he built his Bulleid pacific. I must say that I'm extremely surprised that a highly qualified engineer like Mr. Lewis was unaware that black steel is exactly the same stuff inside as bright mild. It will machine just as well to exactly the same finish, which is only skin-deep anyway.

Another point while I'm about it is that Keith Wilson's con-rods were not 1/16in. wide, but that the inside thickness of the fluting alone is 1/16 inch. The stresses of the con-rod of course are carried on the outside, that's why they machine out the inside and call it fluting. All that it does is to keep the load bearing bits apart, while adding a bit more lightness.

The big-end is based on the successful design by Graham King for his own 'Loch', and has proved to be quite easy to make and to set up. The design features a working cotter and glut as in full size. Don't forget the little hole for the cotter pin; this can either be a split pin, or a taper pin. The big loco has a small tapered cotter driven into the main cotter — see the photos for detail. For the benefit of those who want a quieter life however, I include a simpler solid type big-end, which is pressed in and includes an extended front piece that can be screwed to the con-rod through the dummy cotter pin to give greater security and to stop the whole thing turning.

The roundabout side of these swings, of course says that the crank pin must be more complex, having either a detachable head which is nutted at the rear of the wheel, or a plain screw as per the drawing. Don't forget the oil pots and oilways. Whichever sort of brasses you decide on, don't forget the two little square headed screws that lock up the cotter as they are rather obtrusive; again, see the photos for detail.

Machining

Just a few words on the subject. As I said in the very first article, this series doesn't set out to be of the knock down, drag out kind, giving explicit instructions on how to make a simple loco. If you really need such information I would suggest buying a copy of LBSC's *Tich* book which will give you all the gen. A few pointers however may not come amiss. To rather labour the point, use so-called black steel for preference. If you can't find black steel, use the dreaded bright mild and anneal it. I have two copies of the invaluable *Machinery's Handbook*, one that I was given by my Father about 60 years ago, and an 11th edition that I picked up somewhere. Quite recently, Simon has sent me a computerised copy as well, although I prefer to find the information for myself, I seem to pick up an awful lot of useful gen in this way, by the process of serendipity, which basically is finding something by looking for something else. The point is that this American publication contains vast quantities of information on engineering from annealing to Ziggurat building (an ancient and much neglected art). Get one.

I recently had to machine a pair of forked con-rods which were very similar to the 'Loch' rods. I started by slotting the small ends first, machining them with a home made slot drill, similar to the one that I recently detailed. The blank was then turned through 90deg. on the milling table and the two small end holes drilled and reamed at one setting. The two pieces were parted and the ends filed, which brings me to the use of filing buttons. You cannot get a decent finish to a rod end without one of these gadgets. They have been described in *M.E.* and almost everywhere else a million times. They don't have to be complex. Just two short lengths of round bar of the correct diameter, with a suitable hole through the middle for the rod that goes through the hole in the con-rod. If you haven't used one before, get a bit of practice in first. Use silver-steel and harden through. See *Machinery's Handbook* for instructions.

Digressions

To digress a little from the subject of con-rods, my pursuit of the optimum British 4-6-0 continues. I have also been considering a 3-cylinder compound (as has David Wardale, to judge from an e-mail recently received concerning his modern 4-6-0 — I would dearly love to see that project come to fruition.) To this end, I recently saw no less than *two* Royal Scot chassis offered for sale, one that I sadly overlooked, from a friend of Doug Hewson, in Scunthorpe — I'm sorry I missed that one — the other one from a character, if I may use the word, from the Guildford area, who agreed a sale price and then, later, calmly informed me that he'd sold the engine at a higher price. Charming, especially as a pal of mine had made a visit on my behalf to inspect the loco. I am therefore still looking for a really nice Scot or *Fury* chassis to help me on my way. ▶

This view of the classic 4-4-0 configuration of Roger's 'Loch' shows that it is comfortably up to rolling chassis stage.

Above: the Author's favourite two seater tourer and right: a single seater racing machine from the 'Manxman' stable skilfully worked up to deliver some 50bhp from what amounted to a 'standard' road bike.

One benefit that came from this situation was that I discovered a lovely 85% finished LNER P2, so you could say that I went out for a tin of lager and found the Holy Grail. The two P2/1s have always been among my favourite locos. I can remember that the pre-war Bassett-Lowke catalogue had a picture of their 2½in. gauge *Cock of the North*, spirit fired of course, and not designed for passenger hauling. LBSC rebuilt one with a coal fired boiler and rather unfairly criticised its design. I fell in love with the loco, rather like seeing my first International Norton.

On the subject of Cammy Nortons, quite a few readers have enquired about the 'Manxman' the bike that we (that is the Dragon and I) manufactured in the 1990s. This was a redesign of the single overhead camshaft Norton that was built until 1958. As I had owned about 20 of these models, I was only too familiar with their defects, which were mostly to do with the open rockers and their obvious propensity for anointing the rear of the bike and the rider's trousers with Castrol R, once wear had taken place in the rocker packing. At 100mm the stroke was not in accordance with modern thought, as it limited maximum revs and therefore horsepower, as well as cramping the space available for valves in the cylinder head.

I therefore shortened the stroke to 88mm, increased the bore to 85mm, redesigned the cam box to enclose the rockers, which were investment cast and 40% of the weight of the originals. We replaced all the expensive bronze bushes with needle rollers and used the big Manx head and barrel. We made, or had made, all our own patterns and castings, which was quite a job. The crankcase assembly was simplified and made very much stronger with a redesigned oil-pump and lots more. We sold them as racers and single or two seater touring machines. In racing trim we managed to extract over 50bhp from what amounted to our standard road bike. I include a couple of pictures, one of my favourite two seater, and one of a racer. We had to call it the 'Manxman' because there were so many people who thought that they owned the names 'Norton' and 'Manx', that the whole subject was a minefield. We sold the business last year, having derived an immense amount of pleasure and enjoyment from it. Production will shortly recommence in or near Sale, and we wish the new owners all the success in the world.

Cock-up corner

Roger recently phoned to say that the bogie centre plate hole and pin conspire together to lock up the bogie solid. He's quite right of course, the centre plate hole, detailed at 5/16in. should be drilled at 1/2in. and the centre pin should be 1/8in. longer at 1 3/8in.; all will then be well. If the pin has already been made, simply add a short extension piece 1/2in. O/D and about 1/8in. long. Don't forget to pin or otherwise fix the two nuts, top and bottom of the pin.

One of the snags of having complicated toys in uncomplicated hands, is the 'twit factor'. It has been brought to my notice that on the valve gear drawing, I have not only drawn the valve crosshead twice full size, but I've also dimensioned it twice full size in one place as well. So, please, drill the crosshead 1/8in. to tap 5/32in. x 40tpi. Of course, as is well known, the confuser automatically corrects these mistakes for you as you go along. Trouble is that said confuser hasn't read its own instruction book!

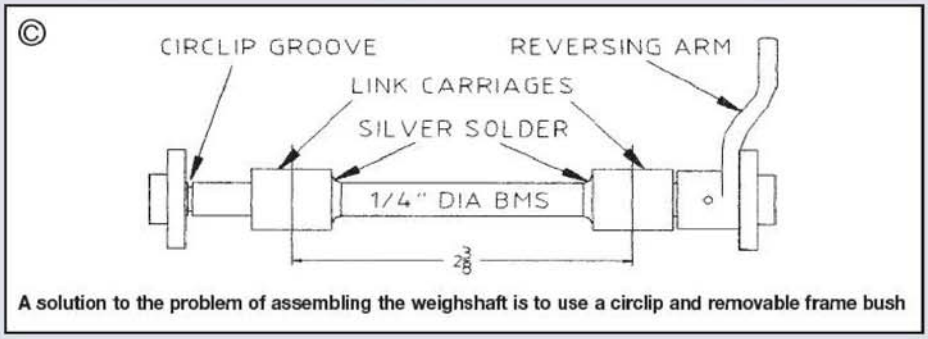
One further point is that of clearance between the valve rod crosshead and the stuffing box. This has manifested itself on the 'Loch' G.A. drawing, but as the 'Big Goods' is so similar, it may be something to watch out for in that one as well. The solution to the possible problem, is to make the steam chest stuffing box 1/8in. shorter, and to slightly shorten the gland nut as well. The problem will then disappear.

Last of all, but by no means least, Roger has suggested that instead of using two weighshaft bushes of unequal length, two short bushes the same length as the left hand bush can be used and a circlip placed close up to the right hand bush. By removing the circlip and the frame bush, the weighshaft can be wangled out without stripping the frame, to everyone's advantage.

Supplier

Drawings, castings, laser cut frames, etc. are available from **Practical Scale, 46 Pentyla, Port Talbot, West Glamorgan SA12 8AA; tel/fax: 01639-883741.** Please send a stamped self-addressed envelope for list.

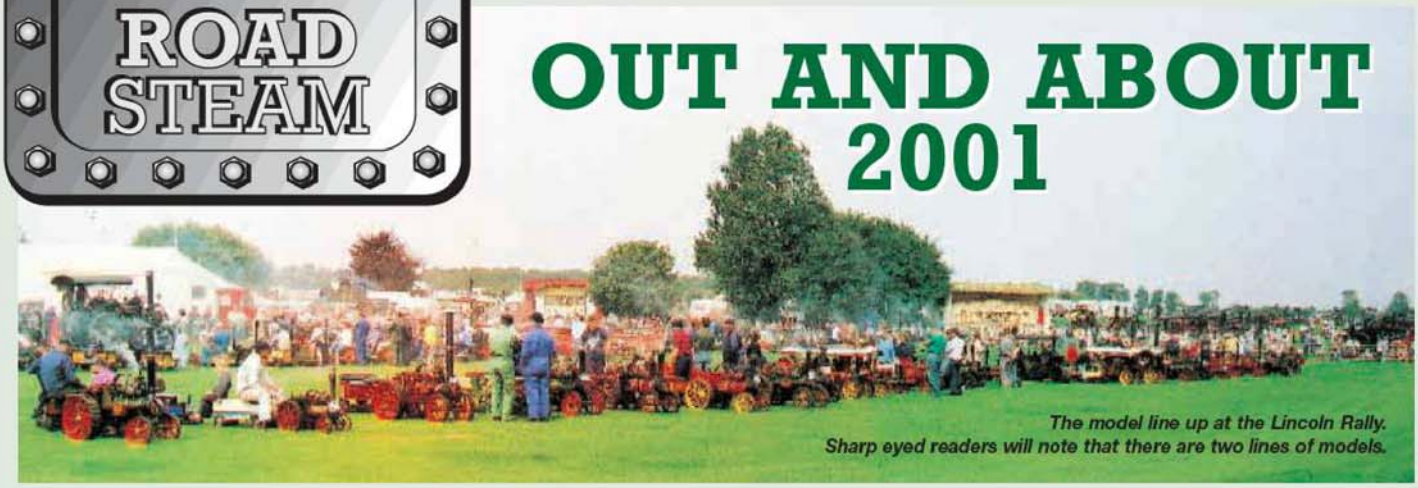
●*To be continued.*



A solution to the problem of assembling the weighshaft is to use a circlip and removable frame bush

ROAD STEAM

OUT AND ABOUT 2001



The model line up at the Lincoln Rally. Sharp eyed readers will note that there are two lines of models.

Martin Wallis
takes time out from his regular contributions to present what has become his customary Christmas review of the past year's events.

First, I should like to wish all *Road Steam* readers a Happy Christmas. This month's offering reviews some of the models seen 'Out and About' this year. I hope you find them interesting. Regrettably, this year a number of excellent events were lost, and several were scaled down considerably, due to the terrible foot and mouth problems. Clearly the farmers must be uppermost in our thoughts, but a thought also might be given to rally and show organisers who, after so much work, saw their efforts dashed — often at the very last moment.

However, many excellent shows did take place and I am pleased that our Editor can spare the space for me to comment on some of the fine models seen. As ever, my greatest problem has been in deciding which models to include and which, of necessity, have to be omitted.

My first rally of the year was the Charles Burrell Museum Easter Sunday Steam-Up. This saw first time appearances for two models: Don Grey's 5in. Burrell 'Special Light Traction Engine' and Mike Plumb's 6in. scale Burrell showman's engine, which was anything but light!

Burrell's 'Special Light Traction Engine'

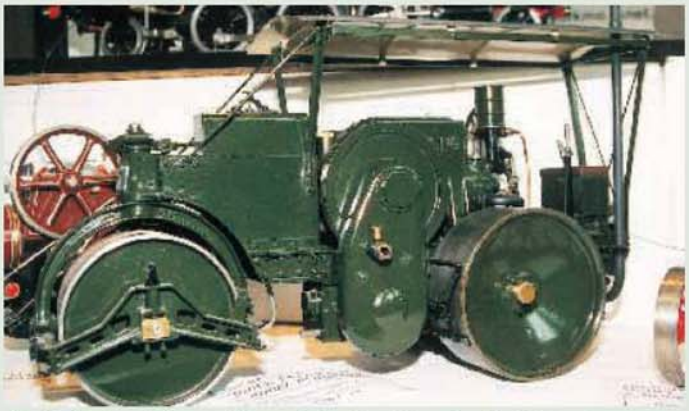
Don Grey built his fine Burrell 'Light Traction Engine' with a minimum of prototype information. All he had was a single drawing and some text in Ronald Clarke's book *The Steam Builders of Norfolk*. The drawing was just a half a side on page 54 and the text half a side on page 55 of that publication. From these scant references Don ▶

The first time out for this splendid and highly unusual model. Don pauses his 5in. scale Burrell 'Special Light Traction Engine' for a picture.

This beautifully made 6in. scale DCC Burrell showman's engine was the work of Mike Plumb.

Left: the polished brasswork was shown off to great advantage against the black and red on the 2in. scale Minnie built by Fred Clarke. For a model that has clocked up well over 100 hours steaming the paintwork is in excellent order.

Right: Dick Millard's 4in. scale 8nhp compound Burrell was one of the finest close scale engines I saw this year. The attention to detail was impressive, and the more I looked the better it got.



Jim Burlingham's beautifully made Aveling DX road roller. The prototype was circa 1936.

Tackle to accompany Don Brooke's Fowler ploughing engines built by George Stubbs (see below left). A 6-furrow anti-balance plough has yet to receive the final touches.

constructed the entire model. The full-size was quite small and rated 4nhp.

A great deal of fabrication was employed. Few castings were used, and those that were, were 'lifted' from other commercial designs. Unusually for a Burrell, trunk guides were specified and for these, commercial 3in. scale Ruston Proctor trunk guides were used, but fitted upside down.

There are two cylinders, and a vertical boiler pressed to 100psi supplies steam. Despite a small amount of superheat (the steam pipe runs through the smoke box) the model suffers a good deal of condensation, particularly when starting. This is an inevitable problem with cylinders remote from the boiler. The drive uses both gearing and chains with a motor mower differential fitted on the second shaft. The model took just two years to build.

The other first time appearance was Mike Plumb's 6in. scale Showman's Engine. This engine was built using Bartlett Engineering's castings and drawings. Since the Easter steaming Mike together with his wife, son, and grandchildren have attended many local shows as well as the larger rallies. The engine is not fitted with a feed pump but instead has two injectors, which is quite common full-size practice. Clear bulbs are positioned behind the canopy sideboards, illuminating the engine to great effect. The engine weighs a little under 3 tons and steams like the proverbial top.

Simply to play with

Among a great many other engines in steam outside the museum was a 2in. *Minnie* by Fred Clarke, doubled up from the popular 1in. scale design by L. C. Mason. Named *Alice*, it is one of two engines; the second engine is for a friend and is yet to be completed. Fred also has a 1in. scale *Minnie* still to build for someone else so he ought to know his *Minnies* by the time he has finished. The only casting on *Alice* was the cylinder. The model has steamed well over 100 hours so far.

Fred is a member of the Brandon club. He called the model *Alice* after the much loved Allis-Chalmers tractor he once owned. Fred told me he made *Alice* No. 2 in just two years and he made it *"... simply to play with!"*

The secretary for the models at the Burrell Museum rally was Dick Millard. Dick is clearly a very capable chap for, not only did he arrange for a splendid collection of models, but his own exhibit, a 4in. 8nhp Burrell Contractor's Road Locomotive, as yet incomplete and displayed inside, was about as fine a model as anybody was ever going to see. It was scaled from engine No. 2789 *The President* of 1905 vintage which lives not far from his home.

Harrogate show

This show continues from strength to strength and 2001 was no exception. In addition to a host of trade stands and exhibits in the hall there were a large number of engines in steam outside.

With such a wealth of models to see it is all too easy to miss one or two. One such exhibit was a 1936 Aveling DX road roller by Jim Burlingham of the York City & District Society of Model Engineers. I believe the model was Edgar Westbury's design of some few years ago. The workmanship was of a very high standard as may be seen from the illustration.

Another fine road steam model was on the SMEE stand. It was a 2in. scale slanting shaft ploughing engine to the design by Haining & Tyler. The prototype was built John Fowler & Co to a design by Kitson & Hewitson in 1862. The model was built by Derek Forster on an 'on and off' basis over a 30 year period. The detail was very impressive and obtained by careful study of photographs from the Fowler collection held at the Museum of Rural Life at Reading University.

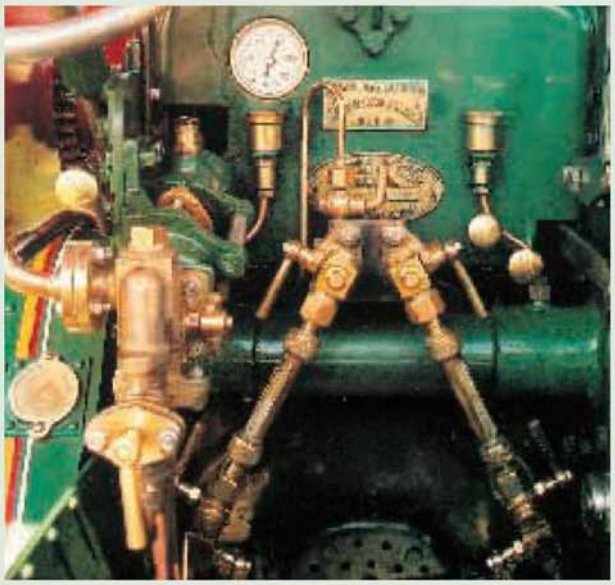
Among the larger exhibits at Harrogate were a pair of 4in. BB1 Fowler ploughing engines built by George Stubbs and now owned by Don Brooke. The models were measured directly from a full-size engine and George made all his own patterns. Weighing in at 22cwt each the pair of them took 18 years to complete. Exhibited with the engines were examples of typical ploughing engine equipment, soon to be accompanied by a six furrow antibalance plough yet to be completed.

Master Potter

The Wood Green Animal Sanctuary Rally was, for me, the first rally not to have been cancelled by the foot and mouth threat. At Wood Green I finally caught up with *Master Potter*, the very fine 6in. scale model built by Terry Young. Terry is well known in steam circles being, among other things, a past Chairman of the East Anglian Traction Engine Society.

The model took a little under four years to complete, 18 months of which were full time. It is based on the popular Garrett 4CD tractor. Fortunately quite a large number of 4CDs have survived into preservation, the prototype being in

Left: One of a pair of 4in. Fowler BB1 ploughing engines built by George Stubbs and exhibited by Don Brooke. The workmanship is of the highest order.



Right Driver's view of the 6in. scale Garrett 4CD tractor by Terry Young to be seen on the cover of this issue; note the care and attention to detail.

Model heavy haulage demonstrations are increasingly popular. Here at the Lincoln rally a Burrell, Foster and Fowler, all in 4in. scale, pull a full-sized Fowler.

production from 1910 until late 1925, during which time there were three or four different specifications and numerous specials made for individual customers.

The model is based on *Mister Potter*, the full-size 4CD restored and owned by Terry. *Mister Potter* was built using parts of two different 4CDs, each engine taken individually being considered beyond preservation. Both full-size engines ended up in children's playgrounds and Terry bought both. One donor engine was built in 1924 and ended up in a playground in Potter Street, Harlow, and the other in a playground in Sawbridgeworth. The Sawbridgeworth engine was little older, being built in 1913 and was in relatively good condition but regrettably had been converted to diesel power in the 1940s by fitting a Maclaren/Benz internal combustion engine which involved the removal and scrapping of the cylinder and all the motion.

The other engine was in a much poorer state of preservation, minus all four wheels, but did have a block and much of the motion. The two engines were thus married up and *Mister Potter* was concieved. Terry has owned *Mister Potter* for 24 years; 20 years of which it was actively rallied travelling to all under her own steam.

Master Potter was, naturally, based on *Mister Potter*. The model is turned out in 'Royal Show Finish' and looks all the better for it. Terry has now retired and has sold *Mister Potter*; the model now provides the family interest and entertainment. When asked whether Terry had any preference for owning a model or a full-size engine there was a hesitation. However, the considered view was that they were about as much fun as each other, but the model was certainly much less hassle and very much easier to transport.

In the bath

Also at Wood Green, and as yet incomplete, was a 6in. Ruston Proctor by Roy Moseley. The full-size was a 3 ton tractor, very small as full-size engines go, so in consequence the 6in. scale model is the same size as a typical 4in. scale engine. The boiler barrel is just 10in. in diameter, a size it shares with the 4in. single cylinder Foster and 4in. Garrett.

The design was one of the casualties of a recent cessation of trading of one of the suppliers of road steam castings and drawings. Several builders, Roy included, were left wondering from where the rest of the castings, including the all-important cylinder, were going to come. In consequence Roy set to and made the necessary patterns for the cylinder, trunk guide, flywheel and safety valves. Fortunately for others he has been very public spirited in supplying castings from his patterns to the other builders.

All the bright work on the Ruston was nickel plated at home in the bath. I imagine Roy has two baths, one for the family and one for the engine! The engine is expected to weigh 8 to 9cwt when finished.

Lincoln

The Lincoln rally, held in mid-August, gets better every year. The model section must be one of the biggest in the country. The models now have a time allocation all to themselves in the main ring, each model driving around the outside and ending up in one of two neat lines, each line being only a model or two short of the full length of the ring. A total of 84 models were booked in, of which 80 were in steam. This is in addition to a further 102 models, together with 24 Meccano exhibits, in the exhibition hall: truly impressive by any standards. A well-known and eye-catching model is the 4in. scale 1953 6-wheel Atkinson lorry built by Rob Selby. The lorry attends many rallies and model engineering exhibitions. Sadly I managed to miss Rob but I did have a chat with Ray Stevens who is building an 8-wheel Atkinson, an unusual model which was attracting a great deal of attention. The power unit is a 4-cylinder Reliant *Robin* engine, complete with gearbox, giving four forward speeds and one reverse. The steering and differential were also of Reliant source. The chassis was beautifully engineered. I hope to be able to see the completed lorry next year, as Ray is clearly a very fast worker (he only started the model in September 2000!) I am looking forward to seeing the two models next year.

Steam omnibus

A very fine and certainly different model, which caught my eye was a 4½in. scale Foden steam omnibus. The omnibus is to John Rex's well-proven and successful Foden lorry design. Richard Pickles and Derek Bacon built the bus in 3½ years. The duplex (twin high) cylinder arrangement was chosen in preference to the more usual compound configuration. This gives smooth and even starting, even when heavily laden.

The model was developed using pictures of the

Left: creating a good deal of interest at the Wood Green Animal Shelter's steam engine rally was Roy Mosely's as yet incomplete 6in. scale single cylinder Ruston Proctor.

Right: Roy made his own patterns for this cylinder assembly. There is a lot of metal in the cylinder, which is topped with an elegant safety valve. A robust casting supports the valve spindle. The round bracket on the barrel is for the pump.

Richard Pickles' and Derek Bacon's beautifully made steam omnibus.

Rob Selby's splendid 4in. scale 1953 Atkinson lorry was much admired.

steam bus that Fodens built themselves as transport for the Foden works band. The only noticeable departure was that the tyres are pneumatic, the prototype having been fitted with solids. Cleverly, the bus parts are all easily removable so the bus may be stripped off reverting the model to a simple flat bed lorry. In bus form the cab roof is higher than on an ordinary lorry, achieved by having two roofs, the bus one lifting off to reveal a second underneath. Richard and Derek have named their bus *Puffing Billy*.

Very much under construction, Ray Stevens' eight-wheel Atkinson lorry. The engine came from a Reliant Robin *and fits neatly between the frames.*

Another unusual steam wagon was the 4in. scale Burrell wagon built by Cyril Richardson. The model was a practical and functional undertaking and ran very well indeed. While some features were drawn from Burrell practice, a number were more the invention of the builder. Of particular note was that the engine was single cylinder — the only single cylinder steam wagon I have ever seen — but it retained the usual three speed gearing and back axle differential. The cylinder casting was a 4in. scale single cylinder Burrell supplied by John Rex for his agricultural engines. The boiler is longer in the barrel than usual and in consequence the motion covers and roof are proportionately longer.

Cyril made his own patterns for the wheels, which are in iron and in Cyril's own words *"... very substantial indeed."* The rubber tyres were vulcanised to the rims professionally and cleaned up to the correct profile by Cyril. To do this Cyril mounted the wheel in the lathe running at a relatively high speed. A piece of coarse emery cloth was secured to a profiled piece of wood in the tool post, this was then carefully advanced into the tyre. The result was a very fine finish indeed but no doubt the lathe was a nightmare to clean up afterwards!

New Zealand engines

A notable feature of the 2001 season has been the appearance of a number of engines 'on holiday' from their native New Zealand. All the engines were made by Charles Burrell and Sons in Thetford. Of the 4094 engines Burrells built, 1026 were exported, of which 192 were shipped to New Zealand. Most of the engines were exported to Burrell's agent Reid & Grey, who were based at Dunedin on the South Island.

Today some 68 Burrell engines have made it into preservation in New Zealand, which represents about 20% of all remaining Burrells. Our visitors were No. 3148 (1909), No. 3229 (1910), No. 3510 (1913), No. 3522 (1913), and No. 3529 (1913); five engines in all.

Special mention might be given to No. 3510. She is one of only two remaining single cylinder Gold Medal Tatters (both in New Zealand) to survive. The compound Gold Medal Tractor is popular with model engineers in 2in. scale, the design being marketed by M & J Engineering, castings also being available for a single cylinder version. The other four were all large 8nhp engines; two were singles, one a single crank compound and one a double crank compound.

I understand they are all returning to New Zealand over our winter period. To do this they travel as normal container cargo. To get them into containers, first the chimney, safety valves, and governors are removed. Then the back wheels, back axle gearing, winding drum and lastly the back axle itself is removed. In this way both the width and height are reduced for the engine to be fitted into a container. A forklift truck then lifts the engine under the backtank, and since the front wheels and steerage are still in place the engine is steered into the container. Quite what position the steersman has to take inside the container is left to the reader's imagination!

I hope our Editor can spare the space for one of the visiting New Zealand engines, in this case No. 3148 completed 30th September 1909.

A 4in. Burrell steam lorry by Cyril Richardson. A number of freelance features made this an unusual and interesting model.

Above: Mr A. J. Stevens' well made and nicely finished centre lathe.

Left: 4-facet drill sharpening attachment exhibited by Mr. D. Arnold.

Right: Victoria milling machine by Mr M. Leafe with swivel vice and other items. Shown grouted to the floor and ready to work, it is difficult to believe that this photo is of a model. Note the excellent proportions of the hand wheels, tools and accessories.

MACHINES AND TOOLING AT CASTLE DONINGTON

Neil Read

gives a brief account of the machine tools and workshop equipment on display at the recent Midlands Model Engineering Exhibition.

As a keen enthusiast for machine tools and the type of workshop equipment of interest to the amateur, it is always a pleasure to visit exhibitions and admire the work of this type produced by others. This can also be a somewhat frustrating experience, as often the standards achieved by the various exhibitors so exceeds one's own that you are left with a vague sense of inadequacy. How can anyone achieve such fine workmanship using tools which are probably not dissimilar to the ones many of us own? All the exhibitors deserve our congratulations and thanks, but space restrictions prevent us dealing with more than the highlights.

This year, there were several significant entries in both the competition class and display only category. Prominent among the latter was a one-man show by Barry Jordan whose work needs no introduction from me. Barry was on hand for much of the exhibition to talk about his beautiful models to a steady stream of visitors. The high spot for me was the opportunity to see his 1/5th scale Dean Smith and Grace heavy duty gap bed lathe again. Somewhat nostalgic too, as I was once responsible for the purchase and installation of a similar machine into my, at that time, employer's works. I still remember the visits to the DSG factory to test the new machine prior to accepting delivery. Barry also had a part-finished model of a Jones and Shipman 1400L surface grinder entered in the competition class. A note attached to the machine warned visitors of wet paint — a reference, no doubt, to last year's show at Donington when Barry's DSG lathe was so new that one of the Judges came away with paint on his hands!

In the competition class, the first prize was awarded to a superb model of a Victoria milling machine by Mr. Malcolm Leafe. Everything about this model looked 'right'. The builder (alas, his name did not appear in the show guide) had achieved true scale appearance in important details like the hand wheels and the electrical cables. The machine was grouted to the 'concrete' floor and was displayed with some typical tools like a hide hammer and a swivel vice. The paintwork was just right and it is difficult to tell from a photograph whether the machine is full size or not. Truly an outstanding exhibit!

The 3½in. centre height, screw-cutting lathe entered by Mr. Alfred Stevens appeared to be well built and finished. Much care had obviously been expended on fitting the various mating surfaces and scraper marks were visible on the bed, cross-slide and top-slide components. Only one minor point of concern occurred to me and that was that Mr. Stevens had chosen to mount the top-slide to the cross-slide using the method adopted by Myfords on their old ML7 lathe. This is a very simple and robust method but it does prevent the top-slide swivelling through 360deg., an arrangement that greatly facilitates screw cutting and other turning tasks. Nevertheless the machine has many practical features and should serve Mr. Stevens well for many years to come.

A wheel-cutting engine displayed by Mr. Derek Collier was a substantial and well turned out machine of interest to actual and potential horologists. The machine followed the usual practice for this class of instrument and had a wide range of adjustment. Judging by the size and robust build of this exhibit, Mr. Collier has some large clock projects planned! Next to this exhibit on the display table was a four-facet drill sharpening attachment by Mr. D. Arnold. The four-facet method for sharpening twist drills was first described in *Model Engineer* by the late Professor D. Chaddock (*M.E.* 3494, 2 August 1974, p738) although the technique had been known in industry for some years previously. This was in the course of his description of building the Quorn tool & cutter grinder. It is not clear on which machine Mr. Arnold plans to use his attachment but the unit was well made and finished and obviously designed for hard work. Mr. Arnold has avoided the use of special collets to hold the drills, as suggested by Professor Chaddock, by the simple expedient of using a Jacobs chuck.

Left: the Author's locomotive in an advanced stage of construction.

Above: A close view of the brake adjuster in situ.

GENERAL STEAM NAVIGATION

Peter Lewis

finishes most of the work on his locomotive and looks forward to an easier time with the tender.

●*Part IV continued from page 379 (M.E. 4157, 2001)*

There was a stage when I looked at the great pile of bits and pieces I had made for the brake gear, noting what was there and thinking that I had finished, only to realise on second thoughts that I was just half way through! I shudder to think of the total. I had made the brake cylinders previously, so I could mount them on the frames where space was getting short. These were not made from square material because it was not available to me, but I used a piece of round gunmetal carefully mounted on a flat plate. They certainly seem to work all right.

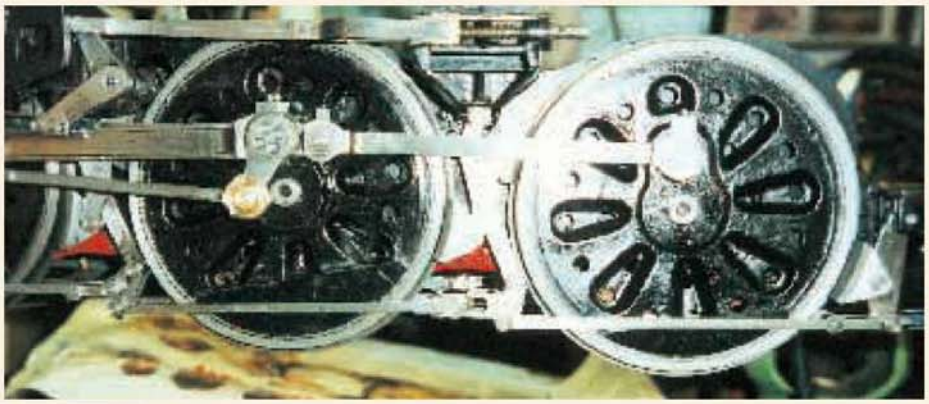
The rest of the brake gear was just a case of hacking it all out. Suitably milled down to produce the rounded ends, I used 1/8in. thick mild steel for the pull rods. They are all straight and not bent as shown. Study of the full size locomotive showed one or two rods near the adjusters with their ends bent in but to be honest, the prospect of bending 1/8in. flat in just the right place is a dodgy business and might spoil it all. Having decided to use straight rods, I had to make up loads of distance pieces to fit between the rods and compensation beams.

As mentioned before, Keith based his design for the reverse screw bracket on the West Country version instead of the Merchant Navy type. With the latter the second upper lever is not required and all levers are the same shape and end up in the same relative positions. After assembly I found that the cross beam and rod had the three holes in the wrong place. These are only for rough adjustment, which is finally made by adjusters behind the driving wheels. For some reason friend Keith has not shown any at all, so I set about and made a set as per full size, later making another slightly beefed up set. They work just as they should. I also found that only two tie bars as shown are required, not three. To slightly different measurements, the third tie bar goes in through the top hole of the compensation beam No. 63, all as per full-size.

I was nervous about using cast iron or mild steel brake blocks on cast iron wheels. It just didn't seem right although I am assured that this is correct to full size practice. A friend at the local garage gave me a set of small Lockheed brake shoes which I cut up and fixed to the steel blocks that were initially made slightly smaller to allow for the shoes. The shoes were secured with Araldite plus two 8BA countersunk screws. If this stuff works okay on cars, surely it must be all right here! Keith's drawing shows the brake gear with all the shoes hard up on the wheels but I found the rear brake hanger was too close to the wheel. It turned out to be quite a fiddle to get this right. At the time of writing these notes, I have recently fitted the lovely little steam brake lever, piped it all up and now look forward to testing it all.

Sanding gear

Something else that is conspicuous by its absence is the sanding gear. Keith shows no sanding boxes at all which surprises me as they stick out like a sore thumb. The ones 'amidships' are made from

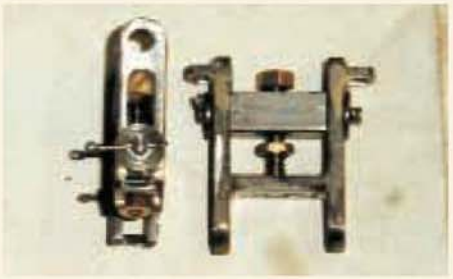


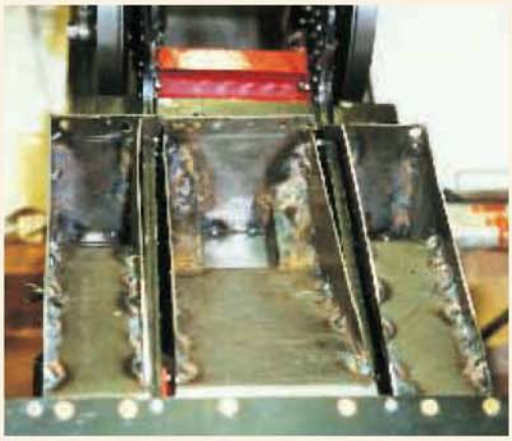
Above: A side view showing the brake gear.

Left: A mass of components is required for the brake gear!

Below: Brake cylinders, assembled (top) and in bits (bottom).

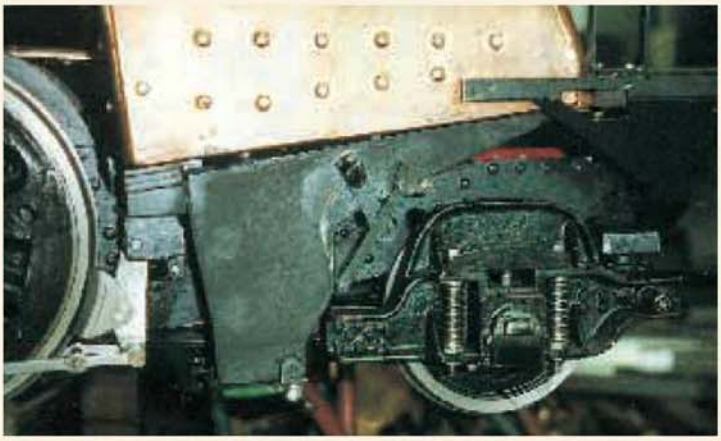
Below right: Brake adjusters.

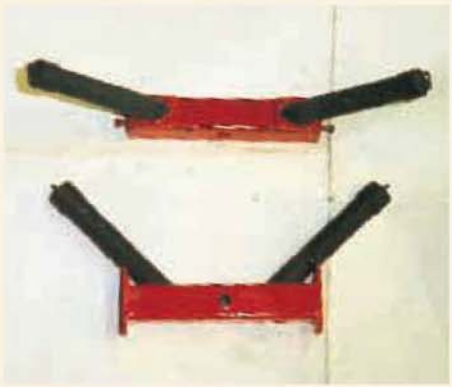




Left: the ashpans were described in a previous instalment (M.E. 4157).

Right: completed ashpans in place, plus detail of the rear brake gear.





The sandboxes are fabricated from square box section material.

The two front sandboxes are of rather more intricate form.

Also mentioned earlier in this series is the reverser gearbox.

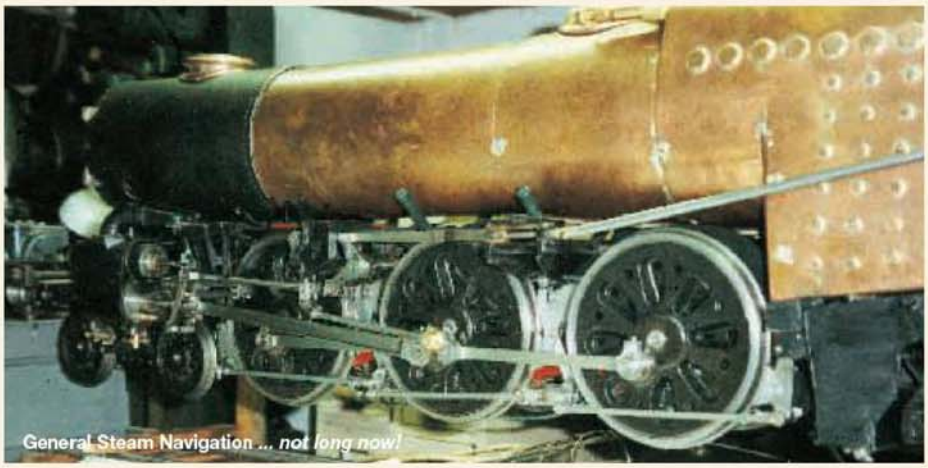
tube with a 1/2in. O/D cap on the top furnished with a suitable little handle. I have piped up the boxes which fit into a piece of 1/2in. square tube fitted between the frames, but haven't made the sanding valves which LBSC describes in his *Live Steam* book. These will be kept for a later date, as I have enough headaches for the time being!

The front sand boxes are fabricated and attached to the smokebox. Ken Whittle told me I had made them the wrong shape, but upon producing umpteen photographs I beat him at his own game; you can't win them all Ken!

At the time of writing, this just about brings me up to date. I am currently attempting to fit all the pipes for the drain cocks. These include the steam pipes from the cab to hold the valves shut and *vice versa* to open when the steam is off. I have taken a pipe from the end of the manifold and led this into a whistle turret which I have had spare for a number of years. This turret has other outlets so I am using one via a valve for the steam supply. Which brings me to the whistle. Having never been a lover of pieces of string hanging from the ceiling ('deckhead' — nautical) I have decided to use a little spring loaded lever, and in any case I need to lift the cab roof off for driving. I shall see how it goes.

This brings back memories of my early time at sea when we also had a rope on the deckhead of the wheelhouse straight through the after bulkhead attached to the whistle on the funnel. (For those who cannot see the logic of the word deckhead, the floor is the deck and the ceiling is the deckhead and 'doing a deckhead survey' is having a snooze!)

Many a time I have seen shipmates hanging on the lanyard so hard that it has parted. Also, of course, nothing happens for a while anyway. First out is a ton of cold water, followed by some hot water, then if you are lucky, steam and a noise. On the Golden Arrow service at Dover (ship — *Invicta*) the drill was to blow the whistle five minutes before sailing. With so many passengers on deck, I have seen them showered with water from the whistle, and this happened every day. The reason for blowing the whistle was to warn all those not sailing with the vessel to get ashore. This included all those hangers-on (myself on occasions) who were in the first class bar knocking back cheap duty free drinks.



General Steam Navigation ... not long now!

I digress; but it still highlights the problems I anticipate with my loco whistle, which is about 8in. long. I hope to hide it under the tender but since it will fill with water here, the best place is as full size, sitting on the boiler top when any water will evaporate. At least I won't have to ring 'down below' to ask for the steam to be put on so I can blow it.

I have done more work this summer (1996) on *General Steam Navigation* than for a long while. Maybe this winter I might make a start on the tender. I am grateful to all who have given me help and advice, especially all those 'down under'. Also thanks to Peter Walker and Diane Carney for the name plates which are a superb job. Thank Heavens several of these engines are preserved so details can be checked. However, if only it were possible for our designers to emulate some modern aircraft and car builders by checking, checking and checking again their drawings and the design against actual manufacture on the shop floor (otherwise Keith, you're not such a bad bloke and come out of all this fairly well after all!)

Perhaps I should report a serious discrepancy concerning the cab width. On sheets 15 and 16 the width over the floors (cab supports) is shown as 9 1/4in. or 9 3/8in. outside the cab. I have a scaled down drawing that shows the overall width over the platform plates as 9 1/2 inch. I had a difficult job with this since, having made the cab, I found that the platform plates would have to be bent in at the rear ends to mate with it. In the end I sprung the lower edges of the cab outwards, fitting a distance piece each side behind to get over the problem and as a result lost the 'tumble home' of the sides. I actually ended up with an overall width of 9 5/8 inches. The tender drawings show the width as 9 1/2 inch.

And so to the tender ...

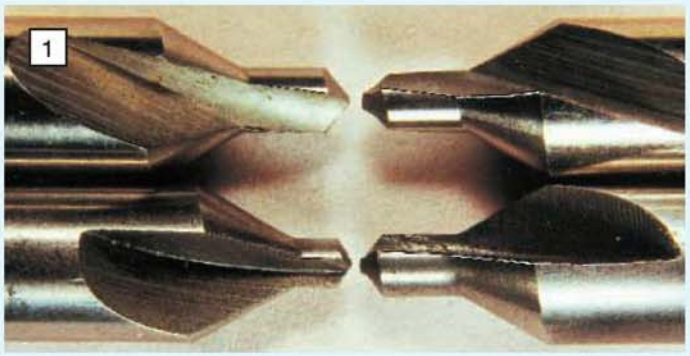
●*To be continued.*

PETE'S PAGE

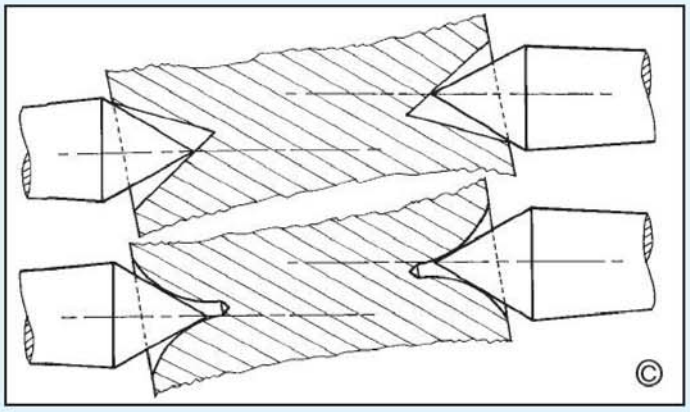
CENTRE DRILLS

Peter Spenlove-Spenlove discusses centres, countersinks and the drills used to produce them before considering some of the problems associated with turning between centres.

●*Part I*



Top left: the 'spiral' cut centre drill (top) is now more common than the the lower straight cut type which is more suitable for working in brass and other metals which would 'snatch' on the spiral type. Centre drills are usually double ended.



Top right: a single lip countersink cutter cuts cleanly and seldom snatches the work.

Left: an exaggerated sketch showing how work drilled with radiused centres runs on normal 60deg. lathe centres.

Most of us have probably used a centre drill to cut the hole in the end of a bar when this bar is to be supported by the lathe tailstock centre. Also, most of us have probably used a centre drill to start a hole before using a normal drill. There are two types as shown in **photo 1**, although few suppliers ask *"Which type do you want?"* In fact, my guess is that some don't even realise that two types exist. Because, apart from size, no one can tell me the official designation, I now refer to them as either 'straight' cut or 'spiral' cut, these terms being derived from straight or spiral flute twist drills.

Both types in the photo are made by traditional famous name drill makers. In recent years, the spiral type, in all sizes, predominates. It cuts more freely but is less easy to re-grind, the cone edges being undercut. In industry, a worn centre drill is discarded, but model engineers can't easily pop along to stores for a new one. Only when the tip has got too short, is a centre drill no good for making proper centre holes. But it is still a useful cutter for cutting a small chamfer on the ends of the holes, and for de-burring untidy holes in sheet metal.

Work carefully!

Since the spiral type has an undercut cone edge, care should be exercised when using it as a countersink. It can easily 'grab' the material and cut too much away, especially in brass and free-cutting aluminium alloys. It can also take hold of sheet metal. For this type of work, the straight cut centre drill is safer, especially if a hand-held power drill is to be used.

If a spiral type centre drill is to be used in the model engineer's lathe or drill press, I would strongly advise nipping up the tailstock sleeve or quill locking screw so that the feed wheel or handle is working against some friction. Without this friction, backlash in the feed will allow the tool to 'grab' or 'snatch', making the countersink too big and perhaps ragged. It is also important to clamp the work safely on the drill press table.

Having suggested the use of a centre drill as a countersink, I should admit that the 60deg. included angle is not suitable for most countersunk screws which often have 90deg. heads. My preference is for a tool like the one shown in **photo 2**; a type to be recommended because it cuts an even, chatter-free countersunk hole which is reasonably free from burrs and wavy edges. The proper thing to do is to choose a size to suit each of the screwheads for which you require countersunk holes, but few model engineers are likely to run to this, so select a size to suit the largest screw heads you expect to use.

Also choose the countersink to suit the taper angle of the screw head. While most are 90deg. some (U)NC and (U)NF screws are angled at 82 degrees. Other special types are also available; countersinking cutters can be obtained to suit them all, but when setting up a new workshop, I think it best to buy the most common 90deg. single lip cutter which suits most UK imperial and metric screws. Just keep the speed down and make sure that the job is securely clamped!

Turning between centres

Centre drills cut a hole with a 60deg. cone angle designed to match the 60deg. standard angle centres supplied with your lathe. This is a universal standard for general machine shop work. Steam railway enthusiasts may have noticed full-size locomotive axles with far more obtuse angled holes of, I suspect, 90 degrees. Wheel lathes will be equipped with matching centres which are far sturdier to carry the weight and turning load.

The drill tip on our 60deg. centres fulfils two functions, it provides clearance for the pointed tip of the lathe centre and an oil reservoir to lubricate the centre.

You may have noticed advertisements in this very magazine for curved point centre drills. They have a useful function for those of us who use a lathe on which the tailstock can be set over for turning tapered work between normal 60deg. centres. My drawing shows how a radiused centre drill provides a centre hole which is better suited for taper turning between centres.

Work can also be mounted on a mandrel for turning between centres. Mandrels are hardened steel cylindrical bars sold in standard diameters, centre drilled at each end and accurately ground, after hardening, to the specified diameter but slightly tapered. One end is a few thou. larger than the nominal size and the other is slightly smaller. The part-finished workpiece is bored to suit and is pushed onto the mandrel which, being hard and well finished, does not damage the bore. Mandrel presses are available for mounting and demounting the workpiece onto or from the mandrel. Elastic deformation ensures that the work is secure and can be finished as appropriate.

Turners (and model engineers) often make their own mandrels to suit non-standard work bores. For one-off work and amateur engineering it is not really necessary to harden our home made mandrels.

Intended for industrial use, most modern mandrels have 60deg. centre holes because the machine on which they are used incorporate other ways to turn a taper without setting over the tailstock. In the old days, mandrels with radiused cone centres were available, but I haven't seen any for fifty years or more.

If, in our own workshops, we use a hardened mandrel, I suggest a hardened centre is fitted in the headstock and a good quality revolving centre is fitted in the tailstock which should not be done up too tightly into the work/mandrel. Although not strictly necessary, a drop of lubricating oil can be applied to both centres each time you stop the lathe. A dead centre should *always* be lubricated though, preferably with grease.

Heavy or fast cutting generates excessive heat. The mandrel will expand, so adjust the tailstock handwheel to relieve the pressure. Later, during finishing cuts, the work will cool and shrink, the mandrel will become loose and rattle and your carefully set up finishing cut will be ruined, so keep an eye on the tailstock handwheel! The industrial user avoids this problem by using a *flood of water-based* cutting fluid which maintains a reasonably constant workpiece temperature.

●*To be continued.*

KEITH'S COLUMN

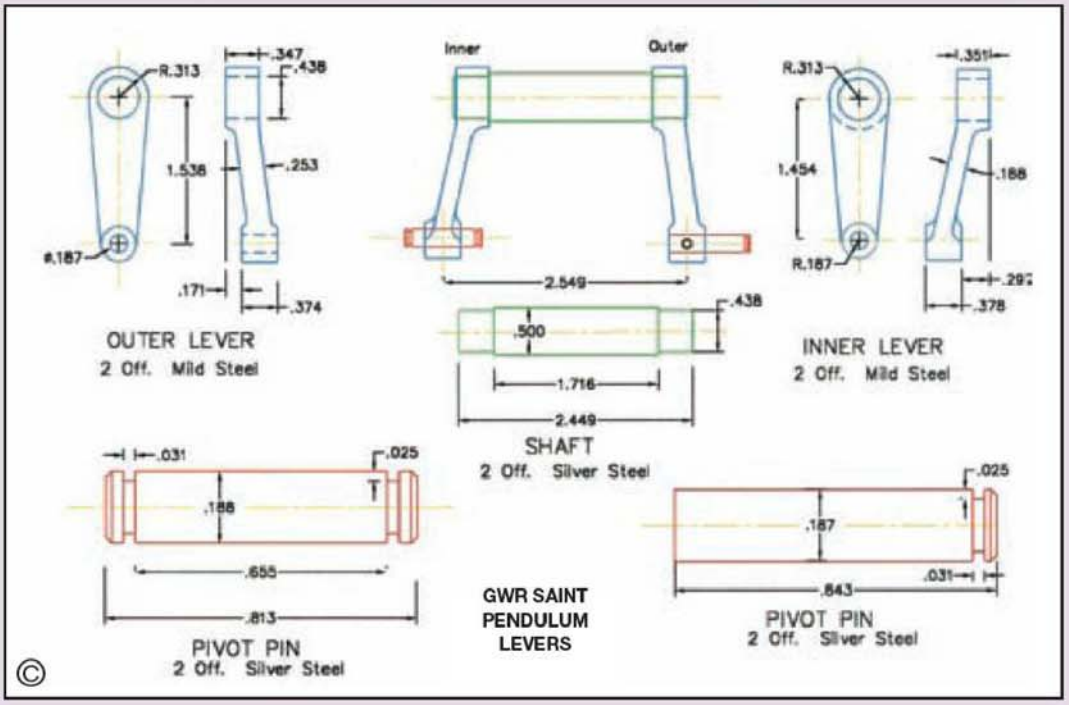
SAINT CHRISTOPHER

A GWR LOCOMOTIVE for 7 1/4in. gauge

Keith Wilson

describes more valve gear parts and starts work on the reverser with the left hand square thread screw.

●*Part XXI continued from page 394 (M.E. 4157, 31 November 2001)*



Having dealt with the most tricky parts, the expansion links and some other bits, a few words now on the remaining parts. The Pendulum Levers have to take a lot of loading, they are about the weakest part of the system, due to the difficulty of making them strong enough, 'bejabours'! Ideally they should be forgings, turned between centres, but it's quite an effort to do this satisfactorily due to the overhang of the levers themselves. Therefore, the best way for us is probably the built-up method, we can get better bearings this way. If the two levers are be bonded onto the shaft and a 3/16in. taper pin put through each joint, this should prove sufficient.

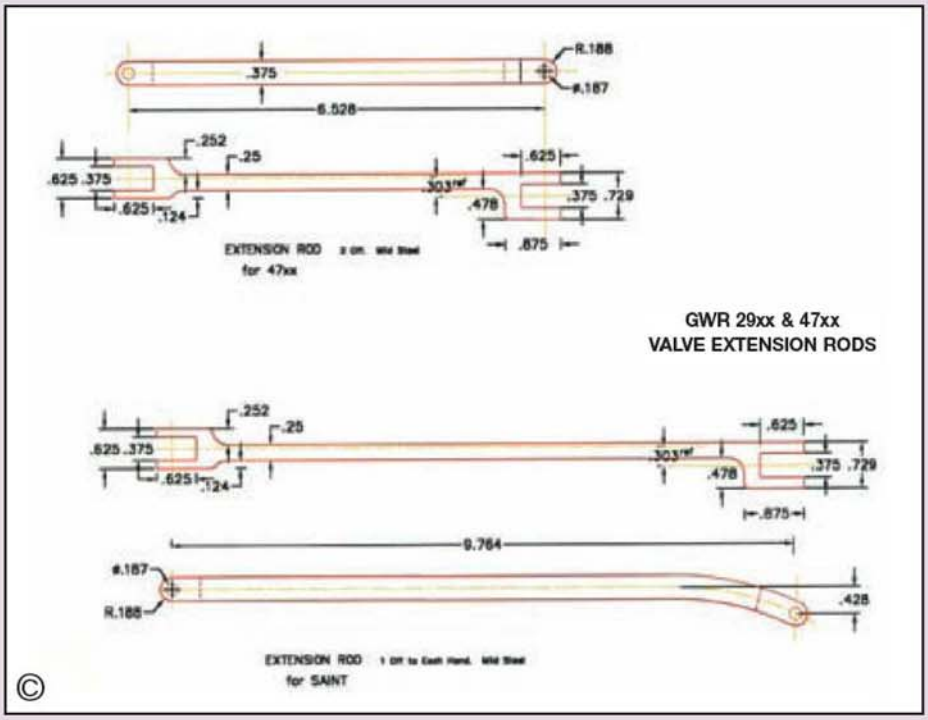
The trouble is that all the torque through this lever assembly is concentrated on a small diameter, therefore the stress is very high if for any reason the valve should jam in its liner (not a rare occurrence in early days of running) then this is the joint that pops off, more especially as it is not too easy to get at without lifting the boiler.

An alternative to bonding and pinning is to silver-braze the joints, but be careful not to quench the joints as silver-steel can go very brittle. If the joint cools naturally before reaching any pickle bath, then it should remain reasonably un-brittle.

Note that one of the two drive pins (the outside one) is pinned into its pendulum lever; the inner one fits through a fork in the extension rod so is circlipped at each end.

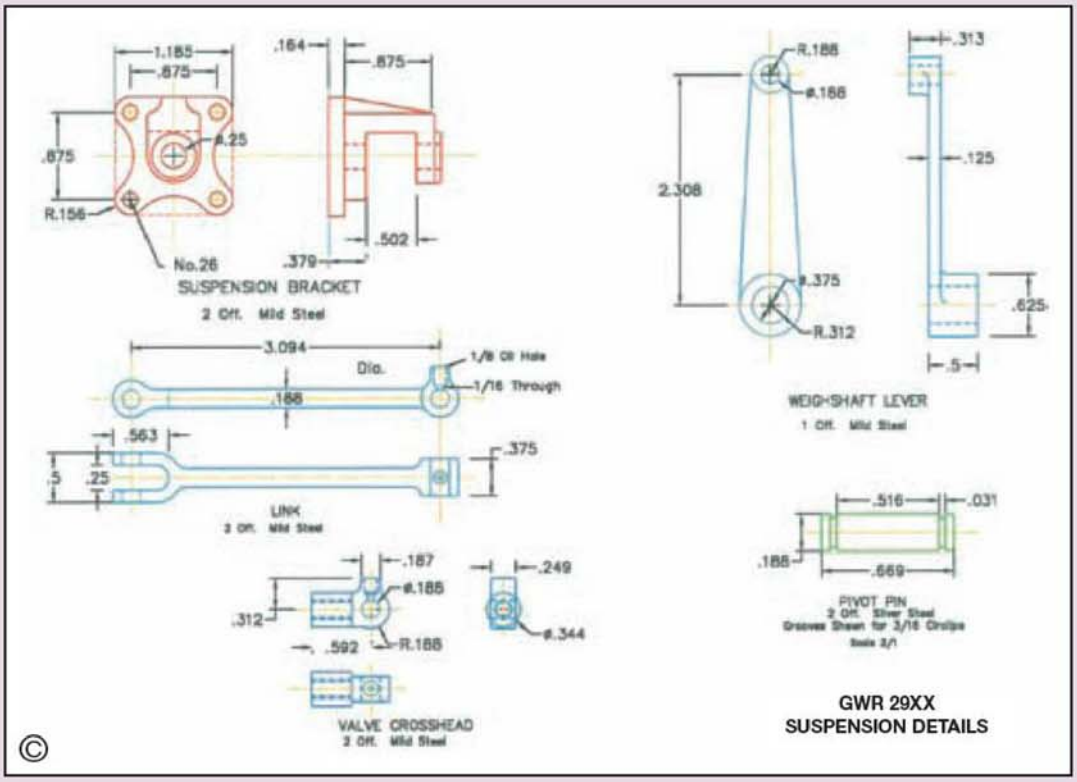
Note the use of plain silver-steel for these circlipped pins. The smallest parting-off tool (5/16 x 1/16in.) with its business end ground down to 1/32in. will do very well for these grooves, and will also part them off. Keep a small square file handy as burr-removal is most important. Silver-steel of 3/16in. diameter is a very good fit in a 3/16in. reamed hole, but you'll soon find out about de-burring.

This small parting-off tool suits a Myford, or any other 3 1/2in. lathe, down to the ground (or centre-line), especially when doing small brass fittings. Such a one is a semi-permanent fixture on my own Myford. Those who look upon cutting these grooves as a tricky operation should take courage from the fact that silver-steel is a higher quality material than ordinary mild steel, it is easier to deal with, and so cutting such tiny grooves is the proverbial 'piece of cake'. Make each groove about 0.020-0.025in. deep. It is best that the clips grip firmly, if needful apply a bit of squeeze with a pair of pliers.



Valve extension rods

There are two main ways of milling out these items, but the longer is probably the shorter in the long run. It uses slightly larger chunks of steel, but the other way involves quite a bit of bending in two planes after machining. Flame-profiled blanks are the easiest way. ▶

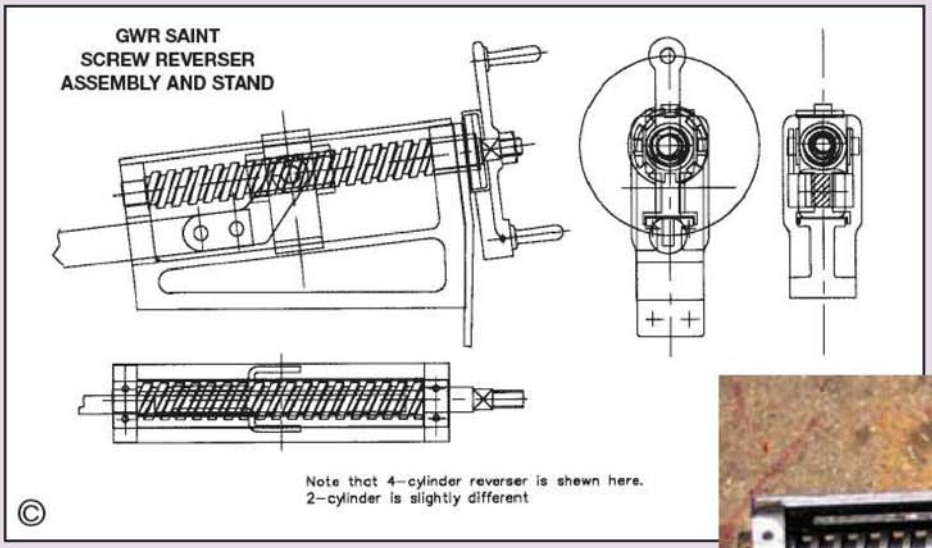


Now, the drawings shew that the originals were fluted, but I certainly wouldn't bother — they are not easy to see tucked away 'twixt the frames, and certes, there is no excess weight problem.

One the best places to take a drive for a mechanical lubricator is from the bottom of the left-hand inside pendulum lever, conveniently done by making the pin in that position a bit longer so that a third rod/lever/link receives a regular reciprocating motion. The fact that this motion isn't always constant in amplitude doesn't matter, for with the non-return clutch on a correct diameter shaft driving the actual lubricator, this reduction of amplitude is to our advantage.

Now, a thing to be noted is that the expansion link is not suspended from both sides, yet is strongly braced across the centre (mid-gear) position by the suspension bracket. The bearings for the lifting links are generous (just about 'scale') so there isn't much chance of sideways movement, this applies likewise to the die block suspension system. All is amply strong, thus settings are likely to remain set for lots of miles.

Although 'both sides' suspension has its advantages, note that in such cases rigidity of die-block suspension suffers; contrariwise, cross-link bracing is ruled out. 'Both sides' can be used with locomotive links (links where one of the eccentric rod pins also takes the lifting links), but it is the old story of compromise. In the Swindon arrangements for inside-cylinder locomotives, die block suspension is quite rigid, for the valve extension rods are mounted in a big bracket through which they slide. Also, the expansion link lifting links are to the top of the expansion link with the weighshaft underneath the system, thus the locus of the expansion link top is nearer a straight line, a good thing for reducing die-slip, but the lower end (principally used for reverse running) is not so good.



Talking of compromise, arguably one of the finest locomotive designs was almost accidental! When enlargement of the brilliant 'Star' class was in the planning situation, the boiler proposed for it (No. 7, designed for the 47xx class), made the locomotive overweight, the limit at that time was 20 tons per axle, so a smaller design was produced to bring the weight down. The result was the ubiquitous 'Castle' and whether ye be Swindonised or otherwise inclined (Poet or Peasant?) there cannot be much argument of its general success.

Suspension blocks

I rather like doing jobs like this; I always feel that it's something you can get your teeth into — I can't think of a better phrase. Begin with a chunk of mild steel $1\frac{1}{4}$in. square by $2\frac{1}{2}$in. long. If the two blocks be chewed out side-by-side then 'tis naught but swarf-making. Note the similarity to the brake suspension brackets, so clearly the same methods are applicable. The scallops along each side are ornamental for us, I only shew them for the benefit of the super-meticulous.

There are a few levers/links that are confoundedly small and therefore difficult to hold in a vice, especially for milling. This difficulty recedes rapidly if made in pairs, parting off is just about the last operation. This applies to all the lifting links as well.

There are some differences between 29 and 47 valve gear parts, but I have tried to make the differences clear. The most obvious ones are pendulum levers, brackets for same, and 'the pole' is actually a pole for the 47.

Ye screwy pole

I well remember, with some sadness, going to see a certain GWR model (I will not give size or type for fortunately there is only one of them) of which I had great hopes. It was built by a fairly famous builder, which didn't help. Alas for an otherwise fine locomotive, it was spoilt by several *very* silly mistakes. Very great care was taken, for

Screw reverser with side covers removed; the technique for screw cutting the left-hand 8tpi single start thread is described in the accompanying text.

example, to get the reversing screw correct, in fact it was a very fine job indeed (outside) but alack and alas! With all the trouble taken to get the outside well-nigh purrfect, the handles (including the lock) accurate, why the (censored) did he use a right-hand thread in the screw, with the result that the gear had to be turned backwards to go forwards, begorrah!

Now I do not claim any superiority in design over anyone, except perhaps I am less reluctant to put my neck in the noose when I drop one, but that was a mistake that I certainly could not make, for the main reason (if no other) that it could lead to danger when operating the locomotive concerned. Although one of my Castles ended up for some time in a museum in Brussels, I make them to run. How this Castle got into said museum I don't know, but as far as I can tell someone recently (1999) got it out again, and it has been doing its proper job.

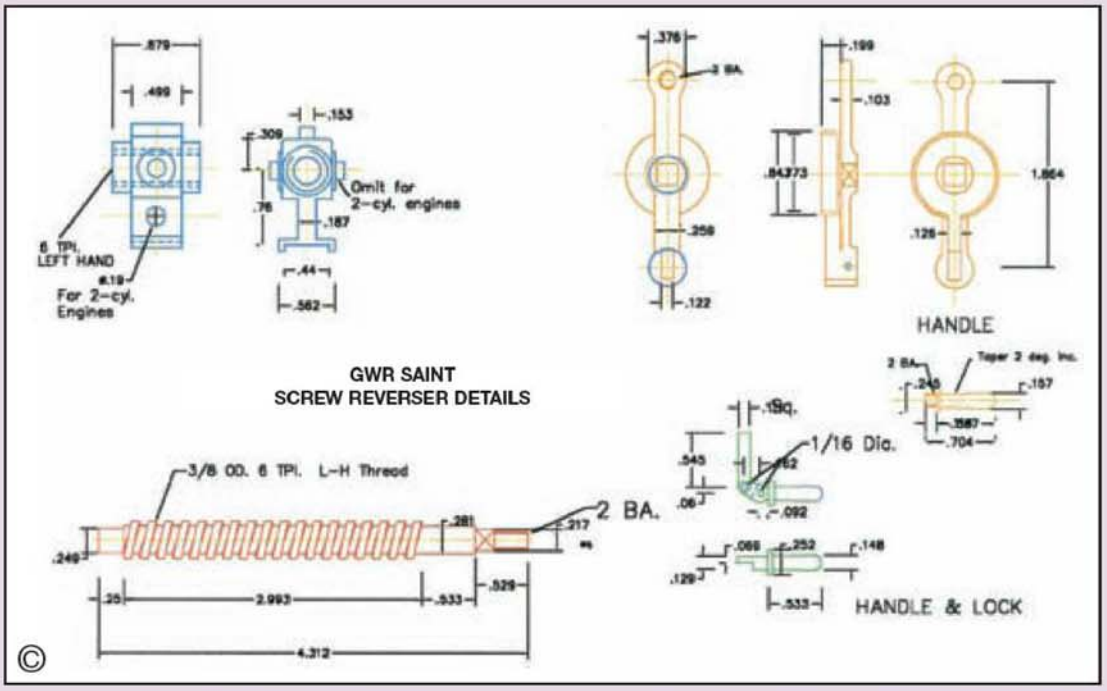
Now if at first the mere thought of churning out a left-hand thread may beseem daunting, once you are set up they can be made in about 3½ minutes each.

To get a good screw

Begin by grinding down a tool to a width of 0.083in. — a simple task. This tool needs to be only about 1/16in. deep. Leave plenty of rake on the right-hand side. But (see below) this tool width applies to 6tpi, if you choose a different pitch then tool width should be about half the pitch. For example, 8tpi would be 0.063 inch. It is not critical as long as it is under rather than over.

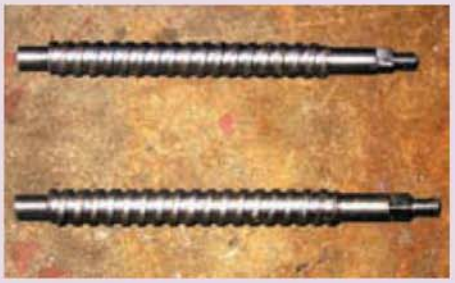
Put a bar of 3/8in. diameter mild steel in the chuck with about 1/2in. protruding, turn the end down to 0.25in. dia. for 5/16in., centre-drill this end. Move the bar out to about 4in. proud of chuck, support with tailstock centre, and turn down about 1/2in. of the bar just outside the chuck jaws to 0.281 leaving a full-size diameter section 3in. long.

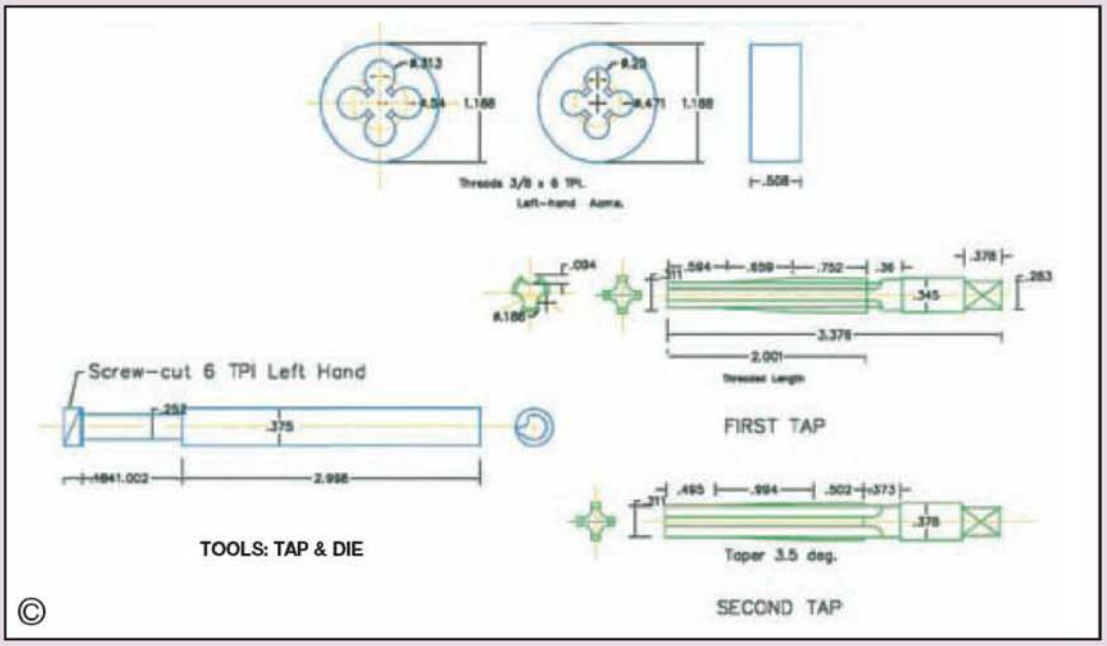
Now select your pitch of thread; it makes life a bit easier if you choose the same pitch as your leadscrew. Run the lathe fairly slowly in the usual direction (forwards) but see that the leadscrew is running backwards, i.e. carrying the saddle towards the tailstock; those whose lathes are fitted with gearboxes and/or tumbler reverse systems can laugh loud and long here.



Left: screw reverser with side covers in place behind which the single start thread remains incognito.

Right: left hand square thread screws cut as described.





Put the saddle close to the chuck, wind the tool in so that it just grazes the job, shift the saddle a bit to the left so that the tool lies in the reduced part, feed in 0.005in. for the first cut and engage the traverse lever. You will be rewarded by a nice but very shallow thread. Subsequent cuts are safest made at 0.005in. increments, up to a depth of 0.045 inch. Then run the lathe a bit faster, and run a smooth file along the threads to just lightly round them off. I find a 9in. triangular file is ideal; they are sold as saw-files and are double-ended. I keep a couple handy in various parts of the workhouse, usually one on the nearest lathe and one on the mill.

I am of course aware that the full-size reversing screw was 4-start, coarse pitch, but just what pitch I know not. Those who wish to go so far are welcome, but I think that such a coarse thread would present great difficulties with normal lathe methods. The actual screw is hidden under the side-covers anyway. The late Bill Carter I believe did a 'dead-scale' thread for his 5in. *Earl*, but there cannot be many in his league — certainly not me!

● *To be continued.*

SWINDON REMEMBERED

"Where's your trolley, Fred?"

David Hawkins
presents the first of his personal reminiscences of time spent at Swindon Works.
●*Part I*

Specialist and Consultant in the restoration of seventeenth, eighteenth and nineteenth century furniture, and its engineering. That was my business; it was a bit of a combination, and what follows may explain how it came about.

It all started nearly 65 years ago with my being apprenticed to the cabinet trade. After a couple of years, plus a bit, the company I was working with went bust, and that was that. Later, and I know not how, my father produced a letter with accompanying railway voucher from the Great Western Railway at Swindon instructing me to report to an office there for an interview. Some of the carriage interiors featured superb cabinet work, and on the best this was often embellished with inlay and marquetry work. The Cornish Riviera Express was a good example of the style, so it seemed to me to be an obvious way (hopefully) to carry on learning my trade. I had my interview, and I was pleased to be accepted.

I don't know if it's possible for a 16 year old lad to faint, have a touch of the vapours or what, but I surely felt something like it when I was told that I was going to work 'through the tunnel' and be involved with the mechanical engineering side of it all! In those days the exclamation *"You cannot be serious!"* was not appropriate.

So began, unknown to me at the time, the engineering side of my life. During nearly five decades while I ran my business, this background has been a huge advantage. When, for example, a complicated lock from a piece of eighteenth century French furniture was missing, the only option was to make a replacement. My ability to do so allowed me to undertake the restoration of mechanical artefacts, a fascinating side to my work which, I have to admit, was often far more interesting and challenging than restoring a two or three hundred year old piece of furniture; at least metal doesn't become infested with woodworm — not that I've ever encountered, anyway!

My Swindon experience really came into its own when I restored an early twentieth century Bassett-Lowke 0-4-4 locomotive in 7¼in. gauge for the late President of the 7¼ in. gauge Society. On the strength of that, I built him a GWR 1366 tank in 7¼in. gauge. On finishing the model, which then had yet to be painted (like Henry Ford, I never paint anything unless it is black — a bit of Swindon here for later on), and having no source of compressed air at the time with which to try it, I took it to him. I shall never forget the experience of first seeing it run when he connected it to his spray plant air line.

Before I realised what was happening, he had taken the loco to the front of his engine shed, set it onto the rails and, to my complete horror, he filled it and lit a fire. I still have the photos to this day, and I'm pleased to say that it ran very well indeed — Swindon must have taught me well!

The Tunnel

There are certain things from Swindon which I shall never forget, one of which remains really vivid, although it was nothing to do with the works, or the engines, or the vast complex that was Swindon Works. No, it was the 100 yard tunnel through which we walked to get into the works.

The day began at 7.30am and I joined the queue with one of the other lads who started at the same time as me, the GWR having found digs for us. There seemed to be thousands of men and indeed there probably were; the tunnel had a low roof which, coupled with the mass of humanity, I found extremely claustrophobic. Smoking was strictly forbidden and this body of near silent men and a few women moved relentlessly toward the far end of this tunnel for another day's work. I never did really get used to it and I very much doubt that the situation would be allowed today.

A visit

For the first time since those days, last year I visited Swindon and walked through that tunnel again. What a transformation, now with striplights, turnstiles and no claustrophobic atmosphere. At the end of the tunnel I turned left and up the steps. On doing so for the first time all those years ago, I was confronted by all-pervading soot and coal black walls everywhere.

The building to which I first reported was still there, pressure washed now and looking like some modern reproduction of a nineteenth century building. I was so depressed by the rest; there seemed to be nothing which I remembered so well. All that remained of the Maintenance Shed where I had first worked, 'B' Shed I think it was called, was a vast open space. The rails on which the transporters ran to move the locomotives from the main track to be rolled over the pits where we worked on them, were still there but they would mean very little to visitors unless they had seen it as the hive of industry that it had once been.

Of the huge brick building, all nine acres of the Erecting or 'A' Shop, there wasn't a sign. The final insult (to me) was that in the middle of that huge open space was a gaudily painted 0-4-0 Pug engine. Why couldn't it have been one of the magnificent leviathans which had filled the place some sixty odd years ago?

Supermarket

After 62 years, I'm afraid I just couldn't bring myself to bother. We went over to a building that was now a sort of shopping centre. I think it had once housed some of the huge and, I imagine, custom built machines. Here too had been the Automatic Capstan Shop where hexagon brass, up to 2in. across flats, was turned into a brass unions in seconds. This shop fascinated me, and the smell of the warm cutting oil remains with me to this day. Produced here were unions of all sizes, nuts and bolts, boiler stays and the like; it was incredible what seemed to be possible. If my memory is correct, all the machines were of German origin without a computer or CNC machine in sight — unless you call the setters, two men who looked after the whole enterprise, computers! The only other men in there were the labourers, as they were called, who fed materials into the hungry machines and shovelled out the swarf which was returned to the foundry to be recycled.

If my geography is correct, we had lunch in a place that had once been the Parting Shop. In here had been machines set up for just one type of operation — to take hexagon steel bar and part it off for the nuts of all types and sizes needed to assemble a steam engine. Some of the nuts were huge, believe me, and it was here that I had been introduced to the use of machine tools and, perhaps more importantly, the safe way of using them. There were no push buttons here, the machines were driven from overhead shafting and wooden levers were used to move the drive belt from a fast (driving) to a loose (freewheeling) pulley to stop the machine. I have recollections of the chargehand there showing me how to repair the leather belt when the strip joining the metal links in the belt gave way. I think it was a piece of gutta percha and this horrid job didn't do your fingers many favours!

I had been at Swindon for a couple of months and was working in the Maintenance Shed when I was told to go to the Stores for a buffer spanner. *"Right ho"* I said and, as I set off, Bill Bunce my charge hand yelled *"Take a trolley, Fred!"* Small trolleys, like those used by the old time porters, were all over the place and, as I had already discovered that our mates liked to play all sorts of tricks on us, I thought the suggestion silly and chose to ignore him. When I got to the stores and asked for the spanner, the storeman asked *"Where's your trolley?"* Now, of course, I realised that to fit a nut which was at least 4½-5in. across the flats the spanner was huge. Pride made me put it over my shoulder to stagger back to our pit and face the laughter and teasing from the rest of the gang.

Self sufficient

Swindon was completely self-sufficient in everything it did and on my return visit I felt that there was little to show people how it had really been. As someone who had been over most of it many times, and even I didn't cover it all, I seem to recall believing that all it lacked in those days were its own coal and ore mines!

I was surprised that I had been so depressed by my visit and after lunch I'm afraid I couldn't even bring myself to see what else had been left. Following a desultory walk around the Exhibition (which left me stone cold) I thought to myself that it wasn't like that at all. How could the atmosphere of the place be depicted when everything had gone, and gone with apparently little consideration for what it had represented for so many years? I decided that bureaucracy has an awful lot to answer for!

●*To be continued.*

TRADE TOPICS

The P-touch labelling machine from Brother

The Brother P-touch 1250 labelling machine is priced at approximately £50 and produces durable, self-adhesive labels at the touch of a button. It is ideal for helping to organise your storage boxes and drawer units. The machine can be run off either a mains adaptor or batteries (not included) so it is suitable for use anywhere around the house, garage, shed or garden. The navigation dial and QWERTY keyboard make the P-touch 1250 simple and convenient to use. Producing the label simply involves typing in the text and pressing 'print'. There is no need for scissors, as the machine will cut the label to your required length with one click of a button.

Different text sizes, fonts and formats and two-line printing are also easy to achieve, and you can see what has been typed as the P-touch 1250 has an 8-character screen.

The P-touch 1250 is available from stockists such as Staples or for details of the complete range of P-touch machines contact **Brother; tel: 0845-60-60-626 (stockist information and brochure requests); 0161-931-2354 (helpdesk); e-mail sales@brother-uk.com; website: www.brother.co.uk**

A light duty MIG/MAG welding machine from ESAB Ltd.

The new LKB 160 MIG/MAG semi-automatic welding machine from ESAB is the ideal power source for light duty applications including craft and hobby work.

The versatile power unit is designed for welding with solid filler wires, both carbon steel and stainless steel, as well as aluminium and flux cored wires, either with or without shielding gas.

Powerful and reliable in operation, the ESAB LKB 160, with a welding current range of between 20-160 amps, offers economy with low operating costs for many applications. Ease of control is assured thanks to the operator being able to select 7 voltage steps. The power unit also incorporates a built-in wire feeder and potentiometers for setting wire feed speed, spot welding and burn back time.

Operation is simplified due to the welding process being initiated by just pressing the torch switch; releasing the switch terminates welding. A soft-start speed (50-70% of the work speed) may also be selected.

The single phase LKB 160 unit has a built in automatic overheat cut-off, is supplied with the ESAB PSF 160 air-cooled torch, and conforms to the standards EN 60974-1 and EN 50199. Further details can be obtained from Cheron Robinson at **ESAB Limited, Hertford Road, Waltham Cross, Hertfordshire. EN8 7RP; tel: 01992-659134; fax: 01992-788053; e-mail: info@esab.co.uk;**

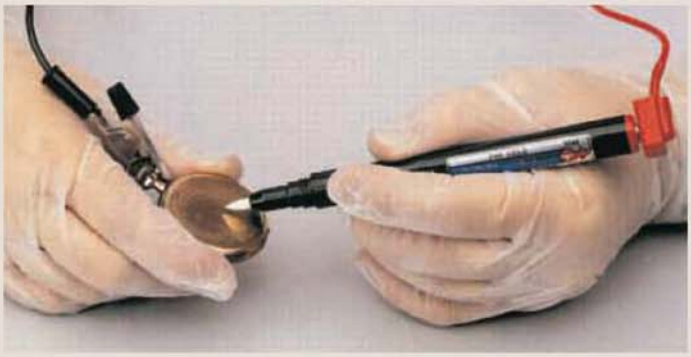
Mini plating pens from Intertronics

Intertronics mini plating pens provide a simple and convenient electro-plating capability for a wide variety of applications including scientific, engineering development, electronic repairs, specialised production, dental work, jewellery, artwork and restoration.

A wide selection of pens is available for plating different finishes. These pens are particularly well adapted for partial or selective plating requirements. Each solution is self-contained in its own marker-type pen thus eliminating the time, effort and expense involved in preparing special plating baths or solutions. Because the pens are self-contained, non-refillable and disposable when empty; the plating solution is fully protected from accidental contamination and operator exposure is minimised.

The system is simple to use with no special skill needed. The desired pen is connected to the power supply and plating begins. Power is available from a variable voltage power supply or any variable DC supply capable of supplying up to 12 volts at 0.1 amps.

For further information contact Peter Swanson at **Intertronics, Unit 17, Station Field Industrial Estate, Banbury Road, Kidlington, Oxfordshire, OX5 1JD; tel: 01865-842842; fax: 01865-842172; e-mail: sales@intertronics.co.uk; website: www.intertronics.co.uk**



Autumn Inspirations from Greenweld Limited

Greenweld Limited have produced a special catalogue supplement entitled *Autumn Inspirations* which lists a small selection of their current stock of tools, components, books and materials for the home hobbyist as well as a variety of special season offers and 'surplus' items including manufacturers over-runs and obsolete parts.

These 'surplus' items are often high specification, industrial quality components or 'specials' not normally available to the home enthusiast and are offered at bargain prices. Although the catalogue has 48 pages, it does not list all the standard electronic items listed by Greenweld and further details of these can be found on their website.

Readers who wish to receive a copy of this edition and all subsequent catalogues completely free of charge should write, phone, fax or e-mail Greenweld with their name and address.

For more information contact Geoffrey Carter or Mick Page, **Greenweld Limited, Unit 24, Horndon Industrial Park, West Horndon, Brentwood, Essex, CM13 3XD; tel: 01277-811042; fax: 01277-812419; e-mail: bargains@greenweld.co.uk; website: www.greenweld.co.uk**

Handiclamp™ from Record Tools Ltd.

What can you do with a Handiclamp™? A better question might be what can you not do with it? This award-winning tool has been specially designed to give you a helping hand around your home and garden, and now you can get even more out of a Handiclamp™ as it is now available in a value for money limited edition four-pack.

The Handiclamp's jaws can reach around even the oddest shapes and its innovative swivel pads grip any surface firmly without marking. Its simple one-handed operation guarantees control and convenience for a whole host of clamping and holding tasks, and adjustable clamping pressure adds to the tool's all round versatility.

Linda Collins, Product Manager at Record Tools, said: *"The Handiclamp™ is one of the most versatile tools on the market, it has so many uses that it is quicker to list the things you cannot do with it than the things you can! The fact that it is so multifunctional has led to its popularity with both tradesmen and do it yourself enthusiasts and we decided to introduce the four pack to enable people to benefit from a substantial saving on buying four Handiclamps individually. With four Handiclamps around the house there'll never be any danger of being stuck for a helping hand!"*

For more information about the Quick-Grip Handiclamp™ contact **Record Tools Ltd., Parkway Works, Sheffield, S9 3BL; tel: 0114-251-9101; e-mail: record tools.co.uk; website: www.quick grip.co.uk**

CLUB CHAT
With Stan Bray

A school party enjoys a ride on the Teeside Small Gauge Railway with driver Ivan Hall in charge.

UK News

Although some time has passed since it was held, a report on the late June Rally at **Stockholes Farm MR** tells us that visitors came from far and wide to enjoy a run on this excellent layout. The first participant travelled from Felixstowe to arrive at 9am on Saturday and was followed by a steady flow of visitors. Running came to an end at 8pm when those present were invited to a barbecue. More visitors arrived with their models on Sunday bringing the total to 13 in operation during the day. Society members continue with track improvements; a new double curved point has been built which, together with a crossing now allows the older and newer circuits to be connected to provide a much longer run.

Staged in conjunction with Bradford Industrial Museum, the **Bradford MES** exhibition appears to have been an overwhelming success. Compressed air supplied by the museum was used to run a number of stationary engines, and the area around the exhibition was adorned with suitable plaques and the like to accompany the wall display provided by the club. Over 150 models were displayed, the museum having provided glass cases for them all except three large road vehicles on show in the museum foyer. The museum staff who are experts at the task used their expertise and equipment to light the entire display with the result that everything was shown to perfection. The club's ground level track will be ten years old in 2002 and a suitable celebration is to be held in conjunction with their Open Day on 23 June. We regret to report that in recent months the track has suffered attack from mindless vandals who have dropped large rocks onto it from a height sufficient to smash sleepers and distort the rails.

Contributions to the well known and popular BBC *Children in Need* appeal were increased by a sum in excess of £200 when members agreed to donate to this cause the proceeds from passenger rides on 31 September, the last day of running for 2001 on **Teeside Small Gauge Railway**. Although it finished on this triumphant note, the year started badly when members found that vandals had ripped up a long section of the track situated in Stockton's Preston Park. It took a super-human effort by all concerned to reinstate the railway in time for the Easter opening. After all the effort, relentless rain kept passengers away, for understandably very few were willing to ride and be soaked to the skin. Members have been kept very busy since, entertaining various school parties in addition to their committment to normal public running in the park. Membership has shown a modest recent increase but more would be very welcome. During the winter it is proposed to build two extra steaming bays, rebuild old rolling stock and carry out some landscaping. A visit to **www.tsgr@ne.communigate.co.uk** will provide details of the club, or for those interested but without access to hyperspace, Secretary Bill Foster (01642-710198) will be pleased to provide the necessary information. Arrangements can also be made with Bill for club groups who are welcome to visit the track.

North London SME is considering an application to the Charity Commission seeking charity status and a small committee has been set up to explore the matter. Certain financial and other advantages accrue from charity status and we are aware that several other societies have made similar applications. As far as we can gather, applications seem to be met with mixed success, some having been turned down flat and others having been successful. We look forward to hearing how **North London SME** gets on with its application.

For ten years, **Woking MRS** have operated their railway at Mizens Farm, Woking. However, as is so often the case these days, the land was purchased, was soon required for other purposes, and the society was therefore obliged to vacate the site. Recognising the society's history, commitment, and the disappointment caused by the loss of their facilities, new owners TAG McLaren who had bought the site for their Formula One headquarters, generously agreed a settlement sufficient for the purchase of 8 acres of former nursery land at Barrs Lane, Knaphill. On this site, members plan to build what will probably be one of the largest society-owned miniature railways in the UK. Rapid progress is being made with construction of a ground level 7¼in. gauge track and associated facilities. Additionally, the society has merged with **Brooklands MR Group**, a merger which will allow members of the public to enjoy the model railway layouts as well as riding on the miniature trains. Information about running dates for 2002 is available from Mike Smith (01483-720801).

An event staged by **Lancaster & Morecambe MES** provided an opportunity for those who enjoy running in the dark despite the chill of the evening. Although a bonfire was not possible, a firework display followed a very welcome pie and pea supper. The committee was re-elected *en-bloc* at the AGM when Mr. S. Jackson who had been acting as Secretary on a temporary basis was confirmed in the position. Further information about the society can be had by contacting him at **sandmatstorthend@btopenworld.com** or by writing to him at Storth End Cottage, Stainton, Kendal, Cumbria LA8 0DZ.

One of the more delightful newsletters we receive is *Mixed Traffic* from the **3mm Society**. For readers who do not follow small scale railway modelling, 3mm scale results in models slightly smaller than the more normal 4mm or 00 scale with which we are familiar. Some years ago Triang introduced a range of models marketed as TT3 and, although not necessarily strictly to 3mm scale, these sparked an interest from which this society was formed. Since the content of *Mixed Traffic* may not strictly be considered by some as 'true' model engineering, the society does not often get mentioned. The latest issue of the newsletter, however, contains some valuable information on preparing true scale drawings using a computer program called 'Paint', and a scanner. The technique is based on the program's capacity to print at 1mm for every 3.79 pixels and expands from that simple comparison. Returning to the relationship between small scale model railways and 'true' model engineering, many enthusiasts, particularly where 3mm scale is concerned, build their models from scratch: model engineering in miniature. Maybe the small-scale modeller does not build his or her own power plant, using instead a commercial electric motor but a great many models of non-steam locomotives are now to be seen on club tracks and, with very few exceptions, these are powered by commercial units; where then is the difference?

While on the subject of smaller gauge railways, it is appropriate to mention the **Gauge '1' MRA** web site at **www.gaugeone.org** which is full of useful information about the association and well worth a visit. The popularity of Gauge '1' is increasing, as indeed is interest in all the garden gauges, and the association is largely responsible for this interest. At present, members are busy building a new exhibition layout and are seeking volunteers among the membership, not only to help build it, but also to operate it at exhibitions. The Association's second steam locomotive design, a Southern Railway 4-4-0, is proving even more popular than anticipated, with record sales of the descriptive booklet to both members and non-members alike.

A Signal Seminar was organised in October by **Saffron Walden DSME** to allow members to air their views on the proposed signalling system. Having been buried when the foundations for the new track were laid, cable for the system is already in place. The club suffered badly from the late autumn floods experienced by the north Hertfordshire and Cambridgeshire area, although fortunately the new track remained above the flood level. Water did get into some of the club premises and the ground was so waterlogged that activities came to a halt for a while. Efforts to encourage junior members to build electrically powered locomotives for themselves appear to have foundered as the youngsters discovered that even a simple electric engine was too long a project for their liking. The frame steel, motors and controller parts stocked by the club for the project is therefore being offered to other members who may wish to build one for themselves.

World News

Canada

With phase one of the new raised track nearing completion, the old track is being offered for sale to members by the **Ottawa Valley LS**

Councillor Gordon Brown, President of Woking Miniature Railway Society, lays the foundation stone for the new station at Mizens Farm.

& ME. The new track will include the original steaming bays and turntable, thereby saving considerable time and effort. Demolition of the old track was due to start immediately after the club picnic in September, which was held on a beautiful warm, sunny day. Both raised and ground level tracks were well used, while others preferred to just sit and chat, enjoying the sunshine, the picnic and the company of others with mutual interests.

The October meeting of **Toronto SME** was particularly interesting as, in addition to a number of members talking about the problems associated with their various projects, they also heard from Charles Duerdoth who entitled his talk *Grandad builds a Steam Engine.* With the aid of some excellent illustrations using an overhead projector, Charles explained that a lathe or a milling machine is not required to put together a steam engine and boiler. All the components of his steam plant were available through the Sears catalogue: he adapted a Craftsman compressor for use as the engine, an air cylinder with brazed-in tubes became the boiler, and the heat source came from a coal/wood burning space heater. Following a successful steam test to 150psi, the boiler's operating pressure was then set to 75psi.

By the time this appears in print **British Columbia SME** will once again have set up their special track in the Loughmeed Shopping Mall and will have entertained children and shoppers alike during the pre-Christmas period. With an increase of 27^{1}/2% in the number of people carried, the summer was very successful as far as raising revenue from passenger hauling is concerned. Not only does this add to the club finances, but the heavy passenger traffic also reveals any problems with the operations procedures, thus allowing improvements to take place for the benefit of all, whether passenger hauling or not.

New Zealand

Some while ago we reported that the signals had been stolen from the **Canterbury SMEE** track site, so it gives us great pleasure to be able to announce that these have since been recovered. They were found by school children who were clearing litter in the park, and to show their gratitude the club has extended an invitation to them to visit the railway for free rides. Further good news for the society has been notification from the local authority of a *reduction* in their ground rent. A good turnout of members with models attended the club's Awards Night 2001, with the following results: *Moody Cup* for Best Model to Reg Dear; *Harrison Shield* for Best Boat to Ewen Allison; *Powell Shield* for Best Workshop Equipment to Harold Kemp; *Curry Cup* for Best Workmanship to Reg Dear; *Edsall Award* for First Model to Bernard Weller; *President's Cup* for Best Small Item to Reg Dear and *The Bent Coupling Award* was presented to John Turner in recognition of his lack of attention when negotiating a blind curve!

We hear that The Great Little Train Show organised by **Southland SME** was very successful, both financially and from the point of view of the number of models exhibited by members. The show also provided an opportunity for judging the club's modelling competition with the following results. Engineering Model: Ian Sinclair; Kit Built Model: Gregory Fordyce; Scratch Built Model: Murray Stuart; Junior Kit Building: Leon Gibbs. Cars parked across the entrance to the park where the club's headquarters are situated have become such a nuisance that an Authority has been approached to erect No Stopping signs.

South Africa

Lionel Squires was unanimously elected honorary life member at the recent **Bloemfontein SME** AGM, at which the make up of the committee was returned largely unchanged. The society held Open House at the end of July, a very successful event which was followed by everyone taking a very well earned break from work until October. There was plenty to do when work started again, including the removal of some old tree stumps and the planting of five new trees. The steaming bay is being enlarged and plans have been submitted to the local authority for permission to build a new structure for storage, and an ablutions block.

The annual **Rand SME** Oil Engine Day was held in late August when over 30 engines were present, a few of which were full-size hot air engines. Visitors brought along a number of engines of varying types and the club's own collection, kept in their exhibition hall, was also in operation. Other members of the club were hosting a birthday party at the same time, and it was noted that a number of those attending this forsook the party for a while to go and see the i/c engines running. The society owns a 5in. gauge steam locomotive named *Sir Alfred.* Very old, it was built to a design published in *Model Engineer* in the early 1930s under the name of *Pioneer* and is believed to be the first 5in. gauge model to be serialised. It has now been completely rebuilt by member Willie Fait and all being well should now last for many more years.

Australia

Two Occupational Health officials arrived during a **SLS Victoria** public running day; it is believed that they were there to enjoy the railway rather than on official business. Even so it served as a timely warning to members to be careful to follow the guidelines for safety as laid down by the society. The Silvertops meetings held on Thursdays for the benefit of retired members has a regular attendance of around 30, a number which many clubs would be pleased to see at their general meetings, and although they tend to be sociable gatherings, these members also do a good share of the work. There has been discussion in the society as to the future of the *Marcus Traylen Trophy*, originally awarded for the Best Scale Model Locomotive shown on judging day. It hardly needs to be said that scale models take a long time to make and there have been occasions when insufficient entries were received to justify running the competition. An attempt was made to keep the competition going by relaxing the rules and using a popular vote to decide the winning model. However, this has not solved the problem because those who preferred building true scale models were at a disadvantage. The latest idea is to have two trophies: the original, and another for the most popular model of the day, which can be any type of model and will still be decided by popular vote. The winner of the *Marcus Traylen Trophy* will be decided by a panel of judges. Competitors will only be able to win one of the trophies at any one time, thus giving everyone a reasonable opportunity of winning.

Holland

With reports from a number of steam rallies, many of which were attended by visitors from other countries, the latest copy of *De Model Bouwer* reflects on just how busy the various model engineering societies in Holland have been during the year. One of these rallies was held at a museum in Mijkerk where a horizontal pumping engine used to drain the low lying land has been preserved, complete with the scoop wheel, although the latter appears to have been completely rebuilt. Several model stationary engines were displayed, a 7^{1}/4in. gauge track was used to give rides to visitors and full-sized steam was represented in the form of a portable engine driving farm machinery. Another notable meeting was that organised by the NVM Modelspoorbanen at their attractive site in a large wooded area. The ground level 7^{1}/4in. gauge track was in operation together with a raised track of mixed gauges. A major and unusual attraction was a model of a sectioned locomotive boiler, painted in suitable colours to demonstrate the flow of heat. There were a number of model road vehicles at work, as well as full-sized ones. Add to that a collection of vintage motorcars and farm i/c engines and it appears to have been a very good show.

In Memoriam

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

Bill Chant	*Canterbury SMEE*
Lou Marquet	*Canterbury SMEE*
Cyril Ovens	*Bloemfontein SME*
Brian Sandbach	*Lancaster & Morecambe MES*

CLUB DIARY

A minimum of 6 weeks notice is required for diary entries. Clubs and Societies are asked to include a telephone number for the assistance of would-be visitors.

DECEMBER

22-24 **Vale of Aylesbury MES.** *Santa's Magic Steamings.* Contact Clive Ellam: 01296-623433.
22-24 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
22-24 **Talyllyn Railway.** *Santa Specials.* Enquiries: 01654-710472.
25 **Bedford MES.** *For Anyone Who Dares - Santa Steam-Up.* Contact Ted Jolliffe: 01234-327791.
26 **Canvey R&MEC.** *Boxing Day Morning Steam-Up.* Contact David A. Clark: 01375-846921.
26 **Cardiff MES.** *Boxing Day Steam-Up.* Contact Trevor Jenkins: 029-20755568.
26 **Colchester SMEE.** *Boxing Day Steam-Up.* Contact L. G. Hammond: 01376-511686.
26 **Hereford SME.** *Boxing Day Steam-Up.* Contact John Arrowsmith: 01432-265151.
26 **High Wycombe MEC.** *Boxing Day Steam-Up.* Contact David Savage: 01494-527402.
26 **Leyland SME.** *Boxing Day Mince Pie & Steam Up.* Contact Alan Wilson: 01942-715072.
26 **Maidstone MES.** *Boxing Day Run.* Contact Martin Parham: 01622-630298.
26 **Malden DSME.** *Boxing Day Steam-Up.* Contact J. Mottram: 01483-473786.
26 **Reading SME.** *Boxing Day Steam-Up.* Contact Graham Bustin: 01189-615450.
26 **Stockholes Farm MR.** *Boxing Day Running.* Contact Ivan Smith: 01427-872723.
26 **Sutton MEC.** *Boxing Day Run.* Contact Mike Dean: 0208-657-5401.
26 **Tonbridge MES.** *Boxing Day Run.* Contact D. C. Brunning: 01732-352153.
26 **West Wiltshire SME.** *Boxing Day Steam-Up.* Contact R. Nev. Boulton: 01380-828101.
26/27 **Leighton Buzzard NG Rly.** *Mince Pie Specials.* Enquiries: 01525-373888.
26-1 January Talyllyn Railway. *Christmas Train Service.* Enquiries: 01654-710472.
27 **Cardiff MES.** *Club Chat.* Contact Trevor Jenkins: 029-20755568.
27 **Staines SME.** *Steam-Up.* Contact Mike Kingham 01932-788793.
27 **Sutton MEC.** *Natter Night.* Contact Mike Dean: 0208-657-5401.
29 **Basingstoke DMES.** *Post-Christmas Run.* Contact Ian Shanks: 01420-561741.
29 - 1 January Nexus Specialist Exhibitions. 71st Model Engineer Exhibition at Sandown Park Exhibition Centre, Surrey. Admission: Adult £6, Senior Citizen £5, Child £2. Sat-Mon 10am-5pm, Tue 10am-3pm. Contact Andrea Colyer: 01322-660070.
30 **Elmdon MES.** *Steam-Up.* Contact Chris Giles: 0121-458-1291.
30 **Hereford SME.** *Steam-Up.* Contact John Arrowsmith: 01432-265151.
30 **MELSA.** *Sunday in the Park.* Contact Graham Chadbone: 07-4121-4341.
30 **Reading SME.** *Running.* Contact Graham Bustin: 01189-615450.
31/1 January Chesterfield MES. *Steaming at Papplewick.* Contact Mike Rhodes: 01623-648676.

JANUARY 2002

1 **Birmingham SME.** *New Year's Day Steam-Up.* Contact John Walker: 01789-266065.
1 **Chesterfield MES.** *Arctic Running.* Contact Mike Rhodes: 01623-648676.
1 **Frimley & Ascot LC.** *New Year's Day Run.* Contact Bob Dowman: 01252-835042.
1 **Halesworth DMES.** *New Year's Day Steam-Up & Barbecue.* Contact Chris Walliman: 01362-695735.
1 **Leicester SME.** *New Year's Day Steam-Up.* Contact Raymond Wallis: 0116-285-8824.
1 **Leyland SME.** *New Year Run.* Contact Alan Wilson: 01942-715072.
1 **Nottingham SMEE.** *New Year's Day Run.* Contact Gerry Chester: 0115-9259096.
1 **Oxford (City of) SME.** *New Year's Day Steam-Up.* Contact Chris Kelland: 01235-770836.
1 **Portsmouth MES.** *Frostbite Run.* Contact Bob Aldred: 023-92-523366.
1 **Rochdale SMEE.** *New Year's Day Steam-Up.* Contact Mike Foster: 01706-360849.
1 **Romney Marsh MES.** *New Year's Day Track Meeting.* Contact John Wimble: 01797-362295.
1 **Stockholes Farm MR.** *New Year's Day Running.* Contact Ivan Smith: 01427-872723.
1 **Taunton ME.** *Social Night.* Contact Don Martin: 01460-63162.
1 **Tyneside SMEE.** *New Year Running.* Contact Malcolm Halliday: 0191-262-4141.
1 **Vancouver Island ME.** *Frost Bite Run.* Contact Dennis Dalla-Vincenza: (250) 480-7042.
2 **Birmingham SME.** *Chit-Chat Evening.* Contact John Walker: 01789-266065.
2 **Bradford MES.** *Bits & Pieces.* Contact Gordon Eddison: 01943-864217.
2 **British Columbia SME.** *AGM.* Contact Sean Laurence: (604) 931-1547.
2 **Chingford DMEC.** *Bits and Pieces.* Contact Martin Masterson: 0208-989-3051.
2 **Historical MRS (Bedford Area).** *Area Pub Night at The Bedford Arms.* Contact John Chamney: 01442-851214.
2 **Tyneside SMEE.** *Quiz Night.* Contact Malcolm Halliday: 0191-262-4141.
3 **Historical MRS (North West Area).** *Denis Morley: Lining Coaches.* Contact David Goodwin: 01224-880018.
3 **Leyland SME.** *AGM.* Contact Alan Wilson: 01942-715072.
3 **Rotherham DMES.** *AGM.* Contact Ken Staniforth: 01709-703794.
3 **Sutton MEC.** *Bits & Pieces.* Contact Mike Dean: 0208-657-5401.
3 **Warrington DMES.** *The Anderton Boat Lift.* Contact Bill Underwood: 01606-891225.
4 **Vale of Aylesbury MES.** *John Wooley: The Great Train Robbery.* Contact Clive Ellam: 01296-623433.
4 **North Norfolk MEC.** *Mr. Jones: Organ Pipes.* Contact Gordon Ford: 01263-512350.
4 **Portsmouth MES.** *Members' Videos.* Contact Bob Aldred: 023-92-523366.
4 **Rochdale SMEE.** *Meeting.* Contact Mike Foster: 01706-360849.
5 **Isle of Wight MES.** *Track & Pond.* Contact Ken Stratton: 01983-760762.
6 **British Columbia SME.** *Frost Bite Meet.* Contact Sean Laurence: (604) 931-1547.
6 **Reading SME.** *Running.* Contact Graham Bustin: 01189-615450.
7 **Historical MRS (London Area).** *David Larkin: Private Owner Rail Tank Wagons.* Contact John Millbank 0208-948-0556.
7 **Leicester SME.** *Michael Chapman: History of Local Railways.* Contact Raymond Wallis: 0116-285-8824.
8 **Crawley ME.** *AGM.* Contact Allan Sinclair: 01293-888203.
8 **Melton Mowbray DMES.** *Meeting.* Contact Phil Tansley: 0116-2673646.
8 **Oxford (City of) SME.** *Richard Tolley: Further Experiences of an Oxford Engineman.* Contact Chris Kelland: 01235-770836.
8 **Stamford MES.** *AGM.* Contact David Ash: 01780-751211.
9 **Birmingham SME.** *Keith Crabtree: A1 Tornado Project.* Contact John Walker: 01789-266065.
9 **Bournemouth DSME.** *Meeting.* Contact Mike Baker: 01202-383653.
9 **Chingford DMEC.** *Tim Pemble: Workshop Practice plus Keith Catchpole: Second Half Black Sheep of the Family.* Contact Martin Masterson: 0208-989-3051.
9 **Historical MRS (East Midlands Area).** *M. C. Bond: The Story of Russell.* Contact Mark Shipman: 0194-983-6311.
9 **Hull DSME.** *Chris Parsons: CNC Setup & Programming.* Contact Chris Parsons: 01964-630563.
9 **Norwich DSME.** *Awards Presentation.* Contact Barry Steel: 01603-743372.
10 **High Wycombe MEC.** *Meeting.* Contact David Savage: 01494-527402.
10 **Historical MRS (Sussex Area).** *Barry Luck: Talk.* Contact Terry Cole, 17 Coombe Drive Steyning West Sussex BN44 3PW.
10 **Sutton MEC.** *Meeting.* Contact Mike Dean: 0208-657-5401.
10-14 *MODEX 2002* at Palmerston North MES, New Zealand. Contact Murray Bold: 64-6-355-7000.
11 **Hereford SME.** *Bits & Pieces.* Contact John Arrowsmith: 01432-265151.
11-13 **Messe Sinsheim GmbH.** *Indoor Steam Meeting* at the Exhibition Centre Sinsheim, Germany (on the A6 motorway near Heidelberg). Worldwide largest indoor steam meeting for functional models up to scale 1:2. Opening 12-8pm Friday, 9am-6pm Saturday, 9am-5pm Sunday. Contact Andrea Schmerbeck ++49 (0) 7261 689128.
12/13 **Chesterfield MES.** *Stand at Chesterfield Model Railway Exhibition.* Contact Mike Rhodes: 01623-648676.
13 **Sutton MEC.** *Track Day.* Contact Mike Dean: 0208-657-5401.
14 **Bedford MES.** *Ken Cox: The Shuttleworth Collection.* Contact Ted Jolliffe: 01234-327791.
14 **Erewash Valley MES.** *Bob Rose: Digital Photography.* Contact Jim Matthews: 01332-705259.
14 **Frimley & Ascot LC.** *Meeting.* Contact Bob Dowman: 01252-835042.
15 **Chesterfield MES.** *G. Waite: Matlock Cable Tramway.* Contact Mike Rhodes: 01623-648676.
15 **Nottingham SMEE.** *Bill Hall: Messing About in Boats 2.* Contact Graham Davenport: 0115-8496703.
15 **Romney Marsh MES.** *Brian Gower: A Transport Holiday.* Contact John Wimble: 01797-362295.
15 **Taunton ME.** *Dr. Trisidder: Healing Power of Flower Essences.* Contact Don Martin: 01460-63162.
16 **Birmingham SME.** *Club Video Competition.* Contact John Walker: 01789-266065.
16 **Bournemouth DSME.** *Annual Dinner.* Contact Mike Baker: 01202-383653.
16 **Chingford DMEC.** *Video Night.* Contact Martin Masterson: 0208-989-3051.
17 **Halesworth DMES.** *Chat Night.* Contact Chris Walliman: 01362-695735.
17 **Isle of Wight MES.** *Bits & Pieces.* Contact Ken Stratton: 01983-760762.
17 **Reading SME.** *Alan Copeland: Curiosities on your Doorstep.* Contact Graham Bustin: 01189-615450.
17 **Sutton MEC.** *Gauge 1 Round-Up.* Contact Mike Dean: 0208-657-5401.
17 **Warrington DMES.** *Bailey & Clitheroe: The Engineering & History of Rocket.* Contact Bill Underwood: 01606-891225.
18 **Rochdale SMEE.** *Bits & Pieces.* Contact Mike Foster: 01706-360849.
18 **Romney Marsh MES.** *Video Evening.* Contact John Wimble: 01797-362295.
19 **Chesterfield MES.** *Running Day.* Contact Mike Rhodes: 01623-648676.
19 **Historical MRS (Scottish Area).** *Dave Sweetland: Etching and Such (plus Bob Goodyear on another topic).* Contact Richard Crockett: 01896-750730.
19 **Reading SME.** *Club Running.* Contact Graham Bustin: 01189-615450.
19 **SM&EE.** *Gordon Hatherill: Problem Solving Forum plus Bring & Buy Sale.* Contact David Boote: 01202-745862.
19/20 **Erewash Valley MES.** *Steaming Weekend.* Contact Jim Matthews: 01332-705259.
20 **Frimley & Ascot LC.** *Club Run.* Contact Bob Dowman: 01252-835042.
21 **Leicester SME.** *Andy Green: Video Evening.* Contact Raymond Wallis: 0116-285-8824.
22 **Historical MRS (East Lancashire/North Manchester Group).** *Members' Evening; Current Projects, Railway Quiz.* Contact John Sykes: 01706-823989.
23 **Birmingham SME.** *Meeting.* Contact John Walker: 01789-266065.
23 **Chingford DMEC.** *K. Brunt: Automatic Signalling.* Contact Martin Masterson: 0208-989-3051.
23 **Historical MRS (N. E. Area).** *R. Payne: Locomotives in the North of England and Midlands.* Contact Philip Dove,14 Meadow Rise, Newcastle upon Tyne, NE5 4TR.
23 **Hull DSME.** *Auction.* Contact Chris Parsons: 01964-630563.
24 **Sutton MEC.** *Natter Night.* Contact Mike Dean: 0208-657-5401.
25 **Colchester SMEE.** *A. Grose: Hertford East Engineman.* Contact L. G. Hammond: 01376-511686.
25 **Hereford SME.** *AGM.* Contact John Arrowsmith: 01432-265151.
25 **Historical MRS (Essex Area).** *Dave Carson: SP/'Frisco Transfer.* Contact Jem Harrison, 27 Colne Place, Basildon, Essex SS16 5UZ.
25-27 **Meridienne Exhibitions.** *The London Model Engineering Exhibition* at the Wembley Exhibition Centre. 10.30am-6pm (Fri/Sat) 10.30am-5pm (Sun). Adults £6, Senior Citizens £5, Children £3, Family (2+3) £15. Enquiries: 01926-614101.
26 **Historical MRS (Bristol Area).** *Jem Harrison: Highbridge Works.* Contact Gerry Nichols: 0117-973-1862.
26 **Mashonaland SME.** *Bits & Pieces.* Contact Ian Andrews: 263-4-882893.
26/27 **Southland SME.** *Edendale Crank-Up Days.* Contact Peter Stark: 03-21-89702.

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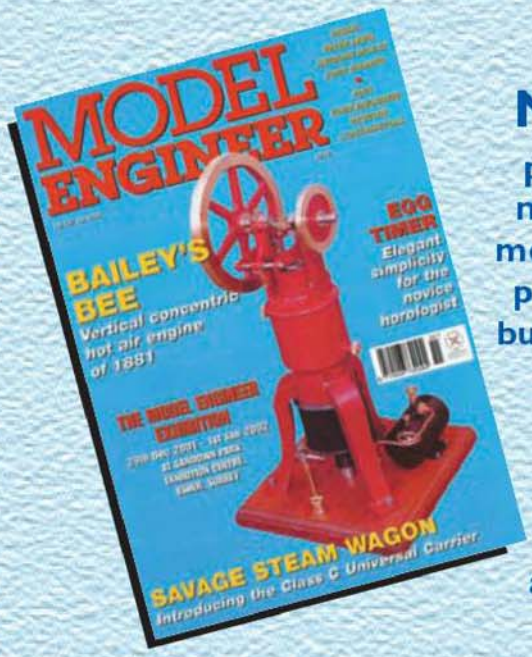
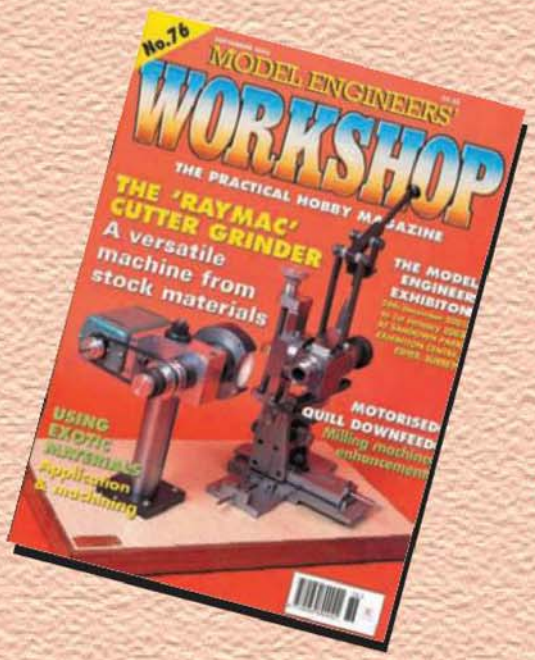


Model Engineer

provides a wide ranging magazine for those who model in metal. It includes practical instructions on building models, which are largely steam-oriented but also hot air and internal combustion engines, horology, electrical, electronic and mechanical items.

Model Engineers' Workshop

is ideal for enthusiasts who operate a home engineering workshop for both model construction or to support an engineering related hobby. The magazine covers machine and hand tools, accessories and attachments, materials and processes, and provides guidance on the selection, commissioning and use of tools and equipment. The essential guide for any workshop.



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GREENWOOD TOOLS

ADVERTISING ERROR

To whom it may concern

Due to an internal clerical error, Model Engineer would like to sincerely apologise for the embarrassment and inconvenience caused to Greenwood Tools when the wrong copy was published in issue 4153.

Somehow, their prices from the previous April were resurrected, some of which have since been reduced and some increased. We obviously caused some concern about which prices were applicable where and when.

As a long-time supporter and advertiser in this magazine, Peter Cook and Greenwood Tools were put in a position that was clearly unacceptable. Again, we apologise for this error and look forward to the continuance of a mutually beneficial relationship in 2002.

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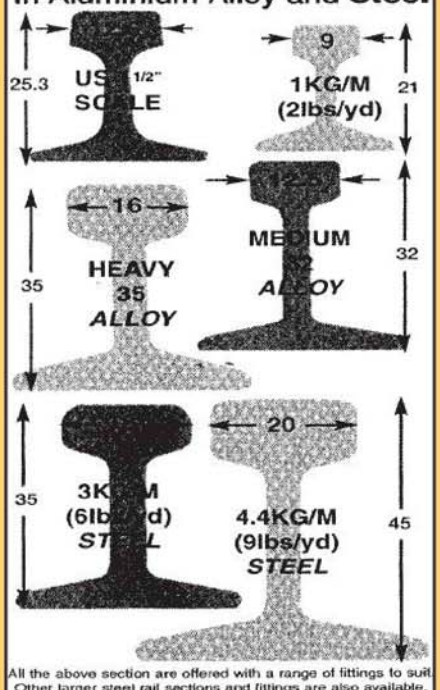

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CENTEC 2B H/V, vertical head, 2 morse taper/swivel, cabinet stand £1,400
ELLIOT Turret mill R8-10 speed 70-3000 rpm, table 45" x 10" (powered) £1,300
EMCO FB2 Vertical 6 speed quill feed head 2 MT, powered 24" x 6" table, full coolant tray and cabinet stand and new 2 MT collet chuck ..... Very nice £2,250
HARRISON horizontal, 31" x 8" powered table ..... Now £250
RAGLAN VERTICAL MILL 2 Morse taper, 2 speed motor, variable selector 175-2520 RPH, cabinet stand £1,150
TOM SENIOR Model E vertical milling machine table 22" 16" , complete with cabinet stand, Clarkson collet chuck, Tom Senior machine vice, original 240 volts from new, probably the last one made in superb condition £3,400
TOM SENIOR M1 horizontal, 25" x 6" powered table, 1" arbor £875
TOM SENIOR M1 V/H, 25" x 6", 2 morse taper, 1" arbor ..... Selection £1,200 – £1,450
TOS FO3 AV vertical turret mill, 40 INT, 54" x 10" table, power lift+feed £1,950
VICEROY AEW vertical mill, 30 Int swivel head, powered table 36"x 8", ... Very Clean £1,595

ENGRAVERS

ECRUPTA 6A 3D engraver, bench machine ..... Swiss £625

DRILLS

ASQUITH 14-54 001 Mk2 (5mt) Radial Drill ..... Immaculate coming in £3950
FOBCO 5" Bench, tilting table £325
FOBCO 5" Pedestal drill tilting table £345
MEDDINGS 5" pedestal drill £345
MEDDINGS 2 Morse taper pedestal drills ..... Choice £275
MEDDINGS MF2 10 Speed 2MT Bench 240 volts drill £350
POLLARD DIDRONA Pedestal VH morse ..... From £100
SIP HDP 600S 10/12mm Bench Drill ..... New £175
STARTRITE MERCURY 5" 4 speed bench drill £225
STARTRITE Mercury 8" pedestal drill, 240 volts ..... As New £300

GRINDING / BUFFING

CLARKSON MKI Tool and cutter grinder ..... Choice £550
CLARKSON MKII 6" x 12" tool and cutter grinder, graduated dials, universal head, centres, cabinet stand £1,750
EAGLE MODEL 4M MKII 24" x 6" table with 14" x 6" magnetic chuck + dust extractor £1,150
JONES AND SHIPMAN 540 Surface Grinder & Magnetic Chuck ..... Ex College/Exam no work £1650
MILFORD 12" Pedestal Grinder £325
R.J.H. Buffing Machine, pedestal model £325
VICEROY Grinder, pedestal model £145
VICEROY Buffers, pedestal models ..... Each £250

MISCELLANEOUS/FABRICATION MCH.

TOM SENIOR M1 / major (round overarm only) £50
VERTEX Dividing head ..... New £245
VERTEX 5" - 6" - 10" rotary tables ..... New From £140
MYFORD ML7 / Early super 7 power cross feed attachment £200
MYFORD Coolant (complete) £275
MYFORD Change wheels, unusual sized ..... Each £5
BOXFORD Vertical Slide complete £425
BOXFORD Turret attachment 4 1/2" + quantity of drill chucks £525
BOXFORD Thread dial Indicator (Imp) £65
MYFORD ML7 / Super7 rear tool post £40
MYFORD 2545 Rear tool post £40
MYFORD Vertical slide/fitted type copy £99
OLIVER - ADRIAN FILER ..... Axis £65
LOCKWOOD QUAD HEADED 2mt Die Holder ..... New £40
LOCKWOOD QUAD HEADED 3mt Die Holder ..... New £40
BRIDGEPORT SLOTTING HEAD ..... From £750
LOCKWOOD Test Bar / 2mt Bored New £39
LOCKWOOD Test Bar / 3mt Bored New £42
HOLDWIN 6" machine vice ..... Very clean £245
MAGNETIC chuck - 18"x6" fine pole ..... Never used £325
TOM SENIOR Model E pedestal stand £150
UNION tool and cutter grinder stand £135
ATLAS shaper 7" stand ..... As is £100
CLARKSON MK1 stand £100
HARDINGE Capstan type toolpost (tick in type) £175
HARDINGE Headstock, bed stand, stand and motor £150
50 IN1 Tooling Selection ..... Just in
STARTRITE 352 Woodworking Band Saw £975
STARTRITE H-6-6 Woodworking Band Saw £775
MITUTOYO 500mm Height Gauge no 520-150 ..... Boxed £225
ALCOSA GF 0001 Rapid Melting Furnace £300
FLAMEFAST CRM5003 Rapid Melting Furnace £425
GASRG BF 620-2, 24" Box and Pan General Use Folder £325
WILLOW Bandsaw vertical 4 speed machine £400
MYFORD Bumerd Griptru 3 Jaw Chucks ..... Boxed £250
COLCHESTER/HARRISON D13 Bumerd 4 Jaw 6" light body independent chucks ..... Boxed £175
RJH 4" Linisher / Vertical (Build in Elimination) £525
ARBURG Plastic injection molding machine G4 Model £425
KASENIT oven (gas fired) ..... small £100
KASENIT oven (gas fired) model 2533 ..... £325
BONIARDI rolls (set each side and spare formers) ..... NOW £250
KILN 5 various ..... £200/£425
SCHAUBLIN 5240 high speed drilling head ..... Never used £525
TAPPING HEADS 1-2-3 Morse Taper ..... Selection Just Arrived
MICROMETERS and associated measuring tools ..... Still packaged as new
POTTERY WHEELS, kilns and associated equipment ..... Just In Cheap
SPECAC Powder type press £325
ELLIOTT Horizontal and Vertical dividing head & 3 jaw chuck £325
HARRISON L6 Taper turning attachment £325
HARRISON L6 Metric Gearbox ..... As is £350
HARRISON L6 Tailstock £145
HARRISON L6 Travelling steady £40
NEW FROM NEW ZEALAND:- Machine vice, 50mm. Jaws precision miniature type ideal for vertical slides and smaller milling machines £55
STARTRITE HB330 M Horizontal bandsaw, 1997 machine ..... As new £3750
SIP 1 TON MOBILE CRANE Manufactured 2000 ..... As new £375
MYFORD SAW TABLE for ML7 – Super7 ..... £140
MITUTOYO grade A set of slips £245
WDS TOGGLE PRESSES, various ..... £30/£40
MARLCO KNURLERS (clamp type) £75
MYFORD coolant system ..... Hardly used £275
F.J. EDWARDS 24" hole cutter £525
RECORD NO.24 quick release bench vice £90
LINK 1.5 tonne vehicle crane + top hat £625
MITUTOYO 100-913 metric set micrometers £275
COLCHESTER CHIPMASTER/BANTAM turret capstan attachment £475
RAPIDOR 6" hacksaw machine £225
BENCH KNEELER, 240 volts £125
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UNION 4.5" x 30" bench centres £175
HARRISON L5 Vertical Slide ..... Never used £345
HARRISON L5 Boring Table £165
CENTEC VERTICAL QUILL feed heads ..... Each £750
ELLIOTT 1250 STURDIMILL vertical head ..... One off (rare) £825
RJH linisher 6" wide belt, pedestal £345
DENDIX/NORTON No2.0 Flipnuts ..... From £145
STEEL STOCK Just arrived - to callers only
ELLIOT U1/2 Slotting Head £475
SWAGE BLOCKS ..... £125 / £145
J&S Universal Grinding Vice ..... Choice £275 / £325
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KASNET Mini Furnace ..... Each £175
COLCHESTER STUDENT/MASTER Round head, faceplates, arm/Marge ..... £50 / £80
QUALTERS AND SMITH 6" Hacksaw £345
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ODONI Machine Bed Clamps (pair) ..... Special £24.50
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ELLIOTT 10M Shaper, 10" stroke £325
DIE BOXES ..... From £45
TRANSWAVE 5HP Converter ..... New £295
TRANSWAVE 3.5HP Converter ..... New £375
TRANSWAVE MMD rotary converters now available ..... From £470
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- Range of threads: (inch) 16-40tpi (metric) 0.4-1.25mm
- Motor: 250w
- Net weight: 25kg
- Distance between centres: 200mm
- Tailstock Taper: MT1
- Cross-slide travel: 70

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Conquest Lathe

- Swing over bed: 180mm
- Spindle bore: 19mm
- Tailstock travel: 60mm
- Speed range variable: 100-2500 rpm
- Range of threads: (inch) 12-52tpi (metric) 0.25-1.5mm
- Motor: ½hp
- Net weight: 38kg
- Distance between centres: 300mm
- Tailstock Taper: MT2
- Cross-slide travel: 70mm
- Dimensions: (LxWxH) 770x254x360

£445

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920 Lathe Deluxe

- Swing over bed: 229mm
- Swing over cross slide: 133mm
- Distance between centres: 500mm
- Spindle bore: 19mm
- Taper in spindle bore: MT3
- Motor: ¾hp
- 6 Speed: 100-1000
- Net weight: 100kg

STANDARD EQUIPMENT:

- 4" 3-jaw chuck with 2 sets of jaws
- 7½" 4-jaw chuck with reversible jaws
- Steady rest • Follow rest
- MT2 Dead centre
- MT3 Dead centre
- 4-way tool post
- Face plate
- Tool Box & Tool Kit
- Belt & Splash guard

£850

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Model B-Super

- Swing over bed: 420mm
- Distance between centres: 500mm
- Mill drill spindle taper: 19mm
- Tailstock barrel travel: 80mm
- 7 speeds: 80-1300
- Swing over cross slide: 160mm
- Spindle taper: MT3
- Draw bar: M12
- Cross slide travel: 180mm
- Motor: ¾hp
- Net weight: 155kg

STANDARD EQUIPMENT

- 4" 3-Jaw chuck
- 2 dead centres
- 1/2 drill chuck
- Change gears
- MT3 chuck arbor

£725

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Comet Lathe

- Swing over bed: 250mm
- Swing over cross slide: 133mm
- Distance between centres: 550mm
- Spindle bore: 19mm
- Taper in spindle bore: MT3
- Motor: ¾hp
- 6 Speed: 125-2000
- Net weight: 130kg

Mill Attachment

- Spindle taper: M13mm
- Head travel: 215mm
- Speed variable
- Range: 0-3000r
- Motor: ½hp
- Net weight: 45kg

£1115

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Centurion

- Swing over bed: 420mm
- Distance between centres: 520mm
- Mill drill spindle taper:
- Tailstock barrel travel: 80mm
- 7 speeds: 160-1360
- Swing over saddle: 160mm
- Spindle taper: MT3
- Draw bar: M12
- Cross slide travel: 200mm
- Motor: 2 x ¾hp
- Net weight: 230kg

STANDARD EQUIPMENT

- 4" 3-Jaw chuck
- 2 dead centres
- 1/2 drill chuck
- Change gears
- MT3 chuck arbor

£1395

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Craftsman Precision Belt Drive

- Swing over bed: 300mm • Swing over gap: 450mm • Swing over saddle: 170mm
- Distance between centres: 570mm • Spindle bore: 36mm • Spindle nose taper: MT5
- Cross slide travel: 150mm • Compound travel: 89mm • Tailstock barrel taper: MT3
- Tailstock barrel travel: 92mm • Range of speeds: 50-1250rpm • Motor: 1 1/2 hp
- Net weight: 398kg

STANDARD EQUIPMENT:

- 6" 3-jaw chuck with reversible top jaws
- 8" 4-jaw chuck with reversible top jaws
- Steady rest • Follow rest
- Stand • 12" face plate
- Splash guard • Threading dial
- 4-way tubular tool post
- 3MT dead centers
- T-Slotted cross slide

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Cub 620/630/640

- Swing over bed: 300mm • Swing over gap: 430mm • Swing over saddle: 174mm
- Distance between centres: 500/750/1000mm • Bed width: 190mm • Spindle bore: 38mm
- Spindle nose: D1-5 • Spindle nose taper: MT5 • Cross slide travel: 160mm • Compound travel: 75mm
- Tailstock barrel taper MT3 • Tailstock barrel travel: 70 • Range of speeds: 9 60-2000rpm
- Number of inch threads 33 • Range of inch threads 4-72 TPI • Motor: 1 1/2hp 240v ph. 2hp415v
- Approx shipping weight 380kg

STANDARD EQUIPMENT:

- Hardened and ground gears in headstock
- Bowl-in stand • Foot brake • Mounted light
- Induction hardened bedways • Face plate
- Jog button and emergency stop
- 4-way tubular tool post
- 6" 3-jaw chuck with 2 piece top jaws
- 8" 4-jaw chuck
- Steady rest / follow rest • 2 dead centers
- Coolant system with full splash • Threading dial
- Direct reading dial cross slide
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