# MODEL ENGINEER

Vol. 194 No. 4248

27 May - 9 June 2005

WHISSENDINE 2005 MINIATURE STEAM RALLY

●

4-5 June

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## I/C ENGINES
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THE TRADE STANDS

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*The widest choice... the best prices!*

## GH-1322 Lathe
**ONLY £2,550** inc VAT & Delivery

- 165mm centre height
- 560mm between centres
- Removable gap bed allows 476mm swing 38mm spindle bore
- Supplied with 3 and 4 jaw chucks
- Faceplate
- Fixed and travelling steadies
- Coolant system
- Halogen lighting
- Telescopic leadscrew covers
- Four way tool post

Also available as 750mm between centres.
**£2,990.00**

## BH-600 Lathe
**ONLY £1,600** inc VAT & Delivery

**For a limited period we will include a revolving centre, tailstock drill chuck and a set of 16mm index lathe tools FREE of charge!**

**Optional equipment**
- Quick change tool post hardened and ground, supplied with 3 tool holders and parting off holder with blade £170 inc VAT with fitting kit to suit BH-600 fitting
- Coolant system £130 inc VAT
- Tailstock die holder £39 inc VAT

- THE ULTIMATE MODEL ENGINEERS LATHE
- HARDENED AND GROUND BEDWAYS
- TAPER ROLLER BEARING HEADSTOCK SPINDLE
- TEE SLOTTED CROSS SLIDE
- POWER CROSS FEED
- NORTON THREAD CUTTING GEARBOX
- 2HP SINGLE PHASE MOTOR
- BACK GEAR WITH 50 RPM LOW SPEED
- 1 3/8" SPINDLE BORE

SUPPLIED WITH ACCESSORIES AT NO EXTRA CHARGE
- 6" 3 JAW CHUCK
- 8" 4 JAW CHUCK
- 10" FACE PLATE
- FIXED & TRAVELLING STEADIES
- FOUR WAY TOOL POST
- IMP/MET THREADING
- STAND, COOLANT TRAY, REAR SPLASH BACK

## VMC Mill
**ONLY £1,450**
inc VAT & Delivery

**SUPPLIED WITH POWER FEED TO X TRAVEL AT NO EXTRA COST**

- ILLUSTRATED WITH OPTIONAL D.R.O AND POWER FEEDS
- TABLE SIZE 26" X 6"
- MOTOR 1 1/2 HP
- AVAILABLE 3MT R8 - METRIC - IMPERIAL

## BV-20 Lathe
**ONLY £525** inc VAT & Delivery

Optional floor stand £99

- FULL ENCLOSED GEARED HEADSTOCK
- SPEED SELECTION BY LEVER
- PRECISION GROUND VEE BEDWAYS
- LARGE BORE SPINDLE RUNNING ON TAPER ROLLER BEARINGS
- COVERED LEADSCREW
- SET OVER TAILSTOCK FACILITY
- INDIVIDUAL ACCURACY TEST REPORT
- SAFE ELECTRICAL INTERLOCKS TO CHUCK GUARD AND GEAR TRAIN COVER

SUPPLIED WITH:
- 4" 3 JAW SELF CENTERING CHUCK
- 4"4 JAW INDEPENDENT CHUCK
- FIXED STEADY
- TRAVELLING STEADY
- FACE PLATE
- FOUR WAY INDEXING TOOL POST
- 3MT AND 2MT DEAD CENTRES
- METRIC & IMPERIAL THREAD CUTTING CHANGE GEARS
- SWARF TRAY
- REAR CHIP GUARD

SPECIFICATION:
- CENTRE HEIGHT 4"
- DISTANCE BETWEEN CENTRES 14"
- SWING OVER CROSS SLIDE 5"
- SPINDLE BORE 3/4" CLEARANCE
- SPINDLE SPEEDS (6) 140/1710 RPM • HEADSTOCK TAPER 3MT • TAILSTOCK TAPER 2MT
- RANGE OF IMPERIAL THREADS 8-24 TPI RANGE OF METRIC THREADS 0.4MM – 3MM
- MOTOR 1/2 HP 1 PHASE • DIMENSIONS 38" LONG x 19"WIDE x 15" HIGH • WEIGHT 230 LB

## Warco Mini Lathe
**ONLY £375** inc VAT & Delivery

- 31/2" CENTRE HEIGHT X 12" BETWEEN CENTRES
- SUPPLIED WITH 3 JAW CHUCK
- FACEPLATE
- THREADCUTTING
- COOLANT TRAY AND SPLASH BACK
- VARIABLE SPEED 0-2500RPM WITH BACK GEAR FOR MAXIMUM TORQUE
- HARDENED AND GROUND VEE BED WAYS
- ACCURACY TEST CERTIFICATE WITH EACH LATHE
- RELIABLE USA BUILT PRINTED CIRCUIT BOARD - THE HEART OF THE MACHINE
- OPTIONAL ACCESSORIES STEADIES AND VERTICAL SLIDE.

**Special offer**
**Tailstock drill chuck and TCT indexable lathe tool set with each machine.**

## Warco WMT 300/1
**ONLY £799** inc VAT & Delivery

Combination Lathe Mill
- 6" CENTRE HEIGHT X 20" BETWEEN CENTRES SUPPLIED WITH:
- 5" 3 JAW CHUCK
- TEE SLOTTED FACE PLATE
- FIXED AND TRAVELLING STEADIES
- VICE
- DRILL CHUCK
- FACE CUTTER
- LATHE TOOL SET
- IMP/MET THREADCUTTING

## Warco WMT 300/2
**ONLY £1099** inc VAT & Delivery

SAME CAPACITY AND ACCESSORIES AS THE WMT-300/1 WITH THE ADDED BENEFIT OF A LARGER MILLING TABLE - 17" X 6" COMPARED TO 8" X 6". RACK AND PINION FEED TO SADDLE AND LEFT HAND THREADING FACILITY.

## Warco WMT 500
**ONLY £1399** inc VAT & Delivery

SIMILAR TO THE SPECIFICATION AND ACCESSORIES TO WMT-300/2. POWER CROSS FEED TO MILLING TABLE/CROSS SLIDE. DEEP THROAT FOR EXTRA MILLING CAPACITY.

## WM-20 MILLING MACHINE
NEW

**ONLY £3,500**
inc VAT & Delivery

- INVERTOR DRIVE - INFINITE SPEED CONTROL
- SPEED RANGE 25 - 1480RPM
- TABLE SIZE 9" X 36"
- R8 SPINDLE
- 1.5HP WILL OPERATE FROM 13AMP SOCKET
- WEIGHT 750KGS

## ZX-15 Milling Machine
**ONLY £550**
inc VAT & Delivery Optional Stand £89
**Ideally matched to the BV-20 Lathe**

| | |
|---|---|
| Table size | 654mm x 150mm |
| Longitudinal travel | 455mm |
| Cross Travel | 145mm |
| Spindle Stroke | 90mm |
| Spindle Taper | 3MT |
| Diameter of Spindle | 63.5mm |
| Diameter of Column | 66.65mm |
| Throat | 165mm |
| Max distance spindle to table | 320mm |
| Height with head at top of column | 1067mm |
| Width | 775mm |
| Depth | 559mm |
| Spindle speeds | 400-1640 |
| Motor | 1 phase 1/2hp with F/R switch |
| Weight | 295lb |
| Head tilting | 90-0-90 worm gear tilt mechanism |

**Delivery UK-Mainland**

Warco, Fisher Lane, Chiddingfold, Surrey GU8 4TD Fax: 01428 685812
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# IN THIS ISSUE

● Vol. 194 No. 4248 27 MAY 2005 ●




***On the cover ...***

*The well-detailed driver's controls on the 1:10 scale model of the Merryweather Type 47 PF 4 fire engine of 1913. This remarkable model was built by Tony Tyrer and is owned by Michael Banfield. It is one of a collection of miniature fire fighting vehicles owned by Michael tracing the development of these machines over the years. For further details of this superb collection, the man who owns them and the talented model engineer who built them turn to page 637 of this issue.*

***(Photograph by Malcolm Stride)***



*TURN TO PAGE 654 FOR GREAT OFFERS ON SUBSCRIPTIONS*

# INDEX to ADVERTISERS

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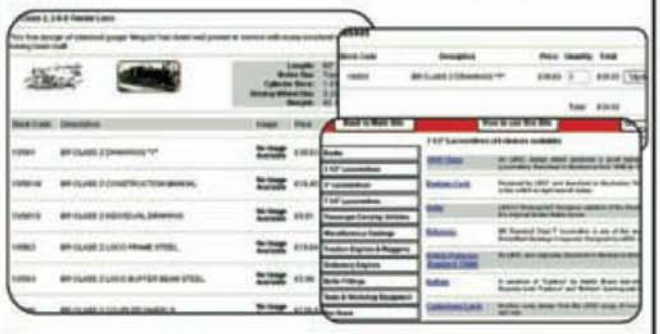

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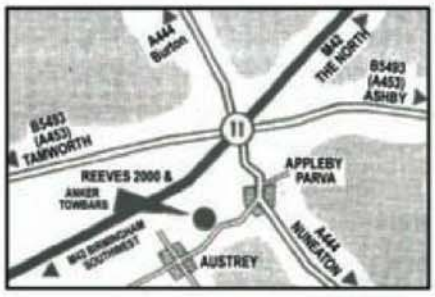


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| 19. | ***ENDMILL SET,*** 5/8, 3/4, 7/8, 1" DIA, WITH 5/8 THREADED SHANK TO FIT COLLET CHUCK | | ***£25 SET OF 4*** |
| 20. | ***COUNTERBORE SET (FOR SPOTFACING)*** [5/16, 1/4, 5/16, 3/8, 7/16, 1/2] OR [m/m 3, 4, 5, 6, 8 m/m] | | ***£30 EACH SET*** |
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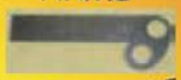

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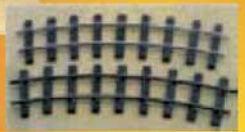

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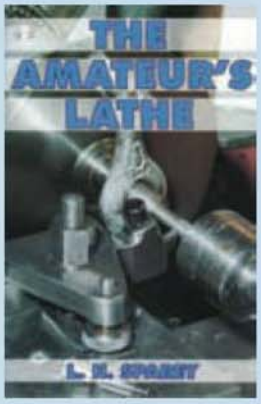


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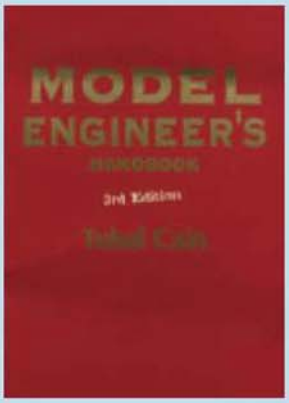


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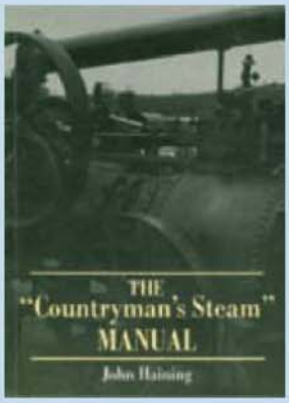


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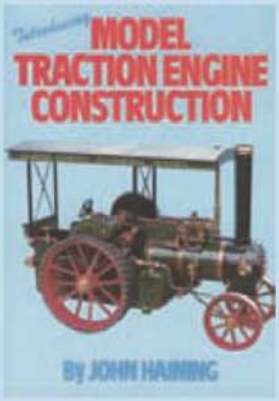


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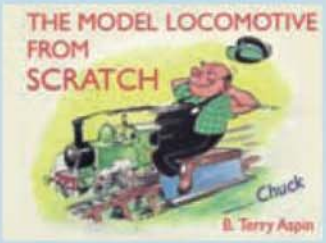


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# SMOKE RINGS
## With the Editors

### IMLEC time
It hardly seems possible, but the next IMLEC will be the 36th. This year it is being organized by the Northampton Society of Model Engineers at their track at Lower Delapre Park. Northampton are old hands at organizing the event, having successfully hosted it twice in the past ten years, and a big entry is expected from those attempting to take the Blue Riband of locomotive performance.

As usual it is open to 3.5 and 5-inch gauge locos and will be run on a raised track.

Each year the award goes to the loco and driver in each of the two scales that return the highest overall efficiency for a continuous run of half-an-hour on the host track, pulling an observer, passengers, and a dynamometer car. Make a note in your diary. It takes place on July 2 and 3.

Chris Orchard from the Northampton club, and one of the compilers of the Model Engineer web-based index, has now written a history of IMLEC. That can be found on the website, along with details of this years event including an entry form. It can all be found on www.imlec2005.co.uk

### End of an era
Its with some sadness that we put this issue of Model Engineer to bed, containing as it does the very last part of the last article by the late Martin Evans. Few people have had the impact on model engineering that he had. His legacy is immense. His loco designs include more classics than anyone else. They will continue to be built in large numbers for years to come.

His legacy of writing about full-size is also great, especially those railways that ran up the eastern side of the country. This final piece on the North Eastern sums up why his contribution has been so good. Everything is thoroughly researched, but unlike many, he resists the temptation to become pompous, and writes at just the right level to make things accessible for the average reader, complete with telling illustrations.

It does mark the end of an era. However, the legacy lives on in the popular writings of those who have followed Martin's example. He set a fine example for all of us to follow.

### Whissendine 2005
The ever-popular Whissendine Miniature Steam Rally takes place this year over the weekend of June 4 and 5. Organised by the Melton Mowbray & District Model Engineering Society it is a rally run by model engineers for model engineers.

All visitors are welcome, and there is no charge for admission.

This year coincides with the centenary of Sentinel steam wagons, and it is hoped that the rally will have the largest collection of miniature Sentinel wagons ever at a single event, plus a display of pictures of the marque.

On Saturday, owners participate in two road runs through the village, at around lunch time and late afternoon. More than 60 miniature steam road vehicles from 1.5 in to 6 in scale will be there, alongside full sized Sentinel and Foden steam wagons. During the day there will also be demonstrations of the engines working, with some giving rides around the extensive grounds.

On Sunday the engines will be put through their paces, including giving rides, and showing what they can do. Sunday is also the day when judging takes place, and the trophies awarded. A general model engineering exhibition will also take place. A bar and lunch will be available.

The event will be well signposted from the A606 Melton Mowbray to Oakham road.

### Tram treat
This year the Festival of Model Tramways returns to the Kew Bridge Steam Museum in Green Dragon Lane, Brentford over the weekend of July 23 and 24.

No less than 20 working tramways are expected, half of them not seen before at the festival. They range from 2mm scale displays to the ride-on 7.25 in gauge Wootton tramway.

Other stands include static model displays, trade stands and models competition for which entries can be made on the day, and all are welcome. Static displays will feature photographs of Trams At War to mark the 60th anniversary of the end of World War II.

Another will show 0.75 in scale model trams built by the late F. E. Wilson, including the oldest known model tram in this scale, LCC Class E no 444, the model that began the hobby. Also on show will be LCC Class E1 no 1800, which was exhibited at the Michael Faraday Centenary Exhibition as long ago as 1931. Both cars are still in working order. Modellers from Belgium and Germany are expected to exhibit to give the Festival an international flavour.

It runs from 11.00 to 17.00 each day. Visitors will also be able to enjoy seeing the Kew engines in steam, and take a ride on the Waterworks Railway. **More information on www.tramways.freeserve.co.uk**

### Gremlins
It has been pointed out that the letter entitled 'The same Mr. Hall?' attributed to Peter Brewster was, in fact, submitted by Chris Orchard. We apologize to both Mr. Brewster and Mr. Orchard for this unfortunate error.

### New Burnley track opens
The Burnley and Pendle Miniature Railway Society, will be officially opening their new 7.25 inch gauge track at Thompson Park. Burnley, on June 26.

The track was constructed by members over the past four years, with some help from The Friends of Thompson Park.

It consists of two loops and includes a 30-metre bridge. The two loops in an inverted figure of 8 encompass the majority of the lower park with a total running distance of around 850 metres. The route of the track takes passengers past the Italian Gardens along the side of the river, through the woods and across the bridge before returning to the station. Thompson Park is situated very close to the centre of town and is only 10 minutes walk from the main shopping area.

Facilities are available for parking while unloading and locos can be unloaded direct on to the track via the turntable from the rear of an average height trailer, van or car.

Car parking is available in Bank Hall Park, adjacent to the park and a short walk from the railway, but there is no public parking within the boundaries of Thompson Park.

The track is open for passenger carrying on Sundays and Bank Holidays between 12.00 noon and 4.00pm from Easter until end September.

Visiting drivers and Locos are always welcome but make contact first, and where necessary please bring along your current boiler certificate and club membership card. **Contact details: Mr D Kitson. Hon Sec, 11 Deerstone Road, Nelson, Lancashire BB9 9LN Tel: 01282 603031.**

**CHUCK, the MUDDLE ENGINEER** **by B. TERRY ASPIN**


## Deeley, Annabel and Josie

SIRS, - I write first to say how much I enjoy reading Ron Isted's remarkably detailed accounts of past steam locomotives, with his superb drawings and many interesting asides. On reading in issue 4232 about the drawing of the Midland 4-6-0 that was never built, I thought the following might be of interest.

In the mid 1930s when I was about 12, my father knew a Mr. Deeley who was a school headmaster in Brighton where we lived. Mrs. Deeley visited our home with her son who was about four years younger than myself and we played with my Hornby trains. Mrs. Deeley told me that they had a number of steam locomotive drawings at home that had come down through the family. I would guess that Mrs. Deeley was born about 1900, so might possibly be Richard Deeley's daughter or granddaughter.

I have hazy recollections of visiting the Deeley home and being shown the drawings by Mrs. Deeley. I was really too young to take in engineering drawings, so can only say that they were about steam locomotives. I now wonder if these were one set for the 4-6-0 that Richard Deeley had taken into retirement as it was never built. The Deeleys soon moved away so we had no further contact.

Secondly Jim Robinson's account of life with "*Annabel*" in the same issue was also of great interest to me. It was particularly interesting to read that she behaved, when running, in very much the same way as my 2½" gauge N.Y.C. 4-6-4 "*Josie*", whose grate is also 6½" by 4". In a 1940's M.E. I remember there was a description of the Bryn Railway in Portishead whose owner also possessed a 2½" gauge "*Josie*" that was also a poor steamer.

My "*Josie*" has run 150 miles over four years but has never run properly until about half a mile has been covered with two or three "blow-ups", then she suddenly roars off at great speed when the fire is fully alight all over the grate. Also she has also never been able to pull up the steam pressure while running.

Many combinations of petticoat length and diameter and blast nozzle height have been tried. Also a three jet blast nozzle, a stainless steel arch and wider fire bar spacing have been tried, all were the same or worse.

After reading about "*Annabel*", I came to the conclusion that if one builds a 2½" gauge replica of a North American locomotive with a scale size grate, something better than the normal blast arrangement is required to get really reliable results.

I decided to try what I have always thought would be a more effective system. This was to put the exhaust steam jet plus some boiler gas into a convergent throat to increase the velocity and produce a low pressure area which would draw in the main body of gas through "windows" in the petticoat pipe.

My version was designed entirely by guesswork. The blast nozzle was set as low as possible, 15/16" above the bottom of the smoke box. 5/8" above the nozzle was the lower end of a long petticoat pipe. This was made from 3/4" copper water pipe which just fitted inside the chimney and had the bottom 5/8" made conical so that the inlet was 1 1/8" diameter. The 5/16" diameter throat body was 7/8" long and a tight fit in the pipe, the convergent entry to the throat being approximately the same angle as the cone of the pipe. The exit from the throat was at the same height as the top of three 1/2" wide by 3/8" high "windows" set at 120 degrees apart in the pipe. A concave profile was turned on the top 3/8" of the throat body to guide incoming gas upwards.

A test run at Cheltenham track was disappointing, but I still felt that this is the was the right solution, so the throat was opened out to 3/8" diameter.

On a further test run she had completely changed character. From a cold start, she roared off at full speed holding 60 psi for half a mile. I realised later that the pressure had dropped then only because I was so taken aback by this change that I had forgotten to put any more coal on! She then ran for a further five miles, on two occasions pulling the pressure up from 30 psi (because I had again been dilatory with the shovel) to 75 psi while running and then blew off so violently that, in the cold December air, I could not see the loco on the track and had to stop.

It has not been possible to have any further test ruins because a section of the track at Cheltenham is being replaced. Meanwhile the throat has been opened out to 13/32" to see if even further improvement is possible. The hinged fire door has been replaced with sliding doors so that she can be calmed down quickly when she becomes ecstatic. I hope to fit a larger blast nozzle after further test runs.

In the far distance I can imagine a loose fitting tubular shutter over the windows. This could be raised or lowered by a linkage from the piston rod of a small cylinder with a spring on one side of the piston and boiler pressure on the other. Automatic pressure control? I wonder.

**Andrew Dick, Portishead**

## Monotube Boilers and Patents

SIRS, - The letter from your contributor David Littlewood implies that I am seeking to profit from fellow Model Engineers, in fact just the reverse is the case, and I greatly deplore his comments. Use of the system for which I hold UK and overseas patents, including Australia and the USA,will benefit them not only in far lower material costs and building time, but in overall safety, as pointed out in his letter by Keith Pearson, last November issue. As Serpollet amply demonstrated with his steam trams and railcars, the volume of water contained even in full-size MSG's can be incredibly small, so lowering the category under the HSE regulations. Strictly speaking, no registration is required for anyone building an MSG using this patented system, providing it is for their own use and pleasure, and not intended for sale, but probably wiser to do so as at some time, for bereavement or other reason, it may eventually take place. Model Engineering is basically a hobby activity, but could not survive without the firms and individuals who make a living from supplying the very necessary materials, tools and equipment that we all need, as well as manufacturers of fittings and ready made conventional boilers for those who require them. The patent was initially intended to apply only to full-size steam, but a grey area exists with some of the larger scale models which are becoming very popular.

On a wider field, most enthusiasts are keen to disclose any new ideas that they have, for all to use, an article regarding the SUJEN valve gear which I once devised was published in M.E. 3990, 7 April 1995, possibly the most simple 'reverse from the cab' of any, and well worth considering for all sizes of freelance steam models. Anyone who has a novel idea for a product with commercial potential can apply for a patent, with the choice of employing a Patent Agent or following the DIY route, the former often advised, but for a start, the book '*The Practical Guide for People with a New Idea*' by Laurence Shaw (usual disclaimer), is well worth reading. This covers not only patents but also Design Registration and Copyright, the Patent Office also provide a very comprehensive brochure on the procedure and format for applications. As regards patent legal matters, most of these are covered in Laurence Shaw's book, I myself am fortunate in having very expert advice for the UK and also an American friend who once actually arranged a 3 way telephone conference with the Washington patent office, the problem quickly solved, modern technology certainly helps these days.

**Cyril Cannell. Peel IOM**

## The Deadly Siphon...

SIRS, - (Extract from the *Petroleum Review*, March 1977 on using siphons)

It is a handy technique for emptying your pool, draining a stopped-up sink or 'racking' home made wine. But if your lawnmower needs gasoline — put the hose away and head for the nearest service station.

Two years ago crew members reporting for work on a drilling rig found one of their fellow workers, a tool-pusher, lying dead beside his car. Although there were no witnesses to the accident, it was immediately apparent that the victim had died while siphoning gasoline from his car's fuel tank, presumably to use in the drill-rig's starting engine. It was obvious, too, that death had come quickly, for the siphon was still working, spewing gasoline to the ground. Without autopsy, local authorities investigating the accident attributed the fatality to suffocation by swallowing gasoline.

Unfortunately, too many people who understand the principle of siphoning — drawing liquid from one container to another on a lower level by sucking it into a tube,. usually by mouth, and then letting atmospheric pressure do the work — do not appreciate the hazards of utilising the technique with gasoline, clinical studies have shown that petroleum distillates (such as kerosene, lighter fluid, gasoline, naphtha, some solvents, mineral seal oil) are all capable of causing serious consequences if inhaled or ingested.

The greatest danger is not the effect in the stomach, but that in the

lungs. When gasoline is taken into the mouth, for example, a certain amount may enter the lungs, where it spreads out and causes immediate irritation and tissue damage. The destruction of the tissue causes the lungs to fill with fluid, known as pulmonary oedema, and the victim literally drowns in his own fluids.

In addition, although the toxicity of gasoline in the stomach is considerably less, the substance rapidly enters the bloodstream and can slow breathing and heart function. Since these reactions occur in only a few seconds - the time required to take a breath - death due to a combination of pulmonary oedema and heart failure can result in a matter of minutes. And even if the exposure is not fatal, the damaged lungs can incapacitate the victim for a lengthy period.

There is another potential hazard to be guarded against - the strong likelihood of more gasoline aspirating into the lungs if the victim vomits, This is why products containing light petroleum distillates carry the warning: "If swallowed, do not induce vomiting". Obviously, then, in addition to keeping such products in a safe place, out of the reach of children, there are two safety practices that should be followed. Do not attempt to siphon gasoline or any of the light distillates. If you must siphon, do not attempt to do so by sucking on a length of tube or hose. You can buy a plastic bellows siphon pump quite cheaply in a hardware store. This investment could save your life.

**Tony Finn, by e-mail**

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## Paddling Around

I was most interested to read Ron Isted's article about the "*Dartmouth Castle*" in issue No.4244, for it brought very happy memories – in fact they have never left me – of our 21 years in Dartmouth, to where we moved in June 1950 when my late father, Leslie Hobbs, was appointed Assistant Manager of the River Dart Steamboat Co. Ltd. When he retired in 1971 he was Managing Director of the company that had by then become a subsidiary of Evans & Reid Investment Trust Ltd. of Cardiff, thus joining another business operating primarily out of Brixham.

In 1950 I was 17 and my brother, Tony, 13, and almost the first thing that we did on arrival was to visit the company's boatyard at the head of Old Mill Creek. There we found the hulk of the '*Dartmouth Castle*', already accommodating spoil that was to convert it into a jetty. On the port side paddlebox we found a paint-caked wooden half-moon, although we had no idea what was underneath. As it looked interesting we removed it, took it home and over a period of weeks we discovered the superb carving of Dartmouth Castle with Kingswear Castle in the distance. I'm pleased to say that I still have it.

Mr. Isted tells us where the trio of paddlers are that father left B.R. in Exeter to manage, together with three motor vessels. Several years ago now I received a phone call from a diving instructor asking if I might be able to confirm that he and some colleagues had found the remains of '*Totnes Castle*' in Bigbury Bay. I was able to do that – from dry land I hasten to add – and he returned a while later with a brass nut and a small piece of decking from the paddler! The engine remained in good order.

The weather was blamed for the loss of the '*Totnes Castle*' and I suspect that that was so for the weather does change very quickly if a depression is on the way. Back in 1950 I experienced that for myself when I took a trip on the SteamTug '*Portwey*' from Dartmouth to Plymouth with the very light hull of a former air-sea rescue launch in tow. Once round Start Point it began to blow, and within a matter of minutes I had decided that I would return to Dartmouth by bus. The tug, another of the Evans & Reid assets in Dartmouth, is now very much in preservation in the hands of a trust set up for that purpose.

The '*Totnes Castle*' had a strengthened deck just forward of the wheelhouse because for several weeks each winter she replaced the railway steamer '*The Mew*' on the ferry service between Kingswear and Dartmouth, and that vessel often carried a railway delivery van and the occasional car. It is possible that speed might have contributed to her sinking for the forecast was not good, and it would have been possible to tow her bows under, for there was very little freeboard up for'ard.

What really astounds me about the article is that the writer has had the good fortune to obtain reference to the original drawings of the '*Dartmouth Castle*'. This has been my first visit to your very interesting journal, and for a very good reason. Thank you and, of course, Ron Isted for that.

**John Hobbs, Devon**

## 5.5" Artillery at Larkhill

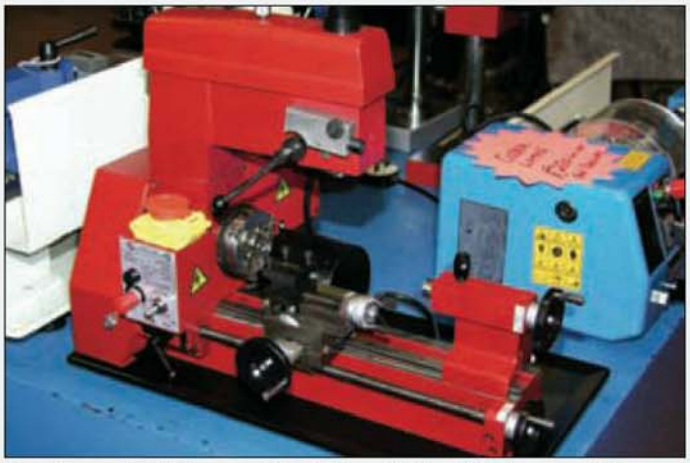
SIRS, - I work for the MOD at the Royal School of Artillery, Larkhill on Salisbury Plain in Wiltshire, so it was very interesting reading the start of David Wilcox's project to build the 5.5" artillery piece.

Like most MOD sites, Larkhill displays many examples of their obsolete equipment including three of these Five Fives, two having riveted chassis and one welded.

Talking to a retired Major, he remembered firing these back in the 1970s. He didn't give an opinion of the effectiveness of the piece but did say that whenever they were tested on the gun, one question was always asked. "How many grease nipples does the gun have?" I believe the answer is 127, certainly over 120,

The Major also said that there was a variant to this design, with a 4.5" barrel. The only surviving example he knows is now displayed in Osnabruk, Germany.

**Peter Gregory, Warminster**



*One of several miniature machine tools available at the show was this Minimulti machine form Chester UK Ltd.*

*S & M Tools were displaying the range of Proxxon small machine tools on their stand.*

# TRADE STANDS
## AT THE 74th MODEL ENGINEER EXHIBITION

**Malcolm Stride**
presents a short tour of the trade stands supporting the Exhibition and provides some useful contact details.

It is always difficult writing a reports of this nature for two reasons, first because there are too many stands to be able to include notes on each and every one and secondly trying to avoid the report becoming just a list of stands.

In an attempt to avoid falling into both of these traps I have decided to concentrate on those stands that particularly caught my eye, thus making this report a very personal view. I will leave it to you, the readers to judge the success or failure of this approach. I also took most of my photographs when the show was closed, mainly for the practical reason that it is virtually impossible to get sensible shots when the show is full!

Can I also start off by saying that inclusion or exclusion of stands in this report does not indicate any preference or recommendation either way. I should also like to record our thanks to all those who made the effort to show their wares at the show, particularly this year with the bank holidays falling on the set-up days making it doubly difficult to find staff willing to man stands. One point I would like to make is that several traders did not have any clear identification of their company on the stands to aid visitors (or your intrepid reporter). I suspect that this may have been the cause of some lost trade.

*One of the range of milling machines on offer on the Warco stand.*

*Doreen Paviour and Mike Chrisp cut the Myford 70th anniversary cake aided by Ivan Law.*

The impression given on my various tours of the Exhibition was of a large number of well stocked stands covering all requirements of our hobby from the brand new, large machine tools down to the 'slightly used' reamer that we want to adapt for some nefarious purpose understood only by ourselves. I sometimes hear criticism of the inclusion in the show of those selling used cutting tools but judging from the crowds who flock to such stands and also my own personal experience, they are a very good (and cheap) source of tools which in our situation may only get used once for a particular project. After all if we can save some of our, mostly meagre, budget in one area it does give us more to spend in other areas.

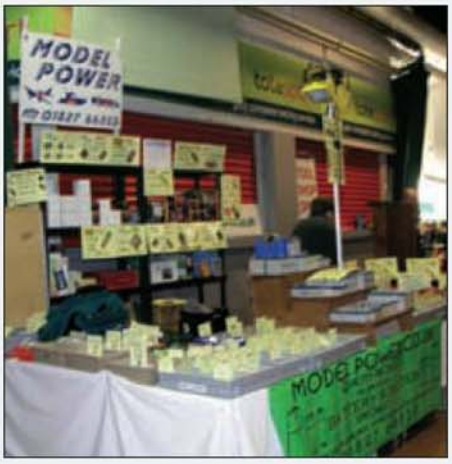
The first thing I noticed this year was that a number of stands were selling small lathes and milling machines which would fit into a very small space and to a beginner would obviously not be as daunting as a large 12in. swing lathe. The first group I shall consider is therefore 'small machine tools'. The first of these I discovered at **Chester UK Ltd. (tel: 01244-531631; website: www.chesteruk.net)** who amongst their usual vast selection of machines had their very neat 'Minimulti' machine, which has 125mm swing and 200mm between centres and comes with variable speed control. It also can be fitted with a milling/drilling attachment, which for those with limited space would seem to be a very good idea.

A machine of similar size and type was to be found in the **Proxxon** range being shown on the **S&M Tools (tel: 0207-831-8366)** stand. This range of small machines and tools appears to be very well made and the range is certainly wide. The one that caught my eye was the PD400 lathe.

Another company with a wide range of machines and associated tooling is **Warco (tel: 01428-682929; website: www.warco.co.uk )** who also carry a range of smaller machines. They were showing a new range of variable speed

*Phase conversion technology was available on the Boost Energy Systems stand.*


*JB Cutting Tools had a large range of lathe and other tooling on their well stocked stand.*




*Rechargeable batteries were one of many items for sale on the ModelPower Co. UK stand.*

*Somoso Products always have a large range of modelling products on offer.*

machines which Warco boss Roger Warren sees as the way forward. It certainly will save a lot of fiddling around changing speed. The range includes several lathes and also a very neat looking small milling machine with a tilting head.

Another company with small lathes (although larger than those mentioned above) is of course **Myford Ltd., (tel: 0115-925-4222; website: www.myford.com)** who had their stand right beside the main entrance. This long established company (70 years and a cake to prove it) had a range of their ever popular lathes and accessories on show and was attracting visitors as they came through the doors.

Of course, if you are looking for second hand machines or accessories for such machines then you will be heading for a machine tool dealers such as **Home and Workshop Machinery (tel: 0208-3009070; website: www.homeandworkshop.co.uk)** who, as usual, had a good selection of machines tools and accessories available.

For those who like large machines with three phase power, or perhaps have acquired a second hand three phase machine, **Boost Energy Systems (tel: 01344-303311; website: www.boost-energy.co.uk)** produce a range of phase converters and accessories to power such machines from a single phase supply.

Of course having bought our new machine tool, we will require some cutting tools for it and this need was well catered for by Jean Blackwell of **J B Cutting Tools (tel: 01246-418110)** who had what seemed to be a much larger stand than previously with an even more extensive range of replaceable tool tips and milling cutters. I saw many visitors taking advantage of this during my time at the show.

Moving away from the machine tool suppliers, I have decided to have as the second group, those traders who were providing all those useful non–engineering items that we all need. The first of these was **ModelPower Co. UK (tel: 01827-711501, website: www.modelpower.co.uk)** who had a wide variety of rechargeable batteries, both in packs and single, together with a variety of chargers. With the increase in the use of digital cameras, there must have been many who like me bought a spare set of batteries.

*5-Star adhesives could supply you with adhesive, tissue and cellulose dope.*

A company that included similar products in their range was **Somoso Products (tel: 023-8022-9223).** Somoso also had a good selection of other modelling products including items like silicon tubing and some very nice three bladed, carbon fibre aircraft propellers. I have to admit that I managed to resist the temptation to buy one of the latter items for one of my engines. The display also included flying model aircraft kits of various types.

Without wishing to ignite the sometimes lively debate about the use of adhesives in model engineering, we all need such items from time to time and our needs were provided by **Hafixs Adhesives** whose products are suitable for a wide variety of materials.

Another supplier of such things was **5-Star Adhesives** who also had a range of products aimed at the model aircraft builder including covering tissue and cellulose dope.

Whilst on the subject of 'sticking things together' I must mention **Shesto Ltd. (tel: 0208 4516188)** who along with their wide variety of products were demonstrating the art of silver soldering with their range of Sievert brazing torches. I am sure several of our readers will have gained useful tips from the demonstrations.

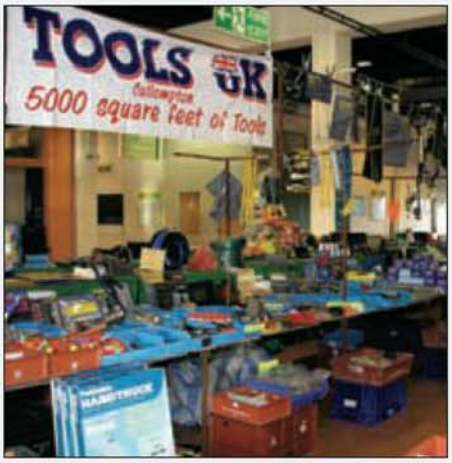
Of course, we as engineers will usually resort to bolting things together in the traditional way and those looking for such things will no doubt have found what they were looking for at **EKP Supplies (tel: 01598-710892)** who had an extensive range of fastenings and other items on their stand.

Those who wanted hand tools were also well catered for with several companies bringing what appeared to be vast quantities of such items. ▶


*Offering a range of industrial grade adhesives was Hafixs who gave practical demonstrations on their stand.*


*Shesto offer a wide range of items for the model engineer, clock makers and hobbyist and demonstrated Sievert equipment throughout the show.*

*Fastener were supplied with a smile on the EKP Supplies stand.*




*A wide range of tools were on offer on the Tools UK stand.*

*Tony Green Models brought plenty of stock to ensure customers went home satisfied.*

**Tools UK (tel: 01884-34415)** came all the way from Devon with a very good selection and in fact their banner quoted '5000 square feet of tools'. Another well stocked stand could be found at **AB Tools (tel: 01630-672748)** who had some very good offers to tempt visitors.

On now to my third group of suppliers, those who supply ready made models or other items which we need for our activities. Amongst these must be included those who supply small gauge live steam railway items which have certainly encouraged many into the world of model engineering. One man with a very large selection was Tony green of **Tony Green Steam Models (tel: 01522-681989)** who had a wide variety of both steam and electric models on his stand together with other accessories for those engaged in this facet of our hobby.

**Chalk Garden Rail (tel: 01474-351672)** was aimed squarely at the garden rail area. They had a wide range of mainly continental style locomotives, rolling stock and accessories on their stand for those who like to be able to lift their models easily.

A different range of models was that being shown by Adrian Grimmett of **LA Services Ltd (tel: 01455-220340, website: www.theengineersemporium.co.uk )** who had a range of small kits on his stand including an interesting hot air engine and a hot air engine powered tractor. Both of these are ready to assemble kits and would be a good introduction to the hobby for youngsters. Adrian also had his range of other engines and a selection of 'pre-owned' items for visitors to peruse.

Another well known supplier of modern type locomotive kits and parts is **Compass House Tools (tel: 01892-852968, website: www.compass-house.co.uk )** who also had a range of their locomotives and parts available for the visitor.

For those who prefer steam locomotives, **Polly Models (tel: 0115-973-6700)** was the place to visit. Not only do they produce the well-known 'Polly' loco kits but also now have the range of fittings etc. from Bruce Engineering. The latter also includes Anthony Mount's range of unusual stationary engines. When I took the photograph it appeared that Anthony was in great danger of being overrun by his engines, there were so many on display.

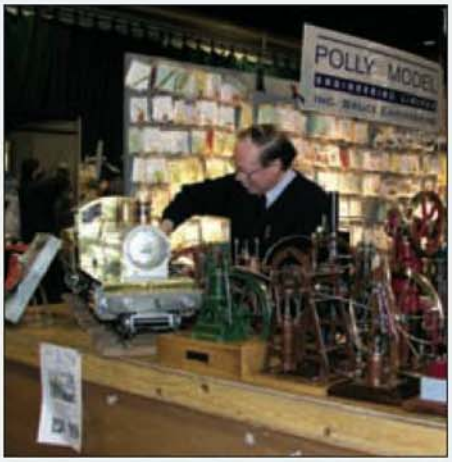
Finally I will round off with a company that produces items which I am sure will be extremely well received by those who display their models at exhibitions. One of the problems we face is that of obtaining suitable name plates for the display stand. **Name It (tel: 01895-832-757)** provide the solution with their extensive range of mail order engraved plates in a range of sizes and styles. There was a lot of interest in their products when I visited the stand.

I hope the above has provided a flavour of the trade stands for those that did not visit, and if you were there, perhaps it has reminded you of companies that you visited and need further information from. I have included the relevant telephone and internet addresses for that reason.

*Looking after garden rail enthusiasts was Chalk Garden Rail.*


*One of a range of model kits available on the L.A. Services stand.*


*Compass House Tools can supply modern locomotive kits and parts.*




*Anthony Mount risks being swamped by models on the Polly Models stand.*

*Custom name plates were on offer on the Name It stand.*

*Edward Perera and Comet*

# STEAMING INTO THE SKY

**Edward Perera**
**a model engineer working under difficult conditions, succeeds where full-sized failed.**

Once upon a time there were designs for steam-powered aircraft. As far as is known none actually flew. So we were delighted to hear from Edward Perera in Sri Lanka, who has just completed and successfully flown one in model form.

Edward is an experienced model engineer. He has made a variety of steam engines, Stirling engines, radio-controlled planes, helicopters, boats, and more besides. His enthusiasm can be gauged by the fact that there are no hobby shops, or local sources of materials and tools. For this latest venture, metals and tools such BA taps and dies had to be imported from India.

The project began when Edward managed to get hold of the articles on the steam powered Comet written by David Parker in Model Engineer in May, June and July 1989. Assisted by sons Collin and Amith, the plane was completed.

On a cool morning with no wind, the aircraft was fuelled with 75cc of methanol, displacement lubricator topped up, and the boiler filled with 150cc of water. The pressure gauge relief valve was set to 100psi. With the operating pressure at 80 psi, the 12 x 6 inch propeller was encouraged to move and the silent engine pushed the roaring prop to 3,600 rpm.

The Comet started rolling on a straight line, lifted off, and climbed easily to 500 feet with no change in the trim on the rudder or elevator. That maiden flight lasted an impressive four-and-a-half minutes.

Edward describes building the Comet as the most enjoyable project he has undertaken. He wrote to Model Engineer to thank the magazine and David Parker for "giving me the opportunity to get involved in such a project which demanded all my experience in various forms of engineering."

***Above: The Comet's boiler***

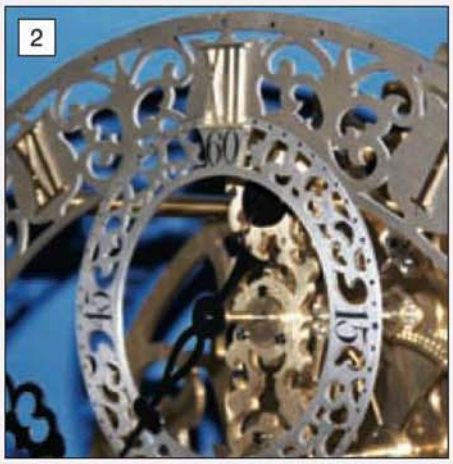
***Left: Single cylinder engine fitted into housing***

The engine and boiler are contained in an aluminium housing which is an integral part of the fuselage structure. The engine is single cylinder double acting with a bore and stroke of .625in. The steam port width is 0.062in and the exhaust 0.125in. Port bar width is 0.062 and port opening to steam 0.032. Valve lap is 0.094in. and valve travel 0.250in.

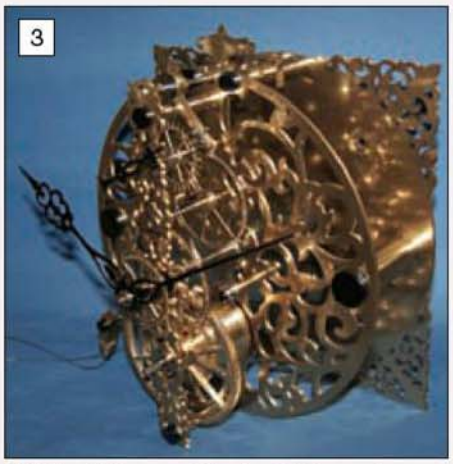
The aircraft has a wingspan of 83in. and length of 44 in. Total weight in ready to fly condition is 58.62 oz (1659 gm.)

Edward kindly sent us a DVD showing construction of the aircraft, and its impressive maiden flight. He is to be congratulated on constructing a fine model which performs well despite the difficulties of being a model engineer in Sri Lanka.

*A general view of the movement. Note the piercing on the dial and motion plates.*



*In this design the seconds ring is let into the main dial ring.*



*With the dial removed the front plate can be seen more easily.*

# AN UPDATED CLAUDE REEVE EIGHT-DAY REGULATOR CLOCK

**John Wilding FBHI**

introduces us to a revised version of a stunning clock.

●*Part I*

This handsome clock was serialised in *Model Engineer* in six installments commencing *M.E.* 3296, 6 May 1966. It is in fact a loose copy of the famous Pickering regulators one of which can be seen at the headquarters of the British Horological Institute at Upton Hall, near Newark.

As can be seen from **photos 1** to **6**, it is an extremely ornate movement with an enormous amount of piercing. It is remarkable that despite all this decorative work Claude Reeve does not give any instructions or information on the way to carry this out. I do not know how many of these clocks have been made but I have only seen two. It is probably the piercing work which puts most people off. Today there are several options regarding this procedure, including wire erosion, and I will be covering the various ways in detail.

Although this clock is referred to as a 'regulator', this is not strictly correct. It is generally accepted that the term 'regulator' implies that the movement has certain characteristic features. It will for instance have a quality escapement, be fitted with maintaining work, have a compensated pendulum and have hands fitted to extensions of the arbors in preference to motion work. Finally the wheel train will be mounted in a rigid framework. Regulators usually have plates not less than 1/8in. but more usually 3/16in. or 1/4in. and five pillars of substantial proportions. It is the last feature where this clock falls down. There is not the rigidity in this frame to qualify the clock for the term 'regulator'.

Full size drawings of this clock are available from Highbury Lifestyle Special Interest's Plans Service (tel: Customer Services on 01689 886660) and these are essential as the procedure for fretting out the plates is to cut out the full size drawing and paste it onto the brass. In addition, if required, the original articles are available from the same source (*the articles ran in consecutive issues-Ed.*). This enables me to confine my role to describing the parts that Claude failed to cover and to correct the small number of errors in the drawings.

The reader must remember that this serial was written some forty years ago and techniques have advanced since then. Claude used 1/8in. BSW threads frequently but there is no need to buy taps and dies in this size as 5BA is a more natural choice today.

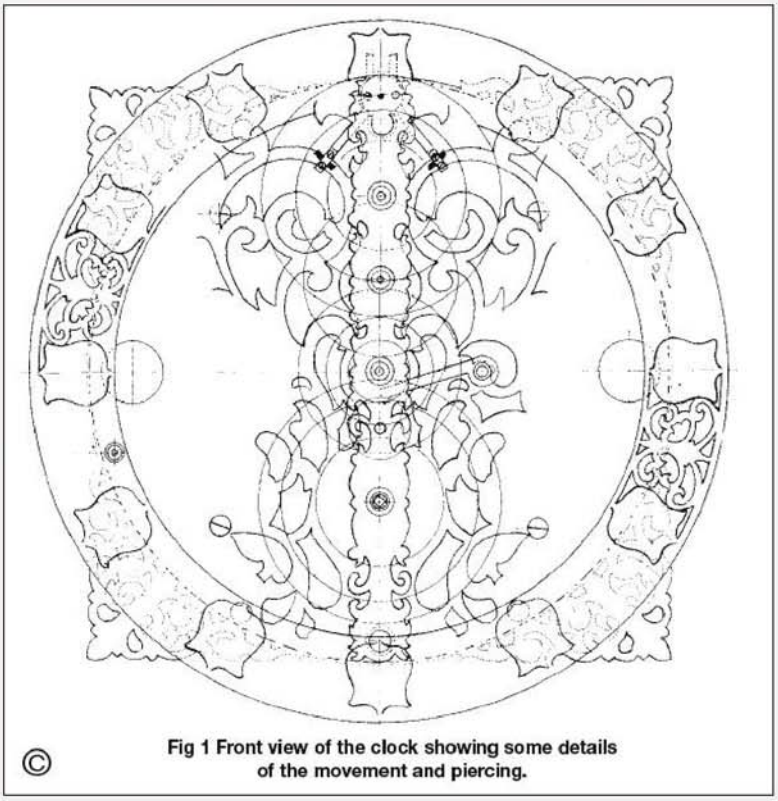
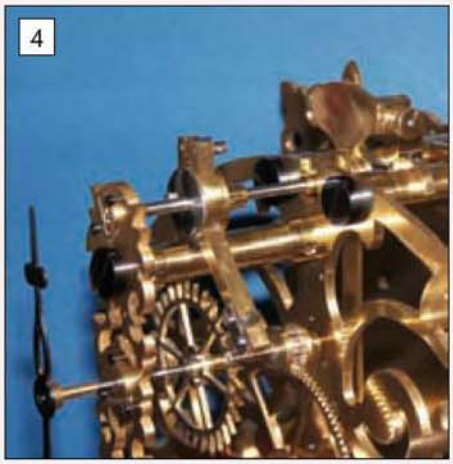


**Fig 1 Front view of the clock showing some details of the movement and piercing.**

The clock is of eight-day duration and the train is conventional with high tooth numbers and lantern pinions of 14 pins. One 0.6 module wheel cutter will cut all the wheels in the clock including the motion work. The arbors could perfectly well be pivoted in the front and back plates but bronze bushes have been specified, each one held with three 10BA screws equally spaced on a common pitch circle. In the original serial the only photographs provided were of finished assemblies. Today, readers expect constructional illustrations and I will be providing these.

There are two serious errors of which I shall warn the reader now in case the parts are made in a haphazard order. The first is the screw cutting of the barrel, which Claude says, should be 12 threads per inch. The length of the barrel is only 1 1/4in. and the clock will not run for eight days under these circumstances. The barrel should be screw cut 14 threads per inch. The other error is in the size of the weight.




*A close-up, general view of the fully adjustable pallet assembly.*


*On the left can be seen the driving weight whilst on the right is the pendulum bob.*


*Even the weight pulley is designed to carry its full share of ornamentation on this clock.*

Claude gives a diameter of 3in. for the tube but this will foul the pendulum bob even if the grooving is carried out left handed to take the weight away from the pendulum as it descends. I have used tubing 2 3/8in. dia. and 4 1/2in. in length.

In domestic clocks it is quite common to have to bend parts when making minor adjustments; the crutch arm is a case in point. However in quality clockwork any adjustments needed are achievable by screw operation. Thus the beat setting in this clock is adjusted by rotating knurled screws and the pallets have no less than three different adjustments. The opening and closing of the pallet frame, the raising and lowering of the pallet arbor to equalise the drops, and 'setting in beat' can all be controlled by adjusting screws with the clock running and so it is possible to achieve a very precise action to the escapement.

The appearance of the clock is quite stunning although the preponderance of piercing may not appeal to everyone. If you want to make a standard, English regulator with solid plates and the traditional dial then this is covered in my book *How to make an English Regulator* (ref 1).

Because of the delicate nature of the clock frame and the general lack of rigidity it is hardly worth the expense of fitting a compensated pendulum rod. The clock will still give a rate within a few seconds a week with a mild steel rod. It is a clock designed for its visual appeal rather than precision time-keeping.

I am not giving a material list as the quantities and lengths can be ascertained from the full size drawings. However the reader may want to order the brass for the main plates and the dial, as this is the starting point for the construction.

Two 10in. squares of 1/8in. brass are required. One of these is the movement mounting plate and is screwed to the backboard of the case. The other is the circular back movement plate. The front movement plate is a narrow strip, also 1/8in. thick, 1 1/8in. wide and 10in. in length. A further 12in. square of 1/16in. thick brass is needed for the dial ring. It is important that all this brass is of the 'compo' type which has a small amount of lead in it, as this machines very easily. It is very laborious to try and fret out brass of the common sheet type (ref 2).

I have put my movement in a standard regulator case, floor standing with glass side panels, but Claude designed a case for this clock and he published a description of this in *M.E.* 3597, 17 November 1978. For those interested, some pictures of Claude's clock can be found in the well-known book *Skeleton Clocks* by Royer-Collard.

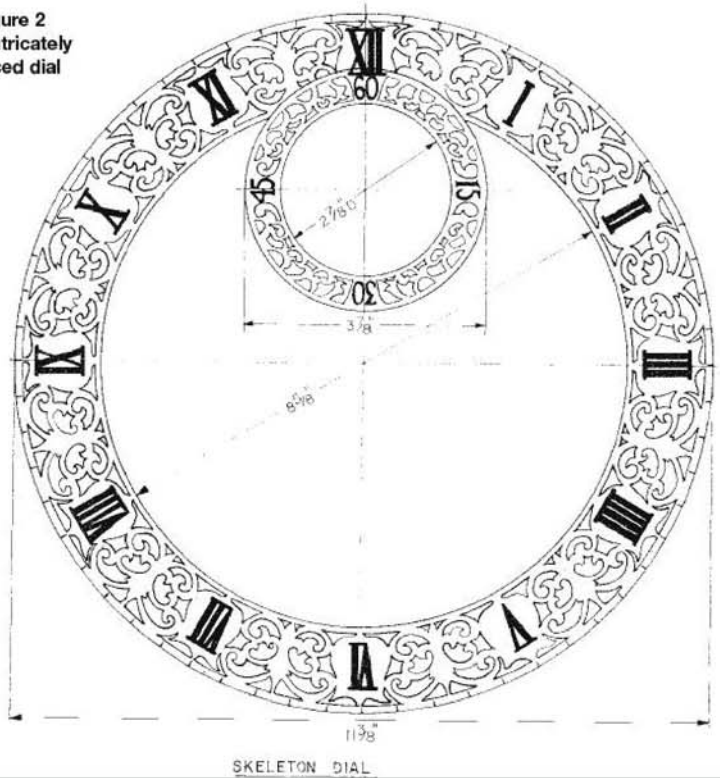
This clock is not recommended for the beginner. There are many far simpler designs available for that category of constructor. Clocks specially designed for beginners are suggested in my brochure available from Rite Time Publishing. Readers should note that some of the early pictures of the construction of this clock are in black and white. These were taken before I obtained my digital camera.

## References

1: Rite Time Publishing, 18 Woolmer Way, Bordon, Hants GU35 9QF; tel: 01420-487747
2: College Engineering Supplies (tel: 01902-842284) can supply all the brass for this clock.

●*To be continued.*

**Figure 2**
**The intricately pierced dial**





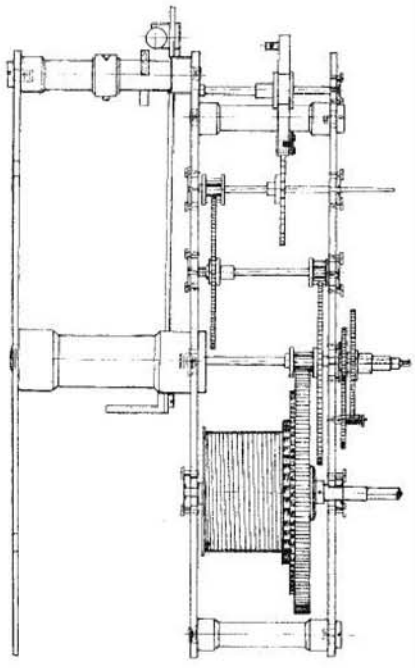





**Figure 3**
**Side view of the movement**

*The eccentric mandrel used to form the four lobes in which the teeth were cut. Note the two pins for location purposes.*

*The Morse taper mandrel on which the finished hob is mounted and fitted into the spindle of the Dore Westbury milling machine.*

# GEAR CUTTING USING HOBS

**A. W. Easton**

**explains how he combined the techniques of two other contributors to cut a set of change gears for metric screw cutting.**

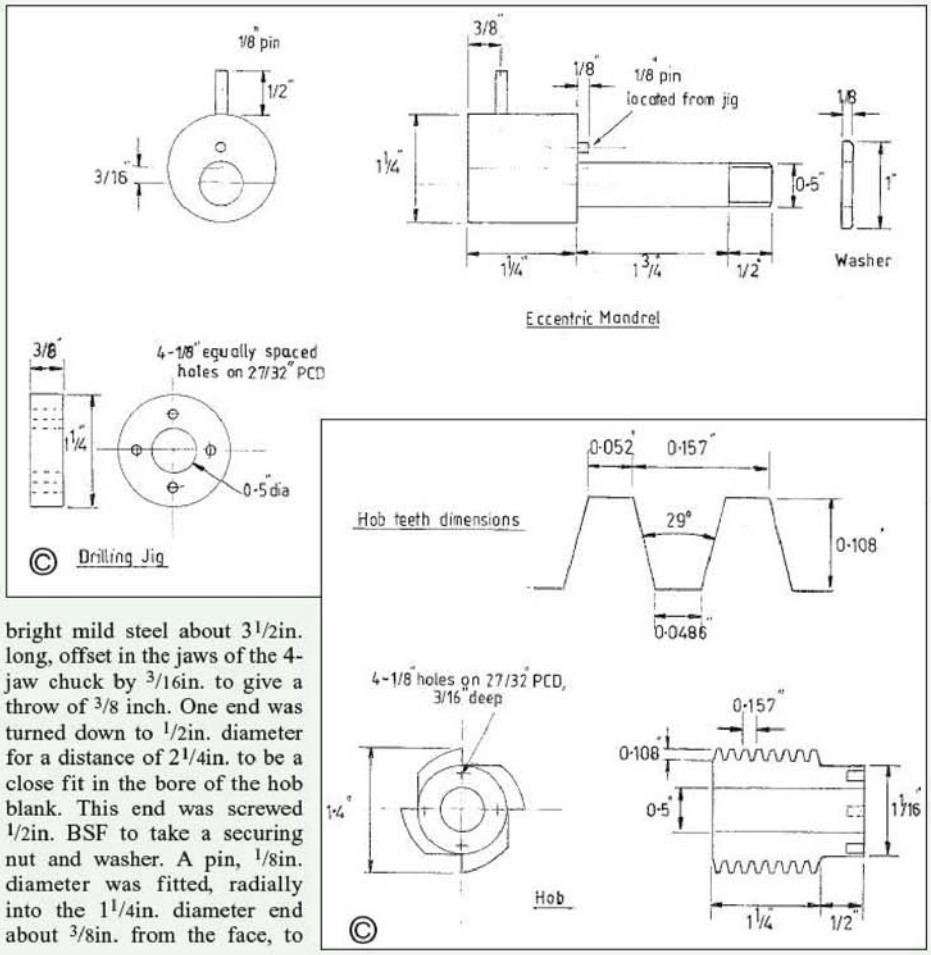
In two issues of *Model Engineer* (*M.E.* 3352,6 September 1968 and *M.E.* 3353 20 September 1968) the late Jack Radford of New Zealand described a method of making a straight hob for cutting spur gears of any number of teeth but all of the same diametral pitch. Mr. Radford was faced with the job of having to cut a number of 20DP gears but all of differing numbers of teeth. The cost of buying the necessary cutters to do this job was prohibitive so he designed his straight hob that would cut any number of teeth, from the smallest down to a rack.

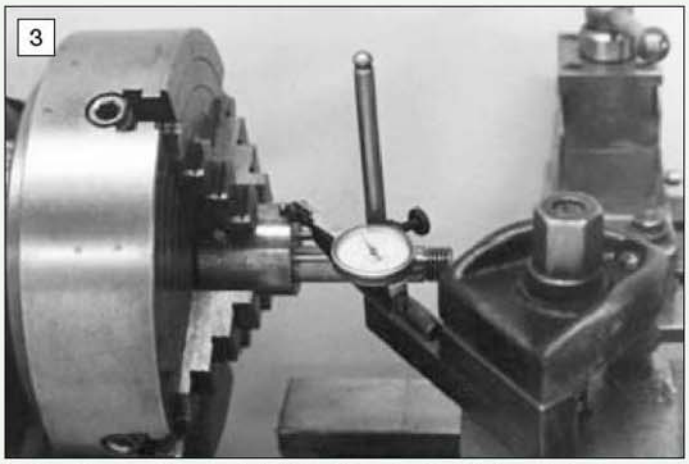
I wanted to make a metric screw cutting conversion kit for my Myford Super 7B lathe. This machine is fitted with a quick-change gearbox arranged to cut imperial threads. The metric conversion unit consists of a quadrant and 12 gear wheels ranging from 28 teeth to 63 teeth. To cut these gears using commercial cutters would require three cutters and after being quoted 50 Australian Dollars (about GBP20) for a rather sad looking secondhand cutter, I decided there had to be another way, so I looked at Jack Radford's scheme. There were some drawbacks to it from my point of view. It would be necessary to make a separate cutter for the sole purpose of backing off the teeth of the hob. Three castings would be needed for the backing-off fixture. After the hob was turned it would then have to be backed-off, using this fixture. All this expense and preparatory work could be by-passed, I thought, if a hob was made using the system described by D. J. Unwin in *M.E.* of 21 August 1970. I had already proved in practice that Mr. Unwin's method of making form-relieved, disc type cutters was successful and I reasoned that it should work for multi-point cutters as well. I decided that that was the way to go.

I commenced with the hob blank. This was a stub of 1 1/2in. dia. high speed steel (HSS) which was faced off to a length of 1 3/4in. and then bored through 1/2in. diameter. This dimension had to be a close fit on both the eccentric mandrel and the arbor that was to drive the hob. The principle that it is easier to make a shaft to fit a hole than the other way around prompted this initial operation. One end of the blank was reduced to 1 1/16in. dia. for a distance of 1/2 inch. The outside diameter of the blank was not important – mine finished up at 1.4 inch. The final operation was to mount the blank on a true running mandrel and skim both end faces, to make sure they were parallel.

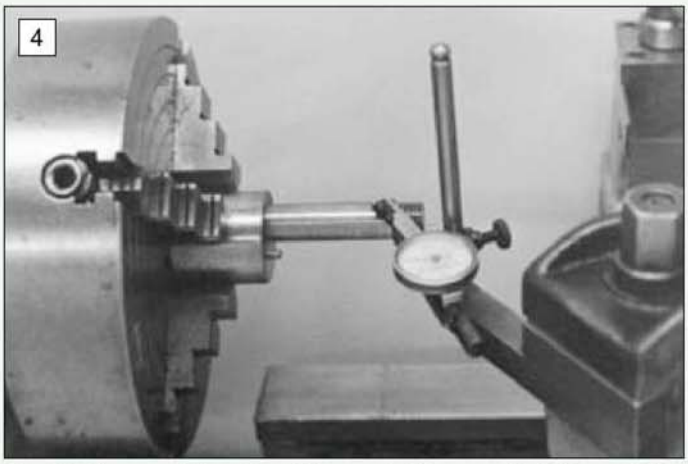
The next step was to make the eccentric mandrel (**photo 1**) on which the hob was to be finish turned. This was a length of 1 1/4in. dia. bright mild steel about 3 1/2in. long, offset in the jaws of the 4-jaw chuck by 3/16in. to give a throw of 3/8 inch. One end was turned down to 1/2in. diameter for a distance of 2 1/4in. to be a close fit in the bore of the hob blank. This end was screwed 1/2in. BSF to take a securing nut and washer. A pin, 1/8in. diameter was fitted, radially into the 1 1/4in. diameter end about 3/8in. from the face, to butt against one of the chuck jaws to prevent any chance of the job moving around in the jaws during the subsequent turning operations on the hob.

The gears were cut in a Dore-Westbury miller with the gear blanks mounted on a Morse taper mandrel fitted into the spindle of a Geo. Thomas versatile dividing head, which has a Myford pattern nose. The gear hob was driven on a Morse taper arbor (**photo 2**) fitted into the miller spindle. Making this arbor was the next step. The No. 2 Morse taper end was turned first. The piece was plugged into the lathe spindle and the other





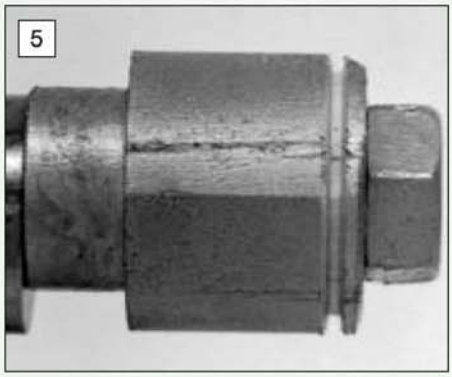
*Setting the eccentric mandrel in the 4-jaw chuck with the main body running true.*



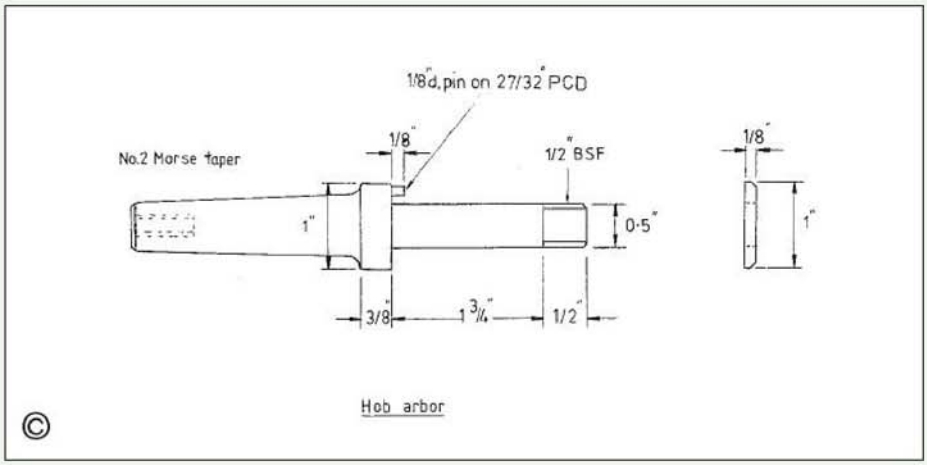
*Checking the eccentric portion of the mandrel to ensure that it is parallel to the bed of the lathe. Check in two positions at 90deg. to one another.*

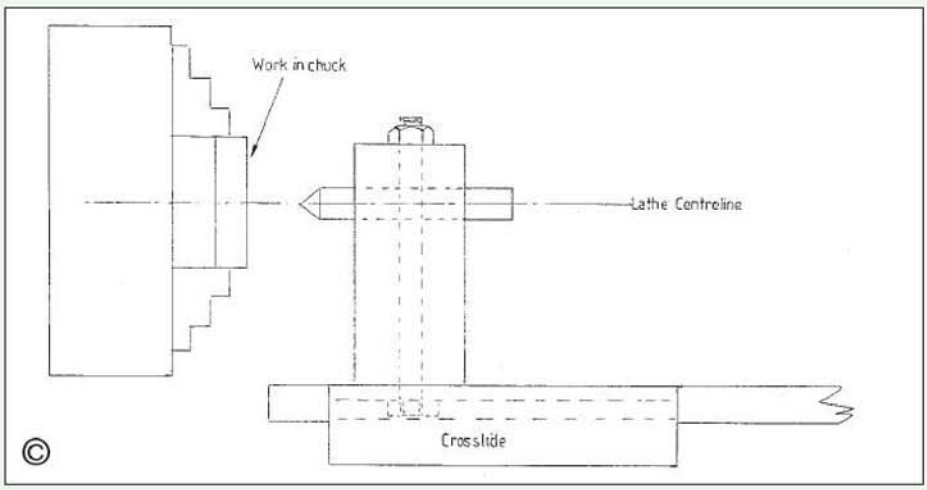
end reduced to 1/2in. dia. for a length of 2 1/4in., a close fit in the bore of the hob blank. The end was screwed 1/2in. BSF for a nut and washer. Four 1/8in. dia. holes were drilled in the 1 1/16in. dia. end of the hob blank at 27/32in. pitch circle diameter. Their purpose was to allow the blank to be indexed around on the eccentric mandrel a quarter of a turn each time. A 1/8in. dia. pin was let into the face of the eccentric mandrel against which the blank abuts, at the same pitch circle diameter, to enter each of the holes in the blank face in turn. Another 1/8in. dia. pin is fitted into the face of the hob taper shanked arbor at 27/32in. pitch circle diameter to give a positive drive to augment the frictional drive given to the hob by the nut and washer.

To make sure that the holes in the blank and the pin in the mandrel were all at the same pitch



*A wooden hob blank made to illustrate the machining principles first described by D. Unwin.*

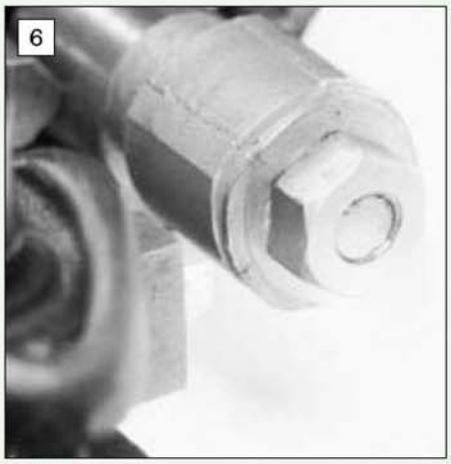


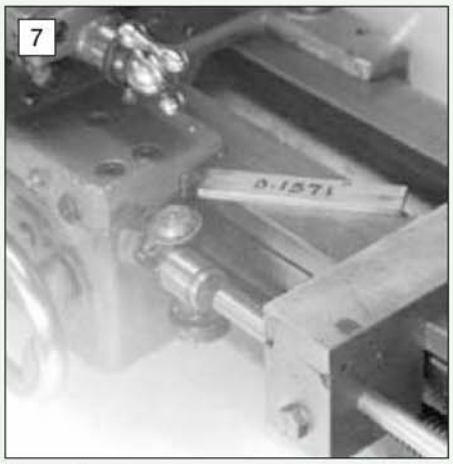

circle, I made a simple jig. This was a piece of 1 1/4in. dia. bright mild steel, faced parallel to about 3/8in. thick and bored 1/2in. dia., again a close fit on the arbor and the eccentric mandrel. While still in the chuck the piece was indexed around a quarter of a turn each time and the hole positions centre-punched. I have made a fitting for this purpose. It consists of a length of 1 1/4in. square bright mild steel, about 2 1/2in. long, faced both ends and a 9/32in. dia. hole put through axially to take a bolt to secure it to the lathe cross-slide. Once bolted down a 3/8in. dia. hole is put through to one side to miss the holding-down bolt, using a series of drills held in the lathe chuck, to give a neat fit for a piece of 3/8in. dia. silver steel. This piece is turned to a point, hardened and slid through the hole in the square pillar, giving a centre punch, which is exactly on the lathe centre line. In use, the point of the punch was brought to a pitch circle diameter of 27/32in. by first aligning the point, by eye, with the edge of the piece in the chuck and then, using the cross-slide dial index, advancing the cross-slide by 0.203 inch.

A light tap on the end of the punch, enough to make a mark but not enough to move the piece in the chuck, will give the hole position. The lathe saddle was not moved until all holes had been punched. This was in case the punch was not lying parallel with the lathe bed. The dimension of 27/32in. for the pitch circle is not critical but it must be the same on the hob blank, the indexing mandrel and the hob arbor, because the blank has to be fitted on both mandrel and arbor. The lightly punched holes in the jig were deepened and four 1/8in. holes were drilled. Reaming these holes would perhaps have been better, to ensure a good fit on the pins over which they were to fit. The jig was now slipped over the 1/2in. dia. portion of the mandrel and a 1/8in. dia. hole drilled about 3/16in. deep in the face of the 1 1/4in. dia. section of the mandrel to take a 1/8in. dia. pin. I had to make up a sleeve and Loctite a 1/8in. dia. drill in it to get the length to drill this hole. I also put a spot of Loctite 601 on the pin to secure it more firmly in the hole.

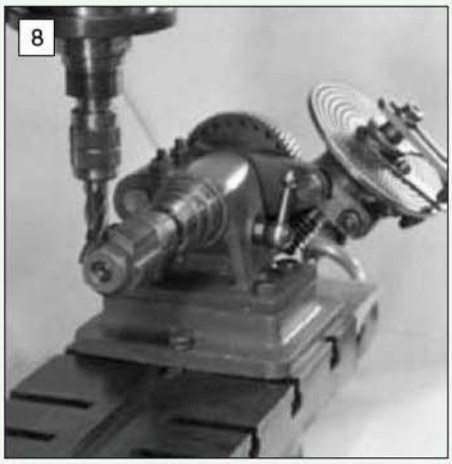
The jig was now used to drill the four 1/8in. dia. holes in the end face of the hob blank. This was the end that had been turned down to 1 1/16in. diameter. A piece of mild steel was turned to a neat fit in the bores of the jig and the hob blank and used to centralise the jig over the blank and the first hole drilled. A piece of 1/8in. dia. silver steel was pushed through the hole in the jig into the hole in the blank and this served to prevent movement while the remaining three holes were drilled. Finally, the jig was slipped over the hob ▶



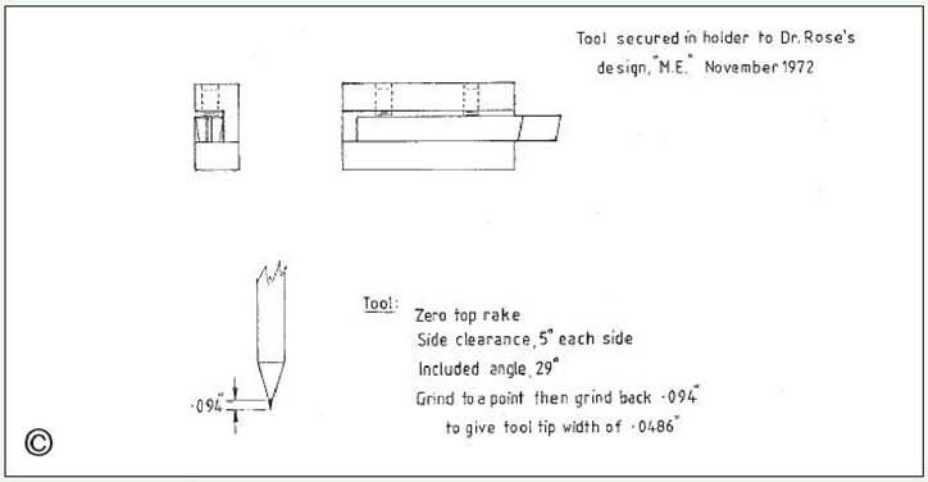
*Another view of the wooden dummy hob showing the four lobes.*



*The saddle stop arrangement used to advance the lathe saddle 0.1571in. for each groove.*



*Milling the grooves along the hob on the Dore Westbury milling machine.*



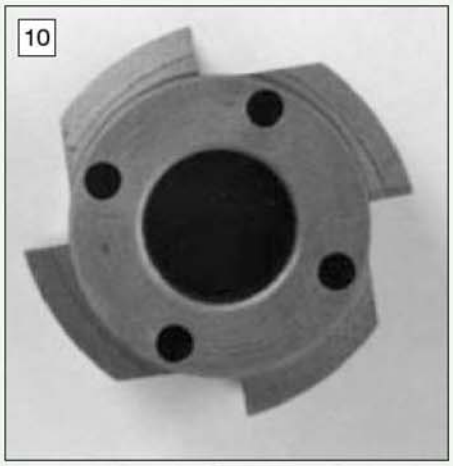

driving arbor and a 1/8in. hole drilled in the face and a pin fitted.

The next operation was the turning of the hob blank. The indexing mandrel was gripped in the 4-jaw chuck with the 1/8in. radial driving pin against one of the jaws. I chose the 4-jaw because of its better gripping power - the pin is just extra insurance against slippage. The mandrel was set to run true on the 1 1/4in. dia. section (**photo 3**). I also ran a dial indicator along the top surface of the diameter eccentric portion to make sure it was true and that there would not be any wobble in the completed hob (**photo 4**). The hob blank was slipped over the mandrel with one of its four holes fitted over the pin in the mandrel face and the nut tightened. With the blank rotating out of centre the first segment or lobe was turned until the machined area was about one quarter of the circumference of the blank (**photo 5**). The cross slide feed index reading was noted. The nut was loosened, the blank withdrawn from the pin and moved around a quarter of a turn until the next hole aligned with the pin. The operation was repeated until all four lobes were turned (**photo 6**).

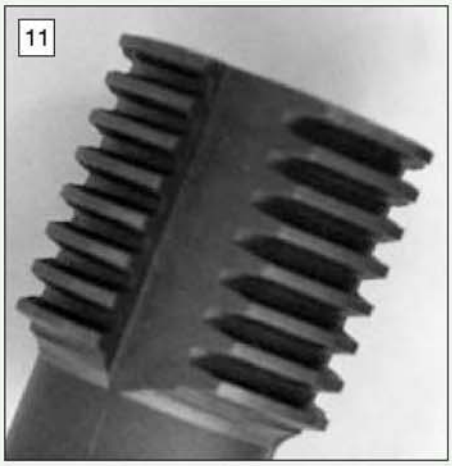
The hob teeth for 20DP are at a pitch of 0.1571in. and are 0.108in. deep, with an included angle of 29deg., (for gears with a pressure angle of 14 1/2 degrees). I ground the tool for cutting tooth grooves from a 5/16in. square HSS bit on a Quorn tool and cutter grinder. Getting the correct tool tip width posed a problem, as I had no means of measuring it accurately, but I calculated that by grinding the tip to a point and then grinding the point back by 0.094in. it should give the tool width of 0.0486 inch. This was easily done on the Quorn and the result looked about right. The tool was set up and forming of the tooth grooves begun. The procedure was a repetition of the previous operation, only this time the tool was fed in for a distance of 0.108 inch. I relied on the cross slide index dial to get each groove the same depth but a cross slide stop probably would have been better. After the blank was indexed around four times and a groove had been cut in each of the four lobes, the saddle was moved along 0.157in. for cutting the second set of grooves. The leadscrew clasp nut was kept engaged for the whole of this operation and the leadscrew dial used to advance the saddle the pitch distance of 0.157 inch. As a further check, I had a stop block bolted to the front shear of the lathe to the right of the saddle. This had a 3/8in. dia. rod through it which could be slid along to butt against the bolt which secures the lathe screw cutting indicator dial and then locked in place. I used a piece of flat bright mild steel, reduced to 0.157in. thick, as a slip gauge between this rod and the star wheel nut (**photo 7**). The tool had 5deg. clearance on both sides but zero top rake, so as not to alter its profile. Cutting was assisted by liberal doses of sulphurised cutting oil.

I cut seven grooves, then took the blank off the mandrel and fitted it on its Morse taper driving arbor. This was in turn plugged into the spindle of the dividing head, mounted on the table of the milling machine. Four gashes were made along the hob to make the cutting edges (**photos 8** and **9**). Care was taken to see that the apex of the lobe was on 'top centre' and that the milling cutter

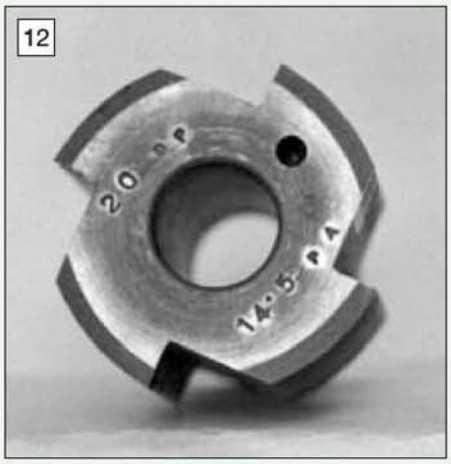
*Close-up of the grooving operation. This aspect of making the hob is here seen nearing completion.*



*The holes in the end of the hob used for indexing purposes on the eccentric mandrel.*



*A close-up view of one of the cutting edges on the finished hob.*




*The hob should be marked to permit easy identification. The hole is to give a positive drive.*


*A gear being cut in the Dore Westbury. Indexing is via the G. Thomas dividing head.*


*The finished metric gear cutting conversion set for the Myford Super 7B in its box.*

was positioned so that the cutting edges so formed would be radial to the hob. I made these gashes about 5/32in. deep. Readers who make this hob will note that the finished hob may differ from the sketch inasmuch as the four 1/8in. dia. holes in its end face (**photo 10**) may not lie on the radii of the hob. This does not matter and the drawing only depicts the face in which the holes are drilled rather than give an exact location.

I had the hob professionally hardened and tempered and then gave it a light sharpening cut ground off the cutting edges. I used this hob to cut all twelve of the gears (**photo 12**) for the metric conversion kit for the Super 7 lathe plus a small gear for the handwheel traverse for a Myford ML7. All the gears run together very smoothly and quietly.

In his original article, Jack Radford stated that after cutting all the teeth in a gear he then indexed around a second time, this time with a tooth instead of a space on the centreline and the hob advanced by half the pitch. This finishes off and undercuts the bottom of the tooth space each side of the central tooth.

The concept of this hob was not an original idea of mine but rather a bringing together of the ideas of two other contributors to *Model Engineer*. These were the late Jack Radford who devised the notion of the straight hob and D. J. Unwin who gave me the idea of backing off a cutter using an eccentric turning method. By eccentric, I mean in the engineering sense of course! I am indebted to both of them.

# A MODEL VOLKSWAGEN ENGINE

**Brian Perkins,**
deals with final assembly and testing.

●*Part V continued from page 501 (M.E. 4246, 29 April 2005)*

Having machined flanges for the exhaust ports, adaptor blocks for the inlet ports and a semi-down draught mounting for the carburettor, I had the problem of producing the necessary bent tubes. Due to the close proximity of the front cylinder exhaust port to the propeller quite a tight bend is needed so I made up a pipe bender with formed rollers to give me a 15mm internal radius on 10mm outer diameter tube and tried bending a piece. It was hopeless! A telephone call to a steam engine building friend resulted in the suggestion of filling them with Wood's metal.

This reminded me of another article in *Strictly I.C.* which I dug out and studied and armed with this information and a container full of the necessary metal supplied by the aforesaid friend I started to boil up some water.

The copper exhaust pipes went round like a dream and I soon had a set of four bent to the wire templates I had previously made. After silver-soldering them to the flanges and we had an exhaust system.

Suitably encouraged I proceeded to bend the aluminium alloy tubes for the inlet manifold but halfway round the bend the back of the pipe split with a resounding crack. It appeared that the friction between the filler metal and the tube was greater than the strength of the tube material even though I had oiled the tubes as suggested in the article. Somewhat chastened I gave the matter some thought and decided to have another go with considerably less force on the bending lever. This was better as I had almost completed the bend before it let go again. In the end I found that the way to do it was to only keep the lightest pressure possible on the lever and to let the metal flow around almost under its own volition. It took time but was successful.

## Assembly

Obviously various parts of the engine had been assembled previously but now came the exciting part, final assembly and first run. At least that should have been the case. However!

The first problem came with how to fire up four glow plugs, I do not know how other people do it but, after several false starts, I ended up with two 2-Volt batteries and four ammeters so that I could see that all plugs were operating. Then came the choice of carburettor, I have been unable to find any information about choke sizes, etc. apart from a brief mention in L. Mason's book where he suggests a figure of from 25% to 33% of the bore size. Checking the carburettor from an HP61 2-stroke, which I still had from my radio control flying days, it seemed to come at the bottom end of this range so I fitted that as a starting point.

So, with the engine set up on a suitable test stand, I choked the carburettor and started to flick. Such optimism!

How long I continued with this fruitless exercise I have now chosen to forget but it involved several recharges of the glow plug batteries and a lot of spitting and firing back on the part of the engine but without what could be called a run.

Even the application of an electric starter failed to bring forth any real life but did finally cause such a violent blow-back that the engine spat out one of the exhaust valve inserts in disgust. After remaking the broken rocker shaft and recovering the rocker from the far corner of the workshop I reassembled the engine but this time with the valve inserts pinned rather than relying on the press fit which I had never really been happy about.

Still no joy! Time to get scientific and check the compression in the cylinders. A friend is the boiler test inspector for a local club so, with his assistance, a pressure gauge was fitted to an adaptor to suit the plug holes. With the heads off and a suitable adaptor plate, each cylinder was checked and found to be fine. No problems with the piston rings. Heads back on, only one cylinder has any sign of compression. Now then what was it that Bruce Satra said about valve grinding in that article in *Strictly I.C.* A quick hunt through the back numbers and all was revealed. I had been doing it all wrong.

I made up the aluminium laps, charging pots and guide pins, polished down the valve spindles to give some clearance, blued all the valves in, re-assembled the engine once again and now we had so much compression that the model starter would not turn it over. Thank you Bruce.

Having had my fill of attempting to hand start it I took a trip to the local car breakers and ▶

***The powerful and compact engine installed in position in the Colibri is an impressive sight.***

bought a pre-engaged, car starter-motor, fitted it with a suitable adaptor and switch and thought - now watch out you engine you!

Armed with my new toy I approached the test stand with a new optimism applied the starter to the propeller and it burst into life. Not for long but long enough for me to be re-assured about my camshaft and engine timing. After playing around with the carburettor settings I was able to keep the engine running but only at one, rather low speed. The throttle seemed to have very little effect.

Further knowledge about carburettors was obviously required. With the help of the local model shop, a friend with an O.S. four stroke and another friend with the drawings for Westbury's *Sea Lion*, I conducted a survey of choke sizes, averaged them all out and came to the conclusion that I needed one 8.5mm diameter. This is just under 30% of bore size so L. C. was not far out.

I then set to and made a carburettor complete with choke as on the *Sea Lion* with a variable mixture control similar to the Chaddock 5cc engine. All back together again, close the choke, set the throttle to tick over and it bursts into life running rich, open the choke, operate the throttle and the engine revs up, close the throttle and it slows down. Magic!

Unfortunately this test was brought to a halt due to the propeller flying off. It should have been a left-hand thread on the retaining bolt. At the time of writing, I have not run the engine again as I have had to modify the crankshaft, make a new propeller and prepare it for exhibition purposes

Next time I run the engine I shall have a rev. counter fitted and it will be mounted on a proper test stand. Meanwhile, the model Colibri, which was the reason for it all, begins to take shape. It is being built exactly to the original drawings including the three piece wing modification which I designed for my original aircraft.

Things I have learned along the way: -

1: Try to envisage problems as much as possible at the drawing stage, changing lines on a drawing is much quicker and easier than re-making bits.

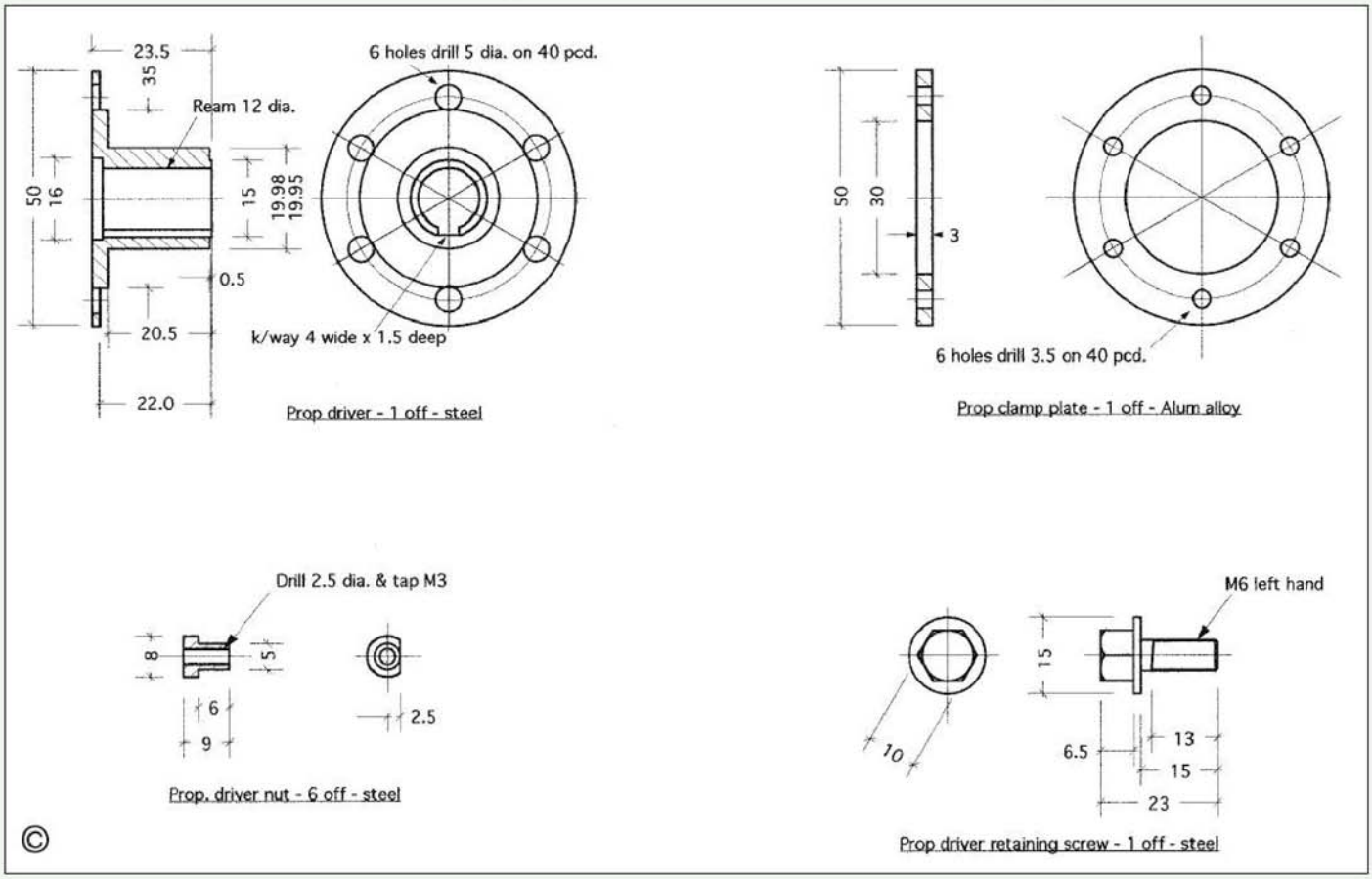
2: If something does go wrong, do not panic. There is usually a way of getting over it and I find that to be part of the challenge. After all if the worst comes to the worst and you have to re-make something it is all good practice and the second attempt will probably be better anyway.

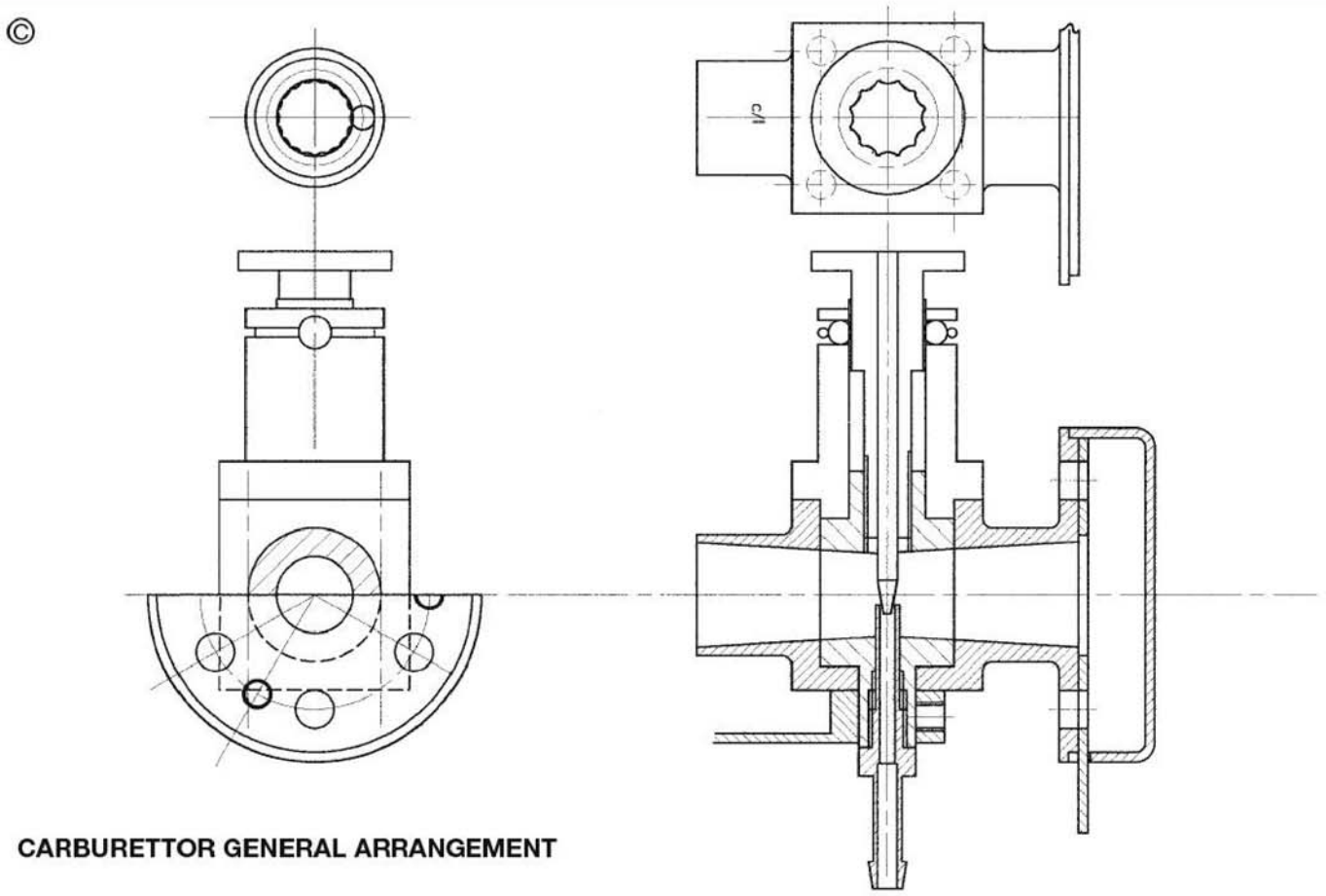
3: Take great care with marking out, using the machine indexes wherever possible, a hole 0.010in. out of position can cause all sorts of other problems when it comes to assembly time.

4: Drilling and tapping small holes in aluminium alloy requires great care to avoid oversize holes and loose threads. I find that to get reliable threads it is best to drill the hole undersize before using the actual tapping drill and to clean the drill and tap with a brush after every hole.

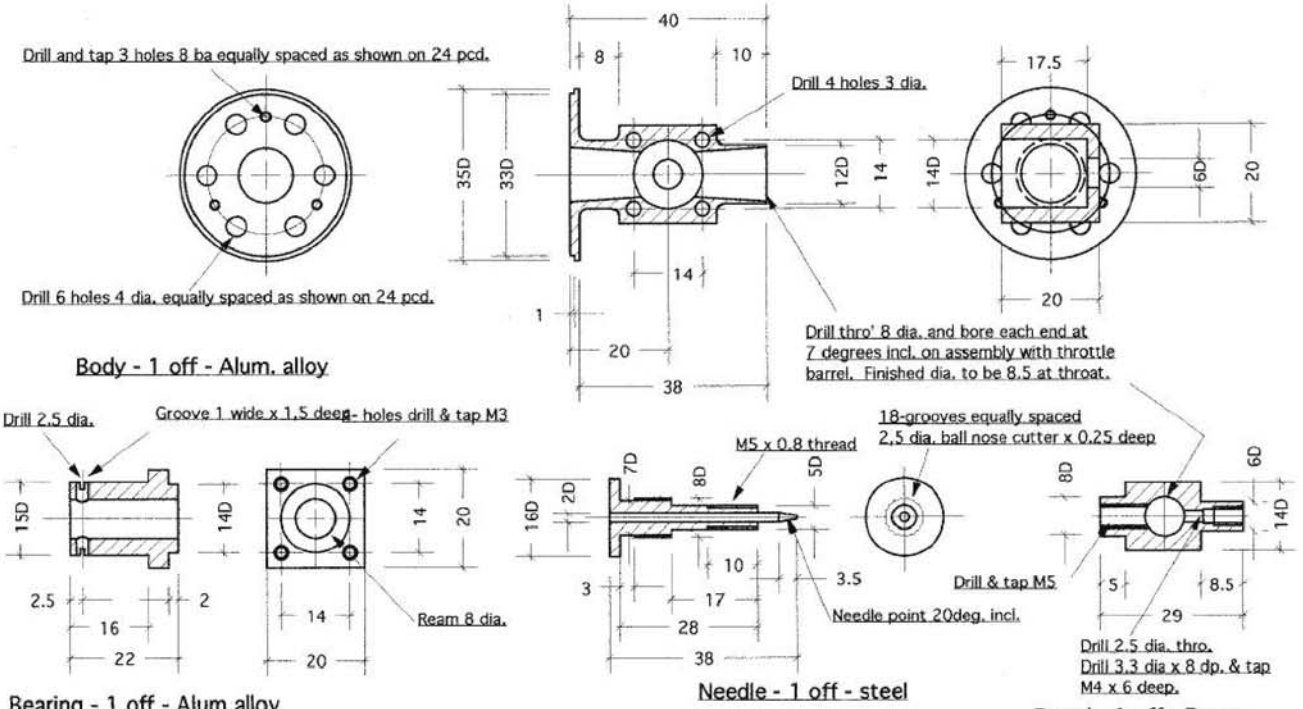
I hope these notes will serve as an encouragement to any one considering the building of an internal combustion engine. I know that, in general, it is felt that beginners should start off with a simple engine to give themselves confidence. However, I feel that if you have a project which requires a certain type of engine, or if there is a design that particularly appeals to you, there is nothing to be lost in having a go.

Take advantage of the depth of experience available to you through the available publications and the few books on the subject and then treat each component as a challenge in itself and hopefully at the end you will have an engine to be proud of.





**CARBURETTOR GENERAL ARRANGEMENT**



PETE'S PAGE

# VERNIER SCALES

*The author's BTH magneto, showing the toothed flange for the Vernier coupling on its spindle.*

**Peter Spenlove-Spenlove reviews some of the uses of this aspect of metrology before touching on the subject of magneto bearings.**

I first came across the Vernier Calliper at school when using it in science classes to take measurements. The principle was devised by a French mathematician named Pierre Vernier (c.1580-1637). Vernier discovered that if he made ten spaces on a secondary scale the same length as only nine spaces on the main scale, he could accurately read the dimension measured to a tenth of the main scale's divisions without having to guess or estimate. Vernier also applied the secondary scale to angular measuring instruments (degrees and tenths of a degree or degrees and minutes).

The length and number of spaces on the secondary scale can be chosen to:-

1: Sub-divide decimal units ($^1/_{10}$ and $^1/_{100}$ degree) or angle (1 degree and 5 minutes).

2: Vulgar fractions of length, i.e. $^1/_{16}$in. and $^1/_{64}$in. or $^1/_{128}$in. and many other combinations.

Most of us use one or more vernier equipped gauges in our workshop. However, the principle has other uses too.

When I was a youth, I, along with other lads would buy an old motorbike or car and try to make it go. Petrol engines require an accurately timed spark to ignite the fuel mixture. Often, a magneto screwed onto a bracket on the crankcase casting generated the spark. It was driven by a shaft or chain, which was connected to the main crankshaft or camshaft so that the magneto's speed of rotation was a direct proportion of the engine's speed. But as the connection was via gear wheels or pitch chains and sprockets, it was not always possible to arrange for the spark to occur at exactly the right moment with relation to the crank/piston top dead centre.

This spark timing is variable according to the type of fuel quality, which varied in those days. We used 'pool' petrol (war time ration quality), paraffin petrol mixture and even creosote from the local coal gas works. Even aviation spirit was used. The spark timing had to be changed to get the best out of our fuel.

Those of us who had coil and battery systems simply slackened the spark distributor clamp and rotated it very slightly, but the magneto was a bit more complicated. It cannot be rotated although on a motorcycle it is usually possible to loosen the sprocket on its spindle from its taper and achieve a rough setting. However, some means of achieving a finer setting is desirable and a Vernier coupling was often found on cars.

This consisted of a device, which had a toothed, vulcanised, rubber-coupling member in between two toothed flanges. One was driven by the engine and the other was keyed to the magneto. The rubber absorbed slight misalignment and vibration but its main purpose was to allow precise spark timing to be achieved.

The engine (drive) flange was provided with 20 teeth. The driven (magneto) flange had 19 teeth. The moulded rubber had matching teeth - 20 on one side and 19 on the other. By uncoupling the joint and moving one flange back by one tooth, and the other flange forward by one tooth and re-coupling, a very fine advance or retard setting was possible - about 1 degree with this 20/19 tooth coupling. The cars have long since gone but I kept a magneto to light the welding torch. It is now 'stuffed and mounted' (see photo).

The rubber coupling was reinforced with fibre to give a tough wear resistant drive. Mine is $2^1/_4$in. dia. by $^1/_2$in. thick with a hole through the centre to clear the nut holding the 'hot stamped' brass flange on its shaft. The teeth are knuckle shape (rounded top and rounded root) with no sharp corners. The arithmetic is easy to understand:

20 teeth = 18deg. spacing

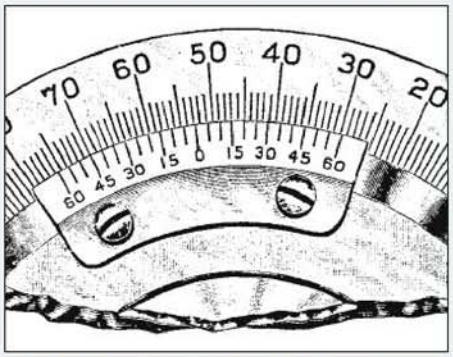
19 teeth = 19deg. (about) spacing

Difference = 1deg. (about) increment

The magneto shown was made by B.T.H. (British Thompson Houston) one of the world's premier electrical machine makers from power stations to domestic fans and cookers.

Some younger readers may have wondered about the term 'magneto bearing' when reading an article about a mechanism and the bearings within it. Vast numbers of magnetos were made for cars. They were made to be easily dismantled for servicing or repair, to avoid the need for pressing the inner and/or outer ball bearing raceway on or off, a special, angular contact, ball race assembly was used. Two bearings were used, one at each end of the rotor.

Each bearing was of precision but light duty construction. It was designed to carry radial load plus a degree of end thrust in one direction only. On dismantling, the end frame was lifted off complete with the outer race. Then the rotor was lifted out leaving the other end's outer race in place. On the rotor would be seen two inner races complete with a ring of balls retained in a brass cage. After servicing or re-magnetising, one simply washed the bearings, greased the balls and reassembled the magneto. Quite a few makers of car magnetos used the same size of bearing. I remember the name 'Hoffmann' marked on the bearing box when I had to buy new ones. I would simply ask for a magneto bearing with no size being quoted. On re-assembly the bearings worked in opposition as regards the thrust. But the end plate was spaced from the body by a paper gasket. If a new thinner paper gasket was used, or even none at all, it meant an excessive end thrust on the ball races and premature wear.

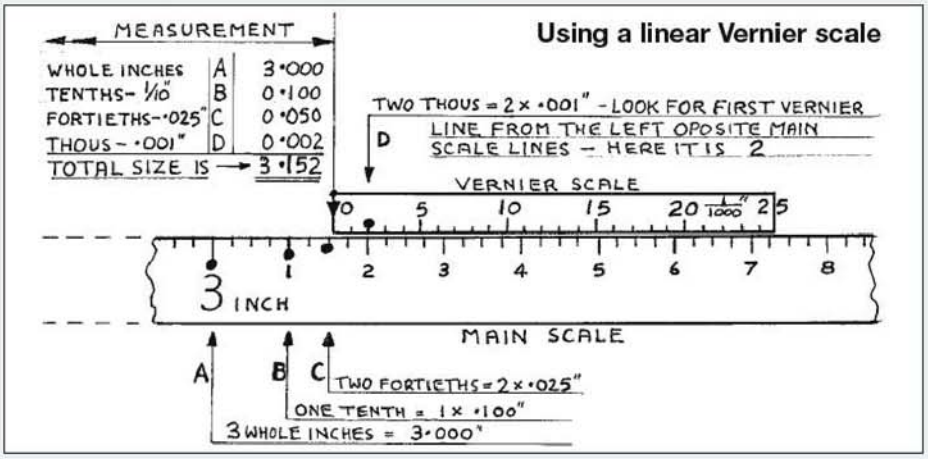


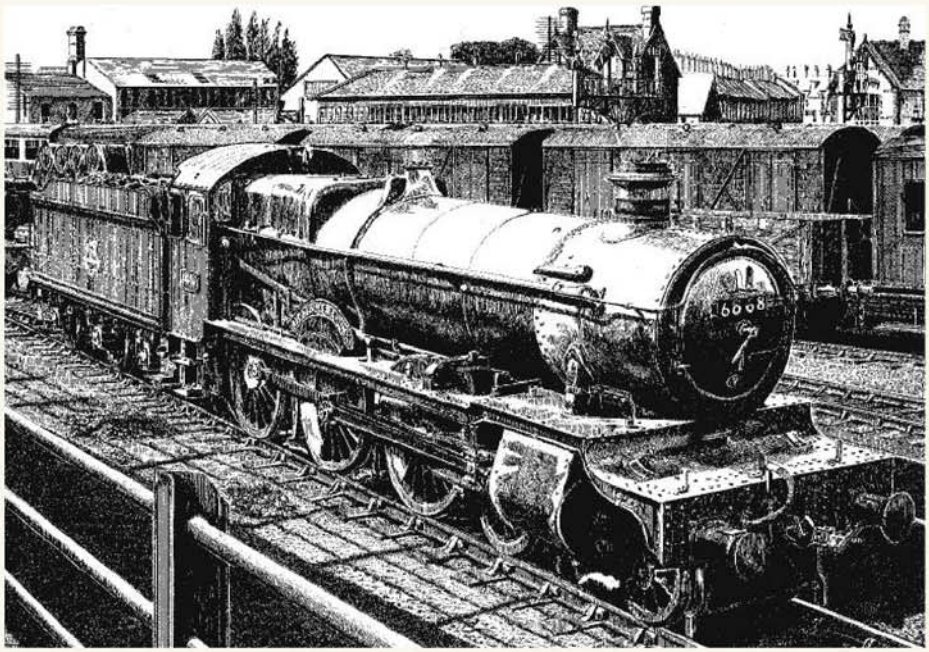

**To read a Vernier protactor:**

**1: The Vernier is to the left of the main scale zero so use the left half of the Vernier only.**

**2: Read the main scale opposite the Vernier zero. Here it reads 52 and a bit degrees.**

**3: Look leftwards on the Vernier scale until you find a line which is directly opposite one on the main scale. Here it is 40-45 minutes. Use an eye glass to make sure. This reading is the 'bit' after the 52deg. read before.**





# PENRHOS GRANGE

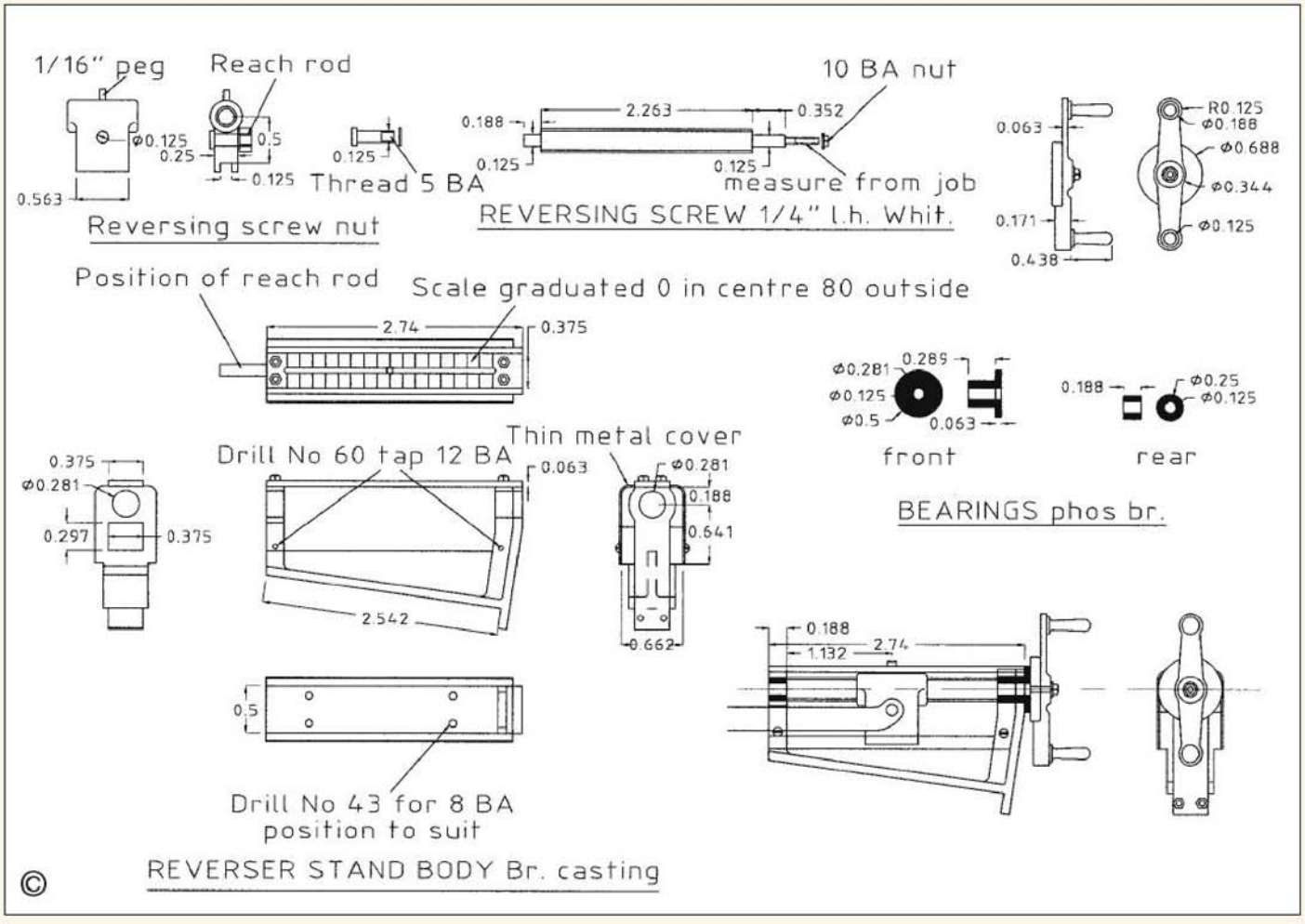
**Neville Evans**
**describes the screw reverser, reach rod and cab before revealing some plans concerning the Midland Compound.**

● *Part XVIII continued from page 508 (M.E. 4246, 29 April 2005)*

The reversing gear is quite straightforward and requires very little description. The mechanism is built up around a casting, which needs to be faced off at the bottom and bored for the phosphor bronze bearings front and rear. The stand is bolted to a large, stable lump of brass or mild steel, which is in turn fastened securely to the right hand main frame.

I say securely because Stephenson's valve gear, even in our small sizes, is apt to place a lot of strain on the reverser set up. So much so that when reversing levers were used, as with most of the GWR locomotive stock, it was considered wise not to attempt to move the lever when the loco was running and steam was on. The usual method was to work up to a reasonable speed, shut off steam, move the lever and open the throttle again. This method of working ensured that you were not catapulted onto the roof of the leading coach.

The ideal system was of course semi-automated and steam operated. Some railways loved them, the LSWR for instance under Drummond and later on when O. V. S. Bullied was chief mechanical engineer of its descendant, the Southern Railway. The steam operated reversers were an absolute boon during shunting operations, though it must be said that they were liable to wander off on their own if not closely monitored by the footplate crew. They were sophisticated, if expensive and troublesome to maintain, and were sometimes the subject of a patent by the Locomotive Superintendent or CME as he was later called. They became obsolete on British railways after



the Bullied era, and were replaced by a rather complex system of bevels and gears, which looked rather like a bacon slicer.

The only basic change that has been made to the cab equipment is that the scale, three-start thread has been replaced by a 1/4in. left-hand, Whitworth screw. The reason for this seemingly retrograde step is twofold. Firstly, it obviates the necessity for a locking mechanism on the handle as the 20tpi Whitworth thread is less likely to move away from its set position. Secondly, it is a lot easier to make. I mentioned this to Dercyk Goodall who of course set too as soon as I had left, screw cut an 8tpi two-start thread and cast a nut around the thread by the next morning. Most annoying.

## Cab

The cab is cut from 1mm brass plate and represents a pretty straightforward sort of job. In accordance with our policy of making loco building easier, quicker and more accessible to the average man, Peter Thomas can supply complete cab sides and indeed the whole locomotive superstructure, including tender, as ready cut and drilled parts at little more than the cost of the raw material.

I was amazed to find that the ready cut cab roof that I examined, had rivet holes that were drilled so accurately that they fitted the corresponding holes in the angle strip even when the roof had been bent to shape. The interior structure of the cab is quite close to scale. The bent T-sections that form the side stiffeners, the angle sections around the corners and the various bracing strips around the roof are all detailed and form part of the kit.

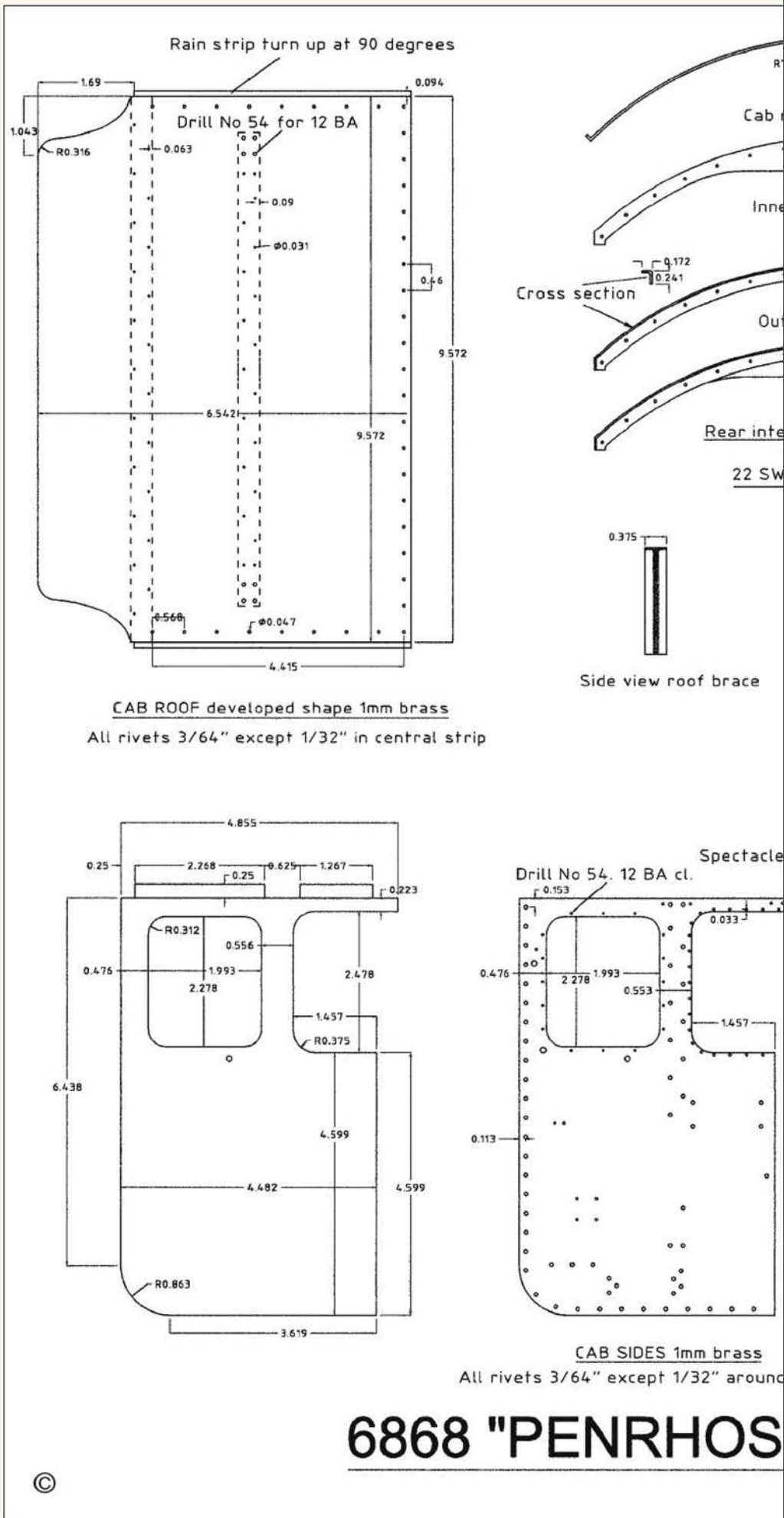
The side windows should present no problems. The transparent sheet is sandwiched in between the frame and the cab sides. The whole assembly is held together by fourteen 12BA round headed and slotted brass screws, which are commercially available from the trade. The frames and window transparencies are available as finished parts.

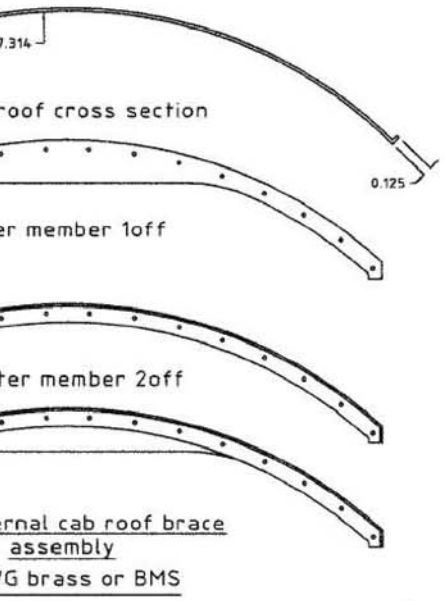
The spectacle windows on the front plate are far more complex and we are at the moment looking into various possibilities such as lost wax castings. The problem is that on the front windows, the glass is sandwiched between the front and rear frames, which tends to add to their thickness to an unacceptable degree. The roof is bolted onto an angle section at the front and bent over tabs on top of the cab sides. I can see no alternative to a fabricated angle at the rear of the roof, which presents a problem of access.

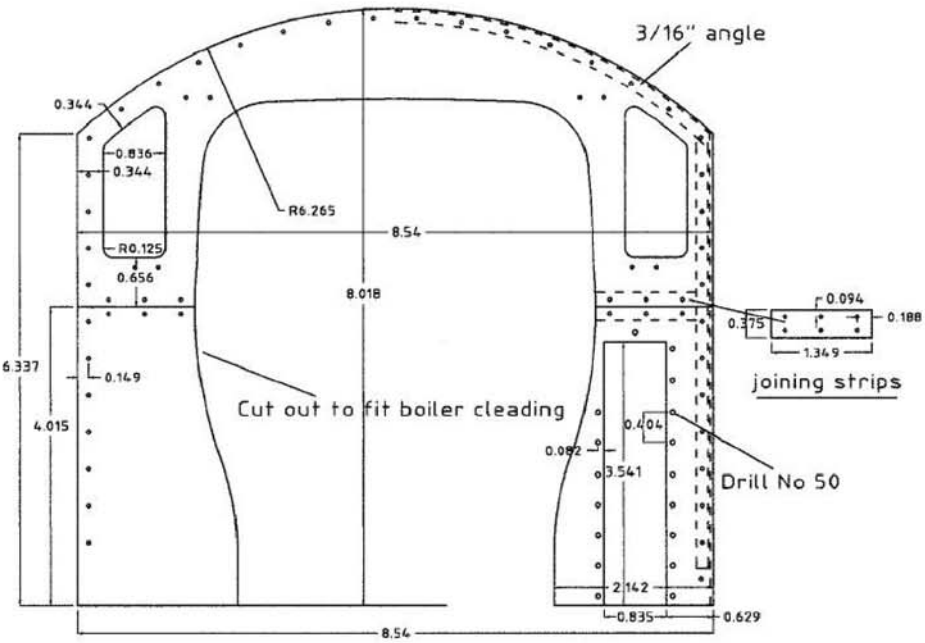
The 'Grange' cab has no top ventilator through which to peer at the various blobs and gadgets inside the cab, prior to burning your fingers thereon. I therefore suggest that a panel of the roof be made removable so as to give a better view of the cab contents.

## Midland Compound

The other day, I was chatting to Ron Bignell, one of the doyens of the Cardiff club, when he mentioned to me that Mike Smart had in fact published a set of drawings for his 'Midland Compound'. Now Mike, who is one of my Gurus and long time telephone adviser, hides a large lighthouse under an equally large bushel,

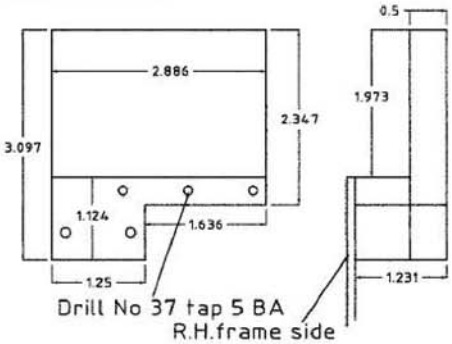




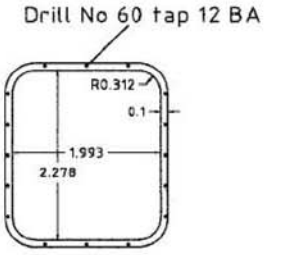




Spectacle plate

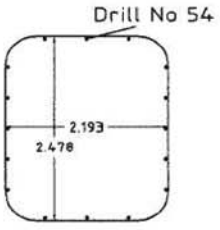
n.b. Spectacle plate fits outside side sheets



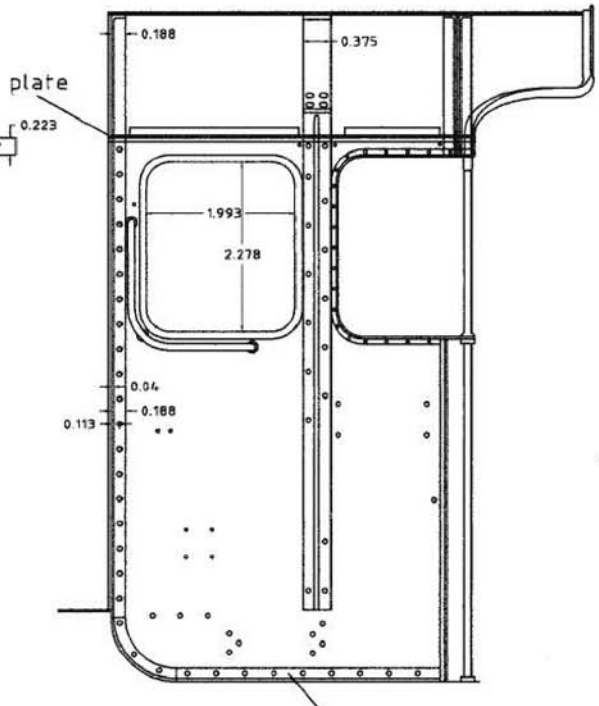

REVERSER STAND




Window frame 2 off brass

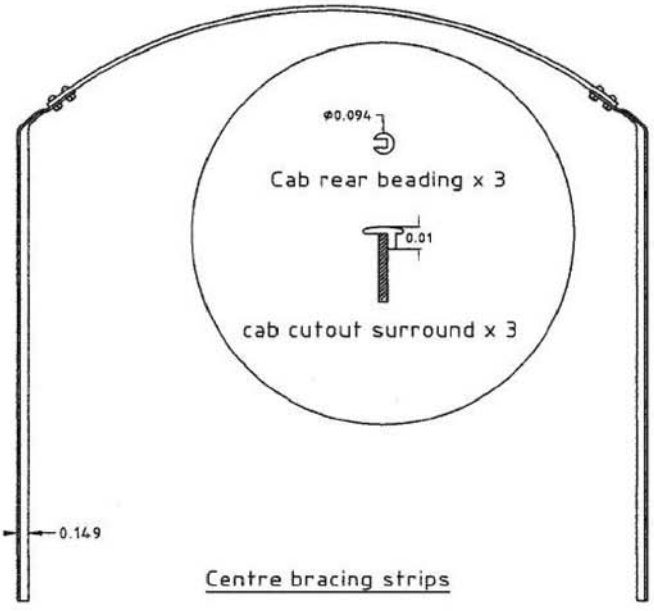



Side window 2 off acrylic sheet




3/16" x 3/16" 22 SWG brass angle

cab cut out

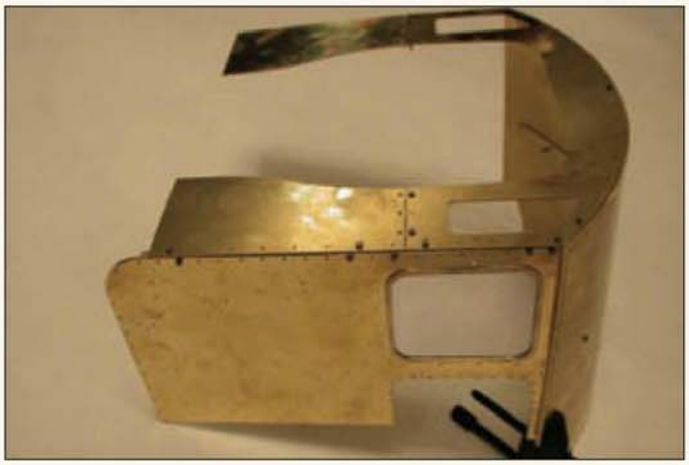




Centre bracing strips

# GRANGE" CAB and REVERSER.

*The cab side of the full size* Cookham Manor *showing the window and window frame arrangement.*


*A view inside the cab of* Cookham Manor *showing the reinforcement used for the sheet metalwork.*



*A trial assembly of the precision, cut parts for the Grange or Manor cab produced by Peter Thomas.*

*A view of some of the parts that go to make up the cab of the model prior to assembly.*

and is agreeable to allowing Bruce Engineering to publish his drawings. This I believe is an excellent arrangement as not only can one build a proper compound, but one is given an insight into Mike's design process as the sheets contain a wealth of design information as well as lots of excellent 'gen' about the full size locomotives. These copies, from pencil originals, are real works of art and seem to exude the character of the full size engines, which is really what we are trying to achieve. They represent good educational material for us all. Remember that the day you stop learning is the day you die. The drawings do not set out to be a full, blow-by-blow account of how to build the locomotive, but rather are what is called a design scheme. They are drawn to a scale of 11.3:1, which corresponds very closely to our normal scale of 11.294in. or 1 1/16in equals one foot.

To simplify matters I have redrawn with full dimensions (in close cooperation with the designer) the main frames and superstructure. Peter Thomas has undertaken to produce laser cut main frame, bogie and tender frame parts, as well as the complete finished (that is cut out and rivet holes ready drilled) superstructure and tender tank in 1mm sheet brass to precision limits.

The castings can be sourced from the trade and the whole project seems to be quite straightforward. There is however quite a lot more work in it than in an ordinary locomotive. Not more difficult, just more of it. Come to think of it though, there is a lot more in the average six coupled engine and compared with something like a 'Royal Scot' with three cylinders and three sets of valve gear, it would seem like an easy option.

While on the subject of laser cutting, I was recently astonished to see the latest developments in that art. Peter showed me some 'Penrhos Grange' frames that had been cut so accurately and cleanly that they were to all intents and purposes finished and required no further cleaning up. These frames can also be supplied spotted through for drilling to precision limits at an extremely reasonable price.

In the next installment I shall include a side elevation of one of the first Deeley compounds, complete with seven foot diameter coupled wheels. Peter Thomas is going to make patterns for these wheels sometime in the 'nearish' future, as they will be useful for many other 'turn of the last century' engines that we all love so dearly because of their beautiful lines.

Mike Smart's drawings are of the standard LMS locomotives with an additional sheet detailing the first two Johnson locomotives. These two elegant creations are the ones that Ron Isted described so eloquently in a previous issue and were arguably the best and most powerful of all the three-cylinder Smith compounds that were built in this country.

I have also in my possession a copy of the two articles that were written by Mr. C. M. Keiller in November 1937. Mr. Keiller takes a slightly different approach to that of Mike Smart, so that we are running them both through the computer to see which one theoretically, is the better, with a view to publishing what amounts to a synopsis of the two designs with my ideas thrown in as well. These latter, Keiller drawings are at 1/2in. to the foot scale for 2 1/2in. gauge, as was Carl Keiller's normal practice. They would however scale up to 3 1/2in. with no foreseeable problems and so may be of interest to enthusiasts of the 3/4in. to the foot scale.

As I mentioned earlier, Simon Bowditch and I are working on the project, with the able cooperation of John Forrest, a near neighbour of Pete Thomas, who worked at Derby as an engineer in the dark and distant, has a soft spot for these Midland Compounds and, more to the point, huge amounts of expertise as well as the right contacts. The three of us are going to try to bring the locomotive up to the standard that we think Mr. Diamond would have approved of.

Refer back to Ron Isted's articles for information about Diamond and his papers to the Institute of Mechanical Engineers, concerning 'losses of power in the Midland Compound' *(Two part serial appears in M.E. 4230, 17 September 2004 and M.E. 4232, 15 October 2004 respectively - Ed.)* Suffice it to say that we shall be paying close attention to such items as proportion of clearance volume in the HP cylinder, reheat and receiver volumes, passage areas and the front end arrangement. I hope that we shall have far more information available next month.

● *To be continued.*

ROAD STEAM

# SAVAGE'S UNIVERSAL CARRIER

**Stan Nipper and Martin Wallis complete the description of the brakes, make an aside on radio control, and look forward to the boiler.**

*Part X continued from page 515 (M.E. 4246, 29 April 2005)*

We now complete the brake arrangements, which will give the builder who is keeping pace, the chassis, axles, wheels, steering and brakes – substantial progress by any standards. Since the manufacture of the various brake levers, rods, links, shoes and so on are pretty straightforward I intend to keep the narrative to a minimum in order, with our editor's permission, to squeeze in a progress report on Cyril Hayler's radio controlled wagon.

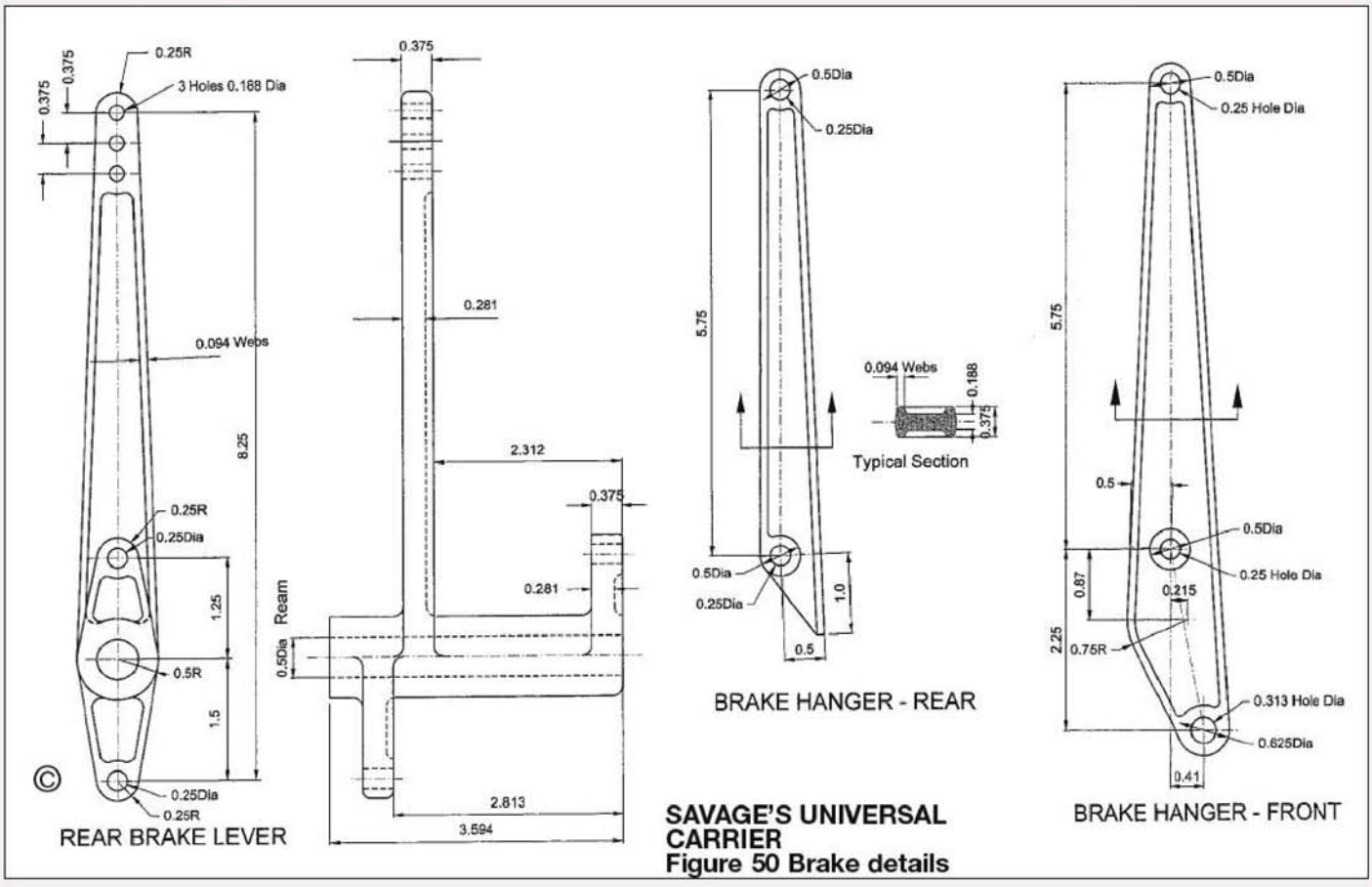

*The brake lever, brake hanger, brake shoe and brake bevel housing castings (Photo: Martin Wallis)*

## Brake rods, hangers and levers

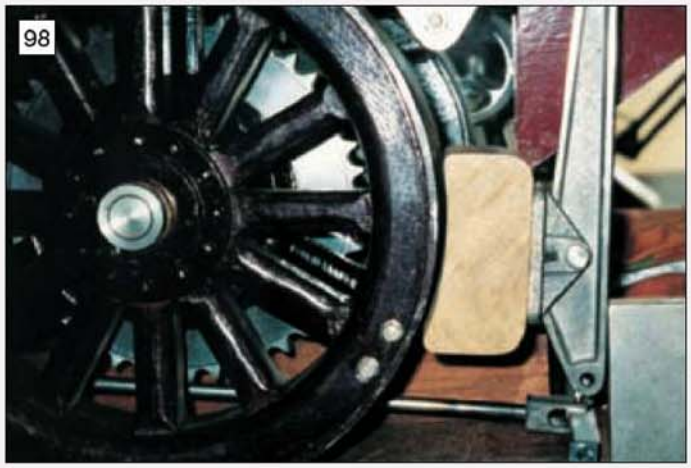
Two front brake hangers, two back brake hangers, and two brake levers are required. These may either be machined from castings or fabricated. A selection of castings can be seen in **photo 97**.

Patterns for the brake hangers were straightforward but since the parts are quite thin and delicate the patterns were made in aluminium alloy. The brake lever pattern was, however, less straightforward. The problem was to keep the pattern simple yet retain the cast recesses that may be seen along the length of the two castings at the back of photo 97. Two different methods employing cores were tried but all too often the resulting castings were not one hundred percent. In the removal of the flash the fettler more than once took a lump out of the casting by mistake, and the slightest movement of a core made the 0.094in. webs unequal. With only half of the castings meeting expectation it was decided to drop the recesses and revert to a simple, two piece split pattern. The recesses, if desired have to be machined in.

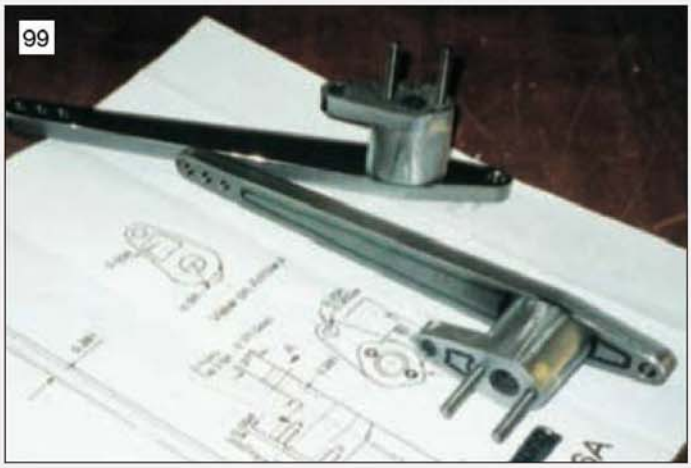
The brake rods, the links and the pins are straightforward machining exercises, the holes should be drilled and reamed and the pins turned to suit. A respectable fit is needed so ▶




**SAVAGE'S UNIVERSAL CARRIER**
**Figure 50 Brake details**




*A front brake hanger casting with the brake shoe fitted. (Photo: John Thompson)*




*Fabricated brake levers. The recesses have been marked out with blue marker pen. (Photo: John Thompson)*

the parts locate positively. Most of the pins are cross drilled for 0.063in. dia. split pins, the positioning of the holes being confirmed on the job.

## Fabrication and CNC machining

While castings are available the levers and hangers may all be fabricated easily enough. If a CNC milling machine is available the recesses are but a short program away and the program may be 'mirrored' across to cut the recess in the other side

Without CNC the recesses can be milled in. The brake levers are likely to be a three part fabrication assembled by either electric welding, brazing, or silver-soldering if the material is steel, or silver-soldering if they are to be made from brass.

John's brake levers in **photo 99** are brazed steel fabrications, the two steel screws in each lever hold it together when hot.

## Brake rods

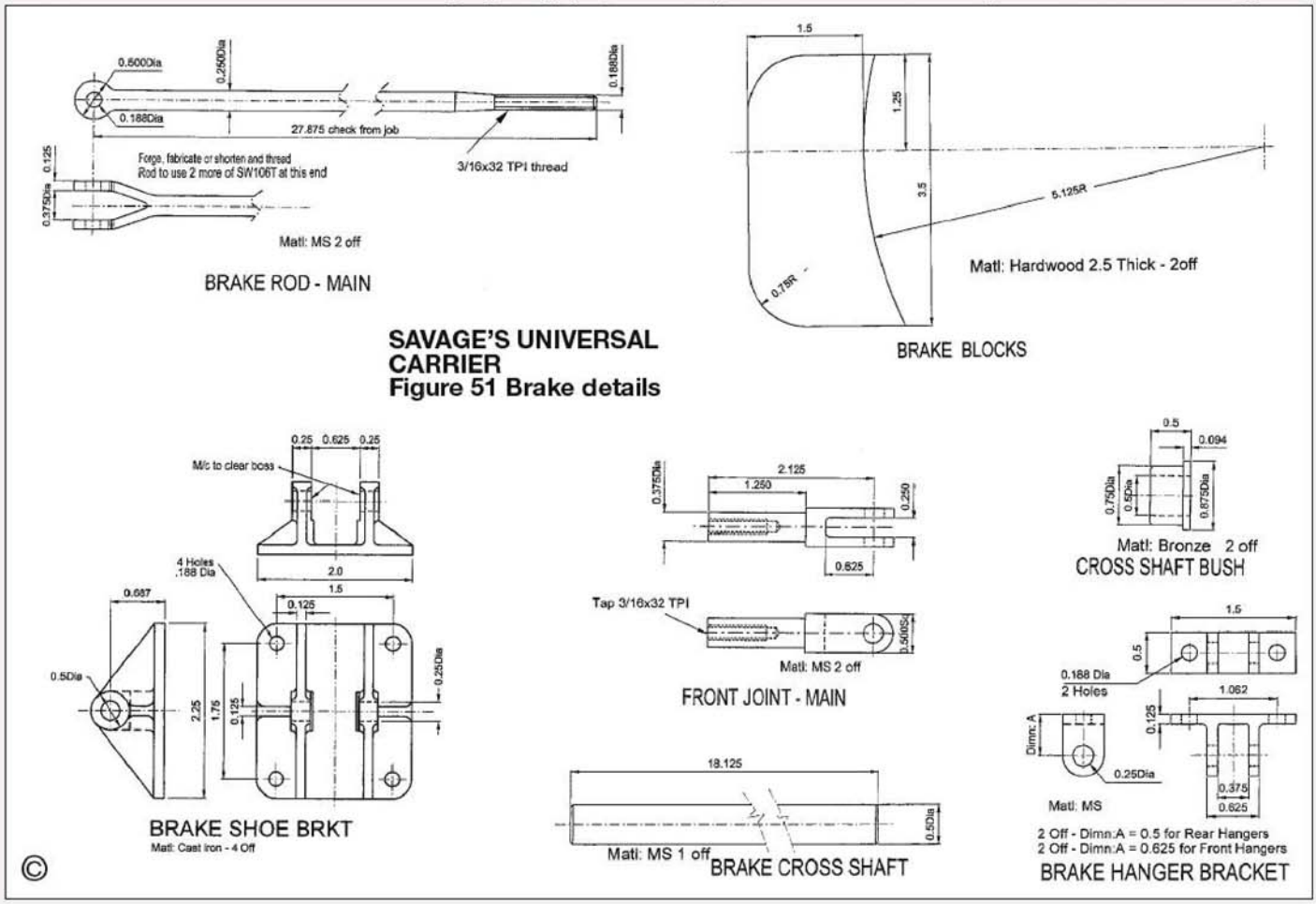
The brake rods are next, and their lengths should also be confirmed on the wagon before cutting the stock to length. Remember if the locomotive boiler is fitted the front cross stretcher with the brake bevel housing on it is 4in. further back to accommodate the firebox and the main brake rods will need to be shortened accordingly.

One end of the main brake rods is threaded 3/16in. x 32tpi to thread into the front joint block, to allow for some adjustment. Once set it may be locked with a nut. On the other end the drawing calls for a forked end which may be forged (as per prototype) or, more likely, fabricated. An alternative, as mentioned on the drawing, is to make two more of the front joint blocks with its 0.375in. slot.

## Brake shoe brackets

Four brake shoes are required to which the timber brake blocks are fixed. A decent close grained hardwood should be used. A visit to a wood yard ought to produce a suitable off-cut. First mark out and cut two pairs of rectangular blocks which should be sanded smooth all round, the 0.75in. radius added, and then screwed to the brake shoe brackets.

The cast brake shoes are then assembled on the brake hangers. There ought to be a little movement and the insertion of a single match stick between the shoe and hanger should lock the two together. The block is then brought into

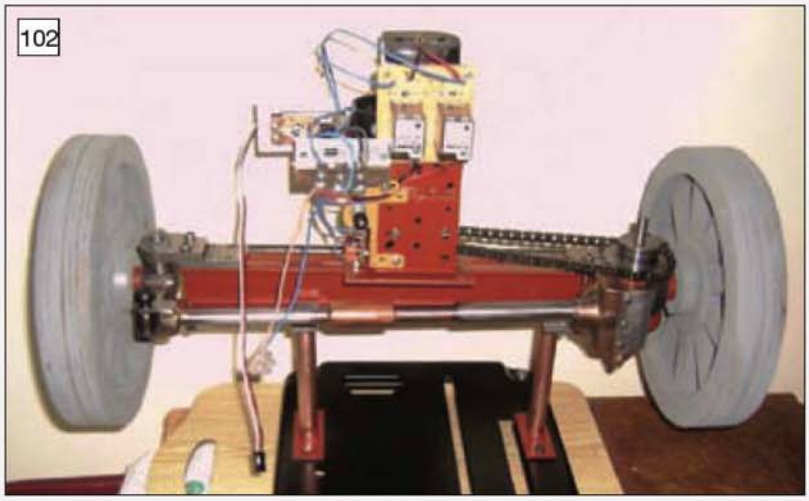



*A set of completed brake blocks acting on an artillery style wheel. (Photo: John Thompson)*


*A brake shoe fitted to a brake block. Note the yellow screws referred to in the text. (Photo: John Thompson)*

contact with the wheel and a pencil compass is used to mark the radius on the timber. A band saw will make light work of cutting the radius, otherwise a succession of cuts with a slot drill will remove the bulk of the material and the radius can be completed with a file and glass paper.

The brake blocks should be given several coats of clear lacquer or polyurethane varnish, a satin finish by choice. All the brake parts may now be assembled on the chassis, adjusted up and tried out. John found the small amount of movement between the brake shoe and hanger on his model caused his brakes to 'grab' which he cured with two threaded screws in each shoe which could be adjusted against the hanger. These screws are shown painted yellow in **photo 101**.



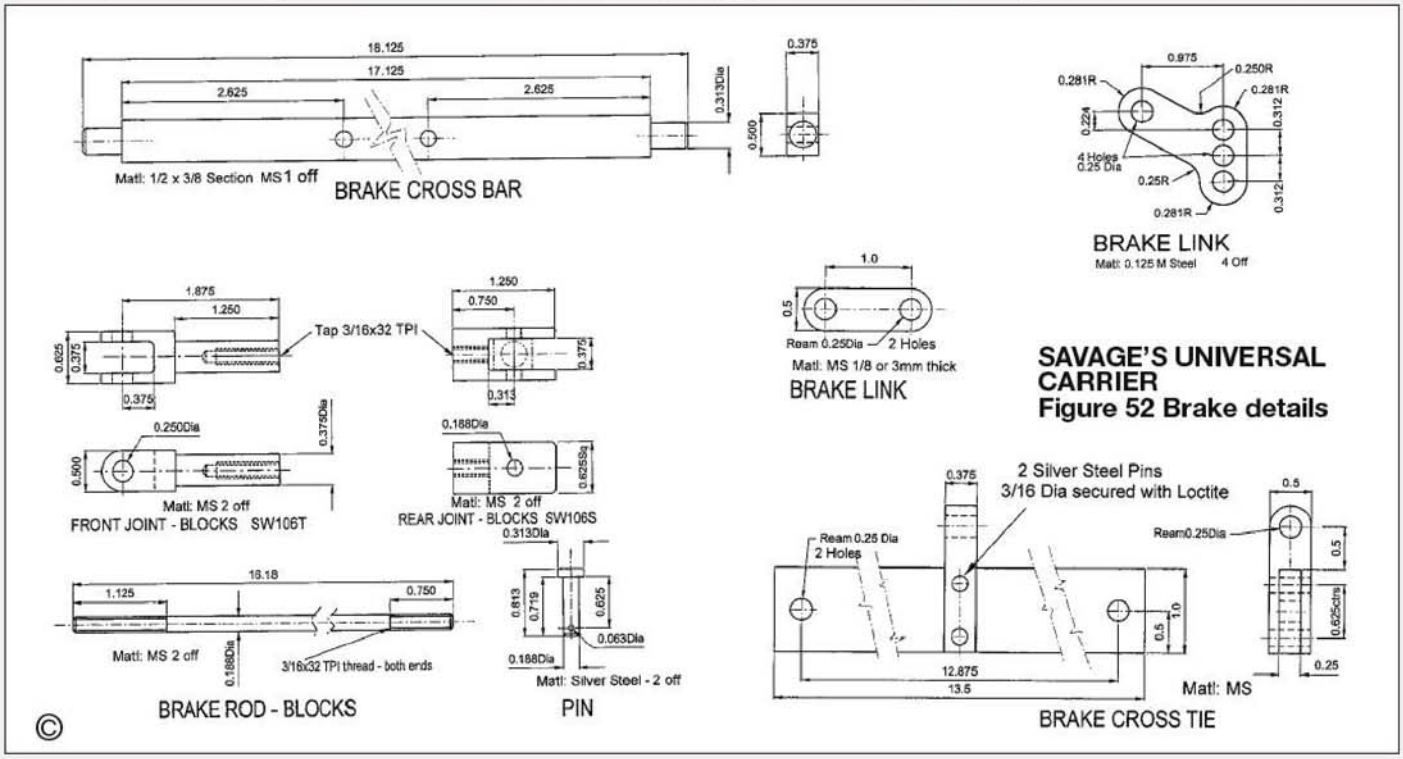

*The radio controlled front axle. A servo motor is attached to the steering bevels by chain. (Photos 102 - 108: Cyril Hayler)*

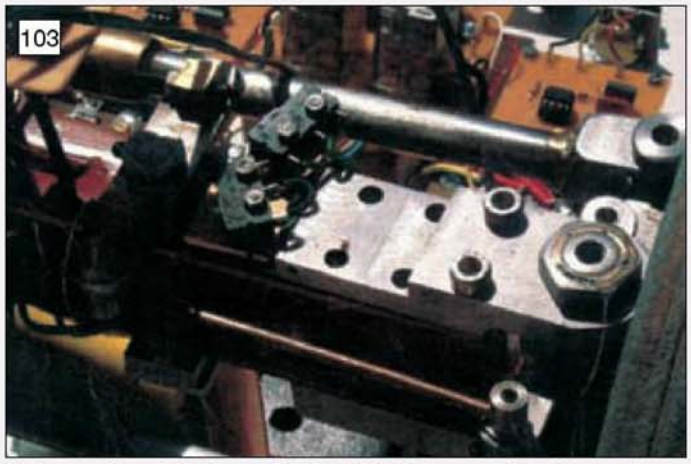
## Radio control

I am very pleased to be able to include some pictures of Cyril Hayler's progress on his Savage wagon, a highly individual and inspiring model (**photo 102 on**). Cyril is a retired engineer with some experience of radio control, and while looking for a new project decided a 1:4 scale radio controlled lorry would be ideal.

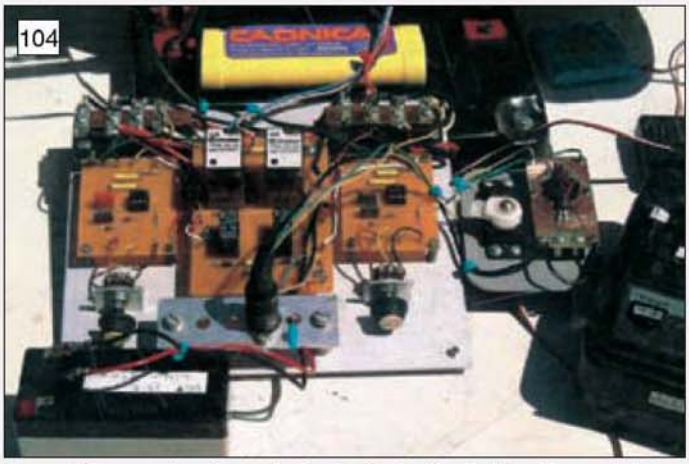
What was required was a chassis design to build his vehicle around and our Savage wagon suited his requirements admirably. The wooden artillery wheels were chosen as these gave a decidedly 'period' feel to the model. Illustrations of Cyril's wheel construction have already been included in these pages. The propulsion was to be electric rather than steam. The cab/platform details are, I understand, still to be finalised.

Much of the design work is still fluid. Cyril has mentioned the benefit of using two electric motors, one driving each back wheel, thus avoiding the need for a differential but the ▶



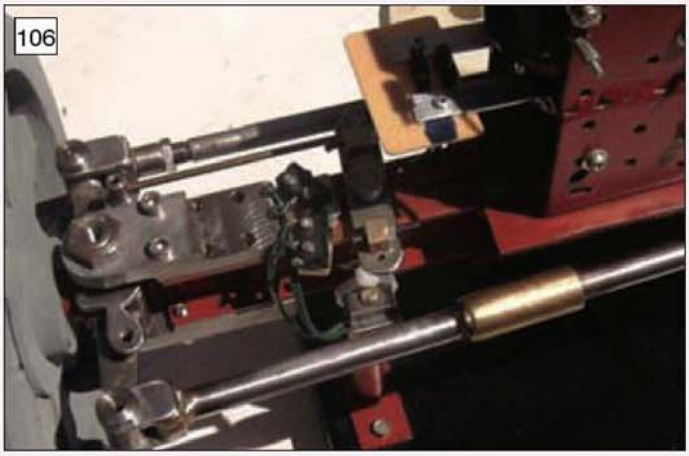



*A close up view of the front axle of Cyril Hayler's wagon. Speed control and electronic stops have been incorporated.*




*Some of the complex electronic circuits devised by Cyril for his unusual electrically driven wagon.*


*The mechanical aspects of the wagon have not been neglected. This picture shows the king pin bracket during assembly.*




*Another view of the front axle. Wooden artillery wheels have been chosen for their period appearance.*

availability of the motor or motors might change this. A dummy scale load may be fitted on the load platform in which is hidden one, or possibly two, batteries to drive the motor(s). I am sure readers will look forward to seeing the completed lorry.

A study of the pictures will quickly confirm how clever Cyril is. The electronics are of his own devising and manufacture. It is hoped in due course to present a schematic of the control systems he has used.

## Boilers next

Readers might well be expecting the engine next and those who were will sadly be disappointed. Attention will be given to the boilers first, and perhaps I ought to explain why.

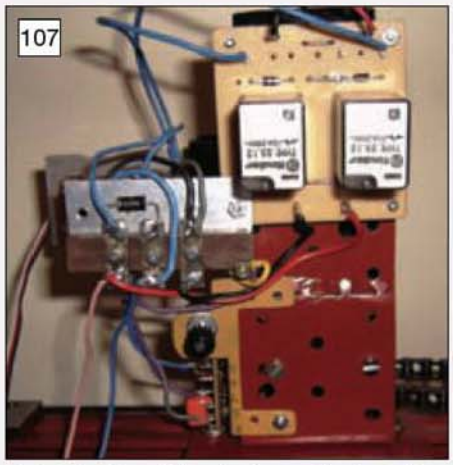
My own model making experience goes back to the early seventies (that is no time at all I hear some of you say!) when copper boilers ruled supreme. 'Road steam' models were invariably 3in to the foot scale or below - 1½in. and 2in. to the foot scale was the norm. I remember seeing my first 4½in. to the foot scale Plastow single cylinder Burrell and being shocked by its great size. It was just enormous, so big that a driver could sit on the tender. The wisdom of the day was that models had copper boilers and full size engines had steel boilers, a fact I never really queried, and everything was , of course, built on a Myford.

Over the last quarter century models have got steadily larger. That is not to say 1in. to the foot scale models are not being built, of course they are, but the range now is from 1in. to the foot scale to as big as 9in. to the foot scale, although 1:2 scale is the usual ceiling. As the size of models increases copper boilers become increasingly impractical both for cost and structural reasons. On large models steel, like the prototype, is the universal choice.

In 'road steam' the general move from small models to large, and therefore from copper to steel boilers, combined with ever more rigorous safety and inspection regimes have contributed to a majority of builders purchasing their boilers commercially. Since boilers are invariably built to order there will inevitably be a time delay. My understanding at present is that this may be anything up to 12 months and applies to both steel and copper boilers. On this basis it therefore seems prudent to consider boilers at this stage so those who wish to make a purchase may do so; the construction of the engine keeping the builder busy while waiting for delivery.

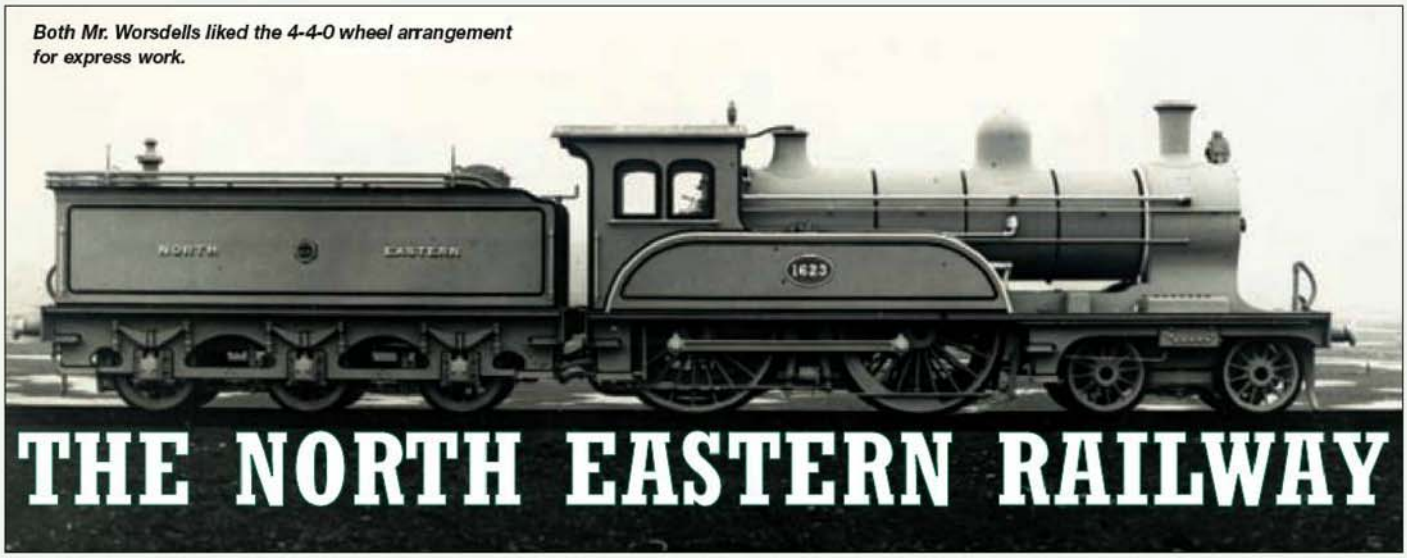
A locomotive boiler in copper and again in steel, a vertical boiler in steel only, and a water tube boiler in copper will all be described so their ought to be no shortage of inspiration. All three boilers follow the original Savage designs as closely as is practical, the locomotive boiler has side firing and the water tube boiler has the same three-drum arrangements as the Musker boiler employed by Savage. As far as I am aware it is the first water tube boiler designed for a model 'road steam' design and, I hope, will meet with readers' approval.

● *To be continued.*




*A close up view of the steering mechanism relays on Cyril's wagon.*


*One of the hub assemblies on the wagon showing the sockets for the wooden spokes.*




*Both Mr. Worsdells liked the 4-4-0 wheel arrangement for express work.*

# THE NORTH EASTERN RAILWAY

**The late Martin Evans concludes his brief look at the locomotives of the North Eastern Railway and considers some tank engines as well as those fitted with 'Uniflow' cylinders.**

●*Part III continued from page 511 (M.E. 4246, 29 April 2005)*

The early suburban tank engines of the North Eastern were mainly of the 0-4-4T type. Mr. Fletcher built a large number of these, with 16 x 22in. cylinders and driving wheels 5ft. 6in. diameter. These were followed in 1836 by a slightly larger type. Designed by T. W. Worsdell and known as Class A, these had 5ft. 6in. dia. driving wheels with trailing wheels 3ft. 9in. diameter. Cylinders were 17 x 24in. - later 18 inches. About 60 of these engines were built between 1886-88. When Wilson Worsdell took over from his brother, he favoured the 2-4-2 type tank engine. The main reason for this was Wilson had doubts about the safety of 0-4-4 engines when running fast, although there had been no cases of accidents due to this - at least up to 1900. Sixty of this class were built up to 1893.

These two classes were followed by Class O. These were very similar to class A, but had driving and coupled wheels of 5ft. dia., bogie wheels 3ft. dia., cylinders 18 x 24in. The boiler had a heating surface of 1,097ft.$^2$ and a grate area of 15ft.$^2$ A total of 110 of this class were built 1894 onwards.

T. W. Worsdell had a strong preference for compounding in locomotives and also he preferred Joy valve gear. His brother, on the other hand, was never keen on compounds and he much preferred Stephenson link valve gear. For local goods traffic, Wilson Worsdell produced a very neat 0-6-2T, which was occasionally used on suburban passenger traffic having driving wheels 5ft. diameter.

The Scarborough-Whitby section of the North Eastern was one of the railways to which the name 'Fred Karno' line was quickly applied. (Fred Karno was the leader of the troupe of comics in which Charlie Chaplin graduated) The passenger from Scarborough to Whitby had first to walk the full length of a long platform to find his train in a bay still further out. After only a few 100 yards propulsion by the engine, the train started its real journey by moving back towards the station before entering Falsgrave Tunnel as the preliminary to a bit of railway 'mountaineering'. For the first five miles the grades are ordinary but the next 2$^1$/2 miles are markedly adverse and the remaining 2$^1$/2 miles to Ravenscar station at the very summit are continuously upward at about 1 in 40. But even this is flat compared with the cross slope of the country as the shortest route to the sea level from Ravenscar is about $^1$/4 mile down 1 in 2! The descent on the railway, for 3$^1$/2 miles northwards from Ravenscar is about as steep as the ascent from Scarborough. Beyond the dip near Robin Hood's Bay a half-size repetition of the Ravenscar 'hump' has to be surmounted before the train, after much braking, reaches Whitby West Cliff station. This, however, is not really Whitby, and so the engine used to run round the train to start it back towards Scarborough before diverging to the left at Prospect Hill Junction. Then brake power was required to make sure that the train came to a smooth stop in Whitby town.

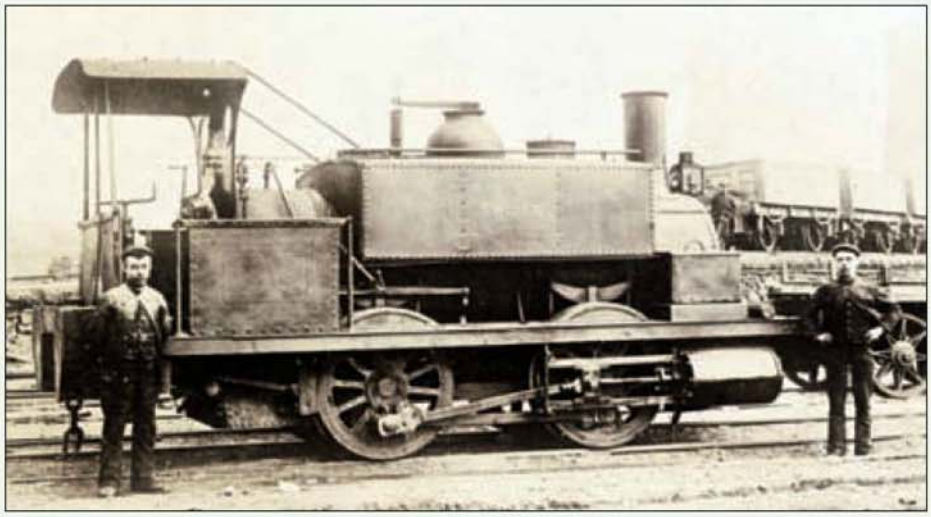
The Scarborough-Whitby line was clearly no speedway and few trains beat an average of 18mph from starting at Scarborough to stopping at Whitby Town. Steep gradients on any line may give the impression that they meant very hard work by the engines. There is, however, no essential connection between the two things. Loads are restricted to what the engine can re-start on the steepest part of the line whatever the conditions.

Originally, the Scarborough Whitby line was dealt with by the 0-4-4 tanks of Wilson Worsdell but it soon became apparent that a more powerful type would be required. The 0-6-2 tanks of classes B1 would have a good advantage as regards adhesion, having 45 tons adhesion weight as against 30 tons of the 0-4-4Ts. They had no advantage in boiler power and this may have decided Worsdell to provide a six-coupled engine for the job. So a 4-6-0 tank, Class W was provided and five were built. For reasons unknown the smokebox was made longer than usual, but the cab and bunker were restricted.

The nickname 'Willies' given to these 4-6-0Ts somehow matched their appearance, for they did not look right. As it turned out, their very small coal capacity proved their downfall when the works produced an enlarged 4-6-0T with much bigger cab and bunker. They quickly became known as the 'Woollies'.

Class W were the first North Eastern engines to be fitted with variable blast pipes. The blast-pipe proper stood inside another pipe and the exhaust steam normally came out of both. Steam could be kept out of the outer pipe by closing a butterfly valve when concentration of the exhaust in the inner pipe gave the steam jet a higher speed and thus a stronger suction.

In neither form did the 'Willies' and 'Woollies' perform and they were only given light duties and their lives were mainly around 40 years. To deal with the longer hump shunting duties, an eight-coupled engine was considered ▶



*An early design of tank engine by Fletcher.*

essential till the arrival of the very powerful class X, 4-8-0 tanks with three cylinders. The class X engines had all six eccentrics on the inside axle, and this was copied on some other railways notably the LNER. They had no trouble in dealing with forty or so loaded wagons.

In class Y, all three main driving crankpins were on the leading driving wheels and axle assembly. This arrangement was used in all the later North Eastern three cylinder designs. One disadvantage of this was that one of the outside cylinders might be damaged while working in the shunting yards and this might necessitate scrapping a whole cylinder block (comparative small 'bumps' in the yard or shed were more common than readers might think!) 20 class Y (4-6-2) tanks were built. Returning now to class Z, the three cylinder system employed on the later eight-coupled engines proved most successful, the running at speed being much smoother than in the two cylinder class Y 'Atlantics'. Engines of this class lasted well into the Gresley days.

## Uniflow cylinders

In the 'Uniflow' system, the length of the piston is made almost equal to the stroke of the engine. A ring of ports extending round the circumference of the cylinder provide means by which steam in either end compartment may escape to the chimney as soon as the piston uncovers them. Two Uniflow's were built, Nos. 825 and 2212. On test with 500 ton trains, No. 2212 did not do too well. No. 2212 took 47 minutes to cover the 30 miles from York to Northallerton. It was found that no fuel economy achieved by a Uniflow could justify the extra expense of building and maintaining them.

*The successful 4-4-0 by the elder Worsdell.*

The Uniflow system eliminated a loss occasioned by a temperature difference associated with expansion ratio. So the big advantage from the Uniflow system might have been expected only where the expansion ratio was high. It might then be expected only to fit No. 825 and No. 2212 with cylinders having a markedly higher swept volume than standard so that the work could have been done at higher expansion ratios than was used in Class S.2. But cylinders much larger than those actually used might have been prohibited by limitations of space and weight.

The Uniflow system was strongly supported by Professor Stumpf in Germany and it was applied to the two NER locomotives under his guidance. The system had actually been tried in 1849 on a 2-2-2 locomotive of the South Eastern Railway but did not prove advantageous enough to be retained. However, the system was adopted in some later stationary engines, apparently with success.

The first of the Uniflows, No. 825 was built immediately after the last of the three cylinder compounds in 1913 and rebuilt as a standard S.2. No. 2212 lasted until 1935 when she was rebuilt with Lentz poppet valves.

In my opening remarks about the North Eastern engines (*M.E.* 4244, 1April 2005) I said that this railway was never a great railway. I think my comments since then have been justified. Although the 4-4-0s of the younger Worsdell were very fine, the later 'Atlantics' of Class Z did much good work, and there was nothing wrong with the big four cylinder freight engines. However, there were too many 'partial' failures to justify a claim of competent designing.

On the whole, one might say that the younger Worsdell was a very competent locomotive engineer, but one cannot claim such a compliment for the older Worsdell, nor for the last of the Chief Mechanical Engineers - Sir Vincent Raven.

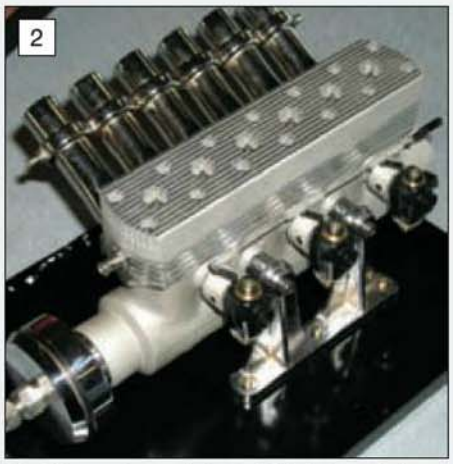
*Another early design by Fletcher.*

*The older Worsdell preferred compounding and Joy valve gear for many classes.*

*An early 2-4-0 for suburban work by Fletcher.*

*The 4-8-0 freight engines were generally successful.*


*The 4-cylinder, 36cc twin overhead camshaft glow plug engine by Schillings.*



*The 60cc, water cooled, straight six two-stroke engine by Eldon*

*The part built model of the Matchless twin cylinder motorcycle engine*

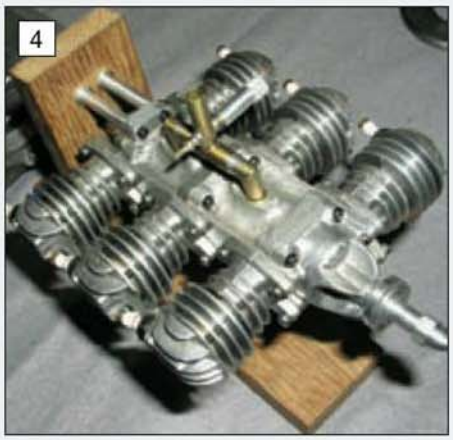
# I/C ENGINES
## AT THE 74th MODEL ENGINEER EXHIBITION

**Malcolm Stride**
takes a closer view of some of the superb engines on display. With additional words and pictures by Neil Read

Those I/C engines included in the competition classes of the Exhibition have already been written up by the various class judges. The purpose of this report is to present to a wider audience some of the many fine engines that were on display, which may otherwise not get a mention, and to perhaps rekindle a little interest in this branch of the hobby.

The first two engines, shown in the loan section, were from the collection of the late Miguel de Rancougne. Both, I have to admit, were exhibited by your reporter. The first is a 4-cylinder, 36cc twin overhead camshaft glow plug engine made by Schillings (**photo 1**). This engine has a five bearing ball-raced crankshaft with needle roller big ends and camshaft bearings. The second of the two is an unusual 60cc water cooled, straight six two-stroke glow plug engine by Eldon (**photo 2**). It was obviously designed for a very fast model boat.

Moving to the club stands, the logical place to find I/C engines is on the I/C Engine Builders Group stand. The group had their usual varied selection which included a very neat, part built Matchless twin motorcycle engine (**photo 3**). Unfortunately this engine only appeared on one of the days and the builder's name was not apparent so I guess we will have to wait to the next time it appears before we learn who built it.



*The reproduction six-cylinder Elf engine constructed by Eric Offen.*

There is no confusion over the next engine as it is the work of Eric Offen (**photo 4**). It is a air-cooled, six-cylinder, horizontally opposed engine and is a reproduction of the ten or so built by the Elf Engine Company in the USA in 1950. The engine apparently has an unusual big end arrangement which depends on a strap with lugs locating in dovetails machined into the connecting rods. Because of this feature Eric has never dared run the engine. Elf apparently used modular construction across their range, which included singles, twins and four cylinder engines. Their pistons were lapped into their respective bores but they did not use piston rings.

The Napier 'Dagger VIII' H24 engine under construction by Norman Lawrence was mentioned in the Club Stand report in the *M.E.* 4247, 13 May 2005. We take this opportunity to show further details of this remarkable engine (**photo 5**). The finish on all the items was exceptional and one can only admire the patience of those building these large multi-cylinder engines.

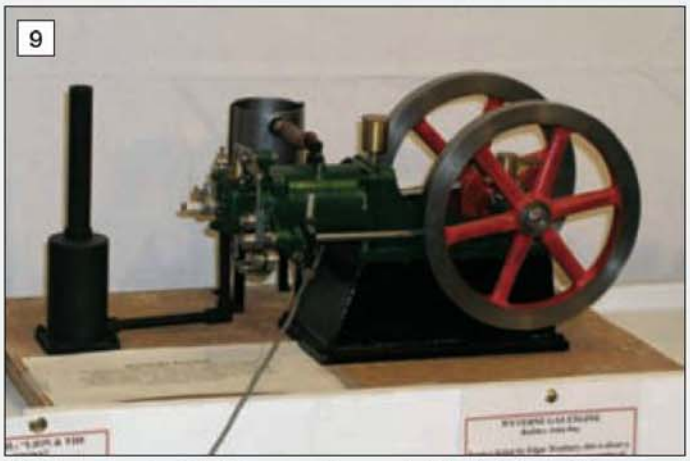
On the same stand was Brian Perkins' *Hydra* double row radial engine (**photo 6**). Also, still ▶


*Some of the components machined for the Napier 'Dagger VIII' H24 engine under construction by Norman Lawrence.*

*The remarkable Bristol* **Hydra** *double row radial engine by Brian Perkins enthralled many visitors.*

*Clen Tomlinson's model of the 'Deltic' engine continues to evolve as more complex parts are added.*

*An insight into the complexity of internal combustion aero engines could be gauged form the many parts on display.*



*This fine example of the Wyvern engine was built by John Day of the Guildford MES.*

*Another example of Wyvern, this time built by your humble scribe and exhibited on the Reading SME stand.*

under construction, was the much photographed Napier 'Deltic' engine by Clen Tomlinson (**photo 7**). Readers will have seen both these engines many times and are no doubt, like me, noting the regular progress that both Brian and Clen have made over recent months.

The last two items on this stand were the group of smaller vintage spark ignition engines and the cutaway radial engine cylinder and head assembly (**photo 8**) which showed the precision work needed for these engines.

Moving on to other club stands, I found an example of the well known Edgar Westbury Wyvern design on the Guildford MES stand (**photo 9**). This was built by member John Day and features smaller flywheels than is usual on this design.

Another Wyvern (**photo 10**) was to be found on the Reading SME stand and is another engine from the stable of your intrepid reporter. This engine was in the company of another two stationary engines, both by Alan Thatcher. The first of these was his hit and miss barn engine (**photo 11**) to the well-known RLE design. Alan's version has been fitted with the correct 3-step timing cam. Alongside this engine was Alan's very recently completed Aermotor 8-stroke engine (**photo 12**). This unusual engine was designed to power wind driven water pumps when the wind dropped. As a footnote, I can confirm the engine is now running complete with its pump. The engine keeps cool by sucking air back into the cylinder via the exhaust port on the 'extra' strokes.

I hope this brief report has given you a flavour of the I/C engines on display at the exhibition. The range of different engine types was quite remarkable and gave a good deal of insight into the many facets of I/C engine technology. I admit to some bias in favour of I/C engines and hope to see more being produced and exhibited in future.

*Alan Thatcher's handsome example of the well-known RLE engine had the correct three step timing cam.*

*Also by Alan Thatcher was this unusual Aermotor 8-stroke engine. The prototype was designed for driving water pumps.*

*Ready for action! - four of Tony Tyrer's impressive fire engine models.*

# WHERE'S THAT FIRE?

**Malcolm Stride**
takes a look at a superb collection of vintage fire engine models.

Ever since man learnt to rub two sticks together to produce fire, one of his problems has been how to put out those fires that were unwanted! Since it was discovered that water could be used to put out fires a lot of time and effort has been expended in finding better methods of getting the water onto the fire culminating in the development of the fire engine. We will all have our own memories of fire engines from our early lives and I think the sight and sound of a fire engine rushing into action will still cause most people to wonder what awaits the crew at their destination. So when Michael Banfield contacted your Editor drawing attention to a collection of fire engine models which illustrated some of the approaches and developments made during many years of fire fighting I arranged to pay a visit and photograph the models for *M.E.* Before I start the description of these fine models, a few words about Michael who owns them, and Tony Tyrer who built them, would be appropriate.

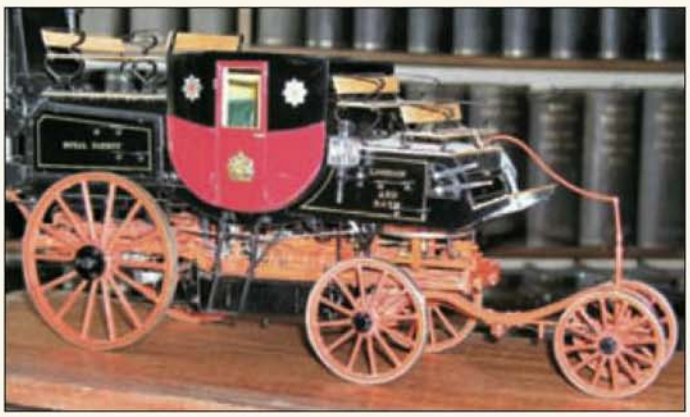
Michael Banfield has had a life-long interest in old cars and old commercial vehicles and his working life was spent in the family coaching business, Charles W. Banfield Ltd., eventually becoming Managing Director. He purchased his first old car, a 1927 Bentley Tourer in 1959, which was restored during 1960. This was followed in 1960 by his first commercial vehicle, a 1932 Leyland Titan TD2 which was restored over the following two years. Michael was a founder member of the then Historic Commercial Vehicle Club and is now Vice President and Senior Executive Officer of the Historical Commercial Vehicle Society (website **www.hcvs.co.uk**) and, along with President Lord Montague, is one of the two founder members remaining. Michael is Hon. Vice President of the Veteran Car Club of Great Britain and is heavily involved with many aspects and organisations relating to the vintage and veteran movements.

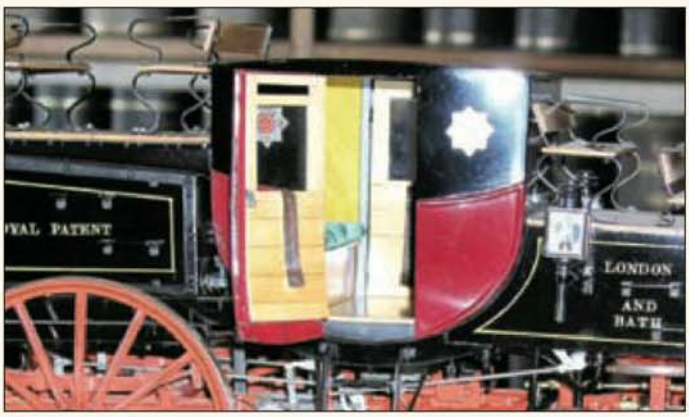
Tony Tyrer who built all the models over many years has had an interest in models from early childhood and has always been an avid aero modeller. Tony acquired his first lathe in the early 1960s in order to make better propeller assemblies for Wakefield and Open Rubber class model aircraft. Since then he has built many models including a 1:8 scale and two 1:16 scale Allchin traction engines. He became a professional model engineer in 1971 and in this career has built many and various fire engine models, showman's engines and numerous stationary engines. Following this Tony spent some years as a pattern maker for a company making white-metal models, mostly 1:43 scale model cars. Now retired, Tony's hobbies still include model aircraft, but radio controlled as he says he is *"too old to chase Wakefield and open rubber models"*.

Now, what of the models? I have to say that when I first saw the collection, I was immediately impressed with the very high standard and attention to detail lavished on them. Hopefully my photographs will give readers some appreciation of this. The models were photographed in Michael's home against a backdrop of many bound volumes of *Autocar* magazine dating from the early days. I thought that this would make an appropriate setting but others will be the judges of that!

## Gurney's Steam Carriage, c. 1827

Although not a fire engine, I have included this unusual model by the same builder. This model is ▶


*Gurney's Steam Carriage, circa 1827.*



*The carriage door opens to reveal the fully fitted out inrerior.*

to 1:16 scale and built using the patent drawings (supplied by the Science Museum) Engine details include twin cylinders of 1/2in. bore by 1 1/2in. stroke and is fitted with valve reverse gear. A separate 'scotch crank' donkey pump engine of 0.3in. bore by 0.7in. stroke supplies water to the boiler tubes. Sir Goldsworthy Gurney (1793-1875) pioneered technically successful steam carriages. Several carriages were built but, due to horse vested interests, were taxed to extinction. He was knighted in 1863 for his work in improving lighting and ventilation to the House of Commons.

Now for the fire engines, which I have dealt with in chronological order.

*Lucar's Engine, circa 1568. Note the later syringe of 1750 in foreground.*

## Lucar's Engine, c. 1568

This is a syringe engine a drawing of which first appeared in *Besson's Theatre des Instruments* published 1568. Tony Tyrer knows of no other model of this engine. The syringe or fire squirt housed in the same showcase represents an example of about 1750. Similar 'squirts' date back to Roman times.

## Merryweather Horse Drawn Manual Fire Engine, c. 1866

Built to 1:10 scale and known as the 'Paxton' after the designer of the Crystal Palace. With 22 men to work it the engine would deliver 100 gallons of water per minute to a height of 120 feet. There are two models of this type in the collection.

## Shand Mason Horse Drawn Steam Fire Engine, c. 1901

Based on the 'Double vertical engine' introduced by Shand Mason & Co. in 1889, this appliance underwent several improvements and modifications over many years. Tony Tyrer recalls the works manager of Merryweather (who acquired The Shand Mason company in 1922) telling him that this design was still being made as late as the late 1950s, he thought for use in a Spanish village. The model is built to 1:10 scale using contemporary drawings.

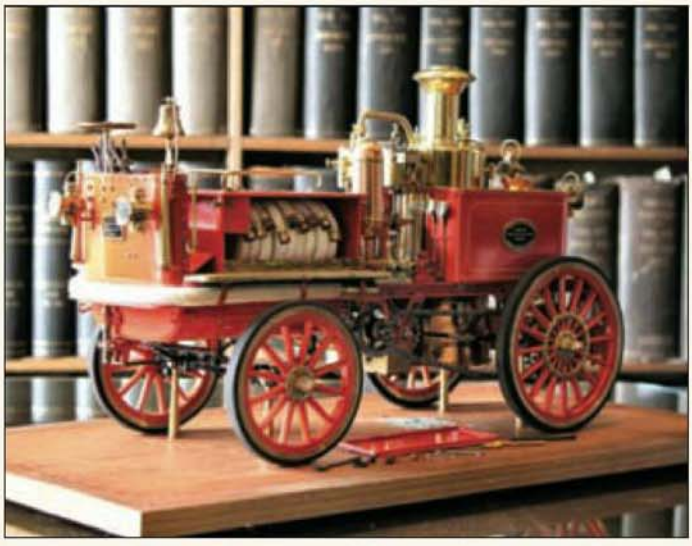
## Merryweather Horse Drawn Chemical Fire Engine, c. 1902

Built to 1:10 scale, the function of this engine was to supply water to fires on a 'first aid' basis. The copper cylinder contained 40 gallons of water mixed with sodium bicarbonate. The top fitting contained a lead bottle filled with sulphuric acid which, when punctured, allowed the acid to react with the bicarbonate solution to produce carbon dioxide and expel the liquid at a pressure of about 100lb/sq inch.

*Merryweather Horse Drawn Manual Fire Engine, circa 1866.*

*Shand Mason Horse Drawn Steam Fire Engine, circa 1901.*

*Merryweather Horse Drawn Chemical Fire Engine, circa 1902.*

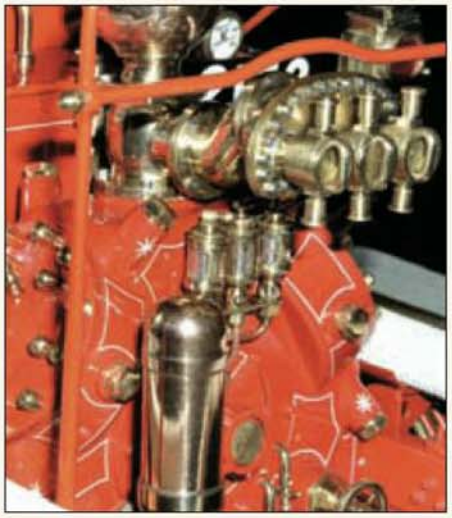


*Merryweather 'Fire King' Self Propelled Steam Fire Engine, circa 1905.*

*Merryweather Type 47 PF 4 fire engine, 1913.*

## Merryweather 'Fire King' Self-Propelled Steam Fire Engine, c. 1905

Merryweather built around 20 Fire Kings although sadly there is no known engine still in existence. They were not generally regarded as successful engines, especially when employed in areas where hills had to be negotiated, the boilers being too small for the task. Also, when the London Fire Brigade decided to adopt vehicles driven by internal combustion engines for all new appliances in 1906, no real development was undertaken. Built to a scale of 1:10, the model is powered by a twin cylinder steam engine of 0.625in. bore by 0.7 inch stroke and is directly coupled to the twin cylinder pump beneath. Stephenson type reversing valve gear is fitted together with Ackerman type steering.


*Close-up detail of the Merryweather Type 47 PF 4.*

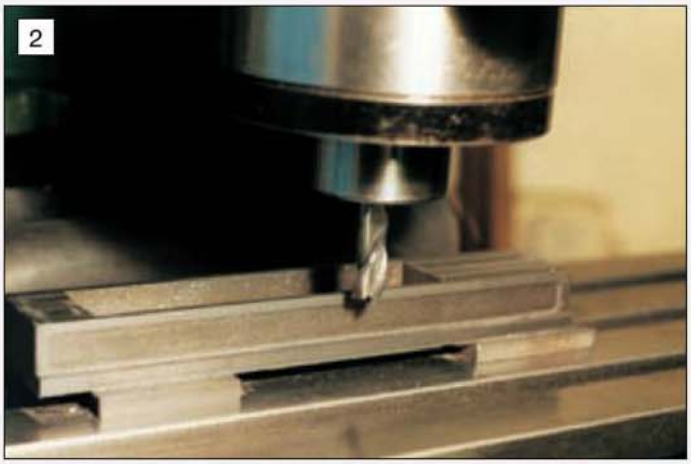
## Merryweather Type 47 PF 4 Fire Engine, 1913

The prototype on which this 1:10 scale model was based was built in 1913 and was owned for the next 50 years by Bass, Ratcliffe and Gretton, the Burton-on-Trent brewers. Rescued from the scrapyard of Langley Mill Commercial Vehicles, Notts, in September 1963, by Michael Banfield, it was completely rebuilt to Merryweather specification during 1964/65. Fitted with a Hatfield pump which delivers 350/400 gallons per minute, E 2152 retains its original English Aster Model A3 4 cylinder 53hp (RAC) engine built to Merryweather specification (and fully detailed in the model). Bore is 135mm x Stroke 150mm. The vehicle is 20ft. long, 6ft. 6in. wide, 9ft. 6in. high, weighs 4 ton 1cwt. unladen. The amount of detail on this very impressive model has to be seen to be believed and can be seen in the photos. What is not apparent from photos is that the majority of the items are working. One example is that moving the advance and retard lever on the steering wheel operates the correct linkage under the bonnet to the distributor. In total this model took some 8,000 hours to build.

I think these impressive models form a very fine and unusual collection which are another illustration of the wide variety of 'different' subjects available to us model engineers. I should also emphasise the point that all the steam models and manual pumps are fully working and have been steamed prior to painting. Finally, it remains for me to say that I am greatly indebted to Michael Banfield and his family for their hospitality and assistance during my visit. Michael (and Tony Tyrer) had prepared detailed information on each engine ready for me and son John did all the lifting around of the models during the photography session which made my job very easy.

*Engine detail of the Merryweather Type 47 PF 4.*

*The finished lathe mounted on a neat wooden base. The chuck is fitted to the mandrel and the faceplate lays beneath the machine.*



*Milling the underside of the lathe bed on a vertical milling machine. Note that the method of clamping allows the whole bottom face to be machined.*

# BUILDING A STUART MODELS' LATHE

**Anthony Mount**

**describes how to build this delightful model of an early lathe**

●*Part I*

A little while ago I worked with Stuart Models in developing a series of model machine tools, which can be built up into a beginning of the 20th century workshop powered by a Stuart steam engine. The first model was of course a lathe and it is this that I am going to describe how to build in this series of articles.

Those who have seen the Stuart stand at recent exhibitions will be aware that their miniature workshop makes a splendid feature. With line shafting driving the machine tools it conveys a good impression of what it was like in a steam driven engineering workshop.

The model is of a medium size heavy-duty lathe as used for general work. It has been kept as straightforward as possible hence no screw cutting features. Drive is by overhead shafting via flat belt to the headstock. Being a heavy-duty type it was possible to use fairly robust sections. But, as always in building models, some of the parts are quite small.

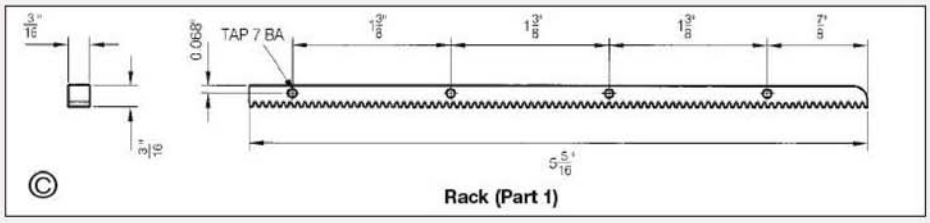
Five iron castings are supplied, plus all the bar sections, gears, rack and screws. Instead of running through the parts consecutively I will start with the castings. As an introduction to the model, **photo 1** shows the completed lathe.

Stuarts have allowed their drawings to be used with the article, a small point concerning the drawings, those who have followed my articles on stationary steam engines will know that those drawings are in 1st angle projection. The drawings for the lathe are in 3rd angle projection.

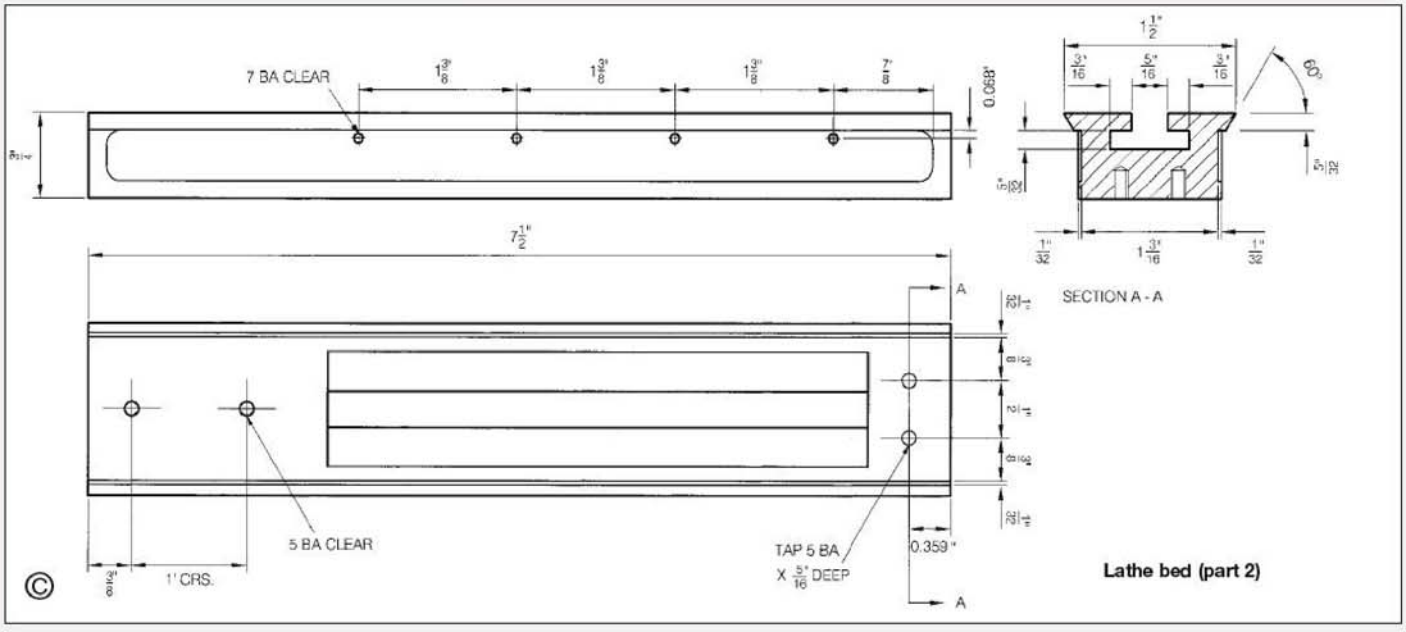
The dimensions are in imperial, again readers of my other articles will know that I use metric equipment so the first job was to change the dimensions to metric, not an onerous job it took all of 45minutes.

## Rack (part 1)

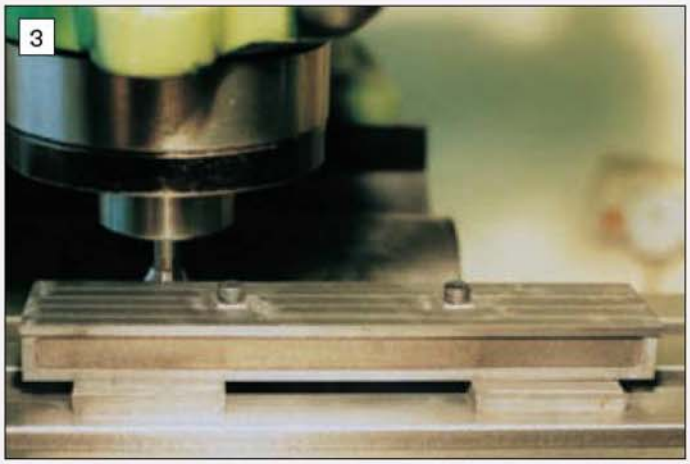
A simple job to get started on, the rack is supplied ready machined, so all that needs to be done is to round one corner where it fits into the lathe bed casting, and to drill and tap the fixing holes. These holes need careful spacing, as given on the drawing as they line up with counter bores cast in on the inside of the lathe bed casting. One safe way to position the holes is to use co-ordinates then the holes will be in the right




**Rack (Part 1)**




**Lathe bed (part 2)**




*Milling the main bed dovetail slides with a dovetail cutter. Care should be taken when milling to avoid distorting the lathe bed.*


*Machining the central slot down the middle of the lathe bed. Note the swan necked clamps to provide cutter clearance.*

position. Pick up the end with an edge finder, space out and drill the holes tapping size for 7BA.

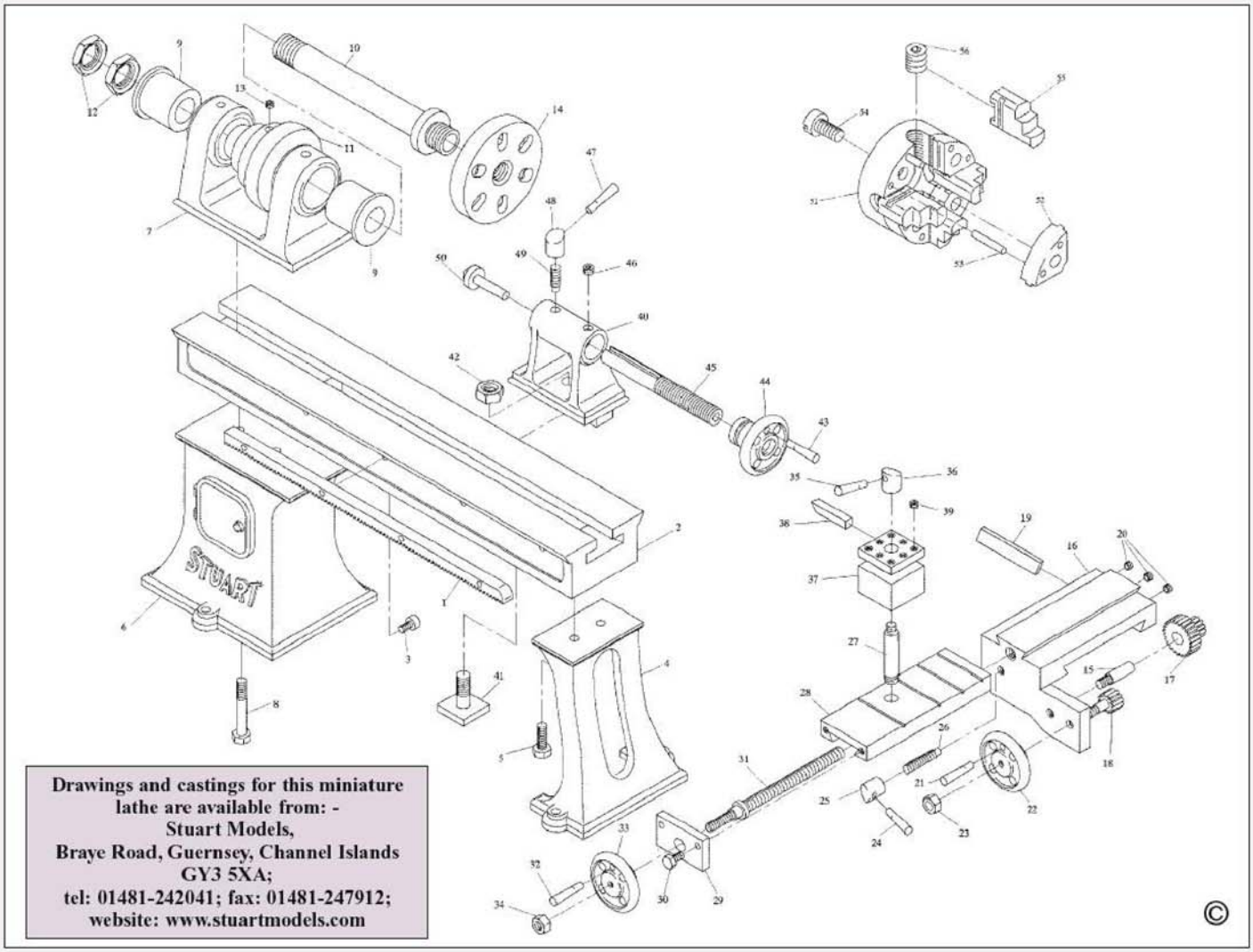
## Lathe bed (part 2)

The foundation of the whole model is the lathe bed, which is supplied as an iron casting. The majority of the work is carried out on the vertical milling machine. Start by bolting the casting face downwards on the milling machine table. A couple of Allen screws with large washers passing through the casting slot into

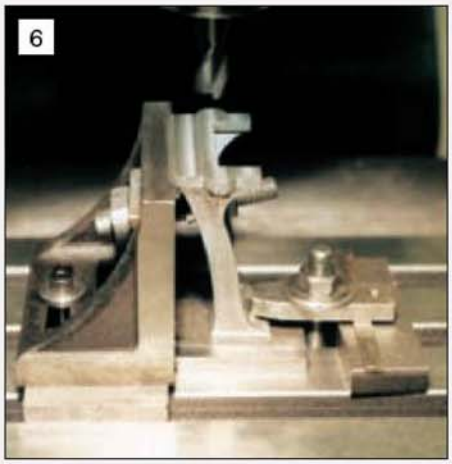

*The Woodruff cutter just emerging from the end of the lathe bed after cutting the T-slot.*

T-nuts will hold the casting firmly to the table. The casting needs obviously to be parallel to the table. This can be checked with an adjustable square off the side of the table. Bring it as near to parallel as possible by eye, then set the square to one end, then try the other end. Make small adjustments until the reading is equal.

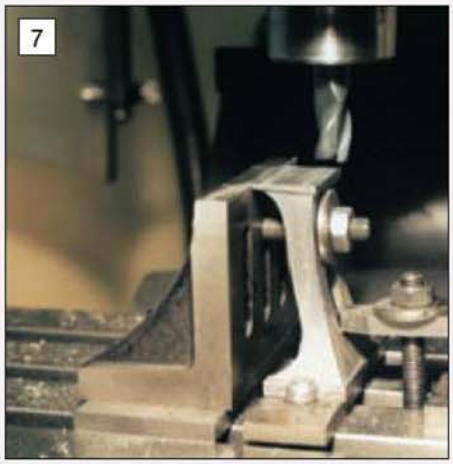
Use some mild steel packing strips between the casting and milling machine table to protect the table from the rough casting. With a large end mill take a facing cut off the ▶



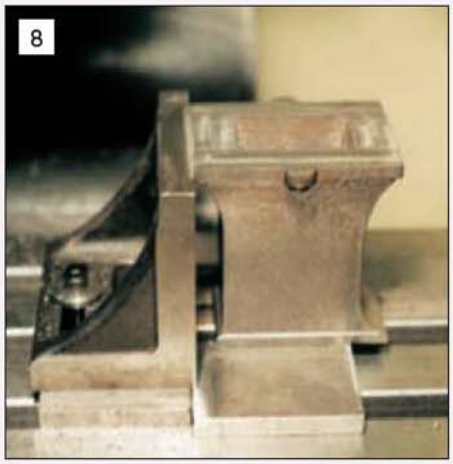

**Drawings and castings for this miniature lathe are available from: -**
**Stuart Models,**
**Braye Road, Guernsey, Channel Islands GY3 5XA;**
**tel: 01481-242041; fax: 01481-247912;**
**website: www.stuartmodels.com**



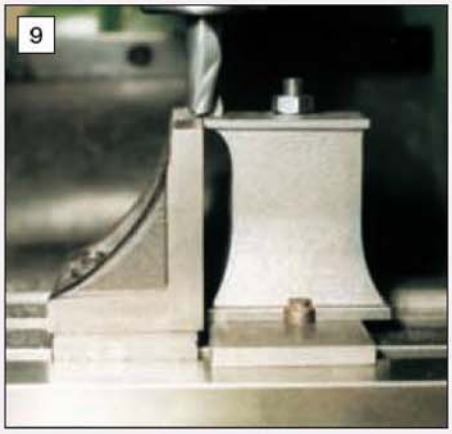

*Machining the lower surface of the tailstock foot flat. Note the use of the angle plate.*



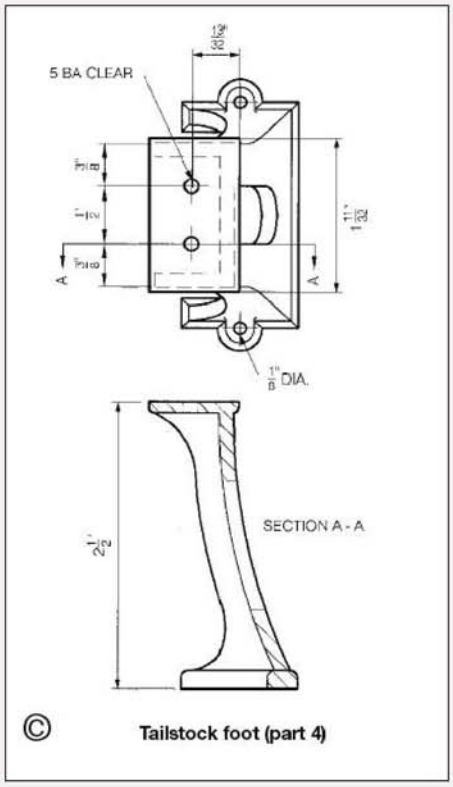

*Much the same set-up can be used to machine the upper surface of the foot.*

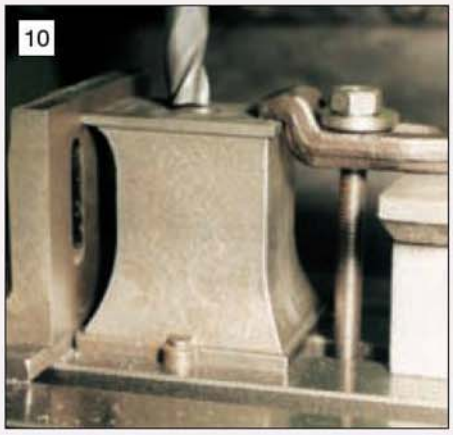



*Machining the underside of the headstock base. Again an angle plate is used for support.*




*A central clamp block can hold the base for the bulk of the top surface to be machined.*




*This can be changed for a clamp in order to finish the machining.*

bottom of the casting bringing it flat and true, as indicated in **photo 2**. At the same setting use the side of the end mill to machine the ends of the bed square and to bring to length. Now the long edges of what will become the dovetail can also be machined square with the side of the end mill, bringing the width of the bed to finished size.

We now have five faces all machined at the same setting, so they should be straight and true. Turn the casting over, and again using Allen screws, fix the casting to the table, check again that it is parallel to the table, though this time we have machined surfaces to check from.

Now the top face can be machined with the bottom of the end mill, except where the Allen screw heads are in the way, **see photo 3** for this setup. Now change to a dovetail cutter, and machine the bevels on the edges. Finish the edges so that there is just a very slight witness of the square machined edge. Do not machine to a sharp edge. With that job complete use four more clamps, this time from the sides of the casting bearing on the just machined areas. Now the Allen screws can be removed and the area that was under the Allen screws can be machined.

Change to a smaller slot drill and machine the centre groove right down the lathe bed, this is shown being done in **photo 4** where the four clamps can also be seen. By using an undersize cutter the exact width can be machined and it can be centrally located by measuring from the edges of the lathe bed.

To do the T-slot you will need a Woodruff cutter as the standard T-slot cutters are too big. The under cut is $^{5}/_{32}$in. but $^{1}/_{8}$in. would do if your cutter is too small, just make the T-nut smaller. This set up is shown in **photo 5**. Turn the bed over again and drill the 5BA clearance holes at the headstock end and drill and tap the 5BA holes at the tailstock end, these holes being blind.

The lathe bed can now be clamped in a large machine vice and the sinking in the front edge, already cast in, can be cleaned up with an end mill to provide a seating for the rack. The rack can be offered up and the fixing holes spotted, then drilled through. They should pass into the counter bores already cast in.

Final job on the bed is to clean up all the working surfaces to remove the machine marks. For a deluxe surface the bed could be given a scraped finish.

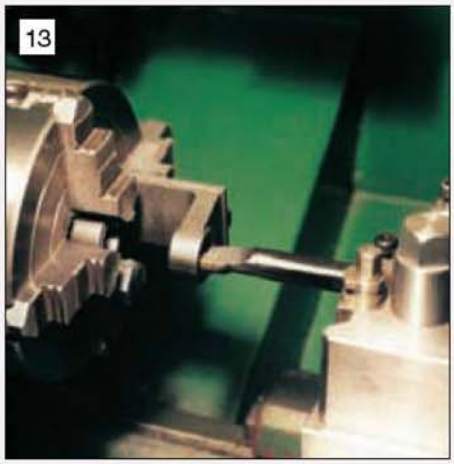

*The headstock base and tailstock foot after the machining operations but before painting.*

## Tailstock foot (part 4)

The tailstock foot casting is supplied as an iron casting. Start by cleaning up all round to remove any rough spots and prepare ready for painting. It is quite an awkward shape to hold for machining. File one end flat and clamp that end to the milling machine table. Use a small angle plate also bolted to the table as a steady, with a bolt passing through the slot in the tailstock foot and angle plate, this arrangement can be seen in **photo 6**. Then an end mill can be used to machine the end flat.

**Photograph 7** shows the tailstock foot up the other way where the end mill is taking a skim of the other end. Then by using light cuts, due to the height and shape of the casting, machine to the flange thickness. Drill the stud holes and the tailstock foot is completed.


*Machining the tenon on the underside of the headstock casting.*



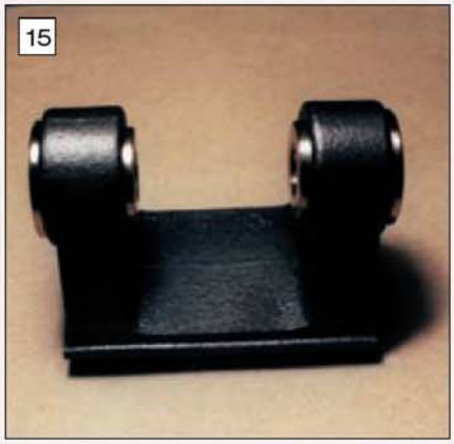

*Boring the spindle bearing holes in the headstock casting. This approach is not recommended.*


*Cleaning up the faces of the headstock casting with an end mill.*

## Headstock base (part 6)

Supplied as another iron casting, the headstock base does not need a lot of machining. You will notice a cored hole in the top and this can be utilised for bolting down the base to the milling machine table for machining the bottom of the base with an end mill. This is shown in **photo 8**, again a small angle plate is used as a steady. As for the lathe bed, use mild steel packing plates to protect the table from the cast surface of the casting.

The base can now be turned over and held down to the table with a stud and nut and the top face machined flat, and brought to finished height, as shown in **photo 9**. The next photo (**photo 10**) shows how a clamp has replaced the stud for machining away the waste material that was under the stud. Finish by drilling for the stud holes. The completed headstock base and tailstock foot can be seen in **photo 11**.




*The finished headstock casting with its spindle bearings fitted.*

## Headstock (part 7)

The headstock which carries the lathe spindle is also an iron casting. The bottom flange stands proud of the main part of the casting, and it will be useful to file it true and square all round. It can then be used as a datum for clamping in the machine vice on the vertical milling machine for milling the tongue to fit in the lathe bed, see **photo 12** for this set up. It needs to be a shake free fit, and central about the spindle.

The headstock can now be repositioned in the machine vice with packing to clear the tongue, and a clamping piece between the spindle ears to press the bottom of the casting against the packing which is pressing on the vice jaw. A square off the bottom of the machine vice can be tested against the ready-filed flange to check that the headstock casting is truly upright. Locate the centre of the spindle position using co-ordinates. The spindle, bearing seats can now be drilled and finish bored to size. It can be done at one setting if you drill through the clamping piece.

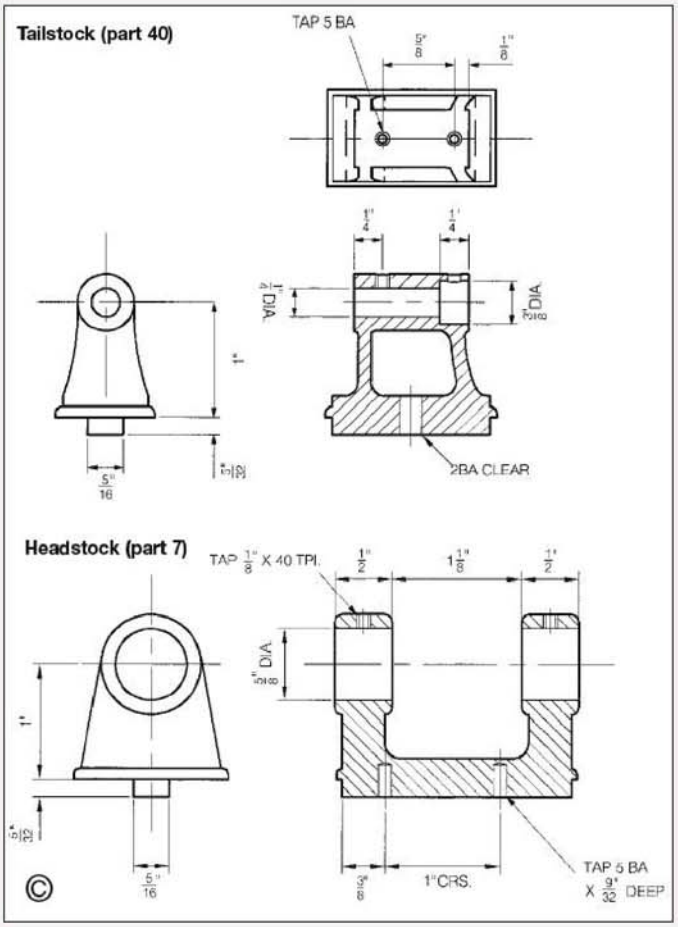
I did not actually use this set up but machined the headstock bore in the lathe as shown in **photo 13**. However, I was not happy with this as it was very difficult to get it to sit square and I cannot recommend it.

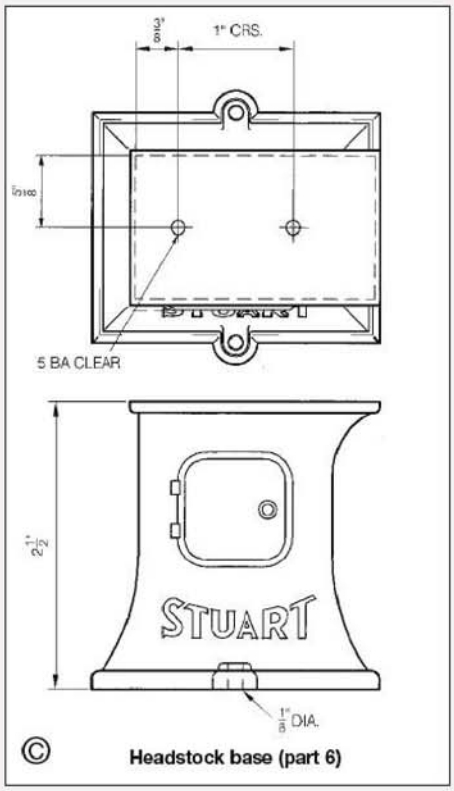
**Photograph 14** shows the end faces of the bearing seats being machined flat with the side of an end mill. Drill and tap the underside for the fixing bolts and in the tops of the bearings for the oil cups. **Photograph 15** showing the completed headstock with the bushes fitted.

## Tailstock (part 40)

With the headstock complete it seems sensible to do the tailstock next. A small iron casting, it again will benefit from having the flange filed square. It can then be clamped in the machine vice for milling the tongue to fit the lathe bed. As for the headstock it needs to be a shake free fit, but you should be able to slide it up and down the lathe bed.

●*To be continued.*



# CLUB CHAT
With Malcolm Stride

## UK News

The technical journal of the **Bristol SMEE**, *Our Cog*, includes a useful table of thermal expansion coefficients for use by members when working out tolerances for piston/cylinder fits etc. Also included are several interesting articles covering topics such as batch production of brake hangers, clocks, electric traction and the Ashton Court track signalling system. All in all an excellent read.

Work at **Crawley Model Engineers** includes the continuing repainting of the track support girders and also painting out "*some meaningless graffiti that had appeared on the hut wall.*" Isn't it nice of the local anti-social elements throughout the country to keep us all from getting bored! The *Warship* locomotive shed a drive belt and so has had two new belts fitted. Work on clearing some weeds and grass uncovered some paving that Editor, Jack Darby "*did not know existed*". A large quantity of leaves was removed from the cutting.

At the AGM, the committee were re-elected en-bloc so as Jack reports, "*either they are doing it right or nobody else wants the job*". Jack also reports that fact that the club had "*3 column inches in the Club News section*" as "*proof that somebody does read the newsletter*" – Yes, it's me!

I am very pleased to welcome a new club to this column in the form of the **Edinburgh SME**. Secretary Robert McLuckie has sent details of the improvements to the club track where a new ground level 5/7 1/4in. gauge track and major upgrading to the existing 3 1/2/5in. gauge track is in progress. Access to both circuits is by a common triple gauge track (sounds like interesting point work!) from the raised steaming bays. Robert reports that the society can now cater for 7 1/4in. gauge locomotives up to 350kgs weight. Running days are monthly on the second and fourth Sundays from 11am. Robert can be contacted at 134 South Mid Street, Bathgate, West Lothian EH48 1DY. I am delighted to welcome the society to this obviously very exclusive group!

The **East Somerset SME** have made excellent progress with their track site and are close to making the club building inhabitable. This involved reducing the building to its steel frames and roof and starting from there. They are aiming to have phase one of the track ready for the beginning of June and this has all been pegged out and a half viaduct over a stream is completed.

Members of **Fylde SME** are looking for a new newsletter Editor after the present incumbent, John Palmer retired from the position due to expansion of his business. Can I thank John for his contribution to this column over the past two years and hope the society find a 'volunteer' soon.

The **Gas Turbine Builders Association** have outsourced the printing of their newsletter to a commercial firm. The extra cost per newsletter was very small but "*the saving in time effort and shear aggravation to the committee is significant*". I can understand their feelings because it is one of the largest I get with 20 sides of closely typed A4 paper.

There are reports of the engine efficiency competition with seven engines entered. The competition is in two categories, the 'Thrust Specific Fuel Consumption' where the amount of fuel used per second per Newton of thrust is calculated and the second is for 'Thrust to Weight Ratio'. The former apparently favours larger engines whilst the latter is best for the smaller units. Both categories were won by Rob Rowbotham with his Merlin 160 which developed 16.65kg of thrust at 116,000rpm. Congratulations to Rob on his achievement.

Martin and Ben Gibbins are building a model gas turbine powered hydroplane. This is a tunnel hull boat with two gas turbines mounted on a moveable frame so that they can tilt and twist for trim control and I assume steering. My question is where are they going to run it? I ask because I have a very noisy water cooled straight six two stroke which I would love to put in a fast boat but the result would upset far to many people at any local venues!

James Hill is making good progress on his axial flow turbine and has "*pretty much concluded the construction of the engine*".

John Wallis from Australia describes the development of his (full size) gas turbine powered motorcycle. The engine is based around truck turbocharger parts and has recorded 0-60mph in 4.5 seconds with 120mph by the 1/4 mile in 12 seconds. If I say that early in the development John describes an 8ft. flame from the exhaust with his neighbour making a dash for safety round the shed you will all understand!

Members of **Guernsey MES** are having a session on 'Casting' on 4 June with other events planned including track days and the West Show on August 17 and 18.

The **Guild of Model Wheelwrights** held their annual dinner at the renowned 'Pudding Club' in the Cotswolds. They report that this "*was widely agreed to be the best yet*" and are planning to

# 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.

**MAY**

**28-30** **Bedford MES.** *AGM, Exhibition & Miniature Traction Engine Rally.* Contact Ted Jolliffe: 01234-327791.
**28** **Brighton & Hove SMLE.** *Trackday.* Contact Mick Funnell: 01323-892042.
**29** **Amnerfield Miniature Railway.** *Public Running.* Contact David Jerome: 0118-9700274.
**29/30** **Bristol SMEE.** *Public Running.* Contact Trevor Chambers: 0145-441-5085.
**29/30** **Cardiff MES.** *Open Days.* Contact Trevor Jenkins: 029-2075-5568.
**29** **Chichester DSME.** *Steam on Sunday.* Contact Brian Bird: 01243-536468.
**29/30** **Claymills Pumping Engines.** *Open Days.*Contact B. Eastough: 01283-812501.
**29** **Edinburgh SME.** *Open Day.* Contact Robert McLucke: 01506-655270.
**29/30** **Elmdon MES.** *Two Museum Days.* Contact Chris Giles: 0121-458-1291.
**29** **High Wycombe MEC.** *Public Running.* Contact Eric Stevens: 01494-438761.
**29/30** **Malden DSME.** *Public Running.* Contact John Mottram: 01483-473786.
**29** **MELSA.** *Sunday in the Park.* Contact Graham Chadbone: 07-4121-4341.
**29** **North Cornwall MES.** *Steam-Up.* Contact Ray Reed: 01237-424254.
**29/30** **Oxford (City of) SME.** *Public Running.* Contact Chris Kelland: 01235-770836.
**29** **Steam LS of Victoria.** *Working Bee & Barbecue lunch.* Contact Graham Plaskett: (03) 9750-5022.
**29** **Reading SME.** *Public Running.* Contact Brian Joslyn: 01491-873393.
**30** **Brighton & Hove SMLE.** *Carnival Trackday.*Contact Mick Funnell: 01323-892042.
**30** **New Jersey Live Steamers, Inc.** *Memorial Day Run.* Contact Karl Pickles: 718-494-7263.
**30/31** **Northern Mill Engine Society.** *Open Days.* Contact John Phillp: 01257-265003.
**30** **Saffron Walden DSME.** *Running Day with Barbecue (public running after 2pm).* Contact Jack Setterfield: 01843-596822.
**30** **Stockholes Farm MR.** *Spring Bank Holiday Running.* Contact Ivan Smith: 01427-872723.
**30** **Taunton ME.** *Public Running.* Contact Don Martin: 01460-63162.

**JUNE**

**1** **Bradford MES.** *Stan Reffin: Miniature R/C Boats.* Contact John Mills: 01943-467844.
**1-4** **East Somerset SMEE.** *RB&W Show plus grand opening of railway to public.* Contact Roger Davis: 01749-677195.
**1-4** **Guild of Model Wheelwrights.** *Royal Bath and West Show, Nr. Shepton Mallet.* Contact Biddy Hepper: 01492-623274.
**1** **West Wiltshire SME.** *Steam-Up.* Contact R. Nev. Boulton: 01380-828101.
**2** **Norwich DSME.** *An Evening with Norfolk Railway Society.* Contact Paul Reed: 01603-462925.
**2** **South Lakeland MES.** *Meeting.* Contact Adrian Dixon: 01229-869915.
**2** **Sutton MEC.** *Bits & Pieces.* Contact Bob Wood: 0208-641-6258.
**3** **Aylesbury (Vale of) MES.** *Track Night.* Contact Andy Rapley: 01296-420750.
**3** **Brighton & Hove SMLE.** *Working Evening.* Contact Mick Funnell: 01323-892042.
**3** **Canvey R&MEC.** *Steam-Up with Food.* Contact Brian Baker: 01702-512752.
**3** **Maidstone MES (UK).** *Evening Run.* Contact Martin Parham: 01622-630298.
**3-5** **New Jersey Live Steamers, Inc.** *Spring Meet.* Contact Karl Pickles: 718-494-7263.
**3** **North London SME.** *Derek Brown: Anna.* Contact David Harris: 01707-326518.
**3** **North Norfolk MEC.** *Traction Engines & Static Engines.* Contact Gordon Ford: 01263-512350.
**3** **Rochdale SMEE.** *Quiz Night.* Contact Mike Foster: 01706-360849.
**3** **Romford MEC.** *Competition Night.* Contact Colin Hunt: 01708-709302.
**4** **Amnerfield Miniature Railway.** *Diesel & Electric Visitors Day.* Contact David Jerome: 0118-9700274.
**4/5** **Aylesbury (Vale of) MES.** *Annual Miniature Traction Engine Rally.* Contact Andy Rapley: 01296-420750.
**4/5** **Dockland & E. London MES.** *Public Running.* Contact P. M. Jonas: 01708-228510.

return this year. Patrick Field has produced a neat device for holding work whilst silver-soldering. I hope to include details in a forthcoming 'Club Tips'.

Retiring Chairman, Richard Donovan, of the **Hereford SME** reports that the society is prospering with the large scales going from strength to strength and the development of the clubroom '00' gauge layout and the new gauge '1' track outside they now "*cater for a very wide range of tastes in the railway arena*".

**King's Lynn SME** have been successful in obtaining a community grant for their new 'Kabin' and work has proceeded apace. As they say this will give them "*a much needed central operating HQ that should help to bring in a few more members*". Anyone in the area wishing to get involved can find contact information on the website at **www.kldsme.org.uk** or by phoning secretary Mike Coote on 01553-673728. The society had a very musical evening at their first meeting this year when Ron and Roseanne Bowyer gave a demonstration and talk about mechanical street organs and music.

Alan Bibby, publicity officer for the **Leyland SME**, has updated us with news from the society. The development of the "*other railway, the ground level track running between the Worden Lane car park and the craft centre*" is being rebuilt as a continuous 'dumb bell' loop which will considerably increase the society's passenger carrying capacity. The new track will be laid using bull head rail with Keruing sleepers on a limestone track bed.

Alan comments that the local South Ribble Borough Council has always given the club "*excellent support and sees us as one of the major attractions in the park*". We are always pleased to report on those councils with such an enlightened attitude.

Chairman Donal Corcoran of the **North London SME** reports that 2005 has seen the news sheet brought into the 21st century by Editor, Nick Rudoe. I can confirm that the new publication is of excellent quality and does the society proud. The society held an unusual quiz at the December meeting. Jim MacDonald produced two sheets of company logos, one of car manufacturers and one of airlines. The members had to name the companies, and for the airlines, the operating base.

The January locomotive section meeting was a video evening and included a film of the track at **Dampf Bahn Club – Holstein** at Schakendorf in Germany. The track is on land owned by a horticultural shop and is dual gauge (5in. and 7¼in.) with the track passing over a lake in two places and complete with tunnels and cutting. One locomotive is reported as having a steam heated driving truck! The second film of the evening was the Venice Simplon Orient Express originally created in 1864 by George Pullman.

The 'Tuesday Club' at **North Wilts MES** have been busy fitting out the kitchen and rewiring the club house when not drinking "*copious cups of the usual beverages*". Other work carried out includes refurbishment of the carriage shed and replacing belts and motors on the Class 86 locomotive.

**Reading SME** have been indulging in some nostalgia in their February newsletter by reproducing a report on their very first exhibition in 1913. They seem to have got the bug again, because no sooner had they exhibited at Sandown than they were off to Brighton for the Modelworld Exhibition. Unfortunately, when member Brian Murby arrived with his van to collect the stand, he omitted to lift the top gate barrier and re-modelled the roof panels of his van when driving in!

A group of members, led by President Les Dawson, visited Sinnsheim for the exhibition with several locomotives. Les reports that he was somewhat surprised on the way back when, after he had "*dealt with a call of nature*" at a Belgian motorway services, the toilet seat began to rotate! The other event that caused amusement was in the hotel when three of the group ordered ham and eggs for breakfast. This arrived on one large platter and was consumed by an anonymous **Worthing SME** member who assumed it was all his breakfast!

The latest newsletter from the **Wigan DSME** is the 500th issue so congratulations to all concerned. Producing newsletters is a time-consuming sometimes thankless job and I think all clubs owe a big vote of thanks to their respective Editors. Chairman Geoff Buckley has produced a design for a lubricator non-return valve using silicon rubber tube for the valve.

Nic Ashmore, secretary of the **Weymouth DSME**, is complaining. Apparently he could not attend the AGM and was voted into the post of secretary in his absence! We wish him well in his new role. Nic can be contacted at 1 The Orchard, Broadway, Weymouth, Dorset DT3 5EA or telephone 01305-813252. The society have a track site in the Budmouth Technology College but had to lift their track when a building was extended. The extension has a club room incorporated and the heavy gang are now re-laying the track. The society has a website at **www.david-riches.supanet.com/wdmeshom.htm**

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4 **Guernsey Model Engineering Society.** *Casting.* Contact Dave Simon: 01481-251017.
4 **Ickenham DSME.** *Public Running.* Contact David Sexton: 01895-630125.
4/5 **Kew Bridge Steam Museum.** *Kew Bridge Model Boat Show.* Information: 020-8568-4757.
4/5 **Melton Mowbray DMES.** *Whissendine 2005.* Contact Phil Tansley: 0116-2673646.
4 **Romford MEC.** *Trackside Afternoon.* Contact Colin Hunt: 01708-709302.
4 **SM&EE.** *Competition Day and Working Model Display.* Contact David Boote: 01202-745862.
4 **South Lakeland MES.** *Open Day.* Contact Adrian Dixon: 01229-869915.
4-5 **Wrexham DSME.** *Narrow Gauge IMLEC.* Contact Paul Malin: 01691-650429.
5 **Birmingham SME.** *BSME Summer Gala.* Contact John Walker: 01789-266065.
5 **Frimley & Ascot LC.** *Public Running.* Contact Bob Dowman: 01252-835042.
5 **Leyland SME.** *Charity Day.* Contact A. P. Bibby: 01254-812049.
5 **Malden DSME.** *Public Running.* Contact John Mottram: 01483-473786.
5 **Northampton SME.** *Public Running Day.* Contact Pete Jarman: 01234-708501 (eve).
5 **Oxford (City of) SME.** *Public Running.* Contact Chris Kelland: 01235-770836.
5 **Plymouth MSLS.** *Public Running.* Contact John Brooker: 01752-671722.
5 **Reading SME.** *Public Running.* Contact Brian Joslyn: 01491-873393.
5 **Rugby MES.** *Models Day.* Contact David Eadon: 01788-576956.
5 **South Durham SME.** *Running Day.* Contact B. Owens: 01325-721503.
5 **Steam LS of Victoria.** *Public Running.* Contact Graham Plaskett: (03) 9750-5022.
5 **Taunton ME.** *Public Running.* Contact Don Martin: 01460-63162.
5 **Wimborne DSME.** *Public Running.* Contact Eric Basire: 01202-897158.
6 **Peterborough SME.** *Bits & Pieces.* Contact Tony Meek: 01778-345142.
7 **North Cornwall MES.** *Club Meeting & Track Evening.* Contact Ray Reed: 01237-424254.
7 **South Durham SME.** *Running Day.* Contact B. Owens: 01325-721503.
7 **Taunton ME.** *Welding Evening.* Contact Don Martin: 01460-63162.
8 **Bradford MES.** *Meeting.* Contact John Mills: 01943-467844.
8 **Brighton & Hove SMLE.** *Wrinklies Running Day.* Contact Mick Funnell: 01323-892042.
8 **Cardiff MES.** *Kids Out Day with Cardiff East Rotary Club.* Contact Trevor Jenkins: 029-2075-5568.
8 **High Wycombe MEC.** *Evening at Track.* Contact Eric Stevens: 01494-438761.
8 **Hull DSME.** *Members' current projects.* Contact Tony Finn: 01482-898434.
8 **Leicester SME.** *Open Evening for local Railway Societies.* Contact Raymond Wallis: 0116-285-8824.
8 **St. Albans DMES.** *An Evening at Chipperfield.* Contact Roy Verden: 01923-220590.
9 **Brighton & Hove SMLE.** *Workshop Evening.* Contact Mick Funnell: 01323-892042.
9 **Leyland SME.** *Chat Night.* Contact A. P. Bibby: 01254-812049.
9 **N. W. Leicester SME.** *Bring & Buy.* Contact John Elliott: 01455-847040.
9 **Sutton MEC.** *Clive Fox: Copper Boiler-making Forum.* Contact Bob Wood: 0208-641-6258.
9 **Worthing DSME.** *First Summer Steam-Up.* Contact Bob Phillips: 01903-243018.
11/12 **Dockland & E. London MES.** *Public Running.* Contact P. M. Jonas: 01708-228510.
11 **Guernsey Model Engineering Society.** *Track Day.* Contact Dave Simon: 01481-251017.
11/12 **Harrow & Wembley SME.** *Open Weekend.* Contact Dr. Roger Greenwood: 020-8427-2755.
11 **Rochdale SMEE.** *Open Running Day.* Contact Mike Foster: 01706-360849.
11 **West Wiltshire SME.** *Gala Day.* Contact R. Nev. Boulton: 01380-828101.
11/12 **West Riding SLS.** *Annual Weekend Rally.* Contact David Batty: 01924-363908.
12 **Bristol SMEE.** *Public Running.* Contact Trevor Chambers: 0145-441-5085.
12 **Guildford MES.** *Driver Training.* Contact Dave Longhurst: 01428-605424.
12 **Guild of Model Wheelwrights.** *Broomfield College, Broomfield, Morley, Ilkeston.* Contact Biddy Hepper: 01492-623274.
12 **Harlington LS.** *Public Running.* Contact Peter Tarrant: 01895-851168.
12 **Leeds SMEE.** *Running Day.* Contact Colin Abrey: 01132-649630.
12 **Malden DSME.** *Kingston Mencap Day.* Contact John Mottram: 01483-473786.
12 **Portsmouth MES.** *Running Day & Barbecue.* Contact John Warren: 023-9259-5354.
12 **Rugeley Power Station MES.** *Open Invitation Day.* Contact Dereck Moore: 01543-490023.
12 **St. Albans DMES.** *Club Running.* Contact Roy Verden: 01923-220590.
12 **Sutton MEC.** *Track Day.* Contact Bob Wood: 0208-641-6258.
12 **Wimborne DSME.** *Young Members' Running Day.* Contact Eric Basire: 01202-897158.
12 **York City & DSME.** *Running Day.* Contact Pat Martindale: 01262-676291.
13 **Bedford MES.** *Restoring a GWR steam railcar.* Contact Ted Jolliffe: 01234-327791.

## World News

### Australia

Fino Faccenda has been elected as President of the Steam Locomotive Society of Victoria for a second term. The society has elected a new secretary in the person of Ron Baneth. Ron can be contacted at 29 Hilton Street, Beaumaris, Vic 3193, Australia, or by phone on 03-9776-9843. Retiring secretary Graham Plaskett has been awarded a life membership in recognition of his services over the past ten years.

The newsletter contains two 'proverbs' which may strike a chord with some of our readers;

"*Light travels faster than sound. That is why some people appear bright until you hear them speak.*" and:

"*The things that come to those that wait are the things left by those who got in first.*"

Good progress has being made on the electric locomotive shed, which will allow the society to commence the other outstanding need which is for a shade over the elevated station, described as "*long overdue!*". Fino reports that it "*has also been pleasing to see the numbers and enthusiasm growing a little on the 'unofficial' Sunday working bees*". The major future project is the planned upgrade to the elevated track which is in the planning stages at the time of writing.

### Canada

Newsletter of the **British Columbia SME**, *The Whistle*, reports that a group of creative ladies have decided to meet on a monthly basis to exchange ideas on their various art and craft projects. Members of the group are encouraged to bring cookies etc., and to "*bring a lunch if you want to eat*". The newsletter has a new Editor, one Edwin Bussey who has taken over following the election of previous incumbent Sean Laurence to the post of treasurer. May we congratulate both on their new roles and with pure self interest particularly Edwin.

Lindsay McDonnell describes an interesting *"one truck (bogie) driving car"* for ground level use. In this design the driver sits above the bogie with his feet in a normal sitting position, whilst the weight of the front is taken by the locomotive coupling. The advantage is that the driver can be closer to the locomotive and is sat more comfortably than on the more usual arrangement.



### United States

At a recent meeting of the **Bay Area Engine Modellers**, Dick Pretel showed a highly modified Gannett Single. As many of you will know, the Gannett was a highly regarded English model boat motor that ran well, but was noted for less than lovely machine work. Dick solved this deficiency by machining an extremely fine four-valve head. The result is not only attractive; it runs far better than the original two-valve arrangement. These engines came as either magneto fired or with breaker points. I remember having close contact with one of these engines many years ago during my early modelling days in the 1960s at the **Southend Model Power Boat Club.** It was owned by one of the members and was installed in, I think, a 'Sea Queen' kit boat. It was certainly very quiet compared to the noisy two strokes being used by the rest of us!

The front cover picture of the **New Jersey Live Steamers** newsletter shows member Tom Battle enjoying a run on his 1in. scale pacific on New Years Day in shirt sleeves! The weather was obviously very unseasonably mild (around 60° F apparently). On the same day, member John Summer had two gauge '1' locomotives running, one equipped with a miniature video camera which transmitted pictures back to the club house so that members could watch the results on television. That sounds like a very good idea for bad weather, *"you drive your loco round outside in the wet and we will sit inside in the warm and enjoy it!"* Various winter maintenance tasks have been carried out including some track rebuilding and repair of the transfer table.

| | |
|---|---|
| 13 | **Frimley & Ascot LC.** *Meeting.* Contact Bob Dowman: 01252-835042. |
| 13 | **Melton Mowbray DMES.** *Visit to Taylors Bell Foundry, Loughborough.* Contact Phil Tansley: 0116-2673646. |
| 13 | **Saffron Walden DSME.** *Club Night.* Contact Jack Setterfield: 01843-596822. |
| 13 | **St. Albans DMES.** *Cdr. LeQuelnec: HMS Belfast.* Contact Roy Verden: 01923-220590. |
| 15 | **Bournemouth DSME.** *Chris Harris: Bullied Pacifics.* Contact Dave Fynn: 01202-474599. |
| 15 | **MELSA.** *Monthly Club Meeting.* Contact Graham Chadbone: 07-4121-4341. |
| 15 | **West Wiltshire SME.** *Steam-Up.* Contact R. Nev. Boulton: 01380-828101. |
| 16 | **North London SME.** *Barbecue at Colney Heath.* Contact David Harris: 01707-326518. |
| 16 | **Sutton MEC.** *New Drivers Run.* Contact Bob Wood: 0208-641-6258. |
| 17 | **Bournemouth DSME.** *Andy Clark: Polly Models.* Contact Dave Fynn: 01202-474599. |
| 17 | **Canvey R&MEC.** *Steam-Up with Fish 'n Chips.* Contact Brian Baker: 01702-512752. |
| 17 | **Rochdale SMEE.** *Annual Models Running Night.* Contact Mike Foster: 01706-360849. |
| 17 | **Romford MEC.** *Track Maintenance.* Contact Colin Hunt: 01708-709302. |
| 17 | **St. Albans DMES.** *Club Running.* Contact Roy Verden: 01923-220590. |
| 18 | **Bournemouth DSME.** *Polly's in the Park.* Contact Dave Fynn: 01202-474599. |
| 18/19 | **Canterbury DMES (UK).** *Silver Jubilee Celebrations.* Contact Mrs P. Barker: 01227-273357. |
| 18/19 | **Guild of Model Wheelwrights.** *Acton Scott Farm, Church Stretton.* Contact Biddy Hepper: 01492-623274. |
| 18 | **Romford MEC.** *Trackside Afternoon.* Contact Colin Hunt: 01708-709302. |
| 18 | **SM&EE.** *Rummage Sale.* Contact David Boote: 01202-745862. |
| 18 | **Steam LS of Victoria.** *Public Running.* Contact Graham Plaskett: (03) 9750-5022. |
| 18 | **York City & DSME.** *Hands-on CAD.* Contact Pat Martindale: 01262-676291. |
| 19 | **Bedford MES.** *Public Running.* Contact Ted Jolliffe: 01234-327791. |
| 19 | **Bournemouth DSME.** *Club Open Day.* Contact Dave Fynn: 01202-474599. |
| 19 | **Bristol SMEE.** *Public Running.* Contact Trevor Chambers: 0145-441-5085. |
| 19 | **Cardiff MES.** *Steam-Up and Family Day.* Contact Trevor Jenkins: 029-2075-5568. |
| 19 | **Chichester DSME.** *Barbecue & CHILIC 2.* Contact Brian Bird: 01243-536468. |
| 19 | **Frimley & Ascot LC.** *Frimley Lodge Park Show.* Contact Bob Dowman: 01252-835042. |
| 19 | **Guildford MES.** *Public Running.* Contact Dave Longhurst: 01428-605424. |
| 19 | **Leighton Buzzard NG Rly.** *Fathers' Day.* Enquiries: 01525-373888. |
| 19 | **North Cornwall MES.** *Steam-Up.* Contact Ray Reed: 01237-424254. |
| 19 | **N. W. Leicester SME.** *Public Running.* Contact John Elliott: 01455-847040. |
| 19 | **Oxford (City of) SME.** *Public Running.* Contact Chris Kelland: 01235-770836. |
| 19 | **Plymouth MSLS.** *Public Running.* Contact John Brooker: 01752-671722. |
| 19 | **Saffron Walden DSME.** *One Day Rally (open to all clubs) with Barbecue (public running after 2pm).* Contact Jack Setterfield: 01843-596822. |
| 19 | **Taunton ME.** *Public Running.* Contact Don Martin: 01460-63162. |
| 19 | **Wimborne DSME.** *Public Running.* Contact Eric Basire: 01202-897158. |
| 20 | **Model Steam Road Vehicle Soc.** *Adam Meredith/Frank Pockett: Lining Out.* Contact Geoff Miles: 01869-247602. |
| 20 | **National 2½in. Gauge Ass'n.** *Locomotive Rally at Stockport SME.* Contact Clive Young: 01233-626455. |
| 20 | **Peterborough SME.** *Barbecue & Drive a Loco Evening.* Contact Tony Meek: 01778-345142. |

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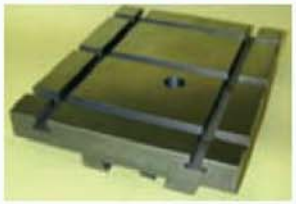

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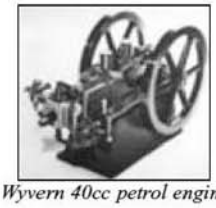

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NET WEIGHT 25KGS

**PRICE** £299.00 INC VAT

### COBRA 3 IN 1

**FEATURES**
VARIABLE SPEED
CAST IRON CONSTRUCTION
NO INSTALLATION REQUIRED
THREAD CUTTING
MANY ACCESSORIES AVAILABLE
CAN BE INSTALLED AND CUTTING METAL WITHIN 5 MINUTES

OVERALL SIZE 540 X 340 X 680
NET WEIGHT 30KGS

**PRICE** £450.00 INC VAT

### COBRA LATHE

**FEATURES**
VARIABLE SPEED
POWERED TRAVEL
CAST IRON BED
QUIET RUNNING
ROBUST AND ACCURATE
EASY OPERATION

**SPECIFICATION**
CENTRE HEIGHT 70MM
DIST: BETWEEN CENTRES 250MM
OVERALL SIZE 340 X 680MM
NET WEIGHT 30KGS

**PRICE** £275.00 INC VAT


**CONTACT DETAILS**

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