MODEL ENGINEER

NATIONAL MODEL ENGINEERING & MODELLING EXHIBITION

HARROGATE

7-9 May 2004

Vol. 192 No. 4220

30 April - 13 May 2004

VOL 192 NO 4220 £2.40

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MODEL BOILER SAFETY

Better or worse with fusible plugs?

OPTIMISE PERFORMANCE

Setting up the Clarke CL300M lathe

HULL & BARNSLEY RAILWAY

Matthew Stirling's J Class 4-4-0s

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- 4" 3 JAW SELF CENTERING CHUCK
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- FOUR WAY INDEXING TOOL POST
- 3MT AND 2MT DEAD CENTRES
- METRIC & IMPERIAL THREAD CUTTING CHANGE GEARS
- SWARF TRAY
- REAR CHIP GUARD

BV-20 LATHE

- 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
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- SAFE ELECTRICAL INTERLOCKS TO CHUCK GUARD AND GEAR TRAIN COVER

ONLY £499 INC V.A.T. & DELIVERY

OPTIONAL FLOOR STAND £99

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" HEIGHT
- WEIGHT 230 LBS

ZX-15 MILLING MACHINE

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

General dimensions may be subject to minor variations.

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OPTIONAL STAND £89

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- LOW COST ACCURATE SYSTEM
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- BAR STOCK WILL PASS THROUGH COLLET AND CHUCK
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IN THIS ISSUE

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On the cover ...

Unanimously acclaimed Best Club Stand at the 73rd Model Engineer Exhibition by the Judges, the Koninklijke Model Yacht Club Steam Group from Antwerp were also arguably the furthest travelled. Ably manned by President Walter Laumen and Wilfred Vermeiren, a wide range of members' work was displayed on the stand leaving visitors in no doubt about the enthusiasm of this group of active model engineers. The presence of the eighteen clubs which supported this year's Exhibition in the Club Room and in various locations around the exhibition halls contributed significantly to the success of the event and their presence was very much appreciated by the organisers and visitors alike. A full report on this aspect of this year's Exhibition begins on page 488.

(Photograph by David Fenner)

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9" Faceplate	£ 35.00
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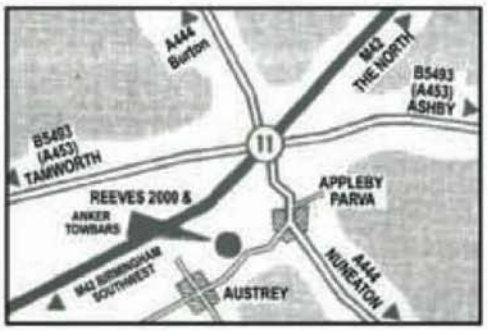

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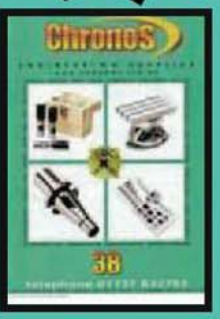

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SMOKE RINGS
With the Editors

NAME Exhibition 2004

I would like here to thank all concerned for their warm welcome and generous hospitality during my visit to the Northern Association Models Exhibition in Warrington. Exhibition Manager Eric Clifford and NAME Chairman Don Broadley had orchestrated a first class exhibition which was very well supported by a good number of clubs and societies and representatives from the trade. I was specially pleased to spend a good deal of my time not only enjoying the wealth of fine model engineering, much of which I had not seen before, but also conversing with a great many friends from 'north of Watford'.

Special arrangements had been made for me to visit the Urmston DMES track in Abbotsfield Park, Flixton and the Wigan DMES track in Haigh Country Park on Sunday morning. My thanks go to my 'chauffeurs' and to the members of these clubs who turned out to welcome me early on a morning following the night when our clocks went forward and we all lost an hour's sleep!

Alan Bibby, NAME News Letter Editor kindly allowed himself to be persuaded to provide an illustrated report of the exhibition for imminent publication in these pages, so readers who were unable to attend will get a taste of what they missed while those who did visit will have a permanent memento of a superb weekend.

Aaron Newborne

Regular readers will recall the generous Monty Ellis Grant awarded last year to Aaron Newborne, a junior member of Plymouth Miniature Steam. We were delighted to receive a recent letter from Aaron bringing us up to date with his model engineering activities and believe that readers will be equally pleased to read what he has to say:

"Dear Mike Chrisp, I am writing to tell you that I have now purchased a small lathe — a Hobbymat MD65. It has 3-jaw and 4-jaw chucks, changewheels, dead and live centres, tailstock chuck, vertical slide and plenty of tool steel. I purchased it from an older man from the club, and he did me a big favour by giving it to me for £50! It is practically brand new and has done just ten hours work.

"With birthday and Christmas money I have bought a pillar drill and a bench grinder. I have ordered a shed to put it all in and will soon have my own little workshop. Maybe I will send some photos of my workshop."

We would add our own thanks to the fellow club member whose MD65 Aaron now uses, for his generous gesture, and look forward to further updates from Aaron concerning progress with his new workshop and projects.

Auction of live steam models

We learn from Lacy Scott & Knight of Bury St Edmunds that a good selection of steam models is lined up ready for their auction on 8 May. Lots include three Maxwell Hemmens 1in. scale models, a showmans engine, road roller and traction engines, all in very good condition, a freelance 2in. showmans engine with riding trailer and road van, a 7¼in. gauge Rainhill trials special locomotive and tender to the LBSC design, neither of which have been steamed for some time, a 5in. gauge 2-6-4 Stanier tank to Martin Evans design and a part built 2in. Burrell showmans engine from parts supplied by MJ Engineering.

Stationary engines include two Kennion Bros. mill engines, one single cylinder, the other a twin compound, a Stuart Turner James Coombes table engine, a Gentry beam engine, a Bray overhead crankshaft single cylinder oscillating vertical engine, a 1¼in. gauge railway shunting engine with lagged boiler, a Redwing petrol engine, a Wyvern petrol/gas engine and a Stuart Turner beam engine with vertical boiler.

There is also a large horizontal Stuart boiler, powering a German (probably Bing) horizontal mill engine, a set of castings (without boiler) for a 7¼in gauge 14xx auto tank engine together with several other lots containing castings, tools, small lathe, and measuring instruments, etc.

Viewing is from 12 noon to 7.30pm Friday 7 May, and 9-10am on Saturday 8 May, the day of the auction. Contact Terry Durrant for the live steam and railway items and David Ellis for the die-cast items. A catalogue is available, an on-line version of which can be found on the Lacy, Scott & Knight website at **www.lsk.co.uk** Lacy, Scott & Knight are at 10 Risbygate Street, Bury St. Edmunds, Suffolk IP33 3AA; tel: 01284-748600; fax: 01284-748610.

Exceptional auction

Ron Moulton reports that Christies' sale room was crowded on 20 January when the 1,200 exhibit collection of the late Miguel de Rancougne (previewed in *Smoke Rings M.E* 4210, 12 December 2003) was auctioned after three viewing sessions by an international gathering of potential bidders. The final total from a 100% sale of every lot was no less than a staggering £408,770.

Many of the lots were groups of 4 to 6 mixed internal combustion engines among which were engines of particular attraction to collectors for their provenance or scarcity. Bids ranged from £200 to over £3,000 according to the desirability of individual units within these grouped lots. Other exceptional, usually larger examples were auctioned singly. The highest bid was £13,000 for a 1:4 scale Gypsy *Major* while the venerable Godefroy monosoupape Vee twin of 1910 fetched £4,200 and a 14-cylinder free lance four-stroke radial, based on commercial castings reached £12,000. The ebb and flow of bids emphasised the mercurial nature of the highly specialised model engine collector market, so professionally handled on this remarkable occasion by Christies of South Kensington.

This working scale model of the Gnome rotary engine to Les Chenery's design realised £2000 at the Christies' auction of the Miguel de Rancougne Collection.

High bidding for the 14-cylinder development by Vernal Engineering of Canada from the five-cylinder Morton M-5, reached no less than £12,000 before the hammer fell at Christies.

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

POST BAG

Stuart Robinson 1932-2004

SIRS, - it is with great sadness that I have to report the death of Stuart Robinson on Friday 19 March 2004. He had been a member of Rugby MES since the early 1970s.

Born in Newton where he lived until the age of 5 when his family moved to Clifton, Stuart was educated first at Eastlands School and then at Lawrence Sherrif Grammar School. Stuart's grandfather, a blacksmith at Shawell with whom he spent many happy hours, was probably responsible for his early interest in metalwork. On leaving school Stuart was apprenticed as a millwright with The British Thompson Houston Co. in Rugby before completing two years' National Service spent mainly in Scotland, servicing and repairing Army vehicles. Until recently, he always looked after his own cars; changing engines and gear boxes was never a problem to him.

On demobilisation, Stuart returned to B.T.H. as a millwright before joining Jones in Coventry, refurbishing machine tools, and then moving on to A. & E. Developments at Cawston in Rugby from where he retired.

Stuart's many interests included grass track racing and scrambling; he built and reconditioned the motor bikes which his son William rode competitively. I believe his first steam locomotive project was his 5in. gauge *Simplex,* completed around 1975, which ran extensively at the Rugby Community Centre track. He then built his 5in. gauge *Netta* which, like his *Simplex,* he ran both for both private enjoyment and public passenger hauling. In the late '70s Stuart built an 80 yard portable track which he and others would take to school and church fetes to give rides for up to 3 hours at a stretch. These events were part of a most enjoyable period covering about 20 years when summer afternoons always seemed to be sunny. Mary and John were always there during this particularly happy time. He helped to build our new clubhouse when we moved to our present site and made the water crane used at our 7¼in. gauge running days.

In the early 1980s Stuart volunteered to work in the Motive Power Depot repairing and assembling locomotives in the Battlefield line workshops at Shackerstone. He soon became a passed fireman and was regularly rostered for duty on passenger trains; eventually, to his credit, he was able to satisfy another of his dreams by becoming a fully qualified driver on a full size preserved railway and had the privilege of driving *Kolhapur* when she visited the line.

On retirement, and entirely self-taught, Stuart took up the challenge of computers. It wasn't long before he was upgrading his own computers, repairing those of friends and building them for a computer shop. His used his own computer to research his family tree and soon amassed hundreds, if not thousands of names of distant relatives. He was also interested in local history and for many years was a member of the Clifton-upon-Dunsmore History Group.

Stuart was among the most friendly and helpful of men; he would willingly give of his time to anyone in need of help or advice on any engineering subject. He had a fertile and active brain and was immensely practical, no problem would beat him; he was usually one jump ahead and had figured out the problem before the question was finished. His workshop was an Aladdin's cave of tools and machinery. One of the biggest projects he undertook on behalf of our club was totally stripping down and rebuilding the 7¼in. gauge *Romulus, Dr. John* bequeathed to our club. The work was completed last summer when Stuart appropriately had the honour of driving it on its renaming day.

Suffering deteriorating health over the last couple of years, it was a real tribute to Stuart's model engineering skills that he won the prestigious LBSC Memorial Bowl Competition held at our club last September.

Our abiding memory of Stuart will be of a compassionate and kindly man who always gave generously of his time and effort for the benefit of others.

David Eadon,
Chairman: Rugby MES.

The late Stuart Robinson with his 5in. gauge **Netta** *during the LBSC Memorial Bowl Competition hosted by Rugby MES, 14 September 2003.*

Gun browing

SIRS, - Trevor Deary's letter (*M.E.* 20 February 2004) on the subject of gun browning took me right back to the early '50s when I had the laboratory of BSA Guns Ltd. At that time gun browning was still in occasional use. I have been able to contact a colleague of those days and our best recollection is as follows.

The process used a solution made up in the lab.; we have no record of the exact proportions but an approximation would be

Ferric chloride: 15%
Copper sulphate: 15%
Mercuric chloride: 5%
Spirits of Nitre: 30%
Water: remainder

The spirits of nitre was a complex organic mixture obtained from the action of nitric and sulphuric acids on ethanol in the presence of a copper catalyst; it was bought in as a commercial product.

In the browning process the components were first degreased in a trichloroethylene vapour plant. When cool, the browning solution was applied with a sponge. When dry, the components were hung in a wooden steam cupboard resembling a large wardrobe. At floor level in the cupboard were perforated steam coils and the parts were exposed to steam for about thirty minutes. This part of the process was repeated three times. At this stage, the parts appeared to be rusty beyond redemption. The next stage was immersion in a tank of boiling water far about twenty minutes during which time the black colour began to develop. Finally, when cool the parts were buffed with a cloth mop on a polishing spindle to bring up the shiny black finish. The final stage was a dip in de-watering oil, the specification of which at that time was Shell Ensis fluid.

The browning process was applied only to high-class work such as the Martini International Target rifle and some bespoke double-barrelled 12-bore shot guns. All other work, including the many thousands of air rifles and sporting rifles in calibres from .22 Remington *Hornet*, to .458 Winchester *Magnum* were finished using a chemical black process involving immersion in a boiling strong caustic soda solution containing some 10% sodium nitrate and having a boiling point of around 120 deg. C. These parts required prolonged washing to remove any trace of caustic residues before being immersed in de-watering oil.

The browning process was used in the production of the .303 SMLE and No. 4 rifle but with introduction of the 7.62mm Self Loading Rifle, the NATO weapon of the sixties, the process was considered to be too expensive and labour intensive, so these guns were finished by phosphating and painting.

Upon reflection, one cannot help wondering what today's Health and Safety Executive would think of the use of boiling caustic soda, trichloroethylene in an open tank, and the browning chemicals applied by hand in an open shop!

I hope that the above information will be of interest to your correspondent and other readers.

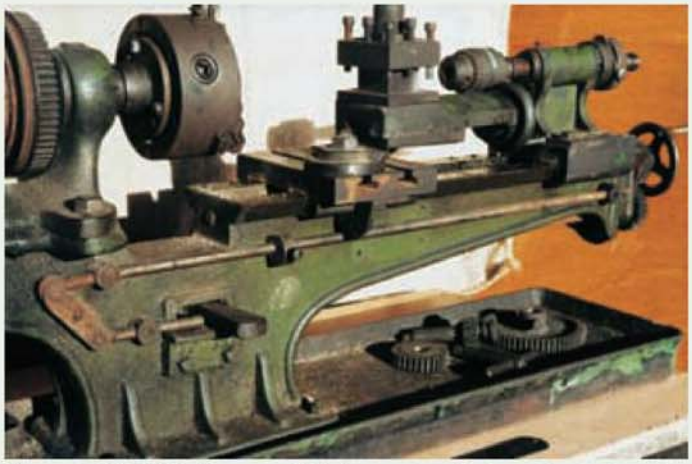
Norman Smith, Oxfordshire.

Soul mate

SIRS, - The latest copy (*M.E.* 4216, 5 March 2003) has just come to hand. I particularly enjoyed Chris Moss' article. I am right there with him. When I showed a 'friend' photos I am taking in the 'workshop' of the various stages of building a loco, his only comment was *"What a dust 'ole!"* But it is comfortable and I *do* know where everything is … well most of it … Okay some of it … maybe. The shop reeks of 'soluble' oil and tapping compound and is a haven for flies, mosquitoes, moths, hunting spiders, etc.

The floor is revolting with swarf, and I have to cross a farmyard to get there as well! There are 'pending' model and farm jobs here and there on the floor or workbench, some awaiting components, others inspiration. I don't smoke (anymore) but there is the remains of a crate of lager under the bench left by the recipient of a quick machining job. The temperature here can get to 41deg. C outside and ooh! a lager is most welcome.

I don't use scrap steel unless I know what it actually is, but recycled nuts and bolts, ex-washing machine motors, useful recyclable milling cutters and drill bits, odds and ends of copper pipe and brass bar, and other useful odds and sods are fair game. With scrap I have come unstuck trying to machine



The post-1906 3 1/2in. Drummond B lathe purchased at a car boot sale and described in Mr. R. A. Chambers' letter.

Mr. Ed. Glarkowski's 'pop-pop' boat with small LPG blow torch and alternative coil 'boiler'.

what I thought was a pale brass which turned out to be aluminium bronze of a very recalcitrant grade. There was also a short end of 'bronze' that defeated a carbide tool; I would like to know what that was normally used for!

I also liked the final cartoon. St. Peter was a fisherman. Have you ever seen what bodges the average commercial fisherman can do to things mechanical? They make the horrible things the least skilled model engineers makes or does look quite good … well, average … okay, merely ghastly. However Chris had better forget it, 'Pearly' Gates implies a satin finish, un-machinable stainless tool steel of no use at all to a model engineer.

I have a suspicion that those magnificent workshops referred to are actually a front behind which is the real workshop … just like ours! Or, like in the *Kate* a fortnight was spent cleaning up and repainting before the Editorial visit with the company photographer.

Peter King,
Christchurch, New Zealand.

Drummond lathes

SIRS, - In November a colleague purchased very cheaply at a car boot sale an unidentified metal turning lathe. One week later, publication of Mr. R. Etter's article in *M.E.* 4209, 28 November 2003 resolved the problem of the lathe's identity. For reference, I thought readers might like to see a photograph of this post-1906 Drummond 'B' 3 1/2in. screwcutting centre lathe as purchased.

The maker's plate, legs and treadle are missing. The bed and cast iron tray still retain some of the original paintwork. Unlike Mr. Etter's example, the saddle auto-stop survives, which is presumably why the chuck and saddle have never come into contact in nearly a century! The bed, top-slide and headstock are in reasonable condition. Last used in October, this machine will be restored and put back into service for perhaps another century of use.

Last year I was given a Drummond 7in. lathe manufactured in the 1920-30s. The workmanship was superb. I can understand why Drummond acquired such a high reputation. Incidentally, the design of the model 'B' is excellent, but why did they not provide a larger diameter headstock mandrel and centre hole? I understand that holes are very cheap!

R. A. Chambers, Oxfordshire

King of Showmen

SIRS, - In *Post Bag, M.E.* 4217, 19 March 2004, Graham Madeley wrote in response to an earlier letter from D. N. Wellings concerning the Pat Collins fairground business.

My brother-in-law knows John Collins personally; it was he who directed me to the book *King of Showmen*. Unfortunately it was published in a limited edition of 2000 copies, however if it helps any other readers, a search of the internet revealed *Dusty Books* at **scribe@dustybooks.co.uk.**

Staff at *Dusty Books* were very helpful and managed to find me a new copy of this book in approximately three weeks for a cost of £27.

King of Showmen is a very interesting book with many old photos of fairground rides and traction engines. It certainly brought back memories of the past when I used to watch *The Leader* pulling many trailers to the fair at Hanley, Stoke on Trent.

I hope this information will be of help to anyone trying to trace a copy of the book.

Robert Davies, Staffordshire.

Experiments with pop-pop boats

SIRS, - I was interested in Prof. Jeff Bindon's recent article on *The Secret Workings of a Transparent Pop-Pop Engine* (*M.E.* 4214, 6 February 2004). Unfortunately I do not have access to a copy of Dr. Crane's article published in *M.E.* 4051, 26 September 1997. Neither have I been able to access Prof. Bindon's other references in my local library; however, some forty seven or eight years ago an article was published in a long-gone magazine, which I think was the old *American Modeller,* which would seem to confirm Dr. Crane's belief as quoted by Prof. Bindon *"that flexibility of the membrane was not essential."*

The old article described a pop-pop engine made of a single loop of metal tubing with the two ends brought back in parallel astern. At the time of the article I built one out of 1/8in. O/D (approx.) brass tubing, but after so many years I cannot recall if it worked! I figured I'd try it again and the outcome is shown in the accompanying photograph.

At the top is the boat with the 'Mk. II' engine along with the wick type alcohol burner in place. At the bottom is the 'Mk. I' engine and between the two is a pencil type butane torch.

The 'Mk. I' engine was made of 1/4O/D x 0.023in. wall copper tube silver-soldered to a scrap of copper roof flashing. The burner is an old spare parts tin with a tube to support the wick and a smaller vent tube. The hull is from the end of a wooden vegetable crate. Upon sea trials in the bathtub the whole thing promptly capsized and sank so wooden dowel outriggers were added.

On lighting off, the wick burner did not provide enough BTUs to get the engine going, so a heat shield was added to contain the flame, but to no avail. The butane torch seen in the photo was applied next and start it did! Switching to a pencil type propane torch gave really impressive results, more of a 'pow' than a 'pop', with a strong forward thrust with each pulse.

For the sake of a comparison, the 'Mk. II' engine was made to the same outward dimensions but using 1/4O/D x 0.016in. wall brass tube with a thin aluminium alloy mounting plate. The 'Mk II' unit actually works on the alcohol/wick burner, albeit weakly; a sort of 'pfut-pfut' rather than a 'pop-pop'. However, the butane torch gives almost as strong a pulse as the propane torch did on the 'Mk. I' copper version.

From these simple and very limited experiments, which in no way are intended to be anything approaching authoritative, I've had a few tentative thoughts.

1: A flexible diaphragm or membrane is not strictly necessary for a pop-pop engine to work, although it might enhance the rapidity of the pulses and the expected 'engine' sound.
2: The action in the coiled-tube type engine may be akin to that in the vertical tube of a percolator-type coffee pot. (I'm no physicist but I drink a lot of coffee!)
3: The coil type engine is quick to make and simple to build and therefore lends itself to experiment and tweaking with different tubing materials, diameters and thicknesses. Burner types obviously also have a great effect.

Ed Gladkowski Jr., Texas, USA.

One of a number of fine locomotives on display on the 2½" Gauge Association stand was this Duchess of Norfolk.

Something to suit most tastes, the Whyteleafe railway layout was a popular attraction for visitors of all ages.

CLUB STANDS AT THE 73rd MODEL ENGINEER EXHIBITION

Malcolm Stride
our Club News Editor, reports.

In all 18 organisations exhibited for the assembled multitudes. In the space available in *M.E.* it is clearly not possible to do more than provide a flavour of the models and activities on show. However, by describing the things which caught my eye, hopefully those who attended will be reminded of what they saw, while those who didn't will get an idea of all the good things they missed. To avoid any unintended implying of relative standards I will describe the stands in alphabetical order. On that basis the first stand to be mentioned is the **2½" Gauge Association** whose members had their usual excellent display of models, both complete and part built. Among these were the castings and a part built example of the popular *Toby* design. *Monstrous* is a model of a New Zealand K class 4-8-4 built between 1937 and 1948, now awaiting restoration, and is very large for a 2½in. gauge locomotive. The highlight of the stand for me was the showing together of the original LBSC *Ayesha* and Henry Greenly's *Challenger* which were the locomotives which contested the 'Battle of the Boilers' in 1924 — history indeed. More modern was the very nice *Duchess of Norfolk* displayed on the end of the stand (**photo 1**).

Moving upstairs, the **Buckinghamshire Garden Railway Society** had their impressive Whyteleafe railway layout (**photo 2**) in operation with lots going on all the time, much to the delight of the younger (and many not quite so young) members of our fraternity. A variety of both steam and electric locos was being run throughout day on this very detailed layout. It was good to see that youngsters could operate a small shunting area separated from the main tracks.

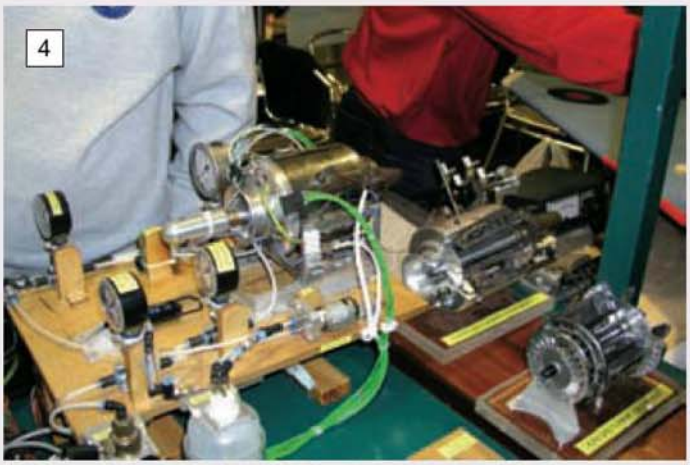
Also upstairs was the **Elmbridge Model Club** stand (**photo 3**) with a mixture of boats, cars and planes. I was very interested in the display of part built and completed Thames sailing barge models from the model barge championships. They brought back memories of my youth around the Essex marshes where many of these fine vessels were moored. Some of the models on display were of a traditional construction, others had been built with glass fibre hulls.

Moving on to something rather more modern, let us visit the **Gas Turbine Builders Association** display. This was always surrounded by a good crowd of people admiring the various gas turbine engines on show (**photo 4**), so much so that it took me two days to get my photographs. I liked the sectioned examples which gave those interested an opportunity to understand the workings of these engines. The turbo-prop engine was very interesting as was the extent of instrumentation on one of the display models. I was impressed by the latest development in the form of the very fine axial flow turbine rotor being manufactured, complete with individually cast blades.

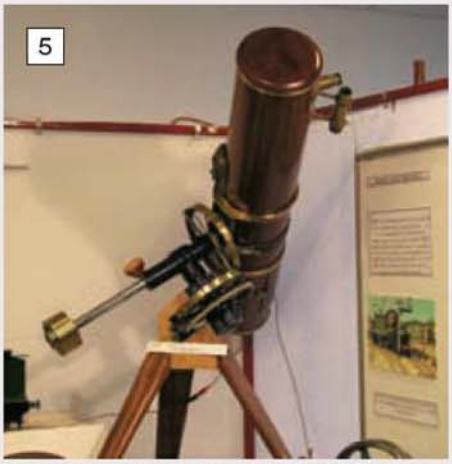
Back upstairs again next for the very impressive **Guildford MES** stand on which a variety of excellent models was displayed. Locomotive enthusiasts will no doubt have been impressed with the very fine *Royal Scot* on show. Among the more unusual exhibits were the set of recorders (musical variety) by Roger Curtiss and the fine Newtonian telescope (**photo 5**) by the same builder. I think it is variety like this which makes for a most interesting and enjoyable stand.

This variety was surely augmented by the collection of various engines displayed on the **IC Engine Builders** stand downstairs. Unfortunately, demonstrations of both the IC engines and the gas turbines were curtailed by rain on the days I visited. However, people again surrounded the displays for most of each day that the show was open. Highlights must include the components for Brian Perkins' *Hydra* and *Aquila* engines, the latter shown in part-assembled and fully

Thames barges were one of the features of the Elmbridge Model Club stand seen here with a view over the Sandown race course.



A glimpse of the Gas Turbine Builders Association stand showing some sectioned engines and the instrumentation used on a demonstration unit.



A superb Newtonian telescope built by Roger Curtiss and seen on the Guildford MES stand.

Aero engines are always popular and this Bentley BR2 had many admirers during the Exhibition.

An unusual uniflow engine seen on the Ickenham and District SME stand.

assembled states. Ron Hankins had his Bentley BR2 (**photo 6**) and German designed V12 glow engines on display. Both these builders must have tremendous patience to make the multitude of identical parts required for these engines. Think of a single cylinder engine and multiply everything by twelve!

Also downstairs was the **Ickenham DSME** with a fine stand with several unusual models on show. The largest were some castings for an American 'Challenger' locomotive which was at a very early stage of construction. When complete, this locomotive and tender will be as long as the stand. It was also good to see more experimental work going on in the form of Peter Reynolds' three-cylinder uniflow steam engine (**photo 7**). This features a condenser and poppet valves for steam control. Another interesting exhibit was an explanation of spiral milling of large threads using a gear driven dividing head on the milling machine.

This fine example of Lion *was one of the exhibits on the Koninklijke MYC Steam Group stand.*

The prize for the 'furthest travelled club stand' must go to the **Koninklijke MYC Steam Group** who brought everything over from Antwerp by car. This excellent stand was manned by Club President Walter Laumen, ably assisted by Wilfried Vermeiren. On display were several examples of their two club projects, a low temperature Stirling engine and a gauge one locomotive *Mono*. They told me that some 40 Stirling engines and 20 locomotives have already been built by club members with more of both on the way. Other exhibits included a fine *Lion* loco (**photo 8**) and an interesting piezo ignition vertical gas engine built from a German kit. Peter and Wilfried had also ensured that English language versions of their club information sheet were available to visitors. This stand deservedly won the 'Best Club Stand' award at the show.

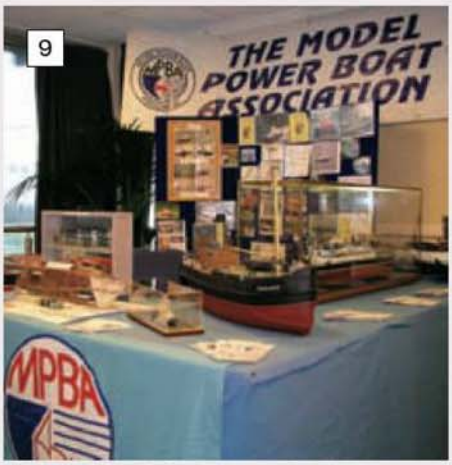
Next to the KMYC stand was the **Model Power Boat Association** stand (**photo 9**) which featured a small display of model boats including a part built 'Aerokits' RAF Crash Tender which I am sure many readers will remember. The model on display was one of the first batch made and is undergoing restoration. Also on show was a good selection of photographs of model boating activities.

Moving further around the hall we came to the **Malden DSME** display which had a very wide variety of models including cars, trains, boats and workshop equipment. Several unusual items were displayed, but the two items which caught my eye were an early *Hornet Mite* glow engine powered tether racing car and a Stuart Turner *Sirius* based wartime generating set (**photo 10**). I believe this latter was intended to be dropped to our men during the war to provide power for radios. A good selection of part built models was also presented on the stand.

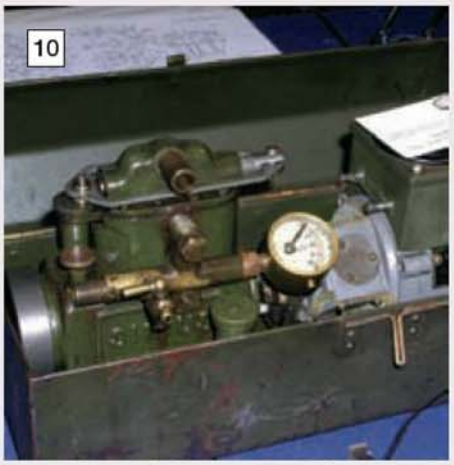
The **Napier Power Heritage Trust** had their display of artefacts and information about Napier products over the years. These included several excellent models of aircraft and boats powered by Napier engines, and the much-photographed model *Deltic* engine being built by Clen Tomlinson (**photo 11**).

Just inside the entrance to the club display room was the **North London SME** stand which was well laid out with some obviously well used locomotives on display. This was nice to see because the 'public running mainstays' often get overlooked in favour of the less used but more 'shiny' exhibits, although the former probably generate a large amount for club funds during a year. There was an unusual outside framed loco in GWR livery and also a four-stroke glow engine with toothed belt driven overhead camshaft (**photo 12**). This looked as if it had been modified from a push rod driven design as the crankcase had obvious provision for a gear driven camshaft.

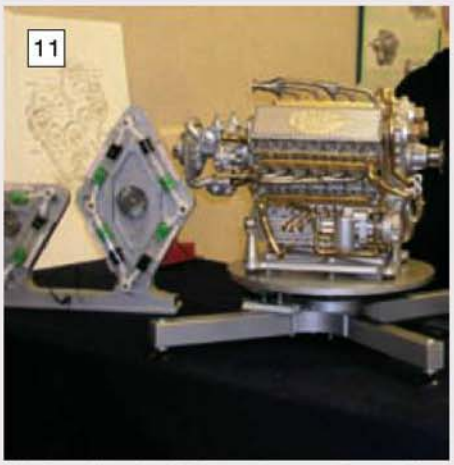
Ruislip Lido Railway exhibited a selection of photographs illustrating their activities together with a very impressive bogie from one of the passenger trucks. ▶



Photographed just before 'opening time', the much admired MPBA stand.

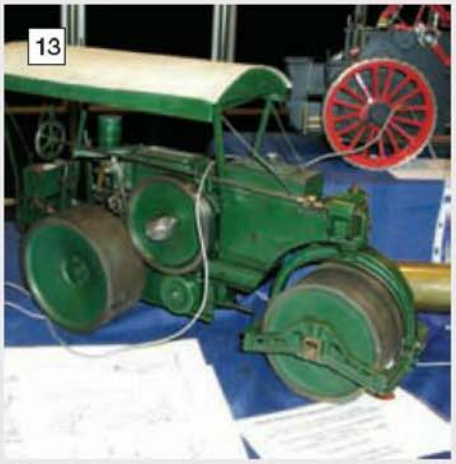


Steam at war. A WW2 generator set built around a Stuart Turner Sirius *engine.*

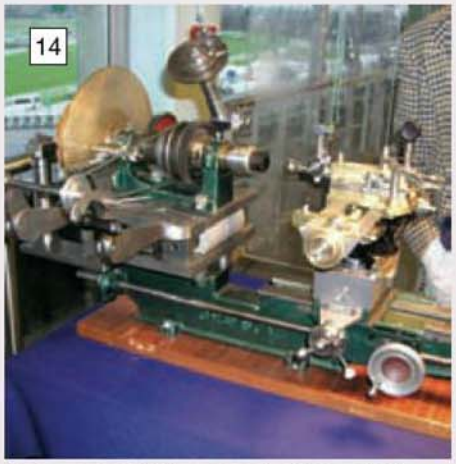


Clen Tomlinson's Deltic engine was shown with diagrams and visual aids to help understanding.

A neat overhead camshaft IC engine seen on the North London SME stand.



A fine Aveling DX roller was one of several models on the SMEE stand.



A rose engine built up around a Grayson lathe on the Society of Ornamental Turners stand.

The **Society of Model & Experimental Engineers** stand was downstairs and featured much activity in the form of demonstrations in progress. I had the impression that the variety of models on display was a little less than in some previous years, but I did like the Aveling DX roller powered by a single cylinder horizontal IC engine (**photo 13**). A demonstration of milling in the lathe using a top-slide mounted milling spindle was being carried out during my visit to the stand. An 0-6-0 tank engine was being steamed on rollers at the end of the stand so that visitors could see a locomotive working in steam. The SMEE was also publicising their forthcoming courses in basic model engineering previously mentioned in these pages.

Another stand with demonstrations in progress was that of the **Society of Ornamental Turners**. This stand was always busy with many visitors obviously very interested in this fascinating branch of our hobby. An excellent display of completed work was shown as well as various items of tooling made by members (**photo 14**). Among other items, these included a rose turning lathe using a Schaublin bed and Drummond headstock by John Anning, an elliptical turning chuck, and a micrometer dial linear rose engine. A turning demonstration was being given — when there was time between questions — on the stand. The Society was awarded a well-deserved Certificate as the runner up in the 'Best Stand Competition'.

The **Southwater Dabblers** had a small stand at the other end of the same room and included several models by David Heaps. Among these was an amphibious ship *Rotterdam* with many operational ancillaries including a helicopter with rotating blades. Another was a nice Flower class corvette.

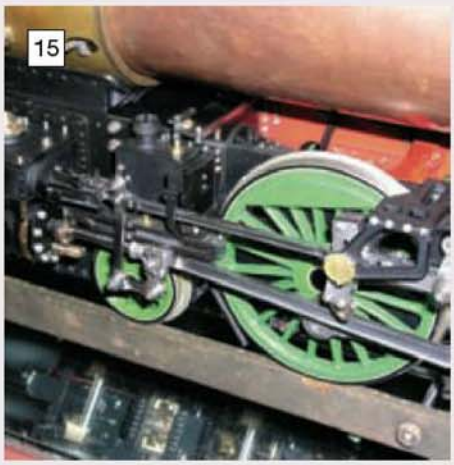
A compact, well filled display was presented by **Staines SME.** The 'roof' of this stand was finished in the form of a station canopy and looked very effective. The display was mainly locomotives (**photo 15**) although two traction engines were parked either side of the main stand. Several part-built models were on show including three very impressive bogies from a 70 ton three truck Shay locomotive, and an LNER 4-6-2 locomotive chassis with a very nice boiler in its 'raw' state. Just above this was a very nice 2-4-0 chassis with the smokebox and cab fitted.

Across the hall from the Staines stand was what I can only describe as the hyperactive display mounted by the **Stirling Engine Society.** There is always so much going on on this stand that it is difficult to know where to start. Many readers will have seen Roy Darlington's hot air powered buggy. This was accompanied by another unusual vehicle in the form of a hot air driven motorcycle. One item which really attracted me was the 'Stirling Workshop' built by Brian Marshall (**photo 16**). This consisted of a lathe, drop hammer, pillar drill and circular saw all driven by line shafting from a hot air engine. I should also add that the music on the stand was provided by a hot air powered gramophone.

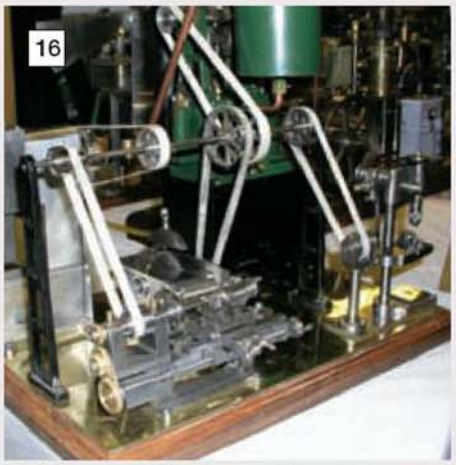
The final club exhibit was that provided by the **UK Tank Club.** They announced their arrival on the set-up day by driving eight or ten very impressive model tanks (**photo 17**) in through the door under full radio control and with full sound effects. This certainly attracted attention. These large, well-detailed models were to be seen moving around the hall throughout the first day and were not deterred by obstacles such as stairs which were just driven up (or down) with no problem at all. This group is one of an apparently increasing number of countrywide specialist groups and has a web site at **www.uktank.org**

All in all the displays were very good this year with a wide variety of exhibits on show. This made the judging of the Best Stand competition very difficult but in the end the judges felt that the high quality Koninklijke MYC stand deserved the top accolade with a Very Highly Commended Certificate being awarded to the Society of Ornamental Turners for their excellent display and demonstrations. The judges were not just looking at the stand itself, good use of the space and variety of models, etc., they were also looking at how the stewards interact with the public and how much interest the stewards are generating.

It was disappointing to see some excellent displays let down by stewards talking among themselves partaking of food and drink on their stand. This does not encourage visitors to ask questions and without their interest where would the exhibition be? Having said that, there was certainly a large amount of interest shown in the club stands this year and I would like to thank all those who made the considerable effort to bring the vast amount of paraphernalia that goes with a stand at such exhibitions and also for their efforts in manning the stands during the show. I look forward to seeing you all again next year.



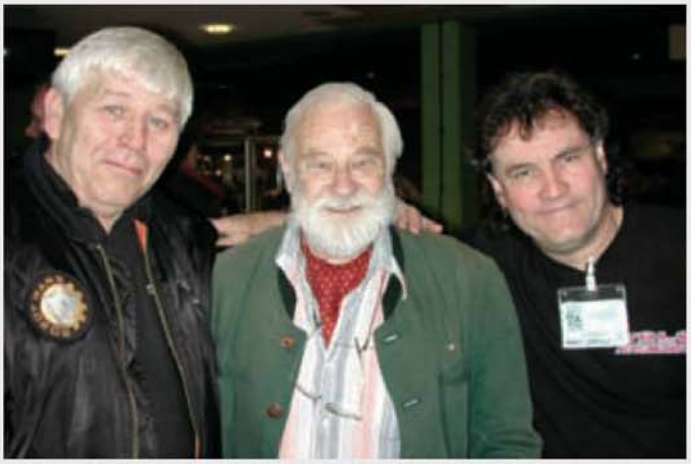
A fine, part finished, 2½in. gauge Gresley Class A3 Pacific seen on the Staines SME stand.



A miniature workshop powered by a hot air engine and built by Brian Marshall.

Battle stations! One of the impressive tanks displayed by the UK Tank Club.

Television personality and model enthusiast Bob Symes enjoys a chat with the formidable **Sir Killalot.**



Left to right: Derek Foxwell, Bob Symes and Mat Irvine. Mat and Derek were on hand during the Exhibition to answer visitors' questions.

ROBOT WARS AT THE 73rd MODEL ENGINEER EXHIBITION

Kelvin Barber
reports on an extremely popular feature of the Exhibition.

For the second year running, some full size war-mongering robots from the popular TV series *Robot Wars*, starred at the Model Engineer Exhibition. This year the robots showed no sign of waning in popularity and our static show exhibits, namely *Sgt. Bash, Matilda, Dead Metal, Shunt, Sir Killalot* and *Growler* were constantly the subjects of an admiring throng. The latter two of these were fully-functioning robots while the former ones were just dummies with no running gear. However, they are identical in every other respect to their performing brethren and often called upon to donate panels and parts to them when they become damaged. With the series in its seventh season, and now on Channel 5, *Robot Wars* still seems to fascinate the viewing public and is as popular with adults as it is with youngsters.

On hand at the show to answer visitors question about the robots were experts Mat Irvine and Derek Foxwell. Both originally helped in the technical aspects of developing the show and Mat was also later seen on screen as one of the panel of three judges. Mat is no stranger to the world of robots and TV as he worked for the BBC's Visual Effects Department for many years. Among his TV credits was work on shows such as *Doctor Who, Blake's 7, Edge of Darkness* and *The Singing Detective*. In fact, those who fondly recall *Doctor Who* will remember the K9 dog robot and here he was on display!

The mechanical dog **K9** *was a favourite with all fans of the television series* **Dr. Who.**

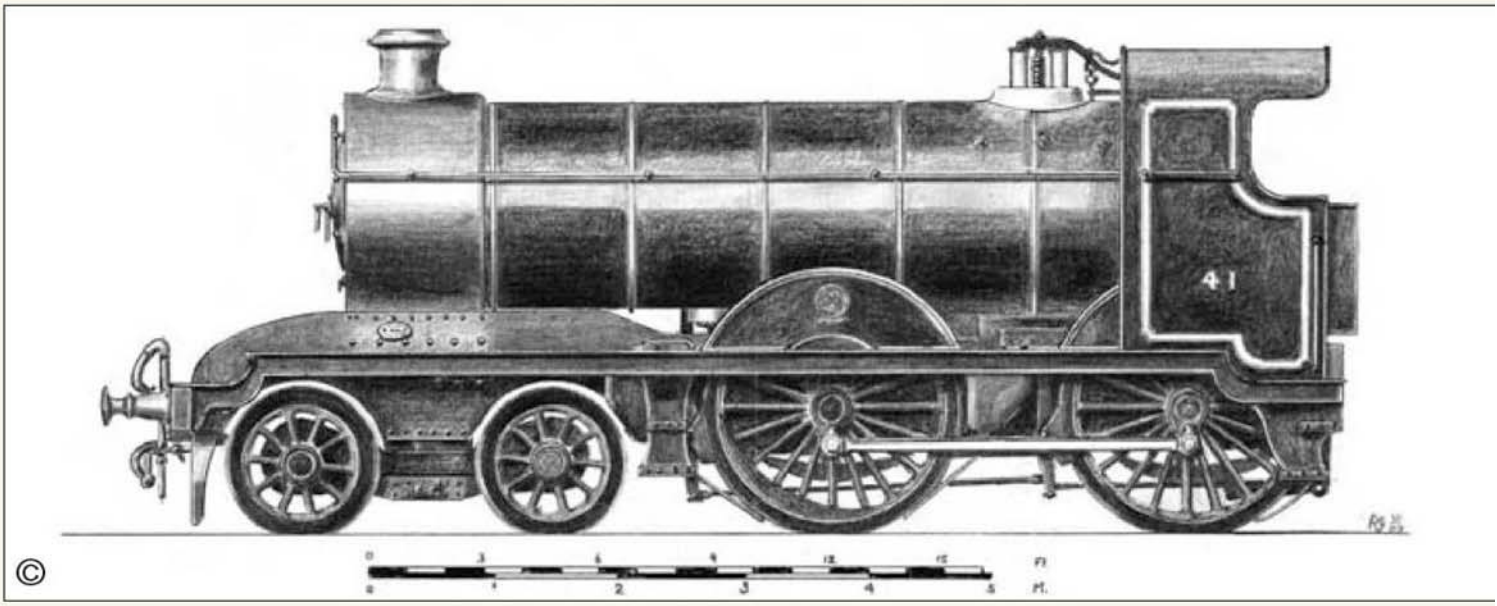
Derek has been involved in TV, as well as films and advertising, and his field of expertise is radio control. On display was his *Dozer* robot which is used in the audition sections of *Robot Wars* for pushing apart combatants and for clearing the arena. Derek's wife Val is also involved with the show and has the important responsibility of transmitter control. Both Mat and Derek had examples of their work on display, and these included props and models seen on TV, as well as those that have featured in modelling magazines, such as *Scale Models International* to which Mat was a long time contributor.

So, with a lecture on the subject also taking place at the show, *Robot Wars* fans were certainly well catered for. Who knows, at next year's show we may even actually get to see them running about and demonstrating their awesome weapons — now wouldn't *that* be something to talk about?

Sergeant Bash, *appropriately 'dressed' in his camouflage jacket.*

The robots are impressive pieces of engineering and use a variety of weapons to vanquish foes.

Love them or hate them, the robots do have a personality all of their own.



EDWARDIAN ELEGANCE

Ron Isted

describes the Hull & Barnsley Railway and Matthew Stirling's J Class 4-4-0s.

●*Part VII continued from page 155 (M.E. 4214, 6 February 2004)*

One of the less-known natural laws relating to British railway history postulates that the length of a company's name is inversely proportional to the length of its mileage. I have yet to discover whether any of the pre-1923 concerns actually succeeded in achieving a title longer than its track, but with just over 100 miles, the Hull, Barnsley and West Riding Junction Railway and Dock Company made a brave attempt to do so. The company was promoted in the 1880s, largely as a result of dissatisfaction with the service provided by the North Eastern Railway which, having a title three-tenths the length of that of its new rival, conformed to the law quoted above by owning roughly 17 times the track mileage. It was also the largest dock owner in the country at the time, and was generally considered to be one of the most prosperous companies in the British Isles, its dividend averaging 6½% for 60 years or more — difficult to imagine today.

By contrast, the HB&WRJR&D Co. was in dire financial straits almost from the beginning of its existence, and even the initial construction of the line was interrupted for some months, due to what would now be called a cashflow problem; so, in 1905, the company achieved a substantial reduction in expenditure on printing costs by officially changing its name to the Hull & Barnsley Railway and subsequently prospered, at least until the First World War.

It also economised on changes in its seninr staff. Matthew Stirling was appointed Locomotive, Carriage and Wagon Superintendent at the early age of 28, shortly before the line opened in 1885, and was still in charge 37 years later, when the line was finally swallowed by its old enemy, the North Eastern, though by then he had acquired the more impressive title of Chief Mechanical Engineer. He was one of the nine children of Patrick Stirling of the Great Northern Railway, and nephew of James Stirling, ex-Glasgow & South Western and later of the South Eastern Railway, so for about ten years up to 1895, the man in charge of matters mechanical on three English railways bore the illustrious Scottish name of Stirling.

Now, here's a little puzzle to keep you occupied for a few minutes in the workshop while your lathe is on self-act: for a very brief period, locomotives designed by all three members of the Stirling family could be seen, at least in theory, not only on the same railway, but within the confines of the same engine shed. Which railway, which shed and when?

The Hull and Barnsley was built primarily for goods traffic, transporting large quantities of coal from the Yorkshire coalfield to its 53 acre Alexandra Docks in Hull, and bringing back equally large quantities of wool and Balkan and Scandinavian timber, much of which was destined to become pit props back in the mines, while some of the remainder was turned into broom handles. This trade in very basic commodities, together with a minimal passenger service, at least in the early years, gave the railway a slightly 'below stairs' aura, but all this was set to change in October 1905, when the H&B made its triumphant entry into the Upper Echelons of Railway Society by inaugurating a through passenger service from Hull (Cannon Street) to Sheffield, using recently acquired running powers over the lordly Midland Railway.

Unfortunately this moment of glory was slightly spoiled by the fact that delivery of the brand new bogie coaches, ordered at great expense by the still impecunious company, missed the start date of the new service — by a mere 1½ years! So, having used some super-annuated six-wheelers graciously lent by the Midland for the first six months, the unfortunate H&B was forced to exhume some of its own ante-deluvian wooden four-wheel dog-boxes for this prestige service. Incidentally, these vehicles bore a certain similarity to some of the mobile monstrosities still at that time bouncing their square-wheeled way in and out of another, perhaps better known, Cannon Street station 200 miles further south.

When the Hull & Barnsley's new coaches finally put in an appearance from Pickerings early in 1907, the company was so proud of them that it ordered more, from the Birmingham Carriage and Wagon Company, but this time two years elapsed before the second batch was delivered! To look after their new rolling stock, a new siding was laid alongside the railway's Springhead Works in Hull and the company even lashed out on a petrol driven vacuum cleaner to keep them clean: as I said, the H&B did have a habit of betraying its humble origins.

The unaccustomed weight of this luxurious new rolling stock on the Sheffield trains caused the 2-4-0s working the service to puff mightily, so Matthew Stirling produced the design for the subjects of this article, the J class 4-4-0s, of which five were built in December 1910 by the old established firm of Kitson & Co. of Leeds. Carrying Maker's Numbers 4700-4704 and built to Order No. 377V at a cost of £3,050 each, they carried numbers 33, 35, 38, 41 and 42 on the Hull & Barnsley, and were the very last new Stirling designed 4-4-0s ever to take the rails, some 37 years after the first engine of that distinctive family of locomotives, designed by uncle James, had made its debut on the Glasgow & South Western Railway.

A comparison of some of the leading dimensions of the two classes is interesting: while the cylinder diameter on Matthew's new design was just ½in. larger than those on his uncle's G&SW machines, the boiler diameter showed an increase of 9in. and perhaps even more significant was the 22½% increase in the size of the grate, from 16 to 19.6sq. feet. Personally, I find the appearance of the H&B 4-4-0s, (**figs 1** and **2**), most attractive, almost perky, and perhaps my imagination is running away with me, but they seem to radiate a determined air to rise above their station, although not built at a time of high inflation — (sorry, couldn't resist that).

Their appearance as built was a mixture of unmistakably Stirling family characteristics, combined with others which would have been anathema to Matthew's father and uncle, spiced with the odd detail which was really — and literally — over the top: for example, the reach

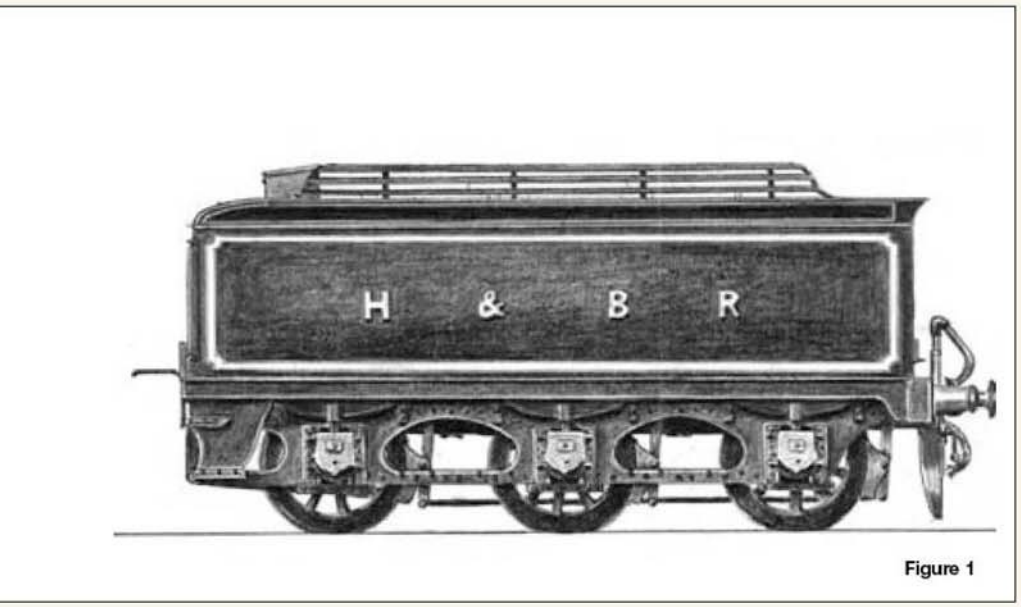
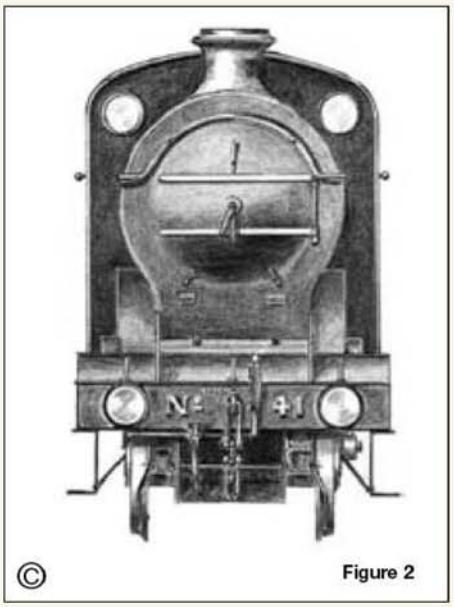


Figure 1



© Figure 2

rod as originally fitted, described an outsize curve high over the top of the driving wheel splashers, before dropping down again to connect with the reversing arm. This mechanically suspect arrangement did not last long, needless to say, and would be even worse on a miniature version, where unless clumsily over scale, flexing of the rod would surely play havoc with the cut-off setting. The reach-rod was connected to the screw reverse by a rocking shaft, an advantage when building a miniature version of an H&B 4-4-0, as it avoids the tiresome business of having to cut a left-hand thread for the reverser in order to turn the handle clockwise when putting the engine into forward gear.

The family trademarks retained by Matthew Stirling included, as you might expect, the domeless boiler, together with the smokebox and its long hinge straps extending right across the door, but with the addition of two clamping dogs (later three), on the lower section (fig 2). The diameter of the boiler, however, was no less than 5ft. (5ft. 4in. over cladding), a considerable advance on anything produced by his father or uncle, and had been the standard dimension on the Hull & Barnsley since 1900, apart from an even larger 5ft. 6in. diameter 'kettle' used on the 0-8-0s built in 1907; with typical footplate humour, those massive locomotives rejoiced in the nickname of 'Tinies'.

It is rather sad that Matthew Stirling has not received due credit for his work on larger boilers: John McIntosh on the Caledonian Railway is usually the first name that springs to mind when the big boiler brigade comes up for discussion, closely followed by Henry Ivatt and his Great Northern Atlantics. One reason is that Matthew Stirling has always been somewhat overshadowed by his two famous relations, both of whom invariably employed the smallest practicable boiler diameter, while a second is that he worked for a relatively small railway, in spite of the length of its title; but the third, even more serious disadvantage, was that it was a provincial concern, without a London HQ. This fact was really brought home to me when researching this article: the major engineering journals of the day (*Engineer, Engineering, Railway Engineer,* etc.) make no mention of the building of the H&B 4-4-0s, the only contemporary report I have found being a cursory couple of paragraphs and photograph in *The Locomotive*. On the other hand, rebuildings and minor alterations to engines belonging to companies with a line into London are reported in minute detail.

How the Hull & Barnsley boilers would compare in actual steaming capacity with those of John McIntosh's Caledonian Dunalastairs for example, is a moot point: the grate area on the Hull & Barnsley engines was just over 19½sq. ft., compared with 22sq. ft. on a Dunalastair III, but of course the duration of sustained effort demanded by the schedules and distances on the Hull & Barnsley was a fraction of the daily requirementr on the Scottish railway.

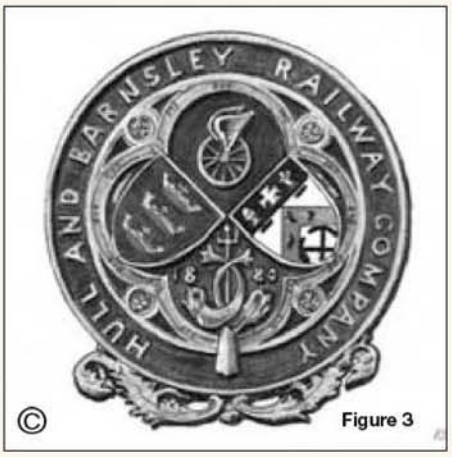
Another family trademark retained by Matthew Stirling was the rounded cab, but with the welcome addition of a rearward extension to the roof, which I feel not only improves the appearance, but more importantly, must have made the lives of the footplate crew a little more comfortable, particularly when the engine was stationary, as was the case for quite a large proportion of the working day of a steam locomotive.

But Matthew deliberately broke away from the family traditions in at least two ways on these engines: he employed the Adams type bogie and he incorporated Allan straight link valve gear, Although his father had tried the latter in an early design for the Glasgow & South Western, he later invariably kept to the more usual Stephenson gear, as did uncle James. The straight link motion, invented by Alexander Allan in the early 1850s, was widely used on the London & North Western, Lancashire & Yorkshire and various Scottish railways, but by the end of the 19th century, it was generally considered obsolescent in Great Britain. In his classic book, *The British Steam Locomotive 1825-1925*, E. L. Ahrons goes so far as to claim that the last locomotives fitted with the straight link motion in this country had been built as far back as 1897. For once, this normally authoritative writer is in error, as it was used until 1915 by Matthew Stirling on the Hull & Barnsley and by the Highland Railway until 1917. The very last application to a new British locomotive, however, was as recent as 1934 — and the second little puzzle in this article is to name the railway and the class of locomotive ...

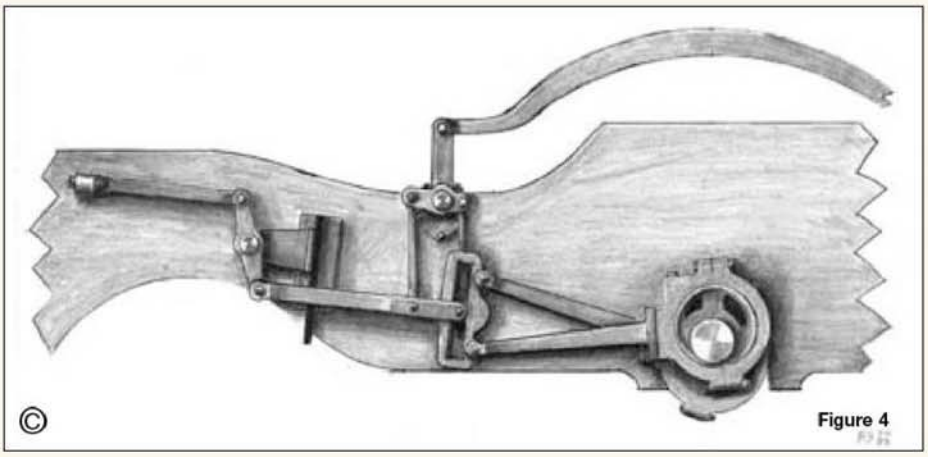
To return to the Hull & Barnsley 4-4-0s: although built primarily for the prestige passenger service to Sheffield, they also managed to escape the claustrophobic confines of their own system on regular through workings to Wakefield, by means of running powers over the Lancashire & Yorkshire, and less frequently to Bradford, Blackpool, Leeds and Morecambe, while in 1920, No. 38 even worked a through excursion all the way to Aintree for the Grand National. Another pleasant day out — and probably less expensive for the crew — consisted of the occasional seaside excursion to Llandudno, where they could well have stood alongside the subjects of the second article in this series, the North Staffordshire Railway 4-4-2Ts, which sometimes escaped from the potteries for a day by the seaside at this upper crust watering place.

There are in fact several similarities between the Hull & Barnsley and the North Stafford: both were relatively small railways in terms of mileage and both acquired extensive running powers over their potentially rapacious neighbours. But while the North Stafford prospered until forced by Act of Parliament to become part of the LMS, the bottom fell out of the Hull & Barnsley's world in 1914, when the coal export trade came to an abrupt end due to the war. The company had previously buried the hatchet with its old enemy the North Eastern, and the two railways had joined forces to build an even bigger and better dock in Hull, only to have it requisitioned by the Royal Navy as a result of the war just three days after the official opening! So it was not altogether unexpected when the North Eastern Railway finally succeeded in gobbling up its small neighbour in April 1922, despite the strenuous efforts of the Corporation of the City of Kingston-upon-Hull, which even organised a public protest meeting in an attempt to prevent the merger. A few months later, the North Eastern itself became part of the LNER, but it is pleasant to record that the Hull & Barnsley was officially classified as a separate constituent company of the new organisation and therefore appointed a director to the board.

When Matthew Stirling retired at the time of the North Eastern take-over, his 4-4-0s initially continued in their old haunts, but their sphere of operations was soon widened to include through workings to Doncaster and even the elite resort of Scarborough — the J class had really made it into Railway High Society. On the other hand, the through Sheffield service, which was the reason for their existence in the first place, had been axed during the war and was never reinstated, while a rather different consequence of World War One was the conversion of No. 35 to oil firing, with which it apparently performed very well, though how long it retained the equipment is unknown. ▶



© Figure 3


© Figure 4

Having finally got its hands on its erstwhile rival, the North Eastern lost little time in making its presence felt at the H&B's Springhead works: in November 1922, 4-4-0 No. 38 emerged after a general overhaul, renumbered 3038 and clad in the full glory of the Saxony Green of its new owners, quite a contrast to the 'invisible green' previously used for all Hull & Barnsley locomotives. It also carried two variations of the North Eastern armorial device, one on the tender, and a circular version on the driving splashers, previously adorned with the H&B's own insignia (**fig 3**). From a distance, the two designs were not dissimilar, but the North Eastern Railway also used its circular device (in full colour!) on its hotel chamber pots, and I hate to imagine the comments of die-hard ex-Hull & Barnsley footplate crews when the same design appeared on one of their top-link passengdr engines.

When the LNER took charge on 1 January 1923, it was again a case of all change, and the Js were at first re-painted in a shade of green similar to the former Great Northern Railway colour, variously known as grass or apple green — both pretty meaningless descriptions when you think about it. Overhauls continued at Springhead for a year or so, after which Darlington Works became responsible for the D24s, as they were now classified, and made several minor modifications, including the provision of cab-roof ventilators, plating in tender coal-rails, changing whistles and fitting capuchons to chimneys, but not to every engine — so if you decide to build a miniature version, make sure you have a photograph of the locomotive you are modelling in the colour scheme you wish to use, or you could end up with a machine that never existed. Full details of these changes can be found in Martin Barker's book (see references at the end of this article), which is quite simply one of the finest railway books I have ever come across, and essential reading for anyone interested in the Hull & Barnsley Railway family of locomotives of great character.

From June 1928, the number of LNER locomotives allowed to carry the green colour scheme was substantially reduced, and all 4-4-0s, apart from the new Shire class, were demoted to black with red lining, a case of *déjà vu* so far as the Hull & Barnsley engines were concerned. From about the same period, they spent more and more time stored in the now sadly run-down Springhead Works, so in retrospect it seems extraordinary that the Darlington authorities considered it worth while to rebuild all five locomotives with brand new domed boilers, complete with North Eastern Raven type chimneys, Ross pop safety valves and new smokebox doors. The first rebuild appeared in September 1929 and the last two were completed ten months later; apart from the typical Stirling cab, the engines presented a very North Eastern Railway appearance and for a couple of years they continued to work between Hull and Leeds, Sheffield & Scarborough.

In spite of this substantial financial outlay, No. 2425 (ex-H&B No. 33) was withdrawn from service in August 1933, less than four years after being rebuilt and, by September of the following year, the last of Matthew Stirling's only class of express passenger locomotives had gone to the scrapheap. Their designer did not live to see this sad event, as he died in October 1931, shortly before his 75th birthday. I find myself wondering whether the sudden withdrawal of such recently refurbished locomotives was an early example of the accountancy tail wagging the railway dog, a situation that was to become so common 30 years later. At least one engine was scrapped just two months after receiving a general overhaul, a small detail that would certainly not have been disclosed in the annual report to the long-suffering LNER shareholders.

Let us turn from the rather sad end of a very distinctive class of locomotive, to the possibilities of preserving memories of them in a small version. I remember seeing a live steam 5in. gauge model of a Hull & Barnsley J class 4-4-0 about 30 years ago — owned by a Frenchman! Whether M. Jean Villette built the engine himself, I am not sure, but it had captured the character of the original very well indeed and seemed quite happy dashing around a track in the south of its adopted country, hauling two or three passengers.

One important point to bear in mind is that no miniature 4-4-0 will ever break records for live passenger haulage, as they are by their nature front heavy: many full size engines of this wheel arrangement were equipped with heavy cast-iron drag boxes to counteract this. But they are compact, relatively easy to transport, and a lot less work than Pacifics and 4-6-0s, as well as possessing in most cases a natural elegance. The biggest practical problem in building a 4-4-0 lies usually with the fight for space between the leading bogie, cylinders (inside or outside) and an adequate depth for the main frames; in the case of our Hull & Barnsley friend, the difficulty is eased considerably by Kitson's incorporation of a very deep front section to the main frames, (which on the full size engine were no less than 1 1/4in. thick), giving the front end of the engine a very distinctive appearance (fig 2). More importantly, it leaves room, even in a 3 1/2in. gauge version, for a full cut-out to clear the bogie wheels, although part of this unaccustomed luxury is lost again, due to the relatively large wheel diameter of 3ft. 9in.

If I were building this engine, I would reduce the size of the bogie wheels to scale diameter over flange instead of tread, so in 3 1/2in. gauge, for example, the tread diameter would come out at about 2 11/16in., in which case the bogie wheels for Martin Evans' SR 4-6-0 Greene King would do rather nicely, while in 5in. gauge, the bogie wheels for Don Young's *Jersey Lily* would seem to fit the bill. Perhaps I should point out that such suggestions are not aimed at constructors trying for the Duke of Edinburgh Trophy, they are intended for ordinary chaps wishing to have a change from published designs, and who want to make use of commercially available castings, etc. So, although I have kept to main dimensions, such as the correct number of spokes, when quoting from published designs, I have ignored the niceties of details like spoke cross-sections and similar minutiae.

The driving and coupled wheels on the Hull & Barnsley 4-4-0s were 6ft. 6in. diameter, the largest the company ever possessed, with 20 spokes and crescent shaped balance weights in the driving wheels only, the crankpin throw being only 11in., rather than the 13in. you might expect with a piston stroke of 26 inches. Apart from the latter dimension, the wheels for LBSC's 3 1/2in. gauge *Maisie* would be ideal, but dear old Curly, in his quest for ever more powerful passenger haulers, added a scale couple of inches to the stroke of his GN Atlantic, giving a crankpin throw equal to 13in., so a small amount of doctoring of the crankpin boss will be required. Another possibility in 3 1/2in. gauge is the wheels for LBSC's *Miss Ten To Eight*, his version of a North Eastern R1 4-4-0, although they are intended for 5in. diameter, rather than the 4 7/8in. we require.

This design used to be marketed by Kennions, now sadly defunct, but I believe castings are available from GLR Distributors. In 5in. gauge, the scale diameter works out at 6 29/32in., and I have to admit defeat in finding anything approaching the ideal; the nearest appears to be LBSC's *Maid of Kent*, inside cylinder version, but these wheels have 22 spokes and a crankpin throw of 1 1/8in., compared to the scale throw of 31/32in. on the H&B engine, beside being slightly oversize on tread diameter. The tender wheels on the Js were identical to the bogie wheels — a sensible piece of standardisation that few locomotive designers seemed to find desirable.

The cylinders on the full size engine were 18 1/2in. diameter by 26in. stroke, inclined relatively steeply at one in nine, another detail that helps clearances in our miniature version. The Richardson balanced slide valves were on top, driven, as mentioned earlier, by Alexander Allan's straight link motion through vertical rocking shafts (**fig 4**). Unfortunately, I have not unearthed details of the maximum valve travel, but the ports were 13 1/2in. long by 1 5/8in. wide for steam and no less than 4 1/4in. for exhaust which, with the open-backed valves should have given a very free-running

engine. However, Martin Barker, in the book already quoted, says the Js had a reputation for being sluggish, although other contemporary reports claim they were *"highly thought of"*.

On perusing Kitson's original General Arrangement drawing, I was intrigued to find that the expansion links were 'launch type', that is with the eccentric rod connections behind the link, as for example in the Swindon version of the Stephenson gear, rather than at the vertical extremities. This is the first time I have come across this design in straight link gear, and was probably intended to help clearances under that large boiler. The general layout bears a remarkable resemblance to the gear fitted to LBSC's North Western 2-4-0 *Mabel* which could easily be adapted for use in a miniature Hull & Barnsley 4-4-0. The 3½in. gauge version of *Mabel's* valve gear was described in *M.E.* 3303, 19 August 1966, while that for 5in. gauge, designed by Martin Evans after Curly's death, appeared in *M.E.* 3465, 18 May 1973, along with very useful notes on its design, and further interesting information followed in letters in *M.E.* 3469 and 3471. More very helpful data on the design of Allan gear appeared in connection with Neville Evans' two Highland Railway locomotives, particularly in *M.E.* 4155, 17 September 2001.

The boiler on our Hull & Barnsley 4-4-0 is a simple round-top, but it is worth pointing out that the three washout plugs on the side of the firebox, so prominent in photographs of these engines, are not in the same position on both sides. When I was preparing the side elevation, (fig 1), for this article, scaling dimensions off various photographs as usual, I could not make out why, in the case of these washout plugs, what should have been confirmed figures off my secondary picture did not correspond with those taken from the main source photo, although everything else tied in quite well. The reason for the discrepancy was that in the main picture the engine was facing left, and in the other it was looking the other way; when the copy of the G/A arrived, all was revealed!

One obvious advantage of building a domeless boiler is that you don't have to cut a hole in it for the dome(!) but it does of course restrict the type of regulator you can use: either the well-known disc in a tube or a simple screwdown job is suitable, both of which have been described many times in this magazine. On the full size engine, the regulator was situated in the smokebox, which is quite feasible on the miniature version, but the front tube-plate will need to be recessed into the barrel, otherwise the smokebox will be extremely cramped. In any case, even if you do not use a smokebox regulator, shortening the tube length will probably be necessary in order to allow room for the header for the superheater, an item of equipment usually considered essential on a miniature version, although the full size locomotives were never so fitted, even when reboilered in 1929.

One very unusual detail on these and other Hull & Barnsley engines was the use of 'Iracier' axleboxes on the tender, an invention of one of the railway's drivers. It was used on several classes of locomotive, including the 'Tinies' mentioned earlier and one hopes that Driver Carson received royalties for his efforts. Martin Barker describes the device, applicable to outside bearings, as 'a flat plate on the axle end' which deflected oil over the top of the bearing when in motion and the main reason for mentioning it is that the axlebox covers were of very distinctive shape, rather similar to what is sometimes known in heraldry as a square-shaped shield — although they are far from square. The general shape can be seen in fig 1, but unfortunately, they are not shown at all on the side elevation of Kitson's General Arrangement Drawing of the tender, although their distinctive profile does appear on the front elevation; I have therefore been unable to produce a detail drawing, so any further information about this item and more precise details of how it worked would be of interest.

The colour scheme for Hull & Barnsley locomotives, both passenger and goods was, as already mentioned 'invisible' green, made up of equal parts of Brunswick Green and vegetable black. It has been well described as *"black, shining as a kind of green in certain lights, like an oil patch on the road"*. The boiler bands were blue, edged each side with vermilion, while the lining on cabside and tender also consisted of a blue band, no less than 2in. wide, again edged either side with vermilion. Once again we are up against the old problem of the precise shade of blue: it was officially described as 'ultramarine', but all colour reproductions I have seen show a much lighter colour, almost lavender in some cases. Contemporary black and white photographs also indicate a lighter shade, but this may be due to the selective sensitivity of the emulsions of the period, as was discussed in the article on the Caley 4-6-0s. The corners of the lining were incurved, as shown in fig 1, and even the tender coping was lined, but with a thinner line — in a miniature version, bashing the metal into the right shape is difficult enough, but then having to fine line the curved surface is really piling on the agony!

Buffer beams were red with a black line round the edge of both the beam and the buffer socket plates, separated from the red by a fine yellow line, while the buffer stocks were unlined red, except for the outer flange, i.e. nearest the buffer, which was black. The footplate valance was decorated at the bottom edge by a blue line, 2/3in. wide, with a fine vermilion line above it, and a ▶

Hull & Barnsley 4-4-0s Class J
Useful Dimensions

Note: these are intended specifically for use in producing a miniature version of these locomotives, so 'internal' measurements such as heating surface and diameter of boiler barrel sections are omitted. The figures for 3½in. and 5in. gauges have been calculated to the nearest 1/64in., using ¾in. to the foot and 1 1/16in. to the foot respectively. For gauge 1, halve the 3½in. gauge figures, for 2½in. gauge, halve the 5in. gauge figures, for 7¼in. gauge, double the 3½in. gauge figures. Figures prefixed by ≈ are approximate only

Description	Full Size	¾in. scale (3½in. gauge)	1 1/16in. scale (5in. gauge)
Length over buffers, engine and tender	≈54ft. 0in.	40½in.	57 3/8in.
Overall length of engine	≈32ft. 3½in.	24 7/32in.	34 5/16in.
Length of engine main frame	29ft. 9 7/8in.	22 3/8in.	31 11/16in.
Overall length of tender	21ft. 2¼in.	15 57/64in.	22 33/64in.
Length of tender main frame	18ft. 9½in.	14 3/32in.	20 23/32in.
Height to top of chimney	13ft. 2in.	9 7/8in.	13 63/64in.
Height to top of cab roof	≈12ft. 7½in.	9 15/32in.	13 27/64in.
Width over footsteps (max. width)	8ft. 8in.	6½in.	9 13/64in.
Width over footplate	8ft. 3in.	6 3/16in.	8 49/64in.
Height from rail to top of footplate	4ft. 9 3/8in.	3 19/32in.	5 5/64in.
Width over cab beading	7ft. 6in.	5 5/8in.	7 31/32in.
Length of cab	5ft. 5 11/16in.	4 7/64in.	5 53/64in.
Distance between frames	4ft. 1½in.	*3 3/32in.	*4 25/64in.
Thickness of frames	1¼in.	*5/64in.	*7/64in.
Locomotive wheelbase, total	23ft. 0in.	17¼in.	24 7/16in.
Divided into: bogie wheelbase	6ft. 6in.	4 7/8in.	6 29/32in.
rear bogie to driving wheel	7ft. 3in.	5 7/16in.	7 45/64in.
driving to coupled wheel	9ft. 3in.	6 15/16in.	9 53/64in.
Tender wheelbase, total	12ft. 0in.	9in.	12¾in.
Divided into	6ft.0in. + 6ft.0in.	4½in. + 4½in.	6 3/8in. + 6 3/8in.
Diameter of coupled wheels (20 spokes)	6ft. 6in.	4 7/8in.	6 29/32in.
Throw of crankpins	11in.	11/16in.	31/32in.
Diameter of bogie wheels (10 spokes)	3ft. 9in.	2 13/16in.	3 63/64in.
Diameter of tender wheels (10 spokes)	3ft. 9in.	2 13/16in.	3 63/64in.
Pitch of boiler above rail level	8ft. 7½in.	6 15/32in.	9 11/64in.
External diameter of smokebox	≈5ft. 9¼in.	4 21/64in.	6 1/8in.
External diameter of boiler (over cladding)	≈ 5ft. 4in.	4in.	5 43/64in.
Visible length of smokebox	≈3ft. 7in.	2 11/16in.	3 13/16in.
Diameter of smokebox door	4ft. 3in.	3 3/16in.	4 33/64in.
Height of chimney above cladding	1ft. 7 7/8in.	1¼in	1 49/64in.
Cylinder bore	1ft. 6½in.	1 5/32in.	1 41/64in.
Piston stroke	2ft. 2in.	1 5/8in.	2 19/64in.
Length of connecting rod	6ft. 8in.	5in.	7 5/64in.
Length of eccentric rods	3ft. 4¾in.	2 35/64in.	3 39/64in.
C/L cylinders to C/L driving axle	10ft. 9½in.	8 3/32in.	11 15/32in.
Motion inclined 1 in 9.			

*These dimensions are probably not practical for a live steam job!
Dimensions indicated thus ≈ have been scaled from a drawing or photograph.

curiously old-fashioned detail was the use of a wooden buffer beam, the ends of which were lined out independently of the valance, thus forming a separate 'box', clearly visible on photographs. Wheels were lined vermilion, as were axle-centres, but the frame section protruding above the footplate seems to have been left plain. Letters and numerals were gold, in plain sans-serif shaded red on the cab and tender sides, but on the buffer beam the lettering was more of a Roman character, shaded black; reading from left to right it showed №, then the coupling hook, then cylinder size ($18^1/2$ x 26), in very small figures near the top of the beam, followed by the locomotive running number.

The Hull & Barnsley's heraldic device (fig 3) appeared on the driving splashers, but I believe the Js were the only engines to be so adorned, while the beading on the driving and coupled wheel splashers, and on the mini-splasher over the coupling rod, was polished brass, as was the safety valve mounting and makers plate. Handrails, smokebox door fittings and buffer heads were burnished steel. In June 1941, (when you might have thought they had other things on their collective mind), Darlington Works issued a colour diagram of the H&B's painting scheme for an 0-6-0, which is reproduced on the back of the dust-jacket of Martin Barker's book mentioned earlier.

If you don't like 'invisible green', then you could perhaps paint your J in the very attractive Saxony Green of the North Eastern, but don't forget that only one engine, No. 3038, was turned out thus. Another alternative is the early LNER colour scheme current from 1923 to 1928, based on the former GNR colours, but in the early days, there were many variations on this theme: for instance, H&B No. 41 emerged from Springhead Works in May 1923 in the so-called apple green of its new owners, with its tender lettered L. & N. E. R. (including the full stop after each letter), but still carrying its North Eastern Railway number, 3041. In February 1924, the Js, or D24s as they had become a few months earlier, were renumbered 2425 - 2429 in the same order, the numerals being applied to the tender rather than the locomotive, which must have caused certain problems if an engine had to exchange tenders for any reason. By the time the LNER had seen the error of its ways and restored the number to the more logical position on the cab-side, the H&B 4-4-0s had been demoted to black once again.

One other quirky detail which really ought to be present on any self-respecting miniature J, is the re-railing jack, invariably carried on the left-hand footplate valance, just in front of the cab. How often they were needed is an interesting question, but their presence does imply a certain lack of faith in the Hull & Barnsley's permanent way department! Full drawings for these items of equipment, which I, probably unfairly, normally associate with the Irish narrow gauge, appear in Martin Barker's book.

And finally, referring back to the opening paragraph of this article, a short piece of railway just east of Doncaster, not actually part of the Hull & Barnsley, was owned jointly by the (a) Manchester, Sheffield & Lincolnshire, (later the Great Central), (b) Great Northern, (c) Lancashire & Yorkshire, (d) Midland, and (e) North Eastern Railways, and must surely qualify for the title of the 'jointest' bit of line ever; it's not surprising that it was generally referred to as the South Yorkshire Joint. Fortunately, as far as I know, it did not own any locomotives — just imagine lettering a $3^1/2$in. gauge tender 'M.S.&L., G.N., L.&Y., M.&N.E.J.R.'

References

1: *The Locomotive*: 15 February 1911 (courtesy I. Mech. E. Library). Good photograph and list of basic dimensions, but no drawings.

2: *An Illustrated History of Hull & Barnsley Railway Locomotives*: M. A. Barker, published Challenger Publications, 1996. A superb book, crammed with information and excellent well-reproduced photographs, which is at the same time both a first-class reference book and a good read.

3: Works Drawings:
NRM ref. 4/GW/11775/E, (Kitson drawing number 288); side elevation of engine; NRM ref. 4/GW/11776/E, (also Kitson drawing number 288): plan view of frames, motion, etc.; NRM ref. 4/GW/11774/E, (numbered LNER 15444D, but actually another Kitson drawing): side and end elevations and plan view of tender.

4: *Locomotives of the L.N.E.R.*, especially Parts 1 and 3: Various authors, published by Railway Correspondence and Travel Society, 1963 onwards. General locomotive history, dimensions and photographs.

5: *The Train Now Standing, Volume 1: Life and Times of the Hull & Barnsley Railway:* Ted Dodsworth, published Hutton Press, 1990. Good general pictorial record, including useful black and white photographs of J class 4-4-0s, unfortunately not well-reproduced, but also contains better colour reproductions of H&B locomotives, and an excellent colour version of the company's armorial device.

The most useful of the above are Nos. 2 & 3. The works drawings may be purchased from the National Railway Museum, Copy Drawings Service, Leeman Road, York YO26 4XL.

●*To be continued.*

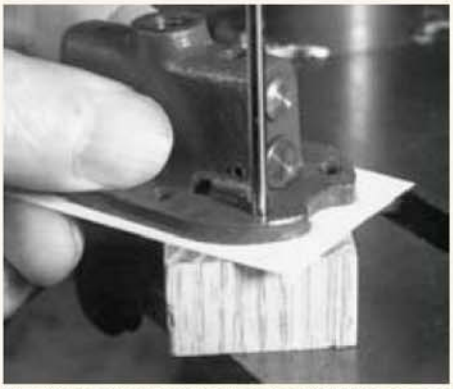
Answers to puzzles in text

No. 1: The engine shed theoretically housing locomotives designed by all three members of the Stirling family was Tonbridge, South Eastern & Chatham Railway, during the second half of August, 1915. As a result of a serious shortage of locomotives on the SE&C due to the war, Hull & Barnsley 0-6-0s Nos. 71, 73, 82 and 93 were sent there that month, while GNR 2-4-0s Nos. 2048 and 1067 (both carrying domed boilers) were also shedded there, on hire until 4 September, and of course various SER 0-6-0s and 0-4-4Ts designed by James Stirling were normal residents.

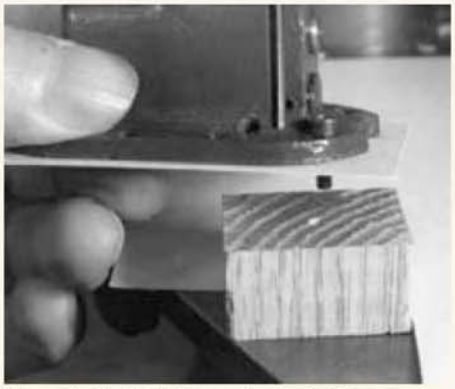
No. 2: The last new locomotives to be fitted with Allan valve gear in this country were, believe it or not, built by the GWR at Swindon in 1934 — the 1366 series of pannier tanks, an update of the 1361 class of 1910, the design of which was itself based on locomotives inherited from the Cornwall Mineral Railway.

MAKING GASKETS

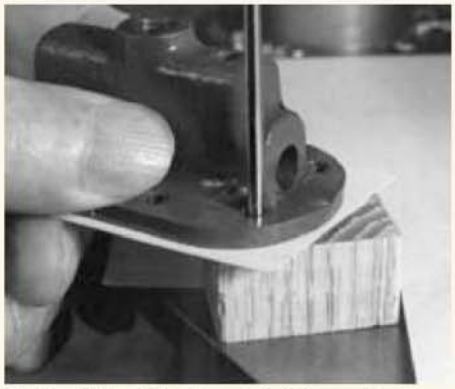
Chris Leggo in California, describes two techniques.



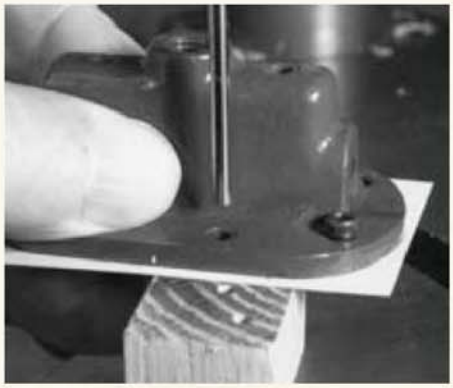
The first method involves using a drill blank, an end grain block of hardwood, the part for which the gasket is to be used, and the drill press. The punch is guided through a bolt hole through the gasket material and into the end grain of the hardwood.



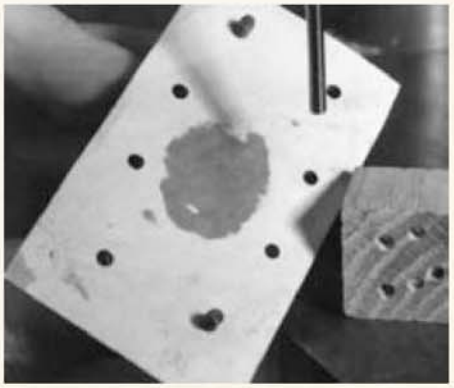
When the first hole is punched, a bolt is put through the hole to register the rest. The punch may be a drill blank or the back end of a twist drill and must be ground off to a square end. Note the indentation in the wood block.



Another hole at the other end of the part is punched next, choosing a fresh surface of the block. A second bolt can now be inserted in this hole and the gasket blank is fixed so that ...

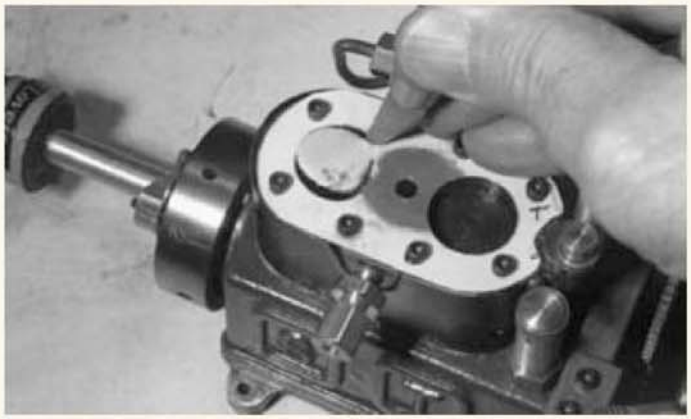


... the rest of the holes may be punched. The punch must be just a slip fit in the bolt hole so that the hole in the gasket will clear the bolt.



All the holes are now punched at their proper locations. Be careful to use a fresh part of the block. If you overlap a hole, you will not get a clean cut.

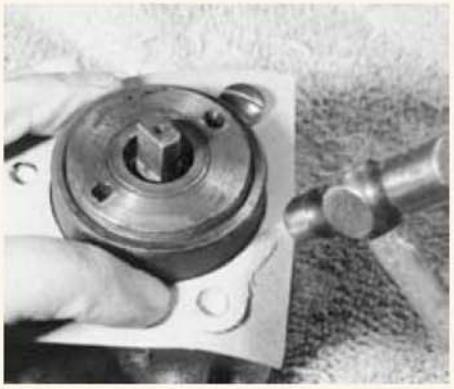
The gasket may now be trimmed on the outside edges, using the part itself for a pattern and, of course, leaving the bolts inserted.



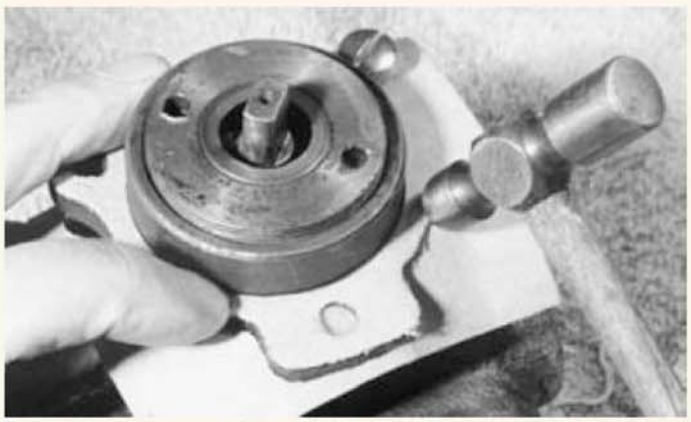
Above left: the gasket is bolted down on the mating part and, using a sharp blade, the necessary holes cut out. A good edge is obtained at the corner of the two machined surfaces. Above right: finished gasket; the top of the gasket has been marked with a 'T'. Gaskets will seldom fit on amateur made work if inverted.

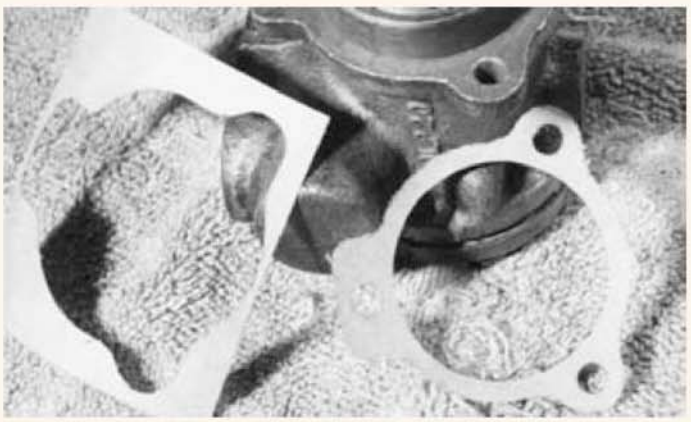
The second technique is one I learned years ago from a 'shade tree' mechanic for making a gasket when none is available, or if you are anxious about the job and it would mean a trip to the supplier. The object here is to cut a gasket for the mounting flange of the pump.

The large circle is cut out by any convenient means. I used compasses and scissors. Starting with the bolt holes, and using the ball end of a small ball pein hammer, the hole is gently tapped until the gasket material starts to break.



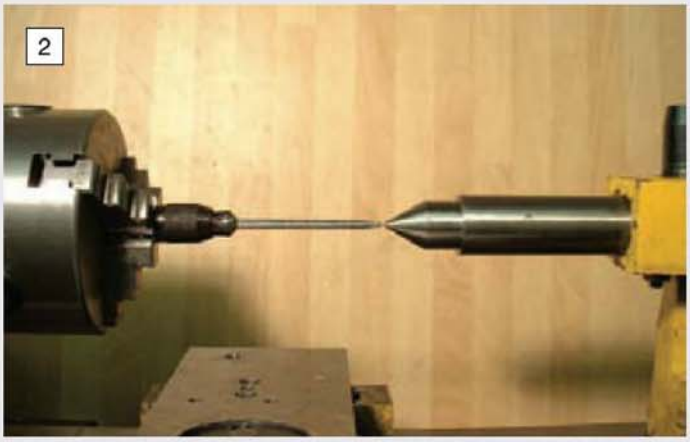
With a bolf in the first hole, the others may be broken out. Each hole should take about ten seconds. The edges may be started next. A machined surface, even where it meets with a cast surface, has sufficient of an edge to cut the gasket material.





Above left: working around the outside, and with constant light taps, the gasket soon takes shape. When working with blind bolt holes, it will be necessary to dig out the scrap with a pricker of some sort. Above right: the completed job only took about ten minutes!

A general view of the author's Clarke CL300M lathe which forms the subject of this article.



Checking the alignment of the headstock spindle and tailstock barrel using a wiggler needle and a tailstock centre.

SETTING UP THE CLARKE CL300M LATHE

Neil Wyatt

describes his experiences with this popular machine, hoping to encourage others to follow suit.

●*Part I.*

In recent years the appearance of relatively inexpensive machine tools of far-Eastern manufacture has, for those on a budget, created an alternative to second-hand machines as a way into model engineering. The Clarke CL300M (**photo 1**), ARC Mini-Lathe, Chester Conquest and Warco Mini-Lathe are all produced to the same basic design, though there are detail differences ranging from built in tachometers to the quality of the set-up. All these machines are fundamentally solidly and accurately built, and while they may lack features such as gap beds and T-slotted cross-slides, within the limits of their capacity they are capable of producing first-class results.

My choice was a CL300M that had been returned, hardly used to Machine Mart Ltd. It was soon apparent that several standard accessories were missing, including the chuck key and several change wheels, but these were forwarded rapidly and without question. Due to my inexperience it took me longer to realise that, though without visible wear (the chuck was dated the year before I bought the machine), the lathe was not very well adjusted. This article deals with what I have discovered about setting it up to get much better results. Along the way I have been pleasantly surprised. While some aspects of the lathe are rather basic (such as the crude bolt to fix the tailstock), as endless commentators said about my brother's ancient MZ125 motor cycle *"it does the job."* I cannot guarantee that the other, similar lathes are set up in exactly the same way, but the general principles will apply to any small lathe.

Precautions and preparations

I make no apology for starting with a reminder to switch of and unplug the machine before doing anything else! The CL300M is not a big lathe but even when not at work it is a heavy, and hence potentially dangerous, object. Before moving it around have a think and decide if and when you may need some help. Ideally, move it onto a small table where you can have easy access to all sides of the machine.

Working from the back of the machine, remove the screws retaining the splash guard. This will create a lot more room, and allow removal of the cross-slide. Consider replacing the screws with either 2BA studs fitted with knurled brass nuts, or finger screws. Wind the top-slide back until a pair of socket-head screws is visible. Slackened, these allow you to set the top-slide to an angle for taper turning. When removed you can lift the top-slide off the cross-slide. You now have good access to adjust the tailstock, saddle and cross-slide.

Tailstock

Offsetting the tailstock of a lathe makes it possible to turn modest tapers. However, by the same token, if the tailstock is out of line, work intended to be cylindrical will end up tapered! Accurate setting of the tailstock is also essential for good results when drilling, reaming or tapping with the tool held in the tailstock chuck. For good results you need to be sure that the tailstock is aligned with the headstock, and that the barrel moves parallel with the lathe bed.

A view of the underside of the tailstock showing the positions of the clamping screws.

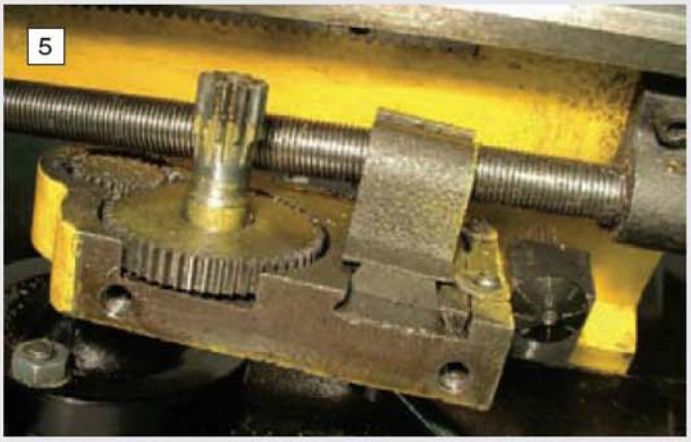
The tailstock is held in place by a large bolt. With this reasonably tight, wind the barrel right out and try and wiggle it. If your machine is like mine, there will be quite a disturbing amount of movement! Fortunately, tightening up the lock screw will lock the tailstock in position with good repeatability.

Peter Spenlove-Spenlove has described a way of testing tailstock alignment using a bar with a hole bored in it set between two centres, and a faceplate. If you have a faceplate, it is worth considering using this method. On the other hand if you do not need toolroom accuracy and but still want to avoid breaking (more) centre drills you can align centres in the head and tailstock by eye. If you are as myopic as I am (about four dioptres — it's like having a built in macro facility!) or have a good hand-lens or loupe, then this is a reasonably practical approach.

Wind the saddle up to the headstock. The handwheel will hit the cover for the electrics which is irritating, but at least it stops the back of the slide hitting and distorting the motor guard plate! With a No. 3 Morse taper centre in the headstock and a No. 2 Morse taper centre in the tailstock their points should meet perfectly when the tailstock is slid up the bed. If you have no No. 3 Morse taper centre, chuck a $1\frac{1}{2}$in. piece of $\frac{1}{2}$in. dia. scrap brass or mild steel in the 3-jaw chuck and turn a 60deg. point on the end. Once you have produced a point do not take it out of the chuck for if you do, when you put it back, it will no longer run true. Another alternative is to use a wiggler needle (**photo 2**), or even a sticky pin set to run true, but I find it easier to match two similar points against each other.

Do not be surprised if the alignment is somewhat less than perfect, particularly when tried with the barrel locked in both the fully retracted and fully extended positions. You will probably find that some judicious adjustment is in order. On my machine the vertical alignment is spot on, which is as it should be as this can only be adjusted by regrinding the head or tailstock! On the other hand, the side-to-side

Checking the alignment of the tailstock barrel to the lathe bed in the horizontal plane using a dial test indicator.



The saddle partially removed to give access to the saddle keep strips. Note the method of retaining the half nuts.

adjustment was well out — by at least 1/32 inch! Why hadn't I checked this sooner? This can be addressed easily enough as the tailstock is constructed in two parts to allow a deliberate offset for taper turning.

Two screws hold the two tailstock components together — a slotted grub screw at the rear, and a cap head setscrew in the base (**photo 3**). Remove the main bolt that holds the tailstock captive and take it off the bed. Loosen both the adjustment screws and re-tighten them so they barely grip the tailstock. You can now slide it from side to side, and you will find there is the potential to slightly twist it as well.

If you have no dial test indicator (DTI), then setting up is a matter of twiddling until the two centres are properly aligned with the tailstock both in and out. If you do have a DTI, lock the tailstock barrel in the extended position (retracted by a turn or so — if wound right to the end it may twist slightly). Set the tip of the DTI on the side of the barrel, and slide the tailstock back and forth by hand (**photo 4**). I found that I could get the tips of the two centres lined up and the barrel parallel to better than 0.001in. along its length. Tighten the two screws gently, in stages, checking alignment as you go. Any error that creeps in can be corrected with a gentle tap from wooden mallet or the base of the handle of an ordinary hammer.

Saddle

The saddle travels along the bed of the lathe and is held down by two strips bearing on surfaces under the edges of the bed. It is easy not to notice these, and even easier to forget to lubricate them! Any slack in the fit will result in side-to-side movement when engaging auto-feed or changing direction with the hand feed. To set these properly you need to unbolt the apron from the front of the slide and move it to the tailstock end of the bed. This is awkward to do, as the clasp nuts will not allow the apron to be completely removed without withdrawing the entire leadscrew (**photo 5**). This will reveal the bolts and grub screws (**photo 6**). A similar set-up is at the back of the lathe. The grub screws set the fit, but the larger bolts actually hold the strips in position. Because there is some spring in the strips, there is some give and take between the two adjustments. Take care, if the grub screws are in too far, you will need to overtighten the bolts, bowing the strip and reducing its effectiveness.

I adjusted the strips by loosening the bolts and then backing off the grub screws. I then experimented with tightening the bolts and grub screws until I could move the saddle back and forth by hand, but with no movement if I tried to wobble or twist the saddle on the bed. A fingertip on the junction of slide and bed is very sensitive. Another guide is to look for movement in the bead of oil along the junction of the sliding surfaces. It took some time, but eventually I felt the strips were tightened evenly along their lengths with no play, yet the slide was moving more freely than before I started.

Before refitting the apron, remove the screw cutting indicator, and take a good look at the half nut mechanism. This assembly has its own gib strip, held down rather crudely with bolts and washers and adjusted by three screws hidden by the indicator. On my lathe this assembly is quite loose with a good deal of play. When the clasp nuts are closed this play disappears and, as backlash is not a big issue with auto-feed, I have left this alone for now.

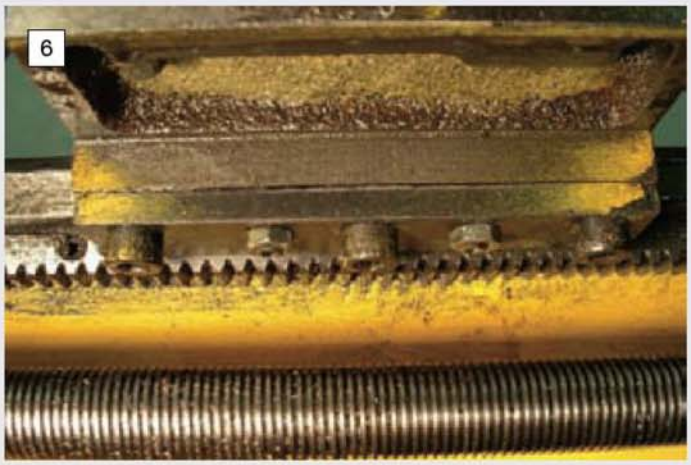
Line up

As supplied, closing the clasp nuts noticeably deflected the leadscrew on my lathe. If you align the apron with the mounting holes in the saddle and close the clasp nuts you should be able to bolt it on so that they can be opened and closed without causing any distortion. This is best done with the saddle near the middle of the bed. The screw cutting indicator can now be re-attached — I leave it engaged all the time since there is very little load on it, but if you prefer you can leave it out of engagement.

Before leaving this area, it is worth contemplating the benefits of fitting a piece of plastic pipe — I used a piece of plastic channel — over the leadscrew (**photo 7**). This will help keep it free of swarf. Do not try and cover the whole length of the screw; you need to be able to see some of it so that you can visually check if is rotating or not!

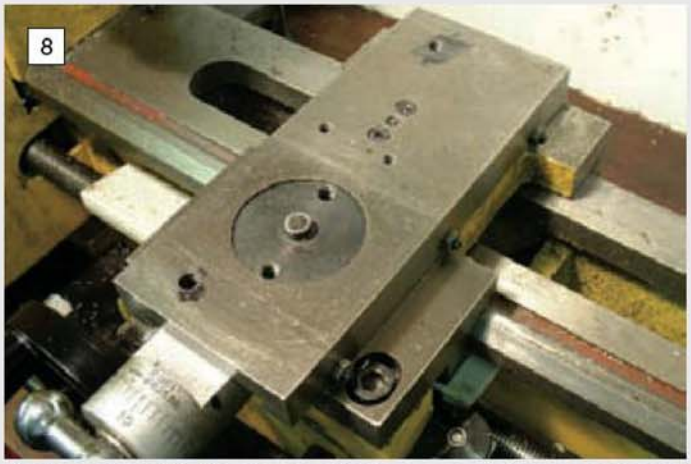
Cross-slide

Moving upwards, the next job is the cross-slide itself. This has two adjustable components, a gib strip and its feed nut. Excessive backlash (free play) in the slide screw may not indicate wear in the feed nut. On a new machine it is more likely the nut is not properly secured. There are three screws accessible from the top of the slide itself, the smaller central grub screw sets the height of the nut, while the two outer screws hold it secure ▶



The front saddle keep plate is only accessible after removing the apron. The rear keep plate is of similar pattern.

It is worth taking steps to prevent swarf falling on to the leadscrew. A simple plastic guard helps.



The lathe cross slide. The gib strip adjusting screws can be seen to the right and the nut adjusting/clamping screws are in the top surface.

The top-slide can be most readily aligned to the cross-slide using a small engineers square.

(**photo 8**). It is important that the two outer screws are not just evenly tensioned, but screwed in by the same amount so that the nut is parallel to the leadscrew.

Wind the slide right out until the nut disengages. Remove the grub screw and gently tighten both the other screws then unscrew them both by exactly five turns. Now re-engage the feed screw. The two screws should lift slightly as the nut comes into line. If they do not lift, slacken them another turn. Screw the slide in half way — the nut should now be 'floating' but perfectly aligned. Screw in the grub screw until you can just feel resistance against the nut, and now tighten the two other screws, *by an equal number of turns,* until the nut is held firmly. Do not overtighten or the bolts could pull out of the nut. Get this right, and you will avoid excessive wear, and better still, gradual loosening of the nut will not be a problem.

Three lock nuts and grub screws adjust the gib strip, a long metal strip that forms one of the bearing surfaces for the dovetail joint between the base and body of the slide. These should all be evenly tensioned so that there is no free play in the slide, but it should be possible to turn the handle to move the slide in and out without excessive resistance. There is no special trick to this, just patience and care. It helps to hold the grub screw in place with an Allen key while tightening the locknut. If you really cannot get a smooth but rigid motion for the whole length of the slide's travel, remove the slide and look at the gib strip. Mine had a noticeable burr, which I stoned off with a small slipstone. The latter is an ageing 'Pegley Davis' stone intended for sharpening fishing hooks, which does many excellent jobs including putting a keen edge on high speed steel tool bits, as well removing small burrs.

Top-slide

Adjusting the top-slide (**photo 9**) should now be a piece of cake! There is no separate feed nut. The leadscrew runs directly in the base, so you only have to adjust the gib strip. As an aside, the 'imperial leadscrew' on my lathe's top-slide appears to have a pitch of exactly 1mm and is not a 25 threads per inch leadscrew.

The final job is to set the top-slide square, much easier on this lathe than most. The top- and cross-slides are precision ground on all their faces, so it is simply a matter of using an engineer's square. It is worth buying a small (say 3in.) good quality square for this sort of job. All the carpenter's try squares I have tried have been noticeably out.

Checking

There are two common ways to test the set-up of your lathe. Parting off a slice of 1in. dia. mild steel will help you decide if all the gib strips are adequately tight. To check the alignment of the tailstock, mount a length of brass or steel bar between centres. Take a light cut along the length. If the diameters of the two ends are no more than 0.001in. different, or you cannot feel any difference when gauging each end with a pair of calipers, then the set-up is pretty good.

●*To be continued.*

Editors' note:

It was felt that the above article contained much useful advice on setting up a simple lathe of the type owned by the author. For this reason it was decide to include it in *Model Engineer* and we trust that newer members of the model engineering fraternity will learn much from it. However, we would be failing in our duty if we did not point out one important omission.

Despite appearing to be very rigid, the bed of the average light lathe is relatively easy to distort. Lathes with beds supported by two feet at each end can twist when they are bolted down onto an uneven bench top. It is therefore a fundamental requirement when setting up a lathe to check that the bed is level and free from distortion. Only when satisfied on this point should the owner proceed with checks like those described above. Incidentally, it was recognition of this potential problem that caused lathe designers in the past to use anvil shaped beds. The early Drummond lathe restored by Ron Etter and recently described in these pages (commencing in *M.E.* 4209, 28 November 2003) has a bed of this type.

The method usually recommended for ensuring that a lathe bed is free from twist is to use a sensitive spirit level. This should be placed across the bed at both the headstock and tailstock ends. The readings should be the same. It is also a good plan to place the spirit level in line with the bed and take a further reading. In this way one can be sure that the bed is free from twist and is also level, this last can be useful when setting up a casting for machining on the boring table. However, the crucial requirement is that the the two ends of the bed are parallel to one another. With a V-flat bed like that fitted to the CL300M lathe it may not be possible to place the level directly on to the bed. Under these circumstances place the level on the cross-slide and wind the carriage along the bed to take your readings.

It must be stressed that a relatively *sensitive* spirit level is required for this task. One detecting 0.003in. per foot or better is required. Such an instrument is far removed from the typical DIY spirit level and is unlikely to be in the tool kit of most amateurs, particularly if just setting up a workshop. If you do not have one then proceed as follows. With the clamp bolts holding the lathe down loosened, chuck a piece of precision ground or bright drawn mild steel in the 3-jaw chuck. This needs to be 6 to 8in. long and of sufficient diameter to be reasonably rigid. Place a dial test indicator (DTI) in the lathe tool post with the plunger horizontal and at approximately centre height. Bring the plunger into contact with the bar at the end remote from the chuck. Rotate the spindle and watch the needle on the DTI. Adjust the dial bezel until the mid-point of the swing of the needle is on the zero. Rotate the bar until the needle reaches zero.

Carefully start to bolt down the lathe. If the bench is perfectly level then the needle of the DTI will stay at zero. However, it is more likely that the needle will move. If this occurs it will be necessary to introduce shims under the appropriate foot of the lathe to ensure that the needle still reads zero when all the bolts are tight. The reader should note that this method does not ensure that the lathe is level but meets the first requirement, which is to ensure that the bed is free from distortion.

Once satisfied that the lathe is as free from distortion as possible using the methods described above, then it is time to do a cutting test by turning a test piece without tailstock support. This piece needs to be of approximately 1in. dia. and as long as practicable without promoting chatter, say 4 to 6in. depending on the lathe. Take a light skim of no more than 0.001 to 0.002 inch. The bar should be parallel. If it is not further shimming may be necessary. It is helpful to make the bit of the test bar overhanging the chuck the shape of a dumb-bell as then you only have to turn two short collars instead of the whole length of the bar. It all helps speed things up if, as is likely, more than one test cut is necessary.

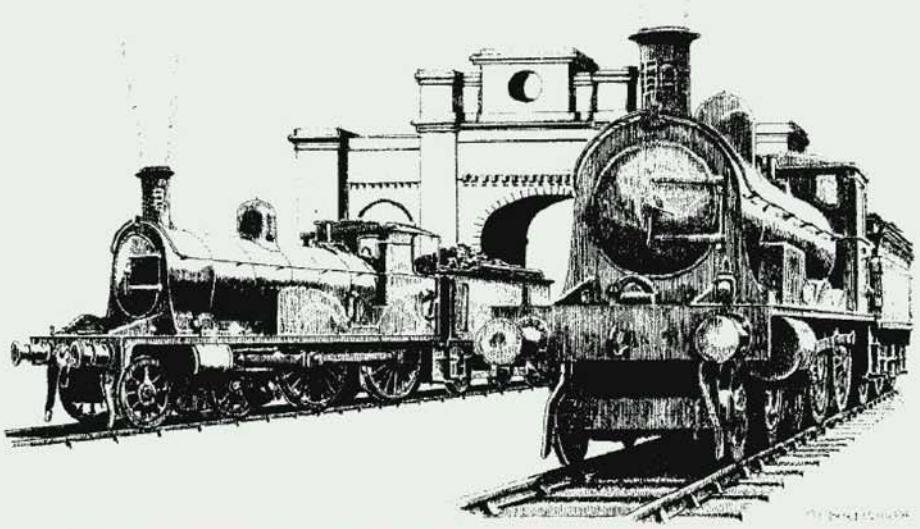
Having now ensured your lathe bed is distortion free it is time to carry out the checks described by Neil Wyatt in his article.

Happy and accurate turning!

Neville Evans

discusses the tender handbrake for the Highland locomotives before returning to the updated valve gear for *Penrhos Grange*.

●*Part XXXVI continued from page 384 (M.E. 4218, 2 April 2004)*



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

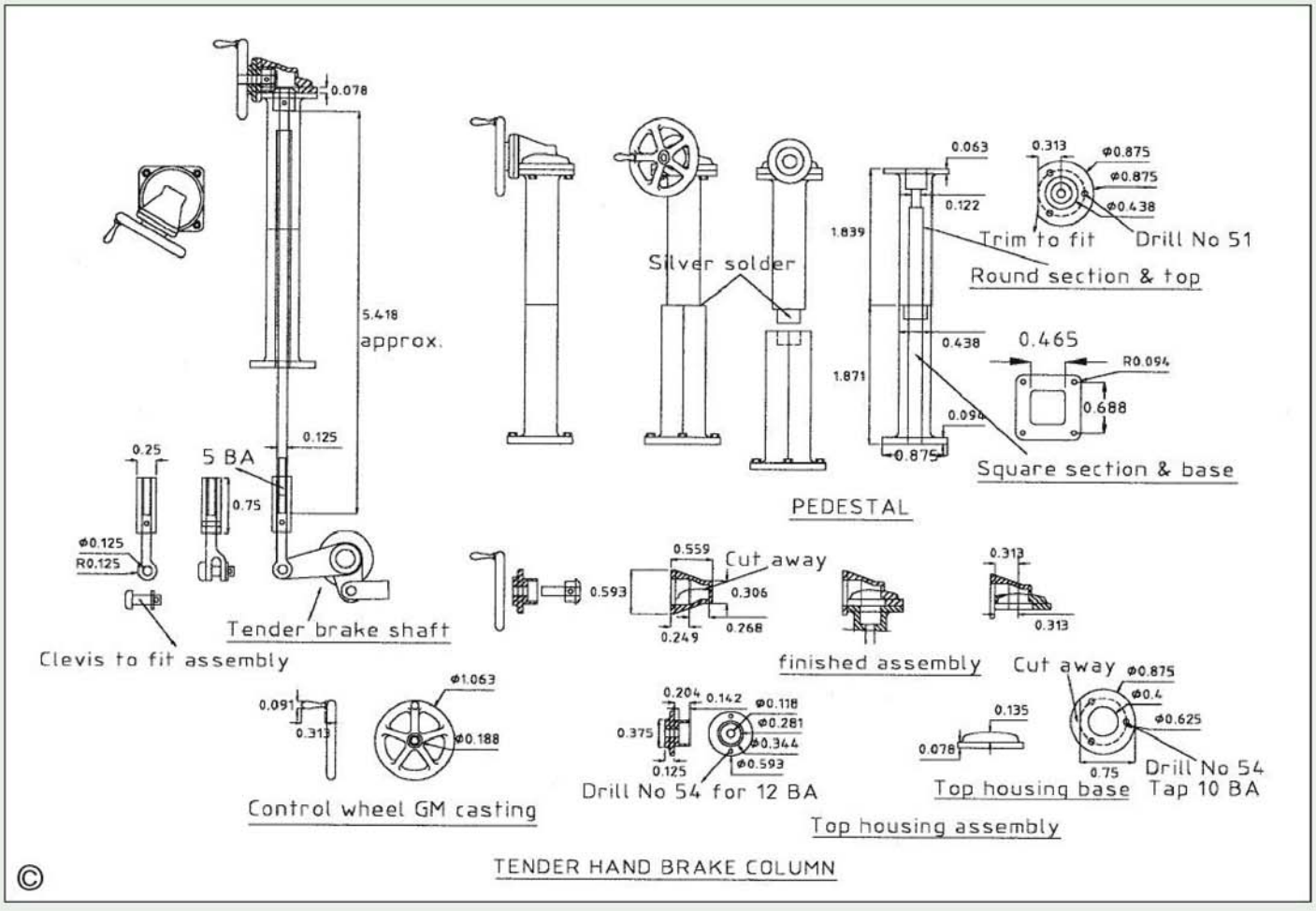
LOCOMOTIVES IN 5in. GAUGE

A large and very obvious piece of equipment, the tender handbrake finds itself in the front right hand corner of the tender. Note that although the pedestal base lies along the fore and aft axis of the tender, the wheel itself is turned through an angle of 30deg. to the base, so as to make it more accessible to the footplate crew. The column is milled down from a piece of 1/2in. square brass bar and I have shown it as being machined in two parts which are spigoted and silver-soldered together. In my opinion, it is easier to drill the long hole up through the centre with sufficient accuracy if you can just hold the piece in a four jaw chuck. The corners are rounded off as shown and the top half of the column is turned round, to 0.438in. diameter. The square base and the circular top may be conveniently made from separate pieces and silver-soldered onto the column halves. Leave large fillets top and bottom as per the drawing. The vertical bevel sits on top of the pedestal in a recess which, as can be seen, is bored to a nice snug running fit.

Top bevel housing

This part caused a few headaches. My Caledonian ally, Graham King, came to the rescue with a sketch of the set-up that he used on his own Loch tender, and I based my design on that. The housing is built of three parts, the base, the housing proper and a small fairing, which holds the lot together. I think that the drawing is quite clear, but a few words of explanation might help.

Start with the thimble-like horizontal bevel housing. It may be easier to make the bevel holder at this time as it pushes into and bolts onto ▶



Handbrake handwheel casting.

Painted handwheel casting **in situ** *on handbrake column in the cab corner.*

Left hand rod end.

the modified thimble with two little 12BA screws. I haven't given a PCD for these as it will be more convenient to fit them where they go in best. The thimble part is now trimmed away, so as to sit on the fairing, which has also to be trimmed on the inside for clearance for the bevels. The completed base is then clamped to it and the whole lot silver-soldered together.

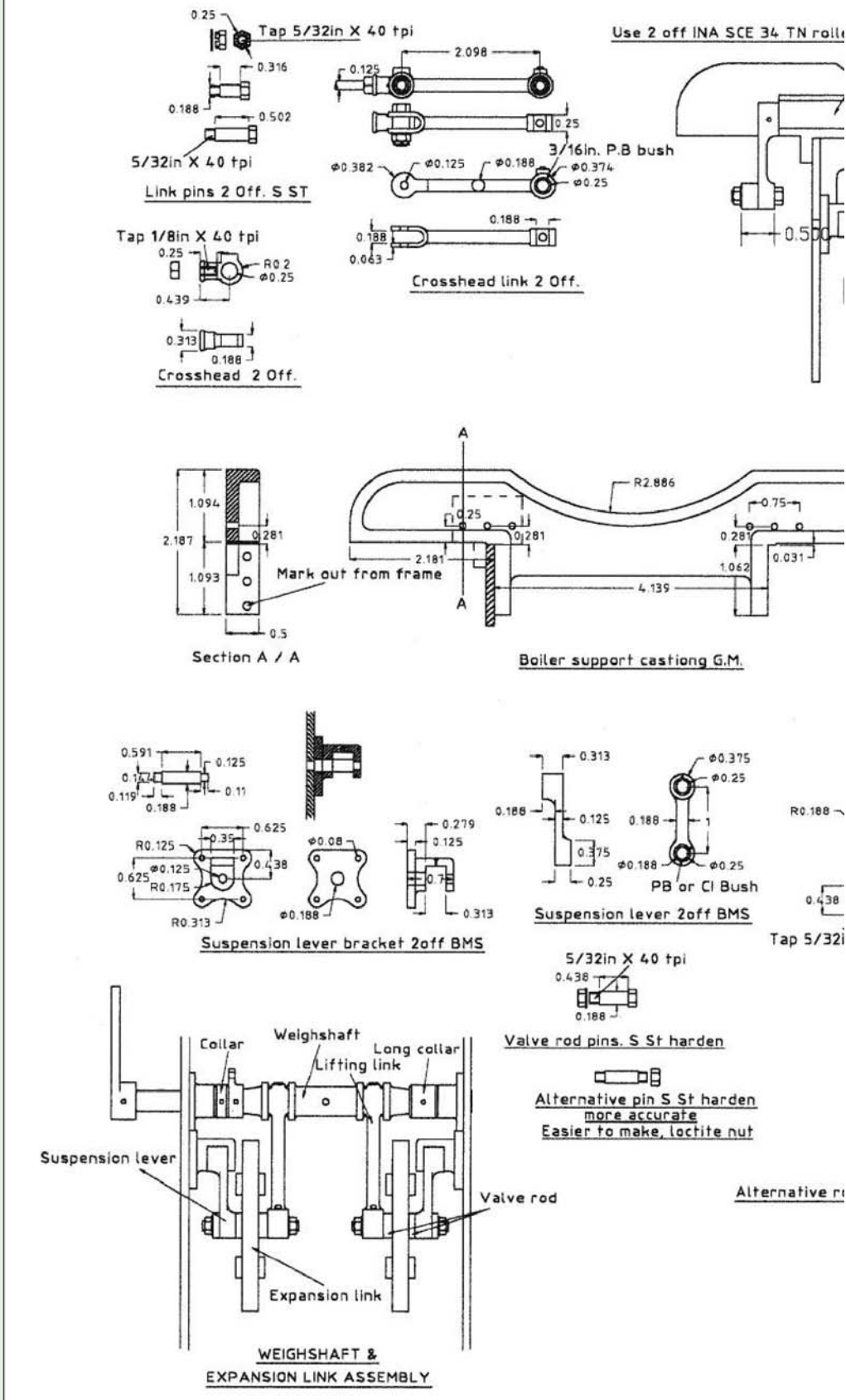
The recess for the bevel holder just about impinges on the bottom of the assembly, so a certain amount of care is called for. The bearing needs to be a tight fit in the housing. In fact it will probably pay to insert a small screw in the side to hold it firmly, The whole assembly is fastened onto the column by three 10BA screws, with 12BA heads, fitted from underneath.

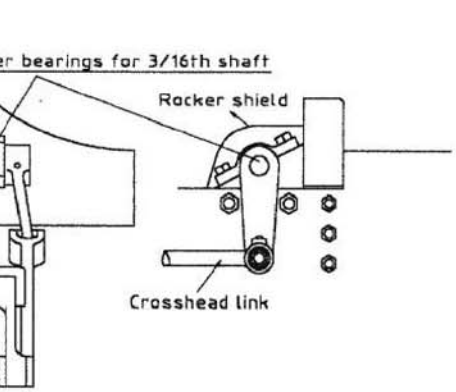
Wheel

The wheel is available as a casting as per the photo. Turn about 1/8in. of the shaft down to 0.110in. and screw the end 6BA. Drill the wheel boss No. 43 and tap 6BA. Assemble with a nut locking it, or pin the shaft. The handle is a simple turning and fits onto the small flat recessed into the wheel rim.

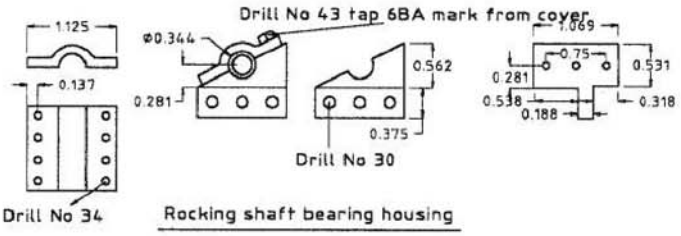
Delrin bevels

I tried to find brass bevels for months before taking the advice of Doug Hewson and used Delrin bevels from Bonds of Midhurst (who used to be Bonds o' Euston Road). These little fellows come complete with a tiny grub screw which screws onto a flat filed on the 3mm diameter rods. Doug Hewson uses these bevels in the

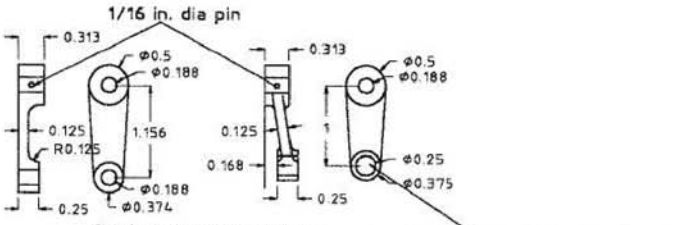




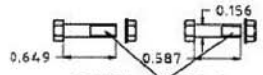
G.A.Rockers



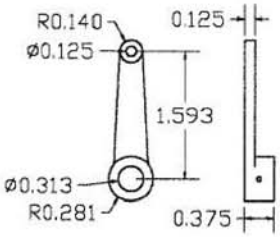
Rocking shaft bearing housing



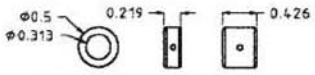
Rocking levers 2 off ea. Use INA SCE 24 TN roller bearing



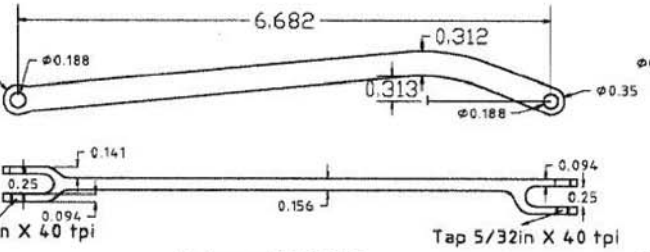
5/32in X 40 tpi
Rocking lever pins 2 off ea. S. ST harden



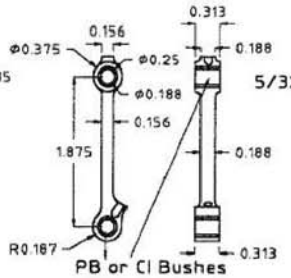
Reversing lever



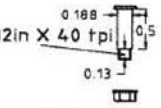
WEIGHSHAFT COLLARS
BMS



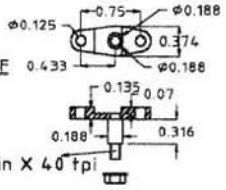
Valve rod 2off BMS



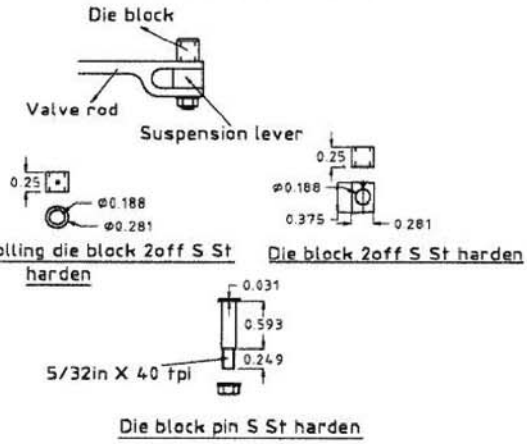
Lifting link 2 off BMS.



Lifting link top pin 2 OFF
S St. Harden



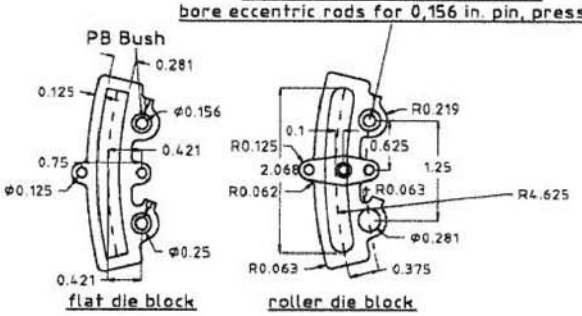
Lifting link bracket 2 off BMS. Rivet to expansion link



olling die block 2off S St harden
Die block 2off S St harden
Die block pin S St harden

VALVE GEAR " PENRHOS GRANGE"

SCE 22 4 TN INA roller bearing
bore eccentric rods for 0,156 in. pin, press fit

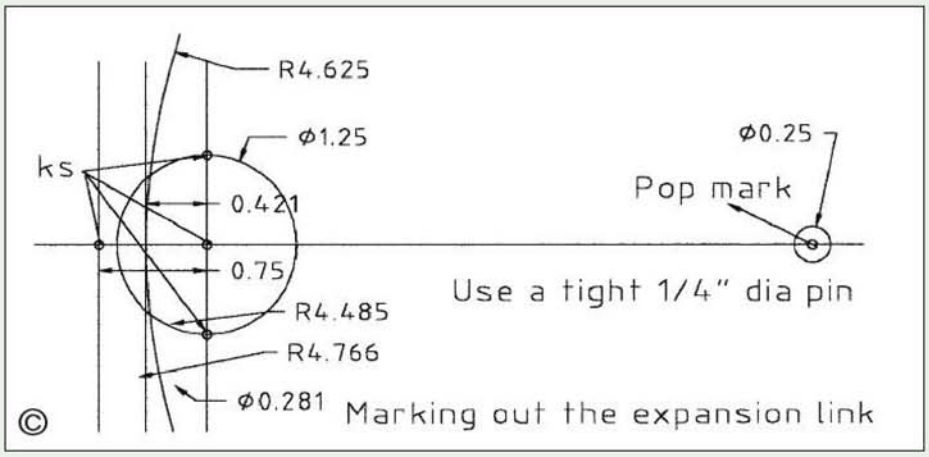


flat die block
roller die block

Expansion link 2off 1/4 in. gauge plate

SUPPLIER

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



reversing mechanism of his British Railways valve gear boxes, so I think that they should be more than equal to the task in hand.

It is almost a certainty that the two bevels will need shimming out, or recessing more deeply into their housings in order to mesh them properly. The exercise of a little patience will probably be called for. Try to achieve a happy medium of not too tight and certainly not too slack.

Linkage

This is all pretty straightforward. Make sure that the 5BA thread on the bottom of the pull rod runs smoothly in its housing and all will be well.

●*To be continued.*

PENRHOS GRANGE

●*Part VI continued from page 268 (M.E. 4216, 5 March 2004)*

I must confess to a slight feeling of dismay when faced with the problem of setting out the Churchward arrangement of Stephenson's valve gear. In my opinion it seems to be mechanically unsound. In an attempt to forestall a blast of rage from Pete Rich, I shall qualify this rather sweeping statement by agreeing that in full size it seems to work very well. There are however times during the design of a small locomotive, when the demands of authenticity and practicability seem to conflict to a large degree.

My problem lies in the fact that I have always believed that if you want to suspend something you always try to hang it from the middle or from both ends. A perfect example is the child's swing; a bit of rope either side and off it goes for ever. If you try to suspend it from one side though, you have to supply a large bent piece of rigid material formed into a half stirrup shape — very cost ineffective.

An inspection of the drawing of the weighshaft and expansion link assembly will show you exactly what I mean. The link is suspended from one side and the die block from the other. This means that when wear takes place, the expansion link is free to twist against the die block, which will in turn cause wear in the die block. Not a happy state of affairs, which is to some extent ameliorated by the restraining effect of the eccentric rod pivots which tend to hold the link in a vertical position. As there is nothing to be done except to point out the problem, we must content ourselves with trying to apply remedies.

The expansion link hangs from the lifting link and particular attention should be paid to the two lifting link bushes. I have found that a good quality cast iron bush, that is one made of Meehanite or somesuch, will outlast a phosphor bronze one by a factor of three or four times, and I can recommend it wholeheartedly. Meehanite can be bought in sticks from a metal stockist (use your local *Yellow Pages*) for use as bearings, bushes or liners. It has the advantage of being very cheap as well as cheerful. The smallest size stocked by my local supplier (C. G. Rees of Cardiff) at the present, is 30mm diameter, a bit too big for small bushes. What I do is to use square bar, cut it down roughly to size and turn it to round bar. It makes a bit of a mess, but it's worth it.

The same problem obtains on the other side, where the long valve rod is swung on the end of the 1in. long suspension lever. This lever is duplicated at the front end by the inner rocking lever, which is also 1in. long. These two levers form a parallelogram and it is vital that the valve rod length is such that the two levers are parallel when in their vertical position, otherwise all Simon's careful work will be wasted.

The valve rod is driven by a die block, and said block hangs quite a long way out from its bearing. The same twisting moments therefore apply and we have to pay attention to the two bushes in the suspension lever. Once again I would recommend cast iron with the provision of small lubrication holes for both bushes. The top bush is lubricated through a hole in the lever bracket, the bottom one by blind faith. I can't say that I would use roller bearings in these applications as I think that the sideways forces placed on them would cause rather rapid wear.

Expansion link

This difficult little artefact has to be made with great accuracy. Start with a piece of gauge plate 1/4in. thick and long enough to accept the full radius of the link slot plus about 1in. either end. The vital dimensions are those of the slot and the two eccentric rod pivot holes. I first make sure that one of the long edges of the plate is absolutely straight, in woodwork this would be called the 'face side' and marked as such. All measurement then takes place with reference to this datum. I then mark out a centre line parallel to that edge.

Use an accurate square to draw a line at right angles to that centre line and make a small centre pop mark on the intersection. The three holes to the inside of the slot lie on this line, so mark off a circle radius 0.625in. from the centre. The positions of the eccentric rod holes lie where the radius and the lines intersect top and bottom. Mark off 0.421in. forward of the vertical line. This is where the centre of the slot lies. Measure 4.625in. along the centre line and describe an arc to represent the centre of the link. From the link centre along the horizontal centre line mark off the other bracket fixing hole.

I would next mount the plate on a rotary table and mill out the slot using a home made cutter of 0.281in. dia. This little tool will walk through gauge plate at an astonishing speed. Spin at approximately 1100rpm. Traverse quickly, both ways, as this tool won't wander in the groove. Use plenty of cutting oil. Take light cuts of around 5 thou. depth and keep the slot clear of swarf with a stiff brush or an airline. I recently cut the slots for a pair of Allen links using one of these cutters, made from a piece of silver-steel, admittedly they are not curved but the principle and the effect are the same. Time: 5 minutes each and exactly to size.

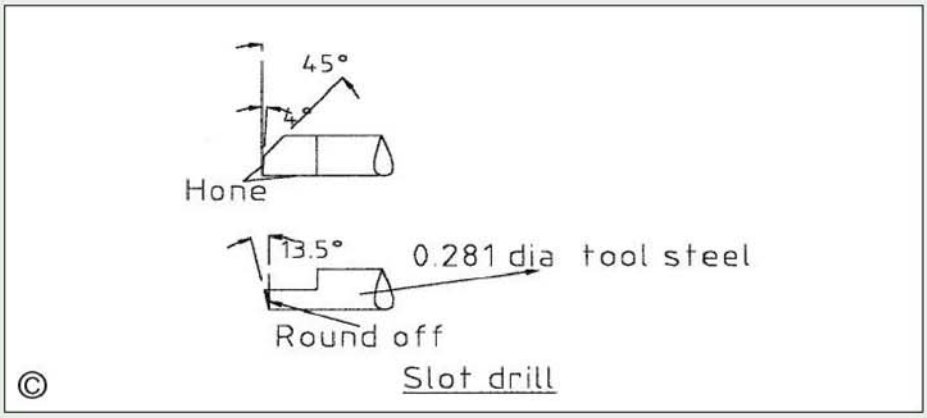
If you don't possess a rotary table then one of Martin Evans' gadgets for curved slot cutting, described many times in these pages will do the job just as well. Drill all four holes next and cut the outside out as per the drawing. I have never found any problem with hardening a complete die block without distortion. Just warm it evenly and quench in clean water.

Die block

I have shown two die blocks, the first is quite orthodox, the second one is a roller. As I mentioned in the last gripping episode, the use of a rolling die block was debated many years ago in these pages. LBSC was against it on the grounds that he thought that it would drag, but I have seen it work on a *Torquay Manor* and a '5100' both in 5in. gauge and it seems to work very well.

If there is a problem of wear, it is confined to the bearing pin of the block and doesn't take place in the expansion link itself. One hour to replace said block and off again for another couple of years. Makes sense to me. I have shown a small oil hole in the block, which should pump oil into the bearing as the block rotates.

●*To be continued.*



PETE'S PAGE

CALIPERS

Peter Spenlove-Spenlove introduces a useful basic marking-out instrument and describes a modification which may help to improve their accurate use.

Among the first tools made by apprentice fitters in the pre-digital age would be a set of two or three calipers. Part of his training, they had to be made properly and suitable for use throughout his working life.

The most common types are the inside (**fig 1**) and outside (**fig 2**) patterns, frequently used at the lathe and other machine tools. The third type, with its scribing point on one leg (**fig 3**), is more suited to bench work and for marking out sheet metal components. The other leg is usually similar to an inside caliper leg. This instrument is known by various names including 'odd legs', 'hermaphrodite calipers' and 'Jenny calipers'.

Having made my odd legs to the approved pattern, I used them, for example, to scribe a line parallel with an edge. However, I found it difficult to keep the non-scribing leg at a constant height on the edge of a piece of metal as the scribing point made its mark (fig 3). Accordingly. a small piece of metal was silver-soldered inside the curve of the non-scribing leg. This acted as a stop to locate this leg (**fig 4**). It is only effective on work with sharp, i.e. unradiused or unbevelled edges on the part of the work being marked out. Burrs should of course be removed before marking is attempted.

Most work requires the edges to be 'broken'. Drawing instruction may say 'break edges' but the marking out should be completed before doing so. Jenny calipers are particularly useful if a row of holes for rivets is to be drilled say, half an inch away from a curved edge of sheet metal.

The photograph shows a standard type and a home made copy with my suggested modification. The additional piece of steel was silver-soldered in place. The sketch of a standard hermaphrodite caliper shows in a much exaggerated manner how the set dimension will bring the scribed mark too close to the edge of the workpiece if the plain leg tip slips down from the top face as the caliper is traversed along the component when scribing a line parallel to that edge (fig 3).

Firm joint

All the calipers shown in these notes are fitted with what is often known as a 'stiff joint' or, as Moore & Wright call it, a 'firm joint'. This type of joint links the legs and consists of a large diameter, thin-headed nut and bolt with a special locking device to prevent them from working loose. A very thin fibre washer is placed between the legs to provide uniform friction when the instrument is adjusted to the required setting.

Types and styles

Before preparing these notes, I checked the relevant literature which I have to hand, referring particularly to some old Moore & Wright and Starrett catalogues. Moore & Wright listed Jenny calipers in several different styles. Their type 332 had the standard pattern of leg and a marking point integral with the other leg. Type 336 had the standard pattern of leg but with an adjustable (and removable) point. Interestingly, type 341 had an adjustable point and a leg with a location spur just like my modified pair. Finally type 342 had a leg with a location spur and a fixed point. Talk about spoilt for choice!

Starrett only appear to list the traditional pattern. All styles were made in a variety of lengths. If you are in the market for a pair of odd-leg calipers it may pay to shop around rather than to accept the first pair offered. I have no idea if all the types listed are still available new, but second-hand examples are sure to be around if you search.

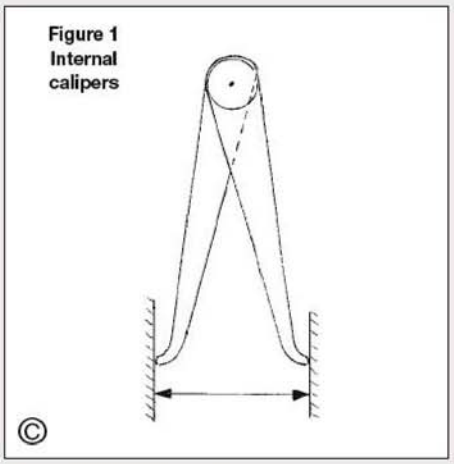


Figure 1 Internal calipers

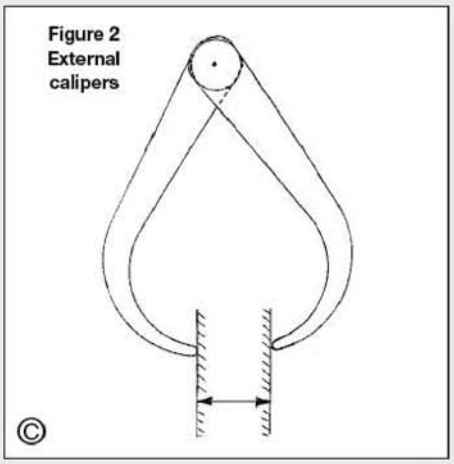
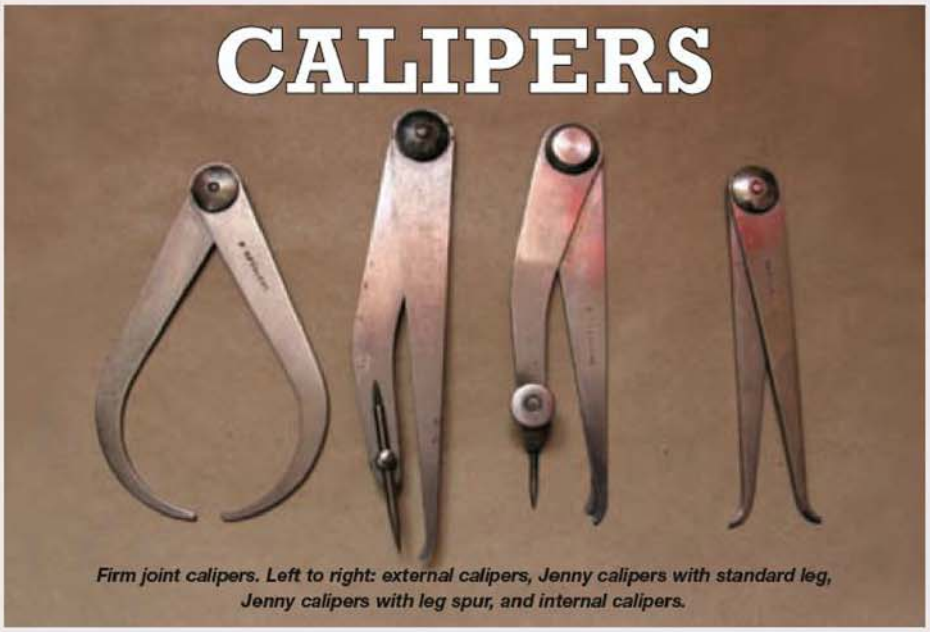


Figure 2 External calipers



Firm joint calipers. Left to right: external calipers, Jenny calipers with standard leg, Jenny calipers with leg spur, and internal calipers.

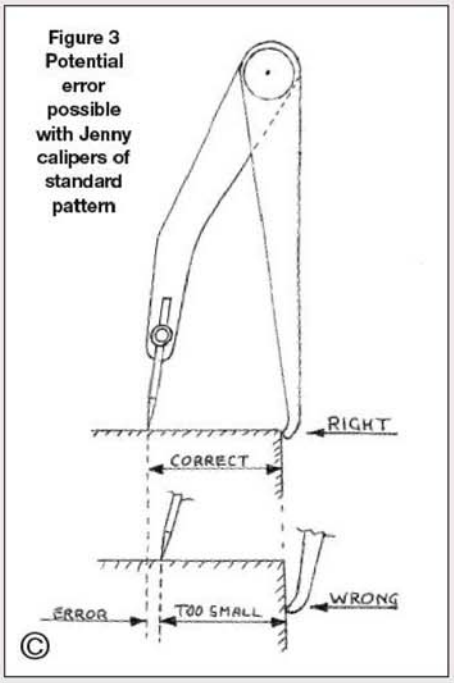


Figure 3 Potential error possible with Jenny calipers of standard pattern

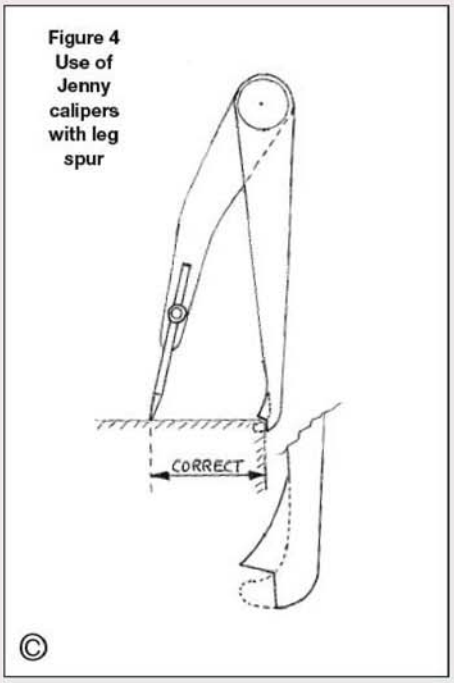


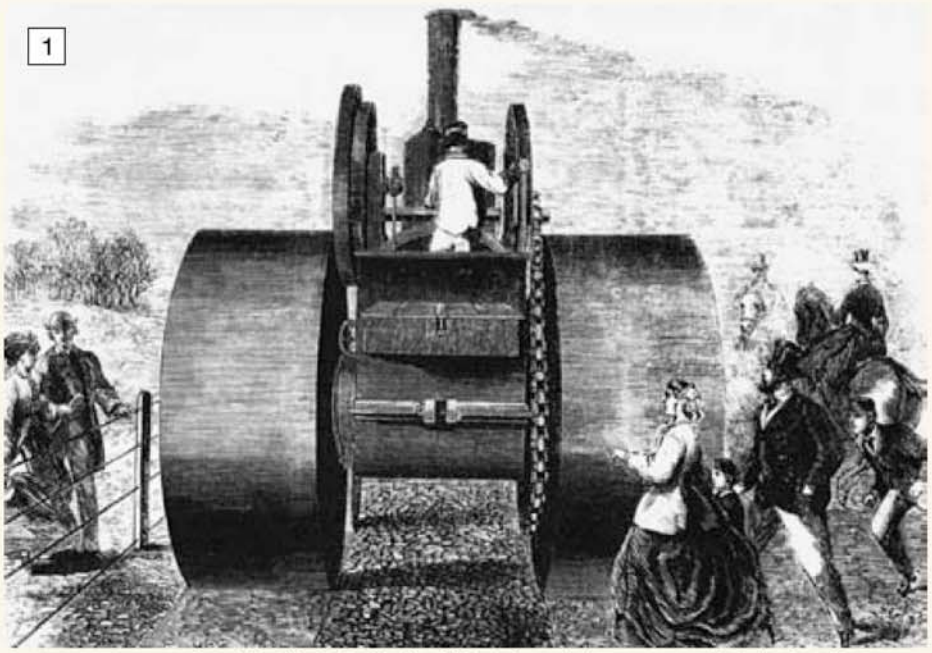
Figure 4 Use of Jenny calipers with leg spur

ROAD STEAM

Martin Wallis

begins with a brief review of the development of this company and its noted steam rollers.

●*Part 1*



Contemporary engraving of the 'Hyde Park' roller. Unless the onlookers were particularly short in stature, the illustrator has exaggerated the size of the machine whose wheels are recorded as 7ft. 6in. diameter.

AVELING & PORTER

SOME NOTES ON A COMPANY AND ITS PRODUCTS

It appears the pictures, observations and asides in *Road Steam* concerning Charles Burrell and John Fowler have been well received. I had envisaged moving on to the next model construction series, the 'Savage Universal Carrier' steam wagon about now, but since Tony Webster's series on building the Fowler Steam Wagon is currently under way, our worthy Editor has asked me to extend my notes on steam engine builders to include a few more makes. A hidden bonus is that this will give the Savage wagon builders, who are providing the photographic illustrations for the series, a chance to get further ahead. Two wagons are now with boilers and just need the cab, boiler fittings and pipe work to complete.

Unconquered

This time we will look at Aveling & Porter, a company best known for its steam rollers; almost any rally in the country will sport at least one Aveling roller. More Aveling rollers survive into preservation, by a large margin, than any other make. This of course reflects relative numbers built, Aveling having by far the greatest market share. Their rollers are easily identified by the rampant horse motif which is part of the Kent coat of arms, deriving from the banner of Horsa & Hengist who invaded Kent in AD449. The word 'Invicta' is usually added underneath which means 'Unconquered'.

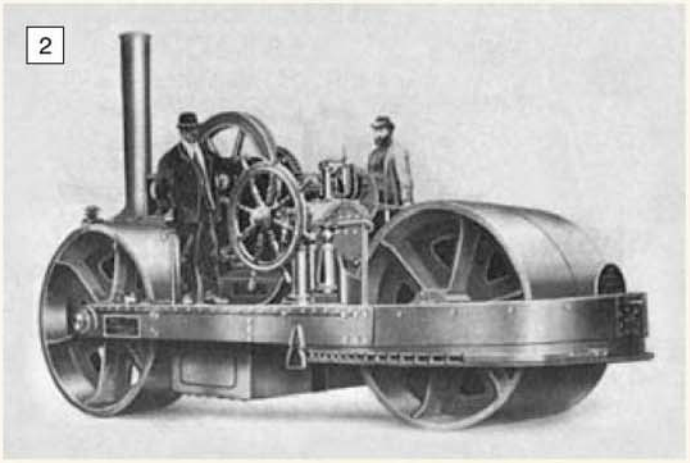
Thomas Aveling was born in Cambridgeshire and, after a short period of schooling, left home to become apprenticed to a local farmer. The mechanical and engineering aspects appealed to him a great deal more than dealing with livestock or arable work, and he made a reputation for blacksmithing and the repair and renovation of broken or deficient machinery.

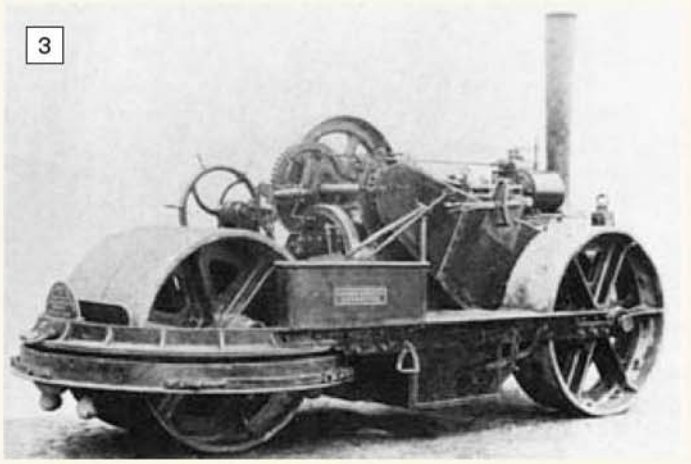
He went into business on his own, expanded, and was soon designing agricultural implements and equipment as well as repairing them. By 1850 he established his works in Rochester, Kent. The biggest agricultural innovation of the day was the portable engine and, naturally, Thomas Aveling took a keen interest. The portables of the time were not self-propelling and Aveling recorded *"It is an insult to mechanical science, to see half a dozen horses drag along a steam engine, and the sight of six sailing vessels towing a steamer would certainly not be more ridiculous."* His solution to the 'insult' will be held over until next time; for the moment we will concentrate on his best-known product, the steam roller.

First steam roller

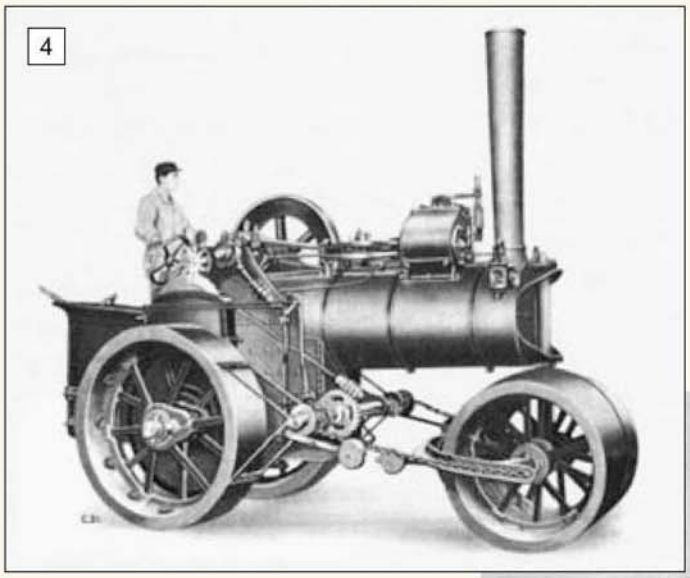
It is reputed that while watching men dragging a cement filled iron cylinder to compact the ground on Rochester Esplanade in 1857, Thomas Aveling concluded that a steam engine might do the job better. However, the practicality of the situation was that his works were not yet fully developed and his engines were being built by Clayton & Shuttleworth in Lincoln. The first engine built at Rochester, a traction engine, was completed in 1861 and 'steam rolling' was not embraced until 1865.

'Steam rolling' is deliberate terminology and the engine was not a steam roller as such but an engine employed to pull a very substantial cast



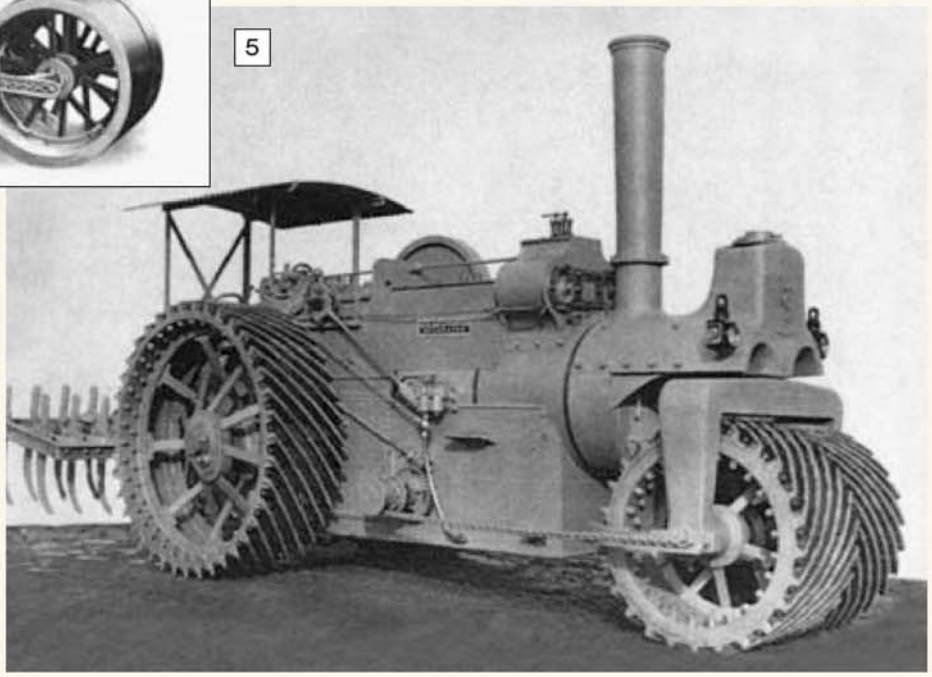


Left: an early example of a 'Liverpool' roller. Right: this slightly later roller was completed in June 1869 and weighed 15 tons. Note it is a pre-hornplates design with the crankshaft held in brackets bolted to the boiler.



Left: an 1875 8 ton 5nhp Aveling & Porter roller fitted with conical front rolls. By now the outer boiler plates are extended upwards and backwards to receive the shafts. Note the very heavy flywheel, early style stove pipe chimney and Salter safety valves. The machine was single speed.

Below: this 22 ton roller, Works No. 2323, was completed in 1887 and exported to the Kimberly diamond mines in South Africa. The purpose was to crush the blue stone ore to release the diamonds. The harrow behind would turn the ore for future passes.



iron roller 10ft. in diameter and 9ft. wide. The roller was said to have been a section from a cast iron bridge pier and had a timber framework to which an engine could be attached either ahead or behind, thus at the end of a run the engine would be detached and driven around the roller for the reverse journey. At 15 tons the roller was too big for Aveling's foundry and so was cast at Erith in Kent. The engine and roller were sold to Easton, Amos & Anderson who used it to roll the avenues in the park at Belvedere, Erith.

While watching the engine at work, Thomas Aveling is again reputed to have noted that the compaction achieved by the wheels of the towing engine was as great as that by the huge roller, the important observation that a smaller weight acting on a smaller area does as much compacting as a larger weight on a larger area.

At this time Richard Thomas Porter joined Aveling to make the legend 'Aveling and Porter', the partnership being formed in 1862. Mr. Porter brought capital into the company and was primarily concerned with marketing and promotion; he was based at the London office in Cannon Street and was not believed to be involved in the design and construction of the engines which remained the preserve of Thomas Aveling.

Hyde Park roller

In consequence of his observations, Aveling's next roller, built in 1866, was an engine fitted with rollers rather than traction engine wheels, the rollers being 7ft. 6in. diameter by 2ft. 6in. wide. Power was provided by a single-cylinder of 11in. bore by 14in. stroke rated at 12nhp. According to one source, this roller had a total weight of 20 tons while another source records 30 tons; readers may take their pick! Regrettably, no pictures of this roller seem to have survived, but an engraving is reproduced here in **photo 1**. Note that the four wheels were at the corners, resulting in a strip of road in the middle remaining uncompacted. A report in *The Engineer* records that the engine was sold to the London Commissioner of Works and used in Hyde Park and Park Lane.

Incredibly, there is a chance that the 1866 'Hyde Park' roller has in fact survived. A few years ago an extremely rusty boiler/cylinder/motion/flywheel of a very early engine was discovered 180ft. down in a disused Victoria Colliery, at Brown Lees, near Stoke on Trent in Staffordshire. Conjecture was that it was the remains of the 'Hyde Park' engine but since the condition was very poor, verification is difficult. I understand the hulk to be in private ownership for assessment and possible rebuilding. I would certainly like to hear from any reader who can clarify the situation.

Some early Aveling & Porter rollers were fitted with a compound cylinder with slide valves over head not unlike the Fowler arrangement. This engine is Works No. 5308 of March 1903 of 5nhp weighing 10 tons.

Weighing 17 tons, one of the largest preserved rollers is Works No. 6340 of July 1907. Called Big Bertha *the engine is rated at 9nhp. The cylinder is on the right-hand side, a very unusual configuration.*

This pretty little roller White Heather *was exported to Italy and has now been repatriated. Works No. 8766 of August 1916 she weighs in at 8 tons.*

A type 'O' 'Quick Reverse' tandem roller, Works No. 10245 completed in March 1922. The roller had power steering, note the driver's seat above and to the right of the steering wheel. The steam reversing engine may just be seen behind the reversing lever.

Another tandem roller, this time in model form. This beautiful 3in. scale single-cylinder roller was built by Ray Newman and runs as well as it looks.

A 10 ton Aveling Barford roller Works No. AC605 of July 1937.

Liverpool rollers

Aveling's evaluation, and that of the engineering press, of the Hyde Park roller was very positive but, rather than capitalise on the design, Aveling effectively shelved it and built the first of the 'Liverpool rollers' in 1867. The first, as might be guessed, was sold to the Liverpool Authorities and other orders came in quite quickly from metropolitan authorities all over the country including Darlington, the London Borough of Islington, Leeds, Maidstone, and Sheffield. The 'Liverpool rollers' were each recorded as weighing 22 or 24 tons depending on the source. The rolls were 7ft 6in. diameter by 2ft. 6in. wide. The rollers had two back wheels and two steerable front rolls adjacent to each other which together were wide enough to roll the strip of road not reached by the two rear rolls. The steerable rollers were held in a large frame which could be rotated by a chain and sprocket mechanism operated by a large ship's type wheel.

The Liverpool City surveyor noted that the running costs were £1 a day, and not only did he have much better roads but once so prepared these roads were subsequently cheaper to maintain and clean. Thomas Aveling soon had as many orders as he could cope with, orders from both home and abroad. In 1869 he sent the first steam roller to America, the customer being the Chief Engineer responsible for Brooklyn and Central Park, New York. This engine worked night and day in Prospect Park for two months after which the Chief Engineer furnished Aveling with the following testimonial *"One day's work at a cost of ten dollars, gives the same result as two days rolling with the old seven ton roller, pulled by eight horses at a total cost of forty dollars."* The Aveling reputation as a master builder of steam rollers was thus established, a reputation which was retained throughout the steam era.

In 1871 Aveling fitted conical split rollers onto an axle which was canted downwards each side of a substantial central pin; when fitted the gap was sufficient for the central pin to pass through. This arrangement was used until 1879 and an example is shown in **photo 4.** An engine of this class won the Order of Franz Joseph as the best exhibit at the Vienna Universal Exhibition of 1873. However, this design was not suited to the new asphalt being imported from Lake Trinidad and a new design was needed. The now universally accepted pair of cylindrical rollers held in a fork was devised and all future production was thus equipped and proved very successful.

A large number of older machines equipped with the conical roller were returned to Aveling and fitted with these new rolls. A number of other awards were also won including a Gold Medal at the Paris Universal Exhibition in 1878 (and the Order of the Legion of Honour) and another Gold Medal at the French Exhibition at Melun in 1880. The publicity was, of course, excellent and the already full order books expanded yet further.

No differential

By the turn of the century, the routine features of a solid flywheel, chain steering and motion covers were established. Additionally, the rear rolls were made slightly tapered, being smaller in diameter on the inside so as a pair they conformed to the camber on the road. The inside diameter of the back wheel was usually 3/4in. less than that of the outside. Most rollers were not fitted with a differential, the drive being to one back wheel only. The choice of which back wheel would depend on which wheel had the driving pin in; on a sharp corner the outside wheel which travelled the furthest would be driven. On soft ground, or when scarifying, both driving pins could be inserted thus locking the back axle.

It is worth remembering that if the back axle is locked, when cornering one wheel will be trying to travel further than the other and a considerable torsional force will result in the back axle. I well remember a few years ago an individual who, in order to leave a wet rally field for a trip to the local hostelry, put both drive pins in. Unfortunately though, when parked on a hard standing he failed to remember to take one out again. All went well until he was ready to leave, did a tight three-point turn and pulled up large sections of the tarmac surfaced car park!

Some engines were built as convertibles being supplied with a set of rollers and a set of traction engine wheels. Most convertibles were fitted with a differential.

Tandem roller

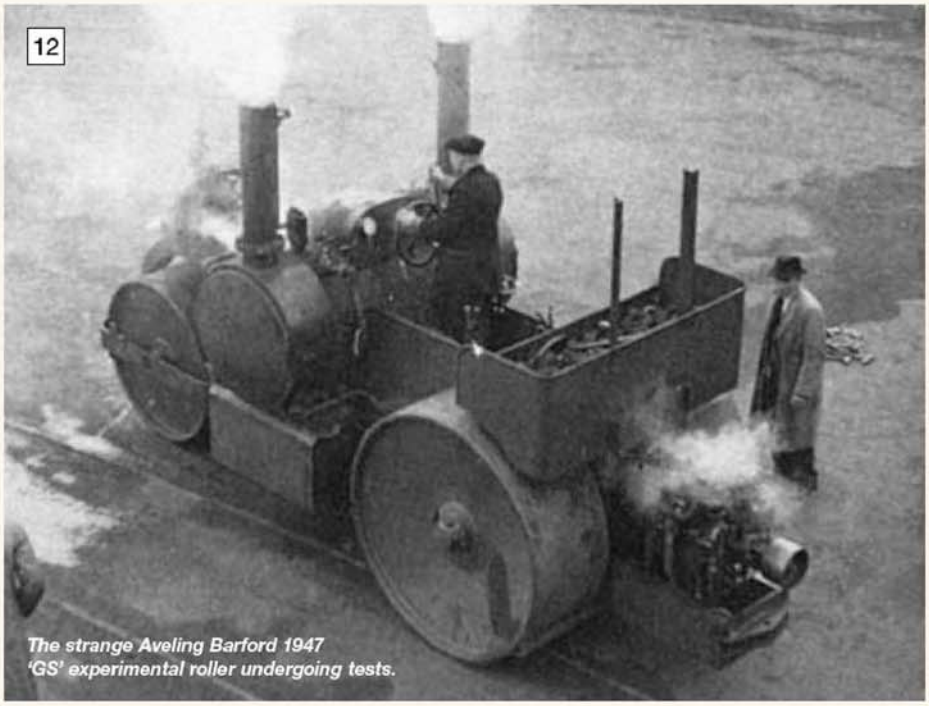
These interesting variants, sometimes called 'coffee pots' in view of the centrally located vertical boiler, with full width rolls both front and back, were developed for rolling hot asphalt. Bituminous surfaces need a quick reverse facility as the time it took for a heavy flywheel to come to rest and accelerate in the other direction was long enough for the roller to sink into the asphalt and leave marks.

These rollers were fitted with duplex cylinders of equal size to give instant reversing and had no flywheel. In 1911 Aveling & Porter introduced their side mounted tandem engine which was directly geared to the back roll via bevels, again with no flywheel, in the interests of rapid reversing.

A.G.E. and Aveling & Barford

To complete the roller picture, a brief mention of A.G.E. (Agricultural and General Engineers) and Aveling & Barford is appropriate as many rollers were built by both at the Rochester works.

Aveling & Porter were one of the earliest members of A.G.E. which it was hoped would restore the fortunes of a raft of engineering companies post-WW1. The theory was that the other constituent members were not supposed to build steam rollers allowing Aveling to concentrate production, by the same token, Garretts built steam wagons and Burrell traction engines. Further details of A.G.E. will be included next time, for the moment it is enough to say that it did not restore Aveling & Porter fortunes and when A.G.E. collapsed Aveling & Barford was formed. An Aveling Barford roller is illustrated in **photo 11**.



The strange Aveling Barford 1947 'GS' experimental roller undergoing tests.

Perhaps the oddest roller with the Aveling name was the strange 'GS' experimental model of 1947. This came about from an enquiry seeking to buy a number steam rollers and diesel rollers co-designed in such a way that as many parts as possible could be shared between them, thus minimising the number of spare parts that would need to be held in stock. In the event, an order was placed for a set of standard diesel rollers and a set of conventional steam rollers so production never got under way.

An Aveling & Porter engine which might get the prize for longest service was a roller sold to the Oslo Municipal Road Department in Norway, in 1878. The engine finally retired in 1960 after no less than 82 years work. Quite correctly the occasion was celebrated with a guard of honour from the Highways Department, and a brass band accompanied it all the way to the Oslo Science Museum where it now resides.

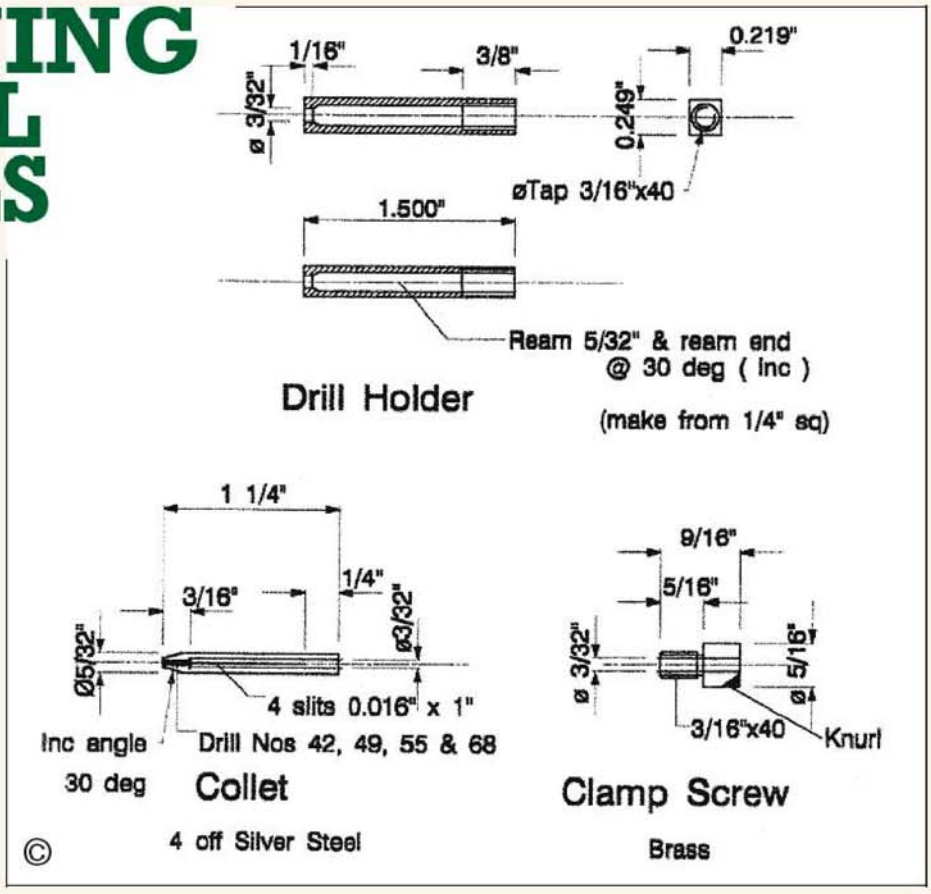
●*To be continued.*

SHARPENING SMALL DRILLS

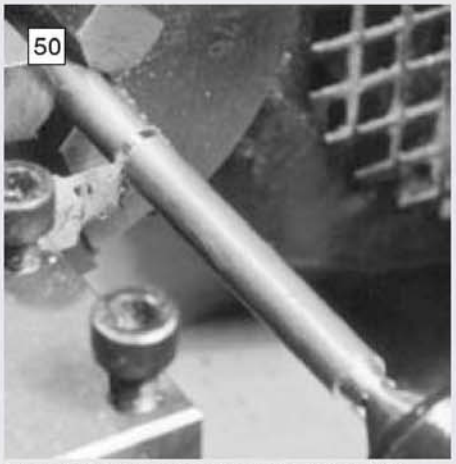
D. A. G. Brown
adjusts his original design to accommodate material currently available from suppliers.

Readers will recall the drill sharpening jig for drills in the range No. 80 to 42 (0.3 to 2.4mm) which was first described in these pages in 1994 and repeated in May 2000. Many hundreds of the devices have been built, as witnessed by the numbers of diamond plates purchased from the suppliers in Geddington, Northamptonshire.

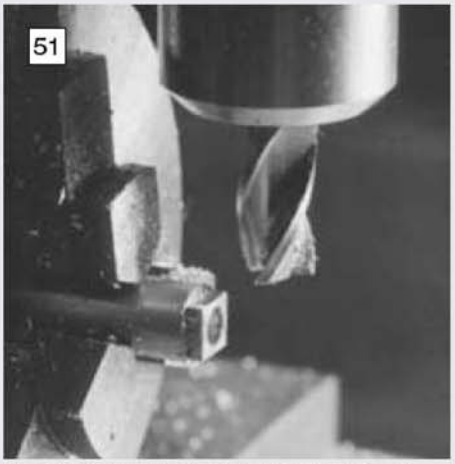
It has been reported to me that the 9/64in. dia. silver-steel originally specified is now virtually extinct, making the collets even more difficult to machine. In a re-think of the design I have made use of 5/32in. dia. material which means altering the screw threads to accommodate the change. The accompanying drawings are, I hope, self-explanatory, if read in conjunction with the original article.



The Author's clock, illustrated here to remind builders of its attractive and unusual style.



The minute wheel pipe is parted off to length.



A square is required to drive the minute hand.

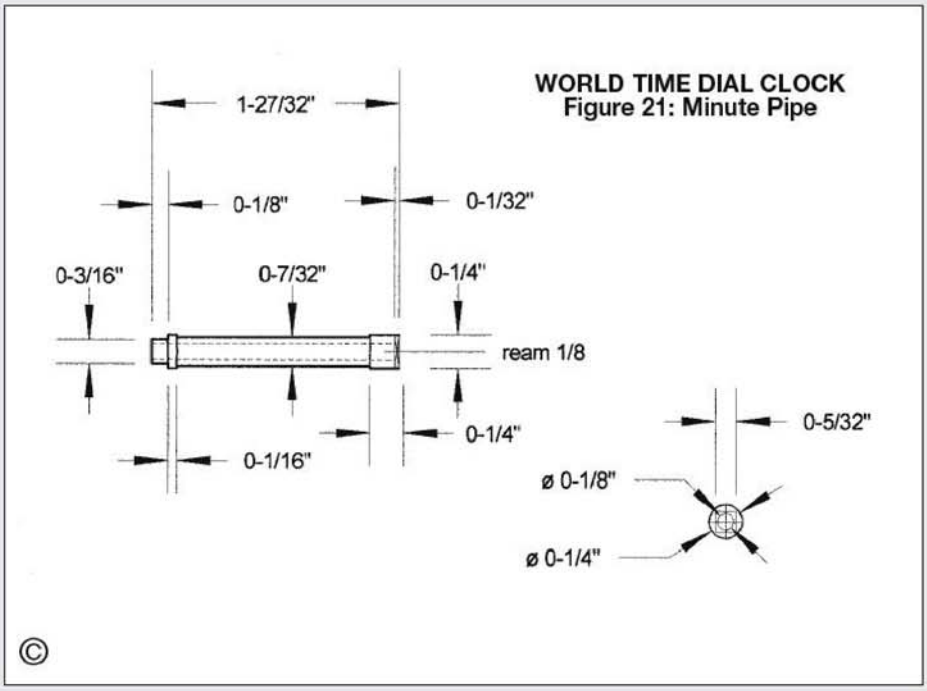
WORLD TIME DIAL CLOCK

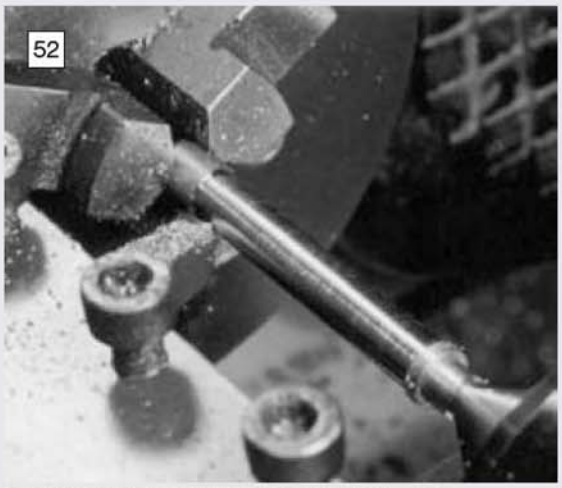
Ian Beilby

continues work on his clock with construction of the minute wheel pipe and the hour wheel collet.

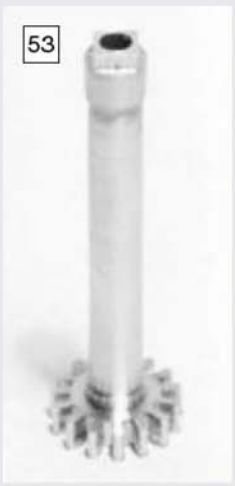
●*Part VII continued from page 393 (M.E. 4218, 2 April 2004)*

A suitable length of 1/4in. brass is held in the 3-jaw chuck and the 3/16in. wheel seating turned. Without disturbing the work, the stock is then centred, drilled and reamed 1/8in. at the same setting (**fig 21**). The pipe is then parted off 1 27/32in. long (**photo 50**). The 5/32in. A/F x 1/32in. long square is then milled (**photo 51**). The pipe is then returned to the lathe and, using tailstock support, its central portion is reduced to 7/32in. diameter (**photo 52**). The 15 tooth minute wheel can then be secured to the pipe with Loctite and, when fitted onto the minute wheel stud, the two minute wheels should be found to mesh correctly (**photo 53**).

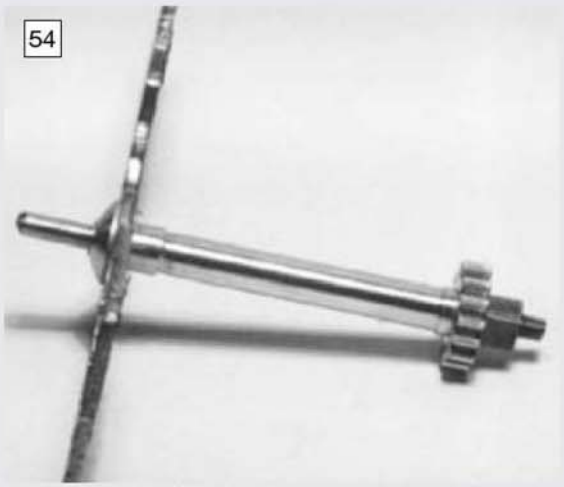




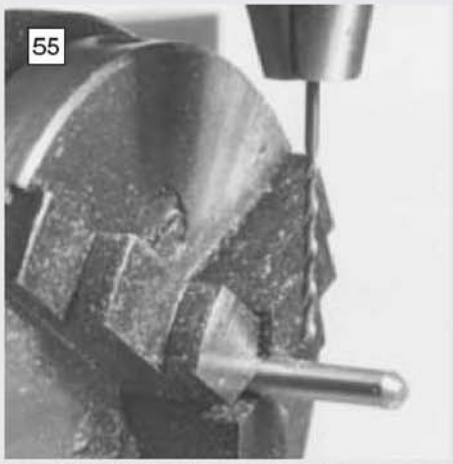
Careful work is required to waist the minute pipe.



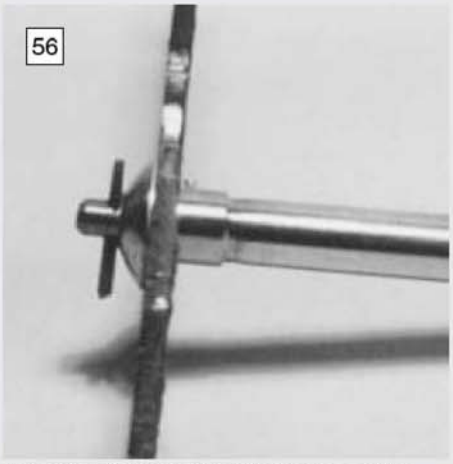
Minute wheel and pipe.



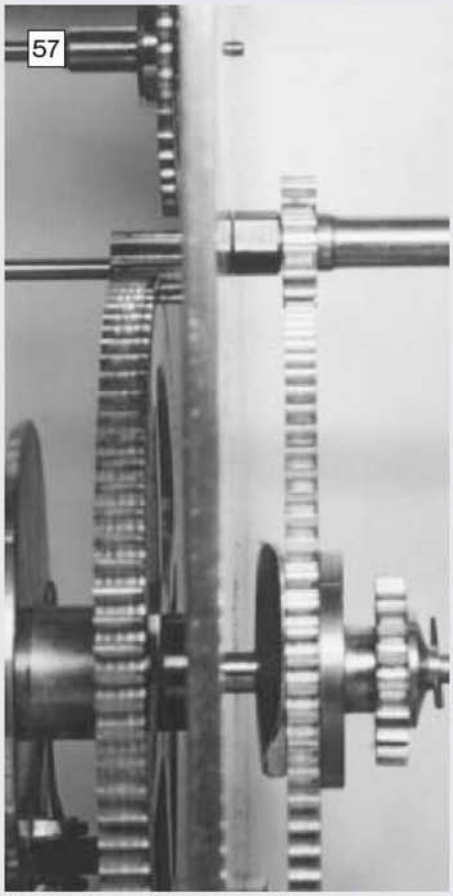
A domed head hand collet is fitted and adjusted.



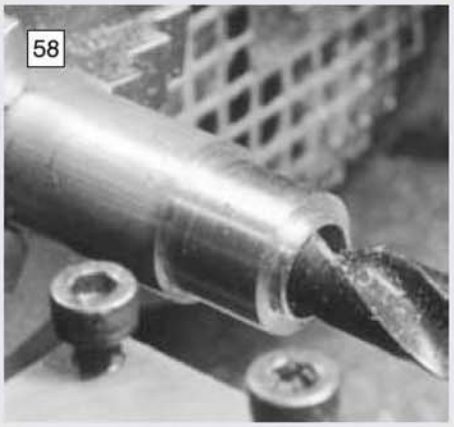
The minute wheel stud is cross drilled.



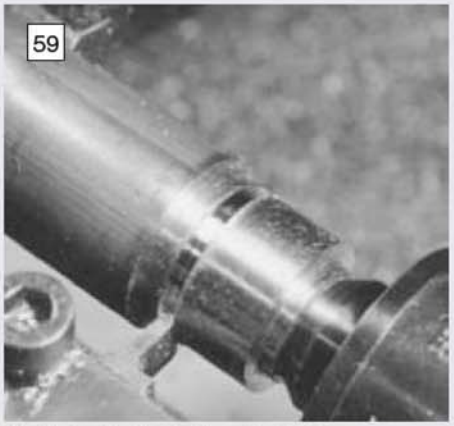
A tapered clock pin is used for final assembly.



The wheels must be correctly aligned.



The hour wheel collet is drilled to 7/16in. diameter.



The hour wheel collet is cut to length.

A dummy 1/32in. thick minute hand should be fitted onto the minute pipe square, followed by a 1/2in. diameter x 1/8in. domed hand collet (**photo 54**). A screw head-slotting file should then be used to mark the position of the cross-hole, which can then be drilled in the minute wheel stud (**photo 55**). The components should be held comfortably in place by means of a tapered clock pin. If the assembly is too tight the back of the hand collet can be filed, if too slack, a thicker hand collet will have to be fitted (**photo 56**).

With the minute wheel pipe and stud in place on the front plate and the reverse minute/hour wheels and bow spring fitted to the great arbor, the two minute wheels should be found to align correctly. If the wheels are not in alignment the bow spring and retaining collet on the great arbor should be adjusted until they are (**photo 57**).

As previously mentioned, the bow spring should provide sufficient tension to drive the motion work and is designed here to slip on the centre of the great arbor, not on the back of the wheel. If the depthing of the wheels is correct and the spring is made from the correct gauge of brass, the latter should be found to be strong enough to work correctly and the wheels align properly.

It may be found an advantage to file a small groove in the front of the retaining collet to accommodate the cross pin and provide a more positive drive to the assembly.

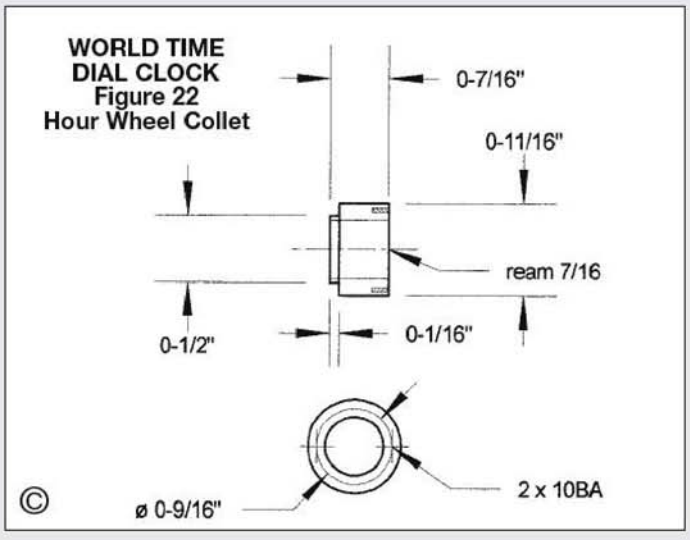
Hour wheel collet

This component is machined from 3/4in. brass rod (**fig 22**). A suitable length of this stock is held in the 3-jaw chuck and the work faced and reduced to 11/16in. diameter. The 1/2in. dia. x 1/16in. wheel seating can then be turned and, at the same setting, the work is centred and drilled out to 7/16in. dia. (**photo 58**). The collet can then be parted off 7/16in. long (**photo 59**). The hour wheel is then secured to the collet with Loctite (**photo 60**).

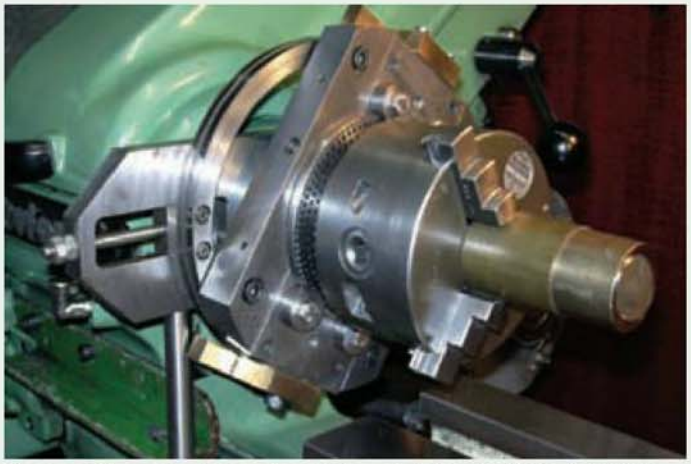
The hour arm is attached to the front of the collet with two 10BA screws drilled 9/16in. diameter. It is better to drill and tap these holes later, after the hour arm has been made so that it can be used as a drilling jig.

In the next part of this series we will make the bridge and the hour arm pointer.

●*To be continued.*



The hour wheel is secured to its collet using Loctite.



The versatile ornamental turning chuck mounted on the Author's Myford Series 7 lathe complete with elliptical work piece.

Rear view of the chuck showing some of the features referred to in the text. Note the support post for the slideway assembly.

A CLOSE ENCOUNTER WITH E.T.

Ron Wallman

in France, reveals some secrets of a devious mind concerning elliptical turning.

●*Part II continued from page 394 M.E. 4218, 2 April 2004)*

Following the publication of Part I in *M.E.* 4218, 2 April 2004, I would now like all of you who thought it was an April Fool joke to eat humble pie and stand me a pint when I turn up. With the co-operation of our Editor, a modicum of devilment on my part, careful timing, absence of photographs and a somewhat zany approach, Part I of this short series was designed to mislead. The photograph in part I has nothing to do with elliptical turning but illustrates my interest in machining techniques. In this case I simulated a geometric chuck which can be done as per the example, but the amount of equipment necessary would put most people off. At this juncture, I also suggest that a certain amount of humour is necessary in the pursuance of our hobby, for it is potentially hazardous and precious work pieces can be so easily destroyed. But for humour, interest in our pastime can die along with the lost parts.

In the same way that tools obtained to make life easy tend to kill enthusiasm, my interest in the elliptical chuck about to be described died for me when I got it to work. The tenet is that if even a fool can use it, then only a fool will want to use it. I present here photographs of a device made principally to determine whether my ideas concerning elliptical turning would work; it has also served for other purposes.

No drawings are presented here as the actual sizes used were dictated by available materials and my thoughts while building the device. The photographs should provide a reasonably skilled potential builder with all he needs to know. I have made notes of general sizes and observations and have used the specifications 'steel' and 'brass' with no further indication, because I do not know exactly what metals I got from the scrap yard. Generally, 'steel' means a grade of mild steel. All dimensions are in millimetres and are determined by tape measurement of the finished sizes. Any drawings which I might prepare would be to abridged industrial standards and possibly considered too 'proper' for amateurs! (Really?)

My photographs show the set-up complete with a brass oddment which I started to face, thus showing the elliptical trace. Another shows the set up with the 3-jaw chuck removed. A photograph from the back taken in daylight shows how rough the job is. It had just been used for turning, so swarf is visible. I separated the slideway assembly and photographed this from the back, having made no attempt to clean it up. This is how it is, mucky and in working condition. It may be worth noting that had I cleaned up all the surfaces to a beautiful gleam, important features would not be shown very well. Reflections from a photographich flashgun make the job look okay, but the daylight shots show a very different aspect. This is particularly true of the view showing the slideway partly dismantled. On the other hand, some more practical readers may enjoy seeing it this way.

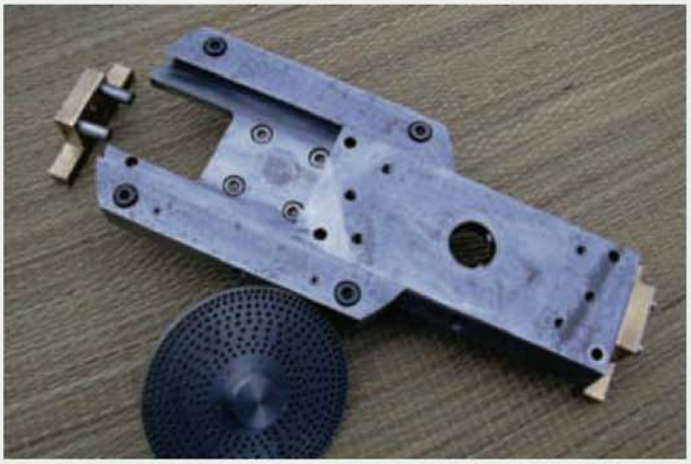
The ring was a disc off-cut resulting from a reference cut on an automatic power saw. It is 168/148 dia. x 12mm with a 1 x 1mm oil groove. I think that a smaller ring could be useful as the eccentricity setting does not have to be very much on small jobs. The oil groove tends to let oil dribble to the ring bottom and is convenient to feed oil into from the top. I milk ostensibly empty motor oil cans for this. The ring is clamped to two T-pieces by means of twin M4 socket screws. These are released when the M6 thread is used to assist in setting up the ring position. An M6 thread has a 1mm pitch, thus facilitating setting. The overall sizes of these T-pieces are 27 x 26mm and they fit a slot 22mm wide. Note that the ring does not rotate.

The frame is 240 x 75 x 12.5mm steel and features a 12mm dia. anti-rotation post held to an angle iron oddment bolted to the quick change gearbox tappings on the lathe, all by M6 threads. This frame is fitted with a very slender bronze bush which rides on the spindle mounting which is actually 51/47 x 8mm and was won from an old bronze bush. The entire device is supported by this and the post alone. An important advantage is that conversion from conventional turning to elliptical work for demonstration purposes takes less than 90 seconds. My collet chuck tapping is occupied by a bull wheel (60 teeth) detent giving 120 divisions. It is not appropriate to comment on the access cut-out made for the barrel nut screw wrench before I cut the T-slots. The T-slots made this redundant. Note that the T-ways allow the ring to be offset only towards the operator, and that the spindle mounting is not in the middle.

The chuck is fitted with an index plate to allow the work to be rotated in discrete steps and patterns built up. The detent mechanism is not shown.

The spindle fitting is a steel billet with a plate machined to 9mm thickness. This has two cut-outs to allow the rubbing strips or jaws passage, giving an 'H' appearance. It is bolted to the spindle fitting which is retained to the frame by a slender split barrel nut closed by an M3 socket screw. The slideway is 180

Partially dismantled chuck. Note that no attempt has been made to over-finish the various parts.



Partially dismantled slide and secondary nose. Note that the locking tongues have been pushed forward for the benefit of the camera.

(with cutaways) x 115 x 21mm thick, assembled. The dovetail slide is serviced by two cheek pieces 0.5mm less thick. One is located by rollpins and M6 socket screws, the other has two chambers which house posts let into the plate. These 10mm dia. posts have an M3 grub screw which pushes the slideway onto the slide, allowing adjustment before tightening the M6 socket screws. Note the access holes visible in the photographs.

The nose is mounted via a 25mm dovetailed spigot which fits into the slide in the same way that a lathe top-slide fits a cross-slide. The small spigot size is determined by a spare division plate and the fact that the 6.5mm dia. locking tongues pushed by M8 grub screws must not be able to crab. If they are not long enough they will lock making it practically impossible to extract the spigot. Note the access holes for the grub screws. The division plate is fitted with four M3 countersunk screws. There are four M6 fitted clamps which act as additional security and can also hold a Tympan chuck (paper pad). The nose can be indexed but I have not mounted the detent in these views. The detent is used when the slideway is locked and the chuck is adapted for use as an eccentric chuck.

The two brass rubbing strips or jaws are 10 thick x 78mm long and I left mine over depth at 35 millimetres. The centre is 36mm wide and the T-like feet are 10mm deep. One is retained by two M4 socket screws. The other has two 8mm dia. bars and a central M6 socket screw. There is a Belleville spring washer but I confess to being unsure as to how effective this is. This sub-assembly can be adjusted to the ring. I used brass because I had some, and the surface speeds at this point are the fastest on the entire device. I do not like the idea of parts rotating and slipping at the same time but failed to find a simple solution. The brass shows signs of wear, but I am not bothered to resurface yet.

Slideway adjustment and the tightness of the rubbing strips or jaws entrapping the ring, permits variation in stiffness. The device will just about rotate if the lathe drive belts are pulled in 'belt drive only' mode. Usually, I use back gear for turning with this device. Theoretically, motion should be nice and smooth with no variation in stiffness. When using hand pressure, mine is not, but no problems are evident when the device is used under power. Easing off results in play and spurious machining patterns. The slide assembly will fall out under its own weight. There is usually a pattern anyway in the elliptical surface that I simply dress out with an abrasive. I suspect the originals did this as well but wood does not show the pattern as prominently as metals.

Using this device is simple 'turnery' with the exception that all tailstock centre based tools and supports such as steadies cannot be used. With parts which could snag and eccentric running, the motion is a bit disconcerting. You need to turn slowly and keep a keen watch for potential dangers. If there is interest, I can illustrate these processes, how to set up eccentric work and an upright or dome chuck simulation — I have a practical use for this device that may be of interest to model engineers.

●*To be continued.*

WIMBORNE SME A PROFILE

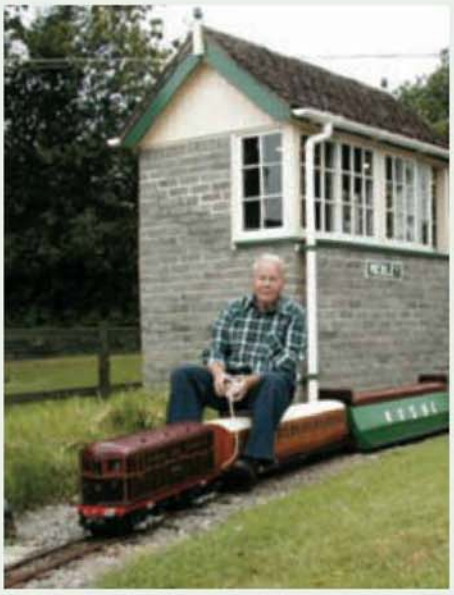
Eric Basire
reveals how he gets his regular 'fix' at a small society in sunny Dorset.

In September 2000 my wife Rita and I moved to West Moors in Dorset. Once we were settled in our new bungalow I began to really miss my former contacts with the Harrow & Wembley Society of Model Engineers. The lack of my regular 'fix' was something I had to remedy as soon as possible. My copy of the Southern Federation list of clubs revealed three in the area: Bournemouth DSME, Luscombe Valley Railway and Wimborne SME. Bournemouth was in the middle of a change of venue. Luscombe, a superb 5in. gauge private garden railway, was basically open for limited evening running and one or two charity days. Wimborne turned out to be the nearest with a splendid 5in. ground level track in the grounds of Cobham Sports Club in Merley.

All my previous experience in Harrow had been with a ground level system following full-size railway practice, and Bournemouth was engaged in building a raised track. I therefore decided that Wimborne had the edge and so I joined a select band of enthusiastic engineers who were, and still are, remarkably active. The Society had just gone through a major upheaval leaving just 20 members to carry the club forward. The main aim of those left in control was to manage the group in an informal, safe and effective way. Any future changes would be made with the consensus of all members. Their intentions appealed to me. The changes were put into practice and, thus far, have proven to be a success. Today the club has some 33 members and the developments to improve the existing railway are moving ahead rapidly; more of that later. First I would like to set the scene.

Foundations

In 1975 a local group of model engineers was looking for somewhere to build a miniature railway. The local Council wasn't interested, but the group managed to persuade Cobham Sports and Social Club to allow them to rent a small area of their grounds on which they could build. Cobhams, a



Author Eric Basire takes an empty stock train past the Merley signal box.

Two's Trouble: Eric Basire and John Ilott wait for a green.

Exit routes from the station and steaming bays.

Wimborne Company of world renown for its innovative flight refuelling systems, agreed but specified that Wimborne SME members had to join their sports and social club. The band of engineers started with a simple ground level track of 3½ and 5in. gauges which over the years gradually developed into a compact yet interesting railway. Work currently in progress has the aim of allowing more effective use of the track during the Sunday passenger running.

Features

Over many years, the numerous skills of different active groups have produced a number of interesting features. The prime example is the working signal box using redundant bricks from BR Poole Station when it was rebuilt. The Club Hut/Station was constructed from the timbers of an old platelayer's hut formerly at Wareham Station. The materials for both projects were acquired by means of a donation to a railway charity.

The station footbridge, which spans three tracks providing safe access to the picnic area, uses a number of old telegraph poles. The tunnel was built using large diameter pipe sections cut by a helpful supplier to fit a curve in the corner of the site.

Perhaps the most interesting feature is the new twin tunnel for carriage storage. Not interesting because of its design or use, but in the curious shape of the bore. Members looked for pipe sections similar to those used for the main tunnel where two sidings could be provided. These were far too expensive. Instead, the club was offered a number of curious 'egg-shaped' pipe sections making a tube into which a single line could be laid. These strange pipes were constructed to repair a Victorian sewer in Ireland. The pipes were delivered but it was discovered that the original dimensions supplied were an inch too big, making them useless. The makers were keen to clear them from their yard, so the club managed to obtain a good deal. A minor disadvantage is the need to make sure carriages are securely linked when shunted into store. If not, a junior member has to crawl in to retrieve any loose vehicle.

A culvert was dug so a bridge could be added. With the generosity of a local farmer, the railway was extended through a small wood which provides another area of interest. The recent addition of a 'disused' station just before the line crosses the bridge, is a delightful feature.

The steaming bays provide easy transfer of locomotives from car and trailer. All bays lead to a turntable which has a number of short storage spurs and an access route to the main track. Coal and 12V DC are on hand.

Fortunately, the society has maintained friendly contacts with the local full-size railways. As a result, old equipment has been lovingly refurbished and is in use again at Merley. Two very large concrete station signs 'Corfe Mullen Halt' and 'Charlton Marshall' from the old Somerset & Dorset Railway are on display.

Andrew Farmer's train exits the tunnel.

The main line winds through woodland.

At some time, all clubs experience the sad loss of older members. This has happened twice recently and one family donated some lengths of small scale track which had been intended for a garden railway. In addition to all the other tasks in hand, members are constructing a short section of raised track for smaller gauge locomotives unable to operate at ground level.

Track

The track is constructed of 12mm square section rail welded onto sleepers of flat steel plates, producing a sturdy structure capable of taking hard wear. The lines are laid a trough of miniature ballast held in place by a heavy plastic lining. The sections of track are joined by stainless steel rods fixed into holes drilled in the end of each rail. At short intervals along the track large blocks of hardwood are screwed to a sleeper to provide anchorage in the ballast. The minimum radius is 35 feet.

Points are constructed using the same materials. Spring loaded trailing, and power operated facing points exist all over the layout. All facing powered points are linked to signals operated from the signal box. They are moved by old 12V windscreen motors.

Signalling

The signal box stands in the corner of the site giving the signal staff a clear view of the station departure platform, the steaming bays and exit line, all three parallel tracks running down under the main gantry, the level crossing, and most of the inner circuit of the railway.

The main duty of the signalman is to control the departure of trains from the station. There is a problem of conflict because the route crosses the inner circuit to gain access to the outer main line. This, and any other potentially dangerous situations, are protected with interlocking signals and points. Control over the number of trains on the main line is essential. More than two trains results in backing up and red signals. Signal staff will therefore only allow a train to depart once a main line driver has diverted into the inner circuit. The actual diversion is driver operated and the action is monitored by audible and visual indications in the signal box.

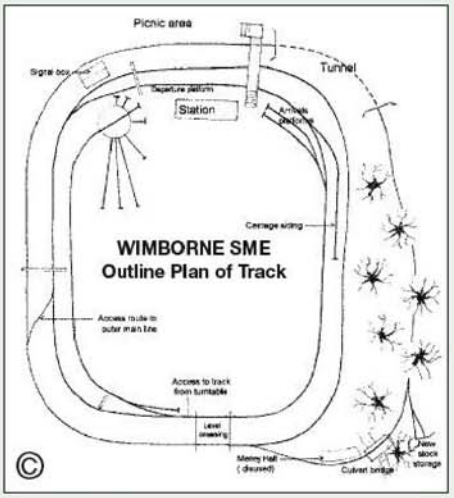
The outer main line is automatically block protected, but it can be operated manually. However, during busy passenger running this automatic system is always used allowing signal staff to concentrate on control of the two inner circuits which are effectively a spiral ending up in the station.

Signal operators also have to keep an eye on car movements, on and off the site, by controlling the lifting barrier on the level crossing. This has to be accomplished with minimal disruption to the train services. Lifting of the barrier puts all the nearby signals to red and turns on a bright flashing orange warning light.

Signals are mainly of the miniature semaphore type operated by solenoids, with a few colour aspect lights. Ground shunting signals also operate in conjunction with power points. There are two main gantries, one spanning the track at the exit from the station, and another over the first straight down the side of the site. A track circuit diagram repeats every signal aspect and indicates occupied block sections. All movements and information are controlled by powerful magnets on every truck and carriage as they pass over reed switches along the line.

The popular picnic area nearby the station.

Peter Tier approaches the level crossing with a full train.



Chairman Alan Lovell emerges from the woods.

Passenger services

The easiest way to provide a flavour of this Dorset gem is to describe the first run of a driver's Sunday tour of duty. Preparations begin on the steaming bay with either a live steam or an electric 'diesel' outline locomotive. When ready for the off, a call to the nearby signal box gets clearance to move from the turntable and down the service line to the shunting signal on the gantry. If there is any delay (tea being consumed by the signalman) there is a trackside bell push to send a reminder.

Once the clear road is given, trains proceed down a gentle gradient parallel to two running lines on the right. The service line enters the inner track just before the level crossing which allows public vehicle access to the club ground. Following the inner line the gradient climbs back up to the arrival platforms of Merley Park station. A branch off to the left divides into two 'terminus' platforms for 'tired' locomotives or drivers. This is a refuge for lunch and tea breaks.

Halfway along the main arrivals platform, a spring reverse point provides access to the carriage sidings. Backing up into the siding, an appropriate number of coaches are attached and pulled into the platform. At the far end of this platform there is a water tower. When the way is clear, trains pass under the station footbridge to the departure platform. While other members attempt to load the children and their parents the driver attends to the fire while keeping an eye on the gantry for a green.

With shouts of *"Keep your feet up. Don't lean out please"* the train moves under the gantry, down past the turntable and signal box to a second gantry and, if clear, out right onto the main line. The track bears left and approaches the level crossing. Ahead the junction signal indicates the route is set to the right, leading to the outer woodland section. Snaking round a disused platform 'Merley Park Halt' the track swings left over a bridge crossing a small culvert and then dives under the trees. Soon reaching the trailing junction which leads back into the new carriage sheds the rails twist and turn along a shallow cutting. Emerging at the end of the wood there is a 'whistle' sign for the tunnel. This feature is on a curve and many children like to shout and scream in the dark so drivers are always ready to cover their ears!

As the trains shoots out of the tunnel it passes immediately under the station footbridge to run in a cutting alongside the picnic area. This is a favourite spot for photographers — and parents waving to their little ones! The line sweeps round left behind the signal box and the train gathers speed down the straight to run under the main gantry. From here the next outer circuit is a repeat of the first out through the wood and tunnel.

Passing under the gantry for the second time drivers have to prepare for the hand operated button as they round the next bend. A sharp tap is administered, followed by a quick look ahead to the dividing junction on the far side of the level crossing. The points change and the signals now show the way is set to the left. The train swings into the first inner line passing along the side of the wood. In the distance the tunnel entrance appears but the rails divert to the left into a deep cutting, under the footbridge again and through the station on a passing line. Just past the station gantry, our rails merge with the platform departure route for a short distance but we keep to the inner track. This leads right round the site to reach the arrival platform. Our happy passengers hop off with a polite *"Thank you."* Some linger to peer into the cab. In all, nearly half a mile has been covered and, with a quick fill of water from the tower, the train edges into the departure platform for a new load of passengers.

Activities and timetables

The Wimborne Society has a good programme of club events. Passenger service running is from 10.30am to 4.00pm every first and third Sunday during the summer months — weather permitting. This service relies heavily on individual members turning up with their locomotives. The club is fortunate because so many members are enthusiastic and willing to volunteer.

Once a month, usually on the last Thursday, an evening event is organised. During the winter months these are indoors, but with summer we have barbecues, driving competitions or local visits (i.e. to Swanage Railway Works, local museums, etc.)

Summer is the time to enjoy the fruits of the off-season labours. The 2003/4 winter has been very busy with major alterations. The whole railway is being re-signalled with changes designed to improve accessibility to the main line, and track layouts modified to give easier access from the turntable to the running lines. All these changes are reflected in the information provided in this article. Members are looking forward to an exciting season.

Visitors

The society welcomes visitors. Our location is roughly 8 miles from both Bournemouth and Poole so the club is in a great position for holiday makers in this part of Dorset. Passenger rides are free, though donations are welcomed. Members are enthusiastic about their hobby and are always willing to talk to interested visitors. A few inquisitive members of other model engineering clubs from all over the UK have tracked us down at Merley. If you plan to have a holiday, or intend to visit the area, we would be pleased to see you. Non-members are also welcome to most of our club events details of which should appear in the *Model Engineer Club Diary*. If you need advice on how to find the Wimborne Society you can contact me, Eric Basire, on 01202-897158

My 'fix'

I seem to have found a solution in Dorset. In addition to the success of finding the Wimborne Club I was pleased to give an evening talk to the Bournemouth Society. Luscombe Valley Railway owner, Richard Knott and his happy band of members have encouraged me to join them for many warm summer evening runs. I am also busy building my own 'Everglades Garden Railway.' What a superb hobby this is!

Some examples of full size fusible plugs. Those to the rear appear to have seen service in a boiler.

The firebox from a 7¼in. gauge model locomotive which had managed to pass its hydraulic pressure test due to scale build up.

FUSIBLE PLUGS

Dick Billington

asks if fusible plugs are important safety features in model steam boilers, or simply 'idiot plugs'?

The fusible plug, in my experience, has not been considered to provide a significant contribution towards safety within the UK model steam world. In fact many model engineers consider them to be 'idiot plugs' for bad drivers. The UK steam-modelling scene is now rapidly changing with models becoming significantly larger. This, together with the effects of the introduction of the new European Union Pressure Equipment Directive as the UK Pressure Equipment Regulations (PER) should, in my opinion, create greater interest in the use of fusible plugs in models. I would therefore like to set down my experience with these plugs, relate this to the new PER size definitions for pressure vessels, present some suggestions and pose some questions for their future within UK steam model engineering.

Secondary safety feature

I first met the fusible plug during my apprenticeship when, in A3 Heat Engines, it was introduced as being a secondary safety feature for a pressurised steam generator (boiler). My notes of the time describe a fusible plug as a small device containing a relatively low melt (fusible) material, which is fitted into the boiler fire box crown of a steam powered vehicle (**fig 1**). If the water in the boiler is inadvertently allowed to run low and uncover the firebox crown, the material in the fusible plug is intended to melt and the small volume of escaping steam provide an audible indication of a problem before the crown overheats and collapses catastrophically. It should be understood that the failure of a fusible plug in full size boilers is not intended to put out the fire although it may have this effect in models. Fusible plugs were introduced as a safety feature in the late 1800s following a series of boiler explosions. Much of this historical information can be found in the book *Locomotive Boiler Explosions* (**ref 1**).

Fusible plugs were in use on British railways and road locomotives to the end of UK steam and are now used in preserved steam locomotives and traction engines. My conversations with most full size and model UK steam vehicle users as to the use of fusible plugs appears to be very polarised, respectively for and against. The use of fusible plugs was largely discontinued in the USA in the late 1930s due their unreliability in use. This was caused by a combination of rising fusible-material melting temperatures, increasing operating pressures and scale build-up while in service. Fusible plugs in US steam were replaced by technically more complex low water devices (see the *Locomotive Cyclopedia of American Practice,* **ref 2**).

Further evidence from full size practice, demonstrating that fusible plugs do not give a positive indication of low water level, can be seen from the two fatal accidents that occurred with the LMS Pacific locomotive *Princess Alexandra* in the 1940s. These are described in the book *6233 Duchess of Sutherland* (**ref 3**). During conversation with a full size locomotive boiler examiner, I was told that the fusible material in full size plugs also tended to 'weep in use'. That is, examination of the plug after use showed that the fusible material had often partially melted and resealed leaving a tear drop of metal mixed with scale which affected the melting temperature of the device.

As a matter of interest, all the references to fusible plugs in full size that I have seen refer specifically to plugs fitted to mobile steam boilers, i.e. locomotives and traction engines, and none to stationary steam plant. Does anyone know if it was the practice to fit fusible plugs to steam boilers for power generation or ships?

Scale

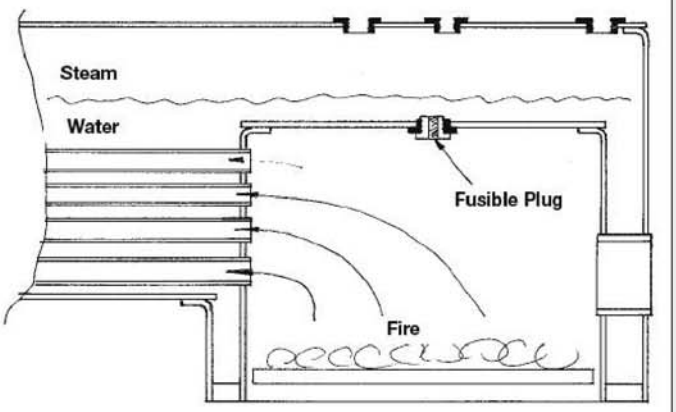
In the 1960s I used fusible plugs as part of a missile, boost-rocket, motor separation system. However, my first real meeting with a steam fusible plug happened at my club traction engine rally in the mid-1970s when a visitor arrived with what I remember to be a 3in. to the foot (1:4 scale) Burrell and asked if someone could repair its fusible plug. I was handed this filthy battered 'nut' about 5/16in. dia. with a small hole through the middle with the comment *"I've lost the rivet. Can you repair it?"*

I will not bore anyone with the comedy of errors that followed as I tried to accomplish this task using lead, but suffice to say that several scorched fingers later I ended up by making a replacement bronze plug and sealing the rivet in with Comsol. This is a high temperature soft solder as supplied by Reeves and others. This plug was installed into the traction engine, which ran at a pressure of 100psi, and as far as I know, is still there.

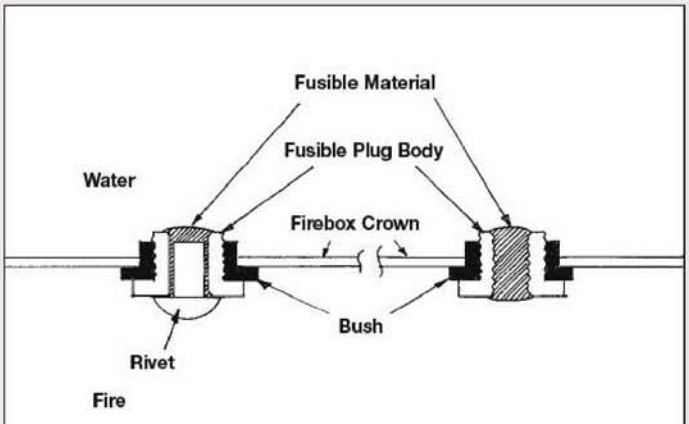
As a club boiler inspector I did not see another fusible plug until the mid 1990s when, as models started to become larger, especially with steel boilers, some had the facility to fit a fusible plug. At this time there was no requirement either to have fusible plugs fitted or to examine or test them. This is still the case and it is apparent that most owners replace them, if fitted, with a blanking plug. Outline drawings of fusible plugs for model use are given in **fig 2** and show plugs with and without a rivet. A photograph of some fusible plugs for large-scale model traction engines can be found in *M.E.* 3993, 19 May 1995 (**ref 4**).

Fusible plugs at full scale tend to be fairly large devices and some units for fitting to full-scale traction engines can be seen in **photo 1**. These fusible plugs were made by a firm local to me which has been in the business of the manufacture and repair of full size traction engines and their boilers for years. I learned from them the problems of using lead as a fusible material in that, when melted and poured into a bronze plug even with a flux, the lead is extremely reluctant to 'wet' and once cooled can just fall out. They have resolved this problem by machining a screw thread in the bore of the plug. The lead core is cast over length and then peened over. This ensures that not only will the lead core not fall out it, but also it is effectively sealed. This method works for model plugs. These full size plugs do not contain a 'rivet' and are examined and changed regularly.

One interesting fact that has come to light is that 'modern' lead sold for use by plumbers, at builders merchants today within the UK has proven to be of little use for fusible plugs and is, to me, an undefined alloy. The owner of the steam engine repair firm said that you must use pure lead that has a known melting point and he gets his from the local church roofs, legally I might add. This point, as to the purity of the lead used, has also been raised by the owner of a 4½in. to the foot (1:2.67 scale) Foden 'D' type wagon which runs at 140psi.



© Figure 1: Position of Fusible Plug in Boiler



© Figure 2: Model Fusible Plugs

The owner of the firm was a mine of information on fusible plugs and said that it was extremely important for them to be installed correctly. They must be both readily visible and accessible. It is also important that the top surface of the plug protrudes through into the water space. If it is lower, the scale that is formed will effectively seal the hole. He told me of an embarrassing experience when, after a fusible plug on a boiler had been removed for examination, the boiler then passed its hydrostatic test without the plug having been replaced. The hole for the fusible plug had been completely sealed by scale.

This problem with scale in a boiler was brought home to me when I was recently conducting a hydrostatic test on a 7¼in. gauge steel locomotive boiler. The owner was experiencing difficulty in making steam so we examined the boiler. Being covered in scale, the top of the crown did not look brilliant, but at twice working pressure there was no apparent leakage. It was only after having retired for a long cup of coffee did we noticed a very small wet patch appearing on the side of the firebox. After some discussion the decision was made to replace the firebox. On strip-down it was found that thumb pressure acting in the opposite direction to steam pressure could poke a large hole through the top of the firebox (**photo 2**). All that was effectively keeping the water in the boiler at 160psi, was scale.

Legislation

Within the Europe Union we now have comprehensive and co-ordinated requirements for pressure vessel design and construction. These are now part of UK law as the *Pressure Equipment Regulations* and the *Pressure Systems Safety Regulations.* These regulations were detailed in the article by Mike Leahy published in *M.E.* 4188, 7 February 2003 (**ref 5**) where the categorised sizes of the pressure vessels (boilers) that cover our models were given. In outline all 3½in. gauge and most 5in. gauge locomotives and the smaller traction engines fall into Category 1, especially where they run at below 100psi. Most 7¼in. gauge locos and most 4in. to the foot (1:3 scale) traction engines running at 100psi or lower fall into Category 2. The larger 7¼in. locomotives and the larger 4in. to the foot (1:3 scale) traction engines, especially where they run above 100psi, fall into Category 3. I believe all models above these gauges or scales will be Category 3 unless they are run at ridiculously low pressures. I am firmly of the opinion that the size categories as defined in PER should form a reference for all future model boiler work. **Table 1** below shows the approximate relationship between the PER boiler size categorisation and model scales and boiler sizes. Note that this is for generalised reference as model boilers can and do vary in size when made.

Professional model boilermakers within the EU have to follow defined rules that for the larger boilers require the use of auditors from external notified bodies to assess the design and construction before sale. The auditor from one notified body within UK has stated that fusible plugs are an essential safety feature and has insisted that his clients fit suitable bushes into the firebox crowns of all classes of the boilers they manufacture.

Table 1: Comparison - PER Boiler Size/Model Classification

PER Boiler Size	Model Size: Locomotive gauge and Traction Engine scale	Comments
Boilers of less than 0.5 Bar operating pressure (approx. 7.5psi)	Gauge 0/1	-
Boilers of capacity up to and including 2.0 litres. No upper pressure limit.	2½in. gauge	-
Category I Boiler. Above 2.0 litres capacity to 50 Bar.litres max.	3½in. gauge; 1:8 scale (1½in.); 1:4 scale (3in.)	32 bar maximum operating pressure
Category II Boiler. Above 50 Bar.litres to 200 Bar.litres max.	7¼in. gauge; 1:3 scale (4in.)	32 bar maximum operating pressure
Category III Boiler. Above 200 Bar.litres to 1000 Bar.litres max.	1:2 scale (6in.)	32 bar maximum operating pressure

Note 1: 1 bar is approximately 14.5psi (1 bar = 14.5038psi)
Note 2: The term Bar.litres simply means the total internal capacity of the boiler in litres which could be filled with either water or steam (or both), i.e. all pressurised internal volumes, multiplied by the boiler operating pressure in bars.

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Failures

Much of my professional life revolved around safety and as part of my hobby I have looked at the safety of our model steam boilers. I believe that our record on miniature boiler safety is excellent. During my nearly 30 year tenure as a club miniature boiler inspector, among the thousands of boilers that have probably been made, I have only heard of one catastrophic structural failure that caused an injury to the driver. This incident, I was given to understand by the owner of the locomotive concerned, was caused by the failure to install a butt strap covering the longitudinal seam in the copper boiler.

During this same period I have either seen, or been able to investigate, only four fusible plug failures. Three failed for the same reason. The driver walked off leaving his vehicle in steam for a short break, which ended up as the usual three-quarters of an hour tea and chat of which we are all fond. This resulted in the vehicle's boiler boiling dry. Once the boiler had cooled, followed by fairly cursory examination and replacement of the fusible plug, by a blank in some cases, things were up and running again quite quickly. The fourth, on a 4in. to the foot (1:3 scale) traction engine, failed due to a combination of a partially blocked water gauge plus a worn out water pump. None of the above failures, I would add, occurred during public running sessions.

Models

The *Australian Miniature Boiler Codes*, (**ref 6**), cover fusible plugs in some detail but, apart from this, very little written information is obtainable for model fusible plugs, as most of the UK boiler design gurus treat them very superficially. The most comprehensive UK article I have seen on fusible plugs for models was written by Ray Stevens, (**ref 7**) and was published in *Engineering in Miniature* in the early 1990s. Unfortunately Ray's article largely covered locomotives of 5in. gauge and below, and the information it contained has been virtually ignored in the UK model world

A number of parameters require examination before the size of fusible plug for a model is selected. First the firebox dimensions have to be drawn and the working pressure defined together with an idea of the ▶

Table 2: Water boiling temperature at pressure

Pressure (psi)	Water boiling temperature °C (approx.)
Atmospheric	100
50	138
75	153
100	165
125	173
150	181
175	188
200	194

working loads. This will allow an estimate of the temperature profiles within the firebox to be made. It should be understood that the temperature at which a steam vehicle burns its coal fuel is largely dependent upon its relative grate area and rate of working. My 3½in. gauge Derby 4F pulling four passengers burns its fuel at white heat in the relatively narrow firebox. By contrast, the fire in a 3½in. gauge *Caribou* with a wide firebox only glows red when pulling four passengers.

Fire bed temperatures obtained in testing by Jim Ewins are discussed in *Model Locomotive Boilers* (**ref 8**). The closer to the fire the fusible plug is, and the further it protrudes into the firebox, the greater the radiant heat impinging upon its surface. The rate of heat transfer through the firebox walls is dependent upon the material used for its construction. Another factor that affects the fusible plug is the temperature of the water in the boiler and this in turn is dependent upon the operating pressure of the boiler. **Table 2** shows how the boiling point of water varies with pressure. **Table 3** shows the melting temperature of various common metals and alloys available for model engineers, plus values for one alloy used for some full size fusible plugs.

From experience and discussion, I would recommend that for models which run at 100psi or below, where a rivet forms part of the plug, Comsol or its equivalent could be used as the fusible material. However, for models that run at pressures above 100psi and for those that run below this pressure, and where a rivet is not incorporated into the fusible plug, I would recommend the use of pure lead. I see no real point in fitting a rivet into the larger model fusible plugs. I do not recommend that the amateur makes his own fusible plugs using any other fusible materials especially the 'low' melting point alloy of lead/tin/copper as used in many professionally made full scale fusible plugs.

I can summarise my experience with fusible plugs within the UK since I became a club boiler inspector as follows:

1: I have never seen a fusible plug fitted to a 3½in. gauge, or smaller, locomotive and I do not know of any published designs which incorporate one.

2: I have only tested two 5in. gauge locomotives with a fusible plug fitting. One had a plug and the other had a blank and I do not know of any published designs with one.

3: I have only tested one 7¼in. gauge locomotive actually fitted with a fusible plug. This surprised the owner who did not realise it was there. I have however tested about three or four locomotives with a blank fitted. I know of others where the owner has given up trying to obtain a satisfactory fusible plug and has deliberately fitted a blank. I have only seen two published designs with a plug. Most 7¼in. locomotives have neither a fusible plug nor a bush to fit one.

4: While a number of 3in. to the foot (1:4 scale) traction engines have a plug bush, most of these are fitted with a blank. The 3in. to the foot (1:4 scale) Burrell design by Plaistow, of which more must have been made than any other model traction engine, does not incorporate a plug bush into the boiler (copper) design. All of the 4in. to the foot (1:3 scale) and larger miniature traction engines up to half size appear to have a plug bush and most have a plug fitted. Many non-builder/owners do not realise that they have such a device fitted or what it is intended to do. One owner actually did wonder what the 'funny plug' was in the box of 'spares' provided with the model when it was purchased.

5: The three failures that occurred due to 'lost' drivers did not appear to be treated with concern but more with amused derision of the unfortunate driver, i.e. the 'idiot plug' syndrome. No long-term damage has apparently been caused to any of the boilers concerned as far as I can ascertain.

6: The failure in the 4in. to the foot (1:3 scale) traction engine, while indicative of low water, was not diagnostic and had the driver been in the habit of blowing down his water gauge at regular intervals the problem may well have been resolved sooner.

7: Discussions with fellow model engineers who know that their model has the facility to fit a fusible plug suggest that most either have already fitted a blank or carry a spare plug and have the ability and tools to carry out the change when failure occurs. The blame for the failure of the plug is almost always said to be the fault of the plug.

8: In all of this time I have never either seen, or been given, instructions to conduct an examination of a fusible plug or have heard of anyone removing the fusible plug fitted to their model for examination.

I discussed the use of fusible plugs in models with the full size traction engine parts manufacturer and he stated that, in his opinion, fusible plugs were of limited use in small boilers. However he would not be drawn on the changeover point and simply said size is relevant!

Conclusions

All of the above has led me to the following conclusions:

1: Fusible plugs, even if they work as intended, are not as effective as some authorities would have us believe.

2: The fairly common practice among model engineers of leaving the model unattended while in steam should be very strongly discouraged as fusible plugs are not a panacea for poor driving skills.

3: I do not believe that a rivet needs to be fitted in model plugs. This is a complication in manufacture that I believe is unnecessary.

4: For models that have boilers encompassed by the new Category 1 size and smaller, i.e. all boilers for models up to 3½in. gauge locomotives with the equivalent sized boilers in traction engines and lorries plus the smaller 5in. gauge locomotives, the fitting of a fusible plug is unnecessary.

5: For models with Category 2 boilers i.e. the larger 5in. gauge locomotives, most 7¼in. gauge locomotives and similar sized traction engines, I would recommend that a bush for a fusible plug should be installed in the firebox crown but the fitting of a fusible plug is not essential provided sensible driving practices are used.

6: All models that have boilers of Category 3 should be fitted with an effective fusible plug.

7: All fusible plugs carried by models should be removed and cleaned, inspected and if necessary replaced at the same time as the periodic boiler test. This act would impress on owner/drivers that a plug is fitted and also widen the knowledge of fusible plugs for those who are just starting.

8: The training of club boiler inspectors should be upgraded as necessary to cover the examination of fusible plugs.

Finally, I am of the opinion that with the increasing numbers of large-scale models now appearing, the UK steam model world needs to take a fresh look at its operating procedures of which the need, or not, for fusible plugs to be fitted is just one aspect. One of the things I have learnt in my life is that it is impossible for one person to know everything and there is always someone who has greater knowledge. My conclusions are my own. I would therefore ask for comments on the above, such that perhaps we can at a later date collate and publish a more comprehensive article. I appreciate that much of this article relates to UK practice but worldwide comment would be appreciated.

I would like to thank all people who knowingly or unknowingly contributed to the preparation of this article and would confirm that identification of the models commented upon, as requested, will not be disclosed.

Table 3: Melting temperature of materials

Material	Melting point °C
Woods metal	70
Electronic solder	100 to 110
Plumber's solder	180 to 200
Tin	231.9
Comsol	*240
	*Quoted by Supplier
Lead	327.4
Zinc	419.5
Lead/copper/tin alloy	450
Copper	1083

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CLUB CHAT
With Malcolm Stride

The Canvey R&MEC signal box has been a focus of winter work activity.

UK News

The **National 2½" Gauge Association** had a successful time at Sandown with one of the highlights being the display of LBSC's famous *Ayesha* and Henry Greenly's *Challenger* on their stand. Another highlight was Malcolm Brown's Lynton & Barnstaple 2-4-2T *Lyn*. Two working exhibits were Peter Gardner's Stirling Single and Des Adeley's *Toby* both running on air. The association now has a new website on **www.users.waitrose.com/~n25ga** Several members visited Bromsgrove to run on the track which has been extended since their last visit. Engines which ran included a *Princess Royal*, a *Toby*, a *Josie*, a *Dyak*, a *Fayette*, a Black 5 and an S160. The day was fine and those attending had some good running despite the aluminium alloy track becoming a little slippery at the end of the day. Good progress is being made with the manufacture of the patterns for the New Zealand Railways class Ab 4-6-2 locomotiove with ten patterns completed at the time of the report.

Members of the **Bournemouth DSME** are preparing for the official opening of their new track by the Mayor of Bournemouth at midday on Easter Sunday, 11 April. It is hoped that the Mayor will be escorted from the official car to the station by a traction engine in full steam. Because the local media will be in attendance, members are being exhorted to 'polish your shoes' by the club newsheet Editor, Richard Harvey. The next event for the society will be their open day on June 11. Intending visitors can obtain more details from Secretary Dave Finn (01202-474599). The club has made spark arrestors compulsory for all passenger hauling from 11 April. A 'custodian' is being sought for the club *Maid of Kent* locomotive to ensure that it is looked after properly.

Members of **Bradford MES** recently enjoyed a talk from member Harry Barrow describing the process by which he makes his superb model boat hulls from metal. Harry builds the hulls over a large wooden former from 0.020in. brass sheet using resin cored electricians solder and solder paint for joints. Harry also makes his own fittings including spinning hawsers from copper wire using a hand drill. Members David Everson and Garry Park have taken over as club boiler testers from Mick Gray and Peter Varey who have retired from the post after nearly 30 years. The newsletter also has a few notes on the origin of WD-40, that indispensable tool in all model engineer's toolboxes. It was developed by Norm Larssen in California in 1953 to prevent corrosion on rockets. It was apparently once used by a bus driver in Asia to remove a python coiled round the undercarriage of his vehicle. The editor asks the question *"could the top of a can of WD-40 ever become rusted on?"*

Canvey Railway & MEC has changed the format of its Modellers Week this year. It will become a 'Modellers Four Days' to run from Thursday 22 July until Sunday 25 July inclusive. Further details can be obtained from Brian Baker (01702-512752). Work on the signal box has continued all winter and further changes will be made during 2004.

Peter Nash, Editor of the **Chesterfield DMES** club magazine has been reading about the dangers of drinking wine and has decided to give it up — reading that is — and proposes never to read anything again! Let's hope he makes an exception for this journal. The society are looking for members and models to exhibit at their open weekend on 15/16 May. Member Roger Kennedy describes his memories of Cranklow Depot in the 1960s when steam was being rapidly replaced by English Electric and Brush Locomotives (I too recall the latter from my own apprentice days at Brush). Peter Richards describes his method for making piston rings including carrying out the heat treatment on a firebrick with the ring gap held open by a very small piece of copper packing to help avoid uneven heating and possible distortion.

Due to bank holidays, snow and the 'ages old local tradition' of 'Christmas Pud Wednesday'! December and January are reported as 'not very productive months' at the Borrowash track site of **Erewash Valley MES.** Despite this, the second drain across the field has been completed and its effectiveness tested by Mike Bannister driving his car across the field 'carefully'. Work on the ground level track bed has also continued. The club's 30th anniversary celebrations are planned for 17 July this year and doubtless we will be able to report the events later in the year.

On 17 May, Canon Greetham is to address **Lancaster & Morecambe MES** on the 'Settle to Carlisle Railway'; this is to be followed on 21 June by 'Steam Boats on Windermere' by Bill Kitchen. The society open day and exhibition is on Saturday 3 July at their Cinderbarrow track site. Further information can be obtained from Stan Jackson (015395-60278).

Members of **Leighton Buzzard Narrow Gauge Railway** experienced much frantic rushing around for coal, mince pies and extra presents thanks to the outstanding success of their Santa Specials with some 3,500 visitors against an estimated 2,500! The permanent way gang has relaid 'Vandyke Bank' with help from contractors Alan Keef who had a gap in their schedule and were able to repack the new track. The railway has also started implementation of a new radio signalling system with the first radio transmission to a locomotive taking place on 18 January. Further information on the railway can be obtained from 01525-373888 or via the website on **www.buzzrail.co.uk**

Progress is continuing on the rebuild of *Lilla* the club locomotive of **Melton Mowbray DMES.** However, the comment is made that *"as usual with these things, more items that need work have been discovered as each piece is inspected."* Other readers will no doubt sympathise with that comment. The society enjoyed Doug Hewson's talk on lost wax casting and laser and water jet cutting. It seems that Doug noted that much of the sales of these items are due to the reduced amount of work involved for the purchaser. Graham Bayliss recommends a trip to the Anderton Boat lift at Northwich for an interesting day out. Details are on the website at **www.andertonboatlift.co.uk** or phone 01606-723800.

We have received a very nicely produced newsletter from the **Model Engineers Society of Northern Ireland** in which they report that a number of members are planning to build a the well-known *Project* gauge 1 locomotive in the society workshop. The society held a 'Boat Evening' in February which turned out to be 'something special' as not only did society members turn up, but also a group from the Bangor Pickie Pool, each with a boat. A new term for model engineers is also quoted; 'Gunthering' apparently means *"embarking on something mechanical, probably without full experience and knowledge of where you're going but with a sense of bravado and enthusiasm which outstrips your practical capabilities."* Does this sound familiar any of you model engineers out there? Progress on the new 'G' gauge layout is moving on apace. The society is planning a 'Horological Evening' on 20 May with the proviso that 'they have the time.' Society meetings are held in Cultra and details can be obtained from Secretary Billy Milliken on 9020-7391.

North Norfolk MEC had a well attended 'Bits & Pieces' evening at which among other items, the exhibits included Jim Smith's *Brittania*, Norman Lawrence's Napier *Dagger* engine, Dick Marriott's three cylinder radial engine running on air, Neil Kettley's multi-position tailstock tool holder, and the club locomotive being worked on by members. Member Gordon Gurney, who had his notes *What is a model engineer?* published in this journal recently, had decided that his new found fame meant that he could no longer write for the club newsletter but in the absence of any demand at his 'book signing' or a further call from *Model Engineer* he has relented and penned an interesting article on his work with clocks entitled *Where are all the Clockmakers?* (apparently in the hope that someone at *M.E.* will read the newsletter). His latest of many projects is an English Regulator clock and we wish him every success with it. Gordon is keen to encourage others to tackle a clock as a change from steam projects. On a more serious note, good progress is being made with the club track storage shed with the walls having been lined and the floor laid. A generator has also been donated by ▶

In Memoriam

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

Maureen Jones	*Canvey Railway & MEC*
Pat Lee	*National 2½" Gauge Association*
Herbert Morton	*National 2½" Gauge Association*
Pete White	*Canvey Railway & MEC*

Dudley Watts which means work can carry on longer each day and power tools can be used. The society's annual dinner, held in December, was attended by over 40 people with catering by Phillip Otty and his family. The first steaming of Peter Davis' *Polly* locomotive took place on 11 January under the watchful eye of a club boiler inspector whose normal fee is apparently *"tea on the hour."* The locomotive ran very smoothly and the afternoon was spent running in both the locomotive and the driver.

Royston DMES has notified us of their running days which are on the first Sunday of each month from May until October. Visiting 3½in. and 5in gauge locomotives are welcome and relevant information can be obtained from Secretary Jeff Dickinson (01763-261670); email: **dickinia@globalnet.co.uk**

Work has started on the station area paving of the **Saffron Walden DSME** site at Audley End and the 'Fence Fairy' has finished the paling fence round the picnic area. Inclement weather has resulted in the club locomotive project leader and his team *"shutting themselves in the Hobby Room and refusing to leave."* Despite this, progress is reported as slow but sure.

Stamford MES reports that membership is now at an all time high of 52, resulting in presentations from new members and in the near future more locomotives being available. News sheet Editor David Ash expressed the hope that this would also result in greater use of the track this year. The club had a symposium on the sharpening of lathe tools, drills and carpentry tools which produced a high level of interest and much useful practical knowledge. A talk on 'Fine Feeds for Non-Gearbox Myford Lathes' by David Dew from **Kings Lynn SME** is scheduled for 4 May.

John Cook reports that members of **Surrey SME** enjoyed an interesting talk by Professor Bryan Woodriff, author of the book *Fulwell - Home of Trams, Trolleys and Buses*. Bryan talked about the history of the various services from Fulwell depot ranging from early trams through trolley buses and eventually to buses. Related to this, a party of members had a guided tour of the Epsom Coaches headquarters which proved fascinating for those attending. Work is progressing on the raised track with the construction of new track, beams and bases following the damage caused by the weather last year.

The next Miniature traction Engine Rally at the Buckinghamshire Railway Centre at Quainton Road is to be a joint venture with **Vale of Aylesbury MES** and will be held on 5/6 June at the railway centre. The event will now include a model engineering show and visitors will have access to the full size railway. Several trade stands are also expected. Further information can be obtained from Ian Meikle (for live steam entries) on 01844-291590 or Andy Rapley (for static exhibits) on 01296-420720.

The refurbishment and new developments at the **Waterworks Museum** at Hereford have begun and will now doubtless have made more progress than at the time of writing. The existing visitor centre has been removed, the ivy on the chimney stack is dead and falling off following the severing of the main trunk, a high voltage cable has been re-routed and the Hartley & Sugden boiler has been moved.

The five members who volunteered for the electronic speed controller project at the **West Riding Small Locomotive Society** are now busy building the units after some instruction and practice in soldering and the issue of their 'bags of components.' John Drewell has defined the calculation of the correct height of the blocks needed when quartering wheels between centres in the lathe. This method uses blocks on the lathe bed to set the crankpin height. John defines the height (H) as C - (T cos 45 + R) where C is the centre height, R is the crankpin radius and T is the crank throw.

We have received details of the running dates for the **West Wiltshire SME** tracks at GBR Bulkington and Queens Road, Westbury. The May dates are 5 and 19, both at Queens Road. Further

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.

APRIL

30 **Chichester DSME.** *OGM & AGM.* Contact Brian Bird: 01243-542266.

MAY

1 **National 2½in. Gauge Ass'n.** *South Eastern Area Rally at New Romney.* Contact Clive Young: 01233-626455 or John Wimble: 01797-362295.

1 **The Society of Ornamental Turners.** *Meeting.* Contact N. S. Edwards: 01234-359392.

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

1/2 **MELSA.** *Great Northern Safari Visitors' Day.* Contact Graham Chadbone: 07-4121-4341.

1-3 **Dockland & E. London MES.** *Passenger Running at Thurrock Garden Centre.* Contact P. M. Jonas: 01708-228510.

1-3 **Great Western Soc.** (Didcot Railway Centre). *May Bank Holiday Steamings.* Contact Jeanette Howse: 01235-817200.

1-3 **MELSA.** *Labour Day Weekend.* Contact Graham Chadbone: 07-4121-4341.

2 **Amnerfield Miniature Railway.** *Public Running.* Contact David Jerome: 0118-9700274.

2 **Basingstoke DMES.** *Public Running.* Contact Ian Shanks: 01420-561741.

2 **Ellenroad Engine House**, Elizabethan Way, Milnrow, Rochdale, Lancashire OL16 4LE. *In Steam plus Vintage Motorcycles and Oulderhill Radio Ham Society.* Enquiries: 01706-881952.

2 **Elmdon MES.** *Public Running.* Contact Chris Giles: 0121-458-1291.

2 **Forncett Industrial Steam Museum.** *Model Engineers' Day.* Contact Dr Rowan Francis: 01508-488277.

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

2 **Leeds SMEE.** *Running Day.* Contact Colin Abrey: 01132-649630.

2 **Leighton Buzzard NG Rly.** *Teddy Bears' Holiday.* Enquiries: 01525-373888.

2 **Leyland SME.** *Ground Level Running Day.* Contact Mark Entwistle: 01772-422411.

2 **Oxford (City of) SME.** *Public Running.* Contact Chris Kelland: 01235-770836.

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

2 **Surrey SME.** *Members' Steam-Up.* Contact John Cook: 020-8397-3932.

2 **York City & DSME.** *Running Day.* Contact Pat Martindale: 01262-676291.

2/3 **Bristol SMEE.** *Public Running Days.* Contact Trevor Chambers: 01454-415085.

2/3 **Claymills Pumping Engines.** *Steaming.* Claymills Pumping Engine Trust., Meadow Lane, Stretton, Burton on Trent, Staffordshire. Contact B. Eastough: 01283-812501.

2/3 **Sutton Coldfield MES.** *Steam-Up.* Contact Neal Harrison: 0121-378-3992.

2/3 **Vale of Aylesbury MES.** *Vames Miniature Steam Railway Gala.* Contact Clive Ellam: 01296-623433. Ian Meikle: 01844-291590 or Bob Jones: 01296-29468.

3 **Bedford MES.** *Public Running.* Contact Ted Jolliffe: 01234-327791.

3 **Cardiff MES.** *Steam-Up and Family Day.* Contact Trevor Jenkins: 029-2075-5568.

3 **Isle of Wight MES.** *Track & Pond.* Contact Ken Stratton: 01983-531384.

3 **Lancaster & Morecambe MES.** *Bank Holiday Running Day.* Contact Harry Carr: 01524-411956.

3 **Saffron Walden DSME.** *Running Day (Public pm) with Barbecue.* Contact Jack Setterfield: 01843-596822.

3 **Stockholes Farm MR.** *May Day.* Contact Ivan Smith: 01427-872723.

3 **Surrey SME.** *Public Running.* Contact John Cook: 020-8397-3932.

3 **Taunton ME.** *Public Running Day.* Contact Don Martin: 01460-63162.

4 **Romney Marsh MES.** *Track Meeting.* Contact John Wimble: 01797-362295.

4 **Stamford MES.** *David Dew: Fine Feeds for Non-Gearbox Myford Lathes.* Contact David Ash: 01780-751211.

5 **Bradford MES.** *Spring Auction.* Contact John Mills: 01943-467844.

5 **Chingford DMEC.** *AGM.* Contact Martin Masterson: 0208-989-5552.

5 **Leeds SMEE.** *Meeting.* Contact Colin Abrey: 01132-649630.

5 **Tyneside SMEE.** *Video Evening.* Contact Ian Spencer, 0191-2843438.

5 **West Wiltshire SME.** *Steam-Up.* Contact R. Nev. Boulton: 01380-828101.

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

7 **Canvey R&MEC.** *Quiz Night.* Contact David A. Clark: 01375-846921.

7 **Maidstone MES (UK).** *Bits & Pieces & Fish 'n Chips.* Contact Martin Parham: 01622-630298.

7 **North London SME.** *AGM plus Bert Mead: Reminiscences.* Contact David Harris: 01707-326518.

7 **North Norfolk MEC.** *Marine Evening.* Contact Gordon Ford: 01263-512350.

7 **Vale of Aylesbury MES.** *Clive Ellam: When Engineering was Fun.* Contact Clive Ellam: 01296-623433. Ian Meikle: 01844-291590 or Bob Jones: 01296-29468.

7 **Rochdale SMEE.** *Roy Gibbins: REMAP.* Contact Mike Foster: 01706-360849.

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

7-9 **Guild of Model Wheelwrights** *at the Model Engineering & Modelling Exhibition, Harrogate.* Contact Biddy Hepper: 01492-623274.

7-9 ***National Model Engineering & Modelling Exhibition.*** Great Yorkshire Showground, Harrogate. Friday/Saturday (7/8) 10am-6pm, Sunday (9) 10am-4.30pm. Adults £8, Concessions £7. Information: 01751-473780.

8 **Hereford SME.** *Visit to Tony Marris' Kyre Valley Railway.* Contact Richard Donovan: 01432-760881.

8 **Welling DMES.** *Open Day.* Contact Reg Hawes: 0208-859-1952.

8 **Woking MRS.** *Rotary Charity Day.* Contact Ronald Dewar: 01932-343331.

9 **Cambridge MES.** *Public Running.* Fulbrooke Road. Contact Rex Mountfield: 01284-386128.

Daffodils bring glorious colour to the Wigan DMES track in Haigh Park.

details can be obtained from Peter Whisstock (01373-472234) e-mail: **peterwhisstock@aol.com** Peter says that *"everyone, both locomotives and humans! is welcome."*

Geoff Buckley, Chairman of **Wigan DMES** has established links with the local Hawkley High School following a visit by one of the teachers, Ian Garner, to the track. Ian is setting up an 'after school' engineering project for interested students. This is another good initiative to encourage youngsters into the hobby and is partly driven by the school's need to be involved with the local community in order to become a 'centre of excellence'. Brian Barrow recounts the tale of his 'far eastern wiggler' which worked but resulted in off-centre holes in a piece of flat bar. After some investigation it was found that the supposedly 1/4in. dia. operational end of the wiggler was in fact 0.22in. so all holes were 0.015in. out. As Ian comments *"far Eastern quarter inches measure 0.22in."!*

York City & DMES is celebrating its 75th anniversary with, among other things, a 'celebration weekend' from Friday 17 to Sunday 19 September. Fellow model engineers, clubs or individuals, are invited to visit the track site in York were they will find raised 2 1/2, 3 1/2 and 5in. gauge tracks along with ground level 5 and 7 1/4in. gauges. Current boiler certificates and insurance will be required for those wishing to steam locomotives. Please note that the event is 'invitation only' and those interested in attending should contact Secretary Pat Martindale (01262-676291) email: **honsec@yorksme.org.uk**

World News

New Zealand

Work on the new track site of **Canterbury SMEE** at Hallswell is progressing well and by the time this note appears, it is hoped that the digging of the new boating pond will be under way because *"the housing estate engineer would like the spoil to use as fill on the new estate."* Following this, the design of the marina will be finalised. Some members ran on part of the new track in December 'without mishap' using the club '08' diesel and the complete circuit has been used several times since Christmas. If all went according to plan, the official opening of the new track should have taken place on 3 April. The society is to host the bi-annual International Model Engineering Convention 10-14 January 2006.

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9 **Cardiff MES.** *Open Day.* Contact Trevor Jenkins: 029-2075-5568.
9 **Guildford MES.** *Diesel Electric Day.* Contact Dave Longhurst: 01428-605424.
9 **Harlington LS.** *Public Open Day.* Contact Peter Tarrant: 01895-851168.
9 **Hornsby ME.** *Running Day.* Contact Ted Gray: 9484-7583.
9 **National 2 1/2in. Gauge Ass'n.** *Midlands Area Spring Rally at Rugby MES.* Contact Clive Young: 01233-626455 or David Eadon: 01788-576956.
9 **Plymouth MSLS.** *Members' Running.* Contact John Brooker: 01752-671722.
9 **Staines SME.** *Track Competition Day.* Contact Stan Bishop: 01784-241891.
9 **Sutton MEC.** *69th Annual Exhibition.* Contact Mike Dean: 0208-657-5401.
9 **Teesside Small Gauge Rly.** *Running.* Contact Mike Aslin: 01642-724255.
10 **Bedford MES.** *Meeting.* Contact Ted Jolliffe: 01234-327791.
10 **Erewash Valley MES.** *Evening Meeting.* Contact Jim Matthews: 01332-705259.
10 **Frimley & Ascot LC.** *Evening Meeting.* Contact Bob Dowman: 01252-835042.
10 **Melton Mowbray DMES.** *Work in Progress.* Contact Phil Tansley: 0116-2673646.
10 **Saffron Walden DSME.** *Club Night.* Contact Jack Setterfield: 01843-596822.
10-14 **Wilkins & Wilkins.** *Work or Play, an Exhibition of Paintings, Drawings and Prints from the Shell Mex BP Advertising Collection.* Contact Maryanne Wilkins: 020-7935-9613.
11 **Dockland & E. London MES.** *Ted Axhall: Hornchurch Aerodrome.* Contact P. M. Jonas: 01708-228510.
11 **Historical MRS (North West Area).** *Geoff Holt: Modelling LNWR Engines.* Contact David Goodwin: 01224-880018.
11 **King's Lynn DSME.** *Meeting.* Contact Mike Coote: 01533-673728.
11 **Sutton Coldfield MES.** *Tony Holme-Barnett: Wood Joints & Tools.* Contact Neal Harrison: 0121-378-3992.
12 **Brighton & Hove SMLE.** *Wrinklies Running Day.* Contact Mick Funnell: 01323-892042.
12 **Norwich DSME.** *Auction Night.* Contact Paul Reed: 01603-462925.
13 **Brighton & Hove SMLE.** *Workshop Evening (Prior notice required.)* Contact Mick Funnell: 01323-892042.
13 **Cardiff MES.** *Forum.* Contact Trevor Jenkins: 029-2075-5568.
13 **High Wycombe MEC.** *AGM.* Contact David Savage: 01494-527402.
13 **Leyland SME.** *Geo. Thomas Night.* Contact Mark Entwistle: 01772-422411.
15 **Basingstoke DMES.** *Members' Running Day.* Contact Guy Harding: 01256-844861.
15 **Historical MRS (London Area).** *Bernard Weller: Modelling the Easy Way.* Contact John Millbank: 0208-948-0556.
15 **Historical MRS (Scottish Area).** *Guest Speaker: Steaming on the Clyde.* Contact Richard Crockett: 01896-750730.
15/16 **Chesterfield MES.** *Open Weekend.* Contact Mike Rhodes: 01623-648676.
15/16 **Guild of Model Wheelwrights** *at Tolkien Weekend, Sarehole Mill, Moseley, Birmingham.* Contact Biddy Hepper: 01492-623274.
16 **Bristol SMEE.** *Public Running Day.* Contact Trevor Chambers: 01454-415085.
16 **Frimley & Ascot LC.** *Club Running.* Contact Bob Dowman: 01252-835042.
16 **Keighley DMES.** *Open Day.* Contact K. Parkin: 01274-564866.
16 **Oxford (City of) SME.** *Public Running.* Contact Chris Kelland: 01235-770836.
16 **Pinewood MRS.** *Public Running.* Contact Ivan Hurst: 01276-28803.
16 **Plymouth MSLS.** *Running.* Contact John Brooker: 01752-671722.
16 **Saffron Walden DSME.** *Running Day (Public pm).* Contact Jack Setterfield: 01843-596822.
16 **Southport MEC.** *Diesel Day.* Contact Craig Skelland: 07867-973443.
16 **Taunton ME.** *Public Running Day.* Contact Don Martin: 01460-63162.
16 **Teesside Small Gauge Rly.** *Running.* Contact Mike Aslin: 01642-724255.
16 **York City & DSME.** *Running Day.* Contact Pat Martindale: 01262-676291.
17 **Lancaster & Morecambe MES.** *Canon Gretham: Settle to Carlisle Railway.* Contact Harry Carr: 01524-411956.
17 **Model Steam Road Vehicle Soc.** *Modellers' Evening.* Contact Geoff Miles: 01869-247602.
17 **Peterborough SME.** *ModelWorld: Visit & Demo.* Contact Tony Meek: 01778-345142.
18 **Chesterfield MES.** *Tony Finn: Lathe History.* Contact Mike Rhodes: 01623-648676.
18 **South Durham SME.** *Evening Steam-Up.* Contact B. Owens: 01325-721503.
18 **Taunton ME.** *Andy Webb: Welding Demonstration and Instruction.* Contact Don Martin: 01460-63162.
19 **Bournemouth DSME.** *Malcolm Bowditch: Cordite Factory at Holton Heath.* Contact Mike Baker: 01202-383653.
19 **Guildford MES.** *Bits & Pieces.* Contact Dave Longhurst: 01428-605424.
19 **Leeds SMEE.** *Gordon Smith: Mild Pop Safety Valves.* Contact Colin Abrey: 01132-649630.
19 **Maidstone MES (UK).** *Members' Afternoon Playtime Run.* Contact Martin Parham: 01622-630298.
19 **West Riding SLS.** *Leeds Traction Engine Club Visit.* Contact David Batty: 01924-363908.
19 **West Wiltshire SME.** *Boiler Testing & Steam-Up.* Contact R. Nev. Boulton: 01380-828101.
20 **Isle of Wight MES.** *Meeting.* Contact Ken Stratton: 01983-531384.
21 **Brighton & Hove SMLE.** *Fun Run Evening.* Contact Mick Funnell: 01323-892042.
21 **Canvey R&MEC.** *On the Table 2.* Contact Brian Baker: 01702-512752.
21 **Frimley & Ascot LC.** *Skittles.* Contact Bob Dowman: 01252-835042.
21 **Rochdale SMEE.** *Members' Bits & Pieces.* Contact Mike Foster: 01706-360849.
21 **Romford MEC.** *David Carson: Tales of the Tube.* Contact Colin Hunt: 01708-709302.
22 **Chesterfield MES.** *Running Day.* Contact Mike Rhodes: 01623-648676.
22 **Historical MRS (Bristol Area).** *Somerset & Dorset Slide Show.* Contact Gerry Nichols: 0117-973-1862.
22 **Hornsby ME.** *Family Day & Boiler Inspection.* Contact Ted Gray: 9484-7583.
22 **Worthing DSME.** ***Southern Railway Designs Rally.*** 10am-6pm for 2 1/2, 3 1/2 and 5in. gauge locomotives and stock, etc. Contact Gerry Tull: 01285-860417.
22 **Old Locomotive Committee.** *AGM.* Contact Peter Gardner: 01252-541999.
23 **Harlington LS.** *Public Open Day.* Contact Peter Tarrant: 01895-851168.
23 **MELSA.** *Bracken Ridge.* Contact Graham Chadbone: 07-4121-4341.
23 **Staines SME.** *Passenger Day.* Contact Stan Bishop: 01784-241891.
23 **Surrey SME.** *Visiting Clubs Day.* Contact John Cook: 020-8397-3932.
23 **Teesside Small Gauge Rly.** *Running.* Contact Mike Aslin: 01642-724255.
22/23 **Tyneside SMEE.** ***Martin Evans Rally.*** Contact Ian Spencer, 0191-2843438.
22/23 **Guild of Model Wheelwrights** *at Arley Hall, Knutsford.* Contact Biddy Hepper: 01492-623274.

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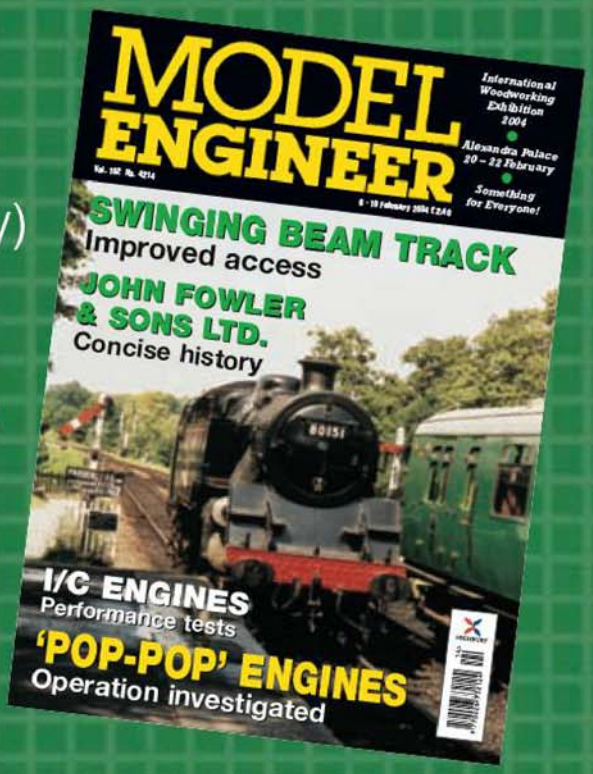

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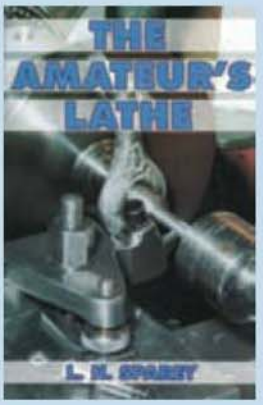

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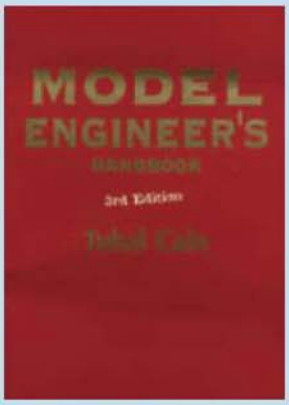

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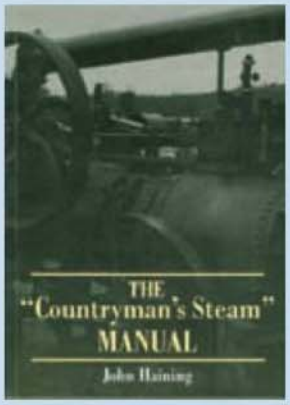

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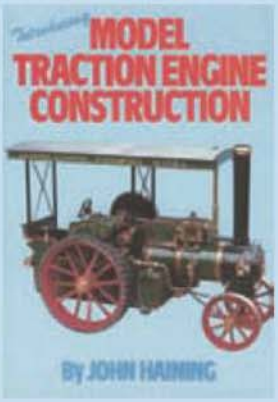

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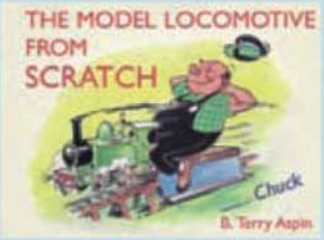

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Jones Shipman small surface grinder 1956, needs good service. £700 ono. More details, Chris. Tel: 01202 533570 (Dorset)

Wanted: Quorn Tool Grinder. Also Wanted Deckel Collets (20mm Shank). Tel: 01628 522164 (Bucks)

For Sale: Small motorised bench top shaper. Approx. 6 inch stroke. Good condition. £130. Buyer to collect. Tel: 01327 351274 (Northants)

CVA 6" toolroom lathe, little TLC. £700 or PX plus cash for mint Boxford. Buyer collects. Tel: 01460 64376 (Somerset)

Bridgeport mill, belt head, DRO, slotting head and more. ALSO, Colchester student lathe, square head, chucks, faceplates, steadies. Tel: 01458 210866 eves (Somerset)

ML7 makers instruction book and ML7 manual, Bradley. Offers? Wanted: user guide for Smart & Brown M type lathe. Tel: 01209 831025 (Camborne)

Wanted: Coolant pump, single phase for Boxford AVD with top tray. Tel: 01258 817474 (Dorset)

Wanted: ML7 cast headstock guard. Tel: 01900 63088 (Cumbria)

Heavy duty vertical milling slide, with imperial dial, for Boxford CUD lathe, as new. £200. Tel: 01326 372806 (Cornwall)

CE5 Gearhobbing machine, new, change gears, 20dpH&B, Arbors, no motor, photos available. Tel: 006463747876 (New Zealand) E-mail: BRIAN WIFFIN crystals@inspire.net.nz

Warco 918 4.5" Lathe as new 9 months old. All supplied accessories. £499. Tel: 01992 303398 (Herts)

Workshop Equipment Lathe, Boxford, CUD 24" x 41/2", Cabinet, 240 Volts 3 & 4 Jaw Chucks, Accessories, Excellent. £975. Tel: 01689 829131 (Kent)

For Sale: Colchester Student 6 Lathe Round Head Gear Box, Speed Range 45 to 1000 £50. Jones & Shipman Cylindrical Grinder. Gantry type, on original stand with coolant, light. Table 16" x 5", 3-phase works well off converter. £250. Tel: 01603 722023 days. 01603 426522 Eves (Norwich)

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LATHES

BOXFORD TUD 4½" x 20" **MK11** 3 jaw chuck, cabinet stand, hand feeds ..... **Choice** £395
BOXFORD CUD 4½" x 20", changewheels, 3 jaw chuck, cabinet ..... **still only** £750
BOXFORD AUD 4½" x 20", gearbox, power cross-feed, 3 jaw chuck, coolant, cabinet stand ..... **240 volts and in really nice condition** £1450
BOXFORD AUD 4½" x 20", gearbox, power cross-feed, 3 jaw chuck, coolant, cabinet stand ..... **240 volts and in really nice condition** £1750
BOXFORD CUD 5" x 22" **MKIII**, c/wheels, 3 jaw chuck, 4 way toolpost £1400
BOXFORD BUD 5" x 22" **MKIII**, c/wheels, power cross feed, T-slotted cross slide £1400
BOXFORD AUD 5" x 22" **MKIII**, gearbox, power cross feed, T-slotted cross slide, cabinet stand ..... **very nice** £1625
BOXFORD 1130 INDUSTRIAL 5½" x 30", geared head, gearbox, power feeds, 3 & 4 jaw chucks, splash tray and light £2450
COLCHESTER BANTAM 1600 model, 5" x 20", geared head, power feeds, gearbox £1400
COLCHESTER BANTAM 2000, 5½" centre height x 30" between centres, 1³/₈" bore, 16 speeds, D13 camlock fitting, 3 and 4 jaw chucks, Dickson tool post, bed stop ..... **in very nice condition and LATEST MODEL MADE** £3750
COLCHESTER STUDENT Square head, 1500 revs / 2 speed motor model, geared head, gearbox, imperial / metric, power cross feed and gap bed, dual dials, 3 jaw chuck, taper turning, coolant, etc. £2,950
COLCHESTER MASTER 6½" x 36", gap bed, gearbox, power feeds, coolant ..... **Nice** £1750
COLCHESTER MASTER SQUARE HEAD 6½" x 36" Precision Lathe, gearbox, power feeds, chucks, Dickson tool post ..... **in nice condition** £2250
COLCHESTER MASTER 2500; short and long bed lathes well equipped £2950
COLCHESTER TRIUMPH 7½" x 25", 3 jaw chuck, Dickson tool post ..... **very nice ex. college Each** £3950
EMCO COMPACT 5, 4½" x 12", bench lathe complete with 3 jaw chuck and tray ..... **in almost new condition** £400
HARRISON L5, 4½" x 24", fully tooled, complete with clutch .... **one of the best start up deals** £950
HARRISON 140, 5½" x 24", geared head, semi gearbox, 3 jaw chuck, gap bed, power feeds, clutch £1400
HARRISON 140, 5½" x 24", geared head, gearbox, gap bed, power feeds, tooling, coolant £1725
HARRISON M250, 5" x 20", gearbox, power feeds, 3 & 4 chucks ..... **nice condition** £2950
HARRISON M250, 5" x 20", gearbox, power feeds, 3 and 4 chucks ..... **240 volts from new** £3250
HARRISON M250, 5" x 30", long bed, gearbox, power feeds, chucks. Acurite III DRO on cross-slide, dual dials ..... **in very nice condition** £3250
HARRISON M300 6" x 24" precision lathe, geared head, gearbox, power feeds, 3 jaw & 4 jaw chucks ..... **Choice** £3250
HARRISON M300 6" x 24" precision lathe, geared head, gearbox, power feeds, 3 jaw chuck, Dickson toolpost .. **This machine is 240 volts as new and in very good all round condition** £3550
HARRISON M300 6" x 40", geared head, gearbox, power feeds, gap bed, 3 jaw & 4 jaw chucks, fixed steady ..... **in very nice condition** £3750
HOBBYMAT MD65 2½" x 12" screwcutting lathe with changewheels and some tooling .... **as new** £395
MYFORD ML7 3½" x 19" lathe, 3 jaw chuck ..... **we have a large selection of this popular model from** £600
MYFORD SUPER 7 3½" x 19" changewheels, 3 jaw chuck and tooling ..... **Choice** £950 - £1150
MYFORD SUPER 7, 3½" x 19" 3 jaw chuck, power cross-feed ..... **Late model Choice**
MYFORD SUPER 7 3½" x 31" changewheels, 3 jaw chuck and tooling ..... **Choice** £1400
MYFORD SUPER 7B 3½" x 19" gearbox, 3 jaw chuck and tooling £1650
MYFORD SUPER 7B 3½" x 19" gearbox, power cross feed, cabinet stand, tooling £2750
MYFORD SUPER 7B 3½" x 19" gearbox, power cross feed, 3 jaw chuck and tooling on industrial stand, excellent condition from new and **NOT** re-conditioned £3550
MYFORD C7 CAPSTAN LATHE £1200
SMART AND BROWN collet lathe complete with cross / top slides and collets £345
VICEROY TDS 1 GBL 5" x 24", gearbox, power slides, 3MT tailstock complete with fixed steady £1250

TOO MANY LATHES TO LIST!!

MILLING MACHINES (V – VERTICAL, H – HORIZONTAL)

ACIERA F3 Universal milling machine complete with collets 1/16" – 5/8" & 2mm – 20mm, suds and light ..... **in all round good condition** £3250
BOXFORD VM30 vertical variable speed/30 INT head, table 21½" x 6" + Abwood vice & chuck .. £1500
BRIDGEPORT vertical belt head 2 speed (short motor) head, R8 powered head, gearbox table, 42" x 9" table ..... **needing work hence** £750
CENTEC 2A Vertical/Horizontal, swivel 2MT head, 16" x 4½" table, pedestal model £950
CENTEC 2B Horizontal, 1" arbor, table powered, 3 ph motor, single phase main motor £725
CENTEC 2B Vertical/Horizontal, quill 2MT head, 25" x 5" table, pedestal model £1400
ELLIOT MINIBORER (Jig borer) collet fixture head with good selection of collets, ... £1200
ELLIOT '00' OMNIMILL V/H 3 Morse taper quill universal head, 28" x 7½" powered table . £1250
HARRISON Vertical 30 INT swivel head & clutch, 30" x 8" table / powered £1650
HARRISON Horizontal, 31" x 8" powered table ..... **still good value** £625
HARRISON H/V 30 INT swivel head & clutch, 30" x 8" table/powered £1650
MARLOW VERTICAL TURRET TYPE MILL, 3 MT, 28 x 7" ..... **A favourite mill for its height under the head** £950
MYFORD VME turret type milling machine in nice condition complete with R8 collet chuck £2400
SIP RF30, vertical milling/drilling machine complete with accessories ..... **Still only and New** £799
TOM SENIOR M1 horizontal, 25" x 6" powered table, 1" arbor £575
TOM SENIOR M1 V/H, 25" x 6", 2 MT, 1" arbor. ..... **Selection** £1200 – £1950
TOM SENIOR ELT MAJOR, 2 MT quill feed head, powered 37" x 8½" table in £2,750
VICEROY AEW vertical mill, 30 INT swivel head, powered table 34"x 8", ... **choice** £1250 – £1625

DRILLS

ASQUITH 14-54 001 Mk2 (5mt) radial drill £3950
BOXFORD 2MT pedestal drill £295
FOBCO ½" bench, tilting table £325
FOBCO ½" pedestal drill tilting table £345
MEDDINGS ½" pedestal drill £245
MEDDINGS 2MT pedestal drills £275
POLLARD CORONA pedestal ½"/1MT ..... **From** £100
SIP HDP 600B 5/8"/2MT bench drill, table operated by rack, speeds; (16) 162-3000 rpm .... **New** £175
STARTRITE Mercury ½" 4 speed bench drill £225

GRINDING / BUFFING

ABWOOD Tool and cutter grinder £425
CLARKSON MKI Tool and cutter grinder complete with universal head and centres .... **JUST IN** £550
EAGLE 4W wet surface grinder + magnetic chuck £725
HERBERT drill grinder + followers ..... **as is** £245
MILFORD 12" Pedestal Grinder £325
VICEROY Grinder, pedestal model £145
VICEROY Buffers, pedestal models ..... **each** £250
VICTOR EAGLE surface grinder, 21" x 6", complete with + 14" x 6" magnetic chuck, dust extractor & coolant £1250

MISCELLANEOUS / FABRICATION MACHINERY

MYFORD 4" & BOXFORD 5" back-plates ..... **special** £22
RAGLAN/LITTLEJOHN lathe set of collets and draw bar, all metric and as new (at least 20) £345
HARRISON vertical slide suit L5, L5A and L6 lathes or similar if required ..... **as new** £375
BOXFORD Dividing head and column suit 4½" and 5" lathe complete with three dividing plates £845
MYFORD dividing head (boxed) suit ML10, ML7, Super 7 lathes £450
JUN-AIR 18-50 compressor 120psi / 50 litre tank £425
HPC TWO twin large compressor £675
GABRO 24" box and pan folder £325
BATY digital vernier 6" with metric / imperial, origin and absolute buttons ..... **new** £35
EDWARDS 39½" x 16g treadle guillotine with all its stops in very nice order £625
ALCOSA hearth ..... **Just in** £245
WELLSAW 4" hacksaw £325
RJH horizontal 4" linisher + built in dust extractor £625
RJH vertical 4" linisher complete with built in dust extractor ..... **Very nice machine** £750
BOXFORD 8" SHAPER, powered table ..... **needs one gearwheel on automatic traverse hence now only** £425
OMT Optical Measuring Tools universal boring head, 40 INT, boxed + tooling £345
CLARKE strip heater, 110 amps in very good order £75
MITUTOYO 7–8", 9–10", 10–11", 11–12" micrometers just in ..... **Each just** £45
ABWOOD SWIVEL/TILT 4" vice in all round good condition £245
ABWOOD SWIVEL/TILT 6" vice in all round good condition £375
CLARKSON RADIUS MK1 radius grinding attachment in nice condition ..... **Boxed** £345
NEW FROM NEW ZEALAND:- Machine vice, 55mm. Jaws precision miniature type ideal for vertical slides and smaller milling machines such as BCA now with the swivel base £134
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MYFORD RODNEY HEAD MILLING HEAD FOR THE MYFORD ML10 ..... £550
MYFORD CAPSTAN ATTACHMENT (LARGE BED TYPE) £550
HOFFMAN DIVIDING HEAD complete with tailstock £425
ARCHER tapping heads ..... **from** £70
HARE MODEL 51T complete with hydrauic indexable table ..... **just** £425
MARLCO notch broaching fixture + notch broach £425
MYFORD vertical slides ..... **just in** £140 / £245
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Quantity of slips, height gauges, squares, straight edges, micrometers, cubes, angle plates and miscellaneous measuring tools
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FLAMEFAST DS 130 ceramic chip forge £345
FLAMEFAST DS 100 hearth £140
JONES AND SHIPMAN 4" x 24" bench centres ..... **very nice example** £245
TOM SENIOR slotting head £450
RJH BT 125 Fretsaw, variable speed £345
SMART AND BROWN / CLARKSON H3-H5 toggle presses ..... **Each** £195 / £275
VERDICT CLOCKS, Long/Short Metric and Imperial models ..... **New** £40
FLAMEFAST LD300 soldering Iron stove £75
GRANITE 18" x 12" Surface Plate £140
VIBROSHEAR Nibbler ..... **Just in** £425
SIP 7" bandsaw, horizontal & coolant ..... **New** £750
DUPLEX D29 toolpost grinder £345
BOXFORD (imperial only) thread dial indicator £65
BURNERD, D14 lever collet chuck + collets £400
BURNERD, LO lever collet chuck + collets £400
VERTEX Dividing head ..... **New** £245
VERTEX 6" – 8" – 10" rotary tables ..... **good value equipment New From** £135
MYFORD ML7 / Super 7 rear tool post £40
LOCKWOOD quad headed 2MT Die Holder ..... **quality equipment New** £40
LOCKWOOD quad headed 3 MT Die Holder ..... **quality equipment New** £40
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STARTRITE 14-S-5 woodworking band saw £775
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COLCHESTER STUDENT / MASTER Round head, face-plates, small / large ..... £50 / £80
QUALTERS AND SMITH 6" Hacksaw £345
TRANSWAVE 3HP Converter (including delivery charge from factory) ..... **New** £322.50
TRANSWAVE 1.5HP Converter (including delivery charge from factory) ..... **New** £445
TRANSWAVE MT & RT rotary converters ..... **From** £400
CROMPTON PARKINSON 3/4hp, resilient mount, Boxford / Myford Super 7 Type motor ..... **New** £140
CROMPTON PARKINSON SINGLE PHASE start / stop switch model DL1 2000 series (4.5 – 7.5amps) ..... **New** £69

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- Metric or Imperial Leadscrews

Conquest Mill £495

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Eagle 25 Mill £699

- Table size: 190x585mm
- Motor: 1HP
- Spindle Taper: MT3
- Speeds: 12 (100-2150rpm)
- Metric or Imperial Machines Available

Eagle 30 Mill £899

- Table size: 210x730mm
- Motor: 1½HP
- Spindle Taper: MT3
- Speeds: 12 (100-2150rpm)
- Metric or Imperial Machines Available

Lux Mill R/C £999

- Table size: 210x730mm
- Motor: 1½HP
- Spindle Taper: MT3
- Speeds: 6 Geared head (95-1600rpm)
- Metric or Imperial Machines Available

Lux Mill Dovetail £1100

- Table size: 240x820mm
- Motor: 1½HP
- Spindle Taper: MT3
- Speeds: 6 Geared Head (50-1250rpm)
- Metric or Imperial Machines Available

Super LUX Mill £1500

- Table size: 240x800mm
- Motor: 1½HP
- Spindle Taper: MT3
- Speeds: 6 Geared Head (80-1250rpm)

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"..I consider it to be very good value for money, and I am personally well pleased with my purchase."

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MEW 97

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- Spindle Taper: R8
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