

MODEL ENGINEER

Vol.199 No. 4314

7-20 December 2007

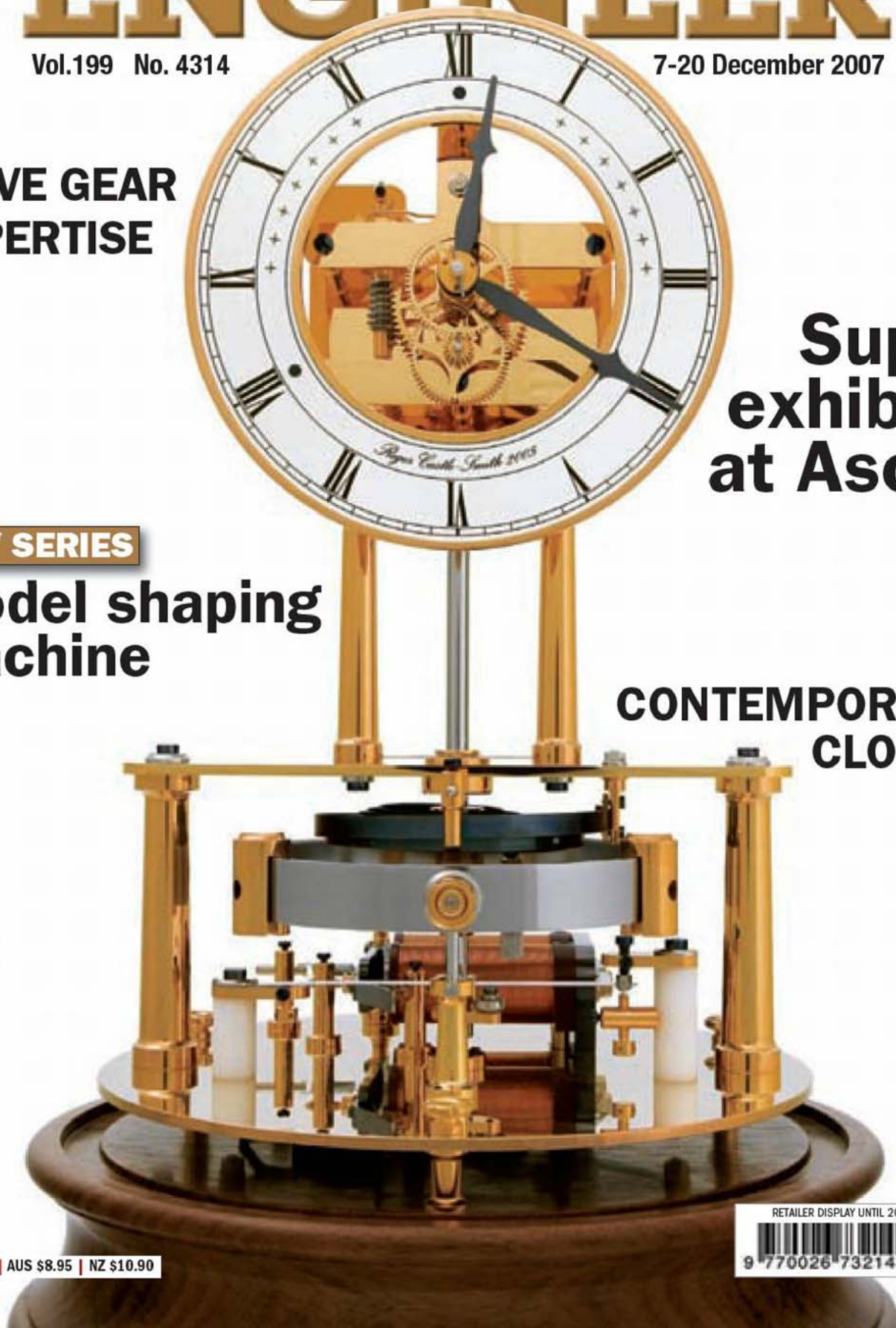
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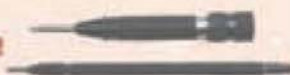
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ON THE COVER...

The outstanding Murday style large balance wheel electric clock won a Gold Medal for Roger Castle-Smith at this year's Model Engineer Exhibition. This clock is based on a John Wilding design, and is largely finished in gold plate to avoid tarnishing, with a silver plated chapter ring. See report on page 673. (Photograph by Roger Castle-Smith)

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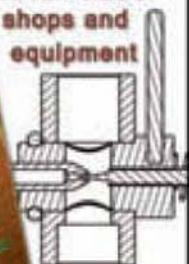
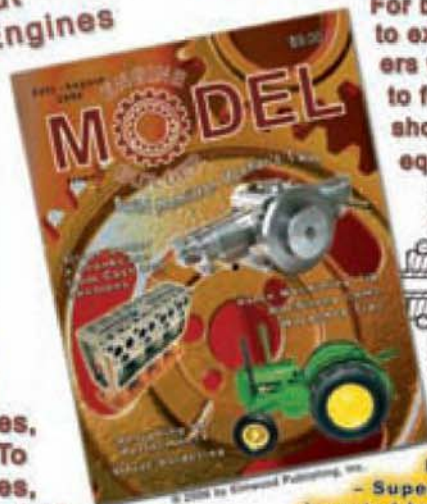
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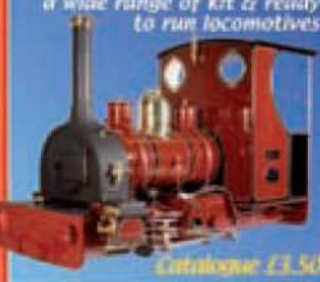
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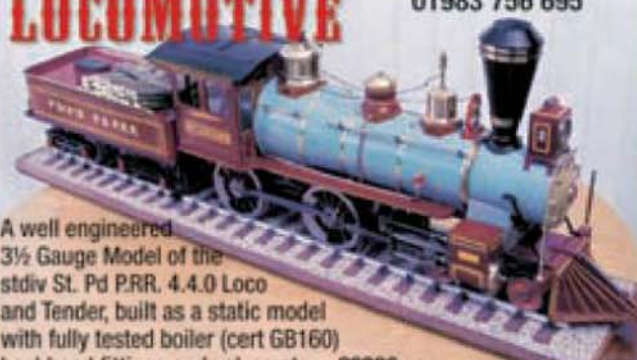
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5. BSF TAP SET (2 Taps each size) & BSF DIE SET	TAPS: E18 SET	DIES: E18 SET
6. BSF TAP SET (2 Taps each size) & BSF DIE SET	TAPS: E18 SET	DIES: E18 SET
7. RSW TAP SET (2 Taps each size) & RSW DIE SET	TAPS: E20 SET	DIES: E20 SET
8. RSW TAP SET (2 Taps each size) & RSW DIE SET	TAPS: E18 SET	DIES: E18 SET
9. METRIC COARSE TAP SET (2 Taps each size) & METRIC DIE SET: 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 mm	TAPS: E20 SET	DIES: E20 SET
10. METRIC COARSE TAP SET (2 Taps each size) & METRIC DIE SET: 14, 16, 18, 20, 22, 24 mm	TAPS: E20 SET	DIES: E20 SET
11. UNF OR UNC TAP SET (2 Taps each size) & UNF OR UNC DIE SET: 1/16 to 1/2 UNF or 1/16 to 1/2 UNC	TAPS: E18 SET	DIES: E18 SET
12. UNF OR UNC TAP SET (2 Taps each size) & UNF OR UNC DIE SET	TAPS: E18 SET	DIES: E18 SET
13. UNF OR UNC TAP SET (2 Taps each size) & UNF OR UNC DIE SET	TAPS: E18 SET	DIES: E18 SET
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16. METRIC FINE PITCH SETS (8 sizes from 14 - 24 mm) TAPS & DIES	(8) TAPS: E18 SET	DIES: E25 SET
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18. SLOT DRILL SET (THREADED SHANK) 1/2" DIA. WITH 1" THREADED SHANK TO FIT COLLET CHUCK		E20 EACH SET
19. ENDMILL SET 1" DIA. WITH 1" THREADED SHANK TO FIT COLLET CHUCK		E20 SET OF 4
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22. DRILLS (LONG SERIES) 10 VARIOUS SIZES BETWEEN 1/16" & 1/2" STRAIGHT SHANK		E8 LOT
23. MORSE TAPER SOCKET REAMERS (FOR CLEANING MORSE TAPERS) No. 0, 1, 2 MT @ E18 EA.	No. 3 @ E22.	No. 4, 5, 6 MT @ E35
24. D-BIT SET (FOR DRILLING SQUARE BOTTOM HOLES) 3" DIA @ E26 SET 2" DIA @ E5 SET		E12 SET
25. SLITTING SAW SET (HS) 3 PIECES, BETWEEN 1/16" & 1/2" FINE TEETH		E25 SET
26. COUNTERSINK SET (PILETED), FOR SMALL SCREWS (H.S.S.) 12 SIZES, BETWEEN 1/16" & 1/2" @ E10 SET		
27. TAPER SHANK DRILLS (No. 1 MT) TO VARIOUS SIZES UP TO 1" DIA		
28. DRILL SETS (HS) GROUND FLUTES, No. 1 - 60 A - 2 @ E18, 1/16" - 1/2" 13mm @ E18, 1" - 60mm x 13mm @ E18, 6" - 10mm @ E25 SET		
29. DIAL GAUGES (MM OR IMP) @ E10 EACH	STAINLESS STEEL DIAL CALIPERS (MM OR IMP) @ E12 EACH	MAGNETIC BASE @ E15 EACH
WOODRUFF CUTTER SET @ E15 SET	EXPANDING REAMER SET FROM 1/16" - 1/2" @ E50 BOX	RE-THREADING FILES (IMP OR MM) @ E8 EACH
30. INVOLUTE GEAR CUTTERS - ALL SIZES FROM 2 DP - 120 DP INCL. MODULE & DP. ALSO STEEL, BEVEL & SPURGEON CHAMF	(10) PIECE SET - SHEFFIELD MADE	@ E18 EACH
31. TAPER PIN REAMER SET @ E15 SET		@ E20 SET
32. CARBIDE INDEX ABLE ENDMILL 1/2" DIAMETER, FOR BORING TOOL 1/2" THREADED SHANK @ E19, WITH CARBIDE TIP		IN HSS @ E18 SET, OR CARBIDE TIPPED @ E18 SET
33. LATHE TONDS (SET OF 6) 1/2" SQUARE VARIOUS SHAPES		
34. REVOLVING LATHE CENTERS, 1 MT @ E16 2 1/2 MT @ E20	DRILL GAUGES, IMP MM, LETTER, NUMBER @ E4 EACH	COVENTRY DREWDR CHASES - ALL SIZES
35. DRILLS WITH 1/2" SHANK 1/16" - 1/2" 1" DIA @ E18 SET	DRILLS (BELOW 1/16" DIA @ 50p ALL SIZES)	@ E10 EACH, WITH TIP (EXTRA TIPS E2)
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37. INDEXABLE TOOL HOLDERS (SWISS) 1/2" SHANK OR 1/2" SHANK		
38. PARTING OFF TOOLHOLDERS, COMPLETE WITH COBALT BLADE		
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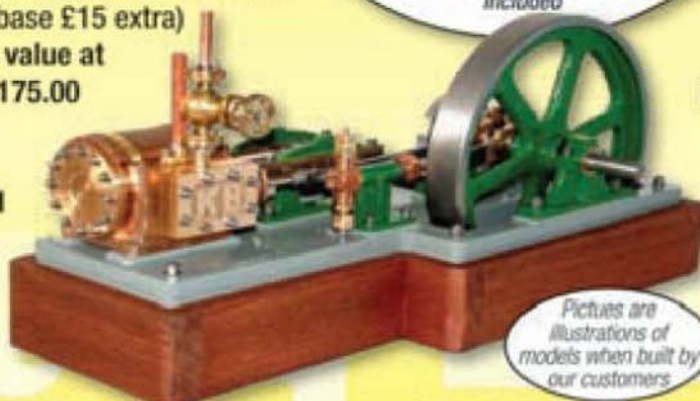
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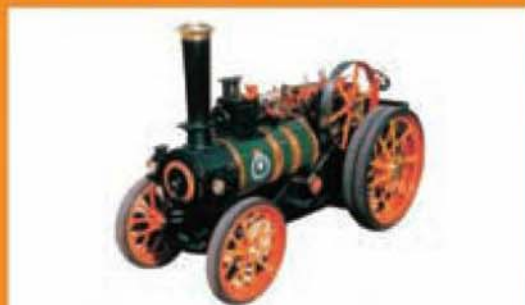
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100 Great Models

At the time of going to press, we have just received our copy of *100 Great Models*, the special publication based on the models on display at the Centenary Model Engineer Exhibition at Ascot. This was produced to provide a memento for those who went to the exhibition, or to add to our reports in *Model Engineer*, for those that could not get to Ascot. It was also intended to interest new people to the wonderful world of model engineering.

Congratulations go to Mike Jones our assistant editor who edited *100 Great Models*, including selecting from thousands of photos he and the M.E. team took at Ascot. From the close of the exhibition to its appearance on the shelves of W. H. Smith took just two months. Unless it sells out, it should be available from Smith's well into the New Year.

Events 2008

We will shortly give details of the 2008 IMLEC competition, and for the next Model Engineer Exhibition.

Meanwhile, we are looking for volunteer clubs for two other events we sponsor.

First is the LBSC Memorial Bowl, or Curly Bowl, as it is better known. This is a more relaxed event than IMLEC, and in true LBSC spirit is all about how well locomotives perform on the track. It is open to all locomotives built to an LBSC design – or based on one.

The club that takes on this pleasant day will need to have 2½ as well as 3½ and 5in. track. The competition has always catered for the smaller gauge, in which Curly did many of his designs. Now the renaissance of 2½ continues, and we know of a goodly number of *Ayesha* IIs being built, and we can expect to see some running next year. Interestingly the National 2½" Gauge Association is actually seeing an increase in membership at a time when many others are recording quite the reverse.

The Curly Bowl usually throws up some fascinating locomotives on display as well as running. This year saw an appearance by *Tishy*, built by the great man himself. The

year before saw a *Duchess of Swindon* at Sunderland.

We can schedule this event to suit the organising club.

This year saw Dennis Monk's last year as judge for the Curly Bowl, having decided to let someone a bit younger take it on. Next year Steve Eaton will continue, assisted by Michael Law, who won the competition a few years ago with his nice *Juliet*.

Our sincere thanks go to them, and to Dennis for his dedication over the years.

If you can't manage 2½in. gauge, how about 7¼? We would like to hear from any club that would like to host SEQLEC, the efficiency competition for larger locomotives. Again this requires less from the organising club than IMLEC, and takes up just one day. Again we can be flexible about the timing of the event.

Any club that would like to take on either of these competitions next year, or in the following years, can contact us at:

T. 01689 899255.

E. david.carpenter@magicalia.com

Dremel result

John Miller of Romford, who entered via *Model Engineer*, came second in the Formula Dremel model car competition. Points were awarded based on the model cars' looks and construction, as well as their



performance on the 'race track'. The judging panel included Markus Winkelhock, Spyker F1 Team driver - now Force India Formula One Team - ('the car an F1 driver would most like to drive'); Chris Barrie - actor of *Red Dwarf*, *Lara Croft: Tomb Raider*, *Massive Machines* fame ('the car a celebrity would most like to be seen in'); Simon McBride from *Auto Express* magazine and Paul Gemmell of Dremel UK (who both gave marks for looks and construction). The cars were also put through their paces on the 'race track' with heats and final stages at Silverstone.

Over 150 competitions were run in newspapers and magazines throughout the

UK during the Summer with entrants asked to create their own model racing car from pinewood kits and send in their photos for judging. The creators of the best looking cars were those invited to Silverstone and enter the final stage to become overall Formula Dremel Challenge champion and win an all expenses paid trip to the Monaco Grand Prix 2008.

Not everyone was a winner but everyone certainly felt like one with high speed rides in a Lotus Exige with a professional race driver, races on a computerised eight lane Scalextric game and fun on the Ferrari 8 simulator. Attendees also got to watch a remote control car demo by *Radio Race Car International* magazine, and the opportunity to examine a Force India Formula One Team car.

John Miller, second left, with Judges and prizes at Silverstone.



Superheating – is it really helpful?

SIRS, - Don Broadley's discourteous comments on my article on superheating (M.E. 4312, 9 November 2007) are reminiscent of the response given to Copernicus when he had the temerity to suggest that the earth revolves around the sun! His letter is based on emotion rather than fact, as I shall try to explain: when steam leaves the boiler drum, it negotiates not only the regulator assembly but also the pipework to the cylinders, in which it loses pressure. The effect of this pressure drop is actually to **superheat** the steam slightly, not to make it go wet; the reason for this is that the change from boiler to cylinders is isenthalpic (no energy is usefully used).

Heat transfer between the ingoing steam and the port walls is of academic importance and I have never seen any evidence to enable us to quantify it. This is not to be confused with the isentropic efficiency being considerably lower than 100%, due to the fact that all the steam does not act on the piston for the whole of its stroke. In all heat engines entry and exit losses are considerable.

I have found one grain of truth in the last paragraph of the letter: it is true that superheating reduces the burden of water to be evaporated but, as I pointed out in my analysis, it does nothing to improve the thermodynamic efficiency. Perhaps Mr. Broadley would like to explain which thermodynamic law in particular contradicts my proposition. I stand by what I have written.

D. A. G. Brown, Rutland.

What is the point of that?

SIRS, - A while back, on a Sunday morning, I bought *Model Engineer* in the local newsagent (M.E. 4304, 20 July 2007). The photo of the Bentley engine on the cover caught the eye of the well-spoken young man who served me.

"What is that?" he enquired. I

said it was a model of a Bentley engine and, waving my hands in the air, said it was about this big. His face fell.

"A model? What is the point of that?"

Seeing I was offended, he quickly asked what else there might be in the magazine. I opened it at random, finding the picture of a beautiful Stirling single.

"That is a model too", I said, "about this big", again waving my hands in the air. "It can be used on a miniature track and people can ride behind it".

"What is the point of that?" he said. "Oh, well, I suppose it might be fun."

Well, in the same issue, a contributor once again put forward the idea that you will not attract young people to the hobby unless the metric system is used. Somehow I feel this will make no difference.

My son had a young school friend to tea and during our conversation I mentioned a size of something in inches. He very proudly said he did not know about inches and was only familiar with metric. I asked him if he could hold his fingers 25mm apart. With a confident gesture he held up the two index fingers with about 6in. between them!

A fellow club member proudly showed me a digital calliper which read in metric, decimal inches and fractions. The measure appears in the display in the chosen scale, only as numbers of course, so with one's gaze on the display the physical/tactile experience of the measurement is lost, that is, the movement from one size to another is not really experienced.

I seem to remember rushing to buy a watch with a digital display and being glad to replace it with one with hands where the movement to and from the hour can be seen. So, for much the same reason, I don't expect I shall use the calliper. However, I did wonder what market forces allowed it to be made; surely more than just a few old eccentrics in the UK.

What is the point of that?

Well, digital displays and

decimal numbers on the page can obscure the physical presence of size, which is what linear measurement is primarily about in the workshop.

J. D. Willman, Devon.

Why make tools?

SIRS, - I was a little flattered to be asked to exhibit at Ascot the tooling that I had made over the last 15 years, but also even more embarrassed at them eventually being seen along side items of a much greater calibre. However, after a little arm twisting and the kind offer from Lou Rex to arrange collection and return of the 70 plus items I agreed to them being shown.

In part my reservation was influenced by having read on the internet, and had said to me directly, that making tools was largely unnecessary in view of them now being available at much more advantageous prices. While I cannot disagree with this statement it overlooks the reason why so many still do make items of tooling.

Cost is still a consideration for many, in my case, some 20 years ago; I purchased my first milling machine, supplied with vice, drill chuck and a few end mills and naively thought that it would then be all systems go. I soon learnt that the drill chuck was totally inadequate for holding end mills. Requiring therefore a milling cutter chuck I was appalled to find that having got so much machine for my £600, just a few pieces of metal to hold my cutters were going to cost around £100. More important though, the £600 outlay had stretched my finances to the limit and so making one was the only option.

There are though other reasons for making tools, typically time and indirectly patience. Many will not have the time to spend on a major project and like to see one completed in a much shorter time scale. In my case, being a multi hobby individual, patience is very much a factor, how I admire those who can work tirelessly on one project over

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Responses to published letters are forwarded as appropriate.

Unusual micrometer

SIRS, - I have come across an unusual (to me) micrometer, possibly used by the inspection department of a factory to check that parts manufactured are within tolerance.

It is rather heavier than the usual 0 to 1in. imperial micrometer and the thimble and locking lever are fairly standard but the anvil is spring-loaded and can be moved by pressing the button below the thimble. The scale is graduated in tenths, and the cursors can be moved independently by the central screw and locknut. The makers name on the escutcheon is ETALON and Made in Switzerland and a number 2578 is stamped on the frame.

I have browsed various catalogues and have seen nothing similar.

Arthur Bellamy, W. Yorks.



Arthur Bellamy's unusual micrometer.

many years. For me, in terms of time spent over the years metalworking comes a poor second to live sound recording, as engineer not performer, some featuring on the BBC. In terms of interest, it is second to cabinet making but there is a limit to how much furniture one can cram into the average home. I am sure though that there are many others who like to spread their time over a range of activities.

When I became editor of *Model Engineers' Workshop*, incidentally as a result of writing an article about the milling cutter chuck, I soon became aware that the majority of readers had come from non-engineering backgrounds and still considered themselves novices in terms of using metal working machines. Such readers were typically musicians, bank managers and ministers of religion.

Of probably greatest importance is that no right-minded novice metalworker with his newly acquired workshop would take on a locomotive or traction engine as a first project. Even the smaller stationary steam engines require quite some know how to achieve

a reasonable result and are quite pricey for a project to start learning on. What better then than a few simple tools to hone ones skills. At the same time, he or she will be equipping the workshop to better take on more adventurous projects as time and ability becomes available. Also, if like me, at least initially, the workshop owner has stretched the budget to the limit the workshop will increase its facilities with only limited extra cost.

There are of course also items that cannot be obtained commercially, examples in my workshop being typically a faceplate balancing fixture, saddle stop, controlled feed tapping stand and multi purpose grinding rest.

Finally, those who visited the exhibition and who do not read the *Model Engineers' Workshop* can be forgiven for saying, that's okay but why does he have to make so many chucks, vices and angle plates, etc. Well the answer to that one being that almost all the items exhibited were made to provide articles for the magazine and made using different techniques, workshops with and without a milling machine for example.

Harold Hall, via e-mail.

Evening classes

SIRS, - A while back you kindly inserted an announcement regarding the closure of the Model Engineering course here in Scarborough and the possibility of running a model engineering course in the future. Well the story so far is as follows; I recruited 12 local model engineers and arranged to hire the Yorkshire Coast College workshop and a member of staff for ten evenings before Christmas and ten evenings after Christmas. The cost is £2,093, not a small sum, nevertheless all the members paid up front and we started last Tuesday evening. The college wasn't at all helpful, but I won in the end.

Two members are making James Beggs bottle engines, one is making attachments for his woodworking lathe, and another is completing his traction engine, which was on show recently at both the Harrogate and Pickering Model Engineering Exhibitions, so we all are very busy on one project or another.

As well as being enrolled on the above course, five of us (all retired) have enrolled on a basic numeracy computing course, organised by 'Learn Direct', a government agency. We think the idea is to get people back into work by teaching them new skills and once they are up to standard and have completed the course, find them a job (in our case no chance, we are too busy in the home workshop). Apparently if Learn Direct hasn't got a course available which appeals to you, then they will give you, so we are told, a £100 towards course fees on a course of your choice.

As to be expected our choice will be Model Engineering. Should any reader consider organising a similar course to the above and feel I could help just contact me via the Editor.

John Fletcher, by e-mail.

Primus jets

SIRS, - Louis Parke asked for a source of Primus parts (M.E. 4308, 14 September 2007).

I understand that these are

obtainable from The Base Camp, The Old Bakery, Clifton Road, Littlehampton, West Sussex BN17 5AS (T. 01903-723853, www.base-camp.co.uk)

The company also sells Optimus stove parts.

Peter Cox, Devon.

Primus jets (2)

SIRS, - I believe Primus were taken over by an American company called Coleman, who may be able to help, and they are at <http://www.coleman-eur.com>

T. Drabble, S. Yorkshire.

Electromagnetic induction

SIRS, - I would like to reply to Mr. Wright's letter in M.E. 4305, 3 August 2007. I agree with his remarks concerning an electric current, apart from the contention that when an emf is applied to a circuit its effect is felt instantaneously throughout the circuit. I quote from Herbert & Procter's *Telephony*:

"The time t of propagation in microseconds per mile (of an electrical wave) is given by $t = 10^6 \sqrt{LC}$, L being the inductance per mile in Henries, and C the capacitance per mile in Farads."

I fear that Mr. Wright has rather missed the point of the final paragraph of *Letter to a Grandson No. 101*. What I was trying to say succinctly was that I could understand both electricity and magnetism on their own; what I found mysterious was the subtle interaction between the two. He is correct as regards what is observed to happen, but I am not satisfied by his explanation of why.

He postulates that every electron has its own magnetic field by virtue of its spin, I accept that if electrons went round and round in a circle like horses on a roundabout they would constitute an electric current, and give rise to a magnetic field linked with the circle; but I question whether a single electron could magnetise itself in the same way. The more so, if, as a physicist told me, "An electron is a bundle of waves in probability".

Another stumbling block is



More on energy saving lamps

SIRS, - Maybe the following might be useful, concerning how to use small quartz-halogen lamps; I was unable to find suitable types of lamp fittings to install in the workshop so I ended up making some. Hopefully the photos show enough detail to allow readers to make their own, usually with whatever is in the scrap box. The main three electrical items needed are the mains transformer with a 12 volt A.C. output, the quartz-halogen lamps and a holder to fit the lamps. Maplins stock some very useful items for this 'quickie' project.

Transformer code number VJ 12 N, price £9.99.
Lamp (type MR 16) code number AB 74 R, price £2.49.
Lamp Holder code number VJ 11 M, price £2.49.

The transformer is rated 50 VA which suits two of the above lamps perfectly. The lamps are rated at 20 Watts each. For a resistive load such as that for a small lamp, VA or Volts x Amps is virtually the same thing as power expressed in Watts. Maplins also stock smaller size lamps (type MR 11) for example code number L 80 AN or SK 43 W and a suitable holder, code number KJ 77 J.

The equipment is fitted in the workshop roof over the bench, and has been moved several times over the years, it has lasted a very long time and the lamps have never fallen out but they could be clipped in with a small bent wire clip if anyone was worried. The transformer does not get hot and the lamp-holders have plenty of air space to let any heat dissipate. The swivels for pointing the lamps could have been a ½in. bronze ball clamped each side, but I did not have one on that day, so two 'universals' were made from ¾in. square brass. The rods joining them together are ¾in. dia. brass, bronze or steel. Mine were threaded ¾in. x 40tpi. These are silver-soldered into the brass base plate, brass was used because there was a piece in the scrap box on that day. The copper tube shown is 1½in. dia. and has a length of 1¼ inches. No, it is not painted; this was a 'quickie'. There are two similar lamps over the lathe. The local DIY supermarket sells quartz-halogen lamps as does the local Tesco, (look very carefully; there are many types and sizes). The assembly is usually covered by a piece of plywood. Although not visible in the photos, there is a separate earth wire to the brass plate, just for safety. Hopefully, this may be some use to anyone who is starting to notice that the workshop lights seem to be getting dimmer!

I would also take this opportunity to say thank you to Mr. Keith Roper. You published a letter and a photo from him in *Post Bag* (M.E. 4309, 28 September 2007) concerning my boat *Julie Anna*. The information was gratefully received.

Martin Ranson, Yorkshire.



Martin Ranson's low voltage workshop illumination kit.

that if electrons are indeed little magnets, why do they repel one another, when it is open to them to join up head-to-tail in rings, rather like the carbon atoms in a benzene molecule?

Whatever the anatomy of an electron may be, it seems to me to be irrelevant. If an electron is in a magnetic field, whether moving relative to it or not, and, for whatever reason, a force acts on it due to the existence of the field, surely that force could only act in the direction of the lines of force. (Gravity does not cause bodies

to move horizontally). Yet there is no denying that the force on the electron is at right angles to the lines of force, and therein lays the mystery.

Could it be that electrons do not obey Newton's laws of motion?

A grain of sand does not act in the same way as sand *en masse*.

At least, Mr. Wright's theory has the great merit of endowing the electron with both electrical and magnetic properties, I assure him that I appreciated hearing

his views, and seek only to arrive at the truth, if, indeed, such a thing is possible.

M. J. H. Ellis, Bristol.

Metrication

SIRS, - So the 'Eurocrats' have kindly allowed us to keep the Imperial standard Inch. What a laugh, what they have actually done is to get themselves out of a very embarrassing situation.

At the end of World War Two, the Allies decided that such a war must never be allowed to happen again, so

they formed NATO; The North Atlantic Treaty Organisation.

During the talks to form NATO it was agreed that in future members should aim to have their equipment interchangeable. To achieve this it would of course be necessary for NATO to have a standard screw thread system.

At that time the whole of Europe was swamped by American military equipment, trucks, jeeps, cars, tanks, and much else, all held together by standard American screw threads.

It was decided that NATO would adopt the Unified system, which is of course an inch system, and interchangeable with US threads.

So ever since the 1950s NATO Equipment has been held together by UNIFIED imperial Inch, nuts, bolts, and screws.

If the Eurocrats had made it illegal to work or trade in Imperial units, NATO would not have been able to produce or buy spare parts or tools. How embarrassing that would have been.

D. Collier, Bristol.

Camera tripod threads

SIRS, As a small footnote to the recent correspondence on photographic equipment threads: I have a Universal Combination Stand (UKV in German) manufactured by ROWI, made in 1958, in which all the major items have the ¾in. Whitworth thread. Also included are several adapter bushes with a ¼in. internal and ¾in. external thread, plus an adapter for mounting a camera with the ½in. thread onto the other items. There is also a wood screw for mounting on posts or trees.

A number of auxiliary items, e.g. carrying case, chest-pod harness, ground spike were available.

I would suggest that one reason for the adoption and continued use of the Whitworth thread in photography could be that a coarse thread is quicker than a finer one and easier to manipulate in a hurry, in the dark, or with cold fingers.

P. W. Mercer, Berks.

CENTENARY MODEL ENGINEER EXHIBITION

Class A5 – Tools and Workshop Appliances Geoff Sheppard

The Tooling section of the competition was reasonably well supported this year, with an interesting variety of accessories being shown. Interestingly, a number of these were intelligent adaptations of pieces of commercial equipment, pressed into service to carry out tasks which the originators are not likely to have anticipated, such is the ingenuity of the members of our fraternity.

However, the first item on the list was a straightforward fabrication job from bar stock in the form of a spherical turning tool of the increasingly popular 'up and over' variety, seen in **photo 1**.

Designed to be fitted to the lathe tool post, it incorporates a dovetail tool slide which allows the radius over which the cutting tool operates to be varied to produce a variety of balls and sockets. Well constructed and finished, it earned Allen Ramsay of Northwich, Cheshire a Highly Commended Certificate.

Nicholas Farr of King's Lynn, Norfolk brought two items, the first being described as

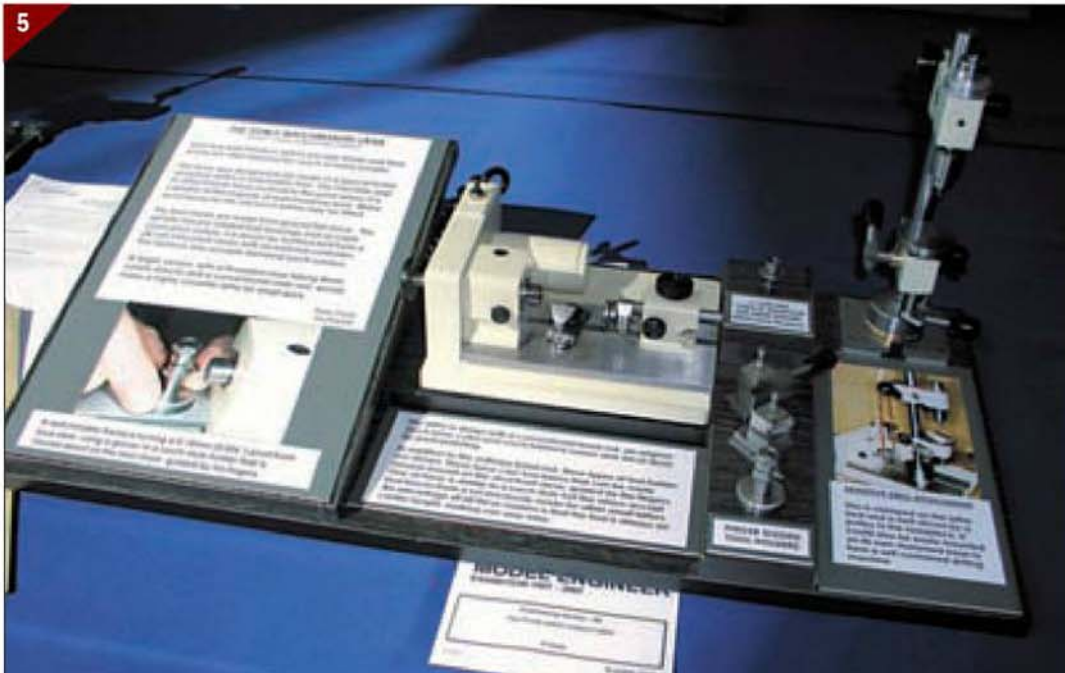
a 'Bench Mountable Drilling Station'. It consisted of an elderly Bonds 'Maximus' drill press supplemented, after renovation, by a drive motor and control system mounted on a base unit such that it is now a self-contained portable unit. Now capable of being secured to any flat surface, it makes a very versatile piece of equipment, deserving of a Commended Certificate.

Mr. Farr's other entry was a speed-reducing unit for a Chester 'Champion'



mill-drill. The ability to operate the widely available small milling machines at lower spindle speeds can greatly enhance their utility, so devices of this type are well worth spending a few hours in the making. This one appeared to be based on commercially available components and was a workmanlike addition to this popular and useful machine. It was awarded a Highly





Dr. Peter Clark of Southwold, Suffolk. Christened the 'Fonly Watchmaker's Lathe (from "Fonly I had one of those")', it was a beautifully crafted, fully fabricated small lathe, complete with sensitive drilling attachment. See **photos 5, 6 and 7**.

The bed is formed from ground flat stock steel mounted on an aluminium plate bed and the HE30 aluminium headstock supports a spindle running in pre-loaded ball bearings. This spindle accepts Lorch 6mm collets. The tailstock body is machined from cast iron and accepts standard Lorch runners, one of which was shown with a Lorch Jacot drum for pivot polishing.

A conventional hand tool rest is designed to use 7mm T-rests, but the lathe can also be used with the finger guided tool holders which we have seen featured on some of Dr. Clark's previous entries.

Presented, as always, in Dr. Clark's immaculate style, this entry was awarded a Bronze Medal.

Commended Certificate.

Another entrant with two items in the competition was Ken Willson of Fleet, Hampshire. The first entry was a device designed to overcome a problem experienced by many home workshop owners, especially those with taller milling machines such as the Bridgeport, namely the task of tightening and slackening the spindle draw bar. Mr. Willson's solution, shown in **photo 2**, employing a concept originating in the USA, was to use an adapted air wrench from which the air control has been separated and re-connected with flexible pipework, allowing remote relocation. With an air supply at around 60 psi, a quick touch on the control causes the wrench to be moved into engagement and the $\frac{3}{4}$ in. socket to rotate in the appropriate direction, so rotating the draw bar. The judges decided that this entry was worthy of a Very Highly Commended Certificate.

Mr. Willson's other entry was an experimental design of lathe top slide (**photo 3**) into which the electronics of a digital read-out system have been fully integrated. The top slide on display, incorporating a rotating base, has been machined from solid and features a leadscrew running between needle thrust bearings and which

mates with an adjustable split nut, thus allowing backlash to be minimised. The system was connected to a display unit loaned by Newall and visitors were invited to try the operation for themselves. It is hoped, with further development, to produce a unit suitable for use with the Myford Super 7. This interesting piece of experimental work was awarded a Highly Commended Certificate.

An unusual entry in this category seen in **photo 4**, was a pattern for a casting for a belt guard intended for fitment to a modified Stent tool and cutter grinder. The maker, Mr. Derek Lampard of Somerton, Somerset is obviously a skilled woodworker because the built up and laminated pattern

is a very decorative item in its own right. This pleasing object was worthy of a Highly Commended Certificate.

The final item in this class was the latest welcome offering from a stalwart supporter of this competition,



Class A6 Clocks Stan Bray

Examples of clock making are always popular exhibits at the exhibition and there seems little doubt that the construction of clocks is becoming more and more popular in the hobby. Unfortunately, the very nature of the finished product makes it extremely difficult to either enter them for the competition, or exhibit them in the loan section. Imagine the difficulty involved in transporting a long case clock (grandfather to the uninitiated) and then setting it up with the possibility of having to regulate it as well. Even smaller examples are a problem as they are far from easy to transport and they also need to be set up, in the case of competition models this includes regulation so that reasonable time is kept, it is all a long and involved process and anyone exhibiting is to be applauded for doing so.

This year there were six examples to be admired by visitors, four of which were



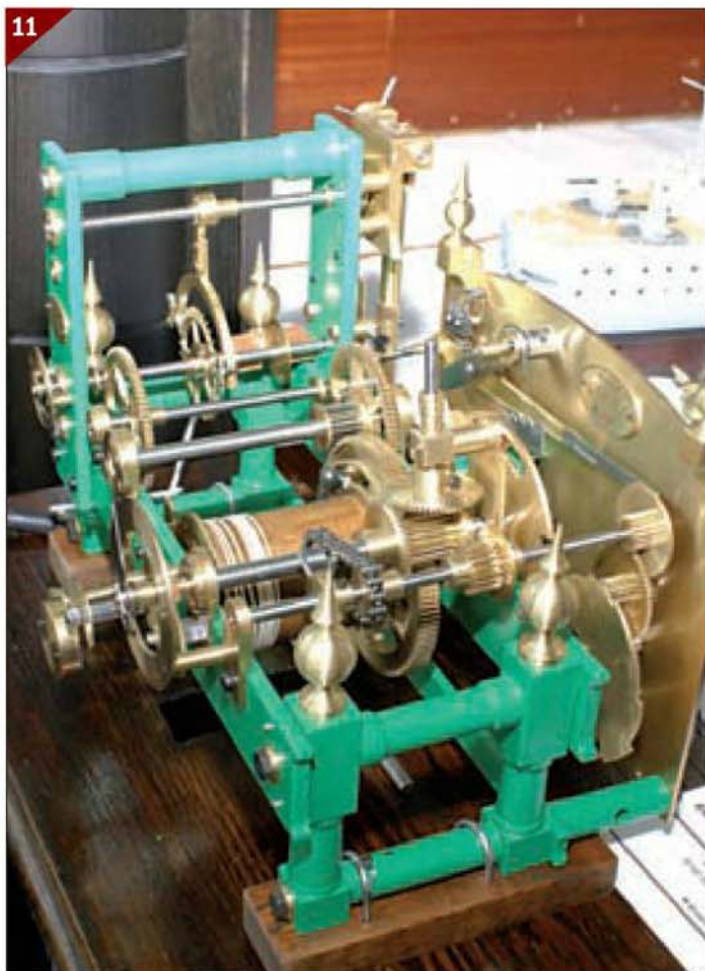
entered in the competition.

Kenneth Allum entered an example of a skeleton clock shown in **photo 8**, based on articles in *Model Engineer* by John Stevens, it had one strike to every hour and was a good example of that type of clock. The constructor had purchased the glass dome that covered the clock and had also purchased the fusee, otherwise it was all his own work. The teeth on the wheels

were particularly cleanly cut and the edges were square, demonstrating that a great deal of care had been taken with this aspect of the work. In addition all fastenings had been expertly blued, giving a nice finish to the movement. Another nice touch was a personalised key. Unfortunately the builder had rather let himself down with machining marks visible on the drum and the base. It was, nevertheless,



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a very worthy effort and earned sufficient marks to be awarded a Bronze Medal.

Peter Hitchin showed an unusual example of a Ferris Wheel Clock based on a series published in *Model Engineer* but with many modifications of his own (photo 9). The clock works on electrical impulses created by a steel ball dropping on to a pair of contacts, causing a single revolution of the movement and at the same time ringing a bell and ejecting the ball, which is returned to the holding chute. The supply of balls is housed in a vertical chute at one side of the movement. The Ferris Wheel arbor carries 200-tooth wheels, one on either side of the main wheel. These wheels engage 25-tooth pinion wheels attached to the centre arbor. The escapement wheel was made of titanium and the pallet nibs tungsten. Four AA-size batteries drive the movement which was housed in a very nice home made case. The finish on the whole was very good

but slightly spoiled by rounded edges to the wheels and frame. Nevertheless, it was a very worthy piece of work and was awarded a Silver Medal.

Wally Brown travelled all the way from Wales to enter his small tower clock that was based on a design by John Wilding, we should be grateful to him for allowing us to see a very fine piece of work. He has named it 'Lofty' and made a number of modifications to the original design, including the fitting of small ball races in place of the more usual pivots. The movement is designed to drive an exposed dial two feet in diameter that was not shown, no doubt because it was not practical to do so. It had also been adapted to drive a remote dial and a large bell with automatic night silencer, this being done with an electrical mechanical arrangement. The frame of the movement was fabricated from mild steel and was nicely finished and painted in the style one would expect a tower clock to be. The general standard of workmanship was

high, as can be seen in photos 10 and 11, and it was awarded a Silver Medal.

The fourth exhibit was a Munday style clock with a large balance wheel, again based on a John Wilding design and was entered by Roger Castle-Smith (photo 12). It was accompanied by a very comprehensive manual showing the construction that no doubt was read by a large number of visitors to the exhibition. The clock is electrically-driven and normally powered from a battery backed mains transformer. For the purposes of displaying it at the exhibition the builder had supplied batteries housed in a Sainsbury's tea box, for which he begged forgiveness, which we gladly do. This movement also had ball races rather than the more normal type of pivot. The workmanship was exceptionally high and places and parts not seen in normal circumstances were finished to the same very high standard.

It is fair to say that the overall polish of the parts had to be perfect as the builder had then gone to the trouble of having them all gold plated and any unwanted scratches would then have become only too obvious but there were none. Of particular note was the very fine chapter ring that had been designed by the builder but printed commercially from a CAD file he supplied, the design was completely in keeping with the overall appearance of the movement. One of the very finest examples of workmanship ever seen at the exhibition, it was awarded a Gold Medal and the Claude B Reeve Trophy. (Ed: Roger has promised us an article on how the finish was achieved)

In conclusion one can only say how good it is to see a steadily improving standard being demonstrated, and to pay tribute to John Wilding who has been largely responsible for it happening.

M.E.

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STUART MODELS SHAPING MACHINE

PART 1

Anthony Mount describes the shaping machine designed to complement the range of models of early 20th century machine tools marketed by Stuart Models.

I have already described the building of a Stuart Models miniature lathe and drilling machine, I am now able to follow it with a description of the shaping machine from the same family of models. As with the lathe, I worked with Stuart Models in developing the shaping machine. It forms part of a series of model machine tools that can be built up into a beginning of the 20th century workshop powered by a suitable Stuart steam engine.

Those who have seen the Stuart stand at recent exhibitions will be aware that their miniature workshop makes a splendid feature. With line shafting driving the

machine tools it conveys a good impression of what it was like in a steam driven engineering workshop of the period.

The model is of a medium size shaping machine as used for general work. It has been kept as straightforward as possible; drive is by overhead shafting via flat belt to the drive pulley. The parts have been designed to be fairly robust, but as always in building models some are quite small.

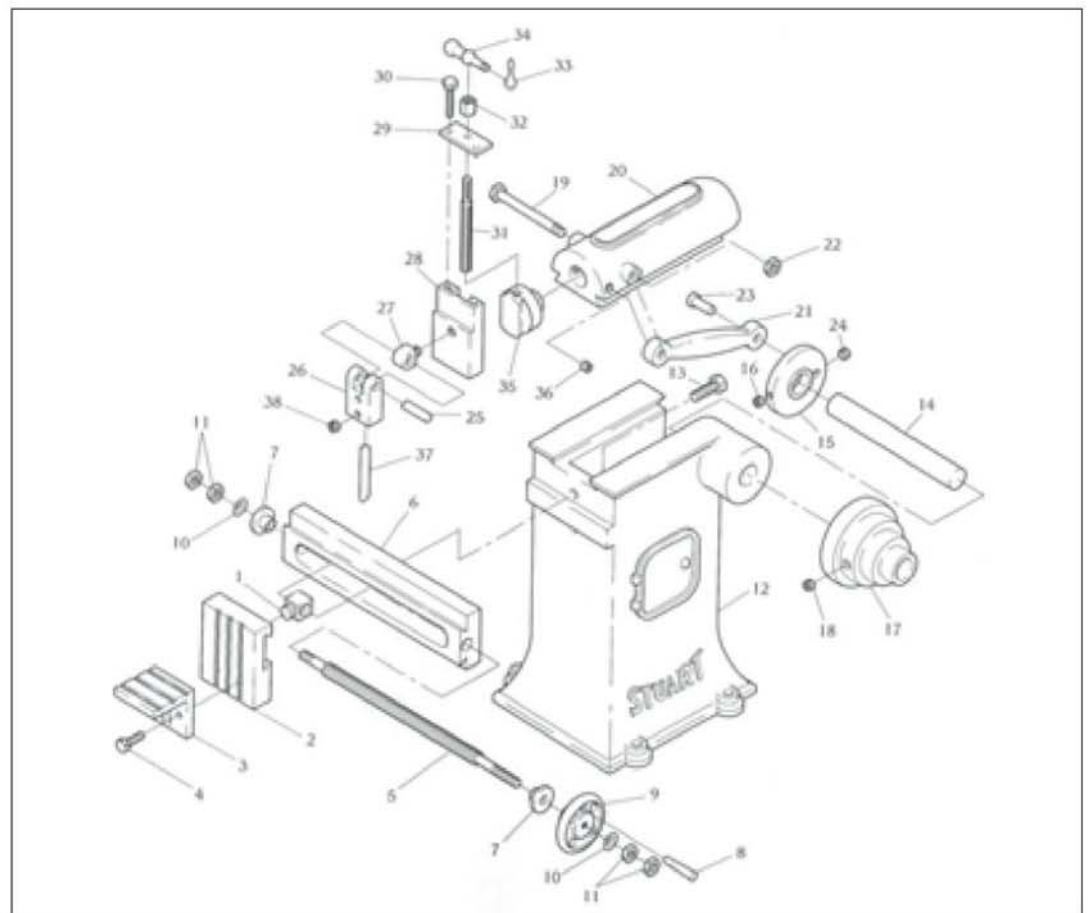
The full-size shaping machine was used for machining flat surfaces with a single-edged cutter something like a lathe tool. The machine was simple, accurate and comparatively cheap, and did much work

in conjunction with its larger brother the planing machine until overtaken by the quicker milling machine.

The invention of the shaper is attributed to James Nasmyth who also invented the steam hammer. The planer has a number of claimants for its invention including, Watt, Clements, Murray, and Roberts. They probably all had the idea independently. Turning a round object on a lathe was easy but the production of true plane surfaces was much more difficult.

Until the planer and shaper came along the fitter had to use a hammer and chisel followed by filing and then scraping to a surface plate. You had to

1 and 1a. The finished model





make the surface plate first and this was done by making three stimulatingly - scraping all three to each other to avoid one, say, being concave fitting another one that was convex.

The planer and shaper greatly reduced the cost of making flat surfaces. It is recorded that Matthew Murray kept his planer in a locked room so important was it to the profitability of the company.

Three iron castings are supplied in the kit, plus all the bar sections, screws and drawing sheet. Instead of running through the parts consecutively I will start with the castings as they are in iron and I find it a dirty material to work with, so lets do them first and get them out of the way.

after which the lathe and milling machine can be cleaned down and the rest of the work done in a clean environment.

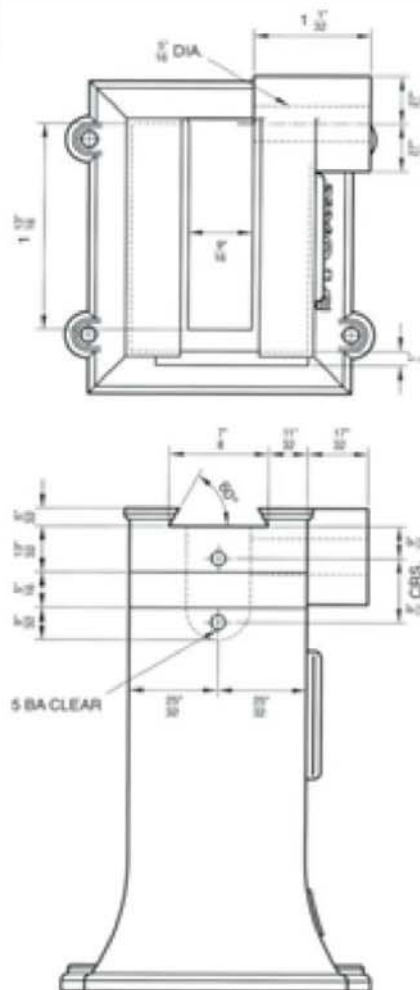
As an introduction to the model, **photos 1, 1a and 1b** show the completed shaping machine. Stuart Models have allowed their drawings to be used with the article. One small point concerning the drawings, those who have followed my articles on stationary steam engines will know that those drawings are in 1st angle projection. The drawings for the drill are mostly in 3rd angle projection where there is a need for more than one elevation.

The dimensions are in imperial, which was quite a culture shock for me being used for many years now to the ease and simplicity of metric. So my first job was to convert from strange things like 1½in. to numbers my machines could understand.

Main frame (part 12)

The main frame is a box like iron casting and the one I had was a very nice clean casting with good definition, and it needed very little cleaning up. All the machining of the base can be done on the vertical milling machine.

First problem was how to hold it. As can be seen in **photo 2**, long lengths of studding and packing were used to clamp the casting down to the milling machine table with a small piece of plywood between casting base and table. This protected the milling machine table from the casting, which although filed flat on the bottom had not yet been machined.



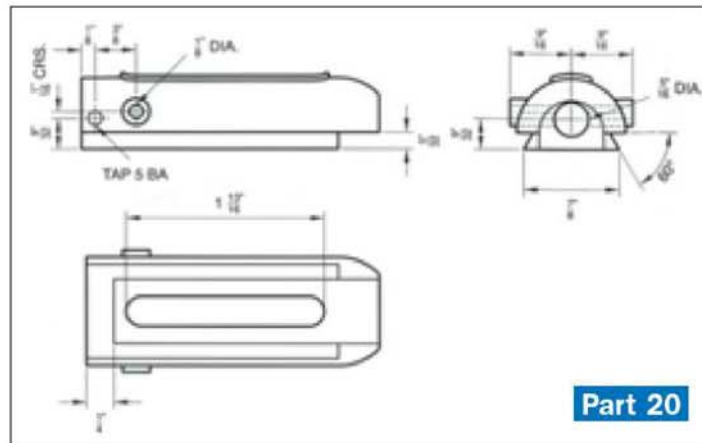
A cut was taken off the top to bring it level with the boss on the right-hand side as viewed from the front of the machine. The end mill was then used to form rebates at the centre and then the side of the cutter was used to face off the boss which is the operation being performed on **photo 2**.

The side of the cutter was used again as shown in **photo 3** to face off the front of the support strip that carries the

slide. The cutter was changed for a dovetail cutter to form the guides for the ram as can be seen in **photo 4**.

The frame casting was then turned upside down and a cut taken across the bottom to true it up. While in this position the holes for the fixing bolts can be drilled. It could then be held in the machine vice, by the ends, for drilling the two holes at the front to take the table. Then the casting was rotated through





90deg. and the $\frac{1}{16}$ in. hole drilled and reamed in the boss. The centre of the hole was located with an edge finder off the perimeter of the boss and the centre located with co-ordinates.

For anybody new to our pastime let me explain about co-ordinates. One can mark out positions of holes on castings and plates by using a rule, vernier height gauge and scribe on a surface plate. But for many jobs I find this a chore and prefer to make up a little chart with the positions of the holes all located from one position, usually the corner of a job. The corner can be located in relation to the machine spindle by using an edge finder and the dials zeroed. It is then just a matter of turning the handles of the slides and reading off from the dials the co-ordinates to locate the positions of holes, which can then be centred and drilled. If you have the luxury of digital read out then the job is even simpler. **Photograph 5** shows the completed base frame masked and primed.

Ram (part 20)

The ram is supplied as another iron casting and at first glance seems impossible to hold due to its rounded surfaces. However, using the T-slot in the milling machine table as a cradle solved this and with two Allen screws through the slot into T-nuts it was securely clamped to the milling machine table, as seen in **photo 6**.

An end mill was used to take a cut across the bottom face to clean it up and then to machine rebates in the sides. A change was made to a dovetail cutter to machine the guides, see **photo 7**. A word of warning here, there is no adjustment of the fit by the use of a gib strip as the model is too small for this so a good fit is required between frame and ram.

Machine until just a little over size, then take cuts of small increments until the frame just starts to go on, stop at this stage. I find cast iron a strange material when trying for good fits, for example between shaft and flywheel. You think you have a good fit and then after you have tried the shaft in a few times it

becomes loose. When machining cast iron a fine dust is released and some of this sticks to the side of the bore and after trying in the shaft a few times you have removed the dust and the fit tends to become loose.

The same can happen with the ram. Push on the frame, remove it and try again. All of a sudden you find the tight fit is now much easier and the frame goes on for the whole length of the ram. If it does not, nothing is lost as another thousandth of an inch can be taken off and the fit tried again. It is easier to take off metal rather than try to put it back on again.

Also the dovetail cutter does tend to leave sharp edges and it is easy to think you have a good tight fit. However, on holding it up to a light source and looking down the joint you will see that the points of the 'Vs' are touching the roots but that the flat surfaces are not in contact. So the sharp edges of the dovetails need to be filed away

to allow the flanks to bed down truly. So leave oversize and remove the sharp edges before trying for the final fit.

The ram can now be held in the machine vice (see **photo 8**) and the side of a small end mill used to face off the bosses for the drive bolt. The ram can now be 'up ended' in the machine vice as shown in **photo 9** and a hole drilled in the front face that takes the slide spigot. The completed ram, masked and primed, is shown in **photo 10**.

● *To be continued.*



Two Contemp

Roger Bunce describes and compares two 'modern-looking' regulator clocks in terms of design, function, aesthetics and materials used.

My career was in machine tool design and medical engineering research. I began making clocks about 25 years ago to designs by John Wilding. After retiring, I studied Horology for three years full time at the University of Central England (UCE).

My current horological interest is the design and construction of 'modern-looking' pendulum clocks. In

particular, clocks where the aesthetic appearance owes more to Bauhaus, Art Deco and Scandinavian design than to clocks of the 19th century. I am also interested in functional innovation, modern materials, and in the use of computer modelling to optimize performance. My design aim is to simplify and integrate both mechanism and aesthetic aspects to maximise the visual impact. Accurate time keeping is obviously important. In this respect, inspiration comes from innovators of the 20th century including Riefler, Hope-Jones, Shortt, Fedchenko, Woodward, Arnfield, Matthys and Stephen (refs. 1 – 8). I admire the work of modern clock designers including Forrest, Burnett, Hunkin, Plant and Kazes (refs. 9 – 13).

I am also interested in clock longevity and ease of maintenance. In this respect, well-tried mechanical, or electromechanical, systems are often better than their electronic counter parts. This is exemplified in the two very different 'modern' clocks described in this article: Firstly, a table regulator involving complex electronics and, secondly, a wall regulator using Hipp's toggle and very simple electrics.

Table Regulator B1

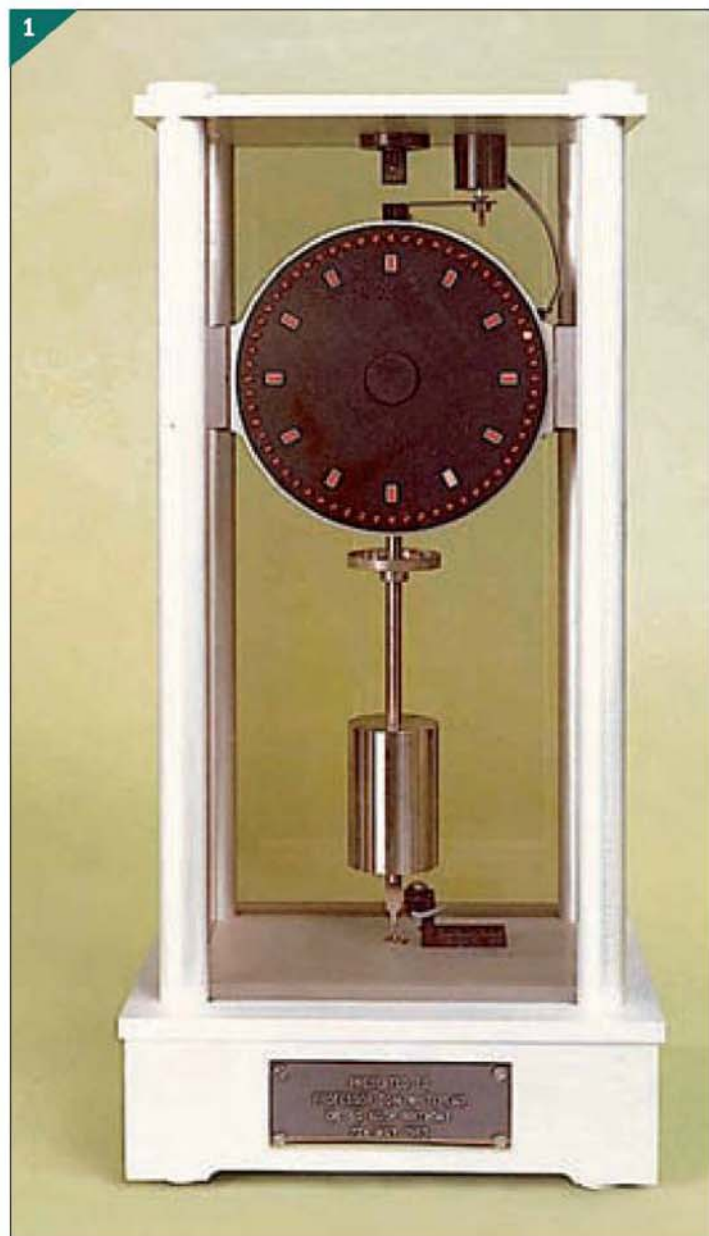
This is a mains-operated regulator combining pendulum and microprocessor technology (**photo 1**). I designed the regulator in May 1983. It was made by the Engineering Staff, Wolfson Research Laboratories, University of Birmingham as a 60th birthday present for Professor Thomas Patterson Whitehead CBE, who was founder and director of the laboratory.

The case is made from clear anodised aluminium and brown tinted glass. The dial

is black anodised aluminium and the time is indicated by red LEDs. An outer ring of 60 round LEDs indicates minutes and seconds. An inner ring of 12 rectangular LEDs indicates hours. All the LEDs in the inner ring are illuminated. A brighter LED in the inner ring indicates the actual hour. The minutes past the hour are indicated by illumination of a single LED in the outer ring. Seconds are indicated by sequentially pulsing LEDs, in the outer ring. The time shown is 12 minutes past five but is not easy to see in the photograph.

The Regulator has a half-seconds temperature compensated pendulum with Invar rod and stainless steel bob. Secondary compensation is achieved using a bronze tube within the bob. Total swing of the pendulum is maintained accurately at 2deg. using an electromagnetic gravity escapement with optical feedback. Impulse is provided by a small permanent magnet which, for the most of the time, is held vertically in a PTFE tube, in the field of an 'ironless' electromagnet. When the lower end of the pendulum rod breaks the infrared light beam of an optical sensor, the magnet falls onto a bronze impulse arm. The magnet is retracted at the mid pendulum position by a signal from the microprocessor.

Initially, the permanent magnet was provided with a bronze upper banking screw so that the 'drop' was independent of magnetic forces. However, after several weeks, the magnet defied gravity and attached itself to the banking screw! This was thought to be a fretting effect but was never fully investigated. To overcome this problem the banking screw was removed so that the magnet now 'floats' within the magnetic field. The escapement is virtually frictionless and,



Library Clocks

because the impulse magnet is so light, it must never be oiled. Timekeeping is about a second per week and regulation is achieved using a weight tray fitted to the pendulum rod.

Bearing in mind the reason for making the Regulator, it was entirely appropriate that it should be an interdisciplinary effort involving all the Engineering Staff. It was for this reason that the hybrid design was chosen. However, the problem with this approach is that electronics can be unreliable and specialist components can quickly become obsolete. In addition, such systems are very difficult to repair without full documentation and without the original computer system used to program the microprocessor. For this reason, the next clock to be described - the Wall Regulator B2, uses Hipp's toggle.

Wall Regulator B2

This regulator has an illuminated dial and mechanism (photo 2). It was designed and made as part of my full time Horology course at UCE, completed in June 2006.

I had limited time in which to design and make the regulator and be sure it would work first time and so I chose a design based on Hipp's toggle. This was invented by Matthäus Hipp in 1843 (ref. 14) and has remained in the clock maker's repertoire ever since through the endeavours of people including: Marshall, Kinoscans, Jones and Wilding (refs. 15 - 18). Indeed, the concept proved so reliable that the GPO used it in their Type 36 Clock in all UK telephone exchanges from the 1930s-1980s (ref. 19). However, the UCE course required there to be some 'original' design content - the remainder of this article describes that.

The minute and hour hand follow the normal regulator layout but this is achieved using an unusual integrated hour hand and motion work (photo 3). This was thought to be novel but was later found to be described by Moons & Van Hoof in 1986 (ref. 20). The time shown on the photograph is five minutes past three o'clock and just over 30 seconds. Like many clock makers, I like the concept of a gearless clock. This motion work goes some way towards this. Conventional motion work comprises cannon wheel (or pinion), minute wheel and pinion, and hour wheel.

This 'new' motion work uses what is essentially a friction drive between an internal wheel and a roller. The internal wheel, which is in the form of an annulus, also forms the hour hand. In my example, the minute roller is 6mm diameter and the internal diameter of the hour hand 72 (to give 12:1 reduction ratio). However, one cannot guarantee that 72 is exactly 72 or the 6 is exactly 6. In other words, there needs to be a means of preventing the hour and minute hands getting out of synchronisation.

This is achieved by a single tooth on the minute roller acting sequentially on 12 notches in the hour wheel. Actually, the single tooth is merely a 1.5mm

dia. rod, half of which is below, and half above, the periphery of the 6mm roller. The 1.5mm rod is held in place by holes in the roller flanges. Hence, every hour the minute and hour hands are re-synchronised.

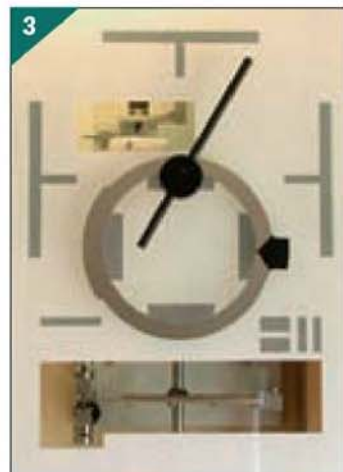
The other condition, which must be satisfied, is that the hour hand must be balanced so that it always hangs vertical. Incidentally, the minute hand is also balanced - the long part is made from aluminium and the short part from silver steel. This motion work works surprisingly well and there have not been any problems in the last year. The regulator also indicates quarter minutes. These are engraved on the periphery of the ratchet wheel, which is seen through a 'window' in the dial.

It was not my intention to make a conventional dial with Roman or Arabic numerals. My aim was to arouse interest, challenge the observer to read the time, and hopefully to look at the mechanism. The dial is made from Perspex. A mains operated 9W lamp illuminates both dial and movement.

The geometry of the dial was achieved by masking and spraying, using automotive acrylic paint, on the reverse side. Clear windows in the dial allow the ratchet mechanism, quarter minutes, and the Hipp's toggle mechanism to be seen.

The gear train is turned by the $\frac{3}{4}$ seconds pendulum using a ratchet wheel and click. More specifically, the ratchet wheel is mounted vertically and turns a single start worm on the same arbor (photo 4). The ratchet wheel has 40 teeth. The worm engages a 60-tooth worm wheel which drives the minute hand via a hand-setting fiction clutch.

This arrangement is simple and reliable and dates back at least 60 years (ref. 17). I decided to design the ratchet and toggle mechanism to give



a pendulum amplitude of about 5.5deg. total swing. This is smaller than normal for this type of clock. I think smaller amplitudes are more relaxing to watch and circular error is also less. Both mechanisms were mathematically modelled using MathCad Software (ref. 21). This software platform saves time and takes the monotony out of repeated calculations. Also, because it uses numerical as well as symbolic methods, it can be used to solve equations which would otherwise be difficult to solve.

The accuracy is 15 decimal places which is more than adequate for my purposes.

The Hipp's toggle has a hardened silver steel V and trigger (photo 5). The V is the only part of the clock



which is lubricated (Moebius 8040 oil). It is known that the trigger of Hipp's toggle can occasionally balance on a point of the V and then fall off with a slight 'bong'. In the initial trials this happened quite regularly – perhaps once every 5 to 10 minutes whereas, in commercial clocks, e.g. Type 36, it happens rarely. This was traced to the V being too soft.

Originally the V was hardened by oil quenching. I would have preferred water quenching (greater hardness) but was concerned about cracking - but now I had to take that chance. Water quenching cured the problem but the V cracked in the process! The Type 36 Clock is reputed to have a V made from agate, which is a natural material. I intend to change the V

material to synthetic sapphire, ruby or tungsten carbide. The 'precious' materials are surprisingly cheap but the shapes and sizes are restricted to jewellery forms (ref. 22). Tungsten carbide, on the other hand, is available in a range of sections including rod (ref. 23).

The toggle operates the electrical switch in the normal way. I chose silver for the contact material simply because it is relatively inexpensive and should be readily available for many years to come. Regarding spark suppression: I succumbed to using a silicon rectifier across the contacts. After a years continuous operation the contact regions remain clean with no sign of sparking.

For reasons explained earlier, I would have preferred to avoid electronics, but could not think of a better alternative. However, as a precaution, spare components are kept in the lower compartment of the clock. The operating voltage is 3V from two 'D' Type Duracell batteries. The toggle operates about every 16th swing of the pendulum (12 seconds). The batteries have lasted a year so far.

The pendulum has an Invar rod (ref. 24) and stainless steel bob (photo 6). Secondary compensation is provided using stainless steel as part of the bob. Again, the pendulum was mathematically modelled using MathCad Software. This takes much of the uncertainty out of the design and MathCad makes light work of the 40

or so variables involved. The regulating nut has a 0.5 pitch metric thread and 27 notches around the periphery. Moving the nut one notch alters the timing by about a second per day. The rating nut is fitted with a locking device à la Reifler. A weight tray is used for finer regulation and a calibration chart, in the base of the clock, gives the time change/weight relationship. The pendulum is fitted with an armature at its lower end and this is impulsed using an electromagnet in the normal way.

I have erred away from traditional materials and finishes. The plates are aluminium alloy (HE30), bead blasted and clear anodized (ref. 25). Incidentally, aluminium alloys with a high copper content do not anodise well (the surface becomes darkish grey rather than bright). The contact posts are brass, bead blasted and satin chromium plated (ref. 26). The ratchet wheel and worm and wheel where made from white polyacetal (Delrin) (ref. 27), and are not lubricated. Worm and wheels are not easy to make properly without specialist gear-cutting equipment and I used standard 'off-the-shelf' components costing about £30 for the pair (ref. 28). The bushes were made from Polyetheretherketon (PEEK) Bearing Grade and, again, are not lubricated. This material is not easy to machine – it 'rags' and blunts HS tools quickly.

I would probably use Delrin AF (bearing grade of Delrin) in future because it is easier to machine (ref. 29). Alternatively, I would seriously consider the use of ball races (ref. 30) - the long debate, regarding their use in horology, appears to be resolving in their favour.

Steel parts, not required to be hard, were made from free cutting stainless steel (Type 303) (ref. 27). Parts required to be hard were made from silver steel and polished. All screws are stainless steel and have socket heads (ref. 31). This reduces the chances of scratching the plates and damaging screw heads.



The case

This is 1,090mm tall and is in the form of two 'L-shaped' sections. The left-hand section forms the hinged door (photo 7). This geometry allows good access and provides a light, open, modern appearance. The regulator is bolted to a solid brick wall and is held away from the wall by two battens. These form a channel for the wires to connect from the toggle switch to the electromagnet and the battery, which is housed in the lower compartment (photo 8). The channel also forms a ventilation duct for the lamp, which is housed in the upper compartment.

The top of the regulator 'floats' above the structure and forms the ventilation outlet as well as being a design feature. The materials of the case are American cherry, Russian birch plywood, Canadian Yellow Pine (ref. 32) and toughened glass (ref. 33). The cherry/birch combination was chosen for subtle contrast. Cherry is a beautiful, hard, close-grained wood, which can be sanded to a very smooth finish. The wood was finished using Osmo TopOil (ref. 32). This is easy to apply and very forgiving if the surface gets damaged and needs to be 'retouched'. Toughened glass is four to five times stronger than ordinary glass and, size for size, the 4mm thick glass panels were probably the least expensive material in the clock



– total cost, including rounding the edges and toughening, was about £30. However, one needs to be aware that the minimum width of panel suitable for toughening is about 125mm and, after toughening, the glass is not quite flat and has slight longitudinal undulations (ref. 34). In this example, the glass is held in slots along the short sides and so was not a problem.

Problems

Hipp's toggle is, to my mind, incredibly elegant. However, this largely traditional implementation is not without its faults and, had I been aware of these at the design stage, things might have been different. The main problems are:

The offset trigger causes axial wobble of the pendulum. The use of a crank in the pendulum rod is reputed to obviate this problem (ref. 17). A better solution is to position the centre of the trigger and V in the plane of swing of the pendulum à la Type 36 Clock (ref. 19).

The V and magnet distances from the pendulum pivot vary with temperature due to expansion of the movement's back plate and wooden backboard of the clock respectively. This changes the time between impulses.

There is always some residual magnetism present in the electromagnet and an increase in magnetism speeds up the regulator. However, providing the regulator is not stopped and started, this effect

is substantially constant.

The battery voltage affects the timing: As the battery voltage reduces, the time between impulses becomes less, the mean amplitude is reduced, and the regulator speeds up.

In conclusion, the Wall Regulator is very simple, reliable, quiet and looks novel. The accuracy is about a second per week, which is adequate for most domestic purposes. See my website www.theclockworks.me.uk for further information about my clocks and other related topics.

M.E.



References and Suppliers

1. Riefler, D., (1981), *Riefler-Präzisionspendeluhren*, Pub. Callwey, 1981.
2. Hope-Jones, F., (1940), *Electrical Timekeeping*, Pub. N.A.G Press Ltd, 1976.
3. Rawlings, A., (1948), *The Science of Clocks & Watches*, Pub. British Horological Institute Ltd, 1993.
4. Roberts, D., (2004), *Precision Pendulum Clocks – France, Germany, America and Recent Advancements*, Pub. Schiffer, 2004.
5. Woodward, P., (1995), *My Own Right Time*, Pub. Oxford University Press, 1995.
6. Arnfield, J., (1987), *An Inertially Detached Gravity Escapement*, *Horological Journal*, October 1987, pp. 10-12.
7. Matthys, R., (2004), *Accurate Clock Pendulums*, New York, 2004.
8. Stephen, R., (2000), *30 Day Vienna Regulator*, *Horological Journal*, March – September 2000, pp. 100 et al.
9. Marianne Forrest CV, www.warwickshire.gov.uk/corporate/artsdata.nsf/0/2a3c45c820241dd580256ae002bc91e?OpenDocument
10. Gordon Burnett CV, www.northlandsglass.com/confer05.html
11. Tim Hunkin CV, www.cabaret.co.uk/artists/hunkin.htm
12. Andy Plant, www.andyplant.co.uk/html/newport.htm
13. Anon., (1989), *The Art of Jean Kazes*, *Horological Journal*, July 1989, pp.
14. Roberts, D., (2003), *Precision Pendulum Clocks – The Quest for Accurate Timekeeping*, Pub. Schiffer, 2004.
15. Marshall, P., (1929), *Electric Clocks and Chimes*, Pub. Tee Publishing, 1994.
16. Kinostan, (1931), *Electric Clocks*, Pub. Tee Publishing, 1994.
17. Jones, C., (1950), *A Battery Driven Electric Clock*, *The Clockmaker* Vol. 1, April 1991 – January 1992, pp. 173 et al. Pub. Tee Publishing (a bound compendium of 'The Clockmaker' magazine articles).
18. Wilding, J., *The Construction of – 3/4 Second Pendulum Electric Clock*, RiteTime Pub. Ltd, www.ritetimepublishing.com
19. Description of GPO Type 36 clock <http://web.ukonline.co.uk/freshwater/clocks/clock36.htm>
20. Moons & Van Hoof, Dutch Patent 8602561, 1986.
21. Supplier MathCad Software: Adept Scientific, www.adeptscience.co.uk
22. Supplier gem stones: Manchester Minerals, www.manchestermaterials.co.uk
23. Supplier tungsten carbide: Ceratizit, www.ceratizit.com
24. Supplier Invar rod: Meadows & Passmore Ltd, www.m-p.co.uk
25. Anodising: E.V. Wood (Anodising) Ltd, www.anodised.co.uk
26. Chromium Plating: Cresswell & Co. (B'ham) Ltd, www.cresswellco.com
27. Supplier white polyacetal (Delrin): Mallard Metal Packs Ltd, www.mallardmetals.co.uk
28. Supplier gears: HPC Gears Ltd, www.hpcgears.com
29. Supplier Delrin AF: Heaven Dowsett & Co Ltd, www.heavendowsett.com
30. Supplier ball races: SMB Bearings, www.smbbearings.com
31. Supplier miniature stainless steel caphead screws: Modelfixings Ltd, www.modelfixings.co.uk
32. Supplier hardwood, softwood, and plywood: Sykes Timber, www.sykestimber.co.uk
33. Supplier toughened glass: Northfield Glass Ltd, www.northfieldglass.co.uk
34. Toughened Glass Data: Pilkington, www.pilkington.com



SPRING CLIPS

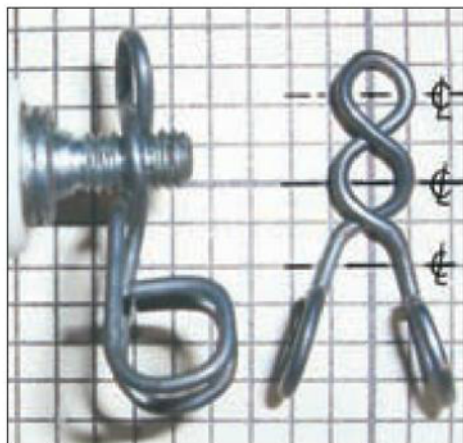
for spark plugs and other purposes

PART 1

Peter Spenlove-Spenlove

discusses the design and features of the once ubiquitous spark plug spring clip. The manufacturing methods described may also be suitable for making clips for other purposes.

Two spark plug clips, one of which is fitted to a suitable spark plug. The photo is taken against a background of $\frac{1}{16}$ in. squared graph paper to enable dimensions to be estimated.



A while ago a reader asked me for advice on making, or getting made, a quantity of spark plug spring clips. During a tidying up session I recently found two clips, which are shown on $\frac{1}{16}$ in. squared graph paper to give some idea of size (see photo). The centre distance between the two holes is 0.23 inch. The spring steel wire from which they are made is 0.0405in. dia. and the shank of a 0.128in. dia. twist drill is a close fit in the 'end' hole.

The outside diameter of the thread on the standard, post-World War Two spark plug is 0.150in. but earlier plugs appear to have varied between 0.178 and 0.246 inches. The middle hole of the clip shown is a close fit on a 0.133in. dia. twist drill shank but this size is not a firm grip on a modern spark plug.

For plugs of recent manufacture the middle hole might best be made 0.128in. dia. like the end hole. For other thread diameters the middle hole should be about

0.025 to 0.03in. smaller than the thread's measured outer diameter.

Complex

The clip is a complex shape, which the constructor would be best advised to make out of dead soft wire. I would not attempt to use wire hardened to spring temper or music string wire. The latter is a special bright steel wire popular with model engineers because a good local music shop should be able to sell you some in short lengths for pianos. Take your micrometer with you to check the size. Such wire will need to be softened for the making of clips.

At work we fixed one end to a ceiling beam with a weight hung on the bottom end. A battery connected to the ends caused heating to red heat and after switching off the wire was found to be soft – usually but not always. Thin wire and cool air did not always soften evenly. More successful was the use of a rotary Variac transformer but you had to be

careful to avoid shocks and the Health and Safety authorities would probably frown on this now. Once the wire had been softened it had lost its springy curl and was straight, ready for bending to shape.

Manufacture

To make the clips drill three holes in a small block of mild steel to the layout shown in the drawing marked A (fig 1). Use a 3mm dia. drill. Get a short piece of steel and turn a test peg of $\frac{1}{16}$ in. dia with one end reduced to 3mm dia. to fit the holes. Cut a 6in. length of soft wire and clip each end tightly into its own individual pair of small Molegrips. Wrap the wire closely round the $\frac{1}{16}$ in. peg to check the size of loop obtained. If the wire is anything but dead soft there will be some spring back and you may have to make a smaller peg. The loop must cover the full 360deg. with the tails sticking out opposite to one another in a straight line as shown in the drawing marked B (fig 2). More on this next time.

● To be continued.

Fig 1

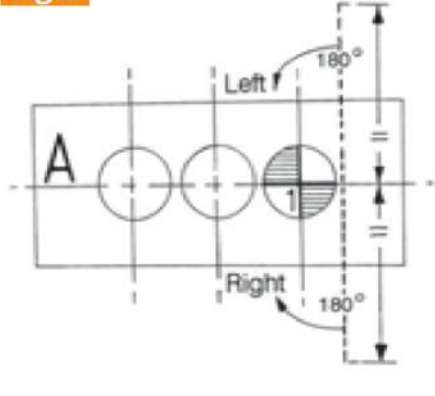
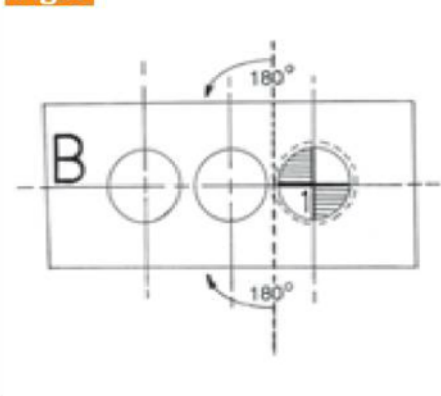
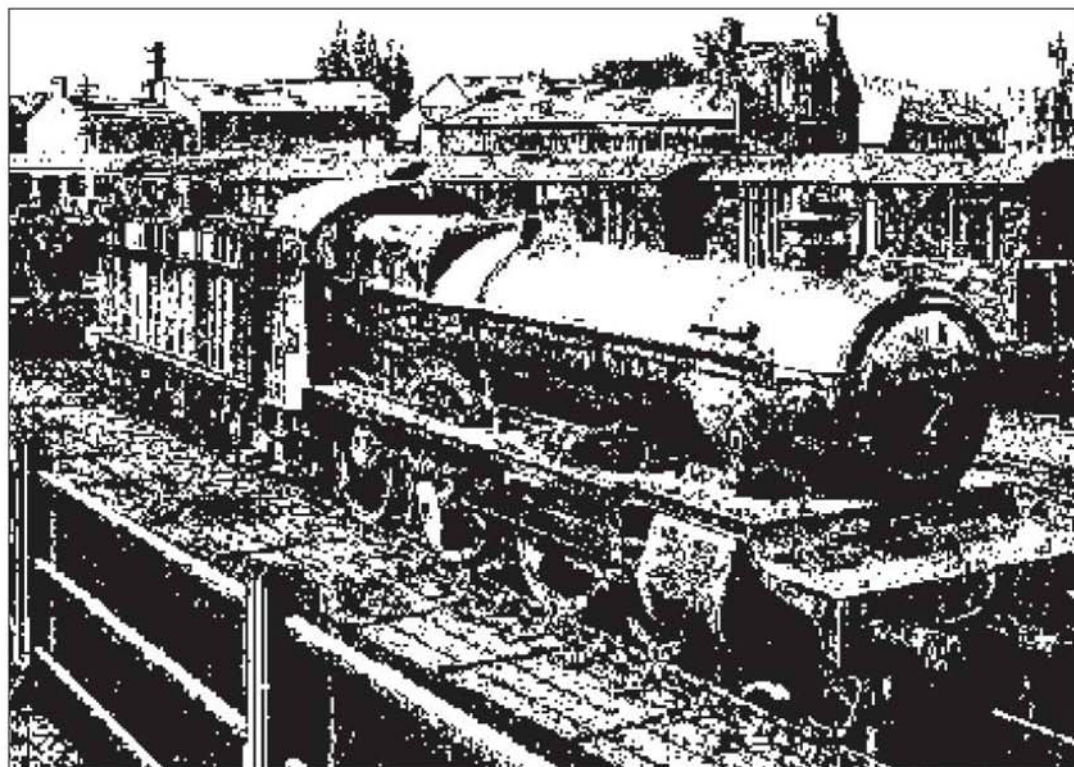


Fig 2





PENRHOS GRANGE

PART 29

Continued from page 520
(M.E. 4272, 28 April 2006)

Neville Evans

revisits this design and, in particular, discusses the lubrication pump based on that designed by Jim Ewins.

I have been using Jim Ewins pumps for many years and can thoroughly recommend them. They work with perfect reliability and don't feed too much surplus oil. What more can one say, except that they are easily made, with accuracy, on the lathe. Please note that:-

1. The Ewins pump will deliver as much or as little oil as you desire, simply by adjusting the length of the two spacers which govern the distance apart of the two O-rings. The distance between the ball and the bottom of the ram at top dead centre remains a constant, the ram just touches the ball at full stroke. You feed the amount of oil trapped between the rings, therefore lowering the top O-ring by lengthening the top spacer decreases the amount of oil fed provided that you shorten the bottom spacer to retain the same overall length.

2. The unit is self purging of air, as on the down stroke any trapped air is pushed out of the inlet ports, and a small amount

of oil leaks back, past the top spacer and takes any trapped air with it. In other words the cylinder is not sealed until the plunger reaches the top O-ring on the feed stroke.

3. The ram should nearly or just touch the ball valve at the bottom of its stroke. This means that as there is no clearance volume, there is no need for a separate clack valve in the delivery line. Jim Ewins used to claim that a feed rate of about $\frac{1}{6}$ th of that of an LBSC oscillator was obtained, but I suppose that a rate of far less than that could be achieved.

4. The spacers should be a push fit (not a press fit or you won't be able to get them out again) in the body and have about a 0.01in. clearance on the ram, which should be highly polished and possess a chamfered end.

5. There is no need to make the ram a tight sliding fit in the pump body, because the sealing is done by the top O-ring. For the same reason, there is no need for a gland at the top of the

body. These two features alone ensure that the pump is easier to make than an oscillator or a fixed ram uniflow pump.

I have redrawn the apparatus as a twin pump which feeds each cylinder separately, thus obviating the necessity for a bifurcated pipe which might feed too much oil to one cylinder, and starve the other. I am using one longish shaft in a large tank that is machined from a solid piece of brass.

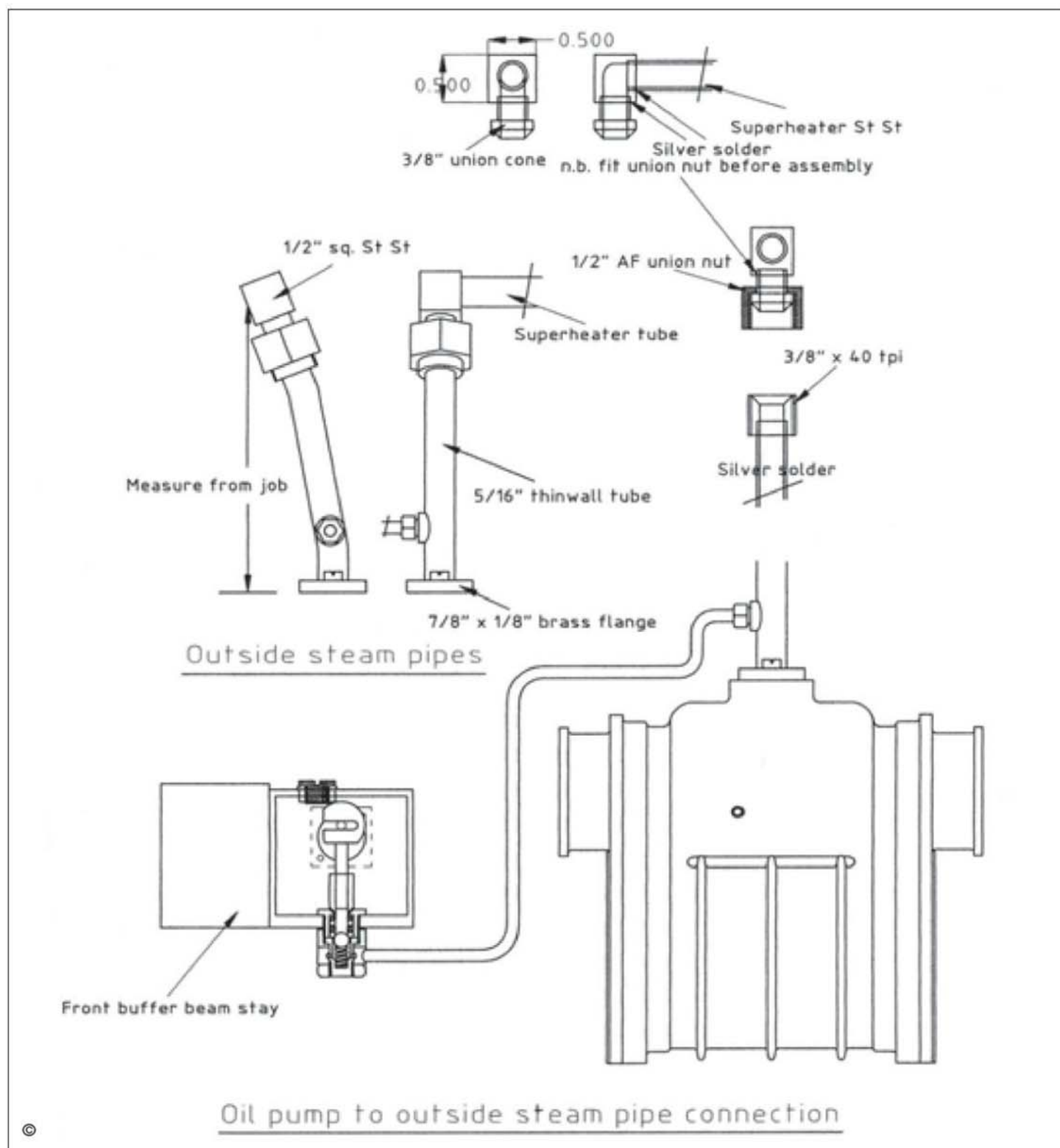
The problems that are found with mechanical lubricators do not usually, in my experience, lie in the instrument itself, but in leaking clack valves and unequal feeds to the cylinders, mitigated if not cured by strict attention to the pipework and that ratchet drive, of which there seem to be two types, those that have just missed a tooth, and those that are just about to miss a tooth. In the past I have used the needle roller clutch, with complete satisfaction, the secret of success being the fit of the bearing on the shaft. Most

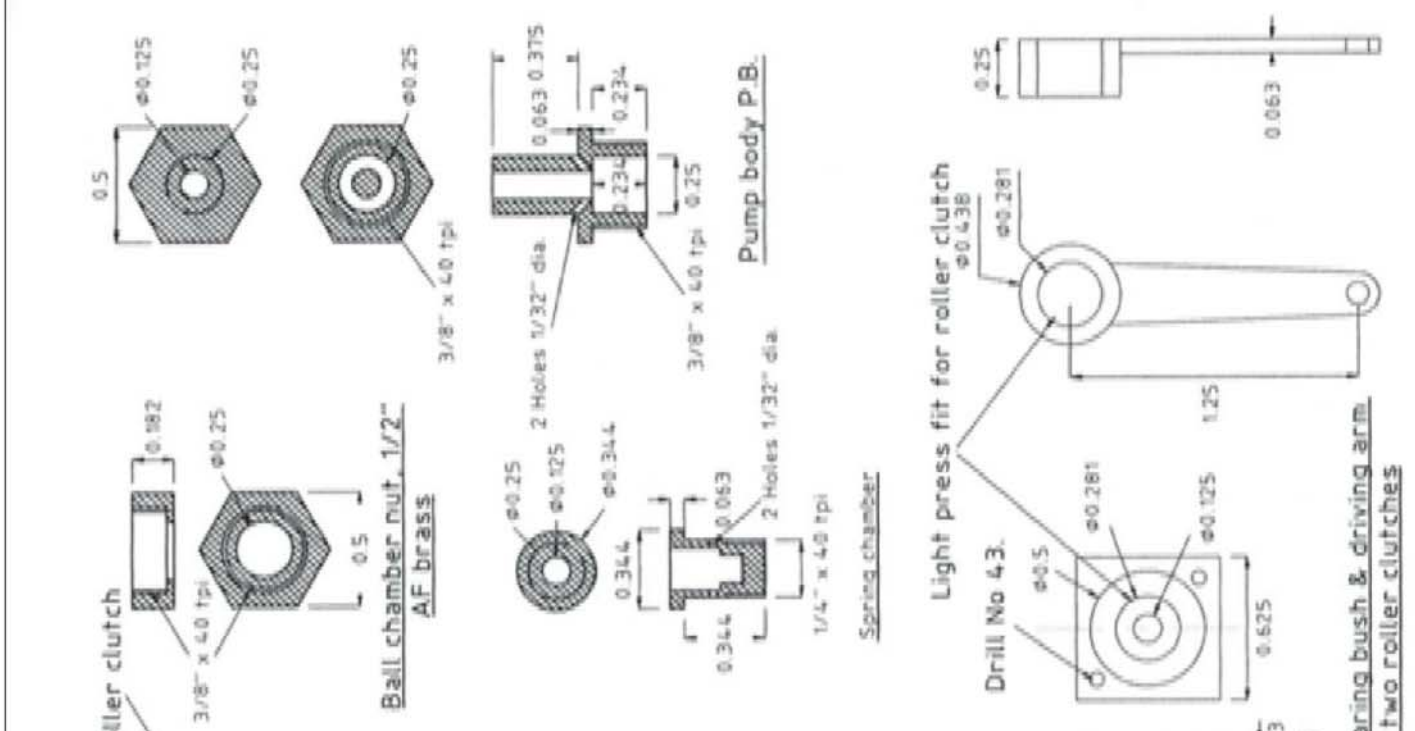
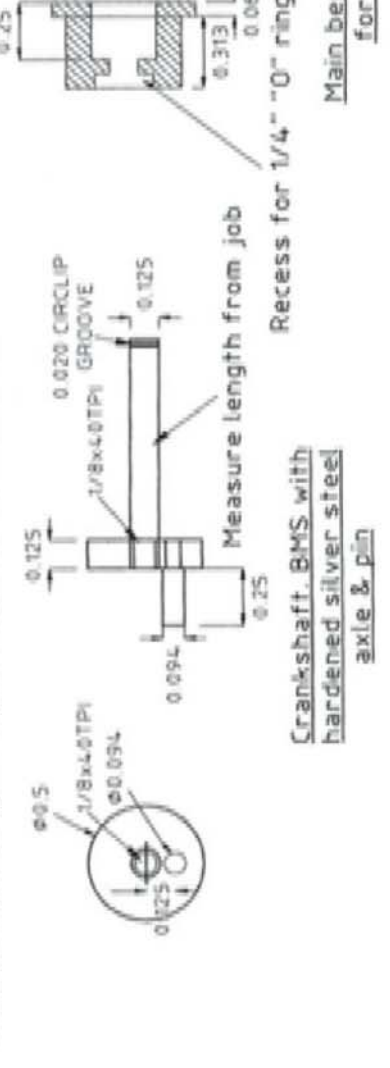
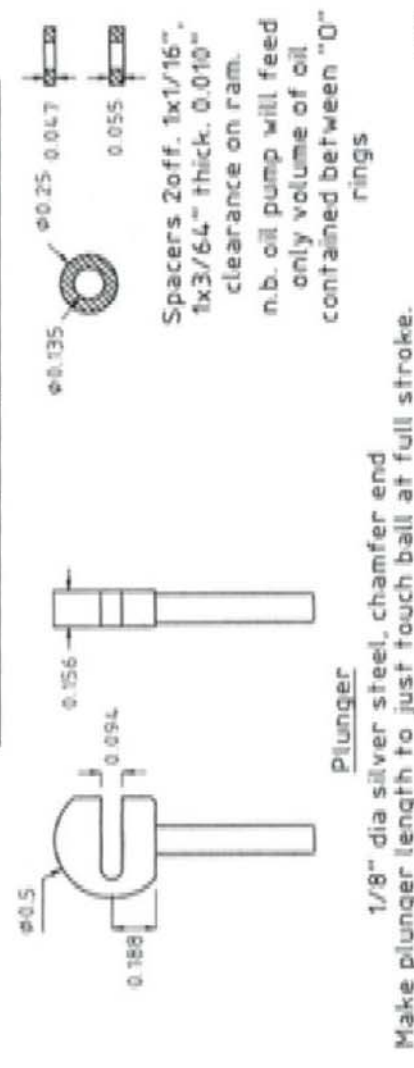
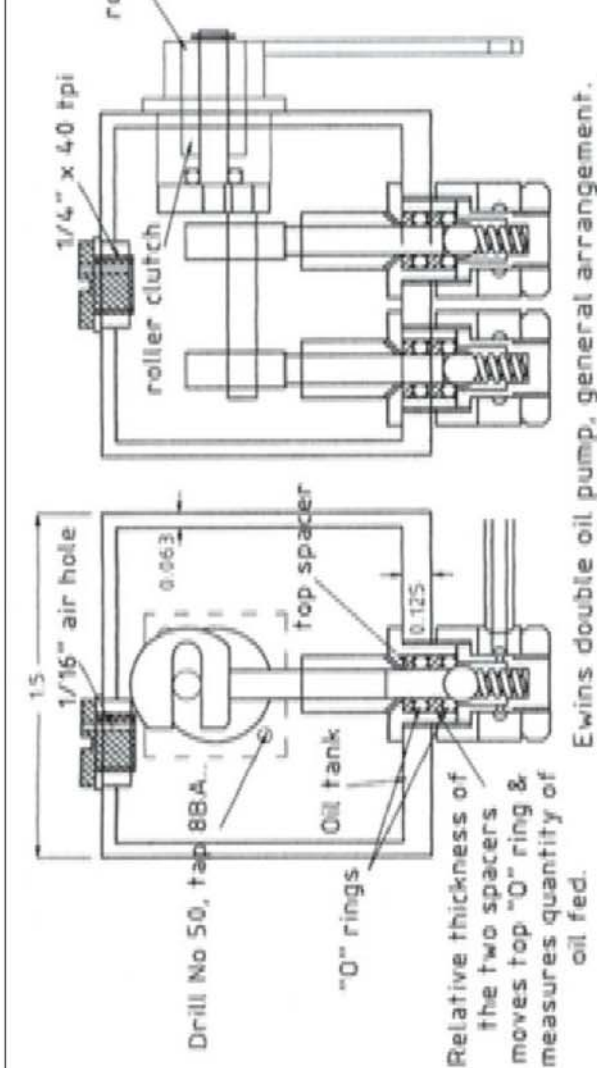
needle rollers are contained in a pressed steel tube with closed up ends, for want of a better description, and are supposed to be squeezed into a housing that compresses them about 0.001in. or so. This squeezing action actually is allowed for at the design stage and is necessary to give the correct running clearance on the shaft. The problem with

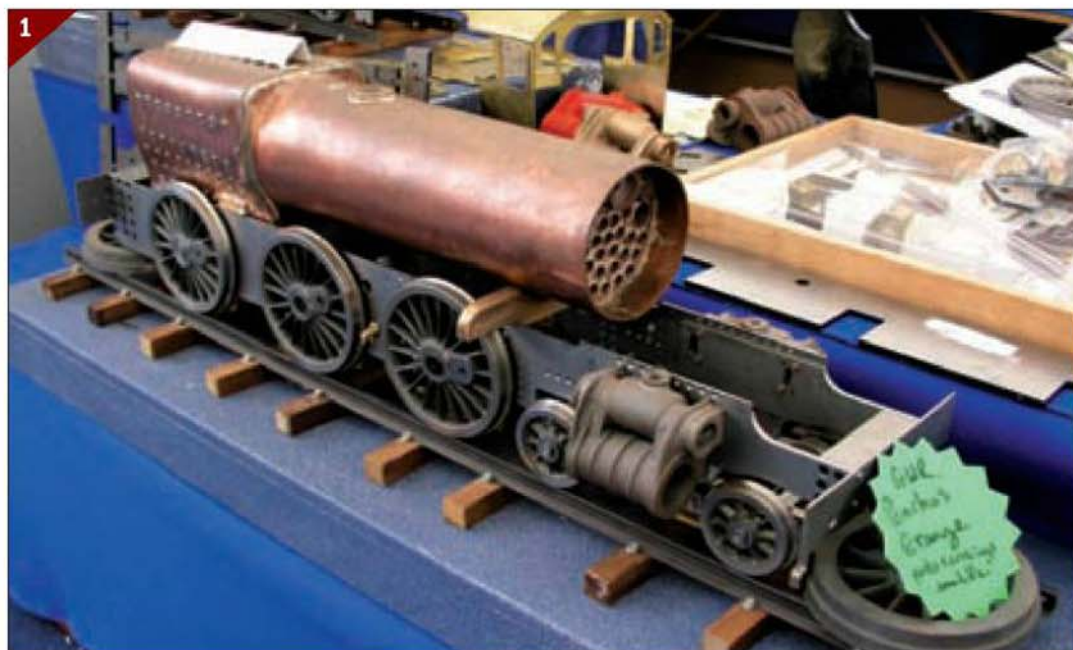
small needle rollers generally and roller clutches in particular, is that it may not be possible to mount them with the accuracy that is required. What I do is to take a piece or two of 1/8in. round silver steel bar along to the needle roller shop and to actually try the clutch on to see if it works. If it does, then use it with the minimum of interference fit. I've just tried a

loose one on a piece of shaft that is exactly 0.125in., and it works perfectly. If it doesn't you'll either have to select one that does, to squeeze it up a little more by using a tighter fit, or turn a bit of thicker bar down to 0.126 inch. Harden the shaft right through, don't temper, and don't polish too hard or you'll make it too small. This sort of drive was pioneered by Dave

Piddington, late of the old A. J. Reeves & Co (Birmingham) organisation. In Dave's original application, he used two clutches to give a positive drive, perhaps because the more usual ratchets use two pawls, one for drive and one for a stopper, so to speak. At the instigation of Deryck Goodall, however, I started to use one only and relied on the tightness







of the gland to stop the pump running back with the arm. Once again, all I can say is that it works very well for me. In this case, however, I have used two clutches, so make sure that you install them the right way round or disaster awaits. To stop the driving arm working its way off the spindle, I have incorporated a C-clip as detailed. This is a personal foible, please feel free to use a nut and washer or some-such if you prefer.

Single pump option

It is of course possible to arrange the 'Grange' for a one pump feed. I just think that in this case individual feeds to each cylinder are a better idea. I have in the past preferred, where possible, to use a twin ram pump and to feed each cylinder separately, for reasons

that I have just stated. On my 'Loch' however I have used one small capacity oil pump, and a symmetrical feed in $\frac{1}{8}$ in. copper tubing which culminates in a No. 60 hole acting as a restrictor and evening out the flow. This arrangement works very well, but the feed is far easier to lay out in the 'Loch' than in a 'Grange' due to the inside valve chests. The point that I'm making is that it is quite possible to use one pump, but I think that two are superior.

Hydrostatic lubricator with sight feed

This was the original equipment for all the GWR locomotives and so I am adapting my friend Ivor (the engine) Roberts' system which works very well and supplies just the right amount

of oil. I hope to have the drawings available in the next part with average luck.

Erecting the superheater

A 'Grange' builder pointed out the other day that it was impossible to erect the steam pipe/superheater assembly into the smoke box simply because the outside steam pipes are too long. He's absolutely right, although in my own defence, I must say that in the past I have always either built the prototype engine myself, or was in close contact with someone who did. If you have the actual locomotive in front of you, or at least available for measurement, it becomes possible to route oil pipes and lubricator drives so as to avoid the more obvious obstacles.

With the 'Grange', however, this system came unstuck because the gent who was building the first locomotive became diverted onto something else, which has rather left me working in the dark. I have drawn a suitable arrangement which I'm sure (hope) will prove satisfactory. As you will notice the lower steam pipe also contains the union for the oil feed, the oil pipes will have to be led as unobtrusively as possible through to the pumps around the front of the smokebox saddle.

On the subject of mechanical lubricators, I've just had a word with our Simon on the Edison Bell apparatus. He mentioned that as some 'Granges' were fitted with high superheat 'Mod. Hall' boilers, they might well have carried mechanical lubricators on the footplate as did some of the 'Halls'. We are now looking for photographic evidence. I'm afraid that lubricator drives and crosshead pumps will have to wait until the next gripping episode as *tempus has fugit*.

● To be continued.

Some photos showing work in progress on three of this author's designs. They were taken on the Practical Scale stand at the 2006 Midlands Model Exhibition.

1. 5in. gauge 4-6-0 Penrhos Grange exhibited by Pete Thomas.
2. 5in. gauge Schools 4-4-0 Stowe exhibited by Derek Tulley.
3. 5in. gauge Highland Railway 4-4-0 Loch exhibited by Neville Evans.



SENTINEL DG8 WAGGON

PART 3

Continued from page 570
(M.E. 4312, 9 November 2007)

Alan Beasley

now gives an account of the work carried out on the chassis of his Sentinel waggon.

The chassis of the full-size waggon was made of 8 x 3in. rolled steel channel, so scaled would be $1\frac{1}{2}$ x $\frac{1}{2}$ inch. The model chassis, 50in. long, was made of folded 16swg steel sheet, which actually had to be made in two lengths as the bender I had access to was not large enough. The joint was plated on the inside and silver-soldered, and is still perfectly sound. I used the same technique when the chassis was extended for the DG8 conversion.

I did consider cutting square steel tube lengthwise for the chassis members as this would have given slightly squarer corners to the chassis rails, but due to the fact that, at that time, I did not have a proper

milling machine and that I expected a lot of warping and twisting of the cut tube would occur, I did not go down that particular route.

Photograph 13 shows the chassis with the front and rear bogies fitted. There are only two additional cross members in addition to the front and rear beams, so the chassis is quite flexible in this state. When the engine is fitted between the two side plates it stiffens it up a lot. The full-size waggons mounted the engine in semi-spherical bearings to prevent engine distortion, the model engine is proportionately very much stiffer due to non-scale casting thicknesses.

The load platform was made of $\frac{3}{8}$ in. marine ply so that also adds quite a lot of stiffness

to the model. The water tank at the rear was copied from that of the full-size waggon and holds about a gallon of water. I discovered later that the tank on the restored DG6 was a somewhat larger replacement than fitted to the original waggons. The model tank was made of 1mm copper sheet, rivetted and soldered. Copper is a lot less difficult to paint successfully than brass!

Bogies

Photograph 14 shows a detail view of the rear bogie fitted to the chassis with the brake gear fitted. The steam operating cylinders are fitted on the inside of the chassis rails and operate the brake cam levers by drop down arms and pull rods. The system is

13. The completed chassis with the front and rear bogie assemblies fitted.

14. A close-up view of the rear bogie assembly showing the brake gear.

15. The front bogie assembly.



fully compensated to allow for differing brake shoe adjustment and to allow for the up and down movement of the wheels. I will cover this in more detail when discussing the rear bogie.

The handbrake pull rod can be seen at the middle right edge of the photo, this then operates the rear wheel of the two via a compensating arm and the long pull rod passing through slots in the drop down arms.

Photograph 15 shows a detail view of the front bogie fitted to the chassis together with the steering components. The cranked radius arms can just be made out which tie the bogie to the two brackets fixed to the underside of the chassis rails. The boiler fits into the square aperture at the front of the chassis. The chassis was extended just to the left of the cross rail and the joins are faintly visible.

The rear suspension assembly is quite a substantial and complex structure in

order to accommodate the chain drive and brake linkages to each wheel.

Photograph 16 shows the newly painted assembly ready to be fitted to the chassis, but without the coupling chains linking the wheels.

As can be seen, the wheels fit between pairs of beams that pivot on a central axle. The wheels and tyres are actually those sold for the Clayton 2in. to the foot scale waggon, the spoke pattern being very close to the Sentinel design. The hub casting was just big enough to allow $\frac{1}{2}$ in. bore ball races to be fitted. The axle for the rearmost wheels is fitted to sliding blocks in the side beams to allow for the coupling chain tension adjustment, see **photo 17**. All the chains are standard 8mm pitch. The combined brake drum and chain sprocket bolts to the conveniently placed 'Y' fork on the spokes.

The inner and outer beams are held together by the wheel

axles and the central sleeve that pivots on the axle. Both beams are silver-soldered steel fabrications, mostly 3mm strip and plate, the inner one being a quite complicated shape as is shown in **photo 18**. The inner beams also carry the back plates for the drum brakes. The front end of each inner beam carries an adjustable radius arm that is fixed to the chassis mounted engine mounting plates, **photo 19** shows this in more detail

Sentinels fitted double sets of leaf springs on the DG6, a main set of springs and an auxiliary set to cope with heavy loads, again see **photo 18**.

These have been made out of semi-tempered spring steel that was then available from the old Reeves concern. It is spring steel, but not brittle, so that with a sufficiently beefy set of bending rolls it can be persuaded to take up a curved shape. The long lengths were rolled up, and then chopped off

to the required lengths. For the lower main spring all the leaves except the top leaf, which has flattened ends, are spring steel of 16swg, note that spring eyes are not needed as the whole assembly has to slide in the chassis spring guides under the control of the radius arms. All the leaves in the auxiliary spring are spring steel, but of a thinner gauge. Four 4BA high tensile steel bolts clamp each spring assembly to the main axle tube.

Two braking systems were fitted to the rear bogies of the DG6/8 waggons, a steam operated set of brake shoes and a separate handbrake set of shoes. **Photograph 20** shows the two sets of shoes assembled to the rearmost wheel position of an inner rear beam. The brake shoes are of conventional design with a fixed pivot, the red nut in the photo, at one end and a cam working against screwed adjusters at the other end of



the shoes plus a return spring. The actuating lever fixed to the operating cam can be seen to the left of the photo. The corresponding pivots for the inner pair of shoes can be seen angularly offset about 60 degrees. The cams and screwed adjusters were all case hardened.

Because of the range of movement of each rear wheel the mechanical brake linkage is quite complicated in order to give a reasonably balanced force to each wheel - modern hydraulics do make things so simple! **Photograph 21** shows the steam actuating cylinder and linkage for one pair of wheels in a partially activated state. The plate carrying the cylinder bolts to the inside of the chassis rail, and the lower horizontal rods connect to the brake shoe cam levers. The right-hand vertical link is pivoted onto the plate and the left-hand one to the actuating cylinder piston rod, the spring at the top

is the retraction spring. The tie link just below the cylinder in the photograph ties the vertical links together so the outward movement of the piston causes the lower ends of the links to move toward each other thus actuating the brakes. Both ends of the links can move laterally as a pair thus allowing the brake forces to balance for any position of the wheels.

I had a lot of problems in trying to find satisfactory piston seals for the operating cylinders that either did not leak a lot, especially when cold, or which absorbed too much force to move them and thus also required a stronger return spring. In the end I settled for good, old-fashioned leather cup seals. They tend to harden and shrink a bit, and one needs to boil the leather first, but they have low friction. A simple in-line displacement lubricator is fitted on the steam line to the brakes to provide a

modicum of lubrication.

The brake actuating valve is in the cab and in full-size was foot operated. In the model it is operated by a lever beside the steering column. It comprises two spring-loaded needle valves, one for boiler steam to the brakes and the other on the exhaust return pipe from them. The exhaust valve is normally open, and as the inlet valve is opened, it gradually closes. Thus the braking force is progressive, and the system can be 'warmed up' by just operating the brake lever a little. When the brake lever is full on the exhaust valve is tight shut.

Front suspension bogie and steering gear

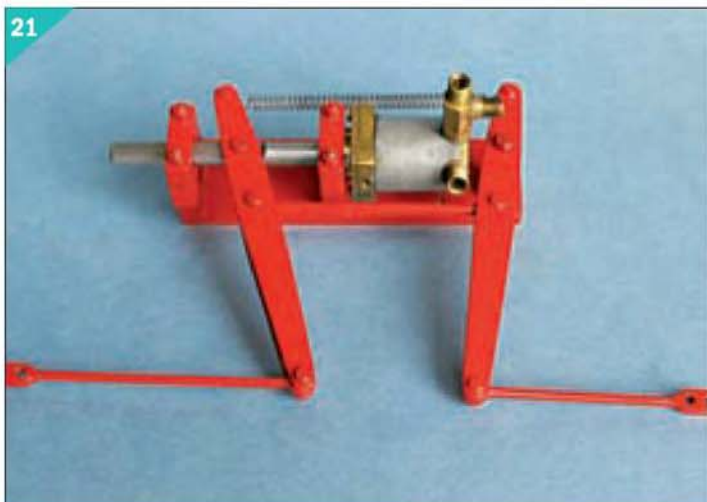
The DG8 front bogie is quite a complicated structure, and must have made the waggon relatively expensive. As previously mentioned, my design was based on information seen in ref. 2 (detailed in M.E. 4312, 9 November 2007 - Ed.).

Photograph 22 shows a view of the rebuilt assembly without the wheels fitted, and is taken from the rear, the main steering link projecting forwards. The main axle, running across the centre, has the spring assemblies bolted to it, just like the rear bogie. At each end, it carries an E-shaped beam, pivoting on the axle at the centre and forked at the ends for the steering king pin assemblies. All four wheels are steered, using Ackerman geometry to get the

proportional angles. Each pair of stub axles, i.e. front or rear, is connected by a tie rod, and the front and rear pairs by an upper linking tie rod pivoting on unequal length arms keyed to extensions of the king pins, see the left-hand side of photo. The wheels are nitted onto the stub axles, silver coloured in the photograph.

The information in ref. 2 did not make it clear how the steering box drop arm was coupled to the bogie steering tie rods. The simplest solution was to couple it to a steering arm linked to a downward extension of the front offside king pin, as was done on the DG6 waggon. This worked, but gave an unacceptable amount of bump steer as the front offside wheel moved up and down - note that this waggon can go quite fast!

● To be continued.



16. The rear bogie assembly.

17. Coupling chain adjustment between the two rear axles is permitted via this sliding block arrangement.

18. The rear bogie inner beam and spring assembly. Note the double set of springs.

19. The rear axle radius arm. The free end attaches to the chassis mounted engine mounting plates.

20. The rear brake shoes are of conventional pattern with one fixed pivot and cam operation.

21. The brakes are designed for steam or manual operation. This is the steam brake actuation assembly.

22. The complex front steering bogie assembly shown without its road wheels.

RACHEL

A wall steam engine

PART 6

Continued from page 575
(M.E. 4312, 9 Nov. 2007)

Stan Bray continues work on the cylinder assembly for this unusual engine starting with the drilling of the cylinder cover holes.

40. Here the mounting holes are being marked in one of the cylinder covers. Indexing is via a block of material placed under the chuck jaws. The centre punch is mounted in the tool post.

41. Turning the grooves in the piston using a rear mounted parting tool.

How to go about making the holes used to hold the covers on the cylinder block may well be something that everyone has their own ideas about. In my case the holes in both covers were marked off whilst in the 3-jaw chuck of the lathe. This was done by simply mounting a centre punch at centre height in the tool post and winding the carriage in quickly so that the punch was pushed smartly in, leaving a suitable recess.

Indexing can be carried out using a gear wheel attached to the lathe mandrel. Builders not having a machine that has screw cutting gear should be able to manage by placing a known sized block of metal under each of the 3-jaws of the chuck and using that as a means of dividing. Be aware though that to use the jaws to mark off six holes it is absolutely essential that the jaw being used is parallel to the lathe bed. Providing the stop block that the jaws will rest on is able to register this exactly then it will be possible to use both sides of the lathe bed and produce six positions. If there

is any angle, no matter how slight the six holes will not be evenly spaced.

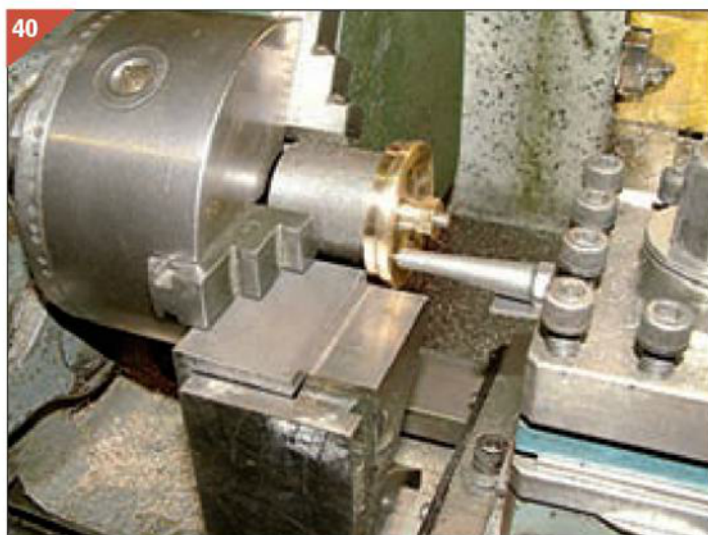
Once the necessary punch marks have been made the holes should be started with a centre drill and then drilled tapping size for the thread to be used. A point to be careful of here is the fact that centre punching metal invariably throws up a jagged edge around the mark and this edge almost certainly will not be of even height right around the mark. This unevenness can cause the centre drill to be thrown to one side and thus the hole will be slightly out of position. The burrs on the marks should therefore be filed off before attempting to centre drill.

Once all the holes in the covers have been drilled, the cover can be pushed on to the cylinder block. If a good job has been made of the fit, light finger pressure will be sufficient to hold it in the correct position while a drill is passed through one of the holes and into the block. If the fit in the bore is not too good it may be necessary to organise some form of clamp for holding the cover in place. Whether to drill the

hole in the block to full depth while the cover is in place, or perhaps to just spot through and remove the cover while the hole is drilled will be a matter of personal choice. Whichever way is chosen, the hole in the block should be tapped and the matching one in the cover opened to clearance size. The cover can then be held in place with a screw while the other holes in the block are drilled, the operation is of course repeated for the cover at the other end.

Piston (item 12)

Making the piston is a straightforward turning operation and should not present any problems. It too is made from stock material rather than a casting. This is a distinct advantage as it means that a length of material in excess of that required can be mounted in the 3-jaw chuck and all operations carried out without the necessity of removing it. It is only a case of machining the outside diameter to the right size, drilling and tapping for the piston rod and then making the necessary grooves for the O-rings. The



instructions for the groove's sizes, as recommended by the manufacturer of the rings, should be strictly adhered to. Finally the piece must be parted off but builders that are using small lathes might find the idea of doing so rather daunting and in that case they can just make a groove round the metal and saw through using the grooves as a guide, finishing off by facing the end that has been sawn off.

Piston rod (item 13)

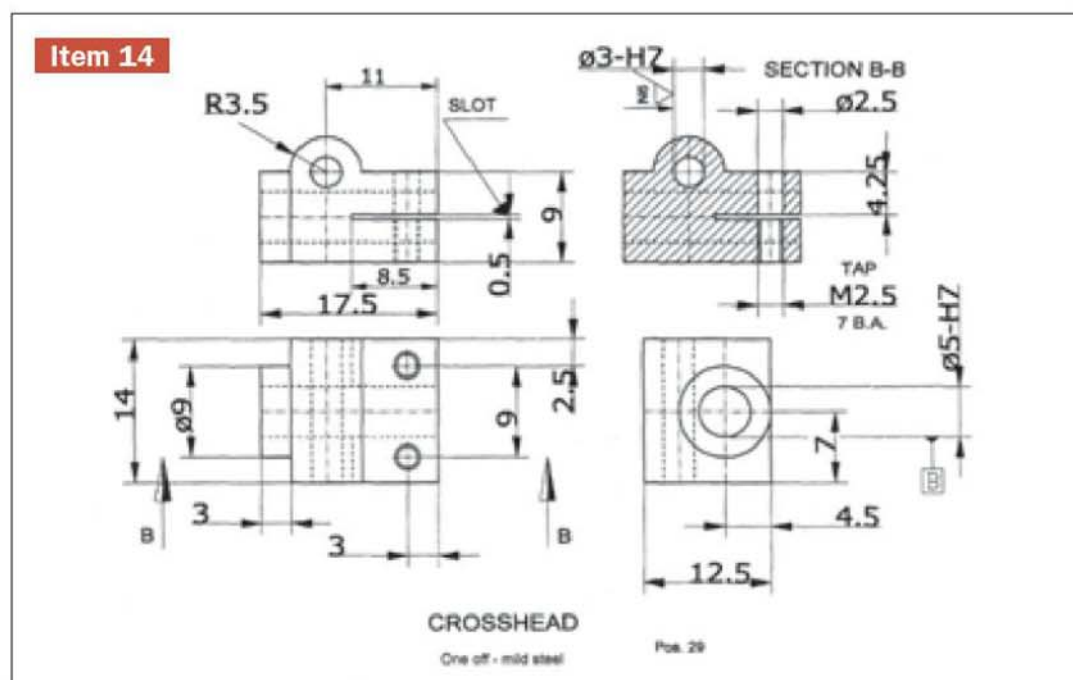
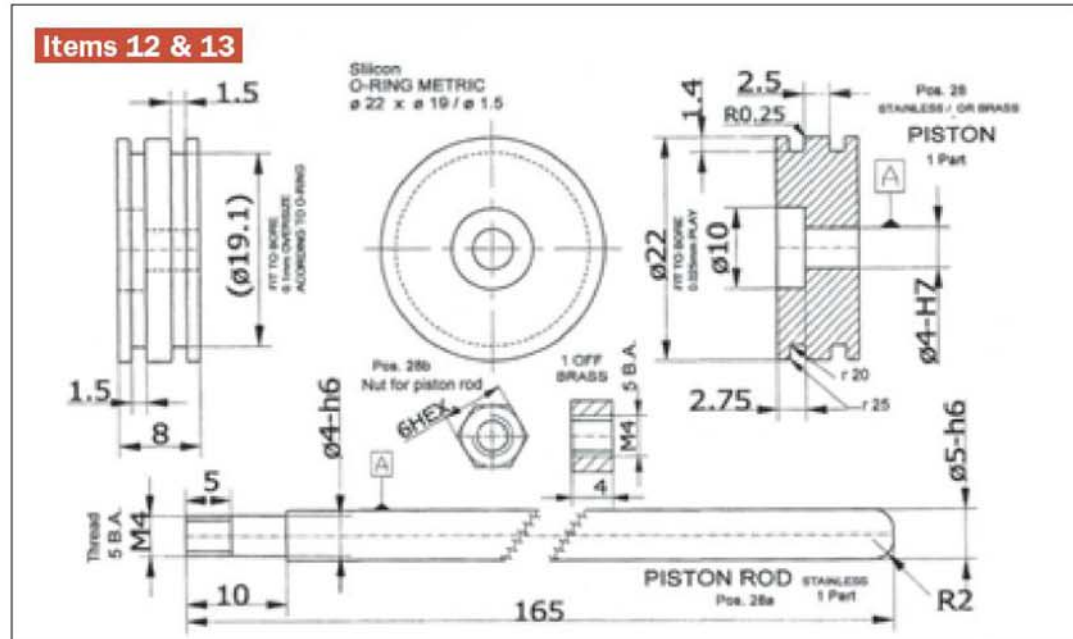
Nothing at all complicated here, simply a length of stainless steel machined to fit through the hole in the piston and threaded to take the securing nut. However, it differs from the more usual type of piston rod in as much as it passes through a guide at the other end of the frame and a crosshead is fitted in front of the guide and secured to the rod. Also the piston rod moves the piston via the crosshead.

Crosshead (item 14)

The crosshead is manufactured from mild steel and is quite straightforward, the only mildly difficult part being a half round section that is formed round the hole to take the gudgeon pin. It is not too difficult to file this section to shape. The hole to take the piston rod is best made in the lathe as that way it is possible to be certain that it will run parallel along the block, most of the rest of the work involves simple drilling, tapping and filing.

The exception to this is a slot that allows the crosshead to be clamped to the piston rod. It is only 0.5mm thick and therefore requires the use of a very fine-toothed slitting saw. It would not be wise to attempt to use a hacksaw. Firstly, getting the cut absolutely straight would be extremely difficult and secondly, any hacksaw blade, even a junior one, will cut considerably over 0.5mm wide.

Tightening onto the rod is achieved with two screws, the holes for which should be drilled tapping size prior to cutting the slot. Once the slot has been cut the lower holes



can be tapped and the top ones opened to clearance size.

Valve (item 15)

The valve is an easy milling job and was made from a piece of 12mm square bronze bar that was left over length while the majority of the operations were dealt with. The recess was the first operation, followed by making the slot for the valve rod (item 16) and subsequently the slot that goes across for the valve nut, which was made from a length of 3 x 6mm brass. Having made the two grooves the milling cutter was run

around the edges to form the lip as shown on the drawings and the piece was finally sawn to length and the rough end where it had been sawn tidied up with a milling cutter.

Exhaust flange

The flange for the exhaust pipe bolts directly to the cylinder block and there are two ways of making it (*drawing appeared with cylinder drawing in part 3, M.E. 4306, 17 August 2007-Ed.*). It can be machined from a length of 10mm square brass the only difficulty arising from the necessity to hold the thin flat section in the lathe chuck,

while making the round section for the exhaust pipe. Very few chucks will have the ability to hold it securely. However, a method that has frequently been used by the author, although it was not used on this occasion, is to stick the work to a piece of flat stock, using double-sided adhesive tape. It is essential that both surfaces are flat in order to ensure good contact, but it has been used in the past to hold quite large components to the faceplate, with complete success.

After some thought the flange was fabricated by drilling three holes in a length of brass strip, ➤

Don Ashton

provides some in-depth answers to a query raised by a reader in *Postbag* (M.E. 4309, 28 September 2007).

LEAD STEAM

Lead is a term with which most model engineers are familiar, but largely as a dimension within the valve and ports, not as a dynamic effect upon the valve events in the steam distribution cycle. It is cited as the amount by which the port is open to live steam when the piston is at dead centres and can be physically dimensioned and measured when the crank is at 0deg. and 180 degrees. Since it is such a small fraction of other dimensions within the cylinder and valve gear area it follows that care and accuracy will be required in order to obtain the correct figure in practice. It cannot be 'machined' in the manner that we achieve lap, for instance.

Expanding the term, lead constitutes an amount of steam admitted before dead centre in order to cushion the mass of piston and associated parts. In most applications this will be required equally at each end of the stroke but large vertical engines obviously create a condition whereby more cushioning is necessary at the bottom end of the cylinder(s) than at the end of the upstroke. Moreover, on starting or at slow speed lead has virtually no function.

As piston speeds rise cushioning becomes more necessary and an earlier

start to the process of getting steam into the cylinder may be advantageous. Having now introduced the time factor it makes sense to consider how long the port remains open before dead centre, rather than by how much: lead as a dimension during the design of the valve gear and ports becomes a quantity of pre-admission, an advance of the whole timing. It is the acceptance of the behaviour of pre-admission that determines a suitable lead dimension, not the other way round.

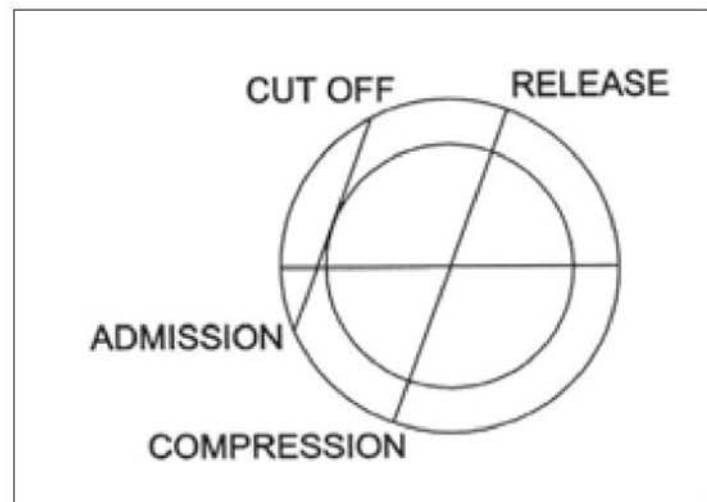
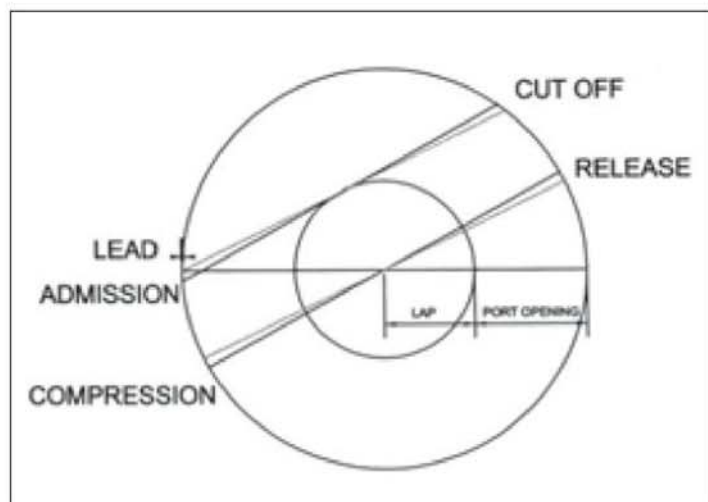
Since the masses that require cushioning are virtually absent in our models (even large ones) and the piston speeds are ridiculously slow by comparison to full-size, do we need to consider lead at all? The quick answer depends on what we expect the engine to do, but the technical answer is that we cannot intrinsically ignore lead. Its effects are present because notching up the gear alters the pre-admission as a function of timing, as we shall see presently. Even the constancy of lead attributed to Walschaerts' gear is not scientifically absolute.

Stephenson's gear exhibits an increase in lead as mid-gear is approached, whilst most radial valve gears are said to have

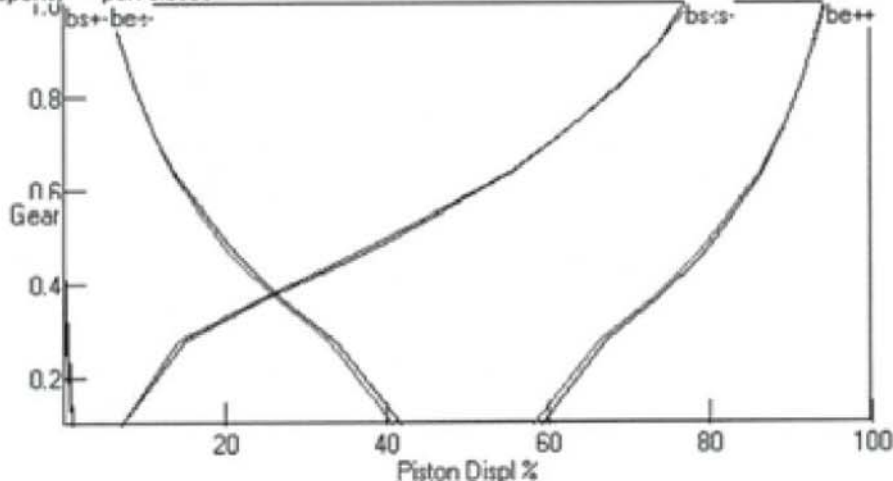
constant lead – we've heard this many times. We may have read that the GWR engines had a negative lead setting in full gear so that towards mid-gear the resultant increase to positive lead would not be excessive. True, but all this gives the wrong impression. Lead determines the pre-admission characteristics affecting compression towards the end of the stroke; in other words lead gives rise to a timing device, and one which advances all valve events as cut off shortens, irrespective of the valve gear employed. We cannot avoid this unless we never notch up and that's not what driving steam locomotives is all about!

The diagram axis represents the piston stroke superimposed upon valve travel at a different scale. It shows the provision of lead in context for full gear and how even this small amount advances events. When the travel is well shortened the amount of lead may stay the same, depending on the gear employed, but the admission occurs earlier and the compression and all other events are advanced with it. Lead becomes an increasing percentage of the total valve opening and pre-admission constitutes a greater percentage of the constant piston stroke. So Swindon actually set

1. Lead and consequent pre-admission at 80% cut off.
2. Results at 25% cut off.



LEGEND: t = top end, b = bottom end
s = steam, e = exhaust
+ = port opens, - = port closes



3. GWR Hall Class - 23.5deg. eccentric advance.

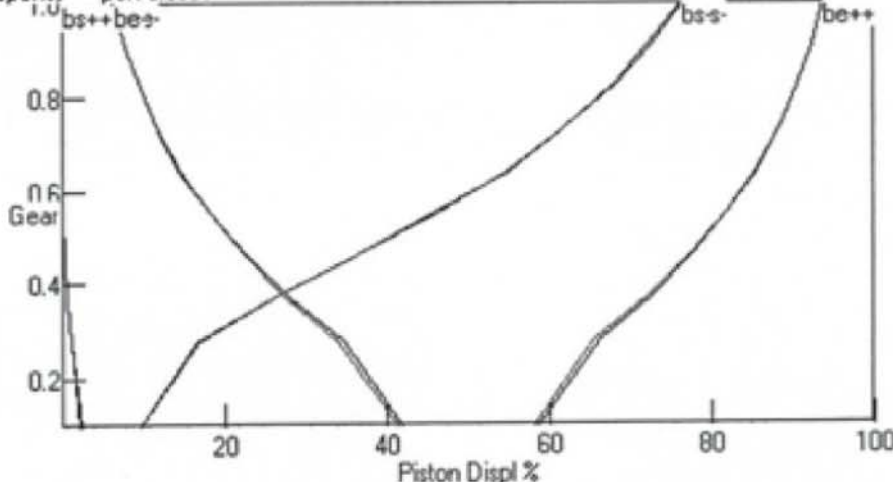
4. GWR Hall Class - 25deg. eccentric advance.

negative lead in full gear to avoid excessive pre-admission and compression towards shorter running cut offs, not to avoid excessive lead as such.

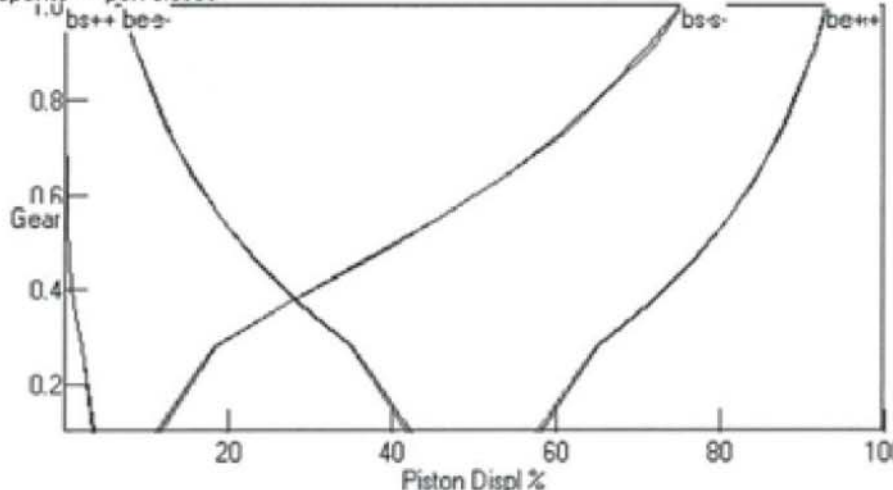
The difference between a gear of constant lead and one of variable lead now becomes more or less immaterial, since both can be arranged to produce acceptable pre-admission characteristics in practice. Here, the judgements may differ in full-size in order to avoid wire-drawing, which afflicted the *Britannia* on the Rugby Test Plant at 20% cut off, or to curtail compression loops apparent during King testing at similar settings. (Both are examples of Walschaerts' constant lead valve gear). Neglecting strict economics, compression loops can be ameliorated by greater clearance volumes and more particularly by the removal of blast pipe restrictions. At an average running cut off of 20%-25% compression should not exceed 30%, with an admission of between 1% and 1.5% of the stroke. With a line-in-line exhaust this would place release at around 68% - 70%.

To see this in action we can take the excellent GWR Stephenson's gear of the Hall Class. The total variation of lead from full gear to mid-gear is fixed by the gear's proportions - notably the length of the eccentric rods, but the advancing of the mechanism is achieved through the angular setting of the eccentrics. Bear in mind that we are still notionally at the design stage, attempting to find the parameters that will achieve the sort of compression/admission figures quoted above. At 21.5% cut off an eccentric advance of 26.5deg. produces 28.5% compression and 0.3% admission; 23.5deg. advance invokes 32.5% compression and 1.75%

LEGEND: t = top end, b = bottom end
s = steam, e = exhaust
+ = port opens, - = port closes

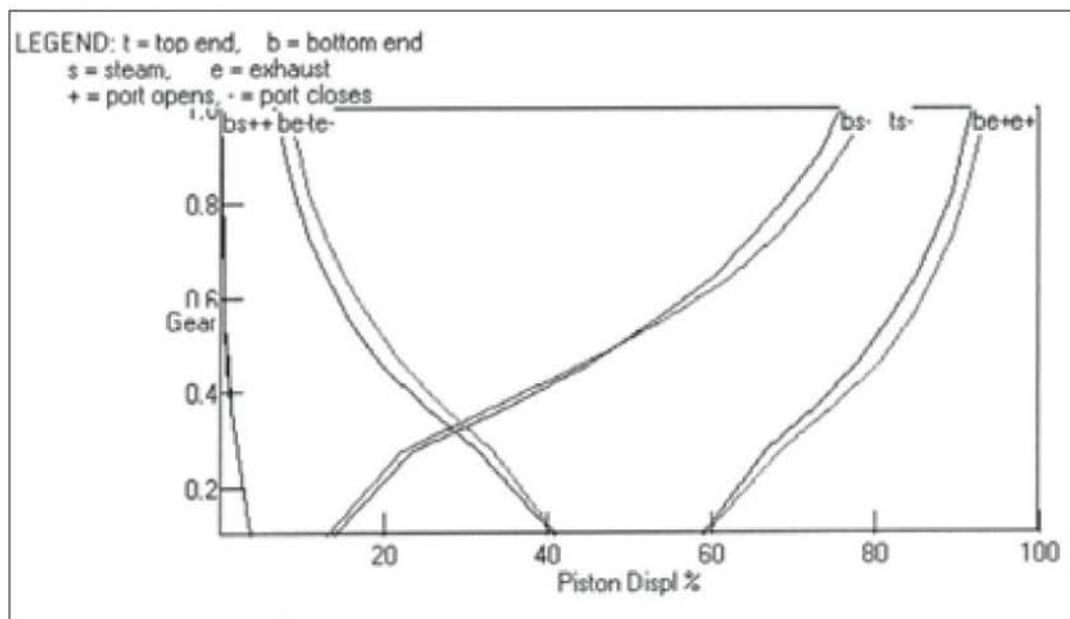


LEGEND: t = top end, b = bottom end
s = steam, e = exhaust
+ = port opens, - = port closes



admission. The same cut off with a 25deg. advance gives 30% compression with an admission of 1.2%. The equality of all events is immaculate but the results at 25deg. advance fit the best end of our stipulations. The exhaust port still opens fully at this cut off. The lower left-hand lines in the screenshots depict the pre-admission increasing towards mid-gear as a percentage of stroke.

Walschaerts' gear would reveal a similar picture in spite of the 'constant' lead. Where we wish to employ less than the scale lead, in order to achieve design parameters appropriate to the model, it can be quite difficult to assuage even this small quantity and at the same time preserve the external gear's correct appearance. This sort of problem often features in designing parts of a scale-working model, of course, the boiler being the prime example. However, it does come as something of



a shock to discover that such a minute dimension as lead has a more far reaching effect than its measurement might at first suggest. At slow speed, because of the adhesion problem, the wheels will spin unless we throttle the steam at the regulator on a model.

Only at greater speed does the steam chest pressure approach that of the boiler. The ease with which steam can then enter the model cylinder indicates that scale lead is excessive and may be counter-productive: at short cut offs there could be as much steam opposing the

5. GWR Hall Class - 26.5deg. eccentric advance.
6. Ivatt Class 2MT - constant lead.

piston just before dead centre
as there is to push the piston
after dead centre! **M**

M.E.

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ON SALE 21 DECEMBER 2007



TWO ENGLISH PRECISION LATHES

MACHINE TOOLS

Tony Griffiths looks at two more precision lathes available to the model engineer.

Although several UK companies re-branded watch and clockmaker's lathes as their own – especially the London dealers George Adams who, pre-World War Two, offered replicas of G. Boley and Boley & Leinen machines – genuine British makers of watch and clockmakers' lathes are rare. Probably the best-known are Pultra (covered in *M.E.* 4312, 9 November) and two others: IME and BTM.

The Ideal Machine Tool and Engineering Company (IME) were originally based in London E8, and made a small range of precision machine tools that included an 8mm watchmakers' lathe with an 80mm centre height, two larger instrument-

makers' lathes of later manufacture and a fine quality drill. All the lathes, and the drill, were their own design with the firm's original product, the 8mm lathe, being built in relatively large numbers (as WB and CWO variants) and is still frequently encountered today.

Individual model types included the WB1/15, WB5/15, WB6/15 as well as complete boxed 'Workshop Outfits' CWO/15, COM/15, COMB/100 and 100/GIB/A-B. The whole lathe was beautifully conceived with every element of the design thoroughly considered; it was constructed of the finest quality materials and assembled and tested with great care – of all the English-made watchmakers' lathes this is, without doubt, the finest.

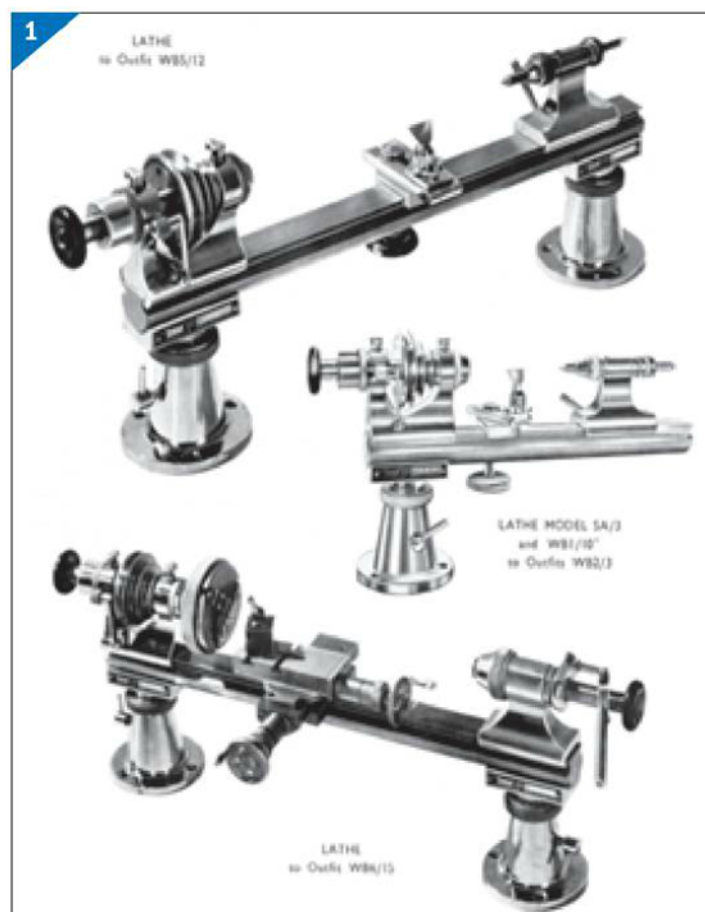
Unusually for this class of machine, it had a V-edged bed made in tool steel, that was, needless to say, finish ground and then hand scraped and nickel plated; the 254mm-long short-bed version had a single, adjustable, swivelling foot while the longer bed versions (lengths up to 350mm were available) sat on twin (rigid) versions of the same mounting.

Made of nickel-chromium steel, the hollow 8mm-collet headstock spindle was hardened, heat-treated, ground and finally lapped to a perfect fit in its high-carbon steel conical bearings. The interior of each bearing was fitted with an oil-retaining felt washer while an exterior dust cover provided further protection against the ingress of dirt.

On early models each bearing housing was topped with an almost flush-fitting, spring-loaded oiler, but later versions had tall, flip-open caps and oil feed through wicks. The balanced 3-step headstock pulley was in duralumin, but with a high-carbon steel plate fastened to its left-hand face into which was drilled a ring of 60 division holes – although the factory also offered alternative plates, with different numbers of holes, to special order.

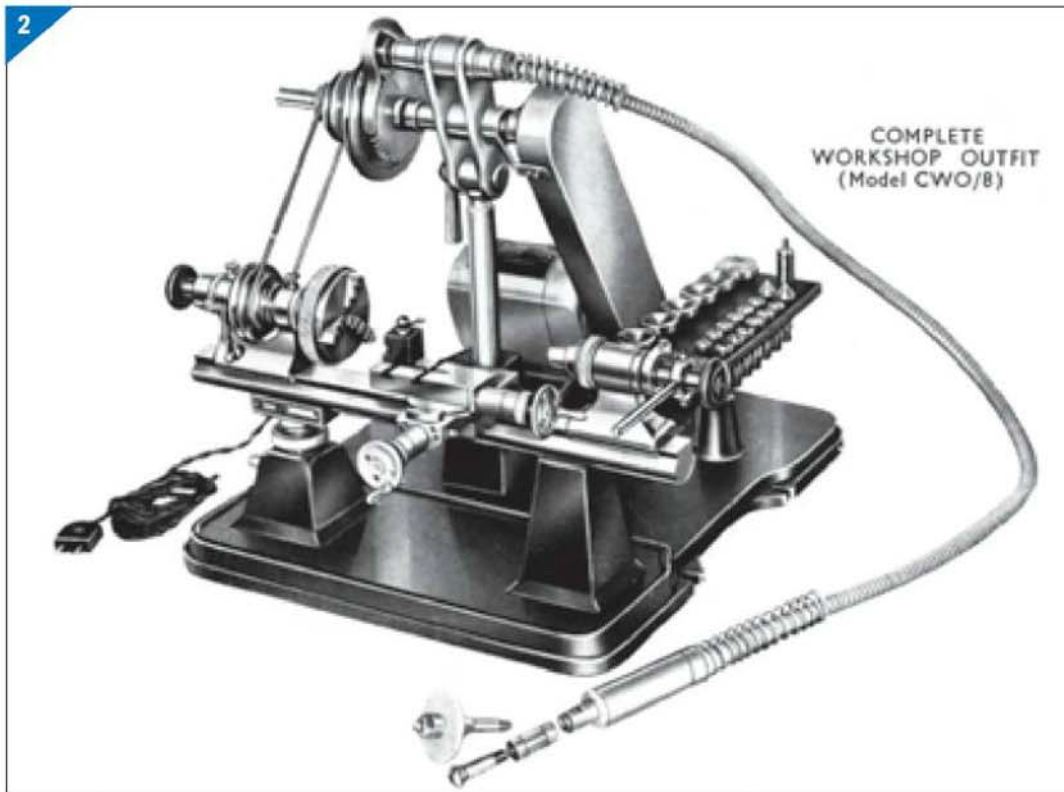
A weak point was the use of a simple swing-in-and-out pin (on an adjustable spring arm) to index the pulley – some competing lathes having a more robust arrangement where the pin was supported by being passed through the left-hand wall of the headstock casting. To ensure absolute concentricity between headstock and tailstock the two units were assembled on a 'master' bed and their bases ground and scraped until a perfect alignment had been achieved.

Fastened to the bed with full-



1. IME WB lathe outfits.

2. Complete workshop outfit.



length clamps, both headstock and tailstock could be firmly held with just a light touch on their locking handles. The standard tailstock featured a 'push' barrel that ran through 4-jaw collet compressed by turning a knurled cap - the system ensuring that collets and other fittings were held in perfect concentricity with the bore.

Other options for the tailstock included a screw-feed barrel (with a graduated collar) and a lever-feed attachment with a barrel able to take either 6mm collets - or the same 8mm type as the headstock. A pleasing touch was the provision of a replaceable spindle bush in the tailstock allowing easy replacement without affecting the accuracy of the unit.

Even the T-rest was a novel design with the shaft of the T set into a miniature 4-jaw collet fixing that was opened and closed by a four-spoke ring surrounding its base. Ingeniously, screw-adjustable balls were fitted to compensate for the wear on the rest. Besides a conventional compound slide, a special version was produced that had both handles facing the front but with the top slide incorporating a neat helical

gear arrangement to turn the drive through 90 degrees.

After assembly, the advertising literature claimed that each lathe was run at 5000rpm for eight hours after which it was dismantled, inspected and re-assembled before being packed for sale into its polished mahogany box complete with a signed test certificate.

Although surviving advertising literature only mentions an 8mm lathe it is almost certain that a 6mm version was built as well, some 8mm lathes having been discovered with a supplementary, 1.625in. centre height headstock and a set of 6mm collets in their boxes. If the lathe is complete as sold, the underneath of these supplementary headstocks may well be found stamped with a production number corresponding to the one found on the maker's test certificate.

In later years (but at an unknown date) the makers moved to Woburn, south east of Milton Keynes in Bedfordshire and introduced two new models: the conventional-looking 2in. centre height Model 300 and the very unusual (and much heavier) 3in. Model 100. The latter machine was mounted on a

substantial cast-iron base that formed, at the rear, a mounting point for the rear-mounted variable-speed motor and, at the front, a space for a large rotary speed-control dial.

While both lathes retained the same design of tool-steel, V-edge bed and beautifully made compound slide rest, the tailstock and headstock were completely new designs. The headstock (which, like the tailstock, was left unpainted) was formed as a simple, box-section casting with the drive to the spindle from an overhung, two-step toothed belt pulley. Power was provided by a $\frac{1}{8}$ hp infinitely-variable speed, thyristor-controlled motor that gave speeds from 50 to 4000rpm. Because both edges of the bed were formed with inverted V-shaped ways (most plain-turning and watchmakers' lathes have just bevelled top edges) the lathe was relatively easy to convert to a powered sliding carriage - and one very rare version of the Model 300 was indeed so equipped.

Yet another (unadvertised) example has been found with a leadscrew and changewheel-driven screwcutting, again with the whole carriage, rather than just the top-slide as

on most similar machines, moving along the bed. The feed and screwcutting conversion consisted of two simple brackets, one bolted to each end of the (conveniently flat) bed ends. Each was bushed to carry the leadscrew and the headstock-end one adapted to support the changewheel banjo. A proper tumble-reverse mechanism was fitted between the spindle and changewheels and the apron fitted with a clasp-nut for engagement.

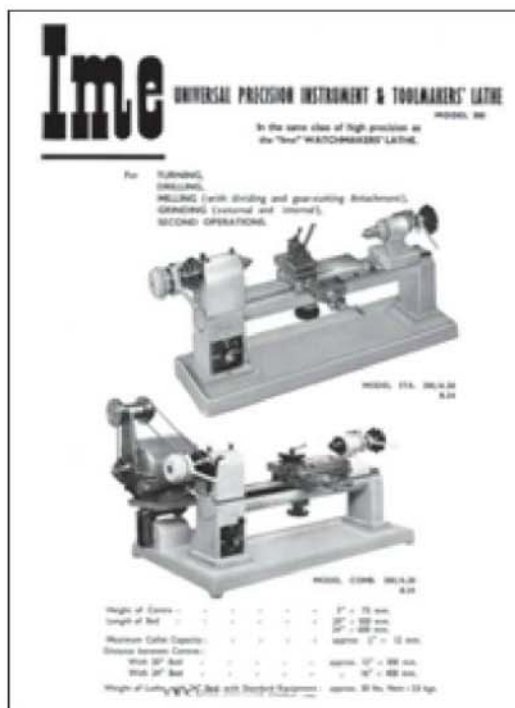
Early versions of the 100 and 300 had an unusual arrangement of headstock bearings with the spindle supported on a ball race immediately behind its nose and a taper roller bearing at the other end; later models were fitted with ball races at both ends. Both the Model 100 and Model 300 were offered with a small range of accessories including a 4-way toolpost, a rear toolpost on a long T-slotted raising block, a vertical milling slide, collets for the tailstock, lever-action and screw-feed tailstock barrels and (though never officially listed) raiser blocks for headstock, tailstock and top-slide.

BTM watchmakers' lathes

Thought to have been first produced during World War Two, when supplies of German machines by makers such as Lorch and G. Boley were unobtainable, the BTM was a beautifully-made English watchmaker's lathe with a centre height of 50mm and 165mm available between centres - both the straight and gap beds some 254mm long being available. However, the lathe must have been but a minor distraction for its makers, the British Tabulating Machine Company Limited, for this was a large organisation, long familiar with precision production methods, who may have made the machine at the behest of a government department.

BTM were later to become ICT and then, in the 1970s, the well-known and very successful computer firm ICL. During the 1930s the company were based





3. IME 100 instrument lathe.
4. Model 300 lathe.
5. BTM brochure extract.

in Icknield Way, Letchworth in North Hertfordshire and licensed by the Tabulating Machine Company (TMC) of America (later IBM) to produce punched-card machines. However, in connection with

the same products, they had also independently developed a particularly successful mechanism, the ingenious Rolling-total Tabulator, a device that was to be further developed by BTM (and

adopted by IBM) and play an important part in scientific and commercial calculations during the 1940s and 1950s.

Of even greater interest is that their background in complex machines gave BTM the experience and skills to undertake the development and manufacture of the 210 massive and ingenious Bombe mechanisms (known internally by the company as the 6/6502 or CANTAB) used at Bletchley Park from 1940 to 1945 as part of the Colossus computer system that decoded enemy signals during World War Two.

Built along lines of the original light Swiss 'Geneva' pattern watchmakers' lathe (as distinct from the heavier American WW models) the BTM watchmakers' lathe had a round bed with the flat element at the top rather than at the (more usual) back. It was intended for, and widely used by, precision industries and the armed services for the manufacture and repair of mechanical instruments. The numbers built must have been considerable for the model continued to be available – in boxes marked "Manufactured by ROF" and in a black crackle finish – until the early 1950s with sales handled by, among others, the well known precision machinery dealer E. H. Jones of Edgware Road, The Hyde, London NW9.

With a headstock that looks to have been an exact copy of that used on the 1920s and 1930s G. Boley watchmakers' lathe, the lathe had a maximum through-collet capacity of 4.8mm (and partial of 5.4mm), with the 8mm bore headstock spindle running in plain bronze bearings with a stated running clearance of 0.00025 inch. A spring-loaded pin was fitted as standard to engage in a ring of indexing holes in the front face of the headstock pulley.

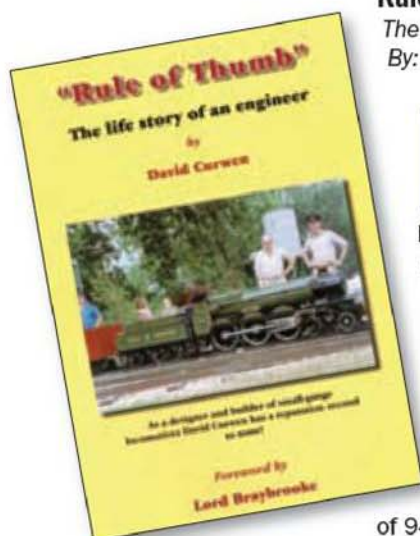
The lathe was supplied in a lockable wooden box complete with a very generous level of equipment that enabled it to be pressed into service immediately. Items included: a straight bed, bed with gap, compound screw-feed slide rest, headstock with hollow spindle and 3-step pulley, two tailstocks – one with a securing lug and one without; a T-rest holder with wide and narrow Ts, bell chuck, self-centring 3-jaw scroll chuck, 5-step 'chucks', set of plain collets to take 1.5, 2.1, 3.2, 3.6, 4.0, 4.2, 4.4, 4.8, 5.2 and 5.4mm diameters, set of cone collets to take 0.8, 1.0, 1.2, 1.8, 2.4, 2.6, 2.8 and 3.0mm diameters, driving chuck with carrier, pulleys runner for tailstock with two pulleys, two plain and six hollow centres and two carriers, centre ejector with vulcanite knob and a driving belt. Available as extras were an electric motor with a drive pulley, a round foot-stand for bench mounting and a lever-action tailstock.

Apart from the crackle-black mounting post, the lathe was finished in nickel plate or polished steel. According to reports by contemporary users, many of these lathes were returned from reserve stores after the war (together with masses of other unused high-precision equipment) and sold off cheaply – but are now comparatively rare.

M.E.



FOR YOUR BOOKSHELF



Rule of Thumb

The life story of an engineer
By: David Curwen.

Mature readers of *Model Engineer* will recognise the name of David Curwen as one of the most important names in the history of larger gauge locomotives. Certainly I remember being awestruck by some of the engines he designed to be built by Severn Lamb in the 1970s.

Now at the age of 94, David has written his autobiography. Just like his locomotives it is a classic.

David's early days were spent at a boarding school where he

was more interested in trains and things mechanical than in things academic. He graduated to Levis and Scott motorcycles, Trojan and Austin Chummy cars, and more names to delight the vintage enthusiast of today. An apprenticeship in generating plant maintenance followed by work in a garage provided an engineering background that youngsters today can only dream of. A move to Short Brothers saw David working first on flying boats and then the Short Stirling bomber.

After the war, David started his first engineering business, tackling work that came in via an advert in *Model Engineer*, and with the help of some war surplus machine tools. Quite soon half a dozen people were employed.

The first big break came with a commission to build something much larger than hitherto, an LNER A1. In 10¼ in. gauge! David decided to build an extra one for himself to put through various tests. He tells of having the boilers made by a specialist boiler maker, who did not need drawings. "No, no. We will just make a sketch of the outside sizes you want, I'll do the rest." Which he did, at a cost of, wait for it, £100 each. As David says: "Those were the days!"

Two more Pacifics were ordered but were built as Atlantics to cope with sharp curves. These were the famous Curwen Atlantics of which five were eventually built. Two went to Lord Gretton's Stapleford Park Railway. One is still there.

David was also very much involved with full-sized narrow gauge locomotives, working with Tom Rolt to get the Talylyn up and running in the early 50s. But it is perhaps the 1960s and work for the Audley End railway of Lord Braybrooke that some of David's best work can be seen. David continued to work there until he was in his late 80s.

This is an excellent book, and it is easy to see why David Curwen gained a reputation for being second to none as a miniature locomotive designer and builder. It is also an account of a life lived with a fascination for engineering.

Appropriately the book ends with a photo of David with his Drummond lathe, both dating from 1913.

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D.C.C.

Design Procedures for Walschaerts' and Stephenson's Valve Gears

By: D. L. Ashton.

Those of us who designed valve gears in earlier years welcomed the publication of Don Ashton's separate books of Walschaerts' and Stephenson's valve gears some 30 years ago. This new, revised edition combines the two books, and the greater credence of the computer age, while still covering the graphical drawing board and calculation methods used by many and, indeed, by the locomotive drawing offices of former years.

In addition, Don Ashton's design methods and Dr. Allan Wallace's simulation computer programs have been combined to assist in the working of the programs. They can be downloaded free from a given address.

The book commences by explaining what Walschaert's designed his valve gear to do. Piston and slide valves are explained, together with port width and lap and the reason why lead in this constant lead gear can be ignored in a model.

Cut-off is explained and while advising that cut-off over 72-78% would be superfluous, the reason for this, that the mechanical advantage of the crank/connecting rod diminishes to zero as the system approaches linearity, is not given.

A description of the valve gear follows, element by element. The reason for backset is explained. We have the lap and lead function, as controlled by the combination lever considered. The expansion link, return crank and suspension of the radius rod are explained. Each of these elements is covered graphically and by calculation, for those with a mathematical bent.

Inherent errors are also discussed, together with the design of reversing gears.

Stephenson's link valve gear differs from Walschaerts' in that it is driven by two eccentrics and the lead increases as the gear is notched up. The equivalent eccentric method of designing this gear is explained and the setting of the lead to give optimum results on a model discussed.

This combined volume is recommended as a must buy to all who wish to understand these valve gears, whether they require to design them, adjust the gear on an errant locomotive or simply want to know them from a theoretical or perhaps a practical point of view.

D.G.M.

Obtainable from:

Camden Miniature Steam Services, Freepost 1502, Rode, Frome, Somerset BA11 6UB.
Price: £15 plus postage.





Malcolm Stride reports

Notices

Fred Dibnah MBE

I am sure many readers will be pleased to hear that the late Fred Dibnah MBE has been honoured by his home town of Bolton with the unveiling of a Blue Plaque at his old home. The inscription reads "Home of the late Dr. Fred Dibnah M.B.E., Steeplejack, Honorary Doctorate: Aberdeen & Birmingham Universities, Artist, Draughtsman, Carpenter, Stonemason, Demolition Expert, Intuitive Engineer, Steam Enthusiast, Devotee of our Industrial Heritage, Raconteur and Television Celebrity, Revered Son of Bolton, 1938-2004". It is not until one sees Fred's achievements and skills listed that one can really appreciate his contribution to the engineering and heritage worlds.

UK Club News

Progress on the compound at **Bedford MES** has continued with about three-quarters of the structure now complete. Once this is complete and the site is tidy, permission will be granted to build the clubhouse and station. The new water softener tower is also complete although some say "the water is just as hard but has had the minerals removed!" The society has now decided that spark arrestors will be compulsory for all solid fuel locomotives running for

the public. The society will not be running Santa Specials this year. The society hosted a visit by members of the **Northolt Model Railway Club** in August. The visitors brought six 5in. gauge steam locomotives, namely a *King*, *Britannia*, *Metre Maid*, *Sweet Pea*, *Simplex* and a *Maid of Kent*. It is reported that "near perfect weather had been arranged, both 5in. gauge tracks were in service and the day flashed by with big smiles all round and scarcely a hiccup to spoil the occasion."

Jim Jennings, President of **Bradford MES** thinks "it is time the politicians did something useful for a change, such as giving us more weekends for the summer months". Jim complains that it is getting more and more difficult to fit in all the special events and rallies these days. I am sure many will echo his sentiments. Following an incident at the boating lake when a youth pushed Arthur Dawson into the lake, the council have offered the presence of a warden during the Thursday evening sailing sessions in future. Apparently the youth got upset that he was not allowed to operate Arthur's model because it was otherwise engaged in rescuing another boat. The police were called but, of course, the youths were long gone. The painting of the raised track has made good progress and has almost reached the turntable, which was the target this year.

Discussion on the new pond construction has taken place with a specialist landscaping company. The junior driver training day in August drew in 22 enthusiastic youngsters who enjoyed a good educational day in the fine weather.

Barry Loraine, Editor of the **Canterbury DMES** newsletter, has taken on a new and very important role as official taster of the food at the Traction Engine Day. Barry reported that "the hot dogs, bacon rolls and tea were of the most excellent quality, although I had to go back several times just to make sure". Well somebody has to do it! The day itself suffered from high winds and dark skies which cut the number of visitors viewing the 10 steam engines attending.

Member's ideas are being sought as to how the 60th anniversary of the **Cardiff MES** can be celebrated next year. Planning permission for the extension and modification to the clubhouse has been granted although the changes to the lease to incorporate a new strip of land are still outstanding.

The 75th anniversary celebrations at **Chesterfield DMES** coincided with the opening of the ground level track extension by the Mayor. Running evenings are now held once a month on the garden railway on the fourth Tuesday. Some discussion has revolved around the cutting

1. The grand parade at the Canterbury DMES Traction Engine Day.



of ivy back from trees. Having canvassed some expert opinion, the conclusion is that leaving the ivy is a good thing unless it has reached the crown of the tree and increases its wind resistance. The ivy is highly beneficial to wild life, particularly late in the year and in the winter.

The newsletter of the **Chichester DSME** carries the story of *Winnie* which, completed in 1908 by Robert Alexander Briggs and his son Robert Westrope Briggs, is reputed to be the oldest surviving working model locomotive in Southern England. In the early 1960s the locomotive was presented to the club by Mr. Briggs (then aged 95) and in 1978 a ground level track for the locomotive was laid and opened with the first few laps of the locomotive being under the control of Peter Briggs, the late builder's grandson. The locomotive received a new boiler in the 1970s. *Winnie* is built to a scale of 2in. to the foot with a gauge of 10 $\frac{1}{4}$ inches. Readers will know the name because among his other achievements, Robert Briggs invented the 'Briggs type' boiler, which was the design originally fitted to *Winnie*.

Jack Darby of **Crawley Model Engineers** has a new idea for attracting the public following a visit to the British Airways Fun Day with the portable track. Jack discovered that the Boeing

777 aircraft was long enough to take the portable track, so has suggested in flight train rides as a possibility! The last Wednesday in August saw the arrival of a new locomotive, Mike Robert's 5in. gauge *Black Five* which was brought along for a steam test. After raising steam and curing some minor leaks, the test was passed. Mike decided not to run because the injectors did not appear to be 100%. Such was the interest in this activity that the Wednesday gang did not get any other locomotives out onto the track. Mike did run the locomotive a week or so later, completing several laps. Following the Big Dig Day when the duct for the electricity supply was installed, a Big Paint Day was held to paint the inside of the clubhouse. This was triggered by the need to move everything outside ready for the electrics to be refurbished. The main cable was installed at about lunchtime and the supply was connected the following day and signed off a few days later.

Members of **Fylde SME** will be exhibiting some models at the G-Wizz event on Saturday 8 December. All profits from the event go to charity. Following the resignation of Norman Almond as Chairman, Alan Chew has taken on the responsibilities. The **National 2 $\frac{1}{2}$ Inch Gauge Association** Northern Rally was held at the Fylde track in August and boasted a good turn out of

locomotives in spite of the inclement weather. Sixteen visitors arrived to join the local contingent.

In spite of the atrocious weather and a very waterlogged ground at the **Guildford MES** Ruby Rally, visitor numbers were near to normal. Just goes to show that it takes more than a bit of weather to keep model engineers down. The main casualty of the weather was the traction engine activities, although a few hardy souls did try steaming on the Saturday. The Chairman expressed his thanks to "the visiting locomotive drivers" and "to the clubs and societies who contribute so much to the exhibition by mounting their stands in the marquee". Particular thanks were expressed (and deserved) to John Jones, the Rally Chairman. The society held another variant on the efficiency competition in August; this one was called Little LEC and was restricted to 3 $\frac{1}{2}$ and 5in. gauge locomotives weighing less than 50lbs. The event was also restricted to Guildford MES members this year. The competition proved that these small locomotives can pull impressive loads, with a *Rob Roy* hauling just over 400lbs and a Tich managing 277lbs. The society is making plans for the Clubhouse redevelopment with a view to having part of the work completed in time for the first public running day next season.

David Boughen, Editor of the newsletter of the **High Wycombe MEC** has a very sensible thought on the metrication debate. He comments, "I am afraid that we have to recognise that more and more basic material supplies are going to be metric. However, if the A1 Steam Locomotive Trust can build a full-size A1 Pacific using metric-based materials, I am sure model engineers can". The track refurbishment is progressing with the likelihood that some capital funds will be left when the project is completed. This will be used for other capital items rather than going in running costs.

Member John Knott celebrated his 90th birthday in August with a fruitcake produced by Doris Buckland. May we add our congratulations to John on reaching this milestone? It just goes to show that model engineering is good for the health. Bill Richardson was the winner of the Grand HWMEC Locomotive Efficiency Competition this year with his 7 $\frac{1}{2}$ in. gauge 0-4-2 *Dart* locomotive.

One of the many societies affected by the floods earlier in the year was the **Kinver & West Midlands SME**. Although the site was flooded to a level above the railhead for much of its length, damage was not as severe as was expected. This is credited to the founding fathers that built in some flood resistance when the site was established. The clubhouse was saved by a few inches because of its elevated location. At the Kinlec event held in August, John Hurley successfully defended his title. New security fencing has been erected along the main boundary in an effort to deter those who "seem better at breaking things than making things".

The annual Whissendene event organised by **Melton Mowbray DMES** bucked the trend this summer by being held in "glorious weather" which resulted in a record attendance by exhibitors and the public. The following nice piece of history was in the newsletter from Stewart Jackson:

"As a rule we try to include some industrial history or heritage item in our family holiday itinerary. However, this year in the Peak District we slipped up by allocating the Friday (because it was raining) to visiting industrial museums in Sheffield. Sheffield doesn't want visitors on Friday, they close.

The nearest we got to anything mechanical has only a tenuous connection with model engineers - ingenuity. Being close to Chatsworth we had to visit their farm shop and restaurant. Amongst the food purchased were a chocolate and beetroot cake (!) and a few bottles of beer from their



new micro brewery named Gardeners Tap. The original brewery on the site of the farm shop complex was closed in 1932 when part of the estate workers wages ceased to be paid in ale (which was quite a late date for that practice), up until then when the beer had been brewed it was sent down a lead pipe to the big house 1½ miles away to be stored in barrels ready for issue. In the 1950s it was decided to lift the lead pipe to recover the scrap value. Where the pipe passed under a greenhouse it was discovered that the ingenious gardeners had tapped into it for additional rations, hence the name in their rather dubious honour".

Eight members of the **Tonbridge MES** visited the Spa Valley railway in August for a drive of a full-size locomotive. The locomotive suffering all this attention was a LMS O-6-OT number 47493 which has seen service on a number of preserved railways following its working life with the LMS and British Rail. Some members of the Spa Valley railway paid a return visit to the club track and tried their hand with the model locomotives.

Seven locomotives and drivers from **Wigan DMES** visited the **Butterley Park Miniature Railway** recently. The locomotives included the two *Precursors* of Alan Atherton and Richard Stoddart. The society work gang is looking for a replacement pillar drill for day-to-day use.

The society website of **York Model Engineers** is now updated and is up and running again at www.yorksme.org.uk Work is continuing on felling trees to open up the track site with some of the resulting logs being incorporated into landscape features. The ground level track station area is taking

shape, as is the space for a shunting area.

World Club News New Zealand

For all those winners of trophies at the Model Engineer Exhibition, Mike Jack, President of the **Auckland SME** has a painless way of cleaning them. Mike advises dissolving a two-thirds cup of washing soda in an aluminium pot of warm water and immersing the cup to be cleaned, ensuring it is in contact with the aluminium. After a few seconds the cup can be removed and rinsed before drying with a soft cloth.

Trade News Longleat Railway

Those who drive locomotives or carry out other duties on the many club tracks like to be well dressed. A full range of uniform caps including loco-men's, station master's, guard's, ticket collector's and others can be obtained from Longleat Railway. In addition the company can supply other accessories needed for railway duties such as flags, whistles, lamps, ticket clippers etc. Further details can be obtained by sending a SAE to Longleat Railway, Warminster, Wiltshire BA12 7NW. Readers may also visit the website at www.longleat.co.uk

H. S. Walsh and Sons

H. S. Walsh and Sons have released a new catalogue showing the full selection of products available from this long established company. The new catalogue includes guide prices to make ordering easier and a free copy can be obtained by contacting the company at 243 Beckenham Road, Beckenham BR3 4TS, T. 020 8778 7061, www.hswalsh.com

Arc Euro Trade

Another company with several

new products available is Arc Euro Trade. The company website www.arceurotrade.co.uk shows several useful new items including a 5C to ER32 collet adaptor, chuck removal wedges, attachments for the C0 lathe and for those wishing to move into CNC milling, a CNC conversion kit for the popular X3 milling machine. The company is also now open on Saturday mornings at 10 Archdale Street, Syston, Leicester LE7 1NA. (T. 0116 269 5693).

A. J. Reeves On-line offer

It is not too late to take advantage of the on-line carriage free offer from A. J. Reeves. The offer applies to all United Kingdom orders placed on-line at www.ajreeves.com with a value of £100 or more and the offer runs until the 14 December 2007. There is just time to order that Christmas present.

Humour Time

The following came from the **Model Engineers and Live Steamers Association** in Maryborough, Australia.

What Retired People Do

Working people frequently ask retired people what they do to make their days interesting. Well for example, the other day I went into town and visited a shop in Margaret Street. I was only in there for about five minutes. When I came out there was a cop writing out a parking ticket. I went up to him and said, "Come on mate, how about giving a senior a break?" He ignored me, and continued writing the ticket. I called him a Nazi. He glared at me, and started writing another ticket for having worn tyres. So I called him a fat pig. He finished the second ticket, and put it on the windshield with the first. Then he started writing a third ticket, so I abused him again. This went on for about 20 minutes. The more I abused him, the more tickets he wrote. Personally, I didn't give a damn I came into town by bus. I try to have a little fun each day now that I'm retired. It's important at my age.

RY DIARY DIA RY DIARY DIAR

DECEMBER

- 3 **Leicester SME.** Derek Brown: *Loco Design using CAD.* Contact John Lowe: 01455 272047.
- 3 **Peterborough SME.** Bits & Pieces. Contact Lee Nicholls: 01406 540263.
- 4 **Basingstoke DMES.** Meeting. Contact Malcolm Duckett: 01420 562835.
- 4 **North Cornwall MES.** Meeting & Maintenance Evening. Contact Geoff Wright: 01566 86032.
- 4 **Oxford (City of) SME.** Bits & Pieces. Contact Chris Kelland: 01235 770836.
- 4 **Romney Marsh MES.** Bits & Pieces/Bring & Buy. Contact John Wimble: 01797 362295.
- 4 **Taunton ME.** Brains Trust. Contact Nick Nicholls: 01404 891238.
- 5 **Birmingham SME.** Running Night. Contact John Walker: 01789 266 065.
- 5 **Bristol SMEE.** Mary Ison: *Dowsing.* Contact Trevor Chambers: 0145 441 5085.
- 5 **Chingford DMEC.** Bits & Pieces. Contact Ron Manning: 020 8360 6144.
- 5 **Guildford MES.** White Elephant Sale. Contact Dave Longhurst: 01428 605424.
- 5 **Leeds SMEE.** Christmas Dinner. Contact Geoff Shackleton: 01977 798138.
- 6 **Cardiff MES.** Carl Pickstone: *More Engineering Topics 5.* Contact Don Norman: 01656 784530.
- 6 **Leyland SME.** Bring & Buy. Contact A. P. Bibby: 01254 812049.
- 6 **Northern Ireland (MES of).** Money Matters. Contact Stephen Atkinson: 9044 8555.
- 6 **Sutton MEC.** Bits & Pieces. Contact Bob Wood: 020 8641 6258.
- 6 **Worthing DSME.** Bits & Pieces. Contact Bob Phillips: 01903 243018.
- 7 **Canvey R&MEC.** AGM.

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.

Brian Ward

Bradford MES

	Contact Brian Baker: 01702 512752.	9	Mottram: 01483 473786.	13	Cardiff MES. Tony Bird: An Evening with Tony. Contact Don Norman: 01656 784530.	17	Contact Ted Jolliffe: 01234 327791.
7	Colchester SMEE. Simon Pulham: Get Organised. Contact K. Wright: 01255 434091.	9	Sutton MEC. Track Day. Contact Bob Wood: 020 8641 6258.	13	Sutton MEC. Quiz & Mince Pie Night. Contact Bob Wood: 020 8641 6258.	17	Leicester SME. John Baylis: Video Night. Contact John Lowe: 01455 272047.
7	Ickenham DSME. Member's Slides. Contact Ian Mortimer: 01895 635596.	10	York City & DSME. Running Day. Contact Pat Martindale: 01262 676291.	13	Worthing DSME. Christmas Social. Contact Bob Phillips: 01903 243018.	17	Leyland SME. Annual Christmas Dinner. Contact A. P. Bibby: 01254 812049.
7	Maidstone MES (UK). Norman King: Steam Lorries. Contact Martin Parham: 01622 630298.	10	Bedford MES. Quiz Night. Contact Ted Jolliffe: 01234 327791.	14	Brighton & Hove SMLE. Party Night. Contact Mick Funnell: 01323 892042.	17	Peterborough SME. Party Night. Contact Lee Nicholls: 01406 540263.
7	North London SME. A Pre-Christmas Social Evening. Contact Rachael Chapman: 01442 275968.	10	Melton Mowbray DMES. Allen Walker: There's Always a Crowd. Contact Phil Tansley: 0116 2673646.	14	Ickenham DSME. Christmas Slide Show. Contact Ian Mortimer: 01895 635596.	18	Basingstoke DMES. Meeting. Contact Malcolm Duckett: 01420 562835.
7	North Norfolk MEC. Dinner. Contact Gordon Ford: 01263 512350.	10	Reading SME. Santa Specials. Contact Brian Joslyn: 01491 873393.	15	Dublin SMEE Ltd. Meeting. Contact Colm de Brun: (01) 868 2549.	18	Chesterfield MES. Photo Competition. Contact Mike Rhodes: 01623 648676.
7	Rochdale SMEE. Alf Molyneux: Travels with Fred. Contact Bob Denyer: 0161 959 1818.	11	Saffron Walden DSME. Christmas Dinner. Contact Jack Setterfield: 01843 596822.	15	Guildford MES. Christmas Social Evening. Contact Dave Longhurst: 01428 605424.	18	Northampton SME. Christmas Drinks. Contact Pete Jarman: 01234 708501 (eve).
7	Romford MEC. Competition Night and Millennium & Rusty Titford Cup. Contact Colin Hunt: 01708 709302.	11	Crawley ME. Fish & Chip Supper. Goffs Park Light Rly. Contact Allan Sinclair: 01293 888203.	15/16	Nottingham SMEE. Santa Specials. Contact Pete Towle: 0115 987 9865.	18	Nottingham SMEE. Valerie Clark: Bombs to Butterflies. Contact Graham Davenport: 0115 8496703.
7	Winchester MES. Christmas Social. Contact Mary Davis: 01703 273473.	11	Frimley & Ascot LC. Meeting. Contact Bob Dowman: 01252 835042.	15	SM&EE. Gauge 1 Informal Run Afternoon. Contact Maurice Fagg: 020 8669 1480.	18	Romney Marsh MES. Member's Social Get-together. Contact John Wimble: 01797 362295.
8	Canvey R&MEC. Members' Only Running Day. Contact Brian Baker: 01702 512752.	11	Manx Steam & MEC. Meeting. Contact Richard Rake: 01624 671258.	15	York City & DSME. AGM. Contact Pat Martindale: 01262 676291.	18	Stafford DMES. Auction & Quiz. Contact Chris Dobbs: 01889 270533.
8	Glasgow & S.W. Rly Ass'n. Various speakers: G&SWR Miscellany. Contact Bruce Steven: 0141 810 3871.	12	Romney Marsh MES. Member's Social Get-together. Contact John Wimble: 01797 362295.	16	Birmingham SME. Children's Christmas Party. Contact John Walker: 01789 266 065.	18	Taunton ME. Mince Pies and Natter. Contact Nick Nicholls: 01404 891238.
8/9	Nottingham SMEE. Santa Specials. Contact Pete Towle: 0115 987 9865.	12	Birmingham SME. President's Evening. Contact John Walker: 01789 266 065.	16	Bournemouth DSME. Santa Specials. Contact Dave Finn: 01202 474599.	19	Leeds SMEE. Quiz Night. Contact Geoff Shackleton: 01977 798138.
8	SM&EE. Training Seminar. Contact Maurice Fagg: 020 8669 1480.	12	Chingford DMEC. Bill Dadswell: Once I Built a Railroad. Contact Ron Manning: 020 8360 6144.	16	Canvey R&MEC. Santa Specials. Contact Brian Baker: 01702 512752.	19	Birmingham SME. Festive Fayre Evening. Contact John Walker: 01789 266 065.
8	Sutton MEC. Christmas Party. Contact Bob Wood: 020 8641 6258.	12	High Wycombe MEC. Colin Brading: A Narrow Minded Enthusiast. Contact Eric Stevens: 01494 438761.	16	Harlington LS. Mince Pie Run. Contact Peter Tarrant: 01895 851168.	19	Bournemouth DSME. Christmas Party. Contact Dave Finn: 01202 474599.
9	Canvey R&MEC. Santa Specials. Contact Brian Baker: 01702 512752.	12	Norwich DSME. Derek Patfield: Flying with Bomber Command in 1944. Contact Shirley Berry: 01379 740578.	16	Leicester SME. Santa Specials. Contact John Lowe: 01455 272047.	19	Bristol SMEE. Jack Shettle: Hints & Tips. Contact Trevor Chambers: 0145 441 5085.
9	Frimley & Ascot LC. Santa Run. Contact Bob Dowman: 01252 835042.	12	St. Albans DMES. Club Christmas Social Evening. Contact Roy Verden: 01923 220590.	16	Reading SME. Santa Specials. Contact Brian Joslyn: 01491 873393.	19	Chingford DMEC. Cheese & Wine Evening. Contact Ron Manning: 020 8360 6144.
9	Harrow & Wembley SME. Santa Run. Contact Roy Goddard, E. RSGwatford@aol.com	13	Canterbury DMES (UK). Annual Christmas Dinner. Contact Mrs P. Barker: 01227 273357.	16	Rochdale SMEE. Work in Progress. Contact Bob Denyer: 0161 959 1818.	19	Leeds SMEE. Quiz Night. Contact Geoff Shackleton: 01977 798138.
9	Malden DSME. Santa Special. Contact John			17	Tyneside SMEE. Christmas Party. Contact Malcolm Halliday: 0191 2624141.	20	MELSA. Meeting. Contact Graham Chadbone: 07 4121 4341.
					Bedford MES. Corn Meeting.		Cardiff MES. Quiz Night. Contact Don Norman: 01656 784530.

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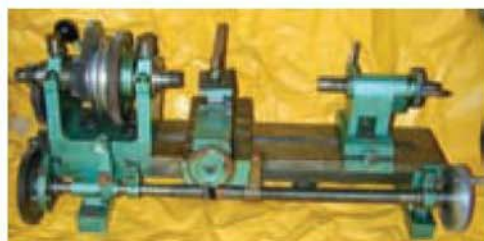
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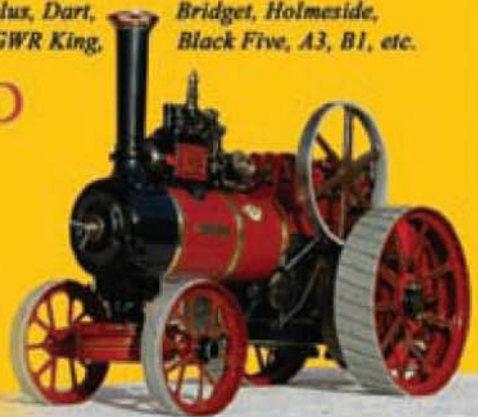
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