

MODEL ENGINEER

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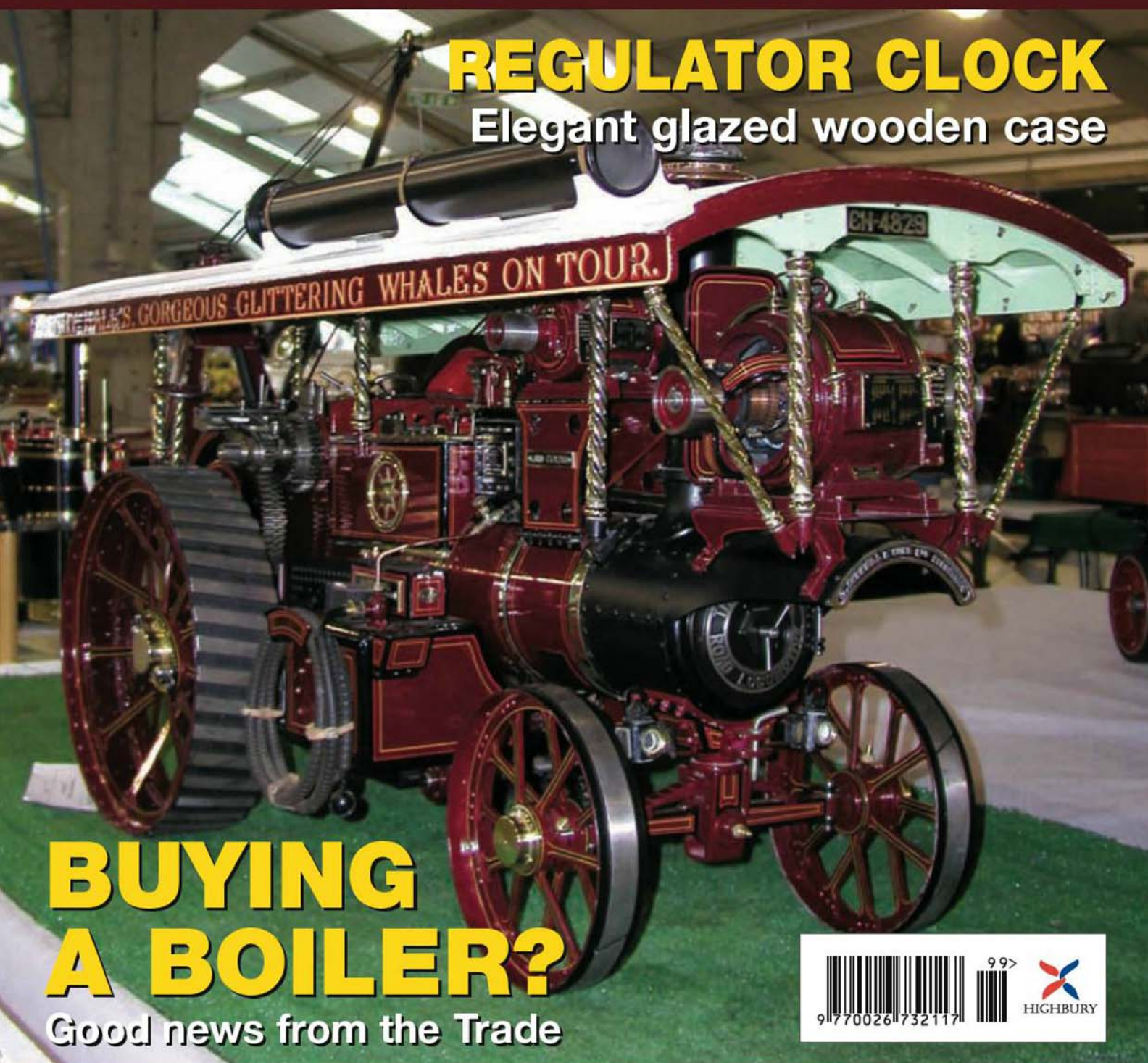
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OSCILLATING ENGINES: FURTHER REFLECTIONS

The saga continues with a double-acting
end-pivot engine, a port-in-pivot engine
and an inside-out engine. Part VII.
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On the cover ...

Mr. A. G. Walker was awarded
The Barry Jordan Trophy for Best in Show
at the 10th National Model Engineering &
Modelling Exhibition at Harrogate
for this fine 2in. to the foot scale
Burrell Scenic Road Locomotive.
Built for heavy haulage on metalled
roads, vehicles of this type supplied
to showmen were usually embellished
with brass ornamentation and superb
paintwork with additional lining.
Burrell were pre-eminent in the building
of these engines and Mr. Walker's model
faithfully reproduces the superb
quality of the prototype.

The model was displayed using its jib
crane to lift a gondola for one of the rides;
all in a day's work for one of these engines.
Our report begins on page 16.

(Photograph by Mike Chrisp)

SELF STEERING WHEEL SETS AND SWING LINK SUSPENSION

A device to produce the requisite wheel
profile precedes further work on the
Lowmac driving car chassis. Part VI.
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MONTH GOING REGULATOR CLOCK

The series concludes with a design
for a glazed case for this handsome
timepiece. Part IX.
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KEITH'S COLUMN: LOGGER & SLOGGER AMERICAN TYPE 2-8-2 LOCOMOTIVES for 5in. and 7 1/4in. gauges.

Work on the boilers begins with the outer
wrappers and advice concerning the
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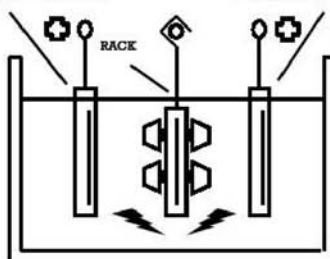
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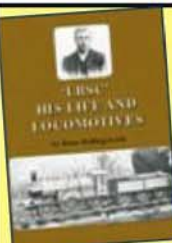


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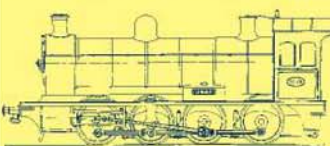


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In this masterly book Brian looks at 'LBSC's' life, writings and designs in some detail,



warts and all. The unfortunate enmity between 'LBSC' and Henry Greenly is considered at length, as is his latterly somewhat fraught relationship with *Model Engineer*. His quirks are also covered sympathetically.

This is a fascinating and highly readable book on a fascinating and highly readable man; it is a book any model engineer with an interest in his hobby should have on his bookshelf. Whilst this edition includes a Tribute to Brian Hollingsworth by Dr. Brian Rogers, and a few minor alterations, it is otherwise a facsimile of the original printing, although the text has been rescanned and set, as have the illustrations, where possible from original prints. 112 pages. Over 220 B & W photos and drawings. Hardbound.

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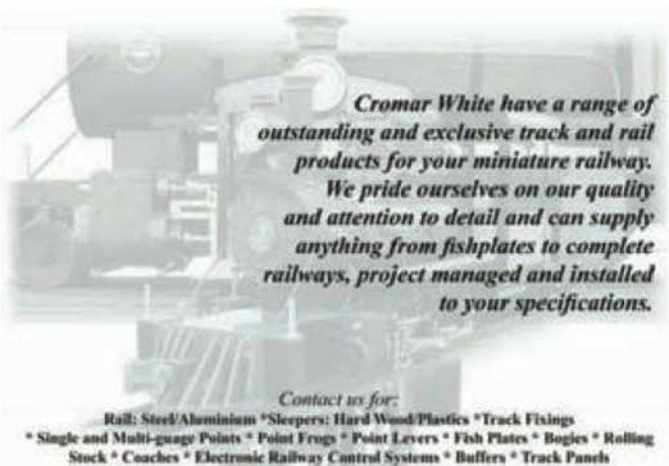


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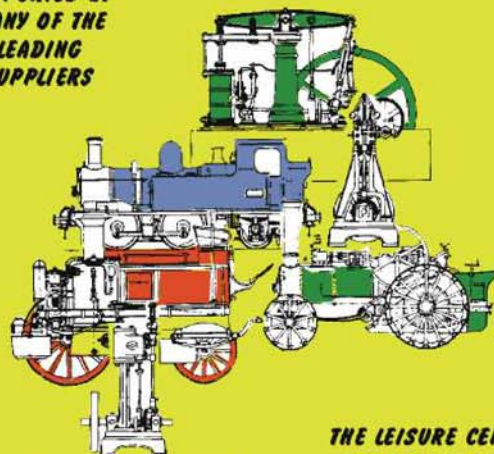


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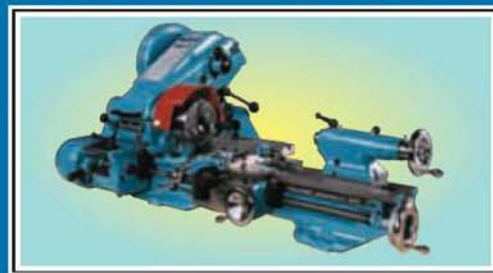
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SMOKE RINGS

With the Editors

Welcome Malcolm!

We offer a very warm welcome to Malcolm Stride, our new Club News Editor whose first contribution in his new capacity appears in this issue. An active member of Reading SME whose track and headquarters are situated in Reading's Prospect Park in Berkshire, Malcolm is also an active model engineer with several completed projects to his credit and others currently in hand.

Malcolm has been persuaded to introduce himself and has done so in a preamble to *Club Chat* in this issue (turn to page 45) while Rosina Tillyer has provided us with a photograph so that any hope he might have nurtured concerning anonymity is now blown!

We look forward to a long association with Malcolm as a new member of the *Model Engineer* team, and wish him much pleasure in the role. We are sure that it won't be long before he finds himself out and about visiting club events and gatherings which take place throughout the summer months.

It is appropriate here to record publicly our thanks to the other applicants for consideration for the role of Club News Editor. Our short list featured some very capable and excellent contenders, all of whom are existing contributors to these pages, and the final choice was far from easy. Put simply, we were spoiled for choice! It must be admitted that the most regrettable matter concerning having to choose just one, is that the others cannot therefore be selected.

Club Diary is prepared in the *M.E.* Editorial Office; to avoid delay and possible loss, information should be sent directly to PO Box 310, Hemel Hempstead, Hertfordshire, HP3 8XL; fax: 01442-269366; e-mail: mike.chrisp@virgin.net. The same applies to club newsletters and magazines from which much of our *Club Diary* entries are extracted. These are then immediately forwarded to Malcolm, from which he gleans the necessary information for *Club Chat*. Material sent to Swanley inevitably incurs a delay of at least a week, sometimes longer, and short dated, time sensitive information may arrive at the Editorial Office too late for publication.

Lynx Model Works

We recently enjoyed a telephone conversation with John Clarke, proprietor of a new business venture in Lincolnshire. An engineer by training and profession, John is also an active model engineer of some 32 years experience and a member of Grimsby & Cleethorpes MES, GL5MLA and the 2 1/2in. gauge Association.

John has set up Lynx Model Works as a business offering a service to collectors and model engineers to build, repair and renovate live steam, i.e. and electric powered locomotives and rolling stock in all gauges. John will assemble or complete kit locomotives, etc., and can produce individual parts to drawings as required.

Contact John Clarke at Lynx Model Works, Dovecote House, Main Road, Maltby le Marsh, Alford, Lincolnshire LN13 0JP; tel: 01507-450121 or 07899-806689; e-mail: info@lynxmodelworks.co.uk website: www.lynxmodelworks.co.uk

IMLEC 2003

Readers are reminded that this year's competition for the Martin Evans Challenge Trophy will take place at the Ashton Miniature Railway track of Bristol SMEE next weekend 12/13 July. The fifth time Bristol has staged the event, the location of the track is detailed on the society's website www.bristolmodelengineers.co.uk.

The first run will start at 8.30am on Saturday, the last will start at 4.30pm on Sunday. Refreshments will be available throughout the event and an exhibition of Bristol SMEE work will be on display. A number of traders will be present and the ground level 7 1/4in. gauge track will operate throughout the weekend. There will be a free temporary car park alongside the drive into the estate and a short walk will be necessary to reach the railway. No vehicles will be allowed on the railway site, although special arrangements will be made to allow elderly and infirm visitors to be driven directly to the venue. Admission will be £5 for adults including programme for one or two days. Under-18s will be free, but no unaccompanied youngsters will be admitted.

For those who wish to make a weekend of it, there are many attractions in Bristol and the surrounding area. Visit www.visitbristol.co.uk and www.whatsonbristol.co.uk for information and www.bristol-hotelonline.com for B&B and hotel accommodation.

Visitors as well as competitors and supporters will be very welcome at this important event in the model engineering calendar. Take a break. Come to Bristol. We look forward to your company.

IMLEC 2004

We are delighted to announce that IMLEC 2004 will be hosted by members of Kinver and West Midlands MES. At this early stage, we can only confirm that IMLEC 2004 will take place over the weekend 10/11 July.

An answer to the construction craft shortage

A group of businessmen, in partnership with Liverpool Community College, has formed the Liverpool International Construction Crafts Guild (LICC) to invest in skills for the future in response to the construction craft shortage. An independent guild, the LICC will raise funds from the private sector to support highly motivated men and women in each of the construction skills. The founder members are concerned about Merseyside losing construction skills and want to ensure that there is a high level of skill in the manual crafts available to the industry.

Students will be modern apprentices at the college and receive practical training with leading construction companies. They will be accredited in enterprise skills and as 'master craftsmen' be admitted to the guild which will ensure continuity. There will also be exciting overseas opportunities to work on projects in the developing world under the direction of the Chairman, Colonel John Blashford-Snell.

The LICC will admit its first students in September 2003.

For further information, contact Sarah Jane Lewis (Press Officer, Colonel Blashford-Snell's office) tel: 01747-853353 or Fran Parkinson, Head of Marketing (Liverpool Community College) tel: 0151-252 3181.

Is anyone considering something similar to meet the needs of the engineering industry?

LBSC Memorial Bowl Competition

Arrangements are currently in hand for this most enjoyable and gentle event, which was once run in conjunction with the Model Engineer Exhibition, to be hosted by Rugby MES on Sunday 14 September 2003.

Further information about the competition and the event will be published shortly but in the meantime we would like readers to note that all applications to compete will be considered.

CHUCK the MUDDLE ENGINEER

by B. TERRY ASPIN



POST BAG

De-carbonising technique

SIRS, - I refer to the difficulty experienced by Mr. G. Keogh in unblocking a blowlamp vaporiser choked with carbon. (M.E. 4195, 16 May 2003).

Some 70 years ago I had the same problem, although I am not sure whether the vaporiser was that of a blowlamp, or of a Primus stove. I should think, however, that my cure would work in either case.

I made a strong solution of potassium nitrate (nitre) and soaked the vaporiser in it. When the vaporiser was then heated, the water first boiled off, after which the nitre set about oxidising the carbon in the same way as it does when gunpowder burns. All it did in my case was to produce a shower of sparks, as from a firework. Not all the carbon was burnt away, but that which remained had been loosened and could be washed out with water.

M. J. H. Ellis, Bristol.

Speed controller repair

SIRS, - When the speed controller on my CL300M lathe failed some time ago (just out of warranty), the replacement cost of about £90 resolved me to try to repair rather than to replace the control board.

The speed controller is a pulse width modulation device using power MOSFETs. My symptoms: immediate maximum speed and fuse blow, suggested that at least one of these was short circuited, which proved to be the case. Some detective work on the marking of the components revealed that they were an obsolete Toshiba 2SK790 rated at 500V 15A. I chose to replace them with an upgraded component: IFRP460 rated at 500V 20A.

While these are more capable than the originals, I was still concerned about the cause of the failure. The circuit design is rather poor in that all the control voltages are derived from rectified mains by way of power resistors which get very hot. This, combined with the sealed box, greatly reduces the effectiveness of the MOSFET heat sink. I therefore fitted a mains powered case-cooling fan to the front of the control box, with a filter to catch the swarf, blowing over the heat sink with the hot air exhausting through small holes drilled in the bottom of the box. This may thought be overkill but three years later is still going strong.

When the same failure occurred on my Conquest mill recently (just

out of warranty again, funny that!) I was interested to see

that the circuit board had been improved, with a transformer supplying the control voltage. There is also some minor attempt at box ventilation, but the problem clearly still persists.

I obtained the IFRP460s from CPC (www.cpc.co.uk) at a very reasonable £2.92 each. Note that even if only one device has failed, both should be replaced and, of course, if you are not competent with mains electrics, you should not attempt any of the above.

Any reader who would like further details can contact me by e-mail at autoairrifle@aol.com Laurence Cooper, Essex.

Citric acid supply: Eureka!

SIRS, - Much has been written in previous issues of M.E. about the merits of citric acid for pickling, as also has the difficulty of obtaining it; I agree with both!

It has been noted that a significant quantity is not generally available from home-brew shops due to the fact that addicts use it to eke out their potions, but on the other hand another reader found some among spices in a supermarket which caters for the tastes of Asians! So, I attempted to resolve the issue once and for all for the benefit of others, made fourteen telephone calls and had complete success.

My last call was to a very helpful Mr. Geoff Marsden of Laycocks Agricultural Chemists. Their minimum quantity is normally 5kg but Mr. Marsden is willing to supply 1kg bags for the benefit of model engineers. The only slight snag is that the cost of the post and packing is about the same as the cost of the crystals, but that is a small price to pay for the ease of obtaining it.

My 1kg bag cost £3.99 plus £4.05 p&p plus VAT which totals £9.44. Laycocks Agricultural Chemists is located at Devonshire Place, Keighley Road, Skipton BD23 2LR; tel: 01756-792166. I asked Mr. Marsden if he would mind having this information published in *Model Engineer* to which his response was that he would be pleased to assist with any other orders. He accepts credit card orders by 'phone. He explained that they supplied "tons of the stuff" to the MOD during the foot and mouth crisis as it can evidently be used as a disinfectant against that horror.

Roger Castle-Smith, Buckinghamshire.

Pendulum electric clock

SIRS, - About three years ago I completed construction of the John Wilding $\frac{3}{4}$ second pendulum clock. This was enclosed in a case with glass front and sides and has been running faultlessly ever since. The two 'D' cells were replaced at each anniversary although they still had some life left in them. Only minor regulation adjustments have been necessary, due possibly to temperature effects. In all, this was a most satisfying constructional experience resulting in quite an elegant addition to the living room.

As a consequence I thought it might be a good idea to try to build a one second clock along the same lines. Some of your readers may have had similar thoughts so my experience to date with some of my experimental dimensions could be of interest.

The accompanying photograph shows my progress so far. I have not attempted to make a decorative frame as in the $\frac{3}{4}$ second version, so the mechanism is on a mounting of strip brass to check its operation. The wheels have not yet been crossed out, this luxury being reserved for when all else is well. Dimensions were retained as far as possible just as in the original John Wilding $\frac{3}{4}$ second version, but the following changes are due to the increase in the periodic time of the pendulum.

The linear amplitude of the pendulum tip was kept the same as before, resulting in a smaller angular displacement. The crown wheel is as before except that now it has 30 teeth instead of 40 and the lever arm must be longer due to both the smaller angle of operation and the larger pitch of the teeth on the crown wheel. The 'A' frame is much bigger due to the smaller angle of pendulum swing.

The following are the key dimensional changes, all relative to the suspension point:

Pendulum length to armature bottom: 1160mm (note that this depends on the relative masses of the pendulum parts, as the centre of gravity of the pendulum assembly must be at a depth of 994mm).

Depth of contact strip: 325mm

Length of operating arm (between centres): 54mm

Pitch circle plane of crown wheel: 50mm

Dial centre: 75mm

So far everything seems to have worked out fine; the clock has been running on its temporary backboard, albeit with only a minute hand, and keeping good time for several weeks.

Bill Brading
Auckland, New Zealand



Mr. Brading's 1 second pendulum electric clock during trials.

Very reasonable

SIRS, - I have just returned from a very enjoyable weekend at Hay on Wye. This is the second hand book capital of the world and I was extremely surprised to find a number of old *Model Engineer* magazines for sale in the bookshops. The oldest I saw was from 1946 and I spent a very happy hour or two looking through them, reading the 'Words and Music'. There were also some bound volumes for sale. Prices? Well, individual magazines were six for £1 while bound volumes were £30. Very reasonable I would say.

Malcolm High, Doncaster.

Wilson's Words of Wisdom

SIRS, - Although I'm building a 5in. gauge model, I've been following Keith Wilson's series on the 7 $\frac{1}{4}$ in. gauge *Saint Christopher* with great interest. His construction notes and techniques are often useful in overcoming my own building problems. Being a beginner, I need all the help I can get!

The recent appearance of *Wilson's Words of Wisdom* brought to mind some philosophical pearls learned during a trip to Greece a decade or so ago. Carved above the stone entrance to an obviously ancient restaurant in Athens were the words: *To be is to do - Socrates*. In the same street another venerable building had these words above the entrance: *To do is to be - Plato*. A few doors

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along a somewhat more modern establishment was adorned by the words: *Do be do be do... - Sinatra!*

While writing, can I register my vote for a K3 from Neville Evans? 5in. gauge, of course.

Thanks for an excellent magazine. **Andy Michel, Suffolk.**

Reputations

SIRS, - It seems that the lack of proper training in metalwork and general handwork at schools in the 'Western' world has now lasted long enough to have a devastating effect on the abilities of the general public. The inability of most to carry out such simple work is now no longer limited to school children, but also applies to adults into the 'thirties' age group.

Like most model or home engineers, I have acquired a reputation for being able to 'fix it', but whereas once the 'fix-its' were for relatively complex problems, I am now asked to fix very simple ones. What I find dreadful is that these otherwise intelligent people have not even the faintest idea how to go about repairing minor faults that have developed with, say a lawn mower. I have just made a new throttle cable for a largish ride-on mower otherwise in good order and worth a couple of thousand dollars at least. The problem was simply that the make is no longer made, no spare Bowden cables could be obtained, and the owner could neither make a new one himself nor find anyone who could or would make a new one for him.

I have been told that every year the number of qualified plumbers, electricians, mechanics, carpenters and joiners and engineers gets less, while the number of third rate non-productive computer operators, lawyers and accountants increases. It is a dismal prospect and clearly the end result of a Government policy that assumes all citizens are dribbling morons, incapable of looking out for themselves and, by draconian legislation, seeks to prevent anyone from ever being subject to the slightest risk of so much as a scratch, no matter how ridiculous the measures taken.

The legions of mindless, politically correct inspectors backed up by further legions of third rate lawyers who are so desperate for work that they will work for contingency fees is frightening. I fear that the only

real engineers that will be left in twenty years will be the few beleaguered model engineers who have not been eliminated by local government bylaws for running that criminal operation: a 'workshop'.

I recently heard that accountants, not engineers, now make all servicing and maintenance decisions concerning steam boilers in a large local (NZ) company. I have grave doubts that the average accountant would know what a steam boiler actually was, let alone make sensible decisions regarding the servicing thereof.

Peter King, Christchurch, New Zealand.

Live and let live

SIRS, - I am a Great Western enthusiast through and through, but I also recognise the achievements of the other regions.

The entire history of the British locomotive is so complex that inter-regional rivalries can sometimes get out of hand. For instance Daniel Gooch, the first true GWR engine designer, was from the north east, and Archibald Sturrock, one of his draughtsmen, from Scotland. Even old IKB was born in Portsmouth.

Unfortunately, Mr. Rich may have irritated a good many north eastern men by his references to K. J. Cook. While no doubt Mr. Cook tweaked the Gresley locomotive into new life, we should not forget the sterling efforts of Alfred Smeddle of the old LNER, whose enthusiasm for the GWR locomotive was legendary. His work with the King class at Swindon certainly made the old girl lift up her skirts and run! He even had two pictures of Gresley locomotives hung up in Churchward's old office. *Sic transit Gloria mundi!*

The reference to the Star class being the foundation of the four-cylinder locomotive on the LMS, while having much truth, was a little off centre. Reading old accounts from various authors, in particular O. S. Nock's *Great Locomotives of the GWR* published in 1990, much of Stanier's lovely pacific design, especially the *Princess Royal* design, is attributed to the King (I know, Super Star) while still retaining Star attributes. It is said that Hawksworth also had a similar design to the Princess.

Comment concerning the amount of detail one puts into the

locomotive is taking a somewhat jaundiced view of our hobby. Does the amount of detail we incorporate on our models really matter? As long as we gain pleasure from our pastime, that's what it's all about. I have been constructing a King in 3 1/2in. gauge for ten years or more, putting in a lot of detail — too much I sometimes think! Approaching 66, at the rate I am going I shall be lucky to finish the thing before going on shed!

As a skilled, time served engineer, I happen to like Keith Wilson's and Neville Evans' work; it is well structured and sufficiently simplified to present the average constructor with all that's required to build something near the original.

Don't fret Mr. Rich, history has proved that there will always be somebody to maintain the traditional ways, and perpetuate the kind of aspirations you embrace. In the meantime let's all enjoy our hobby; to each his/her own.

Robert Hedges, Deep in GWR Country.

Small locomotives and treacle mines

SIRS, - Mr Rich's letter (*M.E.* 4196, 30 May 2003) cannot be allowed to go unchallenged. While he obviously gets a great deal of pleasure from making true scale locomotives, I and many others get equal pleasure from starting with a clean sheet and designing our locomotives from scratch.

The thrill when such a creation actually works is to me greater than that obtained by working to published drawings. Of course I pinch ideas and bits of designs from others, and Neville Evans has provided some rich pickings, as have Keith Wilson, Martin Evans, Don Young *et al.* I am not trying to make a scale model, I am trying to make a small locomotive. If Mr. Rich doesn't like it, then let him bite his lip. I am more than happy that he continues on his way.

Any design which uses lots of 12BA bolts where a few 6BA would be equally effective is not going to interest me; rivets are for holding things together, not for looking pretty. The popularity of designs such as *Sweet Pea* shows that robust simple designs appeal to many. I have great admiration for those who make the models which win the prizes, I stand open mouthed at the exhibitions looking at their creations, then I go across to the club stands and cheer up again looking at locomotives that I actually have a chance of making and will perform

at least as well as the true scale jobs.

If I may be as contentious as Mr. Rich, to suggest that my approach is "discarding model engineering" is complete claptrap. I for one would welcome more innovative designs such as the turbine loco described a few years ago, but doing something very different seems to be totally out of fashion at the moment, and we seem to be in a bit of a rut, being dug deeper all the time by the attitude expressed by Mr. Rich.

While writing, can I get in my own gripe? You have published several letters of late which suggest that the article about Cornish treacle mines was not 100% founded on truth. Shame on you Mr. Editor!

I cannot comment on Cornwall as the only time I went there it rained for a fortnight and the local cider made me very light headed for much of that time, but my father related to me some of the history of the Yorkshire treacle mining industry as told to him by his grandfather.

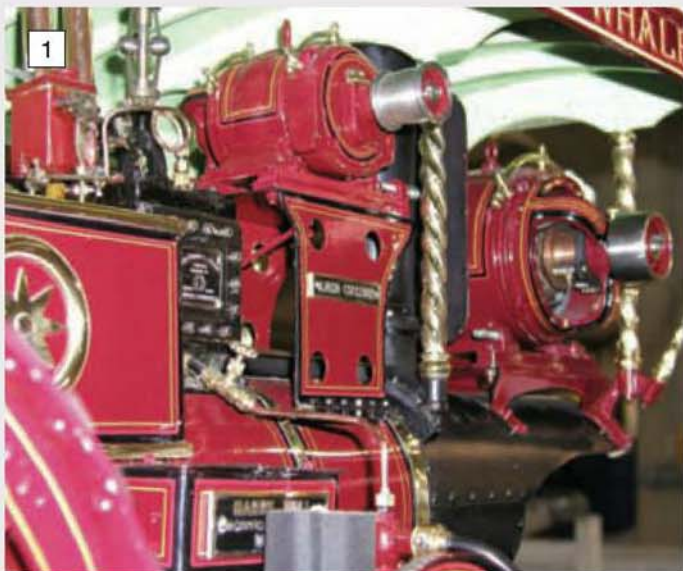
The small industrial town of Pudsey nestles between Bradford and Leeds (my home town), and was well known as a centre of treacle mining. However, this area was also heavily involved in worsted cloth manufacture, and there were many mill engines. These of course required steam from coal fired boilers, resulting in heavy atmospheric pollution, so much so that the local pigeons evolved to fly backwards to keep the soot out of their eyes. This pollution obviously fell to the ground, and all the buildings were black as a result.

The soot was washed into the ground by the rain and eventually percolated down to the treacle beds, with the result that the treacle came out with the more familiar dark brown coloration rather than the green Cornish stuff.

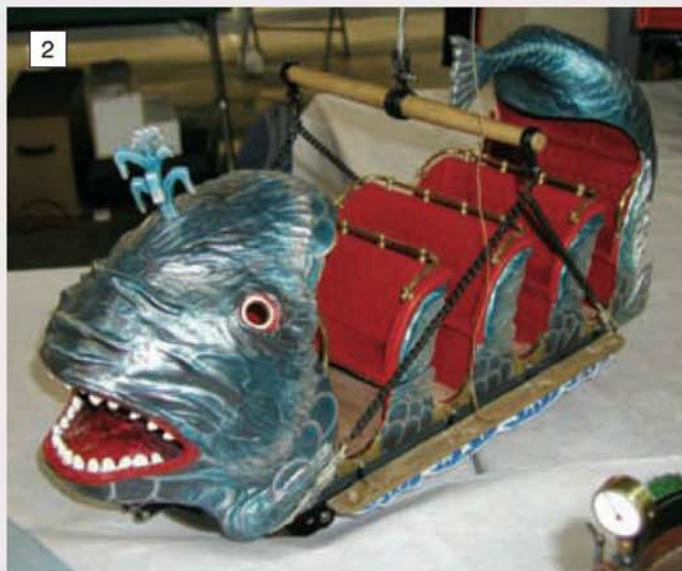
Being an entrepreneurial lot, when the tin mines of Cornwall started to go out of business and threatened the supply of the essential packaging materials, the go-ahead treacle barons of Pudsey combined a bit of summer holidaying with business and bought a tin mine. This they had shipped up to Yorkshire and buried next to the treacle deposits, with the happy result that the treacle could be mined already tinned, saving much double handling.

I have also heard that there was an outcrop of treacle in Lancashire on the other side of the Pennines, at Sabden. This is not at all unlikely given the complex geology of the region, after all there was coal on both sides.

Duncan Webster, by e-mail.



An 'eye level' view of the Best in Show, a 2in. to the foot Burrell Scenic Showman's Road Locomotive by Mr. A. G. Walker.



The Burrell was shown using a jib crane to lift a typical gondola of the period for one of the showman's rides.

HARROGATE 2003

THE NATIONAL MODEL ENGINEERING & MODELLING EXHIBITION

Neil Read

reports on the tenth in the series of these popular events.

●Part I

How time flies! It does not seem anything like twelve months since I was attending and writing about the ninth Harrogate show held in May 2002. However, 9 May 2003 saw me heading northwards once more to the Great Yorkshire Showground, home to this splendid event organised by Lou. Rex, his family and team. The tenth anniversary of anything is an occasion worth marking in some way, as your spouse no doubt reminded you if you dared to forget your tenth wedding anniversary. So, no doubt most visitors, myself included, went with a distinct air of anticipation. I doubt if anyone left disappointed.

The event followed the now established mix of competition entries, club stands, trade stands and live steam exhibits both inside and outside the main halls. It was pleasant to take a break from the crowds in the halls and stroll outside occasionally to watch the miniature traction engines (plus one full size showman's engine), full size steam cars

and steam bicycles steaming up and performing on the extensive private roads of the showground. This was encouraged by the relatively settled weather conditions during the course of the show and ensured that the active steamers really were active for the full three days of the event.

Competition entries

The Barry Jordan Trophy for Best in Show and a First Certificate in Section 45 was awarded to Mr. A. G. Walker for his 2in. to the foot Burrell Scenic Road Locomotive (photo 1). Showman's engines are among the most spectacular of the different types of road locomotive built for various purposes during the time when steam power was the natural choice for heavy haulage. Companies like Burrell, Fowler and Foster vied with one another to turn out engines that were powerful, durable and beautifully finished.

Makers were at pains to point out that a road locomotive was not to be confused with an ordinary traction engine. The latter were built for driving stationary machinery and for hauling such implements from one place to another. They were not built to cope with continuous, heavy haulage on metalled roads. The road locomotive was built

for such duty and usually had three speeds, extra water capacity, large, rubber-shod wheels, better suspension arrangements and compound cylinders. Top of the road locomotive hierarchy was the showman's engine with its polished brass embellishment and lavish paint finish.

Mr. Walker's model Burrell accurately portrayed the majesty of this type of engine and was beautifully made and finished. Such engines were often fitted with jib cranes that utilised the winding drum rope for assisting in the assembly and disassembly of the rides. The model had such a jib fitted and was shown lifting a finely detailed gondola (photo 2).

A First Certificate in Section 45 was also awarded to Mr. G Stubbs for his display comprising two 4in. to the foot scale Fowler BB1 ploughing engines together with scale implements and living van (photo 3). Few people today appreciate the contribution made by steam cultivation to the wellbeing of the people of this and other countries worldwide. Vast tracts of land that were uncultivable by traditional methods could, with the aid of steam, be drained, ploughed and brought into use. This work was done by full size engines of the type shown using



This spectacular display of a pair of Fowler BB1 ploughing engines plus their various cultivation implements was entered in competition by Mr. G. Stubbs.



This 3 1/2 in. gauge Black 5, No. 44767 George Stephenson was one of a pair of fine locomotives entered by Mr. Clyne.



Mr. D. Wainwright's handsome 5in. gauge LC & DR locomotive Europa was well displayed and much admired for its elegant lines.



These two 5in. gauge British Sulzer Type 2 electric locomotives are the work of Mr. P. Dunkley.

the methods pioneered by John Fowler of Leeds. As those who have examined preserved ploughing engines at steam rallies will testify, these engines are large and complex pieces of machinery and, in terms of sheer size, dwarfed the most powerful of the road locomotives produced. Mr. Stubbs' models were superb representations of the full size engines and implements and caused a good deal of debate among the visitors as to the purpose of the individual bits and pieces displayed.

In Section 41 (Steam Locomotives), Mr. H. Clyne was awarded two First Certificates for his fine pair of 3½in Gauge Black 5 locomotives Nos. 44767 and 45395. Quite why Mr. Clyne decided to build two locomotives of this class was not revealed but it is recorded that some engines below number 44768 were experimentally modified or designed with various types of valve gear, roller bearings and steel fire-boxes. Thus, it may be that there are differences between the two that are not immediately apparent to the uninitiated. What is clear is that No. 44767 *George Stephenson* has Stephenson link valve gear while No. 45395 has the more usual Walschaerts valve gear. Whatever the reason, they certainly made a handsome exhibit and Mr. Clyne was awarded the Myford Shield for No. 44767 (photo 4).

A First Certificate was also awarded to Mr. D. Wainwright for his 5in. gauge model of *Europa*, a LC & DR locomotive. This most elegant locomotive was surrounded by admirers for the whole of the show (photo 5).

In Section 43, Mr. P. Dunkley was awarded two First Class Certificates for his pair of 5in. gauge



The very fine Quorn tool and cutter grinder entered by Mr. C. Hollis.

British Sulzer Type 2 electric locomotives (photo 6). These were of the type built at the Derby works for British Railways in 1963. They took Mr. Dunkley three years to build and each locomotive has 800 individual parts. Apart from items like the gears, motors and fans, they were scratch-built.

I always enjoy Section 44, which is for workshop equipment. The Quorn tool and cutter grinder (photo 7) by Mr. C. Hollis was a superb piece of work and was mounted on its own cabinet

with drawers for the various attachments. It was awarded a well-deserved First Certificate and the Chester Shield for Workshop Equipment. John Britten's quarter size Warco VMC milling machine was featured in last year's report of this event but was quite properly included in the competition this time. It was awarded a Second Certificate.

Probably because of the superb venue with many miles of private roads, this event is popular with those who like to steam their model traction engines and steam wagons. Section 46 is for competition entries of this type and a First Certificate was awarded to Mr. D. Smith for his 3in. to the foot Atkinson Wagon seen in my photograph while raising steam raising (photo 8). This fine exhibit was also awarded the Raymond McMahon Trophy for the Best Road Vehicle. Second Certificates were awarded to Mr. T. Baldwin for his 4in. to the foot Foster double crank compound road locomotive and to Mr. T. Carr for his 4½in. to the foot Burrell traction engine.

Section 47, which is for stationary engines, was a popular class with eight entries. First Certificates were awarded to Herbert Stumm for his Malone Stirling cycle engine (photo 9) and his Otto & Langen gas engine. The Malone engine also earned Herbert the Warco Trophy for the Best Stationary Engine. Herbert was a popular winner of this award as he supported this section with no fewer than four entries.

Miscellaneous items are classified under Section 48. Two First Certificates were awarded, the first to Herbert Stumm for his Lanz tractor (Herbert's fifth exhibit at the show) and the second to Mr. W. Scott for his 1:16 scale model



Mr. D. Smith's 3in. to the foot Atkinson undertype steam wagon was in steam throughout the show.



Herbert Stumm is a prolific builder of models and delighted visitors with this Malone Stirling cycle engine.



This 1:16 scale model of a 6 Calibre Naval Quick Firing Gun was built by Mr. W. Scott as a 'quickie' between other projects.



This Edwardian steam launch built by Mr. J. G. Conrad from a kit was very elegant and well finished.



The Armed Naval Cutter built by Mr. B. Kerfoot was made to plans dating from circa 1800. Note the bowsprit which is not part of the rig.



Mr. P. Field's Lincolnshire Waggon followed the design of an actual waggon built in 1874.

of a 6 Calibre Navel QF gun (photo 10). The Lanz tractor was also awarded the Precision Paints Award for the Best Finished Model.

The show is always well supported by the model boat fraternity and in Section 50, which is for 'Kit Built' exhibits a First Certificate was awarded to Mr. J. G. Conrad for his elegant Edwardian steam launch (photo 11). This entry was also awarded the Eventex Shield for the Best Boat. Scratch-built ship models are judged under Section 51 and here a First Certificate went to Mr. B. Kerfoot for his well detailed model of an Armed Naval Cutter (photo 12).

This was a rather an interesting prototype as it

had an unusual feature. The drawings show a bowsprit even though the rig would not lend itself to the use of this item. It also carries two spars, one either side and outboard of the vessel. Mr. Kerfoot believes that these may be rams or, more likely, devices for supporting early torpedoes which were basically a small charge of gunpowder within a barrel attached to a fuse held on the end of a pole over the bow of the vessel.

The final section, Section 52, is for the wheelwrights of the model world. Only one First Certificate was awarded and this went to Mr. P. Field for his 1:12 scale Lincolnshire Waggon and Horses (photo 13). This was modelled on a

wagon built in 1874 by Thomas Butters of Goulceby, Lincolnshire. An unusual exhibit was that of Mr. J. Cartledge who entered a Swedish Fire Engine (photo 14). This was awarded a Highly Commended Certificate.

Two further awards were made. The Doug Hewson Trophy for Best Rolling Stock went to Mick Airey for his LNER Sand Wagon (photo 15) and the Northern Association of Model Engineers Shield for the Best Club Stand was awarded to The Stirling Society.

A full list of the results and a tour of the club stands will appear next time.

●To be continued.



An unusual exhibit was this Swedish fire engine built by Mr. J. Cartledge and displayed in its natural wood finish.



Winner of the Doug Hewson Trophy for Best Rolling Stock was this LNER Sand Wagon by Mick Airey.



On the Great Cockcrow Railway.

manufacturing process. A schedule of repeat visits has been agreed and the members feel comfortable with the cost implications.

Pete was able to show me copies of material Release Notes and Certificates of Conformity, documents with which we were both familiar from our days in the aerospace industry. It is necessary to record the source of each piece of material used in the boiler, not only the sheet and tube, but also bush material and silver-solder. Pete incorporates copies of these into a 'log book' for the boiler which is forwarded to the purchaser. This can accommodate subsequent test certificates, records of changes of ownership and any other significant documentation.

Now that this breakthrough has been achieved, the commercial supply of copper boilers should present few problems, alleviating the concerns of many prospective purchasers.

Kingswood Boilers may be contacted at Unit 21 Hanham Business Park, Memorial Road, Hanham, Bristol BS15 3JE; tel: 0117-949-2555.



BUYING A BOILER? GOOD NEWS FROM THE WEST COUNTRY!

Geoff Sheppard

reports a recent visit to one of the five members of the Association of Professional Copper Boiler Makers.

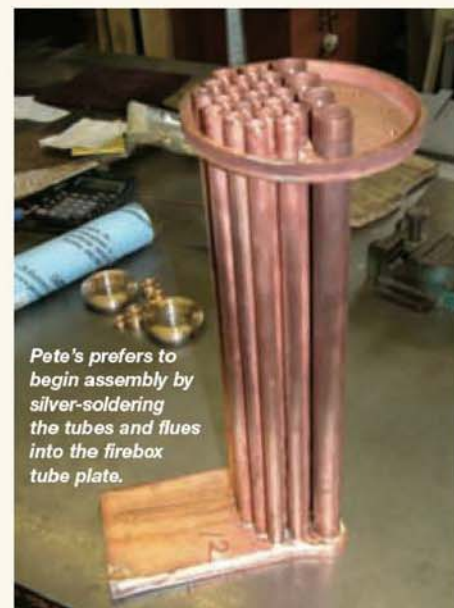
I recently had the opportunity to spend an interesting and enjoyable morning at Kingswood Boilers when, in addition to showing me some of the current projects, Pete Carr was able to brief me on the latest situation regarding the Association of Professional Copper Boiler Makers' efforts to comply with the requirements of The Pressure Equipment Regulations 1999 (PER). Readers may recall the excellent survey of these regulations presented by Mike Leahy in *M.E.* 4188, 7 February 2003.

Until recently there appeared to be two major stumbling blocks which the manufacturers faced, the first being the identification of a Notified Body which not only had sufficient understanding of the nature of copper boilers but also was willing to provide the necessary service at an acceptable cost. The second difficulty appeared to be the reluctance of some material suppliers to provide the necessary certification paperwork which would allow traceability of the materials used and permit copies to be supplied to the boiler user. Happily, within a few days of my visit, all the necessary elements to allow the resumption of manufacture of the larger size CE marked boilers, (Category II and above) should be in place.

The five current members of the Association: Dragon Boilers, John Ellis, Kingswood Boilers, Swindon Boilers and Western Steam were due to, and by now should have signed contracts with the selected Notified Body, whose representative was in the process of visiting each of the members in order to witness various elements of the



Pete Carr, suitably attired, at work on a boiler for a 7 1/4 in. gauge Avonside dock tank.



Pete's prefers to begin assembly by silver-soldering the tubes and flues into the firebox tube plate.



An impressive array of formers for firebox wrappers.

Anthony Mount

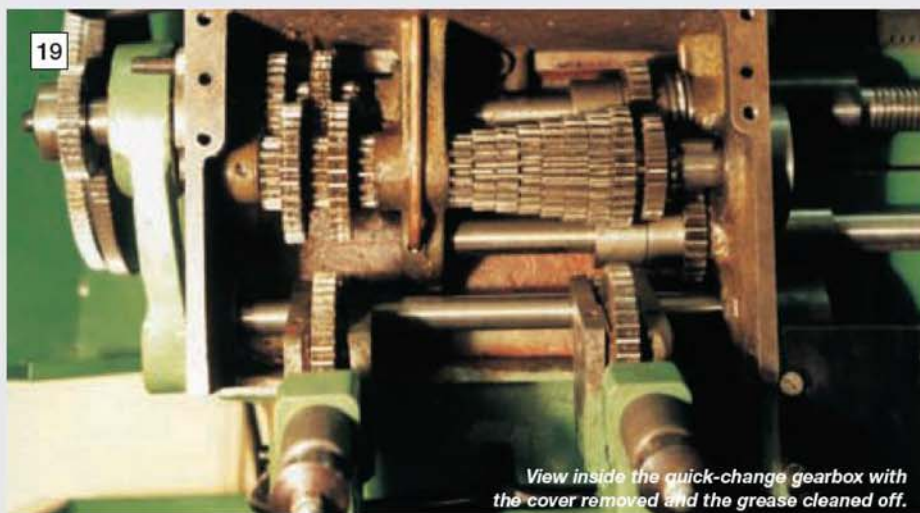
deals with the modifications made to the quick-change gearbox cover and feed screws.

●Part V continued from page 682
(M.E. 4197, 13 June 2003)

On examining the gearbox cover, it seemed to me to be sloping slightly. One has to be careful in lining things up by eye as sometimes there are optical illusions, things can look lopsided but on checking with a square or parallel they are in fact straight. Unfortunately the cover was a little out.

The check with a square revealed that the side adjacent the lead screw needed to be filed square. To do this required the removal of the cover, which needed the engagement lever to be removed. This was held in place by a C-Lok pin, sometimes called a spring pin or a roll pin. This had to be driven out, the handle removed, the four Allen screws removed, and the cover pulled forward, paying due regard to the lever inside. The end was filed square and all reassembled.

While the cover was off I had a good look



View inside the quick-change gearbox with the cover removed and the grease cleaned off.

FINE TUNING A WARCO BH600G LATHE

inside (photo 19), and was disappointed to find some cast iron dust mixed with oil in the bottom corners of the box. Fortunately it is unlikely that a lathe of this size has ever been turned upside down, so the gears were clean. In fact they were

covered with about 1/2lb. of grease.

The dust was carefully scraped out, the bottom of the box cleaned and most of the grease removed. The gears and selectors were checked to see that they all moved smoothly, which they did.

I am somewhat suspicious about the lubrication of the gears. On first reading the manual I thought the oil covers were removed and the top of the box filled with oil, just like the Myford. But this is not so as the box has a flat top and the top of the box below the oilers holds the electrical leads to the stop and start buttons.

In fact, below the oil covers and leads is a piece of 6mm thick felt which absorbs the oil. Below the felt, the top of the gear box is drilled with a series of countersunk holes aligned with the gears, two of the holes having copper pipes attached carrying oil to bearings. I cannot see how the oil finds the holes through the felt. Does it coalesce around the countersinks?

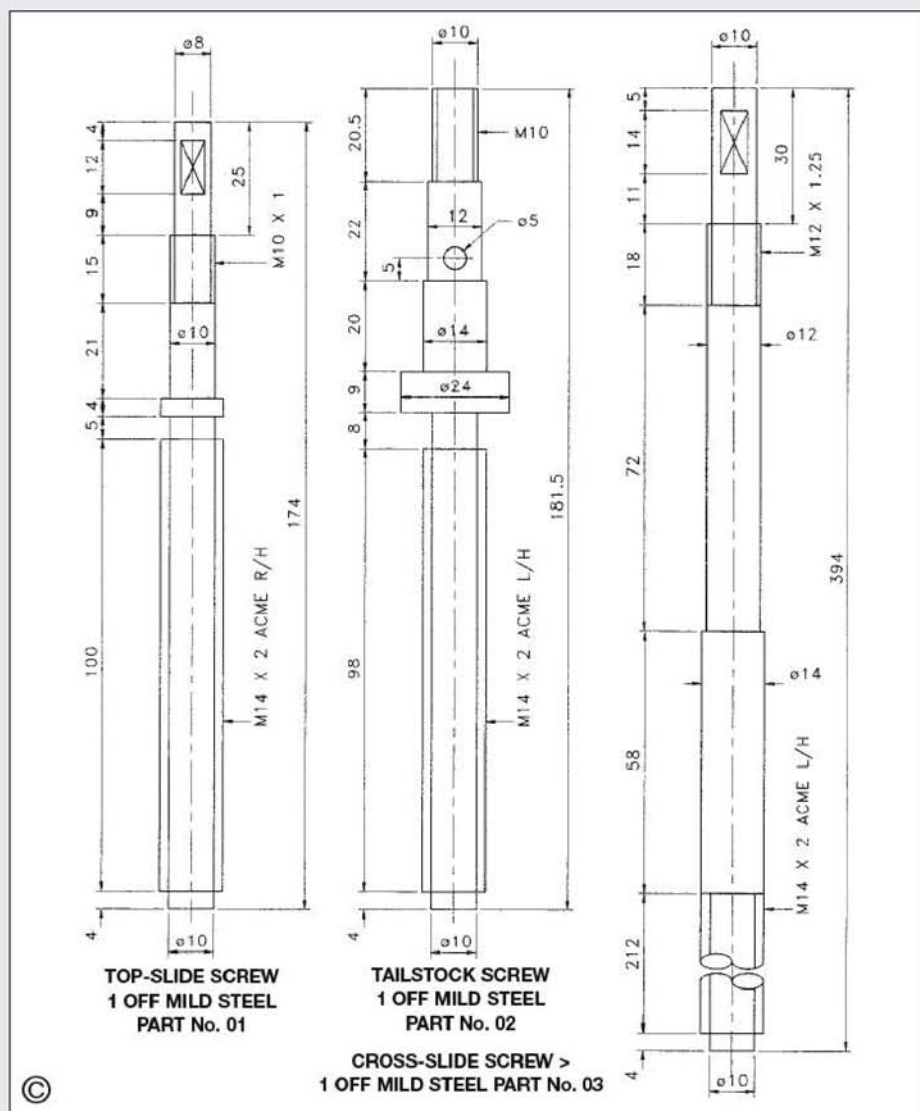
Leadscrew and drive shaft

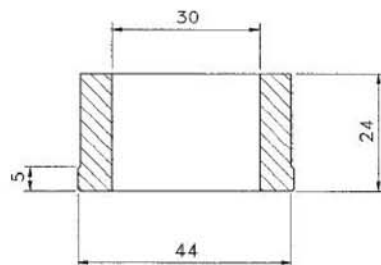
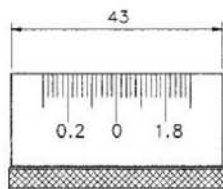
The leadscrew and drive shaft are coupled to the gearbox by C-Lok pins. These are spring steel and pretty tough. The lathe is not fitted with a slipping leadscrew clutch. In the interests of protecting the lathe from damage, should I be careless enough to run the saddle under power into the chuck, I removed the C-Lok pins and replaced them with brass shear pins. The pins are 5mm diameter, and I drilled them 3mm leaving a 1mm wall thickness. It is much better for the pins to shear in the event of a foul up, than to damage the lathe — especially as it is being driven by a 2hp motor.

Dials and feed screws (Parts nos. 01-14c, 20-21)

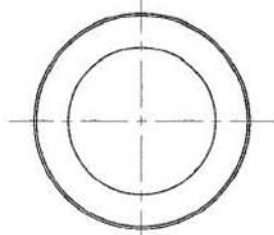
The lathe is supplied with dual dials for metric and imperial operation. But the dials are fixed and as the lathe is fitted with 10tpi screws the metric dials read 2.54mm per revolution. All my other machines are metric so, as I prefer to work in 'round' figures, I had to do something about the dials.

Another point against the cross-slide dial (for me, anyway) was that the graduations read twice the actual movement. The reasoning behind this is that, say a reading of 2mm on the dial (actual

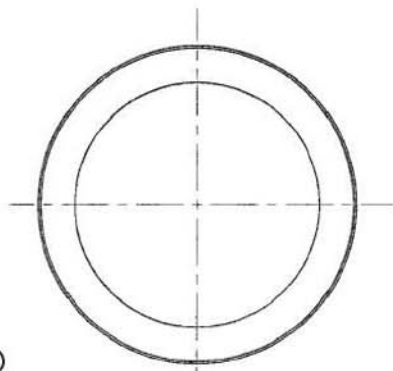
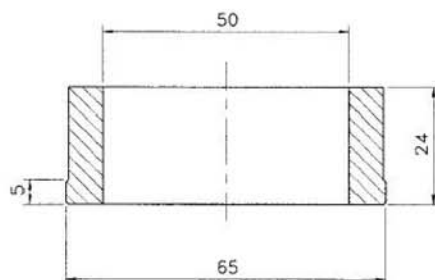
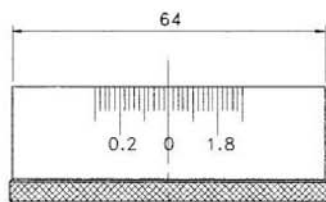




TOP-SLIDE DIAL
ENGRAVED WITH 100 DIVISIONS
EACH DIVISION INDICATES 0.02mm
1 OFF MILD STEEL - PART No. 04



CROSS-SLIDE DIAL
ENGRAVED WITH 100 DIVISIONS
EACH DIVISION INDICATES 0.02mm
1 OFF MILD STEEL - PART No. 05



extension on the front end to suit the requirements of the new lathe. But the cross-slide and tailstock use left hand screws. Boxford lathes have the same arrangement of fixed screw and moving slide. But their screw is 2.5mm pitch. This is very close to the 10tpi existing screws and will leave the automatic cross feed ratios almost the same. Again, the screws will need to be adapted to suit the BH600. I prefer 2mm pitch for the ease of counting, i.e. 0, 2, 4, 6, 8... instead of 0, 2.5, 5, 7.5, 10.... Boxford and other feed screws and nuts are available from RDG Tools (tel: 01422-845-222).

I have drawn up the screws and nuts for those who wish to make them. I can do no better in the making of dials than recommend that you read G. H. Thomas' *Workshop Manual*. This contains a chapter on making dials that covers the whole thing in great depth. In fact the book should be required reading for all model engineers.

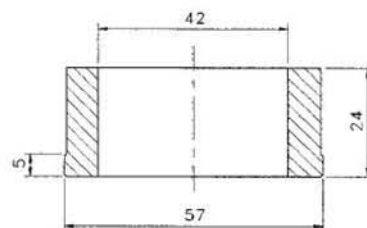
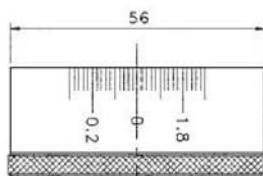
The dials are shown as parts nos. 04, 05, 06, and 07. They are replicas of the existing ones but graduated only for metric. I have shown the numbering for the tailstock dial as sideways on,

movement 1mm) will result in 2mm off the 'diameter' of the work. Thus the operator is saved having to halve each micrometer or vernier reading of the diameter. But to me this is not a real saving as you now have to double each reading for any deeping job such as depth of feed for screw cutting or linear measurement. To me it is more logical to have the dial indicating the true distance moved.

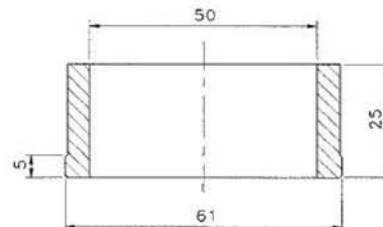
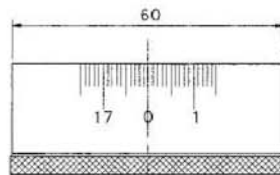
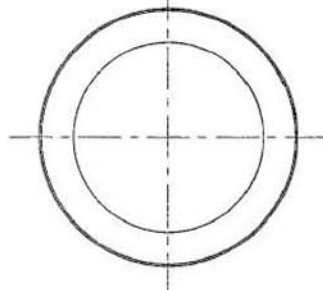
Some lathes have dual reading dials that are geared which means that they both read in round figures. I believe that this trick is done by using 125 and 127 tooth gears for a 10tpi screw. Some cheating is done with the tooth size so that both gears have the same pitch circle diameter and a common pinion can then drive them. I think that for 8tpi screws the ratio is 120/127.

If any of you out there know how it is done and have fully dimensioned, detail drawings of the setup please write in and let us all know how to do it. I followed another route and made 2mm pitch screws (photos 20 and 21) and nuts, and new dials. I now have 2mm per revolution and 0.02mm per division, similar to my other tools. Fortunately for me the saddle has metric gearing and the saddle dial was correct for metric — 18mm per revolution.

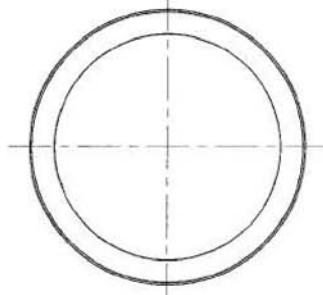
You can save making the top-slide screw by using a Myford 2mm feed screw and nut. It is however 9.5mm (3/8in.) diameter instead of 14mm, and you will need to make up an



TAILSTOCK DIAL
ENGRAVED WITH 100 DIVISIONS
EACH DIVISION INDICATES 0.02mm
1 OFF MILD STEEL
PART No. 06



SADDLE DIAL
ENGRAVED WITH 180 DIVISIONS
EACH DIVISION INDICATES 0.1mm
1 OFF MILD STEEL
PART No. 07





New top-slide feed screw.



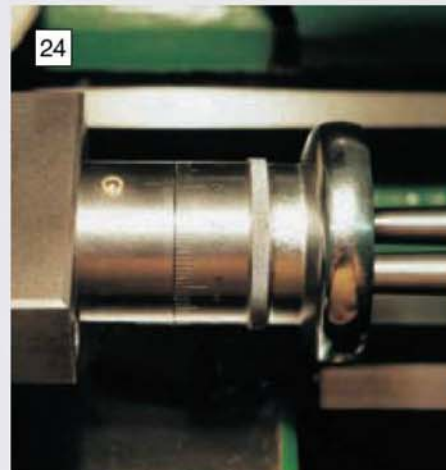
New tailstock feed screw.



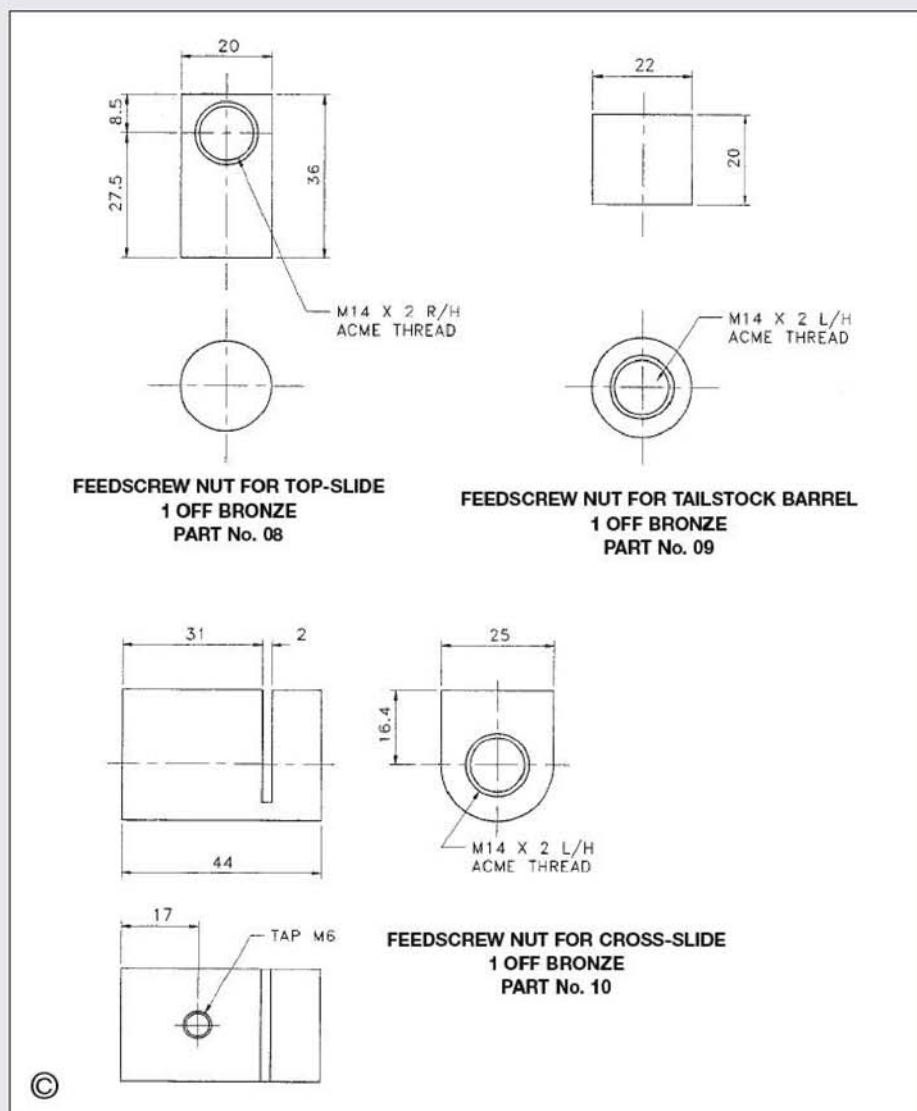
The new cross-slide dial fitted to the lathe. This metric dial shows actual slide movement.



The new tailstock dial fitted to the lathe. All dials were made using G. H. Thomas' techniques.



The new top-slide dial fitted to the lathe. All dials now show only metric graduations.



but this is more difficult to do. The completed dials are shown in **photos 22** (cross-slide), **23** (tailstock), **24** (top-slide) and **25** (saddle).

Whatever way you do the numbering, and I take it you are stamping the numbers rather than engraving them, a jig of some sort will be needed to hold the stamp in the correct location and in line with the others. Note that the number 1 punch needs less of a hammer blow than the others. The set-up for engraving the lines on the dials can be seen in **photograph 26**. A V-tool is held in the chuck, which is locked, and the dial is held in a dividing head on the cross-slide.

A small point perhaps, but when removing the existing dials take care that you have trapped the ball and spring, otherwise you might spend hours searching among the swarf trying to find them!

Nuts parts 08, 09, 10 are copies of the existing design with the new 2mm threads.

You will notice that I have shown a couple of alternatives for the cross-slide and top-slide nuts. My own nuts are shown in **photo 27** (parts 12 and 13). As I intended to screwcut the nuts, I felt 25mm was quite long enough. And by making the nut as a separate sleeve it was much easier to turn and screw cut. Part 14 shows an alternative cross-slide nut with a means of stretching the thread to take up wear. However, I have not made it as I find that feed screw nuts take a long time to wear.

The slide and tailstock assemblies are easy enough to take apart, but the saddle hand wheel is fixed in place with a roll pin. Mine was very tight, so to relieve the saddle of any strain during hammering, I placed a piece of wood beneath the hand wheel down to the floor. Then I was able to punch out the pin without any fear of causing any damage. Once I had got the handle off, the rest came apart quite easily. When I prised off the rivets that held the index line plate in place, I made an interesting discovery. Underneath was an engraved line in the casting. Just what I wanted, so the rivet holes were filled in, and after removing the oiler bush. The bracket casting was



25
The saddle index dial completes the complement of new metric-only dials.

chucked in the lathe and the rim dressed with a fine file, which finished things off nicely.

To remove the oiler, I was able to push in a piece of copper pipe from inside the pivot casting and to tap it out. To remove the oiler on the top-slide bracket, I made up a couple of short pins that were inserted into the back of the oiler from inside the bore, and a Morse taper wedge was used to push out the oiler from the inside.

The top-slide bracket casting did not have an index line under the aluminium alloy index trim, so this was cut in with a V-tool. The bracket was held in the chuck and the V-tool in the tool post on its side. The depth of cut was 0.127mm (0.005in.). The rivet holes were plugged and the bracket dressed off by hand with emery paper. I did not use a file with the bracket revolving in the chuck as I had machined a rebate in the underside for the extra travel and would have had the danger of catching the rebate with the file.

As I was writing the dial details, I was reminded of my article *A confusion of dials* published in *Engineering in Miniature*, July 2000 when I described a similar problem of incompatible dials on my VMC milling machine quill fine down feed. In it I noted that the machine was supplied as metric to start with but the down feed dial had divisions of 0.025mm in batches of five i.e. 0.125mm per major division, quite difficult to read. I made a new dial with 125 divisions, 0.02 per division in batches of five. i.e. 0.1mm per major division. This was much easier to read.

However a Mr. Jon Goldinghay wrote in *EIM* in October 2000 to inform us that some more cheating had gone on and that in fact the gear was imperial and moved 2.54mm per revolution. Also that the additional dial I had made for the rapid quill feed came under the imperial ruling. This meant I was out with both dials.

Mr. Goldinghay suggested that I should graduate the fine feed capstan with 127 divisions of 0.02mm per division. But this seemed to complicate matters and I have been looking for another solution to the problem. Fortunately, Mr. Goldinghay had kindly provided us with the mathematics. From this it seemed that the total down feed on the rapid feed capstan would be 121.92mm per revolution, if it could make a revolution which it cannot as it can only do about $\frac{5}{8}$ of a revolution. I had cut 123 divisions on the rapid feed dial. As 121.92mm is only 0.08mm (0.003in.) short of 122mm. I re-cut the dial with 122 divisions which is near enough for me, especially as there is one division of movement within the gearing, i.e. bring the capstan down to



26
Dividing an index dial using a small dividing head on the lathe cross-slide.

touch the work with a drill and there is another division of movement while slack is taken up before cutting starts.

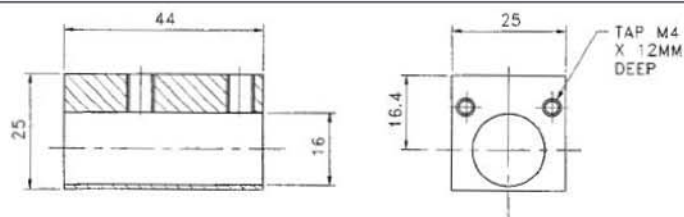


27
The set of new 2mm pitch feed nuts made for the Author's lathe.

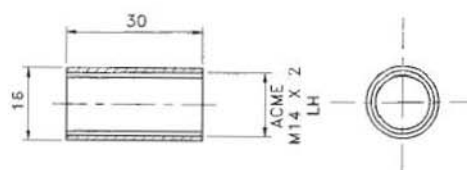
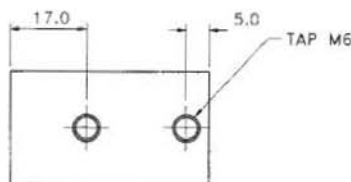
The fine feed dial is more of a problem. As previously stated, it should be marked with 127 divisions but I would lose those nice round figures. I keep trying to convince myself to re-do the dial, but I keep finding other things to do. Perhaps another way round it would be to cut another worm of slightly smaller pitch to give the required 2.5mm movement per revolution.

Is there anybody out there like to take a stab at the mathematics required?

●To be continued.

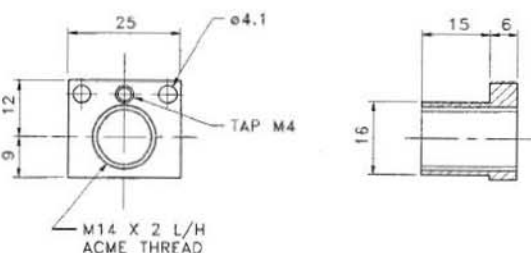


**ALTERNATIVE CROSS-SLIDE
NUT BODY
1 OFF MILD STEEL
PART No. 14A**



**ALTERNATIVE CROSS-SLIDE
NUT
1 OFF BRONZE
PART No. 14B**

**ALTERNATIVE CROSS-SLIDE
NUT STRETCHER
1 OFF BRONZE
PART No. 14C**





The rocking bar sight with connecting link and curved guide for the range arc.



The elevating and range gear mechanism assembled on the model.

18pdr QUICK FIRING GUN

David Wilcox concludes his series on this interesting weapon with further constructional details.

●Part V continued from page 666 (M.E. 4197, 13 June 2003)

Before attempting the sights, the gun angle diagram (see M.E. 4193, 18 April 2003) should be studied and thoroughly understood. After some trial and error, a credible representation of the sighting system, i.e. rocking bar sight bar, arc bracket with toothed arc (sliding in a curved trough fixed to the cradle) and dial sight bracket, was achieved.

Dimensions of some parts may be taken from the general arrangement drawings, but a set of photographs of the mechanism is essential, together with a good understanding of how it works. It should at least be possible to demonstrate the movement of the elevating screws through the two 'gearboxes' and the effect on the sights.

Shield

The shield is cut $\frac{3}{32}$ in. oversize all round from 0.015in. thick brass sheet as per the drawing. The top and side edges of the shield have a narrow ($\frac{1}{16}$ in.) flange turned forward while the flange on the bottom edge is turned back. To form the



The hand wheels for the elevating and range gear were turned from $\frac{1}{2}$ in. dia. brass bar, pierced and filed to final shape.

flanges, first cut a former from aluminium alloy, say $\frac{1}{8}$ in. thick, to the internal flanged dimensions of the shield. Anneal the brass sheet and hammer it over the former. A second annealing may be necessary to achieve neat flanged corners. The top half of the shield has a gentle bend backwards as per the drawing and when this has been done, the side flanges may need some correction. The shield is braced by four wooden battens each $\frac{1}{16}$ in. deep and $\frac{5}{32}$ in. wide. They should be steam bent to match the

curvature of the shield and secured in place with epoxy resin adhesive.

The shield is initially positioned by the flanged bracket on the front end of the trail tube and this should be riveted to the bottom of the shield. The two side supporting stays for the shield are cut from 0.025in. brass sheet and are riveted to the axle-clamping brackets, being careful to ensure correct angular position compatible with the alignment of the tensile stays to the trail. The shield support stays are bolted (14BA) to the shield.

Note that whenever 14BA nuts and bolts are specified, the bolts should be hexagon headed and these will have to be made up by silver-soldering a nut to one end of a length of 14BA rod, taken from a cheese headed screw. A tiny dab of silver-solder paste is all that is required.

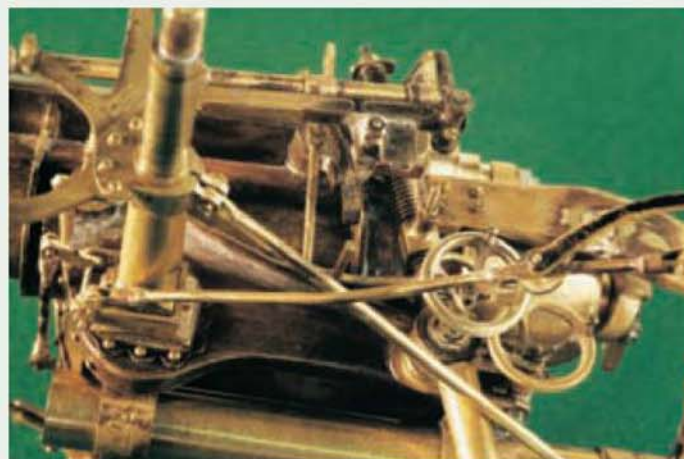
The bottom shield is similarly flanged from 0.015in. brass sheet and braced with two horizontal wood battens. It hinges rearward with four hinges cut from 0.010in. brass or copper sheet and is riveted in place. The hinge pins are $\frac{1}{32}$ in. brass rivets. The bottom shield is retained in the travelling position by means of a spring catch on the right-hand side of the trail.

Brakes

The brake arms are silver-soldered up from $\frac{3}{32}$ in. dia. brass rod, flattened at the inboard end and drilled 12BA for the hinge pins. The brake shoes are milled and filed to shape from brass bar, each



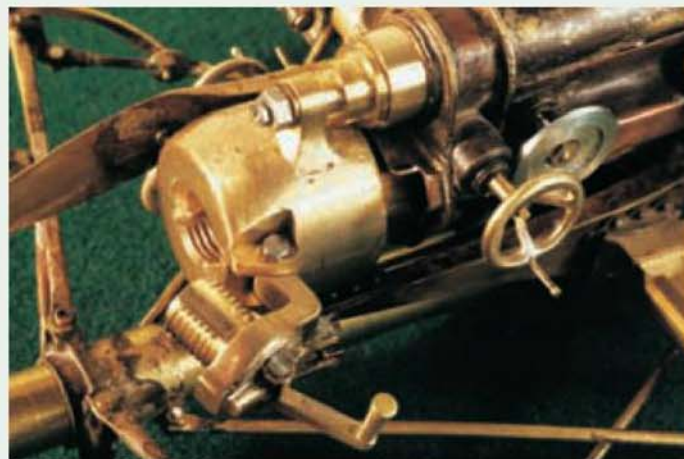
Further details of the elevating and range gear as well as the left hand layer's shield and the breech.



A view from below showing the trail tube, the trail yoke, part of the axletree, the range gear, brake rods and various brackets.



The shield was fabricated from copper sheet stiffened with wooden battens. The edges were beaten over an aluminium alloy former.



The buffer/recuperator is attached to the breech via a lug silver-soldered to the breech barrel.

being silver-soldered to the arms via very short lengths of brass tube. A lug for an anchoring pivot for the link rods also needs to be silver-soldered to the inside of the join of the brake arms to the brake pads. The other elements of the brake system linking rods, bell cranks, operating handles, etc., are made up from appropriate brass sections, all joints being soldered with paste.

The bell cranks hinge on 14BA pivot pins while the other pivots can be either $\frac{1}{32}$ in. rivets or 16BA bolts. The layer's seats are attached to the brake arms, the supporting bracket for each seat being made up from square section brass rod, and the seat itself from a close grained wood, stained a mahogany colour and varnished.

Other details

The firing handle and linkage is made up from $\frac{3}{64}$ in. dia. brass rod hinged to a 14BA stud let into the range arc pivot and to a $\frac{1}{32}$ in. rivet silver-soldered to the inner surface of the layer's shield, whence it operates the firing trigger on the left hand side of the breech ring.

The layer's shield was flanged to shape from 0.010in. brass sheet over a hardwood former. It is bolted (4 x 16BA) to the left-hand rear corner of the cradle. The traversing handspike hinges and latches about a bracket which is silver-soldered to the rear end of the trail tube. The handspike is made up from brass bar and tube and the handle end is painted dark brown to simulate the leather grip.

The wheel dust caps are turned from hexagon brass bar ($\frac{9}{32}$ in. across flats) screwed 4BA and left polished. The drag washer loops are formed from copper or brass wire about $\frac{3}{64}$ in. dia., the washer section being slightly flattened. The range dial is a disc turned from aluminium alloy rod and left partly unpainted.

Paint Finish

Olive green semi-matt is the most appropriate finish for this model, however the rear face of the breech, the breech mechanism, recoil guides, the hand wheels and the wheel hub caps should be highly polished metal finish then lacquered to preserve the polish.



The axle mounted shield support stays.



The tensile stays, brake rods and bell cranks.



Further details of the barrel cradle, the rocking arm sight, the axletree and shield support brackets.



The finished and fully assembled model seen prior to dismantling for painting.



Machining the pistons across the bottom recess clearance. The fixture is a brass block bored to suit the piston. A rod locates the gudgeon pin hole.



The 'bottom half' of the engine laid out for inspection showing some of the components described so far.

AERONCA E113 AERO ENGINE in 1:4 scale

Les Chenery

describes the manufacture of the pistons, valves, push rod tubes and carburettor for this working aero engine.

●Part VII continued from page 661
(M.E. 4197, 13 June 2003)

The pistons are machined from aluminium alloy. I usually make them by turning a piece of rod 1 1/4 dia. x 1 3/4 in. long, with a 7/16 in. dia. x 3/4 in. long spigot on one end from which I do all the machining. I leave about 0.015 in. on the outside dia. of the piston to be machined down to 1.125 in., +0.000/-0.002 in. dia. as the last operation before removing the 7/16 in. dia. spigot. Milling and drilling can all be done by holding the spigot. Make a few extra in case of breakages.

The rings are cast iron. After turning the outside diameter and boring to size they can be parted off, split and, with a 3/32 in. thick wedge in the gap, made red hot in a fixture which clamps them flat all in one go and allowed to cool slowly.

The gudgeon pins are straightforward turning. The circlip grooves are put in with a small undercutting tool for circlips to fit either 1/4 in. or 6 mm rod.

Valves

I have always found it difficult to turn a long 1/8 in. dia. spindle parallel in my lathe, which is getting long in the tooth. I usually end up taking a super smooth file to make it parallel. I made the valves of my Gypsy I engines by this same method and have never had any trouble with them. This time I fabricated the valves

First chuck a piece of 3/8 in. dia. stainless steel, preferably free cutting, and grind a cutting tool to shape the conical side of the valve head. Form the end of the 3/8 in. rod with this tool and drill a 3/32 in. dia. hole into the centre of the rod, then part off to leave a 1/16 in. flange. Make a split bell chuck from a piece of 7/16 in. dia. brass rod by boring out the conical shape and a 1/16 in. deep lip to hold the valve head. With the valve head held in this, drill a 1/8 in. dia. hole 3/32 in. deep.

Cut the 1/8 in. stainless steel rod to length, turn the 3/32 in. dia. and put a very small radius and undercut groove on the opposite end with a small dimple in the 3/32 in. end. Apply some silver-solder flux to the spindle and fit the head. Lightly swage over the end of the spindle, but not too hard. Arrange matters so that the spindle is able to revolve in the head. Apply a blob of flux into the 3/32 in. dia. hole in the head and, with the valve held vertically, silver-solder the two pieces together.

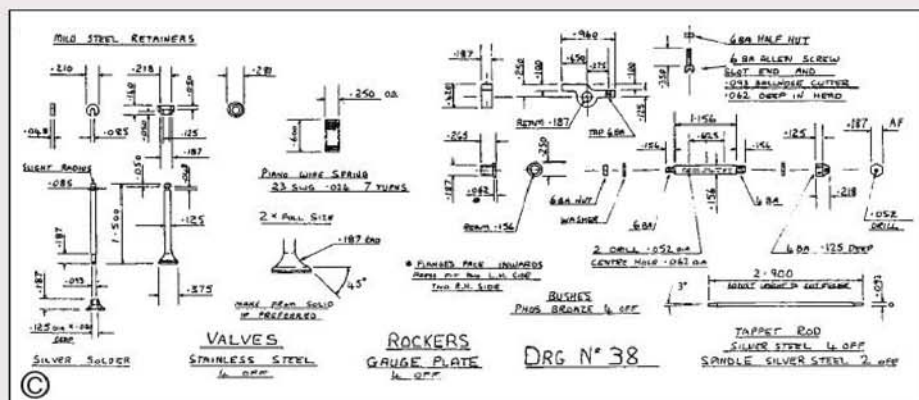
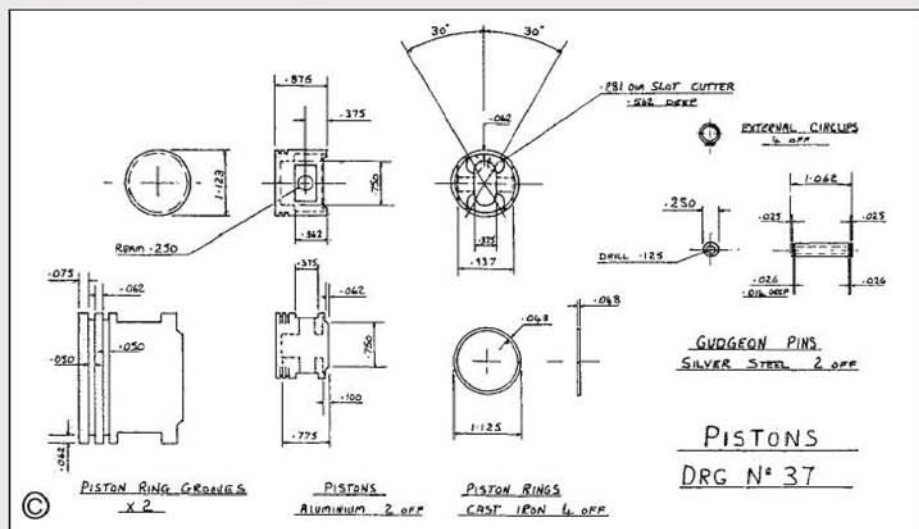
Clean up the valve stem and hold it in a collet. Using a sharp tool, skim lightly across the

outside diameter of the head and clean across the face. Set the top slide to 45 deg. and machine the small angle for the valve seat. This can be lapped in when assembling the heads.

The valve springs can be made from piano wire or commercial springs purchased; the retaining collar and clip are straightforward turning.

Push rod tubes

These are thin wall aluminium alloy tubes obtained from model aircraft shops. The collars on the ends of the tubes can be secured with Loctite or push fitted.





Carburettor

Aluminium alloy mesh can be used on the heater around the exhaust pipe. A small hole must be drilled at the lowest point in the heater body to drain any fuel that may gather at the lowest point and flood the engine on starting.

●*To be continued.*



M. J. H. Ellis

describes a slitting saw arbor for the lathe, admires those with craft skills and muses on the suitability for purpose of drawings.

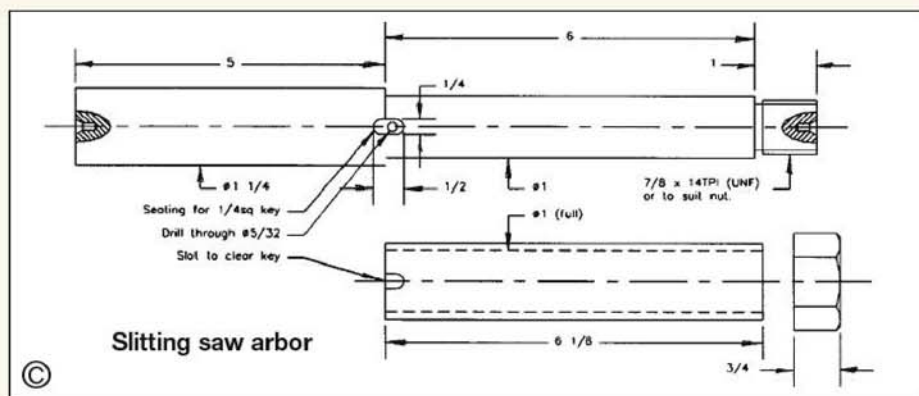
●Part III continued from page 679 (M.E. 4197, 13 June 2003)

Dear Adrian, From time to time I still find appliances which I have made for some special purpose, stuck away in the recesses of my cupboards. I fished out one of these only yesterday when I wanted to mill screw-driver slots in the heads of a batch of countersunk-headed screws which I was making.

This device is not particularly original, since it is no more than an arbor for carrying a slitting-saw and runs between centres in the lathe. The screws are mounted on an angle-plate bolted to the vertical slide. You may wonder why I did not clamp them with a dog on the vertical slide itself. Well, it was a bit of foresight as I was going to make use of the back-gear, and I thought that the saw might exert enough force on the work to shift it, if it had a chance of moving in the vertical direction. With the work projecting over the edge of the horizontal angle-plate, this was much less likely to happen, the angle-plate being secured to the vertical slide by two well spaced T-bolts. By the way, this is the kind of thing which ships' captains have to bear in mind when arranging the stowage of a vessel's cargo: it is necessary not only to pack the hold as full as possible, but also to ensure that the cargo cannot endanger the safety of the ship by moving, were she to pitch and roll in a rough sea.

I enclose a sketch from which you will see that all that is needed is a length of $1\frac{1}{4}$ in. round bright mild steel bar, a suitable large nut, and a length of tubing, an easy fit over the end of the bar turned down to 1in. diameter. I went to more trouble than was necessary to get this part of the bar exactly 1in. diameter over its entire length, but had I thought about it more carefully, I might have realised that the slitting-saws or even any wider milling cutters which I might ever use with it would be most unlikely to exceed $\frac{1}{2}$ in. in width, and so I had no need to bother about the accuracy of any more of the length than the half inch adjacent to the cheek. I milled out a seating for a short $\frac{1}{4}$ in. wide key, over which the majority of cutters would fit. With hind-sight, I can see that I could have done better, because some slitting-saws do not have this $\frac{1}{4}$ in. gap in the bore, and this creates a problem. The trouble is, that the key fits so tightly that I cannot now get it out again, and what I have done hitherto is to get out a gap in the bore using a carbide hacksaw blade, finishing the corners with a diamond file. Of course, I could make a ring with a slotted bore to fit on over the key, but that is something which I will do 'when I get around to it'.

You used to be able to buy a novelty from the pottery stalls on the East Anglian markets. It was called 'A Round Tuit', and printed on it was the explanation of its purpose which was to enable indolent folk to get done the jobs which they had persistently deferred until they could 'get a round tuit'; well now they had one and there was no further excuse for procrastination. It is some years since I last saw one of these invaluable articles,



LETTERS TO A GRANDSON

which I dare say a good many model engineers' wives would like to procure, and that was at St. Ives in Huntingdonshire. Had I thought of it earlier, I could have drilled a hole diametrically through the bar from the bottom of the key-seating, and that would have allowed me to knock out the key when required, with a punch.

In my opinion, by far the best way of forming slots in the end of such things as combination levers and other valve-gear parts, is by milling them-out with something like a $\frac{1}{8}$ in. wide slitting saw. I dare say that there are people so skilled at fine hand-work that they could turn out a job which would bear comparison with machined work, but I am not one of them, nor, I think, are you likely to be one either. All the same for that, I marvel that some are able to attain the skill which they use in specialised hand-operations.

Well before the war, J. B. Priestley made a tour of England, of which he gave an account in *English Journey*, and I remember the admiration which he expressed for a skilled potter, who, using an ordinary potters' wheel, turned out perfectly shaped oval meat-dishes. Come to that, I can draw on my own experience; when I went on a tour of the BSA motorcycle factory in Birmingham. One man was doing nothing else but lining petrol tanks. He did each side in turn with one steady, dextrous sweep of his paint-brush. I recall the Latin tag from my school-days, *Ars celere artem: Art lies in concealing art*. I wish I had made that up. The best I have been able to achieve is *All the roads to Hell run downhill*; in other words, it is easy enough to get into trouble, but more difficult to get out of it. Writing that reminds me that I once wrote a short story as an exercise in Welsh, in which Peter, an advertising executive, is in the power of Sergeant Prodman, a fiend of the Infernal Police. The sergeant, who can be quite genial when it suits him, reminds Peter of the excesses which caused him to be where he is, and throws in the observation, "*We have a proverb here: 'Most advertised, least needed.'*"

I have been musing about what I have told you in my letters. As is usual in such a case, in retrospect I can see how I might have done better. I thought that I was starting at the very beginning, yet I omitted to tell you such a simple thing as that when you had a hole to drill, you should first make a centre pop at the right place. When I started, all those years ago, I didn't know that, and I recall that it was our old friend LBSC who put me wise to it. He was always explicit in his

instructions, and it was clear that he always, had the needs of the beginner (he called him 'the tyro') very much in mind. So by now, you have probably found out for yourself most of what I am now going to say; in which case we can look on it as a review of your progress.

Before you start to make any but the simplest kind of thing, you would be well advised to make a sketch of it. Edgar T. Westbury, a respected writer on the subject of model petrol engines, made much the same point, and I particularly remember him saying, that it would help one to avoid designing an engine which it would be impossible to assemble. Even if you work to a published design, you can't be sure that it is free of errors. In several instances, I have found different sheets of the drawings to be at variance with one another, and when I pointed this out to the suppliers, they said, quite rightly, that it was not their fault, and blamed the publishers. And, I am sorry to say, the latter did not appear to care much about it. I thought at the time that the model engineering societies should have made common cause with one another to make them take a more responsible view of the matter, as it seemed to me that in law, inaccurate drawings are manifestly unsuitable for their purpose, and therefore contravene the Sale of Goods Act.

If you looked at a set of drawings, you would see, for example, a set of clearance size holes around the end of a cylinder cover, while around the end of the cylinder, corresponding tapped holes would be shown for the bolts or studs. You would not try to make the two parts independently, but rather, drill the holes in the cylinder cover first (preferably, tapping size to begin with), and then use the cover as a jig to drill the holes in the cylinder. This point is made by Mr. Paul Breitsch, in the USA, who is (or, at least, was) in a modest way of business producing castings for very pretty little open-crank 'barn engines' of about 5 or 6cc capacity, and several similar products. "*You can always lose accuracy*" he says, or something to that effect. I should disclaim any interest in promoting Mr. Breitsch's business, by the way, but I was a satisfied customer, and I have one of his little engines to prove it.

I can see that I am not going to complete my dissertation on this subject in this present letter, so look forward to some more of this comparatively easy going after the Slough of Despond of the injector, now, happy pilgrim, safely behind you.

Your affectionate Grandpa.

●To be continued.

A SOUTHERN RAILWAY MERCHANT NAVY CLASS LOCOMOTIVE IN GAUGE 1

Roger Thornber

provides the bogie details and looks at side control and side play.

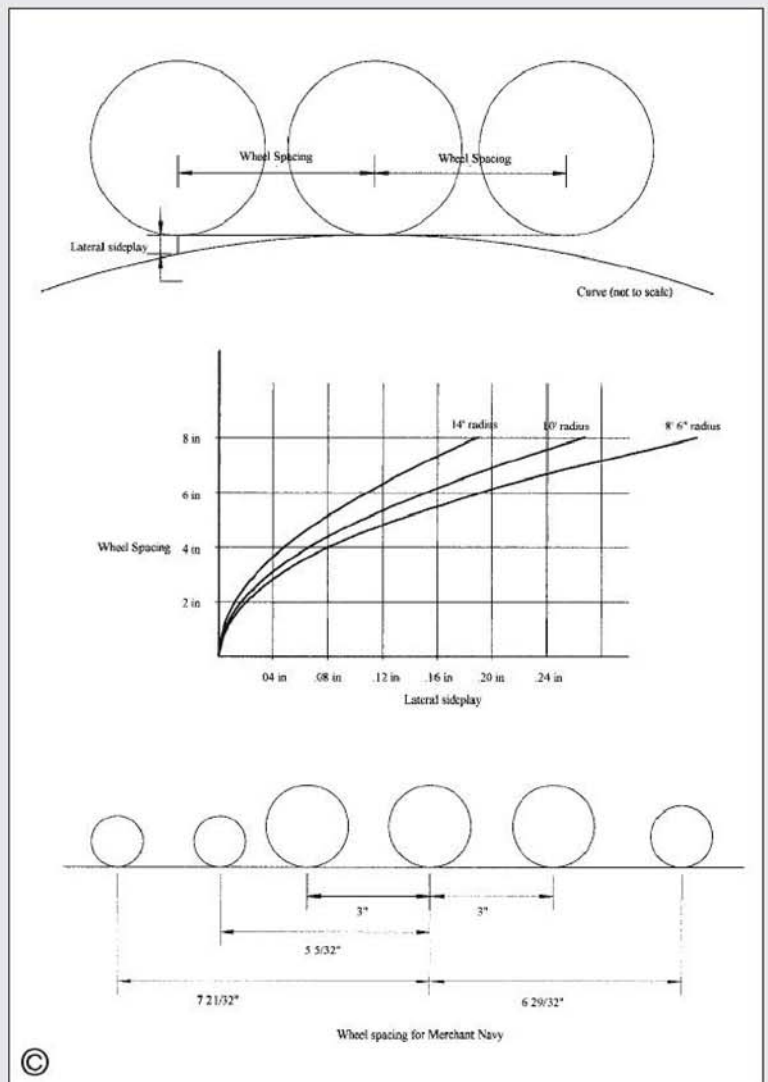
●Part IV continued from page 675
(M.E. 4197, 13 June 2003)

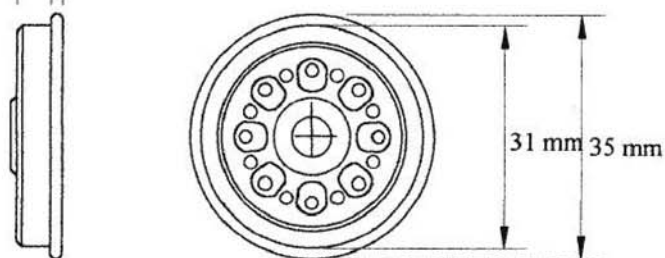
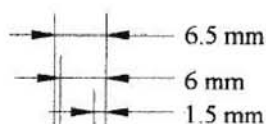
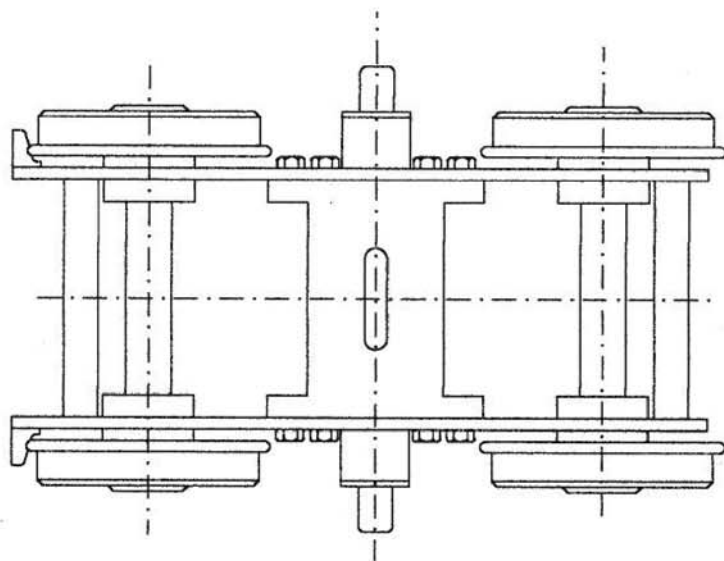
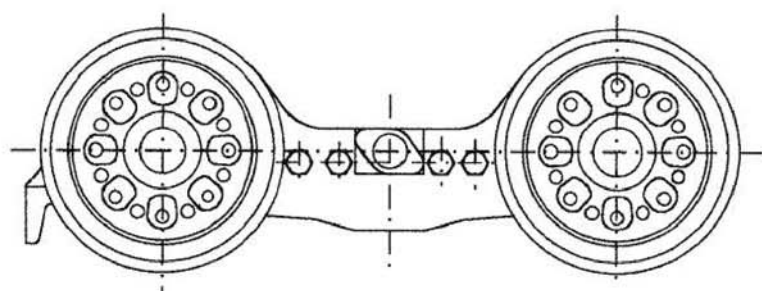
Little need be said about the bogie as I hope the drawings are self-explanatory. The arrangement drawing shows the guard irons which were silver-soldered to the frames. No form of side control springs are shown; so far there does not seem to have been a need for them, and the springing of the individual axleboxes appears adequate.

In part 3 (M.E. 4197, 13 June 2003) the question of side play was raised. I had the feeling that some readers may have thought that I had allowed excess side play for the trailing truck, so I have

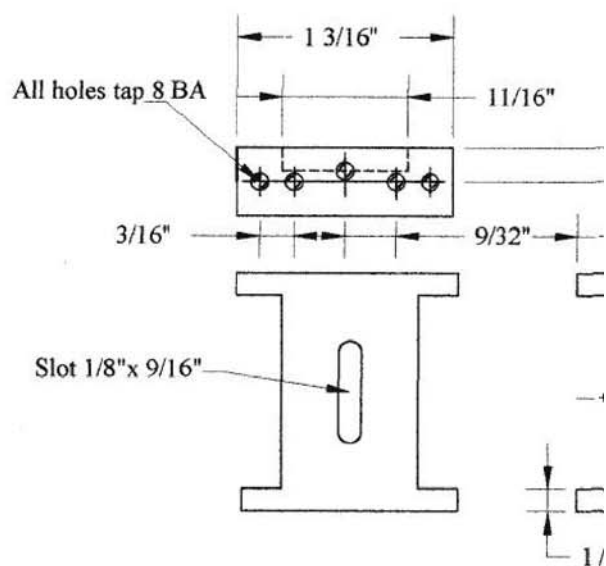


This view of the bogie from the Author's own locomotive shows the nature of its construction.

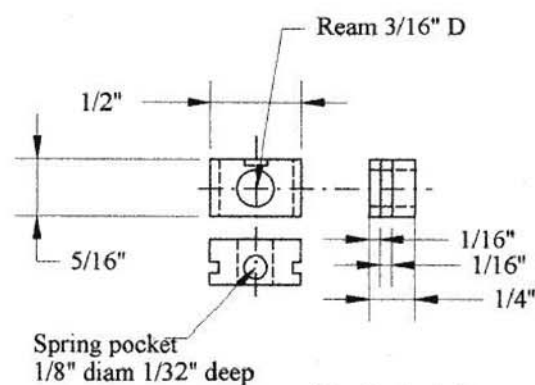




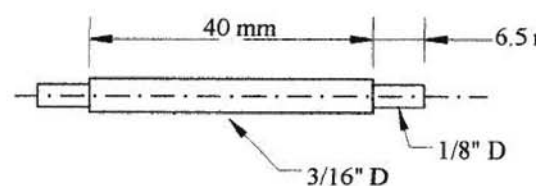
Bogie Wheels (to G1MRA standards)



Bogie Frame Stretcher



Bogie Axleboxes



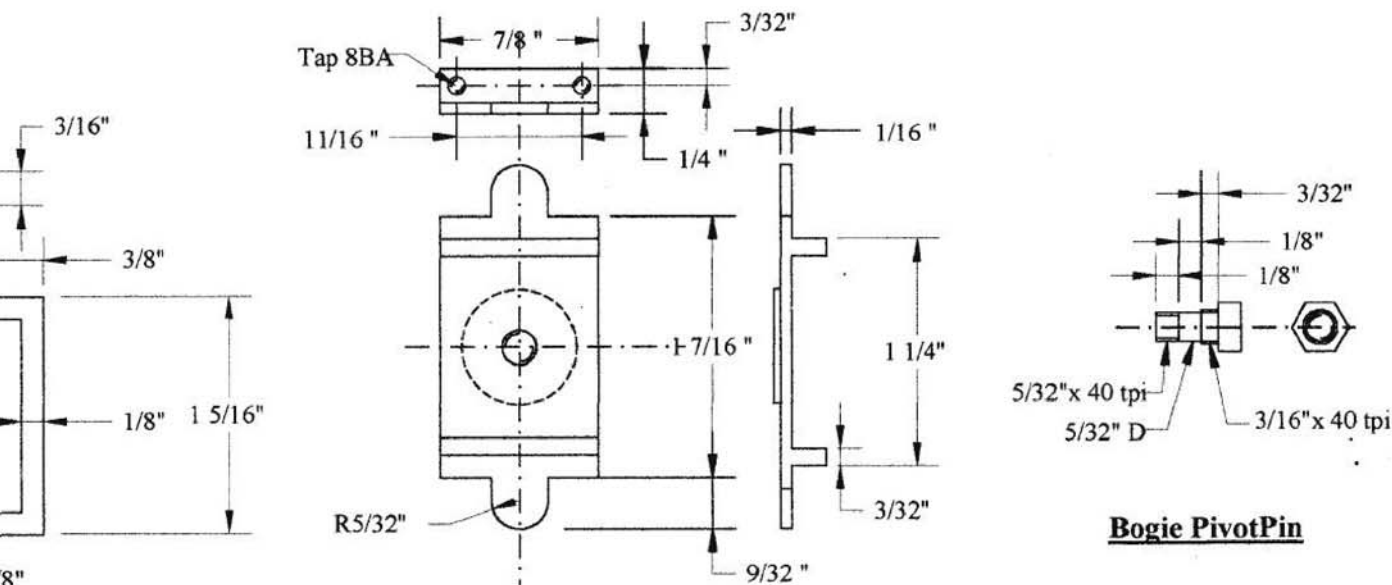
Bogie Axles

A SOUTHERN RAILWAY MERCH

included a little graph that I drew up some while ago when looking at the side play necessary for *Green Arrow* and *Evening Star*. This resulted in a short piece in the *G1MRA Journal*.

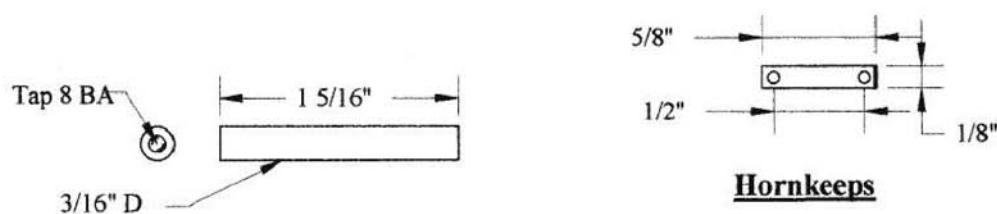
Using several simplifications, curves showing the side play required for different track radii against the wheel spacing are shown. These give the worst case as there is some in-built side play

because of the fact that the gauge over the wheel rims is 43mm whereas the track gauge is 45 millimetres. In drawing the curves, it has been assumed that the centre driver is hard up against



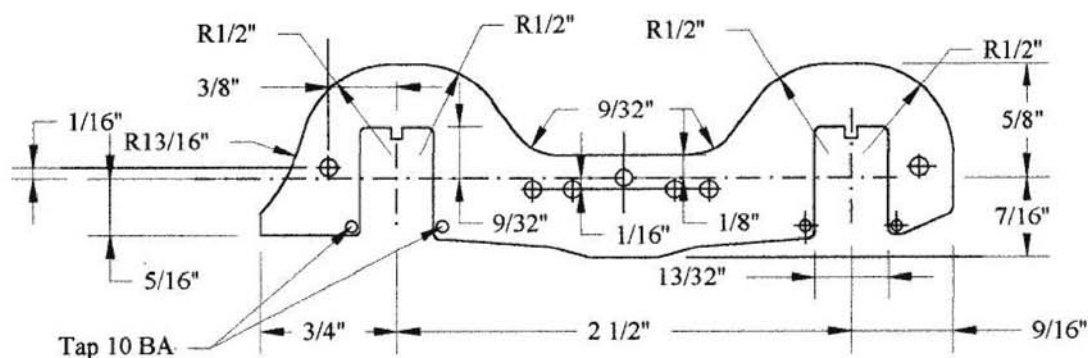
Bogie PivotPin

Bogie Bolster



Hornkeeps

Frame Spacer



All other holes 8 BA clear

Bogie Frames

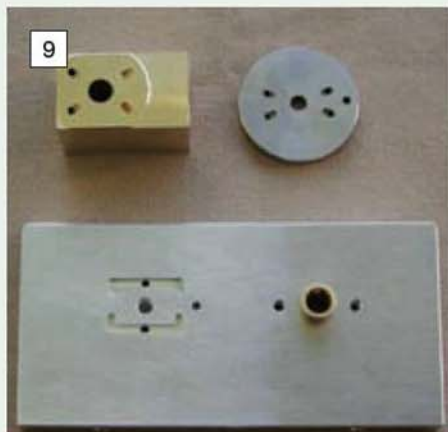
MERCHANT NAVY CLASS LOCOMOTIVE FOR GAUGE 1 BY ROGER THORNBUR

the rail. Looking at the wheel spacing for our Merchant Navy locomotive, the lateral side play needed on the leading and trailing drivers is about 0.04in. for a 10ft. curve. The drawings

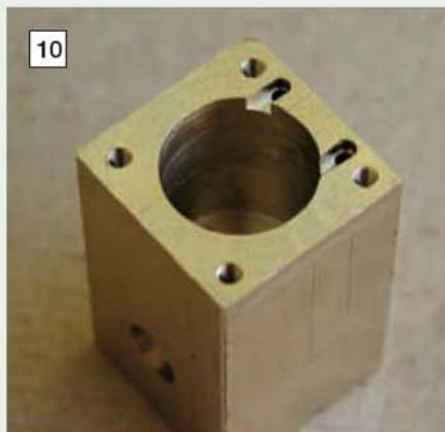
allow for $\frac{1}{32}$ in. which should suffice. The trailing truck needs 0.20 inch. The centre of the bogie moves about the same amount whereas the front wheels go nearly $\frac{1}{4}$ inch.

Some layouts have minimum radii of 8ft. 6in. and it can therefore be seen that on some occasions things can get a bit tight!

●To be continued.



Backplate and porting for the double-acting end-pivot engine.



Port openings at the crankshaft end of the cylinder for the double-acting end-pivot engine.



Assembled double-acting end-pivot engine.

OSCILLATING ENGINES FURTHER REFLECTIONS

Colin Pape

shows us three more developments in this intriguing series of designs.

●Part VII continued from page 678
(M.E. 4197, 13 June 2003)

At the beginning of the original series of engines I had assumed that a double acting engine had to have a central pivot. Before I actually built the double acting V-twin I had an idea that made this assumption invalid but I carried on with a centre pivot design anyway.

For this engine I have developed the idea and the result is this single-cylinder, double acting, end-pivot engine.

This engine is built from basically the same parts as the first engine in this new series. It has the same bore and stroke and the same short piston.

The main difference of course is in the extra ports in the port face to connect with the crankshaft end of the cylinder. The passageways for the crankshaft end of the cylinder run inside the cylinder and two small slots allow these passageways to communicate with the cylinder. The port faces and the cylinder are shown in photos 9 and 10 and the details are shown in fig 7. The engine is shown in photo 11.

Other differences include the provision of a cylinder end cover with a gland for the piston rod, and these parts are basically the same as were used in the V-twin in the original series. This end cover has been extended and is now used to hold the guide rods. The end cover has two bosses on its flat faces. One boss has the same diameter as the cylinder and serves to locate the end cover. The other side has a slightly larger boss to match the gland cover. The piston rod is longer than in the other short piston engines because the layout had to be changed to allow room for the cover on the inner end of the cylinder.

Owing to the extra length of the piston rod due to the cylinder inner end cover, there was a risk of pushing the cylinder pivot even further away from the crankshaft. I took extra care to optimise the dimensions for minimum distance from the pivot to the crankshaft. In the photo, the big end has been relieved to avoid interference with the nuts securing the gland cover but I have since changed the positions of

the gland screws and the relieving is no longer required. Fig 7 has the new dimensions. With the optimising work I succeeded in arriving at the dimensions below which are identical to those for the centre pivot engine.

Main dimensions: Bore: 13mm
Stroke: 14mm
Distance pivot to crankshaft centre: 40.5mm
Angle turned through by cylinder: 19.9deg.

T10 - Port in pivot engine

In an end-pivot type engine there is no real limit to the size and diameter of the cylinder pivot. It can be really large. It can be sufficiently big for the inlet and outlet passageways to be carried inside it, and the port face can be made on the cylindrical surface. This approach allows a great simplification in the engine structure. I quickly gave this engine a simple name: — PIP

In this engine, the aim was to keep things as simple as possible, so I decided to use a standard type cylinder. A guided cylinder engine would have had a greater turning angle and more tolerance in the spacing of the ports.

Main dimensions: Bore: 13mm
Stroke: 14mm
Distance pivot to crankshaft centre: 52.5mm
Angle turned through by cylinder: 15.3deg.

Making the cylinder ports

It was not difficult to put the ports in the pivot. It was more difficult to make the ports in the cylinder. So most of the time was spent on developing a way to produce the cylinder ports without the need for complicated set-ups or tools that I did not possess.

The cylinder ports need to connect the inner surface of the pivot hole to the inside of the cylinder. Because of the end-pivot design, the cylinder ports do not completely overlap the ports in the pivot, so the radial slot idea has to be used. Cutting these radial slots inside a cylinder is beyond my capabilities so I had to imagine a way that it could be done using simple tools.

There are probably as many solutions as there are people who work on the problem and some will be much better than others. I do not know how my approach rates on a scale of 'goodness' but the results were satisfactory. Here is my approach.

Since I could not cut slots inside the cylindrical hole I decided to move the inside of the hole to somewhere else where I could work on it and then put it back inside the hole. This sounds like a conjuring trick but what it amounted to was to make a liner to fit inside the pivot hole. This liner could be prepared before it was put in the hole.

I have generally used a piece of brass bar a little over 19mm square (3/4in.) to make the cylinders

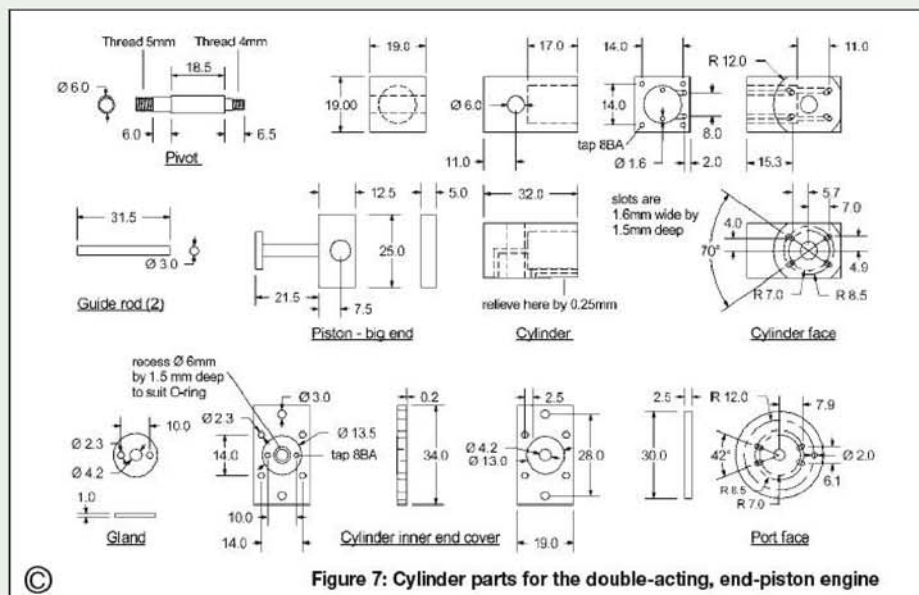


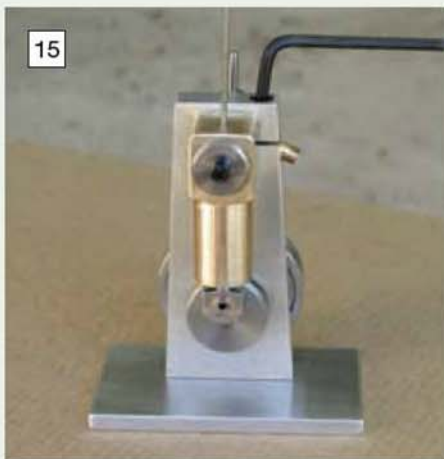
Figure 7: Cylinder parts for the double-acting, end-piston engine



13

14

33



15
Front view of the port-in-pivot engine, observed while final adjustments are in progress.



16
Rear (flywheel side) view of the Author's port-in-pivot engine.



17
Test Engine No. 11; the Author calls this his 'inside-out' engine.

exists and it cannot be solved with a spring so it has to be addressed in other ways.

The first way is by ensuring that the pivot is a very good fit in the hole. It must turn freely but with the minimum possible play.

The engine itself tends to minimise the leakage during the power stroke. It is a useful fall out of the design. When the inlet port opens, the gas enters the cylinder and forces the piston down the cylinder. In turn an equal force pushes the cylinder back against the pivot and minimises the gap between the pivot and the liner just where it is needed.

The engine is shown in photos 15 and 16 and I think that the objective of simplicity was achieved. The thin rod is being used to verify the good position of the pivot. The alignment holes must all line up when the engine is at top dead centre or bottom dead centre. This is quite a delicate adjustment due to the small angle between the cylinder and pivot slots. If not properly aligned the engine will not run equally well in both directions.

T11 - Inside-out engine

Engines that do unusual things have always intrigued me. A few years ago I developed a couple of engines that could operate as either rotary engines or as radial engines. When I reached the port in the pivot engine I began to wonder if it would be possible to develop a rotary engine with oscillating cylinders. If yes, could it be done so that the pistons pushed outwards? After a while I began to think that the answer to both questions was yes, especially if the PIP engine turned out to be viable.

So I made some initial calculations on the dimensions and when all the other engines were running I finally turned to this project. As in some earlier engines, the design turned out to be less difficult than I had first thought. I wanted the engine to self-start but I was running out of some materials so although I made a first design of an engine with the bare minimum of three cylinders I never actually built it. Instead I built the simplest possible single-cylinder version. It was probably a good decision because some of the problems that came up might have been hidden in a multi-cylinder engine.

This engine is based on T10 and is shown in photos 17 and 18. It is very simple and yet it turns out to contain some big surprises.

Surprise number one with this engine is that the cylinder needs only one port. In the ten previous engines I used two ports per cylinder (four for the double acting). Fitting two ports in this engine brings no benefits.

Surprise number two is that the position of the

pivot has no effect on the angular separation of the inlet and outlet ports. There is no longer any need to reduce the distance between the pivot and the big end to maximise the angular motion of the cylinder and maximise the overlap of the ports.

Surprise number three is that the inlet and outlet ports in the pivot, which replaces the port face, are not symmetrical. For the first time in any oscillating engine that I have designed it is possible to optimise the inlet and outlet ports for their respective jobs. The inlet port is much shorter and its bore is smaller than the outlet port.

Surprise number four is that the cylinder does not even oscillate. I never imagined that I would end up with an oscillating cylinder engine whose cylinder did not oscillate! I can imagine that this conclusion could lead to some discussion. After all, it uses basically the same cylinder and piston as the preceding engine.

The cylinder does not oscillate but neither does it rotate at a constant rate. In fact it only rotates at the same speed as the rotor at just two instants per cycle. At other times the cylinder is rotating either faster or slower than the rotor so, in a sense, its turning rate is oscillating.

There is no reversing valve. It is not possible to reverse this simple engine by changing over the inlet and exhaust ports because it has only one pair of ports and the ports are not symmetrical. The method of reversing this engine is to undo the clamp that secures the pivot and to rotate the pivot through 180 degrees.

The main parts of the design of this engine are shown in figs 10, 11 and 12. The engine works

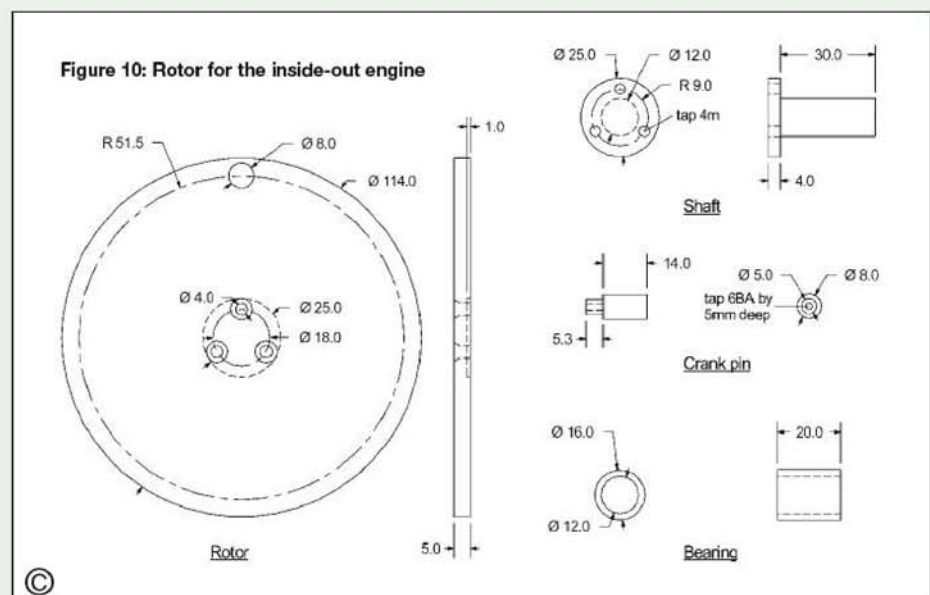
because the rotor surrounds the cylinder system but does not have the same centre as the pivot of the cylinder. It is possible for the piston to push the rotor away and in so doing it causes the rotor to turn.

I did encounter some problems with this engine which I think were amplified by the single cylinder approach. I began to wonder when the surprises would end.

The principal difficulty was rather basic; it did not want to run. Various factors, which I did not understand initially were working against me. I think it is useful to discuss these so that others who may decide to build a similar engine can be forewarned.

Initially I designed the pivot with two equally dimensioned ports. The openings were the maximum length possible without creating a bridge. This was mistake number one. It was very difficult to get the engine to start and I only ever succeeded in making it run in one direction.

The problem was friction in the pivot. When the inlet port opened, the engine was only just past top dead centre and the turning component of the connecting rod force was nearly zero. In contrast, the force pushing the rotor out of the engine and the cylinder back against its pivot was at maximum. These conditions apply to any engine but in this case the problem was made more severe because of the angle being turned by the cylinder. To make a comparison, the angle turned by the cylinder in the PIP engine between top dead centre and maximum turning force on the crankshaft is 7.6deg. but in this engine it is more than ten times that.





18
Rear view of the inside-out engine, a unit which possesses several surprising characteristics.



19
The inside-out engine running with strategically positioned fingers to hold it steady.

I was only using plain bearings and the friction was just too great. A roller bearing was originally planned for the rotor, which was completely different to the current one. This would have helped but I was unable to find a suitable bearing in a reasonable time so I redesigned the engine to use a plain bearing for the rotor.

The first step in correcting the problem was to reduce the inlet port length so that the piston was only working when the turning component was more reasonable. This helped and I made three

more pivots each with smaller inlet openings and the results improved a little each time but not quite in the way I expected.

I could get the engine to run in both directions but there was still a problem. This time it was due to the air in the inlet port pushing the cylinder hard against the opposite side of the pivot when the cylinder port was not open. The inlet port in the pivot has a much greater area than its counterpart in the PIP engine. This condition caused considerable binding in the pivot port.

My solution was twofold. First, to reduce the force pushing the cylinder against the pivot, I reduced the inlet slot width from 2mm to 1/16 inch. Secondly I added a 'balance' slot to the pivot, diametrically opposite to the inlet slot. This slot has the same dimensions as the inlet port and is connected to it internally. The improvement was quite considerable but the results were still not good enough and adjustment of the port position was still too critical. In fact the last improvement aggravated the next problem.

The last major problem now became clear and it was leakage of high-pressure air into the cylinder when the inlet port was supposed to be closed. I could not solve this problem directly with my primitive skills so I adopted another approach. I made a new pivot shaft with the exhaust slot length extended to the maximum possible so that any leakage would be conducted away to atmosphere. The final pivot ports were machined for an inlet opening of 48deg. and a 240deg. exhaust opening. Due to the width of the cutting tool the effective openings become approximately 61deg. and 253deg. respectively.

Now, finally the performance of the engine became acceptable and its adjustment much less critical. It now starts and runs reliably without a flywheel in either direction. However, this engine is not a 'good' engine. It is very simple, has very few parts and is interesting to watch but overcoming the friction of the simple bearings takes too much work. It runs only at low pressure and its speed range is much less than any of the other engines. This engine does not have a throttle and it would run better if it had one. The air supply was controlled directly at the compressor. Because the pivot needs to be rotated 180deg. to reverse the engine, my usual reversing valve would have been upside down half the time. I did not make any attempt to balance this engine and it does need to be held down. The engine is shown running in photo 19.

I have included a full set of drawings of this engine in figs 10 to 12 so that any prospective builders will have some basic information. There is plenty of room for improvement!

Main dimensions:

Bore: 13mm

Stroke: 14mm

Distance, cylinder pivot

to crankshaft (rotor) centre: 7mm

Angle turned through by cylinder: 360deg.

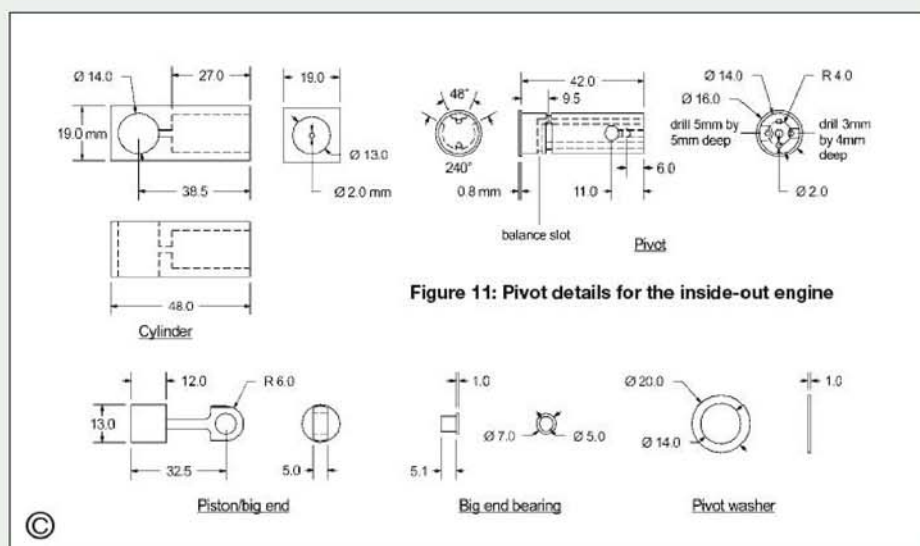


Figure 11: Pivot details for the inside-out engine

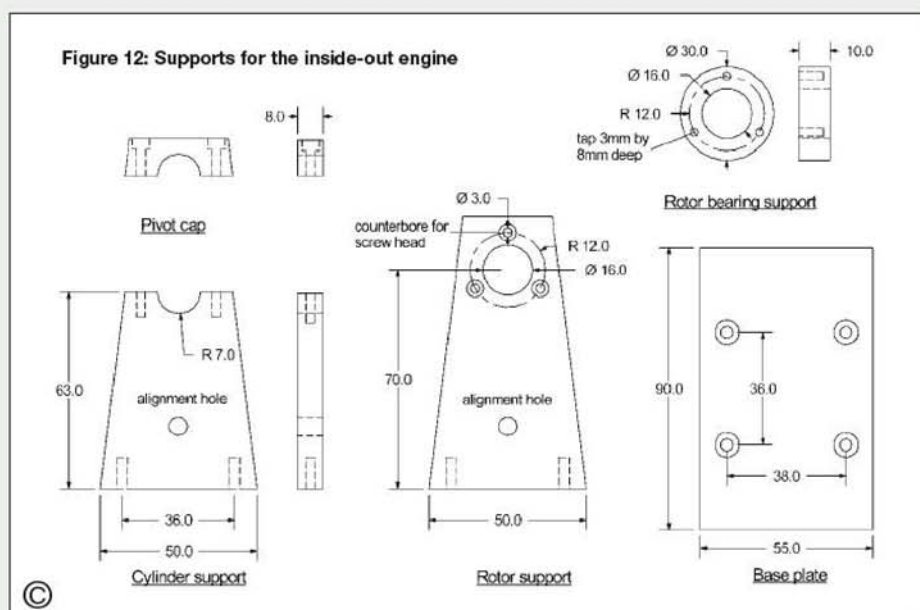
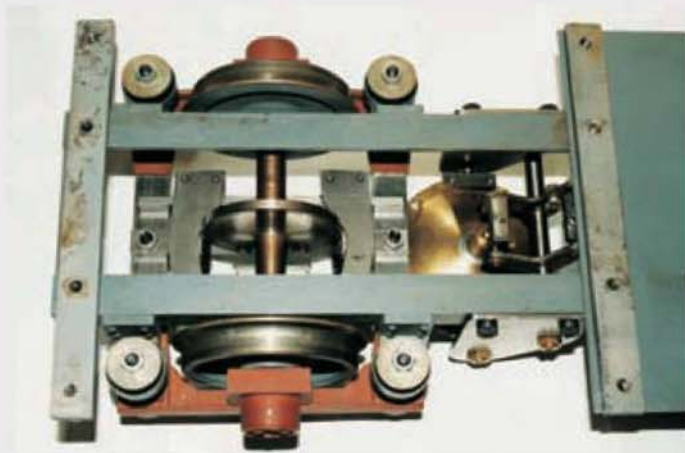


Figure 12: Supports for the inside-out engine

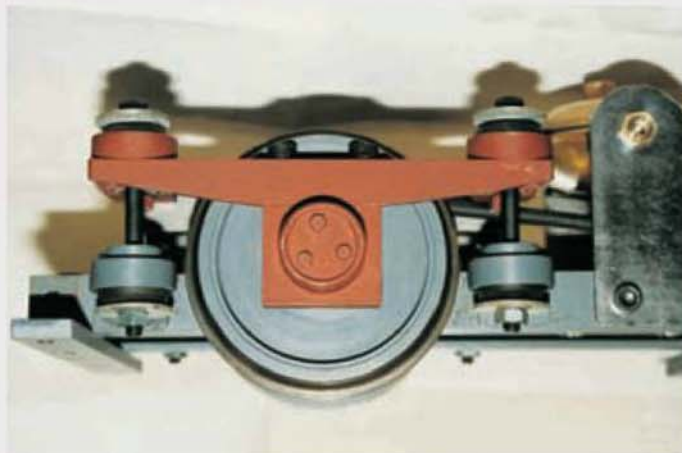
Conclusions

In the different engines that I have described, I found that there was a lot of freedom of action. Many engines deviated quite a lot from the standard description. Now, at the end of the series I have been able to find out what common characteristics applied to all eleven engines. I thought that it was a foregone conclusion that all the engines would have an oscillating cylinder but it turns out that this may not be the case. The inside-out engine certainly produced some surprises. My conclusion is that there is only one common, unquestionable characteristic. They all have a rigid piston/big end assembly. Now, if we changed the name of the breed to 'pivoting' cylinder...!

●To be continued.



Underside view of a bogie assembly showing details of the wheels, brake and suspension.



Side view of the same bogie assembly showing the wheels and suspension.

SELF STEERING WHEEL SETS and SWING LINK SUSPENSION

David Hudson

continues the construction of the Lowmac driving car chassis.

●Part VI continued from page 669
(M.E. 4197, 13 June 2003)

Turning of wheels should present no problems. I remove quite a lot of metal all round to keep their mass as low as possible, consistent with adequate strength. If I am required to profile wheels for anybody else, I always ask them to finish their wheels to the standard SMEE profile. That, then becomes my starting point.

I have made a simple profiling tool from materials to hand, and have profiled some 400 wheels using the same carbide type button tip. Some of you will have your own ideas about a profiling tool, but I have included a drawing of the one that I found to be satisfactory for those who wish to copy it. By the way, the SMEE wheel tyre profile can be found in Tubal Cain's *Model Engineers' Handbook*, which every model engineer ought to have in his possession.

Using the profiling tool

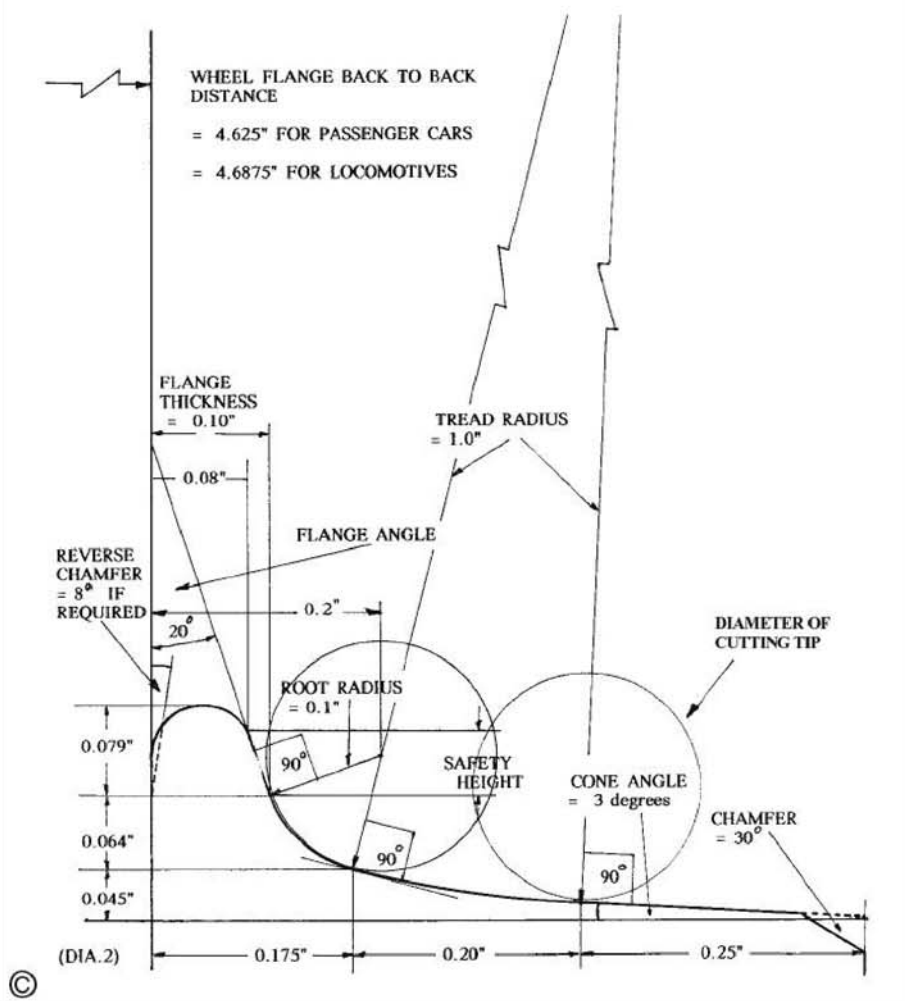
It is essential that the wheels are held securely and truly. If wheels are not on their axles, they may be mounted on a suitable mandrel. If wheel sets are to be profiled, then it is preferable to do this between centres. In this case, a suitable driving dog can be fixed to the catch plate, and a corresponding hole, say 1/4in. dia. drilled in each wheel for this purpose. If you are concerned with balance, then drill two holes diametrically opposite.

Place the profiling tool on the top-slide, with the profiling handle in the closed position. Ensure that this handle is parallel to the faceplate, and lock the tool in this position. Do not forget to lock the saddle. Put a 3deg. setting on the top-slide, then open the handle and position the cutter against the tread, not quite touching the flange. Set the index dials to zero. Now, remove the wheel set, turn it round and put the opposite wheel under the cutter. If the indexes still read zero, all is well. If not, start with the smaller wheel. Start the lathe and plunge cut carefully until the root radius becomes the cutter

radius (either 0.2in. or 5mm dia. may be used). Reset the index dials. This is where the profiling begins. Slowly move the lever until it reaches the

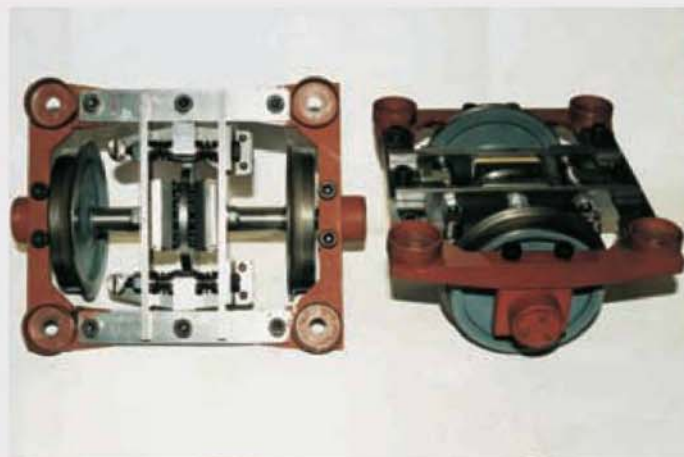
limit of its travel (closed position), and then wind off the top-slide to put on the 3deg. cone angle. Now be careful. Stop the lathe, reset the lever (in

DEVELOPED DIMENSIONS FOR PROFILING THE TREADS OF CAST IRON WHEELS FOR USE ON ALUMINIUM ALLOY RAILS.





Chassis strengthening plate and brake compensator assembly.



Details of the brake showing how the cycle brake blocks are presented to the brake disc.

the open position) and the top-slide to the original zero index dial reading. Back off the cross-slide. Change to the second wheel, and repeat the operations without changing the index dial settings.

If separate wheels are to be profiled, then I use a mandrel held in a large 4-jaw chuck and I always turn towards the chuck. If spoked wheels are to be profiled, it is advisable to use a suitable driving dog as near to the rim as possible. I usually put a 30deg. chamfer on the tyre to increase the edge strength, and to reduce hammer when crossing point blades and frogs. The tip of the flange is profiled to the SMEE specification.

When making axles, I usually part off and face to length a batch of axles, and then carefully centre drill these to the same depth. Next, I cut or rough turn a suitable brake disc, $\frac{5}{16}$ in. thick and $2\frac{3}{4}$ in. dia. and then drill a hole through the centre to suit the axle size.

Place the disc on the centre of the axle, by measuring (not guessing), flux and silver-solder in place. If the disc is a bit loose, then centre pop all round the axle to hold the disc in place while silver-soldering or welding.

There is another method that has been used to fix the disc to the axle. That is to turn a spigot

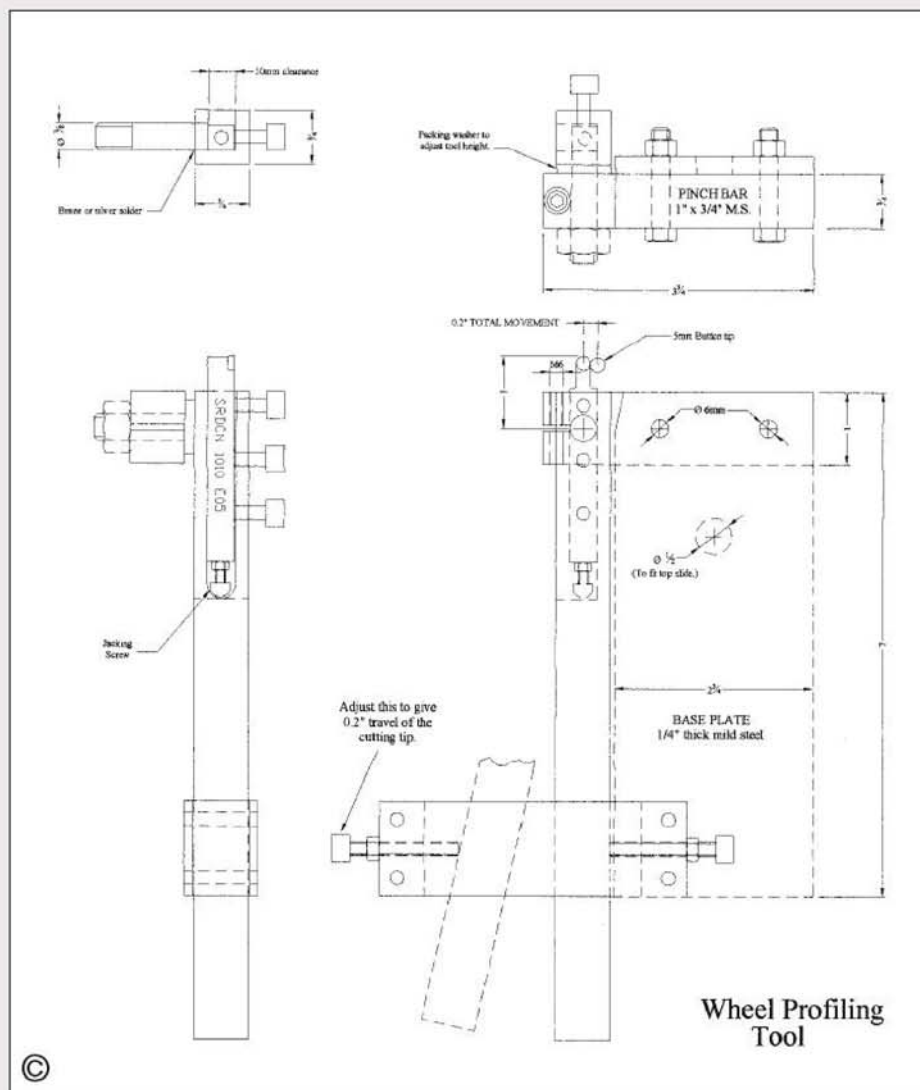
when making the disc, drill as before and fix with Loctite. If you want belt and braces, you can cross-drill and peg.

Place the axle between centres and face one side of the disc. Without altering the tool setting, turn the axle end for end and face the other side. This should ensure that the disc is truly central. Exactly the same technique is used to turn the registers for the wheels and the bearings. If you do not do this, the brake pads will not be central, and you will have to make adjustments by elongating some of the holes in the sub-frame stretchers. This will enable the centralising lugs to be adjusted.

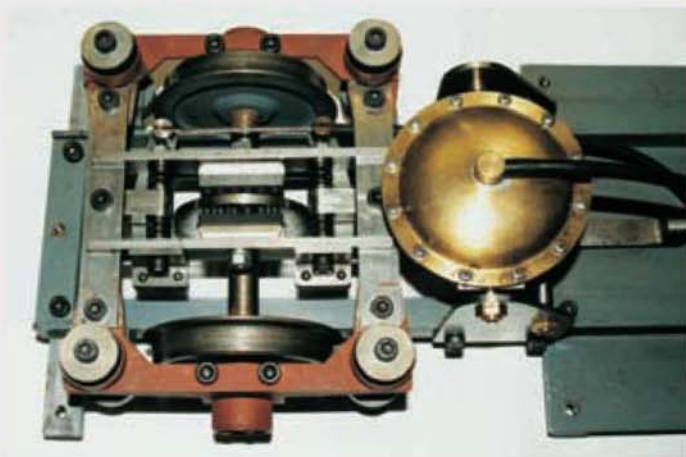
The suspension cups are located in 12.5mm diameter holes, and may be fixed with Loctite. Alternatively they may be expanded in place, using a suitable tapered plug and pad, and squeezing in the vice.

For those who wish to copy my Lowmac design, the sides are cut from 1.5mm sheet steel. The top reinforcing angle frame is made from 12 x 12 x 3 mild steel angle. The cranks, or sets, are formed by cutting pieces from the web and bending to shape. The gaps can be fitted with fillets, and brazed or welded. It is advisable to clamp the frame ends to a straight piece of steel before brazing or welding to keep the frames square and straight. This angle frame may now be clamped to the sides, drilled and riveted. Two pieces of 20 x 20 x 3mm angle can now be cut to shape, and fastened to the strong plate of the central spine. The side frames may now be placed against these angles and carefully aligned, drilled and riveted in place. The buffer beams may now be constructed and fixed to the side frames with angle pieces. There are two droppers, cut from 20 x 20 x 3mm angle, riveted to the buffer beam, and fixed to the ends of the central spine with cap screws into a spacer. The spacer is $\frac{37}{8}$ in. long and made from $\frac{3}{4}$ x $\frac{1}{2}$ in. mild steel bar. This method makes quite a strong structure. It should be remembered that I built this version of driving car to see if it was possible to keep within a scale outline of a Lowmac. It was never intended to scale the detail. I shall leave that to those of you that are more capable than I am.

Now, I had to complete this driving car in a hurry so that it could be run as a look-alike Lowmac, with a suitable load, for use at the August 1999 GL5 Main Line Rally at East Gilling, without causing too many turned up noses. The load represented a large galvanising tank made by Dorman Long. This load housed the vacuum pump, all of the control gear, the fuel bunker, and the water tank. It was topped with a comfortable foam seat, and the whole thing







How the vacuum cylinder fits in relation to the bogie assembly.



Vacuum cylinder and brake compensator assembly.

was within gauge. An earlier photograph of this shows what can be done with a little imagination.

The Lowmac chassis may be finished for use on a raised track. In this case valances can be made from plywood and fixed to the stretchers with cap screws. I have not completed this version yet, but I envisage that it will be suitable for use by drivers of both tank and tender locomotives. If there is sufficient demand I will prepare this for publication at a later date.

The information contained on the drawings should be sufficient for most readers to construct this driving car, and then complete it to their own satisfaction. The original purpose of these drawings was to enable readers to construct the wheel set modules that may then be used in a variety of combinations, such as four or six wheeled vehicles, or four or six wheeled bogies. Some of



The vacuum cylinder seen stripped from the assembly but with part of the linkage in place

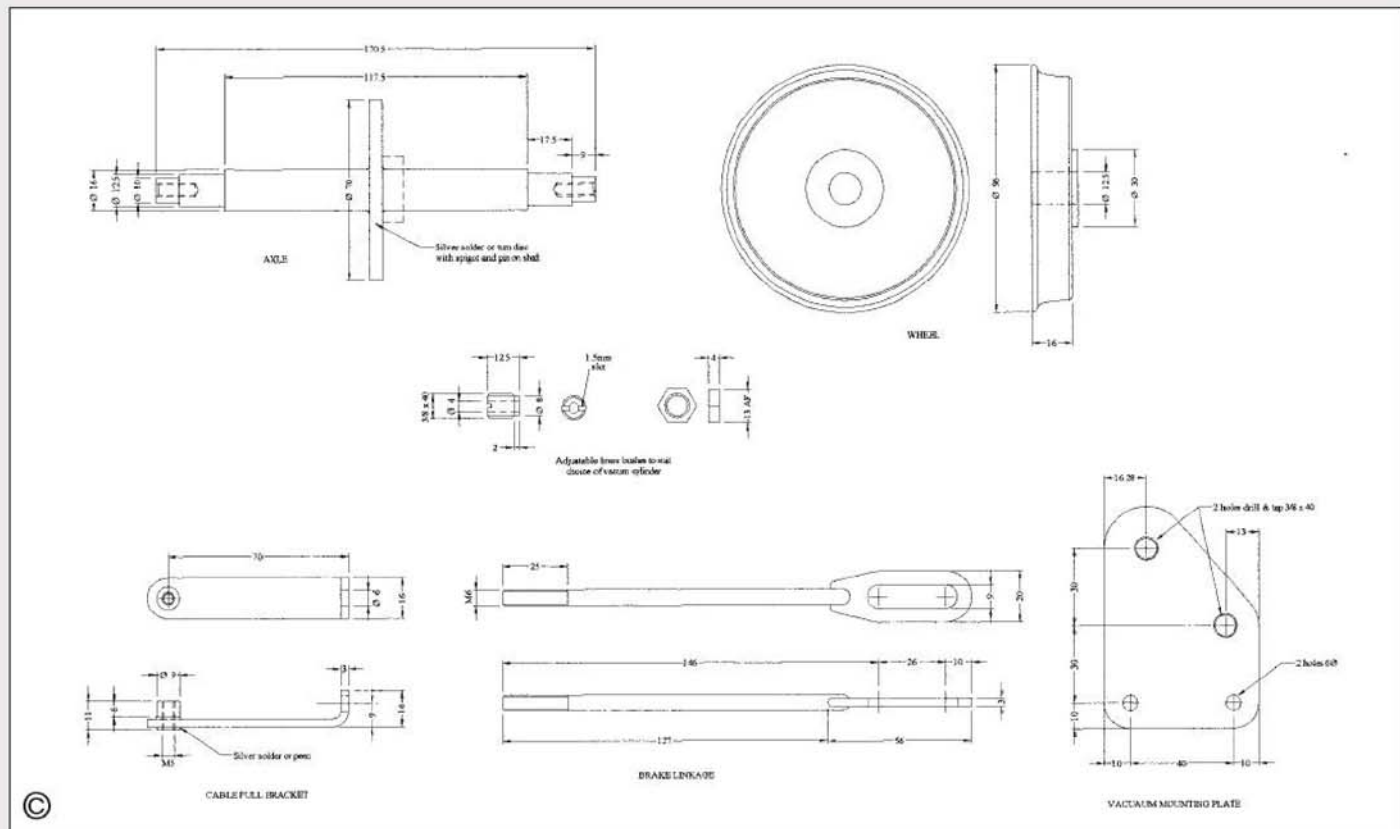
you may not care to use a well-wagon design, in which case there is an alternative design that readers may find easier to build. This design is

(very) loosely modelled on an LMS/BR Goods Brake Van having what was known as a weight box slung between the two wheel sets.

The main outer frame comprises two lengths of 12 x 12 x 3mm ($\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{8}$ in.) mild steel angle, sandwiched between a reinforcing strip, 25mm x 1.5mm (1 x $\frac{1}{16}$ in.) mild steel section, and one side of the weight box, 380 x 80 x 2mm ($15 \times 3\frac{3}{16} \times \frac{3}{32}$ in.), and then riveted together. 2mm backing pieces on each side of the weight box side will also be required to complete the sandwich. These are necessary for anchoring the small angle fillet pieces for connecting to the buffer beams.

Everything else remains the same, apart from the main frame strong plate that will have lengthened to 5in.), and the two middle stretchers have to be moved accordingly.

●*To be continued.*





Finished glazed case fitted with the movement mounting fixture and pendulum.

Peter Heimann concludes his description of this handsome timepiece with a case.

●Part IX continued from page 672
(M.E. 4197, 13 June 2003)

As part from describing the manufacture of the case, we are at the end of the project. Obviously, it will by now be self-evident that the completed clock is quite heavy and will require very secure fixing to the wall. I prefer to Rawlplug, say a $\frac{3}{4}$ x $\frac{5}{8}$ in. batten to the wall

underneath the case to take some of the weight. This will be hidden by the moulding. At the top, I suggest using 6mm Rawlbolts to hold a $\frac{1}{8}$ in. thick aluminium alloy angle bracket to the wall, fixing through this bracket and the top of the case with two, say $\frac{5}{16}$ in. well-made brass domed head bolts. Again, the bracket will be hidden by the moulding. Photograph 30 shows the heads of these bolts to either side of the movement mounting fixture. The fixture butts against the top of the case. I suggest that the beat plate is not fixed until the pendulum is hung so that it can be perfectly aligned with the centre division.

I know the case will have been fixed to the wall as upright as possible but experience has taught me never to completely trust a spirit level! The beat plate can be screwed to the back of the case with a couple of brass pillars to give approximately $\frac{3}{8}$ in. clearance between the face and pointer. As previously mentioned, the time keeping is regulated by the rating nut to give a losing rate of approximately half a minute per day. Addition of small brass weights to the weight tray will then increase the rate until it is correct. The clock will take some time to settle down, so this process will require patience. The speaking clock is a convenient source of reference.

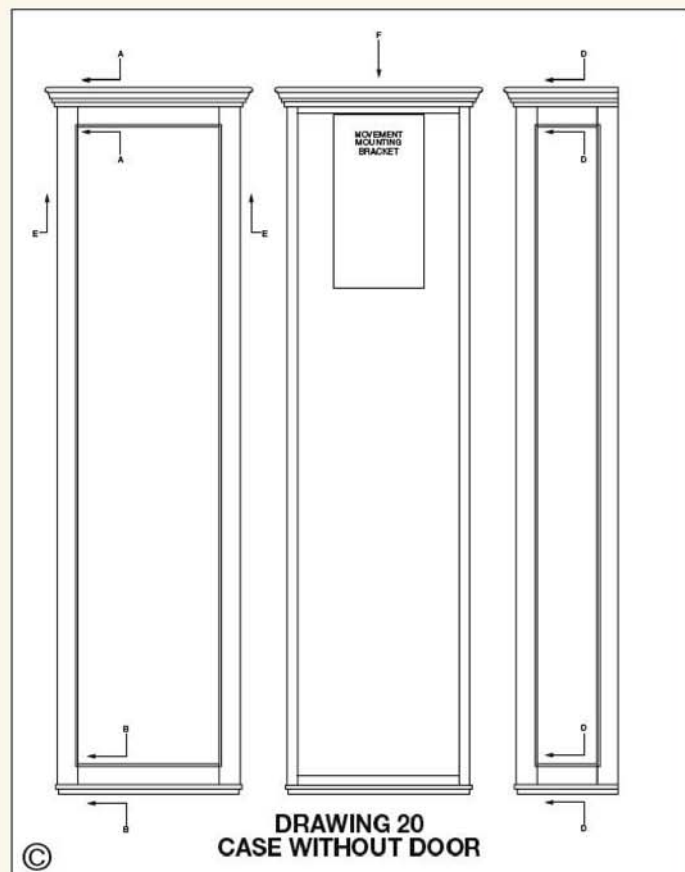
Glazed case

I have given considerable thought to the design of the case. It must do justice to the care and attention to detail that will have been lavished on the manufacture of the movement. On the other hand, the ready availability of material at a

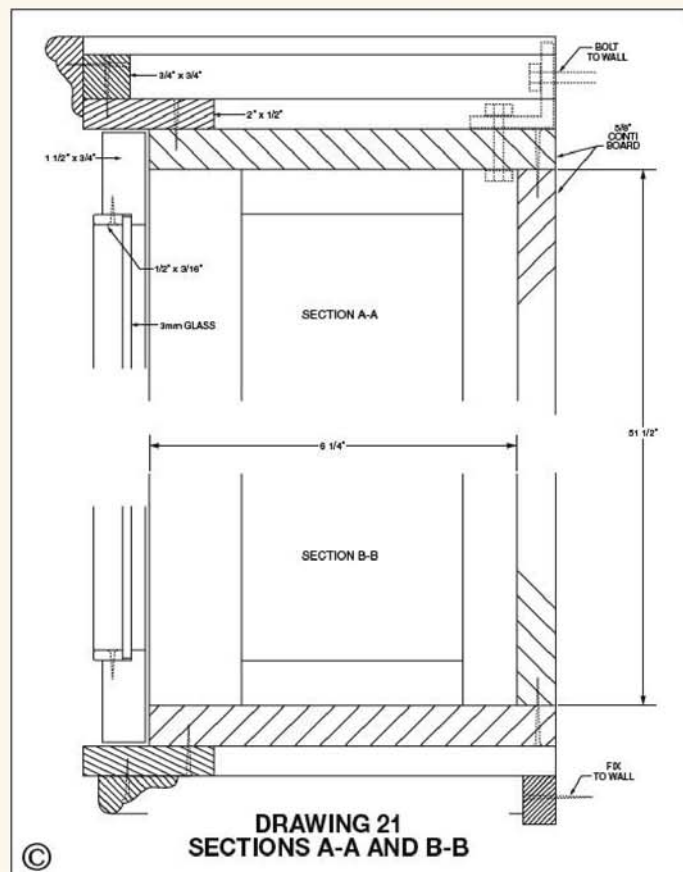
sensible cost, as well as the average model engineer's workshop facilities, have to be taken into account. Drawing 20 shows the general layout. The interior dimensions of $51\frac{1}{2}$ high x 12 wide x $6\frac{1}{4}$ in. deep are important. The rest is the choice and availability of material. Note the shaped moulding which is used for both the top and bottom (nominal $1\frac{1}{4}$ x $\frac{5}{8}$ in.).

Materials

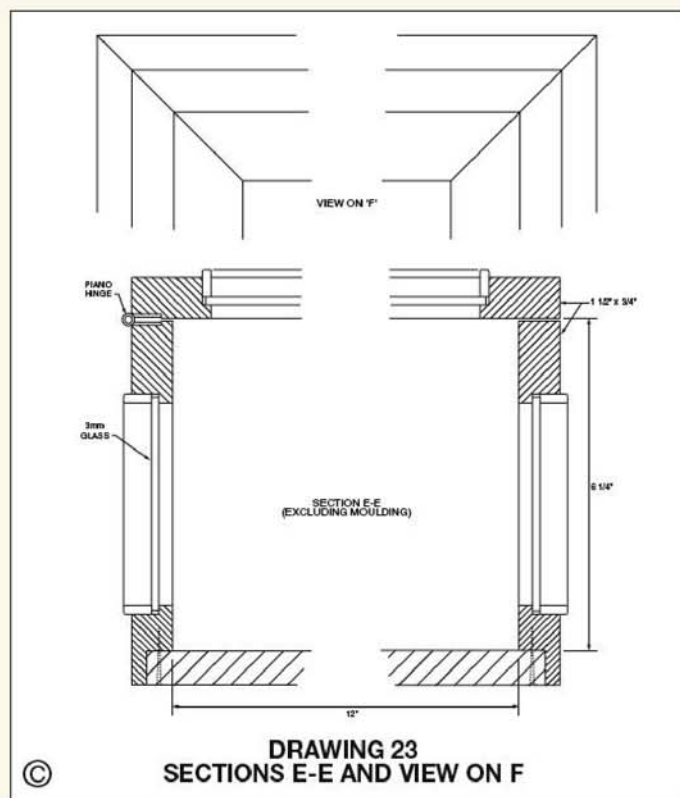
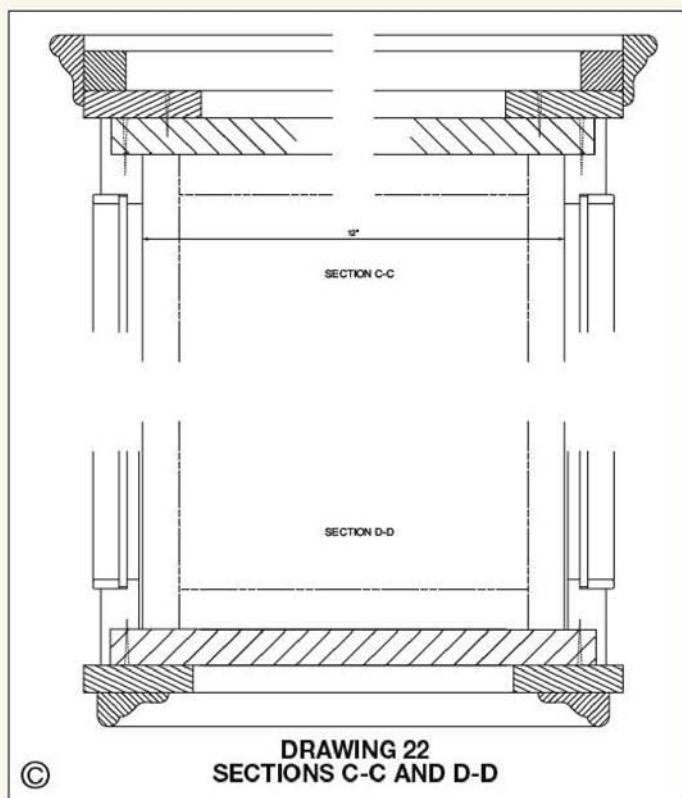
Most DIY outlets stock hardwood sections and mouldings in a 'mahogany' colour material. They also stock 15in. wide, $\frac{5}{8}$ in. thick Contiboard veneered in similar colour hardwood on both faces and on the two long edges. The core of this material is a reasonably dense chipboard which I have found suitable for our purpose. The other main requirement is the $1\frac{1}{2}$ x $\frac{3}{4}$ in. material for the two side frames and the door frame. This should not present an insurmountable problem to have it sawn and planed from heavier stock by a local timber merchant or sawmill. Sapele would be an ideal colour match for the Contiboard if you can obtain it. Meranti is also suitable; other hardwoods will be available as an alternative. The chances are that if the material is sawn from heavier stock there will be off-cuts. For a small extra charge, ask to have these converted into $\frac{1}{2}$ x $\frac{3}{16}$ in. glazing beads which will be a perfect colour match. The only other materials required will be a length of brass, continuous (piano) hinge, also stocked by DIY outlets, various sizes of 'Twin-Quick' wood and chipboard screws (zinc plated



DRAWING 20
CASE WITHOUT DOOR



DRAWING 21
SECTIONS A-A AND B-B



hardened steel), and brass countersunk head screws for the hinge and the glazing beads.

General description of case

The case consists of a backboard (Contiboard) which is rebated into two rectangular side frames (solid timber). The Contiboard top and bottom are also rebated into the side frames and screwed to the backboard. Remember to arrange these two pieces with a veneered edge facing the front. The movement-mounting bracket will eventually be bolted to the backboard. It is recommended to set suitable nuts flush into the rear of the board during construction. Drawings 21, 22 and 23 show constructional details by way of sections and give the main dimensions.

All joints are glued and screwed. I recommend Cascamite glue, but PVA adhesive is also suitable. The door consists of a hardwood frame, similar to the side frames. All will be fully glazed with 3mm float glass, retained by screwed wooden beads from the outside. Decorative mouldings are 'built up' from standard products, as previously mentioned. These are glued and screwed to the top and bottom of the case with mitred corners. The continuous hinge is rebated equally into the right hand side frame and the door. The resultant case will be immensely strong, stable and not too arduous to make. In my view, it will not offend amongst almost any domestic decor. Several photographs earlier in the series show the case 'in action'.

Construction

This calls for sawing to size, squaring, cutting mitres, rebating and corner jointing (mortise and tenon or dowel). Those of you with a circular saw are fortunate indeed and will find this machine of immense value. However, I have made my cases with only the facility of a basic single speed portable electric jigsaw. The secret here is to throw away the rather flimsy fence guide supplied with these tools. Instead, G-clamp a straight edge to the workpiece the correct distance from the line of cut when the platform

bears against it. Ensure that the straight edge is longer than the workpiece so that it acts as a guide for both entry and exit. Use good condition or new fine tooth blades, specially designed for cutting veneered material without tearing.

Squaring and cutting mitres can be very accurately accomplished on the milling machine. Use a fairly large diameter cutter running at high speed with the work piece held in the machine vice. To avoid splintering of grain at the end of the cut, it will usually be found better to feed the opposite way to metal work, so that the cutter pulls into the material, but do so carefully.

Rebating is easily carried out on the milling machine or with a portable electric router. It may be found convenient to assemble the frame before rebating for the glass. The rebates in the stiles (the long members) do not run completely to the ends but only to the junction of the rails. However, if preferred, they could be marked out accurately and machined before assembly.

The next operation is the corner jointing of the frames. The traditional joint here is a blind mortice and tenon. There is no reason why this should not be done on the milling machine unless you are brave enough to do it all by hand. There are twelve of them!

I have used another method with complete success by utilising the lathe as a horizontal drilling machine. This requires a small off-cut of Contiboard, say 5in. square, to be bolted on suitable packing to the top-slide of the lathe in place of the tool post. If jointing 3/4in. thick timber, this platform needs to be approximately 3/8in. below centre. Both pieces of the corner are G-clamped, one to the back and the other to the side edge of the platform, so that by manipulating the saddle and cross-slide, totally accurate dowel holes will be drilled through the stile into the cross rail. Be careful to number both components of each corner as you drill them as you will be working from both top and bottom faces on alternate corners.

Standard 6mm Ramin dowel is another DIY product. It will be found that a slightly smaller

drill will give a satisfactory fit. I suggest that the dowels (two per joint) are kept shorter than the full depth of drilling. Turn up some cross-grained plugs from off cuts of the frame timber which are then glued into the holes left by the shortened dowels. Carefully position these plugs with the grain running long-ways and, after sanding flush, it will be almost impossible to detect the doweling.

Whatever method is used, the frames will have to be clamped up until the glue has set. Proper sash clamps are ideal but failing these, one can make up clamps using cheap softwood battens in pairs with a bolt at each end. The battens are, of course, spaced sufficiently apart to lay either side of the work piece. Cover the glue joint with a piece of plastic carrier bag to avoid the embarrassment of everything sticking together. Use pairs of hardwood wedges to force all joints into tight and square contact until the glue has set.

Please be particularly safety conscious when woodwork is being carried out on machines not specifically designed for the purpose.

Finishing the case

A lot of effort can be avoided by carefully cleaning squeezed out glue with a damp rag during assembly. Glue allowed to remain on the surface will show up after polishing even if it appears to have been sanded off. Try to avoid using stain if at all possible. Hardwood treated with clear lacquer and wax burnished looks much better for our purpose. A two-part (acid catalysed) semi-gloss clear lacquer will give the best finish and can be obtained from specialist paint suppliers (not from DIY).

Although professionally this would be sprayed on, it is quite possible to apply it by brush. At least two coats will be required, rubbing down with sandpaper between coats. After the final coat, allow to harden for a day and then, burnish with medium grade wire wool liberally impregnated with clear or neutral colour furniture wax. Polish with soft cloths and you will have a professional and long-lasting furniture finish on your case.



Keith Wilson

describes the outer wrappers for our boilers and offers advice from his long experience of using pickle baths.

●Part XIX continued from page 685
(M.E. 4197, 13 June 2003)

LOGGER & SLOGGER AMERICAN TYPE

2-8-2 LOCOMOTIVES for 5in. and 7¹/₄in. gauges

The kettles (boilers, if you prefer) for *Logger* and *Slogger* are quite large lumps of copper. However, big bits are frequently made up from lots of little bits, and journeys begin with but one step, so *Courage mes braves!* and all could be well. A big kettle it may be, but with a bit of 'savvy' it will present no unsolvable problems.

Give up any idea of using paraffin blowlamps (as if you would try!) but from personal experience I know that an oxy-acetylene torch will handle the lot with ease. Having made two 10¹/₄in. Royal Scot boilers, a ditto-size Britannia, and the two 47xx pots, I think I can write with some authority, especially as the latter were brazed rather than silver-brazed, and the others were of ⁵/₁₆in. tough-pitch copper. Admittedly, it took a complete pair of gas-bottles to do the annealing alone, but "*que voulez-vous?*" I maintain that when there is no choice but to use an overhead

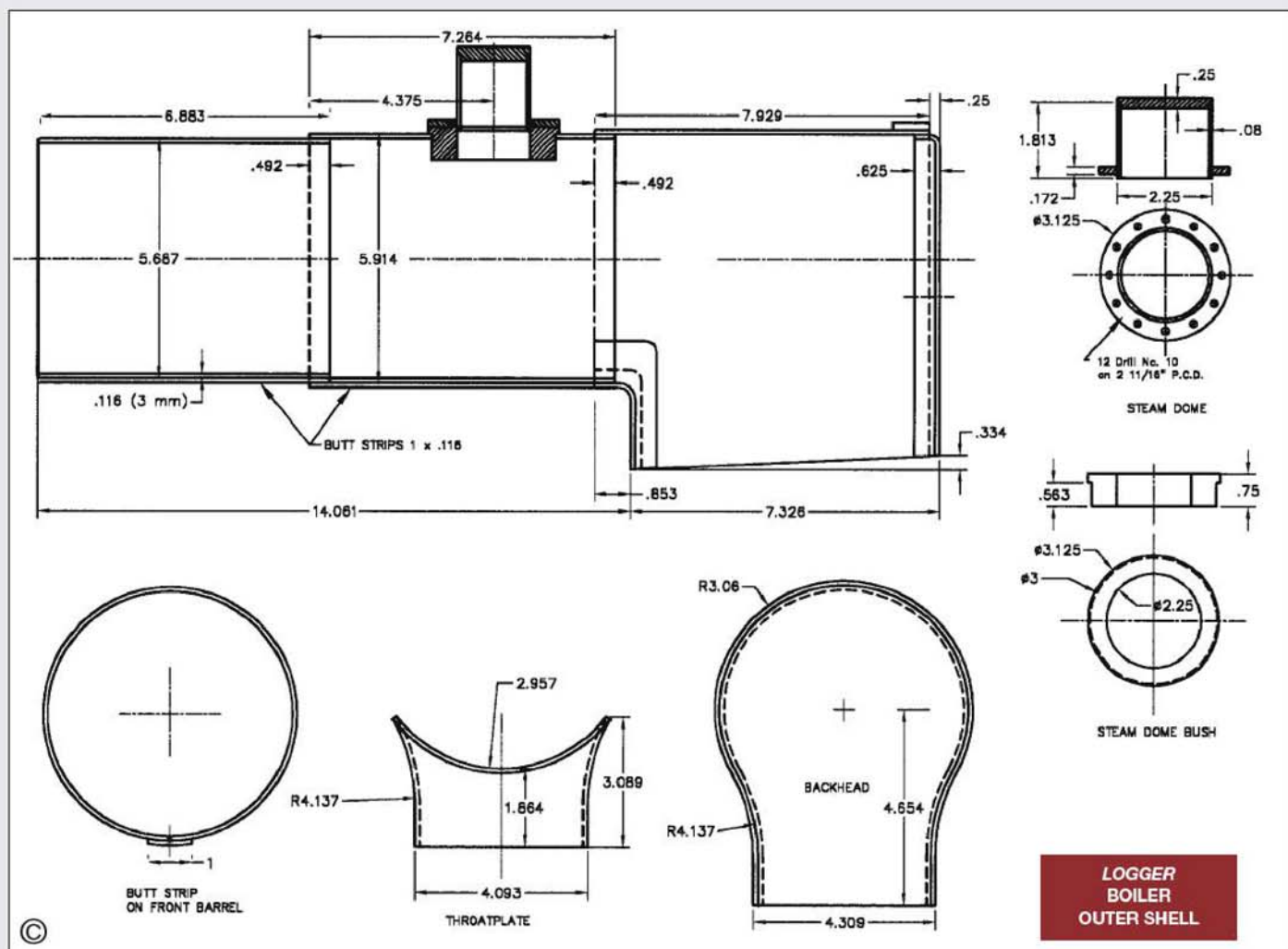
crane or hoist to insert the firebox assembly into the outer shell, then you're getting some experience! For the foundation rings, (1 x ¹/₂in.) we used two torches to get 'em up to temperature, but thereafter one torch sufficed for this operation. Since this is the operation which needs most heat of all, it speaks for itself.

Roll out the barrel!

The front barrel needs a sheet of copper 4 (3)mm thick, 10 x 27 (6⁷/₈ x 18⁵/₈) inch. Metric copper is easier to obtain in the UK than Imperial; 4mm = 0.1574in., about 1¹/₄ thou more than ⁵/₃₂in., while 3mm = 0.116 inch. With a 'cold' safety factor of 10, this thickness gives more than enough strength; in fact the safety factor is more like 11, but as has been mentioned before, the barrel is not only the most highly stressed radially, but also if it popped off, it would clearly

do the most damage, so under no circumstances whatsoever do you omit the butt-strip. The only possible exceptions are if the seam is fully welded, not brazed or silver-brazed, or a proper castellated joint is used. Such welding however is the work of the specialist and beyond the average amateur, and the castellated joint is one that gave me a pain when I tried it. However, I must make it clear that this is purely a personal matter; the joint system is perfectly sound and acceptable.

The barrel could just as easily be made in one piece, but this would need hefty bending rolls at least 20in. long, and much larger in diameter than the average 12in. roller. Normal rolling would leave a nearly flat portion at each end, but if a bit of heavy metal bashing is indulged in before inserting into the roller; then matching up the ends is greatly facilitated. It also helps if the butt-strip is bent slightly into an obtuse-angle vee along its length,



LOGGER
BOILER
OUTER SHELL

Wilson's Words of Wisdom:
*Thrice blessed are those who can
 laugh at themselves for never shall
 they lack for entertainment.*

but don't overdo it. It is a good idea to rough up the surfaces to be silver-brazed, using either a coarse file or (much easier!) a coarse sanding-disc in your angle-grinder. It is also a good idea to bevel off the inside edges to be joined, and advantageous to go over the inside of the butt-stripped seam with heat and silver-braze — every little helps!

Lay the barrel on its back (in this instance the back is the top, which of course should be at the bottom, bejabours! and if need be, use two long clamps to make sure the gap is closed. A pair of carpenter's clamps pay for themselves here — and how! Anoint the jointing surfaces with flux. Two pairs of G-clamps will hold the butt-strip down to the barrel, and you are all set. While I think of it, this butt-strip should be only 8³/₄in. long, leaving 1¹/₂in. (3³/₈in.) clear at the front and 3¹/₄in. (1¹/₂in.) at the rear to allow for smokebox and firebox outer joints respectively. Tacking it at both ends may well prove to be an advantage before completing the job.

Cook up the joint with the torch and apply the silver-brazing material. I firmly recommend Easiflo No. 2 or its equivalent. Other materials may well appear cheaper, but you will need more heat, so it tends to even out. I find that a big pre-heating jet is perhaps best, mine has six No. 60 or so holes in it which give a soft flame rather than the fierce heat usually associated with oxy-acetylene. There is no need to cook up the copper to a bright red as some well-meaning folks have suggested, but as it heats up the flux will melt and present a

'glazed' appearance. At this time, try touching the joint with the tip of the silver-braze material; if it melts and runs into the joint all is well, if it doesn't melt then a little more heat it required. Incidentally, if it doesn't melt immediately, take the stick away, don't keep it in the flame as you will only melt the tip of the silver-braze material and it will leave a blob.

You may well be supplied with the material in rods of about 1¹/₁₆in. diameter; this is surprisingly economical. As the rod melts into the joint and gets shorter, the last few inches can be held in forceps or in a piece of 3³/₁₆in. dia. mild steel with a 1¹/₁₆in. hole in the end about 1¹/₂in. deep. The last little bit is just laid upon the joint and melted in. Do about 3in. one side, then match up with 3in. on the other side; extend this to 6in. and then go back to the previous side. Gluing the kettle together this way make life a bit easier — always useful!

The second barrel is done the same way but, of course, will be 4mm x 10.5 x 28in. (3mm x 7¹/₄ x 19⁵/₁₆in.) It is worth putting a slight bevel on the inside of this portion at the front end, as this will not only aid assembly but also form a useful 'encouragement' for silver-braze materials. This is easily done with an angle-grinder.

It is probably best to put the big steam-dome bush in at this stage. Unfortunately, it is not practical to cut the big hole for it while it is still 'in the flat' for not only will it be virtually

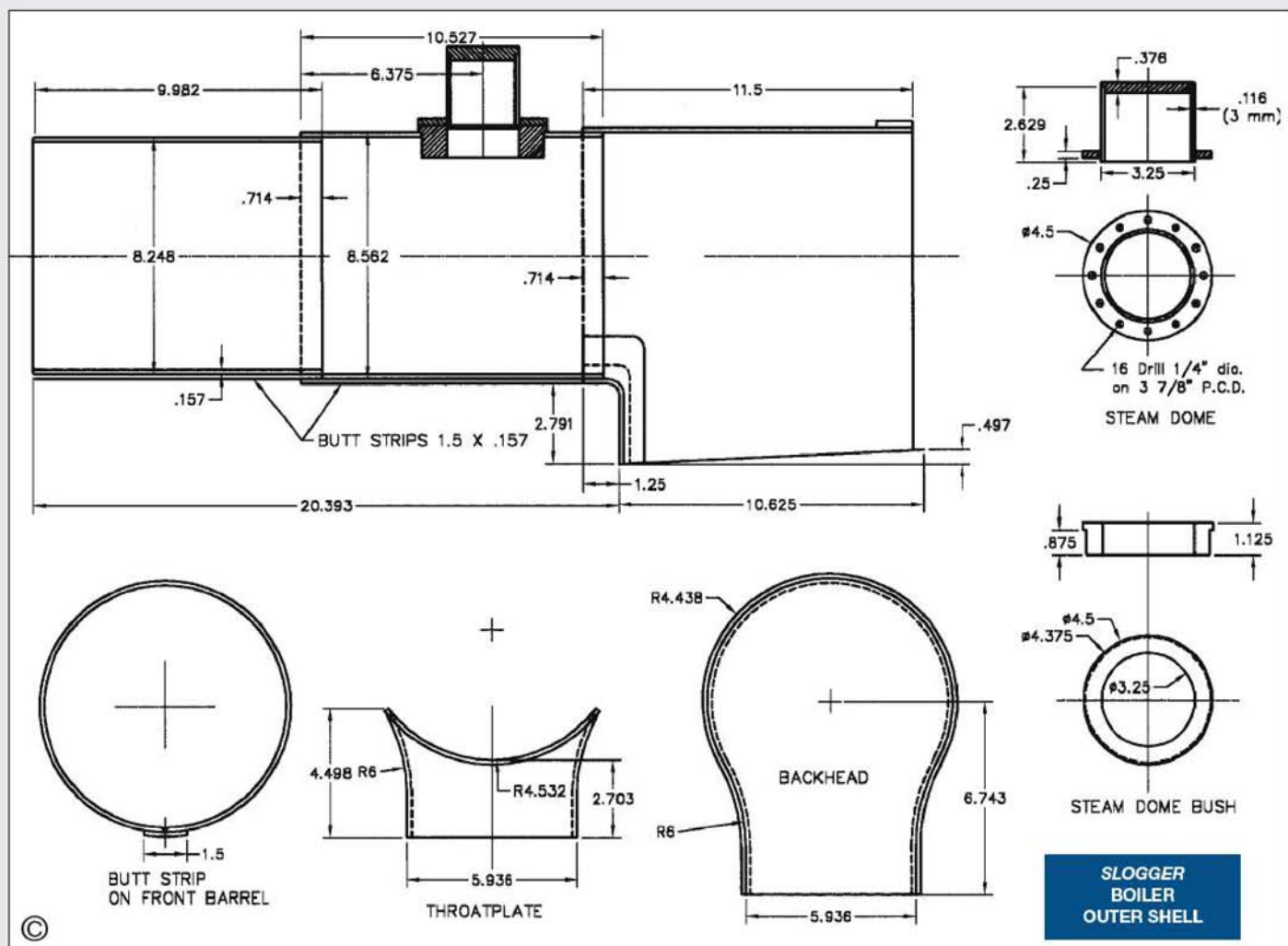
impossible to roll properly — I've tried it with smaller holes — but the hole would end up the wrong shape anyway and need much filing out. The beauty of putting in the bush at this stage is that it is far easier to get at from both sides; with a bush this size it is of no little importance to make sure that the silver-braze penetrates right through the joint all round.

Two barrels into one!

If you have done reasonably well with the cutting and rolling, the two parts should fit tightly together; if they don't then a little persuasion with a hammer will help, and here is another use for carpenter's clamps — as longitudinal squeezers. The exact amount of overlap is not important, if you aim at an overall barrel length of just over 19³/₄in. (13⁵/₈in.) then all will be well. If the overlap is too much, then it provides a bit of useful weight! But ideally it should not be much less than that shown.

Once the two sections are telescoped to the right length and in a straight line, tack them together with 3 or 4 dollops of silver-braze then stand upright on the larger end and go all round with the torch. When you get back to the beginning, go on a bit further so that the whole joint is homogenous (an impressive word which in this case means evenly spread).

Note that there no rivets have been specified — there is no need for any. They add nothing to the strength of the joints. I do not know who first





Looking into it: the barrel of a 7¹/₄in. gauge GWR Bulldog during construction.

realised that rivet-less boilers were okay, but they are certainly easier to make.

The firebox outer is from 4mm (3mm) copper, 11¹/₂ x 28in. (8 x 19¹/₂in.). This is deliberately a bit too long. In fact, I suggest an extra ¹/₂in. on both *Slogger* and *Logger*, for it is extremely easy to get the various bends other than exactly right with the result that you could end up with an outer wrapper too long at one end and not long enough at the other, like the average shoelace. Note that although I have shown the backhead, this is for shape information only and it should *not* be fixed in in any way at this stage; it is there purely for the shape. The throatplate is the same profile as the backhead but a bit deeper. The backhead is useful as a profile guide, but note that if it is used inside out, it is possible to clamp firmly in place by the use of toolmakers' clamps, or indeed any type of clamp.

When getting the outer wrapper onto the barrel, a problem arises in getting them dead in line. Long straightedges may be used, but it is by no means easy to hold them at the required positions whilst faffing about with the parts concerned. A useful aid is to scribe a line along the inside of the barrel and outer, this line to be at the top of both. It follows that if the embryo kettle be laid on its back on a flat surface, supported by a couple of bricks to prevent overmuch rolling, it will be easy to sight along this line. The front of the barrel can rest on a piece of material ¹³/₃₂in. thick (one piece ¹/₄in. + one piece ⁵/₃₂in.). The outer will then be horizontal at its top along the steam-dome bush (which of course is here at the bottom) and can easily be clamped. Material ³/₃₂in. thick will take care of the firebox wrapper, and G-clamps will take care of the throatplate location. Bits are then tacked together. When completely satisfied with

the line-up, silver-braze the whole thing together, including the throatplate, *but not the backhead!!*

Pickling is easy!

Much has been written — both useful and less useful — about the constituents of pickle baths and their methods of use. I can write from quite a lot of experience plus something of a scientific background, for after leaving school with a selection of A levels including chemistry, physics, mathematics and engineering I spent a total of three clear years in scientific research. It was most interesting but being interesting, it didn't pay very well. However, I have a good memory and learnt much.

There is no valid safety worry about using dilute sulphuric acid, if you use elementary safety precautions. Do not quench from very hot, as splashes can be a problem. *Never, ever*, add water to the concentrated sulphuric acid; strange as it may seem it is safe to pour the concentrated acid into water. About the same amount of heat is generated overall, but much less suddenly. For with water into acid, the immediate dilution is very little and all the acid near the drop of water tries to get at it; result — localized heat, often enough to explode into steam, and dodging splashes therefrom is not likely to be easy. The other way round, each drop of acid spreads out and dilution is immediate but dispersed; result — same amount of heat, but it is instantly dispersed. Once the acid is about 50% diluted then either way is okay, but it's best to get into the good habit.

A plastic dustbin is ideal, fill it to about three-quarters full of water from the tap, and pour into it about 1¹/₂ pints of concentrated sulphuric acid, also known as oil of vitriol. Nasty stuff, but one of the most essential chemicals in all industry. With a dilution of about 30 or 40 to one, the resulting solution is fairly innocuous; and if a small object is accidentally dropped into the acid, you should be able to roll up your sleeve and grab it out with the bare hand. Rinse off under the tap as soon as possible, and unless you have an open wound or very sensitive skin you will not even notice any acidic action. A mere scratch might sting for a few seconds, but washing off will cure. If you have an open wound, get someone else to do the fishing. *(It has to be our duty to advise against plunging bare flesh into the acid bath, even though it is dilute. Long plastic or rubber gauntlets are available and it may be possible to fish for the*



External view of the 7¹/₄in. gauge GWR Bulldog boiler barrel during construction; note straps.

lost part using a suitable device of some sort — Ed.)

My present bath has dealt with several boilers, not small ones at that. It is still in good nick, and if the job is left in overnight (recommended) it will come out lovely and clean and pink, but wash off the acid thoroughly or the copper will go dull again as it dries. An old washing-up brush is ideal to aid the flushing.

I have no personal experience with other pickles, so cannot write from experience thereon. The above advice is from possibly the best teacher of all — sheer experience. It may not be complete, but is true.

Washing soda or baking powder kept handy is useful in case of spillage on clothing, and soap is also alkaline, i.e. an 'antidote'. I have not checked for myself, but washing-up liquid and hand wash is also alkaline (or basic, if you prefer the term).

For our *Slogger* kettle, I strongly recommend an overhead hoist of some sort to obviate splashing if the pesky thing slips. It is by no means easy to hoist even the inner assembly single-handed. The *Logger* pot is about half the weight, but is still quite heavy enough!

Corrections

I have been sent a list of errors which have appeared in these designs so far. As soon as I have had the opportunity to go through them, I will publish corrected drawings. Fortunately there are not many, but those there are, are important.

●To be continued.



G-clamps and toolmakers' clamps are useful boiler making tools.



Boiler outer components silver-brazed into an assembly await further work.

CLUB CHAT

With Malcolm Stride

Because all model engineers are sharp-eyed, you will all have noticed the new name at the top of this column, so I thought a few words of introduction would be appropriate.

I have just escaped from the computer industry after some 40 years working in and around manufacturing industry, both in production management and as a business consultant specialising in computer systems for manufacturing companies. Throughout this time, the thing that has been constant has been my model engineering activities, starting in model boats way back in the 1960s and more recently locomotives and IC engines.

Along the way I have built such diverse items as steam turbines (in model boats), a V-twin flash steam plant, a 5in. gauge 0-4-0 *Railmotor*, a hot air engine, a *Wyvern* gas engine, an own-design 15cc four stroke petrol engine and an Edgar Westbury *Seal* petrol engine, among others. One of the strangest projects was a 'bath plug' motor built many years ago and my current long term project is a *Princess Marina*.

I am a firm believer in model engineering clubs and am currently a member of **Reading SME** (Berkshire, UK). I believe that clubs provide a vast amount of support and publicity for model engineers, particularly those new to the field. I have always been impressed by the efforts of LBSC and others who did not have that support and yet did such wonderful work with what were by modern standards, limited facilities. Clubs are also the vehicle (via the various federations) for getting our voice heard by the politicians and others who seek to impose ever more control on our lives.

You will find that the format of *Club Chat* has not changed and there are no plans to do this at present. What I would like to see is more material from those clubs that perhaps do not produce regular newsletters but soldier on quietly doing their own thing, largely unnoticed by their larger more publicity conscious brethren. After all, you may have the answer to someone else's major problem and you never know, getting your name in *Model Engineer* may get you extra members which make all the difference to the finances.

I also intend to visit club web sites on the internet to extract any

relevant information. This assumes they are up-to-date of course. If you do produce a newsletter but don't send a copy to the editor, then how about considering the idea?

UK News

The latest issue of the journal of **The National 2 1/2" Gauge Association** publicises their winning the 'Best Society Stand' award at the Sandown Model Engineer Exhibition last December. Well done to all concerned. The journal also details a security device for models. This takes the form of a small electronic device affixed in an out-of-sight position on the model which identifies the owner when scanned by the police in the event of the model being found. Details can be obtained from Home of 'O' Gauge, 528 Kingston Road, Raynes Park, London SW20 8DT; tel: 020-8540-8808. There is also a web site at www.ogauge.co.uk. This device may be of interest to all modellers. Among a lot of 'construction' articles in the journal is one detailing some experiments with fitting 'ringless' piston valves which provides a lot of information, no doubt also applicable to the larger scales. In the accompanying news-sheet, *Coupling Rod*, more comment is made about the new EU boiler regulations pointing out that the more complex documentation does not apply to all boilers; only the larger 5in. gauge engines and above seem to be affected. It is also suggested that if an individual flanges his own boiler plates and then gets a coppersmith to do the silver-soldering, that individual has legally built the boiler and so avoids the regulations. Others may have views on this topic which seems destined to run for some time. The association has a good programme of events for the year and these seem to be well attended. On the same note, a busy spring rally at **Romney Marsh MES** in May with many locos in steam is reported. Apparently on arrival they were met by a 60mph gale with a small autogyro being tossed around. This, however, soon eased and a good day was had by all (hopefully including the autogyro pilot). The locos in steam included a *Caterpillar* 4-12-2 driven by Simon Batten which hauled passengers during the day. Member Clive Young introduced his South American 4-8-2 which is under construction.

Progress is being made on the pending relocation issues at **Ascot Locomotive Society**. Negotiations with various authorities are



Our new Club News Editor from this issue, Malcolm Stride in his workshop with his Rail Motor, built in the style of an S14 but with a polished dome which he likes (but everyone tells him should be black)!

continuing, resulting in some conservation issues being raised, including the need to protect some newts which reside in a pond near the proposed track. This resulted in the society having to plot all trees over 75mm diameter on the plans, marking those which had to be felled. This of course all adds to the costs and effort needed by members. I wonder how the measurement was defined and what tolerance was acceptable? Some members travelled to the **Isle of Wight Society** open day and reported a pleasant day's running.

Formal driver training courses are being set up by **Birmingham SME** for all members who wish to take part. These will consist of a classroom session dealing with operational theories, a steaming bay session on preparing the locomotive, followed by a session covering driving on the track and correct disposal of locomotives. A certificate will be awarded. The club has a new President with Tony Sear taking over from David Shrimton. Plans for the new raised level station and re-alignment of Kineton Bank have been allocated funds, apparently after much discussion in the case of the bank re-alignment. Some trees have already been felled in preparation for the re-alignment. A detailed list of maintenance tasks was published; looking at this, members have certainly got plenty to keep them occupied for the season! For use by guards, members Peter Flavell and Alan Ruston have also been fitting brake controls to the coaching stock.

A competition has been organised to find a 'nice new catchy name' for the new home of **Bournemouth DSME** at Littledown. Work on the new site is making good progress with all track panels made and groundwork finished. Unfortunately

one of the concrete beams was broken by a digger being operated by a council contractor. This is a larger problem than anticipated because the moulds are no longer available. Track laying is progressing well and the station area has been dug and shuttered ready for concreting. The new turntable has been made and passenger vehicles are being redesigned and refurbished. A new kitchen has been fitted out complete with glazed patio doors which will apparently please the ladies.

The new carriage shed at **Bristol SMEE** is now operational, much to the relief of members who no longer have to carry the passenger carriages to the main line. It has been said that gravity has got much stronger over the years because the lifting seemed to get more difficult; this seems to be a common problem. Comment was made that a bad back, or a pulled muscle, is now no longer an excuse for not helping out! Member Richard Beel reported on the activities of a mouse which apparently took a liking to the drive belts on his model derrick crane prior to last year's exhibition. Preparations are under way for **IMLEC** at the Ashton Court site in July with a large team of members designated to organise the various activities for this event. The club had an interesting talk by Richard Pelham on American-built narrow gauge steam around the world. A good total of 1,054 passengers were carried on the first passenger hauling day in March. The club has had a review of site fire fighting equipment, resulting in a major update to the facilities and the setting up of an annual maintenance contract.

Notes on the **Bromsgrove SME** web site indicate that they have finalised the design for a new

signalling system to the extent of member Colin Gregory producing a demonstrable prototype. Work is to start on building and installing the system as soon as possible. It is intended that it will work with both colour light and semaphore signals.

Just in case this issue arrives early, readers are reminded that the **Chiltern Traction Engine Club** is holding a steam rally at The Hangings, Prestwood, Great Missenden, Buckinghamshire on 5-6 July. Details are available from John Turner on 01494-526807.

The latest issue of the **Gauge 1 Model Railway Association** magazine has some interesting articles which may be of interest to others. These include articles on steam turbine drive, electronic water gauges and a leakproof safety valve. Perhaps they could be submitted to this magazine? There is also the usual busy programme of events which this group enjoys. A

report from seven Swiss members described a holiday they took visiting various members' layouts in the UK including a drive from Staplehurst to Harrow via the centre of London — brave indeed!

Much work has been carried out on the ground level track at the **Isle of Wight MES** including a longer loop by the station and three more spurs on the turntable, one with a covered ash-pit described as "the finest in the Southern Federation." (others may care to comment!) Work has also been carried out on the club prefab. and some unwanted items have been disposed of. The club is inaugurating its new outdoor 45mm (gauge 1) layout this year. This has been likened to Stonehenge by its principal creator Brian Priestman. Mick Mills and Dave Edwards assisted Brian in building the layout.

Lancaster & Morecambe MES has a new secretary, John Mills, who can be contacted on 01943-467844.

The Wednesday Warriors have been tidying the garage at the **Reading SME** site which means that the water tank can be accessed without needing a 'First-Class Degree in Managing the Logistics of Obstacle Courses'. Progress is being made with the cabling for new signalling on the ground level track. Some new bogies have been completed for ground level trucks and these now await the bodies. The monthly engineering workshop lessons are continuing with one member awarding another's newly manufactured coal hammer '2 out of 10 for quality of finish'. This apparently prompted adverse comments about the level of knowledge of engineering excellence of 'ex-LMS' men. An interesting article on the Severn tunnel by the editor produced the statistics that 76,400,00 bricks, 36,794 tons of cement and 3,628 men were used during the construction. Progress

continues to be made on the new club '00' and '0' gauge layouts. Club members will also be busy doing birthday parties at the track and attending local fetes with the portable track during the summer.

A party from **Surrey SME** combined with the parishioners of St. Paul's Church, Hook on a visit to the Severn Valley railway where the visitors enjoyed seeing several locomotives including the rebuilt *Taw Valley* (now *Ottery St. Mary*) and the recently returned to steam Stanier Mogul 42968. The group had a guided tour of the locomotive works at Bridgnorth before departing to Kidderminster behind Ivatt Mogul 46443 followed by the coach ride home.

A London & North Western Railway themed steam up is being held by **Sutton Coldfield & North Birmingham SME** at their site on Little Hay Lane, Little Hay, near Shenstone, Staffordshire. This will

CLUB DIARY

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

JULY

- 11 **North London SME. Locomotive Section Barbecue & Running Evening at Colney Heath.** Contact David Harris: 01707-326518.
- 12 **Cardiff MES. Lord Mayor's Charity Day.** Contact Trevor Jenkins: 029-2075-5568.
- 12 **Maidstone MES. Invitation to Birchley, Biddenden.** Contact Martin Parham: 01622-630298.
- 12 **Reading SME. Club Running.** Contact Graham Bustin: 01189-615450.
- 12 **Romney Marsh MES. Track Meeting.** Contact John Wimble: 01797-362295.
- 12 **Talylyn Railway. Victorian Train.** Enquiries: 01654-710472.
- 12/13 **Bristol SMEE. IMLEC 2003.** Contact Don Cordall: 0117-962-4073.



Come to IMLEC 2003 at Bristol 12/13 July! Seen here with his LMS Jubilee 5XP Thunderer in IMLEC 2002 at Leeds, John Hurley will be masterminding IMLEC 2004 at Kinver & West Midlands. Make a note to be there!

- 12/13 **Chesterfield MES. Steaming at Papplewick.** Contact Mike Rhodes: 01623-648676.
- 12/13 **Dockland & E. London MES. Track Run at Weald Country Park.** Contact P. M. Jonas: 01708-228510.
- 12/13 **Kew Bridge Steam Museum. Festival of Model Tramways.** Information: 020-8568-4757.
- 13 **Canterbury DMES. Running.** Contact Granville Askham: 01227-463295.
- 13 **Cardiff MES. Chernobyl Children's Visit.** Contact Trevor Jenkins: 029-2075-5568.
- 13 **Harlington LS. Open Day.** Contact Peter Tarrant: 01895-851168.
- 13 **Hornsby ME. Running Day.** Contact Ted Gray: 9484-7583.
- 13 **Leeds SMEE. Running Day.** Contact Colin Abrey: 01132-649630.
- 13 **Leighton Buzzard NG Rly. Anoraks' Day.** Enquiries: 01525-373888.
- 13 **Nottingham SMEE. ModelWorks Rally.** Contact Gerry Chester: 0115-925-9096.
- 13 **Ottawa Valley Live Steamers. Steaming Day.** Contact John Bryant: 761-1109.
- 13 **Plymouth MSLS. Members' Running.** Contact John Brooker: 01752-671722.
- 13 **Romney, Hythe & Dymchurch Railway. Romney Express Day.** Information: 01797-362353.
- 13 **Surrey SME. Running.** Contact John Cook: 020-8397-3932.
- 13 **Sutton MEC. Barbecue & Family Day.** Contact Mike Dean: 0208-657-5401.
- 14 **Bedford MES. Meeting.** Contact Ted Jolliffe: 01234-327791.
- 14 **Erewash Valley MES. Steaming Evening & Barbecue.** Contact Jim Matthews: 01332-705259.
- 14 **Saffron Walden DSME. Club Night.** Contact Jack Setterfield: 01843-596822.
- 15 **Chesterfield MES. David Carnell: Bearings.** Contact Mike Rhodes: 01623-648676.
- 15 **Nottingham SMEE. Visit to Pleasley Pit.** Contact Graham Davenport: 0115-8496703.
- 15 **Romney Marsh MES. Track Meeting.** Contact John Wimble: 01797-362295.
- 15 **Taunton ME. Martin Wright: Get On Your Bike.** Contact Don Martin: 01460-63162.
- 16 **Bournemouth DSME. AGM & Richard Harvey: Sinshelm.** Contact Mike Baker: 01202-383653.
- 16 **Bristol SMEE. Monty Ellis: Letter to a Grandson.** Contact Trevor Chambers: 01454-415085.
- 16 **Historical MRS (North West Area). Gavin Liddiard: An Introduction to DCC.** Contact David Goodwin: 01224-880018.
- 16 **Maidstone MES. Members' Afternoon Playtime Run.** Contact Martin Parham: 01622-630298.
- 16 **West Wiltshire SME. Steam-Up.** Contact R. Nev. Boulton: 01380-828101.
- 17 **East Somerset SMEE. 5in. Gauge Track Evening.** Contact Roger Davis: 01749-677195.
- 17 **Isle of Wight MES. Bits & Pieces.** Contact Ken Stratton: 01983-531384.
- 17 **Leyland SME. What is it? Night.** Contact Mark Entwistle: 01772-422411.
- 18 **Canvey R&MEC. Locomotives on Parade.** Contact David A. Clark: 01375 846921.
- 18 **Rochdale SMEE. Visit to East Lancashire Railway.** Contact Mike Foster: 01706-360849.
- 18 **Steam LS of Victoria. Gathering.** Contact Graham Plaskett: (03) 9750-5022.
- 18-20 **Plymouth MSLS. Boconoc Rally.** Contact John Brooker: 01752-671722.
- 18-21 **Talylyn Railway. Have-a-go Gala.** Enquiries: 01654-710472.
- 19 **Chesterfield MES. Running Day.** Contact Mike Rhodes: 01623-648676.
- 19 **Erewash Valley MES. Steaming Day.** Contact Jim Matthews: 01332-705259.

take place on 28 September 2003 from 10am. Any visitors with L&NWR ephemera of any sort are welcome.

The newsletter of **Wigan MES** has an article describing an unusual engine which consisted of six fizzy drink cans attached to a board. This was placed close to a spotlight, the heat from which caused the whole thing to rotate. Each can contained a rubber balloon filled with water which was forced out of the balloon when the can nearest the spotlight warmed up. This caused an imbalance which resulted in the rotation. Apparently the idea was found on the internet! The club has recently had an interesting talk on hot air engines by Norman Reaney who provided several engines for demonstration and showed a video of a reversible hot air engine used in a boat. There is a growing interest in this type of power unit, presumably because it is an area in which original ideas can still be experimented with, which

no doubt suits a lot of us curious model engineers. The newsletter printed a very clear description of the principle of operation of such engines.

The society has also been given a new computer printer on extended loan to improve the printing quality of the newsletter after problems occurred with 'a sort of italic type creeping in' on the old printer. Such is the wonder of computers!

World News

Canada

The Easter running session of the **British Columbia SME** produced a good turnout of people, including some visitors from the USA. A number of members and their families sat down to a delicious Easter dinner on the Saturday evening organised by Catherine McDonnell. Progress is being made on a new canopy to protect passengers and trains on showery days which will also incorporate a passenger waiting 'maze'. The club

is to be congratulated as this year is their 75th anniversary year.

New Zealand

The members of **Canterbury SMEE** have recently been assembling prefabricated track and have so far assembled 850 metres with 2,550 sleepers. More track will be produced in the coming months. The boating section has some new members and a boat has been donated to be used to teach new members about operation of model boats. Some members of the boat section have also tried their hand at locomotive driving. The newsletter carries a report of two noteworthy incidents which occurred during public running, one in which a young mum did two laps while happily breast-feeding a child and another in which a passenger did two laps while reading a novel!

A question and answer session is planned at the **Auckland SME** at which members questions will be

answered by others in the club. Looking at the questions submitted so far, it could be a long evening because entire books have been written about some of the topics! A good selection of items was produced at the April Bits & Pieces night, including a turboprop aero engine reported to produce 7 1/2hp driving a 16 x 8in. propeller. Idling speed is a reported 58,000rpm. Some recipes for colouring steel circa 1907 were printed and the ingredients would certainly raise eyebrows in local chemists stores in the UK!

South Africa

A good programme of events is proposed for the **Centurion SME** including members' workshop visits and visits to the Johannesburg Society. The Christmas outing has already been arranged with instructions to book before the end of October. It is obviously not just the UK where Christmas seems to arrive earlier every year!

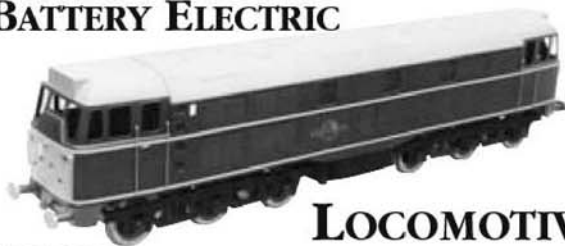
- 19 **Hull DSME. Members' Problems Solved.** Contact Brian Ryland: 01482-647032.
- 19 **Maidstone MES. Visit to Beech Hurst.** Contact Martin Parham: 01622-630298.
- 19 **Romford MEC. Track Afternoon.** Contact Colin Hunt: 01708-709302.
- 19 **Steam LS of Victoria. Club Run.** Contact Graham Plaskett: (03) 9750-5022.
- 19/20 **Guildford MES. Rally/Exhibition.** Contact Dave Longhurst: 01428-605424.
- 19/20 **Kinver & West Midlands SME. 24 Hour Charity Run.** Contact John Campbell: 01384-891244.
- 19/20 **Moors Valley Railway. Hornby Railways Weekend.** Contact Jim Haylock: 01425-471415.
- 19/20 **Romney, Hythe & Dymchurch Railway. A Day Out With Thomas.** Information: 01797-362353.
- 19/20 **Guild of Model Wheelwrights at Holkham Country Fair, Holkham Hall, Norfolk.** Contact Biddy Hepper: 01492-623274.
- 19/20 **Guild of Model Wheelwrights at Much Marcle Steam Rally, Herefordshire.** Contact Biddy Hepper: 01492-623274.
- 20 **Andover DMES. Rob Roy Day.** Contact R.W. Hanman: 01980-846815.
- 20 **Bedford MES. Running.** Contact Ted Jolliffe: 01234-327791.
- 20 **Hornby ME. Sailing Day.** Contact Ted Gray: 9484-7583.
- 20 **Leyland SME. Scale Running Open Day.** Contact Mark Entwistle: 01772-422411.
- 20 **Lincoln DMES. Running.** Contact Paul Thompson: 01522-888228.
- 20 **N. W. Leicester SME. Running Sunday.** Contact John Elliott: 01455-847040.
- 20 **Nottingham SMEE. Running.** Contact Gerry Chester: 0115-9259096.
- 20 **Oxford (City of) SME. Running.** Contact Chris Kelland: 01235-770836.
- 20 **Plymouth MSLs. Running.** Contact John Brooker: 01752-671722.
- 20 **Rugby MES. Running.** Contact David Eadon: 01788-576956.
- 20 **Saffron Walden DSME. Running Day.** Contact Jack Setterfield: 01843-596822.
- 20 **Taunton ME. Running.** Contact Don Martin: 01460-63162.
- 20 **York City & DSME. Running Day.** Contact Ken Bateman: 01904-421445.
- 21 **Lancaster and Morecambe MES. G. Guthrie: Panama Canal & New York.** Contact Harry Carr: 01524-411956.
- 22 **Basingstoke DMES. Meeting.** Contact Ian Shanks: 01420-561741.
- 22 **Romney Marsh MES. Track Meeting.** Contact John Wimble: 01797-362295.
- 23 **Hull DSME. Shep Watson & Wilson Trophies.** Contact Brian Ryland: 01482-647032.
- 23 **Oxford (City of) SME. Running.** Contact Chris Kelland: 01235-770836.
- 24 **Sutton MEC. Evening Steam-Up.** Contact Mike Dean: 0208-657-5401.
- 24 **Sutton Coldfield MES. Sutton Coldfield Railway Society Visit & Barbecue.** Contact Roger Timings: 0121-308-5875.
- 26 **Canvey R&MEC. Open Day.** Contact David A. Clark: 01375 846921.
- 26 **Hornby ME. Family Day.** Contact Ted Gray: 9484-7583.
- 26 **Rugby MES. Outing.** Contact David Eadon: 01788-576956.
- 26 **SM&EE. Disposal Sale.** Contact David Boote: 01202-745862.
- 26/27 **Doncaster DMES. Summer Festival.** Contact I. P. Tattersall: 01405-813131.
- 26/27 **Luscombe Valley Railway. Grand Charity Weekend.** Contact Richard Knott: 01202-709833.
- 26/27 **Oxford (City of) SME. Dreaming Spies Rally at Cuttleslowe Park.** Contact Chris Kelland: 01235-770836.
- 26/27 **Scottish Model Engineering Trust. Comrie Gala Running Weekend.** Contact Jeremy Bull: 01738-441975.
- 27 **Amnerfield Miniature Railway. Running.** Contact David Jerome: 0118-9700274.
- 27 **Bristol SMEE. Passenger Day.** Contact Trevor Chambers: 01454-415085.
- 27 **Cardiff MEC. Open Day.** Contact Trevor Jenkins: 029-2075-5568.
- 27 **Elmdon MES. Running at Wythall Transport Museum Open Day.** Contact Chris Giles: 0121-458-1291.
- 27 **Harlington LS. Open Day.** Contact Peter Tarrant: 01895-851168.

- 27 **High Wycombe MEC. Running.** Contact David Savage: 01494-527402.
- 27 **Leicester SME. Running.** Contact Raymond Wallace: 0116-2858824.
- 27 **Nottingham SMEE. Running.** Contact Gerry Chester: 0115-9259096.
- 27 **Ottawa Valley Live Steamers. Steaming Day.** Contact John Bryant: 761-1109.
- 27 **Staines SME. Running Day.** Contact Mike Kingham: 01932-788793.
- 27 **Surrey SME. Families Day.** Contact John Cook: 020-6397-3932.
- 27 **Wigan DMES. Open Day.** Contact John Chamberlain: 01744-882255.
- 27-28 **August Tallylyn Railway. Victorian Week.** Enquiries: 01654-710472.
- 28 **Bedford MES. Natter Night.** Contact Ted Jolliffe: 01234-327791.
- 28 **Canterbury DMES. Meeting.** Contact Granville Askham: 01227-463295.
- 28 **Hornby ME. Meeting.** Contact Ted Gray: 9484-7583.
- 29 **Bedford MES. Junior Training Day.** Contact Ted Jolliffe: 01234-327791.
- 29 **Chelmsford SME. Steam-Up Evening.** Contact D. Blake: 01378-324205.
- 29 **Romney Marsh MES. Track Meeting.** Contact John Wimble: 01797-362295.
- 30 **Oxford (City of) SME. Running.** Contact Chris Kelland: 01235-770836.
- 31 **Leyland SME. Kit Builders' Night.** Contact Mark Entwistle: 01772-422411.

AUGUST

- 1 **Vale of Aylesbury MES. Track Night.** Contact Clive Ellam: 01296-623433.
- 1 **Canvey R&MEC. Shunting Competition.** Contact David A. Clark: 01375 846921.
- 1 **Maidstone MES. Evening Run & Barbecue.** Contact Martin Parham: 01622-630298.
- 1 **North London SME. General Meeting.** Contact David Harris: 01707-326518.
- 1 **Portsmouth MES. Family Fun Night.** Contact John Warren: 023-9259-5354.
- 1 **Rochdale SMEE. Meeting.** Contact Mike Foster: 01706-360849.
- 1 **Romford MEC. Competition Night.** Contact Colin Hunt: 01708-709302.
- 1-3 **Pietermaritzburg MES. National Live Steam Meet.** Contact Charles Polkey: 0331 442586.
- 2 **Isle of Wight MES. Track & Pond.** Contact Ken Stratton: 01983-531384.
- 2 **Stamford MES. 21st Anniversary Event.** Contact David Ash: 01780-751211.
- 2 **York City & DSME. Summer Informal Meeting.** Contact Ken Bateman: 01904-421445.
- 2/3 **Dockland & E. London MES. Track Run.** Contact P. M. Jonas: 01708-228510.
- 2/3 **Nuneaton SME. Model Exhibition.** Contact Noel Green: 02476-387157.
- 3 **Andover DMES. Members' Running Day.** Contact R.W. Hanman: 01980-846815.
- 3 **Ascot LS. Members' Steam-Up.** Contact Ivan Hurst: 01276-28803.
- 3 **Bristol SMEE. Passenger Day.** Contact Trevor Chambers: 01454-415085.
- 3 **Erewash Valley MES. Visit to Peterborough Society.** Contact Jim Matthews: 01332-705259.
- 3 **Guildford MES. Running Day.** Contact Dave Longhurst: 01428-605424.
- 3 **Hornby ME. Sailing Day.** Contact Ted Gray: 9484-7583.
- 3 **Hull DSME. Dove House Running Day.** Contact Brian Ryland: 01482-647032.
- 3 **Leyland SME. Ground Level Running.** Contact Mark Entwistle: 01772-422411.
- 3 **Lincoln DMES. Running.** Contact Paul Thompson: 01522-888228.
- 3 **Maxittrak Owners Club. Maxittrak Owners Club Annual Rally.** Contact Eric Penn: 0208-979-4335.
- 3 **National 21zin. Gauge Ass'n. Locomotive Rally at Sutton Coldfield MES.** Contact Clive Young: 01233-626455.
- 3 **Nottingham SMEE. Miniature Railway Gala.** Contact Gerry Chester: 0115-925-9096.
- 3 **Oxford (City of) SME. Running.** Contact Chris Kelland: 01235-770836.
- 3 **Plymouth MSLs. Running.** Contact John Brooker: 01752-671722.
- 3 **Taunton ME. Running.** Contact Don Martin: 01460-63162.
- 3 **Guild of Model Wheelwrights at Horse Parade, Walsall Leather Museum, Walsall.** Contact Biddy Hepper: 01492-623274.

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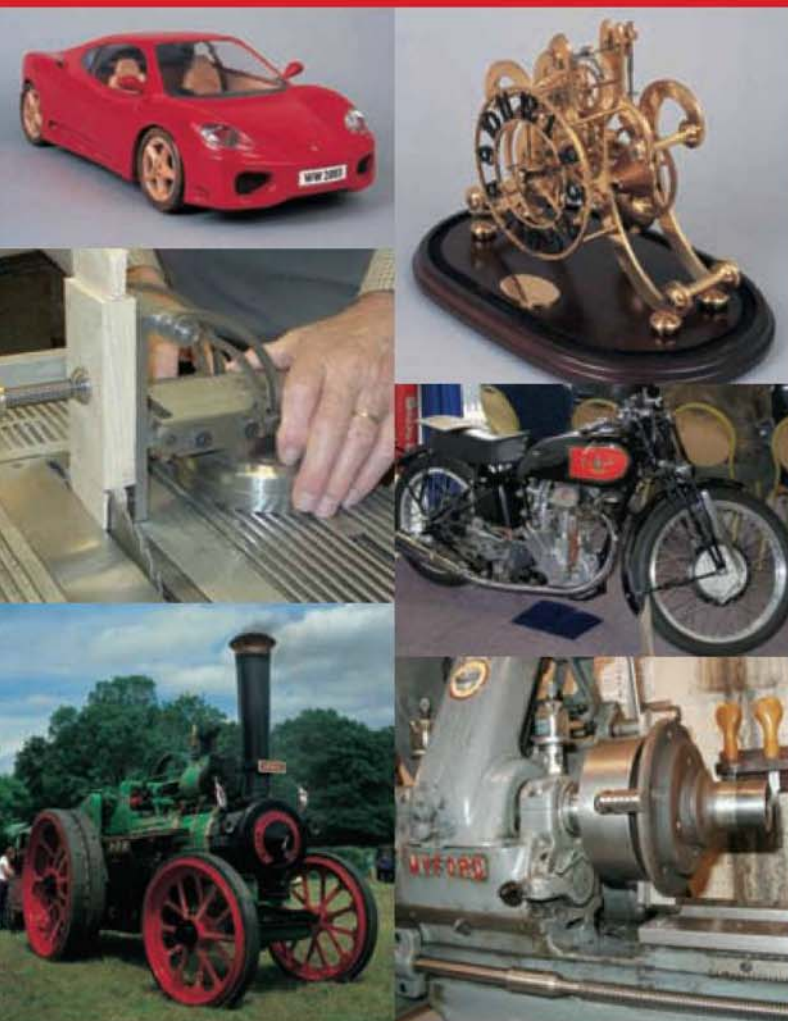
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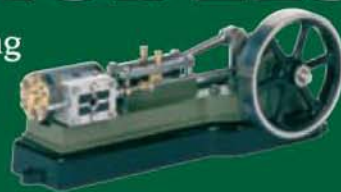
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MYFORD ML7 3 1/2" x 19", Tri-lever, changewheels, 3 jaw chuck, lever tailstock, cabinet stand	very clean £1,500
MYFORD ML7B 3 1/2" x 19", gearbox, 3 jaw chuck and tooling	£1,250
MYFORD SUPER 7 3 1/2" x 19", changewheels, 3 jaw chuck and tooling	Choice £950 - £1,150
MYFORD SUPER 7 3 1/2" x 19", 3 jaw chuck, power cross-feed	Choice £950 - £1,150
MYFORD SUPER 7 3 1/2" x 31", changewheels, 3 jaw chuck and tooling	Choice £1,400
MYFORD SUPER 7 3 1/2" x 31", (long bed) power cross-feed, induction hardened bed, industrial stand and doors, green machine	£2,950
MYFORD SUPER 7B 3 1/2" x 19", gearbox, 3 jaw chuck and tooling	£1,250
MYFORD SUPER 7B, 3 1/2" x 19", gearbox, Power Cross Feed, cabinet stand, tooling	£2,750
MYFORD SUPER 7B, 3 1/2" x 19", gearbox, Power Cross Feed, 3 jaw chuck and tooling on stand	£3,200
excellent condition from new and NOT re-conditioned	£1,200
MYFORD C7 CAPSTAN LATHE	£1,200
RAGLAN CAPSTAN 10" x 24" 6 Station Turret, cut of slide, collet chuck (lever) & collets, bar feed, variable speed, coolant	£950
SMART AND BROWN 1024 Tool-room lathe, full screwcutting gearbox and power feeds complete with 3 & 4 jaw chucks, collet set, steady and equipment	In very good condition £1,495
VICEROY TDS 1 GBL 5" x 24", gearbox, power cross feed, 3 MT tailstock complete with fixed steady	£1,250

TOO MANY LATHES TO LIST!!

MILLING MACHINES

ADCOCK AND SHIPLEY IES Horizontal/Vertical Head, 30" x 8" powered table and feed gears, coolant	£1,625
ADCOCK AND SHIPLEY 2ES horizontal milling machines	SELLING OUT FAST... a silly price of each £145
BOXFORD VM30 vertical variable speed 30" INT head, table 21 1/2" x 6" & Abwood vice and chuck	£1,500
BRIDGEPORT vertical belt head 2 speed (short motor) head, R8 powered head, gearbox table, 42" x 9" table	£1,650
CENTEC 2B Horizontal, 1" arbor, table powered, 3 ph motor, single phase main motor	£725
CENTEC 2B Vertical/horizontal, quill feed 2MT head, 25" x 5" table, pedestal model	£1,400
ELLIOT 90 OMNIMILL VHT 3 Morse taper quill universal head, 28" x 7 1/2" powered table	Just In £1,850
ELLIOT Turret mill R8-10 speed 70-3000 rpm, table 45" x 10" (powered)	£1,500
HARRISON horizontal, 31" x 8" powered table	still good value £625
HARRISON HV 30 INT swivel head & clutch, 30" x 8" table/powered	£1,650
HARRISON Vertical 30 INT swivel head & clutch, 30" x 8" table/powered	£1,650
MARLOW VERTICAL TURRET TYPE MILL, 3 Morse Taper. A favorite mill for its height under the head	£750
RAGLAN vertical mill 2 Morse taper, 2 speed motor, variable selector 175-2220 rpm, stand	give away £750
RIGHTON vertical bench milling machine, 2 MT head quill type, speeds:175-2220rpm, 24" x 6" table/powered	£3,250
SIP RF30, vertical milling/drilling machine complete with accessories	Still only and New £799
TOM SENIOR MODEL E vertical mill complete with cabinet stand	single phase and rare £2,650
TOM SENIOR MODEL E vertical mill complete with cabinet stand	single phase and rare in excellent condition - Tom Senior swivel vice and geared conversion gear, one meticulous owner from new - must see good home
TOM SENIOR JUNIOR horizontal mill with a vertical head (sleeve to be made), table 20" x 4 1/2", powered	£1,200
TOM SENIOR M1 horizontal, 25" x 6" powered table, 1" arbor	£575
TOM SENIOR M1 V.H., 25" x 6", 2 Morse taper, 1" arbor	Selection £1,200 - £1,450
TOM SENIOR M1 V.H., 25" x 6", 2 Morse taper, 1" arbor	very late 240 volt machine £1,950
TOM SENIOR ELT MAJOR, 2 Morse taper quill feed head, powered 37" x 8 1/2" table in	£3,200
VICEROY AEW vertical mill, 30 INT swivel head, powered table 34" x 8"	Very clean £1,625

DRILLS

ARBGA ER 25 / 25" Radial Drill speeds (8) 100-2900 RPM	clean table £1,425
ASQUITH 14-54 001 Mk2 (5m) Radial Drill	£3,950
FOBCO 1/2" Bench, tilting table	£325
FOBCO 1/2" Pedestal drill tilting table	£345
MAS RADIAL DRILL	COMING IN
MEDDINGS 1/2" pedestal drill	£245
MEDDINGS 2 Morse taper pedestal drills (new type lighter drill)	Choice £275
MEDDINGS 2 Morse taper quill bench drills	Choice only (each) £325
POLLARD CORONA Pedestal 1/2" Morse	From £100
SIP HDP 600B 1/2" 2MT Bench Drill, table operated by rack, speeds: (16) 162 - 3000 rpm	New £175
STARTRITE Mercury 1/2" 4 speed bench drill	£225

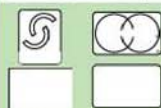
GRINDING / BUFFING

BRIELEY drill point grinder complete with cabinet stand and parts	£375
CLARKSON MK1 Tool and cutter grinder complete with universal head and centres	JUST IN £350
J & S SURFACE GRINDER	COMING IN
MILFORD 12" Pedestal Grinder	£325
VICEROY Grinder, pedestal model	£145
VICEROY Buffers, pedestal models	Each £250

MISCELLANEOUS / FABRICATION MACHINERY

OLIVER 4FT BOX AND PAN 14G	COMING IN
CLARKSON drill and tap lead grinding attachment in nice condition	£425

JONES AND SHIPMAN wheel balancer as new condition	£325
MAYSMITH CYLINDRICAL attachment for any grinder in as new condition	£475
MARCO INDEXING COLLET FIXTURE + collets	£75
MITUTOYO 7-8", 9-10", 10-11", 11-12" micrometers just in	EACH just £45
ABWOOD SWIVEL/TILT 4" vice in all round good condition	£245
ABWOOD SWIVEL/TILT 6" vice in all round good condition	£375
CLARKSON DRILL POINT grinding attachment in nice condition	£425
CLARKSON RADIUS MK1 grinding attachment in nice condition	BOXED £345
New from New Zealand: Machine vice, 55mm. Jaws precision miniature type ideal for vertical slides and smaller milling machines such as BCA now with the swivel base	£134
Vice on own	£85
Swivel base on own	£49
CROMPTON PARKINSON 3/4 HP, resilient mount, Boxford / Myford Super 7 Type motor	New £140
MYFORD RODNEY HEAD MILLING HEAD FOR the Myford ML7 lathe	£575
MYFORD TRI-LEVER for the Myford ML7	£245
MYFORD DIVIDING HEAD in very nice condition	£395
MYFORD CAPSTAN ATTACHMENT new and never bored for the lathe so unused	£750
HOFFMAN DIVIDING HEAD complete with tailstock	£425
LPA 25, 40 INT boring head	£375
ARCHER tapping heads	FROM £70
HARE MODEL 51T complete with hydraulic indexable table	just £425
EMI-MEC SPRINT spindles and collets, BSA No.48 direct spares	just in £425
SWEENEY AND BLOCKAGE NO.2 flypress complete with ball	very clean £225
MARCO notch broaching fixture + notch broach	£425
HARCOS universal head for tool and cutter grinder	£245
MYFORD vertical slides just in	£95 / £155
MYFORD VM-D milling attachment for ML7 and super 7 lathes	as new £675
BCA 12" horizontal / vertical rotary table	very nice £425
QUANTITY of slips, height gauges, squares, straight edges, micrometers, cubes, angle plates and miscellaneous measuring tools	just in
COPE AND DRAGS	WOOD £20 / METAL £30
TONGS (a varied selection)	EACH £5
FLAMEFAST DS 130 ceramic chip forge	£345
FLAMEFAST DS 100 hearth	£140
JONES AND SHIPMAN 4" x 24" bench centres	very nice example £245
TOM SENIOR setting head	£475
STARTRITE 18-5 Woodworking / non ferrous bandsaw (5 speed bandsaw)	£350
DIAMOND fret saw, variable speed	£345
RJH BT 125 Fretsaw, variable speed	£345
SMART AND BROWN / CLARKSON HS-H5 toggle presses	Each £195 / £275
VERDICT CLOCKS, Long Short Metric and Imperial models	New £40
FLAMEFAST LD300 soldering iron stove	£75
GRANITE 18" x 12" Surface Plate	£140
VIBROSHAR Nibbler	Just in £425
TRIUMPH BURNED 4 Jaw Chuck	£245
TRIUMPH FACE PLATE D14	£70
SIP 7" bandsaw, horizontal & coolant	New £750
DUPLEX D29 toolpost grinder	£345
BOXFORD (imperial only) thread dial indicator	£65
VANCO, 1" finisher / vertical + extractor	£495
BURNED, D14 lever collet chuck + collets	£400
BURNED, L0 lever collet chuck + collets	£400
VERTEK Dividing head	New £245
VERTEK 6" 8" 10" rotary tables	good value equipment New From £135
MYFORD ML7 Super 7 rear tool post	£40
MYFORD 25-44 rear tool post	New £40
MYFORD Vertical slide / fixed type (copy)	New £99
LOCKWOOD quad headed 2mt Die Holder	quality equipment New £40
LOCKWOOD quad headed 3mt Die Holder	quality equipment New £40
LOCKWOOD Test Bar / 2mt Boxed	quality equipment New £39
MAGNETIC cutter - 18" x 6" fine pole	Never used £325
UNION tool and cutter grinder stand	£135
50 INT Tooling: Selection	Just in
STARTRITE 352 woodworking band saw	£975
STARTRITE 14-S woodworking band saw	£775
ALCOFA GF 0801 Rapid Melting Furnace	£300
MYFORD Burned Gripus 3 Jaw Chucks	Boxed £225
COLCHESTER D13 Burned 4 Jaw 8" light body independent chuck	one off £225
RJH 4" Linisher / Vertical complete with built in extraction	£625
MICROMETERS and associated measuring tools	Still packaged as new
POTTERY WHEELS, kilns and associated equipment	Just In Cheap
SPECAC Powder type press	£225
HARRISON L6 metric gearbox	As is £250
SIP 1 TON MOBILE CRANE Manufactured 2000 (used just once)	£375
MITUTOYO grade A set of slips	As new £245
F.J. EDWARDS 24" hole cutter	£525
F.J. EDWARDS 12" GULOTINE	£525
Large bench vice	£70
LINK 1.5 ton vehicle crane + top hat	£625
MITUTOYO 103-913 metric set micrometers	£275
NORTON / EDWARDS arbor presses	£75 / £145
AJAX 6" hacksaw	£425
SURFACE plates from 12" x 12" to 36" x 36"	Very nice from £30
WEBER 11/2 ton mobile garage crane, late blue colour	£495
ELLIOTT 1250 STURDIMILL vertical head	One off (rare) £525
RJH 1/2" wide belt, pedestal	£345
STEEL STOCK different stock rolling in almost daily	to callers only
ELLIOT U1 / U2 Slitting Head	£475
SWAGE BLOCKS	£125 / £145
J & S Universal grinding vice	Choice £275 / £325
BOX TABLES: Grade A and B, many sizes	£40 - £150
SLIPS / GAUGES Metric / Imperial, New Sets: 87 / 81 piece	£215 / £145
HORIZONTAL METAL BANDSAW 6" x 4 1/2" capacity	New £170
COLCHESTER STUDENT / MASTER Round head, face-plates, small / large	£50 / £80
QUALTERS and SMITH 6" Hacksaw	£345
BORING HEADS 2 / 3 Morse, R8 Taper, Max. Capacity 4 1/2" round bar	New, each £90
ODONI Machine Bed Clamps (pair)	Special £24.50
HEIGHT GAUGES by Chesterman, Shardlow, Moore and Wright	From £95
DIE BOXES	From £45
TRANSWAVE 3HP Converter	New £295
TRANSWAVE 5.5HP Converter	New £385
TRANSWAVE MT & RT rotary converters	From £485
CROMPTON PARKINSON 3/4 HP, resilient mount, Boxford / Myford Super 7 Type motor	New £140



**WE ARE CONSTANTLY CHANGING OUR STOCK FASTER
THAN THE ADVERTS CAN KEEP UP WITH US!!**

**PLEASE PHONE 020 8300 9070 TO CHECK AVAILABILITY OR TO OBTAIN OUR LIST
DISTANCE NO PROBLEM!! DEFINITELY WORTH A VISIT ALL PRICES EXCLUSIVE OF V.A.T.**

Sole suppliers
of the Stanier precision
miniature machine vice
(50mm jaws) £134 + Vat
including swivel
base

- 2-Axis DRO from **£615** inc vat
- Made in the UK
- 5 year No-Fault Warranty
- 10 micron Accuracy

Conquest Lathe

NOW INCLUDES TEST CERTIFICATE



£395

VARIABLE SPEED
STANDARD ACCESSORIES
• 80MM 3-JAW CHUCK • Q.C.T.P. WITH 3 TOOL HOLDERS
Price includes VAT & Delivery*



Chester
Open Days
24th-26th July

920 Lathe Deluxe

- SWING OVER BED: 229MM
- SWING OVER CROSS SLIDE: 133MM
- DISTANCE BETWEEN CENTERS: 500MM
- SPINDLE BORE: 19MM
- TAPER IN SPINDLE NOSE: MT3
- MOTOR: 1/2HP
- 6 SPEED: 100-1800RPM
- NET WEIGHT: 100KG

STANDARD EQUIPMENT:
• 4" 3-JAW CHUCK WITH 2 SETS OF JAWS
• 7" 4-JAW CHUCK WITH REVERSIBLE JAWS
• STEADY REST • FOLLOW REST
• MT2 DEAD CENTRE
• MT3 DEAD CENTRE
• 4-WAY TOOL POST
• FACE PLATE
• TOOL BOX & TOOL KIT
• TRAY & SPLASH GUARD



£699

Price Includes VAT & Delivery*

Model B-Super

- SWING OVER BED: 420MM
- DISTANCE BETWEEN CENTERS: 500MM
- MILL DRILL SPINDLE TAPER: 19MM
- TAILSTOCK BARREL TRAVEL: 80MM
- 7 SPEEDS: 160-1360RPM
- SWING OVER CROSS SLIDE: 160MM
- SPINDLE TAPER: MT3
- DRAW BAR: M12
- CROSS SLIDE TRAVEL: 180MM
- MOTOR: 1/2HP
- NET WEIGHT: 155KG
- STANDARD EQUIPMENT
• 4" 3-JAW CHUCK
• 2 DEAD CENTERS
• 1/2 DRILL CHUCK
• CHANGE GEARS
• MT3 CHUCK ARBOR



£699

Price Includes VAT & Delivery*

Centurion

- SWING OVER BED: 420MM
- DISTANCE BETWEEN CENTERS: 520MM
- MILL DRILL SPINDLE TAPER: MT3
- TAILSTOCK BARREL TRAVEL: 80MM
- 7 SPEEDS: 160-1360RPM
- SWING OVER SADDLE: 160MM
- SPINDLE TAPER: MT3
- DRAW BAR: M12
- CROSS SLIDE TRAVEL: 200MM
- MOTOR: 2 x 1/2HP
- NET WEIGHT: 230KG
- STANDARD EQUIPMENT
• 4" 3-JAW CHUCK
• 2 DEAD CENTERS
• 1/2 DRILL CHUCK
• CHANGE GEARS
• MT3 CHUCK ARBOR



£1100

Price Includes VAT & Delivery*

Champion Mill

- DRILLING CAPACITY: 20mm
- END MILL CAPACITY: 25mm
- FACE MILL CAPACITY: 63mm
- TABLE SIZE: 150x630mm
- NUMBER OF SPEEDS: 4
- SPEED RANGE: 400-1640RPM
- SPINDLE TAPER: MT3
- TILTING HEAD: 90° Left & Right
- MOTOR: 1/2HP

From

£585

Price Includes VAT & Delivery*



STANDARD ACCESSORIES

- 1-13MM DRILL CHUCK & ARBOR

Eagle 25 Mill/Drill

- MILL/DRILL CAPACITY: 25MM
- TABLE SIZE: 190 x 585MM
- FINE FEED
- NUMBER OF SPEEDS: 12
- SPEED RANGE: 100-2150RPM
- SPINDLE TAPER: MT3
- SPINDLE TRAVEL: 100MM
- MOTOR: 1HP

Price

£699

Price Includes VAT & Delivery*



STANDARD ACCESSORIES

- 1-13MM DRILL CHUCK & MT3 DRILL CHUCK ARBOR
- EAGLE FACE MILL CUTTER
- T3 TILTING VICE
- M12 DRAWBAR
- NVR SWITCH GEAR
- INTERLOCKED CHUCK GUARD
- MANUAL AND PARTS LIST

Eagle 30 Mill/Drill

- MILL/DRILL CAPACITY: 32MM
- TABLE SIZE: 210 x 740MM
- FINE FEED
- NUMBER OF SPEEDS: 10
- SPEED RANGE: 80-2300RPM
- SPINDLE TAPER: MT3
- SPINDLE TRAVEL: 130MM
- TILTING HEAD
- MOTOR: 1HP
- HIGH/LOW GEARBOX

Price

£899

Price Includes VAT & Delivery*



STANDARD ACCESSORIES

- 1-13MM DRILL CHUCK & MT3 DRILL CHUCK ARBOR
- EAGLE FACE MILL CUTTER
- V100 MACHINE VICE
- M12 DRAWBAR
- NVR SWITCH GEAR
- INTERLOCKED CHUCK GUARD
- MANUAL AND PARTS LIST

626 Turret Mill

- MILLING CAPACITY: 25MM
- DRILLING CAPACITY: 32MM
- TABLE SIZE: 152 x 740MM
- FINE FEED
- NUMBER OF SPEEDS: 9
- SPEED RANGE: 190-2100RPM
- SPINDLE TAPER: MT3 OR R8
- TILTING HEAD
- MOTOR: 1 1/2HP

Price

£1340

Price Includes VAT & Delivery*

STANDARD ACCESSORIES

- ONE SHOT LUBRICATION
- HALOGEN WORK LIGHT
- MACHINE STAND
- DRAWBAR
- MANUAL AND PARTS LIST



Craftsman Gap Bed Lathe

- SWING OVER BED: 300MM
- SWING OVER GAP: 450MM
- SWING OVER SADDLE: 170MM
- DISTANCE BETWEEN CENTERS: 570MM
- SPINDLE BORE: 36MM
- SPINDLE NOSE TAPER: MT5
- CROSS SLIDE TRAVEL: 150MM
- COMPOUND TRAVEL: 89MM
- TAILSTOCK BARREL TAPER: MT3
- TAILSTOCK BARREL TRAVEL: 92MM
- RANGE OF SPEEDS: 50-1250RPM
- MOTOR: 1 1/2 HP
- NETWEIGHT: 398KG

STANDARD EQUIPMENT:

- 6" 3-JAW CHUCK WITH 2 SETS OF JAWS
- 8" 4-JAW CHUCK
- STEADY REST
- FOLLOW REST
- STAND
- FACE PLATE
- SPLASH GUARD
- THREADING DIAL
- 4-WAY TURRET TOOL POST
- 3MT DEAD CENTERS
- T-SLOTTED CROSS SLIDE
- HALOGEN WORK LIGHT

£1550

Price Includes VAT & Delivery*



Super LUX Mill

- MILLING CAPACITY: 25MM
- DRILLING CAPACITY: 32MM
- TABLE SIZE: 240 x 800MM
- FINE FEED
- NUMBER OF SPEEDS: 6
- SPEED RANGE: 95-1600RPM
- SPINDLE TAPER: MT3
- TILTING HEAD
- MOTOR: 1 1/2HP

Price

£1500

Price Includes VAT & Delivery*

STANDARD FEATURES

- POWERED HEAD ELEVATION
- CAST IRON STAND
- ANGLE TILTING HEAD
- MANUAL AND PARTS LIST

