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Vol. 201

No. 4333

29 August – 11 September 2008

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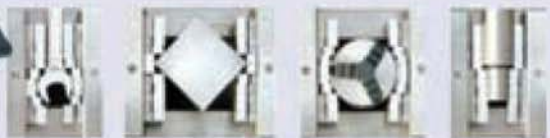
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ON THE COVER...

The IMLEC winner for 2008 was Brian Remmant, here seen pulling away to begin his run. This well-organised event was lashed by rain punctuated by bright patches of fleeting sunshine. In short: It was a great event held in 'typical' summer weather! Our coverage begins on page 253.

(Photograph by Michael Jones)

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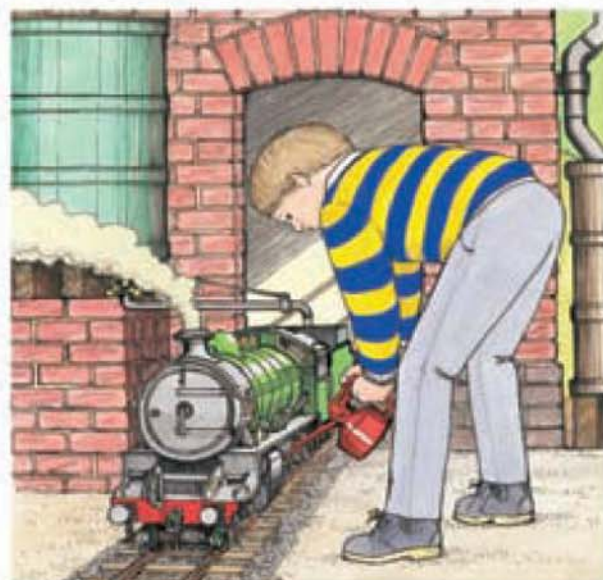
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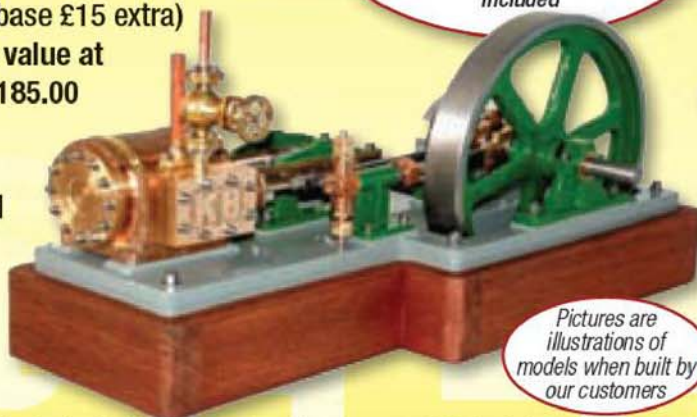
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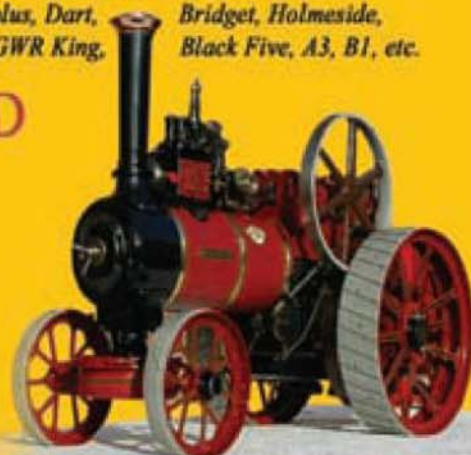
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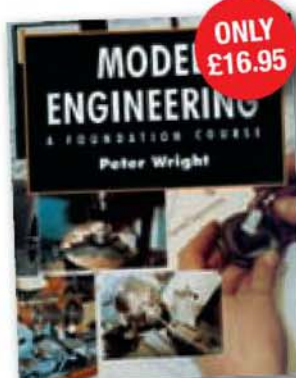
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to meet Para Handy, Dougie the Mate, Macphail the Engineer and Sunny-Jim (the 'Boy') and, of course, 'The Finest Ship in the Coastal Trade'. Eighty-one of the tales appeared in three books, and all of these, plus a further nineteen which only appeared in the *News* are included in the first book. This is a 435 page paperback, with extra notes and 31 B&W photos of Clyde life around 100 years ago when the series first started. The second book is an altogether grander affair, illustrated with lovely paintings by Hamish Haswell-Smith, but only contains the twenty five stories of the very first book. This has 154 large format pages and is hardbound. Whichever you choose, a great read awaits!



Last of the Puffermen • McGinn • £11.45

Subtitled 'The real world of Para Handy', this is one man's story of his life as a pufferman, from starting as a deckhand in 1966 on one of the traditional 66-ft 'classics' up to the end of the trade in 1994, by which time he was the Master on a 600-tonne coaster. Keith McGinn does not glamourise the pufferman's life, or the trade, but his story is full of good humour, and the camaraderie of the puffermen; nor does he minimise the tragedies and dangers of a life on some of the most treacherous waters in the world. A great read! 134 pages. 28 B&W photos. Map. Paperback.



Puffers • Hutton • £ 8.24

Here are 56 B&W photos, a fair few full page, of Puffers in all their grimy glory from the 1880s on the Forth & Clyde Canal, up to the present with just VIC 32 operational, but with the majority of the pictures dating from the 1930s to the 1960s. These and the extensive captions are very informative, and frequently a reminder of just how vulnerable even good sea-boats were to disaster on Scotland's west coast. Well done, 48 page, landscape format paperback.



Model Engines and Small Boats
• 1898 • Hopkins • £ 7.90

If Tubal Cain had written *Building Simple Model Steam Engines* 100 years ago, it might have looked something like this book, although the engines and boilers described here are intended to be built without machine tools. Both oscillating and slide valve engines are covered, and the designs are clever, as are those for the boilers, even if nowadays we would use silver, rather than soft, solder. Also included are 18 pages on hull design and construction methods. 74 pages. 50 drawings, 2 other illustrations. This may be old 'puffer' type technology, but it could form the basis of some interesting models. Paperback.



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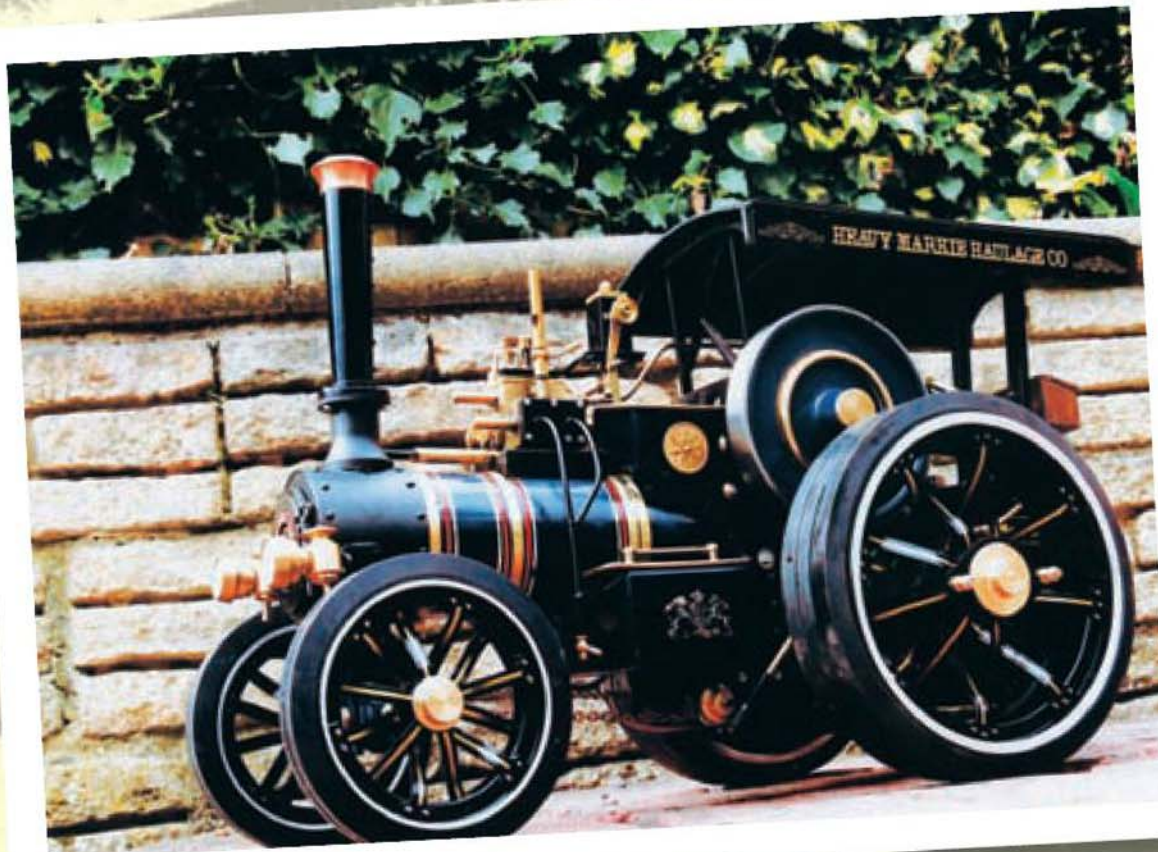
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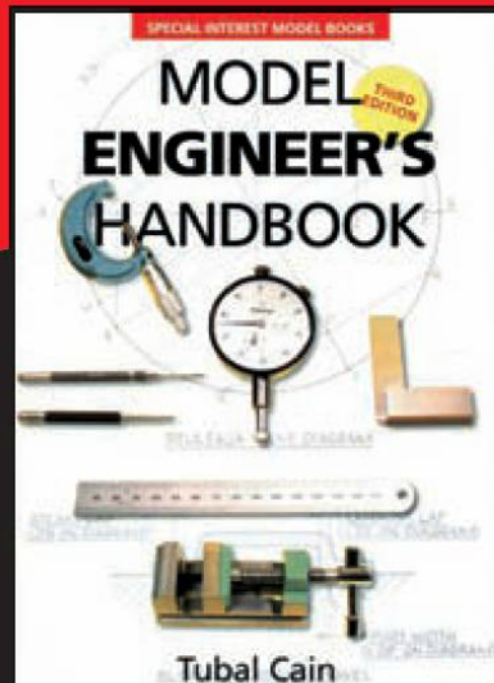
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The 'Curly' Bowl: 7 Sep

The LBSC Memorial Bowl ('Curly Bowl') takes place on Sunday 7 September 2008 at the Sutton Coldfield Model Engineering Society's track at Balleny Green. It's a good chance to see some of the best examples of locomotives to Curly's words and music. Although there is a competition element, this is mostly a fun day for model engineers.

The Balleny Green site is located in the hamlet of Little Hay, north of Sutton Coldfield, south of Lichfield and close to the village of Shenstone. The A38 and M6 toll roads lie to the east, the A5 just to the north and the A5127 to the west. See *M.E.* 4330, 18 July 2008 for a map.

Our Model Engineer Exhibition bus

With so much going on this year we will operate a shuttle bus. It will stop at:

- Ascot Railway Station

- The Model Engineer Exhibition entrance at Ascot Racecourse
- The Sinsheim track
- Caravan, camping and campervan area
- Ascot Locomotive Society

Bring your locomotive

You are welcome to bring locomotives (steam, electric, I/C, even pedal power) wagons and carriages to run on the track. However, you must book in advance, and have suitable paperwork (current boiler certificates). Drivers will receive a complementary ticket to the exhibition for each day of running they request. Use the entry form on this page. Overseas locomotives and drivers are welcome, too!

Caravan parking

Those wishing to come by caravan are welcome from Wednesday lunchtime to Monday morning. There is plenty of space in Car Park 10 off Winkfield Road, so there is no need to book. Just show up and report to George Bryant who will be on site from Wednesday noon. Water, rubbish collection and toilets are available. The Ascot Locomotive Society will be your neighbour and will be serving refreshments in the mornings.

Lectures

The Society of Model and Experimental Engineers will be busy again with a large, active presence at the exhibition. Lectures will be held in purpose made meeting rooms within the Ascot Racecourse, which can each comfortably accommodate audiences of 70 with full audio visual support. Allow some time to attend these popular talks. A list of topics and times will be published in the next *Model Engineer*.

Visit Kempton Park and the Exhibition

There is package tour organised around the Model Engineer

Exhibition, too, which features an exclusive evening tour of the Kempton Great Engine Trust, home of the world's largest fully operational triple expansion steam engine the Sir William Prescott. Some of the editors of *Model Engineer* will be there, too. Also included are one night's hotel accommodation with a full English breakfast, a day pass for the Model Engineer Exhibition in its 101st year and all coach transfers.

Prices start from £89, all inclusive. For more details on this two-day tour: T. 0844 391 2125.

Tickets

With so much on, you might need a few days to see it all. One and two-day tickets are available on-line at the Model Engineer Exhibition website, www.model-engineer.co.uk Because tickets can be delivered electronically, you can order up until a week beforehand.

Club stands

Don't let your club be the one that couldn't get a spot at Ascot. A few club stands are still available, but they're going quickly. We can help with expenses, too. To discuss your needs and for further information, contact:

Lou Rex
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9 Tranmore Lane
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East Yorkshire
DN14 0PR
T. (works) 01977 699669,
(home) 01977 661998,
(mobile) 0787 6452816 (up to 10pm)
E. lourex@btinternet.com

Erratum

In *Smoke Rings M.E.* 4331, 1 August 2008, we incorrectly identified a Speedy locomotive. The one shown actually belongs to David Mayall. Our apologies for the mix-up. Jim Elliot's is based on the 'Speedy' design but not the same colour.

INTERNATIONAL MODEL ENGINEER EXHIBITION 2008 STEAM AT ASCOT ENTRY FORM

To enjoy the 2.5km of 5in. gauge ground level railway track from Sinsheim please complete the form below (photocopies are fine) and send it to:

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- ☐ FRIDAY 19 September
☐ SATURDAY 20 September
☐ SUNDAY 21 September

Brief details of entry(ies)

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NOTE

It will be possible to bring vehicles direct to a steaming bay to unload/load. Naturally, current boiler certificates and insurance will be required. It would be helpful if you could send a photo of your entry(ies) for inclusion in our programme.

Exhibition opening hours

Friday 19th and Saturday 20th September	10am - 5pm
Sunday 21st September	10am - 4pm

A model engineer's thoughts on ecology

SIRS, - We are often told that electric battery-powered cars emit no carbon dioxide, the dreaded 'greenhouse' gas. Whilst this is true of the cars themselves it seems to be conveniently forgotten (or deliberately ignored) that unless the user has a wind-powered charging system the power for charging the battery must be obtained from the electricity produced by burning coal, which does, of course, release carbon dioxide.

Have you wondered how petrol and electric cars compare? I did.

From the internet I found the following:

- 1) Of the energy from burning petrol in a motor car engine, only 25% is available at the wheels to overcome friction, and air resistance etc. The other 75% is lost as heat in the cooling system and exhaust.
- 2) Petrol has a calorific value of 19,000 British Thermal Units per lb weight
- 3) Petrol has a density of 7.3lb per gallon

Imagine a car travelling for 1 hour at a speed of 40mph with a fuel consumption of 40mpg and thus using 1 gallon (i.e. 7.3lb) of petrol.

Petrol is largely consists of octanes, the general formula C_8H_{18} being about 84.2% carbon, so that 1 gallon contains $7.3 \times 84.2/100 = 6.15$ lb carbon.

The chemical equation for burning carbon-to-carbon dioxide is: $C + O_2 = CO_2$

This shows that 1 gallon of petrol per hour burns to produce $6.15 \times 44/12 = 22.5$ lb of carbon dioxide per hour [using the molecular weights of carbon (12), and carbon dioxide (44)].

The energy at the wheels is thus $7.3 \times 19000 \times 25/100 = 34675$ BTU per hour which is equivalent to 13.6 horsepower.

I think it is a reasonable assumption to say that all

cars of the same shape, size and weight travelling at the same speed would require the same amount of energy at the wheels, regardless of the type of power unit.

Also from the internet:

- 1) An electric motor of this size is about 85% efficient in converting electrical power into work.
- 2) The optimised charging efficiency of a lead acid battery (charge power to discharge power) is about 70%.
- 3) A good coal-fired power station is about 36% efficient in converting the heat available from coal into electricity.
- 4) The calorific value of coal is in the range 8000 - 13000 BTU/lb (I'll use the higher figure)
- 5) Coal contains about 80% of carbon

So imagine the same car travelling at 40mph for one hour, but this time using a lead acid battery powered electric motor.

The energy required from coal per hour at the power station is: $34675 \times 100/85 \times 100/70 \times 100/36 = 161900$ BTUs per hour and hence $161900/13000 = 12.4$ lb coal per hour.

At 80% carbon and using the chemical equation above then the carbon dioxide emission is: $12.4 \times 80/100 \times 44/12 = 35.3$ lb of carbon dioxide per hour

This is about 50% more than the petrol-driven car

So stick to your gas-guzzlers chaps. They're less polluting than electric cars.

I wonder how it will work out for hydrogen fuelled I/C engines and hydrogen fuel cells powering electric motors. The only satisfactory method of producing hydrogen is by electrolysis. Another internet search required!

Glynn Hughes, North Yorks.

Photography in public

SIRS, - Further to the letter (M.E. 4325, 9 May 2008) by Clive R. Young regarding his experiences when trying to take photographs in public places, your readers may find the following web page of use/interest: <http://tinyurl.com/5ygl5>

Jonathan Edwards, by e-mail.

Concave screw heads

SIRS, - Regarding the letter (M.E. 4325, 9 May 2008) from Mr. G. Dunn commenting on Grandpa's note about his idea for concave screw heads, sorry nothing is new. Screws of this type are known as binding head screws they were an American spec. and had unified threads. When I worked for a multinational computer company they were widely used on mainframe computers in the 1960/70s, see attached photo. They are listed in *Machinery's Handbook*. There is a note stating that the recessed head is optional and must be specified when ordering. I understand that their use was justified in the computers to meet the specified vibration and drop tests which were part of stringent quality requirements.

Nigel McBurney, Hampshire.

The concave screw heads referred to by Nigel McBurney.



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Responses to published letters are forwarded as appropriate.

Model engineering - homemade or store bought

SIRS, - It was with particular interest that I noticed the photo of the Stuart Tank M5A1 in the article about the Brighton Model World 2008 in (M.E. 4322, 28 March 2008). I have one just like it; in fact it is exactly the same, right down to the serial number on the side, the last six numbers of which are 047999. Now I'll concede to a few minor differences - like the Commander looking out from the turret, and a few sand bags here and there, and a coil of wire - but in all other respects the tank in photo is exactly the same as mine; Exactly!

So it might have been that we both built our tank from the same drawings, or we might have made them from the same kit of parts; but no, we both bought our finished working plastic model from a toy store - or possibly even a model shop.

Don't get me wrong - it is a magnificent model, complete, and realistic in every detail. It is radio controlled with separate motors for each track and the turret rotates left and/or right. It also remotely launches a 'rocket' projectile from the turret cannon with the accompanying 'recoil' as the weapon is fired. Then it has an exquisite array of built-in sound effects including the start-up and tick over of the classic diesel engine, the roar of the diesel engine as the tank moves and the turret rotates, not to mention the sound of optional machine-gun fire. Yes, it is a wonderful model and will delight any model enthusiast. But it is a mass-produced model; so is it model engineering?

Well in my humble opinion it certainly is model engineering and, in some respects, at its very best. The obvious and important difference is that it is not created by someone professing to be a classic model engineer. Could a model engineer create such a model - obviously, but in this case - not so. My 'plans' for the tank include a realistic trailer with a large 12V battery

and a self-starting gas driven generator, and a remote audio-video camera mounted on the turret transmitting a signal to a receiver connected to my lap top, whereby I can visit with my neighbours or check my boundaries from the luxury of my hammock.

I think there is room in the world of model engineering to recognize and applaud the commercial model engineer; perhaps in a new class or classes; i.e. - "marketed manufactured production scale models". Such models could be judged in all the usual criteria - particularly when the model has been enhanced to be 'more realistic'. Whether these models should be classed as toys is mute. Some of the 'toys' in today's market are in fact wonderful models and worthy of recognition, collection and exhibition. Such is the case for the subject Stuart Tank; perhaps it should be recognized as such. One might enquire as to how many models illustrated in the M.E. are in fact commercial production scale models - I know, not many - but, maybe a few?

The subject Stuart Tank was marketed by a Company named New Bright and their product line can be reviewed at www.newbright.com Two of their past models, again radio controlled and with full sound effects and working lights, are the Harley Davidson V-Rod and the Harley Davidson Fat Boy motorbikes at 1:3 scale.

One final aspect, which makes these models so collectable, is their price. In the USA, at the time of purchase the tank and the motorbikes each sold for less than \$100, or about £60 (give or take some!) including the radio control equipment.

Have I opened a Pandora's Box whereby we dash off to the local toy store to enter this year's Model Engineer Exhibition? I don't think so. But should we, could we nonetheless endorse the quality of marketed commercial models.

Dennis E. Fielder, Texas.

An example of Stephen Atkinson's silversmithing work.



Nameplates

SIRS, - I found Alan Crossfield's article on making nameplates (M.E. 4326, 23 May 2008) very interesting. His results are most appealing and well represent the cast ones of yesteryear. I have not made the quantity that he has but I would suggest an alternative method of working which would reduce time and be just as effective.

Silversmithing is one of my strengths and therefore I would employ those skills, which seem to me to be more appropriate for this work. Once the font has been decided upon and the work drawn out full-size onto good quality art paper it is then glued onto the brass background. Leave it to dry completely.

Now drill a small hole inside a letter or number or just outside whichever is necessary. The big difference of my method is to now use a piercing saw.

Use a very fine blade and cut to the line, forget any idea of cutting away from the line and filing to it later. A cut from a very fine blade will need only a touch from a fine needle file.

Lubricate the blade by occasionally drawing a block of beeswax along its length.

Keep the blade taught and saw vertically.

As for fixing letters to a background, silver solder is by far superior to soft solder, and once the flux changes state with there is no problem of the letter or numeral floating around.

Finally, a frame of half round section is best made from that section material and joined up when bent to shape before soldering into position.

Stephen Atkinson, Belfast.

Screw security

SIRS, - I would like to offer the following observations on the subject of screws which work loose, in response to the thoughtful letter from Mr. Dunn (M.E. 4325, 9 May 2008).

(1). True, I did not specifically draw attention in my article

(M.E. 4319, 29 February 2008) to the part played by the screw itself if it should come loose. I thought that the context made it self-evident.

(2). I accept that if a limited amount of 'jiggling' occurs when a single screw is used it can cause the screw to turn in

Sugar locomotive

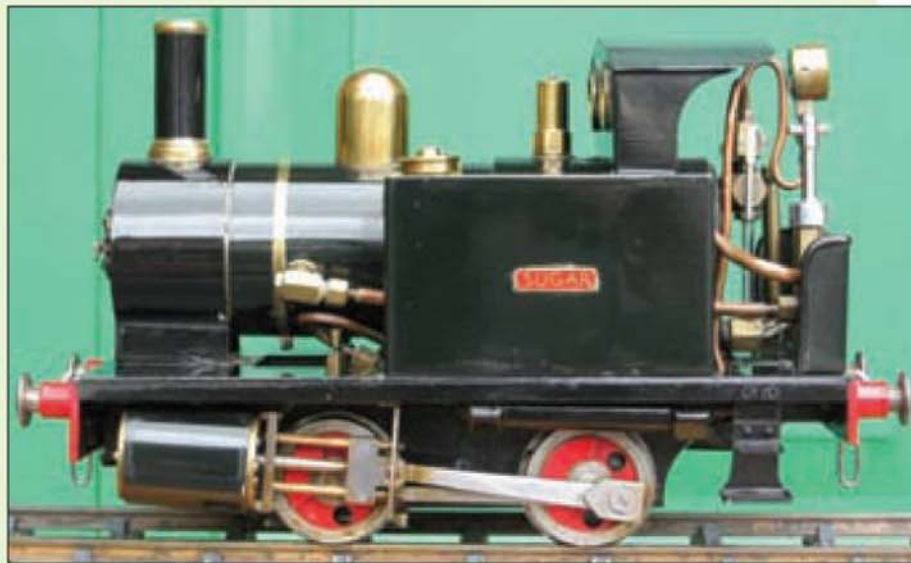
SIRS, - In answer to R. G. Pender's question (M.E. 4326, 23 May 2008), I have built *Sugar*. I started when the articles first came out and it took me seven years of spare time to complete.

If he decides to continue, he should build in a separate blower and if possible a conventional regulator. I found that the combined regulator/blower was too slow in operation by the time you wound it from blower to regulator the fire had almost died.

My views are probably distorted as I had started driving a 5in. gauge locomotive while building *Sugar*. I agree that the articles lack some dimensions, we used overlay transparencies to work out the valve events. I have included a recent photograph of the completed model.

As yet I have not found the articles or my drawings but will continue to search. If I can be of any more assistance I have left my contact details with the Editor.

Ken Parker, Swindon.



Ken Parker's example of the Sugar locomotive.

an anti-clockwise direction in the 'nut', and that this can only happen by virtue of a turning moment imparted to the screw at its head.

(3). If the maximum turning moment which can be transmitted by friction between the screw-head C and the plate B (M.E. 4319, 29 February 2008) exceeds that required to turn the screw relative to the 'nut' A, the effect of a cycle of 'jiggling' will be, slightly to loosen the screw, and then,

possibly, to tighten it again. I say 'possibly' because more effort is needed to tighten, than to loosen it, so that a ratchet action is possible for this reason.

(4). On the other hand, the limiting friction at the head of the screw might be less than that at the nut, in which case the screw will remain immobile, while plate B turns beneath it.

(5). Which of these conditions, (3; or (4) is to be preferred? I think (4), because

it offers no possibility of ratchet action tending to loosen the screw, whereas (3) does.

(6). In that case, I was in error when I advocated that the under-side of the screw-head be relieved in order to increase the effect of friction, (fig. 3).

(7). Mr. Dunn suggests that a spring washer beneath the screw-head would promote a desirable ratchet action. I don't argue against it, but the function of the screw is not only to hold the assembly

together, but also, to enable it to be dismantled easily when necessary.

(8) It may be, that 'jiggling' is not the only cause of screws loosening, but it seems to me that nothing could be lost by reducing it, and this would be achieved if, wherever practicable, multiple screws were used rather than a single one. Several screws, spaced apart, would support one another in holding the assembly firmly together.

M. J. H. Ellis, Bristol.

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ON SALE 12 SEPTEMBER 2008

IMLEC 2008

Roger Bunce and **Michael Jones** report on a well-supported and brilliantly organised event held at Southport.



This year's International Model Locomotive Efficiency Competition (IMLEC) was hosted by the **Southport Model Engineering Club** at their track in their lovely seaside resort over the weekend of 5 - 6 July. Hopes were high for the event as it was held in a town with its own lawnmower museum!

There were 28 entrants: four in 3.5in. gauge and 24 locomotives in 5 inch. The event was particularly well organised with no less than 34 officials ranging from axle weighers to the famous Southport bacon buttie spreaders (the ladies).

Normally an event of this kind is a test between locomotive driver and machine. This year a third factor entered unbidden: the weather. Casualties of the torrential rain included the official timing clock, the scales for weighing the coal and the tractive effort of the engines on wet rails. Of course, the drivers and passengers got soaked, but unlike Wimbledon, rain never interrupts play!

The number of the competitor refers to the photograph in this report.

Allan Bibby (1)

At 8.00 am, the early morning rain was still falling making the track slippery. The first competitor of the day, Allan ran with seven passengers including the observer. His 3.5in. gauge Hunslet *Charles* is about 8 years-old with no major reconditioning. It is based on Jack Bennet's design, but with a longer firebox, integral oil separator, spark arrester, and various other modifications. Allan slowed up at the 'hairpin bend' at the far side of the lake; a region of the track to prove difficult for many drivers. Other entrants watched intensely hoping to pick up tips!

Andrew Siddall (2)

Andrew was driving a Martin Evans designed 5in. gauge LNER 'Springbok'. This was Andrew's first IMLEC. It was raining heavily as Andrew pulled away slowly - struggling to get traction, with nine passengers.

The 'hairpin' took its toll and Andrew had to drop two passengers. The rain was now torrential and it stopped the official timing clock! Because of this, Andrew was allowed a rerun at the end of the afternoon. By then the sun was shining and the rain had stopped. Andrew began his rerun with 11 passengers. At his penultimate lap the engine was down to 50psi and not making steam, all passengers got off - the only chance of getting back to the station! Nice tactics Andrew. M.E. congratulates Andrew in coming second in this competition.

Mike Harrison (3)

Mike, secretary of the **Kinver and West Midlands SME**, has attended the last two IMLECs, this one by far the wettest. He built his 5in. gauge GWR Grange *Crynant Grange* using drawings by Martin Evans, Keith Wilson and some works drawings. Most of the detail was taken from photos shot by Mike or from books. Mike was still going very well after 18 minutes with seven

passengers. Officially the 8mph speed limit was not exceeded by much!

Ken Parker (4)

Ken was driving a 5in. gauge GWR *Prairie Tank 4588*, to the Martin Evans design, but with some modifications including stainless steel tyres. Ken started off with 11 passengers. However, the dreaded 'hairpin' intervened and he had to shed six passengers. The weather was atrocious - 'bucketing down'. Regrettably Ken had to retire. The problem was that the lap on the slide valves was not quite right. He said that he could have coped, but the weather was the final straw.

Paul Collins (5)

Paul was driving a 5in. Atlantic (a change from the printed programme). He began with three passengers, but then had to drop a passenger off. The problem was: at first, the regulator wouldn't open, and when it did open it wouldn't shut! Paul had to do all the driving on the 'gear stick'. Half an hour after his run



the problem was fixed with a squirt of PlusGas - always the way isn't it!

John Cottam (6)

John made the magnificent 5in. gauge Merchant Navy himself. It took him seven years, two of which was 'suck it and see' adjustment of the chain driven valve gear. John was going very well with seven passengers on board then, one by one, he dropped all the passengers off. Asked what the problem was, John said that he got a 'black hole', low pressure and low water - all because he couldn't 'bend in the middle' enough to see inside the firebox, because of his artificial hip.

James Tilbury (7)

At 12 o'clock, blue skies, rain stopped at last!

James, driving a 5in. gauge Polly V, is just 18 years-old and this was his first IMLEC. To quote James, "We're the future." The locomotive was built by his dad (James was busy doing A-levels). James thought it was the first Polly locomotive to enter IMLEC.

James took on six passengers and later dropped off two. It was a fast run - near 8mph.

Both James and his dad belong to the **Urmston DSME**. Asked if it was his dad who got him interested in model engineering. On the contrary, he said his dad was a 'closet steamer' and it was James (then 13 or 14), who persuaded him to buy a second-hand engine. (Ed. Good to see young folks leading the way).

Paul Tomkins (8)

At 12.45 it was tipping down with rain again! Another young driver takes the track. Paul was driving the 5in. gauge LNER B1 'Gazelle'. This was built to the Martin Evans design with the addition of radiant superheaters and a brick arch. Paul took on nine passengers and a junior. He had to have the firebox door open, and the injector on most of the way round - that added to the coal used. By profession Paul is a trained toolmaker. I asked, "So locomotive building is 'easy peasy' for a toolmaker" - the reply was an emphatic, "NO, NO, NO!"

Brian Remnant (9)

Brian was driving his much modified 5in. gauge Sweet Pea, *Lady Margaret*, weighing in at 240lbs. Brian wanted 19 passengers but could only get 11. A few yards out of the station, traction was lost and sand was quickly applied to the track. This did the trick and the train moved off. At the dreaded 'upper hairpin', the train came to a halt - the rain was torrential! This was definitely the wettest run so far. Asked how he got on, Brian said, "This was the worst run of my life. On a good day she can pull away with 20 on and no slip - but not today..." Despite this, Brian won!

ME congratulates Brian - Worthy Winner of IMLEC 2008.

Derek Warrington (10)

Derek was driving the 5in. gauge *Britannia Firth of Forth*. The start was delayed because the bottom of a marshal's jacket got caught under the train! Derek pulled away smoothly with 15 passengers but soon came to a halt. Passengers alighted until

only the driver and observer remained - clearly there was some mechanical problem. Derek was forced to retire. It was thought that a valve had moved on its spindle - not a good start and not a good end!

Karl Midgeley (11)

Again, good to see young engineers at IMLEC. Karl was watched by his granddad owner of this 5in. gauge freelance tank locomotive *Tomking*. This is Karl's fifth IMLEC - he drove his first IMLEC aged 17. Karl also drove *Tomking* at IMLEC last year. Karl began with five passengers but, after problems around the 'upper hairpin', was down to one. After that he set a 'cracking' pace with no more 'hairpin' problems.

Jim Elliot (12)

At 3.15pm, blue skies and the rain had stopped. Jim was driving an LBSC designed 5in. gauge 'Speedy', but with the Don Young valve gear to make it look more authentic. Jim moved off smoothly with seven passengers - the smaller locomotives seem

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Brian Remnant, worthy winner of this year's IMLEC, admires his Martin Evans Challenge Trophy award.

to be better in this respect. Asked how he got on he said, "Terrible - the worst run of my life." Then, with a big smile on his face said, "But you've got to enjoy it haven't you". Jim said he was fine for the first 10 minutes, but then he touched the fire and it collapsed, after that he had trouble maintaining pressure. Jim won IMLEC in 1999 and the LBSC Memorial Bowl in 2000. Jim didn't win this year, but he gets my Jolly Big Smile Award for IMLEC 2008.

Les Prichard (13)

Les was driving a 5in. gauge Aspinall 'A' Class locomotive, which he began in 1980 and finished in 1990. Les pulled away with seven passengers and things went well until the last lap or two. Then he left the injector on a bit too long and had difficulty recovering pressure. He didn't manage to complete as many laps as he would have liked. The number of his locomotive is 127 - metric equivalent of 5 inches!

David Finn (14)

David was driving the other magnificent 5in. gauge Merchant Navy Class locomotive in the competition this year - *Union Castle*. The locomotive was built over a period of 27 years and completed in 2000. Since then there have been many modifications. Sadly,

the superheater burnt out during David's run and he was forced to retire - what a time for that to happen! The only good news is the smoke box had been off recently so there shouldn't be too much corrosion on the joints.

Brian Eatock (15)

Brian was driving his 3.5in. gauge *Black Five*, on which he won the 3.5in. gauge section of IMLEC last year. The crowd was trying to make him smile but he wouldn't; then the PA announced that it was his 77th birthday the day before, and that did the trick! Brian's run went very well and the 'hairpin' was no trouble at all. Asked how the run went Brian said "Went fantastic - couldn't believe it. The piston rings were worn out after 15 years, and I've only just replaced them - never known it go so well." Asked if he wanted to tell me more, "can't", he replied, "I'm too excited!"

Tony Vereker (28 first reserve)

Tony, the first reserve driver, ran at the end of day one. He was driving a 5in. gauge Freelance O-6-OT (based on the

Simplex design). Tony took on seven passengers. Tony said, "Things went brilliantly for the first few laps but then things began to go wrong: Basically, I lost the sequence of fuelling and watering. Then the injector wouldn't work because the pressure was too high and I had to use the axle pump (cold water). Then the fire went down. In addition to all that, the track is very deceptive, particularly the 'hairpin' - you think it's flat but it's not."

Day two

Sunday morning 8.00am, overcast, drizzling with rain.

Marcus Peel (16)

Marcus was driving his 3.5in. gauge B2 *Royal Sovereign* which is 30 years-old this year. After buying it last year, a week later, he ran at IMLEC 2007,

Run %	Loco	Gauge	Competitor	Society	Distance (feet)	Coal use (lbs)
9	N.G. O-4-2ST	5	Brian Remnant	Romney Marsh	12000	2.172
18	LNER B1	5	Frank Nixon	Southport	11970	1.044
2	LNER B1	5	Andrew Siddall	Harlington	15310	2.475
13	O-6-0 L&Y 'A' Class	5	Les Pritchard	Harlington	15850	1.581
16	LNER B2	3.5	Marcus Peel	Wigan	17090	0.481
8	LNER B1	5	Dave Tomkins	Guilford	17040	1.719
17	GWR O-6-OT	5	David Mayall	Bracknell	17030	1.750
26	Britannia	5	Leonard Steel	Guilford	9810	2.156
23	LNER B1	5	David Wainwright	Brighouse and Halifax	13710	2.025
22	4-6-0 converted Scot	5	John Hurley	Kinver	10520	2.306
3	GWR Grange	5	Mike Harrison	Kinver	15350	2.758
24	Horwich 'Crab'	5	Geoff Crank	Wigan	11950	1.956
28	Freelance O-6-OT	5	Tony Vereker	Oxford	15400	2.450
12	GWR O-6-OT	5	Jim Elliot	High Wycombe	10350	1.756
11	Freelance 4-6-4T	5	Karl Midgeley	Gravesend	13600	2.300
6	Merchant Navy 4-6-2	5	John Cottam	Chesterfield	10210	1.836
7	Polly V	5	Keith Tilbury	Urmston	17020	3.328
21	GWR O-6-OT	5	James Brunning	Ascot	11080	1.544
1	N.G. Hunslet	3.5	Alan Bibby	Leyland	17020	2.641
15	Black Five	3.5	Brian Eatock	Chesterfield	15290	1.488
5	LNER 4-6-2	5	Paul Collins	Harlington	11920	0.984
20	GN Atlantic (Maisie)	3.5	Mike Casey	Manx Steam	17070	1.538
25	BR 9F	5	Mike Richardson	Bristol	10200	3.350
4	GWR 2-6-2T	5	Ken Parker	North Wilts		
10	Britannia	5	Derek Warrington	Urmston		
14	Merchant Navy 4-6-2	5	John Lloyd	Southampton		
27	Britannia	5	Steve Eaton	Chesterfield		
19	Withdrawn					

but the weather was atrocious. He recently decided to replace the piston rings and found there weren't any! Marcus took one passenger and was soon lapping at a cracking pace. This year the sun shone on Marcus, and we congratulate him on winning the IMLEC Best Efficiency for a 3.5in. Gauge Locomotive. Marcus's secret of success - not too much charcoal to clog the air intake and always check your piston rings!

David Mavall (17)

David was driving his 5in. gauge GWR Tank *Speedy*, which he completed in 2001. This was David's 13th IMLEC. David pulled away with seven passengers and didn't have any trouble with the dreaded 'hairpin'. Later he commented, "One can learn a lot from a day's observation!" David

reckoned he'd got the load just right. At the end of the run, David's wife handed him a little bottle of what appeared to low viscosity oil - Unusual for even a locomotive man to become excited by a bottle of oil!

Ben Pavier (18)

Ben, another of the younger drivers, was driving Frank Nixon's 5in. gauge LNER B1 *Bongo*. In last years IMLEC Ben was placed 2nd driving his own 3.5in. gauge *Maisie*.

Ben took on eight passengers. Like other drivers, Ben had problems at the 'hairpin' and had to drive backwards all the way back to the station at one stage. Ben said that this was because he was trying to be too careful with the coal. Nevertheless, his tactics paid off and he was awarded second place in the

competition. Congratulations to Ben on his success. In addition, Model Engineer would also like to congratulate Ben on being awarded NAME's 'Young Engineer of the Year 2008'.

Competitor **19** withdrew.

Jack Dibnah (20)

Jack was driving Mike Casey's *Maisie*, a 3.5in. gauge GN Atlantic. *Maisie* is 53 years-old and, apart from soft packings on the pistons and having an injector fitted, she is as Mike made her when he was a teenager. Before the run the engine suffered from a blocked blast nozzle, but luckily that was fixed in time. Jack took on a single passenger and 'flew' round the track - on one occasion at least being warned by the observer about his speed. Jack is a most exciting

and entertaining driver to watch - sometimes adopting a upright 'no hands' gaucha style and other times tucked-in like a downhill skier.

James Brunning (21)

James, chief engineer at the **Ascot Locomotive Society**, was driving his 5in. gauge GWR Speedy which he made from 'the scrap box'. Initially, James took on six passengers but dropped to four after problems at the now infamous 'hairpin' and problems slipping on the wet track. James said his main problem was boiler priming with water disappearing up the chimney. James tries to aim for the minimum depth of fire at the end of the run, but this is not always easy with lots of other things happening.

John Hurley (22)

John is a 'true' locomotive man. He began work at 15 as a cleaner with the British Railway Midland Region, and in the 1970s and early 80s was a driver for the Severn Valley Railway. John was driving his three year-old 5in. gauge 4-6-0 converted Scot 6141. John took on eight passengers and dropped one off at the 'hairpin'. John said it was the first time he had run the engine on Welsh coal (he normally uses anthracite). Pressure was down to 40psi all the time and that was the reason he was slow.

David Wainwright (23)

David was driving his 5in. gauge LNER B1 *Mayflower*. This locomotive is dedicated to his wife and has a plaque on the boiler to prove it. David is building his 10th locomotive and has made 21 boilers - not many ex-bakery managers can claim that!

David took on five passengers and, like many drivers, found the 'hairpin' a killer - "If you don't get the speed right - you don't get round". Scheduling conflicts posed a tough choice for David: IMLEC or the Brighthouse Brass Band Contest!

Geoff Crank (24)

This was Geoff's first time at IMLEC and he was driving >>

ed	Time Mins	Secs	Work done	Average D B HP	Coal consumption lbs/hr	Specific coal consumption	Overall Thermal Efficiency
	29	55	386040	0.391	4.356	11.140	1.630
	32	39	174900	0.162	1.918	11.816	1.536
	30	1	401830	0.406	4.947	12.195	1.489
	34	5	249210	0.222	2.784	12.563	1.445
	27	34	71100	0.078	1.047	13.402	1.355
	29	8	250700	0.261	3.540	13.574	1.337
	29	0	254300	0.266	3.621	13.626	1.332
	30	55	298620	0.293	4.185	14.297	1.270
	27	10	265350	0.296	4.472	15.110	1.201
	32	4	276700	0.261	4.315	16.503	1.100
	26	26	311700	0.357	6.260	17.518	1.036
	30	58	219120	0.214	3.790	17.677	1.027
	32	19	251700	0.236	4.549	19.273	0.942
	32	33	177100	0.165	3.237	19.635	0.925
	29	41	228800	0.234	4.649	19.904	0.912
	29	35	173860	0.178	3.724	20.909	0.868
	30	59	313100	0.306	6.445	21.047	0.863
	30	0	142800	0.144	3.088	21.405	0.848
	33	35	229055	0.207	4.718	22.826	0.795
	30	47	119800	0.118	2.899	24.585	0.738
	26	28	50810	0.058	2.232	38.360	0.473
	31	16	72025	0.070	2.950	42.267	0.430
	29	0	123330	0.129	6.931	53.783	0.338

IMLEC 2008

his 5in. gauge Horwich Crab. Geoff took on six passengers and it was not long before the dreaded 'hairpin bend' stuck again. Nevertheless, Geoff said he thoroughly enjoyed being at IMLEC. Geoff has wanted to run at IMLEC as a tribute to his good friend Norman Lowe who died about 3 years ago. Norman had made the locomotive and "what he didn't know about the Lancashire and Yorkshire Railway, the Horwich Loco Works, and railways generally, wasn't worth knowing".

Mike Robinson (25)

Mike was driving his 5in. gauge BR Class 9F 92219. Mike took on 12 passengers, had trouble getting traction just outside the station and ended his run with six. Mike said he was surprised by the

amount of slip, had problems with the fire (was it the coal?), and generally just couldn't get it going properly. Another problem was: he couldn't put it in reverse! Worst of all he was concerned about 'disappointing his groupies'!

Leonard Steel (26)

At 2.55pm, sun shining but thunder in the air! Leonard was driving his 5in. gauge Britannia 70007 *Coeur-De-Lion*. Leonard won IMLEC in 1997 with the same locomotive. Leonard began his run with 11 passengers but after several stops ended up with nine. Leonard has been coming to IMLEC every year since 1997, but he said this was the first time he really had to struggle and fight for control. Leonard reckoned he did two miles in all but it felt like hundreds!

Steve Eaton (27)

This was the last run of the day and the last run of IMLEC 2008. Steve won IMLEC in 2007 and was driving the same 5in. gauge BR Britannia. Steve took on 12 passengers and was soon going very well - but it was not to last! Steve 'cut it a bit fine' and had to retire. The problem was he had 30psi to last two laps and ran out of pressure on the uphill section of the last lap. Steve has now built 16 locomotives and has quite a few 'on the go'. Steve's philosophy: "Don't take it too seriously - just have fun."

Winners

This year's IMLEC efficiencies were about 25% down on last years - almost entirely due to the very bad weather conditions.

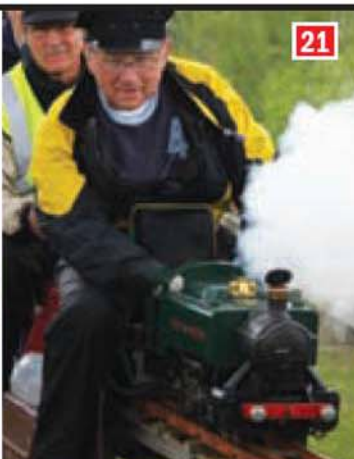
All entrants were presented with a framed certificate, showing information about

their run and with an inset photograph of them aboard their locomotives, by Bob Pelttifer, Club Chairman.

This year's winners were formally announced: Brian Remnant with his 5in. gauge Sweet Pea *Lady Margaret*, and Marcus Peel with his the 3.5in. gauge B2 *Royal Sovereign*. Michael Jones (Assistant Editor) presented the Martin Evans Challenge Trophy to Brian on behalf of Model Engineer (photo A).

Model Engineer wishes to congratulate and thank all who took part. A special thanks goes to the Stouthport Model Engineering Club for their excellent organisation, kind hospitality, and for making IMLEC 2008 such an enjoyable occasion and an outstanding success.

ME



My first boiler

Julia Old tackles the injector bush, firebox back plate, and backhead.

*Continued from page 28
(M.E. 4329, 4 July 2008)*

The drawing shows a double bush for the injector and it took me a little while to work out how I was going to make it. Instead of being round it has a 'racetrack shape'. My first stumbling block was finding suitable metal - I was initially looking for ½in. square bar. I eventually realised that I could mill the desired shape from 1in. dia. bronze bar. I have a Sino,



3-axis, digital readout, fitted to my mill, which enables what is best described as manual CNC. Once a radius is programmed, the display guides the cutter through a series of positions, which cut out the required shape (photo 32).

Door fixings

As designed, the fire door fixings screw directly into the copper backhead; to avoid this I used blind bushes. The silver soldering did not go to my complete satisfaction as, on inspection, one of the bushes did not have a nice fillet on the inside. It was probably OK as it had a nice fillet on the top, and I could just about see silver solder on the other side but, to make doubly sure, I reheated the backhead as I did not want

to risk trouble later (photos 33 and 34). Photograph 35 shows the backhead with bushes fitted, ready for assembly on the boiler.

Backplate

My final piece of homework was to prepare the firebox backplate. For this I had received differing advice from my mentors concerning the order of fitting the stays. The

➤



32. Machining the injector bush.
33. Nice solder fillets on outside of blind bushes.
34. Doubtful solder penetration on inside of one bush.
35. Backhead with bushes soldered in place.



36. Using a large cyclone burner inside the firebox for background heat.

37. Soldering the firebox backplate to the inner wrapper.

38. Pickling in a large tub of dilute sulphuric acid to remove black oxide.

39. Inspecting the firebox soldering.

40. Fitting the backhead.

obvious way was to delay drilling the backplate until after the backhead was soldered and then fit the stays. The down side of this is that it requires another session with the torch operated within the very restricted firebox space. The



alternate involved soldering the stays to the backplate before fitting to the boiler. The down side of this method was that I had to be sure that the location of the backhead would not change once the backplate was soldered in place. I was very brave and went for this option.

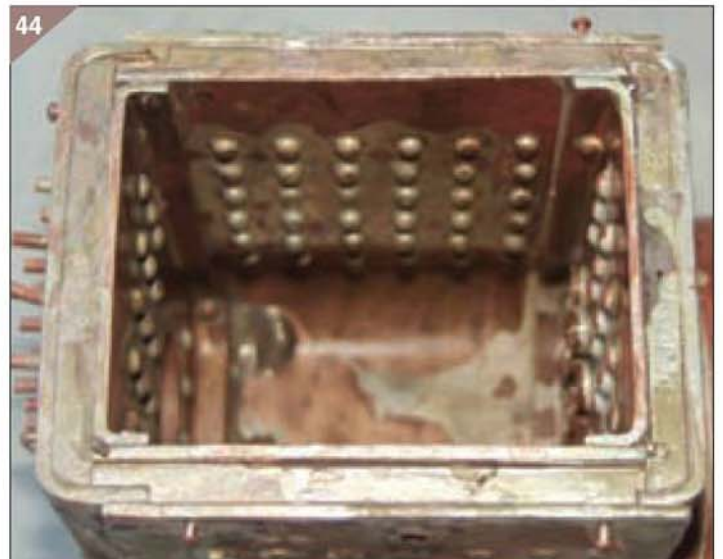
I used a large cyclone torch for background heat, which was particularly advantageous as it could be directed inside the firebox without extinguishing (photo 36). By then I was beginning to recognise when conditions were right for the silver solder to begin to flow, and I learned to wait. Once this point was reached, it did not take long to produce a sound joint between the inner wrapper and firebox backplate (photo 37).

The areas, not protected by flux, became covered with black copper oxide after heating.

This was removed by pickling the boiler in a large tub of dilute sulphuric acid (photo 38). It is vital to keep the cooper clean since any trapped oxide within a joint can cause premature failure of the boiler. It is particularly important that all joints within the firebox are sound, as any in-service failure in that region is very difficult to repair. I was fortunate to have each joint checked by several pairs of expert eyes (photo 39).

Backhead

With the backplate joint passed as acceptable, I moved on to the backhead. Fitting it in place was a little tricky, as I had to first thread the injector steam pipe past the crown stays (photo 40), then I had the job of persuading the ends of the rivets to pass through their holes. A piece of advice, which I received too



late, was to make the ends of the rivets pointed, so that initial alignment was not as critical.

Once the background heat had warmed the job, I started on the stays working from bottom to top. The fire hole ring was done before tackling the final top row (**photo 41**). Attention immediately turned to the outer wrapper and this was completed without too much trouble (**photo 42**). When it came to remove the iron clamp, prior to pickling, I found that it was stuck. Initially I assumed it was flux but it turned out that silver solder had wicked across from the bottom row of rivets. A blast from the oxy-propane torch directed at the clamp was needed to get it off.

Foundation ring

The final job of the day was to fit and solder the parts

making up the foundation ring (**photos 43 and 44**). My preferred practice is to peg these in place with rivets. I find that solder appears around the shaft of the rivet without any special attention. Not only does this give me confidence that the rivet is sealed, it indicates that there has been good penetration of the silver solder into the joint. At the corners of the foundation ring there are gaps where the radiused flange butts up against the inner wrapper. The EasyFlo would be unable to fill them if they were not first filled with off-cuts of copper.

Quick test

With the back end of the boiler complete I thought it prudent to perform a gross leak test. I made up a set of plugs for the backhead bushes, upended



the boiler and filled it with water as far as the dome ring (**photo 45**). I was not expecting problems, never the less, it was very satisfying, after all the hard work, to find there were no leaks.

● To be continued.

41. Soldering the backhead stays and fire hole ring.

42. Soldering the outer wrapper to the backhead.

43. Soldering the remaining sections of the foundation ring.

44. The foundation ring complete.

45. A quick water test.

LETTERS TO A GRANDSON

M. J. H. Ellis
describes the
development of
ignition systems.

Dear Adrian, I now propose to expand on a subject that I have already touched upon:

I would like to tell you about the development of ignition systems. One of my adages is, if you want to find out about something, go to the experts. Accordingly, I asked the National Motor Museum at Beaulieu, Hampshire, to advise me. This is a summary of the information they provided:

Blue touchpaper!

Proposals for an internal combustion engine go back as far as 1673, when Christian Huygens (1629 – 1695) suggested an arrangement, which, to a degree, anticipated the Newcomen atmospheric steam engine of 1712. The piston was to be raised, not under the influence of atmospheric pressure and condensed steam, but by the explosion of gunpowder! As gunpowder is hardly the most trustworthy of fuels, the idea did not get very far, and further developments had to await the advent of a more suitable fuel.

Gas flame

By the middle of the 19th century, practically every town of any size was served by gas. It is hardly surprising that the early gas engines were based on steam engines. Not only were they often double-acting, they also drew a combustible mixture into the cylinder during the beginning of the power stroke, which was then ignited to drive the piston. Ignition was no problem with such an engine, since when it took place, the pressure inside the cylinder was less than atmospheric, and it was only necessary to arrange for an external flame to be drawn in through a touch hole.

There were, however, other methods: In 1838 William Barrett, of Brighton, introduced a large rotatable cock. A gas flame was kept burning inside the cock which could be switched between atmosphere

and engine cylinder. To cause ignition, the cock was turned to connect the flame to the cylinder. A variation of the same system was employed by Pierre Constant Hugon in 1865, but in this case the cavity was formed in a slide-valve.

What mystifies me is that the men who experimented with internal combustion engines paid so little heed to the principles of thermodynamics, with which the proponents of steam and hot air engines were so well acquainted. It was not until 1876 that the now-so-familiar 4-stroke cycle, invented by Nicolaus Otto, was introduced. Importantly, Otto realised that the efficiency of an internal combustion engine is proportion to the compression ratio.

Hot-tube

But I digress. Another form of ignition, used in some of the early stationary engines and even early 'horseless carriages', was 'hot-tube' ignition. The tube was fitted into the cylinder head and was usually made of metal or ceramic. It was first necessary to pre-heat the tube. When it was hot enough, it ignited the compressed charge and the engine would continue to run. Some authorities gave the impression that the tube had to be heated externally all the time the engine was running - this was not the case. However, there were times when hot-tube ignition worked too well; the tube became so hot that pre-ignition set in. The hot-tube was invented by Dr. Alfred Drake of Philadelphia in 1843.

Hot-tube ignition was a feature of the primitive car produced by Gottlieb Daimler and Wilhelm Maybach in 1886, but the days of the hot-tube were numbered. By the time the blowlamp was going and the tube hot enough, a steam car could have raised steam and left the I/C car well behind. However, during the late 19th century, the internal combustion engine had become lighter, ran faster, and needed to respond to wide variations of speed and

load. Moreover, the number of cylinders had been increased. Every one of these factors showed up the shortcomings of the hot-tube system. As a result, electrical ignition systems came into favour, and by 1900 hot-tube ignition had become obsolete as far as motor vehicles were concerned.

Electric spark

As early as 1857 high tension electric ignition had been applied to a gas engine, but efforts in this direction were sporadic; the major disadvantage was that it needed a battery.

Ever since Michael Faraday established the basic principles of electromagnetic induction in 1831, it was known that an electric current could be generated mechanically, and yet the practical exploitation of this knowledge did not begin until about 40 years later. Thereafter, inventions came thick and fast and included the low-tension magneto, which was applied to a gas engine by Nicolaus Otto in 1884. This simple magneto generated an alternating current, which passed through a pair of points inside the cylinder. Driven by the engine, the magneto was timed to generate its maximum current at the time ignition needed to occur. At that instant a linkage caused the points to break contact, and this gave rise to a momentary arc between them.

Robert Bosch applied low-tension ignition to a car engine in 1897. At first the points were operated mechanically, but he later developed a proprietary system whereby the current passed through a coil forming part of a spark plug. Magnetised by the current, the coil attracted an armature, the movement of which caused one of the points to break contact with the other. This simple but ingenious arrangement dispensed with the mechanical linkage, and also ensured that the current was near to its maximum when the points separated.

Your affectionate Grandpa.

THE MODEL ENGINEER EXHIBITION

19th - 21st September 2008 Ascot

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To help you get the best from The Model Engineer exhibition

These notes are written purely for guidance. Full information is contained in the Competitors' Information booklet which is sent to every entrant as part of the information package. If you have an item and are unsure as to the Class into which it should be entered, leave that section blank and we will take care of it. The Judges have the right to move any competition exhibit into another class if they feel that by doing so its chances of gaining higher marks or a more appropriate award are improved.

If the item is offered as a Loan exhibit please indicate this by writing Loan on the form in the box identifying the Class. Loan models are not judged but carry all other privileges associated with competition entries.

Part built models are particularly welcome in the Loan Section; visitors like to see work in progress, and entry does not preclude the item being entered in competition when completed.

The classes listed below are those associated with mainstream model engineering.

Club exhibits

Where a club is exhibiting, each model should be entered on a separate entry form and clearly identified as a club exhibit by entering Loan/Club in the class section box. This ensures that we have a full record of all models on display during the show and facilitates matters of administration and insurance.

Additional forms

If you do not wish to deface your copy of the magazine we are happy to receive photocopies of the entry form, one for each model. We will be pleased to send out extra forms if required, so if you know of a modeller who is not a reader of one of our magazines but who you think may wish to participate, please advise them to contact our Exhibitions Office, or simply photocopy the entry form for them.

The success of the show depends largely on the number of models on display. Your work could well be the stimulus which inspires someone else to start in the hobby. There can be no doubt that this event is our showcase on the world of modelling in all its aspects. Every modelling discipline needs more and more participants, and it is by displaying not only the crème-de-la-crème, but also examples of work of a more achievable standard, that people are encouraged to join into the wonderful world of modelling, in whatever aspect.

We look forward to seeing a sample of your work at the show!

Engineering Section

- A1 Hot air engines.
- A2 General engineering models (including stationary and marine engines).
- A3 Internal combustion engines.
- A4 Mechanical propelled road vehicles (including tractors).
- A5 Tools and workshop appliances.
- A6 Horological, scientific and optical apparatus.
- A7 General engineering exhibits – not covered by the above

Railway Section

- B1 Working steam locomotives 1" scale and over.
- B2 Working steam locomotives under 1" scale.
- B3 Locomotives of any scale, experimental, freelance or based on any published design and not necessarily replicas of full size prototypes, intended for track duties.
- B4 Scratchbuilt model locomotives of any scale, not covered by classes B1, B2, B3, including working models of non-steam, electrically or clockwork powered steam prototypes.
- B5 Scratchbuilt model locomotives gauge 1 (10mm scale) and under.
- B6 Kitbuilt model locomotives gauge 1 (10mm scale) and under.
- B7 Scratchbuilt rolling stock, gauge 1 (10mm scale) and under.
- B8 Kitbuilt rolling stock, gauge 1 (10mm scale) and under.
- B9 Passenger or goods rolling stock, above 1" scale.
- B10 Passenger or goods rolling stock, under 1" scale.
- B11 Railway buildings and lineside accessories to any recognised model railway scale.
- B12 Tramway vehicles.

Marine Models

- C1 Working scale models of powered vessels (from any period). Scale 1:1 to 1:48
- C2 Working scale models of powered vessels (from any period). Scale 1:49 to 1:384

- C3 Non-working scale models (from any period). Scale 1:1 to 1:48
- C4 Non-working scale models (from any period). Scale 1:49 to 1:384
- C5 Sailing ships and oared vessels of any period – working.
- C6 Sailing ships and oared vessels of any period – non-working.
- C7 Non-scale powered functional models including hydroplanes.
- C8 Miniatures. Length of hull not to exceed, 15in for 1:32 scale, 12in for 1:25 scale, 10in for 1:16 scale; 9in for 1:8 scale. No limit for smaller scales.
- C9 For any model boat built from a commercial kit. Before acceptance in this class the kit must have been readily available for at least 3 months prior to the opening date of the exhibition and at least 20 kits must have been sold either by mail order or through the retail trade.

Scale Aircraft Section

- D1 Scale radio control flying models
- D2 Scale flying control-line and free flight
- D3 Scale non-flying models, including kit and scratch-built
- D4 Scale flying radio controlled helicopters

Model Horse Drawn Vehicle Section

- G1 Carriages & other sprung vehicles. (Omnibuses, trade vans etc.) Wagons, carts and farm implements. Caravans.

Junior Section

- J1 For any type of model, mechanical or engineering work, by an under 14 year old.
- J2 For any type of model, mechanical or engineering work, by an under 16 year old.
- J3 For any type of model, mechanical or engineering work, by an under 18 year old.

All entries will be judged for standard of craftsmanship, regardless of the modelling discipline, i.e. a boat will not be competing against a military figure. Providing a model attains sufficient marks it will be awarded a gold, silver or bronze medal.

Model Vehicle Section

- K1 Non-working cars, including small commercial vehicles (e.g. Ford Transit) all scales down to 1/42.
- K2 Non-working trucks, articulated tractor and trailer units, plus other large commercial vehicles based on truck-type chassis, all scales down to 1/42.
- K3 Non-working motor bikes, including push bikes, all scales down to 1/42.
- K4 Non-working emergency vehicles, fire, police and ambulance, all scales down to 1/42.
- K5 Non-working vehicles including small commercial vehicles (e.g. Ford Transit,) scale from 1/43 or smaller.
- K6 Any available body shells including Concours, in any scale or material, to be judged on appearance only.
- K7 Functional model cars/vehicles which must be able to move under its own power of any type. Can be either free-running, tethered radio controlled or slot car, but must represent a reasonable full size replica.

DUKE OF EDINBURGH CHALLENGE TROPHY

Rules and Particulars

1. The Duke of Edinburgh Challenge Trophy is awarded to the winner of the Championship Award at the Model Engineer Exhibition.
2. The trophy remains at all times the property of MAGICALIA PUBLISHING LTD.
3. The name of the winner and the date of the year in which the award is made will be engraved on the trophy, which may remain, at the discretion of MAGICALIA PUBLISHING LTD., in his/her possession until required for renovation and display at the following Model Engineer Exhibition.

4. Any piece of model engineering work will be eligible for this Championship Award after it has been awarded, at The Model Engineer Exhibition, a Gold or Silver medal by MAGICALIA PUBLISHING LTD
5. No model may be entered more than once.
6. Entry shall be free. Competitors must state on the entry form:
 - (a) That exhibits are their own bona-fide work.
 - (b) Any parts or kits which were purchased or were not the outcome of their own work.
 - (c) That the model has not been structurally altered since winning the qualifying award.
7. MAGICALIA PUBLISHING LTD. may at their sole discretion vary the conditions of entry without notice.

COMPETITION RULES

1. Each entry shall be made separately on the official form and every question must be answered.
2. Competition Application Forms must be received by the stated closing date. LATE ENTRIES WILL ONLY BE ACCEPTED AT THE DISCRETION OF THE ORGANISERS.
3. Competitors must state on their form the following:
 - (a) Insured value of their model.
 - (b) The exhibit is their own work and property.
 - (c) Parts or kits purchased.
 - (d) Parts not the outcome of their own work.
 - (e) The origin of the design, in the case of a model that has been made by more than one person.

NOTE: Entry in the competition can only be made by one of the parties and only their work will be eligible for judging.

4. Models will be insured for the period during which they are in the custody of MAGICALIA PUBLISHING LTD.
5. A junior shall mean a person under 18 years of age on December 31st in the year of entry.
6. Past Gold and Silver medal award winners at any of the exhibitions promoted by MAGICALIA PUBLISHING LTD. are eligible to re-enter their model for the 'Duke of Edinburgh Challenge Trophy'. Past winners at any of the exhibitions promoted by MAGICALIA PUBLISHING LTD. will not be eligible for re-entry into the competition unless it has been substantially altered in any way.
7. MAGICALIA PUBLISHING LTD reserve the right to:
 - (a) Transfer an entry to a more appropriate class.
 - (b) Describe and photograph any models entered for competition or display and to make use of any such photographs and descriptions in any way they may think fit.
 - (c) Refuse any entry or model on arrival at the exhibition and shall not be required to furnish a reason for doing so.
8. Entry into the competition sections is not permitted by:
 - (a) Professional model makers.
 - (b) Anyone who has a financial interest in the direct supply of materials and designs to the public.

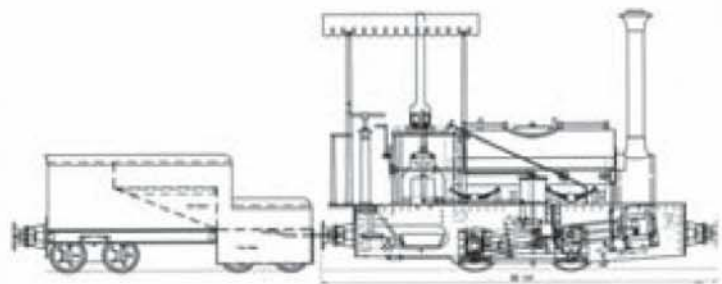
NOTE: If unsure, please contact the Competition organisers prior to the show.

9. The judges' decision is final. All awards are at the discretion of the judges and no correspondence regarding the awards will be entered into.
10. Exhibitors must present their model receipt for all models collected at the end of the exhibition and sign as retrieved.
11. The signed release for each model must be presented to security staff when leaving the exhibition complex with display model(s) after the close of the exhibition.

IMPORTANT NOTE: PLEASE MAKE COPIES, INCLUDING PHOTOGRAPHS, OF ALL INFORMATION RELATING TO YOUR MODEL, AS MAGICALIA PUBLISHING LTD WILL NOT ACCEPT LIABILITY FOR ANY LOSS.

CLOSING DATE 3RD SEPTEMBER 2008

ANNA



A Manning Wardle locomotive for 7¼in. gauge

D. A. G. Brown and **Mark Smithers** return to their tender design with some small changes, details of the braking system and the drawbar.

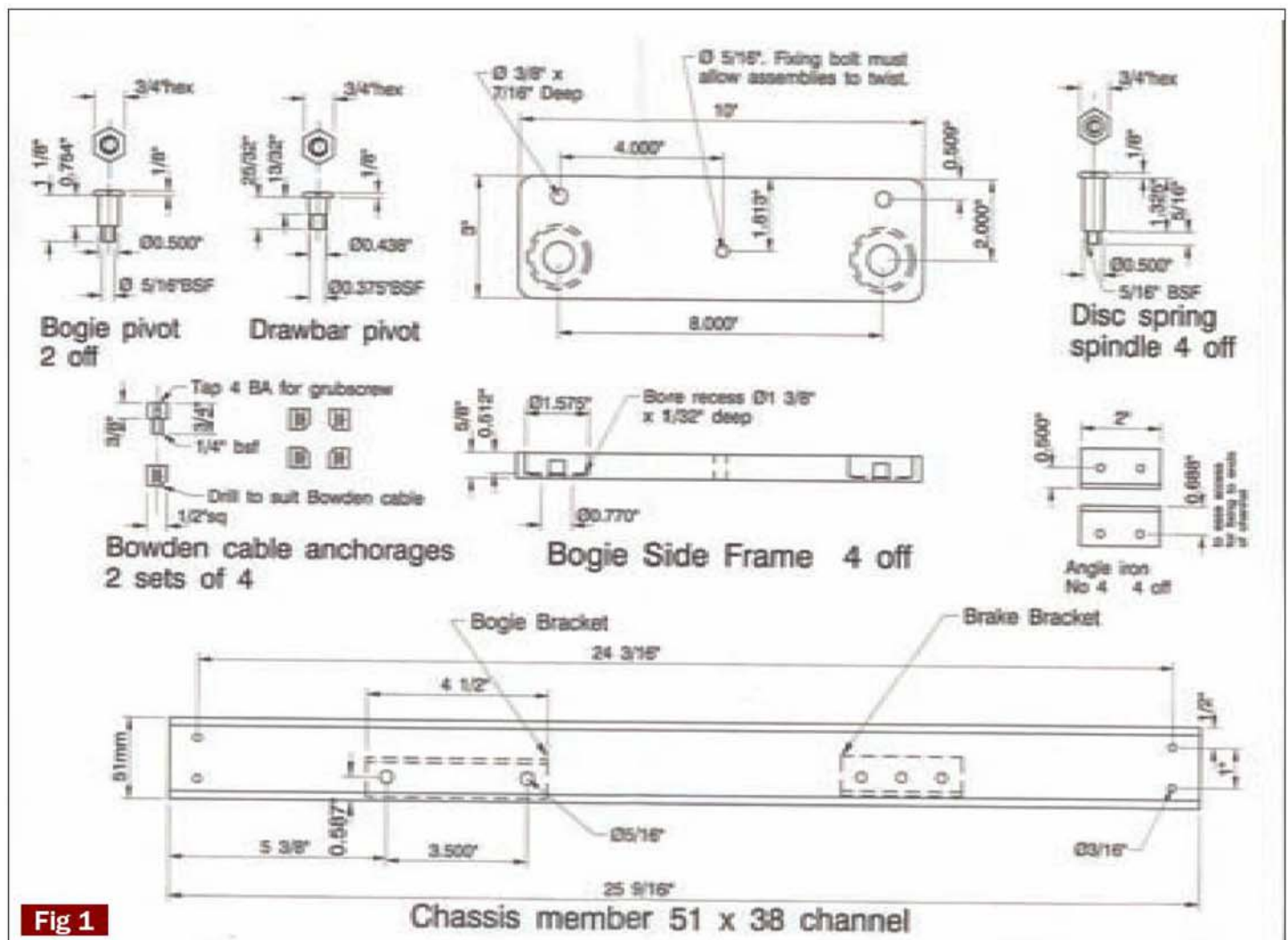
*Continued from page 148
(M.E. 4331, 1 August 2008)*

When we launched the tender design at the end of the main series (M.E. 4261, 25 November 2005), it embodied some novel features. It has since been gratifying to discover that it is being incorporated into one or two other designs, in which the builders recognise that it gets them economically near to rail level and in a driving position where it is possible to reach the locomotive's controls with a comfortable stretch. Applied to *Anna* I can confirm that, even though I am 6ft. 5in. tall, I can

lower my head from the tender seat to look beneath the frilly canopy; furthermore the two vehicles are far enough apart to avoid catching one's head on the canopy spikes.

One of the early protagonists for using the design behind other locomotives was the redoubtable Keith Wilson. Not only did he recommend it in these pages, but he also went to the trouble of scrutinizing the design from his long practical experience. Consequently I am grateful to Keith for identifying a small area of nonsense in the original drawing: I made

play of the ability of the bogies to compensate for track irregularities; that was the intention, but I had omitted to provide the necessary clearances around the axles and bearings. These have now been put right and **fig 1** illustrates the changes, which are as follows: I refer to the bogie side frame at the top centre of the drawing. The axle holes have been enlarged by 0.020in., so that the wheelsets can wiggle around as required; a self aligning bearing needs somewhere for the inner race and ball cage to go as it moves ➤





1. Fabricating the brake callipers from three pieces, the middle of the sandwich being a one-piece calliper, whose middle hole is used to locate the holes in the fabricated bridge pieces.

2. Rear bogie shot from above; the Bowden cables should be positioned underneath the brake support pivots to get them out of harm's way. To the right is the vacuum actuator assembled on its platform.

out of alignment. The shallow recess of $\frac{1}{32}$ in. deep takes care of this feature and affords clearance for the outer parts of the bearing assemblies.

Now for some comments on the machining of the side frames: my Colchester lathe does not have a gap bed, so I am limited to swinging 13in. over the bed. Consequently, I clamped the embryo side frames to the milling machine table, set the datum to zero at the centre pivot point and drilled the pivot hole to finished size. I then moved in turn to each of the axle hole positions where I sank the axle hole right through to a diameter of 0.770in. Undoubtedly the most difficult job was boring the holes to take the outside races of the ball bearings; I made them slightly on the large side (by 0.002in.) and this amount

is taken up on final assembly by the use of bearing retainer from the Loctite stable. By comparison, counter-boring $\frac{1}{32}$ in. deep for the inner race clearance was a piece of cake. This series of machining operations on the eight bearing positions certainly took a long time to complete and they who have large enough swings in their lathes are to be envied!

It is vital to reverse the side frames to drill the $\frac{3}{16}$ in. holes for the brake pivots, since they are open to the insides of the frames, whereas the bearings fit into their holes in the outsides of the frames. The detailed drawing makes this relative positioning quite clear in its use of broken lines to indicate which side of the plates the holes are placed. I must say that I heaved a sigh of relief when I had finished machining the side frames; no other set of tender components took anywhere near as long.

The brake gear

Being of a fairly laid-back disposition, and looking at the drawing of the brake gear, I realised that there is an awful lot of hacking about in 6 and 5mm steel plate to make the large number of components, which range from the brake

platform to the support plates to the callipers and cranks. I therefore joined the whole lot together on a sub-drawing and sent it to the laser cutters; back came the master jigsaw of no fewer than 24 bits, which needed the merest of licks with a file to make them suitable for the finished job. The laser, of course, positioned all the holes and it was an easy job to put them in at their correct sizes.

Brake callipers

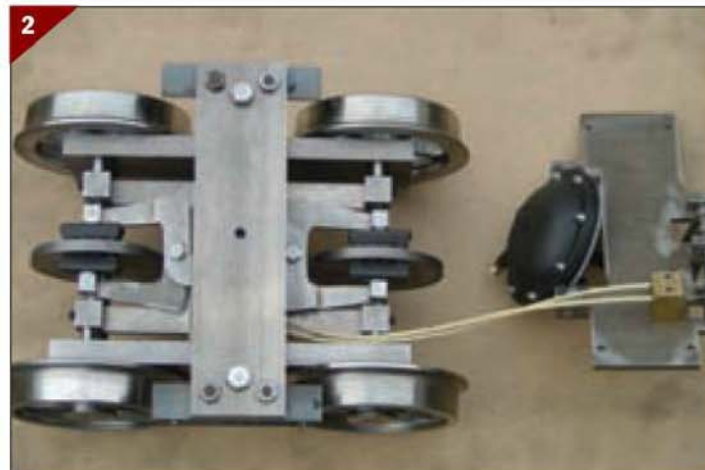
Let us look at the detail of the callipers: each of the four sets has one plain and one built-up arm, the latter bridging the former in the assembly. The built-up arm consists of three pieces, which must be silver-soldered together to make the finished job. An assembly jig is really staring you in the face insofar that the plain arms are of similar hole centres. I assembled the short pieces of the built-up arms on opposite sides of a plain arm, using $\frac{1}{4}$ in. bolts, as can be seen in **photo 1**. The areas to be joined were coated with flux paste and the bridge pieces were clamped above and below the stack as pictured, another $\frac{1}{4}$ in. bolt holding the whole lot together. The alignment of the bridgework could be checked before applying the heat to melt the solder into the joints. After pickling and removing the screws, the result was very pleasing and the set-up shown produced one built-up assembly of each hand, which is aesthetically good, although functionally not really essential. In the picture the plain

component is clearly visible as the meat in the sandwich; it did not even get up to anywhere near the silver-soldering temperature.

To assemble the stacks of callipers I machined up plain bolts, whose ends were turned down and threaded 2BA; the lengths of the plain sections allowed precisely for washers to separate the components for ease of operation, with an eye on clearance for paint on all exposed surfaces.

Brake blocks

I mentioned in the original tender articles that we should be looking at cheap bicycle brake blocks to engage with the brake discs and stop the locomotive in its tracks; that is precisely what transpired, although the manner of its realisation is worth relating. On visiting our local Halfords shop I entered into their bicycle territory, where I was greeted by a young man only too willing to help "Hmm, cheap brake blocks? What model is it for, please sir?" "A Manning Wardle $\frac{3}{8}$ full size" was my calculated reply. "Ooh, I haven't come across one of those; what is it like?" "Enormous and it weighs about 300kg." (Here I realised that it would be no use wasting my breath talking Christian units to the young chap, so kg it had to be.) So we scoured the display shelves for a suitable set of blocks and the cheapest was for a BMX bike, whatever that means. The youth was clearly amazed that this old bloke could get mixed up with BMX machines, and even





3. Rear bogie from low down on one side; the bolts holding the side frames apart are maintained not tight, to allow bogie equalisation. The inverted brake platform illustrates the smaller anchor, ready for the front Bowden cables.

more curious that I should want four sets. Nevertheless, he found me four packets, each impossibly wrapped in a blister pack. I clearly did not fit the job description of his normal customer for this type of merchandise, so before leaving I did put him out of his misery and tell him just what the end use was.

In **photo 2** the brake blocks are obvious; they are moulded around M6 studs, so the $\frac{1}{2}$ in. square x $\frac{3}{4}$ in. steel blocks drawn on the detail sheet to fix into the calliper ends were tapped M6 to match. It was then possible to force the brake blocks into the horizontal position where they gripped the discs tangentially.

Suspension

We shall return to the braking system in a short while, but first let us examine the suspension system. The bogie stretcher is not visible under two other components, but its function is to keep the two side frames the correct distance apart. Its bottom projection is just visible in **photo 3**, which does show the $\frac{3}{4}$ in. bolts which hold the assembly together, but allow pivoting to take place. In fitting nuts inside the stretcher holes, the bolts are left just

loose enough to allow this to happen. The bogie stretcher not only fits snugly between the frames, but it also extends upwards for a short distance, being located by a single pivot pin in the dead centre of the $\frac{3}{4}$ in. material, this aligning itself precisely with the bogie bolster of similar thickness. The pivot pin is pictured in the left top corner of fig 1, in which it is one of a family of parts, worth machining at a single stint. A word of explanation is in order: the generous $\frac{1}{2}$ in. diameter of the pin is good practice to take the riding stresses in operation, but the $\frac{3}{4}$ in. threading of the lower end enables us to keep down the size of the nut which, if made too big, can interfere with the brake gear. The pivot length allows a small amount of play in operation.

Above the bolster is the bogie support beam, which spans the tender chassis in the case of the rear unit, and is fixed at a specific distance below the tender baseplate in the case of the front unit. Between the bolster and the support beam are the four stacks of Belleville washers on which the vehicle is suspended. These are threaded onto what I have called the disc spring spindle, which is top right in fig 1. At the journal

length drawn, the springs should be just fully relaxed with no load on the bogies.

Drawbar

The final member of the machining group is the drawbar pivot, which is tapped into the front bogie support beam. Slack fits here are essential, both to allow the drawbar to move up and down and to allow for the nominal amount of axial misalignment between engine and tender which a rough track is bound to cause. From the safety point of view, you will note that, when the drawbar pivot is screwed up tight, there is just a nominal amount of clearance between its head and the underside of the tender base sheet; it

cannot possibly come out.

Connected with the pivot is the drawbar itself (**fig 2**), quite a meaty piece of metal. The drawing specifies a length of $\frac{5}{8}$ x $\frac{3}{4}$ in. steel flat stock; in the usual fashion I drilled holes in the ends and ran round the holes on the rotary table to achieve the correct profile. It was then necessary to make a $\frac{3}{4}$ in. set or S-bend in the bar, quite impossible cold with my equipment. To make the set, I held the bar horizontal in the vice, with about 1in. protruding, enabling the Sievert gas flame to bring the area to be bent to dull red heat, without overheating the vice. Gripping the long tail with a Mole wrench, it was easy to bend by eye to about 20 degrees. Following quench cooling, the position of the reverse bend was estimated by lining up a piece of $\frac{1}{2}$ in. square material, laid along the short edge of the original material, making a line by guesswork where the second bend should be. Heating this area to dull red allowed the reverse bend to be forced, until a straightedge positioned in the line of sight along the entire job appeared to indicate everything in line. The matter of important judgement is just how far in advance to start the second bend, to allow for a curved corner rather than a sharp bend ➤

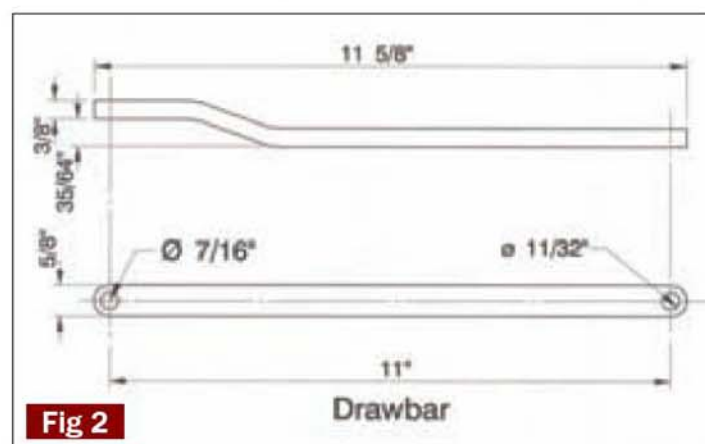


Fig 2



4. Plan view of front bogie with suspension components removed to reveal the Bowden cable anchorages.

5. Two Annas are under construction in the West Country. This one has recently been assembled to this stage by Andy Stait of the Forest of Dean.

on the inside of the metal. This judgement comes from examining the shape of the first bend and mentally transferring it further along the bar.

The brake linkage

Following my original description of the brake gear, one of our readers made what appeared to be a good suggestion, that we should equalise the action between pairs of callipers, thereby saving half of the Bowden cables and perhaps simplifying the runs. Alas, when I tried to implement this suggestion I found that there was no way in which I could effect it; there is just no room to work around the bogie pivot pins. So my original design stays. On reflection, there is a benefit in keeping to the original configuration insofar that I am not at all happy with increasing the loads on the cables, so keeping the duty of one cable for stopping only one wheelset is a move in the right direction.

I experimented with several sources of materials for the cables themselves; as I originally proposed, the local friendly car repair man is an endless source of used clutch

cables from dozens of different cars; however, adapting any of them to our needs is not easy. They seem to be rubber sleeved (which can be stripped away), and this reveals armouring which is not easy to fit into the tender. The central cable is surrounded by a plastic tube for low friction, but this on its own is not robust enough for our installation. So, back to the drawing board, I discovered some net-curtain wire, which had been lying around for years, looking for a good home. My specimen is plastic covered, which is a good thing. The structural material is a close-wound steel spring about $\frac{1}{8}$ in. dia., through which it is easy to thread some 18 gauge steel wire. I did try some multi-stranded wire clock cable, but it is not as smooth in operation as the steel wire; this latter item will go elastically around the bend which we have in the cable layout, so I am now quite happy with the result.

The two short ends of each calliper are fitted with a pair of cable anchorages, which are detailed in the bottom left of fig 1. I found it best to drill and tap 4BA for little socket grub screws in the tops of the anchorages; it pays to countersink the ends of the cross holes to lead the cable ends into their locations. Just to the right of the detail of the anchorages is a layout of the set of four; the chamfer called for in the middle of the cluster of parts is to clear the bogie pivot, which otherwise might

get in the way of effective operation. The cables and their fastenings are pictured in **photo 4**, for which purpose the bogie stretcher, bolster and support beam have been removed; this view also shows the neat way in which the fabricated callipers sit astride their lower one-piece counterparts.

The other ends of the Bowden cables are clamped in two small brackets (different for front and rear). These are clearly visible in photo 2, which also illustrates the superb vacuum actuator which is specified as coming from the stable of Paul Norman (PNP Plastics). I think that maximum mechanical advantage will probably be required and the operating crank is fitted in such a fashion, using the end hole of the group. In photo 3 the actuator assembly has been turned upside down to illustrate the slightly smaller block which holds the Bowden cables which operate the front bogie. Effort is applied to the cables via a double-ended cable crank, whose two throws are drilled $\frac{1}{8}$ in. diameter. In photo 2 you can see that these holes are fitted with a double-ended pin 1in. long, which is 6mm diameter. The distance between cables is 0.500in. and the crank is 5mm thick. The gap between the two cross-holes is filled by a couple of washers about 0.120in. thick and the ends of the pin are tapped 4BA for small grub screws. This arrangement of using a 6mm pin in a $\frac{1}{4}$ in.

hole allows some flexing and therefore compensation between the two cables. It is my intention to apply some grease lubrication to the cables before they enter service.

Chassis work

I am holding over until next time a good picture of the assembled underside of the whole tender, since I shall be discussing the bodywork and fittings as the final offering in this series. However, before leaving fig 1 in our sights, I should like to draw attention to a small modification in the area of the chassis fixing: the pairs of holes at each end of the chassis channel section have been moved $\frac{3}{16}$ in. nearer the centre of the section; corresponding with the matching holes in the No. 4 angle irons, this makes for easier assembly around the buffer beam area. I would also recommend opening out the holes in the angles to $\frac{1}{4}$ in. dia and tapping both the beams and the channel sections $\frac{1}{8}$ in. BSF, with the screws cut off flush in the buffer beams.

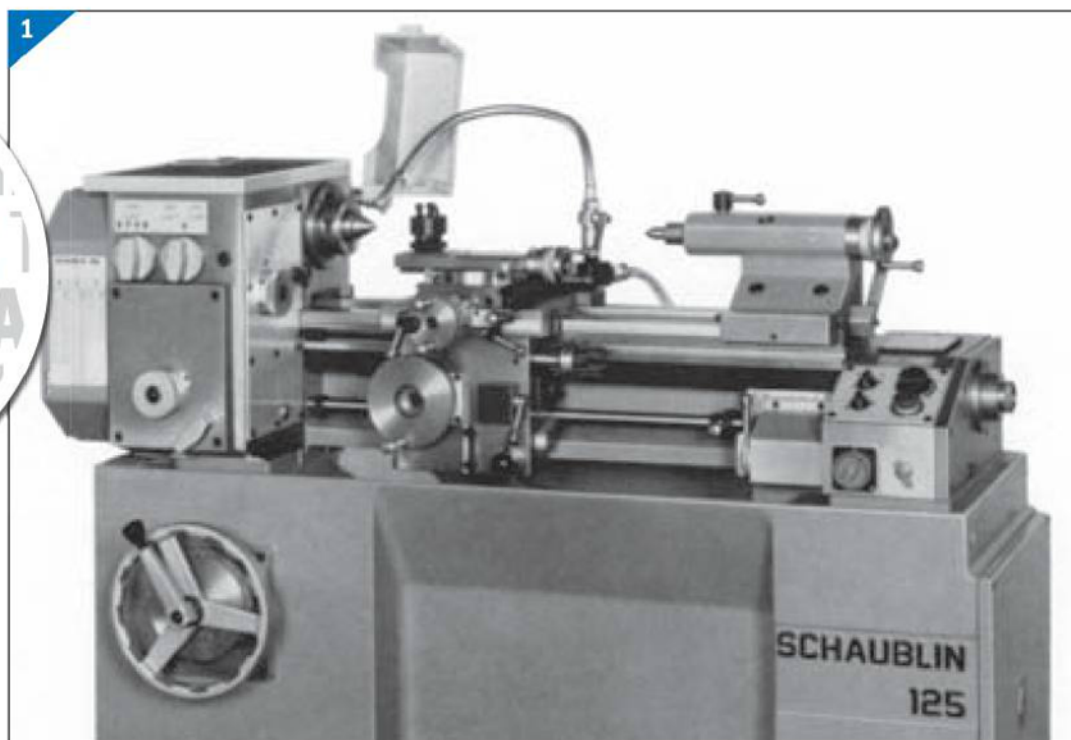
● To be continued.

Drawings, castings and laser cut components for this locomotive are available from the designers. Contact D. A. G. Brown, T. 01780 753162, E. dag@brownmallards.org.uk or Mark Smithers T. 01904 794430, E. mks1960@tiscali.co.uk





Tony Griffiths
describes the
Schaublin 125
lathe - a model
engineer's dream!



Schaublin Swiss precision

The Schaublin 125 lathe was introduced in the early 1970s and joined the company's older and newer screwcutting lathes, the 120, 135, 150 and 160

series - a group that, although similar in many aspects of their design, all were significantly different in detail.

With a 270mm swing over the bed and 500mm between centres, in size and capability, the 125 was a toolroom lathe in direct competition with the superb Hardinge HLV-H. and was, as such, a complex machine built largely without regard to cost.

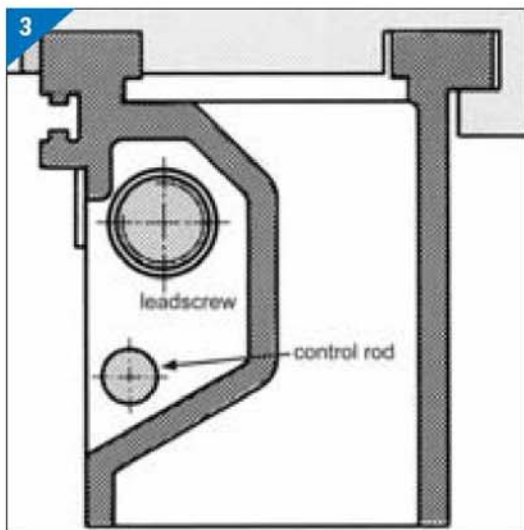
The two lathes shared three important functional similarities: continuously variable-speed drive to the spindle, the provision of an instant-retracting cross slide (to help with screwcutting) and, most important of all, a variable-speed D.C. electrical drive to the carriage that controlled the power sliding and surfacing feeds. By separating the carriage rate from a direct mechanical connection with the headstock spindle (though this was still

available for screwcutting, of course), the operator could quickly and easily obtain the right setting of spindle speed and tool-feed rate to tackle any job from the largest that the faceplate could hold, to tricky multi-start threads, to small-diameter components turned at maximum revolutions.

Three versions of the 125 were available: A, B and C. All accepted the same accessories and each was fitted with an identical electronically-controlled carriage feed. However, the Model A, with a spindle speed of 225 to 3,000rpm, lacked screwcutting. The B was fitted with metric/English screwcutting using changewheels in a system described by the makers (because it employed some permanently mounted gears) as a: 'screwcutting gearbox using change gears'. The

1. Schaublin 125 Lathe.
2. Lathe bed.





3. Section through bed showing lead screw and control rod.



4. Headstock.

top-of-the-range Model C was equipped as standard with a 'proper' dual metric/English screwcutting gearbox together with a reduction gear in the drive system that widened the spindle speed range from 68 to 3,000rpm. Although the reduction box was an optional-extra for the A and B models it appears, from the numbers encountered, to have been a popular choice on the model B, where it would have been needed, in any case, for effective screwcutting and large-diameter turning. In addition, any model could be equipped with a set of pulleys and belt that gave higher spindle speeds: 300 to 4,400 without the reduction gear and 60 to 4,400rpm with it.

All versions of the Schaublin 125 weighed nearly 1,000kg (1 ton), were 59in. (1,480mm) long, 29in. (730mm) deep and 50in. (1,280mm) high.

Bed and Stand

Measuring 220mm wide and of massive depth, the hardened rectangular-way (flat-topped) bed was braced by enormous cross webs and was immensely rigid. It was further strengthened by being mounted on a stand of typical Schaublin design and construction with a one-piece cast iron base topped by an

integral (but rather too small) chip tray. The right-hand section of the cabinet held the electrical switchgear; the left-hand compartment the drive system with the back face cut away to house a neat, tall, 22-litre coolant tank and motor-driven pump.

Compact and self-contained, the drive system was housed around a large aluminium casting, with a 2-speed 0.9/3.0kW, 750/1,500rpm, motor in the base, driving a variable-speed system that used a wide V-belt, running over expanding and contracting pulleys, to an Ortlinghaus, oil-immersed, multi-plate, spindle-mounted, combined clutch/brake unit. The final drive to the headstock spindle was by a toothed belt. The motor was switched on and off by a lever connected to a control shaft that ran the length of the bed. The speed was controlled using a large handwheel on the left-hand side of the cabinet, which opened and closed pulleys. Selection of low and high-speed ranges was by means of a lever mounted concentrically on the speed-change handle shaft. A long foot pedal, positioned along the stand's lower front edge, was used to apply and released a powerful spindle brake, but allowed the motor to continue running. To release the spindle, so that it could be turned by hand (to inspect a job or release a chuck), a separate shorter pedal to the right of the brake was pressed.

Headstock and fittings

The headstock comprised a strong, internally-ribbed, rectangular casting which was adjustable on the bed for alignment. It carried a 28mm bore, D1-3in. camlock spindle running in two pairs of pre-loaded, ultra-precision, angular-contact ball bearings grease-packed for life. The choice of these very expensive bearings was to ensure that accuracy would be maintained over an unusually long service life.

Collets played an important part in the expected use of the 125. The inside of the spindle nose was adapted to take direct-mounting, draw-bar retained, Schaublin Type B32 collets, with a maximum through capacity of 24 millimetres. A special D1-3in. nose-piece adaptor was available for use with internal and external stepped collets (capacity 20 to 120mm). An expensive, high-accuracy collet set, designated B32-UP (ultra precision), was also listed and had a guaranteed concentricity of 0.005mm - or better. For these collets a special quick-closing drawbar (part 125-21.255) was required. A range of D1-3in. mounts, to hold hardened-steel expanding arbors, was also offered and (to special-order only), conversions to accept standard Schaublin W20 and W25 external and internal stepped collets, closers and expanding arbors.

Besides the ordinary hand-operated lever type, for rapid production work, several

designs of collet quick-closing mechanisms were available including pneumatic and hydraulically operated types. Even the faceplate and drive dogs supplied as standard were high-quality. The faceplate was very heavy (7.7kg) and equipped with 4 T-slots and 30 M8 tapped holes. The eight drive dogs had a maximum bore of 30mm and were made of hardened steel.

With the drive system and speed change mechanism fitted in the stand, all the headstock-mounted controls were concerned with screwcutting.

Indentification

The position of the controls is a good indication of the Model of 125 - especially when viewing photographs of a potential purchase, where the vendor may be unaware of the important differences between the versions (and their widely differing values). On Model A, the front face of the headstock was bare; the B had one knob at the top and a dial beneath; the C had two knobs at the top, a dial and lever below, and a dial on the inner face below and in front of the spindle. In the case of Model C, the upper left-hand knob selected four ranges of English pitches, the upper right swapped between English and metric threads, and the lower and front-face dials set individual pitches. The small lever in the lower right-hand corner reversed the direction of the leadscrew to give right or left-hand threads.

Carriage and power feeds

At the tailstock end of the bed was what Schaublin termed the 'turning gearbox' - an assembly of gears, driven by a 0.24kW variable-speed DC motor, working through an adjustable, multi-plate, safety clutch that gave longitudinal and traverse feed rates from 4 to 260mm per minute. However, the drive was not as straightforward as one might have expected and, instead of a separate power-shaft working through worm-and-wheel gearing (to

preserve the leadscrew just for screwcutting) Schaublin, reflecting the practice used for many years on the popular 102-VM, made the leadscrew perform both tasks. However, this was no ordinary leadscrew but was exceptionally large (40mm diameter and 4mm pitch), hardened and ground, running in angular-contact bearings and clamped by long nuts provided with positive oiling.

To provide power for the cross feed, a shaft emerged from the rear of the 'turning gearbox', passed down the back of the bed, to drive the cross slide through bevel gears. This rear-drive system, used countless times by numerous makers from the late 1800s onwards, simplified the apron gearing and operating controls. A single lever, on the inside face of the 'turning gearbox', selected the feed (along or across the bed), with an electrical switch to select the direction, and a dial to vary the speed of cut.

Simple, easily operated and well thought-out, the apron-mounted controls even included good-sized levers to lock the carriage and cross slide. Running through the apron was a long control rod (as used on the 102-VM), that allowed the power sliding feed to be knocked off in either direction and (by the use of retractable dogs) both the feed and spindle to be stopped when screwcutting - the latter

a boon to the busy machinist and a wonderful safety feature. As a further refinement, high-speed screwcutting was possible where, on completion of a cut, moving a lever instantly retracted the cross slide; shifting the lever in the opposite direction caused the carriage to automatically return to its starting point allowing the operator to apply more cut and start the process again. As the makers claimed, with this system in operation it was possible for: "... even operators without any particular skill to rapidly succeed in producing quality threads in several passes without any risk of mistakes".

The base of the double-wall apron held a supply of oil for distribution around the inside, to the bed, cross slides ways and leadscrew clasp nut, using a hand-operated plunger pump that the makers recommended be operated every 2 hours. Also provided (though unaccountably on the tailstock side of the carriage), was a rotating 6-position stop.

The compound slide assembly was a model of smoothness and accuracy with the 130mm travel cross slide carrying ruler marking along its front edge. Dovetailed edges (as on many Colchester lathes at the time), allowed the quick and accurate mounting of a rear toolpost, and an adjustable 2-position stop. The 90mm travel top slide sat on a wide circular base, with a

particularly strong clamp. Both feed screws were hardened, ran through bronze bushes, and were equipped with beautifully engraved (0.01mm interval) dials. The dial on the cross slide could be positively locked by a through bolt - a method that eliminated any chance of slippage. Both feed screws had the same pitch, with one turn of the handwheel giving 2mm of travel.

Screwcutting

Incorporated in the Type B screwcutting mechanism, was a permanently mounted 127t gear that allowed both English and metric threads to be instantly available, by simply moving a selector on the face of the headstock. The arrangement did not obviate the necessity to rearrange the changewheels but, with such a large number provided as standard (21t, 23t, 24t, 28t, 36t, 42t, 48t, 56t, 2 x 60t, 72t, 80t, 84t, 88t and 90t) all metric pitches between 0.25 and 8.00mm could be cut, as could all English screws between 112 to 3 threads per inch.

The 'proper' screwcutting gearbox fitted to the Model C was also fitted with a 127t gear that allowed metric and English threads to be cut without having to disturb the gear train. This gave 24 metric pitches including 19 marked ones: 0.25, 0.35, 0.40, 0.50, 0.70, 0.75, 0.80, 1.00, 1.25, 1.40, 1.50, 1.60, 1.75, 2.00, 2.50, 2.80, 3.00,

3.20 and 3.50 mm. Seventy two English threads could be cut included 32 marked ones: 112, 88, 80, 77, 72, 70, 64, 56, 48, 45, 44, 40, 36, 35, 32, 28, 24, 22.5, 22, 20, 18, 17.5, 16, 14, 12, 11.75, 11, 10, 9, 8.75, 8 and 6 threads per inch. Extra changewheels were also available: 42t, 46t, 2 x 48t, 55t, 56t, 60t, 65t, 72t, 79t, 80t and 84t. Hence, virtually any metric pitch between 0.25 and 8.00 mm, and all English screws from 112 to 3 threads per inch could be cut.

Tailstock

An early version of the tailstock was of rather lighter construction but both had a No. 2 Morse taper, 100mm of spindle travel with self-eject and a knockout tang slot, provision for correcting any error in lateral adjustment (though not a set-over means for taper turning) and wipers on the bed guide ways. The handwheel was equipped with a micrometer dial reading to 0.1mm and a circular Perspex inspection window, halfway along the casting, to read the 1mm division scale. Also available was a tailstock with capstan-handle to operate a larger No. 3 Morse taper spindle, through a rack-and-pinion drive. However, it was not possible to fit this mechanism to the standard tailstock, an entirely different casting was needed.

Accessories

Schaublin offered a wide range of accessories for the 125, some specially built, others adapted or borrowed from other lathes in their range. Items varied from hydraulic copy attachments, to centring microscopes, to high-speed grinding and milling attachments driven by a self-powered 'overhead' drive. **ME**



5. Apron and compound slide.

6. Tailstock and 'turning box'.

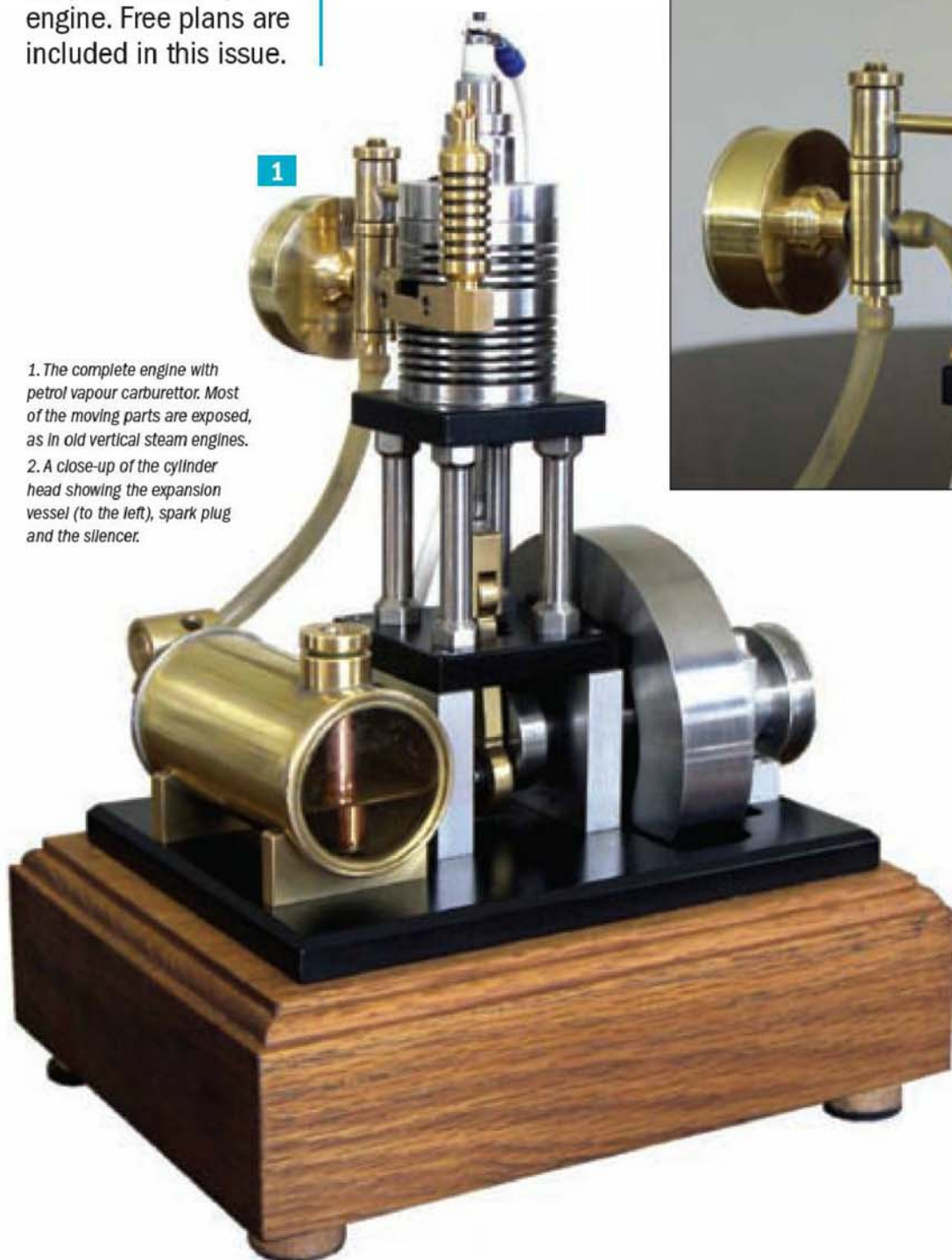
A Simple 2-Cycle I/C Engine

FREE PLAN!

Jan Ridders discusses his design of a simple 2-stroke I/C engine. Free plans are included in this issue.

1

*1. The complete engine with petrol vapour carburettor. Most of the moving parts are exposed, as in old vertical steam engines.
2. A close-up of the cylinder head showing the expansion vessel (to the left), spark plug and the silencer.*



2



The idea for this design started after I completed both the 'Atkinson' 4-stroke and an 'Otto' principle I/C engines. I wanted to design and build a simple 2-stroke engine which would operate relatively quietly and was easy to run. Additionally, I wanted a good-looking engine which was as close as possible to the basic principles of a 2-stroke combustion engine. It had to be able to demonstrate these as clearly as possible, even to non-technically orientated spectators.

I sought to design an engine with the fewest components necessary and a minimum of rotating, oscillating or other motions in the parts. This created a design where almost all moving parts are exposed to view when the engine runs.

For ease of construction there are no complex cooling and/or lubricating systems, or the

need for expensive castings, gears, timing chains or accurate grinding of cams, etc.

Above all, it had to be possible for the 'average' model engineer to make this engine with common materials and typical workshop machinery.

In short, it was my goal to design and make an honest, reliable, nice and quiet 2-stroke combustion engine, rather than a complex and high performing machine. A video of this engine running can be seen on YouTube. W. <http://www.youtube.com/watch?v=17KzKkV3V4Q>

Features of this design

No engine crankcase. The crankshaft is on the outside, as is usually the case with steam engines. The bottom side of the cylinder is closed with a simple cover and a bush for the piston rod. This eliminates a difficult to make crankcase with gas-tight seals.

Simple ball valves will open and close automatically at the right times, determined by the piston movements. This eliminates a mechanically driven intake valve and adjustment of it.

The ignition of the spark plug is uses a piezoelectric element. This is a very simple and compact arrangement compared to the classic system. It eliminates breaker points, high-tension coil, capacitor and battery. I took a piezo crystal, along with another two parts, out of a hand lighter for gas cookers. An ignition cam on the crankshaft takes over the function provided when one squeezes the trigger on these units. When well adjusted this system delivers reliable sparks, even at high engine speed. In fact, the piezo system makes a short spark-train with every cycle which is probably an advantage for a reliable ignition of the fuel mix.

The spark plug is home-made. It contains a Teflon isolator that withstands temperatures up to 180deg. C or more and makes the plug gas-tight at the same time

In the petrol tank there is a simple system that provides for an ideal mix of petrol vapour and air. It takes over the task of a classic, but more complex carburettor.

Air-cooling is sufficient for the engine because it was not intended for long runs at high speeds. Demonstrations of 10 to 15 minutes are more than enough as a rule and for that period, this engine has no problems.

Cylinder and piston

For the cylinder and the piston I used cast iron. In this use, this material is highly preferred, and maybe even required. The expansion of cast iron is very low and in any case equal for both cylinder and piston. Because it is more or less self-lubricating due to its relatively high carbon content, it prevents jamming of the piston, even without oiling. Furthermore, cast iron is highly temperature resistant and working the material is rather easy, even if a bit messy to machine.

I used only one piston ring, but the engine might even run without a ring if the surfaces of the piston and the boring of the cylinder are sufficiently accurate and smooth.

Expansion vessel

Initially the engine did not run properly until I added an expansion vessel, which was a valuable tip from Martin Alewijn. He stated that the extra volume should improve the flushing process above the piston, while I thought that a small as possible volume below the piston causes a maximum pressure and, with that, a maximum amount of the petrol vapour/air mixture would be pressed through the intake ports above the piston.

According to the basic physics that is true, but I overlooked one thing: because I made the space below the piston very small, the pressure of the fresh vapour/air mix became very high. If one makes this volume almost zero, this pressure becomes almost infinitely high!

So, the pressure of the fresh vapour/air mix below the piston cannot be too high nor too low, or the flushing process to clear exhaust gases above the piston will be inadequate.

There is a certain optimal pressure and volume for this expansion vessel, which I determined empirically, must be about 12cc in this case. This is equal to the cylinder content, but I consider this as just a coincidence.

The crankcase of 'conventional' 2-stroke engines is, in fact, an expansion vessel, too. This volume plays an important role in pressurising the petrol/air mix and the subsequent flushing process. Because I did not make a crankcase in this model, the external expansion vessel is in fact a substitute for the crankcase volume.

Flywheel

The flywheel must have a fair-sized mass to run this engine with a relatively low revolution speed. The dynamic energy of a bicycle type flywheel is $E=0.5mw^2r^2$ where m is the mass, w is the radial speed and r is the radius of the wheel. The flywheel of this engine is made of steel with a diameter of 150mm and a width of 20mm. The mass is 1.2kg and the

dynamic energy is about 2.6Nm at 300 revolutions per minute.

Miscellaneous

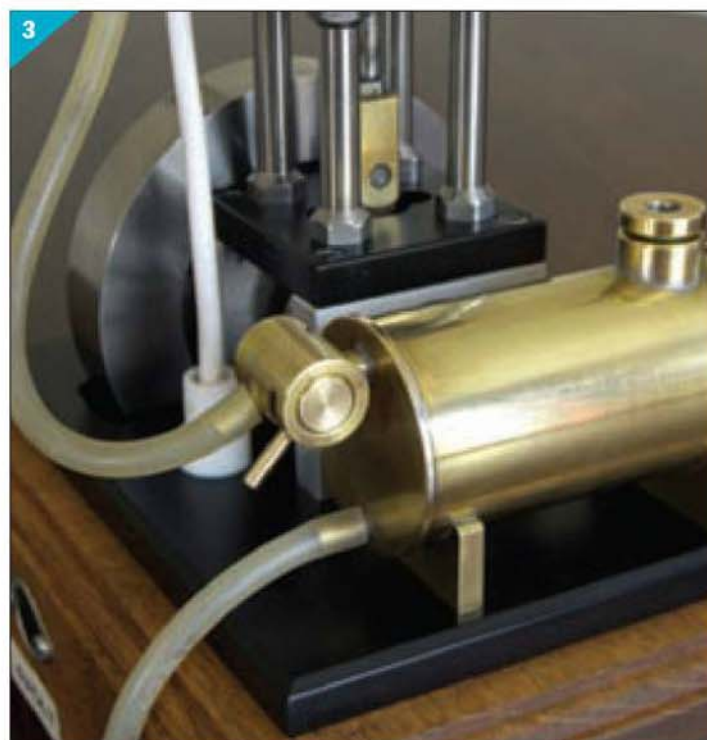
Both the diameter and the stroke of the piston are 24 millimetres. The working volume is about 12cc. The compression ratio is about 1 to 5. I prefer revolution speeds as low as possible for this kind of model engine. So far, the lowest possible speed for this engine is about 1,000rpm.

The engine runs on standard petrol Euro 90 or 95 for cars, without the addition of oil lubrication.

The cylinder temperature usually won't exceed 110deg. C after 10 minutes of running. Since I never need longer run times or high speeds, there is no reason to add a complex water cooling system for these conditions

After each run I put one drop of oil in the cylinder through the exhaust opening. Not really to avoid seizing of the parts, but it will keep the piston and cylinder surfaces in a good condition. **ME**

3. The engine base with the petrol vapour carburettor. The throttle for engine speed is the small lever on the fitting attached to the tank.



FREE PLAN!

A Unique Petrol Vapour Carburettor

Jan Ridders describes the design of his petrol vapour carburettor for small I/C engines. Plans are included free with this issue!

The carburettor is one of the most important parts of a combustion engine and determines the performance and the behaviour of an engine to a very great extent. It is not easy to make a carburettor for a model engine. Problems such as unreliable start-up, 'flooding' the engine, and carbon soot on the spark plug are classic annoyances. Without claiming that it is impossible to make a reasonable operating carburettor, I postulate that it is hard for every model builder, particularly novices, to make them according to the classic automobile designs of float chambers, multi jets, and which achieve satisfying results the first time. This idea made me think of an alternative process that provides for a mixture of 100 percent petrol vapour and air with the ideal ratio of about 1 to 14. A YouTube video shows both styles of intake tubes for this carburettor:

W. www.youtube.com/watch?v=gGU6TZTL97Y

This carburettor is not much more than a petrol tank with a specially designed three way valve.

Carburettor design

The task of a carburettor is to create a mix of air and petrol for combustion in the cylinder of the engine. A good one must mix about one part of petrol with 14 parts of air. The petrol droplets must be as small as possible; the smaller the better the combustion will be. Big or unequally formed droplets often cause flooding of the engine and/or carbon soot on the spark plug due to incomplete combustion resulting in irregular engine behaviour.

The ideal would be that the air is mixed with petrol vapour instead of fluid petrol droplets. Self-made carburettors for model engines sometimes fail to reach this ideal and may not reach a higher ratio than 1:10; it is very difficult to avoid incomplete combustion in that circumstance.

The theory about the ideal carburettor brought me to the idea to make an entirely different carburettor design (although I am told it is a technique used on early motorcycles). The basic thought is that if air is forced through liquid petrol it will create a petrol vapour above the liquid. This can be drawn off and mixed with additional air to create the ideal ratio of 1:14.

First design

The first version of this design has air sucked into the tank through a tube that reaches the bottom of the tank (**photo 1**). The incoming air bubbles through the petrol causing a kind of foam (but it's really a vapour we need). Because the content of petrol vapour in this primary gas/air mix is greater than required for the ideal ratio (it's too rich with petrol) extra air must be added with

a second adjustable intake between the tank and the engine's intake port.

However, there was only a little problem, or inconvenience with this concept. The two regulators (one on the tank top and the throttle-extra air mixing valve are worked independently from each other. You needed some experience to adjust them correctly for a prompt start-up and to regulate the engine's speed. Mis-adjustment of one of the two regulators sometimes caused an engine to stop.

The principle of this improved and simplified carburettor design

A model builder colleague, Gerrit van Kampen, came up with the idea to combine the two air regulators in only one three-way throttle valve with what the ratio petrol vapour/air can be continuously regulated. I liked the idea from the start and within two days I came to the conclusion that it was working extraordinary well!

To my surprise it appears to not be necessary to bubble air through the petrol. A simple tube that ends above the petrol blowing onto its surface is sufficient. It makes a kind of depression in the surface of the liquid depending on the air flow. Neither the distance of the tube above the petrol surface nor its diameter appeared to be critical.

The short intake tube also means that petrol cannot be pushed out of the tank in case of tank overpressure or an unexpected reversing of a 4-stroke engine.

In every position between the limits of the throttle valve, the engine will run with a speed dependent on the

1. The first version of the carburettor. The small holes at the bottom of the tube caused the air flow to bubble through the petrol. The current version has the intake tube above the level of fuel so the air flows over the fuel, not through it.

2. A top view showing the simple throttle/air mixing valve used to control engine speed. The drain is the tube at the bottom of the tank.

3. The carburettor can be mounted on a variety of small 2 and 4-cycle engines, such as this split-cylinder Scuderl 4-stroke engine.



2



original fuel/air ratio. Around the middle position, the ideal of 1:14 will be achieved and there the engine will run best and/or fastest. The regulating characteristic is nicely continuous although may be not 100 percent linear.

Running this carburettor

Fill the tank about half way with fresh petrol (about 50 cc). I use standard auto car petrol Euro 95 or 98 without any oil addition, even for my 2-stroke engines.

Start the engine by hand or with a hand drill and, at the same time, turn the three-way throttle valve until you hear the engine take over.

Adjust the throttle valve with running engine until the engine runs at the desired speed (photo 2).

You can change the speed by turning the valve gradually in one direction or the other to obtain a somewhat richer or poorer gas mix.

Depending on the cylinder size and the engine's speed, the engine will slow down somewhat gradually after a few minutes which is caused by two simultaneously events. First, the concentration of the most volatile petrol component gradually decreases and second, the petrol in the tank is cooling down somewhat due to the petrol evaporation (which reduces the creation of vapour by the incoming stream of air).

You can correct the engine's speed by turning on the throttle valve in the direction for a

richer gas mix (= less extra air added). On longer runs and with relatively big and fast engines you must add some fresh petrol or refill the tank. Keep in mind that this carburettor is designed for stationary and rather small I/C engines with cylinder volume of about 15cc and with speeds between 500 and 2,000rpm. I usually let my engines run for 5 or 10 minutes maximum which in my opinion is more than sufficient for a successful demonstration.

Operation

During the start-up of the engine one can adjust the right throttle valve position with the other free hand for pulling a starter cord or holding a starting motor. This makes this start-up process a lot easier.

Provided the throttle valve is adjusted gradually the engine reacts very proportionally and steadily.

It may be advisable to connect this carburettor with a rubber (silicone) tube to the intake manifold of the engine (especially 4-stroke) to eliminate possible effects of a reversed stroke. In my opinion the possibility for that is low, but because of the constant low pressure in this tube it is not necessary to fit it tightly.

Construction and installation notes

One regulator throttle valve with only three very simple parts as a substitute for the two somewhat more work some regulators. Because there are hardly any pressure differences inside and outside this valve a good standard of fit between the of the outer body and the inner portion will be sufficient for good operation. Greasing it a little bit will make it turn nicely and maintain it for life.

Something simpler than screw-able intake tube is not imaginable and it also acts as the petrol filler cap.

One can connect this carburettor simply and directly with a rubber (silicone) tube of the required length to the inlet manifold of nearly any 2 or 4-stroke model engines (photo 3).

The dimensions of the tank itself (diameter or length) don't affect the function, so they can be changed if desired.

The sight glass can be made from 2mm thick Perspex, but glass is preferable because Perspex can be affected by

petrol over the long term. You can adapt the recess in the end plate for this glass according to the dimensions of the glass you have obtained, for instance from a watch maker or an optician. I glue this glass in place with the well-known instant cyanoacrylate (super) glue which is resistant to petrol in this application. (You need to consider the best way to install this sight glass by petrol resistant adhesive, mechanical means with o-rings or other methods, if indeed you want to have a sight glass. Ed.)

Bonding

Martin Alewijn gave me a useful safety tip to avoid static electric charge in the carburettor. That's why the carburettor is made from brass and screwed to the mass of the engine (or bedplate).

Size and speed limitations

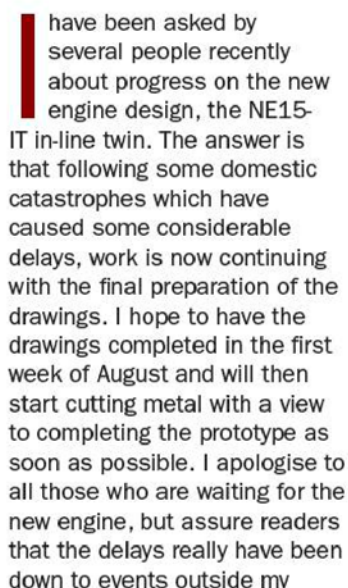
This carburettor can be used for engines with cylinder volumes up to 15cc and speeds of about 2,000rpm. With an engine running at that speed, the air flow through the tank is about 30 atmospheric litres per minute. With much bigger engines and higher speed the air flow through the tank would be much greater of course. I cannot exclude the possibility that at a certain (very) high flows, the air cannot take enough petrol vapour with it. If, and at what flow, that can happen I cannot say. In case of doubt one always can always replace the short stream tube by the original tube as in the 'Petrol Foam Carburettor'. It is advisable to scale-up the tank dimensions in case of a much bigger and/or faster engine.

Conclusions

I hope this design relieves many builders of internal combustion engines, except perhaps some experts in this field, of a 'carburettor nightmare'. This version of the carburettor is a simple and reliable solution for small, stationary internal combustion engines. It is a good example of how simplicity can bring big benefits.

ME





control. In fact, the Guildford Rally is the first event I have managed to attend this year. I have to say, however, that I am very flattered by the interest shown in the new design.

I managed to get to the Guildford Rally for a short visit this year and, as usual, it was a very good show, although the number of I/C engines was down a bit on previous years. At least the weather was better than the previous year with only the occasional shower to dampen proceedings.

The **I/C Engine Builders Group** was in its normal place in the

John was not entirely convinced that this engine was a 1903 version; his opinion, after consultation with members of the De Dion Bouton Society, was that it was closer to a slightly earlier engine. Whatever the pedigree, it was certainly an unusual and good-looking piece of work and I look forward to seeing it running in future.

At the other end of the display, and a complete contrast to the single-cylinder De Dion, was the amazing 24-cylinder Napier *Dagger* sleeve valve engine being built by Norman Lawrence (**photo 2**). I have photographed this amazing piece of handwork many times before, but considerable progress is visible with a large part of the assembly now done. Norman is one of those very talented model engineers who uses hand machining techniques throughout his models, none of the beautiful curves and finish on this engine have been produced using CNC techniques. The superb workmanship can be seen clearly in the three cylinders (**photo 3**). Everybody who sees this engine is not only in awe of the workmanship,





but also comments on the incredible patience needed for such a project.

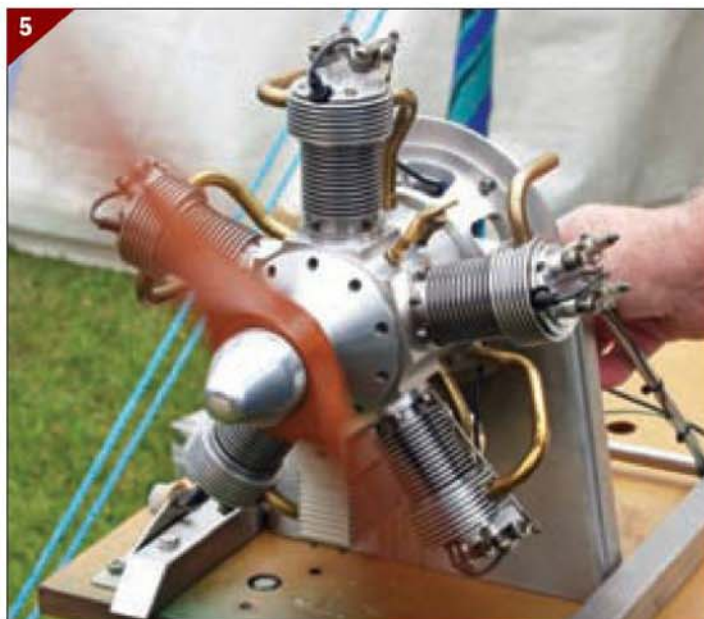
I stayed inside for the next engine which was an example of the well-known Edgar Westbury designed *Seal* 4-cylinder side valve engine. Westbury designed this engine in the late 1940s as a typical 4-cylinder automotive engine of the period. The side valve engine features splash lubrication, a gear driven camshaft, and coil ignition via a distributor. This example (**photo 4**) is by Malcolm Beak and was fitted with a small radiator/fan unit and fitted with an electric starter. At regular intervals, Malcolm would flick the ignition switch and press the starter, bringing the engine to life, to the obvious amazement of those visitors who did not expect it to work. Malcolm uses roller clutches to couple the starter mechanism and it certainly does make things easy although I have fond memories of pulling my own *Seal* over by hand with a starting cord to get it going. This is a popular engine and castings for this and other Westbury designs can be found at Hemingway Kits; T. 01746 767739, W. www.hemingwaykits.com

In fact while I was on the stand with Malcolm we had a discussion with one gentleman who was having problems making his own version of the *Seal* run reliably. One point that came up is with the arrangement used by Westbury to connect the moving point via a fine compression spring. The spring carries the full current of the coil and two things can happen. The first is that with the high current taken by

modern coils the spring can get red-hot and lose its spring thus causing the points to stay open (this happened on my own engine). Also because of the current flowing through the contact area between the spring and the moving point, corrosion can occur in this area, also preventing things working (Malcolm had this problem). Both of these problems can be cured by providing a flexible wire connection between moving point and live terminal so that the current is carried by this, not the spring. Hopefully this comment may prevent others from suffering the same frustrations.

My last engine for this report is the 1:5 scale Kinner JZ-5 5-cylinder radial engine built by Ron Hankins. Ron had his version of the engine set up outside and was running it (**photos 5 and 6**) at intervals during the day. This engine is a very workmanlike radial engine with a bore and stroke of approximately $1 \times 1\frac{3}{16}$ in. giving an overall capacity of around 75cc. The engine has five individually driven camshafts rather than the conventional gear driven cam rings and has spark ignition. This design was originally produced by Merrit Zimmerman and serialised in *Strictly I.C.* magazine (issues 36-40) in 1994. Back issues can be obtained from www.strictlyic.com and the constructional articles include full CAD produced drawings.

There was a later 1:6 scale glow plug version produced by David Johnson (*Strictly I.C.* issues 53-56). This version has a bore and stroke of $\frac{1}{16} \times \frac{7}{16}$ in. giving a capacity of just over 13cc. This makes for a more



manageable engine, although smaller engines are often more critical to set up and run.

Both engines are built from bar stock and although I have no direct experience would probably make a good introduction to radial engine building.

Who started it all?

During a conversation with a gentleman at the Guildford Rally, we were talking about engines we had both used in the past to power models, in my case boats and in his case aircraft and he asked who is credited with starting the production of miniature engines for use in models? Both of us had used engines such as those from E.D., Frog and O.S. during the early 1960s but by

4. Malcolm Beak had his electric start version of the Westbury Seal design running at regular intervals.

5. Ron Hankins version of the Kinner JZ-5 was another engine being run regularly.

6. One of the cylinders on the Kinner, showing the valve gear layout.

that time development had progressed to the extent that there were many commercial engines on the market from both large and small manufacturers.

At the risk of opening up a very large can of worms, I put forward some brief thoughts on the question here.

If we start off the story in the early 1930s, there were many people in America and





7. The Brown Junior replica 2-stroke engine.

8. The rear of the Brown Junior, showing the small exhaust ports and straight side-port induction.

9. The 10cc Ohlsson 2-stroke shows many similarities to the Brown.

in the United Kingdom who were experimenting with small engines to power model aircraft and also model hydroplanes.

Names such as Stuart Turner, Bonds and Grays were all active in the model hydroplane engine field in the UK, although the engines were all 4-strokes, were heavy and slow rewing, and did not do much to eclipse the flash steamers hold on the sport.

Up until this time powered model aircraft were inevitably rubber-powered other than some experiments with lightweight steam power plants. Names that spring to mind are those of Westbury and Bowden (also active in hydroplanes) in the UK and Brown and Ohlsson in the United States but there were others also carrying out successful experiments with I/C engines for model-powered flight.

Remember that the engines at this time were basically built by individuals and nobody

had yet made a successful model engine in large numbers although several engines were in production by individuals in a small way.

In the early 1930s there were two notable successes with I/C engine-powered models. In the United States, Bill Brown had produced an engine used to power a model aircraft *Miss Philadelphia* that went on to win several competitions, albeit against the traditional rubber-powered models of the day.

At around the same time, Colonel W. E. Bowden had successfully flown his *Kanga* biplane powered by a Westbury designed engine. This engine was the famous *Atom* design and like the Brown engine was a spark ignition 2-stroke. *Kanga* was followed by a smaller aircraft powered by the Westbury designed *Atom Minor* engine.

Both of these successes proved what could be achieved. Not far behind these were others such as Irwin Ohlsson and Dan Bunch, also producing successful engines. The *Atom Minor* was also in production for "some time" according to Westbury in his book *Model Petrol Engines*.

The engines all took a similar design philosophy being side-port 2-stroke engines with fairly long strokes and cylinder port intake.



The Brown Junior (photo 7) shows the typical unsophisticated design but does incorporate some interesting features including a lapped steel piston and a soldered on transfer passage (on the front of the cylinder). Note the very small exhaust ports (photo 8) compared with more modern engines. In this case they are just a series of drilled holes.

This engine is in fact one of the limited edition 40th Anniversary replicas produced by Herb Wahl in 1975. The initial production of Brown engines was by Walter Hurlleman, but in the late 1930s the Junior Motors Corporation was formed

and over 50,000 engines were produced during many years of production.

The Ohlsson (photo 9) was also produced for some years, but I don't think in such numbers. It features a slightly more advanced design with a bolted on casting incorporating the transfer and intake passages and a much larger exhaust port. This is one of the early "stepped fin" engines; later models had a smooth curve outline to the fins.

My own view is that probably the Brown Junior was the one that really started it all. Herb Wahl certainly makes that claim, but as always, I welcome other views. **ME**



LILLIAN

A narrow gauge locomotive for 7 $\frac{1}{4}$ in. gauge

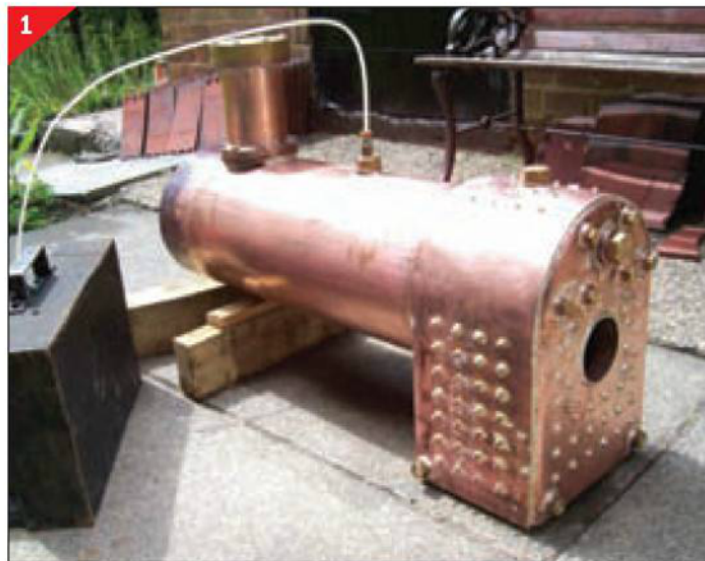
Keith Wilson has more boiler building tips for Lillian builders and some thoughts from a visit to the Leyland SME.

*Continued from page 161
(M.E. 4331, 1 August 2008)*

Busy 'gluing' together two Dean Goods kettles and one GWRILLIAN has drawn another tip or two to my attention. **Photographs 1 and 2** show the first Lillian boiler completed, by Ron Miller of the **Wolverhampton & District MES** who has helped me in the workshop for several years. Boilers weighing in at about 350lb plus take some handling! The nicely-made valve gear and the Lillian boiler sitting on the frames are shown in **photo 3**.

Boiler stays

The problem with inserting longitudinal stays is always tricky, for you have a long stay to thread through both front tubeplate and backhead and very little to hold on by. A short bevel or taper on the far end of the stay will help, this taper is best at the front end where it's not so obvious. Another good way is to drill a hole in one end of the stay - preferably done in the lathe - $\frac{3}{32}$ in. dia. is okay.



1. The backhead end of Ron Miller's Lillian boiler.

2. Ron's boiler under hydraulic testing. The pressure gauges read 200psi.

3. The nicely finished valve gear of Ron's Lillian.



Thread this stay in through the backhead, and a length of material in the corresponding front-end hole (I use a length of silver-braze material, it's always close to hand). Viewing through the dome bush (or its hole if yet unoccupied) it is the proverbial 'piece of cake' to get the end of the material into the drilled hole of the stay. Locating the

stay into its hole in the front tubeplate is then an absolute doddle. This is one of the things that seem so obvious once they are pointed out.

Another way is to use a longer stay that can be trimmed off later. ALWAYS remembering to leave about $\frac{1}{8}$ in. proud of each plate - it makes silver-brazing so much easier.

It is quite likely that you will have some trouble in avoiding stays already present. Although you have no doubt followed drawings carefully, it can easily occur that long stays, crown stays, and cross stays (particularly in Belpaire fireboxes) all disagree within themselves as to which shall be in any given space (or lack of it!). It can appear quite a nightmare. However, there is no need to worry if some stays have to be bent a bit to get them in, even an S-bend near the backhead on long stays will do no harm. It is of no importance if a cold boiler rattles a bit if shaken, a certain amount of clearance due to heating expansion plus a good bit more due to pressure expansion will take care of this. I did the required calculations some years ago; they were published at the time. Even a bend from dead straight of $\frac{1}{2}$ in. will pull straight due to these factors. Recollect that long stays do not necessarily meet the temperature of the outer shell, of course they can hotter it but it doesn't make much difference.

On no account fix the rear end of the boiler rigidly to the frame - unless of course you desire a curved frame. Even if the frame reached boiler temperature; the boiler, if copper, would expand quite a bit more.

I am reminded of a story of one Christopher Columbus. He was at a feast and was a bit nettled at being asked how he managed to 'discover' the American continents, as anyone could have done it.

He called for an egg and asked each person there to make it stand up on the small end. All failed. They asked C.C. to show that it was possible. He brought it down gently on the table, just hard enough to crack the shell a little - of course it remained upright on the small end.

"But that's so easy," said all present. "Yes," said old C.C., "It's easy, now I have shown the way."

This is somewhat similar to my method of pre-quartering axles and driving wheels, and

eccentrics all keyed together with great accuracy, for I put together several different writers' works, therefore very little credit is due to me. "I could not have seen so far had I not stood on the shoulders of giants". So said Isaac Newton, one of two giant Isaacs known to man. (All right, the other was Isaac Asimov.)

Boiler balance: stable or metastable

I have already shown some methods of propping up large samovars in order to silver braze them easily. It may seem over-obvious, but for a boiler of a large $3\frac{1}{2}$ in. gauge or a smallish 5in. one, especially if you are a beginner at the task, it is wise to have someone else present to help. For it is needful at times to rest the kettle on its front end - for example to deal with backhead and inside of firebox tube plate. The brute is then in a state of metastable equilibrium. (Examples: Stable equilibrium - a pencil lying on a level or concave surface lying on its side. Unstable - a pencil balanced on its point. Metastable - pencil balanced on its flat (unsharpened) end.

You may disturb the first pencil but it won't of this disturbance put itself upright. You may disturb the on-point pencil and it will never return to the point-balance condition by itself. You may disturb the pencil-on-its 'blunt' very slightly and it will rock a little and settle down on blunt-end, but push a little harder and it will topple into the 'stable' position.

With another person present, he or she can stand by with insulated gloves, for if the boiler topples and you instinctively tend to grab it, you will soon wish you hadn't. The type of kettle I have in mind is a 'Pacific' locomotive one, rather long and thin. In fact, if you have some metal chain it is well worthwhile to wrap it around the barrel just below the throatplate and tie it round a rafter or similar in the ceiling. He/she can always have a stick of the silver-brazing material to hand to you, more flux to have handy, a spark gas-lighter to

hand if for some reason your torch goes out.

If a boiler is in this metastable position it can be very easy to push it the um that little bit harder accidentally, especially if you are using dark glasses.

Flame colours in brazing

Actually, normal silver brazing of materials of the general EasyFlo type do not usually require dark goggles. I don't know the exact composition of the flux required, but it seems to be based on potassium chloride or fluoride. Although the element sodium has a bright yellow-orange flame colouration, Potassium (the next heavier element in the same column of the periodic table) has very little colour at all, it is a pale lilac and so not too bright. Clear goggles are essential as eye protectors anyway.

The bright di-chromatic flame colouration of sodium can be seen as yellow-orange flashes in virtually any burning flame in Britain due to the relatively close proximity to the sea. I believe that in places like Winnipeg in Canada, somewhat further away from salt water this is very rarely ever seen.

Di-chromatic? Sodium actually has just two flame colours in the visible spectrum, very close together; only about eight angstrom units between them. Amusingly, when still attending college, I was required to carry out an experiment to measure the actual wavelength of this sodium colour. To my no little surprise my result was bang-on the halfway between point!

For processes like Sifbronzing (which is not ideal for boilers) it is another matter, there is quite a good amount of sodium present and dark goggles are a necessity.

Tricky boiler work

I recall the two most difficult jobs I had to do on boilers. One was the case of a small leak on the vertical water-tubes in a long boiler with combustion chamber, just out of sight. It was eventually cured with a bent piece of silver-braze material and looking (hopefully!) through the firehole.

Another was the case where I had agreed to finish a partly brazed 'Rob Roy' kettle. Unfortunately, the backhead had been done, but the crownstays (girder type) hadn't been. So I had to do that job working through the regulator hole in the backhead - fortunately the bush hadn't been stuck in. I cannot recall the state of the front tubeplate, if it was in the flame from the torch would be handicapped badly by the turbulence created within. For the resulting products of combustion have to get out somehow, if the 'way out' is less effective than the jet putting gases in then pressure will build up a bit. Not high enough to matter apart from the turbulence issue.

Bulging

Several years ago friend Ted Martin (who incidentally owns about nine of my locomotives, including two 'Kings' and a 'Great Bear') sent in an article mentioning that he had witnessed an oil tank under an accidental test pressure of about 150psi. The tank was bulging a bit, but sound, built of $\frac{3}{8}$ in. steel sheet and was 48 x 48 x 72 inches.

I was rather sceptical at first, but soon realized that as soon as the side or ends started bulging, of course, they were in tension rather than bending, and different stress calculations apply leading to totally different stress patterns.

I am occasionally asked how close to 'scale' his railway is. My reply is, "even the facing point locking bars have scale nuts and bolts."

Tube thickness

An important matter in boiler design is the thickness of tubes. At first glance the usual bursting stress would seem to apply, but it certainly doesn't. For whereas a cylindrical tube will stay cylindrical under internal pressure, I have yet to learn if it is possible to calculate matters under external pressure. For even a tiny distortion will make the shape elliptical, immediately the stress goes higher without



any pressure increase. It is surprisingly easy to end up with flat tubes!

I made a boiler to a published design about 30 years ago. It stood a test pressure of 200psi perfectly, but, in common with most professional urn-makers, I gave it an extra 20psi. Looking through the big tubes (I think that they were 1in. O/D and 18ga. (0.048in.) they were flat - very. So I contacted the designer and he agreed instantly with the use of 16 gauge tubes (I had already done this change and had no further problems.) The published design was altered. All's well that ends better! (Tolkien).

Pop goes the gauge glass

I recently witnessed that very rare occurrence - the bursting of a gauge glass. It happened about five seconds after the train had stopped. It was not a loud bang but a sort of whoof! No one was injured, and quite correctly the driver remained seated, acting as a shield for the benefit of disembarking passengers.

As I have mentioned in previous articles, the cloud of condensed steam was surprisingly cold. For in such a case, hot water and steam emerge rapidly, and the water flashed into steam which promptly condenses. To go into steam, some 536 calories per gram have to be got from somewhere, and the only supply of heat is from the condensation cooling very rapidly. In other words, the system is very akin to a refrigerator. I have had a much bigger burst right in my face; it was quite cold.

The lesson for this is that automatic shut-off valves on gauge glass fittings are not really needed in our sizes.



Out and about at Leyland SME

As some know, one of the great kicks I get is to see a locomotive built using one of my designs and doing the job better than I can.

Such happened at the Leyland SME on July 19. A fellow locoman from Yorkshire brought his unfinished 'Ariel' to operate on our track. Unfortunately, I was on duty on the 7 1/4 in. track and could not get near enough whilst Rotterdam Lloyds was working, but the distance from Worden Park Station plus very numerous members of the public obstructed the view. The locomotive ran extremely well with about 1/2 ton of train.

I had a good close-up (photo 4) when she was shut down on the steaming bay and a chat with the owner/driver. I think that the last thing on his mind when deciding to come to Leyland was the thought that I might be there! Looking down the chimney (only GWR locomotives have chimmocks!) I was intrigued to see that whilst the chimney was full bore, the blastpipe was in fact multiple. Result: engine ran like the wind, but was just about silent!

Another very fine locomotive was a 3 1/2 in. gauge *Lion* (of

Titfield Thunderbolt fame) (photo 5). The locomotive is almost unbelievably economical, purring away with a lighter load than Rotterdam, of course. It would do a complete lap or more of the raised track (not sure of length thereof) on one firing only. Original 'gab' valve gear too, so couldn't be notched-up. I have had a drive or two on it in the past, with great satisfaction.

King Charles III was there and ran for just about 6 hours - which I make about 49.5km. (31 miles), but he is not so brilliant on thermal economy, but with full pressure, pulling about two tons up the gradient - he don't 'arf sound nice! There are a couple of places on the line where a flat-out scamper can be safely done, blowing the cobwebs(?) out of the smokebox. One is the long straight climb up to the summit (but not beyond it!) and the other is though the station - also straight but with a very slight adverse gradient. It makes an impressive sight. But not quite as impressive as two 10 1/4 in. 47xx class locomotives double-heading through the station at the Cattle Country Railway. With them, the earthquake effect could be felt quite easily. Friend Bob Symes was there frequently, and he admired them too. As

4. The 5in. gauge Merchant Navy class *Ariel* design Rotterdam Lloyds at the Leyland

5. A very economical to run 3 1/2 in. gauge *Lion*.

for as we both know, these two are the largest true-to-scale model locomotives in the world - certainly in this country.

Dear old Curly hated the word 'scale' with good reason, for he recalled seeing a tinplate train set in a shop window labelled 'scale model railway' - and I don't blame him. But I reckon he would be tickled pink to use one of his pet phrases to see these two thundering past!

● To be continued.

WILSON'S WORDS OF WISDOM

The gravest mistake ever made by the American government was to let the scientists in on the secrets of the atomic bomb.

Unknown (just as well)
American Senator.

Hand Grinding Slot Drills

Harold Pearson describes a grinding technique for slot drills.

Back in the 1950s, as an apprentice toolmaker with Metro Cammell in Birmingham I used to spend considerable time in the main machine shop. One operation that fascinated me was a batch of small machines engaged in milling slots in the end of coupling hooks and buffers. These machines had two horizontally apposed milling heads that held slot drills in collets. The slot drills were fed

in simultaneously from both sides with the slot length set automatically. When I first saw these machines in operation as a wet behind the ears 15 year-old, I could only wonder what happened when both cutters met in the middle, of course they never did, one cutter would back out leaving the other to break through and complete the job.

I was talking with the operator one day who was setting up one of the machines for a new job and I couldn't help but notice that he had taken two brand new double fluted slot drills and re-ground the end cutting faces by hand. I couldn't resist asking him for an explanation which I relate as follows:

Evidently as new, the slot drills had a tendency, depending upon which end of the slot they were at, to pull to the right or left as the cut was plunged in. This resulted in a slot that had a slight S-shape when completed. The operator had learned that by re-grinding the end faces of the slot drills to a fish tail form the cutter would pull to the centre when the cut was applied, resulting in



a nice straight slot. With me being a nice humble little chap (one had to be in the working environment that existed in those days) the operator agreed to instruct me on his grinding technique which I pass on to the readers as follows:

I would not suggest you take a very expensive slot drill and re-grind it by hand but it won't hurt to have a go at one that is past its sell-by-date, who knows, perhaps you can revive it and extend its life a little?

We will assume it's an old cutter that's receiving the treatment (**photo 1**). Wearing suitable eye protection, first grind the cutter back until the damaged portion has been removed. Get the end as square as you can. Grind the cutter to look like the one in **photo 4**, there are no special angles just allow a little clearance.

Getting the ends square is very easy; check with a small square (**photo 2**). The re-ground cutter is shown in (**photos 3 and 4**).

I can assure readers that fish tail ground cutters work very well. I recommend grinding up an old cutter for trial on a bit of scrap material.

It's a little more difficult, but it is possible the grind four flute end mills in the same fashion, but of course there would only be two cutting faces at the tip.

ME





Malcolm Stride reports

Notices

Ilford & West Essex Model Railway Club presents its 53rd Annual Model Railway Exhibition on Saturday (10am to 5pm) and Sunday (10am to 4pm) 4/5 October 2008. The exhibition will be held at St. Edwards School, London Road, Romford, Essex RM7 9NX.

This year the society is delighted to welcome a celebrity guest to their show. 'Jack the Station Cat', the popular character of children's fiction. Alan Cliff the author, possibly unique amongst authors, donates 50% of all profits to the designated charity noted in each book. To celebrate the visit by 'Jack' there will be a Treasure Hunt and special prizes for children. As one of the major draw prizes there will be full set of the books written and personally signed by Alan.

Included in the children's ticket price is a free train ride from 'Much Purring' to 'Tails End', on the 5in. gauge miniature railway provided by exhibition regulars Ride on Railways of Romford. There will be a good selection of railway layouts and trade stands at the event and drinks and refreshments will be available.

South Somerset MEES is holding an Exhibition of its members' work in the recently completed magnificent Tythe Barn in the grounds of Haselbury Mill, Crewkerne, Somerset. The new portable track will be in use. The postcode (for GPS) is TA18 7NY. For further details contact Mike Stephens - Secretary (T. 01460 242466).

Welsh Highland Railway Gala Weekend

A unique locomotive will be on display as one of the special

exhibits in the 'Garratt 50 Gala' on the Welsh Highland Railway. The show takes place on 5/6/7 September when 50 models of Garratts in nine different gauges will be on show, including live steam on at least four different gauges.

The special locomotive (**photo 1**) is a 4-4-0 tender engine and as far as is known is of freelance design, it is paraffin blowtorch fired, has a single cylinder and is to a gauge of 2 1/4 inches. The engine was constructed probably 103 or 104 years ago and was the personal property of Herbert William Garratt. The locomotive was passed down to his daughter and she was under the impression that he had constructed it.

The Welsh Highland Railway is 1ft. 11 1/2in. gauge and so visitor's locomotives will not be too dwarfed (the railway class NG 16s are 50ft. long and 62 tons, quite small really). It is hoped that there will be at least one if not two running lines, possibly of mixed 5/7 1/2in. gauge, should a locomotive owner wish to put his (or her) engine into steam. The whole weekend will be a demonstration and get together about the Garratt type of Locomotive.

For further information, please call T. 01689 899200 or F. 01689 899266.

World class flying display of model aircraft

The British Model Flying Association (BMFA) will take to the skies on 18 October at the Fleet Air Arm Museum's Autumn Model Show at RNAS



Yeovilton, Near Ilchester, Somerset BA22 8HT.

Although the flying line up for this year has yet to be confirmed, previous years have seen a jet-powered Concorde (**photo 2**), a massive 22ft. wing span B-52 bomber and a variety of other classic aircraft perform spectacular flying displays.

Throughout the museum, over 60 traders and clubs from all over the UK will be present and there will be a wide range of workshops and competitions for the under 16s with generous prizes sponsored by Airfix.

In addition to the Model Show, visitors can also see the largest collection of naval aircraft anywhere in Europe. For more information contact: Jon Jefferies, Head of Marketing and Development, (T. 01935 842638).

UK club news

The membership of the **National 2 1/2" Gauge Association** continues to rise with a dozen new members being welcomed in the latest newsletter. The society has a new man in charge of the casting service. Christopher Cruickshank is now in the hot seat and can be reached via the society. The many rallies and events held so far this year have all proved to be successful and

1. This very special 4-4-0 locomotive model will be at the Garratt 50 event on the Welsh Highland Railway.
2. If you like large fast model aircraft, the BMFA event at Yeovilton is for you.



In Memoriam

It is with the deepest regret that we record the passing of the following model engineer. The sympathy of staff at *Model Engineer* is extended to the family and friends left behind.

Laurence Harold Oseman

Worcester DMES

3. Derek Bray with J11 Pom Pom passing Chinley Junction with a pickup goods train at Lyndsey Model Society.

show the enthusiasm for this smaller gauge.

Members of **St. Albans DMES** enjoyed a good trip to the Portsmouth Historic Dockyard earlier in the year. The Chairman, Michael Dyer, found the Dockyard Apprentice Museum particularly interesting with all the dockyard trades demonstrated. The Redbourn Museum Steam Day and barbecue were both blessed with good weather with the portable track at the steam day making a good sum for the museum funds. June saw a return to steam of a lovely example of the LBSC Minx 0-6-0 tender locomotive design at the puffing field. The locomotive was built by Ernie Cowell before being sold to Reg Adams in the 1950s. The locomotive was inherited by Reg's daughter and was brought back to life last year by her husband Colin. Colin then joined the society and the locomotive has now been brought back to its home track.

The club locomotive fleet at **Birmingham SME** has been the subject of some major work following many years of service. The 7½in. gauge 08 shunter and the 5in. gauge class 86 locomotives have both received attention as have the cylinders and motion on *Lucy*. The 0-6-0 Eva May locomotive (named *Wilfred H. Kesterton*) had considerable wear in the baker valve gear components so a decision was taken to replace this with a form of Walschaerts gear based on that fitted to the *Ajax* locomotive. During this work, many other items were found to need attention and the boiler and super heater were both repaired. The locomotive is now back in service and performs well.

The 100th Anniversary year at **Bradford MES** is in full swing and the commemorative floral clock in Lister Park is now installed and will no doubt generate a lot of publicity



for the society. One of the commemorative events is an exhibition of 100 models at the Bradford Industrial Museum in October.

Public running at **Bristol SMEE** is off to a good start for the year with an average of over 1000 passengers being carried on each running day. The bell code equipment between the signal boxes is working well and some of the timber sleepers have been replaced with plastic on the ground level track. The society suffered from the attentions of metal thieves in April with the theft of the lead from the roof of the station and two signal boxes.

Crawley Model Engineers have had some good running sessions during June with generally fine weather. This was particularly true on the last Sunday when there were "a large number of people in the park". Some rail replacements have been carried out round the top bend

The first running day of the season at **High Wycombe MEC** was washed out by the rain but it is hoped that another date can be arranged. The "Grand HWMEC Locomotive Efficiency Competition" was held on the 18 May and attracted just four entrants. The event was won by Bill Richardson with his 7½in. Dart 0-4-2 locomotive *Laurie*. Kevin Mockford entered with a completely untried locomotive which had never pulled a passenger trolley and put up a very creditable performance for an inexperienced driver and locomotive.

The running weekend at **Lyndsey Model Society (photo 3)** proved to be very successful with several visitors turning up to run including a group from Nottingham on the Sunday. The weather was generally kind

and the railway is reported as having "run well."

The first June meeting of the **North London SME** featured a talk by Tim Coles on his 5in. gauge GT3 gas turbine locomotive. Tim gave a brief history of gas turbine locomotives and then described the principle of gas turbine operation and the features of his own locomotive. Members enjoyed a trip to the Kempton pumping station to view the triple expansion engines. Work on the raised track is now complete and it is reported that "the track looks splendid." Experimental signalling blocks are being installed on the ground level track.

There are some new faces at the **Society of Model and Experimental Engineers** with Mike Chrisp taking on the role of Chairman and Matt Pulzer taking on the role of Journal Editor. I am sure all readers will wish both success in their roles. The society has had a presence at many events already this year and is planning another full programme at the model engineer exhibition. Some new demonstration and display units have been made for use at such events.

The 73rd Annual Exhibition at **Sutton MEC** was very successful with a good collection of models for the judges to examine and pronounce on. Among the many winners of the different classes, I will single out Mike Dean who got a hat trick of awards. These were the Malcolm Campbell Challenge Trophy, the Ted Poole Memorial Trophy and the Arthur Dare Trophy (all for different exhibits). Congratulations to Mike and all the other worthy award winners. At the track site, raised track refurbishment continues as does the general work around the site.

World club news

Canada
Locomotive No. 73 is back in service on the Burnaby Central Railway operated by the **British Columbia SME**. This gives great pleasure to member John Ostler who considers it his

favourite locomotive. This year marks the 80th anniversary of the society and the 15th year at the Burnaby track site. The president is asking for ideas on how to celebrate the occasion at Trainfest.

South Africa

The **Centurion SME** now has the blue diesel, *Centurion*, and the red one, *Dennis*, both now fully operational, providing a welcome boost to the operating fleet. The society has also been offered a second diesel, built by the late Barry Marx. This locomotive is also painted blue, and is a bit more advanced than *Centurion* and is for example, equipped with brakes.

The first Friday Bits & Pieces Evening proved quite successful with Rudy du Preez bringing along and explaining all the bits and pieces necessary to build a CNC dividing head/rotary table at very low cost (excluding of course the cost of the rotary table itself). Edward Lloyd brought along his Sweet Pea which is progressing very well and showing very fine workmanship. Nick Popich brought a riding car bogie which he is constructing and which will be fitted with a hydraulic braking system. Roko Popich brought a box full of parts for his Baldwin, at which one could only gape in awe, while John O'Mahony also displayed some parts for the locomotive he is constructing.

Humour time

Army Pipe Specification

Technical Data:

- 1) All pipe is to be made of a long hole, surrounded by metal or plastic centred around the hole.
- 2) All pipe is to be made hollow throughout its entire length, do not use holes of different length to the pipe.
- 3) The I/D (inside diameter) of all pipe must not exceed the O/D (Outside diameter) otherwise the hole will be on the outside.
- 4) All pipe is to be supplied with nothing in the hole, so that water, steam or other stuff can be put inside at a later date.

5) All pipe should be supplied without rust; this can be more readily applied at the job site. NOTE: Some vendors are now able to supply pre-rusted pipes. If available in your

area, this product is the recommended thing, as it will save a great deal of time at the work site.
6 All pipe over 500ft. (150m) in length should have the words 'Long Pipe' clearly painted

on each side and end, so the contractor will know it is a long pipe.
7) Pipe over 2 miles (3.2km) in length must have the words 'Long Pipe' painted in the middle so the contractor

does not have to walk the entire length of the pipe to determine whether it is a long or short pipe.

With thanks to the **Model Steam Road Vehicle Society**.

DIARY

AUGUST

- 29 **Newton Abbot & District MES.** Meeting. Contact Graham Day: 01626 772739.
- 30 **Brighton & Hove SMLE.** Public Running. Contact Mick Funnell: 01323 892042.
- 30 **Maidstone MES (UK).** Family & Friends Day. Contact Martin Parham: 01622 630298.
- 30 **Romney Marsh MES.** Boiler Testing. Contact John Wimble: 01797 362295.
- 30 **York City & DSME.** Summer Meeting. Contact Pat Martindale: 01262 676291.
- 31 **Bristol SMEE.** Public Running. Contact Trevor Chambers: 0145 441 5085.
- 31 **Edinburgh SME.** Track Running Day. Contact Robert McLucke: 01506 655270.
- 31 **Leicester SME.** Public Running. Contact John Lowe: 01455 272047.
- 31 **Lincoln DMES.** Running Day. Contact Terry Peacock: 01522 681424.
- 31 **Maidstone MES (UK).** Public Running. Contact Martin Parham: 01622 630298.
- 31 **MELSA.** Sunday in the Park. Contact Graham Chadbone: 07 4121 4341.
- 31 **Norwich DSME.** Running Day. Contact Shirley Berry: 01379 740578.
- 31 **Nottingham SMEE.** Public Running. Contact Pete Towle: 0115 987 9865.
- 31 **Oxford (City of) SME.** Running Day. Contact Chris Kelland: 01235 770836.
- 31 **Saffron Walden DSME.** Public Running. Contact Jack Setterfield: 01843 596822.

SEPTEMBER

- 1 **New Jersey Live Steamers, Inc.** Labor Day Run. Contact Karl Pickles: 718 494 7263.
- 1 **Peterborough SME.** Bits & Pieces. Contact Lee Nicholls: 01406 540263.
- 2 **Romney Marsh MES.** Meeting. Contact John Wimble: 01797 362295.
- 2 **Saffron Walden DSME.** Public Running. Contact Jack Setterfield: 01843 596822.

- 2 **Stamford MES.** Bill Bostock: Restoration of Old Machines. Contact Derek Brown: 01780 753162.
- 3 **Bradford MES.** Workshop Techniques. Contact John Mills: 01943 467844.
- 3 **Chingford DMEC.** Bits & Pieces. Contact Ron Manning: 020 8360 6144.
- 3 **Leeds SMEE.** Meeting. Contact Geoff Shackleton: 01977 798138.
- 3 **SM&EE.** Gary Clayton-Jones: Veterinary Orthopaedics. Contact Maurice Fagg: 020 8669 1480.
- 4 **Edinburgh SME.** Night Running. Contact Robert McLucke: 01506 655270.
- 4 **South Lakeland MES.** Meeting. Contact Adrian Dixon: 01229 869915.
- 4 **Sutton MEC.** Bits & Pieces. Contact Bob Wood: 020 8641 6258.
- 4 **Welling DMES.** J. Ridley: The Crossness Pumping Engine. Contact Bob Underwood: 020 8859 6919.
- 4 **Westland & Yeovil DMES.** Meeting. Contact Gerald Martyn: 01935 434126.
- 5 **Aylesbury (Vale of) MES.** Track Night. Contact Andy Rapley: 01296 420750.
- 5 **Rochdale SMEE.** The Rise & Fall of the Guayaquil & Quito Railroad. Contact Bob Denyer: 0161 959 1818.
- 5 **Romford MEC.** Competition Night. Contact Colin Hunt: 01708 709302.
- 6 **Cardiff MES.** Steam-Up & Family Day. Contact Don Norman: 01656 784530.
- 6/7 **Chesterfield MES.** Open Weekend. Contact Mike Rhodes: 01623 648676.
- 6/7 **Dockland & E. London MES.** Public Running. Contact John Slocombe: 01708 222658.
- 6 **Ickenham DSME.** Public Running. Contact Ian Mortimer: 01895 635596.
- 6/7 **Leighton Buzzard NG Rly.** Steam-Up Weekend. Enquiries: 01525 373888.
- 6 **Leyland SME.** A Traction Attraction Day. Contact A. P. Bibby: 01254 812049.

- 6/7 **Tyneside SMEE.** Late Summer Rally. Contact Malcolm Halliday: 0191 2624141.
- 7 **Frimley & Ascot LC.** Public Running. Contact Bob Dowman: 01252 835042.
- 7 **Leicester SME.** Public Running. Contact John Lowe: 01455 272047.
- 7 **Maidstone MES (UK).** Public Running. Contact Martin Parham: 01622 630298.
- 7 **Malden DSME.** Public Running. Contact John Mottram: 01483 473786.
- 7 **Northampton SME.** Public Running. Contact Pete Jarman: 01234 708501 (eve).
- 7 **Norwich DSME.** Running Day. Contact Shirley Berry: 01379 740578.
- 7 **Nottingham SMEE.** Public Running. Contact Pete Towle: 0115 987 9865.
- 7 **Oxford (City of) SME.** Running Day. Contact Chris Kelland: 01235 770836.
- 7 **Plymouth MSLS.** Public Running. Contact Malcom Preen: 01752 778083.
- 7 **Reading SME.** Public Running. Contact Brian Joslyn: 01491 873393.
- 7 **Royston DMES.** Running Day. Contact Jeff Dickinson: 01763 261670.
- 7 **Saffron Walden DSME.** Public Running. Contact Jack Setterfield: 01843 596822.
- 7 **Sunderland (City of) MES.** Open Day. Contact Albert Stephenson: 01429 299649.
- 7 **Wimborne DSME.** Public Running. Contact Eric Basire: 01202 897158.
- 7 **York City & DSME.** Running Day. Contact Pat Martindale: 01262 676291.
- 8 **Bedford MES.** Video Evening. Contact Ted Jolliffe: 01234 327791.
- 8 **Melton Mowbray DMES.** Bob Fawcett: Ploughing by Steam. Contact Phil Tansley: 0116 2673646.
- 8 **Saffron Walden DSME.** Club Night. Contact Jack Setterfield: 01843 596822.
- 9 **King's Lynn DSME.** Video & DVD. Contact Mike Coote: 01533 673728.

- 9 **Romney Marsh MES.** Meeting. Contact John Wimble: 01797 362295.
- 10 **Chingford DMEC.** Roy Berg: The RAF. Contact Ron Manning: 020 8360 6144.
- 10 **St. Albans DMES.** Peter Thomas: Model Loco Building in the 21st Century. Contact Roy Verden: 01923 220590.
- 11 **Leyland SME.** Bob Bramson: Injectors and Ejectors. Contact A. P. Bibby: 01254 812049.
- 11 **Sutton MEC.** Busy Night. Contact Bob Wood: 020 8641 6258.
- 12 **Polegate & District MEC.** Ian Gledhill: History of the Brussels Tramway. Contact D. F. Pratt: 01323 645872.
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- 13 **Malden DSME.** Families Day & Night Run. Contact John Mottram: 01483 473786.
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- 13 **Model Steam Road Vehicle Soc.** Puff & Chuff at the Blue Lias PH. Contact John Bagwell: 01452 304876.
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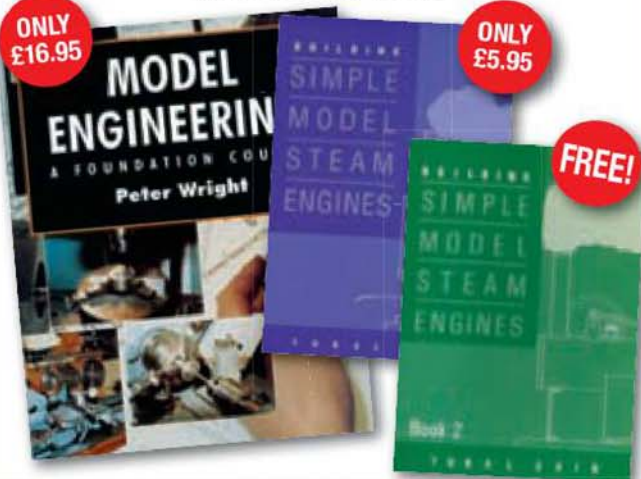
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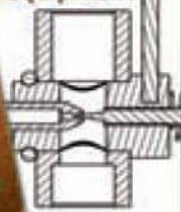
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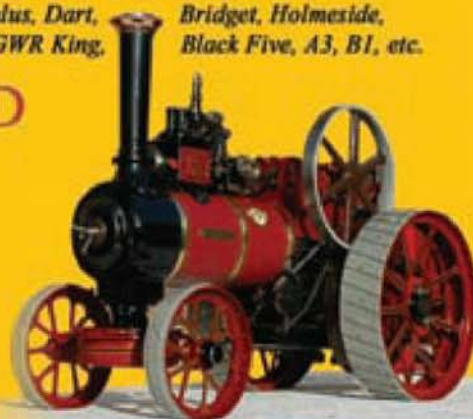
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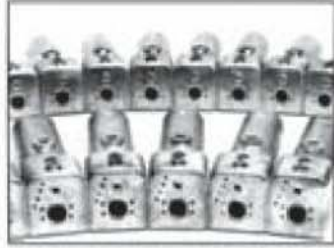
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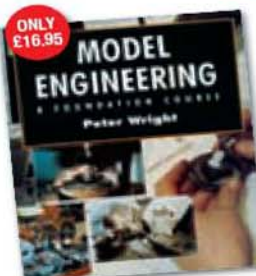
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