

MODEL ENGINEER

Vol. 200 No. 4322

28 March - 10 April 2008

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396



ISSUE IN THIS ISSUE IN THIS ISSUE IN THIS ISSUE IN THIS ISSUE IN THIS

Vol. 200 No. 4322 28 March - 10 April 2008

369 SMOKE RINGS

An inspiring steam roller plus Society of Ornamental Turners celebrate.

370 POST BAG

Letters to the editor.

373 15-DAY SKELETON TIMEPIECE

John Parslow shares his design for a first clock for model engineers.

376 MAKING THE MOST OF THE MYFORD

Graham Howe's simple but effective clutch for the Myford.

378 POP-POP MOTOR

John Ryder achieves success with his motors after much perseverance.

380 MACHINE TOOLS

Tony Griffiths charts the small shaping machines available.

382 STEAM SENSATION AT SINSHEIM

Michael Jones concludes his reports.

385 STOWE

More on Neville Evans' latest loco.

389 SEQLEC

Details of this July's 7 1/4in. gauge Locomotive Efficiency Competition.

390 BRIGHTON MODELWORLD 2008

Malcolm Stride enjoys his first visit to this annual modelling show.

392 PETE'S PAGE

Peter Spenlove-Spenlove advises on making washers.

393 CAMBRIDGE OLD SEWAGE PUMPING STATION AND REPLICA PUMPING ENGINE

Donald Unwin describes the Hathorn Davey pumping engine.

396 FINISHING THE BRISTOL HYDRA

Brian Perkins struggles with valve timing.

399 SMEELEC

Mike Kapp outlines a new energy saving competition for this year's Model Engineer Exhibition.

400 RACHEL

Stan Bray explains how to machine a flywheel.

402 NEWS

News from the trade and clubs in the UK and around the world.

404 DIARY

Forthcoming events.



ON THE COVER...

The delightful clock built by John Parslow. This clock is designed as a first clock for construction by model engineers, easy to make and accurate enough for general use. The series giving clear instructions to budding clock makers begins in this issue on page 373.

(Photograph by John Lynch)

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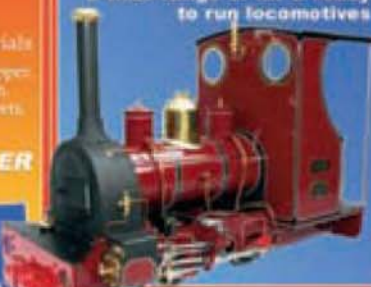
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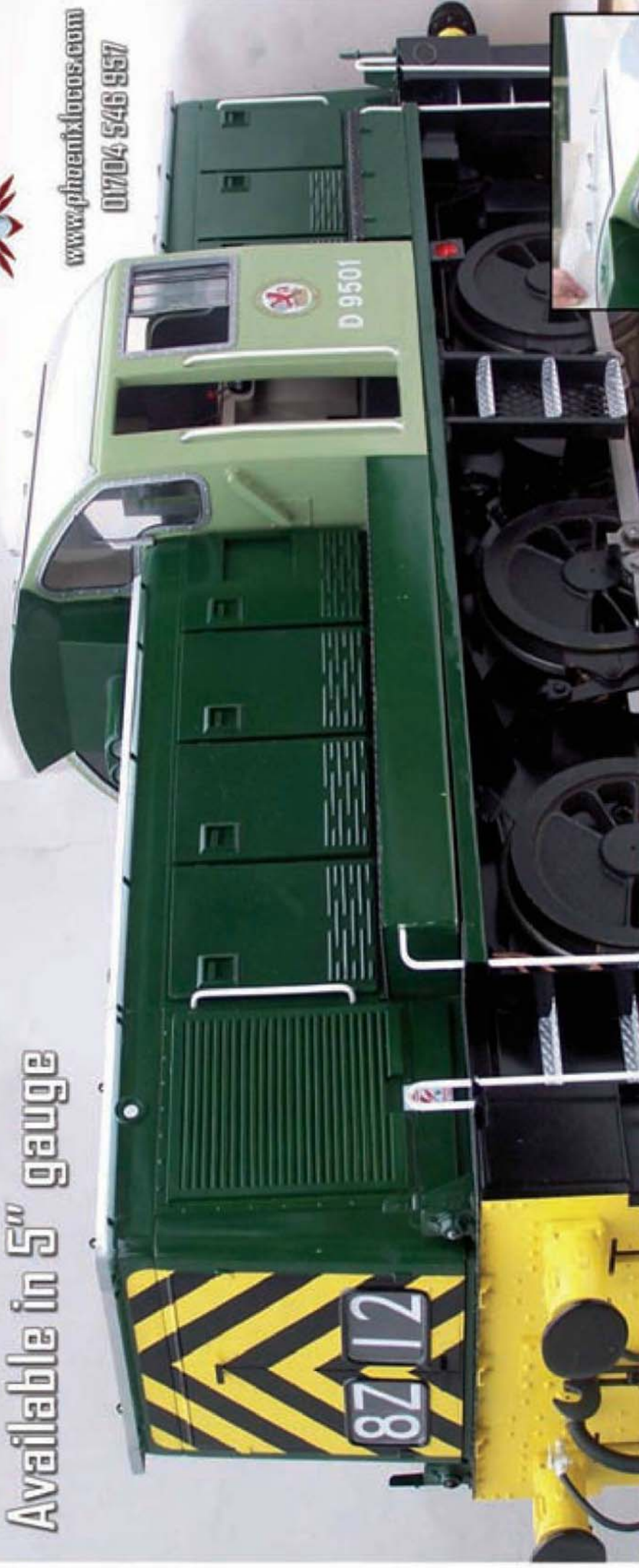
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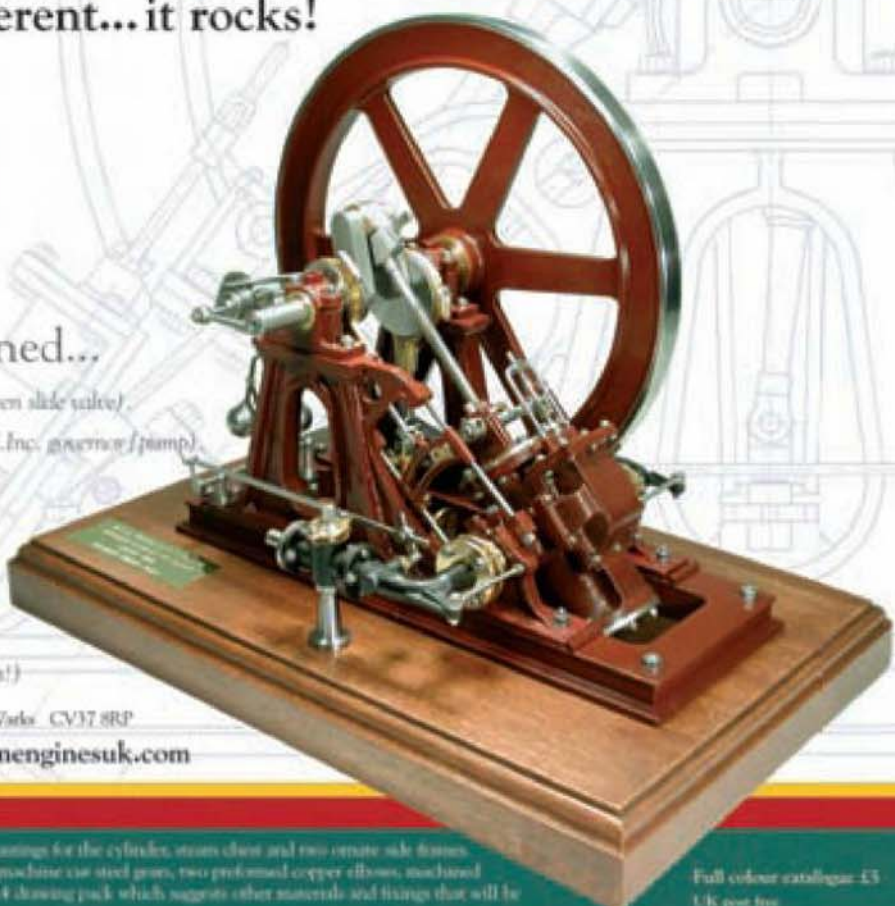
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"The Home Shop Machinist" - very well produced, this bi-monthly magazine focuses on workshop techniques. Virtually every skill needed in the workshop is covered from time to time and the building of workshop tools is a major feature of the magazine. The style is very down to earth as the articles are written by practical (model) engineers with practical, rather than theoretical, objectives in mind. A tremendous magazine which will appeal to all model engineers, or "do it yourself" enthusiasts working in metal, who wish to broaden their range of skills.

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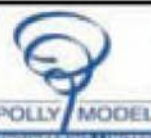


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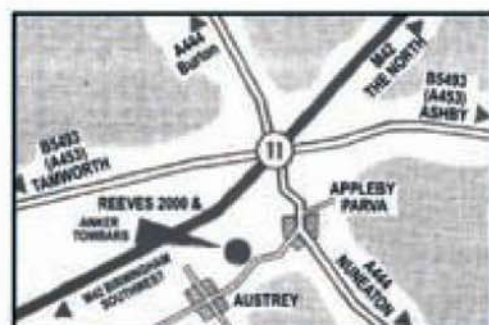


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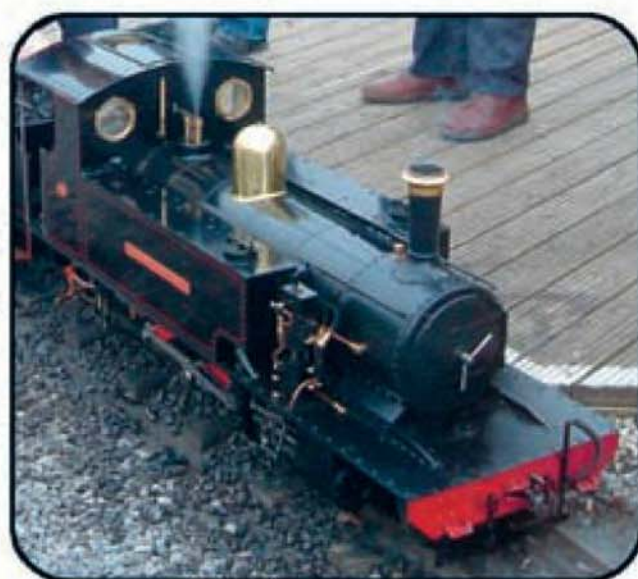
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Inspiring roller

In Martin Wallis' report of last summer's traction engine rallies (M.E. 4317, 18 January 2008)

there is a photo of a 1:3 scale steam roller, a very nice Aveling and Porter weighing in at 15cwt. We have since had the pleasure of hearing from the builder, Gerry Downend of Barnsley.

Gerry tells us he embarked on this little project at the age of 77, and he has given details of some of the construction of this mainly fabricated roller.

It is fitted with a differential based on the design of G. W. Ackland and described in M.E. Vol. 147, page 934, "which made the old grey matter work."

Spur gears were all 6DP and the turning of the main gears and the casing, was carried out on a milling machine, using an adapted lathe top slide.

"I had a small bench 2ft. square with a 3/4in. steel plate on which I bolted a 1 1/2in. shaft about 20in. long, then fitted one collar on the wheel and another to retain the wheel from moving sideways. Then the lathe top slide was fitted to turn the edges of the wheels.

"I then fitted a motor on a board and a few weights to tension the belt around the wheel, which was 20in. diameter. A carbide tool stood up to the job and time finished the work with a few blue turnings down my shirt."

Gerry also pointed out that there is another AP roller to

be seen in M.E. It's in Vol. 148 page 255, and it was built by A. Nash of Derby.

It would be good to see a few more steam rollers around our rally fields. Gerry's effort should be an inspiration to the rest of us.

Diamond turners

This year sees the diamond anniversary of the formation of the Society of Ornamental Turners. Set up to help prevent the craft sinking into obscurity, it has since revived to become thriving hobby.

Daventry Town Council is taking part in Museum & Galleries Month in May and knowing that 2008 is the 60th anniversary of The Society of Ornamental Turners, invited its members to join in and put on an event.

The event, entitled The Craft of Nobility & Gentry, is to be held on Saturday and Sunday 3 and 4 May at the Daventry Town Council Museum, in Bishop Crewe House, North Street, Daventry NN11 4GH.

The society will be demonstrating the craft, and art, of ornamental turning on a Holtzapffel lathe and there will be displays from its collection of items in exotic wood and ivory. The event will be open 10.00am to 2.00pm on both days. Entrance is free and tea/coffee will be available. Car Parking is nearby and free. Contact T. 01327 703970

Ron's reward

Winner of this year's Joe Martin Foundation, Metalworking Craftsman of the Year award, is Ron Colonna of McKeesport, Pennsylvania. He will receive a gold medallion and a cheque for \$2,000. Ron is the 12th winner of the award.

It is given to a person who has "contributed to craftsmanship through a lifetime body of high quality work that demonstrates a wide variety of metalworking skills, at the small end of the size scale." Emphasis is also placed on those who have inspired others to build projects and improve their skills.

Ron's interest in engines started in his youth. He flew



model aircraft with engines he had fine-tuned himself. He started working on steam locomotives and joined a local live steam club before eventually expanding his interests to include internal combustion engines.

When Ron took on the ambitious project of building a quarter-scale model Offenhauser ('Offy') 270 engine, he went the extra step to document the build, make drawings and write a book on how it was done so that others could also build this famous historic racing engine. This, along with the quality of his work, was a major factor in his selection as this year's winner.

Other engines he has built include several live steam locomotives and a Case traction engine, as well as a number of hit and miss, radial, in-line, V8 and V-twin internal combustion engines.

The official presentation of the award will take place on Sunday, April 20, 2008 at the Joe Martin Foundation booth at the NAMES Exposition in Toledo, Ohio.

You can learn more about Ron on the foundation's online museum website at www.CraftsmanshipMuseum.com/Colonna.htm

Joe Martin is a former modeller who owns Sherline Products, Inc., well-known for its range of small precision machine tools.

1. The Aveling and Porter roller built by Gerry Downend.

2. Ron Colonna with quarter-scale 'Offy'.





3-phase supplies

SIRS, - I was rather puzzled and disappointed to read Mr. Eric Clark's article *3-phase electrical supply and the home workshop* (M.E. 4315, 21 December 2007) as I am afraid that there are a number of factual errors and misconceptions that are to say the least misleading.

It should be stressed to all of your readers; please do not tamper with any electrical system unless you know what you are doing.

All electrical transmission systems are 3-phase with the voltages 120deg. apart. This phase relationship means that a 400V phase-to-phase voltage will result in 230V phase to ground. The dividing factor is 1.732 or the square root of 3; NOT the square root of 2 as stated in the article.

Three-phase systems work because the vectorial sum of a balanced system is zero; i.e. there is no return current in the neutral and the star point can be grounded at the distribution transformer.

As far as I am aware the rural 2-phase systems suggested by Mr. Clark are mythical and I suspect that Mr. Wells (M.E. 4308, 14 September 2007) may have been the victim of a rather odd sense of humour. The rural system will be 11Kv 3-phase and a transformer will drop it down to 400 volts line to line. Similarly I do not believe that 2-phase motors exist.

Many 3-phase motors (normally connected in *Star*) can have their windings connected in *Delta* so that they can be run from a lower voltage 3-phase supply, for example a static inverter providing a 230 Volt 3-phase controlled supply.

Static inverters have the advantage that the power delivered to the motor can be controlled giving speed control. The disadvantage of a static inverter is that the lower voltage results in lower torque which can lead to problems achieving top speed on some lathe conversions.

There is nothing 'backwoods' about a rotary converter

that uses an idler motor to derive the rotating field from a single-phase supply and many commercial units use this technique. In fact a rotary converter is probably the best and most efficient method of deriving a 3-phase supply the only disadvantage being the lack of speed control which may well be unnecessary on a multi-speed machine.

Finally, I do feel that a magazine of the standing of the *Model Engineer* needs to be a little bit more careful when publishing information upon electrical matters. When dealing with electricity there is no room for the equivalent of the odd dimensional error.

**Adrian D. Parker, C.Eng.
M.I.E.T., by email.**

More on Gunpowder Mills

SIRS, - In reply to Mr. John Wilson's letter *Gunpowder Mills* (M.E. 4315, 21 Dec 2007), I would like to thank him for the additional information about the Ruston Proctor petrol/paraffin locomotive and also for his interesting opinion regarding the demise of narrow gauge railways. The reference in my article to a 'standard' military gauge was not intended to refute the importance of the 18in. gauge system. As far as I know, there was no accepted standard gauge for military railways and the matter is somewhat subjective and depends of course on one's viewpoint.

As a person who spent the best part of 40 years dealing with chemistry-related issues

Unusual micrometer (1)

SIRS, - Re. the unusual micrometer (M.E. 4314, 7 December 2007), these are only found in high-class inspection rooms. Any books on the subject matter of 'Engineering Metrology' will provide all the answers Mr. Bellamy requires.

John Cornwall, Suffolk.

Unusual micrometer (2)

SIRS, - In answer to the request by Arthur Bellamy (M.E. 4314, 7 December 2007) I enclose a photograph of a set of three indicating micrometers and a box of slip gauges made by Carl Zeiss of Jena. These came from a London Transport auction some 20 years ago, I believe from the Snaresbrook works.

I hope this helps to answer Arthur's question. It is interesting to note that the micrometers are all metric and I think date from the 1930s.

Tony Spicer, West Sussex.

We have had a large response to Arthur Bellamy's query and thank all those readers who wrote in with the answer - Ed.

Tony Spicer's Indicating micrometers and slip gauges.



Write to us

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Responses to published letters are forwarded as appropriate.

in the nuclear industry, I can assure Mr. Wilson that gunpowder is an 'inorganic' material and conversely, nitro-glycerine, nitro-cellulose (guncotton) etc. are 'organic' materials - if you don't believe me check it out on Wikipedia!

To expand, gunpowder is a 'mixture' of an 'inorganic' 'compound' - potassium nitrate (nitre or saltpetre) with two elemental 'inorganic' materials; carbon and sulphur. As prepared, gunpowder will have a long shelf life providing that the product is stored in a hermetically sealed environment; mainly to prevent absorption of atmospheric moisture by the deliquescent component, potassium nitrate. Nitro-glycerine (or to give it its correct name glyceryl trinitrate) however, is an aliphatic 'compound' consisting of carbon, hydrogen, oxygen and nitrogen and very definitely organic. Contrary to Mr. Wilson's comment, it deteriorates with time and has a limited shelf life.

Incidentally, it was probably one of the earliest materials to have a definite 'sell-by-date'! Hence the requirement for a 'Burning Ground' at Holton Heath; where life-expired cordite was disposed of regularly by burning. I hope this clarifies the basic chemistry of these two important explosive materials.
Terry Holland, Malaga, Spain.

Incandescent light bulbs

SIRS, - I was interested to see Malcolm Stride's comment (M.E. 4315, 21 December 2007) regarding the phasing out of incandescent light bulbs and its impact on signalling.

The answer is, of course, that the alternative will not be fluorescent tubes. Halogen bulbs (as used in most car headlamps) are about twice as efficient as 'normal bulbs' and are unlikely to be banned for many years yet. The obvious solution for signal lamps and similar applications are LEDs. These are now common in traffic lights, and as stop, tail, and indicator lamps on road vehicles. Interestingly the 'instant on' of LEDs compared

Screw plates

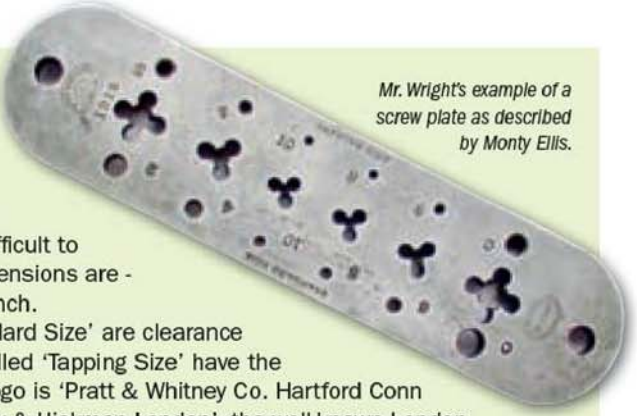
SIRS, - Mr. M. J. H. Ellis describes a 'screw plate' (*Letters to a Grandson, M.E. 4315, 21 December 2007*) for forming small screws. The plate in the photograph performs the same function though it is difficult to envisage its use for mass production. Dimensions are - length 6in, width 1½in. and thickness 7/32 inch.

The holes along one side labelled 'Standard Size' are clearance holes and those on the opposite side labelled 'Tapping Size' have the appropriate size threads. At one end the logo is 'Pratt & Whitney Co. Hartford Conn USA' and at the other end the logo is 'Buck & Hickman London', the well-known London tool merchant.

Unless the end holes are for hanging the plate on a convenient nail their purpose is not immediately obvious to me.

I inherited this plate from my stepfather who was a colliery electrician before and after the 1914-18 War and later ran his own business as a commercial and domestic electrical contractor. He may have used the plate in his work but I am not certain he did so. I imagine that the number on the plate '1915' is a catalogue number rather than its date of manufacture which I guess would be no later than 1939. Whilst the dies are sharp, I have not used it to produce screws but it is very useful when sorting out screws of different sizes. No doubt another reader has better information as to the intended use of the plate.

P. J. Wright, Worcestershire.



Mr. Wright's example of a screw plate as described by Monty Ellis.

to ordinary bulbs is supposed to allow several extra feet of stopping distance when used as brake lights or traffic lights!

The prices are getting low enough that their tremendous lifetime, compared to filament bulbs in an on/off situation, makes them an economic proposition. They are also much easier to power and control using low voltages.

On this subject, I wonder if any M.E. reader could settle a query for me - many buses in the West Midlands have LED turn indicators, but one spot in the LED cluster turns off after all the others. Opinions are divided - is this light on a separate safety circuit, or is it to stop the sudden flash causing epileptic fits - or something else?

One final thought. I saw a 2in. scale traction engine lamp lit by a white LED. Its surface had been 'roughed up' and it looked for all the world like the mantle of a paraffin lamp!

Neil Wyatt, by email.

Forged locomotive wheels

SIRS, - John Illingworth's letter (M.E. 4315, 21 December 2007) raises the conundrum of forged locomotive wheels. I spent a little time searching my library and came up with the following from C. J. Bowen

Cooke's *British Locomotives* first published in 1893.

"Until recently it was the invariable practice to make all locomotive wheels of wrought-iron with steel tyres, and some railway companies continue this system. Each spoke is forged separately on to the boss or hub of the wheel, a section of the rim being first welded on to the outer end of the spoke. Each rim section is afterwards welded up between the spokes".

The welds that Bowen Cooke refers to would have been forge welds where the components are heated white hot and then hammered together to form a homogeneous item, a practice that I was introduced to at school in the days when hands on tradecraft was still almost obligatory. Clearly forge welding was routine in Victorian factories and I have great admiration for the blacksmiths of the day who could build wheels with such accuracy and integrity.

Doncaster works certainly made wrought iron wheels until around 1885 when they began to cast them in steel. The last 8ft. single to be built with iron wheels was the famous No. 774 which was recorded at over 85mph by Charles Rouse-Martin. Number 1 has iron wheels, evidence the

rectangular section spokes, cast wheels having oval spokes. Cast iron was also used for smaller wheels and Bowen Cooke describes the wheels used by Webb on the LNWR for goods engines which had 'I' section spokes.

John worries that these iron wheels were built without the aid of x-rays and ultrasonic testing, but these are relatively modern techniques. The old boys were not daft and learned over time what worked and what didn't and I suspect that their manufacturing techniques, built around long apprenticeships and years of experience, ensured the product was of the highest standard and that locomotives went on to the railway in a safe condition. I can't think of any incidents of wheel centres disintegrating, although there are cases of tyres breaking or detaching. I don't suppose many steam locomotives had the benefit of ultrasonic testing in their service lives, since practical ultrasonic testing didn't become available until the mid 1950s and wide spread use of the technique post dated the demise of steam. The wheel tapper was still a familiar sight on the railway into the 70s!

Edward Gibbons, by email.

Forged locomotive wheels (2)

SIRS, - I am a geriatric mechanical engineer, so geriatric in fact that I think I may be the last surviving person to have turned a mill engine flywheel in a lathe.

I was spurred to write by the letter from John Illingworth (M.E. 4315, 21 December 2007) regarding wrought iron locomotive wheels. In 1835, John Day developed a wheel made entirely from wrought iron components fire-welded together. This was taken up by Beyer Peacocks and thereafter used successfully for all their large locomotive wheels.

Full details can be found on pages 32 and 33 of *Beyer Peacock - Locomotive Builder to the World*.

Gordon Hobson, Holmfirth.

Forged locomotive wheels (3)

SIRS, - I read John Illingworth's letter *Forged locomotive wheels* with some interest (M.E. 4315, 21 December 2007). This is

because I have spent most of my career as an ornamental blacksmith, during which time I have always observed and examined all kinds of ironwork, with a particular view as to how items may have been constructed with regard to any fire welding being part of the process. It is well-known that many anvils have built up by fire welding the various parts together, such as the feet, the bick and also the heel. I myself possess two examples, 3 and 4cwt, made in this way, the joints being quite clear, so ways of handling work on this scale must have been well established.

Examination of very large and old ships anchors recovered from the sea and displayed at ports and harbours all around our coast show clear evidence of both material and constructional methods. The sea has corroded the iron revealing it to be fibrous wrought iron, and the joints at the flukes and where the stem is attached are clearly fire welds, the latter often being of

the split stud weld method for greater strength.

Some I have seen must weigh at least 1 ton so manipulation of parts weighing at least half a ton at white heat and at high speed was a well rehearsed procedure, bearing in mind that the operators had first to bring the two halves up to welding temperature simultaneously in two fires. They then had only a few seconds to remove them, position them accurately and then close the weld by rapid hammering on both sides. This would of course require the whole assembly to be turned over, and maybe be returned to the fire for a second heat to further close the edges of the joint.

In his book *Building Britain's Locomotives*, photo 60, James W. Lowe features eye ends of coupling rods awaiting fire welding to the centre portion of the rod at the Hunslet Engine Co. Leeds Works in 1899. They were obviously confident of the strength of such a joint for a high stress application. It must be assumed that if the Stirling

8ft. wheels are indeed of fire welded construction their size would not have been a limiting factor, but rather the shear complexity of a sequence of multiple welds both to the hub and to the rim. Keeping such a developing structure regular and even vaguely true would have been a huge challenge, and I have never heard of a fire welded structure that comes anywhere near as complex as a spoked locomotive wheel. Wagon wheels have been massed produced by the pressing of a billet in a 6,000 ton hydraulic press in a single stroke, and axles were forged under large steam hammers to impart the optimum grain structure. Access to the structure of the Stirling 8ft. wheels by sea water corrosion or perhaps by x-ray might settle this interesting puzzle.

Michael Malleson, Devon.

We have had a large response on this topic and thank all those readers who sent in information on the process - Ed.

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- Super flame eater engine - watch it at <http://youtube.com/watch?v=XCp623s2WUU>
- Practical superheating
- Peter Rich describes *King Edward VIII*
- Anna - Update on the 7¹/₄in. Manning Wardle
- I/C Topics - The latest from Nemett
- Steam turbine ships
- Self-start steam engine - Watch it on YouTube at Modelengineermedia.

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ON SALE 11 APRIL 2008

15-day skeleton timepiece

John Parslow

describes how to make a skeleton timepiece designed especially for the beginner.

The aim was to design a modern, elegant, reasonably-sized clock suitable for the first-time clock maker who already has some model engineering experience (**photo 1**). The clock has a Brocot escapement which is easy to make and capable of better timekeeping than the more common recoil escapement. The length of the pendulum is 6.8in., which gives 144 beats/minute. The running duration is 15 days. The clock was inspired by *A Beginners Clock*

designed by Mr. E. Isaacs (ref. 1) modified to increase the running time by Mr. A. Price.

The size and shape of the clock was investigated using sketches and cardboard cut-outs. The wheel, pinion count, and the pendulum length were designed to suit (**fig 1** and **photo 2**). The train was laid out in a straight line, avoiding the need to insert the winding key through a hole in the dial. This gives a 'clean' appearance and prevents scratching the dial. The drawings of the clock parts show two alternative positions for the winding ratchet. This can be at the front of the clock (as a decorative feature), or at the back, leaving the front plate clear for the makers name and hometown.

Tools

The tools needed to make the clock are a lathe, small drilling machine, and the usual range of model engineering hand tools. The 4.4in. dia. dial plate is the largest turned diameter but this could be fabricated from separate parts. For clockmakers not wishing to cut their own wheels and pinions, a ready-cut supply is available (supplier 1). The wheels will need to be crossed out and the pinions finish machined. All other materials needed to make the clock are available from the same source.

Clockmakers who intend to make their own wheels and pinions will need a 0.6 module wheel cutter and a 0.55 module, eight leaf, pinion cutter. Incidentally, to make pinion cutting much easier, I



recommend use of a simple milling fixture (ref. 2). As an alternative to the 0.55 module 8 leaf pinion cutter, a 0.6 module 8 leaf cutter may be used. The pinion diameter remains the same but the addendum for this is 0.018 inches. Information on wheel and pinion cutting is given in excellent books by Alan Timmins, and John Wilding, or in recent articles in the *Model Engineer* and *Clocks* magazines.

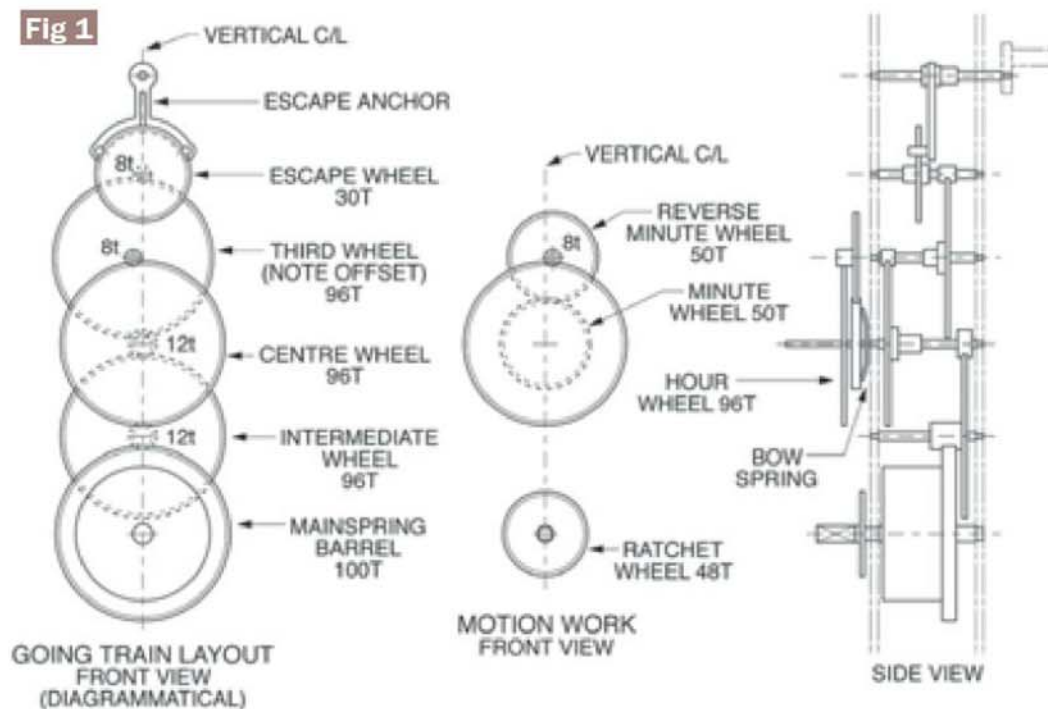
I strongly recommend that all brass parts are gold-plated to prevent tarnishing. This is not prohibitively expensive if you shop around. The clock has been designed so that it can be assembled for testing, disassembled for plating, then re-assembled permanently. This avoids costly blanking off of the steel parts such as the arbor and pinions, which do not require plating.

Clock frame

Figure 2 shows the frame plates. These are made from 1/8in. thick polished engraving

1



Fig 1

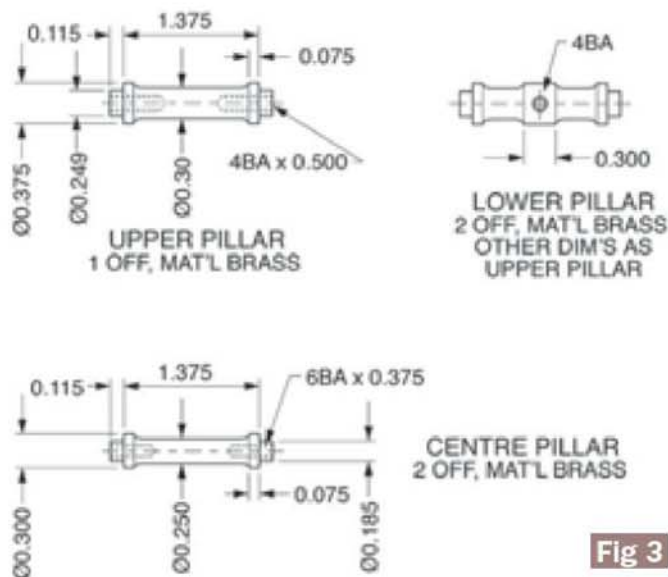
With the marking out complete, clamp the two plates firmly together and drill and ream the four $\frac{1}{4}$ in. and two $\frac{3}{16}$ in. dia. holes. At this stage, make two shouldered dowels from about $\frac{3}{16}$ in. dia. mild steel. These should be a light push fit into the $\frac{1}{4}$ in. dia. holes and will provide accurate location of the plates for future work. The frame plates can now be sawn and filed to shape, taking care not to damage the surfaces. Final draw-filing and finishing the edges is done later.

Next make the five frame pillars (fig 3). All the shoulder lengths must be identical i.e. 1.375 inches. A slight taper on the location diameters, leaving about 0.050in. of full diameter, helps assembly. Assemble the frame using temporary screws and washers to ensure that everything is right.

This completes the clock frame for the time being.

Photograph 3 shows the plates after gold plating, and **photo 4** the assembled frame.

● To be continued.

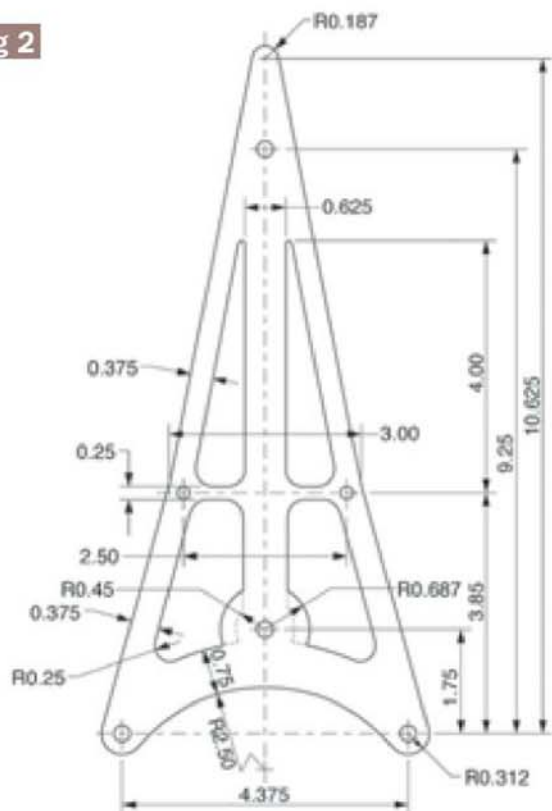
**Fig 3**

brass. Plates can be cut from pieces $11\frac{3}{4} \times 6\frac{1}{2}$ inches. Polished plate is supplied with a protective film on both sides. I suggest stripping off this film and spraying both sides with two or three coats of red oxide primer paint, available in an aerosol can from motor accessory shops. This will protect the surface from accidental marks and scratches and provide an excellent surface for marking out with a pencil or scribe. The piece of plate can then be cut at an angle to make front and rear plates. Note that there is a difference in the size of the 'boss' at the winding arbor hole between front and rear plates. The winding ratchet fits next to the larger boss, so make this either the front or rear plate according to your choice of winding position. Mark out the profile of the frame with the larger boss using a sharp pencil followed by a sharp-pointed scribe, taking care not to scribe over what will be the finished surface of the plate. Do not be tempted to make the sides of the plates straight. The slight 'curves' may not look much but make quite a difference to the appearance of the clock.



HOLES MARKED 'A' REAM Ø0.250
HOLES MARKED 'B' REAM Ø0.187

Fig 2



FRAME PLATES FRONT & REAR
FRONT SHOWN SOLID, REAR SHOWN DOTTED
1 OFF EACH, MAT'L CZ120
(FOR REAR RATCHET PLATES ARE REVERSED)

Suppliers

1. Wheel and pinions with ready-cut teeth and leaves. Also, all other materials required for the clock. (Brass plate and sheet are sawn, rather than guillotined, to remain flat)

Mr. I. Cobb, 8 Poplar Avenue, Birstall, Leicester IE4 3DU.

T. 0116 267 6063. E. ian@iantcobb.co.uk

2. Zone Dial. Part No. D140S. 105 O/D x 67mm I/D

A. G. Thomas (Bradford) Ltd, Tompion House, Heaton Road, Bradford BD8 8RB.

T. 0127 449 7171. F. 0127 454 7407.

3. Suspension Spring. Part No. 070 S5553.

Clock oil, 2ml. Part No. 01070. Key. Part No. K4877 4mm. Cousins Material House, Unit 7, Chesham Close, Romford, Essex RM7 7PJ.

T. 01708 757800. F. 0800 7311095.

E. support@clockspares.com

4. Turned head screws. Live Steam Models Ltd, Unit 7, Old Hall Mills, Little Eaton, Derby DE21 5DN.

T. 01332 830811. F. 01332 830050.

W. www.livesteammodels.com

5. Mainspring. Part No. 0221 204515 20 x 45 x 45.

Alternative round glass dome. Part No. 0623-071415. 180 O/D x 350mm tall

Base to suit above. Part No. 0673-018015. (Supplied unfinished in beech)

Five-sided cutting broach. Part No. 0547-017515.

Meadows & Passmore Ltd, 1 Ellen Street, Portslade, Brighton, East Sussex BN41 1EU.

T. 01273 421321. E. sales@m-p.co.uk

Materials

Dimensions in inches

Sheet brass CZ120

- | | |
|------------------|-------------------------------------|
| 1 - 11¼ x 6½ x ⅛ | Frame plates, backcock, crutch foot |
| 1 - 1¾ x 1½ x ⅛ | Escape anchor |
| 1 - Ø 4½ x ⅜ | Dial plate |
| 1 - 1¼ x ½ x ⅜ | Bow spring |

Wheels

- | | |
|--------------|---|
| 2 - Ø 1½ x ⅛ | Escapement wheel, reverse minute wheel |
| 1 - Ø 2½ x ⅛ | Intermediate, centre, third & hour wheels |
| 1 - Ø 2 x ⅜ | Barrel end plate |
| 1 - Ø 2½ x ¼ | Great wheel |
| 1 - Ø 1½ x ⅛ | Ratchet wheel |

Brass tube CZ126/121

- | | |
|-------------------|-------------------|
| 1 - 2 O/D x 1 x ⅛ | Mainspring barrel |
|-------------------|-------------------|

Brass rod CZ121

- | | |
|--------------|------------------------------------|
| 1 - Ø ¾ x 2½ | Pendulum bob and nut |
| 1 - Ø ¾ x 8 | Frame pillars |
| 1 - Ø ½ x 8 | Collets, bushes, frame washers etc |
| 1 - Ø ¼ x 2 | Back cock pillars and bushes |
| 1 - Ø ¾ x 3 | Dial pillars |
| 1 - Ø ¾ x 3 | Frame feet |

Brass bar CZ121

- | | |
|---------------|---------------------------|
| 1 - ¼ x ½ x 1 | Ratchet retainer |
| 1 - ¼ x ¼ x 1 | Pendulum suspension block |

Silversteel

- | | |
|------------------|---|
| 1 - Ø ½ x 5 | Barrel arbor, centre wheel collet, crutch collet |
| 2 - Ø ⅝ x 13 | Arbors, pendulum rod, pallets |
| 1 - Ø ⅝ x 1 | Intermediate and centre wheel pinions |
| 1 - Ø ¼ x 3 | Third and escape wheel pinions, reverse minute wheel arbor, click screw |
| 1 - Ø 2.0mm x 2½ | Crutch rod |

Gauge plate

- | | |
|----------------|------------------------|
| 1 - 2 x 1 x ⅛ | Click spring and click |
| 1 - 2½ x 1 x ⅜ | Hands |

Cheese head, machine cut, steel screws

- | |
|---------------|
| 7 - 4BA x ½ |
| 1 - 8BA x ⅜ |
| 2 - 4BA x 1½ |
| 6 - 6BA x ½ |
| 13 - 10BA x ¼ |
| 2 - 2BA x ½ |

Wood and mouldings for the base. Glass for the cover.
Material for making the depth tool (if required).

References

- Isaacs, E., (1990), *A Beginners Clock, The Clockmaker* Vol. 1, April 1991 – March 1992, pp. 25 et al., Pub. Tee Publishing Ltd (a bound compendium of *The Clockmaker* magazine articles).
- Parslow, J., 2004, Clock Pinion Cutting, *M.E.* 4218, 2 April 2004.

Making the most of the Myford

Graham Howe describes a simple but effective home-made clutch for the Myford and offers his workshop hints and tips.

*Continued from page 259
(M.E. 4320, 29 February 2008)*

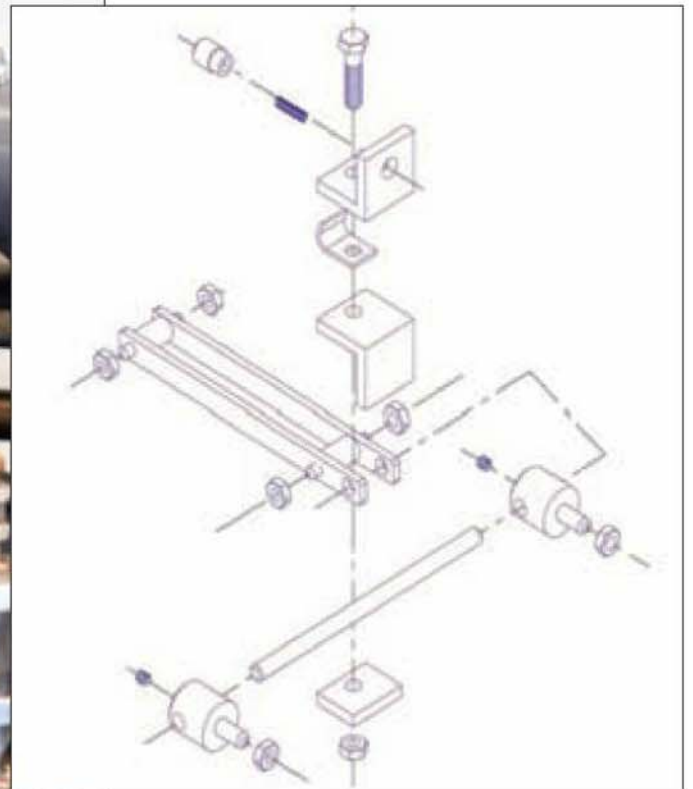
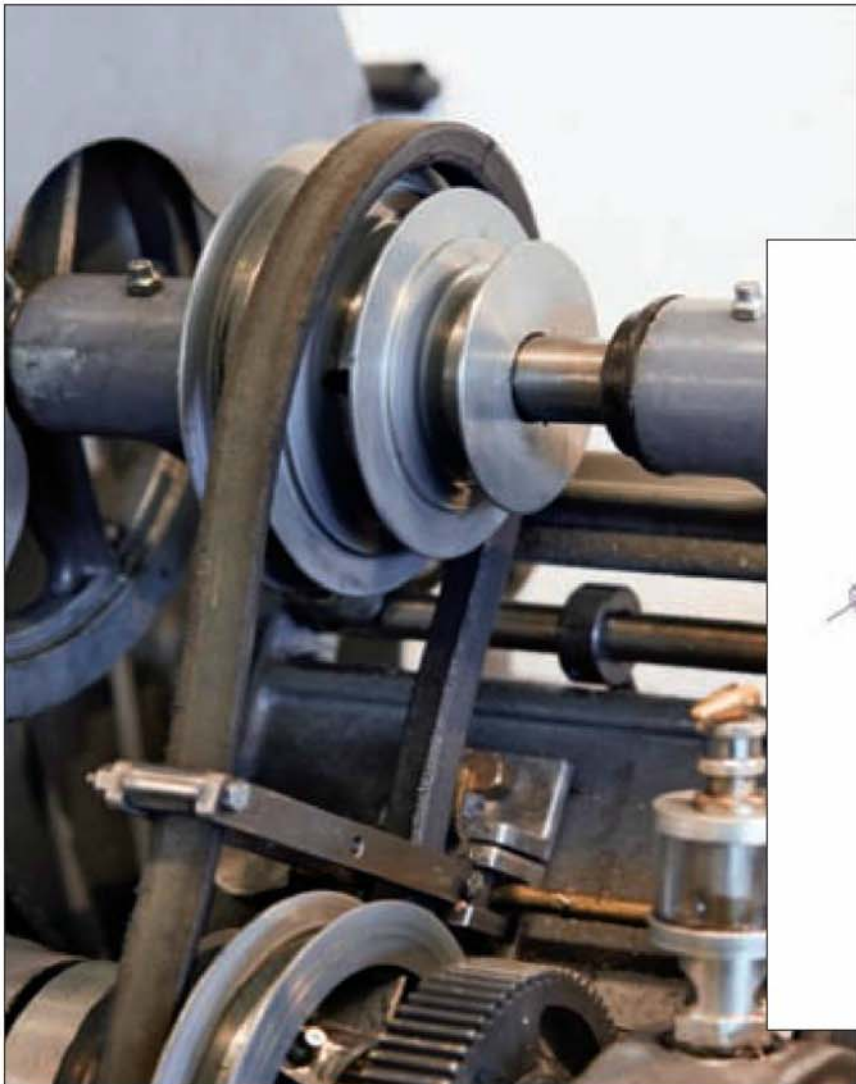
This is such a simple attachment, it can be made in about an hour, and yet provides exactly the same control as the Myford coned clutch. The design principle utilises the belt tension lever to operate engagement. When the lever is relaxed the belt is 'held' so that it is lifted away from the driving pulley and so no wear

occurs. Some minor adjustment can be made to 'hold' the belt by altering the diameter of the front belt guide.

If you look at the photo it can just be seen that the belt is lifted out of the pulley 'V' thus even though the countershaft is rotating no motion is imparted to the belt drive. A small spring is fitted in a pocket recess at the back of the guide rail, which

eliminates any vibration noises. I have operated with the same belt for 20 years!

It is important to switch off the motor before attempting to change the belt pulley diameters or touch the belt. Although a limited amount of 'slip' control can be achieved by the tension lever it is not recommended as this will cause belt wear and friction heat.



Graham Howe's Myford and other workshop hints and tips

- Make a slide way protector for the lathe out of a piece of thin brass sheet so that it fastens to the cross slide easily and covers the lathe ways for about 2 inches. The leading edge has a flat piece of felt super-glued on the underside to wipe the lathe way as it passes over.
- Have the lathe drive belt a little on the slack side so that if there is a calamity the belt will slip and not cause major damage to the lathe or operator.
- To machine a good finish on the lathe make sure the tool is sharp and the cutting edge honed so that it is smooth and then set the lathe in slow speed (back gear) with a fine cut on automatic. Add drops of soluble oil to the work as it progresses. It may be slow but the finish is excellent and needs no further finishing with emery.
- Damp-proofing material (the modern plastic variety) makes very good way protectors.
- Bright metal parts or machined cast iron will quickly rust if left as machined. I always give them a quick spray with WD-40 and leave then for five minutes and then lightly wipe off any excess. The WD-40 seems to form a thin protective skin.
- When making tools and jigs some bright metal parts will tend to rust. You can paint them but in most cases I prefer to heat the part until it changes to a dark purple colour and then submerge the part in engine oil (clean) and leave until cold. Make sure the oil container has a lid as the burning oil smells forever. The part comes out a dark purple/black colour and the oil provides rust protection.
- Keep marking out fluid in a small bottle which has a brush built into the lid. Use methylated spirit to remove after use.
- Dressing the surface grinder is very important to ensure the wheel cutting grains are clean. In order to minimize the replication of errors in the cross feed make sure the diamond is positioned directly below the wheel centre (6 o'clock). Errors show up as 'steps' in the surface finish, which may be very small but very obvious.
- After sharpening a slot or end mill grind a small chamfer on the sharp corner with a relief angle. The cutter will perform very much better.
- Keep a sharp set of new drills for finish drilling or holes that need to be to size. These drills are also good for finishing holes in brass where a keen edge is essential.
- Look after your vice jaws and grind off the serrated teeth. A plain jaw face, which accurately closes to its matching jaw, will provide a good strong grip and not mark your work.
- If you use Loctite adhesive or similar to fasten wheels to their axles it is a good idea to provide an additional locking pin. Drill a small hole that is half in the axle and wheel at the joint and hammer in a pin that is slightly oversize.
- Where possible use a rear tool post on the lathe with the cutting tool positioned 'upside-down'. This allows cutting to take place with the normal anti-clockwise rotation of the chuck (which is a blessing in the case of the Myford with a screw mounting for the chuck). The cutting tool will take much heavier cuts in this position as the natural tendency of the leading edge of the cutting tool is to provide down forces on the headstock spindle which gives additional rigidity.
- When files become clogged you can remove the bits of metal from the teeth using a flat piece of brass ($\frac{3}{4} \times \frac{1}{16}$ in. section). After a short while the brass edge forms the same profile as the file teeth and removes all obstacles with ease. If the file is constantly 'pinning' and bits are tearing into the work surface rub the file surface (after cleaning) over with chalk or rub soluble oil (one part oil to 10 water) into the teeth. The result is a much better finish with less grain.
- When two pieces need to be accurately marked out or drilled then they can be temporarily joined using instant glue or Loctite engineers adhesive and then use gentle heat to break the seal.
- Use a plastic film canister to hold a quantity of made-up flux ready for use in silver-soldering. The canister top is airtight and the contents will maintain their mixed consistency for many months.
- When placing a work piece in the milling vice, after an initial 'nipping' gently tap the work piece with a copper mallet to ensure it is positioned on its base. If like me you have a 'Kurt' clone then make a small recess under both the movable slides near to the jaw with a 0.25in. drill about 0.093in. deep. Insert in these recesses a few coils of a fitted spring (ensuring when compressed it will fit flush in the recess). Next time you tighten the vice, the jaw will ensure the work and parallels are firmly locked especially at the moving jaw end.

Pop-pop motors

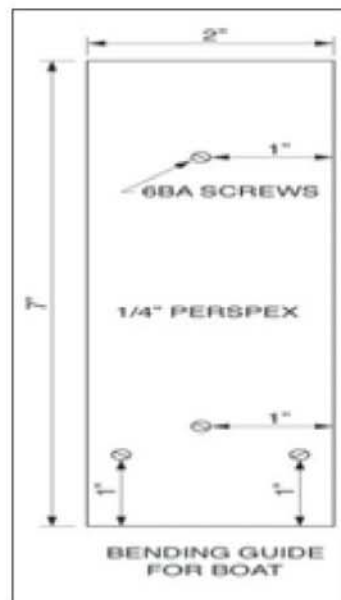
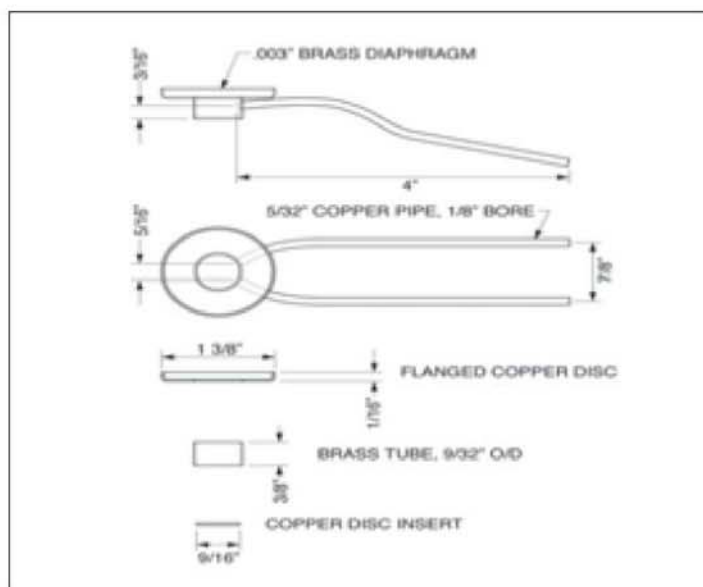
J. M. Ryder describes his experiments with simple pop-pop boat motors.

I became interested in Pop-pop boats when I saw them in action at a Model Engineer Exhibition. These fascinating boats with their seemingly simple engine were made in England once upon a time but now are produced in China. The vibrating diaphragm in these boats is attached to its housing by folding over the surrounding material, a process not available in a small workshop, so has to be soft-soldered in position. This is vulnerable to meltdown due to excess heat.

The forgoing problem led me to try another approach to the construction of this engine, as seen in the drawings and, by making the motor in this way, I found that the soldered joint generally remained intact. Could it be that the water entering the cylinder now has a definite place of containment?

It seems most appropriate to apply heat under the diaphragm support and not under the cylinder, as doing this makes the contained water boil rather than simmer; boiling upsets the required action. Is it possible that the contained water cools the diaphragm more efficiently using the method of construction shown in the drawings? The diaphragm is certainly cooler at its centre than at

1. Clamped up and ready for soldering.
2. Using the bending aid.
3. The burner guide soldered into position.
4. Fitting and soldering the end tubes.
5. Just a teaspoon full of meths.
6. Testing a motor.
7. Burner guide fitted.
8. The completed boat ready for a coat of paint.
9. The fleet's in! A trio of Pop-Pop boats by the author.
10. Boiler assembly ready for silver-soldering.
11. Completed engine ready to fit into boat.
12. Lower view of the engine assembly.
13. Flanged diaphragms and other parts ready for assembly.
14. Completed boat showing correct height of boiler.
15. Not a great success!
16. Motor with 2in. diaphragm, tubes 7in. long, $\frac{5}{32}$ I/D, $\frac{3}{16}$ O/D brass. Boat 11in. long with 2in. beam.
17. Pipette used for filling boat with fuel/water.
18. Completed longer-version boat resplendent in a coat of blue paint.



18



its periphery, as is shown by placing a drop of water at these points.

These little motors also require the correct conditions to start operating. Too much water in the boiler when hot can heat the exit tubes so much that a temperature gradient does not develop; the motor will then only start by cooling the tubes with a damp cloth.

Then again, such a powerful vacuum can develop that the inrush of water appears to buckle or distort the diaphragm and it becomes necessary to replace it to get the thing working. The length of the tubes and thickness of the diaphragm all influence these effects it seems.

You will notice that I have been pumping water in and out of a tin can during my simple experiments so, as might be expected, the tank of water gets warm and usually after a while the required action stops.

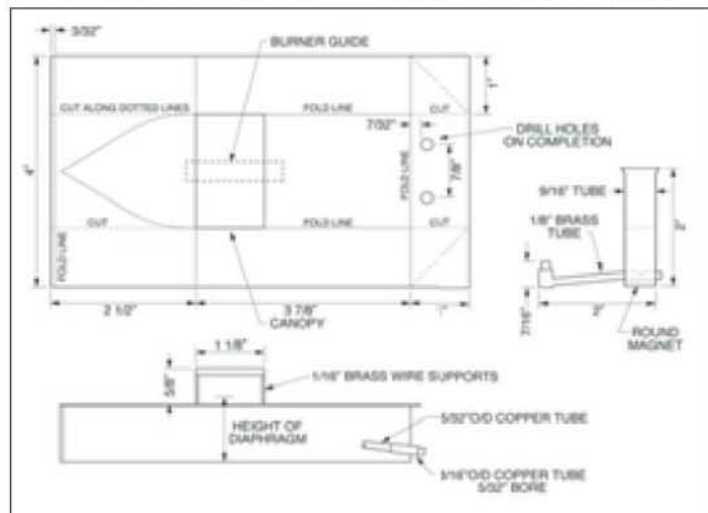
The height to which I have set the boiler is shown in the drawing, but if the motor runs erratically then this can generally be corrected by changing the height. It is best to fill the boiler by means of a plastic syringe while the boat is sitting in the water. The water will then only enter to the height of the exit pipes. I have made the motor removable to make it possible to experiment with other motors or for repairs to

be carried out.

The boat itself is made from sheet tinplate obtained from food cans or from new sheet which, together with copper, brass tubes and brass shim, are available at good model shops. The flanged copper disc was made from a short length of 22mm copper pipe cut lengthways and flattened out. All the parts are silver-soldered except the diaphragm which was attached using multicore electrical solder. The methylated spirits burner has a small round magnet at the base attached by super glue; this stops the burner moving about. The motor likes a constant source of heat.

It is advisable to keep the exit tubes straight at the cold end as these have to slide through the back of the boat. This is the reason that I have added the joints seen in the photographs. Why not experiment with engines of a larger diaphragm and longer tubes? These can also work satisfactorily. One I made has a diaphragm of 2in. dia. and tubes 7in. long, $\frac{5}{32}$ in. bore of brass in a boat 11in. long.

When constructing the motor, make all the parts fit tightly together so as to avoid them falling apart when soldering. Drill the holes for the exit pipes when the copper disc insert, round brass cylinder and the flanged plate have been soldered. Then you can solder up the pipes.



The flanged disc must be rubbed flat on emery paper, and then tinned with soft solder round its edge. Following this, cut a suitable piece of 0.003in. brass shim for the diaphragm. Smear this all over with flux paste (as used by plumbers). Place the brass sheet on a flat piece of wood with the previously tinned flanged disc over it and using a blow lamp gently heat the flanged disc until the solder runs.

It is important to keep the flame away from the thin diaphragm, and of course the wood support. Finally, test for leaks by immersing in water and blowing down the tubes.

Hope all this makes sense and that you will have a try at one.

ME

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SMALL SHAPING MACHINES FOR THE MODEL ENGINEER

THE TOOL
TOOLS MACH
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Tony Griffiths looks at small shapers, useful machines for the model engineer.

Although shapers might be thought to be obsolete – and especially anything operated by hand – they can in fact provide a very useful extension to the model and experimental engineer's workshop, being quick to set up and very economical to tool. With really sharp cutters it is quite astonishing what a variety of useful work these machines can do, even very small ones. In harder times they offered the home engineer an economical way of accomplishing tasks that would otherwise have involved a great deal of laborious, and often inaccurate, hand-filing and cutting.

One of the most popular makes, and that most frequently appearing on the used market, is the tiny Adept in 1A and 2A forms. F. W. Portass of Sheffield was responsible for these and, together with two models of small lathe, manufactured them both before and after WW2. Although just two types are known, rumours persist of a third, even smaller version – the 0A – but will one ever surface? Both the 1A and 2A were of similar construction

and hand-operated with the 2A being considerably more massive. It weighed a considerable 56lbs and was sometimes fitted with an automatic cross feed. The table of the 1A was just 4.5 x 4in., with vertical T-slots 3.5in. high, and the ram travel was 4 inches. The 2A was considerably bigger with a 7 x 6in. table carried on vertical T-slots, which allowed it to be lifted up and down through 4inches. The ram travel was 6.25 inches.

During the early 1950s Mr. F. J. Haynes of Audenshaw, Manchester converted his Adept No. 2 shaper to incorporate a powered ram. So impressed were Portass by this professional-looking design that they adopted a modified version of it for production.

Another older make that must have been produced in some numbers, was the hand-operated 7in. Drummond. A splendid example of late Victorian engineering it was a well-made, rugged little machine with an automatic feed in both directions. The 8 by 9in. table had both two straight and one circular T-slot in its top surface. The latter

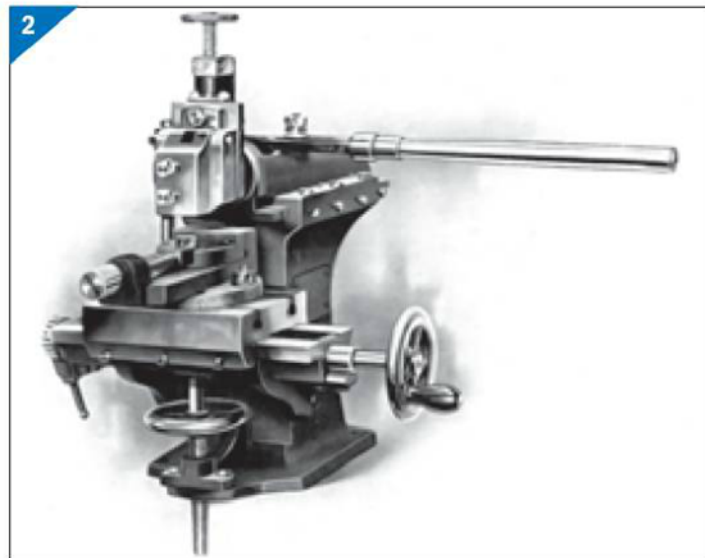
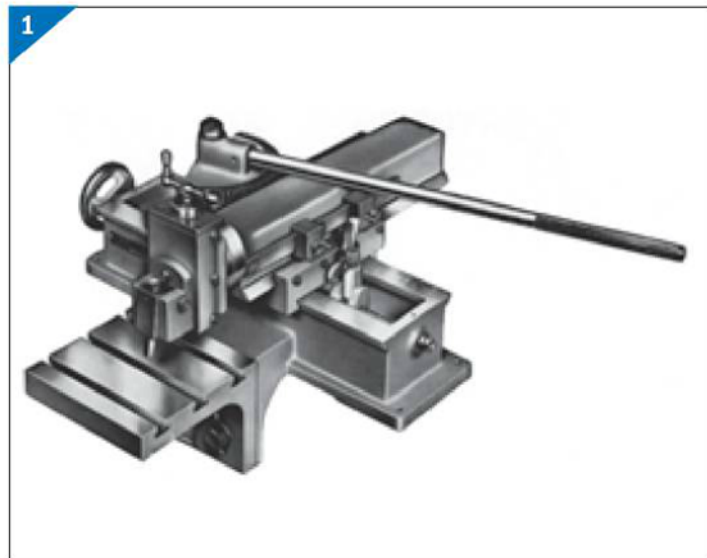
allowing a standard machine vice to be rotated. The table travel was 6in. horizontally and 3in. vertically.

Of more recent production both the Cowells and Perfecto (the latter surviving into the mid-1970s) sold in some numbers. The former was capable of machining an area 6 by 6in. with five rates of automatic cross feed from 0.0025in. to 0.125inches. The latter was similar in arrangement to the Tom Senior shaper produced during the 1930s. This was a more accomplished machine and available with either a 5 or 7in. stroke, hand or power operation, and with or without an automatic cross feed. Judging by the number offered for sale the powered 7in. version appears to have been the more popular model.

The machines were well built and specified, all versions being constructed from ribbed box iron castings and of considerable weight – 130lb for the powered 7in. and 80lb for the 5 inch. For their capacity they were remarkably compact, each model needing only 20 x 17in., plus room for the recommended 0.25hp,

1. Perfecto 7in. hand-powered auto feed.

2. Drummond hand-powered.





1,425rpm motor. The 7in. had a 14.5in. long ram, the 5in. one being some 4.5in. shorter. Both had a maximum cross traverse of 9in., with a reversing, automatic feed as slow as 0.005 inches. They had identical 6in. tables with three T-slots.

The tables could be adjusted up and down 2in. on alternative tapped holes. The toolpost could be swivelling through 360deg. and had 2.25in. of height adjustment. Three rates of stroke were available: 60, 70 and 80 per minute.

If hand-operating a shaper is too much trouble there is still a wide choice of compact and useful powered models. Probably the best of these, though rather heavy to shift, is the Elliott 10M. A development of the Alba 1A, itself a version of the even earlier Royal model, this was an extremely well made and finished machine.

It was popular in both training and production workshops and many thousands are still in use. Automatic cross feed (with a safety over-run device) was fitted as standard and a vertical feed (though with no safety device) available as an option. The machine box table could be swivelled and featured two T-slotted and one V-grooved sides.

Also popular and easily found is the slightly smaller and more easily moved Boxford 8in., also listed as the Model S200. The Boxford was also widely employed in schools and

colleges and, as a result, many of them emerged onto the second-hand market in pristine condition – the great majority of them having never been used. The Boxford was driven by a motor and countershaft unit neatly contained within the stand and had four speeds. Horizontal power feed to the table was standard and a vertical feed (very rarely fitted) available as an option.

When equipped with both power feeds, the operating mechanism was cleverly designed to allow its pawl and ratchet assembly to be swung



through 180deg. to engage either of the movements – only one at a time being available, of course. On balance, a Boxford is probably the ideal shaper for the home workshop. The motor is easily changed to a single-phase unit. The whole machine is light enough to be moved easily in a hatchback car, yet there is sufficient strength and capacity to tackle even larger jobs successfully.

The 10in. South Bend shaper, from the makers of South Bend lathes in the USA, was introduced during 1950 and was a rather elegant little machine,



3. Adept No. 2 motorised with auto feed.

4. Boxford – neat and compact.

5. Substantial Elliott 10M.

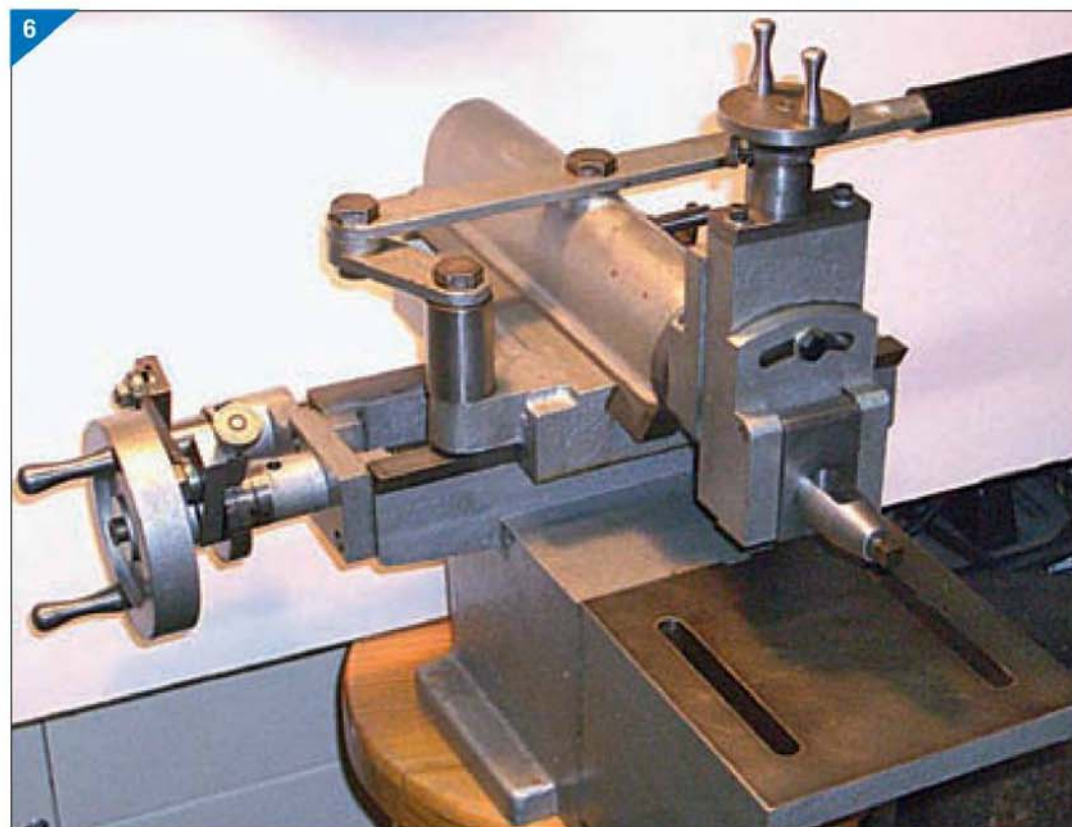
6. Cowells – a late survivor.

capable of being bench mounted but normally supplied on a neat stand with two locking drawers. Besides those mentioned, other makes of small shaper occasional surface. The most common of these are the Senior 8-inch, Britannia, Pools and Robblak – the last even advertised until the mid 1950s.

For more on shapers go to

lathes.co.uk

ME



Michael Jones focuses on the steam-powered stationary and marine models at the Sinsheim Exhibition and examines a few unusual non-steam engines, too.

*Continued from page 334
(M.E. 4321, 15 March 2008)*

Steam sensa

More steam-enthusiast joy awaits in the other halls at the Messe Sinsheim. While steam trains clearly have the most space by virtue of their trackage, there are enormous numbers of stationary engines, marine models, Stirling, I/C and vacuum engines. It was in these halls that I found the smallest Stirling engine I've ever seen.

Stationary steam models

On the stand space of Eberhardt Rau, was this marvellous large mill engine setup complete with Yarrow boiler and ancillary equipment. (**photos 1 and 2**). Mounted on the left-most platform is the Yarrow-type water-tube boiler which is gas fired. The centre platform holds a Worthington-style, twin-cylinder boiler feedwater pump, feedwater by-pass valve, and a domed copper make-up water tank. The horizontal mill engine (photo 2) exhausts into a condenser located behind the engine. It drives an auxiliary feed water pump. The flywheel is about 12in. dia., and the twin-ringed piston is approximately 1in. diameter. The engine ran nearly continuously throughout most of the most exhibition.

Photograph 3 is based on a much-modified Stuart D-10

coupled to a generator. It has a jet condenser (at the right rear side) and was complete with a control board and was running when the photo was taken.

This side-level marine engine was actually turning over at a fairly sedate speed (**photo 4**). However, without using the camera's flash the photograph gives the impression that the engine is turning over at a furious pace. It featured feathering paddle wheels which was fascinating to watch - the naked eye caught the motion very well-but not the camera.

This elaborate, over-crank engine was displayed in a cut-away engine house (**photo 5**). Next door was the one-man joinery shop powered by overhead line-shafting (**photo 6**). Considerable effort must have gone into these displays to build, not only the steam engine, but all the ancillary equipment, work buildings, and engine rooms (sometimes complete with operating boilers).

Simple steam engines can give hours of amusement. This curious, three-wheeled beastie burns Esbit tablets to make low pressure steam in the beaker (**photo 7**). The steam runs a little oscillating cylinder held on the valve port by an O-ring, an arrangement which doubles as a safety valve for the 'boiler'. It

is made in a variety of forms, rail and road, and these are available as kits or ready to run. All were seen on the Mini-Steam stand. W. <http://www.hielscher-dampfmodelle.de/>

An unusual model was a steam-powered gang-saw which specialised in sawing trees (twigs) into timbers (**photo 8**). The stacked boards ready to dry can just be seen to the right of the photo. The saw uses a series of parallel blades into which the logs are fed. Weighted knurled rollers keep the log from lifting off the carriage on the return stroke. A steam boiler and engine are located off to the left. The crowds around this made it impossible to capture the whole scene in one picture.

Steamboats

Marine steam is quite popular and there was a large, circular pool set up to demonstrate models. One modeller had a better solution. He created a shallow box filled with water into which rested his side-wheeler boat model (**photo 9**). From this close vantage point, he could remove the deck houses and show visitors the engine and boiler, point out the way the paddle wheels worked and they could see the churning made in the water at close range.

Titan was a 62m-long suction



tion at Sinsheim



dredger built in 1914 to work along the Kiel Canal (**photo 10**). The prototype was equipped with three steam engines, two for propellers, the third for the suction pump. The model, similarly, has three steam engines; these are oscillating. This 115cm long model, built by Dr. Hugo Sanneck, also has twin propellers and rudders and water discharge over the stern per the prototype.

Small launches were big favourites on the stands and in the pool. *Solent* is one such example (**photo 11**). It's mannequin gives it less of a 'ghost ship' look in photographs.

Two full-size steamboats and marine engines were displayed near the boat pool by members of the German Steamboat Society (DDV). *June Zephyr*,

from Germany, had a particularly nice compound engine with twin piston valves (**photo 12**). Apologies for the diagonal photo, it was the only way everything would fit in one frame.

Flame Lickers

Photograph 13 is a water-cooled, flame licker (gulper) engine running. It is cooled with water pumped up from the reservoir under that 'A'-frame base. The flame is shielded by a brass shield and an exhaust flue.

If one flame works well, four might be better (**photo 14**). This 4-cylinder flame licker makes an interesting noise. It runs very smoothly indeed was unaffected by draughts - when a flame (or two) was diverted, the others were sufficient to keep the engine running steadily.



I/C engines

A unique model of a Swedish Ellwe diesel was displayed by Nick Müller of Munich (**photo 15**). Although this is a convincing diesel-look engine, it is in fact, a petrol engine with the high tension leads to the

sparkplugs disguised as high pressure fuel injection pipes. Lifting the cylinder tops off reveals small spark plugs neatly nestled underneath. Additionally, the model has a reversing gear-box, air-start controls and working mechanical lubrication. ➤



Herr Müller has produced a video tour and demonstration of the engine. W. <http://www.youtube.com/watch?v=3Pa7K287VIU>

Castings for this and the single cylinder version are available from Ambrosi and Gattafoni in Italy. Their website is in Italian, but they will answer e-mails in

English. W. <http://digilander.iberio.it/liguori>

On the stand of Joachim Schurig several wooden patterns were shown assembled into complete engines (photo 16). These stood alongside the finished models (this one built by C. Dietrich Grumpe between

2005 - 6) of a 2-stroke design by Alexis de Bischoff of 1871 (photo 17). The engine was run several times during the exhibition and attracted a crowd to watch and admire its noisy operation.

Stirling Engines

Many Stirling engines were running at the exhibition. Possibly the most artistic in design is shown in photo 18. Just as I was leaving the exhibition to join the coach for the return trip, I was directed to the work of Günter Bettinger. At his display table was the smallest Stirling engine I've ever seen (photo 19). The builder has named it 'die Mücke' or 'the gnat'. It weighs about 4 grammes and

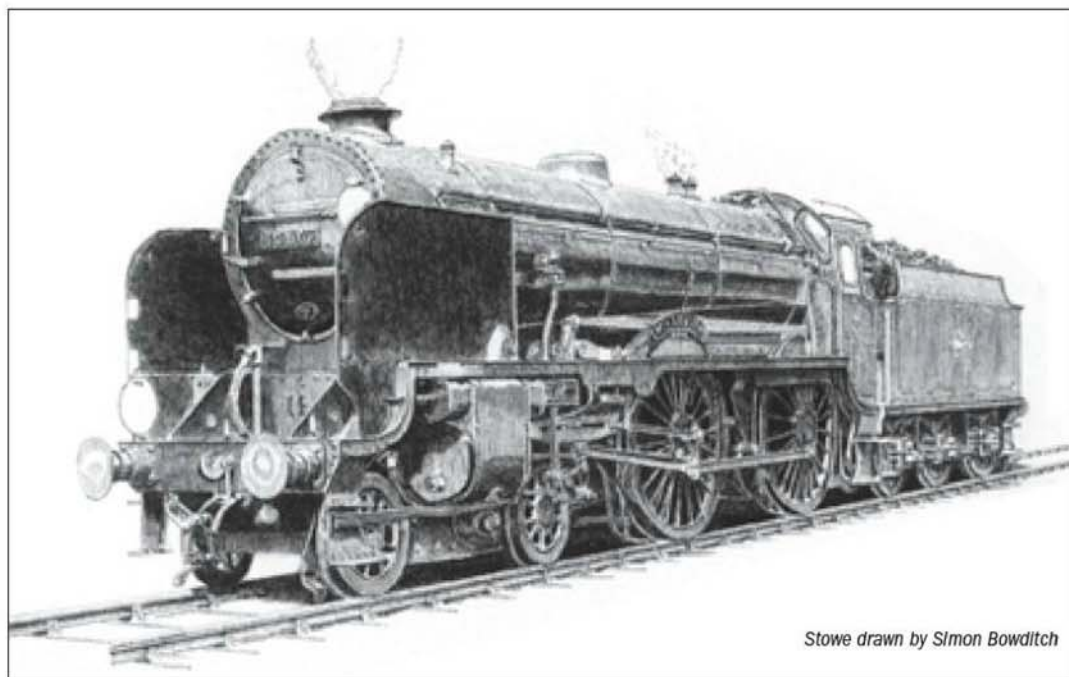
is 16mm (about 0.63in.) in diameter. The builder's fingers in the photo give some scale to this diminutive machine. Next year he is planning on building an even smaller motor. W. <http://tinyurl.com/3y9x8z> W. <http://bettigue.blogspot.com/>

And finally...

The one locomotive I kept photographing was this large 7¹/₂ in. narrow gauge 2-6-0 which was being built for service on a rack and pinion line (photo 20). Only the wheels are castings, all other bits are fabricated (with CNC machinery). It opens up a range of new miniature railway possibilities over terrain that was previously considered too steep. What a great train ride that will make when it's finished. The Echtdampf-Treffenhallen in Sinsheim returns next January – mark your calendars now!

ME

STOWE - Southern Railway Schools class locomotive



Stowe drawn by Simon Bowditch

Neville Evans
provides revised inside
valve gear and describes
the blastpipe and
blower arrangements.

*Continued from page 268
(M.E. 4320, 29 February 2008)*

It may be recalled that I experienced a great deal of difficulty in trying to fit in the driving arrangements for the inside expansion link. Despite close perusal of the drawings, both G/A and detailed, none of us, and I include such luminaries as Prof. Pete Thomas, Simon Bowditch, Derek Tulley, and my wife's uncle Tom, was able to arrive at a satisfactory explanation as to why the driving pin impinged on the slot in such an obtrusive manner. The answer came when I was talking to Paul Norrington, who, importantly, is not only building a Schools but is also a member of the Bluebell Railway Society, and therefore is able to crawl around under their preserved locomotive Stowe. Paul asked me why I didn't stick to the prototype more closely with the inside valve gear? The penny, having been nudged, finally dropped. The Schools is, in fact, an Eastleigh

engine and the tradition at Eastleigh was to drive the expansion link through a drop arm, as on the brilliant LSWR Drummond D15 class, which was, of course, fitted with inside Walschaert's valve gear. Everything now fell into place as can be seen from the supplementary drawings in this article. If you've already made the inside motion according to my earlier drawings, do not despair as the basic layout of the link drive is the same, in fact the early arrangement is easier to make than the revised version; it's simply a matter of authenticity.

Revised inside valve gear

The drop arm, in this application, takes the form of a plate extension to the inside expansion link pivot, as can be seen from the appended artwork (**fig 1**) and Paul Norrington's splendid photos (see **photos 1-3**). The eccentric rod is, of course, forked and remains of the

same basic dimensions as my previous effort. I would suggest that the expansion link is best fabricated from a machined block with the drop arm plate silver-soldered on to the right-hand side. The best thing that I can say is that you are only going to need one inside link pivot, and that the two outside links are quite straightforward and much easier to make.

One problem, that occurs with regularity in the construction of small locos, is that of the fixing of small pins into the ends of various links and other gadgets so that they don't fall out at crucial moments. I've tried many assorted ways and generally find it best to stick to the prototype method, if it isn't too inconvenient. The eccentric rod is a case in point. I'm sure that the best method is simply to follow the prototype and use a clevis with nut and washer. A point to bear in mind is

that while some joints need to be broken for the purpose of dismantling the engine, others need only to be attended to when wear has taken place.

I've detailed a few quite satisfactory methods on the drawing, use whichever takes your fancy. As a general rule, the pin should be made of silver steel, hardened through. I tend not to machine shouldered clevises from larger stock, but to use the ready ground bar in the raw state so to speak. If a shoulder is essential then a groove can be cut and a C-clip of appropriate size can be fitted.

Another realistic method is to drill and tap the $\frac{1}{8}$ in. dia. silver steel rod 10BA and to Loctite a stainless steel 10BA slotted screw into it. The screw head can then be turned down to whatever size takes your fancy. This method combines realism with the convenience of a ready made, hardened and ground bearing surface.

The Great Northern Railway, I'm told, used taper pins fitted tightly in the fork part and loose in the bearing. The GWR commonly used a clevis and lock plate for pin joints, as well as castellated nuts and split pins. Curly Lawrence used a press fitted pin. He used a push fit in

one fork half, a sliding fit in the bearing and a press fit in the other fork half. Ivor uses a sliding pin and Loctite. All five of these schemes work very well; take your pick.

Whichever way you fit the pin, the bush must be of bronze or better, of cast iron which will outlast bronze by a factor of three or four. better still of polished hard steel on polished hard steel (ask any clock maker), this latter is obtained by case hardening the eye of the bearing and then polishing with a piece of suitably dimensioned dowel and a fine abrasive. Buy a tin of case hardening powder and follow the simple instructions.

In such places as the expansion link assembly, which can be difficult of access with an oil-can if placed between the frames, try to plan lubrication holes so that oil splashed liberally onto the top of the link drains into them. A very useful tool is a pump oil-can with a thin 6in. long copper tube soldered into the spout which will enable one to reach those spots that are otherwise so frustratingly inaccessible.

The blastpipe and draughting arrangements

A great deal of work has been carried out over

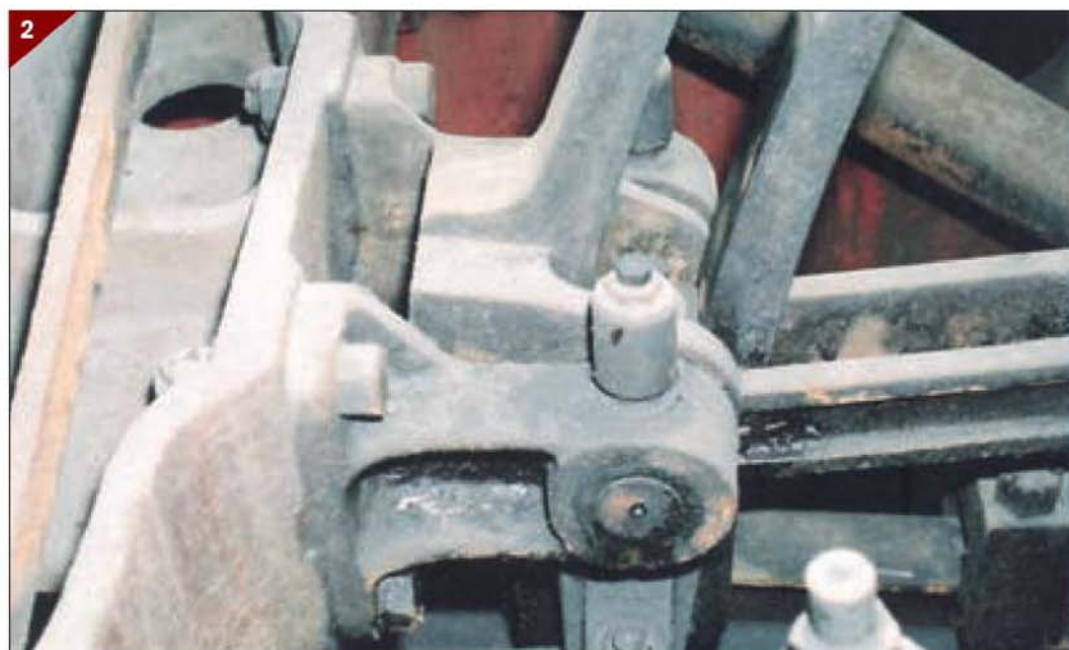


the years into the ideal proportions of the draughting arrangements of steam locos. The early work of Andre Chapelon was based upon the need for a big hot fire to produce steam rapidly, which meant that increased draught through

1. Note that the Inside eccentric rod is fluted on one side only.

2. The expansion link bracket with lubricators on top.

2. Fig 1. Stowe - Revised Inside valve gear.



the fire was required, which in turn necessitated a greater degree of vacuum in the smokebox. Easy enough, but the main thrust of his original work was to obtain this vacuum without increasing back pressure in the cylinders.

The triumphant results of his researches meant that huge increases of power and/or reductions in fuel consumption were available. These advances, together with the doubling of steam pipe diameters, meant that full-size locomotives became far more capable than before.

With small engines however, of 15in. gauge and below, there is a smaller

proportional increase in power, as back pressure in properly designed cylinders is pretty low anyway. There is also the fact that the increases are largely negated by the fact of our much smaller adhesive weight in proportion to tractive effort due to scale effect.

A few days ago I re-drew the blast arrangements of Stowe using Henry Greenley's simple formula of, I suppose, 100 years ago and found that it differed so little from the very most modern ideas that I doubt that it would make very much difference.

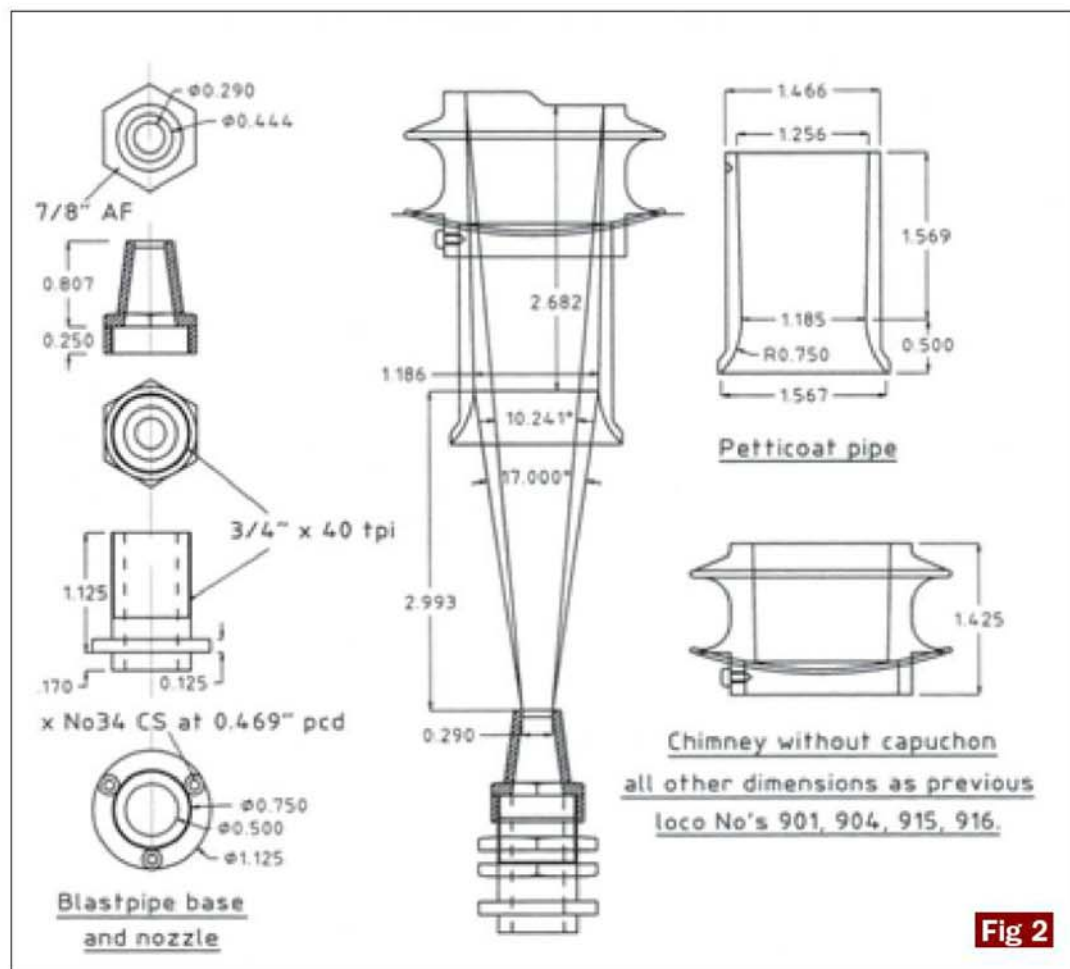
Please don't run away with the idea that I am against development. In fact, the opposite is true and I am very conscious of the advances made by people like Gordon Smith, Lionel Flippance, Don Ashton and Bill Hall, to mention a very few, in the field of greater efficiency and effectiveness.

As to the practicalities, I can envisage no problems in the making of these important parts. The petticoat itself would be improved by turning it from bronze pipe, or even stainless steel pipe, as there is no doubt that a certain amount of erosion due to hard sharp particles of grit from the firebed will take place more readily in a softer material such as brass.

The blower

As is my normal practice, I have simplified the business end of the blower assembly as far as I possibly can. I can't see the point of elaborate assemblies when a simple pipe will do perhaps a better job.

An important operation is that of forming the nozzle of the plain blower pipe by swaging. Anneal the pipe by heating to cherry red and plunging into cool water, push a short length of 1mm stainless steel wire into the hole and gently hammer the tube against a flat surface, while slowly turning it. When the tube is neatly tapered and closed up, extract the wire



3. A view looking forward from the crank axle. Note the drive to the lubricator from the bottom of the link and the oil box.

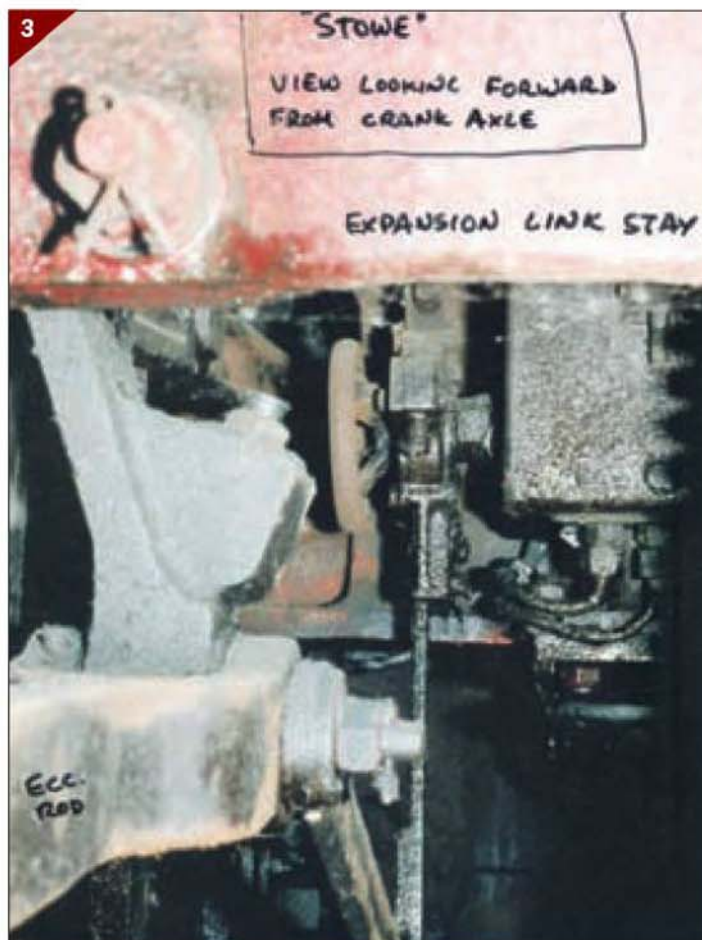
Fig 2. Blastpipe and draughting arrangements.

with a pair of pliers. A suitable spark arrester, a necessary fitment these days, will be detailed later.

Most people who maintain an interest in these lovely engines, will know that they were subject to draughting modifications, which often included new improved cylinders by Oliver Bullied, from January 1939. The first engine to be given a Lemaitre multi-nozzle blastpipe was 914 *Eastbourne* and nearly half the class were similarly modified.

I am looking into the possibility of following suit with a Koopman or a Lempoy blastpipe and large chimney, the problem being that they take up a large amount of volume in the smokebox. Watch this space.

● To be continued.



Land B hosts SEQLEC 2008

This year's SEQLEC will take place in Essex.

The 'Railway Gang' of the Langford and Beeleigh Miniature Railway (L and B) have decided to put their new line 'on the map' by staging SEQLEC (Seven and a Quarter Locomotive Efficiency Competition) over the weekend of 19–20 July 2008.

Situated on the grounds of one of the last steam pumping stations built between the two world wars, the Langford and Beeleigh Miniature Railway takes its name from nearby Langford Station on a now discontinued railway linking Maldon to the main line to Liverpool Street Station in London.

From the 50 or so volunteers who gather weekly to work on displays at the main museum buildings, in 2003 a 'splinter group' built a 7½in. gauge railway on the grounds.

Track and shed

The L and B's substantially-built main line circles the grounds and has 60ft. radius curves and turn outs, a two-platform station at Langford and a wayside halt. The track is controlled by automatic coloured light signals with level crossing warnings and lights.

The main running line (about ¼ mile long) has easy curves, sturdy steel rail and one or two interesting little gradients to provide an ideal test track.

The main station with its two platforms long headshunt, water tower and coal stage will enable trains to be marshalled to suit the requirements of each driver.

The MPD (motive power depot) boasts a three-road shed (40ft. long) has a 14ft. turntable which can access two carriage roads, a steaming and disposal road and a one-ton capacity adjustable loading and unloading ramp. Water, compressed air, mains electricity and 12V DC are available in the engine shed and adjacent workshop.

Rolling stock and water

The rolling stock is comprised of six heavy carriages. One driving and passenger car has a 16-gallon water capacity which

is electrically-pumped and can be controlled by the driver to top up locomotive tanks and tenders during their circuits. There are also three lighter-weight cars, one of which is also a driving car.

All the rolling stock is vacuum-braked on all eight wheels. For the benefit of non-vacuum equipped visiting locomotives, a vacuum generator is available to be fitted to the train which provides the guard with a brake valve and vacuum gauge. A brake valve is also fitted to the driving car. Locomotives driven from their tenders or in other ways, can be braked by means of a valve on a 'wandering lead'.

Accommodation and caravans

The 11-acre site is surrounded by a high steel fence and there is adequate space for secure parking of vans and trailers in the station yard and for caravans and camping in the field or the woods the other side of the river, all part of the museum grounds and gardens.

Plenty of accommodation can be found in the ancient seaport town of Maldon and good pubs and places to eat. There are supermarkets as well as traditional high street shops.

The sights

A river trip on the Blackwater with its boats and fleet of spritsail barges (now carrying passengers, not cargo) can be enjoyed and the 'promenade' offers river views, the lakes (boating and ornamental) and amusements. The larger towns of Colchester and Chelmsford are within easy reach.

The museum itself, situated just outside the old seaport town of Maldon in Essex at the head of the Blackwater Estuary, houses a wide spectrum of 'power' displays from the huge steam pumps to examples of I/C engines and wind and water power. There is a complete operating line shaft-driven workshop.

Entry details from:

John Dines.

**c/o Museum of Power,
Hatfield Road, Langford,
Maldon, Essex CM9 6QA**

ME



Brighton Modelworld

Malcolm Stride takes a trip to Brighton to visit this popular show in its 30th anniversary year.

I had never visited this show before, so I set out to Brighton with no preconceived ideas as to what to expect. The show is held in the Brighton Centre, located right on the sea front and about 10 minutes walk from the main railway station. I arrived at the centre to be welcomed by Tim Steven the show organiser and was soon inside having a first look round. This show is a general modelling show so although I have concentrated on the engineering subjects for my report, I must say I enjoyed seeing many of the other exhibits.

My own club, **Reading SME**, was at the show, so I got rid of my coat and other things before finding Peter Ballard's fine triple-expansion generating set (photo 1) on the stand. I have seen several examples of this engine recently, so it is obviously still a popular subject.

Next door to Reading was the **Mid Sussex MEC** which had a very varied display including the fine Fowler 9/11 tine turning cultivator (photo 2) by Dave White. The prototype



dates from around 1910 and the standard of workmanship on this unpainted model was top class. Another unusual exhibit on this stand was the display of engines to Edgar Westbury designs (photo 3) by Tony Grantham. Tony had a card listing all the engines and they are (left to right, top to bottom): water-cooled 15cc Kiwi

solid); *Dolphin* 10cc 4-stroke; *Atom V* 30cc two-stroke; *Cadet* 5cc 2-stroke; two *Atom Minor* 2-strokes – one with front disc induction; *Ensign* 10cc car engine; *Craftsman Twin* 10cc flat twin; *Cherub* 10cc twin, *Kestrel* 5cc 2-stroke and finally the *Ladybird* 2.5cc twin diesel.

The Society of Model & Experimental Engineers was promoting the SMEELEC Low Energy Challenge competition which will take place at the Model Engineer Exhibition and details can be found on page 399. The test rig was being shown by Mike Kapp and Alan Wragg (photo 4), organisers of the competition. Further details can be obtained from the SMEE website at www.sm-ee.co.uk
Fareham DSME had another



2008

good range of models on its stand and I picked this nice Tyne and Wear Metro electric locomotive (**photo 5**) by Phil Brien for my picture. The full-size locomotive is battery-powered with the batteries charged from the overhead supply.

The next locomotive was being displayed on the very local **Brighton & Hove Society of Miniature Locomotive Engineers** stand. This was the superb Isle of Man locomotive *Peveril* (**photo 6**) by L. Marshall. *Peveril* is one of 15 identical Beyer Peacock locomotives built for the railway. This society was providing train rides for the visitors alongside the **Bentley Miniature Railway** with some familiar faces from SMEE doing the driving.

Several of the famous (or should that be 'infamous') Daleks were happily trundling around the show. They were being controlled by the **Dalek Builders Guild** and my picture (**photo 7**) shows Vince Martyn (on the left!) from Reading SME with his monster which had the temerity to attack your scribe later on!

Among the many things taking place in the arena was the tank and military vehicle display by the **UK Tank Group**. My picture (**photo 8**) shows a typical example of these detailed R.C. models.

We have covered land-based vehicles and locomotives, in addition there were several model boat displays at the show, including a boating pool on which I found a fine cargo ship, the *Venture* (**photo 9**) being put through its paces.

For those who prefer a faster mode of water transport, the *Spirit of Seattle* 3 Point Hydroplane (**photo 10**) should be fast enough. This model was displayed with a collection of other fast boats by the very newly-formed **Brighton & Hove Model Power Boat Club**. The club operates at Hove Lagoon (at the east end of



7. Several Daleks were on the loose, this one by Vince Martyn from Reading SME.



8. An American Stuart M5A1 Light Tank in the display by the UK Tank Group.



9. Venture, one of the boats being operated on the pool.

10. The Spirit of Seattle 3 Point Hydroplane displayed by the Brighton & Hove Model Power Boat Club.

11. Peggy from the South Downs Light Railway Society was popular in the foyer.

12. The electric-powered Lion locomotive under construction by 14 year-old Joe Addis of Fareham DSME.

Shoreham Harbour) on Saturday afternoons for members and further details can be obtained from the founders Dave Monck (T. 01273 415102) or Andy Davis (T. 01273 883822).

Reverting back to large model engineering, the 0-4-0 locomotive *Peggy* (**photo 11**) from the **South Downs Light Railway Society** was in the foyer and provided a contrast between the very large and very small scales on display at the show.

For my final picture, I have saved the unusual electric-powered *Lion* locomotive (**photo 12**) being built (with assistance) by 14 year-old Joe Addis from the Fareham DSME. The locomotive is driven by toothed belts from an upright motor and the battery is carried in the tender.

My notes and pictures can only convey a small part of this show which, although not primarily a model engineering show, has much to interest model engineers. I certainly enjoyed my visit.

ME



Peter Spenlove-Spenlove

concludes his description of making custom washers with some hints and tips.

*Continued from page 269
(M.E. 4320, 29 Feb. 2008)*

To make a good true washer, the middle hole is made first. Punches with retracting springs are often used to make the middle holes. Then a larger punch with a pip is used. The centre hole is hand located on the pip before hitting the punch to cut the washer.

Photograph 7 shows a double-ended punch/die set which does not have springs. The pip (in **photo 8**) must align with the middle hole before striking. The finished washers, in this case $\frac{1}{2}$ in. O/D x $\frac{1}{8}$ in. I/D, were cut in 0.025in. thick Mylar as shown in **photo 9**.

For bigger washers, the cutting end of the punches is 'as-turned' in a lathe. Some people used to make punches with a sloping end. An angle of 5 to 10 deg. was used and the punch and die were hardened. The face of the hole in the fixture was not on a slope. Such tools were sold to amateur radio builders who had to cut holes in 16 or 18swg aluminium chassis for fitting tuning coils and valve bases. However, an angled punch can distort the flatness of a washer, especially if the material is thin metal.

Curing sticky washers

When punching several washers, the earlier one may tend to stick in the lower half of the tool instead of dropping out. There are two ways to cure this: Run a taper reamer into

the hole, but don't ream the cutting edge nor the area for about $\frac{1}{16}$ in. below that. Taper pin reamers can be used but, as few people have these, an alternative method can be used.

Set the slotted and reamed block in the machine vice with the lower hole uppermost. Fill the slot with a flat piece of steel. Use a drill which is very slightly larger than the reamed hole and open it out. The drill point will touch the flat 'obstruction' in the slot and thus it will not open out the hole close to the punching area.

Caution: Use the steel 'obstruction' in the slot. Do not rely on your drilling 'technique' as it is very possible that the drill could snatch and go too far! The aim is to leave about 0.05 to 0.07in. of the hole at the original reamed size.

General reminders

As most of the punch and die sets, whether used freehand or in a press or vice, will be used to make washers, some reminders are worth while.

1. Punch the small hole first.
2. Use a punch with a pip to locate the small hole while it cuts the outer (larger) diameter. When working freehand, this is easy; one can 'feel' if the pip is



engaged.

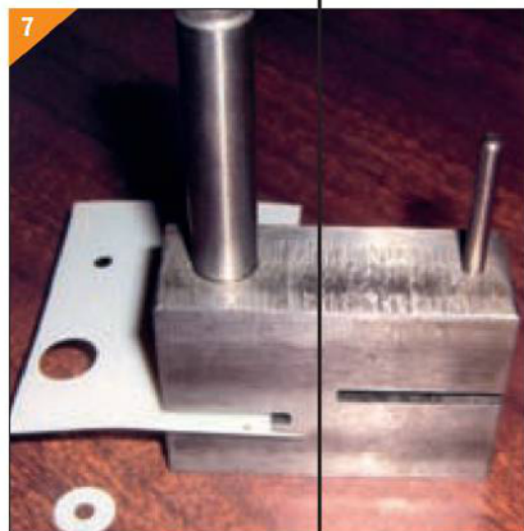
3. Punches with return springs under the head have to be treated more carefully. You will NOT hold the punch while hitting it. In this cases, make the pip a bit longer. Some spacers under the spring may help adjustment, so that the pip just drops into the middle hole while the punch body is just clear of the potential washer.
4. Don't bash the pip into the anvil - it will be damaged!
5. If many washers are to be made, set the punch/die assembly on a surface of block with a hole big enough to let finished washers drop through.

ME

7. A double-ended punch and die set.

8. The larger punch has a 'pip' for locating the centre hole.

9. A washer illustrates how the fixture makes nice, concentric parts.



The Cambridge Old Sewage Pumping Station and replica pumping engine

Donald Unwin describes the full-size Hathorn Davey Sewage Pumping Engine.

*Continued from page 254
(M.E. 4320, 29 February 2008)*

Since the closure of the station in 1968, the sewage input culvert and delivery rising main have been blanked off, and the sewage sump cleaned out and filled with water. To enable the engine to be operated realistically, water is pumped and re-circulated back to the sewage sump.

Figure 2 shows a diagram of the tandem compound cylinders of the pumping engine with the connecting rod coupled to compensating wheels (which act as bell cranks), and the pump rods dropping vertically downwards to the pump cylinders below ground. Davey was anxious to design the engines to have greater pumping efficiency than the Cornish engines used at that time. His heavy compensating wheels (instead of the lighter bell cranks) were one of the ways he used to maximise the

kinetic energy available.

The engine assembly is mounted on a bedplate consisting of two long castings. The high-pressure cylinder, valve bearing castings and the compensating wheel shaft bearings are bolted to the bedplate. Two extension castings, bolted to the ends of the main castings, carry the low-pressure cylinder. The whole bedplate is mounted on a 10ft. high brick plinth rising out of the basement. Below the floor of the basement is the sump from which the sewage, from the incoming culvert, was collected (fig 3).

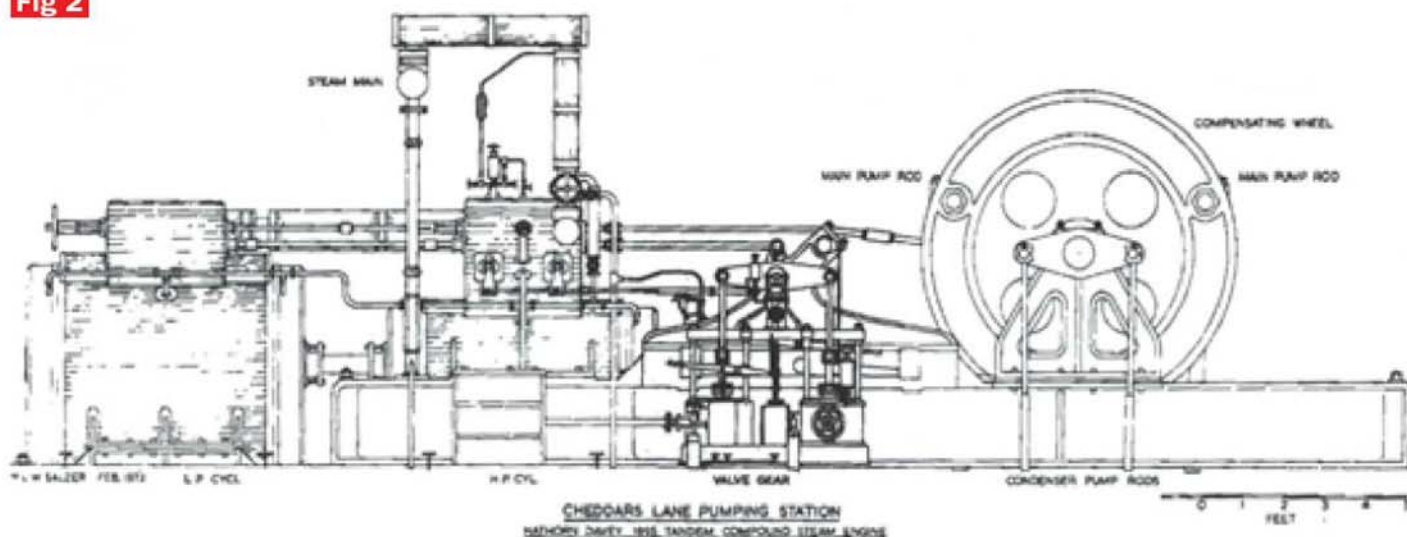
Above each cylinder are the main slide valves, with Meyer type valves on top of them, to enable the cut-off to be adjusted. Although the Meyer valves are operated by a valve rod, hand wheels on the back of each valve chest enable the valves of each cylinder

to be adjusted individually. In addition, the high-pressure cylinder has 'cushioning' or 'snubbing' valves in the exhaust passages to cushion the piston at the end of each strike. These valves perform an important function since the engine is non-rotating and has no flywheel and crankpin to restrain the piston at the ends of the stroke.

Originally, both raw sewage and storm water flowed into the sewers so the depth of fluid in the sump varied considerably altering the load on the pumping engines. The engines had to be self-governing under such conditions. To provide this control, Henry Davey designed an ingenious device he called the 'Differential Valve Gear', now known as the 'Steam Man' (photo 11). This admits steam for a longer or shorter portion of the stroke depending on the load. Davey designed several



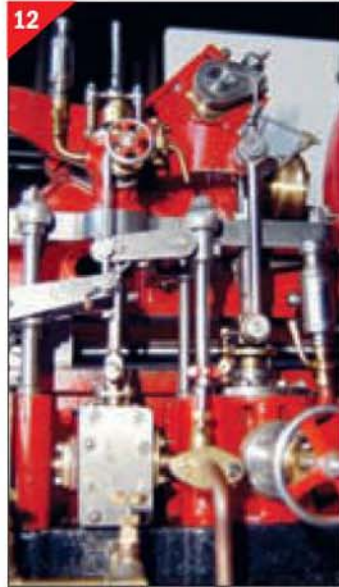
Fig 2





versions of this gear, including one that reversed the steam force on the piston in the event of a sudden reduction in load.

Two steam cylinders are fitted to the Steam Man, each is connected to a water-filled cataract cylinder to enable the piston speed to be regulated. These consist of closed cylinders, each side of the piston being connected via an adjustable flow control valve.



Hence, once set, the speed of the pistons remained constant irrespective of engine load. A smaller 'pause' cylinder operates the slide valve of the larger 'subsidiary' cylinder that, in turn, operates the main engine slide valves through links (**photo 12**).

During normal running, steam admission is controlled by the constant velocity subsidiary piston operating



the main slide valves. Cut-off is controlled by the Meyer valves, operated by the engine. Providing that the load on the engine is sufficient to keep its speed slower than that of the subsidiary piston, the cut-off is controlled by its motion. However, if the speed of the engine exceeds that of the subsidiary piston, due to a reduction of load or rise of steam pressure, then

the Meyer valves will cut off the steam earlier. The Meyer valves are operated via a cross shaft mounted in the two valve bearing castings. This shaft is partially rotated by a link, connected to an arm on the cross shaft, to a pivot on the end of the compensating wheel shaft, on the opposite side to the Steam Man (**photo 13**).

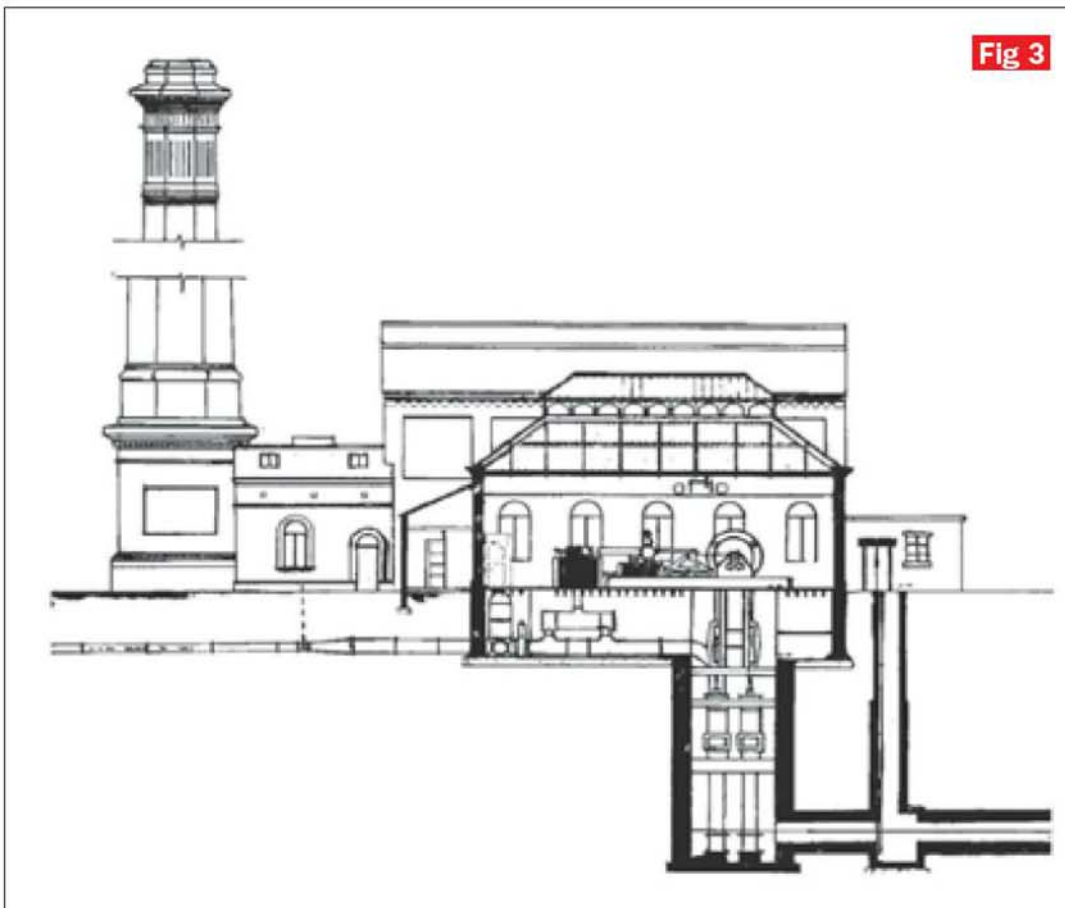
At the end of the engine stroke, a link from the Meyer valve cross shaft, connected to the 'Pause' steam cylinder slide valve of the Steam Man (to the left of the stroke counter), initiates the sequence that controls the return stroke of the main engine (**photo 14**).

On the end of the common piston rod is the crosshead, with a shaft carrying slippers running in guideways on the bedplate castings. The connecting rod big end is on the crosshead shaft and the little end coupled to the bottom of the large compensating wheels. The crank pins of the pump connecting rods are symmetrically positioned in the upper quadrants of the wheels (fig 2). Hence, the compensating wheels drive the two sewage pumps located below in the sewage sump. Crossheads with guideways are also fitted to the top ends of the pump rods in the basement (**photo 15**).

The delivery from the two sewage pump cylinders went into the main discharge pipe, that passes along the basement floor, to the rising main that lead to the Milton Sewage Farm. In the basement is a surface condenser that used the raw sewage discharge as cooling fluid. It is mounted horizontally above the main discharge pipe and connected by a short pipe at each end to the discharge pipe.

Between the two connecting pipes is a diversion valve to divert some of the discharge into the condenser. Just before the junction, at the end of the basement, is an air chamber to reduce hydraulic shock and a large gate valve to close the discharge completely.

This enables one pumping engine to be isolated whilst



the other remains working. Photography of parts of the basement is very difficult so **photo 16** of the condenser and air chamber assembly is of the replica.

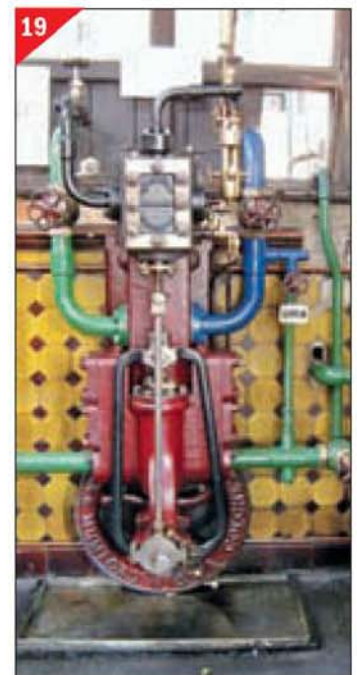
The compensating wheel shaft has a cross arm that has two connecting rods which drive the condenser pumps located below the engine room floor. These pumps draw the condensate from the surface condenser and deliver it to the oil separator (**photo 17**, right). The water sinks below the oil and the clean separated water flows along a pipe into the hot well tank at the back.

On the wall behind the main engines, in full view of the engine man, are two large level indicators, one showing the sewage level and the other the hot well water level.

Also on the wall is a panel of gauges indicating boiler pressure, vacuum and water pump delivery pressures (**photo 18**).

Contemporary with the main engines is a Mumford, double-acting, donkey pump Model No. 6 (**photo 19**). This can either pump water from the river or the hot well tank and deliver it to the boiler or to a header tank in the roof. In addition, there are two Weir, horizontal, reciprocating boiler feed pumps.

● *To be continued.*



Finishing the Bristol Hydra

(THAT ALMOST FINISHED ME!)

Brian Perkins struggles with valve timing and the temptations of the scrap bin.

*Continued from page 257
(M.E. 4320, 29 February 2007)*

The next job was to connect the cam drives (**photos 6a and b**). However, when I turned the engine over, to my horror, the camshafts on each head were turning in opposing directions, and the left and right heads were, as should have been obvious, going in opposing directions. I visited the Trust to see the full-size engine. The cam drive gearboxes had cast-in arrows to show the direction of rotation, so there was really no excuse for missing the point. Mad panic, was I going to have to remake all the cams? Earlier, I mentioned my concern about setting

the valve timing because the cams are hidden within the cam boxes. To help,

6a



I had drilled a hole in each cam so that, with the hole vertical and the piston at TDC, the valve should be in the correct position - but now the shafts were going in opposite directions! After a break for thought, I realised that, purely by chance, I had made the cams symmetrical lengthways so it was just a matter of turning them end-to-end where necessary. A huge sigh of relief!

Having sorted that problem out, it was off with the cam boxes again so that the double valve springs and tappets could be fitted. The valve spring load was calculated from the acceleration figures obtained from the cam design program. This were surprisingly light so it was not possible to use standard springs. So, back to the piano shop for more wire. The springs were wound left and right-handed to avoid any coil binding and the ends ground square (**photo 7**). The valves were fitted to the heads and the springs and tappets installed so that a preliminary

6b



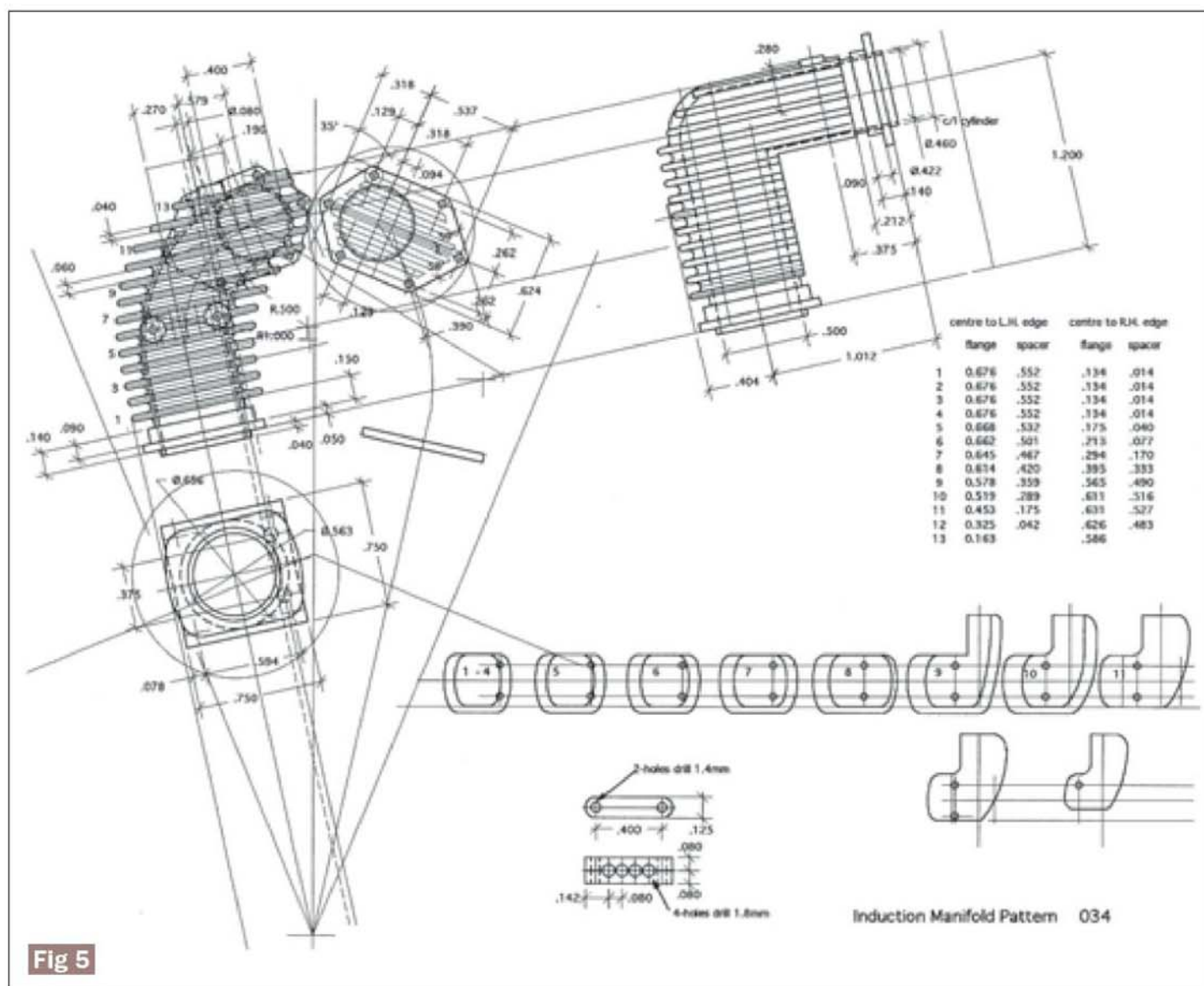


Fig 5

test of tappet clearances could be made.

Valve timing

It was then time to begin the serious business of setting up the valve timing. This took seven months! At one time I was sorely tempted to put the whole lot in the bin (hence the title of the article). I started with the rear row of cylinders but, after setting the first two, there was a click from somewhere inside as a gear jumped a tooth. Initially, I thought it was the fault of the eight bevel pinions driving the cams since, because of the layout, where the gears all come to a point, it had been necessary to skim the top of the 48dp teeth to ensure clearance. So I threw that lot away and remade the pinions

and their drive bevel using 40dp and a wider tooth face.

I reassembled. This time I got to about No. 5 before the dreaded click, so down it came again. This time I suspected the 18t. x 48dp pinion, driving the cam drive, might be causing the problem so this, and it's 138t driven wheel, was remade with 15t. x 40dp and 115t respectively.

I reassemble again. This time I got to No. 6 before it failed. I was now getting rather upset! I decided that the problem was probably bearing play in the eight bevel pinions. These were mounted in plain bushes so, after stripping down yet again, I modified the housings and gears to accept ball bearings to reduce lateral movement.

The next problem was that a gear, which was fastened to

its shaft by Loctite, slipped; which meant another strip down. I pinned the gear to the shaft and reassembled. Then one of the cross shaft bevels, connecting the two camshafts, also slipped so those bevel gears were remade using a hexagon shaft rather than relying on Loctite.

You can imagine that I was now very annoyed - to put it mildly, and the engine

was nearly thrown in the bin! However, after a few days off over Christmas, I reassembled it yet again and finally managed to connect all the drives to the rear cylinders. I even managed to get all the cams set up in the right sense. I now had an engine with 8 cylinders in which the cams were all going in the right direction and the valves were actually going up and down. Of ➤





course, I still had the task of setting the tappet clearances, but this was progress.

Drive couplings

The front cams are driven through a coupling from the rear boxes. This coupling was originally a disc and pin type. However, it quickly became apparent that it would be impossible to use this type of coupling since the cam box has to be slid into place and there is not enough movement in the coupling to allow this. Thinking cap back on. I modified the coupling to the Oldham type, which can be lined up and slid into engagement without any difficulty. Obviously the cams could not be set until the cam box was in place. But, by making them free on the shaft, it was possible to rotate the coupling and cam to its correct position, relative to the rear cam, and lock with a grub screw. Once all the cylinders were set, and I was satisfied that firing order was correct, the couplings were drilled and pinned in place.

In future, I have decided that anything to do with valve timing, and associated drive, needs to be positively fixed with keys, serrations, or by pinning rather than relying on Loctite. However, the chances of me ever undertaking another engine of this type again are remote! The main problem is that, since everything is tucked away within the cases, setting up is extremely difficult – one just cannot see where the problems are.

Inlet manifolds

To ease my frustration, I began to consider producing the finned inlet manifolds, the inlet manifold flanges/covers and the propeller hub:

The inlet manifolds are in the form of double bend tubes with fins. These carry the mixture from the supercharger stubs to the inlet manifold on the rear cylinder (fig 5). The front cylinder is fed by a simple tube between the two inlets. The manifolds are left and right handed so the first thing was to produce a pattern for each. This

was done by bonding together a series of plates to produce the forms and from these make a silicon rubber mould. A second pattern was produced for the core and a mould made from this (photo 8).

End tubes were turned from aluminium which were then fitted to the ends of the cores. I tried wax and Cerrobend for these but gave up on the wax when I scrapped a number of castings because the end tubes moved due to the weakness of the wax cores. The core was placed in the mould and resin poured in to produce the casting (photo 9); then the core was melted out. I tried polyurethane, polyester and epoxy resins but eventually chose epoxy. This seemed to give the best results and were even better when I cast in a vacuum. When it came to final assembly, it was very difficult to position them due to the tight spaces and minimum clearance involved.

The inlet manifold flanges and front covers were jobs that looked simple but turn out to be difficult. Each cover is held on with six 12BA studs, which are fitted through drilled bosses. The rear ones are flat, and were fairly straightforward, but the front ones are fitted to a face at 30deg. to the centre line of the cylinder with the studs in line with the centre line.

To produce them, the hole pattern was drilled and then the covers and bosses sawn off at the 30deg. angle (photo

10). The front covers had no central hole and were left thicker to allow for the fins, which had to be machined once they were parted off. The bosses were made longer than necessary, bonded into place, finished to length, and the flange profiled when cured. I had several attempts to make these parts, particularly the angled ones, before achieving success. Drilling and tapping 12BA holes on the angled faces was a bit fraught; the flat faces were not quite so bad. Drill jigs were made in much the same way as the covers with pre-drilled bosses attached to the flanges. However, this time, these parts were made in steel and silver-soldered together.

Tapped holes

There are over 600–12BA tapped holes on the engine which gave me nightmares just thinking about them. In the event, it all went well and I only broke one tap, which was spark eroded out by a friend of someone at the Trust. All the tapped holes on the engine, including the 148–14BA holes in the cam box bearing covers, were tapped using my normal method of holding the tap in a pin chuck with a four-slit collet so that the square on the tap was held across the corners. The shank of the pin chuck was then held loosely in the chuck of my bench drill and turned with finger pressure only.

● To be continued.



SMEELEC

A NEW COMPETITION FOR THE MODEL ENGINEER EXHIBITION

Mike Kapp outlines the SMEE's energy saving competition that is open to all.

Anybody wandering around the recent exhibitions may have stumbled across a peculiar white contraption with a tall plastic column at one end and a jumble of electronics and a computer screen at the other. Oh, and it also sported a series of pulleys with bits of string running round them. Standing behind this thing you may have noticed two men in blue coats nervously trying to tell all who would listen what it was about.

So what is it about? Well, it is called SMEELEC, short for the 'Society of Model and Experimental Engineers Low Energy Challenge'. It is a competition aimed at anyone who has a yen for doing something that is based on experimental prototyping skills. Basically, it is an exercise in efficient energy conversion. Contestants are required to build a device that can

extract and store energy from a low rate source and then release it as kinetic energy to lift a weight as rapidly as possible. We are not after beautifully finished models – as long as it works we don't care what it looks like. The shortest time wins – finish has nothing to do with it. The device just has to be safe and follow the rules.

There are actually two competition categories and they are differentiated by energy source, being either electrical or heat. The electrical category uses a button cell type LR44 as the energy source. This is the cell commonly used in digital callipers. Energy can be drawn from this for up to 5 minutes, and this energy must be used to lift the weight before the time expires. The heat category uses the flame from a tea light (night light) as the source, but here 10 minutes are allowed for energy accumulation.

The weight is 100 grams, and it must be lifted 500 millimetres in the shortest possible time. The lift time is electronically measured in microseconds (hence the plastic tube which houses the sensors), and the shortest time in each category wins.

How the energy is stored and

converted is entirely up to the contestant, but there are, of course, a few rules. The device must be built on a base of 16mm thick MDF, chipboard, or similar material with a 300mm square footprint. This is so that it can be fitted to the test rig on competition day. It can be up to a metre tall, but nothing may extend beyond these boundaries at any time.

ALL of the energy used for lifting must come from the supplied source – no other energy may be pre-stored or added during the test. Also, the source may not be modified in anyway.

So there you have it. If you want to see the rig in action, visit the SM&EE stand at Harrogate in May. However, if you would like to know more now, the full rules are available as a download from the SM&EE website at www.sm-ee.co.uk

If anybody wants to have a go at this challenge, they can register by E-mail or snail-mail at the following addresses:

smeelec@sm-ee.co.uk or SMEELEC Competition Organiser, 35 Singleton Road, Broadbridge Heath, Horsham RH12 3NP

Here are some FAQs:

Q. Where and when will the competition be held?

A. At the Model Engineer Exhibition to be held at Ascot on 19 to 21 of September 2008.

Q. Is there in fact enough energy in a button cell or candle flame to lift the weight?

A. Hugely more than necessary. It only requires about half a joule to lift the weight against gravity. The cell is capable of delivering around 30 joules in 5 minutes, while the candle can deliver over 1,000 joules in 10 minutes. However, efficient conversion from a small heat source is of course more difficult.

Q. What lift times have been achieved in practice?

A. For demonstration purposes a simple boost

regulator circuit was used to charge some fairly large electrolytic capacitors to around 14 Volts. This was then used to run a motor, the weight being lifted by string winding round the motor pulley. Our 14 Volt output (30 Volts is allowed in the competition) was reached in under 2 minutes. The motor and pulley sizes were by no means optimal, but even so, lift time was consistently less than a quarter second, so contestants should be able to do much better than this.

Q. Heat engines can take a long time to reach operating temperature, but will still be hot at the end of the run, which seems unfair.

A. Contestants will be allowed to get their engines to operating temperature before the run, but they must be run to a standstill

before the new candle is inserted and the timer started.

Q. Many heat engines do not self-start.

A. Contestants will be allowed to 'flick the flywheel' to get engines running.

Q. If energy is stored in a flywheel, a clutch is required to couple the flywheel to the pull mechanism. Can external energy be used to energise the clutch?

A. External energy may be used for coupling or triggering as long as it does not add to the lift energy.

Q. Are there any prizes and if so what are they?

A. Yes, there will be prizes in both categories. A cash prize of at least £100 for the fastest lift in each category

is available. We are hoping for other prizes donated by model engineering related businesses (we've had some already, and if anyone else out there would be prepared to donate a prize, please contact us and become a named sponsor). Every entrant who brings a device will also get a free entry to the exhibition as an exhibitor.

Q. When is the closing date for entries?

A. We have been registering people who have expressed an interest and are sending information to them. We plan to send out an entry form to all registered contestants towards the end of April, and will also have these available at Harrogate. The closing date will probably be August 31, but that will be confirmed later.

To complete the pump, the knuckle joint for joining the pump ram to the connecting rods (Item 26) is usual. The best way to make it is to machine a disk and drill a hole in the edge at some point. Make a suitably shaped pin with a thread to fit the hole at one end and a hole at the other end to fit in the hole in the disk; the parts can then be joined with retaining compound or silver-soldered. The gland takes the same cup-shape as all others and like them is best made with one of the form tools that have already been mentioned.

Continued from page 264
(M.E. 4320, 29 Feb. 2008)

To complete the pump, the knuckle joint for joining the pump ram to the connecting rods (Item 26) is unusual. The best way to make it is to machine a disk and drill a hole in the edge at some point. Make a suitably shaped piece with a thread to fit the ram the other end to fit in the hole in the disk; the parts can either be joined with retaining compound or silver-soldered. The gland takes the same cup-like shape as all others and like this is best made with one of the form tools that have already been mentioned.

First thing to do will be to give the wheel a good dressing over with a file in order to try and remove as much of the surface coarseness as possible.

Cast iron flywheels are more often than not difficult to machine, for a variety of reasons. They are frequently so large that there is no easy way to mount them on the lathe and they also tend to suffer from not being cast accurately.

Most will already know the basic principle, whereby a pattern is laid in a box of sand, which is then rammed down hard, the pattern removed, two grooves made, one for the molten iron to run into the impression and the other for surplus to run out. The founder knows he has poured sufficient iron when it starts to flow from this groove. However, unless an item is a very basic shape it is necessary for the mould to have two parts, half of the pattern impression is in the top and half in the bottom.

As a rule this is achieved by the pattern being made in two halves, but just occasionally, depending on the item to be cast there will be a single pattern and this will be laid half depth in the moulding box and half in the top. Such an arrangement relies on the skill of the founder to ensure both halves line up accurately.

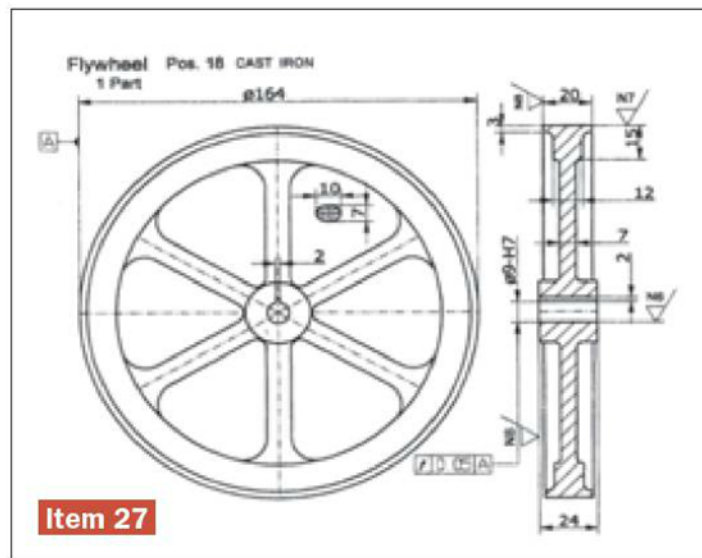
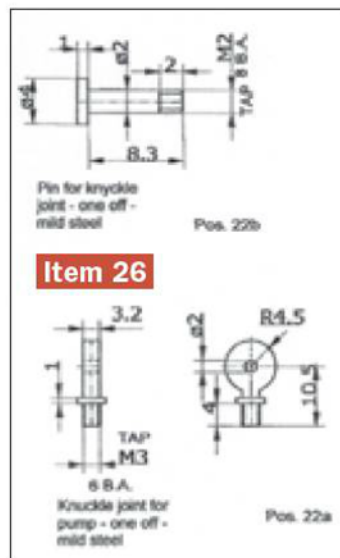
Where problems might occur with an item such as a flywheel, whichever method is used, is if the pattern is laid incorrectly

in the box and a very slight misalignment occurs. It is highly unlikely that there will be any major misalignment as both boxes have dowels to ensure they close accurately and the two halves of the pattern also are dowelled to ensure correct alignment. Problems, therefore, can only occur when the pattern is set at a slightly uneven depth i.e. deeper at one side than the other.

If this does happen the flywheel can be slightly incorrect in a number of ways, none of which will be disastrous but it is always necessary to check thoroughly for any misalignment, which will frequently show itself by a slight stepping effect on either the inner or outer rim. It can also take the form of a rim of varying thickness, or a slightly misaligned boss. There is no need to panic, it is most probable that the flywheel supplied in this case is perfect as was the one machined for this article.

These points should be looked out for as it might be necessary to make slight adjustments to compensate when setting the work up for machining. Therefore, the casting must be checked thoroughly and if there is any slight misalignment a little judicious packing with shims is all that is needed to put matters right, and to line the casting correctly for machining. This applies whether it is to be machined on a faceplate or in a chuck.

In the case of the flywheel in question it was decided to machine on the faceplate, the 3-jaw chuck was not large enough to hold it and although it would fit in the 4-jaw this would have meant it fouling the bed of the Mvford, whereas



when on the faceplate it fitted nicely in the gap in the bed.

To prevent damage to the faceplate when machining the rim, three short lengths of rectangular steel bar were stuck to it with cyanoacrylic adhesive. Should there be any misalignment of the casting then sticking shims on top of the spacing pieces should correct matters. The wheel must be secured at three points, with T-bolts through the slots and with dogs covering two spokes. Get these as near to the centre as possible in order to obtain sufficient clearance to allow work to be carried out on the rim. With the bolts partially tightened the casting can be lined up using a soft mallet and a surface gauge. There is no point in using a dial gauge as the surfaces will not be sufficiently accurate due to the sand residue on the iron. A little tip worth remembering here is to mark any places that need adjustment with chalk, it is easy to see a chalk mark, not quite so easy with a scratch from a scriber.

Once the casting is set up tighten the bolts hard, and use a carbide tipped tool for the machining. The textbooks tell us that the first cut must be deep enough to penetrate underneath the hard outer surface, this may well have been true in the days of carbon steel tooling, but does not apply with either tipped or high speed tools. In point of fact, on the lightweight lathes used in the home workshop, it probably isn't possible to take

a cut to such a depth anyway. So take cuts to whatever depth you might feel is suitable for your lathe. One thing that is essential is that the lathe is running at the slowest possible speed, use back gear if the lathe has one.

At this stage inner and outer rims can be machined. Doing the latter will just involve running the tool into the three spacing pieces, but that is what they are there for and so don't panic when you start to hear three clicks it is exactly what you want to hear. Once these have been brought to size our attention must go the boss, the face of which can be machined and the bore then has to be made. It must be started with a centre drill and can then be drilled and reamed. However, using a boring bar will give greater accuracy and should be considered.

A small keyway is needed and cutting this can be problematic. Some readers will no doubt have a suitable slotting tool. Those without might like to consider making a tool rather like a boring bar, but fitted with a tool of the correct width for the slot and ground square on the cutting edge. Mounted at centre height this can be pushed through the bore using the carriage mechanism. After all this is the way a slotting machine works anyway.

Some readers may feel uncertain at making a slot in this way and there is another method. First of all increase the bore of the wheel to the standard figure plus twice the height of the keyway.



Say the bore is 9mm and the keyway is 3mm deep, it needs to be opened 15mm. Now machine a piece of steel to the outside diameter and bore to the original size, in the case of the example it will be 15mm outside diameter and 9mm inside. Machine a slit lengthways in the piece to the width of the keyway, taking it right through, leaving a rounded C-shaped piece of bar. Use a retaining compound to secure it in the bore of the wheel and there you have a flywheel complete with a very accurate keyway.

Once the machining has been completed the wheel can be turned round on the faceplate. By putting a bar in the tailstock chuck and passing it through the bore in the flywheel it is possible to locate its position on the faceplate fairly accurately, just a couple of light taps with a mallet will centralise it. And the rest of the machining can be completed.

● To be concluded.

73. Although generally quite clean some fettling was required on the flywheel before machining could commence.

74. Three pieces of flat mild steel were stuck to the faceplate with cyanoacrylic adhesive in such a position that they would be in contact with the rim edge, the wheel was then bolted to the faceplate using three sets of bolts and clamps. It was rotated by hand against a surface gauge and discrepancies in casting thickness, etc. were marked on the wheel by chalk crosses. Gradually adjustments were made until the wheel ran as true as possible. It is necessary to check the inside and outside of the rim as the thickness is likely to vary, also the position of the central boss both for concentricity and its relationship with the inside of the rim. Care taken at this stage will be more than repaid when machining takes place.

75. The photograph shows the outside of the rim being machined, using a carbide tipped tool, the three pieces stuck to the faceplate allowed the tool to be taken right across the circumference without any worries about damage to the faceplate. It was necessary to use a different tool to machine the inside of the rim and another for the boss. The wheel was also bored to accept the crankshaft at this stage and the slot for the wedge must also be dealt with before the casting is turned around in order to machine the other side.



Malcolm Stride reports

1. Members of Birmingham Society of Model Engineers celebrate the completion of the footbridge over the raised track.

2. Harry Dryden being presented with his Honorary Membership certificate by Chairman Russell Ainslie at Edinburgh SME.

The organisation of this year's Model Engineer Exhibition is moving forward and we have received several offers of models for display at the show. However, in order to make this a memorable show for locomotives, we are still actively looking for more. Models to designs by all the well-known builders and designers are still sought. Originals models constructed by the designers will be particularly welcome, but good examples of locomotives by other builders will ensure that we have a representative selection by each designer on display. So if you have, or know of any models which you feel would be suitable, please contact the Editor (david.carpenter@magicalia.com) so that we can make some tentative arrangements.

Model Engineer goes multi-media

As I write this column, work is well advanced in setting up a YouTube channel to enable us to bring you additional content and to publicise the magazine. We are looking for short video clips of models in action for use on the site. The clips should not be too long, a minute or two is probably ample. How about sending a video of that

tricky machining set-up, the latest model in action, or some club activity? All this will help to generate interest in model engineering among the younger members of society which can only be a good thing.

Leda power boats

Following my comments about the Leda power boats (*News*, M.E. 4319, 15 February 2007), Chris Orchard has refreshed my memory regarding the builder. It was of course Ted Vanner who built and raced a series of these boats over many years. I thank Chris for the kick for my memory.

Notices

Leicester SME has announced the following special events for this year: Wednesday 11 June - Evening running for visitors from local clubs at Abbey Park, Leicester; Sunday 22 June - Open Day for visiting locomotives at Abbey Park, Leicester; Sunday 28 September - Traction and Track Open Day for visiting locomotives and miniature road vehicles at Abbey Park, Leicester.

Further information can be obtained from John Lowe, Publicity Secretary, T. 01455 272047, E. greenbriar@tiscali.co.uk

The annual rally of the **Model Steam Road Vehicle Society**

will be held, as usual, at the Tewkesbury Rugby Club ground over the weekend of 28/29 June this year.

Rochdale SMEE has confirmed the date for the Northern Association Narrow Gauge IMLEC competition as the weekend of the 14/15 June this year. Further details will follow.

City of Sunderland MES has notified us of two open days to be held this year. The dates are Sunday 1 June and Sunday 7 September.

Worthing DSME will be holding the Worthing 2008 Model Scene exhibition on Saturday/Sunday 26/27 April at Field Place, in the Barn, Pavilion Club House, track and grounds. The exhibition will be open on Saturday from 10.00am to 5.00pm and on Sunday from 10.00am to 4.30pm. This exhibition of model engineering includes boats, clocks, locomotives, traction engines, model railways, a boat pool, workshop demonstrations and more. Live steam train rides will be available throughout the day. For Further information, contact the Society Publicity Officer on 01903 235102.

UK club news

The **National 2½" Gauge Association** calendar for 2008 has sold well with very few left at the time of writing. Simon Clough has taken on the role of south east area secretary and Steve Terris has taken over as trade officer. This is an important role in this society which supplies castings and drawings for several designs. With the recent discussions about metrication in this magazine, Neil Heppenstall purchased a letter 'G' drill from a local shop at a cost of £6.61 plus VAT. The next day he enquired what the price of the equivalent 6.6mm metric drill would be - £3.50 plus VAT. It seems that Imperial items may suffer from being priced out of the market. The association is making good progress with an electric locomotive, in this case a Class 66 freight locomotive. The project is being undertaken in conjunction with



Maxitrak and an initial order for components has been placed. If there is sufficient interest, another electric design, a Swiss *Crocodile* will be pursued.

A visitor to the **St. Albans DMES** annual exhibition last year arrived with an unusual model for the boat pool. The visitor was Brian Spinks from the **Welwyn Garden City SME** who arrived with a radio controlled duck. The duck's head moved with the rudder and it had flashing red and green eyes. There were various competitions organised at the Christmas social evening including a memory test in which contestants had to memorise as many items as possible from a box of 40 in 45 seconds, a sweet quiz, where sweets had to be identified from cryptic clues (such as "self-assembly feline") and a task requiring the identification of everyday items from advertisements with the branding removed. Roger Stephen found an unusual model locomotive in the Museum of Barnstaple and North Devon. The model won the Championship Cup at the 1937 Model Engineer Exhibition and appears to be a 3½in. gauge version of the LBSC *Fayette 4-6-2*. Roger is interested to find out if the design was published in 3½in. gauge. I can't find any reference to the larger version in Brian Hollingsworth's book on LBSC, so if anybody out there knows otherwise, please let us know.

The **Birmingham Society of Model Engineers** celebrated the completion of the footbridge over the raised track at the New Year's Day steam-up (**photo 1**). The bridge builder, centre right, Keith Bloor and President Peter Flavel, centre left, and members of the society carried out a load test. Both the bridge and the refurbishment of the clubhouse were funded by a lottery grant. The steam-up was held in fine weather with 14 locomotives running and hot soup and rolls provided to keep out the cold.

Following a risk assessment, **Bournemouth DSME** has decided that no reverse running shall be permitted on

clockwise running days. This will be reviewed following the installation of track signalling. The society has published an updated Code of Safe Practice as a reminder to all.

The December competition day at **Bradford MES** was a good social occasion with plenty of models on display. There were 23 models entered into the competition, including 11 junior entries but with few finished models this year. The junior members did well in the competition, with Peter Gosbee gaining three awards for his 7½in. gauge electric locomotive, Stanley Ashworth being awarded the Dodwell trophy for "the junior who has done most to promote the interests of the society", and Sidney Ashworth taking the Junior Prize for a wooden model workshop. Congratulations to all on their achievements. The society has found a new use for its leaf blower. After washing the portable track, the blower was used to dry the track and supporting pillars before storing it for the winter. This brings a whole new dimension to the phrase 'wash and blow dry.' Let's hope that the pillars do not go curly after the treatment. The local council is helping to celebrate the club centenary this year by creating a commemorative "carpet flower bed" in recognition of the occasion. The club has produced some commemorative centenary badges for members.

Cardiff MES is celebrating its 60th anniversary this year and has started the year well with some changes to the design of the new clubhouse extension cutting costs and also resulting in the work being able to start earlier than had been thought. The rebuilding work will also be carried out with less disruption to club activities than expected. One of the younger members, Rhys Sully, has written an article on the construction of multi-gauge points. This sounds fine, but these are designed to cope with gauges '1' and '0', so it is probably a good thing that Rhys has a young set of eyes in his head. Rhys started this project because he "was



fed up of having to lean over the all the tracks whenever I wanted to steam my engine up". Rhys used a "flange plate" to ensure that the '0' gauge flanges would be supported through the point. Member Wallace Hook celebrated his 90th birthday at the club in September. May we express our belated congratulations to Wallace on this milestone? Wallace has been a member for almost 50 years which says a lot for the life-enhancing effects of model engineering.

The December meetings of the Wednesday Mob at **Crawley Model Engineers** have been devoted to drinking tea and eating biscuits due to the inclement weather. On one occasion the members went home at 11.30, "not wishing to die of hypothermia". Even the renowned dog had a rest from chasing the ball after developing a strain. The Fish and Chip Supper, a regular feature of the winter season went off very well apart from a 20-minute wait because the fish and chip shop had forgotten about the order. It is reported that the pangs of hunger were kept at bay during the wait with some wine and peanuts!

The first meeting of **Edinburgh SME** at the new venue, the Scout Hall in Broxburn, took place in January, with 18 members in attendance. The hall is very suitable with a bright interior and is extremely well heated. The winter programme has started with the first event being the film night. This was successful with a few interesting DVDs and videos

being shown to the members.

An opportunity is being provided for a group of members to work together as a team to produce a freelance 7½in. gauge petrol locomotive. The power unit for this locomotive will come from the club lawnmower which still has a good working engine and gearbox. It is a 3.5hp engine with a three-speed gearbox and should be ideal as the power plant for a strong locomotive.

On the afternoon of the Christmas track running day, Harry Dryden was awarded an honorary membership (**photo 2**) for his long-term commitment and dedication to the society. A certificate was presented to Harry by the Chairman, Russell Ainslie, who also thanked him for his services. Harry has been involved with ESME since the previous track site at Eddleston and was part of the group involved in setting up the original track layout at Newliston.

A wide range of members' work was on display at the Bits & Pieces night in November. Items shown included a hydraulic ram, a V-twin launch engine, a range of locomotives in various stages of completion and small workshop items. The members present voted the largely complete 2in. scale Fowler tractor by Ross Mark the winner of the Farr Trophy.

The last meeting of 2007 at **Melton Mowbray DMES** was a "string of stories" by Allen Walker about his life from narrow boat building, his time at Springer Engineering and finally his lifelong connection with all types of historic transport. The

meeting was described as "a good evening's entertainment, a laugh a minute". The New Year's Day steam-up was well attended with eight steam and two electric locomotives and a large crowd assisting members of the traction engine group. The 'Professor of Engineering, University of Life's Experience' has passed on a useful tip for those drilling deep holes in bronze or copper. In order to prevent the drill binding in such materials sharpen the drills slightly off-centre. This is a case where very accurate machine sharpening can cause problems. Apparently just 0.001in. extra off one face of ½in. drill solved the binding problems.

I have received information from a club that has not featured in this column in recent times. **Polegate DMEC** has sent details of its lecture programme for the year. The next meeting is on 11 April and is The Bluebell Railway: a look back at 45 years by David Jones. Further information can be obtained from society programme secretary D. F. Pratt, T. 01323 645872.

Winter work at **Rochdale SMEE** has included re-conditioning the portable track passenger cars which needed "a touch of TLC". The work included re-furbishing the running gear and brakes and re-painting in a new livery complete with a large society emblem on the sides. The "brains" of the society are now focussing their attention on how to improve access to the steaming bay area and the introduction of suitable tamper-proof connections between the riding cars.

We have received an update of activities from last year

at **Stafford DMES**. The year is reported as having been very successful by Secretary Edward Hodson. An air operated cross-over was fitted to the main ground level line to access the steaming bays and sidings and construction of a new carriage shed is almost complete. A level crossing has been constructed to improve access. This was done with the help of a grant from the local council. A raised garden railway track for 16mm/gauge 1 has also been constructed. A successful application was made to the National Lottery 'Awards for All' scheme to finance a new 7½in. gauge diesel locomotive and easy access passenger carriage.

The club **Royal Scot** at the **City of Sunderland MES** is now operational and in order to ensure that this and other club locomotives are kept in good condition a paraffin/air gun has been purchased to aid cleaning after use. The 7½in. gauge passenger bogies are being altered to improve the brake system equalising. One bogie has been updated and tested and much less effort is now required to apply the brakes effectively.

Matthew Edmondson is assessing the interest at **York Model Engineers** in the creation of a running track for small scale locomotives in 16mm and gauge 1. Work continues at the track site with the removal of potentially dangerous trees. Work on the fence to improve the appearance of the site is making progress with frames set in 19 post holes filled with concrete in around 90 minutes by a group of eight members. The fence has now been fitted with the vertical palings.

World club news

Australia

Bruce Hielsher of the **Model Engineers and Live Steamers Association (Maryborough)** is celebrating the completion of his Don Young designed *Railmotor* which performs well on the track. Many of Bruce's family enjoy being at the regulator of "this marvellous little locomotive". Having built and run a *Railmotor*, I can agree wholeheartedly with that sentiment. The timber for nine new riding trucks has been acquired and three wagons are well advanced. Membership of the society is increasing. The coal crusher built by Chris Arnold has been used in anger for the first time and after a couple of teething problems is now fully operational.

Canada

Martin Rogers has been made a life member of the **British Columbia SME** for his work and dedication to the club since becoming a member in 1975. Member (and Newsletter Editor) Edwin Bissey was awarded the Member of the Year award for 2007 because he "has quietly put in much effort, more than most, to make the club run well". Congratulations to both members and, from my point of view, thanks to Edwin for his efforts with the newsletter. The annual Christmas season run at the local shopping mall was a big success and came close to being the best ever. A volunteer dinner will be held for those who helped out with the event.

Trade news

Mammoet PCT crane model kit
During the 59th *Spielwarenmesse*, International Toy Fair in Nürnberg, Germany in February Mammoet and WSI Collectibles introduced the world's biggest scale model in a series.

The new model is a replica of the Mammoet PTC crane. A great deal of attention has been paid to details when constructing the model. The model has been given sufficient counterweight so that just as with the prototype the boom can be lifted from the ground.

The new model is produced in a limited edition and has a height of 1.92 metres at a scale of 1:50.

The PTC crane model is the biggest scale model in the world that has been produced in series and weighs 26 kilos.

The model was developed in close cooperation between WSI Models B.V. and Mammoet Holding B.V. The real PTC crane is deployed particularly in the offshore industry, in power plants and the petrochemical

MARY DIARY DIARY

MARCH

- 28 **Hereford SME**. Mike Chrisp: Going for Gold. Contact Nigel Linwood: 01432 880649.
- 29 **Brighton & Hove SMLE**. Public Running. Contact Mick Funnell: 01323 892042.
- 29 **Romney Marsh MES**. Boiler Testing. Contact John Wimble: 01797 362295.
- 29 **York City & DSME**. Jim Burlingham: Especially for Beginners. Contact Pat Martindale: 01262 676291.
- 30 **Chichester DSME**. Steam on Sunday. Contact Brian Bird: 01243 536468.
- 30 **Guildford MES**. Boiler Testing Day. Contact Dave Longhurst: 01428 605424.
- 30 **Harrow & Wembley SME**. Public Running. Contact Roy Goddard: E. RSGwatford@aol.com
- 30 **Maldstone MES (UK)**. Public Running. Contact Martin Parham: 01622 630298.
- 30 **MELSA**. Sunday in the Park. Contact Graham Chadbone: 0741 21 4341.
- 31 **Canterbury DMES (UK)**. AGM. Contact Mrs P. Barker: 01227 273357.

APRIL

- 1 **Romney Marsh MES**. Track Meeting. Contact John Wimble: 01797 362295.
- 2 **Bristol SMEE**. Chris Macdonald: Life and Times of LBSC. Contact Trevor Chambers: 0145 441 5085.
- 2 **Chingford DMEC**. Bits & Pieces. Contact Ron Manning: 020 8360 6144.
- 2 **Leeds SMEE**. Meeting. Contact Geoff Shackleton: 01977 798138.
- 2 **Tyneside SMEE**. DVD selections. Contact Malcolm Halliday: 0191 2624141.
- 3 **Bournemouth DSME**. Tech-Chat. Contact Dave Finn: 01202 474599.

In Memoriam

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

Tom Gaitt	<i>Docklands & East London MES</i>
Ron Poulter	<i>Harrow & Wembley SME</i>
Ken Sewell	<i>Melton Mowbray DMES</i>
Douglas Webb	<i>Cardiff MES</i>

industry where the really heavy loads have to be lifted. PTC is a practical crane because the crane is transported easily in containers.

So transportation by ship, rail and road is possible. The capacity of the real PTC is 1,600 tons. Mammoet has four PTC's in its fleet.

For more information visit the PTC website at www.ptcmodel.com. The model can be ordered online: www.mammoetstore.com

Chronos

One of our regular advertisers, Chronos has recently added several new items to its already extensive range. The new items include a "threading, parting and profiling lathe tool set" comprising external threading, internal threading, parting and profiling tools by Glanz with replaceable tips.

Also new is a range of indexable tip face-milling cutters and arbors in 50 and 63mm cutter diameters with

either 3MT or R8 arbours.

For those needing to line up milling machine heads, a new product is now available, Spindlesquare, which comes fully assembled with two dial type indicators and is described as self-calibrating. The whole is packaged in an aluminium case.

The final new item on the list is a 500 gram jar of dry acid pickling salts which makes up to eight litres of acid dip solution.

Chronos can be contacted at Unit 14, Dukeminster Estate, Church Street, Dunstable LU5 4HU, T. 01582 471900, E. sales@chronos.ltd.uk, W. www.chronos.ltd.uk

Humour time

This was from Northampton SME:

The Tail End
Why does mineral water that "has trickled through mountains for centuries" have a "use by" date?

DIARY DIARY DIARY DIARY DIARY DIARY DIARY DIARY DIARY DIARY

3 **Halesworth DMES. Annual Auction.** Contact Chris Walliman: 01362 695735.

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

3 **Sutton MEC. Bits & Pieces.** Contact Bob Wood: 020 8641 6258.

3 **Westland & Yeovil DMES. AGM.** Contact Gerald Martyn: 01935 434126.

4 **Colchester SMEE. Mike Gipson: From the Paxman Archive.** Contact Jon Mottershaw: 01206 383456.

4 **Maidstone MES (UK). Bring & Buy.** Contact Martin Parham: 01622 630298.

4 **North Norfolk MEC. Club Auction.** Contact Gordon Ford: 01263 512350.

4 **Rochdale SMEE. Bits & Pieces.** Contact Bob Denyer: 0161 959 1818.

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

5,6 **Dockland & E. London MES. Public Running.** Contact John Slocombe: 01708 222658.

5 **Ickenham DSME. Public Running.** Contact Ian Mortimer: 01895 635596.

5 **Isle of Wight MES. Track & Pond.** Contact Malcolm Hollyman: 01983 564568.

5 **SM&EE. Training Seminar.** Contact Maurice Fagg: 020 8669 1480.

5 **Sunderland (City of) MES. Meeting.** Contact Albert Stephenson: 01429 299649.

5,6 **Taunton ME Exhibition 2008 at Heathfield Community School, Monkton Heathfield, Taunton, Somerset. 10am-4.30pm. £5 Adult, £4 Senior Citizens, £1 Children.** Information: 01460 63162.

6 **Bristol SMEE. Public Running.** Contact Trevor Chambers: 0145 441 5085.

6 **Cardiff MES. Steam-Up & Family Day.** Contact Don Norman: 01656 784530.

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

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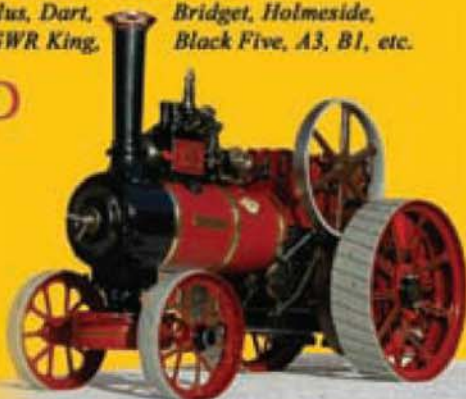
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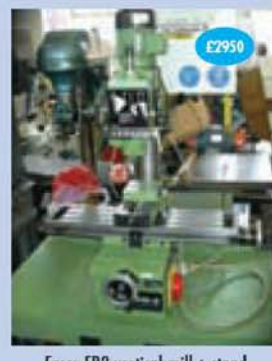
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CENTURION MACHINE CENTRE



Special Offer

£1095

Features
Powered Crossfeed • 2 Motors • 28mm Spindle Bore • Large Milling Table • Taper Roller Bearings

Standard Accessories
3-Jaw Chuck • Drill Chuck • Steel Centres
Change Gears • Lathe Tools • Vice

Specification
Centre Height 210mm
Centre Distance 500mm
Spindle Bore 28mm
Drilling Capacity 25mm
End Mill Capacity 1570 x 480 x 955mm
Size 250kgs
Weight 3/4hp

£1450

Features
1.5HP Motor • Metric or Imperial Machines • MT3 or R8 Spindle Taper • Head Swivels 90 degrees • Head Tilts 45 degrees • One Shot Lubrication System

Standard Accessories
Machine Work Light • Central Lubrication System • Machine Stand • Table Guard • Drawbar • Manual & Parts List

Including Power Feed
Face Mill Capacity 75mm
Table Size 156x45mm
Motor 1.5hp

COBRA LATHE



Special Offer

£199

Supplied With
80mm 3 Jaw Chuck • Lathe Tools, Steel Centre • Change Gears • Variable Speed • Splash Guard

Centre Height 70mm
Centres 250mm
Motor 150hp
Weight 50kgs

£495

Features
Variable Spindle Speed • Dovetail Column • Digital Quill Depth Readout • Column Gullway Covers • Tilling Head • Large Table Size • Wide Spindle Speed Range

Standard Accessories
Drill Chuck • Drill Chuck Adapter • Chuck Guard • Drawbar • Manual & Parts List

Face Mill Capacity 50mm
Table Size 500x140mm
Motor 600w
Shown with optional stand

100mm 3-Jaw Chuck



£41.12

80mm 4-Jaw Chuck



£39.00

100mm 4-Jaw Chuck



£49.00

V Type Vice 5"



£49.00

100mm Rotary Table



£99.00

130mm Self-Centring 4-Jaw Chuck



£75.00

Boring Tool Set MT2 MT3



£59.00

D13 Drill



£49.00

8" Vernier Caliper



£15.00

MT3 Imp/Met Pozzi Lock Collet Set



£80.00

Hobby Coolant System



£59.95

Machine Angle Level



£65.00

5" Bench Hand Shears



£55.23

6" Bench Hand Shears



£60.00

Magnifying Lamp



£35.00

Collet Chuck 125mm ER32



£35.00

Collet Chuck 125mm ER40



£39.00

Imperial Micrometer Set



£35.00

Slip Rolls



12" £99.00 / 16" £109.00
20" £199.00

T1 Quick Change Toolpost and 5 Holders



£115.00

Toolbox 6 drawer Ball Bearing Slides



£60.00

Lifting Crane 1 Ton



£130.00

Digital Height Gauge



£30.00

Scissors Knurler 3 sets knurls



£20.00

Box & Pan Folders



12" £199.00 / 24" £299.00

All prices include VAT. Delivery Free to UK mainland - excluding certain Scottish postcodes. Prices valid for duration of this issue only.



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