

MODEL ENGINEER

Vol. 191 No. 4211

27 December 2003 - 8 January 2004 £2.30

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inc VAT & Delivery



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This offer will apply to first ten WMT orders.

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inc VAT & Delivery



- 6" Centre height x 24" between centres
- Gap bed
- Hardened and ground bedways
- 1 1/8" Spindle bore
- 2 HP 1 phase motor
- Standard equipment includes:
- 6" 3 jaw chuck
- 8" 4 jaw chuck
- Faceplate
- Fixed and travelling steadies
- Cabinet stand and splash back

Reviewed in Model Engineer Workshop by Raymond McMahon, Winner of the Best in Show and Gold Medal awards.

"an excellent machine and surely represents great value for money"

Reviewed in Model Engineer by Anthony Mount, Technical Author.

"a good, sound machine which is accurate and easy to use. It runs quietly and does not take up an excessive amount of workshop space"

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For a limited period we will include a revolving centre, tailstock drill chuck and a set of lathe tools FREE of charge.

Limited offer.
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BRISTOL HYDRA THE FIRST EIGHTEEN MONTHS

Work on this amazing miniature continues
 with the prop. shaft and accessory case.
 Part V.
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On the cover ...

This superb Leake compound launch
 engine was photographed at the
 Midlands Model Engineering Exhibition
 during October 2003.

Built by J. Lauder it is to be fitted into a
 32ft. steam launch of the Bossons Patricia
 design driving a 24 x 33in. propeller.

The engine has cylinders 3 + 5 x 3in.
 with a piston valve on the high pressure
 cylinder and a slide valve on the low
 pressure one. Stephenson link reversing
 gear is fitted. The design uses a separate
 casting for each cylinder making
 machining possible on relatively modest
 machinery. Commercial castings were
 used for the cylinder blocks and
 baseplate, all other castings were made
 from the builder's own patterns.

(Photograph by Neil Read)

SCOTTISH CANALS AND THE FALKIRK WHEEL

A fine Scottish engineering achievement
 in the form of the first rotating boat lift.
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KEITH'S COLUMN: LOGGER & SLOGGER AMERICAN TYPE 2-8-2 LOCOMOTIVES for 5in. and 7 1/4in. gauges.

Designs for the reversing lever and latch
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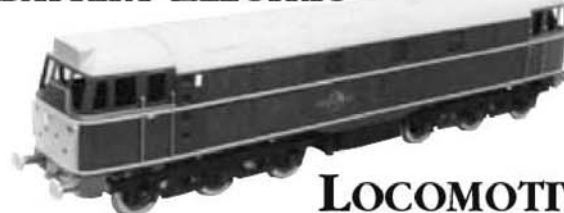
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A4	5/16 x 1/2 - 3/4 - 1 - 1.1/2.	11.70
A5	3/8 x 1/2 - 3/4 - 1 - 1.1/2.	12.35
A7	1/2 x 3/4 - 1 - 1.1/4 - 1.1/2.	18.00

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B2	1/4 - 5/16 - 3/8 - 7/16 - 1/2 - 9/16 - 5/8.	08.40
B3	5/8 - 3/4 - 7/8 - 1.	13.85
B4	5/32 - 1/4 - 5/16 - 3/8 - 1/2 - 5/8 - 3/4. PGMS	16.80
B5	3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1. EN8M	18.65

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C1	5/32 - 3/16 - 7/32 - 1/4 - 9/32 - 5/16 - 3/8.	04.80
C2	1/4 - 9/32 - 5/16 - 3/8 - 7/16 - 1/2 - 5/8.	09.20

B.M.S. SQUARES

D1	5/32 - 3/16 - 1/4 - 5/16 - 3/8.	04.10
D2	7/16 - 1/2 - 5/8 - 3/4.	09.20

BRASS ROUNDS

E1	1/8 - 3/16 - 1/4 - 5/16 - 3/8 - 1/2.	11.10
E2	1/16 - 3/32 - 5/32 - 7/32 - 9/32 - 7/16 - 9/16 - 5/8.16.85	

BRASS SQUARES

F1	1/8 - 3/16 - 1/4 - 5/16 - 3/8.	09.45
F2	1/4 - 5/16 - 3/8 - 7/16 - 1.	19.25

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S1	3/32" - 1/8" - 5/32" - 3/16" - 7/32"	
	1/4" - 9/32" - 5/16" - 3/8" - 7/16" - 1/2"	16.20

BRASS ANGLE

H1	1/4 x 1/4 x 1/16 - 5/16 x 5/16 x 1/16	
	3/8 x 3/8 x 1/16 - 1/2 x 1/2 x 1/16	08.60
H2	5/16 x 5/16 x 1/16 - 3/8 x 3/8 x 1/16	
	1/2 x 1/2 x 1/8 - 3/4 x 3/4 x 1/8	14.70

DRAWN STEEL ANGLE

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BA BRASS HEXAGON

M1	.152" - .193" - .220" - .248" - .282" - .324".	08.60
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BA STEEL HEXAGON

M2	.152" - .193" - .220" - .248" - .282" - .324".	04.10
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BRASS FLAT SECTION

N1	1/16 x 1/4 - 3/8 - 1/2 - 3/4 - 1	08.60
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N4	3/16 x 1/4 - 3/8 - 1/2 - 3/4 - 1	20.65
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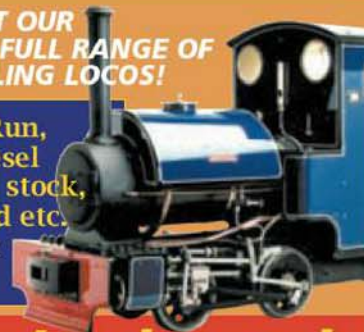


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How to Build Midget Racers • {1936} • £6.60

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Russia's Ekranoplans • Komissarov • £21.39

Is it a boat? Is it a plane? No - it is an Ekranoplan (or WIG craft). Some years ago there was a television programme on these wonderful machines - we were hooked and have been looking for more information ever since which has now arrived. The largest of these machines dwarfs a 'Jumbo' jet, can go nearly as fast, but uses far less fuel when cruising. Fascinated by this unique Russian invention (and you should be)? Read all about them in this well produced 127 page paperback, crammed with drawings, photos and descriptions.



The Tesla Disc Turbine • Cairns • £6.90

Now in its Second Printing, this book describes the bladeless turbine proposed, and built, by the legendary inventor Nikola Tesla - an idea which was far ahead of the metallurgy of the time. Now there is reason to think that this turbine's simplicity and ability to work with a whole range of propellants may mean it is a good powerplant for the future. Various possibilities for its use are given here, together with outline drawings, and full drawings for a small turbine you can build. 34 A4 format pages. Numerous drawings, sketches and photographs, plus 6 pages of complete drawings for a small turbine. Paperback.



Atmospheric Forge & Heat Treat Oven • Goodman & Holmes • £12.35

The first book from David J. Gingery Publishing not written by Dave or Vince Gingery, it only takes second looking at this to see why Vince was keen to publish it. This propane fired forge looks good, is ergonomically designed and highly efficient - it reaches 2500 degrees in 2.5 mins from a cold start, and reduces a bottle to molten glass in 25 seconds. No fan or blower are needed, so there are no electrical connections. The oven has large openings at either end, so multiple jobs can be done at the same time, or one long piece worked on. And the opening means that this unit can also be used to melt aluminium and other metals, so it can be used for foundrywork. It is pretty simple to build being made from heavy gauge steel, so a metal cutting saw and a welder are needed, but they are the only major equipment you require. A great, and useful, project. 72 page paperback with 91 drawings and illustrations.



La Locomotive a Vapeur • {1952} • Chapelon • (trans. Carpenter) • £60.45

Perhaps for those of you with Book Tokens to use (Yes - we do accept them), this is probably the ultimate book on the technicalities and thermodynamics of the steam locomotive. Written by the great French engineer André Chapelon, the man responsible for what were the world's most efficient and, on a pound for pound basis, most powerful steam locomotives ever built, and originally published in French in 1952, here Chapelon reviews in detail developments in the design and construction of all the steam locomotive's major parts, and compares the merits of simple and compound expansion. He then looks, again in detail, at the major standard gauge locomotive designs worldwide of the 20th Century, including his own. Translated from the French by George Carpenter, this edition includes various addenda updating Chapelon's work to the end of commercial steam, looks at Chapelon's unbuilt designs, and reviews the work of those who have continued to develop advanced steam locomotives, including David Wardale currently engaged on designing a new high speed 4-6-0 locomotive for the Twenty First Century. Whether this book cover steam's last breath or not remains to be seen, but it clearly shows what could have been achieved, and what could still be done if the will is there. 659 A4 format pages, over 450 B & W photos, drawings, diagrams and charts, plus 41 colour illustrations and 6 fold out drawings. Hardback.

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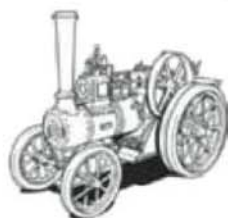
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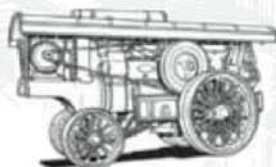


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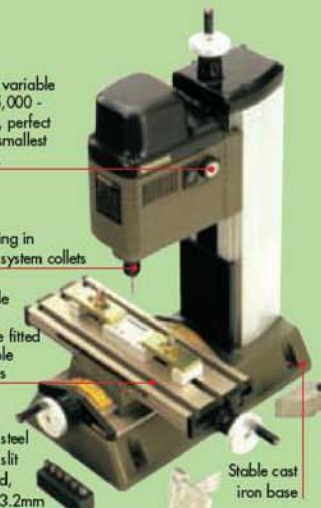
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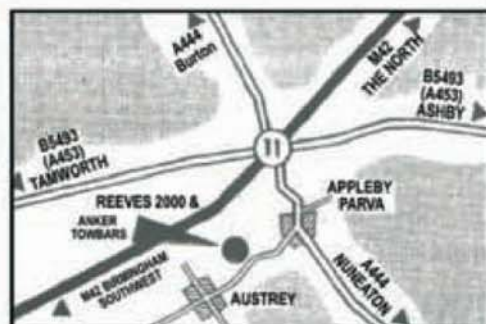


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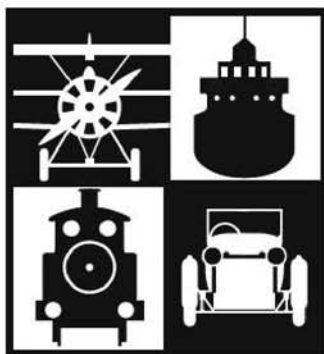
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SMOKE RINGS

With the Editors



Mike, Neil, Kelvin
and Liz wish all readers
a Happy, Peaceful
and Productive New Year

Model Engineer Exhibition 2003

Cover dated 27 December, if all goes according to plan, this issue of 'Ours' should reach you before Christmas, so it is perhaps appropriate for us to reinforce our previous good wishes and hope that you are all set for an enjoyable few days.

The scheduled publication date coincides with the day on which models should be delivered to Sandown Park Exhibition Centre for the imminent Model Engineer Exhibition. Regrettably you will be reading these words far too late to register an application for the Competition or Loan sections of the exhibition but maybe we will have the pleasure of seeing your work next year.

We have been privileged to have some superb work on display in the Model Engineer Exhibition over recent years and I know very well that a great many visitors appreciate the opportunity to take their time to study and photograph the exhibits, your Editorial team most certainly included. Although incomplete at the time of writing, a glance at the list of entries before me, reveals that we will have the pleasure of presenting a collection of very fine exhibits in the forthcoming exhibition. It may bear repeating that successful Competition entries from previous Model Engineer Exhibitions cannot be re-entered for competition, but the Loan Section gives us the freedom to present anew important exhibits from previous exhibitions.

Our Judges take great pains to ensure that their assessments of the models entered into competition are fair and unbiased, awarding marks according to the categories listed on their Judges' Record Sheets. These categories are allocated to several factors including fidelity to prototype, finish, appropriateness of materials, and so on, according to the type of model exhibited. It is from the total of these marks that the awards are made: Gold, Silver or Bronze Medals or Very Highly Commended, Highly Commended or Commended Certificates.

Complementing the Competition Medals and Certificates, outstanding exhibits may also be awarded one of many fine Trophies which have been donated to the Model Engineer Exhibition by its Friends. Two notable examples among the many other prestigious awards presented to proud owners of models which reach the required standard are the Duke of Edinburgh Challenge Trophy and the Bradbury Winter Memorial Challenge Cup. A model which wins one of these trophies is likely to be an exceptional example of its type.

The Duke of Edinburgh Challenge Trophy is awarded annually at the discretion of the Judges for any item of model engineering which has previously won a Championship Cup, Gold or Silver Medal or one of the Cups donated by the Friends of the Exhibition.

The Bradbury Winter Memorial Challenge Cup was donated by Mrs. J. Bradbury Winter and Friends to be awarded annually at the discretion of the Judges for the most outstanding example of Amateur Mechanical Craftsmanship.

Aware that these and other Trophies have not been on public view for some years, arrangements have been made to display them at this year's exhibition. We wonder if by doing so, we will tempt other builders to enter their work in competition in future exhibitions.

Those who provide exhibits for Competition or Loan in the Model Engineer Exhibition

automatically qualify for an Exhibitor's Pass and a complimentary ticket.

For many of us, the annual Model Engineer Exhibition is a very special event. First held in 1907 in the Old Horticultural Hall, it has been held at a venue in or near Central London every since, missing only a few years during and immediately following the two World Wars when London was the centre of much unwelcome attention! This year's event is the 73rd Model Engineer Exhibition and the fourth to be held at Sandown Park Exhibition Centre. Being a Londoner born and bred, I happen to think that this latest venue is now one of the most comfortable and convenient which the Model Engineer Exhibition has been able to call home.

Our team at Orpington has left no stone unturned to publicise the event, and I am sure that we shall enjoy a very good attendance.

The Exhibition runs 29-31 December 2003, 10.00am - 5.00pm on Monday and Tuesday, and 10.00-3.00pm on Wednesday. We look forward to seeing you at Sandown Park.

Appreciation

Your complimentary messages concerning the magazine have been much appreciated. Appended to letters or e-mails, or expressed during telephone calls dealing principally with some other matter, a few words of thanks make up for the frustrations and difficulties which seem to be part of the normal production routine.

The immediate post-Christmas period is a time when Good Children are taught to write letters of thanks to all their relatives and friends who sent them Christmas presents.

Part of the Editorial work load involves answering letters and e-mails received on a daily basis. As has been remarked before in these pages, letters are the life blood of this magazine and bring items of interest to readers in the form of letters for *Postbag* or more formal articles. We are grateful for these and endeavour to respond within a few

days of their receipt. Some of the letters we receive seek help of one sort or another, often technical information which can take a considerable time to collect and prepare. To obtain a reply in the 'Good Old Days' technical enquiries had to be accompanied by a small token cut from the pages of the magazine. No longer the case, we sometimes wonder if a proportion of our time is spent answering queries from people who haven't seen the magazine for years! Not you, of course, you are reading these words!

The New Year prompts an assortment of new resolutions about diet, health, exercise and so forth. Maybe we model engineers should make as one of our resolutions a decision to spend more time in the workshop. Perhaps some of us might also resolve to smile and say thank you more often.

Stolen locomotive

Myke Baigent at mykeloco.fsnet.co.uk writes:

"An acquaintance of mine recently had a model steam locomotive stolen. There is reason to believe that it may have been 'sold on' a couple of months ago via the services of E-bay. Having lost some of my own locomotives due to theft some years ago, I know how devastating this can be.

"On behalf of my friend, I would ask all those of you who use and save information about offers and transactions on E-bay to tax your memory (human or computer) to determine whether you are able to assist. If you have noticed this model, I would appreciate it if you were able to locate the E-bay reference and the identities of the buyer and seller.

"A full description of the locomotive can be found at www.modeleng.org/lost/lostmain/htm. However, we believe it is possible that the model may have been 'sanded down' for re-painting in a different colour livery.

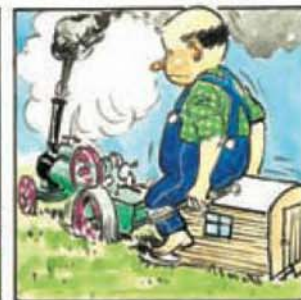
"Please help us to track this one down. All information will be gratefully received."

CHUCK the MUDDLE ENGINEER

by B. TERRY ASPIN



B. TERRY ASPIN



POST BAG

Cutting splines

SIRS, - With reference to Mr. Leonard Sellen's letter *Model spline shaft* (M.E. 4206, 17 October 2003), I have made two Allchin crankshafts with four 1/8in. wide splines and the sliding gear wheel bosses to suit.

I studied the method described in the Allchin book and came to the conclusion that there had to be an easier way! I made mine on a Myford ML7 lathe using a 1/16in. parting-off blade, a boring bar, a slotting attachment and a 60 tooth gear wheel on the rear end of the mandrel as a simple indexing reference.

The centres of the splines on a 4-spline shaft are at 90deg. to one another. To cut the splines, I put the shafts into the chuck and the parting-off blade on its side in the top slide mounted with its lower edge 1/16in. above the centre line of the spline. The mandrel was locked with a finger engaged into a tooth space of the 60 tooth wheel. The topslide screw was removed, the slotting attachment fitted, the saddle locked and the shaft slotted to the full depth of the spline.

The work was indexed round 15 teeth on the 60 tooth gear wheel (i.e. 90deg.) and another slot cut. A third slot was cut with the work indexed a further 15 teeth to make a total of 30 teeth from the starting point on the 60 tooth gear wheel (i.e. 180deg.) from the first. The fourth slot was cut with the work rotated through another 15 teeth to a total of 45 teeth on the gear wheel and 270deg. rotation of the work. To complete this stage of operations, the work was returned to its starting point by rotation through 15 more teeth.

The parting-off blade was then lowered to bring its upper edge 1/16in. below the centre line of the spline and the four slotting and indexing operations were repeated to provide four 1/8in. wide splines distributed at 90deg intervals around the shaft.

I removed the surplus metal between the splines by using the same method, rotating the work by indexing it just one tooth of the 60 tooth gear wheel between cuts. This left me with four lovely splines.

Four matching slots were machined in the sliding boss by mounting a boring bar on its side with a 1/8in. wide tool bit which I ground up from a broken centre drill. This time, the centre of the tool was aligned with the centre of the workpiece and the slotting/indexing procedure described above was repeated. Before

disturbing the boss in the chuck, the shaft was tried for fit and any necessary slight adjustments made.

Using this technique, I made two off each of the splined shaft and sliding bush and am pleased to be able to report that they fitted together in all four positions. What a lovely feeling!

One advantage of the method described here is that the only maths required involves the 1/16in. offsets of the horizontally mounted parting-off blade to give 1/8in. splines. On a Myford ML7 lathe this means that the lower edge of the blade is set $3\frac{1}{2} + \frac{1}{16} = 3\frac{9}{16}$ in. above the lathe bed when cutting the top face of the splines and the upper edge of the blade is set $3\frac{1}{2} - \frac{1}{16} = 3\frac{7}{16}$ in. below the lathe bed when cutting the bottom of the splines. To cut an 8-spline shaft I would index using a 40 tooth gear wheel and increments of 5 teeth between settings.

I hope my method will be of some help to Mr. Sellen.

H. Wilkinson, East Sussex.

Caribou

SIRS, - I am building the locomotive *Caribou* in 3 1/2in. gauge designed by Martin Evans and wish to add more detail to my model than is given in the drawings. The photographs published with the construction series are rather too small and indistinct for my purposes.

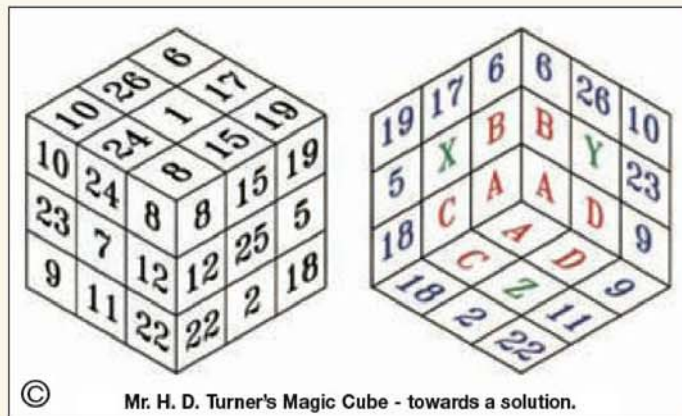
Can anyone please supply any information, drawings or photographs that would help?

Eric Addington, North Yorkshire.

Gyro compasses

SIRS, - I was most interested to read the article by David Wilcox concerning gyros (M.E. 4204, 19 September 2003). One of my part-time occupations is teaching navigation and other nautical subjects to the Maritime Volunteer Service. When it comes to the compass, I always explain that the magnetic compass becomes the most complicated compass there is as soon as it is placed on a steel ship, whereas the gyro is quite simple. It surprises me that there was no mention of the gyro compass in the article, bearing in mind that nowadays every ship and aircraft is fitted with one. The gyro compass is subject to one or two errors but nothing like the magnetic compass.

The story goes that Lieut G. Sperry 'borrowed' the idea from S. G. Brown of Watford and patented it back in the USA. Brown had to start all over again. The compasses are quite different from one another,



Mr. H. D. Turner's Magic Cube - towards a solution.

but one feature is that the Sperry rotates clockwise viewed from North whereas the Brown rotates anti-clockwise, the same direction as the Earth.

Maybe one day I also will dabble in making a toy gyro. I remember them well.

P. H. Lewis, Master Mariner & Engineer, Norfolk.

Magic cube

SIRS, - It may be supposed that some of the magic of the cube (*Post Bag*, M.E. 4210, 12 December 2003), was immediately obvious to readers: each of the rows and columns on the three faces have three numbers which add up to 42. It is assumed that this condition applies to the three hidden faces.

Looking at the diagram of the cube, it could be regarded as being composed of 27 smaller cubes and where two or three faces of a small cube can be seen, the same number is on all these faces. It is assumed that this applies to the faces that are hidden and that no number is duplicated on another cube. There are 8 corner cubes with a number visible on 3 faces, 12 cubes with a number on 2 faces and 6 cubes with a number on 1 face and as $8 + 12 + 6 = 26$, it may be seen that 26 numbers will be sufficient to number all the faces; 19 can be seen on the diagram, so 7 numbers remain to be found.

If the big cube is tilted so that the corner formed by the small 6 cube is vertically above the corner formed by the small 22 cube and the big cube is rotated about this vertical axis by half a turn, then the three hidden faces come into sight and are shown in the second diagram. There are 27 small cube faces to be seen, 15 of which can be immediately numbered because they are the small cubes which could be seen in the first diagram, although a different face on these 15 small cubes is now on show. The 7 unknown numbers have been represented on the diagram by the letters A, B, C, D, X, Y, Z.

By applying a little more thought and by looking more closely at the numbers on the first diagram, connections between them can be found which enables a solution to be

determined. If the value of A were known, all the other letters could be determined by using the 'rule of 42'. Is there anything about A that we can extract from the diagram?

Every cube has 8 corners and in the diagram, 7 corners can be seen, only corner A is out of sight. These 7 corners are numbered 6, 8, 9, 10, 18, 19, 22. If we take corner 22 and extend an (imaginary) line from it diagonally across and through the centre of the big cube, it reaches the corner 6. Similarly corner 18 goes to 10 and 9 to 19. It may be noticed that $22 + 6$, $18 + 10$ and $9 + 19$, all add up to 28. Corner 8 goes to corner A and if the value for $A + 8 = 28$ then $A = 20$. If this value is inserted for A, all the other unknown numbers can be found and the solution is complete.

An alternative way to the solution is by noticing that a line through the centre from number 23 goes to 5 and $23 + 5 = 28$. Similarly $11 + 17$ and $2 + 26 = 28$. If we assume that this applies to the unknown numbers then $B + 12 = 28$ so $B = 16$, $C + 24 = 28$ so $C = 4$, and $D + 15 = 28$ so $D = 13$. X, Y, and Z can then be found to be 21, 3, and 27 respectively, by using the rule of 42 and they too have a sum of 28 when connected through the centre with the number on the opposite face.

It may be noticed that 14 is not among the 26 numbers on the cube but 27 is. If 14 is anywhere it could be out of sight at the centre of the big cube. If all those corner to corner additions are to include this centre number, 14, then instead of a sum of 28 we get 42.

Just as a matter of interest, there is still more magic in the cube. If the middle row on any face is taken, such as the 23, 7, 12 row on the first diagram then $23 + 12 = 35$. The middle column on the same face, 24, 7, 11, has $24 + 11 = 35$. This number, 35 only applies to this face, each of the other 5 faces has pairs of numbers which sum up similarly but to a different value. These values are 15, 17, 21, 35, 39, 41 and the differences between any consecutive pair of numbers form the symmetrical sequence 2, 4, 14, 4, 2.

H. D. Turner, Wakefield.



Mr. John Colville is pleased with his Heimann Regulator clock.

Interesting project

SIRS, - During the construction of my clock I have been in touch from time to time with its designer Peter Heimann who has been particularly helpful. He suggested that I should send you a photograph of the completed clock to stimulate interest and encourage others to build this fine timepiece.

My wife wonders how I could build a clock with "...so much clutter around it!" Maybe she's right and perhaps I should have waited to take my photograph with the clock mounted on a plain white wall, but I'm still adjusting it for the odd second or so in the hour.

Thank you for a very interesting project which is so different from the Allchin traction engine and the *Britannia* and *Springbok* locomotives which I have previously completed. Clockmaking is an entirely different discipline. While friction is not particularly important on the track, in a clock it is to be avoided at all costs.

John Colville, Belfast.

Properties of materials

SIRS, - In his article on *C-spanners for the Unimat* (M.E. 4209, 28 November 2003) John Olsen comments on the toughness of silver-steel. The following story is relevant.

When I was a young man, I had a Mini van which lacked a tommy-bar for its tubular wheel-nut spanner. Thinking I would make a good job

of it, I used a piece of silver-steel ($\frac{3}{8}$ in. diameter) and even rounded off the ends. I was astonished when the first time I used the tommy-bar it snapped in two like a carrot!

I think this shows that although silver-steel is harder than mild steel, especially when heat treated, and it may even be stronger than mild steel, i.e. it would fail at a higher level of stress, it is not tougher than mild steel, by which I understand that it cannot absorb as much energy before failure.

If I needed a really tough (or just strong) material, I would use a piece of steel taken from an old socket head cap screw for the small sizes, or a piece of vehicle half shaft in the larger sizes.

I hope this helps in the general understanding of material properties. Neil G. Heppenstall, Cheshire.

(Readers are encouraged to revisit the brief feature on steel specifications (M.E. 4206, 17 October 2003) in which Neil Read directs our attention to types of readily available steels for particular applications — Ed.)

Accumulated experience

SIRS, - In view of recent letters on the subject of the choice of lathe for a newcomer to model engineering, my experience may be of interest.

I have had a lifetime interest in model engineering with visits to all the Model Engineer Exhibitions going back years, but it was only some 12 years ago that at the age of 50 (me, not she) my wife bought me my first lathe. Purchased from a model engineering firm, this wartime built Drummond/Myford 'M' type came complete with WD arrow and power feeds, etc. I reasoned that if these machines were good enough to use on submarines, they must be fairly sound.

This was a splendid machine on which to learn and lots of extra tooling was made, based on M.E. articles or the various books for lathe owners. However, the longer I possessed it the more I became aware of its shortcomings. First, it wasn't robust enough even for fine feeds, but secondly, and more importantly, wear of the bed was such that a major rebuild or replacement was due. Interestingly, the mandrel still ran like silk.

Two years ago, I decided that with a desire to undertake more ambitious work with reliable accuracy, it was time to look for a replacement. There was the obvious appeal of a new machine, but my budget of £1000-£1200 restricted my choice to a modern Asian built replacement of

my existing machine, or a second hand purchase.

The currently running series on the Warco BH600G show that some very good machines are available, but I also know from talking to other model engineers and the trade that some are not as good as others. I visited a few dealers, all of whom were helpful, but none more so than regular advertisers Home and Workshop Machinery (usual disclaimer) with whom I had spoken at a previous Model Engineer Exhibition.

From a huge range of machinery, and with their guidance, I purchased a Harrison L5A two years ago. This 1966 built machine certainly had a well used appearance but that is where any doubts stopped. Delivery to my home and installation in my workshop was far from easy with such a heavy machine, but experience told and a difficult traverse across multi-level lawns was achieved without a mark on the garden, a task which would have been impossible for me.

The lathe? It had been superbly prepared; despite all those years of work not a single particle of swarf remained. All the gib strips were precisely adjusted and ready to go for £1000. A fabulous machine, it brings a smile to my face every time I use it. Jobs that were quite beyond my dear old 'M' type can be undertaken, and oh! the accuracy.

Some of my old tooling has been modified, other bits have been remade, but then that's what we like to do isn't it?

That then is my experience which I have no hesitation in advising others to follow. Talk to other model engineers and the trade; all that accumulated experience will help you make the right decision.

Ian Dickenson-Standing, Kent.

Skilled people

SIRS, - I fear that Don Unwin (with whose many and varied skills regular readers are familiar) has drawn the wrong conclusion about those of us who would prefer the term 'engineer' to be reserved for chartered engineers (Post Bag, M.E. 4209, 28 November 2003). Later in the letter, he also appears to confuse chartered status with graduate status.

I would like the UK to come into line with most of the rest of the developed world in this respect, simply to avoid confusion. I certainly do not attribute any superiority in the skills that Don mentions to chartered engineers. Membership of an institute requires the demonstration of a particular set of skills and experiences, no more, no less. An IEEE member may have skills of the sort that Don possesses but not because of IEEE membership; ditto an MIMechE, though such a person may reasonably be expected to have some of Don's analytical and planning skills in relation to things mechanical.

I wouldn't want to say that a chartered engineer was 'better' or 'worse' than Don; they almost certainly have different sets of skills and are called upon to do different things.

Unusually for me — I usually prefer UK English — there is an American term that I much prefer to 'model engineer': 'home shop machinist'. It is slightly more verbose and a lot more accurate. Unlike 'model engineer' it isn't ambiguous either.

As for graduates, ah, well! I'd suggest that a bachelor's degree is an indication that a person should be able to develop new skills without direct and continuous supervision. I certainly wouldn't have claimed much more immediately after graduating.

While I'm letting off steam, I'd like to reply to Gareth Porter as well (same issue). 'Making things' covers more than the traditional outputs from dying industries. The software that drives the denigrated 'programmed machines' is made, give or take the odd awful example, by some very skilled people. The term 'software engineering' (the production of software, not CNC machining) is appropriate: good software requires all the skills usually associated with (chartered) engineers.

The final irony is that the most successful manufacturing industries almost everywhere are heavily dependent on CNC machines and their relatives.

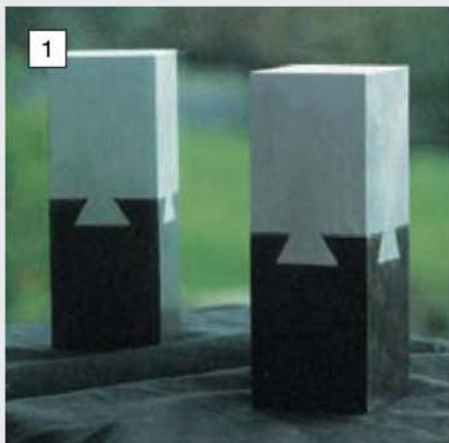
Bob Margolis, Hampshire.

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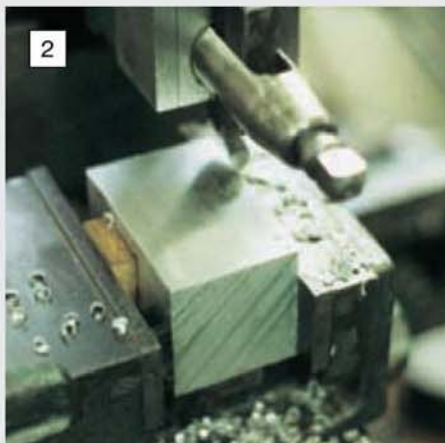
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The completed paradox standing in front of a mirror which reveals a dovetail on each face.



Squaring the aluminium alloy block. Note the use of packing to ensure contact with the fixed jaw.



Gashing the dovetails in the steel block using a parting-off tool borrowed from the lathe.

DOVETAIL PARADOX

John Olsen in New Zealand describes a project with which to astound your family and friends. In doing so, he uses his expertise to explain the proper use of a shaping machine to produce accurate work.

How would you go about machining the dovetail joint shown in photo 1 above? Having machined it, how would you assemble it? Before anyone mentions castings, the two pieces of which it is composed are each machined from solid bar stock, one being aluminium alloy and the other steel. The mirror shows that all four faces are identical. There is no void space inside.

Manufacture

The secret of this novelty is that the dovetails are not in fact square to the faces, but run at 45deg. to the adjacent face rather than across to the opposite side. This converts the problem of machining and assembly from the impossible to the merely difficult. At this point I should mention that I did not originate the idea, but based it on a description of a wooden version which appeared in one of the popular American technical magazines back in the 1950s, probably *Popular Science* or *Practical Mechanics*. However, theirs was constructed by standard hand carpentry techniques, and the idea of turning it into a challenging exercise for the shaping machine is my own.

In order for the dovetails to appear on the surface at a standard 60deg. angle, it is necessary to change the angle of their sides to 68 degrees. For machining by milling in the lathe or vertical milling machine, this would require a special dovetail cutter. The shaper can readily cut dovetails to any chosen angle. For this reason, a shaper is the preferred machine for this project. All operations will be described using a shaper, and owners of milling machines will have to exercise their ingenuity to come up with the

equivalent means on their equipment. Since a 68deg. cutter is probably not available for ready purchase, you are likely to be faced with making one. There are some advantages to the shaper!

First find some suitable material. It is preferable for the two blocks to contrast in colour, otherwise people may think you have just scribed the line of the dovetails. Brass or gunmetal would give a good contrast with steel, but would cost a bit much in a lump of the size required. I therefore settled for aluminium alloy and steel, both of which were already available. It is desirable to use materials that do not tend to crumble at the edge, and both aluminium alloy and steel are good in this respect. The steel was blued to improve the contrast. Any two readily machined metals may be used.

The bar stock I had was round, so the first step was to trim them close to square using a metal cutting bandsaw. Next the two pieces were machined square in my two shapers. Having two shapers, I was able to do one in each, establishing in the process that the fixed jaw of one of the machine vices was not square to the base. This has since been corrected, using the shaper itself.

Machining two blocks like this to be truly square and both the same size is no trivial exercise. First set up the machine vice so that the fixed jaw is parallel with the ram of the shaper, using a dial gauge if available. Choose a pair of adjacent faces on each of the blocks that are reasonably flat and something like square as they came from the saw. A file or belt sander may be

used to improve this a little and to remove any ragged edges.

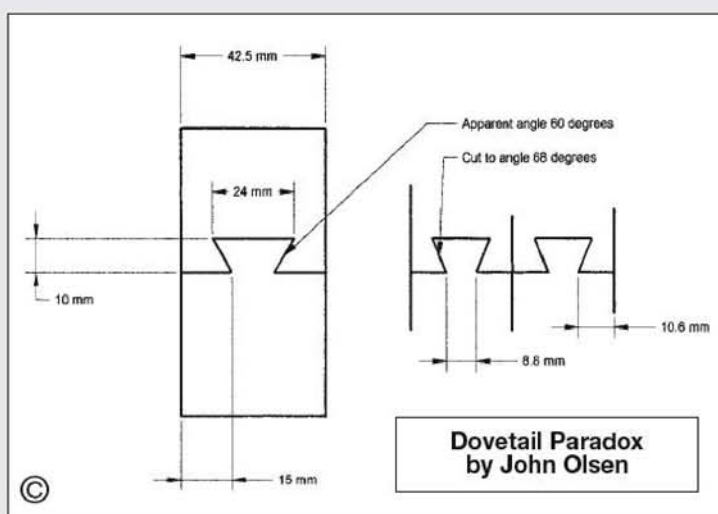
Set the best face against the fixed jaw of the machine vice, laying the other face against a thin parallel on the base of the vice. Clamp up, using a small piece of wood packing to apply the load from the moving jaw along a single line. I used a piece of medium density fibreboard about 6mm thick and 20mm square. Applying the vice load on a single line like this ensures that the job will take up its position against the fixed jaw. If the vice is as accurate as it should be, this means that this surface of the block will be at right angles to the table. Tap the job down on the

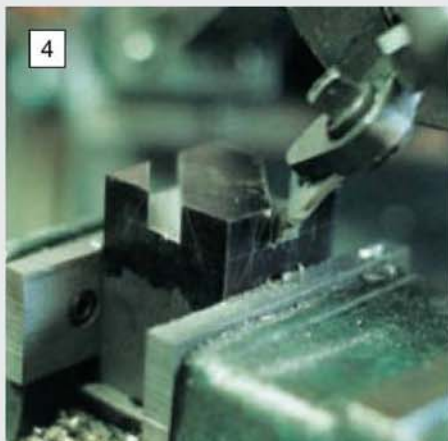
parallel using a soft-faced hammer. The parallel ensures that the block is aligned lengthwise, while allowing the vice jaw to set the sideways alignment. By taking a cut across the top we should now have a top face at right angles to the side. The cut should be sufficiently deep to clean up the whole surface but no more. Since we are doing two blocks, it would make sense to take turns doing a face on each block.

Retaining the same setup, turn the block so that this freshly machined face is against the fixed jaw and repeat the process to give us a pair of trued faces. Using a good square, check that they are actually at right angles. If they are not, your vice is probably not true, and like me, you will have to think about how best to correct it.

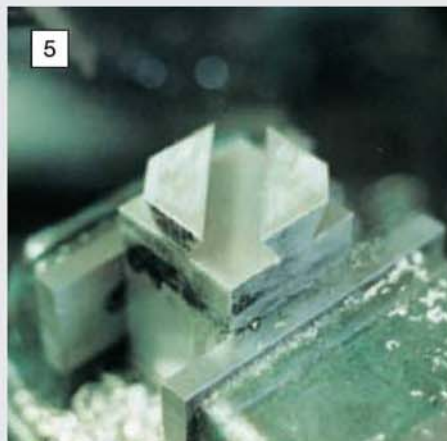
Assuming that all is well, rotate the block again to put the new face against the fixed jaw. Since we now have a machined face on the bottom which is truly at right angles to the face against the fixed jaw, we no longer need the parallel underneath and the job should be tapped down firmly onto the ways of the vice. I retained the soft packing against the moving jaw to ensure once more that the work was truly located by the fixed jaw. (Readers may prefer to retain the parallel under the work to indicate that the previously machined face is firmly bedded down in the vice. This can be determined by checking that the parallel is nipped between the vice and the full length of the work — Ed.)

For the final face, rotate one more time and

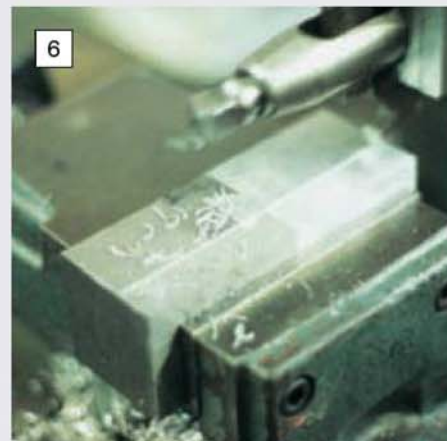




4
Starting the dovetails using a parting tool with an angle ground on the end to suit the corner.



5
The completed diagonal dovetail machined into the aluminium alloy block.



6
Taking a final skim off the faces of the assembly helps disguise the method of construction.

machine to the same vertical feed setting as the last cut on the previous face (photo 2). If you have to take off more to get the surface clean then you can rotate it back to the previous face without changing the vertical feed and take one more cut. If your down feed is not calibrated, it would pay to take the last finishing cut on the last two faces of each block with the down feed locked to the same setting. This should give us two square section blocks of the same size.

Now stand them up in the vice and square the ends off. Some vices have narrow ways, making it awkward to fit a square in along with the job. This makes the setting up difficult. If you find that you have managed to get the end square in the plane that was determined by the jaw but not the other, turn the job over, rotate the job through 90deg. around its longitudinal axis and do the other end. Now the fixed jaw will hold it square in one plane, and the end against the vice ways will ensure it is square in the other plane. By this means, making sure that it does bed squarely against the fixed jaw, you can get the second end better than the first. Another reversal of the job will allow you to take a final cut from the first end to remove the remaining error.

Dovetails

At this stage we should have two rectangular prisms of the same cross section. It is not critical for the lengths to be the same. Coat one end and part way down the sides of each with marking out fluid; a permanent black marker pen will also serve the purpose. Carefully mark out the shapes of the dovetails. Cross hatch the material to be removed on each piece, making sure that you finish up with the correct male and female dovetail parts on each one.

Now set the machine vice to 45deg. using the swivel base. If your machine vice is not equipped with a swivel base, you will need to clamp the vice to the table in this position. In such a case you could use an accurate 45deg. mitre square to help set it up, using the dial gauge to assist. Even if you do have the swivel base, be sure that it is set up correctly so that the machined angle will be accurate. The final appearance of the project will be very much determined by the accuracy to which you can work.

The dovetails are cut by first gashing out as much as possible with a slotting tool which is not unlike a parting off or grooving tool for the lathe (photo 3). You can borrow one from a lathe if necessary. Try to cut accurately to the line. It is possible to set up a shaper to cut on the draw stroke when cutting to a line like this but this requires a

special clapper box that permits the tool to face the other way and allows relief on the forward stroke. The direction of the drive should also be reversed so that the quick return is on the non-cutting stroke. Using this technique, the marked line does not tend to be obliterated by chipping of the edge or by a rag being formed. Small centre pop marks can be used to help make the line more visible, and is particularly useful if you cannot set up for a draw cut. Since I do not have this facility myself, I used the centre pop method.

Once all the material that can be removed by the slotting tool has gone, the shaper down feed must be set to the angle of 68 degrees. This will require resetting during machining to permit the opposite side to be cut. Most shapers provide a calibrated scale for setting the angle of the cutting head, and this should provide sufficient accuracy and repeatability for our purposes. If a scale is not provided, a template with the correct angle should be set out as accurately as possible, and used each time the head must be set. An alternative is to reverse the job in the vice, but I preferred to keep the job the same way around and not disturb it.

The tool for cutting dovetails is simply a narrow angled knife tool able to fit in the angle to be cut without fouling (photo 4). Since our angle is quite large, the tool does not need to be particularly narrow. Both sides must have sufficient backing off to clear the surfaces properly and the tip should be stoned off to a small radius. For these angled cuts, the clapper box must also be angled to ensure that the returning tool swings clear of the job. This requires rotating it in the same direction as the down feed. For example if the down feed is rotated clockwise then the clapper box will also be rotated clockwise. This then requires the tool to sit at an angle across the clapper box to give the correct clearance on each side. Make sure that the angled tool is not preventing the clapper box from moving freely. You would be wise also to check that the tool will move out of the corner into which it is cutting by working the clapper box by hand before starting.

It is worth mentioning that you can avoid much grief by always checking such points before starting a shaper. I always pull the machine around by hand before turning the motor on. This allows me to check that the ram will fully clear the job and the vice. The correct length of stroke is checked at the same time. You also need to think about parts that might come into conflict when the table is fed to either side. Sometimes with angled cuts it is also necessary to ensure that there will be clearance between the corners of the clapper box and other parts of the job or vice at maximum down feed.

Cutting the dovetails should proceed without too much drama, taking light cuts and finally blending the bottom face into the existing surface. Be careful not to wind the horizontal feed back too far to foul the opposite side when opening a slot. Take care also of your personal safety, as working both horizontal and down feed together like this does require you to be rather more wrapped around the machine than is really desirable. The worst incident I have had in a situation like this was a hot chip down my shirt front, which gave a little burn, but even that was bad enough. There is something to be said for roll neck shirts when carrying out operations of this type!

Once you have cut the dovetails on the first piece (photo 5), set up the second and cut them out too. Since the dovetails meet the side at an angle, by starting with the centre pair and working out, you can try the fit before doing all the cuts. Much care should be taken, since there is not much difference between a fit which is too tight or too loose.

Completion

When the job is done, the dovetails should just be a good sliding fit on each other. In the absence of the proverbial 'putting on' tool, if you take too much off the only solution is to face back the end and start all over again. Once satisfied, a final skim over the complete assembly helps disguise how the joint was made (photo 6).

The steel surface of my example was treated with gun blue. This actually gives a black surface that seems to help retain oil and reduce the chance of rust. You should be able to obtain a suitable product from a gunsmith. If you want to keep it indoors on the mantelpiece, an oiled wooden base would be nice. You have the choice of leaving it free to be taken apart, or of adding a drop of Loctite or the equivalent, locking it permanently together. The latter would be a bit of a mean trick, and also prevents showing off your machining skills quite so well. However, since mine is tight enough that it required assembly with the use of a copper hammer, it rather defies casual examination of the inside. If you want to make it a little harder for the observer to figure out what is going on inside, you could make a small glass case, possibly with two mirrors in the back and glass panes for the front.

However, we have rather given the game away by publishing this article, although you should be able to confuse many people who do not read *Model Engineer*. I have been intrigued by noting who manages to work out the secret and who does not. It is not always technically trained people who work it out!



A view from the rear of the Drummond lathe showing the new countershaft bracket assembly, the Hoover motor and the electrical switch gear. This photograph also shows how the drive belt straddles the back gear shaft. Care was taken with the design to ensure it did not foul the shaft on any speed.



The countershaft bracket after fabrication, cleaning up and painting in primer.

RESTORATION OF A CLASSIC LATHE

Ron Etter

in South Africa, completes the work necessary to restore his Drummond 'B' lathe originally built in 1907.

●Part II continued from page 631
(M.E. 4209, 28 November 2003)

Before applying primer to the lathe bed it was checked for wear. The leadscrew, which is permanently engaged with the square thread nut attached to the underside of the saddle, was removed; this allowed the saddle to be pushed along the bed to ascertain if there was any tightness which might need correction. While not perfect, it was within acceptable limits. The more or less uniform wear along the bed was probably due to the tailstock locating surfaces using the same profile as the saddle.

Countershaft bracket

With the application of etching primer to all the castings, bed, tailstock and headstock completed it was time to get to the drawing board and design the frame to hold the ML7 Myford clutch shaft and hinged motor mounting plate. However, I could not think of a better method than that used by Myford on their Super 7 lathe. First I had to establish whether it was feasible to hang the combined weight of the bracket, clutch shaft with

step pulley and Hoover motor onto the back of the lathe bed. At the rear end is a box section; the thickness of the casting is $\frac{3}{8}$ in., with a $\frac{1}{2}$ in. thick rib running along the bottom.

A $\frac{3}{8}$ in. thick mild steel plate was made to neatly follow the external contour of the flat face at the rear of the lathe bed. Six $\frac{1}{4}$ in. Whitworth cap screws were fitted to hold the base plate onto the bed. The $\frac{1}{4}$ in. Whitworth tapped holes in the bed casting go through its $\frac{3}{8}$ in. thick portion. The choice of the Whitworth thread was to obtain maximum depth of thread engagement in the tapped cast iron.

The next step was to fabricate the frame from $\frac{3}{16}$ in. mild steel plate and electric weld it to the base plate. A cardboard mock-up was made before cutting metal for the frame. The critical position of the ML7 clutch shaft relative to the lathe spindle meant that the 10 x 6mm Vee-belt had to straddle the back gear shaft in all three step pulley positions with clearance for this belt. With hindsight I realised why Myford had moved the back gear layshaft below the headstock spindle; the camshaft action to raise and lower the back gear is an elegant solution.

Having completed the fabrication and joining of the frame by arc welding using 2.5mm dia. touch rods, and cleaning the completed frame with a small angle grinder to remove weld splatter, all the necessary shaft holes were machined. Next, the clutch belt tensioning camshaft

mechanism was manufactured and fitted to the frame; likewise the motor bed plate and hinge shaft was fitted, my Myford Super 7 providing the design for both these items. On trial mounting the Hoover $\frac{1}{4}$ hp electric motor upside down and underslung below the frame, I noted that the motor's fitted oil cups were now upside down. I therefore hoped I would be able to rotate the end covers through 180 degrees.

On dismantling the motor, rotation of the end covers was seen to be possible but this introduced a snag in that the internal wiring was now too short. New wiring was duly fitted and, at the same time, a wiring diagram was prepared as I wished to fit a reversing switch. While the motor was dismantled, the starting winding was checked and proved to be okay, although as previously mentioned, the motor had to be started by pulling the belt. The reason for the starting winding being inoperative was found to be due to the bush in the end cover having moved out of position. This allowed too much end float on the rotor and put out of action the centrifugal switch which controls the starting winding.

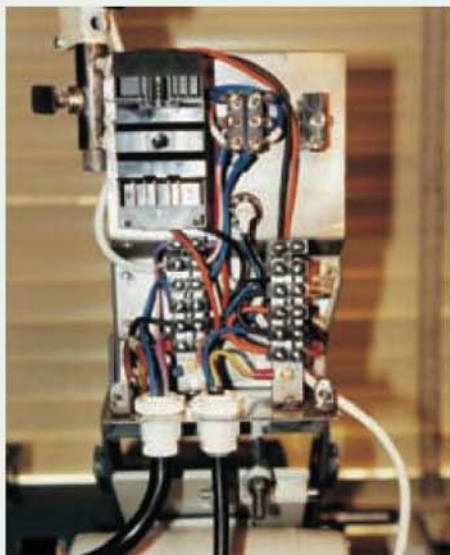
The movement of the bush out of position was no doubt due to fitting a pulley which was too tight on the shaft, repeated hammer blows having dislodged the bush. A piece of shaft was machined with a spigot to suit the bush, the bush was tapped back into position, and *Hey Presto!* I was back in business with the starting winding back in operation. Despite its 50 years of service,



The well made Hoover electric motor which the author was able to repair and return to full operational service. It probably dates from the early 1950s.



The Drummond tailstock is located on the same bed surfaces as the lathe saddle - a factor which may help even out wear.



Seen here with the cover removed, the electrical panel is mounted above the motor on a purpose made bracket attached to the countershaft.

the motor is still in excellent condition; this is no doubt due to a good design — the outer casing and covers are beautiful aluminium alloy pressure die castings, the end covers are fitted with white-metal bearings, hence the need for oil cups, and there is evidence of dynamic balancing of the rotor resulting in quiet, vibration free running.

Intrigued with the advanced design of the Hoover motor, I looked through back issues of *Model Engineer* and in an issue for December 1949 I found an advertisement for a Hoover FHP motor with cast iron end covers and bodyshell. This was the last for the 'old style' motors manufactured in the Middlesex factory. Six months later, in June 1950, the first advertisement appeared for a completely new design of Hoover FHP electric motor, now made in the Cambuslang works in Scotland. I suppose it is fair to assume that the Drummond lathe was converted from treadle power in 1950 to the Hoover electric motor which must have increased the output capacity of the lathe.

Cross-slide

With the clutch shaft, cone pulley assembly, camshaft and motor having been assembled onto the support frame, it was time to move on to fitting the ML 7 cross-slide to the Drummond saddle. Fitting the bottom dovetail plate of the ML 7 cross-slide, I started machining the top of the Drummond saddle which previously had held the rotating compound slide and tool rest. It was with some regret that I machined away the Tee-slots which had served the previous owners of the machine well. A $\frac{1}{4}$ in. high by $\frac{1}{2}$ in. wide step was left on the front of the Drummond saddle plate. This served to butt the ML 7 cross-slide assembly against the step and reinforced the front of the saddle, four $\frac{1}{4}$ in. dia. cap screws with the thread tapped into the Drummond saddle holding the two together.

Instead of using the single clamp tool holder as provided by Myford I decided to make a four-way tool post to the Myford pattern, but reduced to $2\frac{1}{2}$ in. square to avoid the $\frac{1}{8}$ in. overhang on the ML 7 compound-slide. The tool size was also reduced from the normal $\frac{5}{16}$ in. square to $\frac{1}{4}$ in.

square which provided an extra $\frac{1}{16}$ in. thickness on the Drummond saddle plate for extra stiffness.

Tailstock

With the saddle assembly now complete, attention was given to the tailstock and quill locking mechanisms. To lock the quill a screw with a cross-pin is used and for locking the tailstock a Whitworth hexagon headed bolt is used which required the use of a spanner for locking. A more 'ergonomic' solution was required which was again provided by Myford in the form of ball handles. The hexagon head bolt was machined to half hexagon and half round. An eccentric cap was then machined to fit neatly over the head of the bolt and a hole was drilled in the thick part of the eccentric cap at a slight angle. This hole accommodated a press-fitted handle while a $\frac{1}{4}$ in. dia. socket grub screw locked the eccentric cap to the head of the bolt, the flats providing six positions for the handle.

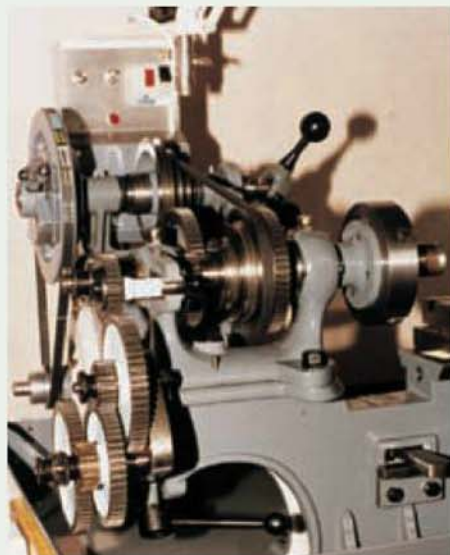
The hexagon headed locking bolt for the change wheel gear quadrant was also awarded with a ball handle. The handles look much better blacked, a finish which was obtained by repeated heating and quenching in dirty diesel engine sump oil; the better the polish and finish on the ball handles, the better the blacking process. It is a primitive method, but it works! A five litre paint tin half full of oil does the trick, and the process is best carried out in the open as the smell is terrible!

A fellow Society member down-loaded some Drummond e-mail information and excellent pictures of Drummond lathes, one of which showed a lovely handle on the back gear shaft fitted to the Drummond lathe before 1906. I machined the existing tapered handle, which was part of this shaft, to a parallel diameter which I then threaded. I obtained some ebony from which I machined and fitted a beautifully shaped replica. The clutch camshaft was also adorned with an ebony ball.

The last item was to fit two commercial oil cups with spring loaded lids to the headstock bearing. A felt plug was pushed into the bottom of the oil cups in order to ensure a slow release of oil to the headstock bearings.

Switch box

Work on the lathe now completed, my attention turned to the electrics. A switch box was made and mounted on a bracket which is part of the



A headstock view showing details of the change wheel arrangements. The handle below the chuck disengages the leadscrew from the drive.

clutch shaft frame. I started hunting for a small push button stop/start switch which could be fitted into the switch box. I was repeatedly offered the normal huge box with its one red and one green button, which proved far too large for fitting into the box. However, persistence eventually paid off, and I found a very neat, 'made in France' switch, Telemecanique, No. GV2-M08 with two small push buttons.

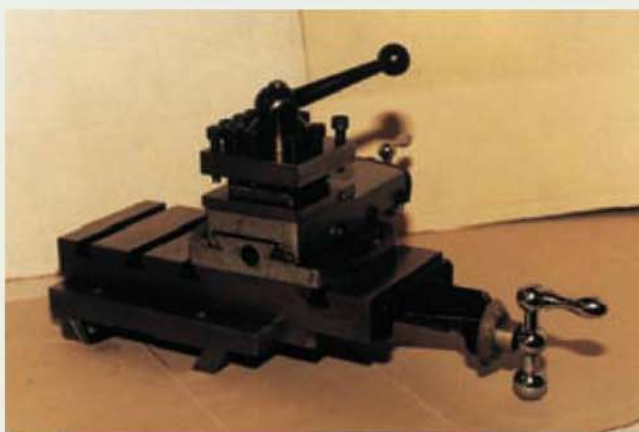
To my delight the current rating of this unit is adjustable between 2.5-4A which can be set according to the rating displayed on the motor: 2.5A for the Hoover $\frac{1}{4}$ hp motor. The only hiccup is the price — the French sure know how to charge for their product! As no cheaper alternative seemed to be available, I had to bite the bullet, pay up and look big. *Vive la France!* say I.

I managed to source some 7-core cable to connect between the motor to the switch box, needed for the running winding in the motor plus the forward and reverse starting winding and one earthing wire. All items that had been trial assembled were dismantled and the job of painting began with the Myford shade of grey enamel to all the parts which had previously received a coat of red oxide etch primer. A week's paint drying/hardening time was used to mount the suds tray onto the cabinet and make up the rear splash guard.

Final assembly and test

The pleasant task of final assembly completed, a test bar was fitted to the independent 4-jaw chuck, the finest available feed set and a $1\frac{1}{4}$ in. dia. mild steel bar was machined for a length of 3in. which is probably about the longest overhang machinable without tailstock centre support. A fine finish was produced using a knife tool, and I reckoned the resulting one thou. taper over 3in., was not too bad.

This satisfactory result was well worth the time spent on restoration and modernisation of the 93 year-old Drummond lathe. I enjoyed every moment working on restoring this historical artefact and found it equally as fascinating as my more normal activity of designing, drawing and building small locomotives. 



The Myford ML7 type compound slide assembly after adaption to the Drummond saddle and ready to fit to the machine.



Run 1: Mike Barnett.



Run 2: Barry Lomas.

THE 6th N.A.M.E. NARROW GAUGE IMLEC

Mike Foster reports the Northern Association's Efficiency Competition recently hosted by Rochdale SMEE.

Picture this scenario: a full weekend running trains in a pleasant parkland setting in glorious weather, the excuse being to host a competition. Meeting old friends, making new friends and the Society pulling together around a common purpose — just like we used to do. An evening barbecue, warm beer and the next day yet more warm weather and not a cloud in sight. The competition running smoothly, but not without incident, so that each night we went home exhausted but happy. Well, that was the dream; how did it turn out? The answer; just perfect. You should have been there!

This year, the Northern Association of Model Engineers' Efficiency Competition for Narrow Gauge locomotives was hosted by Rochdale Society at their track in Springfield Park, Rochdale. This was the sixth year of this particular competition and, as usual, was sponsored by *Model Engineer* magazine. The event was held over the weekend 31 May/1 June and was the culmination of twelve months planning since the idea was first mooted.

Initial concerns over the slow take up of places in the competition were unfounded as we ended

up with a full complement of 16 locomotives of both 3 1/2in. and 5in. gauge lined up to do battle. An early problem concerned the dynamometer car, which was not designed for our raised 7 1/4in. track and clamped down on the outer rails as soon as the driver sat on it. This was discarded and its place taken by a normal riding car fitted with a speedometer for both driver and observer, the results being calculated from a formula involving weight hauled, distance travelled, and weight of coal consumed.

Each locomotive ran for 30 minutes and pulled a train of loaded slate wagons at no more than 5mph; thus giving the appearance of a typical narrow gauge operation at this scale. Drivers were instructed that they must start and stop at the finishing line situated at the station — an important consideration in view of the number of engines which ran out of steam on the last lap and were therefore disqualified.

Run 1: Mike Barnett

Representing North Staffordshire Model Society, Mike started the proceedings at 10am sharp with a trouble free run driving his own engine *Zebedee*, a freelance 2-4-2 with Bagnal Price valve gear. He finished in 6th place.

Run 2: Barry Lomas

Barry Lomas from Congleton was next up driving his *Sweet Pea* which unfortunately could

not make it round the last lap thereby becoming the first casualty of the day.

Run 3: Nigel Thompson

Representing Erewash Valley MES, Nigel found that being the Secretary of NAME was no help in this competition. He was driving his 3 1/2in. gauge *Conway* and after a slight hiccup *en route* from the steaming bays to the station, he enjoyed a good run until the last lap when he too ran out of steam.

Run 4: Mike Barnett

Making his second appearance of the event, Mike Barnett competed next, this time driving Ron Painter's 5in. gauge freelance 2-4-2 *Eli*. Both Mike Barnett and Ron are from the North Staffordshire Society and have been a huge help with this and previous competition by providing most of the slate wagons, which they kindly brought to Rochdale some weeks before the event — a typically generous action which helped so much in organising the event. The slate wagons help to make the competition look authentic and are a great attraction in their own right. Mike enjoyed a spirited and confident run and at this stage went into the lead.

Run 5: Alan Bibby

Alan Bibby represented Leyland Model Engineers; as NAME Newsletter Editor, he had no more luck



Run 3: Nigel Thompson.



Run 4: Mike Barnett.



Run 5: Alan Bibby.



Run 6: Mike Barnett.

than Nigel Thompson. Alan drove *Charles*, his 0-4-0 Hunslet, a model based on an engine built by the Hunslet Engine Co. in Leeds for Penrhyn Quarries and now on display at Penrhyn Castle. When only half way around on his first lap the ashpan fell out and Alan was unable to continue. An unfortunate end for such a superb engine.

Run 6: Mike Barnett

Mike Barnett made his third and final outing onto the track at the regulator of Ron Painter's *Jess*. This freelance locomotive was built in 1987 and is fitted with Atkinson Uniflow Motive Power and a chain drive to the wheels. This powerful locomotive has good 'form', having already won twice and came second twice; however on this occasion the driver exceeded the 5mph limit three times and therefore had to be disqualified.

Run 7: John Brady

Our next competitor was John Brady from York Society, driving *Brown Owl*, his locomotive to Martin Evans' *Conway* design. This engine was built by John's friend Tim Pearson for his wife Janet, and was given to John when the Pearsons gave up model steam. John had a good, trouble free run to take third place at this stage.

Run 8: Brian Remnant

Saturday's final entrant was Brian Remnant who, along with his wife, had travelled all the way from Romney Marsh in Kent. A veteran competitor, Brian won this competition last



Rochdale's Mayor Sultan Ali checks that all is well as Nigel Moyle prepares his father's Beyer Peacock 0-6-2T for Run No. 10.

year when it was held at South Cheshire. His locomotive is a 16 year-old *Sweet Pea* with Bremme Valve gear, a high pressure steel boiler with copper tubes, a massive 32sq.in. grate and is tuned for performance. He gave a masterful display and ended up as leader of the day.

Interlude

After a quick tidy up and wash down it was straight down to business with the barbecue. The evening weather stayed kind and before long chairs were set out on the lawn in front of the hut. Members, friends, competitors and visitors then all enjoyed a gentle wind down discussing the day's events, washed down with a little of the amber liquid. The next day, Sunday, dawned with the promise of another fine and sunny day.

Run 9: Alan Moss

Sunday's proceedings were set in motion by our own member, Alan Moss, driving his canary yellow, but otherwise standard *Sweet Pea*. Alan who is also a member of Urmston Society had plenty of support from both clubs but unfortunately misjudged his final lap and ran out of steam.

Run 10: Jim Moyle

Another Urmston Society contender was Jim Moyle with his engine No. 9, driven on this occasion by his son, Nigel. The engine is a 0-6-2 based on a locomotive built in 1888 by Beyer Peacock for the Guaira & Caracas narrow gauge railway in Venezuela and based on previous showings is a

mighty performer.

Nigel optimistically asked for a full load of 19 trucks but quickly found that all those little wheels on plain bearings can produce a lot of friction going around our tight curves, and he was forced to stop twice to discard some load before he could continue. After Nigel finished his run he was asked to drive the Mayor of Rochdale, Mr. Sultan Ali, who was visiting the event, around the track to his obvious delight.

Run 11: Don Thorpe

Urmston Society were not beaten yet and next up was the mighty 5in. gauge 2-8-4 *Lionheart* of Don Thorpe; based on Indian Railways' narrow gauge *Dholpur*. He effortlessly pulled every



Run 7: John Brady.



Run 8: Brian Remnant.



Run 9: Alan Moss.



Run 10: Jim Moyle.

truck available and was doing very well until a spectacular derailment, starting from the rear, pulled each truck off in turn like a set of dominoes. Although he re-started, the loss of time did not help his chances onto the winners' board.

Run 12: Roy Allen

Representing Warrington Society, Roy Allen brought along his beautifully turned out model of the *Polly IV* which he built in 1991. He had an excellent run, but a slight error of judgement left him short of steam with the finish line in sight. Better luck next time.

Run 13: John Drewell

John Drewell from West Riding Small Locomotive Society was next out with *Walter*, his 0-6-0 *Metre*

Maid which was built in 1994 and is a regular passenger hauler at his home track. John is an experienced campaigner and was a previous winner in 1999. He gave a faultless run and went into 2nd place at this stage.

Run 14: Faj Collin

A regular attender at previous competitions has been Rochdale member, Faj Collin, with his little 5in. gauge, 0-4-0 freelance model, *Alva*. As Chief Judge for this competition, Faj nominated Dave Kinsella to drive on his behalf. At some 18 stones, Dave made an interesting contrast as the largest driver sitting behind the smallest engine. Many wondered how they would perform. Suffice to say that *Alva* hauled Dave plus observer and four trucks for a comfortable six laps and went easily into 3rd place.

Run 15: David Dick

David Dick, another member from Urmston, competed next with his *Sweet Pea*. This model is in the style of a Welsh slate quarry engine and he has finished it without a cab. David gave an excellent display and had a trouble free run.

Run 16: Derek Sidebottom

From the Buxton society, our final competitor, was Derek Sidebottom with his *Sweet Pea*, named *Daph* after his late wife. Another locomotive without a cab roof, the reason in this case is to permit easier driving while on ground level. It was driven expertly by his friend Brian Collier and was on course for attempting the maximum of seven laps when he unfortunately suffered a derailment, which put paid to his chances of challenging the leaders.



Run 11: Don Thorpe.



Run 12: Roy Allen's Polly IV.



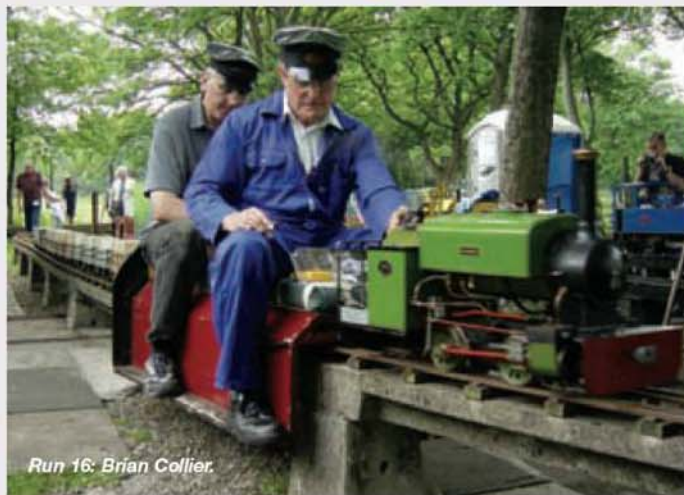
Run 13: John Drewell.



Run 14: Dave Kinsella.



Run 15: David Dick.



Run 16: Brian Collier.

Presentation and thanks

The overall winner was Brian Remnant with *Lady Margaret*, second was John Drewell with *Walter* and third was Dave Kinsella with *Alva*.

The proceedings were drawn to a close by the Chairman of Rochdale Society, Geoff Dowden, who thanked all those involved in making the

event such a huge success.

The presentation of the prizes, with a handsome model of a pair of slate wagons to the winner plus a year's subscription to *Model Engineer* for the first three, together with cash prizes donated by the Northern Association, was made by Don Broadley, Chairman of NAME.

All other competitors were warmly thanked for taking part and each received an inscribed tankard as a memento of the event.

Don Broadley concluded by echoing Geoff's thanks and wished the event well for next year when it is to be hosted by Warrington Society. Be there.



INTRODUCING CAMS

Stuart Hughes

shows how we can help youngsters to understand basic mechanisms.

We often hear at club meetings and read in 'our' magazines that too few youngsters now become involved in model engineering, and much of the blame for this is levelled at schools not teaching enough engineering. Having two young sons of my own, I have looked into this and spoken to the teachers at their primary school who confirmed that the syllabus, even for 9 year-olds, includes basic mechanical devices such as cams and followers, cranks and sliders, and the like.

Further discussion highlighted a shortage of affordable teaching aids which will, after all, be used for only one or two lessons each year. The design

shown here is offered as a simple demonstration of how a cam and follower mechanism works and how the linear travel of the follower is double the throw or offset of the cam. It was made in a couple of brief workshop sessions and used materials that were readily to hand.

Perhaps other fathers and grandfathers reading this may wish to contact their schools to learn if they could produce some aids for teaching Design Technology, and share their designs with us. It might just inspire the next generation.

Construction notes

The base and stand are made from hardwood scraps with Oilite bushes for both the camshaft and the push rod. These two components are $\frac{3}{8}$ in. dia. mild steel, the camshaft being provided with a squared section to accept the various cams.

A roll pin at one side of the bearing and a



Hands on, or interactive learning, makes difficult concepts very much easier to understand.

turned light alloy handle fixed with a grub screw at the other prevent the camshaft from falling out.

The cam follower is turned from brass bar with a suitable radius on the working face. A drop of Loctite retains it on the push rod. A light spring assists gravity in keeping the follower in contact with the cam. The pointer is filed up from brass square section.

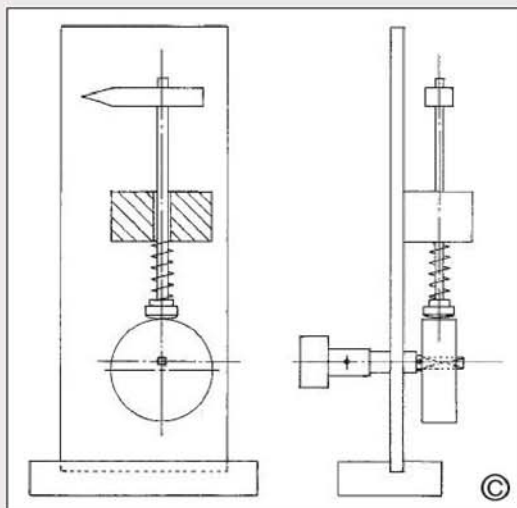
Three cams of 3in. dia. light alloy bar with offsets of 0mm, 10mm, and 15mm respectively complete the set of parts, each having its hole filed to suit the squared section of the camshaft.

In use

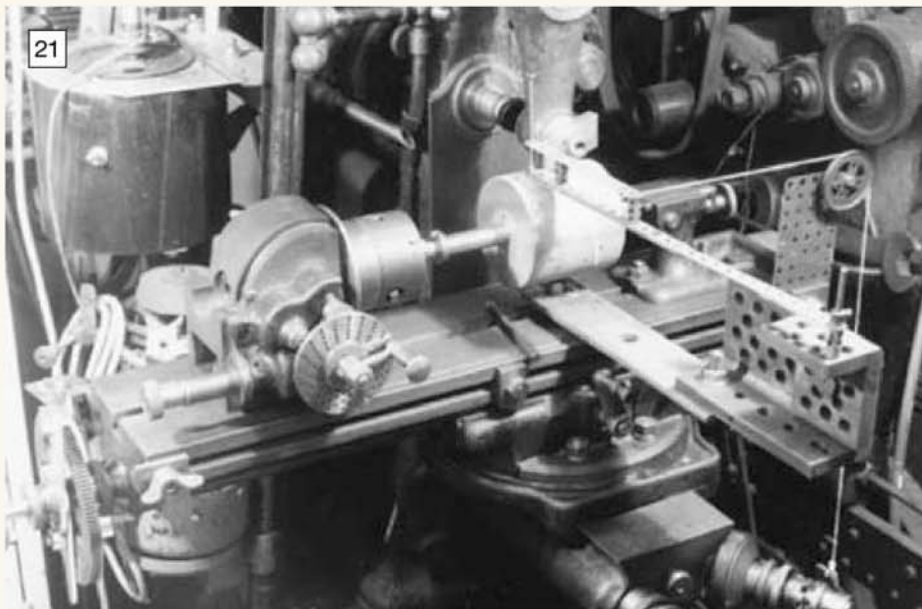
The demonstration during the introduction of the cam and follower will include the zero offset cam and one of the others to show that rotary motion can be changed to linear motion.

The second stage includes the design concept that the lift provided by the cam will be twice its offset. Pupils have the chance to mark the limits of travel and measure the distance between them, interactive learning as it is now called — hands on in old money.

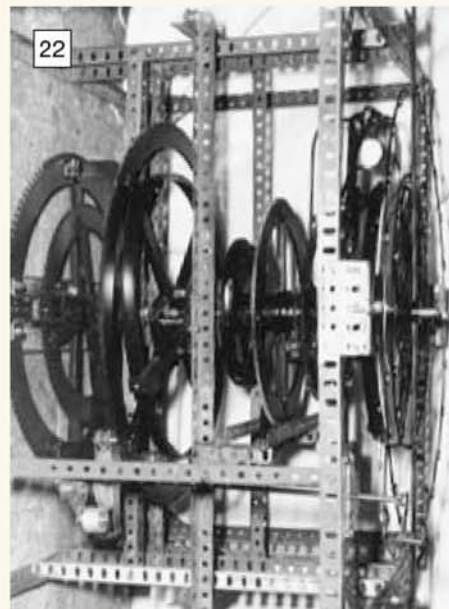
A worksheet/handout has also been produced to go with this aid, I will be pleased to send a copy on receipt of a SAE via the Editor.



A learning aid from the scrap box.



The set up used to mark out the count barrel peg centres looks somewhat makeshift, but it worked perfectly.



The astronomical mechanism housed in its temporary Meccano frame.

Don Unwin

uses some interesting machining set-ups to continue with work on his replica of this unique clock.

●Part III continued from page 633
(M.E. 4209, 28 November 2003)

As the end of the strike locking lever moved across the count barrel in an arc, to mark the positions of the locking pegs accurately, the set up shown in **photo 21** was required.

Using the dividing head, the barrel was indexed the necessary angle between each strike, the milling machine table being moved along one pitch by the index on the left hand end of the leadscrew after each peg was marked. This mark was made by twiddling a flat drill fitting the holes in one end of a Meccano arm of the correct length which was pivoted at the other end and held against a stop by a piece of string and a weight. These holes were then drilled on the drilling machine with the barrel resting in a V-block carefully positioned and clamped to the machine table.

Motive power for both going and strike trains is by weights on cords around barrels. The weights were cast in concrete to represent the contemporary stone.

A REPLICA WALLINGFORD CLOCK

My impression is that the astronomical unit, the gear trains of which are shown in **photo 22**, has some even more interesting operations.

I had decided to mount the two units end on as in **photo 1**, both fixed to a common wood base framework and connected by gearing. This first gear train between the clock and the astronomical mechanism is the epicyclic gearing to convert the mean solar time of the day wheel on the clock to the mean sidereal day of 23 hours 56 minutes 4 seconds needed for the astronomical unit.

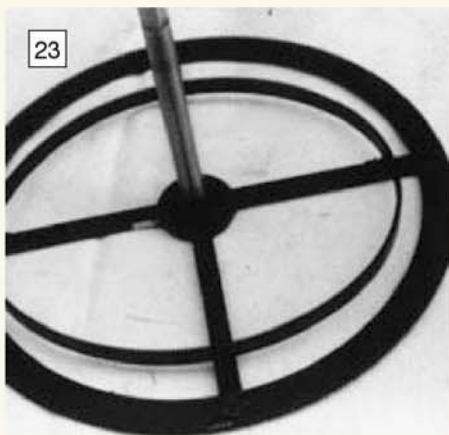
Next follows the gearing to convert mean sidereal time to true solar time for which Richard devised an ingenious system using a large oval contrate gearwheel. By engaging it to a long pinion he obtained a variable velocity ratio which depended on whether it was at the minimum or maximum diameter of the oval wheel. To make the wheel shown in **photo 23**, I set out the full size outline on a piece of card using the various radii Richard gave in his treatise, determining the circumference using a map distance measurer.

From this length, the circular pitch of the teeth

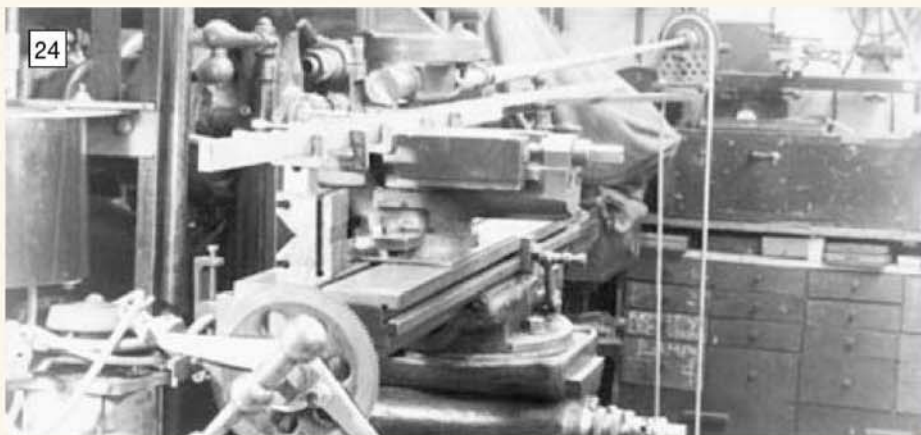
needed was obtained by dividing the length by 331, the number of teeth required. A piece of brass strip slightly longer than the circumference was clamped in the milling machine vice resting on packings at either end. The index quadrant and the gear to be used for dividing were mounted on the leadscrew of the milling machine and set to advance the table one circular pitch per movement. As the cutter axis had to be along the table, I rigged up my separate milling spindle driven by a long rod with universal joints and an independent motor (**photo 24**).

Since the circular pitch worked out to an odd module which I was never likely to use again I made a special form relieved fly-cutter instead of a multi-tooth cutter. Each tooth was cut by traversing the table across but as the length was longer than the table travel, I had to slide the strip along and reset it by locating the cutter in the last tooth before re-tightening the vice.

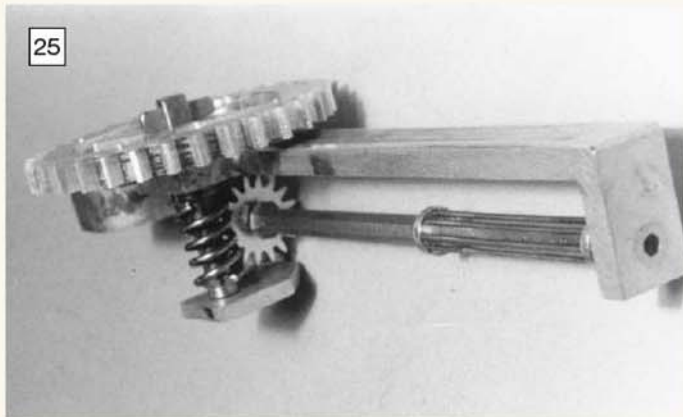
After cutting the teeth, the strip was shaped in the rolls, several settings being necessary to form the different radii. The waster was cut from each



The oval contrate gear wheel was based on dimensions provided by Richard of Wallingford nearly 700 years ago.



Cutting the oval gear teeth on the milling machine prior to rolling into the finished form.



25
The long pinion with worm and worm wheels shown during initial assembly of the mechanism.



26
Winding a worm helix on a mandrel mounted in the lathe chuck. The lathe is set up for screw cutting and provided the correct lead.

end to give the correct number of teeth, then the joint was hard soldered and the shape finally tweaked to fit the outline drawing dimensions.

A worm and wheel (photo 25), also to be seen in photo 22 just above the oval contrate, drives the long pinion that engages with the oval wheel.

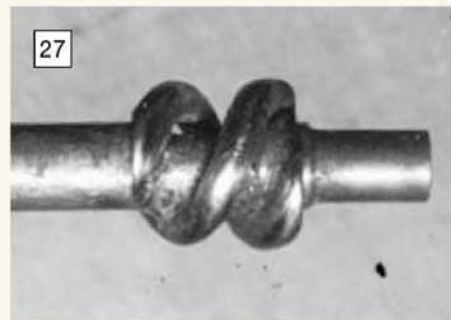
Making this worm, one of several, was interesting, simulating the blacksmith's method of forging a helix of rod round an arbor and forge welding the ends. I wound the helix of small silver-steel rod of the correct diameter to suit the module on a rod in the lathe. The screw-cutting train was set up to the required pitch and the silver-steel fed through a hole in a piece of bar clamped in the tool rest while the lathe was

pulled round slowly (photo 26). It was then cut to length, fitted to the arbor and the ends hard soldered (photo 27).

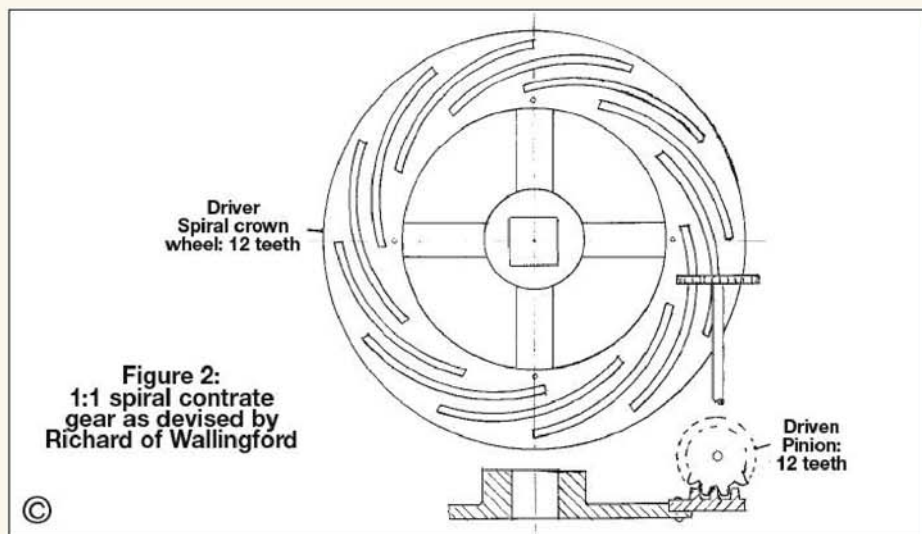
Astronomical train

We now move up the astronomical train to the next interesting component, the spiral contrate. Richard needed a 1:1 right angle drive from a large diameter contrate gear but had only room for a small meshing wheel. For this he devised the spiral contrate shown in my sketch (fig 2). Incidentally, I used a similar scheme professionally some years ago; little did I realise what an illustrious predecessor I was following!

A blank was turned from light alloy with a



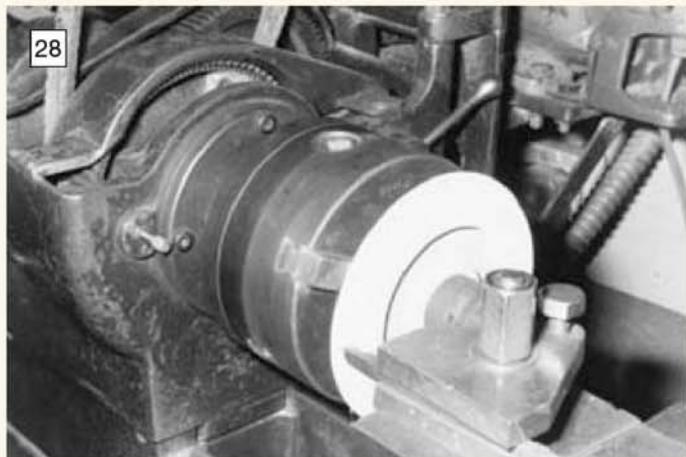
27
A finished worm shown after being trimmed to length and the ends hard soldered.



narrow flange on the outer circumference. This was drilled with 12 equally spaced 1.6mm diameter holes (photo 28) then transferred to the dividing head on the milling machine. A boss fitting the central bore of the disc was fixed to the plate on the head offset from the centre a previously calculated distance and the blank fitted on it and held by clamps. Incidentally, I feel that doing some calculations before starting work can save a lot of time and effort.

A 1.6mm hole was drilled through into the plate from one of the holes in the flange, and an odd bit of 1.6mm steel was used as a locating pin, its end bent at right angles to prevent it from slipping through. A shaped end mill of diameter equal to 0.6 of the circular pitch was fitted into the vertical head and the spiral tooth slot cut by rotating the dividing head. After each tooth was cut the blank was rotated one hole and relocated by the pin for cutting the next tooth (photo 29).

● To be continued.



28
Turning the spiral contrate gear blank on a mandrel held in the lathe 3-jaw chuck.



29
After turning, the blank was transferred to the milling machine. This was the set up used to mill the spiral contrate gear.

A SOUTHERN RAILWAY MERCHANT NAVY CLASS LOCOMOTIVE IN GAUGE 1

Roger Thornber

discusses the evolution of the current boiler design and burner arrangements

●Part X continued from page 627
(M.E. 4209, 28 November 2003)

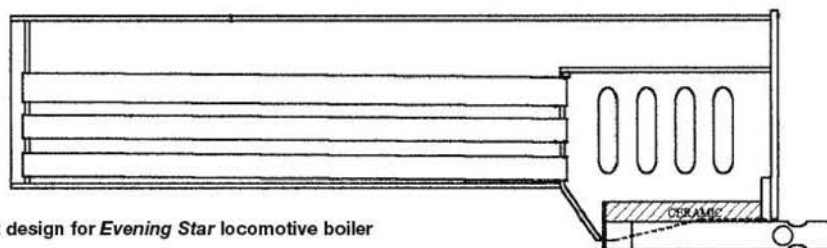
If all has gone well, the chassis should now be able to run. Adventurous builders may have already tested it either on air or from a separate boiler. So, now a boiler is needed. This part of the series discusses the way in which the design for the Merchant Navy has been derived from the experience gained with *Evening Star*.

When *Evening Star* was originally designed, a multi-tube boiler with two poker type burners in the firebox was drawn and made. However, this did not seem to work very well and another boiler, with two 1/2in. flues with a poker burner in each, was made. One of the advantages of working in gauge 1 is that a boiler like this can be made in two to three days. This boiler ran for some six months or so and was very successful — except for the noise it produced. Nobody could fail to notice when I was on the track! Advice from various people failed to do anything significant with that layout.

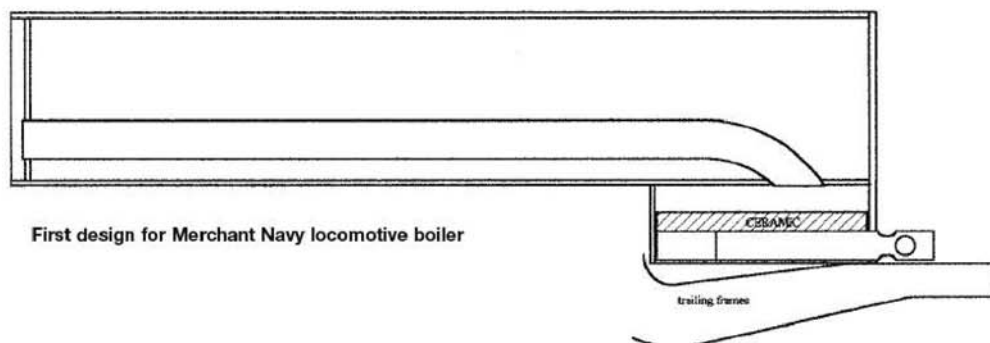
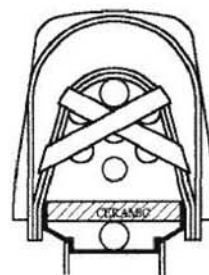
During my search for a solution, I contacted Peter McCabe who introduced me to the ceramic

burner. His proposed boiler layout suggested two 1/2in. tubes bent into a hockey stick form (see second diagram). However, as I already had a multitube boiler, I decided to fit this with a ceramic element. Peter recommended that liquid butane was taken from the bottom of the tank rather than the more normal gas from the top of the tank. Pre-heating of this liquid ensured that it appeared as gas at the jet. The system is a closed system in that the only air is taken in through the jet tube. This has both advantages and disadvantages.

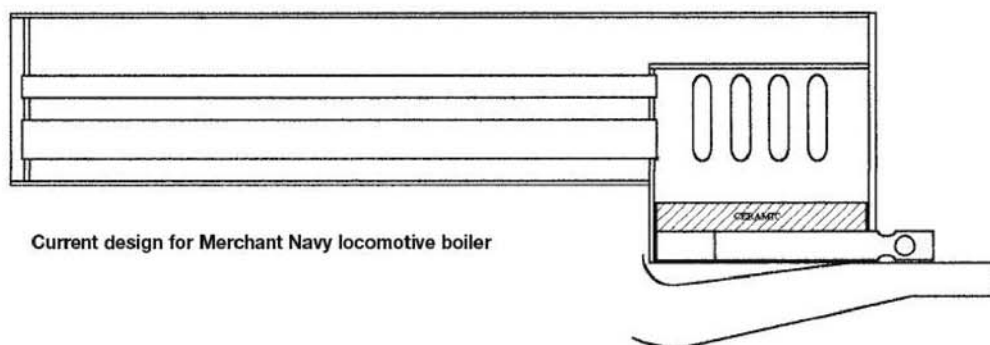
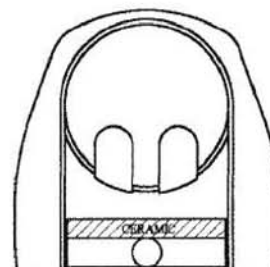
No auxiliary blower is needed with a closed system, either when lighting or when stationary. But, if the boiler runs dry, the fire continues to burn. To me, this disadvantage is outweighed by



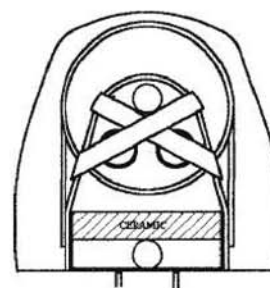
Current design for *Evening Star* locomotive boiler



First design for Merchant Navy locomotive boiler



Current design for Merchant Navy locomotive boiler



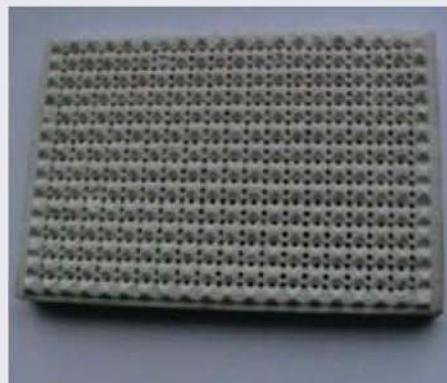
Evolution of boiler designs

©

Exterior view of the SR Bulleid pacific Merchant Navy class locomotive boiler discussed in the accompanying text.



Above right: a section of ceramic burner material used in the construction of the gas fired furnace.



the overall simplicity of the system. If the boiler does run dry, the locomotive stops, giving a clear indication that something is wrong!

The original boiler was therefore modified as shown in the first diagram. This is the design published in *Model Engineer* and has been working very well. Steam is plentiful and, perhaps more importantly, it is quiet.

One slight problem concerns lighting the burner. Since it is a closed system, the burner has to be lit from the smokebox and the flame has to

be persuaded to travel down the tubes to the element. This does not always happen but quickly turning the gas off and on again usually provides a cure.

It was believed that the problem stemmed from the long and relatively small bore tubes. On this basis a boiler was built for Merchant Navy as shown in the second diagram, with the two larger hockey stick flues. This certainly solved the lighting problem, however, I was not entirely satisfied with the steaming performance. Peter

McCabe recommended that there should be at least $\frac{3}{8}$ in. headroom between the ceramic element and the heated surface.

Unfortunately, with the Merchant Navy locomotive this was only barely possible. The trailing frames made it very difficult to obtain any significant increase in this head room, so yet another boiler, as shown on the third diagram, was built. It was considered that this gives adequate headroom and felt that the cross-tubes also contribute quite a lot to the performance.

There was some thought of putting cross-tubes in the flues but unless larger flues were used, these would restrict the cross-section area. This, in turn, would reduce the water volume. The boiler seems to satisfy all my criteria. It lights easily, produces plenty of steam quickly, and is quiet. It is this design that will be shown in the next instalment.

●To be continued.

FOR YOUR BOOKSHELF

MEN AND MODELS

By Ian Marchant

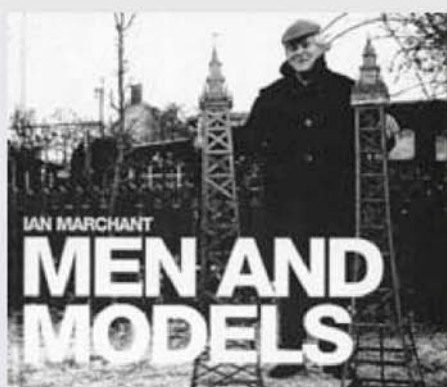
Published by New Holland (Publishers) Ltd.

ISBN 1-84330-553-4 Price £6.99

This odd but amusing little book sets out to take a light-hearted look at men who make models and their reasons for doing so.

Following an introduction, the ensuing pages contain black and white photographs of individuals who build models, shots of those models and brief descriptions of them and their craft. Some model engineers are featured but the author has cast his net wide and has dipped into the world of model railways, model aeroplanes, the building of models from matchsticks, ship models in bottles and even topiary.

The emphasis is on the rather eccentric nature of what some people do in their spare time. To someone not involved in model engineering it may seem strange that anyone would spend four years of their spare time building a model locomotive that is still not finished and will take several further months to dismantle, paint and reassemble. But, what is to be said of the man who puts miniature train sets in old television cabinets or the character who collected 161,000 matches so



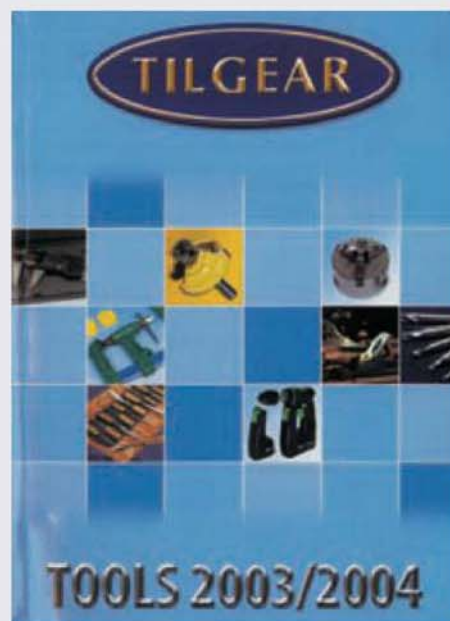
that he could model the Houses of Parliament?

This book is one for the coffee table. Leave it there and your family and friends may conclude you are not quite as eccentric as they once thought. Alternatively, they may write to the author offering you as an entry for the next edition. It should also raise a smile when fellow club members call round for a coffee and a chat.

Men and Models (ISBN 1 84330 553 4) by Ian Marchant has 93 pages, costs £6.99 and is published in hardback by New Holland Publishers (UK) Ltd., Garfield House, 86-88 Edgware Road, London, W2 2EA; website: www.newhollandpublishers.com Neil Read

NEW CATALOGUE FROM TILGEAR

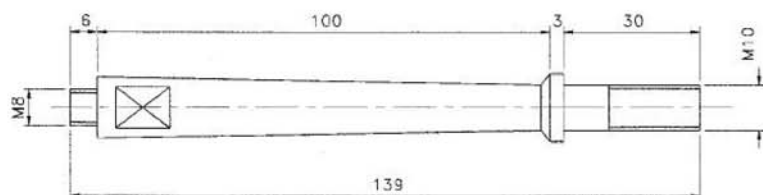
This new, substantial and well illustrated catalogue contains a wealth of high quality items of particular interest to the metal or wood worker engaged on work of a refined nature. For example, the company can supply the



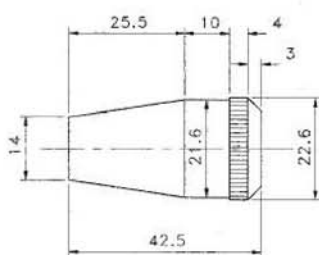
high quality Lie-Nielsen hand tools for wood workers and Habilis precision files for those seeking the highest standards in metal work.

One advantage of being on this company's mailing list is that you receive regular full colour broad sheets and special offer leaflets through the post. These introduce new products, offer special prices on bulk buy items, and list promotional offers and discontinued lines.

Tilgear operates from Bridge House, 69 Station Road, Cuffley, Hertfordshire EN6 4TG; tel: 01707-876008. Business hours are 8:30am-5pm Monday to Friday, but the company offers a freepost ordering address if preferred.



TAILSTOCK CAPSTAN LEVERS
3 OFF MILD STEEL
CHROME PLATE TO MATCH EXISTING
PART No. 48



CAPSTAN LEVER KNOBS
3 OFF BLACK PLASTIC
PART No. 49

5mm BALL BEARING
1 OFF STEEL
PART No. 50



COMPRESSION SPRING
1 OFF STEEL
PART No. 51

15



The capstan handles were prepared from mild steel bar and topped with appropriate plastic handles.

Ejector shaft (Part 52)

While not essential as a loose rod can be tapped down the spindle to free the Morse taper arbors, having an ejector shaft eliminates the search for a suitable rod each time.

The shaft is machined to fit the spindle bore, the end threaded M14 x 1.5, and a short length is turned to 16mm dia. and drilled for three handles.

Material will be saved if the shaft is made in two parts. The thread and handle can be one part, the push rod a separate part. A thread, say M8 can be made inside the M14 thread, and the push rod screwed into the handle part.

The end of the push rod which bears against the Morse arbors could be fitted with a hardened pin.

Handles (Part 53)

The three handles are turned from mild steel and have ball ends with tapered bodies. The ends are threaded and screw into the shaft. A stepped split brass bush should be made up to hold the ball ends while threading the handles but it is unwise to attempt to cut the thread under power; the brass bush will provide only sufficient grip for threading by hand.

Index button (Part 54)

A little steel button is required for an index line to register the amount of feed from the dial. Turned

and a clamp with a piece of brass packing under the clamp to protect the ground surface of the spindle made sure the middle was also secure.

With the rack finished, the barrel was rotated through 90deg. and the underside groove machined with a 6mm dia. slot drill (photo 14). This need not extend for the full length of the barrel, only as far as the start of the rack teeth.

Finally all burrs were carefully removed without damaging the ground barrel surface.

Levers (Part 48)

The levers or handles are copies of other levers used on the lathe. One end is reduced and threaded M10 for the knobs and the other end threaded M8 to screw into the pivot shaft. Three completed levers are shown in photo 15.

Knobs (Part 49)

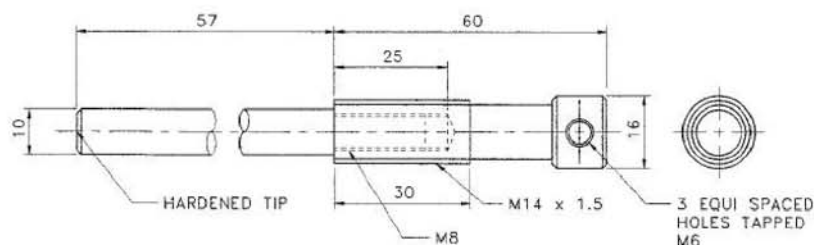
The knobs are in black plastic to match the other knobs. As previously noted when making the clutch handle, Acetyl can be used and College Engineering Supply stock the material. Warco may be able to lay in a stock of handles and knobs.

Ball bearing (Part 50)

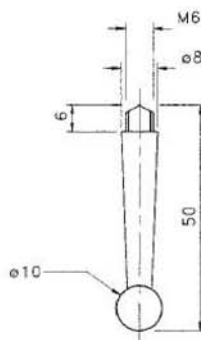
A 5mm ball bearing is used for the spring plunger.

Spring (Part 51)

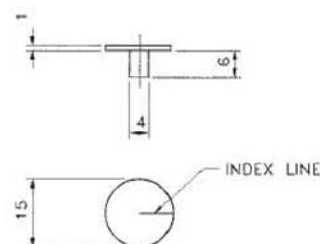
It is quite likely that most of us will be able to find a suitable spring among our collections of odds and ends. It need not be particularly strong, just sufficient to provide some friction to the dial.



MORSE TAPER EJECTOR SHAFT
1 OFF MILD STEEL
PART No. 52



EJECTOR HANDLES
3 OFF MILD STEEL
PART No. 53



INDEX LINE
1 OFF MILD STEEL
PART No. 54

from mild steel, a pin fits into the hole already drilled in the gear housing. The line can be marked with the same tool used to cut the lines in the dial. The line only needs to go halfway across the dial but it does need to be exactly on the centre line. It is surprising how much it shows if it is even only a few thousandths of an inch off centre.

Assembly

Assembly is straightforward. The four screws fit into the existing holes which clamp the device to the tailstock. Remove any paint on the end of the tailstock and check the face for flatness. Insert

the barrel and slip on the gear housing checking that it fits square on the end of the tailstock. Try the screws one at a time and check that the barrel moves easily, if it locks up then that screw is pulling the block over.

If it is stiff to move with all four screws fitted, try a slip of paper between the block and the tailstock, first on one side, then on the other. If (when) it frees up you will know which side to file off to get the block squarely seated.

Remove the top right hand screw and fit the capstan. Now you can try the feed action at last. Once in use you will find the new unit so much

more convenient than the old screw operated tailstock feed — it's easier on the hands as well.

When you are satisfied with the operation of the spindle, refit the top left-hand screw and the fixing washer to the bottom of the pivot shaft. You may need to adjust the angle of the tailstock clamp handle to avoid the handles clashing.

You can now wrap up the old feed mechanism in a clean thick plastic bag with some rust preventive paper and stow it in the back of the cupboard. One day you may have to refit it for a job which needs a screw feed and not a rack feed.

● *To be continued.*

AND NOW, FOR MY NEXT TRICK ...

Ron Thorogood

talks about his three most recent and satisfying workshop projects.

When the end of a current project is in sight, thoughts often turn to what to do next. Occasionally, for some of us, the imagination may run riot and take us into the realms of wonderful medal-winning model engineering marvels that we know we really haven't the skill, equipment, time or money to start, let alone finish. This state doesn't last long and we come down to what is possible for us. In my own case it was becoming increasingly clear that 5in. locomotives were becoming much heavier than they were and getting one ready for the track more of a chore than the thrill it once was. Something smaller and lighter was indicated.

I am not a professional engineer and any skill I may have has come from evening classes and the good offices of fellow club members. As a result I do like 'words and music' as per LBSC or Len Mason's book on his *Minnie* traction engine. I contemplated Gauge 1. The stalwarts at my club had started work on a waist high track and a number of members showed lively interest. I even went so far as to purchase a part-built locomotive, but somehow couldn't work up much interest.

At about this time, the first instalment of the 3/4 second pendulum electric clock by John Wilding appeared (*M.E.* 4078, 11 September 1998). I sat up and took notice. I had never done any gear cutting so this aspect interested me. Also, I had always felt it was a shame to put so much work into a clock and then put it all in a case to be hidden forever, rather like the 'works' of a locomotive with inside cylinders. In this case all the 'works' were visible making grandchildren's questions easier to answer (I hoped).

So I entered the world of arbors and pinions, pivots, pipes and escapements — a whole new language. As the instalments progressed I not only learnt how to cut the gears but how to make a cutter frame and cutter. Crossing out calls for delicate filing and, in my case, the purchase of an illuminated magnifier. Bearings are drilled under size and opened out with a broach making a cone to reduce friction. I was fortunate in that I inherited a number of broaches from a friend



This fine pendulum electric clock was the Author's first taste of the world of horology.

who was an antique clock restorer.

Eventually I came to the paragraph headed "Starting the clock" — the moment of truth. It reminded me of the old car manuals which said "Remove the head" — three short words which can take so much time to realise. This clock just would not run properly. I spent hours trying to get it to run but the adjustment of the pawl was just too sensitive. I saw what I thought needed to be done but was too inexperienced to make any modification which might upset the whole. The 7th Cavalry arrived in the shape of an article by Tony Jeffree (*M.E.* 4120, 19 May 2000). He had a similar problem and suggested an adjustable operating arm. Within seconds I was in the workshop and *Hey Presto!* it worked like a charm; what a relief.

The dial, fretted out with a coping saw from 1/16in. brass was a rather tedious job and John

Wilding's suggestion only to do, at most, two figures at a time is good advice. When completed and silvered it is well worth the effort.

I designed a simple case and provided a cutting list for a club member who is an expert cabinet maker. He kindly agreed to make the bits 'from oddments of oak'. While waiting for this to be done I stripped the clock and went to work on the final polishing. Oh the polishing! It takes ages, but the end result is very pleasing indeed. With the arrival of the woodwork the case was constructed and the clock installed. Mounted on the wall in the hall it has the approval of the 'domestic authority' and looks quite handsome. A locomotive and indeed most of our models are put away again after use. I had to get used to the clock constantly being there and always ticking. It seems basic but was something that rather took me by surprise. It's been working for three years now and keeps very good time.

My next project was the egg timer (*M.E.* 4155, 21 September 2001). This was by way of being a fun project but nevertheless useful and a good talking point. However, my daughter pointed out that you could get an egg timer in local shops for a couple of pounds which was far less trouble!

If there is a part you just don't like making, or requires the use of an expensive cutter for just one gear (the pinions, perhaps) it can usually be bought from one of the many catalogues. Not for the purists of course, but it is a hobby and it's not compulsory to do the awkward bits.

My current project is John Wilding's weight driven eight day clock. Here again 'starting the clock' proved difficult until contact with John established that the weight should be rather more than indicated in the book. After this it was fine. This clock has very interesting optional date work which takes account of 28, 29, 30 and 31 day months. It's an intriguing system of levers and wheels invented by Rev. W. Ludlum around 1740. These Reverend gentlemen seemed to have had time for this sort of thing in those far off days. With luck I shall start on the date work shortly.

I suppose the lesson in all this, if there is one, is that you can teach some old dogs some new tricks. Not having a clock man in my club I have had to rely on John Wilding when in trouble. I thank him very much for being so helpful and prompt with his replies.



LETTERS TO A GRANDSON

M. J. H. Ellis

begins work on an injector body.

●Part LVIII continued from page 624
(M.E. 4209, 28 November 2003)

Dear Adrian, There is one further adjunct to injector-making which I overlooked in my last letter. It won't take long to make, being a small parallel split collet for holding the cones in the 3-jaw chuck. Having turned them to size at one end, you have to reverse them in the chuck to complete the operation at the other. These split collets are of constant use when you want to hold round work of a 'standard' size (in this case, $\frac{5}{32}$ in. dia.) to run true.

I may have mentioned this before, but you cannot expect a so-called 'self-centring' chuck to hold work really true; in fact you could do better with careful adjustment of the 4-jaw chuck. Typically, with a 3-jaw chuck you can get between 0.005-0.015in. wobble, by which I mean the difference between the minimum and maximum distances from the tool. The amount of wobble may vary depending on which socket you use to tighten the chuck, and it is worth finding out which socket produces the least wobble and marking it. Provided that you use this socket and replace the collet in the position in which it was made, it will automatically hold the work true, irrespective of inaccuracy in the chuck itself. When I make a collet, I make a centre-pop at the end against No. 1 chuck jaw a guide to its replacement.

Well, "... all yer gotta do ..." (and those words carry me back nearly 60 years to Drill Sergeant Anderson) is to cut off an inch or so of $\frac{1}{4}$ in. round brass rod, face the ends, make your centre-pop, and centre the end with a centre-drill. Put a small (say $\frac{1}{8}$ in.) drill through, and open up by degrees to about 0.005in. under $\frac{5}{32}$ inch. That will be by use of a 3.8mm. (0.1496in.) or No. 25 (0.1495in.) drill. Then you finish the bore to size with a $\frac{5}{32}$ in. parallel reamer, running the lathe at no more than a moderate speed. Feed the reamer slowly right through, and withdraw it again forthwith.

I keep a tin of 'reaming-size' drills which I use for this purpose alone. Used so sparingly, they keep their edge indefinitely, which is a good thing, as one cannot expect to sharpen them by eye as accurately as the manufacturer did. Moreover, being segregated, they are easy to find.

The final operation on the collet is to grip it by its ends in the vice (using clamps) and to slit it lengthways with a miniature hacksaw. I find it best to extend the saw-cut about half-way through the opposite side of the collet, as this makes it more flexible. Take off the burr on the inside edges of the slit, using a triangular or square needle file.

If you can pick up some 1 x 1 x $\frac{1}{16}$ in. aluminium

alloy angle in the scrapyard, it makes more satisfactory vice-clamps for this kind of work, as the top inside edge of the clam will have a sharp angle, instead of being rounded, as it would be if bent from sheet.

Cleared for action

The decks now cleared for action, you can at last set about making the injector in earnest, and remember, you can't afford to be slap-dash over dimensions. The dimensions I gave you for the block (1 x $1\frac{1}{4}$ x $\frac{7}{16}$ in.) are sufficiently oversize to allow a little latitude in the marking out, so you can start by scribing cross-lines on one of the end faces a nominal $\frac{1}{8}$ in. from the rear face, but actually, to be on the safe side, a few thous. more, intersected by one a full $\frac{1}{2}$ in. from the bottom.

Set the block up in the 4-jaw chuck with little pads of 16 gauge aluminium alloy under the jaws to prevent them marking the work, and adjust the jaws to get the centre of the cross running true, with the aid of a 'point indicator' in the tailstock chuck. The work should project by a good $\frac{1}{4}$ inch. Now you can set about turning the boss at this end, for which purpose I use a Vee-shaped tool with a profile in plan similar to that of pencil with a partly blunted point. To start with, the tool should be inclined at about 45deg. to the lathe axis, until you have got the boss down to a little more than $\frac{1}{4}$ in. dia. and approximately $\frac{3}{16}$ in. long. Then you can slew it round clockwise looking from above, so that it is almost at right angles to the lathe axis, and take the diameter down to size.

If the cross-feed has a micrometer thimble, note the reading (or reset it to zero), and face the side of the block with very light cuts which at the end go on into the boss by first 5, then 10, and finally 15 thou. while each time you feed the tool a little way to the right at the bottom of its cut; thereby producing a groove around the boss a matter of 0.050in. wide at its top but tapering inwards, into which the screw-cutting tool can run at the end of its cut when you come to cut a 40tpi thread on the boss, your next operation.

If you do not proceed as I have directed, you may well find that if you started, through laziness, with the tool in the final position, it would perversely work its way leftwards as you fed it forward, taking up the backlash and producing on the block not a nice flat face, but one which sloped leftwards as it went in. You may think me a bit of an 'Inspector Meticulous' in specifying screw-cutting rather than running a thread down with a die; but the lathe tool, the Vee-point of which should be as far as possible to its left side, will cut a full thread right up to the groove, and that is more than a die can accomplish. Besides, it doesn't take long in gunmetal, you can take 0.002in. cuts to 0.010in. depth and 0.001in. cuts

thereafter until the depth reaches 0.014 inch. Beyond that I would feel my way, half a thou. at a time until a test nut would go on. The finished length of the boss will be $\frac{5}{32}$ in., so it is at present a little too long, but that we will attend to later.

Now we can set about producing the bore. Start by centring the end of the boss with a small ($\frac{1}{4}$ in. will do) centre drill and, using a sharp $\frac{7}{64}$ in. drill, drill half-way into the block and no more. That concludes the work at this end for the time being. We shall next screw the injector by its partly-finished boss into the double-ended adapter held in the 3-jaw chuck, but before taking it out of the 4-jaw chuck, it would make good sense to ensure that the adapter will take it, so check that next, and if necessary, the thread on the boss can be eased slightly until it will fit. In fact, it would have made better sense still to have used the double-ended adapter as the gauge in the first place. Actually, I don't remember ever having experienced the difficulty which I have just anticipated; but I suppose that sooner or later there has to be a first time.

Let us now suppose that the injector body is mounted on the adapter in the 3-jaw chuck. This time, there is no need to scribe any lines as a prelude to forming the threaded boss, but I would be inclined to do the work on the bore first, by centre drilling and drilling in as before to meet the pilot hole from the other end before doing any other work. The reason for drilling from both ends is that before I learnt better, I used to drill right through from one end only, and there were times when my work was spoilt by the drill running off. Since I changed over to drilling from both ends there has been no more trouble.

Even supposing that one or other of the holes (or even both) were slightly out of line, when the pilot hole came to be opened up prior to reaming, the larger drills would find it so much easier to follow the 'beaten track' that the finished bore would be in the right place. But for the present, provided that after boring the second half of the hole the drill continued smoothly into the first one, I would not proceed further with the boring, but rather, get on with turning and screw-cutting the boss first. Remember, that the correct spacing of the cones will depend on the overall length of the body being accurate, and the first step in that direction is to make the length excluding the bosses an accurate $\frac{9}{16}$ inch. For the present, however, for a reason which I will explain later, leave it 0.002-3in. too long. The measurement can be taken by micrometer. The bore, you open up and ream in the same way as the parallel collet.

This being a convenient point at which to leave off, I will take my leave.

Your affectionate Grandpa.

●To be continued.

Almost all who work with their hands sustain minor cuts and abrasions from time to time, usually as a result of carelessness. For me the 'critical' time is when I am cleaning down the lathe after a turning session. While brushing away the swarf and wiping the slides of the machine it is all too easy for your hands to come into contact with the sharp tools in the four-way

WORK SAFELY

turret with predictable consequences.

One way to avoid this is to isolate your machine and then put on a pair of stout gardening gloves. These will protect your hands during the cleaning

down operations and you can even handle the swarf without risk of cutting yourself. Why isolate the machine? Well, gloves should not be used near rotating machinery as they may get caught and pull you into the action. Better to be safe than sorry. The gloves will get dirty inside but you will not wear them for long and they can be discarded before becoming a serious health risk. *Neil Read*



BRISTOL *HYDRA*

THE FIRST EIGHTEEN MONTHS

Brian Perkins

discusses the accessory gearbox, experiences a problem with his digital read out and and makes the propeller shaft and timing gears.

●Part V continued from page 629
(M.E. 4209, 28 November 2003)

It was now November 2001 and I had an attack of Trigeminal Neuralgia which I get from time to time; the tablets used to treat it cause side effects which are almost as bad as the problem. After 2½ weeks of staggering about, I was desperate to get back into my workshop so thought I would

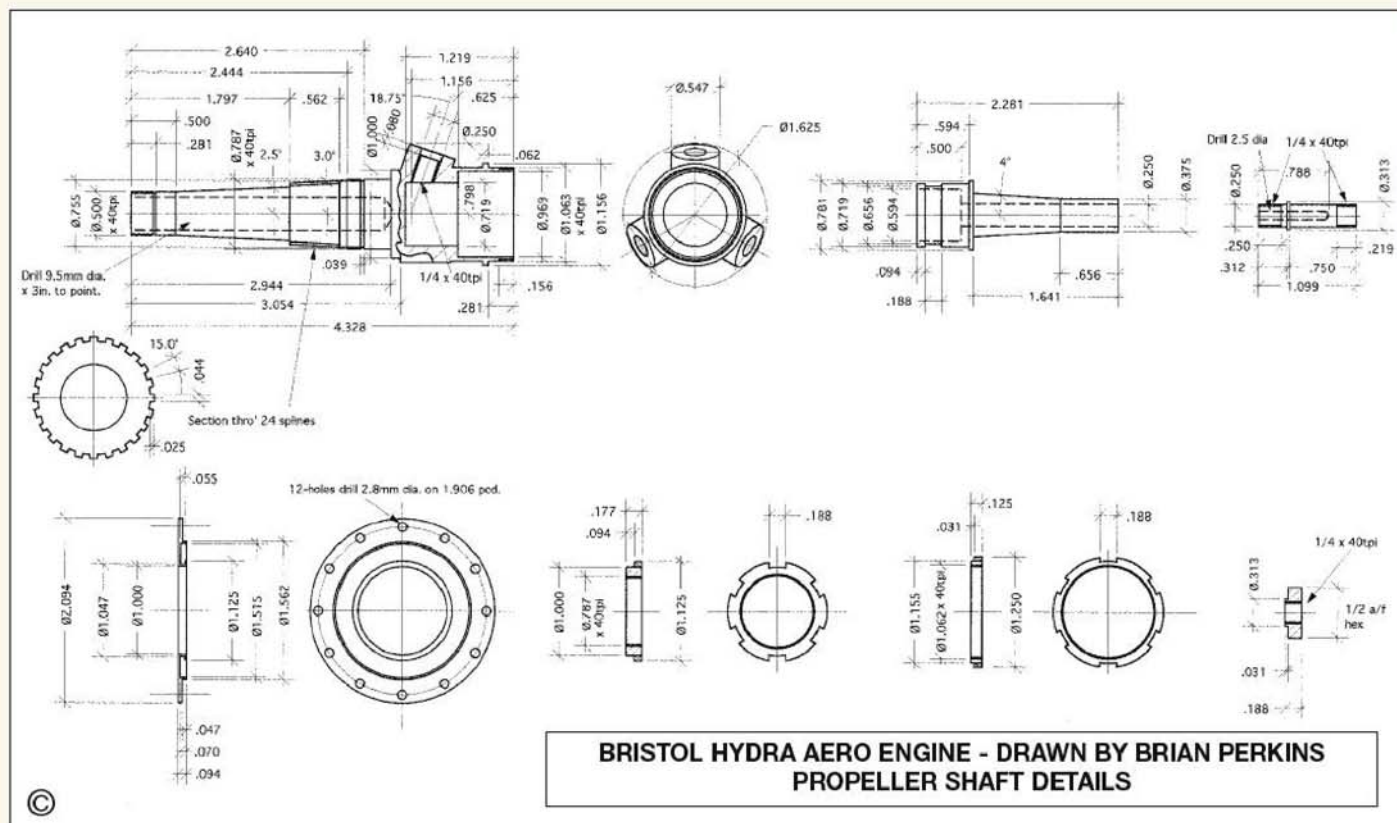
break myself in gently by starting on some of the timing gear blanks. This may not have been a very good idea as my diary reminds me that I scrapped two of them, but eventually I had all the blanks completed and, feeling slightly more 'with it' decided to start on the accessory gear box.

While roughing this out I was puzzled by the fact that it was coming out oversize on the width (X-axis). After several attempts, it occurred to me to check my DRO (digital readout) against the dials when I found to my dismay that it was giving a false reading. I had become so reliant on the accuracy of the DRO that this came as a nasty shock. I contacted the manufacturer who asked me to return the unit for service. Once rectified, life was back to normal but it did lead me to

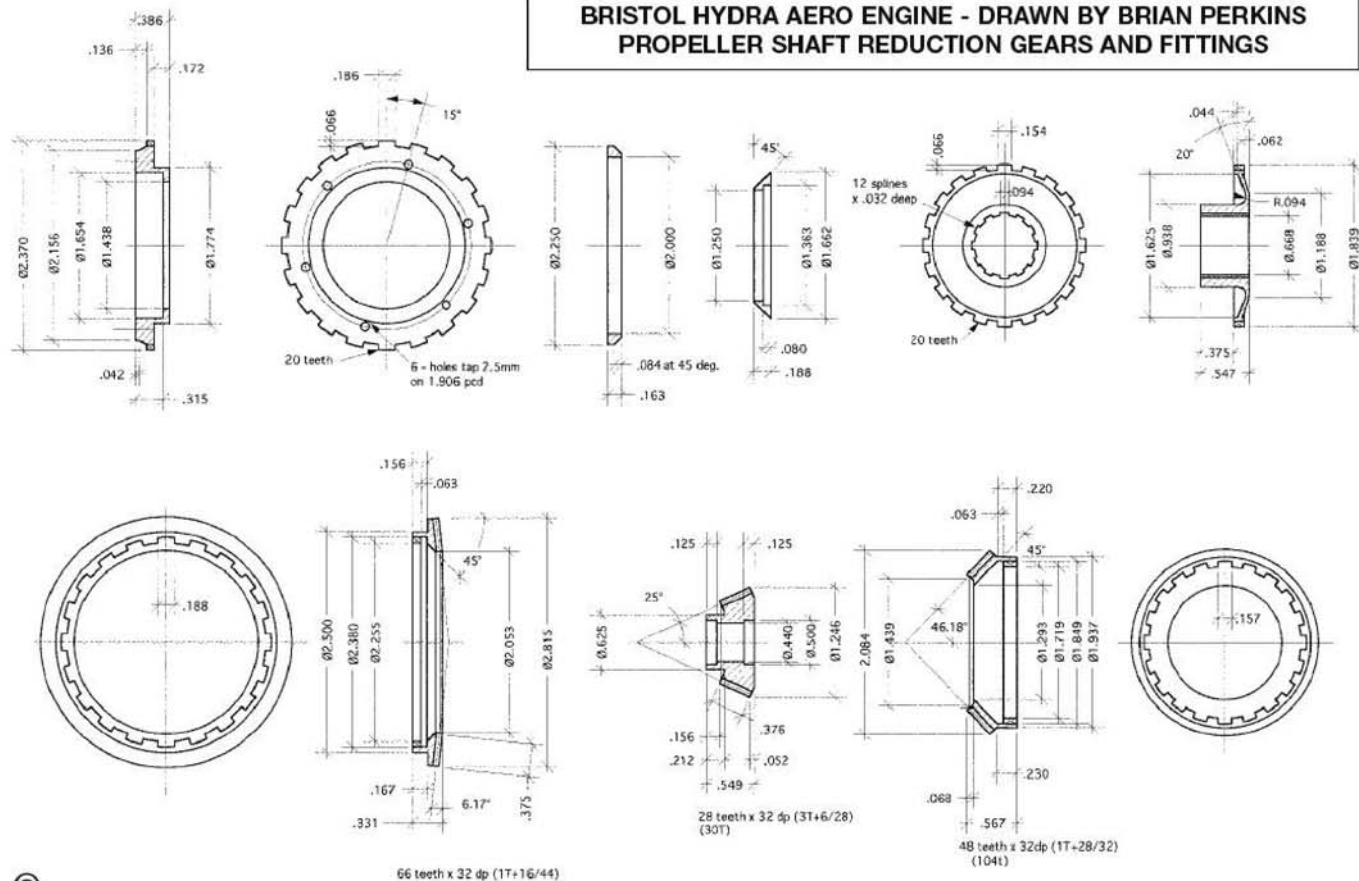
wonder what else may have gone wrong.

Checking through the previously machined components the only problem I have found so far (touch wood) is that the ring of 36, 10BA tappings and clearance holes on the rear cover and supercharger casing were too close to the edge so they all had to be plugged and redrilled.

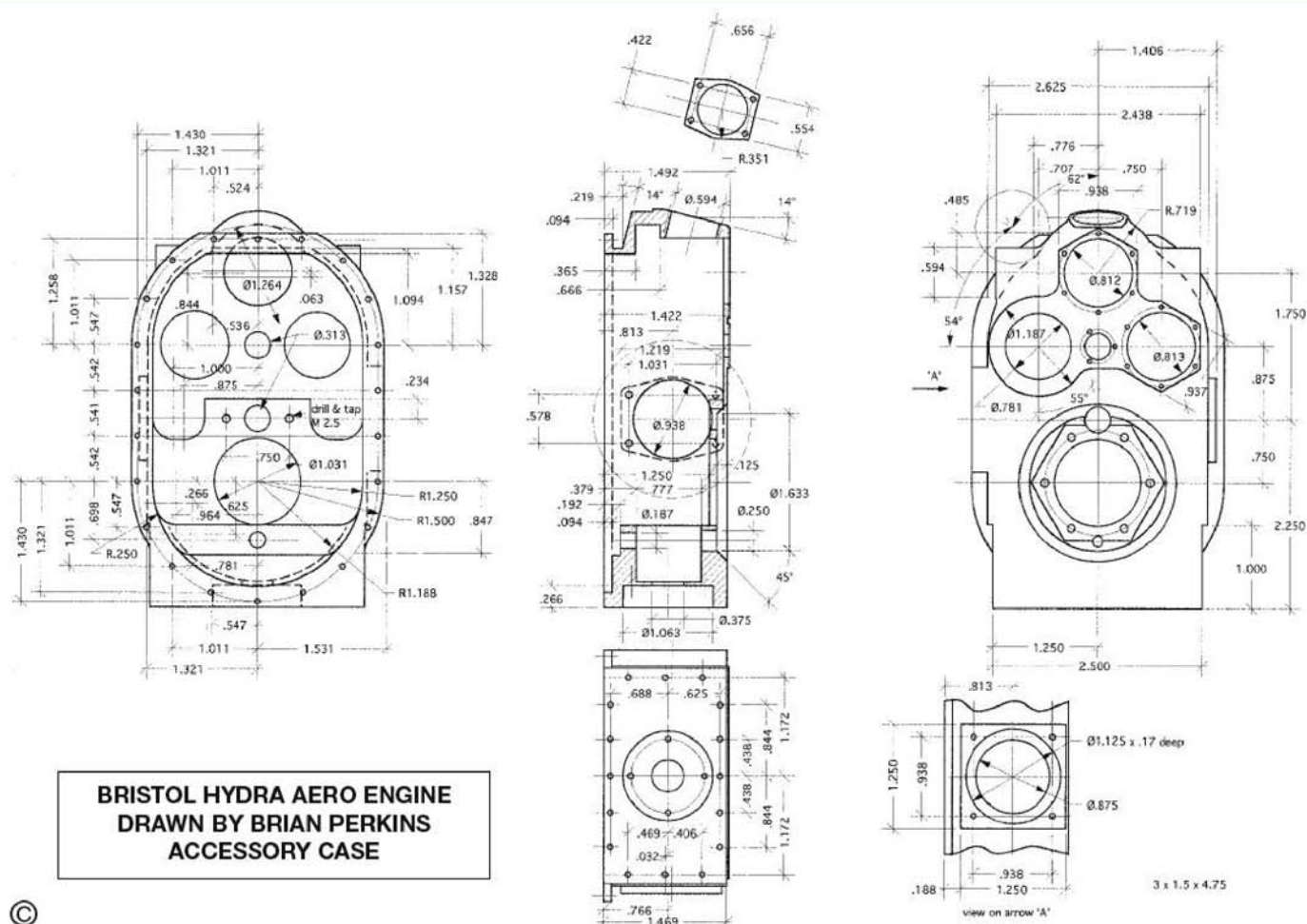
While waiting for the DRO to come back, I made a start on the propeller shaft. On this engine the propeller shaft is in two parts and, because of the high reduction ratio, has the three bevel pinions mounted at an angle of 18.75deg. which made for an interesting exercise. I also started on the blanks for the speed reducer gears complete with the self-aligning feature which I had 'chickened out' of trying on the *Aquila*.

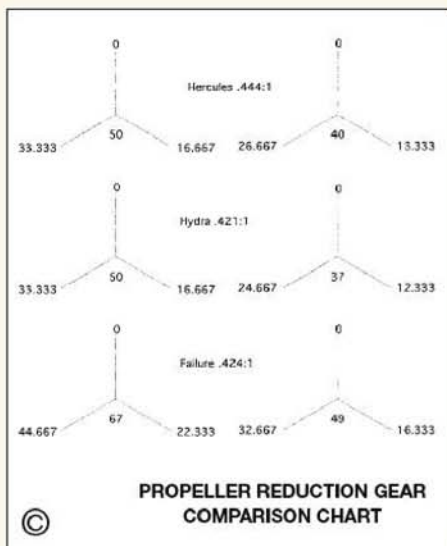


BRISTOL HYDRA AERO ENGINE - DRAWN BY BRIAN PERKINS
PROPELLER SHAFT REDUCTION GEARS AND FITTINGS



BRISTOL HYDRA AERO ENGINE
DRAWN BY BRIAN PERKINS
ACCESSORY CASE





Apart from having to produce the extra components, it is actually easier to set up clearances with this arrangement as the gears can be assembled as a self-contained unit. On the *Aquila*, with its solid bevels, assembly has to be done blind within the gear case; a rather long winded process.

At least, the new arrangement *would* have been easier had I got the number of teeth right on the two large bevels. Scaling the full size G/A and knowing the ratio required I had arrived at figures of 67 teeth on the fixed wheel and 49

teeth on the smaller. On the trial assembly both gears individually would run with the three pinions but there was no way that it would assemble as a complete unit.

Some thinking time later, I realised that neither 67 or 49 are divisible by three and that this was probably the cause of the problem so I set to and made a new set of five gears using 66 and 48 which worked fine. I was still rather puzzled by this because I had details of other reducers with gears indivisible by three, so how did they work?

I eventually arrived at the solution shown in the sketch and a member of Bristol SMEE has subsequently pointed out when I gave a talk on the subject that if the total number of teeth in the two main bevels is a multiple of three, then all is well.

Returning to the accessory case. When the DRO had been sorted out, I was surprised at how long it took to produce. It is quite a complicated component which carries the drives for the supercharger, magneto, distributor and oil pumps as well as forming the mounting for the sump. Most of the work involved milling which I never enjoy as much as turning but it was eventually complete after some 40 hours work. I then produced the sump, which actually carries the oil pumps, and all the casings were completed. So far



The timing and supercharger gears. The teeth on the large bevel had not been cut at the time of the photograph.

I had been 6 months (320 hours) on the project.

As a change from dealing with large lumps of alloy I decided to retrieve the various gear blanks from storage and start cutting teeth. This went fairly well with only a few hiccups until I did the first trial assembly of the speed reducer with the results mentioned previously. Some bad language ensued, but there was no alternative but to produce new blanks and gears. More about this will appear in the next article in this series.

●To be continued.

SCOTTISH CANALS AND THE FALKIRK WHEEL

David Fenner
takes a look at the world's first
rotating boat lift.

Scotland boasts four well-known canals, the Crinan, the Caledonian, the Forth & Clyde, and the Union. The first two form short cut routes, each avoiding sections of the tortuous west coast, and have been in use throughout the

years by a multitude of craft, from the *Para Handy* style puffers of yesteryear to the pleasure yachts of today. Back in Victorian times, much freight and also many people travelled by canal (200,000 passengers per year on the Forth & Clyde)

During the 1960s, when travel by car was still an enjoyable experience and on the increase, an upgrade to the A80 Glasgow to Stirling road was implemented. Displaying the depth of foresight

and long term planning for which they were and are still famous, the officials of the day decreed that money would be saved by not bridging, but merely severing the Forth & Clyde canal at the road crossing north of Cumbernauld. Towards the end of the millennium, the penny finally dropped that here was a national asset which should be reinstated. A major road reconstruction now bridges the canal, once again allowing boats to travel from Bowling to Grangemouth.



In past centuries, the Forth & Clyde and Union canals were an important transport corridor stretching 68 miles across central Scotland. Boats had to negotiate a series of 11 locks to go between the Forth & Clyde Canal and the higher Union Canal.



Today, boats go between the two canals and pass through only three locks. The remaining vertical distance of 89ft. is covered with the help of three large spur gears. Those gears are part of a huge rotating boatlift at the Forth & Clyde end of the waterway, by the town of Falkirk.



The Falkirk Wheel is 115ft. high, 115ft wide and 100ft long. It consists of two large arms which rotate around a giant axle. Each arm has a gondola which can carry up to four boats at a time. The wheel itself can lift some 600 tons, 300 tons at each end. One gear is attached to the wheel's taller concrete

column, one is attached to one gondola and one is attached to the other gondola. These steel stability gears each have 88 teeth. Each gear consists of 22 segment plates. When assembled, each gear has a pitch circle diameter of 31ft. 2in. and weighs over 4 tons.



Two steel idler gears, one in each arm, fit between a gondola gear and the column gear. Each idler gear has 21 rollers which mesh with the teeth of its two mated spur gears. The wheel's axle is supported by two concrete columns and is driven by ten hydraulic motors with 1000:1 ratio hydraulic gearboxes.

The junction between the Union and Forth & Clyde canals presents a level discrepancy of some 35 metres, which in the days of commercial usage, was catered for by a series of locks. May 2002 saw the official opening of the Falkirk Wheel, the world's first rotating boat lift, once again joining these two waterways, and enabling boat passage from Glasgow to Edinburgh.

Basic principles

The structure is basically pairs of radial arms at each end, supporting two diametrically opposed gondolas. The wheel relies on the physical phenomenon that a floating body displaces its own weight of water. Hence a gondola full of water weighs the same as one with a boat. Thus the wheel is balanced, and requires only the power of 'eight toasters' to make it revolve. A system of gears ensure that the gondolas remain horizontal.

Tourist attraction

The wheel has been built over a basin capable of accommodating around 20 boats, and the visitor centre alongside must rank as one of the better tourist attractions. It is well worth a visit and the regular boat trips ensure that you don't wait too long to see the wheel in operation.

British Waterways Scotland are justly proud of their £17,000,000 investment which has given the country a world first in canal technology. Very much less publicity has been afforded to the cost of re-engineering the A80 and re-joining the segments of the Forth & Clyde, not to mention the added unquantifiable cost of disruption to the public. With a little atypical long-sightedness on the part of politicians, and a little added investment in the 1960s, these costs could have been avoided.



The axle is supported on bearings with an integral 188-tooth ring gear at the drive end. Each 13ft. in diameter, the bearings are located in both concrete columns and can support more than 1750 tons. The axle rotates the wheel's two arms 180deg. in 5 minutes, one third of the total 15



minute transit time. As the wheel rotates, the gondola gears and idler gears rotate around the column gear. Supported by wheels which run on circular rails in the Falkirk Wheel's arms, the gondolas stay level. The wheels run on sealed double-row, spherical roller bearings.



Keith Wilson

describes the reverser stand, lever and latch before returning to the setting out of large radius curves.

●Part XXV continued from page 637
(M.E. 4209, 28 November 2003)

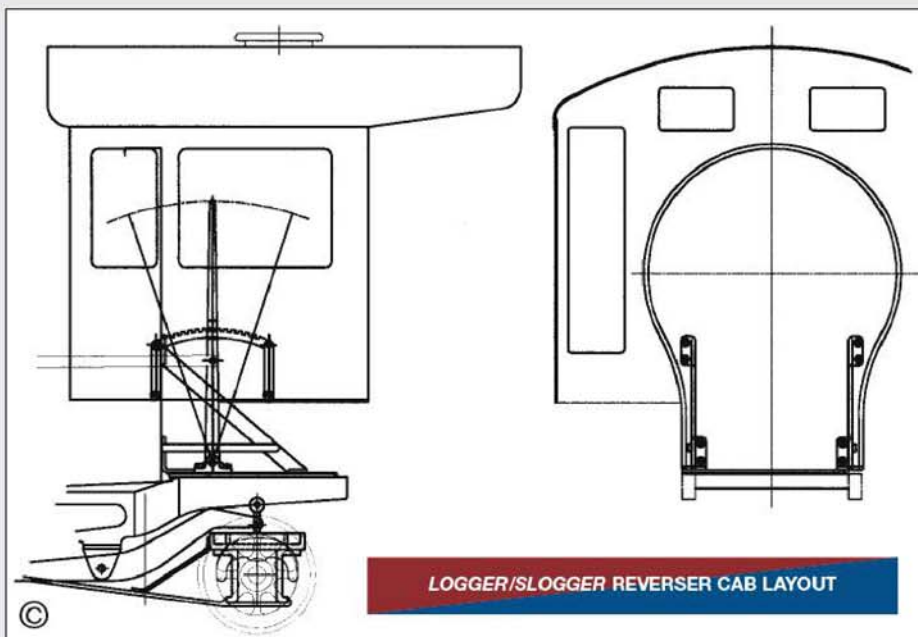
I am not sure just why this next item is called the Johnson Bar, perchance one our American/Canadian readers will enlighten us. Incidentally, my Vancouver Island contact appears to have changed his e-mail address; at least I cannot get through to him, and I owe him so much in respect of this design too.

For us, the bar itself is a bit of a nightmare, but with a little latitude in shape it may not prove so ill. I have drawn it as accurately as I can from my Baldwin G/A but I am getting into strange territory here for the drawings are none too detailed, and since much is missing on the actual locomotive, definite details are somewhat of a problem. However, at least I hope to get a reasonable working locomotive design, although maybe not so 'true to scale' as I would like.

I suggest that a good way of tackling this lever is to partly mill it from $\frac{3}{4} \times \frac{1}{2}$ in. solid bar, or more easily from 20mm square black iron. The big 'joggle' from the base pivot and boss to the first feature is easy to do, especially if formed hot. The boss can be silver-brazed onto the bar and, although not by any means important, it is a good idea to make it from brass.

The photograph showing the sector plate (I've got to call it something) shows it as having a large number of small notches or teeth. Those who wish to follow suit are welcome but it certainly will not work any better. In fact, in our sizes I believe it would wear very rapidly. It is best to machine it from $\frac{3}{4}$ by $\frac{3}{16}$ in. mild steel solid, for the chances of bending it to an exact radius from $\frac{3}{8} \times \frac{3}{16}$ in. are somewhat remote. I don't think any comment from me is required concerning the

LOGGER & SLOGGER AMERICAN TYPE 2-8-2 LOCOMOTIVES for 5in. and 7 $\frac{1}{4}$ in. gauges



LOGGER/SLOGGER REVERSER CAB LAYOUT

Wilson's Words of Wisdom:
There seems to be an immutable natural law that the bigger the fool, the higher he rises.

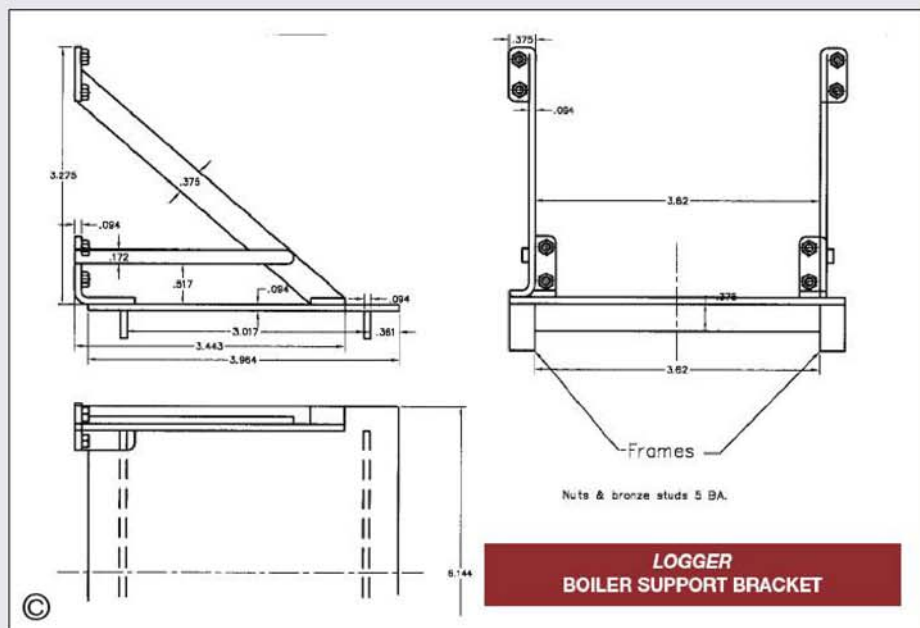
brackets or mounting boss.

You will note from the photographs that the front bracket on the prototype is totally different to that which I have shown, in fact it seems that the sector plate was forged into a bracket at the front. So what? Well, it shows it bolted to the boiler. Since boilers are fixed at the front end, and expand a lot with the heat, this seems a most peculiar system. In our case, with the expansion of copper being half as much again greater than that of steel, I can visualise peculiar things happening if we adopt the same style of mounting.

On further thought, it may be that the cab moves backwards with boiler expansion; i.e. the cab is mounted on the boiler rather than on the frames as in British practice. Thus the effective length of the reach rod changes with expansion; probably allowed for when setting its length. The same must apply to us. By calculation, the boiler should expand lengthwise by 0.07in. due to thermal expansion, and about the same amount due to internal stresses caused by the steam pressure making about $\frac{1}{8}$ in. total which may not be much, but is enough to make a difference.

Two brackets, therefore; it might be needful to make these brackets to suit the finished job, for there are several matters to take into consideration; it is quite possible that tolerances might well add up and the slot in the bar foul with the sector plate. An alternative here would be to use shims under the mounting boss; the choice is yours.

Regrettably, there is no sign of the latch system on either Baldwin drawing, and the Johnson bar itself only appears in 3 of the 140 or



Nuts & bronze studs 5 BA.

LOGGER
BOILER SUPPORT BRACKET



Three views of the Johnson Bar of our prototype locomotive.



so photographs kindly taken by friends 'over there'. In fact as can be seen on the three photographs included herewith, on only two is the handle visible, the actual latch being hidden behind some apparatus attached to the boiler (that's Murphy's Law in action for you). I doubt if better photographs could be taken anyway; roomy as the cab is, from the photographic point of view it is rather small, so my design may not match-up too well. However, I see no reason why it should not work well.

The weight of the full-size latch mechanism is clearly enough to work satisfactorily; however, old square-cube is dead against us here for assuming the prototype latch to weigh about 10lb, ours is likely to be nearer 0.337oz. (about 9 grams). Any questions? Therefore, I have added a spring to hold the latch down; this spring could be no more than 22 or 24 gauge, wound on a $\frac{3}{32}$ in. mandrel. If two $\frac{1}{16}$ in. holes be drilled where shown and $\frac{1}{16}$ in. dia. roundhead rivets bonded in (use silver-braze or Loctite 601), the spring will hook nicely over these and all will be well.

Cradle song

The boiler appears from the drawings to be supported by a sliding cradle fixed onto it by a pair of big brackets. This makes lots of sense, but is not obvious from the information available. This bracket appears on my 'rear end' drawing, and is detailed for both sizes. Incidentally, this rear end drawing is not yet complete but is fairly close to size. It is fabricated from strips of mild steel plus a big flat plate that forms something in the way of a footplate. Arc welding is recommended, although silver-brazing should not be forgotten. I have shown two 'guide pieces' but one is probably ample.

To fix it to the boiler: if you haven't yet made the boiler, then four small plates of copper may be silver-brazed to the backhead. If you have, they can still be brazed on even if you have finished the boiler, that is! It's not too important, if you don't want the pads, then holes may be drilled and tapped into the plain backhead. If the studs are of bronze, which are easy enough to make, they can be locked into the kettle with Loctite 601, Araldite, or plumber's solder. Make

sure that the portion screwed in is longer than the plate thickness.

A word here on this process: dear old Curly frequently used to screw backhead fittings directly into the soft copper. All was well for a time, but if ever it is necessary to remove a fitting (if a leak develops, for example) you may well run into problems. Copper, especially soft copper, is treacherous. I recall a fine engineer making a screw-in electrode from high-purity copper; a lovely job it was too. It screwed into its copper holder perfectly with the absolute minimum of play. He showed it to me with a touch of pride — justified, as both parts were screw-cut. He demonstrated the fit and handed it to me. I unscrewed it, had a look at the work, screwed it in and gave it back. He unscrewed it, re-screwed it in, and that was that. The whole kybosh locked solid and when separated — much force needed, both threads were ruined beyond repair.

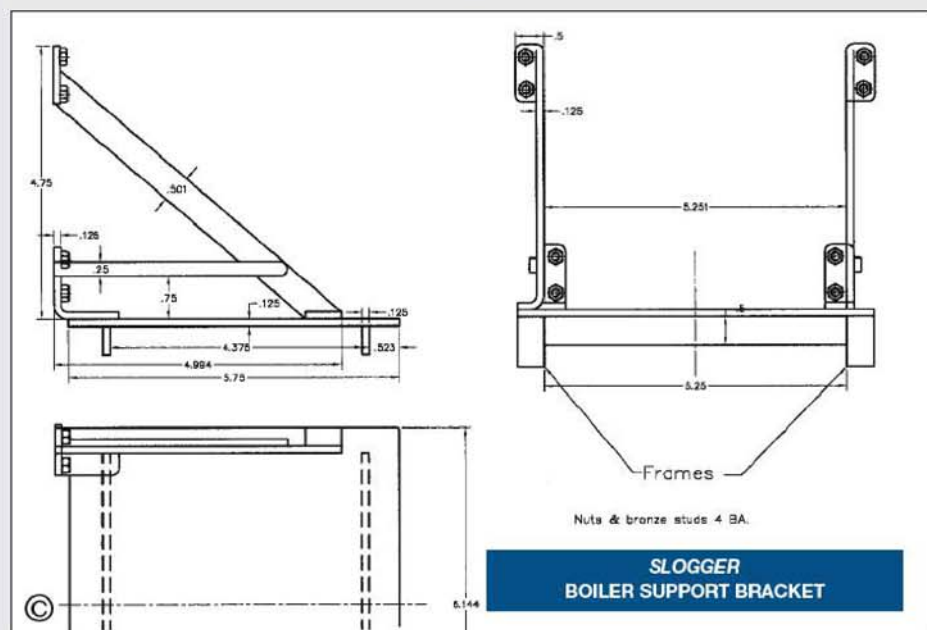
When John Short and I were making boilers commercially, we always put bronze bushes where fittings were to go. Admittedly, we did once have a customer who wanted only blind bushes in his pot, but he gave in when we pointed out the impossibility of this, as well as the somewhat insuperable task of testing! But permanent fixing of things screwed into a boiler and bonded in is unlikely to give any trouble.

It will be seen that the slide guides fit between the frames. As far as I can see from the drawing,

a casting was used, but 'tis hardly worth it for us. Also, from the drawing it looks as though the drawbar was part of this bracket, but I doubt it and certainly would not recommend such a process! All the tractive effort pull going through the boiler? What a lovely load on the smokebox!

I will soon be dealing with the throttle (regulator to my English readers) but I'm not too sure of the type. There is no information on the Baldwin drawings, and nothing certain from the photographs. Perhaps someone 'over there' may know: if so, an e-mail to keithgwloco@blueyonder.co.uk will be very welcome. I believe that 'pull out' throttles are the general rule, but for our smaller locomotives there is a possible snag.

If for any reason the engine should become detached with the driver's hand 'on the throttle' the acceleration is tremendous — I have seen it with a 5in. *Speedy*. Had I been quicker off the mark I could have taken off my coat and thrown it onto the rails, but it's not always easy to know what to do in such an emergency; there were only about 6 seconds before the locomotive ran past me, ▶





A low-loader double-bogie truck basks in the afternoon sunshine.



This wagon retains most of its side panels but is in need of some attention.

RATANGA JUNCTION A MONEX THEME PARK

Mike Thurgood

in Cape Town, South Africa concludes his series of articles with a look at the park's 2ft. gauge rolling stock and engines.

●Part III continued from page 640
(M.E. 4209, 28 November 2003)

Photograph 27 shows a low loader double bogie truck while another twin bogie wagon is shown in photo 28. Although this vehicle has side panelling in place unlike similar

open cars (see photo 3, page 519, M.E. 4207, 31 October 2003), it awaits refurbishment work to bring it up to standard. Other general purpose covered wagons are shown in photos 29 and 30, possibly of the same type as shown in the previous photos. These wagons have been repaired and are very colourfully painted. One is in use as a shop selling the sort of typical craft items which tourists favour and buy. I also came across other rolling stock equipped with new sloping framework attached to the channel frames which will eventually support awnings for the vehicles' intended use for kiddies' parties. The awnings were incomplete at the time of my visit.

1914 Fowler tender locomotive Sandy. Fowler works No. 14316

Sandy, a fully functioning 2ft. gauge Fowler 0-4-2 tender locomotive can be glimpsed in photo 31. This locomotive was originally built as a tank engine in 1914. After a history of use which I haven't been able to ascertain, it was used for a number of years on a track installed at a holiday resort at the Midmar Dam in Kwa-Zulu Natal. During its time there it was converted to a tender locomotive which explains the incongruity and is the reason why the tender doesn't sit comfortably with the locomotive. *Sandy's* footplate canopy doesn't appear to be original, either.



Refurbished, these vehicles are more suited to the ethos of the site.



This vehicle has been converted into a shop for visitors' mementos.



Fowler 0-4-2 *Sandy* with her somewhat incongruous and ill-fitting tender.



2ft. gauge locomotive *Sandy* is fitted with Walschaerts valve gear.



Sandy's superstructure includes a dominant spark arrester chimney!



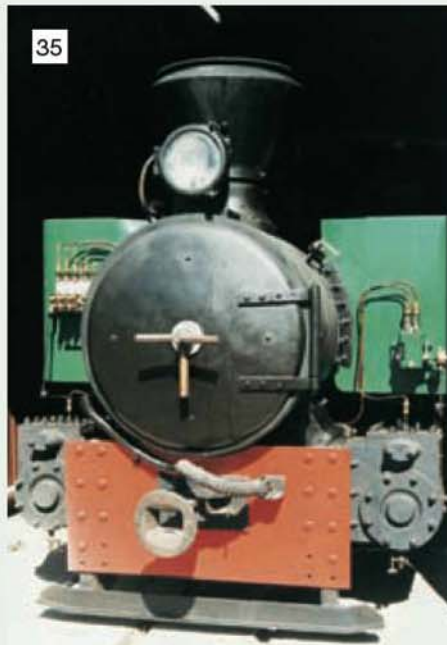
The cab seems more suited to a traction engine than a locomotive.

Its left side Walschaerts valve gear is shown in **photo 32**. The upper part of the locomotive is shown in **photo 33**, and its unusual canopy, reminiscent of the type used on a steam traction engine can be seen in **photo 34** which shows the left hand side of the locomotive. I didn't investigate the purpose of the hinged bracket on the frame towards the rear wheel. The significance of the large ghost number 201 on the tank side is unknown — maybe it was a works number.

The mechanical lubricators are mounted above the cylinders with a very spindly but presumably adequate drive from the valve gear. A view of the front of the locomotive is shown in **photo 35**, with its lubricator distribution manifold mounted on the front of the right-hand water tank (seen on the left hand side in the photograph).

Except for **photo 35** which is of the front of the engine, all my photographs are taken from the left-hand side of the locomotive because of restrictions imposed by the engine shed. Although this locomotive is in full running condition and it is occasionally steamed up, it has since been sold to Sandstone Estates.

At one time there had been a proposal to construct a heavy duty 2ft. gauge track around the whole Century City complex for use as a transport system, using four Garratt locomotives, yet to be renovated, and the Fowler locomotive with passenger stock. However, plans are always subject to change, with other priorities taking precedence. The Century City development has now been fully planned out with no space left for any track, and thus such a development is no longer being contemplated. Owing to local environmentalists' concerns about safeguarding an existing wetland on the Century City site, as previously mentioned, the developers have decided to have a system of canals instead.



Sandy waits patiently for her next turn of duty.

Garratt 2ft. gauge type NGG16 locomotives

Currently it is intended that the four Garratt 2ft. gauge locomotives will remain on static display in their derelict state, together with various items of rolling stock. Perhaps a sad ending for such magnificent locomotives. Various views of them are shown in **photos 36 to 44**. Rather than add too much description in the context here, these photographs are left to tell their own rather too frequently sad story.

These locos were used on railway lines laid to the sugar cane and fruit growing areas in what was Natal, now Kwa-Zulu Natal. The major lines ran from Port Shepstone to Harding, and Port Elizabeth to Avontuur (pronounced like Avonteer). The four locomotives and freight rolling stock at Ratanga Junction no doubt came from these lines.

The 2ft. gauge railways in Natal were never used for passenger carrying purposes, but were used mainly for transporting sugar cane, fruit and wooden mine props. The lines are now effectively closed, although a short stretch of the line from Port Shepstone has been kept going, on which is run a tourist train called the Apple Express.

The main locomotives in use on these lines were the Type NGG16 Garratts, with a capability to pull relatively heavy loads while able to negotiate the many sharp curves on the track. A few of these locomotives are still in good running order in South Africa, but not these at Ratanga Junction.

The static display of the four Garratt locomotives in their derelict state all lend credence to the legend of an imaginary derelict mining town scenario with an adjoining, and equally derelict, railway junction. A relic Dakota aircraft tends however to add a more modern character to the theme park!

What the names and manufacturer's numbers for these Garratt locomotives were is a closely guarded secret; no identifying plates are to be seen anywhere on any of the four locomotives. As the plates were probably cast in brass, they have either gone into the melting pot for a few Rands or various unknown people have them hanging on the walls of their homes as trophies. And quite valuable trophies they will be, too.

To say the least, the condition of the locomotives is poor! Some have motion work missing. As it is most unlikely that this would just have accidentally



One of the four derelict 2ft. gauge Beyer-Garratt locomotives on site.



A study in contrasts; deep shadows hide the condition of this locomotive.



How many visitors to Ratanga Junction really notice this gentle giant?



Without cleading, without fittings and without dignity.



Missing cleading reveals part of the boiler construction at the firebox end.



At least the motion work on this bogie is all present and correct.

fallen off, although not an unknown phenomenon, some of these locomotives were probably used to provide spare parts to keep other similar locomotives going. One even has its forward water tank missing! This would be most likely to be found at someone's homestead being used as a large water butt. However, as these locomotives have been standing more or less derelict for a long time it's not really surprising that parts have gone missing.

The author would be pleased to try and answer questions from *M.E.* readers. He may be contacted direct either on tel/fax: +27-21-552-6634, or by e-mail at: mikethurgood@yebo.co.za

Postscript

Since this article was prepared, and as a result of public agitation that adjoining wetland on the Century City site location of Ratanga Junction must be preserved, the Monex organisation decided



Spring details for the enthusiast!

to concentrate their efforts on these wetlands and canals, and not to go ahead with their original 2ft. gauge heavy duty railway track.

All the locomotives have been sold to Sandstone Estates near Ficksburg in the Free State, South Africa. This high technology farm also runs a heavy duty 2ft. gauge railway track on which they run restored locomotives, and they have stated that the four Beyer-Garratt locomotives described in this article will definitely be fully restored to working order. This will be a massive restoration exercise.

Acknowledgements

The author is indebted to Mr Richard Collard, Managing Director of the Monex Ratanga Junction Theme Park at Century City, and to his staff for their assistance in providing information for these articles — also for permission to submit them for publication.



Sharing a space with the local flora and fauna.



A massive restoration project awaits the new owners.



This mirror pair of single cylinder engines with Meyer valve gear was built in 1884 for the Wilderspool Brewery by Thornewill & Warham of Burton on Trent.

AN ENGINEER'S DAY OUT MARKHAM GRANGE GARDEN CENTRE

Roger Backhouse

finds much of particular interest just off the A1M near Doncaster.

Garden centres are unusual places to find artefacts of engineering interest, yet there are two that are examples in surprising locations. Contrasting with the locomotives, fairground machines and traction engines at Bressingham Gardens in Norfolk, the steam collection at Markham Grange Garden Centre near Doncaster has a fine selection from ships and industry. The museum was started by the garden centre owner, Tom Nuttall who was apprenticed at Doncaster Plant in British Railways steam days and retained his interest in steam while developing the nursery business.

His collection developed almost by chance. During the coal strike of 1984-85 the nursery boilers had to be kept going by burning scrap wood. This led to suggestions of generating electricity and feeding into the National Grid through a renewable energy scheme which needed a steam engine to supply power. An engine came

from a firm in Selby which used it as a standby generator; made by Bellis and Morecambe of Birmingham it is now in the Markham Grange Garden Centre boiler house. From this Tom Nuttall heard about other machines in mills and factories which were closing and, as he says "... it became a hobby that almost got out of hand!" At first his own staff moved and reassembled the machines, but now much of the restoration work and running of the museum is done by volunteers.

Industrial engines

Among several impressive engines, pride of place goes to the remarkable *Agnes*. This is a classic mill engine, built in 1909 for the Washpit mill at Holmfirth by Pollit and Wiggell of Sowerby Bridge. Its position as the mill's central power source is reflected in its superb finish. A mill engine had to be ultra reliable as a failure meant all work at the mill would stop. Solid construction and good maintenance meant it operated almost continually until the mill closed in 1980.

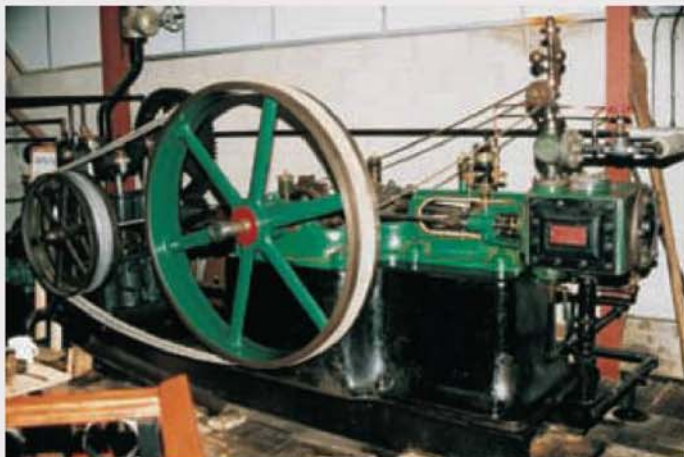
Agnes is a fine example of a tandem compound. The high pressure cylinder is in line with the low pressure cylinder, each fitted with

Corliss rotary valves. The twin piston rods of the low pressure cylinder pass outside the high pressure cylinder to drive a crankshaft. The Lumb governor is a classic. The crankshaft drives a huge flywheel pulley with eighteen grooves, each once having a cotton rope to drive the mill machinery.

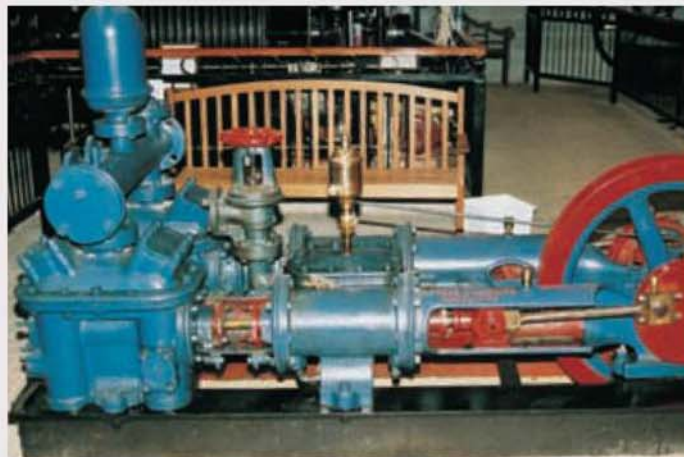
At the time of my visit a model of a tandem mill engine loaned by Bradford Museums was on show nearby. Its maker, W. H. Smith of Bingley, clearly knew these engines well. It is a lovely model created in 1928.

A larger tandem compound can be seen at Ellenroad Engines, near Rochdale. Built in 1916, it represents the pinnacle of steam engineering before electrification was widespread.

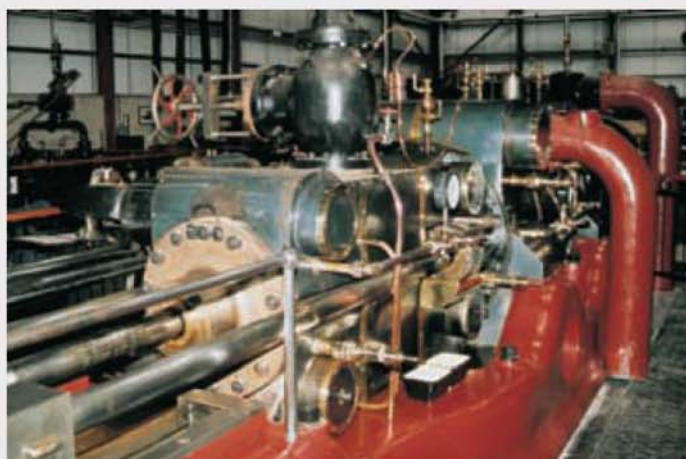
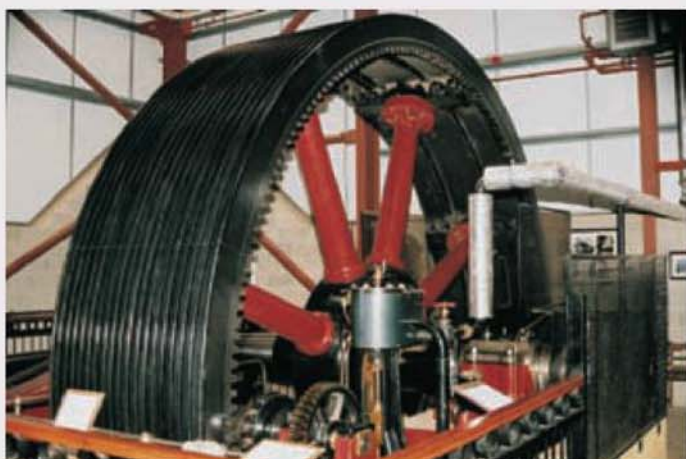
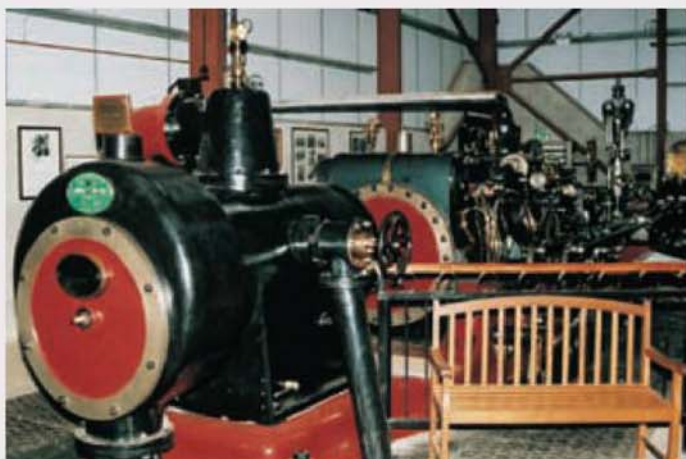
Another attractive engine at Markham Grange once powered Greenall & Whitley's Wilderspool brewery. Made well over a 100 years ago by Thornewill & Warham of Burton on Trent, it is actually a mirror pair of single cylinder engines. The museum usually alternates their operation as it would have been in service with one powering the brewery for a week and the other on standby. The valve gear is an unusual Meyer type. I have not seen this type before so quote here the



Marshall's of Gainsborough built this single cylinder slide valve engine with its characteristic Pickering type governor.



This 1926 two cylinder simple expansion engine with pump came from George Mills of Radcliffe Manchester.



Views of Agnes, the fine tandem compound engine built in 1909 by Pollit and Wiggell of Sowerby Bridge to drive Washpit Mill at Holmfirth until 1980.

description printed in the museum guidebook:

"Each cylinder has an ordinary slide valve without any cut-off adjustment. On top of this is a second slide valve which can be adjusted for inlet cut-off by means of the brass hand wheel, but without restricting the opening to exhaust."

Markham Grange is in the heart of the south Yorkshire coalfield but unfortunately there is no

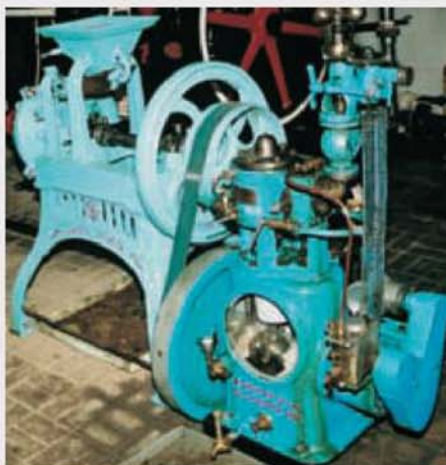
mining machinery on display. Robey of Lincoln were celebrated for fine steam colliery winding engines, one of which is displayed as part of the Papplewick Pumping engines collection in Nottinghamshire. At Markham Grange, Robey's are represented by a two-cylinder single engine which once powered machinery at a Derbyshire brickworks. It is a simple design with surprisingly rudimentary valve gear for an engine built in 1902, but perhaps it is this which helped it remain in operation for many years. Unfortunately it wasn't working on the day of my visit. The gentle motion is said to be soporific and I would have liked to test the reputation against reality!

Another engine built not far away, this time in

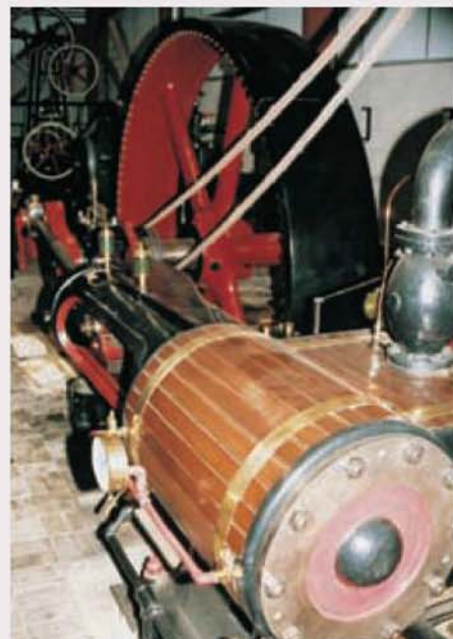
Gainsborough, is a Marshall engine driving the pump that once supplied Agnes with condensing water. A number of smaller engines were also used for pumping. One particularly elegant small machine was made by Joseph Evans of Birmingham. The single cylinder drives the pump valve through a mechanical arrangement driven from an eccentric next to the steam valve cylinder.



This pump by John Thorn of Patricroft from Tong Dyeworks is powered by a horizontal engine by Robey and Co.



An inverted vertical engine built in 1940 by Sisson and Co. of Gloucester for Birkenhead gasworks now drives a Bamford corn grinder.



This two cylinder slide valve engine was built in 1902 by Robey & Co for Cromford Silca Firebrick Works.



This inverted vertical triple expansion engine with Hackworth valve gear was built in 1927 by Sissons & Co. for a Thames passenger boat.

Marine power

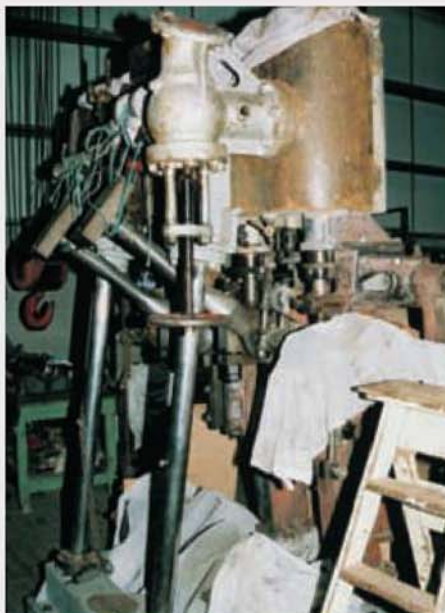
The museum has acquired a good selection of marine engines. Readers may remember the paddle tug *Reliant*, once a centrepiece of the National Maritime Museum in the 1970s. It was then regrettably dismantled but one engine was donated to Markham Grange and re-erected here on loan. This is a vertical side lever engine built by Hepple of South Shields in 1907. It appears almost archaic for the time but it suited the demands of a tug with low speed and high manoeuvrability.

Most other engines are cross-compound double or triple expansion vertical types. One of my favourites was built by Sissons of Gloucester for a Thames steam boat. Sissons specialised in smaller boat engines — as a devout teetotaler Sisson refused to supply engines to breweries. This particular engine was built in 1927 with Hackworth valve gear.

Another smaller vertical engine here was made by W. J. Yarwood of Northwich in Cheshire and is on loan from the Caernarfon Maritime Trust. It once powered the dredger *Seiont II*. The difficulties of preserving steel ships led to the break up of the dredger but many parts are preserved either here or at Caernarfon Maritime Museum. Like many inverted vertical engines, it



A Curnon steam meter on the Thornewill and Warham 'Wilderspool' engine.



Built in 1937 by W. J. Yarwood of Northwich, this two cylinder marine compound engine ex-dredger Seiont II awaits restoration.

combines piston valves for the high pressure cylinder and slide valves for the low pressure, driven by Stephenson's valve gear. It is currently undergoing restoration.

A late example of the inverted vertical engine on show was made in 1942 by Fleming & Ferguson of Paisley to power an Admiralty crane ship. Wartime shortages of labour and materials created a very plain engine but nonetheless well suited to its role.

Restoration work and loans from other museums mean that the collection is subject to change. The



A Fleming & Ferguson of Paisley inverted two-cylinder cross-compound vertical engine of 1942 is from an Admiralty crane ship.

engines described here are just a few of those on display but it is undoubtedly one of the best collections, if not the best, in the north of England.

About Markham Grange

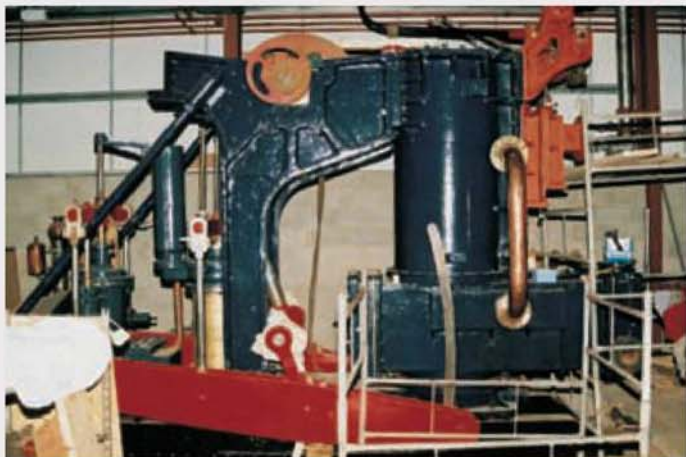
The museum is based at Markham Grange Nurseries and Garden Centre, Longlands Lane, Brodsworth, Doncaster; tel: 01302-330-430; website: www.mgsteam.btinternet.co.uk e-mail: markhamgrange@btinternet.com

The museum is open daily 10am-4pm and admission is free. Steam days are Wednesdays and bank holiday weekends.

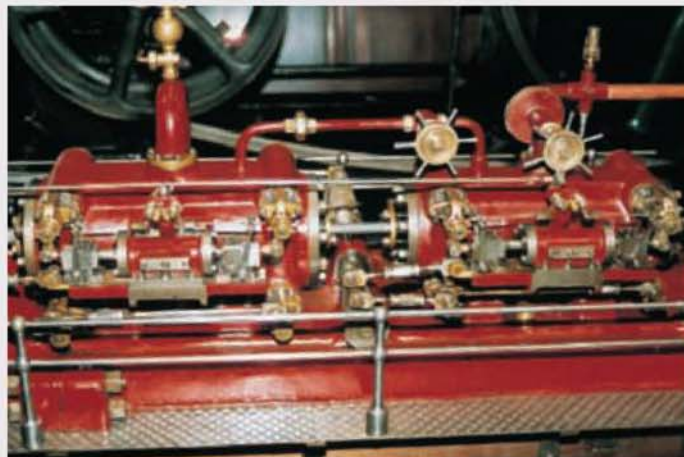
Markham Grange Nurseries and Garden Centre are situated alongside the A1M. Northbound drivers should leave the motorway at exit 38. Southbound drivers should take the A638 towards Doncaster and turn right 200 yards after the *Tally Ho* public house.

Other attractions in the area

The extensive garden centre has a café and shopping mall with an excellent dolls house shop. Cusworth Hall museum run by Doncaster Council has some models of Doncaster-built locomotives. Brodsworth Hall is the local stately home run by English Heritage.



Hepple of South Shields built this 1907 vertical side lever engine. From paddle tug Reliant, it was donated by the National Maritime Museum.



A fine model tandem compound engine made in 1928 by W. H. Smith of Bingley is on loan from Bradford Museum.

TRADE TOPICS

LYNX MODEL PAINTS FROM LYNX MODEL WORKS

Following the successful launch of Lynx Model Works earlier this year, experience and market research has led the company to develop, in conjunction with a specialist paint manufacturer, a new range of specialist high quality synthetic enamel paints, now available to model engineers as Lynx Model Paints. The Lynx Model Paints range is suitable for brush or spray application with the addition of suitable thinners.

Lynx Model Paints are authentic colour matched gloss and include high temperature variants, particularly in black for those warm areas around smokeboxes and the like. The range currently covers some of the most popular locomotive and traction engine colours and will be expanded to meet the needs of our customers.

Black and Clear Coat products are available in matt, satin or gloss finishes. Clear Coat can be applied over a gloss or any other surface to change its appearance.

Primers, including two-pack Self Etch for brass, and specific thinners for Lynx Model Paints are also available at reasonable cost.

Lynx Model Paints products are available in standard pack sizes of 250ml and 1 litre tins. These prices give excellent value for money; for example, a 250ml tin of BR Loco Green is available at £8.55 plus post and packing at cost. No VAT is chargeable.

A Professional Painting and Lining service is also available for those special projects — don't let a poor finish spoil your creation!

For further details contact John Clarke at Lynx Model Works, Dovecote House, Main Road, Maltby le Marsh, Alford, Lincolnshire LN13 0JP; tel: 01507-450121 (mobile 07899-806689); e-mail: paint@lynxmodelworks.co.uk website: www.lynxmodelworks.co.uk

RUST PREVENTING VCI EMITTER FROM CHRONOS LTD

Chronos VCI Emitters provide protection against corrosion for any at-risk metal items in display cabinets, tool boxes, storage cabinets, gun cases and cabinets and electrical junction boxes.

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Rust prevention from Chronos.

should be distributed evenly throughout.

Chronos VCI Emitters cost £4.50 each or £7.95 for two, inclusive of VAT and carriage from Chronos Ltd., Unit 8 Executive Park, 229/231 Hatfield Road, St. Albans, Hertfordshire AL1 4TA; tel: 01727-832793; fax 01727-848130; e-mail: sales@chronos.ltd.uk website: www.chronos.ltd.uk

STOCK MATERIALS FROM METALSONTHEWEB

Metalsontheweb are pleased to announce that their website is now fully operational and already generating a good deal of interest from model engineers throughout the UK.

The website is explicitly designed to cater for the small or occasional metal user, offering as wide a selection as possible of non-ferrous metals and stainless steel in all shapes and sizes, and with the facility to buy just enough to do your job.

The site is easy to navigate and you can browse the shelves without obligation. The net price of all items is displayed on the screen. You can review the contents of your shopping basket at any time, and add or delete items at will.

Having decided what to purchase, you proceed to the check-out to enter your credit or debit card details. These details are encrypted by the software and never appear in clear text on any screen. No employee of Metalsontheweb is ever aware of these details.

All ex-stock orders are ready for despatch within 2 working days and delivery is effected either by first-class post or overnight courier.

Metalsontheweb is a new concept, but is run by people with over 20 years' experience in the metal supply industry. Its systems have been designed to make your purchase of metal as simple, secure and hassle-free as possible.

Contact Metalsontheweb via the website at www.metalsontheweb.co.uk or by using Freefone 0800-587-6749 or by writing to Metalsontheweb at Firth Lodge, Shurdington Road, Cheltenham, Gloucestershire GL53 0JH.

INFRARED THERMOMETER FROM TANDEM4 LTD.

A new product from Tandem4 Ltd. is a handy infrared thermometer which may well be of interest and benefit to model engineers. The MH-1 (Must Have One) is a non-contact, infrared, digital, battery powered, easy to operate thermometer giving a one second reading time. It weighs 42g, measures 25 x 45 x 110mm, and its measuring range is -20 to +220deg. C. A small but powerful neodymium magnet in the underside of the casing allows the device to be securely attached



Temperature measurement from Tandem4.

to any magnetic surface. The digital display also provides diagnostic messages.

The MH-1 is inexpensively priced at £34.95 including VAT and carriage. Quantity discounts will apply and, for a small additional cost subject to minimum order quantities, it can be custom printed with the customer's own brand or logo.

Further details are available from Tandem4 Ltd., Spring Place, New Street, Luton, Bedfordshire, LU1 5DF; tel: 01582-724500; fax: 01582-733788; email: info@tandem4.com; website: www.tandem4.com

DIGITISED DRAWINGS FROM HISTORICAL MODEL RAILWAY SOCIETY

HMRS is pleased to announce the recent release of a new catalogue to accompany the digitisation of its current collection of 5000 drawings. The Drawings Catalogue is now available to the public on CD ROM in several formats including Microsoft Access 97 or 2000, Excel and CSV for £5 inclusive of postage and packing — please state format required. It is also available as a printed 97 page listing for £10 inclusive of postage and packing.

Drawings are now available to the public in a range of sizes and prices as follows: A2 size drawings £6.50; A1 size drawings £9; A0 size drawings £18 (to special order only), all inclusive of postage and packing.

Multiple orders, deduct £1 for each additional drawing in lieu of postage and packing. HMRS members receive a discount on all products.

The Drawings Catalogue and Drawings are available from HMRS Drawings, Walden Villa, Pool Hill, Newent, Gloucestershire GL18 1LL. Further details as required are available from HMRS Exhibition Stands.

NEW CATALOGUE FROM ENGINEERS TOOL ROOM

A regular exhibitor at the Model Engineer Exhibition held at Sandown Park this company aims to supply model and professional engineers with a wide range of cutting tools, workshop equipment and machinery. Indeed, they boast that even if the item required is not in their catalogue, if it is available anywhere, they will get it for you. The items listed include drills, milling cutters, turning tools, taps, dies, reamers, marking out instruments and collets.

Now with a new telephone number, contact Engineers Tool Room at Unit 28, Enterprise Centre, Llwynypia Road, Tonypandy, Mid-Glamorgan CF40 2ET; tel: 01443-442651; mobile: 07770 988840; fax: 01443-435726; website: www.engineerstoolroom.co.uk

CLUB CHAT

With Malcolm Stride

UK News

The 2 1/2" Gauge Association held an 'end of season' meeting recently to which several members brought locomotives to display or to gain advice on problems encountered. Models displayed included Andrew Dick's *Josie*, an American New York Hudson class 4-6-4 enlarged from the LBSC '0'-gauge design. Peter Gardner brought two of his Stirling Single designs, one of which was displayed on a base board so that the method of assembly could be studied. Peter De Salis-Johnson attended with his well-known *Millennium Fay* 4-6-2. Mick Tilley spoke about his experiences of firing full size locomotives on the Swanage Railway. The highlight of the day was the attendance of the artist David Shepherd who spoke about his early life in railway preservation and the purchase of the BR Class 5 *Green Knight* and the 9F *Black Prince*. Lunch and tea were provided by the team led by Mrs. Pat Thacker.



Andrew Dick's innovative *Josie*, an American New York Hudson class locomotive based on LBSC's 0-gauge design.

After over 30 years as treasurer of the 3mm Society, Peter Rogers has retired; the occasion was

marked by a presentation of a specially commissioned painting of Exeter Central by Frederick Lea. An article by Mervyn Turvey recounts the story of how his layout 'Alston' appeared in an episode of the TV drama *Midsomer Murders*. This happened after various visits by production staff and the taking of many photographs. The filming took place at Britwell Salome House and turned out very successfully with five or six "...quite impressive shots" being used. Has anyone else out there had models used in television programmes?

The newsletter of the Gauge '1' Model Railway Association carries a design for a combined regulator and blower valve for radio controlled locomotives. This sounds like a good idea for those of us in the larger scales who regularly forget to turn the blower on when stationary! The newsletter also contains an article on 'Pop' safety valves by Ted Millson. Ted's valves incorporate an adjustable 'pop' recess and a screw to facilitate setting.



David Shepherd, an artist noted for his penchant for locomotives and wild life, enthralled 2 1/2in. gauge Association members and guests with a talk at their End of Season meeting. David is seen here with Graham Barker's 2 1/2in. gauge Evening Star locomotive. (Photo: Graham Barker).

The weekend rally to celebrate the Tenth Anniversary at the Summerfield site of Bedford MES was deemed a great success. The weather "...couldn't have been better" and many people, including non-club members contributed to the success of the weekend. Power to the marquee lighting and fairground organ was provided by John Saunders' Showman's Engine which was generating all weekend. Various club projects had been completed prior to the weekend, including overhaul and decoration of the toilets, new steaming bays and the hydraulic lift for the ground level track. Over 100 members from the total of 170 were spotted during the weekend. At the Saturday night dinner 108 meals and 280 pints of beer were consumed. Other news from Bedford is that the running season has broken all records. The club is looking for a name for the new barbecue hut and have asked for suggestions from the members.

Adam Green has been awarded a year's free membership of Bradford MES in recognition of his entry into the Yorkshire Young Engineers Competition. We wish Adam success with his working

hovercraft project. Adam attends Guisely School and is one of at least ten students in the after-school engineering club. This sounds to be an excellent way of encouraging youngsters to take an interest in our hobby. The newsletter Editor reports that he is on a steep learning curve after upgrading his computer system and is still looking for some of the functions he "...found very useful in the old system." I can report from years of experience that in the computer industry this counts as progress!

The cover of the *Stephenson Link*, newsletter of Chesterfield DMES features a French Brouhot portable engine of 1928. The engine is unusual in that it has remained in the same family since it was made and the present owner could remember it being delivered when he was eight years old. The club locomotive *Percy* is celebrating its 25th anniversary this year and several pictures of its original construction are shown. The club is having an 'Arctic Running' day on 1 January, 2004.

Crawley Model Engineers are well into their winter maintenance programme which was reported as

CLUB DIARY

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

DECEMBER

- 26 Canvey R&MEC. *Boxing Day Steam-Up*. Contact David A. Clark: 01375-846921.
- 26 Cardiff MES. *Boxing Day Steam-Up*. Contact Trevor Jenkins: 029-2075-5568.
- 26 Colchester SMEE. *Boxing Day Steam-Up*.
Contact L. G. Hammond: 01376-511686.
- 26 Guildford MES. *Boxing Day Run*. Contact Dave Longhurst: 01428-605424.
- 26 High Wycombe MEC. *Boxing Day Steam-Up*.
Contact David Savage: 01494-527402.
- 26 Leeds SMEE. *Boxing Day Steam-Up*. Contact Colin Abrey: 01132-649630.
- 26 Leyland SME. *Boxing Day Steam-Up*. Contact Mark Entwistle: 01772-422411.
- 26 Maidstone MES. *Boxing Day Run*. Contact Martin Parham: 01622-630298.
- 26 Malden DSME. *Boxing Day Steam-Up*. Contact John Mottram: 01483-473786.
- 26 Reading SME. *Boxing Day Steam-Up*. Contact Graham Bustin: 01189-615450.
- 26 Stockholes Farm MR. *Members' and Family Day*.
Contact Ivan Smith: 01427-872723.
- 26 Sutton Coldfield MES. *Boxing Day Steam-Up*.
Contact Neal Harrison: 0121-378-3992.
- 26-28 Leighton Buzzard NG Rly. *Mince Pie Specials*. Enquiries: 01525-373888.
- 27 Basingstoke DMES. *Christmas Run*. Contact Ian Shanks: 01420-561741.
- 27 Bradford MES. *Mince Pie Steam-Up*. Contact John Mills: 01943-467844.

- 27 Scottish Model Engineering Trust. *Post Christmas Steam-Up*.
Contact Jeremy Bull: 01738-441975.
- 27/28 Claymills Pumping Engines. *In Steam*. Contact B. Eastough: 01283-812501.
- 28 MELSA. *Sunday in the Park*. Contact Graham Chadbone: 07-4121-4341.
- 28-01 January 2004 Bure Valley Rly. (*Friends of*). *Mince Pie Trains*.
Contact Paul Conibeare: 01263-733858.
- 29-31 Highbury Nexus Specialist Exhibitions. *73rd Model Engineer Exhibition* at Sandown Park Exhibition Centre, Surrey. Admission: Adult £7, Senior Citizen £6, Child £3. Discounts for advance bookings. Mon/Tue 10.00-17.00, Wed 10.00-15.00. Information: Nina O'Kane 01689-899209.
- 30 Wigan DMES. *'Free & Easy'*. Contact John Chamberlain: 01744-882255.
- 31 New Jersey Live Steamers, Inc. *New Year's Eve Run*.
Contact Karl Pickles: 718-494-7263.

JANUARY 2004

- 1 Birmingham SME. *New Year's Day Steam-Up*.
Contact John Walker: 01789-266065.
- 1 Chesterfield MES. *Arctic Running*. Contact Mike Rhodes: 01623-648676.
- 1 Erewash Valley MES. *New Year Steam-Up*.
Contact Jim Matthews: 01332-705259.

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.

Wilf Boothby
John Hickmott
Pauline Padgham

Chesterfield DMES
Romney Marsh MES
Romney Marsh MES

having started promptly at 10:00 hours on 1 October. Things are obviously very precise in Crawley! John Wilks, Bob Hill, Jimmy Nunn and Jack Darby (and dog) made good progress on the ties and joints which continued during the next sessions with the gang (and dog!) becoming more proficient as time went on. The gang report that the San Andreas fault must run through Crawley because a dropped 1/2in. socket disappeared out of sight and a check of the depth showed the crack to be about 4ft. deep. After digging down about 18in. the socket was found resting on a ledge. This was, of course, the only good 1/2in. socket available! At a later session the dog was in trouble for losing two golf balls and not making the tea when requested! I have to ask, is it an old dog, and are you trying to teach it new tricks?

Members of **Frimley & Ascot Locomotive Club** hosted the 7 1/4in. AGM this year at their Frimley Lodge track and reported the event as a great success. This was the result of a great deal of preparation by many members and the club is to be congratulated on its efforts. Members are looking forward to a talk on the Reading to Redhill Railway by Bruce Nathan on 12 January at the Basingstoke Canal Centre.

Kinver & W. Midlands SME have put their social programme on their web site at www.kinvermes.pwp.blueyonder.co.uk/diary.htm. This includes a good variety of events for the winter evenings. The site also carries details of the 2004 IMLEC event which they are hosting on 10-11 July.

We have received news of locomotive arrivals and departures at the **Leighton Buzzard Narrow Gauge Railway**. New arrivals include an Orenstein and Koppel 0-4-0 for restoration. A well plus side tank locomotive, it was purchased from Belgium by Graham Morris. Other arrivals

include a Ruston Diesel *Trent* and an armoured Simplex which is a twin to an existing locomotive. The departing locomotive *Alice* is going to a new home at Bala in North Wales. Details of the railway can be found on their website at www.buzzrail.co.uk. The railway points out that their timetable is changing in 2004 for the first time in many years, so visitors should check out the changes to avoid disappointment.

Doug Hewson has sent us details of work that has taken place at the **Lyndsey Model Society** track. Work has included the manufacture and installation of several new point motors and the manufacture of a new signal box to replace an original made in 1981 which is showing its age. One member was reported as "...mending a bulb with a squirt of WD40." Work is also progressing on several of the locomotives used at the track.

The **Northern Mill Engine Society** reports another busy summer season with good attendance at the summer open days. The society is able to show four of its engines being driven by electric power, but progress is being made on the pipework to eventually connect to a boiler house.

The *Polly* weekend hosted by **Nottingham SMEE** earlier in the year was busy with lots of locomotives on the track enjoying the ride. The newsletter Editor reported that not having a locomotive to occupy him he decided on a full size train ride on the GCR behind a visiting GWR locomotive (*Foxcote Manor*). The journey took him to the Brush Works (*which is familiar ground for me having done my apprenticeship there and stayed on for about 15 years.*) President Graham Davenport was also on the train and could not understand why GWR fans make so much fuss.

There have been some changes in officers of **Pinewood MRS** as a result of the recent AGM. Bryan Harfield is now Chairman, Ivan Hurst is Secretary and Lawrie Lewis is now Treasurer. Ivan can be contacted at 10 Hawkswood Avenue, Frimley, Surrey GU16 8LH; tel: 01276-28803 or by e-mail to ivanjuliahurst@yahoo.co.uk. Ivan reports that following the dissolution of the Ascot Locomotive Society, some 18 of their members have joined Pinewood. Since those concerned were members of the Tuesday gang, the Pinewood workforce is now considerably increased. Work in progress includes a carriage shed extension, new point work, elevated steaming bays and traverser, and extra cable ducts and water pipes.

Following a delay to the local council's plans to install mains drainage in New Romsey, members of **Romney Marsh MES** have installed a 600 gallon septic tank in order to be able to proceed during the winter with construction of toilets at the site. New windows have been installed in the club house and members are to decide on roller or vertical blinds for these. Illustrated in the newsletter are various designs of locomotive spark arrestor ranging from internal mesh to external deflectors.

Members of **Stamford MES** were recently treated to a presentation on various aspects of clocks and clock making by Lionel Brown. Lionel explained, among other things the working of the perpetual calendar and showed some unusual designs of escapement. The society has also announced that it has now recruited its fiftieth member, one Paul Pennycook. We wish Paul well in his new society.

In October, members of **Surrey SME** enjoyed a talk on Epsom Coaches by Company Chairman,

Roy Richmond and Commercial Director, Steve Whiteway. One of their first vehicles was an ex-army Lancia charabanc which apparently cost the partners £886 to restore. Members assembled on 1 November for the traditional Steam in the Dark meeting. Several members had locomotives in steam with head and tail lights fitted. The most powerful light was that fitted to Paul Edmonds' 7 1/4in. Baldwin Class K36 2-8-2 *Queen of Carolina*. The light on this illuminated the track well ahead of the locomotive. A bonfire was lit at 6:30pm, and this was followed by a firework display controlled by Eric Penn and his team.

We have received advance notice of an exhibition planned by the **Taunton Model Engineers**. Scheduled to take place at the Monkton Heathfield Community School, Taunton on Saturday and Sunday 3/4 April 2004 it will be opened at 10am by local MP Adrian Flook. We will publish further details as we receive them.

Some good bargains were to be had at a **Wigan DMES** recent Bring and Buy evening. Examples reported include a large Wolf drill for £1, a *Simplex* chassis with roller bearings for £10 and a bag of large size metric collets for £2 which all just goes to show some of the benefits of joining a club.

More advance notice, this time for the Third Southern Railway Locomotive and Stock rally. This will be hosted by **Worthing DSME** on Saturday 22 May from 10am to 6pm. Further details will be published as we receive them and further information is available from organiser Gerry Tull at Haydonstone House, Silver Street, South Cerney, Gloucestershire GL7 5TS; tel: 01285-860417. I have already been informed by a fellow club member who shall remain anonymous that me, my S14 and LSWR truck are going. It's so nice to have your life mapped out for you!

- 1 **Frimley & Ascot LC.** *New Year's Day Run.* Contact Bob Dowman: 01252-835042.
- 1 **Leicester SME.** *New Year's Day Steam-Up.* Contact Raymond Wallis: 01162-858824.
- 1 **Leyland SME.** *Chairman's Run.* Contact Mark Entwistle: 01772-422411.
- 1 **N. W. Leicester SME.** *New Year's Day Running.* Contact John Elliott: 01455-847040.
- 1 **Romney Marsh MES.** *New Year's Day Track Meeting.* Contact John Wimble: 01797-362295.
- 1 **Saffron Walden DSME.** *New Year Steam-Up.* Contact Jack Setterfield: 01843-596822.
- 1 **Surrey SME.** *New Year's Day Public Running.* Contact John Cook: 020-8397-3932.
- 1 **Sutton MEC.** *Bits & Pieces.* Contact Mike Dean: 0208-657-5401.
- 1 **Stockholes Farm MR.** *Members' and Family Day.* Contact Ivan Smith: 01427-872723.
- 1 **Tyneside SME.** *New Year's Day Run.* Contact Ian Spencer: 0191-2843438.
- 2 **Maidstone MES.** *Review of 2003.* Contact Martin Parham: 01622-630298.
- 2 **North London SME.** *John Marsh: Archive 8mm Railway Films.* Contact David Harris: 01707-326518.

- 2 **North Norfolk MEC.** *Bits & Pieces.* Contact Gordon Ford: 01263-512350.
- 2 **Portsmouth MES.** *Meeting.* Contact John Warren: 023-9259-5354.
- 3 **SM&EE.** *Gordon Hatherill: Problem Solving.* Contact David Boote: 01202-745862.
- 4 **Maidstone MES.** *Annual Lunch.* Contact Martin Parham: 01622-630298.
- 5 **Historical MRS (London Area).** *Alan Rhodes: Railways around Shrewsbury.* Contact John Millbank: 0208-948-0556.
- 6 **Oxford (City of) SME.** *D.A.G. Brown: Drills & Drill Sharpening.* Contact Chris Kelland: 01235-770836.
- 6 **Romney Marsh MES.** *DVD Film Evening on the Large Screen.* Contact John Wimble: 01797-362295.
- 6 **West Wiltshire SME.** *Radio Control.* Contact R. Nev. Boulton: 01380-828101.
- 7 **Bradford MES.** *Bits & Pieces.* Contact John Mills: 01943-467844.
- 7 **Fylde SME.** *Meeting.* Contact Alan Reid: 01253-882872.
- 7 **Guildford MES.** *Frank Perriman: Steering Ships By Steam.* Contact Dave Longhurst: 01428-605424.
- 7 **Historical MRS (Bedford Area).** *Pub Night.* Contact John Chamney: 01442-851214.
- 7 **Leeds SMEE.** *President's Night.* Contact Colin Abrey: 01132-649630.
- 8 **High Wycombe MEC.** *Talk: Conversion of Ffestiniog Locos from Coal to Oil Firing.* Contact David Savage: 01494-527402.

SEASONS GREETINGS

and a

HAPPY NEW YEAR

TO BOTH ADVERTISERS

AND READERS

FROM COLIN TAYLOR AND

TONY ROBERTSON

AT THE OFFICE

GOOD LUCK TO ALL IN 2004



Other events in the new year for which we have also received advance publicity are the Festival of British Railway Modelling 7/8 February 2004 at the Doncaster Exhibition Centre, and the London Festival of Railway Modelling at Alexandra Palace 27/28 March 2004. Tickets can be booked for both on 01778-391134/80 or visit the website at www.brmodelling.com

World News

Canada

The Burnaby track of the **British Columbia SME** echoed to the sound of ghosts and ghouls during the Halloween run. Some 40 members had arranged illuminated pumpkins, smoke machines and ghouls to scare the passengers as they entered the long tunnel. Ten club locomotives were at the event, three steamers and seven electric or i/c powered. These were augmented by four live steamers from Seattle. In all 800 passengers were carried in three hours following the 6pm start. Most of the passengers were dressed in appropriate costume. Thanks are due to Lindsay McDonnell for this information.

Ottawa Live Steamers member Roger Burns has been experimenting with water powered rockets. These were being launched at regular intervals at the fall picnic and drew many "Oohs!" and "Aahs!" from

the assembled multitude. Other picnic features included a new elevated track and an auction run by Richard Vickers.

It is the 70th anniversary year of the **Toronto SME**, their first meeting having been held 8 November, 1933. Congratulations to all members on this achievement. At a recent meeting Steve Lilley showed his unusual 1:8 scale 2-cylinder Reed hot tube engine running on propane. The gas is brought into the smaller cylinder, compressed and then transferred to the larger cylinder where the gas is ignited to power the engine. The prototypes of this engine were used in the Texas oilfields. Member Dave Bowes brought in his electronic ignition engined speed boat and described his efforts to improve performance. Dave mentioned that some problems were down to the fact that the ignition system did not always fire!

New Zealand

Alan Gasteen, President of **Auckland ME** reports a very successful year with progress on several matters including the new station building and various maintenance projects. The station is planned to be officially opened during the first weekend in December. The new club electric locomotive is also now operational

and Alan reports that both the station and the locomotive were funded largely through a local ASB grant.

Otago MES has received a St. Kilda Recreation Allocations Committee grant for a new storage shed. The committee has agreed to make arrangements to secure the power supply to their large lathe and mill/drill to ensure that only those who demonstrate their ability to use these machines safely will be given access. This is to avoid possible accidents to users and machines. A call has gone out for solid aluminium alloy scrap to feed the foundry for the

work coming on stream.

The 'Great Little Train Show' run by **Southland SME** has come and gone for another year and was second only to the biggest show which was last year. Locomotives were running on the outside track and visiting locomotives came from Gore and Dunedin. A selection of boats sailed on the pond. Tom and Donna Frew won the 'Peoples Choice Award' with their 'Watford & Anything Railway Company' layout. Show Co-ordinator Warren Jones has asked to "...hang up his hat" and hand over to someone new with fresh ideas.

- | | | | |
|----|---|-------|--|
| 8 | Historical MRS (Sussex Area). Keith Carter: <i>Railway Cine Films</i> . Contact Terry Cole, 17 Coombe Drive Steyning West Sussex BN44 3PW. | 13 | Dockland & E. London MES. John Slocombe: <i>Canadian Railways video</i> . Contact P. M. Jonas: 01708-228510. |
| 8 | N. W. Leicester SME. Annual Dinner. Contact John Elliott: 01455-847040. | 13 | King's Lynn DSME. David Dew: <i>An Alternative to the Norton Gearbox</i> . Contact Mike Coote: 01533-673728. |
| 8 | Leyland SME. AGM. Contact Mark Entwistle: 01772-422411. | 13 | Stamford MES. AGM. Contact David Ash: 01780-751211. |
| 8 | Sutton MEC. Meeting. Contact Mike Dean: 0208-657-5401. | 13 | Surrey SME. Bits & Pieces. Contact John Cook: 020-8397-3932. |
| 8 | Worthing DSME. Bits & Pieces and The Year Ahead. Contact Bob Phillips: 01903-700642. | 13 | Sutton Coldfield MES. Meeting. Contact Neal Harrison: 0121-378-3992. |
| 9 | Hereford SME. Bits & Pieces. Contact Richard Donovan: 01432-760881. | 14 | Norwich DSME. Meeting. Contact Paul Reed: 01603-462925. |
| 9 | Kinver & West Midlands SME. John Hurley: <i>More Memories of Stafford Road</i> . Contact John Campbell: 01384-891244. | 15 | Isle of Wight MES. Bits & Pieces. Contact Ken Stratton: 01983-531384. |
| 9 | Toronto SME. Meeting. Contact Art Gordon: (905) 820-1988. | 15 | East Somerset SMEE. Tony Moon: <i>Custom Cameras, Wells</i> . Contact Roger Davis: 01749-677195. |
| 9 | Saffron Walden DSME. Club Night. Contact Jack Setterfield: 01843-596822. | 15 | Sutton MEC. Toy Steam-Up Night. Contact Mike Dean: 0208-657-5401. |
| 10 | Reading SME. Club Running. Contact Graham Bustin: 0118-9615450. | 16 | North London SME. Members' Favourite Video Clips. Contact David Harris: 01707-326518. |
| 11 | Cheshire Live Steamers. Annual Dinner. Contact Tricia Sturgeon: 01606-48586. | 16 | Romney Marsh MES. Video Evening. Contact John Wimble: 01797-362295. |
| 11 | Sutton MEC. Track Day. Contact Mike Dean: 0208-657-5401. | 16 | Worcester DME. Norman Ellis: <i>Saudi Arabia, a history</i> . Contact M. Lane: 01905-425972. |
| 12 | Bedford MES. Ian Heys: <i>The view from the hot seat - Video presentation</i> . Contact Ted Jolliffe: 01234-327791. | 17 | Historical MRS (Scottish Area). Alan Mackie: <i>Prototype Signalling & Track Layout</i> . Contact Richard Crockett: 01896-750730. |
| 12 | Erewash Valley MES. Evening Meeting. Contact Jim Matthews: 01332-705259. | 17-19 | Maidstone MES. Maidstone Open Day & Festival. Contact Bob Begnie: 528-9114. |
| 12 | Frimley & Ascot LC. Bruce Nathan: <i>Reading to Redhill Railway</i> . Contact Bob Dowman: 01252-835042. | 18 | Frimley & Ascot LC. Club Run. Contact Bob Dowman: 01252-835042. |
| 12 | Melton Mowbray DMES. Auction. Contact Phil Tansley: 0116-2673646. | 18 | N. W. Leicester SME. Running Sunday. Contact John Elliott: 01455-847040. |
| 13 | Crawley ME. AGM. Goffs Park Light Rly. Contact Allan Sinclair: 01293-888203. | | |

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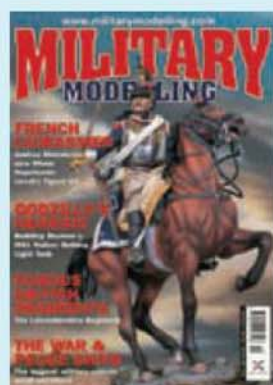
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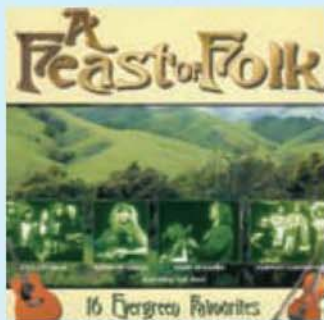
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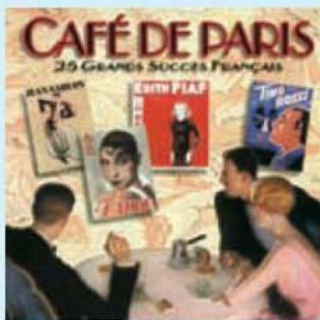
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DOVINGTON PARK
IN OCT

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



£289

Cobra Lathe

- Centre height: 70mm • Distance Between Centres: 250mm
- Speed Range: 100-200rpm • Metric or Imperial Leadscrews



Cobra Mill

£339



- Variable Speed Control
- Spindle Taper: MT2
- Table Size: 145 x 240mm
- Metric or Imperial Leadscrews

DB8 Lathe

£850



- Centre Height: 105mm • Distance Between Centres: 400mm • Complete with 3 & 4 Jaw Chucks, Fixed & Travelling Steadies & Face Plate
- Hardened & Ground Bedways • Accuracy Report

DB10G Lathe

£999



- Centre Height: 125mm • Distance Between Centres: 550mm • Thread Cutting Gearbox • Complete with 3 & 4 Jaw Chucks, Fixed & Travelling Steadies & Face Plate • Vee Bedway • Accuracy Report

Model B Super

£670



- Maximum Swing: 420mm
- Distance Between Centres: 520mm
- Cast Iron Construction
- Metric or Imperial
- All Tapers MT3
- Supplied with 3-Jaw Chuck, Drill Chuck & Arbor and more!

£1100

Centurion



- Distance Between Centres: 520mm
- Centre Height: 210mm • Spindle Bore: 28mm
- Powered Crossfeed • Separate Motor for Lathe/Mill
- Complete with 5" 3-Jaw Chuck, Lathe Tools, Change Gear and more!

Conquest Lathe

£395



- Centre Height: 90mm
- Distance Between Centres: 325mm
- Large MT3 Spindle Taper
- Spindle Bore: 19mm
- Now C/W Quick Change Toolpost
- Variable Speed Range 100-2500rpm
- Metric or Imperial Leadscrews

626 Turret Mill

£1340



- Table Size: 156 x 745mm
- 1.5HP Motor
- MT3 or R8 Spindle
- Metric or Imperial graduations

Champion Mill/Drill

£585



- 1/2HP Motor
- Table Size: 150 x 630mm
- Complete with Drill Chuck & Arbor
- Ground Cast Iron Column
- MT3 Spindle

Craftsman Lathe

£1550



- Centre Height: 150mm
- Distance Between Centres: 570mm
- Swing in Gap: 450mm
- Powered Crossfeed • Spindle Bore: 36mm
- Complete with 3 & 4 Jaw Chucks, Fixed & Travelling Steadies, Face Plate, Machine Stand, Accuracy Report & much more!