

MODEL ENGINEER

Vol. 192 No. 4215

20 February - 4 March 2004

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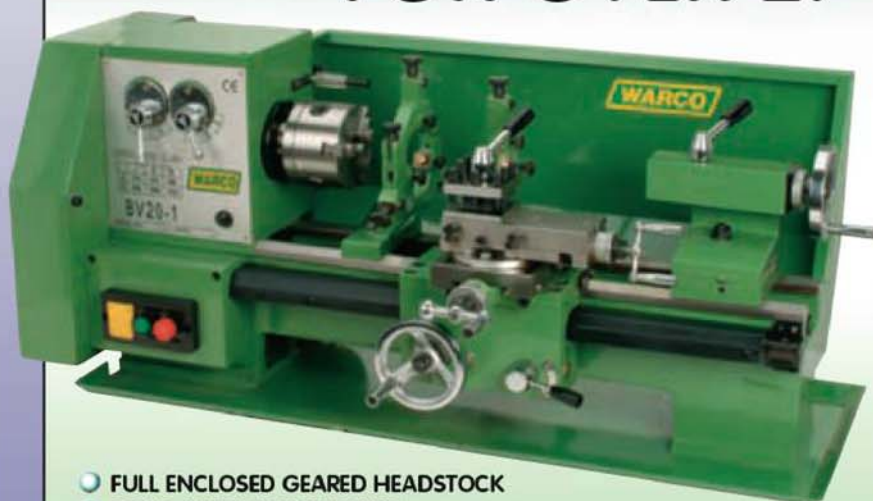
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- SWarf TRAY
- REAR CHIP GUARD

BV-20 LATHE

SPECIFICATION:

- CENTRE HEIGHT 4"
- DISTANCE BETWEEN CENTRES 14"
- SWING OVER CROSS SLIDE 5"
- SPINDLE BORE 3/4" CLEARANCE
- SPINDLE SPEEDS (6) 140/1710 RPM
- HEADSTOCK TAPER 3MT
- TAILSTOCK TAPER 2MT
- RANGE OF IMPERIAL THREADS 8-24 TPI
- RANGE OF METRIC THREADS 0.4MM - 3MM
- MOTOR 1/2 HP 1 PHASE
- DIMENSIONS 38" LONG x 19" WIDE x 15" HEIGHT
- WEIGHT 230 LBS

ZX-15 MILLING MACHINE

Ideally matched to
the BV-20 Lathe

Table size	654mm x 150mm
Longitudinal travel	455mm
Cross Travel	145mm
Spindle Stroke	90mm
Spindle Taper	3MT
Diameter of Spindle	63.5mm
Diameter of Column	66.65mm
Throat	165mm
Max distance spindle to table	320mm
Height with head at top of column	1067mm
Width	775mm
Depth	559mm
Spindle speeds	400-1640
Motor	1 phase 1/2hp with F/R switch
Weight	295lb
Head tilting	90-0-90 worm gear tilt mechanism

General dimensions may be subject to minor variations.



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THE 73rd MODEL ENGINEER EXHIBITION THE DUKE OF EDINBURGH CHALLENGE TROPHY

An analysis of the competing entries for
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Work begins in earnest on the novel
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A delightful project for those seeking
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NEW SERIES:

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Introducing a cost effective and simple
 alternative to a quick-change screw
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BUILDING A DISPLAY CASE

Work continues on the ideal method of
 displaying your static model or clock
 to proper advantage.
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On the cover ...

*Winner of the
 Duke of Edinburgh Challenge Trophy
 for a record seventh time, Mrs Cherry Hill
 entered her 1:16 scale Gilletts & Allatt
 traction engine in competition at the
 73rd Model Engineer Exhibition.
 Our photograph shows close-up details
 of one of the drive units and clearly
 illustrates the superb workmanship and
 attention to detail achieved
 on this unique model.
 Mrs. Hill is renowned for her painstaking
 research and her ability to reproduce
 engineering curiosities from the past.
 Turn to page 192 of this issue
 for full details of this year's competition
 results and the Chief Judge's report on the
 Duke of Edinburgh Challenge Trophy
 Competition.
 (Photograph by Neil Read)*

LETTERS TO A GRANDSON

An error corrected and then further
 progress on the flap valve type
 live steam injector. Part LX.
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KEITH'S COLUMN: LOGGER & SLOGGER AMERICAN TYPE 2-8-2 LOCOMOTIVES

for 5in. and 7 1/4in. gauges.
 Building a donkey pump for the
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DESTINY

A splendid novelty designed to
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Reporting a pleasant weekend hosted at
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Yet More INTERESTING Reading for You!

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The Voice of the Crystal £12.30
Instruments of Amplification £16.30

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Pour Your Own Castings in your Backyard (or on the Patio?):

Metal Casting: A Sand Casting Manual for the Small Foundry Vol.1 £15.70

From Steve Chastain comes this very good first volume (of two) on metalcasting in general. The main headings in this volume are: *The Sand Casting Process, Foundry Projects* (including a *Match Plate Vibrator*), *Melting Equipment* including simple charcoal & gas furnaces, *Temperature Measurement, Foundry Sands and Binders, and Coremaking*. The approach is applicable to anyone melting metal at home, which makes it different from most other similar books we sell, which are aimed at professional foundries. This is well written and covers the subject well. 206 page paperback full of photos, drawings, tables and other helpful information. (Vol. 2 is due in the summer)

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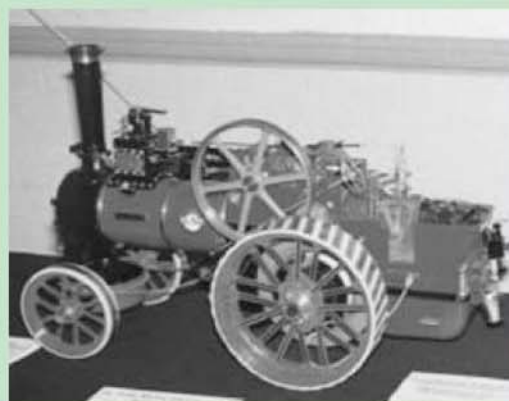
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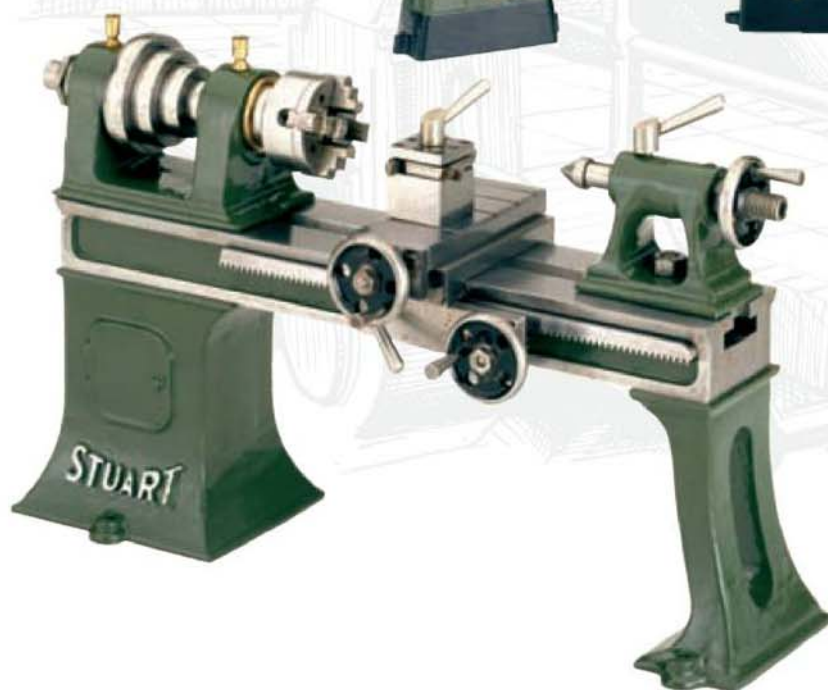
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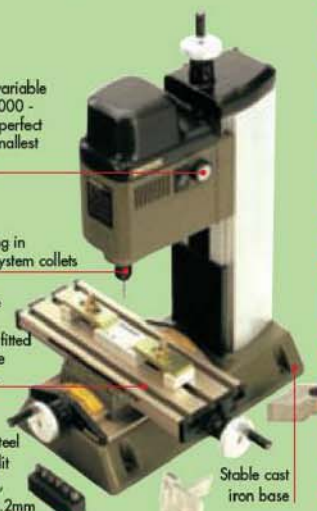
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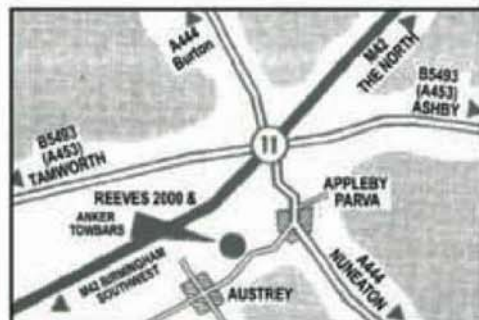


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SMOKE RINGS

With the Editors

Events

We have been chided by those who follow the events sponsored by this magazine that they have been kept waiting for information concerning the outcomes. The events in question are IMLEC, the LBSC Memorial Bowl Competition and SEQLEC, and the criticism is justified. Full reports on all these events held in 2003 have been ready for publication for some time and await only space in these pages while maintaining a reasonable balance in magazine content.

It has been suggested that we could at least publish the results, even if readers are to be kept on tenterhooks concerning full reports. Always happy to oblige, the successful competitors of the above three events for 2003 are as follows:

IMLEC

Winner: John Ellis driving Geoff Moore's 5in. gauge LBSC Minx (2.456%); **Runner-Up:** Geoff Moore driving his 5in. gauge LNER B1 Impala (2.383%); **Third:** David Neish driving his 5in. gauge LBSC J2 Bessborough (2.314%); **Best 3 1/2in. gauge locomotive:** Tony Huxtable driving his S15 Greene King (0.576%)

LBSC Memorial Bowl Competition

Winner: Stuart Robinson with his 5in. gauge 0-8-0 NER T1 Netta; **Runner-Up:** David Mayall with his 5in. gauge 0-6-0T GWR 15xx Speedy; **Third:** David Huddart driving Daisy Taylor's 3 1/2in. gauge American style 4-4-0 Virginia.

SEQLEC

Winner: Melvyn Bright with his 2-10-0 BR 9F (3.58%); **Runner-Up:** John Painter with his GWR 14xx 0-4-2T (1.63%); **Third:** Tony Newberry with his GWR 2-8-0 Heavy Goods (1.17%)

Detailed reports of all these events to follow.

Insurance matters

We have recently been made aware that long term health problems have caused Jacqui Baker to stand down as Insurance Administrator for the Southern Federation of Model Engineering Societies (SFMES). Towards the end of the next SFMES Insurance Year (April '04 to March '05) the services of an Insurance Broker will be required in all dealings with their insurers. The services of such a broker have been obtained and SFMES is pleased to announce that as of 1 January 2004, brokers Footman James will be taking over the administration of their Insurance Scheme. Footman James is experienced in the administration of such group schemes as that of SFMES and has a good understanding of the needs of the model engineering world.

The administration of the SFMES scheme will be much the same as it is now and, of course, all existing insurances (including Directors' and Officers') remain in place.

As of 1 January 2004 all insurance enquiries should be addressed to Footman James who will have sent out renewal details and proposal forms in early February as usual.

Contact details are as follows: Footman James & Co. Ltd., Waterfall Lane, Cradley Heath, West Midlands B64 6PU; tel: 0121-561-4196. The Southern Federation MES Account Executive is Alan J Blount; tel: 0121-561-6231 (direct line); fax: 0121-561-6215. Footman James office hours are 9am to 5pm Monday to Friday.

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Narrow Gauge IMLEC

Mike Foster, who contributed the account of the Northern Association event held at the Rochdale SMEE track and published in M.E. 4211 (27 December 2003), has written concerning a shortfall in his report.

We learn that Polly Model Engineering was a generous sponsor of the event, a fact which was not made clear in the report. We hope that an apology for the omission and an expression here of thanks may go a little way toward making amends for the oversight.

One last Open Day at Red Rice

Rex Hanman recently wrote with the sad news that after more than 30 years at Red Rice, Andover DMES learned last year that their landlord had plans to develop the site which they occupy. Despite initial setbacks, it seems that the latest planning application is likely to be accepted and that the end of their tenure of the site looms large on the horizon.

Several members have been very active in seeking alternative accommodation. Sites have



been found, considered and rejected for one reason or another. One very promising location was a neighbouring exclusive public school which would have been perfect except that the Child Protection legislation caused the school's governors to have second thoughts.

A great, if challenging, location not too far distant has been found, and a planning application lodged on behalf of the society whose members now await the outcome with bated breath. The present Andover DMES lease expires at the end of March 2004 after which they have a month to clear and quit the site. Members feel that they cannot just walk away from their 'home' of 30 years without staging some special event so plan to hold their 'Spring' Open Day somewhat earlier than usual, on Sunday 28 March.

They would like to see as many locomotives and traction engines, etc. as possible in steam for one last time at Red Rice, along with lots of old (and new) friends in attendance. Attendance at open days has fallen in recent years and as this one is rather special we hope that a mention in these columns might provide the necessary boost.

Anyone wishing to participate will be most welcome. If directions, etc. are needed Rex Hanman can be contacted on 01980-846815.

CHUCK the MUDDLE ENGINEER

by B. TERRY ASPIN



POST BAG

Great man

SIRS, - May I, on behalf of many other model engineering enthusiasts express sadness at the passing of Martin Evans.

Perhaps I have a more personal sadness in that I counted Martin and Yvonne as friends as well as colleagues. I well remember how much help they gave to me as a relatively inexperienced editor in my early days. Their copy was always on time and needed very little in the way of correction; at that time Martin was at his peak of production and as a result of either requests from myself, or decisions taken between us produced many fine and enduring locomotive designs.

Martin was not above passing on hints and help to me and, as our tracer, Yvonne often worked long hours for very little reward in order to keep up with our production schedules. It is perhaps not generally realised that purely out of goodwill Martin checked all drawings done by Yvonne before they were delivered to the office.

With his great experience as a designer Martin rarely bothered to build his designs but, if a tricky operation was needed on any part of a design, he always checked that it was possible for the amateur to build before committing it to paper. Each of the designs that I had the privilege of overseeing carried some often minor, but still significant suggestion for a machining operation somewhere within it; indeed many enthusiasts for the hobby who had no intention of building a locomotive still studied his writings to discover these little gems, which were often capable of use in other workshop operations.

As a designer, friend and colleague Martin will be sorely missed, not only for his many locomotive designs, but for the advice and assistance he freely offered to those with genuine enquiries often in difficulties with designs from other sources.

It is not generally known that even in later life he designed and built several models for his own pleasure; although not so interested in driving them when completed, he often sold them once he had steam tested them to his own satisfaction.

Our hobby has lost a truly great man, and I am sure that in his editorial Mike was correct in saying that it will be along time, if ever before we see his like again. His influence on our hobby was truly

great; perhaps I may ask other clubs and societies to adopt the

same mark of respect as we did at Bedford recently, to stand for a few moments' silence to remember and mark the passing of this great man. Ted Jolliffe, Bedfordshire.

Quietness of mind

SIRS, - In response to the précis of the Reader Survey published in M.E. 4213 (23 January 2004), it can't have been a surprise that most of your readers are men over 55 years of age! What else did you expect! Classic model engineering will never have an active following among young adults. How can it?

Classic model engineering is an expensive hobby, in terms of capital outlay, free time and workshop accommodation; it is not a kitchen table activity. Unless a young person is very fortunate he, or indeed she, must have different priorities: buying a house, developing a career, marriage and family life. In my own case, as a boy, I wanted to build a steam locomotive, but it was more than thirty-five years before I had the spare money and a workshop. At 57 years of age, still running a small business, it has taken me seven years to finish the chassis, cylinders and motion of a 0-4-0 shunting loco. The boiler is still to be made. The good news is that I am retiring this year and then, who knows what I will be able to build!

To produce anything in model engineering it takes time, many months of spare time. Mature people can understand this, it needs patience, persistence under adversity (what model engineer hasn't discovered the need for this), getting components right even though it may take several attempts and, very important, Quietness of Mind. The role models paraded before young people and their own hormones are in a completely different direction.

Posh 'n Becks will never order a Myford Super Seven!

Model engineers live inside their own heads, dreaming about the things they can make, about turning to an accuracy of half a thou., and getting the perfect finish on a steel bar. Perhaps that is why only 43% belong to a club, the majority wanting to close the door and get to that time when the head, heart, hand and eye are working in perfect harmony with their machines.

Public perception can be a problem. We might be regarded as 'Grumpy Old Men' in anoraks. That, of course, is not the case

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despite some of the letters published in these columns. We all understand that correspondents only(!) want to get things right and accurate. Model engineers are people of integrity, hard-working, optimistic, capable of deep creative thought, organising their work sequences with the forward thinking to rival that of a Chess Grand Master, but quiet, accurate, painstaking work does not make good television.

It could be that the often expressed anxiety for the future of the hobby is justified. That it has nearly run its natural course and that with the passing of my generation, together with British engineering, it will end. We were very lucky, in our youth having seen, as an everyday experience, the steam locomotive with all its revealed action: piston rods, valve-gear, connecting-rods, smoke and steam. We had excellent teachers (thank you, Mr. Crump and Mr. Marriott) who showed us how to make things in wood and metal; fathers and uncles who worked actually making things.

Personally, I think the future of the hobby is very bright. Whenever I go to an exhibition it is packed! Packed with visitors and scores of traders. Tools have never been so affordable. Okay, most of the visitors are fellow 'silver-tops' but we still have many years of model engineering before us. We now have the leisure time and 'grey pounds' to spend. There are also many teenagers, not in a position yet to produce anything very much, but clearly interested and looking forward to the time when they will have their own workshops and tools. True, those in their 20s and 30s are thin on the ground, but for understandable reasons.

I'm not unique. I wanted to be a model engineer as a boy, but for many years had other priorities. Your series *Letters to a Grandson* unconsciously recognises this. Grandad is still at the lathe, young Adrian is keen to get stuck in, but where is his father? We all know: he's out there earning a living for his family.

So, let's lighten up, let's celebrate that The Golden Age of Model Engineering is for those in their 50s, 60s, 70s and even 80s. The young will catch up, that's certain! Robert Cross, Birmingham.

Back in the fold

SIRS, - Having re-discovered your magazine after an absence from model engineering of some 16 years or so, I felt compelled to write to say how much I look forward to each issue.

At the tender age of 30, I moved to Nottingham from Birmingham for my work 16 years ago. A move into temporary accommodation with my wife and young daughter forced the reluctant sale of my Unimat S, bench pillar drill and Lorch watchmaker's lathe. For the last few years I have had a determination to return to model engineering and so, in early December 2003, I treated myself to a Clarke CL300M lathe. How wonderful to be back in the 'fold', and I have been enjoying myself immensely in the evening, re-acquainting myself with the joys of metal working. I am extremely pleased with the lathe. At just over £400 it is very good value, and accurate!

I bought a copy of M.E. 4210 (12 December 2003) and as a gentle re-introduction to precision working decided to build the 'steam powered Christmas tree' by Chris Vine and Elizabeth Wormald but without the dynamo and Christmas tree. I may be a few years older than Elizabeth, but I too thoroughly enjoyed putting the engine together, especially as it worked first time from a source of compressed air (a diver's bottle). My little son was amazed to see the engine running and I suspect he will also take up our hobby in time.

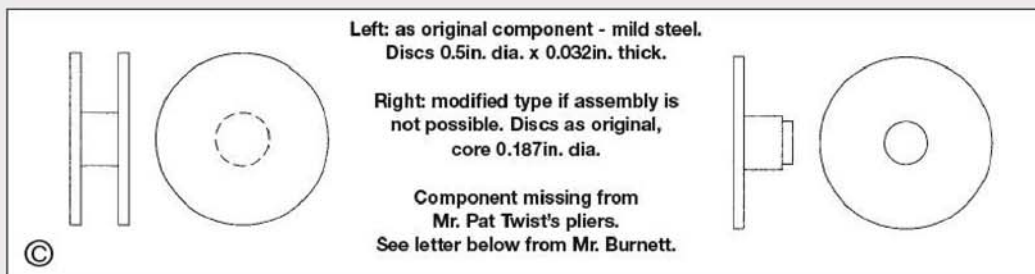
So what next? I have made a number of small items but feel the need for a 'proper' project. I am thinking along the lines of a Stuart engine followed by the usual beginner's model, *Tich*. Before this, however, I propose to make a small milling accessory for the CL300M which I discovered on the internet.

So, come on all you 'resting' model engineers, get yourselves kitted out again and get stuck in; you won't regret it!

T. Beckett, Nottinghamshire.

Bright future

SIRS, - In M.E. 4213 (23 January 2004) you comment on the dilemma of using technical terms for the allowable working stress in steels and below that Colin Abrey refers to the use of ratings of 'everyday' appliances to give an idea of the



power used in heavy machinery.

I believe we should use international standard terminology and units where possible, but there's no harm in giving some comparative figures. After all, James Watt had a similar problem in expressing the work rate (power) of early steam engines; he used the familiar horse to arrive at a unit which eventually standardised to 550ft. lbf. per second (or 746 Watts). The later use of the arbitrary Nominal Horse Power for certain types of engine did rather confuse things! What amuses me is when you see 'Safe Working Load 200 kgs' — I can't see where the time element comes into it, but I can see that some people do not realise that abbreviated units don't use the plural 's'.

Your report *Celebration of Engineering* in the same issue is encouraging, even allowing for the last paragraph; if engineering is considered to be the practical application of science for the benefit of mankind (and I can't remember who said that) then it has a bright future.

Ian Strugnell, Essex.

Neil Read replies:

Ian Strugnell is quite right about using international standard terminology and units where possible. We try to do so and endeavour to edit out the odd stray 's' that sometimes works its way into our contributor's articles and letters. I believe Colin Abrey's remarks were tongue in cheek and, like you, see no harm in relating mass to 'sacks of potatoes' if it helps the non-technical reader to understand the concept.

I am glad you took heart from my article. It was impressive to see the youngsters tackling real life engineering problems and coming up with viable solutions. I still feel we, as a nation, will pay the price for the reduction in formal engineering training programmes. I was looking round the local Waterstones bookshop the other day and find that the 'engineering' shelves have been invaded by, among other things, books on plumbing. Such is the modern perception of our profession and hobby!

Black arts?

SIRS, - With reference to Mr. Dennis Randall's letter published in *M.E.* 4212 (9 January 2004), I too

am having great difficulty with indexable tools.

My tools were also purchased from an impeccable British firm and I have to admit to investing a great deal of money in them. I have tried a whole range of speeds and feeds, with and without cutting fluid, all to no avail. The finish obtained is vastly inferior to that which I can obtain with high speed steel tooling. Nearly all my machining is of bright mild steel and cast iron. I find that with HSS tools I can rough down the workpiece and then lightly hone the tool on an Arkansas oil stone to obtain an excellent, almost polished finish to the workpiece. Not so with TCT indexable tooling, the finish from which looks like the result from 'a sharpened masonry nail'.

Others seem to have no problems and consistently produce excellent work with TCT tooling. Could they please supply us with information describing their techniques?

My other nightmare is machining silver-steel which, when I have finished with it, always looks as though the metal has been torn from the workpiece. I am sure that I must be doing something wrong! Again, could someone please share their methods with the rest of us?

Thank you for such an excellent magazine.

J. Lake, Hampshire.

Wire cutters

SIRS, - The tool shown in your photograph *M.E.* 4212 (9 January 2004) is a powerful wire cutter. It was developed to cut barbed wire entanglements without the final sharp 'click' as the cut was completed.

A friend of mine was working with a Kingston upon Thames engineering company and was involved with the design. He subsequently acquired several of the early samples, one of which he gave to me. I still have it in my possession.

The wire cutter should have a small component (details above) at the lower end of the cutter blades to balance the cutting pressure.

P. Burnett, Surrey.

Sine bar

SIRS, - As I have just started a private pupil on trigonometry, the *Pete's Page* article in *M.E.* 4212 (9 January 2004), about making gauge blocks has raised a long-standing query: who invented the sine bar, and when?

I have tried technical libraries, the Patent Office and the internet, but have been unable to trace the origin of this ingenious precision tool further back than a reference in a 1916 American magazine, which implied it was already well known.

Hoping that your expert readers can help

Frank Lynch, Manchester.

Workshop comfort

SIRS, - For those who have a cold/hard workshop floor or are just tired of standing in fine swarf, Axminster Power Tool Centre (usual disclaimer) have just the thing. Either, Machine Shop Safety Matting (3 x 5ft.) in thick rubber, complete with holes to let the swarf through, or Anti-Fatigue Mats (interlocking 12 x 12in. - 10 off), both at £11.94.

A late Xmas present perhaps?

Ken Willson, Hampshire.

Twin abominations

SIRS, - While leafing through some *Model Engineer* back issues, on one cover I noticed a model which bucked the trend. Slightly grubby, this horizontal engine had worn cleading and the beading was split. In some places round headed screws were clearly visible. There were even washers all over the place, under every nut in sight. No Gold Medal Winner this, I thought. On closer inspection, I realised it was a real steam engine — not an idealised one.

Am I being harsh? Of all the models featured on the cover of *M.E.*, my favourite was a little twin-cylinder engine made by a Russian modeller. This was criticised by judges for having washers beneath its fixing nuts, yet had they been to Russia to inspect the original? Can they not, at least, acknowledge that there are many real steam engines equipped with the twin 'abominations' of washers and round-headed screws?

Neil Wyatt, Derbyshire.

Browning

SIRS, - For nearly thirty years, I have been interested in the process of 'browning', the system used by the large arms factories to give steel its blue-black protective coating.

Although I have assembled quite a lot of written information on the subject, I have never had contact with anybody who has worked in a Browning Shop or who has detailed

personal knowledge of the process.

There are several matters about which I am unclear, particularly in connection with the so-called 'scratching-off' process so, if anyone can help me in this respect, I would be delighted to hear from them.

Trevor Deary, Norfolk.

Masking tape

SIRS, - Mr. Walker's article in *M.E.* 4210, 12 December 2003 describing the construction of a tape dispenser may be deemed trivial by some model engineers but like all articles in *Model Engineer* is worth reading for useful information. In this case a few more tips may be worth mentioning.

Of the dozen or more tapes kept in stock in my workshop, the roll of 3/4in. masking tape on the bench has the most use. Its dispenser is heavy so it stays in place and can be used with one hand. Think twice before fastening it permanently; a thousand and one uses will be found if it is handy, a few of which may not immediately occur include:

- Sticking a bit to small parts like a 10BA screw so that when (not if) it drops on the floor retrieval is easier.
- Wrapping a piece around a drill or tap for controlling the depth.
- Putting some over the heads of small rivets to keep them in place while joining metal sheets is a boon.
- Use to keep pieces of sheet metal in place on a horizontal block so it can be turned to set it vertically in a vice reduces aggravation.

Once you have this material handy you may find you'd be lost without it.

John C. Chappell, Ontario, Canada.

Surge frequencies

SIRS, - I refer to Pete Rich's letter (*M.E.* 4212, 9 January 2004) in which he quotes E. S. Cox as saying that all BR standard locomotives suffered more or less from 'surging'.

Readers should be warned that when Daylight Railtours or Steam Dreams' luncheon or dining trains (which I can highly recommend) are drawn by Standard 5 locomotive No. 73096, its 'surge frequency' when accelerating from lowish speeds can resonate with the natural 'surge frequency' of the coffee in the cups used in the restaurant cars.

A cup can be three parts emptied into the saucer and over the tablecloth, literally in second, unless hurriedly snatched up!

Peter Mercer, Berkshire.



THE 73RD MODEL ENGINEER EXHIBITION RESULTS AND AWARDS

THE DUKE OF EDINBURGH CHALLENGE TROPHY

Cherry Hill *Gillets & Allatt Traction Engine 1862*

CLASS A1: HOT AIR ENGINES

Gold Medal:
Herbert Stumm *Malone-Stirling Cycle Engine 1932*

CLASS A2: GENERAL ENGINEERING MODELS

Silver Medal and the Tom Nevins Memorial Trophy:
John Smith *Cross Compound Corliss Valve Mill Engine*

Silver Medal and the Bill Hughes Cup:
Norman Barber *Sissons Engine*

Very Highly Commended:
Byron G. Barnard *Two Steam Turbines*

CLASS A3: INTERNAL COMBUSTION ENGINES

Gold Medal and the Edgar Westbury Trophy:
Rolf Depping *BMW RS500 Compressor of 1939*

Bronze Medal:
Peter Civati *Four-cylinder 5.3cc Aero Engine*

Very Highly Commended:
Byron G. Barnard *Centaur Gas Engine*

Very Highly Commended:
Byron G. Barnard *10cc Petrol Engine*

CLASS A4: MECHANICALLY PROPELLED ROAD VEHICLES

Silver Medal and the Aveling-Barford Trophy:
Alan Temple *Burrell Gold Medal Showman's Tractor*

Highly Commended:
C. Clarke *1in scale Traction Engine Minnie*

CLASS A5: TOOLS AND WORKSHOP APPLIANCES

Silver Medal and the Bowyer Lowe Challenge Cup:
Martin Gregory *Quorn Tool and Cutter Grinder*

Very Highly Commended:
Peter Clark *Micro Drilling Attachment for Aciera F1 Milling Machine*

Commended:
Ian Cornish *Small Dividing Head for Myford ML7 Lathe*

Commended:
Gary Wooding *Bandsaw Blade Soldering Jig*

CLASS A6: HOROLOGICAL, SCIENTIFIC AND OPTICAL APPARATUS

Gold Medal and the Claude B. Reeve Memorial Trophy:
Philip Warrington *Joseph Merlin's Band Clock 1776*

Silver Medal:
Philip Warrington *Grasshopper Clock*





Tony Meek

Silver Medal:
James Martin Skeleton Clock

Silver Medal:
David Beach 8-Day Skeleton Clock

Bronze Medal:
Ian Rutherford Great Wheel Skeleton Clock with Passing Strike

Bronze Medal:
John Chantler Skeleton Clock

Very Highly Commended:
Adrian Garner Clock Mainspring Winder

Highly Commended:
John Buckingham Clock - Regulator 8-Day Movement

CLASS A7: GENERAL ENGINEERING EXHIBITS

Gold Medal:
David Hudson 5in. gauge Passenger Car Chassis with Pivotless Bogies

CLASS B1: WORKING STEAM LOCOMOTIVES (1in SCALE and OVER)

Gold Medal, the Bradbury-Winter Memorial Challenge Cup and the Charles Kennion Memorial Trophy:
Peter Fagg Sir Bors de Ganis 5in. gauge Southern Railway 4-6-0

Gold Medal and the J. N. Maskelyne Memorial Trophy:
Tony Meek The Princess of Wales 5in. gauge Midland Railway No. 2601

Silver Medal:
Peter Gardner Titan 7¹/₄in. gauge North Eastern Railway T1



Peter Gardner

Silver Medal:
Richard Castle

North British Locomotive Works 0-6-0T Dock Shunter

CLASS B3: LOCOMOTIVES OF ANY SCALE

Silver Medal and the Crebbin Memorial Cup:
David Hudson British Rail Class 2, 2-6-2 Locomotive

CLASS B9: PASSENGER OR GOODS ROLLING STOCK (ABOVE 1in. SCALE)

Bronze Medal:
Guy Harding Metropolitan Railway Dreadnought Brake Third Coach

CLASS D1: SCALE RADIO CONTROL FLYING MODELS

Silver Medal:
David Horton Nieuport 21/22 BIS

Silver Medal:
Colin Hammond B25 Mitchell

Bronze Medal:
Ian Redshaw Fokker EV Flying Razor

Bronze Medal:
Ian Redshaw Airco (De Havilland) DH2

CLASS D3: NON-FLYING AIRCRAFT

Commended:
Stephen Atkinson Supermarine Spitfire Mk.V

CLASS G1: CARRIAGES AND OTHER SPRUNG VEHICLES

Silver Medal:
Brian Young Weeks Potato Sprayer

Silver Medal:
Roger Morgan Herefordshire Wagon



David Horton



Colin Hammond



Ian Redshaw



Brian Young



Timothy Smith



Daniel Hellier



Nick Finch



Wilfred Vermeiren (KMYC)



George Reynolds

Silver Medal:
Harry Baker

Two Wheeled Butchers Cart

Silver Medal:
Harry Baker

Coster's London Trolley & Horse in Harness

Bronze Medal:
Timothy Smith

Brook Bond Tea Wagon

Commended:
Harry Baker

London Well-Bottomed Milk Float

Commended:
Harry Baker

London Milk Van

CLASS J1:

ANY TYPE OF MODEL MADE BY AN UNDER 14 YEAR OLD

Gold Medal and the Junior Trophy (Under 14):

Daniel Hellier

Stuart Turner 10V Steam Engine

CLASS J2:

ANY TYPE OF MODEL MADE BY AN UNDER 16 YEAR OLD

Silver Medal and the Junior Trophy (Under 18):

Nick Finch

1930s Speed Boat

BEST CLUB STAND

The Koninklijke Model Yacht Club

Very Highly Commended:

Society of Ornamental Turners

SPECIAL AWARD

George Reynolds

Display: 50 years of model engineering.

THE DUKE OF EDINBURGH CHALLENGE TROPHY AT THE 73RD MODEL ENGINEER EXHIBITION

Ivan Law

our Chief Judge, describes the three remarkable entries that contested this prestigious award.

I have a considerable respect and admiration for all exhibitors who enter their models for the Duke of Edinburgh Challenge Trophy. Only work of the very highest standard is accepted for entry into this competition which is regarded as the most prestigious of all the awards. Builders of models that are accepted for entry have the gratification of knowing that they have achieved a standard that many hope for and all admire. This in itself is an achievement of which to be proud. The entrants are well aware that no matter how many models are entered into the competition, there is only one award, so the chances of being disappointed are high. The judges understand only too well the thoughts that are passing through the mind of the competitor when the entry form is being filled in, hence my comment concerning admiration in the opening sentence of this report.

The judges are pleased to be given the opportunity to examine these models for a second time, but are more pleased that the public also has the same privilege. Judging models entered into this event is an almost impossible task as they cover such a wide range of disciplines. All the models have, in previous years, been closely scrutinised by judges who are specialists in the disciplines involved in each model type. Each has

then been awarded the highest accolade. It can therefore be assumed that little if any fault has been found in them and that all entries are of the appropriate high standard. One of the criteria discussed by the judges is the number of different disciplines involved in each model.

With most entries it is almost impossible to detect any flaw at all even after the most extensive examination. However, if only a few disciplines are involved in a model's construction, then this must be taken into consideration when making the final choice. There is also a factor that is just as impossible to describe as it is to judge. This is often referred to as the 'X' factor. It is that special something that automatically draws one's attention to a model. When a model has this factor, any observer, not only the judges, can detect its presence, but what it is and how to define it is most difficult. Judging for the Duke of Edinburgh Challenge Trophy is never simple!

There were only three entries in this year's competition. All had qualified for entry by gaining major awards or gold medals in previous year's exhibitions. They were a model Manx Norton racing motor cycle engine made by Mr. Depping from Germany, a World War II Class 'D' Motor Torpedo Boat No. 681 *Fairmile*, entered by Mr. Skeats from Devon and a Gilletts & Allatt traction engine, constructed by Mrs. C. Hill from Malvern.

1954 Manx Norton engine

The trend nowadays for IC engine builders is towards multi-cylinder engines. Mr. Depping

followed this trend and constructed a nine-cylinder unit. For his next project, the one entered into the competition, he fancied an engine somewhat less repetitive and so decided on one with a single cylinder. However, he decided not to build a simple one, as he wanted it to be interesting and demanding.

The prototype finally chosen was a classic motor cycle engine: the Manx Norton racing engine of 1954. This engine has double overhead camshafts driven from the crank by bevel gearing to a vertical shaft and from there via an intermediate shaft to the two camshafts. It is a dry sump engine, the oil being pumped via the timing gear carrier to the big ends through an adjustable metering valve, then to the cam box before being returned to an external tank by means of a scavenge pump. Mr. Depping wanted the engine's sound to be authentic, so this had an influence on the size of the model and after much thought a scale of 1:2.75 was chosen. A correct scale megaphone exhaust system was constructed and fitted. The result is that when running at 11,000rpm, its voice is clear and sounds just like the full size engine.

No castings were used in the construction of the engine, all the parts usually produced from castings being machined from the solid. This method of construction is now quite common with constructors of the more complex IC engines, as it is easier to obtain a scale type of finish, particularly on some of the finer details. Mr. Depping says the engine starts without difficulty



The World War II Class 'D' motor torpedo boat No. 681 Fairmile built by Mr. Skeates with astonishing attention to detail. (Photograph: Jon Godsell)



Mrs. Cherry Hill's remarkable Gilletts and Allatt traction engine is built to the usual peerless standard characteristic of this competitor.

and he has run it for an hour non-stop at various throttle settings with no signs of any distress. The engine is a fine piece of work and thoroughly deserved its place on the DoE stand.

'D' Class motor torpedo boat

There is always a good selection of model boats at the Model Engineer Exhibition so it is not surprising to see a boat entered for the Duke of Edinburgh Challenge Trophy. Many boats are difficult prototypes to model owing to their size. A large prototype means that the model must be built to a small scale and this necessitates producing very small detail work. I discussed this problem with a model boat maker a while ago and he said that he always tried to obtain a photograph of his intended prototype. He then enlarged the picture to the size of the intended model. He then knew that the detail that could be clearly seen on the photograph must be reproduced on the model. A small prototype therefore calls for most details to be included on the model.

Mr. Skeates' entry was of a motor torpedo boat built to a scale of 1:24. This resulted in a model 57in. long, small enough to handle but large enough to include almost all the detail work. Mr. Skeates provided a very extensive range of notes and builders drawings with his entry, this not only was of considerable help to the judges but also showed the depth of research Mr. Skeates undertook to ensure fidelity to prototype. His model was of a 'D' Class MTB of which 228 were built between 1942 to 1945. The designers of the boat, the Fairmile Company, actually supplied a kit of parts for the hull and superstructure to enable it to be constructed in small boatyards throughout the country. In fact some thirty yards produced these craft. It is not surprising that, with so many constructors, variations in detail as well as armament occurred.

This presented Mr. Skeates with a problem, to decide which particular boat to research. The one finally chosen was number 681. It is surprising just how much information he collected considering 681 is at the bottom of the North Sea. It also shows how dedicated he was to make sure his model was authentic. The model is built on the same lines as the prototype, the hull being double diagonal planked with wooden topsides and superstructure. The detail work on the decks and armament is to a very high standard. The searchlight is fully operable, the four main guns both train and elevate and also synchronise correctly to the working sight mechanism. The model of the 10ft. dinghy is an exhibit in itself. It was a pity that the judges were not able to remove the deck in order to obtain a view of the machinery and control systems. We thank Mr. Skeates for



The superb model of a 1954 Manx Norton racing motor cycle engine built by Mr. Rolf Depping.

entering the competition and providing the opportunity for us all to appreciate his fine work.

Gilletts and Allatt traction engine

Mrs. Cherry Hill is no stranger to the DoE Competition. Ever since the competition began she has had regular entries at intervals of about four or five years, all her entries with one exception have always been to the small scale of $\frac{3}{4}$ in. to the foot, and of steam road vehicles of unusual or little known configuration. Illustrated on the cover of this issue, her entry this year was a Gilletts and Allatt traction engine of 1862 vintage. The patent number is 2260 and dated 1862. This described the engine as "... comprising of two separate frames rigidly fixed together to form one four wheeled unit, the leading frame contains the boiler and engine, the steering gear and water tank." The patent refers to this as the 'driving frame'; the rear frame being termed the 'loading frame'. When the two frames are fixed together the result is a rigid four-wheeled vehicle similar to a present day open backed lorry. The loading frame can be uncoupled from the power unit by removing three pins and then exchanged for a similar unit or one specially adapted to suit the load to be transported, the trailing frame carrying the load being able to be changed at will. It is, in fact, an ancestor of the modern, articulated transporter.

If a more powerful engine is required then two identical 'power or driving frames' can be coupled together thus providing a four-wheel traction engine. All the four wheels are then driven and each axle is equipped for steering. A brake drum is fitted to each wheel, the braking being obtained by contracting a band around the drum. The load is then towed in a similar manner

to normal types of traction engines. If required, by disengaging the gears on the drive shaft, any of the wheels can be made to run free on its axle. The model entered by Mrs. Hill depicts the engine in this configuration. An interesting feature about the boilers is that although they are the normal, vertical type, the chimneys are not on the centre-lines of the smokeboxes but well forward. This is to allow easy cleaning of the boiler tubes.

As is common with all of Cherry Hill's models, the Gilletts & Allatt engine required a great deal of research. In fact, this began in 1990 but it was not until 1993 that layouts and detail drawings of some of the component parts began to be produced. Construction was started in 1994 and lasted for five years. The painting, for which she is renowned, occupied a further six months. Working in the small scale she prefers, she finds that it is not practical to use castings so all her models are made from solid stock material or from fabrications. No commercial or proprietary components are ever used. Even nuts, bolts, screws and rivets are made by herself. She says that modern commercial fasteners are not correct in size and profile and do not look authentic on models of early engines.

It is not possible in this brief report to discuss all the details incorporated in the model. It is one of those exhibits that keeps drawing you to itself and on each visit details are noticed that were previously missed. For instance it was quite easy not to notice the tiny chains attached to the toolbox wedges. They are made from 0.008in. dia. wire, the links being only 0.036in. internal diameter, and yet the joints of each link were soldered. I have sometimes heard doubts expressed as to whether her models work. They most certainly do, I have had the privilege of actually driving some of them under pressure and they perform just as well as they look. The Gilletts & Allatt traction engine must have been quite interesting on the road, having two steering axles, four independently driven wheels and independent brakes to each wheel. It would certainly present a challenge to the driver, particularly in modern traffic!

I am led to believe that in the art world, people who make a study of the subject can easily recognise a great artist's work by its individualistic style and the expertise displayed by the artist. It is the same with Mrs. Hill's work but with a difference. Works of art have been copied and, at times, have fooled the 'experts'. I cannot think that anyone will copy one of Cherry's models and then claim that it was built by her!

The judges, after the usual lengthy debate in which the merits of the three entries were assessed gave the award to Mrs. Hill's traction engine.





A view of the completed V-twin engine and gearbox assembly showing the reversing lever and steam receiver pipe.



Another view of the engine and gearbox. Note the method of attaching the gearbox to the crankcase and the final drive arrangements.

FOWLER STEAM WAGON

Tony Webster

makes a start on the engine for this neat and technically novel wagon.

●Part II continued from page 78
(M.E. 4213, 23 January 2003)

The most important structural part of the engine is the upper half of the crankcase (Part No. 8632) which includes the trunk guides with their upper flanges for the cylinders, the substantial engine mountings, and the crankshaft bearing housings. The lower half of the crankcase (Part No. 8635) forms the other half of these housings, and contains the Hackworth valve gear. A sump (Part No. 8635) encloses the bottom of the engine and forms an oil reservoir.

Crankcase

Start by machining the crankcase bottom half (Part No. 8635) on both the top and bottom faces; aim for a depth of $1\frac{13}{16}$ inch. The top face can be done in the lathe (photo 5), but the projecting flange means that the bottom face will have to be milled. Face the flange at the same time and the little rib between the side flanges. Do not machine the outside of the flange at this stage.

The crankcase top half (Part No. 8632) is bolted to the faceplate with two lengths of M8 studding which have been bent to about 45deg. at their mid-length (photo 6). A 50mm or 2in. block of hardwood between the faceplate and the rounded top of the crankcase between the trunk guides locates the casting lengthwise. Lateral location is achieved by adjusting the nuts on the studding. Skim all over the joint face just to clean it up.

To make casting of the crankcase top half possible (photo 7) requires a split pattern with six cores; it is cast without the rear external flange onto which the gearbox will be bolted. The flange and bearing housing part is a separate casting which needs to be machined next (photo 8).

Mark the centre of the bearing housing and set it up in the 4-jaw chuck, gripping by the outside of the flange (photo 9). Face the flange and turn the semicircular projection which contains the positions of the clamping studs; aim to keep it between $3\frac{1}{4}$ and $3\frac{1}{2}$ in. 'diameter'. Face the central part but do not bore it.

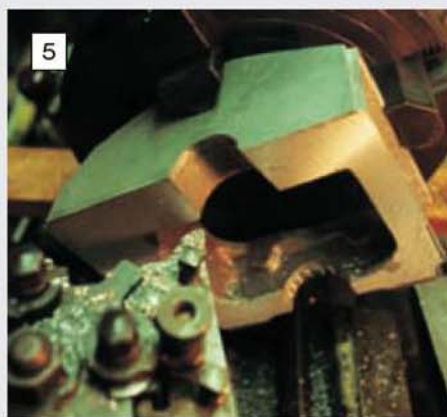
Mount the crankcase upper half on an angle plate which is itself bolted to the faceplate, with

the rear end outwards and overhanging, making sure that the hole at the front of the casting (for the front bearing housing) also runs true. Face the end and bore to match the bearing housing just done.

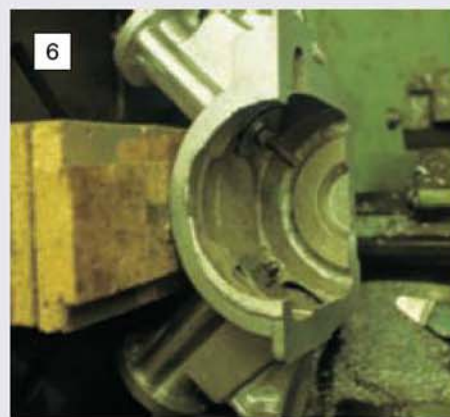
Remove the casting and prepare to drill for the two main M6 clamping studs at $2\frac{3}{8}$ in. centres; these studs are inset $\frac{11}{16}$ in. from the back face of the crankcase inclusive of the extremal flange. Mark out and drill the bearing housing from the flat (joint) side which is not yet machined. Clamp into position in the crankcase top half and drill through. Counterbore from the top to give a full circular seating for two tubular aluminium alloy bosses, giving clearance for the nuts. All nuts

must have flat steel washers where they bear onto the aluminium alloy surface. The bottom face of this housing-cum-flange casting should be standing proud of the crankcase joint face.

Assemble the crankcase upper half with the bearing housing/flange and clamp together with temporary M6 studding. Drill and tap for eight 4BA or M4 countersunk screws on a 4in. pitch circle diameter to permanently secure the bearing housing/flange to the crankcase top half. After dismantling, de-burring and cleaning, these should be sealed and locked with an anaerobic adhesive retaining compound. All future reference to the crankcase upper half will assume that the



Machining the bottom half of the crankcase with the work piece on the lathe faceplate.



The crankcase top half mounted on the lathe faceplate for machining of the bottom face.



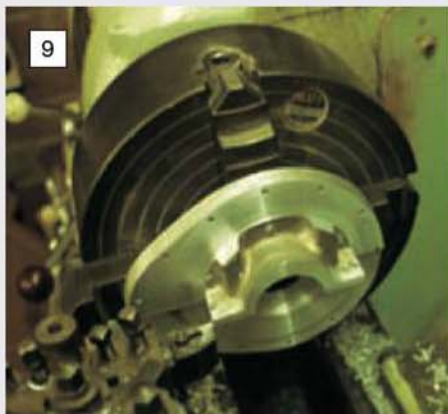
The crankcase top half casting as received from the foundry and prior to machining.



Rear flange and bearing housing castings as received from the foundry.



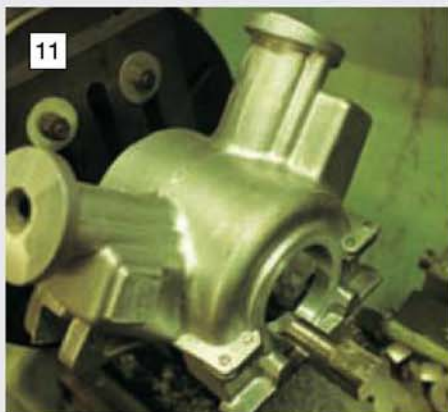
PLATE 3—Engine and Gearbox



9
Machining the crankcase rear flange using the 4-jaw chuck to hold the part.



10
The aluminium alloy casting used as a fixture plate for machining the crankshaft.



11
Boring the front bearing housing with the work piece mounted on the lathe faceplate.



12
Boring the trunk guides with the work piece again mounted on the faceplate.

We regret that the Author's e-mail address as published in Part I of this series was incorrect. Tony Webster can be contacted at webster-tony@sagainternet.co.uk

flange is not very thick, drill and tap 4BA and screw a hexagon head set screw from the top side. This is difficult to get started but the hexagon head allows the use of a spanner to tighten them. The front bearing housing and cap are held by the same six 4BA set screws as the housing itself.

The trunk guides which need to be $1\frac{9}{16}$ in. dia. (a drawing of the liner will be published next time) are bored at 45deg. to the main joint face and parallel to the rear face of the crankcase.

Lay the rear face of the assembled top and bottom crankcase halves down on a surface plate and mark across both trunk guide flanges at a common height. A universal milling machine would come in very handy at this point. Mount the crankcase upper half on the table, making sure that the rear face is parallel to the table travel, set over the head to 45deg. and bore each trunk guide in turn using the quill. While set in each position, turn the outside of the flange to just clean it up and face the flange. If one of these faces is done first, both bores can be completed without moving the table crosswise, and facing the other flange last can complete the job.

A 45deg. angle plate will be needed to bore the trunk guides on the lathe. This is bolted to the boring table (carriage or cross-slide) and the crankcase bored from the chuck. It could alternatively be secured to the faceplate. In both of these cases it is vital that the rear face of the crankcase is in line with the lathe bed (photo 12).

●To be continued.

rear bearing housing and flange are included.

Set up the complete casting on its rounded top as before, again on the 2in. spacer and bent M8 studding on the faceplate, and re-machine the complete bottom face. Remove just enough to clean it up. Remove from the faceplate,

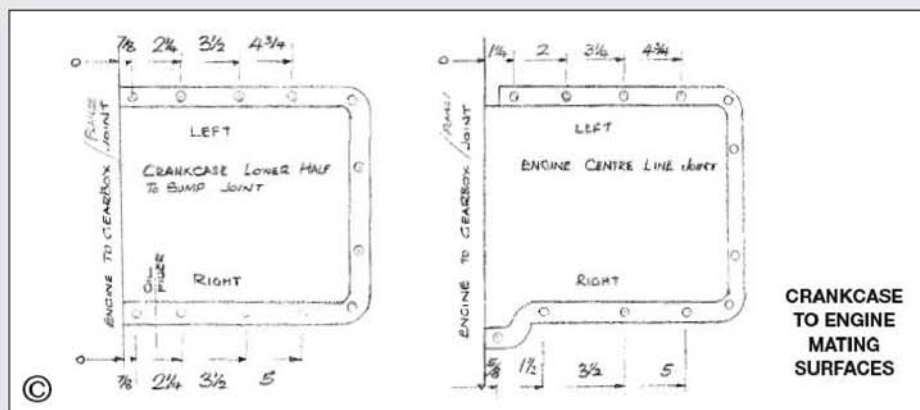
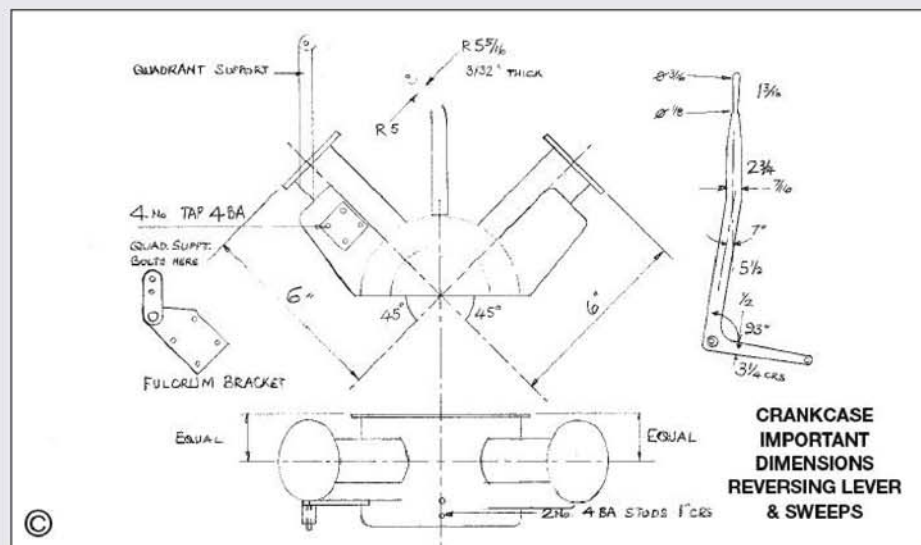
Clamp the two crankcase halves together, spot through into the bottom crankcase half and drill and tap M6 right through. Make M6 studs (or use studding), screw right through and lock with self-locking nuts on the underside after spot-facing the bottom half bearing housing.

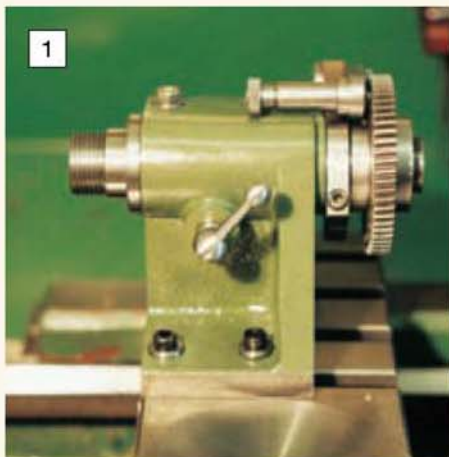
Mount the complete crankcase on an angle plate on the faceplate with the joint line (crankshaft centre) on the lathe centre line. Make sure that the front bearing housing runs true, face the rear of the casting and machine the spigot recess 4.860in. dia. by $\frac{1}{8}$ in. deep to locate the gearbox front.

Remove the job and angle plate and use countersunk screws to secure an aluminium alloy or steel plate to the faceplate, available as an aluminium alloy casting (photo 10). Face the plate and machine the spigot to fit the crankcase. Mount the crankcase on this spigot without moving the plate, and clamp the lot to the faceplate. Face the front bearing housing, flange mounting and bore for the housing (photo 11).

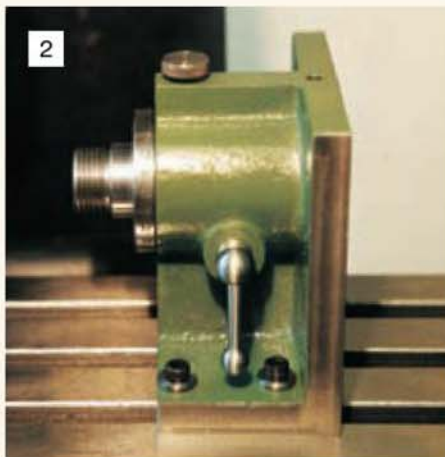
Now bore for the rear ball bearing using a long but rigid boring bar. The front bearing housing and its cap are separate castings. The front bearing housing is all machined from one end, including the circlip groove. The cap spigot traps the bearing in the housing against the circlip and provides longitudinal location for the crankshaft. I shall have more to say about this in a future article.

I should have mentioned that the crankcase halves are held together by 4BA bolts, nuts and washers under both head and nut. The four fixings under the trunk guides need to be studs but as the

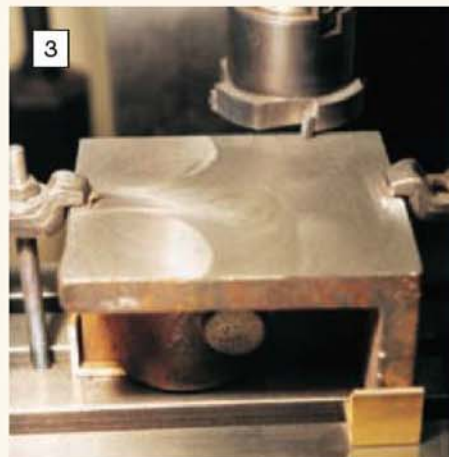




The dividing head for the Warco BH600 lathe is based on principles devised by G. H. Thomas.



The indexing head can be used in the vertical or horizontal mode on the lathe or milling machine.



Machining the bottom of the simple indexing head casting in the milling machine.

Anthony Mount

describes two useful accessories for this popular lathe which are also applicable to the milling machine.

●Part XIII continued from page 83
(M.E. 4213, 23 January 2004)

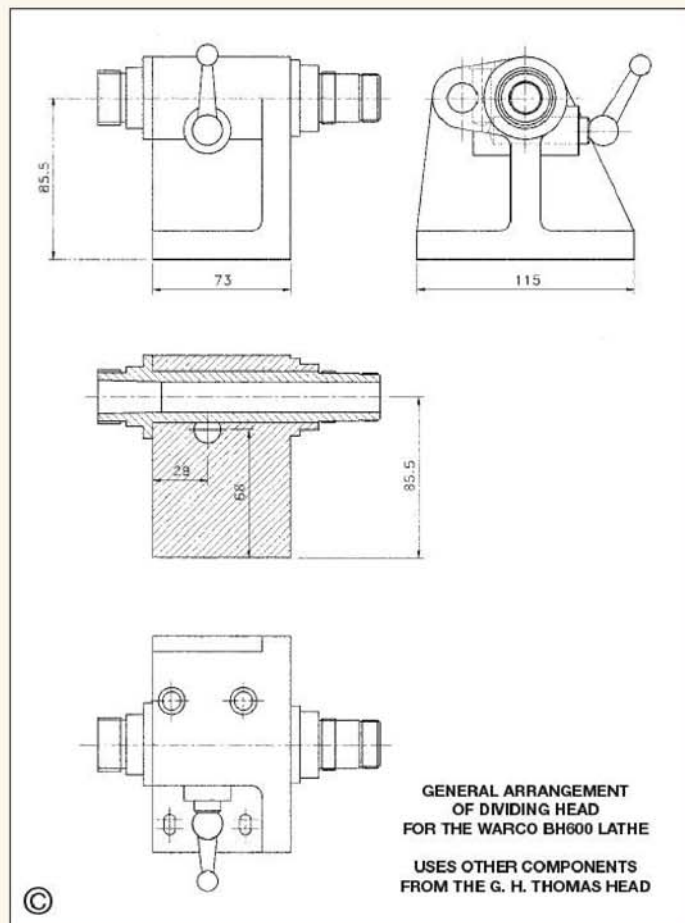
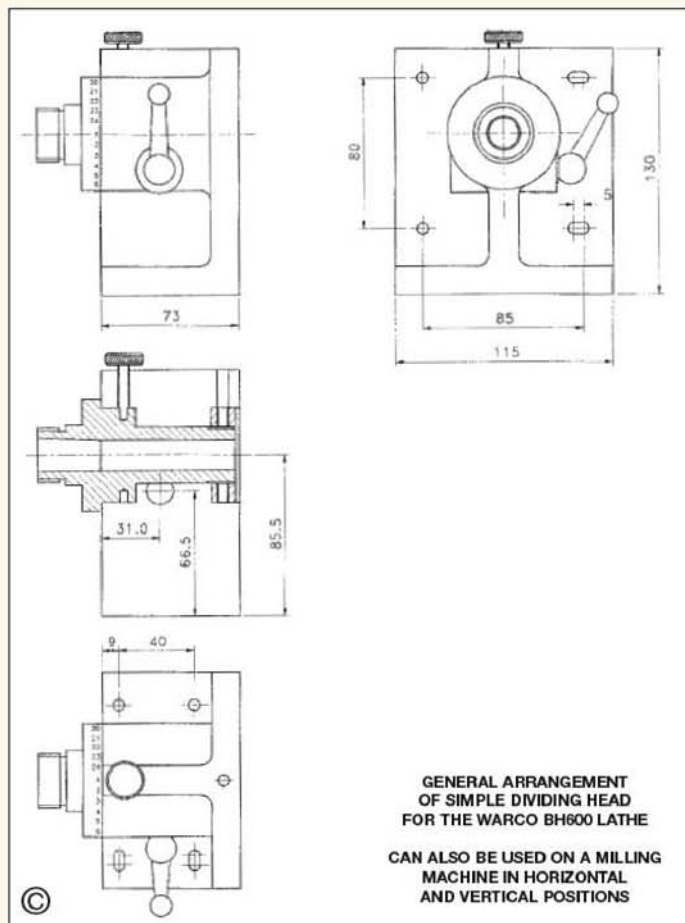
For many years I have used a G. H. Thomas designed dividing head, and found it invaluable for many jobs. If you have not already done so, do read his book on dividing published by EIM Publications as it is a font of knowledge on the subject. As published, the design is for construction and use on the Myford Series 7 lathes. As some of you may have read in my recent articles on *Fine Tuning a Warco BH600 Lathe* I have changed my lathe from a Myford ML7R to something a little bigger. However, I

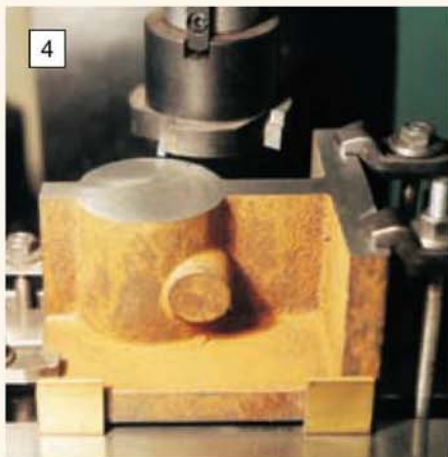
still wanted to have the facility to be able to use a dividing head on the new lathe cross-slide, as it opens up many opportunities for useful machining setups and, of course, for use on the milling machine. Also, with the greater centre height of the new lathe, the chuck jaws no longer foul the cross-slide when opened beyond the body of the chuck. At first I used a raising block to accommodate the existing head but soon felt that a dedicated head was needed for the new lathe.

My first idea was to use a stretched version of the existing casting, but about the same time, in

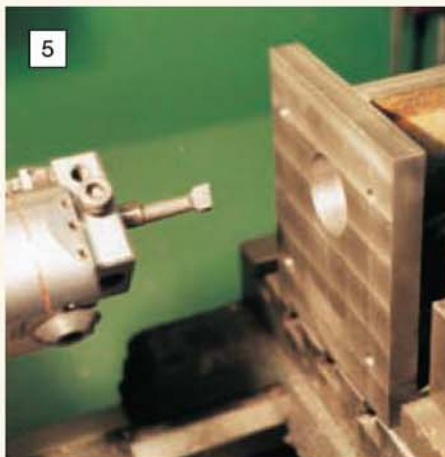
several tool catalogues, I came across a simple dividing head for use with 5C collets. There was also a 5C collet holder which could be used in both horizontal and vertical positions. This would be useful on the milling machine. Unfortunately, both these devices were the wrong size for the new lathe.

A design was evolved using features from all these sources which allowed the dividing head to be used on the lathe and milling machine in either vertical or horizontal modes. The main casting is in the form of an angle plate with a large boss to carry the spindle.

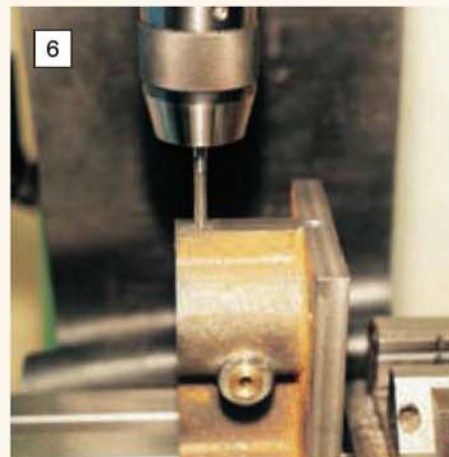




4 Facing the top of the indexer casting to bring the two main faces parallel to one another.



5 Counter boring the back end of the indexer spindle bore to accommodate the retaining nut.



6 Using the milling machine to start the tapped hole for the locking screw square to the base.

The casting is machined all over on the edges forming a square. Then it can easily be set up square on the slides with the aid of a toolmaker's square. It can be bored *in situ* on the cross-slide for concentricity and accuracy to the centre line of the lathe. However, with its ring of 24 holes, this design only lends itself to simple indexing. Another design was therefore developed following the same general shape of the new head but, with the exception of the spindle, using all the parts from the old dividing head. It cannot be used in vertical mode on the milling machine.

The spindle for my GHT head had a Myford nose and was bored MT2. I followed this form for both heads as I still had suitable chucks and collets, in due course I will make another spindle to take ER32 collets for the simple head.

If you are looking into the possibility of getting a set of collets for general use, I urge you to consider the ER type collets. They come in a range of collet sizes to suit different machines; from ER16 which covers 1-10mm, to ER50 which covers 10-32mm.

Their great advantage is that each collet has a closing range of about 1mm, so that one set of collets will cover all the metric and imperial sizes within the set.

I went for the ER32 range which covers 3-20mm. Chucks are available in the ER32 size with R8, MT2 and MT3 shanks. So the one set of collets can be used in the mill to hold cutters and in the tailstock for drills. A chuck is even available from Arco for fixing to the lathe spindle nose so the collets can be used to hold material in the lathe headstock. It is a very versatile system which finds extensive use with CNC machine tools.

You can, of course, make your spindle nose to suit your own special requirements. It can be the same as the lathe nose, or bored MT3. It could be parallel as designed by GHT, or R8 or 5C. Let us

make a start with the machining; the obvious place to begin is with the two main castings.

Main body casting: Simple head (Part 01)

The main body castings are in iron and are machined on most surfaces. It is important to get all the surfaces square to each other so that in any future setting up one can be assured that all is square to the machine tool centre lines.

For both castings start with the bottom face. File the opposite face reasonably flat and bolt the casting to the milling machine table. Interpose a piece of aluminium alloy sheet between the casting and the table to protect the table from the rough casting or, as in my case, pieces of brass angle. As you can see from photo 3, the casting is held down by clamps and packing.

Machining cast iron is not my favourite occupation as the graphite in the metal makes it a very dirty job. Also the material can be quite abrasive to ordinary HSS cutters. If possible use a carbide insert or solid carbide end mill. Take a cut all over, avoiding the clamps of course, to clean up the surface. Do not take heavy cuts; about 0.5mm will do for each pass, finishing with one of 0.1mm.

Remove from the table and file away the nibs left at the location of the clamps. Reverse, re-clamp (photo 4) and machine the opposite

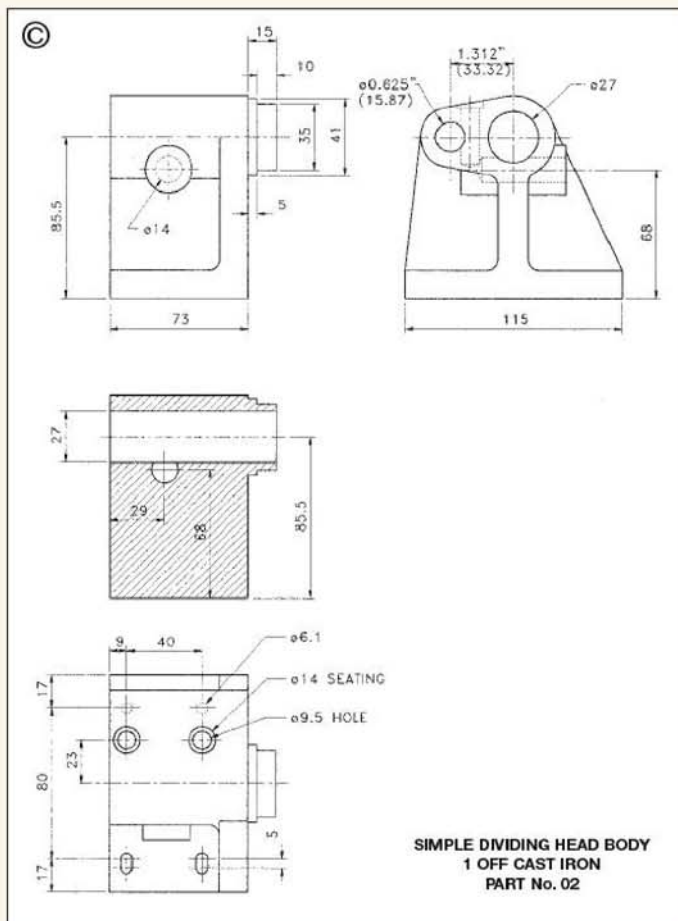
surface flat. We now have two clean surfaces parallel to each other.

Bolt a large angle plate to the milling machine table and clamp the casting to it with the machined surface against the angle plate. The edges can now be machined. Re-position and mill the front and then the back face flat.

The fixing holes can now be drilled. You will notice on the drawing that some of the fixing holes are elongated into slots. This is to accommodate the difference in T-slot centres on my lathe cross-slide and milling machine table. So, check your T-slots to see if they are the same.

The front face can now be machined on the milling machine. Reverse the set square and take a cut from the back face to bring the head to size.

One consideration to bear in mind is to try to get the centre lines for the spindle to coincide with the actual centre of the boss on the casting. It is a casting, so you will not get it exact, but try



Dividing Head Parts List

Part No.	Drawing No.	Description	Material	Quantity
01	03	Simple head body	Iron casting	1 off
02	04	GHT body casting	Iron casting	1 off
03	05	GHT spindle	45mm dia mild steel	150mm
04	06	Simple head spindle	60mm dia mild steel	120mm
05	07	Simple head spindle nut	50mm dia mild steel	45mm
06	07	Locking screw	20mm dia mild steel	50mm
07	07	Ball handles	16mm dia mild steel	100mm
08	07	GHT head screw	14mm dia mild steel	75mm
09	08	Simple head screw	6mm dia mild steel	75mm
10	08	Locking pads	14mm dia brass	150mm
11	08	Locking pads	14mm dia brass	Part of 10
12	09	Locking pads	9.5mm dia brass	100mm

to get somewhere near. During the facing operations, when the spindle clamping boss is in the correct orientation, drop the cutter down to it and skim the surface of the boss flat.

Remove from the cross-slide and mark the centre lines of the spindle hole as taken from the centre of the spindle housing, rather than from the mathematical centre line. Put a centre in the tailstock and with the casting on the cross-slide, see if the centre lines line up with the tailstock centre. If not, remove material from the bottom of the casting until it does.

Before we can bore out for the spindle, a hole needs to be drilled in the centre of the clamp boss to receive the clamp pads. Centre deeply, drill right through 6mm diameter and open out to 14mm diameter.

The brass clamp pads are machined as one piece with a flange. When pushed into the hole, an M6 cap head Allen screw can be used with a cup washer to pull the pad down against the flange. When the spindle hole is bored through

the head, the pads will be machined at the same time. When removed from the head casting, the pad can be cut in half and the flange removed.

When you are satisfied with the external machining, bolt the casting down once again on the cross-slide, checking that it is set square, and drill through for the spindle hole. Open out to as big as you can with drills. Change to a between-centres boring bar and finish the spindle bore to size. Set up a boring head in the lathe spindle and open out the spindle hole in the casting to take the front end of the spindle. Set up a saddle stop on the lathe to obtain a consistent depth to the counterbore.

Reverse the casting on the cross-slide and set it true to the lathe centre line. A piece of 30mm bar held in the chuck can be used to locate the casting. Have the casting loose on the cross-slide, manoeuvre it onto the bar in the chuck and then secure the T-nuts. This should bring the head square to the cross-slide.

Use the same procedure (photo 5) with the

boring head to counterbore the back end of the spindle bore to accommodate the lock nut.

There are two holes to be drilled in the web at the top of the casting. The one at the front is tapped M6; photo 6 shows the tapping operation is being carried out. Not under power, I hasten to add, but by hand to get the tap started true. This is for a knurled screw that acts as a detent for indexing the ring of holes. The one at the back is a clearance hole for an Allen key to gain access to the Allen set screws in the lock nut.

I have used a knurled screw for the indexing detent as it is so simple, but you could elaborate on the design and incorporate a spring loaded detent. Something along the lines of that used on the GHT head for simple indexing would be suitable.

Clean up the casting, removing all sharp edges, fill where required, rub down and give the casting a couple of coats of primer. Finish the dividing head the same colour as the lathe.

●To be continued.



BRISTOL HYDRA THE FIRST EIGHTEEN MONTHS

Brian Perkins

describes how the first eighteen months spent on this most unusual engine drew to a close with work on the cylinder heads and barrels.

●Part VII continued from page 87
(M.E. 4213, 23 January 2004)

The only way to position the crankshaft in the crankcase is through the front end and I suddenly realised that the diameter of this bore would not accept the crank and master

Left: Author Brian Perkins caught off-guard with some of the components for his Hydra engine at the recent Model Engineer Exhibition.

rods combined. Mad panic! When I had calmed down, I put the whole lot together and found that by feeding the assembly in at an angle it is possible to pass the rear master rod through a rear cylinder bore and then, by changing the angle, the front master rod can be threaded into place. Loud sighs of relief!

To give some additional room for manoeuvre, the front and rear bearings have to be left out at this stage, but this is not a problem. How they managed on the full size engine I do not know, but dealing with the weight of the full size components must have made for some interesting moments. The slave rods and the wrist pins will have to be installed through the cylinder bores, but this should present no problems.

I now needed some cylinders so, learning from my previous experience, I took the bag full of



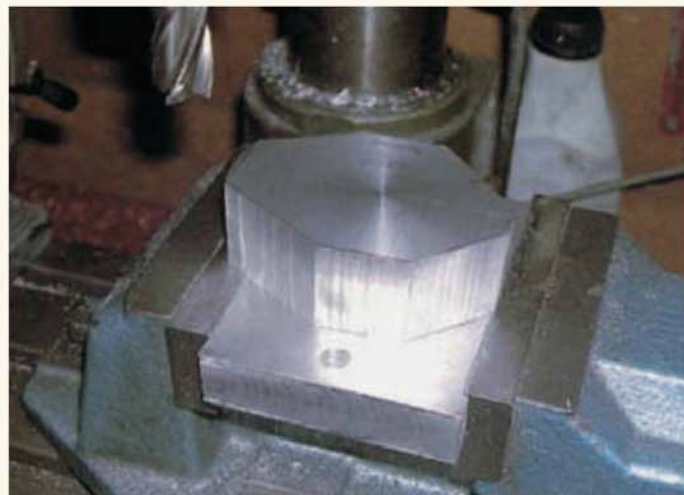
The complex crank assembly complete with the speed reducer assembly, the master con-rods, con-rods and pistons.



The first stages in cylinder head manufacture. Left: the blank has been screw cut. Centre: marked out for band sawing. Right: band sawn to shape.



The fixture devised for holding the cylinder head blanks for milling. The blanks are clamped by the tapered plugs.



The initial set up for machining the outline of the cylinder heads uses the fixture in the milling machine vice.

blanks to the Heritage Trust and spent a morning putting a large drill through the centre of each blank. Back home, I finished the bores and turned and screw cut the outer diameters. The fixing flange was left round at this stage because its true shape and the fixing holes cannot be machined until the cylinder heads have been screwed on and aligned.

I had intended to machine the fins integral with the steel cylinder, as on the full size. However, the combination of the thickness and depth of the fins (0.025 x 0.180in.) defeated me so I reverted to shrunk-on aluminium alloy fins

which at least look like the original engine as those cylinders are cadmium plated.

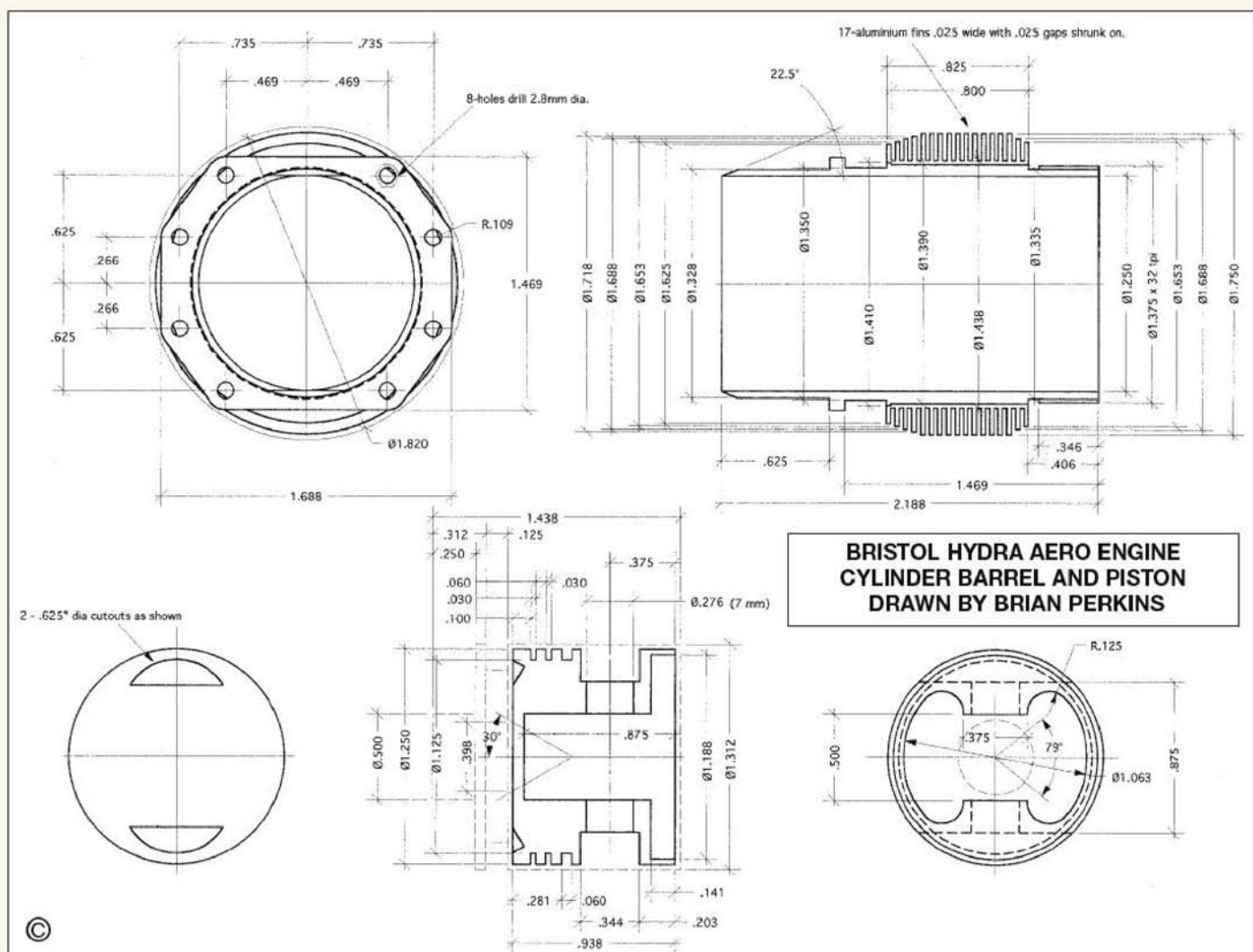
I find grinding these very narrow parting off blades very difficult but I was eventually successful in reducing a standard 1/16in. parting blade to 0.025in. with minimal side clearance, with which I managed to produce the 17 fins on all 18 blanks. Another sigh of relief!

During all this activity I had the bandsaw working away cutting blanks for the cylinder heads so now I had no excuse for not making a start. The cylinder heads are probably the most noticeable feature of the engine and had been

causing me nightmares as to how to produce them. In particular the finning is quite complex and, because of the form of the head, each fin has to be cut individually. Each head has a total of 54 fins.

I began by doing the basic turning of the lower half and then boring and screwcutting the inside form. The profile was then bandsawn to the details shown on the preliminary machining drawing and the faces and bores for the valve inserts produced.

The outer form of the head was then machined using a lin. dia. x 1/16in. thick cutter with the blank held in a tilting vice and the





The appropriate features are rounded off with the workpiece mounted on the fixture which has been transferred to the rotary table.



The vice is required once more for milling the inclined surfaces angled at 30deg. to the horizontal.

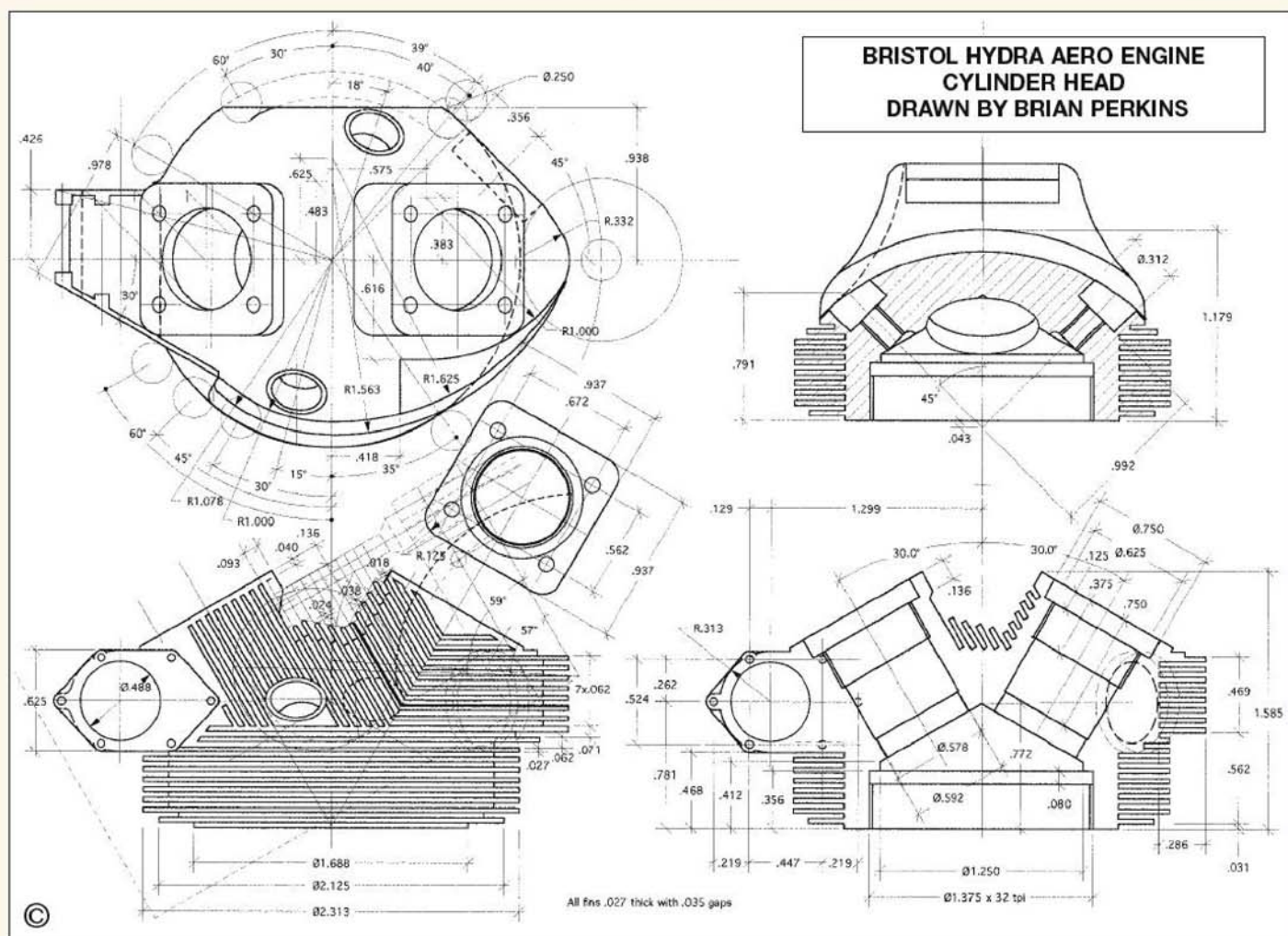
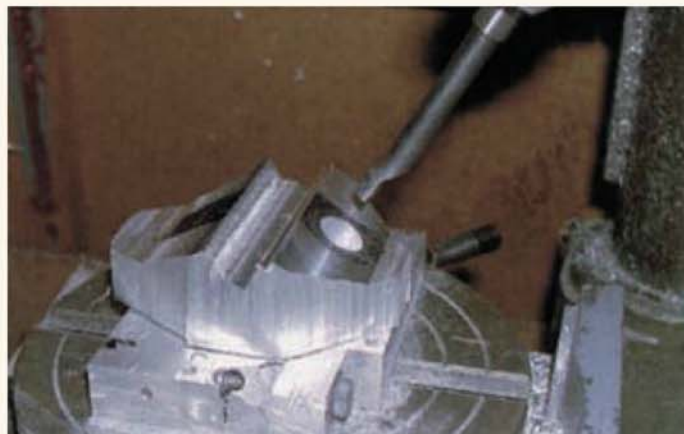
exhaust and inlet ports machined. There were several minor glitches along the way on some of the heads and I was not happy about the way things were going so eventually, after seeing the beautiful work being produced on other engines at the Model Engineer Exhibition, I decided to start again. This represented 175 hours work and the best part of three months down the drain, but I would never have been happy with the way they were turning out.

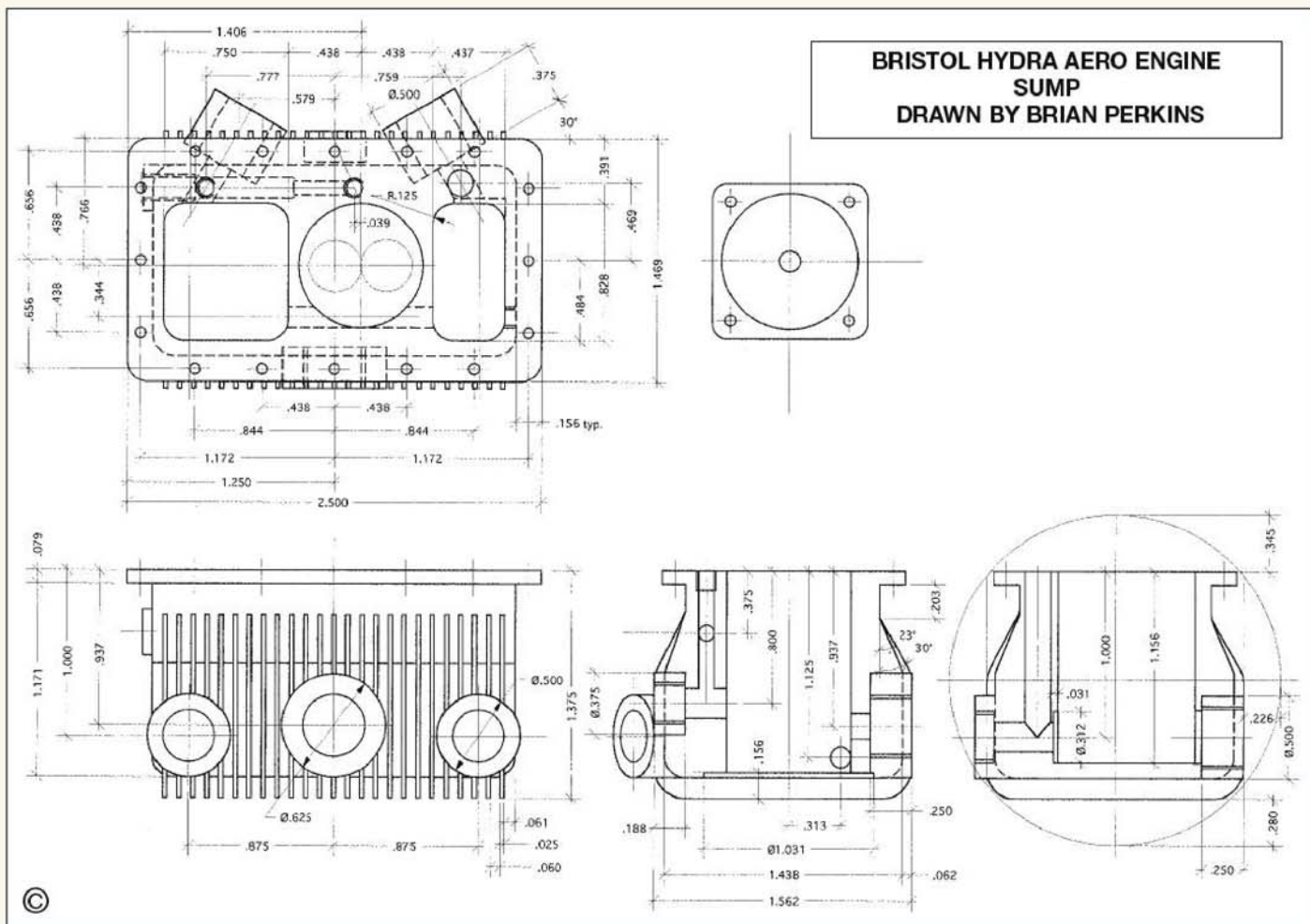
So, in the New Year I ordered another set of blanks and am happy to say that with the experience gained from the first set these appear to be progressing quite well. I have even been able to reconcile something I could not understand relating to the exhaust ports which I had spotted in some of my photographs. It seems that the exhaust

ports actually face downward at 15deg. which I had not realised on the original drawing so the first batch were wrong anyway. I find that to be some consolation for the wasted time and effort.

●*To be continued.*

Right: boring the valve housings in the angled faces using the offset boring head and the quill feed facility on the milling machine.





A tilting vice was used to hold the fixture and workpiece for some of the detailed shaping operations on the cylinder heads.



Here the final outline of the cylinder head is being generated in $\frac{1}{16}$ inch steps using a home-made cutter.



Cutting the cooling fins with a 1 in. dia. x 0.035 in. wide cutter. Many of these cutters were made before achieving a successful design.



The more straightforward fins on the inlet turret were cut with a standard 0.035 in. slitting saw, one at a time because of varying depths.

A SOUTHERN RAILWAY MERCHANT NAVY CLASS LOCOMOTIVE IN GAUGE 1

Roger Thornber
discusses gas firing and deals with
a suitable burner.

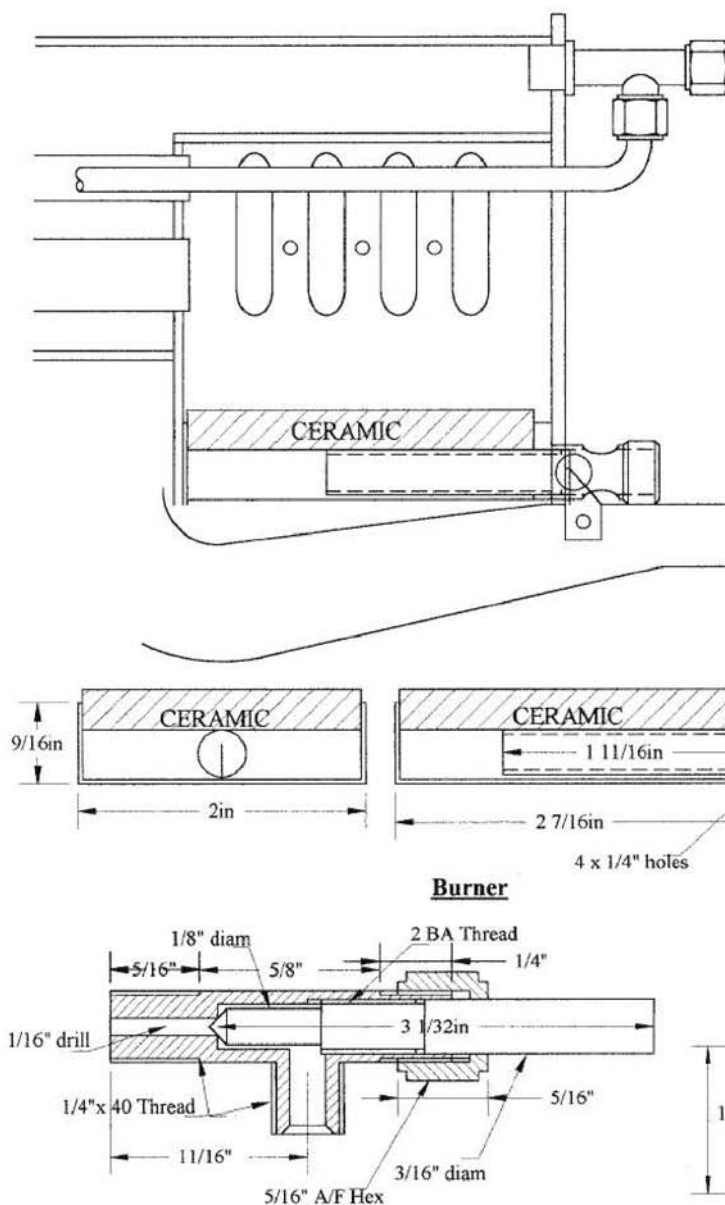
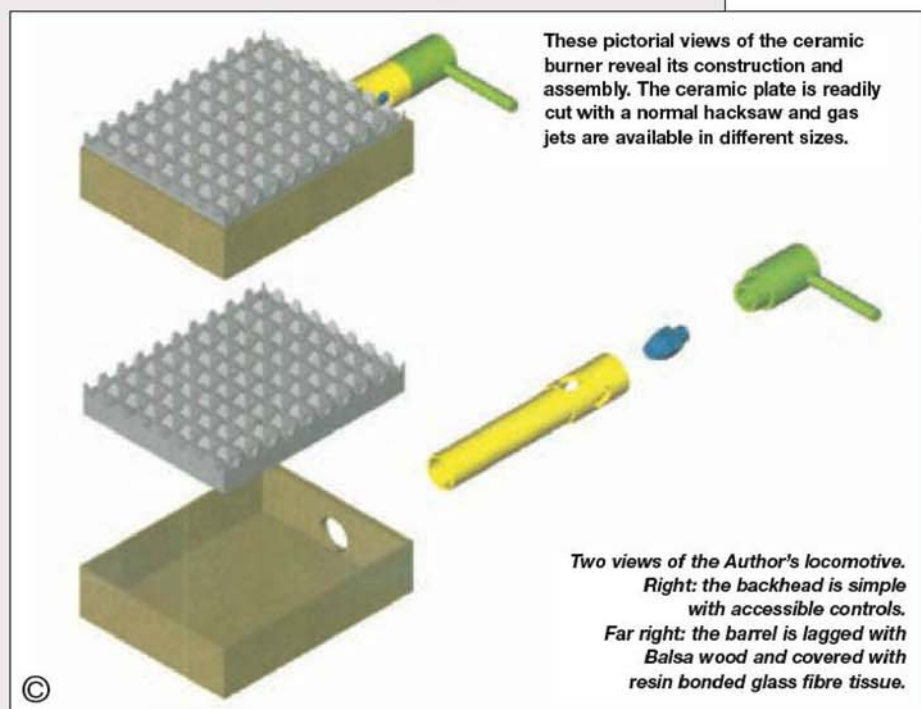
●Part XII continued from page 89
(M.E. 4213, 23 January 2003)

The boiler fittings are conventional and need little description. The gas burner uses a ceramic element, a photo of which was shown in Part X (*M.E.* 4211, 27 December 2003) might be obtained from hardware shops dealing in Calor gas stoves. Unfortunately, my usual stockist has ceased to stock it, but I was still able to get several pieces from him. Other types of element are available which I am sure work as well. The material as used may be available from Bruce Engineering, who advertise regularly.

The jets that I use came from the same stockist and are available in different sizes. I now have a few ranging from No. 6 to No. 15; No. 8 or 10 is about right for Merchant Navy locomotive. As far as stockists are concerned, if you have no luck with Calor dealers, some of the Garden Rail suppliers may be able to help. I believe that Cheddar Models may have some jets. The jets

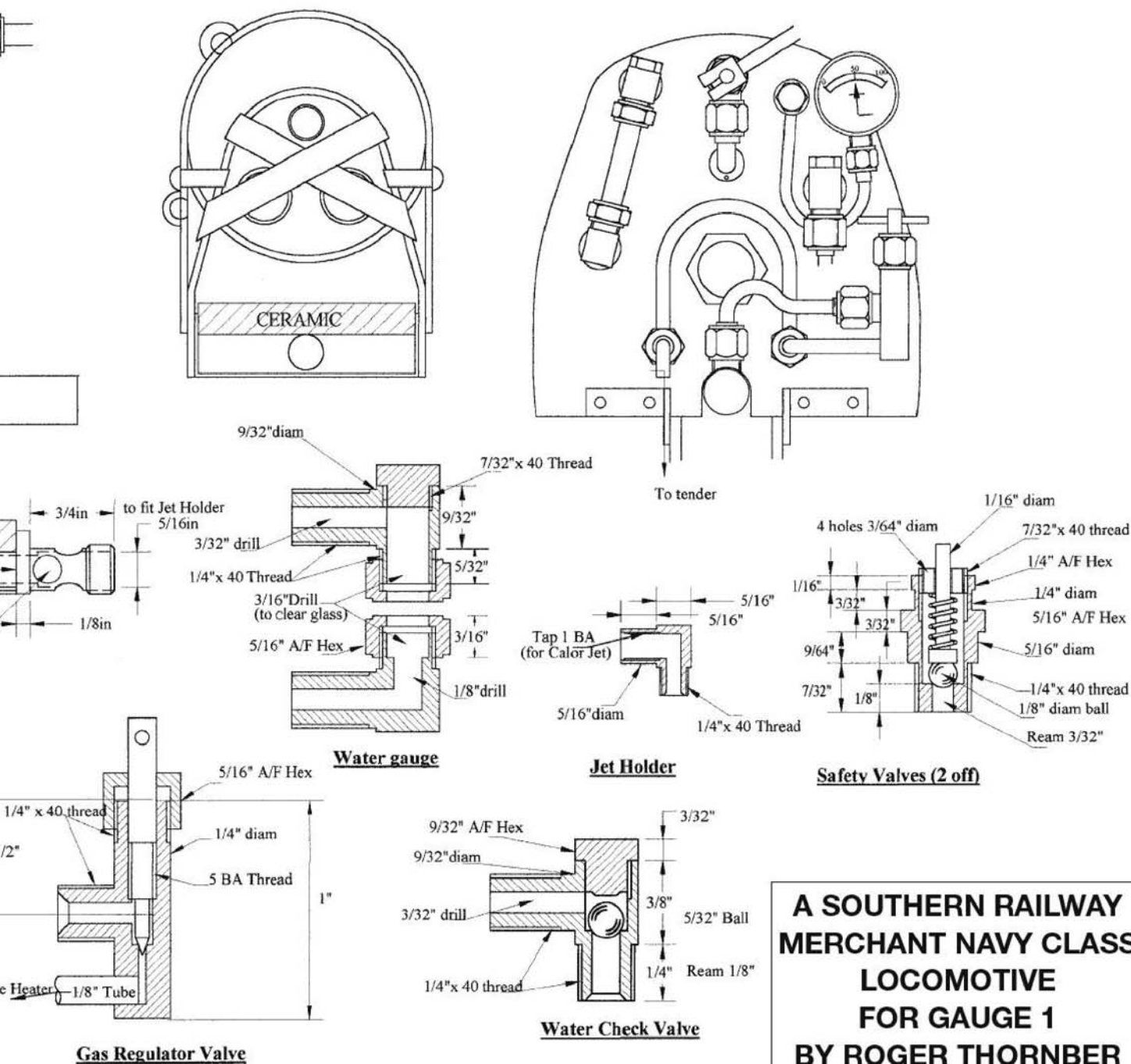
screw into a 1 BA thread and should be a tight fit otherwise they do not burn properly.

The ceramic material is quite soft and easily damaged. It can be cut with a hacksaw and file. The edges between the burner tray and the ceramic need to be sealed. I use 'plastic metal' which seems to do the job and sets quickly. It is also best to seal between the firebox and the burner, but this can be left until final assembly — the burner will work provided that there are no large gaps. However, probably because we are introducing secondary air, I have found that it is not as efficient.



REGULATOR VALVE





A SOUTHERN RAILWAY MERCHANT NAVY CLASS LOCOMOTIVE FOR GAUGE 1 BY ROGER THORNER



Gas firing

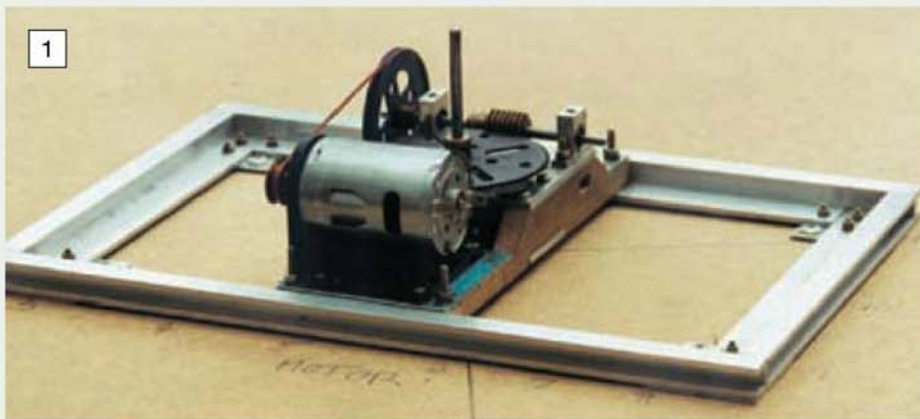
A word about gas; I chose gas, for personal reasons in that I find it the easiest to handle of the alternatives — meths or coal. Like any flammable material it can be dangerous if handled incorrectly. GIMRA now has regulations for the construction and testing of gas tanks. Butane only is permitted — propane or butane/propane mixes are not allowed. The vapour pressure of butane can get quite high as the tank temperature increases. Because of this, if the tank is located in a hot position, e.g. on the locomotive itself, the tank should be tested to 300psi. If the temperature can be restricted to below 60deg. C, i.e. by being surrounded by water in the tender, the tank should be tested to 180psi.

In my experience, there should be no problems with a well-made tank. I have to admit that I have

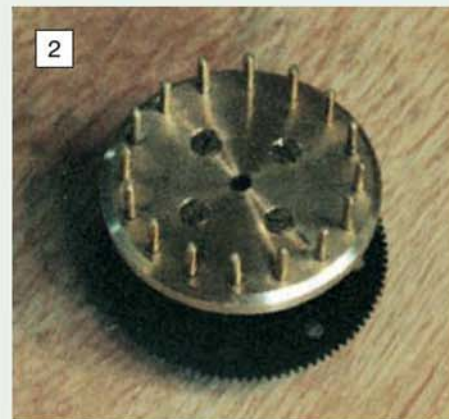
had two small incidents, but neither had anything to do with the tank. The first arose when a regulator valve, which I thought was stainless steel, corroded, and worked the gland loose. This leaked gas, which ignited. The second incident arose when I failed to tighten the connection, after removing the nozzle to clear a blocked jet. Jets sometimes get blocked and ready access is essential. A well soaked teatowel is a good thing to have handy!

The photo shows that I have made some attempt at lagging the boiler. The barrel was wrapped with 1/16in. Balsa wood and then covered with a layer of fibreglass tissue. This will have to be cut away to clear the bodywork formers. I am not sure of the effectiveness of this lagging, but it helps to keep the shell cool.

●To be continued.



The model 'engine' unit was mounted centrally on a 30 x 30in. panel of Sundela board on which the sleeper positions were then marked out.



The finished drive centre which was machined in brass on the Author's Unimat lathe.

A NOAH'S ARK CAROUSEL

T. D. Calvert

brings 'all the fun of the fair' to these pages with his construction of a working model carousel.

After many years of building model aircraft (many crashed!) model railways (re-lay the track again) model boats (stability) something different was required. 'She who has to be obeyed' suggested a model roundabout. After some thought the plans of a Noah's Ark by W. H. King were purchased from J. Maundrell of Peterborough. Very comprehensive, these come in three sheets with some instructions. My next task

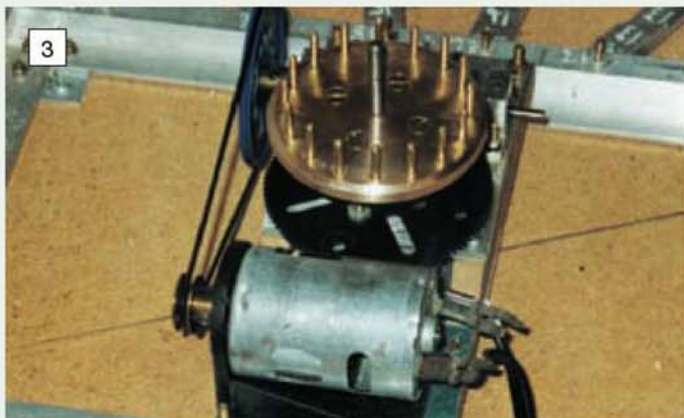
was to study the plans and read the instructions — not for five minutes, but for many hours.

The first step is to purchase a baseboard. Sundela is ideal and the size chosen was 30 x 30 x 1/2 inch. Next I worked out on the board the centre point and the sleeper positions (photo 1). The centre section of the model was made much as described but with one major exception. I did not like the worm shaft drive running in the two bushes. Two small ball races were found in the junk box and these were used to replace the bushes. The bearings are held in by small grub screws and can be seen in photos 1 and 3.

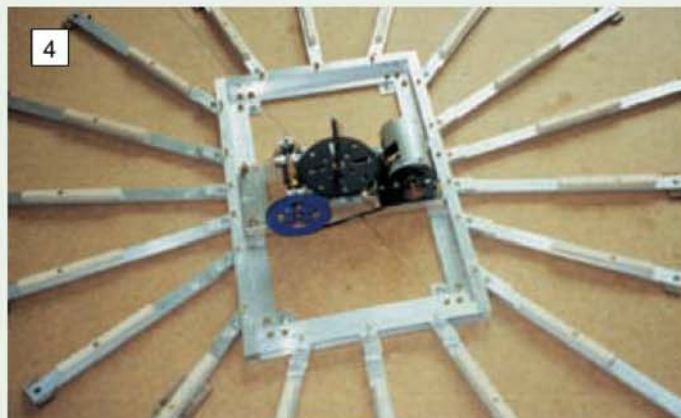
The centre of the drive was turned from scrap brass and the Unimat lathe with its dividing head

was used to locate and drill the pin holes. The bottom of each hole is threaded, as is the bottom of each pin. The finished unit is seen in photos 2 and 3. The whole unit was then mounted and tested for free and true running. If incorrect, the finished model would have been off balance and would not have worked correctly.

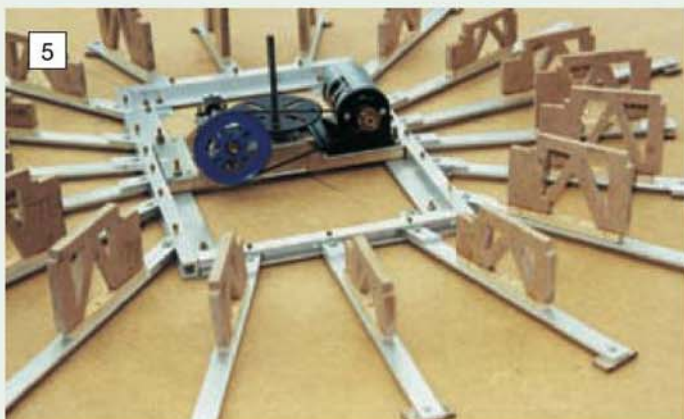
The motor is one of the model car racing types. The sturdy frame is made from H-section aluminium alloy, and the corners are reinforced by aluminium alloy plate. See again photos 1 and 3. Holes were next drilled to hold the brass pins which in turn fasten the sleeper bars to the main frame. The thickness of the aluminium alloy sleepers was incorrect for the H-section of the



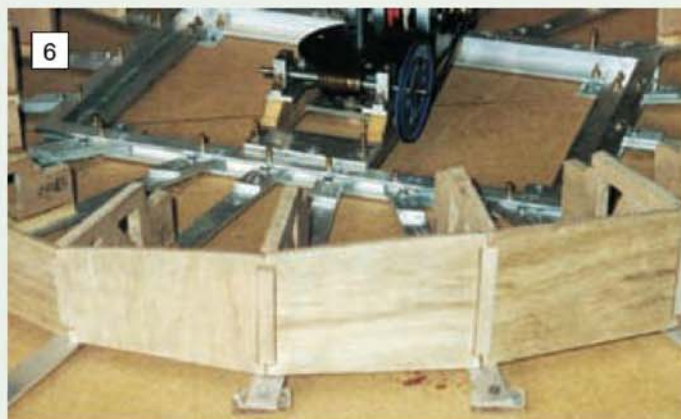
The drive motor is of a type supplied for use in model racing cars.



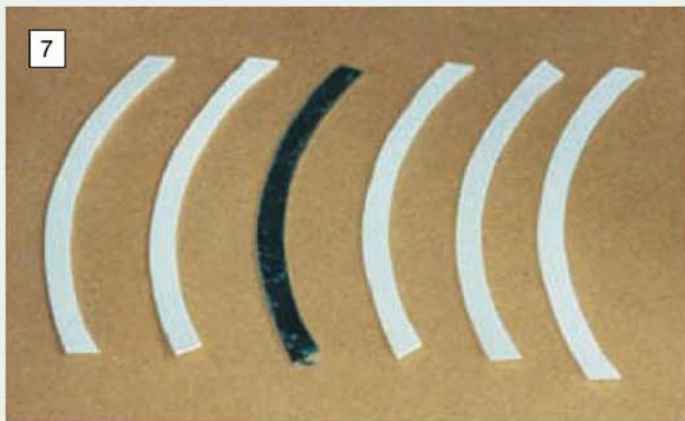
The centre section is surrounded with a fan of eighteen sleepers.



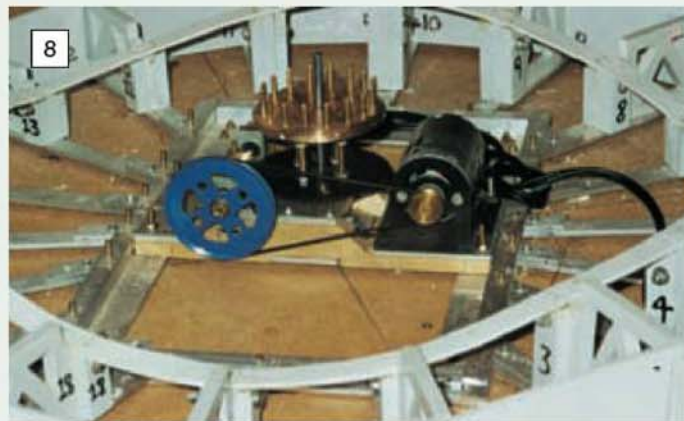
Gate bases were screwed to the sleepers and gates fitted.



Outside shutters were made and fixed in place.



Tracks were cut from styrene sheet using an aluminium alloy template.



Extra track support was provided using blocks attached to the gates.

frame. To overcome this spacers were cut and fixed to the sleepers (photos 4 and 5). The gate bases were then made and screw fixed to the sleepers (photo 4). This was followed by the gates which are held onto the bases by means of two brass pins (photo 5). All parts were numbered; failure to do so would most likely have resulted in a great deal of wasted time on assembly and subsequent re-assembly.

Coming next to the outside shutters, these were file fitted and placed into the model, care being taken to keep all the gates upright (photo 6). This photo also shows the spacers and the worm drive to advantage.

Next were the tracks with which I encountered a little difficulty. An aluminium alloy pattern was made and the tracks cut from styrene sheet (photo 7). Extra support was provided by fixing the end of the tracks to blocks which in turn are held by nuts and bolts to the gates (photo 8). This makes a robust track and helps in trouble free running. All parts were numbered and most were

painted matt grey at this time.

The wheel bars were made from Ramin wood while the wheels were sourced from Lego. This company sells separate parts, one of which is a brick with tyred wheels at each end. If these are very carefully halved they can be drilled, screwed and glued to the wheel bars. They are ideal for this model and give trouble-free running (photo 9).

Bar hinges were then made and mounted with split pins and a hinge rod. The pins were adjusted for free movement before the glue set (photo 10). The wheel bars were then spaced with slave bars which, after adjustment ensure free running and equal spacing (photo 11, the quality for which I apologise!) Once the whole assembly was free running the platforms could be made and fixed to the hinge bars. Once again, when free running the spacer bars could be removed (photo 12). Photograph 12 also shows the numbering for the ride positions, the wheels and the painted shutters.

Next came the walkways. Scored aluminium alloy sheet is suggested but having spent many hours on this model, this material did not seem to be in keeping. On visiting a fairground the answer was obvious — removable duckboards. Frames were made to fit between the gates and tapered slats glued to the frames (photos 13 and 14). While I think this is more in keeping with the prototype, it involved over 400 parts!

The rides were next to be made and these too involved a lot of work. Each one was cut out and fitted to a tapered piece of wood to give the correct inwards incline, and then painted. A thin layer of leather was glued on for the seat and a movable handle fitted. They were all numbered and fitted to the platforms by means of two brass pins. Several photos show the animals, all of which are numbered.

Safety rails were then made, and since these must all be the same, a small jig was milled on the Unimat. Brass rod was bent, cut and soldered and a local plating company kindly chromed the rails which can be seen in photos 15 and 16.



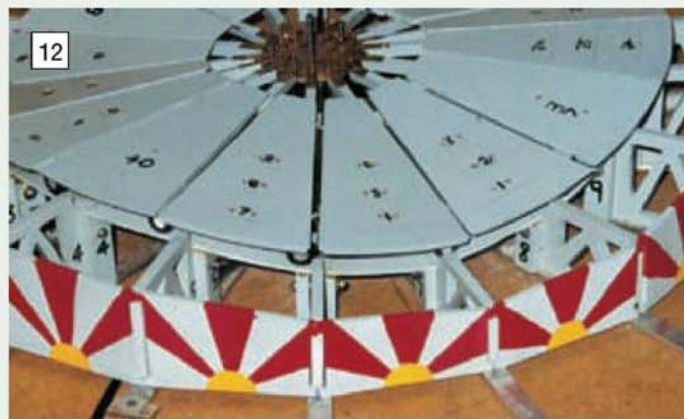
Ramin wheel bars are fitted with Lego wheels which are ideal for the job.



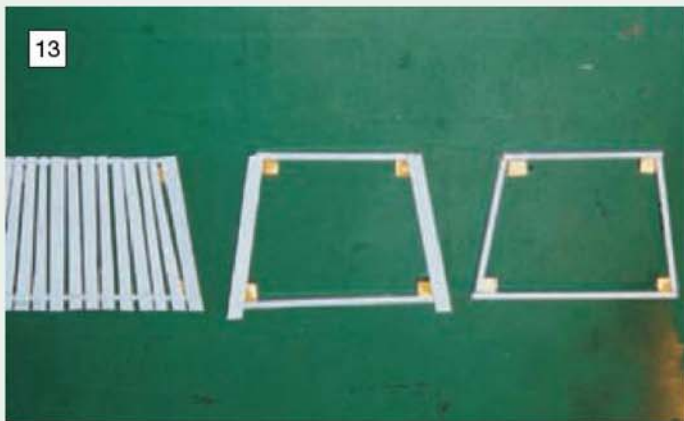
Bar hinges were made, fitted and adjusted for free movement.



Slave bars maintain uniform spacing between the wheel bars.



The shutters were painted and platforms made, fitted and fixed in place.



Tapered duckboards were made to fit on the platforms.



Duckboards with their frames and tapered slats involved over 400 pieces!

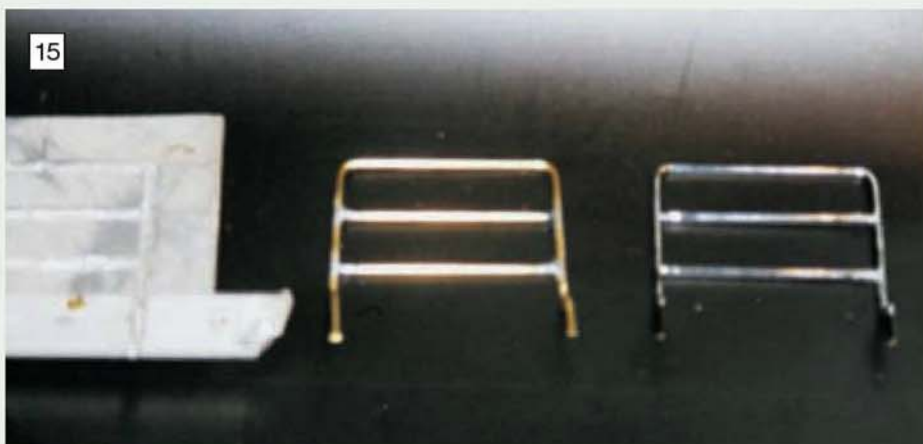
The centre platform was then cut and fitted, and the paybox was assembled and fitted to the platform (photo 17). Small dolls house mirrors were obtained and fitted to the painted paybox. These are just visible in photo 22. This small detail really improves the general appearance of the model. Next came the hook rings which were turned from scrap brass on the Unimat. The holes were again drilled with the aid of the dividing head.

Pillars were made from Ramin wood with a brass pin fitted into their base. A hole drilled into the sleepers then allowed the pillars to neatly slot in (photo 18). Next came the struts and rafters all of which were cut from Ramin and held together with brass hooks and eyes, all made from thin brass sheet (photo 19). Roundings followed; these were made by soaking 4mm Ramin, bending it on a jig, cutting and fitting (photo 20). They are held to the pillars with small brass nuts and bolts and faced with thin ply, photo 21.

Handrails were made, filed and press fitted to the pillars. These too were carefully numbered

(photo 22). The steps were made as units and fitted to the model with brass pins (photos 23 and 24). Photograph 24 also shows the painting

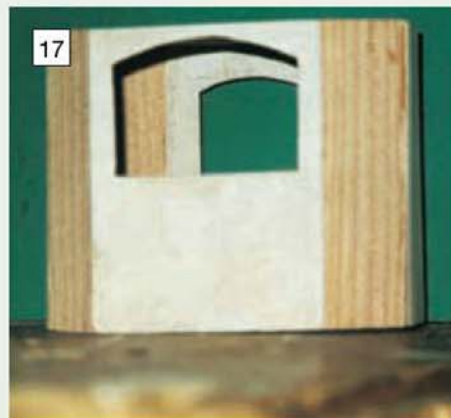
of the roundings, which I kept simple. The completed rides and the central paybox can be seen to advantage in photo 25.



Safety rails were bent up on a jig, assembled by soldering and chromed by a local plating company.



The safety rails were fitted alongside each of the rides.



The paybox was made and fitted.



Brass pins in each Ramin wood pillar located into holes in the sleeper ends.



Struts and rafters are assembled with brass hooks and eyes.



4mm Ramin was soaked and fomed into a curve on a jig for the roundings.



Fitted with small bolts and nuts, the roundings are faced with thin plywood.

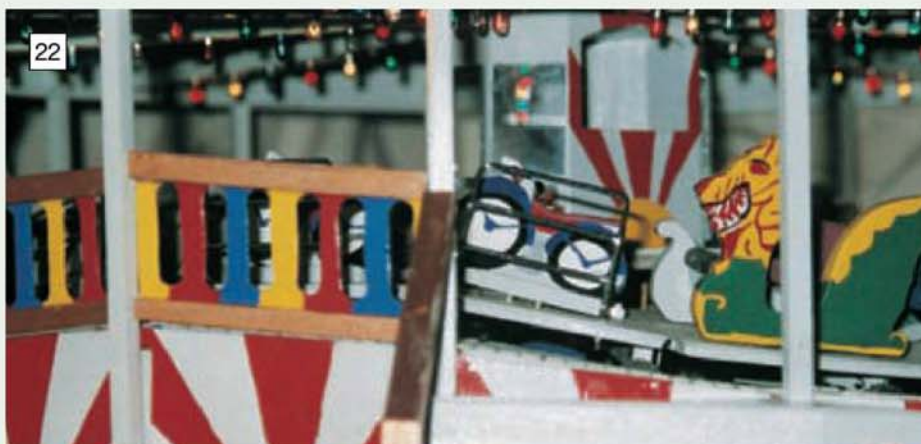
Next on the build schedule, it was time to deal with one of the most important parts of any roundabout — the lighting. The plan

suggests soldering the bulbs to aluminium alloy U-bars. However, my method was to cut Ramin for the beams and to fix a length of brass strip

to one side using two small brass screws. The whole unit was then drilled and tapped at the position of each light (photo 26). A brass strip was then fixed to the other side. Two electrical connections were then required for each set of bulbs and each bulb can then be changed by unscrewing.

The bulbs are rated at 12 volts but are run on 6 volts to avoid problems caused by heat. The bulbs are available from Maplins and were coloured using glass paint available from most art/craft stores.

When completed, the model had taken two years of on-and-off work. Was it worth it? Definitely! Complete satisfaction.



Handrails were made and fitted and, like many other similar parts they were located by numbering.



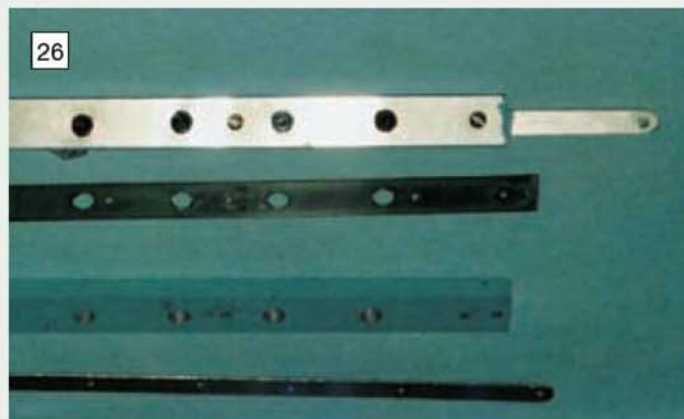
Steps were made and fitted to the model using brass pins.



The Author's carousel with steps fitted and roundings painted.



This view shows the paybox painted and the colourful miniature light bulbs.



Bulbs screw into an assembly of two brass strips and Ramin insulator.



The Welland gear quadrant fitted to the author's Myford ML7 lathe.

David Dew

describes the construction of an accessory designed to greatly reduce the time taken to set up change wheels.

●Part 1

I acquired my ML7 some 25 years ago; it was a nice, well equipped 1953 machine, but as usual without the 'Norton' quick change gearbox enabling pitch changes and feed changes to be made easily and quickly. It did have many other works accessories, although it lacked any 'self-built' ones such as a filing rest, a mandrel indexer or a means of swinging the top-slide through 360 degrees. It was 15 years since I had last used a Myford (at work) so I decided to get a little practice making these various gadgets and others, before starting on 'proper' model making.

It was a pity that G. H. Thomas' book *The Model Engineer's Workshop Manual* had not been published then as it would have saved me a lot of time! But gadget design and making became very addictive, so the one model I ever started is still only half finished, while the heap of gadgets has grown and grown. I even marketed one or two simple ideas as part-machined kits for a while (MyKits), including a 24-point mandrel indexer, a rear parting off toolpost, and the three 4in. diameter Brown and Sharp indexing plates.

I named the devices after East Anglian rivers. This one I call *Welland* and among other advantages, it reduces the time to change feed rates and cuts the time to change over to screw cutting to the tenth of that taken with the standard equipment.

Advantages of kits

Devices like *Welland* present difficulties for the average model engineer to buy economically all the necessary materials in the sizes required. One simple answer is for a manufacturer to produce and sell it. Although Myford expressed interest in this device, they did not follow this one through. It would seem doubtful if any independent manufacturer would take on a product for someone else's machine even though it was probably patentable.

Another way is for 'someone' to produce a kit. This should ensure all the correct size materials and the 'nearly impossible at home machining' is done. The work by the owner should keep the

WELLAND FINE FEED QUADRANT

cost right down. However, my experience (echoed by others) is that there is a poor response to affordable advertising of low-cost kits in magazines with sales sometimes not even covering the advertising cost. But I must admit that I never tried a complex, more expensive kit before I retired, as I could never commit sufficient time then. The greater price of *Welland* may tolerate extra advertising cost on each kit.

I have my doubts though. Twenty years ago, adverts for workshop kits abounded at all prices. Now they are like hen's teeth — perhaps very few people build from kits any more. So is it just wishful thinking that I could produce a batch of just 50 kits for *Welland*? Let me know on DALMANC@aol.com



The standard Myford feed train set up using the optional 12 tooth input gear.

Greater efficiency

At the time of devising this unit, I was trying to use the ML7 to produce bits in a hurry, making REMAP jobs, and various work-related items. I got fed up with the time it took to make changes in feed rates, or worse, to rebuild the whole fine feed train after screw cutting (photo 2).

This slow changeover is common to most changewheel lathes, which is why all industrial lathes, and latterly, new model engineer's lathes, have been fitted with a Norton

screw cutting gearbox. However, there must be tens of thousands of Myford owners out there, still struggling without the quick-change gearbox.

The solution is obvious — buy a Norton box from Myford. However, at a current list price of £973 this could be more than one would need to buy an older, second-hand Super 7B and then sell on the original lathe. I did just that, but I omitted to sell the old ML7! (I am now very glad to say, so I now have two!).

Welland: the alternative

The idea is so simple: just have a second quadrant with a fixed train of reduction gearing. This becomes the standard fitment on the lathe (photo 3). Change the rate of feed by altering just the input gear on the tumbler sleeve gear assembly; make all parts easy fits and have new finger screws, etc. for rapid assembly; 'glue' the Woodruff key to the leadscrew; have clearance keyways in the quadrants; design the fixed train to give a very fine feed and use the original quadrant just for screw cutting (photo 4). This is much faster than changing entire gear trains to alter feed rates and far faster when changing from screw cutting to feed rate. Just exchange the quadrants. While it may still not be as quick as the Norton box, it is only one tenth of the cost!

An average of my times are as follows:

	From	To	Time
Screw-cutting	Myford feed		17 min.
Screw-cutting	Welland feed	1-stud	1min. 40 sec.
Welland feed		screw-cutting	2min. 10sec.

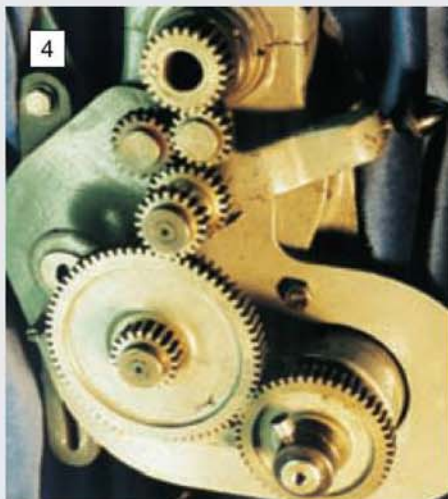
These times demonstrate a reduction to one tenth of that required for the standard configuration. A table of elements giving more times to make various changes is shown below. An estimate of various changes can be made by combining various elements. These trials were idealised as everything was practised first, and all 'bad' results discarded.

Table 1 shows my personal results over 2 or 3 attempts. Conditions were ideal, and there was a clear knowledge of the assembly sequence.

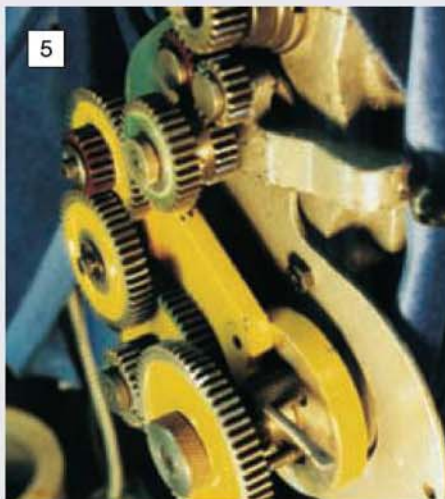
Building the standard feed arrangement would take much longer in normal working to (as indicated above).



The new quadrant with its fixed train of gears. Those on the left are the input gear and tumbler sleeve gear.



The original quadrant is only used for screw cutting and as shown here is set for 20tpi.



Welland installed with a 30 tooth input gear. The bottom two gears can be removed and reversed.



The fabricated quadrant showing the relief groove for the arcuate slots.

Table 1:

Elements of average change-over times
Operation : Time
(sec.)

Remove <i>Welland</i> :	66
Mount <i>Welland</i> :	124
Remove/strip quadrant + 2 gear studs :	100
Mount quadrant with 1 stud (20/50) :	185
Change feed rate on <i>Welland</i> :	32
Change feed rate on S7B :	6
Change S7B feed to screw cutting :	20

There are several ways to change the feed rate with the standard change wheels, but all will take longer than with *Welland*.

The elements above can be combined to estimate the time for combinations of changes.

Don't forget, the only reason for having a Norton gearbox is to save time!

Cost saving

Welland has an advantage over the Norton gearbox in that trains for metric and odd pitches can still be set without the need for any metric conversion kit.

At the time of writing, bought individually, as described in this article, the parts and materials for *Welland* currently cost about £120, mainly for the seven Myford change wheels. If a good number of prospective builders can pool an order, then batches of gears could be purpose cut by a gear maker for far less cost than this, and the steel blanks, bronze and screws supplied too.

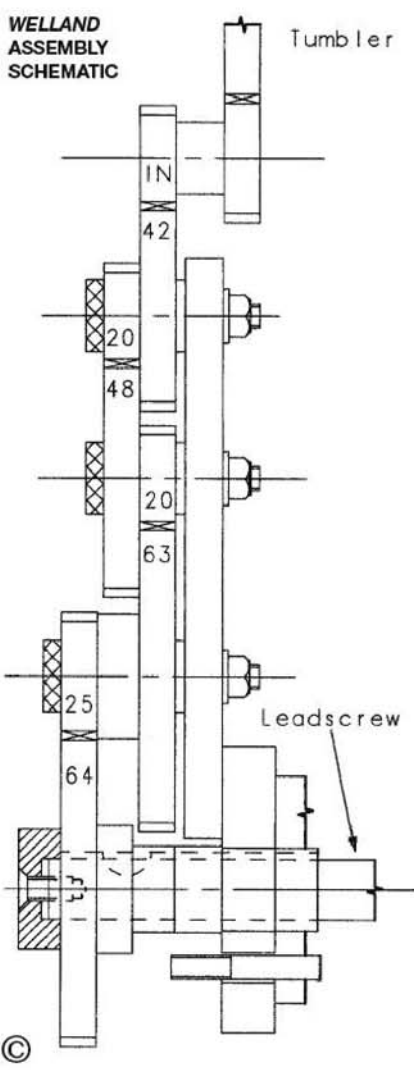
Design possibilities

Although I have conjured with a number of alternative gear trains to meet the requirements, this constructional article will stay with the original design, since it is so well proven. However, experimenters may be interested in the following thoughts.

If the gears are not to be used to supplement the standard set (something I thought useful but have never exploited) then $\frac{3}{8}$ in. plain bore wheels could be used, the pairs soft-soldered together and used with $\frac{3}{8}$ in. dia. phosphor bronze shafts. With no keyways needed, it is then possible to go down to 15T 20DP pinions. Progressively increasing tooth size could be used to match increasing torque.

A paper-only design entailed two gears of 127T and one of 40T (all 32 DP). This additionally gave a metric conversion set, and the entire train can give a feed of less than 0.001in./rev., which is similar to the best small toolroom lathes.

WELLAND
ASSEMBLY
SCHEMATIC



So there is plenty of room for innovation if you intend to do your own thing. Try putting a gear shift lever in the train to go 5:1 ratio from fine to coarse!

To establish the gear layout, cut the PCD of each gear in card, and pin them to the lathe shaft ends drawn on a drawing-board. The impossible soon becomes obvious! The self-imposed guidelines were

- to use a 3 stud (8 wheel) design
- to minimise the size of the gearwheels,
- to aim for a finer feed than standard,

Table 2

Selected range of feeds in inches/rev.

Driver	25/64	64/25
12	0.0019	0.0121
20	0.0031	0.0202
30	0.0046	0.0302
45	0.0069	0.0454
70	0.0108	0.0705

to keep the train within the standard guard, to use only Myford gears, to use tooth numbers outside the standard set, and to use the supplied wheels as input gears.

In addition, the design was tweaked to allow for the final pair to be reversed to give coarse feeds. If the guard is not fitted, it is possible to fit larger wheels which could radically alter the design of the *Welland* train. This may be acceptable if the lathe is converted by the user and is only used for recreation. 'Recreation' is not 'work', and may be considered outside the scope of the 'Health and Safety at Work Act'.

Final selected train

Shown as each driver-over-driven pair, and then multiplied together, and including the $\frac{1}{8}$ in. leadscrew, the train I used is as follows:

$$\frac{\text{Drivers}}{\text{Driven}} = \frac{(12 \text{ to } 70)}{42} \times \frac{20}{48} \times \frac{20}{63} \times \frac{25}{64} \times 0.125 \text{in.}$$

Basic feed with 20T input = 0.00308in./rev.

(Divide by 20T and multiply by input for others i.e. 0.00176in/rev with 12T cluster)

A 70T input is the largest to fit under the guard. The 25/64 pair can be quickly reversed to give the coarse feeds 0.011 - 0.067in./rev.

Two 20T Tufnol quiet running gears from the non-standard ML7 tumbler were used (photo 5).

Most users will find the selection in Table 2 will cover all their regular needs. Having these five gears ready to hand will further save time.

Other design details

My new quadrant was made from 75 x 10mm black steel flat, because it was available. A 3in. dia. BMS disc was joined to it with screws. Any combination adding up to 0.940in. will do (the thickness of the maker's banjo) provided the minimum plate thickness is 6mm (photo 6).

●To be continued.

Ian Beilby

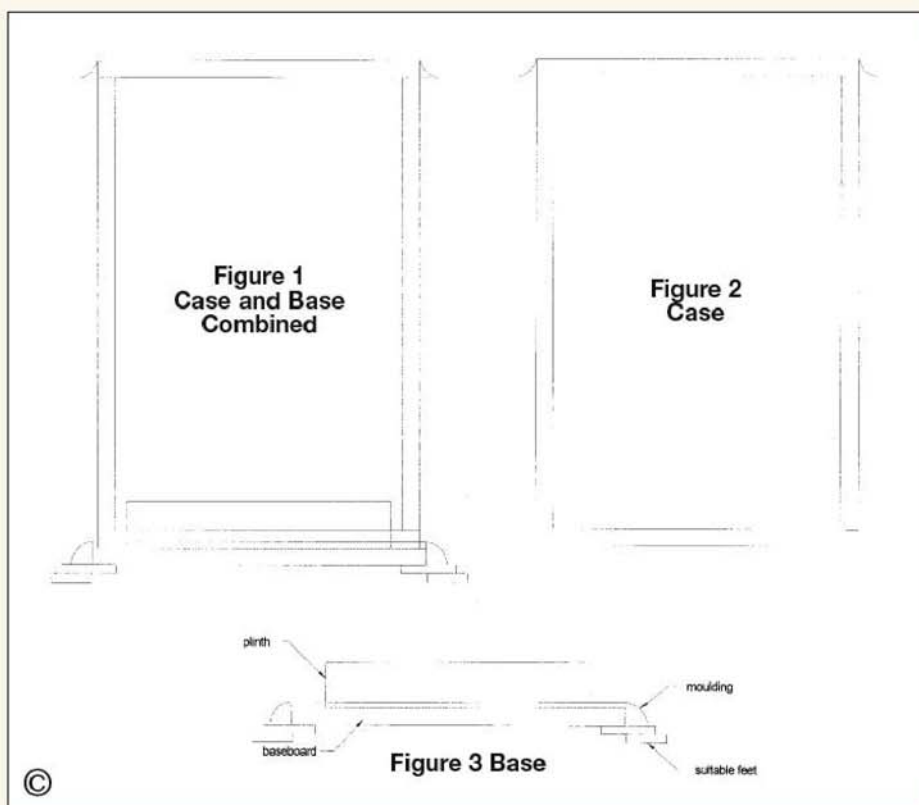
describes the construction of his elegantly simple 'glazed' presentation case made to protect and enhance a fine antique clock.

●Part II continued from page 95
(M.E. 4213, 23 January 2004)

In order to simplify construction, the framework of the case is provided with a $\frac{1}{8}$ in. wide groove $\frac{1}{8}$ in. deep, set back $\frac{1}{4}$ in. from the front edge of the case. After the base of the case and the uprights have been assembled, the Perspex panels are simply slid into the aligned grooved channels and the top is finally glued and screwed into position. This method of construction does away with the need for machining a rebate in the framework, and also pinning beading in place.

The only disadvantage with this method of construction is that after the framework of the case is glued together the Perspex sheets would be difficult to replace should one become damaged, but as I mentioned earlier Perspex is extremely tough and not prone to breaking easily. Perspex sheet is readily available and easily cut to size with the use of a Stanley knife and steel straight edge by carefully scoring it on both sides and then simply breaking it apart to leave a clean edge.

Figures 1, 2 and 3 are drawings of the combined base and case, the case, and the base alone. There would be little point in my including dimensions which would, of course, be determined by the item being cased. The base upon which the case sits is made slightly larger overall than the width and depth of the case, and the moulding fixed around the base should be slightly proud of the baseboard in order to facilitate the location of the case. The only point to bear in mind when calculating the size of Perspex sheeting for the case, is that the sheets should be $\frac{1}{4}$ in. overall larger than the sight area of the case to allow for the $\frac{1}{8}$ in. groove machined into the framework of the case.



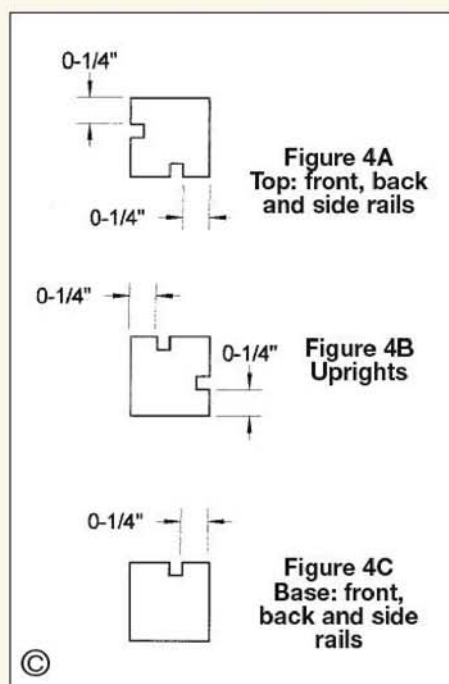
BUILDING A DISPLAY CASE

Figure 4 shows the profiles of the case sections. All the sections are cut from $\frac{3}{4}$ in. square MDF and comprise four uprights, four sides and two each fronts and backs. Depending on the dimensions of the case you are making, the sides, fronts, backs, and uprights must naturally all be carefully cut to identical lengths. Photograph 9 shows my timber for the case and base sawn to size.

Having cut the case sections to their relative

lengths a $\frac{1}{8}$ in. wide groove is machined $\frac{1}{8}$ in. deep and $\frac{1}{4}$ in. from the front of all the rails, as per the profiles shown in fig 4. All the sections should be machined at the same setting. The $\frac{1}{8}$ in. groove is plenty wide enough to accommodate 2mm Perspex sheet and allows sufficient tolerance should there be any slight misalignment in the framework and grooves.

It will be noticed that the top sections and uprights at fig 4A and B have two grooves at



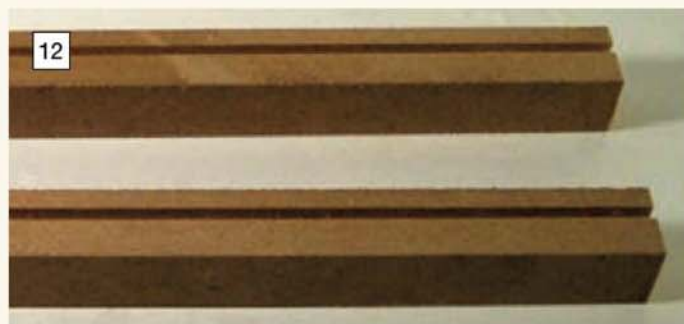
The Author's case timber prepared and carefully cut to size and length.



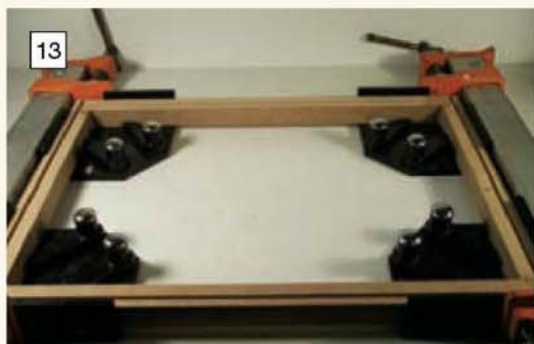
A $\frac{1}{8}$ in. diameter routing cutter was used to machine the $\frac{1}{8} \times \frac{1}{8}$ in. glazing grooves.



The $\frac{3}{4}$ in square MDF case rails after the glazing groove had been cut.



The $\frac{1}{8} \times \frac{1}{8}$ in. glazing groove is inset $\frac{1}{4}$ in. from the outer faces.



Base rails are assembled and glued using a resin adhesive.



Mitre clamps are very useful for clamping the rail joints while the adhesive cures.

right angles to each other, while the base sections at C have only one groove. The groove underneath the top rail has to accommodate the tops of the vertical Perspex panels while the groove on the inside of the top is to retain the horizontal top Perspex panel.

Photograph 10 shows the router bit and fence I used to machine the grooves. Both the cutter and guard have been raised in order to illustrate the cutter. On no account should the router be used without an adequate guard in place. Photographs 11 and 12 show some of the case sections after grooving.

Figure 5 shows plan views of the base and top; the base is the first item to be made and assembly is straightforward. The sections are simply butt jointed and glued together with the aid of mitre clamps. The front and rear rail sections also have cross grooves machined $\frac{1}{4}$ in. from the ends to accommodate the edges of the Perspex side panels. Where they break out into the front and side of the rails, the grooves are easily filled later with Pollyfilla.

The rails must be aligned accurately with their corresponding grooves lined up together. Photograph 13 shows the base of the case clamped up while the glue sets. Modern resin woodworking glues are exceptionally strong, stronger than the wood itself and, as long as the sections are accurately cut and bonded together,



Cross grooves at the ends of the front and back rails must be aligned on assembly.

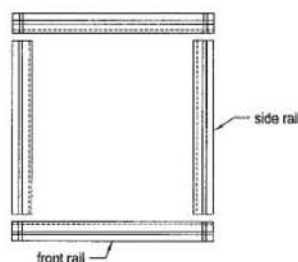


Figure 5A Top Rails (viewed from beneath)

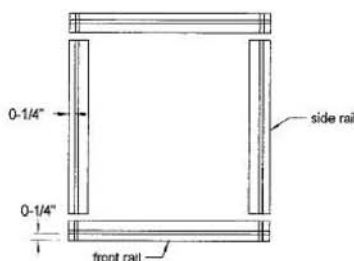


Figure 5B Bottom Rails (viewed from above)

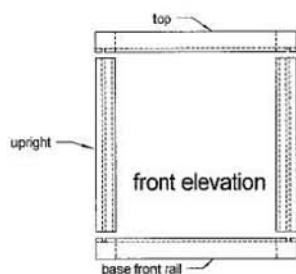
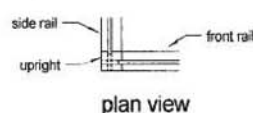


Figure 6 Rail Assembly (viewed from front)



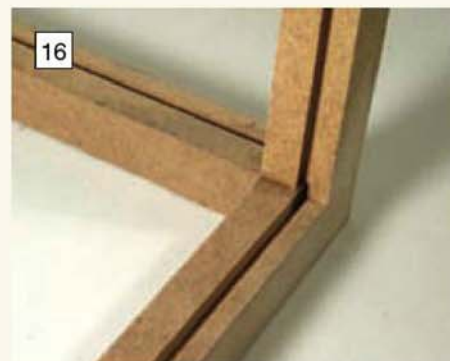
©

there should be no need to reinforce the joints with wood screws.

The top of the case is constructed in the same way as the base except that the order of assembly is slightly different in that the Perspex sheet for the top has to be inserted before the frame is finally glued up.

I initially glued the front/back and one side rail together as can be seen in photos 14 and 15. Photograph 15 gives a clear view of the cross groove in the front top rail. The Perspex sheet was then inserted and the other side glued in place. Hindsight reveals that it would have been somewhat easier to paint the inner edges of the top frame before inserting the Perspex. This would have saved having to mask the Perspex when painting the top later on.

With the top and bottom of the case assembled holes can be drilled centrally in each of the corners for screws to attach the upright sections. Referring to fig 5, diagonals should be marked across the corners of the top and bottom frame, and clearance holes drilled to accommodate the screws. The holes should be countersunk on the top so that they may be filled and sanded down before painting. The ends of the uprights will also require spotting through the holes and pilot drilling to prevent the wood from being split when the screws are driven home. I used 35 x 3mm zinc plated countersunk steel screws, and found



The three members of a bottom corner joint shown here temporarily assembled.



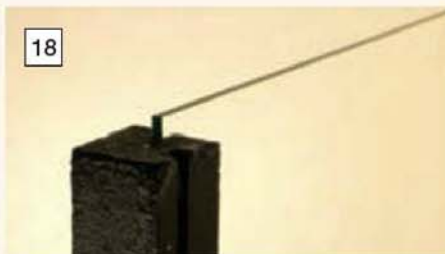
A temporary assembly to check alignments.



The base during construction.

that a 2.4mm pilot drill prevented the MDF from splitting at the edges.

The front elevation of fig 6 shows that the uprights are simply butt jointed to the base and



Perspex 'glazing' is housed in $\frac{1}{8} \times \frac{1}{8}$ in. grooves.

top; in this case, however, the glued joint is held in place and reinforced with screws. The uprights are first glued and screwed to the case base, again ensuring that the sections are correctly aligned and that the grooves all align with one another. One of my corner joints is shown in photo 16 while photo 17 shows the top of the case temporarily screwed to the uprights to permit an alignment check of the case and the grooves.

Before finally inserting the Perspex sheets into the framework and gluing the top in place, a decorative moulding should be mitred and fitted around the top. The uprights, base and top may then be painted. Photograph 18 shows one of the Perspex sheets $\frac{1}{8}$ in. proud of one of the uprights. When all the Perspex sheets are slotted in place, the top can be glued and screwed to the uprights after which the countersunk holes are filled and painted. Photograph 19 shows the completed case at this stage.

The base is relatively simple to make, and fig 3 gives the general outline. Photograph 20 shows the baseboard with its mitred moulding attached, the plinth shown is made from two pieces of lin. veneered chipboard cut to size and screwed together. The baseboard is painted black to match the case, and the plinth covered with velvet material before being screwed in place on the base. The moulding needs to be slightly deeper than the baseboard in order to help locate the case on the base.

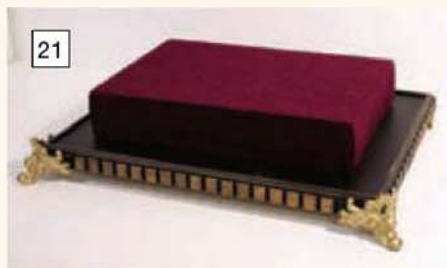
The mouldings on both the top of the case and the base are finally highlighted with gilt wax, and a set of decorative feet attached to the base. The finished base and case are shown in photos 21 and 22 and the combined clock and case in photo 23.

I mentioned earlier that my case was designed and finished primarily in an effort to complement and enhance (hopefully!) a fine antique clock, while at the same time protecting its vulnerable movement from the ingress of harmful dust and dirt. I am sure readers will appreciate that the final design and finish can be easily adapted or simplified, the basic methods of construction remaining the same.

Finally, I hope this article will be of assistance to other constructors faced with



Completed case with decorative top moulding.



The completed base is most elegant!

this type of problem, and stimulate model engineers more used to working with metal and solder to turn their hands to wood, glue and paint!



Painted and suitably embellished with gilding wax, the Author's display case awaits its contents.



The case not only complements the antique French clock within but will protect it from atmospheric dust, etc..

LETTERS TO A GRANDSON

M. J. H. Ellis

corrects a previous error before proceeding with the description of how to make his flap valve injector.

●Part LIX continued from page 84 (M.E. 4213, 23 January 2004)

Dear Adrian, I regret that I have to alert you to an error in my previous letter No. 57 (M.E. 4209, 28 November 2003 under the sub-heading *Insertion Tool*).

The steam cone projects $\frac{5}{16}$ in. into the injector bore, and also $\frac{1}{32}$ in. into the combining cone. It follows, therefore, that the length of the shorter pusher has to be $(\frac{5}{16} - \frac{1}{32}) = \frac{9}{32}$ in. (0.281in.). The combining cone's second half is $\frac{5}{32}$ in. further in, so the length of the longer pusher needs to be $(\frac{9}{32} + \frac{5}{32}) = \frac{7}{16}$ in. (0.438in.).

How I arrived at $\frac{17}{64}$ in. instead of $\frac{9}{32}$ in. I am completely at a loss to explain. That figure would imply an overlap of $\frac{3}{64}$ in. between the combining and steam cones, an amount which is nowhere mentioned. Had it been $\frac{19}{64}$ in. and the overlap $\frac{1}{64}$ in., that would be more understandable, as it would suggest a simple lapse of memory, whereby I thought the overlap was $\frac{1}{64}$ in. instead of $\frac{1}{32}$ inch.

The second error, $\frac{27}{64}$ in. in place of $\frac{7}{16}$ in. simply proceeds from the first.

I can't see any plausible excuse for such a silly mistake, although a reason is not far to seek: approaching senility. At least I can offer my sincere apologies. There have been too many gaffes in the *Letters*, and you had better write in my report "*Must be more careful!*"

In my last letter I left you to get on with the valve-cover for the injector. Inside the rim, at the top, on the left-hand side, fits a little plate, only $\frac{1}{4} \times \frac{1}{8}$ in., which holds down the valve. Nobody else will ever see it, but you will know whether you made a good job of it or not, and I suggest that for the sake of your own self-respect you make this small item first, and file the rim to fit it. What I did was to make it too large, drill a No. 10BA tapping size hole in the middle of it (more or less) and then take it down to size with the hole nicely in the centre. I don't suppose that the valve will have any great inclination to work loose in any case, but if the little oblong piece fits snugly into the rim of the cover it will get the minimum of encouragement. Of course, supposing the screw to work loose, the lid of the cover would stop it unscrewing very far, and if the heel of the valve were tight against the cover-rim, I very much doubt whether, even at the worst, the valve would be able to move sufficiently to stop it functioning. You may find that the rim obstructs the exit port for the steam to some degree, but this is easily overcome by filing what might be called a 'round nick', deepest at the back of the rim, to clear the way.

The precise position of the screw-holes is of no consequence, provided that the two at the bottom will allow the screws to have sufficient metal in the injector-body to get a firm hold, and that those at the top are no higher up than necessary, as this will ensure that the injector ends up no bigger than it has to be. In the first instance, these holes, too, should be 10BA tapping size.

We now have the rather fiddling job of drilling five holes, to be tapped No. 10BA, in the injector body. Experience has taught me not to risk 'spoiling the ship for a ha'p'orth of tar.' I don't believe that 'an infinite capacity for taking pains' is the only quality which is needed to produce a genius; indeed, I would think a quite slap-dash person could be called one, provided that he was richly endowed with bright ideas; whereas the most painstaking of plodders could only succeed in doing something mediocre to perfection. Be that as it may, there is little satisfaction in putting less than your best into doing a job, and what is more, he who works in a slapdash fashion is not likely to improve.

So, after that sententious moralising, let me just tell you what I did myself. I turned up a piece of aluminium alloy rod to an easy fit in the bore and drilled a radial hole in it not quite all the way through, which I tapped 8BA. I made a little stud, threaded 8BA on its two ends, the thread being long enough to enable it to go into the aluminium alloy rod as far as it could. Its other end went through a hole in a cross-bar, so that when the aluminium alloy rod was in the bore and the stud threaded into it, the cross-bar could be tightened down onto the rim of the lid, holding it firmly in the correct place for drilling the holes. It is easy enough for me to say 'the correct place', and I should add that to ensure that it was in the right place, I filed the edges of the still-oversize rim so that they were parallel with the corresponding finished inside edges of the valve-chamber. By inspecting it from the rear I was thus able to ensure that the rim would not be askew, while its position in relation to the steam outlet port made sure that it would not be to one side.

I remember that when I drilled the hole for the little oblong piece for holding down the valve I had the rim already in place and held down with distance pieces under the heads of the four screws, while a small hard-wood 'sprag' (as-they are called in my part of the world, meaning 'strut') held the little piece firmly in place in its corner. I couldn't do this at the same time as the four holes in the rim because the holding-down stud was in the way.

In order for the sloping front of the injector to be horizontal, I deemed it wise to make a wedge-shaped piece from aluminium alloy to support it for the drilling operation. To prevent the work slipping down the slope I left a ridge standing up at the foot of the slope, taking out a slot for the water-union boss to go through. Once again I repeat my gremlin-warning; when I was your age I found it all too easy to let my mind wander, and one effect of this was, that I sometimes drilled holes deeper than I should have done. It was in the course of boat-building that I found the way to prevent this act of folly. With the drill which I was about to use I drilled a hole along the grain of a piece of scrap wood, and pared it down into a cylinder of about $\frac{1}{2}$ in. diameter. This was threaded over the drill with the necessary length of the cutting end projecting, and then the other end went into the chuck as far as the wooden sleeve would allow. It always worked, and the end of the sleeve did no harm to the work.

It is still not time to open out the holes in the rim to clearance size, as you can use them as a

template to drill the holes in the cover-plate; but on second thoughts, it would not matter a lot if you did so, as the holes in both components are clearance size. I think I do it the way I do on the principle that if a pilot hole is drilled first and then opened up to size the resulting hole will be more likely to be its proper size, and not oversize, as it might possibly be if the second drill was poorly sharpened with its point out-of-centre.

The time has now come to trim both the rim and the top of the cover to nearer their final size. It is now possible to screw the whole lot together, and scribe a line from the rear around the two sides and bottom of the rim. Now you can mill the surplus material almost down to its final size on these two pieces bolted together. There still remains the surplus metal on the top and at the top right-hand corner and, as this entails removing metal from the injector body itself, it is best accomplished by bolting the entire assembly together, holding the work down on the aluminium alloy wedge, and milling the surplus away by fairly light cuts. You will have to take care when milling the sloping right-hand side, as it would be all too easy to take too deep a cut, so that either you would have to leave an unsightly ridge at the bottom, or risk cutting into the threaded boss.

Assuming these perils to be safely passed, it only remains to round off the corners at the top, and the work on the body will be completed. The final metal-work before turning our attention to the cones is turning the overflow pipe from some odd piece of gunmetal. It is straightforward turning, first down to $\frac{3}{16}$ in. diameter, at which point you can put $\frac{1}{4}$ in. or so of $\frac{3}{16}$ in. x 40TPI thread on the end, which this time I do not object to your doing with a die in your tailstock die-holder. You can now turn away the metal for $\frac{5}{8}$ in. or so to the left of the threaded end, and all of the thread itself in excess of what will screw into the injector body. When the unwanted thread disappears you will know that you have taken off enough.

Finally, you centre the end with a small centre-drill and bore the work out to a depth of about $\frac{3}{4}$ to $\frac{7}{8}$ in. You could, if you thought it desirable, carefully face off the end (the work is now becoming rather fragile) but if you do, don't forget to run the die down again, first in order to clean up the other end of the thread where you reduced its length. Then if the pipe jibs at screwing into the injector, you can be sure of picking up the thread with the die if you run it down from the other (pipe) end.

If you want to make a really neat job of soldering the overflow in place, let me remind you of the tip which I gave you when I was discoursing about soft-soldering. Make yourself a really dainty soldering iron, the copper bit of mine was only $\frac{3}{16}$ in. diameter, tin the end, screw the pipe in with some resin-type flux round it; heat up the injector and bit at the same time with the gas-torch, and when hot enough, just apply the bit, and the solder will form a delicate fillet just where you want it.

This is a very suitable point at which to leave off. In my next letter I will tell you all about making the cones, which, if you follow the instructions carefully, is not so bad as you may think.

Your affectionate Grandpa,

●To be continued.



Keith Wilson

discusses the design and construction of a donkey pump suitable for these locomotives

●Part XXVII continued from page 98
(M.E. 4213, 23 January 2004)

I offer this donkey pump design as 'part of the bargain', for a pump is needed to cater for the Westinghouse type air brakes as used 'over there'. In point of fact, in 'our' sizes the vacuum brake system has great advantages, for the 'box of tricks' supplying the air/vacuum is tiny, compared with a big lump of mechanism that can wear out.

In full size, I believe the air brake to be faster in application, but this is nowhere near so important for our trains. Old square cube says that there is about $1/475$ the amount of air to pass through $1/60$ the area of passage, and for good measure it has only $1/8$ the distance to travel, so speed of application in our sizes is much faster.

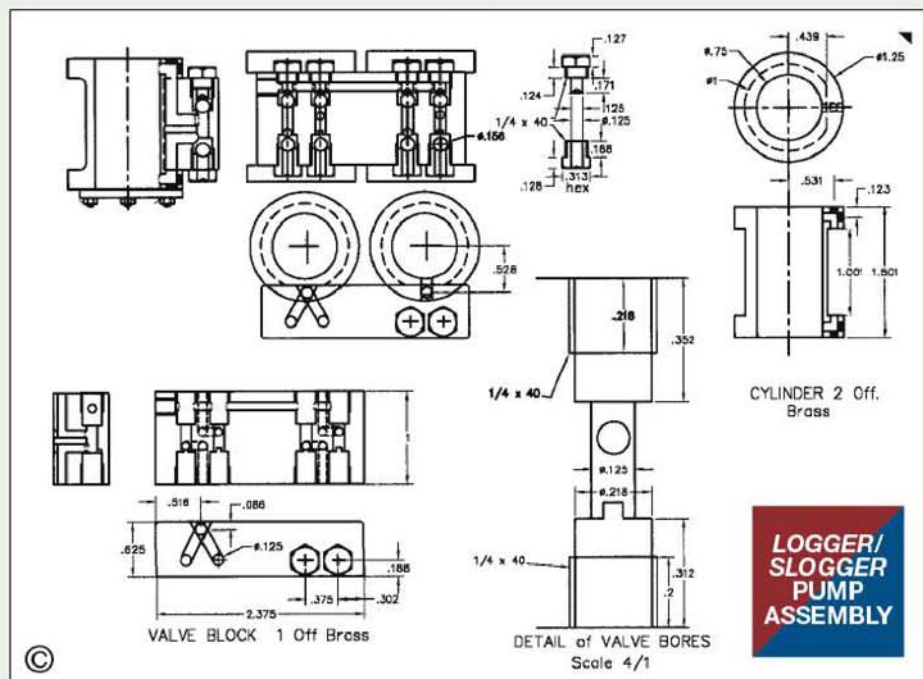
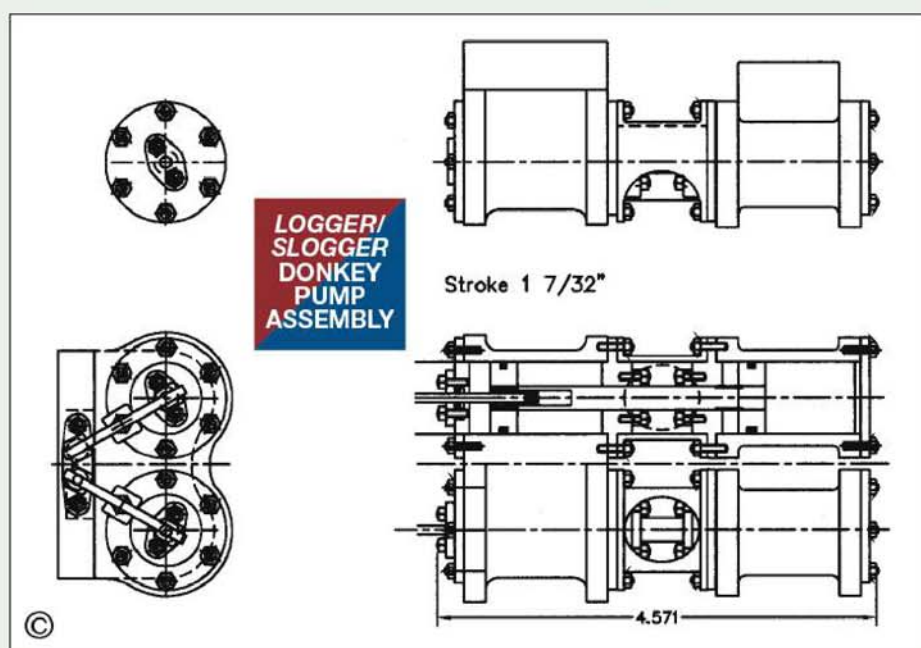
The GWR had an accelerator valve which admitted air into the pipe as a booster as soon as the vacuum fell, matching up with the vacuum. I am not certain of the exact details, but clearly if all the air required to apply the brakes had to pass through the driver's control valve, it took lots of time; direct admission of air into the system clearly increased the speed of application. In similar vein, Westinghouse has a 'triple' valve, which lets air into the cylinder from the reservoir, one at least on each vehicle, directly on any drop of pressure in the system — clearly faster.

Once fully charged, the Westinghouse system is faster to apply *and* to release, but it takes longer to re-charge the system with air up to working pressure. In rare cases, frequent applications and releases can exhaust the system beyond the safety point — hence *Bang!* In the case of the vacuum system, release is somewhat slower, but full power is available far more quickly. Another advantage is that with the Westinghouse, it is not

possible to partially release the brakes, they must be completely released and the re-applied; with vacuum brakes, finer and quicker adjustment both ways is possible.

Once fully charged? According to some reports, with a long 'empty' train, a good half-hour could elapse. Much may be learned about the 'un-published' details of these 'critters' in a volume *A Treasury of American Railroad Folklore*

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



which makes very interesting reading, is well written, and includes a chuckle or three.

For those who don't want to fit air brakes, there is no reason why you should not fit it up as water feed pump — but injectors are far superior. It is basically an enlarged version of Curly's donkey pump as described in his *Live Steam Book*, an invaluable source of reference like Martin Evan's book, although forsooth in the case of the former it is a little 'small' for our gauges! No criticism is intended, but we have progressed a bit since Curly's time.

Many years ago I made one to his design to pump air. I tested it thoroughly by putting it on the airline at the place where I worked. Rather naughtily, I fitted a length of rubber tube over the outlet, clamping the other end firmly. Steadily this tube grew fatter, concluding with a most satisfactory bang that rattled the windows merrily. I had warned people beforehand, so no-one was too surprised.

Blockhead

Begin work with the main cylinder block, one of the trickier bits to make. It is a gunmetal or iron casting. I don't think it matters much which. If a start is made by making the portface and ends dead flat and square with each other, the bores are easy. Finish by honing if at all possible.

Dealing with the passages is the tricky part — using small drills to drill fairly deep holes into a casting is not a matter to be undertaken lightly. Frequent withdrawal of the drill to clear the chips and swarf helps a lot, and an occasional spray



these could well out-last an O-ring, for 'tis a bit tricky to get these lower cylinders lubricated.

The little fork pieces are awkward to hold for machining, it took me quite a while about 50 years ago to realize that it is better to cut the fork first on the end of a long bar of stock (say about 8in. long) and part it off later; this way the round part of the fork can be turned before parting off. To grip the forks for boring and tapping, put a bit of $\frac{3}{32}$ in. thick stuff in the fork and hold it in the 4-jaw chuck; a 4-jaw self-centering chuck is useful in many cases.

The levers are fairly plain, but you will find it easier to make the insides first, for a blank strip long enough to make both is far easier to grip in the machine vice than two short bits. It's rather like making expansion links; there are few locomotives requiring other than 2 of these; since the insides are far more important than the outsides, do the insides first. If you do the outsides first and make a mistake on the inside, a deuce of a lot of work is wasted. T'other way round, a duff outside matters relatively little.

Covers and spacers

Accuracy is required here, for all bits must line up correctly. A certain amount of tolerance is available due to the use of O-rings; note that the main holes in the covers are slightly larger than the rods. It is important that the spigots on the outsides of the covers are all as concentric as you can get them, and good fits in their relevant spacers. 'Twill make life easier if the holes for mounting covers on cylinders and spacers are all carefully matched. The way always used by me (I hate those phrases 'the writer' and 'your humble servant'; they all seem so artificial) is to mount the covers in the 3-jaw chuck, which in turn is mounted on the rotary milling table. Location of the holes is then the proverbial 'piece of cake'. If you use this method to set out the covers then use these on their respective cylinders to locate the studs. For the spacers, use the covers to locate holes. The only covers which need radial accuracy are the top ones on the cylinder, so watch it.

The spacers are rather thin, but strong enough. Do the bores first, reaming to final size. The secret of getting these fragile bits machined is to use light cuts and the sharpest tools you can get. To get the cut-out cut out, preferably use a brand-new cutter and treat gently. If in doubt, then a small drill (high speeds, 'mini-craft' hand drill ideal) and needle files are suggested.

Pumps

These took a bit of midnight oil, as so many holes had to be arranged to miss (and occasionally hit) each other, and some had to be sealed at both ends so to speak.



It is necessary to have four valve chambers (one for each end of each cylinder) for although single-acting pump cylinders would work, much is gained by double-acting.

Now although it is reasonably well-known that a ball-valve only needs $\frac{1}{4}$ of its diameter in lift, this applies to non-compressible fluids; liquids in fact. Since we are pumping air, less lift is required, so efficiency is improved by reducing the lift. So the figures for hole-depths in the pump valve chest are maxima, best to leave them shallower and open out later to get ball-lift of

Wilson's Words of Wisdom:
Etiquette was invented for the sole purpose of save the self-styled 'upper classes' from the bother of thinking.

about $\frac{1}{32}$ inch. There might well be use for a mesh filter on the inlet passage(s), take yo' pick. Depending on where you need the outlet, choose which end of the block you put the output. If you make all holes and caps to precise sizes as drawn, this 'lift' will be about right.

At first I designed in a passage that connects all the inlet chambers, but on detailing I soon realized that just to leave the bottom row of caps holed throughout would save a bit of effort and probably work better. Incidentally, these holes that form seatings for valves should be reamed — they work better that way. I also thought at



first that the passage connecting the upper or delivery chambers would need to have top caps carefully aligned so that there would be a continuous passage; once again on detailing it was seen that it would be better to put this passage a wee bit lower down so that aligning the caps wouldn't matter. These passages are all $\frac{3}{32}$ in. diameter.

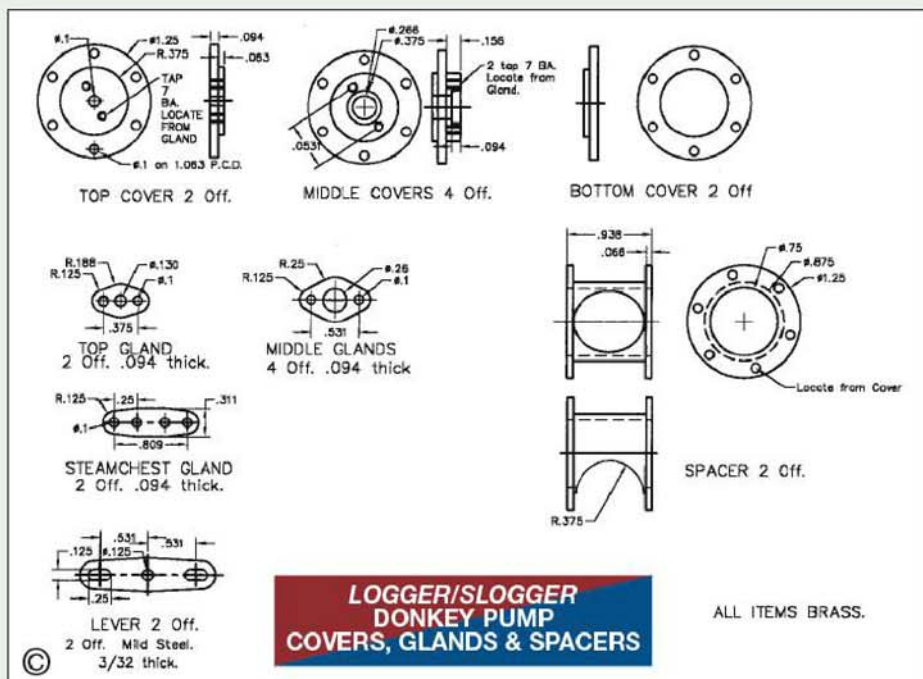
It would have been just as easy to use $\frac{1}{8}$ in. balls on $\frac{3}{32}$ in. diameter seatings with threads reduced to $\frac{7}{32}$ in. x 40TPI; take yo' pick again.

To get these pump cylinders properly aligned with the drive cylinders, do not fit the valve block yet. Line up and fix the covers and spacers, get the pump cylinders lined up with the 'ports' facing the back of the whole unit and bolt them on (studs and nuts preferable) and then anoint the flat parts of the cylinders plus the valve block, and then soft-solder the block to the cylinders. Do not over-do the amount of solder; as long as the junctions are sealed that is enough. You certainly don't want to block any of them off!

Although for several reasons I cannot make one of these at the present time, I might well try in the near future. I would expect one of these to output about 20psi. less than the input — it might well do better.

The photographs included show that this donkey is not the same as the one on the prototype. However, it is not unsightly and might well prove to be better than the single-cylinder types.

●To be continued.



DESTINY



A sculpture born out of a chance conversation on the shapes produced by intersecting holes.

Len Walker

describes another of his delightful conversation pieces.

This little item, conversation piece, oddity, metal sculpture or what have you, came into being by way of a very unusual route. Many moons ago, a few of us in a tool drawing office were chatting over a cup of tea about the shapes produced by the intersection of drilled holes. We all seemed to be able to imagine the shapes produced by two holes intersecting but no one could predict what three holes meeting up

would look like. Cerebral stuff this!

In the true spirit of technical curiosity, a cube was bored right through, from three sides, providing a positive answer. Everyone was happy with the quite complex shapes produced.

The cube lay in my drawer for several years, until one day it randomly lay alongside some plastic strips left over from some other job. Casually, I bent a strip around, forming a top pivot, a base was added, and the basic oddity was born! Proceeding at this breakneck pace, some years later, I made a 'proper' version with a polished aluminium alloy cube, a brass arm and a jet-black Perspex base, all on a mahogany stand. It looked good to several people and, after another lengthy interval, I coined the title *Destiny*, which was engraved on a little plate.

Should anyone like to make one of these unusual little items, I offer a few notes, which may help someone out there.

Detail 1

This was made from an odd piece of mahogany (mine started out as a drawer).

Detail 2

Cut from 1/8in. thick jet-black Perspex and glue to Detail 1 using Araldite. When the adhesive has set mill (or file) to shape. Take particular care not to scratch the polished surface of the Perspex (use cardboard vice jaws). The 1/2in. wide slot must be a slide fit to Detail 5 and be true and square to the base. Do not drill any holes yet.

Detail 4

Machine from 1 1/2 x 1 1/2in. aluminium alloy. Cut off a piece, say 1 5/8in. long. File one end accurately square. Using four aluminium alloy strips, to avoid marking the work, grip in the 4-jaw chuck with the accurate face against the chuck face. Tap gently with a hide mallet until it makes a good contact. Face off leaving the length slightly plus. Reverse in the chuck and face the other end to size.

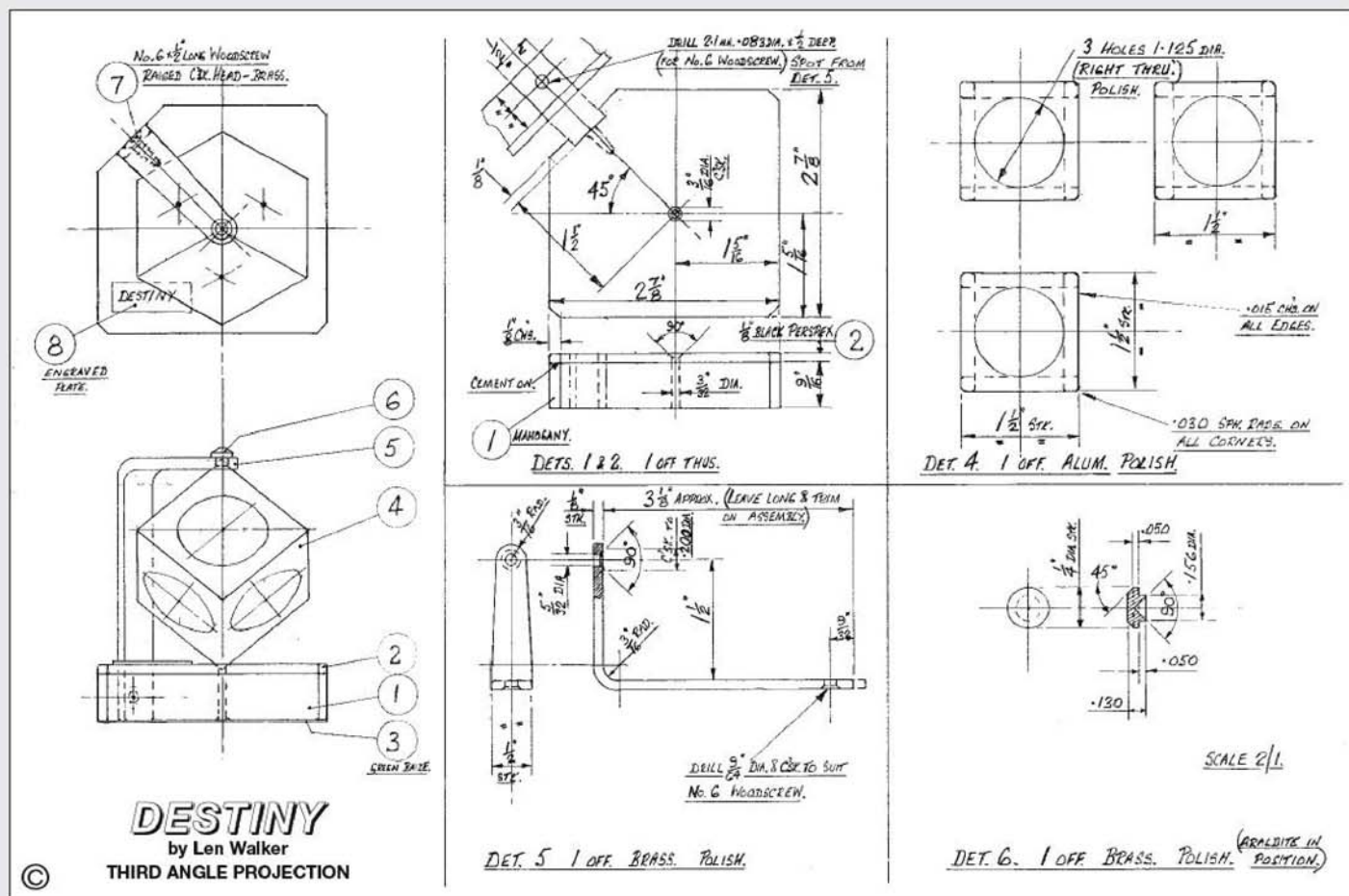
This methods of squaring up promotes accuracy as the chuck face is generally flat and runs true and thus gives better results than relying on the jaws alone.

On a surface plate, mark out the centres of three faces, each at 90deg. to the others, making the lines no longer than 3/4 inch. This will help when we come to polish the cube later.

Next, check whether you need a parallel packing piece to bore into to avoid damaging your 4-jaw chuck. Set a centre dot to run true using a dial test indicator and a wobbler between the centre dot and tailstock centre. Centre drill, drill and bore to finished size right through.

Take a very light facing cut (about 0.001in.) to leave a first class finish. Paraffin (taking all due precautions) brushed on aluminium alloy while machining works wonders. Repeat the above procedures on the two other faces forming three mutually perpendicular through holes.

Using a dead smooth needle file, carefully chamfer all edges and round off all corners shown on the detail drawing. To get a mirror



finish in all the bores, use a 'lap' consisting of a piece of wooden broomstick held in a 3-jaw chuck and turned *in situ* to approximately $\frac{7}{8}$ in. diameter. Using double sided Sellotape, secure a piece of 1200 grit wet or dry paper, just to fill the circumference, but *not* overlapping.

Thread the cube on, and using a gentle planetary action, plus a few drops of paraffin, bring all three bores to a very smooth finish (280rpm will do nicely).

To achieve a real mirror finish, replace the 1200 grit paper with a soft cloth material (I cut up an old woollen dressing gown!) Add a few drops of metal polish and run the lathe at, say 800rpm. As with all final polishing, it is essential to get rid of every particle of earlier abrasives. Polish the outside of the cube, including all edges and corners. Wash in white spirit, wrap in tissue paper, and set aside.

Detail 5

Make from $\frac{1}{2} \times \frac{1}{8}$ in. brass strip. Bend as shown, using an odd piece of, say $1 \times \frac{1}{2}$ in. bright mild steel with a $\frac{3}{16}$ in. radius filed true on one

end as a former. Alternatively, to avoid any stray marks, use a wooden block.

Mark off and drill a $\frac{3}{32}$ in. dia. pilot hole at the $\frac{5}{32}$ in. dia. position. Now assemble Detail 5 to the slot in Details 1 and 2. Slide down on to a $\frac{1}{4}$ in. thick wooden packing piece, clamp and transfer drill $\frac{3}{32}$ in. dia. into the base. This guarantees the line up — no sweat.

Open out the hole in Detail 5 to $\frac{5}{32}$ in. dia. and carefully countersink the inside face to 0.2 dia, by hand. Using a filing button, form the $\frac{3}{16}$ in. radius and then taper as shown. In Details 1 and 2 drill $\frac{3}{32}$ in. dia. through and carefully countersink the Perspex to $\frac{3}{16}$ in. diameter

Assembly guidance

Now assemble the cube (Detail 4) as shown on the general arrangement drawing. Slide Detail 5 downward in its slot to just 'nip' the cube, then scribe a line on the brass level with the underside of the wooden base (Detail 1). Separate, file Detail 5 to the scribed line then mark off, drill and countersink for a No. 6 woodscrew.

Detail 6

Make from $\frac{1}{4}$ in. dia. brass. Face, turn 0.156in. dia, and the 90deg. cone. Form the 45deg. chamfer, polish and part off. When happy with everything, fix the cap in position with Araldite using the minimum amount and keeping it clear of the 'works'.

Now, with Detail 5 and the cube back in position, transfer the position of the woodscrew hole. Drill 2.1mm dia. (0.083in.) $\times \frac{1}{2}$ in. deep and assemble with the screw.

Detail 8

Make a neat little nameplate engraved *DESTINY*, and Araldite in the position shown.

Stick a piece of thin green baize (Detail 3) onto the underside of the base (Detail 1) and the job is done

Oddly enough, the making of this little item has given me a great deal of pleasure. Perhaps this is because my wife likes it. She must, as it now resides in her china cabinet.

Good luck and work safely.



THE SOUTHERN FEDERATION AUTUMN RALLY 2003

Dave Marshall

describes the event held at Saffron Walden & District Society of Model Engineers Audley End Miniature Railway site.

The weather will make or break any outdoor event, so it was no surprise that our Chairman was tuning into as many weather forecasts as possible. However, he need not have worried as we enjoyed wall-to-wall sun over the weekend of 19-21 September when

Saffron Walden & District Society of Model Engineers hosted the Southern Federation Autumn rally at the club ground adjacent to Audley End House.

On the Friday, caravans began to arrive from late morning. Among the first was Brian Thompson, Chairman of the Southern Federation of Model Engineering Societies. By the end of the afternoon the field beside the track began to resemble a caravan rally, but slowly engines were being unloaded from the back of vehicles and transported to the steaming bays.

First to steam up and run on the newly laid

1,500ft. ground level track was Brian Remnant from Romney Marsh MES. He also managed to be first on the track on the Saturday and clocked up 30.2 miles over the three days on his locomotive to the *Sweet Pea* design which he has named *Lady Margaret*. First on the raised level track was Malcolm Hall from SWDSME with his *Hielan' Lassie*.

Over the three days 35 engines registered from 20 different clubs ranging from a $\frac{3}{2}$ in. gauge *Canterbury Lamb*, to Len Connell's $\frac{7}{4}$ in. gauge *Iron Horse* from Maidstone, and on Sunday Joe Middleton's $\frac{7}{4}$ in. gauge *Koppel*. Members and



Brian Remnant joining the track for the first time with his *Lady Margaret*.



Joe Middleton with his *Koppel* getting steamed-up on the club's turntable.



A study in concentration as this Mogul negotiates a switch.



Busy steaming bays with the clubhouse and caravans in the background.

guests used both the raised and the ground level track with some taking the opportunity to enjoy both. At times there were upwards of eight engines running on the ground level and four on the raised track. Others could be found in the steaming bays by the clubhouse or off the turntable waiting to join in.

There was also one steam traction engine, which meandered its way around the grounds.

The ground level track took Saffron Walden members nearly four years to build from conception to fitting the golden rivet only six months before the rally. Don't go looking for it—it was only a copper one. The turntable, which currently has five lead-in roads, was only completed a month before the event, but proved to work well during the rally. Still to be completed at the time of writing is the signalling system, which is well under way. It will all be controlled from a miniature signal box near the clubhouse. Points control will be by ex-London Underground miniature signal levers. There will also be a mimic board showing the status of the track.

The track, which had already bedded in well, proved its worth with one engine clocking up 13mph on the back straight during Saturday's running. There were only a couple of minor derailments over the whole weekend.

Arrangements had been made with *The Queen's Head* at Littlebury for the provision of an evening meal on the Friday evening which was

enjoyed by many of the early arrivals and club members. This also provided an opportunity for people to get to know one another. The club also arranged for both a food and sweet stall to be sited in the club grounds for the weekend.

After a successful running day on the Saturday, Lord Braybrooke steamed up *Barbara Curwen* one of his 10¹/₄in. gauge locomotives,



The one steam traction engine present enjoyed uninterrupted meandering around the site.

and provided superb trips around his 1¹/₂ mile track through Teddy Bear Woods. The club then provided an excellent barbecue and bar for all, with Lord and Lady Braybrooke joining the members and guests. This was followed by another opportunity to ride on the 10¹/₄in. railway into the dark, again driven by Lord Braybrooke. To round off the evening, guests and club members were given the chance to run their engines in the dark on the ground level track with flares placed at intervals to light their way. Three guests and one club member accepted this unique challenge and ran well into the night.

Judging for the Australian Association of Live Steam trophy was carried out during Saturday, and the award was made by Brian Thompson to Bernard White of the Maidstone club for his 3¹/₂in. gauge *Britannia*. Brian went on to award Jonathan Leech, SWDSME Chairman, with a Certificate from the Federation and congratulated the club on providing such excellent facilities and a most enjoyable weekend.

The event went on until late Sunday afternoon when the final caravan left the idyllic setting and the Audley End Railway returned to normal.

Finally, members of Saffron Walden & District Society of Model Engineers wish to thank all those who participated in any way, and for the kind comments received throughout the weekend. We look forward to seeing you at future events.



Steam is raised in a fine Atlantic while Clive Young enjoys some repartee.



The 10¹/₄in. gauge Audley End Miniature Railway proved very popular.



As I write this, 'fresh' as it were from a very busy Model Engineer Exhibition, I would like to take this opportunity to thank all who presented me with information for this column at the event, and also to say how much I enjoyed meeting many who have sent information over the past few months. It was nice to be able to put faces to the names at last. I would also like to remind you all that the best address to use for contributions is the **Model Engineer Editorial Office, PO Box 310, Hemel Hempstead HP3 8XL**. This gives Kelvin an opportunity to extract information for Club Diary and Mike a chance to look through the material before forwarding it to me post haste for inclusion in these columns as appropriate.

UK News

Brian Thompson, Chairman of the **Southern Federation of Model Engineering Societies** informs us that the next Federation Annual General Meeting will be held at **STEAM — The Museum of the Great Western Railway, Kemble Drive, Swindon, Wiltshire SN2 2TA** on Saturday 20 March, commencing at 2pm.

Tony Weale of the **National 2½in. Gauge Association** reports that he was astonished on opening his front door to a knock, to be presented with the *George Williams Memorial Trophy* by fellow member Des Adeley. Peter de Salis-Johnston reports that at the **LBSC Memorial Bowl Rally 2003**, hosted by **Rugby DMES**, Andrew Dick's *Josie* did her best to behave badly in front of the judges and then ran beautifully once they had all gone off to lunch. Who says steam locos have no sense of humour! *Steam Chest*, the Association's journal, carries an article about a visit to Mavis Harriott, whose sitting room adjoins what was once LBSC's workshop. The report states that the house used to shake when Curly was running his belt driven machinery. Sadly only the supporting posts of the 'Polar Route' remain because no one locally was prepared to maintain this famous track. Mrs. Harriott still proudly displays the **LBSC locos Ayesha, Sir Morris de Cowley and Tich** in places of honour.

Reporter *Peregrine of Bedford MES* comments on the success of the club's 10th Anniversary Rally

and wonders "... why wait another ten years and lose the momentum?" It is

suggested that an annual rally would attract considerable interest. We will report any developments as news reaches us.

Brighouse and Halifax ME has a new secretary. David Wainwright has taken over the mantle from Bob Durham and introduced himself to this column with a brief report on recent club activities. Members are busy building a new 'semi-underground' carriage shed to house their new driving cars. The reason for the 'semi-underground' location is to avoid lifting the vehicles. The club holds Open Days every second Sunday in the month from Easter until October when visitors are always welcome. Boiler certificates are, of course, required if you wish to run a steam locomotive. Other clubs are also very welcome on Wednesdays for a run or a chat. The club is also disposing of seven redundant passenger cars. Anyone interested in acquiring these can contact David at 6, Slead Road, Brighouse, West Yorkshire HD6 2JQ or by telephone on 01484-710672 any time. We extend a warm welcome to David and look forward to more news from Brighouse in the future.

George Sallis was awarded the *Bostel Award* in recognition of his "... many years of devoted service to the club" at the recent **Brighton & Hove SMLE AGM**. This is the second time George has been awarded this accolade. The Young Members' award was presented jointly to Matthew Jones and Graham Lynn for services to the society. We extend our congratulations to all three recipients; it makes pleasant news to hear of youngsters achieving in this way after recent reports of vandalism in this column.

In accordance with the club constitution, Ian Morris has stood down as Chairman of **Cambridge MES** and his place has been taken by John Bartholomew. We wish John well in his new role. In his final "View from the Signal Box" Ian reported a good year in 2003.

The AGM of **Cheshire Live Steamers** resulted in the committee being re-elected unchanged. Increased insurance costs mean that members are now being asked to pay a surcharge of £5 for boiler certificates. Following the AGM an auction of the late Ron Schofield's workshop contents was held by Doris 'Trish' Pritchard, using the soup ladle from the village hall kitchen as an

auctioneer's gavel! Let's hope that there were no dents in it at the end of the sale.

East Somerset SMEE is continuing negotiations for the lease on their proposed HQ at the Bath and West Showground. Hopefully the sticking points involving personal liabilities for the lease will soon be resolved so that this new society can look forward to a secure future.

We have received information from Doug Hewson concerning the **Gilling East Railway** driver training courses. The first is to be held over the weekend of 17/18 April at the railway in North Yorkshire. Further details are available from Doug at 73 Victoria Road, Barnetby-le-Wold, North Lincolnshire DN38 6HY, or e-mail doug@the-hewsons.co.uk. The event is restricted to the first 20 applicants for each day and is designed for those who have not driven miniature locomotives before. The course costs £70 and includes a buffet lunch. The first Gilling Main Line Rally will be held over the weekend of 15/16 May for which details are also available from Doug.

Another society in the process of negotiating a new lease is **Harrow & Wembley SME**. We wish them every success in their negotiations. This situation is always worrying for societies because attitudes to our hobby can alter if the officers of the leasing organisation change, so much depends on personalities in these situations. Various maintenance tasks have been carried out, with more planned over the winter season.

Members of **Leicester SME** have a good programme of presentations for the winter, including 'Pattern Making & Casting' by Norman Smedley scheduled for 1 March. These meetings are held at the Regent Sports and Social Club in Regent Road Leicester. Details of these and other events can be obtained from Raymond Wallis on 0116-285-8824.

Club Chat (haven't I seen that name before somewhere?) in the **Peterborough SME** journal carries a comment with which most of us will agree in that the 2003 season "... was one of the hottest and driest ever." At the October auction, two tins of Dubbin turned up and Peter Jackson wonders about the origins of this increasingly uncommon substance. No doubt some of our knowledgeable readers will know. The tunnel on the club track is reported as "... sagging in the middle" and will need to have all the earth removed from the top for

repairs. On occasion I have received comments inferring that my body has the same problem; perhaps a visit to Peterborough is needed! Peter is looking for a copy of *Landscape with Machines* by L. T. C. (Tom) Rolt, published by Longmans in 1971. A call to Peter on 07712-980196 (evenings please) will no doubt be appreciated if anyone can help.

We have received advance notice of *FireRail 2004*, an event organised by **Sandwell MBC**. This annual event is a modelling exhibition held to raise money for local charities nominated by the Mayor. This year's event will be held at St. Peter's Collegiate School, Compton, Wolverhampton on 3/4 July. A study of the programme for last year's event indicates that there will be much to interest our readers. Further information is available from Peter Wise at 232 Gayfield Avenue, Brierley Hill, West Midlands DY5 2SU or telephone 01384-830432 or e-mail pwise@blueyonder.co.uk.

The Chairman of **Stamford MES** reports that while on holiday cruising down the Danube, among the passengers he found one railway author and two model engineers; he was thus able to suppress his withdrawal symptoms while on the trip. The newsletter Editor comments on the use of 'backpacks' at exhibitions being convenient for the wearer but not for anyone else. Having been thumped a few times at Sandown Park Exhibition Centre can I put in a plea from us non-back packers for those who wear them to remember that they have them when moving around a crowded exhibition?

Chris Dobbs of **Stafford DMES** tells us that the society is to have a talk by Terry McMenamin on 'Rail Vehicle Engineering' on 24 February and one by Bob Essery entitled 'Midland Miscellany' on 27 April. Contact Chris on 01189-270533 for more details.

Stan Bishop asks us to point out that he has been secretary of **Staines MES** since March 2003. Stan can be reached at 3 Queens Walk, Ashford, Middlesex TW15 3JG; telephone: 01784-241891 or e-mail: stan-bishop@lineone.net. The society Christmas get together consisted of traditional Christmas fayre along with hot rum punch and party hats. The 'Adult Entertainment' consisted of a railway question time, a joke session based on model engineering terminology and a passing around of a hat for club funds. Among the

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.

Frank Burke
Frank Johansen
Eric Warburton

Hornsby Model Engineers
2 1/2 in. Gauge Association
Hornsby Model Engineers

donations in the hat, the club was pleased to receive a collection of nut shells, three mince pie wrappers, a part chewed toffee and an assortment of used cracker snaps which will be recycled as fire raising aids at the driver training sessions. Members are refurbishing the passenger vehicles and the station ticket office, and other work is being carried out ready for the new season. At the time of writing their newsletter, the society was planning a club stand for Sandown Park. I am pleased to report that they were indeed present with an excellent stand which I visited on one of the days.

Sutton MES is another club insisting on the fitting of spark arrestors to coal fired steam locomotives. This will come into effect as from 11 April this year, so any potential visitors reading this column should please take note. Keith Roper ponders the lack of efficiency of steam locomotives and internal combustion engines, pointing out that with the efficiency of most model locos being less than 1%, for every hundred coal mines, only one involved coal that did any useful work. Internal combustion engines are not much better, needing 0.6% of fuel in the air to produce the required power but at least 1.2% to get the fuel to burn hence, presumably, the development of 'lean burn' engines. Keith notes that hot air engines are 80-90% efficient. Does this mean that hot air engine guru Roy Darlington is in fact saving the planet?

Gordon Bullard of **West Riding Small Locomotive Society** reports on his development of an electronic speed meter for the observer's car used for the Jack Scarth Trophy event. A very sophisticated device, this uses infra-red beams and revolving discs coupled to integrated circuits. The read out is in the form of two large meters, one

for the driver and one for the observer. Future developments may include distance and 'work done' displays. The club is investigating the cost of fencing and security alarms after an attempted break-in to the 7 1/4 in. gauge loco shed. The club reports that the Bonfire and Evening Steam Up event was a great success with 70+ people in attendance and several locos in steam, including a Garrett. The bonfire was lit and augmented with desks and chairs from the local school. (Did the teachers know?) Catering by the Lockwood family included a three course meal of soup, pie or sausage roll and mushy peas followed by either hot apple pie and custard, rice pudding or a cold sweet.

World News

New Zealand

Maidstone MES reports a successful year and extends best wishes for the new year to all those in the UK who see their newsletters — and presumably to those who only see these extracts.

Members of **Hutt Valley MES** are planning a repaint of their diesel locomotive and the two youngest members have been asked to choose a suitable colour scheme. Both apparently stated 'Bumblebee' black and yellow. The newsletter carries photographs of the 'stub' type points being used by **Canterbury SME** for its new track. Perhaps we could have some more details of this design which may well be useful to others?

Canada

The front cover of *The Whistle*, journal of **British Columbia SME** carries pictures of some of the objects used for Halloween including

a realistic skeleton made from various sizes of plastic milk containers. The society ran at the local Loughheed Mall during the run up to Christmas and at the time of writing their report things were going well. As a result, member Lyndsay McDonnell was complaining that he had trouble typing his *Musings from the Caboose* column because of sore fingers from counting the large numbers of nickels, dimes and quarters being taken during the event.

The cover of *The Link*, journal of **Ottawa Valley Live Steamers** carries a photograph of Graham Copley's Gauge 1 *Flying Scotsman*. This was built from an Aster kit and was at a meeting where Malcolm Whittall, David Hayman, Graham, and John Bryant steamed their models on Malcolm's 'backyard' track. The newsletter also includes a report of the Los Angeles Live Steamers accident in November when a train was tipped over when somebody shifted their weight resulting in some minor "... scrapes, cuts and abrasions." This has resulted in the State of California Division of Occupational Safety and Health, Permanent Amusement Ride Unit asserting their jurisdiction over the Los Angeles track and requiring that the club comply with their extensive safety requirements and inspection programme. In the meantime the track has been closed to the public and various members are spending time with DOSH to develop a sensible safety programme for the railway. This may affect activities throughout the USA and possibly spread to other countries. On a happier note *The Link* also carries pictures of the Wartsila NSD RTA96-C two-stroke diesel

engine, the most powerful and efficient piston prime mover in the world. The impressive statistics include a bore of 965mm, a stroke of 2489mm and availability in 6 to 12 cylinder versions. It develops 89,640hp at 100rpm and has exceeded 100,000hp on overspeed test (101.5rpm). The efficiency exceeds 50% which puts steam locomotives firmly in their place!

Thanks to member Scott Barrie, **Toronto SME** has a video showing the history of the society and activities which members enjoy as part of their hobby. The society continues its programme of meetings to which members bring their latest projects and present details to members.

Australia

Members of **Hornsby Model Engineers' Co-operative** are carrying out work on their Galston Valley Railway track including upgrades to the track, loco loading areas and improved drainage to parts of the site. Various members were interviewed recently for a local television station. The programme was recorded by member Milton Brown's eldest daughter so that a record of the event is available for members. Events attended by members recently include the 15th Australian Miniature Traction & Road Steam Rally, the Mudjee Wine Run and the Wagga Wagga Invitation Run. A very important event for the club was their 30th Birthday Weekend which had a static exhibition of members' work including an IC engined tractor and an abundance of locos of all scales from '0' to 7 1/4 in. gauge. The Wednesday Workers recently had a morning tea with large birthday cake in honour of John Knight's 80th birthday. We hope John will accept our belated congratulations on this momentous occasion.

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.

FEBRUARY

- 20 **Kirver & West Midlands SME.** Roger Bryan: *Electricity made Simple*. Contact John Campbell: 01384-891244.
- 20 **MELSA. AGM.** Contact Graham Chadbone: 07-4121-4341.
- 20 **Rochdale SMEE. Rob Wardale: Model Jet Engines.** Contact Mike Foster: 01706-360849.
- 20 **Steam LS of Victoria. AGM.** Contact Graham Plaskett: (03) 9750-5022.
- 20 **Worcester DME. Roger Hennessey: The Atlantic Enigma.** Contact M. Lane: 01905-425972.
- 20/21 **Great Western Soc. (Didcot Railway Centre). Photographers' Evenings.** Contact Jeanette Howse: 01235-817200.
- 21 **Historical MRS (Scottish Area). Chris Pendleton: North East Modelling.** Contact Richard Crockett: 01896-750730.

- 21 **Hornsby ME. Family Day, Boiler Inspection.** Contact Ted Gray: 9484-7583.
- 21 **MELSA. Social Dinner.** Contact Graham Chadbone: 07-4121-4341.
- 21 **N. W. Leicester SME. Running Sunday.** Contact John Elliott: 01455-847040.
- 21 **Steam LS of Victoria. Club Run.** Contact Graham Plaskett: (03) 9750-5022.
- 22 **Great Western Soc. (Didcot Railway Centre). Didcot Steamday.** Contact Jeanette Howse: 01235-817200.
- 22 **Sutton Coldfield MES. Steam Up.** Contact Neal Harrison: 0121-378-3992.
- 22 **Wortley Top Forge ME. AGM.** Contact Alec Butteriss: 07771-841168.
- 23 **Bedford MES. Peter Haycock: Making Taps & Dies.** Contact Ted Jolliffe: 01234-327791.
- 24 **Historical MRS (East Lancashire/North Manchester Area).** Derek Evans: *Etched Kit Construction*. Contact John Sykes: 01706-823989.

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event and rally dates 2004

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WMLEC Jun 5/6th

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Sept 18/19th**



contact :

G.KINCH 01554 770 521

G.MOSEY 01554 759 598

P. DOBSON 01792 884 854

The dates shown are all open invitation events and have been running for some time. All welcome with or without a loco.

Boiler certificates are required as is a fitted spark arrestor.

Caravan spaces available, call for details.

Come and join us, The track is inside a country park with beaches and forest walks available. Tea and coffee on tap!!

- 24 **Stafford DMES.** Terry McMenamin: Rail Vehicle Engineering.
Contact Chris Dobbs: 01889-270533.
- 24 **Sutton Coldfield MES.** Geoff Cowmeadow: Railway Films UK 1937-1962.
Contact Neal Harrison: 0121-378-3992.
- 24 **Wigan DMES.** Brian Woodward: Steam in the 1960s.
Contact John Chamberlain: 01744-882255.
- 25 **Birmingham SME.** 2004 Cup Competition.
Contact John Walker: 01789-266065.
- 25 **Harrow & Wembley SME.** Marine Bits & Pieces.
Contact Dr. Roger Greenwood: 020-8427-2755.
- 25 **Historical MRS (Bedford Area).** Robin Cullup: Railways in the Kettering and Cambridge Areas. Contact John Chamney: 01442-851214.
- 25 **York City & DSME.** Doug Hewson: Building a BR 2-6-4 Tank Locomotive.
Contact Ken Bateman: 01904-421445.
- 26 **Cardiff MES.** Mike Messenger: Indian Narrow Gauge Railways.
Contact Trevor Jenkins: 029-2075-5568.
- 26 **Sutton MEC.** Non Steam Night. Contact Mike Dean: 0208-657-5401.
- 26 **Worthing DSME.** AGM. Contact Bob Phillips: 01903-700642.
- 27 **Brighton & Hove SMLE.** Peter Jones & John Burling: The Southwold Collection. Contact Mick Funnell: 01323-892042.
- 27 **Chichester DSME.** Club Night/Bits & Pieces. Contact Brian Bird: 01243-542266.
- 27 **Colchester SMEE.** Club Auction, Part 2.
Contact L. G. Hammond: 01376-511686.
- 27 **Hereford SME.** Meeting. Contact Richard Donovan: 01432-760881.
- 27 **Historical MRS (Essex Area).** Dave Goodyear: Diesels, a Brush with Colour.
Contact Jem Harrison, 27 Colne Place, Basildon, Essex SS16 5UZ.
- 27 **Kinver & West Midlands SME.** John Swingwood: Film Show.
Contact John Campbell: 01384-891244.
- 27-29 **Hornsby ME.** LMLS Birthday Run. Contact Ted Gray: 9484-7583.
- 28 **Historical MRS (Bristol Area).** Ian Pope: Forest of Dean Railways.
Contact Gerry Nichols: 0117-973-1862.
- 28 **The Society of Ornamental Turners.** Meeting.
Contact N. S. Edwards: 01234-359392.
- 29 **MELSA.** Sunday in the Park. Contact Graham Chadbone: 07-4121-4341.
- 29 **Steam LS of Victoria.** Working Bee & Barbecue lunch.
Contact Graham Plaskett: (03) 9750-5022.

MARCH

- 1 **Historical MRS (London Area).** Dave Larkin: Cattle Wagons.
Contact John Millbank: 0208-948-0556.
- 1 **Leicester SME.** Norman Smedley: Pattern Making & Casting.
Contact Raymond Wallis: 01162-858824.
- 2 **Auckland SME.** Jim Yeam: Injectors. Contact Gary Farquhar: 576-7025.
- 2 **Basingstoke DMES.** Meeting Night. Contact Ian Shanks: 01420-561741.
- 2 **Oxford (City of) SME.** Talk: Building a Live Steam Model from a Machined Kit.
Contact Chris Kelland: 01235-770836.
- 2 **South Durham SME.** Meeting. Contact B. Owens: 01325-721503.
- 2 **Stamford MES.** Bits & Pieces. Contact David Ash: 01780-751211.
- 2 **Taunton ME.** AGM. Contact Don Martin: 01460-63162.
- 2 **West Wiltshire SME.** Dan Jevons: Battery Electric Locomotives.
Contact R. Nev. Boulton: 01380-828101.
- 3 **Bradford MES.** AGM. Contact John Mills: 01943-467844.
- 3 **Cardiff MES.** Bits & Pieces. Contact Trevor Jenkins: 029-2075-5568.
- 3 **Guildford MES.** Video Evening. Contact Dave Longhurst: 01428-605424.
- 3 **Leeds SMEE.** Trophy Night. Contact Colin Abrey: 01132-649630.
- 4 **Cardiff MES.** Robin Williams: Braithwaite, Engineers.
Contact Trevor Jenkins: 029-2075-5568.
- 4 **Leyland SME.** Project Night. Contact Mark Entwistle: 01772-422411.
- 4 **Sutton MEC.** Bits & Pieces. Contact Mike Dean: 0208-657-5401.
- 4 **Tyneside SMEE.** Philip Work: The Clyde Steamers.
Contact Ian Spencer, 0191-2843438.
- 5 **Kinver & West Midlands SME.** Dave Reynolds: Tales of The Severn Valley.
Contact John Campbell: 01384-891244.
- 5 **Maidstone MES.** AGM. Contact Martin Parham: 01622-630298.
- 5 **North London SME.** John West: Not Just a Hole in the Ground.
Contact David Harris: 01707-326518.
- 5 **North Norfolk MEC.** Auction. Contact Gordon Ford: 01263-512350.
- 5 **Rochdale SMEE.** Dave Coleman: The Corris Railway.
Contact Mike Foster: 01706-360849.
- 5 **Vale of Aylesbury MES.** David Strong: Restoring a Steam Powered Boat.
Contact Clive Ellum: 01296-623433; Ian Meikle: 01844-291590 or Bob Jones: 01296-29468.
- 6 **Birmingham SME.** BSME Dinner & Dance.
Contact John Walker: 01789-266065.



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- 6 **Cardiff MES.** Steam-Up and Family Day.
Contact Trevor Jenkins: 029-2075-5568.
- 6 **York City & DSME.** B. Robinson: A Railwayman's Tale.
Contact Ken Bateman: 01904-421445.
- 6/7 **Liskeard MS.** Annual Exhibition. Contact Peter Field: 01503-240312.
- 7 **Ottawa Valley Live Steamers.** Meeting. Contact John Bryant: 761-1109.
- 7 **South Durham SME.** Steaming Day. Contact B. Owens: 01325-721503.
- 7 **Surrey SME.** Members' Steam Up on Ground Level Track.
Contact John Cook: 020-8397-3932.
- 7 **Sutton Coldfield MES.** Steam Up. Contact Neal Harrison: 0121-378-3992.
- 8 **Bedford MES.** A. Tait: Arctic Survival. Contact Ted Jolliffe: 01234-327791.
- 8 **Erewash Valley MES.** Evening Meeting. Contact Jim Matthews: 01332-705259.
- 8 **Melton Mowbray DMES.** AGM. Contact Phil Tansley: 0116-2673646.
- 8 **Saffron Walden DSME.** AGM. Contact Jack Setterfield: 01843-596822.
- 9 **Crawley ME.** Goffs Park Light Rly. First Aid Lesson.
Contact Allan Sinclair: 01293-888203.
- 9 **Dockland & E. London MES.** Meeting (Prize Quiz Night).
Contact P. M. Jonas: 01708-228510.
- 9 **Historical MRS (North West Area).** Dave Skipsey: Colour Light Signalling.
Contact David Goodwin: 01224-880018.
- 9 **Surrey SME.** Bits & Pieces. Contact John Cook: 020-8397-3932.
- 9 **Sutton Coldfield MES.** Geoff Nicholson: President's Evening.
Contact Neal Harrison: 0121-378-3992.
- 10 **Bradford MES.** Committee Meeting. Contact John Mills: 01943-467844.
- 10 **Norwich DSME.** Meeting. Contact Paul Reed: 01603-462925.
(540 Dereham Road, Norwich, Norfolk NR5 8TU)
- 11 **High Wycombe MEC.** D. R. Goddard: Hydraulic Systems and Models.
Contact David Savage: 01494-527402.
- 11 **Sutton MEC.** Natter Night. Contact Mike Dean: 0208-657-5401.
- 11 **Worthing DSME.** Ian Gledhill: Volks Railway Update.
Contact Bob Phillips: 01903-700642.
- 12 **Brighton & Hove SMLE.** David Jones: Building a LBSCR H2 Atlantic at The Bluebell Railway. Contact Mick Funnell: 01323-892042.
- 12 **Chichester DSME.** Introductory Evening. Contact Brian Bird: 01243-542266.
- 12 **Colchester SMEE.** Brian Bourne: Precision Time Keeping in the 20th Century.
Contact L. G. Hammond: 01376-511686.
- 12 **Hereford SME.** Meeting. Contact Richard Donovan: 01432-760881.
- 12 **Toronto SME.** Meeting. Contact Art Gordon: (905) 820-1988.
- 12-14 **Great Western Soc.** (Didcot Railway Centre). Day out with Thomas.
Contact Jeanette Howse: 01235-817200.
- 13 **Leighton Buzzard NG Rly.** AGM. Enquiries: 01525-373888.
- 14 **Bedford MES.** Boiler Test Day Rail Locomotives.
Contact Ted Jolliffe: 01234-327791.
- 14 **Cheshire Live Steamers.** Boiler Testing Day.
Contact Tricia Sturgeon: 01606-48586.
- 14 **Hornsby ME.** Running Day. Contact Ted Gray: 9484-7583.
- 14 **Leeds SMEE.** Running Day. Contact Colin Abrey: 01132-649630.
- 14 **Sutton MEC.** Track Day. Contact Mike Dean: 0208-657-5401.

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1998 1-85486-165-4 189x246mm
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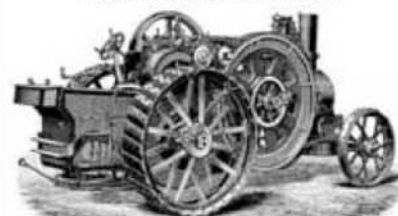
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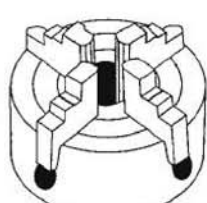
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STARTRITE 14-S-5 woodworking band saw	£775
ALCOSA GF 080/1 Rapid Melting Furnace	£300
COLCHESTER D13 Burner 4 Jaw 8" light body independent chuck	one off £245
AJAX 6" hacksaw	£425
STEEL STOCK different stock rolling in almost daily	to callers only
ELLIOT U1 / U2 Slotting Head	£475
SWAGE BLOCKS	£125 / £145
J & S Universal grinding vice	Choice £275 / £325
HORIZONTAL METAL BANDSAW 6" x 41/2" capacity	New £170
COLCHESTER STUDENT / MASTER Round head, face-plates, small / large	£50 / £80
QUALTERS AND SMITH 6" Hacksaw	£345
TRANSWAVE 3HP Converter	New £305
TRANSWAVE 5.5HP Converter	New £400
TRANSWAVE MT & RT rotary converters	From £400
CROMPTON PARKINSON HP, resilient mount, Boxford / Myford Super 7 Type motor	New £140
CROMPTON PARKINSON SINGLE PHASE start / stop switch model DL1 2000 series (4.5-7.5amps)	New £69
DEWHURST reversing switch the original from Dewhurst!	New £126.50



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

PLEASE PHONE 020 8300 9070 TO CHECK AVAILABILITY OR TO OBTAIN OUR LIST

DISTANCE NO PROBLEM!!

DEFINITELY WORTH A VISIT

ALL PRICES EXCLUSIVE OF V.A.T.

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



£275

Cobra Lathe

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



Cobra Mill

£299

Special Deal
includes 4 metric
& 4 imperial
Collets

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



DB8 Lathe

£699



- 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

£850



- 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

Complete with a USA
Built PCB

£380



- 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

£1299

Now Supplied
with a 100mm
Machine Vice

- 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

£1499

- 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!

