MODEL ENGINEER

Vol. 189 No. 4183

29 November - 12 December 2002 £2.20

FREE TICKETS FOR MEX 2002 WHEN YOU ENTER YOUR MODEL FOR COMPETITION OR DISPLAY!

VICTORIAN NURSERY
Accurate animated miniature

REGULATOR CLOCK
Month-going design to build

LANZ GUMMI-BULLDOG
1:6 scale model tractor

9 770026 732100 83>
HIGHBURY

THE MODEL ENGINEER EXHIBITION
29 - 31 DECEMBER 2002 AT SANDOWN PARK, ESHER, SURREY


Machine Mart
WEBSITE
ORDER ONLINE
www.machinemart.co.uk
where Quality costs less
44 SUPERSTORES NATIONWIDE
Clarke METAL LATHE - CL300M
ONLY £399.95 EX VAT
£469.91 INC VAT
Full range of accessories available
BEST SELLER
Power feed
300mm between centres
LH/RH thread screw cutting
Gear change set
Self centering 3 jaw chuck with guard
Electronic variable speed
Compound mitre slide & 4 way tool post
Clarke 6 SPEED METAL LATHE WITH 12 SPEED MILL/DRILL HEAD - CL500M
ONLY £699.95 EX VAT
£822.44 INC VAT
Full range of accessories available
Shown with optional floor stand ONLY £119.95 EX VAT £140.94 INC VAT
430mm between centres
Compound slide with 4 way tool post
Power fed screw cutting facility
Forward/reverse lathe operation
Clutch for independent mill/drill operation
Clarke ARC/TIG WELDERS
FROM ONLY £129.95 EX VAT £152.69 INC VAT
Clarke TOOL CHESTS/CABINETS
FROM ONLY £44.95 EX VAT £52.82 INC VAT
Clarke TOOL CHESTS
BLUE LINE INDUSTRIAL
FROM ONLY £129.95 EX VAT £152.69 INC VAT
NON-SLIP DRAWER LINER ROLL
Clarke DRILL PRESSES
FROM ONLY £33.95 EX VAT £39.89 INC VAT
Safety cutout on belt guard
Tables tilt 0-45° left and right
Depth gauge
Chuck guards
Full range of Drill Vices available
Clarke MIG WELDERS
FROM ONLY £119.95 EX VAT £140.94 INC VAT
Includes free:
Face mask
Earth clamp
Gas regulator
OTHER SIZES & ARC WELDERS AVAILABLE
Clarke 6 SPEED METAL LATHE
ONLY £579.95 EX VAT
£681.44 INC VAT
CL430 - Identical specification to the CL500M, (pictured top) but without the Mill/Drill head. N.B.: A Mill/Drill head is not available separately.
Clarke TIGER TURBO AIR COMPRESSORS
FROM ONLY £84.95 EX VAT £99.82 INC VAT
Fully portable
Hi/Duty pumps
Auto stop/start control
HUGE RANGE OF AIRLINES & ACCESSORIES
Clarke ENGINEERS WORKBENCHES
FROM ONLY £109.95 EX VAT £129.19 INC VAT
Clarke TOOL CABINET
ONLY £22.95 EX VAT £26.97 INC VAT
10 DRAWER STEEL CONSTRUCTION
GREAT VALUE
Clarke 12 SPD MILL/DRILL
ONLY £899.00 EX VAT
£1056.33 INC VAT
Precision engineered with cast iron head, base & column
Accessories available
12mm chuck
Clarke SOLDERING GUN KIT
ONLY £14.45 EX VAT £16.98 INC VAT
KIT BOX INCLUDED
Clarke BOLTLESS SHELVING
FROM ONLY £24.95 EX VAT £29.32 INC VAT
CAN BE ASSEMBLED AS A SHELVING OR BENCH UNIT
SIMPLE, FAST ASSEMBLY
Clarke SWING ARM & MAGNIFYING LAMPS
Ideal for fine detail work
FROM ONLY £7.95 EX VAT £9.34 INC VAT
Clarke DRILL SETS
ONLY £24.95 EX VAT £29.32 INC VAT
AVAILABLE IN IMPERIAL AND METRIC
Titanium bits last up to 6 times longer than std bits
Can be resharpened
Clarke ANGLE GRINDERS
FROM ONLY £13.95 EX VAT £16.39 INC VAT
Clarke AIRBRUSH KITS
FROM ONLY £7.99 EX VAT £9.39 INC VAT
Clarke BENCH GRINDERS
FROM ONLY £13.99 EX VAT £16.44 INC VAT
Clarke MEASURING INSTRUMENTS
Clarke TAP & DIE SETS
FROM ONLY £12.95 EX VAT £15.22 INC VAT
Clarke AIR COMPRESSOR
ONLY £59.95 EX VAT £70.44 INC VAT
Clarke TORCH KITS
ONLY £19.95 EX VAT £23.44 INC VAT
Clarke VICE
ONLY £39.95 EX VAT £46.94 INC VAT
VISIT YOUR LOCAL SUPERSTORE OPEN MON-FRI 8.30-6.00, SAT 8.30-5.30
24hr TELESALES
0845 450 1800
0845 450 1801
(Calls charged at local rates)
4 WAYS TO BUY
SUPERSTORES
TELESALES
WEBSITE
FAX
NEW! AUTUMN WINTER CATALOGUE!
499 NEW PRODUCTS
537 REDUCED PRICES
Collect from your local branch
Order from www.machinemart.co.uk
e-mail: sales@machinemart.co.uk
Telephone: 0845 450 1855 (local rate)

Model Engineer is published by
Highbury Nexus Special Interests Limited
Nexus House, Azalea Drive, Swanley, Kent BR8 8HU
Tel: 01322 660070 Fax: 01322 616319
www.hhc.co.uk/modeng
Highbury Nexus Special Interests Limited is a subsidiary of Highbury House Communications plc.

EDITORIAL

Editor
Mike Chrisp
Technical Editor
Neil Read
Assistant Editor
Kelvin Barber
Club News Editor
Stan Bray
Technical Consultants
Martin Evans, John Haining, Stan Bray, J. Malcolm Wild FBHI, D. A. G. Brown, H. D. Bickley BSc CEng MIEE.
Editorial Administrator
Sarah Paine

PRODUCTION

Design
Elizabeth Marfell
Production Manager
Sifa Symons
Printed by
Polestar (Colchester)
Origination by
Atelier Data Services

SALES & MARKETING

Group Sales Manager
Colin Taylor
Sales Manager
Tony Robertson
Marketing Manager
Tim Daniells

CIRCULATION

Circulation Director
Sharon Douglas
Circulation Department
Sally Cooper
020 7331 1000
UK Specialist Outlet Distributors
Mike Reynolds-Jones
0121 788 3112
Overseas Specialist Outlet Administrator
Louise Sharp
01322 660070

MANAGEMENT

Divisional Publisher
Dawn Frosdick-Hopley
Associate Publisher
Jez Walters

SUBSCRIPTIONS & BACK ISSUES

Direct Subscriptions and Back Issues are available from Highbury Nexus Subscription Services, Link House, 8 Bartholomew's Walk, Ely, Cambs CB7 4ZD
Phone: 01353 654422; Fax: 01353 654400
Email: nexus@wyvernnet.co.uk
Rates for 26 issues (annual), 13 issues (six months):
UK: £57.20 (annual) £28.60 (six months);
Europe: £70.00 (annual), £35.00 (six months);
RoW Surface: £71.00 (annual), £35.50 (six months);
RoW Airmail: £75.50 (annual), £37.75 (six months);
US Surface: $100.00 (annual), $50.00 (six months);
US Airmail: $115.50 (annual), $57.75 (six months).
Cheques payable to Highbury Nexus Special Interests Ltd.
Second class postage paid at Rahway NJ USA.
Postmaster, please send address corrections to Model Engineer c/o Mercury Airfreight International Inc, 2323 Randolph Avenue, Avenue 1, NJ 07001. Usps 0011099.
US Subscription Agent: Wise Owl Worldwide Services, 1926 S. Pacific Coast Highway, Suite 204, Redondo Beach, CA90277-6145, USA.
Phone: (310) 944-5033; Fax: (310) 944-9963.
Email: wiseowl@sprintmail.com
Website: www.wiseowlmagazines.com
Visa/MC/Discover accepted.
Canadian Distribution by Gordon & Gotch Periodicals (Toll free 1-800-438-5005).
Model Engineer is published fortnightly.

ISSN 0026-7325

IN THIS ISSUE

● Vol. 189 No. 4183 29 November 2002 ●

On the cover ...

Herbert Stumm in Swisstal, Germany, is a prolific model engineer who creates his miniature masterpieces to a consistently superb standard. This 1:6 scale model of a Lanz Bulldog tractor was built following detailed research and measurement of an original tractor encountered by accident as a result of a detour caused by a motorway traffic jam!
This working model was awarded a Gold Medal and the Edgar Westbury Trophy at the Millennium Model Engineer Exhibition at Sandown Park.
Turn to page 533 for Herbert Stumm's own description of his model.

(Photograph by Gary Sinfield)

INDEX to ADVERTISERS

FYNE FORT FITTINGS

The Steam Fittings Specialists

CLARENCE BOATYARD
EAST COWES, ISLE OF WIGHT
PO32 6EZ, U.K.

from Axle Pumps to Whistles
Large S.A.E. + 2 stamps for free list
Trade Enquiries Welcomed
Tel: +44 (0)1983 293633
Fax: +44 (0)1983 297755
Email: sales@fynefort.co.uk
Web: www.fynefort.co.uk

Seasons Greetings!

OUR CHRISTMAS PRESENT TO YOU...

FREE POSTAGE

on orders over £15 Sterling up to the end of 2002
(Carry, applies to U.K. only)

Ask for our latest CAT!!

Access/Visa accepted

Folkestone Engineering Supplies.

At Sandown 29th-31st December

F.E.S - run by a model engineer enthusiast, for model engineers.
Fast friendly service, competitive prices, no minimum order value, no VAT and large stocks.

Why not ask for our free catalogue or visit our web site.

Fasteners (metric & imperial), ferrous and non-ferrous metals (round, hex, square, flat etc), also off-cuts (subject to availability).
Goods supplied mail order or callers (by appointment) welcome.
Tel 01303 894611 email metal2models@btopenworld.com
www.metal2models.btinternet.co.uk

Visit us at Sandown exhibition stand A41, where we will have a range of our stock available, but to avoid disappointment, please pre-order for collection.

A small sample of our stock and prices are shown below.
Metal priced per 300mm/11.8" length, larger sizes are priced by the 150mm, 75mm and 25mm.

	*BMS	Brass	Aluminium	Stainless Steel
1/4" Rod	£0.25	£0.42	£0.35	£0.74
1/2" Rod	£0.60	£1.91	£1.18	£2.40
3/4" Rod	£1.34	£3.95	£1.97	£5.06
1.0" Rod	£2.08	£5.75	£3.35	£6.48
1/4" Hex	£0.28	£0.66	£1.00	£1.18
1/2" Hex	£0.60	£1.58	£1.58	£2.60
3/4" Hex	£1.52	£3.71	£3.10	£8.06
1.0" Hex	£2.04	£5.87	£4.20	£10.92
1/4" Sqre	£0.28	£0.79	£0.50	£1.55
1/2" Sqre	£0.87	£2.08	£1.41	£3.77
3/4" Sqre	£1.77	£5.12	£2.65	£5.36
1.0" Sqre	£3.11	£10.16	£4.95	£8.52

BMS available in *EN1A, EN8, EN1A Pb and EN24T

BMS Flat
[illegible]

Socket Screws - price per 10 (Quantity discount available)
[illegible]

Please note due to Sandown, we will be closed 27/28th December.
62 Canterbury Road, Hawkinge, Kent CT18 7BP
Open weekdays (0900-1600) & Saturday mornings (0900-1200)

LARGEST SELECTION OF MACHINES IN THE NORTH EAST

MILLS

Boxford Vertical VM30 £1,850

Semco Vertical	£1,500
Aciera FS3	£3,000

LATHES

Emco Compact 5	£400
Myford Speed 10	£875
Myford ML7	£975
Boxford AUD	£1,150
Boxford BUD	£975
Boxford CUD	£750
Boxford TUD	£475
Viceroy TDS	£575
Viceroy TDS/2/GBL	£1200
Harrison 12" gap	£1650
Colch Bantam 800	£975
Colch Bantam 1600	£1,250
Colch Student RHS	£1,250
Colch Master 1500	£2,250
Colch Mastiff 1400	£4,750
Colch Mascot 1600	£4,750

SHAPERS

Elliot 10M shaper £675

Elliot 14M	£775
Boxford 8"	From £375
New England 8"	£475
Royal 8"	£475

GRINDING

J & S 310 Tool & Cutter	£1,850
Superior 10 x 5 surface	£750
Viceroy Sharpedge tool	£250
Samand tool lapper	£175
Hembrug tool & cutter	£3,750
Quorn tool & cutter	£375

TOOLING

Myford face plate
Myford 3 jaw chuck
Myford 4 jaw chuck
Myford milling slide
Myford change wheels
Boxford change wheels
Milling tooling (various)
Marking off tables/plates

FABRICATION

250 x 30 pinch rolls	£175
250 x 40 pinch rolls	£225
Walton 6.5 x 32" pinch rolls	£365
Walton 50" x 2" pinch rolls	£550
Walton 50"x 3" rolls (new)	£966
Edwards I.P. rolls 1M x 50	£475
Edwards 4' Straight Folder	£600
Morgan 3' C.I Folder	£475
Walton 1250 Box/Pan (new)	£1,150
Walton hand swager	£475
Edwards hand swager	£575
Allday powered section rolls	£950
Tauring hand section rolls	£950
Edwards shear 6'x18g	£1,250
Edwards power shear 50"	£1,950
Edwards T/shear 50"x16g	£950
Edwards T/shear 12"	£275
Angle bar cropper 1¼" x ¼"	£275
Angle bar notcher	£275
Pickhill Bantam welder	£165

VAST AMOUNTS OF SMALL TOOLING
mostly used
some new
RING: 01207 283302
FAX: 01207 283824
Email:
info@rondean.co.uk

Gas casting crucible	£175

WOODWORKING

Wet stone grinder	£175
Luna universal wood/wkr	£1,500
Wadkin 12" Planer Thick'	£1,250
Startrite 12" Planer Thick'	£1,150
Startrite TA175 saw bench	£975
Wadkin LS H/F Router	£3,950
Elu 40" wood lathe	£350
Graduate 30" wood lathe	£975
Graduate bowl lathe	£775
Viceroy wood lathe	£875
Dewalt (new) flip over saw	£585

GENERAL

Rapidor 6" Power H/Saw	£250
Opus Sawing/Filing M/c	£475
Hiab 1 ton crane	£550
Radcliffe 300kg tail lift	£650
Wenger pottery kiln	£1,85
Vacuum forming pump 240v	£225

ALL PRICES + VAT

As this is our most busiest period, visitors by appointment only please

RONDEAN MACHINERY
Stanley, Co Durham

Stock & Photos on our Web Site: www.rondean.co.uk

SEE US AT SANDOWN & WEMBLY

CHRONOS LIMITED

NEW CAT 37 OUT NOW. PHONE FOR YOUR FREE COPY

DIGITAL SCALE UNITS FOR YOUR MILL ETC!!

LARGE CLEAR DISPLAY - READS METRIC/IMPERIAL - DIRECT CONVERSION
GUARANTEED 2 YEARS!! - AVAILABLE HORIZONTAL OR VERTICAL

Code	Description	Price
CX5	6"/150mm HZ	£45.00
CX6	6"/150mm VT	£45.00
CX7	12"/300mm HZ	£49.00
CX8	12"/300mm VT	£49.00
CX9	24"/600mm HZ	£99.00
CX10	24"/600mm VT	£99.00

AXIS DIGITAL COUNTER FOR USE WITH THE ABOVE

Code	Price
CX112	£45.00

THE AMATEURS LATHE

By Sparey
NOW IN STOCK
£9.50

CROSS VICES

Code	Size	Price	
XM148	3"	£29.95	£22.00
XM149	4"	£39.95	£30.00

WWW.CHRONOS.LTD.UK

GLANZE R8 INDEXABLE ENDMILLS

Code	Dia	Tips	Price
CX45	32mm	2 (+6 Free)	£44.95
CX46	40mm	3 (+6 Free)	£46.95
CX47	50mm	3 (+6 Free)	£48.95

GLANZE 2MT INDEXABLE ENDMILLS

Code	Dia	Tips	Price
CX48	16mm	1 (+4 Free)	£29.95
CX49	20mm	1 (+4 Free)	£32.95
CX50	25mm	2 (+4 Free)	£34.95

GLANZE 3MT INDEXABLE ENDMILLS

Code	Dia	Tips	Price
CX51	32mm	2 (+5 Free)	£35.00
CX52	40mm	3 (+5 Free)	£37.65
CX53	50mm	3 (+5 Free)	£39.95

WE ARE OPEN 7.30 TO 4PM DAILY

OPEN SAT 9-12 CALLERS WELCOME

VERTEX BSO DIVIDING HEAD

Complete with Headstock, Tailstock, Div. plates
Test Certificate

Code
CX17

Price
£199.00!!

VERTEX ROTARY TABLES & ACCESSORIES

Code	Item	Price
CX18	HV4 4" Rotary Table	£135.00
CX19	Div Set for HV4	£ 49.95
CX20	Tailstock for HV4	£ 55.00
CX21	HV4 + Div Set + Tailstock	£220.00
CX22	HV6 6" Rotary Table	£145.00
CX23	Div Set for HV6	£ 49.95
CX24	Tailstock for HV6	£ 55.00
CX25	HV6 + Div Set + Tailstock	£230.00
CX26	HV8 8" Rotary Table	£220.00
CX27	Div Set for HV8	£ 65.00
CX28	Tailstock for HV8	£ 74.00
CX29	HV8 + Div Set + Tailstock	£320.00

New M12 Chuck Adapter with Myford thread to suit HV6 + HV4

Code	Price
5070	£24.95

2" BORING HEAD C/W SET OF 9 TCT BORING BARS

Code	Size	Price	
XM132T	2MT	~~£84.20~~	£75.00 !!
XM133T	3MT	~~£84.20~~	£75.00 !!
XM13R8	R8	~~£84.20~~	£75.00 !!

SET OF THREE 1/2" DIA INDEXABLE BORING BARS FOR 2" BORING HEADS

Brand New and Exclusive to Chronos!!!

Code		Price
XM132ST		£45.00
XM130	Spare tip	£ 2.95

NEW MINI METRIC TAP & DIE SET

31 PCS METRIC
1, 1.1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.5mm
2 TAPS & 1 DIE EACH SIZE
PLUS HOLDERS

£24.95
CODE SCTMM

4 JAW IND CHUCK (PLAIN BACK)

Code	Size	Price	
XM144	80mm	~~£65.00~~	£55.00 !!
XM145	100mm	~~£75.00~~	£65.00 !!
XM146	125mm	~~£90.00~~	£80.00 !!

SECURE ONLINE ORDERING AT WWW.CHRONOS.LTD.UK

PRICES INCLUDE VAT & CARRIAGE (UK MAINLAND)

CHRONOS LTD UNIT 8 EXECUTIVE PK 229/231 HATFIELD RD ST ALBANS HERTS AL1 4TA

PRICES ARE CORRECT AT TIME OF GOING TO PRESS AND ARE ONLY AVAILABLE WHILE STOCKS LAST
TEL (01727) 832793 - 5 LINES FAX (01727) 848130 WEBSITE WWW.CHRONOS.LTD.UK
EMAIL SALES@CHRONOS.LTD.UK

MasterCard VISA SWITCH

SMOKE RINGS
With the Editors

SMEE tours to Sinsheim 2003

Following last year's tour the Society is organising two coach trips to this major exhibition in Germany, one from the north of England and the other from the south. Over 6000 metres of 5in. and 7¼in. track are to be found, together with smaller gauges including G gauge layouts and suppliers, a boat pool, road vehicles, stationary engines and the usual supporting trade stands and demonstrations. A daylight sightseeing tour along the splendid Mosel Valley is also planned, as well as a trip to the Transport Museum at Nurnberg plus a visit to the Technik Museums at Sinsheim and Speyer if a more varied itinerary is preferred. The tour from the North will visit Autoworld in Brussels and the Netherlands Spoortwegmuseum in Utrecht.

Travel will be via the North Sea and the English Channel by executive coach with toilet and drinks facilities. Alternatively you can meet the tour in Brussels where we can arrange the journey by Eurostar. The first night for the southern tour will be in Koln, arriving at Sinsheim early on the Friday morning. The next two nights will be spent in Mannheim. You'll have the chance to spend three full days at the exhibition in Sinsheim unless you prefer to take one or all of the excursions.

The journey home will begin late afternoon on Sunday with an overnight stop in Koln arriving in the UK late on Monday evening, 13 January 2003. The northern departure will spend three nights in Mannheim and one in Koln along with two nights on board ship. Pick up points *en route* and from other locations in the UK can be arranged to suit numbers. If you have any enquiries or wish to bring a locomotive, please contact Martin Cook (tel: 01732-452706; e-mail: **martinelizabeth.cook@btinternet.com**) or Boz Oram (tel: 01980-621418; e-mail **Boz.Oram@glajd.co.uk www.glajd.co.uk**)

The Southern short tour departs early morning 9 January and returns mid evening 13 January for a cost of £325 per person including bed and breakfast in hotels, evening meals, excursions and entrances on the 5-day tour. Full details are available as stated above.

The Northern long tour sets off during the day 8 January for an overnight North Sea crossing to Rotterdam and returns during the day 14 January for a cost £395 per person sharing a twin room. Full details are available as stated above.

A booking deposit of £150 per person will be required. Booking forms are available from, and should be returned to GLAJD UK, PO Box 1829, Shrewton, Salisbury, Wiltshire SP3 4PN.

Bringing railway safety to life

Arriva Trains Northern is set to improve the way it shows children across West Yorkshire the dangers of playing near railway lines, thanks to a donation from a group of railway model enthusiasts.

The Skipton and District Railway Society has created a special model that will help the train operator improve youngsters' understanding of the risks associated with going near railway lines.

The model, which was made by representatives from the society, provides a detailed three-dimensional representation of a scene on the railway where children are trespassing and will prove a valuable teaching aid for the train operator's local school liaison officer Chris Leech.

Commenting on the donation, Chris said: *"This superb tool will help me realistically demonstrate to local children what kind of dangers they could face if they were to trespass onto local railway lines, and the potential consequences of their actions.*

"The model is very well constructed and I have no doubt that it will play a major role in my programme of visits to schools across West Yorkshire in the future."

Trevor Shaw, chairman of the Skipton and District Railway Society, said: *"We are delighted that the skills and expertise of the society could be put to practical use. We make a lot of models which means there are often materials going spare. We decided to put them together and make the model. I hope it proves useful for many years to come."*

Chris Leech (left), Arriva Trains Northern schools liaison officer and Trevor Shaw, chairman of the Skipton & District Railway Society with the model.

Progress

We know that many readers enjoyed the article about the GWR King and its epic run to Paddington (*Keith's Column M.E.* 4179, 4 October 2002). Recently, whilst researching another subject entirely in Volume 9 of *Model Engineer*, we happened upon the story of a railway journey that took place in 1903; on Thursday 4 June to be exact. It seems that the Society of Model Engineers (now the SMEE) decided to take a day trip to Doncaster to visit the Great Northern Railway works based there. This must have been quite an adventure in 1903 when many people never left the parishes in which they were born.

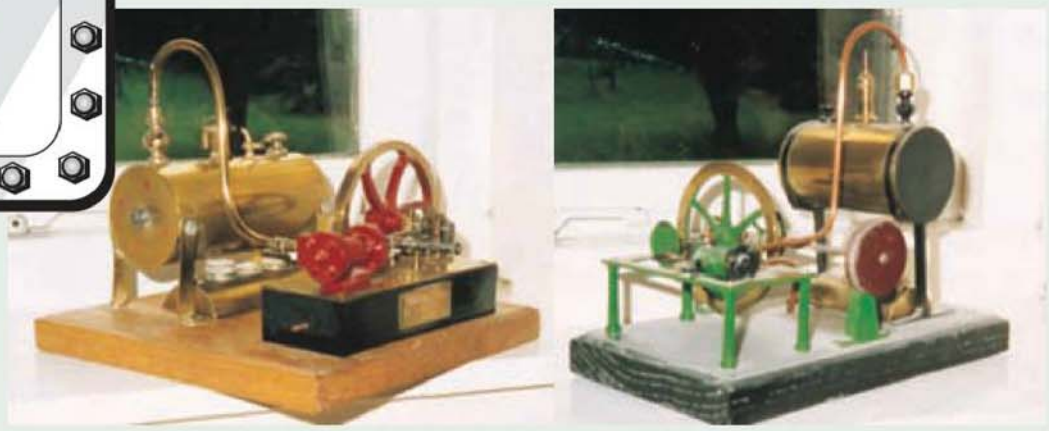
The party took the 9.45am dining-car express from Kings Cross hauled by *"one of Mr. Stirling's 7ft. 7½in. singles (Number 871) built in 1892"*. The first 76 miles of the journey were reeled off in fine style and Grantham, the first stop, was reached after 80 minutes. Simple arithmetic would suggest that the next 40 or so miles to Doncaster would be achieved in approximately 45 minutes giving an overall journey time of a little over two hours. However, it was not to be. By Retford the Stirling single was running short of steam and a *"four-coupled"* engine was attached to the train to complete the journey, which was accomplished at *"just before 1 o'clock"*. The reason for the problems is not clear but the *"engineers"* on the engine blamed *"bad coals"* and *"clinker"* so some of the excuses trotted out at IMLEC and SEQLEC are not new!

I suppose a journey time from London to Doncaster in approximately three hours must have seemed remarkable in 1903. We checked with the timetables to see what the journey time would be now and, travelling at a similar time, the journey would take 1hr. 33min., so some progress has been made in the last 99 years.

Just in case you are wondering, the trip to Doncaster went well and was voted a success by the members who attended.

CHUCK the MUDDLE ENGINEER — by B. TERRY ASPIN

POST BAG



The two early stationary engines rebuilt by Mr. Alan Ashberry one of which bears the date 1868.

Model locomotive design

SIRS, - I would like to thank Neville Evans for his kind words (*M.E.* 4176, 23 August 2002). I too believe that *Torquay Manor* was one of my best efforts. I have had many letters from builders of *Torquay Manor* who were greatly pleased with both the appearance of this engine and its performance on the track. I am sure that *Penrhos Grange* will prove equally successful.

Regarding the matter of colour on drawings, I think this is quite attractive where details are concerned but feel that dimensions are much clearer when drawn as black on white.

Martin Evans, West Sussex.

Octogenarian's view

SIRS, - Mr. Warren's letter (*Post Bag M.E.* 4174, 26 July 2002) prompts me, another octogenarian, to pen a few thoughts in reply.

His letter poses many questions, some of which are unanswerable, even if I knew Mr. Warren personally. I can only say that if one is active and in reasonably good health it should be quite possible to engage in the fascinating and sometimes frustrating pursuit of model engineering well into one's eighties.

One's mental processes do slow down with age, I think we must accept that. In my own case a solution to a machining problem which some years ago would have been immediately apparent now takes a little longer to resolve, and occasional forgetfulness can be very annoying.

Even some degree of physical disability need not preclude model engineering activities. In my own case an arthritic leg means that walking or standing for a short time becomes quite painful, but I spend several hours in my workshop most days. I can file reasonably accurately while sitting down and have increased the height of a stool so that I can often sit at the lathe or mill. This is not recommended for anyone who is fully active. I have an electrically assisted cycle, which enables me to visit the local club track about four miles a way.

Mr. Warren says he has purchased a lathe, which I think is an essential piece of equipment. He does not say if he has any engineering experience. If he has he will not have to learn the basic skills and this will save some time. I would suggest starting on a fairly simple model, not less than 3½in. gauge if a locomotive, but have the boiler commercially made. This will save time and ensure a sound component. One of the simpler stationary engines can also make an attractive model. If Mr. Warren likes woodwork a simple boat, steam powered, is another possibility.

And now for a bit of philosophy. I have come to realise that even if one cannot finish one's project there is the pleasure one has derived from working towards that end. As someone once wrote *"It is better to travel hopefully than to arrive."* If I was a younger man I would not necessarily hold that view!

Finally, it is a great benefit to have an understanding wife or partner who will not mind you being in the workshop for a few hours from time to time. I am blessed in having such a wife.

Louis D. Parke, Oxfordshire.

Derek Warren replies:

I thank Mr. Parke for his kind and most welcome letter. It is gratifying to learn that there are others within my age group who are still busy with their model engineering projects. Also that, while I appreciate that most of us become subject to various aches and pains as the years pass, we may well be able to continue to do so even though it may be at a lower level of concentration.

A few months ago I had the opportunity to purchase a small lathe at a reasonable price, and this seemed a good omen for the future. It is a Clarke 'Metalworker' (300mm between centres and 180mm dia. swing). Not a Myford ML7 I fear but hopefully good enough for me to decide if I want to invest in something better later. This is the point, of course, how much later for anything? It was humourous discussion on this factor which prompted my somewhat tongue-in-cheek letter to *M.E.* requesting information concerning what projects I might indeed yet have time to complete.

Mr Parke's suggestions as to how I should start are much appreciated. After a visit in late July to the Fareham (Hampshire) Club's Railway Weekend (a great show with literally thousands of visitors) and conversations with some of the exhibitors, I came away with two possible ideas. First was clocks, which rather took my fancy, and second was a small stationary steam engine. Anything larger would, I felt, be too ambitious, at least for the moment.

There were numerous examples of both at the show, as well as scores of locomotives and traction engines of all types and sizes in addition to the dozen or so locomotives of all gauges pulling trains of excited children (and parents) around what seemed like miles of tracks. With a large lake, many radio controlled boats under sail as well as steam and other power, and a whole host of other models of every kind one could think of, it was a show well worth a visit, certainly a show for me to revisit another year for further ideas.

Mr. Parke's letter has been most helpful and I am indebted to him for the advice and suggestions given therein. I am a subscriber to *Model Engineers' Workshop* and have been able to purchase some past copies of that magazine. It looks as if, for me, this next winter is going to be a very busy one.

Rebuilds

SIRS, - I enclose photographs of two models that I have just finished rebuilding. I received them as a box of bits and pieces with the various parts of the two engines all mixed up. They were accompanied by a request from the owner for me to put them in working order once more.

It took some time to sort out the various parts and establish which bit fitted which engine. The box of components had been in a cellar for some considerable time so they all needed a good clean before repainting. I also had to re-make two or three damaged parts plus a couple which were missing altogether.

The brass boilers were thoroughly inspected and this revealed some cracks on the outside surface. This did not worry me however as the engines will never be steamed again. In fact, I am not sure they could ever be made to operate on steam without further major work.

Assembly of the two engines was not the problem I imagined it would be. The various parts fitted together very well and it was a big thrill to see them running on air.

Much of the work involved with the engines was done by hand. For example, the flywheels were repaired using hand methods. On one engine the contrate gear which operates a countershaft had to be made, and this was hand cut.

All in all they are a very interesting pair of engines and I am very pleased to have been involved with their reconstruction. The original wick burners of the engines have survived and one engine carries a plate bearing the maker's name and a date of 1868.

Alan Ashberry, Hertfordshire.

Hot air engines

SIRS, - In view of the current series of articles in *M.E.* by Mike Thurgood on his Heinrici hot air engine I thought the enclosed photograph and a few comments might be of interest.

The photograph shows a model of the Westbury version of the engine, which I constructed a few years ago using the drawings published in the original 1964/65 articles but without the use of any castings. All of the components were fabricated or machined from the solid, including the flywheels, which were turned and milled from solid steel discs probably resulting in more swarf than flywheel! Like Mr. Thurgood, I used thin walled stainless steel tube for the hot end of the displacer cylinder in order to minimise heat transfer by conduction to the cold end.

The snag with this approach is that the heat transfer from the burner flame to the air inside the cylinder is also reduced. I therefore brazed a short copper section to the lower end of the stainless steel tube where the flame impinges. In my model the upper (cold) section of the displacer cylinder is an integral part of the body fabrication. Most of this fabrication is of steel but the inner tube forming the cold section of the displacer cylinder is brass. This again was to improve heat transfer to the cooling water, although of minor

Mr. Norman Barber's Heinrici style hot air engine built without the use of castings.

significance since the major resistance to heat transfer in this area is the gas/metal interface. Furthermore, I have never found it necessary to use cooling water — the engine runs quite happily for half an hour or so with no cooling.

The A-frame fabrications are fitted with removable caps and proper brasses rather than the split housings used in the Westbury design, an arrangement that I deplore.

The furnace is fabricated from sheet steel, the edges of the various panels being machined to the correct bevel and the whole silver-brazed together. The inner surfaces are lined with 1/4in. thick asbestos type heat resisting material. The model is fired with a small burner designed to use butane from the cartridges sold for small 'blowlamp' type burners.

The engine runs very well at about 450-500rpm, the almost completely silent operation always being a source of fascination to me.
Norman R. Barber, Essex.

Scrap

SIRS, - I was interested in your comment on mistakes under the heading *Scrap* in a recent *Smoke Rings* editorial (*M.E.* 4178, 20 September 2002).

Some years ago I bought a large, quarter chiming/flatbed movement made by Gillet & Johnston of Croydon. This movement had been vandalised and many parts stolen. The large casting was machined on its upper surface and the bearing brasses were secured to this machined surface with 1/2in. Whitworth screws, which located in blind tapped holes in the casting. When I was dismantling the movement I noticed that one of the Whitworth bolts holding a pair of brasses to the casting was much shorter than the other three. I made a mental note to replace the bolt with one of the correct length. However, after the overhaul, when I was re-assembling the movement, the new bolt would only enter a short distance.

When I shone a torch into the hole I saw the broken end of the 1/2in. tap at the bottom of the hole! Fortunately it was the extreme tip of the tap which had broken and there was sufficient length of thread above the broken tap to provide a satisfactory hold for the bolt.

I often wonder what would have happened had the tap broken higher up. How would they have got it out?
John Wilding, Sussex.

Dynamos

SIRS, - Back in *M.E.* 3863, 15 December 1989, a book entitled *The Homebuilt Dynamo* by Alfred T. Forbes was reviewed.

This particular book was originally published in Auckland, New Zealand but despite considerable time spent on the Internet I have been unable to locate either the author or publishers.

Does any reader know where I can obtain a copy of this book, which will be eventually used for teaching students?

All reasonable expenses will be refunded.
James C. Wells, Saudi Arabia.

Pickle acid

SIRS, - Mr. G. F. Hennessey's desire for 96% Sulphuric acid *(Postbag, M.E.* 4178, 20 September 2002) sends cold shivers down my spine. He is seeking is a very dangerous substance that certainly has no place in the model engineer's workshop. Let me put the matter straight.

So-called concentrated sulphuric (96% and specific gravity 1.8) reacts violently with water to such an extent that it explodes violently if water is added to it. In contact with the skin it rapidly burns and attacks tender organs such as eyes with greater speed than one can obtain help.

If it is carefully added to water great heat is released, but this reaction finishes by the time the acid is about 78% concentrated; further mixture with water from this stage is docile, with no further release of heat. So called battery acid, with a concentration of about 40% and a specific gravity of about 1.3 is therefore quite safe to mix with water and is available in the motor trade.

This battery acid is still very corrosive and must not come into contact with the skin. Diluted further, about 10 times, it is less of a danger and is the correct strength for our pickling needs.

Sulphuric acid is an important raw material in the chemical industry and it is the cheapest of the common acids. Hydrochloric, if concentrated, fumes dangerously and wreaks havoc in the workshop; it is also bad news if used for pickling stainless steels. Nitric acid is dangerous to the skin, even when diluted significantly and is a powerful oxidising agent, just what is *not* required when pickling copper! Phosphoric acid, although relatively expensive, does pickle steel well and creates the ideal surface on which to apply paint; it is available in the motor trade, Jenolite being a recognised trade name.

All the above acids are inorganic, or 'mineral' acids and exist in solution as hydrogen and mineral ions (charged particles). Consequently they are said to be 'strong' acids. In this sense strength has nothing to do with concentration of a solution.

There are many organic acids, all containing carbon atoms, many of which occur in nature. None is as strong as the mineral acids, their hydrogen ions not being completely dissociated in solution. The most common include

Formic: ant, bee and wasp stings; poisonous, so don't use it!
Oxalic: rhubarb leaves and other plants; quite expensive.
Acetic: vinegar, an impure form, leaves unhelpful deposits.
Malic: apples and other fruits; very weak and of no use to us!
Salicylic: birch trees and some shrubs; the base of aspirin.
Citric: lemon, lime, orange; just the right strength for model engineering.

From the above you will gather my strong preference for citric acid, above all others as a brass pickle, though it's not really good for removing silver-solder flux. It is as well to remember that some bugs thrive on citric acid, so if it is stored, do not forget to add a drop or two of household bleach to half a pint of solution to keep it sweet. I see no point in looking for another acid, as citric is sold by health food shops and home brewing specialists.

To recapitulate, my armoury of pickles is: citric for brass and copper components, very dilute sulphuric for major jobs and the removal of flux and finally, phosphoric for the descaling and dulling of steel components. One further word of caution regarding your sartorial elegance: even 2-3% sulphuric acid gives rise to 'holey trouser syndrome', as I well know to my cost; so don't do your pickling in your dinner jacket, or it may end up looking like a gruyere cheese.
D. A. G. Brown, Rutland.

Spring wire clips

SIRS, - I am pleased to report that I have managed to locate a company able to supply me with suitable spring clips, and would like to thank our editor for publishing my original request (*M.E.* 4173, 12 July 2002) for help in locating a source of supply for the above.

My thanks are also due to the number of readers whose helpful letters I received via the editor. I especially thank Peter Spenlove-Spenlove who wrote to me twice. One of his letters included detailed instructions as to how I might manufacture my own clips.

In case other readers need similar clips, the name of the firm is Springmasters Ltd., Arthur Street, Lakeside, Redditch, Worcestershire B98 8LF, tel: 01527-521000. Minimum order is £10, plus VAT and postage.
R. G. Marden, London.

Mils

SIRS, - In reply to the query by John Walford about angular measurement, the use of 6400mils is derived from the mil-radian. From artillery spotting, a shift of 1 yard in 1000 yards was also called a mil.

There are 2π x 1000 (6283.185) mils in a circle and I think that 6400 was the best rounded up approximation they could come up with. Its circular measure is thus 1:1018.6
John D. Walker,
Perth, Western Australia.

The Author's clock; its elegant lines would fit it well for any domestic environment.

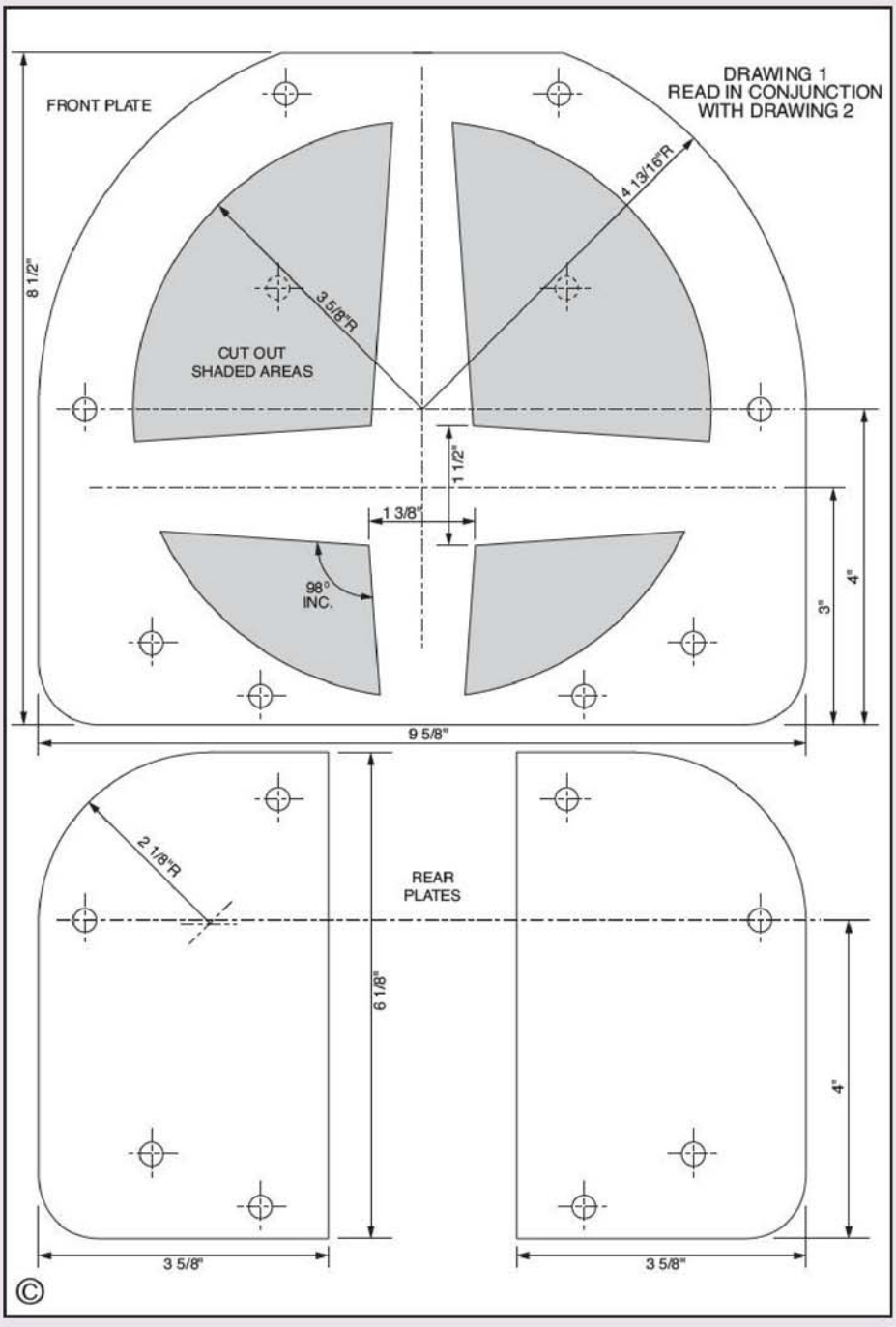
MONTH-GOING REGULATOR CLOCK

Peter Heimann
introduces his fine new project with a brief description and specification before commencing construction with the plates.
●*Part I*

Early in 1999 I wrote a series describing the construction of a 'Workshop Regulator Clock'. In my view, by its very nature, this type is a real engineer's scientific instrument, heavily constructed with no frills but when carefully made capable of very accurate timekeeping. In years past, not only were these clocks to be found in the clockmaker's workshop but also the great engineers often had one in their office. Isambard Kingdom Brunel certainly had one! As there is no motion work on a traditional regulator, the seconds, minutes and hours are indicated on three separate dials. This means reading the time requires rather more than a fleeting glance! These clocks usually run for eight days per winding.

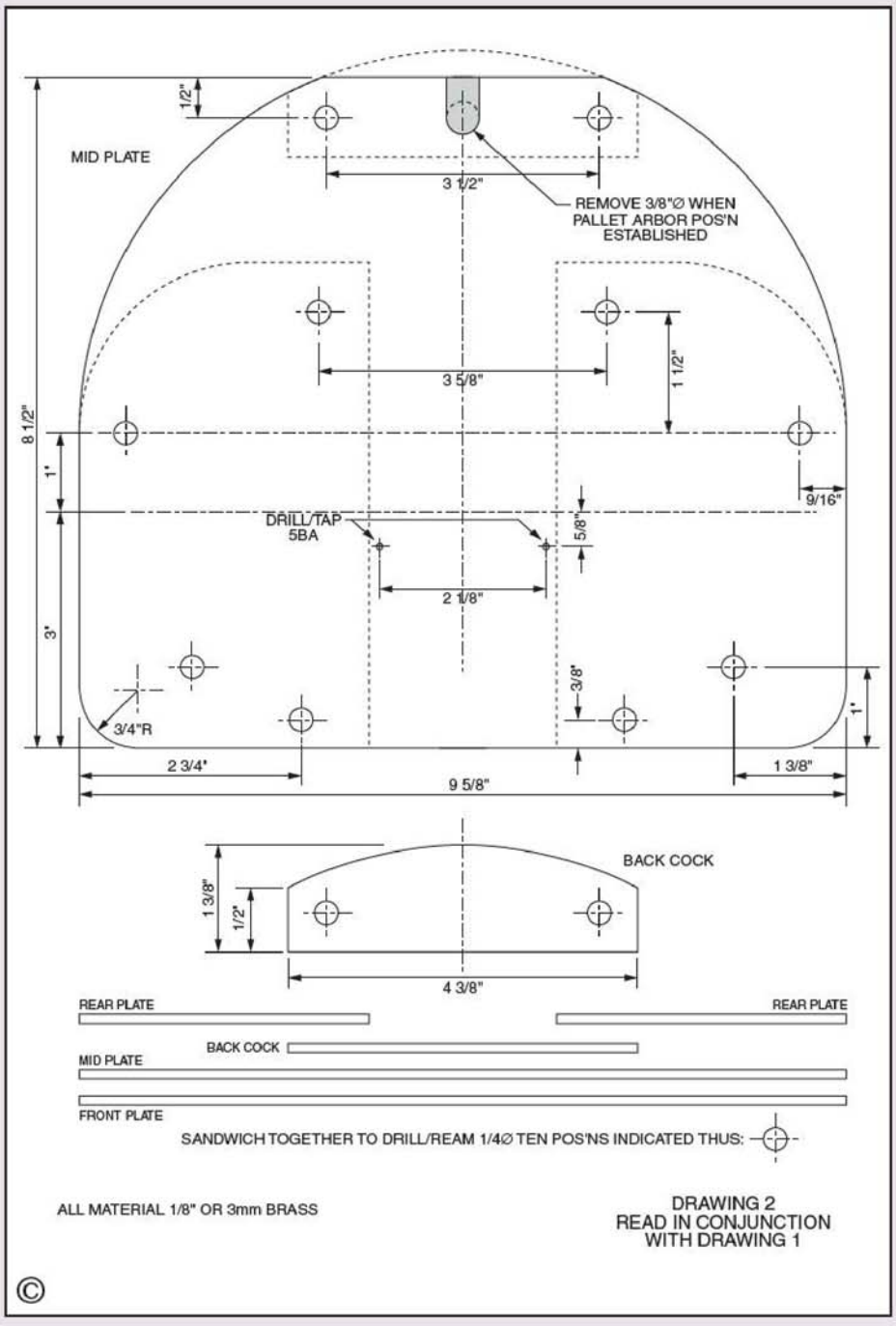
Our current regulator project bears many similarities and is of almost the same physical dimensions. But it does have motion work thus showing the hours and minutes against a conventional 10in. dia. chapter ring with a big and a little hand. It runs for a month, in fact 32 days, per winding. One can therefore come back home from holiday to the comforting sound of ticking, rather than a hateful, deadly silence! The front plate is 'skeletonised' so that the wheels and escapement can be seen in action, which adds greatly to its appeal. The glazed wall-hanging case measures only $51\frac{1}{2}$ x 12 x $6\frac{1}{4}$in. internally and I submit that it will make a welcome and practical addition to the home. **Photo 2** is a front view of the movement.

A brief specification is as follows. The clock is a month-going regulator with a 'seconds'



compensated pendulum, dead beat escapement, adjustable pallets spanning 8-teeth of the 30 tooth escape wheel, adjustable (eccentric) bushes for the pallet-frame arbor, eccentric 'centering' for the motion work, optional seconds indicator, 10in. dia. silvered chapter ring and is of twin-framed construction with a skeletonised front plate. All arbors up to and including the center run in ball races, the third and escape wheel arbor are fitted with end stones, winding is anti-clockwise, the pendulum bob and weights are 2in. dia. lead filled brass tubes.

More work is involved with this model than with the previous one; it will take longer to construct but the level of difficulty and skill required is no greater. As before, all work, including the glazed case, can be carried out in the average model engineer's workshop. I have a Boxford ME 10, a lathe that will just accept the 10in. dia. chapter ring. This is the greatest swing required. For constructors without this capacity, there should be no difficulty in obtaining this item from 'outside'. Generally, my comments on tooling in the previous series apply equally. Those of you who have built the workshop version, will be well away. I use a home-made, direct division plate mounted on the lathe mandrel and a home-made milling/drilling spindle mounted on a vertical slide. These cover both gear cutting and pinion trunnion drilling as well as 'engraving' the chapter ring with Roman numerals. An illustrated description of these processes will follow at the appropriate time. Gear teeth modules are 0.8 and 0.6. All the divisions required can be achieved from 120, 96, 90 and 64



Material List

Brass sheet (finished sizes)
- 9 5/8 x 6 1/2 x 1/8in. (or 3mm): 2 off.
- 6 1/8 x 3 5/8in.: 2 off.
- 4 3/8 x 1 3/8in.: 1 off
- 10 x 10 x 1/16in. (for chapter ring): 1 off.

Brass round
- 1 1/4in., 1in., 3/4in., 1/2in., 1/4in. diameters: 6in. of each.
- 5/8in. dia.: 50in. total length.

Brass hexagon
- 3/8in. A/F: 12in.

Brass tube
- 2in. dia. x 16 gauge: 32in.

Brass wheel blanks
- 4in. dia. x 3/16in.: 2 off.
- 2in. dia. x 3/16in.: 2 off.
- 3in. dia. x 1/8in.: 1 off.
- 2in. dia. x 1/8in.: 6 off.
- 2 1/2in. dia. x 1/16in.: 2 off.
- 2in. dia. x 1/16in.: 8 off.

Gauge plate
- 1 off: 3 x 3 x 5/32in.: 1 off.

Steel cheese head screws
- 10BA x 1/2in., 100 off.

Blue pivot steel
- No. 67, No. 60, No. 56: 1 bundle each

Invar rod
- 1/4in. dia. or 6mm: 1 length

Material suppliers

Mr. I. T. Cobb,
8 Poplar Avenue, Birstall, Leicester LE4 JDU; (0116-2676063).

Repton Clocks,
48 High Street, Repton, Derby; (01283-703657).

E.K.P. Supplies,
The Old Workshop, Bratton Fleming, nr. Barnstaple, Devon EX31 4S4; (01598-710892).

P. P. Thornton (Successors) Ltd.,
The Old Bakehouse, Upper Tysoe, Warwickshire CV35 0TR; (01295-680454).

Goodacre Engraving Ltd.,
Trumpton Avenue, Meadow Lane, Long Eaton, Nottingham NG10 2GB; (0115-9734387).

Meadow & Passmore Ltd.,
1 Ellen Street, Portslade, Brighton BN41 1EU; (01273-421321).

Cousins Material House,
Unit J Chesham Close, Romford, Essex RM7 7P3; (01708-757800).

H.S. Walsh & Son, Ltd.,
243 Beckenham Road, Beckenham, Kent BR3 4TS; (0181-7787061). Also in London and Birmingham.

The clock movement removed from its case to reveal the skeletonised front plate through which the motionwork is clearly visible.

hole plates which simplifies the manufacture of a plate if one is not available.

I am keen to encourage individual variation and personalisation to detail and method rather than strict adherence to prototype within the parameters of wheel count and lay-out. In my view, herein lies the fundamental difference between our model engineering, where we build a detailed scale model of a prototype (visions here of rivet counting), and clock making which, generally speaking, is not 'modelling' at all but building full size.

It is interesting to reflect that in spite of this difference, model engineering and amateur clock making have always been compatible bed fellows as is evident by browsing through past issues of *Model Engineer*. However, the freedom of not having to stick rigidly to specification does have a price. Read the drawings in advance to make sure that any divergence will not create future problems (and, indeed, that I have not made errors with dimensions shown). In the main, I have stuck to imperial measure but there will be instances when metric dimensions should be substituted depending on the material available.

Materials

With regard to material, 'compo' brass sheet is by far the easiest to work. It is usually dead flat and comes highly polished and protected. It is also very expensive. For the prototype clock, I deliberately used ordinary brass sheet in the form of offcuts and even scrap from my local 'Smiths'. This did need some straightening, considerable elbow grease to polish and a very gentle feed on gear cutting but my goodness, it did save a lot of cost! As a point of interest, there is a precedent. At work, we sometimes come across old, nicely made clocks with *mild steel* plates, just brass bushed for bearings. Clearly, it must have made commercial sense at the time.

I suggest contact with your nearest Smith Metals Centre, also a call to Mr. I. T. Cobb who took over stock when Crafts for 4 Seasons ceased trading. This will be worthwhile in connection with brass as well as wheel blanks. Invar rod for the pendulum is not easy to find but I know that Repton Clocks do stock this in 6mm diameter.

Ball races will be best sourced from your local bearing and transmission specialists. Here it pays to compare price between imperial and metric sizes and modify the drawing specification accordingly.

E.K.P. Supplies manufacture very good BA screws which 'blue' beautifully. P. P. Thornton supply gear cutters.

Messrs. Goodacre Engraving Ltd. would, no doubt, be able to quote for the chapter ring but doing this yourself is an interesting exercise if your lathe is of sufficient capacity (minimum 10in. swing).

Meadows and Passmore Ltd. are able to supply blue pivot steel and list this in Stubbs Wire Gauge under No. 67 (for 0.031in.), No. 60 (for 0.040in.) and No. 55 (for 0.050in). This firm also lists suspension springs and phosphor bronze weight line.

Subject to the usual disclaimer, addresses and telephone numbers of all these suppliers and several others are appended. Their catalogues will be found to be a mine of information.

To help with forward planning and cost calculations, the main material requirements are listed in the panel.

Making the plates

We will now make a start on the plates, which are all 1/8in. or 3mm thick. It pays to protect the surfaces with thin adhesive paper as much and for as long as possible in order to save a lot of hard work later. When marking out, be sparing with the scriber; I find that a sharp hard pencil is a good alternative. The sheet metal must be as flat as you can get it, especially the mid-plate. The others, particularly the skeletonised front plate will tend to follow when clamping together. **Drawings 1** and **2** refer. The plan is to build up a sandwich of all the plates for drilling the ten 1/4in. dia. reamed pillar holes very accurately, so that the sandwich can be dismantled and reassembled without trouble.

Mark out the front plate completely, as per drawing 1, including a light centre pop at the centre position shown 4in. up from the bottom. Do not cut out the hatched areas at this stage but concentrate only on the outlines. The front and mid-plates are the same shape and the two rear plates are also alike. To avoid later confusion, determine the best side as the front and mark the rear. The back-cock shown on drawing 2 will be a little tricky to position in the sandwich. It may be best to leave this oversize initially, say 4 1/2 x 1 1/2in., with one good straight edge. A strip of similar thickness material 1 3/8in. wide with straight parallel edges placed between the top edges of the rear plates and the bottom edge of the back cock will locate this accurately in the sandwich.

The traditional method of locating the layers of a two-part sandwich is with tapered pins. In our case, I suggest making half a dozen really accurate diameter bolts and nuts. The clamps holding the sandwich together can then be replaced by these bolts as drilling and reaming progresses. I cannot over-emphasize the importance of positional and relative accuracy for these ten 1/4in. dia. holes. Before taking the stack to pieces, mark the 4 13/16in. radius on the back cock.

The next stage is to skeletonise the front plate by removing the sections shown hatched on drawing 1. Although I have a milling machine and rotary table, I find it quicker to do this sort of job by chain drilling, sawing and filing. Whatever method is chosen, all edges must be square with sharp corners and well finished. On this type of construction, every bit of the clock shows! On drawing 2 I also show two 5BA tapped holes in the mid-plate. These will not be used until much later, but it is just as well to deal with them now. Needless to say, all holes should be well de-burred.

●*To be continued*.

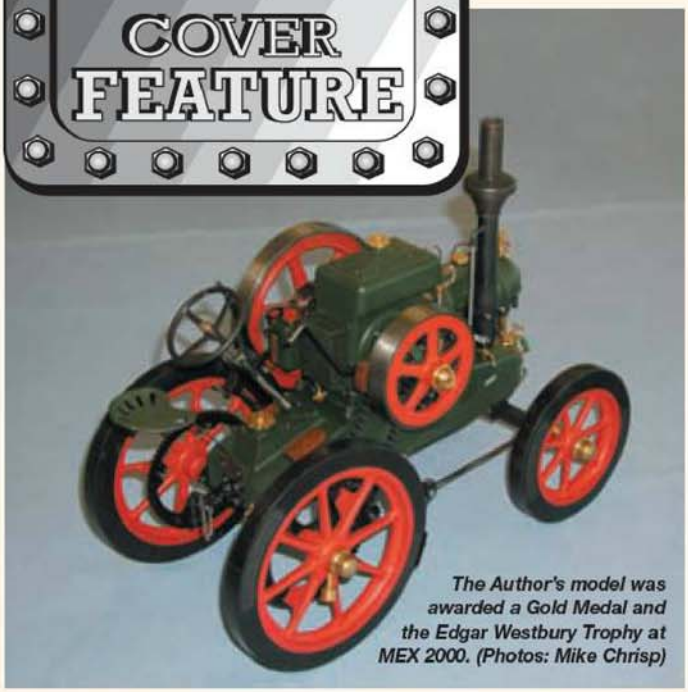
TRADE TOPICS

Christmas cards from The Welshpool & Llanfair Light Railway

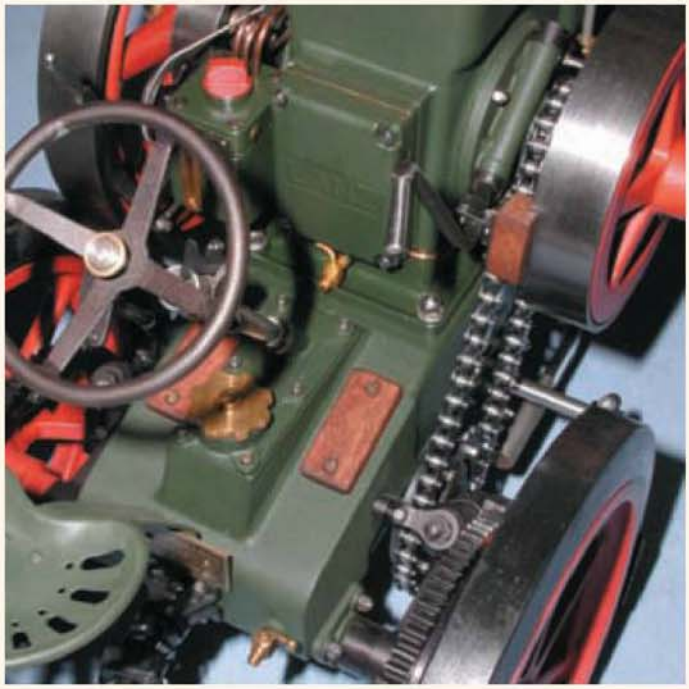
This nostalgic artist's view of red-liveried ex-Antigua Sugar Co. 0-6-2 No. 12 *Joan* rounding the curve towards Heinarth with a passenger train for Llanfair is featured on the Welshpool & Llanfair Light Railway Christmas card for 2002.

The cards cost £2.95 for ten, £7.95 for 30 or £12.95 for 50, all post free and are available from **R. E. Cartwright, Owl Halt, Manor Road, Sealand, Deeside, N. Wales CH5 2SB (tel: 01244-815273).** Please make cheques payable to W&L Sales Ltd.

COVER FEATURE



The Author's model was awarded a Gold Medal and the Edgar Westbury Trophy at MEX 2000. (Photos: Mike Chrisp)



LANZ 'BULLDOG' in 2in. SCALE

Herbert P. Stumm in Germany is a prolific modeller. He researches and builds superb models of unusual prototypes and here describes his working tractor.

●*Photographs by Eva Stumm.*

Following the first World War, German farmers were short of fuels like petrol and diesel. Dr. Fritz Huber of Messrs. LANZ/Mannheim (now John Deere) designed a tractor with an engine based on Englishman Herbert Akroyd Stuart's invention. This engine ran on almost any liquid fuel including crude oil, tar oil, spirit, vegetable oil, etc., the only alteration necessary when the driver wanted to switch from one type of fuel to another being the hot bulb.

The operation of this 2-stroke engine differs to that of a diesel. With a diesel, air is compressed into the combustion chamber and fuel is injected into the hot air at top dead centre. A very high compression ratio, of the order of 20:1, is required. The Akroyd Stuart engine, however, injects fuel into a pre-heated hot bulb chamber when the piston has already passed bottom dead centre. The fuel evaporates but because there is a lack of air, cannot burn. Combustion takes place when the rising piston forces fresh air into the combustion chamber. Compression is fairly low, of the order of only 5:1. To prevent premature combustion, the connection between the chamber and the cylinder was reduced to a relatively small bore.

The design of the tractor is simple and foolproof so that farmers could do their own repair work; there were only two ball races on the entire tractor. When the farmer wanted to start the engine, the hot bulb had first to be pre-heated for some 20 minutes using a petrol blow torch. The flywheel was then turned in one direction and the engine started to run in the opposite direction. The tractor is equipped with two brakes, one of which acts on the hind wheels, the other on the rim of the small flywheel. The lever of this brake also actuates the clutch which is integral with this flywheel (**fig 1**).

Lubrication was by means of a 'Bosch' oiler which is a box filled with oil and housing a nest of small individual oil pumps driven by a tumbler. This made it easy for the driver to determine and adjust the precise amount of oil for every single lubricating point by means of a screwdriver.

Cooling was simply by evaporation and involved a large chamber in the cast-iron chassis which contained water. Another chamber in the chassis was used as a silencer with the exhaust at the bottom of the chassis. This arrangement was soon altered to a normal exhaust pipe and this chamber became useful for other purposes such as a toolbox. The hind wheels were connected to the engine via a chain, a differential gearbox and spur gears.

The tractor was available in several different versions; one was fitted with ribbed cast iron wheels for farm work, another with rubber tyres for transport (maximum speed approximately 5-7mph). There was also a 'light railway' version and last, but by no means least, the engine alone was available for use as a stationary engine. It was given the name 'Bulldog' by the LANZ staff because from the front it reminded them of that particular breed of dog. The 'Bulldog' was a commercial success and was built until the late 1940s during which time many improvements were made. The tractor and its characteristic noise (similar to that of a 'Field Marshall') has since become a legend for vintage tractor enthusiasts. A good many are preserved in Germany.

Investigation

The idea to build a model of the 'Bulldog' came to mind during a visit to the Technical Museum at Sinsheim. Two of these types of tractors are exhibited here and I took several photographs just in case (**photo 1**). Lesson No. 1: every model engineer should always have some measuring equipment ready in his pocket; you never know when you might need it! Unfortunately for this ▶

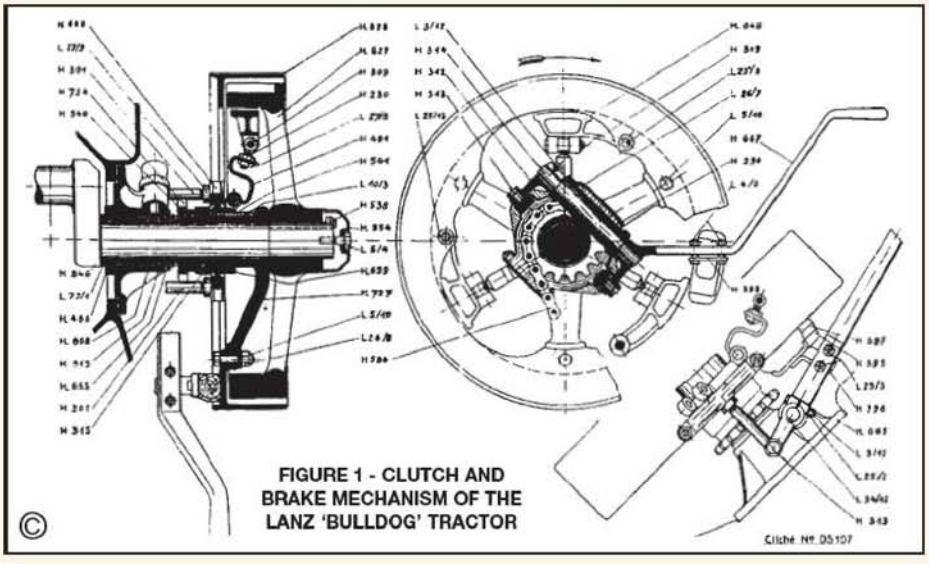
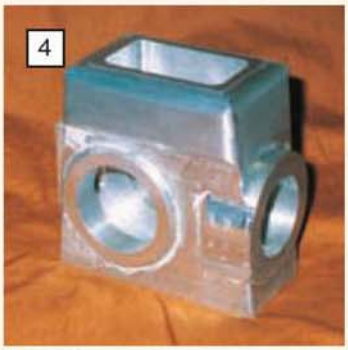


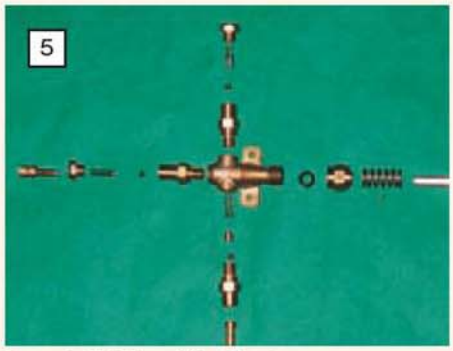
FIGURE 1 - CLUTCH AND BRAKE MECHANISM OF THE LANZ 'BULLDOG' TRACTOR

The injection pump system on the prototype.

A motorway detour led the Author to a seat on the real thing.

The chassis and crankcase were carved from solid chunk of aluminium alloy.





An exploded view of the injection pump.

visit, I had not, so I was unable to take any measurements at this time. Just a few days later a friend gave me a book about the history of Messrs. LANZ which included some drawings (**figs 1** and **2**) and pictures. Based on the data and information which this book contained I was able to make a start.

The results of further investigations at tractor meetings were poor and although most people were friendly and willing to help, the only owner of an early Bulldog who lived in my neighbourhood was not. We sometimes have to rely on good fortune and at a model engineering exhibition in Leek in Holland I count myself very lucky to have met a model engineer from Hamburg who knew a lot about LANZ. He kindly offered me a nearly complete parts list of an early Bulldog including pictures of every part of the tractor (**fig 3**). With this list I could achieve a high degree of fidelity to the prototype.

The chance to see a real 'Bulldog' came at last when my wife and I were on our way home from Northern Germany. Caught up in a motorway traffic jam we decided to leave at the first available opportunity. Travelling through a small village, my wife Eva spotted a signpost to a little country museum and suggested we should break our journey. *"Let's drop in"* she said. Inside we found a very old but real 'Bulldog' dating back to 1926. I was allowed to climb onto it (**photo 2**), to inspect everything, to turn the flywheels and whatever I chose to touch or try. This time I had a tape measure with me and was able to take and record as many measurements as I could. What follows is an account of my investigations.

The 2in. scale model

I seldom make drawings before I start work on a model, and only prepare workshop sketches if a particular part is too complicated to carry all the dimensions in my mind. Sometimes, to avoid mathematics and to make sure that things fit together I use my CAD program. With the exception of flywheels, which are relatively cheap and can be found at exhibitions as surplus items, I prefer to work without castings. In my opinion, pattern making pays off only if you have to build the wheels of a 4-10-4 locomotive!

The first parts to be made were the chassis and the crankcase (**photos 3** and **4**). Carved from solid aluminium alloy blocks which were to hand they involved milling, turning and a lot of filing and sand-blasting to achieve the appearance of castings. The four wheels were made in the same way from four offcuts of the same material. The cylinder, cylinder head and crankshaft bearing plates were made from brass to facilitate subsequent silver-soldering of the brackets and bosses.

The cylinder liner was turned from a bar of good quality cast iron from which I also made the piston rings. My technique for piston rings may seem a little odd to the experts, but it works for me. I turn rings to the exact inner diameter of the cylinder liner, split them, spread them apart by approximately 2-3mm with a nail or whatever happens to be handy, and heat the whole lot to dull red. After slow cooling, the nail is removed to leave a gap which provides the ring with the necessary spring. The gap, of course, closes when the ring is fitted into the cylinder bore.

The piston was turned from a suitable aluminium alloy while the crankshaft was fabricated from silver-steel with bright mild steel crank webs which were pinned and silver-soldered in place. To permit experimentation with different com-

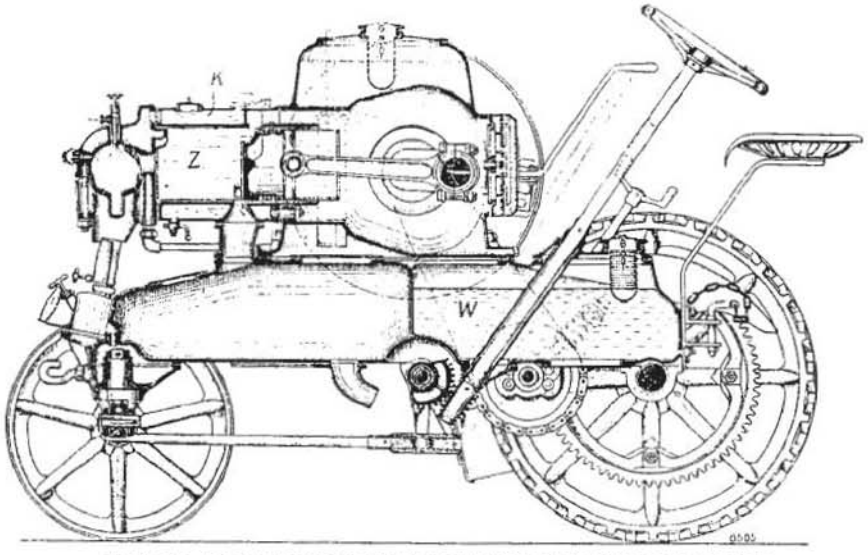


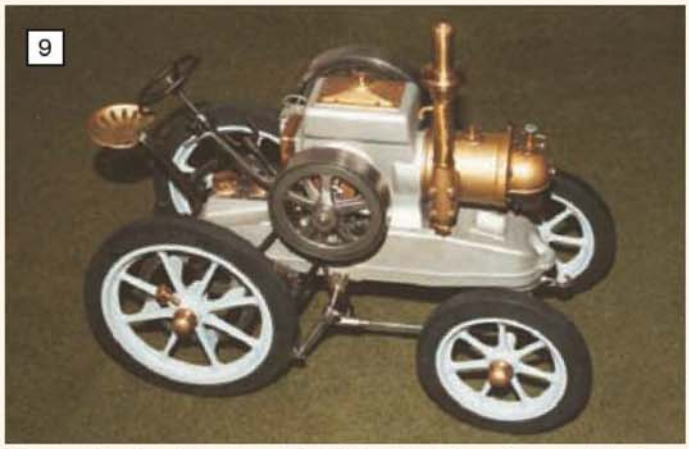
FIGURE 2 - A SECTIONED ELEVATION OF THE LANZ 'BULLDOG' TRACTOR

Bore: 190mm; Stroke: 220mm; Engine speed: 450rpm (max.);
Power: 12hp; Road speed: 5mph (approx.)

The rear axle with the differential gearbox on the left-hand side.

Steering is by worm and half-wheel on a common axle with the rear brakes.

The rubber tyres were cut from old lawnmower wheels (top left).



The completed model, successfully tried and tested, awaits a coat of paint.

pression ratios and various fuels, I turned up several stainless steel hot bulbs. The connection between combustion chamber and hot bulb is sealed with an annealed copper ring.

The bright mild steel connecting rod is fitted with Oilite bearings, split at the big end. The air inlet valve consists of three brass plates: the valve plate with thin stainless steel reeds, a filter plate with bronze gauze, and the lid. The big flywheel is fitted with a regulator and an eccentric to drive the fuel pump (**photo 5**), and the water pump. These pumps are fabricated from brass with stainless steel ball valves and pistons. Engine speed is altered by the stroke of the fuel pump by means of a small lever-operated gearbox (see photo 1) connected between the eccentric and pump. The regulator doesn't work in this small scale, but it is fitted for aesthetic reasons.

All small fabricated silver-soldered parts were sand-blasted and lightly gilded to give them the appearance of cast bronze components. The small flywheel (see fig 2) has the clutch integral and drives the differential gear via a commercial chain (**photo 6**). The gears are all spur gears and were cut on the milling machine using a dividing head. Four very small gears had to be made for the differential gearbox which proved to be a rather fiddly job. Fortunately, making the four other gearwheels (module 1), which connect the gearbox to the hind wheels, was a more straightforward job.

Steering is by half-worm wheel and worm on a common axle with the rear brakes (**photo 7**). The exhaust pipe was turned from brass and then chemically blacked. The heating torch was made from brass using parts (orifice and filling valve) from a cheap commercial small gas soldering torch (one of those little blue ones). It can be filled with lighter fuel gas. I couldn't manage to fit the 'Bosch' oiler with individual pumps for every lubricating point so I integrated the assembly into a single small pump and distributed the oil by means of small orifices. The pump is driven by the crankshaft and I used a steel spring belt as per the prototype.

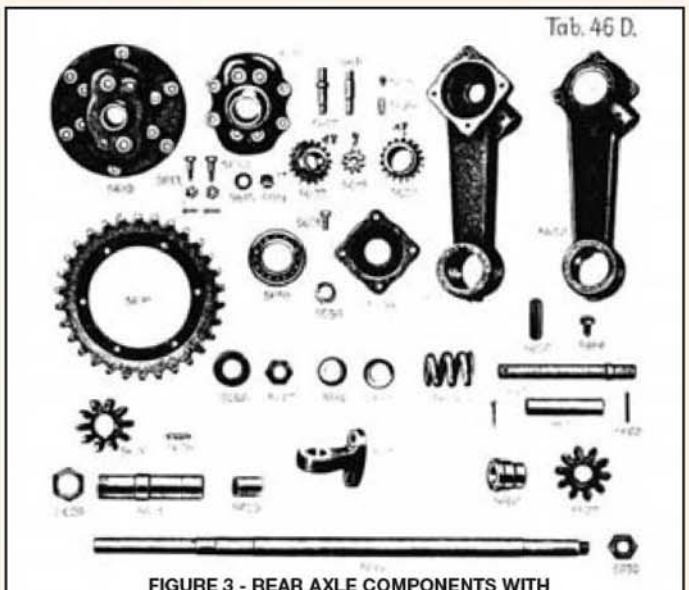


FIGURE 3 - REAR AXLE COMPONENTS WITH DIFFERENTIAL GEAR FOR LANZ BULLDOG TRACTOR
(NOTE THE ONLY BALL RACE OF THE ENTIRE TRACTOR)

Lots of other small parts had to be made, including pipework, grease cups, lids, cocks, foot plates, seat, hooks, etc., totalling some 350 individual items, some of which were fabricated. This figure doesn't include the studs, nuts and bolts!

When the engine was finished, I was able to carry out some experimental work on different fuels and compression ratios. Unfortunately, the flywheel mass wasn't sufficient (you can't scale nature!) to allow me success in reaching the low speed and the characteristic 'puff-puff' noise of the prototype. To get the engine to run, I had to disconnect the regulator and change over to a kind of slip eccentric (nature again!) to achieve the correct injection timing. The engine ran fairly fast and produced a lot of smoke in my workshop. Eva was not amused!

As the model was to represent a 'Gummi-Bulldog' (a rubber Bulldog) used for road transport, rubber tyres had to be fitted. These were made from old lawn mower wheels sourced from car boot sales (**photo 8**). I had to visit every car boot sale in the area for quite some time before I found four rubber wheels of the size needed. They were turned on the lathe, sharpening the tool every minute; you wouldn't believe how quickly the tool wears when you turn rubber! The lettering was cast in black silicone and glued into milled recesses on the sides of the tyres. Finally, to complete the model the tyres were Loctited onto the rims.

My 'Bulldog' was finally ready for the last stage before completion — painting (**photo 9**). I used etch primer for the aluminium alloy and the brass parts, then applied a filler and finally sprayed a matt green acrylic finish. Incidentally, this shade of green was one of the original liveries in the old days, the characteristic LANZ blue only came about in the 1930s. The wheels were painted red.

I kept no record of the actual number of hours I spent building my 'Bulldog', but the work took up about 18 months of my spare time.

Left: tank side nameplate secured using blind nuts.

Right: maker's nameplate on the back of the tender.

FABRICATED MODEL NAMEPLATES

D. A. G. Brown

explains his techniques for producing these prominent items.

I have long admired the beautiful nameplates etched by Diane Carney for small models. However, there are applications in which fabrication is more appropriate, or perhaps you are just looking for a challenge! My own experimentation with home-made plates started with pattern-makers' letters many years ago, but I have now harnessed the might of the home computer to assist in making the appropriate artwork and offer some practical tips on a method which I find highly successful. I shall deal with the subject in the following three sections:

1: Generation of artwork.
2: Cutting out and finishing of lettering, etc.
3: Fixing of letters to the background material.

Generation of artwork

It is quite remarkable how the home computer has developed in the past dozen years, in many cases becoming a master rather than a slave to do the menial work. I regard mine as a slave and spend as little time as possible sitting in front of it. I enjoy myself far more in the workshop!

I am not a graphic artist, so I leave it to the designers to produce the fonts that look right and are aesthetically acceptable. The proportions and spacing of the letters are very subtle; so do not try 'improving' them! Have a careful look at a set of upper case letters, drawing a horizontal line along the tops and bottoms of the E and T. You will see that the rounded letters such as the O and S protrude noticeably below and above the lines. If they do not the overall effect looks wrong. Just ask any sign writer (if you can still find one these days) or better still examine his work on the sides of vans and lorries.

Not surprisingly, I use CAD to generate my artwork, but you can just as easily use one of the artistic packages or office programmes which seem to be 'bundled' with most computers purchased from high street stores. I shall deal with three examples, each of which has its own unique points to illustrate.

First, let us consider the nameplate for my 7¼in. gauge Hunslet *Tony Priest* (**photo 1**). I chose Helvetica font, but reduced the aspect ratio from 1 to 0.8, thereby squeezing the width of the letters to make them more appropriate to my needs. I told the computer not to fill the letters, which meant that it printed them as outlines. The significance of this move will become apparent when you come to cut them out. I also produced the border around the letters to an appropriate shape. Thus, the whole spacing and layout of the job was determined. Using a computer, it is then a simple matter to alter the scale of the work and to print to the size required (**fig 1**).

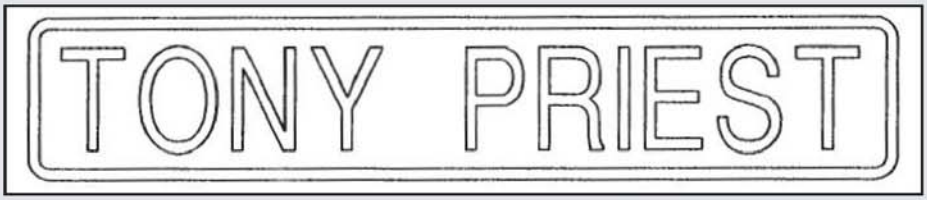
Secondly, let's look at the maker's name discs. In my case, these fit on the front of the cab and the back of the tender and were again laid out in Helvetica font. This time the lines of letters were 'exploded' to enable them to be bent around into elliptical shapes to match the border. Here I was attempting to imitate the original Hunslet name discs which were fixed to the cab sides, and this I have achieved to my own satisfaction. In making this move, it is important to retain the correct letter and word spacing so that the words look right when printed (**photo 2**).

My third example is for the LNER A4 locomotive. After the Second World War, the cabside numbers and tender letters on these locomotives appeared in stainless steel cut-out form. These were cut to a specific font designed by Eric Gill, an Art Deco designer, and were known as Gill Sans. Sans is short for 'sans serif', denoting a plain letter form without curlicues and it was adopted by the LNER in its house style (Gill had been hired by the Railway company to form its public relations image).

The problem which I faced was that I did not have any reference to a Gill Sans font on my computer; Helvetica was quite close, but with some significant differences. The procedure I adopted was to write 'LNER' in the required size (1 3/32in. high letters), but with an aspect ratio of 95%, and then to explode the line of text twice, thereby breaking it up into individual strokes and curves. Comparison with true Gill Sans revealed that most of it was a very good likeness, except for the letter 'R' which had to be doctored to come into line with the 1930s style. This was quite a simple operation involving normal CAD editing techniques. During this operation, the locomotive's 1946 number 5 was also altered in a similar way and the assembly of numbers and letters is shown in **photos 3** and **4**.

Cutting out the lettering

The artwork was printed on a sheet of special sticky paper. This is the only material I have found to have the tenacity to resist mechanical cutting operations without stretching or shrinking. It is removable by soaking once the work is complete. The gum is a vesicular product, which means that it is applied as tiny beads to the paper



Top: Fig 1 - Artwork for a nameplate, generated on a computer using a CAD program and printed onto adhesive paper.

Above: the letters have been stuck onto stainless steel and cut around. The upper set are finished and polished; the lower set show how the paper sticks tenaciously to the metal. The outlines are still visible through cutting oil stains.

Left: this artwork is printed exactly full-size on sticky paper, which in this instance is pink. Several copies are made, easily done when using a computer! The bottom letters have been filled, not recommended for cutting around.

Our contributor at East Herts Miniature Railway. The name and maker's plates are clearly visible on the saddle tank and cabside.

surface and appears as a matt, clear film. I have tracked down a supply of this paper and can supply small quantities by post.

To make most nameplates, the commonest material is brass; so the lettering should be stuck on to an appropriate sized piece of say 18 or 20 gauge material. This must be absolutely clean; a surface abraded with fine emery cloth is most appropriate. In applying the gummed paper use the minimum of water to wet it (as one of my friends says *"One lick okay, two licks and the gum has gone!"*) Water is best applied by means of a small sprayer.

I have found it very easy to cut around the profiles of the letters, within 0.005in. of finished size, using a Hegner saw with, say a No. 9 'Gold Snail' blade. I have found that a Burgess band-saw is a bit fierce for the job, so a wider berth must be taken. At this point, the wisdom of leaving the letters unfilled becomes apparent, the fine lines of print still being just visible after the cuts. I am sure that the process can also be carried out with a piercing saw, much to the benefit of the arm muscles! It then becomes a simple job to finish the letter edges with needle files and an accuracy of ±0.002in. is easily attainable. Study the artwork and note that the vertical and horizontal strokes of letters are not necessarily all equal.

You should now have a pile of neat, finished letters and numbers. Note that surrounds or edgings should be cut out madly big on outside dimensions for finishing later.

Fixing the lettering

I shall assume that the background material will be, say 1/8in. brass plate, although thinner metal may be appropriate. First, decide how the plate is to be fixed to the model. I chose two 6BA screw studs in each case located behind the cover of lettering or edging. These can be fixed in place by silver-soldering or even Loctited before any lettering is applied. Eventually my plates are affixed to the model by blind nuts and small fibre washers, thus being suitable for the water space, while always being removable for repainting.

Now we come to the question of fixing the letters on to the background. During my experimentation, I found that it was quite easy for solder to form a skating rink and for little letters to finish up in the wrong places. Follow these instructions and that should not happen.

First, generously tin the back sides of the letters (and edgings) with Multicore solder which contains resin flux. The brass should now be noticeably thicker than it was originally. Now mark the layout of the artwork on the background, coat the background material with resin flux and lay the lettering out on the background surface to the markings as above. When you are happy with the appearance of the lettering, heat the whole lot up gently, applying most heat from beneath the brass plate. You should first see the flux go fluid and then the solder melt and flash around the letter edges. It seems that in this process the solder is drawn into the joint by capillary attraction without causing the pieces to move. Finally, clean up the fluxed areas, paint the background and stand back to admire your work.

Supplier

Should you wish to purchase a small quantity of suitable gummed paper, I can supply packs of 25 sheets for £5 including postage (UK). I can be contacted through our Editor as usual via the *M.E.* Editorial Office, PO Box 310, Hemel Hempstead, Hertfordshire, HP3 8AX.

TRADE TOPICS

Historic Steam Models from L.A. Services Ltd.

Woking-based Historic Steam Models, a division of Vision Engineering Ltd., is launching a new range of finely detailed, fully working steam models, the first of which is now available. The unique York-Bolton recaptures a typical late 19th century steam plant and mill engine, the universal stationary power plants of the day used in textile and industrial factories and in agriculture.

Self-contained, cast in brass and electro-lacquered to eliminate tarnishing, the model consists of a York Steam Plant and a Bolton Mill Engine. The steam plant contains a 70 x 140mm feed water storage tank, sludge tank, oil separator and butane holder, while the mill engine is a horizontal, single 19mm bore cylinder slide valve unit. The unit features stainless steel hardware and is painted using stove enamel epoxy, highly durable and oil resistant.

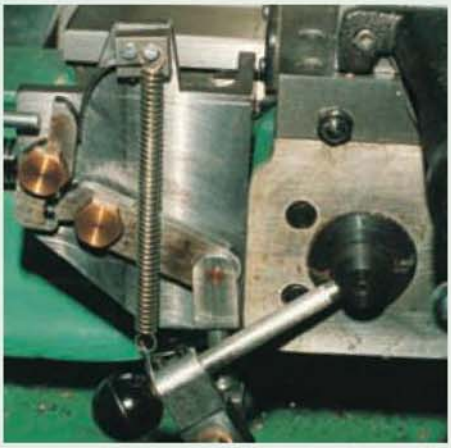
The steam plant is mounted on a polished electro-lacquered brass plate and hardwood base, measuring 420 x 390mm. The 89mm diameter vertical boiler is of multi-tube, silver-soldered heavy gauge copper construction, fitted with ceramic gas burner with main and pilot jets, electric ignition, water and steam pressure gauges, safety and vacuum valves and whistle. Gas flow is regulated by a control valve that cuts the main burner in and out to maintain steam pressure, and it is pressure tested to 140psi.

The mill engine contains crankshaft, eccentric and big end bearings of a sealed ball type, concealed to look like plain bearings but giving long life and zero maintenance. A boiler feed pump and steam lubricator are fitted, together with belt-driven dynamo with voltage regulator and lamp standard. Other features include a dummy but fully operational ball governor and adjustable load damper, a cylinder and steam chest drain, valves and sump.

Designed for smooth running and long life, the York-Bolton has been crafted as a model of deep aesthetic beauty to give lifetimes of pleasure and education to steam model enthusiasts. It can be steamed from cold in a few minutes and is over-engineered for safety. A bespoke engraved plate can also be provided for mounting on the base.

As a division of award-winning innovator Vision Engineering Ltd., Historic Steam Models has over 40 years' experience of precision engineering to draw on, and has six outlets in Europe, America and Japan. The company was established to manufacture a range of the world's finest steam models, thus resurrecting a bygone age of mechanical beauty.

For further information or to place an order please contact **The Engineers Emporium, L. A. Services Ltd. Bramcote Works, Bramcote, Warwickshire CV11 6QL; tel: 01455-220340; www.theengineersemporium.co.uk** or visit the **Historic Steam Models** website at **www.steammodels.co.uk**



The half-nut quick-release mechanism fitted to the Author's lathe. Here the unit is shown with the half-nuts engaged with the leadscrew.

The unit with the half-nuts disengaged. The mechanism locks the half-nuts together during engagement. Release is by way of a spring.

The actuator rod which triggers the release lever is screwed to the front of the lathe, only suitable when no quick-change gearbox is fitted.

QUICK-RELEASE HALF-NUT MECHANISM

Rowland Lowe

describes a device designed for Myford Series 7 lathes which, once made, will convince most builders of its usefulness when machining to a shoulder and screwcutting.

The device to be described has been found to be a very effective accessory for my Myford Super 7 and would be equally applicable to most of the Series 7 range. A trigger mechanism holds the leadscrew half-nuts engaged, and when this contacts the adjustable stop, the nuts are rapidly released.

Experience has shown that disengagement takes place with a very good degree of repeatability and that the machine can be run with confidence at relatively high speeds with power feed to the leadscrew.

Two important applications have been extensively used. The first is machining up to a shoulder at a constant feed for optimum finish. This has proved much faster than hand feeding using the leadscrew handwheel to determine the manual disengagement point, not only because of the higher speed, but the point of disengagement is determined by the stop and is constant in relation to the workpiece. If the leadscrew handwheel is used to determine the shoulder position, disengagement of the half-nuts may upset the relationship of the leadscrew to the half-nuts and affect the handwheel reading.

Such errors cannot occur with a fixed stop. Avoiding mistakes by withdrawing the tool and leaving the half-nuts engaged while reversing the leadscrew by its handwheel rather than the apron traverse loses much time. The exact positioning of successive shoulders can be ensured by use of the stop collar shown on the stop rod in the photograph, and minor adjustments can be made by use of the top-slide index.

The second main application is in screwcutting, especially up to internal and external shoulders. In these cases a runout groove is normally made with a parting tool to allow manual disengagement with some allowance for variation. As the width of this groove is limited, speed needs to be restricted to avoid errors and spoilt work. Another disadvantage, especially when the threaded length is short, is that a significant length may be sacrificed to the runout groove. With the mechanical method, this is not necessary. When the leadscrew is released, the tool continues to cut a runout groove around the work without traversing further, and on the final cut the work is left with a runout groove of the minimum size, the same width as one thread.

The fitting has proved so useful that it is left permanently in place on my lathe. If not required, it can easily be isolated by temporary removal of one of the 5BA bolts from the top spring block, unhooking the tension spring attached to it, and slipping the trigger behind the leaf spring to relieve this tension — quicker done than described! The clasp nut lever then operates normally. Construction is shown in the sketches and photographs.

Materials come from the odds and ends box and partly depend on what is available. The bracket was from a piece of scrap angle, the only major adjustment being the fly-cutting of a small flat on the inner face to give a suitable surface for the head of the mounting bolt to sit truly. The method of mounting on the lathe is not seen in the

QUICK RELEASE MECHANISM FOR MYFORD SERIES 7 LEADSCREW
FIRST ANGLE PROJECTION

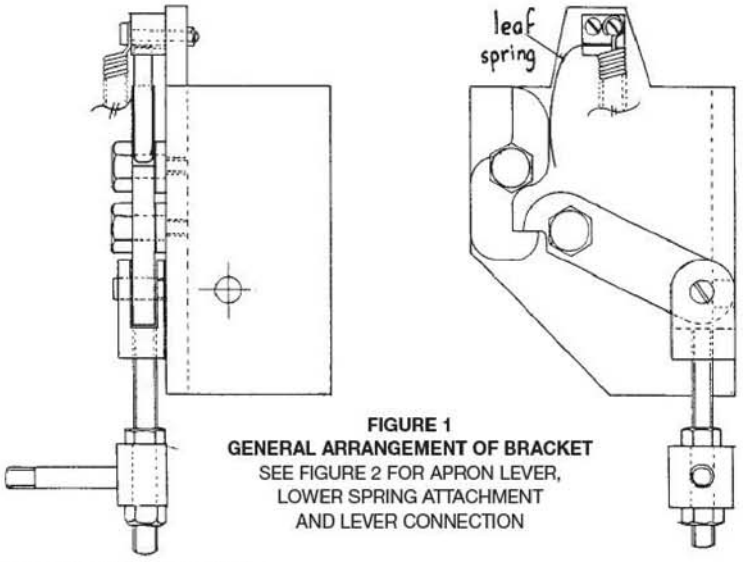


FIGURE 1
GENERAL ARRANGEMENT OF BRACKET
SEE FIGURE 2 FOR APRON LEVER, LOWER SPRING ATTACHMENT AND LEVER CONNECTION

STANDARD ITEMS REQUIRED:

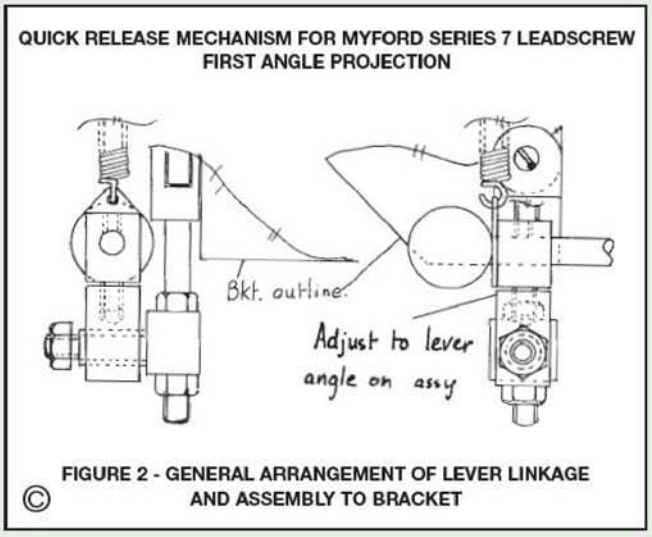
3 x 1/4in. BSF NUTS, 7/16in. A/F
1 x LEAF SPRING FROM CLOCK SPRING OR STEEL SHIM STOCK
1 x TENSION SPRING 1 3/4in. FREE LENGTH
1 x 2BA GRUB SCREW 2BA x 3/16in. LONG
2 x 6BA GRUB SCREWS 6BA x 1/8in. LONG TO FIX LEAF SPRING
2 x 5BA x 1in. LONG BOLTS & NUTS .

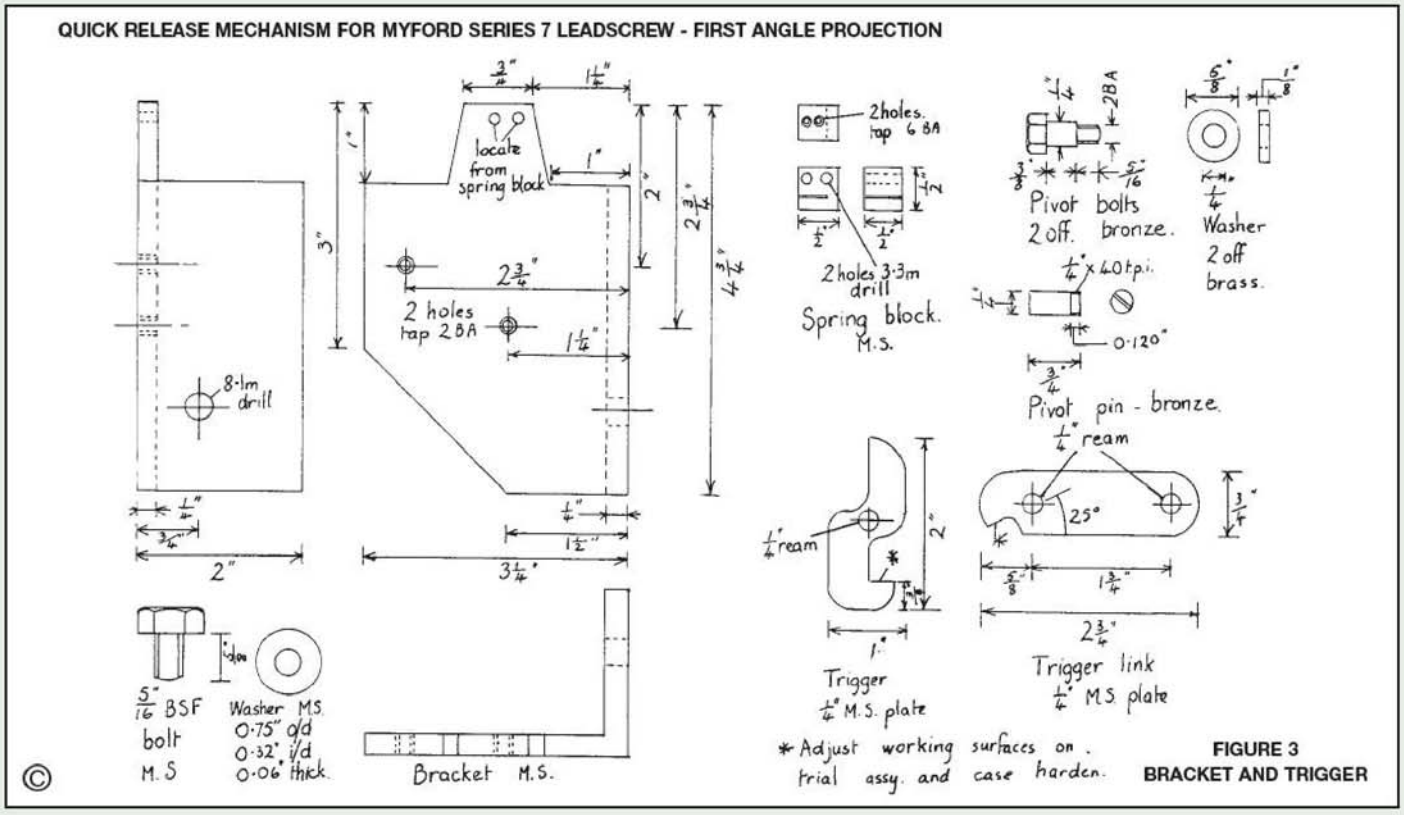
photographs but is simple, being by the single 5/16in. BSF bolt detailed. On the left hand side of the apron is a 5/16in. BSF tapped hole for a socket screw (Myford part No. LA58), which is far enough into the hole to leave sufficient thread to engage the fixing bolt.

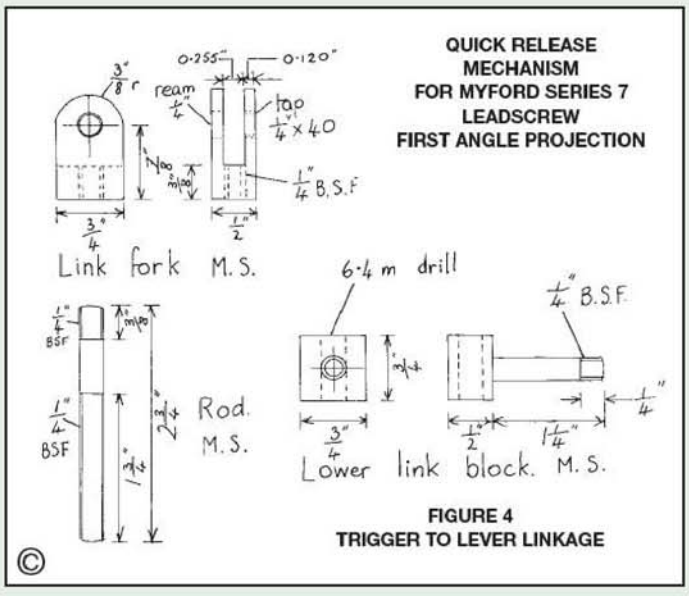
The stop rod itself and mounting are not detailed. The stop is a plain rod about 1/4in. dia. mounted as convenient to strike the trigger. On a change wheel machine, as can be seen in the photograph, it can be mounted in the holes drilled in a block secured by screws in the holes provided in the bed for mounting a quick-change gearbox. An alternative would be necessary for a gearbox machine.

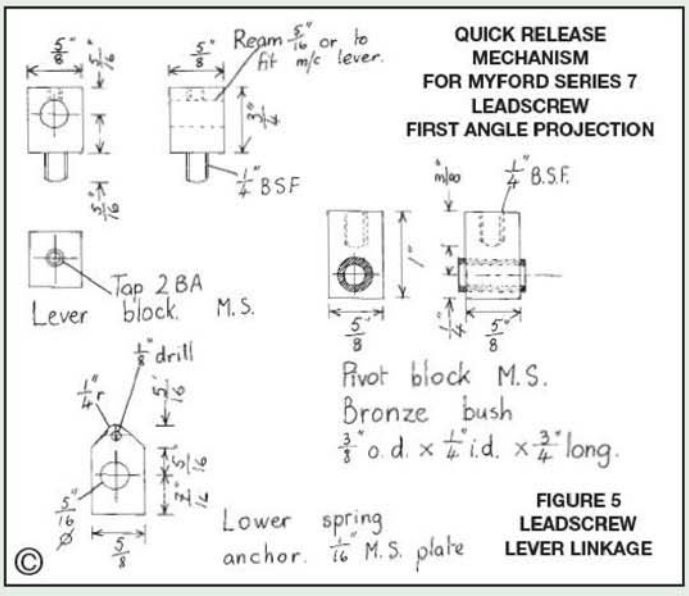
Final adjustments to the trigger mechanism should be made on trial assembly. For the best operation, the cocked trigger should be set vertical with its trip face horizontal and the corresponding face on the lever also horizontal.

You'll not need much use of this fitting to convince yourself of its usefulness!









A HEINRICI HOT AIR ENGINE

Mike Thurgood

finishes off the flywheels and describes how he assembled the top cap into the displacer tube.

●*Part V continued from page 437 (M.E. 4181, 1 November 2002).*

A final swarf-cleaning run through the threaded hole on the crankpin flywheel is shown in **photo 26**. This clean-up was necessary because I use a Tapmatic 1 fluid, even when tapping cast iron, and the cast iron dust won't blow out until the fluid has dried out.

The original Heinrici drawing for the model shows a 3/8in. (approximately 9.5mm) dia. silver-steel crank pin with a 1/4in. x 32TPI thread. I changed this thread to 5/16in. x 32TPI to improve the retention of the crank pin in the flywheel. Being readily available, I used 10mm dia. 316 stainless steel rod for the crank pin, threading one end to suit the threaded hole in the crank flywheel.

I drilled a transverse hole through the other end of the crank pin specifically for the purpose of tightening and releasing it when gripping the flywheel. I had good reason for doing this, first because I didn't want to spoil the appearance of the crank pin by machining a hexagon or flats at some point along it. Second and more importantly, if there is ever a need to remove the crankshaft assembly with the 'A'-frames *without removing the power piston and cylinder*, the crank pin must be readily removable.

But that isn't the end of the story either, because if there is ever a need to remove the power cylinder, the body has first to be dismantled from the stand/firebox, two of its six mounting studs being otherwise inaccessible. (Although the Westbury design shows just two mounting studs for the power cylinder, I used six for reasons which will be explained later)

I thought I would further improve the security of the crank pin by threading it to a slight interference fit for the thread in the flywheel. However, cast iron is fairly easily worn down after a few threadings. I also made the crank pin longer than required for the big end of the power piston connecting rod because I had an idea in mind for driving a proposed water pump. However, after some further thought, I abandoned this means of driving the pump.

The top end of the displacer piston tube was next dealt with. This has a bronze cap which is silver-soldered into its upper end (**photo 27**). The end cap is threaded to take the screwed end of the displacer piston rod. It also has an as-cast conical indent which matches a corresponding projecting internal cast integral cone, and at the upper end of the water jacket insert.

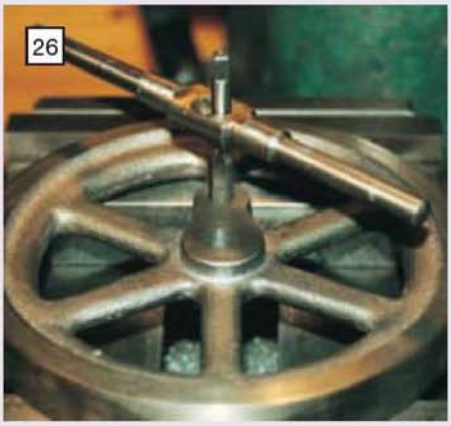
In the original Westbury design, the cone on the insert (see figs 4a and 4b, *M.E.* 4175, 9 August 2002) provides the metal for the threaded holes for the screws used to attach the insert to the body casting. However, I didn't adopt this attachment method for reasons discussed earlier in this series. The cone also provides a greater thickness of material and therefore rigid support for the displacer piston rod but, as also previously explained, I used a relatively long manganese bronze bush instead.

I don't know if the method of attaching the insert to the body with screws going into the projecting cone inside the former was Heinrici's original idea. Unfortunately, neither Volumes 1 nor 2 of the recent Lindsay publications: *Hot-Air Engines* (available from Camden Miniature Steam Services; tel: 01373-830151), which give quite a number of US patents, includes any for the Heinrici engine. Maybe he didn't take out a US patent. Without access to one I can't check his original design, and I don't think that the Head of the Engineering Department at Stellenbosch University is likely to permit me to dismantle theirs to find out!

The thread in the cap for the displacer piston has to be truly parallel to the axis of the tube so that the piston runs truly axially in its cylinder when attached to its piston rod. Some thought was required on how best to ensure parallelism when silver-soldering the cap.

First, both ends of the stainless steel tube were squared off in the lathe to the required length. Length adjustment to provide a gap of about 1.5-2mm between the lower end of the displacer piston when at the bottom of its stroke, and the bottom end of the displacer cylinder, is accommodated by adjusting the length of the latter before silver-soldering its bottom end cap. I didn't consider the length of the displacer piston to be critical to within a few millimetres.

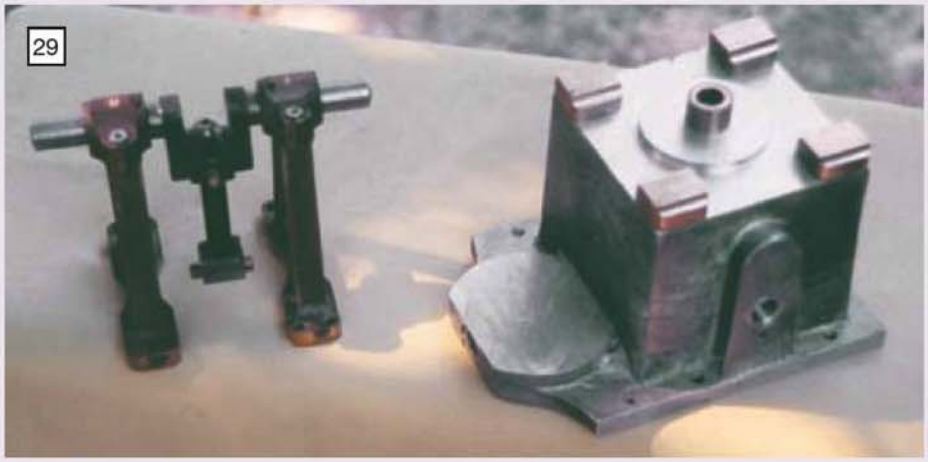
The threaded cap was turned to give a light push fit in the end of the displacer piston tube. The stainless steel tube I used is a seam welded type with an average wall thickness of 1.5mm but with a slight internal weld ridge along its length. Although acceptable for most purposes, the tube wasn't truly round, but they do stand square over lengths of at least 1 metre, which is much longer than the length of the displacer piston. If the thread in the cap doesn't end up truly concentric,



Left: cleaning debris from the 5/16in. x 32TPI threaded crankpin hole. A more secure joint results from the choice of this larger thread than the 1/4in. BSF specified (see text).

Centre: displacer cylinder with its upper upper end cap silver-soldered in place. The bronze end cap is internally coned to match the insert through which the bronze displacer piston rod bush passes (see figs 4a and b, M.E. 4175, 9 August 2002). The test piston rod and locating core are also shown, the latter is bored 10mm to centralise the test piston rod during silver-soldering (see text).

Right: the components shown in photo 27 assembled for silver-soldering the upper cap into the stainless steel tube. The test rod is screwed into the top cap and located in the register hole in the lower insert to provide axial alignment of the thread in the upper cap. Parallelism of this threaded hole with the tube axis was considered to be more important than concentricity. The rolled/seam welded displacer cylinder tube has an internal ridge at the weld and is not truly cylindrical (see text).



Above: the 'A'-frame raisers in position on the engine body (right).

Right: the second part-assembly, with the 'A'-frames on their raisers and the displacer piston connecting rod now clear of the piston rod bush (compare with photo 23, M.E. 4181, 1 November 2002).

at least it won't be more than a few thou. out which hardly matters for a displacer piston.

Whether or not off-centre, much more important is the requirement of the displacer piston rod to be aligned truly parallel to the axis of the tube. Eyeballing the job during silver-soldering is not good enough to ensure adequate parallelism so I had to devise a method.

I made and fitted an insert at the other end of the tube, drilled with a hole to take the test rod which would then be positively located at each end of the piston tube. The parts used are shown in photo 27, and assembled in **photo 28**. I reckoned that by doing the job this way, as long as the test rod inside the tube is truly parallel to the tube axis then it should be equally parallel when threaded from the outside into the upper cap. In the event, this proved to be the case.

Digressing for a moment, it's always a surprise to me how sometimes the most useless pieces of scrap metal – *"Why am I keeping this?"* - can come in useful. Thus the lower insert shown on the right in photo 27 was turned from the plug for an iron casting made by the Foundry Group of the Western Province Live Steam Society some ten years ago! I had kept it for luck, or whatever. Modern tungsten carbide tipped lathe tools make such a difference when turning such a rough piece of metal. However, having turned about 25% of the metal from it, maybe I have lost an equivalent amount of luck!

When I introduced photo 23, which shows the first assembly of parts, I mentioned that raising blocks were required to allow the little (forked) end of the displacer piston connecting rod to clear the bronze bush for the displacer piston rod. Four were machined from brass stock. The assembly with its raising blocks is shown in **photos 29** and **30**. Note that the flat area seen on the left of the body at its base in photos 23, 29 and 30 is the mounting platform for the power cylinder.

●*To be continued.*

TRADE TOPICS

Narrow gauge locomotive from Cheddar Models

Samson is based on a Bagnall narrow gauge locomotive of the 'Gibraltar' type which was a simple four-coupled locomotive designed to run on portable or permanent light railways in common use in plantations, mines and quarries. It ran on railways from 2ft. 6in. gauge to 5ft. 6in. gauge and was fitted with a marine type boiler adaptable to burn wood, coal or oil.

The miniature version of *Samson* available from Cheddar Models in both gauges 1 and 0 differs from the original in that the Bagnall Patent valve gear has been replaced with a most interesing simplified valve gear to suit radio control in these smaller gauge models. The side tanks have not therefore had to be cut away to accommodate the prototype's lifting links. In all other respects, it is a reasonable representation of the full size locomotive.

Samson's boiler is made of copper with all joints silver-soldered. It is fired by a ceramic gas burner. At the burner end, the firetube has a combustion chamber with cross-tubes; the firetube tapers down to 22mm dia at the smokebox end. The locomotive is gas fired, fuel being supplied from a refillable footplate mounted gas tank which is supplied with a Certificate of Testing.

Samson's standard boiler equipment includes water gauge, boiler filler valve, safety valve, pressure gauge and syphon. Each boiler is numbered and supplied with a Certificate of Testing. Maximum working pressure is up to 60psi (4 bar). The slide valve cylinders are 5/8in. (just short of 16mm) bore and stroke.

General features include controllable lubricator, sprung axleboxes, bronze bushed coupling and connecting rods, lost wax cast headlamp and whistle, and insulated spoked wheels set outside the frames.

Samson *is fitted with a simple but unusual valve gear.*

A complete radio control system for proportional forward and reverse speeds is included and supplied.

Weight in working order 8.14lb.; boiler capacity approximately 200ml; running time 20-30 minutes on one filling; haulage capacity on level track over 60lb. 28kg.

Finished in mid Brunswick Green or in black, *Samson* is supplied ready to run (RTR) with a Futaba 4-Channel Skyport 40MHx FM Radio, NiCd batteries and mains charger (UK orders only). Overseas orders are supplied with a 40 MHz AM radio or similar.

Samson is available in both gauge 1 and gauge 0 versions for £995 (VAT included UK, plus £10 carriage UK) from **Cheddar Models, Sharpham Road, Cheddar, Somerset BS27 3DR; tel: 01934-744634; fax 01934-744733; www.modelsteam.co.uk**

GRANDMA'S

Mike Chrisp
describes a visit during which Neil and he saw some very fine model engineering created by a husband and wife team working in their own individual areas of interest.

May King and her husband Bob live in a village in Kent conveniently located for their active life style with regular outings to the Welling DMES and Chelmsford SME club tracks. In the past, Bob has been Secretary of both societies, serving ten years with each and May is an Associate Member of Welling DMES. With family in New Zealand, they make regular trips to the antipodes and have a great fondness for that country to the extent that they have been welcomed as Honorary members of Southland Model Engineers.

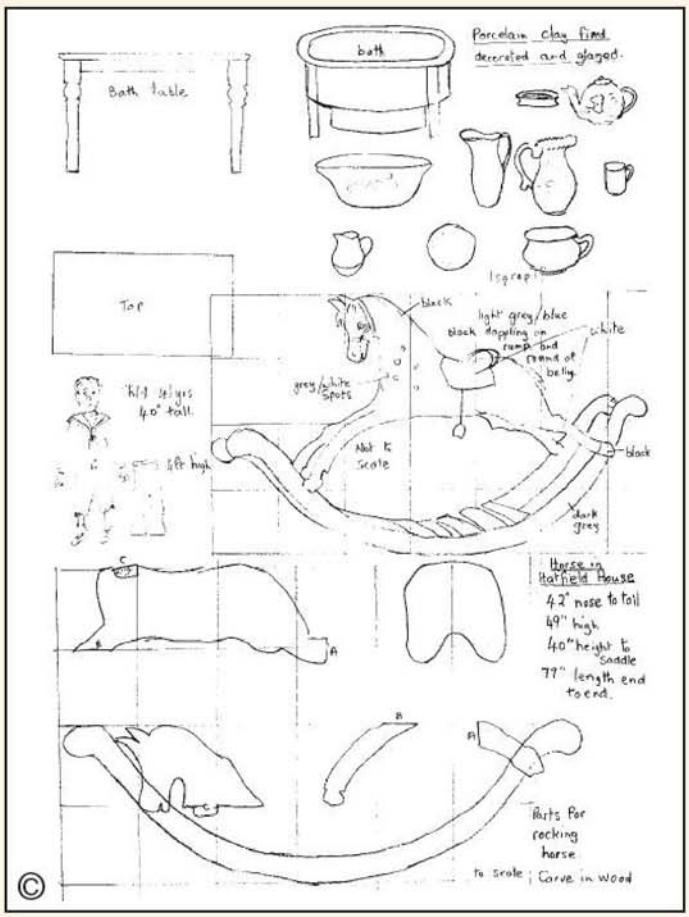
Those who know them will be aware that Bob is a prolific builder of locomotives and that May has created two 'room boxes', one a 1:12 scale miniature of their garden shed and the other a model of Bob's workshop to the same scale. Both of May's miniatures have been sucessfully shown at previous Model Engineer Exhibitions but Bob declines to submit any of his work for competition following inaccurate criticism by a well known modeller. May and Bob are both very keen to promote modelling activities for young people and have done so in a practical way with their own children and grandchildren and any others seeking assistance. Bob donated a cup to be awarded by Welling DMES for the best model by a junior member displayed at their annual exhibition. Regrettably, due to a lack of entries, this has not been awarded for the last couple of years.

Their promotion of the hobby among the young probably stems from the fact that they were both teachers. May trained as an infant teacher, a profession which she followed for some 40 years; Bob was a teacher for a similar period, retiring in 1988 after 25 years as head teacher of two primary schools. May took *Hobbies Weekly* as a child and was encouraged in practical craft activities by her father who she explained was very clever with his hands. He also spent much time trying to build perpetual motion machines and built kites to fly at holiday times. At the age of 16 years and while still at school, May purchased a fretsaw which she used to make a variety of things from the plywood with which her father complied with the wartime window blackout regulations. May still uses her fretsaw to this day.

Bob and May have been together for nearly 50 years and early in their married life they formed the Moulsham Marionettes; Bob made the structures and May dressed them. Their stage was some 14ft. wide and 10ft. high and for some ten years they gave shows all around Essex to Sunday school parties and the like. Their reminiscences include recollections of an occasion when they entertained 1000 children at one sitting, of Andy Pandy and Muffin the Mule, popular television puppets at the time, and of a lethal contraption involving a metal plate in a water tank to dim the electric lights for their performances of *Hansel and Gretel*. The marionette theatre is still alive and well; the Kings' youngest son has taken it over and still gives performances.

May's inspiration for her 'room boxes' came from seeing one displayed on the Model Wheelwrights' stand at an exhibition. *"I can make one of those"* she declared, and started work on her miniature garden shed. The pleasure

May King made the tiny porcelain teapot and the other glazed pottery, as well as the abacus and the slate, which she selected and split herself.



S TREASURES

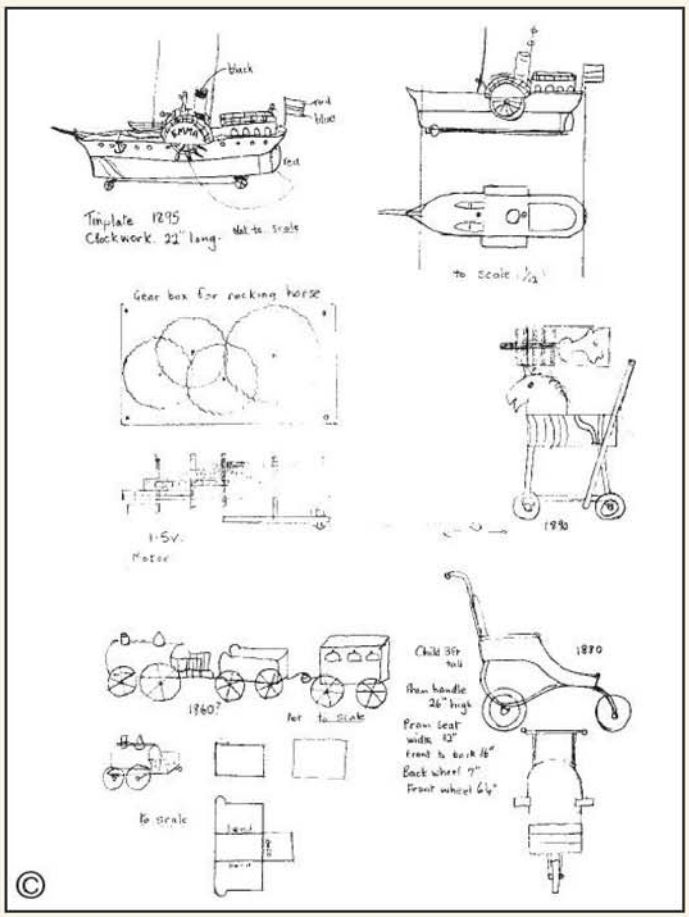
of making this and the successful outcome prompted her to have a go at a making a miniature version of Bob's workshop. The research for the workshop was easy, she claimed, all she had to do was pop out to the shed to measure what was there! For the record, the machines all work and May was awarded the Welling DMES Shield for her 1:12 scale workshop. She came second in the club competition two years previously with her garden shed.

For her third project, May chose something to celebrate the Millennium: a miniature replica of a Victorian child's nursery of 100 years ago. Everything in her model, also to 1:12 scale, would have been available at the time. The furniture, including an old carpet and table, would have been brought from other parts of the house; it would have been unusual for new items to have been purchased for the nursery. May's nursery project took some two years to complete, half of this being spent on the necessary research. Work started with the rocking horse, a replica of just such an item displayed at Hatfield House. Pleased with the result, she was also relieved to find that it had not been as difficult as she thought it might have been. The horse was carved from small pieces of wood and equipped with a small rider; she then devised a mechanism to animate the rocking action which involved a gearbox and small electric motor.

The wall lights were bent up from fine bore brass tube, fitted with lampshades carved from scraps of PTFE retrieved from Bob's workshop scrap box. The grain of wheat bulbs are illuminated using a single strand of insulated wire inside the tube with the tube itself serving as the return conductor. The fire also uses a small bulb hidden beneath chips of wood and is set in a carved wooden fireplace painted with black acrylic paint and rubbed all over with a soft pencil to give it the sheen typical of a blackleaded finish. The wire fireguard was made from strands of copper wire retrieved from flexible mains cable. The mesh was woven with the aid of a sewing needle, stretched over a wire frame and painted black.

May made all the pottery items herself. Having attended adult education pottery classes for a number of years she was perfectly capable of throwing the miniature porcelain pots herself and firing, decorating and glazing them too. Although Bob has a lathe in his workshop, May does not have a lathe herself, so she uses her bench drilling machine for turned components. The item to be turned is fitted into the drill chuck, a makeshift toolrest arranged and such tooling as appropriate pressed into use including small files, saws and the like. A woodcarver friend gave her some special polish and so May has been able to produce the necessary turned items for the miniature furniture required in her Victorian nursery.

The child's slate is a sliver of real slate from a Welsh quarry; needless to say, May split it from a larger piece herself and fitted it into a little frame. The paddle steamer is based on an original Victorian toy. The paddle wheels revolve by way of a flexible shaft powered by a gearbox beneath the floor. The shaft is actually a piece of plastic tube which absorbs any slight misalignment between the gearbox below floor level and the model placed on top of the miniature chest of drawers. The trains too are based on original contemporary Victorian toys. May made the wheels by marking out and cutting a central spoked portion onto which she soldered a washer or a wire ring which she then filed to form the tread. One of her Southland model engineer friends produced a 12V ▶



May King's Noah's Ark with some carved beechwood figures (above). The illustrations on the left are of pages from her notebook.

The lamp is made of brass pieces with a carved scrap of PTFE for the shade.

motor with built in gearbox to animate the 'clockwork' engine. The bucket was rolled up from a piece of tinplate and a small disc soldered into the bottom for a base before being suitably decorated as a seaside bucket and spade set.

Apart from the grain of wheat bulbs for the lighting, and the associated connecting wire, switches and batteries, plus the electric motors and gearwheels for the gearboxes, May has made everything else herself. The wallpaper came as a sample length of dado trim from a local DIY store and the carpet started out as a piece of plain fawn doll's house carpet. May designed the pattern she required and painstakingly drew it and coloured it using felt-tip pens. Since the synthetic carpet material was non-absorbent, it

May still uses the frestsaw she bought as a teenager at school.

took simply ages to dry and has adopted a somewhat faded look which suits the notion that furniture would have been taken to the nursery from elsewhere in the house. The pictures were cut from magazine illustrations.

May works in an upstairs room; warm, comfortable and well lit, it is furnished with a desk retrieved when it was thrown out from a local bank. Being substantial, it makes an ideal workbench. The items in May's Victorian child's nursery are normally stored safely away to avoid dust and possible damage, however her grandaughters are allowed to play with the model because they are very careful and well aware that they are playing with 'Grandma's Treasures'.

Following a fascinating morning spent hearing about May's work and looking at her model, we were shown Bob's locomotives and workshop. A prolific model engineer, Bob has built six locomotives including LBSC's *Speedy* which was built to published drawings, a true Ffestiniog

The bucket was rolled up and soldered, and the wire handle fitted before decoration.

Railway double Fairlie, built without drawings, *Mountaineer* to Don Young's design, *Conway* to Martin Evans' design and built for their younger son, a New Zealand Railway Ab Kingston Flyer built without drawings, and a recently completed 2-4-0+0-4-2 NZR Mallet built with reference to a photocopy enlargement of a general arrangement on a postcard. This article is not the place to feature these fine locomotives, but if I reported that we were impressed with what we saw, it would be the understatement of the year!

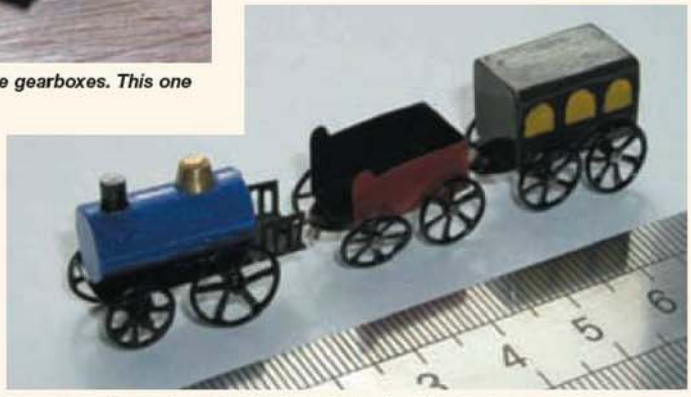
Our thanks to May and Bob King for their welcome and hospitality are coupled with gratitude for all the time and trouble to which they had both gone to prepare for our visit.

Hadmade pottery and a miniature portrait set off the 'blackleaded' fire surround and wire guard.

Beneath the floor are three gearboxes. This one drives the rocking horse.

Ingeniously designed to convert from a high chair to a rocking chair, May used staples for hinges.

Paddle steamer Emma *sits on top of a chest of drawers through which a flexible plastic shaft transmits drive from a gearbox to the paddle wheels.*



One of the tiny trains with fabricated wheels with tinplate spokes surrounded with a washer to provide the tread. The rule shows millimetres.

LETTERS TO A GRANDSON

M. J. H. Ellis

describes his technique for setting work in a 4-jaw independent chuck before returning to the Bridge Duplex transmission system.

●*Part XLV continued from page (M.E. 4181, 1 November 2002)*

Dear Adrian, before I answer your question about the Bridge Duplex, there is something relating to the workshop which I would like to say before I forget it.

Suppose that you want to mount work in your 4-jaw chuck so that a point defined by the intersection of two lines scribed at right-angles runs as true as possible. This problem arose frequently in connection with my experimental injectors. For a good many years, I would have made a light centre-pop at the point of intersection, and used a loupe and what I call. a 'point indicator' (just an old 1/4in. end-mill, ground to a fairly slender point) held in the tailstock drill-chuck as index, to show which way the work needed to be adjusted.

This technique worked tolerably well but I found by accident what I think is a better way. I no longer make a centre-pop at the intersection but use the point indicator to set each of the scribed lines (set to a vertical position) as near as possible on the lathe axis. It does not matter if the point of the indicator is not precisely on the axis itself because I just get the line close to it, make a mental note of which way and by how much the line is away from it, and then give the chuck a half-turn and see how the difference then looks. Then I do the same with the other scribed line, and find no difficulty in getting the work set up as I want within 0.015in. or so.

You may object that it complicates matters if the adjustments require all four chuck jaws to be moved every time. But in practice, I can't remember the need to do so ever having arisen. When, like the injectors, the work is rectangular, you will naturally scribe the lines parallel to the sides of the rectangle whereas if the work happens to be circular, you have a free choice as to how you hold it in the chuck, but preferably with the scribed lines aligned with the chuck jaws.

Having got the work close to where I want it, I make the final adjustment by bringing up the point indicator into gentle contact with the work, and giving the mandrel two or three turns by hand. The point will, of course, make a mark on the work and if this does not lie on the point of intersection, I make the small correction needed and try again, this time letting the point press a little harder so that the original mark is obliterated by a deeper and broader one.

It is seldom that the desired result is not achieved in three tries of this sort, but if I have been too ham-fisted, it is time to take out the point indicator and replace it with the smallest (1/8in.) of the centre drills. It will leave a shallower but broader crater, but it is no more difficult to see with the loupe if it is in the right place. I make no secret of my mistakes, and on one occasion I still had not got it right, and had to change to the next larger (3/16in.) centre drill. *"Dyfal donc a dyr y garreg"* they say in Wales which means *"It is by repeated blows that the rock is broken"* but I don't know whether the proverb originated in the slate quarries or not.

Using a pin to locate the intersection between marked lines aligned with the chuck jaws.

Nothing is important

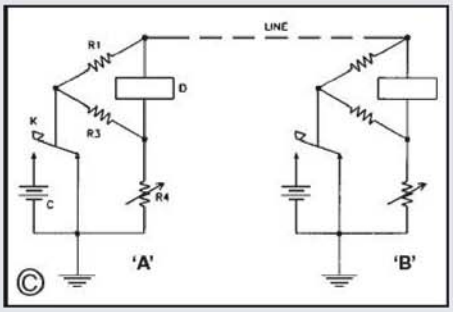
Now I had better try to avoid any further enticing discursions, and return to the subject of the telegraph. *"You talk"* you say, *"as though two separate currents can flow in a circuit at the same time. How can that be?"* Well, of course they cannot, although there is nothing to prevent the current coming from more than one battery. But if it makes things easier to understand, and no inaccuracy results, it is convenient to pretend that they can. Before you condemn this kind of thinking as dishonest, let me point out that it can show very respectable credentials.

The whole of the mathematical treatment of magnetism, for example is based on the concepts of isolated magnetic poles and lines of force, neither of which really exist. Again, in a work on transistors, the reader is advised *"to consider (holes as) equivalent to positively charged electrons; that is, particles with mass equal to the mass of the electron and charge equal to that of the electron but of opposite sign."* In other words, one has to imagine 'nothing' as being 'something'.

I'm sorry, but I feel myself on the point of yielding to the temptation to tell you the riddle with which I introduced a talk I was invited to give to a group of school children concerning the Channel Tunnel. It is always a good thing to engage the interest of one's audience with the very first sentence, so I asked them:

"What is it that if a soldier were afraid of it, he would be likely to be given a medal; you say that you can see it, but you cannot tell its colour; and although it is not poisonous, if you ate it you would be certain to die?"

The children made valiant efforts to provide me with an answer, and perhaps it was hoping too much to expect to hear it: 'Nothing'. But I wanted to make the point that there are times when 'nothing' is extremely important. In the case of the Tunnel, all the work of excavation and the construction of the lining were no more than the means to the real end; the provision of a continuous region of emptiness through which the trains might run. Incidentally, I believe that in a suitable location, such as a worked-out quarry, 'nothing', in the form of vacant space for dumping rubbish, fetches about £2 a cubic yard.



Superpositon theorem

In the case of the Duplex, justification for imagining two independent currents arising from the batteries at the two ends of the circuit, is to be found in the Superposition Theorem. You won't want an elaborate exposition, and it will be sufficient for me to say that in the one case which matters, (i.e., when both keys are down), it shows that the current which actually flows in any branch of the circuit is equal to the sum of the two notional currents which would flow if each battery were removed in turn, leaving in its place only a resistance equivalent to its small internal resistance.

But to all intents and purposes these are the same currents which would flow if only one of the stations were transmitting. As we already know that when only, say station 'A' is sending current, it does not affect its own relay, it follows that if station 'B' now sends a marking current as well, only this current from 'B' will affect 'A's relay. In other words, the effect on the relay at 'A' is the same, whether or not 'A' is transmitting, and, of course, the same applies at 'B'.

Another, way of looking at it is as follows:

1: The operation of the circuit in only one direction is straightforward. Any elucidation is only needed when a marking signal is made from both stations at the same time.
2: When battery is connected to line at both ends, the circuit is symmetrically balanced. Consequently, no current flows in the line wire.
3: If no current flows in the line, it would make no difference to the current in the local circuit if the line were disconnected. Let us suppose that it is.
4: At both stations, the battery now produces a current in the local circuit. In particular, one arm of the bridge being out of action (vide (3), current now flows through and operates the relay.
5: Note that if the key at, say 'A' is raised while that at 'B' remains depressed, the relay at 'A' remains operated to battery from line without interruption, since the current through it remains in the same direction.

I have now concluded as much as I need to say about the Bridge Duplex, and I intend to turn next to Edison's Differential system. I am nearly at the end of my letter, and do not think it worth starting on it now. Look forward to it in my next.

Let me end by saying that although for some perverse reason, perhaps because the apparatus was so beautifully made, I have always had more affection for the telegraph than for the telephone which gave me my living for over 40 years. I had no practical experience on the telegraph side, so I confine myself to essentials. In fact, when I entered the Post Office in 1935, only the teleprinter remained in use in the telegraph offices.

●*To be continued.*

THE HETTY WINDING ENGINE

Figure 1 - Engraving of the Rhondda Valley circa 1820 by Henry Gastineau, now in the National Museum of Wales.

Ed Cloutman

introduces a description of a unique winding engine with a fascinating review of the development of the Welsh coal mining industry.

●*Part I*

This is the story of the Hetty Winding Engine in the Rhondda (rhon-the) which at this moment is undergoing restoration by the Pontypridd Historical Society under the direction of Brian Davies, curator of the Pontypridd (ponter-preeth) Museum. One cannot mention the Rhondda without coal, the two are synonymous, so an insight into the South Wales coal-mining industry is included and forms an introduction to the Hetty engine.

The local mining industry is well presented in the Pontypridd Museum which is well worth a visit, and a few of the excellent models will be shown later. A small private museum will also be included in these articles. It concerns an important part of the social history of the Welsh Valleys and celebrates the famous Bracchis, Italian cafés where miners and their families could have a hot meal and a smoke in the warmth of the shop and, of course purchase some of that excellent Italian ice-cream!

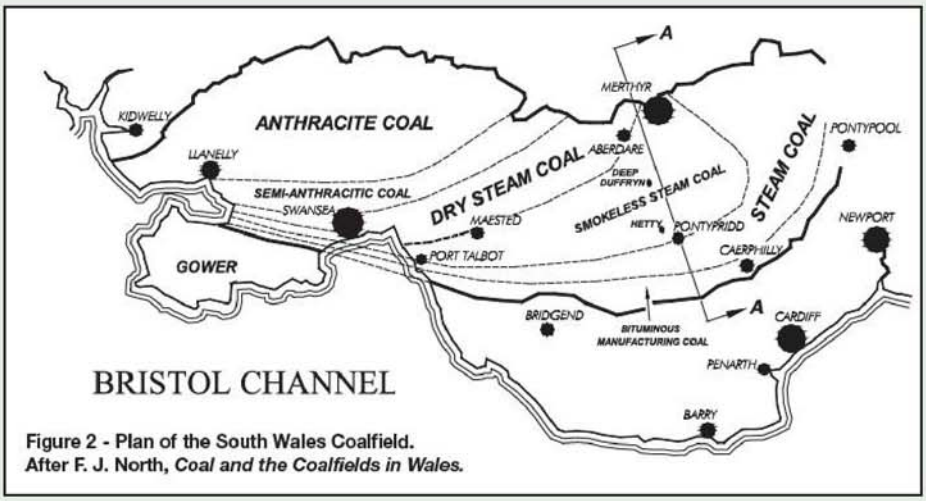


Figure 2 - Plan of the South Wales Coalfield. After F. J. North, *Coal and the Coalfields in Wales.*

Background

An engraving by Henry Gastineau circa 1825 (**fig 1**) depicts the Rhondda valley near the site of the later Great Western Colliery, with wooded hillsides and meadows stretching down to the river which meanders its way to the sea at Cardiff. It presents a very rural and peaceful scene.

In 1908, Arthur Morris wrote *"The River Rhondda is a dark, turgid and contaminated gutter, into which is poured the refuse of the host of collieries which skirt the thirteen miles of its course. The hills — have been stripped of their woodland beauty, and there they stand, rugged and bare, with immense rubbish heaps covering their surface."* He goes on to say that the peace of the valley is broken by the din of steam engines, the whirr of machinery, the grating of coal screens, the hammering of smithies by day and by night.

Within a single generation, the population of the Rhondda increased from about 2,000 to over 150,000. Mining developed in all of the major valleys with names such as the Gwendraeth, Amman, Towe, Nedd, Dulais, Afan, Llynfi, Garw, Ely, Cynon, Taff, Rhymni, Sirhowy, Ebbw, Llwyd and, of course the Rhondda.

The South Wales coalfield (**fig 2**) is composed of three main coal types, anthracite in the west, steam coal in the deep and middle ranges of the coalfield, and bituminous coal close to the surface. Anthracite has a high carbon content and while unsuitable for open grates or steam boilers, it is good for central heating furnaces and stoves for heating glasshouses and hothouses. The best steam coals burn with little smoke or clinker and give a bright, hot fire. Thus they are most suitable for the boilers of ships and locomotives. Bituminous coals produce smoke and gas, and are most suitable for use in open grates, the manufacture of gas, and for smelting metals.

The coalfield developed in stages as requirements changed, thus until the 17th century, mining was concentrated along the fringes of the coalfield where the coal lay near the surface and could be mined by open-cast or drift mining. Drift mines are tunnels which run into the hillsides to follow the coal seams more or less horizontally. This was made more cost effective by the close proximity of carboniferous limestone (**fig 3**) which lines the basin in which the coal measures lie, and thus outcrops at its margins. Hence many lime-works

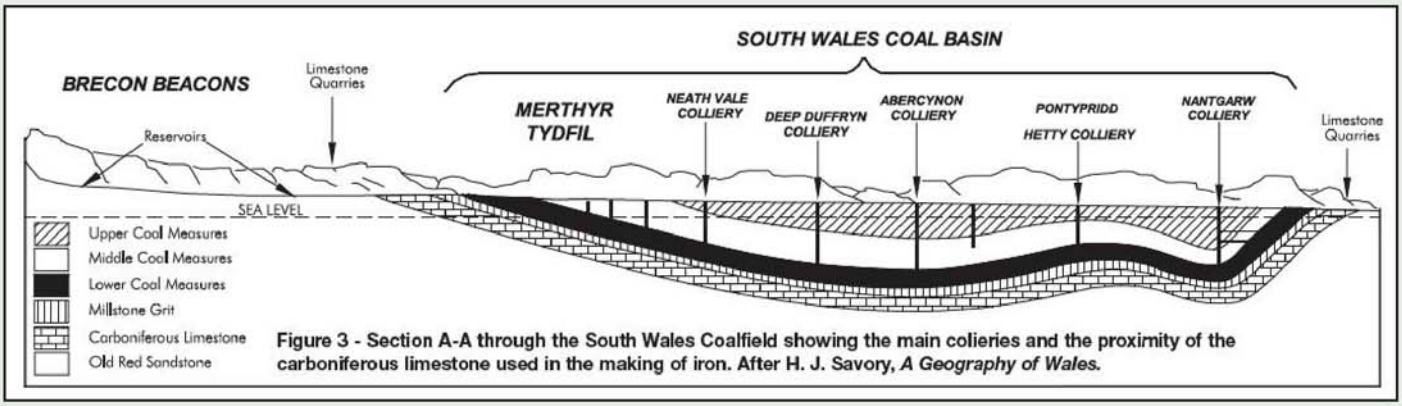


Figure 3 - Section A-A through the South Wales Coalfield showing the main collieries and the proximity of the carboniferous limestone used in the making of iron. After H. J. Savory, *A Geography of Wales.*

were concentrated in these areas. Most of the coal produced at this time was used in open fires and by some industries.

During the 17th and 18th centuries, more coal was required for the copper smelting industries. It was found to be more economic to send the ore from mines in North Wales and Cornwall to South Wales, than transport the coal to the copper mining areas. Thus the lower Swansea valley became the largest copper smelting area in Britain and Swansea, briefly, the largest town in Wales.

By the 19th century, coal was being used for the smelting of iron, and Merthyr Tydfil took its turn to be the largest town in Wales, with large ironworks at Cyfarthfa and Dowlais. The output of the ironworks was largely pig iron, most of which had to be carried on horseback or on carts down the Taff Valley to the port of Cardiff. This was a distance of some 25 miles and the difficulty of transporting the iron greatly restricted the expansion of the industry, leading to the development of the Glamorgan Canal. Barges could handle up to 25 tons of iron rather than hundred-weights.

The canal became very successful, and by 1799, congestion and the shortage of water in the upper reaches led to a Bill being presented to Parliament for the construction of a tramroad. Despite considerable opposition, construction of the Merthyr Tramroad between Merthyr and Abercynon began in 1800. Ownership was divided between the Dowlais, Penydarren and Plymouth ironworks. The iron rails were set on large stone blocks with a gauge of 4ft. 4in., the remains of which are still visible today (**photo 1**). Each rail was a yard long, weighed 56lb., and was held in place by a long spike. One horse was used to pull five full wagons downhill to Abercynon, carrying ten tons of iron. The same horse would then pull the empties back to Merthyr. Part of the original tramway is now a portion of the Taff Trail, a cycle-way from Brecon to Cardiff.

In 1803, Richard Trevithick was brought to the Penydarren ironworks to install high-pressure stationary engines which were considered more efficient than existing machinery. It was not long before it was decided to try one of his road locomotives on the Tramway, hence the development of the Penydarren locomotive. The hauling capacity of the engine was proved beyond question, but the experiment was short-lived because the weight of the locomotive caused the rails to fracture. Rather than scrapping the locomotive, it is probable that it was used as a stationary engine at the Penydarren Works.

The final stage in the development of the coal industry was the production of 'sale-coal'. This was coal that was produced primarily for export

Stone blocks on which the cast iron rails rested on the Merthyr Tramroad. The inset shows one of the stone blocks with spike hole.

and was used in the increasing numbers of coal-fires in homes in Britain and by other industries. The export trade led to the expansion of ports in Newport, Llanelli, Barry and, of course Cardiff and Swansea.

But it was the engineering associated with deep mines that interests us here. At first, mining was carried out in bell-pits which, as the name implies, were bell-shaped holes dug in the ground, joined to the surface by a short vertical shaft. From these, horizontal galleries were hand-cut into the coal seams and the coal winched to the surface by hand. A similar method was used in the Neolithic flint mines at Grimes Graves in Norfolk. If the pit flooded or collapsed, it was easier to dig another adjacent pit, rather than to pump the water out, or shore up the sides with timber. Furthermore, the pits did not have to be artificially ventilated.

By contrast, to reach the steam coal and anthracite at all but the edges of the South Wales coalfield required the sinking of deep shafts. Headings were driven from the vertical shaft and the coal seams worked from these. The excavated coal, and the miners would return along roadways. Other areas were cleared for the storage of machinery and trams, and to provide stables for the pit ponies.

Requiring wooden props to shore up the roofs and pumps and fans to remove water and ventilate the mines, these mines were expensive to operate. There was the constant fear of explosion from coal dust and methane gas 'fire-damp'. Suffocation caused by carbon dioxide poisoning 'choke-damp' was also a danger. Ever present was the threat of collapse and flooding, and the only light before electricity was by candle or oil lamp. A series of underground doors was required to ensure that the ventilation worked correctly, the doors operating like valves, directing the incoming fresh air through all the workings. The stale air was drawn up from underground through the up-cast shaft, the clean air passing in through another. Initially, furnaces were used, either at the base or the top of the up-cast shaft; later, fans were used. Children as young as six, both boys and girls, would stand by the doors and open and shut them as required. They would work 12 hour shifts, often standing in total darkness and with the constant danger of being run over by a tram or trampled by a pony.

All of this can be experienced by a trip to Big Pit Museum at Blaenavon. You are kitted out with the correct miners' gear — lamp, lead battery pack, and helmet. It is a real mine and therefore all the relevant safety precautions are taken. You are taken through the roadways, shown the stable area and machinery; all that is missing is the dirt and noise. It is a very peaceful journey, not unlike a balloon ride, and is an experience that should not be missed.

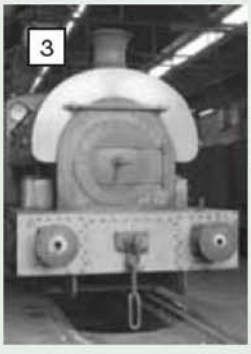
To bring the coal to the surface and to transport the miners, some form of winding machine was required. In the early days this would have been man-powered, horses were used later. A water balance method was also employed which involved a water bucket attached to each end of a chain. The empty trams were placed on top of the upper bucket and the full ones on the lower one. Water was added to the upper bucket until it was heavy enough to lift the full tram and on reaching the bottom of the shaft the water was immediately drained off.

As production increased, and shafts were driven deeper, more efficient methods were required, and with the introduction of steam power, winding engines were the obvious successor. These were superseded later by electric power. Further engines were required to drive the ventilation fans and pumps.

The uses to which the steam coal was put is often reflected in the names of the coal companies, like 'Navigation', 'Naval' and 'Ocean', names which appeared on the sides of the coal trucks that trundled up and down the Valleys delivering their cargo to the ports of Cardiff, Newport, etc. Companies often boasted in their advertising that they supplied to the Admiralty, or to ships of the Cunard line including the *Mauretania* and *Lusitania*, or to the Royal Yachts and the railways.

As model engineers, some readers may remember the Welsh Steam coal available for a short time in the 1960s from Deep Duffryn

The 44ft. diameter Waddle fan used to ventilate the coal workings in Deep Duffryn, Mountain Ash.



0-6-0 saddle tank locomotive No. 1859 Sir Gomer *by Peckett & Sons of Bristol, built in 1932.*

0-6-0 saddle tank locomotive No. 1885 by Hudswell Clark of Leeds, built in 1955.

Colliery, Mountain Ash. This amazing coal had an extremely high calorific value and would burn to ash with very little, if any clinker. I can remember that my 3½in gauge tank engine would travel two laps of the Southampton track in Cobden Meadows (Riverside Park) on about two small lumps of this coal!

I visited Deep Duffryn in about 1973 and photographed the large Waddle fan (**photo 2**) that ventilated the mine workings. This was driven by a single cylinder steam engine. There were actually two cylinders, one each side of the crank, but only one was used at a time, the connecting rod swung over and connected to the other cylinder if servicing was required.. The engine was removed and is now at Big Pit Museum.

The two 0-6-0 saddle tank locomotives were taking a well earned rest in the engine shed, side-by-side. No. 1859 *Sir Gomer* (**photo 3**), was built in 1932 by Peckett and Sons of Bristol remaining at Mountain Ash throughout its working life. The other engine (**photo 4**), No. 1885 was built by Hudswell Clarke of Leeds in 1955 and came from Lady Windsor Colliery.

The Hetty engine

The Hetty winding engine lies in the Rhondda Valley and began its life as part of the Great Western Colliery Company. In 1844, John Calvert obtained the rights to mine coal at Newbridge Colliery which was sunk to the No. 3 Rhondda seam at a depth of 50 yards. The colliery continued producing coal until 1897. Meanwhile he sunk another shaft to the No. 3 Rhondda seam at Gyfeillion at a depth of 149 yards. The shaft took three years to complete. The colliery was purchased by the Great Western Railway Company in 1854, worked profitably for ten years and was then sold back to Calvert.

Formed in 1866, the Great Western Colliery Company Ltd. sunk two more shafts to mine the deeper steam coals, one of which was the Hetty. This shaft was 16ft. diameter and was sunk to a depth of 392 yards. The original winding engine was built by Barker and Cope of Kidsgrove, Staffordshire and installed in 1875. It had two 40in. bore by 6ft. stroke low pressure cylinders coupled to a 16ft. diameter drum using a flat winding rope. It ran for 30 years in this condition and raised some 6,000,000 tons of coal. In 1880 there was a spectacular over-wind which sent a sheave spinning over the roof of the engine house, which proceeded to demolish a house on the riverbank. Fortunately no-one was hurt.

By 1900 the Hetty engine had become obsolete, as the Great Western colliery increased its output and was briefly the largest colliery in South Wales. The rapidly increasing coal output, and the depth of the Hetty pit required a more efficient engine.

Modernising the Hetty engine posed a problem in that it had to be accomplished while the pit was providing coal with as little disruption as possible. Due to the proximity of the railway and the road, it was not possible to construct a new winding house either behind, or across the other side of the existing pit head. Somehow the old engine had to be modified *in-situ.* Thus it was decided to fit new high pressure cylinders, 34in. dia. by 6ft. stroke, and piston valves by Worsley Mesnes of Wigan (**photos 5** and **6**). Melling's patent expansion valve gear (**photo 7**) was also fitted which required three eccentrics (**photo 8**).

The original 16ft. diameter drum was made of cast iron sections, bolted together. The new drum, (**photo 9**) was 15ft. diameter and made up of two sets of ten sections, split down the centre. This was to allow access to the original brake drum, which was retained. The original crank was also used. The spokes were steel sections supplied by Dorman Long of Middlesbrough and were riveted to the drum.

The new drum was designed to take round steel rope to replace the flat wire rope, a change which posed two problems. To retain the length of rope, either the diameter of the drum would have to be increased, or the drum made wider. Available space restricted both of these modifications, so instead, Hugh Bramwell, the colliery's chief engineer, designed a drum that would allow the rope to wind back on itself, the first large drum of this type in Britain. Thus the new drum was grooved to guide the rope across it, and the sides were shaped to ensure that the rope reversed its direction across the drum. It was Bramwell, incidentally, who was responsible for the Hetty modernisation programme.

●*To be continued.*

KEITH'S COLUMN

LOGGER & SLOGGER
AMERICAN TYPE 2-8-2 LOCOMOTIVES
for 5in. and 7¼in. gauges

Keith Wilson

emphasises the importance of good size exhaust passages, discusses springing, and reports a recent gathering at Echills Wood.

●*Part XI continued from page 449*

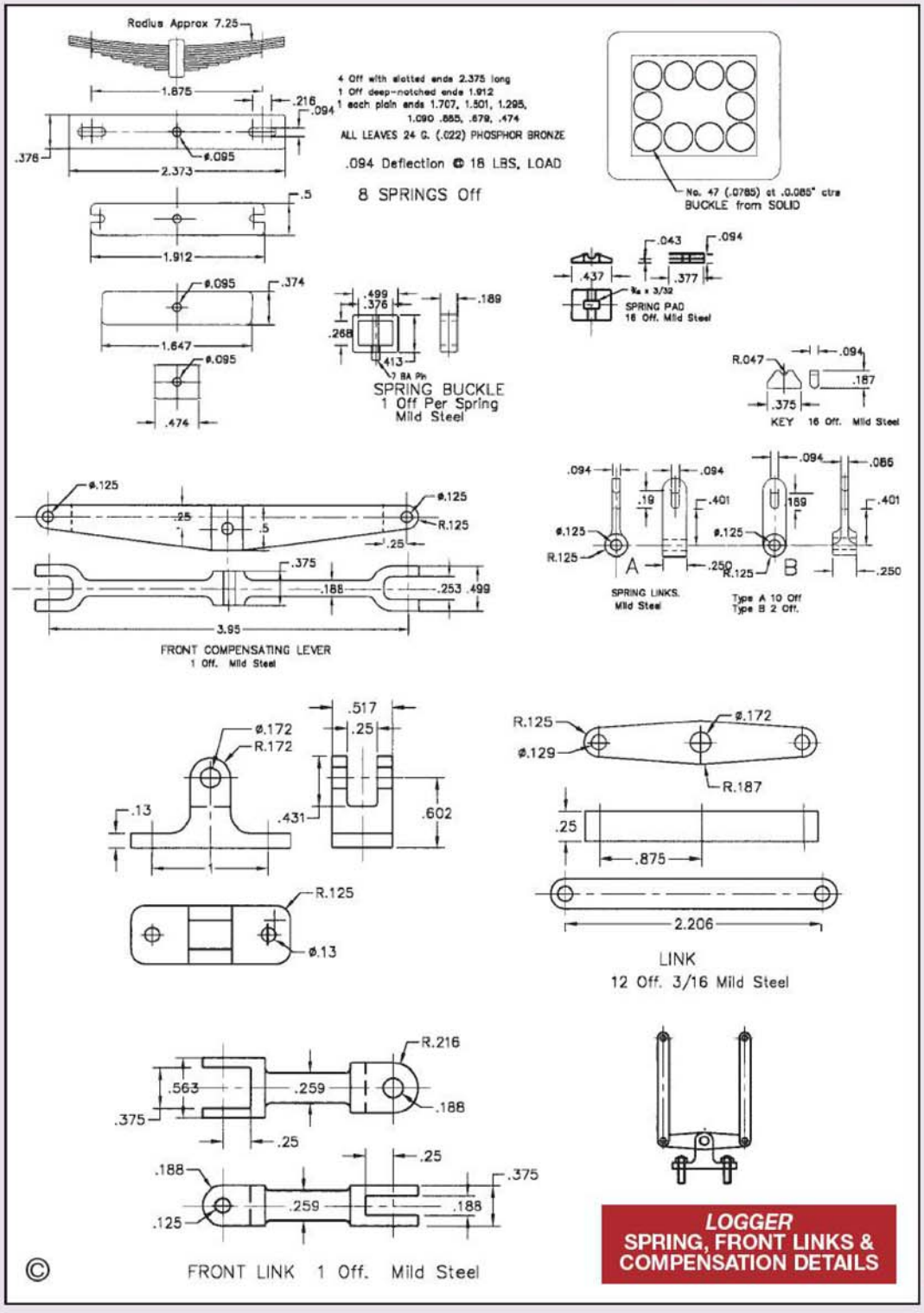
M.E. 4181, 1 November 2002

A few days ago I happened to visit the workhouse of a new friend 'somewhere up North'. I will not pass on any names because they might be misinterpreted, sufficient to state that the workhouse concerned did most certainly *not* perpetrate the horror I saw, and would shortly be dealing with it. Suffice it to say that he showed me an A4 in 7¼in. gauge. My first glance revealed that it had but one chimney hole; A4s were double. But far worse was to follow. I saw the exhaust manifold for myself. I lie not, but the *exhausts* from the three cylinders (needing of course 6 connections one way or another) were ⅜in. O/D leading to a manifold with some ⅜in. holes in it! I'll not swear that the pipes were not 0.376in. O/D, but ⅜in. (0.375in.) was what they looked like, and were.

Seldom has my flabber been so ghasted! It was complained that the engine neither steamed well nor would it run with any great gusto. Now, I am prepared to concede that it might have been a first attempt, but a casual inspection showed that many other details were quite well made. I know not who made it and do not particularly want to know, but if the builder wishes to contact me for some free advice under very strict conditions of secrecy (guaranteed) then an e-mail to **keithgwrloco@fsbdial.co.uk** could be to his advantage.

We all had to start sometime, and admittedly if there is no source of reference then ignorance is no shame, but to me the matter is a bit more than obvious. I would add that to make matters worse, the ⅜in. pipes were badly kinked where they had been bent *"to reach the parts that other pipes couldn't reach."*

I'm not aware of any laid down criteria for exhaust pipe size, and of course old square-cube works in our favour (volume of steam as scale cubed, area of exhaust pipes as scale squared, but at a rough guess for this locomotive I would insist on ¾in. pipes, absolute minimum.



If memory is correct, I used 1in. on various 7¼in. Kings that I have built, with some success.

Enough! We'll pass over as quick as we can, the fate of that gray – that unhappy young man!

You never know when you might be paid a compliment although at times it can be difficult to be sure.

Recently I saw a club member (a friend, needless to state) about to drive a pole into the ground to hold up a piece of steel netting. It was only a temporary measure, but before he had hit the first thump I called across and suggested threading it through the mesh first; the meshes were about 4in. square. He looked straight at me, put on a fierce look and said after a few seconds, just before threading the pole: "I 'ate clever b.....ds!" At which we both had a hearty laugh.

Many years ago, resting with some of the local lads in a barn after assisting the farmer to bring in the hay, my eldest son and I were having a lovely argument, assisted (or punctuated, to the delight of all present) by some hearty but in the main unprintable name-calling. He finished one line by calling me a cross-eyed bird (at least it rhymed with bird). Up spoke a lad present in some horror *"Are you going to put up with that sort of talk from your son?"* To which I replied *"Can you think of a better proof of love and trust?"* Silence reigned while they thought that one out.

As I said, a compliment is not always easy to spot.

Spring is here!

Now there's no real doubt that coil springs are much easier to design and make than leaf springs, but there's also no doubt that the latter are better for main springing than coils, and give much better results to boot.

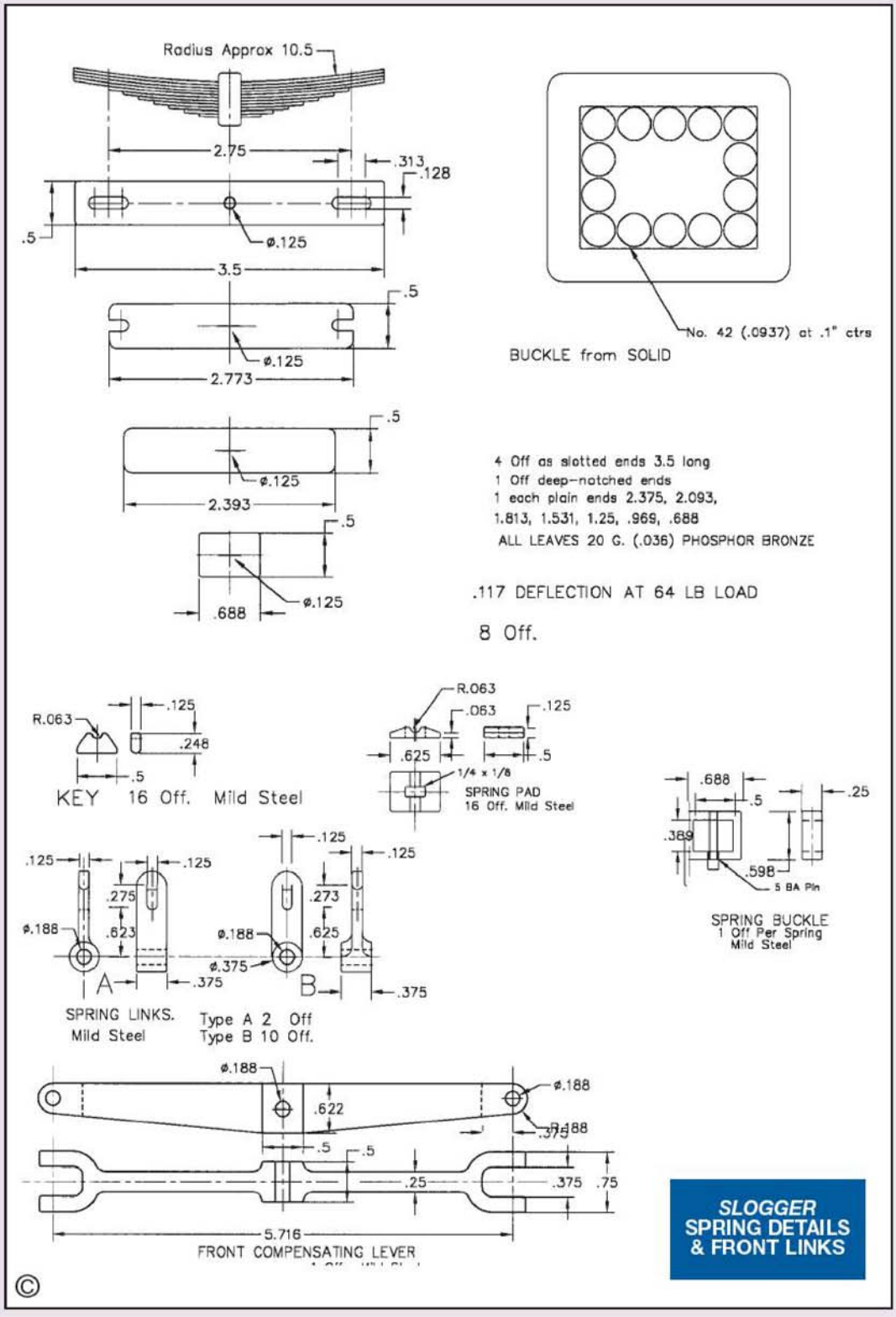
The reason for this is not hard to follow, for the internal friction between the leaves gives a certain amount of damping. In fact the system may be said to be critically damped, for the vibration associated with operation keeps this friction extremely low, yet still much greater than that due to coil springs. The overall result is that a coil-sprung locomotive will bounce up and down on its springs, while a leaf-sprung job will be far more stable with better adhesion and steadier running.

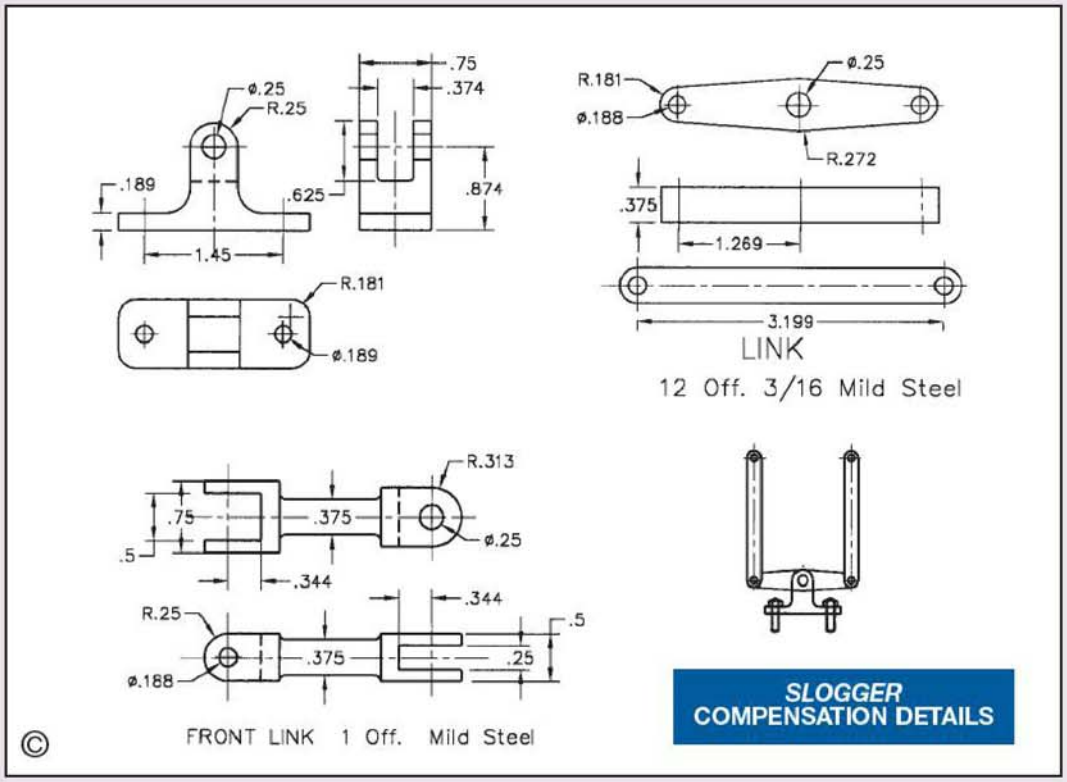
Whether compensation is much use in our sizes I know not; I have never yet used it on springing and am therefore not qualified to give an opinion. I suspect that old square-cube might work in our favour in this instance, but 'tis not even an informed guess! However, for those who want it, I shew full details of the prototype as far as I can tell. I have dealt with the compensation as applying to the pony truck assembly and will describe the rest as we get to it.

The easy way of making spring buckles is to bend them to shape over a bar as a former, silver-brazing the joint on completion. This has the disadvantage of weakness at the joint, so the apparently harder way turns out to be the easiest in the long run. Daunting though it may appear, I discovered that a whole engine's worth of buckles took but one afternoon of work — not very hard work at that.

Begin by making the jig from ⅛in. plate. This jig calls for great accuracy, but as my reader(s) will be aware by now, we are all sitting on at least one jig-borer, whether it be called lathe, mill, or (poshly) milling machine. Use the various slides to locate the holes with a small centre-drill and follow through with a No. 46 (recommended). If this jig be clamped to a piece of ¼in. mild steel plate, then poking the No. 46 drill through is something of a doddle. Run the drill at top speed, use some 'juice' (suds, cutting oil, whatever) and then open out to No. 42, or if you can manage it No. 39, preferably new. This will give minimum material to remove by hand. Drill sizes quoted here refer to the *Slogger* springs.

If the sheet is now placed strategically (a good word) over the partially-opened vice jaws, then





SLOGGER COMPENSATION DETAILS

resting a piece of mild steel on the bit-to-be-knocked-out and clouting it heartily with a hammer will remove said bit and leave very little cleaning-up to do. Machining the outside of the buckle is now the proverbial doddle. I have used this system to make buckles from $^{5}/_{8}$in. thick plate.

Spring leaves are self-evident.

The various links and levers present little in the way of problems to make, but a problem exists in our size that is somewhat less in full-size. The various spring links and leaves are assembled or connected by wedge-type keys and pads. In full size, recall that the locomotive is seldom lifted off the track, in our case it is a hearse of another colour. It is seldom in a day's run that ours are *not* lifted off the track, hence a system which gravity holds together is rather inclined to come unhitched in such circumstances. Now, I have no direct experience of this, but it seems to me that after assembly, life would be much easier if some silver-braze material were discreetly set into the key/pad assembly.

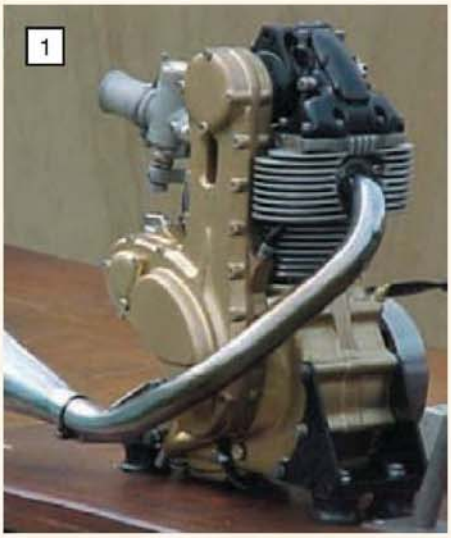
A word of warning on the part labelled 'front link'. It is quite easy to make, but take care that you make the two ends at 90deg. as shown. The same applies to some other links. It might well be that I am teaching my grandmother to suck eggs, but it is surprisingly easy to put the job in the vice in such a way that the slots come out parallel, which is not really much use. I cannot recall ever having done this myself, but I can guess approximately what I would have said!

Many of us use small plastic trays or tubs for our supply of butter/spread/can't believe it's not steam oil; well, when no longer containing their original product they are just about perfect for small parts.

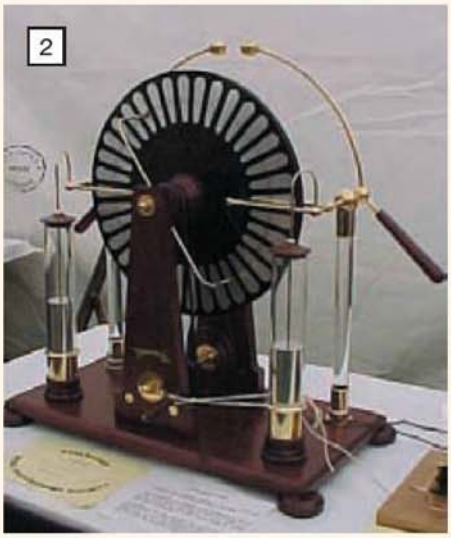
●*To be continued.*

Free-for-all

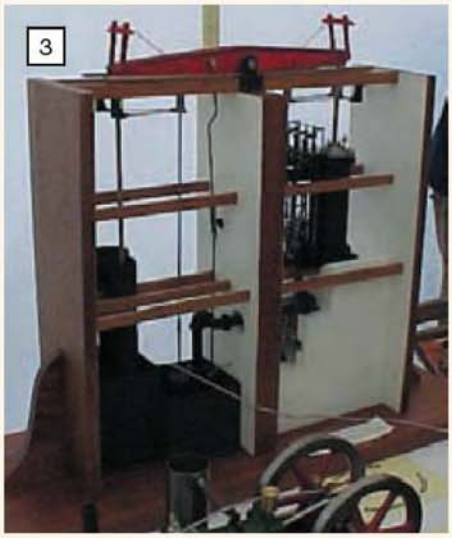
The weekend of 26-27 October was intended as a free-for-all at the Echills Wood Railway in the National Agricultural Showground, Stoneleigh. We had a goodly number of visiting locomotives, among them two 0-4-0ST locomotives, a GWR 'Prairie', 'Hall' and 4-6-0 'County', a couple of *Highlanders* (Black 5s), a BR standard loco and a slightly larger black 2-6-0, to say nothing of some beautiful freight vehicles that made up a very fine sight as a goods train. Some 'homers' were there too, running on their own track, so to speak. Unfortunately, although the Saturday was a great success, the weather was not exactly encouraging for Sunday — as we all know. We were greatly surprised to have our first 'Santa Special' booking for the year 2003! I found great interest in the small 0-4-0s, for they were driven in the main by youngsters, and also in one of the 0-4-0 narrow-gauge types, for not often do we see young ladies owning and driving steam locomotives, and driving them exceedingly well too. I show four photographs, and have spent some time (without success alas) in searching for a '50 years younger' button on my computer.



Bill Conner's half size Matchless G50 engine not only looked good but also sounded wonderful on its megaphone exhaust.



The Wimshurst machine built by James Finch as an A-level design project was made and finished to an exceptionally high standard.



John Day's model of the No.2 Crofton pumping engine set in a sectioned engine house conveyed the atmosphere of the full-size engine.

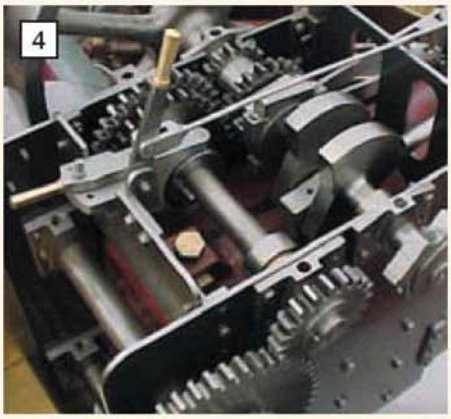
GUILDFORD 2002

Neil Read
reports on this popular annual event organised by Guildford SME.

I really will have to learn to keep my wits about me! It was in July that our Editor, offered me a ticket for the 35th Model Steam Engine Rally & Model Engineering Exhibition at the Guildford SME track in Stoke Park. I had only ever heard good reports of this event and so I happily accepted this somewhat uncharacteristic act of generosity. Then came the punch line —quoth he: *"Now you're going to the event I'd like you to prepare a piece for the magazine."* Truly, there is no such thing as a 'free lunch'.

However, the prospect of seeing the Guildford tracks, and the models and trade stands there dispelled any sense of foreboding and it was with a feeling of anticipation that I pointed the car southwards. Having reached the site I was immediately impressed with the standard of organisation. Parking was well sign-posted and controlled, entry was easily effected and the site well laid-out. Of course, with any outdoor event it helps to have the weather on your side and we were fortunate to have reasonably settled weather for that particular weekend. However, considerable effort had been taken to make the visitors feel welcome and little touches abounded. I particularly liked the provision of the two picnic areas where we could sit and eat our sandwiches without having to do battle with marauding insects.

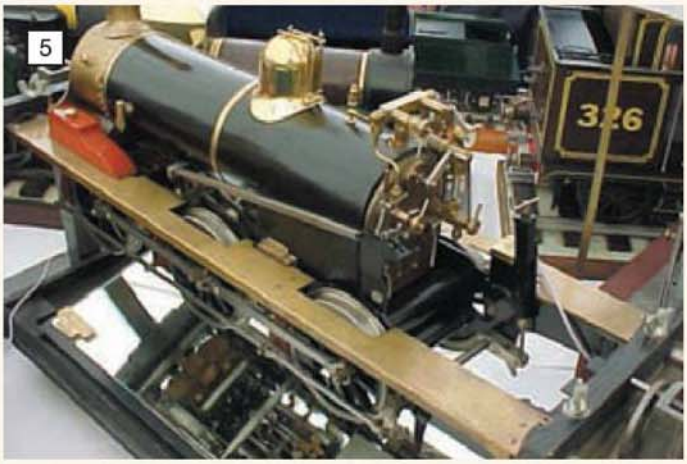
The event itself encompassed just about every aspect of model engineering; locomotives, traction engines, I.C. engines, static models and boats were all represented, together with a good selection of trade stands. As is so often the case when reporting events of this nature the problem is not what to put in but what to leave out. The majority of the exhibits were of a very high standard and the exhibitors and the organisers are to be congratulated. I will take this opportunity to mention a few items that caught my eye and if I miss your favourite model or part of the event I apologise in advance. Lack of space makes it impossible to include everything seen in an event of this size.



A close-up of the gearing and crank shaft on Peter Breakwell's 2in. scale traction engine.

In front of the main exhibition marquee was a demonstration area for model internal combustion engines. Among the other very fine engines on display was Bill Conner's half scale model of a Matchless G50 racing motorcycle engine c1962 (**photo 1**). This was a ready starter and had exactly the right exhaust note characteristics. It even showed some of the temperament of the prototype when the different climatic conditions, compared to Bill's workshop, affected the carburation. The sound of this engine starting was guaranteed to cause a migration of visitors over to the exhibition marquee, the better to hear the distinctive exhaust note.

Inside the marquee was a diverse range of models,



Ron Roebuck's loco stand incorporated a mirror so one could admire the motion work of his LBSC Terrier tank engine.

The horizontal milling attachment for a vertical mill/drill exhibited by Mr. B. Hatcher showed considerable ingenuity and appeared well made.

'Tea break at the loco yard' and not a soul to be seen! This 16mm scale water tank and store shed diorama was built by Roger Hayward.

A close up of some of the detail work on the Savage galloping horses roundabout being modelled by Ernie Summerhayes.

instruments and tooling. The Wimshurst machine (**photo 2**) built by James Finch for his A-level design and technology project was exceptionally well made and finished and did much credit to its 17 year-old builder. We hope that James maintains his interest in practical engineering, as clearly his skills are well adapted to a wide range options. We believe he would be particularly suited to clock making and we look forward to seeing other examples of his work in the future.

The 1:20 scale model of the 1846 No. 2 Crofton pumping engine by John Day (**photo 3**) was a fine representation of this famous old engine. Displayed in a sectioned engine house, the model captured the atmosphere of the prototype engine while permitting observation of the detail. The original engine was built by Harvey & Co. of Hayle in Cornwall and was rebuilt with its present 42in. dia. cylinder in 1904. The engine was used to pump water to the summit of the Kennet & Avon canal until 1958.

Peter Breakwell's part built 2in. scale *Minnie* traction engine (**photo 4**) enabled us to admire some of the engineering details that go into the building of a model traction engine. All too often the finely made gearing and other precision items end up hidden behind steel guards. In 2in. scale *Minnie* is quite a substantial model and we look forward to seeing this particular engine again when it is complete.

Mounted on a business-like display/building stand was Ron Roebuck's part built 5in. gauge LBSCR Terrier tank engine (**photo 5**). The provision of a mirror under this loco enabled visitors to observe the detail of the motion work without contortion or physical effort, and was much appreciated.

Milling is now a widely accepted process in the model engineer's workshop and many people in the hobby use the inexpensive imported mill/drills offered by a number of suppliers. These machines can undertake most of the work needed by model engineers but are not well adapted for operations with large slitting saws or side and face cutters. Such cutters are really designed for use on horizontal milling machines. Mr. B. Hatcher obviously had a need to use such cutters on his mill/drill and designed and built a horizontal milling attachment to facilitate this (**photo 6**). This well-made device would meet a need in many workshops and perhaps Mr. Hatcher may consider contributing a short article on his design.

Roger Hayward's 16mm scale diorama of a water tank and store shed (**photo 7**) entitled *Tea break at the loco. yard* was good fun and was beautifully detailed. I am often impressed by the attention to detail on exhibits like this and they always reward close scrutiny. The more you look the more you see.

A working model of a Flower Class Corvette cruises on the boat pool. Such ships were built for submarine hunting during World War Two.

A most unusual exhibit was the 2in. scale, Savage galloping horses roundabout by Ernie Summerhayes (**photo 8**). Although only part built this is already a substantial structure and we hope Mr. Summerhayes has allowed sufficient room to store and display this impressive model.

A model boat pool (**photo 9**) is always a popular attraction, particularly with the younger children. There were a variety of models on display ranging from an aircraft carrier to a mallard duck.

One of the high spots among the model traction engine fraternity was the grand parade held on Saturday afternoon. During this a trophy is awarded (kindly donated by Tracy Tools Ltd.) for the best presented engine and driver. This year the award went to Martin Cook driving Michael Gilkes' engine (**photo 10**). I am not sure what was appreciated more — the award or the cans of beer that came with it.

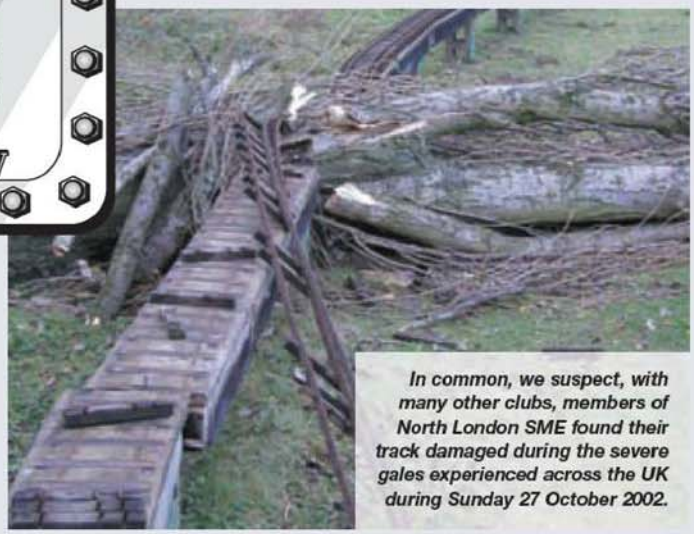
Photographing moving objects is not my forte but I did manage to get a shot of John Dalton's superb 5in. gauge Britannia *William Wordsworth* (**photo 11**) before it did its stint of passenger hauling on the track. There were so many fine locos. running that it seems churlish to pick just one, but I was impressed with the way that this particular loco handled its loads with neither fuss nor temperament.

As already stated the trade was very much in evidence and, judging by the smiles, I would say business was good. I hope they had a successful visit to Guildford. I certainly did and I would like to think that maybe Mike may offer me another free ticket next year!

Michael Gilkes, Martin Cook (at the controls) and their wives look pleased with their Tracy Tools Award for the Best Turned Out Traction Engine and Driver, and the cans of beer that came with it.

The superb motion work and paint finish on John Dalton's Britannia class loco William Wordsworth *seen prior to being steamed when its faultless performance matched its appearance.*

CLUB CHAT
With Stan Bray



In common, we suspect, with many other clubs, members of North London SME found their track damaged during the severe gales experienced across the UK during Sunday 27 October 2002.

UK News

Staff at *Model Engineer* would like to join with members of **High Wycombe MEC** in congratulating their ex-President and honorary member Laurie Watling on having reached his centenary. Although no longer an active modeller, Laurie still takes keen interest in society matters. The club was represented at his birthday party held in Gerrards Cross Nursing Home where he now lives.

Rapid progress is being made at Littledown, the new **Bournemouth DSME** headquarters. Now in place, the engine shed is wired for power and lighting ready for connection to a supply to be laid in by the local authority who will also pipe in mains water. They will connect the new toilet, currently being built, to the sewerage system. A good turnout of members every Sunday has ensured rapid progress. A wall of redundant railway sleepers has been erected to prevent earth slippage at a bank supporting a private road, and several tons of topsoil has been delivered and distributed for a grassed area on which people can sit and picnic once the railway is operational. A delivery of 6 tons of 'scalpings' will permit a base to be laid for the steaming bays, although the actual construction is likely to be held over until improved underfoot conditions prevail. In addition to all this effort at the new tracksite, the club newsletter has been revamped and is now being produced with the inclusion of a little colour, we assume with the aid of new computer Desktop Publishing software.

Despite a very harmonious relationship with their landlords, the **Bure Valley Railway**, **North Norfolk MEC** have had nothing but complaints from incomers who have bought properties adjacent to the track site, complaints which have been solely concerned with noise. It is difficult to understand on what grounds these complaints have been upheld for it seems beyond the realms of credibility that a few 3½in. and 5in. gauge locomotives on a short length of raised track can make more noise than the full size railway. It is also completely unreasonable that on purchasing a house in an area where facilities already exist, these incomers can then successfully set about complaining about something which had been there a long time before their arrival, and making their own presence felt. The philosophy of 'live and let live' seems to have gone by the board; such people should accept that when they move in to a location new to them, they should accept the prevailing circumstances. Notwithstanding all this, the complainants have had the last word and despite support from members of the local council and from the BVR itself, the club has been obliged to vacate the site. Fortunately, the BVR authorities have offered to help with the removal in any way possible, and the news is not all bad as the **North Norfolk Railway** has offered the model engineers facilities at Holt Railway Station and has even cleared a suitable area for their use. It now remains to be seen whether planning permission for a track will be granted by the local authority.

The annual **National 2½in. Gauge Association** end-of-season get-together took place in October at St Paul's Church Centre in Hook and was as well attended as ever. A variety of models in various stages of completion were on display, creating interest and promoting discussion among those present. Members enjoyed an illustrated talk about Arthur Binfield, who was apprenticed to Henry Greenly, and heard about the models he had built and his association with Henry Greenly, Bassett Lowke and several other famous model engineers of bygone days. Ladies from St Paul's Church Centre supplied refreshments and the session was rounded off with the presentation by Mrs. Joan Williams of the *George Williams Trophy* donated in memory of her husband. This year it went to Peter Shaw in recognition of his outstanding work on behalf of the association.

At a recent AGM, Garry Garrett, former Chairman of **Docklands & East London MES** was made an honorary life member in recognition of his services to the society. He was responsible for the club's relocation to its present headquarters at Belhus Woods following a terrorist bomb in Docklands which resulted in the termination of club meetings at their original headquarters. The Belhus Woods venue has proved very satisfactory and members have been able to develop a railway which is currently in process of being extended.

Following protracted negotiations with their District Council **Chichester DMES** has at last managed to negotiate a new lease for its track site, the terms of which are slightly more favourable than the council had originally suggested. It is now proposed to proceed with construction of a new station building for the raised track as well as improvements to the station used for ground level operations. It is also hoped that the club locomotive *Speedy* can be completed in time for the next running season, and that a start can be made on important track maintenance work, which may involve replacing some of the rail.

The new **Frimley & Ascot Locomotive Club** ticket office is making good progress, but sadly Paul Finn who, despite his severe disability, regularly manned the ticket office, has died and will not therefore be able to give it his seal of approval. However, as a mark of respect, and in memory of the considerable amount of work he carried out on behalf of the club, it is proposed to dedicate the new ticket office in his name. The 2003 AGM of the **7¼in. Gauge Society** will be held at the Frimley & Ascot track and in anticipation of the usual large turnout of locomotives for these meetings, several new storage sidings are being constructed. Although taking a low priority in comparison to the many other tasks, steady progress is being made on the club's 08 shunter.

West Riding SLS now own three locomotives: a 7¼in. gauge electric powered engine, a 7¼in. gauge scale model of the very early locomotive *Fire Queen*, and a 2½in. gauge Tasmanian Garrett, the last two having been donated to the society by a Mr. Meakin. All three models were in operation in mid-July making the occasion something of a red-letter day. The annual club trophy day, which is a form of efficiency trials, was held in September with nine participating models. Winner John Lockwood, with a 5in. gauge LNER 2-8-0 locomotive, was presented with the *Jack Scarth Memorial Trophy*. The runner up and therefore winner of the *Geoff Haythornethwaithe Trophy* was Tom Shevlin with a 5in. gauge GWR 'Manor' 4-6-0.

Graffiti is a major concern for **Maidstone MES**. Following the latest attack, the local authority's permission was sought to protect some of the buildings with anti-graffiti paint. The council responded by cleaning off all the graffiti, but having left the surfaces invitingly clean, how long it will be before the next attack is anybody's guess. Members who attend the club on Wednesdays have had a blitz on the buildings and have made considerable improvement. The inside has been completely redecorated, damaged plastering having first been made good, and the outside shutters were painted with anti-vandal paint. A lot of necessary external painting has also been done and the bench seating repaired and re-varnished. Work has also been carried out on the track, the ticket office renovated and the fencing repaired. Two windows have been bricked up, something which members would doubtless have preferred not to have had to do, but at least by doing so some of the vandalism and burglary problems may be prevented. The inevitable reduced internal illumination has been compensated by fitting brighter 'daylight' tubes in the fluorescent lights. All this effort has been accomplished by a small and dedicated band of volunteers. As well as entertaining children from Chernobyl, the society has run events for several charities, including the Alzheimers Society, and MENCAP.

As a result of the popularity of the smaller (garden) gauges, members of **Sutton MEC** have decided to install goods sidings around the outside of their layout. This will provide additional interest and enable shunting competitions to be organised. Last summer's extremes of weather have caused some damage to the layout, a heavy downpour of hailstones having damaged the felt in which the track has been laid, and the combination of heavy rain and hot sun having caused some of the baseboards to warp. These problems will be resolved during the winter when it is also hoped to incorporate

In Memoriam

It is with deep 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.

Paul Finn	*Frimley & Ascot Locomotive Club*
Lionel Frerk	*Malden DSME*
Peter Hodgson	*Taunton Model Engineers*
Robert Houston	*North Norfolk MES*
Sam Taylor	*Chichester DSME*

a removable section to allow ride-on mower access inside the layout. The extremes of last summer's weather have created other problems which might not have arisen in a 'normal' home counties summer, a considerable programme has therefore been scheduled for the other tracks, although these mainly involve civil engineering.

Taunton ME reports a very successful exhibition, the *alfresco* attractions proving to be particular favourites with the public. The Mayor not only extended his visit beyond his scheduled time but also took control of a 7¼in. gauge locomotive, taking his wife for a trip round the tennis courts. We wonder if the mayor was one of the number of new members recruited during the exhibition which appears to be a regular means of introducing people to the club. A total of 40 members joined a trip to the Swindon Locomotive Shed at Williton where they were able to see a 'West Country' Class 4-6-2 locomotive and a sleeping coach of 1897 vintage undergoing restoration. In the event, having been scheduled to take place during the period of heavy rain experienced across the UK during the summer, the club's annual barbecue was held indoors this year. Nevertheless, all who attended seem to have enjoyed their evening, even if there were no trains to ride.

Of the many newsletters we receive regularly, several are so comprehensive and well produced that they are much better described as magazines. One personal favourite is the *Bulletin* from the **Society of Ornamental Turners** which is invariably packed with interesting technical articles, snippets of history, and news of the society itself. Receipt of each new issue invariably promotes the desire to join this dedicated band of enthusiasts who turn out such lovely work, and the latest issue is no exception. Also presented is information concerning a bursary competition designed to encourage talented turners wishing to achieve professional status. There are details too, of a society meeting held last May when William Thurlow was presented with an illuminated address in recognition of his work on behalf of the society over the last 30 years. Among the historical articles is an amusing and interesting account of ornamental turning in the eighteenth century when not only was King George III a skilled turner but so also were many ladies of the aristocracy. Anyone interested in learning more about this fascinating organisation is invited to contact the Secretary, Nicholas S. Edwards, Kirklea, Park Road, Melchbourne, Bedfordshire MK44 1BB.

One of the annual **Reading SME** highlights is their annual efficiency trials which this year took place on 22 September. Seven entries included five 5in. gauge and two 3½in. gauge models. The winner was Rob Manley, driving fellow member Geoff Down's 3½in. gauge *King Arthur*. How pleasing it is to read of a 3½in. gauge locomotive beating its larger opponents in such an event! Intended winter work includes the re-organisation of the station area when, by moving the point work it will be possible to extend the departure platform and allow three trains into the station at any one time.

World News

South Africa

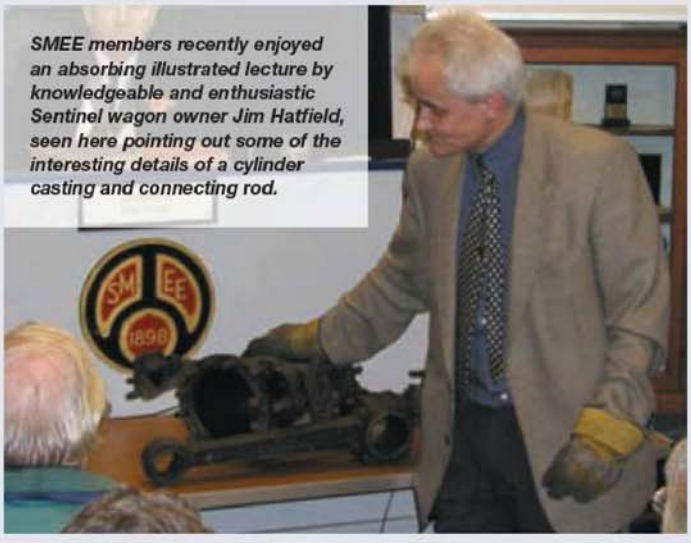
The problem of finding volunteers to collect tickets on public running days is more acute in some societies than others. In that it provides the opportunity to meet the general public and to enjoy repartee with the children, it is an activity to which some look forward and much enjoy. Others charged with the task take the opposite view, are reluctant to do it for any longer than absolutely necessary, and will do everything possible to avoid it, which can lead to sloppy operation. The committee of **Centurion SME** has decided to avoid this problem in the future by paying a non-member to do the job. Societies will have experienced difficulties with members who rarely or never attend meetings but who turn up on a running day and are somewhat, and not unreasonably, put out when marshalled along with the general public. To eliminate the awkwardness of such encounters, particularly with a non-member as ticket collector, special identification tags have been issued to all CSME members and their close relatives who are entitled to ride free on the trains, and they are urged to be sure to wear them when attending at the track.

Canada

Participation in the Western Ontario Steam Threshers Association Annual Steam Show is one of the **Bluewater MES** calendar highlights at which a number of members exhibit their models. Although some might concede that there was a dominance of traction engines, this year the club display was particularly varied. The event is also seen as an opportunity to attract new members and any visitor showing particular interest receives copies of the club newsletter to offer further encouragement to join.

British Columbia SME seems to have a new recruit to its ranks although he has made no application to do so and has not yet paid any subscription. No one knows his name but everyone recognises him by his habit of sitting with one ear up and the other down, except when excited by the passing of trains when both ears are erected in celebration. Reference to a male gender in the foregoing note may be incorrect for this interested party, who has a favourite spot by a junction, is a rabbit with a love of trains and apparently no fear of humans. He, or perhaps she, is quite happy to hop inside the clubhouse during meetings and is very content to watch the trains go by. Whether it will be willing to help out at working parties remains to be seen. We hear that the 5th annual Train Fest went well and attracted a large number of visitors some of whom arrived early Friday morning. More than 100 sat down to dinner on Saturday which involved the organisers in a hasty visit to the supermarket for extra food. The club borrowed the **WRCA Mini Rail** portable track to augment their own at the Atchelitz Threshermens' Association annual Threshing Bee. The WRCAMR track had been built to the same drawings as their own and it was hoped that the two would be compatible. In the event, this interesting experiment was a success and resulted in a run of some 400ft., making it much more enjoyable than the more usual portable track events. All BCSME members have been much saddened by the passing of Bill Copeland, former Mayor of Burnaby, who had been a very good friend to the club, took a great interest in its activities and frequently attended the track, even after becoming incapacitated and confined to a wheel chair.

The use of pre-assembled track sections imported from Switzerland has enabled **Alberta MES** to make rapid progress with the 7¼in. gauge railway at their site at Airdrie. Having laid a good solid bed on which to put the track, construction was rapid, and some contractors working nearby allowed themselves to be persuaded to use their heavy machinery to carry out some landscaping. The new clubhouse has been decorated in the style of buildings of the Canadian Pacific Railway and when complete the 11 acre site should become a major attraction.



SMEE members recently enjoyed an absorbing illustrated lecture by knowledgeable and enthusiastic Sentinel wagon owner Jim Hatfield, seen here pointing out some of the interesting details of a cylinder casting and connecting rod.

Australia

A major effort by some members of The **Steam Locomotive Society of Victoria** has resulted in a large area of concrete being laid to provide an apron around the clubhouse. An area of concrete at the rear of the clubhouse that had become unstable has also been replaced as has some at the steaming bays which was becoming badly worn. The fact that so much was done seems to have been partly due to the arrival of an over-generous supply of readymix concrete! In an attempt to attract more members to running days a free barbecue is now available to all those who attend, thus making it even more of a social event.

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.

NOVEMBER

29 **Hereford SME.** *Video Evening.* Contact John Arrowsmith: 01432-265151.
29 **Malden DSME.** *Rummage Sale.* Contact John Mottram: 01483-473786.
30 **Cardiff MES.** *Childrens' Christmas Party.* Contact Trevor Jenkins: 029-207-55568.
30 **Oxford (City of) SME.** *AGM.* Contact Chris Kelland: 01235-770836.
30 **York City & DSME.** *Bits & Pieces.* Contact Ken Bateman: 01904-421445.
30/1 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
30/1 **December Rand SME.** *Year End Function & Christmas Party.* Contact Colin Retief: (011)-763-6813.

DECEMBER

1 **Cardiff MES.** *Santa Special Day.* Contact Trevor Jenkins: 029-20755568.
1 **Durban SME.** *Christmas Party.* Contact David Martin: 031-5635755.
1 **Ottawa Valley Live Steamers.** *Meeting.* Contact John Bryant: 761-1109.
1 **Reading SME.** *Running.* Contact Graham Bustin: 01189-615450.
1 **South Durham SME.** *Running Day.* Contact B. Owens: 01325-721503.
1 **Surrey SME.** *Members' Steam-Up.* Contact John Cook: 020-8397-3932.
1 **Teesside Small Gauge Rly.** *Meeting.* Contact Bill Foster: 01642-710198.
2 **Lancaster and Morecambe MES.** *Auction.* Contact Harry Carr: 01524-411956.
2 **Peterborough SME.** *Bits & Pieces.* Contact Tony Meek: 01778-345142.
3 **Romney Marsh MES.** *John Snell: Railways Around the World.* Contact John Wimble: 01797-362295.
3 **South Durham SME.** *AGM.* Contact B. Owens: 01325-721503.
3 **Stamford MES.** *Bits & Pieces.* Contact David Ash: 01780-751211.
3 **Surrey SME.** *Bits & Pieces.* Contact John Cook: 020-8397-3932.
3 **Taunton ME.** *Mike Johns: The Chertsey 7¼in. Gauge Railway.* Contact Don Martin: 01460-63162.
4 **Chingford DMEC.** *Bits and Pieces.* Contact Martin Masterson: 0208-989-5552.
4 **Fylde SME.** *Christmas Lunch.* Contact Alan Reid: 01253-882872.
4 **Guildford MES.** *White Elephant Sale.* Contact Dave Longhurst: 01428-605424.
4 **Tyneside SMEE.** *Bring & Buy Sale.* Contact Malcolm Halliday: 0191-262-4141.
5 **Cardiff MES.** *Bits & Pieces with Newport MES.* Contact Trevor Jenkins: 029-207-55568.
5 **Leyland SME.** *Project Night.* Contact Alan Wilson: 01942-715072.
5 **Portsmouth MES.** *Meeting.* Contact Bob Aldred: 023-92-523366.
5 **South Lakeland MES.** *AGM.* Contact Adrian Dixon: 01229-869915.
5 **Sutton MEC.** *Bits & Pieces.* Contact Mike Dean: 0208-657-5401.
6 **Vale of Aylesbury MES.** *Mike Clemence & David Knapman: More Sounds of Steam.* Contact Clive Ellam: 01296-623433.
6 **Brighton & Hove SMLE.** *Christmas Film Show.* Contact Mick Funnell: 01323-892042.
6 **Chichester DSME.** *Christmas Dinner.* Contact Brian Bird: 01243-542266.
6 **Colchester SMEE.** *B. Dyes: Wheels of Ipswich.* Contact L. G. Hammond: 01376-511686.
6 **Maidstone MES.** *Video & Crumpet Night.* Contact Martin Parham: 01622-630298.
6 **North London SME.** *Social Evening.* Contact Tony Dunbar: 01992-465625.
6 **North Norfolk MEC.** *Christmas Dinner.* Contact Gordon Ford: 01263-512350.
6 **Rochdale SMEE.** *Geoff Dowden: Building a Private Owner Wagon.* Contact Mike Foster: 01706-360849.
6 **Romford MEC.** *Competition Night & Millennium and Rusty Titford Cup.* Contact Colin Hunt: 01708-709302.
7 **Brighton & Hove SMLE.** *Christmas Event.* Contact Mick Funnell: 01323-892042.
7 **Sutton MEC.** *Christmas Party.* Contact Mike Dean: 0208-657-5401.
7/8 **Amberley Museum.** *Santa's Fun Days.* Contact Derek Kilburn: 01798-831370.
7/8 **Barrow Hill Engine Shed Society.** *Santa Steam Trains with Thomas.* Contact Kate York: 01246-472450.
7/8 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
7/8 **Reading SME.** *Santa Specials.* Contact Graham Bustin: 01189-615450.
8 **Chichester DSME.** *Santa Specials.* Contact Brian Bird: 01243-542266.
8 **Frimley & Ascot LC.** *Quiz Night.* Contact Bob Dowman: 01252-835042.
8 **Malden DSME.** *Santa Specials.* Contact John Mottram: 01483-473786.
8 **N. W. Leicester SME.** *Santa Specials.* Contact John Elliott: 01455-847040.
8 **Surrey SME.** *Santa Specials.* Contact John Cook: 020-8397-3932.
8 **Sutton MEC.** *Track Day.* Contact Mike Dean: 0208-657-5401.
8 **Sutton Coldfield MES.** *Santa Special.* Contact Roger Timings: 0121-308-5875.
8 **Woking MRS.** *Santa Special.* Contact Ronald Dewar: 01932-343331.
9 **Bedford MES.** *Quiz Night.* Contact Ted Jolliffe: 01234-327791.
9 **Erewash Valley MES.** *Ladies Evening.* Contact Jim Matthews: 01332-705259.
9 **Melton Mowbray DMES.** *Auction.* Contact Phil Tansley: 0116-2673646.

9 **Saffron Walden DSME.** *Christmas Dinner.* Contact Ken Archer: 01763-852911.
10 **Chelmsford SME.** *Social Evening.* Contact D. Blake: 01376-324205.
10 **Dockland & E. London MES.** *Christmas Get-Together.* Contact P. M. Jonas: 01708-228510.
10 **Manx Steam & MEC.** *Meeting.* Contact Mike Casey: 01624-861613.
10 **Romney Marsh MES.** *Christmas Lunch & Steam-Up.* Contact John Wimble: 01797-362295.
10 **Sutton Coldfield MES.** *Wine & Mince Pies Social Evening.* Contact Roger Timings: 0121-308-5875.
11 **Basingstoke DMES.** *Meeting.* Contact Ian Shanks: 01420-561741.
11 **Chingford DMEC.** *John Baker: 'Precious Metal Bashing'.* Contact Martin Masterson: 0208-989-5552.
11 **Harrow & Wembley SME.** *Dennis Craig: History of the National Trust.* Contact Dr. Roger Greenwood: 020-8427-2755.
11 **Hull DSME.** *Social.* Contact Brian Rylance: 01482-647032.
11 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
11 **Norwich DSME.** *Meeting.* Contact Paul Reed: 01603-462925.
11 **St. Albans DMES.** *EGM.* Contact Roy Verden: 01923-220590.
11 **Staines SME.** *Christmas Rave Up.* Contact Mike Kingham 01932-788793.
12 **Cardiff MES.** *Questions & Answers.* Contact Trevor Jenkins: 029-207-55568.
12 **High Wycombe MEC.** *Meeting.* Contact David Savage: 01494-527402.
12 **N. W. Leicester SME.** *Chit Chat & Pint Night.* Contact John Elliott: 01455-847040.
12 **Reading SME.** *Alan Copeland: Tales of the Unexpected.* Contact Graham Bustin: 01189-615450.
12 **Sutton MEC.** *Gerald Quarendon: A Senior Highflyer.* Contact Mike Dean: 0208-657-5401.
12 **Worthing DSME.** *Christmas Social & Theo Whiteside Photographic Competition.* Contact Chris Devenish: 01903-268158.
13 **Hereford SME.** *Christmas Soiree.* Contact John Arrowsmith: 01432-265151.
13 **North London SME.** *Archive Films.* Contact Tony Dunbar: 01992-465625.
13-15 **Great Western Soc.** (Didcot Railway Centre). *Thomas Santa Specials.* Contact Jeanette Howse: 01235-817200.
14 **Erewash Valley MES.** *Santa Special.* Contact Jim Matthews: 01332-705259.
14 **Guildford MES.** *Christmas American Supper.* Contact Dave Longhurst: 01428-605424.
14 **Hornsby ME.** *Santa Visit.* Contact Ted Gray: 9484-7583.
14 **Surrey SME.** *Santa Specials.* Contact John Cook: 020-8397-3932.
14 **York City & DSME.** *AGM.* Contact Ken Bateman: 01904-421445.
14/15 **Amberley Museum.** *Santa's Fun Days.* Contact Derek Kilburn: 01798-831370.
14/15 **Barrow Hill Engine Shed Society.** *Santa Steam Trains with Thomas.* Contact Kate York: 01246-472450.
14/15 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
14/15 **Talyllyn Railway.** *Santa Specials.* Enquiries: 01654-710472.
14/15 **Woking MRS.** *Santa Specials.* Contact Ronald Dewar: 01932-343331.
15 **Chichester DSME.** *Santa Specials.* Contact Brian Bird: 01243-542266.
15 **Frimley & Ascot LC.** *Santa Run.* Contact Bob Dowman: 01252-835042.
15 **Harlington LS.** *Mince Pie Run.* Contact Peter Tarrant: 01895-851168.
15 **N. W. Leicester SME.** *Running Sunday.* Contact John Elliott: 01455-847040.
15 **Plymouth MSLS.** *Mince Pie Specials at Plym Valley Railway.* Contact John Brooker: 01752-671722.
15 **St. Albans DMES.** *Track Meeting.* Contact Roy Verden: 01923-220590.
15 **York City & DSME.** *Running Day.* Contact Ken Bateman: 01904-421445.
16 **Centurion SME.** *Mini Steam Meet.* Contact Rudy Du Preez: 012-9986780.
16 **Hornsby ME.** *Christmas Social Night.* Contact Ted Gray: 9484-7583.
16 **Lancaster and Morecambe MES.** *P. Burton: Diving in the Red Sea.* Contact Harry Carr: 01524-411956.
16 **Peterborough SME.** *Party Night.* Contact Tony Meek: 01778-345142.
17 **Chesterfield MES.** *Members' Slides.* Contact Mike Rhodes: 01623-648676.
17 **Northampton SME.** *Christmas Drinks.* Contact Pete Jarman: 01234-708501.
17 **Nottingham SMEE.** *Christmas Get-Together & Bits & Pieces.* Contact Graham Davenport: 0115-8496703.
17 **Surrey SME.** *Chairman's Evening.* Contact John Cook: 020-8397-3932.
17 **Taunton ME.** *Social Night.* Contact Don Martin: 01460-63162.
17 **West Wiltshire SME.** *Bring & Buy.* Contact R. Nev. Boulton: 01380-828101.
18 **Bournemouth DSME.** *Christmas Party.* Contact Mike Baker: 01202-383653.
18 **Chingford DMEC.** *Cheese and Wine Night.* Contact Martin Masterson: 0208-989-5552.
18 **MELSA.** *Meeting.* Contact Graham Chadbone: 07-4121-4341.
18 **West Riding SLS.** *Christmas Party.* Contact David Batty: 01924-363908.
19 **Cardiff MES.** *Club Chat.* Contact Trevor Jenkins: 029-207-55568.
19 **Colchester SMEE.** *Christmas Meal.* Contact L. G. Hammond: 01376-511686.
19 **East Somerset SMEE.** *Bring & Buy.* Contact Cliff Almond: 01749-344735.
19 **Leyland SME.** *Christmas Dinner & Dance.* Contact Alan Wilson: 01942-715072.
19 **Rugby MES.** *Christmas Social.* Contact David Eadon: 01788-576956.
19 **Sutton MEC.** *Quiz Night.* Contact Mike Dean: 0208-657-5401.
20 **Colchester SMEE.** *Quiz & Fizz Evening.* Contact L. G. Hammond: 01376-511686.
20 **Rochdale SMEE.** *Meeting.* Contact Mike Foster: 01706-360849.
20 **Romford MEC.** *Bring & Buy Sale (Members Only).* Contact Colin Hunt: 01708-709302.
20 **Romney Marsh MES.** *Video Evening.* Contact John Wimble: 01797-362295.
21 **Chesterfield MES.** *Running Day.* Contact Mike Rhodes: 01623-648676.
21 **Luscombe Valley Railway.** *Anti Shopping – Humbug Day.* Contact Richard Knott: 01202-709833.
21 **Talyllyn Railway.** *Carol Train 7pm.* Enquiries: 01654-710472.
21/22 **Amberley Museum.** *Santa's Fun Days.* Contact Derek Kilburn: 01798-831370.
21/22 **Barrow Hill Engine Shed Society.** *Santa Steam Trains with Thomas.* Contact Kate York: 01246-472450.
21/22 **Great Western Soc.** (Didcot Railway Centre). *Thomas Santa Specials.* Contact Jeanette Howse: 01235-817200.
21/22 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
21-24 **Talyllyn Railway.** *Santa Specials.* Enquiries: 01654-710472.
22 **Ascot LS.** *Members' Steam-Up.* Contact Tony Alderman: 01932-854393.
22 **Plymouth MSLS.** *Mince Pie Specials at Plym Valley Railway.* Contact John Brooker: 01752-671722.
22 **Tyneside SMEE.** *Christmas Party.* Contact Malcolm Halliday: 0191-262-4141.
22 **Woking MRS.** *Santa Special.* Contact Ronald Dewar: 01932-343331.

TO HELP YOU GET THE BEST FROM THE MODEL ENGINEER EXHIBITION

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

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

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

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

Club exhibits

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

Additional forms

If you do not wish to deface your copy of the magazine we are happy to receive photocopies of the entry form, one for each model. We will be pleased to send out extra forms if required, so if you know of a modeller who is not a reader of one of our magazines but who you think may wish to participate, please advise them to contact our Exhibitions Office (01322-660070), or simply photocopy the entry form for them.

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

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

COMPETITION CLASSES

Engineering Section

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

Railway Section

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

Marine Models

- C1 Working scale models of powered vessels (from any period). Scale 1:1 to 1:48
- C2 Working scale models of powered vessels (from any period). Scale 1:49 to 1:384
- C3 Non-working scale models (from any period). Scale 1:1 to 1:48
- C4 Non-working scale models (from any period). Scale 1:49 to 1:384
- C5 Sailing ships and oared vessels of any period - working.
- C6 Sailing ships and oared vessels of any period - non-working.
- C7 Non-scale powered functional models including hydroplanes.
- C8 Miniatures. Length of hull not to exceed 15in for 1:32 scale; 12in for 1:25 scale; 10in for 1:16 scale; 9in for 1:8 scale. No limit for smaller scales.
- C9 For any model boat built from a commercial kit. Before acceptance in this class the kit must have been readily available for at least 3 months prior to the opening date of the exhibition and at least 20 kits must have been sold either by mail order or through the retail trade.

Model Horse Drawn Vehicle Section

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

Junior Section

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

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

Model Vehicle Section

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

DUKE OF EDINBURGH CHALLENGE TROPHY

Rules and Particulars

1. The Duke of Edinburgh Challenge Trophy is awarded to the winner of the Championship Award at the Model Engineer Exhibition.
2. The trophy remains at all times the property of Highbury Nexus Special Interests Ltd.
3. The name of the winner and the date of the year in which the award is made will be engraved on the trophy, which may remain, at the discretion of Highbury Nexus Special Interests Ltd, in his/her possession until required for renovation and display at the following Model Engineer Exhibition.
4. Any item of model engineering work will be eligible for this Championship Award after it has been awarded, at The Model Engineer Exhibition, a Gold or Silver medal by Highbury Nexus Special Interests Ltd.
5. No model may be entered more than once.
6. Entry shall be free. Competitors must state on the entry form:
   (a) That exhibits are their own bona-fide work.
   (b) Any parts or kits that were purchased or were not the outcome of their own work.
   (c) That the model has not been structurally altered since winning the qualifying award.
7. Highbury Nexus Special Interests Ltd may at their sole discretion vary the conditions of entry without notice.

COMPETITION RULES

1. Each entry shall be made separately on the official form and every question must be answered.
2. Competition Application Forms must be received by the stated closing date.

LATE ENTRIES WILL ONLY BE ACCEPTED AT THE DISCRETION OF THE ORGANISERS.

3. Competitors must state on their form the following:
   (a) Insured value of their model.
   (b) The exhibit is their own work and property.
   (c) Parts or kits purchased.
   (d) Parts not the outcome of their own work.
   (e) The origin of the design, in the case of a model that has been made by more than one person.

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

4. Models will be insured for the period during which they are in the custody of Highbury Nexus Special Interests Ltd.
5. A junior shall mean a person under 18 years of age on 31 December in the year of entry.
6. Past Gold and Silver medal award winners at any of the exhibitions promoted by Highbury Nexus Special Interests Ltd. are eligible to re-enter their model for the 'Duke of Edinburgh Challenge Trophy.'

Past winners at any of the exhibitions promoted by Highbury Nexus Special Interests Ltd. will not be eligible for re-entry into the competition unless it has been substantially altered in any way.

7. Highbury Nexus Special Interests Ltd. reserve the right to:
   (a) Transfer an entry to a more appropriate class.
   (b) Describe and photograph any models entered for competition or display and to make use of any such photographs or descriptions in any way they may think fit.
   (c) Refuse any entry or model on arrival at the exhibition and shall not be required to furnish a reason for doing so.
8. Entry into the competition sections is not permitted by:
   (a) Professional model makers.
   (b) Anyone who has a financial interest in the direct supply of materials and designs to the public.

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

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

IMPORTANT NOTE PLEASE MAKE COPIES, INCLUDING PHOTOGRAPHS, OF ALL INFORMATION RELATING TO YOUR MODEL, AS HIGHBURY NEXUS SPECIAL INTERESTS WILL NOT ACCEPT LIABILITY FOR ANY LOSS.

CLOSING DATE 16TH DECEMBER 2002

THE MODEL ENGINEER EXHIBITION

Please return completed form to:
Model Engineer Competition, The Leys,
Church St., Twyford, Bucks. MK18 4EU

ENTRY NO.

OFFICE USE ONLY

CLASS	ENTRY NO.

ENTRY FORM - COMPETITION & LOAN MODELS

PERSONAL DETAILS (Please print)

Surname ..... Forename(s) ..... Age .....

Address .....

.....

.....

Post Code ..... Home Tel: ..... Daytime Tel: .....

Model Club or Association .....

Have you entered before? Yes/No Do you purchase or subscribe to a Highbury Nexus magazine? Yes/No

How many years have you been a modeller? .....

Mail Order Protection - please tick this box if you would prefer not to receive mail from other companies which may be of interest to you ☐

MODEL DETAILS - PLEASE TICK BOX IF MODEL IS FOR LOAN ☐

Entry Class (competition entries only) .....

Model Title (to be used for catalogue and display card) .....

.....

Model Description .....

.....

.....

Model Scale ..... Length ..... Width ..... Height ..... Weight .....

Type of construction.....

.....

Parts not made by you and commercial items.....

.....

Have you supplied a photograph? (Y/N) .....

Are you supplying Judges Notes? (Y/N) .....

Value of model (Highbury Nexus will not insure the model unless a value is entered) £ .....

Name and address of local newspaper .....

.....

NB Please make a copy of this form and any photographs enclosed for your own reference. Please note that Highbury Nexus will not accept liability for any loss of documents or photographs submitted with this form

gandmtools

selection from current stock

email: sales@gandmtools.co.uk **web: www.gandmtools.co.uk**

LATHES
Emco Compact 5 CNC Bench Lathe, Toolchanger, 1ph, Manuals £1850.00
Boxford BUD 4 .5x10 Lathe, Tooled, VGC £1000.00
Boxford 10-20 Centre Lathe, 5" x 20", Tooled, 3ph, VGC £1950.00
Boxford BUD 5" x 22", Lathe, Tooled, 3ph £1250.00
Boxford CUD 4.5" x 18" Lathe, 3 Jaw & Toolpost £ 525.00
Boxford CUD 4.5" x 18" Lathe, Tooled, 1ph £ 795.00
Ferris Bench Lathe, Tooled, No Motor, VGC £ 445.00
Weiler Condor Toolroom Lathe, Tooled, 3ph £2750.00
Schaublin 102 Centre Lathe, Stand, 3ph £2500.00
Boxford 240TCL CNC Lathe, 1ph £1500.00
Denford Viceroy 280 Synchro Variable Speed Lathe, 3 Jaw Only, Immaculate £1000.00
Myford Super 7 3.5" x 19", Stand, Gearbox, 1ph £1450.00
Myford Super 7 3.5" x 19", Stand, Gearbox, Tooled, 1ph £2000.00
Myford 280 Centre Lathe, Tooled, VGC £1800.00
Myford Super 7 3.5" x 30" Long bed, Incl.Stand, Gearbox, PCE Coolant, Tooled, 1ph £2600.00
Myford ML10 3.5" x 13", Bench Lathe, 1ph £1250.00
Myford Super 7 3.5" x 30" Bench Lathe, PCE Tooled, 1ph £2250.00
Tos 3/32 Centre Lathe, 6" x 32", QCTP, Tooling, 3ph £2250.00
Colchester Bantam 2000 6.5" x 20" Lathe, Tooled, 3ph £2750.00
Colchester Bantam 1600 5" x 20" Centre Lathe, 3ph £1500.00
Colchester Bantam 800 5" x 20" Centre Lathe, 3ph £1450.00
Colchester Bantam 5" x 20" Centre Lathe, Tooled, Taper Turning, VGC, 3ph £1900.00
Colchester Student 1800 6" x 26" Lathe, Tooled, 3ph £2750.00
Colchester Student 6" x 26", Tooled, 3ph £ 950.00
Colchester Triumph 8H 7 1/4" x 40", Gap Bed, Tooled, 3ph £1250.00
Harrison M250 Centre Lathe, 5" x 30", Tooled, DRO, Immaculate, 1996 Machine, 3ph £4750.00
Harrison M250 Centre Lathe, 5" x 20", Tooled, Light, Coolant, 3ph £2250.00
Harrison M300 6" x 25" Centre Lathe, Tooling, 3ph VGC £3250.00
Harrison M300 6" x 40" Centre Lathe, Tooling, 3ph £1500.00
Harrison M300 6" x 25" Centre Lathe, Tooling, 3ph £2250.00
Harrison 140 5 1/2" x 20" Gap Bed Lathe, tooled, 3ph £1450.00
Harrison L5A 11" Gap Bed Lathe & Tooling, 3ph £1250.00
Schaublin 70 Capstan Lathe, Stand, Collets, 3ph £1750.00
Schaublin 102 Centre Lathe, Bench Mounted, Collets £1500.00
Weiler Capstan Lathe & Tooling, 3ph £2250.00

DRILLING MACHINES
Ajax 3MT Geared Head Pillar Drill, 3ph £ 500.00
Arboga 10T Drill/Tapper, Stand, 3ph £ 350.00
Essex Bench Tapper, 1/4" chuck, 1ph £ 250.00
Warner High Speed Bench Drill, mm Cap 3ph £ 150.00
Oldack Tapping Machine, 3ph £ 450.00
Meddings Drilltru Bench Drill, 3ph £ 225.00
Meddings Drilltru Pillar Drill, 3ph £ 200.00
Meddings MF3 Pillar Drill, 3ph £ 300.00
Startrite Mercury Bench Drill, 3ph £ 150.00
Fobco Bench Drill, Variable Speed, 1ph £ 350.00
Fobco High Speed Type TDR/11 Bench Drill, 1ph £ 200.00
Elliott Progress No 1 Pillar Drill, keyless Chuck, 3ph £ 300.00
Pollard Pillar Drill, 1MT Spindle, Light, 3ph, Choice £ 250.00
Fobco Star Bench Drill, 1ph £ 200.00
Spares available for Fobco Drills £ POA

MILLING MACHINES
Pinnacle Small Turret Mill, R8 Spindle, Coolant, Mitutoyo DRO, 3ph £1950.00
Boxford 190VMC CNC Bench Mill, Toolholders, Manual, 1ph £2000.00
Boxford VM30 Vertical Mill, 1ph £1500.00
Elliott 00 Omnimill, Vertical/Horizontal, 3ph £1750.00
Elliott U1 Vertical/Horizontal Mill, 3ph £1500.00
ABW Viceroy Horizon Vertical/Horizontal Mill, Power Feed, 30 INT, 3ph £1200.00
Sigma Jones Bench Jig Borer, 1ph (like BCA) £ 650.00
Bohle Type 50 Universal Mill, Plain & Swivel Tables, Arbors, Adaptors, DRO, 3ph £3850.00
BCA Jig Borer Fixed Precise HS Spindle, 6000rpm £ 900.00
Emco F1 CNC Bench Mill, Manuals, Used 2 Hours Only, 1ph, Immaculate £2750.00
Emco F1 CNC Mill, High Speed Model, Stand, Tooled, 1ph £2000.00
Herbert Horizontal Mill, Very Large, 3ph £ 750.00
SIP MP3K7 Jig Borer, 3ph £1500.00
TOS FNK 25 Turret Mill, DRO, 3ph £1500.00
Bridgeport Varispeed Turret Mill, Power Feed, 3ph, Tooling £1850.00
Bridgeport Series 1 2HP Turret Mill, Power Feed, DRO, Variable Speed, 3ph £1950.00
Condor Varispeed 3HP Turret Mill, Power Feed, DRO, 3ph £2250.00
XYZ 2000 Varispeed Turret Mill, DRO, Power Feed, 3ph £1850.00
Hurco Varispeed Turret Mill, Power Feed, DRO, 3ph £1950.00
Schaublin 12 Vertical/Horizontal Milling Machine, 3ph £1250.00
Harrison Vertical/Horizontal Mill, 3ph £1250.00
Harrison Horizontal Milling Machine, 3ph, VGC, Choice of 2 £ 425.00
Tos Senior Mill Vertical/Horizontal Milling Machine, 3ph, VGC £1450.00
Adcock Shipley Milling Machine, Vert/Hori, 3ph, VGC £2500.00
Deckel FP1 Sliding Vertical Mill, Choice, 3ph ... from £2500 - £4500.00
Pallas Vintage Horizontal Mill, 1ph, lever Op Slides, GC £ 250.00
Ernault Somua Type 750MM Production Horizontal Mill £ 500.00
SIP Mill/Drill, NEW, 3MT, 1ph £ 750.00
Astra Horizontal Mill, 425mm x 120mm table, 3ph £ 450.00
Dunkinsport Horizontal Mill, Power all ways, 50 Int, Table 50" x 12", 3ph £1900.00
Landert No 0, Type ... Gear Hobbing Machine £ 650.00

POWER HACKSAWS/BANDSAWS ETC
Ferris 350 Circular Cut Off Saw, 3ph £ 650.00
Qualters and Smith Power Hacksaw, 3ph £ 350.00
Qualters and Smith Power Hacksaw, 1ph £ 325.00
Startrite 14-S-5 Bandsaw, 3ph £ 550.00
Startrite 10-T-10 Bandsaw, 3ph £ 500.00
Startrite 24-T-10 Vertical Bandsaw, 3ph £ 550.00
Startrite 24-S-5 Vertical Bandsaw, 3ph £ 550.00
Muller DB 200 Production Bandsaw, Feed Etc £2000.00

GRINDERS, LINISHERS, POLISHERS
Hauser Jig Grinder, Well equipped, 3ph £3750.00
Clarkson Mk 1 Tool & Cutter Grinder, 1ph £ 500.00
Clarkson Mk 2 Tool & Cutter Grinder £ 650.00
Pinnacle Tool & Cutter Grinder, 3ph £ 750.00
Denford Viceroy Double Ended Pedestal Grinder, 1ph £ 250.00
Union Jubilee Double Ended Polisher, 3ph £ 150.00
Eagle Hand Op Surface Grinder, Mag Chuck, 3ph £ 600.00
Vanco 1" Belt Linisher, Stand, 3ph £ 350.00
Vanco 1" Belt Linisher, 1ph, VGC £ 375.00
Jones and Shipman 540 Surface Grinder, Mag Chuck, 3ph £1950.00
K/H Tim Tool Grinder, 3ph £ 125.00
K/H Nerrett Tool Lapper/Grinder, Stand, 3ph £ 275.00
Duplex Toolpost Linisher, 3ph £ 325.00
Elliott 610 Surface Grinder, 3ph £1250.00
Micron 60/0 Hob Sharpener £1000.00

SHAPERS
Adept No 2 Hand Shaper £ 280.00
Elliott 10M Shaper, 1ph £ 350.00
Elliott 10M Shaper, 3ph, Excellent Condition, Choice of 2 £ 325.00
New England 10" Shaper, 3ph £ 250.00
Alba 1A Shaper, 3ph Rusty But Runs Well £ 150.00
Thos Taylor Hand Op Planer/Shaper, Very Pretty, Wooden Stand, Circa 1870 £ 750.00

BOXFORD SPARES AND TOOLING
Change Gears (Also Fit Southbends)
[illegible]
100/127T Compound Gear £ 55.00
120T/100T Compound Gear £ 65.00
54T/60T Compound Gear £ 30.00
72T/60T Compound Gear £ 35.00
32T Tumbler Reverse Gear £ 12.00
Boxford Collet Closer, Nose Cap and Draw Tube £ 85.00
Boxford T Slotted Cross Slide, Fits all Models, NEW £ 110.00
Boxford Manual "Know Your Lathe" New Copies £ 16.00
Boxford 4" Chuck Backplate, NEW £ 20.00
Cross Slide Nuts, Imperial, NEW £ 38.00
Boxford 6" Faceplate, NEW £ 45.00
Boxford 5" Catchplate £ 15.00
Pratt Burnerd 6" 4 Jaw Chuck £ 75.00
Boxford 6" 4 Jaw Chuck, VGC, With Fitted Boxford Backplate £ 100.00
Toolmex 6" 4 Jaw Ind. Chuck Fitted Boxford Backplate, NEW £ 155.00
Boxford Lathe Cabinets, suitable for many bench lathes £ 100.00
Headstock Saddle & Apron parts available POA
4 1/2" or 5" Tailstock £ 125.00
Boxford Change Gear Cover £ 40.00
Boxford Change Gear Quadrant £ 15.00
Boxford Topslide Assembly £ 45.00

MYFORD SPARES AND TOOLING - Change Gears:
[illegible]
Metric Conversion Set Comprises Quadrant Gears, Spacers and Studs, NEW £ 195.00
Myford 3 Point Steady New £ 105.00
Myford 2 Point Steady New £ 45.00
Myford Super 7 Manual, Inc, Gearbox Info £ 22.00
Myford Lever Op Collet Chuck £ 200.00
Myford Handwheel Op Cutoff Slide £ 200.00
Toolmex 100mm 3 Jaw, Myford Mount New £ 100.00
Toolmex 160mm 4 Jaw Ind Chuck, Myford Direct Mount, NEW £ 145.00
Myford 6" Faceplate £ 24.00
Myford 7" Faceplate £ 30.00
Myford 9" Faceplate, NEW £ 40.00
Myford 4 1/2" Catchplate £ 15.00
Myford 4" Backplate £ 10.00
Myford Dickson Quick Change Toolpost & 4 holders (NEW) £ 100.00
Myford Dividing Head, One Plate Only £ 300.00
Myford 254 Wood Turning Rest Set, VGC £ 60.00
Myford Super 7 Coolant Unit 1ph or 3 ph £ 150.00
Myford Circular Saw Table Set (Boxed) £ 140.00
Myford ML7/S7 Block £ 12.00
Myford Cross Slide Mounted Turret Attachment, VGC £ 225.00
Myford Super 7 Headstock £ 225.00
Myford Super 7 Cabinet Stand with Raising Blocks £ 275.00
Myford Super 7 Tailstock £ 150.00
Myford Swivelling Vertical Slide £ 175.00
Myford Super 7 Gearbox and Leadscrew £ 425.00

WORKSHOP EQUIPMENT
96" x 36" Cast Iron Surface Table £ 950.00
4" 1st & 2nd Cut Hand Files, NEW Each £ 1.00
4" 2nd & 3rd Cut Round Files, NEW Each £ 1.00
6" 1st Cut Half Round Files, NEW Each £ 1.00
4" 2nd & 3rd Cut Flat Taper Files, NEW Each £ 1.00
4" 1st & 3rd Cut Triangular Files, NEW Each £ 1.00
6" 3rd Cut Flat Taper Files, NEW Each £ 1.50
6" 1st & 2nd Cut Triangular Files, NEW Each £ 1.50
8" 1st & 2nd Cut Hand Files, NEW Each £ 2.00
8" 3rd Cut Round Files, NEW Each £ 2.00
8" 2nd Cut Flat Taper Files, NEW Each £ 2.00
8" 1st Cut Triangular Files, NEW Each £ 2.00
8" 1st & 3rd Cut Square Files, NEW Each £ 2.00
10" 3rd Cut Hand Files, NEW Each £ 2.50
10" 1st Cut Triangular Files, NEW Each £ 2.50
10" 3rd Cut Square Files, NEW Each £ 2.50
12" 3rd Cut Half Round Files, NEW Each £ 3.00
12" 2nd Cut Flat Taper Files, NEW Each £ 3.00
12" 1st, 2nd, 3rd Cut Triangular Files, NEW Each £ 3.00
14" 2nd & 3rd Cut Hand Files, NEW Each £ 4.00
14" 3rd Cut Round Files, NEW Each £ 4.00
14" 2nd & 3rd Cut Half Round Files, NEW Each £ 4.00
14" 3rd Cut Flat Taper Files, NEW Each £ 4.00
14" 1st, 2nd, 3rd Cut Triangular Files, NEW Each £ 4.00
14" 2nd & 3rd Cut Square Files, NEW Each £ 4.00
Shelton Micraspine 10" x 5" Sine Table £ 150.00
Crown 8" x 12" Compound Sine Table, T Slotted £ 325.00
PVE No 2 Co Ordinate Table, 12" x 10" £ 350.00
24" X 24" Cast Iron Surface Table, Cover, GC £ 225.00
36" x 24" Cast Iron Surface Table £ 250.00
12" x 18" Surface Plate £ 60.00
5 3/4" Dia. Lapping Plate £ 40.00
Windley 10" Dia. Lapping Plate £ 50.00
Windley 12" Dia. Lapping Plate £ 60.00
630mm x 500mm x 300mm Webbed T-slotted Angle Plate £ 250.00
9" x 7" x 6" Box Cube £ 75.00
12" x 10" x 9" T Slotted Box Cube £ 85.00
M & W Metric Radius Gauge Sheet £ 7.00
Number Drill Gauges 1-60 £ 5.00
General 28 M Screw pitch Gauge 9-40 TPI £ 7.00
Craftsman 9-40 Screw Pitch gauge 4-84 TPI £ 10.00
M & W Metric Wire Gauge, New £ 6.00
M & W 38 M Feeler Gauge £ 15.00
Preimae 3" x 15" Sine Bench Centres £ 350.00
Jones and Shipman 10" CH x 24" BC Bench Centres £ 650.00
Essex Tool and Gauge Co 10" Sine Bar £ 30.00
Matrix 250mm Sine Bar £ 45.00
Mercer Type 8501-451 Clock Stand £ 35.00
6 1/2" x 6 1/2" Compound Sine Table £ 250.00
Crown Compound 12" x 8" Sine Table £ 300.00
22" x 8" Sine Table £ 150.00
6" x 5" x 5" Webbed Angle Plate, Rough £ 12.00
8" x 7" x 7" Angle Plate, Rough £ 20.00
10" x 10" x 10" Webbed Angle Plate £ 50.00
7" x 4 1/2" x 5 1/2" Webbed Angle Plate £ 20.00
12" x 12" x 12" Angle Plate £ 40.00
10" x 8" x 6" Angle Plate £ 35.00
Windley 6" x 6" x 6" Webbed Angle Plate £ 30.00
6" x 6" x 6" Angle Plate £ 30.00
6" x 6" x 6" Angle Plate, Heavy Duty £ 45.00
12" x 6" Swivelling T-Slotted Plate £ 125.00
Bridgeport Adjustable Angle Plate £ 250.00
18" x 9" Swivelling T-Slotted Plate, Damaged T-Slot £ 75.00
12" x 12" x 9" Angle Plate £ 175.00
6" x 5" x 4 1/2" Webbed Angle Plate £ 25.00
10" x 6" x 6" Angle Plate £ 25.00
12" x 9" Adjustable Angle Plate £ 75.00
12" x 8" x 9" Angle Plate £ 60.00
Pair Toolmex V Blocks 47mm x 38mm x 47mm £ 40.00
Pair Toolmex V Blocks 67mm x 60mm x 70mm £ 50.00
Pair Toolmex V Blocks 100mm x 70mm 120mm and Clamps Unused £ 100.00
Pair Toolmex V Blocks 67mm x 67mm x 70mm and Clamps Unused £ 65.00
Hadet Magnetic Sine Bar £ 100.00
Eclipse/Walker 8" x 24" Magnetic Chuck, VGC £ 325.00
Transwave 5 HP Capacity Phase Converter, New £ 375.00
Transwave 3 HP Capacity Phase Converter, New £ 300.00
Spare Circular Tables for Imported Pillar/Bench Drills £ 35.00
20" x 10" x 6" Ammunition Boxes £ 5.00
Jones and Shipman 0612-001 Assembly Press £ 100.00
Large Quantity Silversmiths/Metalworkers Stakes Available POA
Gabro ER/20 Box and Pan Folder, Stand £ 550.00
Gabro 2/62 Guillotine Notcher, Stand £ 350.00
Flamefast Ceramic Chip Forge/Brazing Hearth £ 375.00
Flamefast Ceramic Chip Forge/Brazing Hearth £ 225.00
Large Anvil, Worn £ 150.00
Small Anvil & Stand £ 150.00
Blacksmiths Leg Vise £ 65.00
Blacksmiths 12" x 12" Swage Block and Stand £ 125.00
Blacksmiths 12" x 12" Swage Block, No Stand £ 100.00
Edwards No 408 Flypress £ 350.00
Denbigh No 6 Flypress £ 350.00
Denbigh No 5 Flypress £ 250.00
Denbigh No 3 Flypress £ 240.00
Norton 58 Flypress £ 275.00
Norton No 6 Flypress, Stand £ 425.00
Norton 12 Daylight Fly Press, Stand £ 475.00
Herbert Bar Straightening Press on Stand £ 375.00
Kingsland 36 Treadle Guillotine £ 450.00
Kingsland 4" Hydraulic Guillotine £1200.00
NTW 6 Heavy Duty Bench Lever Shears £ 100.00
J.H.L. Modelmark Bench Press £ 150.00
Prior Interchangeable Type Set 1/4" £ 75.00
Pryor Interchangeable Type Set 1/8" £ 75.00
Prior Automatic Numbering Stamp, 3/8" Letters, 1" shank £ 250.00
ES No 013-154 Wire Wrapping Tool, 240V £ 75.00
Cebora Puntatrice 20 KVA Spot Welder £ 750.00
Qty Redman Punches £ 150.00
Edwards 12" Hand Op Bench Light Duty Bending Rolls £ 175.00
Bederman Welding Fume Extractor £ 275.00

MEASURING EQUIPMENT, MICROSCOPES, PROJECTORS ETC
Mauser 160mm Vernier Caliper with Fine Adjustment, 1/1000" 0.02mm £ 10.00
OMT Toolmakers Microscope on Cabinet with many accessories £1500.00
M & W 0-1", 1"-2" Micrometers each £ 20.00
M & W 3"-4", 4"-5", 5"-6", Micrometers each £ 25.00
M & W 10" - 11" Micrometer £ 40.00
M & W 11" - 12" Micrometer £ 45.00
M & W 12" - 13" Micrometer £ 50.00
M & W 15" - 16" Micrometer £ 60.00
M & W 17" - 18" Micrometer £ 65.00
M & W 18" - 19" Micrometer £ 65.00
M & W 19" - 20" Micrometer £ 85.00
KS 0-1", 1"-2" Micrometer each £ 15.00
KS 2"-3", 3"-4" Micrometer each £ 20.00
KS 7"-8", 8"-9" Micrometer each £ 35.00
KS 9"-10", 10"-11" Micrometer each £ 40.00
KS 11"-12" Micrometer £ 45.00
KS 0-4" Adjustable Micrometer £ 50.00
KS 16"-20" Adjustable Micrometer £ 200.00
KS 0-1" or 0-25mm Indicating Micrometer £ 75.00
KS 1"-2" or 25-50mm Indicating Micrometer £ 75.00
KS Micrometer Sett 125-300mm £ 350.00
KS 0-25mm, 25-50mm Micrometer each £ 15.00
KS 50-75mm, 75-100mm Micrometer each £ 20.00
KS 100-125mm, 125-150mm Micrometer each £ 25.00
KS 175-200mm, 200-225mm Micrometer each £ 35.00
KS 225-250mm, 250-275mm Micrometer each £ 40.00
KS 275-300mm Micrometer £ 45.00
KS 300-400mm Adjustable Micrometer £ 150.00
KS 400-500mm Adjustable Micrometer £ 200.00
KS 500-600mm Adjustable Micrometer £ 250.00
KS 0-6" Depth Vernier £ 20.00
KS 0-12" Depth Vernier £ 25.00
Mitutoyo 101-117 0-1" Micrometer £ 25.00
Mitutoyo 101-111 0-25mm Micrometer £ 25.00
Mitutoyo 101-118 1"-2" Micrometer £ 30.00
Mitutoyo 103-180 3"-4" Micrometer £ 45.00
Mitutoyo 103-186 9"-10" Micrometer £ 75.00
Mitutoyo 123-102 Disc Micrometer 25-50mm £ 75.00
Mitutoyo 129-110 0-75mm Depth Micrometer £ 65.00
Mitutoyo 129-152 0-6" Depth Micrometer £ 85.00
Mitutoyo 103-142 275-300mm Micrometer £ 75.00
Mitutoyo 139-175 100-300mm Tubular Inside Micrometer £ 240.00
Mitutoyo 141-135 2"-12" Internal Micrometer £ 100.00
Mitutoyo 193-105 Direct Reading Micrometer 100-125mm £ 100.00
Mitutoyo 523-105 Dial Snap Meter 50-75mm £ 175.00
Mitutoyo 104-160 0-150mm Adjustable Micrometer £ 80.00
Mitutoyo 104-151 6"-12" Adjustable Micrometer £ 150.00
Mitutoyo 104-139 6"-12" Adjustable Micrometer £ 165.00
Mitutoyo 104-135 150mm-300mm Micrometer £ 150.00
Mitutoyo 400-500mm Adjustable Micrometer £ 350.00
Mitutoyo 103-927 1-75mm Micrometer Set Boxed £ 100.00
Mitutoyo 114-115 1"-1.6" 3 Flute Micrometer £ 125.00
Mitutoyo 159-101 Comparator 0-25mm £ 40.00
Mitutoyo 159-104 1"-4" Comparator £ 50.00
Mitutoyo 159-103 Dual Reading Comparator 2"-3"/50-75mm £ 75.00
Mitutoyo 159-104 Dual Reading Comparator 3"-4"/75-100mm £ 80.00
Mitutoyo 229-116 0-150mm Dial Depth Micrometer £ 125.00
Mitutoyo 129-110 0-75mm Depth Micrometer £ 65.00
Mitutoyo 7304 Dial Thickness Gauge 0.001"-1" £ 30.00
Mitutoyo 7305 Dial Thickness Gauge £ 30.00
Mitutoyo 516-602 Slip Gauge Accessory Set £ 150.00
Mitutoyo 2015-10 Dial Indicator, .001" 0-100 1/10" £ 25.00
Mitutoyo 513-118 Dial Test Indicator 0-20-0, .0001" £ 40.00
Mitutoyo 101-105 0-1" Ext Micrometer .001" Std. Ratchet £ 30.00
Mitutoyo 1081E Dial Indicator .5-35 0-25-0 .01mm £ 20.00
Mitutoyo 1003-40 Dial Indicator 1.4/100-0-10 .10mm £ 20.00
Mitutoyo 468-121 Holtest Int. Mic. set 275-5"/3-12.7mm £ 350.00
Mitutoyo 517-516-1 Granite Surface Table, 1500mm x 1000mm x 150mm £1000.00
Mitutoyo 140-153-40-150" Tubular Mic. Inside Micrometer £ 150.00
Mitutoyo 536-136 Blade Jaw Caliper 0-300mm .05mm £ 100.00
Mitutoyo 505-145 Vernier Caliper-Grooved 0-150mm .05mm £ 100.00
Mitutoyo 525-203 10 Dig. Offset Caliper 12"/300mm .0005"/.01mm £ 110.00
Mitutoyo 513-117 Dial Test Indicator 0-40-0 .01/0mm £ 35.00
Mitutoyo 513-118 Dial Test Indicator 0-20-0 .0001" £ 35.00
Mitutoyo 345-713-10 Digimatic Inside Mic 1-2" £ 125.00
Mitutoyo 500-327 Water Resistant Digi Cal 0-150mm .0005"/0.01mm £ 100.00
Mitutoyo 7316 Dial Thickness Gauge 4" .001" 1.2" Throat £ 35.00
Mitutoyo 368-001 Holtest Internal Mic .06-1" .0001" £ 280.00
Mitutoyo 368-002 Holtest Internal Mic 1-1.2" .0001" £ 250.00
Mitutoyo 368-005 Holtest Internal Mic 3-3.6" .0001" £ 250.00
Mitutoyo 368-020 Holtest Internal Mic 7-8" .0002" £ 200.00
Mitutoyo 368-021 Holtest Internal Mic 8-9" .0002" £ 200.00
Mitutoyo 368-022 Holtest Internal Mic 9-10" .0002" £ 200.00
Mitutoyo 368-023 Holtest Internal Mic 10-11" .0002" £ 250.00
Mitutoyo 3060 Dial Indicator 1/10 0-100 .01mm £ 35.00
Mitutoyo 527-301 Dial Depth Gauge 150mm .01mm £ 50.00
Mitutoyo 1125F Dial Indicator .5-3.5 0-25-0 .005mm £ 25.00
Mitutoyo 141-133-2 12" Inside Micrometer Rod Type .001" £ 75.00
Mitutoyo 2967-10 Dial Indicator .01/.0004-0-4 .0001" £ 30.00
Mitutoyo 7316 Dial Thickness Gauge 4" .001" 1.2" Throat £ 35.00
Mitutoyo 916-102 Engineers Square Grade B 47/100mm £ 10.00
Mitutoyo 103-1000 25mm Ext Micrometer .01mm Std Ratchet £ 20.00
Mitutoyo 368-011 Holtest Internal Mic 1.6-2" .0002" £ 100.00
Mitutoyo 368-016 Holtest Internal Mic 3.6-4" .0002" £ 100.00
Mitutoyo 513-205 Dial Test Indicator 0-100-0 2/1000 £ 40.00
Mitutoyo 513-504F Dial Test Indicator 0-40-0 .002mm £ 40.00
Mitutoyo 568-414 Borematic Holtest Mic 3.6-4", 81-46-100mm £ 300.00
Mitutoyo 500-123 Digimatic Caliper 150mm £ 45.00
Mitutoyo 500-2607 Digimatic Caliper 200mm W/O Depth Bar £ 65.00
Mitutoyo 505-145 Vernier Caliper-Grooved 0-150mm .05mm £ 100.00
Mitutoyo 368-106 Holtest Internal Mic 11-12" .0002" £ 250.00
Mitutoyo 102-217 0-25mm Ext Micrometer .01mm Std Ratchet £ 20.00
Mitutoyo 192-105 1000mm Digi. Height Gauge with dial .01mm £ 750.00
Mitutoyo 350-3720-1" Micrometer Head Digital Type .001/.0002" £ 100.00
Mitutoyo 350-3820-1" Micrometer Head Digital type .001/.0002" £ 100.00
Mitutoyo 2971-70 Dial Indicator .002/.075 0-15-0 .0025" £ 25.00
Mitutoyo 104-150 30-40 Ext. Micrometer .001" Std. Ratchet £ 750.00
Mitutoyo 143-120 Caliper Micrometer 2-3" .001" £ 75.00
Mitutoyo 145-185 2-3" Inside Mic. Caliper Type .001" £ 75.00
Mitutoyo 146-110 5-4" Groove Micrometer .5 Dia. .001" £ 75.00
Mitutoyo 147-300 75-100mm Hub Micrometer .01mm £ 50.00
Mitutoyo 147-401 0-10mm Wire Micrometer .01mm £ 50.00
Mitutoyo 3050 Dial Indicator .05/125 0-5-0 .001" £ 35.00
Mitutoyo 4520 Dial Indicator .05/.075 0-30 .0005" £ 40.00
Mitutoyo 511-177 Dial Bore Gauge 250-400mm 250/.01mm £ 200.00
Mitutoyo 511-169 Dial Bore Gauge 10"-16" .0001" £ 200.00
Mitutoyo 511-402 Dial Bore Gauge 35-60mm £ 100.00
Mitutoyo 526-119 Dial Bore Gauge 3"-4" .0005" £ 125.00
Mitutoyo 573-321 Carbide Tipped Caliper 0-200mm .01mm £ 40.00
Mitutoyo 531-102 Vernier Caliper 200mm .05mm £ 25.00
Mitutoyo 535-135 Blade Jaw Caliper 0-300mm .05mm £ 100.00
Mitutoyo 147-401 0-10mm Wire Micrometer .01mm £ 50.00
Mitutoyo 148-0110-.50" Micrometer Head 3ph Face Type .001" £ 15.00
Mitutoyo 293-582-30 125-150mm Digimatic Mic £ 100.00
Mitutoyo 293-583-30 150-175mm Digimatic Mic £ 100.00
Mitutoyo 293-584-30 175-200mm Digimatic Mic £ 125.00
Mitutoyo 293-585-30 200-225mm Digimatic Mic £ 125.00
Mitutoyo 293-750-30 Digimatic Micrometer 11-12" £ 125.00
Mitutoyo 350-2015-2" Digimatic Mic. Head Non Rotating Type .0002" £ 100.00
Mitutoyo 342-371 Digi. Point Mic. Special 0-12mm/05" to 0.0005 £ 75.00
Mitutoyo 2419-10 Dial Indicator .01/.0250-5-0 .0001" £ 50.00
Mitutoyo 148-1400-.5" Micrometer Head Std Type .001" £ 15.00
Mitutoyo 148-0110-.5" Micrometer Head 3ph Face Type .001" £ 15.00
Mitutoyo 148-0510-.5" Micrometer Head Fine/Reading Type .001" £ 15.00
Mitutoyo 152-3400-25mm Micrometer Head Std Type .002mm £ 100.00
Mitutoyo 153-2050-1" Micrometer Head Non rotating type .0001" £ 35.00
Mitutoyo 187-906 Bevel Protractor 6" Blade £ 75.00
Mitutoyo 192-112 18" Digital Height Gauge with dial .001" £ 500.00
Mitutoyo 192-140 Height Gauge 12"/.001" Dual Counter with Dial £ 250.00
Mitutoyo 293-581-30 100-125mm Digimatic Micrometer £ 100.00
Mitutoyo 209-707 Dial Caliper Gauge 0-1" £ 75.00
Mitutoyo 209-701 Dial Caliper 0-0.3" .0002" External £ 75.00
Mitutoyo 209-700 Dial Caliper 0-0.4" .0005" External £ 75.00
Mitutoyo 209-794 Dial Caliper Gauge 0-0.4" 0.0005" External £ 75.00
Mitutoyo 209-796 Dial Caliper Gauge 0-0.4" 0.0005" External £ 75.00
Mitutoyo 209-014 Dial Caliper Gauge 10-200mm .01mm/Inside £ 100.00
Mitutoyo 209-831 Electronic Caliper Gauge 10-35mm/.40-1.37" £ 300.00
Mitutoyo 209-820 Electronic Caliper Gauge 30-55mm/1.18-2.16" £ 300.00
Mitutoyo 209-830 Electronic Caliper Gauge 50-75mm/1.97-2.95" £ 300.00
Mitutoyo 209-660 Dial Caliper Gauge 0-10mm 0.01mm External £ 75.00
Mitutoyo 209-661 Dial Caliper Gauge 0-10mm .01/outside £ 75.00
Mitutoyo 209-702 Dial Caliper Gauge .4-1.2/.0005" Internal £ 75.00
Mitutoyo 209-706 Dial Caliper Gauge 1.2-2.0/0.0005" Internal £ 75.00
Mitutoyo 209-715 Dial Caliper Gauge 2.4-5.4" 0.0005" Internal £ 75.00
Mitutoyo 209-731 Dial Caliper Gauge 20-40/0.002" Internal £ 75.00
Mitutoyo 209-733 Dial Caliper Gauge 40-80/0.005" Internal £ 75.00
Mitutoyo 209-734 Dial Caliper Gauge .80-1.2/0.0005" Internal £ 75.00
Mitutoyo 209-735 Dial Caliper Gauge 1.2-1.6/0.0005" Internal £ 75.00
Mitutoyo 209-172 Caliper Gauge £ 75.00
Mitutoyo 209-640 Digi Caliper Gauge 0.5-50mm/0.020-1.968" £ 300.00
Mitutoyo 209-641 Digi Caliper Gauge 0.5-50mm/0.020- 1.968" £ 300.00
Mitutoyo 209-654 Dial Caliper Gauge 20-30mm/.01mm Inside £ 75.00
Mitutoyo 209-655 Dial Caliper Gauge 30-40/.01mm Inside £ 75.00
Mitutoyo 209-656 Dial Caliper Gauge 40-50/.01mm Inside £ 75.00
Mitutoyo 209-657 Dial Caliper Gauge 0-5/0.005mm External £ 75.00
Mitutoyo 209-736 Dial Caliper Gauge 1.6-2.0/0.0005" Internal £ 75.00

TELEPHONE ENQUIRIES WELCOME ON ANY ITEM OF STOCK. WE HOLD HUNDREDS OF ITEMS THAT ARE NOT LISTED. FULL STOCKLIST AVAILABLE. ALL ITEMS ARE SUBJECT TO AVAILABILITY. ALL PRICES ABOVE ARE SUBJECT TO CARRIAGE AND VAT AT 17.5%.
WE DELIVER TO ALL PARTS OF THE UK & WORLDWIDE.
OVER 7000 SQUARE FEET OF TOOLS MACHINES AND WORKSHOP EQUIPMENT

opening times: monday – saturday 9am – 1pm and 2pm – 5pm

g and m tools, the mill, mill lane, ashington, west sussex, rh20 3bx

all items subject to carriage, vat and availability

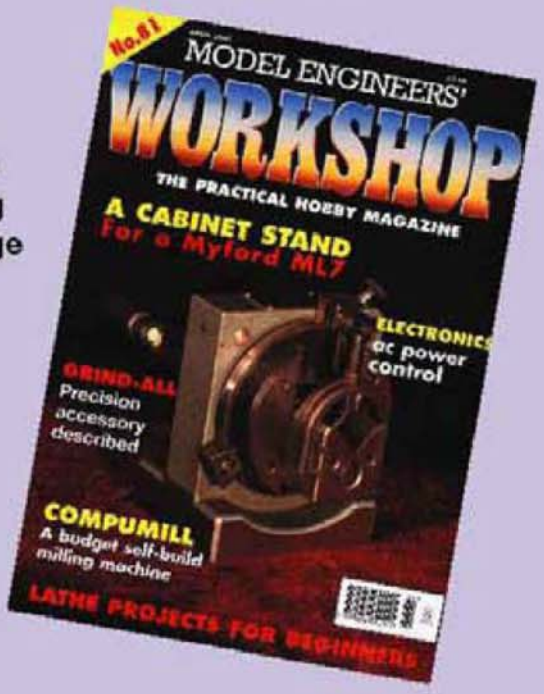
phone 01903 892510 **fax 01903 892221**

emails: sales@gandmtools.co.uk web: www.gandmtools.co.uk

SAVE £££'S WITH A SUBSCRIPTION

20% Discount on Model Engineer and Model Engineers' Workshop

The best resource for modelling in metal with both magazines offering comprehensive knowledge and advice on a range of subjects. They are a perfect compliment to the serious enthusiast with a home engineering workshop and an interest in the engineering hobby.



Subscribe or renew today by completing your details on the form below or phone the credit card hotline now on 01353 654422 quoting A202

☐ Yes I want to subscribe to ***Model Engineer*** for 1 year.
Please start my subscription with the next available issue.

☐ Yes I want to subscribe to ***Model Engineers' Workshop*** for 1 year.
Please start my subscription with the next available issue.

Is this a subscription renewal? ☐ Yes ☐ No

MODEL ENGINEER (26 issues)

			20% Discount
One Year Subscription	UK	~~£54.60~~	£43.50
	Europe	~~£69.00~~	£55.00
	USA Airmail	~~$113.50~~	$91.00
	ROW Airmail	~~£74.50~~	£59.50

MODEL ENGINEERS WORKSHOP (8 issues)

One Year Subscription	UK	~~£26.00~~	£20.80
	Europe	~~£31.00~~	£25.00
	USA Airmail	~~$51.00~~	$41.00
	ROW Airmail	~~£33.50~~	£27.00

I enclose a cheque for £..... made payable to Nexus Media Ltd

Please charge my credit card for £.....

☐ Visa ☐ Amex ☐ Mastercard

Cardholder's Name .....

Card Number .....

Expiry date..... Signature.....

YOUR DETAILS

Title..... First name.....

Surname/Family name.....

Address .....

.....

.....

.....

Post/Zip code.....

Country.....

Telephone .....

Email .....

PLEASE RETURN YOUR COMPLETED COUPON TO:
Nexus Media Subscriptions, Link House, 8 Bartholomews Walk, Ely, Cambs CB7 4ZD
Tel 01353 654422 Fax 01353 654400
e-mail nexus.subs@highbury-wyvern.co.uk

US/CANADIAN SUBSCRIBERS PLEASE RETURN YOUR COMPLETED COUPON TO:
Wize Owl Worldwide Publications, 1926 S Pacific Coast Highway, Suite 204, Redondo Beach, CA90277-6145 USA
Tel 310 944 5033 Fax 310 944 9963 e-mail wizeowl@zprintmail.com

This offer closes 31 January 2003

☐ Please tick this box if you do not wish to receive any further information from Nexus Media Ltd or 3rd party companies carefully selected by us. A202

THE ESSENTIAL WORKSHOP LIBRARY

from NEXUS SPECIAL INTERESTS BOOKS

MODEL ENGINEERING BOOKS

Building Simple Model Steam Engines
Tubal Cain
The book shows how to build four model steam engines and features designs and plans that even a beginner will be able to follow.
1993 *1-85486-104-2* *210x148mm*
112 pages *Illustrated paperback* *£8.95*

Building Simple Model Steam Engines II
Tubal Cain
More projects ranging from a delightful little turbine to a larger engine in the style of the magnificent Steam Engines of the Highest Class' offered by toymakers before WW1. Fully detailed methods of construction with the beginner in mind.
1997 *1-85486-167-6* *210x148mm*
112 pages *Illustrated paperback* *£8.95*

Model Engineering - A Foundation Course
Peter Wright
A new book by an experienced model engineer covering all the basic techniques: understanding engineering drawings, buying materials, marking out, sawing, filing, bending and forming metals.
1997 *1-85486-152-2* *234x189mm*
416 pages *Illustrated paperback* *£16.95*

Model Engineers Handbook
Tubal Cain
The third edition comprises a compilation of tables, facts, procedures and data that the author has found invaluable in his model engineering activities. It provides a real mine of information to which you will return again and again.
1996 *3rd Edition* *1-85486-134-4* *210x148mm*
240 pages *Illustrated paperback* *£9.95*

The Model Locomotive from Scratch
B.Terry Aspin
Based on a series of articles by Chuck, the pseudonym used by the author for a series of articles published in Model Engineer. All the text and illustrations have been specially prepared by the author for this book.
1998 *1-85486-165-4* *188x246mm*
96 pages *Illustrated paperback* *£10.95*

Introducing Model Traction Engine Construction
John Haining
This book discusses types in a brief history, choice of model, workshop processes and the tools needed for every stage of construction. Profusely illustrated and full of interesting and useful information.
1985 *0-85242-805-7* *210x148mm*
112 pages *Illustrated paperback* *£6.95*

The Countryman's Steam Manual
John Haining
First published in 1982, this new and enlarged edition covers the design, construction and care of steel boilers in general, with formulae and data used by firms of repute. Designs of three vertical boilers are included - the Scotland, the Cotsdec and a 3-inch scale version.
1996 *1-85486-136-0* *210x148mm*
96 pages *Illustrated paperback* *£5.95*

An Introduction to Robotics
Harprit Sandhu
An introduction for the amateur to the ideas and concepts of robotics, a discipline that will eventually radically change the way we work. The first part explains how and why robots work and are controlled, while the second part shows you how to make a simple two-legged humanoid robot that can be programmed to walk from a personal computer.
1997 *1-85486-153-0* *234x189mm*
208 pages *Illustrated paperback* *£9.95*

The Amateur's Workshop
Ian Bradley
All model engineers are occasionally faced with an operation outside their usual experience, with more than 430 line and photographic illustrations, this book is a comprehensive reference book providing information on setting up a workshop and the use of various machines and tools.
1995 *1-85486-130-1* *210x148mm*
256 pages *Illustrated paperback* *£8.95*

The Amateur's Lathe
L.H.Sparey
Virtually the standard work on small (5-1/2 inch) lathework since its original publication in 1948.
1972 *0-85242-289-1* *216x138mm*
224 pages *Illustrated paperback* *£8.95*

WORKSHOP PRACTICE SERIES

Hardening, Tempering & Heat Treatment WPS 1
Tubal Cain
A comprehensive exposition of the structure of steels and the effects of different heat treatments, particularly in respect of tools. With accurate colour temperature charts.
1984 *0-85242-837-5* *210x148mm*
128 pages *Illustrated paperback + 4 pages of colour plates* *£6.95*

Vertical Milling in the Home Workshop WPS 2
Arnold Throp
Small workshops, including those of model engineers, are making increasing use of small vertical milling machines. This book explains how to use them (and lathe milling attachments) in clear terms.
1984 *0-85242-863-X* *210x148mm*
96 pages *Illustrated paperback* *£6.95*

Screwcutting in the Lathe WPS 3
Martin Cleeve
A fully comprehensive survey of the use of a lathe for all forms of screwcutting in all thread forms, imperial and metric.
1984 *0-85242-859-1* *210x148mm*
176 pages *Illustrated paperback* *£6.95*

Foundrywork for the Amateur WPS 4
B.Terry Aspin
This book is regarded as the perfect introduction to casting work in common metals. This new edition, brings everything right up to date.
1998 *1-85486-168-9* *210x148mm*
112 pages *Illustrated paperback* *£6.95*

Milling Operations in the Lathe WPS 5
Tubal Cain
This book by Tubal Cain, who needs no introduction to Model Engineer readers, is a thorough and practical discourse on how to use the lathe for all types of milling work.
1984 *0-85242-880-5* *210x148mm*
128 pages *Illustrated paperback* *£6.95*

Measuring & Marking Metals WPS 6
Ivan Law
Model engineers and many small workshops do not need, or have access to, much of the sophisticated measuring equipment used in industry. Accurate marking out and measurement by even basic means at all stages of work are comprehensively described.
1985 *0-85242-841-5* *210x148mm*
112 pages *Illustrated paperback* *£6.95*

The Art of Welding WPS 7
W.A.Vause
This book sets out the basic techniques for oxyacetylene welding, brazing, flame cutting and electric arc welding with mild steel, cast iron, stainless steel, copper, brass etc. in sheet, plate or cast form.
1985 *0-85242-861-4* *210x148mm*
96 pages *Illustrated paperback* *£6.25*

Sheet Metal Work WPS 8
R.E.Wakeford
The author is an instructor in metal work and allied crafts and describes clearly all the processes likely to be encountered by the hobbyist in a model or light engineering workshop.
1985 *0-85242-869-9* *210x148mm*
152 pages *Illustrated paperback* *£6.95*

Soldering & Brazing WPS 9
Tubal Cain
Joining metal by one form or another of soft and hard soldering, or brazing with various alloys, are run-of-the-mill jobs in model and light engineering workshops.
1985 *0-85242-845-6* *210x148mm*
136 pages *Illustrated paperback* *£6.95*

Saws & Sawing WPS 10
Ian Bradley
This book examines all types of saw, hand and machine, their use, maintenance and useful tables relating to various applications.
1986 *0-85242-887-1* *210x148mm*
96 pages *Illustrated paperback* *£5.95*

Electroplating WPS 11
J.Poyner
This title will be of value to model engineers and small workshops wishing to plate with any of the customary metals using simple equipment.
1987 *0-85242-882-6* *210x148mm*
64 pages *Illustrated paperback* *£6.25*

Drills, Taps & Dies WPS 12
Tubal Cain
In this book, Tubal Cain discusses drills and drilled holes and threading with taps and dies, primarily by hand. Imperial and metric sizes plus conversions are included together with all standard thread gauges.
1987 *0-85242-866-9* *210x148mm*
104 pages *Illustrated paperback* *£6.95*

Making Small Workshop Tools WPS 14
Stan Bray
Making 14 simple but useful adjuncts to the tool kit for bench and lathe use, taking no more than 3 to 4 hours or involving special materials, yet each able to save considerable time in use as well as aiding accuracy.
1987 *0-85242-885-5* *210x148mm*
92 pages *Illustrated paperback* *£6.95*

Workholding in the Lathe WPS 15
Tubal Cain
Tubal Cain discusses all the practical aspects of the subject, with many photographs to illustrate specific points.
1988 *0-85242-900-2* *210x148mm*
112 pages *Illustrated paperback* *£6.95*

Electric Motors WPS 16
Jim Cox
Principles, characteristics, operation, installation, speed control, braking etc. plus generation, safety, testing and a useful section on identifying and applying scrap motors.
1987 *0-85242-914-2* *210x148mm*
136 pages *Illustrated paperback* *£6.95*

Gears & Gear Cutting WPS 17
Ivan Law
Explanations and reasons for all conventional types of gears are clearly set out in this book together with useful tables and machinery techniques to form an invaluable reference work for anyone dealing with machinery.
1987 *0-85242-911-8* *210x148mm*
136 pages *Illustrated paperback* *£6.95*

Basic Benchwork WPS 18
Les Oldridge
This title details normal bench practice suitable for engineering apprentices. By avoiding broken tools and spoiled work, this book will save its cost many times over.
1988 *0-85242-920-7* *210x148mm*
128 pages *Illustrated paperback* *£6.95*

Spring Design & Manufacture WPS 19
Tubal Cain
Every type of spring and all the necessary calculations are clearly explained as well as materials and methods.
1988 *0-85242-825-0* *210x148mm*
96 pages *Illustrated paperback* *£6.95*

Metalwork & Machining Hints & Tips WPS 20
Ian Bradley
A workshop information pot-pourri combining useful advice and instruction for beginners, with explanations of tools and techniques often familiar in name but not always found described in detail.
1988 *0-85242-947-9* *210x148mm*
96 pages *Illustrated paperback* *£6.95*

Adhesives & Sealants WPS 21
David Lammas
David Lammas covers traditional adhesives, their advantages and shortcomings as well as synthetic products.
1991 *1-85486-040-8* *210x148mm*
144 pages *Illustrated paperback* *£6.95*

Workshop Electrics WPS 22
Alex Weiss
This book deals with electricity in the garage or home workshop and includes: everything from fitting a 13 Amp plug to wiring up a new workshop building.
1994 *1-85486-107-7* *210x148mm*
128 pages *Illustrated paperback* *£6.95*

Workshop Construction WPS 23
Jim Forrest & Peter Jennings
This book contains the details for building the floor assembly, walls and roof and covers the peripheral areas including layout, planning regulations, tools, materials, security and insurance.
1995 *1-85486-131-X* *210x148mm*
144 pages *Illustrated paperback* *£6.95*

Electric Motors in the Home Workshop WPS 24
Jim Cox
Detailed advice is given on how to identify and make good use of discarded and surplus motors from both domestic and industrial sources and also how to operate three phase motors from single phase supplies.
1996 *1-85486-133-6* *210x148mm*
144 pages *Illustrated paperback* *£6.95*

The Backyard Foundry WPS 25
B.Terry Aspin
This book covers basic principles, materials and techniques, pattern-making, moulding boxes, cores and core boxes, metals, electric, gas and coke furnaces.
1997 *1-85486-146-8* *210x148mm*
104 pages *Illustrated paperback* *£6.50*

Home Workshop Hints & Tips WPS 26
Edited by Vic Smeed
A selection of useful hints and tips culled from a wide time-scale of the Model Engineer magazine as relevant today as when they were first printed.
1997 *1-85486-145-X* *210x148mm*
128 pages *Illustrated paperback* *£5.50*

Spindles WPS 27
Harprit Sandhu
Spindles describes the design construction and use of a variety of spindles that will be of interest to the amateur engineer and dedicmaker.
1997 *1-85486-149-2* *210x148mm*
160 pages *Illustrated paperback* *£6.95*

Simple Workshop Devices WPS 28
Tubal Cain
This is an updated edition of a previously published title, now an essential addition to any model engineer's library.
1998 *1-85486-158-6* *210x148mm*
144 pages *Illustrated paperback* *£6.95*

CAD for Model Engineers WPS 29
D.A.G.Brown
Derek Brown shows how by taking one step at a time the computer can soon be turned into a versatile drawing tool with many advantages over traditional drawing methods.
1999 *1-85486-169-1* *210x148mm*
128 pages *Illustrated paperback* *£6.95*

Workshop Materials WPS 30
Alex Weiss
This book describes the many and varied materials used by model engineers in their workshops.
1999 *1-85486-172-1* *210x148mm*
192 pages *Illustrated paperback* *£6.95*

Useful Workshop Tools WPS 31
Stan Bray
This practical collection covers benchwork, the lathe and milling operations, and includes: marking-out and machining aids.
2000 *1-85486-194-0* *210 x 148 mm*
104 pages *Illustrated Paperback* *£ 6.95*

Unimat III Lathe Accessories WPS 32
Bob Loader
The author has become an acknowledged authority on the popular Unimat mini-lathe, developing numerous accessories and techniques to assist the model engineer in getting the best from the machine.
2001 *1-85486-213-0* *210 x 148 mm*
160 pages *Illustrated Paperback* *£ 6.95*

Making Clocks WPS 33
Stan Bray
This book explains the terminology of the clockmaker and provides general details of clock construction including layout of wheels and escapements.
2001 *1-85486-214-6* *210 x 148 mm*
128 pages *Illustrated Paperback* *£ 6.95*

Please add £1 p&p for single book orders and 50p for each additional book ordered.

Send payment with your name, address and telephone number to:
Nexus Customer Services, Nexus House, Azalea Drive, Swanley BR8 8HU.
Cheques made payable to Nexus Media Ltd. or phone **01322 616300**

MODEL ENGINEER CLASSIFIED Advertisements

Send to Model Engineer Classified Department, Nexus Special Interests, Nexus House, Azalea Drive, Swanley, Kent, BR8 8HU. Tel: 01322 660070, Fax: (01322) 616319
All advertisements will be inserted in the first available issue. There are no reimbursements for cancellations. All advertisements must be pre-paid.
The Business Advertisements (Disclosure) Order 1977 – Requires all advertisements by people who sell goods in the course of business to make that fact clear. Consequently all trade ads in *Model Engineer* carry this 'T' symbol

WORKSHOP EQUIPMENT

MYFORD Collets Imperial and metric 24 off with box and tools £150. Royston 01763 221557

WARCO VMC MILL Inverter variable drive, Acu-rite DRO, extras including R8 tooling, excellent condition £1450. tel: 01242 524861

BOXFORD ME10 LEADSCREW Unused £20.00. DE VILBISS AIR COMPRESSOR Ideal airbrush use £40.00 o.n.o

WANTED FLEXISPEED METEOR 2 LATHE PLUS SCREWCUTTER whole or spares Tel: 0208 8504848 (SE London)

COLCHESTER STUDENT (£800) 6½" x 40" Excellent condition hardly used £3000 ono 3hp 01865 429024 (evening) Oxford

MYFORD ML 7 LATHE AND STANDARD EQUIPMENT CHUCK VGC, single phase. Offers please. Tel: 0113 286 4288

MINI PIPE BENDING KIT £40 ono. Tel: 01452 551075 (Gloucester)

SUPER 7 Quick Change, 3 and 4, Jaw Chucks, Face Plate, Single Phase Manuals, Stand, Very Good Condition £1,200

DRAPER 5 inch Bench Grinder VGC £25 Tel: 01452 551075 (Gloucester)

CENTEC 2B MILL H/V Joint Dro well equipped £,1450. UNION TOOL CUTTER GRINDER Tooled £325 Tel: 01242 862127

MYFORD SUPER7B on cabinet stand, quickchange gearbox, 3&4 jaw chucks, faceplate, Dickson toolpost (Southport) Lancs. Tel: 01704 875228

LATHE HARRISON M300 1983 3 Phase 61/2" x 25" 3/4 jaw chucks, Q.C.T.P. Various tooling £1,850 Tel: 01753 652631 (Middx)

BURNARD 4" 3 Jaw chuck brand New 85.00, 5" 3 Jaw chuck £65.00 M/W 0-6" depth Mic 35.00. Tel: 01384 273396

SCHWEIZER PRECISION Sensitive drilling device, type SPF2 for Lathe No.1 morse shank 0-1.5mm Albrecht chuck £68.00. Tel: 01668 214572

HOFMANN
3½ in Universal Dividing Head, Tailstock, Gears, Tooling. Late type hardly used, immaculate condition **£650**

CLARKSON
Drill Point Tap Lead Grinding attachment **£350**

Tel: 01708 473013

WARCO Quick change tool post for lathes GH1200 1300 1400 series. Cost £150 sell £100 (New). Tel: 01303 277354

WANTED Tailstock for 10" southbend 1940's model, also any tooling chucks etc.

LITTLEJOHN 5" Lathe, all ancillaries, Pallas Horizontal Mill, Kerry Pillar drill, all excellent Tel: 01245 256583

MYFORD ML7 LATHE Complete with 3-4 Jaw chucks, change wheels, vertical slide, tooling on stand £575 o.v.n.o Tel: 01429 268041 (Teeside)

FOBCO ½" BENCH DRILL £125 UNION GEARED HEAD PEDESTAL DRILL 2mt spindle £150 Both 240v Tel: 01484 656196 (Huddersfield)

BRITISH ELECT MOTOR ¾HP 5.P 240V Excellent cond. plus contactor £50. Tel: 01986 781 334

MYFORD ML7 superb. purchased from Myford, fully refurbished but unused. New motor, chuck, cabinet stand £875 o.v.n.o Tel: 01227 860469

WARCO minor milling drilling machine 3.M.T. 1 phase 1998, excellent condition £595 Tel: 01282 871660 evenings

EMCOS Lathe/milling machine unused 3/4 jaw steady topslide tray, spalshback mill table collet, fine feed drill chuck manual etc £600 o.n.o Tel: 01509 237968

END MILLS/SLOT DRILLS HSS New, Boxed, Good British/German makes, various sizes up to 16mm £3 each p.p Tel: 01327 351274

3" SLOTTED ROTARY TABLE TOOLMAKER made unused comes in wooden box with T-nuts and tommy bar £70 Tel: 01327 351274

THE PEATOL LATHE

£160 including 3 or 4 jaw chuck. Milling attachment and other accessories available.
Centre height 2¼" distance between centres 9½".
Full details send 2 x 2nd class stamps. Price inc. VAT
Peatol Machine Tools, M.E, 19 Knightlow Road, Harborne, Birmingham B17 8PS Tel: 0121 429 1015
www.peatol.com

COMPLETE HOME WORKSHOPS
AND MODELS PURCHASED. DISTANCE NO OBJECT
Tel: Mike Bidwell on 01245 222743

R.A. ATKINS

MYFORD SUPER 7 LATHES, from	£925
MYFORD SUPER 7B LATHES, from	£1,450
MYFORD ML7 LATHES Choice from	£475
JUBILEE WOOD LATHE 30", tooled	£300
BOXFORD MODEL C LATHE ON CABINET	£475
COWELLS 90 CENTRE LATHE Fully Equipped	£975
WARCO MINOR MILL DRILL, Equipped	£475
ALPINE MILL DRILL, Equipped	£475
MYFORD VM-D MILL UNIT suit 7 Lathe	£400
MYFORD PLAIN VERT SLIDE	£90
MYFORD METRIC CONVERSION SET	£150
Q&S 6" POWER HACKSAW	£425
WARCO H.DUTY POWER HACKSAW	£150
KENNET T&C GRINDER ON STAND	£250

100'S MODEL ENGINEER TOOLS & EQUIPMENT WE URGENTLY REQUIRE TO BUY WORKSHOPS

HUNTS HILL HOUSE, HUNTS HILL, NORMANDY, GUILDFORD, SURREY GU3 2AH
Tel: (01483) 811146 Fax 811243

COWELLS SMALL MACHINE TOOLS LTD
Tendring Road, Little Bentley, Colchester, Essex, CO7 8SH
Tel/Fax +44 (0) 1206 251792 E-mail sales@cowells.com
MANUFACTURERS OF PRECISION SCREW CUTTING LATHES, 8MM HOROLOGICAL COLLET LATHES AND MILLING MACHINES.
www.cowells.com

ENGINEERS TOOL ROOM
The tool supplier for Professional & Model Engineers
CUTTING TOOLS: HSS – COBALT – COATED

Drills: Metric, Fractional, Jobbers, Long Series, Boxed Sets
Reaming: Metric, Fractional Hand and Machine.
Threading: Taps, Straight Flute, Spiral Flute, Boxed Sets, Metric, Imperial, Unified, BA.
Dies: Split Dies, Solid Dies, Die Nuts, Metric, Imperial, Unified, BA.
Milling: End Mills, Slot Drills Plain and Screw Shank, Horizontal Cutters, Slitting Saws, Collets.
Turning: HSS Tool Bits, Tungsten Carbide Tipped Turning Tools, Insert Tools, Collets.
Measuring: Micrometers, Verniers, Dividers, Callipers, Setting up Tools
Workshop Machinery: Lathes, Milling Machines, Pillar Drills, Band Saws
Machining Services: full machining service available, turning, milling, grinding, wire and spark eroding, tool and mould making

"New" Tool Catalogue available FREE – Send for one today
CHECK OUT OUR SPECIFICATIONS & PRICES BEFORE ORDERING YOUR MACHINES – Contact us for a Quotation
Part Exchange on some machine tools welcomed
Tel: 01443 777167 Fax: 01443 773347
Mobile 07770 988840
Web Site: www.engineerstoolroom.co.uk
Email: regpugh@aol.com
262 PARK ROAD, CWMPARC, TREORCHY, MID GLAMORGAN CF42 6LE

Go to the
MODEL ENGINEER EXHIBITION
29 - 31 December at Sandown

www.eternaltools.com
secure ordering online
DIAMOND WHEELS
All Shapes for all machines:
Quorn, Worden, Stent, Bench Grinders
Prices from: £34.95 inc VAT

"Bring life to old carbide tools"
Eterna
tel: 020 7291 4436 fax: 020 7291 4437
1 - 7 Harley St - London W1G 9QD

TOOLCO
The home of good quality used tools and machinery
www.toolco.co.uk
or send for full itemised stocklist.
Unit 4, Ebley Ind Park, Ebley, Stroud, Glos GL5 4SP
Important: Phone for opening times before travelling.
(Just 4 miles J13 M5 Motorway) Tel: 01452 770550
E.Mail: sales@toolco.co.uk Fax: 01452 770771

ATTENTION MODEL MAKERS
A wide selection of used workshop machinery
Boxford, Viceroy, Colchester & Harrison Mills, drills and wood lathes.
Carluke, Strathclyde, Scotland.
Tel: 01555 751121 Fax: 01555 751682

Complete Home Workshops and Models Purchased
Distance no object
Tel: Chris Moor on 0115 925 4222

EVENSON ENGINEERING

Quality Machines and Tooling

Machine Sales

MORE BRADFORD UNIVERSITY MACHINES

Bridgeport Mill, vari.head and new Dro 48"x9" table £3250
Harrison vertical mill (looks like new) with power feed £1800
Arboga geared head drill 3mt £850
Startright mercury bench drill, 1 phase (like new) £200
Epco Engine Crane £225
Harrison Boaring table £125
Well Saw, Small power Hacksaw £300
Heavy Duty spot welder £275
Colchester Master 6" x 36" Late fully Tooled £1500
Arboga Maskiner geared Head Pillar Drill 3MT £875
Colchester Chipmaster, taper Turning Rear Tool Post, Bed Stops Fully Tooled £1200
Arboga Geared Head Drill 3MT £850
Elliot 00 Mill 27" X 8" Table £1800
J+S 12-12 Hand opp cylindrical Grinder Single Phase £1800
J+S 540 Surface Grinder (Like New Condition) £3500

MILLING MACHINES

Bridgeport 42"x9" table power feed belt head (re-built by BRS) ..... P.O.A.
Bridgeport A & S, production mill with mini Bridgeport Head 2mt on quill £1300
Harrison horizontal mills ..... from £700

LATHES

10 of Harrison L5 come fully tooled gap bed ..... £825 each
Colchester Bantham 1500 2 speed motor coolant etc & tooling £1200
Colchester Student straight bed with tooloing £1200
2 Colchester Masters 6" 36" One with Clutch £1400
Colchester Bantham 2000 6" 30" Gap Bed Dual Dials £1850
Harrison M250 Fully Tooled £2300
Colchester Chipmaster Tooled Taper Turning Rear Tool Post (Verty Nice) £1450

MISCELLANEOUS

Jones & Shipman dig. form model AT new boxed £550
Bridgeport Riser Block and spider £225
Eagle Hand operated surface Grinder (very small machine) 10"x4" Mag chuck
Transwave 3 HP converter £225
Milford Pedestal Grinder/Buffer 1 pahse (ex Uni) £225
J & S Swivel and angle grinding vice £150
Abwood vert-spindle surface grinder 18"x6" mag chuck, hand operated, little used
Myford 6 position turret fro cross slide £80
Bridgeport 90° Head £225
Bridgeport Slotting Head, excellent condition £800
Viceroy pedestal grinders, 2 off, ex cond (small & compact) £180
Leytool slotting machine, 3" stroke, small footprint, swivel head, rebuilt & painted £1175
LBridgeport milling head, 2 speed motor R8 power quill (fits most mills, ie Adcock & Shipley 1ES) £850
Eclipse magnetic chuck 19" x 12" £300
Flypresses ..... from £50
Colchester Chipmaster lathe (breaking) £350
Harrison spares ..... please phone
Swivel vertical head 4MT, make unknown but will fit Senior, A&S etc with modification £300
Collet chucks, box blocks, vices, angle plates, surface plates etc ..... Please phone
Union Bench Drill £280
Student/Master Collet Chuck 2 of ..... each £100
Student 18" Faceplate £95
Boxford 2MT Pillar Drill (Untidy) £80
Hort Pedestal Sander 15 Disc Ex Uni £350
Hydraulic Stacker Truck Ideal for Lifting Vices and Chucks 800 kg £350
Jones Shipman Bench Centre ..... POA

WE ALSO PURCHASE QUALITY MACHINES & TOOLING • DELIVERY SERVICE AVAILABLE
PLEASE TELEPHONE BEFORE TRAVELLING – WEEKEND & EVENING VIEWING AND DELIVERY SERVICE

More machines always in stock.
Tel: 01274 544409 & 780040 Mobile 07050 272169
4 Duchy Crescent, Bradford, BD9 5NJ

Seen My CAT!
Now on-line
Models, Machinery, Misc.
www.theengineersemporium.co.uk

HI-TEC 3-PHASE CONVERTERS

Speed Controls, Fwd & Rev Switches, 12 volt & 24 volt dc. to mains 230 volts ac full sine wave inverters. Static and Rotary Phase Converters 0.8 kW to 45 kW to run 3-phase 415 volt machinery from a Single Phase. We can also supply Transformers and Components.
Website: www.phaseconverters.co.uk

BOOST ELECTRICAL ENGINEERING
Tel: 01959 534073 Fax: 01959 532726

TRUE PHASE CONVERTERS

ESTABLISHED FOR 60 YEARS

- RUN THREE PHASE MACHINES FROM A SINGLE PHASE SUPPLY
- REVOLUTIONARY DESIGN
- OUT PERFORMS OTHER CONVERTORS
- MONEY BACK GUARANTEE

DANEBURY ELECTRIC LTD
Phone, Fax or Email for Colour Brochure
email: truephasesales@daneburyelectric.co.uk
Web: www.danebury.co.uk
Tel: 01202 524888 or Fax: 01202 530940

TOOLS PURCHASED

Hand Tools and Machinery, whole or part collections – old and modern. Will call.
Tel: Alan Bryson.
Tel: 01823 288135 (Taunton).

PLEASE MENTION MODEL ENGINEER WHEN REPLYING TO ADVERTISERS

TAPS & DIES

Also: Drills, Reamers, Endmills, Slotdrills, Stubdrills, Toolbits, Slittting Saws, Cutters Side & Face, etc. – *Send SAE Free Price List*

Every size manufactured/stocked – Sold 25 years
EXCELLENT 1st QUALITY HQSS TAPS & DIES
Fax/phone Enquiry/Orders – SAME DAY POST
BSW, BSF, UNC, Metric, BA, Cycle, BSP, ME
Individually or in Wooden & Metal Boxed Sets
Our brands: 'T&D-HQS' & 'ZN' & 'TOTEM'

THE TAP & DIE CO.
445 West Green Road, London N15 3PL
Tel: 020 8888 1865 Fax: 020 8888 4613
www.tapdie.com

THINKING OF SELLING YOUR LATHE, MILL OR COMPLETE WORKSHOP

and want it handled in a quick, professional no fuss manner? Contact David Anchell, Quillstar (UK) Ltd (Nottingham).

Tel 0115 9255944 Fax 0115 9430858

DON'T DELAY
CALL TODAY
01322 660070

GENERAL

ORIGINAL ARTICLES OF E. WHITTLE
Designed V8 Engine commenced in M.E. 21.4.95 vol 174 Needed
all costs etc. Payed
Email: graeme@starkey.nv or
Phone 01621 772639 Evenings

PRECISION TURNING AND MILLING DONE TO YOUR SPECIFICATION
ALSO
GLASS BEAD BLASTING FOR SMALL PARTS
Tel: 01652 649274 Lincs

WANTED

WANTED 71/4" G Standard Gauge 8 coupled locomotive. Preferably Stanier 8F, others considered. Tel: 01427 872723

GUNMETAL

"GUNMETAL, BRONZE AND BRASS" in 12" lengths by mail order. For price list S.A.E. to PEMMSA, Unit 6, Riverbank Enterprise Centre, Dewsbury, West Yorks WF13 3RQ.

HARRISON LATHE SPECIALISTS. On site service, pre-purchase inspections on your behalf. Valuations and disposals, etc. Contact Pemmsa 01924 459276 Mobile 07786 146738.

Ortec

Ortec are manufacturers of low cost, high quality, precision digital readout - DRO for machine tools such as milling machines for the hobbyist and model engineering user. We offer a complete range of readouts from 1 to 3 axis in a variety of encoder lengths.

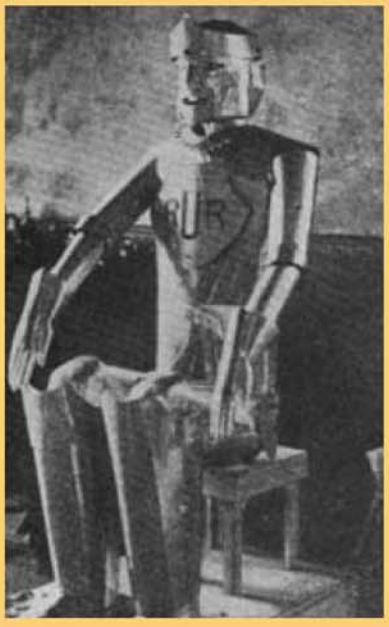
Phone +44 (0)1481-235708

WHERE IS HE NOW?

MODEL ENGINEER EXHIBITION 1928

In 1928 a sensation was caused by an exhibit of a Mechanical Man, a robot figure which obeyed its inventors commands and answered questions. So clever was this conception that it actually opened the Exhibition. Seated on a platform above the railway track it rose at the word of command, bowed to the audience and delivered an opening speech.

ANY INFORMATION ON THE ABOVE TO THE OFFICE PLEASE



01322 660070 ext 2205 or 2468

HOME AND WORKSHOP MACHINERY

QUALITY USED MACHINE TOOLS

144 Maidstone Road, Foots Cray, Sidcup, Kent, DA14 5HS.

Telephone 020-8300 9070 – Evenings 01959 532199 – Facsimile 020-8309 6311.

Opening Times: Monday-Friday 9am-5.30pm – Saturday Morning 9am-1pm

10 minutes from M25 – Junction 3 and South Circular – A205

www.homeandworkshop.co.uk

LATHES

BOXFORD TUO 41/2" x 20" 3 jaw chuck, cabinet stand, hand feeds £995
BOXFORD CUD 4 1/2" x 20", changewheels, 3 jaw chuck, cabinet stand £760
BOXFORD AUD 4 1/2" x 20" Mk2l gearbox, power cross feed, 3 jaw chuck, tools! £1,575
BOXFORD CUD 5" x 22" Mk3l, c/wheels, 4 way toolpost £1,250
BOXFORD BUD 5" x 22" Mk3l, c/wheels, power cross feed, T-slotted cross slide £1,400
BOXFORD 10-20 6" x 20", geared head, power feeds, very late machine £1,950
BOXFORD 1130 61/2" x 30", geared head, gearbox, power feeds, cabinet stand, clean machine £2,450
Colchester Chipmaster 5" x 20", gearbox, variable speed, 3 jaw chuck, face plate, 4 way tool post Just £950
COLCHESTER EANTAM 1500 model, 5" x 20", geared head, power feeds, gearbox £1,400
COLCHESTER EANTAM 2000, 61/2" centre height x 30", between centres, 11/4" bore, 16 speeds, D13 camlock fitting, 3 &4 jaw chucks in very nice condition £3,250
COLCHESTER Student Square head, 1500 revs / 2 speed motor model, geared head, gearbox, imp/met, power cross feed & gap bed, dual dials, 3 Jaw chuck, taper turning, coolant, etc £2,950
COLCHESTER STUDENT 1800 61/2" x 40" + gap bed, 19" swing, 3 & 4 jaw chucks, Dickson tooling, taper turning, dial indicator, coolant, splash back, very nice, metric dials! £3,750
COLCHESTER MASTER 6 1/2" x 26", square geared head, power feeds, gap bed £1,425
COLCHESTER Triumph 2000 71/2" x 50" full screwcutting gearbox and power feeds, gap bed, 3 & 4 Jaw chucks, Dickson tooling, faceplate etc ..... now £4,950
DENFORD 250 5" x 20", 3 jaw chuck, two way tool post, dual dials! £950
HARDINGE capstan lathe £895
HARRISON L5, 41/2" x 24", fully tooled, complete with clutch £950
HARRISON 140, 5 1/2" x 24", geared head, semi gearbox, 3 jaw chuck, gap bed, power feeds, clutch £1,400
HARRISON 140, 5 1/2" x 24", geared head, gearbox, gap bed, power feeds, tooling, coolant £1,725
HARRISON M250, 5" x 20", long bed, gearbox, power feeds, chucks, Acurite III DRO on cross-slide, dual dials. In very nice condition £2,250
HOBBYMAT MD65 2 1/2" x 12" Screwcutting Lathe with changewheels and some tooling £425
MYFORD ML10 31/4" x 13", changewheels, 3 jaw chuck, rotating centre and cutting tools £725
MYFORD ML7 3 1/2" x 19", changewheels, 3 jaw chuck, we have a large selection of this popular model £750
MYFORD ML7B 31/2" x 19", gearbox, 3 jaw chuck and tooling £1,250
MYFORD ML7RB 31/2" x 31", changewheels, 3 jaw chuck, tooling in almost excellent condition £1950
MYFORD SUPER 7 31/2" x 19", changewheels, 3 jaw chuck and tooling ..... Choice £950 - £1,150
MYFORD SUPER 7B 3 1/2" x 19", gearbox, 3 jaw chuck and tooling £1,250
MYFORD SUPER 7 31/2" x 31", changewheels, 3 jaw chuck and tooling ..... Choice £1,400
MYFORD SUPER 7, 31/2" x 19", 3 jaw chuck, power cross-feed ..... Late model Choice
MYFORD SUPER 7B, 3 1/2" x 19", gearbox, Power Cross Feed, cabinet stand, tooling £2,750
MYFORD SUPER 7B, 3 1/2" x 19", gearbox, Power Cross Feed, Hardened bed, 3jaw chuck and tooling on stand, excellent condition, from new and NOT re-conditioned £3400
MYFORD SUPER 7B, 3 1/2" x 31", (long bed) power cross-feed, industrioned hardened bed, industrial stand and doors, green machine £2,950
RAGLan Capstan 10" x 24" 6 Station Turret, cut of slide, collet chuck (lever) & collets, bar feed, variable speed, coolant £975
SMART AND BROWN 1024 Toolroom lathe, full screwcutting gearbox and power feeds complete with 3 & 4 jaw chucks, collet set, steadies and equipment, in very good condition £2,250
TAYLOR SPINNING Lathe 7" x 20", two speed motor & ram machine in Nice Order £750
VICEROT TDS 1 GBL 5" x 20", gearbox, power slides, 2 MT tailstock complete with fixed steady £1,400
TOO MANY LATHES TO LIST!!!

MILLING MACHINES (V - Vertical, H - Horizontal)

ADCOCK AND SHIPLEY IBS Horizontal/Vertical Head, 30" x 8" powered table and feed gears, coolant! £1,625
BOXFORD VMB0 variable speed / 30 INT head, table 211/2" x 6" + abwood vice and collet chuck £1,500
BRIDGEPORT Series 1 - 2 HP Variable speed R8 head, powered (gearbox) table, 42" x 9" £2,250
BRIDGEPORT Belt head 2 speed (short motor) head, R8 powered head, variable speed 42" x 9" table Very nice £2,250
CENTEC 2B Horizontal, 1" arbor, table powered, 3 ph motor, single phase main motor £725
CENTEC 2B Vertical/horizontal, quill feed 2MT head, 25" x 5" table, pedestal model £1,400
ELLIOT DOWNHAM mini-borer, very late machine complete with collets and chuck (power down feed) £2,250
ELLIOT 100 OMNIMILL 3 Morse taper quill universal head, 28" x 71/2" powered table. Just In £1,650
ELLIOT Turret mill R8-10 speed 70-3000 rpm, table 46" x 10" (powered) £1,500
EMCO F02 Vertical 6 speed quill feed head 2 MT, powered 24" x 6" table, full coolant tray and cabinet stand, 3 phase and does not like a converter ..... so only Now £1950
HARRISON horizontal, 31" x 8" powered table £625
HARRISON H/V 30 INT swivel head & clutch, 30" x 8" table/powered £1950
HARRISON VERTICAL 30 INT swivel head & clutch, 30" x 8" table/powered £1950
RAGLAN VERTICAL MILL 2 Morse taper, 2 speed motor, variable selector 175-6220 rpm, cabinet stand £950
SIP RF30, milling/drilling machine complete with accessories ..... New £799
TOM SENIOR JUNIOR horizontal mill with a vertical head (sleeve to be made), table, 20" x 4w", powered £1200
TOM SENIOR M1 horizontal, 25" x 6" powered table, 1" arbor £575
TOM SENIOR M1 V/H, 25" x 6", 2 morse taper, 1" arbor. Selection ..... £1,200 - £1,450
TOM SENIOR ELT MAJOR, 2 morse taper quill feed head, powered 37" x 61/2" table in extremely nice condition £2,200
TOS FO2 AV vertical turret mill, 40 INT, 54" x 10" table, power all-ways. Please ring to view £1,950
VICEROT AEW vertical mill, 30 INT swivel head, powered table 34" x 8", Very clean £1,625

DRILLS

ARBOGA ER 25 / 25" Radial Drill speeds (9) 100-2500 RPM. Just in £1,425
ASQUITH 14-54 001 Mk2 (Smt) Radial Drill. Immaculate coming in £3,950
FOBCO 1/2" Bench, tilting table £325
FOBCO 1/2" Pedestal drill tilting table £345
MEDDINGS 1/2" pedestal drill £245
MEDDINGS 2 Morse taper pedestal drills ..... Choice £275
MEDDINGS MF2 10 Speed 2MT Bench 240 volts drill £350
POLLARD CORONA Pedestal 1/2"/1 morse ..... From £100
SIP HDP 600 B 1/2" / 2MT Bench Drill, table operated by rack, speeds; (16) 152 - 3000 rpm ..... New £175
STARTRITE Mercury 1/2" 4 speed bench drill £225
STARTRITE Mercury 1/2" pedestal drill, 240 volts ..... As New £300
WARCO 2MT Pedestal 9 speed drill, speeds; 150-6200rpm, table operated by rack £495

GRINDING / BUFFING

CLARKSON M10 Tool and cutter grinder £650
JONES AND SHIPMAN 540 Surface Grinder &Magnetic Chuck. Ex College/clean no work £1650
MELFORD 12" Pedestal Grinder £325
R.J.H. Buffing Machine, pedestal model Buffalo £325
VICEROT Grinder, pedestal mode £145
VICEROT Buffers, pedestal models ..... Each £250

MISCELLANEOUS / FABRICATION MACHINERY

TAYLOR HOBSON ENGRAVER + TOOLS AND EQUIPMENT £1400
BCA 12" horizontal / vertical rotary table. Very Nice £425
QUANTITY of slips, height gauges, squares, straight edges, micrometers, cubes, angle plates, scales, weights (kilos) and miscellaneous measuring tools Just in Ramefast dc 130 ceramic chip forge £345
FLAMEFAST dc 100 hearth £140
BRIDGEPORT slotting head £750
MARLCO broaching press £425
TRANSARC 150 + Transtig 150i £425
JONES AND SHIPMAN 4" x 24" bench centres £245
TOM SENIOR slotting head £450
STARTRITE 18-s-5 Woodworking / non ferrous bandsaw £950
DIAMOND fret saw, variable speed £345
RJH BT 125 Fretsaw, variable speed £345
SMART AND BROWN / CLARKSON H3-H5 toggle presses ..... Each £195 / £275
ARRAND 2MT long milling spindle ..... As new £75
VERDICT Clocks, Long/Short/Metric and Imperial models ..... As new £40
FLAMEFAST LD300 Soldering Iron Stove £75
GRANITE 18" x 12" Surface Plate £140
VIBROSHEAR Nibbler ..... Just in £495
TRIUMPH Burnerd 4 Jaw Chuck £245
TRIUMPH FACE PLATE D14 ..... £70
VANCO LINISHER. Very Nice £345
JONES AND SHIPMAN Broaching Press + Stand £375
CLARKSON Mk I Radius Grinder Attachment £425
ABB Inverter & 1/2 hp motor, wired up £250
FLAMEFAST moulding bench £100
SIP 7" bandsaw, horizontal & coolant ..... New £750
WELLSAW hacksaw ..... Choice £245 - £345
BRIDGEPORT high speed drilling head £495
MYFORD dividing head £295
STARTRITE sc315d cut-off saw £750
DUPLEX d29 toolpost grinder £345
BOXFORD (imperial only) thread dial indicator £65
HOFFMAN Rotary Tables ..... Selection
ASWOOD 6" swivel/tilt machine vice ..... Each £345
BURNERD, D13 6 jaw Griptru chuck £345
VANCO, 1" finisher / vertical + extractor £495
BURNERD, D14 lever collet chuck + collets £400
BURNERD, L0 lever collet chuck + collets £400
VERTEX Dividing head ..... New £245
VERTEX 6" - 8" - 10" rotary tables ..... New From £135
BOXFORD Turret attachment 41/2" + quantity of drill chucks £525
MYFORD ML7 / Super 7 rear tool post £40
MYFORD 254S rear tool post ..... New £40
MYFORD Vertical slide / fixed type (boxy) £99
OLIVER - Adrian Filer ..... Now £49
LOCKWOOD quad headed 2mt Die Holder ..... New £40
LOCKWOOD quad headed 3mt Die Holder ..... New £40
LOCKWOOD Test Bar / 2mt Bored ..... New £39
LOCKWOOD Test Bar / 3mt Bored ..... New £42
MAGNETIC chuck - 10" x 6" fine pole. Never used £395
TOM SENIOR Model E pedestal stand £150
UNION tool and cutter grinder stand £135
HARDINGE Capstan type toolpost £175
50 INT Tooling. Selection ..... Just in
STARTRITE 352 woodworking band saw £975
STARTRITE 14-S-5 woodworking band saw £775
ALCOSA GF 680/1 Rapid Melting Furnace £300
GABRO BF 620-2, 24" floor and Pan general use folder £395
MYFORD Burnerd Griptru 3 Jaw Chucks ..... Boxed £250
COLCHESTER / HARRISON D13 Burnerd 4 Jaw 8" light body independent chucks ..... Boxed £175
RJH 4" Linisher / Vertical (built in Extraction) £625
Kilns various ..... £200/£425
MICROMETERS and associated measuring tools ..... Still packaged as new
POTTERY WHEELS, kilns and associated equipment ..... Just In Cheap
SpecAC Powder type press £225
HARRISON U5 Metric Gearbox ..... As is £250
HARRISON U5 Tailstock £245
NEW FROM NEW ZEALAND - Machine vice, 55mm. Jaws precision miniature type ideal for vertical slides and smaller milling machines such as BCA now with the swivel base £134
VICE on own £65
SWIVEL BASE on own £49
SIP 1 TON MOBILE CRANE Manufactured 2000 ..... As new £375
MITUTOYO grade A set of slips £245
MARLCO KNURLERS (clamp type) £75
F.J. EDWARDS 24" hole cutter £625
LARGE BENCH vice £70
LINK1.5 ton vehicle crane + top hat £525
MITUTOYO 103-913 metric set micrometers £275
NORTON / EDWARDS arbor presses ..... £75 / £145
AJAX 6" hacksaw £425
SURFACE plates from 12" x 12" to 36" x 36". Very nice ..... from £30
WEEBER 11/2 ton mobile garage crane, late blue colour £495
ELLIOTT 1250 STURDIMILL vertical head. One off (rare) £525
RJH finisher 4" wide belt, pedestal £345

STEEL STOCK Just arrived - to callers only

ELLIOT U1 / U2 Slotting Head £475
SWAGE blocks ..... £125 / £140
J & S Universal grinding vice ..... Choice £275 / £325
BOX TABLES: Grade A and B, many sizes ..... £40 - £150
SLIPS / GAUGES Metric / Imperial, New Sets, 87 / 81 piece ..... £215 / £140
HORIZONTAL METAL BANDSAW 6" x 4 1/2" capacity ..... New £170
COLCHESTER STUDENT / MASTER Round head, face-plates, small / large ..... £50 / £60
QUALTER S AND SMITH 6" Hacksaw £245
BORING HEADS 2 / 3 Morse, R8 Taper, Max. Capacity 41/2" round bar ..... New, each £90
ODONI Machine Bed Clamps (pair) ..... Special £24.50
HEXIBIT GAUGES by Chesterman, Shardlow, Moore and Wright ..... From £95
ELLIOTT 10M Shaper, 10" stroke £325
DIE Boxes ..... From £45
TRANSWAVE 2HP Converter ..... New £290
TRANSWAVE 5.5HP Converter ..... New £385
TRANSWAVE 12K - RT rotary converters ..... From £465
CROMPTON PARKINSON 3/4 HP, resilient mount, Bolford / Myford Super 7 Type motor ..... New £140

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

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

DISTANCE NO PROBLEM!! DEFINITELY WORTH A VISIT ALL PRICES EXCLUSIVE OF V.A.T.

SEE US AT SANDOWN 29-31 DECEMBER Stand B1

newall
Newall Measurement Systems

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

Conquest Lathe

NOW INCLUDES TEST CERTIFICATE

£395

Price includes VAT & Delivery*

VARIABLE SPEED

STANDARD ACCESSORIES

- 80mm 3-jaw chuck
- 1-10mm drill chuck & arbor

CHESTER U.K. LIMITED
MACHINE AND TOOLING SPECIALISTS

920 Lathe Deluxe

- Swing over bed: 229mm
- Swing over cross slide 135mm
- Distance between centres: 500mm
- Spindle bore: 19mm
- Taper in spindle nose: MT3
- Motor: ¾hp
- 6 Speed: 100-1800rpm
- Net weight: 100kg

STANDARD EQUIPMENT:

- 4" 3-jaw chuck with 2 sets of jaws
- 7" 4-jaw chuck with reversible jaws
- Steady rest • Follow rest
- MT2 Dead centre
- MT3 Dead centre
- 4-way tool post
- Face plate
- Tool Box & Tool Kit
- Tray & Splash guard

£699

Price includes VAT & Delivery*

Model B-Super

- Swing over bed: 420mm
- Distance between centres: 500mm
- Mill drill spindle taper: 19mm
- Tailstock barrel travel: 80mm
- 7 speeds: 60-1300rpm
- Swing over cross slide: 160mm
- Spindle taper: MT3
- Draw bar: M12
- Cross slide travel: 180mm
- Motor: ¾hp
- Net weight: 155kg

STANDARD EQUIPMENT

- 4" 3-jaw chuck
- 2 dead centres
- 1/2 drill chuck
- Change gears
- MT3 chuck arbor

£725

Price includes VAT & Delivery*

Centurion

- Swing over bed: 420mm
- Distance between centres: 520mm
- Mill drill spindle taper: MT3
- Tailstock barrel travel: 80mm
- 7 speeds: 160-1360rpm
- Swing over saddle: 160mm
- Spindle taper: MT3
- Draw bar: M12
- Cross slide travel: 200mm
- Motor: 2 x ¾hp
- Net weight: 230kg

STANDARD EQUIPMENT

- 4" 3-jaw chuck
- 2 dead centres
- 1/2 drill chuck
- Change gears
- MT3 chuck arbor

£1100

Price Includes VAT & Delivery*

Champion Mill

- Drilling Capacity: 20mm • End Mill Capacity: 25mm
- Face Mill Capacity: 63mm • Table Size: 150x630mm
- Number of Speeds: 4 • Speed Range: 400-1640rpm
- Spindle Taper: MT3 • Tilting Head: 90° Left & Right
- Motor: ¾HP

From **£585**

Price includes VAT & Delivery*

Eagle 25 Mill/Drill

- Mill/Drill Capacity: 25mm
- Table Size 190 x 585mm
- Fine Feed
- Number of Speeds: 12
- Speed range: 100-2150rpm
- Spindle Taper: MT3
- Spindle Travel: 100mm
- Motor 1hp

Price **£699**

Price includes VAT & Delivery*

STANDARD ACCESSORIES

- 1-13mm Drill Chuck & MT3 Drill Chuck Arbor • Eagle Face Mill Cutter • T3 Tilting Vice • M12 Drawbar • NVR Switch Gear • Interlocked Chuck Guard • Manual and Parts List

Eagle 30 Mill/Drill

- Mill/Drill Capacity: 32mm
- Table Size 210 x 740mm
- Fine Feed
- Number of Speeds: 10
- Speed range: 80-2300rpm
- Spindle Taper: MT3
- Spindle Travel: 130mm
- Tilting Head
- Motor 1hp
- High/Low Gearbox

Price **£899**

Price includes VAT & Delivery*

STANDARD ACCESSORIES

- 1-13mm Drill Chuck & MT3 Drill Chuck Arbor • Eagle Face Mill Cutter • V100 Machine Vice • M12 Drawbar • NVR Switch Gear • Interlocked Chuck Guard • Manual and Parts List

626 Turret Mill

- Milling Capacity: 25mm
- Drilling Capacity: 32mm
- Table Size 152 x 740mm
- Fine Feed
- Number of Speeds: 9
- Speed range: 190-2100rpm
- Spindle Taper: MT3 or R8
- Tilting Head
- Motor: 1½hp

Price **£1340**

Price includes VAT & Delivery*

STANDARD ACCESSORIES

- Oil Sight Lubrication • Halogen Work Light • Machine Stand
- Drawbar • Manual and Parts List

Craftsman Gap Bed Lathe

- Swing over bed: 300mm • Swing over gap: 450mm
- Swing over saddle: 170mm • Distance between centres: 570mm
- Spindle bore: 36mm • Spindle bore taper: MT5
- Cross slide travel: 150mm • Compound travel: 89mm
- Tailstock barrel taper: MT3 • Tailstock barrel travel: 92mm
- Range of speeds: 50-1250rpm
- Motor: 1½ hp
- Net weight: 398kg

£1550

Price Includes VAT & Delivery*

STANDARD EQUIPMENT:

- 6" 3-jaw chuck with 2 sets of jaws
- 8" 4-jaw chuck
- Steady rest
- Follow rest
- Stand • Face plate
- Splash guard
- Threading dial
- 4-way turret tool post
- 3MT dead centres
- T-Slotted cross slide
- Halogen work light

Super LUX Mill

- Milling Capacity: 25mm
- Drilling Capacity: 32mm
- Table Size 240 x 800mm
- Fine Feed
- Number of Speeds: 6
- Speed range: 95-1600rpm
- Spindle Taper: MT3
- Tilting Head
- Motor: 1½hp

Price **£1500**

Price includes VAT & Delivery*

STANDARD FEATURES

- Powered Head Elevation • Cast Iron Stand
- Angle Tilting Head • Manual and Parts List

Call for our latest Catalogues
01244 - 531631

Visit our website
www.chesteruk.net
For our Special Offers

Email us at
sales@chesteruk.net

CHESTER UK LTD
Clwyd Close
Hawarden Ind. Park, Hawarden
Nr. Chester, Flintshire CH5 3PZ

*INCLUSIVE OF DELIVERY IN UK MAINLAND ONLY