

THE ORIGINAL MAGAZINE FOR MODEL ENGINEERS

Vol. 222 No. 4604 • 18 - 31 January 2019

MODEL ENGINEER

Join our online community www.model-engineer.co.uk

US/UK
LEXICON

GWR Pannier
Tank

Garrett
Canopy

COVER FEATURE

Barclay Cab Fittings



gandmtools

Just a small selection from our current stock

Buy online now at: **www.gandmtools.co.uk**



Boost Energy 2.2Kw Rotary Phase Converter,
£550.00 plus vat.



Colchester Bantam 2000 Centre Lathe, Tooled,
VGC, 3ph, £4250.00 plus vat.



ETA Tool Co Flat Belt Drive Lathe with Motor
Unit, 1ph, £450.00 plus vat.



Flamefast DS430S Chip Forge & Brazing
Hearth, VGC, £675.00 plus vat.



Dore Westbury Vertical Milling Machine,
Stand, 1ph, £725.00 plus vat.



Duplex Toolpost Grinder with Internal Spindle,
VGC, 1ph, £525.00 plus vat.



Durston Powered Bench Silversmiths
Rolls, VGC, 1ph, £1475.00 plus vat.



Colchester Student 1800 Gap Bed Lathe,
3ph Tooled, £3750.00 plus vat.



12 Speed Bench Milling/Drilling Machine,
1ph, £750.00 plus vat.

- Telephone enquiries welcome on any item of stock. • We hold thousands of items not listed above.
- All items are subject to availability. • All prices are subject to carriage and VAT @ 20%. • We can deliver to all parts of the UK and deliver worldwide. • Over 7,000 square feet of tools, machines and workshop equipment.



Opening times: 9am -1pm & 2pm -5pm Monday to Friday. Closed Saturdays, except by appointment.

tel: 01903 892510 • **www.gandmtools.co.uk** • e-mail: sales@gandmtools.co.uk



G and M Tools, The Mill, Mill Lane Ashington, West Sussex RH20 3BX

MODEL ENGINEER

Published by **MyTimeMedia Ltd.**
Suite 25S, Eden House, Enterprise Way,
Edenbridge, Kent TN8 6HF
+44 (0)1689 869840
www.model-engineer.co.uk

SUBSCRIPTIONS

UK - New, Renewals & Enquiries
Tel: 0344 243 9023

Email: help@me.secureorder.co.uk

USA & CANADA - New, Renewals & Enquiries
Tel: (001)-866-647-9191

REST OF WORLD - New, Renewals & Enquiries
Tel: +44 1604 828 748

Email: help@me.secureorder.co.uk

CURRENT AND BACK ISSUES

Tel: 01795 662976

Website: www.mags-uk.com

EDITORIAL

Editor: Martin R Evans

Tel: +44 (0)7710 192953

Email: mrevans@cantab.net

PRODUCTION

Designer: Yvette Green

Illustrator: Grahame Chambers

Retouching Manager: Brian Vickers

Ad Production: Andy Tompkins

ADVERTISING

Advertising Sales Executive: David Holden

Email: david.holden@mytimemedia.com

Tel: 07718 648689

MARKETING & SUBSCRIPTIONS

Subscription Manager:

Kate Hall

MANAGEMENT

Group Advertising Manager: Rhona Bolger

Email: rhona.bolger@mytimemedia.com

Chief Executive: Owen Davies

mytimemedia
print & digital media publishers

© MyTimeMedia Ltd. 2019

All rights reserved ISSN 0026-7325

The Publisher's written consent must be obtained before any part of this publication may be reproduced in any form whatsoever, including photocopying, and information retrieval systems. All reasonable care is taken in the preparation of the magazine contents, but the publishers cannot be held legally responsible for errors in the contents of this magazine or for any loss however arising from such errors, including loss resulting from negligence of our staff. Reliance placed upon the contents of this magazine is at reader's own risk.

Model Engineer, ISSN 0026-7325, is published fortnightly with a third issue in March and September by MYTIMEMEDIA Ltd, Enterprise House, Enterprise Way, Edenbridge, Kent TN8 6HF, UK. The US annual subscription price is 93.00GBP (equivalent to approximately 132USD). Airfreight and mailing in the USA by agent named Air Business Ltd, c/o Worldnet Shipping Inc., 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA. Periodicals postage paid at Jamaica NY 11431. US Postmaster: Send address changes to Model Engineer, Worldnet Shipping Inc., 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA. Subscription records are maintained at dsb.net 3 Queensbridge, The Lakes, Northampton, NN4 7BF. Air Business Ltd is acting as our mailing agent.



<http://www.facebook.com/modelengineersworkshop>



<http://twitter.com/modelengineers>



When you have finished with this magazine please recycle it.

Paper supplied from wood grown in forests managed in a sustainable way.



ISSUE IN THIS ISSUE IN THIS ISSUE IN THIS ISSUE

Vol. 222 No. 4604 18 - 31 January 2019

148 SMOKE RINGS

News, views and comment on the world of model engineering.

149 ME VERTICAL BOILER

Martin Gearing continues turning out fittings for the vertical boiler.

152 STEAM TURBINES LARGE AND MINIATURE

Mike Tilby explores the technology, history and modelling of steam turbines.

156 MAKING SIGNALS

Doug Hewson shows how to make fully authentic signals for a miniature railway.

159 GARRETT 4CD TRACTOR

Chris Gunn makes the wooden canopy for the tractor.

162 THE BARCLAY WELL TANKS OF THE GREAT WAR

Terence Holland describes and constructs two appealing, century old locomotives.

166 THAMES TWILIGHT

James Wells looks back on the twilight years of the Thames Industries.

168 A NEW GWR PANNIER

Doug Hewson embarks on a mission to improve LBSC's half century old GWR Pannier Tank design.

173 POSTBAG

Readers' letters.

174 CITY OF STOKE ON TRENT IN 2½ INCH GAUGE

Robert Hobbs builds an LMS Coronation Class locomotive.

177 LATHES AND MORE FOR BEGINNERS

Graham Sadler begins work on his boring tool kit by machining the main block.

180 MIDLANDS MODEL ENGINEERING EXHIBITION 2018

John Arrowsmith takes a look at the club and display stands.

184 THE GREAT ORME TRAMWAY

Graham Astbury visits Llandudno and takes a trip on the unique Great Orme tramway.

188 BRITISH AND AMERICAN TERMS FOR MODEL ENGINEERING

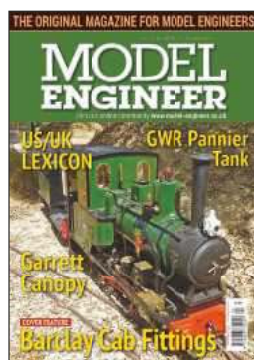
Gregory P. Widin supplies a handy translation guide for model engineers and home machinists.

190 CLUB NEWS

Geoff Theasby compiles the latest from model engineering clubs around the world.

193 DIARY

Forthcoming events.



ON THE COVER...

Terence Holland's 7½ inch gauge Barclay Well Tank Douglas (photograph: Terence Holland).

The Hallmark of Distinction



Order with confidence from the leading supplier of Workshop Accessory Kits. Trusted by the world's most demanding constructors and tool makers

- ❶ The Name to Trust since 1976
- ❷ More designs than ever
- ❸ Industry quality instruction sets
- ❹ Hugely satisfying to build and use

Send £2 (refundable) for our latest workshop catalogue or visit our website

Hemingway

Hemingway Kits

126 Dunval Road, Bridgnorth Shropshire WV16 4LZ

United Kingdom

Tel/Fax: +44 (0) 1746 767739

Email: info@hemingwaykits.com

www.hemingwaykits.com

Alec Tiranti Ltd

established 1895

Centrifugal Casting & Mould Making Machines, White Metal Melting Pots & Hand Casting Alloys



www.tiranti.co.uk

Tel: 0845 123 2100

Modelling Moulding Tools & Materials,
Pewter, White Metals Alloys, Bearing Metal, Silicone Rubbers,
Polyester, Polyurethanes & Epoxy Resins,
Including Fastcasts, & Clear Resins,
Professional range of Cold Cure Silicone Rubbers.

27 Warren Street, London, W1T 5NB 0207 380 0808
and

3 Pipers Court, Berkshire Drive, Thatcham, Berkshire, RG19 4ER

3 Broadleaze
Upper Seagry
Chippenham
SN15 5EY

**MAINLINE &
MARITIME**

WHAT YOU
SEE IS WHAT
YOU PAY!
ALL PRICES
INCLUDE UK
P&P

JUST PUBLISHED!

**British Military
Railways Overseas**

— in the —
Great War



Edited by
Dr. Paul F. Waters & J. Julian Rainbow

Compiled by
The British Overseas Railways Historical Trust
to mark
the Centenary of the Great War

£50 inc. UK p&p

MODEL ENGINEER

BECOME PART OF
THE ONLINE
COMMUNITY FOR
MODEL ENGINEER MAGAZINE



- Get access to exclusive competitions and giveaways
- Exclusive articles and advice from professionals
- Join our forum and make your views count
- Sign up to receive our monthly newsletter
- Subscribe and get additional content including Online Archives dating back to 2001*
- Register for free today and join our friendly community!

WWW.MODEL-ENGINEER.CO.UK

* only available with digital or print + digital subscriptions

FOLLOW US



Email: sales@pollymodelengineering.co.uk Website: www.pollymodelengineering.co.uk

POLLY MODEL ENGINEERING LIMITED

Build and drive your own 'POLLY Loco'!

British Made with a Proven Track Record



'MOLLY ANN' 0-6-0 Saddle Tank

Fully machined kit to build our latest coal fired 5" gauge loco. Easily assembled by novice builder with hand tools only.

With 10 other distinctive Polly kit build locos to choose from there is something for everyone (and we also sell drawings and castings for fine scale models).

Kit price £7044 inc VAT & UK delivery, other 5" gauge kit locos from £5716



The rugged POLLY designs provide for reliability and longevity, with performance to match the experts. Manufactured using state of the art CNC machinery in our own Nottingham workshops.

With over 30 years of POLLY locomotive manufacturing experience, you need have no concerns regarding support or spares availability. Customers are welcome to visit our Nottingham workshop to meet the team, discuss requirements and see our facilities.



Don't forget Polly is one of the largest suppliers of fittings, drawings, castings, materials, parts etc to model engineers. See us at exhibitions, worldwide mail order.



Catalogue available £2.50 posted and enquire for further details or visit our website where you will find other Polly Loco's, Kits, drawings and castings for scale models and comprehensive ME Supplies.

Polly Model Engineering Limited www.pollymodelengineering.co.uk
Atlas Mills, Birchwood Avenue, Tel: 0115 9736700
Long Eaton, Nottingham, NG10 3ND email: sales@pollymodelengineering.co.uk

A.m.€ 01952 879607

Abbotts Model Engineering
Makers of fine 5" & 7 1/4" Gauge
Locomotives & Rolling Stock

See Website for up to date info.
Please re-fresh your website browser.



Locomotive kits / Ready to run

Class 59 / 66

Class 67



from £2395



from £2495

Neptune 2 / 3

Neptune 4



from £1195



from £1895

Saturn 2 / 3

Saturn 4

Trucks



from £1020



from £1570



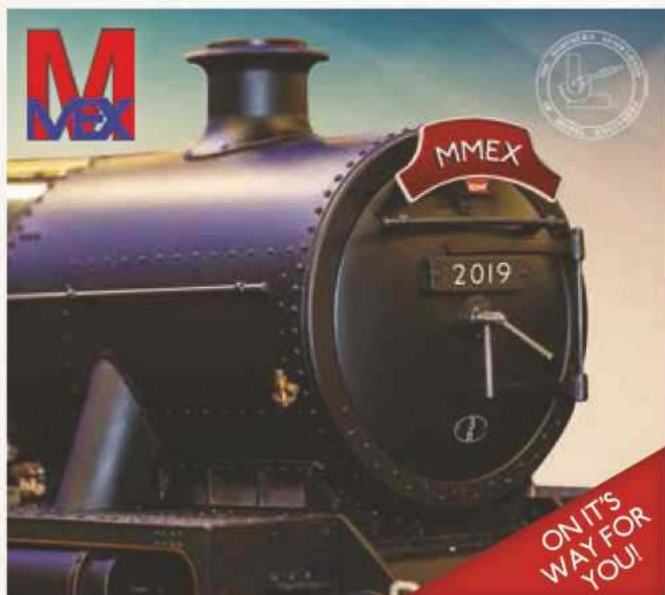
from £495



Unit D7, Haybrook Ind Est, Halesfield 9, Telford, Tf7 4QW

Shop open Mon to Fri 9.00am to 4.00pm
Locomotives, Coaches & Trucks all on display
(See website for products & updates)

www.ametrains.co.uk



THE MANCHESTER MODEL ENGINEERING EXHIBITION 2019

QUEEN ELIZABETH HALL, OLDHAM
New Radcliffe Street, OL1 1NL

Saturday 23rd February (10am - 5pm)
&
Sunday 24th February (10am - 4pm)

Advance Tickets £4
Tickets on the door £7
Accompanied children FREE
No other concessions

For more information and ticketing please visit www.mmex.co.uk

Bonhams

AUCTIONEERS SINCE 1793



The Gentleman's Library Sale

Including an Important Collection of
16 Scratch Built Live Steam Models

New Bond Street, London | 30 January 2019, 10am

ENQUIRIES

+44 (0)20 7393 3872
jon.baddeley@bonhams.com
bonhams.com/gentlib

**A FINE LIVE STEAM MODEL
BURRELL AGRICULTURAL
TRACTION ENGINE**

44in long
£6,000 - 10,000 *

* For details of the charges payable in addition to the final hammer price, please visit bonhams.com/buyersguide

LYNX MODEL WORKS



WORKING LIVE STEAM SCALE MODELS, SPECIALIST PARTS
MANUFACTURE. PRE-MACHINED KITS FOR WORKING
STEAM LOCOMOTIVES IN 5" AND 7¼" GAUGES



- BESPOKE PARTS MACHINING
- STATIONARY AND MARINE
ENGINES MANUFACTURED
- FULL PAINTING & LINING
SERVICE
- EC COMPLIANT
BOILERS FOR
SALE
- UNFINISHED
MODELS
COMPLETED



LYNX MODEL WORKS

Dovecote House, Main Road,
Maltby Le Marsh, Alford, Lincs,
LN13 0JP

Tel/Fax: 01507 206006

Email: info@lynxmodelworks.co.uk



www.lynxmodelworks.co.uk

All major Credit and
Debit cards accepted



The CS V6
Boiler

£2149
full price

Both gas &
coal fired

18kg empty

CASTLE STEAM

Can't find a boiler to drive
your large Stuart engine?

Castle Steam can hand-build you a boiler that will.
Our V6 boiler can produce over 4000cu.in. of steam
per minute @ 100PSI, and comes with all fittings.
We build in batches of 5 boilers. If you are interested,
please contact Mike for more information and a
specification sheet.

Also available are advanced kits and finished boilers
for locomotives and traction engines including Allchin,
Burrell, Durham & Nth Yorkshire, and Ruston Proctor.

Phone Steve on 07984 920786

or contact Mike at info.castlesteam@gmail.com

Tracy Tools Ltd.
Unit 1, Parkfield Units,
Barton Hill Way,
Torquay TQ2 8JG

Visit our brand new website

We ship anywhere in the world www.tracytools.com

PRODUCTS

- | | |
|-----------------------------|------------------------|
| • Taps and Dies | • Endmills |
| • Centre Drills | • Lathe Tooling |
| • Clearance Bargains | • Reamers |
| • Diestocks | • Slot Drills |
| • Drill sets (HSS)
boxed | • Specials |
| • Drills | • Tailstock Die Holder |
| • Drill set (loose) HS | • Tap Wrenches |
| | • Thread Chasers |



Tracy Tools Ltd

Tap & Die Specialist, Engineer Tool Supplies

Tel: 01803 328 603

Fax: 01803 328 157

Email: info@tracytools.com

www.tracytools.com

THE MOST VERSATILE TOOL FOR TURNING & FACING

It's easy to see why our best selling turning tool is the SCLCR. It can turn and face a bar without altering the toolpost, and the 80° nose angle gives much more strength than a 60° (triangular) insert. The NJ17 insert cuts steel, stainless, cast iron, phosphor bronze, aluminium, copper, brass etc. Please state shank size required - 8, 10 or 12mm square. Spare inserts £6.86 each for 8-10mm tools, £7.99 for 12mm.

SPECIAL OFFER PRICE £39.20

USE THE OTHER 2 CORNERS FOR ECONOMY!

Our SCRCR rough turning tool uses the same inserts as the SCLCR tools above. The good news is that it uses the other two corners! These very strong 100° corners are rigid enough for rough or intermittent turning. The insert is mounted at 75° to the lathe axis. 10mm sq section (for CCMT06 insert) and 12mm sq section (for CCMT09 insert).

SPECIAL OFFER PRICE £39.90

PROFILING WHEELS or SHAPING AXLES & PILLARS?

If you need to create complex shapes, our SRDCN button tool is invaluable. The 10mm square shank holds a 5mm dia cutting insert, and gives great versatility, superb strength and excellent tool life. The late Mr D Hudson of Bromsgrove SME used these tools for many years to profile the special form of tyre treads for his self-steering wheel sets with great consistency. Spare inserts just £5.79 each.

SPECIAL OFFER PRICE £39.20

TURN SMALL DIAMETERS with LIVE CENTRE IN PLACE!

The SDJCR tool uses a 55° insert, allowing access to small diameter components when using a tailstock centre. It can also profile back-angles. The NJ17 insert cuts steel, stainless, cast iron, phosphor bronze, brass, copper, aluminium etc. Shank size 10mm square section. Spare inserts just £6.86 each.

SPECIAL OFFER PRICE £39.20

A TOP QUALITY BORING BAR FOR YOUR LATHE

Here's your chance to own a top quality boring bar which uses our standard CCMT06 insert. Steel shank bars can generally bore to a length of approx 5 times their diameter. Please state bar dia required - 8, 10, 12 or 16mm. Spare inserts just £6.86 each.

Bar Dia.	Min Bore
8 mm	10 mm
10 mm	12 mm
12 mm	16 mm
16 mm	20 mm

SPECIAL OFFER PRICE £42.58

INTRODUCING THE GROUNDBREAKING NEW KIT-QD PARTING TOOL!

The new and innovative KIT-QD parting tool has a more secure insert location, stronger body and improved insert design compared to the original KIT-Q-CUT. It has an increased maximum reach of 23mm, giving over 1.3/4" parting capacity in solid bar. As previously, the tool fits the vast majority of ME lathes, including ML7 & ML10 machines, regardless of toolpost type. It comes complete with the key to locate and eject the tough, wear resistant insert. Cuts virtually all materials. Spare inserts just £10.75 each.

SPECIAL OFFER PRICE £69.50

EXTERNAL THREADCUTTING TOOL

These tools use the industry standard 16mm 'laydown' 3-edge inserts. With tough, tungsten carbide inserts, coated with TiAlN for wear resistance and smooth cutting, threads can be cut at very slow speeds if required. Tools are right hand as shown. 55° or 60° insert not included - order separately at £13.65. See our website for more info.

SPECIAL OFFER PRICE £43.80

INTERNAL THREADCUTTING TOOL

These tools use the industry standard 11mm 'laydown' 3-edge inserts. With tough, TiAlN coated tungsten carbide inserts, quality threads can be cut with ease. Tools are right hand as in picture. 10, 12 and 16mm dia's available. 55° or 60° insert not included - order separately at £11.37. See our website for more info.

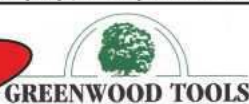
SPECIAL OFFER PRICE £43.80

DORMER DRILL SETS AT 60% OFF LIST PRICE!

All our Dormer drill sets are on offer at 60% off list price. The Dormer A002 self-centring TiN coated drills are also available to order individually in Metric and Imperial sizes. Please see our web site for details and to place your order.

TURNING, BORING & PARTING TOOLS COMPLETE WITH ONE INSERT.

Please add £3.00 for p&p, irrespective of order size or value



Greenwood Tools Limited

2a Middlefield Road, Bromsgrove, Worcs. B60 2PW
Phone: 01527 877576 - Email: GreenwTool@aol.com

Buy securely online: www.greenwood-tools.co.uk

SOLDERS & FLUXES

Soldering materials for the Model Engineer & Enthusiast.

www.soldersandfluxes.co.uk

Order online today for Next Day Delivery*.



SILVER SOLDER



FLUXES



SOLDER WIRE



*Next day delivery available if ordered Monday-Thursday before 4.30pm

Order online at www.soldersandfluxes.co.uk

LIVE STEAM MODELS

SPECIALISTS FOR DRAWINGS, CASTINGS, MACHINING AND FITTINGS FOR A RANGE OF 3" - 6" TRACTION ENGINES INCLUDING RUSTON-PROCTOR, FOSTER, FOWLER, BURRELL, MARSHALL.



Castings, Boiler & Pipe Fittings and Accessories for 3" to 6" Traction Engines

A Wide Range of BA Steel & Brass Screws, Washers, Nuts & Rivets, Tap/Dies and Tools



NEW Annual Service Kit
Available to Purchase Through Our Web Shop
ONLY £50 Inc Post
Includes—Steam Oil, Boiler Treatment, Fusible Plug, Gauge Glass, & Seal and Graphited Yarn



Send £4.00 for our Catalogue which includes our MES list to - Live Steam Models Ltd., Unit 7, Old Hall Mills, Little Eaton, Near Derby, DE21 5LA 01332 830811 or visit

www.livesteammodels.co.uk
info@livesteammodels.co.uk



MODEL ENGINEER

BECOME PART OF
THE ONLINE
COMMUNITY FOR
MODEL ENGINEER MAGAZINE



- Get access to exclusive competitions and giveaways
- Exclusive articles and advice from professionals
- Join our forum and make your views count
- Sign up to receive our monthly newsletter
- Subscribe and get additional content including Online Archives dating back to 2001*
- Register for free today and join our friendly community!

WWW.MODEL-ENGINEER.CO.UK

* only available with digital or print + digital subscriptions

FOLLOW US



GS MODEL SUPPLIES

LTD Directors : Geoff Stait & Helen Verrall-Stait

Now Available

Diesel outline Electric Locos in 5"g & 7 1/4"g



Contact us about your requirements.

Unit 4a, Love Lane,
Burnham-on-Sea,
Somerset,
TA8 1EY.

Tel: 01278 788007

www.gssmodelengineers.com

info@gssmodelengineers.com

MAXITRAK.COM

The best of model rail and road.

Tel: 01580 893030 Email: info@maxitrak.com

Finance available
Terms and conditions apply



5" EM BALDWIN

- Bo-bo diesel
- High level of detail
- Steel body
- 8 Motor
- Starting from £1995



**New for
2019!**



**TIG
Welded
Boilers**

PROMPT MAIL ORDER

TEL: 01580 890066

maidstone-engineering.com

30 years experience providing fittings, fixings, brass, bronze, copper and steel
Browse our website or visit us at 10-11 Larkstore Park, Staplehurst, Kent, TN12 0QY

BRITAIN'S FAVOURITE PHASE CONVERTERS...

CE marked and EMC compliant

THE
ONLY PHASE
CONVERTER

MANUFACTURED IN
BRITAIN TO ISO9001:2008
by POWER CAPACITORS LTD
30 Redfern Road,
Birmingham
B11 2BH

Transwave®

CONVERTERS

SUPPLYING
THE WOODWORKER
& MODEL ENGINEER
SINCE 1984

POWER CAPACITORS LTD
30 Redfern Road,
Birmingham
B11 2BH

STATIC CONVERTERS from £342 inc VAT

3-YEAR WARRANTY/MONEY-BACK GUARANTEE

240-volt 1-phase input, 415-volt 3-phase output. Single or multi-motor operation via socket/plug or distribution board. Eight sizes from 1.1kW/1.5hp to 11kW/15hp.

Ideal solution for "one machine at a time" environments. Output retrofits directly to existing machine wiring loom so no modification to machine necessary. Manual power adjustment via switch using voltmeter as guide.

Transwave
CONVERTERS



JAGUAR CUB INVERTERS from £196 inc VAT

5-YEAR WARRANTY/MONEY-BACK GUARANTEE

240-volt 1-phase input, 240-volt 3-phase output (i.e. dual voltage motor required). SOFT START-STOP, SPEED CONTROL, BRAKING, MOTOR PROTECTION and JOG FUNCTIONS. Simplified torque vector control giving enhanced performance at low RPM. Four sizes from 0.4kW/0.5hp to 2.2kW/3hp.

IMO

JAGUAR VXR INVERTERS from £296 inc VAT

5-YEAR WARRANTY/MONEY-BACK GUARANTEE

240-volt 1-phase input, 240-volt 3-phase output (i.e. dual voltage motor required). SOFT START-STOP, SPEED CONTROL, BRAKING, MOTOR PROTECTION and JOG FUNCTIONS.

Advanced vector control giving optimum performance at low RPM. Four sizes from 0.4kW/0.5hp to 2.2kW/3hp.

IMO



ROTARY CONVERTERS from £539 inc VAT

3-YEAR WARRANTY/MONEY-BACK GUARANTEE

240-volt 1-phase input, 415-volt 3-phase output. Single or multi-motor operation via socket/plug or distribution board.

Eleven sizes from 1.1kW/1.5hp to 22kW/30hp. Ideal solution for multi-operator environments or where fully automated "hands-free" operation is required

irrespective of demand. Output retrofits directly to existing machine wiring loom so no modification to machine necessary. Some sizes suitable for welding applications.

Transwave
CONVERTERS



NEW iDrive2 INVERTERS from £142 inc VAT

2-YEAR WARRANTY/MONEY-BACK GUARANTEE

240-volt 1-phase input, 240-volt 3-phase output (i.e. dual voltage motor required). SOFT START-STOP, SPEED CONTROL, BRAKING, MOTOR PROTECTION and JOG FUNCTIONS.

Low-Cost, general purpose simplified torque vector control.

Entry level performance suitable for the majority of applications. Four sizes available from 0.4kW/0.5hp to 2.2kW/3hp.

IMO



REMOTE CONTROL STATION £74 inc VAT

2-YEAR WARRANTY/MONEY-BACK GUARANTEE

Suitable for all IMO inverters, this remote pendant allows you to access the software of the inverter remotely, bypassing the buttons on the inverter itself. START, STOP, FORWARD, REVERSE, RUN, JOG, SPEED POTENTIOMETER. NO-VOLT RELEASE safety feature and two metre length of 7-core flex as standard.

Transwave
CONVERTERS

CONVERTERS MADE IN BRITAIN SINCE 1984; 3-YEAR WARRANTY ON ALL CONVERTER PRODUCTS; BS EN 9001:2008 QUALITY ASSURED MANUFACTURING ENVIRONMENT; CE MARKED PRODUCTS COMPLIANT WITH EMC REGULATIONS, THE LOW VOLTAGE DIRECTIVE and BS EN ISO 61000-3-2:2006.

Inverter-Metric Motor-RCS packages from £282 inc VAT • Imperial Packages from £337 inc VAT



Ideal for
Myford &
Boxford
lathes



Metric Motors from £54 including VAT



Imperial Motors from £149 including VAT



NO SURCHARGE FOR DEBIT & CREDIT CARD PAYMENTS

FREEPHONE 0800 035 2027 or 0121 708 4522

transwave@powercapacitors.co.uk • www.transwaveconverters.co.uk



DIRECT DEBIT SUBSCRIPTIONS (UK only)

Yes, I would like to subscribe to *Model Engineer*

☐ Print + Digital: £17.99 every quarter

☐ Print Subscription: £14.99 every quarter (saving 41%)

YOUR DETAILS must be completed

Mr/Mrs/Miss/Ms Initial Surname

Address

Postcode Country

Tel Mobile

Email D.O.B

I WOULD LIKE TO SEND A GIFT TO:

Mr/Mrs/Miss/Ms Initial Surname

Address

Postcode Country

INSTRUCTIONS TO YOUR BANK/BUILDING SOCIETY

Originator's reference 422562



Name of bank.....

Address of bank

..... Postcode

Account holder

Signature Date

Sort code Account number

Instructions to your bank or building society: Please pay MyTimeMedia Ltd. Direct Debits from the account detailed in this instruction subject to the safeguards assured by the Direct Debit Guarantee. I understand that this instruction may remain with MyTimeMedia Ltd and if so, details will be passed electronically to my bank/building society.

Reference Number (official use only)

Please note that banks and building societies may not accept Direct Debit instructions from some types of account.

CARD PAYMENTS & OVERSEAS

Yes, I would like to subscribe to *Model Engineer*,
for 1 year (26 issues) with a one-off payment

UK ONLY:

☐ Print + Digital: £78.00 (Saving 36%)

☐ Print: £66.00 (Saving 36%)

EUROPE & ROW:

☐ EU Print + Digital: £105.00

☐ EU Print: £93.00

☐ ROW Print + Digital: £105.00

☐ ROW Print: £93.00

PAYMENT DETAILS

☐ Postal Order/Cheque ☐ Visa/MasterCard ☐ Maestro

Please make cheques payable to MyTimeMedia Ltd and write code ME4604P on the back

Cardholder's name.....

Card no: (Maestro)

Valid from..... Expiry date..... Maestro issue no.....

Signature..... Date.....

TERMS & CONDITIONS: Offer ends 31st January 2019. MyTime Media collects your data so that we can fulfil your subscription. We may also, from time to time, send you details of MyTime Media offers, events and competitions but you always have a choice and can opt out by emailing us at unsubscribe@model-engineer.co.uk. Please select here if you are happy to receive such offers by email ☐ by post ☐ by phone ☐. We do not share or sell your data with/to third parties. Details you share with us will be managed as outlined in our Privacy Policy here <http://www.mytimemedia.co.uk/privacy-policy>. Please visit www.mytimemedia.co.uk/terms for full terms & conditions.

POST THIS FORM TO:

MODEL ENGINEER SUBSCRIPTIONS, MYTIMEMEDIA LTD,
3 QUEENSBRIDGE, THE LAKES, NORTHAMPTON NN4 7BF

**HURRY
OFFER
CLOSES**
31st JANUARY
2018


PRINT + DIGITAL SUBSCRIPTION

- 26 Issues **delivered to your door**
- **Great Savings** on the shop price
- **Download** each new issue to your device
- A **75% discount** on your Digital Subscription
- Access your subscription on **multiple devices**
- Access to the **Online Archive** dating back to August 2001


PRINT SUBSCRIPTION

- 26 Issues **delivered to your door**
- **Great Savings** on the shop price
- Never miss an issue

SUBSCRIBE TODAY

MODEL ENGINEER

DIGITAL
SUBSCRIPTIONS
AVAILABLE ONLINE!

SUBSCRIBE TO MODEL ENGINEER TODAY AND SAVE!

SAVE up to 41%**

Model Engineer is a great way to stay informed of everything to do with working mechanical models. With over 100 years of experience to draw on, Model Engineer covers everything from classic steam locomotives to cutting-edge modern developments in scale engineering. Regular content includes constructional articles, features on the best techniques and tools available and profiles of full-size modelling subject prototypes. Model Engineer magazine publishes 26 great issues a year.

**So subscribe today,
make great savings
and never miss
an issue!**



TERMS & CONDITIONS: Offer ends 31st January 2019.

*This digital discount is only available when you subscribe to the 'Print + Digital' package.

You can still get a great discount on the digital package, please visit the URL stated below for more information.

**36% saving relates to print only subscription. Please see www.mytimemedia.co.uk/terms for full terms & conditions.

SUBSCRIBE SECURELY ONLINE

 <https://me.secureorder.co.uk/MODE/ME4604P>

CALL OUR ORDER LINE

 **0344 243 9023**

Lines open Mon-Fri 8am – 8pm GMT & Saturday 9.30am – 3.30pm GMT

Quote ref: ME4604P

Calls are charged at the same rate as standard UK landlines and are included as part of any inclusive or free minutes allowances. There are no additional charges with this number. Overseas calls will cost more.



MARTIN
EVANS
Editor



DIANE
CARNEY
Assistant
Editor



YVETTE
GREEN
Designer

Rogue Traders

Model engineers are almost without exception a trustworthy tribe. This is true of both hobbyists and trade suppliers. Our dealings with each other are normally carried out on a basis of mutual trust and that trust is very rarely abused. Unfortunately, though, this is not universally true. There have been a number of instances recently where a handful of traders have acted negligently, incompetently or even fraudulently, in some cases inflicting significant losses on their customers.

In one case a boiler was inadequately packed and arrived damaged, to the point of having to be scrapped. The customer got his money back but had to go to court to do so and the court costs exceeded the value of the boiler. Other customers have paid for work to be done and then been kept waiting years while no progress was made. There have even been cases of traders dissolving their companies in order to escape their liabilities, leaving their customers 'high and dry'.

Such cases are, mercifully, rare but, all the same, it is probably wise to make some simple checks on a company before doing business, especially if a valuable model or significant amounts of cash are involved. A first step would be to look them up at Companies House (www.gov.uk/government/organisations/companies-house) which takes literally seconds. Mike Palmer of Station Road Steam offers plenty of good advice in his blog and I am sure he will not mind if I direct readers to his website – www.stationroadsteam.com

Dreweatts Auction

Mr Barry Gasson writes to inform me that Mr Bill Connor's collection of internal combustion (i.c.) engines are to be sold at auction. Mr Connor died

in August last year and was a well-known builder of i.c. engines, many of which gained gold medals and graced the pages of *Model Engineer*. Some readers may remember seeing them run at various model engineering events and exhibitions.

The sale will be hosted by Dreweatts on March 12th. This is the same sale at which Lord Braybrooke's collection will appear, as I mentioned in *Smoke Rings* recently (M.E.4602). As well as his i.c. engines, the sale will include his motor cycle and Bentley rotary radial engines, plus a 5 inch gauge *Britannia* locomotive, which was an IMLEC entrant in the 1980s.

You can find out more about Bill Connor's engines by searching on the internet for 'bill connor engines'.

Ultimate Edge

The Axminster Tool Centre announces a new general purpose sharpening and finishing machine – *Ultimate Edge*. It comes in two guises – single speed or the *deluxe* variable speed version. The single speed version has a 375W motor and can handle most light duty work in the workshop, including light grinding and sharpening lathe tools. The variable speed machine has a 560W motor. A range of accessories is available to allow you to make full use of the machine.

The belt of each machine can be positioned horizontally allowing

finishing and flat sanding jobs to be done. The *Ultimate Edge* is also an effective polishing and honing machine, utilising the unique multipurpose arbor. This feature enables the almost instant change of different mops, felt wheels and profiling wheels. Polishing mops and felt wheels should always be used in order, working from coarse to a fine compound.

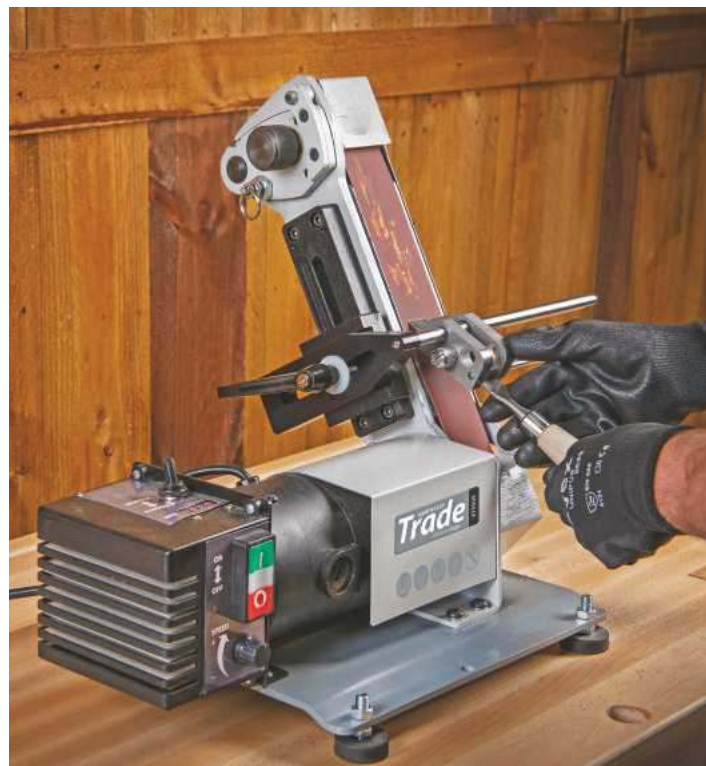
The single speed machine costs £329.95 and the variable speed version costs £379.96. Further information is available on Axminster's website at www.axminster.co.uk

Huddersfield Show

This is no longer at Huddersfield but in Halifax, its new home! The show features mainly aircraft, ship and civil and military vehicle models and will be held at the North Bridge Leisure Centre in Halifax on Sunday 10th February. Admission is £4 and further details may be found at www.huddersfieldscalemodelshow.co.uk

Duff Pictures

It turns out that a couple of pictures in the last issue contained text that did not reproduce very well. These are in the Sieg CNC article and the Diehead article. Improved versions of these pictures will be printed in the next issue, within the relevant articles.



Martin Evans can be contacted on the mobile number or email below and would be delighted to receive your contributions, in the form of items of correspondence, comment or articles.
07710-192953
mrevans@cantab.net

ME Vertical Boiler - Fittings

PART 22

A project aimed at beginners wishing to develop their skills or those requiring a robust vertical boiler for the running or testing of small steam engines. **Martin Gearing** adds to the pile of parts for boiler fittings.



Gauge glass top body - Item BF10

10AF Brass (fig 63)

Lathe

Hold in a 3 jaw chuck with 25mm protruding.

- Face off, centre drill, drill 5.3mm diameter x 20mm deep.
- Turn 7.94mm diameter x 5mm. Using a 1mm wide parting tool, undercut 0.5mm into the 7.94mm diameter.
- Thread 5/16 x 32 ME x 5mm (6¼ turns).
- Chamfer hexagon 30° x 0.5mm.
- Part off 19mm overall. Screw into the 5/16 x 32 ME mandrel (produced when making the hand pump valve plugs) and hold in the chuck.
- Face off, bringing the length between the mandrel and end face to 13.5mm.
- Chamfer the hexagon as before.
- Drill 5.5mm diameter x 6mm.
- Thread ¼ x 32 ME x 6mm (7½ turns).

Fig 63

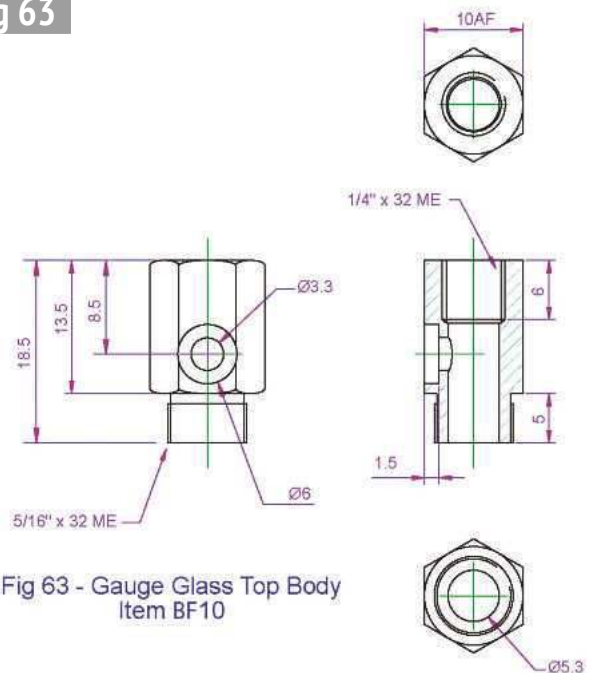


Fig 63 - Gauge Glass Top Body Item BF10

Move over to the milling machine.

Screw a union nut onto the 5/16 x 32 ME thread, before

positioning the body in the centre of and near to the top of the vice jaws using a suitable parallel placed

Fig 64

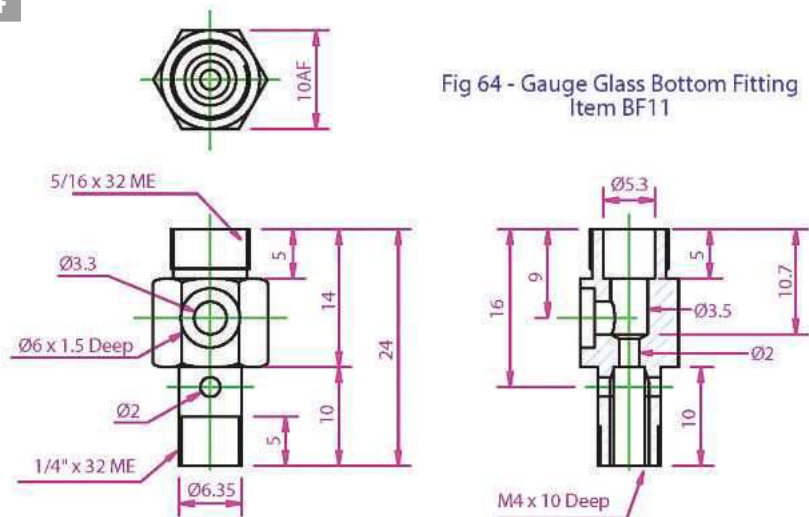
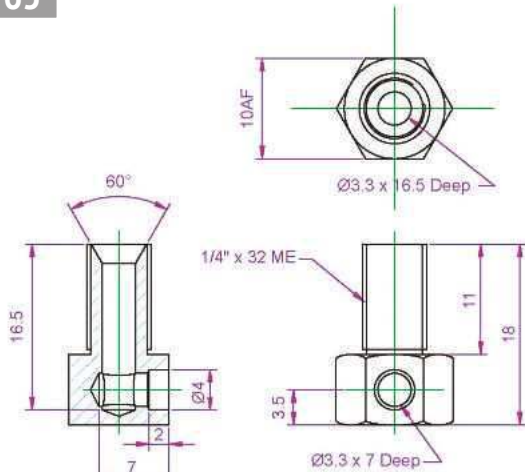


Fig 64 - Gauge Glass Bottom Fitting Item BF11

Tolerances:

Non functional (i.e. parts not a fit or match) $\pm 0.1\text{mm}$

Functional (i.e. parts having to match) $\pm 0.02\text{mm}$

Fig 65**Fig 65 - Cap Exhaust Fitting and Nut Item BF12**

under the flat section of the hexagon, with the top internally threaded face against the fixed jaw. Centre the spindle to the middle of the body on the X axis and to the fixed vice jaw on the Y axis. Clamp the X axis and zero the Y axis. Move the work towards the column 10mm, clamp the Y axis.

Centre drill, drill 3.3mm diameter breaking through completely into the 5.3mm hole. Drill 6mm diameter

x 1.5mm deep, measuring from when the drill just cuts full diameter. Alternatively, you can use a short series centre cutting slot drill. Remove, deburr and put to one side.

Gauge glass bottom body – Item BF11

10AF Brass (fig 64)

Hold in a 3 jaw chuck with 30mm protruding.

- Face off, centre drill.
- Drill 3.5mm diameter x 10.7mm deep, measured from when the full diameter of the drill goes past the end face.
- Drill 5.3mm diameter x 5mm deep from when the drill cuts full diameter.
- Turn 7.94mm diameter x 5mm.
- Using a 1mm wide parting tool, undercut 0.5mm into the 7.94mm diameter.
- Thread 5/16 x 32 ME x 5mm (6¼ turns).
- Chamfer the hexagon and part off 24.5mm overall. Screw into the 5/16 x 32 ME mandrel and hold in the chuck. Face off, bringing the length between the mandrel and end face to 14mm.
- Centre drill, drill 2mm diameter through to the 3.5mm hole, withdrawing frequently to clear the swarf and taking care as

the drill breaks through.

- Drill 3.3mm diameter x 10mm. Thread M4 x 9.5mm (13½ turns).
- Turn 6.35mm diameter x 10mm. Thread ¼ x 32 ME x 6mm (7½ turns).
- Chamfer the hexagon. Move over to the milling machine.

Screw a union nut onto the ¼ x 32 ME thread, before positioning the body in the centre of and near to the top of the vice jaws as before, with the Ø5/16" x 32 thread against the fixed jaw. Centre the spindle to the middle of the body on the

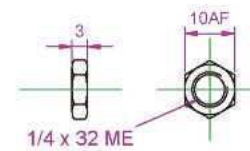
the drill just cuts full diameter. Alternatively, you can use a short series centre cutting slot drill. Move the work a further 7mm towards the column (16mm total), clamp the Y axis. Using a centre drill with a pilot of 2mm diameter or less, centre drill and drill 2mm diameter completely through the fitting taking care as it breaks into the M4 thread. Remove, deburr and put to one side.

Exhaust cap fitting – Item BF12

10AF Brass (fig 65)

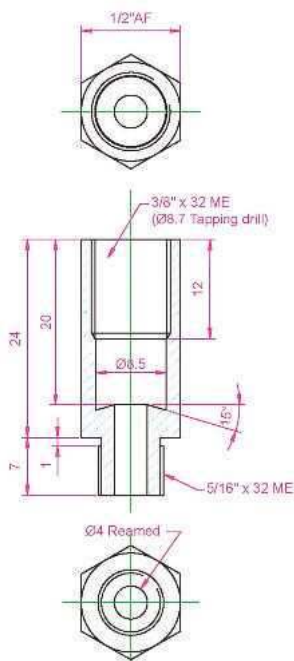
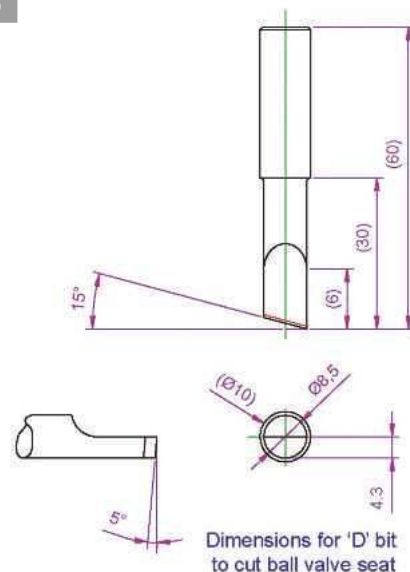
Hold in a three jaw chuck with 30mm protruding, face off, centre drill, drill 3.3mm diameter x 16.5mm deep from when the drill tip just enters the work, withdrawing frequently to clear the swarf. Turn 6.35mm diameter x 11mm. Using a 1mm wide parting tool, undercut 0.5mm into the 6.35mm diameter. Chamfer the hexagon. Thread ¼ x 32 ME x 11mm (13¾ turns). With a centre drill having a pilot of less than 3.3mm diameter drill into the face, stopping when the cone formed is just short of the core diameter of the thread.

Screw into the ¼ x 32 ME mandrel and face the hexagon to 7mm length measured from the mandrel

Fig 66**Fig 66 - Cap Exhaust Fitting and Nut Item BF24**

X axis and to the fixed vice jaw on the Y axis. Clamp the X axis and zero the Y axis. Move the work towards the column 9mm, clamp the Y axis.

Centre drill, drill 3mm diameter breaking through completely into the 5.3mm hole. Drill 6mm diameter x 1.5mm deep, measuring from when

Fig 67**Fig 67 - Safety Valve Body Item BF13 Use Ø1/4" Ball****Fig 68****Fig 68 - Safety Valve Seat 'D' Bit**



Drilling six vent holes.

face. Chamfer the hexagon. Now move to the milling machine.

Screw a union nut onto the $\frac{1}{4}$ x 32 ME thread to protect the coned face. Position the body in the centre of and near to the top of the vice jaws using a suitable parallel placed under the flat section of the hexagon, with a flat face against the fixed jaw. Centre the spindle to the middle of the body on the X axis and to the fixed vice jaw on the Y axis. Clamp the X axis and zero the Y axis. Move the work towards the column 3.5mm, clamp the Y axis.

Centre drill, drill 3.3mm diameter x 7mm deep, breaking through completely into the 3.3mm hole. Drill 4mm diameter x 2mm deep, measuring from when the drill just cuts full diameter or use a slot drill, as before. Remove, deburr and put to one side.

Exhaust cap fitting nut – Item BF12A

10AF Brass (fig 66)

Hold with 15mm protruding, face off, centre drill, drill 5.5mm diameter x 5mm deep after the drill cuts full diameter. Chamfer the hexagon. Thread $\frac{1}{4}$ x 32 ME x 5mm (6 $\frac{1}{4}$ turns). Part off 3mm overall, feeding slowly to achieve a good finish. Hold the stop valve body (BF7) with the short $\frac{1}{4}$ x 32 ME protruding. Screw on the nut, chamfered face first, and chamfer the hexagon.

Remove, deburr and put to one side.

Safety valve body – Item BF13

$\frac{1}{2}$ inch AF Brass (fig 67)

Hold in a three jaw chuck with 35mm protruding and face off. Turn 7.94mm diameter x 7mm. Using a 1mm wide parting tool, undercut 0.5mm into the 7.94mm diameter. Chamfer the hexagon then thread 5/16 x 32 ME x 7 (8 $\frac{3}{4}$ turns). Part off 31.5mm overall.

For the next stage of forming of the ball valve seat, you will need to make a 'D' bit to the dimensions given in fig 68 from a 60mm length of 10mm silver steel.

The process of manufacture and heat treatment is exactly the same as for the smaller 5.5mm 'D' bit used for the hand pump and clack valve seats.

Measure the length of the hexagon section and note how much in excess it is of 24mm. Turn around and hold with 3mm protruding then face off, removing the amount noted. Centre drill and drill 3.8mm diameter through. Because of the depth apply lubricant to the drill, withdrawing frequently



Drilling the spring seat.

Fig 69

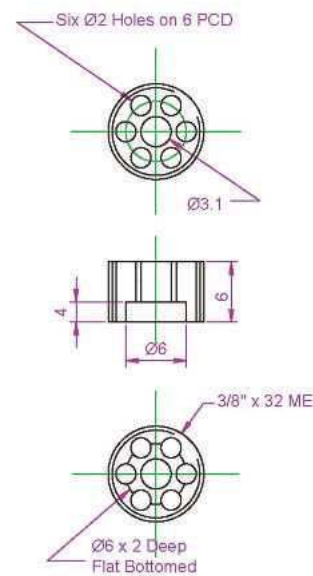


Fig 69 - Safety Valve Adjuster Item BF14

Safety valve adjuster – Item BF14

Ø10 Brass (fig 69)

Hold in a self-centring chuck with 20mm protruding, face off, centre drill and drill 3.1mm diameter x 8mm deep. Turn 9.93mm diameter x 9mm. Thread $\frac{3}{8}$ x 32 ME X 9mm (11 $\frac{1}{4}$ turns).

Remove the threaded bar and move to the milling machine.

Transfer the work to a rotary table fitted with a three jaw chuck, checked to run true with the rotary table spindle, and set in line with the machine spindle. Zero the X and Y axis. Clamp the Y slide. Move the table 3mm on the X axis, and clamp the slide. Centre drill using a drill with a pilot of less than 2mm diameter at 60° intervals. Drill 2mm diameter at the same

60° intervals 8mm deep measured from when the drill cuts full diameter (photo 122).

Transfer back to the lathe with 15mm protruding. In the tailstock drill chuck hold a 6mm centre cutting slot drill and drill 2mm deep to form the recess in the adjuster to locate the end of the spring (photo 123). Part off 6mm overall. Deburr and put to one side.

●To be continued.

Steam Turbines

Large and Miniature

PART 9

Alternatives to the Parsons design.

Mike Tilby explores the technology, history and modelling of steam turbines.



Parsons reaction turbines and ship propulsion.

As described in the last article, Parsons-type reaction turbines are of the utmost importance historically and remain the basis of turbines operating in many large power stations and industrial plants. For many decades steam turbines played a major role in propulsion of all types of large ships but this use has virtually ceased and now very few turbine-propelled ships seem to exist, even in preservation. For the last few decades, essentially the only steam turbine ships in use have been those transporting liquefied natural gas. Steam power remained cost-effective in these because of a continual boiling off of gas from the cargo. This gas cannot be allowed to escape because of its harmful environmental effects and if not used for propulsion, it must be re-liquefied.

In power stations, turbogenerators always run at a fixed speed because they



End view of the rotor in a turbine from the T.S.S. King Edward (built 1901 and now in the Glasgow Riverside Museum. Photograph used by courtesy of the museum).

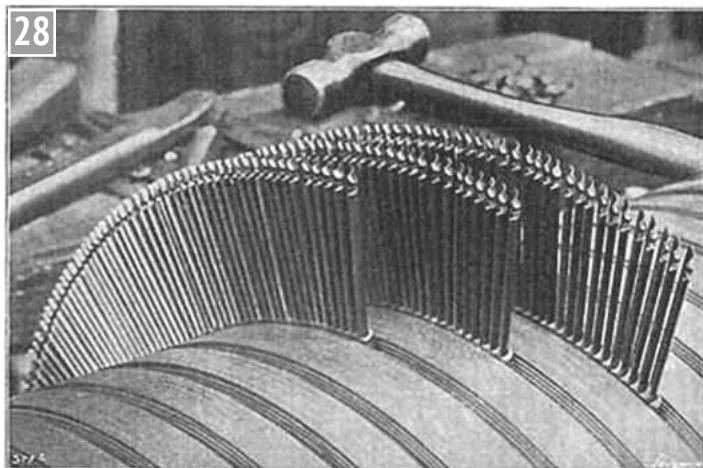
must maintain the correct frequency of the AC electricity. The turbines are, of course, designed to be most efficient at that speed. In contrast, marine turbines needed flexibility in speed. However, operating a Parsons turbine at less than full power meant operating with a partially closed steam inlet valve. This caused wire-drawing at the valve and thus wasted energy. Also, the lower steam pressure prevailing at the entrance to the blading resulted in lower turbine efficiency since the steam velocities attained were sub-optimal for the design of turbine, particularly in the initial high pressure stages. Because of these factors, in the earliest years of turbine propulsion, the types of ship that were most suitable for this type of engine were those that generally sailed at maximum speed. These included the grand ocean liners which used to fulfil the role now performed

by airliners in getting passengers and mail from A to B as quickly as possible.

This lack of efficiency when running at sub-optimal speeds was one of four shortcomings of the Parsons design that were identified by the French engineer Professor Auguste Rateau. In 1901, Rateau and Sautier filed a patent (ref 1) in which these shortcomings were explained and a new design for a steam turbine that overcame all of them was proposed. It is these same shortcomings that make the Parsons design a poor choice as the basis for a working model.

Nothing new under the sun

Before describing Rateau-type turbines it is worth emphasising that when Parsons, De Laval and Rateau filed their patents for turbine designs they were not describing any novel basic principles of turbine action,



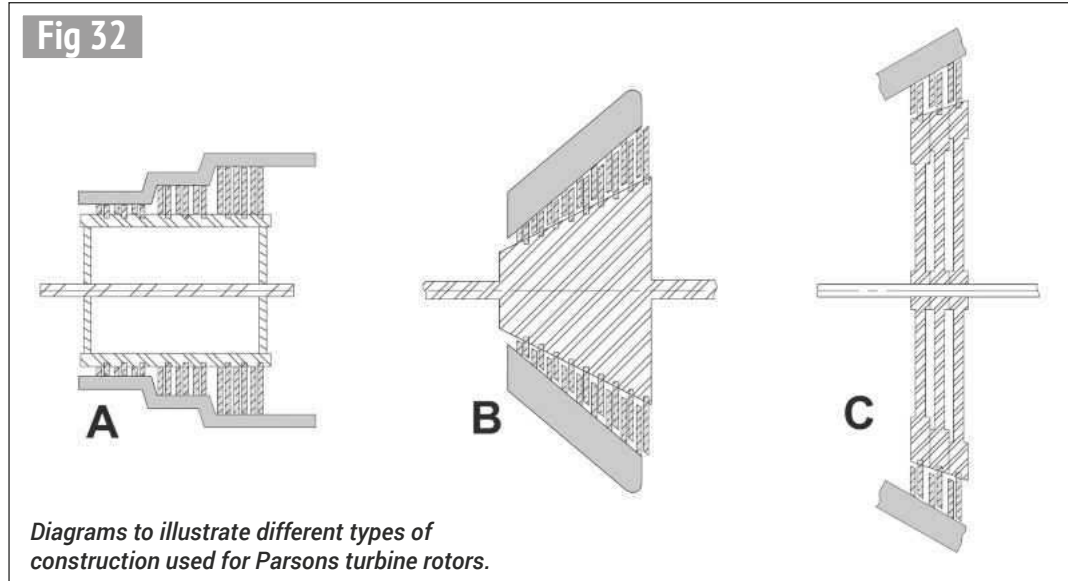
A partly bladed Parsons-type rotor.

since the principle of reaction and of impulse turbines and of pressure compounding had been described many decades, centuries or millennia earlier. Parsons himself insisted that he had not invented the steam turbine but had invented a workable design. Even the convergent-divergent De Laval nozzle had been described on a couple of previous occasions although De Laval may not have been aware of these documents and the earlier authors may not have realised the significance of their proposals.

The reason that the patent applications by Parsons and De Laval were accepted is that they incorporated established principles into novel and complete functional designs. A similar situation arose again in 1901 when Rateau and Sautier filed their patent. By this time Parsons turbines were already starting to replace reciprocating engines for electricity generation and for powering ships.

Professor Rateau and compound impulse turbines.

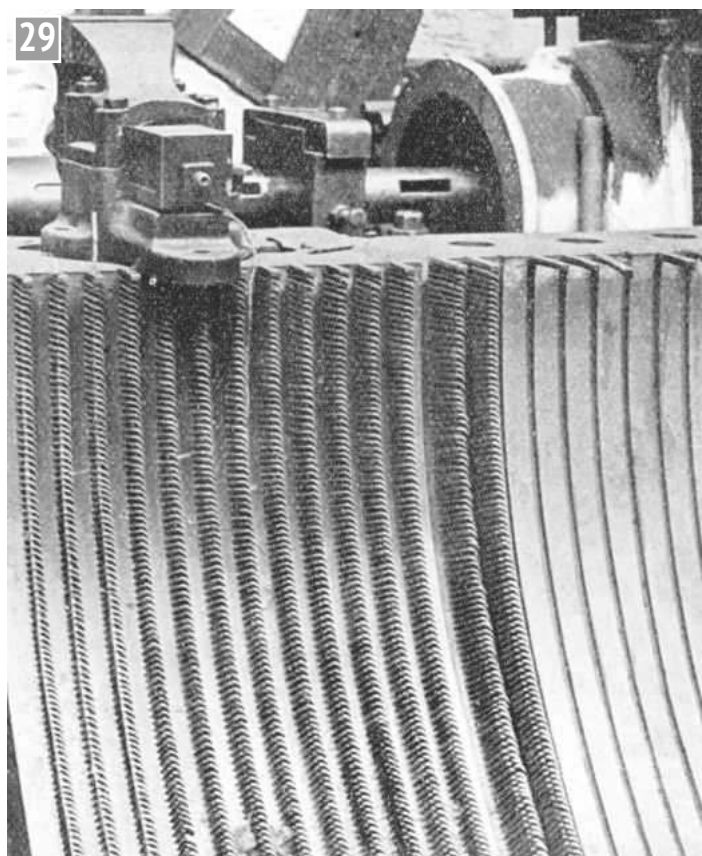
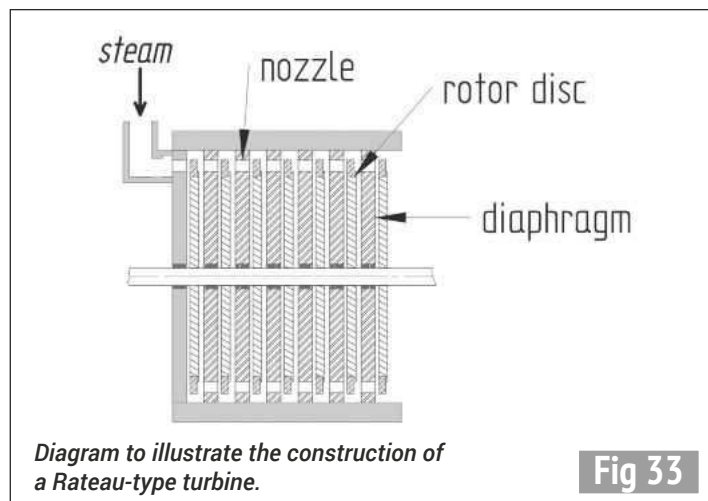
Auguste Rateau worked for 10 years as professor at the St. Étienne School of Mines which was the institution that, 70 years earlier, had been associated with the pioneers of water turbines - Burdin and Fourneyron (see part 3). Some of Professor Rateau's earliest inventions related to mine ventilation fans and later he contributed to the



development of turbochargers for internal combustion engines. However, it is his design of steam turbines that still carries his name. Like Parsons turbines, the Rateau turbine is pressure compounded and consists of a large number of stages. However, whereas in a Parsons turbine each stage is 50% reaction, in a Rateau turbine each stage is purely impulse so a whole machine basically consists of a series of De Laval-type turbines.

Turbine construction

At first glance Parsons and Rateau turbines may look similar but closer examination shows major differences in their construction and blade design. To illustrate the difference let's first briefly look at how Parsons rotors have been constructed.



A partly bladed Parsons-type casing.

For several decades they consisted of a hollow forged steel drum supported on spoked wheels at each end (**photo 27, fig 32(A)** and **photo 20** in the previous article). The blades of this type of rotor were inserted into specially shaped grooves turned in the drum (**photo 28**) while the stationary blades were inserted into grooves turned inside the casing or cylinder

(**photo 29**). Later designs used a solid forged rotor turned to a conical shape (**fig 32(B)**). For very large diameters the rotors consist of substantial forged discs that are shrunk onto the main shaft. These discs each carry a single row of blades and abut their neighbour with no intervening gaps (**fig 32(C)**). Sometimes disc and drum or disc and solid constructions were combined in different

sections of the same rotor.

In Rateau turbines (**fig 33**) the steam passes through nozzles mounted in fixed diaphragms (**photo 30**) and is directed onto blades attached to the peripheries of discs that are mounted on the shaft (**photo 31**). They are sometimes called multicellular turbines because each rotor disc is separate from its neighbour and is contained in its own cell (**photo 32**). In each cell the pressure is lower than in the preceding cell from which it is separated by one of the diaphragms. Some diaphragms were made as whole discs (**photo 30**) while others, were made in two halves (**photo 32**). The steam passes from one cell to the next via the nozzles in which it accelerates before passing into the ring of blades on the next turbine disc.

As a result of the pressure staging and the small pressure drop per stage, steam velocities could be kept relatively low which meant that, in contrast to De Laval's design, Rateau turbines only needed simple converging nozzles (see article 4). It also meant that the speed of rotation of the rotor could be kept low whilst attaining good efficiency. Therefore, stresses in the rotor discs were relatively low and they could be made more simply than De Laval-type rotors. Also, like Parsons turbines, Rateau turbines could be used for directly powering ship propellers.

Disadvantages with Parsons turbines

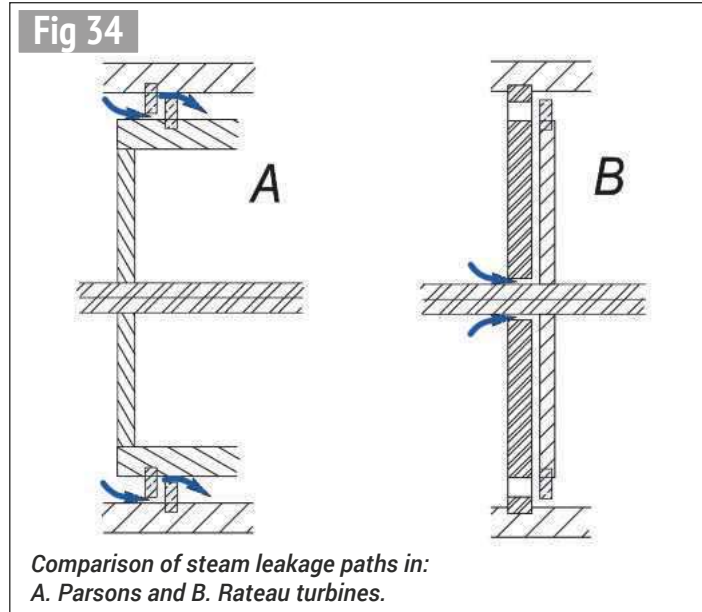
As mentioned above, Professor Rateau identified four difficulties in the Parsons turbine design. The first was the very large number of stages that they require. For the same drop in pressure across one stage, an impulse turbine can have a lower blade speed than a Parsons type reaction turbine and yet achieve a similar theoretical efficiency. This is because the most efficient blade speed for a reaction turbine is equal to the steam velocity whereas in an impulse turbine

it is half the steam velocity. Consequently, compared to a Parsons turbine of the same diameter and revolutions per minute, a Rateau turbine can use a greater pressure drop per stage which means that fewer stages are needed and so the turbine can be shorter.

The other three disadvantages all result from the fact that, because they are 50% reaction, Parsons turbines have a pressure drop across each set of rotating blades.

The second disadvantage is that, in Parsons turbines, single ended rotors experience an end thrust for which there must be some means of compensation. This adds complexity to the design because of the need for the dummy piston (see last article). Since the Rateau turbine is purely impulse, there is no end thrust.

The third disadvantage is that steam tends to leak past the tips of the blades and therefore the clearances between blade tips and casing must be kept very small. This adds difficulty to the manufacturing process and also means that, for some designs, slight wear on the bearings causes the rotor to start rubbing against the casing. Since, in a Rateau



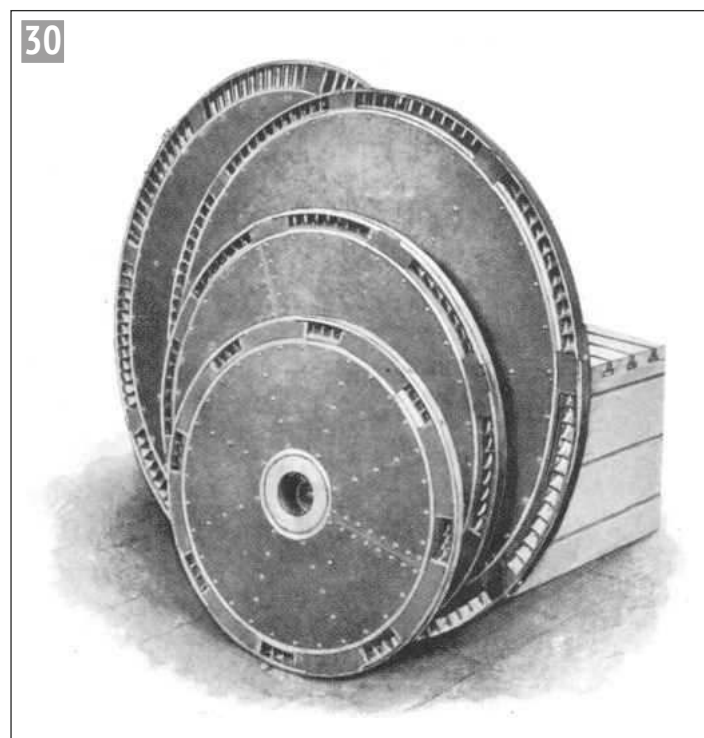
turbine, there is no pressure drop across the blades the clearance at the blade tips can be large and the only location where steam leakage needs to be prevented is where the shaft passes through each diaphragm. Preventing the leakage at this point is much easier than across blade tips in a Parsons turbine because the circumference of the shaft is very much smaller (**fig 34**). This means the leakage area is smaller and it is easier to control leakage by using a

labyrinth or some other type of seal.

The fourth disadvantage is that, in Parsons turbines, steam must always act upon the full circumference of the rotor. This is so even for the very first stage. However, ideally the area of entry of steam to a turbine would be restricted in order to limit the flow rate to the desired level. In a De Laval turbine entry of steam could be via just a single nozzle but in a Parsons turbine it would be difficult to restrict entry of steam to just a few blades.

However, even if such restricted entry could be arranged, it would not be acceptable because of the pressure drop that occurs across the rotor blades. This pressure drop would result in sections of the blades and rotor rim being subject to rapidly fluctuating axial forces as they passed in front of the steam inlet. The need for full admission around the rotor means that the only way to reduce the area of entry of steam in a Parsons turbine is to have very short blades. However, this leads to an increased proportion of the steam leaking past the blade tips.

In the impulse design it is perfectly acceptable to restrict entry of steam to a small portion of the circumference since there is no significant axial thrust on the rotor.



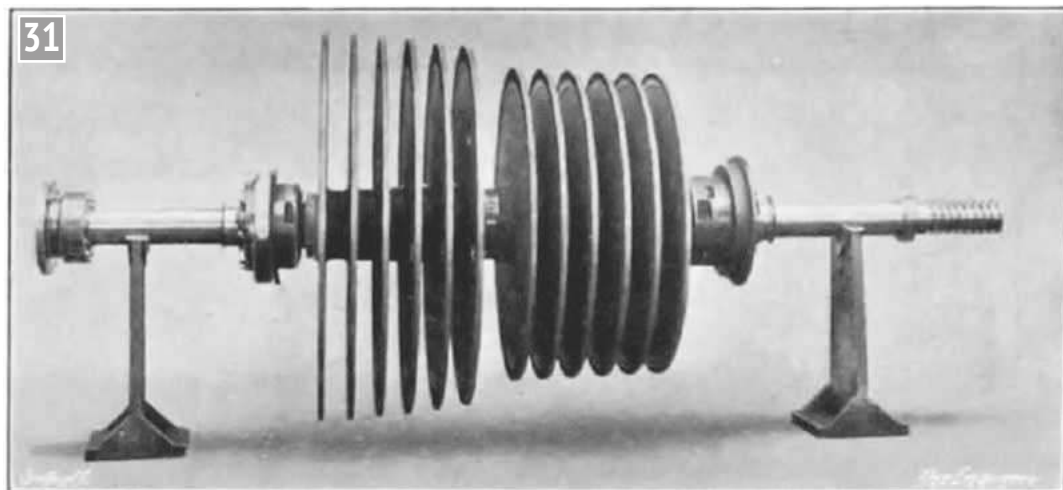
Diaphragms for a Rateau turbine.

Steam expands as it passes down the pressure stages and the cross-sectional area of the steam path must increase to accommodate this increased volume. In Parsons turbines this was achieved by increasing blade length and rotor diameter. However, in Rateau turbines it was possible to achieve the same effect, at least in part, simply by increasing the number of nozzles in the diaphragms (photo 30).

In practice the above limitations of Parsons turbines were not too problematic and they do not outweigh the higher potential efficiency of reaction turbines. This is particularly true for large turbines where leakage past blade tips is small in proportion to total blade area and where even a small improvement in efficiency has a large cost-benefit over many years of service. Pressure compounded impulse and reaction turbines can both achieve high efficiencies but many later turbines took advantage of the best of both designs by combining Rateau type impulse blading for the initial high pressure stages with Parsons-type reaction blading for the remainder. This arrangement has the additional advantage that the turbine casing does not have to withstand extreme steam conditions. This is because the highest pressure and temperature is restricted to just the pipes and passageways leading to the first nozzles.

Rateau turbines.

Rateau-type turbines became quite widely adopted in competition with the Parsons-type. Initially Rateau wanted to develop his design in partnership with Charles Parsons but Parsons refused and so Rateau established his own company in France. In America the large General Electric Company took out a license to use the Rateau design. Their chief competitor, Westinghouse, had already acquired a license to build



A Rateau rotor made by Fraser & Chalmers (Erith, Kent), about 1911.

Parsons turbines. In the UK, Rateau turbines were built by the engineering company Fraser and Chalmers, at Erith in Kent. In 1918 Fraser and Chalmers' turbine factory was taken over by GEC who continued to build turbo-generators of the same design. In 1965, the steam turbine part of GEC was bought by Parsons and the Erith turbogenerator site was eventually closed. Parsons itself was taken over by the giant Siemens corporation in 1997. The original Parsons site remains in use with a modernised but smaller scale facility.

Model turbines and other types of impulse turbine.

At the time that the Rateau turbine design was becoming established, a few other companies started making

their own design of pressure compounded impulse turbines. One of the better-known types was designed by the Swiss engineer Heinrich Zoelly who worked for Escher-Wyss of Zurich.

As far as I can find out, no working model of a Rateau-type turbine has been described in the model engineering press, although Professor Chaddock wrote that he thought a pressure-compounded two-stage impulse design would have been his next step if he had continued working on steam turbines instead of switching to gas turbines (ref 2).

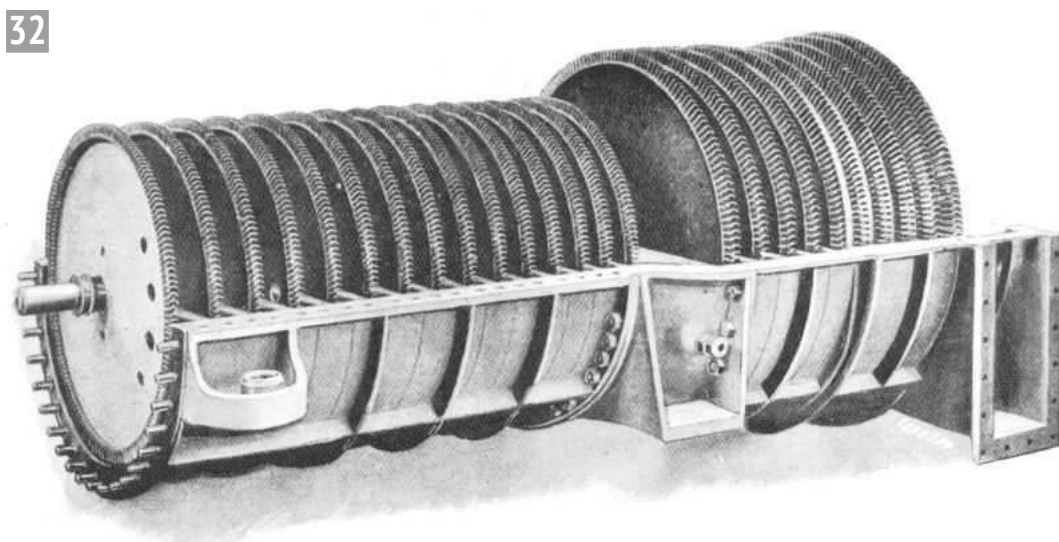
Eventually Zoelly and other turbine makers built turbines in which impulse stages, as described in this article, were combined with stages that worked on another

principle known as velocity compounding. As we'll see, one or two miniature velocity compounded turbines have been described and several model engineers have built simple single-stage impulse turbines using a design of rotor that was originally used in full-size velocity compounded turbines. These models and the principle of velocity compounding will be discussed in the next article.

●To be continued.

References

- Ref 1** Rateau, A.G.E. and Sauter, G. (1903) *Patent No. 748,216. Multicellular turbine.* www.google.co.uk/patents/US748216
- Ref 2** Chaddock, D.H. (1988) *Is compounding worth the trouble? A footnote.* *Model Engineer* 160 (3828): 38–40.



A Rateau turbine with the high pressure end cover and top half of the casing removed.

Building Signals for 5 inch Gauge

PART 6

Doug Hewson adds realistic detail to the running lines.



Continued from p.26
M.E. 4602, 21 December 2018



Photograph 76 shows the new Peak Forest signal box at night during one of our runs. From this angle one can just see the block shelf with the bells and



tappers. **Photograph 77** shows the beautifully made block bell casings and the shelf made by my late friend Tony. It isn't finished yet as there is lots of wiring that needs tidying up but you get the idea. Sorry, but the little sign modification 'Junction' has dropped off. In the centre is, of course, the

telephone and then the two instruments for detectors for the main crossover 'No 6' at the far end of the station, which I can't see from the box, especially when there is a bit of a crowd on the station, and for Chinley Junction, which I can't see either. There is also a little green switch on the left

had side of the box whereby I can also speak to Stowmarket Yard so that I can liaise with them about what I am going to send in and what is coming out. This is so that I know what bell code to give the train. There is one bell for the up line (on the right) and one for the down, the third bell in the middle is for the branch Line. **Photograph 78** shows the new signal box in position.

These (**photo 79**) are just a few of the fittings I made for our signals. Included on the right are the two spectacle plates, one for the main arms and the other for the subsidiaries. On the left is the finial and the two chain wheel pullies and then there are things like the lamps and other bits and bobs.

Here (**photo 80**) we see the scene around Peak Forest Yard with the late Derek Bray passing by on the up main on his dad's Pom-Pom (J11) amongst some wagons in the yard. He is just passing the up main home signals with the



one which is off is for the main line. He is on a pick-up goods train bound for Stowmarket Yard. Just in front of the locomotive is a loading gauge which Malc made to add to this nicely detailed scene. It is all these little touches which I love to see. **Photograph 81** shows Derek's J11 in Peak Forest Yard awaiting his next turn. The pipe bent down just above the handrail is the exhaust for the working vacuum brake ejector.

This is the scene (**photo 82**) when we welcomed a visit from the Nottingham gang with Nick Harrison



enjoying a spell of shunting on the 08, whilst Mike Firth (with shunting pole), another Nottingham member, is in conversation with Nick over the next move. Mike also has his own ground level railway. The photograph shows the yard from a different angle, this time with the up homes in the foreground. Now, this signal is one signal which I did make properly. From left to right the signals are the branch loop home signal,



next is the main branch line up home, next we see the up main line home signal with a call on arm below that and finally, on the extreme right is the subsidiary signal for working wrong line through the station. This signal is one which would have begun its life with lower quadrant arms on it but the main post is a Midland timber one.

The branch line arms have now been changed for the later corrugated arms and so has the wrong line working signal but the main line arms have now been changed for the later Nichols pattern BR arms. As you may see, this signal is operated with the Midland torsion bars whereby the signals are all pulled off by twisting the longitudinal rods.

As you will see there is a good assortment of wagons in the yard, including three goods brake vans, one NE one and a couple of long wheelbase LMS ones. There is also the down main starting signal pulled off, which we will come to in a moment - always a good sign! The manhole cover in the left foreground covers two buried 45 gallon drums which is our water supply for the yard and the column on the main line just opposite the box.

Malc and Steve are seen here (**photo 83**) busy fitting a new signal which will be Peak Forest No. 27 and is the yard exit signal. This was at a time when I was spraying all the rails to make



them appear rusty. It is quite amazing what a difference it makes. **Photograph 84** shows the signal now in action. This is Dave Noble's wonderful little Brush Diesel shunter. It is radio controlled and lovely to operate as it does not come to an abrupt halt but gradually slows down and the same applies when you put the power on. When you get used to this little quirk it is brilliant. I love it! The prototype is now preserved on the Middleton Railway in Leeds. It is also in charge of one of Dave's kits, his 21 ton hopper wagon. Note my rusty rails now!

This (**photo 85**) is the stop signal for Peak Forest No.

28, which is the down branch home signal. For some reason I am afraid I can't find a photograph of the whole signal in this case. **Photograph 86** is the distant arm for the same signal and **photo 87** shows a little bit more detail of the back of the signal. I had to use my LNER lamps for this signal as it was put in long before I made the patterns for the Adlake lamp and bracket.

Photograph 88 shows the down starter for Peak Forest Box and it too has the torsion bar pull rods, not that you can see them very well in this photograph. Unfortunately,

this is the best photograph I have for this signal. This has the notoriety of being the very first signal that we saw on the railway. For some inexplicable reason this is one of the best signals operated from this Box.

Finally, **photo 89** is the little dolly outside Peak Forest Box which is our up home signal. It is the one on the post which was modelled from the one at Barnetby which stood on the post outside East Box so I religiously copied it, even down to the number of rungs in the ladder!

ME



Garrett 4CD Tractor

in 6 inch scale

PART 52

Chris Gunn makes and paints the woodwork for the canopy.



This article has been written to guide the builder through the construction of the 6 inch scale Garrett 4CD tractor designed by Chris d'Alquen. The writer has previously built a 4 inch scale Garrett and a 6 inch scale Foden wagon so has the benefit of considerable experience in larger scale modelling. Most machining can be done in the average home workshop but the supplier from whom the castings and drawings are currently available is able to provide a machining service for the largest items if required.

Continued from p.29
M.E. 4602, 21 December 2018



Once all the uprights were dealt with, I marked out some 19mm ply to make the three arches that support the roof from the three sets of uprights. I had to use a piece of bar and a couple of G-clamps to extend my trammels (**photo 462**). I cut the ply into three pieces with my circular saw and then cut the profile with my jigsaw (**photo 463**). Then the three pieces were clamped together and taken outside and sanded to the line as a set. I measured

the centres of each set of uprights and marked out the fixing holes on the ply arches; I drilled them and then fitted them into position.

I decided to fit thin angle brackets to the ends of each arch to support the sides of the roof, as I could then use bolts to hold it all together during its construction. I looked around for some material from which to make these and hit upon some thin rectangular hollow section (RHS) tube that I had salvaged from an old computer

desk frame that I scrapped a few months ago. (This came in handy very quickly, compared with most of the stuff under the bench!) I marked out the holes in the hollow section first and drilled them as shown in **photo 464**. Once drilled, the RHS was cut into lengths and then I slit the rectangular sections with my disc grinder with a 1mm thick cutting disc to create the angles. These were cleaned up and, after cleaning them, I fitted two to each end of the arches with

Drawings, castings and machining services are available from A. N. Engineering: Email: a.nutting@hotmail.co.uk



Marking out the canopy support.



Sawing the canopy support.



Drilling the RHS.



All the supports in position.



Sanding the stiffeners.

4mm bolts. Once the angles were added I fitted the arches to the supports (**photo 465**). I was then able to clamp a straight piece of timber along each side and the result was pretty good, as all the ends were in line.

I measured up the canopy frame and ordered some hardwood side pieces and some narrow width slats with which to clad the roof.

While I was waiting for the wood to be machined, I set about making the stiffeners and end pieces. I found some hardwood I had saved from a (supposedly) teak garden table and found that I could get the two ends and three intermediate sections from the salvaged timber. The timber was cross-cut to length and then I marked out the curves from the ply arches and cut over size using my jigsaw. I also attached more angles to the ends of the stiffeners, again made from the scrapped computer desk frame. Once

they were all done, I assembled them all with G-clamps and everything looked fine, but when I tried a timber across the top of all the arches there was a gap here and there as the arches were not all exactly the same. I marked the arches in sequence from front to back, took them all off, clamped them together and then sanded them to the same profile (**photo 466**). I concluded that if I had made all the arches together I could have

got them all the same to start with but I really wanted to see how the first three would look and also to check the integrity of the canopy supports.

In the meantime my hardwood strips were ready, so I collected these and then set the canopy roof up again, using the right materials. The side members were attached to the three main arches fitted to the canopy supports. I jockeyed these about until the sides were in the right

positions and held them with G-clamps. I checked across with a builder's square to make sure the uprights were square with the sides and tapped the joints until the embryo canopy was set up correctly.

Next I added the ends and intermediate stiffeners and realised that one can never



Initial assembly.



Canopy screwed together.



The set-up for planing.



Roof cladding part complete.



All the slats fitted.



The cladding completed.

have enough G-clamps. Once everything was lined up and square (**photo 467**) it was time to get some screws through the angle brackets. I elected to put some temporary cap head screws through the angles and, at a later date, these would be changed for some countersunk head screws, with the deep countersinks on the outside. Before painting, the

screw holes would be filled and sanded smooth to hide the presence of the screws. I felt this would be a more secure method of fixing everything together rather than short wood screws from the inside, through the angles and into the side rails which are not that thick - just $\frac{1}{2}$ inch.

I elected to use my right angled air drill to drill through

the angles from the inside and then fit the temporary M4 screws and nuts. This went reasonably well and eventually every bolt was in place and I could put all the G-clamps away (**photo 468**).

The next step was to clad the roof with the narrow hardwood strips. I started with the top centre piece, measured the centre position and then I planed a slight angle on each side of the centre strip, so the joint would be closed at the inside and outside of the canopy roof. I had bought two cheap, fold-away workbenches for another job and these came in handy to deal with the long strips. I could hold one strip with the two workbenches and then take a pass off each side with the planer as shown in **photo 469**.

I anointed the arches with wood glue and then tacked the strip to the arches with 1 inch panel pins. Once the first piece was in place, I continued to add strips, glueing one side

of the strips as I fitted them. **Photograph 470** shows the first side almost complete.

The final piece on each side was trimmed so it overhung the side by $\frac{1}{2}$ inch, so I could wrap the canvas roof covering over the lip and under where it could be stuck to the underside of the lip. At this stage the slats were left overlong so they could be trimmed when the cladding was complete. Once one side was done, I worked from the centre again and fitted the slats to the other side; **photo 471** shows all slats in position, as yet not sawn to length.

Once the glue had been allowed to dry, I cut the canopy ends to length with my jig saw and then cleaned the saw edge up with a disc sander. Then I cleaned up the canopy roof with a disc sander, blending in all the edges of the slats, as there was some slight variation. Once this was done, I was pretty happy with the result (**photos 472 and 473**).

Once the sanding was done, I removed the canopy roof from the supports and then proceeded to tidy it up. I removed the temporary bolts holding the angles and carefully, deeply countersunk the outside side rail and fitted countersunk M4 screws with nuts on the inside, making sure the screw heads were well below the face of the side rails. Once all the screws were dealt with, I filled the holes with household filler as I felt this would stick to the wood better than any alternative. Then I supported the roof on the two workbenches and went over the inside of the canopy roof filling any gaps with the household filler and removing all the drips of adhesive ready for painting. The inside of the canopy was then painted cream on top of a suitable primer.

● To be continued.



Quite a pleasing result.

NEXT TIME

Next time I shall add the canvas covering to complete the canopy.

The Barclay Well Tanks of the Great War PART 44

Terence Holland describes and constructs two appealing, century old locomotives.



Continued from p.53
M.E. 4602, 21 December 2018

This constructional series addresses Andrew Barclay 0-4-0 and 0-6-0 narrow gauge locomotives supplied for use in the First World War. Built without the use of castings, the 0-4-0 design is described as two versions; as-built for the British Admiralty in 1918 and as rebuilt and currently running on the Talyllyn Railway as their locomotive No.6, *Douglas*. The 0-6-0 engines described were built in 1917 and operated on 60 centimetre gauge track at the Western Front in France. These were small, spartan machines of which only 25 were supplied and none have survived into preservation.

My valve designs

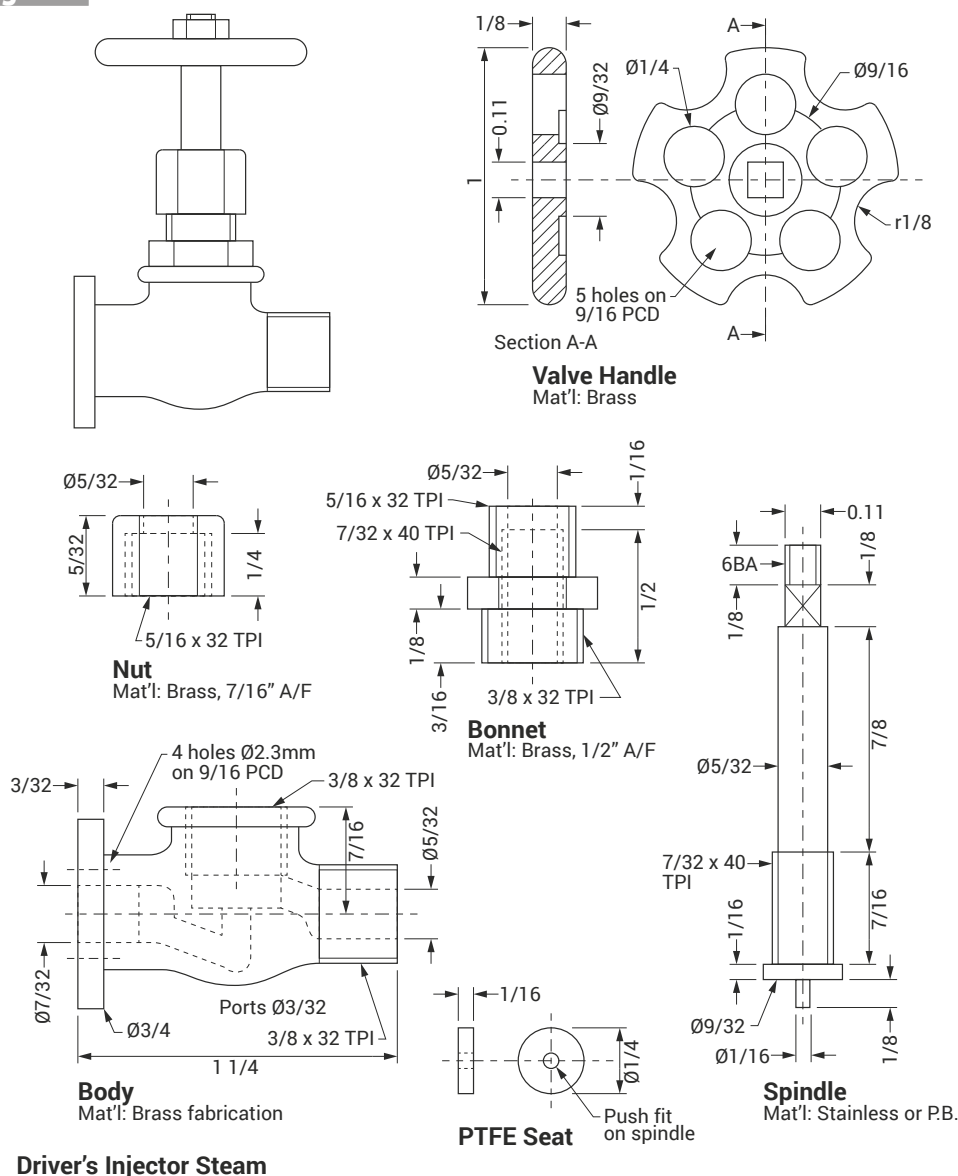
Figures 136 and 137 detail the two injector valves, which, design-wise, are identical in all respects except that the fireman's unit is smaller. For the smaller valve, along with the angle valve design in fig 138, handles are not shown

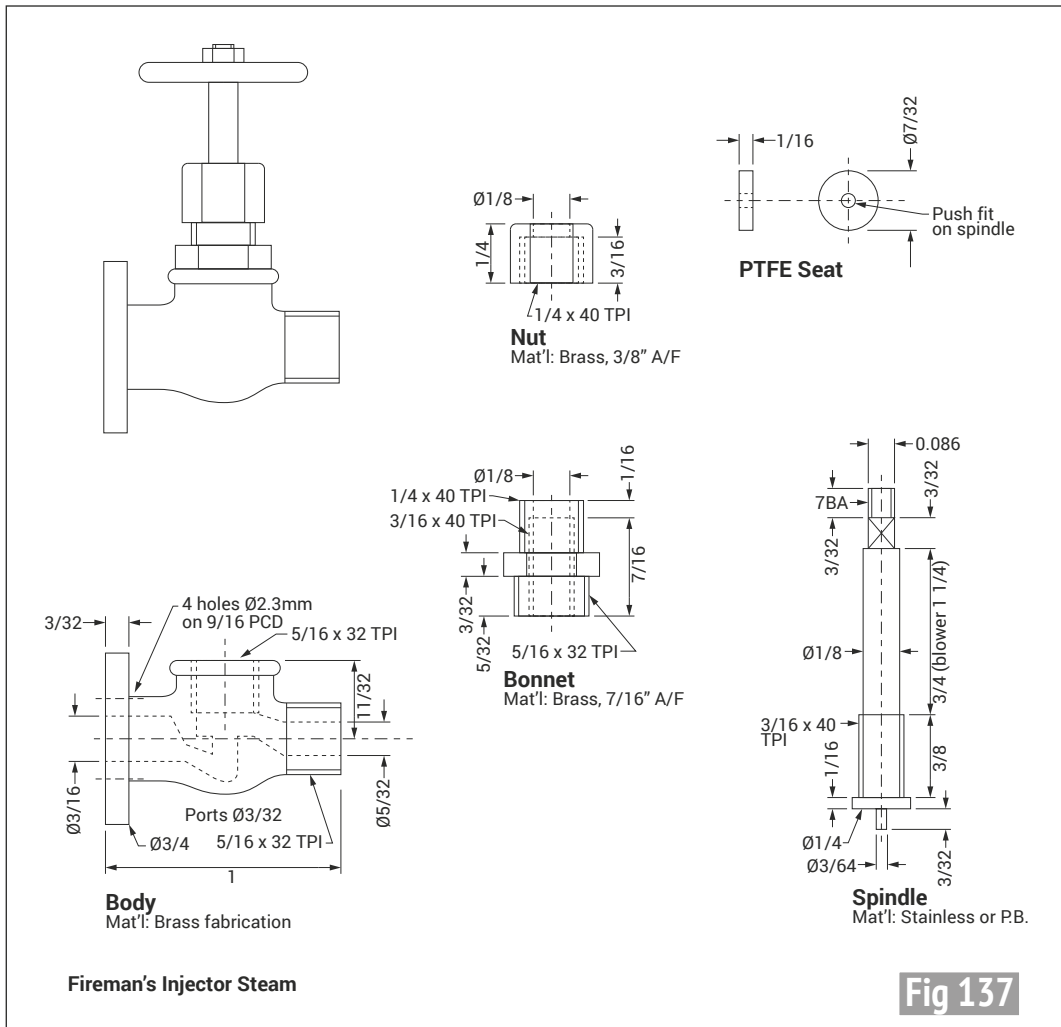
as a suitable handle (for the boiler barrel clack valves) was presented in fig 125 (p.526, M.E.4596, 28th September 2018).

Figure 138 details the angle valve design, which is used for the steam brake stop valve, the blower and the crosshead

feed pump bypass; i.e. for both steam and water. The spindle is probably the most difficult part to make but a modern carbide tool fitted with a nice, new tip should help. The PTFE seat means that concentricity is not a major issue, as it is with the conventional pointed

Fig 136





Regulator and stand.

depth of the $\frac{3}{8}$ inch diameter thread on the stay nut is shown as $\frac{3}{8}$ inch and not $\frac{3}{4}$ inch as shown incorrectly in fig 106 (p.731, M.E.4586, 11th May 2018).

Blowdown valve

The blowdown valve is shown in fig 140.

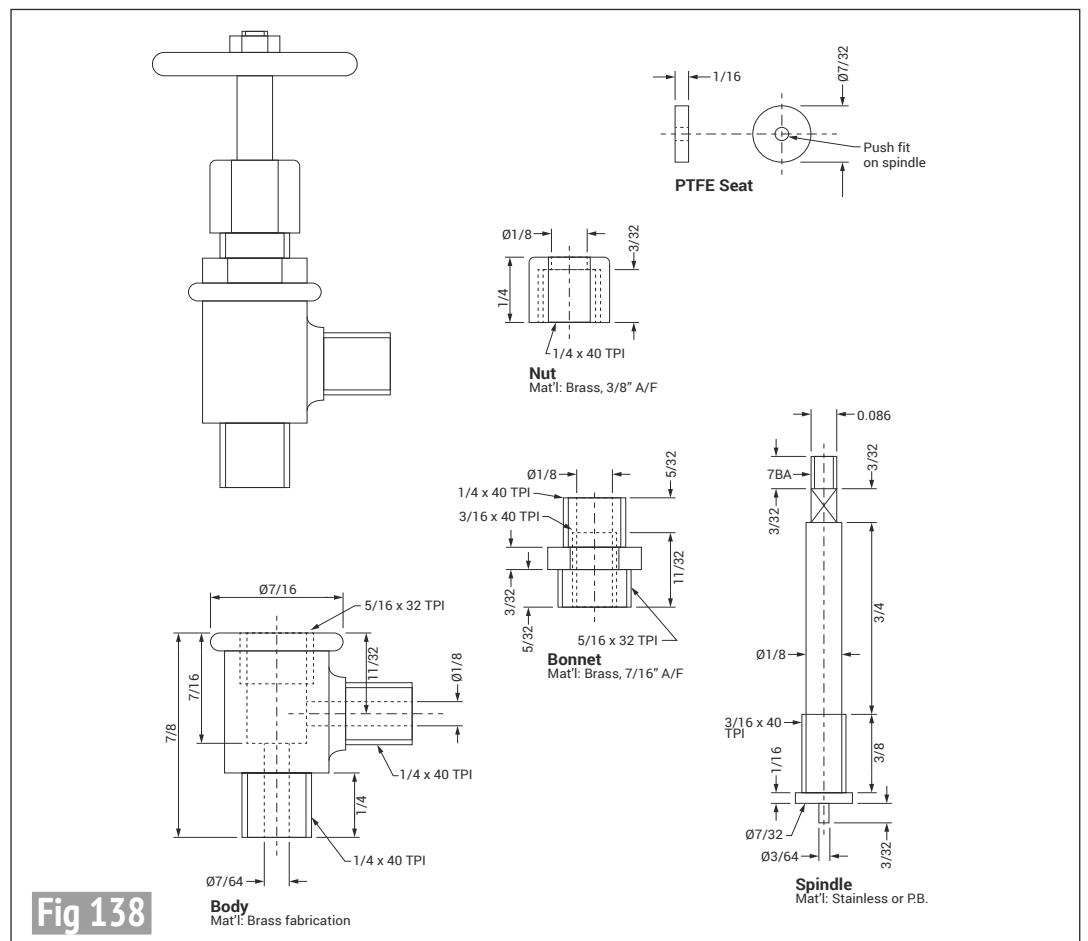
It is essential that this item is made from phosphor bronze, as it will be permanently exposed

tip. Note that the spindle for the blower valve needs to be $\frac{1}{2}$ to $\frac{3}{4}$ inch longer than the other valves to make it easier to access during operation.

Regulator stand

The stand (fig 139 and photo 216) is made from mild steel components silver soldered together. The part of the stand that connects to the boiler is difficult to define, so the dimensions given are a bit 'fast and loose' and will need to be determined 'on the job'! Note that the threads for the 4BA studs can be drilled and tapped *in situ* although it is possible to remove the two stay nuts and carry out the work in the lathe.

Space is at a premium on the right-hand side of the boiler and, therefore, if there is insufficient clearance for the reversing lever, it may be necessary to dispense with the studs and replace them with 4BA steel or stainless screws, countersunk into the $\frac{1}{16}$ inch thick bracket. The



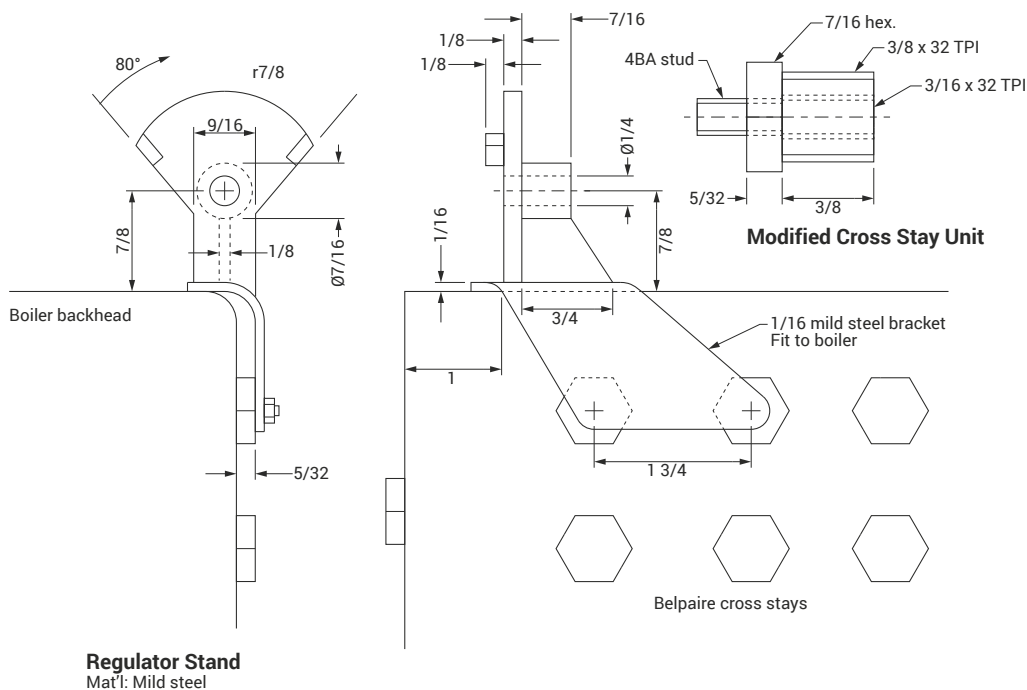
to boiler water. The spindle is turned up from stainless steel but needs no gland - if water/steam comes out the top during blowdown it's not going to be a problem. A locknut is not shown but is important, as it stops the valve moving when the spindle is opened; especially if PTFE tape is used as the thread sealant.

Crosshead pump clack and bypass valve

The bypass valve for the crosshead feedpump was shown in fig 138. There are several options to deal with the overflow produced when this valve is open, i.e. when water is not being fed to the boiler.

- Water will fill the right-hand bunker which acts as the feed for the driver's injector. Once the tank is full it will overflow to the track – there's plenty of water in the driver's tender and not too much waste if the injector is in regular use.
- Once the injector head tank is full, the feed to the crosshead pump can be isolated via the shut off valve in the tender. This means there is no regular

Fig 139



water feed to the boiler via the pump – so it's probably not a good idea.

- If the well tank is used for feed to the crosshead pump (rather than the tender tank), the overflow from the injector feed tank can be returned to the well

tank via a tapping into the top rear of the tank and the water overflow pipe can be connected to this via a short length of plastic tube.

The clack valve for the crosshead pump is shown in fig 140. Again, make the body from bronze to

prevent problems with dezincification.

●To be continued.

NEXT TIME

We will discuss the water and pressure gauges.

Water Crane

Roger Davis completes his third scale GWR water crane by dealing with the water supply and the ground works.

Polly Wog

Tony Bird begins the description of a model outboard racer, first described in the American magazine Popular Mechanics in 1933.

Boiler Treatment

Bob Bramson explores the mechanism of corrosion within boilers and methods for preventing it.

Tilting Table

Harprit Singh Sandhu solves the problem of cutting long bevels on a milling machine by constructing a tilting table.

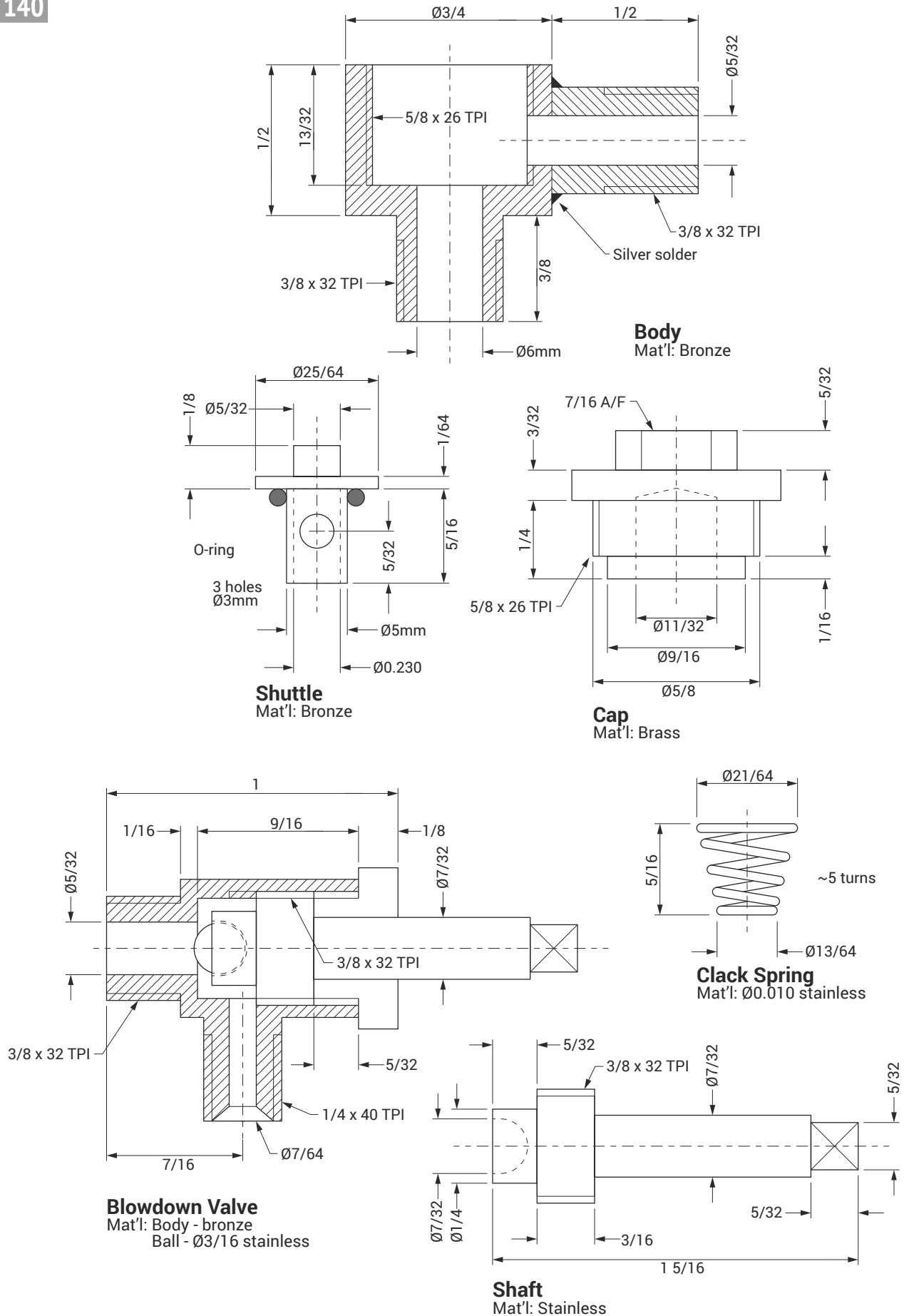
Niche Engineering

Julie Williams reviews a rather unusual branch of model engineering, on show at the recent Lowestoft exhibition.



Content may be subject to change.

ON SALE 1 FEBRUARY 2019

Fig 140

Thames Twilight

James Wells reflects on the final days of heavy industry on the Thames.

One long forgotten part of the Thames story is the very significant part that Thames Industries and the London Docks played in the 'D' Day landings.

There was only one place where the large caissons could be built and that was the London docks. At least part of the docks was drained and the necessary shuttering assembled in the dock. Where the massive Blue Water shopping complex now stands was formerly the largest cement works in Europe, which supplied the vast quantities of concrete required for the Mulberry Harbour.

There were vast police escorted convoys of fresh concrete being moved to the London docks and poured straight into the shuttering. As the concrete set the caisson was floated out of the dock and was then towed by tug to the Thames Estuary or shallower south coast and flooded until it settled on the sea bed. Any damaged metalwork or other such problems were then readily sorted out by the nearby Thames Industries.

Whatever complaints are made about British workmanship, after seventy years of Atlantic battering some of the caissons can still be seen at Arromanches, so the Mulberry Harbour must be considered good quality.

Shipping

Even before WW1 the shipping companies had settled on the legendary triple expansion engine and Scotch boiler for the majority of the shipping fleet. The steam turbine, although giving much higher speeds, was too uneconomical for almost all routes except possibly the prestigious trans-Atlantic route to New York and, here, even the famous Titanic was driven mainly by piston engines. With coal bunkering bases dotted around the existing empire the various ships could steam

steadily and economically to the various ports delivering people and cargo.

Post WW2, as the UK began to recover from the ravages of the naval war and trade began to boom, there was an urgent need to replace lost shipping and, even here, economy was the overriding factor. The steam turbine had a proven track record for being reliable but, despite all the advances of wartime engine technology, most of the shipping companies had continued to opt for the more economical piston engine in the form of the evolving Diesel engine. The slower speeds of Diesel engined ships were accepted as the price of economy.

With new shipping tonnage being built and brought into use and the ravages of two world wars beginning to be overcome, the Thames infrastructure adapted to new demands and there was a gradual improvement in living standards. Social patterns were changing as well. Welding was increasingly being used and, in any case, fewer young men were prepared to accept the deadened and whitened forearms of the long-term riveter, the lost fingers or the cursing and nursing of the almost inevitable hernia or even double hernia.

Despite these hardships it is almost possible to shed a tear over some aspects of the lost docks and the simplicity of those days. It was possible to visit a shipping company office and purchase a round sea trip on a freighter. You would show your ticket and passport to the Purser and then be shown by a crew steward to a small single cabin. The Purser usually had various brochures about the destinations or stops on the route as well.

With a round trip to Madeira or Gibraltar for freight that was the annual holiday. There were also the more famous

'liners' visiting larger ports but the freighters were cheaper and visited the lesser known ports. The business 'air' of doing something useful was an interesting contrast to what I considered the rather aimless wanderings of a modern cruise ship, trying to keep passengers dubiously entertained.

Coal was King

Even with the shipping companies increasingly going over to oil fired Diesel ships, the lifeblood of the Thames Industries had long remained coal along with its significant infrastructure, starting with the coal initially brought to a large storage depot near Woolwich. From there it was transported to various customers.

The Thames had a number of colliers to supply coal upstream to the Battersea Power Station. To proceed under the fairly low bridges the colliers had funnels that folded rearwards to allow passage under the bridges. At the power station there was a sort of 'zigzag' conveyer belt system to move the coal from collier to the station jetty, colliers and conveyer belts being an interesting sight to an apprentice.

Another large customer was the Beckton Gas works at what is now Newham. At the gasworks the coal was baked to remove the gas and chemical contents, leaving coke as a by-product. The coal gas produced was probably the most tolerant and possibly safest fuel ever used. Many a worn-out engine, a non-starter on petrol, could be started with coal gas then run on petrol.

The resulting chemicals were transported to the large Brunner Mond chemical works at Silvertown that produced explosives and which was to become the site of a large and legendary explosion, still part of Thames folklore. Other coal tar chemicals went to the nearby soap factory.

Before being usable domestically, coal gas had to be washed by bubbling it through underground water tanks located in various places. The Coal Board vehicles turning up, lifting the manhole cover, pumping out greenish water and replacing this with clean water were a regular sight.

As a by-product, coke was the cheapest fuel available and this same coke had a wide range of uses from the Woolwich Arsenal Bessemer Converters to domestic use. Widespread use of the comparatively smokeless coke, rather than coal, made the Thames an early contributor to later 'clean air' requirements.

Most of the south-east London terraced housing had cellar storage for coke complete with a circular access plate in the front path - the legendary 'coalhole' - and this feature was frequently quoted in the details of a house sale. The coke was delivered by the equally legendary coalman with his horse-drawn cart and the sacks of coke were poured down the access hole into the cellar as the householder counted the sacks.

Transport

With the vast international trade of the docks there was a considerable amount of disposable timber left over from crated imported goods. I purchased some ex-crate boards about the size of building site scaffold boards and built my first shed. It was to be a good move as I did my first model engineering in that same shed. The shed lasted well over twenty years and, in retirement and having built a new shed, I still claim to be a long term 'Man in a Shed'.

It is arguable just which was the first UK integrated transport system but the Thames Industries must have been one of them. Prior to WW1, most of the transport was horse drawn and already unable to cope with transporting the increasing numbers of people employed in the area. With the vast industrial expansion of the area for WW1, and later WW2, a whole new transport system based on trams was developed

and installed reaching almost to the London suburbs. The schoolboy bicycle proficiency test even included a question about avoiding getting a bike wheel caught in the tram track, at the 'tram pinch'.

Going to work down a particular hill, if the tram or bus turned left it was heading for the Blackwall Tunnel and the docks. Turning right and it was heading for the industrial areas. The former industrial area is now a large business park but the adjacent river seems very empty without the ships.

Even if the Thames Industries were entering their golden years, there was always the general pessimism about 'enjoying this prosperity we've had since the end of the war'. The seeds of this pessimism were usually fairly obvious with machinery constantly being patched up. When further repairs became impossible, machinery was scrapped and never replaced.

Closure

Despite the lurid stories of the Thames being a strike prone area usually the first anybody seemed to know about these was from the newspapers. One such impending dock strike was 'postponed' to allow a school ship to sail on time. Generally, relations between industrial unions and employers seemed to be reasonably good; I certainly never heard of any of the infamous demarcation disputes of other industrial areas. The final closing of the Thames Industries was a gradual process but, unlike the northern areas, doesn't seem to have left much of a long-lasting bitter legacy. As an industry closed there were reasonably generous final payoffs and I can recall several former Thames industrial workers being reasonably satisfied at the final payoff and disposal of company housing stocks.

In retrospect there seem to be only two enduring Thames legends. The first of these is Winston Churchill, the *Thunderer* and the closure of the Thames Ironworks. The other legend

is the great explosion at Silvertown. Whatever the official finding, posterity doesn't seem to blame anybody specifically for this but, during my apprenticeship days, the older men who actually remembered the explosion reckoned that 'sun shining through the windows' directly caused the explosion.

One big annual Thames event had been at midnight on New Year's Eve when all the ships in the London Docks sounded off with their horns. As industrial closure gradually crept across the Thames ever fewer ships sounded their horns until there were none left. Like old soldiers, Thames Industries had quietly faded away but both industry and community had been stubborn survivors from the Days of Iron in the early 19th century to the last years of the 20th. The river at what is now known as Docklands seems both very empty and quiet without the ships and the bustling dock activity. I used to regularly purchase my 1960s *Model Engineers* at Stan and Betty's little paper shop. I still possess the magazines but the shop has long been demolished.

Votes for women

In an earlier article (p.18, M.E.4589, 22nd June 2018) I mentioned the long-suffering women who stood so loyally and stoically by the side of the Thames menfolk and I have been persuaded to add a couple more anecdotes. One of these concerns the above mentioned 'safe' coal gas.

Even in my apprentice ship days the coal fired cooking range had long gone to be replaced by the coal gas cooking rings and twin burner oven. Closing the oven door too rapidly, one burner might be snuffed out while the other was burning normally so the oven would fill with un-burnt gas. On later opening the oven door the gas would immediately ignite, but as a brief flame rather than anything more serious. The usual result was the housewife singeing her eyebrows but little other damage. The neighbours soon knew who had been the latest to shut the oven door too rapidly.

Neither of my WW1 veteran grandfathers had ever really spoken about their experiences but seemed willing to talk about their wives', daughters' and sisters' efforts as indeed, did these same women. The efforts of women in munitions have rightly become legendary and here I would like to record a couple of family women-folk memories. A now deceased great-aunt, who'd never done any kind of manual work, on the outbreak of WW1 had got herself some employment manufacturing large naval shells. She had a son in the navy and liked the thought that her son might be firing the shells she was helping to manufacture. There must have been a lot like that and, best of all, her son survived the war, possibly helped by his mother's shells.

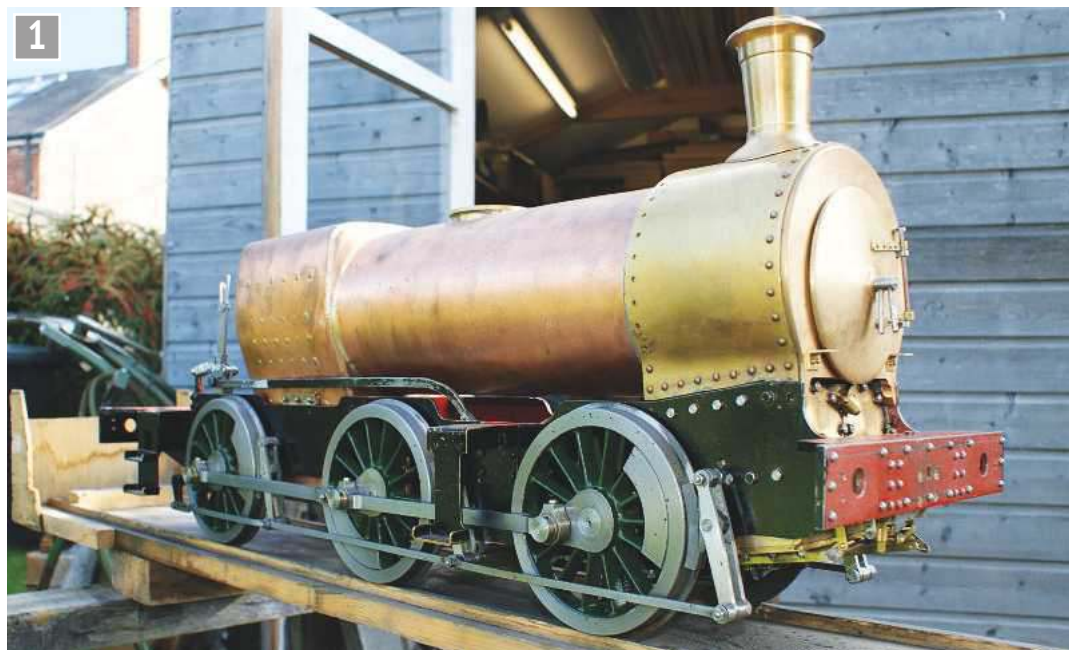
In the early days of WW1, machine gun ammunition and belts were crated up and shipped separately. At the front, the crates of belts and ammunition frequently got separated and time was taken up locating the correct crates then laboriously filling the belts. The request was made that the belts be filled with ammunition at source so as to be ready for immediate use. So there in the Woolwich Arsenal was my grandmother on both overtime and piece-work filling belts of ammunition and nailing down the lids on the crates when these were filled. Grandmother mentioned that the nailing down always gave her a special pleasure. Eventually, she was earning more money in the Woolwich Arsenal manufacturing munitions than my grandfather was paid firing off the same ammunition at Vimy Ridge.

Rather than the Suffragettes, it was the hordes of women working on munitions and in other industries that melted any real male opposition. It must have still cost most working men a lot of money though as the women, naturally, had to purchase a new Thursday hat specially for when they trooped off to cast their newly earned votes.

ME

A New GWR Pannier PART 1

Doug Hewson decides that LBSC's well-known GWR pannier tank design needs a make-over.



The first chassis 'as bought'.

One of my favourite occupations is shunting the yards either at Gilling East or on our own railway as I just revel in being surrounded by scale rolling stock with my Y4. However, the new yard at Gilling has a headshunt which falls away from the yard on a gradient of 1 in 100 and the Y4 really struggles when trying to transfer a heavy coal train from the marshalling sidings to a

departure road. I can manage to push about 16 loaded coal wagons up the bank; any more than that and I usually have to move the train in at least a couple of bites. It is not so bad on our own railway as we do not have the gradients and neither do we have the room to handle 40 wagon trains.

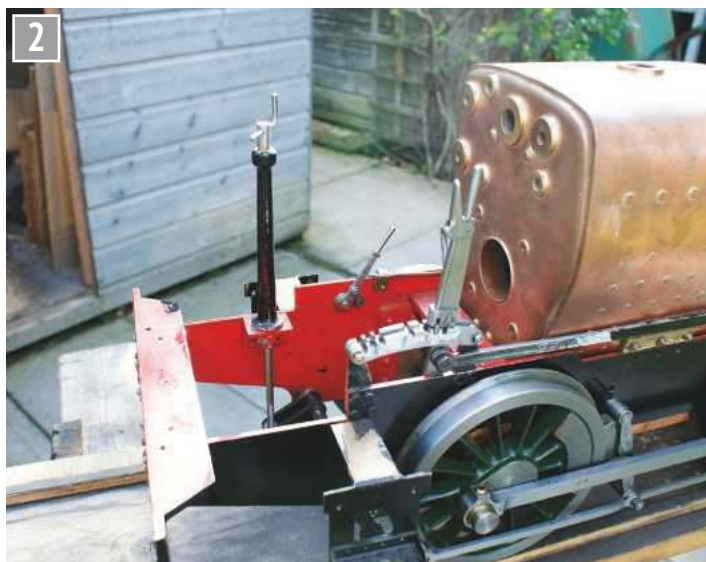
So I decided to look for a more powerful six coupled tank locomotive, preferably LMS or LNER, but there are few designs available for such things and of course anything freelance is absolutely out of the question. In any event as a founder member of GL5MLA (The Ground Level 5 Inch Gauge Main Line Association) they would not be allowed under our rules - but neither would I thank you for one anyway. Whatever I design or build has to be such that it can be photographed amongst the scale rolling stock and be indistinguishable from the real thing.

However, I was aiming to save time and as I couldn't find the locomotive I was looking for I decided I would have to bite the bullet and advertise for

an LBSC *Pansy* chassis as that seemed to fit the bill power-wise. Moreover, on our own railway we do at least have a GWR yard where it would be at home sometimes. I hardly dare mention my apparent change of allegiance to our other club members but they will have to learn to live with it.

I placed adverts in *Model Engineer* and *Engineering in Miniature* and I ended up with a reasonable chassis (or so I thought!) and then another very nice one came along. I decided it was too good to miss so I bought that one too with the intention of completing both eventually in different guises and different liveries. I was also offered a brand new chassis which I also bought as I knew one of our club members was on the look out for one so that one was passed on to him. Then I wasn't quite alone - but Oh! the shame.

Anyway, the main reason for wanting a running chassis was that I thought I wasn't going to be too fussy about the lower works or the bits out of sight as long as the upper works



The first chassis 'as bought', showing the rear end.



The first chassis 'as bought', showing a view of the motion.

looked right. I thought that I could then go to town on the cab, tanks and bunker to make a nice looking locomotive.

I decided to try the first chassis (**photos 1 to 4**) on air but on hooking it up to the airline there was no response in either gear. When I looked a little more closely I realised that the reversing arm was an inch short so an extension was made which consisted of two strips of 20swg strip and a couple of $\frac{1}{16}$ inch copper rivets on the top. How on earth it ran I have no idea! I bought the second one from a friend and he told me that this one ran perfectly as long as you ran it upside down! I had already been forewarned about that problem by Rob King who has one and is one of our regular Gilling drivers. He had already modified his at a very early stage to prevent the valves from dropping off their seats but more of that later.

At this stage I decided to do a bit more delving as I could see that both lots of coupling rods were wrong. They should be fish bellied and, although nicely finished, these were definitely straight, so they had to go. Also, the buffer beams were adorned with the most hideously over scale rivets, a lot of which were in the wrong places, so they were also consigned to the scrap bin, as were the clumsy brackets which held them in place. Furthermore, the quite visible brake hanger brackets were nothing like the full-size ones so the bin was quickly filling up. As I piled more bits into

the scrap bin I began to realise there were far too many holes in the frames apart from the ones which the builder had already drilled in the wrong places. Even worse, the holes were all way over scale size, so I decided I had better treat it to a new set of frame plates as well. If I was going to do that then they may as well be right in the first place, so they had to be hole for hole to the works drawings otherwise there would be no point in this exercise.

I rang Neville Evans to see if he had any drawings of the pannier tanks and, although the answer was negative, he 'knew a man who did'. So he passed me on to a friend of his, John Hill, who kindly offered me a loan of his copy. This drawing arrived in very short order and at once I saw that there was obviously nothing for it but to start again, almost from scratch.

I say 'almost' as I will explain. I already knew of a number of people who were either trying to complete a Pansy and wanted to improve the detail and others who already had one and wanted to make improvements to theirs at the next rebuild. Also, I had a perfectly good cylinder block and crank axle (that was all that was left of the original chassis!) and I was sure that there would be others who would want to improve their existing models. I therefore decided to stick with the original frame spacing (which is $\frac{1}{4}$ inch too narrow to be strictly to scale) so that all the

new castings could be used for either the original Pansy or the new one. I also decided to stick with the original arrangement with the valves underneath for reasons which will become clear later.

The prototype

The next major problem was the fact that I couldn't find out much information on the prototype GWR 5700s until my good friend Steve Whittaker pointed me in the direction of the RCTS book on GWR locomotives in which there is a brief section devoted to them. This, together with other information provided by Steve and others has helped enormously. There are also some papers to be published shortly on the pannier tank classes by Irwell Press so watch out for their adverts.

With my new-found knowledge I thought it would be useful to include some of the details I found here, for interest's sake.

I will use the term 5700s as a generic term as that is how they are designated in the 1950's Ian Allan locomotive spotters' books, despite their different number classes, all of which had their differences. The 5700s (**photo 5**) have a long pedigree and were actually an almost unaltered

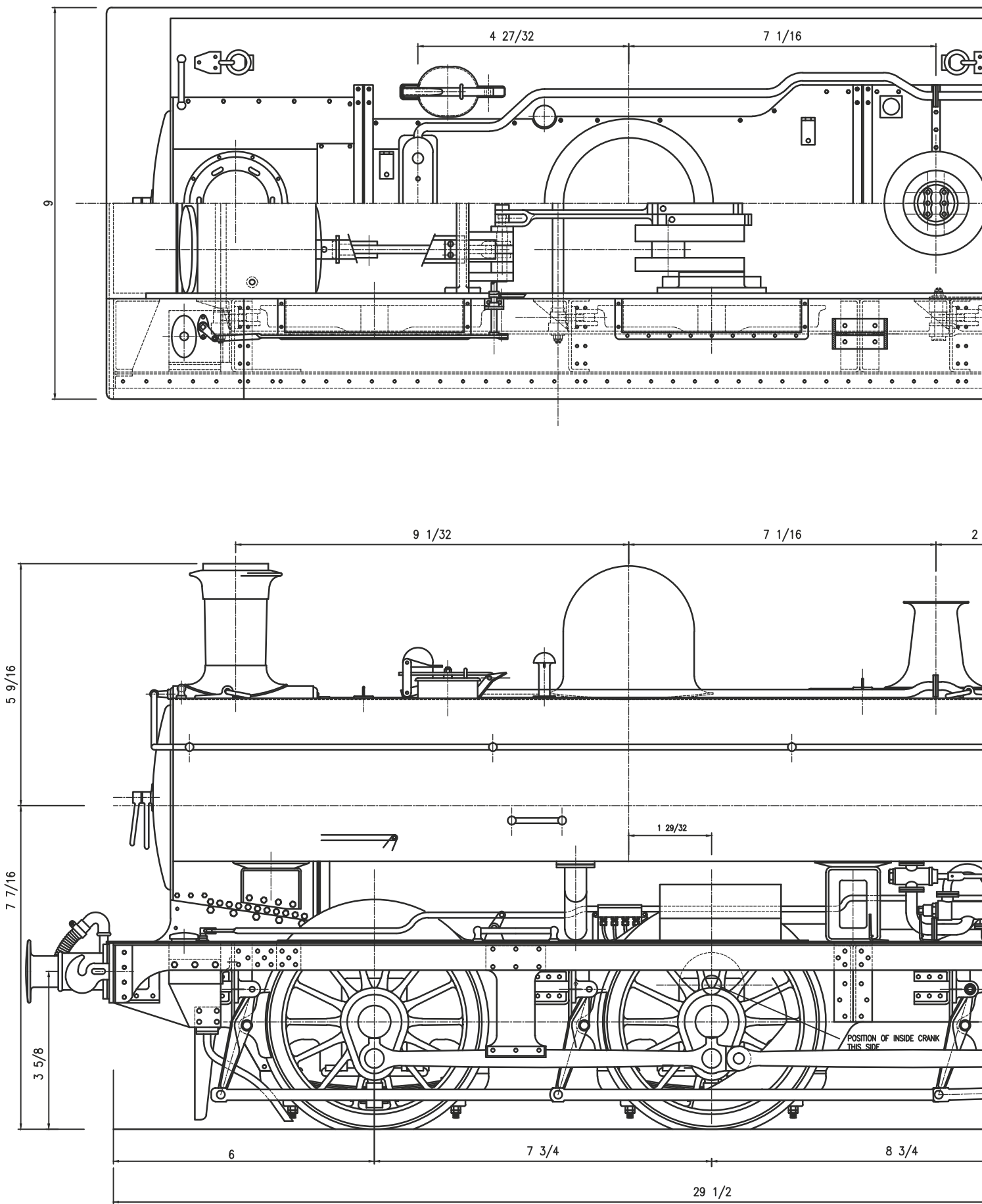
continuation of the rebuilt 2700s but had the earlier rectangular section coupling rods of the 1854 Class and prior to that the 1813 Class of 1882. Building commenced in 1928 with the first of the class being completed in 1929 and production continued on and off until 1950, well into BR days. So, there is a good range to choose from and if you don't want a Swindon product (dare I say it!) (my blue pencil is twitching – Ed.) there were quite a number built by outside contractors. These were all built during the late 1920s and early 1930s under a government scheme to alleviate the effects of a trade depression.

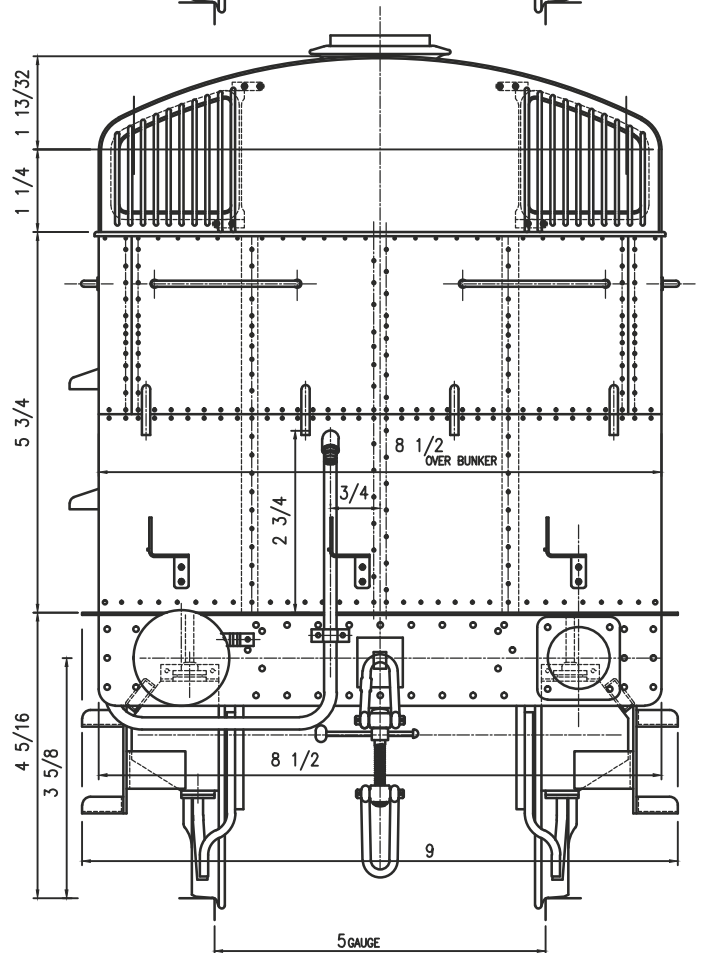
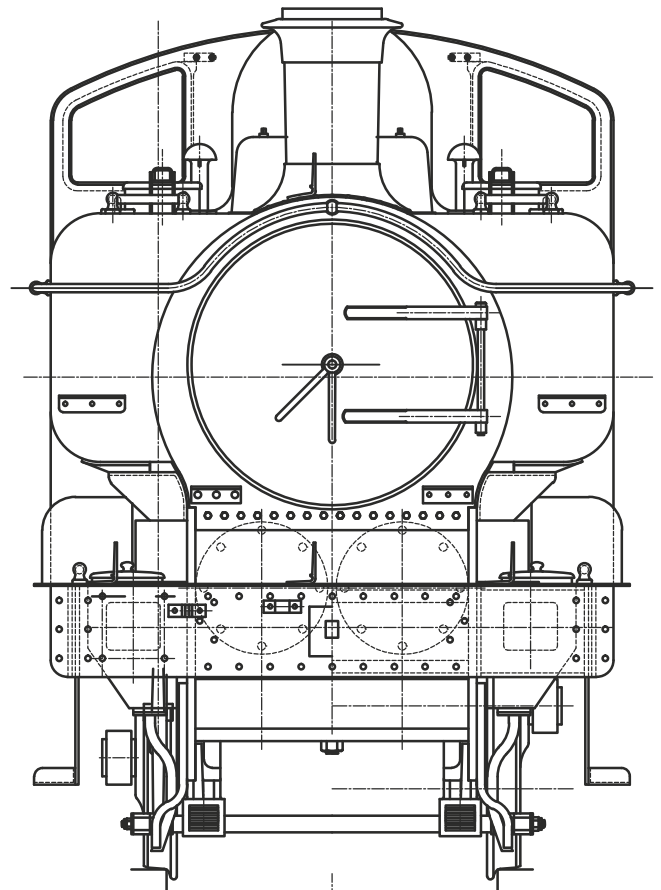
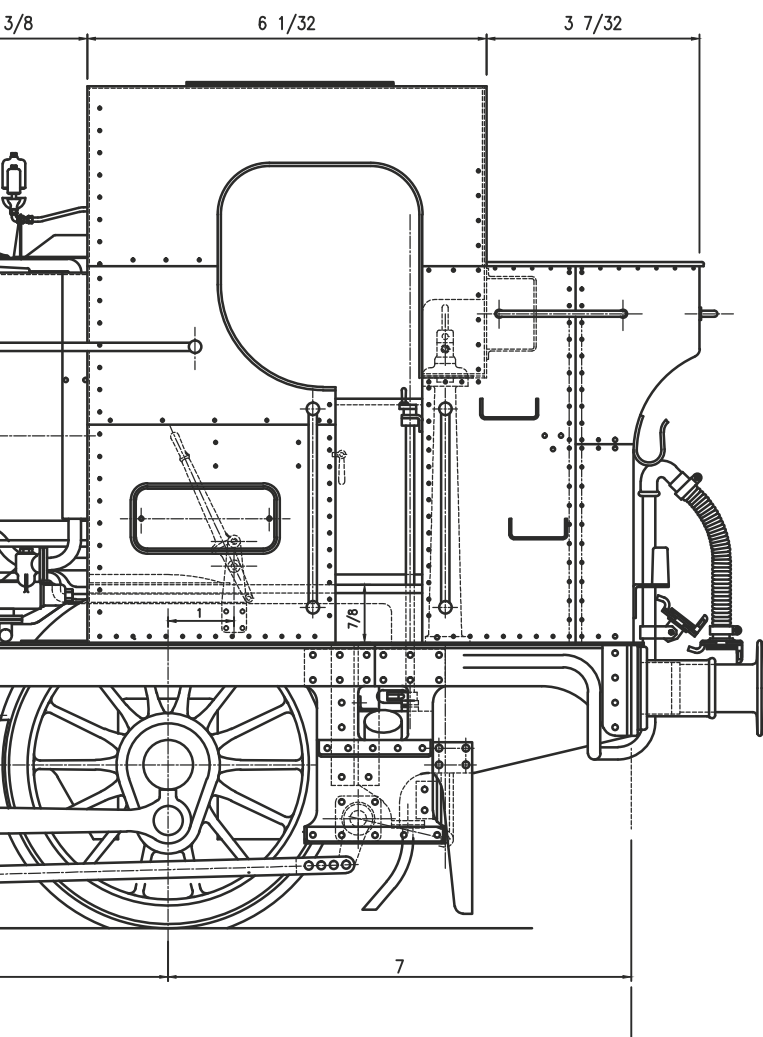
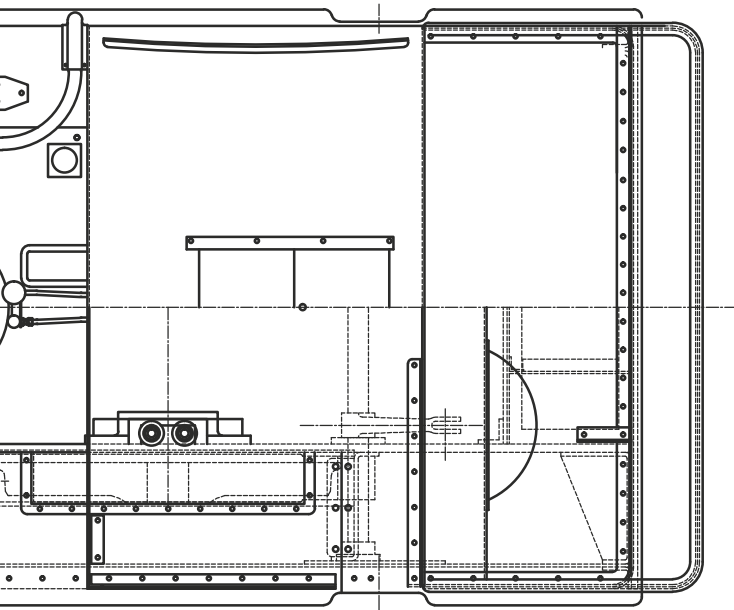
The locomotives were built with quite distinctive cast iron chimneys, so no polished copper ones please, and a lot were turned out with painted safety valve bonnets though they were mostly polished up later. If you wish to build a slightly simpler version then 5700-99, 7700-99 and 8700-49 were built without steam heating and, for those who want an even simpler version 6700-49 were built with steam brakes only and three link couplings as they were built purely for shunting duties. This also applied to 6750-79.

Beginning with 8750



The first chassis 'as bought' with the motion seen from a different angle.





in September 1933 the locomotives were fitted with an improved cab with the square windows and, according to the works drawing, the dome covers were 3 inches lower. The new cabs had sliding shutters and hinged doors and in 1937 a drawing was issued for these to be retro-fitted to the older locomotives. A further modification was made with two steps being welded to the left-hand side of the bunker and some additional handrails added to the fireman's side of the cab. The first locomotive to be so fitted was 9795 in 1934 but these too were added to the earlier locomotives as they went through the shops.

In 1942 the first locomotives emerged with top feeds and the first of the older locomotives to be retrospectively fitted were 8770 and 5735. The first locomotive to be fitted from new with top feeds was 4656 although it did not seem to be standard fitting on new locomotives until 1944. The top feed arrangement was then fitted to the older locomotives but subsequently some lost theirs again later during boiler changes.

The third sub class was the 9700s which were built with condensing gear and partly deepened side tanks and were all allocated to Old

Oak Common to work the Metropolitan Lines to Smithfield. The end result was 863 locomotives being built. Another little difference which people may like is that the locomotives 7700-24 built by Kerr Stuart had riveted baffle plates in the tanks resulting in several vertical rows of rivets in the tanks, some single rows, some double and rivets down each end. Some of these were used on the London Underground and some preserved but sadly the one at Quainton Road lost its rivets when it was rebuilt with new tanks.

According to the RCTS book, under BR they were designated Class 4F and apart from 3656 and 3742 all had BR front number plates. Nos. 6760-79 and 9673-82 (**photo 6**) were built with BR front number plates from new. However, the '4F' designation is open to question as they were always known as '3Fs' in the Ian Allan Locomotive Spotters' books.

The following locos were sold to London Underground Ltd.: 5775 (L89), 7711 (L90) (1), 7760 (L90) (2), 5752 (L91) (1), 5757 (L91) (2), 5786 (L92), 7779 (L93), 7752 (L94), 5764 (L95), 7741 (L96), 7749 (L97), 7739 (L98), 7715 (L99). 7760 and 5757 were bought as replacements for 7711 and 5752 at a later date and took



This is 5764 at Highley on the Severn Valley Railway setting off on its way to Kidderminster. It has the earlier round windows.

Other Preserved 5700s

Number	Location	Status
3650	Didcot Railway Centre	Operational
3738	Didcot Railway Centre	Operational
4612	Bodmin and Wenford Railway	Operational
7714	Severn Valley Railway	Awaiting Restoration
7754	Llangollen Railway	Undergoing Restoration
9600	Tyseley	Operational
9629	Pontypool	Undergoing Restoration
9642	Gloucester and Warwicks' Rly	Undergoing Overhaul
9681	Dean Forest Railway	Operational
9682	Chinnor & Princes Risborough	Operational

their original 'L' numbers. The following London Underground locomotives are preserved as below:

5775 Keighley and Worth Valley
 7760 Tyseley
 5786 Worcester Locomotive Society, South Devon Railway
 7752 Tyseley
 5764 Severn Valley Railway
 7715 Quainton Road

Note that all these locomotives had cut down cab roofs to give 2½ inches clearance in the tunnels which meant clipping the sides of the roof off flush with the cab sides and moving the rain strips inwards by 6 inches from the original edge so beware when copying these preserved ones. This is quite obvious on 5764 which I photographed recently at Bridgnorth.

● To be continued.



This is 9681 photographed running round at Parkend on the Dean Forest Railway. You can just see the gable end of the cottage we used to stay in. What an ideal place! This is the later version with the square cab windows.

NEXT TIME

We will make a start by looking at the frames.



Content of *Model Engineer*

Dear Martin,
I have to disagree with David Hockin. *Model Engineer* is (as it says) the Magazine for Model Engineers, and they have always been people who make models.

Unfortunately, the magazine now tends to have more and more articles which I would term just 'intellectual waffle', which can only be of interest to a few.

There are numerous articles on how to use lathes and other machines but no series on something they can actually build.

Years ago, there would be articles covering the construction of a locomotive, traction engine, stationary engine, etc, plus all the detailed drawings. What has happened to these?

Perhaps it is time to repeat some of these previous articles if no new designs are available.
Michael Willerton (Lincoln)

Crisis of Confidence?

Dear Martin,
Whilst we were at the NRM, the NAME officers were discussing the state of model engineering clubs at the present time and I suggested a letter - or maybe an editorial item - which I believe illustrates the point of our discussion.

Model engineers seem to have a number of potential problems according to what we read about in the pages of our favourite magazines or hear through the rumour mill: reducing membership, lack of interest from younger generations and compulsory loss of track site are some of the things that worry us.

Could these be some of the reasons for the apparent lack of confidence in the future for current model engineering societies?

Some seven years ago I started as the treasurer for the Northern Association of Model Engineers (NAME). One of my tasks was to arrange for member clubs to access NAME's interest-free loan

scheme. At that time loans to member clubs exceeded £50,000. Many societies appeared to join NAME to be able to take advantage of this scheme.

Our member clubs were making great plans: re-laying track; a new clubhouse; adding a disabled toilet facility; and, of course, new club locos and passenger trolleys.

Fast forward to 2018 and I have yet to receive a new application. Our loan book is just over £11,000. The amount available for loans earns miserable interest in our bank. So where are applicants now for what I consider to be the best offering for model engineering societies?

I accept that in the current climate to which I alluded above, together with trade wars, President Trump, 'Brexit', *et al* makes taking a positive view difficult. But for some thirty years my experience has been that us model engineers look at the positive picture. Perhaps we should take a collective leap forward.

Best regards, **Richard Guthrie (NAME Treasurer)**

Gunge

Dear Martin,
I can sympathise with your correspondent Roger Castle-Smith with regard to the removal of gunge from his micrometer threads (M.E.4601, 7th December 2018). Whilst he has tried several solvents including Gunk, lighter fuel (heptane), white spirit, isopropyl alcohol and methylated spirits, has he tried some less common solvents? I have found in the past that more aggressive solvents can be tried.

I have tried acetone, methyl ethyl ketone ('MEK'), methyl isobutyl ketone ('MIBK'), and furfural and find that these are increasingly powerful - most will remove any paint finish, dissolve most polymers (except polyolefins and fluorinated polymers) and the grease in your fingers! All are flammable and toxic to some degree and their inhalation should be avoided, along with contact with the

skin. Note that acetone is often sold as 'nail polish remover' but the liquid purchased from High Street chemists and beauty salons is not pure acetone as it often contains ethyl acetate, ethanol and possibly glycerine as well which would not leave the micrometer threads particularly clean.

Standard kitchen type household rubber gloves are inadequate for skin protection and nitrile rubber gloves should be used as a minimum. The best gloves to use are disposable polyethylene gloves inside industrial grade PVC gloves which are thrown away after use as they will retain solvent for a considerable time.

Most of these solvents are readily available on-line in small quantities but it appears that furfural, which was originally derived from oat hulls and is used in solvent refining petroleum oils, is not so readily available in small quantities (do you really want to buy 200 litres from China?).

If all else fails, he could try 20% w/w hot caustic soda (sodium hydroxide) which may well remove the most stubborn of gunge but might also damage the finish on the micrometer. Such a strength is extremely corrosive and should only be undertaken using adequate personal protective equipment. You really need chemical resistant goggles for this type of work - and don't wear contact lenses as a splash in the eye will cause immediate irreversible damage to the cornea and make removing the contact lens almost impossible, even in hospital. Never use an old aluminium saucepan to heat the caustic soda - it will dissolve the pan very quickly releasing hydrogen!

Interestingly, good old Scotch whisky contains traces of furfural, not that I am recommending the use of whisky for freeing up micrometers. If you did use whisky, you might not be able to read the micrometer clearly until the following morning...

Yours sincerely,
Graham Astbury (North Yorkshire)

Write to us

Views and opinions expressed in letters published in *Postbag* should not be assumed to be in accordance with those of the Editor, other contributors, or MyTimeMedia Ltd. Correspondence for *Postbag* should be sent to:

**Martin Evans, The Editor,
Model Engineer, MyTimeMedia Ltd,
Suite 25S, Eden House,
Enterprise Way, Edenbridge,
Kent, TN8 6HF
F. 01689 869 874
E. mrevans@cantab.net**

Publication is at the discretion of the Editor. The content of letters may be edited to suit the magazine style and space available. Correspondents should note that production schedules normally involve a minimum lead time of six weeks for material submitted for publication. In the interests of security, correspondents' details are not published unless specific instructions to do so are given. Responses to published letters are forwarded as appropriate.

City of Stoke on Trent in 2½ Inch Gauge

PART 4

Robert Hobbs creates a longed for Pacific from an historic set of castings



Continued from p.45
M.E. 4602, 21 December 2018



A view of my workshop with converted bed!

We left part three of the series looking at my other passion, model yachting and the workshop notice I received from Eva as a Christmas present. Most wives and partners think we

have a bed in our workshops ... well I have! My clean bench - that's the pine one shown in **photo 67** - is exactly that; a converted bed. Just behind the mill in photo 67 you can see my engineer's tool box which

is still in regular use despite nearing its sixtieth birthday and stems from my apprenticeship days at Fairey Aviation, which is rather nice because many of the hand tools made during my apprenticeship have proved very useful when working in this hobby of ours. When we were disposing of the single bed from our spare room it occurred to me that it would make a super bench. Four sets of legs were made from decking boards that I had handy and *da-dah!* - a super bench with fantastic storage drawers to boot. Now that's what I call recycling. I am 1.8 metres tall and the bench was made a useful height for me to work at when standing; my Myford is on a high cabinet and, as can be seen in **photo 68**, similarly my Warco Mill is raised from the floor by



Machine tools are set at a suitable working height.



Wooden former for the backhead.

200mm of railway sleepers, all of which help with the ergonomics and reduced back ache when working in the workshop.

Enough background - now on with the boiler.

My models are made for display following the pleasure of making, painting and assembling them. After several problems silver soldering previous boilers I have given up and build my locomotives with a dummy boiler. The barrel was rolled from galvanised steel in the slip rollers and the bottom seam trimmed to form the taper, this joint being soldered and cleaned up. The backhead was marked out on sheet brass to suit the wooden former shown in **photo 69**. The brass was annealed and bent over the former to obtain the flange for the rivets; several annealings were necessary to achieve the final shape. This process was repeated for the



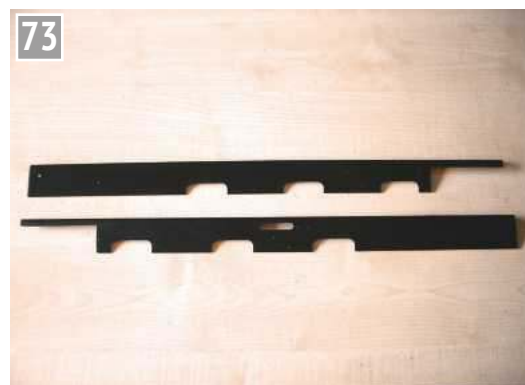
Former for making the firebox wrapper.



Trial positioning of the firebox wrapper.



The intersection of cab sides, running boards and firebox outer wrapper.



Completed running boards.



Trial assembly of the reach rod and reversing gear.



Looking down upon the reach rod support casting.

throatplate. A 6mm wide ring was soldered to the throatplate to suit the inside diameter of the boiler shell to simplify the assembly of these two items.

Photograph 70 shows the former used to make the firebox wrapper. This former was made from the backhead block and an identical shaped block together with three wood spacers and a few deck screws. The outer wrapper was marked out on copper plate and cut to size, annealed on the gas stove and formed around the block. The wrapper was married to



Firebox wrapper and backhead.



A selection of components ready for fitting to the backhead.



The steam dome and chimney were castings.



A view of the back end of the (non steam) boiler.



The chimney casting in place.



The completed boiler ready for painting.

the throat plate and is shown loosely assembled in **photo 71** together with the other boiler components. This loose assembly allowed the running boards to be positioned, marked to length and cut to suit the wrapper. Also the dummy running boards on the cab sides could be shaped to suit the intersection of these components. The spectacle plate is shown in **photo 72** whilst **photo 73** shows the completed and painted running boards. The reach rod was shaped to size and tapered at the leading end with a joggle being formed at the cab end to align with the screw reverser, this trial assembly being shown in **photo 74**.

The next task was to position the cut-away in the spectacle plate for the reach

rod. The position of the cut-out was carefully marked and filed to suit the range of movement of the reach rod and, similarly, the reach rod support casting was machined and positioned on the running board (**photo 76**). The rivet holes around the outer wrapper were marked out and drilled to suit both the throatplate and backhead; this is shown in **photo 76** together with the backhead which had been previously marked out and drilled for the boiler fittings and fire door.

The fittings for the boiler are relatively simple turning and threading operations swiftly carried out on the Myford. **Photograph 77** shows the steam turret, regulator handle, water gauge, fire door assembly, blow down valve and clacks. The top feed fitting

was fabricated from brass stock as were the bushes for the backhead; the steam dome and chimney are from cleaned up castings and are shown in **photo 78**. The backhead will require cleaning up and removal of the primer before the bushes can be soldered in place. Looks like I got a little ahead of myself with the build programme. The primed backhead was cleaned off and the bushes soldered in position allowing it to be riveted to the outer wrapper. The edge joint was then finished with Isopon P38 filler and smoothed to suit. The rivets were then added to the throatplate, thus finishing off the front joint of the wrapper in a similar fashion to the backhead. The complete assembly was then sprayed in grey primer and put to one

side to harden. **Photograph 79** shows the rear end of the boiler. The smokebox was offered up to the boiler barrel with the door in position and is shown in **photo 80** together with the chimney. The completed dummy boiler assembly is shown in **photo 81** primed and ready for painting. This is a convenient place to end this section of the project.

● To be continued.

NEXT TIME

In the next two parts we will conclude the project with dismantling, cleaning, polishing, some priming, painting and the final assembly which will complete my City of Stoke on Trent.

Lathes and more

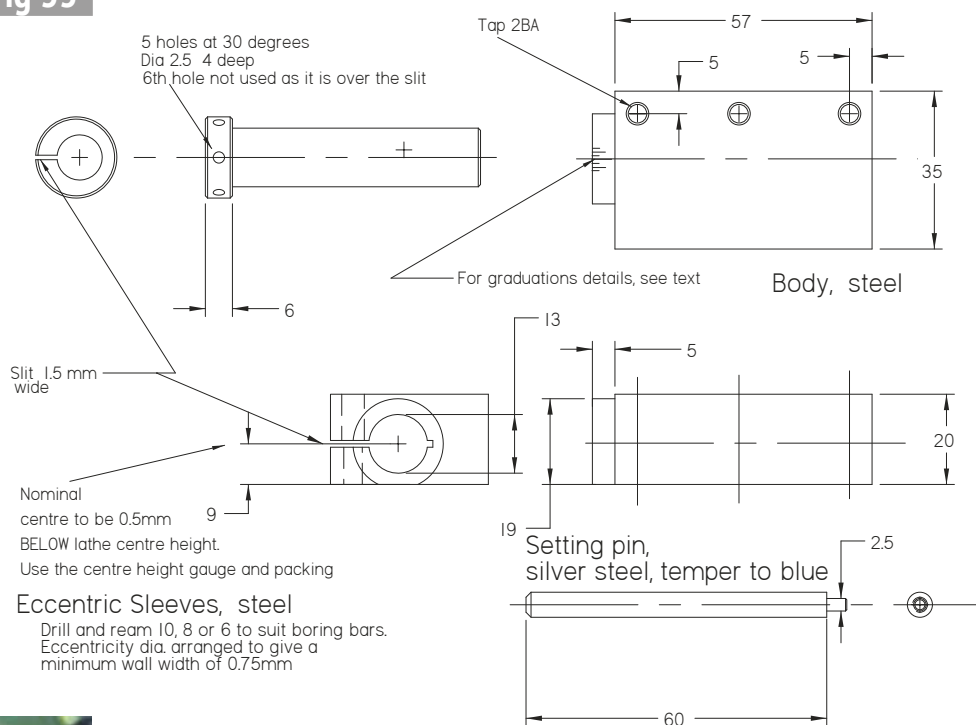
PART 31

Graham Sadler machines the main block for the boring tool kit.



Continued from p.103
M.E. 4603, 4 January 2019

Fig 33



147
Facing the block to size in the four-jaw chuck. Do not use a tipped tool for intermittent cuts of this nature.

The main block

I had to face mine down from thicker material but you can use a piece 20 x 35 x 65mm. The first task is to bring the block to size (**fig 33**). This can be achieved by facing in the four-jaw chuck (**photo 147**). Producing the hole is next, which must be positioned so that its centre is about 0.5mm *below* the lathe centreline, which is nominally 9mm if you are using my tool post but care is needed here to get the block the correct way round, so once again use a marker to label chuck, lathe axis, top and bottom faces.

Mount it in your tool post in its working position but pack it up with an 0.5mm feeler gauge or even card if you clamp it lightly. Use the centre height gauge to mark the now corrected height. The advantage of having the block bore below centre height is that with this limited height

adjustment, it's better to be too low, as a piece of 0.5 or 1mm sheet can be used under the block to lift it, whereas we cannot move it down! Set up in the four jaw chuck, with protective packings for drilling, and use the wobbler to centre it.

A short discussion about deep drilling

Surprisingly, drilling uses more power than almost all the lathe operations. This is especially true when drilling very deep holes such as in this project. A deep drilling is defined as a hole which is more than ten times the drill diameter. This can cause problems and can be difficult as the swarf will rapidly fill the flutes of the drill. Without frequent withdrawals and lubrication, the swarf can jam up and even pressure weld itself into the flutes. This can - or rather will - cause the drill to seize in the



148 *Setting a stop on the lathe bed to control the length of the boss.*

hole thus forcing it to rotate in the drill chuck damaging the shank.

If this does happen, immediately after use, before putting the drill away, use a slipstone to remove the inevitable raised nib or burr round any grooves, taking care not to remove the sizing information. At school, many drills were often in a shocking state as the children often didn't tighten the drill chuck enough, making it very difficult to produce accurate holes. So, the advice is to look after the drill shank. If you don't remove the nib, I bet the next time you use it the nib will be sitting under one of the chuck jaws and be partly crushed while tightening, resulting in an insecure grip. This will exacerbate the problem, reduced the drilling force needed to make the work grab the drill, resulting in even more shank damage.

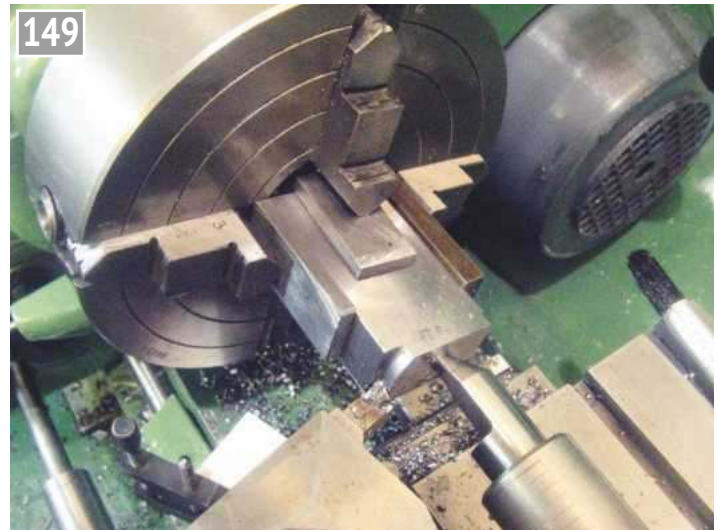
I only use keyless chucks; while they are more expensive than the keyed versions, they give a more positive grip, being easier to tighten fully. They don't seem to damage the drill as much when there is a slippage. I had one fitted to my new Fobco bench drill (a decade birthday present) and I ordered one for the lathe after a couple of days usage - it was a revelation! In any case I could never find the chuck key before I got these chucks! Murphy's

rule states if it isn't in your hand or rack then it's lost and the key will never be found without an extensive hunt (it's in your overall pocket idiot...).

So, for deep drillings, I will put in a pilot hole of about 4.5mm for about 25mm then open up the hole with a 10mm drill for a depth of 20mm then go back to the smaller one. In reality, this is bad practice as twist drills are designed to pivot on their chisel edge across the two flutes and pilot drills are a bit of a 'no-no'.

However, step drilling has been the standard in model engineering for years, but *good practice* demands perfectly ground drills, properly lubricated and mounted in holders in which they cannot slip; ours in a home workshop will rarely meet these requirements. In industry, the situation is better as drills for very deep holes have tiny holes axially through the webs through which high pressure coolant is pumped, keeping the drill cool and at the same time flushing out the swarf. On a visit to the old Myford factory in Nottingham, we were told of the ridiculously short time it took to produce the hole down the centre of the lathe spindle; it was a jaw dropper, the actual figure being forgotten in the mists of time!

Drilling brass and drawn bronze is even more difficult.



149 *Turning the boss using tailstock support. Use plenty of lubricant on it!*

With bronze, a lot of heat is generated and the material is almost 'sticky' causing a much earlier drill binding and 'grab'. The drill must be sharp with undamaged lands on the edge of the flutes and must cut cleanly at all times with a steady and positive feed. Even then it can be difficult. With brass, as we discussed in relation to lathe tool angles, it is one of the materials which will pull the tool into the work (by taking up backlash in both the feed-screw and the rattling fit of the barrel key mounted in the tailstock casting). This will make it jam up.

One common recommendation is that drills to be used on brass should have the cutting lip (where it meets the flute) taken back with a tiny slipstone so that the positive rake between cutting edge and flute is reduced to zero, i.e. in line with the axis of the drill. All well and good, but one really needs two sets of drills or a regrind will be needed when working with steel. A set of 1-10mm drills x 0.1mm (1-6mm and 6-10mm) will set you back perhaps £70 so this is an expensive luxury.

One simple dodge is to gently nip up the tailstock barrel lock a trace making it tight and thus harder for the drill to grab and take up the backlash in the barrel feed screw, pulling the lot forward into the cut. This will not fully

solve the problem but it can help. Special straight fluted drills resembling slot drills on the end are available for industry - at a price. In this project it is only the 6mm sleeve which can be classed as a deep drilling, but the 10 x diameter rule obviously applies to a perfectly ground drill. So, whenever the depth length ratio creeps over 1:5 then care should be exercised if the hole is have any chance of being on diameter, have a good enough finish and to emerge where you want it to!

Back to the project

The hole in the block should really be bored - a chicken and egg situation! However, the block is only a clamping carrier and, while a reamed finish would be better (13mm is a non-standard size), drilling in stages to 13mm will produce an adequate hole. An alternative if you have one is to make the bore to be ½ inch i.e. 12.7mm and ream it to that size, adjusting the sleeves to match.

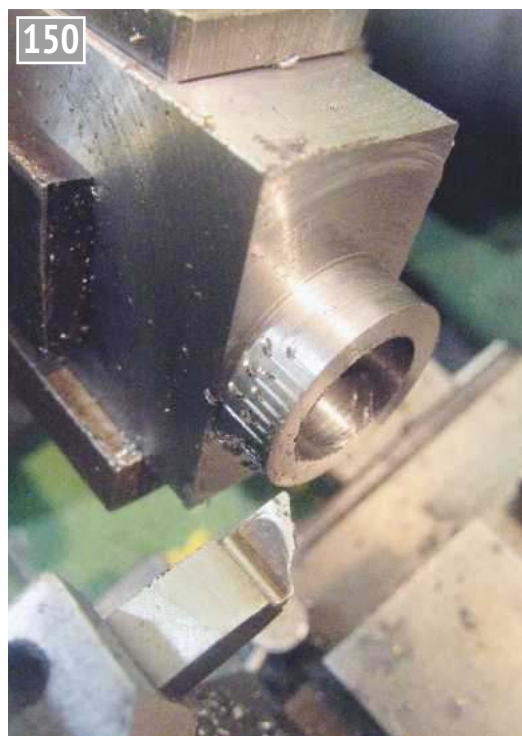
Next, we produce the boss. Firstly, we face the end then we will use the scales on the top-slide to determine its exact length. Advance the top slide then retract it to the zero mark (in order to remove backlash). Touch a knife tool on the end and back off the top slide 6mm. Re touch the tool on the work but this time move the saddle not the top sliders and temporarily lock the carriage

to the bed. Arrange a clamp on the bed of the lathe to act as a stop which is pushed firmly against the edge of the saddle. Use card to protect the lathe bed (**photo 148**). While this is definite overkill for this task, it does illustrate how a carriage stop can be used. (Remember this series is about teaching you how to use a lathe and introduce a wide range of techniques which, once you know them, you will be able to adapt and use for your own machining tasks.)

An alternative way is to lightly set up the stop, put the saddle hard against it then trap a 6mm flat between stop and saddle. Push the stop with the saddle until the tool touches the work, or touch the tool on the work and use the flat between stop and saddle - different ways of doing the same thing but the first way is the most accurate. Serious workers will fit a decent saddle stop having a positive and repeatable position. Perhaps I will detail mine in due course. Centre drill the hole then turn the boss. I used tailstock support because of the intermittent cutting (**photo 149**). After the final cut, add 0.02mm cut with the top-slide and face the block end nice and shiny and remove any ridges.

Graduations

Set up the headstock dividing kit we detailed recently and set the top face of the block vertical with a square on the lathe bed. Grind a very fine pointed tool no more than 10 degrees inclusive angle and mount this sideways in our spare tool holder, using the centre height gauge to check it is at the correct height. Touch the tool onto the spigot, then advance the cross slide about 0.2mm and use the top slide to cut a graduation right up to the shoulder. This produces the zero mark. Now rotate the lathe spindle one gear tooth on the 60-tooth wheel and produce a line of 2mm length with the top-slide. Then alternate 3.5mm, 2mm



Cutting the graduations.

etc. I did seven divisions on each side of the zero mark. The graduations will be at six degree intervals.

While a smaller angle would be of greater use, this would need a more complex division method and, in any case, the graduated spigot is only 18mm diameter, i.e. a circumference of about 60mm, making our current division spacing only 1mm and at the limit of easy reading on the machine (**photo 150**).

Use a very fine file to remove the burr put up by the graduation tool. Don't forget, this is a potentially dangerous action with very sharp corners of the block rotating. Keep the file handle in your left hand and the right hand at the back, reducing the danger of contacting the chuck and work. Mind your sleeves and don't run the lathe too fast - 100-200rpm only. By the way, we will be using the graduating tool again soon so leave it set to height in your spare tool holder for now.

Sawing the slit

Mark out and drill the M5 tapping holes (4mm) all the



Slitting the block. This could be achieved with a hacksaw but would be untidy. Carefully check for clearance of the fixings. Speed 100rpm.

way through. Then set up the vertical slide parallel to the chuck face. Bolt the block onto it on spacing so that the slitting saw cap will clear the slide. Advance the saddle until the saw touches the outside of the block. Advance the saddle 11mm plus half the thickness of the saw blade. To do this, you can use the callipers set against the tailstock as we did for milling the bolting clamp set (p.852, M.E.4588, 8th June). Do check that all bolts are tight - squat down to sight through the lathe gap to ensure any clamping bolts will clear the chuck. Lift the slide so you can cut fully into the bore.

Set the lathe to run at about 100rpm. Feed from the front to the back and take it very slowly at first. The saw will seem to complain, making grunching noises, but this is common at first until it's cutting in a wide arc rather than on the corner at the commencement of the cut. Feed steadily and slowly, feeling what's happening through the slide handle using, when possible, both hands twisting the screw rather than turning the handle

in order to maintain an even and steady feed. Use plenty of lubricant. Do not stop the lathe while the saw is actually cutting, it must be withdrawn a little first. Start the lathe before slowly advancing to restart cutting. It really is a lot simpler than it seems from above, but it needs care and concentration (**photo 151**).

An option is to over-cut the slot into the block to allow easier clamping of the combined sleeve and bar, but don't overdo it - 3 - 4mm only. Finally, with a dead smooth short file, carefully produce a neat chamfer on all edges and drill out the top of the screw holes to 5.2mm for clearance to fit the three cap screws, then tap the holes - an easy task as the clearance hole will guide the tap.

●To be continued.

NEXT TIME

We'll get started on making the tool holder.

Midlands Model Engineering Exhibition 2018

PART 2

- Club Stands and Displays

John Arrowsmith offers a retrospective of the club and display stands at the recent Midlands exhibition.



Continued from p.85
M.E. 4603, 4 January 2019



Anthony Batting's 4 inch scale Foster and Ransomes baler in action on the rally field.

Outside, the lovely weather was providing a good basis to enjoy all the various activities provided by the Fosseway Steamers and the demonstrations. Phil Scarborough and Richard Kew combined with their engine and rack saw to demonstrate the art of making copious amounts of sawdust (!!) whilst making decent sized planks of wood. Another nice little

combination provided by Anthony Batting was the 4 inch scale Foster agricultural engine driving a nicely made 4 inch scale Ransomes baler which was turning out miniature bales of hay. With plenty of atmospheric smoke about it made a good picture of agricultural working practice from years ago (photo 14).

The high-tech Gas Turbine Association demonstrated the power these small

engines can generate by firing one up at regular intervals during the show. There was always a large group of onlookers watching closely as James Hill showcased the capability of these scratch-built machines (photo 15). Jerry Birchell's gas turbine locomotive is progressing very well and really looks the part now (photo 16).

Another interesting and crowd pulling display was offered by Noel Shelley with his portable foundry. This really drew the crowds and Noel was kept very busy answering the many questions posed by the visitors. The other event that takes place outside was the awarding of the Len Crane Trophy for the best engine in steam. This year it was awarded to Ken Wood (photo 17) for his well-presented 4 inch scale Burrell traction engine, *Victory*. Note the little 'pot boiler' and vice on the running board.



James Hill has the attention of the audience as he powers up one of the gas turbine engines.



Gas turbine locomotive 18100 under construction by Jerry Burchell.

The Stirling Engine Society under the watchful eye of Julian Wood presented their usual large display of working Stirling engines in all their many forms, from large gas powered machines to smaller solar powered engines, which were continually working throughout the exhibition. The compact display by the Model Steam Road Vehicle Society featured a very well made 4 inch scale Burrell agricultural engine and a rare 3 inch scale Wallis and Stevens road roller (photo 18). A good display from the Wolverhampton & District MES (photo 19) included a wide range of models and tools. I liked the Tool & Cutter Grinder which looked a very practical piece of equipment (photo 20).

On the National 2½ Inch Gauge Society stand visitors could see a wide range of locomotive prototypes and examples of some of the castings and fittings which are available in this gauge. In the same scale but with a more scenic approach, the Gauge 3 Society again had a good range of models on show to demonstrate what can be achieved in this gauge (photo 21). If clocks were your interest then a visit to The Olde Clock Shop provided by the Milton Keynes Clock Club would have satisfied your needs with a varied display of fine timepieces (photo 22). Another regular supporter of this exhibition is the



Ken Wood's beautifully made 4 inch Burrell traction engine won the Len Crane trophy for the best engine in steam.



A rare model of a Wallis & Stevens road roller in 3 inch scale shown on the MSRVS stand.



Wolverhampton SME had a well filled display.

Birmingham SME and again their varied and interesting display provided lots of fine models to admire which were all numbered and described in a very useful folder. The Gauge 1 Model Railway Association

had a small tribute to the feat of LNER A4 *Mallard* in breaking the world speed record for a steam locomotive in 1938 as part of their comprehensive display of locomotives and rolling stock.

A good selection of boats and marine craft also provided plenty of talking points. The 1:18 scale model of the tug, *Gondia* on the Blackheath MPBC stand was a well-made craft and the engine system was on display alongside, together with a full description of the type, size and how it all works (photo 23). Detailed models of marine craft showed off the range of interest in the Knightcote MBC and gave visitors plenty of food for thought, as did the Kingsbury Water Park MBC who featured a number of large naval craft on their display (photo 24).

Part of the display on the Hereford SME stand was a small display board showing



This well-made and useful tool and cutter grinder was part of the Wolverhampton display.



The Gauge 3 Society display of 2½ inch gauge locomotives and rolling stock.



From Milton Keynes came the Olde Clock Shop which housed some superb examples of detailed clock making.



HMS Hotspur, part of the Kingsbury Water Park MBC display.

how boiler tubes can corrode within a steel boiler until they just disintegrate. A salutary warning is there and a lesson to be learned (photo 25). The Steam Apprentice Club, part of the National Traction Engine Trust, also had a sectioned boiler on show which clearly showed how neglect and perhaps ignorance can lead to a dangerous situation

developing unless it is professionally inspected. The boiler had been bought by an unsuspecting client complete with a full test certificate. It was an accident waiting to happen and again shows what can happen without the correct procedures being in place. This display also contained a number of component parts made by young people using the on-



Some of the instructional models made by members of the SAC.



The tug Gondia and its boiler plant.



The result of poor boiler management shown on the Hereford SME display.

stand 3D printer (photo 26).

The two organisations who look after the majority of model engineering clubs, the Northern Association and the Southern Federation, had relevant displays of information accompanied by selections of work and artefacts to interest visitors. A display of smaller historical exhibits accompanied the wire eroder machine on the

SMEE stand which created a lot of interest. The Midlands Meccano Guild had a colourful and very interesting stand which included a fully working haunted house and a number of 'Emmett' type locomotives and road vehicles. It was selected by the other stand holders as the Best in Show (photo 27).

That just about sums up the clubs and display sections of the Midlands Exhibition. There was a great deal more to report but, as usual, space limits preclude including everything so I hope that those clubs and organisations I haven't mentioned will understand. However, all your efforts, whether as a trader or club were fully appreciated by the organisers so, on their behalf, thank you. I hope to see you all again next year.



A prize winning stand from the Midlands Meccano Guild.

ME

Try any title for

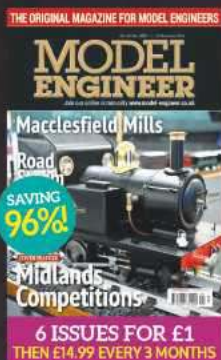
Save up to
96%!

£1*



Whether it's Crafting, Model Engineering or Fishing, make 2019 the year that you give yourself some me-time. And what better way than to try one of our great hobby magazines for just £1 with no obligation to continue! So go on, treat yourself... or someone else!

- Range of great titles to choose from
- No obligation to continue
- Great future savings
- Delivered conveniently to your door



SUBSCRIBE SECURELY ONLINE:
WWW.MYTIMEMEDIA.CO.UK/NY19P
CALL **0344 243 9023**** AND QUOTE **NY19P**

Prefer a
Digital or
Bundle Sub?

Offers available online at:
www.mytimemedia.co.uk/NY19P

*UK only Direct Debit/Continuous Credit Card offer only

**Calls are charged at the same rate as standard UK landlines and are included as part of any inclusive or free minutes allowances. There are no additional charges with this number. Overseas calls will cost more.

TERMS & CONDITIONS: Offer ends 28th February 2019. Subscriptions will begin with the next available issue when order is placed. You can cancel your subscription before the third issue and pay no more money than the £1 already debited. Otherwise your subscription will automatically continue at the low rate selected above. This is a UK offer only. The prices above relate to trial print subscriptions. Digital and Bundle trial subscriptions are also available online at www.mytimemedia.co.uk/NY19P.

MyTime Media collects your data so that we can fulfil your subscription. We may also, from time to time, send you details of MyTime Media offers, events and competitions but you always have a choice and can opt out by emailing us at unsubscribe@mytimemedia.com

We do not share or sell your data with/to third parties. Details you share with us will be managed as outlined in our Privacy Policy here <http://www.mytimemedia.co.uk/privacy-policy>.

Please visit www.mytimemedia.co.uk/terms for full terms & conditions.

The Great Orme Tramway PART 2



The Lower Section haulage cable.



One of the guiding sheaves in the conduit.

Graham Astbury takes a trip on a unique tramway in North Wales.



Continued from p.19
M.E. 4602, 21 December 2018

The Upper Section

The Upper Section is different from the Lower Section in that it operates as a true funicular in that both cars are connected by a single cable passing over a sheave at the top of the section. However, in a typical funicular railway, this top sheave is used to drive the cars up and down (ref 5). This is not the case for the Great Orme Tramway which is driven from the bottom. This arrangement is only found on funiculars where the incline is relatively low. This Upper Section only rises 150 feet in a length of 827 yards, giving a mean gradient of 1 in 16.5 and a maximum gradient of 1 in 10.5, with some parts that are level.

A winding method similar to that used on the Lower Section is used on the Upper Section in that there are two drums connected by a shaft with each haulage cable being wound onto a drum. The motor is a similar slip-ring motor, but of only 75 HP as the gradients, and hence the motor load, are considerably less than on the Lower Section. The nominal speed of the Upper Section cars is 7 mph as the track is on its own private right of way and not on the public

roads. As with the Lower Section, there is a central band brake used to control the speed of the cars and stop them as necessary. The Winchman for this section sits in the same Control Room as the Lower Section Winchman and has a similar control panel and indicators. As the cables are not uniformly held in tension by the weight of the cars, due to the level sections and the low overall gradient, winding the cable onto the drum does not necessarily follow an even pattern, so guide rollers are used to lay the cables on evenly (photo 15). The rollers are moved back and forth across the face of the winding drum by a cam driven from the gearbox driving the drums (photo 16).

However, winding the cable onto each drum is not straightforward since there is a further complication. As the cars move along the track, the cable passing over the top sheave connects the two cars together so the distance between the two cars over the top sheave is constant. However, as the upper car is travelling down from the Top Station, the drum winds in the cable at a slower rate than the cable paid out to the ascending

car, so there is an imbalance between the cables which needs some mechanism to ensure that the cable does not go slack and come off the guide rollers in the track. This compensating gear is in the form of a heavy weight in a deep pit held up by the haulage cable passing over a series of fixed pulleys (photo 17) and pulleys on a heavy weight (photo 18). Since the haulage loads are much lower on the Upper Section because of the low maximum gradient, these compensating weights allow the haulage cable to be kept taut irrespective of the positions of the two cars. A little thought will reveal that the weight supported by the cable about to pull a car down is at the top of the pit so that the cable is taut. The weight on the other side will take up whatever position it needs to to keep the cable taut. Hence photo 17 was taken when Car 7 was in the Halfway station at the bottom of the Upper Section and Car 6 was ready to be brought down from the Summit.

When the Upper Section was built, there were two reasons why the same construction as the Bottom Section - of two slightly interlaced concrete surfaced tracks with a central conduit



Access covers in the road surface above the rollers – always on the inside of the curves.



The guide rollers on the Upper Section winding drums.



The cam which moves the guide rollers back and forth.



The compensating pulleys.



The pit is 17 feet deep!



The flanged pulleys guiding the cables on the curve.

containing the haulage cable - was not used. One was cost and the other was that there was no need to use an enclosed conduit as the track runs on a private right of way and hence does not need covering. Since the haulage cables do not pass through an enclosed conduit, they can be run side-by-side down the single track and use flanged pulleys to guide the cables (**photo 19**). Also visible in photo 19 is the inductive loop cable just in front of the rail nearest the camera. Again the pulleys are used on the inside of the curves and plain horizontal rollers are used on the straight sections (**photo 20**). Because the haulage cables are each off-set from the centreline of the track, the draw-bars on each car are off-set to match. The effective side-load on the car bogie due to the use of off-set draw-bars is very small as the load on the haulage cables is quite low.

As both cars use the same track it is clear that a passing place is required. This has points at both ends because the track is single both below and above the passing place (**photo 21**). As with the Bottom Section, each car always uses its own side of the passing place and the points switch over automatically by the passage of the flanges through the points. The points are examined each morning before starting the service to ensure that they are set correctly for the positions of the cars. The status of the points is clearly visible by a number showing for which car the points are set. In photo 21, the points are set for Car 7 to travel down the right-hand track of the passing place as can be seen by the number 7 showing on the disc inside the cage. The number 6 on the other disc shows when the points change. **Photograph 22** is taken, looking in the opposite direction to photo 21, from Car 6 whilst descending

showing the rear of Car 7 ascending after having passed the points in the background of photo 21.

Since there are now two haulage cables which have to negotiate the passing place, the point-work has to have gaps in the tracks to allow the cables, and hence the draw-bar, to pass through. Each track has suitable check rails to guide the cables and the wheels so that the car follows the correct path. Again, as each car leaves the passing place, it sets the points for its return journey, so each set of points operates once for a return journey (**photo 23**).

Although there is a compensating gear on each haulage cable, there is a potential problem due to the variable gradient of the track. There is one steep part which is not by the passing place, so as a car descends the steep section, the other car is on a level section so has a much reduced load on the

haulage cable. Consequently the weight of the descending car is sufficient that its speed exceeds that of the haulage cable being wound in and the cable would go slack. This is avoided by the Observer applying the wheel brakes to offer just enough resistance to keep the haulage cable taut. As it may be that the brake is not applied sufficiently, there is still a need for the oscillating cable guide rollers as in photo 15. The Upper Section cars, numbers 6 and 7, do not have the same emergency brakes as the Lower Section cars, numbers 4 and 5, as it has been shown that on such slight gradients as the Upper Section has, slipper brakes as fitted to modern street-running trams are adequate to act as emergency brakes and will stop the cars quickly. The emergency brake is operable by both the Winchman and the Observer. The slipper brakes are shown in **photo 24** and when actuated bear directly



Horizontal rollers guiding the cables on the straight sections.

onto the track providing the braking effort required.

The haulage cables

Whilst to the layman steel cables are pretty straightforward, there is a difference between cables used for straight haulage and those used for winding onto drums. As can be seen in photo 3 (see part 1) the cable is very neatly wound onto the left-hand drum for Car 4. This is because the cable is always under tension due to the weight of the cars and the continuous gradient of the track. Thus the cable never becomes slack until the bottom car touches the buffers at Victoria Station. As the cable is always wound layer upon layer on the drum, there is contact between the cables on consecutive layers and wear can take place. In ordinary lay cables, the wires are wound one way into strands (in a left-handed helix) and the strands are wound in the opposite way to make the cable with a right hand helix. This results in the individual wires being parallel to the cable. Because the wires are parallel to the cable, they tend to lie between the individual wires on the layer below and hence rub against each other which would result in wear of the individual wires. In order to minimise the potential for wear on the cables, the recommended type of cable for this duty is Lang's lay



Car 7 travelling up through the passing place.

which is a specific way of manufacturing the cables where the individual wires are wound into strands which are then wound to make the cable.

In Lang's lay, the wires are wound into a right-hand helix to form each strand and the strands are also wound in a right-hand helix, so that the resulting cable does not have the individual wires running parallel to the cable. This is better when the cables are wound on top of each other, as the individual wires cross the layer below at a steep angle so do not tend to lie within the cable beneath.

Half way through the cable's life, it is turned end-for-end as the part nearest the car travels further and passes round more sheaves as the car moves, so the part nearest to the drum wears less. Turning the cable



The Upper Section passing place looking towards the Halfway Station.

end-for-end allows the relatively little worn part to be used at the end of greatest wear, thus evening out the wear and extending the life of the cable.

As it happens, there is an experiment being undertaken at the moment on the Tramway on the use of an ordinary lay cable instead of a Lang's lay cable to see how the wear compares. The ordinary lay cable is shown in photo 12 where it can be seen that the individual wires are actually parallel to the cable, whereas in the Lang's lay cable shown in **photo 25** the individual wires are laid in a helical path wound the same way as the individual wires are wound into strands, so appear to be wound in a much tighter helix.

The cars

There are four cars still in

existence, all built when the line was opened and all the cars are essentially the same. Each car seats 48 passengers and takes one crew member (the Observer) who stands on the front platform. Originally the capacity was 48 seated and 12 standing, but standing passengers are no longer permitted. A glazed door between the main body of the car and the platform is closed once the passengers are on board to isolate the Observer from any distraction from the passengers. The main passenger section has open windows along the upper half, which is good on hot, sunny days (like 2018!) but not quite so good when it's wet and the wind is blowing. The first two cars, numbers 4 and 5, were delivered in 1902 to inaugurate the Lower Section service. The other two, numbers 6 and 7, arrived a year later to enter service on the Upper Section. It would appear that the cars have always operated on the Sections on which they now operate and have never been swapped around.

Each car has an overall length of 37 feet, with two bogies each of four 19 inch diameter wheels set on a wheelbase of 4 feet. The bogies are mounted at 24 foot 4 inch centres underneath each car. They are repainted frequently (due to the somewhat exposed conditions in which they operate) and



23 *The check rails on the points at the top of the Upper Section passing place.*

have carried the same livery since 1992 (**photo 26**) when the cars were named after local Saints: St. Tudno (No. 4); St. Silio (No. 5); St. Seiriol (No. 6) and St. Trillo (No. 7). These cars still look good despite being 115 years old. As the gauge is 3 feet 6 inches, they would make an excellent 1 inch scale model running on 3½ inch gauge track and would not require any difficult provision of electric motors underneath the car – being cable hauled.

Visiting

It is a unique and well worth visiting railway and, despite many people thinking that it is like the San Francisco Streetcar system, it is completely different. There are two similar funiculars that operate on public roads in Lisbon but if you are in the U.K., why not visit the Great Orme Tramway? I am sure that you will not be disappointed! It is a wonderful piece of Edwardian engineering still going strong after 110 years.

The Great Orme Tramway is open every day from late March to late October running every 20 minutes from 10am to 6pm, but it is advisable to telephone before visiting to check the running times as sometimes it runs every 10 minutes at peak periods whilst early and late in the season it has reduced frequency and times of running.

Contacts:

www.greatormetramway.co.uk
Tramfford y Gogarth, Gorsaf Victoria, Church Walks, Llandudno, LL30 2NB
Tel. 01492 577877

Acknowledgements

I would like to thank Mr. Neil Jones, the General Manager of the Great Orme Tramway, for allowing me access to the 'inner workings' and for granting permission to publish the article. Also I would like to thank the Light Rail Transit Association for permission to reproduce some of the statistics and a summary of the history from their publication, *Great Orme Tramway – The First 80 Years*, by R. C. Anderson.



24 *The slipper brakes fitted to Cars 6 and 7.*



25 *Lang's lay cable showing the much greater twist of the individual strands.*

Finally, I would like to thank Mrs. Sue Marriott for the kind loan of that book, without which the article would not have been written.

References

Ref 5 Astbury, Graham, *The Babbacombe Cliff Railway, Model Engineer*, Vol 214, pages 300-3, (2015).

ME



26 *Car 6 in resplendent livery leaving the Summit Station.*

British and American Terms for Model Engineering

Gregory P. Widin offers a useful lexicon for improving trans-atlantic communications between model engineers and home machinists.



As George Bernard Shaw is famously (and variously) quoted: 'Britain and America are two countries separated by a common language'. This is certainly true in model engineering or hobby machining. In fact, 'Model Engineering' as a term doesn't even exist in American English—the closest expression is probably 'Home Shop Machinist' which is, like *Model Engineer*, the name of a publication.

After reading American and British hobby engineering magazines for more than 35 years, I've learned many equivalent terms in both lexicons. Some are obvious, while some are obscure. In a few cases, there is no exact 'translation'. For the benefit of anyone reading the other country's magazines, here are a few of the most important equivalences. I have left out the terms which are not specific to our engineering hobby, such as 'windscreen', 'bonnet' and 'boot' (British) for 'windshield', 'hood' and 'trunk' (American). The terms in each section are alphabetized according to the British version. I have tried to use capital letters only for abbreviations or trade names.

The most difficult correspondences to establish are sizes. There are multiple standards for screw threads, drill diameters, wire sizes, sheet metal gauge and the compositions of different metal alloys and brazing materials such as silver solder. While numeric correspondence between some British and American parts may be possible, this is rarely exact. For example,

Machinery, Machining and Workshop Terms

British

blow pipe
blowlamp
Boxford
C-spanner
centre pop
cheesehead
clasp nuts
coach bolt
cramp
D-bit
dog clutch or
dog-point screws
dome nut
floating centre
G-cramp
gland
grease nipple
grub screw
gudgeon pin
guillotine
jennies
lathe ways generally
flat (Myford pattern)
linisher
pin-spanner
pistol drill
pump centre
screened
slide-rest
slot drill
sintered brass bearing
slippers
snipe nose pliers
spanner
spelter
spirit burner
split pin
sticky pin
swarf
swing
(radius, e.g. 4½ inch)
telescoping damper
torch
trunnion pin
plumber's jointing
upsetting
vice

American

blow torch
kerosene blow torch (obsolete)
South Bend (approximate equivalent)
open-end wrench
center punch
fillister head
half nuts (on a lathe)
carriage bolt
clamp
(one-flute reamer)
fastener with short
unthreaded length at the end
acorn nut
live center
C clamp
ferrule/packing
Zerk
set screw
wrist pin
metal shear
hermaphrodite calipers
lathe ways generally inverted-V
(South Bend or Boxford pattern)
linear sanding belt machine
spanner
drill gun
spring(-loaded) center
shielded (electrical)
top slide
center-cutting end mill
Oilite bearing
(surfaces for sliding contact)
needle nose pliers
wrench
brass for brazing
alcohol lamp
cotter pin
center finder
chips
swing
(diameter, e.g. 9 inch)
shock absorber
flashlight
wrist pin
pipe dope
swaging
vise (spelling difference)

Materials

<i>British</i>	<i>American</i>
aluminium	aluminum
baize	felt
bright steel	CRS (cold rolled steel)
mild steel	low-carbon steel
(MS, also 'merchant stock')	
silver steel	drill rod (high-carbon steel)
gauge plate	ground flat stock
German silver	nickel silver
gunmetal	red brass
HRS	hot-rolled steel
meths	wood alcohol (dyed blue in the UK)
(methylated spirits)	
paraffin	kerosene
petrol	gasoline
rustless steel	stainless steel
Tufnol	Bakelite
washing-up liquid	dishwashing liquid
[used as a wetting agent, e.g. in soldering flux]	
white spirit	mineral spirits

Special Railroad Terms

<i>British</i>	<i>American</i>
brake van	caboose
buffers	[bumpers on front and rear of car or engine to absorb shock of bumping]
buffer beams	pilot beams
clack	check valve
engineman/ driver	engineer
fishplates	tie plates
'fitted' goods van	trains with freight cars equipped with (vacuum) brakes
(on the) footplate	(in the) cab
goods van/train	freight car/train
guard	brakeman
horn block	journal box
permanent way	right of way (line)
reverser	Johnson bar
storage road	siding
sleepers	ties
shunting	switching

Relevant Slang

<i>British</i>	<i>American</i>
boot sale	flea market
chemist's	drug store
estate car	station wagon
galloper	merry-go-round
Heath Robinson	Rube Goldberg (a wild, hare-brained contraption)
high street	overly fancy, snob goods
ironmonger's	hardware store
motor spares shop	auto parts store
one-off	one of a kind, unique
over the top	excessive, beyond the limit
posh	(overly) luxurious
town gas	natural gas
splashers	fenders
2-off	number of identical parts to be made

Abbreviations

<i>British</i>	<i>American</i>
A/F or A.F.	across flats (for a hexagon)
AVO	VOM (volt-ohm-milliammeter)
(amp-volt-ohmmeter)	
ELB	GFI or GFCI
(earth leakage breaker)	
Residual current circuit breaker	GFCI (ground fault circuit interrupter)

Trade Names

<i>British</i>	<i>American</i>
Abrafile	non-tooth filing tool
Aloxite cloth	emery cloth or paper
Araldite	(2-part) epoxy glue
Baker's fluid	(acid?) soldering flux
Boxford	South Bend
Eclipse Jr.	miniature hacksaw
Tippex	White-out (used to limit flow of solder)
Hallite	washer/gasket material
Marigolds	yellow dishwashing gloves
Mole wrench	vise-grip pliers
Peatol	Taig
Primus stove	small portable gas (camp) stove
Seloc pin,	roll pin,
Groverlock pin	tension pin
Verdict	dial test indicator (DTI)

while fastener diameters may be similar, thread pitches will differ, resulting in disparate indications of strength. Wikipedia has several articles which include tabular data on threads, thicknesses and alloys, and readers are encouraged to find equivalences that pertain to their own project requirements. *Machinery's Handbook* covers many different systems, including archaic ones. The variety can make your head spin! Fortunately, a given project will typically require translation of just a few fasteners and materials, depending on the user's specific application.

There is an interesting set of differences in tooling end mills. British publications refer to Clarkson-style, or threaded-shank end mills. In the USA, end mills typically have a 'Weldon' shank, which is anchored instead by a flat on the mill's shank against which a set screw from the mill holder is tightened. Another difference is the British 'slot drill'. The slot drill is a two-flute, centre-cutting end mill. In the USA, however, such end

mills may have any number of flutes, so centre-cutting end mills may be obtained with two or more flutes. Consequently, in the USA, the term 'slot drill' is never used, since it is really not a unique specification of the mill's configuration.

Materials are often difficult to compare. In Britain, the 'EN' series steels have been replaced by other standards. The USA uses AISI/SAE standards for the composition of steels and other metals. Thus, unless the materials specified are generic, like cold- or hot-rolled steel, one must compare detailed composition information to equate British materials to American, and vice versa.

A final difference is the British preference for first-angle projection drawings, while American sources prefer third-angle projection. Wikipedia has an article on 'multiview projection' which should clarify this difference. Misinterpretation of a drawing can result in a 'backwards' part being created, so it pays to be careful when first viewing the drawing.

ME

CLUB NEWS

Geoff Theasby reports on the latest news from the Clubs.



Debs and I visited Magna in Rotherham, a Millennium project built in a redundant steelworks.

Incorporating four 'pavilions' - Air, Water, Fire and Earth - illustrating the relevance of these to our industrial past. It's big, cold and dark, with lights and soundtracks to illustrate the workings of a steel melting plant and high walkways to look down on the 'floor' and imagine steel being produced. There's lots of 'stuff' to entertain the kids, especially in the water section, and the 'captive' JCBs allow visitors to scoop up metal scrap. Some exhibits weren't working; I imagine that they have a hard life being bashed about by enthusiastic visitors. The café was quite decent, for what it was. They had no straws, 'to protect the environment', which would have been fine had the adjacent shop not been full of plastic tat for the kids. No books, precious few scientific toys but a good adventure playground.

By way of a contrast, Debs and I are booked to visit the Advanced Manufacturing Research Centre in Sheffield (an ultra-modern manufactory, M'Lud) courtesy of my membership of the Institute of Engineering Technology. A report will follow.

I bought an aerial tuner at auction and, getting it home,



Ian Marsh's Gaff Schooner at Otago. (Photo courtesy of Gary Douglas.)

took the case off, as we tend to do. Although intended for listeners only - no doubt due to the close spacing of the variable capacitors - the constructional engineering was very good. Apart from the case fixing screws, which were M3 into clinch nuts rather than the oft-met self tappers, there were no fastenings on any part of the exterior. This bodes well. The inductance was big and strong enough for transmitting through and the internal wiring substantial. I thought it was worth putting a few watts through and so far, all is well. It's a bit big, almost the size of the transmitter, but it should last a while. I also renewed my aerial feeder cable, as it was misbehaving. On removing the original, I found that some clueless poltroon had used satellite cable, which is for listening only and the wrong impedance. I blame the gremlins.

We have a barcode reader, as we are members of a shopping analysis scheme and it was failing to scan barcodes reliably. Based on a three month temporary job with Dent Electronics in Colne over 20 years ago, I suggested the lens needed a wipe. And, Lo! It worked fine again! I modestly explained that Dent made yarn breakage detectors for spinning frames, so I knew that minor marks or scratches on the LEDs could stop them working. Now then, 'to wiping bar code reader lens - £1. To knowing why it

was failing - £100'.

In this issue: HGVs, marking our equipment, Rugby, steam outnumbers diesel, a farm wagon, *Lion* wheels, Fiji and a gypsy.

John Billard writes following my query regarding the steam ploughing photo in *M.E.* 4603; 'The implement behind the plough is an original John Fowler furrow or land press. It operates automatically with the Fowler six furrow anti-balance plough'.

PEEMS Newsletter, October, from **Pickering Experimental Engineers and Model Society**, has a detailed article by Editor, Neville Foster on the visit to Parkol Marine in Whitby. Whitby was once the sixth major port in the UK and has been building ships since 1706. Ron Baier has built a model of the Iron Bridge, Coalbrookdale, from a kit. It can be soldered but he used superglue. A fine looking model.

W. www.parkolmarine.co.uk

Stamford Model Engineering Society sends a very short newsletter. It details the Harringworth Viaduct, 82 arches and over 1,000 metres long, built in only 13 months in 1878 and using 20 million bricks, made on site. Editor, Joe Dobson writes on an item from the Campaign for Better Transport, regarding the proposed increase in length of HGVs. Despite many claims that they offer cost savings, in practice, most of the time they are not loaded to capacity and



Swing bridge hydraulic machinery. (Photo courtesy of Malcolm Phillips.)

therefore the advantage is lost.

Leeds Lines, November, from **Leeds Society of Model and Experimental Engineers** begins with Chairman, Jack Salter mentioning something most of us never consider. We may be aware that our valuable machine tools etc. should be listed and valued so that when they are eventually disposed of, our survivors and executors do not part with them for a song. How many have not, however, marked jigs, tools and sundry equipment with what they are for (if in doubt) and our name, with an engraving tool or permanent marker? Engraved brass plaques are not expensive, identifying our models for future owners and your drawings need to have an owner too. Good thinking, Jack! Jack is also an admirer of the Morgan 3-wheelers and found the current model rather too expensive, reckoning he could do much better. He found a man who had plans available for a lookalike 1935 model, using a 2CV engine. It is now complete, is half the weight of the real thing, has passed the government MSVA test and is waiting for a registration number to be allocated.

W. www.leadssmee.btck.co.uk/

Conrod, November, from **Otago Model Engineering Society**, mentions this interesting video from Facebook, www.facebook.com/BBCArchive/videos/2111009969227615/ It concerns the testing of steam locomotives at Rugby after WWII. Ian Marsh's beautiful schooner on a calm 'sea' is possibly the real thing (photo 1). Bruce and Marcelo Milne do a yearly Father and Son holiday, involving some form of transport. This time it was mostly KiwiRail and the Kapiti Line. Henry Gooselink told humorously of buying a chainsaw to cut up some old lampposts, finding it didn't cut straight and the saga of rectifying said fault.

W. www.omes.org.nz

The Link, December, from **Ottawa Valley Live Steamers**



Alan Bullock's J50 at Adlestrop. (Photo courtesy of Peter Vincent.)

and **Model Engineers** reports that its members are vexed. Having promised to run at the Halloween Special museum event, they arrived on a wet, cold day to find no provision had been made for them and the museum had made little or no effort. Consequently, they will appear again only in good weather and if they want to. Analysis of track usage shows that the High Line (raised track) was used by steam locomotives more than the Ground Level track, a situation not seen for several years and ascribed to the HL improvements of late. Please note the new website, run by Len Winn, is ovisme.x10host.com

TSMEE News, October, from **Tyneside Society of Model and Experimental Engineers** begins with Malcolm Phillips describing a visit by 22 members to the swing bridge in Newcastle. The first bridge was built in 120 AD and three further bridges were erected, each following some calamity, as the Archdeacon, 'Henry' (Robertson Hare) would say, in *All Gas and Gaiters*. Operated by hydraulic power at 600 psi, the reserve is such that it

can open and close one and a half times before needing a breather and can make one revolution in six minutes. ('The Six-minute Revolution', an everyday story of Geordie folk – Geoff) (photo 2).

W. www.tsmee.co.uk

GMES News, November, from **Guildford Model Engineering Society** says that Peter Langridge is now in a nursing home and wheelchair bound. His mental agility is not lacking and he is always ready to discuss his traction engine and Rosebud grates. When Health Minister, Jeremy Hunt officially opened the facility, Peter told him that he was sorry he could not show him the (unfinished) model. The September charity event led to a donation of £1000 being made to their neighbours, Disability Challengers, in recognition of the continuing good relations between them. A bits and pieces evening produced some interesting models. Ivan Hurst built an LBSCR brake van, which includes the ability to apply and release the brakes from each end. He spent some time thinking how to do this. Peter Shires continues with the good

ship *Nancy Blackett*, for which he has carved a miniature lavatory complete with lifting lid. Tony Hills now has three working video cameras, after purchasing a screen which was not UK TV system-compatible. Swapping it for a compatible screen on another camera did the needful. Roger Curtis made a Monmouthshire farm wagon using boxwood which has the advantage of scale grain and can be tapped down to 12 BA. Only square-headed nuts and coach bolts were used in the originals so he made all of them from square stock.

W. www.gmes.org.uk

Lionsheart, November, from **The Old Locomotive Committee** reveals that Adrian Banks has now taken over as Editor, replacing John Hawley, who now intends to build his own *Lion*. Adrian has already built his own version, is Treasurer of Tonbridge MES and brazenly confesses that he knows little of those foreign parts North of Watford. In deference to the 'maintenance of good order and discipline', I make no further comment. Harrye Frowen writes on making a *Puffing Billy* and



Hack Green electrojumble. Dentistry anyone?

the difficulties in making the driving wheels. Too small to cast all-in-one, he fabricated them from five main parts. It constantly surprises me that a club such as this manages to produce so much fascinating material, when its sole reason for existing is a single, solitary locomotive, albeit a rather special one. But are they not *all* special in their own way...?

W. www.lionlocomotive.org.uk

Gauge 1 North, Yorkshire Group, Newsletter, October, visited Adlestrop, postponed because of the 'Beast from the East' and the reward was a fine, warm day. Such was the enjoyment thereof that a return visit is planned. (Down in the dumps? - Get Adlestrop!) Alan Bullock's J50 is shown (**photo 3**). The response to a request for a suitable trailer met with an overwhelming response. Apathy! The good news is that Secretary, Peter Vincent can tow up to 3500Kg with his current car, something to do with being licensed in the 1960s. (For similar reasons, I can drive a 7½ ton wagon (and have) and track-laying vehicles.... - Geoff)

W. www.gauge1north.org.uk

Stamford Model Engineering Society, December newsletter tells us that Editor, Joe Dobson has been helping with the restoration of a DUKW, the six-wheeled, amphibious lorry made for the US in WWII. I *think* I have read that these are

now in so much demand that a company is making replicas. (There are replica 90% scale Spitfires available too - Geoff.) Keith writes on the history of fairs in Stamford. King John granted a Charter in 1261 but there are mentions of fairs in 1229 and 1189.

Branch Lines, Winter, from **West Riding Small Locomotive Society** relates that Stephen Seale visited BCSME in Vancouver in a downpour. Despite the drenching he got, from which his overcoat completely failed to protect him, his ear-to-ear grin lasted for some considerable time. This newsletter arrived in Mk 1 and Mk 2 versions, due to a spelling mistake over which I will draw a discreet veil.

W. www.westridingsmalllocomotivesociety.20m.com

Model and Experimental Engineers, Auckland, November *MEEA Newsletter* has Dave Watt describing how he converted two Myford ML7 and one (US) Rivett lathes from Imperial to metric standards. Andre Pointon has a small, cheap, electronic module which can identify most electronic components. I have such a device and very useful it is too: £5 from Amazon. Murray Lane found that Howick Mezshed (Men's Shed?) is to replace its mechanical tools and the majority of the redundant gear is to go to Fiji to help train the locals in their

use. What turned out to be a Diamond woodturning lathe was discovered on clearing the machinery. According to Lathes.co.uk, they date from the 1900s and are quite rare, so it has been restored. Ken and Andre built a steam windlass for an Australian yacht owner. An interesting job, they said, and an interesting looking machine. (The 'pulley' gripping the chain is called a Gypsy, I gather. The terminological exchanges on Yachting and Boating World forum are illuminating, may I say? - Geoff)

Lack of pictures (see Postscript below) allows me to print this collation of small tools, offered to Hack Green in October (**photo 4**).

Worthing and District Society of Model Engineers' Newsletter, Winter, relates the saga of the new toilet block. Before laying the vinyl, the floor was found not to be level. Much activity was undertaken with a heavy roller, to no effect, then someone checked the spirit level... Due to a fault, design problem, incompatibility or other non-compliance, a new bubble was required. Instant level floor! Chairman, Kevan, reports on disappearing teabags, although the soup is unaffected and he is keeping a very close eye on the chocolate digestives. Peter Bulling writes on the little-known Malta Railway.

It's metre gauge, seven miles long, opening in 1883 and closing in 1931, following competition from trams and ex-WWI lorries. Mike Wheelwright weighs in with some ideas about locomotive weight distribution and how modellers often need to add weight, rather than keep it down so the Civil Engineer will allow their use. (One of my G1 'diesel' locomotives could hardly move itself, until I added a one inch square bar under the bonnet to give it some traction. Others put discreet rubber tyres onto the driving wheels - Geoff.) Dereck Langridge was on a walk near Chichester and by a series of unlikely events, got to Selsey lifeboat station. There he saw a Shannon Class lifeboat on its tractor and powered trailer, capable of launching in 2.4 metres of water. The tractor is able to withstand submersion to 9 metres without harm.

W. www.worthingmodelengineers.co.uk

Postscript: two days before I sent this masterpiece to Editor Martin, I lost all access to my photos file and kept getting Disc Usage Analyser instead. Oh Calamity! For real! Looked for File Manager, not there. Posting a question on the internet, I find I need Nautilus. Not there. Can I download? No. Reinstall the operating system? Not enough memory. Free up memory? OK. Try again, file is corrupt. Find out how to remove it. By this time I am wading haphazardly through Linux Terminal. Eventually discovered how to run Nautilus, Eureka! My photos are back! This personal version of Finding Nemo took two days! Now I can send it off to press, I'm going off to press flowers...

And finally; Engineering is like maths but LOUDER!

ME

Contact:
geofftheasby@gmail.com

JANUARY

- 15 Grimsby & Cleethorpes MES.** Monthly meeting, Waltham Windmill, 7.30pm. Contact Dave Smith: 01507 605901.
- 15 Romney Marsh MES.** Members' social afternoon, 2pm. Contact Adrian Parker: 01303 894187.
- 16 Bristol SMEE.** Talk: 'GWR Fleet Transformation' – Andy Bowdidge. Contact Dave Gray: 01275 857746.
- 18 Rochdale SMEE.** 'Walkden Yard, Workshops of Central Lancs Coalfield' – Alan Davies, at Castleton Community Centre, 7.30pm. Contact Rod Hartley 07801 705193.
- 18-20 London Model Engineering Exhibition** at Alexandra Palace – see www.londonmodelengineering.co.uk
- 20 North Wiltshire MES.** Public running, Coate Water Country Park, Swindon, 11am-5pm. Contact Ken Parker: 07710 515507.
- 20 Tiverton & District MES.** Running day at Rackenford track. Contact Chris Catley: 01884 798370.
- 22 Romney Marsh MES.** Talk: 'On the Narrow Gauge' – Richard Linkins, 7.30pm. Contact Adrian Parker: 01303 894187.
- 23 Leeds SMEE.** Meeting night – 'Building a Replica Morgan Three Wheeler' - Jack Salter. Contact Geoff Shackleton: 01977 798138.
- 24 Worthing & District SME.** Club meeting – '50 Years Repairing Rolls-Royce', William Pullar, 7.30pm. Contact Geoff Bashall: 01903 722973.
- 26 Worthing & District SME.** Club social evening.

Contact Geoff Bashall: 01903 722973.

- 27 North Wiltshire MES.** Public running, Coate Water Country Park, Swindon, 11am-5pm. Contact Ken Parker: 07710 515507.
- 29 Romney Marsh MES.** Members' social afternoon, 2pm. Contact Adrian Parker: 01303 894187.
- 29 Wigan DMES.** AGM. Contact Brian Clark: brianclark2@sky.com.

FEBRUARY

- 1 North London SME.** Talk: 'The Development and History of Earls Court and Lillie Bridge' – Paul Godwin. Contact Ian Johnston: 0208 4490693.
- 1 Portsmouth MES.** Club night – AGM, 7.30pm, Tesco Fratton Community Centre. Contact Roger Doyle: doyle.roger@sky.com.
- 1 Rochdale SMEE.** Auction night, at Castleton Community Centre, 7.30pm. Contact Rod Hartley 07801 705193.
- 2 Tiverton & District MES.** Running day at Rackenford track. Contact Chris Catley: 01884 798370.
- 3 North Wiltshire MES.** Public running, Coate Water Country Park, Swindon, 11am-5pm. Contact Ken Parker: 07710 515507.
- 5 Romney Marsh MES.** Talk: 'Developments at Maxitrac' – Andy Probyn, 7.30pm. Contact Adrian Parker: 01303 894187.
- 6 Bradford MES.** Film evening, 7.30pm, Saltaire Methodist Church. Contact: Russ Coppin, 07815 048999.
- 6 Brandon DSME.** Meeting at The Ram Hotel, Brandon, 7.45pm. Contact: Mick Wickens, 01842 813707.

- 6 Leeds SMEE.** Meeting night – 'It's About Time' - Richard Hanes. Contact Geoff Shackleton: 01977 798138.
- 7 Sutton MEC.** Bits and Pieces. Contact Paul Harding 0208 2544749.
- 8 Tiverton & District MES.** Club meeting at Old Heathcoat Community Centre, Tiverton, 7.30pm. Contact Chris Catley: 01884 798370.
- 10 North Wiltshire MES.** Public running, Coate Water Country Park, Swindon, 11am-5pm. Contact Ken Parker: 07710 515507.
- 10 Sutton MEC.** Sunday track day from noon. Contact Paul Harding 0208 2544749.
- 12 Romney Marsh MES.** Members' social afternoon, 2pm. Contact Adrian Parker: 01303 894187.
- 12 Southampton SME.** Talk: 'Operating a RN Helicopter from a Destroyer' - John Passmore. Contact David Goyder: 02380 421201.
- 14 Worthing & District SME.** Club meeting – 'Scams and Rip-offs', PC Richard Moores, 7.30pm. Contact Geoff Bashall: 01903 722973.
- 17 North Wiltshire MES.** Public running, Coate Water Country Park, Swindon, 11am-5pm. Contact Ken Parker: 07710 515507.
- 17 Westland & Yeovil DMES.** Track running day 11am – 4.30pm. Contact Bob Perkins: 07984 931993.
- 17 Tiverton & District MES.** Running day at Rackenford track. Contact Chris Catley: 01884 798370.
- 19 Grimsby & Cleethorpes MES.** Monthly meeting and AGM, Waltham Windmill, 7.30pm. Contact Dave Smith: 01507 605901.

- 19 Romney Marsh MES.** Talk: 'Engraving and 3D Printing' – Dave Draycott and Jeff Gibson, 7.30pm. Contact Adrian Parker: 01303 894187.
- 20 Bristol SMEE.** Talk: 'Transforming the Western Region' – Paul Stanford. Contact Dave Gray: 01275 857746.
- 24 North Wiltshire MES.** Public running, Coate Water Country Park, Swindon, 11am-5pm. Contact Ken Parker: 07710 515507.
- 26 Romney Marsh MES.** Members' social afternoon, 2pm. Contact Adrian Parker: 01303 894187.
- 26 Wigan DMES.** Presentation by Mr J Schofield on 'The Isle of Man Transport System'. Contact Brian Clark: brianclark2@sky.com.
- 28 Sutton MEC.** Cotton reel racing – make your own. Contact Paul Harding 0208 2544749.
- 28 Worthing & District SME.** AGM, 7.30pm. Contact Geoff Bashall: 01903 722973.

MARCH

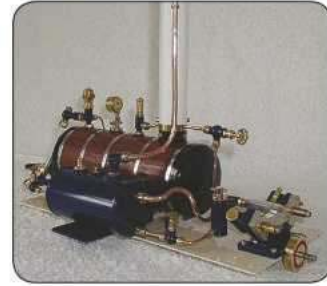
- 1 North London SME.** Auction. Contact Ian Johnston: 0208 4490693.
- 1 Portsmouth MES.** Club night – members railway heritage films, 7.30pm, Tesco Fratton Community Centre. Contact Roger Doyle: doyle.roger@sky.com.
- 1 Rochdale SMEE.** Members' projects and problems, at Castleton Community Centre, 7.30pm. Contact Rod Hartley 07801 705193.
- 2 Tiverton & District MES.** Running day at Rackenford track. Contact Chris Catley: 01884 798370.

The Best of **BRITISH STEAM**

Beautifully Crafted Models Handmade to Order by John Hemmens

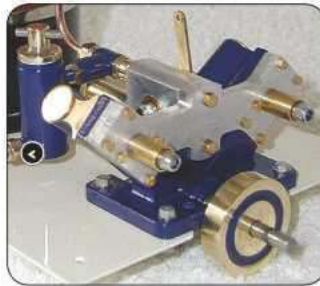
My Ribblesdale and Wharfedale plants are individually made to the highest standard demanded by my customers around the world. They are recognised as wonderful collector's pieces that over time will increase in value as have many of my other models I have made over the last 48 years.

I can proudly state that my models are "Made in Yorkshire" the birthplace of many of the best Engineers in the world



The illustration shows the "Ribblesdale" boiler mounted on a common bedplate with the "Richmond" twin cylinder steam engine and a steam oil separator. The "Ribblesdale" boiler is constructed from copper components and silver soldered. The boiler is stoved with high temperature paint at 175 degrees C. The boiler is lagged with individual hardwood planks and held by stainless steel bands. To improve the boiler performance it is fitted with a ceramic burner. The finished boiler is pressure tested to 150 psi for continuous working pressure of up to 80 psi. A test certificate is supplied with the boiler confirming the test and guarantee of quality. The boiler is fitted with a water filler bush, pressure gauge, water gauge glass and blowdown valve, safety valve, vacuum valve, steam on/off valve, ceramic gas burner, gas pipe and gas on/off valve. The white/cream stove painted chimney is pre-drilled for the exhaust pipe bracket should you wish to extend the exhaust pipe alongside the chimney.

This plant is priced at £1550



The illustration shows the "Wharfedale" boiler mounted on a common bedplate with the "Richmond" twin cylinder steam engine and a steam oil separator. The boiler can be fitted with either the "Richmond" engine or "York" engine and a steam oil separator. These can be purchased as single items. The "Wharfedale" boiler is constructed from copper components and silver soldered. The boiler is stoved with high temperature paint at 175 degrees C. The boiler is lagged with individual hardwood planks and held by stainless steel bands. To improve the boiler performance it is fitted with a ceramic burner. The finished boiler is pressure tested to 150 psi for continuous working pressure of up to 80 psi. A test certificate is supplied with the boiler confirming the test and guarantee of quality. The boiler is fitted with a water filler bush, pressure gauge, water gauge glass and blowdown valve, safety valve, vacuum valve, steam on/off valve, ceramic gas burner, gas pipe and gas on/off valve. The white/cream stove painted chimney is pre-drilled for the exhaust pipe bracket should you wish to extend the exhaust pipe alongside the chimney and also includes a polished brass flared top. This plant is suitable for installation in all my boat products with ample power to drive your boat satisfactory.

The price for this model delivered by UPS within the UK is £1550. Please contact us to discuss delivery, based upon your requirements. You can now place a reservation on payment of £100. The balance of the purchase to be paid upon notification that the model is now ready for despatch.



I also manufacture high quality boat kits with GRP Hulls or plank on frame construction. These fully detailed kits have been produced to supply a package which is full of top quality parts and superb schematic build information that will, with attention to detail and time, produce a very high-quality scale replica of that very product, and if so desired one can reach museum quality. These kits are priced from £1400-£1950

JOHN HEMMENS STEAM ENGINEER

28 Brighton Road, Bubwith, East Riding of Yorkshire. England YO8 6DQ

Tel: +44 (0)1757 289 664 www.steamengines.co.uk Email: enquiries@steamengines.co.uk

WARCO

ALL NEW SUPER MINI LATHE



£599.00

Now fitted with metal leadscrew handwheel and calibrated dial at no extra cost. An accurate sensitive longitudinal feed.

Additional features:

- 100mm 3 jaw self centering chuck
- Steel gears fitted to headstock • Steel change gears
- Brushless 450w motor • Steel and aluminium handwheels

SPECIFICATION:

Centre height: 90mm
Distance between centres: 350mm
Speed range: 50-1100/120-2500 rpm with back gear for maximum torque. Hardened and ground slideways Weight: 39 kg
Wide range of accessories available including fixed and travelling steadies, 4 jaw chuck, vertical slide, quick change toolpost. Huge range of cutting tools.

WM12 VARIABLE SPEED MILL



£685.00

- Compact, versatile milling machine
- Infinitely variable speed control
- Dovetail column ensures positive head location
- Available in metric and imperial versions

SPECIFICATION:

Head tilts. Calibrated 45° - 45°. Very powerful 600w motor. Back gear for maximum torque in low range. All steel gears. Longitudinal traverse 250mm. Cross traverse 165mm. Digital rev counter. Weight 54kg

NEW DRO WM14 MILLING MACHINE



£1,095.00

Same features as our established WM14 milling machine, with 3 axis DRO fitted as standard.

- Magnetic scales • XY and Z traverses • Switchable between metric and imperial • Compact illuminated digital counter

SPECIFICATION:

Table size: 500 x 140mm
Longitudinal traverse: 330mm Distance spindle to table: 280mm
Speed range: 50 - 2,250rpm infinitely variable, with back gear for maximum torque Motor: 500w.

NEW DRO WM180 LATHE



£1,095.00

- Fitted with 2 axis DRO
- Magnetic scales
- Supplied 3 and 4 jaw chucks, fixed and travelling steadies, face plate.

SPECIFICATION:

Centre height 90mm
Distance between centres: 300mm
Speed range 50 - 2,500rpm infinitely variable
Weight 70kg

In addition to these new DRO versions, we will continue with our standard machines. All prices quoted include VAT and UK mainland delivery, excluding Highlands and Islands.

Our next exhibition is the London Model Engineering Exhibition at Alexandra Palace, 18th to 20th January 2019

T: 01428 682929 Warco House, Fisher Lane, Chiddingfold, Surrey GU8 4TD
E: sales@warco.co.uk W: www.warco.co.uk





Ex-display
items now
for sale. Check
our End of
Line

Garden Railways

Visit Our Aylesford Show Room!
Open Monday-Friday 10am-4:30pm & 1st
Saturday of the month 11am-4pm

Request
your **FREE**
Catalogue
today!

01622 793 700

www.dream-steam.com



Locomotives | Rolling Stock | Track | Accessories | Upgrades | Fixing kits & Washers | Chuffers | G Scale Figures | Curve Setters

BRAND OF THE MONTH: MSS

Side Tank Locomotive (32mm/45mm)	909003	£200.00	(Available in Blue, Black, Green & Maroon)
Saddle Tank Locomotive (32mm/45mm)	909013	£230.00	(Available in Black, Green & Maroon)
Side Tank Locomotive Kit (32mm/45mm)	909011	£190.00	(Available in Blue, Black, Green & Maroon)

Maroon Tender (32mm/45mm)	911403	£53.00
Green Tender (32mm/45mm)	911405	£53.00
Black Tender (32mm/45mm)	911401-BL	£53.00
Blue Tender (32mm/45mm)	911402-BL	£53.00
Maroon Passenger Coach (32mm/45mm)	911201	£53.00
Blue Passenger Coach (32mm/45mm)	911201BL	£53.00
Log Wagon (32mm/45mm)	911501	£53.00
Goods Van (32mm/45mm)	911101	£53.00
Guards Van (32mm/45mm)	911001	£53.00
Coal Wagon Grey (32mm/45mm)	911505	£53.00
Coal Wagon Unpainted (32mm/45mm)	911505-1	£53.00
Pair of Flat Bed Wagons (32mm/45mm)	911301	£57.00
Straight Track	910003	£34.00
Curved Track	910005	£34.00
Left Hand Point	910001	£24.40
Right Hand Point	910002	£24.40

WE HOLD A FULL RANGE OF MSS SPARES
AND UPGRADES FOR OLD MAMOD & MSS LOCOS

ROLLING STOCK ARE ALSO
AVAILABLE AS KITS
PRICES FROM £50!



*In stock as of 04/01/19, please note these loco's may no longer be available, check stocks online or call.
Please note basic range takes 4 weeks from initial order and other locomotives are in batches.
Batch dates will be in product description. Locomotives in stock will state instant dispatch available.

PECO

32mm (SM32) Track

Flexi Track - 12 Pack	SL600x12	£110.00
Flexi Track - 4 Pack	SL600x4	£38.00
Flexi Track - Single	SL600x1	£10.00
Setrack Curve - 6 Pack	ST605x6	£44.00
Setrack Curve - Single	ST605x1	£6.90
Setrack 38 Radius Curve - Single	ST607	£8.50
Setrack 38 Radius Curve - Six Pack	ST607x6	£48.00
Right Hand Point	SL695	£45.00
Left Hand Point	SL696	£45.00
Y Point	SL697	£45.00
Small Radius Right Hand Turnout	SL691	£45.00
Small Radius Left Hand Turnout	SL692	£45.00
Wagon Turntable and Crossing	SL627	£20.00
Rail Joiners - 24 Pack	SL810	£3.50

45mm (G45) Track

Flexi Track - Six Pack	SL900x6	£79.00
Flexi Track - Single	SL900x1	£15.00
Setrack Curve - Six Pack	ST905x6	£40.00
Setrack Curve - Single	ST905x1	£8.00
Setrack Straight - Six Pack	ST902x6	£40.00
Setrack Straight - Single	ST902x1	£8.00
Right Hand Point	SL995	£54.00
Left Hand Point	SL996	£54.00
Point Motor Mounting Plate	PL8	£3.60
Metal Rail Joiners - 18 Pack	SL910	£6.00
Insulating Rail Joiners - 12 Pack	SL911	£3.10
Dual Rail Joiners - 6 Pack	SL912	£6.00

SLATERS

Festiniog Railway Ashbury First Class 4-Wheel Carriage Kit	16C01	£73.50
Festiniog Railway Third Class Ashbury 4-Wheel Carriage Kit	16C02	£73.50

Dinorwic Slate Wagon Kit	16W01	£20.00
Festiniog Railway 2 Ton Braked Slate Wagon Kit	16W03	£26.60
Festiniog Railway 2 Ton Unbraked Slate Wagon Kit	16W04	£25.40
War Department Light Railways K Class Skip Wagon Kit	16W06	£20.00
Dinorwic Quarry Slab Wagon Kit	16W08	£25.50
Dinorwic Quarry "rubbish" Wagon Kit	16W09	£25.50

Slater's Mek-Pak	0502	£5.00
Slater's Mek-Pak Brush	0505	£3.70

In Stock Now*

Millie	Black, 32mm	£650
Sammie	32mm & 45mm	£650
Bertie	Blue, 32mm & 45mm	£650
Bertie	Yellow, 32mm	£650
Little John, DHR	Blue, Red Buffers	£602
Little John, Victorian Maroon, Chevron Buffers		£602
Little John, Yellow, Chevron Buffers		£602
Bulldog, Deep Brunswick Green, Red Buffers		£634
Clarence, Brown, R/C, Insulated wheels		£1,710

On Order

Katie	Due Dec 2018
Russell	Due Dec 2018
Lilla	Due Feb 2019
Billy	Due March 2019
Bulldog	Due March 2019
Lady Anne	Due April 2019

Please note all loco's 'on order' can be altered to your own specification requirements
Deposit of only £200 required

V Dump Car (Oxide Red)	92504	£46.00
G Flat Wagon with Logs	98470	£79.00
"LS" Skeleton Log Car	98490	£79.00
"LS" Speeder Orange	96253	£90.00
"LS" Speeder PRR	96251	£90.00
"LS" Speeder Santa Fe	96252	£90.00



Set-a-Curve

Available in 32mm and 45mm
with a wide range of Radii

£15

ROUNDHOUSE

DSW

Upgrade Cylinders	DSUPCYL	£72.00
Ceramic Gas Burner Set	DSUPGBS	£90.00
Three Wick Meths Burner	DSUP3WMB	£45.00
Dead Leg Lubricator	DSUPDL	£29.00
Steam Regulator Kit	DSUPSRK	£35.00
Small Brass Chimney Cowl	DSENSMCWL	£4.00
Brass Cab Hand Rails	DSENC	£4.20
Brass Side Tank Hand Rails	DSENSTHR	£5.20
Brass Smoke Box Hand Rails	DSENSBXHR	£3.10
Cylinder Covers	DSENCYCV	£12.00
Brass Sand Boxes	DSENSBX	£12.50
Brass Tank Tops	DSENCWT	£9.40
Lubricating Oil	SWLUB30	£3.00
Meths Burner Wick	DSWWK6	£1.90
Curve Tipped Syringe	DSWCTS	£2.10
460 Steam Oil 500ml	DSW460SO500	£5.50
220 Steam Oil 500ml	DSW220SO500	£5.50
Solid Fuel Tablets	980001	£3.50
Water Filler Bottle	DSWWFB	£4.00
Meths Filler Bottle	DSWWFB	£3.00

BACHMANN

Percy and the Troublesome Trucks Set	90069	£390.00
Thomas with Annie & Clarabel Set	90068	£390.00
Thomas' Christmas Delivery	90087	£410.00
Toby the Tram	91405	£250.00
Thomas the Tank Engine	91401	£225.00
James the Red Engine	91403	£230.00
Annie Coach	97001	£80.00
Clarabel Coach	97002	£80.00
Emily's Coach	97003	£80.00
Emily's Brake Coach	97004	£80.00
Troublesome Truck 1	98001	£59.50
Troublesome Truck 2	98001	£59.50
Ice Cream Wagon	98015	£56.00
Tidmouth Milk Tank	98005	£39.00
S.C. Ruffey	98010	£70.00
Explosives Box Van	98017	£56.00
Open Wagon Blue	98012	£56.00
Sodor Fruit & Vegetable Co. Box Van	98013	£56.00
Sodor Fuel Tank	98016	£56.00
	98004	£56.00

MAMOD

Telford	MTLGO	£452.00
MKIII	MK3	£336.00
Saddle Tank	MST	£336.00
Brunel	MBrunelOG	£440.00
Brunel Goods Set	BGS-CC-N	£520.00
Tender	MTDR	£39.00
Tanker	MTNK	£39.00
Goods Wagon	MGWN	£44.00
Guards Van	MGVAN	£50.00
Telford Tender	MTDR-T	£45.00

BACHMANN

16mm Scale Fireman and Driver	16-703	£19.95
16mm Scale Sitting Man and Woman	16-704	£19.95
16mm Scale Standing Man and Woman	16-705	£19.95

G Scale Grazing Cows	22-199	£24.95
G Scale Horses Standing and Grazing	22-201	£24.95



SUMMERLANDS CHUFFER

These highly developed and precision engineered chuff pipes that can bring the real sound of a working steam loco
A wide range always in stock!
Specials can be ordered on request

£29
inc. P&P



facebook

twitter

Dream Steam Ltd, Ground Floor Suite, Vanguard House, Mills Road, Aylesford, Kent, ME20 7NA

Call us: 01622 793 700 or send an email to sales@dream-steam.com

www.dream-steam.com | sales@dream-steam.com | @dreamsteamworks | facebook.com/dreamsteamworks

CNC Machined Wheels for 5" & 7 1/4 Gauge

Contact 17D Miniatures:

Tel: 01629 825070 or 07780 956423

Email: sales@17d-miniatures.co.uk



Example prices:

5" g. Plain Disc Wheels
£8.90 ea

7 1/4" g. Plain Disc Wheels
£13.30 ea

7 1/4" Narrow Gauge Dished Wheels
£21.70 ea (6" Diameter)

Note: Prices subject to VAT



Sweet William Fully Machined
Fully Machined Wheels
£68.80 each

7 1/4" g Fully Machined
Spoked Wagon Wheels
£29.90 each



Cylinders, valve gear, rods,
& bespoke wheels

**Live Steam Parts
& Bespoke CNC
Machining**



This is a small selection from our range of wheels.
Please visit our website to see the full range, or
contact us for more information.

**Super
Detailing parts**



MINIATURE RAILWAY SPECIALISTS
LOCOMOTIVES, ROLLING STOCK, COMPONENTS
CNC MACHINING SERVICES

www.17d-miniatures.co.uk

17D Miniatures, Units 12 & 13 Via Gellia Mill, Bonsall, Matlock, Derbyshire, DE4 2AJ

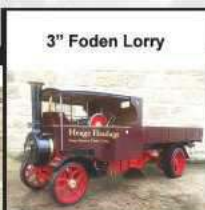
The Steam Workshop

Now Incorporating D.Hewson Models

**All steam models bought, sold, exchanged, valued, restored, repaired, finished, painted, lined,
.....and of course,.....played with!**



1 1/2" Alchin DCC



3" Foden Lorry



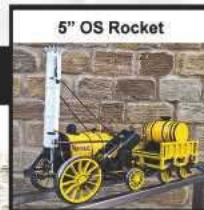
5" LMS 3F Jinty



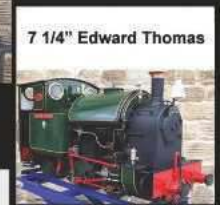
4" Durham & N. Yorkshire



5" Maxitrak "Pearl"



5" OS Rocket



7 1/4" Edward Thomas

We always have a huge number of models in stock, and are always interested in anything from a set of castings to a gold medal winner. Please do visit our website, or simply give us a bell for the most friendly, helpful, fair and knowledgeable,..... (if we do say so ourselves),..... service available.



By Enthusiasts



For Enthusiasts

07816 963463

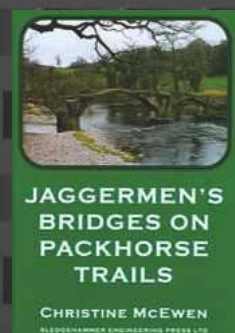
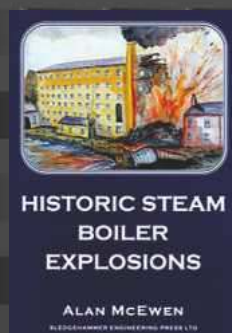
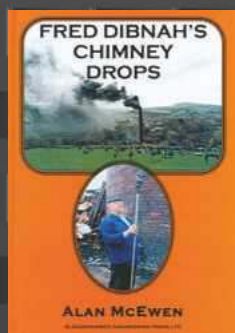
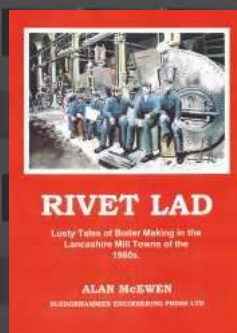
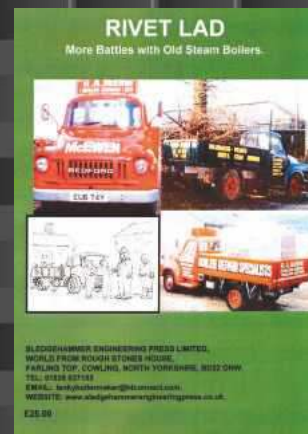
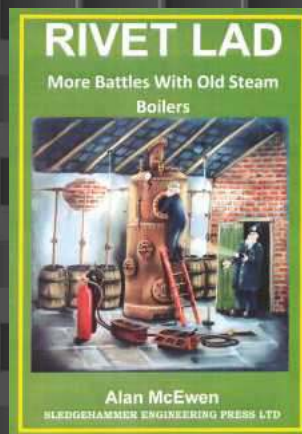
www.steamworkshop.co.uk

Introducing the latest riveting title from Sledgehammer Press, 'Rivet Lad - More Battles With Old Steam Boilers'



RIVET LAD - More Battles With Old Steam Boilers. This latest book chronicles Alan's story from leaving Phoenix Boiler Makers and establishing his own firm on the 4th August 1968, H.A. McEwen (Boiler Repairs). In these early days Alan battled with a great variety of old steam boilers in town and country, where he met some extremely interesting and rather bizarre characters.

Book size B5, there are 128 pages of text and photographic images.



Alan's earlier book: **RIVET LAD – Lusty Tales of Boiler Making in the Lancashire Mill Towns of the 1960s** was published in September 2017 and is now reduced to £30 including postage and packing to UK addresses. Our other three books are £16.00 EACH including postage to UK addresses

SPECIAL OFFER

The two RIVET LAD books can be purchased together for £50 including postage and packing to UK addresses. Both books will make fantastic Christmas Presents.

Overseas postage: Europe and the Republic of Ireland £5.00. Australia, Canada, USA and the rest of the world £7.50. We accept payment by debit/credit card, cheques, cash and postal orders made out to **SLEDGEHAMMER ENGINEERING PRESS LTD.**

To place an order please telephone 01535 637153 / 07971 906105. All our books can be ordered on our website www.sledgehammerengineeringpress.co.uk or email: lankyboilermaker@btconnect.com.

World From Rough Stones House, Farling Top, Cowling, North Yorkshire, BD22 0NW.

PARKSIDE ELECTRONICS

www.parksiderailways.co.uk 01282 613646

Southfield St, Nelson, Lancs, BB9 0LD

Manufacturer and supplier of

Motor speed controllers, Motors, sprockets and chains, gears, bearings, springs, bespoke control panels, pneumatics. Bespoke electric and IC loco - complete and part - design

New range of 5" gauge bogies, chassis and locos

All chassis and locos are ready to run just add batteries

Powder coated with choice of body colours

Parvalux 150W motor on each axle

60 or 100A controller fitted as needed

Roller bearings in the axle boxes

Compression spring suspension

All can be operated from either end and be run as multiple units



Folded Bogie - £440

2x motors



Powered starter chassis £670

2x batteries - 2x motors



"Elf" £1050

2x motors

2x batteries

60A controller



"Pixie" £1350

3x motors

2x batteries

100A controller



"Imp" £1650

4x motors

4x batteries

100A controller



The Digital Readout & Measurement Specialists



- Lathes
- Mills
- UK Brand
- Hobby
- Industrial
- Optical
- Magnetic

If you have a lathe or milling machine then you will appreciate the need for a quality digital readout system to provide consistent accuracy and repeatability in machining.

ems-i provide both **optical** and **magnetic** systems to machine builders, re-builders and main dealers so you can be assured of performance, quality and service.

Our specialist encoders, for smaller machines, allow for neater installation and integration in limited spaces without performance compromise. Perfect for Myford, Boxford, Viceroy, SIEG etc.



UK's Smallest
Magnetic Encoder



0116 279 3035 : facebook.com/ems-i.systems

info@ems-i.co.uk : www.ems-i.co.uk

Midland Loco Works



- Machining service
- Painting and lining service
- Laser and water cutting
- Ce marked copper boilers
- Buy and sell live steam models

Tel: **07487 268956**

Email: **midlandlocoworks@gmail.com**

Web: **www.midlandlocoworks.com**

CNC Cutting service Wood, Metal, Plastic & CNC Conversions

- Need a part for your loco or model CNC machined?
- Need fine engraving done onto metal?
- We have lathes, mills, plasma cutters, laser engravers.
- CNC Machine conversions (both lathes and mills).
- Custom PCB design.

NO job too small give us a ring today for a chat!

**Routout cnc +
Tiggy Aviation**

Tel: 01664 454795
www.routoutcnc.com

Suffolk Steam

Specialising across Suffolk, Norfolk, Essex & Cambridgeshire

Great prices paid for all live steam models

Especially Polly loco's, Stuart models, part built, out of certificate 3½", 5" or 7 ¼" gauge
Call Andrew on 07918 145419 or andrew@suffolksteam.co.uk

Wishing to sell your Lathe, Mill or Complete Workshop?

**Full clearances
carefully undertaken**

Speak to:

**Malcolm Bason of MB Tools
01993 882102**

Re-homing workshop
machinery for 20 years!

Complete home Workshops Purchased

Essex/Nottinghamshire locations
Distance no object!

Tel: **Mike Bidwell**

01245 222743

m: **07801 343850**

bidwells1@btconnect.com

Mallard Metal Packs Ltd

53 Jasmin Croft
Kings Heath, Birmingham, B14 5AX

Tel/Fax: **0121 624 0302**

E-mail: sales@mallardmetals.co.uk

Worldwide mail order.

www.mallardmetals.co.uk

Supplier of all Ferrous & Non-Ferrous Metals

NO MINIMUM ORDER

CATALOGUE AVAILABLE: Please send
address details with 3 First Class Stamps

THINKING OF SELLING YOUR LATHE, MILL OR COMPLETE WORKSHOP?

and want it handled in a quick
professional no fuss manner?

Contact Dave Anchell,
Quillstar (Nottingham)

Tel: 0115 9206123

Mob: 07779432060

Email: david@quillstar.co.uk

Midland Loco Works



- Machining service • Painting and lining service • Laser and water cutting
- Ce marked copper boilers • Buy and sell live steam models

Tel: **07487 268956**

Email: midlandlocoworks@gmail.com Web: www.midlandlocoworks.com



any age, size or condition considered - any distance, any time

ALL STEAM LOCO'S WANTED

ALL PART BUILT MODELS WANTED

ALL WORKSHOPS CLEARED SWEEP CLEAN

All 5" Gauge Loco's Wanted

Hunselt, Simplex, Speedy,
BR Class 2, Horwich Crab,
BR 8400 tank, Maid of Kent,
Black Five, Jubilee, Royal
Engineer, B1 Springbok,
Torquay Manor.

All 7¼" Gauge Loco's Wanted

Hunselt, Hercules, Jessie,
Romulus, Dart, Bridget,
Holmeside, Paddington, GWR
Mogul 43xx, GWR King, Black
Five, A3, B1, etc.

All 3½" Gauge Loco's Wanted

Titch, Juliet, Rob Roy,
Firefly, Jubilee, Maisie,
Doris, GWR Hall, Britannia,
Hielan Lassie, Etc.



**ALL
TRACTION
ENGINES
WANTED**

Minnie, Burrell, Royal Chester, etc.

For a professional friendly service,
please contact:

Graham Jones M.Sc.

graham@antiqusteam.com

0121 358 4320

antiqusteam.com



Model Engineer Classified

M-MACHINE
Unit 6 Forge Way, Cleveland Trading Estate
Darlington, Co. Durham. DL1 2PJ
Metals for Model Makers
Contact us for Copper, Brass, Aluminium,
Steel, Phosphor Bronze, etc.
PHONE & FAX 01325 381300
e-mail: sales@m-machine.co.uk
www.m-machine-metals.co.uk

TAPS & DIES
Excellent Quality manufactured-supplied

British-box HQS taps dies cuts stainless
ME5(33pcs) ME4 (30pcs) BA3(35pcs) has
all Model Eng 32+40tpi BA, BSB, MTP etc
THE TAP & DIE CO
445 West Green Rd, London N15 3PL
Tel: 020 8888 1865 Fax: 020 8888 4613
www.tapdie.com & www.tap-die.com

Cotswold
COLLECTION
HERITAGE
www.modelsteamenginesuk.com

WESTERN STEAM
Model Engineers
Founder Member Assn of Copper Boiler Manufacturers (ME)
COPPER BOILERS
For Locomotive, Traction, Marine &
Stationary engines, to PER cat 2. All
copper construction, silver soldered
throughout using quality materials to the
standards required by the APCBM(ME),
PER, & relevant Model Engineering
Associations. CE marked and certificates
of proof test and conformity supplied.

Write or phone to Helen Verrall:
Unit 4A, Love Lane, Burnham-on-Sea
Somerset, TA8 1EY
Tel: 01273 768 007
Visit our website: www.westernsteam.co.uk

**Model Engineering
Products Bexhill**
Manufacturers of
**5" gauge diesel outline
battery electric locos
and accessories**
Telephone: **01424 223702**
Mobile: **07704 256004**
email: modelengineerssupplies@gmail.com
17 Sea Road, Bexhill-On-Sea,
East Sussex TN40 1EE
Visit our website:
www.model-engineering.co.uk

www.model-engineer.co.uk
LASER CUTTING
CNC Folding and Machining
Fabrication and Welding
All Locomotive & Traction Engine parts.
Your drawings, E-files & Sketches.
m: **0754 200 1823** • t: **01423 734899**
(answer phone)
e: stephen@laserframes.co.uk
Well Cottage, Church Hill, North Ripton, LEEDS LS17 0DF
www.laserframes.co.uk

**PRECISION ENGINEERS
& MACHINISTS.**
Turning, Boring, Milling,
Drilling, Grinding etc
also
Tool, Cutter & Drill Grinding Service.
**John Dunn
Engineering**
North Cave, East Yorks
Tel: 01430 424957 Fax: 01430 423443
Email:
theworks@johndunnengineering.co.uk
www.johndunnengineering.co.uk

GB BOILER SERVICES
COPPER BOILERS FOR LOCOMOTIVES AND TRACTION ENGINES etc.
MADE TO ORDER
Constructed to latest European Standards
7 1/4" gauge and P.E.D. category 2 Specialist
No VAT Enquiries, Prices and Delivery to: **No VAT**
Telephone: **Coventry 02476 733461**
Mobile: **07817 269164** • Email: gb.boilers@sky.com

Cowells Small Machine Tool Ltd.
Cowells Small Machine Tools Ltd.
Tandring Road, Little Bentley, Colchester CO7 8SH Essex England
Tel/Fax: +44 (0)1206 251 792 e-mail: sales@cowells.com
www.cowells.com
Manufactures of high precision screwcutting lathes,
8mm horological collet lathes and
milling machines, plus comprehensive accessory range.
Talk directly to the manufacturer


Meccano Spares

New Reproduction and
Pre-owned Original
Meccano Parts.
www.meccanosparses.com
sales@meccanosparses.com
Tel: 01299 660 097

PHOENIX  **PRECISION**
The Original and Still the best
Phoenix Precision Paints Ltd.
Orwell Court, Wickford, Essex, SS11 8YJ.
www.phoenix-paints.co.uk sales@phoenix-paints.co.uk
CARR'S
Modelling Products
www.carrs-solder.co.uk

HORLEY
MINIATURE LOCOMOTIVES
7 1/4" Drawings and Castings
Dock tank
BR STD Class 2 2-6-0
BR STD Class 2 2-6-2T
BR STD Class 4 2-6-4T
BR STD Class 5 4-6-0
BR STD Class 7 4-6-2
BR STD Class 9 2-10-0
L.M.S Coronation Class 8 4-6-2
(Duchess)
5" Castings Only
Ashford, Stratford, Waverley.
7 1/4" Castings Only
Dart, Roedeer, Green Queen
HORLEY MINIATURE LOCOMOTIVES LLP
Phone: 01293 535959 Email: hml95@btinternet.com
www.horleyminiaturelocomotives.com

**MODEL
ENGINEER**
BECOME PART OF
THE ONLINE
COMMUNITY FOR
MODEL ENGINEER MAGAZINE

► Get access to exclusive competitions and giveaways
► Exclusive articles and advice from professionals
► Join our forum and make your views count
► Sign up to receive our monthly newsletter
► Subscribe and get additional content including Online Archives dating back to 2001*
► Register for free today and join our friendly community!
WWW.MODEL-ENGINEER.CO.UK
* only available with digital or print + digital subscriptions
FOLLOW US

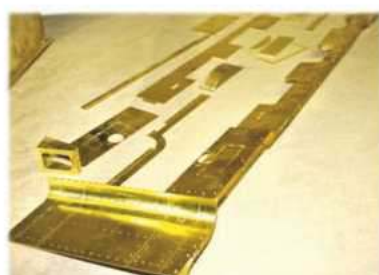

To advertise on these pages contact David Holden on 07718 64 86 89 or david.holden@mytimemedia.com

Practical Scale

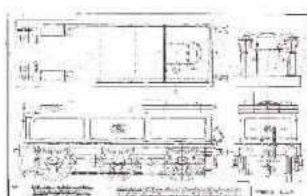
So much more than drawings and castings



Let us help you realise the model of your dreams



Precision platework, windows and fittings, not just for our own designs but to suit most 5" and 7 1/4" gauge GWR locos. Platework our speciality, cnc cut, drilled, formed or scored. Our brass origami helps you to make sandboxes, toolboxes, tanks, etc.



Most styles of GWR tender tank, loco cabs, sandboxes, toolboxes and platework can be supplied. We also supply drawings, castings, lost wax castings, laser cut parts and much more. Enquire for tanks for narrow gauge models.

Buy with confidence from an established British Manufacturer & remember Polly is one of the largest established suppliers to the model engineering hobby.

144 page Catalogue £2.50 UK £8 international posted (or download free!) and enquire for further details or visit our website where you will find Polly Locos, Kits, drawings and castings for scale models and comprehensive ME Supplies.



Polly Model Engineering Limited
Atlas Mills, Birchwood Avenue,
Long Eaton, Nottingham,
NG10 3ND, United Kingdom

www.pollymodelengineering.co.uk

Tel: +44 115 9736700

Find us on 

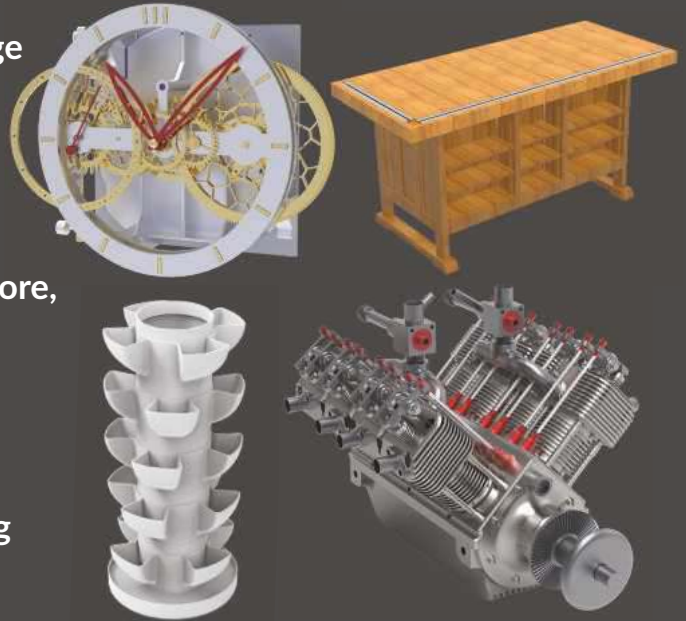
email: sales@pollymodelengineering.co.uk

New CAD Software for Hobbyists

Coming soon from Alibre, LLC



- A powerful and affordable 3D design package for your home PC
- User-friendly and precise modelling of your projects
- Export to CNC machines, 3D printers and more, or create 2D drawings and build it yourself
- Create single parts and combine them into moving assemblies
- Stop wasting time and materials - everything fits the first time around



AVAILABLE SOON FROM MINTRONICS

To register your interest, please contact

0844 357 0378 | www.mintronics.co.uk



Jeadon Engineering

www.jeadon.com

Supplier of quality preowned engineering equipment from all types of cutting tools, measuring equipment, work and tool holding. From top brands including Dormer, Titex, Moore & Wright, Mitutoyo, Seco, etc. New stock added daily.



www.jeadon.com | enquiries@jeadon.com | 07966553497

Enjoy a Happy New Year use coupon code MEW19 for a 10% discount on all items until 31st January 2019



CHESTER

Hobby Store

Crusader Deluxe Lathe

£3,298.91 inc vat

Swing Over Bed 300mm

Between Centres 810mm

Spindle Bore 38mm

Spindle Taper MT5

Spindle Nose D1-4

Tailstock Taper MT3

Power Supply 240v

Weight 450kg



Stand and
DRO included



Stand
and DRO
included

Super Lux Mill

£2,224.00 inc vat

Drilling Capacity 32mm

Milling Capacity 75mm

Spindle to Table 470mm

Spindle Taper R8

Worktable 240x820mm

Weight 300kg

For more information email us at sales@chesterhobbystore.com, visit
www.chesterhobbystore.com or call us on **01244 531631**
Prices may be subject to change without notice