

5-10 January 1979

First and Third Friday

Volume 145

Number 3600

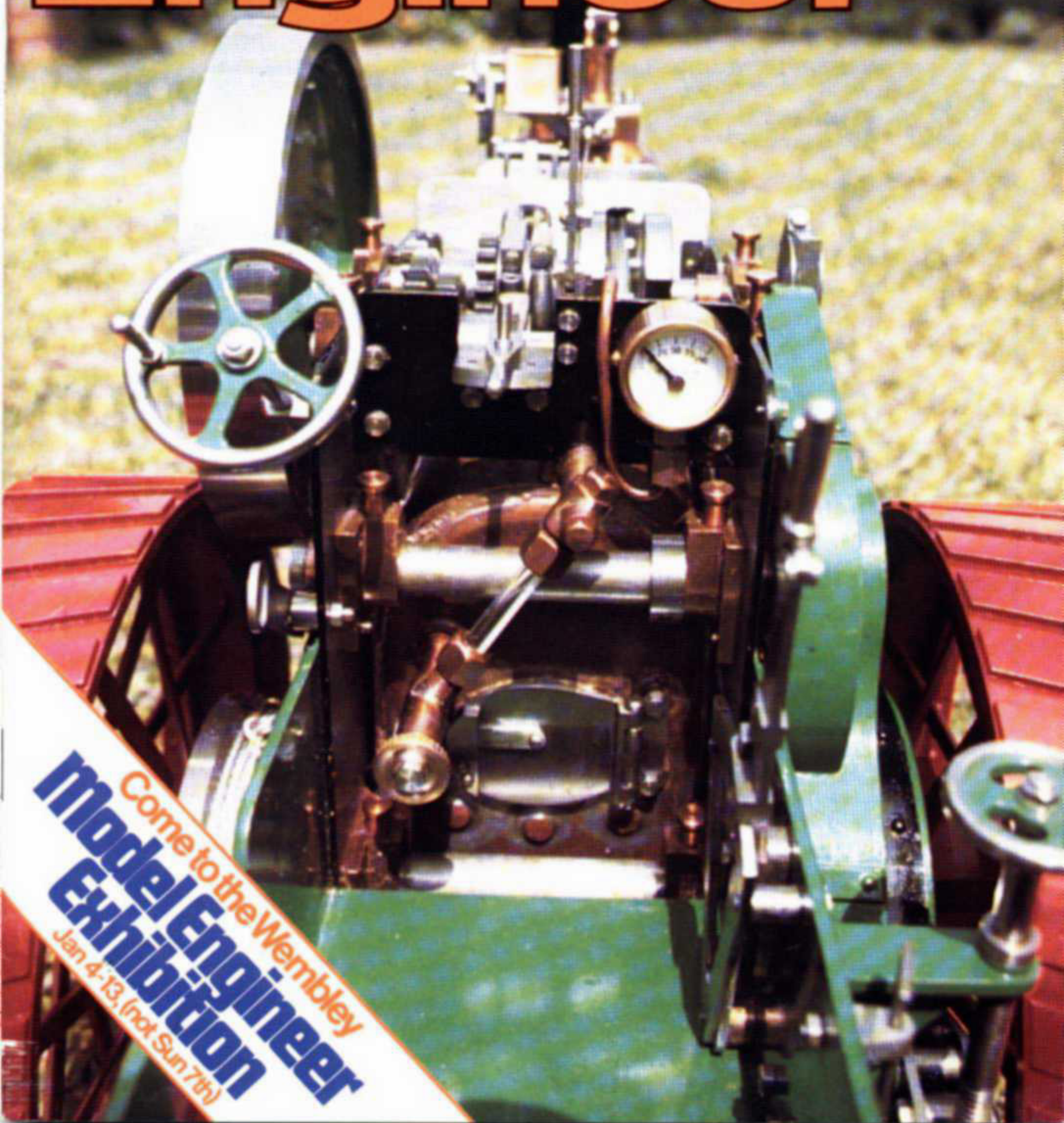
40p

Model Engineer



(USA & CANADA — \$1.75)

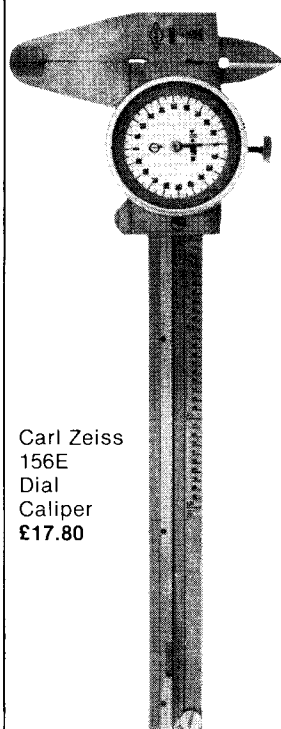
HOBBY MAGAZINE



**Come to the Wembley
Model Engineer
Exhibition**
Jan 4-13, (not Sun 7th)

MEASURING EQUIPMENT

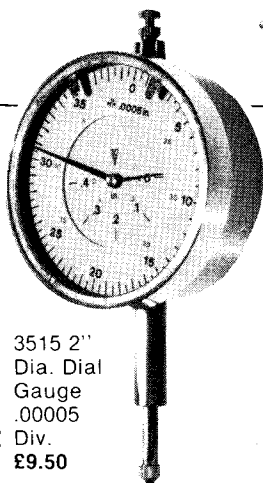
by CARL ZEISS SUHL



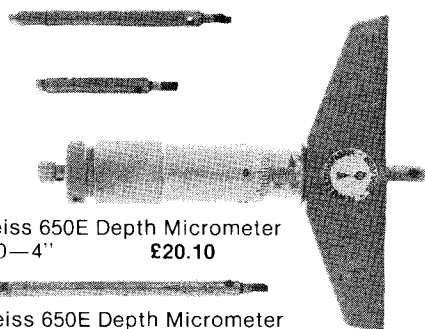
Carl Zeiss
156E
Dial
Caliper
£17.80

Carl Zeiss Plain Anvil
Micrometer 526E

0—1"	£8.50
1—2"	£12.15
2—3"	£13.90
3—4"	£15.90



3515 2"
Dia. Dial
Gauge
.00005
Div.
£9.50



Carl Zeiss 650E Depth Micrometer
0—4" £20.10

Carl Zeiss 650E Depth Micrometer
0—6" £24.90

Sample prices inclusive of VAT 8%, postage and packing for Plain Anvil Micrometers.

0-1"	£8.50	3-4"	£15.90
1-2"	£12.15	4-5"	£17.55
2-3"	£13.90	5-6"	£19.10

Available up to 12", also in metric equivalents

Complete boxed set of 4 Plain Micrometers 0-4"	£56.40
Complete boxed set of 6 Plain Micrometers 0-6"	£92.15

Carbide faced £3.15 each extra

3515 2" dia. Dial Gauge .00005 div., Back Lug mount, also in metric equivalent	£9.50
Carl Zeiss Depth Micrometers 0-4"	£20.10
0-6"	£24.90

Dial Gauges, Verniers and many other items — please send S.A.E. (9" x 4") for full price list on Carl Zeiss Suhl and other leading manufacturers equipment, addressed to:

MERCER PNEUMATIC TOOLS LIMITED

Springfield Works

Moorside

Cleckheaton BD19 6JT

West Yorkshire

Tel: Cleckheaton 874586

Model Engineer

Founded 1898

Incorporating Mechanics, English Mechanics, and Ships and Ship Models

Volume 145
5 January 1979

Number 3600

CONTENTS

Smoke Rings	11
The Marshall Portable Engine	12
What's in Store	19
Club Diary	18
Enterprise — the 5 in. gauge L.N.E.R. 2-6-2T	20
Sweet Pea	24
Countryman's Steam — 2 in. scale agricultural engine	26
A Simple Dividing Head for the Lathe and Miller	31
A 1½ in. Foden Steam Wagon	36
Improved Drive for the Unimat 3	41
Jeynes' Corner	47
Club Chat	49
The First Midlands Model Engineering Exhibition	50
The Piston Drop Valve Engine	54
Post Bag	66

This periodical is sold subject to the following conditions: that it shall not, without the written consent of the publishers be lent, resold, hired-out or otherwise disposed of by way of Trade at a price in excess of the recommended maximum price and that it shall not be lent, re-sold, hired-out or otherwise disposed of in a mutilated condition, or in any unauthorised cover by way of Trade; or affixed to or as part of any publication of advertising, literary or pictorial matter whatsoever.

Second-class postage rates paid at New York, U.S.A. Registered at the Post Office for transmission by Canadian Post. American enquiries regarding news stand sales and advertising should be sent to MODEL ENGINEER, Eastern News Distributors Inc., 111 Eighth Avenue, New York, N.Y. 10011, U.S.A.

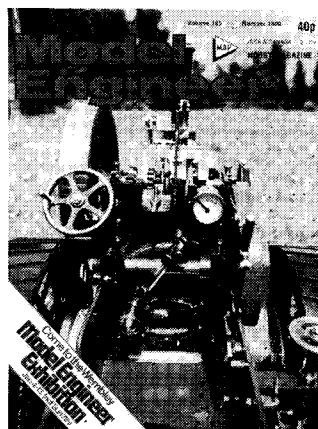
Enquiries regarding Hobby Shop Sales to Bill Dean Books Ltd., 166-41, Powell's Cove Boulevard, Whitestone, New York 11357, U.S.A. Telephone: (212) 767-6632.

Model & Allied Publications Ltd

Editorial and Advertisement Offices:

P.O. Box 35
Hemel Hempstead
Herts, HP1 1EE

Tel: Hemel Hempstead
Editorial } 41221
Advertising }



A traction engine built by Mr. Walter Merriott.
Photo by D. L. Brown.

NEXT ISSUE

More of the Midland Exhibition.

Editorial Director	R. G. MOULTON
Editor	LES PORTER
Assistant Editor	STEPHEN ARCHER
Technical Consultants	MARTIN EVANS
	PROFESSOR D. H. CHADDOCK C.B.E., M.Sc., C.Eng., F.I.Mech.E.
	GEORGE H. THOMAS
	JOHN HAINING
	J. MALCOLM WILD
Managing Director	GOSPATRIC HOME
Group Advertisement Manager	M. GRAY

The Editor is pleased to consider contributions for publication in "Model Engineer". Manuscripts should be accompanied if possible by illustrations and should also have a stamped addressed envelope for their return if unsuitable. While every care is taken, no responsibility can be accepted for unsolicited manuscripts, photographs, art work, etc.

Subscription department:

Remittances to Model & Allied Publications Ltd., P.O. Box 35, Hemel Hempstead, Herts. HP1 1EE (Subscription Queries Tel: 0442 51740). Subscription Rate £13.00, Overseas Sterling £13.00, U.S.A. and Canada \$28.00, 1st Class Airmail \$64.00. Annual Subscription includes a copy of the Model Engineer Exhibition Guide published in mid-December and the Annual Index.

Also published by MAP: Aeromodeller; Model Boats; Radio Control Models & Electronics; Model Railways; Scale Models; Military Modelling; Woodworker; Gem Craft; Clocks; Model Mechanics.



Model Engineer is printed in Great Britain by Blackfriars Press Ltd., Leicester, for the proprietors and publishers, Model & Allied Publications Ltd. (a member of the Argus Press Group), 13/35 Bridge Street, Hemel Hempstead, Herts. Trade sales by Argus Distribution Ltd., 12/18 Paul Street, London, E.C.2, to whom all trade enquiries should be addressed.

M.E. QUERY COUPON
JANUARY 1979

DON YOUNG DESIGNS

OUR NEW YEAR RESOLUTIONS

Our first aim must be to provide a SERVICE to builders of Locomotives to our designs. To this end we have kept **Drawing** Prices stable for almost 2 years now, of which we are justly proud. Although the inevitable will have to happen at the end of March, we promise to keep increases to a very minimum, and invite you to take advantage of the real bargains that are presently available.

We have increased **Castings** coverage of our more recent designs, and made improvements as experience teaches. We have in part to thank Messrs Reeves for this, and for their continued support of our earlier designs as published in M.E.

It is in the **Fittings** area that currently we are not properly supporting builders of our Locomotives, this due to general demand for our **QUALITY** items, and we must take drastic steps to improve the position. Therefore, from 1st January our General Fittings List is withdrawn. Until the end of March we shall concentrate on reducing the backlog of Orders, customers please note, whilst continuing production of Injectors. At 1st April we shall introduce our new List, with emphasis on Injectors and their ancillaries; devoting any spare capacity to providing a SERVICE to builders of Don Young Designs Locomotives. Only in this way can we re-establish our watchwords of **QUALITY** and **SERVICE** to our valued customers.

Our Catalogue of Drawings, Castings and Injectors is reduced to 25p (\$2.50) post paid.

DON YOUNG DESIGNS

Bardonela, Adgestone, Sandown, Isle of Wight,
PO36 0HN, England.

Telephone: Brading 644

(Changes to Sandown 406200 from May 1979).

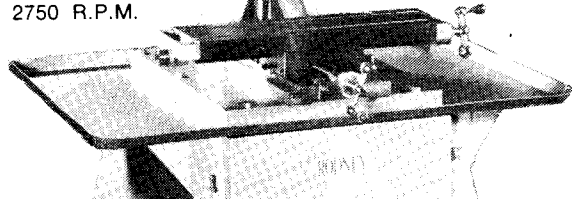
RODNEY PLUS

Vertical Mill

8 Spindle Speeds

320 R.P.M.
450 R.P.M.
610 R.P.M.
850 R.P.M.
1040 R.P.M.
1490 R.P.M.
2190 R.P.M.
2750 R.P.M.

£595 + VAT
H.P.
arranged



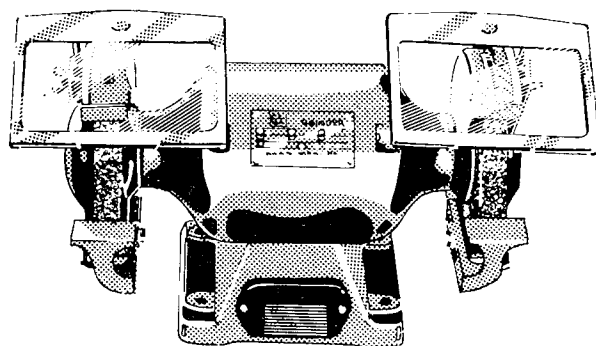
Throat Depth	4 7/8"	Table size	15" x 4 1/4"
Max. height under spindle	6 5/8"	Longitudinal Travel	10"
Max. height under cutter	5 5/8" (Approx.)	Cross Travel	4 1/2"
		Indexes in .001" All Directions	

TEW MACHINERY LIMITED

MANOR WORKS . COGENHOE . NORTHAMPTON
Telephone 0604 891050

NEW ELECTRIC BENCH GRINDERS

DOUBLE ENDED SINGLE PHASE



6" single phase Bench Grinder with eye shields

£45

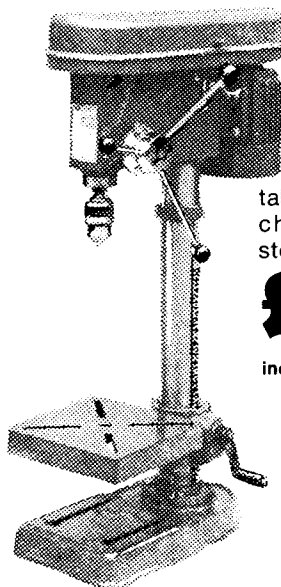
including carriage and VAT

8" single phase Bench Grinder with eye shields

£75

including carriage and VAT

NEW 12 SPEED DRILLING MACHINES



5/8" capacity 2-speeds
210-3, 650 revs No. 2
Morse Taper, 45° tilting
table complete with chuck,
chuck guard and depth
stop.

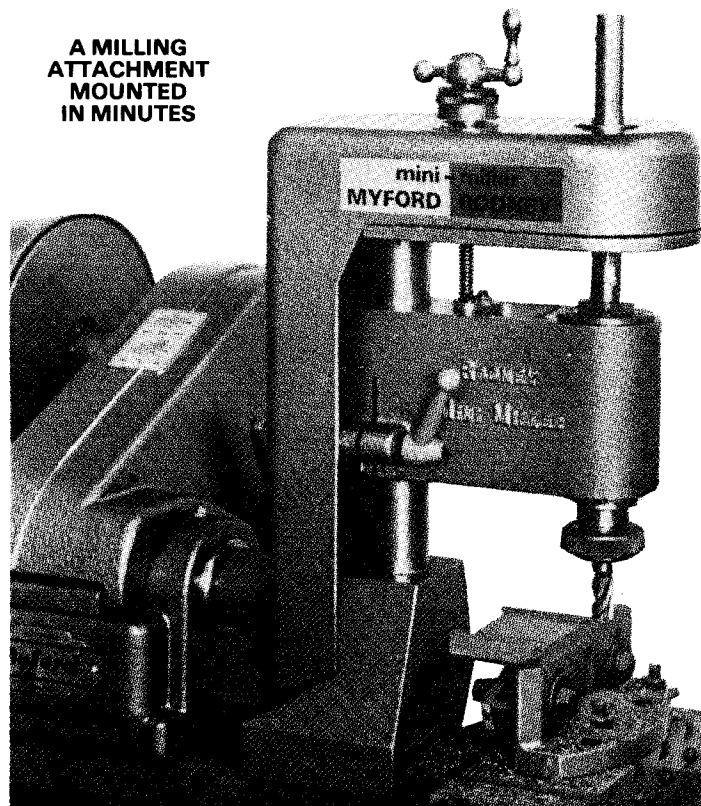
£180

including carriage and VAT

WHITECOTE
PRODUCTIONS (MACHINE TOOLS) LTD.

Quarry Mills, Oxford Road, Gomersal, Yorkshire
Tel: Cleckheaton 873509

**A MILLING
ATTACHMENT
MOUNTED
IN MINUTES**



MILLING ON YOUR ML10

**WITH THE No. 20/165
MINI-MILLER ATTACHMENT**

The No.20/165 attachment will greatly increase the capability of the ML10 lathe for milling operations.

No machine modifications are required. Throat depth 4" (100mm).

Max height, Spindle nose to cross slide 5.3/8" (135mm). Min height, spindle nose to cross slide 1.5/8" (42mm)

Myford LIMITED
make the most of your skill

BEESTON • NOTTINGHAM
TEL 254222 • TELEX 37100

THE CLAYTON UNDERTYPE WAGON

This particularly attractive design of a Steam Road Locomotive has been prepared by Robin Dyer in 2" Scale. By arrangement with the designer we are supplying the following castings and materials. Patternmaking is nearly complete and the following priced items are now in stock and further items are arriving daily for sale at our "Over the counter" retail dept or through our world wide Mail Order Service. Construction details and drawings are now being published in "The Model Engineer" and further prices will be announced in subsequent advertisements.

Drawings M35	Each	£1.25	Front Drawbar	G.M.	76p	Water Pump	G.M.	£1.06
Axle Jaws	C.I.	£1.35	Cylinder Group. 9 items	G.M.	£12.10	Boiler Flanged Plates	Cu.	£5.80
Rear Axleboxes	G.M.	£5.60	Piston Blanks	G.M.	£1.28	Full Boiler Matl Set	Cu.	£24.79
Steering Quadrant	G.M.	68p	Trunk Guides	G.M.	£4.23	Roller Drive Chain, 8 mm		£3.50
Front Hub Caps	Br.	38p	Valve Spindle Guides	G.M.	76p	10 tooth Pinnion		£2.68
Front Wheels Pair	Al	£4.43	Crossheads	G.M.	£1.36	40 tooth Sprocket		£2.46
Rear Wheels Pair	Al	£8.81	Sump Casing	Al	£1.76	Differential Gears		£16.50
Differential Centre	G.M.	£2.87	Big-end Brasses	G.M.	83p	Pump Gears 45t x 32dp	Pair	£4.00
Rear Axlebox Collar, Nearside	G.M.	30p	Boiler Top Ring	C.I.	£1.75	Pump Gear 30t x 32dp		£2.00
Rear Axlebox Collar, Offside	G.M.	30p	Smokebox Top	C.I.	£1.75	1" x 1/2" x 16 swg MS		
Rubber tyres, chassis plates matl.			Chimney Base	G.M.	68p	Chassis Channel		£3.00
Rear Hubcaps	Br.	£1.06	Chimney Cap	Br.	£1.13	1 5/8" dia EN1A for Rear		
			Regulator	G.M.	53p	Axle and Sleeve		£2.80

All prices plus postage plus VAT at 8%. Current 1-10-1978

The 1979 issue of our Catalogue and price list is available at 50p post free inland. Overseas Airmail or Surface post extra

A. J. REEVES & CO. (BIRMINGHAM) LTD
incorporating **DICK SIMMONDS & COMPANY**

HOLLY LANE, MARSTON GREEN
BIRMINGHAM, B37 7AW Tel: 021 779 6831-2-3

FIELD ELECTRIC LTD

3 SHENLEY ROAD, BOREHAM WOOD, HERTS WD6 1AA
Tel: 01-953 6009

Motors listed: CROMPTON PARKINSON, HOOVER, AEI, GEC, ENGLISH ELECTRIC. Sleeve Bearing, Foot or Resilient Mounted unless stated

ALL PRICES + 8% VAT

Please ring for quote for motors/geared motors not listed

1/10 h.p. 2800 r.p.m.	£6.50 + £1.50 carr.
1/8 h.p. 1380 r.p.m.	£6.50 + £1.50 carr.
1/8 h.p. 880 r.p.m.	£6.50 + £1.30 carr.
1/4 h.p. 1440 r.p.m. 250v a.c.	£11.50 + £1.90 carr.
1/2 h.p. 1440 r.p.m. 250v a.c.	£13.50 + £1.90 carr.
1/2 h.p. 1440 r.p.m. 250v a.c.	£18.50 + £1.90 carr.
1/2 h.p. 2850 r.p.m. 250v a.c.	£13.50 + £1.90 carr.
1/2 h.p. 2850 r.p.m. 250v a.c. Ball Bearing	£15.50 + £1.90 carr.
1 1/4 h.p. Flange Mounting 2800 r.p.m. Ball Bearing	£24.50 + £4.00 carr.

MEM AUTO MEMOTA MOTOR START SWITCHES

TT43: 1/8-1/4 h.p.	£8.00 + 70p carr.
TT44: 1/8-1/2 h.p.	£8.00 + 70p carr.
TT45: 3/4-1 1/2 h.p.	£8.00 + 70p carr.

Gear Box 60:1 Reduction Angle Box£2.00 + 56p carr.

Geared Motors

Crompton Parkinson 35 r.p.m. 12 ft/lb.	£12.50 + £1.90 carr.
El Remco 1 r.p.m. 4 KL o cm	£3.00 + 20p post
Crouzet 150 r.p.m. 600 ems cm	£4.50 + 60p post

WALK-ROUND WAREHOUSE FOR MODEL ENGINEERS IN LANCASHIRE AND YORKSHIRE

NUTS BOLTS SCREWS WASHERS SPRINGS
and thousands of other fasteners

CLIPS FITTINGS POP RIVETS RIVETING TOOLS

WOOD SCREWS SELF TAPPING SCREWS

STEEL STAINLESS STEEL BRASS

ALUMINIUM in Bar, Strip, Off-cuts

ELECTRICAL COMPONENTS RECTIFIERS

DIODES PHOTOCELLS BALL BEARINGS

SCREWDRIVERS DRIVER BITS

SOCKET & DRIVER KITS

PLIERS SIDE CUTTERS ENGINEERS TOOLS

MASSIVE STOCKS METRIC AND IMPERIAL

AT BARGAIN PRICES

Callers Only, no lists at present
Open Mon.-Fri. till 5.30 Sat. till Noon

A. C. TOWNLEY LTD
Ferney Mill, Todmorden, Lancs

(Turn off Burnley Road at Freemason's Arms)
PHONE: Todmorden 5246 (070-681 5246)

TRACY TOOLS

58 LONDON ROAD
KINGSTON, SURREY
TEL: (01) 546 9723

★ NEW BRITISH & USA MADE TOOLS ★

1 Set M/M Taps: (2 Taps each diameter)
2 - 2 1/2 - 3 - 4 - 4 1/2 - 5 - 5 1/2 - 6 - 7 - 8 - 9 - 10 - 12 - 14 mm
(List Price £15.00) **OUR PRICE £6.00**

1 Set WHIT Taps: (2 Taps each diameter)
1/16" - 5/64" - 3/32" - 1/8" - 5/32" - 3/16" - 7/32" - 1/4" - 9/32" - 5/16" -
3/8" - 7/16" - 9/16" - 5/8" - 11/16" - 3/4"
(*1 Tap Only) (List price £21.00) **OUR PRICE £8.00**

1 Set Round Dies: BSW: 1/8" - 7/32" - 1/4" - 5/16" - 7/16" - 9/16"
BSF: 3/16" - 1/4" - 5/16" - 7/16" - 5/8" - 9/32"
M/M: 2 1/2 - 3 - 3 1/2 - 4 - 5 - 5 1/2 - 6 - 7 - 9 - 10
BA: 2 - 6 - 10 (List price £35.00) **OUR PRICE £10.00**

1 Set BA Taps & Dies: 0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 14 BA Taps
2 - 6 - 10 - BA Dies
(List price £12.50) **OUR PRICE £5.00**

1 Set BSF Taps & Dies: 3/16" to 1/2" BSF (2 Taps each size - some high speed)
(List price £23.00) **OUR PRICE £8.00**
Lancashire Taper Broaches 1/16" & 1/8" (ONLY £2.00 per 10) *not now made.*

1 Each. L.H. Dies: 1/4" - 5/16" - 3/8" - 7/16" - 1/2" BSF
L.H. Taps: 3/16" - 7/32" - 1/4" - 9/32" - 5/16" - 3/8" - 7/16" - 1/2" -
9/16" - 5/8" BSF
(List price £25.00) **OUR PRICE £8.00**

1 Set (3) 1-2-4-6 BA L.H. Taps
1 each 0-2-4 BA L.H. Dies (Some H.S.S.) (List price £14.00) **OUR PRICE £4.00**
1/4" BSF Dies

Watchmakers' or Jewellers' Drills. H.S.S. - All sizes from .005" to .039"
(in .0005" steps) (List price £7.00 per 10) **OUR PRICE £1.50 per 10**
of ANY ONE SIZE

24 Model Makers Burrs: Packets of 6, in 4 different shapes **£3.00 LOT**
Any specific new items of the following can be supplied at list - 50% (p & p Free.):
Drills - Reamers - Milling Cutters - Taps & Dies - Toolbits - Coventry Dies -
Screw Ring & Plug Gauges - Endmills - Namco & Landis Dies - Slitting Saws -
etc. (Send your enquiries for price!)

Cash with Order (p & p free) add £2.50 Overseas

Walk around our Bargain Tool Shop of Discontinued Items, at up to 75% off
List Prices. (Public Car Park at Rear)

*The LINSAW will cut materials
other saws won't even
scratch*

HARDENED & HIGH SPEED STEEL

● TUNGSTEN ● STELLITE ●

GLASS ● PORCELAIN ●

MASONRY

FITS STANDARD HACKSAW FRAME

This sawblade enables precise intricate
cuts in a very wide range of hard,
very hard and brittle materials. This
is an invaluable and long lasting
tool for engineer, D.I.Y. and
builder.

PLEASE NOTE We are
stockists of the ASBO
all purpose drill bit,
also for MASONRY-
GLASS, porcelain-
steel etc. etc. Ask
for our full list
and brochure.

10" blade

£3.98

12" blade

£4.30

Inc. VAT

& Post

GLASS

LABSCIENCE TECHNICAL SERVICES, 28 Ash Hayes Road
Nailsea, Avon. Tel: Nailsea 2866 Bristol 292966

SEND ... ☐ 10" ☐ 12" BLADE/S PLEASE TICK
MR./MRS.

PO/CHEQUE ENCLOSED £

LABSCIENCE TECHNICAL SERVICES, 28 Ash Hayes Road
Nailsea Avon. Tel: Nailsea 2866 Bristol 292966

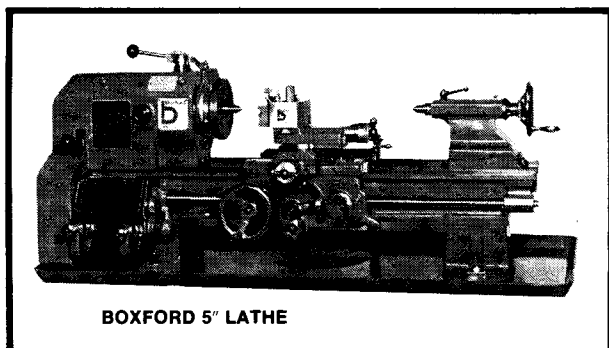
N. MOLE & Co. (Machine Tools) Ltd

MAIN STOCKISTS OF ALL LEADING MAKES OF
SMALL MACHINE TOOLS

MYFORD — BOXFORD

EMCOMAT — UNIMAT — MAXIMAT

LATHES, MILLING MACHINES AND ACCESSORIES



BOXFORD 5" LATHE

★ PART EXCHANGES ★

ALL EQUIPMENT FOR YOUR
MODEL ENGINEERS
WORKSHOP

**5 TOLPITS LANE
WATFORD, HERTS
Tel. WATFORD 43135**

Camden Miniature Steam Services

in association with CLARKSONS OF YORK

FANCY SOME STEAM WHEN SPRING IS SPRUNG — OR EARLIER?

At the time of going to press, amongst others, we had the following models tried, tested and ready to drive away:

3½" gauge	Freelance Pacific tender loco	£1,250
" "	LMS 'Princess' class Pacific	£2,100
" "	GWR 'Firefly' 2-6-2 tank loco	£1,250
" "	SR 'Schools' class 4-4-0 loco	£2,500
5" gauge	BR 0-6-0 Diesel (petro-mechanical) shunter	£500
" "	Freelance 0-6-0 tank (Reeves/LBSC design)	£1,200
" "	Freelance 0-6-0 tank (NEW-'Simplex' design)	£1,600
" "	GWR 'Speedy' 0-6-0 tank	£1,400
" "	NER 'Netta' 0-8-0 tender loco (re-built & re-boilered)	£2,500
7¼" gauge	GWR 0-6-0 'Dock' tank (NEW)	£2,200

The above prices do not include VAT, and this will vary with the type of sale

53-57 Layerthorpe, York YO3 7XB

Telephone York 54873



AUSTRALASIA

Authorised agent and stockists of
M.A.P., ARGUS, PLANS, TECHNICAL
BOOKS, magazine subscriptions

We are also proud to be agents and stockists of the following:

BRANT WRIGHT ASSOCIATES — Books about clocks
TRACTION ENGINE ENTERPRISES — M.E. BACK COPIES

MARDAVE ELECTRIC AND GAS CARS — (RC)

DELTA — RC Cars

ELECTRA CARS — Electric RC Cars

WORKING PRECISION MODELS — Steam, petrol engs, workshop equipment, castings.

REEVES • Model engineers' supplies, castings for locos, traction engines, tools, workshop equipment, steam lorries, etc.

Sole Australian Distributors for

WHELAN MODELS — Small loco, stat. steam, petrol engines.

LANCER ENGINEERING — Steam and petrol engine castings.

IMPEX ENGINEERS — Ready to run petrol engines. ALZ, o.h.c. 30 cc. and K.K. 135 2 stroke, variable pitch marine props., marine clutch and inertia starter.

Send \$1.00 for catalogue and information to:

WORLDWIDE ENGINEERING & HOBBIES

3 Carramar Cres., MIRANDA, N.S.W. 2228, AUSTRALIA

IMPORTS-EXPORTS

Telephone: 5249889

THE MID SUFFOLK GUN STORE

(L.A.Co.)

GUNSMITHS

The High Street, Laxfield, Woodbridge, Suffolk

Tel: UBBESTON 323

presents

JUST ABOUT THE MOST REMARKABLE RANGE OF AUTHENTICALLY STYLED FULL SIZE REPRODUCTION HISTORIC WEAPON KITS NOW AVAILABLE IN GREAT BRITAIN... FREELY PURCHASABLE, LICENCE OR CERTIFICATE IS NOT REQUIRED WHEN BUYING A HIGH QUALITY PRODUCT FROM "CONNECTICUT VALLEY ARMS, INC."

- Excellent quality brass furniture.
- Fully machined (un-vented) steel barrel, in the white.
- Lock, fully working, engraved and colour case hardened.
- Graceful hardwood stocks — fully shaped and 95% inletted.
- Complete and easy to follow instructions.
- Finished pistols weigh up to 40 oz. Rifles weigh 7 lb.
- High quality throughout, competitively priced. The perfect gift.

AND NOW FOR THE MODELS:

• KENTUCKY FLINTLOCK RIFLE £51.00 • KENTUCKY FLINTLOCK PISTOL £32.50 • TOWER TYPE FLINTLOCK PISTOL £32.50 • COLONIAL FLINTLOCK PISTOL £28.50 • TOWER TYPE PERCUSSION PISTOL £32.00 • COLONIAL PERCUSSION PISTOL £28.50 • PHILADELPHIA PERCUSSION DERRINGER £22.50 • NAPOLEON 3RD CANNON £89.10. (Prices include V A T P & P Pistols £1.00, Rifles £1.25, Cannon £1.50).

For illustrated catalogue of the complete collection send large S.A.E. or order direct from the 'Mid Suffolk Gun Store', High Street, LAXFIELD. For "BLACK POWDER" reproduction weapons and accessories catalogue/list send 50p plus large S.A.E. (includes £1.00 free purchasing voucher). We are one of Britain's largest direct "BLACK POWDER" replica suppliers.

MINI-POWER DRILL KIT
ULTRA HIGH SPEED — WITH ONLY 25,000 R.P.M.
Only £34.95

With this Mains operated Dremel Kit you can grind, drill, polish, carve, sand, rout, engrave, etc. Contains over 30 accessories, including cutters, grinding wheels & points, brushes, polishing tips, sanding discs, drum sanders, sanding bards, mandrels, dressing stone, collet wrench etc. All you need for home, hobby and craft work, modelling and pattern making, gun-smithing, lapidary work — you name it. In fitted case £34.95 + £1.65 p&p. If required, 34 piece accessory kit, £11.95 + £1 p&p.

FINE WORK MAGNIFIER
Only £13.95

A wonderfully convenient way of examining articles for study, leaving both hands free. This is the GIANT SIZE model with 4" approx. dia. powerful Magnifying Glass set onto a flexible stem assures virtually any position needed. On weighty stand, ruggedly made, really useful. Only £13.95 + £1.25 p&p. Send £15.20.

JOHN DUDLEY & CO. LTD. (Dept. ME31)

Carolyn House, Water Road, Wembley, Middx.
(MAIL ORDER), 01-435 5456 (before noon).

MICROJET WELDER
A TINY FLAME UP TO 5,000°F!
£22.50
INC. FLAME TIPS

Precision tool using combination of butane and compressed oxygen or micronox. A pencil lead thin flame size, adjustable to 5,000°F. Cuts metals, welds, brazes and solders gold, silver, ideal for radio constructors, electricians, opticians, dentists, silversmiths, modelling, jewellery, clockmakers, electronic and computer servicing. Up to 30 minutes use on fuel supplied. Replacement set of 2 micronox, 1 butane cylinder £2.10 + 25p p&p extra. Only £22.50 + £1.35 p&p. Send £23.85.

WATCH-MAKERS' 15x EYE-GLASS
Only £5.95

Lens can be held comfortably in the eye for long periods. Much stronger than commonly available, 15x (area mag.). For minute examination of anything tiny. Only £5.95 + 45p p&p. Send £6.40. All mags. approx.

Access accepted.
Send name, address and No.

SAVE UP TO 30%

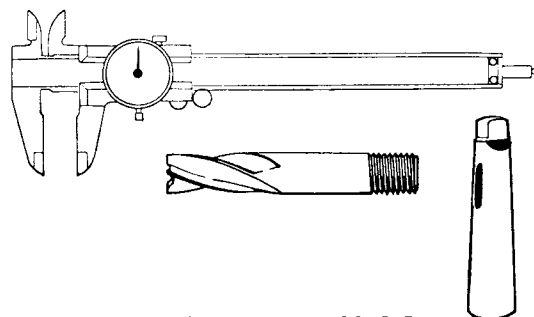
AND UP TO 70% FROM OUR SPECIAL OFFER LIST

Good quality Engineers tools — off the shelf

Send 9p stamp for your copy of our
40 PAGE ILLUSTRATED AND PRICED CATALOGUE

Overseas please send three International Coupons
or one Dollar

OUR 1979 CATALOGUE SHOULD BE AVAILABLE IN
FEBRUARY 1979. YOU WILL RECEIVE A COPY BY
POST, IF YOU ARE ON OUR MAIL LIST



AKRON TOOL SUPPLY CO.

(Dept M) 69 NIGHTINGALE LANE, WANSTEAD, LONDON, E11 2EY

Telephone: 01-530 4405/4660

Shop Hours: M-F 9-5.30, Sat. 9.30-12.30

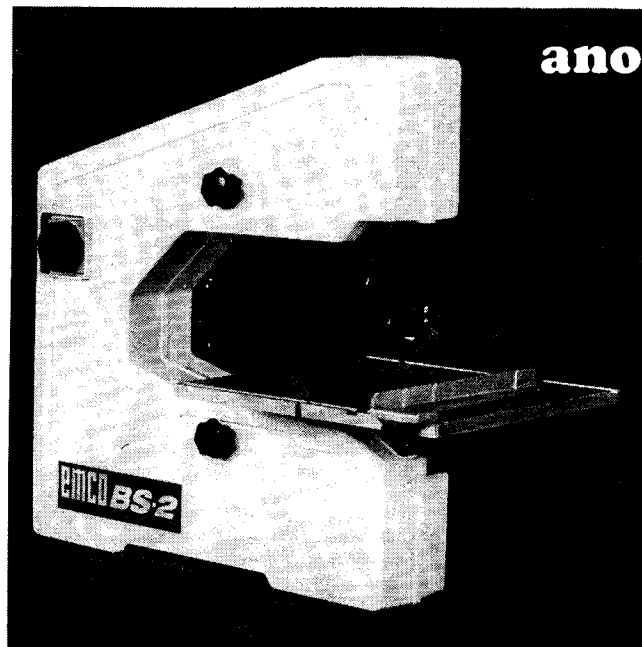
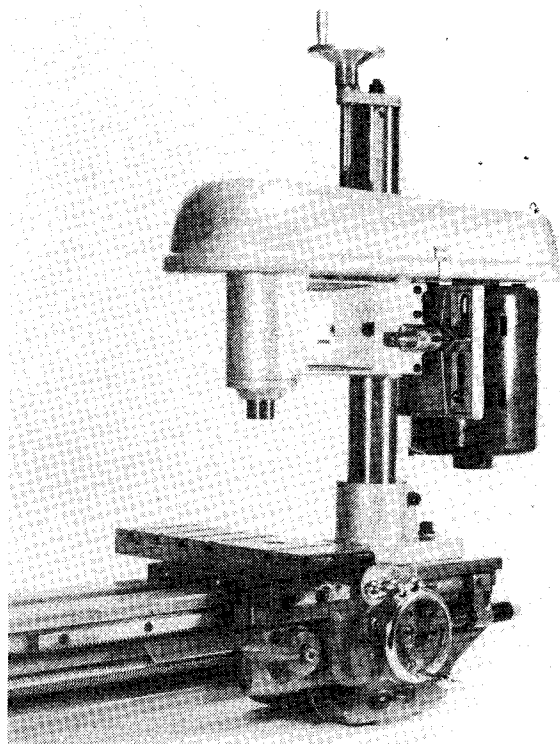
AMOLCO MILLING ATTACHMENT

FOR MYFORD AND BOXFORD LATHES
No. 2 MT SPINDLE—WILL ACCEPT
MYFORD COLLETS, OR A COLLET CHUCK
4-SPEEDS, 325—1600 R.P.M.
VERTICAL MOVEMENT — 6½ IN.
DISTANCE FROM CENTRE OF SPINDLE
TO COLUMN—5 IN.

PRICE £159.00
PLUS £12.72 VAT
CARRIAGE £8.00

N. MOLE & CO. (MACHINE TOOLS) LTD

5 TOLPITS LANE
WATFORD, HERTS, WD1 8LU
Tel. WATFORD 43135



another EMCO winner

*THE BS2 3-SPEED BANDSAW FOR WOOD, METAL & PLASTIC

From the factory that manufactures the Unimat, Compact, Emcomat and Maximat Lathes we are now pleased to introduce the EMCO BS2 Bandsaw. This machine has been developed for both the amateur and the professional, being particularly suitable for the Model Engineer who needs to cut either wood, metal or plastic quickly, easily and accurately. Simple and intricate shapes are all the same to the BS-2 Table tilts 45°

Extra equipment includes:

Bandsaw Blades of various widths, Knife Blade, Sanding Belt, Saw Set Pliers, Three cornered File, Truing Stone, Mitre Gauges, Rip Fence

Speeds (3)	120/750/1200 m/min
Depth of cut	145mm
Motor	370w
Table	400X400mm
Throat	360mm
Roller dia.	170mm
Weight	26kg
Bandsaw blade	1783mm endless

Northern Branch: E.M.E. Ltd., BEC House (Northern),
Queensway, Transpennine Trading Estate, Rochdale,
Gtr. Manchester, OL11 2PX. Tel. 0706 54569 Telex 635171



E.M.E. LTD. BEC HOUSE
VICTORIA ROAD, LONDON NW10 6NY
Telephone: 01-961 0120

DREMEL TABLE-SAW

£65.88
tax paid

A 4"
circular saw for
professional
wood cutting.
Table tilts up to
45° with mitre gauge and rip fence
supplied, adjustable blade height and blade guard.

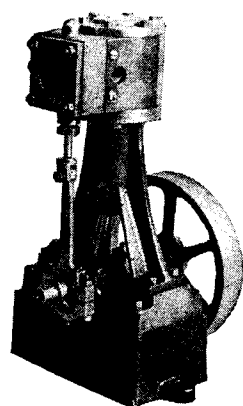
From all good Model Shops

Please send me details of other DREMEL TOOLS

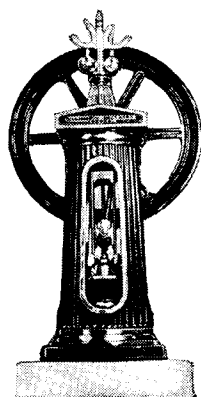
NAME

ADDRESS

MICROFLAME (U.K.) LTD. ME
ABBOT'S HALL, RICKINGHALL, DISS, NORFOLK IP22 1LS
Tel: (037 989) 555-6 Dealership enquiries invited



STUART MODELS



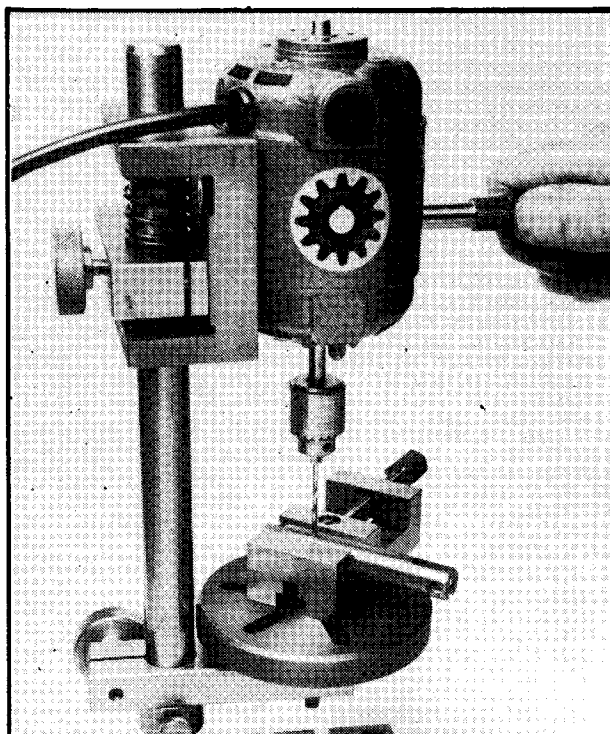
Build a steam engine!

Send now for the 48 page
Catalogue of Stuart
steam engines, marine
and stationary; more
than 60 illustrations of
engines, fittings etc.
60p post paid U.K.

STUART TURNER LTD

Henley-on-Thames . Oxon . RG9 2AD

Tel: 049-12 2655



John Hall Ltd.,
2, Railway Street,
BATH,
BA1 1PG
Telephone: 0225 4513

John Hall Ltd.
37, Whitehouse Street,
Bedminster,
BRISTOL,
BS3 4BU
Telephone: 0272 632847

Balco Industrial Supplies,
49, Vyse Street,
BIRMINGHAM,
B19 9JH
Telephone: 021 554 1026

A.J. Reeves & Co. (Birmingham) Ltd
Holly Lane,
Marston Green,
BIRMINGHAM, B37 7AW
Telephone: 021 779 6631

Power Tool Services (Southern) Ltd
851, Christchurch Road,
BOSCOMBE,
Dorset,
Telephone: 0202 420583

Ryall & Walters,
34, Llandaff Road,
CARDIFF,
CF1 9NJ
Telephone: 0222 31367

G.M.H. Bunce & Co. Ltd
206, West Street,
FAREHAM,
Hampshire,
PO16 0HF
Telephone: 0329 234136

J.E. Siddle Ltd.,
83, Victoria Street,
GRIMSBY,
South Humberside, DN31 1NJ
Telephone: 0472 58741

Thorncraft,
181 182, Queens Road,
HASTINGS,
Sussex, TN34 1HQ
Telephone: 0424 423072

R.H. Beaumont,
150, Chatterlands Avenue,
HULL,
HU5 3FR
Telephone: 0482 43701

John Hall Ltd.,
Russell Square,
LEICESTER,
LE1 2DR
Telephone: 0533 50671

Aird & Anderson Ltd
31, Mathew Street,
LIVERPOOL,
L2 6RE
Telephone: 051 236 6987

John Hall Ltd.,
88-92a, Merton High Street
LONDON,
SW19 1BD
Telephone: 01 542 6644

J. Gleave & Son Ltd
Gateway House,
Piccadilly Station Approach,
MANCHESTER, M1 3AA
Telephone: 061 236 1840

Henry Osborne Ltd
39, Percy Street,
NEWCASTLE-UPON-TYNE,
NE99 1HW
Telephone: 0632 73681

John Hall Ltd
51, Commercial Street
NEWPORT,
WY1 1LP
Telephone: 0633 38004

Peter Crisp
High Street,
RUSHDEN,
Northamptonshire, NN10 9JP
Telephone: 09334 56424

J.B. Hindley Ltd
Ladys Bridge 3
SHEFFIELD,
South Yorkshire, S3 9BD
Telephone: 0742 730559

S. Tyack & Son Ltd
341, Old Street
Shoreditch,
LONDON EC1Y 9NL
Telephone: 01 739 8301

John Hall Ltd
31, Kingsway
SWANSEA,
SA1 5LH
Telephone: 0792 55841

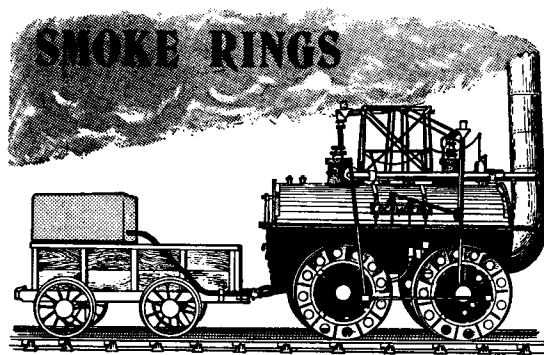
N. Mole & Co. (Machine Tools) Ltd
5, Talpots Lane
WATFORD,
Herts. WD1 5LU
Telephone: 0923 43135

Cowells Ashford Ltd
Hammer Road, Kingsnorth
ASHFORD,
Kent TN26 1NU
Telephone: 0233 31931

COWELLS

COWELL ENGINEERING LIMITED
OAK STREET, NORWICH, ENGLAND.
NORWICH 614521. TELEX 975205.

Manufacturers of Engineers Machine Tools.



A Commentary by the Editor

Loco pictures

Mr. G. W. Bell, who lives near Exeter has sent me a cutting from "Express & Echo", the local paper, dated 4 November 1978, in which there appears an offer to readers. This is for colour prints of locos from Rocket to Evening Star — 60 in all. To claim the postcards, readers have to collect numbers which appear daily and pay the sum of 30p for ten cards. This goes on for six weeks until the set is collected. A nice idea and one which, I hope, could be repeated, particularly in other areas so more enthusiasts can benefit.

Oakhill Manor

On 16 July last year, Phase 1 of the Oakhill Manor Museum and Railway was officially completed and opened. The 10¼ in. track, which is set in beautiful surroundings, was very much appreciated by all who attended then and since — we have John Haining's report which will be published soon. Now Phase 2 is under way and planning permission is being sought to commence the construction of the museum side which, it is hoped, will become a model maker's Mecca. It will take some time for all this of course, but meanwhile, a Trust is being formed which will, among other things, assume the responsibility for collecting models. Already on the Trust are The Honourable John Gretton, Mr. Roland White, and Mr. Walter Harper. If you have any model(s) which you would like to loan or donate to the Museum, please contact Mr. Roland White at Latymer, The Drive, Belmont, Surrey (01-642 3710).

Anyone remember this loco?

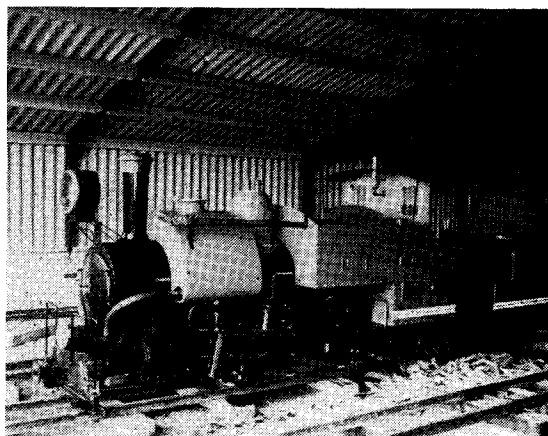
We have received a request from a Mr. Hollas to publish his efforts in tracing a G.N.R. loco built at the turn of the century by his father. The loco, I'm afraid we know no more about it, is in apple green (could be a Stirling Single?) and was lent, according to Mr. Hollas, to a museum in Halifax. It has since disappeared, hence the request.

Metrication

How much further will we progress towards metrication this year? The progress report for 1977/8 published by the Metrication Board last November seems to indicate that in the previous 18 months the progress "has been insufficient judged from the point of view of both Britain's competitive strength in world markets and the long term interests of people in their daily lives". The report also says that the use of metric units will increase in world trade, industry and technology and to avoid an "indeterminate period during which the inefficiencies and inconveniences of using the two systems side by side will grow" we ought to take out the proverbial finger and achieve the transition "in an orderly fashion". Well, quite a few industries now use metric units as readers will know and in our schools the craft teachers concentrate on this unit of measurement. For the model engineer his main concern is for gauge and length and until all future designs are made solely in metric, we will just have to do a bit of mental arithmetic. With most designs the emphasis is on safety rather than lightness and so if there is no exact equivalent for the dimensions given then we go to the size larger. It's all good practice anyway for if the Metrication Board gets its way it won't be very long before imperial measurements disappear.

That Milner loco

Back in July I mentioned Milner Engineering's Darjeeling Himalaya Mountain Railway loco which had gone to Carhaix. I have just heard from a M. André Joseph, a very capable photographer from Paris who visited Mur de Bretagne and sent us this picture of the loco in its new home. It's a pity that our monochrome reproduction cannot do justice to the photo — nor to the beautiful paint job on it — but visitors to that area of France can get some idea of what they will see. Our thanks go to M. Joseph for the photo.



THE MARSHALL PORTABLE STEAM ENGINE

by R. L. Kibbey

Part XIX

From page 1416

REFERRING TO THE ASSEMBLY drawing of the pump in the last instalment and also the details in this issue, the function of the pump is as follows — with the by-pass valve closed, the outward suction stroke draws water up the suction pipe, lifting the ball valve shown in section CC of the assembly. During this stroke, the ball valve shown in section XX remains seated. On the delivery stroke, the ball valve in section CC closes and the delivery valve in section XX and also the non return valve in the boiler opens to admit the water. When the by-pass valve is progressively opened the delivery of water is shared between the boiler and the by-pass return pipe to the degree that the by-pass valve is opened. On the suction stroke, the by-pass valve cannot admit air because it is on the delivery side of the delivery valve (section XX).

Assuming that the David Piddington jig and planning sequence is followed, the machining of the body offers no particular problems, but considerable care in accurately marking out the various hole centres is obviously necessary. The valve casing is suitable for holding in the four-jaw chuck for facing both sides and for machining the 15/16 in. dia. outside diameter. Again, great care should be taken in setting out the position of all the drillings. The tapered bore for the by-pass valve will require the usual home-made reamer. This should be made at the same setting of the top slide and at the same time that the plug valve is turned. The turning tool must, of course, be dead on centre height, or else a barrelled shape will be produced.

Alongside the detail of the plug valve I have included a sketch of the recommended procedure for bending the handle of the valve. The hole in the bush used to hold the valve whilst bending should, of course, be reamed with the reamer made for the bore in the valve casing.

The delivery and suction valve plugs and the three water passage plugs are shown with the hexagons milled and with integral shoulder washer faces — a bit more trouble than using hexagon bar

but I always think this gives a nice finish to the job as well as providing better spanner clearance in tight spots.

The clack or non-return valve seating which is screwed into the boiler boss is shown as made from bronze. I have precluded brass, firstly because of possible dezincification and secondly because of the thin wall between the internal and external screw threads.

As shown in the assembly drawing (Part XVIII) the recommended spring for use in this valve can be made from a spring out of a standard Schrader motor tyre valve. I picked up this tip from a fairly recent copy of *M.E.* (or maybe I was back tracking over some earlier copies). Anyway, I checked that these springs are rustless wire and have found several occasions to use them in similar valve installations.

The four holes tapped 7 BA in the boiler boss should be spotted through from the holes in the pump body. Note that I have shown these as blind holes. Should any of these holes break through, it will be advisable to coat the set screw threads with sealing paste on assembly.

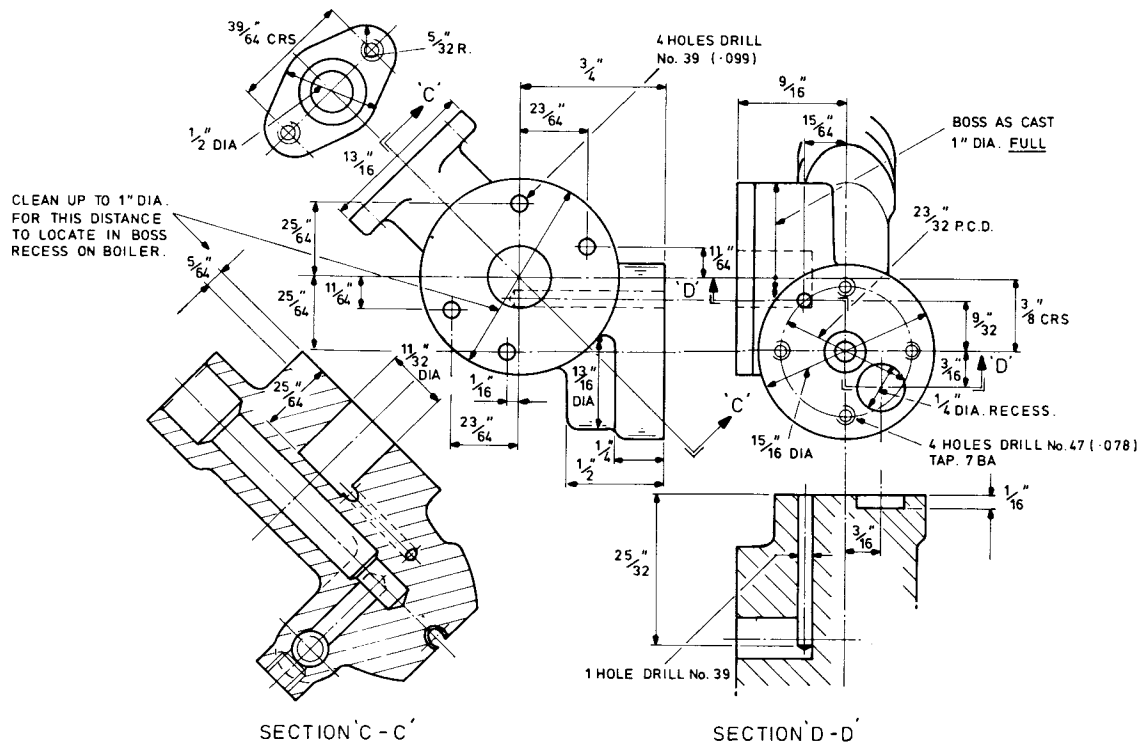
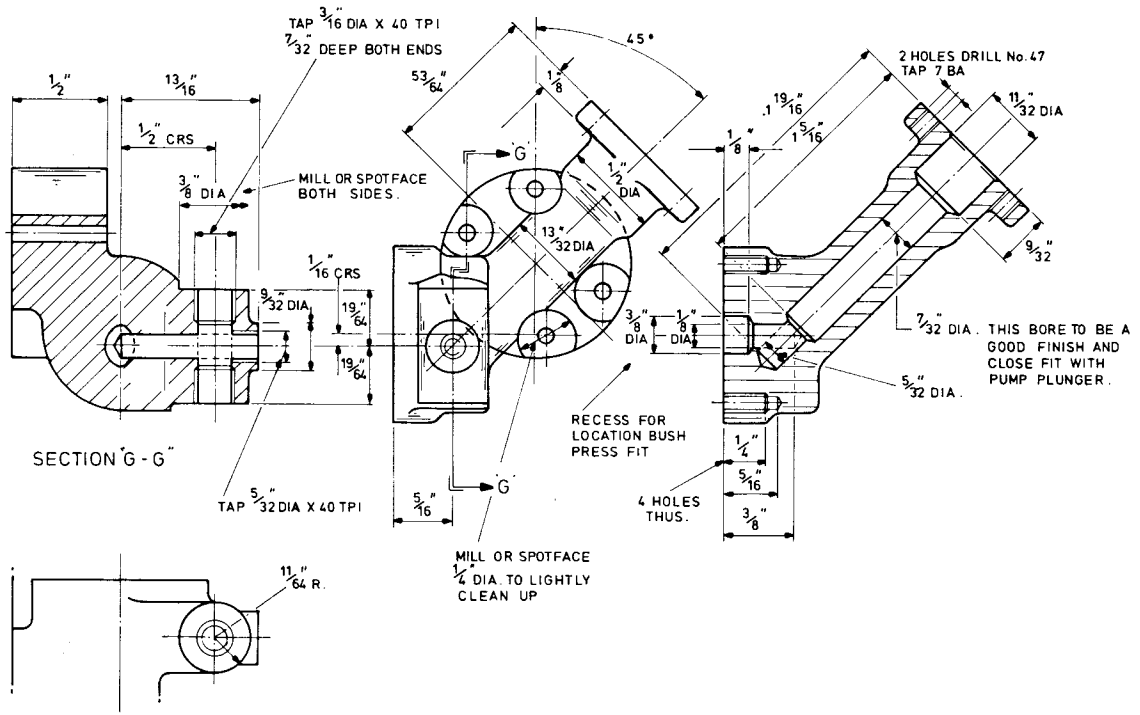
The eccentric strap is produced from a gun metal casting and the machining sequence follows the usual practice. Briefly, this consists of the following — holding lightly in the four-jaw, face both sides to just clean up (not to the final width yet). Next, secure horizontally in a machine vice on the vertical slide and drill the two No. 39 bolt holes. The ends of the bosses for the bolt heads and nuts can now be faced. The two halves can now be separated, preferably with a slitting saw about 3/64 in. or 1/16 in. thickness running between centres and square with the side faces of the straps.

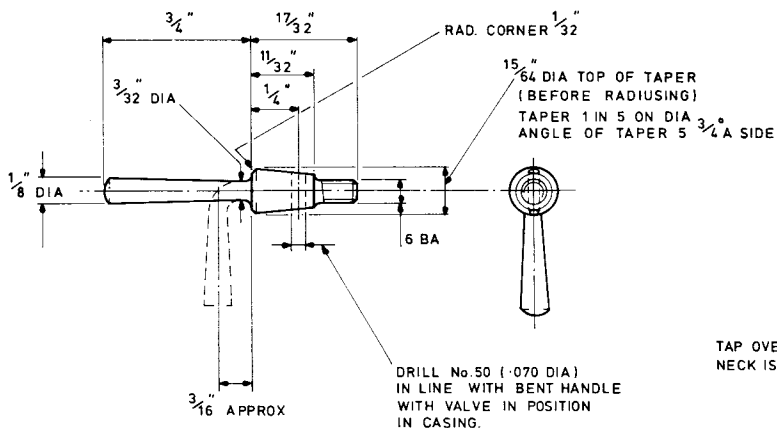
After bedding the abutment faces, bolt the two halves together and finish machine to the dimensions quoted. Take care to ensure that the bore centre line is coincident with the joint line. The .005 in. maximum relief machined on both sides is not an essential feature but improves the appearance.

The eccentric rod is shown fabricated in three parts, the foot and the fork end being machined separately and being finally Loctited together in the correct angular relationship. I make no apology for again stressing that close clearance fits and clean metal joints are essential.

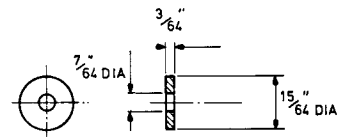
The full-scale drawing of the engine side elevation prepared by Bill Hughes shows a water pump ram which scales 1/4 in. diameter. I purposely reduced this to 7/32 in. dia. on my design on the principle that this engine will almost certainly always be running in an unloaded state with resultant relatively low water consumption. Any builders who intend to work the engine hard under load might consider using a 1/4 in. dia. ram.

WATER PUMP BODY Matl. - BRONZE OR G.M. CASTING.

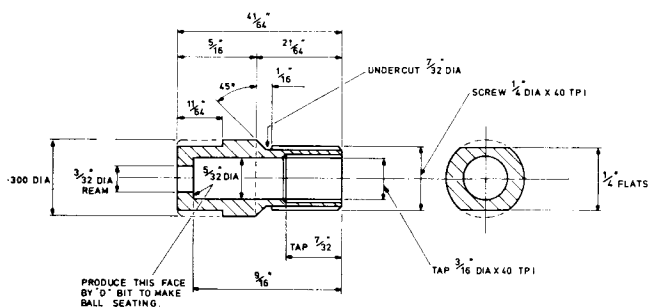
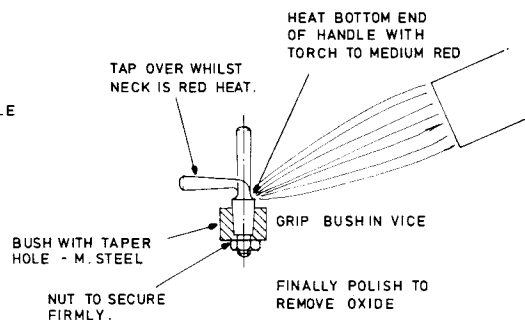




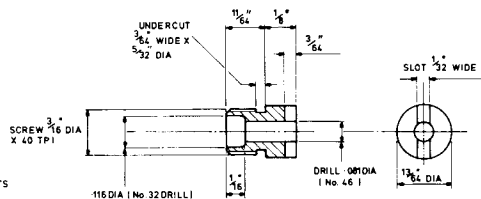
PLUG VALVE - WATER PUMP
BY - PASS.
Matl. - STAINLESS STEEL



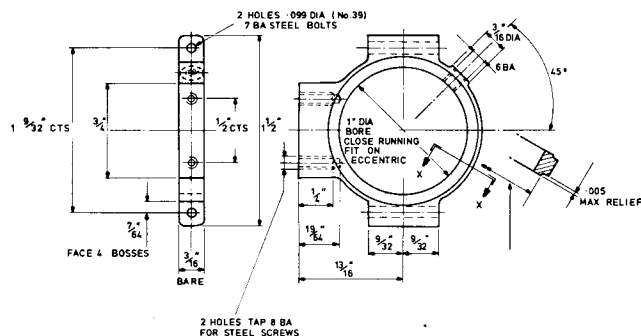
WASHER - PLUG VALVE
Matl. - STAINLESS STEEL
USE BRASS 6 BA NUT.



BOILER CLACK SEATING - 10FF
Matl. - BRONZE DRAWN BAR (NOT BRASS)

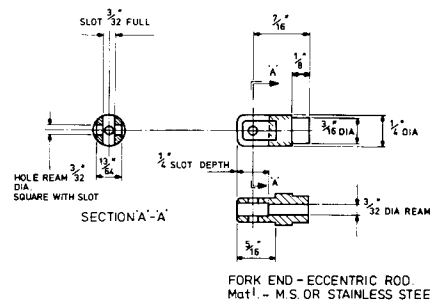


RETAINING PLUG -
BOILER CLACK SPRING - 10FF
Matl. - BRONZE OR GM BAR (NOT BRASS)

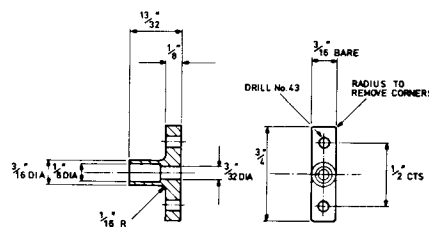


NOTE: BORE AND FACE SIDES WITH 2 HALVES
FIRMLY BOLTED TOGETHER

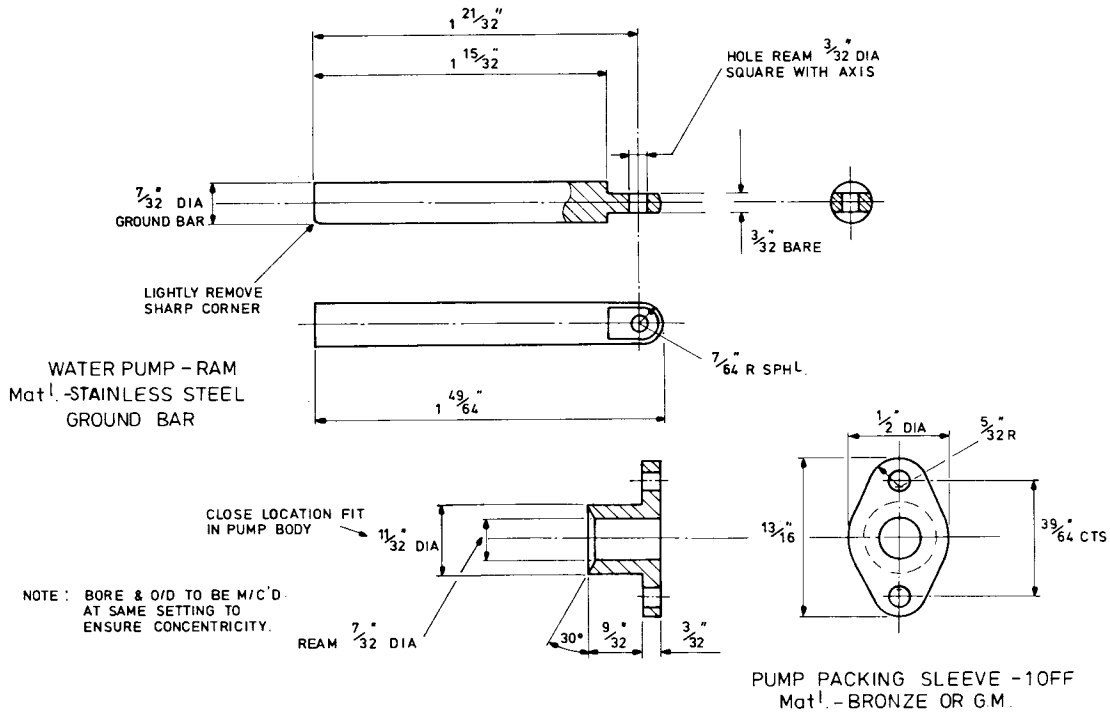
ECCENTRIC STRAP - WATER PUMP 10FF
BRONZE OR GM CASTING
(MAKE FROM VALVE
ECCENTRIC STRAP CASTING)



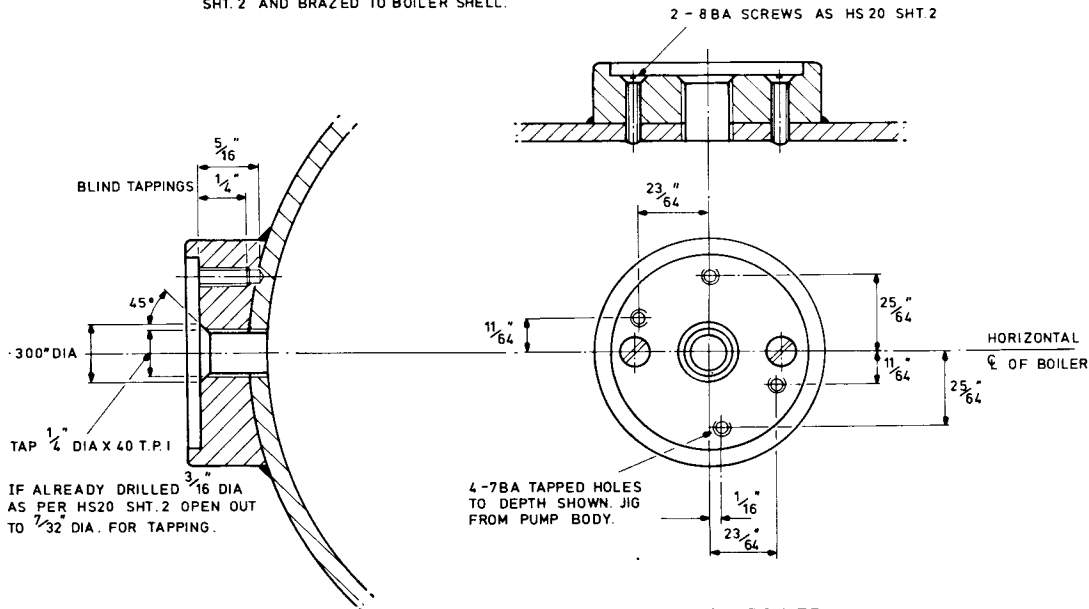
FORK END - ECCENTRIC ROD.
Matl. - M.S. OR STAINLESS STEEL

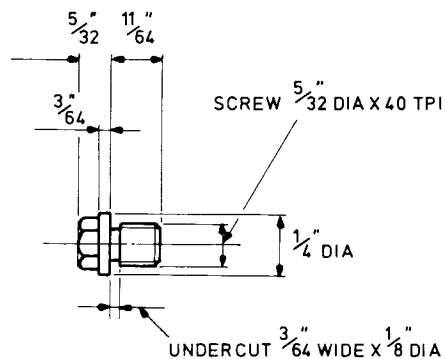
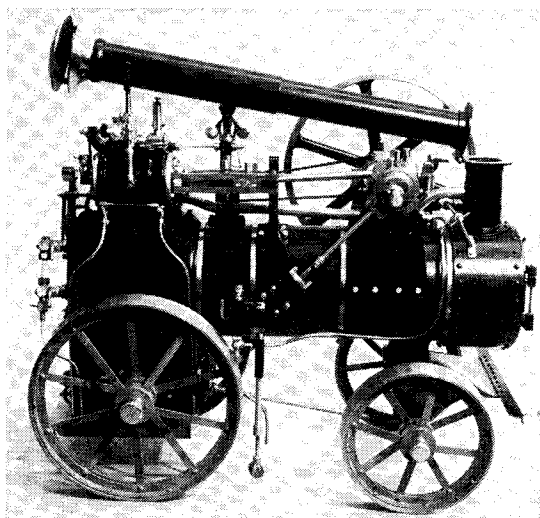


FOOT - ECCENTRIC ROD.
Matl. - M.S. OR STAINLESS STEEL

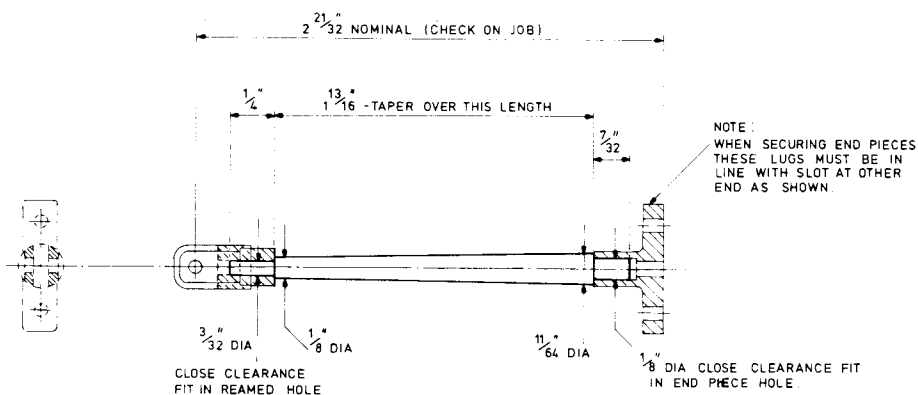


NOTE - IT IS ASSUMED THAT THE BOSS HAS
ALREADY BEEN MACHINED TO HS20
SHT. 2 AND BRAZED TO BOILER SHELL.



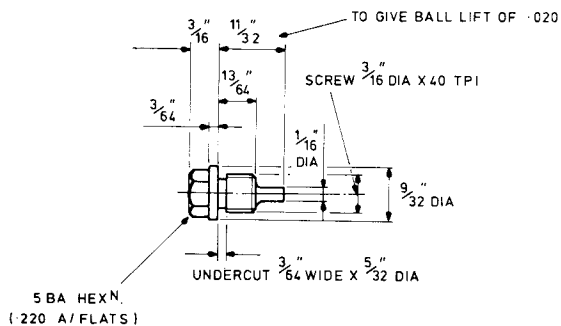


PLUG - WATER PASSAGES - 3 OFF
Mat^l. - BRONZE OR BRASS.

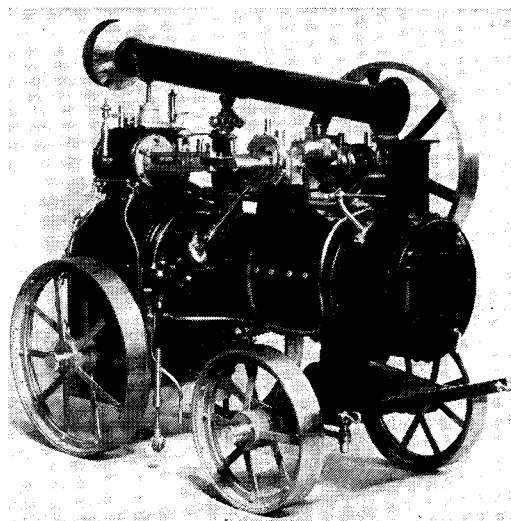


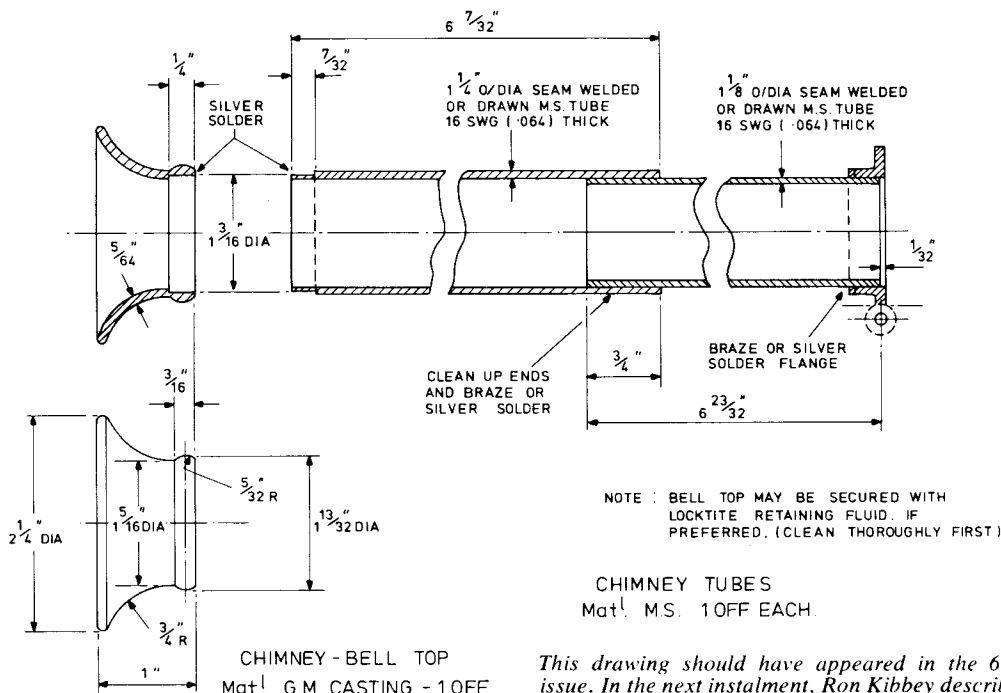
ECCENTRIC ROD - WATER PUMP - 1 OFF
Mat^l. - M. S. OR STAINLESS STEEL.

END PIECES TO BE SECURED WITH LOCKTITE
RETAINING FLUID PART TO BE METICULOUSLY
CLEANED BEFORE APPLYING.
(NOTE ANGULAR RELATION OF ENDS)



PLUG - WATER PUMP
DELIVERY VALVE - 1 OFF
Mat^l. - BRONZE OR BRASS.





This drawing should have appeared in the 6 October issue. In the next instalment, Ron Kibbey describes boiler details not covered by the August 1976 issues.

CLUB

Dates should be sent at least five weeks before the event to ensure publication. Please state venue and time. While every care is taken, we cannot accept responsibility for errors.

DIARY

48th MODEL ENGINEER EXHIBITION

at the

WEMBLEY CONFERENCE CENTRE

from

4th - 13th January
(closed Sunday 7th)

JANUARY

- 5 Romford Model Engineering Club. Competition Night.
- 5 Vale of Aylesbury M.E.S. Progress Night and Judging for Chairman's Cup. Jubilee Hall, Birtton, Aylesbury.
- 5 Huddersfield M.E.S. Films shown by the Huddersfield Examiner.
- 5 Stockport & District S.M.E. Bits and Pieces. Parish Hall, Cheadle Hill.
- 8 Wirral M.E.S. Members' Movies. Victory Hall, Upton, Birkenhead. 7.30 p.m.
- 8 Swansea S.M.E.E. Annual General Meeting. 3 Gloucester Place, Swansea. 7.30 p.m.
- 8 N. Wales M.E.S. Meeting. United Reformed Church Hall, Colwyn Avenue, Rhos-on-Sea, Colwyn Bay. 7.30 p.m.
- 8 Clyde Shiplovers and M.M. Society. "Dug-out canoes of the Clyde" — George Appleby. Partick Halls, Burgh Hall Street, Glasgow. 7.30 p.m.
- 9 Basingstoke & District M.E.S. Meeting Night.
- 9 Sutton Coldfield & N. Birmingham M.E.S. Workshop Questions. Wylde Green Library, Sutton Coldfield. 7.30 p.m. for 8 p.m.
- 9 Guildford M.E.S. Executive Committee Meeting.
- 10 Birmingham S.M.E. Mastertrain quiz. Sheepcote Street. Now 14 February.
- 10 Southampton & District S.M.E. General Meeting. Malvern Hotel, Winchester Road, Southampton.
- 10 Historical Model Railway Society, Chester. Talk by H. J. Leadbetter on "Modelling Railway Buildings". Venue Y.M.C.A. Lounge, Old Palace, Vicar's Lane. 7.30 p.m.
- 10 Andover & District M.E.S. Bits and Pieces. Subs due. Swallow Hall.

- 11 Hull Society of Model Engineers. Rummage Sales of Engineering Oddsends. Trades & Labour Club, Room 3, Beverley Road, Hull. 7.45 p.m.
- 11 Sutton M.E.S. 16 mm. Film Night — details will be announced.
- 12 Kinver & W. Midlands S.M.E. "Making a Working Model of a London Tube Train" — John Reaveley. Club House, Marsh Playing Fields, Kinver. 7.20 p.m.
- 12 Dublin S.M.E.E. Visit to Dunsink Observatory.
- 13 Bristol Historical Model Railway Society. Talk by Rev. W. Wdwy on "J. E. McConnell and the Birmingham & Gloucester Railway". Venue Royal Commonwealth Society, 14 Whiteladies Road (opposite the B.B.C.). 2.30 p.m.
- 15 City of Leeds S.M.E.E. Don Ashton slide show and lecture arranged by Mr. R. Jeffrey. Salem Chapel, Leeds. 7.30 p.m.
- 15 Leicester S.M.E. "Scale Model Ships" by Mr. S. Wigham. Royce Institute, Crane Street, Leicester. 7.30 p.m.
- 17 Birmingham S.M.E. Ilshaw Heath. 9.55 mm. Film Evening of the '30s. Unique old films presented by John Walker.
- 17 Cannock Chase M.E.S. Meeting. "Valve gears" — W. Childs. Lea Hall Club. 7.30 p.m.
- 17 Bromsgrove Historical Model Railway Society. Talk by N. R. Millar on "Early Standard Gauge Stock of the G.W.R.". Venue The Golden Lion Hotel, Worcester Road. 7.30 p.m.
- 17 Guildford M.E.S. Bits and Pieces Competition. HQ Stoke Park. 7.45 p.m.
- 18 Rugby M.E.S. "Building a Torquay Manor Boiler" — illustrated talk by Alec Farmer. 7 p.m. prompt. Limited space so please come early.
- 18 Sutton M.E.S. "Bert Sandys" — more stories from the Festiniog Railway.

WHAT'S IN STORE

Where possible, the items reviewed are seen and tested by "M.E." staff. However, where this is not possible reviews are given solely on the information received from the manufacturers and we cannot accept responsibility for products which do not measure up to the claims made for them.

Sweet Pea anyone?

We know there are many other designers of locos and suppliers of drawings and castings than ourselves — and please note that we do not supply castings — but unless you have all the catalogues or read all the ads, you may not be aware of them. People like Don Young, A. J. Reeves, Ron Bray etc. all have their own designs. Hopefully we will be able to include in these pages short reviews of some of these designs with photos of completed locos where possible. This is possible in the case of Sweet Pea, a design for narrow gauge by Jack Buckler. Drawings and castings are at present available from Blackgates Engineering, 209 Wakefield Road, Drighlington, Bradford, W. Yorks who have sent us a couple of the drawings for our appraisal. The standard is high, imperial dimensions are used and all lettering is professionally done with stencils making them easy to read. We won't include a photo of the loco here as an article by Jack Buckler appears on page 24.

No licence required

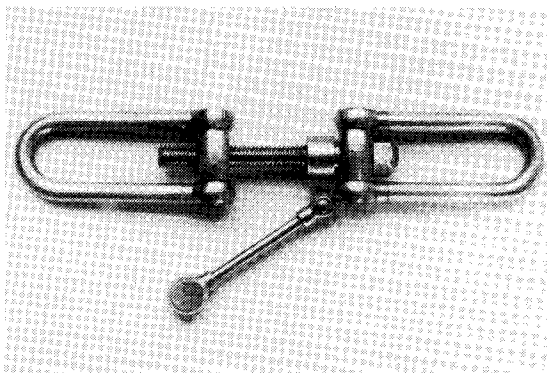
If you feel like a change from locos or traction engines and the wife keeps on about covering that bare patch on the wallpaper, you might like to try your hand at making an antique gun. The kit we have just examined is about the nearest thing we have seen to the real thing except that the barrel is not bored right through so that firing is impossible. We might add that if you convert the gun to a working replica you are required by law to have a gun licence. One particular kit is of a Kentucky pistol but there are also kits for a Derringer pistol, Colonial, and a Kentucky Rifle. Prices respectively are £32.50, £22.50, £28.50 and £51.00. If that seems rather a lot, then the contents of the kit will put your minds at rest. The constructional metalwork is already complete and even has that slightly worn, used look about it, the operation of the hammer and trigger is authentic but a few holes must be drilled and the stock requires finishing. Made up it would take an expert in antique guns to recognise a modern work of art. For further information, contact Mr. J. R. Fawcett at The Mid Suffolk Gun Store, High Street, Laxfield, Suffolk.

Heat where you want it

The products of Rhodes Flamefast Ltd. were mentioned in Club Chat a couple of issues back when it was stated that a review would follow. Well as far as can be obtained from the brochures and watching the apparatus at work, here it is. Perhaps the most fascinating is the Safety Tilt crucible furnace, the CM 250, because it brings the ability to make castings within reach of any club or some individuals if work load dictates. The cost is £120 and comprises a refractory and insulation, single burner with spark ignition, A 10 capacity crucible, and lifting and tilting handles. Spare crucibles are £9.50. This quite small furnace looks ideal for casting the type of components most used by the model engineer. There are larger versions of course, but this one should fit most requirements. Other items are Ceramic Chip Forges — again just the job for the budding blacksmith — jewellery benches complete with gas manifolds etc., Bunsen burners, kilns, brazing hearths and all associated equipment. Club secretaries would do well to write to Rhodes Flamefast at Pendlebury Industrial Estate, Bridge St., Swinton, Manchester.

Simplex

We have heard a bit more from Moreton Precision Models Ltd., Grays Lane, Moreton-in-Marsh, Glos. about the availability of parts for their Simplex bolt together kit. There are nine groups which may be purchased separately or together as demand and cash dictates but the whole lot will cost £1250 plus VAT and carriage extra. The groups are as follows: Main Frames; Buffers; Wheel assemblies; Cylinder assemblies; Feed Pump; Motion Bracket assembly; Valve Gear Set and coupling rods; Boiler, smoke box, regulator, superheater; and Plateway and fittings. If you wish to buy separately, the prices per group are respectively: £125; £30; £115; £175; £35; £70; £200; £300; and £200. The complete kit includes the construction booklet. As an added extra you may like to buy a set of screw couplings as seen here. The pair costs £9.00 plus the usual extra.



Close up work

Here is an idea that really works, small magnifying glasses that adhere by suction to normal spectacles so that with both hands free you can concentrate on the close up detail. Called the Mini-Loupe, these little lenses come in four magnifications, 1.2X, 1.6X, 2.5X and 4X. At present they are only available from Mec Lab Inc., 2770 East Walnut Street, Pasadena, California 91107, U.S.A. The only price we have is \$14.00 but Mec Lab are looking for an agency in the U.K. so the prices will be affected.



'ENTERPRISE'

A three-cylinder L.N.E.R. 2-6-2 tank locomotive for 5 inch gauge

by Martin Evans

Part IV

From page 1404

THE MAIN AXLEBOXES were illustrated in my last article. They are of the usual split type, machined from gunmetal castings. However, with the present high price of gunmetal, there is no reason at all why mild steel should not be used, provided that this metal is bushed. The bushes can be quite thin, 1/32 in. wall thickness being adequate. Another idea is to use mild steel but to bush with "oilite" bushes; but from reports that I have received, it seems that the life of oilite bushes used in locomotive axleboxes is not as long as it might be, further, the fitting of these to split axleboxes would be a bit of a problem.

Another suggestion for a long wearing axlebox is to follow full-size practice and provide a thin layer of white metal on the upper surface of the axlebox. An easy way of doing this would be to machine the bore of the axlebox very slightly oversize, then "tin" the surface, using ordinary tinman's solder. I have done this in the past, but have not been able to test such an axlebox in service so far.

As the axles are drilled at their ends for lubrication purposes, the oilbox shown on my drawing is not essential, but as it is easily put in, being a matter of drilling a few holes, may be worth while for the benefit of getting oil between the sides of the axlebox and the bearing surfaces of the horns.

The next items to tackle are the driving and coupled wheels. The correct wheel should have 18 spokes, the spokes being laid out as shown in my drawing. The spokes of Gresley wheels were much flatter than, say, Swindon type wheels, where the spokes were swept out towards the boss. Some readers may query the shape of the balance weights. It seems, however, that most of Gresley's driving wheels had crescent shaped weights, the inner radius being quite large; I estimate this radius at about 9 in. for 5 in. gauge. As the castings that will be on the market shortly will not have the balance weights included (for economy purposes on pattern-making) these will have to be added, and they could be made from 1/16 in. thick brass sheet. If a piece is fitted to both front and back, held together by a few brass screws put into tapped holes in the front and filed off flush, a little lead or even soft solder could be run in to build up the

weight, but this should not be overdone.

In machining the wheels, it is important to bore them for axles, to say 5 thou below 5/8 in. dia., then ream to size. If drills only are used, the hole is sure to run out. For drilling for crankpins, the usual simple jig will be required, to ensure that all wheels have exactly the same "throw".

Two "plain" axles come next; these are machined from 3/4 in. dia. ground mild steel. Don't be tempted to use silver-steel; this is more expensive, harder to machine, and has no advantage over mild steel for axles. True centres must be left in both ends, to facilitate "quartering" later on.

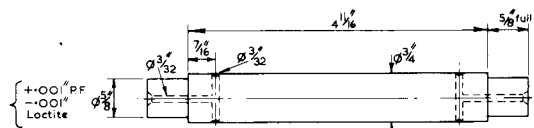
On many lathes, the bore of the spindle will be too small to allow the axle material to pass through, so the axles may have to be turned between centres. If 3/4 in. steel is used, it may be difficult to centre this dead true, even by the usual method — using a steady — so a good alternative is to use 13/16 in. or 7/8 in. dia. ordinary mild steel, and turn this down, giving the axlebox bearing area a good polish.

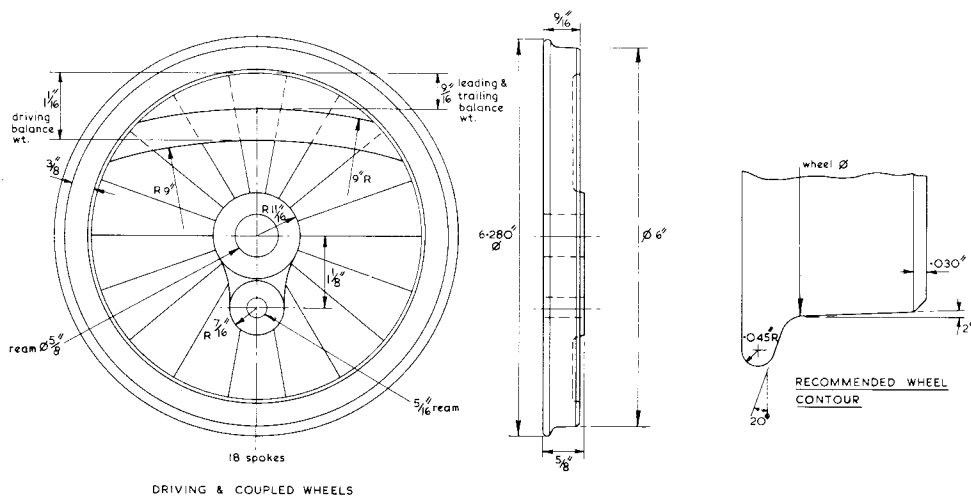
Crank-axle

A single throw crank-axle without eccentrics should not present any difficulties. My own method is to start by making a normal axle, fitting the "webs" to this, and afterwards cutting the excess away. This does at least ensure that the whole crank-axle is really true; whereas using separate "stub axles" calls for very accurate turning.

The two webs are cut from 1/2 in. thick mild steel plate; they should of course be bored out together, on the faceplate, and if Loctite is to be used, rather than press fits, the webs should be bored out 1 to 1 1/2 thou over the nominal size.

The point which now arises is how to set the three cranks at the required angles to one another. The difference between the angle of the outside





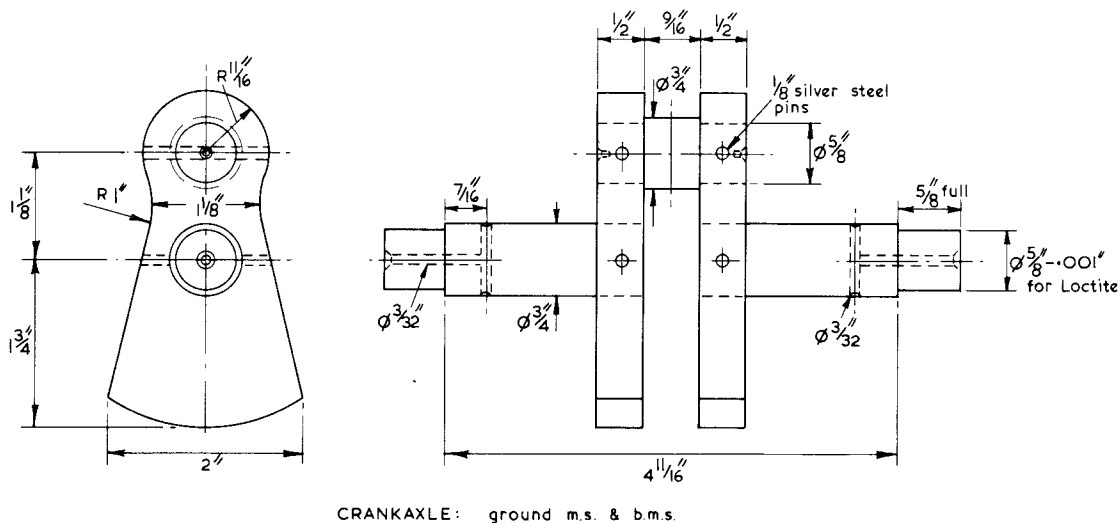
cylinders and the inside cylinder amounts to 5 deg. 14 minutes, thus the angles between the right-hand and the left-hand outside cranks will be exactly 120 deg., but the angle between the L.H. crank and the inside crank will be 120 deg. plus 5 deg. 14, or 125 deg. 14. The angle between the inside crank and the R.H. outside crank will then be 114 deg. 46 minutes.

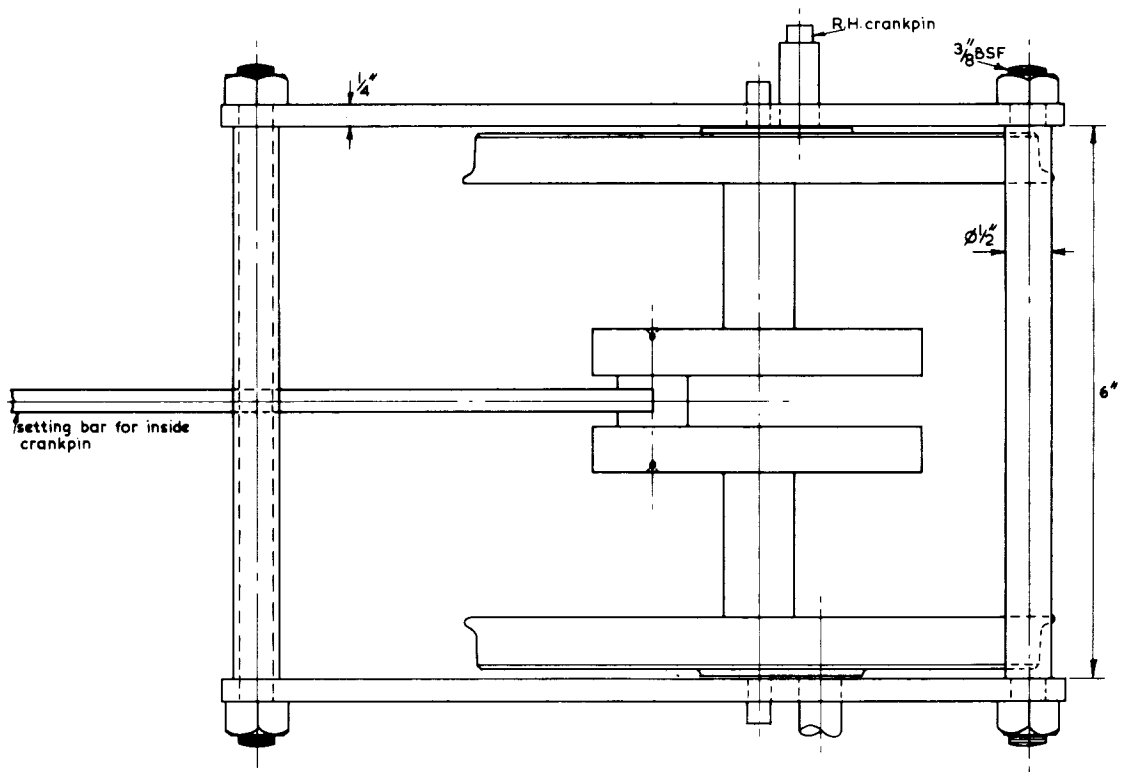
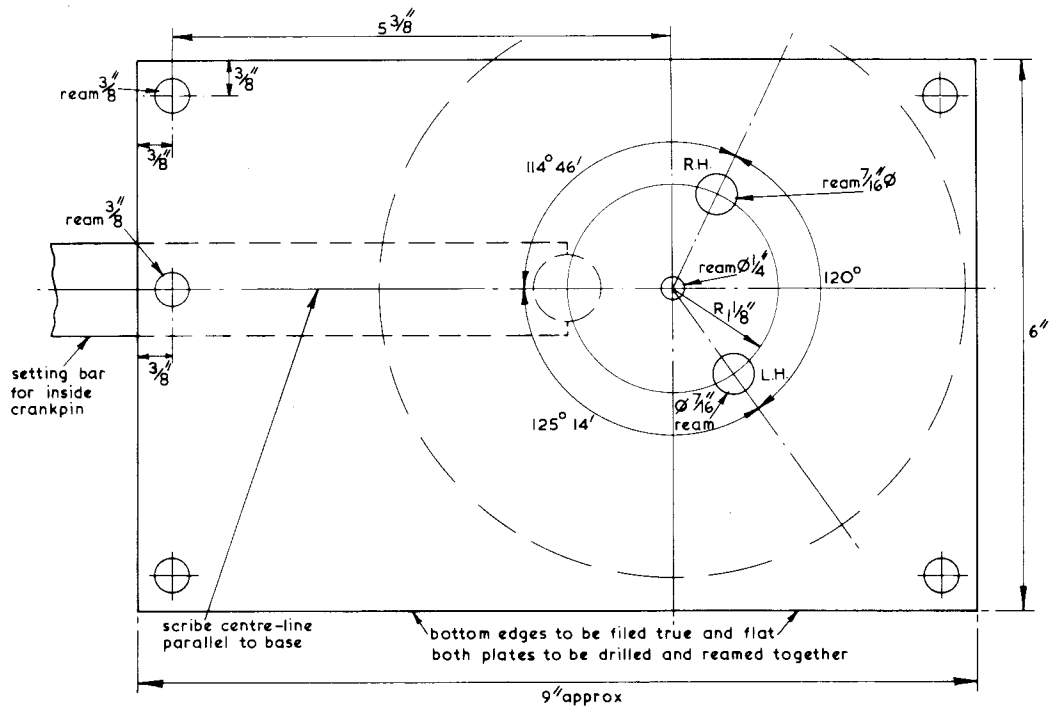
I have given a good deal of thought to the best way of getting these crank angles correct, and equally important, that the leading and trailing wheels should also be at the same angles corresponding to the crank-axle. I remember that the late LBSC, in describing how to build a three-cylinder "Green Arrow" locomotive for 2 1/2 in. gauge, suggested that the motion and valve gear could be made and assembled, and the crank set from the valve gear. He claimed that this method was used

by some locomotive building firms who built locomotives with Gresley's "two-to-one" gear. How they managed this I cannot say, as in full-size practice, wheels are put on their axles by hydraulic presses. I think it would be very difficult to use this method on a model.

Once again, I have come to the conclusion that it pays to make a proper jig for wheel quartering. Several readers have expressed interest in the type of jig I use for this job, so I have included drawings of a substantial jig that will deal with the unusual angles involved with the Gresley cylinder arrangement, while at the same time coming in very useful for other locomotives which have their cranks at the more usual 90 deg.

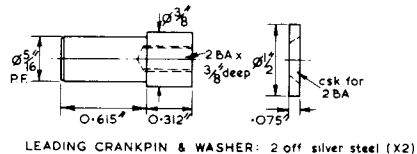
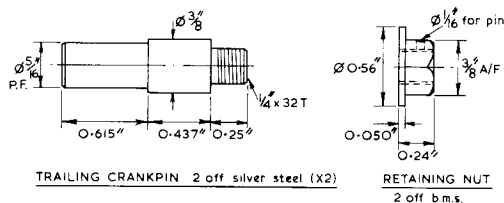
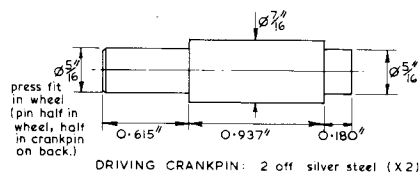
As can be seen from the drawing, two stout mild steel plates are required, of section 6 in. x 1/4 in. Their length is not critical, but I would suggest





PLAN OF JIG SHOWING CRANKAXLE AND WHEELS IN POSITION.

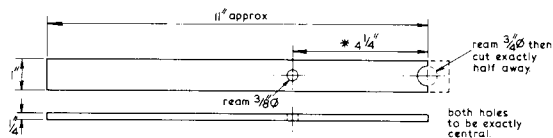
about 9 in. to give good stability. The bottom edges of the plates must first be filed or machined quite true, after which one plate is marked out as shown, the distance between the central (axle) hole and the 3/8 in. reamed hole on the left-hand side (5 3/8 in.) being important. The two plates are now clamped together and all the holes drilled and reamed as accurately as possible.



Four stretchers are next required, these being turned from 1/2 in. dia. mild or silver steel, their ends being turned to a really good fit in the 3/8 in. reamed holes in the corners. The stretchers are further extended to take a thread, say 3/8 in. BSF, to save having to make special nuts. When bolted together, washers should be used under the nuts, though I have not shown these in the drawing. A length of 3/8 in. dia. silver steel is now required, which, when the jig is in use, is placed through the 3/8 in. reamed hole at left centre. This rod forms the pivot for the "setting-bar" for the inside crank.

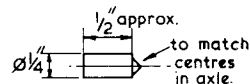
The "setting-bar" is now made. While mild steel could be used if true, a length of gauge plate would be better. A piece one foot long is used, and a 3/8 in. reamed hole is formed exactly on the longitudinal centre line and about 5 1/4 in. from the right-hand end. Then a hole 3/4 in. dia. is drilled (or bored) and reamed exactly 4 1/4 in. from the 3/8 in. hole, as shown. A saw cut is now made across the 3/4 in. hole, so as to leave exactly half of it.

Having satisfactorily finished the wheels and the crank-axle, and made sure that the axle wheel seats and the holes in the wheels are quite clean, high-strength Loctite is now applied to the wheel seats and the whole assembled in the jig. Incidentally, it will be found convenient if the four stretchers



"QUARTERING" JIG

are permanently bolted to one side plate, the other plate being removed while assembly is taking place. It will be noticed that the holes reamed in the side plates to receive the main crankpins are 7/16 in. dia. These are of course for the driving crankpins only. When assembling and "quartering" the leading and trailing pairs of wheels, bushes are used, good fits in the 7/16 in. holes and accurately reamed 3/8 in. dia. to take the smaller diameter crankpins.



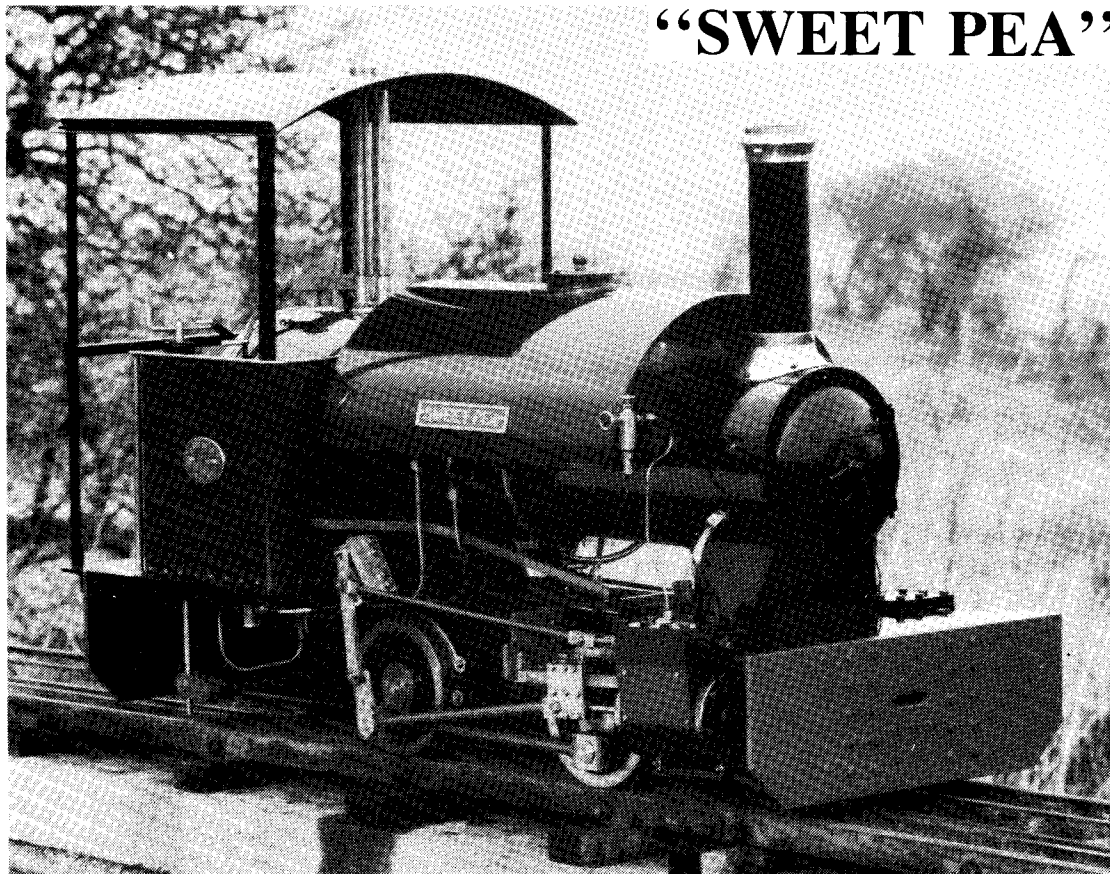
But to return to the "quartering" process, having inserted the crank-axle with its driving wheels in position, with the 1/4 in. dia. "centres" inserted into the ends of the axle, and with the crankpins through their holes in the side plates, the "setting-bar" is put into position as shown, with the "half-3/4 in. dia." registering against the inside crankpin. All we now have to do is to set the setting-bar parallel to the base, when the inside crank will be at the desired angle. A surface plate should be used if available, if not, a piece of thick plate glass, or even the lathe bed. A surface gauge will quickly check when the "setting-bar" is parallel, and it would be a good idea to clamp this bar in position while the Loctite is "setting". What I generally do, is to leave the wheels in the jig overnight, while getting on with some other job; then the jig is dismantled and made ready for the other two pairs of wheels.

It may be asked how the angles are marked out on the side plates in the first place. I use nothing other than a large draughtsman's celluloid protractor. If care is taken, and the job done in a good light, it is possible to get quite close to the desired angles, certainly close enough for our purpose; but the advantage of the jig is that all three pairs of wheels will come out at the same angles, to quite close limits if the jig has been made with care.

The crankpins are straightforward turning jobs, so I don't think I need say anything about them, except that the driving crankpin must be pinned on the back of the wheel, using a pin half in the wheel and half in the crankpin. Incidentally, it also pays to pin or key the driving and coupled wheels on their axles; though this is not necessary on carrying wheels.

To be continued

“SWEET PEA”



A Freelance Narrow Gauge Design

by Jack Buckler

MY INTEREST IN steam locomotion dates back to childhood, but during the last 20 years it has focused on narrow gauge. It culminated in the restoration, together with a colleague of our own 2 ft. gauge Quarry Hunslet, of 1894 vintage, and the building of a 1/4 mile line at my home. So when it came to a design for a live steam model, narrow gauge was a foregone conclusion.

Apart from my own interest, I consider that narrow gauge prototypes have a lot to offer the model engineer. So many smaller locos were designed for quarry or contracting work, and could perhaps be described as “basic locomotives”. They were sturdy, strong, required minimum maintenance and above all were of simple straightforward design. Also, by using narrow gauge prototypes, the owner of the average 3½ in. lathe can build a very “beefy” loco indeed.

I have attempted to combine these qualities in *Sweet Pea*, a model of a 2 ft. gauge 0-4-0 contractor's loco. In style it is very reminiscent of the smaller Bagnall locos, although the frames and chimney are very “Hunslet”.

As an example of the simple approach, I considered separate steam chests a must. Cutting a set of accurate ports is sufficiently nerve-racking without the added trauma of doing the job at the bottom of a little cast iron box. The boiler is simplicity itself, being of the marine type. Before all you Standard Gauge types look down your collective noses, I can say that after some initial modifications to get the grate and fire door positions right it makes steam faster than the engine can use it. The saddle tank brings its own usual penalty — water too warm for an injector to handle, but a generous axle pump plus hand pump are well on top of the job.

Valve gear is Hackworth — an example of elegant simplicity — but like many such mechanisms, there is more to its working than meets the eye! The well-known drawback to this gear, i.e. the effect of vertical suspension travel on valve events has been virtually eliminated by using rubber block suspension on the driving axle — a leaf from Sir Arthur Heywood's book. The leading axle is on coil springs with plenty of travel, thus giving ample equalization.

The frames are very rigid, being of 4 in. x 3/16 in. plate with full depth buffer beams, and vertical and horizontal stretchers. The horns have separate cheeks of T-section carrying cast iron axle boxes. Faithful to some full size practice, my original model was correctly (and tediously) assembled using fitted bolts. For those not in the know, these are bolts (4 BA in this case) with a short length of thread and the rest of the body left plain, of an accurate diameter. These are made a drive fit in reamed holes, and serve the purpose of both bolt and dowel. The bolt heads, as in the prototype, are circular. I suspect that this was to ensure that the bolt was correctly fitted, otherwise the nut could not be tightened. All this is very well for the perfectionist or the masochist (there are over 100 such bolts in the frames) but 4 BA bolts in 9/64 in. holes give a completely adequate fixing for a rigid frame. Coupling and connecting rods are of circular cross section with marine type big ends. The centre dimensions of these can be adjusted on assembly to match the wheel centres — another job simplified.

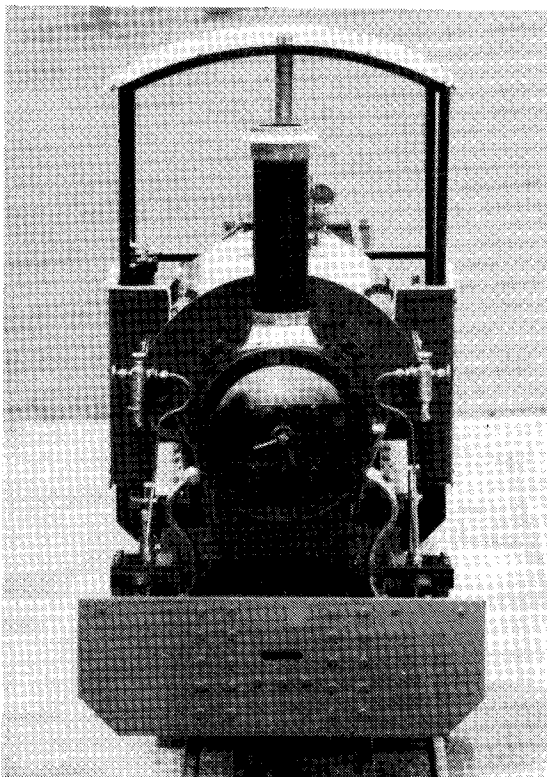
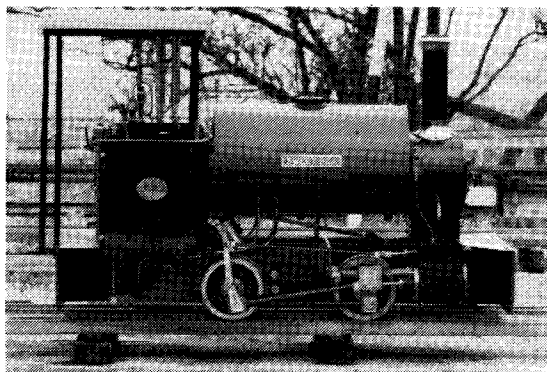
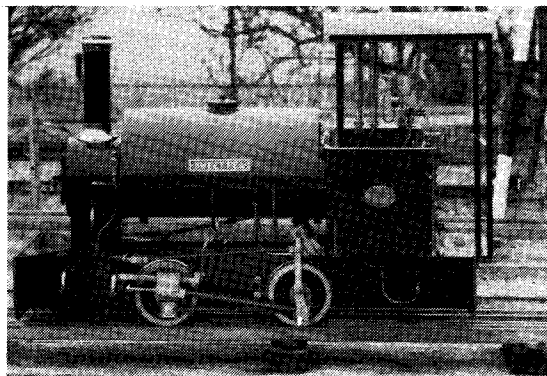
The marine boiler is easily constructed, all flanges are circular, so the blocks and the plates can be turned, whilst the only stays are six longitudinal. The boiler is domeless, the raised top of the circular firebox acting as steam space, and containing a slotted steam collector. The regulator is external, a common narrow gauge practice, and thus readily accessible for maintenance. Because of this type of boiler construction, with its circular inner firebox, the grate assembly is self-contained with its ashpan, firedoor plate, etc. The whole of this assembly can be readily removed for fire dumping and ashpan cleaning, not to mention the advantages of laying and lighting the fire before refitting to the boiler.

Displacement lubricators of scale size are fitted, and though tiny, they do work. At least, they start the run full of oil and end up full of water, so the oil has gone somewhere!

Perhaps due to some of the advantages I have mentioned, the popularity of narrow gauge seems to be on the increase among model engineers. One word of caution when selecting a scale. A design for 5 in. gauge based on a 2 ft. gauge prototype is to a scale of 2½ in. equals 1 ft., and is likely to be quite sizeable. As a rough guide, 3½ in. narrow gauge locos are of a similar size to the more usual 5 in. gauge, 5 in. narrow gauge similar to the average 7¼ in. and so on.

Sweet Pea has proved a good hauler and ready steamer, the expected speed penalty of small wheels has not materialised, to judge from the blurred motion as it hurries round the track. All in all I have found the design exercise fascinating and the construction relatively simple.

So all you model engineers, why not "narrow your outlook" and try narrow gauge!



“COUNTRYMAN’S STEAM”

Single-cylinder Agricultural T.E. in 2 in. scale

by John Haining

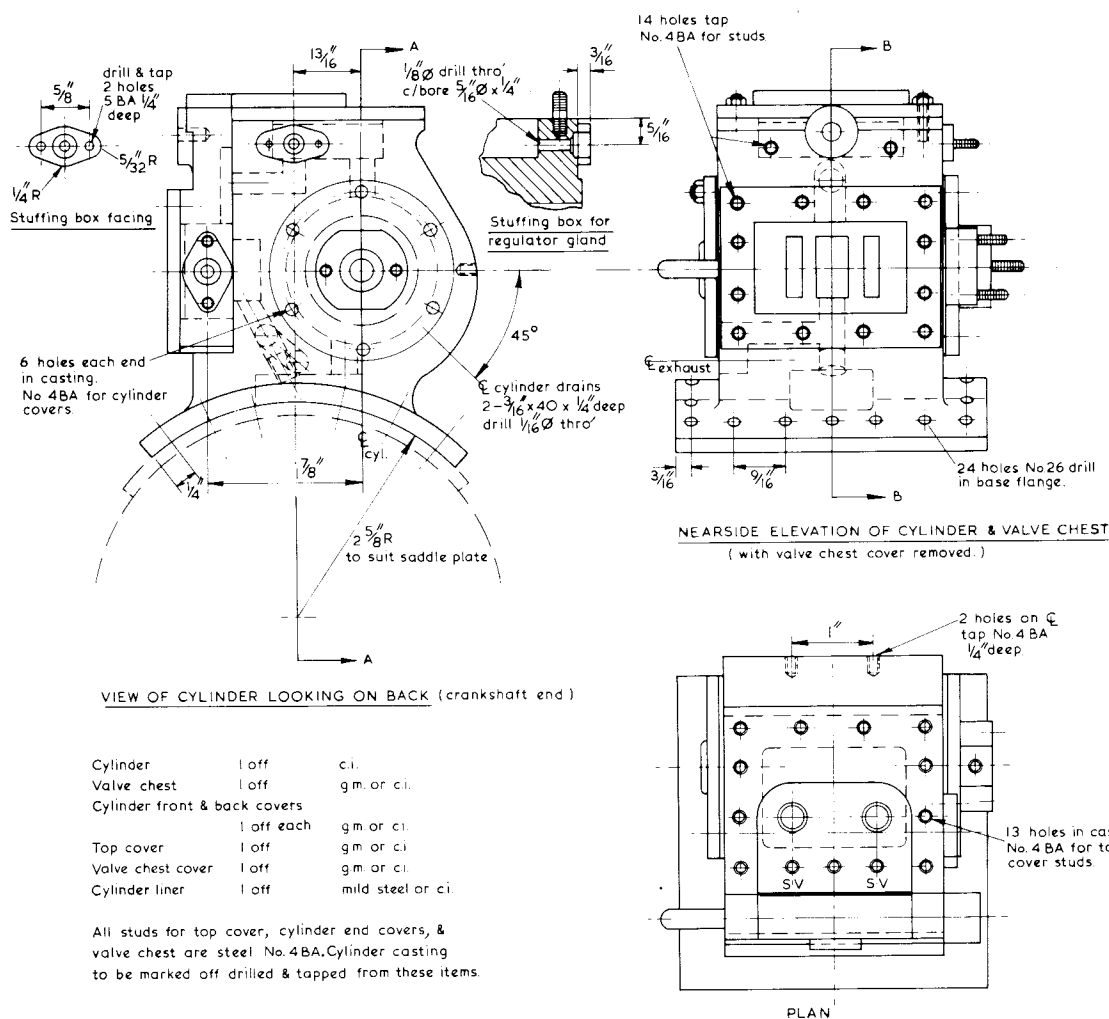
Part IV

From page 1412

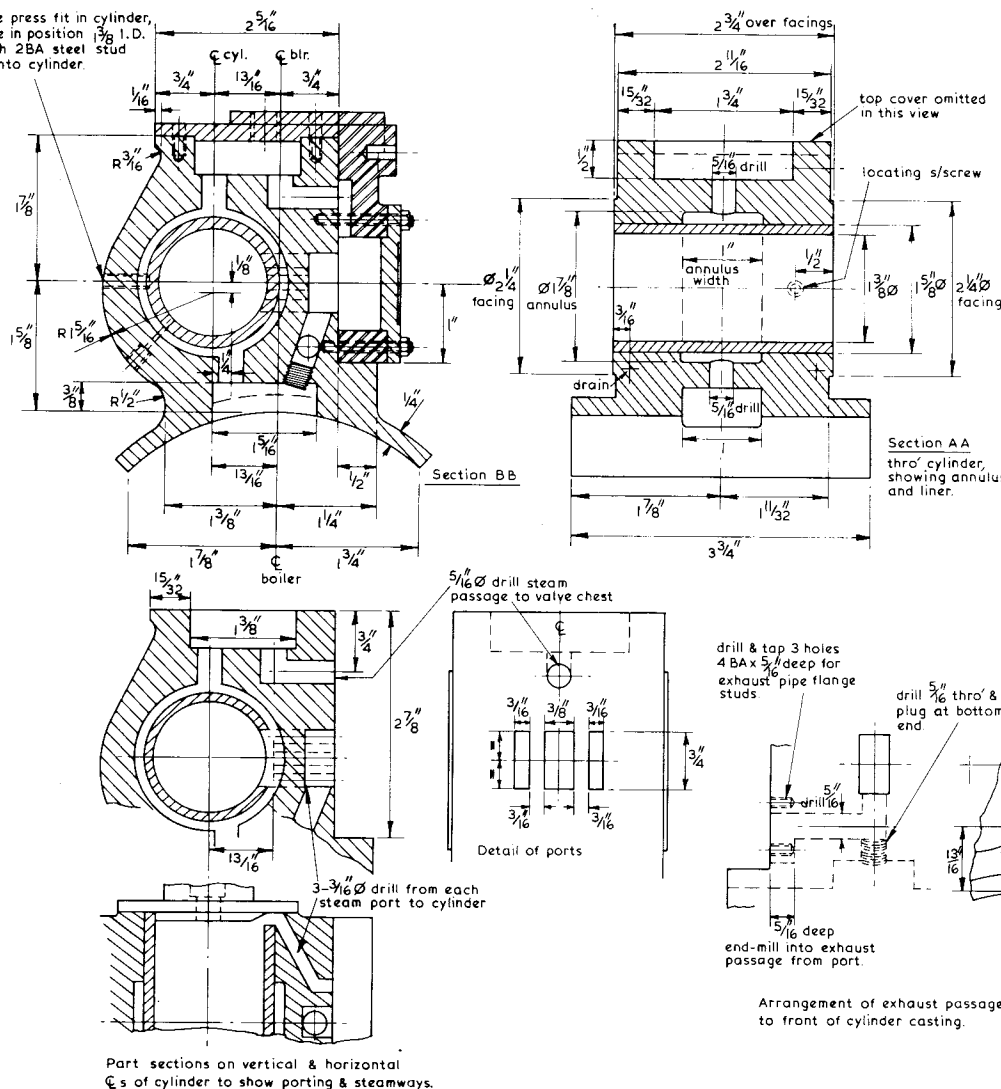
THE CYLINDER casting on the full-size engine was neat and well proportioned, rather more handsome than those fitted to many contemporary engines probably because the casting continued well up above the area of the cylinder bore to form a high rectangular steam cavity or dome surmounted by a tap cover which, when removed, gave direct access to the stop and governor valves. Many makers of the period still used a cylinder arrangement in

which the cylinder and valve chest were incorporated in one casting with a circular steam dome, and in fact the four-wheel drive engine built by the North Bridge Works was depicted in a contemporary illustration with this type of cylinder casting tapped by a single Salter spring-balance safety valve set in a rather ugly shallow domed casting.

The cylinder on the 6 n.h.p. engine, the prototype of the model, followed the usual practice in as much



liner to be press fit in cylinder,
finish bore in position $\frac{1}{32}$ I.D.
locate with 2BA steel stud
screwed into cylinder.



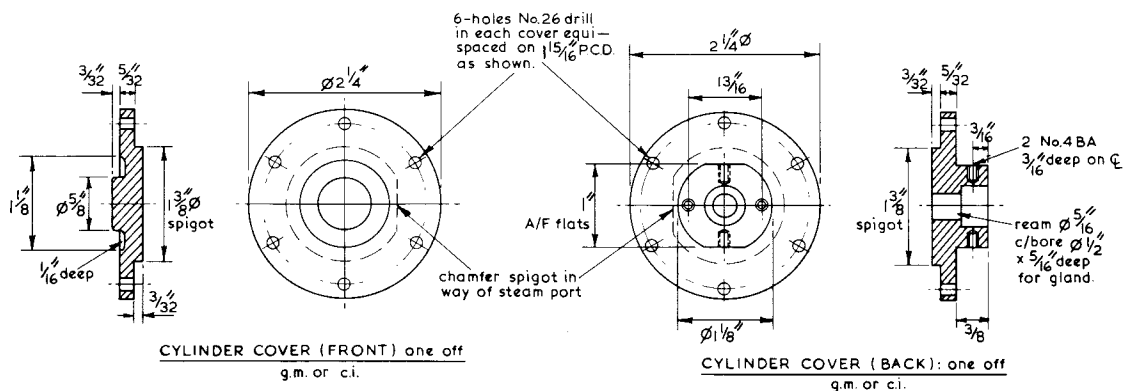
as the valve chest was an integral part of the casting with the valve spindle supported in an extended boss and gland instead of running through a valve spindle guide bracket mounted on the boiler top, at the chimney end, being supported in a short forward-extending housing, a layout followed on quite a number of early engines, and eliminating the need for a cast valve spindle bracket.

A more unusual feature was the use of a hardened cylinder liner which allowed steam to pass from the boiler up through the cylinder casting, past the liner and up into the top dome cavity, an arrangement which lends itself particularly well to

reproduction in small scale and does away with the job of drilling rising steamways up through the casting, and past the bore.

The top of the cylinder casting was finished off each side with a shallow lip and presented a flat surface to which was bolted a cast cover plate, thickened up to provide seatings for the two safety valves and a mounting for the governor and governor-valve operating arms and rods.

While keeping to the external appearance of the prototype it has obviously been necessary to make some concessions to scale inside the cylinder, particularly regarding the valve chest, which is a sepa-

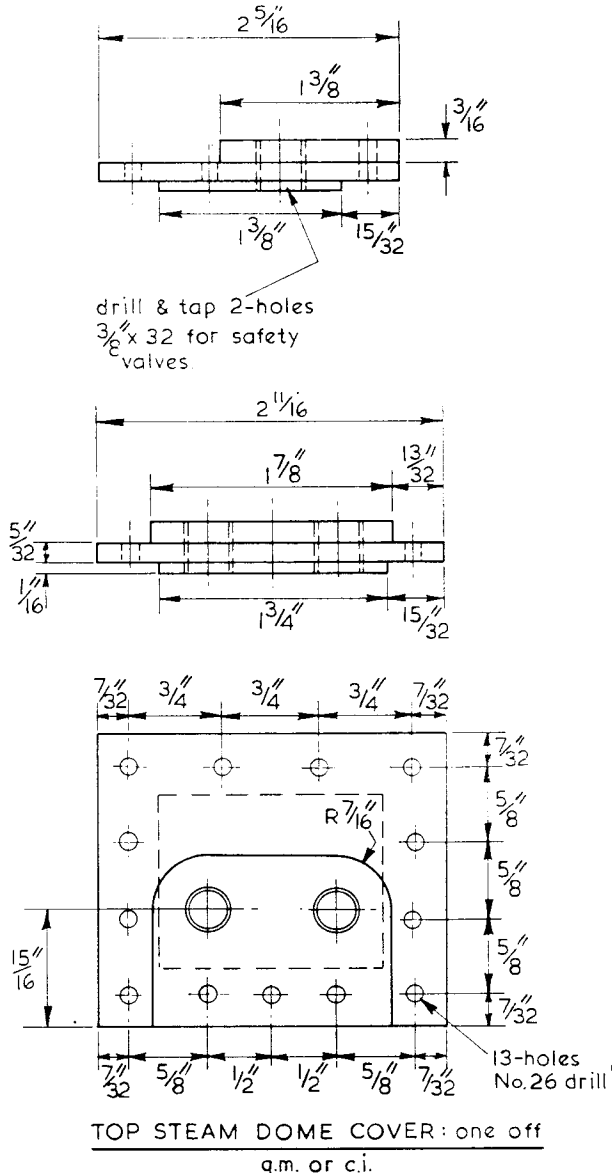


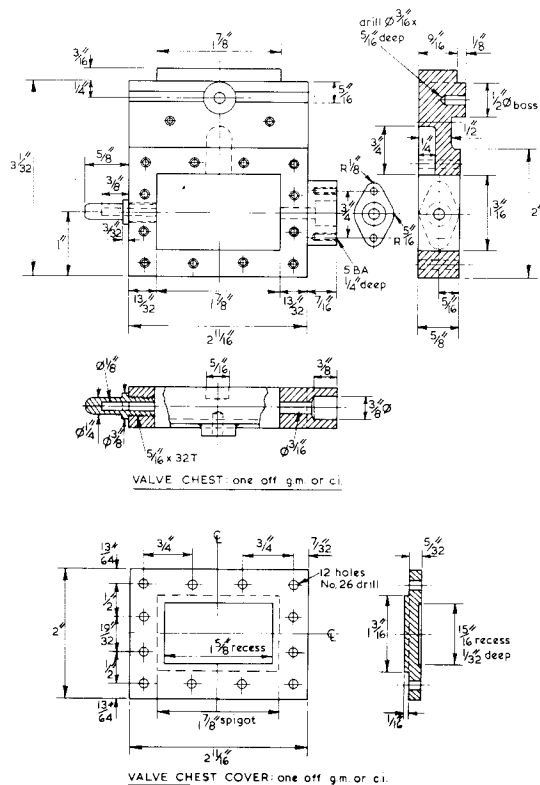
rate casting attached to the main body of the cylinder block in a manner which, hopefully, when assembled will appear as an integral part.

Looking first at the view on the back of the cylinder and valve chest (the crankshaft end), on my drawing, the top cover plate is shown bolted in position over the cylinder casting, with the small external lip clearly shown on the latter where the outer radius runs into the top on the right-hand side. Looking now at the valve chest in the same view, a matching lip equal in thickness to the cylinder lip just referred to, plus the thickness of the top cover plate is apparent on the outer edge of the top of the valve chest casting, with the governor mounting boss in the centre.

Because the valve chest is a separate body and must if possible not appear to be so, a shallow simulated joint line should be cut along this deep lip — a $1/32$ in. x $1/32$ in. sawcut will be enough to make this side match the true joint face on the opposite side, and in plan view the thickened-up part of the top cover with the safety-valve holes in it must match-up exactly with the same part cast on the top of the valve chest; in other words the top cover must look as though it is in fact one complete length as on the full size engine, and not one shorter cover matching up with a dummy short length over the valve chest. If care is taken that all mating faces are flush with each other all should be well. Sorry to appear to labour the point regarding the business of making both sides of the top lip and facing appear the same, but with a separate valve chest care has to be taken not to lose characteristic details like this.

The governor fits over the valve chest, with the governor drive stub-spindle sitting in the $3/16$ in. dia. blind hole in the centre of the dia. boss, and reluctantly I have had to leave some work on this assembly until later as the actual governor valve and operating rod and arms details are not available and will have to be worked out to suit two-inch scale. The governor bevel gear drive and pulley are drawn ready for making.





A glance at sections "A-A" and "B-B" will show the pretty straightforward method of getting live steam up to the dome cavity and then down to where we want it, the valve chest. Steam enters the annulus around the cylinder liner from the bottom cavity and thence to the valve chest via the drilled passage covered by the flat regulator valve meeting up with a milled recess in the back face of the valve chest. Twelve No. 4 BA studs serve both to attach the valve chest to the cylinder body and the coverplate to the valve chest, and the studs screwing into the two tapped holes running into the exhaust passage should be a tight fit and touched with a drop of Loctite before being screwed home. As the live steam passage extends up into the top part of the valve chest casting I have shown a couple of No. 4 BA studs just under the central boss (see the nearside elevation) to make sure this important face is kept steamtight. These are additional to the 12 already mentioned. Exhaust steam is taken from the exhaust port by 5/16 in. diameter, drilled, passages and because the blastpipe to the chimney base is on boiler centreline and it is not possible to maintain this line all the way from the port because of running into the bottom steam cavity, a 5/16 in.

drilled hole is run upwards from the bottom steam cavity straight into the exhaust port with another drilled passage running parallel to the cylinder bore from the front face of the cylinder casting to connect with it, a screwed plug sealing off the drilled hole running up from the lower steam cavity. (See Section "B-B").

The steam ports connect with each end of the cylinder via three 3/16 in. dia. drilled holes, and each end of the liner plus each cylinder cover spigot must be chamfered to allow steam free movement to and from these drilled steamways.

The annulus around the cylinder liner is shown as 1 7/8 in. dia. x 1 in. wide, these being minimal dimensions and with care can even be increased slightly if anyone is particularly adventurous — but do be careful not to break into either those drilled steam ways I've just mentioned — or the exhaust port which must NOT exceed 3/8 in. in depth.

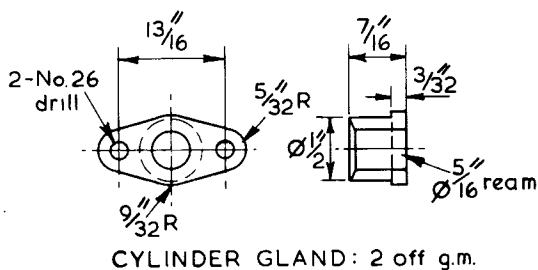
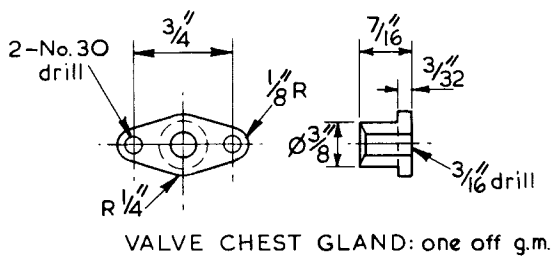
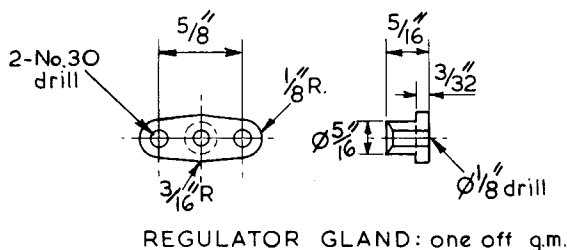
Years ago I fitted the gunmetal cylinder casting of an engine with a steel liner which caused some raised eyebrows and predictions of all sorts of trouble ranging from a cracked casting to steam leaking past the liner, none of which, luckily ever came to pass, so I have a mind to try a steel liner again, on this engine, observing the same precautions against rust as before. Cast iron is specified on the drawing as an alternative for those builders who don't like the idea of a steel sleeve press fitting into a cast-iron bore.

The first job to be done on the cylinder casting is to clean it up externally so that it can be mounted on an angle plate on the vertical slide for machining along the port face and the adjacent step in the casting at right angles to it, using these two faces as the datum for the subsequent marking-out of vertical and horizontal centrelines, the boring of the cylinder and annulus and machining of both end facings.

As an alternative to this more usually accepted sequence of operations, and given a casting which cleans up well and is reasonably square on all faces, a start can be made by first of all flycutting the 2 5/8 in. radius on the underside of the curved bottom flange and then steel pipe machined to the radius of the cylinder mounting pad on top of the boiler and sliced through exactly along the centreline to correspond with the boiler horizontal centreline, as shown in my sketch.

A flat plate, drilled for holding-down bolts, should be tack-welded inside the half-section of steel tube and cleaned up on the underside by grinding to match the boiler centreline. Both edges should be machined back to form parallel flat surfaces — and of course all machining on the baseplate or sides should be done after welding is completed.

If this method is used, all marking out and machining operations can be carried out with the



cylinder attached by two end-clamps and 4 dowels to the half-round fixture, which in turn is bolted to an angle plate on the vertical slide, it being only necessary to swing the whole fixture through 90 deg. to bore the cylinder, annulus, and both end facings and then end mill the port face and lower step, and the ports themselves. This method meets the basic requirement of ensuring a cylinder bore parallel to the boiler centreline and square with both end and port faces, without having to remove and remount (and re-check) the casting for the sequence of machining operations, and the same fixture can be used, if it is left a bit longer than the base flange plus clamping length each end, for machining the slide bar bracket in its correct relative position to the cylinder centreline; the steam chest can also be bored in situ for its gland and valve rod and even the top face of the cylinder casting will be certain to be parallel to the centreline. I first used this method a fair time ago when machining one of the Every gunmetal traction engine cylinder castings which was so accurately produced and clean that cleaning up and scraping was all that was necessary to ensure that the cylinder saddle bolted without rocking to the curved fixture — a lucky break for me as I did not have

facilities for flycutting a casting of this shape.

The steel tube used to make the curved fixture is a short length of heavy hydraulic steel tube 5 1/2 in. O.D. x 4 3/8 in. I.D.; machined down to 5 1/4 in. O.D. before slitting along below the centreline to produce one complete half. Unfortunately standard steel tube of the nearest size is 5 3/8 in. I.D. x 5 1/2 in. O.D. which of course is far too thin when reduced to 5 1/4 in. O.D.; and the next size down, 4 1/2 in. O.D. would need building-up to the correct radius by means of longitudinal strips of steel 3/8 in. thick.

Heavy duty hydraulic steel tube to British Standard 778 can sometimes be found in short lengths or offcuts and is well worth acquiring as it machines excellently and is highly suitable for such things as wheel tee rings, and in the smaller sizes is so accurate in the bore as to need very little cleaning up for use as cylinders or liners.

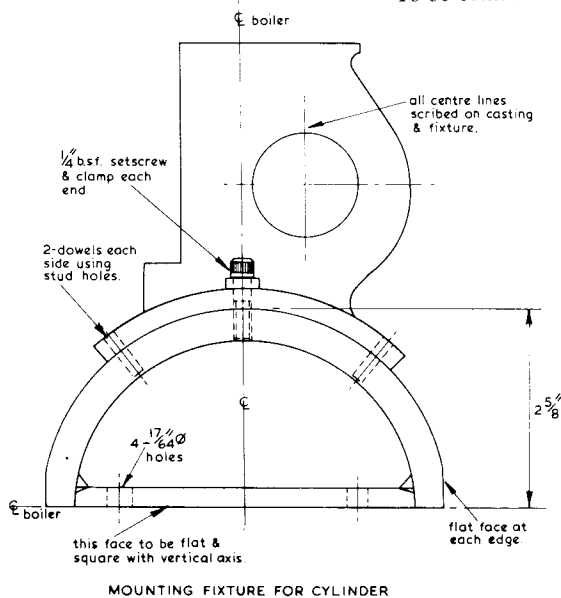
In Part 5 I hope to deal with the rest of the engine parts plus some advance information on the wheels for readers who like to plan ahead.

For those building the Ransomes Steerage Plough for which I was unable to obtain scale square headed bolts I have good news in the form of a letter from Model Components (Norwich), 30 Cromer Road, Stratton Strawless, Norwich NR10 5LU, which contained several excellent examples of the type of square headed bolts on these implements.

I have sent this firm a list of all the bolts used on the 2 in. scale model, and they have offered to supply readers, who should order direct from the address given.

I have no connection with the firm in any way other than being able to recommend their products.

To be continued



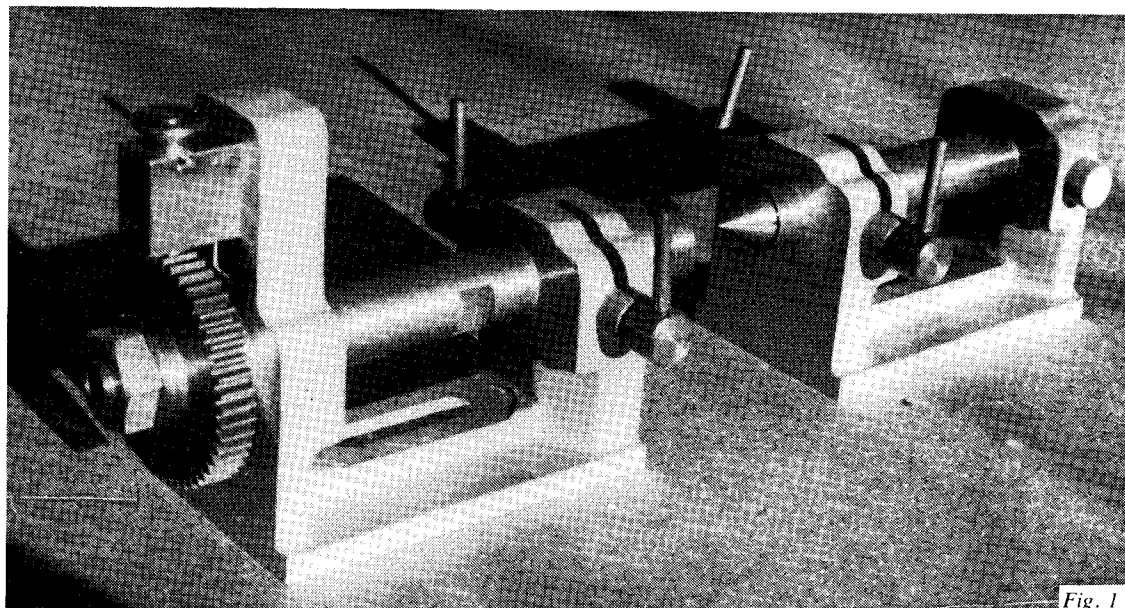


Fig. 1

A SIMPLE DIVIDING HEAD FOR THE LATHE AND MILLER

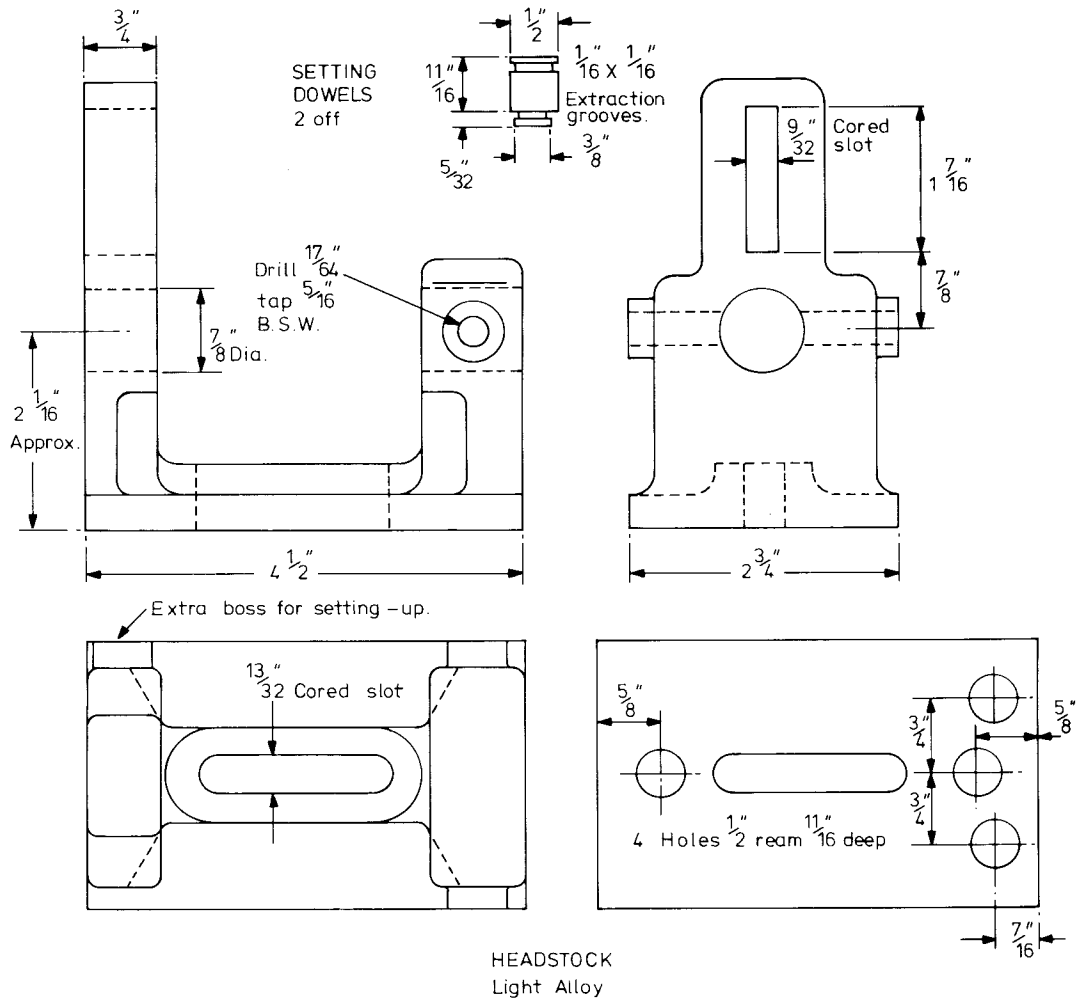
By Arnold Throp

THERE ARE SEVERAL illustrations of the use of a simple dividing head in my book "Vertical Milling in the Home Workshop" (Argus Books, Ltd. 1977) and readers of that may well ask where they can obtain a head of the type shown. The one I was using was made by a man now dead many years, and there has not since been a source of supply for a low-cost fixture of this type. To remedy this position I have made drawings and patterns, and hope that materials in the form of a part-machined kit of components will be marketed by one of the *Model Engineer* advertisers.

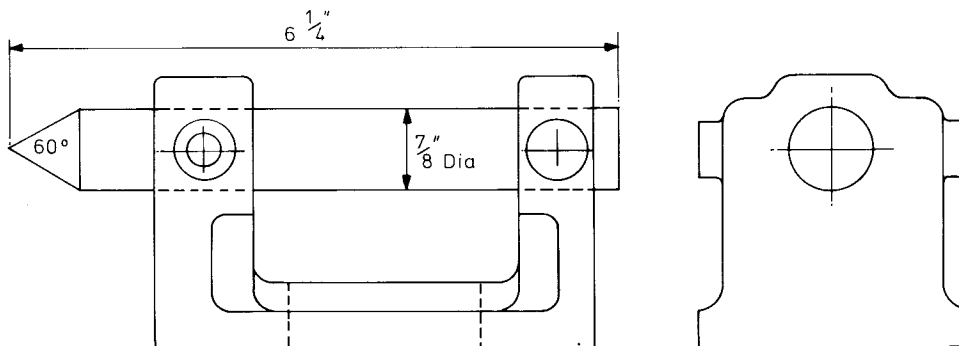
The original head did not have a tailstock to go with it, a rather unfortunate omission which is now remedied. The spindle was solid, so that neither Morse taper arbors nor Myford collets could be used until I had made a new spindle with No. 2 Morse taper and a nose like the Myford lathes. The new heads are shown complete in Fig. 1 and the headstock is shown in the arrangement drawing Fig. 2. It will be seen that the casting is similar to a small lathe headstock, but has an upward extension at one end to carry a plunger that engages with the teeth of a standard 20 d.p. lathe change wheel used as a division plate. The casting is in light alloy which is plenty durable enough for this purpose, and is easy to machine with home workshop

facilities. The spindle bearings are bored on the lathe, so they are bound to be at the same centre height, a great convenience when using the head on the lathe as will be shown later. The spindle is drilled through for a drawbar and bored No. 2 Morse taper (this should be done by the suppliers) and if screwed etc. like the Myford lathes, then the chucks and collets sold by Myfords can be used with it, a quite important facility. The block which carries the indexing plunger is guided in a slot cored in the casting, and held by a 1/4 in. stud and nut, so it can be adjusted up and down to suit a range of sizes of change wheels, selected according to the number of divisions required.

A 60 tooth change wheel is a good one, since it will provide division of 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60. But it cannot give 8, and a study of the kind of jobs that may have to be done in model engineering suggests that 8 is probably as important as 5 or multiples of 5. So a wheel with 48 teeth will give 2, 3, 4, 6, 8, 12, 16, 24 and 48. This is not included in the list of Myford standard gears, but it is hoped that the suppliers of the kit will include a ready-to-use wheel of 48 teeth as part of the set. If anyone needs a division with a factor of 5 it will be necessary to buy another wheel, and in the Myford range there are several that will serve.

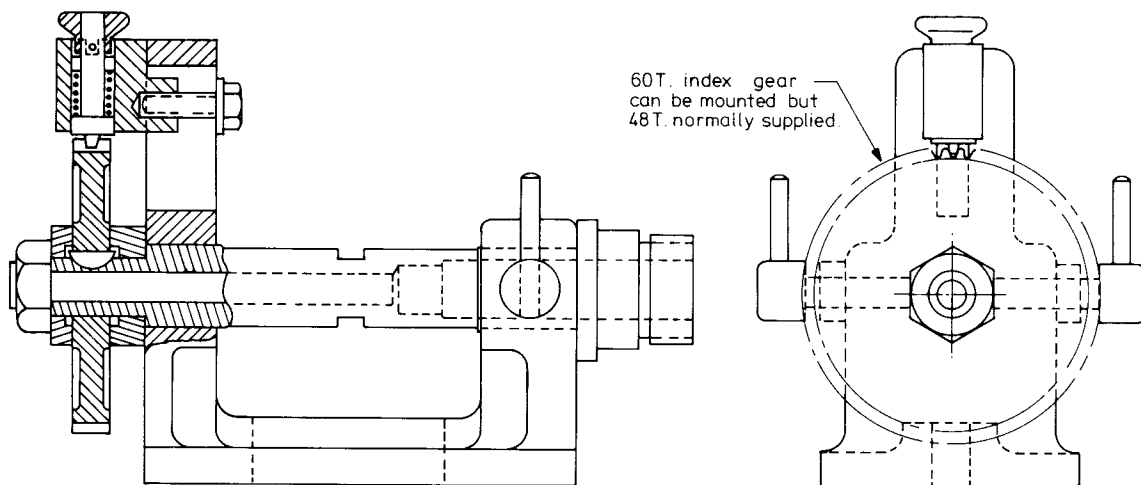


HEADSTOCK
Light Alloy



TAILSTOCK
Light Alloy

FIG. 3



GENERAL ARRANGEMENT

FIG. 2

The conical tipped plunger fits snugly into the space between two teeth, and is spring loaded down into position. When lifted it can be turned through 90 deg. and a cross pin holds it out of contact with the wheel so that free rotation is feasible. In the base of each casting a slot is cored for a holding down bolt. While a plain drilled hole would serve, as on my old head, sometimes it is needed a bit away from the place it is drilled, because of the position of table slots, so the cored slot is more convenient.

The inside edges of the verticals of the castings are chamfered away to make more spanner clearance, a feature noticeably absent from my original unit. Holes are provided for setting plugs to align the head with the table slots on the lathe boring table and milling machine table. These must be drilled and reamed before the spindle bearings are bored, so that the spindle axis will be in just the right relation to them. The plugs shown on the drawing are stepped from 1/2 in. to 3/8 inch. Placed one way in the holes they fit the boring table slots of the Myford lathes, and the other way they fit those examples of the Dore-Westbury miller which have a 1/2 in. slot along the centre of the table. For other millers with different table slots the plugs can be made to suit. Two screws are provided for locking the spindle when milling or drilling operations are in progress, to avoid torque coming on the pointed plunger in the toothed wheel.

The tailstock is very similar to the headstock, in fact all measurements are the same except that the upstanding bracket part for carrying the plunger is omitted. There is no need for a screw feed for the tailstock spindle. When it is used one simply pushes it up into engagement and locks it with the screws.

Instructions for machining

Taking the headstock and tailstock castings (detailed in Fig. 3) for a beginning, they should be inspected for lumps left on by the foundry, and any such should be filed down, so that when bolting down or clamping against an angle plate the contact will be on areas of reasonable extent and not on sharp pimples which might crush under pressure. On one side of these castings there are two bosses, one of which is a dummy provided only to facilitate setting for machining. When the work is finished it can be cut off or just left in place. These two bosses and the edge of the casting should be filed where necessary so that when placed on, say, a drilling machine table, there is no rocking. Only a few light strokes of the file will be needed, and not much more than the roughness of the metal should be removed. The casting will rest with a three-point support on these faces when the first operation of facing the bottom is being done.

To encourage those who as yet only have a lathe and not a milling machine, all the operations have been planned to be done on the lathe and all the photographs show the work on a Super 7. Those who do have a vertical miller may find some operations can be done more conveniently on it, so they can at their discretion depart from this script as it suits them. On the Super 7 there is enough boring table area and enough slide travel to permit mounting the castings so that with one exception the tool for flycutting will cover the entire length while traversing in one direction. Unhappily on the standard ML7 this is not possible. But this need not deter anybody from making the heads.

A boring head to carry a flycutter is practically essential.

To be continued

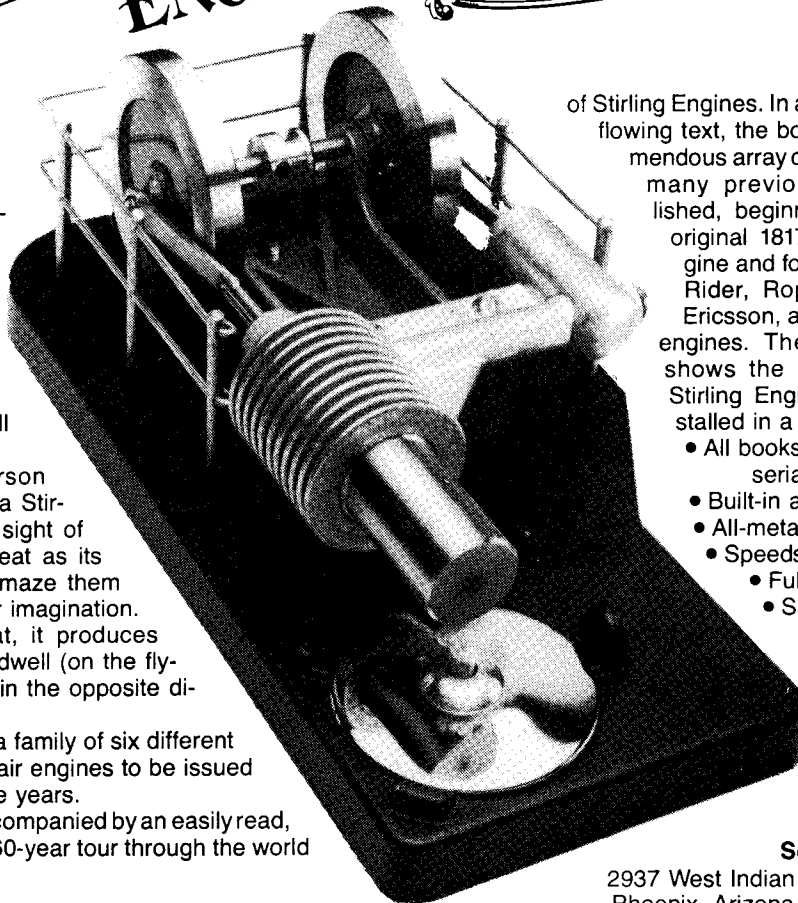
STIRLING ENGINE 1817-1977 CYCLE

Heat is the only fuel this fascinating engine requires. The heat may be from any source: burning newspapers, charcoal, alcohol or, when attached to a readily available parabolic mirror, it will run on solar energy!

The average person has never heard of a Stirling Engine, so the sight of one running, with heat as its only fuel, will first amaze them and then excite their imagination. Furnished with heat, it produces power. Change the dwell (on the fly-wheels) and it runs in the opposite direction.

This is the *first* in a family of six different desk-top model hot air engines to be issued during the next three years.

Each engine is accompanied by an easily read, 128-page book. A 160-year tour through the world



of Stirling Engines. In addition to the flowing text, the book has a tremendous array of illustrations, many previously unpublished, beginning with the original 1817 Stirling Engine and followed by the Rider, Roper, Heinrich, Ericsson, and other heat engines. The last photo shows the Ford-Phillips Stirling Engine neatly installed in a 1975 Torino!

- All books and engines serially numbered
- Built-in alcohol burner
- All-metal construction
- Speeds to 1000 rpm
- Fully assembled
- Safe and silent
- Fully tested
- 7½" x 4"

Solar Engines

2937 West Indian School Road
Phoenix, Arizona 85017 U.S.A.

Hobbyist's Power Source • For The Executive Desk • Experimenters & Collectors

Solar Engines

2937 West Indian School Road
Phoenix, Arizona 85017 U.S.A.

- ☐ Check ☐ Money Order
Charge my: ☐ Master Charge
☐ American Express
☐ BankAmericard ☐ VISA

INTERBANK NO. _____

CARD NO. _____

EXPIRATION DATE _____

Please send me:

☐ Engine and Book _____ @ \$31.00

☐ Book (separately) _____ @ \$ 4.00

(Domestic shipments are sent postpaid. Overseas orders for Engine and Book require an additional \$8.00 postage (airmail) and \$1.50 additional postage for Book only.)

TOTAL \$ _____

SIGNATURE _____

NAME (PLEASE PRINT) _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

ME3

We are pleased to advise that the first Sun Motor is now available

**The Sun Motor is a solar fired Stirling Cycle Engine
and it is the second engine produced by
SOLAR ENGINES of ARIZONA, U.S.A.**

Solar Engines products are available from:

I.T.E.C.,
631 Shikishima Cho, Nara, Japan.

Steam Age,
59 Cadogan Street, London S.W.3.

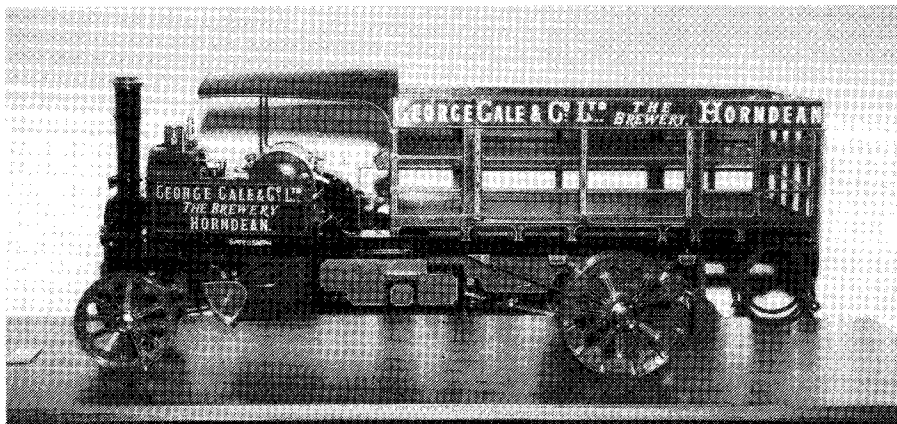
E. Seiler, AG.,
Hohengasse 31, Postfach 51, CH-3400, Burgdorf 2, Switzerland.

Kurt Diriwaechter,
Moosstrasse 16, 6000 Lucerne, Switzerland.

H.O. De Mexico, S.A.
Apartado Postal 7-1044, Mexico 7D.F.

Central Solare Italiano,
Via Di Acilia, 214 ACILIA, Rome.

**SOLAR ENGINES, 2937 West Indian School
Road, PHOENIX, ARIZONA 85017, U.S.A.**



1½ in. FODEN STEAM WAGON

by G. D. McLeman

A description of the building of a model of this popular overtype wagon

I WAS RECENTLY ASKED to build a 1½ in. scale model of a Foden steam wagon with all details as close to prototype as possible, whilst making it a working engine. The wagon chosen was that built in 1912 for George Gale & Co. Ltd., of Horndean, being a 4-tonner, frequently called a 5-tonner. As can be seen from the photographs it has traction engine type wheels, chain steering and brewer's bodywork.

Through the kindness of Mr. Bill Briggs, I was able to measure and photograph a full-size wagon of the period and together with drawings and spare parts lists, etc. supplied by Fodens I had enough information to build an accurate model.

Working from a works drawing of the boiler, I built this main item from copper, following the dimensions as closely as possible whilst allowing for safety. The complete boiler is riveted and silver-soldered. I pitched the rivets from the drawing, using 5/64 in. dia. snap head with around 300 being used. Where possible the rivet tails were silver-soldered to avoid leaks.

The barrel diameter is 3 in. and the length 3½ in. Fifty-three 1/8 in. dia. copper fire tubes are fitted, with two 5/32 in. solid stays. There are 93 firebox stays in gun-metal, the box being approximately 2¼ in. square by 3½ in. high. The grate is built up from 3/4 in. by 1/8 in. steel bars on edge, and the ashpan from sheet steel and angle.

Riveted onto the firebox end are 3/8 in. by 3/8 in. angles, to provide attachment of the mainframes and steering gear. Four mud lids are situated at the bottom of the firebox. A pair of brackets riveted to the boiler barrel give attachment to the front end of the mainframes.

A ring is riveted to the front end plate, the back-head on locomotives, and the firedoor is bolted to this, being 1 in. wide by 1½ in. deep. The front end plate is dished at the firedoor.

Lagging on the boiler is made from narrow strips of wood, as the prototype, and finally clad with .008 in. steel sheet, this being held in place with two brass bands 1/4 in. wide.

On test the boiler proved to steam successfully and stood the hydraulic and steam test well, apart from a couple of small leaks around the mud lids, these being quickly dealt with.

The smokebox is built up from thin sheet brass and two rings. The near ring is a spacer and the smokebox is riveted to the boiler through this ring, the front ring taking the hinges and crossbar for the smokebox door. There are various cut-outs on the smokebox to take the chimney, exhaust pipe and forecarriage saddle bracket, this detail being formed from 1/16 in. sheet and bolted by 10 BAs. The front pulljaws are bolted to this bracket.

Before leaving the smokebox I will mention the silencer which is a 1/2 in. dia. tube 1¾ in. long, one

end is blanked off, the other being connected with an oval flange to the exhaust pipe. The blast nozzle is a 1/4 in. dia. boss having a simple drilled hole 5/32 in. diameter.

The chimney is bent from sheet brass, formed around a wooden former with a riveted seam, a ring riveted to the bottom for bolting to the chimney base, and the familiar copper cap is spun from thin copper in two parts. The base is built up from brass and riveted to the smokebox with 1/16 in. rivets.

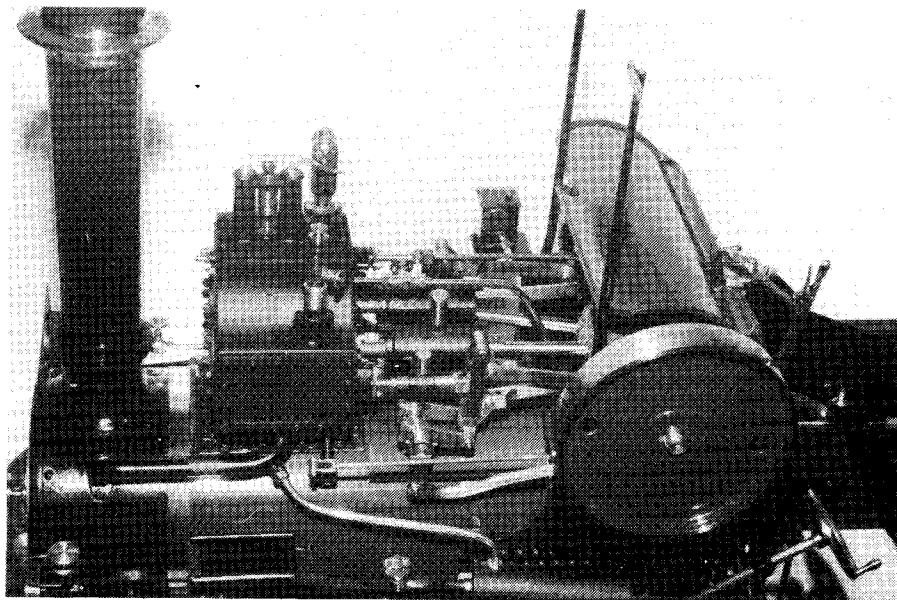
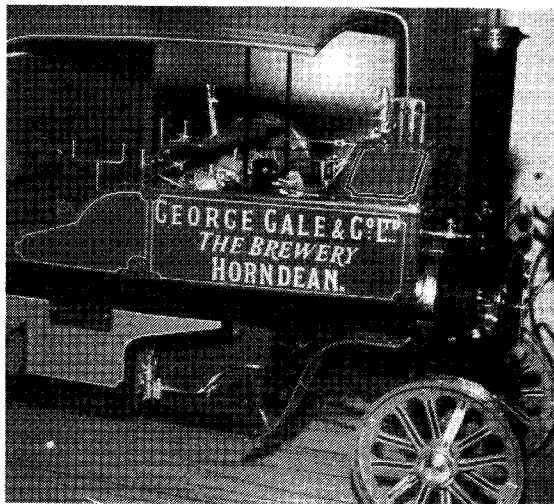
I turned the door from brass with a baffle riveted onto it with six 3/64 in. rivets. The hinge is formed from brass, and the crossbar is 1/8 in. thick steel. The clamping handle and wheel are of polished brass. The usual range of boiler fittings are used, a single water gauge, pressure gauge, injector, water lifter, boiler filler plug, and test cock.

The turret valves control the steam to water lifter, pressure gauge and injector. Steam is taken from the rear of the cylinder block. A water heater is fitted, this being a thin-walled copper tube 1/8 in. dia., coiled inside a 5/8 in. dia. tube. In action, the water flows inside the copper tube, and hot exhaust gases flow around the coil within the outer tube. This is fitted between the mechanical feed pump and boiler check valve which is on the boiler barrel, near side.

The exhaust is taken from the exhaust pipe and a drain is fitted at the rear of the heater. This complete unit is bolted to the mainframes under the flywheel.

The feed pump is fitted on the offside and is driven from an eccentric on the second motion shaft.

The pump only works when the wagon is moving. Some engines had this pump driven from the crankshaft on the near side, through a friction



Three views of the front end of the Foden.

block. I built the pump from various pieces of brass, the inlet and outlet valves use 1/8 in. dia. balls and the plunger is 3/16 in. diameter.

The cylinder block is built up from brass details preshaped and silver-soldered together. The block is then cleaned up and machined. As the various passageways are built into the block, the main machining is the bores and steam and dome chests. The bores are high pressure 1/2 in. dia. and low pressure 7/8 in. dia. These were bored out on the faceplate. The faces of the chests were hand scraped to get them perfectly flat. Quite a long job, but it had to be right, so I simply tickled away until I was satisfied.

I fitted 'O' rings to the pistons, but used graphited packing on the piston and valve glands. These are oval and have 12 BA studs. 10 BA studs are used on the various covers. The block being studded to the boiler barrel with 8 BA stainless studs.

The engine can be run in three separate ways, using the steam control lever and a 3-way cock. It can be run on the high-pressure cylinder alone. On compound, by supplying live steam to the high-pressure cylinder the exhaust being directed via the 3-way cock to the low-pressure cylinder and finally by supplying live steam to both high-pressure and low-pressure cylinders. This is called 'Double High' and gives extra power for hills, etc. but takes a great deal of steam and can only be used for short periods.

Slide valves are fitted, operated by Stephenson's valve gear. The two crankshaft shows are set at 90 deg. to each other. The valve links eccentric rods, etc. are machined from the solid and finished by drawfiling. The eccentrics are 3/4 in. dia. steel and the straps are phosphor bronze. The connecting rods are turned and milled from the solid and have separate brasses with correct cotters, locking bolts and oilers. The trunk guides are built up from brass and are machined after silver-soldering.

I had to build these items on a jig to get the centres of the piston and valve spindles correct. Any error here could only lead to friction and loss of power.

The reversing lever is pivoted on a bracket on the boiler and the quadrant is bolted to the spectacle plate, there are three positions in forward gear and one in reversing and mid gear.

The 3-way cock control knob is fitted below the reversing lever and the steam control lever at the top of the spectacle plate.

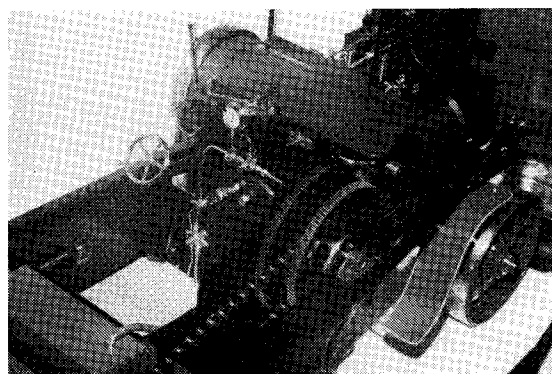
Twin safety valves and a displacement lubricator are fitted on the dome cover, and oilers are fitted to the trunk guides. The gear change lever operates in a box on the offside of the spectacle plate being locked by a pin. There are two speeds, having the pinions sliding on four splines on the crankshaft end, and the large gears rotating on a stub shaft,

bolted to the hornplate and supported by a bracket on the mainframes. Both the stub shaft and pinion change speed control have oilers.

On the near side of the crankshaft is fitted the flywheel. This is 3 in. dia. steel and has a width of 1/2 in. being keyed to the crankshaft with a 1/16 in. wide key.

The crankshaft is supported by the two main bearings, split and held in two housings bolted to the hornplates by 8 BA bolts. The caps have 8 BA studs and a 12 BA adjusting bolt. The balance weights are held by straps around the webs and the nuts are inside counterbores in the weights and flushed over with solder.

The front wheels are 4 1/8 in. dia. and 3/4 in. wide, having 12 spokes 1/4 in. by 1/16 in. and 5/8 in. wide at rims. The rims are steel plated and the hubs are relieved between the spokes. Brass hub caps are fitted, held by three 12 BA studs. The spokes are riveted using 1/16 in. rivets. The front axle is milled from the solid, and has the ends turned to 9/32 in. dia., the wheels being retained by collars, pinned with 1/16 in. dia. pins. The axle pivots on a square-headed pin, 3/16 in. dia., 1/4 in. square



A "cab" view.

head, and the front spring has 11 leaves, 3/8 in. wide.

I built up the front swivel jaw from brass, and this has a turned pin top and bottom, the top pin going through the front forecarriage bracket and split pinned, the bottom pin attaching to the stay rod from the front end of the firebox.

As mentioned earlier the steering is by chains and these are shackled to the front axle. I had to make this chain, as commercial chain of the correct links was too thin. The shackles are bent, as is the chain, from 1/16 in. dia. steel, and the correct springs are fitted to the chain adjusters.

The steering roller rotates on bearing brackets which are bolted to angles on the front of the firebox. I cut the steering worm from steel on the lathe, and the steering worm wheel was cut on the mill using a home-made cutter of silver-steel. The steering wheel has a rim 1/8 in. dia., five-spoked,

and 1½ in. dia.; the steering rod is also 1/8 in. dia.

The steering worm and wheel have a cover on the outside only and this is riveted to the near side mudguard.

Two 10 BA bolts attach the mudguards at the front to the mainframes, and at the back they are supported by brackets attached to the steering brackets. The mudguards are made of steel and have half-round beading on the edges.

Before leaving the front of the model I will mention the motion and cylinder covers. These are made from thin sheet steel, the side covers being strengthened by steel uprights which are riveted to the covers and these in turn are bolted to the mainframes. There is a 1/8 in. angle riveted along the top to strengthen them further. The side covers are 2¾ in. high and have a 1/8 in. half round brass strip along the top edge.

The cylinder covers are screwed to a curved length of 3/16 in. by 3/16 in. angle, the ends being bolted to the side covers. A cover of 1/8 in. thick wood at the front has a cut-out to allow adjustment of the tail rod gland of the steam control valve or regulator.

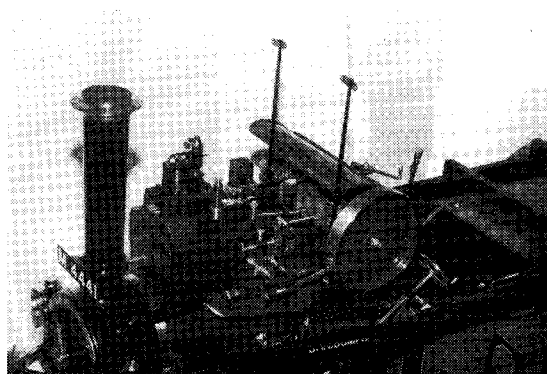
Coming on to the mainframes of the model, these are 3/4 in. by 3/8 in. channel section 1/16 in. thick, and are cranked inwards at the front to bolt onto brackets on the boiler barrel. Along the rear of the wagon they are 6 in. apart and their total length is 29 in.

The driver's compartment is built up from sheet steel and angle, the whole unit being riveted together using 1/16 in. and 3/64 in. snap heads. There is a coal space at the rear and a wooden platform for the driver's benefit. On either side of this unit there is a sandbox with a hinged lid. The near side only has a footstep. Also on this unit are the covers for the chain drive to the rear wheels.

The brake controls are a footbrake to operate the flywheel brake, a horizontal handle by the driver's seat to the band brake on the rear axle, and a vertical handle working the wooden blocks on the rear wheel rims.

As no commercial roller chain was near enough to scale for me, I had to build this myself, and this is 5/16 in. pitch and has 108 links. The driving sprocket is fitted between the two second motion gears, and has 12 teeth whilst the large driven sprocket has 32 teeth and is part of the differential which is working, the levels being housed in an oil bath.

The rear axle is 9/16 in. dia. and has split bearings, with an oil pipe at the rear for lubrication and the springs are bolted onto these. The springs have 14 leaves 1/16 in. thick and their movement is controlled by brackets bolted to the mainframes. Oilers are fitted here. The axle bearings have torsion bars pinned to them, the other end being fixed to brackets on the mainframes.



Another close-up of the motion.

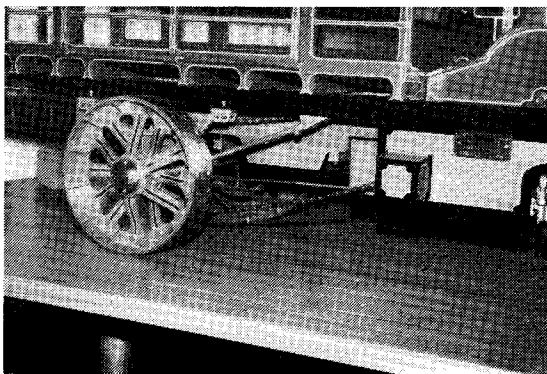
The nearside rear wheel is fixed to the axle, whilst the offside is fitted to a sleeve; this is fixed to the differential and the differential lock is on this wheel.

The rear wheels are 5¼ in. dia. by 1¼ in. wide on the rims, which are steel plated. The rims are reinforced with webs, and the spokes are 7/16 in. wide, 1/16 in. thick, widening to 13/16 in. on the rims. Three 5/64 in. snap head rivets secure them to the rim. As with the front wheels the hubs are cut away either side of the spokes. The brass hub caps again are secured by 12 BA studs and nuts, this time four off. An oil pipe is fitted to the offside hub only.

Suspended from the mainframes at the rear is the water tank, and this was built up from thin brass sheet, riveted with brass angles inside. The whole lot being soldered. A water gauge is fitted at the rear with a filler at the front on the inspection hatch on the nearside and the delivery is taken from a well at the bottom. The tank is held in place with six long studs, three each side fixed into wooden bearers at the top and through wooden bearers slung across the tank at the bottom.

Going back to the mainframes, there is a cross member at the rear and this has the rear pulljaws bolted to it, this member being bolted to the frames and a pair of stiffeners from frames to cross-member. There are wooden blocks fitted into the

The rear wheel and chain drive.



rear of the frames at the side, and onto the rear side is bolted the bracket for stowing the water hose. The brass strainer was quite a job, as it was in the form of a hollow ball with holes, and ribbed, the ball diameter being 7/16 in.

Being a brewer's wagon the amount of woodwork was considerable and took quite a long time to make. I used ramin as this has a good straight grain and no knots.

There are eight cross members 5/8 in. by 7/16 in. and onto these are bolted the floorboards, 1 in. by 1/4 in., with the side frames fixed to the floorboards and crossmembers. The sideframes are built up from various sizes of stripwood 7/16 in. by 3/16 in., 5/16 in. by 3/16 in. and 3/16 in. by 1/8 in. I used the correct joints and glued with .050 in. dia. bamboo dowels, the resulting assemblies being quite strong.

At each side there is a drop-down hinged door, and the complete rear also drops. The steel hinges were bent up from 1/4 in. wide material and bolted to the doors. The long hinge bolts being 3/32 in. diameter. There are nameplate boards, bolted to the top, these being 1 1/8 in. by 1/8 in. wood.

One of the longest jobs was the chamfering of the various pieces of wood, and this was achieved with a home-made cutter of silver-steel, run at high speed.

The hinged side doors and rear door or gate are locked by a pin and a chain exactly as used on a lot of modern lorries.

The wooden cab was a nice exercise in wood, being built from miniature tongued and grooved boarding. Again I used a cutter made from silver-steel to machine the boards. The back of the cab has 22 boards with stiffeners across these, the top two being grooved to take the sliding hatch. There is a small toolbox fixed here on the offside. The roof of the cab was also made from the tongued and grooved boarding with curved crossmembers, the whole lot being held together with glue and bamboo dowels. The roof has stiffeners and rainstrip fitted and a hinged hatch.

The back of the cab is bolted to the woodframing and the front is supported by two steel uprights bolted to the hornplates.

A motion cover is hinged between the two cab supports and this is built up from thin sheet steel and half-round beading.

After the model was test run and adjusted to get the various controls set correctly it was stripped down for painting. I use cellulose paint and a small paint spray gun.

All the metalwork was degreased using cellulose thinners, the steelwork was rustproofed and the brass to be painted was sprayed with etch primer. These are available from a well-known advertiser in *Model Engineer*.

The woodwork was trimmed and the various non-painted parts were taped over. Using thin

coats of paint the colour was built up rubbing down in between coats with very fine Wet and Dry.

When the paint was completely hard the lining was then started. I use Humbrol enamels for this as any mistakes can be wiped off with enamel thinners without affecting the cellulose. For applying the lining I use a draughtsman's pen and thinned down enamel paint. The end of the pen should be well rounded off and highly polished. I use templates made from a thin plastic. The lettering was hand painted using various templates and Sellotape.

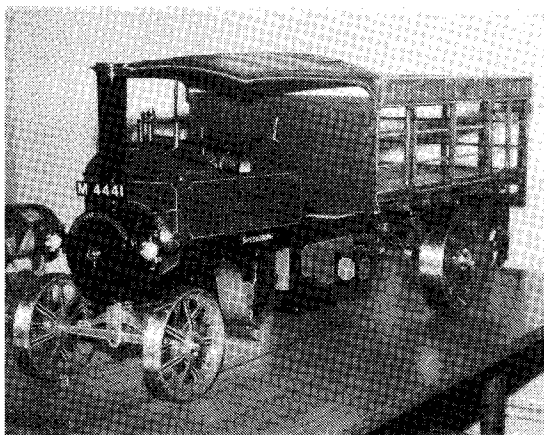
Quite a colourful wagon this one, below the mainframes it is painted red lined out in yellow with various edgings and panels of black. Above the frames the colour is dark green. This is again lined in yellow. The smokebox and chimney are gloss black and the boiler firebox and backhead, etc., in dull black. The steering gear and chains in gloss black and inside the motion cover and flywheel red, as also are the crankshaft webs and balance weights.

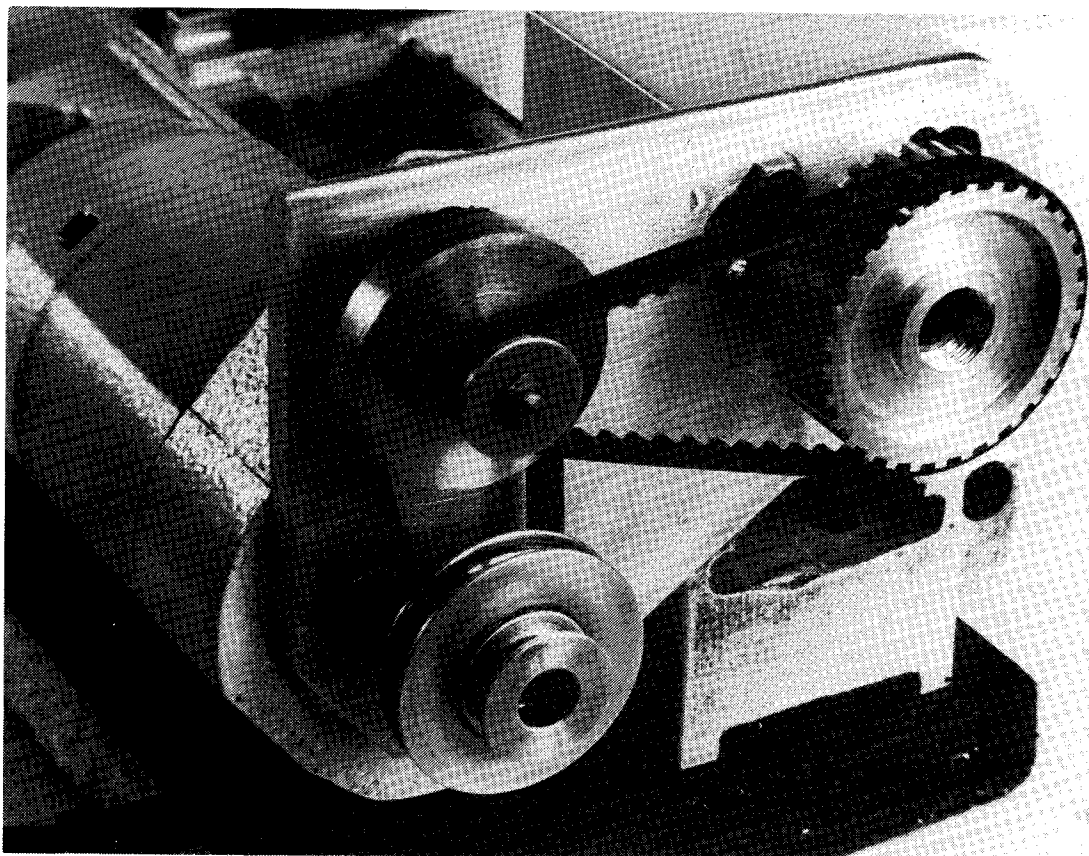
The various polished brass details are wheel hubcaps, various oilers and lubricators, boiler fittings, smokebox hand wheel and engraved plates. There are two legend plates on the engine. The familiar curved one on the smokebox, and a rectangular plate on the driver's compartment offside. The copper chimney cap is of course polished! I use a lacquer called 'Ercalone' to protect the polished details; this is easy to use and is very tough. The lettering is in gold with the lettering on the rear woodwork shadowed in red. The cab roof and platform are matt black.

This has proved to be a very interesting model to build, as on top of the usual engineering one has the woodwork to contend with and the finished engine is very attractive to look at.

In closing I would like to thank Ken Woodham for his help in the final details, Fodens for supplying me with information and Bill Briggs for allowing me to measure up his wagon.

Another view of the wagon.





IMPROVED DRIVE FOR THE UNIMAT 3

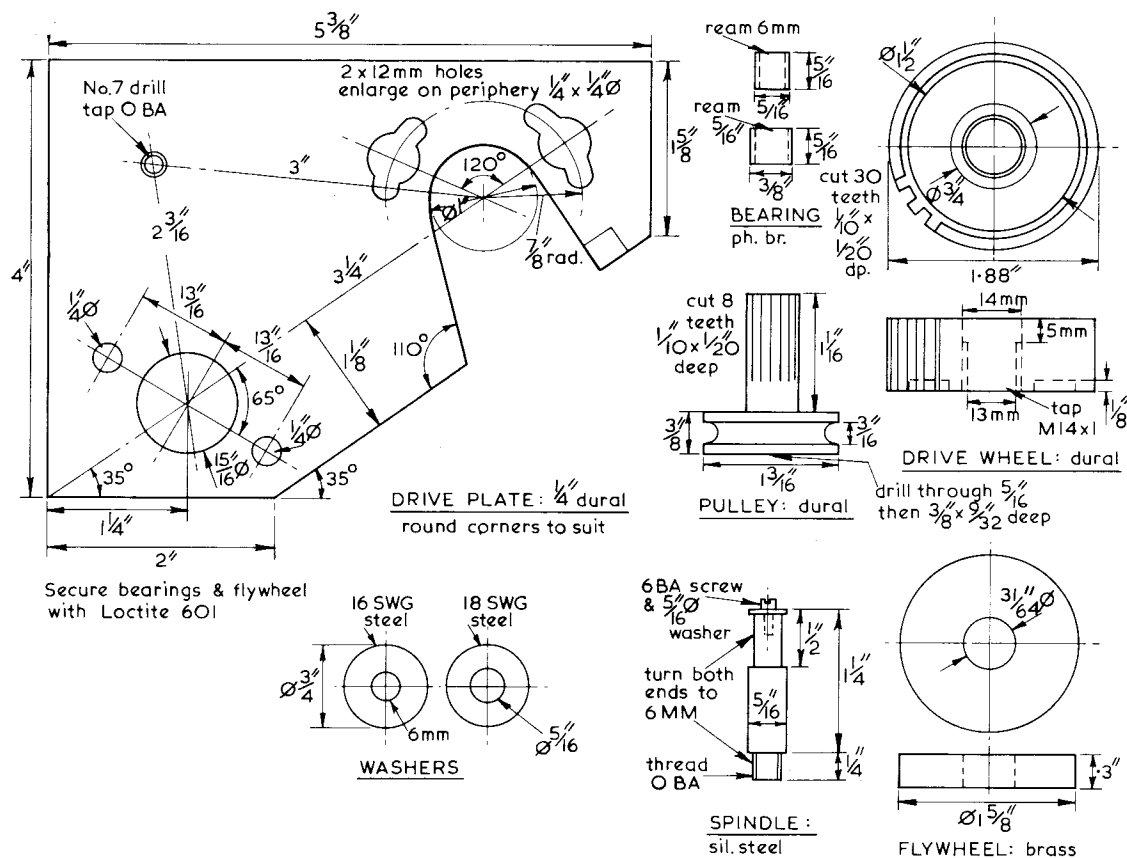
by Rex L. Tingey

THE BIG LATHE in the machine workshop can be driven by a large, heavy-duty, three-phase electric motor providing unstoppable power through belts and a gear system to the main spindle. With the small precision lathe the power drive is a matter of compromise. The motor has to be quite small yet still provide enough power, and so the brushless induction motor, as used on the large machines, is abandoned for the smaller brush motor which runs at a high speed off load, but provides more power on load, although at a reduced running speed.

The ability of the brush motor to sort out its own power/speed ratio gives the operator of the precision lathe less requirement for various motor to spindle speed ratio changes, particularly as with this type of motor a simple electronic speed control can be fitted, usually a silicon controlled rectifier device, which can vary the alternating voltage

without a significant loss of power. Then the provision of a belt changed ratio gives a higher speed for operations such as grinding, and a lower speed where greater power is required such as large diameter turning. The problem on the Unimat is that such changes of ratio for greater power places an excessive load on the single, round-section rubber, final drive belt causing it to break.

The rubber belt drive of the Unimat 3 is an improvement over that of the SL model, and yet in both the modes AC1 and BC1, which are the major useful modes for turning, milling and drilling, the belt snaps with surprising ease under a sudden load, such as can easily occur when turning alloy or drilling phosphor bronze. Drive belts are not cheap or always readily obtainable. A simple answer is to use a Hoover drive belt, 3½ in. OD, which is over-size in section and more flexible than the Unimat



one, but it stretches and easily flies off, the guard case cannot be closed with it fitted, and the lubricants cause the belt to slightly melt to cover surfaces and hands with black, sticky rubber.

The real answer is to convert to a nylon toothed belt drive in a similar manner to that which I described in a previous article on the Unimat SL. With the Unimat 3 the drive components are mounted on a flat plate which, in turn, is mounted onto the headstock by two bolt heads holding against slotted holes. The motor is mounted on to the plate, all the plate itself carries is the intermediate drive component, so all that need be made is the plate with a new intermediate drive component, this time for a toothed belt drive, and a new toothed gear for the main spindle in place of the pulley, as fitted.

In use the new plate can permanently take the place of the old and still give drives AC1 and AC2, with the main spindle pulley back in place, toothed wheel removed, leaving the new AB belt in place. With the toothed belt and gear the BC1 and BC2 become a single position giving 890 r.p.m. with no load, and on switch position I this becomes 530 r.p.m. If a variable electronic speed control is fitted, with the switch in position II and the control in

the controlled position, speeds from 460 r.p.m. down to 1 r.p.m. with excellent power, are obtainable. In fact with the toothed belt fitted there will be few times when it will be necessary to revert to the original system; and the toothed belts, in use, last for months. When the teeth become worn after many hours of use a sudden jam or dig-in may cause the smaller toothed wheel to shear part of the toothed surface free from the pitch cords, but this has not happened to me, with the Unimat 3, yet.

The components are easy to make and assemble, with guidance from my previous articles on gear cutting and the improved drive making. The only snag with this machine is that the drive spindle in the vertical mode has an $M12 \times 1$ thread, with its own smaller centre in the pulley, so that if the improved drive is required for milling and drilling then a separate toothed drive gear wheel has to be made for the smaller thread diameter as well as the $M14 \times 1$ for the main drive spindle.

An alteration to my design drawings is to make the plate from $\frac{3}{16}$ in. BMS flatstock instead of from $\frac{1}{4}$ in. thick alloy. To match, turn and thread the bottom of the intermediate drive spindle only $\frac{3}{16}$ in., leaving the extra $\frac{1}{16}$ in. on the spindle itself, and fit a thicker washer on the bottom of the

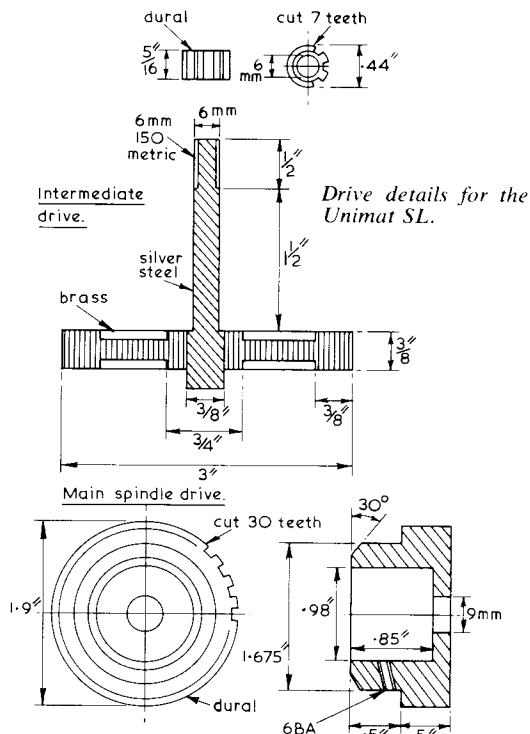
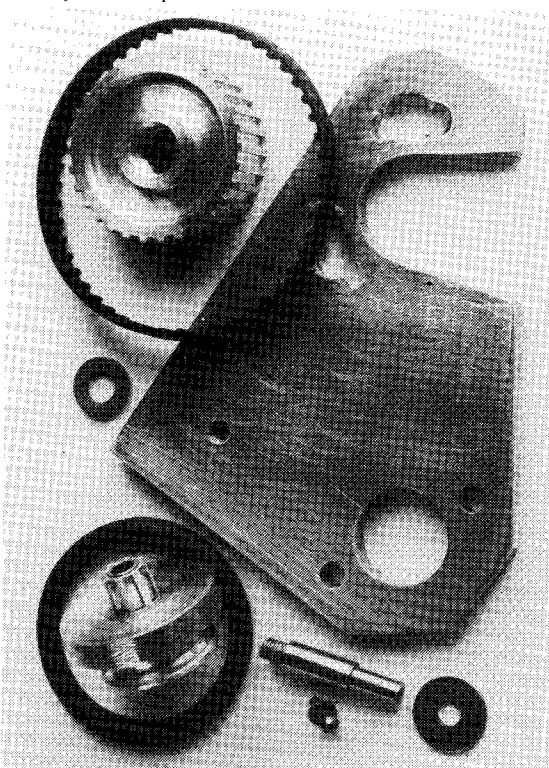
spindle to keep the levels right. The steel plate would be stronger, easier to fit on the screw heads, and less likely to tear under these same heads. It would require a little more effort and time in the making.

Main Spindle Wheel

The spindle gear wheel is turned from 2 in. diameter duralumin stock, first cutting then finishing both ends in the three-jaw chuck, jaws reversed, drill a 1/4 in. hole through and bring up the tailstock with the live centre. Turn out the recess, 1/8 in. deep, the sole purpose of which is to provide something for the chuck to grip while tooth cutting, etc. Hold the recess and turn the outside down to size, drill through 13 mm and the first 5 mm to 14 mm. Set up the indexing attachment with the 30 tooth plate in place and, using the home-made cutter described previously, cut the 1/10 in. slots at one tooth intervals around the wheel carefully using the cross-slide wheel division setting and the carriage setting to cut to the correct depth and to avoid chopping bits from the chuck face.

Fit up the threading attachment and turn at a low speed, with the 1 mm leader in place, to make the M14 x 1 internal thread. Dismantle and screw the wheel onto the nose of the main spindle to carefully turn down the teeth until the belt fits perfectly.

Parts for the improved drive.



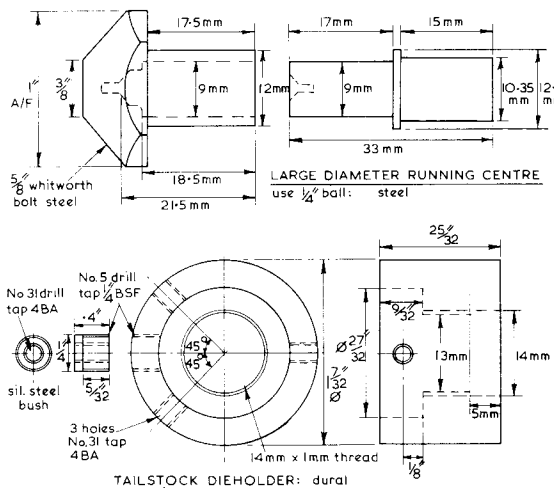
The belt used is designated 100 x LO31 and has 50 teeth 1/20 in. high and 1/10 in. long with 50 same size spaces between. It is .31 in. wide, and can be obtained from model shops as a spare for a radio-controlled stock car, or from Mardave R/C Racing, Rookery Lane, Groby, Leics. The 100 refers to the size of the pitch line — 10 in., and the L means a light duty belt.

The Drive Plate

Mark and cut out the plate in outline first, before carefully marking out, with just the scribe in soft alloy, or with marking-out blue first on the steel. The first line to mark is the line between the centres of the two big circles, parallel to the angled side, as the other measurements are derived from this line. Mark the other two lines of the triangle which position the two circles and the hole for the intermediate spindle. When all is marked centre punch and drill out, finally cutting out the main spindle cutaway and filing the peripheral extensions to the 12 mm hole using a 1/4 in. round file. Tap the spindle hole with an 0 BA first taper in the drill chuck in the vertical mode, turning the pulley by hand to get a perfectly straight thread at 90 deg. to the plate, held flat on the cross-slide.

Intermediate Drive

For the intermediate drive first make the pulley by cutting the correct length of 1 1/4 in. diameter duralumin, drilling through 6 mm in the lathe, hold-



ing in the three-jaw chuck and centring in the tailstock with the running centre to make the pulley groove with a round tool in the toolpost. Reverse and hold by the pulley to turn the rest down to 1/64 in. under 1/2 in. Turn the end down clean, reverse and hold by the thinner part to turn the bottom end down and to drill 3/8 in. for the phosphor bronze bearing.

Reverse and hold by the pulley, with the indexing attachment in place fitted with a suitable plate to cut the eight teeth required (24, 36 or 40). Cut the teeth with the cutter made with slightly angled sides to allow for the compression of the belt teeth around the small diameter.

The size of this pulley to motor pulley gives an intermediate drive ratio of 1.5:1 approximately, and the toothed drive gear gives a final drive ratio of 3.75:1. The pulley needs a smaller belt than that provided: the small belt for the Unimat SL is ideal, otherwise the Hoover small drive belt is easily obtainable and cheap (O.D. 2 3/8 in.).

Make the two bearings from 5/16 in. and 3/8 in. diameter phosphor bronze rod passed through the main spindle, drilled and parted off with a newly-sharpened parting-off tool. Loctite the bearings in place with 601. Cut a slice of brass for the flywheel, face both ends, drill through to fit a mandrel and turn the outside down true. Replace in the three-jaw chuck to drill through 31/64 in. before Loctiting onto the pulley assembly.

Turn the spindle from 5/16 in. dia. silver steel taking the top 1/2 in. down to 6 mm and then drilling the end and tapping 6 BA. Reverse to turn 1/4 in. of the other end down to 6 mm, then tap this 0 BA in the lathe. Grease the spindle with a motor grease before inserting into the pulley assembly to check for fit. Drill out two washers to size, as shown, cut the 6 BA cheesehead screw to size and, fitting the spindle into the plate, tightened well, assemble the

parts of the intermediate drive. Fit the motor and belt to drive the pulley for ten minutes, to run it in.

Assembly

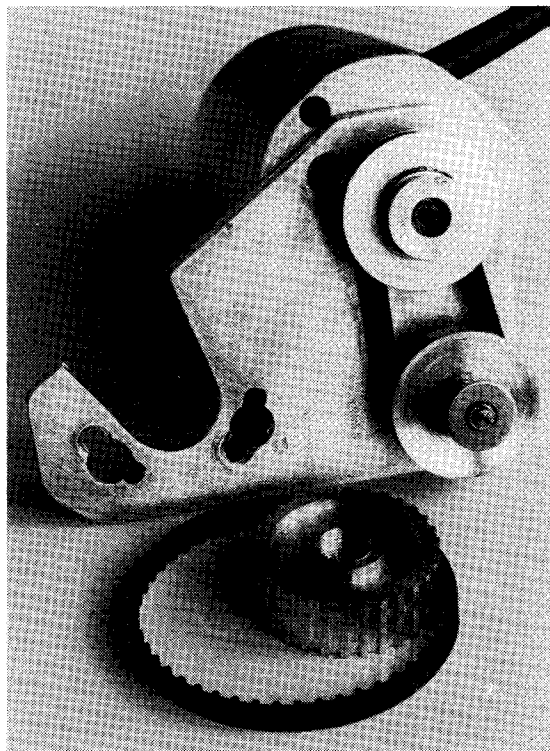
Fit the plate to the headstock, loosening the screws a little more than usual, screw the drive gear wheel onto the main spindle and lift the motor to fit the toothed belt. Lower the motor and push down to apply a little tension to the belt before tightening the two hexagon head bolts. The belt should feel tight but springy under the thumb; any inherent looseness at this stage will need adjustment by filing out the securing bolt positions to allow more movement to apply tension. If the drawing has been followed and the plate made correctly this will not be necessary.

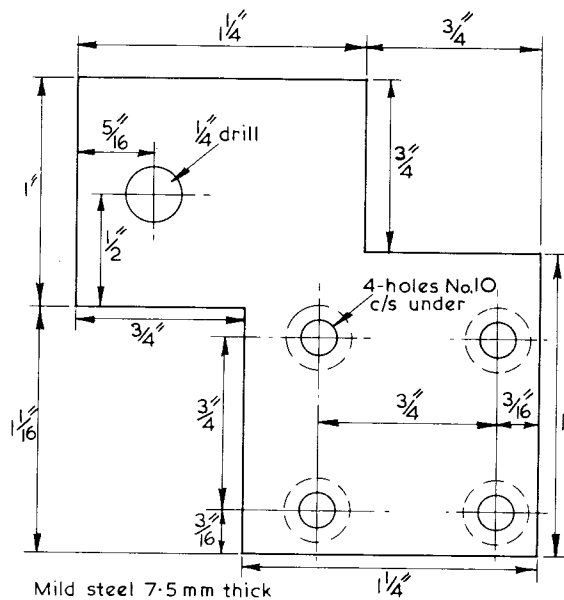
Running

A test that can now be carried out is to fit a piece of 3/4 in. alloy into the chuck, a knife tool into the toolpost, switch on the improved drive and bring the tool hard into the workpiece where it will cut away metal as never before.

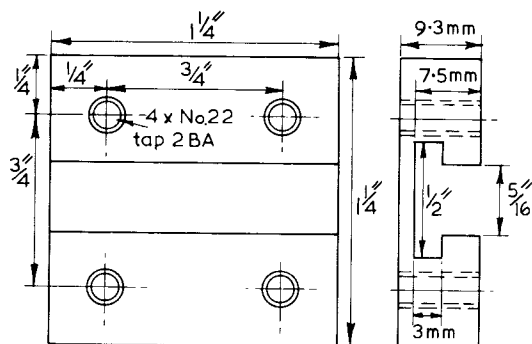
In use it will be found that there is little need to revert to other modes with the lathe, using the toothed drive for all purposes. The speeds for various materials and diameters being varied either by the loads imposed on the motor, either by depth of

Partly assembled drive plate.

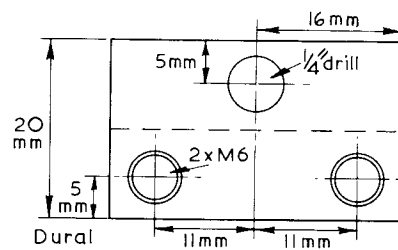




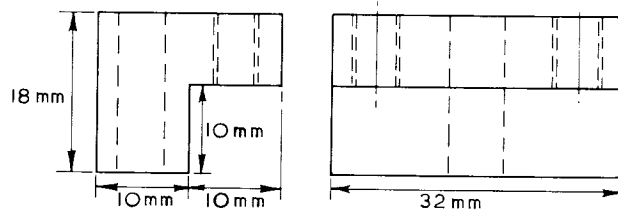
EXTENDED TOOLPOST



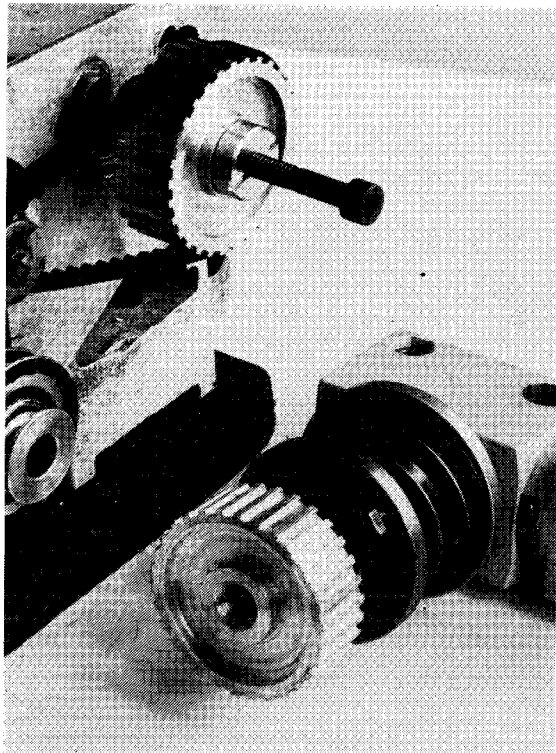
Dural



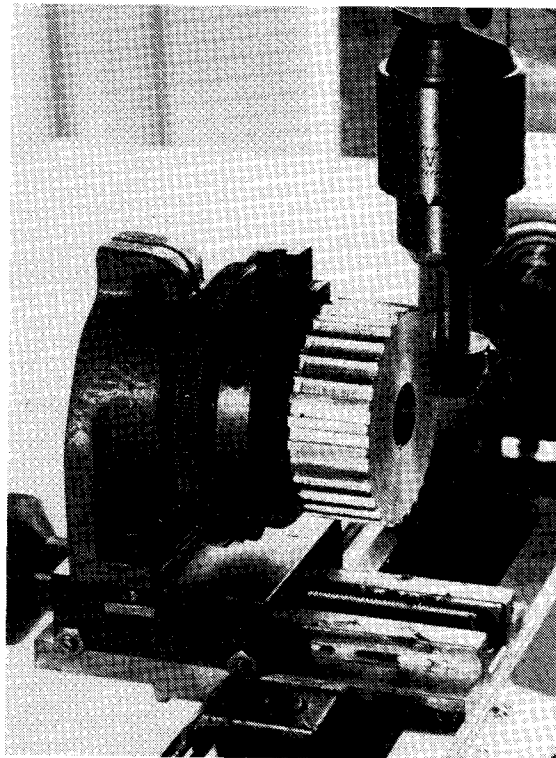
Dural

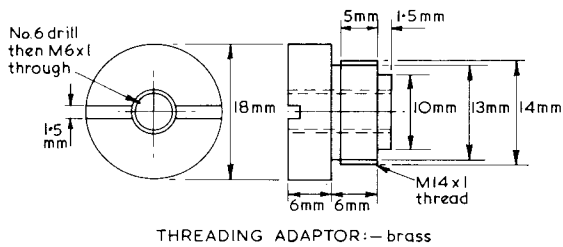


Two wheels, smaller centre for vertical drive.



Cutting drive wheel teeth.

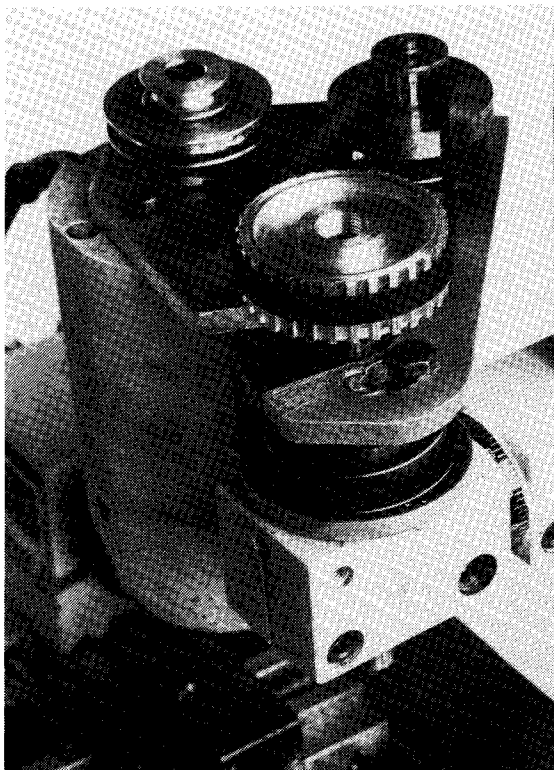




cut of speed of feed, or when circumstances dictate, the use of electronic control.

Practice will soon determine the depth of cut or speed of feed which is most suitable for a particular material and diameter. The positive drive is most pleasant to use, and it eliminates, to a great extent, the chatter patterns which occur with fine cuts, and the tool dig-in stoppages with less positive drives. A problem now can be overheating of the work-piece due to better cutting and lack of efficient cooling, so lubrication becomes very necessary, using the laboratory wash-bottle to provide this, as I have recommended previously. In particular, with soft alloys, chips of metal welding onto the tool tip can be a problem.

Drive plate and wheel in vertical mode.



To re-adapt the drive back to normal all that is necessary is to remove the toothed gear from the main spindle and fit the old pulley and the position between this and the motor pulley are again available for the rubber belt. In the vertical mode, if the toothed gear with an M12 x 1 centre has not been fitted then the rubber belt drive can be used as usual.

The flywheel is belt-driven by the motor in all circumstances as this gives a better torque to the drive, and it also, with the toothed belt system, prevents sudden shocks and stops from being transmitted fully back to the motor.

If, as I have previously suggested, a foot switch is used to control the motor there is no necessity to make the circular cut-outs on the drive plate for swivelling the motor when used in the vertical mode since there is no need for the switch to be available. The foot switch is a safety precaution, anyway, as it leaves both hands free in an emergency, and it was never a good idea to reach over a turning chuck to find a switch! If it is felt that the circular cut-outs are required then mill them before drilling the motor hole to size, moving the plate around a temporary axis for milling. Otherwise it is a simple matter to just make two more holes for the motor for this position. When fitting the motor to plain holes the two swivel plates can be temporarily discarded.

Tapping and Threading

When using the threading attachment with the Unimat there is no need to change the plate back and to fit the special pulley. Make the brass adaptor to screw into the end of the toothed drive wheel, which will take the leaders, and make a more positive drive at the available slower speeds and a better and easier task.

For tapping and threading with standard taps and dies a tailstock die-holder helps to thread true, and use the taps in the drill chuck for true tapping in the lathe, horizontal or vertical, both operations being eased by using the toothed drive wheel as a knob.

Tubal Cain's Boiler

The 5 in. test boiler which we published recently by Tubal Cain had a slight omission: the working pressure. This should have been added to the drawing and is 80 to 100 p.s.i. I would like to thank those readers who wrote to us about this, we have also been asked to quote a capacity. Well, Tubal Cain tells me that he hasn't seen any reference to capacity on a boiler drawing since 1937 and feels that it would not be right to quote figures which could not be maintained. However, he does say about 10 to 12 lb. of steam per hour should be available depending on how the boiler is fired but if you push it too hard the degree of superheat will fall.

JEYNES' CORNER

The hydraulic ram in perspective

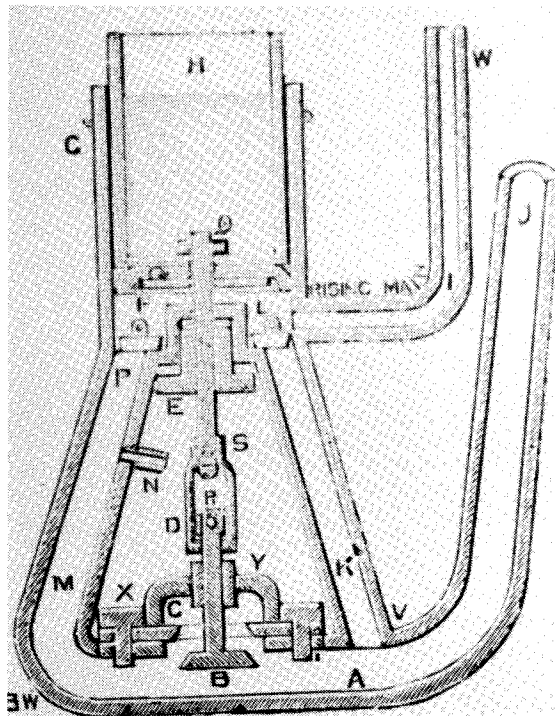
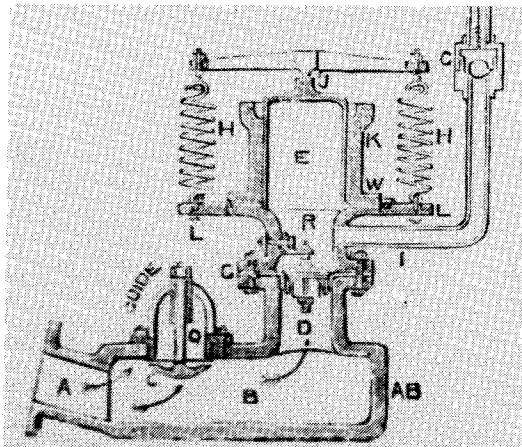
Part III

From page 1423

Another idea to increase the efficiency of hydraulic rams was tried out by the famous firm of Hydraulic Engineers John Blake of Accrington (who still manufacture hydraulic rams) the original John Blake having been one of the pioneers in this field from practically the start). This was in the form of a spring-loaded piston working in a cylinder open to the atmosphere. When the water flowing into the body of the ram acquires sufficient velocity to close the beat valve, besides forcing water into the air chamber, it also forces the piston up into the cylinder, thus assisting to form the partial vacuum and making the closing of the beat valve more certain.

Blakes also produced a type of ram without the conventional air chamber, a plunger or piston being substituted in its stead, which was held down in its cylinder by two springs and a crossbar. When the ram started, as the water rose from the body of the ram, it raised the piston in its cylinder causing it to rise up with every stroke of the beat valve. This in effect was just an ordinary accumulator action, the springs forcing water up the delivery pipe, each time the incoming stream from the ram body stopped. This ram was more noisy than the conventional design, and it was difficult to keep the cylinder and piston tight against the high pressure within it. P. J. Davies had several patents which I would have thought would cover this principle, but possibly they had some agreement between them, although I think the Davies patent was for a dead weight accumulator.

Blake design to avoid air chamber. The piston rises and falls with each ram beat.



Davies self-starting and stopping ram.

Davies was a London manufacturer of hydraulic rams, and he invented the self-starting and self-stopping ram which also employed the dead weight accumulator principle I just mentioned. This type of ram was started and stopped by the rise and fall in pressure in the rising main. It was rather complicated in design and construction, and I believe more temperamental than the ordinary ram, which is saying something. Davies discontinued the ram production side of his business in 1876.

Hayward Tyler were another London firm manufacturing rams: these were fitted with a cover plate which could be removed to examine and service the delivery valve. They also made a ram having two beat valves, which I do not think was much advantage, as if one failed, the ram stopped, which was just the same result with the single beat valve.

Those who have had the opportunity to study different types and makes of rams will have noticed that some makers fitted the beat or waste valve on the trunk side of the ram body, and some fitted it on the other side, incidentally, Blakes made rams of both designs. Also it is noticeable that many of the different makes of rams required the delivery pipe to be dismantled before access could be obtained to the delivery valve. One notable exception was the ram made by McDougals of Galt Ontario; here the body of the ram had two side passages into the air chamber base, beside the disc type and spring loaded delivery valve, thus the delivery could be

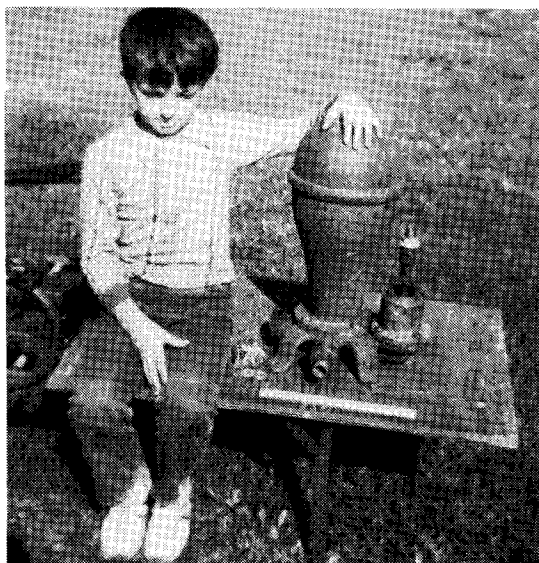
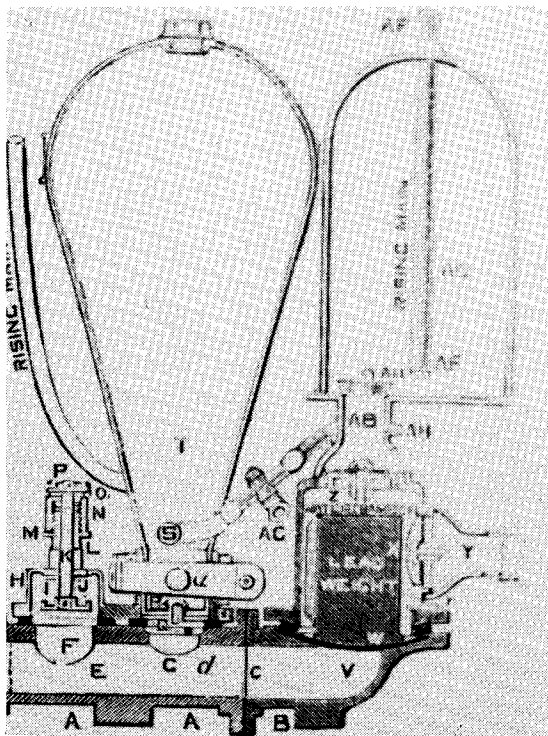
taken from either side of the ram whichever was most convenient, a cap being provided to blank off the unused outlet.

Fyfe and Co. built hydraulic rams, and their product was instantly recognisable by its tall thin tapering air chamber which was a direct contrast to some of the chubby ones. Their standard ram had a flanged bolting face at each end of the body, one for the drive trunk, the other a flat cover plate; where their rams were required to pump dual supplies, i.e. one clean water, and one from the water working the ram, this cover was removed, and a diaphragm pump body fitted, either with or without an air chamber, according to the requirements.

Another type of ram which could be either single or dual purpose was the "injection ram". In some cases these rams only made one stroke, the action then being carried on by syphoning. This required that the suction lift was not more than about 15 or 16 feet, the ram, instead of having the usual waste valve, had an internal flap valve with adjustable balancing to suit conditions, and the water passing through the valve was taken through a pipe into which the suction pipe was branched.

Here is a case of the water being cut off by the closing of the valve when the water receding from it caused a vacuum sufficient to draw water up the suction pipe and the water mingled with the water used to start the syphoning. It was necessary to

Fyfe dual purpose ram with by-pass.



No. 5 Galt ram by McDougals. Note two exits.

have the outlet pipe of sufficient length to allow this action to work. Where the outlet pipe was short the ram would beat, as the vacuum was made and lost; it could also be fitted to raise some of the working water by provision of a delivery valve air chamber and delivery pipe.

These rams are also commonly called syphon rams, although there is another type which is rather complicated, especially if it is a dual purpose ram. The "safe" lift for these rams is about 15 feet; theoretically it is possible to get a much bigger lift, this is a conservative figure.

Getting back to the mechanics of installation, the drive pipe in any case should be as straight as possible, and have an inclination of about 10 degrees from the horizontal. Where it is not possible to have a straight drive pipe, and there are several curves, (these should be kept as wide as possible), the size of the pipe bore should be increased to offset the additional skin friction caused by the bends.

In some districts trouble is experienced with cast iron drive pipes, also with standard wrought iron pipes, by internal rusting, and means should be arranged for drain-rods and a rope having a bundle of steel wire pulled through.

To be continued

Club Chat... with the Editor

The October Newsletter of the **Gauge 1 Model Railway Association** has just arrived — all 40 pages of it. It is, as usual, full of reports on the Association's activities and letters from members. Some of the venues for the previous few months include Harrow in July, Bexley also in July, Whitesmith and Farnham in August, the North West Kent Group get together on 27 August and the Kettering & District M.R.C. Exhibition on 9 September. The latter function meant collecting the Association's track from London and erecting it in the Drill Hall for the Exhibition. The local club was supported by members far and wide and quite a few locos took to the track. Electric locos were also running on the inner circuit. So there was activity for the whole of the eight hours the show was open.

I see from the **Birmingham S.M.E. Ltd.** that one of the members, Mr. J. Godfrey, was awarded first prize in its class at the First Midlands Model Engineering Exhibition. His model is a Tip Cart which of course won the horse drawn vehicle class. I add my congratulations to those of the club and also my commiserations to the other three members of the same club who entered the Exhibition but were less fortunate.

I have had a little bit more information from Mr. N. Kay of **Worcester and District M.E.S.** about the track we featured in "Club Chat" of 17 November issue. We did not publish details then but here they are now. The old, raised track is 660 ft. round, nearly level. The new track at ground level is a double circuit of 1100 ft. with gradients of 1 in 62 and a tight radius in one spot of 30 ft. It is 3½/5/7¼ in. gauges and there are seven steaming bay roads in roundhouse fashion connected to the old track.

Another track being built is at **Gravesend M.E.S.** where one of the local sports centres, Thong Lane Sports Ground, has been offered by the local council — or rather, a piece between the car park and the rugby pitch has been offered. However it is big enough for an oval 540 ft. in length. Both straights are finished and one end in place. At the other end all is drilled awaiting track which

by the time this is read, should have been laid. The track started on concrete supports but as they had some trouble with the moulding they went over to iron supports. Mr. J. C. Hale, who sent us the details, says he made 98 of these in three weeks.

Down at **Auckland S.M.E.** they have started a scrapbook of the club's history and are asking for photos, etc. which can be included. I think this is a great idea. Many clubs we know have gone to the wall but what better way of retaining interest than through a compilation of all available history. Some of the clubs in the U.K. go back many years and must have a very fascinating past. How about any club, no matter where, letting me have the history with photos so we could perhaps have a regular historical spot?

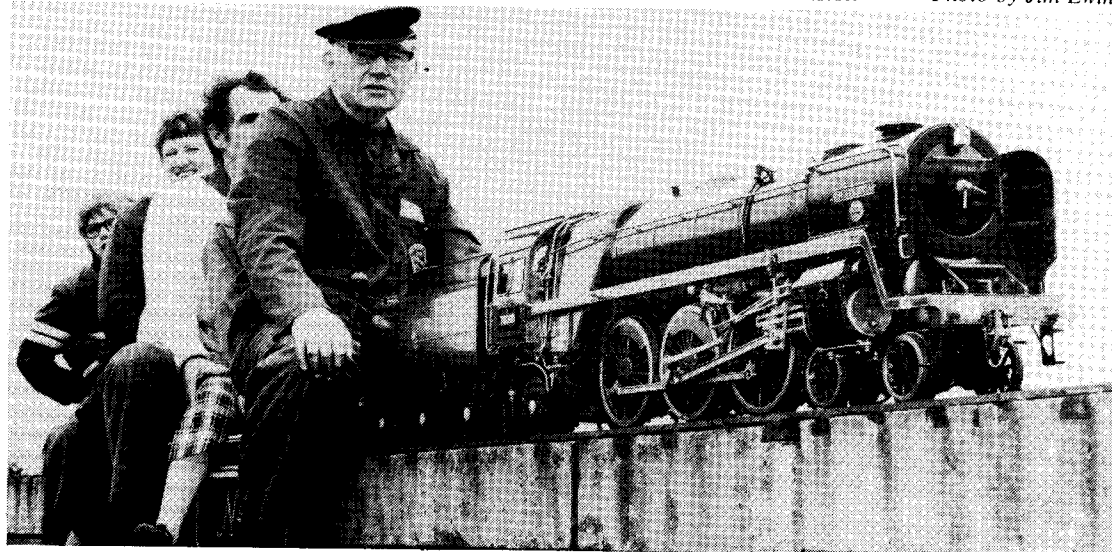
We have mentioned from time to time the **Basingstoke & District M.E.S.** and the progress on the track. Mr. J. H. Jarvis, the P.R.O., has now told me that the last remaining arch of the bridge section has been completed — all this in the past two years. In about a year's time the track should be laid and the steaming bay and station completed. Landscaping has been started and — by coincidence — a history album is in progress.

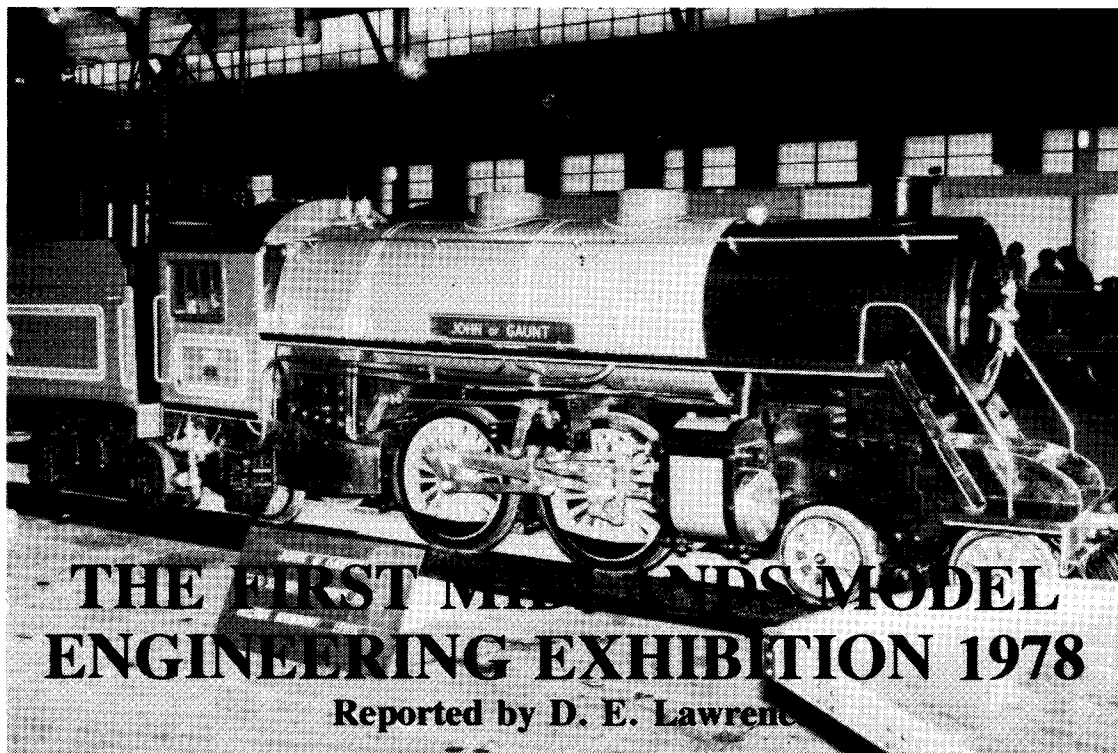
Cultra is now a flourishing track due, no doubt, to those few regular stalwarts of the **Model Engineers Society N.I.** who have given of their time for the past two and a half years. There are now 1700 ft. of track awaiting the opening ceremony on Easter Monday and the locos.

I'm pleased to see that Bert Kirby, Editor of *Big Wheel News* — journal of **The Steam Locomotive Society of Victoria** — has arrived safely back after his globe-trotting saga with Ken Tinkler, Colin Campbell and Sid McComb. The trip took in Japan and Britain (at least the first instalment does) and it was a pleasure talking to Bert at Guildford in July. From his notes in the journal the four travellers had a very interesting time and I hope it won't be long before we see them this way again. Don't forget IMLEC at Bristol in July!

Pontins 1978! T. H. Thomas of the Whitchurch club on his 5 in. "Britannia" at Bristol.

Photo by Jim Ewins.





Curwen Atlantic from the Stapleford miniature railway

THIS LARGE EXHIBITION was sponsored by Traction Engine Enterprises Ltd. and hosted by the Leicester Society of Model Engineers; in effect, this meant T.E.E. looked after the commercial side and the Society took care of the practical side of the Show. The Society had a very big job to do and, under the energetic direction of Dave McCullough their General Secretary acting as Assistant Exhibition Manager, they did their job very well. Some help came from other Clubs, such as the North West Leicester M.E.S. of which more later. Support also came from the trade who took stands, advertising space, donated cups and Messrs Dalton and Co. Ltd of Belper donated a supply of *Silkolene* oils for use in the models and locomotives in the Hall.

Because of the nature and value of the huge number of models there, security had received extra special consideration by the organisers; there was a constant surveillance by closed circuit t.v., 24-hour security guards with sharp fanged guard dogs in close attendance and all the models on show were wired through into an electronic alarm system. All this was very re-assuring to the many exhibitors.

Professor D. H. Chaddock, well known to readers of this magazine, officiated at the informal opening ceremony and also acted as Chairman of the

seven-man judging panel. They had the unenviable job of selecting the winners out of 180 models spread over 16 Competition Classes, some of which had over 20 entries in each class. As some Competition Classes had four cash prizes to be awarded, their judging had to be quite searching. Anyone who has done this sort of thing will know that frequently a winner stands out and is no bother to select, but the difference between say, 2nd and 3rd or 4th, may often present a great deal of careful scrutiny. I think the judges there did a very fine job.

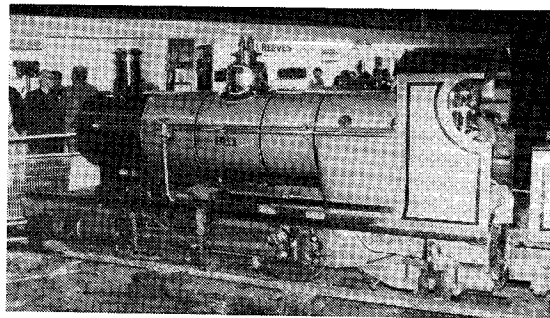
I will not be able to give a comprehensive description of the whole Show and will confine this report to the winners, the Club stands, a sample of the trade and a brief look at some of the 230 odd display items. The huge hall had several very big double doors along one side and, of course, very large exhibits could be brought in on their own wheels, thus Len Crane's monster 22 ton *Fowler* crane engine with jib erected was on show and occupied pride of place in the main display area. It is still in first class working order in spite of being almost 50 years old and is well maintained. *Bresingham* Museum loaned a 15 in. gauge 4-6-2 *Rosenkavalier*, which had been built by Krupps based on a design by Henry Greenly and a near sister Pacific designed by Greenly, *Winston Churchill*, was loaned by the Romney, Hythe and Dym-

church Rly. These two large locomotives flanked the Fowler crane engine and made an impressive display. From the Leicester environs came two 10¼ in. gauge locomotives from the Stapleford Miniature Rly., one was loaned by John Gretton, the Curwen Atlantic *John O'Gaunt*, now 30 years old and rebuilt with some modifications in 1969; it is in regular use at Stapleford. The other locomotive was Mike Froggatt's L.M.S. three cylinder *Jubilee* 4-6-0 which was put into fairly regular service on the S.M.R. about three years ago. This is a handsome engine and was modified from the Greenly two cylinder design for a *Royal Scot* into a taper boiler *Jubilee* with the third cylinder added.

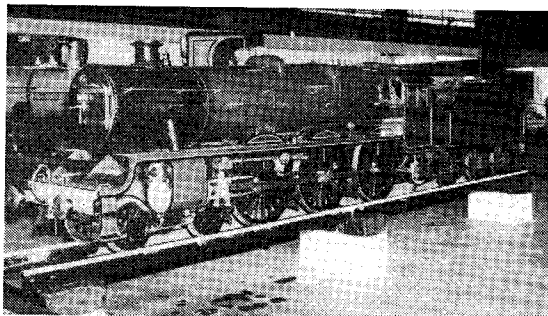
In another display area was the full size Hunslett 0-4-0ST *Pamela*, on each side of which was a brightly painted 7¼ in. gauge model Hunslett. *Pamela* is an ex-Penrhyn Quarry locomotive and is now owned by John Vernon. A similar display was adjacent to these items and comprised a full size Fowler BB1 ploughing engine of 19½ tons and two 2 in. scale models. The Fowler was immaculate and attracted a great deal of attention from the "instamatic" brigade; according to the Exhibition catalogue, it and its sister engine had lain derelict for 20 years and presented a mammoth task of restoration for their present owner Andrew Fisher. I will mention the models when I come to them later.

There were 104 locomotive models in the display section, i.e. not entered for Competition and it was here one noticed the widest variation in quality which ranged from the very ordinary to the very excellent. At the top end of the quality were two fine 5 in. gauge L.M.S. locomotives, a *Jubilee* 4-6-0 and a *Coronation* Pacific by B. Goodwin, both were coming along very nicely and were well detailed and finely finished. As yet they lacked boilers but will be excellent jobs when completed. The platework was clean and the builder had taken the trouble to protect the steel plate with Jenolite or something similar which gives a dull silvery grey finish to clean steel but which shows up any blemishes — as far as I could see, there were none.

Amongst the stationary engines there was plenty of variety and I was attracted to a type rarely modelled nowadays, this was R. Wallis's horizontal ½ h.p. gas engine, a solid looking job which could have been to any scale; (unfortunately the details given on cards accompanying the exhibits were sparse and left the observer to work things out for him or herself). Arnold Throp, one of the judges, had several examples of his work in the Tools and Workshop equipment section including a very useful stepped mandrel for setting fingers of 2, 3 or 4 point lathe steadies accurately and a nicely made new type of slotting attachment for various uses on a Myford lathe. I must admit to being intrigued by



"Sian" 2-4-2 from the Fairbourne 15 in. railway.



Mike Froggatt's 10¼ in. gauge "Jubilee".



Miscellaneous and ship models on display.

the 3 in. scale *Wallace* concrete mixer I saw in the Miscellaneous section, I could only conclude the builder had used it for demonstration purposes or perhaps the wife wanted a cake mixer and -----!!

Competition amongst the Award Classes was pretty fierce; there were some very good models indeed. In Class 1 for locomotives up to Gauge 1 the winner was Clarry Edwards with his M. & G.N.R. "0" gauge live steam 4-4-0 No. 44. He actually had two such models entered and there was not much to choose between them. They were both neat and tidy and although steamers, nothing was out of scale except perhaps the wheel flanges were a little on the deep side.

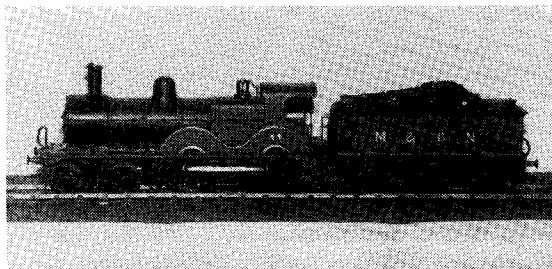
In Class 2 for 2½ in. and 3½ in. gauge locomotives, the winner was Peter Wardle's East Africa class 57 Beyer-Garratt 4-8-4 + 4-8-4. We have met Peter recently in these pages and his Garratt is now all in one piece and is a giant in 2½ in. gauge, all two hundredweight of it! The sheer quantity of work put into this job probably gave him a head start over the other competitors; perhaps the only criticisms one could make about this engine was that the piping and paintwork could have been a little better. The Clarkson cup for a model built to their drawings or with their castings went to A. J. Bodily's *Stirling Single*.

There was some really lovely work in Class 3 for 5 in. gauge locomotives and Roy Amsbury's *Caledonian* 2-4-0 of 1870 emerged as the winner, taking the A. J. Reeves Ltd. Trophy. This model has been seen at the M.E. Exhibition a few years ago, where it collected a premier award and certainly it deserved the prize here. A G.W.R. King class tender in a glass case was a fine well detailed job but I thought it had rivets a little oversize and rather thick beading.

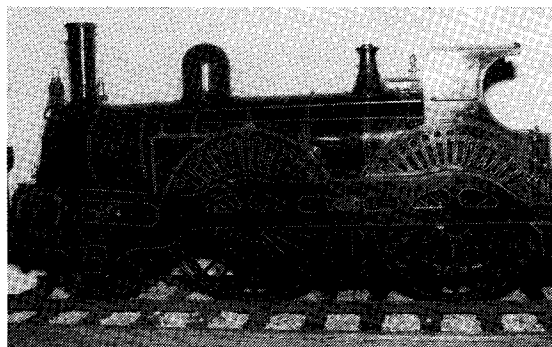
In Class 4, locomotives 7¼ in. gauge and over, the winner of the Burton Model Imports Ltd. cup was R. Kay with his 0-4-0ST *Alice* class Hunslett, a nice solid job, plain but well finished in a red livery, the kind of colour which stands out in slides beautifully and complements any polished brass around.

Class 5 was for rolling stock of any gauge and the winner here was D. Spooner's 5 in. gauge coal wagon; well detailed and neatly finished in private owner style, there was very little to fault in this model. The exhibit also had a section of track and ballast filled buffer stop, both of which looked quite realistic.

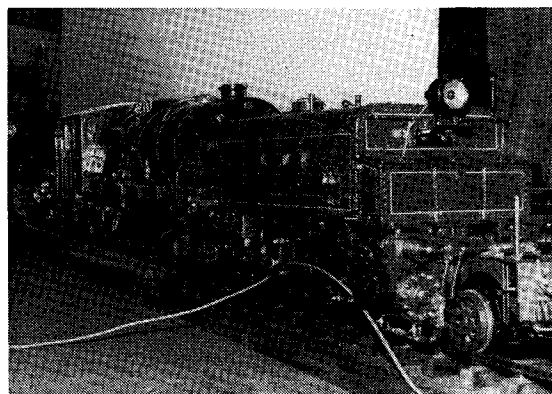
Class 6 was for stationary engines and T. Smith's horizontal cross compound condensing mill engine with Corliss valve gear won the Modelcraft cup. This model was another which had received a premier award at an M.E. Exhibition not long ago and the experts tell me there is little of detail to fault; I'm told there should be more and smaller rope



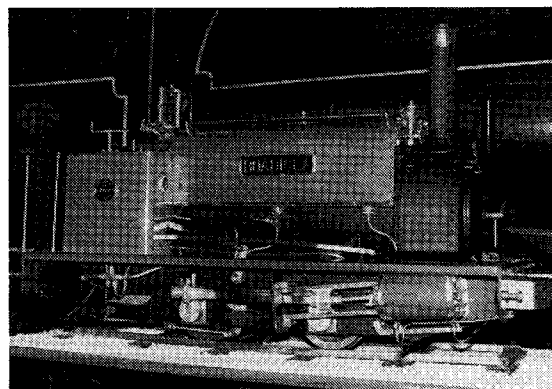
Clarry Edwards' "O" gauge steam loco.



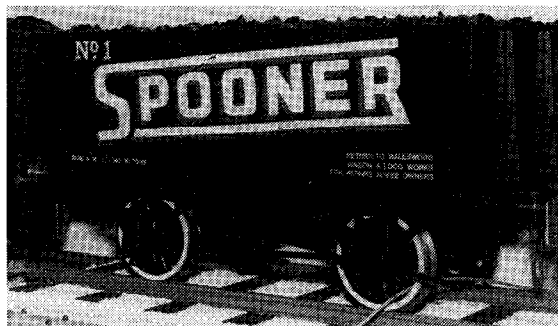
Roy Amsbury's "Caley" 2-4-0.



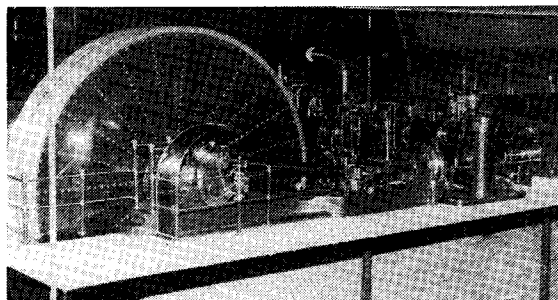
Peter Wardle's 2½ in. gauge Garratt.



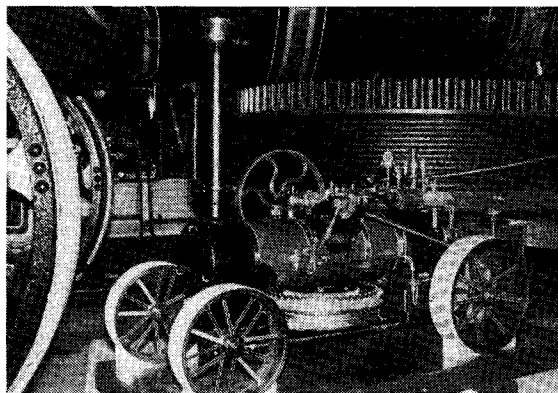
Hunslett saddle tank by R. Kay.



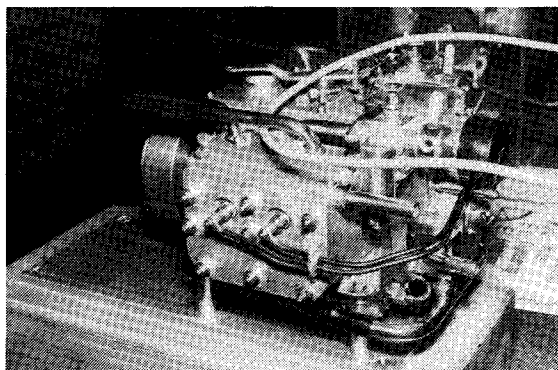
5 in. gauge coal wagon by J. Spooner.



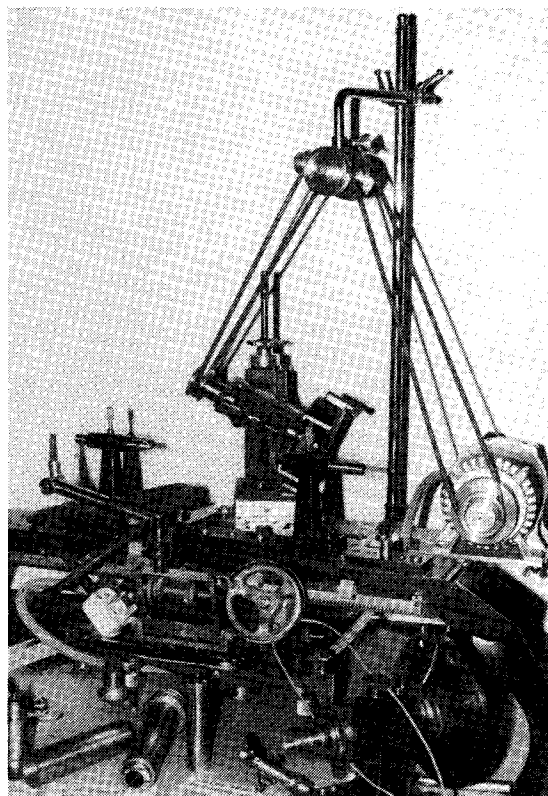
Cross compound mill engine by T. Smith.



Dr. A. Braddock's ploughing engine.



J. Dempster's flat four petrol engine.



P. Spenlove-Spenlove's tool and cutter grinder.

grooves and an aluminium flywheel isn't quite the thing, but for all that, the model is excellent and most impressive. The glass case surrounding it precluded any chance of a decent photograph but I hope the one here will give some idea of the model.

Steam road vehicles were in Class 7 and the winner of the Staffordshire Joinery cup was Dr. A. Braddock's 2 in. scale Kitson & Hewitson slanting shaft ploughing engine. Standing alongside the full size Fowler made it possible to compare detail and, although from different stables, it could be seen that it looked right.

In Class 8, Machine Tools and Workshop Equipment, the winner was P. Spenlove-Spenlove with his own design Tool and Cutter Grinder which to me appeared a complicated machine and very versatile. A number of attachments were displayed with it. Dave McCullough kindly toted around a large (and heavy) white board to place behind the various winning exhibits for me to get reasonable photographs, but even so, the one of this T & C G does not do it justice.

Class 9 was for Petrol and Diesel i.c. engines and a 24 c.c. flat four petrol engine with opposed cylinders (it looked like L. C. Mason's Mastiff design) by J. Dempster was the winner. There were two of these engines placed together and it was surprising the difference that cleaning up and radiusing corners made to the style and appearance of the finished products.

To be concluded

THE PISTON DROP VALVE ENGINE

by A. Haworth

Part IX

From page 1475

NOW, THE STOP VALVE. Why a stop valve I confess to utter bafflement. Why not the start valve? It starts every time it stops. But there it is, it has to be one or t'other, so why not this one? If it was called a "start" valve we would undoubtedly ask, why not a "stop" valve? Aw, forget it, fill her up again.

There are many valve manufacturers in this country who make valves from 1/4 in. bore to many feet in diameter and moreover, the prices of these are most competitive. Why not use a standard commercially available valve? It performs as well if not better than a model. So why not use one? The problem is that of scale. A 1/4 in. bore commercial valve is as big as, or larger than the cylinder it is to serve. Then we must make one.

There are many arrangements of stop valve relative to the cylinders in cross compound engines. One of the best layouts, in my opinion, is that where the main steam pipe approaches the HP cylinder from below the engine room floor level. The valve is placed in the pipe midway between the cylinders and opposite them. The valve spindle is extended upwards, supported in a neat floor column on the engine room floor with a capstan type handwheel on the top. The engine man looks to his left and sees the HP valve gear, to his right and sees the LP valve gear. Immediately in front is the governor so he can see the instant of lift. Also at his front is the gauge board which will show boiler pressure, pressure at stop valve, vacuum gauge and possibly a rev. counter.

The valve itself is relatively simple to make and when assembled is an attractive device in its own right. It is neat and compact and will give, with care, satisfactory service. It is a nominal 1/2 in. bore valve and will handle all the steam necessary to the engine at 100 p.s.i. (dry saturated) from the Lancashire boiler or boilers. The spindle is guided above and below the valve which is good design practice in any valve. The conical valve which is integral with the spindle enters or leaves an identical conical seat machined in the valve body.

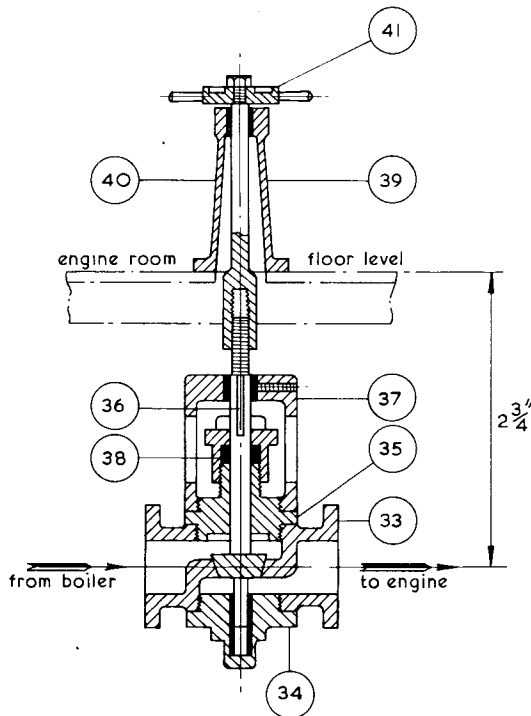
Initially grind in both valve and seat and ensure a perfect 'bed'. A valve and seat of this design is virtually a plug cock and a well maintained plug will remain steam tight for years. Another unusual feature is that the valve spindle is prevented from rotating. The reason lies in the screwed portions of the valve spindle and the coupling spindle which operates it. If these two parts were to stick together

for any reason, then the valve would turn forever neither lifting nor falling. If the valve spindle cannot rotate, then it can *only* rise or fall.

Please note that the coupling spindle is collared at the top by the handwheel and the spindle collar inside the floor column. Never apply any more torque than can be applied by the handwheel. No bars, tubes, wrenches or wheel spanners. Close it lightly by hand. If it leaks, force will not cure it, in fact you will add to your troubles with a fractured spindle. Repair the valve, re-grind it "in".

On the drawing, I have shown the operating screws as No. 4 BA left-hand thread. These taps and dies may be difficult to obtain. You are, therefore, free to choose your own thread. Fairly fine, about the same diameter, but it must be left-hand thread! Otherwise your handwheel will be opening to close, closing to open.

When in a panic to shut a valve one instinctively uses a clockwise motion. After the flywheel has



SUB-ASSEMBLY OF STOP VALVE & COLUMN

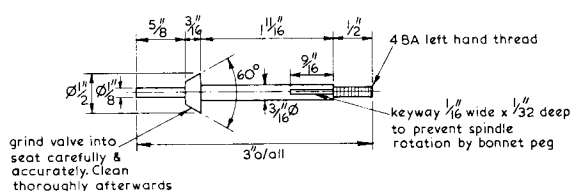
burst, one wonders why? You usually remember in the ambulance. Another odd feature concerns its appearance. Most valve bonnets are tapered, whereas this one is a cylinder. This is mainly due to the fact that I have deliberately been generous in the dimensions of the spindle and glad. I could have introduced a slight taper but I do not believe in machining for machining's sake.

Another odd one is the fact that I describe an optional arrangement on the valve operating floor column, item 40. It was always referred to in the trade as a 'valve position indicator'. In all my years concerned in the design, construction service and repair of these mill engines, it has never been satisfactorily explained to me as to what the purpose is of this device. Firstly a stationary steam engine which is governed will, or should have, its valve fully open if running, or fully shut if stopped. Any variable demand for steam is controlled by the governing system. Admitted, a valve may be 'cracked open' for the purpose of warming through. In certain industrial processes where the mixing of certain fluids takes place, the amount of opening of a valve may be a certain piece of valuable information.

It has to be admitted that the amount a valve is open is a function of the flow. My own philosophy is that if the valve is fully open the engine is running. If fully shut, the engine is stopped. It is possible that the valve is fully open with the engine stopped but the valves are 'tripped'. I will not have it that with a valve half open or half shut, the engine is half running or half stopped. Do not confuse the issue with a 'throttle valve' such as a loco regulator or a marine engine valve. This valve is not, or intended to be a throttle valve.

Yet many engines by various makers had these devices so fitted. Perhaps they are a so-called 'throw back' to the days when engines were throttle governed. Even so, there seems to me to be little connection between the information imparted and throttle governing unless the actual valve was so calibrated. I would be grateful to anyone who knows the answer to contact me via the Editor of *M.E.* I promise anyone who builds this model and invites me to view it, my first question will be "What is the purpose of the slot and the markings on the column?" You will no doubt reply that it is "classified under the section headed useless information".

I have prepared drawings showing the location of the stop valve and operating column relative to the engine cylinders. It should be understood that, as detailed, the valve and column consist of a packaged unit, so to speak. The centreline of the column must be in line with the centreline valve within close limits and the centreline valve must be at a specified distance below the base of the column. You cannot say "I will have the valve here, and the



VALVE SPINDLE : stainless steel

(36)

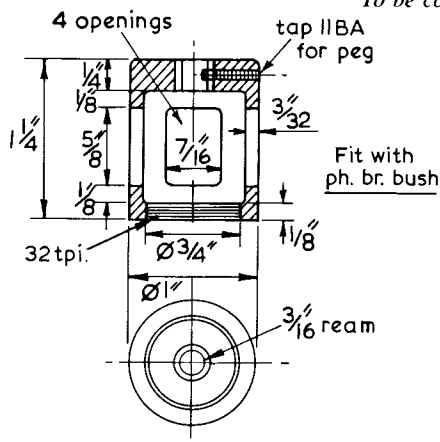
column there". It can be done in full-size practice by using angled coupling spindles fitted with universal joints. These cannot, however, be made in model form.

Regarding pipework, I have envisaged an arrangement of the boiler house being to the right when looking on the rear cylinder covers of the engine. There are they who will say, "But this puts the HP cylinder furthest from the boiler". I shall counter by replying "So it does, but it also places the feed tank and boiler feed pump near to the boilers where they belong" — "Yer pays yer money, and . . .".

I do not intend to detail any pipework as such. It is my considered opinion that the fabrication of pipes prior to engine assembly is largely a waste of time and effort. As much trouble is caused by rectifying pipes already made as originally went into their making. My method is assemble the plant, measure up carefully and make accurate sketches. Then make your pipes.

Small bore piping is easily made and the piping runs are uncomplicated. This applies to all piping, that is main LP steam, condensate and feed. Standard copper tube is used mostly. If you insist on making it beforehand, all the information will be there to enable you to do so. I do not recommend it.

To be continued



The peg end is to engage keyway in No.36 to prevent rotation of spindle.

VALVE BONNET

b.m.s.

(37)



CHERRY'S OF RICHMOND

STEAM into the NEW YEAR with one of our Models.

Locomotives from 0 to 5" gauge always available.

We also stock Traction engines, Stationary engines, Marine engines, Boilers and Steam Plants.

Main Agents for the Stuart Turner range of castings and fittings, their catalogue 35p including postage, Overseas Air Mail \$2.00.

"Steps in Steaming" by S. F. du Pille, a useful guide to firing and maintaining model locomotives.

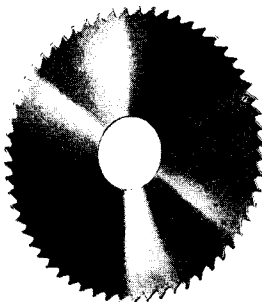
CHERRY'S LIMITED

62 SHEEN ROAD, RICHMOND, SURREY (LONDON AREA)
Tel: 01-940 2454. Open 9 to 5.30; Sats. 9 to 5; Closed all day Wed.

NEW TOOLS DISPATCHED BY RETURN POST FROM OUR LARGE STOCKS

WE WELCOME ACCESS, BARCLAY, CUSTOMERS PLEASE QUOTE YOUR No.

All prices include VAT. U.K. orders post free. Overseas orders post extra



H.S.S. Metal Slitting Saws— All 5/8" Bore suitable for use on a lathe

Dia.	1 1/2"	1 3/4"
Width	.016"	.020"
Price	£2.00	£2.00
Dia.	1 3/4"	1 7/8"
Width	.025"	.032"
Price	£2.00	£2.00

H.S.S. Metal Slitting Saws— All 1" Bore. Suitable for use on a Lathe

Dia.	2 1/2"	2 3/4"
Width	.016"	.020"
Price	£3.30	£3.30
Dia.	2 3/4"	2 7/8"
Width	.025"	.032"
Price	£3.30	£3.30

H.S.S. Metal Slitting Saws—All 1" Bore Suitable for use on a Lathe

Dia.	3"	3 1/4"	3 1/2"	3 3/4"	3 7/8"	4"
Width	1/32"	3/64"	1/16"	5/64"	3/32"	1/8"
Price	£3.30	£3.30	£3.70	£4.05	£4.40	£5.15

All the above saws have fine teeth

Drill Grinding Attachment for fast and accurate sharpening of drills sizes 1/8"-3/4" diameter. The jig has 5 included angles suitable for various materials for use with bench grinder. Boxed complete with full and clear instructions.

Our Price **£5.10**

Sets Tungsten Carbide 3/8" square lathe tools already ground to shape and ready for general use, one each round nose facing, straight round nose finishing, bar turning, parting tool.

Our Price set of four tools **£5.25**

WISHBONE DRILL SHARPENER DESIGNED TO ENABLE ANYONE WITHOUT SPECIAL SKILL TO RESTORE BLUNT AND BROKEN DRILLS IN A FEW MINUTES SUPPLIED AS A COMPLETE KIT IN BOX WITH INSTRUCTIONS. SUITABLE FOR SMALL DRILLS UP TO 1/8".

Our Price **£4.50**

Shop Hours 9 am-5 pm. Thurs. and Sat. close 1 pm
Closed 1-2 pm lunch

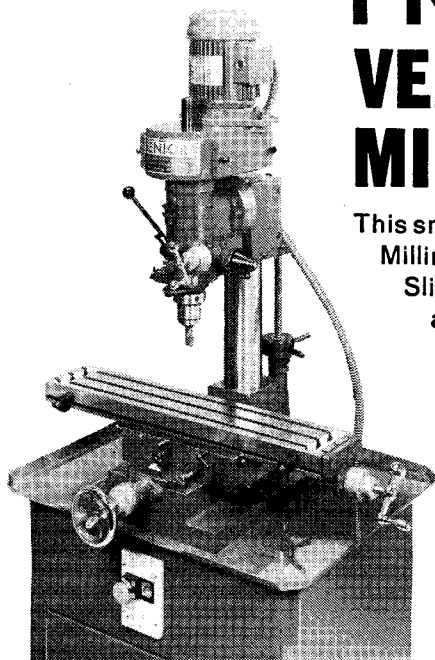
A. E. KING (TOOLS) LTD.

3 CENTRAL PARADE, STATION ROAD
SIDCUP, KENT DA15 7DL

TELEPHONE: 01-300 1342

A REGULAR ADVERTISER IN 'M.E.' FOR OVER 20 YEARS

FROM SENIOR VERTICAL TYPE 'E' MILLING MACHINE



This small Vertical Milling Machine incorporates the 'SENIOR' Junior Milling Table and Saddle together with the well-proven 'SENIOR' Sliding Spindle self-motorised Vertical Head and is supplied at a price which we feel is very competitive with any similar machine which may be currently on the market.

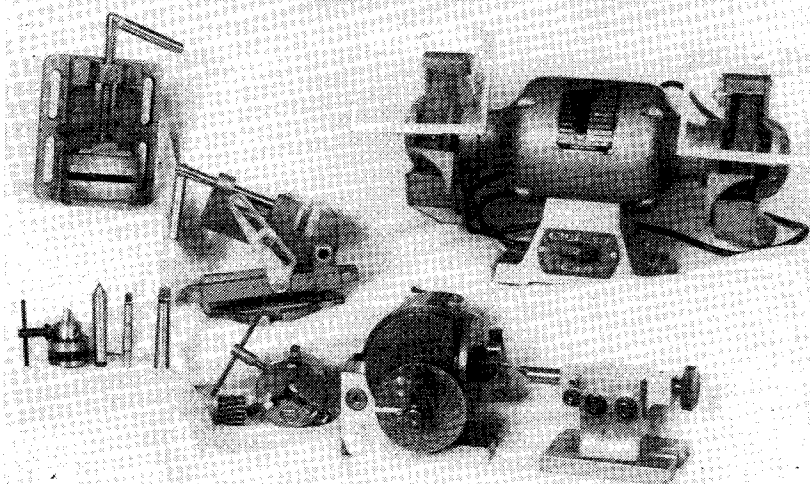
BRIEF SPECIFICATION:

	Inch	Millimetre
Table:	25 x 4½	635 x 122
Table Travel:	15 plus	381
Cross Travel:	6	152
Vertical Travel:	14½	368
Spindle Movement:	2½	64
Diameter of column	3	76

For further information, please contact the manufacturers

TOM SENIOR (LIVERSEEDGE) LTD
ATLAS WORKS, LIVERSEEDGE

Tel: Cleckheaton 873547 **YORKSHIRE, ENGLAND**
MANUFACTURERS OF QUALITY PRODUCTION
MACHINES FOR THE SMALL USER



All Prices Include VAT (Post Free)

- **BENCH GRINDER** 6" ½HP SINGLE PHASE MOTOR complete with eye shields and tool rests. **ONLY £53.00**
- **DIVIDING HEADS** BS-0 £220. BS-1 £375
- **DRILL VICES** 3" £8.44. 4" £10.12. 5" £14.62. 6" £19.12
- **ANGLE VICES** 2½" £15.75. 3½" £16.87. 2½" swivel base £22.50
- **DRILL CHUCKS** ¼" cap. with 1MT arbor £5.84. ⅜" cap. £5.68. ½" cap. £6.56
- **1MT** arbor to fit ⅜" chuck £1.12
- **2MT** arbor to fit ⅜" chuck £1.24
- **2MT** arbor to fit ½" chuck £1.57
- **2MT LATHE CENTRES**, without tip £2.70 with tip £4.62
- **3MT LATHE CENTRES**, without tip £3.15 with tip £5.96
- **DRILL SLEEVES** 1-2MT £1.10. 2-3MT £1.68
- **SELF CENTRING LATHE CHUCKS** 3JAW with set of internal/external jaw, T bar handle and mounting bolts 3" £29.55. 4" £31.73. 5" £34.98. 6" £50.10
- **TOOL STAR MINIATURE SOCKET SETS** - UNCONDITIONAL LIFE TIME GUARANTEE (not illustrated). ¼" drive, 39-piece.
11 Metric Sockets 4-12MM, 11BA Sockets 0-10BA, 11AF Sockets 5/32"-½"
- 6 Accessories (Ratchet Handle, 2 Extension Bars, T Bar, Flexible Handle and Tommy Bar) complete set in metal case. **ONLY £13.99.**

Due to heavy demand 4 weeks delivery on some items.

L.S. MACHINE TOOLS SUPPLIES Tools Discount Centre

119 Nedham Street
Leicester LE2 0HF
Tel: 0533-22870

Please send all mail orders to:
125 NANSSEN ROAD
LEICESTER LE5 5NL

BUCKINGHAM TOOL COMPANY

P.O. Box 25, Pankridge St., Crondall, Farnham, Surrey Tel. Aldershot 850142

Safe, Silent, Superb – SHARPENSET

*for the sharpest tools,
you've ever used*

STILL ONLY £148.50

(delivered price
inc. V.A.T.)



Already widely
installed in
schools,
restoration
departments,
professional &
amateur
workshops.

SEND FOR 1979 CATALOGUE -
60p NOW!

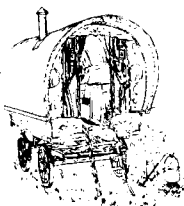
Order Slip

Name

ORDER NOW

**Immediate
Delivery!**

Cut coupon and send to: Buckingham Tool Company,
P.O. Box 25, Pankridge St., Crondall, Farnham, Surrey.



"MAKING MODEL GYPSY CARAVANS"

—A new book by
John Thompson

This long awaited volume has been
beautifully produced, and is crammed
with plans, photographs, hints and
ideas to start you on an absorbing
hobby. Contains a simple design as
well as ambitious projects for the
serious modelmaker.

Available direct from the author, price **£3.95 plus 50p postage** (or **\$12**
by Air Mail to U.S.A. etc.). Illustrated catalogue **35p** by post. Also available
"Making Model Horse Drawn Vehicles", **£3.50 inc. postage**.

JOHN THOMPSON, (Ref. ME), 1 Fieldway, Fleet, Hants.

ORKAN BORING TOOLS

OF SOLID SPECIAL
HIGH SPEED
STEEL EV4CO

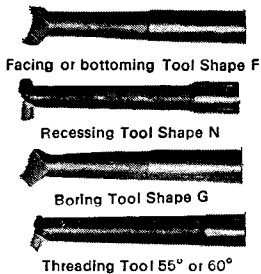
(12% Tungsten, 5% Cobalt,
4% Vanadium)

Range of 48 Tools in 4 shapes
9 Standard Length Types
5 Extra Length Types
For bores from 1 in. diameter
Stockists and distributors of drilling
machines up to 2 in. capacity, also
milling machines and all metal
working machine tools.

Send for Priced Leaflet

STANTON-THOMPSON (London) LTD.

Lincoln Way, Off Windmill Road, Sunbury-on-Thames, Middx.
Tel: Sunbury-on-Thames 88681 Telex: 261350



Threading Tool 55° or 60°

Boilermakers to the World

Not an idle boast.

If you want the
very best in model
boilers Bishop is
the name, the only
name.

BISHOP & CO

**38 HAMSTEAD ROAD
BIRMINGHAM B19 1DB**

**Tel:
021-554 0174**

Storage Cabinets



Type 1633

Made of metal with
transparent plastic
drawers. Ideal for small
parts, spares, nuts,
bolts, etc. Many other
uses also in the Home,
Workshop, Laboratory,
etc.

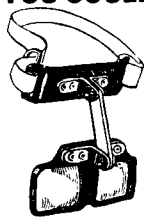
Choose from the
following range to suit
your own needs.

Type	Height (inches)	No. of drawers				Price
		Total	Small	Med.	Large	
1118	11	18	15	2	1	£8.65
1838	18	38	35	2	1	£12.95
1633	16	33	30	2	1	£10.95
2236	22	36	30	4	2	£14.75
2260	22	60	60	—	—	£14.95

All cabinets are finished Blue, 12" wide x 5½" deep.
Prices include VAT and Post. Satisfaction or money refunded.
Cheque/P.O. to:

**MILLHILL SUPPLIES, 35 Preston Crowmarsh, Benson,
Oxon, OX9 6SL.**

YOU COULD DO IT—IF YOU COULD SEE IT



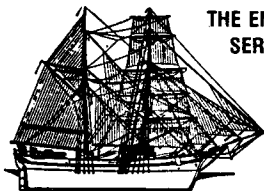
And you CAN see with . . .
**THE VERSATOR BINOCULAR
MAGNIFIER**

- Headband mounting leaves hands free
- Fully adjustable for position and angle
- Can be swung up when not in use and is instantly available when required
- Prismatic lenses relieve the eyes of strain and enable the finest work to be done over long periods
- Can be used with glasses
- Overseas Airmail at no extra charge
- **Send for list of other optical aids**

£14.95
on 14 days
approval
Inc. p & p

Mason & Gantlett Ltd. 29 SURREY ST., NORWICH
NR1 3NX Tel (0603) 28101

SHIP PLANS FOR MODEL WORK



**THE ENTIRE SAILING SHIP & POWER CRAFT
SERIES OF AUTHORITATIVE DRAWINGS**

By Harold A. Underhill, A.M.I.E.S.
By Courtesy of the Executors

**Illustrated list of 70 Sailing
Ship Designs 60p**
**Illustrated list of 35 Power
Craft 40p**

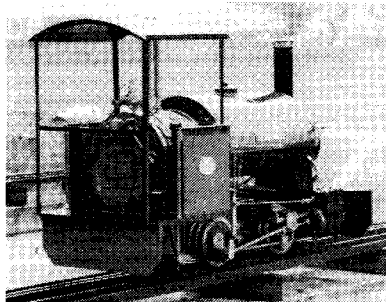
From Leading Dealers or direct from:

BASSETT-LOWKE LTD.

KINGSWELL STREET, NORTHAMPTON NN1 1PS

"SWEET PEA"

**A Narrow gauge type locomotive designed
for 5" gauge, by Jack Buckler**



A 0-4-0 Contractors type locomotive. Designed to be simple and easy to build. Suitable for either beginner or experienced builder. Sweet Pea is available either Complete ready to steam or as drawings and castings. Set of 6 fully detailed drawings **£6.00**
or GA available separately **£1.25**
Plus postage + 8% V A T

For further details send large SAE for full descriptive leaflet and price list.

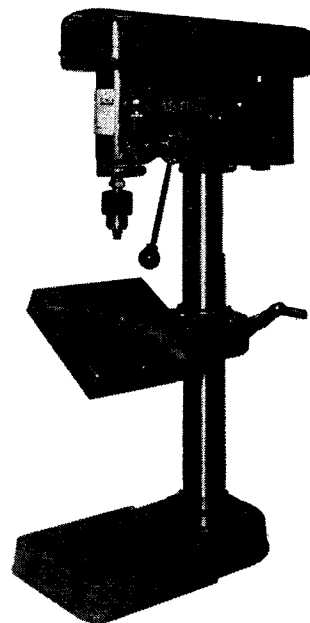
**BLACKGATES ENGINEERING, 209 Wakefield Road
Drighlington, Bradford, West Yorkshire BD11 1EB
Tel: Drighlington 853652 (STD Code 0532)**

ON THE HOLE A BETTER DRILL !

ASTRA

MODEL GHD 13R 1/2" CAPACITY BENCH DRILL

- **4 SPEEDS**
480 to 2470 r.p.m.
- **SPINDLE**
to table 17 in.
to base 23 1/4 in.
- **3 1/2" COLUMN DIA.**
- **OVERALL HEIGHT**
39 in.
- **WEIGHT APPROX.**
150 lb.
- **INCLUDED AT NO
EXTRA COST:**
- **RACK AND PINION
RISE AND FALL
TO THE TILTING
TABLE**
- **CHUCK & SWITCH**
**ALL FOR £147
PLUS VAT**
Chuck Guard
£11.50 extra + VAT
must be supplied only
if used in factory



SCOT
URQUHART

**371 Earlsfield Road
Earlsfield, London SW18
Telephone: 01-874 5708**

HSS DRILLS

No. Drills	Each	No. Drills	Each
1 — 4	45p	30 — 45	22p
5 — 11	40p	56 — 78	22p
12 — 19	33p	46 — 55	18p
20 — 29	26p	79 — 80	26p
Fractional Drills	Each	Fractional Drills	Each
1/64", 1/32", 3/32", 7/64", 1/8"	22p	9/32", 19/64", 5/16", 21/64"	60p
3/64", 1/16", 5/64"	18p	11/32", 23/64"	78p
9/64", 5/32"	26p	3/8", 25/64"	90p
11/64", 3/16"	33p	13/32", 27/64", 7/16"	£1.10
13/64"	40p	29/64", 15/32", 31/64", 1/2"	£1.36
7/32", 15/64", 1/4", 17/64"	45p		

All prices include VAT but please allow sufficient for P&P
£5.00 order value post free

Castings available for 5" Enterprise and 3 1/2" Columbia
as the series progresses. Details on request

Catalogue **60p** Overseas **£1.00**

VISA and ACCESS WELCOME

MODEL & MINIATURE RAILWAYS

120/122 DRAKE STREET, ROCHDALE, LANCs

Tel: 45657

DORE WESTBURY VERTICAL MILLER

Table size 16" x 5 1/2"

6 speeds 1650 to 34 1/2

Supplied in kit form, all major machining
done.

Can be finished on ML7 lathe.

ALSO

DORE 5" MACHINE VICE KIT

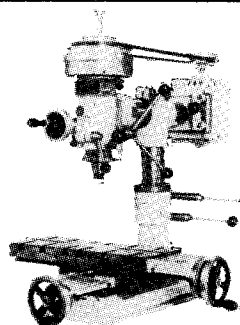
Specially designed for this machine

Every item required for the completion is
included in the above kits

S.A.E. (9" x 4") for leaflets to:

MODEL ENGINEERING SERVICES

6 KENNET VALE, BROCKWELL
CHESTERFIELD, DERBYSHIRE S40 4EW
Tel. Chesterfield 79153 or ECKINGTON 3218



CALLERS WELCOME
BY APPOINTMENT

VISIT US ON STAND 42
AT THE
MODEL ENGINEER EXHIBITION WEMBLEY

H. R. PLASTOW

Specialists in large scale
STEAM Traction Engine and
Roller Models for the last
20 YEARS

COAL FIRED FULLY AUTHENTIC

Excellent stock. Prompt service. Drawings and castings for 10 engines including injectors, drawings for paraffin lamps and cylinder feed oil pump.

Illustrated catalogue giving full details of our **HARD WORKING, PRIZE WINNING** Model engines and fittings. Send £1 inland; £1.50 Europe; U.S. \$7 Airmail.

CREDIT FACILITIES AVAILABLE.

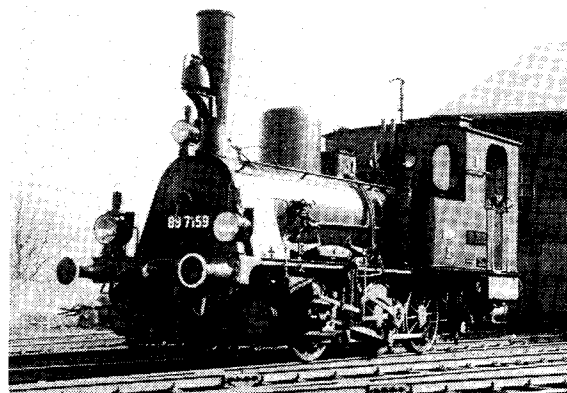
2nd Edition, **The Building and Running of Steam Traction Engine and Roller Models** by H. R. Plastow. Now available. £5 inland and Europe; U.S. \$12.50 Seamail, \$16.50 Airmail.

H. R. PLASTOW

The Old Rectory, All Saints

Halesworth, Suffolk, IP19 0PB

Phone: (Saint Cross) 098-682 325



Drawings and castings for 5" gauge
Prussian T3 0-6-0 well-tank loco **TERESE**

Available from:

DAMPFMODELLBAU SCHULDT

Norderstr. 23, 2200 Elmshorn, W. Germany

Drawings, 16 sheet

Horns	£4.25	Eccentric straps	£2.62
Wheels	£21.14	Eccentric sheave	£1.61
Chimney	£7.61	Axle pumps pair	£3.45
Safety valve	£3.19	Cylinder set CI	£11.74
Bell	£1.78	Valve chests GM	£3.35

PETROL ENGINES

Castings, gears, spark plugs, valve springs, piston rings, mini-coils etc. for **EDGAR T. WESTBURY'S** most popular engines.

2 stroke, 4 stroke, single, twin and 4 cylinder designs.

Also castings for workshop equipment, nuts, bolts, taps, dies, end mills, slot drills, twist drills etc.

Illustrated catalogue: Home—35p. Overseas airmail—70p

WOKING PRECISION MODELS LTD.

Harbour Lane, South Queensferry
Nr. Edinburgh, Scotland, EH30 9PT

Tel: 031 331 1093

EX-STOCK REAMERS

Probably the Largest Selection in the Country
METRIC and IMPERIAL SIZES

0.80 mm. — 50.0 mm.

Morse taper hand reamers 0, 1 and 2
now available

SAME-DAY SERVICE
SEND FOR STOCK LIST

TOOLEX

BRISTOL RD., SHERBORNE, DORSET

TEL: 093 581 4359/4350

NEW! ENLARGED! RIPMAX MODELLERS HANDBOOK

248 pages

page size: 10½ x 8in.
full colour cover

The complete RIPMAX
RANGE illustrated and
described (over 6,000 items
in all) PLUS OVER 70
EDITORIAL FEATURES
on modelmaking subjects.

NEW EDITION . . .
JUST PUBLISHED



It's **THE** standard reference book for anyone interested in the world of models. Over 400 model kits are illustrated and described plus **ELECTRIC MOTORS, ENGINES, RADIO CONTROLS, TOOLS, MATERIALS**, etc. — and a vast range of accessories of all types. Every page is packed full of interest, for study or browsing. Then there's also a whole range of editorial features.

EDITORIAL ARTICLES & FEATURES ON . . .

Adhesives - Modelbuilding Tips - Choosing Airscrews - Marine Props - Soldering Irons, etc. - Engine Care and Servicing - Fuels - Hand Tools - Materials - Metals - Plastics - Pulleys and Gears - Spray Painting - Using Files etc., etc., etc. Also Selection Charts, English/Metric Conversions, Tapping and Clearance Drill Sizes and other useful data.

Price £1.95 from ANY MODEL SHOP (or £2.50 post paid direct from Ripmax Ltd., Ripmax Corner, Green Street, Enfield, Middlesex, EN3 7SJ).

AUSTRALIA and NEW ZEALAND

R. & A. MEARS

have pleasure in announcing that we are now the Australian and New Zealand agents for ARRANG ENGINEERING PRODUCTS. Their products will be ex stock.

Please send for catalogue to:

R. & A. MEARS
MODEL MAKERS & SUPPLIERS
P.O. Box 85 PADSTOW 2211 N.S.W. AUSTRALIA
Tel: 7733838

SELF BUILD SUDS PUMP

For use with water based coolants or light cutting oils on lathe, drill or miller. A few hours work will produce a first class reliable unit based on a high quality fully encapsulated Swiss solenoid assembly which will give long trouble-free service.

Complete solenoid assembly for 230V 50C (a small stock of units for 110V 50C and 24V 50C is also available — specify if required) strainers, suction and delivery tubing, spring and valves, bar for piston, body and fittings together with detail drawings and full instructions for building and operating:

U.K. £10.20 complete incl. p & p
EXPORT £11.40 complete incl. p & p

"O" FLEX ROUND SECTION PLASTIC BELTING

For small lathes, drills and milling spindles. Full details of simple heat bonding technique supplied. Prices are for 2 metre lengths: 3 mm. dia. 35p, 5 mm. 42p, 7 mm. 76p, 8 mm. 90p, 10 mm. £1.10. Pack of 2 metres of each size £3.30. Lengths up to 50 metres available. Prices complete incl. p & p. Minimum order £2.00

CONTROL DEVELOPMENTS LTD., 11A Fauvel Rd., Glossop, Derbyshire

THE COMPLETE WORKS

We supply all you need to build your own clock — Grandfather/Mother, traditional or modern. Yes, Charles Greville & Co. offer you from stock the most comprehensive range of Europe's finest clock movements and dials. Plus British plans and kits. Easy to follow — simple instructions and prompt attention from a long established family business. We supply the movements and the choices. A satisfying hobby — a D.I.Y. project — build an heirloom. Send today for free literature on our comprehensive service. Also available two full colour brochures showing vast range of clock movements and accessories for antique, long case, bracket, cuckoo, battery clocks, barometers, etc. 60p (money refunded with first purchase). **Plans for other D.I.Y. projects available.**

CHARLES GREVILLE & CO.

Dept. ME13, Unit 5, Rear Airport House, Purley Way, Croydon
Tel: 01 886 2972



Authentic Railway Colours

As supplied to the National Railway Museum and Preservation Societies. Our 12 page catalogue now includes an abundance of additional information on dates, specs; and usage etc. Also available Full Size Railway Crest Transfers — see our advert in 17th Nov. and 1st Dec. *Model Engineer*.

Send 15p plus 9" x 4" S.A.E. to

PRECISION PAINTS CO. LTD.

EXMOUTH STREET, CHELTENHAM, GLOS. Tel: (0242) 29878

Our paints are available from all leading Model Shops
Trade enquiries welcome

Barrow Hales

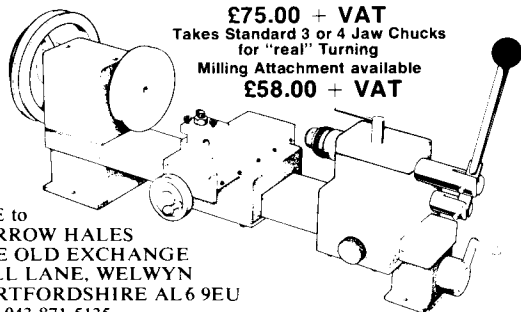
50 mm CENTRE LATHE

£75.00 + VAT

Takes Standard 3 or 4 Jaw Chucks
for "real" Turning

Milling Attachment available

£58.00 + VAT



SAE to
BARROW HALES
THE OLD EXCHANGE
MILL LANE, WELWYN
HERTFORDSHIRE AL6 9EU
Tel: 043-871 5135

DURHAM & NORTH YORKSHIRE 6 H.P. TRACTION ENGINE in 2" SCALE

Flywheel	£7.20	Chimney base	£4.50
Cylinder Set	£28.00	Smokebox ring	£4.80
Piston	£1.00		

All prices + Postage & V.A.T.

Our latest Illustrated Catalogue 30p (\$2.00) Post Free

LoCo Parts

Model Engineers

Callers by Prior Arrangement

P.O. Box 24
Station Road
Avonmouth
BRISTOL
Tel: Avonmouth 2363

COLIN M. GRANT LIMITED

33 Balmore Road, Glasgow G22 6RJ Tel: 041-336 8741

UNIMAT THREE

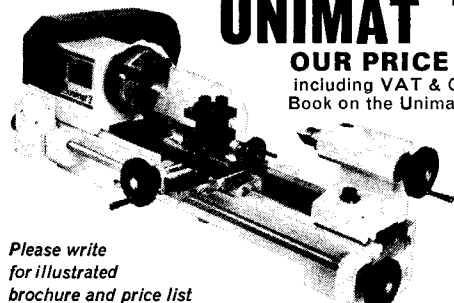
OUR PRICE £137.50

including VAT & Carriage, plus 'The Book on the Unimat' by D. J. Laidlaw
Dickson

EXTRA

3-Jaw Chuck
£20.52

Vertical Drilling/
Milling
Attachment
£41.04



Please write
for illustrated
brochure and price list



The Steam Fittings Specialists

GOLDEN HILL FORT
FRESHWATER, I.O.W. PO40 9TF

Axle Pumps to Whistles

S.A.E. for free list

Trade Enquiries Welcomed

F Y N E

I sland made
T ender Hand Pumps
T ender Water Valves
I njector Valves
N uts and Cones
G auge ONE to Gauge SEVENS

See our display at
MODEL CRAFT Stand 52

CLASSIFIED Advertisements

All Classified Advertisements must be pre-paid.

Private and trade rate 12p per word (minimum £2.00). Box numbers 50p extra.

Display Box rate £6.25 per column inch (maximum 2").

Box replies to be sent care of Advertising Department, P.O. Box 35, Bridge Street, Hemel Hempstead, Herts., England HP1 1EE. All advertisements will be inserted in the first available issue. There are no reimbursements for cancellations.

The Advertisement Manager reserves the right to refuse or suspend advertisements without giving any reason. Every care is taken to avoid mistakes, but the publishers cannot be held liable in any way for clerical and printing errors or omissions. Receipt of 'copy' for publication implies acceptance of these conditions by the advertiser. Whilst every care is taken to exclude advertisements from doubtful sources, no responsibility can be accepted by the publishers for the bona fides of advertisers.

WORKSHOP EQUIPMENT

Wanted: Genuine 5" Holtzapffel or Evans metal turning sliderest. Mint condition essential. Box No. 3462, (Merseyside), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. E

OXFORD ARC WELDERS

Give you full control of the welding current essential for quality welding from the thinnest materials upwards. No gimmicks—just properly engineered oil and air cooled arc welders from £52

Free Leaflet from:
C. G. & W. YOUNG Ltd. (Oxford Welders)
Colne Road, Twickenham, Middx.
Tel: 01-894 5168 and 01-894 7767

Unused tools etc. offers invited. Verdict T500 DT1 c/w attachments. M & W 6" x 4½" Surface plated boxed. Potts milling attachment. M & W 0-6" depth micrometer. Eclipse 5" x 2½" magnetic chuck boxed. Box No. 3461, (Merseyside), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. E

MYFORD SUPER 7, ML7R, ML10, BOXFORD ME10, UNIMAT SL and UNIMAT 3 Lathes and Accessories. Engineers small tools, metals, precision hand tools.

Complete Workshops purchased.

G. M. H. BUNCE & CO. LTD.
206 West Street, Fareham, Hants

Tel. Fareham 234136 Closed Wednesday all day

Wanted: Denham 5" lathe, or Boxford, Southbend, etc., any condition. Also: Vertical miller and bench drill. Tel: Sheffield 334303 or write Box No. 3463, (S. Yorks), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. EFG

WE MUST CLEAR STOCKS

Swiss Precision Files Still Available — 50 Ass. Shapes-Cuts-Lengths £12.50. Other parcels of Files available — **Rush your orders while stocks last.** Send 20p for our list of tool bargains and claim your **Free Precision File** — All goods post free except overseas orders. **No Callers.**

**B & B, 17 Lingfield Road, East Grinstead
Sussex RH19 2EX**

Fully equipped ML7 with motor clutch, long c/slide, chucks. Moles Vertical Milling attachment. ¾" bench drill. All almost new £700. Box No. 3465, (Bucks), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. E

Offers are invited for the following redundant equipment situated at various schools. 9 metalwork lathes, 14 woodwork lathes, 2 Polisher Grinders, 2 Compressors, 1 Pottery Kiln, 2 Circular Saws, 1 Potter's Wheel, electric, 1 Pugmill, 2 Bandsaws, electric, 3 Electric Drills, 1 Whetstone, electric. Forms of offer with details of makes and locations available from the County Supplies Officer, Suffolk County Council, County Supplies Department, Long Street, Ipswich, IP4 1LQ, (Tel: 55801 Ext. 469) and are returnable by not later than Friday 9th February 1979. E

PETER CRISP OF RUSHDEN

Unimat 3, Cowell Tool Department

Myfords Lathes and Accessories.
Precision, Hand and Power Tools
by leading makers.

Pulleys, Belts and Bearings.
Sureweld Electric Welders and
Accessories.

Sievert L.P. Gas Appliances.
Drills, Reamers, Taps and Dies.
M.E. Series our speciality.

25p P.O. for lists. Rushden 56424-7

High Street, Rushden, Northants

Lathe: Willmot 3" S.C., S.C. chuck, face plate, change wheels, on C.I. stand, £40. S.A.E. **Wanted:** Change wheels for 3½" Drummond. 5 Fairfield Road, Isham, Kettering, Northants. E

Myford Swivelling Vertical Slide, good condition, £20. Also large Universal Dividing Head with 6" chuck, old but in reasonable condition. **Offers:** Box No. 3459, (Avon), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. E

"A Happy New Year to all!"

Watch out for new B.R. number sheets for 3½"/5" gauges, plus new red/white lining sheets for B.R. and L.N.W.R. locos, curves and straights — all due soon!

Available now and growing popular, "Layaline" yellow lining sheets curves and corners included. Two sizes 64th and 32nd widths both 60p. per pair. plus post charge of 25p per order.

0.8.0. Netta for sale £1300 (3½" g)
Send for our complete list of items, S.A.E. to:

ASHDOWN MODELS

**"Witchwood", Blackness Road
Crowborough, Sussex TN6 2NA**

Unimat SL, 3 and 4-jaw chucks, drill chuck, slow speed, index, steady, grinder, £150. 2 years old, v.g.c. Tel: 01-647 2447. E

Tom Senior Vertical Milling Machines type "E", ex-stock. Automation Extras (Machine Tools) Limited, 15 Belgrave Road, Gloucester. Tel: (0452) 27650. EF

MATERIALS

BRASS, STAINLESS STEEL, NYLON ALUMINIUM, COPPER AND BRONZE

plus other hard to obtain materials. Bar and sheet offcuts available as usual at about half normal retail price. Catalogue No 13 now ready, price 20p. Includes drill sets, reamers, grinding wheels, silver solder, screws, stellite, callipers, files and many other interesting items. Plus our comprehensive range of stock materials, second-hand equipment and machine tools.

J. A. CREW

Spinney Lane, Aspley Guise, Milton Keynes

One number 2' x 1' 6" surface plate for sale. Offers over £60 considered. Tel: Medway 43721. E

Columbia 6" x 55" B.G.S.C. Gap and Vee Bed lathe on legs, 6" chuck, change wheels, fix and travelling steadies, face and catch plates, etc. Good condition, £350 o.n.o. Clifford Tel: Kirkby Thore 338 Cumbria. E

H.S.S. NUMBER DRILLS

Full set Nos. 1-60 in metal case £16.95
or your own selection, min. order £1.50

Nos.	Price each	Nos.	Price each
1-4	47p	26-29	28p
5-8	41p	30-42	23p
9-12	37p	43-70	18p
13-25	33p	71-80	24p

H.S.S. CENTRE DRILLS

BS1 — 42p, BS2 — 49p, BS3 — 63p, BS4 — 81p
New 5" Bench Grinder with coarse and fine wheels, 230 V. 2990 r.p.m. £32.50
Mitutoyo Combination Square Set £38.85
(Recommended price £45.69)

Prices include VAT and Postage

Satisfaction or money refunded. Cheque/P.O. with order please. Other tools also available, list sent on request.

MILLHILL SUPPLIES

35 Preston Crowmarsh, Benson
Oxon. OX9 6SL

Boley 6 mm Watchmaker's lathe with 18 collets, Universal 3-jaw chuck, compound slide, set of five step chucks, bell chuck, mandril face plate, pivoting attachment, set of three lantern chucks, countershaft and motor. £350 o.n.o. Private. Tel: Maidenhead 26239. E

WE BUY, SELL & EXCHANGE

model engineering tools and machinery.

EQUIPMENT WANTED

we collect and pay cash. Also part built 3½ in., 5 in. & 7½ in. gauge locos wanted.

M.E. SALE & EXCHANGE

25 Vale Road, Tunbridge Wells, Kent
Tel: 0892 39227

Collection new craftsman made precision tools suitable model engineer, including vee blocks with clamps, adjustable scribing block, drill and pipe vices, bottle jacks, calipers, etc. Value £70, accept £45 or would separate. Tel: Leeds 771507 E

ENGINEERS SAVE UP TO 75%

Send S.A.E. for free New bargain list

Pack 82	6 Hand Chasers, various	£3.50
Pack 33	6 Tungsten Tool Bits	£2.50
Pack 41	25 Engineer's Taps, assorted	£3.75
Pack 65	10 10" HSS Hack Saw Blades	£1.50
Pack 69	3 HSS Ground Tool Bits 5/16 sq.	£1.75

Add 7p per £1 for p.p. + 8% VAT on total

GRAHAM ENGINEERING LTD.
 Roebuck Lane, West Bromwich
 Tel: 021-525 3133

Perfecto 7" Power Shaper £165, Fobco 1/2" Bench drill £140, Milling table 15" x 4 1/4" as used on "Rodney Plus", £100. All new and unused. Cash only. Buyer collects. Tel: Mansfield 29489. E

We have in stock New Myford ML10, ML7, ML7R, Super 7 and Long Bed Super 7B. New Elliott Unimat 3. Bench drills by Starrite, Meddings etc. Nippy machine vices. Drill sets, toolbits, boring bars, centre drills etc.

Let us have your enquiries by post or phone to:

R. & N. ELDERS

7 Oldhams Rise, Macclesfield, Cheshire
 Tel: Evenings or Weekends 0625 28343

New Myford ML10, ML7R, Super 7B lathes and new VM-C milling machines in stock. 5" D.E. Grinders £27. Bench drill 2 MT with 3/8" chuck £189. All single phase. Hasland Machine Tools, 6 Stortford Trading Estate. Tel: Chesterfield 33993. T/C

"MATOSA" QUALITY ROTATING CENTRES

Twin dual load bearings. Sealed lubrication. Nos. 1, 2 or 3 Morse Taper Shanks. Offered at approx. half price **ONLY £12.50** inc. post and VAT. **SATISFACTION OR CASH REFUNDED.**

MACHINE TOOL SALES

Sparks Lane, Cuckfield, Sussex

Washita & Arkansas Whetstones: large selection including modelmaker's patterns available direct from importer. S.A.E. for lists. C. J. Rufino, Manor House, South Clifton, Newark, Notts. T/C

Measuring Instruments

Verdict Dial Test Indicators, 1" dia. Dial, Pear Shaped Stylus, Reversible. 0-15-0 by 0-0005" or 0-0-25-0 by 0-01 mm. Standard fitting, in case. £11.00. **Magnetic Stands** to suit; 3" tall, 1" dia Magnet, 1/4" dia Rod, with Universal D.T.I. clamp £3.75.

Carl Zeiss Suhl Micrometers, Ratchet Thimble, Enamelled Frame, Superb Value, 0-1" or 0-25 mm; £8.49. 1-2" or 25-50 mm; £11.99.

All cased. **Zeiss Suhl Depth Micrometers**, in wooden case with rods; 0-4" or 0-100 mm £20. Prices include postage. State whether inch or metric required.

A. D. TAUNTON

9 Elmtree Avenue, Esher, Surrey

The "Five-Way" Tailstock Turret, part finished £19.80. Send S.A.E. for illustrated leaflet. Peter Walker Engineers, Millstone, Stubton, Newark, Notts., NG23 5BY. C/F

SMALL CYLINDER HONE

Infinitely adjustable between 3/4" and 1 1/2". Flexible shaft drive. Three independently mounted cutting stones. Many uses for model engineer. Price £4.50 + 20p P&P. Spare stones available 180 and 320 grit. £1.25 per set of 3, post free. Together with mounting instructions.

HONING FLUID

Now available. Specially refined and blended honing fluid. Price £1.25 per 8oz. jar, post free.

N. TAYLOR

56 Southfield Lane, Horbury, Wakefield
 West Yorkshire. Tel: Wakefield 273893

Buck & Ryan for lathes and workshop accessories, drilling machines, grinders, electrical tools, surface plates, etc. 101 Tottenham Court Road, London W.1. T/C

MODEL MAKERS FURNACE

At last a small propane gas-fired furnace every model maker can afford, melts Aluminium, Silver, Brass, Copper, etc. Ideal for Lost Wax Modelling, Hardening and Tempering, Jewellery Making, 101 uses, no workshop can afford to be without one. Complete with Burner, Pipe and Pressure Valve, at a fraction of the list price. **ONLY £29.90**. P/P £2, limited quantity at this price, (gas bottle not supplied).

STAR SPORTS CO
 54 Mount Street
 Walsall, West Midlands

Boxford Aud Mk II 4 1/2" x 22" centres B.G.S.C. (Cabinet mounted), 1 h.p. single-phase motor, with coolant system. Very little used. Drawbar, Collet Adaptor, Nose Cap and Collets 1/16" — 1/2" in 16ths (round). Burnerd Chucks 6" 4-jaw independent hard and soft jaws, 5" 3-jaw selfcentring Griptru hard and soft jaws inside and outside, 3 1/2" 3-jaw selfcentring hard and soft jaws inside and outside. 2 Jacobs 3/8" Chucks on No. 2 M.T. Bed-mounting micrometer stop. 4-way Toolpost. Travelling Steady. 5" Catchplate, 8" Faceplate. Various centres and lathe tools. Some dogs. Toolpost Grinder (not used on lathe yet). Complete 1978 Replacement circa £2,000. Offers £1,250 o.n.o. Box No. 3468, (Herts), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts. HP1 1EE. E

The DORE SIMPLE INDEXING DIVIDING HEAD for MYFORD ML7 and SUPER 7 LATHES.

Send S.A.E. for details of this and other workshop items to

HEMINGWAY

30 Links View, Rochdale, Lancs.
 OL11 4DD

MODELS AND MATERIALS**N.Y.C. HUDSON CASTINGS**

4-6-4

1" SCALE—3 1/4" GAUGE

WE NOW OFFER IN 3 1/4", 7 1/4", 7 1/2" GAUGES
 FREIGHT CAR AND TRUCK CASTINGS,
 ENDS, AND WHEELS, DRAWINGS

ALSO LOW TARGET SWITCH STANDS
 1 1/4" SCALE, READY TO FASTEN TO
 YOUR POINTS—\$16.50

CATALOGUE \$1.50

REFUNDABLE ON FIRST ORDER

C. A. HOFFMAN, 25 THORNRISE CR.
 KITCHENER, ONTARIO, CANADA
 N2M 4V9

7 1/4" gauge: battery-electric locomotives, rolling stock, alloy rail. S.A.E. list: Pfeifferbahn, Withnell Station, Abbey Village, Chorley, PR6 8DA. E/J

If you have a model to sell, consult **STEAM AGE**. Though specialising in Locomotives and Traction Engines we are interested in buying models of all descriptions.

STEAM AGE

59 CADOGAN STREET
 LONDON, S.W.3
 Tel. No. 01-584 4357

Tich and Rob Roy drawings, castings, tools and materials supplied. Speedy service. S.A.E. for list. Rowland M.E.S., 37 Kynance Crescent, Brinsworth, Rotherham, S60 5EW. EFG

RAILWAY EQUIPMENT

For 3 1/4" to 10 1/2" GAUGES

Complete sets of track parts, points, bogies, wagons, carriages, signals, etc. Electric, and Steam Locomotives. Railway planning and construction.

Send 25p for illustrated brochure. Overseas 50p by Postal Order only

CROMAR WHITE RAILWAYS

Western Road, Stratford-Upon-Avon
 Warwickshire
 Tel: 0789-38878

For Sale: New 3 1/2" gauge Rob Roy 0-6-0T locomotive. Well engineered. Current boiler, test certificate. £900. 26 Arundel Avenue, Ewell, Surrey. Tel: 01-393 4545, weekends only. E

**PEN-MODELS**

342 LAKESHORE
 ROAD E.,
 OAKVILLE, ONT.
 CANADA L6J 1J6
 (416) 844-6418

Reeves & Stuart Castings, Myford, Tools and

Materials, etc. M.A.P. Books

Cat. 6-74 \$1.50

Also Boats, Planes, Trains Zg-'O'g
 Plastics and Meccano

9-6 Mon.-Thurs., to 9 Fri., 5.30 Sat

Model Engineering equipment. Loco in progress, genuine sale as one lot. Buyer removes, help given. £650 negotiable. Box No. 3460, (Dorset), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. S.A.E. please, genuine enquiries. E

LOCOSTEAM

New catalogue No. 11 — 50p

FOR MATERIALS AND CASTINGS
 * See our advertisement in the next M.E.*

LOCOSTEAM MODEL ENGINEERS
 37 Victory Road, West Mersea
 Colchester, Essex CO5 8LX

Tel: West Mersea 2392

Engineer required to finish a 3 1/2" gauge tank locomotive. Box No. 3464, (Yorkshire), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. E

JOHN SHORT LOCOMOTIVES BOILER SPECIALISTS

For all copper boilers
 from 3 1/2 in. to 10 1/4 in. gauges

11 Sunny View, Winkleigh
 Devon EX19 8HS
 Winkleigh 252

Complete 7 1/4" gauge steam railway with track points and coaches. A. Martin, Kingswood Colliery, A5, Churchbridge, Cannock, Staffs. E

R & A MEARS

Model Makers and Suppliers

STOCKISTS OF

Plans, Castings, Nuts, Bolts, Rivets, Materials and Accessories for the Live Steam Constructor. Locomotives and Boilers constructed to order.

Send for catalogue and price list

P. O. Box 85, Padstow 2211
 N.S.W., AUSTRALIA

5" Gauge "Speedy". Recently overhauled and repainted. Current boiler certificate. Boiler by Fred Stone. £1100 o.n.o. Dean, 176 Crewe Road, Haslington, Crewe, Cheshire. Tel: Crewe 584088. EF

STEEL, BRASS, ALUMINIUM

Most sections available from stock. Send S.A.E. for completely revised list of over 200 stock lines to:

ANDERSON & JARVIS LIMITED
Point Pleasant Works, Putney Bridge Road
London SW18 1TU
Tel. No. 01 874 2424/25

Simplex, machined wheels, axles, cranks, hornblocks/studs, frames (95%) spacers, shaped firebox with flanged plates and backhead, £42. Box No. 3466, (Avon), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. E

John R. Procter, 65 Buckingham Road, Brighton (0273) 23696 and five minutes from Brighton station but 'phone first please. Would like to purchase traction engines and locomotives from 'O' gauge to 3½". Too old to lift 5'1

4 — Millbro scale model coaches in 2½" gauge, in L.M.S. Crimmon lake; with sprung equalised bogies, also 2½" gauge Caledonian "Cardean" spirit fired 4-6-0 locomotive and tender. Box No. 3467, (Herefordshire), c/o Model Engineer, 13-35 Bridge Street, Hemel Hempstead, Herts., HP1 1EE. S.A.E. for details. E

WANTED: 2½" Gauge Spirit fired locos also rolling stock, signals, etc. Any condition.

Tel: Haywards Heath 51893.

Collector requires model steam locomotives (part built considered), also railway relics, photos, films and slides. 54 Gainsborough Road, Dronfield, Nr. Sheffield. Tel: 416599. E

BUY DIRECT — SAVE £££'s

Model Steam Boiler Specialist
R. R. CHAMBERS
37 Wyke Oliver Road, Preston
Weymouth, Dorset DT3 6BW

Boilers. All silver soldered with Test Certificate
Phone after hours 0305-833295
Daytime 0305-813438
S.A.E. all enquiries please

Steam Locomotives, traction engines, stationary engines bought, sold, exchanged. Any size, condition or age. Complete models preferred. John Doyle Locomotives, 227 Kingsway, Manchester M19 2WB. Tel: 061-224-4602. CDEF

COPPER, BRASS, STEEL, ALUMINIUM
Rounds, squares, flats, hexagons, tubes, angles, sheets.

NUTS, BOLTS, WASHERS, RIVETS, etc.
Catalogue of over 450 stock lines, plus TOOLS—30p

SUPERSCALE LIMITED
Bentalls, Basildon, Essex, SS14 3DD

Seen My Cat? Now 31 years old. No. 91 free. 5000 items Mechanical/Electrical. K. R. Whiston, "M.E.", New Mills, Stockport, SK12 4PT. W-H

SCALE MODEL COACH BOLTS AND SQUARE NUTS

Axles, materials, steel strip and wood for model wagon builders, also authentic model horse brasses, and harness parts. Send 3 x 9p stamps for full price lists and colour brochure showing horses.

LENHAM POTTERY
215 Wroxham Road, Norwich, NR7 8AQ

MAKE HANDSOME CLOCKS

for Pleasure or Profit... with our superb electronic and quartz battery movements from the world famous KIENZLE Works. With every one we include a traditional style dial beautifully screened on metallic gold card. The quality of our movements can be judged by the repeat orders we enjoy. Send SAE for details now:
SMS/Kingswoode (ME1), 24 Holwood Road, Bromley, Kent BR1 3EB

¾ full size 7½g Maunsell S.15 4-6-0 new and professionally built and painted to highest scale standards, all copper boiler by Fred Stone, to be sold with ¼ mile scale alloy track, points, 7 bogie passenger cars and engine shed. Suitable private or commercial use. Tel: 037-977 205. CDE

The full range of

O. BURNABY BOLTON DESIGNS

for Live Steam Locomotives, Stationary and Marine Steam Engines to 3" bore, I.C. Engines 0.3 cc. to ¾ h.p., Boilers and Model Ships is now available from
E. & J. WINTER

MODEL ENGINEERS SUPPLIES
P.O. BOX 126, WALLSEND
2287 N.S.W. AUSTRALIA

Sole Agents for Australian-made HAMWIN TOOLS
Please send for catalogue and price lists—A\$3.90

3½" gauge, live steam locomotives of prototype appearance only required for display purposes. Excellent prices paid for good examples. All enquiries answered, distance no object. All model railway literature, catalogues, etc. are still required for our research library. State your price and within reason we will meet it. New Cavendish Books, 65 Marylebone High Street, London W1M 3AH. Tel: 01-486 7063. L-1

'SIMPLICITY'

- ★ Battery powered narrow gauge passenger hauling diesel locomotive, 5" Gauge £275
- ★ Also available in easily finished fully machined, part assembled kit £215
- ★ Rolling stock (Box van-Wagon etc) from £75
- ★ SAE to (prices plus VAT)

MAXITRAK

Rothiemay, Otham Road, West Malling, Kent

Nuts and Bolts: 10 BA, £2.25; 8 BA, £2.10; 6 BA, £1.80; 4 BA, £1.90; 2 BA, £2.65; 0 BA, £3.30 (prices per 500 assorted pieces including postage). Minfordd's (ME), Ffestiniog, N. Wales. (S.A.E. lists.) A-F

Send \$1.00 for a list of plans of items you can build in your own Shop.

Plans are proven and reasonably priced. Catalogue lists 21 plans of various items such as 11" Radial Aircraft Engine — Two Stern Wheel Steam Engines — Rotary Table — Dividing Head — Four Steam Engine Models, two with boilers — Seven useful lathe accessories — Two Conversation Pieces — Precision Standing Table and Square

CATALOGUE SENT BY AIR MAIL

\$1.00 refund on first order

SAMUEL K. HODGSON

3908 Greenbrier Drive
Dallas, Texas — 75225

Iron, Gunmetal, Brass, Aluminium castings to your patterns or drawings. Enquiries to: Jaystock Foundry, 19-21 Oak Street, Norwich, or Tel: Framingham Earl 3725. E

WANTED

First class 3½" gauge or 5" gauge locomotive. Prepared to pay a very good price for a good model. Also interested in traction engine, or good road vehicle.

Phone Mr. R. Wills
Forest Row 2969 daytime or 2857 evenings
(London Code 034-282)
or write Rystwood Corner, Forest Row, Sussex

CAST IRON BAR

BS 1452 Grade 17 (Meehanite GC Equivalent). Flake Graphite Iron, very close grained and 100% porosity free. Ideal for Pistons, gears, shafts etc. Available from 30 mm dia. upwards cut to length. Price on application.

STEEL BAR

Available from 25 mm dia upwards, cut to length. 6p per lb. ex works.

MODEL CASTINGS

To customers patterns and specifications. Free Advice given.

Contact Mr. Brown

ARKDENE LTD.

Pallion Foundry, Sunderland, SR4 6PX
Tel: (0783) 74987

Allmodels for Perspex, Nylon, P.T.F.E. Acetate, etc. Plastics catalogue 30p. Lathes, Tools, Metals, etc. catalogue 40p. Industrial and Exhibition models. All-models Engineering Limited, 91 Manor Way, Ruislip, Middlesex. Tel: Ruislip 74126. T/C

Merryweather Steam Fire Engine 1888. For Sale

A magnificent Merryweather horse drawn Steam Fire Engine of 1888. All fittings original, and in excellent condition, including engine and pumps. Original paintwork. The engine has not been steamed for many years and will require overhauling. This is a rare opportunity for an enthusiast to undertake or direct restoration. When completed the fire engine would, without doubt be amongst the finest in existence. Health reasons reluctantly force its sale. Serious enquiries only please.

Phone 0602-326101

Just completed, new Romulus 0-4-0 (Steam) with tender for driver (Roger Marsh design) 7¼ gauge, together with 500' of steel track. Delivery to customers requirements. Offers around £4,000.00.

VALLEYSIDE GARDEN CENTRE LTD.

Bell Hagg, Manchester Road
Sheffield S10 5PX. Tel: 0742-301925

5" g. Screw Couplings as described M.E.£9.00 VAT. P&P extra. "Simplex" expansion links and Die Blocks £10.00 pair or complete assys. £23.00 VAT. P&P extra.

Moreton Precision Models Ltd.

Grays Lane, Moreton-in-Marsh
Glos., GL56 0LS

7¼" NARROW GAUGE

KERR STUART "WREN"

Coming from the drawing board of Ken Swan, designer of "Bridget" and "Jessie", this brand new model locomotive design should appeal to builders interested in narrow gauge. Forty original Kerr Stuart drawings are being used as guidance in designing this model which is to a scale of 3¼" to the foot. Although almost ½ full size the dimensions and weight of the model are very modest and handling should not prove too difficult. To date 10 drawings are completed and most iron castings are already available ex stock.

Send £1.40 plus 16p postage for full size, fully detailed drawing of Sheet 1 — General Arrangement, or enclose S.A.E. for leaflet giving more details.

KEN SWAN

Dipwood Way, Rowlands Gill, Tyne & Wear
Tel: Rowlands Gill 2560

BOOKS AND PUBLICATIONS

American Railroad Box — modelling, diesel, steam, trolleys. "Model Railroader", "Railroad Model Craftsman", "Live Steam", "Trains", "Traction & Models" etc. subscriptions. List 15p. Clyde, Box G, 6 The Mount, Ewell, Epsom, Surrey, KT17 1LZ. E-A "Model Engineer" back numbers. From 1946 at 10 pence each. Buyer collects from Bookshop, 104 Pitshanger Lane, London, W.5. (Open Wednesdays to Saturdays). Tel: 01-997 6454. E

The largest range of **MODELBOOKS** can be obtained from the following:

- ★ Albion Scott Ltd., 51 York Road, Brentford, Middx. Mon.-Fri. 9-5.30.
- ★ Bewdley Bookshop, 7 Welch Gate, Bewdley, Worc. Mon.-Fri. 9-5.30, Sat. 9-1.
- ★ Foyle's, Charing Cross Road, London (Dept. 7). Mon.-Sat. 9-6.
- ★ Also worldwide mail order, write for lists or see the MODELBOOK advertisements in this and other modelling magazines.

Model Engineer always available/wanted. T.E.E., 216 Coventry Road, Hinckley, Leics., LE10 0NG. T/C

Model Engineer bound from £5, unbound from £3.50. Individual copies from 25p. Tel: Watford 26128. B-E

Marshall Portable Steam Engine

in 1½ inch scale

Drawings for this W. J. Hughes design are available from:

HISTORIC STEAM

Beighton, Sheffield S19 6EP

Sheets 1-17 now ready: 60p each plus 15p P&P any number

£80 "minimum" offered for M.E. volumes 1-80 (portions welcomed, available). Lambert, 60 Salhouse Road, Rackheath, Norwich, NR13 6AA. C-N

SERVICES

IRON CASTINGS FOR THE MODEL ENGINEER

Iron castings to customer's patterns or specifications. Enquiries or patterns to:

Phil W. Gibbons, F & G Foundry Co
Fen Road, Baston
Peterborough PE6 9PU

Tel: Greatford 209 & 386 STD code 07786

Professional painting and lining service, live steam models a speciality. Competitive prices for quality work. K. Crawley, 5 Mile End Green, Dartford, Kent. Tel: Longfield 6845 evenings. E-H

FROM AUSTRALIA

Castings available for the following:

LOCOS 7¼" Highlander, Bridget, Jessie.
5" Boxhill, Simplex, Nigel.
3½" Gresley, Juliet, Tich.

Machinery

Evening Star, Mountaineer, Green King, Hielan Lassie.
Westbury Mill (large and small version), vices, rotary Table, vertical slides, dividing heads, sander, marking out plates 18" x 12" (finish ground), division plates. Finish yourself 4" centre lathe.

Engines

Vertical Engines — 3" x 2½" and ½" x ¾" Paddle engine. Traction Engines — Allichin, "Minnie" and 2" Showman's.

Machining Service available. Send SAE for details and enquiries to:

NORTH EASTERN ENGINEERING

72 Buena Vista Drive, Montmorency, Victoria Australia. Tel: Melbourne 439 7572

Brass, Bronze, Gunmetal and Aluminium castings made to customers' requirements. Enquiries to: Wils-tead Pattern and Castings, 10 Dane Lane, Wils-tead, Beds., MK45 3HT. C-H

GENERAL

NEW SCREW LIST

SEND S.A.E. FOR LIST "N.S.L."

NOW OVER 125 SIZES AND

TYPES CUT THREAD

CLERKENWELL SCREWS LTD

107-109 CLERKENWELL ROAD

LONDON EC1

01-405 6504

For Sale: Dimensioned construction drawings muzzle loading artillery and vehicles. S.A.E. to: Howard, 17 Trevor Road, Ainsdale, Southport, Merseyside, PR8 3PJ YACEGI

"Moleskin" Trousers, 100% cotton, lovat or brown shades. Slim leg, cross pockets, hip pocket. Sizes 30" to 44"; leg lengths 28", 30", 32", £16, plus 90p postage. Also 100% cotton corduroy trousers (our speciality for over 50 years). Mind-fawn only, other details as above. £16.50 plus 90p postage. C.W.O. delivery by return. Refund guarantee. Hebben Cord Co. Ltd., Desk K, Hebben Bridge, West Yorkshire. HX7 6EW.

WANTED

Model White Metal kit assemblers for building and spraying models (must have own airbrush equipment.) Hand painters not required. Rewarding job with first class wages.

There is also work for scratchbuilders on one-off models. The work is mainly on 4 mm. buses and trams.

We do not require timewasters please — only people who can do what they say they can and deliver on time.

Ring **Mr. Varney, Transport Replicas Ltd.**, 01-698 5457 for appointment.

Projectors direct from Manufacturer. Combined 2" x 2" and 2¾" sq. 35 mm stereo. Viewmaster reels, back projection viewers. Microfilm Readers and Screens. Episcopes (5" x 5"). Also Optics, Fans, Lamps. S.A.E. for leaflets stating interest. Marshall Smith Ltd., 64-74 Norwich Avenue, Bournemouth. T/C

HOLIDAY '79

Cottage to let in Snowdonia National Park, at head of Tally-Y-Llyn Railway and within easy reach of several other light railways. Sleeps 5 max. — Mr. Walters, Sedge Cottage, Admaston, Nr. Rugeley, Staffs. or phone Walsall 32595

Interchangeable watch material etc., lowest prices (UK only), no lists — quotations S.A.E. J. H. Young & Son, 133 London Road, Chippenham, Wilts, SN15 3AN.

Wanted: Sub-contract work for "Pultra" Capstan lathe, large or small batches. Quotations upon receipt of drawings, sketches, etc. Burrows, 3 Ocean View Cottages, Coastguard Lane, Freshwater Bay, I.O.W. DE

Post Bag

The Editor welcomes letters for these columns. Pictures, especially of models, are also welcomed. Letters may be condensed or edited.

Drummond Round Bed Lathes

SIR.—I have recently acquired one of these excellent old machines, No. 3703. It is the type with separate head bearings, which I understand would date the machine about 1910.

I came across the lathe, in of all places, a Garden Centre, looking very forlorn, and heaped with all sorts of rubbish.

I bought the machine, stripped it down, cleaned and rebuilt it, and it is now in almost daily use and giving excellent service.

The machine had been fitted with epicyclic back gear within the largest drive pulley, the tailstock is now ejector-type, and index's have been fitted to cross-feed and lead screw. These mods have been well made and fitted, and work very well indeed.

I was very interested in the letter by Mr. G. Crewe, who mentioned that he has in his possession an original booklet by Drummond Bros. on this machine, and I would like to ask you if it would be possible to have a

copy taken of this. I would gladly pay any expenses involved.

I would like to mention in passing that I have taken the *Model Engineer* for the last 35 years and still can't get my hands on it quick enough, even though it is usually 6 to 8 weeks old when I receive it.

Elizabeth Field, South Australia

John K. Gallery

Die-ing Threads in the Lathe

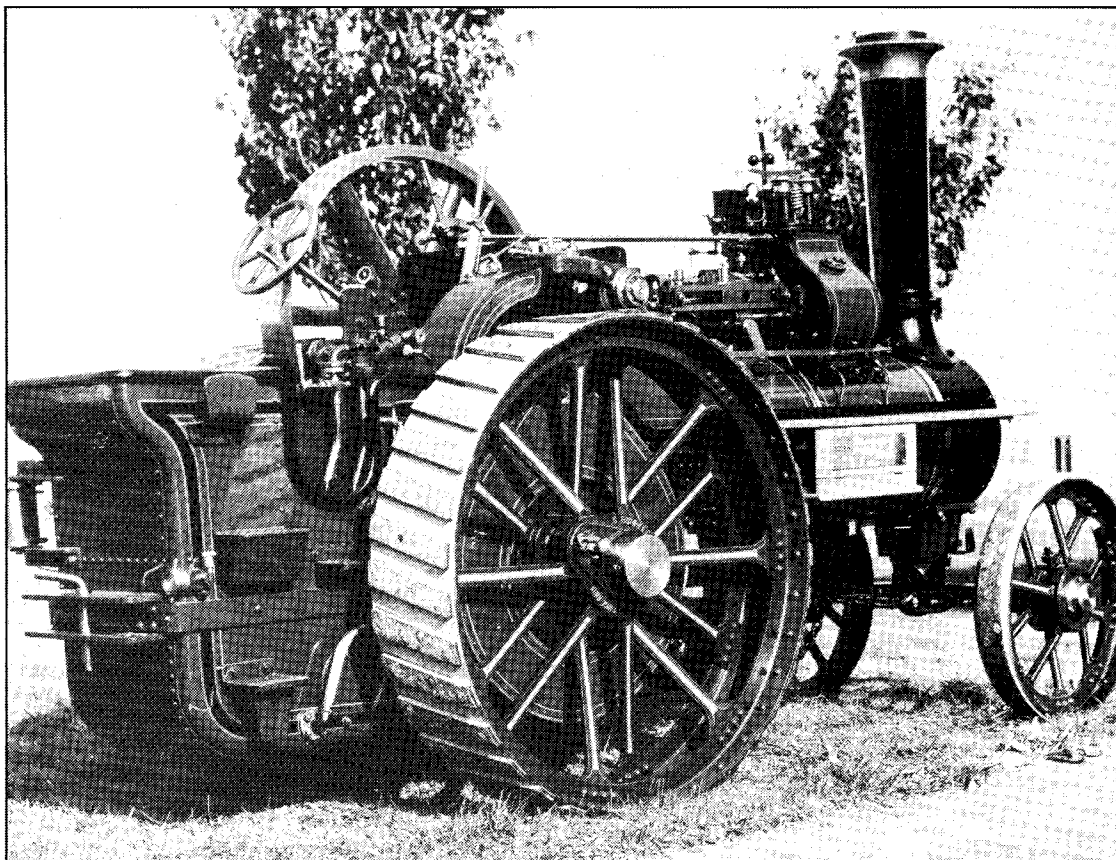
SIR.—The following dodge has never been published in the *Model Engineer*, to the best of my knowledge.

When applying a threading die to a piece of material which requires to be threaded, hold the work in the lathe chuck. Place the drill chuck in the tailstock and position the latter so that the drill chuck face is touching the back side of the die stock as the die begins to cut the thread. Since the face of the drill chuck will be pretty nearly perfectly square with the lathe axis, the die will be started on the work about as squarely as possible. As the die advances onto the work, the right hand advances the drill chuck via the tailstock handwheel to maintain the die square with the work. (A helper to turn the countershaft pulley to and fro is a great help here, as the left hand will be busy with the die stock.)

I have used this procedure with good results on numerous occasions. I do not claim to have originated it, for it was shown to me by another member of our local S.M.E., and I have seen others here also doing the same thing.

West Vancouver, Canada

Guy Lautard

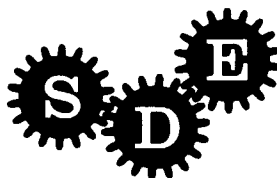


**Half full size working replica of Burrell
'Devonshire' 5 N.H.P. Single Crank Compound
Traction Engine of 1904**

We are currently building a limited batch of these engines for sale to discerning clients.

They are built to a very high standard to Burrell's original drawings and we believe them to be the finest half-scale traction engines built.

For further details, please apply to the Managing Director.



South Dorset Engineering Co.(Weymouth) Ltd.

Precision Engineering, Fabrication & Assembly

Contractors to Admiralty and UKAEA

Defence Standard 05-24 Registration No 78770/1/01

**1 Kent Close, Granby Industrial Estate
Weymouth, Dorset DT4 9TF**

Telephone Weymouth 2865 (030-57)

Model Engineering Books by post

... the easy way to receive those titles of special interest to you. Simply send the order coupon to Argus Books—the number one publisher and distributor of hobby books!

THE AMATEURS WORKSHOP. Ian Bradley. Deals with all phases of turning, milling in the lathe, shaping, drilling, knurling, screw cutting, reaming etc. A highly prized reference source for the serious engineer. 445 line drawings and pictures. 210 × 146mm, 265 pages. Casebound £4.75.

VERTICAL MILLING IN THE HOME WORKSHOP. Arnold Throp. Describes, with illustrations, many of the wide range of operations which can be performed. These cover work on model locomotives and other machinery. 215 × 138mm, 76 pages. Paperback £1.95.

BUILDING THE ALLCHIN-Modelling 'Royal Chester', a 1½" General Purpose Traction Engine. W.J.Hughes. fully illustrated and scale drawings. 242 × 153mm, 256 pages. Limp edition £6.95.

THE BOOK OF THE UNIMAT LATHE. D.J.Laidlaw-Dickson. A profusely illustrated working manual for novice or expert. 216 × 138mm. Paperback £2.75.

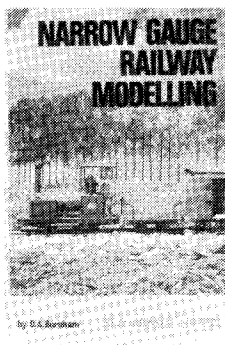
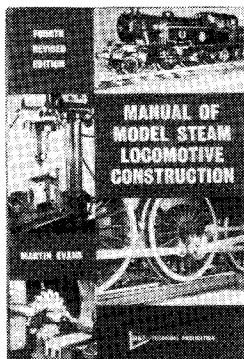
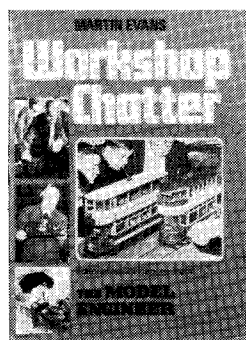
MAKING THE MOST OF THE UNIMAT. Rex Tingey. Based on original material from the 'Model Engineer' magazine, showing how to get much improved performance from your machine. 215 × 276mm, 128 pages. Paperback £3.75.

BACKYARD FOUNDRY.

B.T.Aspin. A sequel to 'Foundry work for the Amateur' covering all aspects of foundry work, well illustrated throughout with many stage by stage sequences. 184 × 121mm, 128 pages. Perfect bound, card cover. £2.25.

NARROW GAUGE RAILWAY MODELLING. D.A.Boreham. This classic work reappears in a revised edition after being out of print for a long time. Full coverage of all the latest ideas and developments. Copious new pictures and drawings. 138 × 216, 153 pages. Casebound £5.50.

MANUAL OF MODEL STEAM LOCOMOTIVE CONSTRUCTION. Martin Evans. Fourth revised edition. A book to savour for the armchair enthusiast and the serious model engineer. Lavishly illustrated with diagrams drawings and photographs. 241 × 142mm. 172 pages. Casebound £4.75.



THE BEGINNERS WORKSHOP. Ian Bradley. Setting up a home workshop; selection of tools, installation, maintenance and practical uses of machine tools and hand tools. Primarily for beginners but abounding in useful hints and tips for all. 186 × 123mm, 256 pages. Casebound £3.00.

SCREW THREADS AND TWIST DRILLS. 4th edition. Ian Bradley. A valuable work which includes a wealth of information on thread cutting methods by lathe and hand, tabulated references, equipment, taps and dies. Amply illustrated. 184 × 121mm, 120 pages. Paperback £1.75.

WORKSHOP CHATTER. Martin Evans. A pot-pourri of people and things. The ingenuity of modelmakers and the amazing models they built; traction engines, steam ploughs, battleships, roundabouts, steam locos, stationary engines, not forgetting the small lathes and accessories made or adapted for model engineering. Lavishly illustrated. 222 × 160mm. Casebound £4.75.

FOUNDRY WORK FOR THE AMATEUR. B.T.Aspin. Mould and pattern making and casting for model making or other purposes. Many helpful illustrations and drawings. 184 × 121mm. 108 pages. Paperback £1.95.

MODEL ENGINEER VOL 144 Part 1. Handsomely bound six monthly issues of the 'Model Engineer', Jan-June 1978, ready to update the serious modellers library. Casebound £12.50.

TO: ARGUS BOOKS LTD. 14 St.James Road, Watford, Herts.

Please rush me the titles I have indicated in the boxes below.

- ☐ The Amateurs Workshop.
☐ The Beginners Workshop.
☐ Screw Threads and Twist Drills.
☐ Foundry Work for the Amateur.
☐ The Book of the Unimat Lathe.
☐ Making The Most of the Unimat.
☐ Vertical Milling in the Home Workshop.
☐ Building the Allchin.
☐ Backyard Foundry.

NAME

ADDRESS

- ☐ Narrow Gauge Railway Modelling.
☐ Model Engineer Vol 144 Part 1.
☐ Manual of Model Steam Locomotive Construction.
☐ Workshop Chatter.

Prices as stated plus 50p P & P, I enclose cheque/P.O. for

ARGUS BOOKS LTD.