

No. 320



AN INDEX CHUCK

Alan Jackson repurposes an old chuck for milling machine indexing

MODEL ENGINEERS' WORKSHOP

THE MAGAZINE FOR HOBBY ENGINEERS, MAKERS AND MODELLERS OCTOBER 2022 ISSUE 320 WWW.MODEL-ENGINEER.CO.UK

CROSS SLIDE IMPROVEMENTS FOR YOUR MINI-LATHE

Three useful enhancements for your Mini-Lathe



COAXIAL INDICATORS FOR MILLING MACHINES

Bernard Towers made two different devices for his mill



INSIDE THIS ISSUE



A TILTING WELDING TABLE

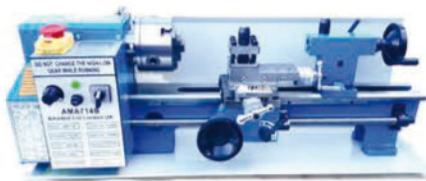
A versatile solution from SMAC

- A SIMPLE RADIUS TOOL FOR THE LATHE
- HOW TO: SHARPEN FOUR FACET DRILLS ON A TOOL AND CUTTER GRINDER
- FITTING A COUNTERWEIGHT TO A FLOOR STANDING PILLAR DRILL
- AUSTIN HUGHES SHOWS HOW TO ADAPT A HORIZONTAL BANDSAW FOR VERTICAL USE
- COMPLETING WILL DOGGETT'S CHAIN SAW ALTERATION TOOL
- MAKING AND EXPERIMENTING WITH TELESCOPE EYEPieces
- HAND SKILLS: FITTING FLAT AND RIGHT-ANGLED SURFACES

OCT. 22
£5.75



MORTONS



AMA714B Mini lathe
Brushless Motor

SPECIFICATION:

Distance between centers: 350mm
Taper of spindle bore: MT3
Spindle bore: 20mm
Number of spindle speeds: Variable
Range of spindle speeds: 100-2250mm
Weight: 43Kg

Price: £694



AMABL250Fx750

SPECIFICATION:

Distance between centers: 750mm
Taper of spindle bore: MT4
Spindle bore: 26mm
Number of spindle speeds: Variable
Range of spindle speeds: 50~2500rpm
Weight: 140Kg

Price: £1,904

W 2 Axis DRO - Price: £2,280



AMABL290VF Bench Lathe (11x27) - power cross
feed - BRUSHLESS MOTOR

SPECIFICATION:

Distance between centers: 700mm
Taper of spindle bore: MT5
Taper of tailstock quill: MT3
Motor: 1.5kw
Weight: 230Kg

Price: £2,395

W 2 Axis DRO - Price: £2,787



AMAVM25LV

SPECIFICATION:

Model No: AMAVM25LV (MT3) / (R8)
Max. face milling capacity: 63mm
Table size: 700x180mm
T-slot size: 12mm
Weight: 120Kg

Price: £1,360.00

W AXIS POWERFEED - Price: £1,659

W DRO - Price: £1,730

W DRO + PF - Price: £2,045



E3 Mill R8 Metric Brushless Motor

Direct drive spindle.
No gears. No belt

SPECIFICATION:

Max. drilling capacity: 32mm
Max. end milling capacity: 20 mm
Max. face milling capacity: 76mm
Motor: Input- 1.5KW
Packing size: 1050x740x1150mm
Net weight: 240kg

Price: £2,560.00



AMAVM32LV

SPECIFICATION:

Model No: AMAVM32LV (MT3) / (R8)
Max. face milling capacity: 76mm
Table size: 840x210mm
T-slot size: 14mm
Weight: 240Kg

Price: £1,962.00

W AXIS POWERFEED - Price: £2,081

W DRO - Price: £2,363

W DRO + PF - Price: £2,856

See website for more details of these machines and

many other products including a large range of accessories that we stock

Prices Inc VAT & Free Delivery to Most Mainland UK Postcodes

www.amadeal.co.uk

| Call: 0208 558 4615 | Email: info@amadeal.co.uk |



MODEL ENGINEERS' WORKSHOP

EDITORIAL

Editor: Neil Wyatt

Designer: Andy Tompkins

Publisher: Steve O'Hara

By post: Model Engineers' Workshop,
Mortons Media Group, Media Centre,
Morton Way, Horncastle, Lincs LN9 6JR
Tel: 01507 529589 **Fax:** 01507 371006
Email: meweditor@mortons.co.uk
© 2022 Mortons Media ISSN0033-8923

CUSTOMER SERVICES

General Queries & Back Issues

01507 529529

Monday-Friday: 8.30-5pm

Answerphone 24hr

ADVERTISING

Group advertising manager: Sue Keily

Advertising: Angela Price

aprice@mortons.co.uk Tel: 01507 529411

By Post: Model Engineers' Workshop advertising,
Mortons Media Group, Media Centre,
Morton Way, Horncastle, Lincs LN9 6JR

PUBLISHING

Sales and distribution Manager: Carl Smith

Marketing Manager: Charlotte Park

Commercial Director: Nigel Hole

Publishing Director: Dan Savage

Published by: Mortons Media Group,
Media Centre, Morton Way, Horncastle,
Lincs LN9 6JR

SUBSCRIPTION

Full subscription rates (but see page 54 for offer):
(12 months 12 issues, inc post and packing) - UK
£56.40. Export rates are also available - see page
46 for more details. UK subscriptions are zero-
rated for the purpose of Value Added Tax.

Enquiries: subscriptions@mortons.co.uk

PRINT AND DISTRIBUTIONS

Printed by: William Gibbons & Son,
Wolverhampton

Distribution by: Marketforce (UK) Ltd, 3rd Floor,
161 Marsh Wall, London, E14 9AP 0203 787 9001

EDITORIAL CONTRIBUTION

Accepted photographs and articles will be paid for upon publication. Items we cannot use will be returned if accompanied by a stamped addressed envelope, and recorded delivery must clearly state so and enclose sufficient postage. In common with practice on other periodicals, all material is sent or returned at the contributors own risk and neither *Model Engineers' Workshop Magazine*, the editor, the staff nor Mortons Media Ltd can be held responsible for loss or damage, howsoever caused. The opinions expressed in MEW are not necessarily those of the editor or staff. This periodical must not, without the written consent of the publishers first being given, be lent, sold, hired out or otherwise disposed of in a mutilated condition or, in any unauthorised cover by way of trade or annexed to or as part of any publication or advertising. literary or pictorial matter whatsoever.

This issue was published on June 17, 2022.

The next will be on sale on July 22, 2022.

MORTONS
MEDIA GROUP LTD

recycle
When you have finished with
this magazine please recycle it.



On the Editor's Bench

What do you want to see in Model Engineers' Workshop?

This issue is, I think, only the second in over 100 issues I have edited that contains a full three pages of 'Scribe a Line'. Many and perhaps most of the letters and emails I receive are responses to articles within the magazine. I also receive many messages on more general aspects of MEW, as well as seeing much discussion of the magazine on the forum at www.model-engineer.co.uk.

The recent change of publisher has facilitated making some changes to the magazine, and perhaps the most consistent response has been the diversity of readers' views. The same seems to apply to readers views on content, and our last issue generated some particularly polarised opinions. For some readers the issue strayed too far from our core subject of the small workshop, others responded positively to the individual articles. One reader lamented an article as a suitable topic for the magazine, while another got in touch to welcome the guidance on a problem they were currently struggling with. You can't please all the people all the time, but with this issue I have tried to concentrate more closely on practical workshop topics.

My overall impression is that most readers enjoy seeing some content that explores wider issues, but some don't. On balance, most like each issue to have plenty of content focused on workshop issues of tools, techniques and equipment but will enjoy, or at least accept, a few contributions on other, related, topics. Obviously making and modifying tools is always going to be at the heart of such content. Should we carry more reviews or workshop visits? How wide should the scope be when discussing how we use our tools – is the construction of a model solely the territory of Model Engineer, or if it focuses on the techniques involved, does it belong here? To what extent should we cover wider topics: engineering news, historic engineering, painting and finishes or electronics?

There are no right or wrong answers, as every reader has their own view on these issues – it is the editor's task to try and strike an acceptable balance. Soon we will be inviting readers to take part in a survey to get more detailed feedback on what you want to see in your magazine.

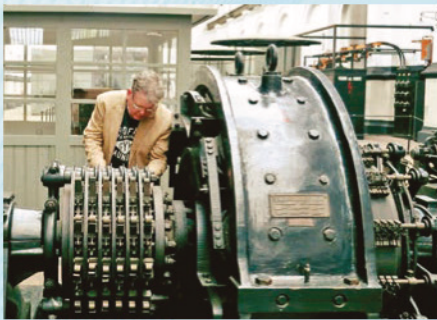
In the meantime, I am always open to your thoughts on these matters and interested in your offers of, and suggestions for, articles, in particular requests for specific topics to be addressed. My email is meweditor@mortons.co.uk, please feel free to share your views and feedback.

We have had enough entries to make the competition viable, but only just. As a result, the deadline for entries is being extended to 30 September, you only have a couple of weeks to enter, but to do so essentially all you need do is to send me three or four pictures and a description of a piece of tooling, jig or other workshop item.

Full details of the competition rules were in issue 318 and are on the website.

NEWTON TESLA

SMOOTH, QUIET, HIGH PERFORMANCE VARIABLE SPEED
CONTROL FOR LATHES AND MILLING MACHINES



Managing director George Newton, originally from the British Steel industry where he worked with 20,000 HP rolling mill drives is also a skilled machinist and uses his own lathes to design and refine speed controllers especially for the Myford ML7 & Super 7

For the Myford ML7, George and his team produce the AV400, a complete 'Plug & go' solution including a new variable speed motor that meets the original Myford motor specification, has the correct 5/8ths shaft diameter and is a direct fit

The 'AV' range is extended with the AV550 & AV750 for the Super 7 lathe giving a choice of 3/4HP & 1HP motor power Full Torque is available from motor speed 90 - 1,750 RPM. Advanced Vector control for maximum machining performance. Prewired and programmed ready to go. The AV400/550/750 speed controllers have an impressive 10 year warranty for the inverter and 3 years for the motor (Terms and conditions apply). Over 5,000 units supplied to Myford owners. Speed control solutions also available for other lathes including Boxford, Southbend, Colchester, Raglan etc call or email for details. Technical support available by telephone and email 7 days a week.

Newton Tesla (Electric Drives) Ltd.

Warrington Business Park, Long Lane, Warrington, Cheshire WA2 8TX,

Tel: 01925 444773 Email: info@newton-tesla.com

Visit <https://www.newton-tesla.com> for more information.

Follow us on Facebook: www.facebook.com/NewtonTeslaLtd



Si (Système international d'unités) Newton, unit of mechanical force, Tesla, unit of magnetic field strength

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

 **Tracy Tools Ltd**

Visit our brand new website

We ship anywhere in the world

www.tracytools.com

PRODUCTS

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

Acme
Taps

Taper Shank Drill
HSS

Reamer

Taps
&
Dies



Tracy Tools Ltd

Tap & Die Specialist, Engineer Tool Supplies

Tel: 01803 328 603

Fax: 01803 328 157

Email: info@tracytools.com

www.tracytools.com

metalcraft™

Hand powered metalforming tools

Handy for so many jobs

Punching



Cutting



Riveting



Bending



Rolling



Scrolling



Twisting



Also suppliers of
a wide range of
steel, fixings,
clock components
& much more.

Call today for your free catalogue and if you
quote our promo code* MMENGW21, we will
send you our demonstration DVD free of charge.

J & C R Wood Ltd, Dept MMENGW21, 66 Clough Road, HULL HU5 1SR

Tel: 01482 345067 Email: info@jandcrwood.co.uk

OR Visit our on-line store at

www.metal-craft.co.uk



MIDLANDS MODEL ENGINEERING EXHIBITION

THE SHOW FOR MODEL ENGINEERS



**THURSDAY 13th
to SUNDAY 16th
OCTOBER 2022**

Thursday - Saturday 10.00am - 4.30pm

Sunday 10.00am - 4.00pm

**WARWICKSHIRE
EVENT CENTRE**

...more than just an exhibition
- it's an experience...

Meet nearly **30 clubs
& societies**. See nearly
1,000 models. Learn
from the **experts** in the
workshops. **Buy** from
up to **50 specialists
suppliers**.



BOOK TICKETS NOW ONLINE AT
www.midlandsmodelengineering.co.uk

SPONSORED BY
THE MAGAZINE FOR MODEL ENGINEERS
**ENGINEERING
in Miniature**

EXHIBITION LINK BUS
from Leamington Spa Railway Station (not Sunday).

FREE PARKING
Ample parking for over 2,000 vehicles. Sat Nav CV31 1FE.

Tickets can be purchased in advance via our website
or purchased on the day of your visit from the ticket
office. If purchasing on the day please ensure you
have the correct change ready or pay by card.

TICKET PRICES

£11.00 Adult
£10.00 Senior Citizen (65+ yrs)
£5.00 Child (5-14)

Meridienne Exhibitions cannot process any
telephone bookings. If you have event specific
enquiries, please call 01926 614101. Meridienne
Exhibitions Ltd will continue to monitor and act on
advice from the Government. Please make sure you
visit our website for the latest information prior to
your visit.

f Meridienne Exhibitions LTD



RAILWAY MAGAZINES YOU'LL LOVE GREAT OFFERS AVAILABLE ACROSS THE RANGE



SUBSCRIBE TODAY AND SAVE UP TO 29%

VISIT: WWW.CLASSICMAGAZINES.CO.UK/RAILWAY22

CALL: 01507 529529 QUOTE: RAILWAY22

Contents

8 Tailstock toolholder

An unusual accessory from 1947.

9 Elevating a horizontal bandsaw

Austin Hughes explains how to convert a horizontal bandsaw for vertical use.

21 Beginners' Workshop

Geometer looks at techniques for hand fitting flat surfaces and 90-degree angles.

16 Drill grinding on a Worden

Howard Lewis describes the accessories he uses to sharpen four-point drills on his Worden grinder.

26 A topslide radius tool.

Peter Peters offers a simple and straightforward way to tackle radius turning.

27 Making eyepieces in the workshop

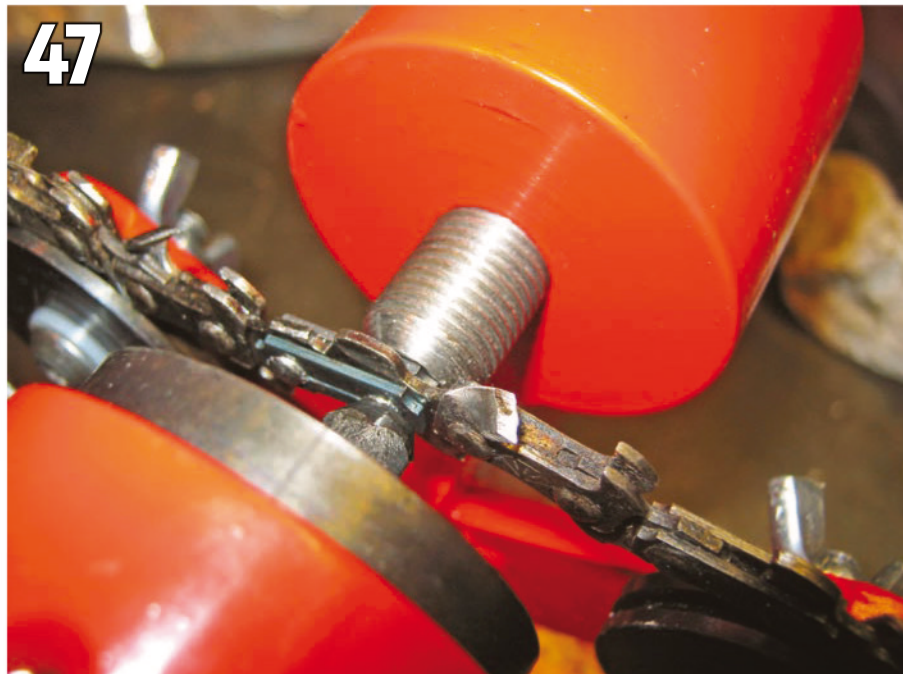
Stargazer encourages readers to do some optical experimentation in their workshops.

34 A Tale of two indicators

Bernard Towers needed an indicator to fit in the limited headroom of his Raglan mill and ended up making a pair of them.

35 An indexing chuck

Alan Jackson, known for his 'Stepperhead' lathe, describes a useful indexing accessory made using an old chuck.



40 Rust

Rust never sleeps... but there are ways to defeat it and keep your tools in good condition.

42 A portable welding bench

SMAC experimented with a range of solutions a before coming up with a satisfactory design.

47 A Chain Alteration Tool

Will Doggett concludes the construction of this rotary riveting tool.

56 A Table Counterweight for a Pillar Drill

Mike Philpotts designs and installs a

counterweight system for a Medding's floor standing pedestal drill table.

60 Modifying my mini lathe

Geoff Andrews returns with a number of valuable ideas for improving the cross-slide of these popular machines.



SUBSCRIBE TODAY!

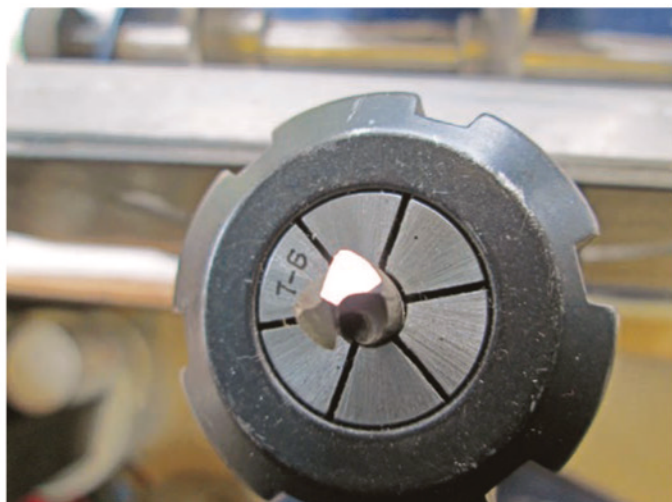
GET YOUR FAVOURITE
MAGAZINE FOR LESS
DELIVERED TO YOUR DOOR!

See page 54 for details.

Coming up...

in our next issue

In our next issue Laurie Leonard updates a system for using ER collets with a tool and cutter grinder.



Regulars

3 On the Editor's Bench

What content would you like to see in your magazine?

22 Scribe A Line

A bumper crop of reader feedback this month. Editor, Neil Wyatt, is always keen to hear from readers, just drop an email to meweditor@mortons.co.uk.

32 Readers' Tips

This month we look at a tip for extracting reluctant shaft keys.

52 On the Wire

More news from the world of hobby engineering.

66 Readers' Classifieds

Another fine selection of our readers' sale and wanted ads

ON THE COVER >>>

The cover of this issue shows a boring operation on the cross slide of Geoff Andrews' mini-lathe, see page 60 for details

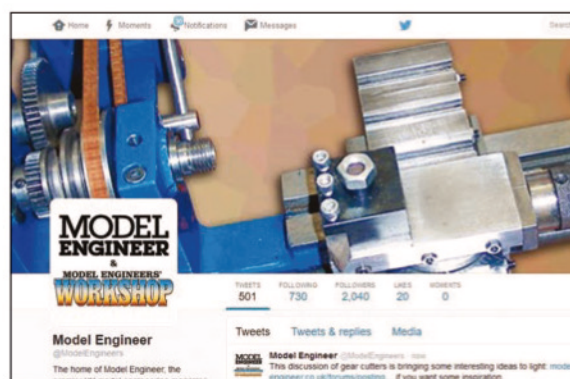


HOME FEATURES WORKSHOP EVENTS FORUMS ALBUMS

Visit our Website

www.model-engineer.co.uk

Why not follow us on Twitter:
twitter.com/ModelEngineers hashtag #MEW



THIS MONTH'S BONUS CONTENT

Log on to the website for extra content

Visit our website to access extra downloads, tutorials, examples and links.

www.model-engineer.co.uk/extracontent

Other hot topics on the forum include:

Keyway Cutting

Looking for advice, by Tom Gullan.

Anyone ever machined the damage from a mill table?

Will it bend like a banana? By Brian Abbott.

Learning the hard way - distortion caused by chucking forces.

Chucking a workpiece can cause distortion, by Robin Graham.

Come and have a Chat!

As well as plenty of engineering and hobby related discussion, we are happy for forum members to use it to share advice and support. If you feel isolated by the lockdown do join us and be assured of a warm welcome.

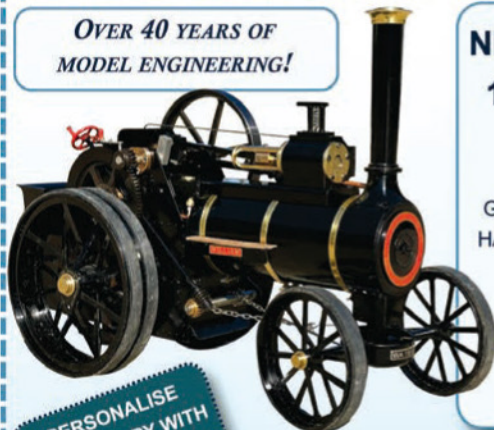
CLASSIFIEDS EXTRA SUBSCRIBE ARCHIVE SUPPLIERS

MAXITRAK.COM

The best of model rail and road.

Tel: 01580 893030 Email: info@maxitrak.com

OVER 40 YEARS OF
MODEL ENGINEERING!



NEW FOR 2022!
1.5" ALLCHIN

AVAILABLE IN
THREE LIVERIES
GAS/PROPANE FIRED
HAND & CRANKSHAFT
PUMP OPTIONS.

READY TO RUN
£3,495

PERSONALISE
YOUR LORRY WITH
GRAPHICS!



3/4" SCALE
SENTINEL DG6
BOX LORRY CONVERSION
READY TO RUN
£1,740

10-11 Larkstore Park,
Lodge Road, Staplehurst,
Kent, TN12 0QY

credit terms available

MAIDSTONE ENGINEERING SUPPLIES

01580 890066

MAIDSTONE-ENGINEERING.COM

info@maidstone-engineering.com

**One stop model
engineering shop**

Leading suppliers of fittings,
fixings, brass, copper, bronze, steel,
plastics, taps, dies, drills, machine tools,
BA nuts and bolts

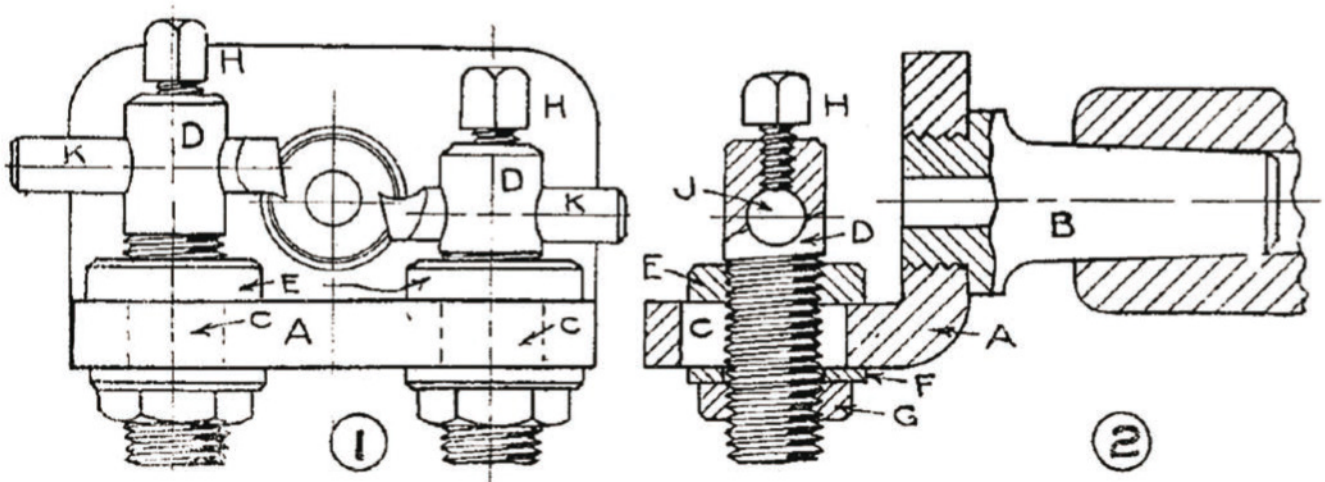
Browse our website or visit us at
**10-11 Larkstore Park, Lodge Road,
Staplehurst, Kent, TN12 0QY**



**Copper
TIG Welded
Boilers**



A vintage 'Lathe Tailstock Tool Holder'



Next year is the 125th anniversary of Model Engineer magazine. We've been looking at how MEW can celebrate its fellow publication's milestone; to whet your appetite here's a classic idea from 1947.

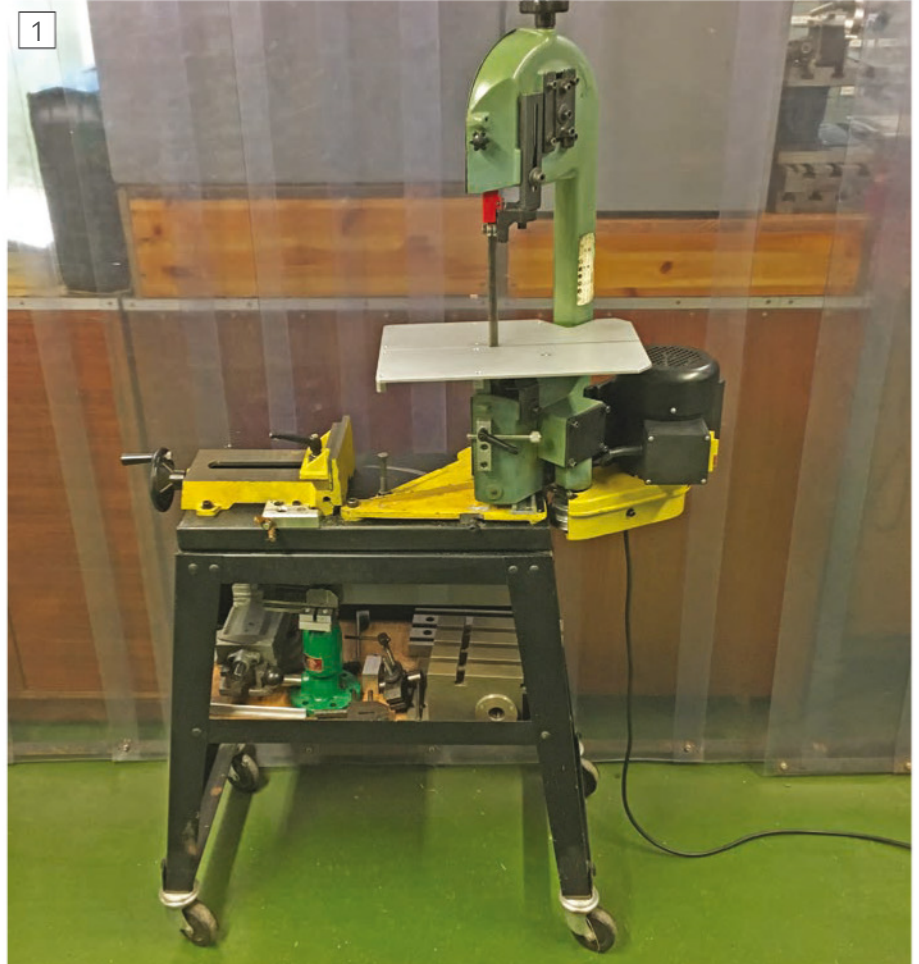
This 'Lathe Tailstock Tool Holder' was the subject of a short article by F Hall Bramley. In effect it's a sort of 'box tool' where you set the cutters to a pre-determined position and use it to cut a spigot on the end of work, typically as a repeat operation to make several parts on stock fed through the lathe spindle. The threaded sections allow for height adjustment. It's not clear from the drawing, but one of the two cutters should be set ahead of the other, allowing two different diameters to be cut in one pass to leave a shoulder. The hole in the mounting taper allows a plug to be inserted and used to help with setting up.

Elevating a Horizontal Bandsaw

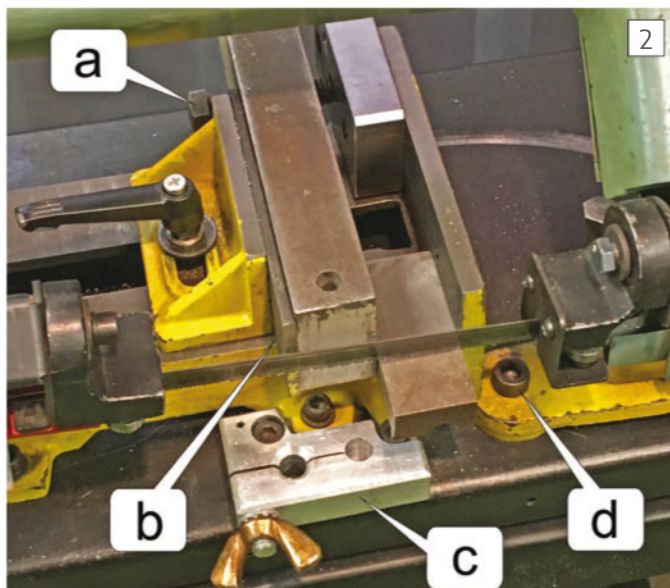
After many years of use, and various bits of tweaking, Austin Hughes' entry-level CY90 bandsaw from Warco has paid for itself many times over, so he decided to see if it could be further enhanced by being adapted for use as a vertical saw, and thereby be made suitable for sheet materials

Before turning to what would be needed, I am happy to admit that what finally emerged, **photo 1**, was effectively determined by a combination of what was in my stock of 'come-in-handy-sometime' materials, and what tools were available.

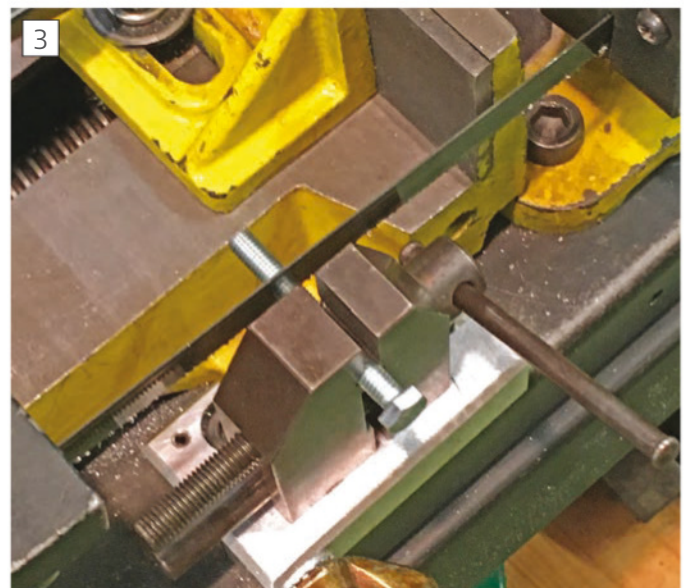
There must be others like me who find it easier to look in their stores and find something that sparks an idea, rather than start with a blank sheet and produce a design from scratch. I much prefer to make it up as I go along, even if this sometimes means scrapping a stage when a better way forward emerges. The bandsaw is a good example, where



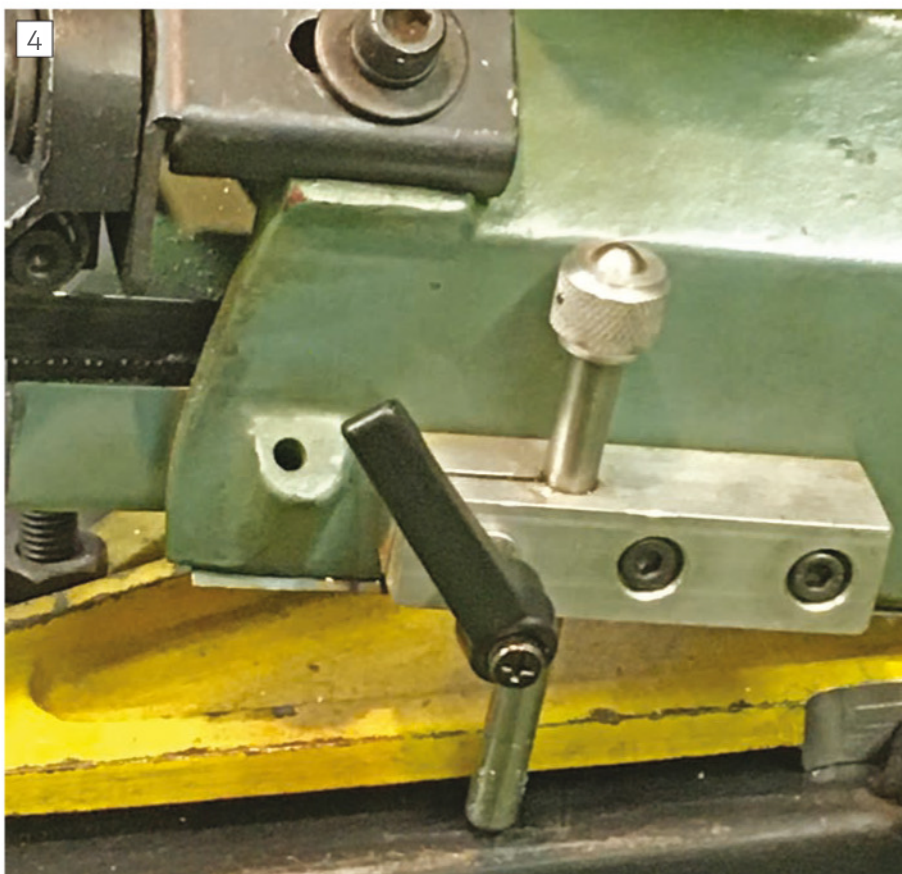
Saw ready for action



Previous additions in vise area



Instrument vice used for screw shortening



Adjustable stop to prop up arm

the base for the table was completed with a leftover piece of aluminium plate long before I began to seek something for the table itself, which eventually turned out to be from an entirely unexpected source.

Previous modifications

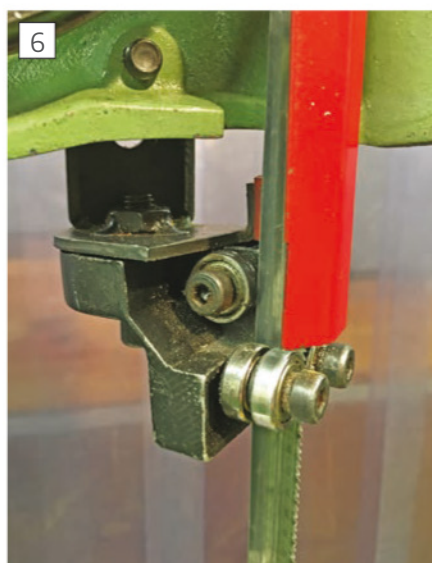
Soon after buying the saw, I fitted additional bracing members at the foot of the legs, a shelf to store heavy items and thereby improve stability, and heavy-duty castors: I wondered if two might be better than four, but found that a full set made for easy mobility without any tendency to 'walk' while in use.

The vice is probably its weakest link, and is not much use for holding items that are shorter than the width of the jaws, although the use of the block of steel with a jacking screw ((a) in **photo 2**) makes a big improvement. Recently our editor pointed out that the fixed jaws sometimes have a removable front plate that could be swapped to widen the shorter moving jaw: mine did, so I have tried this ((b) in photo 2), but can see it that it might restrict the width of material that can be cut by fouling the blade guide

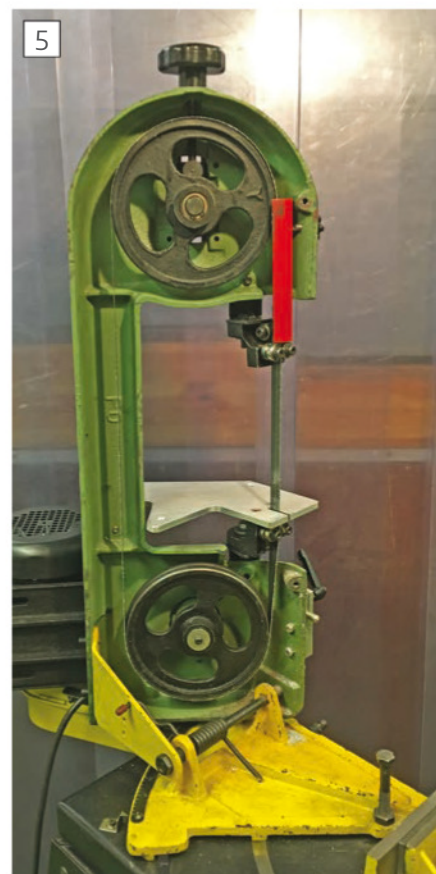
Holding small items can often be difficult, so I made a holder so that

an instrument vice can be clamped vertically on the outboard side of the blade ((c) in photo 1). **Photograph 3** shows an 8mm screw set up in the vice ready for shortening.

Positioning the workpiece in the vice while simultaneously holding the heavy swinging arm so that the blade is just clear of the work can be difficult, so I added an adjustable stop to hold the arm, as shown in **photo 4**. The plunger, clamped by the indexable handle, allows



Blade guide (idler pulley end)



Rear view of arm casting

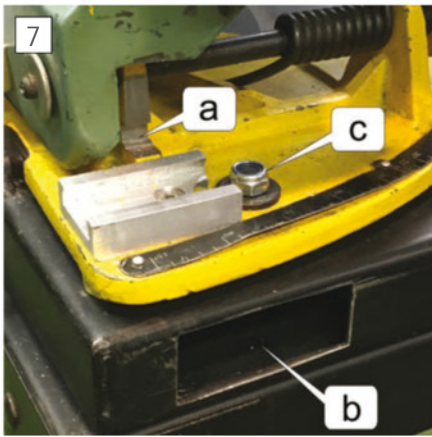
the arm to be propped so that the blade is just above the workpiece, making positioning easy.

Understanding the rest of this article should be relatively easy for anyone who is familiar with this type of bandsaw, but I have given an overview of the construction and operation of the saw to make it easier for a anyone who is new to the CY90 or similar to understand the changes made. Unfortunately, I have no 'beforehand' photos, so where this omission might cause confusion I have tried to clarify matters.

Construction and Operation of the Bandsaw

The motor, oil-filled and sealed gearbox, driven and idler pulleys, and blade guides are mounted on the substantial green cast 'arm', the back of which is shown in **photo 5**, with its thin steel cover removed.

The arm pivots on a shaft running in trunnions which project from the yellow sector-shaped casting also shown in photo 5. When the arm is in the horizontal position for cutting, its centre of gravity is well away from the pivot and a downward force of just over 5kg is applied to the blade, and hence to the workpiece. When the arm is lifted, the counterbalancing effect of the motor



Rear end of sector plate

and gearbox becomes significant, and a balance point is reached at about 35°, at which point a spring comes into play and provides a gentle restraint as the limit of about 45° is reached. The arm is parked in this position for blade changing.

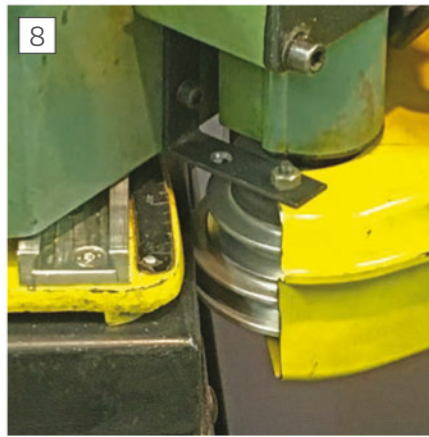
The keen-eyed reader will see that in photo 5, the arm is in the vertical position, that is well beyond the original limit of 45°: the reason of course is that this photo **was taken** after the modifications had been carried out.

Happily, both the arm and the sector castings are robust, the majority of the arm being thick enough to accept tapped holes up to at least 8mm diameter. The yellow sector casting is mounted on a decent fabricated base made from 2mm steel, to which the vice is fixed. Angled (mitre) cuts are obtained by slacking off a clamping screw, and swivelling the entire saw assembly about the pre-set bolt shown at (d) in photo 2. My impression is that more expensive saws often have a swivel vice instead.

The single-phase, 1460 rev/min induction motor has a 3-gang pulley with an A-belt driving a slightly larger set on the gearbox input shaft, and is mounted on slides for belt tensioning.

All of the superstructure is readily dismantled, although it helps to know in advance that the pivot shaft is screwed into the front trunnion.

Logically, it might be expected that in order for the front (cutting section) of the blade to be vertical, the axes of the pulleys would also be vertical, but, in common with most horizontal saws of similar size, the main arm carrying the pulleys is inclined at approximately 45° to the base, in order to prevent the 'return' side of the blade from limiting the length of workpiece that can be accommodated in the vice. The blade leaving the driven pulley therefore has to be twisted by 45° before it reaches the cutting section, and after leaving the



Gearbox input pulley and cutaway guard

cutting section it has to be twisted back again before it reaches the other pulley. Ball bearing rollers that rest on the sides of the blade do the twisting, and another bearing provides support for the back edge of the blade, **photo 6**.

Adjusting the guides to ensure that the blade cuts square can be tricky, but more by accident than design, matters have been improved by the modifications outlined below. (Incidentally, in most woodworking bandsaws the blade does not have to twist, so the side rollers are only brought into contact with the blade if it strays off course.)

Worn Idler Bearing

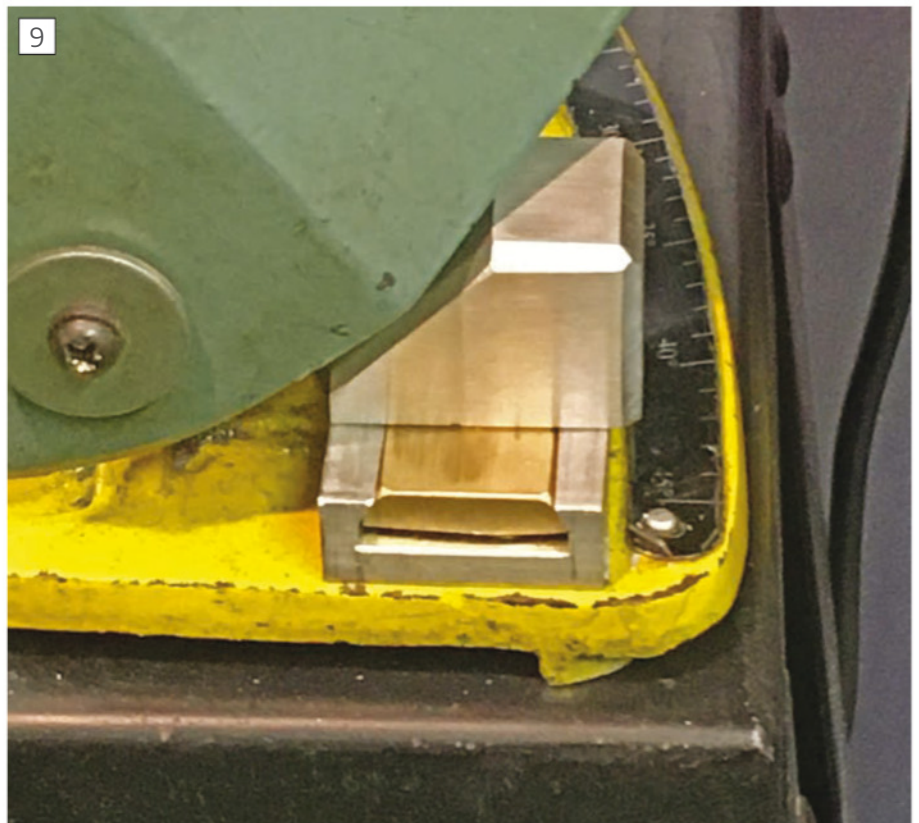
The blade tension is set by means of

the screw with large knob visible at the end of the arm (photo 5). I have only used it when changing a blade, so on dismantling everything for this project I was surprised to find that the idler pulley was very slack on its stub shaft. The shaft is mounted on a sliding base moved by the tensioning screw, and there is also a jacking screw that alters the orientation of the stub shaft in order to get the blade to run true on the rim of the pulley.

There was a lot of wear in the oilite bush, which is perhaps not surprising in view of the sideways load applied to it by the blade tension. It could not be persuaded out, so I resorted to mounting the pulley in a 4-jaw chuck and carefully machining most of it away until the rest could be broken out. The bore in the casting was not worn, and the bush is a standard size so a web search yielded a source for a replacement. I was relieved that when it was pressed in (using the tailstock of my Boxford), no boring or reaming was required and the stub shaft ran sweetly.

Requirements for Vertical Operation

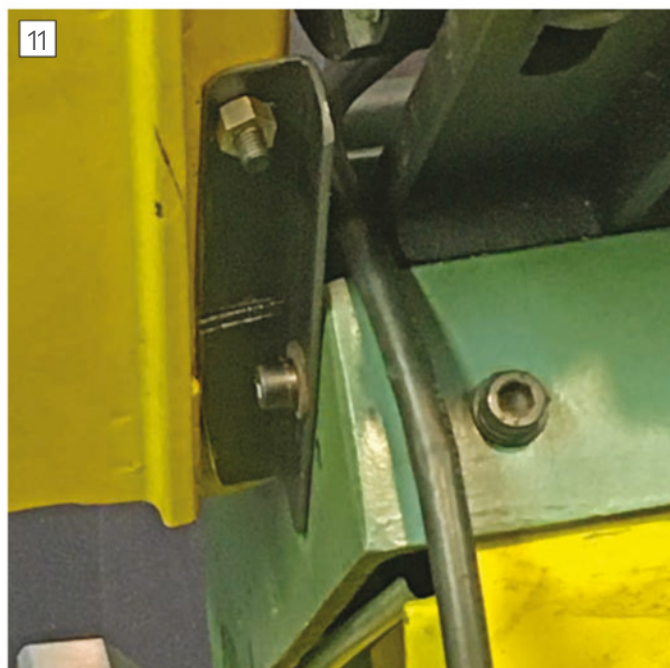
Most important by far is that changing from horizontal to vertical must be quick and easy because experience has taught me that long set-up times discourage me from doing things properly, with



Support for arm in its parked position



New bracket at front of pulley guard



New bracket at rear of pulley guard

subsequent regrets. Secondly, any changes must not be to the detriment of horizontal operation, which will remain the dominant mode. The other obvious requirements are that the table must be rigid and square to the blade in both axes, and the whole assembly must remain stable when the saw is in vertical mode.

Modifying the Arm to reach Vertical

The maximum angle to which the arm could be raised was originally limited when the right-hand end of the arm ultimately rested on the top of the combined nut and lever securing the sector plate clamping screw. The screw was originally fitted with a locking lever, which is released in order to allow the sector plate to be swivelled for angled cuts: but, as explained below, this has now been replaced with a lower-profile hexagon nut, shown at (c) in **photo 7**.

However, removing the lever only allowed the arm to advance by a degree or two more before the arm casting fouled the front trunnion. It was also clear that even when this second constraint was dealt with (see below), the extra few degrees gained would bring the pulley guard into contact with the fabricated steel base. Removal of the flimsy guard (subsequently refitted in cutaway form) allowed the arm to get a precious few degrees nearer to vertical before the large driven pulley hit the end of the steel base.

My immediate thought was to put both pulleys on backwards, so that the



Sub-table in permanent position

smaller driven pulley would be the one nearest to (but clear of) the base, but the motor shaft is stepped and it would have required its pulley to be bushed and rebored. Instead, I judged that by cutting away part of the end of the base to provide clearance for the pulley, the arm could reach the desired vertical orientation.

Having dismantled the saw, some of the trunnion was milled away ((a) in photo 7), and a rectangular hole was cut in the end of the steel base ((b) in photo 7): the aluminium channel is referred to later.

Re-assembly showed that there were adequate clearances when the arm was vertical, but not surprisingly it was past its equilibrium point and unless held it would tip further. A temporary end stop was inserted in the hole previously occupied by the clamping screw ((c) in photo 7), and to my delight

everything ran smoothly with the driven pulley protruding slightly into the slot in the base, **photo 8**. Despite the redistribution of weight, the whole saw remained stable on its castors.

Two issues remained. Firstly, how to prop the saw in its original 'up' (i.e. 45°) parking position when in its usual horizontal mode, and what to do about the pulley guard.

Holding the arm at 45° was achieved with the arrangement shown in **photo 9**. It comprises an aluminium base screwed to the yellow casting, into which slides a dovetailed brass bar carrying a block of aluminium with sloping front (all of which were offcuts). An 8mm grubscrew in the front face of the aluminium provides for minor adjustment. In the vertical mode, the end of the arm casting rests on the sides of the aluminium channel, which therefore serves a dual purpose.

The dovetail may seem over-elaborate, but it was to ensure that there was no possibility that the horizontal component of the weight of the parked arm might tip the block over. It works well, being easily released to change to vertical mode by slightly depressing the left end of the arm to take the weight off the block.

The lower end of the pulley guard was sawn off, which removed one of the original fixing points, so two new brackets were made for the front and back as shown in **photos 10 and 11** respectively. The ability to drill and tap into the arm casting made this an easy job. Although there is now some

exposure of the driven pulley, it is out of harm's way, and I've not written a risk assessment!

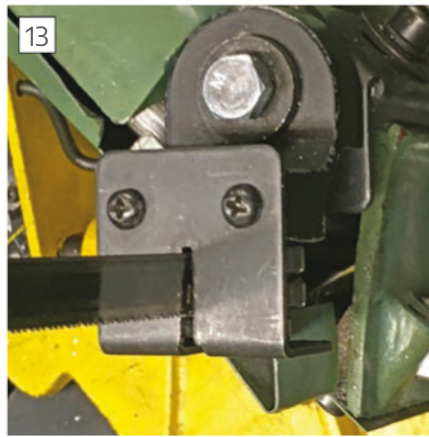
Table Base

To achieve the key requirement – ease of set-up – it seemed a good idea to have some sort of sub-frame or sub-table, that could be left permanently in place without interfering with the horizontal operation, but to which the full table could be attached easily for vertical working. I had a spare piece of $\frac{1}{4}$ "x 5" aluminium plate, so after several iterations with dummy cardboard templates, the sub-table took on the rather curious shape shown in **photo 12**.

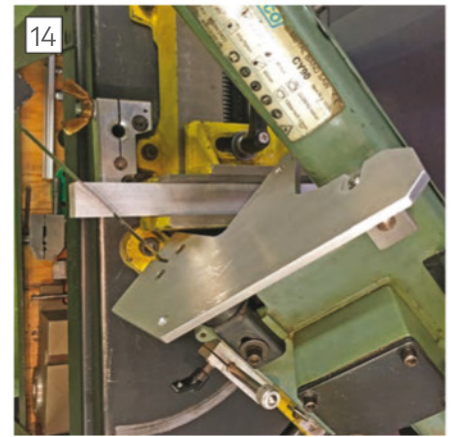
The sub-table is attached at three points. The two 5mm socket-cap screws adjacent to the blade take the place of the cross-head screws that originally held an L-shaped guard over the drive-end bearing housing, **photo 13**. The aluminium plate is only just over 6mm thick, so the screw heads were turned down slightly so that they do not project from the plate. The sub-table now shields the bearings from swarf in place of the original guard.

The advantage of fixing the table to the blade guide is that any adjustments to the angle of the blade (which involves slackening the hexagon headed bolt in photo 13 and swinging the guide assembly), is that the position of the table relative to the blade is automatically preserved. However, two closely-spaced 5mm screws are clearly not capable of providing sufficient rigidity, so additional support is provided by fixing one side of the sub-table to a block of aluminium attached to the arm, as shown in photo 12. A slot (just visible in **photo 14**) allows for minor angular adjustment of the blade guide, and this turned out to be an incidental benefit, because it provides welcome extra leverage for positioning the blade guide when making adjustments.

The twisted blade exerts a restoring torque on the guide, so previously, after slackening the hex screw (photo 13), it was difficult to both grasp the blade guide by means of the small L-shaped plate and at the same time adjust the angle before re-tightening the screw. The extra leverage now available via the sub-table makes adjustment much easier. I was so pleased with this unexpected bonus that I made a bespoke tool for adjusting the other blade guide from a piece of extruded aluminium that came from the bathroom reject referred to later.



Original cover over blade guide bearings



Plan view when set for 45° cut

The reason for the removal of the roughly square area from the original rectangular plate is revealed in photo 14, which is the view looking down on the vice with the saw horizontal and set to cut a 1" bar at the maximum mitring angle of 45°. The cutaway area prevents the plate from fouling the fixed vice jaw. Of course, if the workpiece were to project above the jaws, the sub-table would have to be removed.

An important parameter in any saw is its depth of throat, **photo 15**, which is only 75mm in this case. Hence if one wanted to make a long straight cut to trim material from the edge of a sheet, for example, the most that could be taken off at a time would be 75mm. I don't see this as a serious drawback for the sort of work that I do.

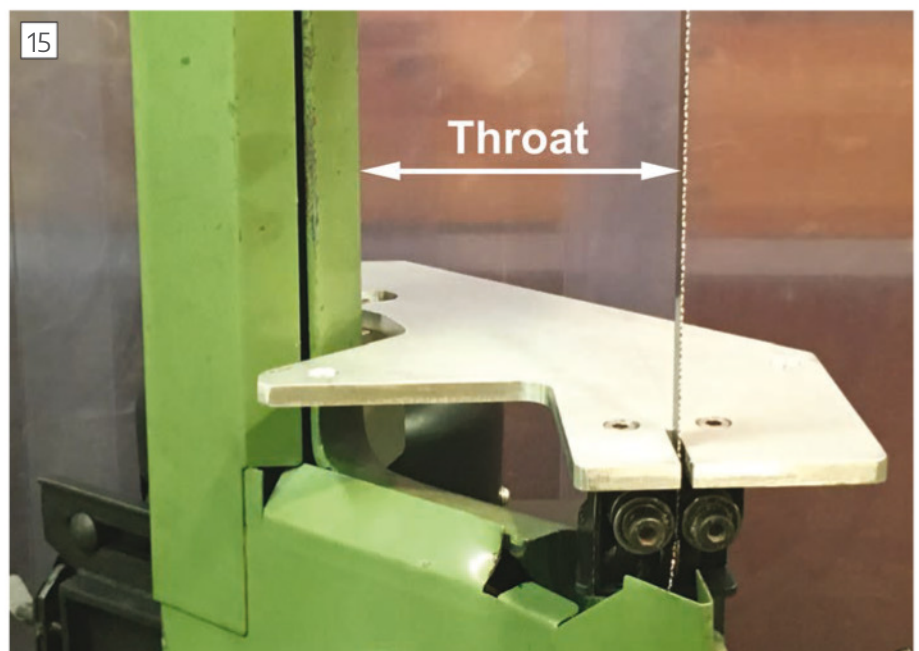
The bits of the plate that project to the left of the arrow defining the throat in photo 15 may seem superfluous, because when long cuts are made the workpiece

will never rest on them. The truth is that rather than being 'designed-in' their existence is due to the fact that the plate was 5" wide, and I always think it wise not to cut away metal that might later be useful. And so it proved, as one of the projections (hidden in photo 15) was used to anchor the sub-table, while the other provides one of the fixing points for the full table.

Work Table

As previously mentioned, I completed the sub-table before deciding on the shape and material for the top. Broadly speaking I had in mind a rectangle with the blade near its centre, a decent feed-in length to support the advancing work, and a corresponding feed-out area.

Because the blade is a continuous band, there has to be a long slot in the worktable to allow the top to be slid into place. After much experimentation with pieces of cardboard, I chose to locate the



The rather narrow throat

slot on the 'output' side of the blade, and finally settled on the proportions shown in **photo 16**, with the slot bisecting the width of the table.

To fit the table, it is brought in from the left, **photo 17**, and the slot is engaged with the blade, but because the side of the table is wider than the throat, it is necessary to angle the table and blade slightly to the right while advancing the table forward until the notch in the top clears the green arm, when the table and blade can be brought back into line.

The preferred table would be ground cast iron, but needless to say I did not have a spare lying about, nor did I have any metal that would do, so I was left with the choice between seasoned teak about one inch thick, or 15mm low-density plastic. Both were flat, and would be easy to cut on my wood bandsaw, although to keep the slot nice and straight I would be better off using a slitting saw on the mill. But as often happens, neither of these options were taken up, as can be seen from photo 16.

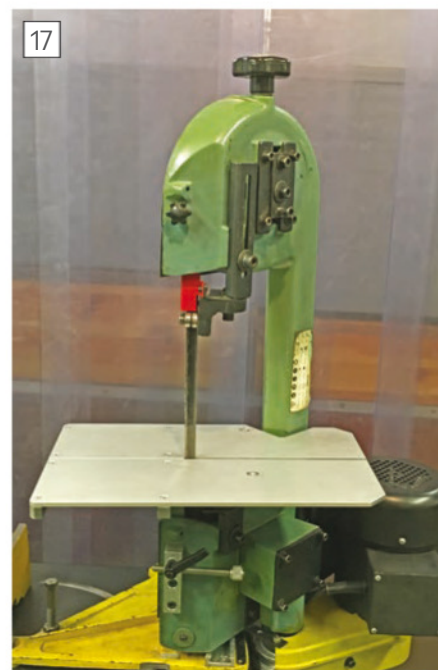
At the time, my daughter had recently moved house, and asked me to help remove an unwanted bathroom cabinet. It was much heavier than it looked, and on close examination turned out to be an upmarket design made mainly of ¼" thick aluminium. I could see that the top and bottom panels would be ideal when joined side by side, which was easily done with a couple of steel straps, **photo 18**. Creating the slot was achieved easily, by clamping the two



Work Table

pieces together and end-milling away half a slot width from the exposed edges. One of the pieces had a 15mm hole where the electrical supply had entered the cabinet, but fortunately this was avoided by judicious choice of the position of the notch shown in photo 18.

The top is secured to the sub-table by two 6mm screws, countersunk into the top and retained with a two-part metal adhesive. The corresponding 'nuts' are relatively large, toothed wheels with countersunk bores for ease of installation: they are easy to get started



Position of work table relative to arm

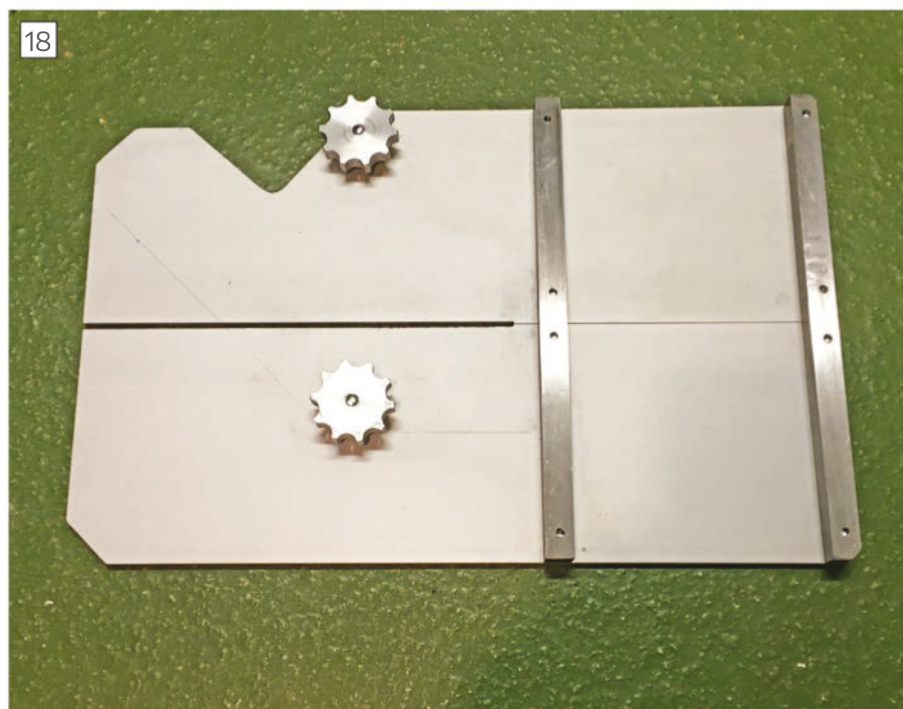
on the thread and they spin easily for tightening or removing. So far, no further fixing seems to be necessary.

Operation

It is still early days, but experience so far has been good. A bandsaw user would usually stand behind and in line with the blade, but because the bulk of the trolley is in the way, it is necessary to stand alongside. Fortunately, the blade is in line with nearside edge of the base (photo 1) so it is easy to adopt a comfortable stance.

The no-volt relay and on/off pushbuttons are mounted on the motor terminal box, and are thus easy to reach when the saw is in horizontal mode. In vertical mode, however, the operator's hands are busy guiding the workpiece, and it is a long and awkward reach to the stop button. I was concerned at the potential risk, so an emergency stop button has been added in series with the mains lead, so that pressing the button interrupts the supply and drops out the no-volt relay: it is positioned on the rear side of the base, behind the vice and well out of the way of swarf.

When I first tried a cut on a piece of mild steel, progress was very slow, and I was disappointed, until I remembered that in horizontal use the downward force applied to the blade by the weight of the arm is over 5 kg. Having plucked up courage to mimic this with what at first seemed excessive hand force, the blade performed exactly as it has before: as long as that continues, I will be well satisfied.



Underside of work table showing 'nuts'

BEGINNERS WORKSHOP

These articles by Geometer (Ian Bradley) were written about half a century ago. While they contain much good advice, they also contain references to things that are out of date or describe practices or materials that we would not use today either because much better ways are available or for safety reasons. In particular, never use abrasive cloth on a lathe without a backing board. These articles are offered for their historic interest and because they may inspire more modern approaches as well as reminding us how our hobby was practised in the past.

By Geometer

Hand fitting methods

for flat and right-angle faces

GIVEN ACQUAINTANCE with the principles involved, and the necessary time and care, hand fitting methods as applied to basic equipment such as faceplates, straightedges and squares, can attain the highest standards of precision. Contrary to what might be thought, the methods employed are for the most part extremely simple-and, moreover, have applications in optics, where the highest machine precision falls short of requirements.

In possession of a faceplate, straight-edge (such as a good steel rule) and a square, it is possible to undertake various tests of work and components.

A part with a flat surface can be placed on a faceplate and tested for "rock" with the fingers. Lightly oiling the faceplate, or using a smear of red lead and oil mixed together or marking blue, the component when lifted from the faceplate will reveal where it has touched-on the high spots. Applying a straightedge to narrow surfaces will likewise reveal if they are straight-by placing a bright light behind and observing if there are gaps anywhere. A square will show if two faces or edges are at right angles, either when applied direct to the component, or when used on the surface plate with the component.

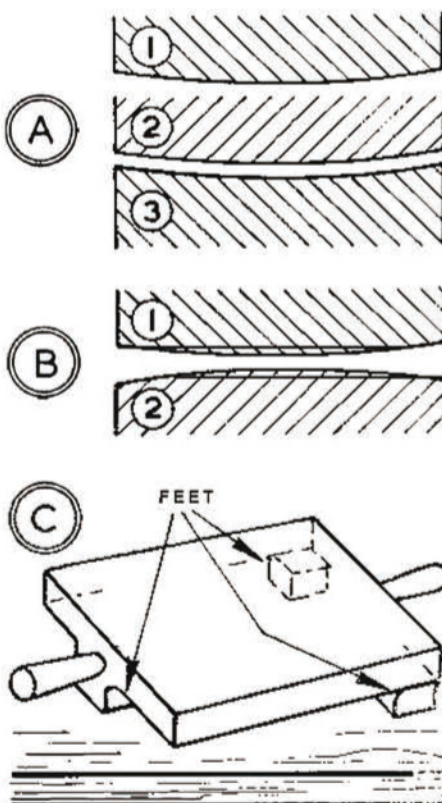
Minimum three surfaces

In all these tests, however, reliance is placed on the accuracy of the equipment — faceplate, straightedge and square. And obviously there must be some methods of verification of these-which are not too involved, or engineering could never have developed.

There are two ways of bringing surfaces into agreement so that they make contact over a large area or as completely as possible. They are: 1, by removing the high spots when revealed, by some abrading or scraping means (files or scrapers in hand fitting, when the equipment must not be altered or damaged) and 2, by rubbing the surfaces together with a suitable abrasive between them (lapping), as is

always done in finishing optical surfaces, and also in hand fitting, but using other surfaces than those of the test equipment.

Two surfaces, however, may be in close contact but not as required-which is flat, to bring about which condition there must be a minimum of three surfaces, A. Either convex surface 1 or 2 placed on the concave surface 3 would fit closely. But when,



as at B, 1 and 2 are brought together, they are obviously defective.

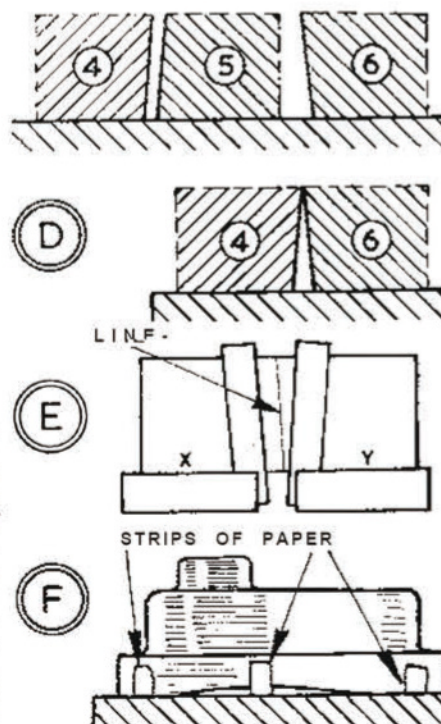
So it is, three surfaces fitted together by filing, scraping or lapping are inevitably flat. The same is true of straightedges; two might have complementary curvature, but three in agreement must be straight.

The principle is applicable to right-angle faces, using a standard surface plate, C. Two blocks, D, 4 and 5, might have faces in agreement but not at right-angles, while a third, 6, could

also be defective. Trying all together, however, such as 4 and 6, errors are revealed. Only when the faces are at right-angles will all pair properly. For a test such as this, red lead and oil or marking blue, can be smeared on one face, the blocks kept in contact with the faceplate and rubbed sideways, revealing areas of contact. If the blocks are cubes, only two are necessary since they can be turned about on different faces to discover errors.

Squares can be tested on a faceplate, three together; but the usual workshop test for a single square is as E. It is laid on a straight-edged piece of material in position X and a line scribed, then turned over to position Y and the alignment of the blade checked against the line.

In checking straightedges or components on the faceplate, F, strips of paper can be situated at various positions, and where errors are discovered by the paper pulling out, the thickness then increased until the paper grips. Alternatively, thin metal foil-shimstock-can be used.



Drill grinding on a Worden



Howard Lewis shares his experiences of improving this popular cutter grinder for drill sharpening with guidance on making your own accessories.

A long time ago there came the opportunity to buy a kit for a Worden cutter grinder that had only just been started. Once completed, and capable of grinding lathe tools, it seemed sensible to obtain further accessories for it, and a kit for drill grinding was one of the first. This would enable drills to be ground with four facets, with the advantages that they bring.

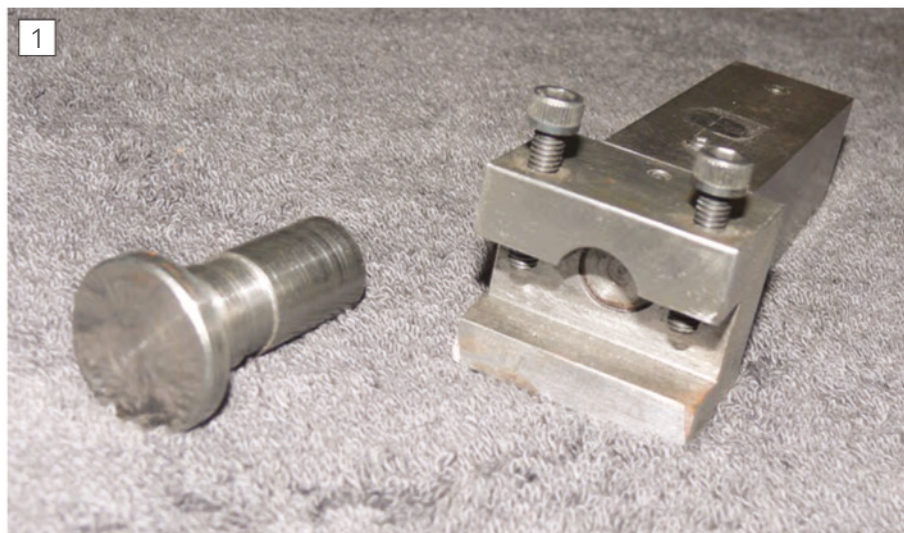
With use came the realisation that although useful, it did have some drawbacks, so further improvements were explored. What follows is an account of how accessories for drill grinding progressed, with an account of making one more to extend its usefulness.

History

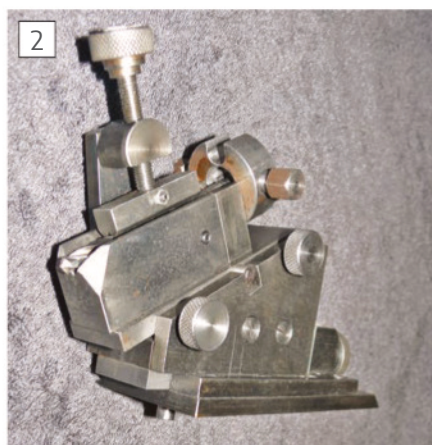
The first attachment was based on holding the drill in a collet for that specific size of drill, to be held in one of the holders primarily intended for grinding lathe tools. This is shown in **photo 1** with the blank for a collet. This would entail setting the drill with the cutting edge parallel to the table and producing the point angle, by swivelling the holder across the graduations. The primary and secondary clearance angles for four facet grinding, would have to be produced by tilting the table.

Drills ground with four facets cut extremely well and can be used without preliminary centre drilling. Effectively, they are an end mill with an angled

With use came the realisation that although useful, it did have some other drawbacks, so further improvements were explored.



Basic drill holding arrangement.



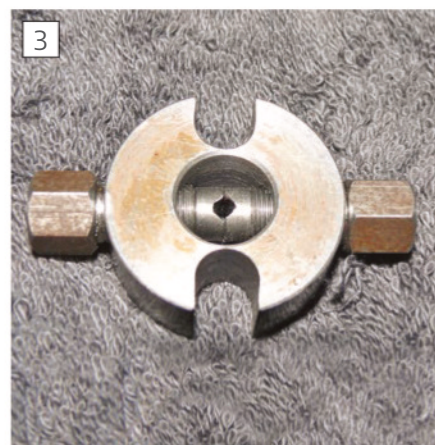
Original drill grinding attachment.

face, akin to a chamfering cutter, but centre cutting.

A small setting block was made up with a face three-quarters of an inch above the table for setting the cutting edge horizontal relative to the table.

In practice, this technique was not used, since the actual lathe tool holder had been fixed to the square block with anaerobic sealant.

Even if a holder, specifically for this job had been made, there would be the risk of not consistently holding the drill in the same longitudinal position, relative to the grinding wheel.

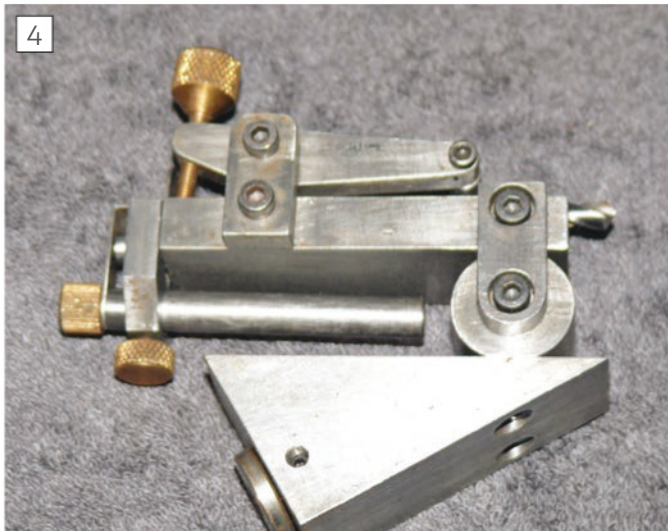


Drill clamp.

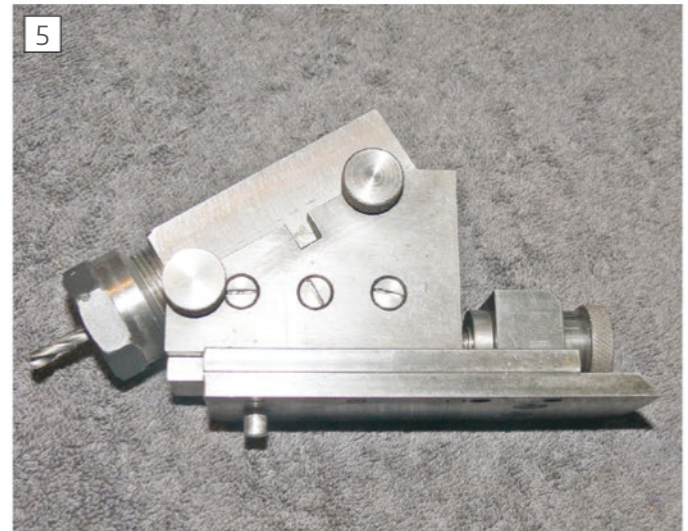
Also, a collet would be needed for every size of drill. To cover all the drills in the ranges of imperial $\times 1/64$, letter, number, and metric 1 – 10 mm $\times 0.1$ mm, a huge number of collets would need to be made and safely stored!

All in all, this was regarded as being as not being a satisfactory or feasible method.

The drill grinding attachment shown in **photo 2** was a Hemingway kit and uses a steel block with a face at 31 degrees to produce the 118 degree angle on the end of the drill. ($118 / 2 = 59$, then $90 - 59 = 31$)



Mark 2 drill grinding jig.



ER20 collet drill holder.

The drill is clamped in a vee, located by a small very small pin, with half milled away, set in the bottom of the vee, at the front. The drill is located longitudinally by the collar, which is clamped to the shank of the drill, and used to ensure that it is rotated by 180 degrees to grind the second face. The cut outs locate over a pin set into the back of the 31-degree block, to ensure that the drill is rotated by 180 degrees.

The block bears witness to my lack of care at various times! The clamp is shown in **photo 3**. Feed into the wheel is by an ME (Model Engineer) 40 tpi thread and a small dial with 25 graduations.

This arrangement was not considered to be reliable in securely clamping the drill. My intended solution, of using ER collets, had already been adopted, in a slightly different form, without my being aware of it, by Giles Parkes. The first attempt used ER25 collets in a holder with the usual 16-degree internal taper,



Drawer front for the Worden.



Setting the block in the milling vice.

and an external 32 x 1.5mm thread. The ER25 clamp nut was really too large to clear the table of the Worden, and needed to be turned down, as well being chamfered at 59 degrees to increase distance from the grinding wheel.

It greatly reduced the multiplicity of collets, and the problem of securely clamping the drill. Since the ER clamp nut was held against the front of the block, longitudinal positioning was provided. The drill needed to be aligned with a square, to ensure that the cutting edge was vertical. Again, infeed was provided by the ME 40 thread and graduated dial.

By this time, a mark 2 version of a holder for drills had been produced, **photo 4**. Although this was used, I was not entirely happy with this arrangement

WHAT IS AVAXHOME?

AVAXHOME-

the biggest Internet portal,
providing you various content:
brand new books, trending movies,
fresh magazines, hot games,
recent software, latest music releases.

Unlimited satisfaction one low price

Cheap constant access to piping hot media

Protect your downloadings from Big brother

Safer, than torrent-trackers

18 years of seamless operation and our users' satisfaction

All languages

Brand new content

One site



AVXLIVE . ICU

AvaxHome - Your End Place

We have everything for all of your needs. Just open <https://avxlive.icu>



8 Finding the edge with a wiggler.



9 Machining the vee.

and thoughts of using ER collets returned. Since the ER32 arrangement was too cumbersome, another holder was made, with a 25 x 1.5mm external thread, to take ER20 collets. This would cope with drills up to 13 mm diameter, and being extended range, could hold imperial sized drills as well.

Again, the back of the nut was

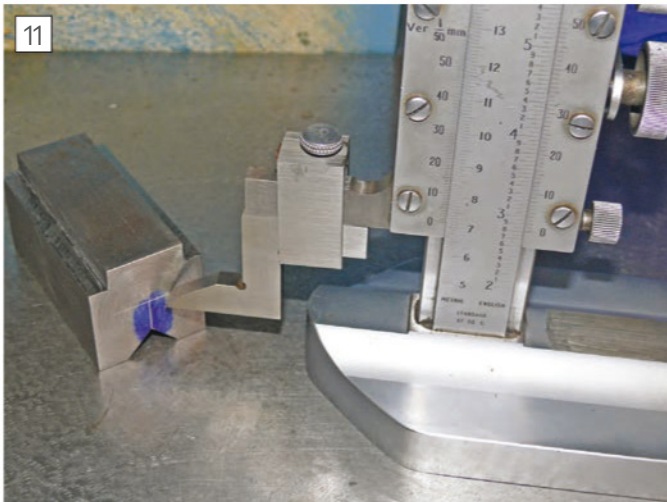
chamfered at 59 degrees to maximise clearance from the wheel, and to provide a datum for longitudinal location. The chamfer can just be seen in **photo 5**. Once more, this utilised the 31 degree block with the 40 tpi infeed, the cutting edge being set vertical with a square, and the clearance angles provided by swinging the attachment over the

graduated scale on the table.

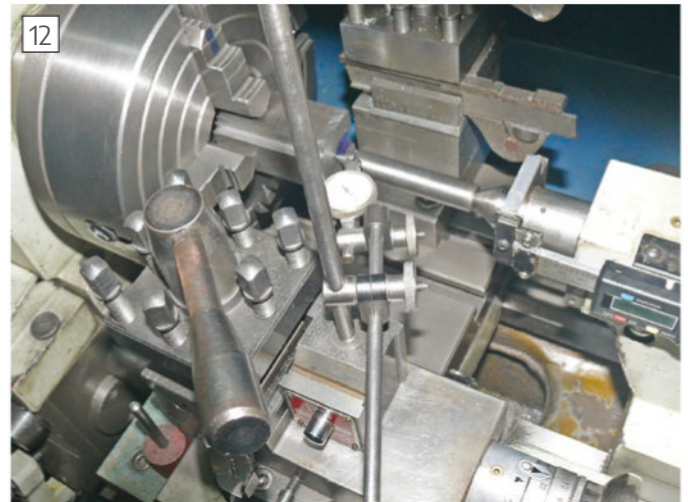
A home-made spanner was made to fit onto the hexagon of the clamp nut, to tighten and slacken it. Subsequently the clamp nut has been replaced a ball bearing version. This increases the clamp load that can be applied, with reduced risk of rotating the collet and the drill from the required position. Since the



10 Machining the rebates.



Marking out for the end stop drilling.



Two centres to centre the block.

Since the day would come when blacksmiths' drills would need to be sharpened, something would have to be done.

nuts are hardened, a carbide tipped tool is best used for turning the angled face.

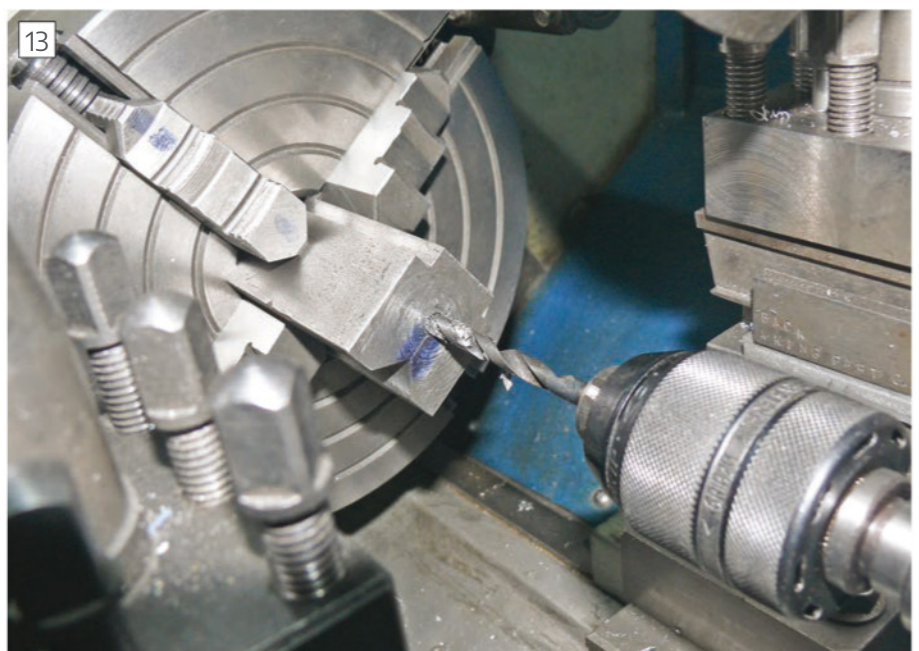
The collets are stored in holes bored into a small piece of chipboard, placed in a metal drawer which has been made to fit between the reinforcing bars under the table, and extending almost the full length of the base of the machine. A friend made and labelled a stainless-steel full width front to the drawer, which was secured in place by two knurled knobs, **photo 6**.

To maximise the range of travel, the head of the allen capscrew that clamped the accessory to the table, was reduced in diameter as much as possible.

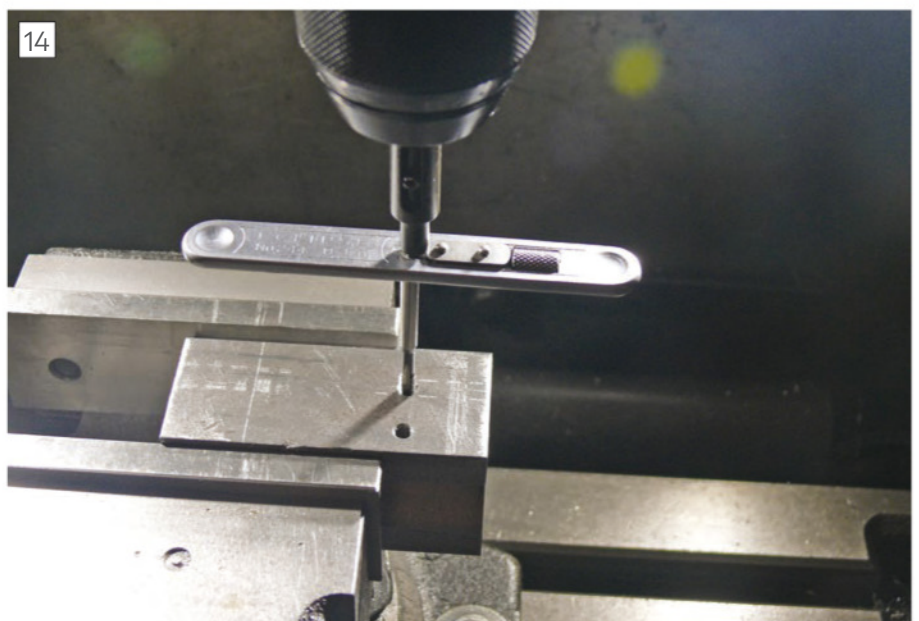
This arrangement has worked well, but could not deal with longer drills, or those larger than 13 mm.

Since the day would come when blacksmiths drills would need to be sharpened, something would have to be done. The final product draws very heavily on previous designs, using the base of the original mark 1 and mimicking the drill holding arrangements of the mark 2, but on a block, as on the mark 1.

Although using imperial materials, and made to imperial dimensions, metric near equivalents have been quoted in parenthesis. To add confusion, metric threads have been used!



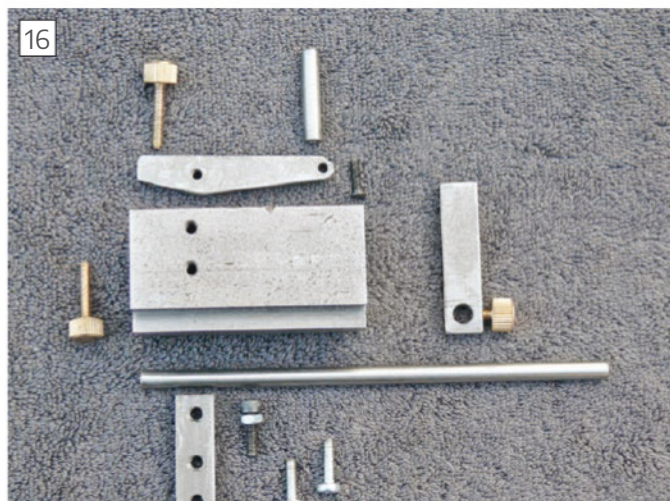
Drilling for the end stop rod.



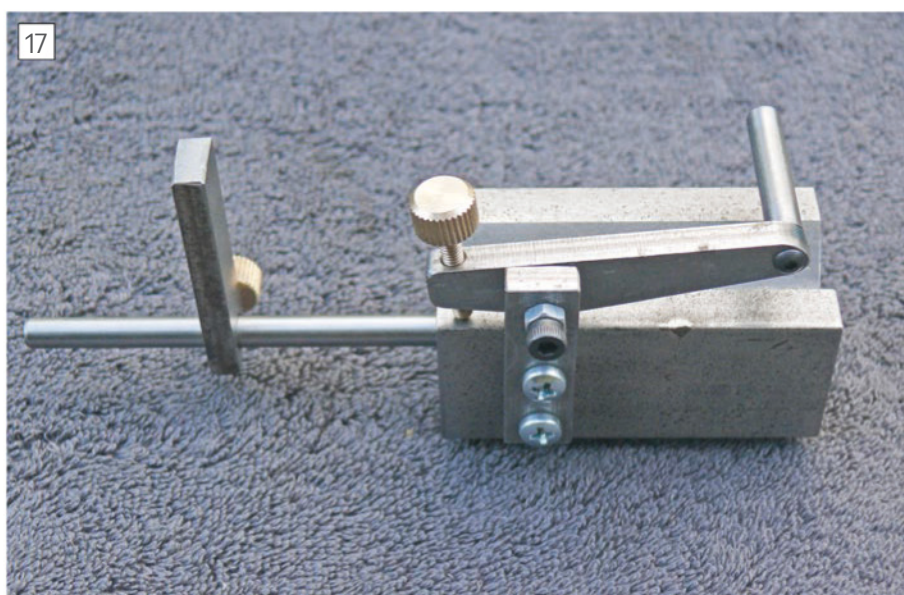
Tappings for the bracket.



Tapping the lever.



Parts kit.



Assembled attachment.

Because the largest drill would be 1" (25.4 mm) diameter, the base of the drill holder would, have to be larger than that, so a piece of 1.5" (38 mm) square bar, looking for a purpose, was cut to 3" (75 mm) long.

This was set up in the vice on the mill at 45 degrees, using a centre square, which happened to have a conveniently angled face, **photo 7**. Having calculated the diagonal of the block, the edge was found, using a wiggler, **photo 8**. A 12mm end mill was positioned over the centreline, and gradually plunged into a depth of 12 mm, to produce the vee, **photo 9**.

Once this had been done, the block was repositioned and the cutter used to produce a rebate, 0.25" (6mm) wide and deep, along each side, so that the block would locate in the mark 1 inclined base, **photo 10**.

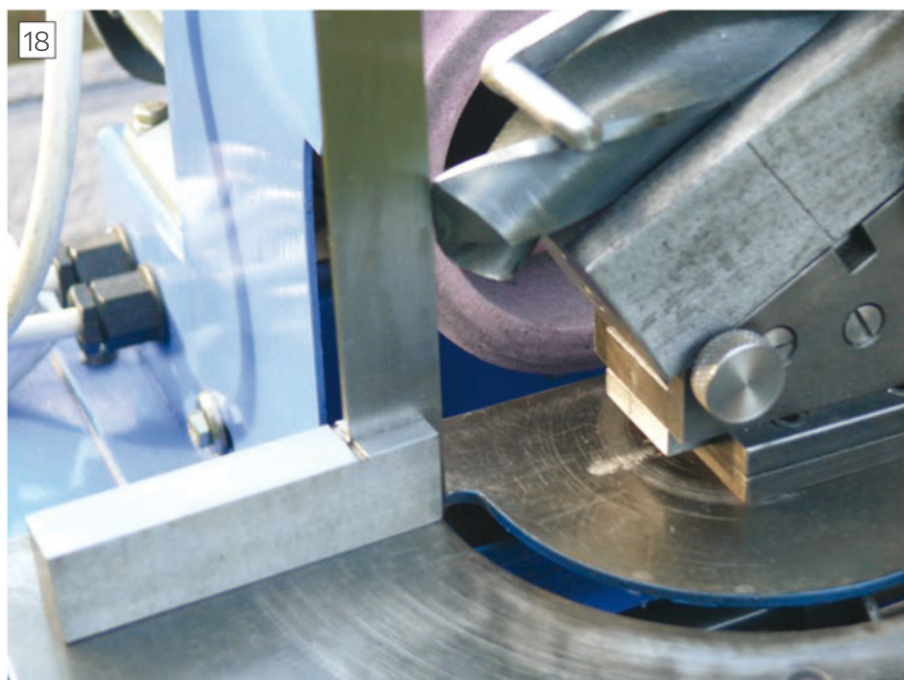
The length stop arrangements for the drill would be based on a 0.25" (6

mm) rod, passing through the block, beneath the centreline of the vee, and carrying a moveable end stop. In this way maximum range could be obtained by moving the end stop on the rod, and if needed, by the rod being moved within the block. The position for this was marked out, prior to being centre popped, ready for drilling, **photo 11**.

This was then transferred to the 4-jaw chuck on the lathe, and centred, using the two centres method, **photo 12**.

Once centre drilled, the block was drilled through, gradually increasing sizes until the final drill was 1/4" (6 mm), **photo 13**.

The block was returned to the mill, and by using co-ordinate dimensions, drilled and tapped M4, in two places. These two tapings would be used to secure the bracket carrying the lever



Setting the cutting edge vertical.

used to clamp the drill into the vee, **photo 14**.

The block was then turned over, and another M4 tapping made, on the centreline of the $\frac{1}{4}$ " drilling, for a screw to clamp the rod used as a length stop. The outer end was drilled to 4 mm clearance, by $\frac{3}{8}$ inch (10 mm) deep, leaving a shorter distance to be tapped.

Attention was now focussed on making a lever, slightly longer than that used on the mark 2 drill grinding attachment. Tapping the $\frac{1}{4}$ " (6 mm) material M4 for the clamping screw is shown in **photo 15**.

Three knurled m4 brass screws were made, with lengths suited for the purpose to which they would be put. The kit of parts, prior to assembly is shown in **photo 16**, and the complete assembly in **photo 17**.

To maximise the range of location, the rod for the end stop extends the full length of the block, being clamped by the shortest brass M4 thumbscrew, (on the other side) in the tapping on the centreline of the rod. In this way, the end stop can be at the end of the rod, whilst it is moved out of the block.

Once the blacksmith drill has been placed in the vee in the block, the cutting edge is set vertical with a square, before being clamped with



Four facet ground drill.

the transverse bar, **photo 18**. The complete assembly can then be swivelled around, on the table, to be clamped in place to grind the secondary clearance by passing the drill across the full width of the face of the wheel, to be followed by resetting to grind the primary clearance. If the attachment were to be used

to grind morse taper drills, the end stop arrangements would need to be extended even further, to bring the cutting edge to a point where it can be ground.

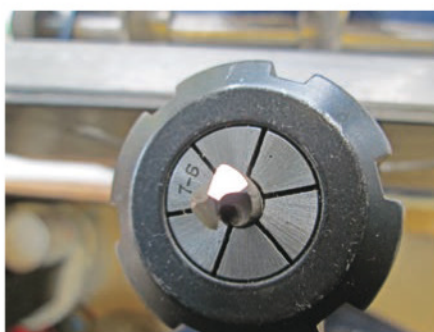
The end product of four facet grinding is a drill point, with the facets of the primary clearance meeting in a point, **photo 19**. ■

In our Next Issue

Coming up in issue 321
On Sale 21st October 2022

Content may be subject to change

**Look out for your copy of MEW 321,
the November 2022 issue:**



Laurie Leonard updates a system for using ER25 collets with a tool and cutter grinder.



Brett Meacle explains how to repair broken off screws.



We feature this year's entries for the Stevenson Trophy.

DON'T MISS THIS GREAT ISSUE - SEE PAGE 54 FOR OUR LATEST SUBSCRIPTION OFFER

Scribe a line

YOUR CHANCE TO TALK TO US!

Readers! We want to hear from you! Drop us a line sharing your advice, questions or opinions. Why not send us a picture of your latest workshop creation, or that strange tool you found in a boot sale? Email your contributions to meweditor@mortons.co.uk.

Plating Plastic

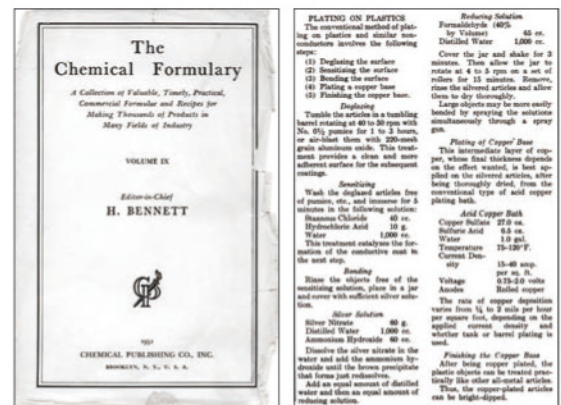
Dear Neil, I was very interested to read the article by Glenn Bunt in MEW 316, "Electroplating 3d Printed Parts".

It reminded me immediately of my boyhood days, 60 years ago, when as a budding industrial chemist I used to metal plate the plastic figurine novelties that came in the breakfast cereal boxes.

I used a process described in one of my favourite books, "The Chemical Formulary", 1951.

The process was simple enough for me to prepare the solutions and follow the steps to catalyze and sensitize the surface of the plastic then proceed to plate copper onto the figurines. There was no application of conductive paint or graphite. The results, where as I remember, excellent.

I wonder if this process would work on the plastics used as the filament for 3D printing. Perhaps Glenn would like to give it a try.



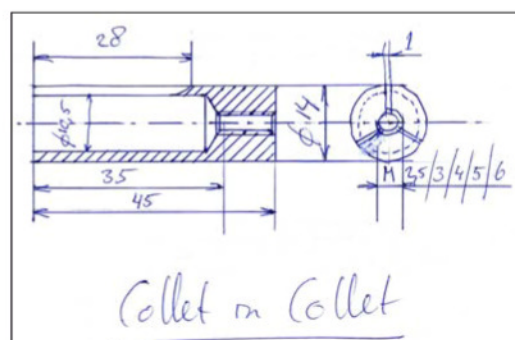
Lindsay Bramall, the Blue Mountains in New South Wales, Australia.

Apollo 10 Command Module

Dear Neil, I enjoyed Stub Mandrel's visit to the Science Museum in issue 319. I found the old machines and tools very interesting. An error has crept into the caption of the Apollo command module. The command module on display in the Science Museum is the Apollo 10 command module but this was not the first machine to carry humans to the far side of the moon. That honor belongs to the Apollo 8 command module that took Frank Borman, Jim Lovell and Bill Anders to the moon to complete 10 orbits before returning to the Earth. Apollo 8 did not have a Lunar module because it wasn't ready.

Apollo 10 was the first to go to the moon with a Lunar module but the second to carry humans there. John Young, Thomas Stafford and Gene Cernan tested the Lunar module in Lunar orbit, undocking and flying free for several hours before redocking for the return home. Many thanks for the great mag,

Tom Cooksley, Devon.



Shortening small screws and bolts

Dear Neil, recently a good old friend of mine passed on and his widow asked me to take care of his extensive workshop and tooling. Somewhere in there was a huge stack of MEW copies, starting at the summer 1990 issue - which looks like one of the first. I'm quite impressed and have now taken out my own subscription.

Maybe of interest to some of your readers is my simple device to hold small bolts for shortening. My main interest is building clocks and it comes for me with a lot of shortening small bolts. Basically, I use a collet in a collet. I drill a piece of brass rod of diameter 14 mm with diameter 10.5 mm to nearly the end. At the end I drill and tap for metric threads 2.5/3/4/5 and 6. Finally I cut 3 slots. It is as easy done as said. I put these brass collets in my W20 type collets that go

with my Schaublin lathe, but it also works with ER25 or ER32 collets. See attached picture and sketch.

Looking forward to the coming issues of MEW!

Peter Chevalier, The Netherlands.

Bandsaw Tension Meter

Dear Neil, I send you some information for Scribe a Line about the article 'Tensiometer for a Bandsaw Blade' as my name is given about my article published in the June 2016 issue of Engineering in Miniature. As you can see in the photo, I've added a holding wing (piece of aluminium angle) to ease manipulation.

The set screws should be set ideally in the middle of the blade width to avoid any bending strain if occurs.

The back of the blade must not touch the bottom of the forks, also to avoid any bending strain.

The advantages of this tensiometer is that it works for any blade dimension and that it needs no modification of the machine. The disadvantages are that the measure must be made from the slacken state and that you can't know the actual tension in the blade (that can vary as time lasts).

From my calculations the tensioning force is about 100daN for a small blade (0.65x13mm section), so 200daN tensioning force on the pulley. For a big blade (0.9x19mm section) the tensioning force on the pulley should be 428daN.

Figures and calculations from the "strength of material" theory:

1 - Tension stress: $s = N/S$ (daN/mm²)

N = tension force (daN); S = cross section (mm²)

2 - Tension strain: $e = \Delta l/l$ (no unit)

l = length considered (mm); Δl = elongation (mm).

3 - Hooke's law: $s = E.e$; E = modulus of elasticity (daN/mm²)

Recommended stresses in the blade:

Carbon steel blades: 10 to 15 daN/mm² (14500 to 21750 PSI)

Bimetal blades: 17 to 24 daN/mm² (24650 to 34800 PSI)

Elongation measured by the DTI:

Using the formulas 2 and 3: $\Delta l = s.l/E = 0,056$ mm

For $l = 80$ mm, $E = 20000$ daN/mm² and $s = 14$ daN/mm² (20300PSI)

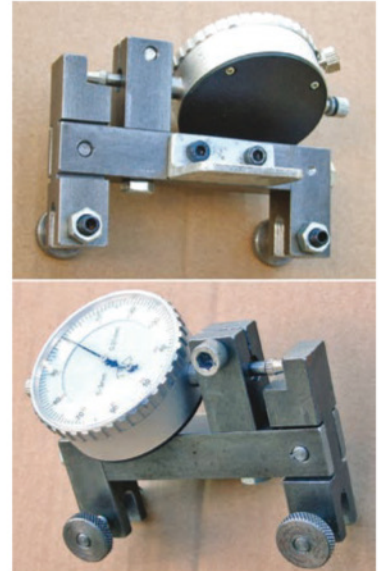
Pulling force on the tensioning pulley:

Using the formula 1: $N = s.S = 100$ daN; $S = 11 \times 0.65 = 7.15$ mm² (for my blade)

But the blade is pulling on two sides of the pulley hence:

Pulling force = 200 daN (450lb)

This force is far more than the one I was used to set, but the machine works far better.



Jacques Maurel, France



An Unusual Measuring Device

Dear Neil, a couple of days ago a friend showed me the enclosed pictures. His question was whether I knew what it was. I had no idea.

His late father had been a carpenter, so I thought it could have been something to measure an angle. I was warm, as we say in the Netherlands.

It is a device to measure the angle of saw teeth. To my amazement I got the MEW issue 318 and saw on page 49 the article about the teeth of a chainsaw.

Maybe readers will be interested in this tooth measuring device.

Henk Salij, Ridderkerk, the Netherlands

Tony Jeffree's Clock

Dear Neil, I have been reading Tony Jeffree's series with interest. It takes me back to my apprenticeship (aka a Youth in Training) on the GPO in the late sixties, a superb training that I regard as the most useful of my working life. I spent several months in the non-director exchange at Ramsgate attached to the exchange maintenance staff.

Next to the workbench where the two maintenance men spent their time trying to keep on top of the faults, particularly with the electromechanical dialled digit regenerators which were feature of that exchange, was a free pendulum clock fixed to the wall. It was housed in a beautiful oak case, glass fronted and about 3-4 feet tall. It drove all the slave clocks in the building, and I think it supplied timing pulses to all the exchange metering equipment, virtually all Strowger exchanges had similar clocks.

It worked on a deceptively simple procedure. Attached to the pendulum was a small bracket on which was suspended what appeared to be an agate pointer about half an inch long or so. As the pendulum swung the pointer was dragged across a flat agate strip about 1-2 inches long and probably half an inch wide. The pointer wiped across the strip falling off at the end of the swing and was again dragged across the strip on the return. As the swing progressively decreased there came a point where the pointer did not clear the end of agate strip and was forced to pivot vertically by the returning pendulum and in doing so operated a set of contacts. That energised a pair of coils that gave an impulse to the armature attached to the pendulum and the procedure repeated itself. These master clocks appeared fault free and sadly they were probably disposed of when the Stronger exchange was replaced. I wonder if any have survived?

EuroEng. Mike Matthews BA MSC. MIET, by email



Drill Press Modification

Dear Neil, I thought your readers might be interested in this adjustable depth gauge for a drill press. Many new and old drill presses have a depth gauge arrangement that is not so user friendly.

This is a modification I carried out on two pre-war drill presses of mine; a Jones & Shipman and Adcock & Shipley. The Jones & Shipman had a disc scale mounted at the end of the rack pinion where you had to cock your head 90 degrees to read it and was not adjustable.

Below I have detailed the construction method of the friction slide depth gauge: Before the groove was machined in the pinion hub (also a modification) masking tape was wrapped around it. With the quill in the up position the tape was then marked at the pointer. Dropping the quill by 50mm, the tape was then marked again.

Removing the tape, the distance between the two marks was measured and divided by 50 (in my case it came to 2.57mm) to give millimetre divisions for drill depth.

A piece of 20 x 3mm aluminium flat bar was placed on the

milling machine table with double sided tape and clamped at each end.

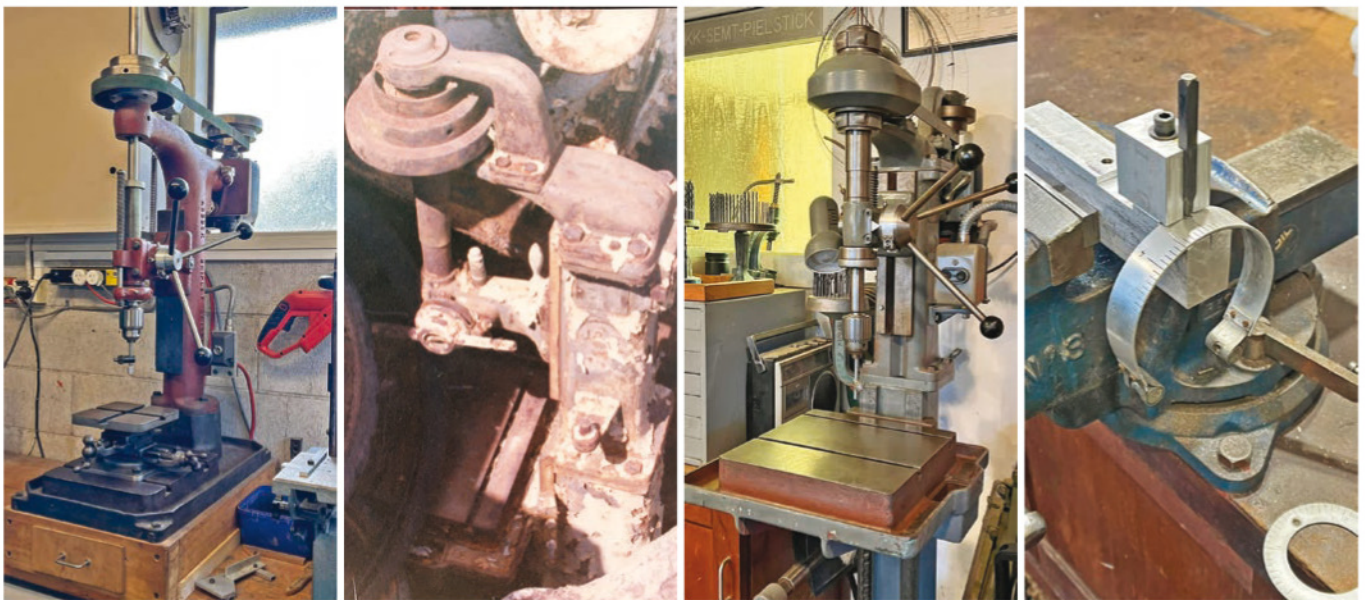
With a sharp pointed tool, the bar was indexed along its length, and connectors from a hose clamp was riveted to the ends as shown.

The groove in the pinion hub was machined 3mm deep so the scale lay flush with its circumference.

Friction adjustment was made with the cap screw, allowing the scale to be rotated easily by hand, but firm enough not to move when the drill is in operation.

One photo shows the original disc scale from the Jones & Shipman drill and the jig for the number stamps. Perhaps of interest to some – the Jones & Shipman and Adcock & Shipley came from the Sembawang naval shipyard completed in 1938 in Singapore and were rescued from a scrap metal yard. One photo shows the drill as found.

Colin Webb, New Zealand



Motor Rewind

Dear Neil, I found the article by Black Fingernail on rewinding a motor (MEW No. 319) very interesting as I too have recently rewound a motor. However, there are a few points that I think may be of interest to other readers contemplating a motor rewind.

Firstly, when the windings are completed, the use of standard “woodworkers” polyurethane varnish is not the correct varnish to use. It has a much lower temperature rating and will not withstand the long-term heat that a motor might have to endure. The ideal electrical varnishes are alkyd-based and have a temperature rating of 155°C (Class F) - far in excess of the typical 93°C maximum service temperature of a polyurethane varnish.

On the same vein, heat shrink sleeving has a maximum service temperature of around 120°C, so is not really suitable for the temperatures that may be encountered in a motor. It is worth noting that the life of an insulation halves for every 10 deg C rise in temperature, so increasing the service temperature from 120°C to 155°C will reduce the service life by around 91% - so failure may well occur well before it is intended!

Whilst it is an acceptable idea to warm the varnish prior to application, this should be done in a hot water bath - but the hot water should be taken away from the source of heat before inserting the tin of varnish, as the flash point of electrical varnishes is quite low - typically 27°C - so form a heavy, flammable vapour that can be ignited easily by the cooker as shown in the article.

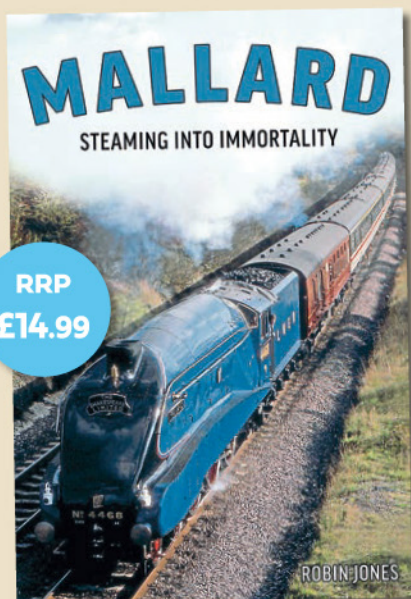
Also, it is difficult to tell from the photographs whether slot-closers have been fitted to the rewind. These are not essential but are advisable to prevent stray wires coming out of the slots during assembly - a wire out of the slot will result in either a short to earth or the wire being severed when the rotor is re-inserted into the stator.

Graham Astbury, by email.

Get 20% off a selection of aviation and railway reads from Mortons Books

'FLASH20' for 20% off

Use code 'FLASH20' at the checkout



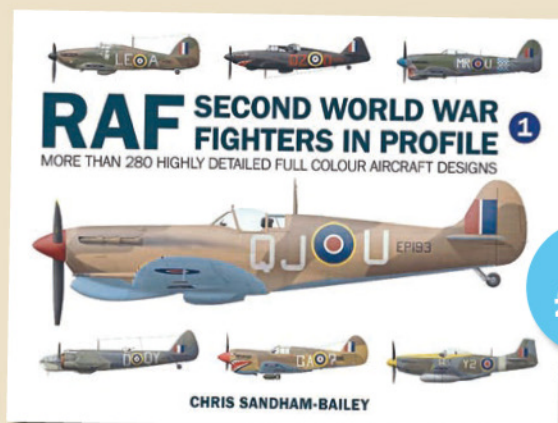
MALLARD – STEAMING INTO IMMORTALITY



THE SECRET HORSEPOWER RACE
– WESTERN FRONT FIGHTER
ENGINE DEVELOPMENT



SUPERMARINE SECRET PROJECTS
VOL. 1 – FLYING BOATS



RAF SECOND
WORLD WAR
FIGHTERS
IN PROFILE

RAF COLD WAR
JET AIRCRAFT
IN PROFILE



SETTLE & CARLISLE REVIVAL –
THE LINE THAT REFUSED TO DIE

MORTONS
BOOKS

Excludes bookazines

ORDER NOW: www.mortonsbooks.co.uk

Tel: 01507 529529 Offer expires: 31.12.22

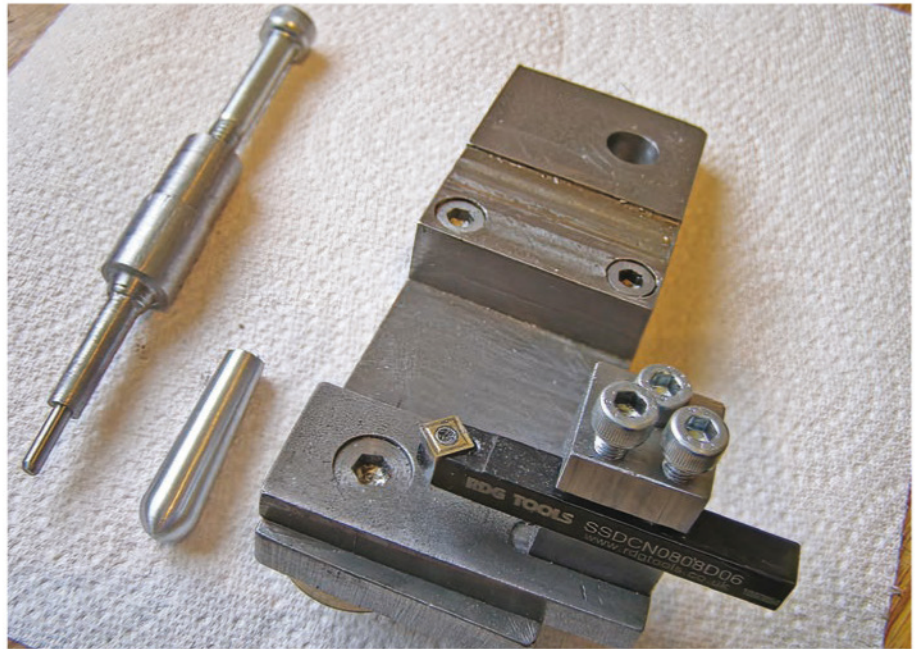
Radius Tool for Topslide

Peter Peters describes a simple but useful accessory

This is part of the story of the design and development of a fisherman's giant landing net. The subject of this article is to account for the machining of one part of that apparatus, a ball ended socket with blended taper in aluminium alloy to a fine finish. The function of this piece is to finish the end of a tapered carbon fibre rod and to retain a high tensile cord.

The machining sequence posed a problem or three. First, if a blank is chucked and machined to a radius followed by a blended taper then two tool settings are required, (a) with the radius tool mounted on the cross-slide and (b) with a turning tool set to turn the taper from the top-slide set to the specified taper. Secondly, having done that, the problem arises of how to reverse and hold the piece, without marring, to drill the socket. So, why not reverse the process and chuck the blank followed by centre drilling and drilling the socket to size followed by knocking it onto a special mandrel with interference fit. The mandrel is then chucked to hold the piece for ball ending and taper turning. This proved to be a good method but the next problem arose – how to get the piece off the tight fitting mandrel. An ejector screw and push pin was furnished to do that job.

A prototype was produced and approved by my client (my son) who promptly asked for a small quantity production. Being an elderly and consequently lazy dad I thought it might



help if I devised a radius tool to be mounted on the top-slide so that the ball ending and taper turning could be done sequentially and so without any tedious resetting. The design and execution of the system could be at a leisurely pace as demand was not for tomorrow but maybe next month.

Immediately the next problem cropped up – no radius tool assembly simply mounted on the tool-post would bring the tool-tip down to lathe centreline level. Problems posed by levels and dimensions were solved on the drawing

board. Readers will no doubt by their exercise of ingenuity and their skill will do better than me and achieve a satisfactory device suitable for their machine.

The fancy took me to get a blacksmith to forge or weld a cranked bed for the tool which would reduce the number of parts required but would then need to be precision machined all over. Being somewhat of a carpenter as well as an engineer, screwing and gluing a small number of simple precise components proved to be an easier option. Sharp eyes will notice that a bit of milling was needed to allow back swing of the tool-stem.

To ensure smooth controlled action of the radius turning tool without rocking which could spoil the finish, the swivelling assembly was machined to close fits and furnished with a large brass spacer lightly nipped-up by a friction nut, say Nylok, Aerotite or similar approved! Once put to use, action to turn the ball end was easily accomplished by gripping the end of the tool shank between finger and thumb. However an adjustable stop was fixed to prevent accidental over-swivelling which would cause a bad blend with the tapered length.

The tool holder was simply produced on the vertical milling machine using centre drill, tapping drill, M4 tapping, all at one setting followed by resetting to mill out the tool slot. ■



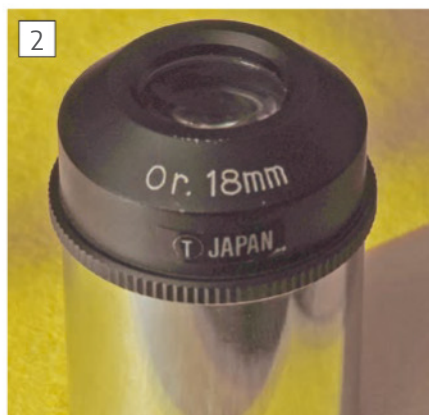
Making Eyepieces in the Workshop



Even with a comprehensive collection of commercial eyepieces it can be rewarding to experiment with making your own.

Stargazer experiments with some simple optics.

One of my hobbies is astronomy, and I find it is an excellent complement to running a workshop giving me the opportunity to use my workshop skills to make often quite complex projects. In this article I'd like to show how my interest in the engineering and science behind practical astronomy led me to some fairly straightforward workshop experiments. Experienced visual astronomers will agree that having quality eyepieces is as important as having quality telescopes. Although the standard eyepieces supplied with many telescopes are often



The 'Ortho' eyepiece design requires a triplet field lens as well as a plano-convex eye lens, in contrast the designs detailed here use simpler, easier to obtain lenses.

not particularly good, by making careful choices it is possible to build a good, varied eyepiece collection at reasonable cost, **photo 1**. This raises the question – why bother making your own basic eyepieces?

My answer is - just for the fun of it! If you have assembled your own telescope, it may seem a shame to only use it with bought in eyepieces, even if these offer better views. Also, there is interest in making and comparing different eyepiece designs and also the opportunity to be surprised by how good some more advanced self-made designs can be, even if they don't come close to better commercial designs.

Not all eyepiece designs are straightforward to design and make

without complex calculations, **photo 2**, but there are several designs that you might wish to experiment with. For such an experiment, simply fitting the lens or lenses into a suitable plastic or cardboard tube should be fine, but if you have a 3D printer you can make more durable holders in the form of tubes with a ledge to support the bottom lens, **photo 3**. You can also 3D print space rings or just use rings of plastic tube, sheet or card. Some people make beautiful eyepieces by carving or turning wooden bodies, but most of us with metalworking workshops will want to make our own metal bodies. **Photograph 4** shows such an eyepiece that also uses an eyecup scavenged from broken binoculars. If you decide to make regular use of a homebrew eyepiece from softer materials, consider a nose from 1.25" metal tube, or use one recovered from a cheap eyepiece.

To find the focal plane of your eyepiece, just use it to view your fingertip. The point where it is in sharp focus should be easy to find, for ease of focusing try to position the 'shoulder' of the eyepiece close to the focal plane.

It is hard to accurately calculate the focal length of a completed eyepiece, as even if you find the focal plane, where exactly do you measure from? I suggest using an online focal length calculator such as that at www.astronomyboy.com/eyepieces/ep_calc.shtml which works for both two and three element eyepieces.

For testing your own eyepieces, a good first try is to pop it in a low powered scope and look at a relatively distant scene. Look for sharpness across the field of view, distortion of any straight edges (such as walls) and for coloured fringing around bright objects (or dark objects silhouetted against the sky). How wide is the field of view? Does it render colours accurately? Once you know how to reach focus with your eyepiece you can do a night-time test being more critical of how sharply stars are focused

For testing your own eyepieces, a good first try is to pop it in a low powered scope and look at a relatively distant scene.



A 3D printed lens bod with internal ledge.



Workshop-made lens with metal body and reused rubber eyecup.

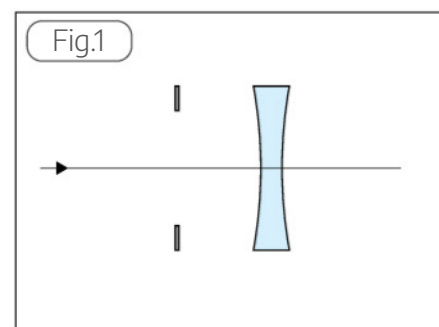
and if their shapes are truly round. You may find the image, especially from the simpler designs, is badly distorted or blurry around the edges, if so, try adding a 'field stop' in the form of a disc with a central hole placed at the eyepiece's focal point, this will improve the sharpness just like stopping down a camera lens with its iris.

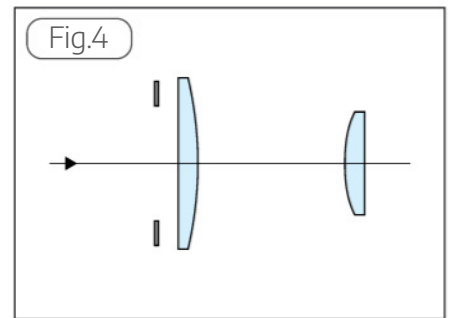
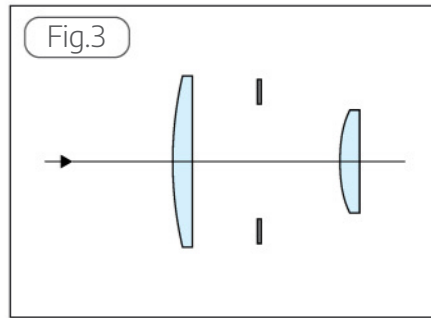
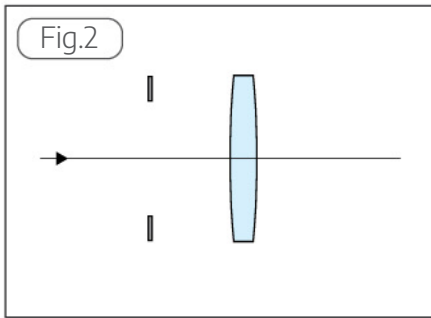
For some designs it helps to calculate the focal length of lenses. An accurate enough method is to use the lens to cast the image of a distant scene (e.g. the

view out of a window) onto a sheet of paper. The distance from the paper to the middle of the lens will be an accurate enough measure of focal length for the experiments in this article.

Inexpensive or broken roof prism binoculars are probably the cheapest source of small achromatic doublet lenses and the 'budget' eyepieces supplied with telescopes are a potential source of cheap single elements for experimenting. Be aware that at the cheapest end of the spectrum they may not be fully coated or only have single coatings, and sometimes may have obvious defects.

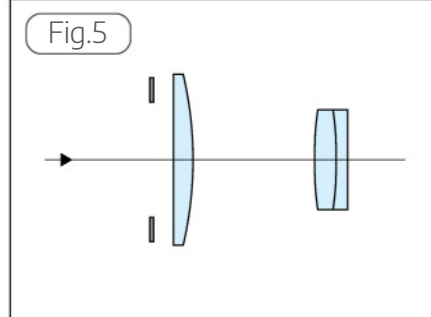
The cheapest eyepieces are usually just glued together, careful work with a razor saw or junior hacksaw can usually open these up. Slightly better ones usually have a metal nosepiece that can be unscrewed and recycled for your own eyepieces, then have screwed in rings and spacers to retain the lens elements. You may also be able to use the bodies of these lenses as housings for your own experiments.





Small roof prism binoculars can usually be persuaded to give up their objective lenses in the following way: Any neck cord is usually held in place by two screwed caps with central holes for the cord. Remove these. This should reveal the screws which hold the central; focuser section in place, loosening these should allow the two barrels to be 'popped' free of the central portion. Now remove the short screws used to move the focusing elements. Roll back any outer rubber cover and a screwdriver through the slots for the focus screws should be able to push the elements out; they are likely to be coated in sticky grease so clean them up with a workshop wipe, avoiding getting any gunk on the lenses.

To remove the lenses, there may be two slots or other features that grip the lens, perhaps with dabs of adhesive.



Remove or break these and you should be able to gently push the lenses out of the focus tubes. If desired, recover the roof prisms from inside the tube, these can be fitted in front of ordinary eyepieces to make them into erecting eyepieces, but at the cost of reducing their light grasp. The binocular eyepieces are usually fairly crude and very small but can be a source of small lenses for

experimentation and rubber eyecups.

Never force lenses in or out of their holders -they are fragile compared to glass tableware! A pair of clean nitrile gloves (or just one for your 'best' hand) can help you avoid leaving greasy fingerprints.

Single Lens Eyepieces

There are two very simple designs of eyepiece that just use a single lens, any such lens from less than 10mm to over 25mm can be used. Suitable lenses are readily available online, even very cheap plastic ponies will do for experimentation.

Galilean Eyepiece

This is just a negative lens placed somewhat closer to the objective lens than the telescope's focal length, **fig. 1**, as used in the earliest refracting



Inexpensive roof prism binoculars used as a source of lenses.

telescopes and is really only suited to low magnifications. A negative lens does not have a 'focal length' so you will just have to experiment and see what works. Unusually it gives an erect image, and it is still used in things like opera glasses and toy telescopes because it is so cheap. If you can find a small bi-concave lens it should work, as long as your telescope's focuser will move inwards well past the focal point. This should not be a problem with most refractors as you can remove the star diagonal.

Convex Lens Eyepiece

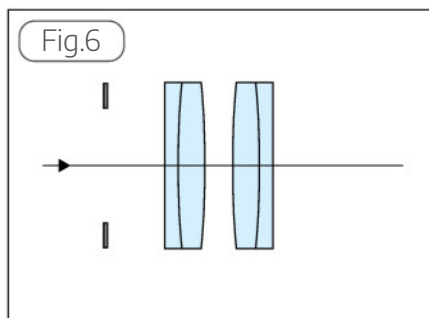
Any simple magnifying lens will work as an eyepiece, **fig. 2**, but expect to see considerable chromatic aberration and distortion. A benefit of experimenting with this lens is it will show you some of the errors more complex eyepieces are designed to address!

Two Lens Eyepieces

For the next two eyepieces you will need to find two 'plano convex' lenses, that is lenses which are flat on one side and rounded outwards on the other. One should be about $\frac{2}{3}$ the diameter of the other.

Huygens Eyepiece

These simple eyepieces are still to be found supplied with very cheap



telescopes because of their low cost and they do work well enough with long focal length telescopes, **fig. 3**.

To make one you will need to position both lenses with their round face towards the telescope objective, the smaller lens at the viewing end. Their separation should be:

$$D = 0.5 \times (f_A + f_B)$$

The focal plane of a Huygens lens is between the two elements, so expect to rack the focuser in further than normal, also any field stop will need to be placed between the lenses.

Ramsden

If you reverse the larger of the two lenses in a Huygens eyepiece, you get the Ramsden arrangement, **fig. 4**. Ideally, the lenses should both be of similar focal length and placed about $\frac{7}{10}$ to $\frac{7}{8}$ of the eye lens's focal length

apart. If they are exactly a focal length apart any dust in the system will be very obvious!

The focal plane of this design is just in front of the larger lens.

Kellner

The Kellner lens is essentially similar to the Ramsden design, but uses an achromatic doublet for the eye lens, **fig. 5**. In other respects, it is set up in the same way, although it should have a significantly better performance with less chromatic aberration.

Typically, such doublets, comprising a convex (positive) and concave (negative) elements each made of a different type of glass, are used for the objectives of achromatic and ED telescope designs. If you have a broken or inexpensive pair of roof-prism binoculars, you could use one of the objective lenses if it is not too big. The pair in **photo 5** has objective

A negative lens does not have a 'focal length' so you have to experiment and see what works.



Two doublet lenses, one 'blacked' on the edges.

lenses only 22mm in diameter and they even appear to have a rudimentary anti-reflection coating. These lenses can also be used to make more advanced eyepieces.

You need to know which way around to place the doublet lens for best performance. Typically, they have a groove at the join between the two elements, the convex lens is always on the narrower side of this groove. The convex element will usually 'bulge' more than the concave element which may even be flat or slightly concave.

Plossl

The Plossl uses two doublet lenses and the two lens pairs are placed with their convex lens elements facing each other and spaced roughly 20% of their focal length apart, **fig. 6**. This gives an eyepiece with around half the focal length of the individual elements.

Unlike the previous designs the two elements should be identical, so both objectives from a discarded pair of compact binoculars are ideal. Commercial Plossls usually have lenses that are slightly convex on the outer surfaces, but the design will work well with ordinary doublets.

The Plossl design offers a significant step up in quality above the simpler designs, at the expense of having short eye relief, but at longer focal lengths even home-made Plossl can be expected to perform surprisingly well.



Eyepiece with a shoulder at the focal plane.



Parts for a Plossl eyepiece.



Eyecup 3D printed using flexible TPU.

The pair in **photo 6** are the objective lenses from the cheap 8x21 binoculars, they have a focal length of 80mm and so are suitable for making an eyepiece of about 40mm focal length. Blackening the lens' outer edges with a felt pen will significantly improve the contrast of any eyepiece design. The lenses are around 5mm thick, so a 7mm spacer gives an optical spacing of 12mm and a calculated focal length of 44.8mm.

Photograph 7 shows the two lenses, a 3D printed body and spacer and a simple eyecup printed from flexible TPU filament. The body has a small

ledge inside to support the lower lens, as in photo 1, then the spacer is fitted, followed by the upper lens, **photo 8**. The retaining eyecup can be glued in place with a flexible adhesive such as Gorilla clear, taking care to keep it was from the lens itself.

This assembly turned out to have a focal plane too low down in the tube, so the design was amended to extend the barrel and a shoulder at the focal plane, **photo 9**.

●To be continued

Readers' Tips



Easy extraction of shaft keys

TIP OF
THE MONTH
WINNER!

This month's winner is Brian Wood, with a tip for getting out those fiddly shaft keys!

I recently watched an otherwise well-presented recording from the USA of the overhaul of a Bridgeport milling machine in the owner's workshop. Things were going well for him until he had a tight woodruff key to extract and the struggle this gave him became anything but professional and was rather unedifying to watch.

After many futile attempts with pliers, screwdrivers used as chisels and so on, he eventually resorted to using a Dremel grinder to destroy the centre of the key before it finally gave up the battle. The shaft and key seat were both scarred in the process.

There are two much easier methods worth noting. If the shaft has already been removed, grip the key in a bench vice and simply lever the shaft off it. This is a method used regularly by H&W Machine Repair of Fort Wayne in Indiana and hardly needs illustrating.

A method I have found works well and is useful when the shaft is still in situ is to grip the key hard with a pair of nail pincers right down close to the shaft and lever the key out using the pincers to provide the mechanical advantage. If the grip is still insufficient improve it by adding fine emery cloth on both sides with a piece laid over the key.

The attached photos, both of which have been staged, show the method in use on a woodruff key. As a bonus, the keys extracted by either method can often be used again in reassembly.

Brian Wood



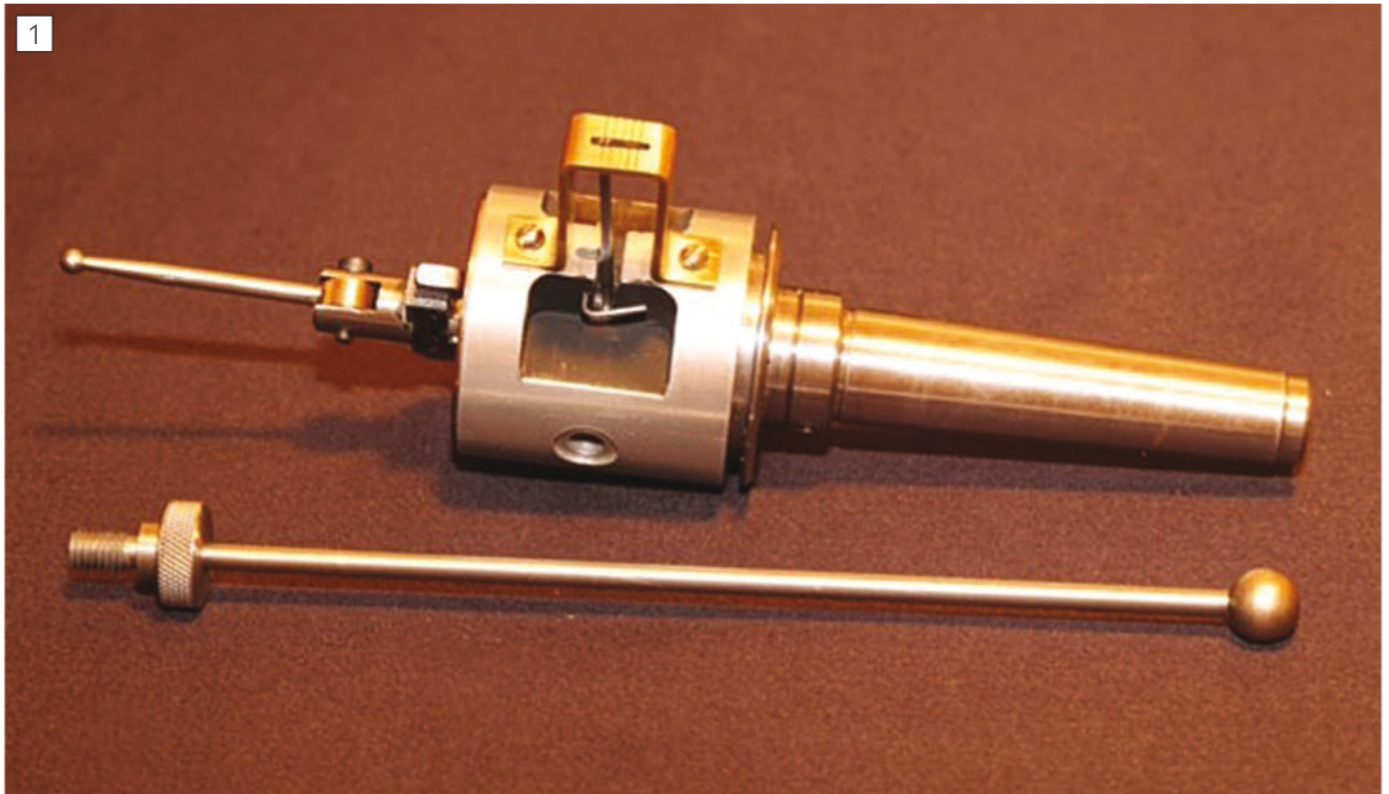
We have £30 in gift vouchers courtesy of engineering suppliers Chester Machine Tools for each month's 'Top Tip'.

Email your workshop tips to meweditor@mortons.co.uk marking them 'Readers Tips', and you could be a winner. Try to keep your tip to no more than 400 words and a picture or drawing. Don't forget to include your address! Every month I'll chose a selection for publication and the one chosen as *Tip of the Month* will win £30 in gift vouchers from Chester Machine Tools. Visit www.chestershobbystore.com to plan how to spend yours!

Please note that the first prize of Chester Vouchers is only available to UK readers. You can make multiple entries, but we reserve the right not to award repeat prizes to the same person in order to encourage new entrants. All prizes are at the discretion of the Editor.

A Tale of Two Indicators

A coaxial indicator is fitted in the spindle of a milling machine and used to accurately align it with workpieces. Bernard Towers explains how he made two of his own to overcome issues with the size of commercial types.



Bernard's first 'rocking needle' design.

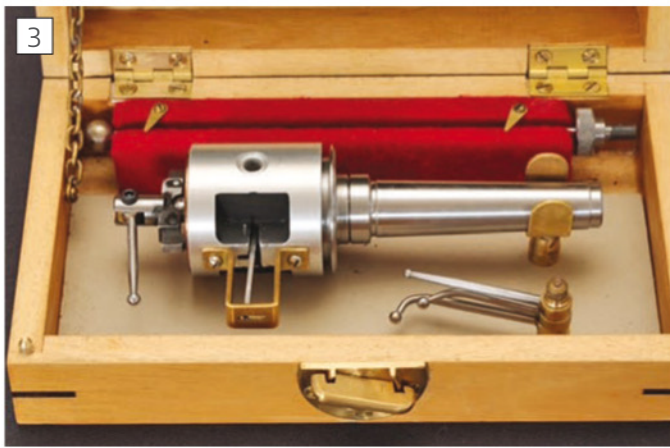
A few of those advertised specify an accuracy figure but that is not really the feature that is important, the idea is that when used correctly it reads zero making a hole or pin concentric with the milling machine spindle. Having a small mill (Raglan varispeed) with only 210mm of fresh air between the spindle nose and table it is almost impossible to use a commercially available coaxial indicator because of the size (typically around 170 to 180mm long with a short feeler arm fitted).

Part of the problem with the design is the fact that they use a 40mm dti vertically which means you start off with a measurement of 85 to 90mm which is the dti display face plus the probe and the cover protect the top of the probe when depressed.

I dispensed with the dti in favour of a rocking needle saving a chunk of space, **photo 2**. The needle is operated



The rocking needle design in use.



The first design in its box, note MT2 taper.



The sideways indicator version.

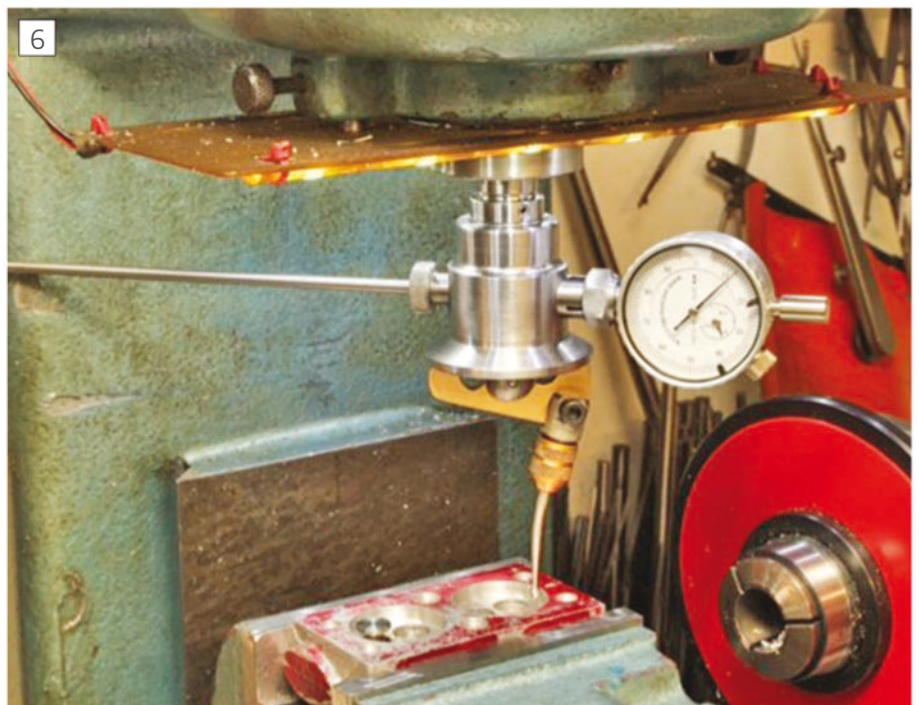
Part of the problem with the design is the fact that they use a 40mm dti vertically...

by a sliding piston that is sprung loaded and situated in the space between the central shaft and the outside of the body. Not much room but it will go in. The body comes in at around 50mm and with a probe fitted at about 100mm. Fitting the unit into a number 2 Morse Taper blank, **photo 3**, puts it very close to the milling machine spindle again saving some space. On test it seems to work well giving more accurate results than a wiggler as you have the situation of the wiggler either climbing or falling depending on which side of the hole/pin the wiggler was working.

Almost at the end of the project I spotted an image on the internet of a much more elegant design which had I known about earlier would have been the one to make but as I had invested quite a bit of time in the design and making of it I carried on to the end. I was glad I did as it works very well. Whilst in the mindset of indicators I had a go at the one from the internet photo which uses a 40 mm dti sideways on saving a lot of height, **photos 4 and 5**. The way it works is that the central shaft has a 45 degree taper where the dti probe touches so as the body of the tool is raised and lowered by the lower probe if the job is not central, the indicator reads some movement, so by adjusting X and Y till the indicator needle stops moving making the job central to the spindle axis, **photo 6**. ■



Sideways version in box.



Sideways version fitted to milling machine.



An Indexing Chuck

Alan Jackson made a useful accessory from an old lathe chuck.

A long while ago I was given a slightly battered 6 inch three jaw chuck. It had no back plate and only one set of inside jaws. It was probably a bit big for my then Halifax 4.5-inch lathe so it just gathered dust.

It eventually dawned on me that it would make a useful mounting fixture on my milling/drilling machine for holding round items etc. in the vertical for milling, hexagons, squares, drilling etc. To clamp it down solidly to the mill table I machined a shallow groove in the chuck body near the rear mounting face. This enabled profiled clamps to hold the chuck down to the table. A plug that fitted closely in the chuck bore and bolted in place via a tee nut provides a centred location point, enabling the chuck to be rotated about this plug. To complete the mounting, I made an index ring that fitted between the base of the chuck and the table top. The index ring has a raised locating step that fits into the chuck mounting register. The index ring has been graduated in one-degree steps with every 30 degrees numbered. A locating dowel, that fits closely into the tee slot is mounted on the underside of the ring. This positions the indexing

ring and prevents it from moving when the chuck is rotated.

To complete the set up I have drilled shallow holes at the bottom of the groove in the chuck body every 10 degrees to accept an indexing plunger. The spring-loaded plunger has a raised plug that fits the indexing holes and can be pulled back and rotated 90 degrees

to disengage its operation enabling indexing manually for 1 degree or less increments.

Finally, the chuck body has fiducial graduations at 90 degree intervals, numbered 0, 90, 180 and 270 degrees. The reason for four graduations is that the rear of the chuck is not easily seen when mounted and the other marks



Chuck mounting components



Indexing ring



Underside of indexing ring

come into view as you rotate the chuck.

The setup is shown mounted on the milling table in **photo 1**. The indexing plunger and clamps can be positioned as desired within the limits of the tee slot locations.

Photograph 2 shows the spring loaded indexing plunger, note the profile at the indexing point which can fit in the shallow groove or be rotated 90 degrees to disengage its function. The clamps are profiled to fit into the chuck groove but clear the index ring when they are locked down. They can incorporate a locking lever or just be a hex or socket screw for simplicity. I have only shown two clamps which seem to lock the chuck quite well enough but more could be used if desired. I cut the clamp profiles by bolting them to a face plate at the required radius and then turning the clamps to the shape shown.

Photograph 3 shows the indexing ring with its raised step to fit the chuck register. I made this from a piece of cast iron but it could be made from any other material. It may be a good opportunity to use a 3D plastic printed one to simplify manufacture.

Photograph 4 shows the underside of the indexing ring. The locating spigot uses a hex socket head screw turned down to closely fit the tee slot groove.

Photograph 5 is a rear view of the chuck showing the shallow groove, which just about fits between the rear face and the chuck key hub, and the shallow indexing holes every 10 degrees. To machine this groove I mounted a piece of about 40mm diameter steel about 150mm long in my lathe chuck, centre drilled the end for the tailstock

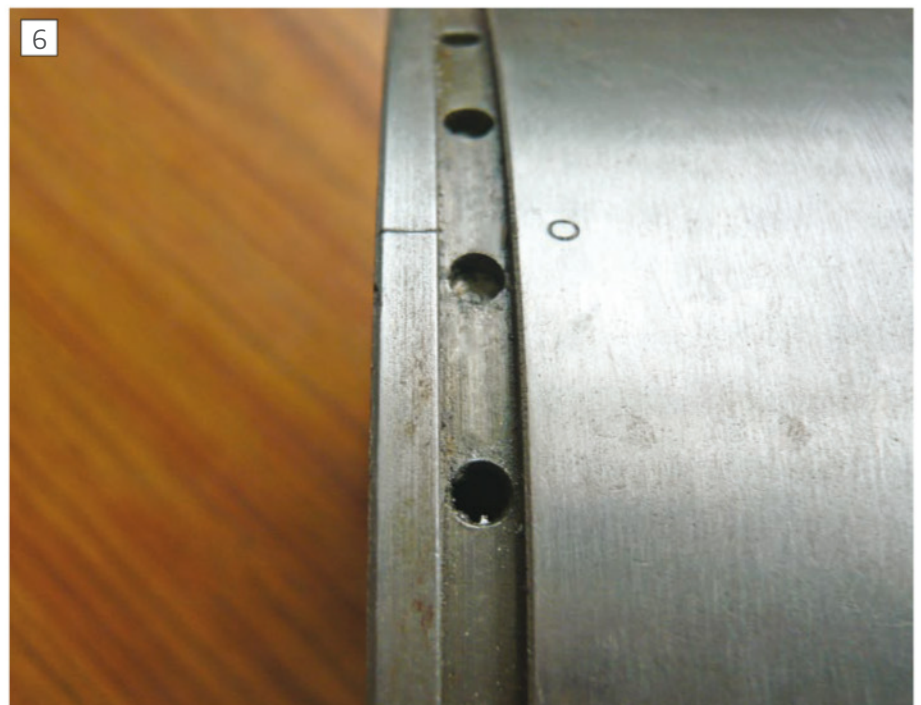


Groove in chuck body

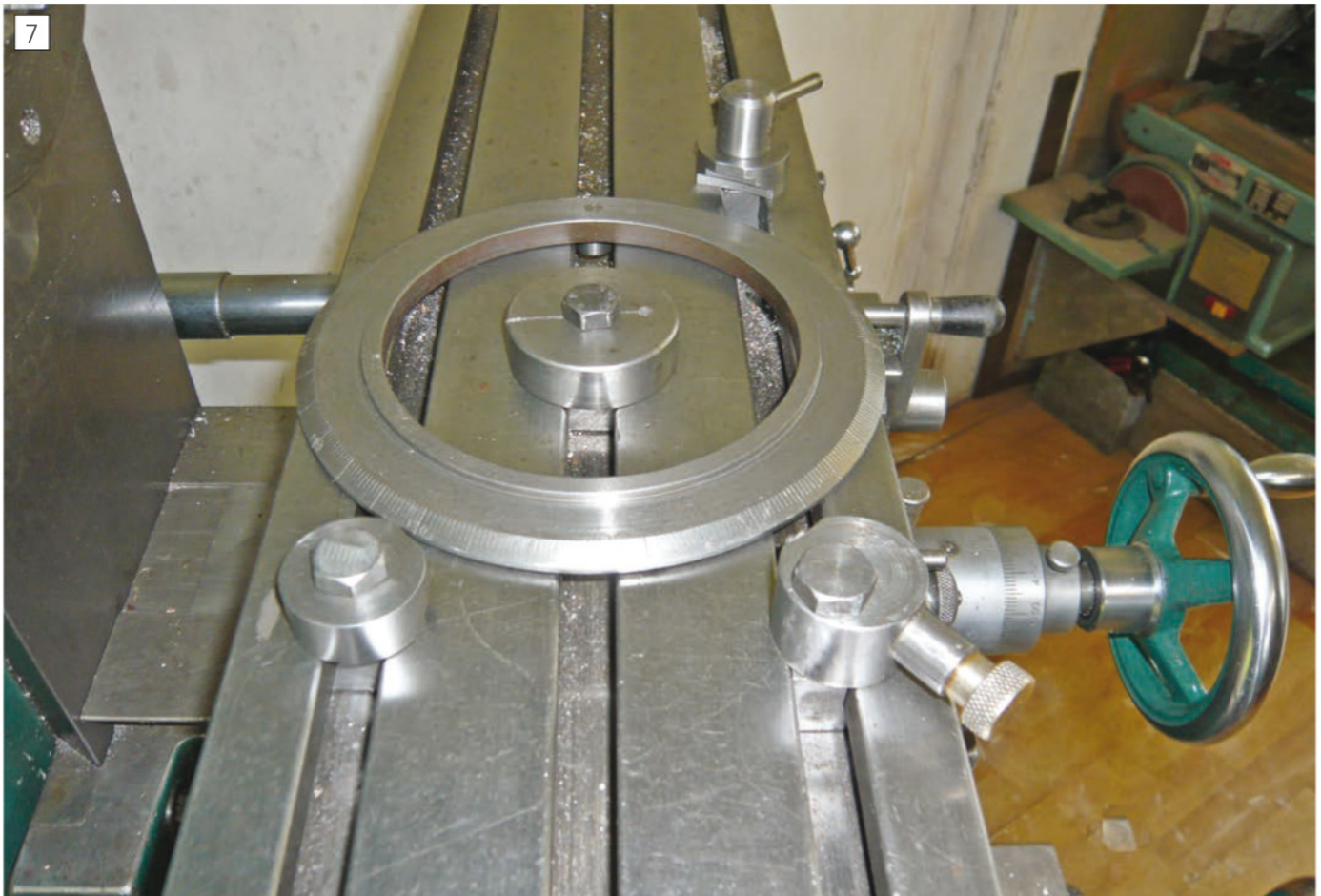
centre and made a skim cut so that it was concentric. The chuck was then mounted on the bar and clamped to it using the chuck's jaws to lock it in position. The indexing holes were made using a toolpost mounted drilling head, an indexing disc fitted at the other end of the lathe spindle was used to space the holes.

Photograph 6 shows the fiducial line scored into the edge of the chuck body at 90-degree intervals. This was also done while the chuck was mounted in the lathe.

Photograph 7 shows the set up on the milling table prior to placing



Indexing holes in chuck groove



Mounting components on the milling table

the indexing chuck in position. The centre hub is bolted in position while the clamps and plunger mounting are left loose and are moved into position after placing the chuck on the centre plug and centred index ring. This plug has been modified by cutting a slot and fitting a grub screw to slightly expand its diameter to closely fit the chuck bore. I made this a feature to recover from my mistake in turning the O/D (outside diameter) just too small, so it is not

entirely a requirement. The indexing ring fits into the chuck register and is positioned concentrically by the chuck. The clamps and plunger are then finally positioned into the chuck groove.

Photographs 8 and 9 show the chuck assembly mounted and ready for operation. The set-up process is quite quick and simple to carry out. It can be seen that the big advantage of bolting the chuck directly to the table makes a rigid mounting for the chuck with a

minimum height which avoids having to mount a chuck concentrically onto a rotary table, that's if you have one.

Photograph 10 shows the plunger for indexing the chuck in 10-degree steps. The two punch dots indicate the position of the plunger point for indexing. By withdrawing and rotating the plunger 90 degrees the point is set in its disengaged position for smaller chuck rotation increments.

Photograph 11 shows the indexing



Chuck & clamps mounted



Showing rear clamp



Indexing ring plunger



Rotary table added

chuck and my home made 8 inch rotary table mounted side by side on the milling table. The height of the face of the chuck to the face of the milling table is 68mm and the height of the rotary table face to the milling table is 65 mm. I made rotary table about as low as can be managed to maximise vertical space to the cutting tool.

Photograph 12 shows the indexing chuck mounted on the rotary table, making the overall height to the top face of the chuck 133mm. Please note that the clamping bolts and washers are just to indicate the clamping means. They should actually be purpose made to fit the tee slots and chuck groove.

I have not yet needed to use this arrangement because just using the direct mounted indexing chuck has been my choice due to its superior rigidity and ease of set up. It is quite obvious that mounting a chuck onto a rotary table can never be as rigid as mounting the chuck directly to the milling machine table, because the extra height and additional rotary table joint reduce the overall rigidity. I have also been able to find online a set of outside jaws for the chuck which now greatly extends its gripping range.

One factor to consider is the total weight of the combined chuck and rotary table, which for an eight-inch rotary table and a six-inch three jaw chuck becomes a weighty item to lift on and off the milling machine table. I have not weighed this assembly, but it is just about as much as I can manage. Another point to note is that once you have spent some effort to centralise the chuck on the rotary table, you would be reluctant to remove the chuck from its concentric setting.

There are of course many machining operations that are carried out by mounting a chuck concentrically onto

a rotary table, which cannot be carried out by just mounting a chuck directly on the milling table. However, this comes with a sacrifice in available head room and rigidity, but for many drilling and light milling operations this is the normal method.

The arrangement I have shown could be somewhat simplified by just mounting a circular ring on the back of the chuck using countersunk or counterbored screw fixings, providing a flush surface, and rotating the chuck with its integral circular ring against the milling table surface. The ring should extend just enough outside the chuck diameter and could be made from steel, aluminium or even plywood as a last resort, depending on your facilities and requirements. The clamps will be made to clamp the ring to the milling table. The ring would be marked out with degree increments which can be marked

on the top or edge of the ring or, dare I say, it could be printed out and glued on to the top of the ring. A separate indexing pointer will also be required, perhaps just held in place by a magnet. This simplification avoids any machining to the chuck, the centring plug will be much the same as I have shown.

In writing this article I decided I ought to check the concentricity of the chuck jaws when rotated around the locating plug. I have never bothered to do this before because most of the operations I have done have not needed very stringent concentricity requirements. Anyway after expanding the centre plug to a slightly stiff fit I measured a total run out of just over 0.002 inch on a 1 inch diameter test bar mounted in the chuck jaws. So, I was very pleasantly surprised at this result from an old chuck. So I will just finish this article by saying "ok chucks"! ■



Chuck mounted on rotary table

MARKET LEADER IN LARGE
SCALE, READY-TO-RUN,
LIVE STEAM

LNER A3 CLASS FOR 5" GAUGE

Order in the name and livery of your choice



£14,995.00
+ p&p

The LNER A3

The world famous "Flying Scotsman" is probably the name that most readily comes to mind out of the 78 A3's that saw service on Britain's railways.

All locomotives received double chimneys by 1960 and subsequently most were fitted with German style "trough" smoke deflectors following complaints from drivers in respect to poor visibility. 4472 was the first steam locomotive to be officially recorded at 100 mph.



Also available with double chimney and smoke deflectors, in the livery of your choice.

The A3's saw service over most parts of the LNER system. The final locomotive, 60052 was withdrawn in 1966. Before the war the A3's were painted in LNER green livery, but carried unlined black 1939-45. They were re-painted in LNER green following the war. A majority of locomotives then carried BR blue livery before all were re-painted in BR brunswick green with orange/black lining. Early, or later, lion crests were carried according to period.

Request your free brochure today

Request your free brochure today by e-mail, telephone, or by returning the coupon opposite.

Telephone: **01327 705 259**

E-mail: **info@silvercrestmodels.co.uk**

Find more information at
www.silvercrestmodels.co.uk

The Model

This coal-fired model features three cylinders and outside Walschaerts valve gear. The copper boiler is silver soldered and hydraulically tested to twice working pressure, CE and UKCA marked. The body casing is assembled using etched brass sheet.

This development of this model has been supervised by our award winning professional engineer Mike Pavie and the batch is being built by the same manufacturer who supplied our much acclaimed Coronation Class locomotive.

The A3 Class model is supplied fully built and ready-to-run, painted and lined in either LNER green, or BR lined green. We will supply your choice of nameplate. As testament to our confidence in the quality of this model each locomotive will be supplied with a full 12 months warranty. All models will be subject to a pre-delivery inspection and boiler test. Our after sales service is considered by customers to be second-to-none.

Summary Specification

- Coal-fired live steam
 - Silver soldered copper boiler
 - Reverser
 - Working drain cocks
 - Stainless steel motion
 - Safety valves
 - 3 cylinders
 - Boiler feed by axle pump, injector, hand pump
 - Bronze cylinders with stainless steel pistons and valves
 - Sprung axle boxes with needle roller bearings
 - Piston valves
 - Mechanical lubricator
 - Outside Walschaerts valve gear
 - Multi-element superheater
 - Etched brass bodywork
 - Choice of liveries
 - Choice of nameplate
 - Fully painted and lined
 - Ready-to-run
- Approx Dimensions:
- Length 74"
 - Width 9.5"
 - Height 14"
 - Weight 105 kg

25 MODELS ONLY
OVER 50% ALREADY SOLD!

Limited Availability

We have reserved factory capacity for the manufacture of just 25 models. We may be able to increase this a little, but cannot guarantee additional stock availability. Once the batch is completed it is unlikely we will commission further production of the A3 Class for a number of years, if at all. The model is scheduled to complete its build in April 2023.

Free p&p worth £195.00 if you order early.

We will offer free p&p on any order placed within 28 days of a thank you for your early order.

Delivery and Payment

The order book is now open and you can reserve your model now for a deposit of just £1,995.00. We will request an interim payment of £5,000 in October 2022 as the build of your model progresses, a further stage payment of £5,000 in January 2023 and a final payment of £3,000 on build completion.



Please send, without obligation, my free 5" gauge "A3 Class" brochure.

Name: _____

Address: _____

Post Code: _____

Please send to: Silver Crest Models Limited
18 Cottesbrooke Park, Heartlands Business Park,
Daventry, Northamptonshire NN11 8YL

FREE
BROCHURE
REQUEST FORM

MEW

Company registered number 7425348

RUST

Depending on your workshop, rust may only be something to you see on objects brought into the shop, or it may be a constant enemy you battle with. A dry, ventilated but well insulated workshop is unlikely to have major rust issues, but if you have to locate your workshop in a damp cellar, leaky shed or even share garage space with a damp car then you may have problems.

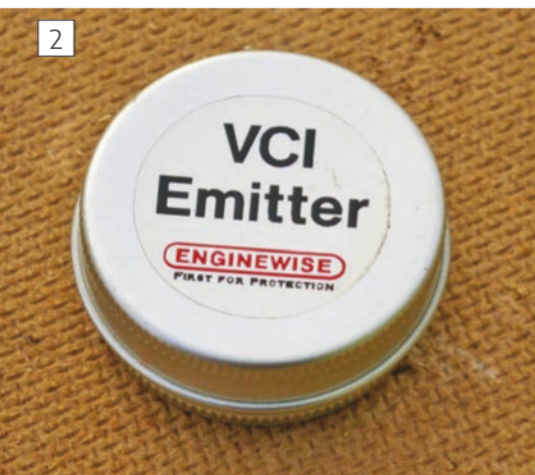
If you have a real, regular damp problem, then the best solution is a de-humidifier, **photo 1**. They are not particularly expensive to run and can be fit and forget if the water collector drains to the outside (otherwise you need to regularly check if the reservoir has filled up).

For workshops that have occasional rust problems, the issue is often not damp, but sudden changes in temperature or allowing moist air to enter a cool workshop. A typical problem is wooden walls that can allow moisture to evaporate in the morning warmth, which then condenses on machine tools that are still cold from the night before. Often a solution to this better insulation, including a vapour barrier. Another 'cure' can be gentle heat, perhaps just a couple of hundred watts from an electric greenhouse heater or a heater with a frost thermostat. Never rely on a paraffin or flueless gas heater as these pump out a lot of moisture into the air which will condense on cold tools.

If your rust issues are very infrequent and only affect things like tools



A dehumidifier is useful for difficult damp problems.



A tin of VCI placed in a cupboard can prevent tools rusting for a year or more.

which sit used for a length of time, you can probably get away with a few precautions such as silica-gel dehumidifiers in cupboards and keeping tools well oiled or greased with rust-protecting grease or oil. Do not use water-dispersing oils as a long-term anti-rust treatment, some can actually attract water as they break down over time. Another very effective approach

is to use a 'volatile corrosion inhibitor' or VCI – this is a sheet of treated paper or a tin you leave open; it emits very tiny amounts of a chemical that actively prevents rust on bare metal surface, **photo 2**.

Rust Rescue

At any car boot sale, you will find toolboxes full of rather sorry looking



A towing hitch before and after derusting, showing how effective the process can be.

tools, sometimes for sale at very low prices. Beware of just buying a big pile of rusty metal, but a careful search can turn up much useful 'treasure'. It's hard to go wrong with basic tools like hammers, screwdrivers, punches, sockets and spanners, even if they are rusted – they will come up a treat if put in a plastic bucket with a rust removing solution, **photos 3 and 4**.

This could be a commercial product, but good, if slower, results can be

achieved using various harmless solutions such as citric acid, vinegar, molasses and even cheap cola. Be aware that de-rusted tools are left very clean and will rust again rapidly unless you dry and oil the surface promptly. You can also de-rust drills, reamers and all sorts of cutters – sometimes the result will be useless, but you may be surprised how often you get a perfectly usable end result, **photo 5**.

Old files are rarely worth picking up

– run your thumb over the teeth and if it feels blunt, don't bother. Most other cutting tools can be resharpened, but this often takes a fair bit of effort unless any rust or damage is minor. Old saws can be very high quality if you have the patience to sharpen and set their teeth but beware of handles rotted by woodworm – it's often less bother to buy a disposable hardpoint saw. ■

5 A selection of rusty tools cleaned by immersion in a de-rusting fluid.



Back to the Scrap Box

A Portable Welding Bench

SMAC makes a tilting workshop bench from found materials

This project evolved after two false starts, but I will start at the beginning as there may be some ideas illustrated in the earlier concepts that some readers may derive inspiration from.

For more years than I care to count I have carried out grinding, welding and any process that creates sparks outside. To assist in this, I have a folding "workmate-like" bench the top is covered in polycarbonate sheet and has an angle iron metal surround. This was developed as I considered that it would be primarily used more for metal holding than anything else. This can be seen in **photo 1**.

Having recently being doing more welding the polycarbonate was starting to get pitted from the spatter. I decided that the bench required a supplementary covering but of a temporary nature.

In my surplus material that is "The Scrap Box", I had a piece of stainless steel 40cm square by 2mm and some 25mm square aluminium tube. This quickly produced a top plate. The only construction was, drilling through from the top right through the tube and inserting rivnuts in the base of the tube and securing with countersunk head set screws, **photo 2**.

It was intended to place a central cross tube with a supplementary tube mounted to facilitate securing the top in the jaws of the bench vice. This would have provided a stable and secure supplementary top.

Searching through the Internet revealed commercially produced portable welding benches, which as well as folding for storage had height and angular adjustment. These additional features certainly have merit when you are in your 70s. So alas the first false start had expired.

Having decided on the need for height adjustment further search of the internet revealed a builders' trestle with height adjustment, advertised on the main DIY web sites. One feature solved. Considering the construction, it was considered that the existing side mounts could accommodate an



The Original work bench showing the polycarbonate top and angle iron surround.

additional plate which would enable the centre line of the already constructed top to pivot just clear of the existing top cross member. A method of creating the pivot was achieved by mounting a piece of aluminium tube on two short supplementary square tubes, shown in **photo 3**. The U-bolts were secured inside the square tube leaving the opposing surface flat to mount flush on the underside of the stainless steel plate. Where they were secured by the same method as the side tubes and an intention, which did not materialise, to provide additional security with 6mm set screw and nuts in holes through the side and supplementary tubes. Having some quite rigid plastic of the same diameter as the round cross tube it was intended to make a boss at either end and mount a spindle on the centre which would be

mounted on the planned side plates. The preceding design concepts may be useful if you go down this route but again the Internet provided a much better solution so the second false start occurred.

Looking online, I came across a used folding work/bench vice. The location of the advertised bench was fairly close so an offer was made and accepted and it arrived at the workshop. It has height and angular configurations of 0, 25, 50 and 80 degrees. The height is adjustable from 775 to 1075mm. **Photograph 4** shows this bench with the top plate removed, it is only secured with four bolts. The construction is very solid, and both the height and angular systems are double locked.

The angular system is operated by the higher blue knobs, pushing both knobs in releases a spring-loaded locking pin



The constructed bench top intended to be fitted to the above bench.



The intended pivot fixture for fitting to the builders trestle.



The leg structure of the commercial produced bench/vice with the top removed.



The bench top fitted to the legs at 4 above.



After fitting the top is shown at one of the tilt angles



A sample of scrap tubing set up for welding.

and the top plate will rotate and lock at each of the four **angular settings**. The knobs can then be tightened to the frame and thus locking the pins in place. The height is adjusted by a spring-loaded foot pedal which is secured to two actuating rods within the frame. pushing the pedal forward releases the locking tabs and the bench assembly can be raised by pulling upwards. There are a number of holes in the vertical tubes and releasing the pedal locates the locking tabs at the desired height. Again, the system can be double locked by tightening the lower blue knobs. All in all, a well designed set up.

The gap between the two legs was 49cm and of course the top plate was 40cm. All the cross members and the foot pedal were shortened to 40cm. The top plate **was fitted** and the four holes for securing the original bench/vice were marked on the square tube side runners and drilled. The only other adjustment required was to remove a part of each top tube at 45 degrees to accommodate the passage of the side tubes when the top was tilted. The bench top **fitted** is shown in **photo 5**, one of the tilt angles is shown in **photo 6**.

The commercially available benches

have three longitudinal slots in the top to facilitate securing a work piece. Industrial welding tables have a series of holes similar to Stephenson metric blocks but on a larger scale. It was decided to compromise as producing the slots in stainless was not appealing. A series of four 8mm holes just above the centre with three further holes mid distance between the four at a higher level would be the initial choice. A length of angle iron was bolted longitudinally just below the centre line. This was not continued all the way across as the space at the end could accommodate longer work pieces. No dimensions have been shown as it is a subjective concept for the individual's requirements.

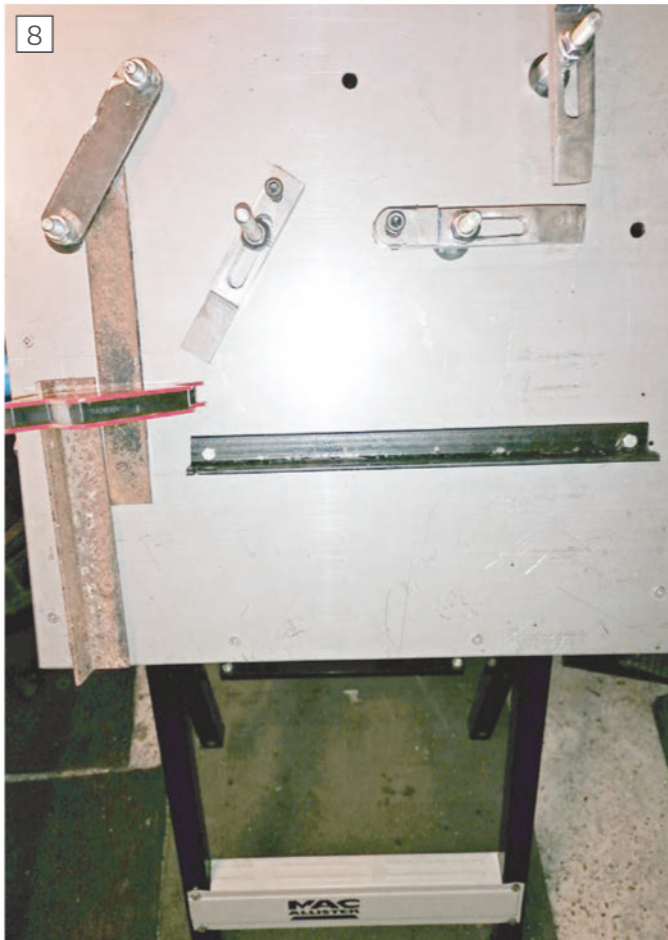
The set up is shown with a sample work piece in **photo 7**.

The disposition of the 8mm holes is indicated in **photo 8**. The initial two clamps are mounted on uprights mounted on a coupling nut secured to the top on the underside with an 8mm screw. You will note that the positioning of the two rows allow the clamps to more or less meet thus securing any work piece between. The next clamp along is mounted on a threaded rod secured on the underside with a flange

nut, This is intended for thinner material. The final bar is mounted on two 8mm set screws and is intended to hold any long work pieces in the space mentioned earlier. Again indicated with a sample work piece in photo 8.

The availability of both height and angular adjustments makes welding so much easier and as mentioned earlier it avoids bending and stretching which is no longer always possible. In reflection if there had been a piece of mild steel in the scrap box it would have been a **better choice** for the top as the welding magnets could have been used to greater effect which has only been compensated by the angle iron locating piece. Also, if you were contemplating constructing your own bench it would **save time and effort** if you made the top 49cm that is assuming you were using the same leg structure. It has not been checked but the builder's trestle is of similar dimensions and it may well accommodate a 49cm top.

Finally, the bench is shown in the folded position in **photo 9**. ■



The diverse fittings for securing the work piece.



The bench reduced to basic height and folded.

NEXT ISSUE

Atmospheric Railway

Roger Backhouse looks at the history of a fast, silent – but short-lived – Victorian railway.

Concrete Sleepers

Stephen Wessel updates us on the use of concrete sleepers in his garden railway and extends his methods to include pointwork.

Annie

Robert Knox constructs a 7¼ inch gauge version of the Lister petrol electric engine.

Two Stroke Engine

Patrick Cubbon takes two incomplete two stroke engines and uses the parts to create a single engine.

Scotsman Sanders

Peter Seymour-Howell continues the production of a set of steam and gravity sanders for his 5 inch gauge *Flying Scotsman* locomotive.

Content may be subject to change.



ON SALE 7 OCTOBER 2022

Cormak Tytan 330 x 700 Universal Manual Lathe



Cormak Gear Head Universal Manual Lathe.
Suitable for small workshops or training centres.
Power: 230V, Single Phase.

PRICE: £2,550.00 INC VAT

Technical data	330 x 700 Universal Manual Lathe
Swing over bed	330mm
Maximum workpiece length	700mm
Swing over cross slide	220mm
Bed width	160mm
Spindle bore	38mm
Spindle taper	MK5
Spindle speeds	12
Range of spindle speeds	65, 90, 120, 160, 220, 300, 380, 500, 640, 850, 1100, 1650 rpm
Maximum side stroke of the tool holder	160mm
Maximum longitudinal stroke of the tool holder	100mm
Types of metric thread	17 types
Metric thread range	0.5–4 mm
Types of inch thread	24 types
Inch thread range	9-40 TPI
Longitudinal feed range	0.1–1.396 mm/turn
Transverse feed range	0.025–0.34 mm/turn
Tailstock quill diameter	40mm
Tailstock quill bore	70mm
Tailstock quill taper	MK3
Motor	1.1 kW, 230V
Dimensions	1400x770x550 mm
Net weight	320 kg



HK25L VARIO Milling Machine with auto feed



Compact milling and drilling machine of universal application. Swivel head, MK3 spindle taper. Digital display shows spindle speed. Machine equipped with an automatic table feed.

This machine comes without a base.

Technical Data	HK25L VARIO Milling Machine
Drilling	25 mm
Cylindrical-frontal milling	16 mm
Frontal milling	63 mm
Spindle taper	MK3
Spindle feed	50 mm
Head tilt	+/-90°
Number of spindle speeds	adjustable
Spindle speed range	50–2250 rpm
Table surface	700x180 mm
Maximum longitudinal table travel	490 mm
Maximum transverse table travel	180 mm
Maximum vertical travel	280 mm
T-slots number	3
T-slots dimensions	T12/ 12 mm
Motor	S1: 0.75 / S2: 1.1 kW
Weight	115 kg

PRICE: £1,995.00 INC VAT

Aries Duct Fix Ltd

Unit 5-6, The Foundry Business Park, Seager road, Faversham, Kent, ME13 7FD

Office: 01227 751114 Email: sales@ariesductfix.com www.ariesductfix.co.uk

A Chain Alteration Tool

Will Doggett makes some savings with a home made rotary riveting tool - part 3



6mm holes



Bracket setup

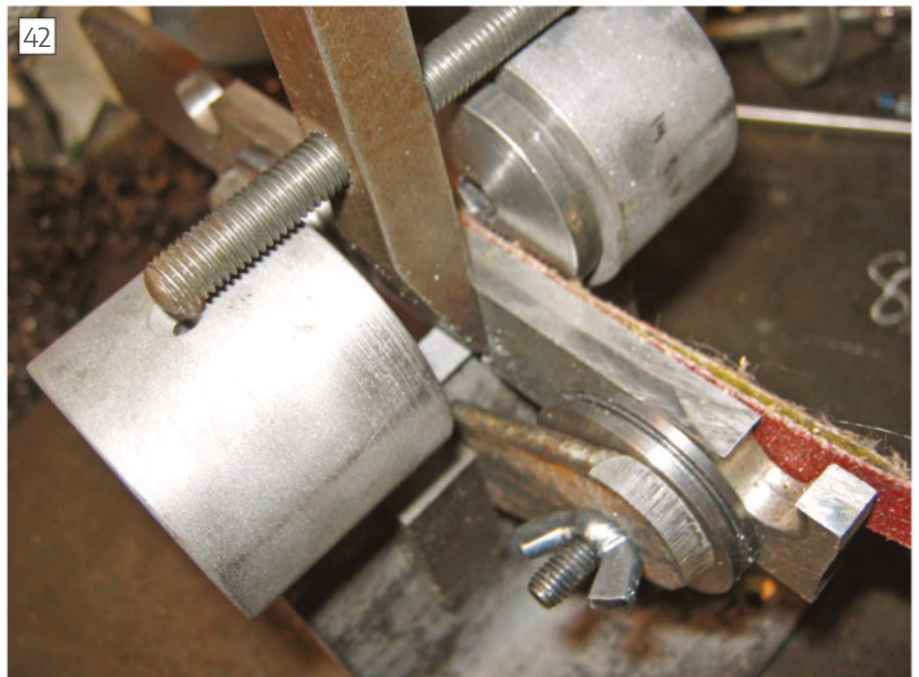
Making the support bracket

I first put the newly made chain support on the full size rotary riveting base sketch with the top edge on the lower line on the sketch about 45mm from the vertical centre line and marked through the hole in the centre of the support piece. This gave me the position of the hole for the support piece, I then set the arm of the drawing to 30 degrees and marked a line through the hole to the upright line. This gave me a size for the support bracket; the centre line to the hole was 47mm. These measurements were transferred to the 25mm piece of steel for cutting.

To cut the support bracket flat to size I set the bandsaw over to 60 degrees and cut the blanks then the cut ends were cleaned up with a file. The bandsaw was then set to 90 degrees and they were cut to their nearly finished length, 70mm from the long corner of the taper to the top square end.

The mounting hole for the chain support was marked out 47mm up the centre line from the tapered end and on the centre line of the 25mm flat. The hole was marked with a centre pop.

Now the centre was marked I used a pair of dividers to scribe a radius on the square end this radius was then hand filed to size on both pieces. The marked holes were then drilled 6mm, **photo 40** shows the support brackets drilled and the ends with their radiuses.



Magnets at the bottom

To hold the support brackets in position ready for welding I used a piece of aluminium with holes drilled to correspond with the support bracket holes. The brackets were held with screw through the chain support pieces with a pair of wing nuts at both ends. The aluminium has a cut out at bottom to sit on the centre of the base frame, **photo 41** shows this setup. The bottom of the brackets are held with magnets

at the bottom, you can just see them in **photo 42**.

The position was finalised, and a clamp was used to secure the bracket and aluminium at the top and I left the magnets at the bottom then made a big tack weld on one side. After removing the magnets, the other side was also tack welded they are then fixed to the base. **Photograph 43** shows one of the brackets in position after welding



43
Bracket after welding



44
Section removed



45
After priming



46
Parts after bluing

and cleaning up with my new shot blast cabinet.

It was only after priming the base that I realized the base would require modifications as the chain when in the carriers was being pulled over by the rest of the chain as it couldn't fall in a straight line under the carriers.

To remedy this I put the base on its side and marked the area where the metal was required to be removed. The base was then set in a machine vice on the dill and clamped down and using a 60mm hole saw I removed the section. **Photograph 44** shows the section removed before cleaning up

with a power file and then a hand file to remove the sharp edges.

I then washed the base with white spirit to remove the oil that I had used when cutting the hole. When this was dry I sprayed the base again with a can of aerosol primer, **photo 45** shows the base with the primer drying.



47
Screw after bending



48
Handle bending



Varnished file handle



Finished handle



Base painted

With the cut-out in the base the chain is now not pulled over as it was before as the chain can be put in the cut out, and the ends fall straight down from the chain support carrier.

I let the primer to dry completely before spraying the top coat on, this let me get on with other parts. The first parts that I worked on were the riveting tool holder and the two chain supports. I thought they would look better if they were blued so they were heated then put in some oil, **photo 46** shows them after this treatment.

Pressure screw

The pressure screw was already threaded, so the position of the bend and the length of the handle was all that was required. To do this the height of the thread to the bottom of the base was measured I then transferred this measurement to the screw just after

the thread to the end. This was then marked and cut to this length with the end rounded in the lathe. I heated the plain part after the thread to red heat and then pulled the bottom around to almost 90 degrees as seen in **photo 47**. The pressure screw was then blued in the same way as the other parts. The finished dimensions for the pressure screw are thread end to bend centre 85mm bend centre to rounded end 120mm.

Riveting head handle

Moving onto the handle for the riveting head the thread end was also made so the position of the bend was

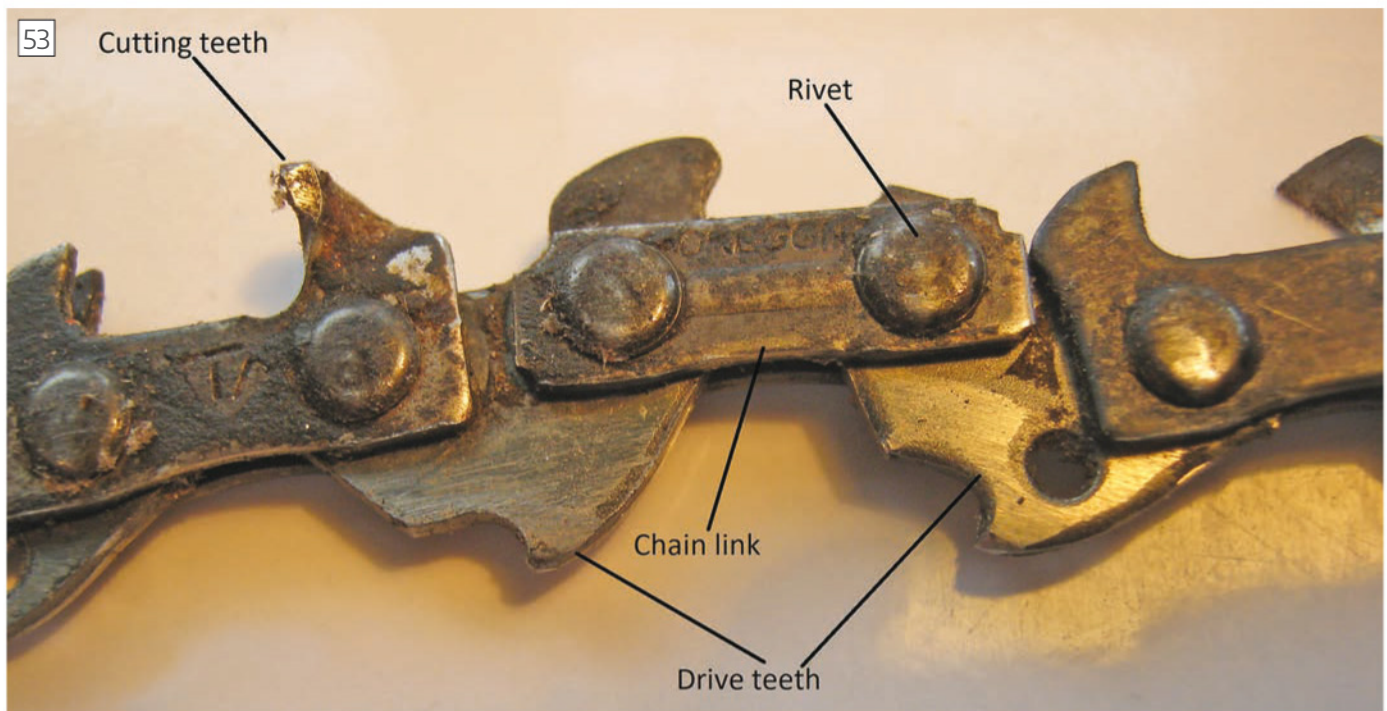
heated to red heat and pulled around to 90 degrees and 30mm from the end of the thread. To form the part of the handle that you hold, I measured from the bearing block thread to the bottom of the base. From this measurement I subtracted enough so that I could get my hand under the handle without hitting it on bench as I turned it.

With this information and the size of the handle I could mark the 8mm rod for the bend this was then heated to red hot and holding it the bench vice it was pulled around to 90 degrees in the opposite direction from the top this gives me the start of a handle **photo 48**. The finished sizes of the handle are thread end to bend centre 35mm bend centre to bend centre 110mm and the handle section is 90mm.

To form the wooden handle, I used



Parts ready for fitting



The link



Modification to punch



Removing a link

a small file handle. This is 75mm long, I drilled through at 8mm then varnished it, **photo 49**. The file handle gave me the length of the now formed metal handle, so that I could cut the metal handle to length and put an M8 thread on the end to secure the wooden handle with a nut, secured with thread lock. **Photo 50** shows the finished handle.

The gloss red painted base is shown in photo 51, this was now ready for assembly with the other parts shown in **photo 52**.

How to use the riveting tool

The first thing to check is the width of the chain so that you can buy the correct links this involves measuring the drive teeth width or gauge in the case of this chain it is .50 so the order was $\frac{3}{8}$ x .50 chain links

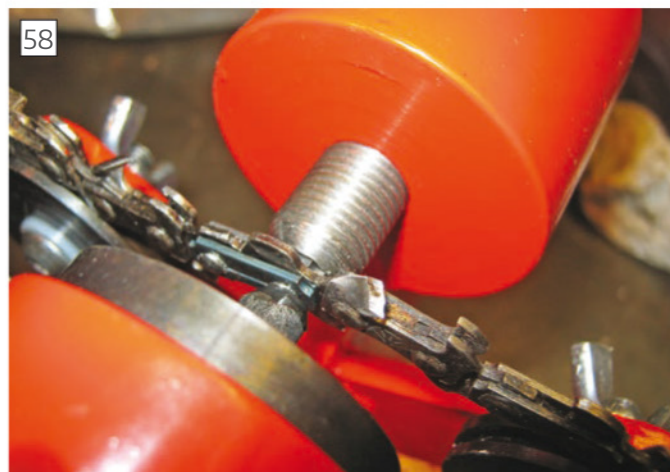
The next thing is to check the number



First link removed



New link



Riveting

of links to be removed to shorten the chain, chainsaw chains are measured by counting the drive teeth.

The rivets to be removed are the ones in plain links these are the ones that are just links without drive teeth or cutting teeth, **photo 53** shows a plain link.

Having decided the number of links to be removed, I mark them with a felt tip pen and then check that this is the correct number of drive teeth by counting the drive teeth again.

The next thing is the removal of a rivet from the chain, this was done by putting the modified punch photo 5 in the arbour press photo 6. A block is required that has several slots in it to correspond with several different chains using the slot that fits the chain that is being split. The block and punches normally come as a kit.

Put the chain over the correct slot then put the block and chain underneath the punch and line the punch up with the centre of the chain's pin and push it out with the press then repeat on the other rivet pin in the same link.

Repeat this pin removal on the other rivet pins in the links that require removal. This operation can be done with just the correct slot in the block and the punch using a hammer to punch the pins out.

Having set the chain in the arbor press with the modified punch, it was not possible to remove the rivet as I could not get the pressure to push the rivet out on this press. The alternative was to use my hydraulic press this required another modification to the punch. This was a sleeve to fit the press ram, **photo 54** shows the sleeve on the punch.

It was then possible to set the chain the block and the punch in the press ready to remove the rivet, **photo 55**.

The first rivet that was removed is shown in **photo 56**, the small ring at



Riveted link

the bottom right in the photo is the head of one of the rivets these usually stick on the punch as the rivet is pushed down. The other rivet that requires to be removed is treated in the same way as the first.

The new link **photo 57** is then assembled on the chain ready for riveting. At this point check the chain has no kinks or twists in it, then put it in the riveting tool. I use long nose pliers to hold the link together when putting the link in between the screw and the riveting head and tighten the screw to clamp the link in position, **photo 58**, ready for riveting.

I put a very small amount of oil on the rivet pin that is going to be closed. With the chain link in position start turning the riveting tool handle at the same time tighten the pressure screw until the pin starts to form a rivet head. After the head on the first pin starts to form, move to the second pin and form this one. Check the rivet is not too tight then move back to the first pin and do the same as the other pin, check this pin is not too tight as well.

The new link and the riveted heads are shown in **photo 59**. We now have a successfully shortened chain.

Conclusion

My initial concern over making the hexagon socket was not justified as this went much better than expected. The mistake with the chain twisting was overcome easily so all in all the project was a success in those respects and as a bonus it worked.

From the point of making this project I got a lot of satisfaction from the designing and overcoming problems and then making the tool. The only down side is that after being used for the first time it may not get used again for a long time.

But that is not what home workshop engineering is about; it is the making something that is useful so the time in the workshop is not wasted. If we all thought that making something was not cost effective the hobby would die out.

The diamond cutting disks that I have been using for this project are 22mm in diameter part number 070-020-00100 and bought from arceurotrade.co.uk ■

On the **Wire** **NEWS** from the World of **Hobby Engineering**

Don't let darker days stop the job!



As we enter the final few months of the year, it is not only going to get colder but also much darker, much quicker. That means it can be difficult to have enough hours of light during the day to get that outside work finished on schedule. Machine Mart, stock a wide range of free standing work lights and floodlights to help keep you in action over the winter months.

Their lights are all portable and have an IP44, IP54 or IP65 rating, making them suitable for internal or external use. They supply lights on a strong, sturdy tripod or with a useful carry handle meaning they can also be used for a variety of purposes.

The Clarke COB10CR is a rechargeable work light, ideal for site or home use, offering a 650lumen floodlight and 2 and half hour working time off a single charge of its 7.4V lithium battery. It comes supplied with a 230V charging adaptor and a 12V vehicle accessory outlet charging lead. This product is available for £32.39 inc VAT.

The Clarke SMD84T features two work lights that each utilise 42 SMD LEDs to provide an extremely bright light. Each light has its own On/Off switch with an LED life expectancy of 20000 hours. The tripod has an adjustable height of up 1720mm and handy cable storage hooks. It is available for £89.99 including VAT.

More details at Machinemart.co.uk



Castings for Drummond Type M Lathe Parts



The Drummond Type M Lathe originated as a flat bed design in the early 1900s and evolved into its typical design in 1924. In 1941 Myford took over production of the machine as part of the wartime reorganisation of British manufacturing. They introduced a number of changes and despite focusing on their other designs the M-Type continued in production until the early 1950s.

Despite going out of production around seventy years ago, many of these machines are still in use, but as you can imagine spare parts and accessories are now hard to obtain. David George and Rob Gough have arranged for suitable castings to be made at a local foundry. They don't make any profit, and just cover the cost of the casting and postage. They have let people on the Drummond Lathe Groups.io forum and the Drummond Myford Facebook web page know about these but would like to make sure that other Drummond owners are aware of them.

All the castings listed below are available. The M type tail stock hand wheel casting is for David George's 2MT modification. Current prices, not including postage are:

- M type extended cross slide bridge - £15.20
 - Modified M type apron - £21.80
 - M type apron covers (set) - £15.20
 - Tumbler reverse (set) - £28.40
 - M type tail stock lever operation (set) - £28.40
 - Rear tool post base - £15.20
 - M type fixed steady - £35.00
 - M type 2MT tail stock hand wheel - £21.80
- Send David an email at dgeorge7@globalnet.co.uk for any requirements.

MODEL ENGINEERS' WORKSHOP

SUBSCRIBE AND SAVE

Enjoy 12 months for just £43.50



SAVE
37%

PRINT ONLY

Quarterly direct debit for £11.25

1 year direct debit for £43.50

1 year credit/debit card for £47.99

PRINT + DIGITAL

Quarterly direct debit for £13.50*

1 year direct debit for £56.99

DIGITAL ONLY

1 year direct debit for £34.00*

1 year credit/debit card for £37.99*

*Any digital subscription package includes access to the online archive.

GREAT REASONS TO SUBSCRIBE

> Free UK delivery to your door or instant download to your device > Great Savings on the shop price > Never miss an issue > Receive your issue before it goes on sale in the shop



www.classicmagazines.co.uk/MEWDPS



01507 529529 and quote **MEW2022**

Lines open Monday to Friday 8.30am – 5.00pm GMT

Offer ends December 30, 2022. Subscriptions will start with the next available issue. Direct Debit payments will continue on the agreed plan unless you tell us otherwise.
To view the privacy policy for MMG Ltd (publisher of Model Engineers' Workshop), please visit www.mortons.co.uk/privacy

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

Pillar Drill Table Counterweight

Mike Philpotts designs and installs a counterweight system for a Medding's floor standing pedestal drill table

I'm getting old and increasingly safety conscious. The worktable on my old Madding's floor standing pillar drill seems to be getting more awkward and heavier each time it needs adjustment. It lacks the rack and pinion adjustment found on some versions. For more detail of the drill see <http://www.lathes.co.uk/meddings-pacera/>

Having seen a few ideas to easily lift and lower the table on a floor standing pillar drill it would be good to adapt my drill in a similar way.

Many of the adaptations look like Heath Robinson affairs. However, they were for me great jury-rigged efforts to demonstrate the concepts and clarify my design objectives. The most suitable for my drill was the counterweight style as opposed to the winch arrangement offered by one experimenter. This design could be adapted to winch operation if required but it would be lifting deadweight. The counterweight idea has the appeal of simplicity and elegance and produced a self-satisfied (or smug) grin on the operators face at first time of operation!

Most of the previous attempts (prototypes) seemed to have their counterweights and attachment points too far from the centre of gravity of both the counterweight and the drill table. I resolved to try and make it simpler.

Having conducted a few thought-experiments, the interior of the hollow column of the Madding's drill seemed like a good place to house/hide the counterweight. That gives fewer worries about the offset cable attachment points causing the table to jamb by 'racking'.

The Madding's floor standing drill - Description

The pillar is 63.00" (1600mm) tall to the top of the column and is 2.750" outside diameter, 2.375" internal diameter. It looks like a model MF2 from the 1940's and 50's.

Prior to adding the counterweight



Meddings drill

table height adjustment was a very delicate and risky affair.

Experience shows that just the static counterweight has made lifting the table so much easier.

I have a separate X-Y table I want to use but would be far too heavy on the standard non-modified table.

So, I need something where I can add weight by increments to get the balance just right.

The Design Concept

The idea is very simple and uses a single wreath pulley arrangement as the basis of operation. See **sketch 01** below

Sketch 1

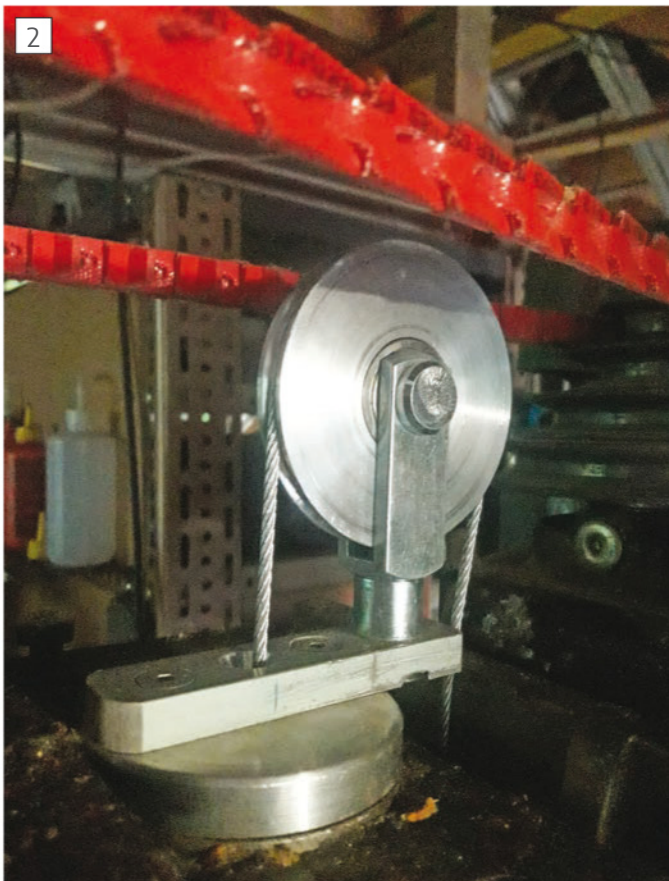
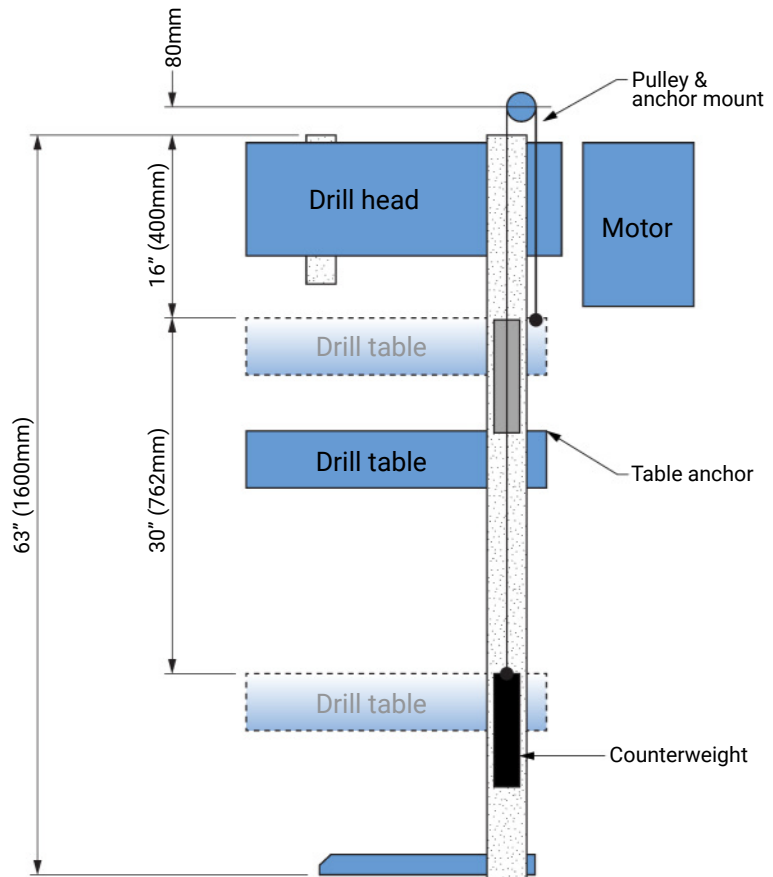
The Concept

Calculate lift cable length

Head to table	= 400 x 2	= 800
Head to pulley		= 160
Pulley wrap		= 125
Table travel		= 760
Total		= 1845

Counterweight calculations

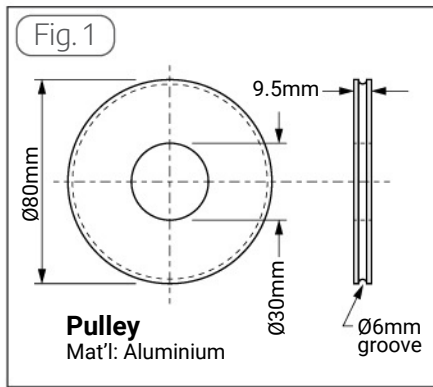
Internal dia. of column	= 58
Dia. of counterweight	= 54
Length of counterweight	= 1600 - (400 + 762)
	= 438 (max)
Table travel	= 762 (30")
Weight of table	= 10kg (?)
Weight of counterweight	= 7.5kg (steel)
	= 11.3kg (lead)



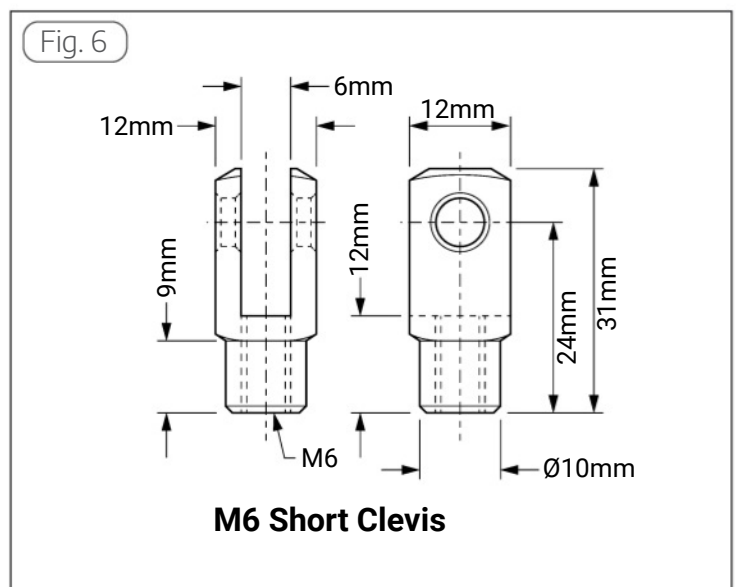
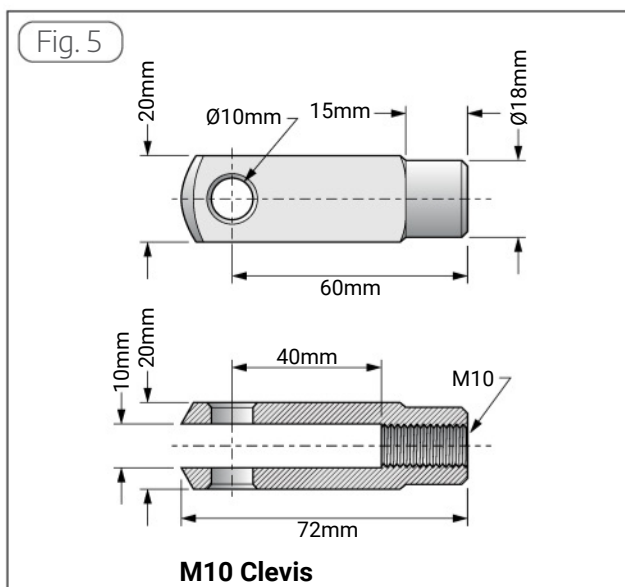
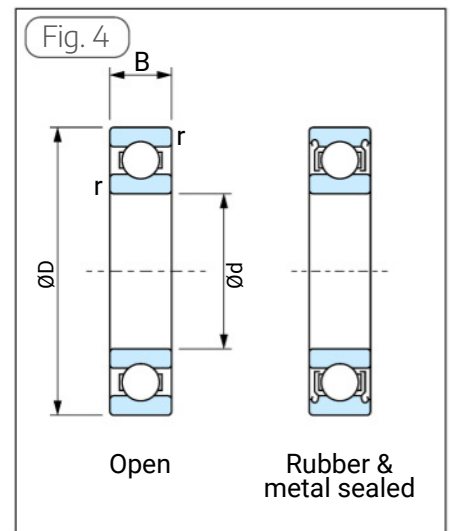
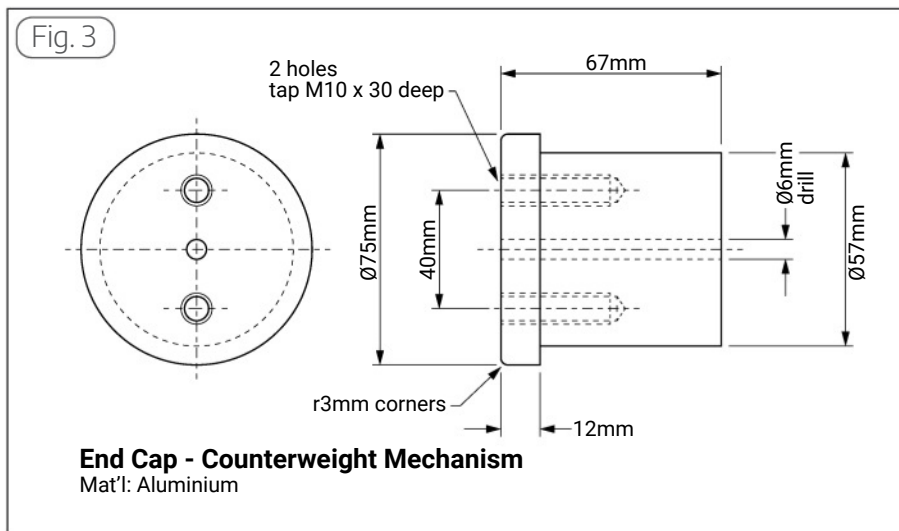
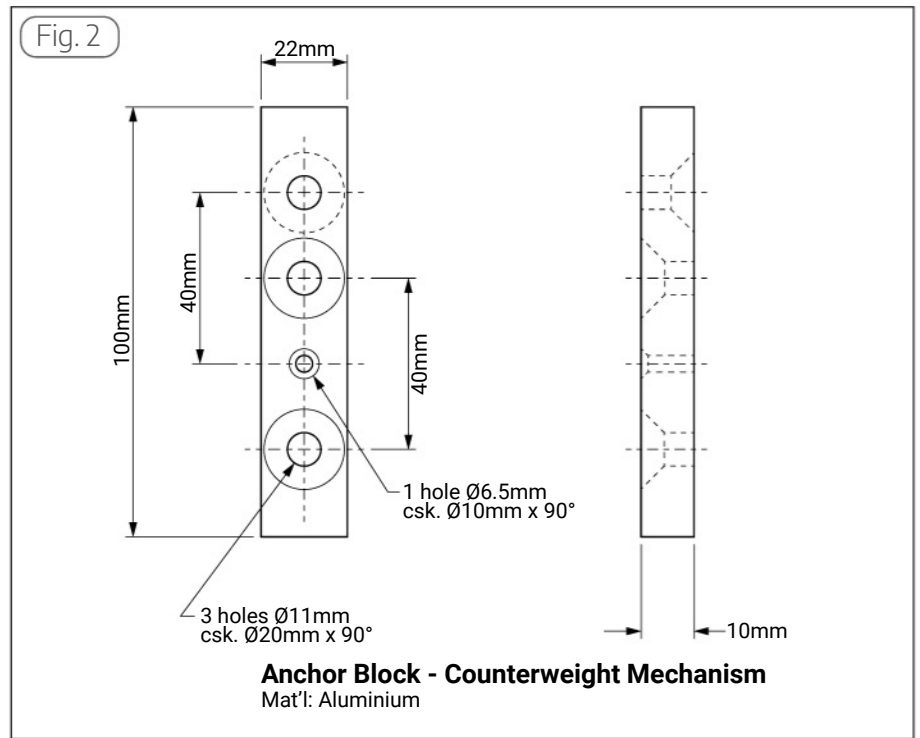
Pulley block and counterweight.



The yoke for the counterweight anchor.



The table was surprisingly satisfying to operate with this modification.



The counterweight, made from mild steel, is a little light and it requires small effort to move it.

Detail Design

Given the basic dimensions of the column we can now proceed to work on the detail parts. First up is the counterweight itself. Initially, I used a piece of mild steel bar 54mm in diameter x 430mm long, tapped with a M10 thread for the eye bolt as an anchor for the lift cable.

Fig 1. Cable pulley - machined from 80mm diameter aluminium bar and has the 30 x 9 x 9.5mm deep groove bearing pressed in the centre.

Fig 2. Anchor bracket - aluminium bar 22mm by 12mm section

Fig 3. End cap - machined from 75mm diameter aluminium bar

Fig 4. Bearing - 30mm od x 10mm id x 9mm wide. Off-the-shelf from one of the on-line bearing suppliers

Fig 5. Yoke - off-the-shelf long series M10 clevis.

Fig 6. Cable anchor - short series M6 clevis with a spring clip pin retainer. – attached to table bracket

Apart from the 3mm diameter steel cable and the fixings these are the major custom and purchased components to complete the counterweight system. The finished pulley is shown as installed in **Photo 2**.

The diameter and fit of the end cap are such that no fixings are required. As soon as the cable is tensioned the end cap 'racks' against the tube wall and prevents further tipping or movement.

Anchor table end

The anchor at the table is a piece of bent 2mm thick mild steel. It is joggled to get the anchor eye as close to the pillar as possible. The table clamp

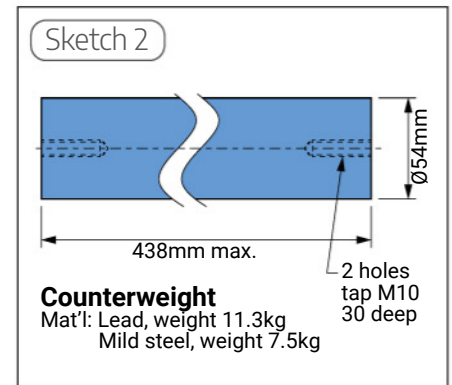
boss is drilled and tapped M6 for the fixings. – see **photos 3 and 4**.

Conclusion

The system works well and saves my old bones from being broken by a free-falling unrestrained cast iron drill table.

The counterweight, made from mild steel, is a little light and it requires small effort to move it. However, it is not the runaway mass it was before the counterweight was fitted. Scrounging around, may produce enough scrap lead to replace the steel. That will get 50% more weight to get an even better balance.

Scrounging done! With a full-length counterweight, 50% lead and 50% steel, the table moves a little too quickly. Operator beware! However, with the X-Y table mentioned earlier there is just enough weight to enable it to be lifted or lowered with a slight effort.



To get the table moving, the clamp is released and then by adding a little pressure on the end of the table, it will move up or down freely. The table was surprisingly satisfying to operate with this modification.

All round, a simple human energy saving and safety project that utilises and references good work done by others. ■



Another view of the yoke.

Modifying my Mini Lathe Part 2



Continuing from his article in MEW 317, Geoff Andrews finds that using the slotted table from a vertical slide as a boring table on a mini lathe is fairly straightforward.



Boring table in position

The dovetail of my vertical table is slightly wider than the lathe saddle dovetail and it is also deeper. This means putting it into place is no problem as it slides very loosely along the saddle dovetail. I found that by using a brass slip 1.5mm thick and 10mm wide on the opposite side of the dovetail from the gib strip it would fit into the gap so that any small adjustment to fit could be made by the table gib strip itself.

To retain the brass slip I turned the ends over at 90 degrees to locate at each end of the table. Because this slip is

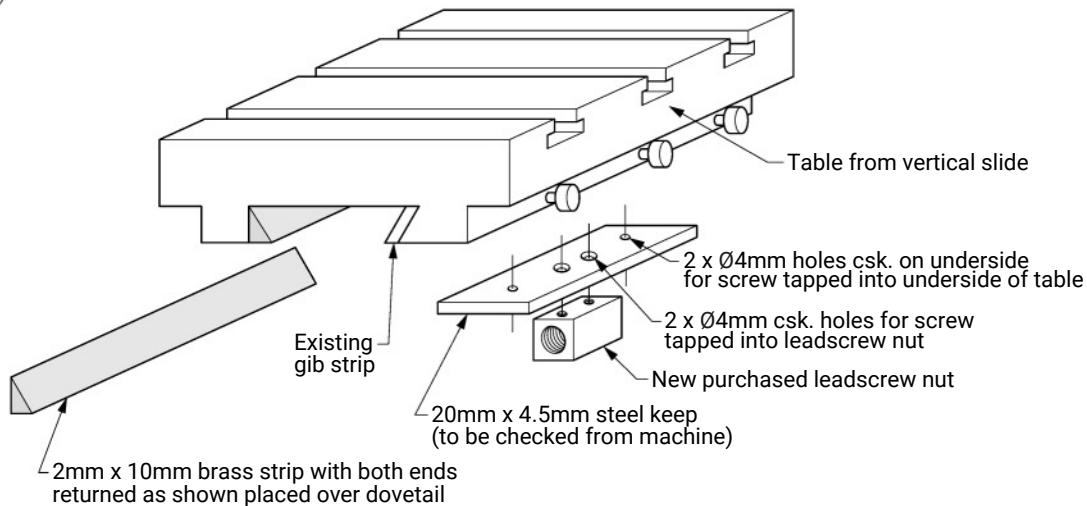
at an angle of 60 degrees the two lower corners of it were removed, see **photo 1** and **fig. 1**. No additional fixing is needed. As stated above the actual final fit is made by the gib strip.

That was the easy part. Next the table needed a nut for the cross-slide lead screw. Rather than take the nut from the cross slide, I purchased a new nut quite inexpensively. These are available from Amadeal and Arc Euro Trade. Because of the additional height of the table dovetail, the nut needed to be mounted onto a spacer to bring it to the correct level to align with the lead screw. This

was useful as extending the spacer longer than the length of the nut this gave the obvious means of securing the nut to the underside of the table. This could then be fitted or removed easily as required.

I found the thickness of this spacer to be 4.5mm. Obtaining this was not easy with the equipment I had, although eventually I found that using two strips of 2mm thick steel bonded with a layer of epoxy and left overnight did the trick. I drilled and countersunk for one M4 screw to secure the nut to the spacer and two

Fig.1



Modification Of Vertical Slide Table As Lathe Boring Table



Underside of modified top slide base

M4 screws to secure the spacer to the underside of the table. Details are shown in fig. 1.

Eventually, due to a small error, I found that the screw was running a little tight, there was a slight discrepancy in alignment. I used only one screw to secure the nut so the nut would now

twist slightly and in effect self-align. Many lathes' cross slide nuts are only held by one fixing. No irreversible work has been done. By removing the strip on which the nut is mounted and dropping out the brass slip the table is ready to be refitted to the vertical slide.

If a screw happens to be placed

underneath a slot the fixing screw length is reduced to prevent any subsequent tee nuts from bottoming.

As the gib strip is wider than the small brass slip this means that the nut is not central to the dovetail. It will be necessary to fit the table in place and then transfer the centre line of the lead

screw to the edge of the table with the slip fitted and the gib strip tightened. Once the table is taken off this line can be transferred along the whole length of the underside of the table to give a centre line for drilling and tapping the table for the M4 screws. It may be somewhere along here that my error had occurred.

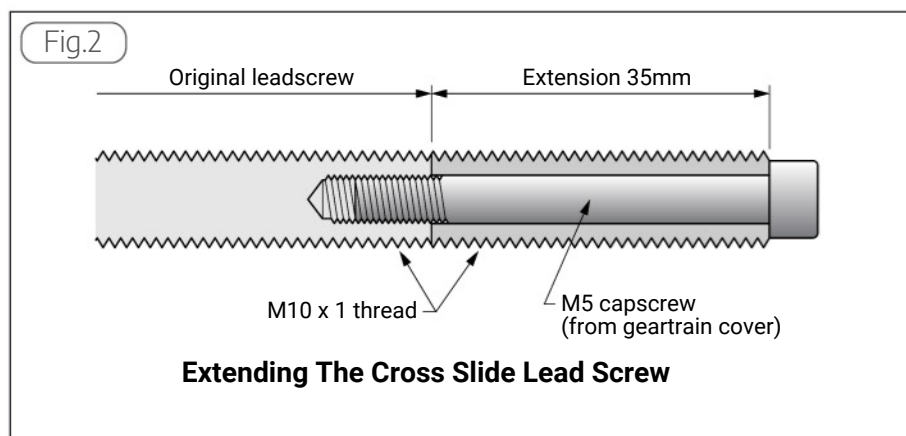
A note here is that due to the screws of the gib strip being positioned higher, there is a slight tendency for the gib strip to tilt. However, as it is mainly used for holding the table in place as opposed to sliding regularly, I was happy not to make any alterations here.

A final check with the dial gauge to check that the top surface and sides where level and square to the lathe bed showed all was well. The work I had done on the lathe saddle detailed in the previous article had paid dividends.

The longitudinal position of the nut fixing to the underside of the table is best decided by experiment depending on whether the cross-slide lead screw is just as originally supplied with the machine or if this has been modified already.

A number of people have extended the travel of the cross slide by extending the forward support bracket of the lead screw between the dial and the saddle. In some machines this has needed a modification to the saddle to allow the cross slide to move further forward. In these cases, repositioning the nut under the cross slide would achieve the same thing.

This allows an increase typically of 20mm to the forward travel of the cross slide. Fortunately, my Warco machine



has a long slot in the saddle casting and no modification here was needed. I had therefore only to simply turn a 20mm extension piece to fit between the bracket as supplied and the saddle. This can be seen in **photo 2**. I also drilled a hole for lubrication and fitted a small grub screw to protect against swarf getting in.

Now, especially having the boring table option, I thought it would be useful to be able to extend the travel to the rear as well.

There were two options. I could make a new longer lead screw which was my original intention. I had in fact done this, and made a new nut, on my old Atlas machine which had a very well used and worn 10 tpi acme thread. The other option was to extend the lead screw.

Extending the cross slide lead screw

I had fortunately come across an excellent but unusual method for

doing exactly this on the internet.

This is described on the web site andysmachines.weebly.com/extended-cross-slide-travel.html. At first, I was a bit sceptical but it does in fact work very well. In short, a hollow extension, threaded to match the lead screw is held on to the end by a long M5 screw, the web site gives full details. **Figure 2** shows a section of the extension I made which is 15mm longer than that shown on the web site.

This extension needs one long M5 socket cap head screw. Unfortunately, I did not have any M5 socket cap screws. It seemed a shame to buy a load of screws when in fact I may only ever need one, that is, until I remembered the manufacturers of the lathe had very kindly already provided two of these on the machine itself. These are the two screws which fasten the plastic change gear cover to the headstock. These screws were removed, the holes in the plastic cover drilled out to 6mm dia. and the thread in the headstock tapped M6 to suit cross head screws which I already did have in stock.

By using these M5 cap head screws extension the lead screw and hence the cross slide or boring table travel has been increase by 35mm to the rear. Taking the front extension into account the total additional travel is now 55mm.

Photograph 1 shows the boring table in position and the rear extension can just be seen poking out at the back. One of my first modifications on the lathe, (described in my previous article), had been to make the rear splash guard fold down. Changing over from cross slide to boring table or removing either for some reason is now just a two minutes job. Also if the cross slide or table extend to the rear to touch the splash guard, as it is only held by a magnet, it simply folds down out of the way.

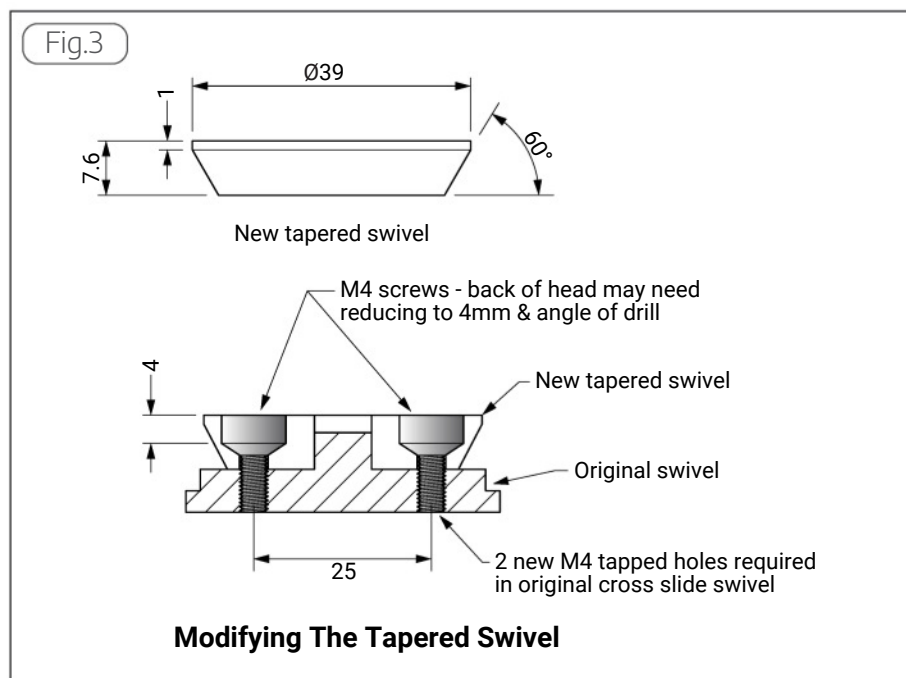
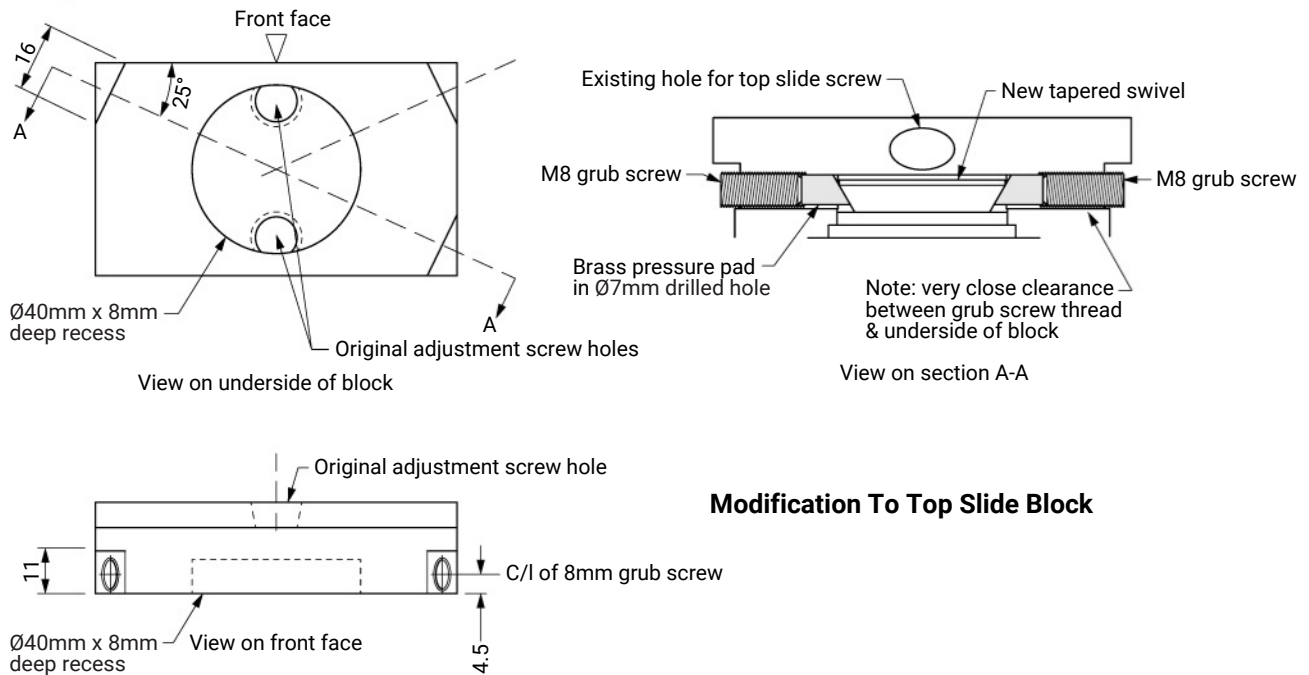


Fig.4



Modification To Top Slide Block

Modifying the top slide base

I was never impressed by having to almost detach the top slide in order to access the holding screws to alter its angle which is standard on all of the mini lathes.

Photograph 2 shows my solution. This is based on the system used by Atlas, Boxford and some Myfords and other lathes as well. Here I have turned up a 39mm diameter swivel which is the largest I thought practical to get in the space available to resist rotational turning forces. This screws onto the existing swivel disk of the cross slide via two additional M4 fixing screws. My new 39mm diameter swivel is a 60 degree cone and measures 8mm high. As can be seen this new tapered swivel locates into a bored recess in the bottom of the top slide base and is secured by three M8 grub screws with 7mm diameter brass pressure pads, **fig. 3**.

This system is very secure, and I have found no tendency for it to rotate under the force of turning. To adjust the angle of the top slide the three grub screws are loosened slightly, and the base rotated as required. Loosening the grub screws further allows the whole assembly to be removed. I dispensed with the plastic protractor fitted to the base, as these are really next to useless, and I always use an engineer's protractor to set the angle when needed.

I made the tapered swivel in fig. 3 by

first facing the end of a piece of 40mm diameter bar then drilling an 8mm diameter hole in the centre. This hole would be to locate the new swivel onto the location up-stand on the original machines swivel to which it was going to ultimately be screwed. I then trued up the external diameter of the bar, hence the 39mm diameter I eventually ended up with. A 60-degree angle 7mm long was then turned leaving a 1mm rotational register. This was then parted off at 9mm long. Parting off, that is, as far I could safely get the parting tool into the bar. The new swivel then finally parted company with the piece of bar in the vice by good old-fashioned hacksawing as I do not have a mechanical saw. This did not take as long as I expected but a cup of tea was welcome.

Turning now to the top slide base itself. Having marked the centre on the underside of the base I placed it in the vice of the bench drill and used a large centre drill at this position. This was then placed it into the four-jaw chuck aligning it with the tailstock centre with the jaws fastened at this position. You can be more accurate in positioning the base but this method is quite accurate enough for this purpose. The drawing in **fig. 4** gives the details of this modification.

The first operation was to use a 4mm then 10mm drill in the centre drilled hole until it intersected with the hole for the

top slide screw hole of the base. The next operation was then to open up the hole to be a nice fit on the new tapered swivel by using a boring bar.

Here was the main problem. As the top slide and tool holder were removed the question was how to hold the boring tool. The obvious solution was to fasten the boring bar securely to the vertical slide mounted on the cross slide. However, only having the travel of the standard cross slide screw, (This was before I had extended the cross-slide screw as described above, life would have been much easier if I had done this small modification first), try as I may with the vertical slide on the cross-slide I could not get the boring bar sufficiently in line.

As model engineers we often try to get our equipment to do things it was never intended to do and resort to improvisation. **Photograph 3** shows my eventual botch up to hold the boring bar. But it worked surprisingly well.

The bar is held in a tool holder in a vice mounted on the vertical slide. The yellow block of wood is threaded M10 with an M10 hex screw into this. The screw head being adjusted to support tightly under the boring bar tool holder it is locked by the screw on top of the block. An M8 cap head screw was fitted through the wooden block and through a clamp plate under the bed ways with a nut below to secure everything in place.

By carefully taking small cuts the hole



Boring the top slide base

was opened out until I had a nice fit on the 39mm registration diameter of the tapered swivel. An additional problem needing care of course is that the top slide base has two holes passing through this area for the original fixing screws giving intermittent cuts to the boring bar.

The next operation was to drill and tap for the securing clamp screws. I have three of these, two at the front and one at the right-hand rear. After marking off I used a hacksaw and files to form the three recessed flats which were at right angles to the lines bisecting the centre of the base which themselves were 25 degrees to the front and rear face. I had decided to use M8 grub screws for maximum holding of the base in position. The flats were therefore made 10mm high which left a substantial 5mm support to the top slide.

As the new swivel taper is only 8mm high care needs to be taken with the M8 thread for the grub screw which is very close to the bottom of the base and is in effect only just covered.

Compromises sometimes must be taken and here I thought the higher clamping force of the M8 screws was worth it.

By lining up the base in a vice on the pillar drill to intersect the centre of the base, I drilled a 7mm diameter hole at each of the three positions. These were tapped to a depth that left approximately 8mm of plain drilled hole near to the central bore for the brass pressure pads. These pads just under the 7mm diameter have a flat face for the grub screw to operate against and a 60-degree angle to locate on the edge of the tapered swivel.

My original intention was to unscrew the tapered swivel when I wanted to use the vertical slide which could then be fitted to the original swivel. However, even with the lead screw extensions the space is limited as the vertical slide can only be fitted at that one location. It would be nice to secure the vertical slide to the boring table at other locations but of course the table is part of the vertical slide!

I considered fitting the tapered swivel, when required, to a new

position directly on the cross slide but this would require making a sub base for the vertical slide for the swivel to operate.

Some ideas once planted are difficult to get out of one's mind and fitting other things to the boring table was well logged in there. So it was that a few months later when I visited the Midlands Model Engineering exhibition in 2019 that I found myself carrying back to my car a nice box containing a swivelling vertical slide.

This came with two pins for locating into a Myford slotted cross slide. These were too wide for the boring table, so I made two new pins of the correct diameter. This new slide can be fitted via screws and tee nuts to any of the three slots in the boring table and gives the maximum flexibility.

Now, as I would no longer need to use the original swivel on the cross slide, I used Loctite to secure it to the underside of the cross slide to provide extra protection should it in future have any tendency to rotate. ■

FOR SALE

American 5" Gauge F7 in authentic Great Northern colours



LOCO has authentic sound system power plant.
2 car batteries installed.

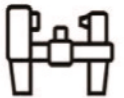
Used but as new £4,500
Enquiries to verayarwood@gmail.com

webuyanyworkshop.com

Re-homing model engineers' workshops across the UK



It's never easy selling a workshop that has been carefully established over a lifetime. I will buy your workshop so you don't have to worry about finding a new home for much loved workshop equipment and tools.



Please email photos to
andrew@webuyanyworkshop.com
Or to discuss selling your workshop, please
call me on **07918 145419**

All equipment considered: Myford, Warco, Chester, classic British brands etc
Polly steam locomotives also purchased, especially those needing a bit of 'TLC'

To advertise here
contact Angela Price at
aprice@mortons.co.uk

M-MACHINE

Unit 6 Forge Way, Cleveland Trading Estate
Darlington, Co. Durham. DL1 2PJ

Metals for Model Makers

Contact us for Copper, Brass, Aluminium,
Steel, Phosphor Bronze, etc.

PHONE & FAX 01325 381300

e-mail: sales@m-machine.co.uk
www.m-machine-metals.co.uk

THINKING OF SELLING YOUR LATHE, MILL OR COMPLETE WORKSHOP?

and want it handled in a quick
professional no fuss manner?
Contact Dave Ansell,
Quillstar (Nottingham)

Tel: 0115 9206123

Mob: 07779432060

Email: david@quillstar.co.uk

ON
SALE NOW

BLURRING THE EDGES



Buying, assembling, and teaching myself to use a
Tormach® 770MX CNC milling machine:
my journey from distinctly novice to relative competence



STEVE DUNTHORNE

BLURRING THE EDGES

...a new book

Essential reading before
purchasing a CNC milling
machine. Records the author's
journey from choosing, importing
and assembling a CNC milling
machine, tackling CAD/CAM,
figuring out feeds and speeds, to
getting it to make beautiful parts.

Paper back, 294 pages of practical
help and advice in full colour.

www.blurringtheedges.co.uk

Available from Amazon, WHSmith
and all major outlets now

FREE PRIVATE ADVERTS

MODEL ENGINEER **MODEL ENGINEERS' WORKSHOP**

Save a stamp! You can now place your classified ads by email. Don't waste time scanning the form, just send the text of your ad, maximum 35 words, to meweditor@mortons.co.uk, together with your full name and address, a telephone number, whether it's a for sale or wanted and stating that you accept the terms and conditions for placing classified ads – see below. Please note, we do not publish full addresses or website links to protect your and other readers' security security.

Coronavirus advice is changing! Please follow local government advice in Wales, Ireland, Scotland or England as appropriate, especially if you are considering buying or selling items for collection.

Tools and Machinery

■ **WARCO BV20-1** lathe 8" swing over bed 13" between centers. 3 jaw and 4 jaw chucks, face plate, quick change tool post with 6 toolholders. Full set inch and metric screw cutting gears. £600.
T. 01457 856413. Glossop.

■ **FREE LATHE** - Many years ago I was given an old 'PORTASS' lathe by a reader in the North: I am now prepared to pass it on again, but transport costs have increased so much, that I must ask the successful party collects it.
T. 01480 531667. St Ives, Cambridgeshire.

■ **Universal Miller** screw cutting lathe, 3 wood lathes, £150 each. Large 2 speed Bandsaw, £300. Rotary Inverter 7HP, £300. Back geared Pillar drill, £200, accessories to fit all of above makes, height vernier, inside vernier + depth angle vernier.
T. 01142 334758. Sheffield.

■ 80mm 4 jaw chuck, 65mm three jaw chuck, 12 hole indexer all 3 with ½" 20 TPI thread. Vertical slide and vice, 8 single tool holders. All suitable for use on an old Cowells lathe. Photos available.
T. 01329318033. Fareham.

■ **Smart and Brown Sabel** lathe headstock and spindle, in fine condition together with bull wheel and thrust bearing. The 4-step pulley is not included; £100 buyer collects. Also available are several headstock related castings for £30.
T 01845 526435. Thirsk North Yorkshire.

■ **Dean Smith and Grace** lineshaft driven lathe, 18" swing, 32" gap, 6' very good condition, 92mm bore, this Rolls Royce of lathes was new to Levant Mine in 1920 mining work from then to today, 3 tons interest?
T. 01803 557107. Torquay.



■ **Atlas BGSC** Lathe c/w 4 jaw independent chuck, 3 jaw c/c chuck, powered cross-slide, change gears, stand, spare motor, f/r, stop/start. cutting tools, £695 Also various single phase motors, 1 ton chain block, beam trolley. **T. 07542113567. Holywell.**

Models

■ **Locomotive LMS**, black, 5 built to Don Young drawings in 5" gauge exhibition standard, little wear and extras like vacuum, engine, brakes, full boiler certs for 4/1 years, price £10k.
T. 01202 813366. Bournemouth.

Parts and Materials

■ Lot of 3mm eutectic arc welding rods. Box of aluminium sheet offcuts. Vintage as-new 6V-12V battery charger. Clarke MIG welder, 150 Amp gas type. Call or text for more info.
T. 07909 766687. Bury St. Edmunds.

■ **Stuart Turner**, No 9 casting set inc Governor and water pump as supplied by ST with drawings, £400.
T. 01202 813366. Bournemouth.

Wanted

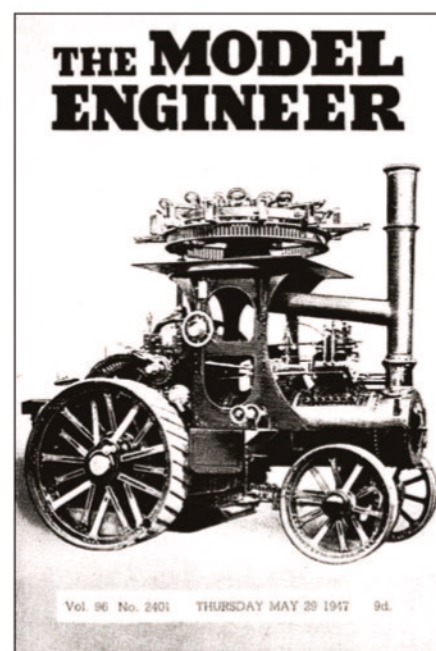
■ Top slide for Colchester or Harrison Lathe.
T. 3530872020628. Cork City, IE.

■ Service handbook for Excel Swing Die Grinder. **T. 07947 606525. Urmston.**

■ **Prestacon** press spares, punches, guide bars etc. or complete press considered, or detail drawings for tools and guides.

T. 07497 634128. Sutton Coldfield.

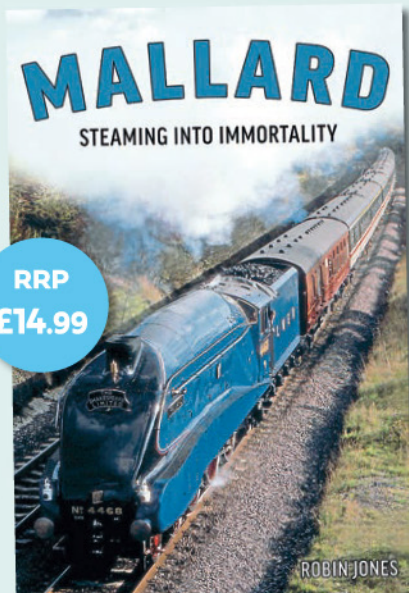
■ Free holiday for two in exchange for either a Myford Super Seven or Cowells ME lathe. Must be in mint condition. Sensible adverts did not work, hopeful this time. **T. 01986 835 776. Norwich.**



Get 20% off a selection of aviation and railway reads from Mortons Books

'FLASH20' for 20% off

Use code 'FLASH20' at the checkout



MALLARD – STEAMING INTO IMMORTALITY



THE SECRET HORSEPOWER RACE
– WESTERN FRONT FIGHTER
ENGINE DEVELOPMENT



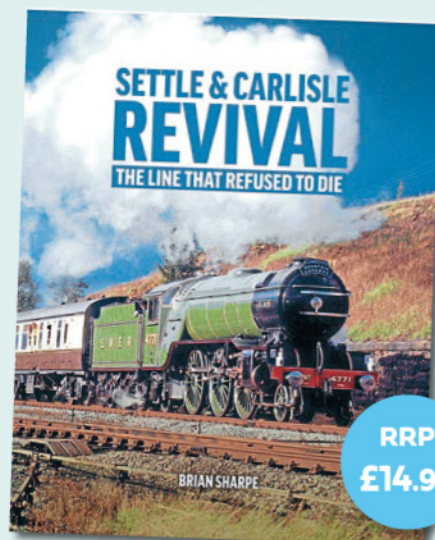
SUPERMARINE SECRET PROJECTS
VOL. 1 – FLYING BOATS



FLEET AIR ARM LEGENDS:
FAIREY SWORDFISH



RAF COLD WAR JET
AIRCRAFT IN PROFILE



SETTLE & CARLISLE REVIVAL –
THE LINE THAT REFUSED
TO DIE

MORTONS
BOOKS

Excludes bookazines

ORDER NOW: www.mortonsbooks.co.uk

Tel: 01507 529529 Offer expires: 31.12.22

HOME AND WORKSHOP MACHINERY



Check out our eBay store!



3 1/2" Britannia 4-6-2 rolling chassis and castings, check out our website for more pictures £1150



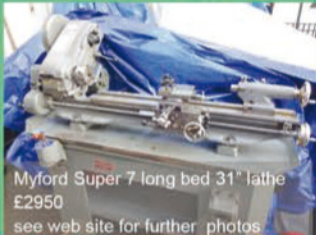
Pacific poss. 5" locomotive 4-6-2 Boiler kit, casting set and frames see website for more pictures £1800



Elliot 12" rotary table 4" 1/4" height £500



Harrison Graduate wood lathe £1450



Myford Super 7 long bed 31" lathe £2950 see web site for further photos



Transwave 7.5HP 5.5KW HD Static converter £500



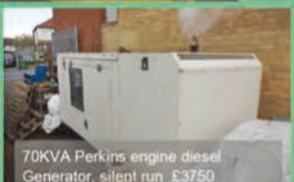
RJH Antelope 6" vertical liner + extractor, emergency stops etc £1650



Heat cut and soluble cutting oils £10 each



Milling cutters, drill bits, chasers, DOC cutters etc.



70KVA Perkins engine diesel Generator, silent run £3750



Books and manuals in our eBay shop from £6.00



Harrison M300 lathe £3950



Startrite SD320 Profi 12" planer thicknesser 240V £1500

144 Maidstone Road, Fooks Cray, Sidcup, Kent, DA14 5HS

tel: 0208 300 9070 - evenings 01959 532199

website: www.homeandworkshop.co.uk

email: sales@homeandworkshop.co.uk

visit our eBay store! Over 6500 items available; link on website;

homeandworkshopmachinery



Colchester Bantam 2000 lathe (long bed) metric leadscrew, Dickson post £4950



Stanier precision vice 55mm jaw New / New Zealand £195



Startrite Robland K210 £2450



Harrison M250 lathe 5" x 20" 240 VOLTS FROM NEW £5450



Sealey 150 litre V Twin Compressor, 10 bar £495



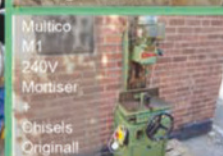
X-Y 12" x 6" table £525



Myford Super 7B hardened bed very nice £4250



Harrison / Colchester change wheels



Moltico M1 240V Mortiser
Chisels Original £150



Boxford 280 5" x 30" geared head precision lathe (never used) £3500



Meddings L1 MK V drilling machine £2250



Warco GH40 Geared Head 31" x 8" table, 3MT £1400



DP / MOD gear cutters £20 each please enquire for availability



Clarke 917 vacuum former £495



Myford ER25 solid collet chuck made by Myford (Notts) New £70 More in our eBay shop!



Trugrip collets metric £35 Imperial £30, Marico 2820 £15 each



Chester Cub 630 6" x 30" centres chucks, steadies hardly used £2950



Colchester Triumph 7 1/2" x 30" gap bed centre lathe, 2" spindle bore, 3 jaw chuck, 4 way tool post from university (nice condition) £2750



Myford ML7 Tri-Lever lathe, two speed motor, stand, etc. £1625



Bridgeport 42" x 9" powered both ways! turret milling machine / R8 VARIABLE speed Chrome slides, nice! £6450



Tripos 240v switch £90

Myford bridge & rifle lathes £7.50 each



Myford ML10 robust lathe! £1400



Myford gearbox unused £1000



Crown Windley Brothers 6ft x 4ft cast iron surface table £1425

Please phone 0208 300 9070 to check availability.
Distance no problem – Definitely worth a visit – prices exclusive of VAT
Just a small selection of our current stock photographed!

Worldwide
Shipping

POWERED BY
barclaycard

