EASY ADJUSTMENT OF MILL GIBS

MODEL ENGINEER & WORKSHOP

EST. 1898

THE LEADING MAGAZINE FOR HOBBY ENGINEERS AND MODEL MAKERS

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Volume: 235, Issue: 4775, April 2026

Silver Crest BR Class 1500

MARK THATCHER BUILDS A 5" GAUGE LIVE STEAM LOCO KIT.

A New Tool and Cutter Grinder

BUILD PAUL LOUSICK'S FLEXIBLE NEW DESIGN.

Sanding Gear Valve

ESSENTIAL DETAILS FOR THE BR MOGUL.

INSIDE this packed issue:

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20 March 2026
The next issue will be on sale
17 April 2026

SMOKE RINGS

ON THE EDITOR'S BENCH

I've decided to experiment with mixing 3D printing and traditional machining for my current project. It's a 'Presflo' wagon in 3 ½" gauge to go behind my Hudswell Clarke cement works shunter, Southam. I started with the old Dapol kit, but as is typical of my projects I started finding more photos and plans online… The plan is a 3D printed body and chassis with steel wheels and axles running in ball races, to provide some low-down weight and necessary stability. The main body had to be printed in two pieces, each taking roughly 24 hours and using about three-quarters of a kilo of filament.

The process has reminded me what a blessing a metal cutting bandsaw is, sawing a wheel blank off a bar of 3" bright mild steel takes about ten minutes, just time to have a cup of tea. The motor does warm up though, so I left it to cool down between cuts. I did forget one blank and returned to the saw an hour later to find the motor particularly warm, although being off-load no harm was done. The cuts were nice and straight, a reward for effort put into the getting the tracking well set up.

If it all goes well, I will share more details in these pages, and I might even make another. It would be nice to get the loco and wagon to Nottingham SMEE's Diesel Gala in July.

IMLEC 2026

We are still to find a club willing and able to host this year's International Model Locomotive Efficiency Competition. To recap, The competition requires a venue with both 3 ½" and 5" gauge tracks, ideally with a range of track conditions, and the capacity for good numbers of locomotives to steam up at the same time and safe viewing for spectators. Because of the situation we can be flexible with the date, and we will make sure the organiser gets the support and help they need. Please could any club wanting to find out more drop me an email at **neil.wyatt@kelsey.co.uk.**

Neil Wyatt
Editor

Neil

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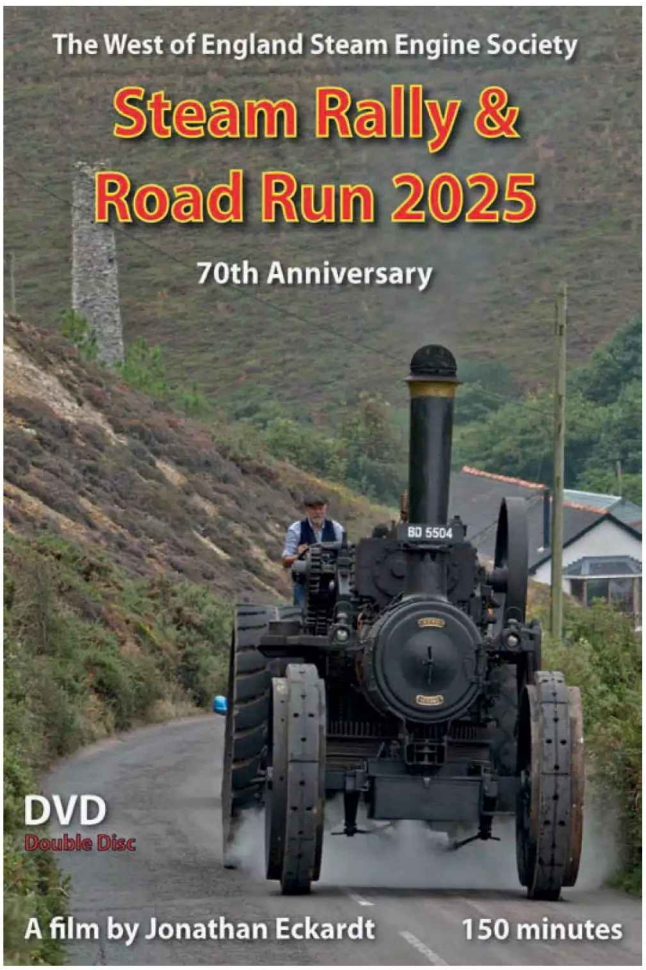
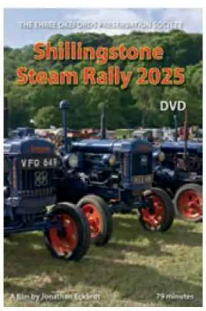
The West of England Steam Rally & Road Run 2025 DVD



Held at Stithians, Cornwall, the 70th event by one of the oldest societies in the country, It is based in Cornwall, one of the cradles of the birth of the Steam engine, home of such giants as Richard Trevithick etc. who were instrumental in it's development. With large numbers of exhibits in all sections and particularly Steam Engines.Total running time 150 Minutes - £16.00

The Three Okefords Shillingstone Steam Rally 2025 DVD



A comprehensive display of everything preservation - It is a great rally much loved by young and old alike.
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The Abbey Hill Steam Rally 2025 DVD

A rally with a distinguished history, it is run by enthusiasts anxious to provide a comprehensive, interesting and entertaining cross-section of exhibits.
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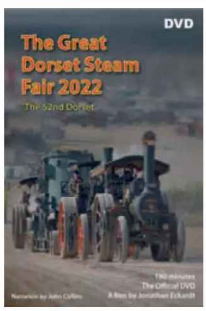

General coverage showing a wide variety of exhibits ranging from Working Steam, Heavy Haulage, Tractors, Vintage Vehicles, Heavy Horses, Collections, The World War Displays, Modern Classic Cars & Motorcycles and the Old-Time Fun Fair .
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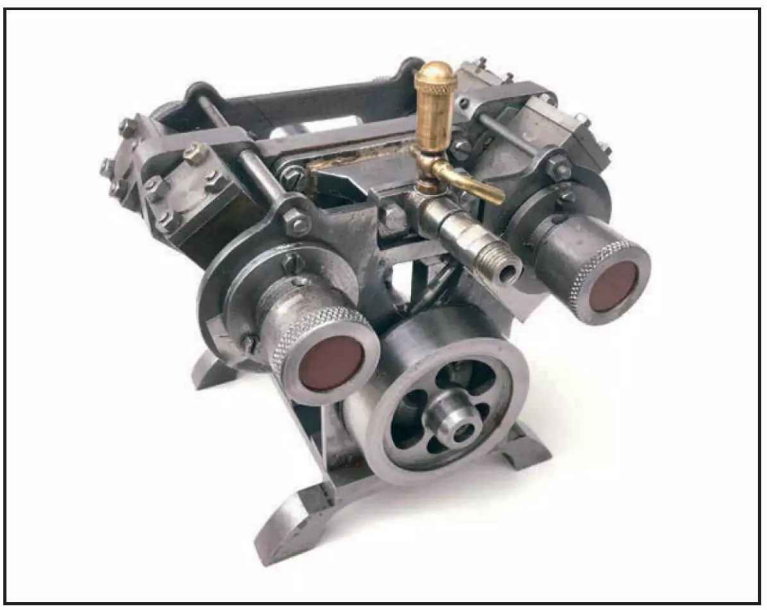
On the Cover

Our cover features Paul Lousick's new tool and cutter grinder design. Find out more on Page 9.

Next Issue



In our next issue, Steven Fulton describes his father David's remarkable engine 'Fourunner'.

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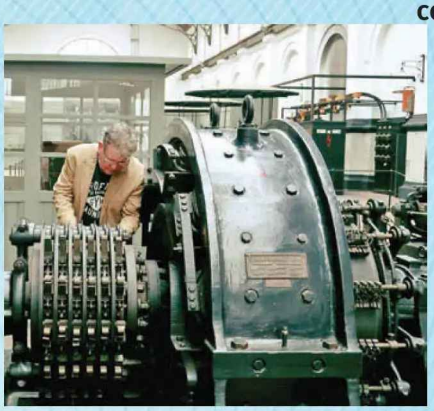

New updated hardware for 2026

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

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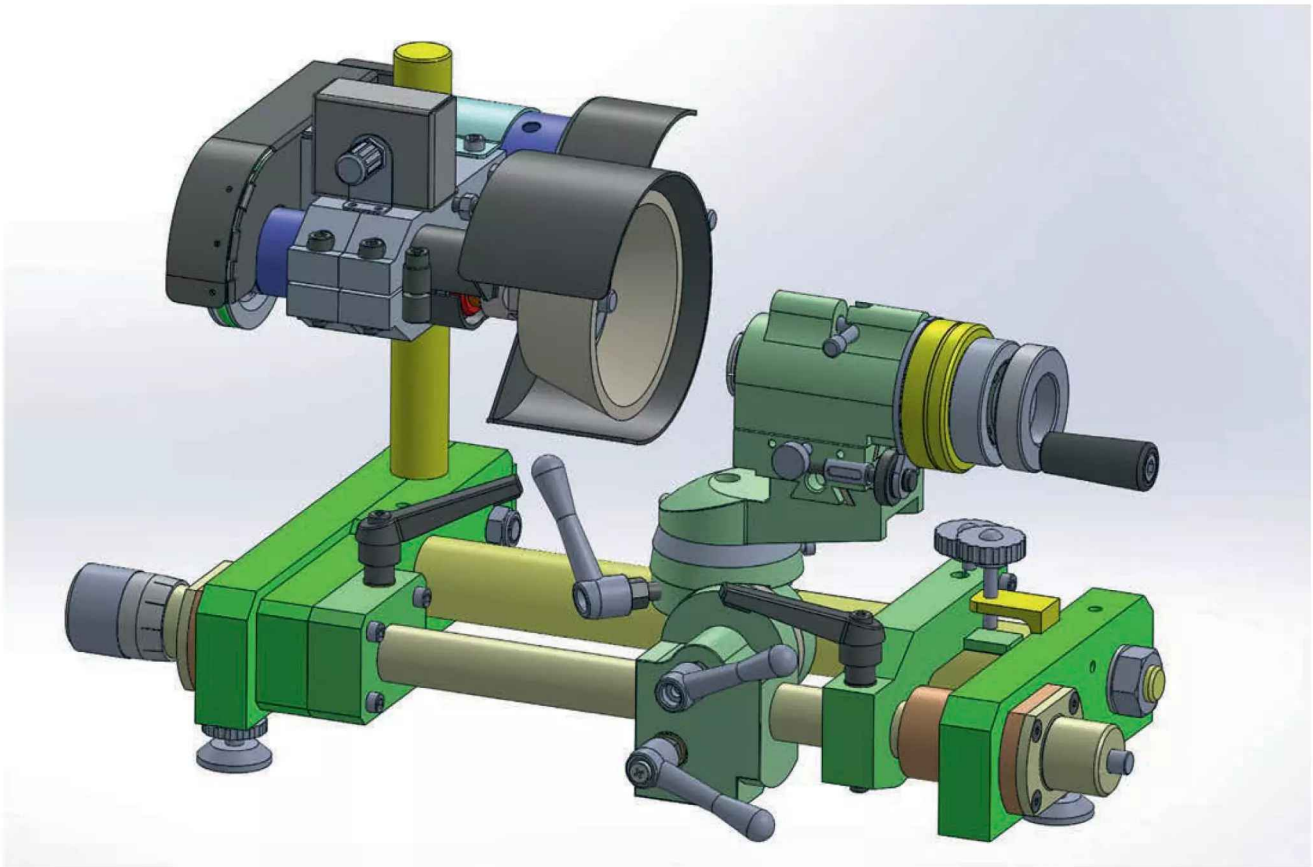


A Tool and Cutter Grinder

Paul Lousick has designed this tool and cutter grinder around a readily available cutter holder. It offers a great deal of flexibility while being relatively straight forward to construct. There are about a dozen groups of drawings which may appear slightly out of synchronisation with the text in order to keep each instalment a reasonable length.

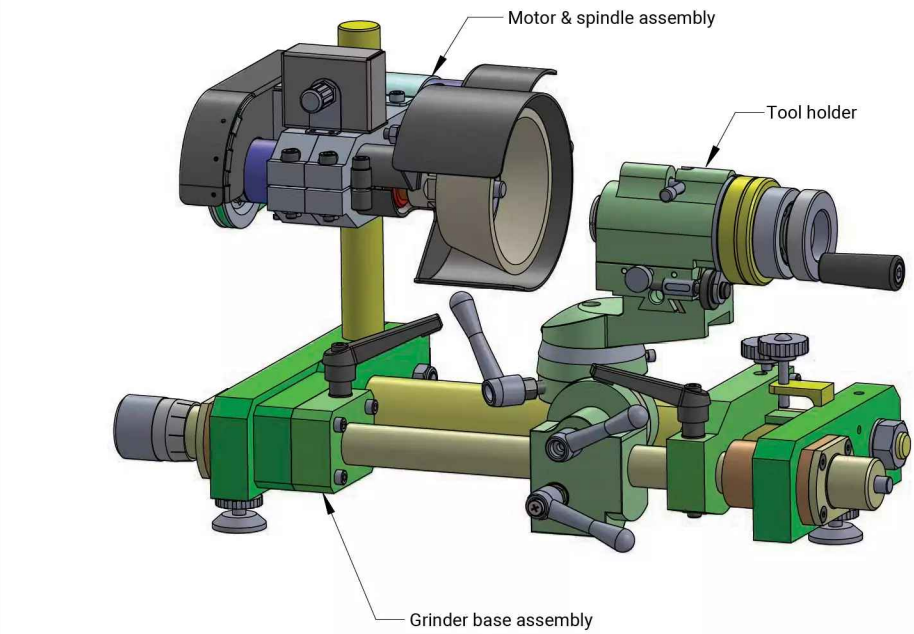
PART 1

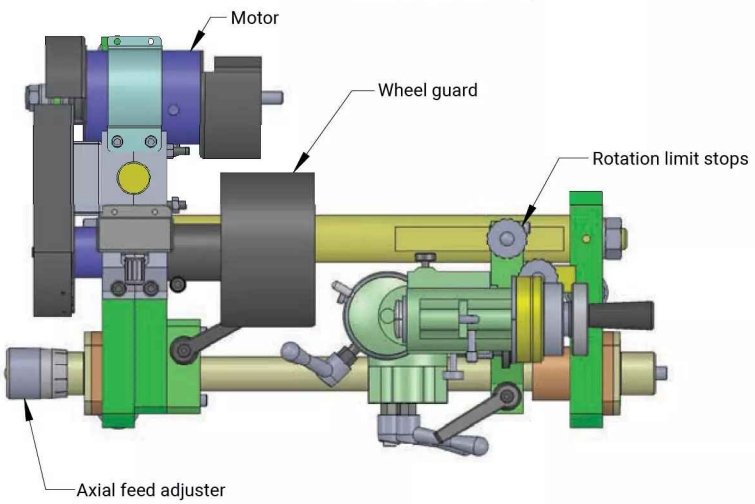
This Tool and Cutter Grinder, **photos 1** and **2** and general arrangement, **fig. 1,** has a similar base frame and motor-grinder as a Quorn grinder but with a fabricated construction, instead of castings, which have been cut out of 25mm thick aluminium plate. My material was sourced from a metal re-cycle yard. It is of unknown grade but hard and machines easily, possibly 6161.

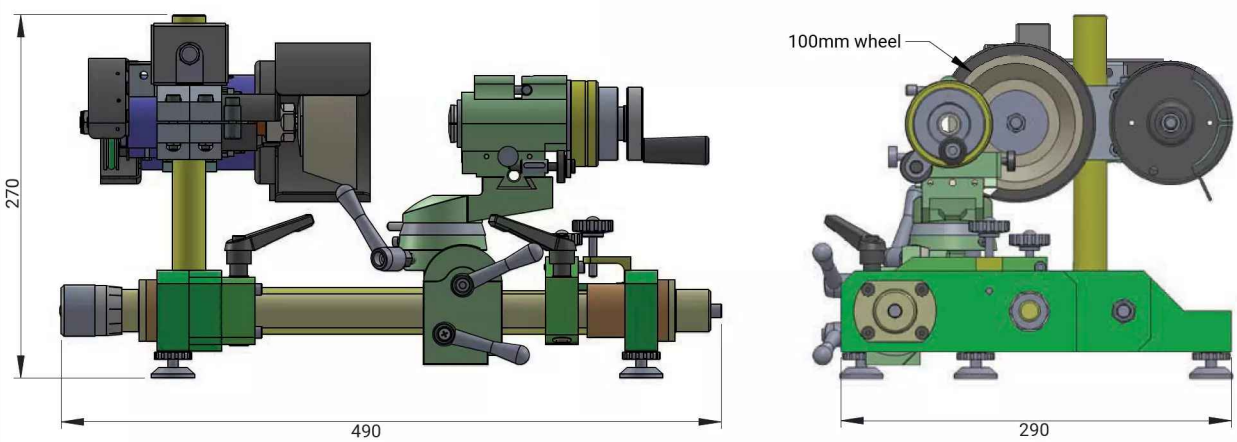
The spindle for the grinder uses a commercially available ER11 straight shank extension to hold grinding wheels with a maximum diameter of 100mm. The grinder and motor unit is removable and could also be used as a toolpost grinder on a lathe.

The tool holder is a clone of a Deckel D-Bit grinder, now made in China and marketed as a U2 Universal Cutter grinding holder, **photo 3**. It is now out of copyright and sold on a

1





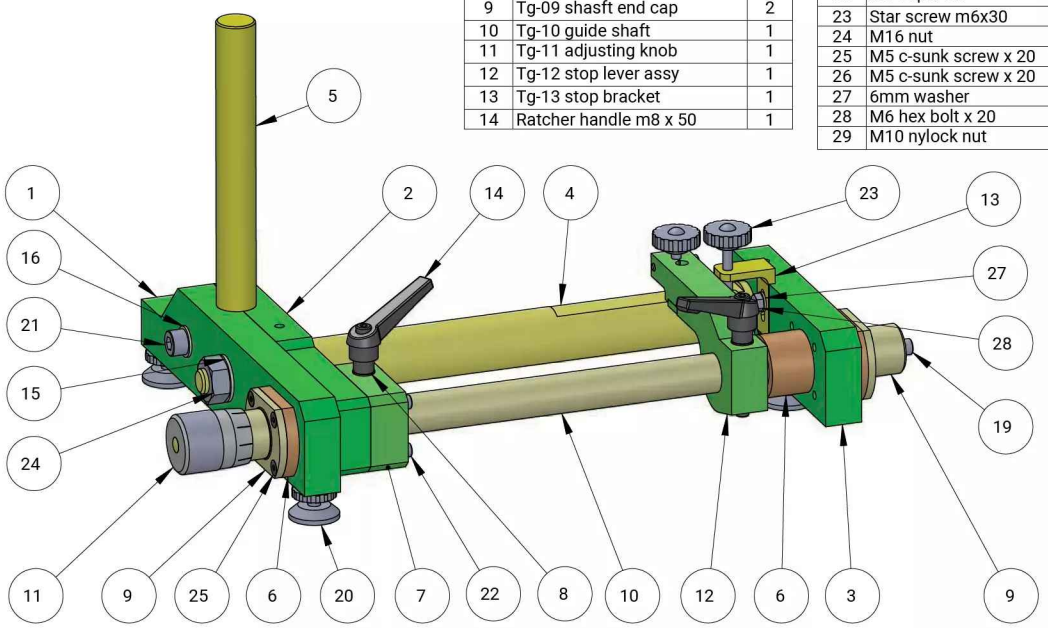


Tool & Cutter Grinder Assembly

Fig 1

Item	Part number	Qty
1	Tg-01 base	1
2	Tg-02 base	1
3	Tg-03 base	1
4	Tg-04 base rod	1
5	Tg-05 base column	1
6	Tg-06 shaft bush assy	2
7	Tg-07 shaft clamp housing	1
8	Tg-08 shaft clamp	1
9	Tg-09 shasft end cap	2
10	Tg-10 guide shaft	1
11	Tg-11 adjusting knob	1
12	Tg-12 stop lever assy	1
13	Tg-13 stop bracket	1
14	Ratcher handle m8 x 50	1

Item	Part number	Qty
15	16mm washer	2
16	10mm washer	1
17	10mm ball bearing	2
18	Spring assy	1
19	Spring screw	1
20	Levelling screw m8	3
21	M10 cap x 60	1
22	M5 cap x 35	4
23	Star screw m6x30	1
24	M16 nut	2
25	M5 c-sunk screw x 20	7
26	M5 c-sunk screw x 20	4
27	6mm washer	1
28	M6 hex bolt x 20	1
29	M10 nylock nut	1



Grinder Base Assembly

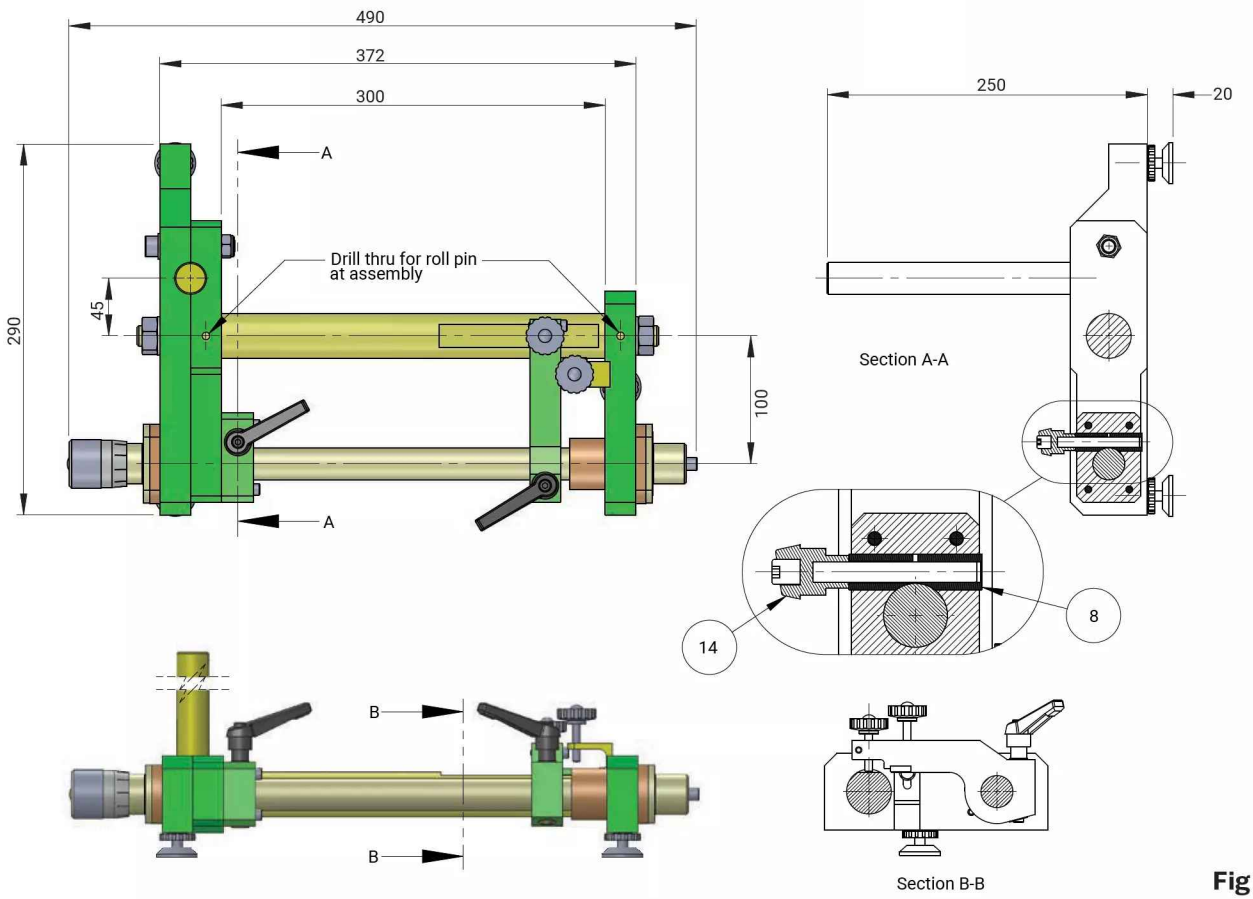


Fig 2

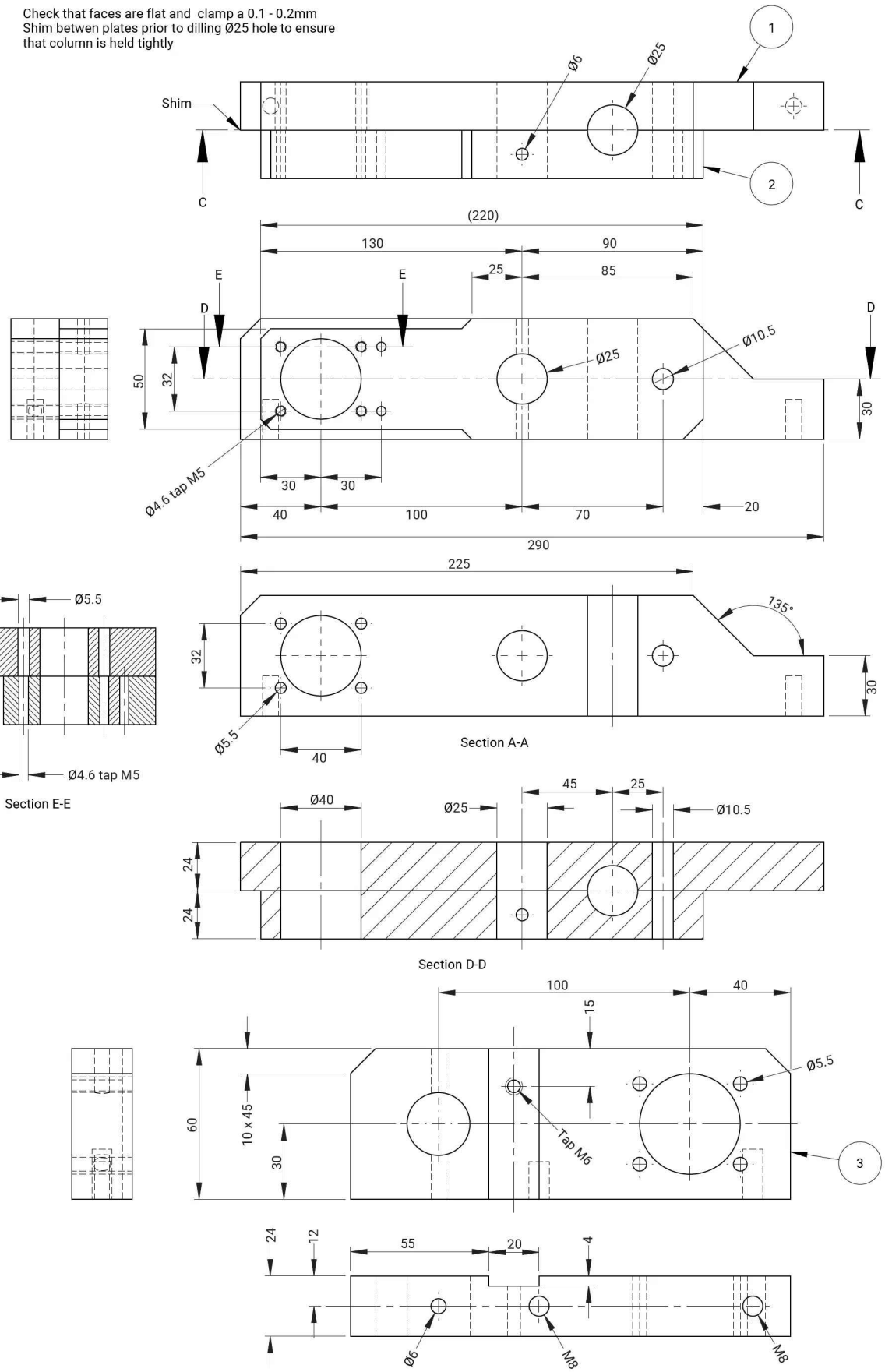
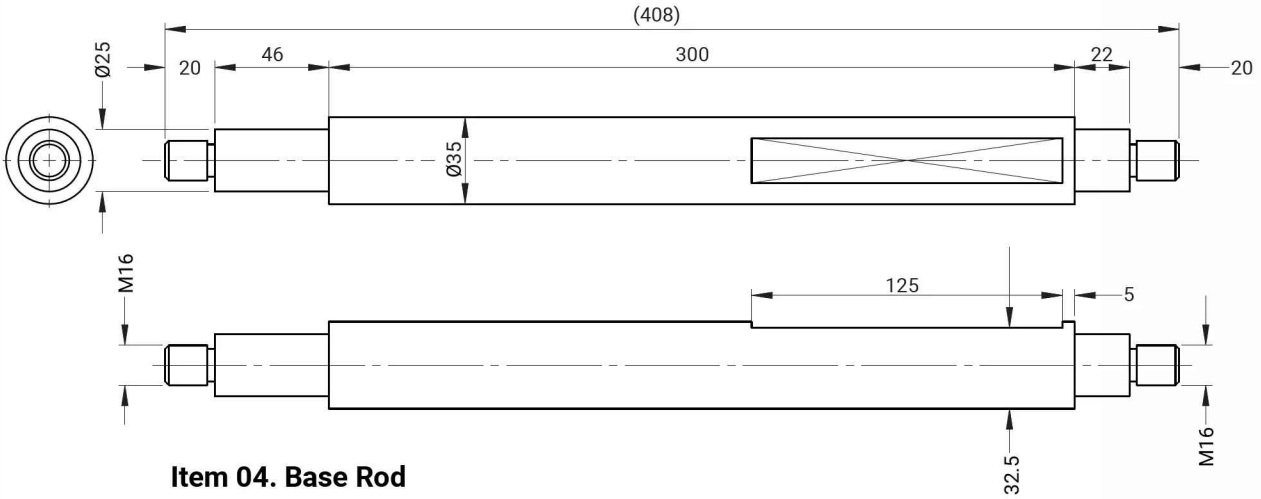
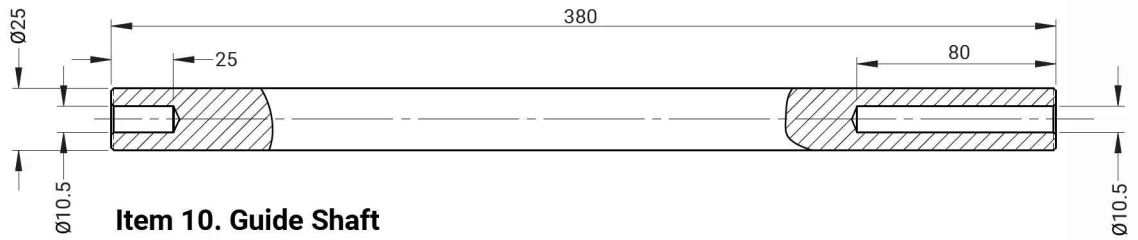

Check that faces are flat and clamp a 0.1 - 0.2mm
Shim betwen plates prior to dilling Ø25 hole to ensure
that column is held tightly
Shim
Ø6
Ø25
1
2
C
C
(220)
130
90
25
85
E
E
D
D
50
32
30
Ø25
Ø10.5
Ø4.6 tap M5
30
30
40
100
70
20
290
225
135°
Ø5.5
32
30
Ø5.5
40
Section A-A
Ø4.6 tap M5
Section E-E
45
25
Ø40
Ø25
Ø10.5
24
24
Section D-D
100
40
15
Ø5.5
60
10 x 45
30
Tap M6
3
24
12
55
20
4
Ø6
M8
M8

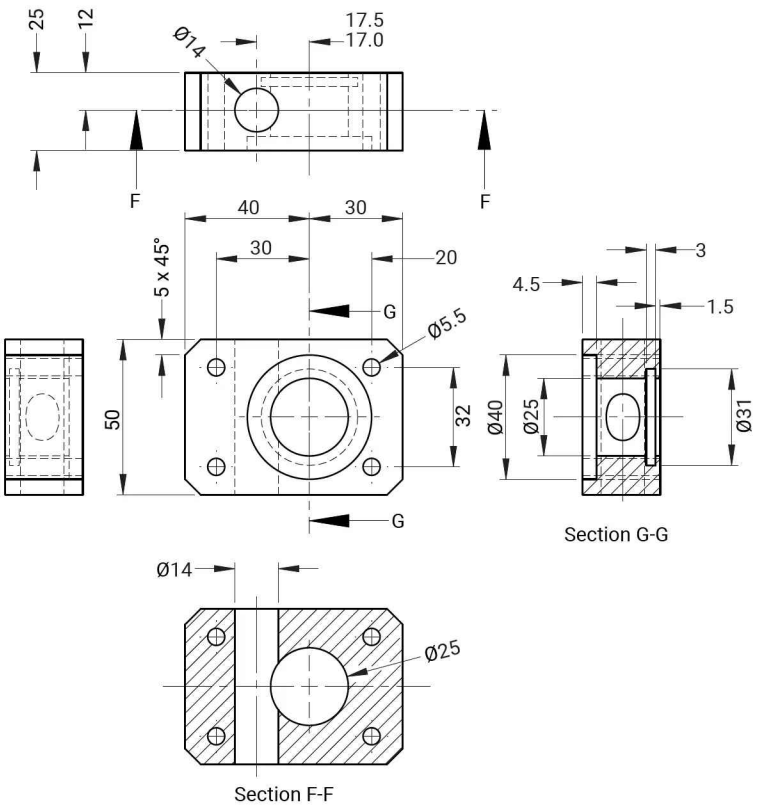
Fig 3



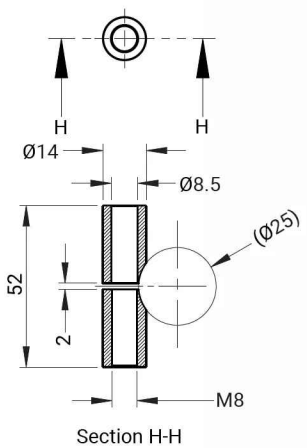
Item 04. Base Rod



Item 10. Guide Shaft



Item 07. Shaft Clamp Housing



Item 08. Shaft Clamp

Mat'l: Brass
Make as one piece & assemble with mating part for cutting radius

Fig 4

number of internet sites. Although it is made with average quality, it can be modified to make an acceptable unit – there are a number of YouTube videos showing upgrades.

Because the base, **fig. 2**, is a similar to a Quorn or a Bonelle grinder my biggest problem is whether to call it a 'Dorn' or 'Donelle' grinder.

BASE FRAME CONSTRUCTION

The two plates that make up the left side of the base were sandwiched together to ensure an accurate alignment of holes, **fig. 3**. They were clamped in a vice against the fixed jaw and a piece of soft wire to compensate for any variation in width. Holes for the connecting shaft and bearings were drilled and bored to the finished size and those for fasteners were drilled to a size for tapping a thread.

Threaded holes in the top plate were tapped while they were still clamped in position, **photo 4,** then removed, allowing for clearance holes to be drilled for bolts in the bottom plate.

The ends of the connecting rod, **fig. 4** are turned for a close fit with the base end plates. Then a thread added for clamping the base together. Ideally this operation should have been done between centres, but my lathe is too short, and I held one end in a chuck and supported the other with a steady rest, **photo 5**.

The end plates and connecting rod were assembled and clamped to the mill table to ensure that they were aligned with each other and the nut at each end tightened.

A hole for a roll pin was drilled thru at each end (inner plate on the LH end) and a pin hammered in to stop any twisting of the two ends of the base, **photo 6**.

The two plates on the LH side were separated by a shim (aluminium drink can) and clamped together while the hole for the motor pedestal was bored, **photo 7**. This was to ensure that the pedestal is firmly clamped between the plates after the shim is removed.

Machine a flat on top of the connecting rod for the screw on the tool holder shaft stop to locate on, **photo 8**.

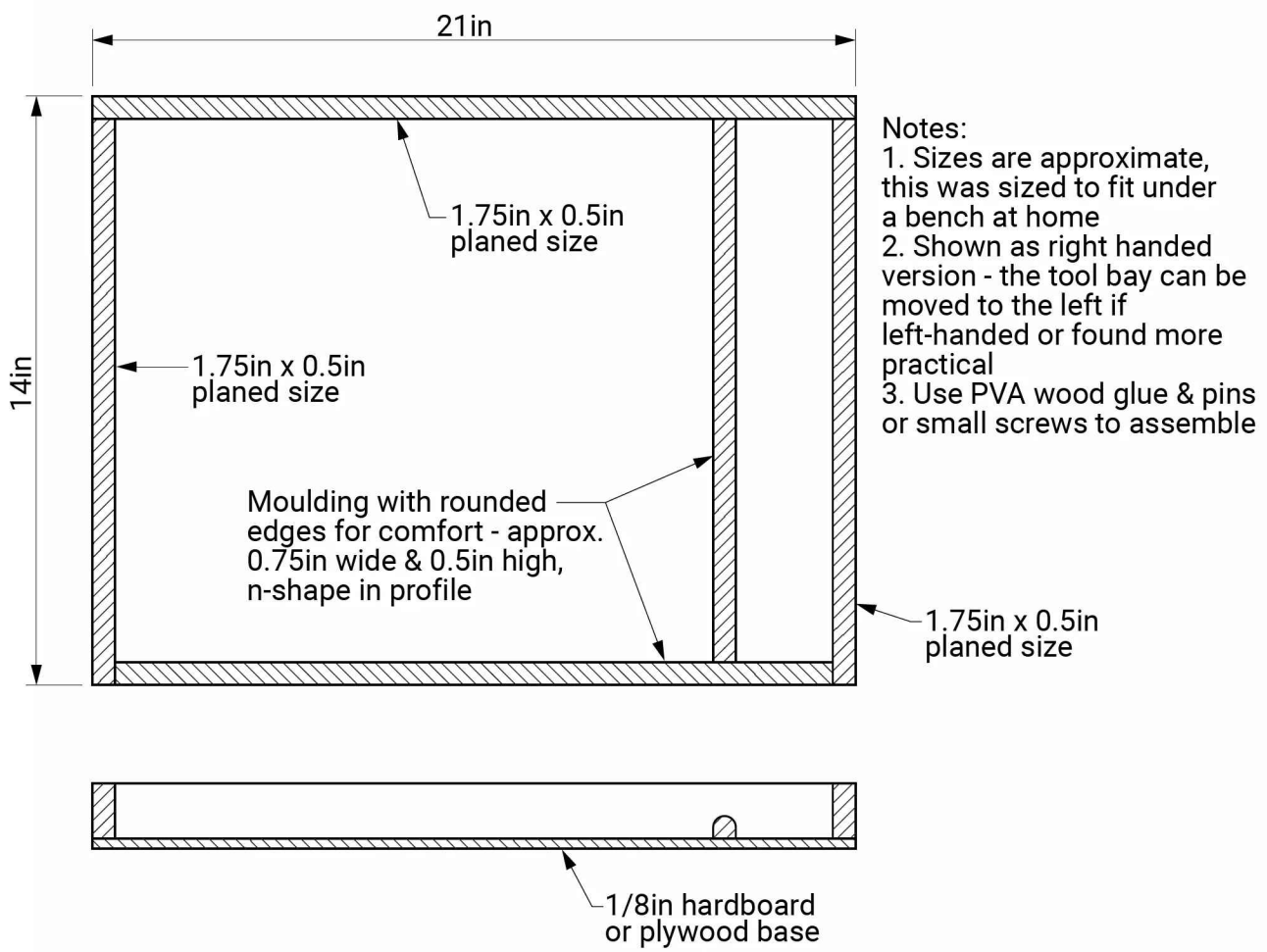
The stop arm was cut from plate on a band saw. Then mounted on a rotary table to mill the plate to the finished size and to bore the hole, **photo 9**.

to be continued

Modelling Tray

Mike Joseph proposes a handy work tray to make working on small parts less frustrating.

Fig 1



How many times have you been working on a small part and it rolls away into the wide blue yonder of oblivion? Behind the bench or under that thing which is full of stuff or even between the cracks of the floor?

Here is the solution to all your woes! It doesn't cost a lot and can save the Engineering Esperanto, **fig. 1**.

I would recommend strongly that the two mouldings (especially the lower one) are rounded for comfort. I neglected this on the first one I made and regretted it. Also, I would seal the surface if ply is used by applying boiled linseed oil. And a safety note here – always dispose of any rags or similar that are contaminated with boiled linseed oil very carefully, because as it dries it is known that it can self-ignite. I usually put them in the grate and burn them but be careful, it is highly flammable. When dried they make good firelighters! Orange peel when dry can also be used as a firelighter. Steve, the dear old boy next door, used to do this - dried the peel adjacent to the fire. (How did he light the fire to dry the peel? – Ed)

The sizes suggested were so that the trays fit on battens under my worktop to enable projects to be stored safely out of the way and away from dust, mostly. I have space to store four of them because when I get stuck (often) on a project, I will do something else until a solution floats to the surface of the soggy mass of my brain.

And finally, why have things roll off the worktop? Mine all have a small lip around the perimeter…

POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

PostBag is one of the most popular sections of the magazine - readers 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 neil.wyatt@kelsey.co.uk.

TANKS AND CLUTCHES

The February issue arrived this week and I noticed in Postbag another letter regarding the German A7V tanks from WW1, this time from Kiwi land. Andre Rousseau has researched this much more, even down to the individual tank manufacturer and chassis the numbers, that's dedication! For us in the Antipodes - especially after that war - we could not be seen to be better than the Mother Country - even that we think we are - so probably that is one of the reasons why New Zealand didn't get its spoils of war. It's almost always been a national sport here in Australia to get one over the Poms, hence our war bounty of Mephisto.

On another matter, in Brett Meacle's article, *Gearing Around*, he mentions in part 1 articles by Graham Meek of a screw cutting clutch for the ML7 that appeared in MEW issues 261 - 263. I've had a 'blokes look' on the ME&W web site but haven't come across the articles. Can give any advice. it will be much appreciated.

Tony Reeve, Australia

I seriously hope my mentioning of this matter in Smoke Rings isn't going to lead to an international incident. The back issues you mention are long out of print but are available in the digital archive on the forum – Neil.

ISLE OF MAN LOCOMOTIVES

Hi Neil, I was just wondering, before I go in to the archive and subscribe, I am just interested if there are any articles that have ever been done on a 5" inch gauge steam model of a Beyer Peacock Isle of Man 2-4-0 *Peveril*? Myself and my mate who live on the Isle of Man are just starting out to build one which will be under No.5 Mona.

David Bellamy & Max

Articles on IoM locos ring a bell, although not much comes up when searching the indexes. I think LBSC's Mona design is completely different. I sent you a link to a useful search and I hope that gives you a start. Can any readers can come up with more specific pointers? – Neil.

***Peveril* at the Port Erin Railway Museum, Hubert Ortner, CCbyA, V4**

THE ANTIPODEAN SUBMACHINE GUN

Hi Neil, On returning home from invading the south island of New Zealand with my V12 powered Tiger Tank at the Otago Model Engineering Society Exhibition, I opened my February issue of Model Engineer & Workshop magazine where I spotted the letter about the Aussies stealing the German A7V tank from the original captors, New Zealand, or more correctly Kiwi troops. It's true, but the Aussies are not the only ones to hide the facts. On my 1,500km drive from Dunedin (not Florida) to Auckland I dropped in to the New Zealand Army Museum on the North Island. It's a fine museum vividly retelling the bravery and tenacity of the Kiwi soldier, but they have one glaring omission from their displays.

There is a wall featuring WWII weapons used by and against New Zealand soldiers - Britain's Lee Enfield rifles, Sten sub-machine guns and Vickers machine guns, American Thompson sub-machine guns and German and Japanese rifles and machine guns. But there is one sub-machine gun missing – dubbed the Digger's Darling by New Zealand soldiers fighting in the Pacific. Yes, they have neglected to display arguably the best submachine gun of the second world war – the Australian designed and manufactured Owen Gun. A strange looking weapon with the vertical magazine, it was reliable in the Pacific jungles and preferred by the New Zealand and American soldiers to their own weapons.

So, it's true - those dratted Aussies stole the A79V tank but then those dratted Kiwis forgot to honour their Owen Gun.

Gerard Dean, A Dratted Aussie!

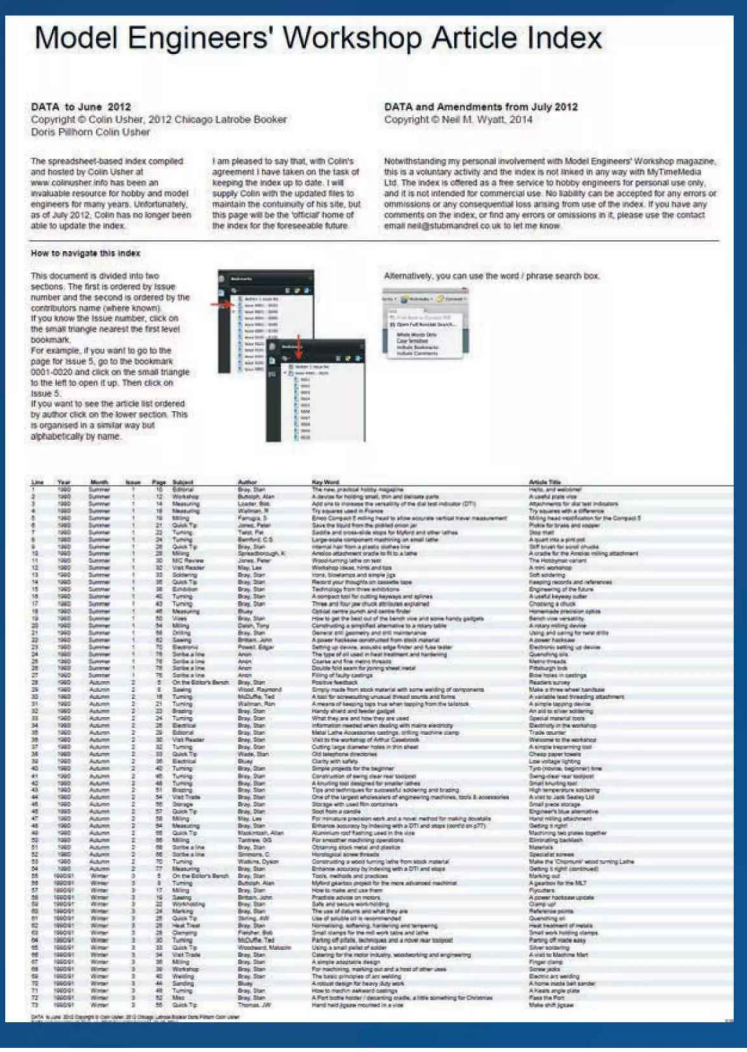
Readers may also be interested to know that, whilst designing the STEN, alongside Reginald Shepherd, Harold J. Turpin nevertheless found time to write several contributions to this very magazine during the dark days of WW2.

DRILL STAND

Dear Mr Wyatt, Mr Leonard's article about his drill stand (*ME&W* 4772) was rather interesting. Like hime I made one years ago as an apprentice3 although mine was more a 'gauge' as it was made out of 1/8" steel plate, however, years later I acquired a perfectly satisfactory plastic one covering 1/16" to **½"** in 64ths. Needless to say I followed 'convention' and put the drills in by the shank end, but subsequently, possibly because of drills with damaged shanks, I now always put them in point first! With this method there is very little chance of error with a drill being in the wrong hole; and it also reduces the slight chance of minor finger cuts caused by handling the cutting edges.
Mr L.J. White, Eastleigh.

PLASTIC MOGULS

Dear Neil, I have this plastic Mogul sitting on my shelf - I made all the kits, I found them to be very therapeutic.
The kit makers were originally Rosebud/Kitmaster. As a teenager (a frighteningly long time ago) I bought coach kits (green - Southern?) and put lights in them picking up power from my Hornby Dublo 3 rail track. I also bought the Schools kit which I motorised with the pick-ups in the tender - it worked.
One tip - I painted all the parts before removing them from the sprue - making sure the bits to be glued were paint free. I also made all the models so that the wheels & motion worked - so I was horrified when I took my Mogul off the shelf to find the wheels seized solid.
I'm a member of the City of Newport Model Engineering Society and I'm the librarian. I didn't want to be librarian, I was told that as I was standing around doing nothing, I was librarian. There was an unsorted mountain of MEs going back to Issue No 1.
Dave Woolven, by email.


Model Engineers' Workshop Article Index

DATA to June 2012
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Doris Pillhorn Colin Usher

DATA and Amendments from July 2012
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The spreadsheet-based index compiled and hosted by Colin Usher at www.colinusher.info has been an invaluable resource for hobby and model engineers for many years. Unfortunately, as of July 2012, Colin has no longer been able to update the index.

I am pleased to say that, with Colin's agreement I have taken on the task of keeping the index up to date. I will supply Colin with the updated files to maintain the continuity of his site, but this page will be the 'official' home of the index for the foreseeable future.

Notwithstanding my personal involvement with Model Engineers' Workshop magazine, this is a voluntary activity and the index is not linked in any way with MyTimeMedia Ltd. The index is offered as a free service to hobby engineers for personal use only, and it is not intended for commercial use. No liability can be accepted for any errors or ommissions or any consequential loss arising from use of the index. If you have any comments on the index, or find any errors or omissions in it, please use the contact email neil@stubmandret.co.uk to let me know.

How to navigate this index

This document is divided into two sections. The first is ordered by issue number and the second is ordered by the contributors name (where known).
If you know the issue number, click on the small triangle nearest the first level bookmark.
For example, if you want to go to the page for issue 5, go to the bookmark 0001-0020 and click on the small triangle to the left to open it up. Then click on Issue 5.
If you want to see the article list ordered by author click on the lower section. This is organised in a similar way but alphabetically by name.

Alternatively, you can use the word / phrase search box.

ONLINE INDEXES

David Frith prepares the indexes for Model Engineer & Workshop. The latest copy can be downloaded on from the Forum at www.model-engineer.co.uk – just select Forums and then the Model Engineers' Workshop topic. Alternatively scan the adjacent QR code.

The Silver Crest BR Class 1500

PART 1

Mark Thatcher builds a 5" Gauge Live Steam BR Class 1500 loco kit from Silver Crest Models. He starts with a kit overview and constructing the frames.

I can hardly call myself a model engineer. I have a small EMCO Unimat lathe that I have never truly mastered, plus a small selection of hand tools, but am much more in my comfort zone working on smaller 1/19th scale locomotives and rolling stock for my garden railway. So, when an opportunity arose to tackle this much larger kit in a much larger scale, it piqued my interest. If I could achieve a reasonable result and half fool myself that through this process, I would be on the first rung of the ladder to becoming a 'proper' model engineer, then this may be a satisfying process too.

WHAT'S IN THE BOXES?

When the kit arrived in August last year, I was presented with a large crate, **photos 1** and **2** containing nine individually packed cardboard boxes with the boiler being strapped down to the bottom of the crate for secure shipment. Whilst the 1500 loco weighs in at 51kg (dry weight), adding the crate and packing materials increased the weight to 75kg. If, like me, you have mobility issues, you will need help to get the crate off the DHL truck as it is more than a one-person job.

Also in the box were hydraulic test and boiler certificates and a ring-bound 169-page A4 instruction manual. The build is broken down into seven logical stages, with plenty of good photographs plus exploded CAD drawings so you can see where all the components are located. I felt at time these were written with a little too much assumed knowledge, particularly for a rank-amateur like me, although I suspect more experienced model engineers will have no issues.

This kit is billed as a bolt-together kit that people with limited engineering experience can manage. All the fixings are metric, and all I needed to acquire was a set of metric Allen nut spinners and some ball-ended Allen keys which helped me get into some tight spaces were clearances where challenging. Also, I needed some *Fireweld* (the mastic-type product that is used to seal flues on wood burners and stoves) to seal the joint between the smokebox and the boiler wrapper, plus the two steam pipes from the cylinders to the smokebox. Gasket maker or gasket sealer would achieve a similar result.

THE BOILER

The boiler came complete as an entire unit, with much of the back head detail and pipework already loosely secured into place, **photo 3**, although much of this would need to be removed and added again to enable the cab to be fitted. The boiler cladding was also pre-fitted. The cladding over the top of the firebox area seemed fine, although that around the boiler was further secured with plastic tape, **photo 4**. I was not a fan of this approach as I could see this melting when the boiler was in

Photo 1: A very impressive crate.

Photo 2: Full of boxes...

Photo 3: Boiler with backhead fittings loosely attached.

Photo 4: Pre-insulated boiler.

Photo 5: Smokebox end of boiler.

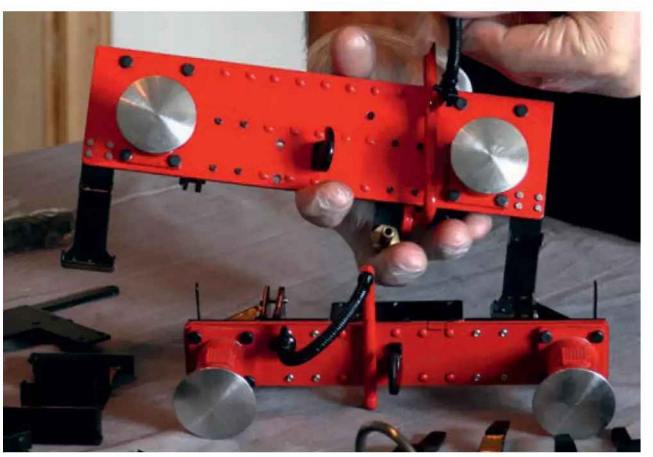

Photo 6: Pre-assembled buffer beams.

steam. I asked the kit's designer, Mike Pavie, about this matter and was told not to worry as he has serviced many Silver Crest locos over the last decade without issues here. The tape would eventually be hidden by the boiler wrapper once it was fitted over the cladding in any case.

The front of the boiler also had most of the pipework fitted although I would need to add two the top feed steam pipes that connect the boiler to the two cylinders later, **photo 5**. These pipes would eventually be covered by two cosmetic top feed pipe covers later on in the build. The exhaust pipe will also be fitted later to join these two pipes together from the inside of the smokebox.

One area of detail I think that stands out are the pre-assembled and pre-made buffer beams. I think in general the fit and finish of this kit is very good, **photo 6**, and it is a

Photo 7: Decals.

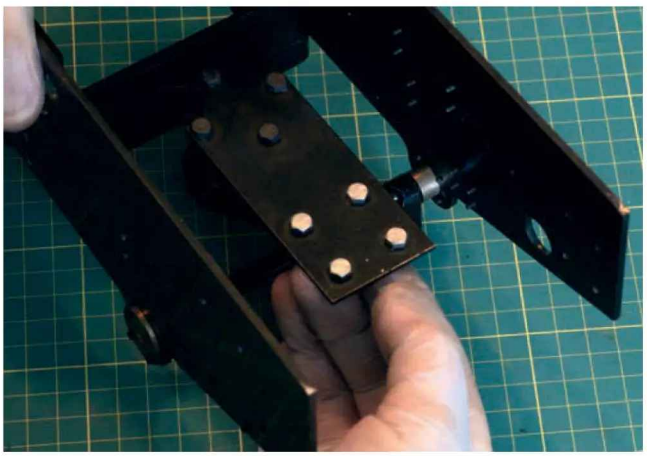

Photo 8: Master brake cylinder.

Photo 9: Steam exhaust pipe.

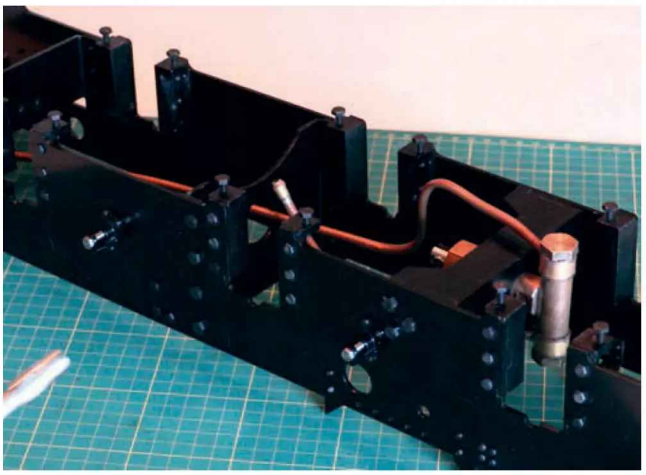

Photo 10: Axle pump pipework.

real bonus to be supplied with these as bolt on assemblies. The rear vacuum brake hose was attached to one beam; the front one was not. In any case, I elected to remove both sets and repaint them as I felt the black on the pipes was a little too glossy and wanted to repaint these in satin black, adding some gold and chrome accents to lift out the detail on the hose clamps and levers. Later on in the build I could see I would be adding more bolts which were either unpainted stainless steel or blackened. I touched these in either by pre-spraying them in *Simoniz* Post Office Red, or hand-painting them in *RailMatch* Buffer Beam Red.

The theme of good paintwork continues through to the body panels. The kit is available either in GWR loco green, plain BR black, or lined BR black, which was my preferred choice. At the time of writing this article I believe the GWR colour variant has sold out, but there would be no harm in asking Silver Crest to see if they have the odd one left.

When I originally examined the paintwork, I could have been forgiven for thinking the lining was handlined. It is not, but then I also wrongly assumed these parts had been Tampo-printed. Wrong again! They are actually decals which are heat applied before being over-sprayed with some sort of clear coat to protect them, **photo 7**. The black painted body and cab panels have all been stove-enamelled (even though they have more of a satin finish) and so far, I have found these to stand up to the rigours of running on the permanent way well.

ASSEMBLING THE FRAMES

The instructions suggested that I assembled the two sides of the frames firstly, adding frame stretchers where appropriate, then to add the front and rear buffer beams. I found the issue with this approach was that should I do this, the buffer beams clamp the frames up, making adding parts like the axle-driven water pump, steam brake assembly and main exhaust pipe more challenging later on in the build. So elected to fit these sub-assemblies inside the frames firstly, keeping the fixings loose. Then when I was happy everything was square and true, I nipped up the bolts and then added the buffer beams as the last stage.

Photograph 8 shows the master brake cylinder is being fitted between the frames, and in **photo 9** the steam exhaust pipe has been added. This is where a set of ball-ended Allen keys really comes in useful as the bolts are a devil to get to and to nip up. Despite the excellent (to this point) instruction manual, I still managed to fit the exhaust pointing down towards the track and not up into the chimney. See I told you I was a rank amateur earlier on!

Adding the crank-driven water axle pump was where I hit my first snag. This was supplied pre-mounted to its frame stretcher with the input and output pipes also pre-installed. Now, in one of the many boxes, I was supplied with all the other pipework loose. Whilst there were pictures of where this lot of copper spaghetti went, there were no clear instructions to guide me. When I asked Mike how to do this, his best suggestion was to take my

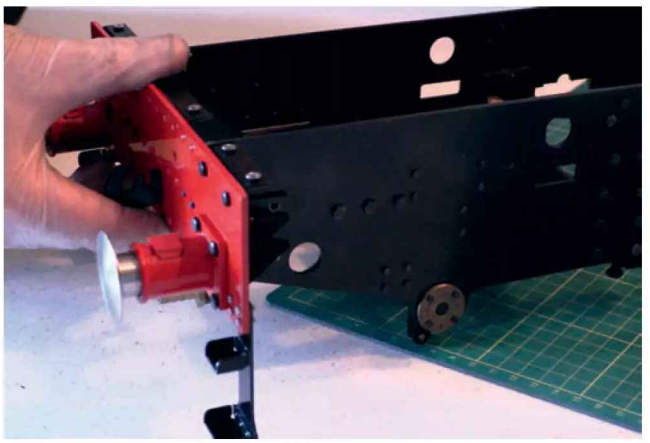

Photo 11: Fitting buffer beam.

Photo 12: Support beams for boiler and water tank.

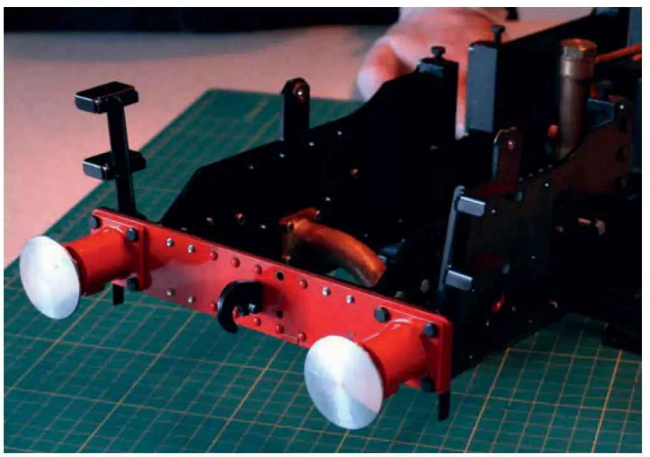

Photo 13: Front steps fitted.

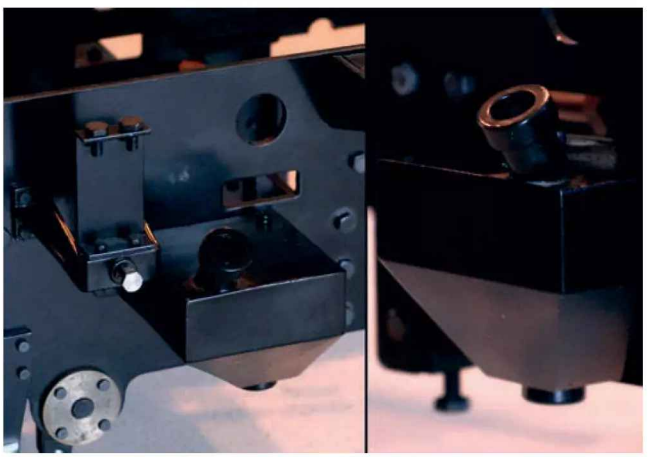

Photo 14: Sand boxes.

time and employ trial and error, which eventually worked. They can only fit one way round, and that will be the right way!

However, I was also told to remove the two pipes attached to the axle pump. But I thought I would try to be clever and leave them *in situ*, and just best guess how these were routed through the frame stretchers, **photo 10**. I was wrong and they are not. So out came the axle pump stretcher assembly as I really did need to remove this pipework… except I couldn't!

For some reason the banjo bolts that retained the ball bearings into the axle pump had been sealed in with Fireweld or similar. I really don't understand why Silver Crest thought this was a good idea. At some point in the future these bolts may need to be removed to service the axle pump in any case. So having removed this assembly I tried to remove the pipes. They were stuck in solid and I did not want to risk damaging anything by clamping this assembly in a vice. So, there was nothing for it. I refitted the pump between the frames once again, then just about got a 13mm ring-ended spanner onto the bolts and eventually freed the two pipes using the frames to hold the axle pump in place whilst I did so. I knew I would have to figure how they were really routed later on down the line.

Once the majority of work was completed in between the frames, I could then finally fit the front and rear buffer beam assemblies, **photo 11**, to tie everything together, before I threw a spirit level across the chassis to check that everything was straight and level, which it was.

The next stage was to add the three top supports to the top of the frames. Two will support the boiler when it is added to the frames later on. Note in **photo 12**, the first two stretchers are for the boiler, and the third (furthest away) is the front water tank support bracket. There is a similar one at the rear of the chassis to secure both water tanks.

The finishing touches were to fit the front steps. These are handed, but once I figured out which side was which, they were very easy to fit, **photo 13**. Note the exhaust pipe has now been fitted correctly, pointing up from the underside of the chassis and into where the smokebox will eventually be located.

Before the sand boxes were fitted – just a word of warning. In the kit build notes for this stage, both pairs of sand boxes are mentioned in the parts list, but ONLY do the instructions mention fitting the rear pair of boxes at this stage. The rear sand boxes are located outboard of the frames, the front pair to the inboard. Of course, I put two and two together and in my usual way came up with 5¾, so fitted the front pair as well, **photo 14**.

If you do this at this stage you will find it impossible to fit the smokebox saddle later on in the build, so don't do it. In my defence whilst the instructions did not mention fitting these, they were clearly shown, not only on the parts list but also as fitted on the accompanying pictures. An easy mistake to make.

One other tip: don't fit the offside rear sand box before you have fitted the reversing lever lower pivot bracket, as if you do, you will make hard work for yourself trying to shoe-horn this bracket into place later.

Fitting the guard irons was a simple matter of adding four bolts to each one and bolting them onto the frames,

photo 15. Just beware that these are also handed. They point with the chamfered edge into and pointing towards the middle of the frames and the irons splay out slightly down and out from the top of the frames.

And that was pretty-much it as far as kit one was concerned. After I went round and checked everything was nice and secure a final last check with a spirit level confirmed everything lined up, **photo 16**. The instructions suggested building the frames on plate glass, but not having a large enough piece to hand, I used the next best thing: the Corian worktop on my centre island in my kitchen. Thank heavens I don't have a significant other, otherwise I may not have gotten away with this!

FIRST IMPRESSIONS?

I have to say that overall, I have been impressed by my first foray into pretending to be a model engineer. I think the biggest challenge I faced was learning all the names of the different parts, so I apologise now if I have my nomenclature wrong in this article. I think the most useful photograph I used as my reference was the exploded CAD diagram, even though it does show parts that will not be fitted until kit two, **photo 17**. But it gave me the general idea and a good point of reference as to what I was aiming for.

WHO IS THIS KIT FOR?

I first thought this kit would be perfect for someone just like me: someone with a passing interest in model engineering but with only half the gear and no idea! When I mentioned this to Silver Crest, they tell me they have also sold many of these kits to dyed-in-the-wool engineers too, who have maybe spent years machining parts for one model. But who see this kit as a displacement activity between other tasks, and they also get a quick fix of bolting something together and seeing it on the track much more quickly. I am sure people with such engineering skills greater than I possess (ie. everyone else!), will be in a position to embellish these kits as they see fit.

NEXT TIME...

...I will build up the kit further and hopefully will end up with a rolling chassis. If you would like a more detailed insight into the building of this kit, then you can check out my series of build videos on YouTube. Just search for my channel's name: **MADforSTEAM** and you will find them. Until then, happy steaming!

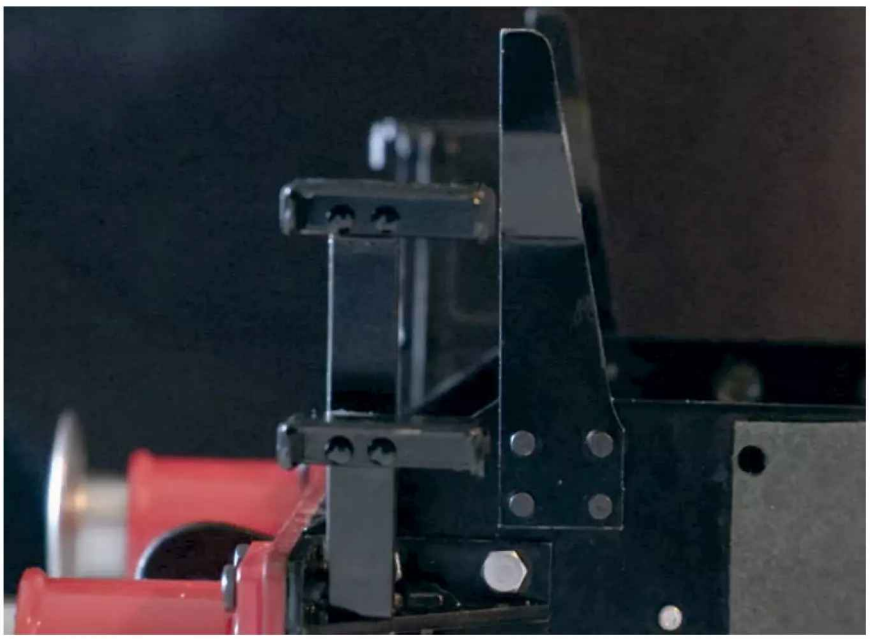

Photo 15: Guard iron.

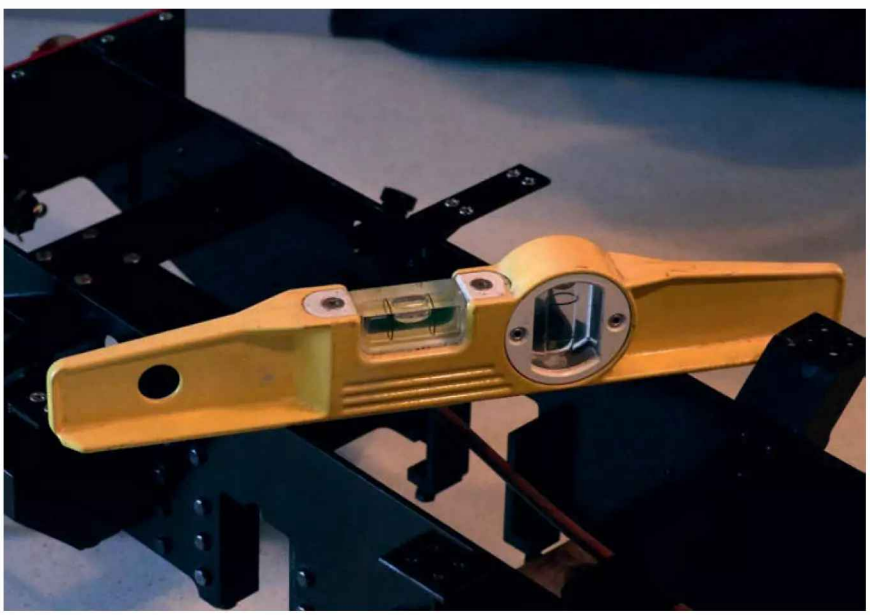

Photo 16: Checking the chassis is true.

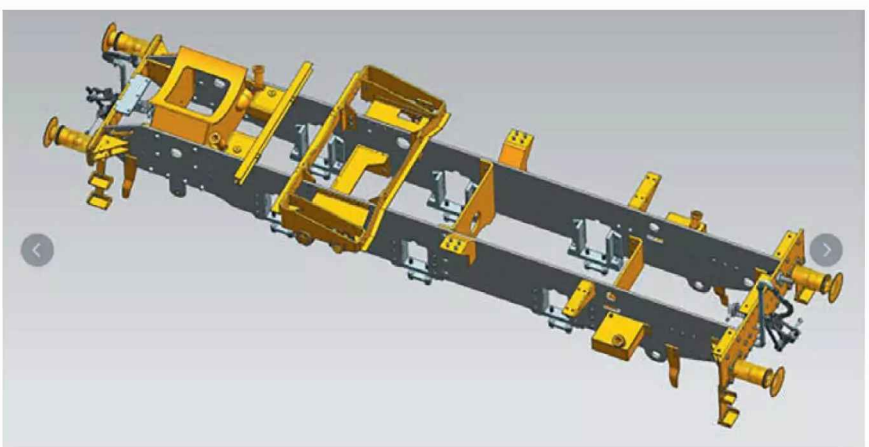

Photo 17: Example of CAD assembly drawing.

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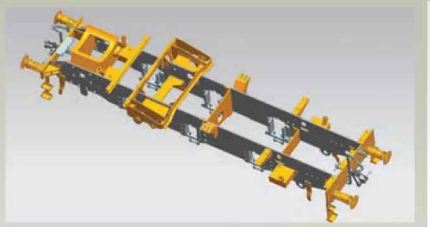
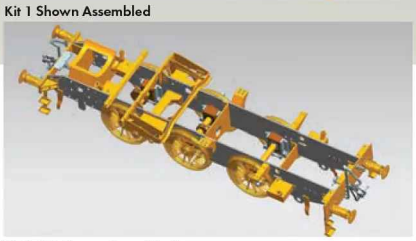


Kit 1 Shown Assembled

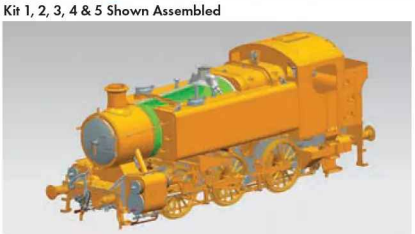


Kit 1 & 2 Shown Assembled

Kit 1, 2 & 3 Shown Assembled

Kit 1, 2, 3 & 4 Shown Assembled

Kit 1, 2, 3, 4 & 5 Shown Assembled



Kit 1, 2, 3, 4, 5, & 6 Shown Assembled

£6,495 + £195 p&p

See YouTube build video's. **Over 120,000 views!**
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Summary Specification

- 5" Gauge, coal-fired, live steam
- 2 outside cylinders
- Outside Walschaerts valve gear
- Stainless steel motion
- Silver soldered copper boiler
- Boiler feed by axle pump, injector and hand-pump
- Multi-element superheater
- Drain cocks
- Safety valve
- Etched brass body
- Choice of liveries
- Mechanical lubricator
- Reverser

Approximate Dimensions

- Length 35"
- Width 10"
- Height 14"
- Weight 51kg

15xx model in BR Black livery

The GWR 15xx Class

All ten locomotives of the class were constructed in 1949 at Swindon and entered service on the Western Region of British Railways. They were employed on heavy shunting duties at London Paddington.

The 15xx Model

We are delighted to report that our fully machined, bolt-together, kit of the GWR15xx has proved to be a great success. The quality is superb and this has enabled many customers to assembly their model quickly and get out on the track. It is suitable for the novice builder who will benefit from illustrated assembly instructions and a telephone helpline if advice is needed. The complete kit is delivered in a single consignment fully painted in unlined, or lined, black livery with the number of your choice. The 15xx is also available as a factory built ready-to-run model for an extra £500. Boilers are silver soldered and UKCA marked. All models benefit from a 5 year warranty.

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ME&W

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On the Wire

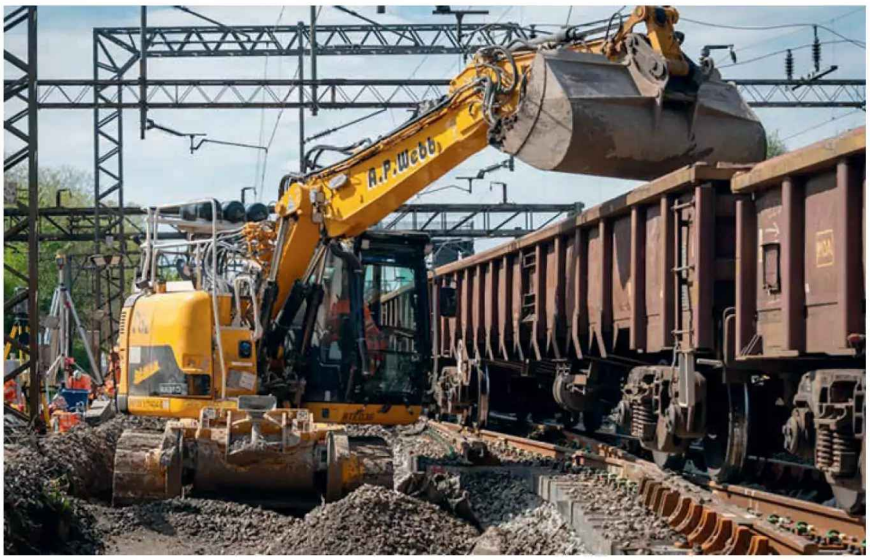
News from the world of engineering

Easter Shutdown for £7.2m improvements to Scotland's railways

A £7.2m package of engineering work will be delivered across Scotland's railway over the Easter weekend and throughout April to improve infrastructure and support more reliable train services. Network Rail will use the quieter travel period to carry out upgrades, including targeted signalling, track, overhead line and drainage renewals.

Much of the activity is scheduled to take place when trains aren't running, allowing engineers to complete the work safely and with minimal disruption.

While the vast majority of Scotland's railway will remain open, some lines will see temporary changes to services. Passengers are being encouraged to plan ahead and check their journey with their operator before travelling.



What's happening?

- £2.2m worth of key infrastructure renewals around Glasgow and the installation of a new £1.5m bridge at Carstairs will mean an amended service between Glasgow Central and Motherwell / Lanark / Edinburgh. **(4-6 April)**
- Work on the West Coast Main Line in Scotland and further south - including £3.5m of reliability improvements across South Lanarkshire and Dumfries & Galloway - will affect journeys between Glasgow and London Euston. **(3-8 April and 11-20 April)**

The Midlands Model Engineering Exhibition 2026

Meridienne Exhibitions will be presenting the Midlands Model Engineering Exhibition from Thursday 15th to Sunday 18th October at the Warwickshire Event Centre.

This year there will be nearly forty of the leading model engineering specialist trade suppliers, all waiting to meet you and provide everything you need for your modelling activities.

The exhibition will also showcase hundreds of fascinating models in competition and display classes and on nearly thirty club and society display stands and outside steamers.

Once again *Model Engineer & Workshop* will be hosting the popular talks programme.

Opening Times are Thursday – Saturday 10am – 4.30pm. Sunday 10am - 4pm.

Make a note in your diary now and see **www.midlandsmodelengineering.co.uk** for all the latest information.

Pill boxes transformed to create new homes for bats

World War II pill boxes on the Kennet & Avon Canal in Berkshire have been given a new lease of life as homes for bats by the Canal and River Trust...
Their volunteers and colleagues have transformed two pill boxes at Garston Lock near Reading and Hamstead Lock near Newbury, which first appeared along the canal as part of a defence line during World War II, to give them a new purpose eighty years after they were first built.
Their thick concrete walls and roofs create the perfect environment for bats to thrive. The canal is home to a vast range of wildlife. In Berkshire alone you can find twelve of the UK's eighteen bat species such as crevice loving bats like the common pipistrelle and whiskered bat, or cave dwellers like the greater and lesser horseshoe bats.
Pill boxes such as at Hamstead Lock have had four of the five slits in the concrete walls of the structure, that allowed weapons to be fired at an approaching enemy, covered and had a door added to create a dark and undisturbed environment. Boxes have also been installed inside, providing cosy roosting places.

The work to convert the pill boxes and time spent by volunteers has been made possible by a grant from Historic England and through funds raised by players of People's Postcode Lottery.

LBSC Competition 2026

This year's LBSC competition, 'The Curly Bowl', celebrating one of *Model Engineer*'s most prolific contributors is to be held on the 13 September, hosted by Reading Society of Model Engineers. The competition is open to any LBSC locomotives of 2 1/2",3 1/2" or 5" gauge that have not won before. The (rather poor) photo is one of the few images we have of Lillian 'Curly' Lawrence – LBSC – running one of his engines. Entries are invited on a first come first served basis, please send your application to eatons182@gmail.com.

NSMEE Miniature Diesel Locomotive Gala 2026

Nottingham Society of Model & Experimental Engineers are holding a Miniature Diesel Locomotive event for 7¼ inch, 5 inch & 3½ inch gauge locos, plus a Miniature Electric Road Vehicles Display. The event is on Saturday 18th July 2026, 10am to 4pm, at the Nottingham Transport Heritage Centre, Ruddington, NG11 6JS.
This event is directly for enthusiasts of both battery and petrol-powered diesel locomotive models in 7¼, 5-inch and 3½-inch gauge. Plus, model engineers who have built miniature electric road vehicles.
This will be an opportunity to meet members of other groups all with a common interest. Teas and coffees will be available, plus a lunch time barbeque, by donation.
If you would like to take part in this event, please pre-book before the day, both visiting group members and NSMEE members in order we can cater for numbers. Please contact Rob Buxton via email – buxton845@gmail.com typing NSMEE in the subject box, or text or phone 07837272650 (ideally evenings between 6pm and 10pm). Please specify which Society you are a member of, and the type of model you intend to bring.
The 7¼ inch track is ground level, whilst the 5 inch & 3½ inch gauges are both raised. Please bring an appropriate driving car if possible. If this is not possible, please specify when booking that you require the loan of a driving car on the day, specifying the gauge. Miniature electric road vehicles will have the opportunity to drive around the site at their leisure.
On the day, anyone bringing a model who is not a NSMEE member may be asked to provide proof of their groups 2026 public liability insurance. So, please ask your group secretary to provide you with a photo copy of their insurance.

Vibration, Sound and Noise

Rhys Owen continues his exploration of the phenomenon of 'vibration' and turns to the application of the mathematics to some practical issues. PART 2

VIBRATION CONTROL

The spring in a locomotive's drawbar is a typical example of vibration isolation in practice. Isolation is something of a misnomer, as springs do not eliminate vibration but rather, if properly specified, attenuate it to a level at which it is of little consequence. Springs, sometimes with additional dampers, are very commonly used to control vibration and examples include:

- The drum of a washing machine (which has to cope with the vibration caused by the rotation of unbalanced loads).
- Building services where vibration isolators are very common.
- The mountings that support an internal combustion engine on the chassis of a motor vehicle.

If you listen to a washing machine as it starts up and slows down, you can detect the peak as the damped natural frequency is crossed. Likewise, a car or a bus ticking over tends to vibrate the body more than when it is running at speed. This is why a bus is often noisier when stationary then when it is travelling.

In the example earlier we considered a machine of mass *m* kg that caused its spring supports to compress by 10mm. We established that the natural frequency of the system was about 5Hz. Thus, above a frequency of about (5 x 1.414≈) 7.1 Hz, the transmissibility will start to fall below 1, reducing progressively as the frequency of the vibration increases. If the mass is a machine, then the faster it runs the less vibration is transmitted through the spring mounting. The designer's task is to find a way of dealing with the resonance peak while achieving acceptable transmission at high frequencies.

In the case of a rotating machine another design problem is dealing with the horizontal forces that will be caused by imbalance. For example, many machines are stabilised by arranging matters so that the machine's centre of mass is low relative to the suspension mounts as shown in **fig. 7**.

Apart from the designers of washing machines, building services and motor vehicles, construction engineers also take an interest in vibration, especially when piling rigs or tunnel boring machines are being used near to people's houses. In reality, it takes a high level of vibration to damage a building, but this fact is not generally known to residents so that they tend to find construction vibration alarming.

Structural engineers and architects also concern themselves with vibration, especially when they are designing tall buildings and other structures. A problem associated with such structures is vortex shedding, which is oscillation caused by fluid flow going past a bluff (i.e. unstreamlined) body. When this oscillation coincides with the natural frequency of the structure then the structure will resonate with harmful results. This is why many industrial chimneys have helical strakes to introduce turbulence and reduce the amplitudes of the resonant frequencies.

Skyscrapers are also subject to this effect and can sway in high winds. One method of addressing this is to use a tuned mass damper in the form of a mass mounted on damped springs and situated close to the top of the building. This device is effectively another mass-spring system that is so arranged that it reduces the amplitude of the skyscraper's vibration at the resonant frequency. However, it has the effect of increasing the vibration amplitude at other frequencies. The same principle is used to reduce torsional vibration in some internal combustion engines.

VIBRATION CONTROL METHODS

As with most forms of pollution, the best method of tackling vibration is to control it at source. For example, rotating machines that are properly balanced give rise to less vibration than unbalanced machines and this is why motor car tyres are balanced when they are fitted. For construction work in sensitive areas percussive piling is avoided where possible and drilling or hydraulic methods are usually preferred to insert piles. The benefit of controlling vibration (and noise) at source is that all the receivers benefit when this is done.

Another way of reducing the vibration at a receiver is to control it during transmission. In the case of ground vibration, digging a trench (if necessary, filling it with an appropriate filler material) removes the medium by which some of the waves travel. Incidentally, where vibration waves (including sound waves) encounter a change in medium there will generally be a loss of transmitted energy.

Supporting a building on special attenuators is an example of controlling vibration at the receiver.

MEASURING VIBRATION

Vibration is usually measured using either an accelerometer or a geophone. As the name implies, an accelerometer measures vibration acceleration. These instruments feature in a wide variety of devices ranging from mobile phones to navigation systems. One type of accelerometer consists of a

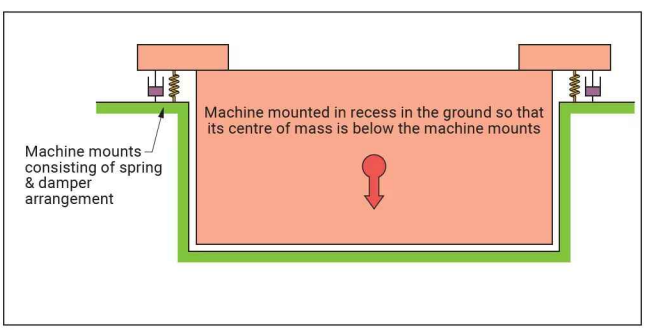


Figure 7 Example of machine isolation

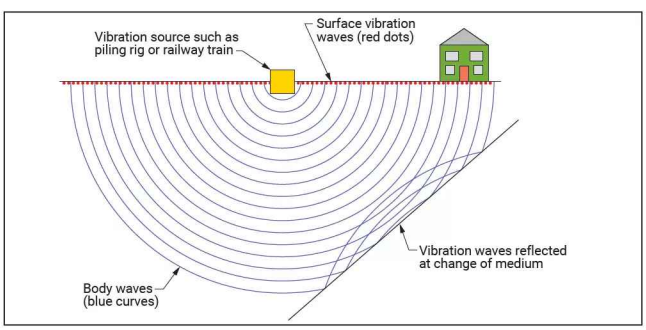


Figure 8 Transmission of vibration through the ground

transducer in which the deformation of a material that is compressed by a small mass creates an electrical charge that is measured by an instrument. The vibration causes the mass to move and the instrument analyses the charge generated to determine the level of the vibration acceleration. Points that must be considered are whether the mass of the accelerometer itself influences the vibration of the body whose vibration is being measured, the natural frequency of the accelerometer itself and how well the accelerometer is attached to whatever it is measuring. Attachment of the accelerometer can be by a stud in a hole drilled and tapped in what is being measured, by a magnetic attachment or by an adhesive such as beeswax.

Another device for measuring vibration is the geophone which measures vibration velocity. As the 'geo' implies, geophones are often used to measure ground vibration from such things as trains and movements of the earth. Many geophones work by analysing the current generated by the movement of a magnet within a coil. When the geophone is moved by vibration the coil moves relative to the magnet.

In AD 132 the Chinese polymath Zhang Heng (張衡, modern form 张衡, Pinyin: zhāng héng) presented a seismometer to the Han dynasty court. This device consisted of a pendulum that, when activated by the vibration wave caused by an earthquake, released a ball that fell into the mouth of one of eight metal toads, each located at the various compass points. Initially viewed with scepticism, Zhang's seismometer proved its worth when, a few days after a ball fell into the mouth of one of the toads, news came from North West China that an earthquake had indeed occurred. No-one in Luoyang, then China's capital, had felt anything!

VIBRATION WAVES

There are different types of vibration waves in solids. For example, the vibration entering a building from, say, piling may be transmitted by waves on the surface of the earth as well as by compression waves (push and pull) or transverse waves (waggle) below the surface. This gives three possible mathematical models for the transmission of vibration energy (in some solid media, such as automotive drive trains, torsional vibration may occur). A further complication is that, as a medium for these waves, the earth is not homogeneous so that the transmission of the waves may be influenced by, say, reflections from the underlying rock or changes in the type of soil. Prediction of the vibration that will be generated by a piece of equipment is thus not for the faint of heart – conservative assumptions allied with empirical methods are generally used. **Figure 8** illustrates the challenges.

Ground vibration also has the effect of generating sound within a building – the ground vibration causes the building elements to vibrate and these in turn cause the air next to them to vibrate thus creating sound, **fig. 9**.

This is the same effect as a drum skin or a violin string – the vibration of both of which creates sound waves both directly but also by the vibration of the structures supporting them.

In general, vibrating surfaces create noise. Damping also has an effect here – a metal railway bridge that has been rivetted together will have more intrinsic damping than an otherwise identical welded bridge so that, all other things being equal, a train crossing the welded bridge will create more noise than it would crossing a rivetted bridge.

Vibration can help with testing. A railway worker now very rarely encountered is the wheeltapper who, in the steam age, could be heard tapping the tyres of carriages during station stops. When the wheeltapper's hammer hit a cracked tyre then that tyre would not emit the same sound as an uncracked tyre because the crack interfered with the vibration waves within the metal. The tyre did not ring but emitted a 'clunk'. Both the ringing and the clunk were created by the surface of the tyre activating the air around it. It may not be entirely a coincidence that the word 'sound' in English refers both to acoustics and to reliability.

In the same way a boilersmith tapping a stay with a hammer will know if it is cracked or not by the sound emitted.

Ultrasonic testing is sometimes used to inspect objects of various types. This type of testing typically depends on an ultrasound transducer, usually separated from the object being tested by a couplant such as gel. In one kind of test the transducer emits ultrasound waves (ultrasound means that the frequency is above the range that the human ear can detect) and receives reflections from interfaces such as the walls of the object or, more importantly, imperfections inside the object. In another kind of test a separate receiver detects the amount of acoustic energy that has passed through the object, and this allows the operator to detect flaws.

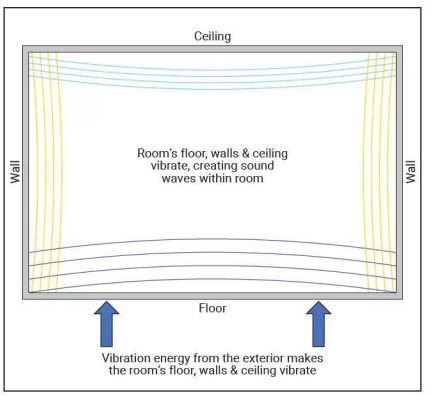


Figure 9 How vibration generates sound in a room

Human bodies are often inspected by ultrasound testing, ultrasonic waves being transmitted into, for example, the abdomen of a pregnant woman to examine the foetus.

Nature, of course, has already been using ultrasound for millions of years because bats (and some other mammals) use it for echo-location.

SOUND AND NOISE

First of all, what is the difference between sound and noise? "*One man's symphony is another man's cacophony*" – noise is usually defined as unwanted sound.

One definition of sound could be 'a variation in the pressure of the air next to the ear' but a broader definition would be that 'sound is a mechanical wave that results from the oscillation of particles through which the sound wave is moving'. The particles move very little but, by oscillating, each particle transmits energy to adjoining particles. Sound does not just occur in air but in pretty much any medium, one 'non-air' example being the transmission of the sounds made by whales, dolphins and ships in water.

Sound power is a measure of what a sound source emits – in very rough terms one can think of the sound power of a source as corresponding to the wattage of an electric fire while the sound pressure at a particular point corresponds to the temperature that one experiences at a particular distance from that electric fire.

TRANSMISSION OF SOUND IN FLUIDS

While vibration waves in solids may be of several types, sound transmission in air and other gases consists only of compression waves, that is, energy is transmitted through the gas by pulses of compression.

The same is true of water and other liquids in that the sound source causes the surrounding molecules to compress and decompress, this process of compression and decompression being transmitted further through the medium.

In both cases one can think of the ripples caused when a stone is cast into still water – except that these ripples occur in three dimensions rather than two.

The frequency of these waves is important. Human beings can generally hear sound at frequencies between 20Hz (1Hz = 1 cycle per second) and 20,000Hz (or 20kHz) although as we age, we lose our ability to hear some frequencies. Moreover, studies have shown that human beings are more annoyed by some frequencies than others.

Another wave parameter is the wavelength, which is the distance between two peaks of a sound wave (or indeed, the distance between any two corresponding parts of that wave).

Just as a person's walking speed can be calculated by the length of the total stride (i.e. 'left, right') multiplied by the number of total strides made in unit time (the frequency) so the speed of a wave can be determined by multiplying the wavelength by the frequency:

$$C = f\lambda$$

Where:

C = speed ("celerity"), f = frequency and λ = wavelength.

ATTENUATION WITH DISTANCE

As sound energy radiates outwards from a sound source, the power per unit area, where that area is perpendicular to the direction in which the wave is travelling, is known as the sound intensity. This is a vector quantity, that is, it is specified in terms of both magnitude and direction.

For spherical propagation from a point source suspended in air we can see that if the sound power is *W*, then at a distance *r* the sound intensity *I* will be expressed thus:

$$I = \frac{W}{4\pi r^2}$$

In other words, at distance *r* from the source, the sound intensity is the sound power divided by the surface area of the sphere of radius r. (For a sphere of radius r, the area of the surface is $4\pi r2$ as demonstrated by Archimedes in a rather nice proof).

It is helpful to visualise this attenuation in terms of a child with bubble gum – as the bubble expands so its area increases but its thickness decreases.

THE DECIBEL.

At this stage we had better introduce the decibel.

Sound level meters measure sound pressure, in other words the variation in the pressure of the air mentioned above. However, the sound pressure of a military aircraft taking off at 30m distance is some 200 Pa whereas the sound pressure of a whispered conversation at 2m distance is some 0.002 Pa, that is, the former is 100,000 times the latter. To make this range more manageable acousticians use a logarithmic scale, so that the former is represented by 140 decibels and the latter by 40 decibels. We normally write decibel as 'dB'.

The decibel scale represents 'what we hear' rather better than the sound pressure itself. When we refer to the decibel version of the sound pressure we call it the sound pressure level.

ADDITION OF DECIBELS

The mathematics underlying the decibel is something that we shall not go into here but to extend the above example see **table 1.**

Table 1 – Sound level comparisons

Sound pressure (Pa)	Sound pressure level (dB)	Example
200	140	30m from military aircraft taking off.
20	120	Maximum level in a boiler shop
2	100	Maximum level in underground train station
0.2	80	Next to a busy street
0.02	60	Noisy restaurant
0.002	40	Whispered conversation at 2m
0.0002	20	Recording studio background noise.
0.00002	0	Threshold of human hearing.

Essentially decibels relate to the ratio of a quantity to a reference value. From the above it may be seen that 0dB does not actually mean that there is no sound!

ADDITION OF DECIBELS

If we add two decibel values A dB and B dB, where A≥B (A is greater than, or equal to, B), then the sum depends on the difference between A and B (essentially we are adding the underlying energy ratios). This is known as 'dB addition', **Table 2**.

Table 2: Decibel Addition.

A	B	Add to A	dB sum of A and B
A	B=A	3.0	A + 3.0
A	B=A-1	2.5	A + 2.5
A	B=A-2	2.1	A + 2.1
A	B=A-3	1.8	A + 1.8
A	B=A-4	1.5	A + 1.5
A	B=A-5	1.2	A + 1.2
A	B=A-6	1.0	A + 1.0
A	B=A-7	0.8	A + 0.8
A	B=A-8	0.6	A + 0.6
A	B=A-9	0.5	A + 0.5
A	B=A-10	0.4	A + 0.4

It may be seen that if A exceeds B by 10 or more decibels, then B may generally be ignored. Spreadsheets can be used to do "dB additions" but the above table can be used progressively to add several values together.

As mentioned above, if a sound pressure level is 0 dB this does not mean that there is no acoustic energy at all! 0 dB is the sound pressure level at the normal human threshold of hearing (the sound pressure represented by 0 dB is 0.00002 Pa). So, the 'dB addition' of 0 dB and 0 dB gives 3 dB!

ATTENUATION

The attenuation of a sound wave with distance depends on how large that distance is compared to the size of the source. For example, if the source is a large rectangular plane surface (such as the side of a factory) then, if we were to start measuring the sound pressure level close to the surface, we would find that the sound pressure would initially barely decrease as we moved the sound level meter away from the plane surface. At a certain point we would find that the sound pressure level decreased by 3 dB with each doubling of distance from the source and, when sufficiently far away we would find that the sound pressure level decreased by 6 dB per doubling of distance which is the normal rate at which the sound pressure level of a point source decreases. There are in fact mathematical formulae for this, but we shall not follow that path.

So, defining a point source is really a matter of the transmission distance relative to the dimensions of the source. Normal practice for a rectangular source (such as a wall) with sides of length a, b (where a < b) is to assume as in **Table 3.**

Table 3: Sound Propagation

Distance	Propagation type	Distance attenuation
$0 < r < a/\pi$	Plane wave	Negligible
$a/\pi < r < b/\pi$	Line source propagation	3dB reduction per doubling of distance
$b/\pi < r$	Point source propagation	6dB reduction per doubling of distance

In addition to the distance attenuation that arises from the expansion of the wavefront, air attenuation and, in some instances, ground attenuation also occur. However, these attenuations are often neglected.

Where the noise source rests on a reflective surface such as hard ground it is usually assumed that all the energy is reflected back from it so that the sound pressure at a given distance is double what it would be in the case of no reflection. As we saw above from our addition table, doubling the sound pressure means that sound pressure level will be 3dB greater than it would have been if the source were on a completely absorbent surface.

Likewise, the sound measured next to a wall can be expected to be 3dB higher than would be measured in free-field conditions because of reflections back from the wall to the meter's microphone.

When measuring noise in the open it is customary to avoid measuring at a distance that is between 1m and 3.5m from a wall as, in this region, it is not clear what amount of reflected sound would affect the measurements.

Here is an example of the foregoing theory in use:

EXAMPLE 2

A model engineering club operates 100 metres from a house. The resident of the house has complained about the noise from the club locomotive's whistle, citing levels of 85 dB(A) at the facade of his property. An acoustician visits and at 2 metres from the whistle measures the sound pressure level as being 110 dB(A) in the free field. The whistle is symmetrical in the horizontal plane.

SOLUTION

The fact that the whistle is symmetrical in the horizontal plane indicates that we need not consider directivity, which is the variation in noise level around an object.

The whistle is sufficiently small to be considered a point source. Even a full-size whistle of maximum dimensions of, say, 200mm, would be treated as a point source at a distance further than ($200/\pi \approx$) 64mm so 2m distance (i.e. 2,000mm) is certainly far enough.

Applying a decrease of 6 dB per doubling of distance we get the following:

Distance (m)	Sound Pressure Level dB(A)
2	110
4	104
8	98
16	92
32	86
64	80
128	74

We can see that at 100m the free field sound pressure level will be between 74 dB(A) and 80 dB(A). Using the standard calculation method, as shown below, we can see that it is 76 dB(A)

$$L_{P100} = L_{P2} + 20\log_{10}\left(\frac{2}{100}\right)$$

$$L_{P100} = 110 + 20\log_{10}(0.02)$$

$$L_{P100} = 76\ dB(A)$$

However, this is the sound pressure level in the free field. If we assume full reflection from the wall of the house, then the energy is doubled giving (76+3=) 79 dB(A).

Remember, doubling of energy in acoustics amounts to adding 3 dB!

The above calculation indicates that the resident's claim of 85 dB(A) should be treated with suspicion because 85 dB(A) is greater than 79 dB(A). Whatever was being measured was not entirely the whistle (if at all)!

FREQUENCY ANALYSIS

In the example above we used 'dB(A)' rather than simply writing 'dB' and this indicates that the 'A weighting' has been applied to the sound pressure level measured.

A French mathematician, Jean-Baptiste Joseph Fourier, showed that periodic functions can be expressed as combinations of various trigonometric functions (such as the sine function with which we have been dealing). Accordingly, a given sound wave can be transformed into a combination of waves of different frequencies. High grade sound level meters carry out a 'Fast Fourier Transform' that converts the received signal into octave bands (or one third octave bands). Since human beings are more sensitive to sound at particular frequencies than others the A weighting is usually applied to take account of this.

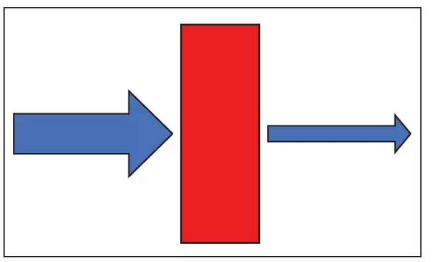


Figure 10 Transmission through a partition

NOISE CONTROL

There are three main ways in which sound can be controlled, these being by insulation, by isolation and by absorption.

INSULATION

If we wish to prevent sound from being transmitted from one space to another then we can interpose insulation (e.g. a thick wall) between the two spaces. Essentially, the sound waves impinge upon the insulation material and, while being transmitted through that material, the sound energy is reduced, **fig 10**.

When going through the insulation material a proportion of the energy is converted into heat while the remaining energy exits on the other side of the material, radiating from there. The fraction of the incident acoustic energy that is transmitted through the insulation material is given by the transmission coefficient (referred to as the Greek letter τ pronounced 'tau') so that:

$$\tau = \frac{Radiated\ sound\ energy}{Incident\ sound\ energy}$$

Normally, τ is converted into a decibel quantity called the sound reduction index R. In general, the sound reduction of the material increases with mass per unit area.

Also, with the exceptions that are discussed below, any given insulating material attenuates high frequency sound more effectively than low frequency sound. This is because the higher the frequency the greater the number of cycles made in which sound energy can be attenuated.

However, resonance reduces the attenuation of, say, a wall at certain low frequencies and, at certain higher frequencies, there is a "coincidence effect" which relates to the bending waves in the partition coinciding with the impinging sound waves. This phenomenon reduces the barrier performance at the coincidence frequency and above.

Easy 3D Printed Workshop Aids

Paul Zeusche shares some 'quick and dirty' jigs and fixtures.

CNC machining, DROs, solid modelling programs and digital calipers/micrometers can all be considered useful adjuncts to the home workshop. While certainly not essential, when affordable and with sufficient interest worth a closer look. I believe 3D filament printed parts for use in the workshop fall in this category.

With the increasing availability of relatively inexpensive 3D filament printers and useful information from vendors and other users readily available on YouTube, anyone with a basic modelling program and the ability to model and export an STL file can 3D print prototype parts, temporary fixtures, casting patterns and some light use press tools that, amongst others, can be produced quickly and inexpensively before committing to cutting from more expensive metal.

Cura and other free slicing programs provide the g-code and printer settings required. The excellent book, *3D printing for Model Engineers,* by editor Neil Wyatt explains the ins and outs of the process very well.

Visualizing a finished part is not always easy from drawings that lack all three views coupled with inadequate dimensioning, and sometimes even a rough 3D print will help in this regard.

It could be argued that some of these could as easily be produced from wood or other materials and in terms of time possibly faster in many instances. However if a dimensioned drawing has to be produced, you are half way to producing a 3D model and with this converted to an STL file and transferred to a slicer program, the part can be produced fairly quickly (or for larger parts overnight) while you get on with something else.

The ER 32 printed collet in **photo 1** worked surprisingly well, the good part about it is once modelled without the centre hole, any shape can be dimensioned and produced in the basic model very quickly before pushing it out to the printer. Moreover, if the first version isn't what is required simple changes in the model file will quickly produce a revised part until you are satisfied.

Another option that may produce a model that can be modified are websites such as Thingiverse, Grabcad and other websites, though searching over 2-1/2 million models can in itself be challenging (I usually search google for 'what I want STL' – Ed.)

The following parts were used recently during a half scale traction engine build; a photo and brief description accompanies each part.

Photo 1: ER32 printed collet for odd sized square stock.

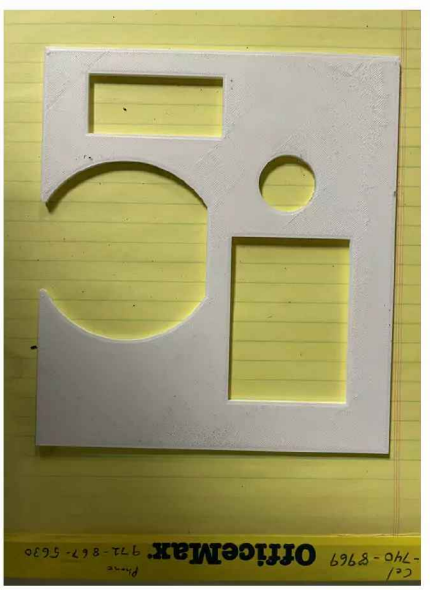


Photo 2: Test cover plate for cylinder casting, printed in the same thickness as metal, rectangular holes are to decrease print time only.

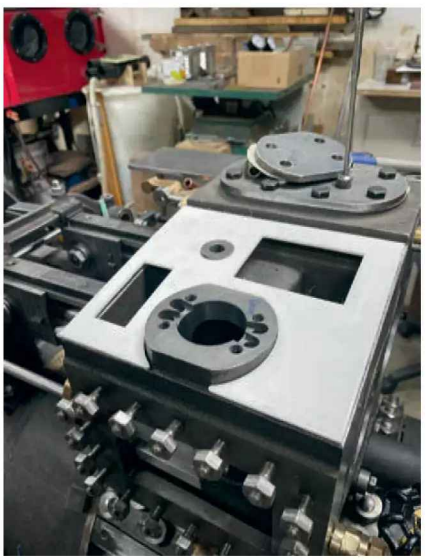


Photo 3: Trial fit for cover plate.

Photo 4: Damper rod quadrant and rod notches, spacing and angle trial part.

Photo 5: Prototype threaded inserts for cast polyurethane parts.

Photo 6: Copper tube bending dies, male and female, diameter specific.

Photo 7: Printed casting pattern (painted white) with included edge draft and shrinkage allowances, resultant cast part shown to the left.

Photo 8: Two piece printed pad to more securely support the main axle on a project, this encloses the smaller top of the support stand column and protects the axle from damage.

Photo 9: Prototype (before testing) press dies to produce part of a sheet metal helix for a steering chain guide in my traction engine build.

If your hobby includes any aspects of engineering, the **ME&W** will have much to interest you in its pages. Bigger than either of its predecessors it has the space to cover all aspects of model engineering from traditional live steam models to gas turbines, from clocks to toolmaking We look in depth at the skills you need to get the most out of your hobby: using maintaining and improving lathes, mills and other workshop machines such as 3D printers and CNC. We also cover the widest range of workshop activities – traditional ones like casting, brazing and welding to modern skills like using embedded electronics. Finally, we keep you up to date with what's happening in the world of hobby engineering with our event reports, news features and reviews.

Neil Wyatt

Editor

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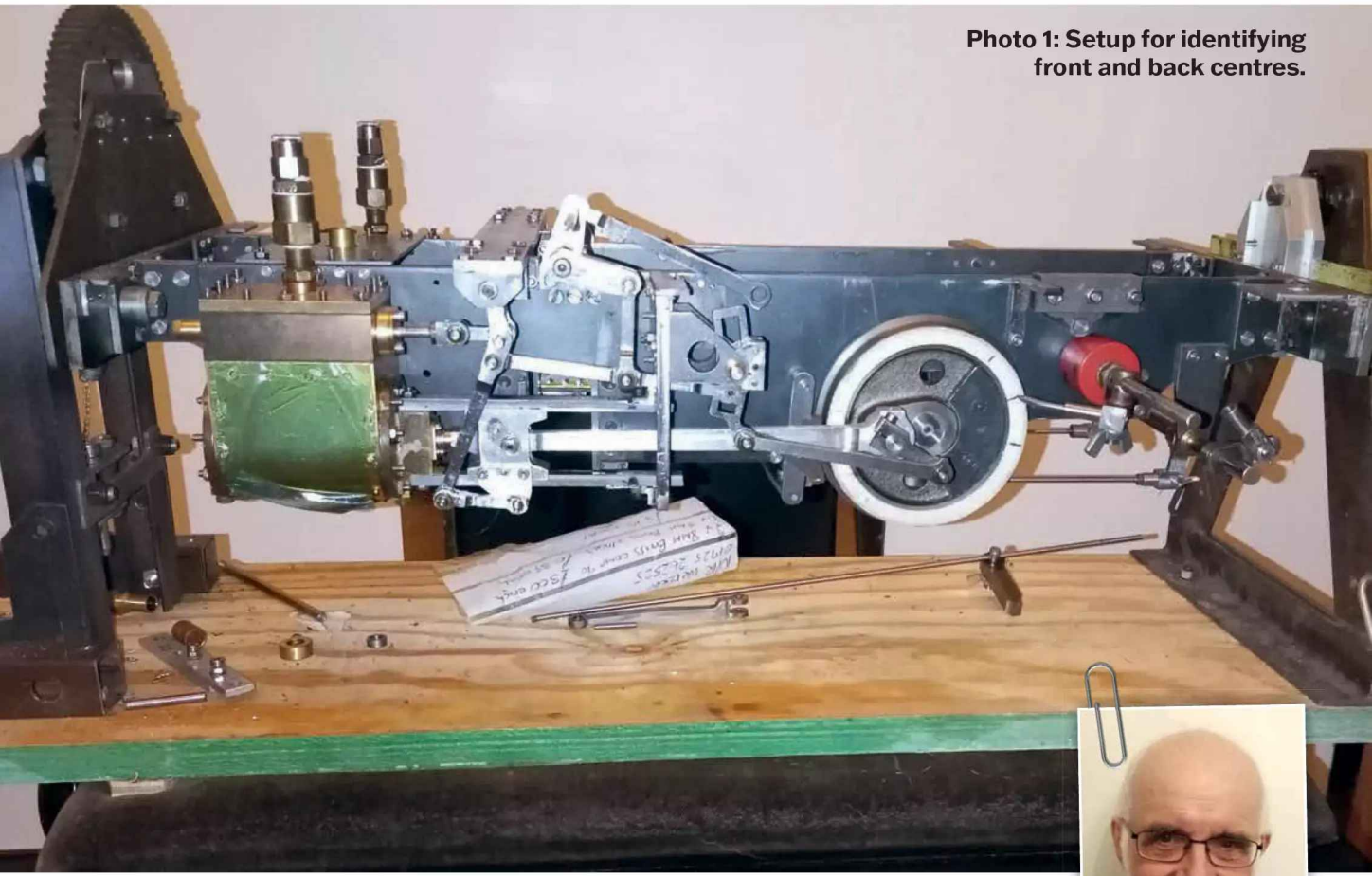


Photo 1: Setup for identifying front and back centres.

Setting Up Walschaerts Valve Gear

Duncan Webster explains how to get the best performance from the Walschaerts valve gear fitted to many scale model locomotives.

There have been several threads on the Model Engineer forum about this topic, and it comes up frequently at our ME club meetings. I described how Walschaerts valve gear works in *Model Engineer* issue 4729, 3 Nov 2023, so there is no need to repeat the intricacies here. A copy of article is at www.model-engineer.co.uk/?p=839272 or use the QR code to go direct to the article.

If the gear is well designed there are only three issues, setting the valve along its spindle to get equal lead both ends, setting the return crank and setting the length of the eccentric rod. These last two are done at the same time. I have reproduced the arrangement drawing for inside and outside admission valves in **figs 1** and **2.**

FINDING FRONT AND BACK CENTRES

It is important to be able to accurately set the engine on front and back centres. Trying to do this by eye is not easy, with a 2" stroke piston 5 degrees off centre is only 0.004" movement before you add in the effect of bearing clearances. How I do it is to position a pointer against the driving wheel rim and stick some segments of thin card to the wheel (Pritstick works well) so that they are under the pointer with the piston on front and back centres by eye, **photos 1** and **2**. My pointer is held to the frame via a pot magnet and the little clamp is used to hold a dti. This photo is posed, so the piston might not be exactly at front centre, but it's no far off. There is a spacer 'twixt each axlebox and its hornkeep to hold the axle at running height.

Now find a suitable spacer, so that if you rotate the wheel, positioned as in **fig. 3** (top), anticlockwise the spacer is trapped between the front of the crosshead and the back cover of the cylinder or some other fixed point. Mark the card template as shown. Now position the wheel as in fig. 3 (middle) and trap the spacer again by turning

Fig 1

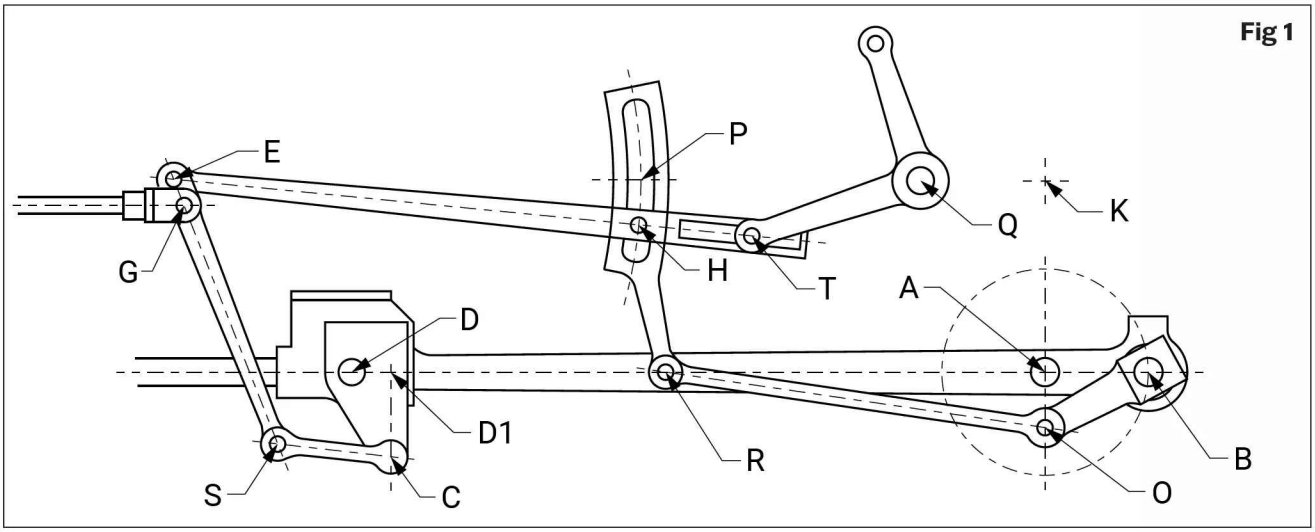
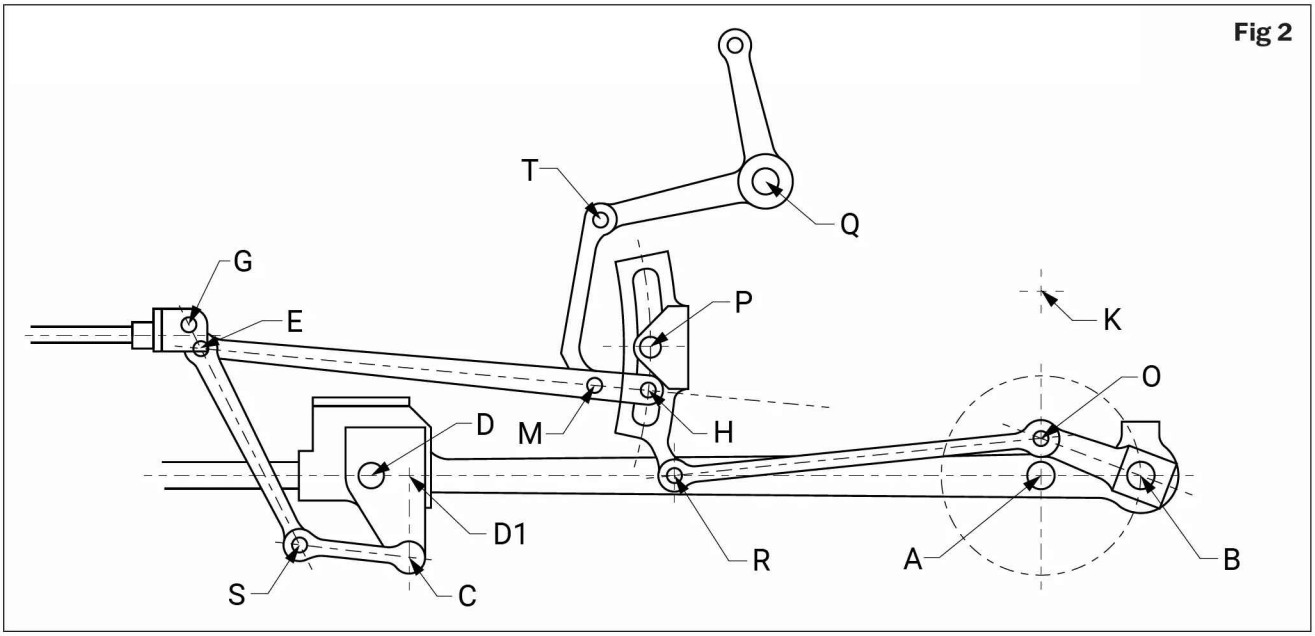


Fig 2



the wheel clockwise and mark the card again. Now using a pair of dividers put a third mark exactly half way between. If you now align the pointer with this centre mark, the piston is at front centre, fig 3 (bottom). Repeat for the back centre. Do not move the pointer at any time.

SETTING THE LEAD.

A well-designed gear will have constant positive lead. This is not always the case, even though it was made exactly to drawing, one model (an *Achilles*) I was asked to help with had the slide valve too long, so no amount of adjusting would get correct events. It is just worth checking the drawings and doing one simple sum.

Referring to **fig. 4**, in mid gear (points h and p coincident) point g does not move, so If you haven't got

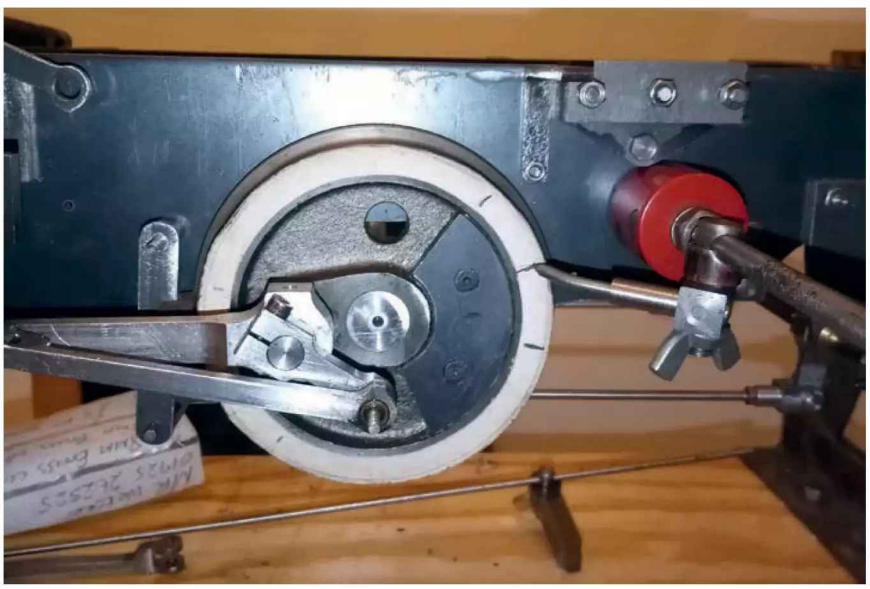


Photo 2: The pointer arrangement.

the drawings, it is possible to measure the lap + lead travel direct. Easy with a slide valve, just measure from one end of the valve to a fixed point with the piston on front and back centres, subtract one dimension from the other, then divide by 2. If you have a piston valve, then using a depth mic or dial indicator from the front of the steam chest is the best option.

$$lap + lead = \frac{stroke}{2} * \frac{eg}{es}$$

$$lead = (lap + lead) - lap$$

I've designed my 3 5" gauge locos to have 0.010" lead. I've heard of some designs with far higher lead, I can't see that this is helpful, in fact excessive lead is harmful. If you're happy with the lead, just adjust the valve along its spindle so that in mid gear you get equal leads both ends. If you haven't got enough lead, or negative lead then just machine a bit off each end of the valve for slide valves or the inner faces of the bobbins for piston valves. This is easy with slide valves, you can see what is going on. With piston valves it is less so. If I ever designed a loco with piston valves, I'd have access ports in the transfer passages so you can see the valve move, but in the absence of this some other way must be found. What a fellow club member does is attach short lengths of flexible pipe to the drain cocks and dip the bottom ends in a jar of water. Now if you apply a low pressure to the steam inlet, when the valve starts to open you get bubbles in the water. Adjust the valve so that the valve starts to open at the same angle before centre at both ends. This relies on having good fitting valves. A dose of oil will help.

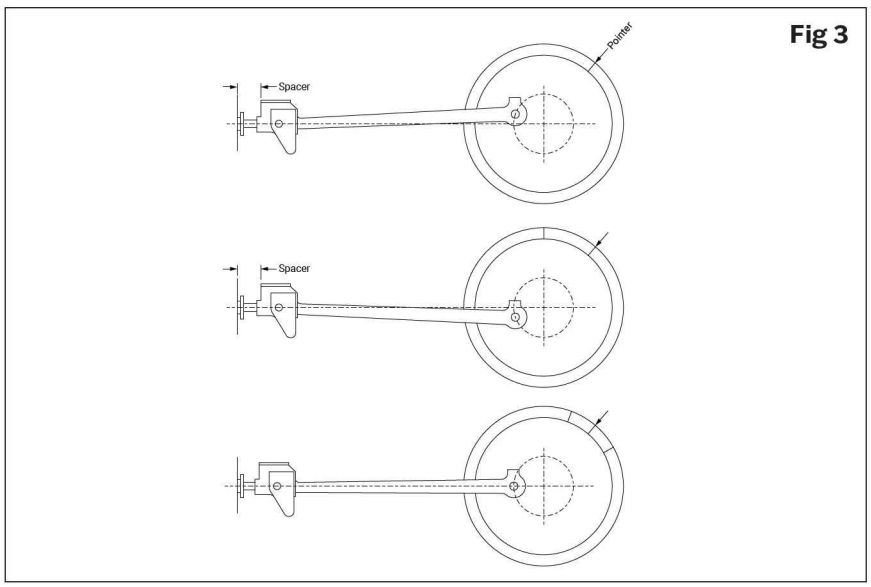


Fig 3

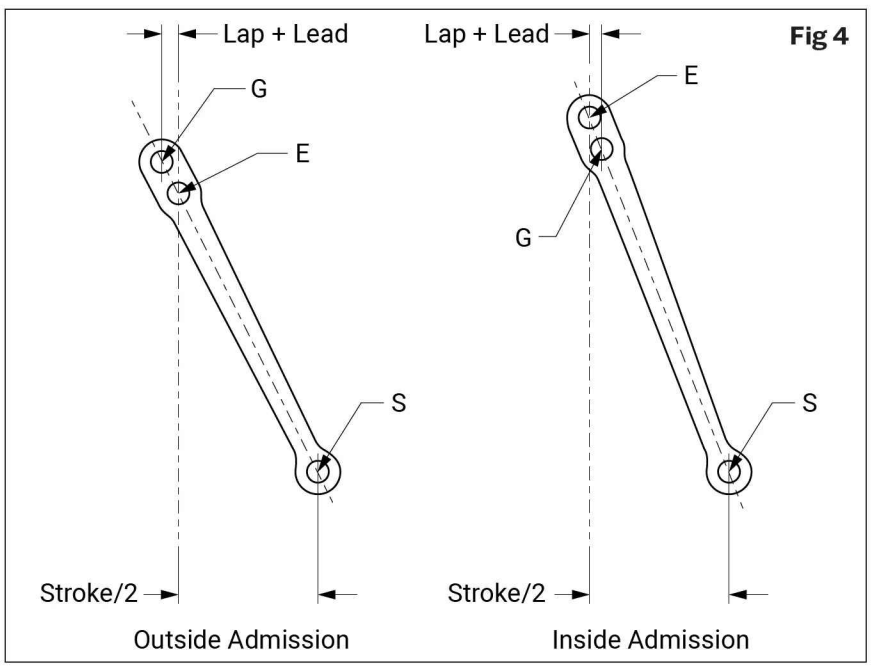


Fig 4

SETTING RETURN CRANK AND ECCENTRIC ROD

This is more difficult. What we are trying to achieve is that with the piston on front and back centres, the die block *h* can be moved up and down the expansion link without moving the valve. To achieve this we require both the angular setting of the return crank *ob* on the crankpin and the length of the eccentric rod *or* to be correct. Unless you are very skilful indeed, the required length of the eccentric rod is unlikely to be as shown on the drawing. What I do is to find an *ad hoc* means of clamping the expansion link so that the die block can be moved as above, then with the piston on front and back centres, measure between points o and r using a digital caliper, and adjust the rotation of the return crank on the crankpin until these two measurements are the same. Sounds easy, believe me it can be frustrating. You don't want distractions from SWMBO. Take note of the positions of the return crank relative to the main crank as shown in fig 1. Then you can make up an eccentric rod to this dimension. I make a crude adjustable one to try just to be on the safe side, nothing worse than carefully shaping a rod to the wrong dimension because you've slipped up somewhere. Been there, done that.

Everything should now be right. I've had a chap who wanted to increase the max cutoff of his loco – just rotate the return crank to increase the throw. Nope, won't work, you will no longer have the ability to go from fore gear to back gear without changing the lead. If you want to increase the maximum cutoff you either need to make the die block move further along the expansion link, or make up a longer return crank, which could necessitate a change to the eccentric rod, or have a shorter tail on the expansion link, but this would also change the return crank setting and eccentric rod length, as well as being a major undertaking. This is why putting the design through one of the computer simulations before you start cutting metal is a good idea. Just following the published design is not necessarily a guarantee of first-time success, there are several instances of poor design out there, such negative or excessive lead, too little maximum cutoff.

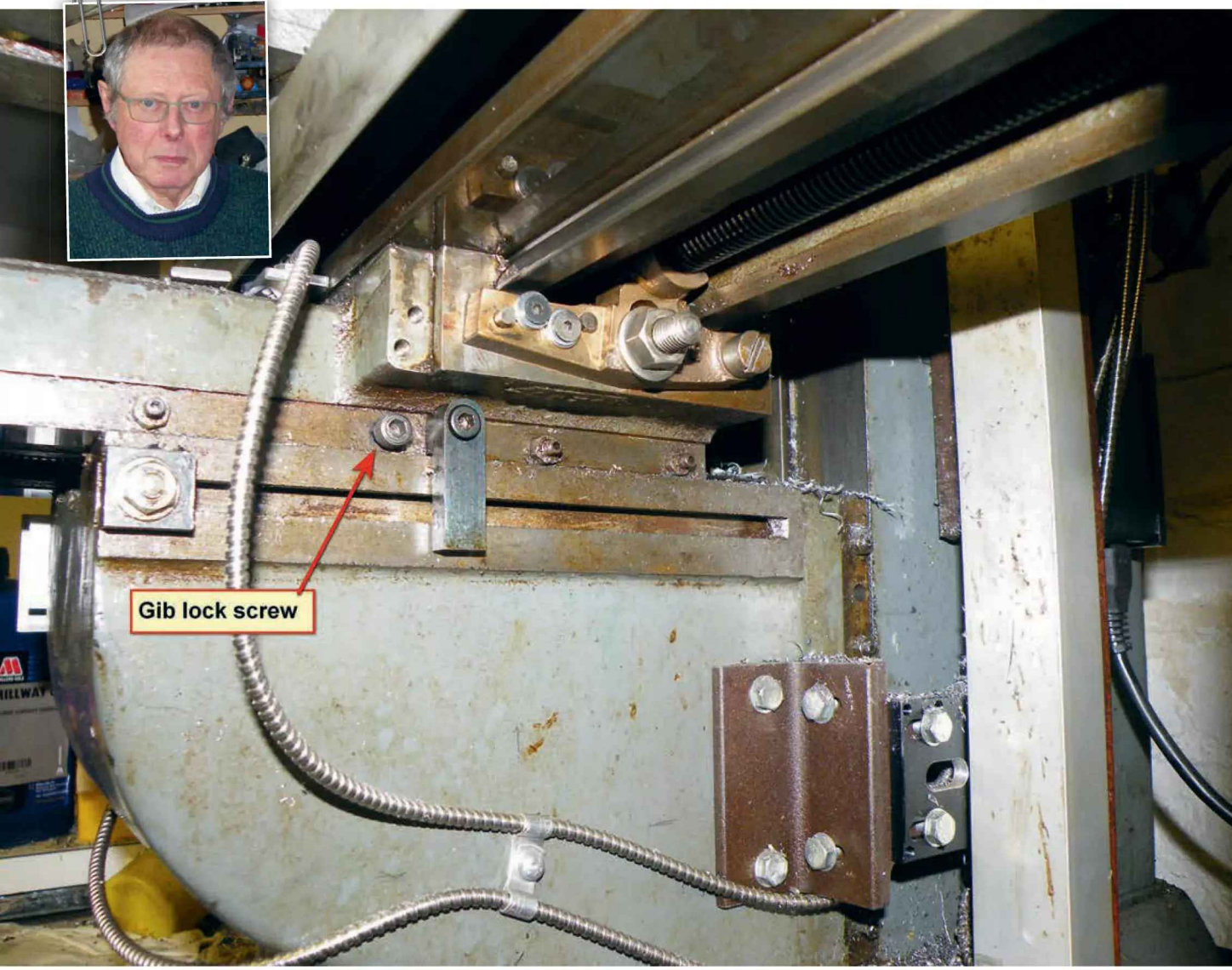


Photo 1: The gib locking screw under the table.

A Gib Lock Screw Extension

Gary Wooding has a handy tip for Centec Mill owners that can work for many other mills with limited access under the table.

Both axes of my Centec 2B table have carriage locks operated by screws. The x-axis screw is behind the table and has a nicely angled lever with easy access, but the y-axis is locked by a long socket-head screw that lies under the table on the right. It is somewhat inaccessible and requires an Allen key to operate it, **photo 1**. If the key is left in place, then it is likely to fall out, and it's quite fiddly to re-insert.

The actual screw is two inches long with a ¼ inch BSF thread and a 3/16 inch hex socket head, **fig. 1**. It lives just below the carriage half-nut carrier support bracket leaving a clearance of just about 10mm, **photo 2**.

A lever like the one for the *x*-axis can't be used because of the 10mm space restriction, and I couldn't make a screw long enough to clear the half-nut bracket because I didn't have access to a ¼ inch BSF die. So I decided to do something different, **fig. 2**.

I had a short length of 25mm aluminium rod that would make a suitable extension to the existing screw. It was a simple turning job to make the extension; the only critical dimensions were for the little nipple at the end. With the screw held in the

Photo 2: Limited clearance limits the obvious solutions.

lathe chuck, the nipple was pressed into the hex socket with the tailstock, **photo 3**.

It worked perfectly and was well worth doing, **photo 4.**

Photo 3: Pressing the extension piece into place.

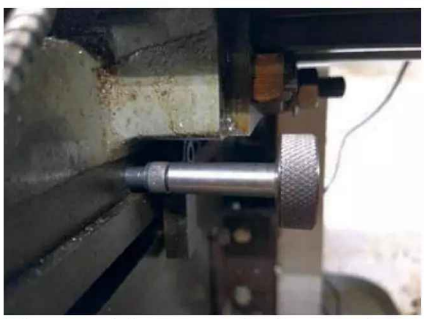
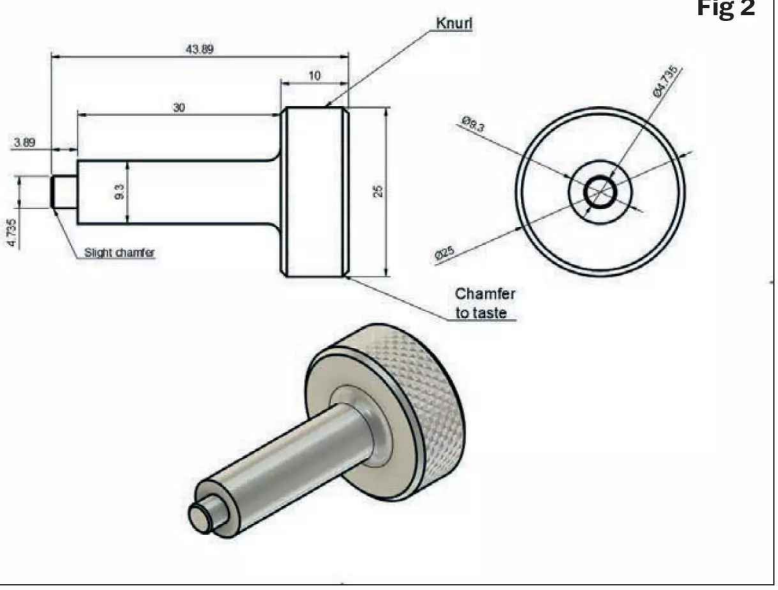


Photo 4: The extended screw in place.

Fig 1

Fig 2



A Clutch for the ML7

The use of a clutch on a lathe is most desirable. In this article from *Model Engineers' Workshop* issue 5, June/July 1991, Alan Buttolph described how to make a clutch which operates freely and positively. We have received reports of this design providing decades of trouble-free service. Although the measurements given apply to the Myford ML7 there is no reason why the idea cannot be adapted to any lathe fitted with a countershaft. A trial of the methods used produced a fully operational clutch in a weekend.

YOUR FULL SIZE PULLOUT DRAWINGS

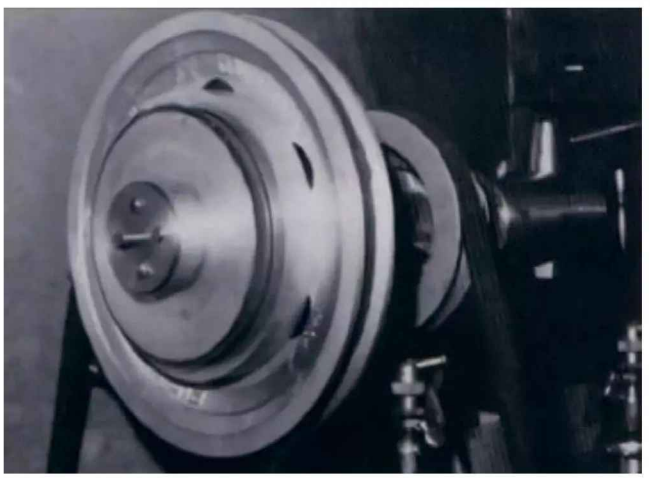
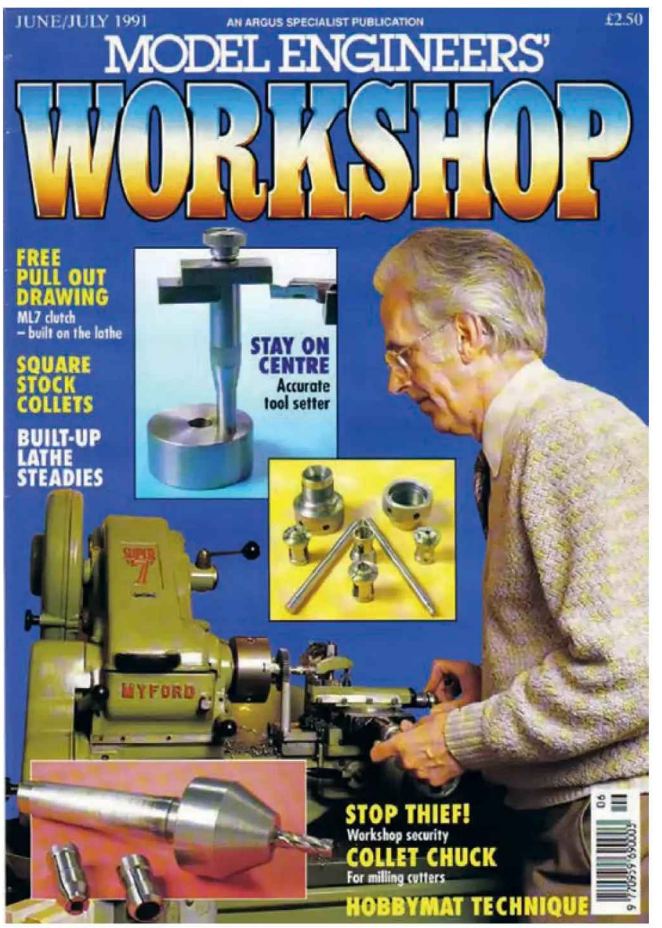


Photo 1: The clutch parts disengaged.



If you only stop to think about such trivial matters, it is obvious that, in producing even the simplest item on a lathe, the main spindle must be stopped and restarted several times. It is the sort of thing we do with hardly a thought and yet, is stopping and starting entails switching the diving motor on and off every time, we are really imposing very unfair conditions on the motor, not to mention the switch. Unless we have a motor and switchgear specially designed for such a repetitive 'duty cycle' - which I venture to suggest is most improbable – then commonsense suggests that the motor be left to run free once it is started and the lathe spindle be controlled otherwise.

In the days of line shafting serving many machines we slipped the overhead (flat) driving belt from the idler to the driving pulley with no necessity to give a thought to the driving motor. Few amateurs can still be using this sort of setup although it is simple and effective but requires a fair amount of space to accommodate. In these days of limited space, the self-contained lathe with integral drive has a lot to commend it and a hand-operated clutch between the driving motor and the lathe spindle is a real asset.

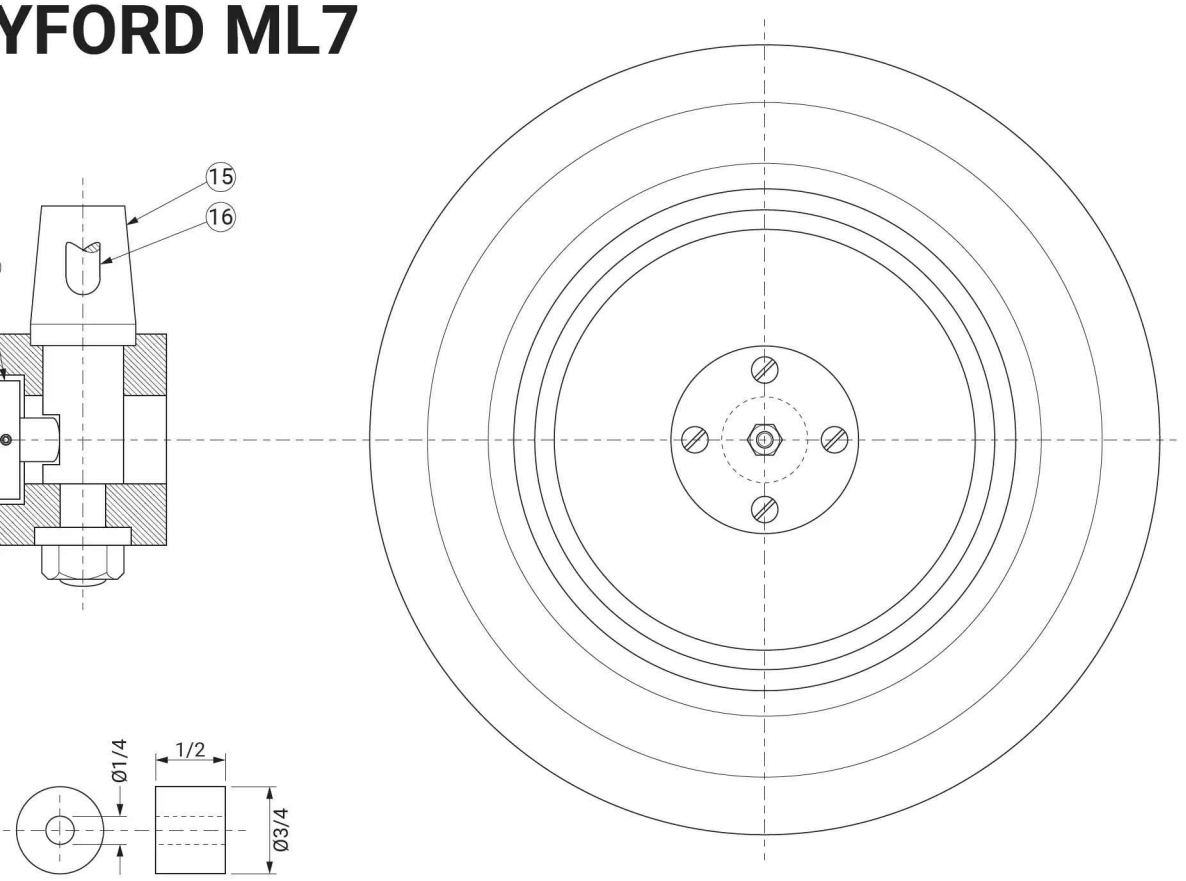
When I first tackled the idea of fitting such a clutch to my Myford ML7 the preliminary sketches were so encouraging that I decided to design and make my own clutch. The ML7 design lends itself most effectively to such a project which, with average care and the materials available to the amateur, is well worth the time and very small cost involved. Other lathes will also be adaptable for a clutch of this type.

The simplest and, for our purpose, most effective type of clutch is the friction cone clutch. This consists of two conical parts, one male, one female, which are held together by axial thrust to rotate together by virtue of the friction grip between the conical surfaces. The friction grip is smoothly engaged and disengaged by making one of the mating surfaces of a pliant material, such as leather.

MATERIALS

You can see from the plans (centre pages) what the general setup is; this shows the two parts of the clutch when engaged. The two parts are of aluminium or light alloy, which is still available, I trust, from our

YFORD ML7



tor Belt Guard

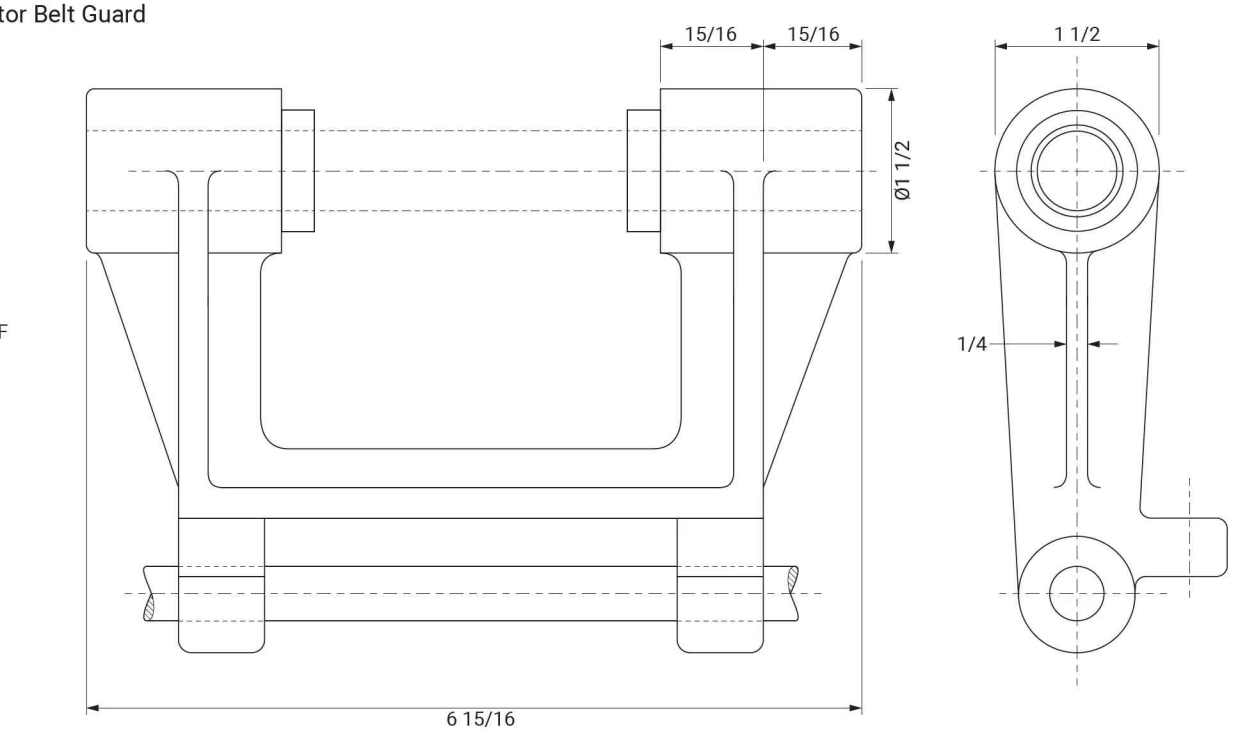
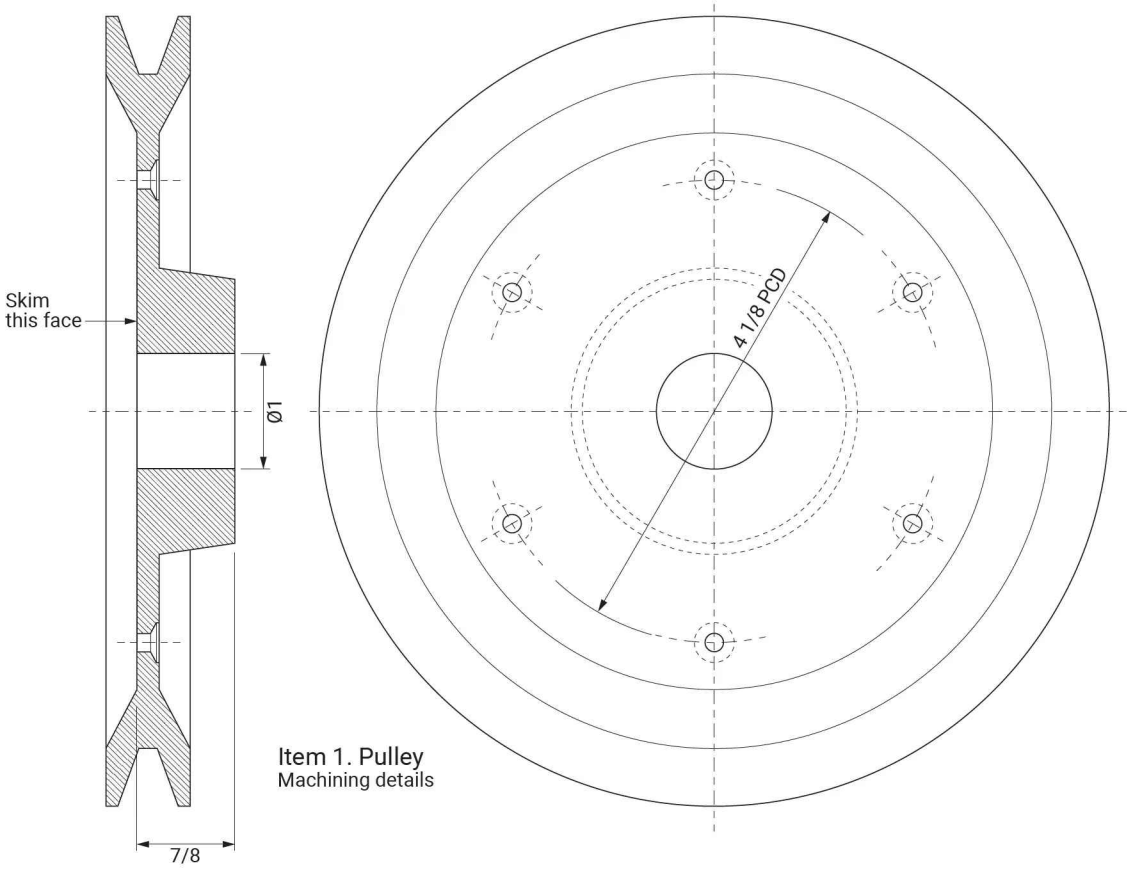
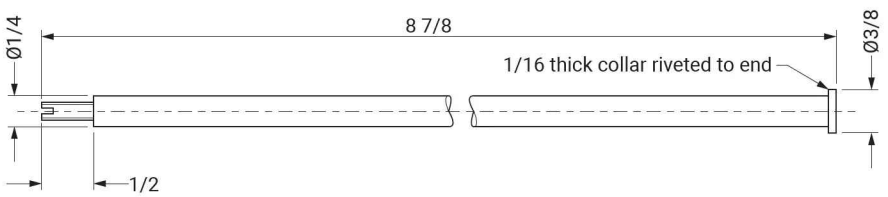


Fig.2 Existing Countershaft Bracket



Item 1. Pulley
Machining details

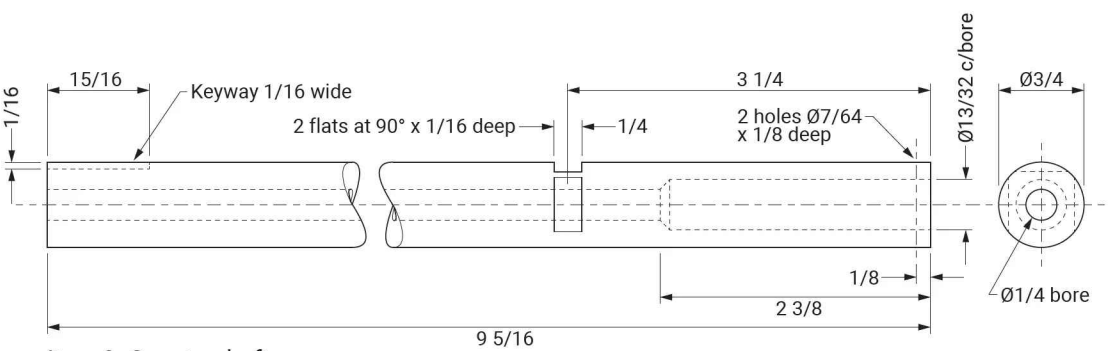
Item 2. C
Mat'l: Light



Item 10. Pushrod
Mat'l: Mild steel

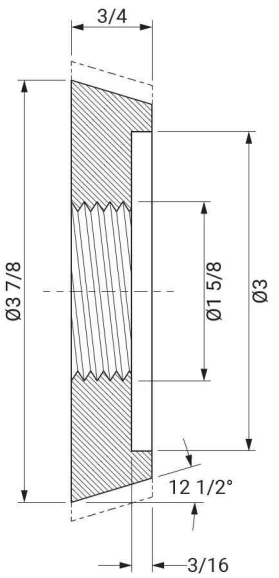
1 3/8

Item 12. P
Mat'l: Mild s

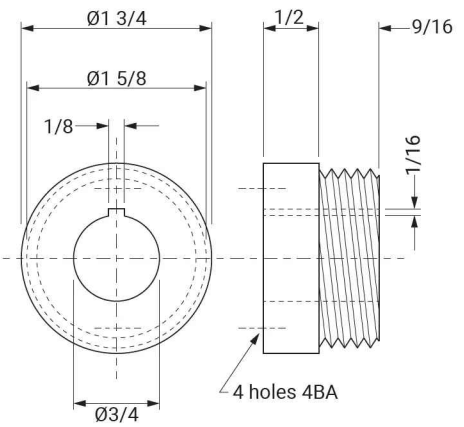


Item 9. Countershaft
Mat'l: Mild steel

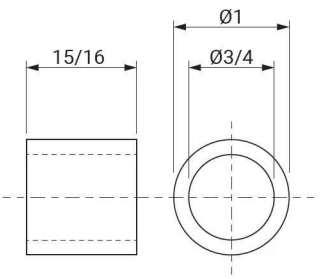
Clutch - Fixed Half
t alloy



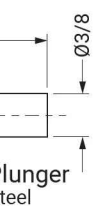
Item 3. Clutch - Sliding Half
Mat'l: Light alloy



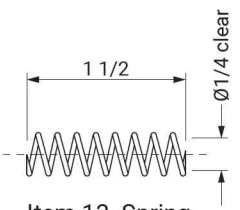
Item 4. Boss
Mat'l: Light alloy



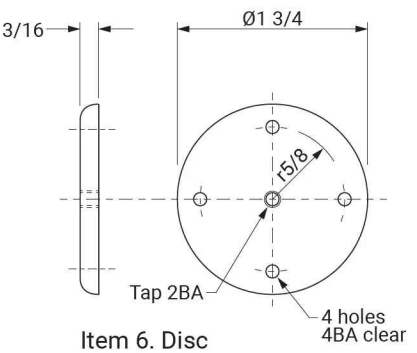
Item 5. Bush
Mat'l: Bronze/brass



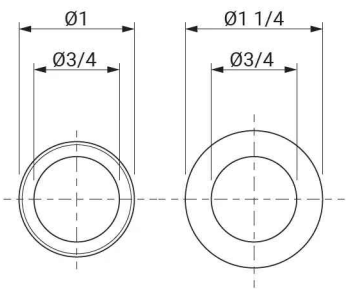
Plunger
teel



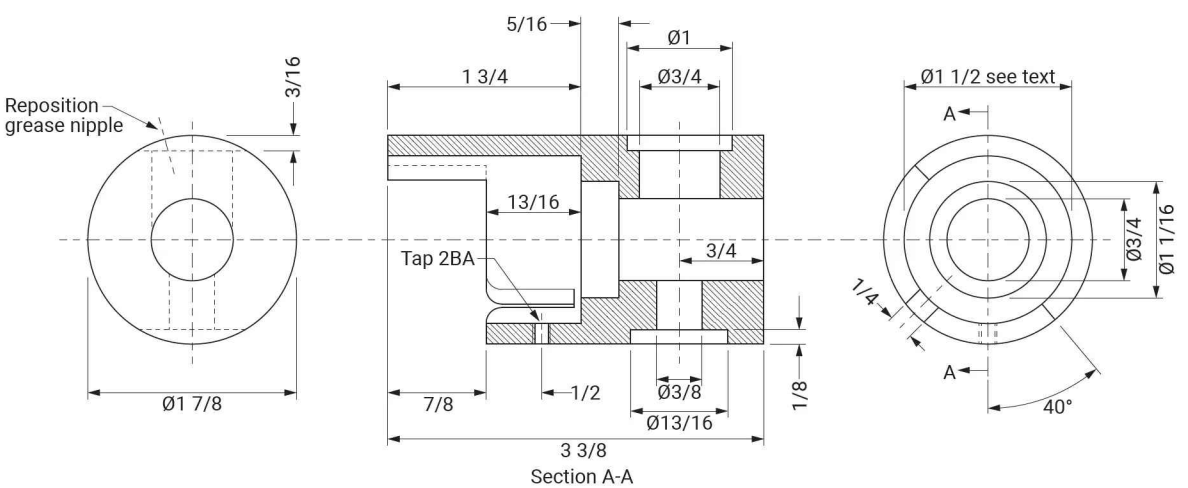
Item 13. Spring
16 or 18 SWG



Item 6. Disc
Mat'l: Mild steel



Item 7 & 8. Shaft Washers
Mat'l: 1 off mild steel
1 off fibre



Item 11. Thrust Block
Mat'l: Mild steel

A CLUTCH FOR THE M

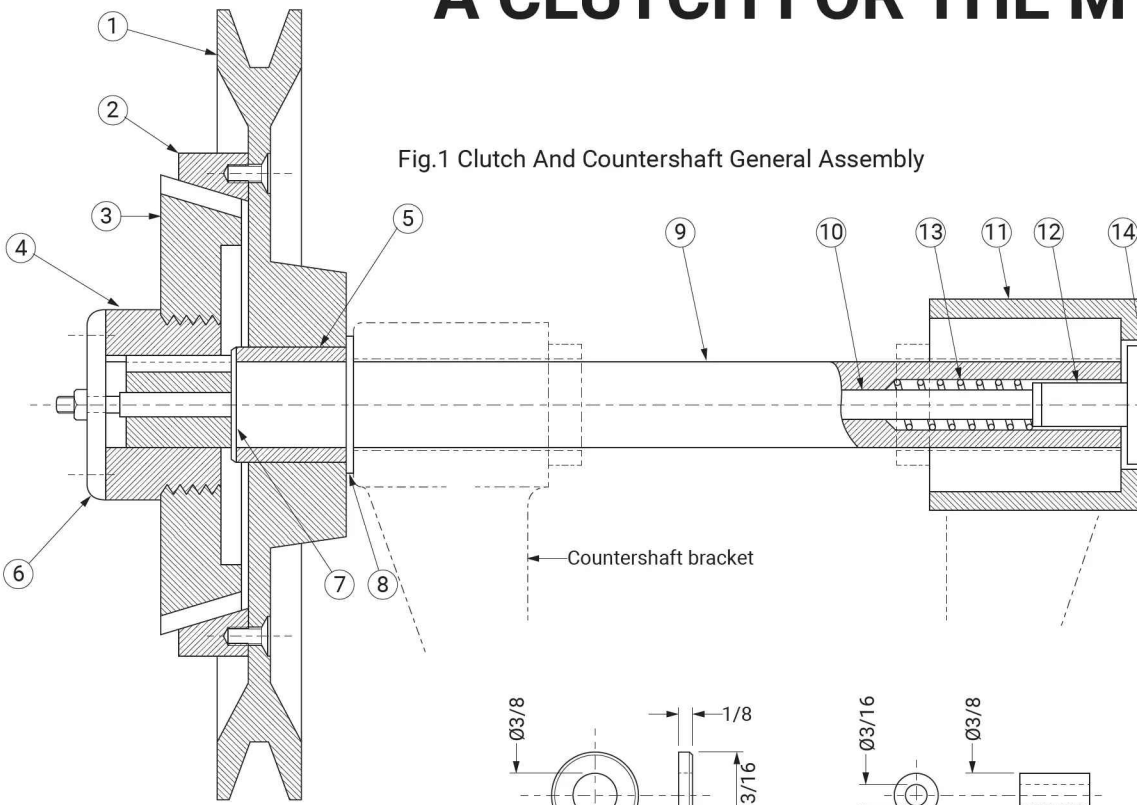
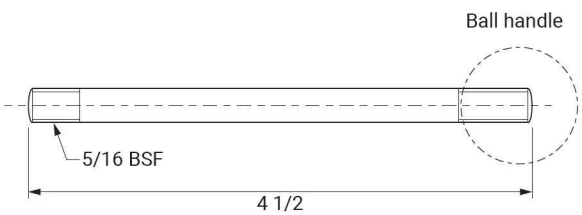


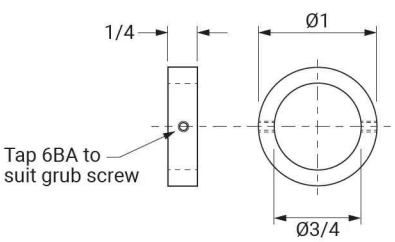
Fig.1 Clutch And Countershaft General Assembly

Washer
Mat'l: Mild steel

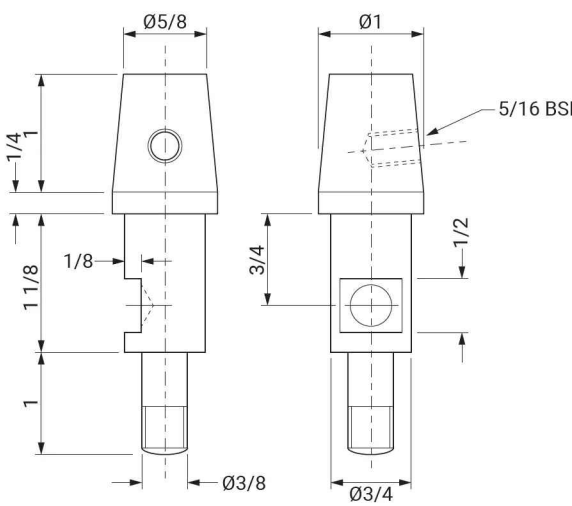
Spacers For Mot
Mat'l: Mild steel



Item 16. Lever Arm
Mat'l: Mild steel



Item 14. Thrust Collar
Mat'l: Mild steel



Item 15. Lever
Mat'l: Mild steel

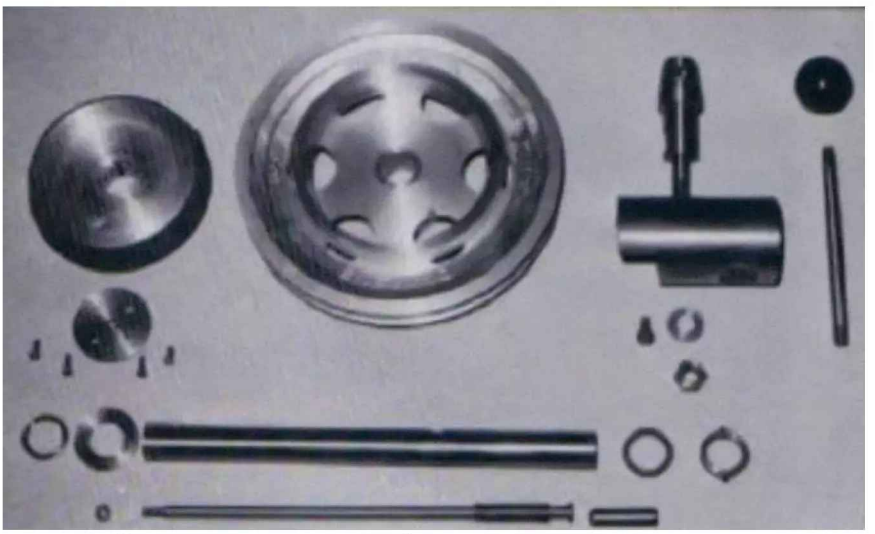


Photo 2: Complete components for the clutch assembly.

usual suppliers in the rather large diameter required here, but the available thickness is usually under and inch. So, our moving half-clutch is constructed with a separate boss. If you have the necessary thickness of material available, of course, it can be made from one solid blank. The other components are from materials which I can well believe are easily to hand or to be obtained. These are nearly all mild steel, with a short length of brass and a about a dozen screws. Finally, you will need to but or make a new 7-inch diameter driving pulley. (With some ingenuity you may be able to use the existing driving pulley. It would need very careful contriving, otherwise at some stage you are without an operational lathe for essential turning! It is simpler to have a new pulley available.) (One alternative might be to use a temporary wooden pulley – Ed.)

KEEPING THE LATHE IN SERVICE

We soon run up against the obvious question – "How do we make it and fit a new drive for the lathe while keeping the lathe operational?" We solve this by planning the operation carefully and by replacing the existing countershaft and driving pulley with new ones. I suggest that you first check the various dimensions of your own countershaft bearing bracket to see if they agree, more or less, with those that are shown in the plans. They probably will, but any normal variation can easily be accommodated because the design dimensions given here can easily be adapted to particular needs provided that all interdependent dimensions are given attention.

THE COUNTERSHAFT

Start with the new countershaft which has to replace the existing one. First trim it to length, face and centre-drill the ends then turn it between centres to the diameter of the old countershaft – ¾ inch I assume. You may be fortunate enough to have a suitable piece of bright, drawn mild steel which is true to size, in which case use it; but you must ensure that the ends are centred quite true. The next job is to put a 13/32" hole down the axis to a depth of a about 2 3/8". A fixed steady is a great help here as we now have to extend this hole ¼" diameter for the rest of the length of the shaft. You will probably find that your standard length of ¼" diameter drill will not be sufficient to get half-way along the shaft, so, having drilled as far as you can into the shaft from each end, you now proceed to make a 'flat' drill from a length of ¼" diameter silver steel.

If you have not improvised this type of drill before, it is quite straightforward. File two parallel flats on one end of the silver steel for a lengths of about one inch so that you reduce the end to a symmetrical flat about 0.1 inch thick. File the end to a 120-degree point just as in a standard twist drill, and 'relieve' the cutting edges and also the sides of the flat, very lightly, back from the cutting edges. Harden and temper the cutting point and finally grind or stone the cutting edges to be reasonably sharp.with this drill you can finish off the hole to be ¼" diameter for the remainder of the length. The holes are not too critical for size within a few thousandths of an inch but you should be as straight as you can achieve, so don't push the drill too hard!

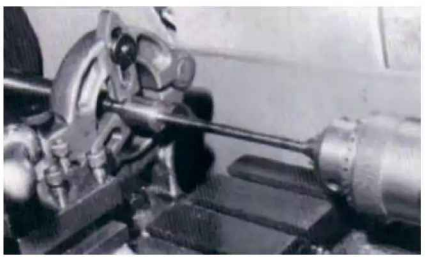


Photo 3: A long drill, improvised from silver steel, will complete the hole down the length of the shaft.

The craftsmen who made sporting guns and rifles had to get really true straight holes up the barrels, which they achieved by putting a D-bit of correct size through. The initial hole to permit threading of the D-bit shank through the barrel was drilled undersized and as straight as practicable. Final honing and adjustment gave a perfect bore.

Now finish off the countershaft by filing or machining two flats to accept the grub screws in the cone pulley.

THE CLUTCH BOSS

Strategically, the next piece to be made is the separate boss for the mating half of the clutch. This is turned, bored and threaded and trimmed to length in one setting, the bore being a good sliding fit on the new countershaft. Leave the keyway for later. The two halves of the clutch are not too large for a four-jaw chuck. The sliding part is machined first. Leaving the outside diameter, face both sides, face to length, recess 3/16" deep and bore to core diameter for the thread. Now cut the thread which should be a good fit to the boss already made. All being well you can now assemble the boss, fixing it firmly with adhesive on the cleaned threads. Caution! Do assemble the boss from the side opposite to the recess.

Set the top slide to about 12 ½ degrees clockwise and retain this setting until all the work on the cone angles is finished. It is advisable to complete the sliding part so, holding it in the chuck by the boss, set this up true to the bore and the face. Machine the conical face to the dimensions shown.

CLUTCH MATERIAL

I covered the conical face of the sliding part with some old leather belting and the dimensions shown are dictated by the thickness of the finished facing. The facng material need not be available in one continuous piece, you can use any available source of leather, which must be reasonably thick. Old belts, garden

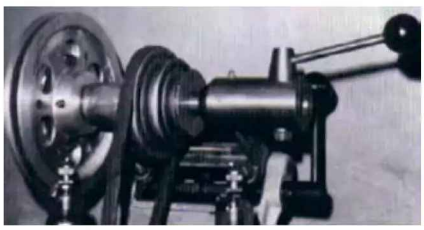


Photo 4: The clutch assembly on the countershaft bracket.

gloves or even discarded shoes can be cut into suitable strips, sufficient to cover the circumference of the moving half-clutch. The thicker the better, up to about 1/8" thick. It will all be machined to uniform thickness later on. It is secured to the metal by a good epoxy adhesive. When this is quite secure, this half of the clutch is set up truly concentric in the lathe, and the working face of the leather is machined true with a sharp tool.

Now chuck the blank for the fixed half-clutch, face both sides and bore out to about 3 ½". Using this internal diameter by which to hold it in the reversed chuck jaws, finish turn the outside diameter. It is a help here to anticipate the six tapped securing holes, so with a sharp pointed tool, scribe a circle 4 1/8" diameter on one face.

Now rechuck, holding it by the finished outside diameter, which must now run true. The scribed circle should be on the inside, next to the chuck face. Machine the conical mating surface and as you get near to size, check occasionally by offering up the mating face of the finished sliding half. Bear in mind that this must fit tightly into the fixed half and yet stand proud about ¼" to 5/16".

DRIVE PULLEY

You can now set up the new driving pulley, probably on the faceplate, so that the bore runs true. You will probably find that the boss is all to one side of the pulley. This must be machined on the face to give a total thickness of 7/8" for the boss. The diameter of the boss can be left 'as bought'. The bore is now opened out to 1" diameter to accept the brass bush. While it is set up, you can lightly score the pitch circle for the securing screws. Remove the pulley from the lathe, mark out and drill the six holes for the securing screws.

The brass or bronze bush for the pulley can then be turned to size. You may find it convenient to finish turn the outside diameter to be a firm press fit in the pulley but leave the inside diameter to be about two hundredths of an inch small. After fitting the bush

Photo 5: Driving pulley and 'fixed' half of clutch.

to the pulley, youc an mount the pulley on the faceplate so that the bore of the bush runs true. Finish the bore of the bush so that the countershaft is a nice running fit. An oil hole angled through boss and bush is advisable and in this connection, you will most probably find that your new driving pulley comes with a suitable hole already in the boss, threaded and complete with grub screw. Just remove the grub screw and continue the hole through the inside of the bush. A reasonable improvement here is to fit a grease nipple – as the driving pulley, when installed, will not be accessible for frequent oiling.

FITTING THE CLUTCH TO THE PULLEY.

We can now proceed to fix the half-clutch to the pulley and it must be concentric with the new driving shaft. So, insert the shaft into the pulley, assemble the clutch onto the shaft with the two halves together and slide it into contact with the pulley. Holding the assembly firmly, now mark through the holes in the pulley web to position two diametrically opposite holes in the clutch. Separate the clutch, drill and tap these two holes. Use these holes to fix the half-clutch to the pulley and you can now drill the remaining four holes in the clutch through the corresponding holes in the pulley. These are tapped and assembled. If you now put the driving shaft between centres with the pulley mounted on it you can check for concentricity.

You can now cut the keyways in the end of the driving shaft and in the boss of the clutch. The key must be firmly secured to the shaft. The keyway in the boss must be a nice sliding fit over the keyed shaft. A thin steel washer limits the end play of the assembly and runs against the end of the key. A circlip is not advisable in this position.

THE THRUST BLOCK.

The thrust block is designed to fit securely to the existing boss at the right-hand end of the countershaft bracket. You will probably find that the boss is reasonably cylindrical, so remove the grease nipple and clean off all the paint.

The thrust block must fit over this diameter quite closely. If your fit is right, the single clamping screw is enough to hold it in position under working conditions. The slot in the thrust block for the web and the cut-away portions are positioned angularly to bring the operating lever to a convenient working position. Make careful note of the present position of the grease nipple that you have removed and drill and tap a hole in the thrust block so that it registers with the grease hole in the boss. There is no need to dismantle anything else just yet.

The thrust collar is necessary to keep the countershaft positioned against the axial operating force. It is held in position by two short 6BA grub screws as the simplest method of assemble. These screws can only be 3/32" long, as they must not protrude above the thrust collar when assembled. If you prefer a circlip, this can be accommodated. The fibre washer reduces the possibility of wear at the rubbing faces. The spring provides the axial force to engage the clutch. It must slide easily over the1/4" diameter push rod and inside the 13/32" diameter bore., so it needs to be very little more than 3/8" outside diameter. If you have to make it, try winding 16 or 18 gauge piano wire over a 3/16" diameter mandrel.

ADJUSTMENTS AND ASSEMBLY.

It is essential that there is some provision for adjustment of the clutch and this is achieved quite simply. The disc securing the push rod to the boss of the clutch by means of four screws is threaded to receive the push rod which has a slot in the end. Rotating the rod my means of this slot moves the clutch relative to its mating half, the locking nut being tightened when correct adjustment is achieved. When all components are ready, we can proceed to dismantle the existing countershaft. The cone pulley is held to this by two screws which need an Allen key. Things are much easier if you first remove the belt guard.

Proceed to assemble items on to the new countershaft from the right-hand end. First the thin steel washer, then the new driving pulley with half-clutch attached, followed by the second thin steel washer. Thread the shaft into position in the bracket bearings, not forgetting to assemble the cone pulley the right way round!

Photo 6: The thrust block.

Photo 7: Thrust block with operating lever assembled prior to final mounting.

Remember also the driving belt and the two rubber collars which are part of the belt guard assembly. Assemble the fibre washer and finally the thrust collar on to the end of the shaft – with plenty of grease! Now thread the spring onto the end of the push rod and slip tis into the hole down the countershaft, well-greased, followed by the thrust plunger.

We now have to fit the thrust block which should be complete with operating lever and plenty of grease. With the clamp screw lightly assembled and the lever in the drive position, slip the block over the bracket boss. It will go most of the way without undue resistance. Now brace yourself and push really hard to get the block as far as it will go against the resistance of the spring, which should be up to the end of the boss. Tighten the clamp screw.

The screwed end of the push rod will now extend beyond the end of the shaft. Slip on the sliding half-clutch, screw on the disc and fix the disc to the clutch by means of the four screws. You can now check that the clutch engages and disengages, making any adjustments by means of a screwdriver in the end of the push rod; any tendency to slip under power can be corrected in this way. Then tighten the locking nut.

Photo 8: The two mating halves of the clutch.

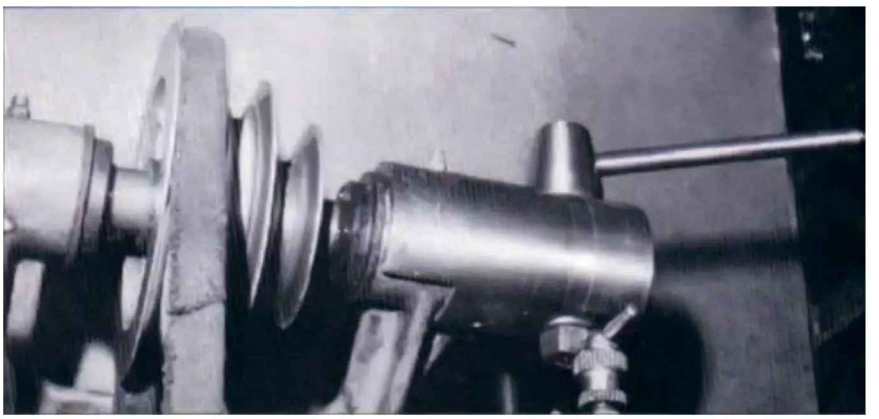


Photo 10: The thrust block fits over the boss of the existing countershaft bracket.

MODIFYING THE GUARD.

Now hold on! You haven't finished yet. The clutch takes up more room than your previous drive and will foul the motor belt guard, which therefore needs modifying. For this you will need to make three cylindrical spacers about 3/8" diameter and about ½" long. Remove te motor belt guard and remove the three 2BA screws holding the flat plate to the inside of the guard, now reassemble with a spacer on each screw under the plate. The fixing boss on the side of the guard is now lengthened by another short spacer which can be secured to the face of the boss by epoxy adhesive. Fix the guard back into position and check that is has sufficient clearance.

USAGE

Any accumulative wear on the clutch is very gradual so it should stay in adjustment for a long time once you have set it. Any subsequent adjustment is quite simple, requiring only a screwdriver and 2BA spanner at the clutch end of the push rod.

It is advisable, as always, to keep shaft bearings well greased. The driving pulley may well be required to idle for intermittent periods over long working sessions so keep it well greased or oiled.

With a clutch you will find that your work speeds up and is very much more convenient – with much less stress on motor and switchgear!

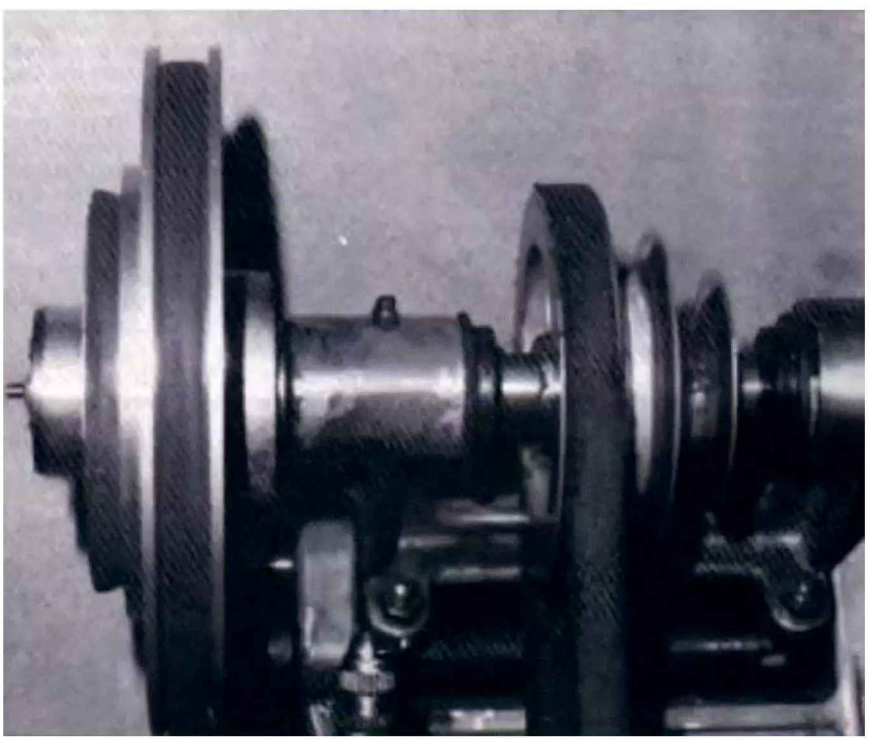


Photo 9: The new clutch takes up little more space than the old drive.

Club Diary

Please send your events for Club Diary to meweditor@mortons.co.uk

2026

EVERY SUNDAY

Urmston & District MES
Public Running every Sunday Contact: secretary@udmes.co.uk

Warrington MES
Running day. Contact : contact@wdmes.org.uk

Wakefield SMEE.
Public running day. Contact Denis Halstead 01924 457690

MARCH

18 Leeds SMEE
Judith Bellamy - Keynan Railways (Nairobi Railway Museum). Darrington Golf Club, 7pm.

21 Gauge 1 Yorkshire Group
Running day at Drax Power Station social club, 9:30 - 15:30. Contact secretary@gauge1north.org.uk

22 Stafford & District MES
Steam up, County Showground, Stafford, 10:00 am. See www.sdmes.co.uk or Facebook.

22, 29 Bristol SMEE
Public Running day, Ashton.

APRIL

1 Leeds SMEE
Ian Sparks - Day with Rocket. Darrington Golf Club, 7pm.

5, 16, 19 Bristol SMEE
Public Running day, Ashton.

8 Saint Albans and District MES
Auction with auctioneer Guy.

19 Stafford & District MES
Steam up, County Showground, Stafford, 10:00 am. See www.sdmes.co.uk or Facebook.

19 Bradford Model Engineering Society
Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

MAY

3, 4, 24, 25 Bristol SMEE
Public Running day, Ashton.

6 Leeds SMEE
Jack Salter - What I Did last Summer. Darrington Golf Club, 7pm.

9 Bromsgrove SME
Bromsgrove SME will be hosting the Polly Rally. Contact Richard Taylor 01905 779688.

17 Bradford Model Engineering Society
Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

23-24 Bradford Model Engineering Society
Event at Bradford Industrial Museum

JUNE

5-7 Cardiff Model Engineering Society
34th Welsh Locomotive Rally Heath Park, rally@cardiffmes.com.

7, 14, 28 Bristol SMEE
Public Running day, Ashton.

10 Saint Albans and District MES.
Puffing Field, depending on weather. Alternate July

13-14 Rugby Model Engineering Society.
Sweet Pea Rally, To be held at Rainsbrook Valley Railway.

20-21 South Cheshire Model Engineering Society LittleLEC annual locomotive efficiency competition, Willaston, near Nantwich. littleLEC@gmes.org.uk.

21 Bradford Model Engineering Society
Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

JULY

4 Bromsgrove SME
Bromsgrove SME will be hosting a Moden Traction Open Day. All gauges welcome 5", 3.5", 2.5", Gauge 1 and 16mm. Contact Doug Collins 07585 524836.

5, 26 Bristol SMEE
Public Running day, Ashton.

8 Saint Albans and District MES.
Puffing Field, depending on weather. Alternate July.

18 Nottingham SMEE
Miniature Diesel Locomotive Gala. For enthusiasts of both battery and petrol-powered diesel locomotive models in 7¼, 5-inch and 3½-inch gauge. You must book in advance with Rob Buxton – buxton845@gmail.co.uk or 07837 272650.

19 Gauge 1 North
Live steam on the Ridings track, traders and society stands North, Agriculture and Business Centre, Bakewell. Contact: secretary@gauge1north.org.uk

19 Bradford Model Engineering Society
Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

AUGUST

2, 30, 31 Bristol SMEE
Public Running day, Ashton.

16 Bradford Model Engineering Society
Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

SEPTEMBER

5 Bromsgrove SME
Bromsgrove SME will be hosting the Rob Roy Rally plus other 3.5" friends all welcome. Contact Doug Collins 07585 524836.

13 Bradford Model Engineering Society
Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

13, 20 Bristol SMEE
Public Running day, Ashton.

26-27 St Albans and District Model Engineering Society
The BIG St Albans Model Show.

OCTOBER

3 (TBC) Bradford Model Engineering Society
Visitors Day. BMES welcomes members and their locomotives from other societies to Northcliff for breakfast & lunchtime butties. Let Russell know in advance, please: Russ Coppin, 07815 048999.

11 Bradford Model Engineering Society
Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

The Melbourne Society of Model & Experimental Engineers presents our

100TH YEAR CELEBRATION 2026

SATURDAY 3RD - SUNDAY 4TH OCTOBER 2026

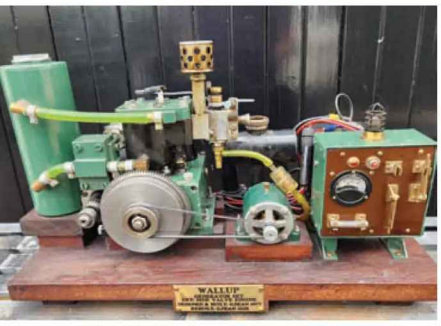
SOUTH OAKLEIGH COLLEGE, BAKERS RD, SOUTH OAKLEIGH, VICTORIA, AUSTRALIA

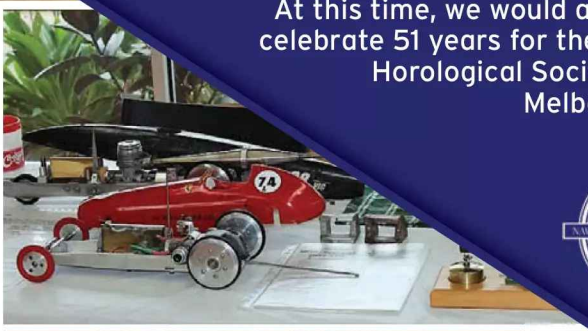
This year we invite you all in celebrating Melbourne Society of Model & Experimental Engineers Centenary 100th Anniversary! To mark such a historic event, our exhibition will be hosted over two full days, back to back. We hope to see you there.

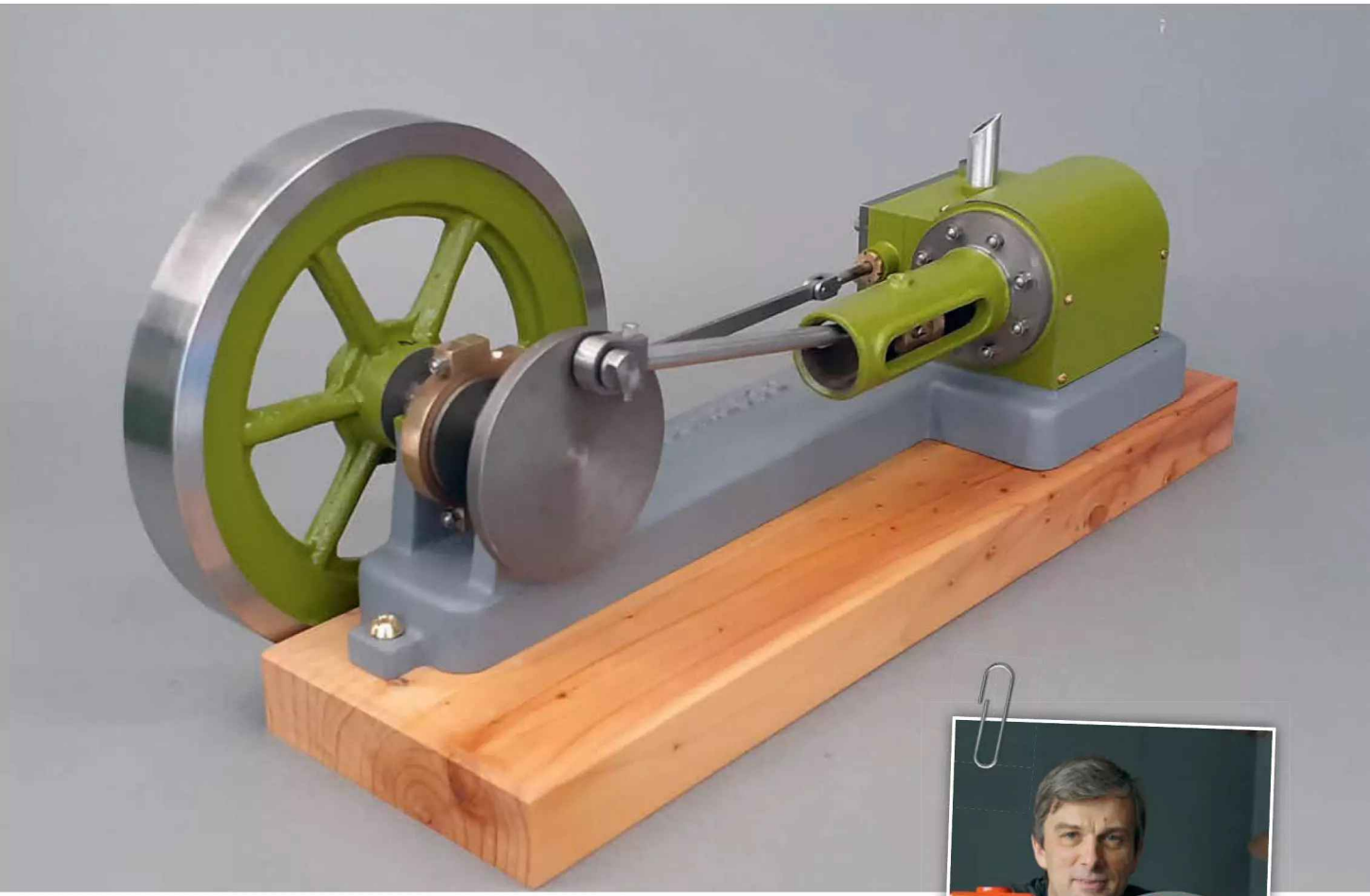
Use our website to get in touch if you'd like to exhibit models from past club or family members. As for our centenary, we hope to feature earlier work alongside today's latest creations.

To keep up to date with further information, visit our website or Model Engineer & Workshop's website.

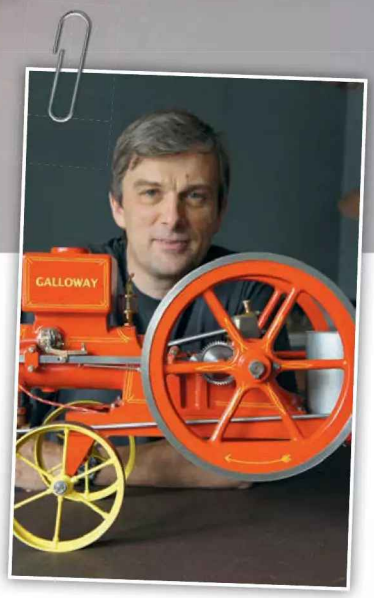
At this time, we would also like to recognise and celebrate 51 years for the Australian Antiquarian Horological Society and 42 years for the Melbourne Meccano Club Inc.







The Clarkson 24x38 Horizontal PART 2



Jason Ballamy tackles the crankshaft and cylinder for this stationary steam engine with beginners in mind.

MAIN BEARINGS

For engines of this size and the small amount of use that most are likely to get I do not feel it is worth making split bearings, which simplifies things quite a bit. With some bronze bar mounted in the lathe, face the end, spot drill, drill 7.8mm and the ream to the final 8mm diameter. Using a small sharp parting tool the 10mm waist can be created by making a series of overlapping plunge cuts to say 10.1mm diameter and then bring it down to final size by moving the cutter side to side as the tool is fed in. The same parting tool can then be used to part the bearing from the parent bar, stop part way through and use a fine file against the rotating work to remove any burrs before completing the parting cut. Lastly remove any burrs from either end of the hole, **photo 13**.

Photo 13: Completed bearing ready to be parted off

CRANK DISC

Hold in the 3-jaw chuck with the flat side facing out and projecting approximately 5mm from the chuck jaws so that sufficient can be turned to diameter and a facing cut taken - just enough to clean up the face. The other side can now be tackled, if you have soft jaws then make use of them. If not use some packing or parallels between the part and the chuck face to ensure there is no wobble (remove packing before switching on). Face off the casting and then form the 1.5mm projecting spigot. Spot drill, drill 5.8mm and ream 6mm, **photo 14**. Don't worry about the overall thickness at this stage it can be done later.

Clamp the disc to the mill table with its central hole over a tee slot and locate it centrally under the spindle. Then move sideways (along the line of the slot) 19mm and spot drill 3.3mm and tap M4.

Photo 14: Reaming crank disc after turning

CRANK SHAFT

This can be made from Precision Ground Mild Steel (PGMS) or silver steel as they will be closer to 8mm than bright drawn bar. Face the ends to bring it to 80.5mm and then turn the 6mm diameter spigot to a length of 5.5mm using the hole in the disc to gauge the final diameter. Aim

Fig 5

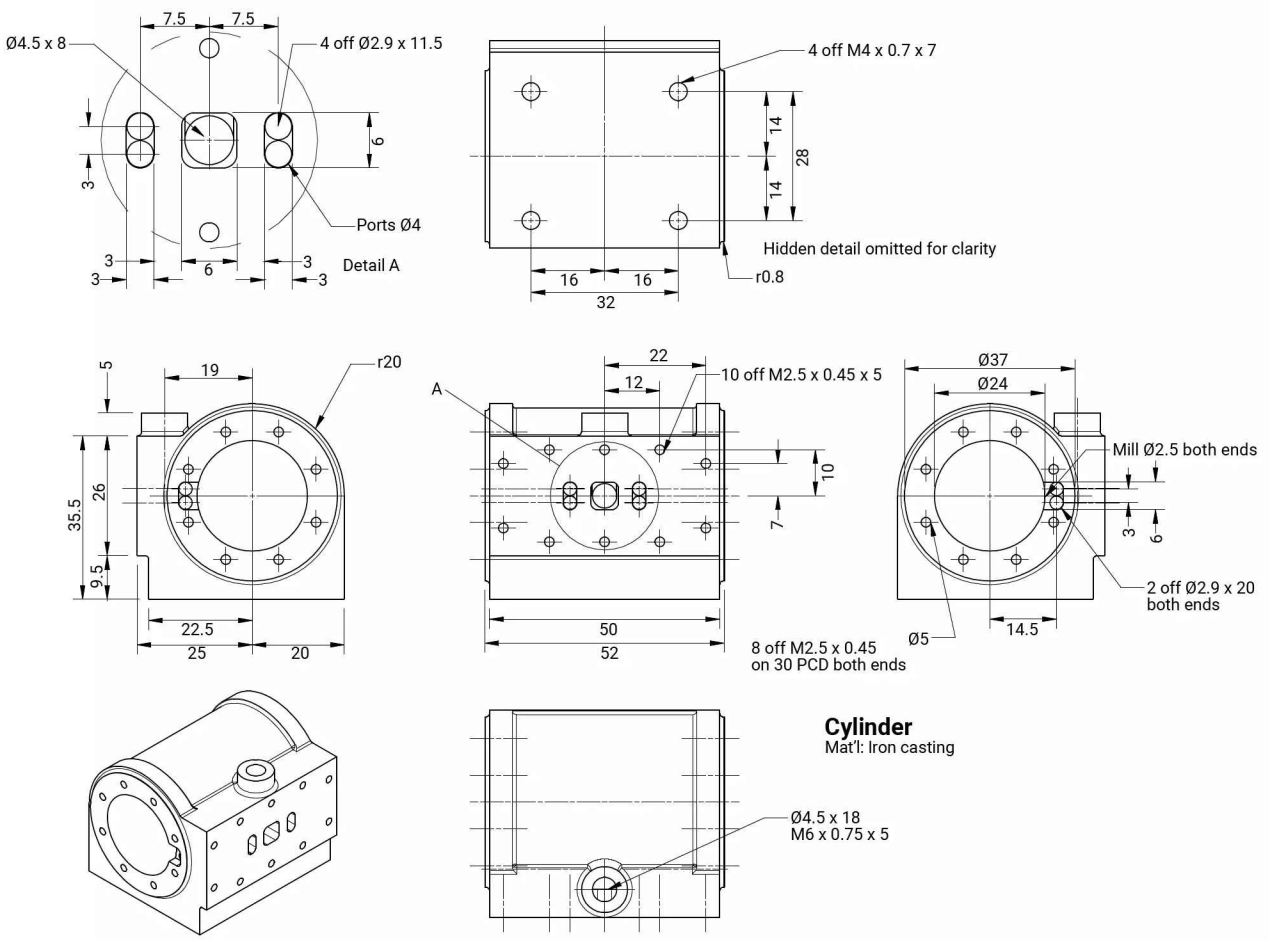


Photo 15: Checking fit of crankshaft spigot in crank

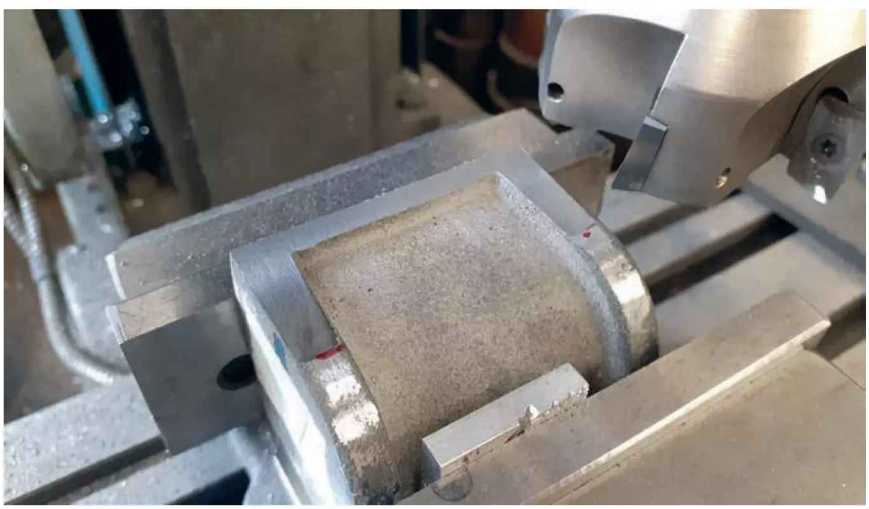


Photo 16: Squaring edge of cylinder upto centre height

for a push fit which is one that can be assembled by hand but is close enough that the disc won't slide off the spigot, **photo 15**.

The shaft and disc can be Loctited together, No. 638 will do and once set the shaft can be held. Preferably in a collet, but the 3-jaw will do, to enable the disc to be faced back to its final thickness. This ensures that the flat face runs true to the shaft even if there was a bit of play in the fit of the joint.

Light cuts and a sharp tool is the best approach as it is a large diameter on a small shaft.

CYLINDER

This is the most complex part of the engine and there is a lot on the drawing but break it down into stages and take your time.

After a quick clean up with an old file, spend some time checking the casting over to establish where metal will need to be removed. It helps if the centre of the bore can be marked temporarily, aim to get it concentric with the curved outline of the casting. With that done hold the casting in the vice with the bottom surface against the fixed jaw, aluminium packing against the other and take a skim off of the valve face, just enough to clean it up for now. Then put the port face against the fixed jaw and take a cut or two off the bottom. Lastly with bottom against the fixed jaw, port face against the bottom of the vice, take just enough off the other side of the cylinder to remove the draft angle up to the centre height of the cylinder, **photo 16**.

Now that some parallel and square surfaces have been established the marking out proper can be done. With the casting upside down and the port face against an angle plate or 1-2-3 block mark a centre line 20mm up on the end that will face the crankshaft, **photo 17**. Another centre line can then be marked at the same 20mm setting while the casting is held port face up. With a dot punch lightly punch where the two lines cross and inspect to ensure the mark is accurate, if so, make the punch mark heavier. If it is not quite right, then tilt the punch and hit it again until you have pulled the mark to where it should be.

The cylinder can now be held in the lathe's 4-jaw chuck and the punch mark set to run true. Make sure to use a tri-square held against the chuck face and the machined edges of the casting to ensure they are square, **photo 18**. The bore can now be opened up with a series of drills, I went with 6, 10, 15 and 20mm which will give access for a boring bar to complete the bore to the required 24mm diameter, **photo 19**.

Mark approximately where the middle of the casting is length ways and then face off the end of the casting 26mm from that. Then with a tool that has a small radius to the tip, face back a further 1mm to leave a raised circle of 37mm for the cylinder cover to sit

Photo 17: Marking centre of bore

Photo 18: Clocking cylinder centre true in 4-jaw chuck

Photo 19: Boring cylinder

Photo 20: Facing end of cylinder with radius tool

Photo 21: Cylinder base ready for final cut

Photo 22: Drilling and tapping cylinder base

against, **photo 20**. Reverse the casting in the chuck and set the bore to run true again. Face to the overall 52mm length and, as before, form the 37mm diameter end by partially facing off another 1mm.

Moving back to the mill, support the casting with a bar through the bore and packed up at each end so the casting just clears the bottom of the vice. Starting with the port face against the fixed jaw machine the bottom back to final size, I had 0.72mm left to come off which was just enough to remove the cast recess, but it does not matter if some remains, **photo 21**. Repeat with the bottom against the fixed jaw so that the port face can be finished and lastly reposition so a cut can be taken to clean up the top of the exhaust boss.

With the main machining complete a start can be made on some of the various holes the first of which are the four M4 holes in the bottom. Locate the lengthways centre of the casting and the far (non-port) side and set the holes out from there firstly spotting, then drilling 3.3mm and tap M4 preferably using the mill's spindle to guide the tap vertically into the hole, **photo 22**

Next with the port face upwards establish the lengthways centre line and another 22.5mm up from the bottom and then set out the ten M2.5 holes for the studs that hold the valve chest in place from there. The central 4.5mm

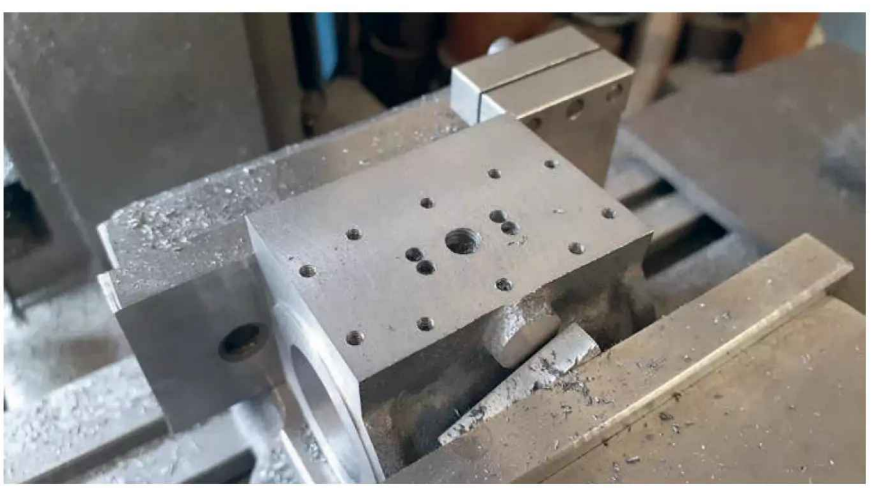


Photo 23: Stud and passage holes drilled in port face

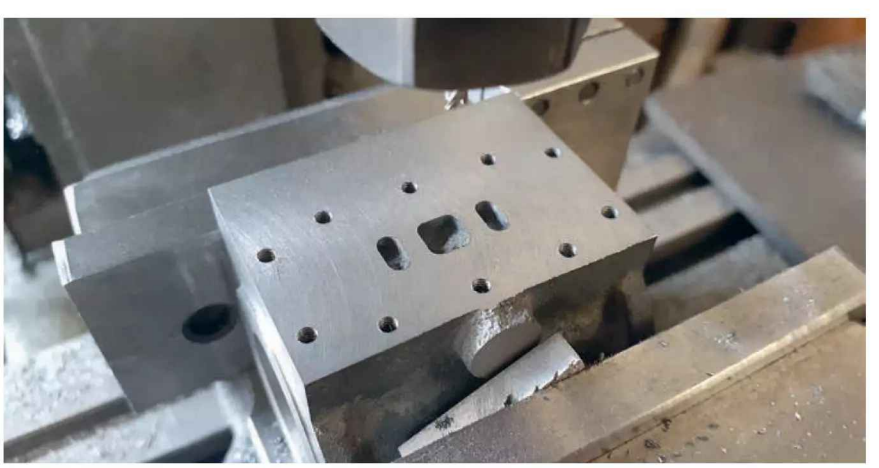


Photo 24: Ports milled to final shape

Photo 25: Cylinder ends drilled, tapped and milled

Photo 26: Lapping cylinder with Emery around a tube

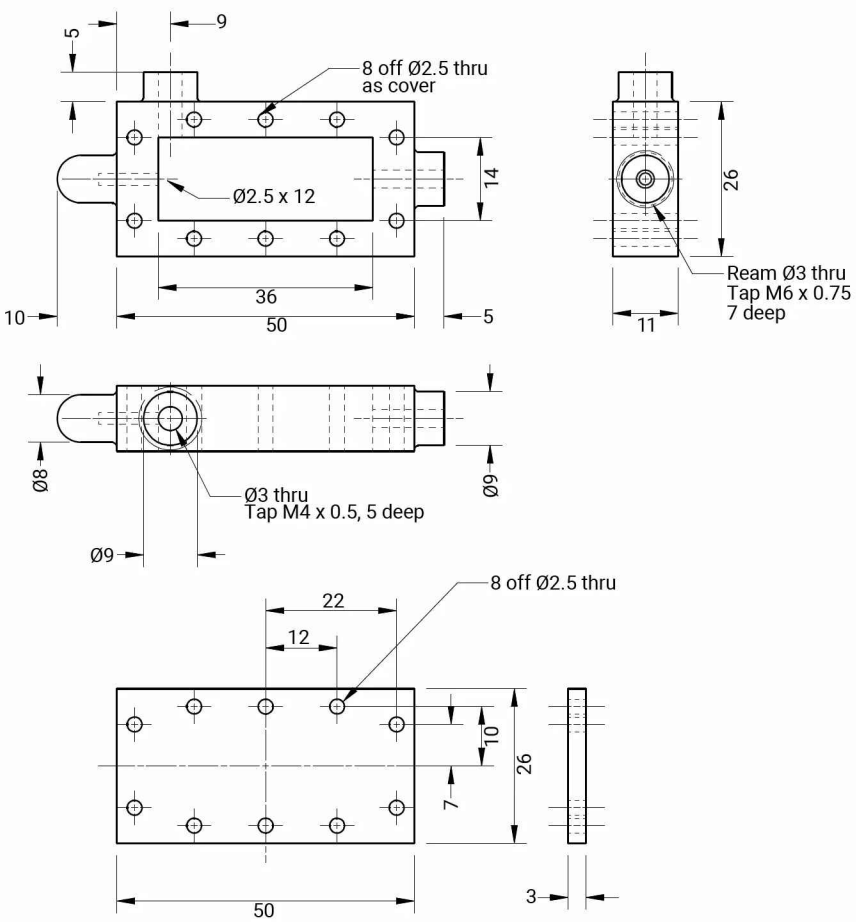
hole and the four 2.9mm holes can then be drilled to depth, make sure not to go deeper and break into the cylinder bore, **photo 23**. Changing to a 3mm milling cutter mill the two inlet slots and the square that forms the exhaust port, **photo 24**. While still held in this position the rebate below the port face can be cut to bring it back so that it lines up with the edge of the cast pad on the base. If you have a milling cutter with a 1mm convex corner that can be used to leave a fillet for that 'cast' look, if not a normal flat ended one will do.

With the cylinder stood on end, locate the centre of the bore and spot, drill and tap the eight stud holes as well as drilling the two 2.9mm steam passages to meet those drilled from the port face. Use a 3mm cutter to mill a recess to link these two holes to the main bore. Turn the cylinder the other way up and repeat, **photo 25**. Lastly drill and tap the exhaust hole. I have specified M6 x 0.75 but anything around that size to suit your connections can be used such as 1/4" x 32 or 40 tpi ME thread.

The last job on the cylinder casting is to lap or hone the bore. A brake cylinder hone will just about fit the bore or a piece of emery cloth wrapped around a wooden dowel or a tube will do. Cut a slot in the tube/dowel and slip the emery into that which will grip it once wound around the tube. The diameter can be adjusted by the length of emery cloth used and fine-tuned by adding a layer or two of paper under the emery, **photo 26.**

To be continued

Fig 6



Valve Chest, Cover And Gland

These articles by Geometer (Ian Bradley) were written about seventy years ago. While they contain much good advice, they also contain references to things that may be out of date or describe practices or materials that we would not use today either because much better ways are available of for safety reasons. 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 practiced in the past.

Beginner's Workshop

CENTRES and TAPERS

GEOMETER tells how to achieve accuracy of work between centres

THE ACCURACY OF WORK machined between centres on a lathe depends in large measure on truth and alignment-of the centres. If 'the live centre is not running truly the work will be machined eccentrically? and if the centres are out of alignment the work will reveal a similar divergence from truth-usually as taper where parallelism is desired.

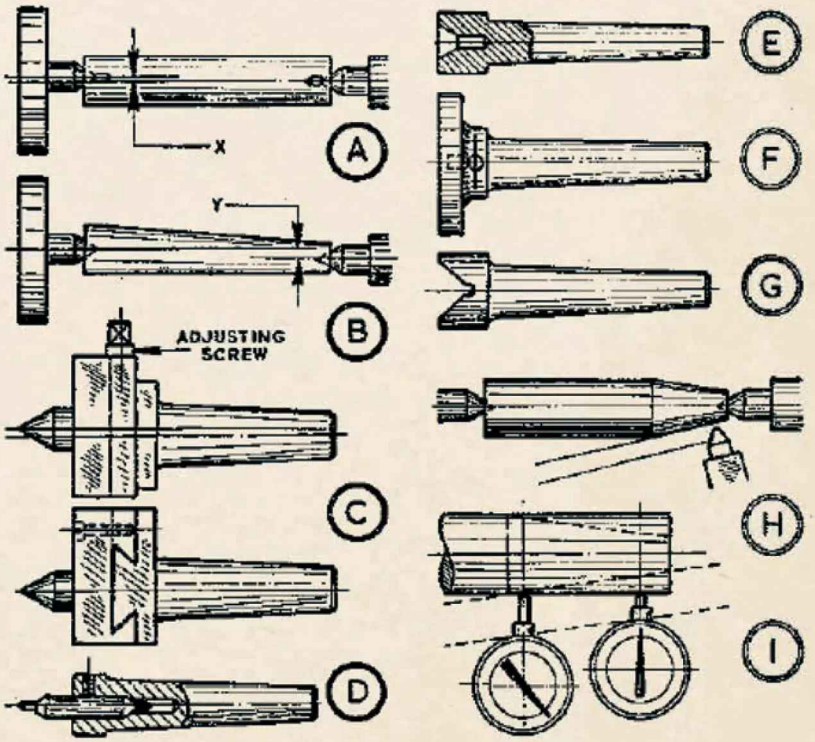
On a dead-centre lathe, or between-centre-grinder, both centres are stationary and the work is automatically concentric about the centres on which it revolves. On a lathe, however, where the spindle centre is running, truth at this point is important. Should this centre wobble *A* to the extent X, the work will be circular but eccentric; and with the work reversed on to the tailstock centre the wobble becomes evident.

This can be guarded against by grinding the angle of the centre with it running in the spindle, then fitting in the original position; or a soft centre can be used here-good quality mild steel or cast steel-and lightly machined before use when necessary. As there is no movement of the work on this centre it neither wears nor needs oiling.

Tapering work *B* occurs as a result of the centres being out of alignment with the main guideways of the bed, usually because of inaccuracy of the tailstock setting Y. This may be overcome by truing or setting over the tailstock, taking light cuts on the work to test' the effect and ensure parallelism before' the work reaches finished size.

In this connection it is not unusual for inaccuracy to be more marked at certain extensions of the tailstock barrel, or to vary with the degree of force used in clamping the barrel in the tailstock. Moving the tailstock on the bed can also affect alignment and call for re-truing the setting.

For such cases-occurring mostly on older type or worn lathes-an adjustable centre, C, is invaluable. This incorporates a small slide and adjusting screw by means of which the centre can be regulated sideways independent of the tailstock. Very slow tapers can be machined with the centre (or tailstock) deliberately set over.



A centre drill for use from the tailstock can be mounted in a holder D. Mild steel is turned taper on the outside to fit in the lathe spindle, then centred with a pointed tool and drilled from the tailstock to take the centre drill tightly-a grubscrew being used for holding. In the absence of other means of extraction flats can be filed on the holder to turn it with a spanner.

A hollow centre *E* can be similarly made. Such a centre is useful for drilling in a lathe when for any reason the drill cannot be held in the tailstock chuck. Instead a carrier is fixed on the drill to prevent it from turning. The drill is then held by the carrier, shank end into the hollow centre, and the cutting end applied to the work revolving in the chuck-feed being put on by the tailstock.

Except when drills are small speed should not be too high; and if there is any possibility of the drill becoming unmanageable, the leg of the carrier should be supported on the slide rest, or a piece of tubing should be slipped over it to maintain a better hold.

A flat or pad centre *F* can be made from a shank brazed or welded into a mild-steel disc. Then the shank is fitted in the spindle and the front of the disc faced true. This centre can be used for squaring work endwise in the chuck or for drilling flat material with the drill running in the chuck. A V-centre G can be used for cross-drilling round material.

For machining tapers the topslide is set over H for the tool to move parallel to the taper. On parallel material I, using an indicator and knowing the taper per inch in thou, a setting can be obtained by feeding the topslide 1 in. for the variation in reading to be seen. ❑

An Orenstein and Koppel Regulator

Edward Draper has been bringing a 1914 narrow gauge locomotive back into running condition.

My 60cm gauge steam locomotive, O&K No 7529, of 1914 is reaching the end of an overhaul from derelict condition that has taken twenty years to date. It is rated 50 HP and will weigh about 9 tons all up. I anticipate it hauling trains on the Golden Valley Light Railway (www.gvlr.org.uk). I am writing this because I am an occasional purchaser of your magazine, and cannot help but feel that the subject of regulators will never end its run!

This loco has many features that allow it to claim far superior quality over the standards of contemporary British locos, I'm afraid, although it equally possesses one or two curious features. Adjustable wedges for the axleboxes, good. (Yes, really, on a little industrial 0-4-0 in 1914). Backhead completely clad - good, especially on a hot summer day. 'Inside out' expansion link and dieblock - not so good. Cylinders bolted direct to the well tank - not at all clever. I'm considering isolating the front half of the tank.

What looks like a marvellous feature is the design of the regulator, when compared with the standard British practice, which in this size was almost invariably a stiff slide valve (and also in many of much larger size). I hope I can satisfactorily describes its action, with 3 different valves in series with each other. I have high expectations of it being a dream to shunt with.

Incidentally, the loco can be seen working in a film made in the early 1960s, if you search YouTube for "Chemins de fer disparu 24". It worked for about 50 years in a sand quarry at Nemours, south of Fontainebleau, France. It arrived in the UK in late 1967, and whilst I am the fourth UK owner, I am the first to do anything with it.

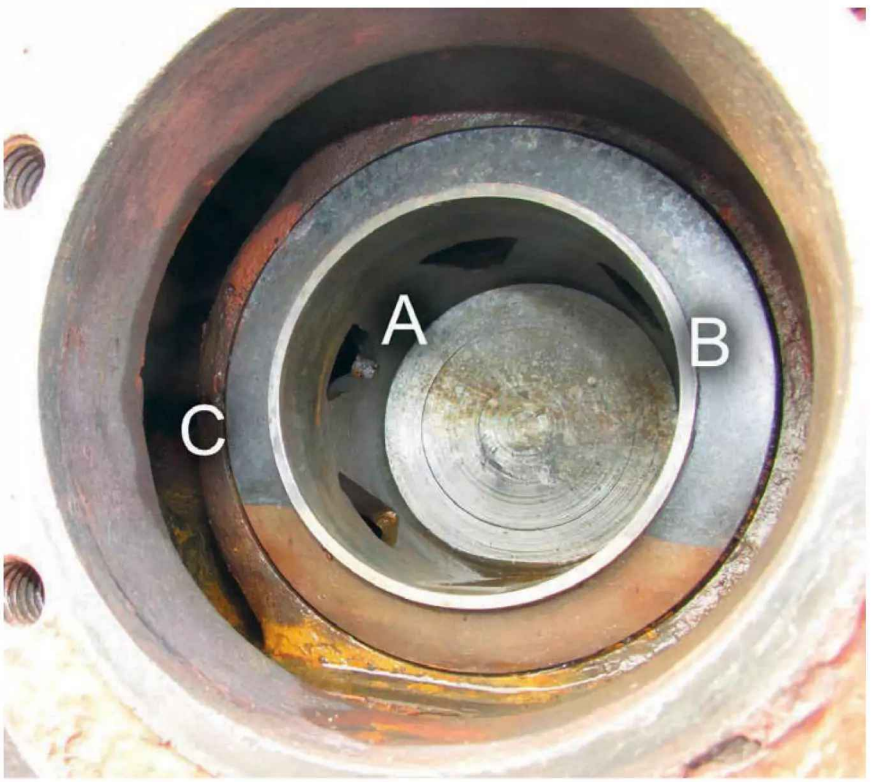


Photo 1: Main housing from the operating spindle end. A – Tapered ports leading to main steam pipe. B – Main steam shut-off valve seat. C – Steam inlet from boiler.

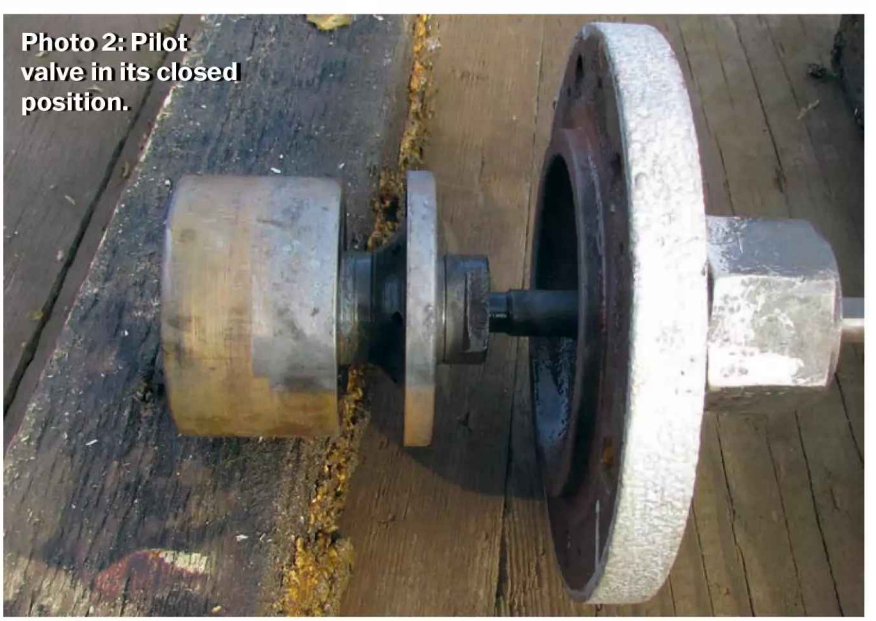


Photo 2: Pilot valve in its closed position.

ORENSTEIN & KOPPEL REGULATOR FOR BOILER PRESSURE OF 12 KG / SQU CM (11.77 BAR, 170.7 PSI).

The regulator is attached outside the right-hand side of the dome and is operated by a horizontal pull rod from a

lever with rack and pinion in the cab. To put these pictures into scale, the cover is held on by six 9/16" whitworth studs.

THE HOUSING.

Steam enters from the side of the dome into the outer chamber at the spindle end, from the port on the left (A) in **photo 1**. It exits to the main steam pipe to the cylinders via the tapered ports which are progressively opened by the piston valve after the main poppet valve has opened. This has the beneficial secondary effect of avoiding most of the throttling and consequent erosion occurring at the main poppet valve seat.

MOVING PARTS.

The main poppet valve has a large area, so would require excessive force to operate it and hold it partially open. However, since the majority of the throttling takes place at the piston valve downstream of the main poppet valve, once the poppet valve is open, the pressure is nearly equal on both sides of it, even for a small opening. In order to achieve balanced pressure across the main valve before it is opened, a pilot poppet valve is located at its centre, and this is shown closed in **photo 2** and open to the full extent in **photo 3**. Further movement of the operating rod to the right opens the large valve and then starts to uncover the tapered side ports. The part of the main valve poppet within the pilot valve is drilled through with multiple small holes to allow steam from the open pilot valve to pass to the downstream side of the main valve and balance it.

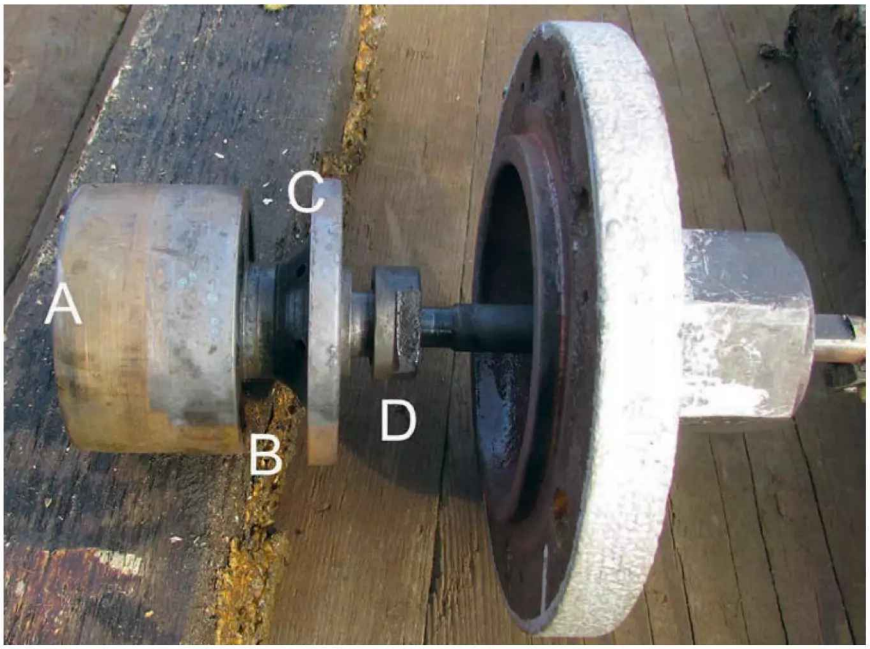
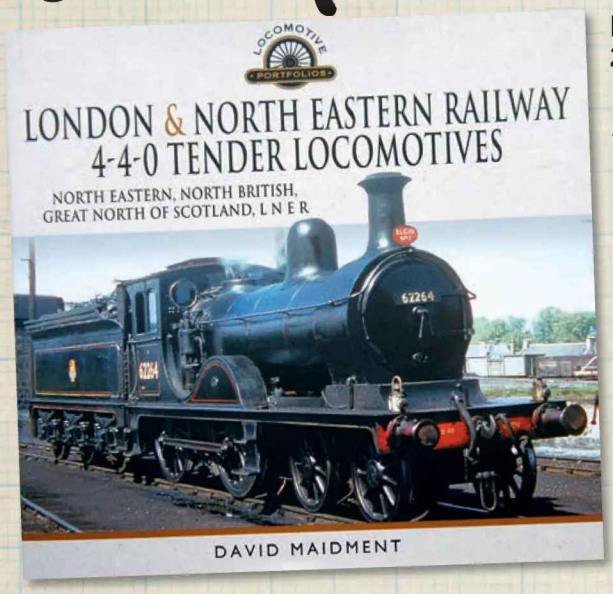


Photo 3: Pilot valve in the full-open position. A – 'Steam edge' of piston valve. B - Steam passages through piston valve. C – Seat of main poppet valve. D – Pilot valve head fixed to spindle.

Book Review

London and North Eastern Railway 4-4-0 tender locomotives: North Eastern, North British, Great North of Scotland, LNER. (Locomotive Portfolios Series), by David Maidment.

Pen and Sword Transport. 2025. Hardback. 238pages. £35. ISBN 978-1-39903-684-9



This book is the second volume in the author's account of LNER 4-4-0s and has a strong Scottish flavour. It starts with biographies of railway engineers responsible for this range of locomotives. Of these, Wilson Worsdell was one of the most distinguished of the pre-grouping era as Locomotive Superintendent of the North Eastern Railway from 1890 to 1910.

Locomotive evolution is described for each company with copious photographs, some in colour, and many taken in Scotland mostly drawn from the Manchester Locomotive Society collection. Visually the GNSR 4-4-0s were striking with notably tall chimneys. There is little engineering detail, a disappointment but the author has admitted elsewhere that he is not an engineer. Instead we have details of shed allocations, and logs of various runs which are surely now of specialist interest.

Later LNER designed D49 *Shire* and *Hunt* classes added to the total of 920 4-4-0s inherited at the Grouping. Unlike most earlier designs these had outside cylinders and valve gear, the *Hunt* class having rotary cam operated poppet valves, unusual for this wheel arrangement. If it seems odd that the LNER, best known for Pacifics, had so many of this wheel arrangement, many Scottish lines such as the Waverley route needed engines with lower axle weights.

Four ex-LNER 4-4-0s have been preserved, notably *Glen Douglas* in the Riverside Transport Museum Glasgow.

It's impossible not to admire David Maidment's dedication in writing these books as all royalties go to the Railway Children charity he founded.

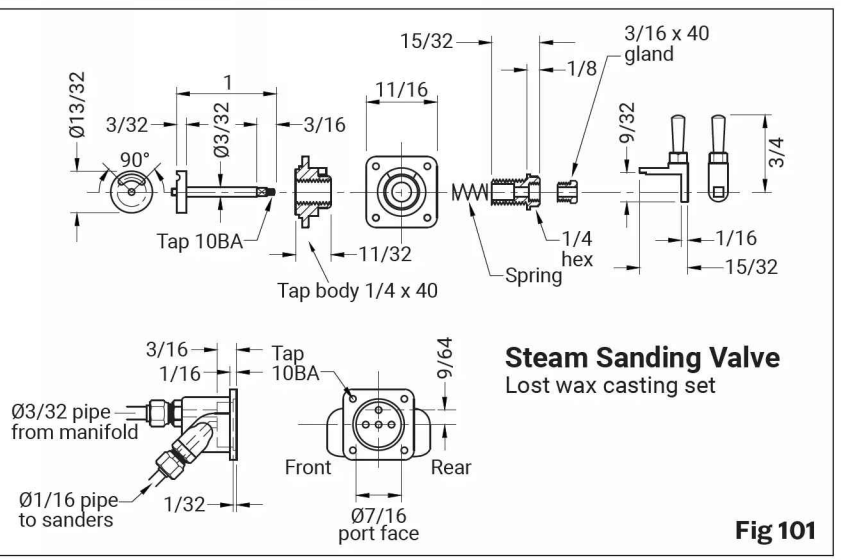
Roger Backhouse

The BR Standard 2-6-0 Class 4 Tender Engine

Doug Hewson describes the sanding gear for the Mogul.

PART 25


Photo 246: Pedestal soldered up.



Steam Sanding Valve
Lost wax casting set

Fig 101

How about a bit of sanding gear then? I know that a lot of people will jibe at that a bit, but apart from ruining the look of your engine, it will look half empty underneath without it. It doesn't have to work if that is any consolation. I have actually made mine work on my 4MT, but I have never filled the sand boxes as I would be rather reluctant to do so in case it got into the valve gear. I have provided all the castings so that you can try it if you want to. First of all, there are two-piece castings, one for the sand ejector and another one for the sand nozzle. There is a bracket which needs folding to form an angle and then it needs bend in it. This needs to be soft soldered between the two and it will need a couple of studs in the brake hanger. You then need to bring a 5/32" pipe from the sand trap to the nozzle. You will of course have to make another five of these. The next job will be to tackle the sand traps. These are devices which allow a certain amount of sand to drop down the sand pipe without allowing as excess amount out and running out continuously. These fittings were all made by either Gresham and Cravens or Davies and Metcalf so that means they were an off the shelf item. The two parts can be soft soldered together. There was also a 1/16 pipe to each ejector which came from the steam valve inside the pedestal, or the "disk" (rather than the desk) as the Severn Valley lads used to say.

The steam valve is quite an interesting gadget to make. The first thing to do is the put it in the 3-jaw and next, ream the hole right through 3/32" and then with a D-bit made dead square, face the port face with a skim. The disc valve needs to be steam tight otherwise it will leak sand all over the place. I think the rest of the drawing will be self-explanatory.

The next job will be building up the pedestal and there should be a laser cut kit for this, so hopefully it will be available from The Steam Workshop.

Photo 247: Full size sanding valve.

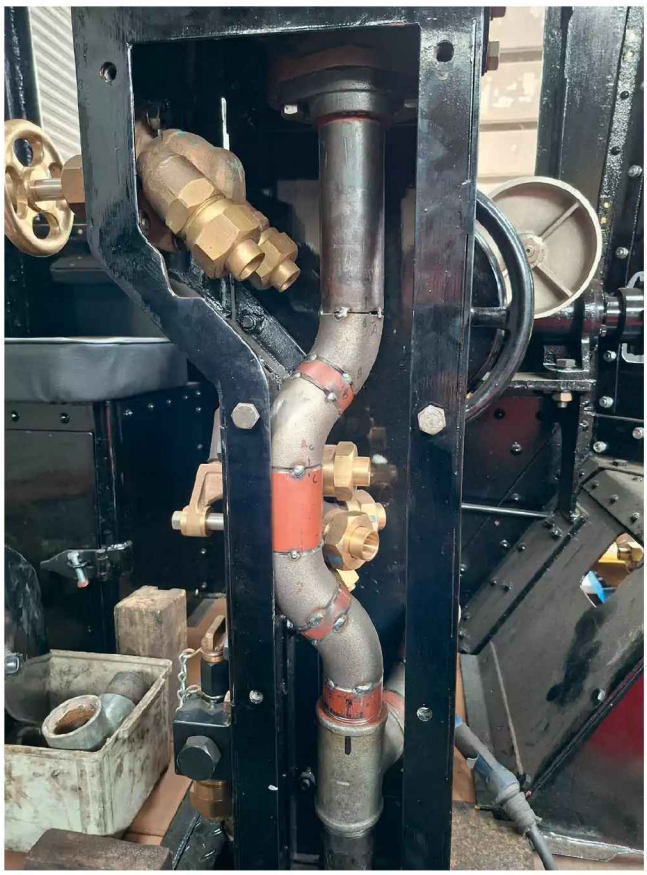


Photo 248: Side view showing the path of the pipe.

There are eight separate pieces to the kit, and we used to supply these ready bent up, but I suppose this is out of the question nowadays. The things we used to do! This needs silver soldering together for a start and then you can fit the sanding valve but if you don't want it working, then it will be a cosmetic item only. However, you can still fit it so that your cab looks complete. I made mine work, but I can well understand if you don't want it to. I have only dealt with the sanding valve at this stage as I does get a bit crowded in there. I have missed out the vacuum gear and the blower for now, but they will follow later and that will make it even more crowded, but believe me, everything fits in very nicely. **Photograph 246** shows the pedestal which has been silver

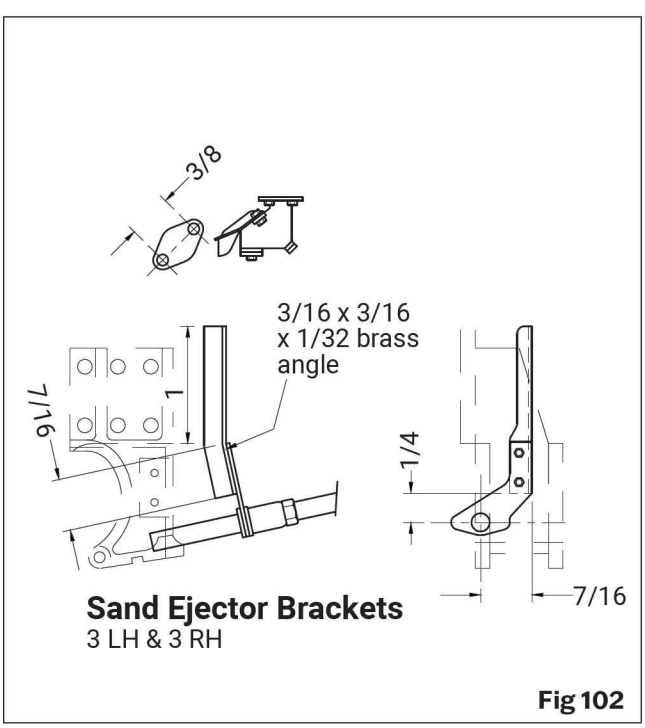


Fig 102

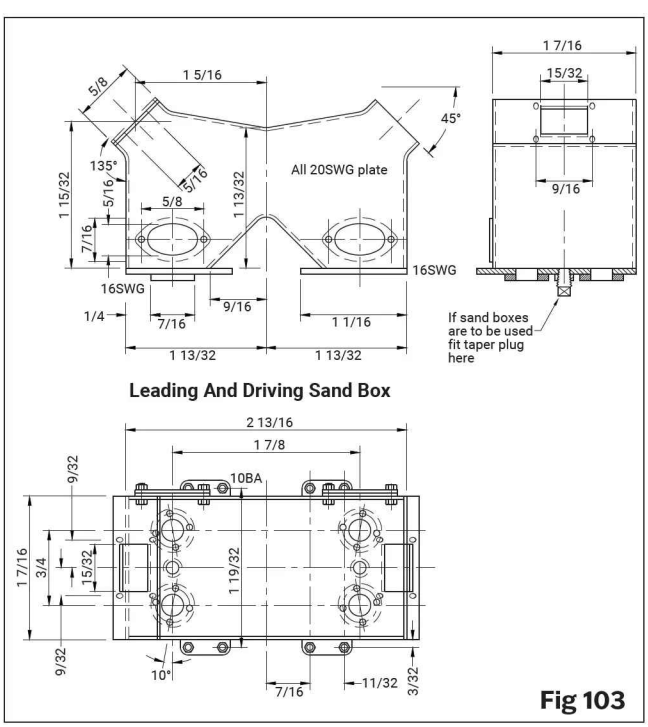


Fig 103

Photo 249: Reaming the valve body.

Photo 250: Rear view of valve assembled to pedestal.

soldered together by Geoff Whittaker and mounted in its correct position on the engine. Now then, I have just this minute received a couple of **photos**, **247** and **248,** from Andrew Meredith, who has been working on 76077, as I was working on the sanding gear. Andrew was also working on the pedestal and pipework in the pedestal, and he has got it all tack welded together so I thought at this

Photo 251: Front view with blower valve

stage it would be an appropriate to show it all off. In the background is the sanding valve and above that is the blower valve. Your pedestal should look almost identical apart from the copper tube. So that you don't feel left out I have shown some photos of mine showing the pedestal on my 4MT which is identical to the 2-6-0. **Photograph 249** shows the sand valve mounted in my three jaw chuck ready for reaming straight through the body, and **photo 250** is the sand valve mounted inside the pedestal ready for the handle to be mounted.

Photograph 251 is the outside of the pedestal, and this shows the blower valve now also in place and also the vacuum release valve. Once your pedestal is complete you can fit it in your cab, it is mounted on a built-up angle, which is in the kit, and it is level with the top of the frame plate on the left had side of the engine. The distance from the rear plate outside the cab should be 2 ½", no more, no less otherwise other things I have not described yet just might not fit in! **Photograph 252** shows the sand pipe to the centre driver. The sand boxes are made from 20swg plate. There is

Photo 252. Sand pipe for centre driver.

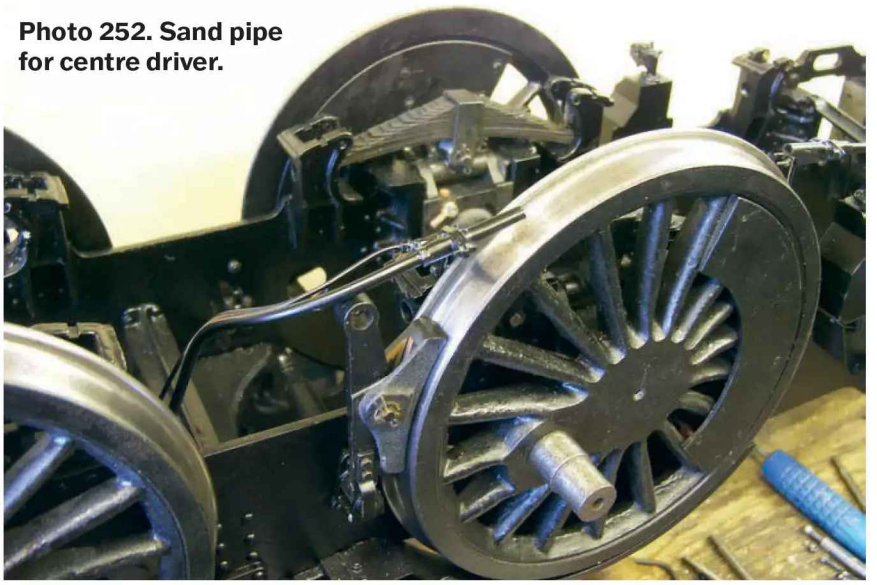


Fig 104

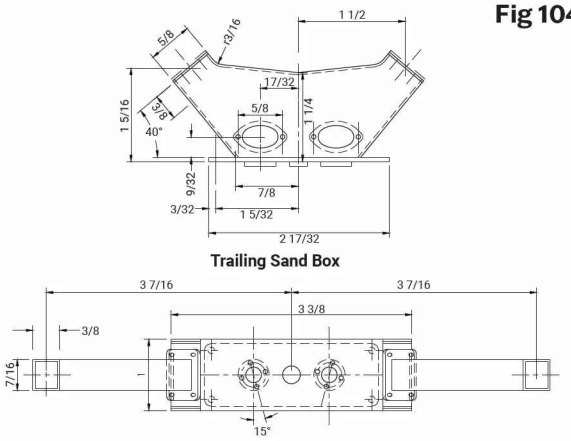


Fig 105

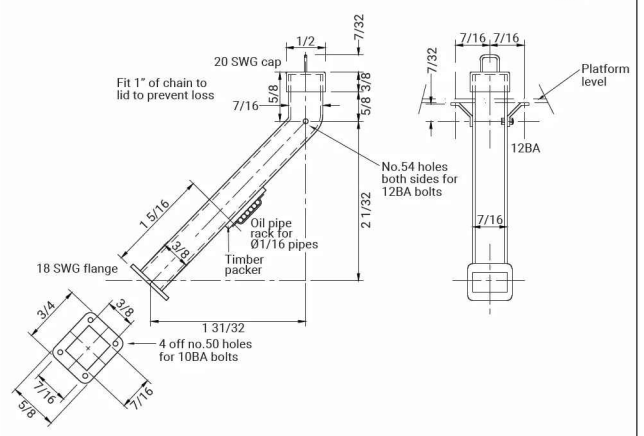


Photo 253. Rear driver sand pipe.

Photo 254. Ejectors and brackets.

Photo 255. Assembled sand ejectors.

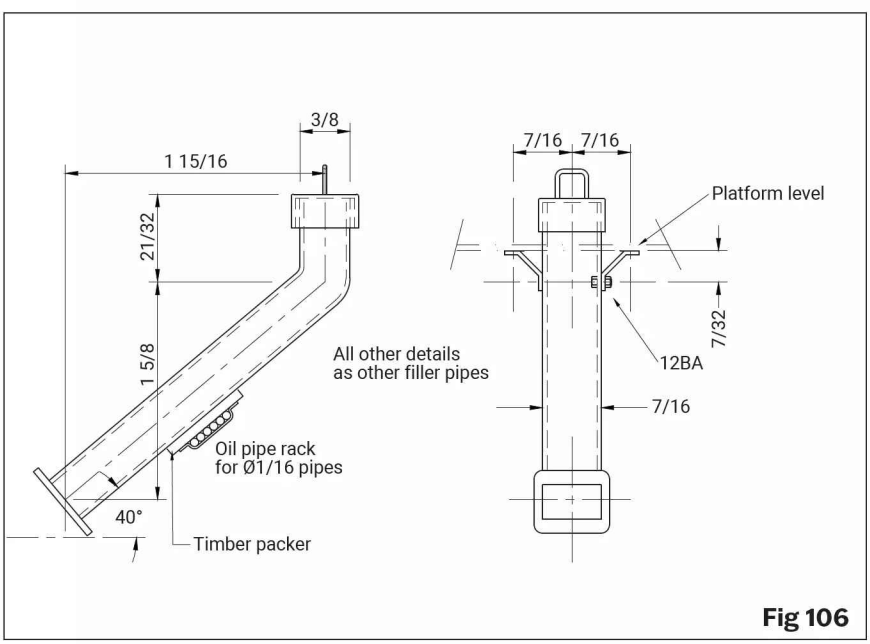
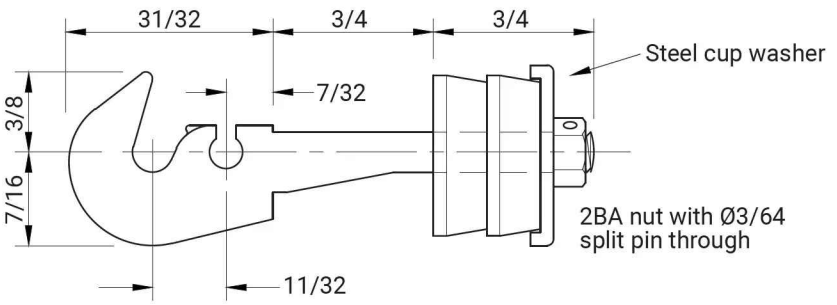


Fig 106

Photo 256. Driver's brake valve.



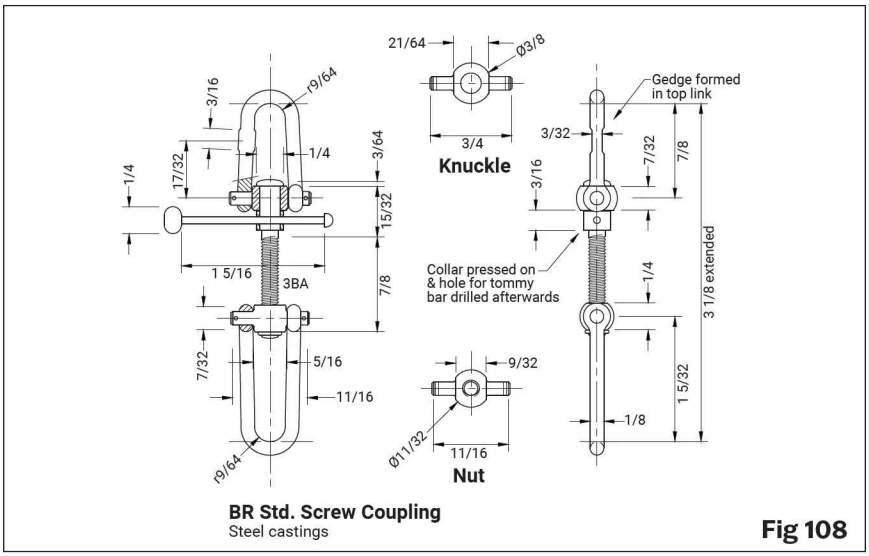
Front Draw Hook
Steel casting

Fig 107

one drawing for the front sand boxes and another one in front of the fire box. I don't think that I have drawn the laser cutting drawing for these yet but hopefully I will have this finished before you need it. I have drawn the filler pipes separately as they are quite complicated.

Photograph 253 shows the sand pipes for the front of the rear driver in full-size. **Photographs 254** and **255** are the sand ejectors and brackets which I made for my 4MT, and yours will be more or less the same. Brackets are just pieces of angle which I folded to fix the ejectors to the spring hanger brackets. **Photograph 256** is the top of my drivers brake valve, which as I say is a standard fitting but yours will need machining and just behind at the bottom is the 'pepper pot', which on the full size engine which is for adjusting the level of vacuum in the train pipe but I have another one up my sleeve which will work. You will also see that I have now got my steam brake valve in place but don't forget to add the little lubricator which is just below the valve. I know that it doesn't work but it needs to be there, as it is all part of the cab fittings. **Photograph 257** shows one of our 4MTs being coaled at Beattock Shed. One might have thought they might have had better facilities than that at a

Photo 257. 4MT at Beattock.

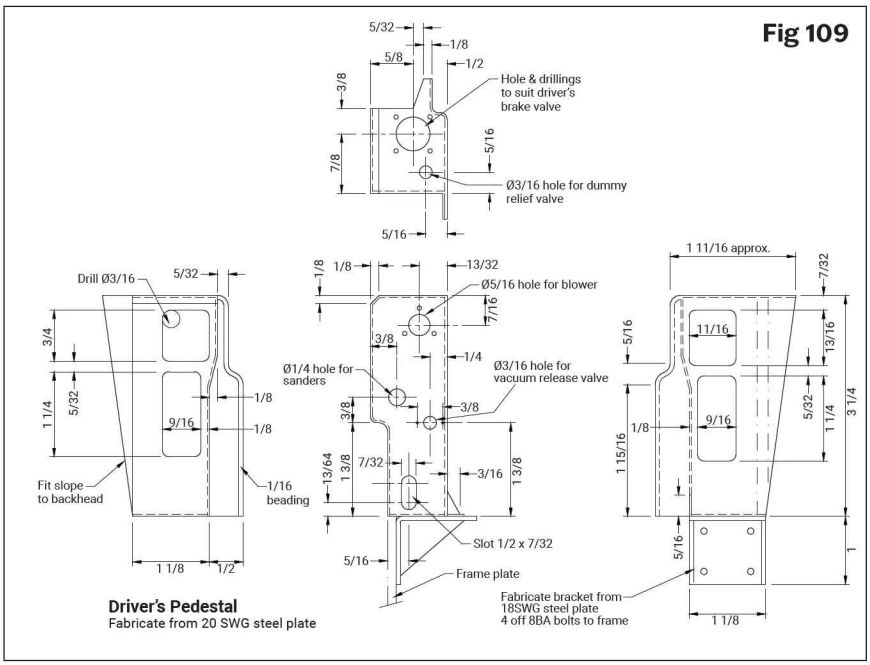


BR Std. Screw Coupling
Steel castings

Fig 108

Photo 258. Assembled blower valve.

Fig 109



Driver's Pedestal
Fabricate from 20 SWG steel plate

Photo 259. Blower valve in two pieces.

Photo 260. Blower valves with long tails for easier assembly.

place like this! **Photograph 258** shows a lovely blower valve which a gent from Chorley made from one of my castings, and **photo 259** shows one of our blower valves in two pieces. The last photo **photo 260** for this session shows more blowers for other people who had asked us to make for them. The pipes were just silver soldered into the cast in union nuts as was intended. The tail pipes were left at this length so that they could be coupled up where there was a little more finger space to get in there!

Readers' Tips

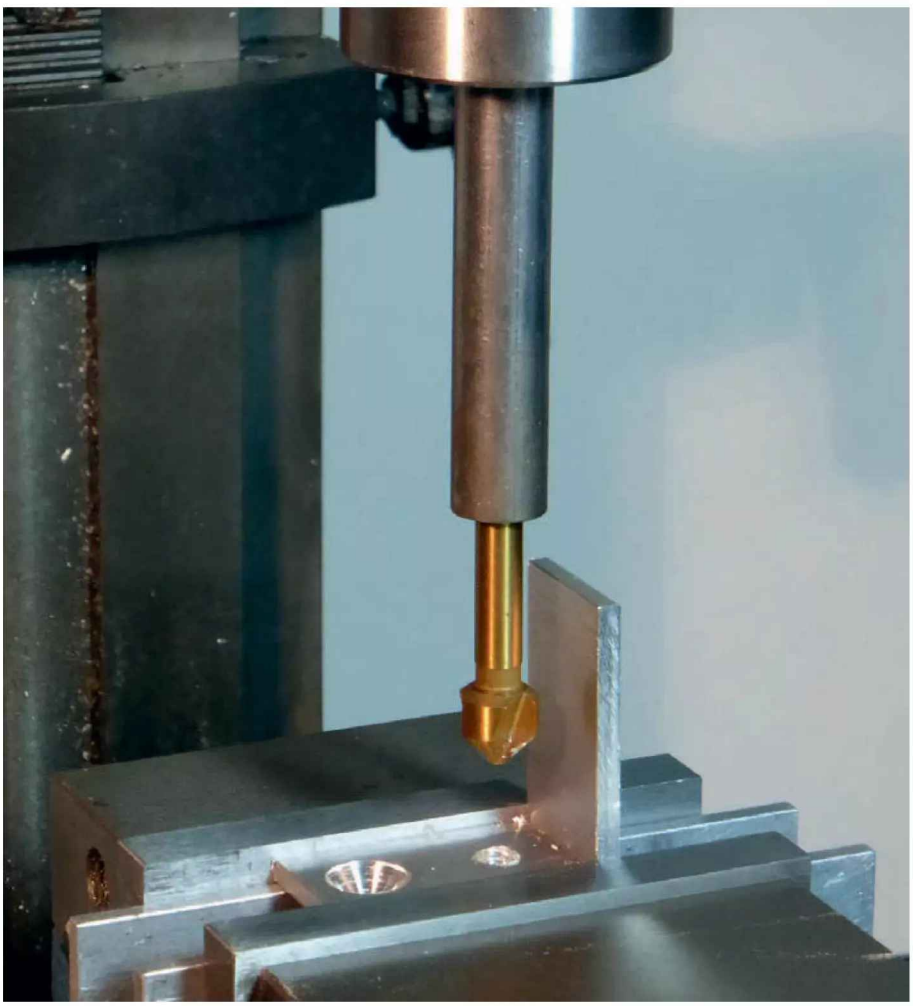
CHESTER MACHINE TOOLS

We have £30 in gift vouchers courtesy of engineering suppliers Chester Machine Tools for each month's 'Top Tip'. Email your workshop tips to **neil.wyatt@kelsey.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 we'll choose a winner for the Tip of the Month will win **£30 in gift vouchers from Chester Machine Tools**. Visit **www.chesterhobbystore.com** to plan how to spend yours!

AN EXTENDED COUNTERSINK

Our tip winner this month is Peter Webb, who points out that countersinks are often not very well designed for reaching less accessible holes:

Countersinks have short shafts making it difficult to countersink holes close to corners. The bright round bar in the photo has a hole drilled on a lathe to take a countersink which has then been held in place with Loctite. It is being used to countersink a hole in a simple bracket. After use, the countersink can be removed from the rod by placing in a domestic oven. Potentially this technique could also be used to hold a drill in a milling machine collet when there is insufficient height available for a chuck.



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.

Photo 7: Dick Allan's fine Gauge 2 *Derwent* model resulted from an article about Darlington Railway Museum, where it can be seen.

Writing For The Model Engineering Press

Would you like to see more about your favourite topics in Model Engineer & Workshop? One answer is to contribute something yourself – Roger Backhouse shares his perspective.

Model engineering publishing has seen the biggest changes for years. *Engineering in Miniature*'s closure followed by the merger of *Model Engineer* and *Model Engineers' Workshop* have altered the publishing scene, **photo 1**.

These aren't the only publications for model engineers. Club and society magazines such as the SMEE *Journal* are often high quality, **photo 2.** As a former editor of York SME's *Newsletter* I was always looking for articles, news items and photographs. Other magazine editors have the same quest.

Special interest societies have magazines like *Steamchest* for the 2 1/2 inch gauge association and the Federation of Model Engineering Society has its *News*, though not all accept contributions from non-members. Related magazines like *Garden Rail, Old Glory* and *Stationary Engine,* are worth considering for articles. Several websites cater for model engineers, **photo 3**. Some writers could consider 'blogging' on a forum or even setting up their own website.

WHY WRITE?

Although model engineers usually work alone in their workshops, sharing ideas and information has been important since *Model Engineer* began in 1898. The magazine and its successors

Photo 1: A Model Engineer and Workshop cover.

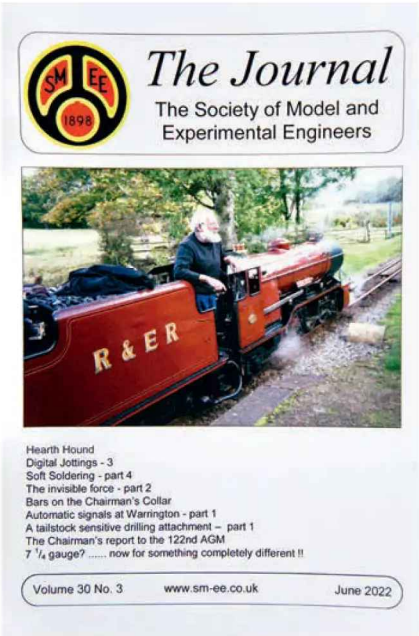


Photo 2: Club and society newsletters are important parts of the model engineering press. Editors always welcome contributions.

inspired models, introduced new techniques, broadened knowledge and generally raised model engineering standards worldwide. Many believe that model engineering is the world's best hobby; sharing information is an important part.

Some hobby publications have been lost because of changes in the magazine market, but another challenge has been a shortage of articles. Surely few want to see that happen again – writing and publishing helps maintain a living hobby.

My own experience? Since 1999 I've written nearly 200 articles for *Model Engineer* and *Model Engineers' Workshop* plus some for *Engineering in Miniature*. Most have been general interest about engineering history and heritage, for example *An Engineer's Day Out* and *A Good Engineering Idea At The Time*. Some readers prefer more construction articles, but general engineering interest features go back to the earliest days of *Model Engineer.* Sometimes these articles inspire others to make models or to carry out further research.

The secret of a good magazine is variety, and the model engineering press is no exception.

In my experience, editors are rarely proactive asking for articles on particular topics. Instead they like to see a range of possible features and then select from these, ensuring a variety for publication.

HELPING YOUR HOBBY, HELPING OTHER PEOPLE

The first reason for writing is to help the hobby. Articles about models and full-size engineering can inspire. They introduce new ideas. Model engineering is about making and techniques so when York's Richard Gibbon wrote about restoring piston valves on a *Speedy* he probably helped others faced with similar problems, **photo 4.**

Articles have helped introduce new techniques. 3D printing now has its own following, as do computer aided design and CNC. Perhaps model engineers using laser cutting, spark erosion and water jet cutting would like to write about their experiences?

Construction articles are the real backbone. Each issue of *Model Engineer and Workshop* is, like its predecessors, unusual by including part works of longer series like recent articles about making a Great Western Railway pannier tank. These are important for some readers, but you need to be confident of your abilities to write such a series. *Model Engineer and Workshop's* change to a monthly format means less space for longer series and the editor has guidance for contributors that encourages shorter series.

Articles can offer advice on techniques, suggest approaches to problem-solving, give instructions for making models or tools and much more. Many model engineers have followed advice and instructions in construction series for locomotives. Some construction series written long ago still guide making.

My view is that there is scope for shorter articles with more aimed at beginners. Reeves *Popular* engine castings, **photo 5**, have been best sellers but has anyone described how to make one in a magazine? There is scope for exploring the use of different materials as in Patrick Hendra's articles (e.g. Superglue is Super in *Model Engineer,* Vol 228 issue 4746).

Articles can inspire. An article about the then working steam engine and looms at Queen Street Mill encouraged Charles Hirst from London to visit. He was impressed, **photo 6**. A feature about Darlington's Head of Steam museum, now rebranded and enlarged as Hopetown Works, pictured the preserved 1842 Stockton and Darlington Railway *Derwent* locomotive. Dick Allen from Farnham visited following publication and then

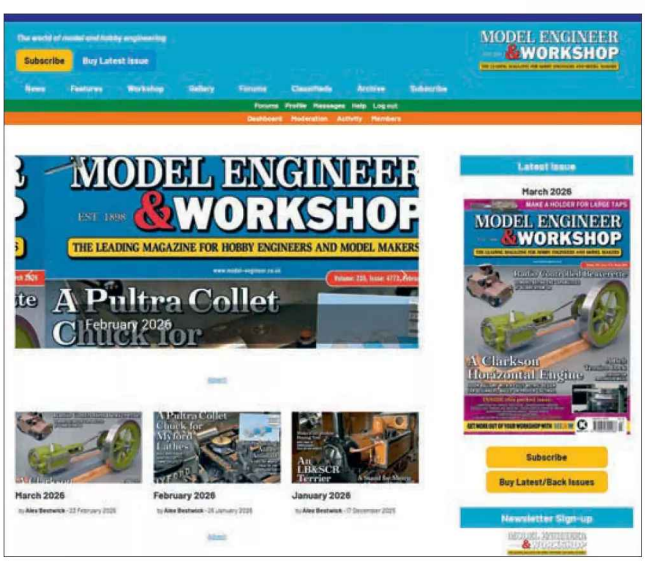


Photo 3: The magazine's website, www.model-engineer.co.uk.

Photo 4: Richard Gibbon from York MES described restoring an inefficient piston valve assembly on a *Speedy*. Such articles can help others faced with similar problems. (Recovering Speedy's Performance, *Model Engineer,* Vol 228 issue 4691.

Photo 5: Reeves *Popular* engine is one of their best sellers. Describing its making could be an article helping beginners.

made a lovely gauge 2 model of the locomotive, **photo 7.**

HELPING YOUR SOCIETY

Many engineers are club or society members with at least ten model engineering societies in Yorkshire alone. John Arrowsmith's club visits are important, but articles can describe activities, models or tools made by society members. They show creative and enthusiastic societies that people want to join.

Sadly, some model engineering societies have closed, though York Model Engineer's membership grew from 132 to 232 in just ten years. Several factors helped including a marketing strategy, itself the subject of an article, developments like a new workshop and now a Gauge 1 railway.

Photo 8: An article about York SME's *Clanger* trophy, awarded for the biggest mistake, showed the lighter side of club life.

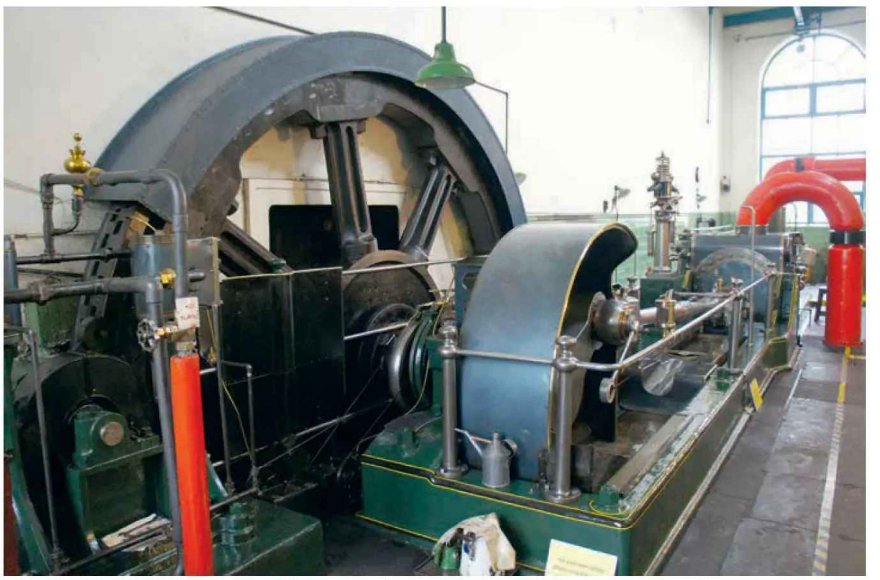


Photo 6: The then working tandem compound engine at Queen Street Mill, Burnley. A *Model Engineer* article encouraged visitors to go before it closed.

Also several magazine articles featured or mentioned that society.

Some pieces showed the humorous side of club life, like the Clanger Award, **photo 8,** and member's youthful hair-raising experiences with explosives. Article fees were donated to York Model Engineers, a boost to funds.

When editing York's newsletter I sometimes received articles or news items that could be sent to *Model Engineer* after they'd appeared in the society newsletter. Always good to see features by York society members circulate wider. Football clubs have talent scouts, and I was doing the same for *Model Engineer* – good publicity for York!

Paul Tanner helps with track and signalling at York Model Engineers. He created a simple and effective 'siding lockout device' to stop runaways on to running lines. After a write-up in York's *Newsletter* it was published in *Model Engineer*. (Paul Tanner, Siding lockout device, Vol 225 issue 4644). **[photo 9]**

Photo 9: Paul Tanner of York Model Engineers designed this simple but effective device to prevent runaways on to running lines.

Advertisers say 'All publicity is good publicity as long as they spell your name right'. That's not always true but articles can help. It's surprising the number of clubs that don't send their newsletters to Geoff Theasby for *Club News*. Why not? Free publicity is always good.

HELPING YOU - SATISFYING THE EGO

Thankfully, model engineers are rarely self-aggrandising but a little recognition never goes amiss! Talking to another model engineer in a ticket queue at the former Doncaster show I mentioned writing for *Model Engineer*. I was asked "are you *the* Roger Backhouse" and my family will confirm I was on Cloud Nine for days afterwards.

Less egotistically researching articles is often informative. I've visited many different places and met model engineers with interesting stories and some amazing models. A recent visit to Bolton Steam Museum was an eye opener where I learned about Uniflow engines, **photo 10.** Writing has become another hobby and an enjoyable one.

"WEALTH BEYOND THE DREAMS OF AVARICE?"

The days when *Model Engineer* had a full-time editorial team are long gone. No-one gets rich writing for the model engineering press. Nevertheless extra

income from articles is welcome, times are hard and model engineering isn't an especially cheap hobby.

You can earn up to £1000 a year from self-employment without paying tax on it. If earning over that amount writing, then don't forget you can claim reasonable expenses to set against tax. Page rates can vary, and what you get will depend on how much extra work is needed to make an article suitable for publication.

Club and society magazines don't pay, but their editors always appreciate articles as do websites. By writing for them you are spreading good ideas and practice. There's nothing to lose and model engineering as a whole will gain.

BUT I CAN'T WRITE...

Model engineers sometimes say, "I can't write". They are too modest as it's rarely true. Model engineers can talk and are creative thinkers. If you can talk and think you can write.

There's no need for literary flourish in model engineering writing. It's about writing what's observed, how things were made and even simple things like how work pieces were held for machining. Engineers generally write clearly - see rail and air accident investigation reports for clear and succinct writing.

ME&W editor, Neil Wyatt, told me "it surprises me how many people worry they 'can't write' even if they often post really interesting things online! In truth, what I look for in an ideal article is exciting or interesting ideas that will encourage people into their workshops, not perfectly written English. It's ideas that count, not grammar or spelling; it's an editor's job to prepare articles for publication."

Construction writing is similar to a construction process - using a step-by-step approach. One tip to help writing is to think of an article as headings rather like the key stages in making a model or a workshop tool.

IDEAS

The late great Victoria Wood was asked where her ideas came from, replying "if I knew I'd go and live there". You may think inspiration is lacking but model engineering is always creative. Most model engineers have ideas for doing things differently or improving old techniques. They needn't be complex subjects. Why not write about them? For example modifications to a simple self-designed tapping stand were subject of an article in *Engineering in Miniature,* **photo 11.**

When *Model Engineer* published a reader's letter reporting problems running a small engine Graham Astbury from Bradford Model Engineers planned a letter in response. After discussion with former editor Diane Carney he realised the subject deserved longer treatment, so he drew on his scientific knowledge of combustion to write two articles. (Graham Astbury. Problems Of Combustion In Small Engines, *Model Engineer,* Vol 211 issues 4470 and 4472).

PAPER - THE MOST IMPORTANT MATERIAL IN A WORKSHOP!

Always keep a notepad in the workshop and record what you've done. Should your writing be delayed, a notebook reminds what was done.

Likewise it's essential to take photographs. They are vital for construction articles and even smartphones can take good quality pictures. (For advice on photos see Neil Wyatt's series of articles in *Model Engineer's Workshop* issues 322 to 326).

Good photos are clear, have no confusing background and illustrate the process described. Usually three or four pictures per 500 words of a construction article will be enough. Photos showing a common process, e.g. spot drilling, are less useful unless there is something different, perhaps a new way to hold the workpiece? Please don't forget to include a photo of the finished article! (It's amazing how many contributors do! – Ed.)

Most construction articles need drawings. Whilst it's good to have perfect drawings many model engineers work from their own sketches. ME&W can work these up to a printable standard. The ideal is drawings prepared in a CAD package and exported as PDFs, but even hand sketches can be used, if they are clear enough.

By writing you'll help other model engineers, spread your creative ideas, perhaps gain modest recompense and even enjoy writing.

Editors will be pleased to hear from you. Why not write? The model engineering world will be better for your ideas.

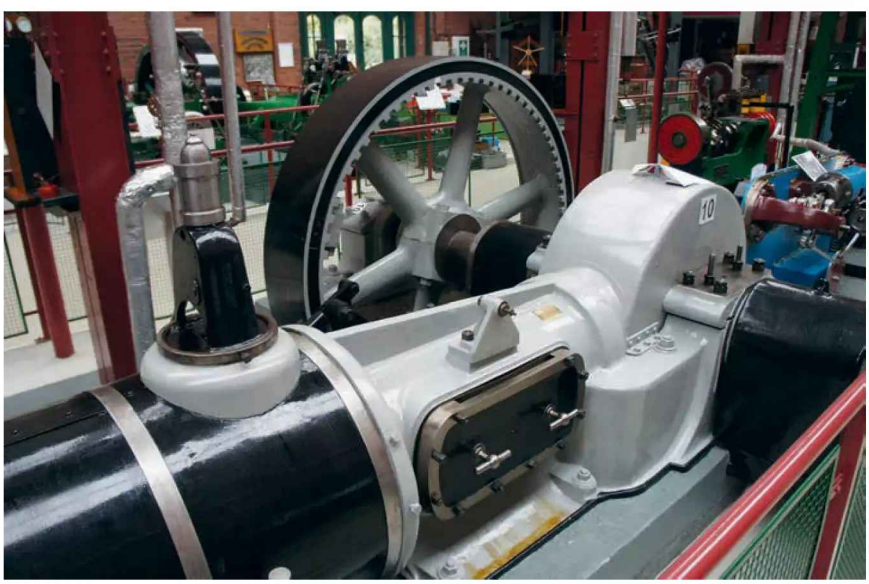


Photo 10: From the excellent captions at Bolton Steam Museum I learned how this uniflow engine worked.

Photo 11: Modifications to this self-designed tapping stand featured in Making And Modifying A Tapping Stand, *Engineering in Miniature,* Vol 44 issue 11.

The track with its new sleepers heads into the distance at West Huntspill MES.

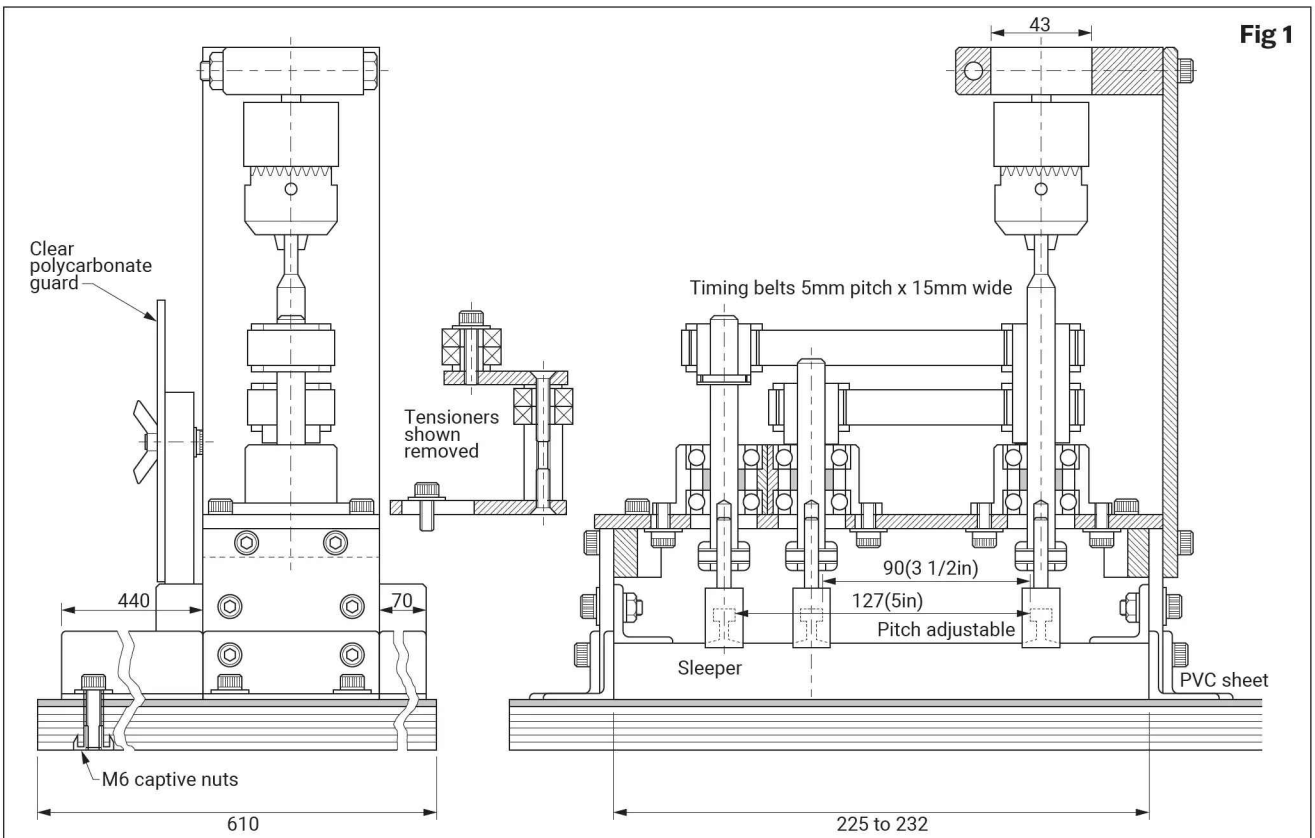
A Sleeper Grooving Machine

The West Huntspill Model Engineering Society faced a mammoth task to replace thousands of timber sleepers for their track. Geoff Harding designed a machine to simplify the task of grooving their plastic replacements.

At West Huntspill we have a very fine raised level 3 ½ and 5-inch railway track. Also being built is a ground level 7 ¼ track. The track has been here for over forty years and although many wooden sleepers have been replaced it has been decided to use recycled plastic for their future replacement. The wooden sleepers have grooves machined in the top surface to locate the track in gauge with fixing screws clamping the rails down. As there are several thousand sleepers to replace it can't be all done at once in the short down time season.

In order to come up with a suitable design for a machine to help with grooving the sleepers, several considerations had to be thought about. We have two different sections of track profile at present and perhaps in the future replacement track may be different. The machine, **photo 1**, has

Photo 1: The sleeper groove cutting machine.



Sleeper Groove Cutting Machine

had to be made to be adjustable and hold different sets of cutters.

Due to the quantity of dual gauge sleepers needed just using a standard router cutting one slot at a time seemed out of the question. The slots are not very deep so one motor source should be able to cope. The recycled plastic has a small amount of metal filings imbedded, so a clear guard became essential to include in the specification.

Although I expected the cutting forces to be quite low, I did decide to use timing belts for the drive train. I decided the power would come from a mains hand drill, this has a standard 43mm diameter neck that would be used for its support.

The next stage was to see what material I had available. In my workshop I had a small quantity of 45mm wide 6mm thick bright mild steel plate and some 20mm square bright bar. I have a good stock of M6 Allen screws, so it seemed a good idea to use that size as a standard.

As part of the specification I decided to use sealed ball races in the cutting spindle housings, the spindles themselves are made from ground silver steel stock.

Like all projects, we always have to make sure that when designing something the machines at hand are capable of carrying out the processes needed. I my case my trusty Southbend lathe, Bormilathe and Axminster mill/drill were very suitable especially as the mill has digital readout.

The design was reasonably straight forward. The first stage was to collect all the dimensions of the purchased items such as the bearings and timing belts. It was obvious at this stage that a system would be essential to adjust the slack in the timing belts. It was also quite evident that two belts would be needed to facilitate all the adjustments required.

When I design a project, I normally sketch a general assembly. After I have drawn all the parts, I then draw a proper general assembly, **fig. 1**, using the dimensions of the bought in parts. By doing that I have given myself a rehearsal without wasting valuable time and materials.

The machining and assembly went as planned, but for use it was mounted on a plywood base covered with a PVC sheet to cut down friction. Guides were added and a rack for cutters and tools.

In front of the cutters is a Polycarbonate screen this keeps fingers away from the cutters.

I am pleased to say that it works, as many hundred sleepers have been cut and installed. The photographs show the machine and the assembled track with the rolling dual track gauge, **photo 2**.

Photo 2: Another interesting device, a rolling track gauge used to check the distances between the rails.

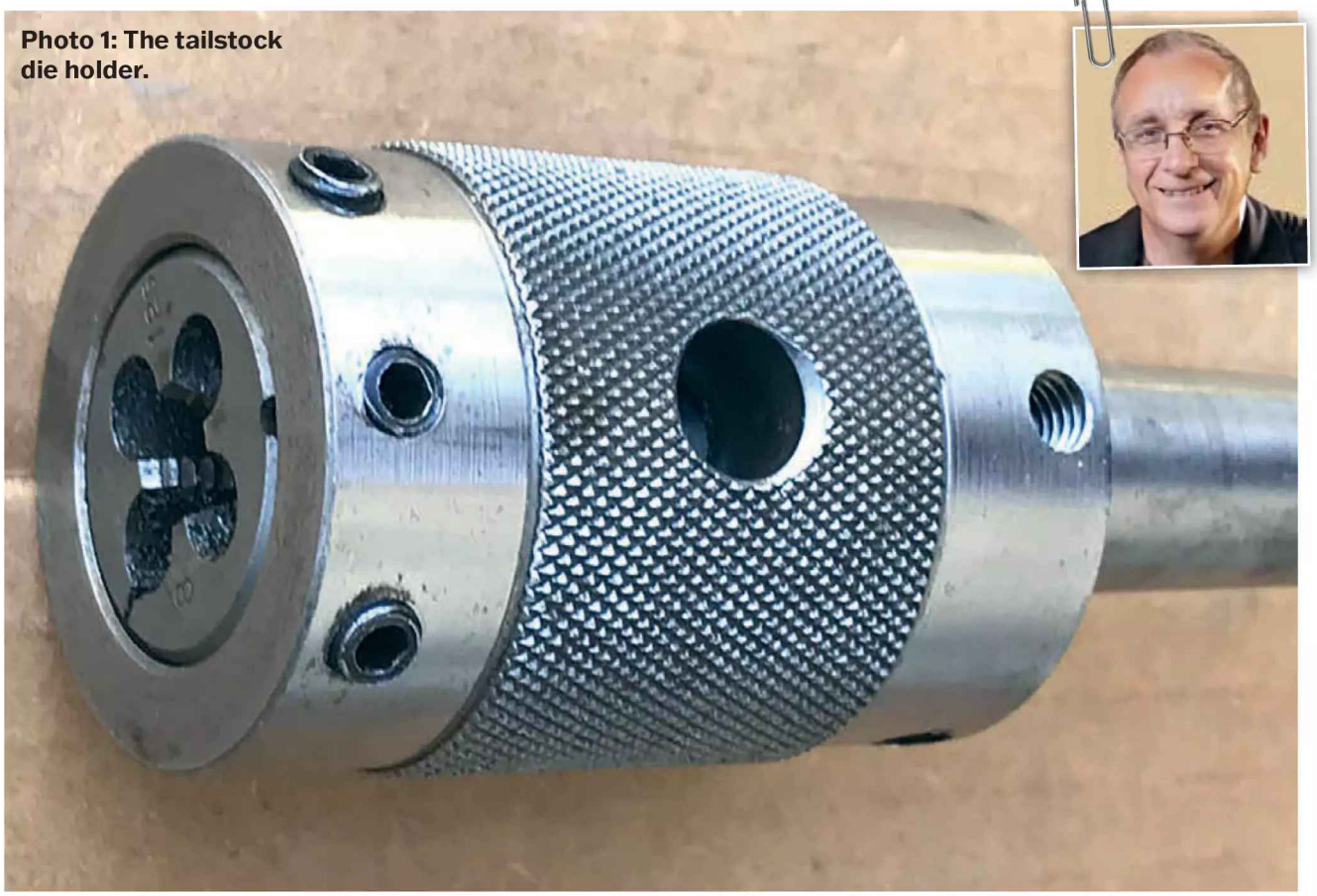


Photo 1: The tailstock die holder.

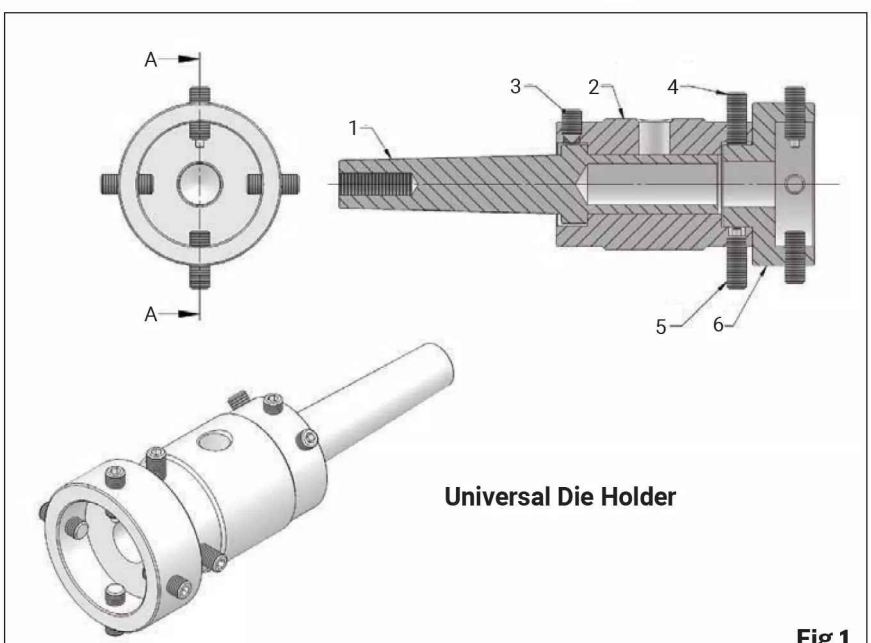
A Universal Die Holder

Jacques Maurel follows up his lathe tap holder designs with a 'universal' tailstock die holder.

The problem was that I owned many different second-hand dies (of the button type), being of course of different diameter, lengths and fixing systems, some with radial dimples and others with axial counterbores to lodge fixing screws.

My universal solution to holding these different dies is as follows – I use a lathe die holder of the usual type (see **fig. 1** and **photo 1**) one side is to hold the standard 1" dies, the other side is an adaptor for smaller diameters dies (see later), in this side, a bigger adaptor (**part 6**) can be fitted for bigger dies up to 1.5" (see fig. 1).

All the dies are given a 2.5mm wide axial groove on the external diameter, with an angle grinder, for driving them. I've made this on all my button dies as I was not sure that the driving dimples were in the right position to line up with the pointed driving screws, so the dies could be tightened awry and so the machined threads would be too.



Universal Die Holder

Fig 1

Photo 2: One end of the body uses four screws to centre the die.

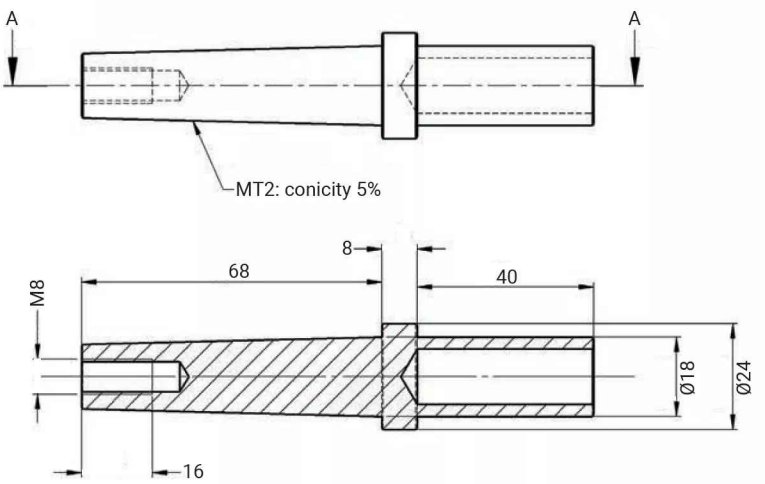
Photo 3: Holding a 30mm die.

THE ADAPTORS

These are small, bore diameter 26 mm **photo 2,** and large, bore diameter 38.2mm **photo 3.** They are equipped with four grub screws, three of these screws have a flat end, the fourth one has a 2.5mm diameter peg end to be located in the axial groove of the die for driving.

ADJUSTMENT

My example is holding a 30mm diameter die, **photo 3**. Use the large adaptor and adjust two adjacent screws (under the punched dots) so that their flat ends are protruding by 4mm (38-30)/2 inside the bore (measure with a sliding caliper) and tighten the two others, the peg end one set in the axial groove of the die.



Part 1. MT2 Bracket

Part 1

PARTS LIST:

Ref.	No.	Name	Material	Remarks
1	1	MT2 bracket	FCMS	
2	1	Die holding sleeve	FCMS	
3	3	Screw Hc M6-10	8-8 mini	Point end
4	6	Screw Hc M6-16	8-8 mini	Flat end
5	2	Screw Hc M6-16	8-8 mini	Peg end diam 2.5; 2.5 long
6	1	Big adaptor	FCMS	

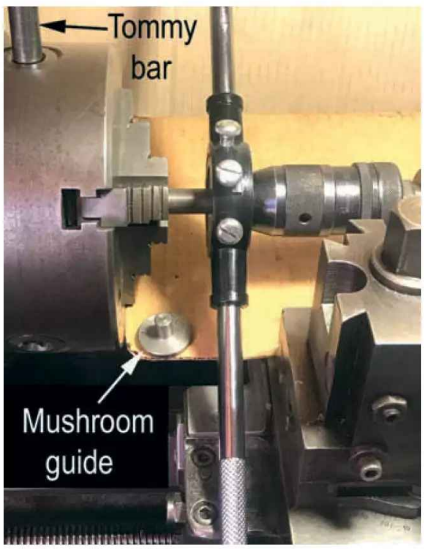


Photo 4: Mushroom guide used to press against the back of a die in a standard die holder.

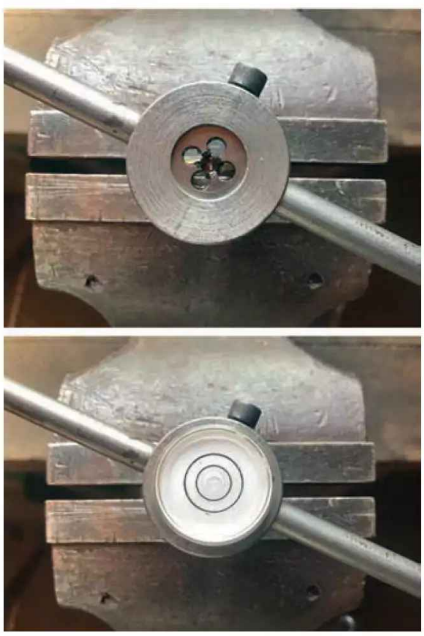
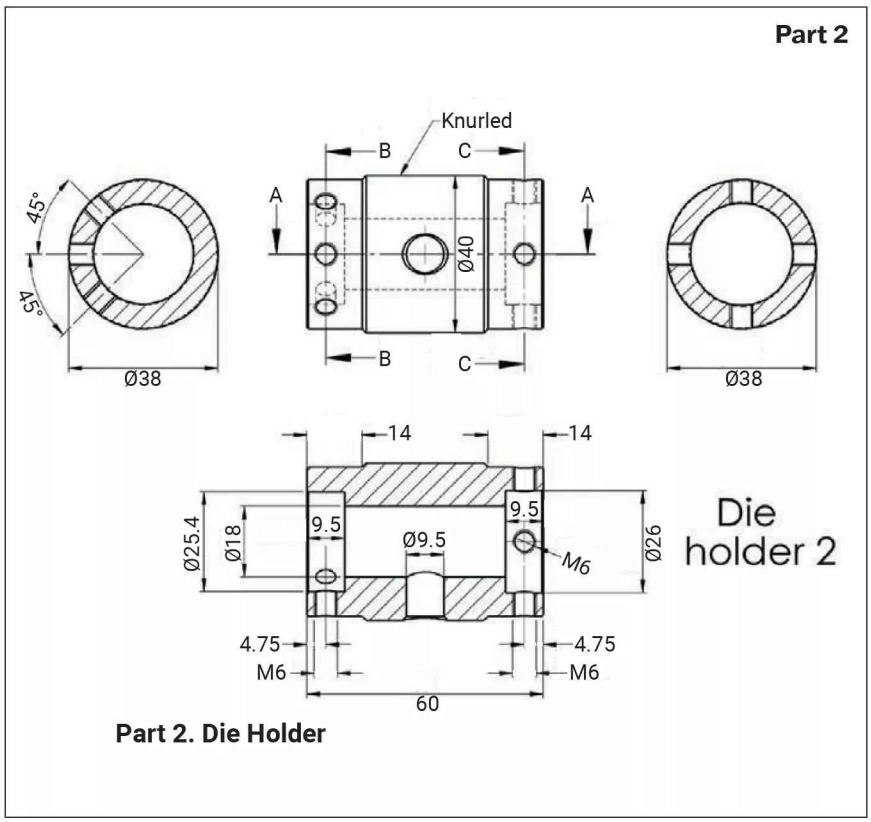


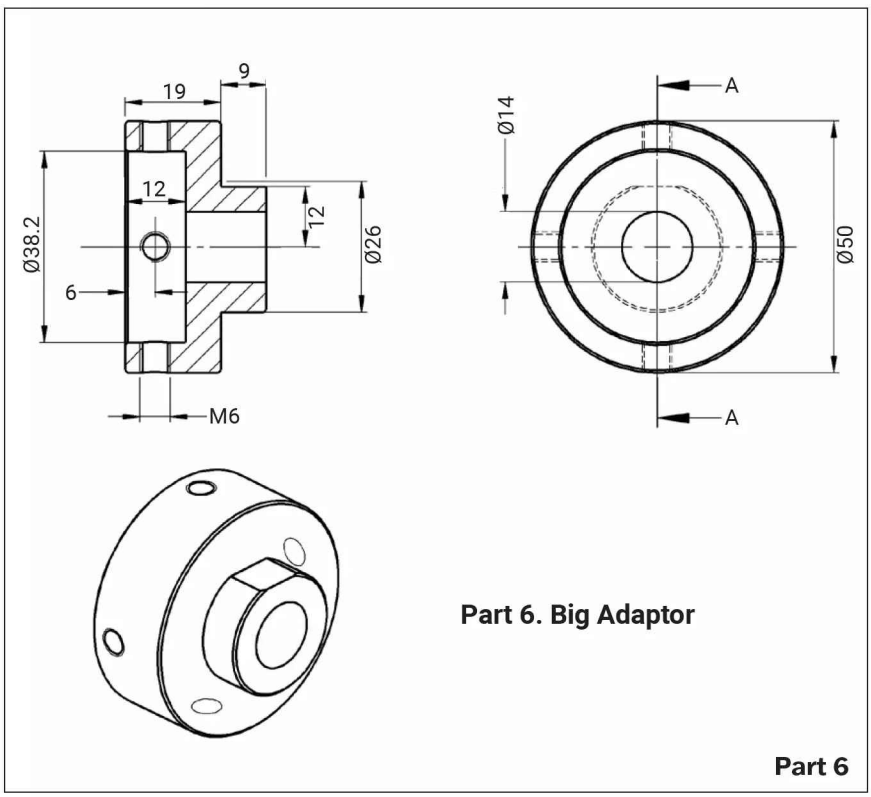
Photo 5: Using a 'bullseye spirit level to guide hand threading.

THE 'MUSHROOM GUIDE'

This is used for guiding the button dies of a single set, **photo 4.** The 'foot' of the mushroom (diameter 10mm) is tightened in the standard tailstock chuck, while the 'head' is centred in the rear part of the die holder. The die is now centred and pushed against the machined part (held in the lathe chuck) by the tailstock barrel, while the torque is taken by one of the die holder arms resting on the saddle. The threading torque is given to the lathe chuck by a tommy bar set in the chuck pinion's square holes (not the best practice but satisfactory from my own experience).



Part 2. Die Holder



Part 6. Big Adaptor

OFF-HAND DIE THREADING

When the part can't be held in a lathe chuck, for example, threading an eyebolt stem, very often it's possible to hold it vertically in the bench vice. In this case, it's worth using a spherical level vial (also known as a 'bullseye' spirit level) set on the die holder, **photo 5,** for starting the first threads, as it's so easy for the die to go awry.

Club News

Geoff Theasby reports on the latest news from Model Engineering Clubs.

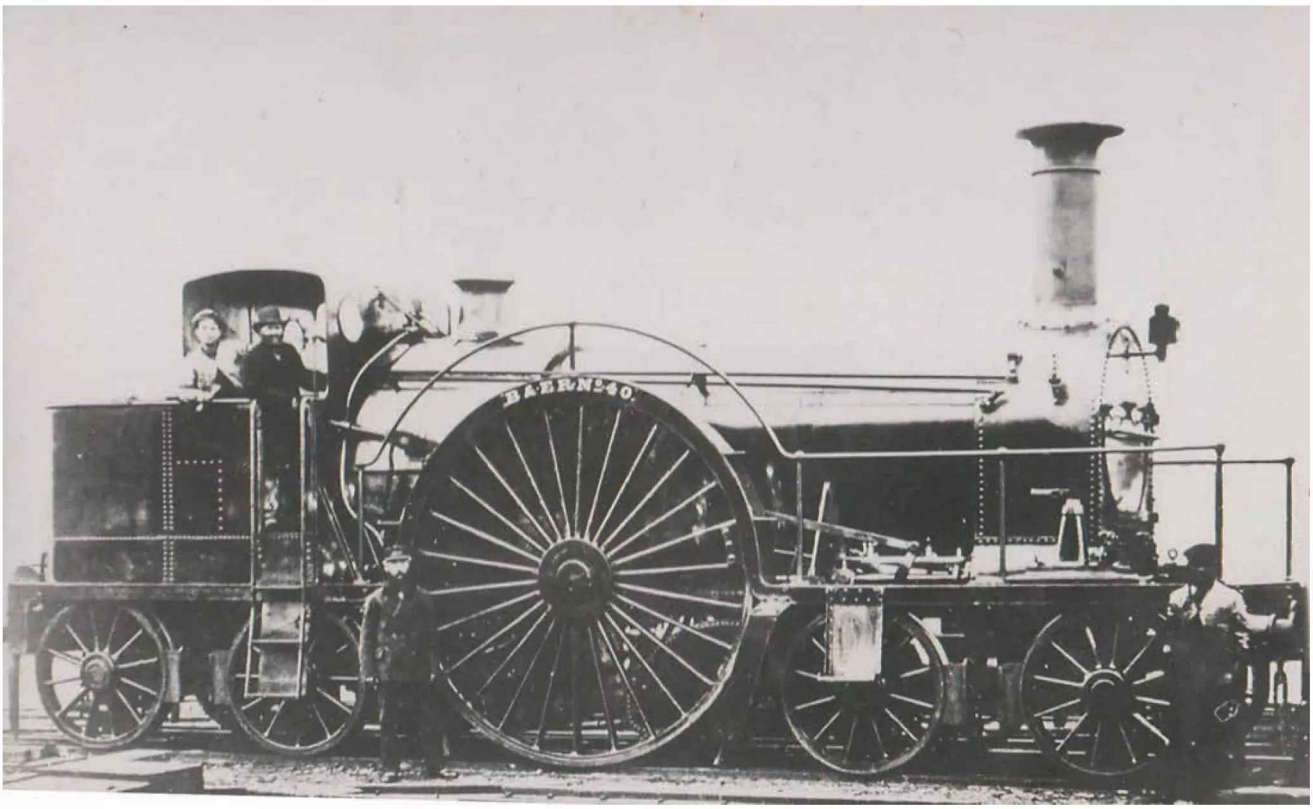


Photo 1 David's Photo No 40 B&E Railway

As I was putting the final touches to last month's *Club News*, I lost all my work in the computer and could not recover it despite the many attempts over two days. Debs volunteered to retype a previously typo-ridden printout, I am once again indebted, my Saviour!
In this issue: a free ride, a 3-D puzzle, an editor's dilemma, a railway murder trial, old photos, when you are in a hole, a centre punch, a festival and a gold spark arrestor?
The Frimley Flier, January, from **Frimley and Ascot Locomotive Club**, recalls a successful Santa event. One of Santa's little helpers had a broken leg once, and couldn't ride on the train. The following year she was given a complimentary ride, a kindness she has never forgotten. Chairman Richard Clark, as well as thanking all whom gave a hand during the year, noted that the new coaches needed some attention before using them on a public running day, particularly the brakes. Operated by Bowden cable, they must meet the standards demanded of them. Paul Naylor acquired a locomotive fitting which came as a box of bits, it was a duplex steam pump. With some difficulty he established how it worked out but it had leaks everywhere. He then had to turn it over by hand to check valve events. How to 'turn over' a steam pump? There are no wheels to grasp… He found that he could run one cylinder at a time, and the only movement is the valve of which the settings were critical. He began to wonder if it ever worked at all. It seems to be self- starting, but maybe only by accident. He still does not know the valve events. Editor Andrew Douglass noted that *Romulus* had been put away without proper cleaning and disposal tasks. And says "Gentlemen, this is what caused the downfall of the engine in the first place!" W. www.flmr.org
Debs' cousin David died, and he left me a collection of old monochrome railway photographs. Many of them are noted on the back "Locomotive and General Railway Photographs" They seem to date from about 1875 to 1914, but they have no apparent theme. An example, here is Pearson 4-2-4T domeless locomotive, No 40. Built in Bolton for the broad gauge Bristol and Exeter Railway, No 40 had flangeless driving wheels 9 feet in diameter, shown here in 1876, **photo1.**
The *Stephenson Link*, from **Chesterfield & District Model Engineering Society,** January, Editor John Walker, says he is reluctant to read the copy returned from the printers, as he always spots at least one more error. This gave him an idea, The first member to spot an error in the magazine will be acknowledged in the next issue, with his name misspelled. The club are also responsible for steaming days at Papplewick pumping engine, which is well worth a visit in its own right.
A calendar of events is presented, together with more dates when Hady Hill, the club site, will be operational.
The club has a new Facebook page, it's only official presence on the internet.
Patrick Wells reviewed the year with the junior members, the increasing number of whom bodes well for the future. David Fletcher acquired

Photo 2 'A'usterity loco and pickup goods

a '*Mona*', designed by 'LBSC' but unfinished by its most recent owner, so he took it on. 'Curly' described it as a simple engine for beginners, but David says it is "anything but". He noted that it cost £875 to buy, the boiler had been professionally made for £1,400, laser parts £200 and castings £300. Some excellent photos taken over the year at the club track, concludes a healthy and readable newsletter. **Photographs 2** and **3** are by junior member Patrick Wells W. www.cdmes.co.uk

Sheffield Society of Model & Experimental Engineering newsletter, *Steam Whistle,* for January arrives. Mike Peart writes that in the National Rail Museum at Donaster, there is a 1/6th scale LSWR carriage, infamous as an exhibit in a murder trial, said to have been committed by one George Parker. The model was made by apprentices at Eastleigh Works for the trial. The layout of the 3rd class non-corridor lavatory carriage was used by Parker to assist him in committing his crime. 92-year-old John Forrest is pictured with his recently-purchased Basset-Lowke locomotive which was the property of, and run by, Guy Mitchell in the early 1900s when he lived at Totley not far fom the SDMES. After checking, it was found to be that very loco and Johh was reunited with it at club track, Abbeydale. W, www.sheffiedmodelengineers.com

Bradford Model Engineering Society's *Monthly Bulletin*, in 'Ade's jottings', by President, Adrian Shuttleworth says the Bradford Challenge has gained an ally in the school and college activities, in that Bradford College has a Lego competition which they believe complements the Challenge. Richard Pulleyn gave a talk on railway signalling, which was well received. Jim Jennings was contacted by an engineer's widow in Canada to say that an old friend has died. It took some time to trace him, so your old files are still current somewhere and you never know who may get in touch. W. bradfordmes.uk

St Albans Model Engineering Society, says that Edward Hobbs was Wenman Basset-Lowke's right hand man, sadly his name is less well known. B-L began in 1908, and made ship models (and artificial limbs, an odd combination). Tony Martin writes on Lord Verulam and his anti-railway activities. Tony Ashgrove writes on The Newcomen Society whose interests are the recordings of the Industrial Revolution. I am a member and the talks at Sheffield Kelham Island Museum are a must attend for me, it 'pushes all my buttons'. W. www.stalbansmes.com

The patio outside my back door has collapsed. We did not know this, we might have been out, but the flooring became springy underfoot. Investigating showed a collapsed substructure, and it needed immediate attention, being dangerous and stopping access to the rear garden. The outdoor table and chairs needed be moved, from the space to give the builder room to work (we have the technology...) Consequently it reminded me of the Flanders and Swann song, "We're terribly House and Garden … the garden's full of furniture and the house is full of plants."

The March of Technology! I acquired a test meter some time ago, which was very clever. On connection to a circuit, it automatically decided what the voltage and current were, or the resistance, and presented the results on a screen. I got quite keen on its abilities, so I was quite put out when it failed in service. Unfortunately, it isn't equipped with 'find the fault' circuitry, so it joins the collection of 'to mend' items, (aka junk...)

With respect to my monorail, I at first planned to use double flange pulleys, but then later decided that there was no need, a couple of penny washers, one either side of a plain ball bearing would do the job. and the sheer delight when the idea occurred to me filled the workshop with joy, (lovely girl).

On Track, from **Richmond Hill Live Steamers** announces they have been putting the finishing touches

Photo 3 Darjeeling loco

Photo 4 LNER layout at Doncaster

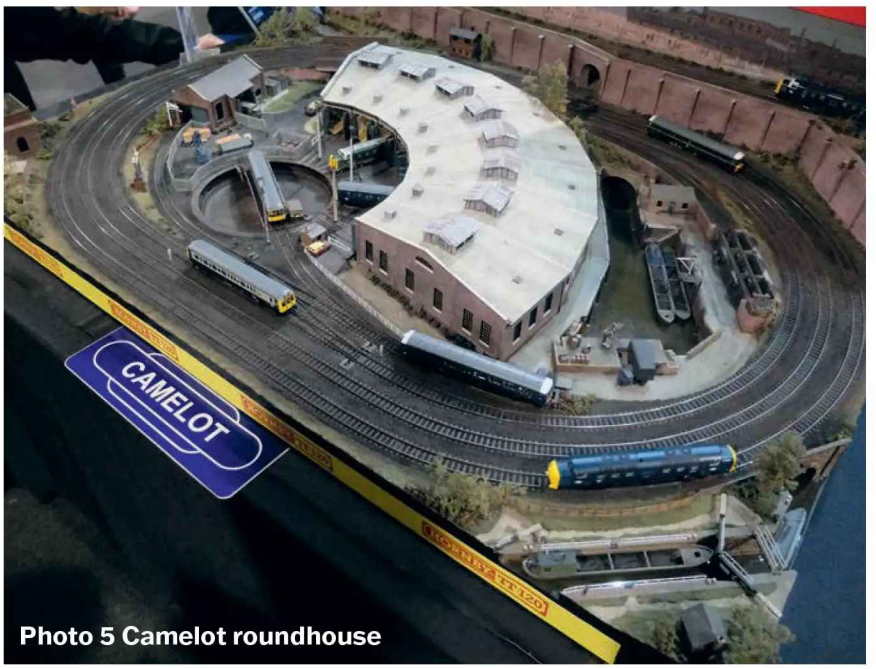


Photo 5 Camelot roundhouse

to their Highland Extension, and a recent Open Day attracted nearly 1,000 visitors. W. www.richmond-hill-live-steamers.tripod.com

Centre Punch, January, from **Andover and District Model Engineering Society** opens with Editor, John Godfrey giving thanks to all contributors who helped make this edition a large one full of ideas and diversity. The track is showing its age, and some sleepers are beginning to rot. The decision has been taken to relay the entire track with composition sleepers, which should last well. A trial section was laid three years ago and shows no adverse effects, so the whole track will be done. A silver birch tree encouraged progress by threatening to fall down, so the track is closed until the job can be finished, hopefully in the Summer. George Ray needed to shorten some thirty M3 screws, so he built a lantern chuck to make the job easier. The forthcoming Bluebell Running Day in April is expected to rival last year's, in which people queued for two hours to buy tickets, and over 1,000 visitors are expected. Doug Rundle describes a generator set on long term loan from a benefactor, which was built on to a truck chassis so that power tools, may be used at remote parts of the track. In cases where the welder is also used, it was mounted on a Lowmac type truck to run with the generator in a works train. Trevor Marks described a railway built on Salisbury Plain in 1916, to study the effect of gas on entrenched troops. Locomotives used were a Fowler, a Bagnall and two Kerr Stuarts, used until the construction was finished, whereupon they were removed. Two 'Protected Simplex' 40 hp locos were used on a daily basis thereafter. Closure was gradual and piecemeal and activities ceased in about 1968. Alan Wood is responsible for the maintenance of the Brimpton Church clock, (It's interesting how many such jobs are pressed upon one when people know you a have a lathe and a workshop...) and he decided to make a synchroniser to automate its operation. Basically, a stepper motor winds a fishing line, to which lead weights are attached, in or out at intervals. This action is preceded by a comparison betwixt a local clock and the time from a GPS satellite, carried out by a miniature computer board which decides whether it is fast or slow, and instructs the stepper motor accordingly. The effect of the weights being added or subtracted to a small tray on the pendulum, ultimately determines the speed of the clock. There are lots more in the 47 pages of this newsletter edition, but I have to call a halt somewhere! W, www.admes.uk

Debs and I went to the Festival of British Railway Modelling at Doncaster and were very impressed. There were thirty layouts, mostly N and Z gauge, with sixty clubs and traders and very many visitors. The ground floor was 'rammed' on the Sunday. This is claimed as the premier model railway event of the year. I noted the presence of garden railways and thought that a Venn diagram would show good synergy, much as did the makers at Sandown Park a few years ago, before they grew large enough to start their own line of shows. In fact, I wonder if there is likely to be any mileage in proposing a joint model engineers and model railways exhibition?

In my opinion, the LNER society had the biggest, and best continuous running track, **photo 4**, whilst in the end-to-end types Camelot featured a ¼ roundhouse and a very neat layout in TT150 scale, **photo 5.** I met David Byrne from *Cock o' the North,* an enthusiast from the P2 rebuilding project for one of the biggest locomotives at a celebration of the smallest! Here is a detail from the Wakefield layout, **photo 6.**

And finally, one for Editor Neil; How many environmentalists does it take to change a lightbulb? 4 - One to change the bulb and 3 to write the environmental impact statement.

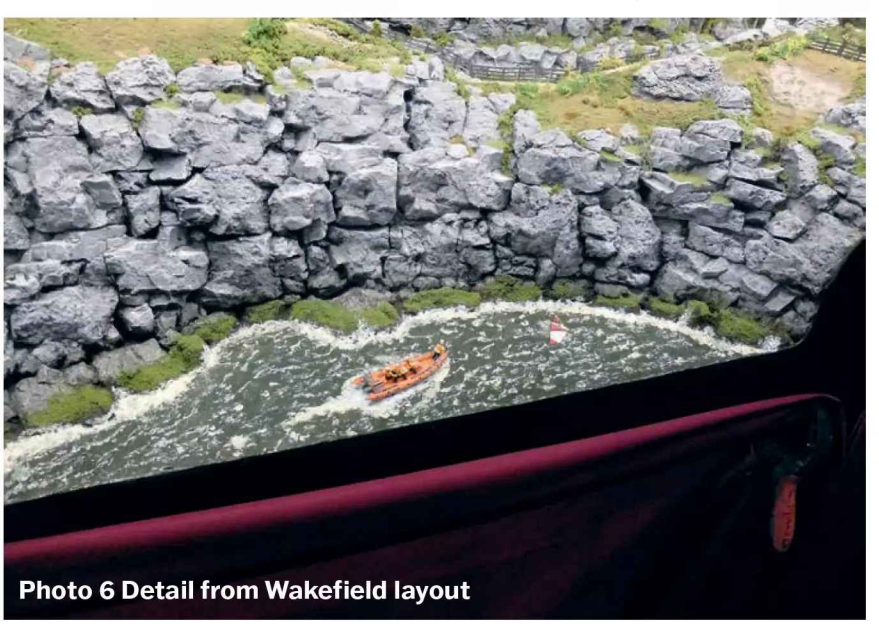


Photo 6 Detail from Wakefield layout

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PARTS AND MATERIALS

Myford Dewhurst switch with mounting bracket. £35. Virtually new Clarke 1hp motor, unused Dunlop taper lock pulley, would suit a myford. £65. All plus carriage. **Email mmatthewsiet@michaelgf.plus.com. Tel. 01304 614015. Sandwich Kent.**

MODELS

MISCELLANEOUS

Hydraulic lift table loco build stand. Hydraulic lift with 5"g rails. Table 40" * 16" Height 15" down, 37" up 4 off 5" dia casters It will have to be collected. loco isn't included, the jack is Similar Machine mart item is £480 £200. **Tel: 07526473230. Email: duncanwebster26@gmail.com. Warrington Cheshire.**

MAGAZINES, BOOKS AND PLANS

Model Engineer Magazines including 23 Exhibition Souvenir Guides. Totalling 1116 editions. Earliest years 1950's and 1960's-not complete.

1970's - 2007 mostly complete. 2008 onwards - most years but not complete. Free to collect. **Email: bankcottage@sky.com. Sheffield.**

WANTED

Wanted: Myford Speed 10, 3 1/4" x 13" or Diamond 10 with chucks, not too worn please. **Tel. 07407 783516. Wallasey.**

Wanted for 1944 Myford Drummond M 3 1/2" lathe double Vee drive pulley 9" 1/8 diameter and 7" 7/8 diameter. **Tel. 07596203581. Cheddar.**

Wanted: Parts for American Watch Tool Company 6mm Lathe. I have an American Watch Tool Company 6mm lathe. Hoping to get a few parts that will fit. Believe collets made by Whitcomb will have a thread that will fit. Also want a tailstock for 6mm AWTC with standard drill chuck fitted. **Email: andy@orinocho.co.uk.**

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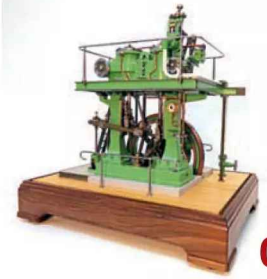

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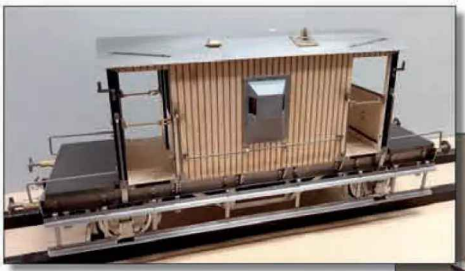

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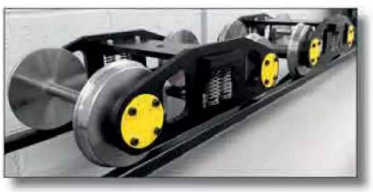

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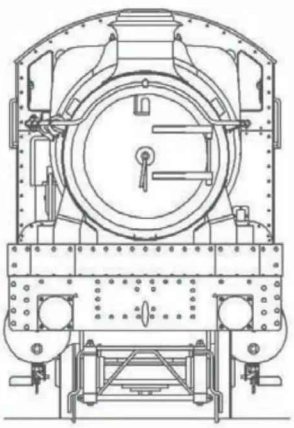

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