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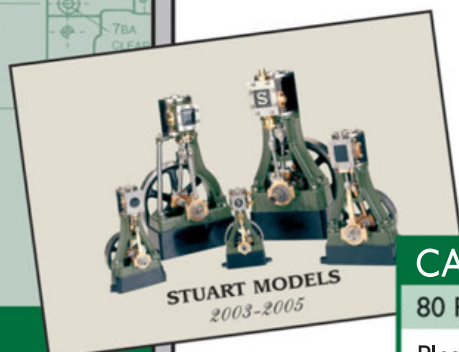


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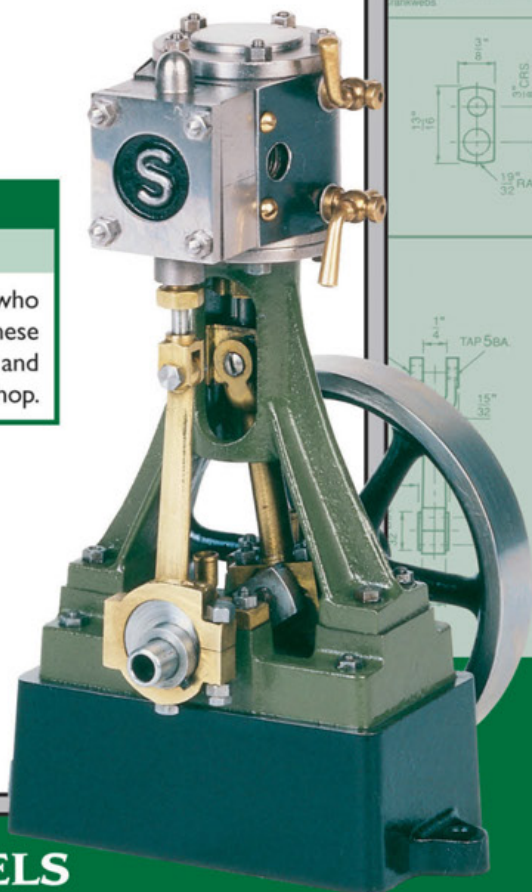
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FRONT COVER

Family fun at the Sweet Pea Rally, Martin Holland on the regulator of grandad Brian's Meter Maid. A full report of this popular annual event is in this issue.

Photo: John Arrowsmith



EDITORIAL

Lots of summer action, but winter is on the way...

Welcome to the September issue of EIM – and yes we know that is a cruel headline to write, especially as your editor is penning these words on an early August evening when EIM Towers is a hot, muggy place to be! Bear with me, there is a point!

This issue of the magazine is more biased towards running models at outside events rather than making things in workshops, with good reason – it's the height of summer and most of our readers will be doing just that, getting out and enjoying their models. Unless you've invested in expensive air conditioning, workshops are hot, stuffy and not that appealing places to shut oneself away in at this time of year, especially with the record temperatures we have been seeing in recent weeks.

So yes, most are out running and reporting the more important events is an important part of our remit – certainly our roving rally reporter John Arrowsmith is being kept busy at present, making up for all those events he hasn't been able to enjoy over the past couple of years due to the dreaded Covid.

However, winter is indeed on the way, and I expect the thoughts of many a model engineer will be turning to those projects they will be tackling in their warm and cosy workshops in the coming months. This leads naturally on to a familiar request from me – if you are tackling something new this winter, keep your camera (or a smartphone, today's phones take perfectly magazine-usable pictures) close by, along with a notepad, and produce something to share with your fellow engineers in our pages. We have payment waiting! And a much depleted feature file which needs bolstering! We'd like to see some new authors too, especially as some of our regulars are having to take a break. On which note, Jan-Eric Nyström's piece giving more details of the pause in his traction engine build has been held back a month due to some technical difficulties – it will be in next month's issue.

Also in next month's issue will be our traditional pull-out guide to the Midlands Model Engineering Exhibition. Well we say traditional, we haven't been able to run it since 2019! We are looking forward to seeing hopefully many of you at the show in October.

Andrew Charman – Editor

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T-slots Dimensions	10mm
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Sweet Pea Rally 2022

Summer is of course the high season for club events and John has been busy this month, including making a return visit to a popular narrow-gauge gathering...

BY JOHN ARROWSMITH



1



2

PHOTO 1: The four-track layout at Fareham showing how all the lines come together – two trains are travelling towards the station.

PHOTO 2: Lakeside Halt – in the background the new 7¼-inch gauge branch heads off towards the unloading bay.

PHOTO 3: First on the track, Malcolm High bypasses the station under the superb footbridge.

PHOTO 4: Nottingham member Nigel Ball approaches the station with his 0-4-2 tender version of Sweet Pea.



3



4

The Fareham Society of Model Engineers was again the host for this annual rally for exponents of Jack Buckler's popular 5-inch gauge 0-4-0 locomotive over the weekend of 18th-19th June. The society was hosting the event for the fourth time and hoping that preparations would all come together to make for a good weekend.

As they say, however, the best-laid plans and such did not quite materialise on this occasion as the attendance at the Rally was down on 2021, the last time Fareham hosted the event. This was likely due to the high cost of travelling and accommodation that is prevalent these days. Those who did attend enjoyed an excellent weekend with plenty of track activity and all the usual good-natured banter that takes place during these events.

Pinch point

The Fareham facilities include an elevated track of about 450 metres and a ground-level 7¼-inch gauge track extending to around 250 metres. The elevated track has been designed so that at one point on the circuit all the routes come together so it is possible that four trains can be passing one another, all going in different directions but all heading to the same main station – very clever (**Photo 1**).

On this stretch of track is another small station, Lakeside Halt, (**Photo 2**) which as well as being the location for the new 7¼-inch gauge access and unloading track also has a gated pathway which leads to the adjacent caravan park, so that residents can



easily access the railway without using the main road.

On my arrival on Saturday morning the steaming bays were already busy with locomotives being prepared for their time on the track. There is always a good-natured informal competition at these rallies to be the first loco on the track and again it was Malcolm High who proved victorious with his tender version of the design 'Adele Marie' (Photo 3). He was quickly followed into action by Nigel Ball from Nottingham with his 0-4-2 tender design 'Ernie' (Photo 4).

It was good to see a number of family groups here and the Holland family from Oxford had three generations enjoying their driving time. First of their number on the track was Paul Holland (Photo 5) followed by his dad Brian (Photo 6) then his grandson Martin took the regulator as illustrated on the cover of this month's EIM.

Family values

Jim Alderman from the Worthing club is a regular at these rallies and this year he had both his sons with him as well and again as a family they all enjoyed their time at the Fareham club. Jim's loco 'Vera May' is another 0-4-2 tender version of the Sweet Pea which performed to its usual high standard (Photo 7). Peter Harrison and son Chris from the Reading Society were also taking an active part in the day's proceedings (Photo 8).

Nigel Linwood from the Hereford SME soon had the club's 'Sweet Jay' in action and was performing well during the day (Photo 9). I had a drive as well and I was very pleased with the way the loco handled the track.

There is always an alternative attraction at these rallies and among the extras this year, one of the host club's members had brought along ►

PHOTO 5:

Paul Holland drives round the lakeside curve back towards the station.

PHOTO 6:

A pensive-looking Brian Holland drifts round the bottom curve with his immaculate 'Metre Maid' version of the Sweet Pea.

PHOTO 7:

Jim Alderman and his sons prepare his engine for its first run of the day.

PHOTO 8:

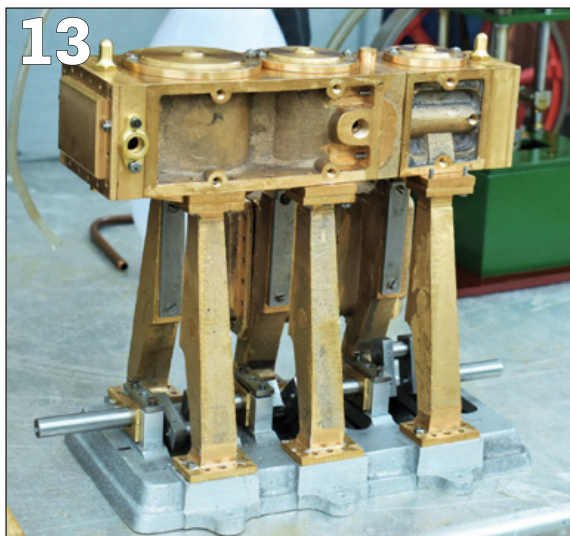
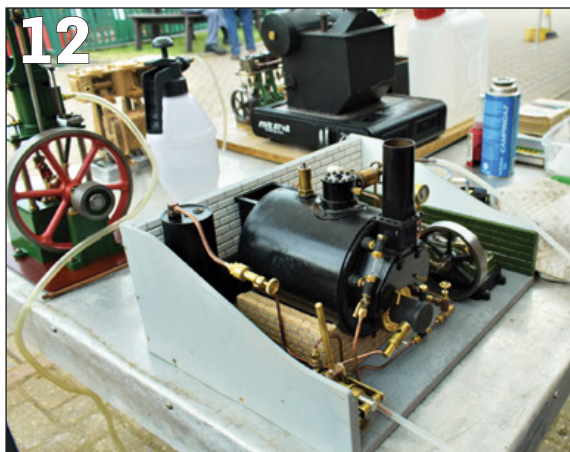
Chris Harrison from Reading powers away from the station.

PHOTO 9:

'Sweet Jay' the Hereford club loco with Nigel Linwood in charge climbs the bank towards the tunnel.

Photos by the author





his 1930 Austin 7 car (Photo 10). This splendid example has been in the same family for 85 years and owner Clive Addis told me that his grandfather had bought it for £130 and then proceeded to show me the actual bill. Grandfather had managed to get a discount, it was originally priced at £150. Clive had renovated

the Austin 40 years ago and it looked pristine, as if it had come straight out of the showroom.

Alongside the Austin was a 1928 BSA 350 motor cycle (Photo 11) which had been renovated from poor condition again by a member of the Fareham club, Chris Jeffries – it looked a superb machine.

What is Sweet Pea?

The Sweet Pea was developed by Jack Buckler in the mid 1970s as a 5-inch gauge model version of a typical Bagnall 0-4-0ST narrow gauge contractor's locomotive.

The construction of Jack's model was serialised in EIM from October 1981 and the entire series later collected together in a book.

Castings were made available by Blackgates Engineering and over the years many hundreds of Sweet Peas have been built, some builders greatly modifying the basic design as photo 19 of this report shows! The annual rally began with an event at Eggborough, Leeds in 1993.

The Sweet Pea phenomenon is not only confined to 5-inch gauge – Jack later designed versions to 3½-inch gauge, dubbed 'Sweet Violet', and a larger 7¼-inch gauge model called 'Sweet William.'

Andrew Charman

Stationary attraction

There was also a nice display of stationary engines put on by club members Charles Read and Brian Fisher. Both had on show steam boilers which had been recovered from poor condition – now fully restored and tested they were providing power for a couple of engines (Photo 12).

A triple expansion engine following the John Bertinat design and currently under construction by Charles Read is coming along nicely and will be a fine engine when completed (Photo 13).

The only 7¼-inch gauge loco to the Sweet Pea design present and in steam was that of Phil Owen from Blackgates – he made sure his engine was used to its maximum during the weekend with a number of different drivers being given the pleasure of taking the engine round the track. My photo shows Robert Pierce at the regulator while departing from the station (Photo 14).

Standing in the yard however was a 7¼-inch gauge 'Tinkerbell', owned by Wally Pearson, it looked to be a good example of the type (Photo 15). Members of the Fareham club have built a very convenient unloading facility for these larger engines on the approach road into the site. This ensures there is plenty of room to safely unload and then progress onto the main track circuit (Photo 16).

The climax of the weekend is traditionally the awarding of the Jack Buckler Memorial Trophy and this is presented to the locomotive most considered to be a model built as Jack Buckler would have wanted. This year the engine built and driven by Malcolm High was selected and



15



16



17

PHOTO 10: additional attraction – the 1930 Austin 7 owned by the family of Clive Addis for a mere 85 years.

PHOTO 11: Also on display was this 1928 350cc BSA motor cycle restored by Fareham club member Chris Jeffries.

PHOTO 12: Brian Fisher's restored boiler plant was providing steam for his Steeple engine.

PHOTO 13: Another display item was this fine triple expansion engine under construction by Charles Read.

PHOTO 14: Robert Pierce starts the 7 1/4-inch gauge 'Jacquie O' away from the station.

PHOTO 15: Standing in the station yard was this fine 7 1/4-inch gauge 'Tinkerbelle' owned by Wally Pearson.

PHOTO 16: The well thought-out cover for the new 7 1/4" gauge unloading lifting table.

PHOTO 17: Malcolm High with Jacquie Owen after receiving the Jack Buckler Trophy, the end of the branch line seen in photo 2.

PHOTO 18: Plenty of open running line – a view from the footbridge towards the twin bore tunnel.

PHOTO 19: Taking the Sweet Pea versatility to extremes – Phil Brien's unique 2-4-4-2 electrically-powered steam outline locomotive.



18

Malcolm was duly presented with the traditional cut-glass Vase and a memorial polo shirt.

Caught by surprise

Malcolm has an unflappable sort of character but this award caught him completely unawares and he accepted the trophy from Jacquie Owen with an almost emotional astonishment (Photo 17) – well done to Malcolm.

With the completion of that little ceremony the task of packing everything up and making long journeys home began. Next year's rally will be held over the weekend of the 3rd and 4th June on the Sheffield SMEE's splendid track at Abbeygate. Finally my thanks go to all the members at Fareham, especially the ladies who worked very hard keeping the steam levels correct! It was a well organised and enjoyable event, thank you all. **EIM**



19

A Steam Whistle and Whistle Valve

Regular readers of Rich's writings will not be surprised to discover his efforts to add an audible alert system to his locomotive took him down an innovative route...

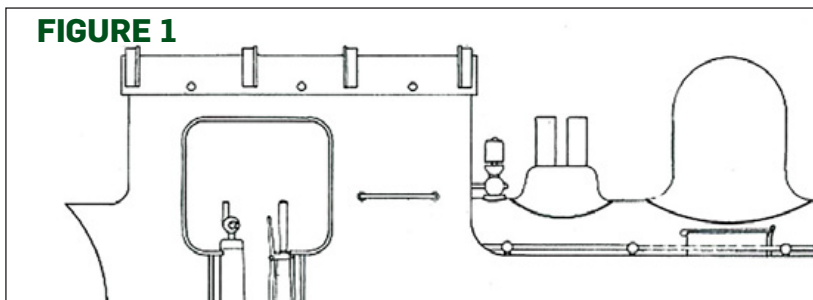
BY RICH WIGHTMAN

To run a steam locomotive at the club track you must have a whistle, an audible means of approach. Electric and internal combustion engine locomotives are sorted in this respect as they have horns (the electric sort not antlers).

Looking at page one of the plans, the general arrangement sheet, of my current loco build 'Chub', I noticed that it has a nice little bell-type whistle fitted into a bush on top of the boiler just behind the two safety valves (Figure 1). When I built the boiler this



FIGURE 1



LEAD: Two stainless steel whistles and the brass prototype.

FIGURE 1: Diagram on Chub plans showing the bell whistle

PHOTO 1: Typical brass tube whistle recommended for fitting in cab.

PHOTO 2: Conway's whistle, hidden under the running board.

PHOTO 3: Conway's commercial whistle valve mounted in cab atop the firebox.

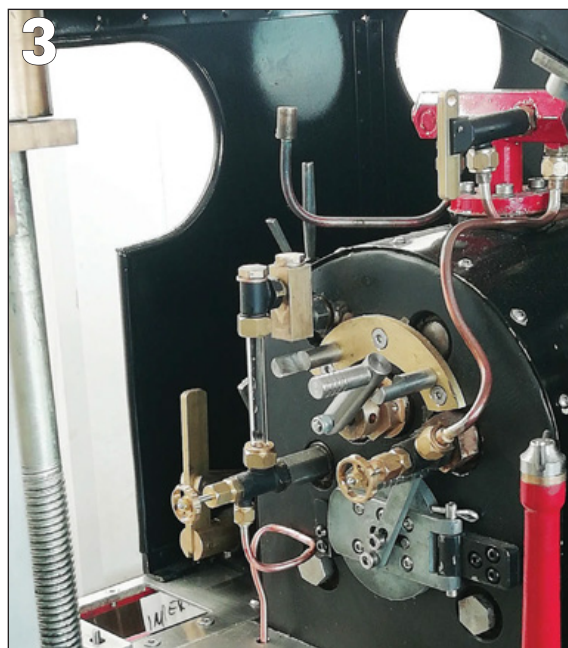
Photos and diagrams by the author

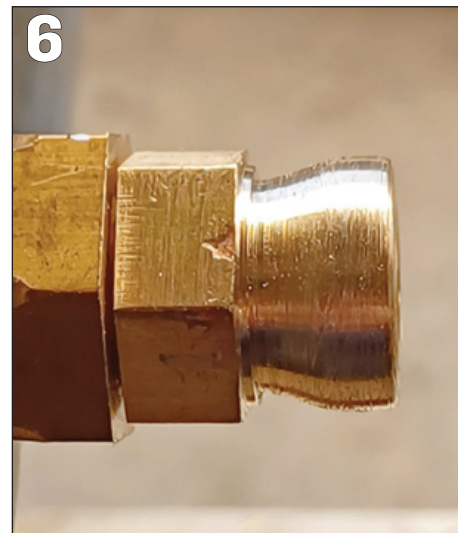
bush was clearly shown on the plans so was included. But on page 10 of the plans it shows a tube type of whistle similar to that in Photo 1 which it recommends should be fitted vertically inside the left-hand rear corner of the cab. Not the best place to have hot steam emitting forth I thought.

On my previously built 'Conway' I have fitted the whistle out of the way underneath one of the running boards (Photo 2), operated by a little whistle valve fitted into the turret (Photo 3). Looking again at the general arrangement drawing I quite fancied the cute little bell whistle. Can whistles be described as cute? Maybe not but anyway I really liked the idea.

So my first port of call of course was the internet to see if there were any plans out there. I found lots of photos of bell-type whistles, mainly vintage and full-size, but very little in the way of information or plans on a miniature one could I find.

I started jotting down a few plans and ideas of a miniature whistle that I thought would work. I decided not to include the little operating valve built into the body of the whistle but to use a whistle valve fitted into the turret the same as on Conway, and to connect that to the whistle via a short length of pipe. In the size of whistle I





intended to make I thought that incorporating a valve into the body would entail some really small parts that would be too difficult for my fumbling digits.

I sketched out what I thought would work and went ahead and made one. Would it work? In a word no, it didn't. I would like to briefly show you my first attempt. I find it useful, and I hope my fellow model engineers do, to see mistakes made by others so that I don't go down that path myself.

I turned and threaded a piece of 1/2-inch brass hex to give a 3/8-inch x 26 TPI and screwed it into a bit of tapped brass held in the three-jaw chuck. To create an internal chamber in the body of my first attempt I drilled into it with an end mill. I then made a cap with a small locating boss (Photo 4) and silver soldered the two pieces together (Photo 5), thus creating the internal chamber.

Back in the lathe I profiled it a little to fancy it up (Photo 6). A central hole was drilled and tapped M3 followed by six 1/16-inch holes equally spaced drilled on a 0.120-inch radius through into the chamber (Photo 7).

PHOTO 4:

Brass end cap for the first attempt at a whistle.

PHOTO 5:

The end cap silver soldered in place.

PHOTO 6:

Profiling the whistle body.

PHOTO 7:

Drilling six equal spaced holes for steam passages.

PHOTO 8:

Whistle made up and sitting on the boiler.

FIGURE 2:

Showing how steam travels through the whistle to produce sound.

The bell is made from 1/2-inch round brass which I subsequently used on the Mk2 whistle so is shown on the drawing and will be described later. The side of the body was drilled through into the chamber and tapped 3/16-inch x 40 TPI. Assembly was by means of a length of M3 stainless steel threaded rod and stainless steel nuts. A brass tube threaded 3/16-inch x 40mm was screwed into the body (Photo 8).

Filled with confidence I blasted a bit of air into it fully expecting to hear a shrill whistle. No... all I got was the sound of blasting air. I messed about adjusting the bell up and down for a while until I admitted defeat and went back to the drawing board.

Further research ensued. So how does a bell-style steam whistle actually work? Having made some more research from what I understand (perhaps someone would care to elaborate on the physics) steam pressure enters the lower chamber where it is forced through the small gap around the edge – here it accelerates due to the small opening and is directed across the mouth and towards the lip of the bell.

Turbulence is created, some steam exits the mouth and some enters the bell. It is this turbulent action that causes the bell to resonate. I think I'm right but will stand correction. The drawing, (Figure 2) hopefully shows what happens.

If you take a look at the first one I made you can see that it would never work. The air stream was virtually straight up into the bell and not aimed at the lip.

Armed with my new-found knowledge I set to work on the Mk 2 version (Figure 3). The body is made from a piece of 1/2-inch brass hex 1 5/16-inch long. Turn one end down to 3/8-inch x 0.312-inch and thread 3/8-inch x 26mm. This is the size of the bush in the boiler – although the whistle will not be getting its steam from here I still intend to mount it in the boiler purely for cosmetic reasons. The whistle body therefore is actually a bung so is not drilled through.

This threaded end you can make to suit your own needs – I have a stub of brass hex drilled and tapped 3/8-inch x 26 TPI that I use in the lathe

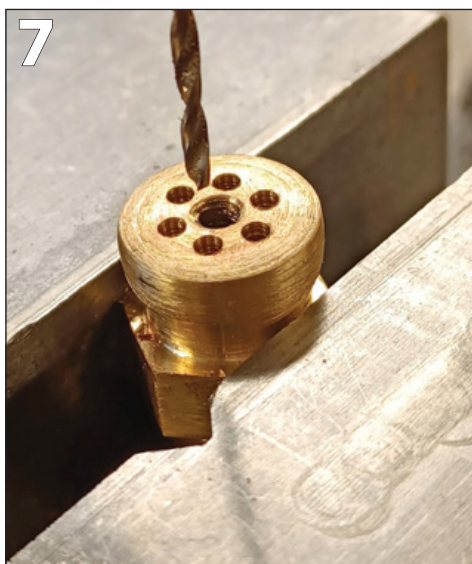


FIGURE 2

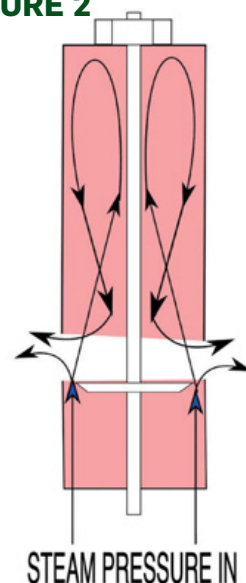
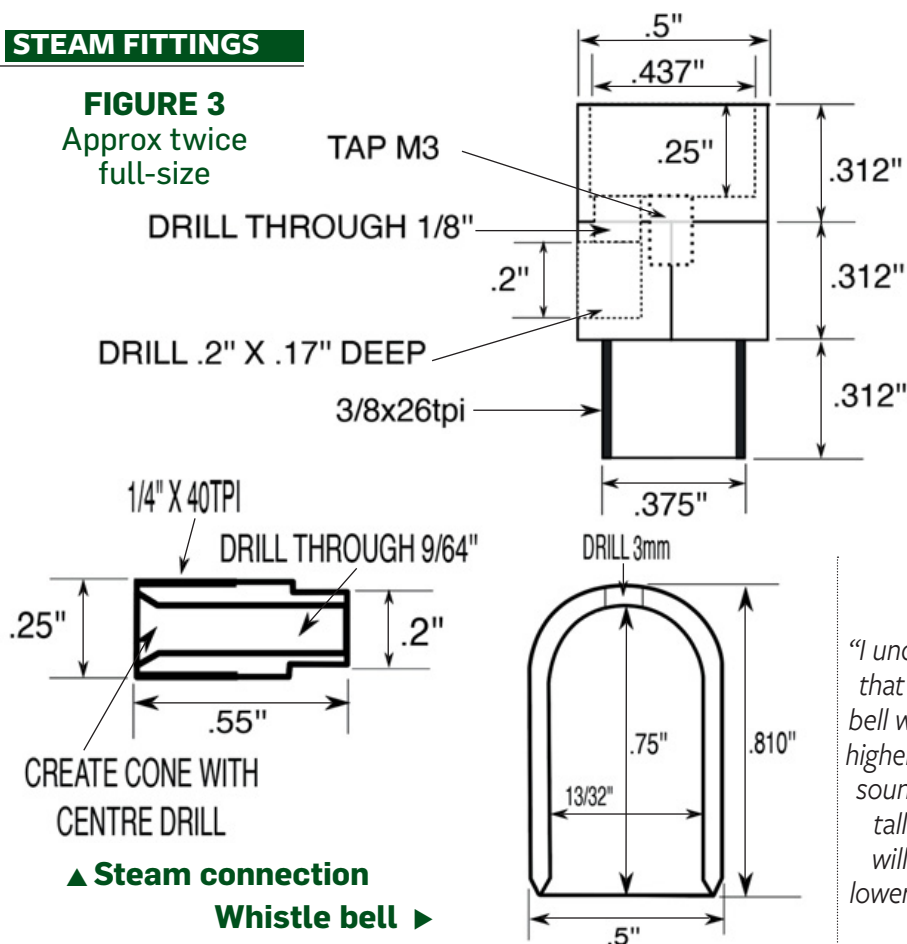
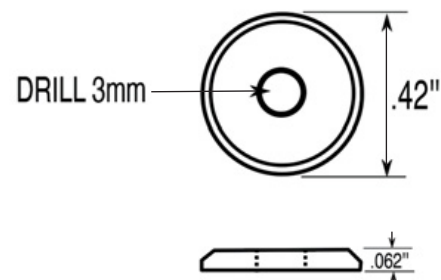


FIGURE 3

Approx twice full-size

**Whistle disc**

shown the diameter on the plans as 0.2-inch which is approximately a $1\frac{3}{64}$ -inch or 5mm drill.

Now mount the body vertically and drill through to the cross-drilled hole with a $\frac{1}{8}$ -inch drill aiming to get the hole as close to the edge as possible (**Photo 11**).

The steam connection is $\frac{1}{4}$ -inch round brass threaded $\frac{1}{4}$ -inch x 40mm and drilled through $\frac{9}{64}$ -inch or 3.6mm, then centre drilled to create a seat for the pipe cone (**Photo 12**). With the parting tool turn down to 0.2-inch to create a boss then part off to 0.55-inch in length. The connector can now be silver soldered into the body (**Photo 13**).

The disc, made from $\frac{1}{2}$ -inch round brass, is firstly turned down to 0.420-inch (**Photo 14**). This must be accurate as it fits into a 0.437-inch hole to leave a 0.0085-inch gap around the edge. Chamfer the edge of the disc and drill a 3mm hole in the centre. Part off to 0.062-inch.

The bell is also made from $\frac{1}{2}$ -inch round brass. I used a ball turner to round the end off for cosmetic reasons but it could be shaped by other methods.

Centre drill and drill 3mm (**Photo 15**). Part off, reverse in the chuck and machine to a length of 0.81-inch. Centre drill then drill to a depth of $\frac{3}{4}$ -inch with a $\frac{13}{32}$ -inch drill measured from the point of the drill (**Photo 16**). We don't want to go right through do we Richard!

Chamfer the internal edge with a countersink (**Photo 17**) and the external edge with a file. **Photo 18** shows the finished bell. I haven't experimented as yet but I understand a short bell will give a higher-pitched sound and a taller bell will give a lower pitch.

"I understand that a short bell will give a higher-pitched sound and a taller bell will give a lower pitch..."

for screwing small parts into so the body is mounted in that.

The other end is turned to $\frac{1}{2}$ -inch x 0.312-inch. Using a $\frac{7}{16}$ -inch end mill cutter drill in to a depth of $\frac{1}{4}$ -inch (**Photo 9**). While it is in the

lathe drill the centre 2.5mm to a depth of $\frac{3}{16}$ -inch and tap M3.

Move the body over to the milling machine and mount it horizontally. Drill into the hex part to a depth of $\frac{3}{16}$ -inch deep (**Photo 10**). I have

FIGURE 3:

Constituent parts of whistle.

PHOTO 9:

Drilling the body with an end mill.

PHOTO 10:

The completed and cross-drilled whistle body.

PHOTO 11:

Drilling the steam passage, as close to edge as possible.

PHOTO 12:

Machining the steam connection.

PHOTO 13:

Steam connection silver soldered into the body.



**PHOTO 14:**

Turning the whistle disc.

**PHOTO 15:**

Bell rounded and drilled 3mm.

**PHOTO 16:**

Drilling out bottom of bell.

**PHOTO 17:**

Chamfering the internal edge.

they are all over the floor and if you ask nicely they will give you a handful, for free.

Firstly I did a bit of research into Schrader valves. It's not easy to find the specifications but if you persist and go through several pages you can ►

To assemble the whistle firstly screw in a length of 3mm stainless-steel threaded rod. Next screw on a stainless-steel nut followed by the disc chamfer-side down. Adjust the nut so that the disc is flush with the top of the body then lock it in place with another nut.

Screw on another nut followed by the bell and then another nut to lock it in place. Leave a gap of about 0.087-inch between the bell and the body. A bit of trial-and-error adjusting of the gap will be needed to tune the whistle. With the whistle mounted in the vice I gave it a squib of air and nearly deafened myself – it emitted a loud shrill whistle way beyond my expectations. You can watch a video of the whistle at <https://bit.ly/3cL5fTt> The sound quality isn't too good, maybe too high pitched for my phone's recording capabilities but you will get the idea.

Now that I knew the whistle worked I replaced the nuts on the threaded rod with lengths of 4mm outside diameter 3mm inside diameter brass tube cut to the correct length and added a brass domed nut on top. Small adjustments to the bell height can be made by adding a washer as a spacer (**Photo 19**). A test fit of the

whistle in the boiler bush is shown in **Photo 20**.

At this stage I assumed that the whistle would react differently under steam instead of air so I left it at that for now.

The whistle valve

A problem I had when building Conway was the whistle valve. It leaks – not massively but a permanent fizz. I tried all ways to solve the problem, re-machining the seat, adding a new ball and such like, but to no avail. I understand, talking to some members of our club, that this is a common problem with whistle valves.

So I designed and built a new valve (**Photo 21**) which works okay but proved complicated and fiddly to make. Therefore I decided to have another look at whistle valves and to see if I could improve them, but nothing I came up with seemed to be a simple but good solution.

A few days later quite by chance I was outside with my little compressor checking the tyre pressures on our cars when a bolt of lightning hit me. Schrader valves as fitted into car tyres – why not? They don't leak, will stand a high pressure and are cheap. In fact if you go down to your local tyre shop

PHOTO 18:

The finished bell.

PHOTO 19:

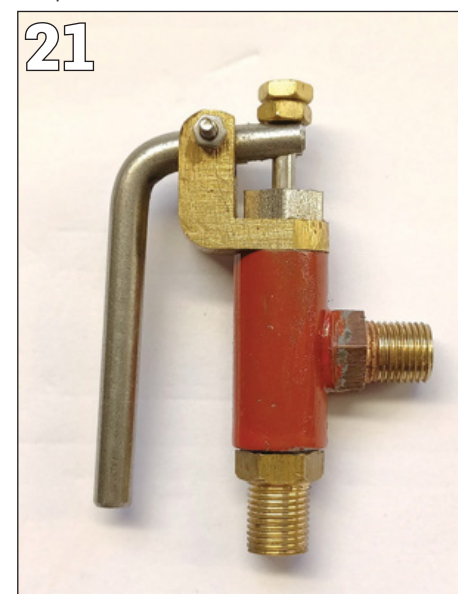
Assembling the whistle parts.

PHOTO 20:

Test fit of the whistle on the loco boiler.

PHOTO 21:

Whistle valve made to Rich's own design.





dig up some information. One of my concerns was whether the rubber seals would stand up to steam temperature. The answer is probably yes but they are available with different coloured



"This would be my first attempt at tap making and as it turned out it was not as difficult as you might think..."

PHOTO 22:

A tubeless tyre valve stem and internal brass.

PHOTO 23:

Half brass stem machined away.

PHOTO 24:

Showing the tapered seat on the valve stem and valve core.

PHOTO 25:

First stage in making a tap, turning down silver steel rod.

PHOTO 26:

Slight taper turned on the other end.

PHOTO 27:

The 36TPI thread screwcut on rod.

PHOTO 28:

Three flutes cut in each tap.

seals which have a different temperature range. From what I could ascertain using information gleaned from the internet the colour code is as follows – note that this is not definitive, just a guide;
Black: Max 10 bar (147psi) -65 to 225 degree temperature rating
Green: 30-800 psi -10 to 300 degree temperature rating
White: 80-4000 psi -40 to 225 degree temperature rating
Blue: 30-500 psi -40 to 450 degree temperature rating
Brown: 30-3000 psi -40 to 450 degree temperature rating

The valve cores are of course corrosion-resistant for obvious reasons and the bodies are made of brass. Some are nickel plated and are intended for use in aluminium valve stems of tyre-pressure monitoring systems as fitted to some modern cars.

Schrader valves offered a viable solution to my problem so the first thing I did was to find out what thread the valve core is. Here proved to be the first problem. The valves are not a standard thread, presumably for safety reasons made so that nothing else will fit. A quick check of a few suppliers that I use had a single tap to cut a suitable thread priced between £18.00 and £30.00! For experimental work that's a bit pricey. The thread by the way is 0.209-inch x 36 TPI, sometimes referred to as a 5V1-36.

Undeterred I investigated further. I took a tubeless tyre valve stem and



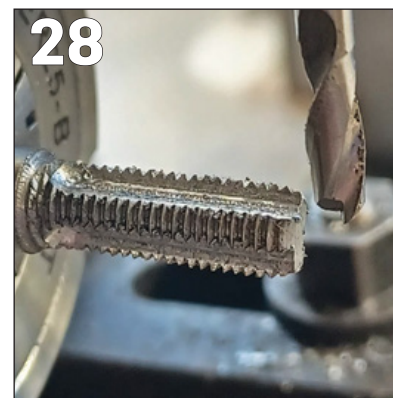
removed the rubber casing – I have a wire brush fitted to my grinder which made short work of the rubber outer. **Photo 22** shows the valve stem before and after. I then mounted it in the milling machine and machined away half its diameter to have a look inside, (**Photo 23**). The valve core has a slight taper at its seal and so does the valve body which can be seen in **Photo 24**. Right then, I concluded two things would be needed to experiment with Schrader valves, a tap and a cutter to machine a tapered seat in the body.

Starting with the tap, I decided to have a go at making one. This would be my first attempt at tap making and as it turned out it was not as difficult as you might think.

A piece of 1/4-inch round silver steel (drill rod to our American friends) was held in a collet in the lathe and very carefully turned down to 0.210-inch (**Photo 25**) then polish finished to 0.209-inch with fine Wet and Dry paper held on a small flat file. The silver-steel bar was reversed in the collet and the same procedure of turning adopted again to the other end. On this end I knocked the top slide over a few degrees and machined a slight taper on the first 1/4-inch or so (**Photo 26**).

Next I screw-cut each end to 36 TPI (**Photo 27**), the idea being to make a taper and a plug tap. Each tap must next have three flutes machined in it so I held the rod in a collet mounted in my hexagonal block. Using a 1/8-inch round-nosed cutter I machined the three flutes in each tap 0.036-inch deep, (**Photo 28**). I think a normal cutter would do just as well as a round-nose. Each tap was then parted off to 2 1/2-inch in length and held in a square collet block each tap had a square machined on its end, (**Photo 29**).

The taps now needed to be hardened. When carrying out this process I turn the lights off in my workshop and rely on daylight only to observe the colour change. The taps are heated slowly from the shank end until the metal is a nice colour of boiled carrots, I then gently keep the heat there for two minutes or so to





ensure they are evenly heated right through. I then quench them in clean cold water with a swirling action, (Photo 30).

Next I polished the shank and flutes, not the threads, with some fine Wet and Dry. The taps needed to be tempered next, and polishing helps to make the colour change obvious. Again starting at the shank end I gently heated to a straw colour and worked the heat along to the tap's threaded end, taking care not to overheat it. They were again quenched in cold water followed by a final polish to clean them up, (Photo 31).

Now for the moment of truth, would they work? I found a bit of ½-inch square brass and drilled a 4.6mm hole in it. I calculated the tapping-hole size from the following data gleaned from the internet – note the use of a combination of imperial and metric measurements:

Internal thread = 0.209-inch (5.3mm) x 36 TPI (0.706mm pitch)
Using the metric measurements
5.3mm – 0.706mm = 4.594mm, a 4.6mm drill being near enough

I use a home-made tapping guide in the milling machine which I have found very useful and which helps prevent breaking taps.

I used the taper tap first which cut surprisingly well, followed by the plug tap which also cut very well, (Photo 32). A trial fit of a Schrader valve proved to be a perfect fit, (Photo 33) – it's a nice feeling when a plan works.

The taps cut the brass very well but I wasn't willing to try them in steel at this time. Okay, I now had a tap that worked so how to cut the tapered seat. A bit more research and I came across a very useful page from Schrader valves (www.sunairindustrial.com/catalogs/valves_cores.pdf) This provided a very useful drawing giving all dimensions as shown in Figure 4.

The D cutter I made from ¼-inch round silver steel (Figure 5). I very carefully turned the rod down to 4.6mm (0.181-inch) the tapping drill size, aiming for a really good finish



"The taps are heated slowly from the shank end until the metal is a nice colour of boiled carrots..."

PHOTO 29:
Square machined on each tap end.

PHOTO 30:
The two taps after hardening...

PHOTO 31:
...and tempering.

PHOTO 32:
Testing the taps.

PHOTO 33:
A trial fit of a Schrader valve in the tapped hole.

FIGURE 4:
Valve core dimensions.

FIGURE 5:
Design drawing of the D-bit.



(Photo 34). Then I turned down to 0.145-inch for the first ¼-inch (Photo 35). The top slide was then knocked over to 8 degrees and the taper turned (Photo 36).

Now I polished the D bit. Moved over to the mill it must have exactly half, 0.0905-inch machined away (Photo 37). Too much will leave the tool undersized and not enough will



FIGURE 4

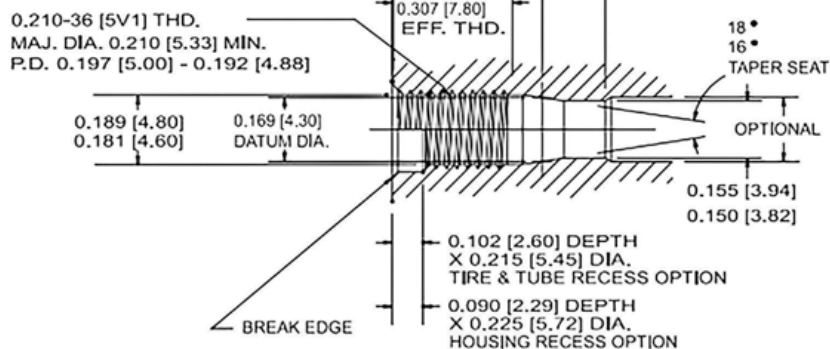
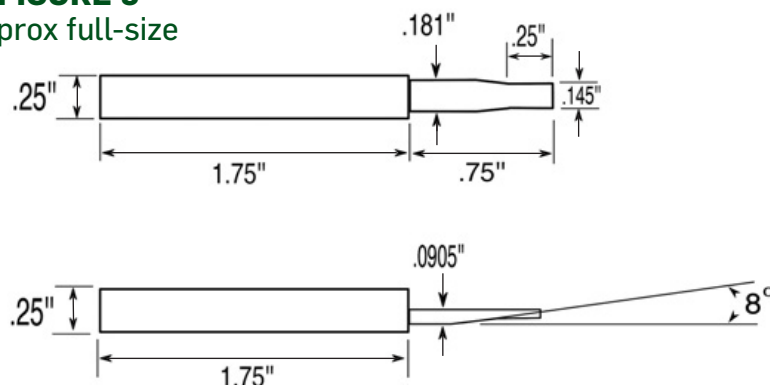


FIGURE 5
Approx full-size



WHAT IS AVAXHOME?

AVAXHOME-

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

Unlimited satisfaction one low price

Cheap constant access to piping hot media

Protect your downloadings from Big brother

Safer, than torrent-trackers

18 years of seamless operation and our users' satisfaction

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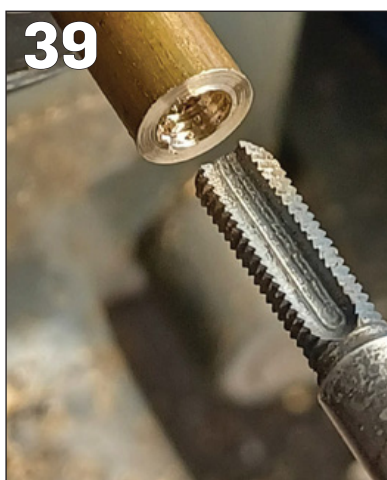
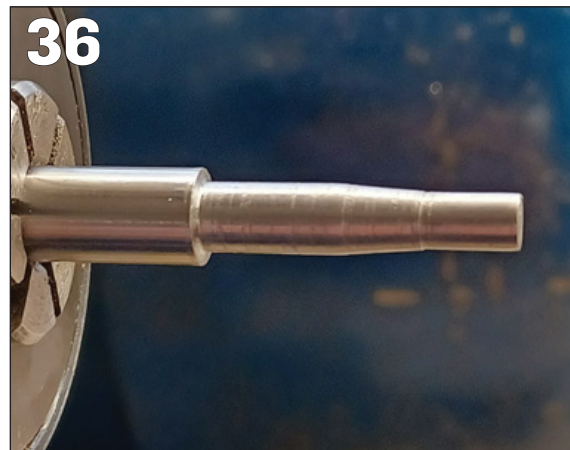
One site



AVXLIVE ICU

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mean the tool won't cut. I then hardened and tempered the tool in the same manner as the taps.

A piece of $\frac{5}{16}$ -inch round brass held in the lathe was drilled through with a 3.4mm drill followed by the D cutter. It cut beautifully (Photo 38) and was followed by the taps to cut a thread (Photo 39). A trial fit of a Schrader valve proved successful (Photo 40).

This might sound like a lot of trouble to go through but once I had figured out how to do it making the taps and D-bit was only a couple of hours' work. Back in the mill I machined away half of the test piece to have a look inside (Photo 41). A Schrader valve in the test piece is shown in (Photo 42).

Now that I was happy with the taps and cutter it was time to make a whistle valve. I wanted to make it pretty much along the lines of the commercial one. For the valve holder a piece of $\frac{5}{16}$ -inch hex brass was turned down and threaded $\frac{1}{4}$ -inch x 40TPI for $\frac{3}{8}$ -inch. I then centre-drilled and drilled through 3.4mm followed by the D-bit and then the taps (Photo 43).

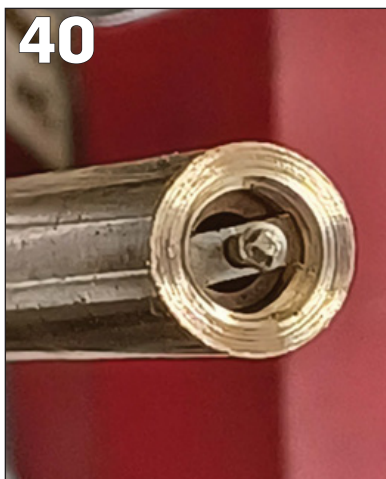


PHOTO 34:

First stage turning of the D-bit...

PHOTO 35:

...followed by the second stage...

PHOTO 36:

...and the third and final stage.

PHOTO 37:

Exactly half of the rod machined away to create D-bit.

PHOTO 38:

Making a test cut with the D-bit.

PHOTO 39:

Hole cut by D-bit has thread tapped in it.

PHOTO 40:

A Schrader valve is tried for fit in the hole.

PHOTO 41:

Half the test piece machined away to show its interior.

PHOTO 42:

Interior view of a Schrader valve in the test piece.

I parted off to $\frac{3}{4}$ -inch and screwed it into a piece of brass hex tapped $\frac{1}{4}$ -inch x 40TPI. The other end is turned down to $\frac{1}{4}$ -inch and threaded $\frac{1}{4}$ -inch x 40 for $\frac{1}{4}$ -inch. Note the drawing shows the first stage of machining only. This end is drilled $1\frac{1}{64}$ -inch, 0.420-inch deep to give the Schrader valve a little clearance. Photo 44 shows the valve holder with its Schrader valve fitted.

The body starts life as a piece of $\frac{1}{16}$ -inch round brass turned down to $\frac{5}{16}$ -inch for a length of $\frac{7}{8}$ -inch. I drilled and tapped $\frac{1}{4}$ -inch x 40TPI to a depth of $\frac{1}{4}$ -inch (Photo 45). This was parted off and finished to $1\frac{1}{4}$ -inch. It was then reversed in the lathe, held in a $\frac{5}{16}$ -inch collet and drilled and reamed $\frac{1}{8}$ -inch (Photo 46).

In the mill the sides were machined away and a $\frac{1}{8}$ -inch slot cut through (Photo 47). This was then cross-drilled $\frac{1}{16}$ -inch for the lever pin (Photo 48). The body was cross-drilled and the steam connection silver soldered in.

The lever is a piece of $\frac{1}{4}$ -inch x $\frac{1}{8}$ -inch brass flat bar drilled for the $\frac{1}{16}$ -inch pin and drilled $\frac{1}{8}$ -inch for attaching a chain.

The whistle valve was assembled by screwing in a Schrader valve (I used a Schrader valve with a green seal) into the housing and then by screwing the housing into the body. I used a copper washer here to make





disassembly easier but thread seal will do just as well.

A piece of 1/8-inch round stainless-steel rod was pushed into the body (with a bit of trial and error to get the length correct) followed by the lever and pin. **Photo 49** shows a commercial valve on the left and the new whistle valve on the right.

It was time to test it. I mounted the whistle and valve on a bit of scrap aluminium angle and made up a short 1/8-inch copper pipe to join the two. My air line was connected to the whistle valve and the pressure turned on. I don't have a pressure regulator on my air line so about 130psi was used – a good sign, the valve didn't leak. A quick press of the lever and the whistle let forth its shrill and very loud whistle. A video of this test can be watched online at <https://youtube.com/shorts/eLgOMiog3iE>

I thought I would have to wait until the loco was finished and in steam to try my new whistle and valve but as luck would have it my good mate and fellow model engineer Julian had just completed a vertical boiler, testing purposes for the use of – splendid, a visit was duly arranged to test the whistle under live steam.

Julian has a ball valve on his boiler so that items can be piped up and removed if necessary while the boiler is in steam. We connected the bell whistle and whistle valve to the boiler



PHOTO 43:
Machining the valve holder.

PHOTO 44:
The completed valve holder.

PHOTO 45:
Next step was to machine and tap the valve body.

PHOTO 46:
This was drilled and reamed...

PHOTO 47:
...and the sides and slot then machined into it.

PHOTO 48:
Cross drilling for the lever pin.

PHOTO 49:
A commercial valve on the left. Rich's valve on the right.

PHOTO 50:
The whistle and whistle valve connected to the test boiler.



(**Photo 50**) and opened the isolation ball valve. The boiler was running at 80psi and more good news, there were still no leaks from the valve. Pressing the operating lever resulted in a very loud shrill whistle – again a bit of video of the steam test can be seen at <https://bit.ly/3vi7kwv> – a resounding success if you will pardon the pun. Once again the sound quality isn't too good but you will get the idea. The whistle and whistle valve were left connected to the boiler for a half-hour or so with no leaks whatsoever.

The prototype proving a success, I made two more whistles from stainless steel, as pictured at the start of this feature. Each has a slightly different length of dome, 0.842-inch and 0.957-inch and each a slightly different tone. Both worked perfectly. **EIM**



Tender Bender

Father-and-son team Peter and Matthew complete their 'universal' bending tool project in the proper manner, by trying it out on the kind of jobs it was created for...

BY PETER & MATTHEW KENINGTON Part Four of a short series

The Tool in Use

Now comes the exciting bit – at least it was for us after many weeks of construction (weekends-only, I hasten to add). We decided to 'jump in at the deep end' and try out the 'sharp bending' configuration – this is the most challenging thing to do well and we wanted to understand both how accurately we could locate bends and just how 'sharp' they would be, along with the general visual impression of the result and the degree of error from 90 degrees of the resulting piece.

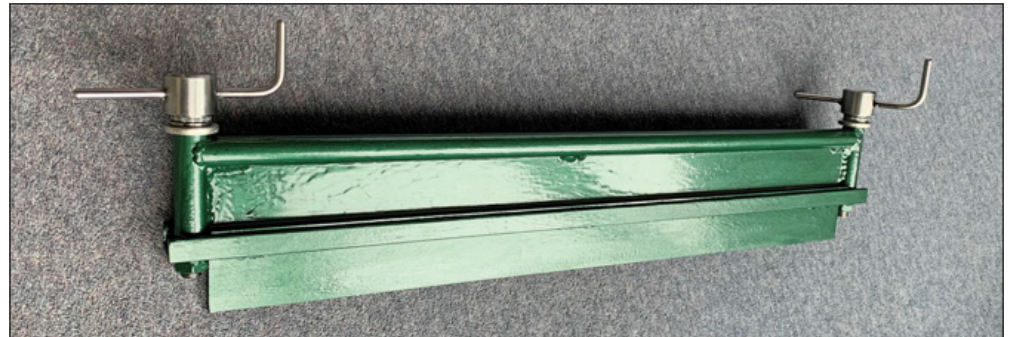
To set up a bend, a small engineers' square was used to ensure that the workpiece was perpendicular to the length of the bender (**Photo 51**). This photo shows a scrap piece of 1mm thick brass to which we had added a bend-line with a very fine-tipped (0.6mm) permanent marker pen. We didn't use the alignment guides, in this case, as it is relatively straightforward to judge the alignment of the line and the 90-degree pointed tip of the bending bar (the square cross-section bar was used, of course).

We did the whole process twice, with two similar pieces of brass, as a means of judging reproducibility – to guard against us just being 'lucky' with the first sample! The resulting bends are shown in **Photo 52** and to say we were delighted with the outcome would be somewhat of an understatement. They were both perfectly 90 degrees and both bends were exactly on their respective bend lines. The larger piece, shown at the bottom of the picture, is 1.3mm thick and the smaller piece is 1mm thick.

The bends are also 'sharp', as can be seen in **Photo 53**. This photo shows an edge-on scan of the thicker of the two samples (1.3mm) discussed above. The yellow circle has a radius of 1mm, showing that this is the bend radius achieved with this sample. This is smaller than the 'natural' bend radius of the material (which would typically be achieved, approximately, by the kind of bender shown in Photo 1 in the first instalment of this series). The bender described herein is therefore quite impressive when it comes to the sharpness of the bends it can achieve.

A Real Application

For our first 'real' part, we thought we would start small. We need to make



ABOVE: The completed bending tool.

PHOTO 51: Aligning a piece to be square in the bender.

PHOTO 52: Brass offcuts bent to 90 degrees using square-rod and anvil setup. Green tinge in middle of bends are remains of the fine-tip marker pen line indicating required bend location, showing how precise location of bends can be. These were very first bends using tool, showing ease of accurate results.

the stand-off pieces for the firing-irons rack on the tender of our 5-inch gauge GWR locomotive. We have already made the main component of the rack – a long piece of shallow U-section – and used a conventional bender (brake) for this (indeed the self-same bender shown in Photo 1 earlier in this series). To do this, we had to make a much deeper U-section and then cut off the extra material with a bandsaw, as the bender could not work with the small returns needed to form the 'walls' of the U-channel we needed to create.

We therefore decided to see if our bender could succeed where the commercial part had failed and tried to bend a return of the correct size without further trimming. The stand-offs required for the firing-irons rack (which actually support the firing irons in use) are pieces of shallow U-section, just like the main piece, only much smaller in both length and width.

To fabricate these, we again had a rummage around our scrap-brass box (passed on from another model engineer for a small fee) and found a

piece which was exactly the correct width and sufficiently long to make all three pieces required for the rack.

Some idea of the size of return we are working with, in relation to the size of the bender, can be seen in **Photo 54**. In this photo, the brass return is only just peeping out from under the bending rod.

The remainder of the part, with one bend already completed, can be seen in **Photo 55** and the completed U-section piece, from which the three parts can be cut, is shown in **Photo 56**. As is evident from this photo (and I can assure you that this is exactly as it came out of the bender apart from a light rub with emery cloth), the result is very good indeed – no further trimming is required on the two returns, forming the vertical components of the 'U'; all that remains is to cut the pieces to length (**Photo 57**).

Retaining a Workpiece

Having lined-up a workpiece, particularly when using the guides, as will be discussed below, it is useful to be able to retain it while the stand-offs



53

Bend radius: ~1.0mm

54

55

56

are detached, the blade is lowered and the guides are removed. There are a few ways to achieve this, particularly as the retaining strength required is usually minimal. We have used everything from masking tape to Blu-Tack (with non-ferrous materials), but a neat solution for ferrous materials is to use neodymium magnets.

Regular readers will know that we are big fans of these little marvels of materials science and have come up with a variety of uses for them in the workshop. We always keep a stock of them handy as they have so many

applications. **Photo 58** shows their use in holding a sheet of 1mm galvanised steel, prior to bending. Despite their small size, just two magnets are needed to provide a good hold on this (relatively large) sheet of material – one at either edge.

Once the bend is set up, and with only a light clamping pressure applied, the magnets can be removed, to ensure that they have no influence on the precise positioning of the bend – they could ‘hold’ one side of the material, preventing it from sliding into the bending ‘V’ and thereby bias

PHOTO 53:

Bend radius measurement for ‘sharp’ bend in 1.3mm thick brass plate.

PHOTO 54:

Bending piece needing very small return – impossible with conventional tool.

PHOTO 55:

Other side of piece in photo 54, during bending.

PHOTO 56:

Resulting piece of shallow U-section – also made from scrap brass, hence the (unwanted) pointy end.

PHOTO 57:

The formed U-channel has been cut into three parts, which will become spacers for firing-irons rack in a 5-inch gauge GWR tender – note these are not yet ‘finished’ parts.

PHOTO 58:

Use of magnets to hold a ferrous workpiece, prior to bending.

Photos by the author

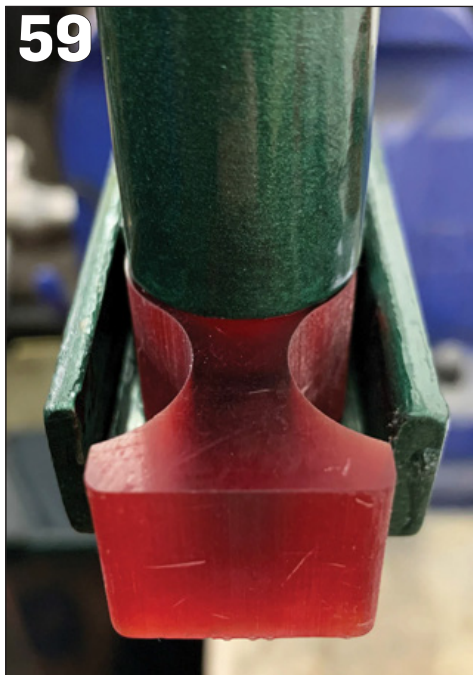
the bend to one side of the desired bending line. They will probably have a negligible influence in practice, but as they are easy to remove, there is no point in taking the risk.

Photo 59 shows an example of one of the blade supports, discussed in last month’s instalment of this series, in

57

58

59



use in the finished bender. As designed, it is very easy to install, with just enough flex/friction to stop it being knocked out accidentally, but not so much that it is difficult to remove or is likely to fracture, if made from a fairly brittle material.

In our case, we opted for a height for this part such that it causes the blade to sit (only) just above a sheet of material to be bent. This allows accurate positioning to be achieved relatively easily. Thicker versions can, of course, be created for other applications of the tool.

Quick Project: Coal Tray

Finally, we offer a quick example project, to demonstrate the versatility of the bender. In this case, we used 0.9mm stainless-steel sheet to make a

PHOTO 59:

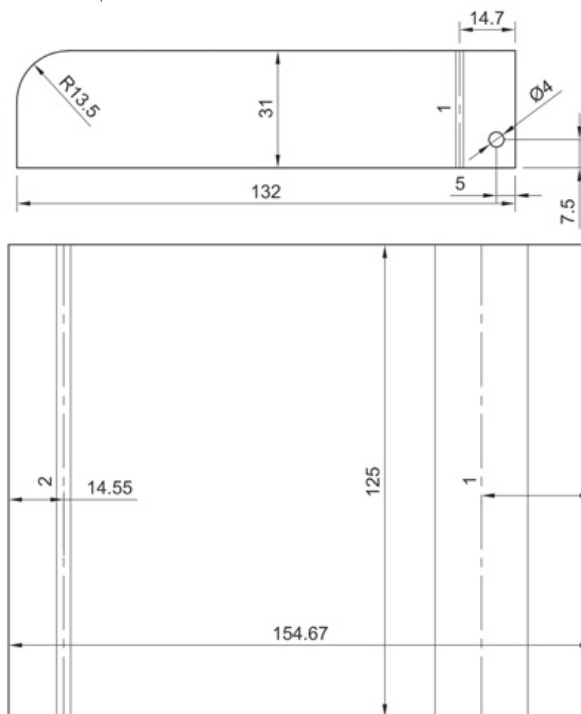
Blade-support spacer on bender. Only minor 'flex' required of (3D printed) material, all but most brittle should work fine.

FIGURE 8:

Coal-tray flat patterns and bending details.

PHOTO 60:

Bending stainless steel pieces to form sides of coal tray for 7/8-inch ride-on tender.



Bend Table			
ID	Direction	Angle	Radius
1	Up	90	.9

Side-panels (2-off)

Bend Table			
ID	Direction	Angle	Radius
1	Down	107.4	12.7
2	Up	17.4	12.7

Base-plate

FIGURE 8
Approx half full-size

coal tray to sit on the exit of a coal-chute/bunker on a 7/8-inch gauge ride-on tender. A 'flat-pattern' drawing of the project is shown in **Figure 8**, with the individual pieces being band-saw cut, prior to bending.

The two side pieces were bent together (**Photo 60**), to ensure that they were as identical as possible. They illustrate a handy technique when working with planar materials (and we have Matthew's Design Technology teacher to thank for this one): a 1:1 scale drawing of the part was printed out, cut out and pasted to the metal sheet using paper glue of the Pritt-Stick variety. This was used as the guide when cutting out the piece and also to position the bend, the bend-line being included in the printed-out drawing. Pritt-Stick is surprisingly good at sticking paper to metal (I was sceptical initially, I must admit) and it makes cut-outs and bends very easy to achieve, accurately, without any tedious measurements or marking out.

This technique is again in evidence in **Photo 61**, where it is being used to align the main bend in the baseplate/shovel tray component of the design. In this case, the alignment guides were used to precisely align the centre of the bend. This part required two bends, one of which is greater than 90 degrees (approximately 107 degrees) and hence the additional bending needed to be done by hand, as the tool will only bend to 90 degrees, at least with the angle-iron inserts discussed in these articles. Clearly, it would be possible to devise a custom part to achieve the required bend but for a one-off, this is a little extravagant.

The completed coal tray is shown in **Photo 62**, in situ on its riding truck/tender. It needs some finishing off, painting and such but hopefully

illustrates the versatility of the bending tool. The whole thing was completed in under a couple of hours, including welding.

Example Materials

Whilst not constituting a specification, the following is a list of materials which have been successfully bent, to date, using the 'sharp bend' configuration – the most challenging configuration from a bending-force perspective:

- Brass sheet up to 1.5mm – note that the thicker sizes, at least, should be annealed prior to bending, if a 'half-hard' grade of brass is used, although we did successfully bend a piece of unannealed 1.5mm brass – the bend was good, but the part took quite a bit of muscle-power to bend!
- Stainless steel sheet up to 0.9mm – given how easy this was to bend, I suspect that thicker samples (1mm plus) could also be accommodated.

We have not had cause to bend mild steel as yet, but would expect this to be a little easier than stainless, for a given thickness.

The capability of the machine, in regards to material thickness will, of course, depend upon the length of material to be bent; bending a 750mm length of 1.3mm unannealed brass, for example, would we expect, be beyond its capabilities (or at least beyond the capabilities of the human driving it!). In extremis, the initial bending of a thick/long sheet of material could be initiated as designed (and described above), with the unit and workpiece then being demounted from the vice and the vice itself then being used to apply additional force (mounting the whole bender horizontally). Alternatively, strong G-clamps could be added to assist in the bending

60



operation, at various points along the length of the bender. The intrinsic strength of the component parts of the bender should enable it to cope with a fair amount of this kind of 'abuse'.

In Conclusion

This has been an interesting project and forced us to learn a few more techniques (for example, how to mill larger-radii arcs than would naturally result from a given diameter milling cutter, as described in the April 2022 **EIM** and the milling of V-grooves in steel bar stock). As a project, it is well within the capability of a near-beginner to model engineering (and to metal fabrication, in general), providing a useful and versatile tool which will make future projects much quicker and simpler. At least, this is what we hope – we have a GWR tender to get back to and it is steadfastly refusing to build itself... **EIM**

■ Parts 1-3 of this series appeared in the June to August 2022 editions of **EIM** – digital back issues can be downloaded or printed copies ordered from www.world-of-railways.co.uk/store/back-issues/engineering-in-miniature or by calling 01778 392484.

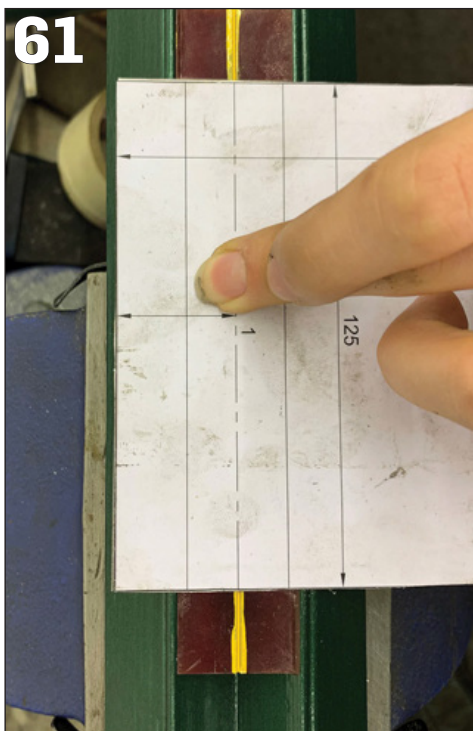


PHOTO 61: Using alignment guides, see Figure 5 and Photo 33 (**EIM** July 2022). Note, yellow paint was still tacky when photo taken and so surfaces of guides not sanded to achieve precise, thin, lines in Photo 33.



PHOTO 62: Coal-chute tray temporarily installed on footplate of riding-truck/tender. All bends made with bending tool, although the plus 90 degrees bend did need a little manual assistance to go beyond 90 degrees.

PHOTO EXTRA



■ The recent requirement to attend a wedding in the New Forest gave your editor a cast-iron opportunity for a family day out and his first ride on the 7¼-inch gauge Moors Valley Railway near Ringwood – though the Ed's young grandson, visible in a couple of these pictures, apparently already knows the line quite well (note to any new parents reading, this is known as bringing your children up properly!).

The Moors Valley is certainly an impressive line with a long and involved ride and excellent facilities. It's clearly also a popular base for 7¼-inch loco owners – just a small selection are in the picture below and the shed in the background must have contained at least another 20 or so locos – well worth a visit...



A GNR Stirling Single in 5-inch Gauge

This month the latest locomotive build project from Australian engineer Bruce focuses on lubrication and the removal of excess water....

BY **BRUCE BOLDNER** Part Three of a short series



To lubricate the cylinders of my Stirling Single 4-2-2, a Sooty mechanical lubricator (made by Mike Boddy) was installed beneath the footplate behind the front buffer beam. The lubricator is driven via a mechanical link off the axle-driven water pump.

Separate oil lines lead from the lubricator to each steam chest and Mike had a suspicion that only one cylinder was receiving oil.

To confirm this, we ran the Stirling on compressed air and we discovered that oil was coming from the opened drain cocks of only one of the cylinders. An oily chimney does not prove that **both** cylinders are receiving oil.

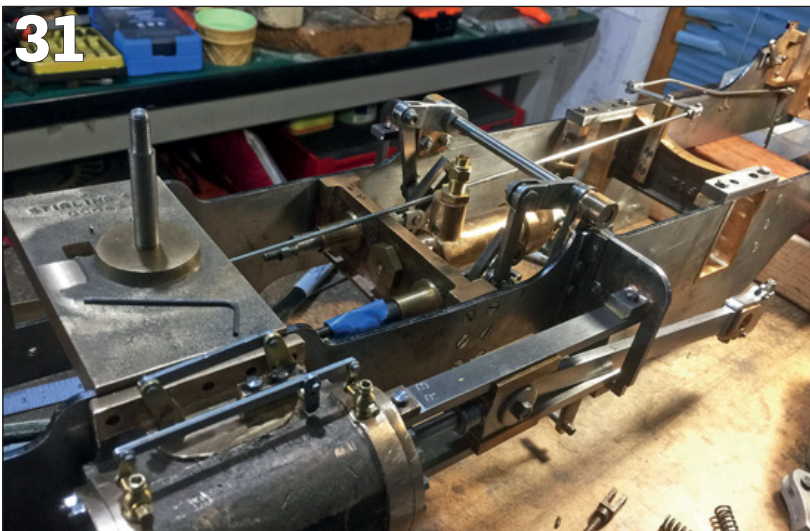
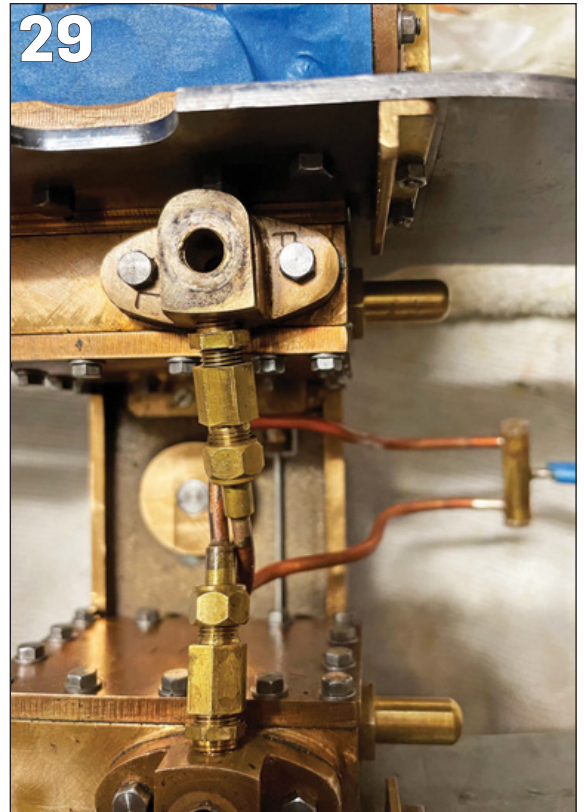
Oil was not well

A Sooty lubricator only provides one drop of oil per arm movement and is

therefore synchronised to one cylinder only. Whilst the cylinder to which it is synchronised has its inlet open and draws the oil in, the opposite cylinder inlet port is closed. When the wheel revolution continues and the opposite cylinder port opens, the Sooty has not yet pumped another drop of oil into the line. Therefore, this cylinder receives no oil.

To remedy this problem, Mike recommended a ball valve clack be installed in each oil line, immediately before the line entered its respective steam chest.

When the wheel revolution continues and the opposite (previously oil-starved) cylinder intake port opens, the clack valve on the original cylinder will have closed, thus forcing the oil down the only path now available to it into the second cylinder, providing it with the oil it had



previously not been receiving.

Mike also recommended the oil exit orifice on each clack be restricted to a no. 70 drill hole, to increase back pressure and consequently increase the oil velocity into each steam chest. Each oil line must of course be exactly the same length from the lubricator T-piece to each steam chest, otherwise the shorter line will get all the oil.

In addition to an oily chimney, I now have oil emanating from all the drain cocks when running on compressed air! I hope I've interpreted this information correctly. I refer readers to Mike Boddy's original article on this published in the June 2020 edition of **EIM** for a definitive explanation. **Photo 29** shows my oil line clacks on the Stirling.

A draining exercise

Now to describe the building of the draincocks – something which proved to be a convoluted story indeed! On the full-size Stirling Single displayed at the National Railway Museum in York, there is a right-angled lever protruding from the cab floor next to the inner edge of the left-side main frame. I assume it is to open the ashpan, although I have not discovered any documentation describing this lever's purpose.

Regardless, I have replicated this lever in my model cab in order to use it to open and close the cylinder draincocks (**Photo 30**).

A rod runs from this lever to a pivot on the underside of the middle main-frame stretcher, with another rod going from this forward to the bogie stretcher, where it engages with a lever arm to operate the draincocks (**Photo 31**).

This lever arm protrudes above the top of the bogie stretcher and tightens with a grub screw onto a transverse operating arm which leads out to the cylinders on either side.

As both the stretcher and its surrounding main frame are already perforated with numerous holes, I did not wish to weaken things by adding another. I therefore drilled a hole through a cylinder mounting bolt on each side and the operating rod runs through these (**Photo 32**).

As illustrated in **Photo 33**, this operating rod connects by means of a grub screw with the crank lever in the left of the photo. The operating rod had to be located across the front section of the bogie stretcher in order to avoid fouling the bogie pivot pin and bolster.

Now its operating arm had to be transferred rearwards to minimise interference with the centre panel of the bogie wheel valance – hence the link from this left operating lever to

"The building of the draincocks proved to be a convoluted story..."

PHOTO 29:
Clacks fitted to the oil lines.

PHOTO 30:
Mystery lever on cab floor adapted to operate the draincocks.

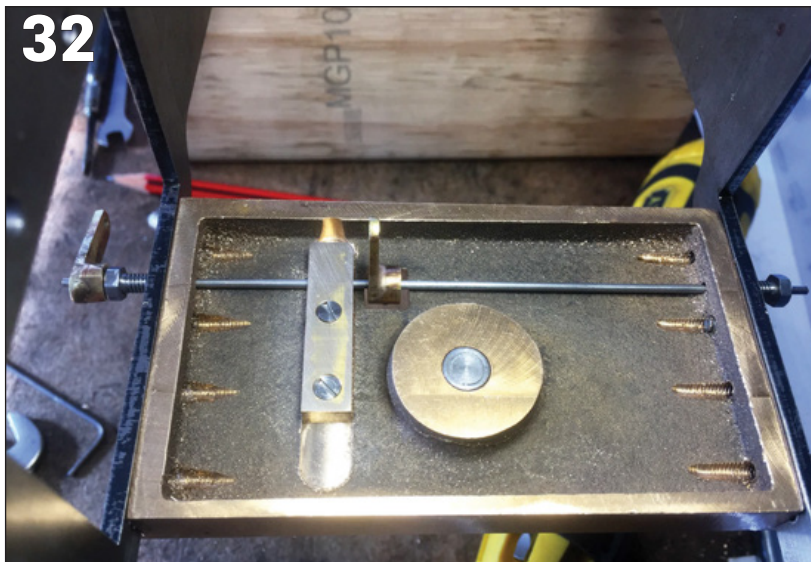
PHOTO 31:
The draincock linkage and its required pivot.

PHOTO 32:
Operating rod makes use of cylinder mounting bolts.

PHOTO 33:
Horizontal arm links front and rear draincocks.

PHOTO 34:
Finished job – the bogie wheel valance hides the operating levers.

Photos by the author

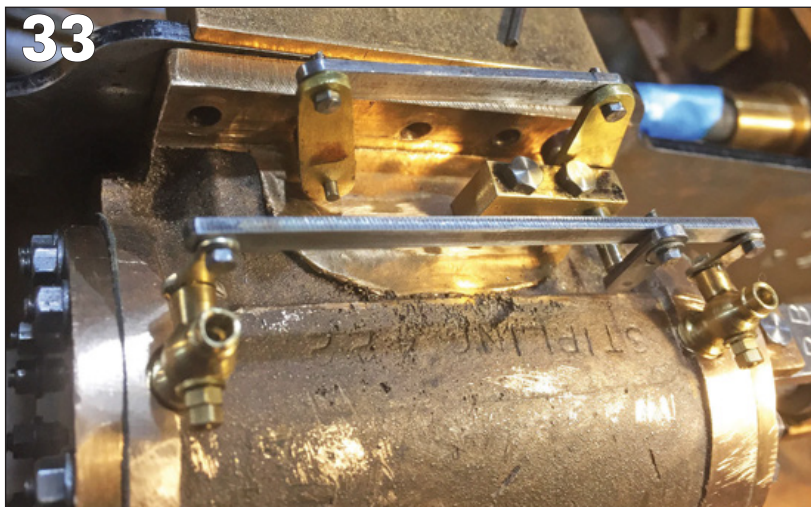


another on the right. This right-hand lever is supported by a pivot block. An operating pin extends from this lever to a hole in the horizontal arm linking the front and rear draincocks as can be seen in **Photo 33**.

When the bogie wheel valance is installed, the centre section covers the inner operating arms from view. (**Photo 34**). **EIM**

■ Next month Bruce dives into the meatiest part of the Single's construction, the boiler.

Parts 1 and 2 of this series appeared in the July and August 2022 editions of **EIM** – digital back issues can be downloaded or printed copies ordered from www.world-of-railways.co.uk/store/back-issues/engineering-in-miniature or by calling 01778 392484.



Restoring a Gauge 1 Midland Compound

Anthony's workshop restoration of an electrically-powered Gauge 1 locomotive focuses this month on essential details, the cylinder draincocks and pipework, and the brakes.

BY ANTHONY WHITE Part 6 of a short series

For this month's episode describing my restoration of a very tired Gauge 1 model I focused first for some detail that was missing from the acquired model, the cylinder draincocks and their associated pipework – the latter is a prominent feature in photographs of the prototype loco.

A completely accurate reproduction of the prototype is difficult as it is quite flimsy once made to scale and vulnerable to damage by catching on things, so I simplified my work to basic draincocks represented by handrail knobs soldered into holes under each end of the cylinder block – a 1mm nickel-silver rod then passes through these and is doubled ahead of the front draincock.

The tricky part is making and holding the prototype strap that supports the front end. There were several options that I considered, even having it fitted to the under surface of the running plate with the pipe free to hook into the J at the lower end but eventually, I settled for attaching it all to the frames. Getting the lengths between angles correct is also tricky, the result is shown in **Photo 38** – it is admittedly rather too neat and straight as the copper pipes on the prototype were often quite wobbly and irregular and some later

versions had a much shorter pair of pipes fitted.

Brake Gear

The brake gear on these locomotives is not just a matter of the usual pair of brakes, hangers and some pull rods as found on many other engines – these locos have two brake shoes per driving wheel that requires more hangers, brakes and associated gear. The brake hangers are also of different lengths at the front and rear of the wheels, while the pull rods are in two separate pairs with visible adjusters, and there is an operating cylinder set between the two drivers. It's a lot of work and took me much longer than anticipated as I had to make everything from scratch but it does improve the appearance of the loco below the running plate.

I started by looking at drawings and photographs and from these made some simple outline sketches to capture the essential features. I made a start by cutting the eight brake hangers, two sets of four – the upper part of each is the same but four are longer as they hang lower. I cut some 1mm nickel silver into 5mm strips and soldered them into two packs of four, then drilled the three holes in each pack and then filed them to shape. The result is shown in **Photo 39** although I haven't



quite finished the filing as prototype photographs suggest they are a bit slimmer in the lower part than I had so far achieved.

Once I had them down to size the next decision was how to fit them. I attached a cast whitmetal brake shoe to one hanger to check that they fitted and looked correctly aligned when hanging from the 12BA bolts I had fitted for them to the frames. The brake block is simply screwed on to each hanger from behind with a $\frac{3}{16}$ -inch 12BA countersunk screw with a nut added on the outside for cosmetic appearance.

Next was how to replicate the U-shaped hanger top fitting to resemble the real thing that held the brakes at the correct distance from the frames so as to sit over the tyre. I used a 6.5mm length of $\frac{3}{16}$ -inch U-shaped brass strip drilled to go over the 12BA bolt, held in position to frame by a 12BA nut soldered just inside the U next to the hanger.

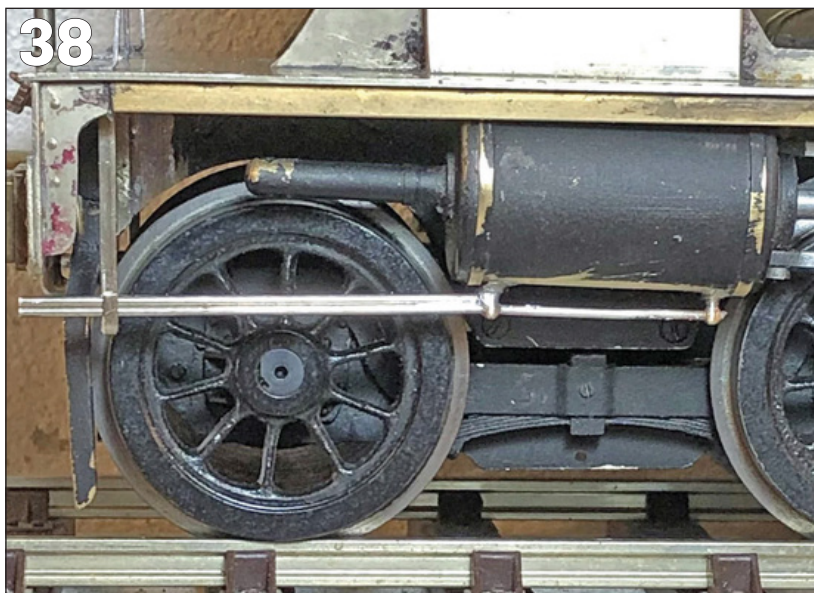
PHOTO 38:

The cylinder draincocks and pipework.

PHOTO 39:

Two packs of four loco brake hangers in the process of being filed to shape.

Photos by the author





Everything was held on by another 12BA nut on the outside, the final assembly looking as in **Photo 40**.

This prototype assembly seemed to work and look right so it was just a matter of making the pieces for all eight brakes, in the happy knowledge that I was not wasting my time, and

then assembling all of them.

It is a fiddly job but it is made easier if you first make a jig for drilling the holes in the brass U pieces. The result will produce a better final impression than just hanging the brakes from the 12BA bolts sticking out from the frames or

the flimsy brass wires that were originally fitted.

Once you have all eight brakes and hangers in position the next job is to make the four pull rods from 2mm x 0.5mm nickel silver, checking that the lengths enable all the brakes to hang in their correct positions. On each of the four rods there's a hexagonal adjuster, you don't need to make it work but an 8.5mm length of some small brass hexagon adds a bit of authenticity and breaks up the simple plain lengths. It also looks better if you cut a 1/2mm recess each end 1/4mm deep.

Then it's on to the four cross pieces, as on the tender these are brass tubes of 1.6 x 1.4mm internal diameter, all of correct length, that is vital, with 12BA studding threaded inserts to enable the lower end of the hangers to be attached with nuts to hold them in position.

All this is not difficult but again rather fiddly and time-consuming, but it is important to get the parts of correct dimensions so that it all hangs correctly and symmetrically otherwise it will look terrible.

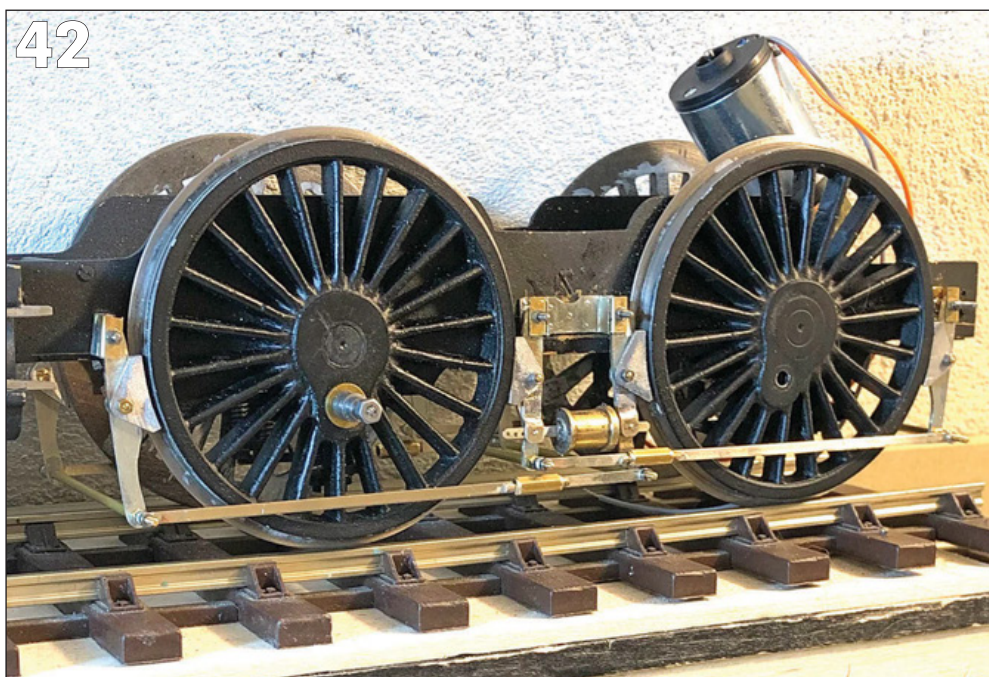
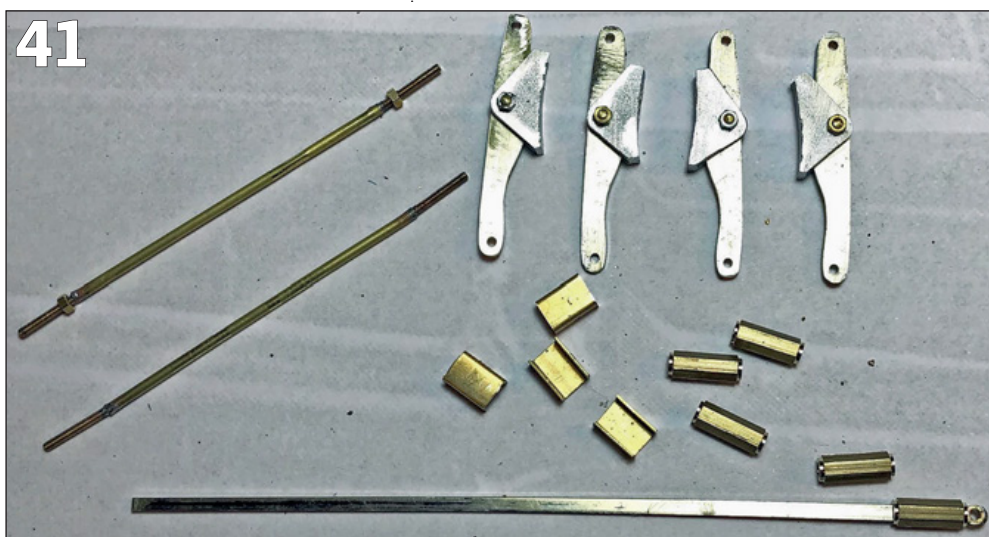
Practical measures

Rather than soldering the pull rods in position I decided to bolt them to the hangers so that should the driving wheels ever need removing from the loco this can be done relatively easily and the brake gear reassembled. But that was a situation created by staying with the existing fixed frame bearings. If starting from scratch I would have made axle boxes that could be dropped out of the chassis frames.

The initial assembly before all were fitted was going reasonably well considering I had needed to correct the position of some of the holes in the frames. **Photo 41** shows some of the parts that have still to be fitted, two crossmembers with 12BA extensions, one with nuts fitted, some sample U pieces, a brake casting, a brake hanger and one fitted together.

The final shot in this section (**Photo 42**) shows all the brake gear in place but not finally fixed, all eight brakes and their rodding in place. The last job was the cylinder to fit between the two central brake hangers and this is a brass turning drilled 2mm and fitted with a strip of 2mm x 0.5mm nickel-silver strip soldered in position.

The cylinder needs a reproduction of some mechanism for holding it to the hangers. I attached this to the 2mm strip first before attaching the whole assembly to the locomotive. Do make sure that the brakes are a snug but free fit to the



tyres first because once fitted further adjustment is not easy to arrange.

Once the whole assembly is fitted, I checked that everything aligned properly and that the driving wheels ran freely. Then any surplus 12BA studding could be removed while some black paint will stop the nuts coming off while running. The whole brake manufacture and assembly took almost as long as did some of the more major structural rebuild tasks.

Sandboxes

The original model had a pair of simple plain sandboxes between the driving wheels, there should in fact be four, one in front of each driver. However I didn't have a lot of room now between the wheels for the other two to be seen as I had added so much more of the complex brake gear. As I wanted to reuse as much as possible of the original model I decided to reuse this pair in the vacant space available ahead of the front drivers. **Photo 43** shows how I did this by drilling two holes in the solid brass fitting, clamping them in position and drilling the holes on through the frames. Then I tapped the frames 12BA and opened out the holes on the boxes to clear 12BA and quickly had them bolted in position.

These will mostly also be hidden behind the front steps but I added sandpipes, also not on the original model. These will be visible so I soldered a nut on them at their exit point to provide a bit of detail and added a non-prototypical but hardly visible cross piece between the two pipes to assist in their security – they are a quite vulnerable to damage in a working loco. I put it quite close to the cross piece at the lower end of front brake hangers so that it is not too visible from the side.

Having completed the brake gear and looking at the side view of the chassis I realised that something was still very wrong. Although it stood comparison with other electric models it didn't look like photos of the prototype and I then realised that from one side looking at the brake gear between the driving wheels, you could also see everything on the other side as well – on the prototype there is the firebox, ashpan and grate hiding a view of the other side. I just don't know how I came to miss this earlier as it would have been so much easier to deal with before all the cross rods were in place.

By unscrewing a major chassis spacer and then constructing a suitably sized box from some scraps of nickel silver, plus making an allowance for the spacer to be replaced the offending gap was duly



PHOTO 40:

One completed brake hanger assembly and some of the parts involved.

PHOTO 41:

The various components for the brake gear.

PHOTO 42:

The successful end result of rebuilding the brake gear.

PHOTO 43:

Adding the front sandboxes and their pipework.

PHOTO 44:

The new ashpan for the chassis – a cosmetic item but also a useful place in which to add some traction weight.

Photos by the author

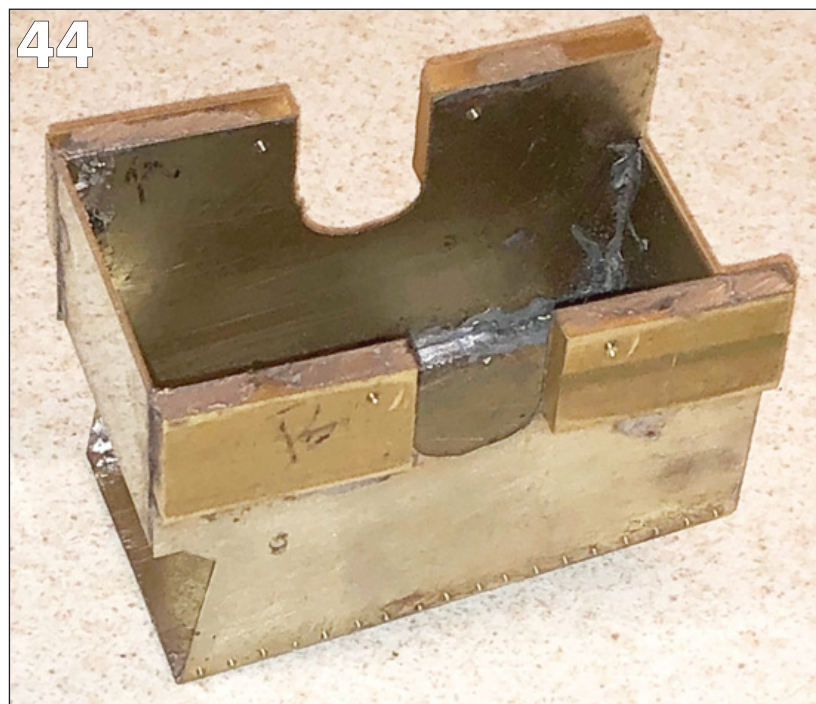
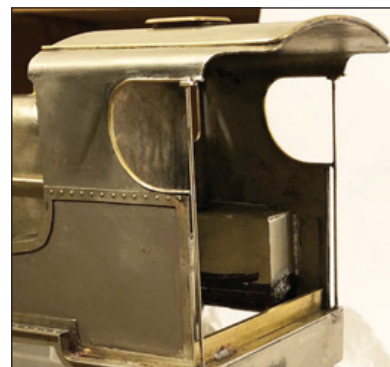
filled by the item shown in **Photo 44**.

The ashpan is narrower than the gap between the frames which is handy as it avoids the nuts inside the frames holding the brake gear. But it does mean that you need to have four 1/8-inch spacing blocks at the top which is also useful because they can be drilled and tapped 12BA to hold the assembly in position.

On the plus side this turned out to be a bonus as the box had one further use – it was an ideal place to add some extra weight right over the driving wheels. By stacking up and gluing some rectangles of lead sheet I added a useful 250 grams. **EIM**

Differing standards on wheel back-to-back measurement – see Letters, page 35

■ Next month Anthony begins the major task of restoring the Compound's body (below). Parts 1 to 5 of this series were published in the April to August 2022 editions of **EIM**. For details of how to order printed or digital back issues see page 23.



All locked up...

Harry goes big this month, tackling the Fairbourne Railway's 12¼-inch gauge motive power shortage from a start point of something a bit wider...

BY HARRY BILLMORE

I must start with an apology for the content of my article this month, as it is unfortunately not specifically miniature – however the techniques and components used should be interesting to many a model engineer!

Over the past month I have actually managed to take a week's holiday while the railway's peak season timetable has also required me to drive quite a lot. Therefore the only significant workshop work I have carried out has been on the Simplex loco that the Fairbourne Miniature Railway has bought to allow me to take our long-suffering main diesel out of operation in order to give it a full rebuild.

The Simplex started out as a 2ft gauge example and that was the first thing to be sorted out – in last month's article there was a picture of the loco sat in our workshop on a pair of accommodation bogies with its wheelsets removed. These are very simply held to the chassis by the leaf springs, one end of which has a threaded adjuster to tension the drivetrain while the other has a bolt that sits under the last leaf to prevent it dropping out in the event of the loco suffering a derailment.

Of course the adjuster nuts on our loco were rusted badly and the most difficult one to access was the most stuck of them all. This necessitated using a gas axe to heat it up to cherry red, on the second hottest day of the year so far...

With the wheelsets out they were quickly despatched to the Vale of Rheidol Railway workshops where there is a large press, big enough to move the wheels along the axles. In very short order (many thanks to the VoR!) the wheels were back in our workshop and I could put the axleboxes back together, put the wheels back under and lower the Simplex down onto its regauged wheels for the first time.

Finescale they are not

I did have to make an interesting compromise with the wheels, due to them being designed for a loco working in an industrial environment with likely not exactly quality trackwork, the flanges are much thicker than the ones on all of our wheels, meaning that if the back-to-back is correct, the wheels will sit on



the root radius of the flange. This is however far better than having the back-to-back tight and it binding up on all of the points! If more time had been available, I could have machined the wheels to our profile, but it wasn't!

Now that the loco was on its wheels it was time to sort out the drivetrain. Originally the output from the gearbox had a duplex sprocket with one set of sprocket teeth driving each axle by a chain. Unfortunately this duplex sprocket now lines up with the wheel, however there is plenty of space for a pair of lay shafts, one running either side of the transverse engine and gearbox assembly underneath the chassis sides.

These shafts would be driven by chain from the original duplex sprocket and then drive the axles via another sprocket located approximately in the middle of the frames. This required four new



PHOTO 1: Lots of driving this month combined with a holiday has meant less workshop time. Not all the days have been as beautifully sunny as this either!

PHOTO 2: The Simplex wheelsets after arrival back from the Vale of Rheidol Railway workshops and their big press.

PHOTO 3: Back on its wheels for the first time as a 12¼-inch gauge locomotive.



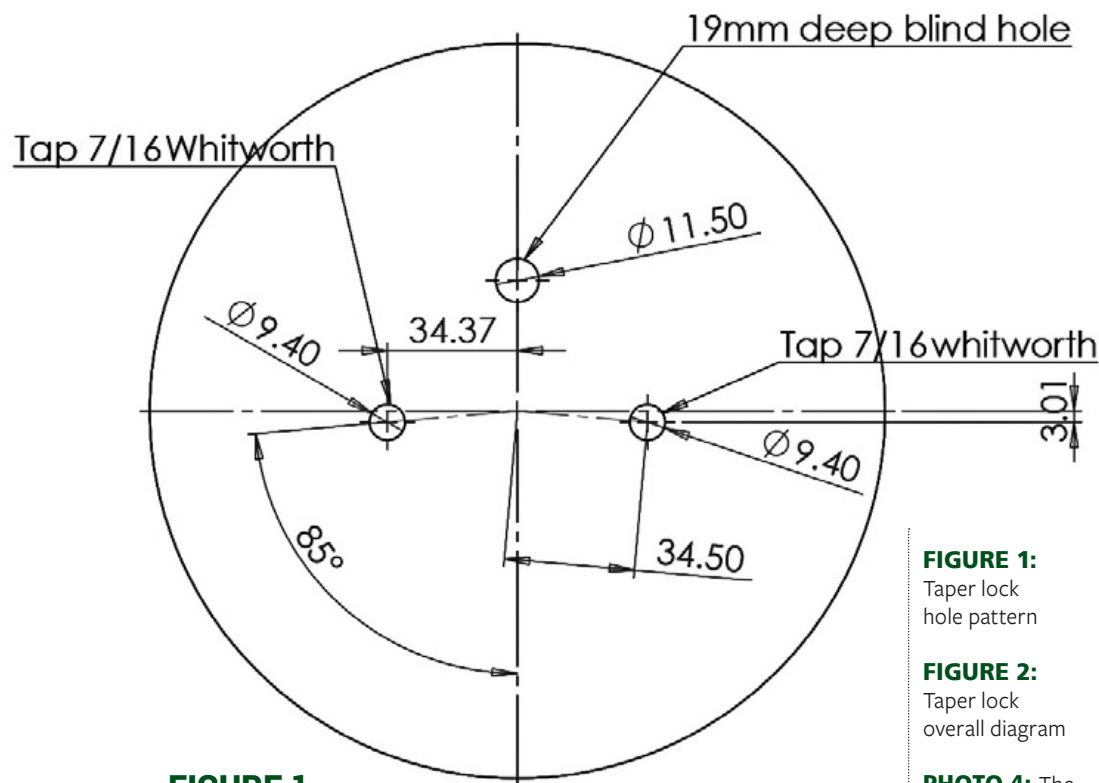


FIGURE 1
Approx half full-size

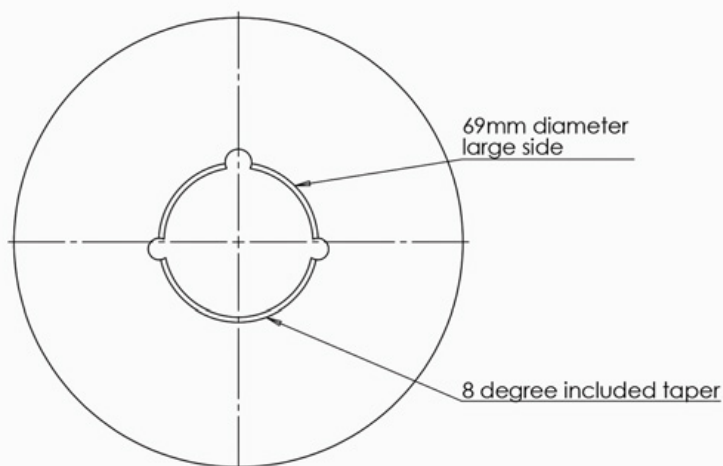


FIGURE 2
Not to scale

FIGURE 1:
Taper lock
hole pattern

FIGURE 2:
Taper lock
overall diagram

PHOTO 4: The
first layshaft
fitted on its angle
brackets and
pillow blocks.

PHOTO 5:
First sprocket
on the mill for
machining for
taper lock bushes.
Tapped holes are
not on centreline
of central hole so
care needed to
get it all correct.

PHOTO 6: Set
up in the lathe,
the first thing to
do was to drill out
the central hole
as big as possible.

sprockets being joined to the layshafts.

To do this, I decided to use taper lock bushes – as the name suggests they use a matching taper to lock the shaft to whatever it is you're trying to drive, in this case a sprocket.

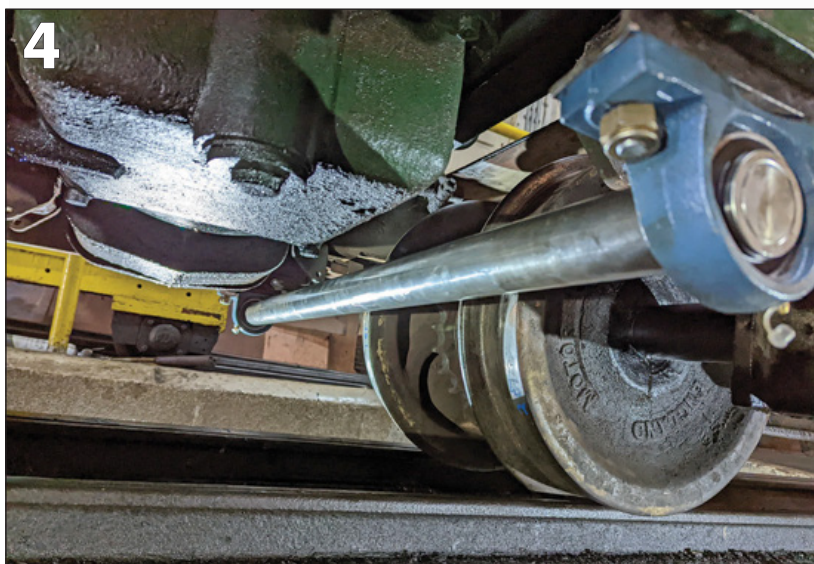
They work by having a parallel bore and an 8-degree included taper on the outside, this is drawn into the sprocket by a pair of grub screws which engage in a half set of threads in the sprocket and a blind half hole in the taper lock to drive the taper tight into the sprocket. This tightens the split section of the bush onto the shaft to the point where it can transfer high loads, while there is also provision for a keyway.

To remove the bush there is a threaded half hole on the bush itself and a blind hole in the sprocket which works to draw the bush out from the taper. This whole system makes for an extremely flexible and adjustable method of transferring drive.

Money-saving machining

I called our usual driveline supplier and gleaned that a sprocket by itself would cost just under £40, but a sprocket machined to take the taper lock bush was a little over £200 (the taper lock bushes themselves came in at £14 each). I reckoned each sprocket would take around an hour of machining so ordered plain sprockets. I then spent about half an hour doing a little research on the internet for the hole positions and taper size (all of which are freely available) and drew up the diagrams you see reproduced on this page, one of which shows the hole positions and the other the central bore dimensions.

I drew the hole diagram with particular reference to how I was going to machine the sprockets. Using the milling machine with a DRO (digital readout) and a centre finder, the centre dimensions for each of the



holes are coordinates from the centre of the main bore. This is obviously the first machining to be done as it is quite difficult to tap half a hole! Once the centre had been found it was then a simple drilling and tapping job, though I did use the depth stop feature on the Bridgeport mill to make life easier to get the blind hole the correct depth.

Wiggle makes its mark

The sprockets were then mounted up in the lathe, drilled out to the largest drill size I had before approximately setting the compound slide to 4 degrees. When I have quite a lot of material to take off, I find it easier to set the angle by a process of trial and error, getting closer to the precise angle required. I do this by gently putting the bush into the bore after taking a few passes, then wiggling it – the bore will leave a witness mark on the bush and that shows where you have to adjust the angle to match the taper.

A mark at the outer side of the bush will mean the angle needs increasing, a mark at the inner edge means it will need decreasing and after a bit of messing around you get it so that the contact patch reaches all the way across the bush. Once the angle has been set, you can then machine the bore out to the desired diameter. I double-checked the fit onto the layshaft before rinsing and repeating three more times and of course de-burring.

The layshafts were a simple machining job to fit a plumber block bearing on each end, this was bolted to an angle plate which was then bolted to the frames.

With all the components machined I could then put everything all together and line up the drivechains. The last thing to do before testing the loco out was to ►



PHOTO 7: With top slide angle set approximately, machining carried out until close to finish size before testing fit. Here it is only contacting at the bottom of the hole.



PHOTO 8: Slight adjusting of the compound rest followed with repeated checking of the fit on a bush to get the angle perfect.



PHOTO 9: Visible here is a small gap around the edge of the hole, indicating more adjustment is needed.

PHOTO 10: The witness mark towards the left of the bush shows the angle has been over-adjusted.

PHOTO 11: A perfect fit and to size.

PHOTO 12: Double checking the fit once mounted on the layshaft.





"The last thing to do before testing the loco out was to adjust the brake gear so the blocks acted on the wheels rather than fresh air..."

PHOTO 13: A before-and-after picture of the sprockets as they arrived and once ready to fit.



PHOTO 14: Machining one of the following three sprockets, getting ready to set the depth stop by setting the drill at the top of the workpiece.



PHOTO 15: Measuring the correct amount to go down to get the blind hole.

PHOTO 16: The two layshafts in place with the four sprockets mounted on them being lined up before final clamping takes place.

PHOTO 17: The completed layshafts with their sprockets and chains fitted.

PHOTO 18: Machining the brake cross-shafts to move the brake shoes inwards to match the wheels.

All photos and diagrams by the author



adjust the brake gear so the blocks acted on the wheels rather than fresh air – thankfully the design of the Simplex brake rigging meant it was a simple turning job, before fitting sleeves to maintain the strength of the brake crossmembers.

With all this work completed I could move the loco under its own power on 12¼-inch gauge rails for the first time. There are a few issues still to sort out, like I don't have quite enough movement on the layshafts to properly tension the gearbox chains, so I have ordered a half link to shorten the chain a little and allow the correct tension to be applied. I also need to do a service on the engine and a full fluid change, but our new loco is getting close to entering traffic! **EIM**



Dreaming Spires Rally

A busy month for our roving rally reporter as John heads for Oxford...

BY JOHN ARROWSMITH



Cutteslow Park is the home of the City of Oxford Society of Model Engineers (COSME) and the weekend of the 2nd-24th July saw the Society's annual Dreaming Spires Rally, an event attracting model engineers and their locomotives from all over the UK.

With good dry summer weather prevailing I went along on Saturday to enjoy this popular rally. The club site itself looked immaculate and is a real tribute to the members there who keep

ABOVE: The fine facilities at the Oxford club are well used.

PHOTO 1-2: Both the raised and ground-level tracks boast excellent loco loading facilities.

it in tip-top condition. The clubhouse had been decorated with flags and bunting and a couple of gazebos had been very thoughtfully erected in front to provide additional shading if required. Of course there was also an ample supply of tea, coffee, homemade cakes and cold drinks ready for all the visitors and members to enjoy.

Both tracks were in operation and both have excellent facilities for unloading locomotives to storage sidings ready for the day's activities.

(Photo 01-02). I think the first locomotive in steam and out on the raised track was the British Railways Standard Class 4 tank which belonged to Jeff and Nick Elliot from Bromsgrove (Photo 03). This is a proprietary-built engine but Jeff and Nick have added a number of extra fittings to create a good-looking locomotive. It went as well as it looked and I was pleased to be given a turn on the regulator which showed me what a powerful loco it is.

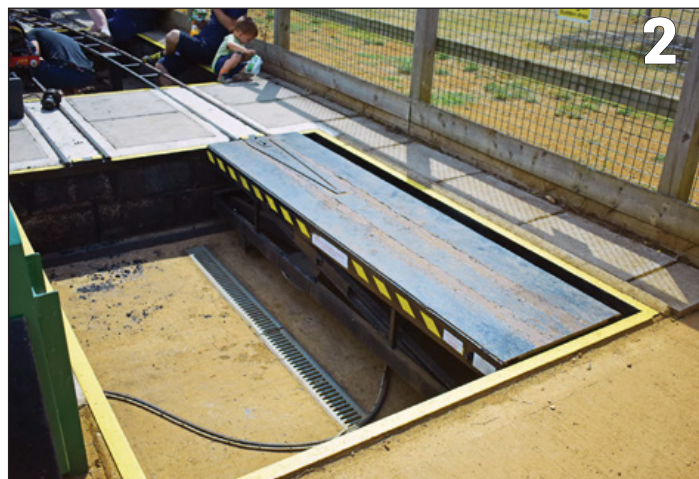




PHOTO 3:

Nick Elliott has his Class 4 running well.

PHOTO 4:

Approaching the station, 6-year-old Ellie Mills is at the controls of the F7.

PHOTO 5:

The Beck-liveried Class 66 with 10-year-old Martin Holland in charge.

PHOTO 6:

'Jack' the only 3½-inch gauge loco at the event.

PHOTO 7:

The view of the steaming bay with the super new repair shop in the background.

An early runner was the 5-inch gauge American outline F7 driven by six-year-old Ellie Mills who was present with her dad Dave from the Romney Marsh club (**Photo 04**). Dave told me he brought this loco because his daughter likes driving it so much and a good careful job she was making of it too.

There was a most unusually liveried Class 66 on the track as well and this was being driven by 10-year-old Martin Holland. The livery took the form of a Harry Beck map of the London Underground and very eye catching it was too (**Photo 05**). Apparently the basis of the covering was scanned from a 4mm scale model of the engine and then using a graphic design technique was printed into the correct size for 5-inch gauge onto a sheet of vinyl which was used to wrap the bodywork. The locomotive's name was appropriately 'Harry Beck' the originator of the first official London Underground map.

There was just one 3½-inch gauge engine on the steaming bay and it was not steamed during the day but nevertheless it was a good example of the popular Juliet design (**Photo 06**).

Useful asset

Over on the ground-level steaming bay was a varied selection of large locomotives being prepared. **Photo 07** shows this activity while in the background behind the turntable is the brand-new repair workshop which the club acquired from the local authority about three years ago. It was formerly the park's aviary which was no longer wanted so this super building was just what COSME needed – now fitted out it is a major asset to the club.

On the steaming bay at this time the group of 7¼-inch gauge engines included 'Lyn' a Lynton & Barnstaple Railway 2-4-2 Baldwin tank engine, a 2-6-2 Great Western Railway Small Prairie, a 4-6-0 GWR Grange and a 0-4-0 Hunslet. It was a fine sight

especially with the young sons of James Duncan, who owns both the Prairie and the Grange, busy helping with cleaning rags and an oil can (Photo 08).

All these locos were soon on the track and providing some spirited running. The Hunslet of Nigel Surman was soon in steam and taking the track in its stride (Photo 09).

The L&B 2-4-2 tank locomotive is owned by Alan Mitchell who had travelled from the Spensborough club in Yorkshire. It started life as a Winson Engineering kit and Alan had just a chassis so he installed the boiler and fitted it out – it was performing very well at the rally (Photo 10).

Another fine locomotive steaming well was the GNR Stirling Single brought by Martin Parham from the Maidstone club it looked good in the sunshine (Photo 11).

Park Run

Of course the club here is fortunate in having a much longer run out into the park itself and these larger engines made good use of this extra distance. This run also gives visitors to the park a chance to see and hear the locos in action at close range. The larger engines certainly made use of this additional length (Photo 12-13).

The two larger Great Western engines at the rally are owned by James Duncan who also built the Small Prairie, both superb examples of their class that really did work well. James is keen to get his young sons involved and at the rally both of them were doing just that all day long. Elder son Connor is already a competent driver as seen in Photo 13 and handles the Prairie without any problems.

A fine footbridge give passengers and visitors access into the centre of

PHOTO 8:

A busy ground level track steaming bay.

PHOTO 9:

Nigel Surman glides through the ground-level station on his Hunslet.

PHOTO 10:

A birds-eye view of Alan Mitchell and his 2-4-2 L&B tank as they power out onto the main line.

PHOTO 11:

Martin Parham waiting with the Stirling Single for the signal into the station.

PHOTO 12:

Alan Mitchell watches the barrier opening as he approaches from a run on the Park line.

PHOTO 13:

James Duncan and sons out in the Park with his small Prairie.





PHOTO 14:
Dave Holland's much modified Sweet William.



PHOTO 15:
The 4-4-0 Maid of Kent owned by Colin Walton.



PHOTO 16:
Tim Trotman looks pleased with himself as "Linda" drifts round the long curve towards the station.

PHOTO 17:
James Lloyd from Swansea steaming his 0-6-0 tank loco.

PHOTO 18:
One of the Mid Cheshire club members comes in from the Park line on his Scamp i/c loco.

Photos by the author



the track but it is also a good elevated vantage point for photography. My photo heading this report shows the view towards the club house emphasises what excellent facilities the club has and the range of activities at events such as this.

Brian Holland from the host club soon had his 7¼-inch gauge Sweet William in steam and this much-modified engine (**Photo 14**) boasts no less than five different ways of putting water into the boiler (if Brian is reading I'm sure *EIM* readers would like to know more! Ed).

Another well-travelled visitor was Colin Walton from the Halesworth club who attended with his 5-inch gauge GWR Pannier tank and a 5-inch gauge Southern 4-4-0 'Maid of Kent' (**Photo 15**). The 4-4-0 had a most unusual side-emitting smoke deflector fitted to it but the engine seemed to perform well.

Down-sized

Tim Trotman, a member from Oxford and also a fireman on the Ffestiniog Railway steamed his 5-inch gauge version of a FR favourite 'Linda' – this little engine just flew round the track (**Photo 16**).

From the Swansea Society James Lloyd steamed his little 0-6-0 Southern tank engine that resembled one of the P-class locos (**Photo 17**). Meanwhile a couple of members from the Mid-Cheshire club had brought along a pair of Scamps and these popular little i/c engines purred round the track all day long (**Photo 18**).

In concluding my notes for this rally I must thank chairman Dennis Mulford and all the Oxford club members for making the whole event a really successful day. The hospitality was second to none and everything seemed to work well and provided all the visiting locomotives with good track time. Thanks must go also to the ladies of the club who provided that almost endless supply of tea, coffee and cold drinks along with some excellent homemade cakes. **EIM**

Brass is bold, but steel sure

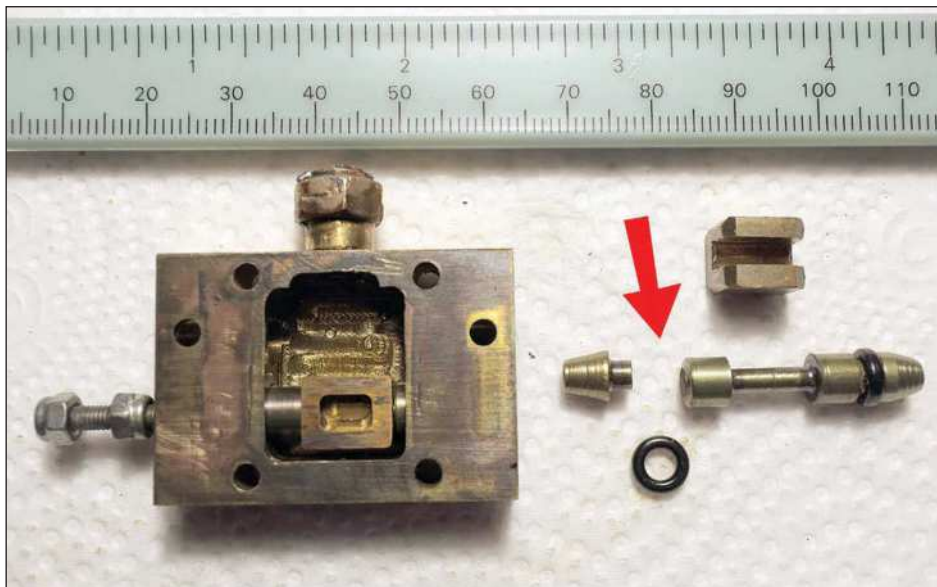
Today was a running day at our railroad museum, and I had planned to run my Ten-Wheeler for five to six hours - but the run was cut short because the feedwater pump suddenly stopped working!

It is the very pump I described in the July 2020 issue of *EIM* – in that article, I specified stainless steel for the shuttle valve stems, but I had just used brass myself.

That certainly backfired, as you can see in the photo: the valve stem is broken in two at the O-ring groove! The tiny shuttle moves rather vigorously and the constant pounding had weakened the brass.

Now, off to the lathe to turn a new valve stem, this time in stainless steel...

Jan-Eric Nyström



The standards available on G1 wheels

I have just received the latest edition of *EIM* and reading the description of the restoration of the Gauge 1 Midland Compound, I note that the author is changing the loco's wheel back-to-back measurement to 42mm.

Referring to the Gauge 1 Guild website, the G1 standard is 40mm back-to-back of 40.0 +0.5/-0, for standard gauge while for finescale it is 42mm.

Perhaps it is worth warning readers as a loco made to finescale measurements will not run on standard track.

Robert Postlethwaite

The Editor replies: Robert is right to be concerned and it's worth reiterating this to readers but in fairness to author Anthony White, he did actually deal with this in some detail in the first part of his series in the June issue, including providing a table of both standards and explaining at some length his problem that the original model wheels had some Standard dimensions and some Fine dimensions and why he had to change to all Fine dimensions.

Anthony also referred to the website of Mark Wood Wheels (<http://www.markwoodwheels.co.uk>) – Mark produces high quality

wheel castings for the scale and he sets out Gauge 1's three standards saying that "standard track will accept wheels of any of the finer standards, though they will not be supported by the check rails and may pass the wrong side of a point tip. Small wheels, narrower than standard wheels are more likely to drop in the long wide gap at the frog."

Anthony agrees that in theory using Fine standards can lead to trouble though adds he has never experienced any in 20 years; "Both the GWR Bulldog I completely scatchbuilt a year or so ago (with compensation) and this LMS Compound rebuild that has a fixed chassis have both been run for well over an hour and been videoed without a single derailment."

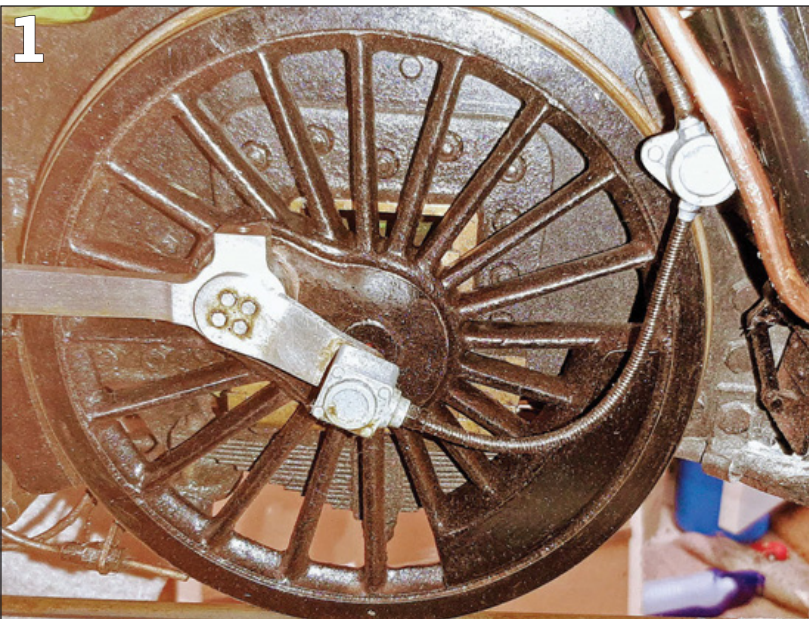


■ Reader *John Ollerenshaw* sent in the photo above of *EIM* tech ed Harry Billmore at the Fairbourne Railway's Gala in May, helping out a driver on the 7¼-inch gauge track at the beach line's Penrhyn Point terminus. "As a Fairbourne volunteer it was nice to see Harry turning his experience to a 7¼-inch gauge Sweet William – I understand the owner was having problems getting water into the boiler," John said. We're not surprised – as the Ed's photo above right shows, Harry has a passion for anything steam powered no matter what size! Harry adds, however, that it is lucky the Fairbourne photo does not come with an accompanying audio track!

Updating a Speedo

Details maketh the whole, as Ken proves with an improvement to his 5-inch 'Britannia'.

BY KEN GRUBB



"I added to my sense of triumph by tapping the holes without breaking the tap - cue one well-earned cup of coffee and a smug smirk..."

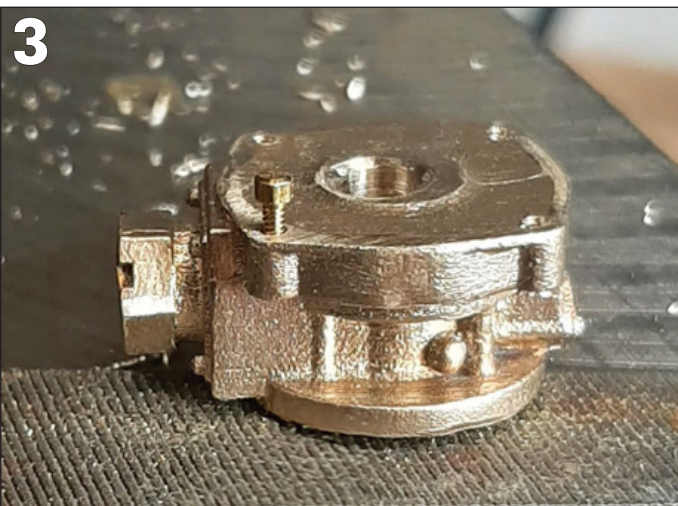
My 5-inch gauge 'Britannia' 4-6-2 was built in the 1980s and its builder used all the skills that were available at the time. He also did a fantastic job to add the cosmetic detail of a speedometer to his model locomotive.

Looking for a different project after finishing the build of my Butch loco, I read an article in my GL5 (Ground Level 5-inch Gauge Mainline Association) magazine, showing how to add a better-looking speedo to a model Britannia loco.

Since my loco was built there has been great changes in the availability of more detailed accessories like lost wax castings and now digital 3D printing. Adam Cro owns a business that specialises in fully detailed bits to be added to our models. He has been concentrating on British Railways Standard locos but has now moved onto LMS parts. There is a full and extensive range on his website at www.crofitings.co.uk.

I ordered my Speedo kit and it came with detailed drawings. I eagerly examined the parts when they arrived, they all looked really good, but a little small compared to what I was replacing. I took off the old parts from the loco, and removed the driving crank from the rear, left-hand driving wheel. However the bracket attached to the frames to hold the receiver had the fixing screws part-hidden by the driving wheels! As a result I had to make special spanners to get one screw out, doing this took a couple of days of frustration!

The builder of my loco had used a better product and solution for the cable that goes between the units and



on up to the footplate. I decided to re-use these items and I had to amend the drawings to suit. The receiver unit needed new 12BA holes to be drilled and tapped and then the unit could be fitted to the existing bracket, which was reattached to the loco.

After taking the old sender unit off the loco I considered how to attach this to the new sender. I drilled the unit for a running fit onto the crank pin, then countersunk the front face so that a countersunk screw drilled and tapped into the end of the pin would hold it all in place.

The front face of both the sender unit and its cover were then cleaned and lapped flat before I set about bolting the cover to the main body of the sender.

On the castings there were dimple marks showing where to drill. But the scale bolts that were supplied were M1.0 hex head brass. Did I have that size? Stupid question but good old Amazon came to the rescue, supplying a kit of all three types.

Tap chance

Next task was to find a suitable tapping drill. I chose 0.029-inch to see what would happen (!) – a typical muddle engineer's approach. However by holding the unit in a special homemade jig, and taking my time, all went okay. I added to my sense of triumph by tapping the holes without breaking the tap – cue one well-earned cup of coffee and a smug smirk.

The top cover was then drilled out to suit. I then attempted to join the two parts using the smallest set of pliers I had. That didn't work – I ended up breaking one screw and losing the other! This required an email to Adam Cro and a polite "can I have a few more please?"

PHOTO 1:

Starting point – original 1980s representation of a speedo.

PHOTO 2:

The Cro Fitting kit at supplied.

PHOTO 3:

New 1mm holes were fitted into the transmitter.

PHOTO 4:

Putting it all together proved a challenge.

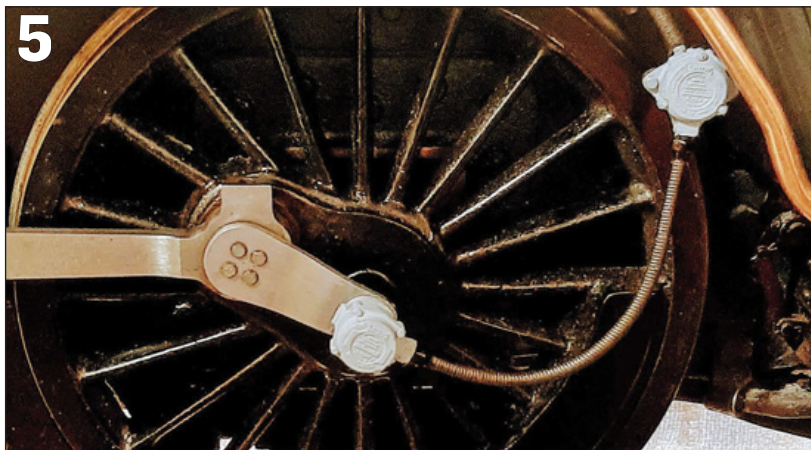
PHOTO 5:

The finished and fitted upgrade – without doubt an improvement.

PHOTO 6:

Another detail adding to the impressive look of a Britannia loco. Photo: Michael Topham

All uncredited photos by the author



What I managed to find out is that a M2.0 set bolt has a socket head that fits an M1.0 hex head bolt (1.5mm across flats). I purchased a boxed set of bolts from M2 to M4 (I may need them in the future) and turned down the head of the bolt so that it fitted the recess of the top plate. I then successfully screwed them together, thus earning not just a coffee and a

smug smirk, but also a celebratory slice of cake!

At last all was reassembled and after painting everything was refitted to the locomotive. Once they're coated in oil and muck and any of my engineering imperfections well hidden I trust you will be suitably impressed as I flash past at what I reckon to be a scale 80mph... **EIM**

REVIEWS

LNER 4-6-0 Locomotives – their design, operation and performance

By David Maidment

David Maidment continues his seeming ambition to create an in-depth loco class reference library with this new volume on the London North Eastern's heavy traffic locomotives. The book follows the pattern of earlier volumes we have previously reviewed in **EIM**, firstly focusing on the designers of each class of locomotive before detailed studies of each type in turn, from the earlier Great Central and North Eastern locomotives right up to the renowned Gresley B17s and Thompson B1s.

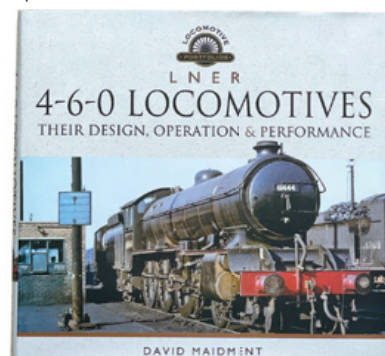
As ever the book scores on its detailed analysis of each type, including tables of runs with all intermediate station times listed. And again the photographs are a major plus factor – a host of

well-printed period shots that will be a real boon to modellers striving for accuracy.

Our desire from previous editions to see some detailed drawings remains with this title, though it would be difficult in this case as basic general arrangements of some 20 different types are included in a detailed reference section. This also lists every single

locomotive, their first and last depots and eventual fate. **AC**

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Show seeks models for competition entries

Organisers of the Midlands Model Engineering Exhibition on 13th-17th October are hoping for a big entry into the event's model competition and display classes this year – not only because this is the first time in three years model engineers could enter their work, but also in honour of show founder Chris Deith, who died in May. Chris was a great advocate and supporter of the show's competition classes.

The 16 classes, which are all free to enter, cover the entire sphere of model engineering and are divided into two sections:

Competition which will be judged by acknowledged experts with cups awarded and **Display** where exhibitors just wishing to put their work on show, finished or unfinished, may do so for the enjoyment of show visitors.

The classes are;

- 1) Locomotives up to & including Gauge 1
- 2) Locomotives – 2½ and 3½-inch gauges
- 3) Locomotives – 5, 7¼-inch & above
- 4) Rolling Stock, any gauge
- 5) Stationary Engines
- 6) Steam Road Vehicles (static)
- 7) Machine Tools & Workshop Equipment
- 8) Internal Combustion Engines
- 9) Horological, Scientific & Automata
- 10) Marine Models – Scale (over 50 per cent scratchbuilt)
- 11) Marine Models – Kit (standard or modified)
- 12) Model Horse Drawn Vehicles
- 13) Scale Aircraft Models
- 14) Young Engineers Award (under 20 years)
- 15) Miscellaneous
- 16) Hot Air Engines

Entry rules

Show organisers add that models entered in competition classes must be the work of the exhibitor, except in exceptional circumstances and with the prior agreement of the organiser. Any model previously awarded first, second or third place prize at



the Midlands Model Engineering Exhibition may not re-enter a competition class, but may be exhibited in a display class. The judges also reserve the right to move any competition entry into another class when in their opinion the model has been entered in the incorrect class.

Unfinished models should be entered into display classes only and the closing date for all entries is 19th September.

More details of the competition classes and an entry form are on the show website at www.midlandsmodeleengineering.co.uk

Model Engineers Laser

If it's 2020 and flat, we will cut it! even if it's 100ft for model release (see, checking!)
Established in 2004 by Malcolm High and passed to the new ownership of Edward Parrott in 2021, Model Engineers Laser can boast a catalogue of over 22,500 parts with customers all over the world.
Laser cutting offers a fast and accurate way of cutting various materials, and its popularity has increased dramatically in the industry. Trying to keep prices down, without compromising our service or quality is of utmost importance to us. We can offer such great prices as we keep overheads to a minimum, such as recycling packing materials where we can (this is also really great for the environment), and by batch cutting orders, so please don't expect a next-day service.
*See our materials section for availability.

How to use our online catalogue:



MEL cuts out sharp new site

Model Engineers Laser has launched a new website which company owners Ed and Holly Parrott tell us remains at the same address of www.modelengineerslaser.co.uk but has "some new great features and a snazzy new look."

Taken over by the Parrotts in 2020 from founder Malcolm High, MEL offers a product list of more than 22,500 parts over gauges and scales from O to 10¼-inch.

The new website now allows customers to place orders online for standard catalogue items, all of which are listed on the website instead of having to copy a list and either call or email them over.

To keep it easy, the site layout and menus remain as they were before but customers now log into their own account that lets them see their previous orders and track the progress of current orders.

"MEL wants you to know that although the new website allows you to place orders, it will never ask you for money. We are still happy to take orders by email and by phone though if you prefer," Holly says.

Calling all model engineering manufacturers and suppliers

We want your latest news!

If you are launching a new product or have any news to impart that will be of interest to our readers, then space is available on this page.

Please send details, and pictures, to editor@engineeringinminiature.co.uk



Typical of the type of entry that would be very welcome in class 1 of the Midlands Model Engineering Exhibition's competition classes, and indicative of the very high quality work that goes on in the smaller model engineering scales, is this 16mm scale Hagan's Patent 2-6-4-OT locomotive that won the Allcomers Trophy in the Model of the Year competition at the recent National Garden Railway Show in Peterborough.

Completely built from scratch by Steve Bell, who among other things has regularly driven his own locomotive on the 15-inch gauge Evesham Vale Light Railway, the gas-fired model represents a prototype that worked on the 2ft gauge North East Dundas Tramway between 1900 and 1924. The four rear driving wheels were carried in a separate pivoted frame that allowed the loco to traverse curves of just 100ft radius.

Peak season events keep coming

Clubs are keeping very busy through the summer with rallies and open days but the pace is pressuring some of the infrastructure...

COMPILED BY ANDREW CHARMAN

Welcome to this month's club and track news round-up and with these words being written just as we move into the peak summer month of August, there is plenty happening on the tracks, and among the clubs too.

We start this month's selection with news of major changes at what used to be known as the Cleveland Association of Model Engineers – following an overwhelmingly positive vote by members in June, this club has changed its name to the **Stockton and Darlington Model Engineers**.

The Cleveland group was originally formed after an announcement in the *Model Engineer* magazine in March 1977 and had a meeting base in Stockton-On-Tees. But since 1981, it has been located at the Tees Cottage Pumping Station in Darlington where it runs the Tees Cottage Miniature Railway – this funds the club activities and its continuing aims to promote an interest in model engineering.

The name change has come about to show the history of the group in both towns, but it also fits in nicely with the forthcoming 200th anniversary Celebration of the Stockton and Darlington Railway (the world's first public railway) in 2025.

The now Stockton club tells us that membership is open to all interested in miniature steam, electric or internal combustion. As well as the open days, there are regular members-only running days on the railway and the club site also provides a secure location in which to operate road steam.

So if you are based around the area and interested in joining up, you can get further details on email from tcmrailway@gmail.com or by visiting the website: www.tcmrail.co.uk

Roving Roys

Again there are plenty of events to attract the attention of our readers, and it's good to see the EIM club diary page back to its pre-Covid health. In this issue we feature John Arrowsmith's report of one annual rally for a classic loco, the Sweet Pea, and we have news of another – the **Bromsgrove SME** is again hosting this year what will be the 10th Rob Roy Rally, following the success of the event it staged last year and which we featured in the April 2022 issue.



ABOVE & BELOW: Many a successful miniature railway has been established as part of a larger steam centre and the **Vale of Aylesbury ME** certainly adds to the attractions of the Buckinghamshire Railway Centre, as **Ken Jones** discovered on a visit in May. The line, around 1km long, runs around an attractive wooded area and includes a crossing and tunnel.

The club boasts tracks of 32mm and 45mm gauges on the raised garden railway and 3½, 5 and 7¼-inch gauges on their ground-level track. The miniature railway is open on steaming days and special events at the centre.

We particularly liked the model cable car which can be seen emerging from a portal of the tunnel in the picture below...

All owners of the classic Martin Evans 0-6-0, launched 61 years ago, will be welcome at the event on 17th September, and anyone interested in attending can get more details from Ian Horsfield on 01386 792628.

The Bromsgrove club is also holding its Autumn open day on Saturday 10th September. Running facilities will be available on the 32mm/45mm garden gauges and the 2½, 3½ and 5-inch gauge tracks and





visitors, with the usual insurance certificate where appropriate, will be very welcome. Further details of the day are on the events page of the Federation of Model Engineers website (<https://fmes.org.uk>).

A bumper crop of newsletters arriving at **EIM** Towers this month and among them a new one sparking happy memories for your editor, from the **Brighton & Hove MLE**. For this southerner as a child day trips with the grandparents on the train to the south-coast resort were a regular treat, and it was on one of these trips that grandad bought me a Mamod traction engine – the rest, as they say...

Mind you grandad had form in this area – my mum used to tell a tale of when she was a child and live-steam engines were run around the

ABOVE: The ‘Terrier Gala’ at the Bluebell Railway in late July suffered the failure of a star guest but this 10¼-inch gauge version from the South Downs Railway kept on going strongly.

BELOW: More size comparison on show at the Welsh Highland Heritage Railway in Porthmadog, Wales. Photos: Phil Barnes

floor of the living room for her brother’s benefit, until one day one tipped over and set a sheepskin rug alight! Grandad in the doghouse...

I digress... The front of *The Lobby*, the Brighton newsletter proudly records that the club has been running trains around its track in Hove Park for 71 years, and writing in his editorial chairman Mick Funnell reports that the public running days so far in 2022 have seen “some memorable passenger numbers.”

The club is seeing great benefits from a recently installed storage traverser which has removed the chore of lifting the three battery-electric locos onto the steaming bays for use. And Brighton is also following the example of many other clubs in replacing wooden sleepers on

its running line with recycled plastic, which is supplied in lengths and has to be sawn to finished size and slotted to take the rails.

Interestingly Brighton was one of the clubs that felt compelled to take action following health and safety guidance of blocking areas between carriages where visitors could trap their limbs, as reported in these pages last month. The solution was to fit wooden formers at the end of each passenger car – these formers have press studs on them that allow fabric ‘curtains’ to cover the coupling area between cars. Ingenious...

Moving just a few miles along the south coast, I always enjoy the newsletter of the **Worthing SME** which I’m sure editor Dereck Langridge won’t mind me describing as one of the more anarchic! The latest edition mentions Page 3 girls on its cover, alongside a picture of a member with his motorcycle, and captions another picture with the question “How many skilled technicians are needed to wire a three-pin plug?”

There is serious stuff of course, including an excellent article on the boiler member Clive Pattern is building for his A1 locomotive, but the fun is never far away, an in-depth description of the club signalling system entitled “When our signalling system goes horribly wrong...”

Staying on track

Continuing our south-coast tour and the latest newsletter from **Plymouth Miniature Steam** reports major track renewal planned for the club’s track in the Goodwin Park nature reserve. It seems the first couple of public running days this year produced a number of derailments at a particular section and on inspection “it was found that the track was a real roller-coaster, with the track changing super elevation by as much as four degrees in half a metre and it was probably this rapid change in super elevation (camber or slope), that was causing the problems.”

This shows just how careful one has to be with trackwork – the club is now planning to replace some 90 metres of track in this section, and another 30-metre section elsewhere, so members are going to be busy in the next few weeks...

Still patiently awaiting the opportunity to build their new track are members of the **Leeds SME**. As we’ve reported previously the Society is set to move back to its previous home of Eggborough power station, once the power station is demolished, and writing in the new issue of *Leeds Lines*, chairman John Hunt offers the encouraging news that the



demolition contractors appear to be upping the pace. "All that looks to be left is the main body of the boilers, the chimney and the outer wall of the turbine hall.

"Hopefully after this phase the site can then be cleared and... hopefully when new access roads are laid it may open the door for us to return. We live in great hopes," John adds. We are sure the wait will be worth it in the end and in the meantime the Society is getting a great deal of use out of its portable track at local events.

The latest newsletter of the **York ME** includes a practical piece on the loading of locomotives from a ground-level portable track onto a trailer, and the neat little folding ramp that has been created as a result. Member Richard Gibbon describes the project in detail complete with paper cut-outs showing how it works, plus photos demonstrating that it actually does! One thing we have learnt through many years of involvement with model engineering clubs – so many of them are full of members boasting a real flair for innovation.

An interesting note in the latest edition of the **SMEE** newsletter on the subject of new technology and the dreaded Zoom video-conferencing tool. Writing in his column chairman Alan Berman comments that; "Zoom is going from strength to strength and we now regularly have more members online watching the lecture programme than we have in Marshall House..."

Narrow gauge, wide appeal

As a confirmed 'Shortaxle freak' (you can follow me on Twitter @ShortAxle...) your editor wishes he had been able to attend the Narrow Gauge Rally at the **Rugby ME**. Organised by member, Model Engineers Laser co-owner and occasional **EIM** contributor Edward Parrott, the event proved a major success with plenty of visitors on both days and some impressive locomotives running – of course when one builds a narrow gauge prototype to say 7¼-inch gauge, the result tends to be quite a large lump of locomotive!

Two that stood out, pictured on this page, were what was described by Edward as "A stunner and rarely seen



"We now regularly have more members online watching the lecture programme than we have in Marshall House..."

prototype," the Welsh Highland Railway's Hunslet 2-6-2T 'Russell', and a loco with an interesting history behind it. The Bagnall 0-4-2 was built by a man local to the Rugby club but apparently never a member, he running on a railway in north Wales.

After he died Rugby members helped clear the remains of his workshop and discovered the Bagnall, in need of some serious TLC

which was completed by Hendred Locomotive Services. Edward says that it ran very well at the rally.

Whoops – out of space again. Keep the newsletters coming, and please, I know I sound like a stuck record but do send us some pictures of events and developments at your club – we'd rather print pictures of clubs than commercial lines, but we need to get them sent in! **EIM**



ABOVE: Busy steam-up area full of evocative machines at the Rugby club's annual Narrow Gauge Rally. Photo: Aubyn Mee/Rugby ME

ABOVE RIGHT AND RIGHT: 'Russell' and a newly restored Bagnall, two of the stars of the Rugby Rally.

Photos: Edward Parrott/Rugby ME

DIARY

EVERY SATURDAY

(Weather permitting)
Sussex MLS public running, Beech Hurst Gardens, Haywards Heath RH16 4BB, 2-5pm (until 24th Sept)

EVERY SUNDAY

(Weather permitting)
North Wilts ME public running, Coate Water Country Pk, East Swindon, SN3 6FG, 11am-5pm

Ryedale ME public running, Gilling East, North Yorks YO02 4JJ (until 25th Sept)

Southampton SME public running, Nursery Rd, Southampton SO18 1PQ

SEPTEMBER

- 3** Tiverton & Dist MES running, Rackenford, EX16 8EF
- 4** Lincoln & District ME running at car boot sale, North Scarle playing field, LN6 9ER
- 4** Plymouth MS public running, Goodwin Pk, Plymouth, 2-4.30pm
- 6** Romney Marsh ME Track Meeting, Rolfe Lane, New Romney, from noon
- 7** Bristol ME meeting, Wilton windmill restoration, Begbrook social club, BS16 1HY
- 7** Bradford ME meeting, Marine Thrust Talk by Michael Hawkrigde, Saltaire Methodist Church, 7.30pm
- 8** Cardiff ME meeting, Medieval Cardiff by Richard Britton, Heath Pk, Cardiff CF14 4AW
- 8** Worthing SME meeting, Bits & Pieces, Field Pce, Worthing, 7.30pm
- 10** Brighton SME public running, Hove Pk Railway, BN3 7RB, 2-5pm
- 10** Bromsgrove ME Autumn Open Day, 32-45mm, 2½, 3½, 5-inch running, insurance certificate required, Avoncroft Museum
- 10** Cardiff ME Steam-up & family day, Heath Pk, Cardiff CF14 4AW
- 11** Bradford ME Public running, Northcliff, BD18 3DD Members 11.30am, public 1.30-4pm

11 Bristol ME public running, Ashton Court Railway, BS8 3PX, noon-5pm

11 Havering MRC public running, Lodge Farm Park, Romford. RM2 5AD, 11am-4pm

11 Hereford SME public running, Broomy Hill, Hereford HR4 0LJ, <https://hsme.co.uk/> noon-4.30pm

11 Worthing SME public running Charity Day, Field Place, Worthing, Sussex 11am-4pm

13 Lincoln & District ME public running trial event (TBC), North Scarle playing field, LN6 9ER

13 Romney Marsh ME Track Meeting, Rolfe Lane, New Romney, from noon

14 High Wycombe ME meeting, subject TBA, Rosetti Hall, Holmer Green HP15 6SU, 7.30pm

15 Cardiff ME Forum, Heath Park, Cardiff CF14 4AW

16 7¼" Gauge Society Mini-Gathering and AGM, Echills Wood Railway, Sutton Coldfield B76 0DY

17 Brighton SME Fun Day, Hove Pk Railway, BN3 7RB

17 Bradford ME Friends of Northcliffe Pop-up Cinema, Northcliff, trains 5.30-6pm, film 'Railway Children Return' 7.30pm, weather permitting

17 Rob Roy Rally, Bromsgrove ME, Avoncroft Museum, for details contact Ian Horsfield, 01386 792628

17 Ryedale ME Late Summer Social, Gilling East, North Yorks YO02 4JJ

17 South Cheshire ME Steam-up with London & North Western Railway Society celebrating centenary of LNWR merger, Cre Rd, Willaston, Nantwich CW5 6NE, from 10am

18 Bristol ME public running, Ashton Court Railway, BS8 3PX, noon-5pm

18 Cardiff ME open day, Heath Pk, Cardiff CF14 4AW

18 Guildford ME Charity Day, Stoke Pk, Guildford GU1 1TU, 2-5pm

18 Lincoln & District ME running at car boot sale, North Scarle playing field, LN6 9ER

18 Plymouth MS public running, Goodwin Pk, Plymouth, 2-4.30pm

18 Tiverton & Dist MES running, Rackenford, EX16 8EF

20 Romney Marsh ME Autumn Meeting & BBQ, Rolfe Lane, New Romney, from noon

21 Bristol ME zoom meeting, the world's crane makers, Stothert and Pitt – contact secretary@bristolmodelengineers.co.uk

21 Leeds ME jumble sale, Mid Yorks Golf Club, Darrington WF8 3BP, 7pm

22 Worthing SME meeting, Steyning Line Revisited, Field Place, Worthing, Sussex 7.30pm

24 Brighton SME public running, Hove Pk Railway, BN3 7RB, 2-5pm

24 Romney Marsh ME boiler testing, Rolfe Lane, New Romney, tests 9am, running from noon

24 East Somerset SMEE Model Engineers Open Weekend, Bath & West Showground – booked visitors only, no public running. Contact Michael Malleson, 01747 860719, openweekend@esmee.org.uk

25 Havering MRC public running, Lodge Farm Park, Romford. RM2 5AD, 11am-4pm

25 Hereford SME public running, Broomy Hill, Hereford HR4 0LJ, <https://hsme.co.uk/> noon-4.30pm

25 Worthing SME Public running Green Fields Day, Field Pce, Worthing, 11.30am-4pm

27 Romney Marsh ME Track Meeting, Rolfe Lane, New Romney, from noon

OCTOBER

1 Tiverton & Dist MES running, Rackenford, EX16 8EF

2 Bristol ME public running, Ashton Court Railway, BS8 3PX, noon-5pm

2 Guildford ME Small Model Steam Engine Group open Meet, Stoke Pk, Guildford GU1 1TU, 2-5pm

2 Plymouth MS public running, Goodwin Pk, Plymouth, 2-4.30pm

4 Romney Marsh ME Track Meeting, Rolfe Lane, New Romney, from noon

5 Bradford ME meeting, 'Things that go bang in the night' by Ian McKay, Saltaire Methodist Church, 7.30pm

5 Bristol ME meeting, On the table, Begbrook social club, BS16 1HY

6 Cardiff ME meeting, Black Vein mining disaster of 1860 at Risca, by Stephen Lyons, Heath Pk, Cardiff CF14 4AW

8 Brighton SME public running, Hove Pk Railway, BN3 7RB, 1.30-4.30pm

9 Cardiff ME open day, Heath Pk, Cardiff CF14 4AW

9 Havering MRC public running, Lodge Farm Park, Romford. RM2 5AD, 11am-4pm

9 Hereford SME public running, Broomy Hill, Hereford HR4 0LJ, <https://hsme.co.uk/> noon-4.30pm

9 Plymouth MS Members Sunday, Goodwin Pk, Plymouth, 2-4.30pm

9 Worthing SME final summer public running day, Field Pce, 2-5pm

11 Romney Marsh ME Track Meeting, Rolfe Lane, New Romney, from noon

13 Cardiff ME Bring & Buy, Heath Pk, Cardiff CF14 4AW

13 Worthing SME meeting, Austin Nippy restoration by Christopher Gould, Field Pce, 7.30pm

13 Midlands Model Engineering Exhibition, Warwickshire Exhibition Centre, full details at www.midlandsmodelengineering.co.uk

16 Bradford ME Public running, Northcliff, BD18 3DD Members 11.30am, public 1.30-4pm

16 Guildford ME Open Day, Stoke Pk, Guildford GU1 1TU, 2-5pm

16 Plymouth MS public running, Goodwin Pk, Plymouth, 2-4.30pm

16 Tiverton & Dist MES running, Rackenford, EX16 8EF

18 Romney Marsh ME Track Meeting, Rolfe Lane, New Romney, from noon

19 Bristol ME Zoom meeting, talk by Holden F5 Locomotive Trust

Details for inclusion in this diary must be received at the editorial office (see page 3) at least EIGHT weeks prior to publication. Please ensure that full information is given, including the full address of every event being held. Whilst every possible care is taken in compiling this diary, we cannot accept responsibility for any errors or omissions in these listings.

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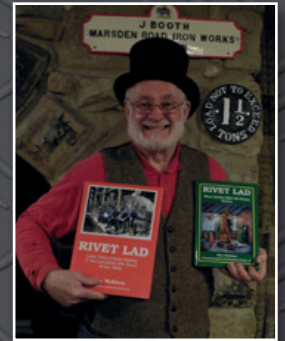
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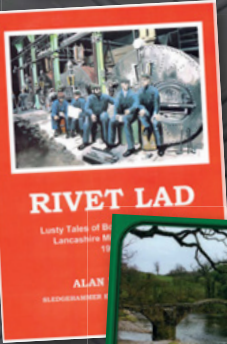
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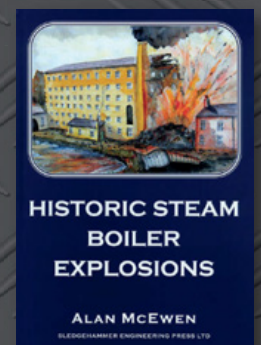
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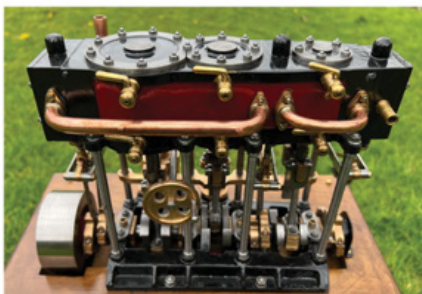
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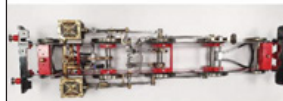
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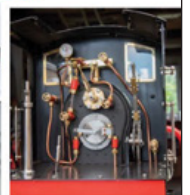
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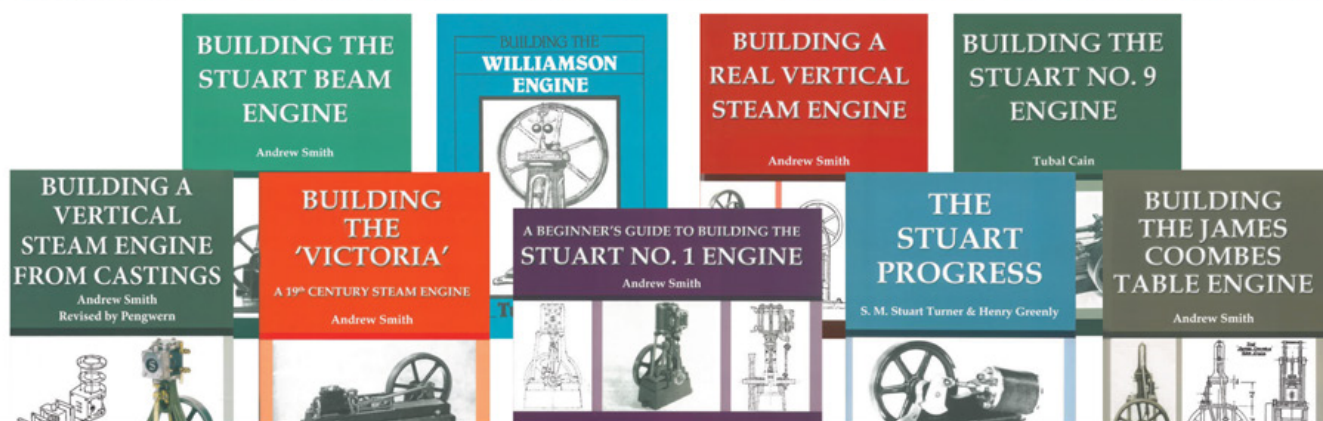
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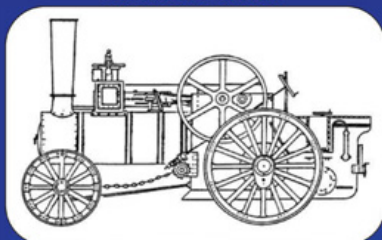
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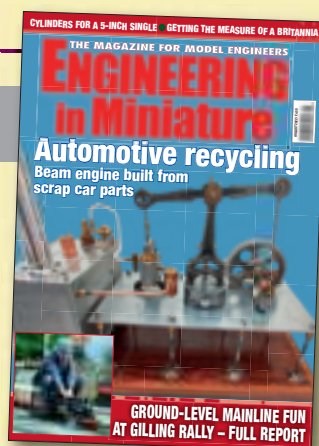


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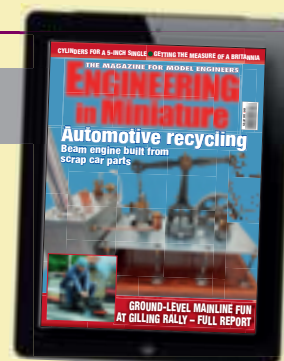


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A new "Molly Anne" 0-6-0 by Polly Engineering, the 0-6-0 variant of their attractive "Trojan" design. It's at an advanced stage of assembly, air-running, with parts to complete.

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5 INCH GAUGE BR STANDARD CLASS 4 2-6-4T

A 5 inch gauge Standard Class 4 tank by Silver Crest Models; a one-owner engine - steamed twice from new. Condition both mechanically and cosmetically is close to new. Complete with manufacturer's documentation, including original boiler certificate.

ref 10702

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7 1/4 INCH GAUGE GWR 14XX 0-4-2T

An exceptionally well built 7 1/4 inch gauge GWR 14XX 0-4-2T, built to Martin Evan's well-regarded "Dart" design. Standard of workmanship is to a high standard throughout; fit and finish of valve gear and motionwork is good. Free-steaming, it goes as well as it looks.

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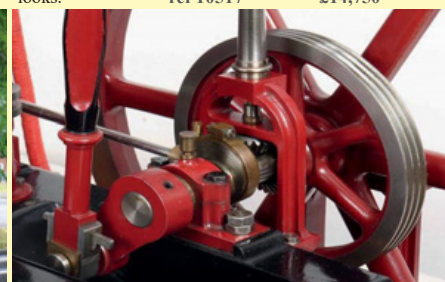


5 INCH GAUGE LB&SCR "TERRIER" 0-6-0T

A well-built 5 inch gauge London, Brighton & South Coast Railway "Terrier", built to Martin Evans' "Boxhill" design. Runs very well on air in either direction with clear, even beats.

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A well made Stuart "Major" beam engine to the design by George Gentry. The engine turns freely and runs on air, mounted on a wooden base with pipework for steam, exhaust and boiler feed pump led out through the back.

ref 105193

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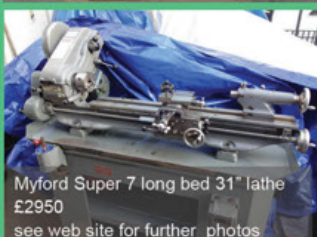
Pacific poss. 5" locomotive 4-6-2 Boiler kit, casting set and frames see website for more pictures £1800



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



Boxford BUD cross feed, 3 jaw, 4 way, Tee slot slide 240 Volts £1250



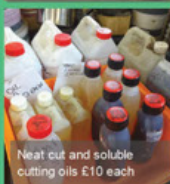
Myford Super 7 long bed 31" lathe £2950
see web site for further photos



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



Myford gearbox unused £1000



Neat cut and soluble cutting oils £10 each



Bridgeport / Versatool cabinet £400



70KVA Perkins engine diesel Generator, silent run £3750



Books and manuals in our eBay shop from £6.00



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



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



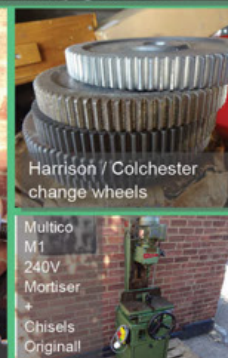
Startrite Robland K210 £2450



X-Y 12" x 6" table £525

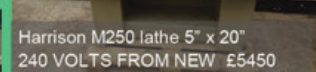


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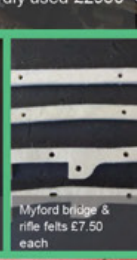
Transwave 4KW / 5.5HP rotary converter £800



Bridgeport 42" x 9" turret milling machine / R8 Preferred belt change head type £3250



Tripus 240v switch £90



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