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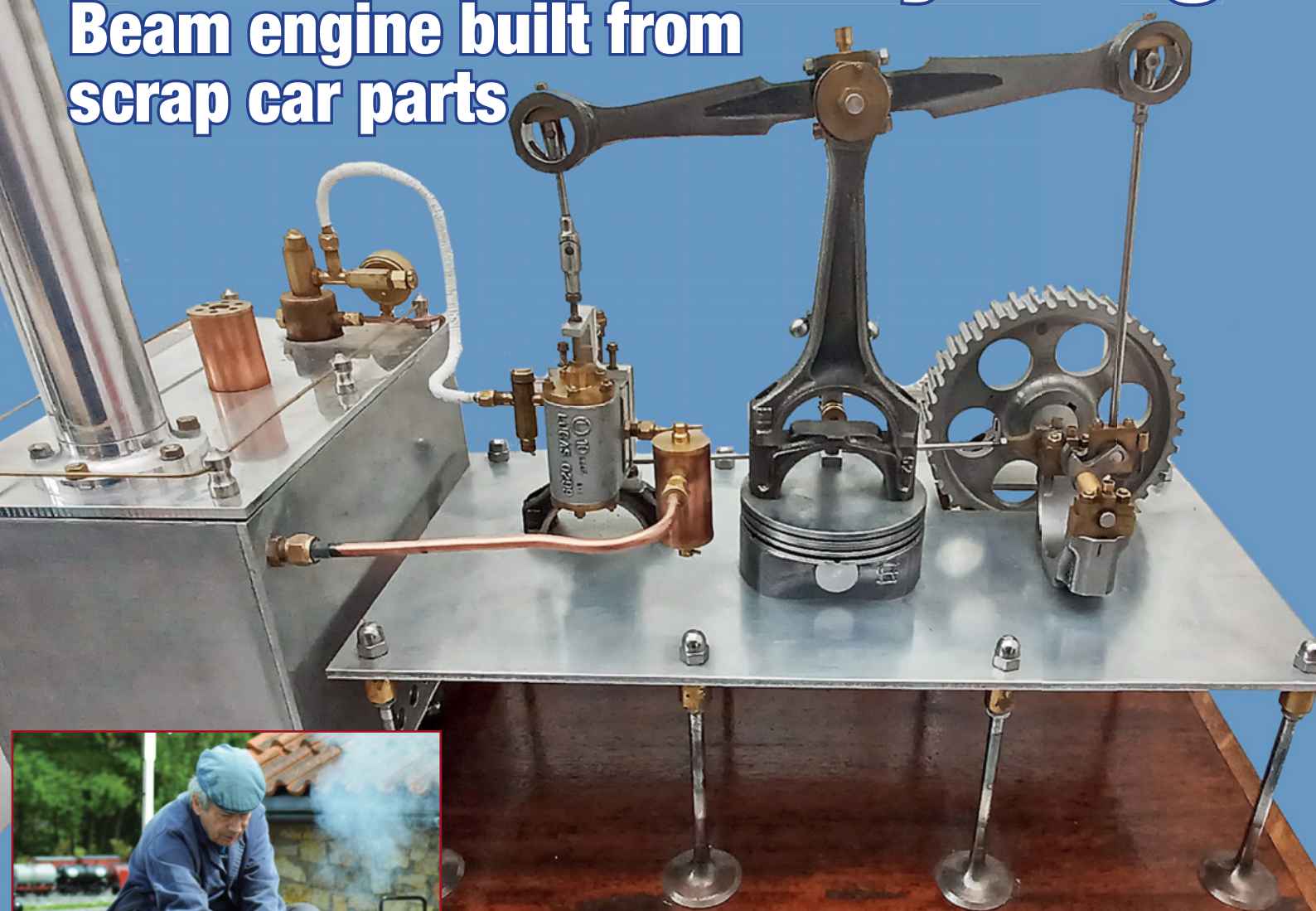
THE MAGAZINE FOR MODEL ENGINEERS

ENGINEERING in Miniature



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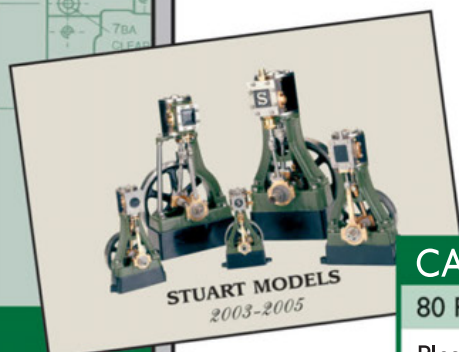


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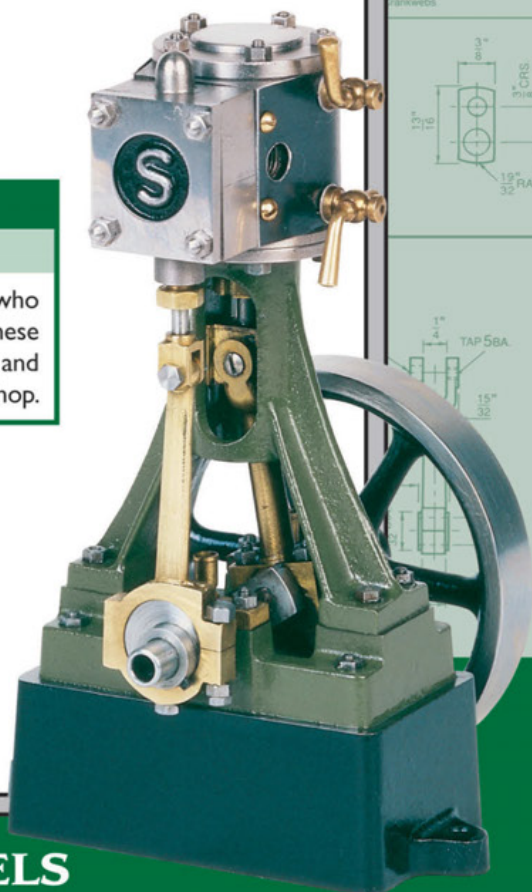
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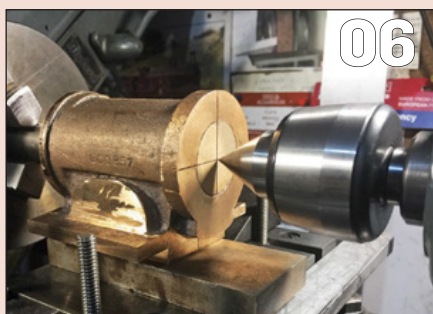
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CONTENTS

AUGUST 2022 Volume 44 Number 02

THE MAGAZINE FOR MODEL ENGINEERS
ENGINEERING
in Miniature



06 LOCO BUILD: STIRLING SINGLE CYLINDERS

by Bruce Boldner

10 A BEAM ENGINE FROM SCRAP CAR PARTS

by Rich Wightman

13 3-INCH TRACTION ENGINE – PIPEWORK

by Jan-Eric Nyström

16 TENDER BENDER – A BENDING TOOL

by Peter & Matthew Kenington

19 AT THE TRACK - A CAUTIONARY TALE

By Stuart Rothwell

20 RESTORING A GAUGE 1 MIDLAND COMPOUND

by Anthony White

23 PROTOTYPE: HOVERCRAFT & AIR CUSHIONS

by Rodger P. Bradley

28 HARRY'S GAME: MORE SOLUTIONS & ISSUES

by Harry Billmore

36 GILLING MAINLINE RALLY 2022

by John Arrowsmith

36 BENCH TALK: A BRITANNIA DILEMMA

by Warwick Allison

38 GENERAL NEWS

Sisters reunited at Rhyl

39 LETTERS

39 REVIEWS

40 CLUB & TRACK NEWS

44 DIARY

FRONT COVER

Spot the con-rods, piston top, exhaust valves...
The beam engine built by *Rich Wightman* is a masterpiece in re-using supposedly scrap parts.
The inset shows the Gilling Mainline Rally, a superb event reported on this month by *John Arrowsmith*.



EDITORIAL

Midlands show is happening –so let's make it a good one

Welcome to the August **EIM** and I write these words not long after returning from the funeral of our founder Chris Deith, whose passing was reported in the July issue.

I suppose it's inevitable that I learnt at the funeral of rumours circulating suggesting the return in October of the Midlands Model Engineering Exhibition, also founded by Chris and the jewel among a number of shows he organised, would not happen due to his passing. Well I'm pleased, and frankly not in the least surprised, to be able to dismiss such rumours as completely untrue – the show team, led by Chris's daughter Avril, are working very hard to prepare for the event and have even more reason to ensure that this year's show, the first since 2019, is a success as a tribute to Chris. A few days before I penned these words a list of the latest suppliers to sign up for the event was released and it's looking just like the Midlands shows we enjoyed pre-pandemic – more details are on our news pages.

It is very important that the Midlands exhibition is a success, and while to honour Chris is a very valid reason it is by no means the only one. It's pretty clear that this will be the only major model engineering show this year, and we haven't had one since London in January 2020, getting on for three years ago. I don't know about you, but the opportunity to get out to a show is very important to me and something I have greatly missed – not only to take advantage of a host of suppliers being all in one place at the same time, and to see the various projects underway on the club stands, but crucially to get to meet up with fellow model engineers, find out what's going on in the hobby and yes, put the world to rights! We need the Midlands show to return in style to ensure the future of London, of Doncaster... a future without shows would be a poorer one for all of us.

A reader made me very happy recently when he commented that he enjoys **EIM** because he learns something from every issue – that means we are doing something right! The learning point from this issue's cover feature could well be – don't ever consider a part is scrap! Rich Wightman's beam engine made almost entirely of car engine components, and built some time ago when he was in the motor industry, is a lesson in multiple areas – budget model engineering, recycling, innovation... Brilliant stuff, of the type I'm proud to include in our pages. And a reminder again that if you have something you think would look appropriate in **EIM**, you know where we are...

Andrew Charman – Editor

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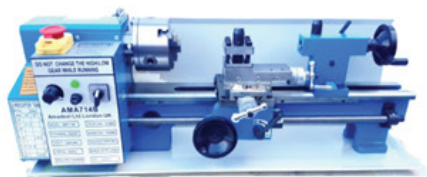
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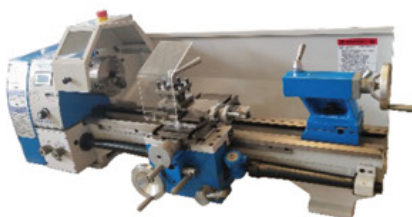


AMA714B Mini lathe
Brushless Motor

SPECIFICATION:

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Spindle bore: 20mm
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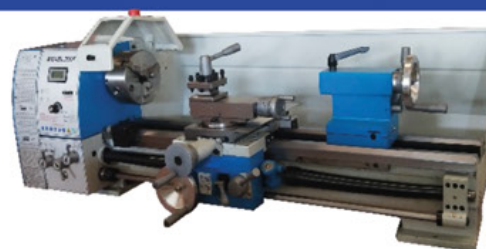
AMABL250Fx750

SPECIFICATION:

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

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W 2 Axis DRO - Price: £2,280



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Price: £2,395

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AMAVM25LV

SPECIFICATION:

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T-slot size: 12mm
Weight: 120Kg

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W AXIS POWERFEED - Price: £1,659

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AMAVM32LV

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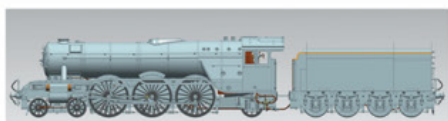
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The Model

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

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

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Summary Specification

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

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A GNR Stirling Single in 5-inch Gauge

Australian engineer Bruce continues his new favourite locomotive build project, begun last month, by making the cylinders for his Single.

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

Each cylinder for the David Piddington-designed Stirling Single model locomotive, as supplied by Reeves, was a single bronze casting with its port face. I cut to shape a sheet of MDF to fit into the as yet unmachined cylinder holes of the casting at each end, then pencilled in crosshairs to determine the centre point of the cylinder bore (**Photo 12**).

I then machined the port face to be parallel to the cylinder bore. This could only be estimated by eye by visually lining up with the outside of the cylinder casting.

The top slide of the lathe was then removed and the casting bolted, port face down onto the cross slide and shimmed so that the centre point of the crosshair lines on each end were aligned with centres mounted in the chuck and tailstock.

The cylinders were then bored to a diameter of 1 inch and $\frac{7}{16}$ ths with a boring bar (**Photo 13**), before I fitted the pistons with Viton O-rings.

Each port face was then inserted into its mounting cut-out in the mainframes, then clamped whilst mounting holes were drilled through the frames into the cylinder mounting flanges (**Photo 14**).

A central exhaust port of $\frac{1}{4}$ -inch diameter and front and rear exhaust ports of $\frac{5}{32}$ -inch diameter were then drilled using slot drills. However the exhaust port was required to enter the

PHOTO 12: MDF used to help determine centre line of cylinders for boring out.

PHOTO 13: Boring process here underway.

PHOTO 14: Port face clamped in position on frame before drilling out mounting holes.

PHOTO 15: Setup for drilling steam exhaust port at required angle to cylinder.

Photos by the author



casting at an angle, a problem that was solved by clamping the cylinder casting to the rear fixed jaw of the mill vice to conform to this angle. This procedure is shown in **Photo 15** – the mirror in the foreground was to be able to see the slot drill when it broke into the port, so as to stop it going too far and marring the far side of the port chamber.

The steam chest walls were then machined from another gunmetal casting and screwed to the port face, sandwiching a gasket in between.

Photo 16 shows one, with just the top cover to be added.

Highly sprung

The trailing axle completes the Stirling locomotive wheels. I cannot deny that it looks rather ridiculous to have a coil spring passing right

through a cast dummy leaf spring. Although I constructed this as per the plans, I feel that it would have been better to have working leaf springs (**Photo 17**). Working out a leaf spring formula for a given load, however, appears to be more difficult than finding suitable coil springs.

In any case, the trailing wheels of a single driver locomotive must bear only a minimal load. If the springs are too strong, they lift the driving wheels and drastically reduce traction. In my experience the weight of a single driver locomotive should ideally be centred equally between the bogie centre and the driving axle.

The trailing wheels are mainly present to stop the locomotive tilting backward with its nose up (like a speedboat) when it is accelerating forward. They also provide guidance



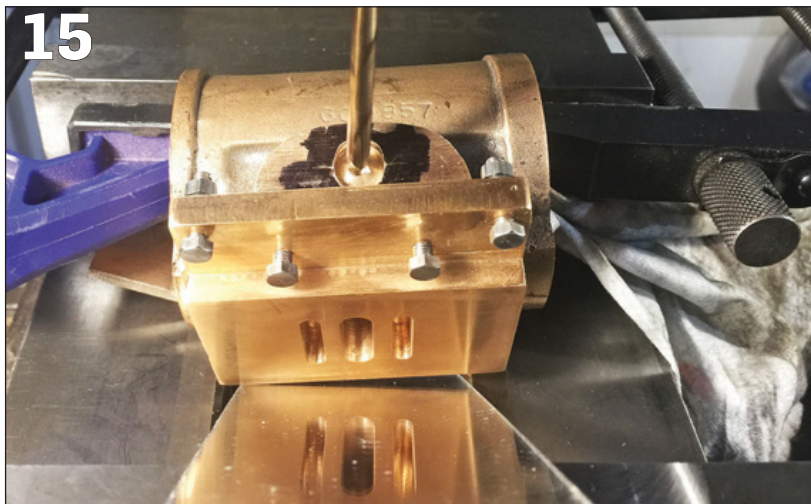
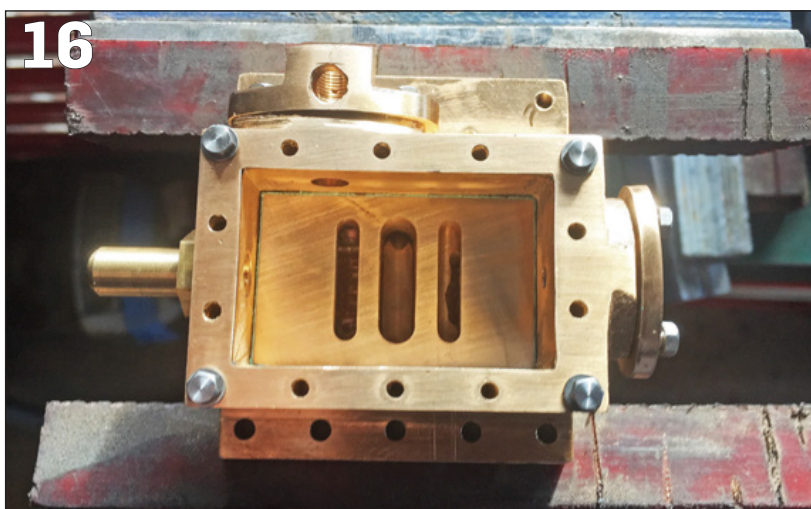


PHOTO 16: Finished cylinder and valve chest just awaiting its top cover.

PHOTO 17: While seemingly counter-intuitive there are reasons for passing coil spring through dummy leaf.

PHOTO 18: Drilling mounting holes in cylinder front cover.

PHOTO 19: Careful measuring and machining needed for slide bar mounting tabs on cylinder rear covers.



when backing through points.

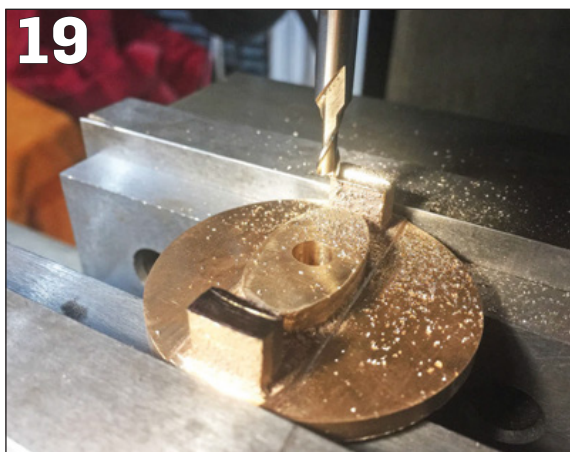
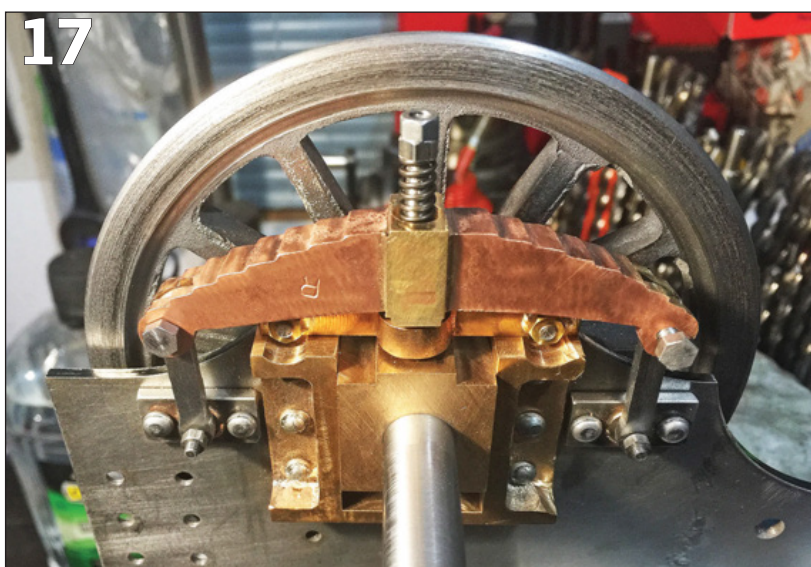
These parameters became especially apparent to me when I built a miniature brass Midland Spinner in P4 scale (4mm to the foot). It was far more difficult to obtain the required traction with the P4 Spinner than the 5-inch gauge version. The above weight distribution was especially critical for the smaller model.

The cylinder covers were next.

Photo 18 shows a front cover being drilled for mounting bolts. The rear

cylinder covers had tabs onto which the piston slide bars were to be attached. The mounting surfaces of these tabs of course had to be precisely machined the correct distance apart so as to hold the slide bars at the correct spacing – careful measuring then machining was required (**Photo 19**).

However, my machining was a bit inaccurate and when the slide bars were bolted to the tabs, they were crooked, rather than at precise right angles to the covers. So I measured the



20



angle (Photo 20) then machined this angle in the reverse direction on the slide-bar surface where it met the tab and when the slide bar was again bolted to the cylinder cover tab, it achieved the required right angle (Photo 21).

I made a jig to construct the eccentrics. The eccentric blank was shimmed beneath to stand it at the correct height. The strap was secured around this, from which the eccentric rod proceeded to its lower resting point at the far end of the jig, creating the necessary offset.

Pins through the eccentric blank and the fork at the end of the rod ensured the length between attachment points was the same for all the eccentric rods. Each rod was then silver soldered to its eccentric strap whilst held in the correct position on the jig (Photo 22).

My friend Mike Boddy suggested that as I had the room to do so, why not make double-width eccentrics?

PHOTO 20:

An error in mounting the slide bars meant this angle needed rectification.

PHOTO 21:

Problem sorted by applying a little ingenuity described in the text.

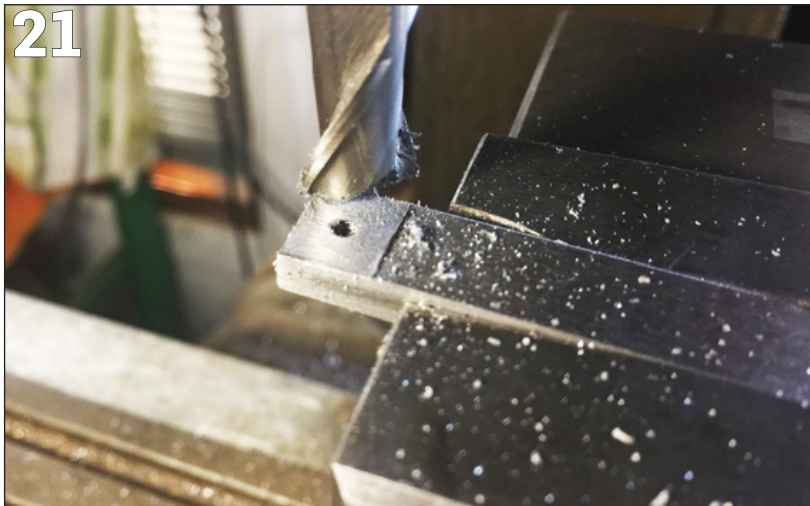
PHOTO 22:

Jig made to construct the eccentrics.

PHOTO 23:

Completed valve gear with double-width eccentrics fitted.

21



The grub screws or pins securing the eccentrics to the axle could be drilled through the exposed half of the eccentric, meaning the straps did not have to be removed to access the screws for adjustment. So I did this and it was a great idea! (Photo 23).

Oiling the way

Before we leave the eccentrics, my solution to oiling them was to attach nipples to the forward section of each eccentric strap, then run neoprene oil lines from each to a junction box mounted on the inside of the mainframe immediately in front of the driving axle horn guide. From here a single oil line runs to an oil box located in one of the front sandboxes.

I had originally intended to run all five lines from each eccentric nipple to its own nipple on the oil box.

However, they ran the risk of being cut to pieces by the eccentric rods, especially when the motion was in reverse. Mike Boddy's solution was to take all the piping immediately to the side junction box, preventing the pipes from being positioned above the rods towards the expansion links, where the rod movement would be greater (Photo 24). Being just forward of the driving axle, they are thus moved only minimally by the rods.

The above procedure was made necessary by the fact that the Stirling engine's boiler is mounted so low in the frames. I have often wondered how other builders of this model are able to lubricate their eccentrics and driving axleboxes. It is impossible to get an oil can in there, especially since the front sandbox blocks entry under the boiler. Even access from underneath on a raised track is difficult. For example, the top fitting on the centrally mounted axle-driven water pump sits just 4mm below the boiler apex!

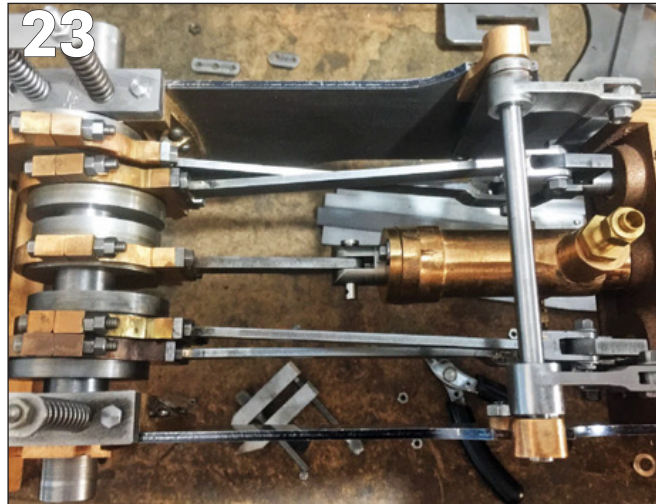
I had thought that the shortest oil line might get all the oil, starving the longer ones, but I found this not to be the case. I've fitted a length of fine copper tube to my Reilang oil can and I insert this into the neoprene tube, extending into the sandbox oil reservoir and prime the tubes. Once they are all full, they continue to duct oil from the reservoir.

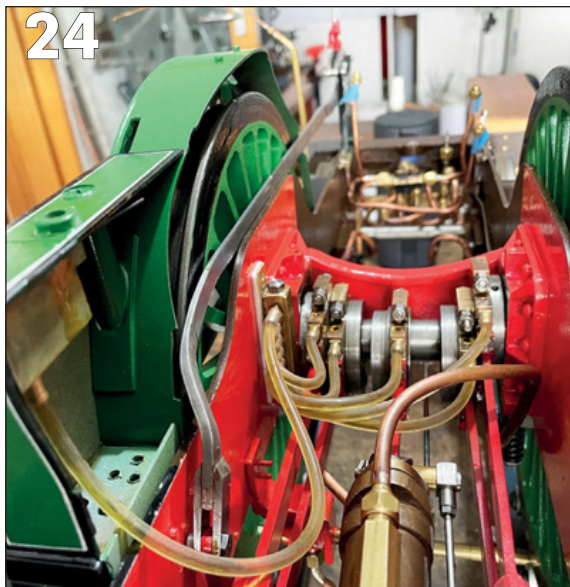
I had the locomotive's expansion links water-cut at a local firm which proved a real time saver. Mike Boddy produced a CAD drawing with the outside profile made slightly oversize and the slot for the die block slightly undersize. The water cutter made two expansion links to these dimensions in gauge plate, also pinpointing the

22



23





holes that were to be drilled for bolts.

It was then just a simple matter of hand filing the perimeter, then machining the die block slot to size using a rotating sector plate jig (Photo 25). An expansion link with its pair of eccentric rods attached is shown in Photo 26.

After machining up the valves with their holding buckles and spindles and fitting each one into its steam chest, it was a simple matter to adjust the valve throw across the ports by adjusting the valve spindle nuts forward of the motion plate.

Once again, I referred to figures 20-21 on page 200 of the book *Building the New Shay* by Mr Kozo Hiraoka to time the ports. Although his locomotive is a geared Shay, its valve gear is Stephenson Link motion mounted vertically.

In short, in forward gear, when the right driving-wheel crankpin is at front dead-centre, the front right port should just be beginning to crack open. Another quarter wheel revolution and that port should be fully open. When the wheel's crankpin is at back dead-centre, the rear right-side port should just be cracking

PHOTO 24:

Lubrication setup, oil lines running from tank at left.

PHOTO 25:

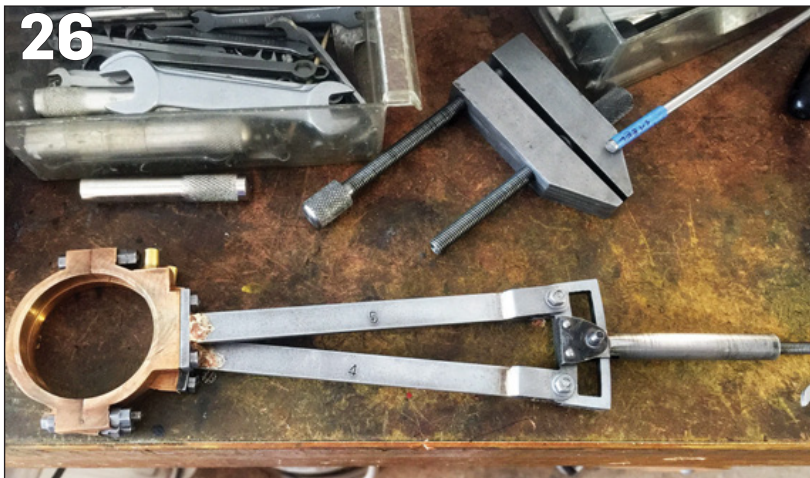
Machining the expansion link to size.

PHOTO 26:

Completed expansion link with its eccentric rods fitted.

PHOTO 27-28:

Perspex covers fitted temporarily to observe valve timing process.



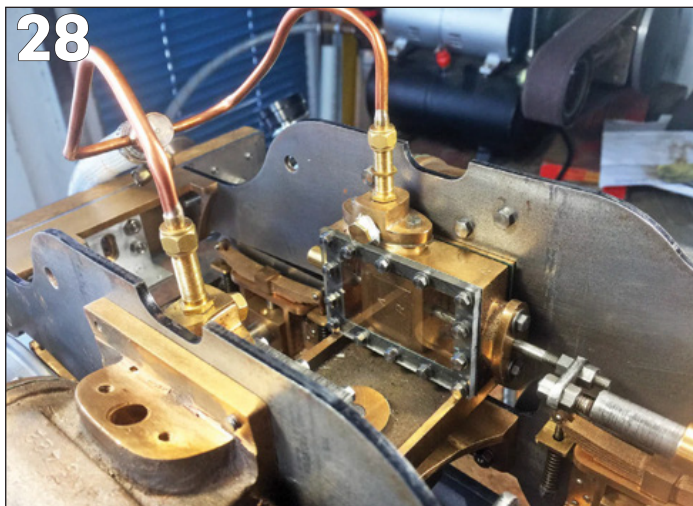
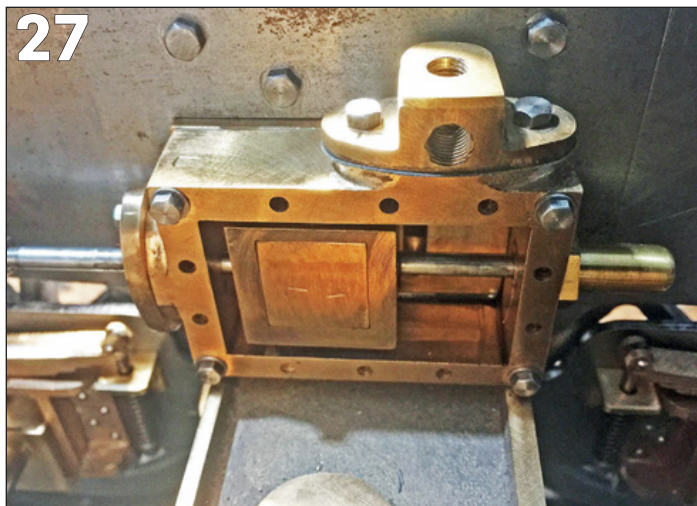
open. Another quarter turn and that port should be fully open and so on. Repeat the procedure for the left side. Mr Hiraoka's diagrams are excellent and make the whole sequence clear and comprehensible.

The bronze valve-chest covers were of course removed during the timing process. However I then ran the Stirling on compressed air to test for smoothness and found it helpful to temporarily install clear Perspex valve covers, so that the valve relationship

to the ports could be seen in motion. (Photo 27-28). **EIM**

■ Bruce continues his project in next month's issue, tackling the Single's lubricator and draincocks.

Part 1 of this series appeared in last month's July 2022 edition 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.



Making a Beam Engine from 'Scrap' Castings

Rich provides a compelling argument that no part should ever be considered as scrap with this attractive beam engine constructed from automotive components

BY RICH WIGHTMAN

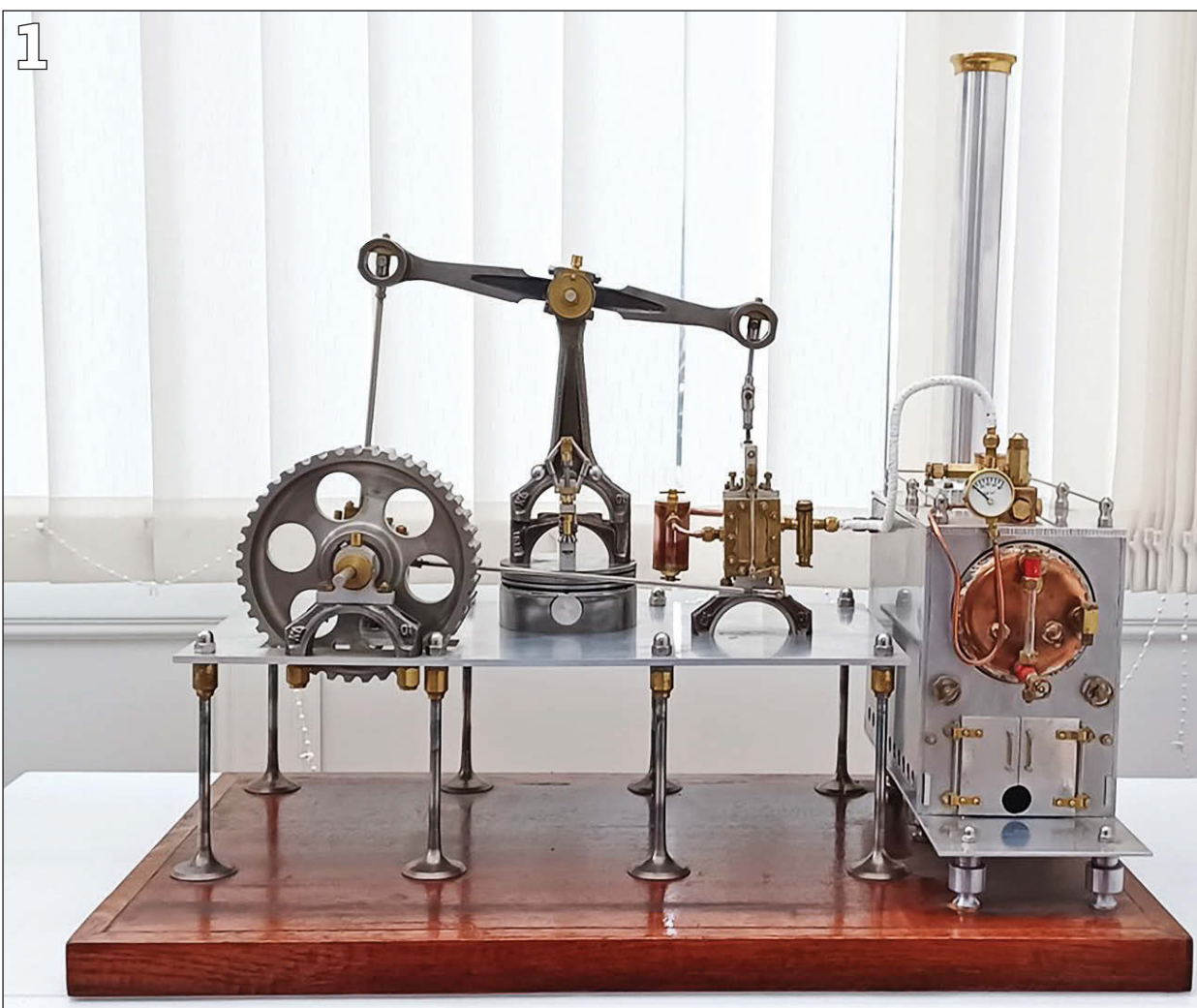


PHOTO 1: The beam engine and boiler – a lesson in recycling scrap parts...

PHOTO 2: The cylinder – once activating the brakes of a Rover car.

PHOTO 3: The cylinder with its piston and guide fitted.

PHOTO 4: All the components for the cylinder.

PHOTO 5: The displacement lubricator, the condenser and valve linkage have been fitted.

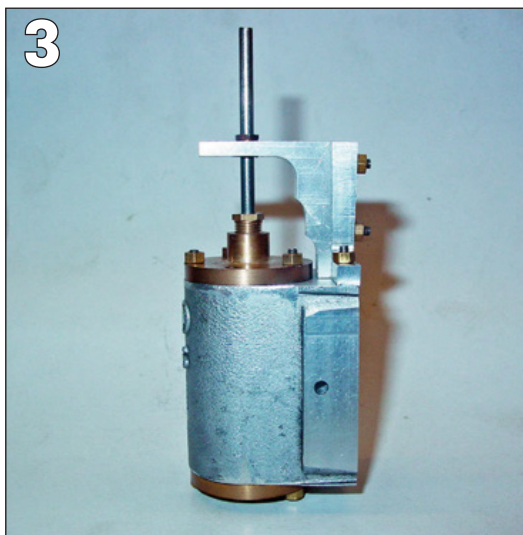


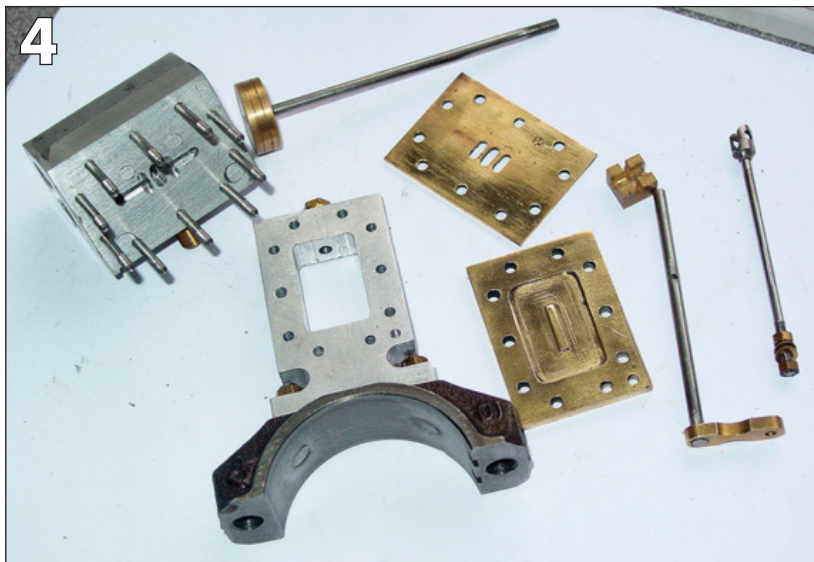
PHOTO 6: The crankshaft and flywheel – a camshaft gear.

PHOTO 7: Two solid fuel trays provide the heat.

PHOTO 8: The front panel of the porcupine boiler.

PHOTO 9: The boiler mounted in its housing.

Photos by the author



There has been mention recently on a couple of the model engineering forums that I am a member of that the price of castings seems to be on the increase. Which is not surprising given the current state of world affairs – the rising cost of raw materials, electricity and gas inevitably mean a rise in the price of finished goods.

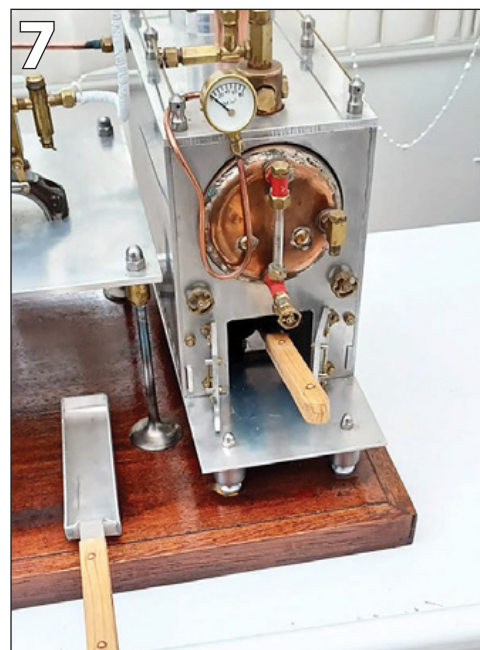
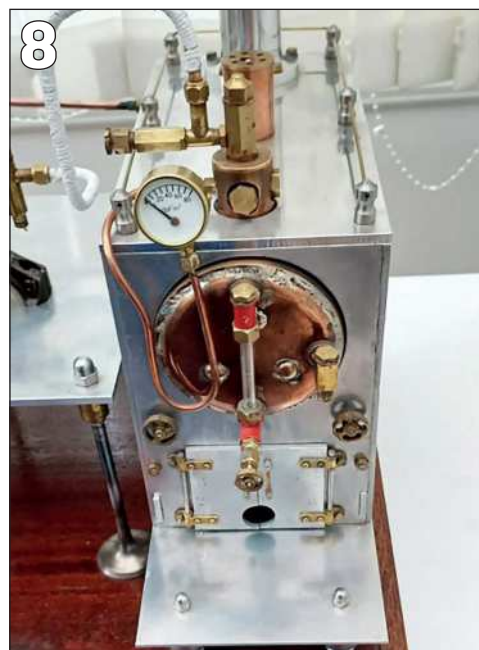
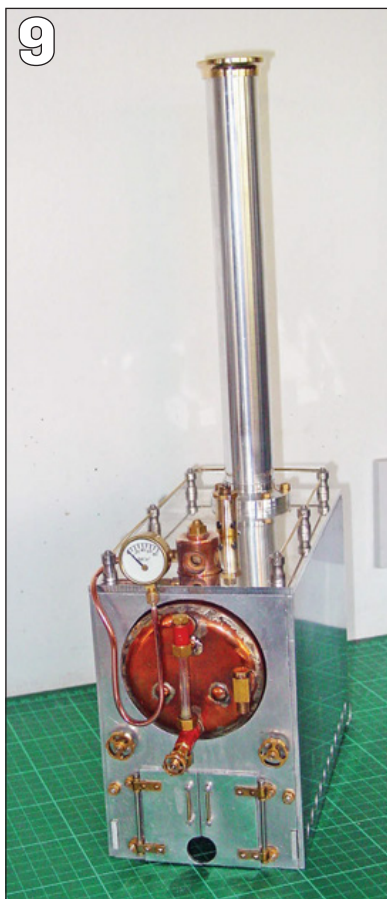
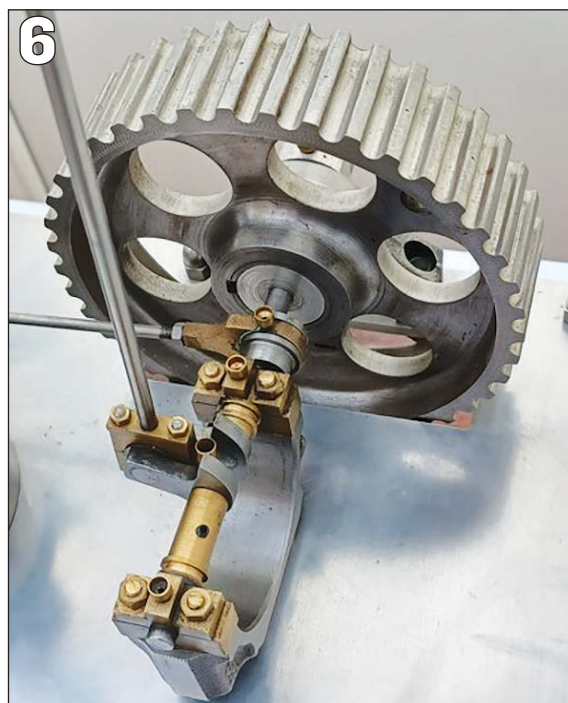
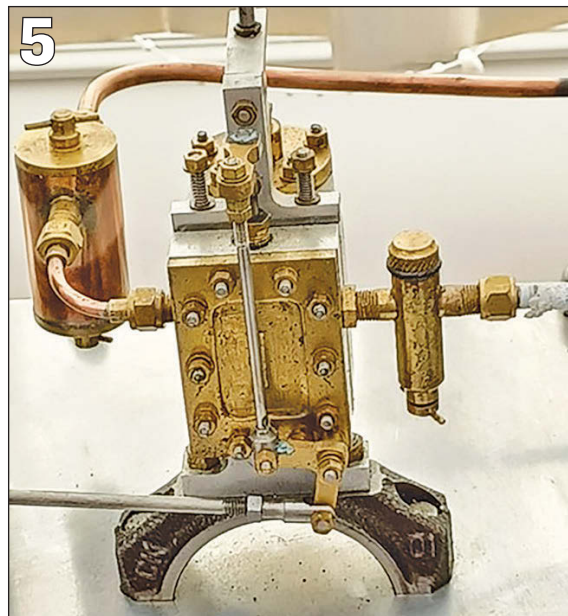
Anyway thinking about this motivated me to write a few lines about one of my early engines. I have always been a bit of a recycler, a keen skip-dipper, scrounger and forager and from an early age I have been amazed at the amount of stuff we throw away.

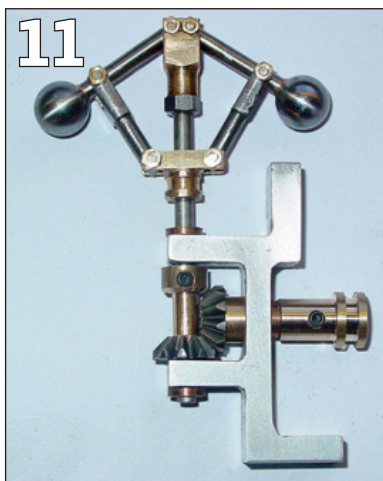
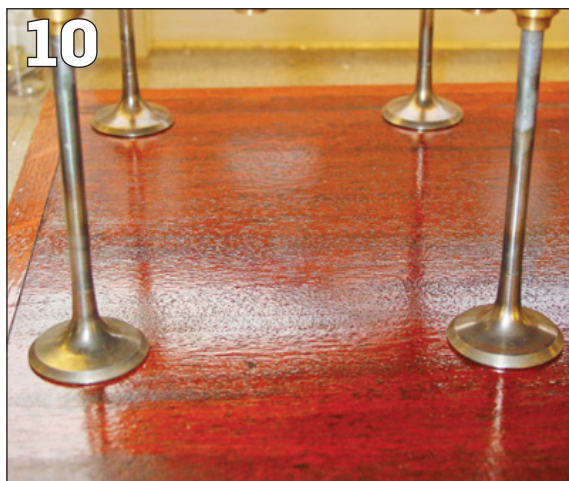
In my early days in the motor trade it was a common job to remove a dynamo or water pump, recondition it and refit it to the car. It later became the norm, however, to buy an exchange unit, in automotive terms everything from starter motors to brake shoes. Nowadays they are throw-away items, they don't even want the old units any more.

Is this progress? I'm not sure but let's save that debate for another day and get back to the subject of this article, a beam engine made from castings. Well castings of a sort – please take a close look at the main view of my beam engine (Photo 1). I completed it way back in 2008 and at the time I wasn't in the habit of taking many photos.

Raiding the bin

You can see that there are a good number of car engine parts involved in this build, all rescued from the scrap bin at work. One lunch hour I dragged a few bits out and laid them





on the bench, closely observed by my colleagues who were somewhat sceptical when I said I was going to build an engine out of them.

To list the main parts – the column and beam are car engine connecting rods. The column sits on

an inverted big-end cap which is itself mounted on top of a piston. The crankshaft is supported on two more big-end caps and the flywheel is a camshaft gear.

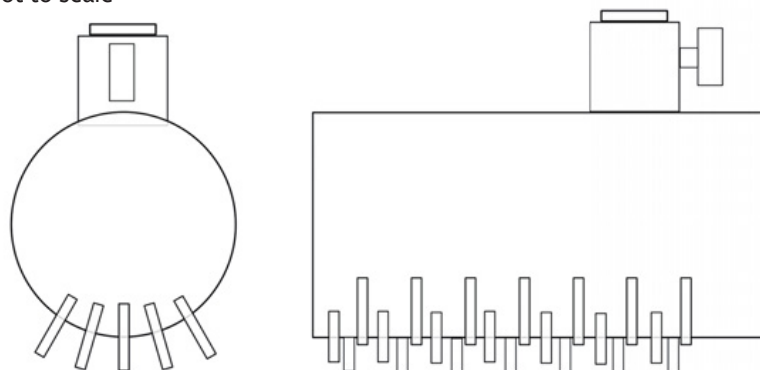
The cylinder, which is also sitting on a big-end cap, started life as a

PHOTO 10: Car exhaust valves make excellent legs for the engine's base.

PHOTO 11: The fly ball governor – even this has an automotive provenance...

FIGURE 1

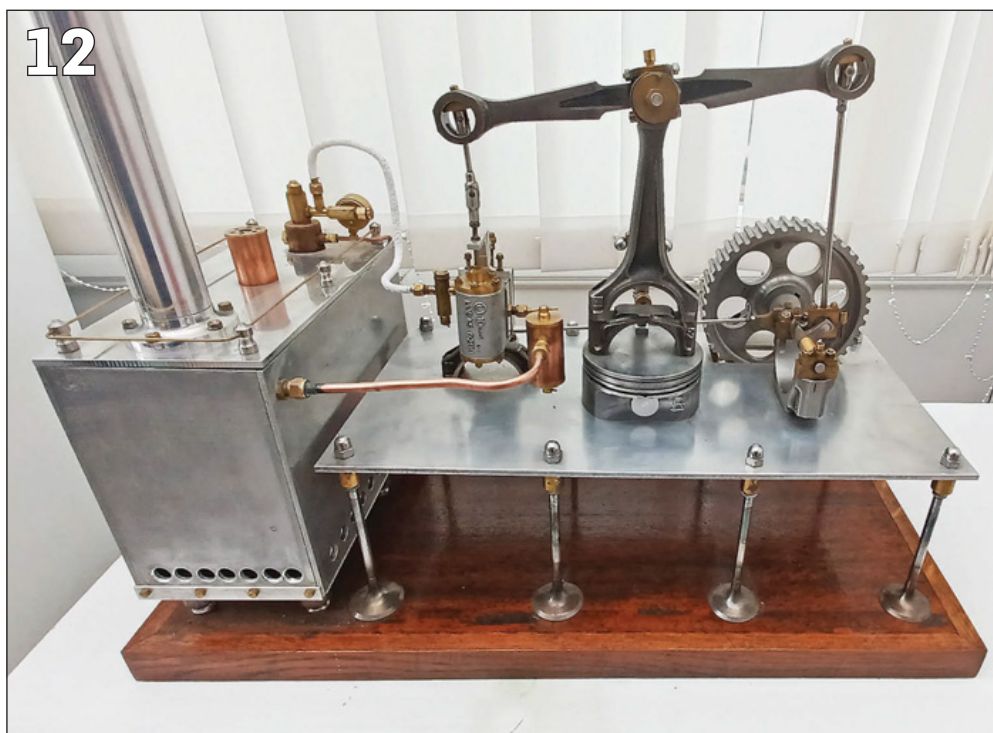
Not to scale



COPPER STUDS 1/8" X 3/4"
5 ROWS OF 7

FIGURE 1: Simple diagram of a porcupine boiler design.

PHOTO 12: Rear view of the completed engine – anything is possible!



Rover rear brake cylinder. The baseboard is supported on eight car exhaust valves. The mock fly ball governor balls were sourced from a front wheel bearing and this is driven by an oil filter rubber seal (missing in the photo).

The material for the rest of the engine came from offcuts and bar ends – inside every bit of scrap metal there's a new piece waiting to get out.

The brake cylinder, which is aluminium, had two holes that needed to be plugged, the brake pipe and the bleed nipple. I threaded some aluminium rod and screwed it in tight then cut it off. The cylinder could then be machined as a normal casting – the bore is beautifully machined and honed, probably better than I could ever achieve.

Brake cylinders are also available in cast iron – I have just had a quick look on eBay and found them on sale for as little as £7.50, brand new and complete and with two pistons already machined!

All the other bits of the engine I just machined as I went along so I cannot provide any plans or drawings, sorry. I have included a few photos that hopefully show a bit of detail.

A first boiler

I later added the little 'porky' boiler – this was my first attempt at boiler making and it powers the engine easily. For those unfamiliar with porcupine boilers I hope my little sketch will show what they are. When I researched what type of small boiler to make, of all the simple little boilers the porcupine was the most efficient compared to other types.

Basically it consists of five rows of seven copper studs, 1/8-inch x 3/4-inch which are silver soldered into the bottom of the boiler so that half their length is inside it. Heat from the burner is transferred through the studs directly into the water. If you can obtain a copy of the book *Little Steamers and Their Boilers* by Jack Wheldon (*Jack was known for his expertise in smaller-scale steam and a pioneer in 16mm scale – Ed*) you will find an excellent article all about simple little boilers.

The boiler runs on solid fuel tablets. Three tablets in one tray is enough to get the boiler up to 30psi and then I swap it for the other tray to keep it going for around ten minutes.

I also added displacement lubricator and a condenser. And it all works – you can see a video of the engine running on steam on Youtube at <https://youtu.be/m12bdCT-Yn0>

There are many castings out there in other industries that could be easily utilised in this hobby of ours. All it takes is a little imagination... **EIM**

A freelance traction engine in 3-inch scale

Pipework occupies Jan-Eric in the latest part of his road engine project.

BY JAN-ERIC NYSTRÖM Part Eleven of a series



Building this traction engine, I've already come as far as having to find a way for the 'steam plumbing', even though there was an almost two-year hiatus in construction – this was partly due to a painful, almost completely snapped tendon in my right shoulder (from attempting to start a recalcitrant mower), which prevented any heavy lifting for more than a year. The finished traction engine will probably weigh around 120kg/260lb, so it is definitely not a toy for tiny tots... nor for broken tendons! In addition, I had to take care of the estate inventories after my parents, who both died within 15 months of each other – a quite exhausting task...

Now, with the tendon healed, and the other duties brought to completion, there was again time to go down to the basement workshop and plan the final design of the traction

PHOTO 114:

The fabricated cylinder assembly attached to the top of the boiler.

PHOTO 115:

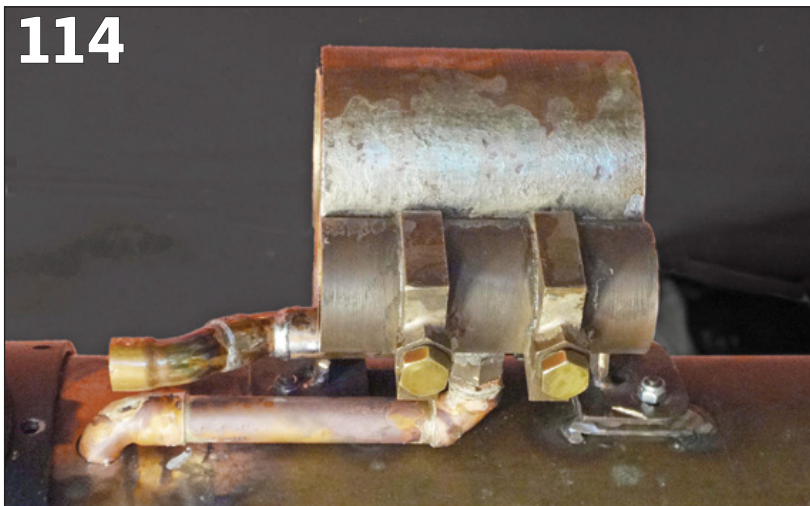
The superheater pipe 'bend' is fabricated from a short piece of copper tube.

PHOTO 116:

The return bend assembly is sealed with phosphor-copper solder – silver solder is not suitable here.

Photos by the author

114



engine. You may remember that I'm building it 'off-the-cuff', almost completely without any construction drawings (except for the necessary CAD designs for the plasma cutting of the cab and coal bunker parts). I'm 'ad-libbing' as I go – even though this sometimes paints me into a corner, to coin a phrase...

Pipe dream or nightmare?

The steam cylinder was finished long ago, but now I had to find a way to get the steam in and out of it. Looking at photos of original, antique equipment as well as the many drawings in decades-old issues of model engineering magazines, I noted that the exhaust pipe almost always was

visible, on top of the boiler, going from the cylinder assembly to the chimney. Would it be sacrilegious to also have the live steam coming into the cylinder in the same, visible way?

I thought it could, since my engine is not an exact model of any existing prototype, anyway – I'm just building a fun toy!

So, instead of having the steam coming from a hole in the top of the boiler shell, straight up into the cylinder assembly's steam chest, I copied the design from my ten-wheeler locomotive, using a throttle in the smokebox instead of in the valve chest. Then, I could simply drill a hole in the top of the smokebox, and pass the steam through a pipe to the cylinder

115



116



WHAT IS AVAXHOME?

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117



118



119



PHOTO 117: The interior of the smokebox with the exhaust pipe in front.

PHOTO 118: A close-up of the banjo connectors.

PHOTO 119: The exhaust pipe from the cylinder assembly passes through a hole in the base of the chimney.

PHOTO 120: The interior of the chimney seen from below.

PHOTO 121: Looking into the chimney from the top, exhaust pipe is nicely centred.

PHOTO 122: The steam piping is now completed. The unorthodox live steam supply pipe is seen under the exhaust pipe.

PHOTO 123: The blow-down valve has a quick-release connector.

PHOTO 124: Two eccentrics with straps. One is for the valve gear, the other for the feedwater pump.

valve (also non-existent on prototypes, which all used slide valves).

Photo 114 shows my solution. The lower pipe brings the steam from the smokebox throttle to the valve cylinder, while the upper tube, still unconnected at left, will pass the spent steam to the exhaust nozzle in the chimney. At least the latter is in prototype fashion!

I also decided to fit a superheater (these were not used in prototype traction engines, as far as I know), so I made a very simple one from 1/4-inch copper pipe with 'return bends' fashioned from 3/8-inch pipe. **Photo 115** shows how I shaped the ends on the 1/4-inch pipes in order to make the simplest possible return bend, using – well, having seen my little self-portrait cartoon before, you must surely know: my trusty angle grinder!

Sticking the smaller pipes into holes drilled in the short piece of the larger pipe, I used ordinary plumbing phosphor-copper solder to seal the return bend, **Photo 116**. Silver solder would not have worked, since it flows very easily into even the smallest spaces due to capillary action. The phosphor-copper solder acts in a quite different way, being paste-like at lower temperatures, while it still flows well at higher heat. (Silver solder is an 'eutectic' alloy, melting all through at a single temperature, or in any case a very narrow range, while phosphor-copper has a much wider range from solid to liquid.)

Working carefully with a smallish propane torch, it was rather easy to seal the gaps of less than 1/16-inch in the return bend, and still avoiding too much phosphor-copper solder to flow past, into the larger pipe and plug the steam path.

Note that this type of solder is **not** suitable for constructing a boiler! It will become brittle with age due to interaction with combustion gases, and could cause the boiler seams to crack. In a return bend, a cracked joint is not a big deal, it is easily repaired, and will pose no danger. But for copper boiler construction, ordinary tin-free silver solder, melting

at around 650 degrees C/1,200 degrees F should always be used. Always remember: Safety First!

Inside the smokebox

Photo 117 shows the smokebox interior. Note the large steel ring, tack-welded to the inner front edge of the smokebox, and which has many drilled and tapped holes for the smokebox cover bolts. The ring was plasma-cut from 3mm (a little under 1/8-inch) thick steel plate at the same time as I made the parts for the cab and coal bunker. The superheater loops enter the two large flues in the middle of the boiler.

In **Photo 118**, you can clearly see the two 'banjo' connectors for the steam supply – they are necessary for both assembly as well as disassembly of the piping. Without them, it would be necessary to solder the parts together but this would make any future service operations a lot more difficult, needing de-soldering of the pipes each time.

The half-hidden banjo joint at the top is the steam outlet from the throttle valve, into the two 1/4-inch pipes going to the superheater loops. On either side of that banjo, you see two hollow stays; one is for a steam pipe to the whistle, the other to a blower, yet to be installed. The vertical pipe in front is the 'dry pipe', going upwards, through the smokebox and to the cylinder.

Photo 119 shows how the exhaust steam from the cylinder is led into the chimney. The hole in the chimney is drilled to the same diameter as the exhaust pipe, which is thus a tight fit, in order not to spoil the partial vacuum that develops when the spent steam is blown upwards in the chimney, creating an ejector effect. This is necessary to keep the fire going in the firebox.

Photo 120 shows the inside of the chimney, photographed from below. The small brass screws hold the pipe sections in place in their respective elbows. Removing the screws makes disassembly for servicing very easy. These screws need to be of brass; steel

screws would quickly rust away in the hot steam.

Photo 121 is shot from the very top of the chimney. I may yet have to add a constricting nozzle to the end of the exhaust pipe – the first steam-ups will tell if this is necessary or not. An ordinary concentric blower nozzle will be installed around the exhaust tube, in order to keep the propane fire going when the engine is not running and no exhaust steam is blown up the chimney. A blower would be just as necessary for coal or oil firing. Starting up the fire will necessitate an electric blower on top of the smoke stack to induce some draft.

Taking shape

Photo 122 shows the engine at this stage of completion, less the wheels and many parts of the driving gear mechanism – these had to be removed in order to fit all the parts built at a later stage. Below the exhaust tube going from the cylinder to the chimney, you can see my ‘heretical’ steam feed to the valve chest – I hope it doesn’t mar the looks of the engine too much, once the cylinder cowl and boiler cladding have been added...

Looking at the bottom of the boiler’s firebox, you will see a quick-release coupler and a ball valve, a close-up is shown in **Photo 123**. The valve is used for blowing down the boiler after a run (necessary to prevent build-up of scale), as well as for filling the boiler with water from a garden hose or other suitable source. I have a similar arrangement on my ten-wheeler locomotive, and it has proved to be very practical.

Two flat ‘hooks’ are also welded to the bottom of the boiler’s foundation ring on each side of the valve, these hooks are for holding the propane burners in place.

I have started work on the valve gear. **Photo 124** shows two eccentrics with their straps. The latter are made from two parts, a ring and a ‘lug’, silver soldered together. The M6 threads in the lugs will accept the threads on the eccentric rods, which thus can be adjusted to exact length.



“The exhaust pipe almost always was visible, on top of the boiler, going from the cylinder assembly to the chimney. Would it be sacrilegious to also have the live steam coming into the cylinder in the same, visible way?”

The straps contain PTFE-coated sleeve bearings (cut to length to fit the thickness of the straps).

The eccentrics will be virtually self-lubricating, only infrequently needing a drop or two of oil. One eccentric is for the feedwater pump, which has the same the throw as the valve gear, in other words 18mm. Unlike my railway locomotives, this traction engine will rely on only one water pump, partly because the engine can be shifted ‘out of gear’, allowing the pump to work while the wheels stay stationary.

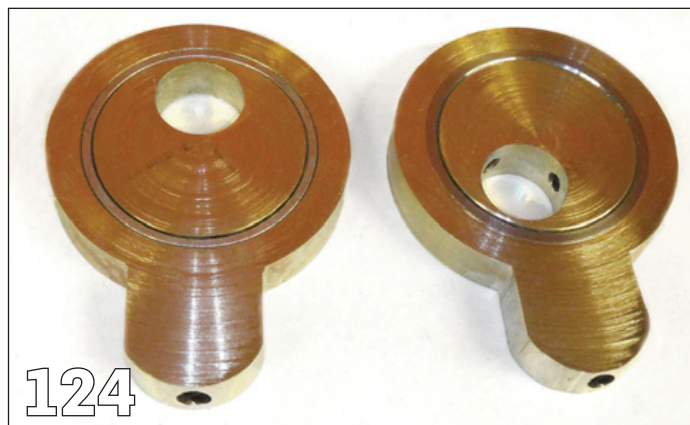
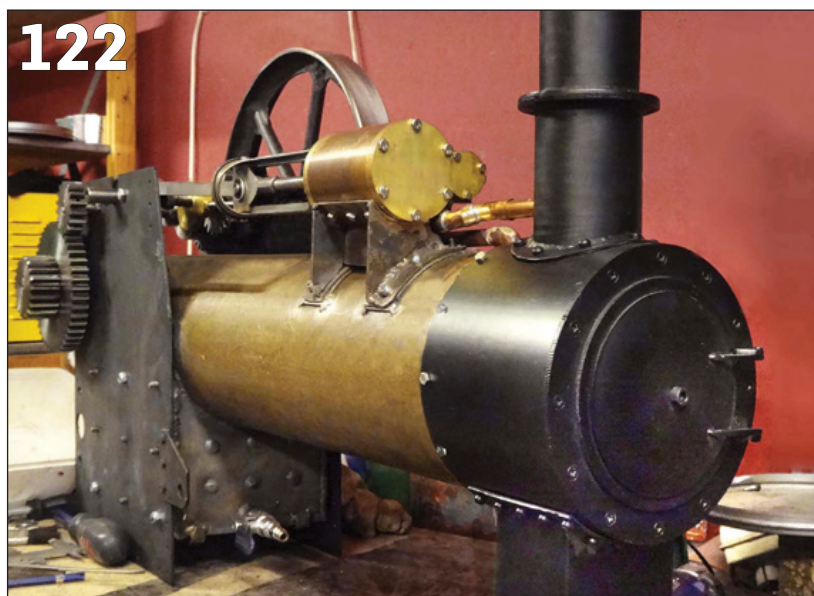
The other eccentric is for the valve gear, which will be of the ‘loose eccentric’ type, needing only a single eccentric, unlike Stephenson’s valve



gear, which needs two. I’ll describe the valve gear and feedwater pump in future articles. **EIM**

■ Unfortunately we won’t be bringing you the next part of this series for a little while as Jan-Eric is being obliged to take a break from the construction. He will tell more next month.

Parts one to eight of this series appeared in the September 2021 to April 2022 issues of **EIM** and part nine and ten in the June and July 2022 issues. To read previous parts you can download digital back issues or order printed copies from www.world-of-railways.co.uk/store/back-issues/engineering-in-miniature or by calling 01778 392484.



Tender Bender

The latest part of father-and-son team Peter and Matthew's project to build a 'universal' bending tool able to form almost any radius focuses on adding a sharp bending accessory.

BY PETER & MATTHEW KENINGTON Part Three of a short series

One further part was made for the bending tool that we have constructed over the past couple of issues – an 'anvil' to enable sharp bends to be made precisely. This is an example of a 'custom-designed' part for a specific application (achieving very tight radius bends), although many other possibilities exist for other 'custom' parts, to fit into the same place (U-channel base section) in the bender.

This part was fabricated from a piece of 30mm x 16mm x 750mm mild steel bar. Fortunately, such bar is readily available, with the correct width and thickness dimensions, so the only fabrication required was to cut the bar to length and then to mill the V-groove along its length. This is not straightforward to do, particularly on a mill with an X-travel of less than the required 750mm and it required careful setup.

The end-elevation drawing of the anvil is shown in **Figure 7**. Essentially the whole part is a 750mm extrusion of this end-face.

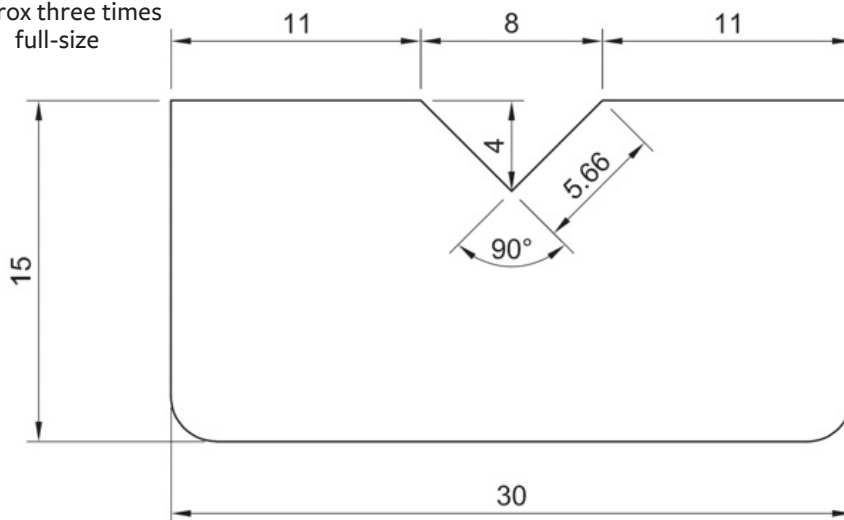
The basic setup used is shown in **Photo 36**. Two V-clamps were used, the smaller of which was held in a machine vice (to the right in the photo) and the larger of which was supported on a collection of 123-blocks. Parallels were used to provide some positional adjustment – one was used on each V-block, although only the left-hand one is visible in the photo.

The workpiece needs to be precisely level and precisely parallel to the mill-table. The latter is relatively easy to achieve, with a little patience and an edge-finder. In the former case, we used two methods: the first was to deploy a digital inclinometer, with a magnetic base.

With this method, it is first necessary to ensure that the reference machine vice is level – or at least to note what angle it subtends to horizontal (**Photo 37**). As can be seen, our mill is pretty well set up in this regard. The workpiece itself can then be measured (**Photo 38**) and adjusted, for example using shims in either the vice or a V-clamp.

The second method was to use an electronic edge-finder, essentially as a depth probe (**Photo 39**). The DRO Z-reading is checked at two points some distance apart along the bar and

FIGURE 7
Approx three times
full-size



both readings should be as near identical as possible (or zero, if Z = 0 was set at the first probe location).

Note that a challenge with this method is that the end of the probe, being spherical, is difficult to place centrally on the bar's edge, if the front-rear (Y-direction) placement of the bar isn't accurate beforehand. This can be overcome by edge-finding the front and rear of the bar, at equivalent Z-heights for both measurements and splitting the difference (and doing this again at the second measurement location) – a slightly tedious process, but the most accurate method. It also serves to confirm (or otherwise) the parallel alignment of the workpiece to the mill's Y-axis.

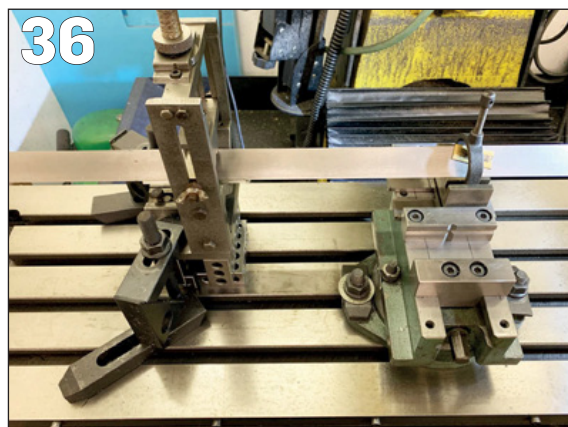
Finally, it is necessary to find the centre of the face into which the groove needs to be cut (the wider of the two faces on the bar). Whilst this can be done by a little trigonometry (I

FIGURE 7: Diagram of the anvil V-groove.

PHOTO 36: Overview of the setup for machining a V-groove in the 'anvil' bar.

PHOTO 37: Checking that the vice is level...

PHOTO 38: ...and then that the installed bar is level.



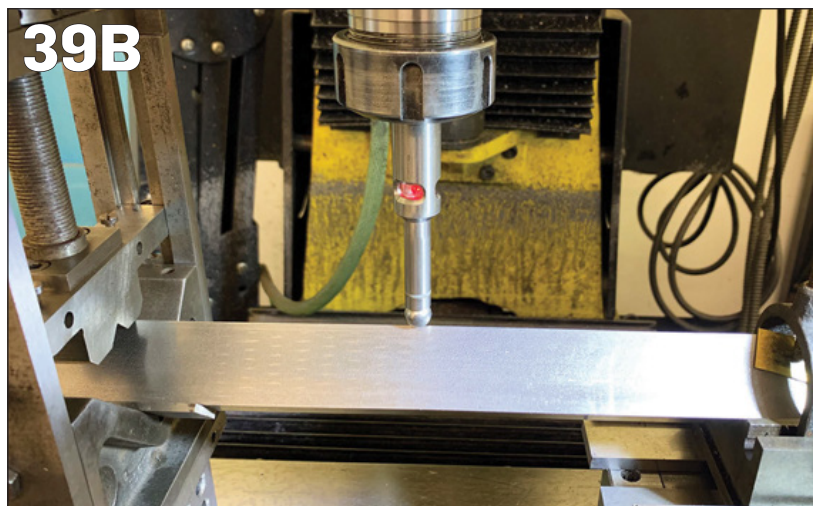


FIGURE 39A/B: Re-checking that bar is level by a different means; (a) reference position and (b) measurement position.

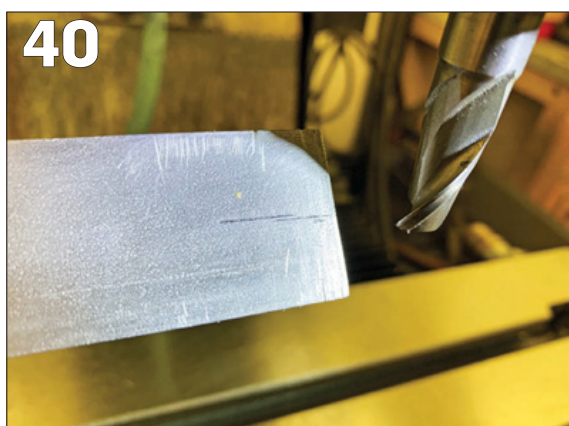
PHOTO 40: Setting tool-height – the three ‘scratches’ show the attempts at doing this; callipers can be used to measure the position of the (very light) cut and adjustments to the Y and Z axes made accordingly. These scratches will, of course, be milled away when cutting the groove.

PHOTO 41: Completed anvil, after painting (and some use!).

PHOTO 42: U-section before milling.

PHOTO 43: U-section after milling and painting.

Photos and diagrams by the authors



set Matthew this as an exercise, which he got right in method but wrong due to misunderstanding how to use the calculator built into Microsoft Windows!), it can also be done by observation relatively quickly/easily. The centreline doesn't need to be perfect, as the blade has a little lateral 'slack', in use, and can move small amounts to accommodate errors made here.

The iterative method involves setting the edge of the milling cutter's 'corner' to approximately the correct position and then taking a short, light cut (Photo 40). The position of the resulting score line can then be measured (for example using callipers) and the tool position re-adjusted.

A second light cut can then be taken, slightly longer than the first in

order to make it distinctive, and the location of this mark again measured. This process can be repeated as many times as necessary to find the centre position. As can be seen in the photo, it took us three iterations to do this.

Once the central position has been found, it is probably a good idea to zero the Y and Z axes on your DRO (if you have one) as it makes it easier to then set the required cut depth for the final V-groove.

The depth of a cut required in both of the Y and Z directions, in order to form an a mm depth in the centre of the 'V', is given by:

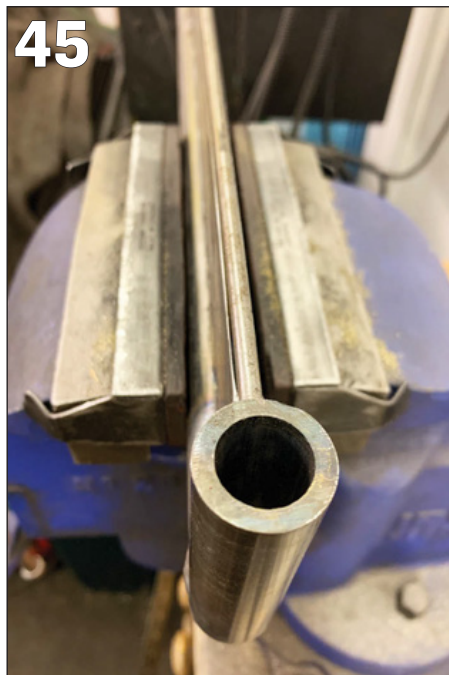
$$Y \text{ \& Z cut depth} = \sqrt{2} \times a$$

So, for example, to achieve the desired 4mm V-depth in a single pass, a cut depth of 5.66mm in both Y and Z axes would be required. With many smaller mills, it would, of course, be advisable to build up to this cut depth, rather than attempting to do it in a single pass.

Once complete (and painted), the anvil should look something like Photo 41.

It was also necessary to mill out our piece of U-section, such that its internal walls were square to the base. As supplied, these are square externally, but tapered internally, with radiused corners (Photo 42). These need to be made square, to accept the 'anvil' bar, not forgetting to make some allowance for the thickness of any paint you may wish to apply, to protect both parts from rusting (Photo 43).

It is, of course, perfectly valid to machine the bar to fit the U-section, thereby preserving the lateral strength properties of the U-section (no sharp corners to encourage cracking). However this is more difficult to do, especially without an angled vice (one of the many desirable pieces of workshop equipment we don't yet have!). Any loss of lateral strength in the U-section part should not be an issue in practice, however, ►



as the angle-iron pieces will absorb the majority of any such loads present, in use.

Bending options

An example range of options for bending-rods, which can be accommodated by the tool, are shown in Photos 44-47. In **Photo 44** a 6mm square cross-section rod is shown placed (but not held, other than by

gravity) in the milled V-groove discussed above. This rod is capable of 'sharp' bends when used with the angle-iron base shown in Figure 4 in part 2 of this series.

Photo 45 and **46** show increasing sizes of round cross-section rod (also held in place simply by gravity) – both fit and centre easily. Finally, **Photo 47** shows the blade inverted (as it would be in use) with a much larger rod of

PHOTO 44:

Bending blade with 6mm square cross-section rod resting in the V-shaped groove. This can be used for tight (minimum radius) folds.

PHOTO 45:

Blade with 5mm diameter rod in the V-shaped groove. This will result in slightly greater than (but close to) a 2.5mm radius bend.

PHOTO 46:

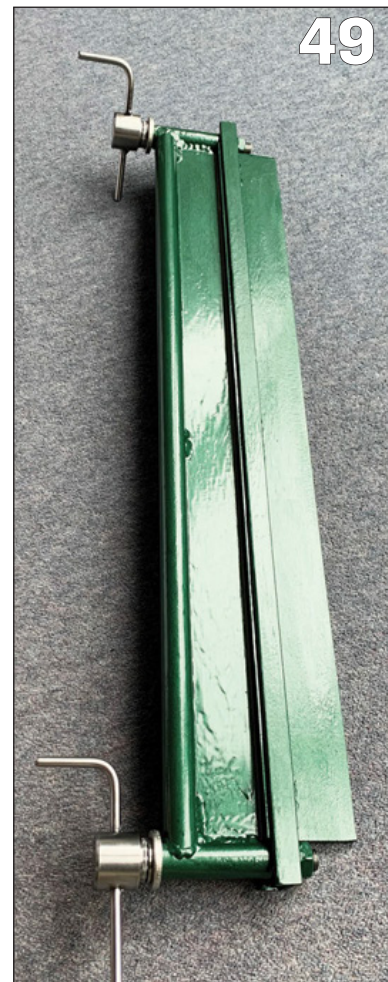
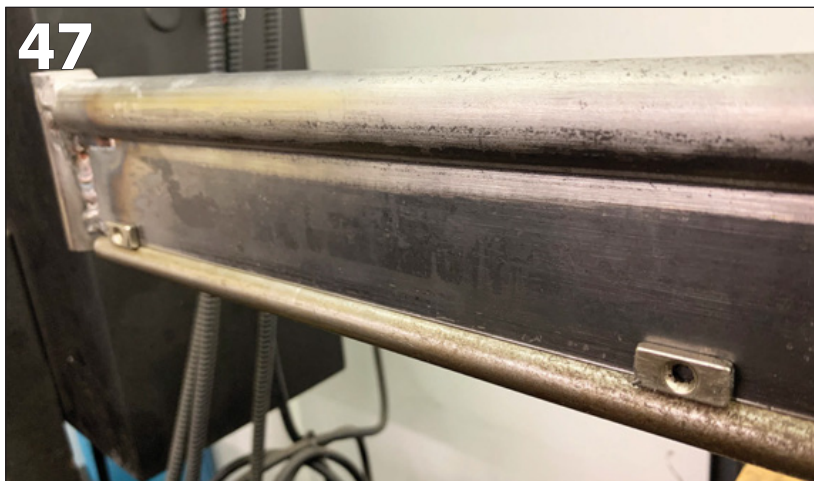
Blade with 8mm diameter rod in the groove – this still fits securely and produces a slightly greater than 4mm radius bend.

PHOTO 47:

Finally, bending blade (inverted, to its correct orientation) with a 14mm diameter rod held in the groove by small neodymium magnets. These allow blade to be positioned on work-piece but will have no impact on the bend itself.

14mm diameter in position.

This photo illustrates the use of small neodymium magnets in order to hold the rod in place. These can be used whilst the workpiece is being positioned and initial bending pressure is applied. After this point, the bending pressure alone will hold the rod in place and the magnets can be removed, if they are likely to impinge upon the bend.



Completed Bender

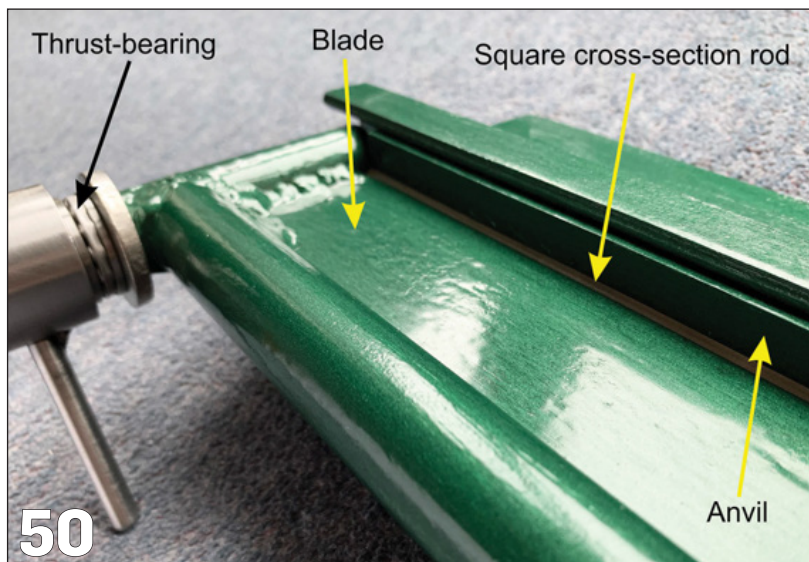
The completed bender was painted using some leftover Hammerite paint and is shown assembled in its 'flaring' configuration in **Photo 48**. The V-groove in the top of the blade, used to accommodate narrower bending rods/formers, is just about visible, if you look carefully. In its 'flaring' configuration, as shown in the photo, the angle-iron pieces are inserted in the U-channel of the base section and the blade inserted rod-side downwards.

Photo 49 shows the bender in its 'sharp' bending configuration. The angle-iron pieces have been replaced by the anvil, discussed in relation to Figure 7 and its subsequent photos, and the blade has been inverted, with a square-cross-section rod inserted into the groove in the blade. Our rod was made of stainless steel and so cannot be held in place using magnets, however a small piece of masking tape, or some Blu Tack, can be used instead; holding the rod in place whilst setting up the workpiece does make life a little easier during this stage of the process, although it is not essential.

PHOTO 48:
Completed bender looking smart in its green Hammerite livery.

PHOTO 49:
With the blade inverted and a square-cross-section rod added to put the bender into 'sharp' bending mode.

PHOTO 50:
Key components of the bender when used in its 'sharp' bending configuration.



A more detailed view of this configuration is shown in **Photo 50**, with the main components labelled. The thrust-bearing is also clearly visible in this picture and certainly makes achieving a final 'nip' much easier, especially when using thicker/stronger materials. **EIM**

■ Peter and Matthew conclude their project in next month's issue by describing examples of the bending tool in use.

Parts one and two of this series were published in the June and July 2022 issues of **EIM** – to obtain printed or digital copies of these editions, see page 9.

AT THE TRACK

A word of warning...

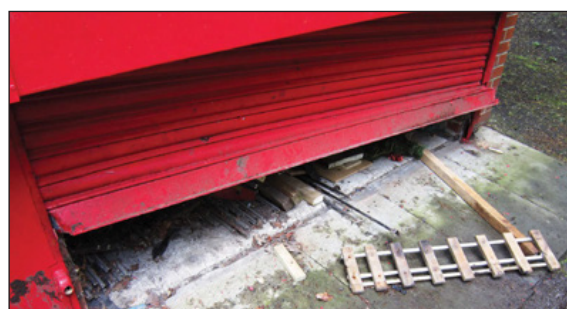
Stuart tells a sorry tale to alert clubs to the dangers at tracks that seem safe...

BY STUART ROTHWELL

Encouraged by the articles I wrote in recent times for **EIM** I became involved in the restoration of a 5-inch gauge half-a-mile long track formally known as the Moss Bank Model Engineering Society. It was run for the public in the 1980s but the then society eventually closed down and the track was used by a local fairground as part of the attractions in the park – eventually it stopped altogether about six years ago.

The population of Bolton that frequent this park have fond memories of having rides on the line with their parents and were very disappointed at the closure. Some 2½ years ago and with encouragement from our council a very small group decided to attempt a rescue – I joined the group and since most of the physical engineering work had been done to the track, passenger trucks and locos I concentrated on the legal, health & safety and insurance side of things.

Eight weeks ago we opened to the public, running only diesel-outline locos for now and in a quiet way whilst we allowed the track to settle and our volunteers got used to the procedures. I have to say that it proved



a huge success and the line has received massive amounts of encouragement from the residents who were able to take their children on a nostalgia trip.

Around 1am on Saturday 5th June, however, a group of thieves stole all the aluminium rail on the line including the new stock we had for repairs and in doing so destroyed all of the track.

I write this in order to warn other societies that though they believe their property is secure, which ours was, it proved easy for these crooks who with the right equipment did not have any problems getting what they wanted. We do not know what we will do now, restoration again is a major

"It proved easy for these crooks who with the right equipment did not have any problems getting what they wanted..."

Photos by the author



undertaking with very few people and no finance, but we will see. **EIM**

The Editor adds: A cautionary tale indeed. Sadly such thefts are becoming more common due to rising prices of metal. If any person or organisation feels able to help Stuart and his fellow members we will gladly pass on your contact details.

Restoring a Gauge 1 Midland Compound

Anthony's G1 restoration project this month begins to tackle the locomotive itself.

BY ANTHONY WHITE Part Five of a short series

I now turn to the perhaps more exciting and engineering part of the project; the restoration of the locomotive – firstly the chassis and then the superstructure. The chassis I had to begin with is shown in **Photo 28**, and as I previously found with the bogie and tender, the back-to-back wheel measurement was incorrect for the standards so I needed first to dismantle the chassis and remove the cross-pieces by a mix of unsoldering and localised heating, to break down the glue and dismantle it into its component parts.

I described in Part 1 the challenges of getting wheels off their axles on the side where the spokes had been sawn through and re-glued, as I dare not get too much heat into those spokes. After dealing with the remaining driver on its 'solid' side I used a small blowlamp close to the axle into the wheel on the 'fragile' side, with the wheel itself placed in a packing of ice before heating the axle. This seemed to quickly do the trick without damaging the glued spokes and I finally had the frames apart as shown in **Photo 29**.

Hitting rock bottom

Once I had the two frames separated it was time to remove paint, glue and general thick grime from them so I used a paint stripper followed by really hot soapy water. This I felt was the low spot of the rebuild, it becomes a horrible thick gunky mess and I did worry that I would discover that part of the chassis was plastic – I already knew it had been a loco with insulated wheels for two-rail track pickup – and my restoration would become a major rebuild. But once the job was done and I was starting to clean up the metal things begin to look better.

With the wheel back-to-back having to be increased by 2mm on the tender and bogie the same was required of the width of the main loco frames, so I replaced the two round cross-pieces with new turned ones 37mm rather than 35mm long.

The rectangular cross-pieces were of a hard non-metallic material and I wanted to avoid completely remaking them, as it would have meant buying in some suitable material. So I added 1mm thick matching rectangular



PHOTO 28: The chassis before restoration.

PHOTO 29: The main frames separated, but still with cylinders and the slide bars attached.

Photos by the author

pieces soldered to the inside of the frames in the appropriate places, drilling holes through to take the 8BA screws of the existing cross-pieces. This can just be seen in **Photo 30** where the front spacer has been widened with a 1mm extra nickel-silver layer soldered in place on the inner aspect of the frames.

The spacer further back for the bogie fixing has not yet been replaced but the 1mm thick packing piece is just visible soldered in position and drilled with matching holes, although as it has been filed and shaped to the frame it is quite difficult to see.

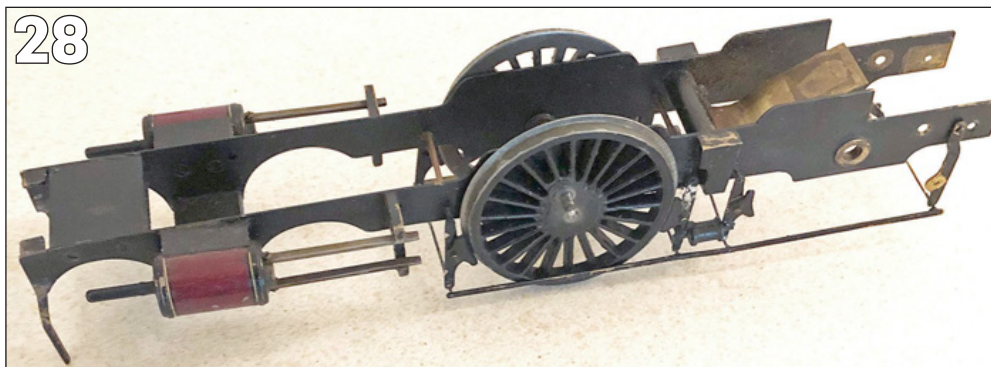
Increasing the frame width by 2mm means moving the cylinders and their associated parts in by 2mm. As the cylinders sit in a shaped brass block (**Photo 31**), this was an easy task as all I had to do was mill away 1mm from the base of the seating block.

Then of course the slide bars had to be altered at their rear fixing to remain in line parallel with the frames. I could probably have soldered the slide bars to their holding bracket further in by a mm, but I took them both off and milled 1mm off the base before re-soldering them in position. I used the opportunity to refit them not at right angles to the top of the frames as originally but lightly angled to line up with the cylinders as in prototype.

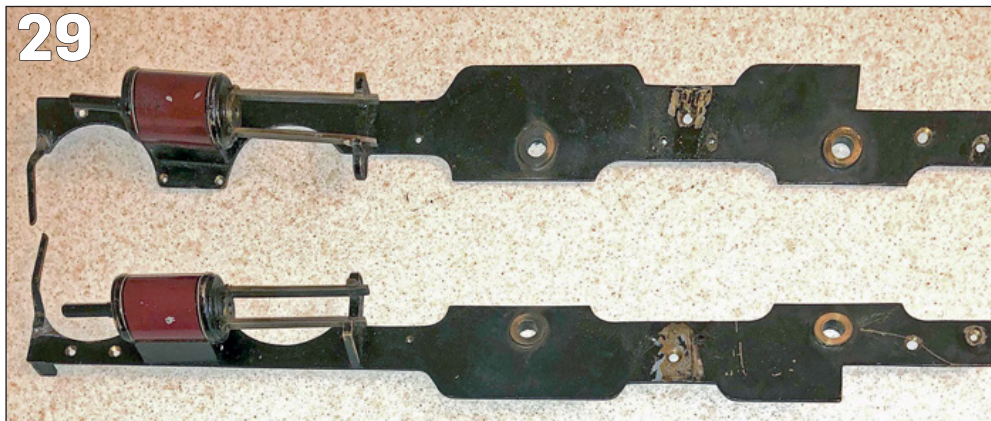
While I had the frames apart I ran some checks on the fittings for the brake gear and discovered that only one hole was in the correct position and was rather oversize. So I tapped and filled all the holes with scraps of 6BA brass stud, soldered in position, filed the faces smooth and drilled and tapped new holes all in the correct position to take 12BA bolts. The result can be seen on one side in **Photo 32**.

The critical task here again is to ensure that all the holes are at the correct height and in line, otherwise you will get into terrible problems later when the cross-pieces at the

28



29





lower end of the hangers are put in place. One or more will be skewed and worse when the pull rods are added these will not be parallel to the ground or each pair in line.

I did move each brake fitting point 1mm further out from the axle centre of each driver than on the prototype, to accommodate the slightly larger flanges on the model. Once happy that the side shown in the photo was going to be satisfactory I repeated the changes for the other frame.

Adding some spring

Reviewing the new chassis, I realised that though it didn't have real sprung suspension it even lacked any obvious cosmetic spring detail, leaf springs for the rear and twin coils at the front. So I faked it and manufactured these from a couple of spring castings in my scrap box and some old coil springs and scraps of brass and nickel silver. The result before and after can be seen by comparing Photo 32 with Photo 33.

For the coil springs the dimensions are approximations of works drawing dimensions – the top is an 11mm length of brass angle drilled and tapped for 10BA bolts, over which fits some 3.5mm brass rod. This is drilled 1.7mm to fit into some Mark Wood coil springs that are 4mm outside diameter. This brass tube helps fill the interior of the spring coil and keep everything symmetrical – the springs having an internal diameter of about 3mm didn't sit comfortably and straight over the 10BA bolts with an external diameter of 1.7mm.

At the bottom is a scrap of brass of 4mm x 10mm with holes to go over the lower end of the spring, tube and 10BA bolts. The whole lot is tightened up to slightly compress the springs for a better appearance.

The frames were then reassembled and it was then necessary to see how this widened chassis would fit under the body. Apart from a little filing at the lower end of the reversing lever on the bodywork it seemed to settle in, but the rear chassis spacer was no longer usable as it prevented the rear

brake hangers from being fitted in their correct position. It needed redesigning and remaking and that became the next job after I had quickly checked that my replacement motor and gearbox would also fit the chassis without modifications.

The new rear spacer was fabricated with some scraps of brass angle and a piece of 1/8-inch thick brass 15mm x 37.5mm to fit between the rear of the frames. Its shape is not important, except that the hole for the rear fitting screw needed to be measured up carefully so that it lined up with the existing screwed hole in the cab floor.

I decided to paint the now complete chassis before replacing the drivers, although the brake gear still had to be redesigned, remade and added. All the 12BA steel bolts for holding the brake gear were in place – I put a short length of plastic tube over each to keep paint off the threads.

I then thoroughly degreased and cleaned everything and with a length of wooden dowel in the main bearings I sprayed it all with primer and a couple of coats of black enamel. Experience had taught me that getting the brake gear and wheels off again to

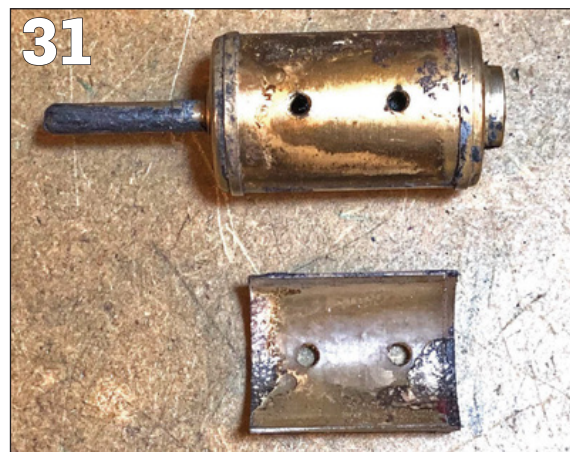


PHOTO 30:

Front frame spacer increased in width by metal spacers added to inside of frames.

PHOTO 31:

A cylinder and its holding block.

PHOTO 32:

The chassis reassembled 2mm wider and now with 12BA brake hangers in position.

PHOTO 33:

Cosmetic spring arrangement fitted under the frames.

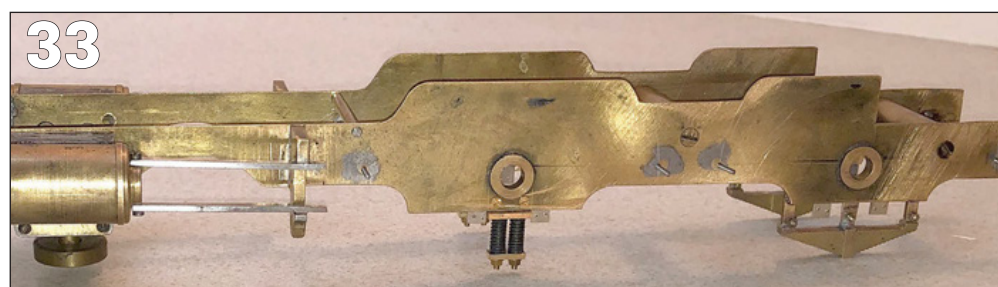
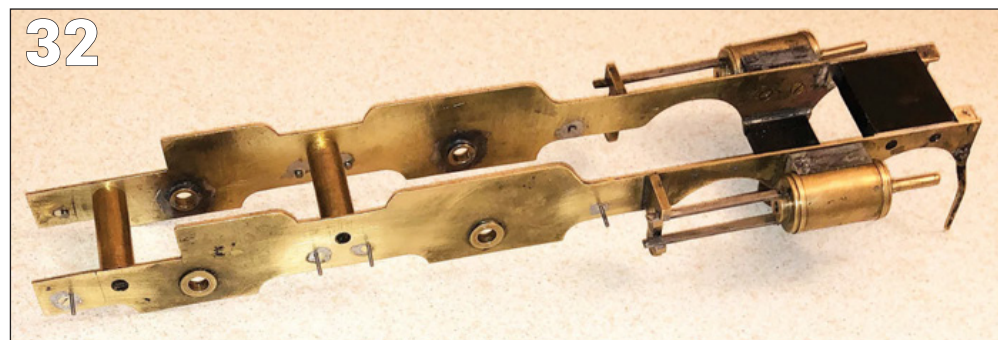
paint the chassis was an unnecessary chore that could easily be avoided.

I have previously detailed how I worked on the tender and bogie wheels, but doing the drivers was a job I had been putting off. Restoring them first required the chipped paint to be removed, again without damaging the glued spokes on one side and fitting the new longer and now telescopic axles. I had been thinking about the two major issues, getting the back-to-back correct at 42mm and quartering.

Getting the paint off required a combination of isopropyl alcohol and elbow grease with wire brushes, files, grit blocks and emery paper. It was very definitely a tedious job but important as the wheels are quite prominent on the finished model.

I also had to repair part of one driver as it had some missing spokes where a magnet had been glued. It was a dirty, laborious and boring job – the alternative would have been turning new castings, which I would have enjoyed a little better and which probably would have been quicker.

I decided to paint the spokes and faces of the drivers before starting on fitting the axles. I felt I needed to have





to hand a sturdy back-to-back gauge and as I had given away all my Gauge 1 gauges I made one from a scrap of angle iron as shown in **Photo 34**. I do wonder whether I wasted my time as so far, all the wheels have had the back-to-back set by the design of the axles so I hardly used the gauge.

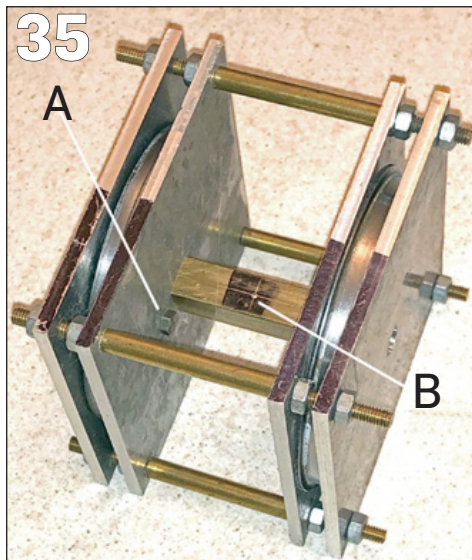
A quartering jig (that doubled as a back-to-back check) was made next and was a more useful gadget that would also double as a jig for drilling the hole in the telescopic axle for the taper pin when assembling the drivers. It is shown in **Photo 35** and was made from four sheets of 75mm square aluminium, centre drilled 1/4-inch for

PHOTO 34:
Simple back-to-back gauge.

PHOTO 35:
The driver assembly and quartering jig.

PHOTO 36:
Original crank pins (above) and replacements.

PHOTO 37:
Chassis complete ready for body.



the axle and with four symmetrical holes to take some 4BA studding.

For driver quartering a hole is drilled in the two inner plates to take a 6BA screw through the rear of the crankpin holes at **A** so you need to ensure the jig is assembled with the drivers correctly quartered.

For drilling the taper pin hole, you need to have the square jig **B** in position on the axle to act as a guide for the drill. I only use this to make a pilot hole and once done I remove the jig before using the taper reamer to create the hole for the taper pin. I usually shorten the taper pin once set up to avoid having a long pin rotating round the axle that might catch on something when running.

When I came to use it, I found that I didn't need the outer plates to hold the drivers flat against the inner plates because the 6BA bolt or screw from inside the inner plates that was holding the wheel by its threaded crankpin hole (arrow A), once tightened did that job. I thus ended up using only the two inner plates.

Once I had both pairs of driving wheels quartered and the taper pins fitted I assembled both pairs in the chassis, added the bogie and carried out a test to ensure everything sat easily on a nine-foot curve before starting to add the motor, crankpins and rods. But first the crankpins

themselves needed major attention.

The original crankpins needed to be remade because the front pair had the coupling rod inside and the connecting rod on the outside. This is of course wrong as on this class of Midland loco the connecting rod is on the inner aspect of the front pins with in Gauge 1 a 5mm bearing. The coupling rods, with 4mm bearings, are set outside and parallel to the frames so that at the rear there is a significant gap between coupling rod and wheel boss face. The difference in crankpins is shown in **Photo 36** with the new replacements in the lower group. These were a simple turning and threading job, but length dimensions need to be carefully made.

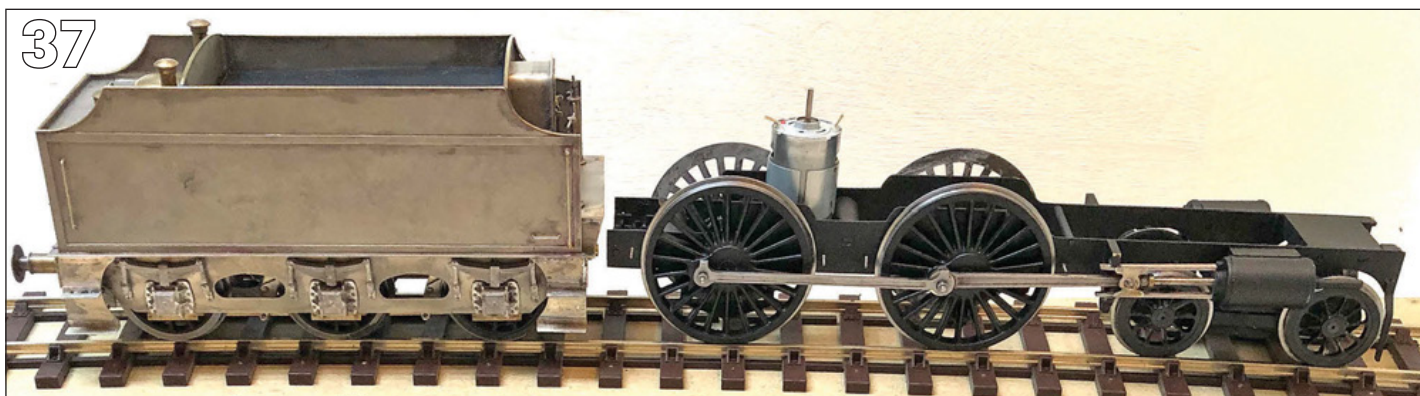
Now that I knew for sure that the chassis would comfortably negotiate a small curve I felt confident to assemble the working motion parts. It was then that I came up against one of the problems of making a scale model to 10mm scale rather than 1/32 scale – the gauge is too narrow for the scale and I had problems aligning the slide bars and connecting rods.

With a bit of tweaking using some extra washers I disguised the discrepancy and ended up with a fully set-up motion work that turned over with a smoothness that gave me quiet satisfaction and considerable relief.

Visual spur

As can be seen in **Photo 37** showing progress to this point, I did finish painting the chassis at this stage to save having to remove the drivers again. As has been said before once you get to this stage and can see your model working it is encouraging knowing that there is really only cosmetic detail work from now on.

Two further chassis aspects that needed considerable work done were making, or in my case re-making and refining the brake gear and improving the bogie fixing. While the loco did sit on a 9-foot curve, it was a tight fit and a little controlled sideways movement of the bogie would be an improvement. The solution to the latter was covered in part 1 of this series and the brake gear I will return to shortly. **EIM**



Hovercraft & air cushions

Rodger describes the short history of a prime example of British engineering innovation, the potential of which was never properly exploited.

BY RODGER P. BRADLEY

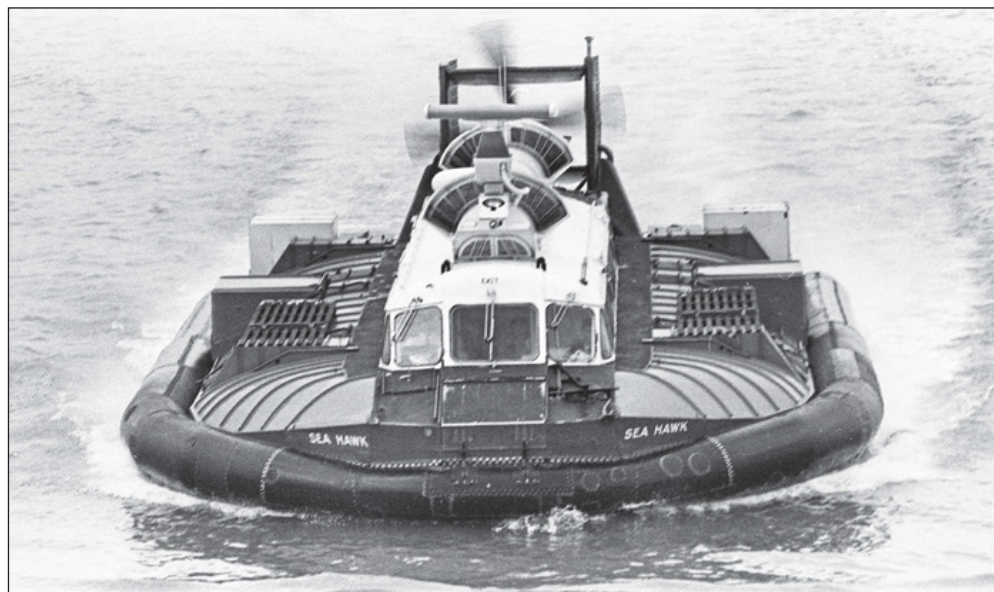
As a child, like many of us I was drawn to building models, and of course, at school we had these arts and crafts lessons – a welcome relief from learning ‘times tables’ and ‘weights & measures’, although those skills did come in handy too.

One of my earliest attempts at building a model was inspired by news of the latest transport technology – the SRN1 hovercraft. But, surprisingly the idea for the real thing had a very long history and was almost 250 years old, although like many of us my first thoughts were directed to Christopher Cockerell, creator of the SRN1.

The original concept came from a Swedish theologian, a philosopher with a passion for science. Emanuel Swedenborg had studied physics at Uppsala in Sweden, and travelled across Europe, through the Netherlands, Germany and England. He returned to Sweden in 1715, and in his own publication *Daedalus* in 1716 described his own design for a “Flying Machine”, which was described as resembling an upside-down boat. At the heart of this – literally – was a control position, with a paddle used to compress the air beneath the boat, to provide lift.

Clearly manpower alone would never provide enough force to provide the necessary lift – so it remained simply a sketch on paper. There was then around a 150-year gap until in Britain, Sir John Thornycroft began experimenting with the idea of using a ‘film’ of air to reduce the drag between the hull of a ship and water. There was no intention to try and use air to ‘lift’ the ship, but simply to provide less friction.

Various other ideas appeared in



the 20th Century as either theories or small-scale models. One of the most ingenious perhaps came during the First World War, when a fast torpedo boat was built in Austria, based on a design by Dagobert Müller von Thomamühl. This was powered by a six-cylinder engine driving two propellers, but the key component was a four-cylinder engine driving a fan to blow hot air down the hull to create an air cushion, the vessel described as a ‘Hydrofoil with Thomamühl system’.

Later, the eminent Russian rocket scientist Konstantin Tsiolkovsky, who had been working on aerodynamics and rocketry since the late Victorian era, turned his attention to jet aircraft and gas turbines, and in the 1920s published his design for a train riding on an air-cushion.

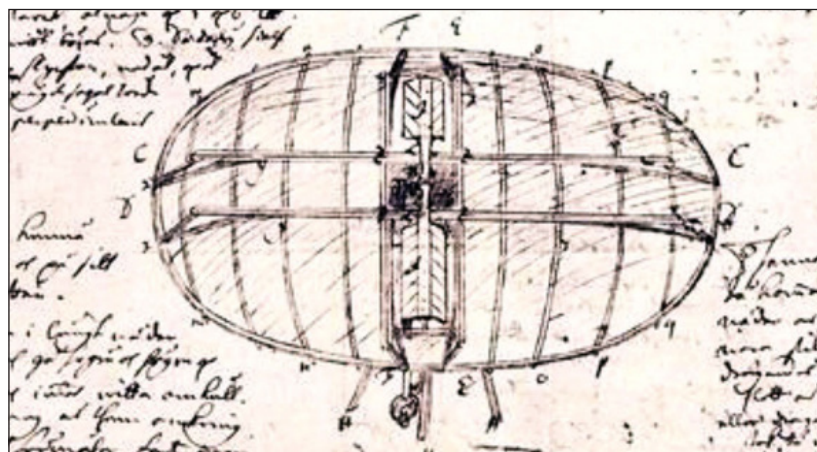
In fact, Tsiolkovsky had been developing the idea of the hovercraft since 1921, publishing a fundamentally

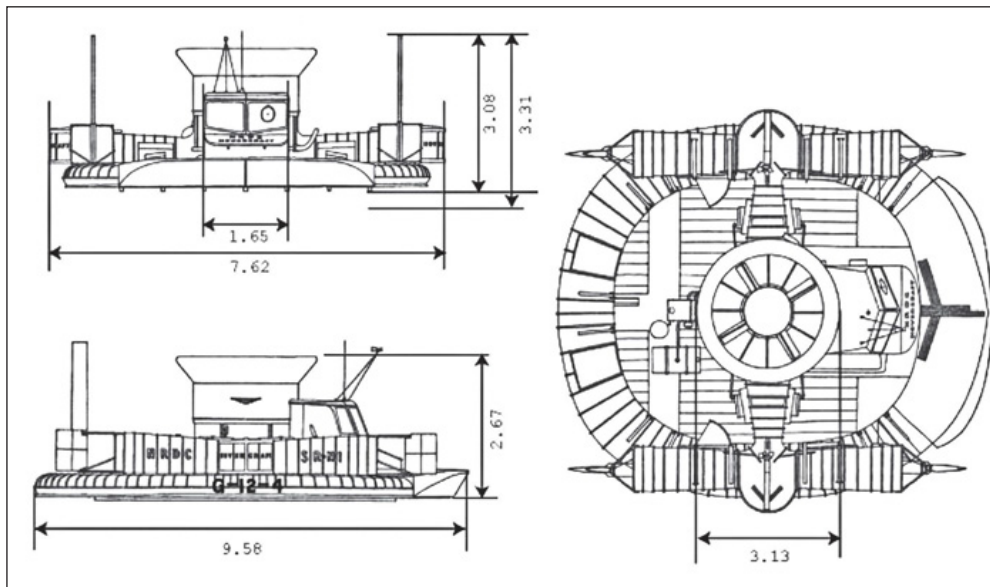
ABOVE: Popular image of the hovercraft, here on the Isle of Wight service in summer 1980. Photo: Andrew Charman

BELOW: The author’s interest in model hovercraft was stoked by plans published by MAP, still available in the 1970s.

BOTTOM LEFT: Emanuel Swedenborg’s design for a ‘Flying Machine’ from 1715, operated by manpower!

Image: Swedenborg/Wikipedia Commons





important paper on it in 1927, entitled *Air Resistance and the Express Train*. In this paper the first key theories on aerodynamic methods for air-cushion vehicles was published.

The work done by British engineer Thornycroft was not lost, but the idea for an air-cushion vessel never got off the ground – literally – in Britain until after the Second World War. The name that will forever be synonymous with ‘air cushion’ vehicles or ‘hovercraft’ – Sir Christopher Cockerell – began his working life employed by the Marconi Company.

Cockerell left Marconi in 1950 and bought a small boat and caravan hire company, Ripplecraft Ltd, in which he developed “revolutionary” ideas for the traditional ‘Broads’ pleasure boats – including placing the steering position towards the bow. The success of the boat building and hiring activities led him to think how a boat could be made to go faster, which in turn led him back to Thornycroft’s thinking over 30 years earlier.

ABOVE: The design of Sir Christopher Cockerell’s and the world’s first true hovercraft. Image: James Rowson/Wikipedia Commons

BELOW: Alvis ‘Leonides’ aero engine used to drive the fan on SRN.1, at MOSI Manchester. Photo: ChrisO/Wikipedia Commons

BELOW RIGHT: Original SRN.1 on test with the Royal Navy. Photo: National Archives/Wikipedia Commons

Developing the Principle

Most of the early ideas were targeted at pumping air underneath the boat’s hull, and just providing enough air film to reducing the drag, and perhaps raising the hull slightly above the surface. This was all well and good, but deriving forward motion would be a challenge.

Cockerell took the next step in the evolution of this theory, which was to channel the air through narrow jets around the perimeter of the vessel, and the moving air would provide a ‘momentum curtain’.

This wall of air would then restrict the amount of said air that could ‘leak’ out, and this meant that a cushion of high-pressure air could be maintained with a smaller engine, and in turn, the craft could be lifted away from the surface of the water.

The boatyard was based near the village of Somerleyton in Suffolk, and together with other innovative ideas, Ripplecraft Ltd began developing and testing a modified rowing boat and a small motor launch, which was fitted with a centrifugal fan. The initial work with the rowing boat used a vacuum cleaner to force air under the boat from a slot in the rear, whilst the

fan of the motor launch was driven from the propeller shaft, and delivered air over the bows to determine the pressure pattern.

Success came in the summer of 1954, on a dinghy Cockerell had adapted and fitted with a pump to blow air beneath the hull. The air was retained using a rubber curtain allowing that ‘lift’ to be generated.

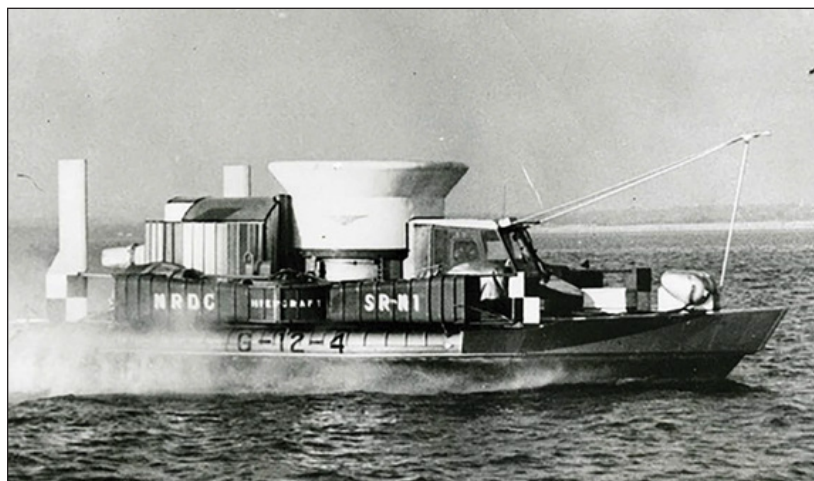
More interestingly perhaps is the idea that the creation of the ‘plenum chamber’ from a cat food tin and a Lyons Coffee tin produced that ‘eureka’ moment.

The two tins were of similar diameter, but the cat food tin slightly smaller. So it was placed inside the larger Lyons tin and secured near the top, and a hole was then made in the top of the slightly larger coffee tin, and air from an industrial hose attached. The air forced through the hole dissipated around the space – the plenum chamber – between the two tins, and exhausted at the bottom, at a greater pressure as a ring or curtain of air, creating lift. This is the simple but essential heart of the hovercraft principle – the ‘momentum curtain’.

From these initial experiments a working model was built, which according to some reports was a cross between a spaceship and a Dan Dare (from the *Eagle* comic) flying helmet. Balsa wood was the chosen material for the structure – as I’m sure most of us know this was very popular for modelling in the 1950s and ‘60s. The model was powered by a small glow-plug engine, also very popular at the time amongst aeromodellers.

The original Ripplecraft boatyard was joined by a new neighbour – Ripplecraft Hovercraft Ltd, based in an old shed previously used as a tool store – a very inauspicious start to a perhaps spectacular invention of the 20th century that as a go-anywhere form of transport is unrivalled.

The next steps in the journey bring in Lord Somerleyton – on whose land some of Cockerell’s early model trials were held – and Lord Louis



Mountbatten. It was Mountbatten as First Sea Lord who passed Cockerell's documentation on the theory and operation of the hovercraft to the Admiralty's Director of Research. Cockerell was keen to convince officials, from the Ministry of Supply to the various military agencies, that the 'Hovercraft' was a key vehicle in the future of transport.

Cold storage

They were not keen, and oddly, and sadly, the design disappeared into the bowels of Whitehall for some time around 1955 and was placed on the 'Secret' list – this was the time of the early battles of the 'Cold War'. Not until 1958 was the design and its supporting technology declassified, and whilst the 'authorities' delayed, reports had been received by developments of the technology overseas – much to the annoyance of its creator and his supporters.

It was as a result of these reports that a Whitehall official and Cockerell persuaded the Ministry of the need to act quickly, and approval was given to the National Research & Development Corporation (NRDC) to build and test a full-size working hovercraft. And this led to the involvement of aircraft manufacturer Saunders-Roe.

A year earlier there had been a massive re-thinking of air defence philosophy in Britain, outlined in the 1957 Defence White Paper, which called for manned combat aircraft to be replaced by missiles.

This clearly had an immediate effect on manufacturing in Britain, especially in design and planning phases. The previous programme had included a new interceptor aircraft type, designated SR.177, which was to be built by Saunders-Roe at its factory on the Isle of Wight. The company had been in the aircraft and shipbuilding industries for many years, and was well known for its flying boats – the first and last jet-powered flying boats built in 1947.

The age of the flying boat was over by 1950, and in the fixed-wing arena, Saunders-Roe developed an innovative 'mixed propulsion' fighter aircraft as an interceptor. The SR53 combined the use of a rocket engine to achieve maximum rate of climb and attack hostile aircraft together with a jet engine to allow the plane to return to its home airfield.

Saunders Rowe was also heavily involved in the early days of autogiros and helicopter development, with a controlling interest in one of the pioneer businesses. The restructuring of Britain's aerospace industries in the 1950s under the British Aircraft Corporation (fixed wing) and Westland Aircraft (helicopters) led to

RIGHT: The first passenger hovercraft SRN.2 captured at Weston-super-Mare beach in August 1963. This craft carries the 'Westland' logo, in contrast to the NRDC lettering on its predecessor. Its unique hull shape, complete with bow, was a success. *Image: Rocknrollmancer/ Wikipedia Commons*

BELOW: The SRN.3 was the last of the prototypes, and the first to be fitted with Rolls Royce 'Gnome' power units. Here it is on Interservice trials, IHU lettering prominently displayed. *Image: Jastao13/ Wikipedia Commons*



Saunders-Roe coming under the Westland umbrella and from the company's involvement with both sides of the aero industry, it was perhaps why the NRDC awarded the project to build the world's first hovercraft to Saunders-Roe.

Nautical 1

The go-ahead to complete this revolutionary project, from its previously 'secret' classification, was swift. It began with the prototype model, which had a large, inverted fan in the centre to provide lift and a 'driving cabin' at the front. Air was diverted through ducts from the central fan to provide propulsion. The 'model' was tested over land as well as water, to confirm that it was able to clear obstacles safely.

The world's first full-sized hovercraft was initially known as the Model A and consisted essentially of a riveted aircraft-grade aluminium alloy sheet buoyancy tank, coated with a thin layer of pure aluminium to protect against corrosion. Set in a large cylinder in the middle of the upper surface of this 'deck' was the craft's engine and horizontally

mounted fan – the outer casing of the cylinder was reinforced to protect the crew in the event of a catastrophic engine failure.

A simple cab was placed at the forward end, where the captain, or pilot would be positioned – this was initially built without doors for its maiden outing and not very watertight for its occupants.

The air drawn in by the fan and used for lift could also be directed through twin ducts at the outer edges of the structure to provide propulsion and manoeuvrability. At the end of each duct were simple aerofoils used for changing the direction of airflow.

The power unit to drive the lift fan was an Alvis Leonides nine-cylinder radial piston engine, which developed 450hp – later examples of this engine were developed for use in light transport aircraft and trainers, as well as Sikorsky and Westland helicopters.

Including the design and testing phases, the 7-ton, 20 feet long, almost circular craft by then known as SRN.1 (Saunders-Roe Nautical 1) was built and launched in less than eight months. This rapid development of such a new and unusual craft as a





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ABOVE: Seen at Ryde Pier Head on the Isle of Wight in 1965, an SRN.6, then branded 'Hovertravel', and used for the short sea crossings to Southsea. No fewer than 71 examples of this design were constructed by Westland and the British Hovercraft Corporation, alongside 15 of the SRN.5. Hovertravel still operates two hovercraft today.

Photo: Ben Brooksbank/Wikipedia Commons

LEFT: The power plant adopted for the SRN.3, SRN.5 and SRN.6 was this Rolls Royce Gnome gas turbine/turboshaft engine. This example is on display at the Fleet Air Arm Museum.

Photo: Nimbus 227/Wikipedia Commons

Pioneer Hovercraft Main Dimensions

	SRN.1	SRN.2	SRN.3	SRN.4	SRN.5	SRN.6
Builder	Saunders-Roe	Saunders-Roe / Westland	Saunders-Roe / Westland	British Hovercraft Corporation (i)	British Hovercraft Corporation (i)	Westland
No. Built	1	1	1	6	15	71
Date first flown	1959	1962	1963	1967	1964	1963
Class	n/a	n/a	n/a	Mountbatten	Warden	Winchester
Weight	7 tons	27 tons	37 tons	320 t (Mk. III)	7.9t	10.9 tons
Length	20 ft	19.8 m	77 ft	56.38m (Mk. III)	12.01m	17.78
Beam	7.62 m	9.14	9.3	23.77m	6.93m	7.97
Height	3.08 m	7.43	9.76	11.48m	16ft 9ins	6.32
Installed power	450hp	3,260hp (2,432 kW)	3,800hp	3,800hp	900 shp (671 kW)	1,050 shp (780 kW)
Power Unit	1 x Alvis Leonides	4 x Bristol Siddeley Nimbus turboshaft engines (2 lift, 2 thrust)	4 x Rolls-Royce Gnome T58 (ii)	4 x Rolls-Royce Marine Proteus gas turbines (iii)	1 x Rolls-Royce Gnome T58	1 x Rolls-Royce Gnome T58
Speed	35 knots	73 knots	70 knots	70 knots (Mk. III)	70 knots	50 knots

(i) British Hovercraft Corporation (BHC) was formed by amalgamating Westland with Vickers aircraft division in 1966

(ii) The engine was actually a USA General Electric T58 built under licence by de Havilland and aimed specifically at the helicopter market. It was used in the well-known Westland Sea King, Wessex and Whirlwind designs.

(iii) For lift and propulsion

novel form of transport certainly captured the imagination of many, and SRN.1 appeared in front of the world's press on the 11th June 1959. It was reported too that the press refused to leave the scene around the Saunders-Roe yard until SRN.1 had been shown to operate on water – obviously successfully.

Only a few weeks later, SRN.1 made its first Channel crossing from Calais to Dover, with its inventor on board. Appropriately, this was the 50th anniversary of Bleriot's first flight over the channel in 1909. The shape of its structure led to the hovercraft naturally for a time acquiring the nickname of 'flying saucer' – but they are a very different animal!

This first true hovercraft also opened up a whole new area of controversy – was it a boat, or an aeroplane? The answer at least for commercial craft was of course not helpful, since the large passenger-carrying variety had captains, as well as crew, and military applications for the smaller craft followed conventional authority structures.

Next Steps

Next out of the Saunders-Roe/Cockerell design and innovation school was the SRN.2, but that was not until after a number of modifications and detail changes had been made – especially apparent after the Channel crossing, where spray was generated in huge volumes. SRN.1 was updated to the Mark 2 then Mark 3 version, and by then the need for an additional curtain around the perimeter of the craft had seen trials of crude strips of rubber attached to try and reduce the impact of spray. A patent on the general arrangement of skirts had been lodged by an aircraft designer by the name of Cecil Latimer-Needham, and the patent was sold to Westland in 1961. Cockerell had of course come up with the idea before Needham, back in 1957 – but the lack of a patent could be seen as a mistake not uncommon in many pioneering areas of technology.

One of the obvious differences in SRN.2 was the provision of a bow, to allow easier passage through rough water, and this feature was tested on a further modification to SRN.1. The new design was still basically ovoid, but it was intended with this version to venture into the civil/commercial arena, as well as for military purposes, and it was not intended just to be a research project.

That said, carrying freight or other heavy objects was not uppermost in the minds of the designers, but people were, and the design provided what could be regarded as typical of an approach to carrying passengers on short trips.



By 1963, the military had some interest in hovercraft and formed an Interservice Hovercraft Trials Unit, at the Royal Navy's base HMS Daedalus at Lee-on-the-Solent close to Portsmouth. Unsurprisingly a new military hovercraft designated SRN.3 appeared – this like SRN.2 was produced under the Westland brand, but by 1964, all the hovercraft businesses were merged into the British Hovercraft Corporation (BHC).

Between 1966 and 1974, SRN types were operated by the Interservice Hovercraft Trials Unit, with various programmes intended to test the structure and its operations to the limit. With the success of the technology established BHC went on to design and build more and bigger craft – the SRN.5 and SRN.6 were the most numerous of these, launched in 1964 and 1965 respectively. In 1967 the biggest craft of all was launched – the SRN.4 or 'Mountbatten Class' was perhaps the most famous of all hovercraft and provided the basis for commercial cross-channel services for several years – yet only six were built.

A 'crossover' between air and land transport saw the arrival of the 'cushion craft', such as those developed by plane maker Britten-Norman, and which appeared only two years after SRN.1. As the company was developing STOL (Short Take Off & Landing) it seemed an opportunity. Britten-Norman was also based on the Isle of Wight, and though its first product – the CC1 – hovered successfully, it was not until the CC2 arrived a year later that the air from the lift engine (a 240hp Rolls-Royce V8) was deflected to provide effective propulsion. The company went on to improve and develop these cushion craft, although it too was later absorbed into the British Hovercraft Corporation.

For making lake and short sea crossings, the hydrofoil was a serious contender, and whilst most did not have car-carrying capability, they were certainly competition to the hovercraft for many services.

As early as 1967, the lack of major

ABOVE: SRN.4 design at Dover in 1973, seen here with the cargo ramp down, and in 'Hoverlloyd' markings. Photo: GeorgeLouis/ Wikipedia Commons

ABOVE RIGHT: SRN.4 at Dover Hoverport in 1980, from where it operated services to Calais and Boulogne under the British Rail Seaspeed banner. Photo: Murgatroyd49/ Wikipedia Commons

BELOW: Twilight of the technology – Hoverspeed's Mark III SRN.4 arriving in Dover on its last commercial flight on 1st October 2000. Photo: Andrew Berridge/ Wikipedia Commons

orders globally for hovercraft was overshadowing Britain's pioneering efforts. One MP, during a debate in Parliament shortly after the huge SRN.4 was launched, commented "I will turn for a few minutes to hovercraft. The British Hovercraft Corporation has 90 per cent of the market and it made the very big and bold jump from the 7 to 10 tons SRN.5 and 6 to the huge SRN.4, just launched. But technically the new hovercraft is not very different in design and layout from the small vessels. Will this new craft be commercially viable at a capital cost of £1½ million? It was designed at a time of shortage in cross-Channel shipping, but now that there are 16 to 18 ships a day crossing the Channel, competition will be severe."

Cross-Channel operation

In the 1960s, British Rail was the owner and operator of a number of coastal and ferry services, including its 'Sealink' traffic between Dover and Calais, and it was a logical step to exploit the new technology in the cross-Channel 'British Rail Hovercraft' services. In 1965, BR had a 50/50 partnership with SNCF (French National Railways), to operate these new services from 'hoverports' at Dover and Calais, under the brand name 'Seaspeed'.

These two were not, however, alone in the competition for cross Channel traffic, as ferry operators

such as P&O, Swedish American Line and Swedish Lloyd were keen to join, but the port facilities at either end of the route were not open to them for conventional ferry services.

In 1966 the two Swedish companies formed 'Hoverlloyd' to operate a Calais to Ramsgate service using the SRN.6 craft whilst awaiting the larger SRN.4 vessels. From 1969 the company took on four of the larger vessels and operated between the newly built hoverports on both sides of the Channel well into the 1970s.

Competition with British Rail's Seaspeed was fierce, and by the late 1970s sales were falling and losses mounting. In the early 1980s, Seaspeed and Hoverlloyd were merged to form 'Hoverspeed'. But the economics were against these large craft and despite restructuring, the frequent services were dwindling, as the competition from large hydrofoils and of course the opening of the Channel Tunnel spelled the end.

Today, the military usefulness of the hovercraft and its ability for search and rescue duties is exploited in many places, but in Britain, sadly, that potential was never fully realised.

A museum near Gosport in Hampshire is dedicated to the memory of this remarkable craft – the Hovercraft Museum has more than 50 craft on display. Here it is still possible to experience a trip on one of these fascinating vehicles more than 60 years after their birth. **EIM**



Finding solutions and more interesting issues...

Our master of matters 6-inch scale on the Welsh coast this month gets the smoke out of his eyes, only to discover a material he really didn't want to see...

BY HARRY BILLMORE

Thankfully after all the hard work that had been put in on 'Sherpa', the Fairbourne Miniature Railway's 6-inch scale Darjeeling B-class (and described in recent editions of this column – Ed), the locomotive went into traffic on the day before the May bank-holiday Gala and then performed well throughout the three-day event.

The Gala also gave me the kick up the behind to finish re-commissioning my 7¼-inch Scamp petrol loco that I had inherited just before lockdown. It had languished in a somewhat leaky shed for two and a bit years before I managed to bring it to my house and start work on it, although it turned out to not need too much mechanically – a new belt for the generator drive, a new clutch cable, a few adjustments, drain the fuel and then off it went! Unfortunately, it only went in one direction...

After a little investigation this was traced to the forward/reverse switch contacts being dirty, however the issue was only discovered on the Saturday afternoon of the Gala, the loco having run on the short multi-gauge section of track at the Fairbourne's Barmouth Ferry terminus station (see last month's Club News pages) using a friend of mine's 5-inch gauge battery electric Ruston as a reverse gear.

Friendly fuel

After a load of mechanical operation, the switch contacts were clean enough to operate and the Scamp was back to working as it should. On a slight side note, I am now running the loco entirely on a synthetic four-stroke fuel called Aspen 4 – this has two advantages over petrol from the pumps: it does not degrade in the tank over time so it can be left for a long period without having to drain the tank between runs and it will not attack the various engine components over time like E5 petrol can. I get my supply from my local lawnmower supply shop.

With the Gala successfully out of the way I was about to start work on various other projects when I noticed one of our semi-open carriages had a weld that had split. Upon



PHOTO 1:

Two of Harry's projects running well, Darjeeling 0-4-0ST 'Sherpa' with new axles, cranks and crank pins and his 7¼-inch gauge Scamp which has required a bit of re-commissioning. The 5-inch gauge wagons are very interesting in how they were built – a story for another time!

PHOTO 2: One of the welds split on a carriage.

PHOTO 3: The rust jacking that caused the weld to split.

Photos by the author

investigation it turned out that the two c-channel steel sections, that had been welded on top of each other to form the chassis, had started to rust

badly between the layers and the rust jacking had applied enough force to break two 3-inch long welds.

Unfortunately to sort this issue





PHOTO 4: Trials underway with another batch of green (in aim and colour!) coal.

PHOTO 5: The fire with the green coal – it looks good but there are still challenges to overcome.

PHOTO 6: The new chimney extension in place with its catch holding it up out of the way.

PHOTO 7: The chimney extension in use – this has massively reduced the smoke that hangs in the shed during light ups.

PHOTO 8: A specialist removing asbestos containing gasket material from the chassis of 'Beddgelert'.



out properly will require the carriage to effectively be taken back to its component parts and rebuilt which I currently don't have time to do, so it is now sat at the back of the carriage shed out of use until I do have the time. It is worth checking over components like this to ensure rust jacking isn't causing issues.

Coal from oil

We have also recently had a ton-sized fresh batch of 'green coal' delivered – I reported on the last batch we had, made from the waste produced by rapeseed oil production, in the December 2021 issue of **EIM**. This latest batch is both a different shape and size, the intention being to help reduce the smoke by allowing the volatiles to burn off properly.

Unfortunately with our engines and line, it has not worked as well as intended – it definitely reduced the smoke, but not to a level that we could work with. The 2ft 3-inch gauge Talylyn Railway has also tried it with significantly more success, so I believe the effectiveness is mostly down to the draft through the fire and the smaller size of the fireboxes on our locos not allowing the volatiles to burn off and therefore creating smoke. The other slight downside is that it dissolves slightly in the rain, making firing a little more interesting in the liquid sunshine of the Welsh coast...

On the subject of smoke, I have been trying to reduce the amount of smoke that builds up in the running shed in the morning when locos are being lit up. The most effective solution so far has been to fit long chimney extensions into the existing hoods that drop down onto the chimney tops and take the smoke a long way up the hood chimney.

A top-hat flange on the bottom of as wide a tube as would fit up the hood, combined with a simple catch mechanism to hold it up out of the way, has worked wonders. This has all but eliminated the smoky haze that would occasionally fill the running shed in the mornings!

Asbestos alert

I mentioned in an earlier article that we had begun to strip down our 6-inch scale Welsh Highland Railway loco 'Beddgelert' ahead of an overhaul and a return to service after several years out of use. Unfortunately this had to be halted when the cylinder cover was removed and an gasket containing asbestos was discovered.

While this is a relatively 'safe' form of asbestos, as it is encapsulated in the gasket material and very unlikely to release fibres, I took the decision to bring in specialists in asbestos removal and disposal to chip



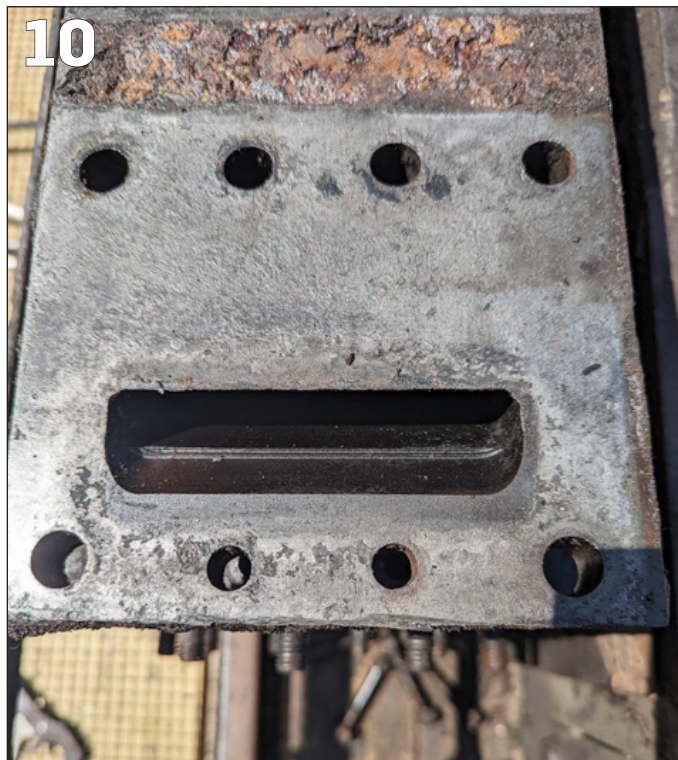
the gasket face clean. As the firm charged by the day, I continued to strip the loco down until more asbestos gasket material was found at which point they would step in, deal with it and dispose of it in a safe manner.

I found there were asbestos gaskets on the front and rear cylinder covers and between the cylinder casting and the valve chest spacer. It is worth noting that the loco was only built in 1979 so anyone working on slightly older locos needs to be aware that they could contain asbestos gasket material that will require appropriate action.

Ports to ponder

Once the loco had been stripped down I had my first opportunity to really look at the cylinder porting and how it passes through the frames – unfortunately this is going to create some challenges. As you can see in the photos, the steam passages from the cylinder bore to the inside edge of the cylinder casting are extremely close to the clamping studs – this necessitated the builder putting significantly smaller studs in this position to allow for any sort of land for a gasket.

You can also see from the impression left



behind on the spacer casting that the steam passages didn't line up and created a step. This is really not good for steam flow, especially with a design that has long steam passages. How I proceed will require a lot of thought – I am currently leaning towards putting a piston valve conversion onto it, both to improve the porting but also to reduce the load on the valve gear which has been excessive over the years – as I will show you next month!

The other interesting feature that removing the cylinder has revealed, is the



PHOTO 9: an old tool stash... broken drill bits stashed on top of the Beddgelert's left-hand cylinder.

PHOTO 10: The steam chest spacer casting, note the mismatch between the port and where the imprint of the gasket is from the cylinder casting.

PHOTO 11: The cylinder casting as it comes through the frames – the port is so close to the clamp studs that the builder has had to use smaller diameter studs in this area.

PHOTO 12: Removing one cylinder reveals how little frame material is left to take all of the force from the cylinders, even with a doubler plate in place.

PHOTO 13: Just visible in this photo is where someone in the past has removed a bracing gusset from the frame stretcher to each frame plate, further weakening the frames at what is their weakest point.

PHOTO 14: A reference photo taken to import into Harry's CAD software to reproduce the shape of the smokebox – this old smokebox is paper thin in places.

PHOTO 15: The Fairbourne's new diesel up in the air with its wheelsets out for regauging.

PHOTO 16: Beddgelert's return will be welcome – here it is awaiting attention in April 2021 behind the chassis and boiler of Sherpa.

Photo: Andrew Charman



small amount of frame material left where the cylinder casting passes through the frames – even with the doubling plate on the frames there is not a whole lot of material to take the force of the cylinders working hard.

To compound this, someone in the past has cut out the strengthening gussets from between the frame plates and the front frame stretcher, which has further weakened the frames in this critical area.

Unwanted movement

To make matters even more concerning, the cylinders have not been attached to the frames with fitted bolts, thus allowing a small amount of movement between cylinder and frames and not making use of the cylinder casting to strengthen the frames. I need to have a good long think about what to do in this area too as the access into the space between

the frames is extremely limited.

The other bit of work that I have been doing on Beddgelert in the background is drawing up a new smokebox for the loco – the old one is so rotten that you can put your finger through it quite easily. I have done this by taking a photo of it as square on the front face as possible, then inserting this photo to scale into my CAD software to use as a reference to get the shape correct before drawing in all the holes that are needed.

Just to add to the fun of all of the above, I have been doing a few driving turns to cover the normal train service, while our new diesel has arrived. This is a 2ft gauge Simplex which will be regauged to 12¼-inch – a full description of that process will also be in next month's issue! **EIM**

■ Details of Fairbourne Railway services are at www.fairbournerrailway.com



"This is really not good for steam flow, especially with a design that has long steam passages – how I proceed will require a lot of thought..."



2022 Mainline Rally

John went along to the Ryedale SME's Gilling track for the latest running of this highly popular annual gathering with an emphasis on scale running.

BY JOHN ARROWSMITH



HEADING:

A line-up really epitomising the appeal of the Mainline Rally with a B1 and an O4 waiting to leave the up yard as a B1 passes with a coal train.

PHOTO 1: The useful hydraulic locomotive lift at the Ryedale track leads directly to the shed roads.

PHOTO 2:

An impressive fleet awaiting their turns as Geoff Moore backs his little GWR 0-6-0 Saddle tank onto the main turntable to collect his first train of the day.

Photos by the author

This annual and always enjoyable event at the Ryedale SME took place over the weekend of the 14th-15th May and as usual the preparations for the rally started on Friday, with many of the locomotives arriving along with the rolling stock and being unloaded and put into storage for the next day's operations.

There is a very good hydraulic locomotive lift adjacent to the Gilling track's shed so that engines and large stock can be unloaded directly onto the system without any problems (Photo 01). It is also a good time to catch up with lots of people who have travelled to be present – one visitor had travelled all the way from Australia to be there and enjoy the atmosphere which is 'Gilling'.

Scale action

The railway is located in the village of Gilling East which is about 20 miles north of York and the rally is organised by the Ryedale Society in conjunction with the Ground Level 5-inch Gauge Mainline Association (GL5). For readers who are not familiar with this event, it is a rally where apart from the loco drivers, no passengers of any kind are carried on trains. All the operations are based on British Railways practice from the steam age and all locos and stock are



standard gauge – no narrow gauge is permitted during this weekend.

There are two large shunting yards where trains of all descriptions are made up by the yardmaster and his team. Locomotive drivers are given their allotted time on the track with the type of train they are to haul and it is then the shedmaster's task to ensure the engines are sent out in time to pick up their trains, be it on the up or down lines. This can lead to some interesting movements as locomotives are shunted across the two busy main lines to the respective shunting yards or station and then in reverse when they have finished their duty turn.

The two main running lines are about a quarter of a mile in length and feature some testing gradients for trains especially with the longer express passenger workings.

Operations start at about 8.30am in the morning and continue until around 5pm in the afternoon so it is a long day and a driver may get two different time slots in that time – all engines have to be carefully managed and maintained during the day.

Challenging day

Each main line has its own water columns strategically placed so that drivers can get water at any time, but the coal has to be loaded before the engine leaves the shed. It is always a good test to know what your loco is capable of doing and running at this event will soon sort you out if you are not experienced!

Strict speed limits are in operation so for example a small pick-up goods train just plods round the mainline at a suitable speed whereas the 15 or 16-carriage express does what it says on the tin, runs at express speeds. This can be quite a sight at times.

The early morning start sees the steaming bays and turntable area at their busiest with locos being lit up and prepared for the first turns (Photo 02-03). The yards also start to fill with stock ready for sorting into the various trains needed at any one time.

"It is always a good test to know what your loco is capable of doing and running at this event will soon sort you out if you are not experienced..."

PHOTO 3: The yard turntable routinely boasted an impressive array of engines ranged around it, here including a Great Central 4-4-0 B11/2.

PHOTO 4: Small but very powerful – the radio-controlled Class 8 shunter moves the carriage stock into Erimus yard.

PHOTO 5: The LNER K1 of Balan Baker was among the early starters, here drifting through the station with a stopping passenger train.



For example, the main carriage store is underneath the Erimus yard adjacent to the down line and stock has to be assembled here into whatever the roster needs, so it is quite a job to move all these carriages at one time. Photo 04 shows the little radio-controlled Class 8 shunter pushing a long rake of coaches into the yard. The loco controller is standing in

front of the signal box, no mean feat for such a small locomotive.

Once all these movements have taken place the serious business of running trains begins. One of the first on the up line this year was Balan Baker with his LNER K1 2-6-0 and a short stopping passenger train (Photo 05).

Obviously with all these train and ▶





engine movements the signalmen have to concentrate very hard to ensure there are no near-misses or accidents and with two boxes to man they are always busy (Photo 06).

Another very pleasing aspect of these weekends is the number of younger people actively involved with all the many operations needed. A couple of 8 year-olds were both kept



PHOTO 6:

Erimus signal box provides a good view for operators of the yard and main line at Gilling.

PHOTO 7:

Among many young people involved was 16-year-old Sam Yields from the Tyneside club – here heading back to the shed after his shift.

PHOTO 8:

Visitor from Australia Neil Howley certainly enjoyed himself, here chatting matters model engineering in the steaming bay with Mike Aherne.

PHOTO 9:

Part of what Gilling is all about – discussions about everything railway-related go on under the new roof covering the steaming bays.

PHOTO 10:

A rare example of a 2-10-0 War Department locomotive awaits its turn.

busy, one as the station pilot driver and another learning the signal box operations. There is always encouragement for these young people and another young man from the Tyneside club was quite happy and content driving an A3 loco without any problems at all (Photo 07) – 16 year-old Sam Yields came through the Young Engineers section at his club and is now fully capable of handling a large engine at these sort of rallies.

Well-travelled

The visitor from Australia was Neil Howley, a member at the Boxhill club in Melbourne and he was thoroughly enjoying himself as he absorbed the sights, sounds and smells of this busy rally. When I caught up with him he was with Mike Aherne who was steaming his King Arthur class loco 'Queen Guinivere' with some eco-coal he was trying out and this was making plenty of smog to add to the atmosphere (Photo 08).

Since my last visit to Gilling the steaming bays have been fitted out with a new roof (Photo 09) which certainly helps with the weather that sometimes affects the running at the rally. This year though the event was blessed with fine dry and warm conditions which always helps.

I always like to see rare locomotive prototypes and Gilling is one of those events where they often appear – this year was no exception. The model of a War Department 2-10-0 named 'Dame Vera Lynn' (Photo 10) really stood out – finished in olive green it was an excellent example.

There were some good double-header combinations as well – the Doug Hewson-designed BR Standard Class 4 2-6-4 tank loco combined with his tender version of the loco (Photo 11) made for a good display. The double-chimney engine was driven by Paul Utfield while Doug's own engine was driven by Joe Gibbons and a fine sight they made as they handled their heavy passenger train with ease.





PHOTO 11: A pair of Standards back onto their passenger train waiting in the platform.



PHOTO 12: Father-and-son crew Steve and Matt Andrews ease the mail train away from the station bay platform.

PHOTO 13: Always plenty to see in the steaming bays – here Kenneth Willingham from the Scunthorpe Society prepares his Don Young-designed Y4 0-4-0 for its shift.



PHOTO 14: John Gaye waits for the signal on the up line with a train of steel hauled by his LMS 'Crab' 2-6-0.

PHOTO 15: Happy driver – almost a bird's eye view as a coal train with a B1 4-6-0 in charge heads towards the up yard.

“More than 30 locos were booked in for both days with many types of wagons and carriages all very well built and maintained...”

Family affair

The father-and-son combination of Steve and Matt Andrews, who are regulars at these events, displayed their driving skills on the extended Royal Mail train which was coupled up to an LNER V2 and an LMS Jubilee class loco (**Photo 12**), demonstrating the sights of yesteryear very well.

The weekend continued with constant loco changes and movements in and out of the shed combined with lots of shunting in the yards. If railway operations are your interest then you can do no better than visit one of these events where you will be well entertained. More than 30 locos were booked in for both days with many types of wagons and carriages all very well built and maintained.

The organisation was excellent and the inner man was amply catered for by the host club's catering ladies, who did a splendid job. My thanks go to everyone concerned for a great weekend filled with lots of interest and banter and some excellent running – it was a pleasure to be there. **EIM**

■ More details of the GL5 Association can be found at www.gl5.org, and the Ryedale club at <http://rsme.org.uk>



A Britannia Dilemma

Warwick sorts an issue of appearance with an acquired part-built locomotive.

BY WARWICK ALLISON

Some time ago I acquired a very well built 3½-inch gauge Britannia chassis. The boiler was part-built, and all in all it was a very desirable project to finish.

Now a Britannia is a difficult construction. Apart from lots of bits, the shape must be correct or else it will look terrible. And the shape is not simple! Very little is straight and right-angled, the cab is low on the boiler and the sloping-back firebox in three planes means there is very little room above the boiler and below the cab roof for the manifold and other piping. My loco is to the LBSC design.

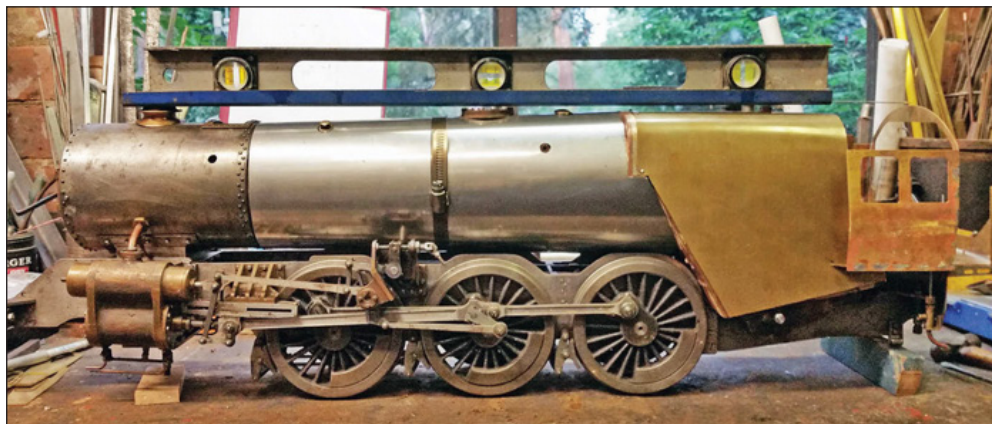
The chassis came with some drawings, but alas no general arrangement. I obtained the *Model Engineer* articles from the club library but these were not overly dimensionally informative. To speed the construction I obtained the tender kit from Model Engineers Laser and some loco parts, mainly the smoke deflectors and cab parts.

That's not right

I finished the boiler but when placed on the chassis it was clear that things were not right. It was far too high at the cab end, while the cab sides looked too deep, the cab roof too long.

It was clear I had a problem, but I did not know where the actual problems were. The missing general arrangement and the dimension-sparse remaining drawings did little to help. I needed a dimensioned drawing for 3½-inch gauge.

The problem was resolved by creating my own. I had an elderly but very useful *Locomotive Profile* book



ABOVE: The Britannia after acquisition – some issues to address...

BELOW: The completed loco, suitably splendid.

FIGURE 1: The Britannia drawing in CAD, dimensioned for 3½-inch gauge.

Photos and drawing by the author

which included a very clear elevation line drawing. I have since seen similar (if not the same) drawing in other publications. I scanned this to a PDF and then imported the drawing into my CAD program. (I use a free one available online).

I knew what the prototype wheel size should be, so measured the wheel size on my CAD drawing. I then scaled the drawing in the ratio of the wheel sizes to create my 3½-inch gauge version. I could then dimension any item I desired! The critical dimensions were the height from the rail to the top of the frame, and the rail to top of the boiler and cab.

I found the rear truck rollers were lifting the rear too high so I removed them. I then set the loco springs to give me the correct height, and a frame parallel to the ground.

Lagging behind

Now that the chassis was sitting correctly, I could place the boiler on it and see how it fitted. Of course this

was too high. LBSC did not lag his boilers and I wanted to lag this one, so I needed said boiler to be a smidgeon lower than what it should have been.

I found that filing the corner of the angled lower throatplate edge parallel with the frame did not remove much material but made a substantial difference to the boiler height. I also removed a small amount of the cross chassis member, and soon the boiler level was correct.

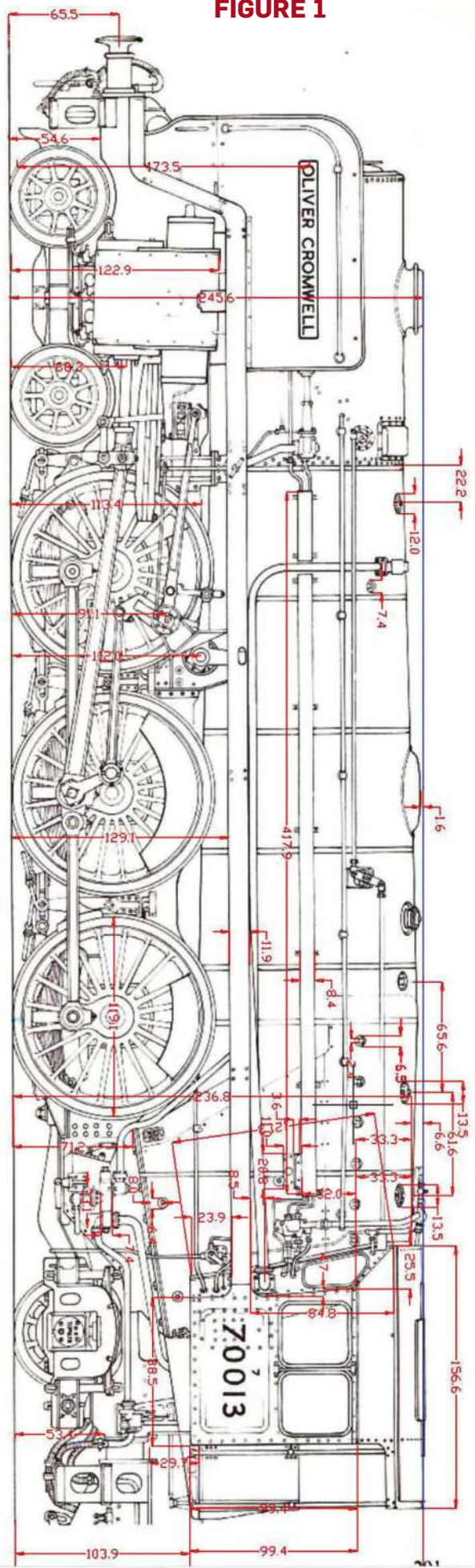
Further troubles were experienced with the cab sides and roof but with my CAD program I could find any dimension I wanted and it was now a straightforward task to manipulate the cab plate sizes to the correct scale. It was still a squeeze to fit everything under the cab roof, but with some space now determined at least I had a fighting chance!

The benefit of a CAD drawing of what you are making is that you can easily obtain any dimension you want, many more than are usually shown on drawings. Bliss! **EIM**



Stan Bray, 1925 – 2022

FIGURE 1



It is our sad duty just a month after informing readers of the death of **EIM**'s founder Chris Deith, to bring you news of the passing of the magazine's first editor – Stan Bray passed away peacefully at home on 18th June, aged 97.

Admittedly Stan was not the editor of this magazine for long as after overseeing just four issues in 1980 he was poached to become associate editor of *Model Engineer* – no surprise as his reputation as a leading model engineer was already well established.

He remained with the *ME* for very many years and had his own regular column, and also funded and edited sister magazine *Model Engineer's Workshop* – reputedly he believed it would only last “for a few specials” when launched in 1990 but the magazine is still going strong today. He also contributed regularly to *Model Boats* magazine.

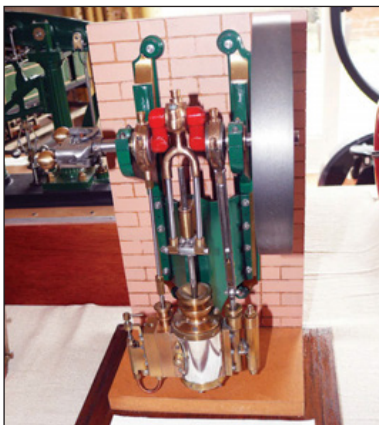
Stan made the most of his career which started as a machinist being paid the princely sum of 14 shillings a week. He wrote a number of books on model engineering subjects, covering areas ranging from clockmaking to making simple model steam engines, marine steam to machine shop techniques particularly lathe and milling work.

Outside of model engineering Stan



was also an enthusiastic cricket player and supporter of the game. At his funeral, which was held on 12th July at the Peterborough Crematorium, donations in Stan's memory were made to The Primary Club, a cricketers' charity that raises money to provide sports and recreational facilities for the visually impaired.

■ **EIM** is grateful to Howard Lewis of the Peterborough SME for his assistance with this tribute and the provision of photos taken by himself and other members of Stan and some of his many models. Stan was an honorary vice president and enthusiastic supporter of the Peterborough club, and is seen below discussing matters model engineering with Howard at an exhibition.





Sisters reunited at Rhyl Miniature line

Five of the six 'Barnes Atlantic' 4-4-2 steam locomotives built in the 1920s for miniature seaside lines are now together at the Rhyl Miniature Railway, following the arrival of 'Billie' on the north Wales 15-inch gauge line on 28th June.

The Rhyl Steam Preservation Trust, which runs the Rhyl line, purchased the loco from Austin Moss of the Windmill Farm Railway in Lancashire. Austin had already carried out much of the restoration of the engine – this will now be completed at Rhyl allowing Billie to enter service alongside sisters 'Joan' and 'Railway Queen'.

A fourth Barnes Atlantic, 'Michael' is currently being reassembled at Rhyl

following engineering work to its boiler, while the fifth, 'Billy' is owned by Rhyl Town Council and on display in the line's museum at Central Station.

Billie was built for the Dreamland Miniature Railway in Margate – the loco is thought to have been completed in 1922, and so celebrates its centenary this year. It has not hauled public trains since 1983.

RSPT chairman Les Hughes has wanted to bring all the locos built by Albert Barnes back together since 1980, when he first started supporting the line. Les described the arrival of Billie as a real achievement. "It is another chapter in a dream I have been following for the last 40 years," he said.



"I would like to thank everyone who has supported us during the last few years and have made this possible, in particular the passengers who ride on the trains and our team who operate the railway."

The sixth Barnes Atlantic, 'John' is in private ownership – it spent some years based at the Evesham Vale Light Railway but is now understood to be in storage.

Photos: RSPT

Full steam ahead for return of Midlands show

Preparations for the first Midlands Model Engineering Exhibition since 2019 are proceeding as planned – organiser Meridienne Exhibitions has dismissed rumours that the show would not take place following the death of founder Chris Deith, and has released details of more suppliers who have signed up for the event between Thursday 13th and Sunday 16th October at the Warwickshire Event Centre, close to Leamington Spa.

Sponsored by **Engineering in Miniature**



and long presented as *the* show for model engineers, the Midlands event is expected to be the only major model engineering exhibition in 2022 and the first to be held in close to three years.

Currently around 40 traders and 30 clubs

and societies have confirmed their attendance with more signing up each week – the current full list and more details including advance ticket booking are online at www.midlandsmodeleengineering.co.uk

Organisers are also hoping for a bumper entry in the competition and display classes – 32 classes are available covering the wide spectrum of model engineering, with cash prizes and trophies for the best in each class.

We will be publishing our usual pull-out guide ahead of the event in the October issue.



Several model engineering societies joined in the celebrations at the start of June for Her Majesty the Queen's Platinum Jubilee. York Model Engineers members ran their portable track at Poppleton's Jubilee Children's Sports Day – the sports day is an annual event but this year enjoyed an extra boost from the Platinum Jubilee, plus according to York's Roger Backhouse, who took the picture of member Jason Edwards driving the Kerr Stuart Wren that he built, "some lovely weather!"

Roger told us that a good team turned out from York ME to help with what was probably the most successful Children's Sports Day for many years, more than 30 people waiting for rides at one point.

The York ME usually runs around six portable track events during the year in and around the city. "It's an opportunity to promote the society and attract visitors to the Open Days at the club track," Roger added.

Chris Deith – EIM was 'a brave venture'

I was sorry to hear of the passing of EIM founder Chris Deith. In the early days of EIM, I visited the Hinckley office many times and was a regular provider of front cover images for the magazine.

At one time I lived a short way down the Fosse Road from the Fosse Exhibition Centre and on many occasions took Dick Blenkinsop's full-size Aveling Barford roller to exhibitions at the Fosse.

EIM was a brave venture in taking on the established *Model Engineer* publication, but was a breath of fresh air and produced in a very readable format.

My model engineering days are long over, but I still keep my enthusiasm with steam as the owner of a Lykamobile replica steam car.

Paul Stratford

The Editor replies: Thanks to the several readers who have taken the time to write following the untimely passing of Chris.

Are you a supplier with a new release in the model engineering market?

If so then send in details to editor@engineeringinminiature.co.uk or to the editorial office at 12 Maes Gwyn, Llanfair Caereinion, Powys SY21 0BD and we will feature it on these pages.

Also if you have a point to raise, a question to ask – or one to answer – then send it in for potential use on our letters page.



Steam shows – too expensive?

My good mate and fellow model engineer Julian and I like to visit as many steam fairs as we can. Covid saw many cancellations so it's very welcome to see them back again.

So far this year we have visited Stapleford, which with entry at £5.00 per car was great value, Whissendine for which entry was free, even better value, and Ashby Magna which at £6.00 per person for a big show was also good value.

Next on the agenda is Rempstone which is a big steam rally local to us – I usually treat my family to a day out, which is myself and wife, three daughters and a son-in-law and three grandchildren. This year they have whacked the price up to £15.00 per adult! That would cost me £90.00 just to get us in. Plus nine burgers at around a fiver, nine drinks in the beer tent and the grandchildren haven't had a coke or ice cream yet or a visit to the fun fair.

My gripe is I simply can't justify that

amount of money at present what with gas and electricity prices rocketing plus petrol.

I do understand the shows have lost some income recently but to try and get it back by increasing the entry fee by 50 per cent in my opinion is not on.

They should be trying to encourage people back to the show not putting them off. I'm not the only one who won't be going this year so how many more tickets have they got to sell to get back what they will lose by just me not going?

Rich Wightman

The Editor replies: I can see Rich's point, but I can see the other side too. Show organisers really face an unprecedented balancing act this year, coping with greatly increased costs, a lack of income from the past two years and still a threat that Covid could rear its head again. I think the show scene is going to remain pretty unsettled for some time yet...

Transport Curiosities, 1850 – 1950

By John Wade

Every so often a book comes along that is different from the norm and might not be picked up by the average reader of this magazine, but which merits a look – *Transport Curiosities* is just such an example.

The premise is simple, the author has taken the four major methods of propelled travel – by track, land, over and under water and by air, and looked for the more unusual examples of machinery produced to meet the needs of travellers. He's certainly found plenty to write about.

The rail section starts the book and is the largest category, beginning with propeller-driven trains, several of these on overhead lines and of course including the famed Zeppelin machines tried between the world wars. Pneumatic and atmospheric railways are of course included, before moving onto such oddities as the first 'Daddy Long Legs' Volk's Electric Railway.

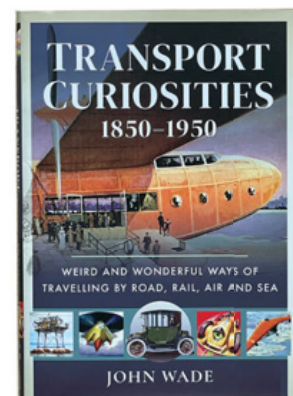
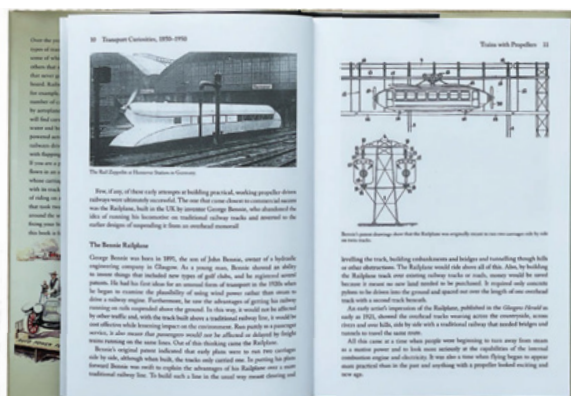
The section on road transport includes plenty on electric cars, which are a lot older

than many might believe, while the book continues with a litany of unusual and in places frankly insane creations – especially in the air section where one feels much bravery, or foolhardiness, would have been needed to travel in such machines.

What really makes the book, however, are the illustrations – they are plentiful, and almost entirely consist of

contemporary engraving-type images which are very finely detailed and a pleasure to look at. This is an unusual title but we feel many will enjoy reading it. AC

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Summer fun, but stay safe...

Events enjoyed and to look forward to, but some sobering advice to hear too...

COMPILED BY **ANDREW CHARMAN**

Four packed pages rounding up the club action this month, reflecting just how busy the scene has been over the past few weeks, evident in the many magazines and newsletters sent into **EIM** Towers and the pictures arriving from our various correspondents (Yes – we are getting some pictures sent in at last!).

We start with the **7¼" Gauge Society** and it is no surprise at all that the summer edition of *7¼ Inch Gauge News* features on its cover a picture of chairman Frank Cooper, presenting awards at the Society's Nottingham Mini Gathering on what proved to be his final duty before his untimely passing on 3rd May.

In the magazine Society president Brian Reading pays full tribute to Frank, commenting that he "was a great asset not only for our Society but to model engineering interests in a variety of fields – he worked extremely hard on behalf of our Society and his contribution was so wide it is difficult to start in trying to record all that he has achieved."

Brian adds that it must not be forgotten that Frank was also chairman of the Northern Association of Model Engineers, and "on occasions, such as at model engineering exhibitions, was able to juggle the two (or more) hats with conspicuous ease.... Frank will be greatly missed not only by our Society but also the whole world of model engineering and heritage railways."

Carriage safety

Elsewhere the *7¼ Inch Gauge News* publishes the latest advice issued by the Health & Safety Executive concerning open vehicles used on passenger-carrying miniature railways, and it is advice that every club operating trains for the public needs to read and act upon.

The advice follows an incident on a line in 2021 when a member of the public got their leg trapped between the carriage they were travelling on and the raised track the train was travelling on. The HSE investigation concluded that there were no suitable guards installed to ensure the limbs of passengers could not extend into the dangerous entrapment area between the moving carriage and track. And a further potential entrapment point was identified between carriages when trains round curves in the track,



ABOVE: Phil Barnes visited the 7¼-inch gauge line at Hollycombe Steam Museum on 19th June and pictured the line's Tinkerbell 0-4-2T 'Bob' running for the first time in some years following the completion of an overhaul.

reducing the space between vehicles on one side.

The HSE has insisted that manufacturers and designers of passenger-carrying miniature railway stock (on raised or ground-level track) should ensure there is no potential for entrapment points. Operators of railways should appoint a competent person to assess their stock and if they feel it is capable of trapping passengers should take the vehicles out of service until they can be rectified. The HSE also advocates continuous instruction, inspection and maintenance regimes for anyone operating such stock.

What is clear from all this is that clearly our operations will be watched closely in future by the authorities – you have been warned...

Fire risk

Continuing the safety theme and a very serious incident that shows that smaller-scale locomotives should not be treated any less carefully than larger passenger-carrying examples. The **Gauge 1 Model Railway Association** has issued urgent advice following a fire at a UK model engineering club track.

Fuel leaking from a locomotive at





a steaming bay ignited and was doused using water from a nearby container for boiler water. When the leak continued to burn a similar container was picked up to douse it, but this container was full of not water but alcohol – the resultant fireball resulted in the air ambulance being called and three victims being taken to hospital with serious burns.

We can no doubt expect further action from the HSE following this incident, but meantime we implore all operators of gas or alcohol-fuelled locos to take a look at the advice – it's on the **Federation of Model Engineering Societies** website at <https://fmes.org.uk/wp-content/uploads/2022/05/G1MRA-Safety-Advice-May-2022.pdf>

Turning to brighter things – correspondent Phil Barnes has been in touch to tell us about the first fete in three years at the Ingfield Special Needs School near Billingshurst in Sussex, held on 18th June and

featuring the use of the 10¼-inch gauge Ingfield Manor Railway. "Having very few public running days these days, the railway was well patronised," Phil says, adding that the day featured a few firsts. "It was the first time that the new extension had been used by the public at a fete, it was the first time that two 'Royal Scot' 4-6-0s had double-headed public trains, and most importantly, the first time that the newly refurbished Disabled Access Vehicle was in traffic, which saw much use by the residents of Ingfield School."

The railway fielded 12 steam locos plus a diesel and a battery electric loco and some 53 volunteers were rostered to support the operation – impressive in these times of much pressure on volunteer resources. All the monies raised from ticket sales and donations were passed to The Friends of Ingfield School after the event.

Good to receive a bumper edition of the newsletter from the **Stockholes**

FACING PAGE, BELOW:

The appeal of the Wythall Miniature Railway is clear from this picture from this season by Ken Jones

ABOVE: The Ingfield Manor Railway debuted its new accessible carriage on 18th June. Photo: Phil Barnes

BELOW: Matthew Pye pictured the open day of the attractive 7¼-inch gauge Littledale Light Railway in Lancashire on 26th June.

Farm MR in Lincolnshire, bolstered by a whole lot of activity at this 7¼-inch gauge line. Notable achievements include the completion of the second section of the decorative wall that we pictured in the May issue, made entirely of wine bottles – apparently finishing this section required 140 bottles, which must have been fun to source...

Other recent major achievements at Stockholes include the creation of a carriage store – the majority of the stock previously stored in the tunnel on the main running line has been moved into the new store and duly filled it..

The cover of the latest **COSME Link** from the **City of Oxford SME** boasts a patriotic picture of a large union jack flag flying over the track, the club being one of many to join in the celebrations for Her Majesty The Queen's Platinum Jubilee at the start of June.

Appearance bonus

In his column Oxford chairman Denis Mulford comments that it is good to see the track busy with running days well attended by both members and public. "I really do not think that we realise how well we are thought of," he says on chatting to visitors over the fence and adds that one regular park user commented how nice the area looked after club members had cut the grass, a tribute to Oxford's gardeners and the track and building maintenance teams. A reminder for us all – a tidy and attractive site does much for our standing in what are often public areas used by a wide variety of visitors.

Denis does sound a word of warning, however, concerning dwindling membership numbers; "True we are at about 100 members but we could do with some more younger members coming along who want to get involved in the various projects we have planned." Very true words – I know this column sounds like an old record at times but attracting new members, particularly the next-generation model engineers, is crucial to ensure the future growth, in fact survival of our vocation – they are out there if you make an effort to find them...

By the way the Platinum Jubilee proved a disappointment for some, notably the **Lincoln & District ME**, the club's latest newsletter reporting that a very wet weather forecast for Sunday 1st June led to a Jubilee event being transferred from the North Scarle playing fields, where the club has its track, to the village hall; "This ended our plans to participate with train rides..."

Better news from Lincoln sees





plans to trial public running on the second Saturday in the month, starting on 13th August – let's hope it goes well. Meanwhile the club's new station has recently been officially named – Jacqueline Sutherland of the Lincolnshire Co-op was given the honour of unveiling North Scarle Halt, the Co-op's Community Champions fund having paid for the new station with its overall roof.

Regular readers will know that the **Welling & District ME** has found a new home at Hall Place & Gardens in Dartford, after being forced to vacate its Falconwood site owned by National Grid in May 2021.

Society members have been busy building a new permanent track, infrastructure and clubroom but unfortunately delays in connecting water and electricity to the site has forced repeated postponements of the commencement of public running, with there now being concerns that there won't be any public days in 2022.

ABOVE:

Well-travelled miniature railway correspondent *Jonathan James* called into the Derby ME on 28th May and found members simply enjoying their track

BELOW:

Jonathan then moved on to the Nottingham Model Engineers, based at the Great Central Railway standard gauge preserved railway, and found diesel traction in use on the 7¼-inch ground-level line

Excellent effort

Writing in the latest *Welling* magazine editor Tony Riley comments, however, that the club should be pretty proud of itself; "Thanks to the efforts of many club members – several of whom have joined us since the move – just one year and one day after leaving Falconwood we were able to resume regular club running on Tuesday afternoons at our new track. I think that is pretty impressive".

Meanwhile work is continuing apace and the front cover of the magazine shows the new station canopy being erected over the raised track, while members were recently able to enjoy their first AGM meeting in their new home.

We have featured the annual radio-controlled locomotive competition staged by the **Bradford ME** before in these pages. This year's contest was held as the June monthly meeting and attracted a trio of entries, including a six-wheeler from member

John Shelton that boasted Formula-1 style front and rear aerofoils!

Each competitor was allowed three laps of the track with each timed. John Coppin entered the only axle-driven loco and suffered wheelspin on getaway, whereas his two rivals, Mr Shelton and Derek Round, both entered locos powered by ducted fans. In the end all three were declared winners – John Coppin for the fastest axle-driven lap, Derek Round for the fastest overall and John Shelton for the fastest in 5-inch gauge, the others being of 3½-inch. Seems a very fair way of doing things...

Looking significantly ahead right now is the **Bournemouth & District SME**. This club will celebrate its centenary in 2024 and members are reminded in the latest newsletter that "This is not so far away so now is the time to start making plans, assuming we are going to mark the occasion in some way." Surely there's no question that you will? A centenary doesn't come along very often...

Efficiency expected

Also planning well ahead is the **Bristol SMEE**. The club has been chosen to host the annual IMLEC competition for efficiency in model steam locomotives next year, celebrating 50 years since the Bristol club opened its Ashton Court Railway. So a small group of members decided to practice for the big event by holding their own internal version, BRIMLEC, actually reviving a competition that was started at the club's previous Canford Park site in 1971 and was an integral part of the calendar until the turn of the century.

Six runs were made with coal and water use closely monitored and a dynamometer car also involved. Geoff Smith was declared the winner with his recently acquired 'Speedy' Simplex 0-6-0 with his son Steve taking the same loco to second place.

The Bristol club recently opened its 16mm scale track with a special event which included a display of models judged by Alan Regan, chairman of the **Association of 16mm Narrow Gauge Modellers**. Best model on show was won by Bristol member Iain Holland for his Fowler locomotive. It's good to see more clubs responding to the ever-growing appeal of the smaller scales.

Meanwhile the aftermath of the pandemic has seen many clubs catching up on delayed significant birthdays and the latest is the **Tonbridge ME**. The club has issued an invitation to join in the delayed 70th anniversary of the establishment of its track at Brightfriars Meadow in the Kent town – the track which sits alongside a swimming pool and the



River Medway was laid in 1951.

The event will be held on Saturday 27th August and will include a lunchtime barbecue. Visiting locomotives with valid boiler certificate and club third-party insurance will be very welcome and anyone interested in joining the party should advise club secretary Colin Harwood by 13th August – he can be reached on 07950 508222/020 8777 8586 or on tonbridgemes@gmail.com

Another likely to be highly enjoyable special event making a glorious return this month will be the Standard Gauge Rally at the **Rugby ME**. Taking place over the weekend of 13th-14th August, the rally will feature running facilities for 2½, 3½, 5 and 7¼-inch gauge models. Entry is free but there will be a small fee if you want a ploughman's lunch – more details are at stdGRally@outlook.com

Looking a little further ahead, the **South Cheshire ME** will be joining forces with the London & North Western Railway Society on 17th September, for a special steam-up celebrating the centenary of the merger between the L&NWR and the Lancashire & Yorkshire Railway to create a much larger L&NWR.

The event will be at the South Cheshire track in Willaston, Nantwich with elevated 2½, 3½ and 5-inch gauges available and potential visitors with suitable locos are asked to contact the organisers via kennethwood2014@hotmail.com. Locos do not have to be of L&NWR origin, and a separate display area will be set up for those who wish to display model locos in smaller or larger scales.

Super Scamp

Regular readers of these pages will know that the monthly newsletters from Rugby are always full of the latest happenings at what is a most busy and active club and the latest editions are no different. My eye was most taken in the most recent edition,

however, by the home-build project of Rugby member Rolf Thomas.

Rolf's 'work-in-progress' is effectively a 'Scamp on steroids', taking the popular 7¼-inch petrol loco as a basis but powering it by a single-cylinder Petter diesel engine sourced from a cement mixer and driving through a dynamo, control box and motor. No doubt once complete this will be a very powerful loco indeed...

Finally I still find it odd getting newsletters from elsewhere in the world that are marked 'winter edition', as we are watching the temperature climb into the high 20s, even in mid Wales where our sunshine is said to be often liquid...

Playing to the public

Typical of this is the latest *Smokebox* from the **Red SME** in South Africa, editor Luker adding that recent months have been so depressing (South Africa another to suffer in the Covid pandemic) that a funny story is in order – he then proceeds to describe an example of pulling a train full of children around the track with the club's unsuperheated Lawley loco, which has to be driven carefully to avoid priming, when arriving at the tunnel "that naughty side of me had a lightbulb moment..."

Luker asked the child sitting directly behind him whether they should fill the tunnel with steam, and when she nodded enthusiastically, he crept into the tunnel and then cracked open the regulator with the reverser on full forward. "Sir William did not disappoint... there were screams of joy from all the passengers!" he writes, adding that on arrival back at the station everyone was smiling "from ear to ear".

Luker concludes; "Those insurmountable world problems we all tend to focus on seemed a little smaller, and I was reminded how a few smiles can change the world..." **EIM**

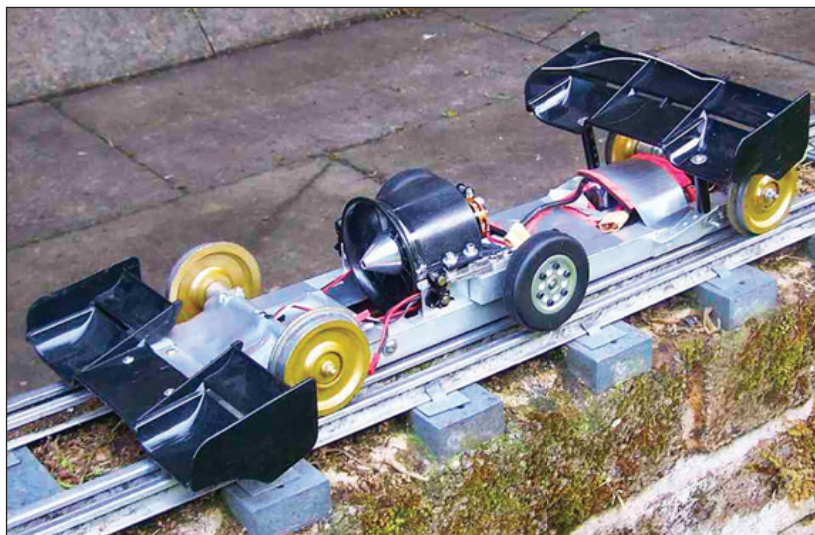


ABOVE: Making a return visit to the Ascot Locomotive Society on 3rd July, having previously visited in 2001, Jonathan James found Class 20 bo-bo locomotive 'Percy Hathaway' in action on the ground level line – the Society, based close to the famed horse racing venue, has 3½, 5 and 7¼ inch gauge tracks.

BELOW LEFT:

Yes, this is a railway loco! John Shelton's entry for the annual radio-control loco contest at Bradford ME was certainly an innovative design... Photo: Graham Astbury/Bradford ME

BELOW: Super power! The Scamp-based loco being built by Rugby ME member Rolf Thomas is certainly going to be quite a loco once complete... Photo: Rugby ME



EVERY SATURDAY

(Weather permitting)

Sussex MLS public running, Beech Hurst Gardens, Haywards Heath RH16 4BB, 2-5pm

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

Southampton SME public running, Nursery Rd, Southampton SO18 1PQ 10.30am-4pm

AUGUST

3 Bradford ME evening running, crepes & social, Northcliff, BD18 3DD Members 11.30am, public 1.30-4pm

3 Bristol ME meeting, club auction, Begbrook social club, BS16 1HY

3 Lincoln & District ME club running evening, North Scarle playing field, LN6 9ER

4 Cardiff ME Members Projects, Heath Pk, Cardiff CF14 4AW

4 Guildford ME public running, Stoke Pk, Guildford GU1 1TU, 10am-1pm

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

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

7 Guildford ME Small Engine Group Open Meeting, Stoke Pk, Guildford GU1 1TU, 2-5pm

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

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

7 Rugby ME members running, Onley Ln, Rugby CV22 5QD

7 Southampton SME Sailability Charity Day, Nursery Rd, Southampton SO18 1PQ

10 High Wycombe ME track evening, Holmer Green, HP15 6UF

11 Worthing ME Club Meeting, Field Place, Worthing BN13 1NP 7.30pm

12 Tiverton & Dist ME a'noon/eve running, Rackenford, EX16 8EF

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

13 Old Locomotive Committee Lionsmeet 2022, Worcester ME, Waverley Str, Worcester, WR5 3DH

13 Rugby ME Standard Gauge Weekend, Onley Ln, Rugby CV22 5QD

13 West Riding SLS Gala Weekend, behind Freedom House Annex, Bradford Rd, Tingley, Wakefield

14 Guildford ME public running, Stoke Pk, Guildford GU1 1TU, 2-5pm

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

14 Worthing ME public running, Field Place, The Boulevard, Worthing BN13 1NP, 2-5pm

17 Bristol ME zoom meeting, BRIMLEC/IMLEC review – contact secretary@bristolmodelengineers.co.uk

18 Lincoln & District ME running, North Scarle playing field, LN6 9ER

20 Cardiff ME Steam-up & family day, Heath Pk, Cardiff CF14 4AW

21 Bradford ME Open Day & public running, Northcliff, BD18 3DD Members 11.30am, public 1.30-4pm

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

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

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

21 Rugby ME public running, Onley Ln, Rugby CV22 5QD, 11am-1pm, 2-4pm

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

25 Guildford ME public running, Stoke Pk, Guildford GU1 1TU, 10am-1pm

25 Worthing ME Club Meeting, 30 years a model engineer by Chris Devenish, Field Place, Worthing BN13 1NP 7.30pm

27 Tonbridge ME 70th Anniversary, Lower Castle Fields, Tonbridge, Kent TN9 1HR, details from Colin Harwood, tonbridgemes@gmail.com

27 Ryedale ME Main Line Rally, Gilling East, North Yorks YO02 4JJ

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

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

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

28 Worthing ME public running, Field Place, The Boulevard BN13 1NP, 2-5pm

28 High Wycombe ME public running, Holmer Green, HP15 6UF

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

31 Rugby ME midweek public running, Onley Ln, Rugby CV22 5QD

SEPTEMBER

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

7 Bristol ME meeting, Wilton windmill restoration, Begbrook social club, BS16 1HY

7 Bradford ME meeting, subject tba, Northcliff, BD18 3DD 7.30pm

8 Cardiff ME meeting, Medieval Cardiff by Richard Britton, Heath Pk, Cardiff CF14 4AW

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

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

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 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

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

24 East Somerset SMEE Model Engineers Open Weekend, Bath & West Showground – booked visitors only, no public running. Contact Michael Malleon, 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

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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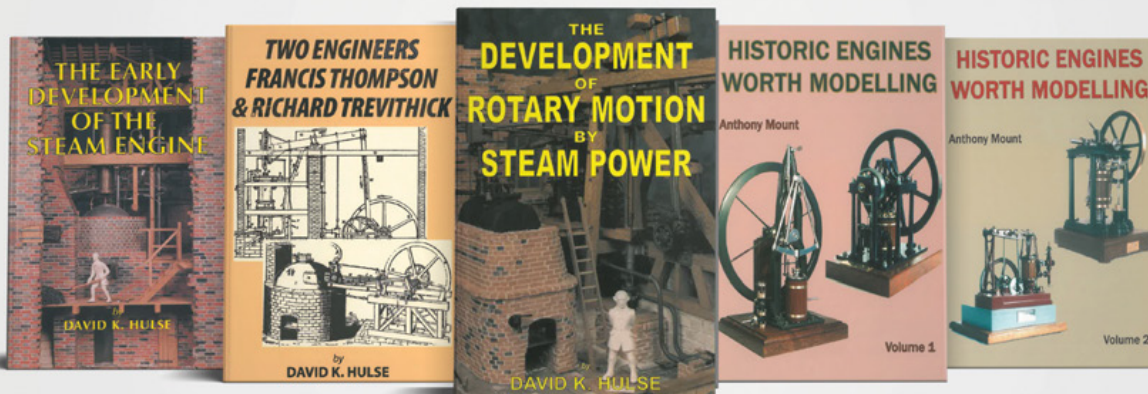
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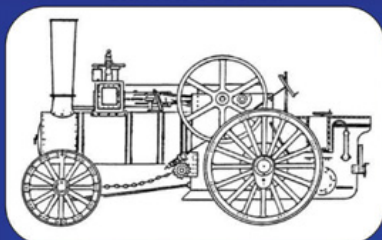
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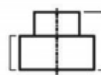
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ADVERTISERS' INDEX

17D MINIATURES.....	48	MINTONICS.....	49
ABBOTS MODEL ENGINEERING.....	49	POLLY MODEL ENGINEERING.....	52
AMADEAL.....	4	R.A BARKER ENGINEERING.....	50
AP MODEL ENGINEERING.....	50	SILVER CREST MODELS.....	5
BARRETT STEAM MODELS.....	49	STATION ROAD STEAM.....	51
GB BOILER SERVICES.....	50	STEAMWAYS ENGINEERING.....	46
EDDIE YARWOOD.....	49	STUART MODELS.....	2
GAUGE 1 MODEL RAILWAY ASSOCIATION.....	47	TEE PUBLISHING.....	46,50
HORLEY MINIATURE LOCOMOTIVES.....	50	THE STANTON COLLECTION.....	48
ITEMS MAIL ORDER.....	50	TIGGY ENGINEERING.....	50
J & C R WOOD LTD (METALCRAFT).....	46	TRACY TOOLS.....	47
LIVE STEAM MODELS.....	47	WALKER MIDGLEY INSURANCE.....	48
MAXITRAK.....	45	WE BUY ANY WORKSHOP.....	50
MECCANO SPARES.....	50	WILLIAM ROWLAND.....	45
MILTON KEYNES METALS.....	50		

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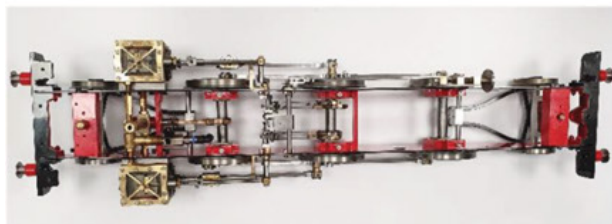
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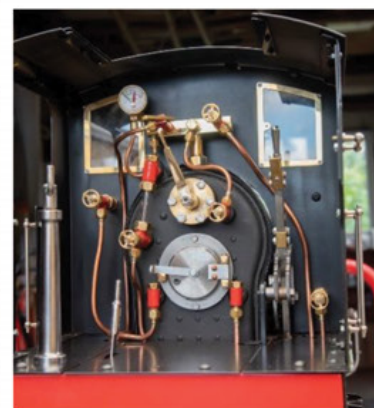
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