

THE ORIGINAL MAGAZINE FOR MODEL ENGINEERS

Vol. 225 No. 4642 • 3 - 16 July 2020

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ISSUE IN THIS ISSUE IN THIS ISSUE IN THIS ISSUE

Vol. 225 No. 4642 3 - 16 July 2020

68 SMOKE RINGS

News, views and comment on the world of model engineering.

69 REALISTIC BASES FOR MODEL ENGINES

Neil Wyatt claims that every good engine deserves a plinth.

73 TEMPERING AND GEAR CUTTERS

Martin Gearing shares his experience of a foolproof approach to tempering cutting tools.

76 A NEW GWR PANNIER

Doug Hewson embarks on a mission to improve LBSC's half century old GWR Pannier Tank design.

78 MODEL ENGINEER VISITS THE CARDIFF MES

John Arrowsmith drops in on the Cardiff club to see the results of the track laying project.

81 CONFESSIONS OF A MODEL MAKER

John Moorhouse explains how you can maximise the chances of carrying out a successful project.

84 POSTBAG

Readers' letters.

86 A DISPLACEMENT LUBRICATOR FOR CHARLIE

Nick Feast makes a lubricator for his 3½ inch gauge Southern Q1 locomotive.

90 WAHYA

General arrangement drawing for Luker's American 4-4-0 locomotive.

92 GARRETT 4CD TRACTOR

Chris Gunn makes a set of fairleads for his 6 inch Garrett tractor.

94 A LOCO WORTH MODELLING

Mark Smithers witnesses the restoration of a Baldwin 10-12-D locomotive.

100 THE MIDDLETON DOUBLE SIDED BEAM ENGINE

Rodney Oldfield constructs the latest stationary engine from Bob Middleton.

102 A SIMPLE BUT EFFECTIVE DEPTH STOP

Les Phillips describes a simple but very useful addition to your Myford lathe.

104 THE BARCLAY WELL TANKS OF THE GREAT WAR

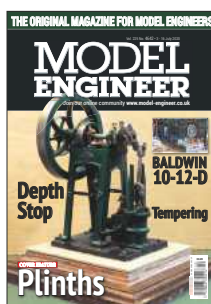
Terence Holland describes and constructs two appealing, century old locomotives.

106 MURDOCK VERTICAL OSCILLATING ENGINE

Geoff Spedding builds this engine from castings supplied by the Myers Engine Works.

110 CLUB NEWS

Geoff Theasby compiles the latest from model engineering clubs around the world.

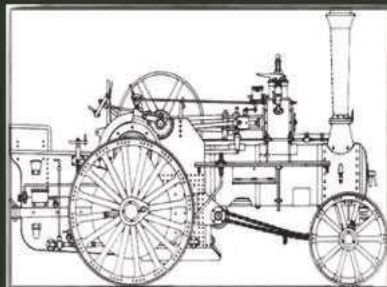


ON THE COVER...

Neil Wyatt's model of a Chadwick A-frame engine, built from information in a letter printed in a 1940's issue of Model Engineer and suitably 'enplinthed' (photo: Neil Wyatt).

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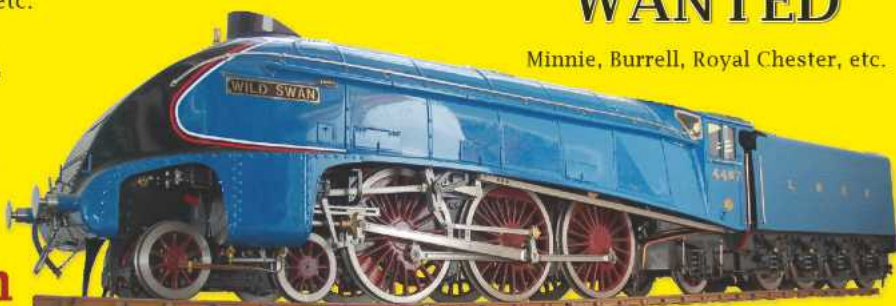
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Optimism

We are at last seeing a break in the cloud that the coronavirus has cast over us and perhaps

we can hope that our club activities can soon return to normal. Many clubs have already resumed outdoor activities, allowing them to maintain their sites and working within, of course, government guidelines for group activities. In

many cases this has required the setting up of rotas for organising working parties. It's not ideal, but it is a start, and a great improvement on the previous situation. I hope, by the time you read this, that restrictions will have been lifted further and we can all get back to a life as near normal as possible.

'Near normal' also means a life free, as far as possible, of fear of the virus. Surveys suggest that, even after our freedom is restored, many people will be hesitant to get out and about. This is what, I believe, the Prime Minister refers to in private as 'morbid funk'. Many people – probably most of us - have little understanding of statistics or find it difficult to get them into perspective (see Smoke Rings, M.E. 4639, 22nd May). This is evidenced by the number of people who are quite sure they must win the Euromillions jackpot one day (this includes my wife). They are also quite sure that they are not going to get struck by lightning. The two events, though, have roughly equal probability – in fact, I believe getting struck by lightning is a little in front! The coronavirus can certainly be lethal but mostly for people whose health is already seriously compromised, through cancer, diabetes, obesity or a number of other conditions. Apparently, the overall lethality of the virus (according to the latest figures) is about two or three times that of seasonal 'flu. For the great majority of us, young or in reasonably good health and with properly functioning immune systems, covid-19

Prescience

A reader has kindly pointed out the following to me, from *Model Engineer and Electrician*, 29th September 1904, in the forerunner to Smoke Rings: '...there is a striking testimony to the natural mechanical ingenuity of the Chinese - as a constructor of clever puzzles the skill of the *Celestial* is proverbial, and now that there are possibilities of China being fully awakened in the near future, we begin to wonder whether the mechanical genius of the Chinese race will ever lead them to seriously take up machine building as a business. If so, we may see some inventions which, for cuteness, may even put our American cousins in the shade. The prospect of China becoming the workshop of the world is, perhaps, too remote to contemplate but that China may be someday a formidable competitor in things mechanical is worth a passing thought.'

Model Engineer – always ahead of the curve!

is a fairly mild disease.

And let's not forget we face greater risks every day than an adverse experience with covid-19 without worrying too much about them.

So, what does your optimistic editor say? He says 'forget *morbid funk* – let's get back to normal as soon as we're allowed to and enjoy this great hobby of ours to the max!'

'Can we please ask our supporters who walk through the Park to keep an eye out for us. We suspect it's the evenings when these things go on, but we may be wrong. If you see damage being attempted then please take details and pictures if you can, to be passed onto the police, but do not put yourselves at risk. One lovely lady from the public was trying to do a bit of clearing up today, horrified at what she had found. A big thanks to her'.

I suspect the experience of Maidstone is familiar to many clubs around the country. In response to the arson incident at Pembroke (Smoke Rings last issue) Davina Hockin (see Postbag, p. 84) suggests that clubs should install video surveillance. Given the ready availability of the necessary kit, its low cost and simplicity in use, that seems to me an excellent suggestion which should be taken up by all clubs in vulnerable situations.

Duff Drawings

The issue affecting *Wahya* and *Murdock* engine drawings appears to have been resolved and the *Murdock* Engine article in this issue (page 106) includes a repeat of the figure that was barely visible in the previous instalment. I have also included the *Wahya* locomotive general arrangement in this issue (page 90), which was displaced from the last instalment of the *Wahya* series by the repeated frames drawing.

Vandalism

I have the following from the Maidstone club:

'Sadly, the vandalism around the clubhouse premises in Mote Park continues, and the drinking parties leaving bottles and cans strewn all over the place, plus the participants go to the toilet in the area so the place stinks. These people should be ashamed of themselves.

Martin Evans can be contacted on the mobile number or email below and would be delighted to receive your contributions, in the form of items of correspondence, comment or articles.
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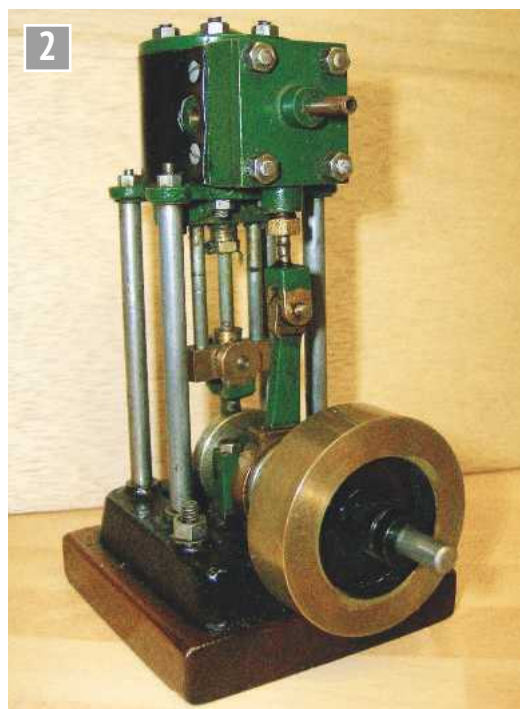
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Neil Wyatt adds a finishing touch to some of his stationary engines.



Stationary engine on a brick and stone plinth.

Trojan is a utilitarian Edgar Westbury design intended as a power plant for small model boats, perfectly at home on a wooden plinth.



Realistic Bases for Model Engines

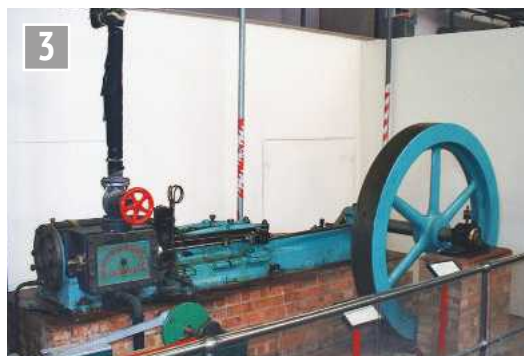
In my view one of the things that really sets off a scale model of a stationary engine is a realistic plinth, or a building for a house-built engine (**photo 1**). For non-scale models plain wooden bases or plinths are often appropriate (**photo 2**) and this may well be a personal choice for engines with a 'box bed' or similar too.

Over the years the pages of *Model Engineer* have been graced by many different approaches to 'plinth making' that have achieved varying degrees of realism. I have come to realise that this is an area where we have much to learn from our dolls' house making colleagues; I don't mean the use of 'brick papers' or at least

not the basic printed paper kind. There are a number of more realistic alternatives, including paper slips faced with brick dust, real brick slips and even miniature bricks, as well as various types of stones and flags that can be used to make up highly realistic structures. There are other approaches as well, so this short article is meant to give an introduction to a number of these and encourage makers of stationary engines to think beyond a simple polished wood plinth.

Prototypical materials

It is often assumed that neatly dressed and jointed stone (ashlar) is the typical material for the plinths of stationary engines. Certainly, it is what one would expect for larger engines, but smaller steam engines can often be seen on



Buxton and Thornlea engine at Abbey Pumping Station.



Small steam engine at Clay Mills Pumping Station (with an amazing array of lubricators!).

built up brick bases, which were, naturally, rather less expensive (**photos 3 and 4**). Random stone is less likely, but there is a precedent for virtually any building material to be used. This would usually reflect the local vernacular architecture (e.g. random flint with brick framing on the Weald, or sandstone in the Peak District). Greater variation may be found in the construction of walls but note that any wall that supports moving parts of an engine must be modelled as sufficiently robust to take the forces involved (**photo 5**). In the real world walls, and even plinths, may often be seen rendered with plaster or mortar, often whitewashed. This may seem like an easy way out but done with care to ensure there is a suitable surface texture, a modest finish that doesn't overwhelm the model can be the result.

Floors offer the opportunity for endless experiment. Waterworks often had beautifully tiled floors with tessellated patterns; these can be reproduced with either miniature ceramic tiles or vinyl tiles. Other alternatives are slate or other types of stone flagstone (**photo 6**). All these are readily available from suppliers of dolls' house making supplies. They should be applied to a flat surface and you will find that PVA is a suitable adhesive for most materials, especially those with a little porosity.

Another alternative is to use a suitable plastic, scored to represent joint lines or cut into tiles. This may seem a cop-out, but if the plastic surface is carefully finished with an abrasive block, and the score-lines carefully accented using indelible marker, the result can be almost indistinguishable from slate (or other stone, depending on the colour of the plastic) (**photo 7**).

It is not unusual to see lighter engines apparently on wooden floors, but this usually means the engine is supported on hefty wooden beams or iron framing, and the floorboards are simple laid around it.

Naturally the best material for imitating floorboards is some sort of wood, ideally close-grained and without noticeable knots. Boards might be highly polished, but in most cases would be bare and weathered to a grey, dusty finish. A dark stain finished with matt or satin varnish is best; a thick 'yacht varnish' gloss will immediately create a toy-like impression.

Whatever you use for your floor, remember that pipes etc. don't just disappear into solid ground. There should be space around permanent pipework, or metal grills or plates should be inset into the floor. Floorboards may be cut to fit, or there may be hatches or grills provided for maintenance access.

Ashlar

Ashlar stonework is typically finished very accurately, with fine joints, and with each course of stone characteristically smaller than the course below. The 'gold standard' is, of course, to use suitably fine-textured stone blocks to make up an ashlar plinth, but an almost indistinguishable result can be obtained using stone slips, especially if corner slips

(L-shaped in cross section) are used on the corners. At model sizes the joints should be very close, with the subtle change in stone colour or texture indicating their presence, unless accentuated Vee-joints are used.

Another alternative is to use a single block of stone for the plinth, carefully engraving the joint lines. Simply scoring is unlikely to produce a realistic result, so the sort of finish where each joint is a shallow 'Vee' is best. Make sure that you use a very bland stone for this. While marble or alabaster are easy to work (they can be easily cut with a hacksaw), their strong textures can result in very visible lines running across joints and spoiling the illusion of separate blocks.

One way of modelling stone bases is to use wood, MDF or even plastic. It is very difficult to get the meeting points of various joints just right, so a method that can be used to advantage is to have one layer of material to represent each layer of stone. The upper and lower edges of each layer can be slightly bevelled (just a fraction of a mm), so that a visible joint results.

Vertical joints can be scored, or cut with a triangular file, at suitable places around each layer, resulting in clear joints that don't over-run. This leaves the challenge of a realistic final surface treatment – both painting and the application of real stone dust (wear a face mask!) can be considered.

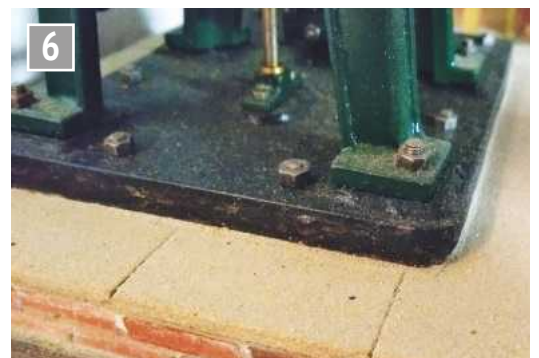
It may seem surprising, but a cast finish does a good impersonation of a dressed stone surface, as exemplified by some of Anthony Mount's models. The disadvantages are twofold – firstly, you will probably need to mill 'joints' in the stonework, and secondly stonework usually has vertical faces, so excessive draft on the casting may be unacceptable. The challenge with a cast 'brick' or 'stone' plinth is again, of course, the painting and finishing.

Brick

A basic solution to brick plinths is painting a suitably shaped base. This is most convincing if an assortment of (relatively similar) brick colours is used. One strategy is to paint all the bricks in a suitable colour, then progressively dull this down



Work in progress on a model of a 19th Century 'house built' engine.



Plinth from miniature bricks, topped with real sandstone flags.



'Slate' tiles from textured plastic.

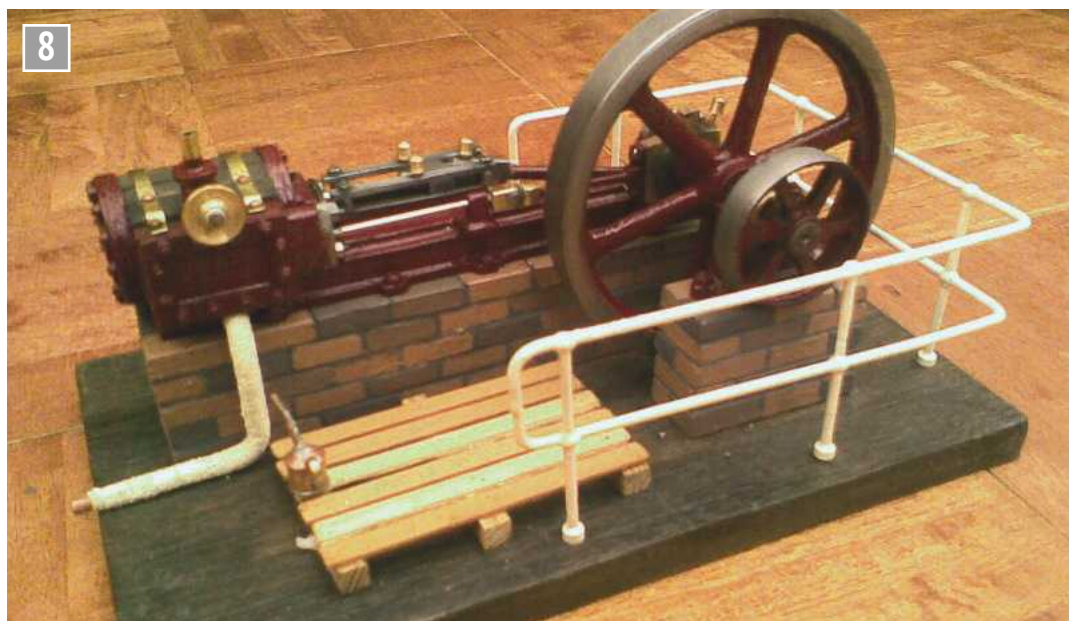
by adding black or dark grey, painting in a few bricks at random with each colour change. This is most easily done with acrylics. To finish, carefully paint the joint lines a matt mid-grey. The plinth for my 'Buxton' engine was completed this way (**photo 8**). I'm not convinced it is the best result I could have achieved, and I may one day overlay it with brick slips.

There are two ways of building up more realistic brick plinths or walls. The first is to use real bricks, which can look absolutely smashing, but requires as much skill as laying a real wall. The second is to use brick slips, and if special corner bricks are used the result is indistinguishable from real bricks. I have used both and I am a convert to brick slips; they are cheaper, but the real advantage is that the result can be so much neater.

If using real bricks, they can be laid using real quick-setting mortar (don't add any sand). A cheat is to use strips of card of suitable thickness and well soaked with PVA between each layer of bricks. This makes it easier to get a neat result, but unless the PVA really penetrates the card (cheap, rough and porous card is best) the resulting wall will be very weak, splitting along the lines of card. Whichever way you choose, don't try and finish the faces of the brick wall at the same time as laying them; once it is thoroughly dry you can point it with mortar, rubbing it well into the joints and then using a damp sponge to clean off any excess.

Brick slips are much easier; just mark parallel lines across a wooden or card backing and then glue them in place with full strength PVA. Once dry, 'grout' with mortar to provide the pointing, just as with real bricks, and be prepared to impress yourself!

Both real brick and brick slips are fairly friable and can be easily broken to length with bull-nose pliers or nibbled into any awkward shapes. A better and neater result can be obtained using a sanding



Hand painted brick plinth.

table, but beware the brick disappears in an instant, and don't forget to set up a vacuum for dust extraction.

Brick slips make the laying out of window arches, doors and corners on walls relatively easy (**photo 9**) but for more complex arrangements, using stone corners or even pre-made window or door arches can be considered.

For a middle ground and very economical finish, it is possible to obtain card brick slips coated with real brick dust. These are not as convincing as real brick slips, but they can easily be cut to shape and they do look quite good when used to cover large areas. All these different types of brick or slip are available in many different colours and textures. My personal favourite is the 'Tudor red' brick colour, but in modern sizes, not the rather smaller Tudor-sized versions.



Arch, made using brick slips.

As with stone bases, a brick plinth can also be made up from multiple layers. In $\frac{1}{12}$ scale roughly 6mm ($\frac{1}{4}$ inch) is about the right thickness, and vertical score lines should be about $\frac{3}{4}$ inch apart when aiming to represent whole bricks. The grooves (and the bevels on the edges of each layer) should be more generous than with stonework as we are aiming to represent a decent thickness of mortar. I haven't tried it myself,

but I understand that brick dust (sprinkled onto a layer of PVA diluted 1:1 with water) is a very effective way to finish such a plinth but bear in mind that the resulting colour will be pretty uniform, which may or may not be what you want. Once very dry, point your brickwork with real mortar (the quick drying type used without added sand works well) and again clean off any excess with a damp sponge.



Preparing to cast a concrete base.



Concrete base – this was later replaced by flagstones.

Concrete

A remarkably realistic concrete can be made very simply and used for pads or paths - or even, with suitable shuttering - 'cores' used to cast plinths or other solid shapes (**photos 10 and 11**). If just surfacing a brick plinth, for example, a thin layer of 'concrete' won't need any reinforcement. On the other hand, thicker sections can be strengthened by casting in lengths of unfluxed welding rod, just as if you were making full-size reinforced concrete. Bear in mind that although concrete was used in the Classical world and allowed the Romans to make huge advances in their architecture, its use in the 19th Century was fairly limited.

My secret recipe is to mix ordinary bird grit, which is very fine, with ready-mixed, quick-set mortar. Unless you are using shuttering to mould a shape, it isn't worth picking the odd larger bit of shell or stone out of the grit, as the few bits that show on the surface are easily picked off with tweezers. Allow to set overnight and several days to dry properly. Bear in mind that you may need to use an acidic wash to clean white stains off the surface. A weak pickle such as commercial descaler is ideal for this, as well as being suitable for cleaning up after brazing jobs! Hydrochloric acid-based brick cleaner is over the top and could damage your fine handiwork.

As an aside, it's not just engines that benefit from a realistic base; that for my canal crane incorporated a concrete pad, a gravel 'towpath' and some 'kerbstones' as edging (**photo 12**).

Making your own bricks

There is another option, if you want to use large quantities of bricks, especially if you are not looking for the most perfect brick shapes. The medium used is DAS air-drying clay, which is available in a convincing terracotta colour. My mould is just two strips of wood, $\frac{1}{4}$ inch (6.3mm) thick,

glued $\frac{11}{32}$ inch (9mm) apart to a backboard (**photo 13**). It has full-depth hacksaw cuts across both strips every $\frac{3}{4}$ inch (19mm). Making bricks is very simple: roll a 'sausage' of DAS, press it into the mould (**photo 14**), trim with a knife and then smooth off the top with a piece of wood (**photos 15 and 16**). After drying overnight, the 'brick' will have shrunk slightly. Using an old hacksaw blade, cut down through each slot (**photo 17**) then upturn the mould and knock out the bricks. Rub them on some sandpaper if they have any 'mould flash'. If you make a stick of ten or twelve bricks every evening you will soon accumulate a whole boxful (**photo 18**). They



Canalside base for a model crane.

can be used in exactly the same way as normal miniature bricks, although they are a little less robust.

I hope these ideas encourage readers with ideas for making realistic bases for their own models. ME



Mould with example bricks.



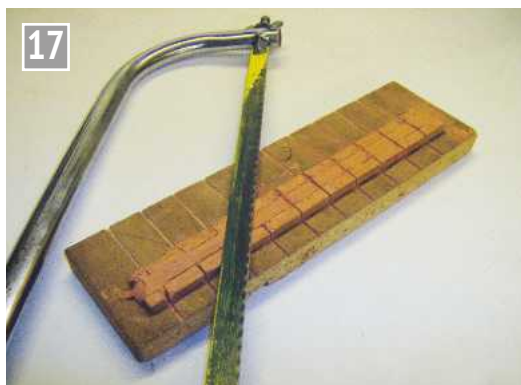
The mould needs to be over filled to ensure the bricks are full.



Use a sharp knife to trim off the excess clay.



Smooth the upper side of the bricks with a piece of wood.



Trimming the bricks with a junior hacksaw.



A box of completed bricks.

Tempering and Gear Cutters

Martin Gearing explains a foolproof method for tempering cutters.



Introduction

It is said that dog owners end up looking like their dogs. In my case it would seem the passage of time has worked to suggest that my name is somehow connected with the subject of gears and gear cutting. In truth, because of the type of training I was lucky enough to experience, followed by the demands of work, it was expected that it should become understood at a practical level at least.

The need to machine metal and then change its state to resist wear and make or repair mechanisms that involve gears becomes fundamental to the maintenance, repair, development and/or manufacture of almost everything related to engineering, the longer one remains involved and - more importantly - interested.

Tempering after hardening with guaranteed results

The catalyst behind this article was provided when I read a very comprehensive article by Michael Ward in the 2013 November/December copy of *Home Shop Machinist* covering all the processes to manufacture a set of hex drivers, in particular the section concerned with heat treatment, which looked at the subject from a practical no nonsense point of view. Generally – and I suspect this will apply to most of us operating from a home workshop – nearly all the items that I require to heat treat relate to making special one-off cutting tools, usually for shaping metal of one form or another.

After my first experience in a school metalwork class of heat treating steel over forty five years ago I read Michael Ward's article with interest, as until five years ago the results of the tempering stage were not as guaranteed as I felt

they should be, particularly in the 'field', far away from all the resources of a decent company's workshop, which is pretty much identical to the average amateur home workshop.

The need for guaranteed results became paramount when I started a project which centred on the making of the skew bevel gears for the Climax geared logging locomotive, designed by Kozo Hiraoka, which I decided to build larger at 1 inch scale and with different gear ratios.

His method gave me all the technical data required but I did not want to use a lathe for the gear cutting process as he demonstrated – preferring to use a vertical mill. Also, I could see no sense in making the form tool single sided, cutting one side tooth profile then turning the tool over and reversing the spindle direction to cut the opposite tooth profile. His design of button tool used to form the gear tooth profile cutter was different to all the other versions I'd experienced, so I was keen to incorporate that part of his design in my cutter manufacture process.

The transmission required two different sized gears that demanded two pairs of identical buttons to produce two different profile gear cutters for their manufacture. For the smaller pinion gear I chose to use steel intended for making high tensile studs and, for the larger gear, phosphor bronze. Both of these materials demanded cutting tools that were sharp and - more importantly - stayed sharp. So the hardening and tempering of the various cutting tools with guaranteed results first time was of prime importance. From past experience the section of the cutting edge of either the buttons or the profiled four toothed gear tooth cutter did

not lend themselves to heating the bulk and watching for the correct colour to arrive at the cutting edge before quenching with any certainty of an acceptable outcome.

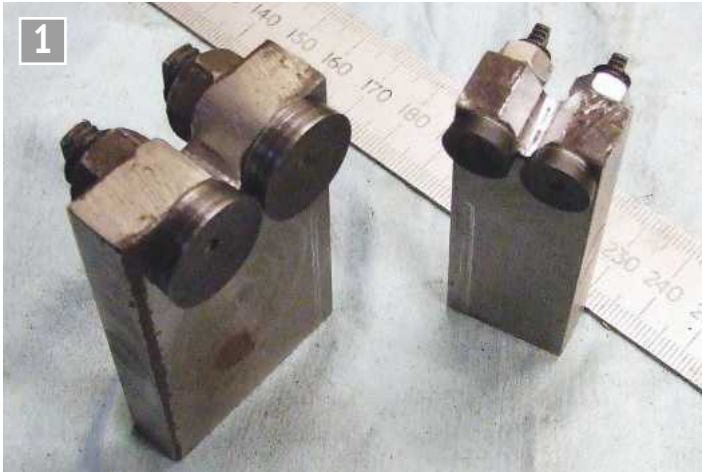
I mentioned that I'd used Kozo's design in the making of the buttons used to profile the gear cutter, and I almost used his method of tempering the buttons after hardening, which was to submerge the tools after hardening in a pan filled with salad oil heated to the required temperature.

Well it seems stupid putting this down on paper but, believe it or not, using the pan of salad oil wasn't the problem. It was both my wife's and my inability to find out what salad oil might be – bearing in mind he lives in Japan and was writing for the American market and I live in England. Looking back, I suppose it wouldn't have mattered what kind of oil was used but all had a fire risk at the temperatures involved.

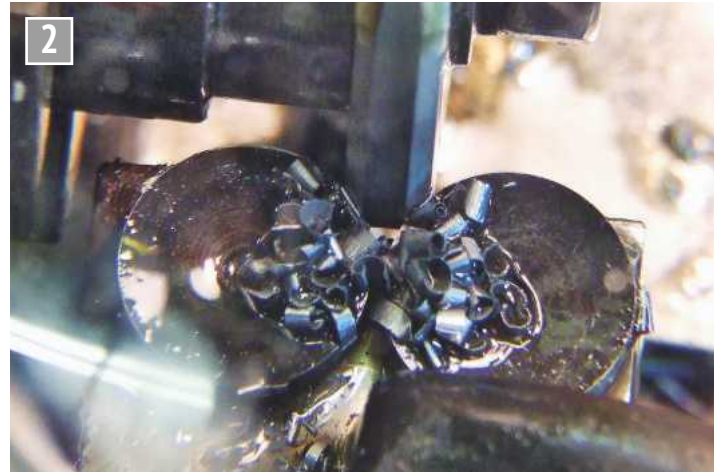
After a lot of wasted time I turned to Tubal Cain's Workshop Practice book No. 1. *Hardening, Tempering and Heat Treatment* ISBN No 978-085242-837-5. I find this an excellent reference on the subject when confronted with a problem.

Reading through the section on 'Heating' (pages 28 -30) he reminded me that the material should be held at a specific temperature just below the upper critical - 790°C – cherry red, for the equivalent of one hour per inch (25mm) of thickness. This suggested 10 minutes for the buttons and 15 minutes for the four toothed cutters. Perhaps to make me feel better he said that it is rarely done!

The editor of *Model Engineer's Workshop*, David Clark, about this time wrote about a task involving hardening the two types of tool steels that are freely available in the UK and



Gear cutting buttons mounted in their folder.



Buttons in use.



Completed gear cutter profile.



Gashing the cutter to form the teeth.



stated that silver steel, which seems to be peculiar to the UK (elsewhere the equivalent being referred to as drill rod - W1), and should be quenched in water but that ground flat stock (GFS - elsewhere referred to as ground flat bar - O1) should only be quenched in oil. Having just purchased some GFS, I was able to confirm this by reading the instructions for heat treatment on the wrapping. Must be getting old - reading the instructions before doing a job!

Moving on to the tempering process (pages 44 – 45), I found he took a similar line to that suggested by Kozo but suggested using the domestic oven in addition to a deep frying chip pan. He said that the thermostat should

be checked but the range was suited for the tempering process required by the amateur - for my purposes this would be 210°C.

I couldn't believe that using a domestic oven could work - I'd never before heard of tempering being done this way. Our oven is an electric fan type and having a decent industrial thermocouple I checked the accuracy of the dial. Much to my surprise, despite being around 15 years old, it was spot on! So, last thing at night, after the oven was up to temperature, into the oven the silver steel buttons went and were left in allowing 1 hour for every inch (25mm) of thickness, in this case 20 minutes, before turning the oven off and going to bed. I reasoned that doubling the time would compensate for the parts going in cold.

A set of skew bevel gears.



The gear cutter after use.

If you've read this far I'm guessing that you might try the method when making one off tools because it sounds so ridiculously simple and controlled.

Believe me - if you do give it a go - like me you will be surprised not so much by the simplicity but the guaranteed results every time.

Couldn't have been easier! The proof as to how well the process worked was that the buttons, when mounted in their holder (photo 1), machined the gear cutter blank from ground flat stock with ease (photo 2).

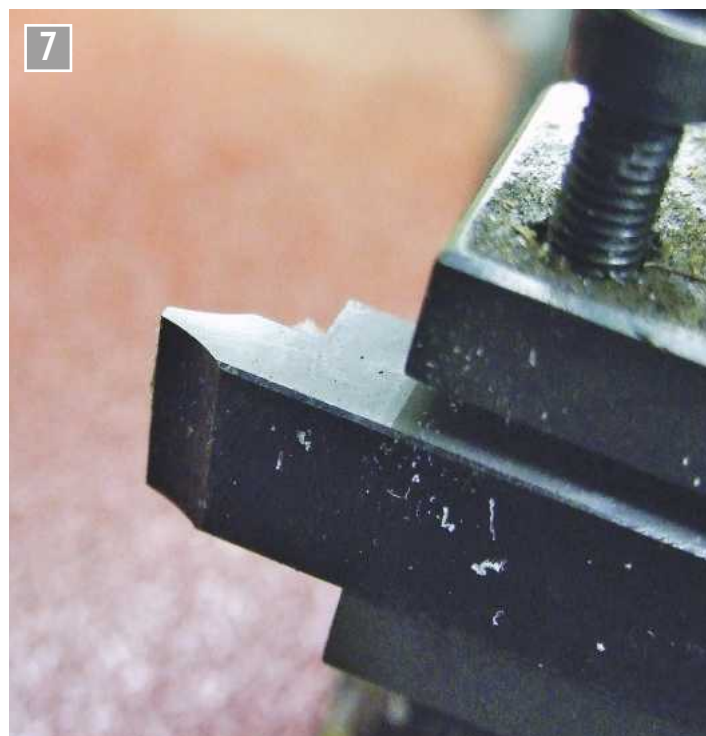
There were in this case only four teeth to profile (photo 3) but after having done this there was absolutely no sign of any degradation to the cutting edges.

The cutter blank was then gashed to form the four teeth required (photo 4) before being hardened – quenching in oil as advised. After washing thoroughly to remove all traces of oil the blank was put into the preheated oven last thing at night for 30 minutes before switching off and going to bed as before.

Again, the results speak for themselves as the cutter cut a set of gears in Delrin plastic to prove the setup, before cutting six gears each, six in steel with 17 teeth and six in phosphor bronze with 22 teeth (photo 5).

The cutters show no sign of wear so for me the method is proven (photo 6).

From then on success has been 100% - for drills and any odd cutters required. A couple of years later I became interested in trying out Alan Suttie's method of making skew gears, all of the manufacturing of which was carried out using a normal centre lathe that he described in issue 16 of *Model Engine Builder*. For the purposes of demonstration I needed them to be made large and this demanded making cutters of 19.79DP for a 1:1 set and 32.7DP for a 2:1 set. Using the formulae for calculating the button diameters and positions required I was able to machine the cutters from ground flat stock blanks. These I hardened and tempered using the method to described, resulting in a lathe tool (photo 7). This was used to machine the gear sets at various shows (photo 8), not because I needed them but because the process is



Lathe tool for machining gear sets.



A completed pair of gears.

so fascinating to watch and always attracts a lot of interest, questions and enquiries.

If you've read this far I'm guessing that you might try the method when making one off tools because it sounds so ridiculously simple and controlled. Believe me - if you do give it a go - like me you will be surprised not so much by the simplicity but the guaranteed results every time. And if you make sure that anything that goes in the oven is washed clean of any

oil by giving a good scrubbing with detergent/washing up liquid there will be no cause for complaint as the inside of the oven is mainly steel, the same as your (CLEANED!) cutter and any pie dishes!

● To be continued.

NEXT TIME

I will discuss the use of this process for making involute gear cutters.

A New GWR Pannier PART 20

Doug Hewson decides that LBSC's well-known GWR pannier tank design needs a make-over.



Continued from p.818
M.E.4640, 5 June 2020

Inner dome

Now, I think we may as well make the inner dome cover for a start (**fig 33**). This consists of a $2\frac{1}{16}$ inch length of $1\frac{1}{2}$ inch x 16swg tube with a $\frac{3}{16}$ inch base plate and a $\frac{1}{8}$ inch top on it. I would just let the top in by $\frac{1}{16}$ inch and then you will not have any problem silver soldering it in. However, I would also drill the eight No. 34 or No. 30 holes in the base ring before you silver solder that in. I would certainly opt for No. 30 holes as I always use my good old $\frac{1}{8}$ inch welding rod which I acquired very cheaply from our local welding supplier and - apart from that - I used to use loads of 5BA nuts for the studs which I make.

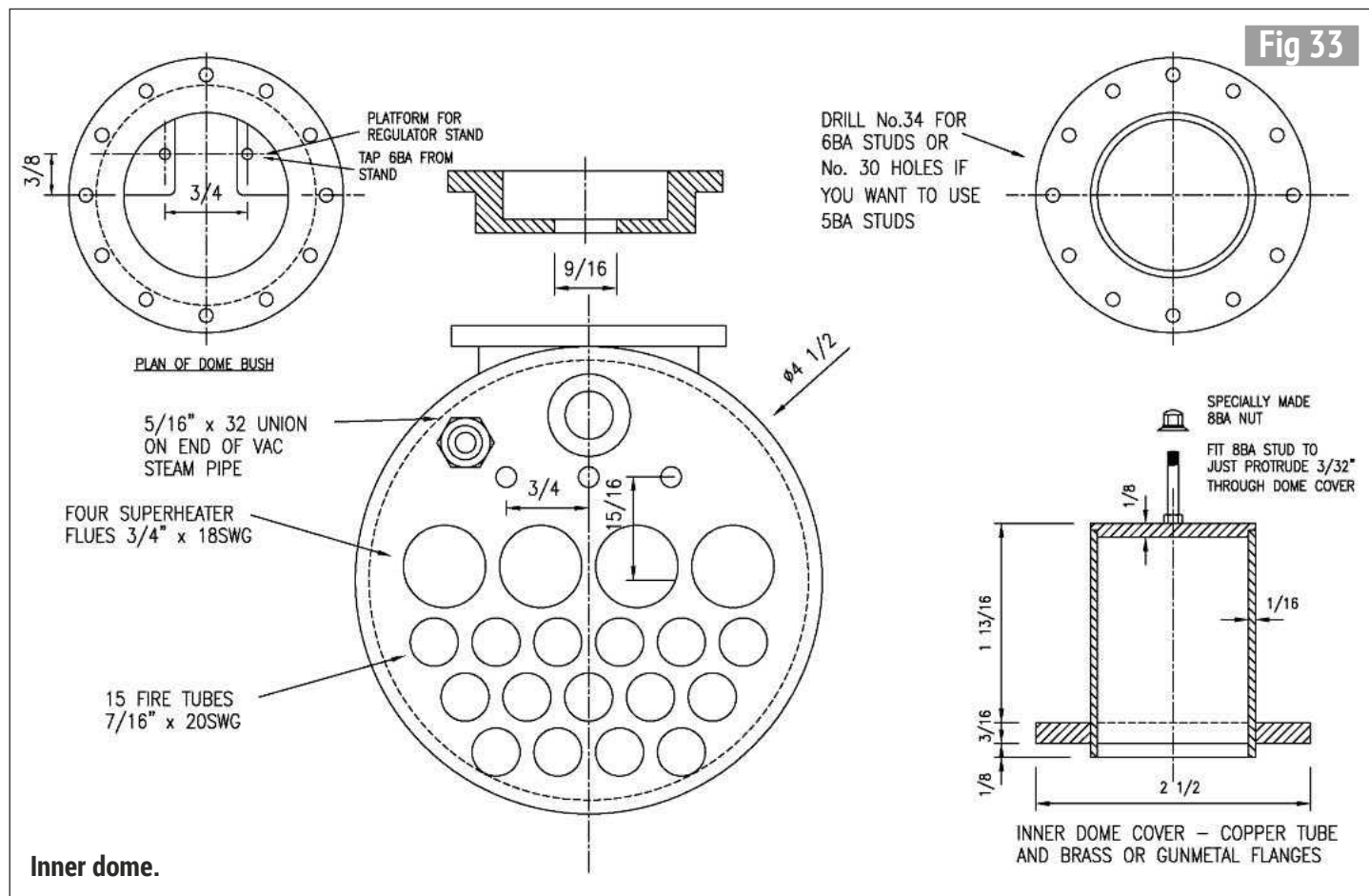
The one thing I would like you to do is to make a special fixture for the cover. It consists



Outer dome – badly fitted on full-size locomotive!

of an 8BA stud which needs to protrude $\frac{3}{32}$ inch above the cover and then you should make a special 8BA nut to go on top of it as in **photo 163**. The washer is turned as part of the cover. Now, have you noticed in

the photograph that the dome cover on the full-size engine appears to have been fitted at 90 degrees to where it should be, which is why it does not fit very well. The little blip to fit over the boiler is on this side!



Inner dome.

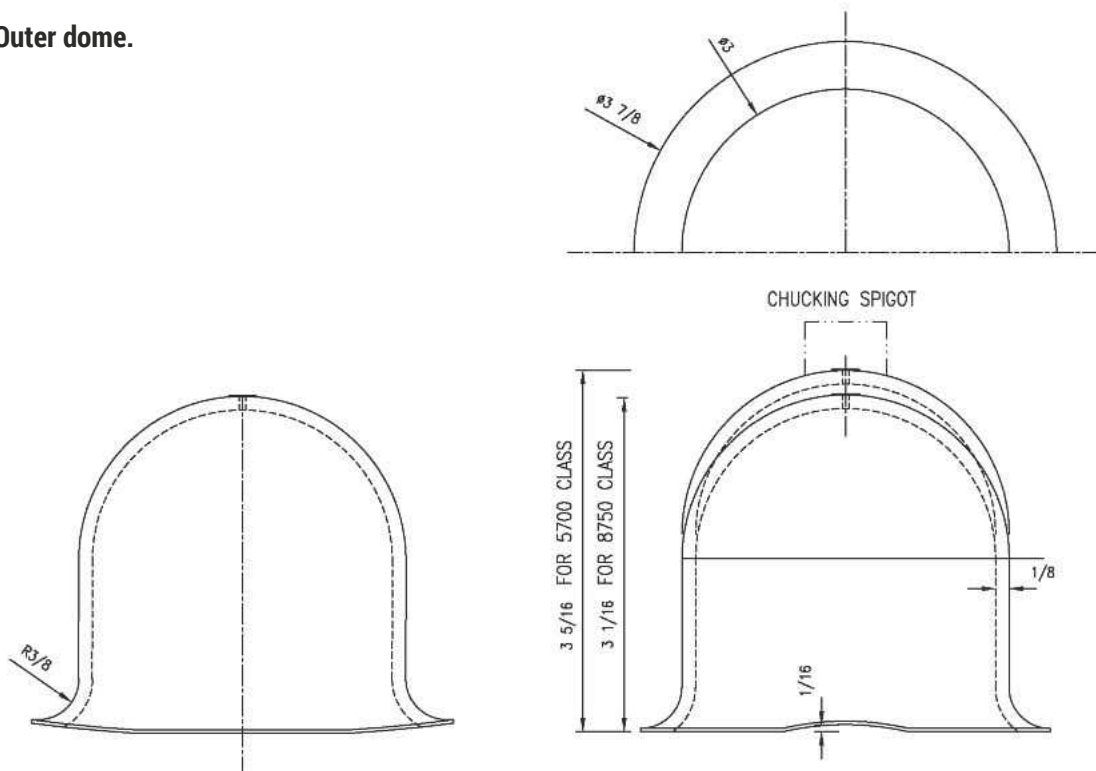
Outer dome

For some reason the current pannier dome casting is a pain in the bottom. It has been like that since time immemorial. It is so wrong and why no one has pointed this out to anyone absolutely beats me - why people still sell these I do not know when they are so obviously wrong. The pattern for some reason has been made to fit the boiler and not the cover plate over the tanks so hopefully Geoff Stait (G. S. Model Supplies) will be having a new pattern made for that.

Note that the dome on the 5700 is $\frac{1}{4}$ inch taller than that on the 8750 class locomotives. The pattern should suit either locomotive. It is three inches in diameter so it's quite a large dome (**fig 34**). Whatever you do, don't polish the thing as they were not polished on the full-size engines. There is just a little blip in the dome flange to fit over the top of the boiler, otherwise it is about flat. That means that you just won't be able to turn it, although you can turn it flat if you wish and then just cut a little bit out to fit over the boiler and silver solder a piece of flange in there. I certainly think that is what I would be doing anyway. **Photograph 164** shows a pannier boiler and you can see from this the difference in size compared with the outside

Fig 34

Outer dome.



diameter of the smokebox. Fortunately, one crinoline band has been left on the boiler and this just shows how much insulation there is on there - not a lot! You can also see the boiler slide - or rather the fixings for it - on this side of the firebox.

Blast nozzle

The next thing I want to describe is the blast nozzle and blower (**fig 35**). This can be turned from brass bar. I would suggest that you drill the nozzle $\frac{1}{4}$ inch and that will work for the time being. You

will no doubt have to drill this out after experimenting with your engine as you do not want it blowing off all the time but neither do you want it to be short of steam. The blower, which is separate from the blast pipe, can also be made from brass bar and it is in two pieces. There are three nozzles on the blower and these need angling inwards slightly and should be threaded 6BA. This

is so that you can remove them and clean them out if they get blocked as mine have done a couple of times, especially when I happen to have re-packed a gland.

● To be continued.

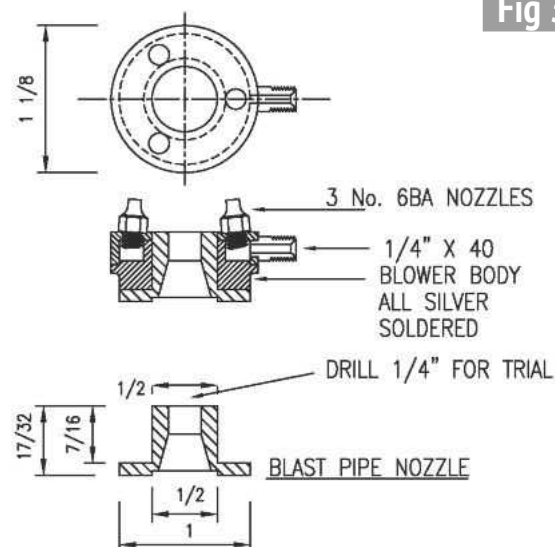
NEXT TIME

I shall discuss the superheater and the regulator.



Pannier boiler, showing the inner dome.

Fig 35



Blast nozzle and blower.

Model Engineer Visits the Cardiff MES

John Arrowsmith drops in to the Cardiff club to admire their new tram and railway tracks.



The impressive members' clubroom.



Part of the '00' gauge layout.



The Myford put to good use, busy making signal pins.

I spent a very enjoyable early March morning with members of the Cardiff MES at their Heath Park track and for a change it was not raining and the sun was shining. Chairman Mike Williams

met me and I soon had the obligatory cup of tea in my hand as it was the members' break time. Suitably refreshed, Mike took me on a tour of the site and showed me all the various improvements made in the last 12 months, I was then free to stroll around the track and workshops talking to the working members while Mike got on with all his other jobs.

I think a little of the history of this fine club is appropriate here as over the last few years they have had a few battles with local objectors, who don't like them being in Heath Park. Founded in 1948, it was called The Whitchurch (Cardiff) and District MES but it wasn't until 1967 that they were able to find a permanent site on which to build a clubhouse, workshop and passenger carrying track.

In 1971 they built their 18 inch gauge tramway, complete with an overhead power supply; this was quite an innovative feature for a model engineering club.

Another move in 1987 saw them re-locate to Heath Park and a piece of ground adjacent to a small woodland area. Since that time they have built one of the best, if not the best, two storey club houses anywhere in the UK, fully equipped with club room (**photo 1**), committee room, five star catering facilities, toilets, fully fitted workshop (**photo 2**) and a model railway room (**photo 3**).

Outside, the 18 inch tramway has been rebuilt together with a ground level railway and an elevated line, as well as a large garden railway layout (**photo 4**). Being in a public park has led to a few problems over



Part of the garden railway layout showing what great views over the site are available from the walkway.



View from the tram shed onto the main line.



Side by side the new tramway and new dual gauge main line. The centre pathway has to be completed.



One of the new pneumatic point operating installations.



Immaculate trackwork through the station area.

the years with local objectors being very difficult about what they were trying to do but all these obstacles have been overcome and the club is now very much a part of the fine park in which it is situated. About two years ago serious thought was given to altering the existing tracks in order to provide a longer running line as an extension into the woodland. Despite having planning permission from the local authority they could not

satisfy the local objectors so a new ground level extension was planned. This was to be a major project but the results have been very worthwhile.

My visit coincided with the almost completed track extension and rebuilt tramway which are nearly ready for use (photo 5). When I say 'almost completed' I mean the ground level track work has been completed - it is just waiting for the signals to be fitted to the new gantries.

This work has been extensive and during the construction the club members have excavated and removed over 200 tons of material and, with the tram track realignment included as well, they have laid approximately 150 tons of stone to provide the embankment along with a retaining wall and safety handrails.

The 7¼ inch gauge ground level track now measures around 2500 feet in length, which will be a good testing drive for any locomotive. Five new sets of points have been built along with 22 new semaphore signals (photos 6 to 9). The track for the tramway has also had to be realigned to make way for the ground level track. It was decided at this time that many of the tram track sleepers needed replacing as well, so rather than using wooden replacements a new concrete mould was made and 420

concrete sleepers were made and fitted together with over 1400ft of rail. All this work has resulted in a splendid new layout which will provide plenty of good driving for both members and visitors.

I mentioned the ground works above and with all this work other areas have been upgraded as well. The area adjacent to the main clubhouse level crossing, where there is a short stabling siding and watering facility, has been - at first sight - nicely laid out with coloured pavements. On closer inspection it is a concrete slab which has been cleverly marked out with a club made pattern plate to make the surface appear to be laid with individual blocks - very clever. Existing sidings adjacent to the signal box have been extended by removing a section of the embankment and in the space between the running lines and these sidings the area has been covered with an artificial turf



The new signals waiting installation.



Tidy siding work by the signal box.

material which certainly looks the part (**photo 10**).

In the tram workshop, progress was being made on the traction bogies for the passenger cars which appear to be well-built pieces of kit. The Bostock & Bramley motor and gearbox drive the axle through a substantial chain drive (**photo 11**). The work being carried out looks first class and should provide the club with a very reliable set of trams. Also being worked on in the tram shed was a 7¼ inch gauge Hunslet 0-4-0 which has been assembled from a set of parts given to the club (**photo 12**). It has needed some considerable extra work and the result is going to be a fine addition to their locomotive stud. This workshop is also equipped with a good-sized box folder and guillotine which are a useful size for club projects.

The main club workshop is located within the main club building and is well equipped to carry out most tasks. Two Bridgeport milling machines are complemented with centre lathes including a Myford Super 7. All the usual hand tools are available as well as a power hacksaw and drilling machine. Within the main clubhouse there is a substantial '00' gauge layout which is being made ready for the public running season. It has a large main station which is based on the main line station at Leamington and the working lifting bridge based on that still in position at Carmarthen was an excellent piece of modelling (**photo 13**).



The re-built Hunslet tank locomotive under construction.

Of course, the public walkway which the club built a few years ago is a superb piece of engineering giving access to the middle of the track circuit so that members of the public can move around the site in complete safety. It is also fully accessible for disabled passengers and those in wheel chairs, which is much appreciated by all users (**photo 14**).

In 2018 the club celebrated their 75th anniversary and to commemorate this event a fine anniversary clock was fixed to the club house wall and provides a useful facility for club members and park users (**photo 15**).

The club has a healthy membership which includes a number of young people



One of the tram bogies with Bostock & Bramley gearboxes ready for installation onto the tram.



This impressive working lifting bridge is part of the '00' gauge layout.



The superb access walkway across the site.

who are being trained for club duties - this is a good idea and it is hoped they all continue to enjoy their club activities. These club activities include the annual Welsh National Rally over the weekend of the 6th/7th June which is open to anyone who would like to attend - but check with the club beforehand. One of their regular charity events is the day when they entertain underprivileged children from the Chernobyl area of Belorussia nuclear disaster. This annual event is organised by the local Rotary Club and provides welcome activities for the affected youngsters from Russia. They also support the Lord Mayor of Cardiff on his annual charity day. Add to this the regular twice monthly open

days for the public and you can see that they have a very busy schedule which keeps everyone on their toes.

My thanks as usual to chairman Mike Williams for the hospitality and to all the members I spoke to for their help and information - it was a most enjoyable morning.

ME



The 75th anniversary clock on the gable end of the clubhouse.

Confessions of a Model Maker

Maximising the Chances of Success in a Making Project

John Moorhouse looks at the factors which lead to the successful planning and execution of a project.



Continued from p.795
M.E. 4640, 5 June 2020

In the first part I considered issues such as the complexity of the project, research to create the design and the various stages common to all projects. Part 2 considers the workshop environment and how it can influence our working to achieve a successful outcome.

The workshop environment

I suspect that we have all visited workshops where the working space is very cluttered. These must be inefficient work places; tools are harder to find, edges of cutting tools are damaged, dust and swarf become mixed with tools and components, small components dropped on the floor are much harder to find. I find that basic tidiness actually repays itself many times over. It is just a simple discipline which needs to be adopted in all areas of work. An integral part of tidiness and efficient working is having a designated location for everything; knowing exactly where to go to locate a tool or whatever. Very untidy workshops are also likely to be less safe working environments. Safe machines lead to better efficiency with fewer mishaps.

I suspect that within most of us there is a part which suggests that we keep our activities as tidy as possible. In response to the hoots of derision from my domestic partner reading this over my shoulder I have to explain this further. Tidiness is not about clearing everything away and having a pristine workshop; it is about having adequate clean working areas for the components and tools required. If I leave items around it is for a specific reason. I also have a rather visual memory, and if deliberately left in view it



An important aspect of workshop tidiness is having items stored cleanly and safely, with commonly used tools easy to locate and access, making for efficient working and reduced frustration with 'lost' items. Proper storage also needs to prevent any dirt and abrasive dust accumulation.

serves to remind me about something.

One key motivation for having a tidy workshop is because of limitations of space; some of my equipment is stored or pushed away and pulled out when needed.

Tidy aspects

This tidy feeling comes and goes although it does seem to get occasional reinforcement from our domestic partners. This attitude has certain consequences. It can have an impact on our priorities and also be a bar to progress if it becomes a task avoidance routine. When we should progress onto the next stage of a project in a logical manner it may create a distracting side track. I therefore have a deliberately structured approach to tidiness. After a stage or process has been completed then I put away all of the tools used and clear the working surface of the bench. In this

way I have a cleaned and refreshed working area again. For the next processes the only tools drawn out are those which are actively required. Some boxed sets - particularly easily lost small items such as packs of small drills, brass pin wire, sets of taps and dies, stocks of nuts and bolts - are always put away after each use. The bench tidying also provides a small yet valuable sense of satisfaction. My firm belief is that a well ordered and tidy workshop contains a well ordered and tidy worker (photo 4).

If you are a watchmaker you will know that some types of work require you to be 'in the mood', such as straightening and truing bent balance springs. The working environment helps to set the mood. Factors such as lighting, warmth and noise all make a difference. I try to set the environment so that it is suitable for the type of work in hand so that I feel happy



and confident to take it on. Good lighting is of enormous assistance to being able to work on fine mechanisms. I have found that the same principle is true in my larger workshop. High levels of lighting make for more visibility, making for a more confident approach with fewer mistakes as well as for safer operation of my machines.

I have to admit that there is one considerable frustration in my machine workshop and that is the consequence of items falling under or behind the machines. Items are very hard to recover due to the limited space available. There are some things you just have to learn to live with, and I have by developing techniques for recovering dropped items.

I always take every chance offered to visit a private or commercial workshops because I always learn something about technique or layout. I would urge everyone to lay out their workshop in a way which allows easy, efficient and safe working, and to equip themselves with the best machines they can afford (**photo 5**). I see good machines as not a cost but as an investment. For this reason, I aim to allocate a portion of my time for planned and not crisis machine maintenance. Not only can better machines achieve better quality work more easily but they also provide no excuse for sloppy standards.

Performance and efficiency

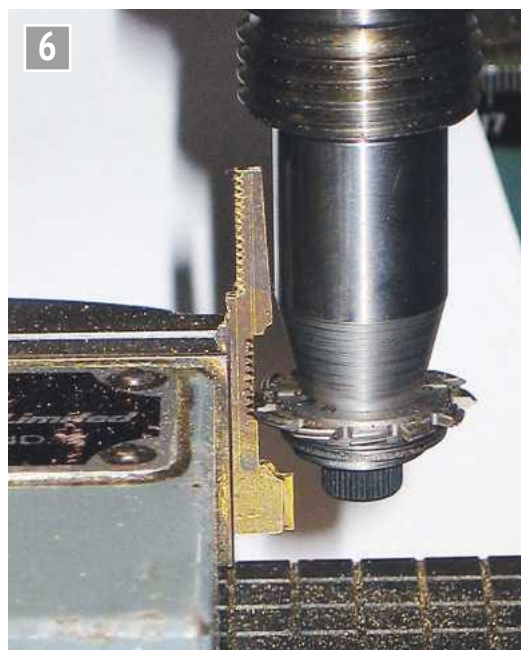
I have found it to be helpful to review my own performance and levels of skill so that I know the areas of work I am able to tackle and which to avoid. It is a good ego trip to think that you can do everything but it is usually a false self-praise. My conclusion is that if you do not have the skill or suitable equipment to satisfactorily cut items such as pinions then do not waste effort trying the impossible or making a poor product. Either attend a course to gain the skill, visit the workshop of a friendly maker



Machining small, accurate components such as watch size pinions requires a set-up or machine with substantial rigidity and with means of accurate centring and indexing such as this Swiss machine (originally for patterning using a high speed diamond). The milling spindle is 55mm in diameter.

and gain it there or else buy in the service. Get the necessary skills and practise them before you need them - and only work within your area of ability and confidence. This is integral to the British Horological Institute code of practice and is very sound advice.

Patience is definitely a virtue. You need to know your own mental strengths and weaknesses and chose your pattern of working accordingly. If you are a good morning worker then reserve this for the most demanding processes (**photo 6**). Leave the easy parts



Making unusual components for a project can provide considerable satisfaction in solving problems, such as machining these miniature, double-sided (0.3 module) racks, in a stack of two soldered together, to provide rigidity during milling. Scribed lines allow setting to vertical for both sets of teeth.

reason, components can often be made independently without any risk. However, it is tempting to make some of the simple components too early, perhaps because they are easy to make and you wish to see visible progress. There are risks in doing so if it has to mate with another component. Should I make A before or after B? Which would be more effort to re-make it if it was outside tolerance? For this reason, I strive to carry out work in the correct order and because I believe that efficient working will generally lead to good quality work.

One pattern of working I have had to adopt when making a mechanism in which many aspects interrelate, is to take one set or sub assembly of components to an advanced, but not finished, stage and then do the same with the next and further sets of components. In this way I have a number of sets all awaiting completion to ensure the required correspondence. This necessitates a good sense of which set has to be completed first. Also, each set has then to be worked on again to bring to completion, although the cycle may be repeated two or

It is tempting to leave a certain piece of work
until later because of its perceived difficulty.
It then becomes a worry and the perceived
difficulty can get magnified out of proportion.

Another finding from my self-assessment was that when I had made an error or had a mishap, it was primarily because I was rushing along, trying to make too rapid progress. It was a lesson well learnt but never completely eradicated.

In my making I find that when I know exactly what to do next then rapid progress is made. It is when there is doubt or uncertainty that progress slows, or worse, comes to a complete stop when I have made an identified mistake.

for when you can relax and switch off later in the day. I have found that in the evening, if I start to carry out a small task, then before I realise it I have spent an hour and a half and made much more progress than intended. This gives me an added sense of achievement.

Order of working

A clear benefit of copying a proven project is that it allows work to continue in the confidence that the parts will all successfully come together in the end. For this

Starting a project is much easier than finishing.
It is not unusual with makers to find that they
have started work on a number of projects but
to date have not finished any of them.

three times until everything is satisfactory. Clearly a full understanding of how they should fit and operate together is critical for success.

It is tempting to leave a certain piece of work until later because of its perceived difficulty. It then becomes a worry and the perceived difficulty can get magnified out of proportion. I find that it is better to tackle these items sooner rather than later. The level of difficulty is then understood and a successful outcome gives one's morale a great boost.

When about to embark on a complex process, particularly if it is for the first time, I think about each step of the process including the tooling required (**photo 7**) as if I was actually carrying it out or teaching someone else. (I am convinced that one learns much more about a topic by the process of explaining it to others.) This raises possible conflicts before they arise and is time very well spent. It takes away any tendency to plunge straight in with consequent risks to metal, tools, flesh and temper.

Progress

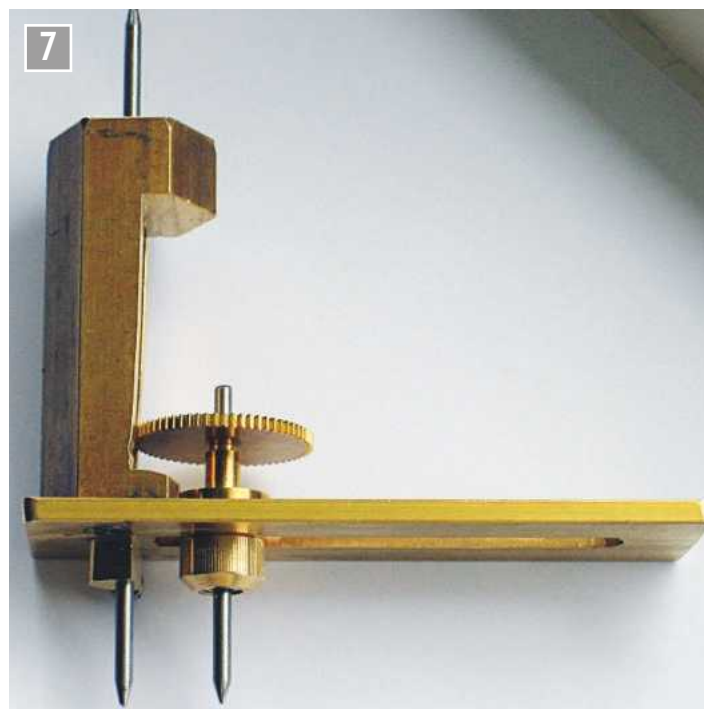
Starting a project is much easier than finishing. It is not unusual with makers to find that they have started work on a number of projects but to date have not finished any of them. They usually have a number of ideas for new projects well before they have finished the current one! How does the maker manage this common temptation?

I have found that making visible or recognisable progress on a project is a key to maintaining enthusiasm in it. My policy with my big project is whenever possible to do at least some small

aspect of work on it, no matter how small, *every day*. (I never actually achieve this but I come as close as I am able.) In this way it is always moving forwards and it allows plenty of thinking time before the next operation. Working on more than one major project at a time is, for me, a step too far but having some smaller items as fill-ins works well; they fill the gaps when there is an unavoidable delay; help to maintain the sense of achievement; provide a bit of light relief; give a regular burst of positive feedback; allow time to ponder on problem areas in the main project and this leads to more ideas for possible solutions.

Often a project is put aside, not from a lack of enthusiasm but whilst waiting for the purchase of a material or a component. Another reason is the availability of a machine since the changeover of a machine from one setting to another can sometimes take lots of valuable time due to necessary checks of squareness and parallel etc. I find it beneficial therefore to leave a changeover until the quantity of work justifies it. In this way a job can be left untouched for a period. This can be when the enthusiasm wanes whilst another project rises in interest, since it provides an opportunity to make progress and give a sense of achievement elsewhere. These are the danger signs which need to be recognised and managed.

When machining components such as wheels or pinions I also always make extra items as spares when the machine is set up – much easier to have these in reserve rather than have to retrace the same steps (**photo 8**).



Making new or modified tooling to fill an essential need - such as this small deepening tool originally for holding and deepening only lantern pinions, based on a design by John Wilding - gives me added interest and reward.



Thread type milling on the Myford of an endless screw, without tailstock support (peeling), is a very satisfying process once set up for the correct thread angle and depth. Pivots are cut at the same setting for maintaining truth. Easy to make some spares at the same settings from roughed out blanks.

An additional benefit is that having one or more spares ensures being able to tackle the next operations on these parts with the confidence that any slip or failing will not be a serious drawback. I always try to remember that having a positive attitude is a very powerful driving force. I also get a sense of satisfaction from utilising the machine to extra efficiency. It gives me a small personal bonus for planning ahead.

Domestic demands can also cause considerable interruption in the progress of a project. This needs to be well managed! I try to establish times when each

area of work such as domestic or my projects have their own established priority. I also try to minimise the risk of continual small interruptions; they slow the work, I may forget machine settings and concentration is lost.

●To be continued.

NEXT TIME

We will consider various strategies to maintain momentum, overcome problems and maximise our chances of bringing the project to a successful conclusion.



Tungsten Chromium Steel

Dear Martin,
I have some tungsten chromium steel, supplied by a deceased friend, formerly employed by a now defunct Sheffield tool steel supplier, which I have worked up into hand tool blanks. Having got as far as grinding the cutting edges I seem to have lost the booklet giving details for heat treating these steels.

The tungsten content is at very most 5% and chromium 3% and an alloy supplied for boilermakers' hand tools. Can any reader help with advice for hardening and tempering the cutting edges for these alloys, oil or water quenching etc.? I understand that this heat treatment differs somewhat from heat treating the usual carbon steels.

Best Regards, James Wells

Casting

Dear Martin,
With *Model Engineer* having run two very good articles on foundry work I would like to suggest some further reading for those who want to know more about the subject. The 1989 Lindsay publications reprint of the *US Navy Foundry Manual* is the 1957 revised version of the 1944 original. In simple terms and with many drawings it explains the various aspects of making castings, including plenty of technical information though not so as to be boring. Copies are available and I highly recommend this work; I also found a digitised version that could be downloaded on the internet.

Then there are the four books by Steve Chastain on foundry work. The first two are *Metal Casting, A Sand Casting Manual for the Small Foundry, Vols. 1 & 2*. These volumes go into considerable detail on a practical level. The other two books cover building furnaces, again on a practical level, with many simple calculations to enable you to design and build a furnace of whatever size you

need. Although written in the US anybody intelligent enough to read the books would have no difficulty in converting measurements etc. to UK or metric. I recommend all the above works and needless to say I have no connection with the publishers or authors.

Noel Shelley
(King's Lynn, Norfolk)

Dear Martin,
I have been thoroughly enjoying reading the series on 'Mastering Non-Ferrous Metal Casting' by Gerald Martyn and am looking forward to the last installment. I think it's great to share the knowledge and expertise in these pages for fellow readers who have an interest in foundry practices either to make the hobby more affordable or just for the pure enjoyment of it. I would love to see more ideas and methods published to shorten the inevitable learning curve when it comes to casting. It will also be great to hear from other foundry men about their home recipes used for their specific casting methods of which I am sure there are many. To that end I'll throw the first pebble into the pond and hope for a ripple...

Anybody with a workshop building live steam projects will have ample non-ferrous chips and filings, but the amateur foundry man would have found it incredibly difficult to melt these fines. By the time the furnace is hot enough to melt the fines the lower melting alloying elements have already started to fume (especially with the brasses). Normally you end up skimming loads of fines that were just too stubborn to melt. At any rate casting at this temperature is not a good idea for health reasons but also because you likely to get burn-on (penetration into the sand leaving a rough sandy surface). The recipe below is for a reducing/fluxing inoculant that is loosely based on the PGM and blister copper submerged arc melting process. Basically the

inoculant forms a light slag (floating glassy substance that is not as shiny as metal and slightly darker) that you continuously add the fines on top of and the slag reduces (strips off the oxygen which causes the melting issues) and melts the fines, at a much lower temperature, which then gets deposited to the charge below; safe from the furnace atmosphere. There is no need to plunge the melt and when the crucible is full the metal can either be poured into ingot moulds and the slag chipped off when cold or the slag skimmed off and poured into a sand mould. I add roughly 1-2 table spoons to my 4kg charge of fines; mixed and added to the crucible cold (again no plunging). I formulated the mix to have a melting point suitable for even the lowest melting brasses but it is probably not suitable for aluminium (I've never tried), an inoculant for which can be found in the shoe drawer...

10% agricultural lime (garden shop)
35% clean quartz (kiddies play sand, but as white as possible)
10% coal dust
45% bone meal (garden shop)
Luker (South Africa)

Gerald Martyn replies:
Luker is much further up the learning curve than I am and his photographs show some fine castings. I note he's reduced the metal bulk between the cylinder and port face, something I should have done I think, to minimise shrinkage problems. For a start, though, I wanted to keep the patterns simple though the consequent shrinkage problem took a while to solve. All part of the learning process. It really is good to hear from someone on the same road, especially when he's so much further ahead. As I mention at the end of my article, so far I've had no contact with any other home casting enthusiast, so hearing from Luke has been a real pleasure.

Write to us

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Responses to published letters are forwarded as appropriate.

Water Gauges

Dear Martin

James Wells (M.E. 4636, 10 April) and Martin Ranson (M.E. 4640, 5 June) refer to an article on electronic water gauges, but are unable to identify it. I think the article in question was written by C. R. (Roy) Amsbury and appeared in M.E. volume 140 number 3494, 2 August 1974. The gauge used a pair of copper electrodes to detect the water level in a small boiler and an electronic circuit to drive a display of three LEDs. A circuit diagram and drawings of the electrodes and other items were included.

All the best, David Cleworth

Vandalism

Dear Martin,

Sad and shocking as is the news of the latest bout of vandalism of the Pembrokeshire society's premises, adding to the long

list of such occurrences nationwide, I cannot see why so few fail to take any preventative actions.

Inexpensive still and video cameras are readily available, small enough to be easily concealed and able to be automatically started from movement sensors.

Both still and video pictures can aid the apprehension of vandals, enabling their conviction, and suitable signs can warn of the fact that the premises ARE under surveillance, helping to deter as well as apprehend, the culprits.

Considering not just the expense, but also the years of loving labour that goes into these ventures, a little more thought is surely the necessary adjunct to completion of them, whether in an isolated clubhouse, or an equally deserted exhibition venue.

**Davina Hockin
(Portishead, North Somerset)**

Pipe Bender

Dear Martin,

I was interested while reading David Haythornthwaite's article on his beam engine (M.E. 4639, 22 May) to see that he had used my small tube bender that had originally been published in *Model Engineer's Workshop*. As my photograph illustrates, I still have it for the occasions when it is required and it still lives in its cigar box. I too have made the odd 'special' sets of formers over the years, one of which lurks near the bottom of the picture. However, may I be allowed to expand on the subject as follows.

The original inspiration was from my days in the chemical industry, dealing with internal service pipe runs and external pipe bridges, where standard procedures very much applied. The bends were invariably to a radius of three times diameter, which made for neat installations and allowed standard tooling to be used. So that is what my model form follows and it is basically applicable to most services on steam plants, acknowledging that there are specific requirements such as following profiles like boiler cladding that may dictate their own rules locally.

Technically the three times rule is quite sound since it does not distress the metal from which pipes are made and it is also suitable for employing in our model copper pipework installations.

As an aside, soon after the publication of my design I was amused, on a visit to the Harrogate exhibition, to note how many examples of the design had been produced, mainly on club stands, and that in every case they were housed in second-hand cigar boxes. It seemed that I had got it right!

D. A. G. Brown (Tinwell, Rutland)



Suez Crisis

Dear Martin,

The article by James Wells (M.E. 4640, 5th June 2020) brought back memories of a really practical engineer who worked with my father. He was definitely not put off driving by restrictions on petrol during the Suez crisis. He had a small trailer for his car and set about making a producer gas plant to fit onto the trailer and feed the car engine through a length of steam hose procured from the scrap bin at the chemicals works where he was the services engineer. He built the producer gas plant from a discarded 45 gallon drum and scrap pipe and pipe fittings.

He used to fill the producer gas plant with coke, light an oily rag and put it inside the drum and then start the car on petrol, drawing the air for the engine through the gas plant. Once the plant was lit and going well, he turned the petrol off and carried on driving using the producer gas (carbon monoxide) made from the red-hot coke and the air stream. He found this was ideal when petrol was rationed as there were so few cars on the road. However, like all home-made gadgets, he did have a problem when he decided to drive from Manchester to Carlisle. As he went up the A6 over Shap (no M6 in those days), it was a long drag up to the summit so as the engine was at full throttle, the air flow through the producer gas plant was so high that the drum became red hot and the wooden floor of the trailer started to smoulder.

On reaching the top of Shap, he didn't stop and deal with the trailer smouldering but continued and coasted down the other side thinking that the wind would stop the smouldering of the floor of the trailer spreading to the car. Now that he had the throttle closed, the air-flow through the producer gas plant reduced so much that the fire went out and when he needed power as the road became level, there wasn't any producer gas being made so he slowly ground to a halt. He then had to re-start

on petrol, with the inevitable burning oily rag shoved into the old oil drum, before finally arriving in Carlisle. In those days, the Construction and Use Regulations were a lot less onerous than they are now, so I cannot recommend trying this sort of thing these days.

**Yours sincerely, Graham
Astbury (Skipton)**

Projects

Dear Martin,

The article by John Moorhouse on planning and executing a project ('Confessions of a Model Maker', M.E. 4640, 5th June 2020) reminded me of the days when I was a project engineer in the chemical industry. Once a project had passed capital authorisation, the seven stages were quickly identified as:

1. Enthusiasm
2. Disillusionment
3. Confusion
4. Panic
5. Search for the guilty
6. Punishment of the innocent
7. Adoration and praise for the uninvolved

However, these do not seem to apply to club projects which tend to be less constrained by time and commercial pressures. At Bradford MES, we are fortunate that our projects have a very disciplined and well organised team who always work together and deliver the project on time and within budget. At Bradford, the seven stages are usually:

1. Enthusiasm
2. Setting the budget
3. Finding the money
4. Searching for the bargains
5. Hard work
6. Finishing the final items
7. Adoration and praise for the whole team

Bradford has been a Society for well over 100 years, so has quite a history of doing things well!

**Yours sincerely, Graham
Astbury (Honorary Bulletin
Editor, Bradford Model
Engineering Society)**



C23 freshly outshopped on the steaming bay at Bournemouth DSME - sight feed glass visible through cab side window.

A Displacement Lubricator for Charlie

PART 1

Nick Feast makes a displacement lubricator for his Southern Q1.



My working life in the pump industry taught me that, although mechanical pumps are generally reliable, they can and do break down! The sort we fit to our miniature locomotives for cylinder lubrication have a hard time, having either a delicate ratchet mechanism or miniature roller clutches, very small ports passing viscous oil, small spring-loaded ball valves, and a location often prone to dirt. The smaller the engine the more difficult it becomes to find a convenient location, and the more fragile the parts become.

My original *Charlie* Q1 design used an LBSC style oscillating pump, driven as in the full size by a return crank on the

left side front coupled wheel. The pump is situated under the front footplating directly below the smokebox door and covered with a loose-fitting lid. As on the full-size great care must be taken not to allow smokebox char to fall into the oil tank.

It worked okay most of the time but there were times when the non-return valves would give up and the oil tank would fill with water forced back from the cylinders.

However, a number of the full size Q1 class were fitted with hydrostatic (also known as displacement) lubricators. This type simply uses condensed steam to displace oil from a reservoir of cylinder oil, which then is fed by boiler pressure

via an adjustable sight feed to the point of application. Many older locomotives were built with these or with a combination of hydrostatic and mechanical feeds.

Valve and cylinder lubricating oil was usually fed via atomisers on main line engines, in order to better distribute the oil over the large working surfaces involved. These were simply mixing chambers where the viscous cylinder oil was mixed with steam under pressure to produce an emulsion, which it was hoped would cover a greater area of working surface in the valve chests and cylinders. It may surprise the reader to learn that the amount of oil from each feed



A sight glass full of mayonnaise - no hope of seeing the oil feed rate.

on a mechanically lubricated main line locomotive is a *maximum* of 2 fluid ounces (56cc) per 100 miles of running. After running in, pumps were usually set to deliver less than this.

Adjustment of the feed rate was set in the workshops and interference by the footplate crews was frowned on. By

contrast the hydrostatic lubricator was placed in the cab and adjustment could be made whilst running. Steam feed to the device was often linked to the regulator as on GWR designs or manually controlled to prevent over feeding of oil whilst stationary. There may be times when additional oil might be

required, such as after serious priming, when the oil film would have been washed off the valve and piston bores. In the preservation era it is common to see steam locomotives driven for a considerable distance with the drain cocks fully open - also guaranteed to blow the oil out of the cylinders!

The simple principle of the displacement lubrication concept did hide a couple of pitfalls, which I was soon to discover. **Photograph 1** shows the newly completed Q1 number C23 ready on the steaming bay at Bournemouth track. The sight feed for the lubricator is just visible through the fireman's side window.

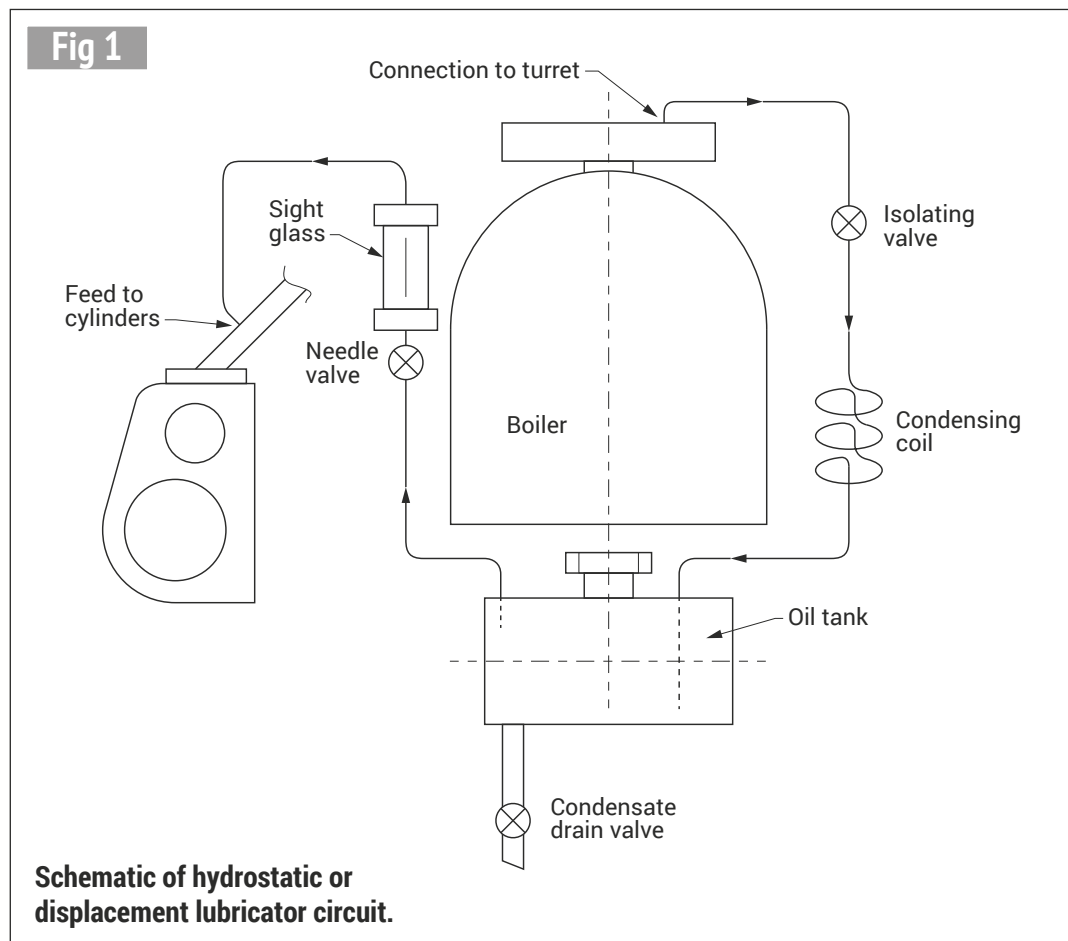
The system worked well enough but after a period of running the sight feed just filled up with emulsion and so it was impossible to verify the oil flow. **Photograph 2** shows the problem - the only cure was to dismantle the sight feed and clean the mess off the glass and start again. I was

using glycerin as the liquid in the sight glass and some have recommended salt solution. This sounds a bit corrosive for brass and bronze parts so I haven't tried it myself.

I figured out that the small coil of tube feeding the steam feed to the oil tank was not providing enough cooling to fully condense it, so more heat loss was required. On a full-size locomotive cooling and condensing would usually be dealt with by an air cooled pipe coil inside the cab roof but, as in industrial heat exchanger applications, liquid cooling would be more efficient. On the Q1 I have incorporated an axle pump on the tender so the obvious solution was to incorporate this flow into a small heat exchanger. I am quite happy to let the axle pump feed the boiler and just use the injector when the locomotive is working hard and needs more water. This is usually once per lap on our track or when sitting in the station waiting for passengers.

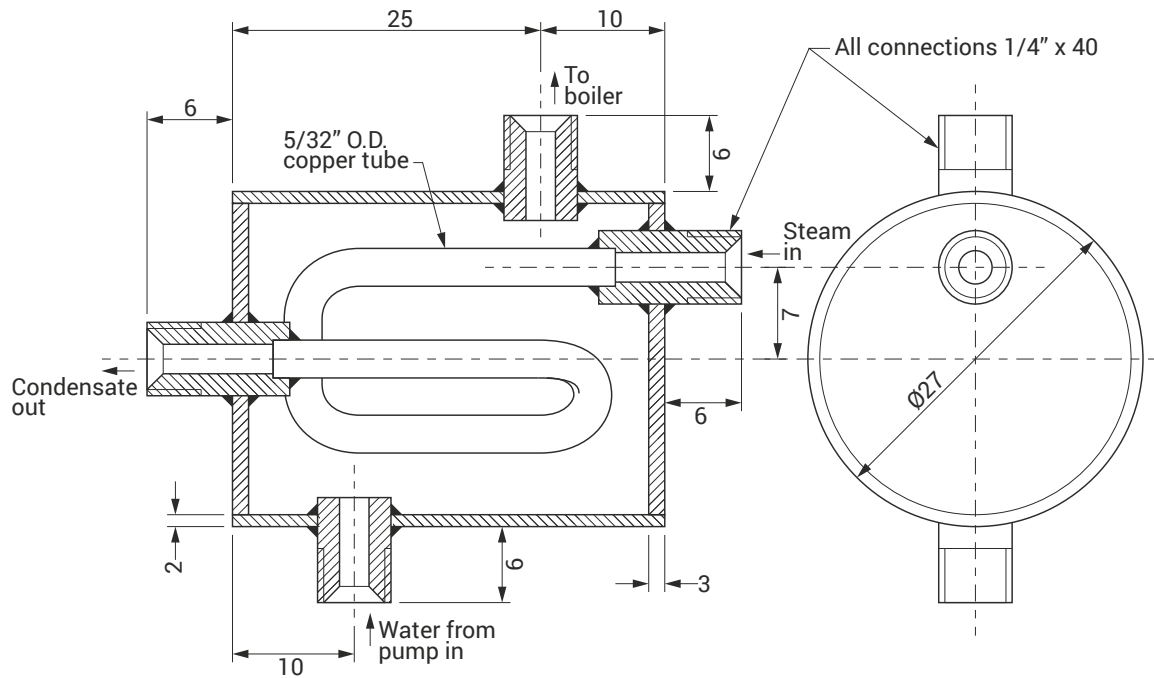
Figure 1 shows the main components of the improved circuit.

Although I was able to find space under the cab floor for a reasonable capacity oil tank, there was really nowhere on the locomotive to hide a heat exchanger that would be big enough to do any good. However, studying photographs of those I used in the construction series provided a possible answer. **Photograph 3** shows 33039 in BR days with a battery box and vacuum reservoir fitted



The battery box and vacuum reservoir on 33039 in the 1960s.

Fig 2

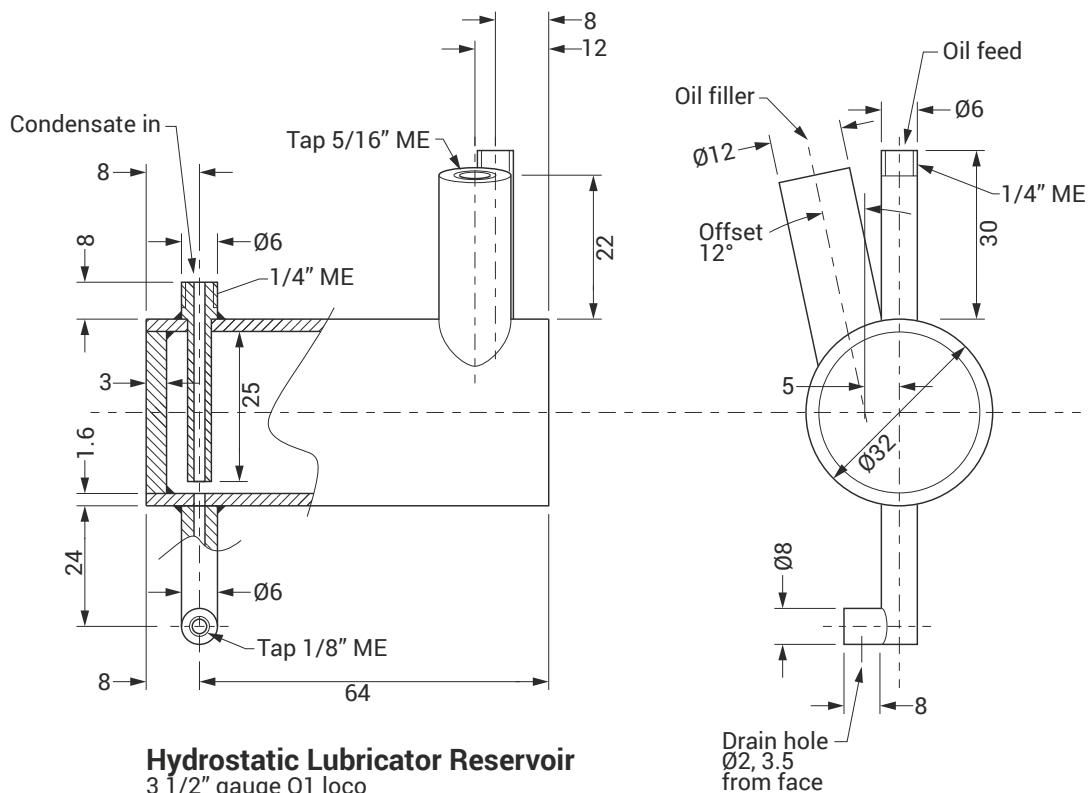


Condensing Tank For Hydrostatic Oiler

Mat'ls: Tube & ends - copper
Connections - brass or bronze
All joints - silver solder
Note: mounting brackets not shown

Drawing of condensing tank for 3½ inch gauge Q1 locomotive.

Fig 3



Hydrostatic Lubricator Reservoir

3 1/2" gauge Q1 loco
Note: mounting brackets not shown

Drawing of hydrostatic lubricator reservoir for 3½ inch gauge Q1 Locomotive.



Location of the heat exchanger tank on C23.



The copper oil reservoir for C23 under construction.

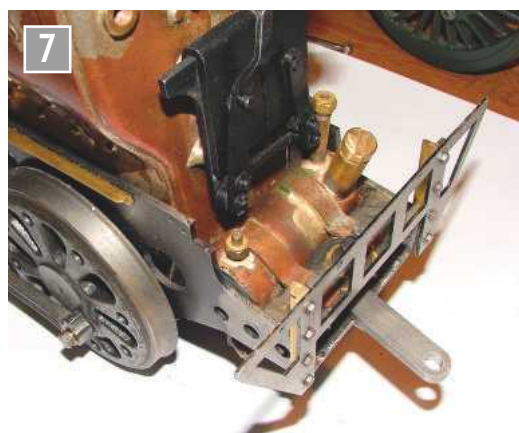


The almost completed oil tank.

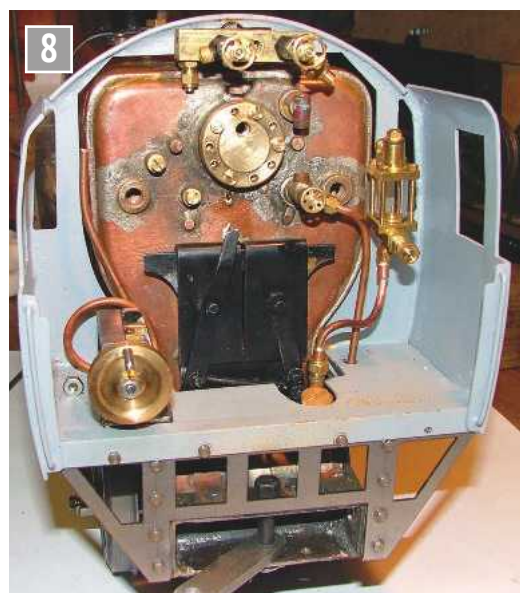
below the cab on the driver's side. This was equipment added during the sixties for the BR AWS (Automatic Warning System) along with the pick-up shoe below the front coupling. **Photograph 4** shows the tank fitted on the model of C23, although the AWS equipment would not have been fitted on the original till much later, in BR days. The boiler feed water from the tender axle pump is fed into the bottom of the tank and exits at the top, continuing forward to the clack at the front of the boiler on the top right-hand side. The steam feed is at the rear and hopefully condensate leaves via the front connection *en route* to the displacement tank under the cab floor.

Figure 2 shows the dimensions. Construction is straightforward enough - I silver soldered the internal coil to its threaded terminations with a higher temperature solder first and then assembled the rest of the bits for the final soldering with Easiflo or similar. Mounting brackets can be riveted on and silver soldered at the same time or soft soldered on later to give a bit of leeway in the final location to suit pipe runs and so on.

It should be noted that this is a pressure vessel that could see full boiler pressure both in the steam coil and the external tank and should be tested accordingly before fitting to the locomotive. The same applies to the oil tank.



The tank in situ - mounting straps have been added.



The cab has been fitted and final position of the sight glass determined.

Figure 3 details the oil tank to suit this locomotive. Not shown is the small drain screw to drop out the condensate to allow the oil to be replaced at the end of a few hours running.

Photograph 5 shows the tank part made, with the condensate pipe going almost to the bottom of the tank - as we all know oil floats on water so there is less chance of the two mixing.

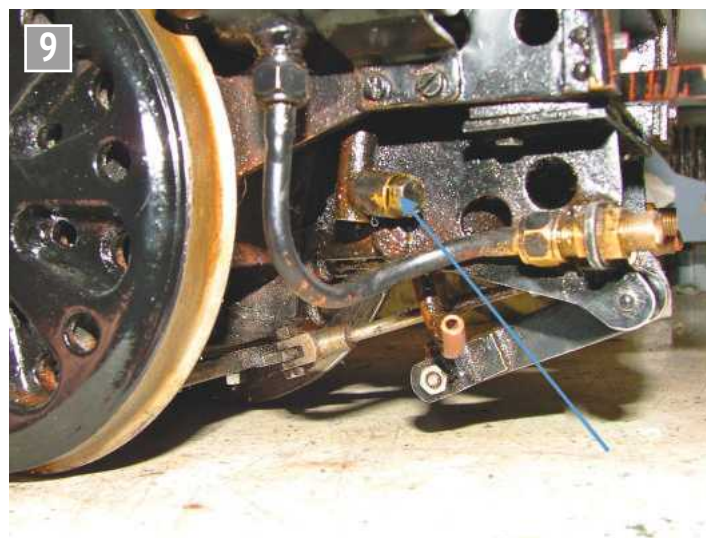
Photograph 6 shows the completed tank with mounting brackets and **photo 7** shows the installation on the locomotive, slightly further on in the build in **photo 8**. The extended filler neck was necessary to be flush with the cab floor; there is a wooden floor covering the filler when the locomotive is in use as seen in photo 3.

Photograph 9 shows the drain screw, indicated by the

blue arrow, which must be opened to drain off water that has condensed in the tank. The steam valve should be turned off and the filler cap removed. The tank should be refilled with cylinder oil - I find a plastic

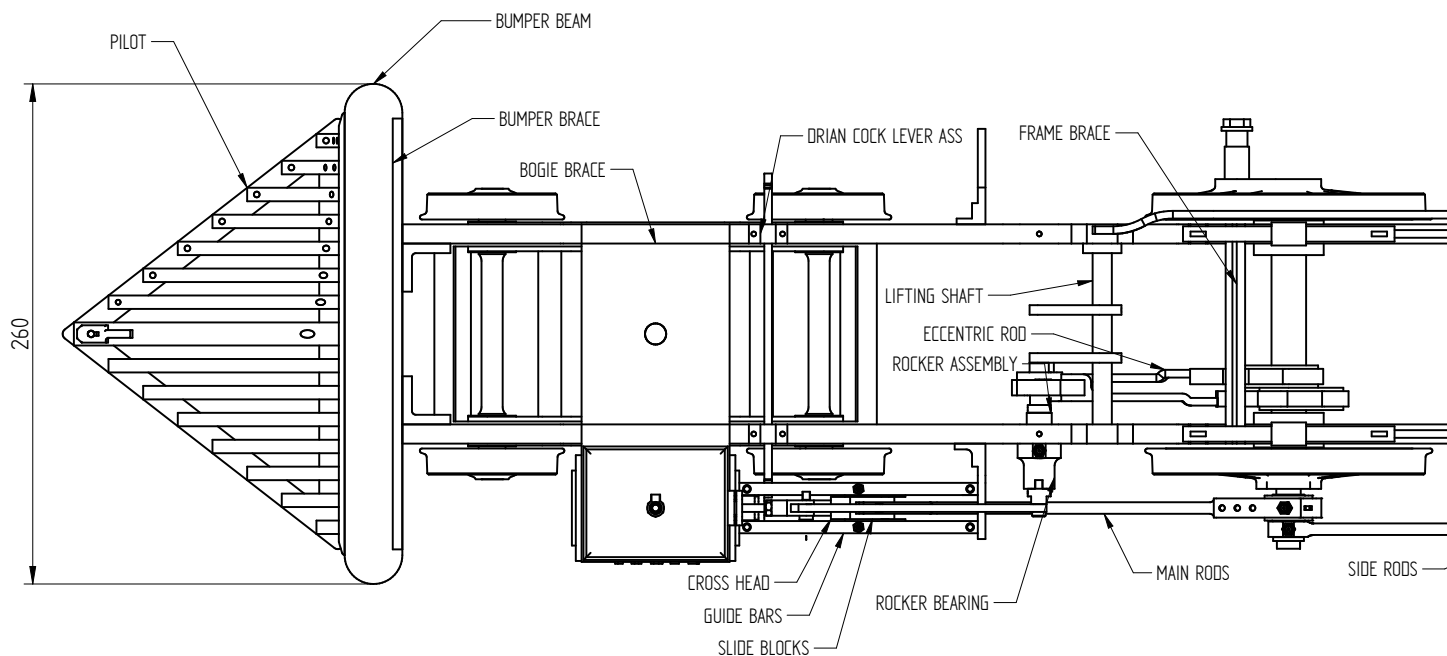
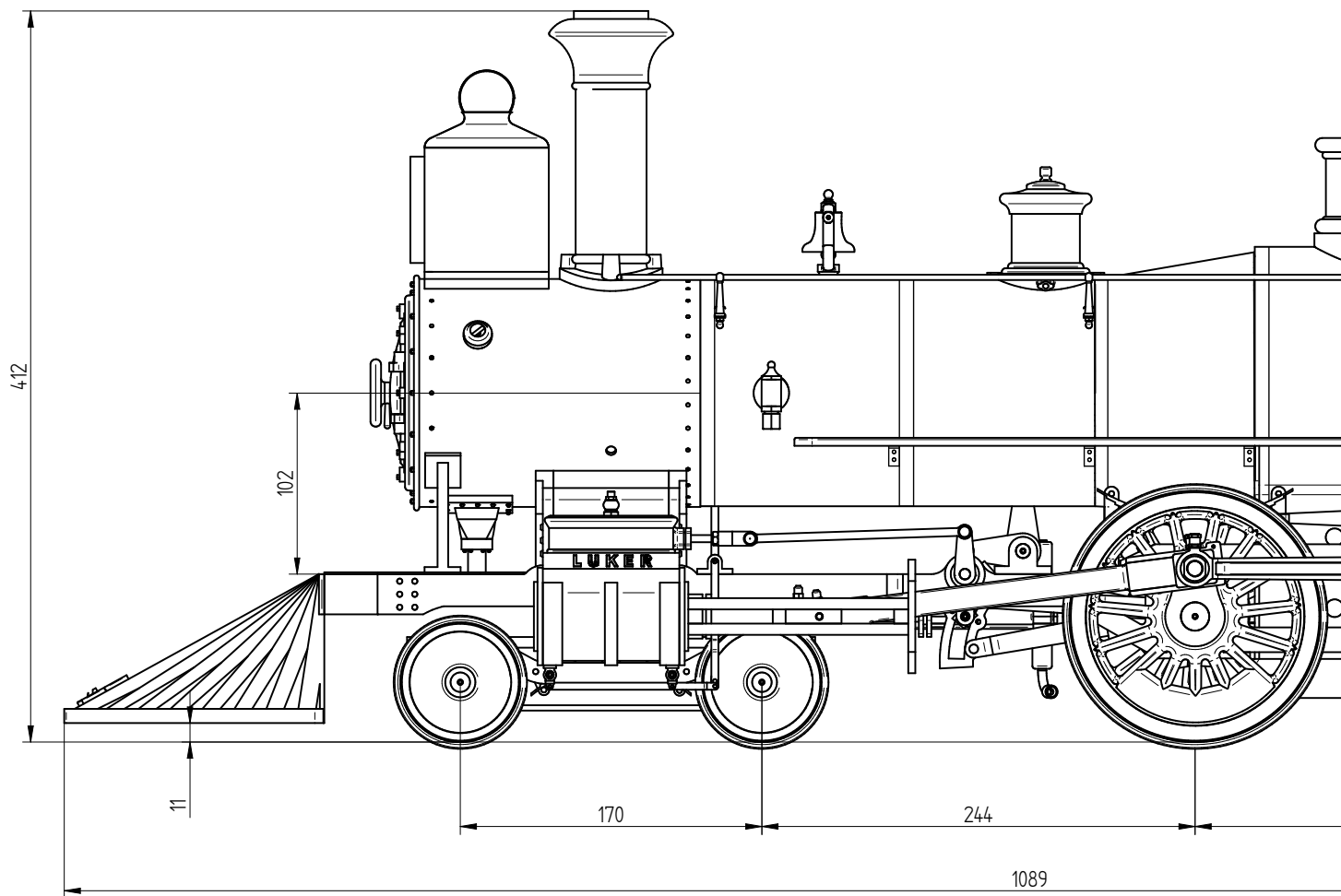
syringe makes this a bit easier than trying to pour in the oil using gravity alone.

●To be continued.



Space is more limited on the L class - piping more cramped.

Wahya General Arrangement

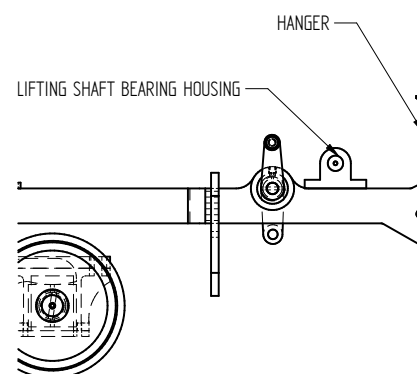


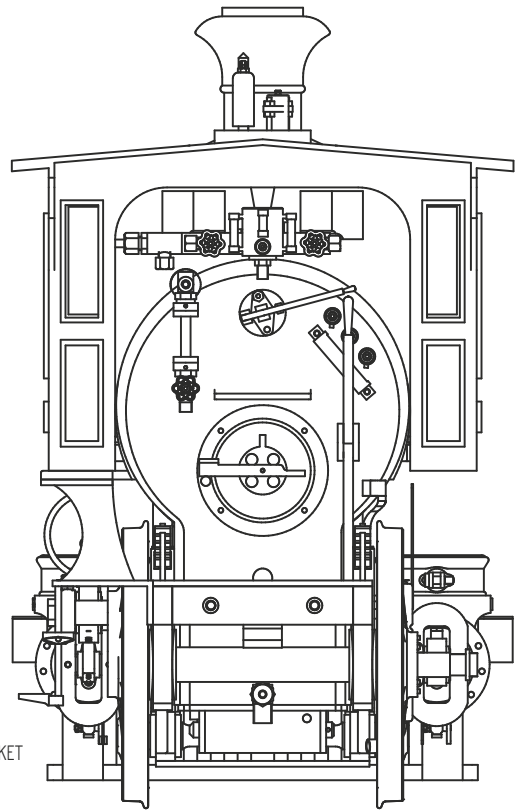
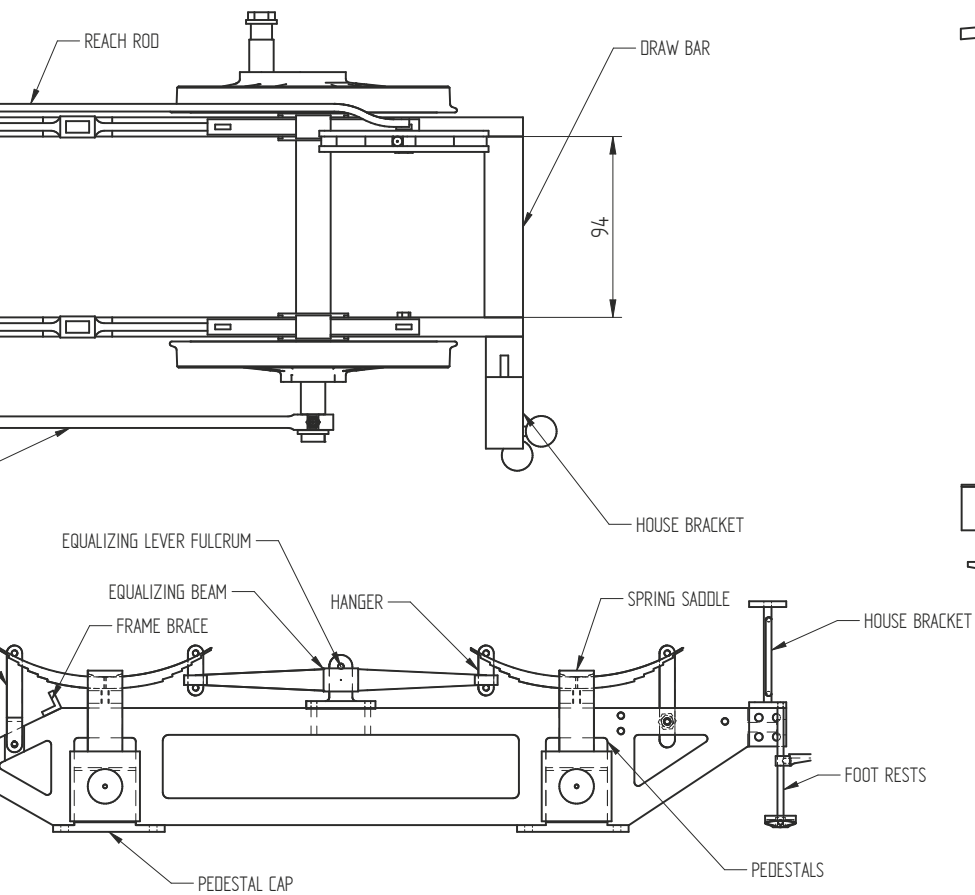
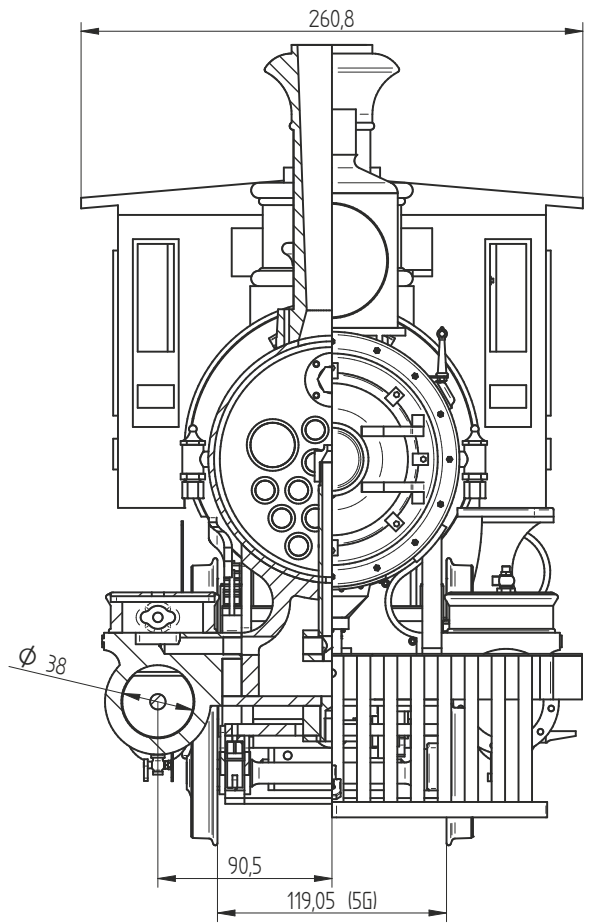
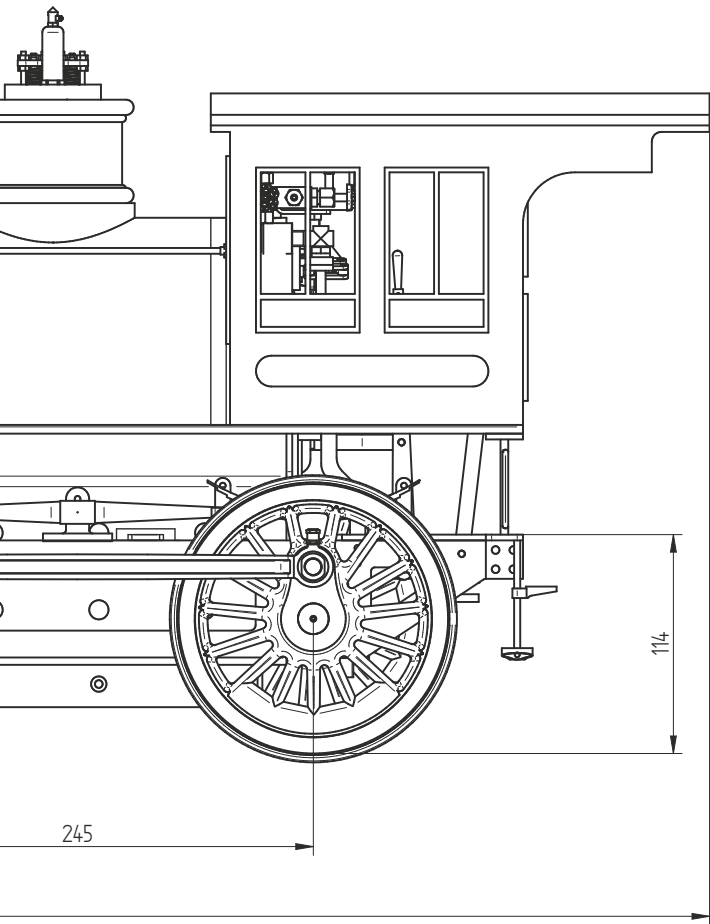
PIPING SIZES:

DISPLACEMENT LUBRICATOR TANK TO CYLINDERS = 3/32IN
 VALVE TO DISPLACEMENT LUBRICATOR TANK= 2.5MM
 PRESSURE GAUGE = 3/32IN
 INJECTOR STEAM LINES = 1/8IN
 BLOWER LINE =1/8IN
 ALL WATER LINES = 3/16IN (4.8MM)

COUPLING SIZES:

DISPLACEMENT LUBRICATOR TANK TO CYLINDERS: 3/16X40 6mm AF NUT
 VALVE TO DISPLACEMENT LUBRICATOR TANK: 7/32X40 7mm AF NUT
 PRESSURE GAUGE: 7/32X40 7mm AF NUT; 3/16X40 1/4IN AF NUT ON GAUGE.
 INJECTOR STEAM LINE: 1/4X40 valves 8mm AF NUT; 5/16X32injector 3/8AF NUT
 BLOWER LINE: 1/4X40 valves 8mm AF NUT
 ALL WATER LINES: 5/16X32 injector 3/8IN AF NUT; 5/16X32 tender coupling.





Garrett 4CD Tractor

in 6 inch scale

PART 71

Chris Gunn discovers how to make wicks for the lubricators.



Continued from p.833
M.E. 4640, 5 June 2020

This article has been written to guide the builder through the construction of the 6 inch scale Garrett 4CD tractor designed by Chris d'Alquen. The writer has previously built a 4 inch scale Garrett and a 6 inch scale Foden wagon so has the benefit of considerable experience in larger scale modelling. Most machining can be done in the average home workshop but the supplier from whom the castings and drawings are currently available is able to provide a machining service for the largest items if required.

The next items I dealt with are shown on the general arrangements but not on any detail drawing. These are the stay and stay ends that link the front axle perch bracket and the belly tank support. I had already drilled a hole in the belly tank support for a bolt for the rod eye on that end and also fitted a long $\frac{5}{8}$ inch stud in the bottom of the axle bracket.

I made the two rod ends first and as I had a $\frac{5}{8}$ inch BSF tap and die I made the rod ends with a $\frac{5}{8}$ inch BSF thread in them. I found a piece of 30mm square bar, marked out for the cross hole at each end of the bar, and drilled this in the Bridgeport to ensure the hole was square across the bar. I made both cross holes $1\frac{1}{4}$ inch so the eye would pass over the $\frac{5}{8}$ inch stud at the front. It is perhaps worth pointing out at this point that the front axle bracket will need to pivot to allow the front wheels to turn, so the stud will need to rotate freely in the front rod eye.



Once the cross holes were done, I fitted my four jaw scroll chuck on the Bantam, faced off the ends of the square, then drilled and tapped the ends $\frac{5}{8}$ inch BSF x $\frac{3}{4}$ inch deep. I took the corners off next to finish up with a round end and then parted off the two rod ends. I made a couple of locknuts with threads to match and a shouldered screw for the belly tank support end.

Once these parts were made, I fitted them to the engine and used another piece of gas welding filler rod to make a template of the bent rod. When that was done, I cut a piece of $\frac{5}{8}$ inch bar slightly longer and then threaded each end of the bar a suitable distance to allow a bit of adjustment. The bar was held in the bench vice, a long piece of tube was made ready

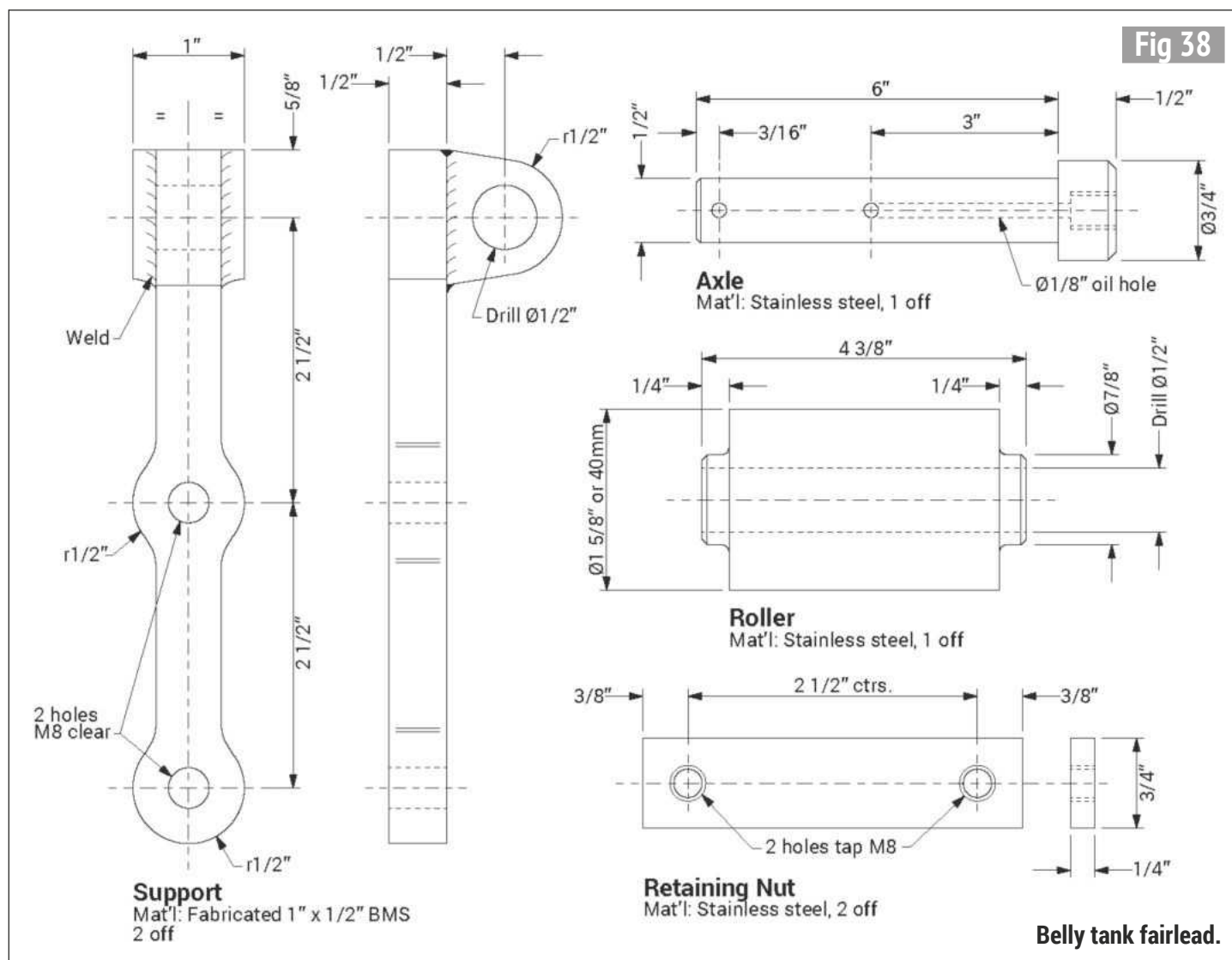
for the bend, and I warmed up the bar until it was red and gave it a good yank with the tube until the bend matched my template. The rod was reversed in the vice and the other end warmed up for the second bend. **Photograph 616** shows this in progress.

I took the finished rod to the engine when it had cooled down, fitted the rod ends and attempted to fit it but I was a little out, so I had to have a re-heat and adjust the bend before trying again. I have to admit I could not get it right, as the rod was slightly short when I got the angles right. I had to make another one and this time I managed to get it right and tightened it all up. It seemed fine until I tried to turn the steering and realised that the front rod end should not be tight. I made a couple of thin nuts so they could be

Drawings, castings and machining services are available from A. N. Engineering; Email: a.nutting@hotmail.co.uk



Stay rod bending.



locked together and leave the axle free to pivot. **Photograph 617** shows the finished result.

Another item that I had seen on another miniature but which is not shown on the drawings is the belly tank fairlead. In practice this would guide the wire rope from the winding drum over the top of the belly tank thus avoiding any damage to the tank, although, that said, the load on the supports for this fairlead which are bolted through the front of the tank could be quite considerable when carrying out some heavy duty pulling. I imagine this was only used for light work when it was impossible to turn the engine around and pull from the rear. **Figure 38** shows the parts as I made them, as scaled from a picture.

The two brackets were fabricated from some



617
Front axle stay.

1 x 1/2 inch flat bar, which was used for the uprights and the boss, with the bosses carrying the roller welded on after drilling. The retaining holes were drilled and then the uprights were profiled in the Bridgeport. The roller and axle were made as described before from some oddments of stainless and the axle drilled for grease and tapped



618
Belly tank fairleads.

1/8 inch BSP for the TAT grease nipple. I also made a couple of retaining 'nuts' from 1/4 x 3/4 inch flat bar which were tapped M8 for the retaining bolts. These flat bar 'nuts' helped to reinforce the front of the belly tank and I could tighten the bolts without needing to get a spanner on the inside of the tank. I did not expect to be using this

fairlead but it might as well be done right. **Photograph 618** shows the fairlead on the finished engine.

● To be continued.

NEXT TIME

I will continue with the first steam test and the addition of the cladding.



A front left-hand three-quarter view of the Baldwin locomotive as seen under restoration in the workshop on April 3rd 2019. At this stage the tanks had yet to be fitted and therefore much of the detail of the locomotive's boiler and chassis area can be seen. Note the rivetted boiler barrel, believed to be the locomotive's original, and the boiler support plates, whose inherent flexibility caters for the locomotive's boiler expansion in normal service. Some of the tank brackets and the main steam pipe flange can be seen 'parked' on the apron plate at the engine's leading end. This plate required replacement during the restoration. The smokebox, another replacement item, is very much in evidence, whilst the chimney had yet to be fitted. One constructional feature very indicative of the locomotive's U.S. parentage is the cylinder and smokebox arrangement whereby each cylinder is cast integrally with its adjacent half of the smokebox saddle before the two halves are machined and bolted together with the aid of flanges.

A Loco Worth Modelling

The Baldwin '10-12-D' PART 1

Mark Smithers presents the case for modelling the Baldwin '10-12-D' locomotive.



One of the best-known of the more sophisticated domestically-based narrow gauge steam locomotive designs was the ex-War Department Light Railways Baldwin 4-6-0 tank. During the pre-preservation era, a total of eleven specimens of this design were to see service on British soil. These were distributed amongst the Ashover, Welsh Highland and Snailbeach District Railways, along with the Glyn Valley Tramway and the Associated Portland Cement Manufacturers Ltd's works at Rainham, Kent.

They were representatives of the 495-strong Baldwin 10-12-D class, of which all except nine survived shipment from the U.S. for use by the British Military Authorities during

World War One. The class has been perennially popular with modellers in 16mm scale and below despite the fact that none of the original British imports survive today – the last Ashover-based specimen having been scrapped in 1951.

Fortunately, other class members survived in India and more recent years have seen four of these relocated to the United Kingdom. Of the first pair, imported during the 1980's, Baldwin W/N 44656 (ex-W.D.L.R. 778) is now in working order on the Leighton Buzzard Narrow Gauge Railway whilst W/N 44699 (ex-W.D.L.R. 794) is currently undergoing restoration under the guise of W.H.R.-based 590 (scrapped in 1942) for use by the Welsh Highland Heritage Railway.

More recently, two further class members were brought over to the United Kingdom by Statfold Barn's Graham Lee in March 2013. These are officially credited as Baldwin W/Ns 44657 of 1916 (ex-W.D.L.R. 779) and 45190 of 1917 (W.D.L.R. 608). Following relocation of the locomotives, it was decided to retain the former at Statfold Barn, probably because of its Staffordshire connections as it was one of a group of these locomotives that passed through the Bagnall works for overhaul shortly following the Armistice. This locomotive currently remains there on static display in unrestored condition. The other locomotive was put up for sale and its recent restoration to working order has provided a



The new smokebox and door are shown head-on in this view, which illustrates well the dog-catch arrangement for securing the door.

rare opportunity to photograph its components for the benefit of prospective modellers, particularly in larger scales.

Varied career

When new to W.D.L.R. service in France, Baldwin 45190 carried the running number 1058 prior to renumbering to its more familiar identity. Following the Armistice, it was sent to British India's frontier with Afghanistan for service in the third Anglo-Afghan War. Following the petering out of this conflict during the period from 1919-22, the locomotive was taken into Indian North Western Railway stock as its No. 45 prior to sale via Robert Hudson (India) Ltd. to Daurala Sugar Co. in Uttar Pradesh. During this period,



LEFT: This is the flange for the main steam pipe in close-up. RIGHT: A close-up view of the Baldwin locomotive's right-hand cylinder, once again showing the typically U.S.-pattern outline of this component. In the background can be seen part of the flange that facilitates the connection of both halves of the cylinder/smokebox saddle assembly.



the locomotive was named *Dushyanth*. Following closure of this system during the 1970's, 45190 joined 44657 550 miles further east at Ryam sugar plant, where it worked until the early 1990's. Some two decades of dereliction at

the site followed until both locomotives were acquired by Mr. Lee for shipment to Statfold Barn.

Restoration of the Baldwin

At this stage in the story, there was to be a massive change

in fortunes for Baldwin 45190. Graham Fairhurst, one of the founders of the West Lancashire Light Railway, had had a long-time fascination with the '10-12-D's stemming from his grandfather's distinguished service with



As mentioned in the main text, most of the locomotive's braking and associated linkage components had been removed during its spell of service in India. However, the steam brake cylinder was the exception and restoration of this item proved possible. It is seen here, anchored to the mainframes immediately ahead of the leading boiler support plate, with its piston rod centre left of the picture.

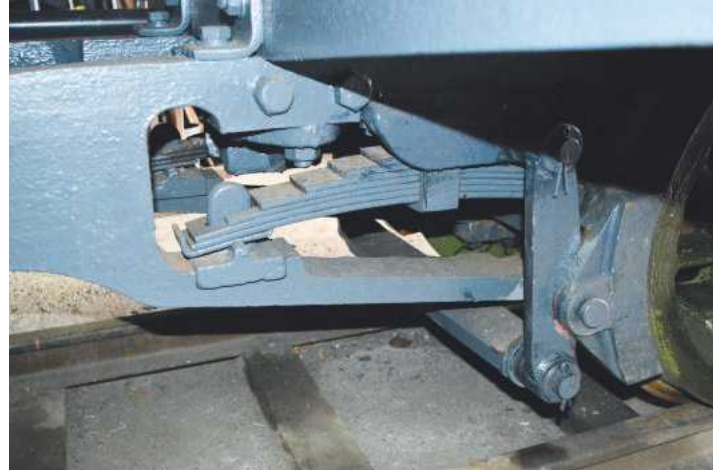


This view shows the upper frame area and suspension associated with the leading coupled wheelset. The bar-framed construction of the chassis is shown to advantage here, as is the arrangement of springing; on the right-hand side (nearest the camera), the fixed anchorage of the leading spring hanger can clearly be seen, whereas on the left-hand side, the bottom of the trailing spring hanger is just visible, connected to its compensating lever.



LEFT: The driving wheelset is flangeless, as can be seen here. Further detail of the bar framing is also evident, as is the fact that the springs and hangers associated with this wheelset effectively form a 'bridge' between their adjacent pairs of compensating levers. The rear wheelset has two pairs of leaf springs, each pair linked by beams centred over the axlebox. A portion of the leading right hand spring can also be seen in this view. Other details illustrated here include the brake hangers and the big-end crankpin with the return crank for the Walschaert's valve gear yet to be fitted.

RIGHT: Each of the trailing inverted springs is rigidly anchored to the bar frames, as can be seen in this illustration of the right-hand anchorage.



At the time of taking the photographs, the valve gear components had yet to be fully assembled on either side of the locomotive but the bracket holding the expansion link is clearly visible here. Note that, as with other components of the locomotive, such as the boiler support plates, much use is made of bolts rather than rivets as an aid to interchangeability of components. The reversing lever, reach rod and its associated bellcrank are located on the right-hand side of the locomotive. The handbrake cross-shaft can also be seen in this view with its bearings anchored to the rear of the trailing boiler support plate.



The leading left-hand cylinder cover required replacement. A repair in India had seen a piece of steel plate used in this role. The new cover, cast at a local foundry and machined on site, is seen in this view.

the King's Liverpool Regiment at the Somme, Arras and Ypres. Graham was also very interested in the Colonel Stephens connections of nine of the U.K.-based class members. Having seen the two recently repatriated specimens at Statfold Barn in 2013, he consulted his friend Jack Cuerden - an engineer with experience gained at Howich Works, with the Sierra Leone Government Railways and on restoring 0-4-0WT *Utrillas* of the W.L.L.R. - to see whether he would be willing to undertake the bulk of the engine's restoration to working order.

Jack's answer was in the affirmative and, following a more detailed examination a week later, it was concluded that the project was feasible and Graham acquired the locomotive. Restoration of the Baldwin to working order was undertaken at Jack's private workshop near Leyland in Lancashire, a task which was completed in the autumn of 2019. In addition to Jack's invaluable contribution, help with the restoration of the locomotive stemmed from a variety of sources, notably Patrick Keef, David Smith, Bob Gratton, Laurie Marshall, Peter Lemmey and Jonathan Whitehead for information they supplied and practical input during the progress of restoration work on the



LEFT: A close-up view of the leading boiler support plate, again emphasizing the extensive reliance upon bolts rather than rivets during construction. Note the apertures for the valve rods and the fulcrum (just visible) for the steam brake linkage lever.



RIGHT: This is the right-hand half of the smokebox saddle, cast integrally with its adjacent cylinder.



LEFT: The bogie used on these Baldwin locomotives is quite sophisticated and was described by the makers as being of the 'swing bolster' type. The housing for the control spring (which is within the central pivot) was anchored to the lower part of the 'fore and aft' swinging arms as shown here, with the upper pivots attached to the bogie itself. Limited provision was also made for vertical deflection of the bogie axleboxes to cater for inequalities in the road, a common occurrence on the Western Front! RIGHT: On the extreme left of this illustration can be seen the transmission bellcrank for the handbrake linkage.



LEFT: The tank supports are bolted to the boiler in the manner shown here. RIGHT: This is a detail much of which is not normally visible on the Baldwin 10-12-D locomotives as shown in working condition. The handbrake is actuated by means of a mechanism consisting of a horizontal screw and a vertical lever, which has had to be completely renewed during the restoration work.



locomotive. Some parts were also been made by students on engineering courses at Southport College.

Design philosophy

One important point that Graham pointed out is that Baldwin had a rather different production philosophy to that employed by British and other European builders. He pointed out that with locomotive builders such as Orenstein & Koppel, Hunslet and Kerr Stuart, despite class members theoretically being covered by the same G. A. drawing, there are often odd differences amongst them that inhibit the interchangeability of individual components.

Baldwins tended to produce individual components to templates, giving a much greater level of component interchangeability between class members. Baldwin locomotives were 'assembled'



LEFT: This is the handle for the handbrake control. RIGHT: What at first sight appears to be just a mounting for the pressure gauge is in fact the steam manifold and on the left of the picture the rear main steam pipe can be seen. Anchored to the lower part of the pressure gauge support is the fulcrum for the pull-out regulator lever rod. Above this can be seen the gland for the regulator valve control spindle, with a small part of the spindle also visible.



A close up of the take-off from the rear main steam pipe for the left-hand injector steam feed.

in a version of the American 'factory system' rather than 'built'. Graham is also of the view that this may have had something to do with why Col. Stephens opted for the Baldwin design for his railways over, say,

the W.D.L.R. Hunslet 4-6-0T, as they would have been cheaper to operate and maintain as a consequence. The policy followed on the Ashover Light Railway, where locomotive cannibalization played a major



LEFT: The firehole door and its seating are both castings, as is readily apparent here. A washout plug can also be seen centre-right uppermost in this illustration.

RIGHT At the time of taking this photograph, the reversing lever and guide had yet to be fully assembled, although much of it is visible here. The lever and catch for the regulator can be seen in the upper left part of this picture.

part in the proceedings, was a case in point - particularly during the latter years of the line's operation.

●To be continued.

ISSUE NEXT ISSUE NEXT ISSUE NEXT ISSUE NEXT IS E NEXT ISSUE NEXT ISSUE NEXT ISSUE

● Club News

Geoff Theasby celebrates a decade at the helm of *HMS Club News*.

● ME Beam Engine

David Haythornthwaite completes his one inch scale *Model Engineer* beam engine by adding the water pump.

● Tractive Effort

Duncan Webster studies the cyclic variation of locomotive tractive effort.

● Tempering

Martin Gearing applies the tempering process described in his first instalment to the making of involute gear cutters.

● Wenford

Hotspur connects the crosshead pump to the water tanks in his 5 inch gauge Beattie well tank.

● Smoke Signals

Noel Shelley looks at some of the subtle ways electrical equipment lets you know all is not well.

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The Middleton Double Sided Beam Engine PART 11

Rodney Oldfield constructs another of Bob Middleton's stationary engines.



Continued from p.49
M.E. 4641, 19 June 2020



Roughing out two link arms, back to back.

Turning the pin on the valve operating arm.



A pair of completed link arms.



A pair of crosshead guides mounted on their piston rod.

Valve operating arm

Machine as the drawing (fig 20) using a four-jaw chuck (photo 80) and whilst it is oblong in shape mill the $\frac{1}{8}$ inch slot and round off the edges to size (I drilled and tapped the outer side 5BA). I made all the screws and slightly domed all the heads.

Full link arm

I wanted to make all my small bits out of stainless steel but they would be easier to make

out of brass – as always, use whatever material you have available. Using some $\frac{3}{8}$ inch square bar approximately $2\frac{1}{2}$ inches long mark off the hole centres, mill a $\frac{1}{8}$ inch slot at both ends, mark off the hole centres from either end, drill and tap the outer side 5BA then drill and ream the other side $\frac{1}{8}$ inch. Saw off and round the top and bottom as in photos 81 and 82. Again, I made all the screws and slightly domed all the heads.

the difference in half and this will give you the length of the spacer.

Crosshead slides

Please refer back again to fig 19 (M.E. 4641).

Having no $\frac{1}{2}$ inch square brass I used some old $\frac{5}{8}$ inch hexagon bar turned down to the drawing size. Centre, drill and ream to $\frac{1}{8}$ inch (photo 83). Keep checking you have a good sliding fit in the engine frames.

Link

Please refer back to fig 17 (M.E. 4639, 22 May).

Two of these are needed; machine as in the drawing - $1 \times \frac{3}{8} \times \frac{1}{8}$ inch, drill and ream two $\frac{1}{8}$ inch holes at $\frac{3}{4}$ inch centres (photo 84).

Piston rod top

This is straightforward turning as in the drawing (see fig 19, M.E. 4641, 19th June) – make sure the $\frac{1}{8}$ inch cross-hole is square with the piston rod.

The spaces for the operating shaft

Measure between the built up engine frames, take off the width of the link arm, split



Operating arm assembly, showing the links.

●To be continued.



Fig 20

A Simple But Effective Depth Stop

Les Phillips describes an accessory for your lathe that is indispensable for repetitive work.



Over the years in our wonderful magazine I have seen a variety of 'depth stops' and unless my memory fails me - of which there is every possibility - I do not remember this particular one being described previously. So I decided to offer its description to the editor. If *'I am going where some man has gone before'* it must have been some time ago.

I was prompted to offer this as I was turning wheels, axles and crank pins for an N.S.W.G.R. 24 class steam locomotive, which is a story in itself. When I finished two, or more correctly one and three quarters, N.S.W. C38's in about 2005/6 I decided I was getting a bit 'long in the tooth' to tackle another 'steamer' so I decided to build a battery powered Diesel of all things (no offence intended to Diesel



Depth stop installed on the lathe.

enthusiast readers!). The reason - it would be quicker. **Well, it wasn't** - mainly because I am not an electrical person. Two wires and I am fine, add a third and I am history!

Upon completion I **again** thought - I am a slow learner! - I am NOT going to build another steamer - I'm done! Discussing this with my wife we agreed I needed a workshop project and she smiled and quietly informed me "it will keep you off the streets"! Then fate smiled - or perhaps frowned! - on me because I was offered the castings and various other components for the 24 which after some misgivings I took up. The attraction - the 38 is getting too much for me to handle. Of course, I have not changed so the 38 must be getting bigger and heavier!!

So here I am talking about a depth stop. The 24 is a

2-6-0 with a six wheeled tender and over time I have come to like so much about this locomotive. It is the antithesis of my general thoughts on locomotives which are an uncluttered exterior appearance. But what really appealed especially was the fact that it will be easier for me to handle. And the icing on the cake is it came with drawings and instructions from Barry Potter who readers will remember from his articles in *Model Engineer* (Barry is our Australian LBSC!). So - to use an LBSC expression - 'I am following the words and music'. I have to admit it really had everything going for it.

As a consequence, there were seven axles, fourteen wheels and six crank pins to turn besides anything else. I have a Myford Super Seven lathe - with which I am still in love after some 43 years of use! - and once again the depth stop I had made **many** years before came into play for these operations. I consider it as an indispensable accessory to the machine. It then occurred to me that readers with Myfords out there could be interested. It is simple and easy to make and install and makes turning to a depth a 'piece of cake', as the Spitfire pilots used to say.

Made from square and rectangular section bright mild steel I am sure you will have all the suitable material you need in your workshop.



Depth stop in use.

The drawing shows all the relevant sizes and I make no apology for it being dimensioned with Imperial measurements. Conversion of the whole thing to metric would be relatively easy.

The drawing shows all the relevant dimensions and the mounting of the unit is straight forward as the headstock mounting on the Super Seven has a vertical machined surface and even with the gear box there is enough room for the unit. And once again, if my memory is not playing tricks, there is one tapped hole already there which I utilised. On top of that there is also a machined face on the side of the saddle which the 'distance rods' can bear against.

It is essential that a small brass plug is installed under the locking screw to prevent indents in the flat surface of the distance rods.

I believe the drawing gives a fair representation of its simplicity. You could of course make a pattern for the body if a few of you banded together to produce one. **Photograph 1** shows it in place beside the gear box with the saddle withdrawn for the photograph. **Photograph 2** gives an idea of how it is used. In this case a piece of tool steel is used as the depth measurement.

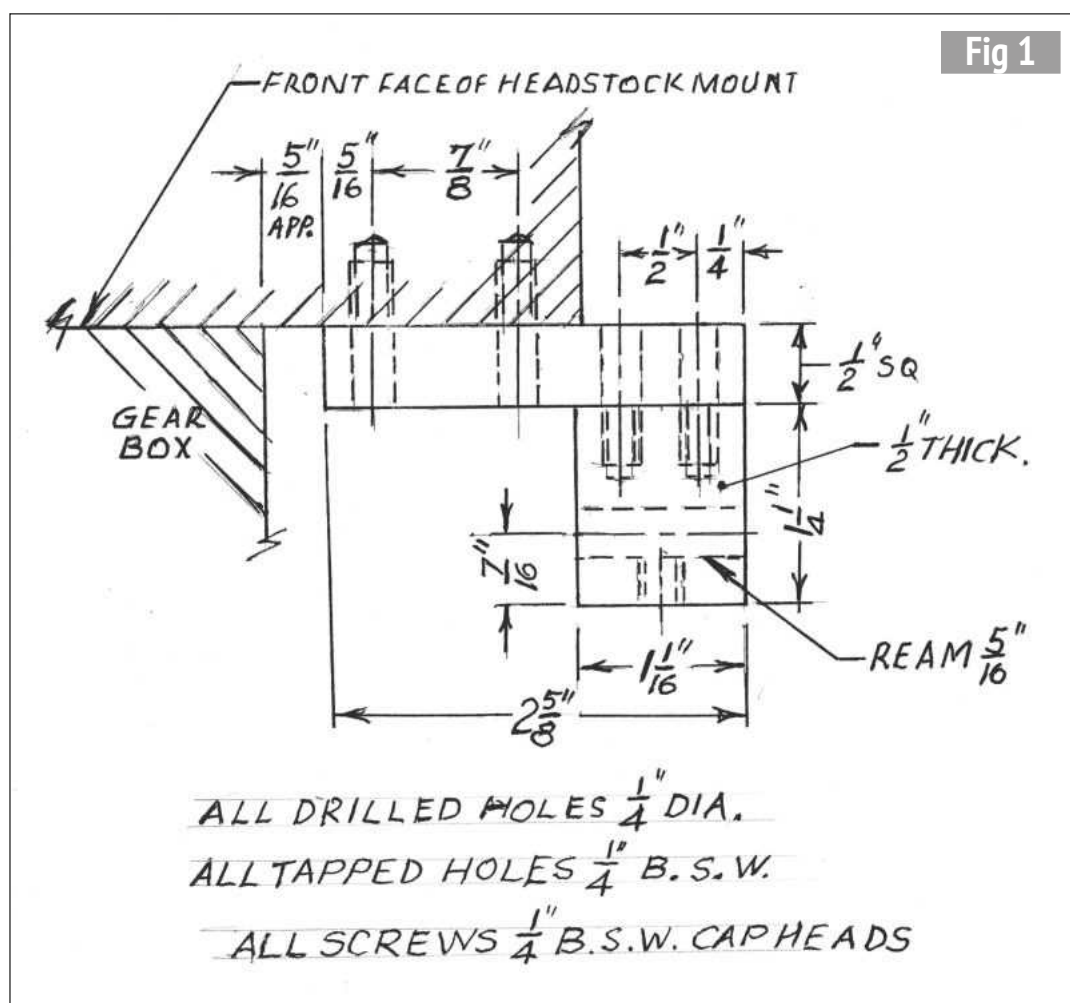
A few of my rods are shown in **photo 3**. They are just plain pieces of $\frac{5}{16}$ inch bright mild steel with a small flat machined on one end for the locking screw to bear on and a radius machined on the other.

In use gently touch the tool, whether it be in the tool post or in a boring bar etc, on the face of the workpiece. Place a suitable 'spacer' between the saddle machined face and the selected 'distance rod' and whilst holding it with a gentle pressure, lock the 'distance rod' in place with the socket head screw, or whatever you use. Then take your cut until you feel the saddle gently touch the rod.

I have a collection of spacers, especially tool bits which I use regularly. As you



A selection of rods.



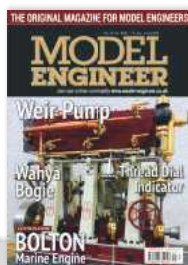
will be well aware these are generally one or two 'thou' undersize so I compensate with an adjustment on the

compound rest. I have also made some especially for the job at hand. It all depends how important the measurement is.

I hope some of you will enjoy using this very useful lathe accessory as much as I have.

ME

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The Barclay Well Tanks of the Great War

PART 63

Terence Holland describes and constructs two appealing, century old locomotives.



Continued from p.798
M.E. 4640, 5 June 2020

This constructional series addresses Andrew Barclay 0-4-0 and 0-6-0 narrow gauge locomotives supplied for use in the First World War. Built without the use of castings, the 0-4-0 design is described as two versions; as-built for the British Admiralty in 1918 and as rebuilt and currently running on the Tallylyn Railway as their locomotive No.6, *Douglas*. The 0-6-0 engines described were built in 1917 and operated on 60 centimetre gauge track at the Western Front in France. These were small, spartan machines of which only 25 were supplied and none have survived into preservation.

The Andrew Barclay 0-6-0WT

Now we get to the interesting bit - a Barclay 0-6-0WT locomotive that no longer exists and about which there is limited information. But first some history is called for to explain the need for steam locomotives on narrow gauge lines at the Western Front. I note that this was first addressed in the introduction to this series, published some eight months before the series commenced (M.E. 4490, 5 September 2014).

Railway operations at the Front - Eric Geddes

Once the need for feeder railways was accepted on the Western Front, one person whose name stands out with respect to the organisation of railway operations is Sir Eric Campbell Geddes. Born in



18 inch gauge diesel Carnegie.

1875, he came from a 'landed' background but appears to have been the black sheep of the family in his early years. He moved to the United States and drifted for over two years doing jobs such as lumberjack and steelworker, eventually becoming a stationmaster for the Baltimore and Ohio Railroad.

He returned home in 1895 and was sent to India for a minor job in estate management where he gained experience building light railways, before becoming superintendent of the Rohilkund and Kumaon railway in 1901. This was a metre gauge line in the north of India with a network of almost 600 miles. He eventually returned to England and joined the North Eastern Railway, rising to deputy general manager in 1911.

Once things stagnated into trench warfare, he was 'head-hunted' by Lloyd George to oversee small arms and eventually shell production. With his background in railways, he was appointed in 1916 as head of Military

Transportation on the Western Front, with the rank of major-general. He was so effective in his job that he moved on as a 'trouble-shooter' and was appointed First Lord of the Admiralty between 1917 and 1919, as the Admiralty had been experiencing problems coping with U-boat attacks among other problems.

After the war he served as the first Minister of Transport between 1919 and 1921, in which position he was responsible for the deep public spending cuts known as the 'Geddes Axe' - a forerunner of the Beeching cuts.

At the beginning of the war in 1914, military operations were expected to be 'mobile', with cavalry charges pushing forward into enemy lines followed by the infantry. Consequently, no provision was made by military planners for a semi-permanent transport system, which was desperately needed once things started to degenerate into trench warfare. The problem was compounded by wet weather, which could quickly turn a

heavily-used dirt track into a muddy morass.

The Railway Operating Department (ROD) was initially tasked with all War Department (WD) railway operations in France. Eventually the ROD was made responsible for standard gauge operations and War Department Light Railways (the WDLR) was set up to oversee narrow gauge operations. Light railway operating companies were formed, 30 in total; 20 in the UK, six from existing units in France, two South African, one Canadian and one Australian. The track gauge of 60cm (equivalent to 1 foot 11 $\frac{5}{8}$ inches) was adopted as this gauge was already extensively used on the continent.

Training was carried out at Longmoor Military Railway, where possible recruits with railway experience were enrolled. Rapid expansion of the light, 60cm gauge railway network also took place within the British sectors of the front line and, by the end of the war, almost 2,000 miles of new 60cm track had been laid. At the peak in 1918 some 200,000 tons of material was carried per month (ref 60). To give some idea of the enormous quantities of *matériel* shifted, during the Somme campaign some 20,000 tons of stores were distributed daily on a 12 mile front (ref 61). Items carried included cement, barbed wire, corrugated iron sheets, roofing felt, wire netting etc., as well as munitions and feed for both men and horses. And, of course, we should remember the sad, endless task of evacuating the wounded to the dressing stations and field hospitals. A unique, first-hand account of what it was like to work on the WDLR was published by T.R. Heritage in 1931 (ref 62).

I note that, for many years, the application of 'standard' narrow gauge track of 18 inch and 2 foot 6 inch gauge had been under consideration by the UK military. An example of the use of 2 foot 6 inch track in the UK was the narrow gauge

railway laid to that gauge after the outbreak of war at the RNCF - the Royal Navy Cordite Factory operated by the Admiralty in Dorset (ref 63). The smaller gauge of 18 inches was in use in establishments such as Woolwich Arsenal and typical 18 inch gauge stock from Woolwich can be seen in the Waltham Abbey Gunpowder Mills museum. **Photograph 299** is of *Carnegie*, an 88 horsepower Bo-Bo Diesel built by Hunslet in 1954 for Woolwich. The locomotive is pictured in Devon in the 1990s when it was running on Bicton Woodland Railway.

Much of the War Department 60cm track was lightly laid; 20 pounds per yard was typical. To give some idea of its temporary nature, current track on the 2 foot 3 inch gauge Talyllyn Railway main line is laid in 60 pounds per yard material, whereas on UK standard gauge line weights of 125 pounds per yard are not unusual. The feeder tramways, working in the 'Heavy Artillery Zone' commencing some three miles from the front line and operated by the Army Transport Companies, were laid with even lighter track, 9 pounds per yard, prefabricated and laid directly on the ground.

Operating conditions were quite primitive and derailments were common, as were disruptions caused by enemy shellfire. The larger 'main line' 60 cm gauge locomotives, such as the Hunslet and Baldwin 4-6-0s and the American Locomotive Works 2-6-2s (the 'Alcos') were equipped with water lifting gear – similar to that fitted to traction engines – and this enabled locomotives to replenish their water from rivers, streams and even shell holes when necessary. Water towers were impractical in front line areas as they made ideal targets for enemy aircraft or shellfire.

On the opposite side, the Germans were far better supplied with 60cm gauge equipment. Some 300 bogie tenders were available to work with almost 2,500 *Feldbahn*

0-8-0 locomotives, of identical design but built by 19 different companies.

One disturbing fact, associated with retreat when it became necessary, was that a hand grenade in the firebox quickly immobilized any locomotive that could not be moved. What a waste of all that lovely copper! There were exceptions to this however if time was available, and a more sympathetic approach was to strip locomotives of their injectors and side rods and, likewise, tractors of their magnetos and compressors – the parts were buried locally (ref 64). To avoid too many losses, east to west escape lines were installed at various points, which each fed back to a permanent terminus of the standard gauge.

Transshipment

One of the main obstacles to the application of narrow gauge railways in general is the need to move goods between gauges and, in particular, at the interface with the standard gauge. On the Western Front a lack of manpower was not a problem but, even so, moving material from the standard gauge to 60cm gauge must have been a major nightmare. Additionally, the primitive 9 pounds per yard tramways serving the trenches demanded further transshipment, as the lightly laid tracks were not suitable for locomotives or for 'standardised' bogie wagons. Motive power on these tracks was provided by manpower, mules or heavy horses. In Palestine, additional transshipment occurred

between the 2 foot 6 inch and 60cm gauges (ref 64).

WDLR motive power

In general, the mechanical motive power available on the WDLR 60cm lines could be broken down into three types:

1. 'Main line' 60 cm gauge engines, such as the Hunslet (modified Hunslet *Hans Sauer* class), the Baldwin 4-6-0s and the 2-6-2s built by the American Locomotive Works (referred to by their crews as 'Alcos' or 'Cokes', after their alternative company name the Cooke Locomotive Works). The 2-6-2s were the preferred option by the operators due to their ability to run equally well in both directions;

2. The lightweight Hudson 'G' class and Barclay modified 'F' class 0-6-0 well tanks were used on lightly laid 'feeder' lines, along with the petrol locomotives, for shifting war *matériel*, such as shells, trench building material etc. up to the front line;

3. The petrol-engined locomotives, such as the 20 and 40 hp 'Simplex' ('protected' and 'armoured' types), the 'Crewe Tractors' which were Model T Fords modified by the LNWR at Crewe locomotive works and the 'petrol-electrics' (two types – Dick Kerr and British Westinghouse), each with 55 hp four-cylinder petrol engines driving a 30kW generator, which supplied 500 volts to two electric traction motors; one on each axle with the final drive via gears.

● To be continued.

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61. Keith Taylorson, *Narrow Gauge at War*, Plateway Press, 1987.
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Murdock Vertical Oscillating Engine PART 2

Geoff Spedding builds the Murdock oscillating engine from the Myers Engine Works.



Continued from p.824
M.E. 4640, 5 June 2020

Cylinder (Part 11)

I had to ponder over the best way to machine the cylinder. Apart from its shape, there was some miss-alignment of the two halves of the cylinder casting. Of more significance, however, was the cylinder bore was cast off-centre by around an $\frac{1}{8}$ inch and ran at a slight angle through the cylinder. This prevented drilling out the bore and holding on a mandrel to face off the cylinder ends. However, for holding purposes during machining, a spigot has been cast on one end of the cylinder rotation axis; the valve ports being on the opposing end. Measurements of both the spigot and valve end diameters indicated reasonable concentricity, so centres were marked and drilled with a centre drill. The cylinder was mounted between centres in the lathe with the chuck being used as a driver. The valve port end was machined round, not quite to the finished dimensions at this time. The casting was then reversed and the spigot end machined (**photo 16**).

I next needed to get one end of the cylinder square with the rotational axis so I could



machine the cylinder bore. To do this I transferred the casting to the rotary table on the milling machine, using a tailstock for support (**photo 17**) and with some light passes with the $1\frac{1}{2}$ inch cutter, smoothed and squared one end.

With one end squared the casting was returned back

to the three jaw chuck in the lathe to correct the alignment of the cylinder bore. The best possible concentricity was obtained by checking with a dial gauge. With a boring bar and taking light cuts of around 5 thou, the cylinder was bored to 0.75 inch diameter. At this point the cylinder was removed from the chuck and mounted on an arbour (**photo 18**). This allowed the other end of the cylinder casting to faced off and flange finished to its diameter of 2.18 inches. The cylinder was then reversed and the other end finished. The cylinder was machined to its finished length of 3.06 inches at this time.

With the cylinder end flanges machined to the correct diameters the cylinder was re-mounted in the three



Machining the spigot end of the oscillating cylinder.



Facing off one end of the cylinder.

jaw chuck and checked for concentricity. Taking small cuts, the cylinder was carefully bored to the specified finished dimensions of 1.27 inch (**photo 19**).

With the completion of the boring of the cylinder, the centres of the cylinder flanges were marked for drilling of the steam passages. The cylinder was transferred to the milling machine and after centering and setting the offset of 0.875 inch the $\frac{3}{16}$ inch diameter passage was drilled to a depth of 1.25 inch on both ends. At the same time a $\frac{3}{16}$ inch wide slot 0.10 inch in depth was milled connecting the steam passage and cylinder bore.



Facing off the other end of the cylinder using an arbor.



Boring the cylinder.

The cylinder was then rotated 90 degrees and held by the spigot, in the machine vice and the centreline transferred from the flange end to the port flange by using

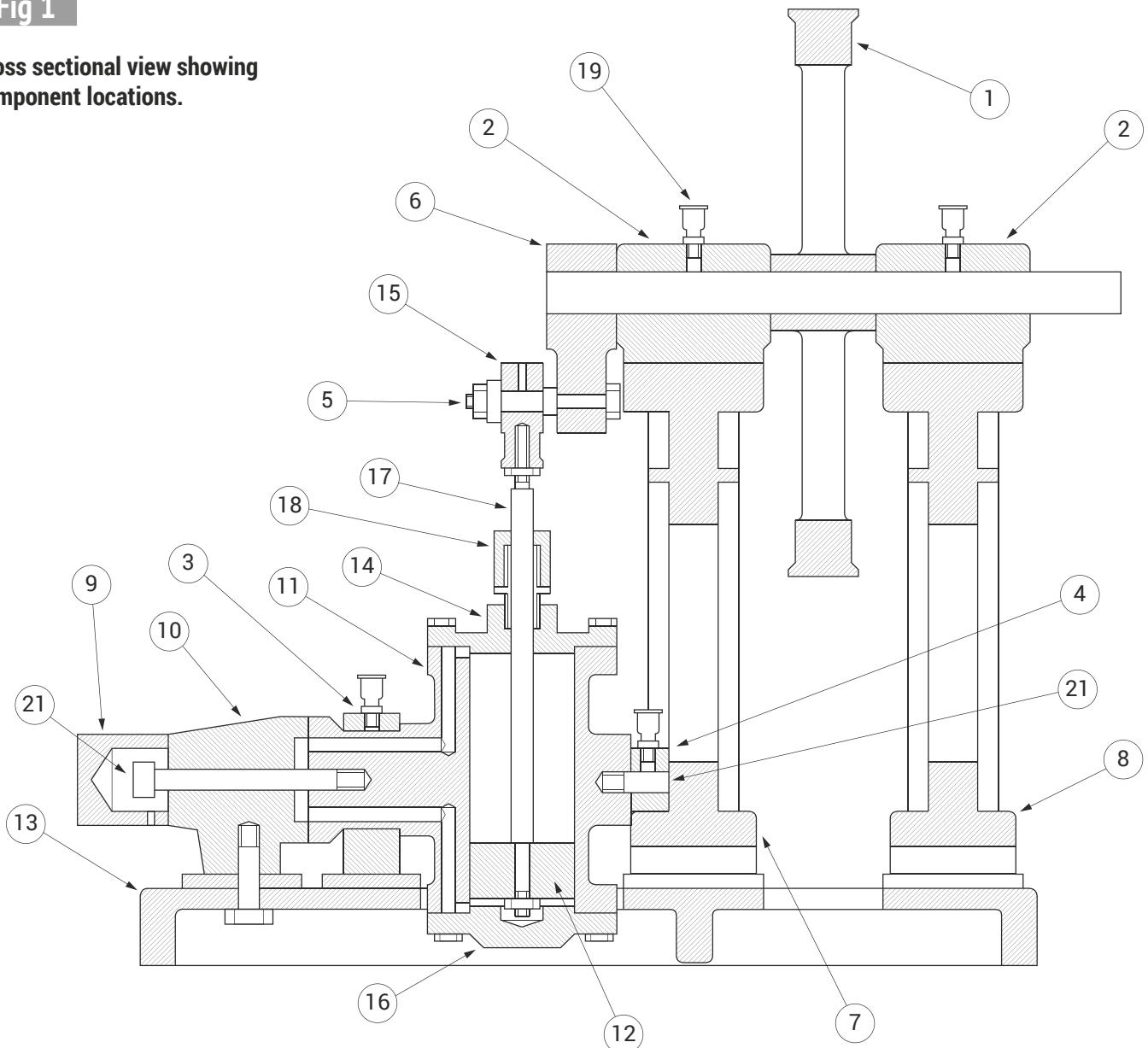
the height gauge (**photo 20**). Using the spigot the cylinder was held in the machine vice and aligned for drilling the intersecting steam ports (**photo 21**). These were drilled

to a depth of 1.56 inch to intersect the cylinder ports.

The cylinder was returned to the lathe to drill the $\frac{1}{4}$ inch hole for the rotational dowel along with drilling and tapping

Fig 1

Cross sectional view showing component locations.





Transferring the cylinder centreline to the port flange.



Drilling the steam ports.



Drilling the hole for the rotational dowel.



Turning the cylinder bottom cover.



Turning the bottom cover to the finished diameter.



Drilling the fixing holes in the cylinder covers.



Squaring up the cylinder bearing block.

remove the material remaining around the centre hole.

Cylinder head bottom and top (Parts 14 and 16)

The cylinder head bottom casting was machined first. It was mounted in the three jaw chuck held out by spacers and the internal surface machined first. To facilitate the machining of the outer face the internal bore section was machined to a greater depth to enable it to be held in the chuck (photo 23). On completion of machining the inner face, the outer face was machined to the finished profile. The casting was then reversed again in the chuck and a revolving centre used to hold the head in the chuck (photo 24) and then turned to finished diameter. Again the head was mounted in the chuck with spacers and the internal bore section reduced to the correct depth.

The cylinder head top was turned in a similar fashion. However, holding was much easier with it having a greater section for holding the piston gland nut. The gland was drilled and tapped with a $\frac{3}{8}$ inch x 32 ME thread.

Both the top and bottom cylinder heads were transferred to the rotary table on the milling machine and the six bolt fastening holes were drilled at 1.75 inch between centres (photo 25).

The cylinder heads were then used as the templates for drilling the cylinder holes. The cylinder heads were aligned on the cylinder and held in place with a couple of machinist's clamps. One hole was drilled and tapped 4BA to hold the cylinder head in place. The remaining holes were drilled and tapped. The cylinder head holes were then drilled out to the clearance size.

Cylinder bearing (Part 3)

The cylinder bearing is machined from two generous sized cast aluminum blocks. The blocks were mounted in the four jaw chuck and rotated to clean all sides and square them up (photo 26).

the bearing end for the $\frac{1}{4}$ x 20 UNC rotational holding screw. Photograph 22 shows how this was carried out. One end being held in the chuck with the other end being supported by a steady. The holding spigot was not removed at this time. It was left on until final assembly commenced and its final length could be determined. At assembly time, once measurements of distance between the bearings was established, surplus material was then cut off the spigot. The cylinder was again held in the lathe chuck and supported on a rotating centre to allow it to be finished to its final length. A little filing was required to

While the drawings give a finished width for the bearing and bearing split dimension, no length or height is given. A length of 2.2 inches was arrived at from measurements of the engine base. Both upper and lower bearing blocks were finished to this length and the height of the lower half machined to the finished split height of 1.09 inch. This time both bearing halves were mounted together in the four jaw chuck (**photo 27**) and machined to the finished 0.68 inch width. The blocks were removed from the lathe and the locations of the two fastening holes were marked as noted on the drawings. The two fastening holes were drilled and the lower half tapped at this time to hold the halves together. With the two halves bolted together the



Machining both bearing halves to the finished width.



Finishing the profile of the bearing block.

bearing centre was marked and drilled with a centre drill. The bearing was then returned to the four jaw chuck and carefully centred.

Drills were used to open the bearing hole to $\frac{3}{4}$ inch then with a boring bar to the finished diameter. With the bearing bored, 0.6 inch was skimmed off each side to give

the finished profile shown on the drawings. The drawings give no specific measurement for this profile width; mine ended up at a diameter of 1.50 inch (**photo 28**).

The drawings show a curved top on the bearing. One could have a straight top on the bearing. I decided to make mine as illustrated in the drawing. Back to the milling machine where the material was removed to the outer circumference of the profile and from the sides.

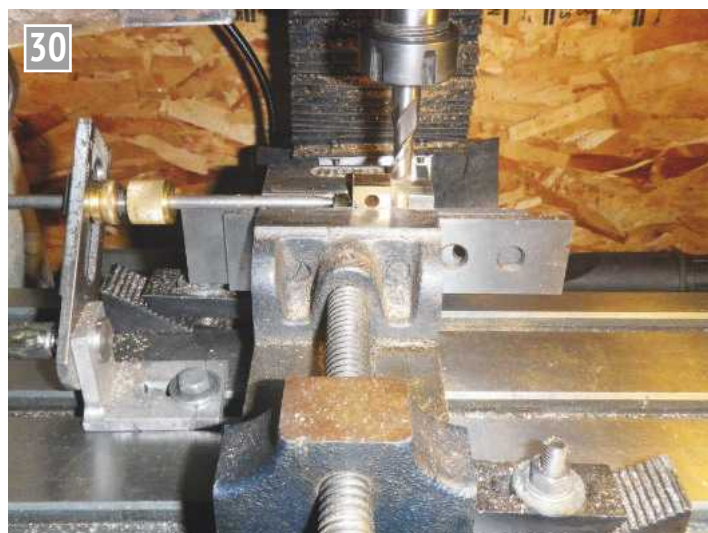
To form the curvature on the top of the bearing it was mounted on a mandrel in the rotary table on the milling machine (**photo 29**) supported by the tail stock. A small milling cutter was used to take small cuts down to the required profile. Final finishing was undertaken with needle files and emery paper.

bar in the milling machine, the dimensions of the bearing were marked out and the $\frac{1}{4}$ inch bearing hole drilled. The surplus height material was removed with a hacksaw, then the bearing cut off the length of bar. Mounted back in the milling machine vice it was machined to the correct length. Then the side profiles were cut to the drawing dimensions. Through the use of a vice stop the part was reversed and the second fastening shoulder cut (**photo 30**). The bearing height, along with the width, were then finished to the drawing dimensions. Lubricating and fastening holes were also drilled at this time. **Photograph 31** shows both the finished cylinder bearing (Part 3) and the bearing block (Part 4).

● To be continued.



Forming the curvature on the top of the bearing block.



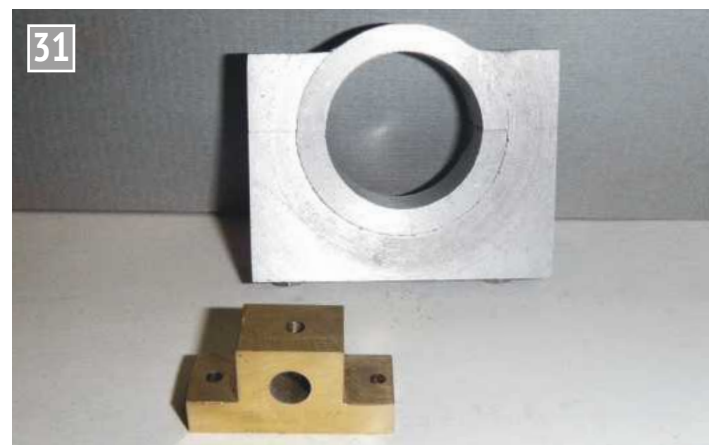
Forming the profile of the second cylinder bearing.

Bearing block for cylinder (Part 4)

This was made from a piece 0.5 inch x 1.0 inch brass which I had in stock. After squaring one end of the brass

NEXT TIME

I deal with the piston assembly and go on to complete the engine.



Completed bearings.

Geoff Theasby reports on the latest news from the Clubs.



Malcolm Place's go kart. (Photo courtesy of Mary Place.)

Hello all! Gosh what a palaver! We are living in 'interesting times' as the Chinese curse is reputed to go. In the turmoil I have been mentoring a young man who wishes to take up amateur radio. Truly, he knows nothing about it. However, we were all in that position once and he's keen.

I had a concentrated effort on the 'Bolide' for a few days and have reached the conclusion that the garage floor is too rough for its delicate little wheels. According to Parkside Electronics, a 150 watt motor should be able to pull 2 or 3 people at 8mph on a reasonably level track so, with this in mind, I shall modify my existing 20 feet of 5 inch gauge track, acquired with *Deborah*, my other locomotive project, to add a third rail, so my 7¼ inch Bolide will run on it. If it still won't take me on a tour of the garage, I may have to increase the gear reduction ratio. So, studding and hex nuts delivered, it awaits my production of a drilling jig to avoid lots of marking out.

In this issue: 'No news' is bad news, more newsletters, a shrinking lake, sad remains, a junk boat, window copying, a coprophilic matter, Murphy, getting shirty and *not* cooking with gas...

Anyway, ignoring all that, another fumble in the swarf bin reveals that *PEEMS News*, April issue is on top, so... **Pickering Experimental Engineering and Model Society's** journal begins with Jonathan Milner admitting he has no news to report. What, not even of the unfortunately-nicknamed 'Piglet' on the NYMR (televised as the Yorkshire Steam Railway)? Then the question on everyone's lips was, "what did Cooke, Troughton and Simms do in the war, Daddy?" The answer lies within... Jonathan tells us of his time on the *SS Oronsay* as Junior Engineer Officer. He describes this vessel as 'built in 1950, 28,000 tons and worn out'. Progress on Ivan Shaw's personal aircraft, which was tested at Leeds East Airport (ex-RAF Church Fenton), has thrown up a few niggles - see next issue. Neville Foster used to work in the acoustics dept. at BAC Weybridge (Brooklands) and tells of an intriguing incident at the end of a Heathrow runway. (Enquire within.) He also modified his Mini to have a fibreglass, forward hinged bonnet like the Triumph Herald/Vitesse/Spitfire. (This probably made it stronger than the steel original - Geoff.)

W. www.peems.co.uk

St Albans & District Model Engineering Society Newsletter has increased its production rate to fortnightly. There's confidence! Editor, Mike Collins already has enough copy for the next several issues, this one weighing in at a very decent 23 pages. Chairman, Clive Reynolds, in his last report before stepping down, notes the passing of the boating lake, by shrinkage, like the Aral Sea. Other 'meres' have been offered to the club, but with constraints. Meetings have been cancelled as in so many other groups. It was suggested that the telephone would be a suitable alternative method of communication. To which, I hear you cry ...Well, anyway, welcome to the 21st Century! How about *Zoom* or *Webex* for large meetings and *Skype* for more individual contacts. (Other virtual meetings systems are available.) Treasurer, Mike Grossmith sent a picture of an unfinished and abandoned 'Buran' (Russian space shuttle attempt) - a very depressing picture; dirty, rusty, unmaintained, not even in a museum. (Now I know form follows function, but Buran and Concorde in its time, look very like their American and British counterparts, making me think of industrial espionage. - Geoff.) Mike uses

this to introduce an idea to resurrect all those half-finished projects we once began with enthusiasm until *force majeure* brought a hiatus. Rob Briancourt updates us on his 'hard chine' Harbour Pilot boat, the constructional aspects of which were news to your scribe, as such details rarely appear in *Model Engineer*. Collingwood, Port of Tyne's new pilot boat, which may be similar, we spotted from our cruise on *Balmoral* last year. We were at breakfast at the time so no photo. <https://www.maritimejournal.com/news101/vessel-build-and-maintenance>

Following this, Clive Reynolds also updates us on the Gauge 1 project. Steve Knapman bought an unkempt power boat he found in a 'Junk Bucket' at a museum. He thinks it is about 50-plus years old, maybe a Basset-Lowke. If it is he would like to clean it up, preserve the patina and keep it.

W. www.stalbansmes.com
Steaming Ahead, spring, from **Crowborough Locomotive Society**, has an item by Vice Chairman, Malcolm Place on his progress through engineering. It began, when aged 12, as he built a go-kart from angle iron, 1/4 inch Whitworth fasteners, a 250cc BSA Bantam engine, a Ford Popular steering box found on a bomb site and a government surplus ejector seat (I can't resist it, I can't... 'One careful lady owner') (photo 1). It dates from 1959 and the contemporaneous picture was taken on a Box Brownie by his twin sister. He then owned several motorbikes, including a Scott 1928 replica TT bike (a basket case) and ten Triumph Herald and Spitfire insurance write-off rebuilds. He recommends this activity as ideal for trainee and junior engineers. In 'Foreign Stuff', John Wood explains his interest in other countries' steam locomotives. He concludes with André Chapelon's ultimate design, 242A1, in 1946, which was more powerful than the

locomotives replacing it. It was put to the torch in 1960.

W. www.crowboroughminiaturerailway.com

Grimsby & Cleethorpes Model Engineering Society sends its April *Blower*, which reveals that GCMES has been asked to replicate two missing drop windows for the 1932, ex-LCC Bluebird tram being restored at Crich. Dismantling proved difficult as the example to be copied was of a similar vintage and, unlike wine, trams do not improve by being neglected.

W. www.gcmes.com

The UK Mens Sheds Association sends the April *Shoulder to Shoulder*, the highlight of which, I thought in my twisted way, was how to make toilet roll holders. (For 'poo tickets', so help me...) Very apposite, especially if you are one of those who immediately stocked up earlier this year. To make it more interesting (!) there is a competition. If such sophisticated activities are not to readers' liking, there is a whole page of URLs to stave off boredom, *ennui*, jigsaws or late-night TV. The Australian Mens' Shed Association has developed a program to enable shedders worldwide to keep in touch. Other, established

programs like WhatsApp, Zoom and Skype are also mentioned elsewhere in the publication.

W. www.menssheds.org/theshedonline/ Charlie Bessel, UK Mens Shed's Chief Officer has written a poem on the lockdown, echoing the sentiments above, detailing his late night activities - in his case, watching his own shed on his own CCTV circuit... And then, there's this by a man called Patterson: https://www.youtube.com/watch?v=1a0bfWbOLjY&feature=emb_logo

W. www.menssheds.org.uk

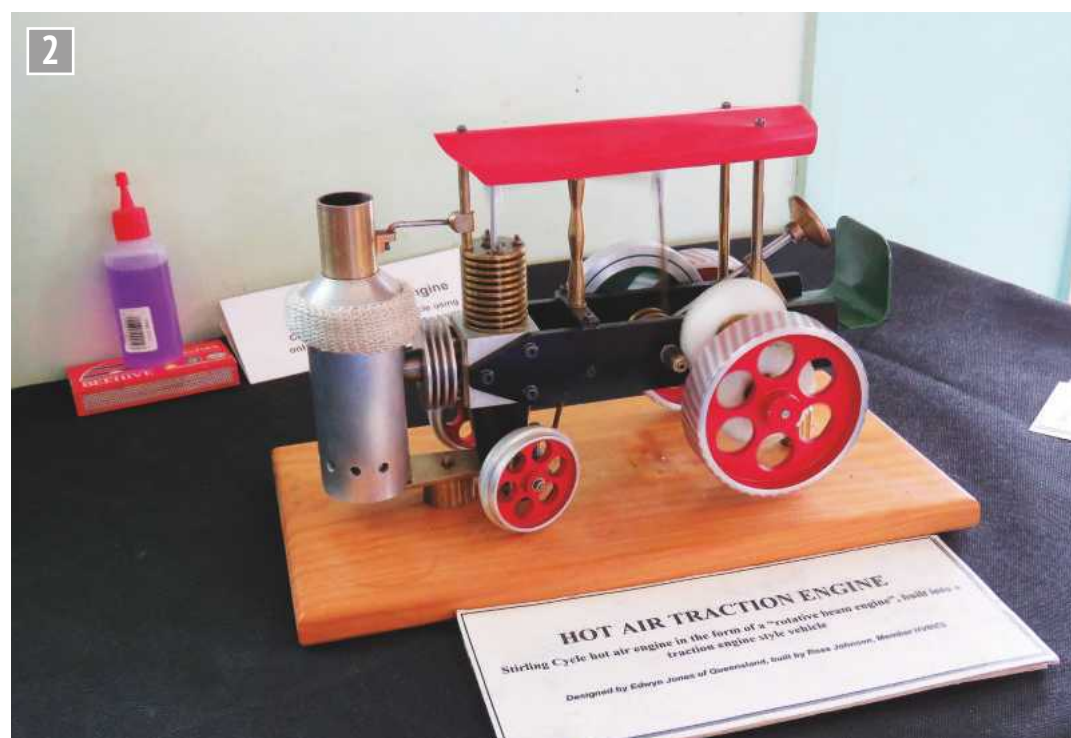
Model Engineers Association, Auckland, in their April *Newsletter*, had a virtual 'Show & Tell' meeting, one of which was a little different. A semi-automatic .22 rifle was lent to a friend, including a 15 round magazine, which size of magazine has since been declared 'rem non receperent'. Therefore, it was carefully cut down to hold only 10 rounds. Murray had a close encounter with the mythical Murphy recently. By the time all the dust had settled, Murphy was winning 10-nil. Dave Hamp has been making a John Harrison-style skeleton clock with a grasshopper escapement, a new venture for him. Edgar

Salwegter has made some fly cutters with which to make clock gears. Again a new experience for him and they work very well.

Blast Pipe, May, from **Hutt Valley & Maidstone Model Engineering Societies** joint newsletter, says that the Committee made Club History by meeting via Skype for the first time. Only three members could not join in, two because of a gremlin and one who did not have the necessary equipment. A discreet note by the Editor announces that if any members are financially embarrassed by the lockdown, arrangements can be made for subscriptions to be made periodically. Ross Johnson has built a hot air traction engine from a kit and ten excellent drawings by Edwyn Jones in Queensland, Oz (photo 2). Hutt Valley President, Claude Poulsen comments on the extreme lack of traffic on The Esplanade, Maidstone.

W. www.hvmes.com

Steam Lines, May-June, from **Northern Districts Model Engineering Society**, Perth, tells of some members who spent an enjoyable day at Katanning Miniature Railway in March. Lest anyone look askance at this outing with



Hot air traction engine at Hutt Valley MES. (Photo courtesy of Ross Johnson.)



Loading logs by steam power. (Photo courtesy of James Huntley.)

20:20 hindsight, says author Jim Clark, this was before the lockdown came into effect and restrictions placed on gatherings. How quickly the world has changed in a few weeks. Dave Barlow, visiting family in Oz for six weeks in 2015, called at NDMES and was photographed in a bright pink shirt, which his wife promptly binned. (I share your pain, Dave; I had a couple of such shirts, which met the same fate – Geoff.) Alan Ward had a train trip from Adelaide to Brisbane using carriages from The Ghan. Due to the bush fires, an extra 400km of track, many freight-only, were traversed. Quite a memorable trip for the 159 passengers! Continued from the previous issue is an item on the early valve gear, the Carmichael, or 'Gab' gear. The invention of a single, slotted link, which now seems so obvious, did not appear for another ten years, being used by Robert Stephenson in 'his' valve motion. Laurie Morgan, continuing his Stuart Turner build, wonders how the original coped with adjustment of two independent flyball governors. Surely, he thought, one governor controlling both engines would be better, yet the original had two... The biggest beam engine in the world can be found quite close to Schiphol Airport in the Netherlands, called 'De Cruquius'. As Tom Winterbourn points out in a fascinating article, we modellers make steam cylinders of about

an inch in diameter and a Duchess Pacific cylinders were 16½ x 28 inches' this cylinder was 144 inches in diameter! Designed for draining the land, its eight beams could drain a swimming pool in eight minutes. Built in 1849, it drained the Haarlemmermeer, with its two sister pumps, in three years. It was decommissioned in 1932 and became a museum.

W. www.ndmes.org.au

This newsletter's title reminds me of something I overheard at RailFest at the NRM in York, 2004. A young couple with children aged about 10 or 12 were cultivating the habit in their offspring of moderating their tendency to use foul language. To this end, they fabricated their own expletives, 'Great Steaming Pistons!' and 'Red Hot cinders!' As these oaths have not

become common parlance, I assume they fell on deaf ears, but nice try!

Raising Steam, April, from the **Steam Apprentice Club** of the National Traction Engine Trust, has Acting Chair, Nick Bosworth, regretting the lockdown since it meant the cancellation of The Great Northern Steam Fair at Beamish, to which he was due to take his own engine, a Foster 7 nhp built in 1920 and named *Sprig*. An online steam rally is being organised by Charlotte Coulls and here is a fine tableaux of loading logs onto a trailer using Mamod steam models, by James Huntley (**photo 3**).

This was devised to keep the Apprentices' interest high during the hiatus. Further ideas will be on building trailers using K'Nex. The downside of cooking with steam is illustrated by several pictures of what began as food, but then went into the firebox. Jacket potatoes did not survive being warmed up in the smokebox as the engine concerned took on a steep hill and a forgotten stew which boiled dry had to be removed from its container with a hammer and chisel. Before the mid-1800s there was no common design of traction engine and some strange examples appeared. As well as those that Cherry Hill superbly modelled, Fowler produced some with 9 and

12 foot diameter rear wheels, supposedly less likely to get bogged down. In respect of the pandemic worries about social distancing, our attention is drawn to - #Twittersteamrally (A virtual rally, M'lud)

W. www.ntet.co.uk>sac

B&DSME News, April, from **Bournemouth & District Society of Model Engineers**, reports that Simon Ganderton has been restoring a Kent Water Meter clock found in a barn; it was mostly complete, but sans pendulum and weights. Having 3-D printed and cast the missing items and with 20 kg of weights, it now runs for a week, as intended. Chris Bracey writes from the Eastleigh Lakeside Railway Diesel day (no electric lookalikes in disguise!) which has 7¼ and 10¼ inch gauge tracks.

W. www.littledownrailway.org.uk

Not many photos this time, so here is one from my archives. Taken on 35mm film and scanned for this occasion, at the NRM's 'Railfest' in 2004, it shows three superbly presented Scammel mechanical horses in three different liveries (**photo 4**).

And finally, I've invented a new word: plagiarism.

Contact:
geofftheasby@gmail.com



The 'Big 3' at Railfest, York, 2004.

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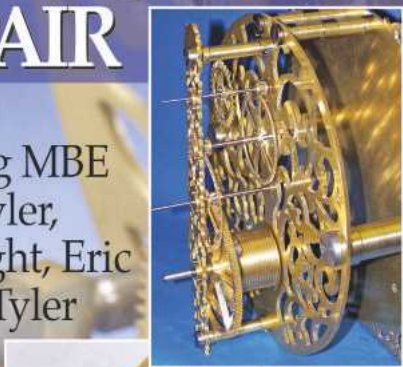
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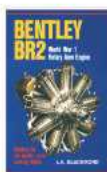
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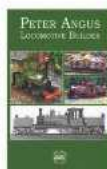
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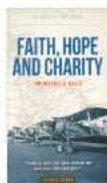
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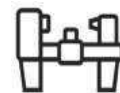
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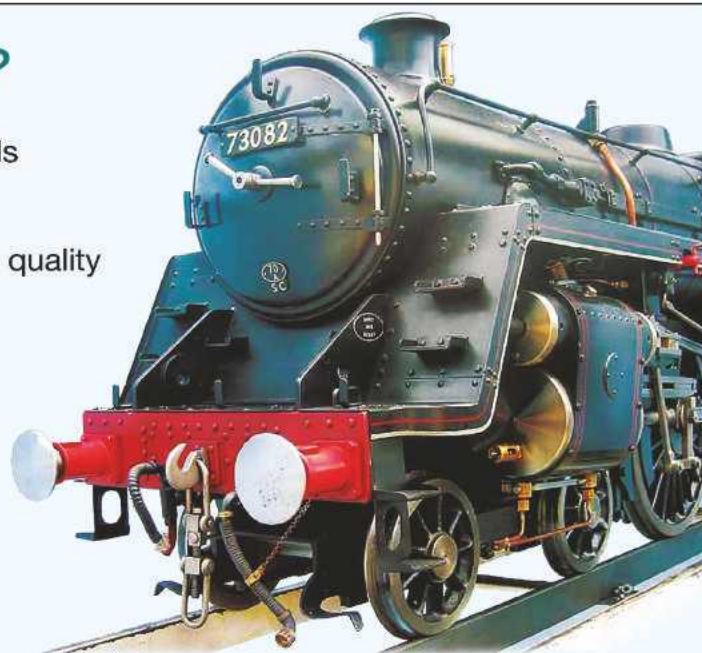
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