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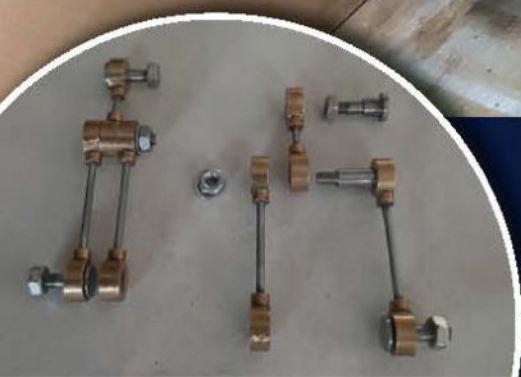
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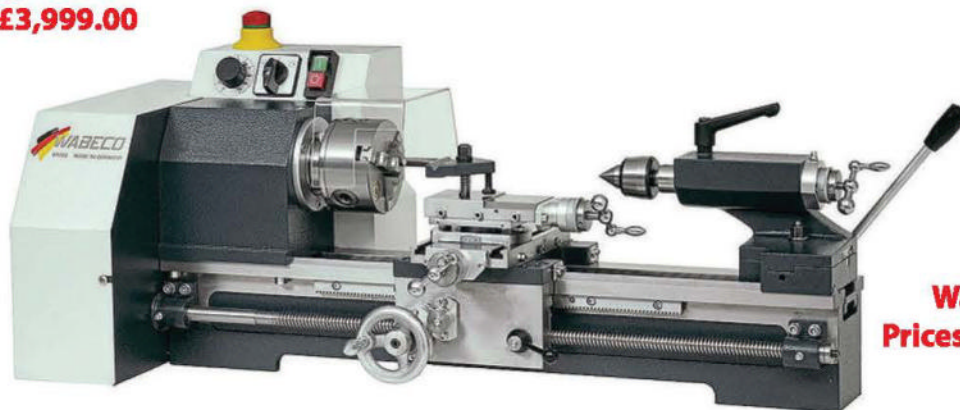
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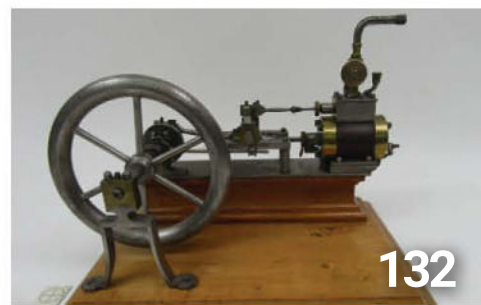
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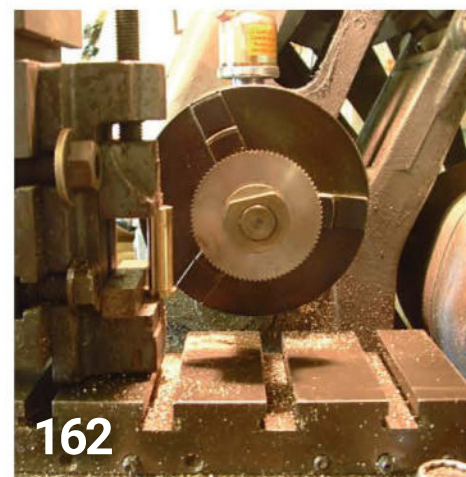
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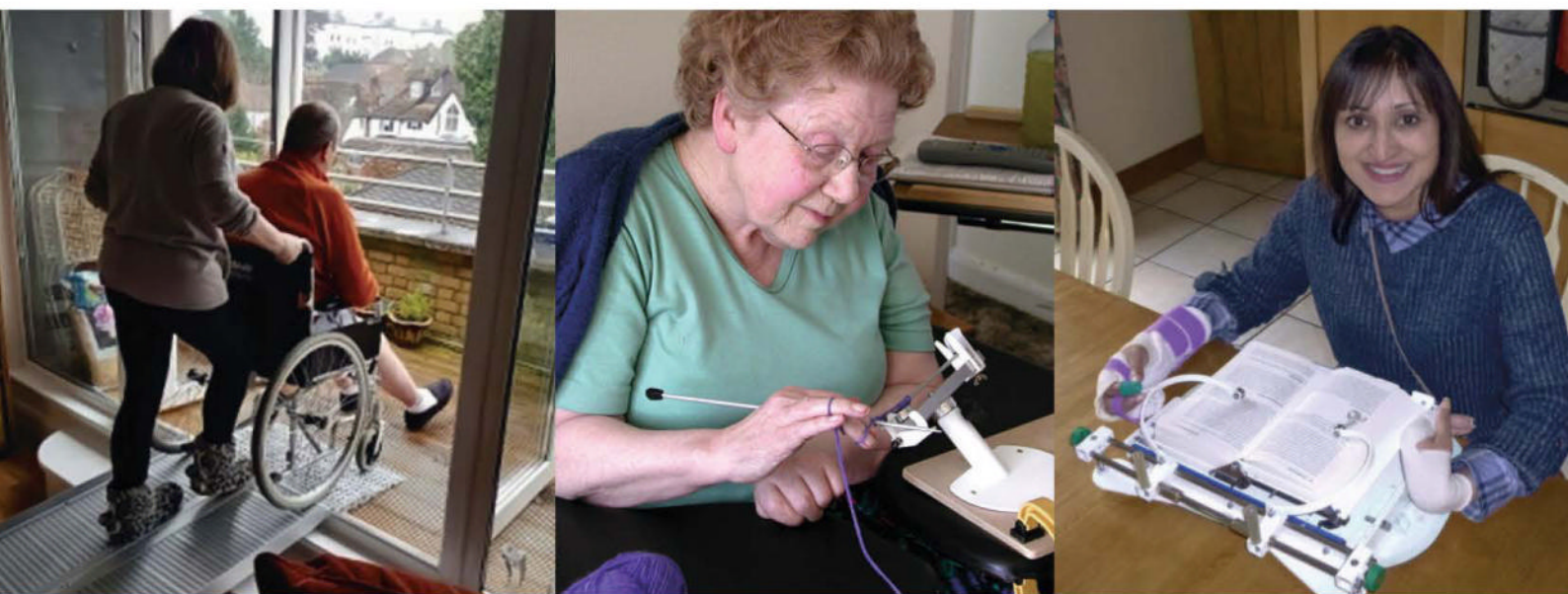


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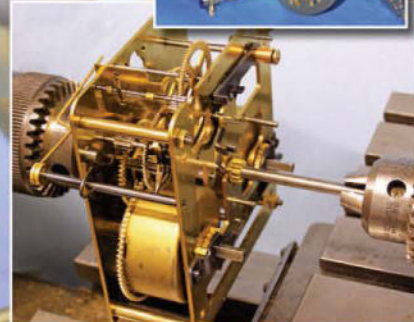
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Hobbies

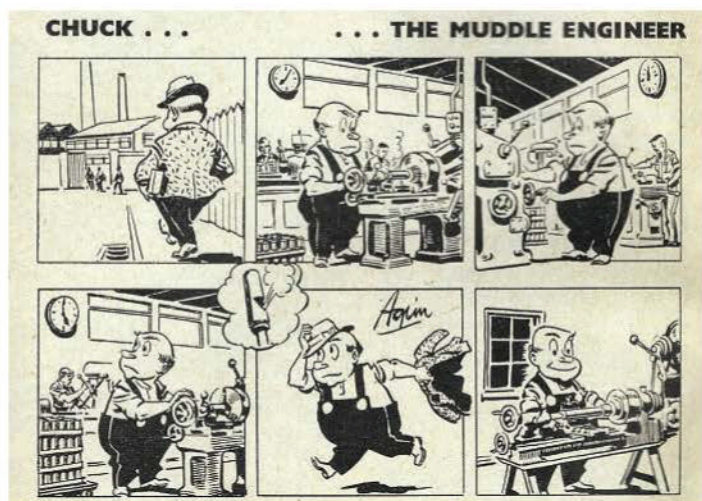
Every man should have a hobby. It provides him with a pleasant way to fill his spare time, it provides a great deal of personal satisfaction if it involves the acquisition of a new skill and it has therapeutic value, distracting us from the stresses and cares of our lives. Some say a man (or a woman, of course) should have three hobbies – a physical one, to keep him in good health, a cerebral one, to keep the mind active, and a creative one. Model Engineering, I believe, satisfies all three of these requirements so it has triple value as a hobby!

Hobbies depend, of course, on the existence of free time. Long ago, this was a rare commodity as maintaining a home and providing food and clothing was, for most people, more or less a full-time occupation. These days, life is comparatively easy and the necessities of life can be supplied with much less effort than used to be the case.

Consequently, many people fill their spare time with a variety of hobbies. Some are entirely unrelated to their working lives but some draw on the same skills employed during the day time. In the past, the 'traditional' model engineer was in many cases a man who worked during the day as a turner or fitter but during the evening would redirect those skills to the construction of a steam locomotive or traction engine. This seems an odd thing to do but perhaps context is everything – working for someone else and working for yourself are two entirely different things. Ron Fitzgerald has drawn my attention to a cartoon by B. Terry Aspin which nicely illustrates this point.

I think we might argue that the pursuit of hobbies is one factor that makes Britain what it is. A Japanese study has suggested that the British are the originators of 50% of the world's inventions and discoveries.

That's extraordinary, isn't it? How can it be that a rather



The difference between a job and a hobby, according to Aspin (from Model Engineer, M.E.3100 December 8 1960).

small country should be so inventive? Even if the 50% figure is disputed there is no denying that many of the developments that define the modern world come from Britain, certainly more than the size of the country might suggest.

The answer ultimately, perhaps, is geography. The living in the British Isles is comparatively easy, more so than many other places, with a benign climate, fertile soil and easy access to a virtually unlimited source of fuel, in the form of coal. A substantial minority of the population could get away with doing very little real work and so these people had the time to pursue their own interests. Many of these people were what we could call 'gentlemen scientists'. Typically, they might be wealthy land owners, clergymen or academics. Being generally well educated they would often pass their time exploring science or technology. Charles Darwin is one example. He spent most of his time as a student in Cambridge out in the countryside looking for beetles and, not having to work, was able to join *HMS Beagle* on its voyage around the world, including the Galápagos Islands. Eventually he was able to publish his magnum opus *On the Origin of Species*. Robert Boyle was the son of an Irish Earl who developed an interest in science, was a founder member of the

Royal Society, and went on to formulate his famous gas law. There are many other examples, which Lisa Jardine presents in her excellent book *Ingenious Pursuits*.

Hobbies, then, can have an importance far greater than their use simply as a means of filling time. They can influence the development not only of an individual but also of a nation. Every man should have one.

IMLEC and LittleLEC

Now that our shiny new year resolutions have come and gone it's time to consider our activities for the coming year. So far, I have fixed dates for two important events – IMLEC (the International Model Locomotive Efficiency Competition) and LittleLEC (the same for small locomotives).

IMLEC goes north this year and will take place at the Southport Model Engineering Club on Friday, Saturday and Sunday, 19th-21st July. This competition is open to 3½ and 5 inch gauge locomotives and further details about how to enter and so on will be published shortly. LittleLEC takes place at the North London Society of Model Engineers' track at Colney Heath on Saturday and Sunday 8th – 9th June. The competition, again, is open to 3½ and 5 inch gauge locomotives but the dry weight of the locomotive is limited to 50lb. Further details, including how to enter, are given in Martin Cooper's article on page 170.

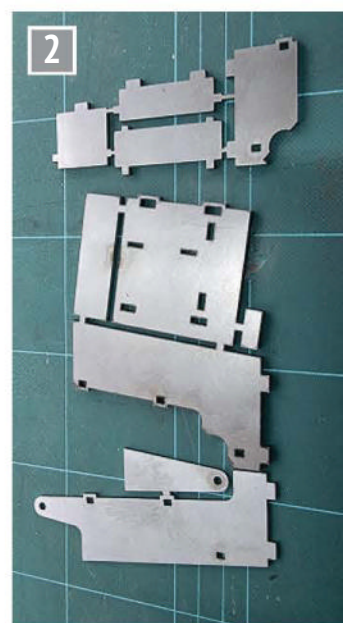
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Flying Scotsman in 5 Inch Gauge

PART 58 – REVERSER STAND



Reverser stand for Sir Nigel Gresley.



Below we see the parts as supplied by Ed.



A quick dry run to check the fit

Peter Seymour-Howell

builds a fine, fully detailed model of Gresley's iconic locomotive to Don Young's drawings.



Continued from p.651,
M.E.4717, May 5 2023

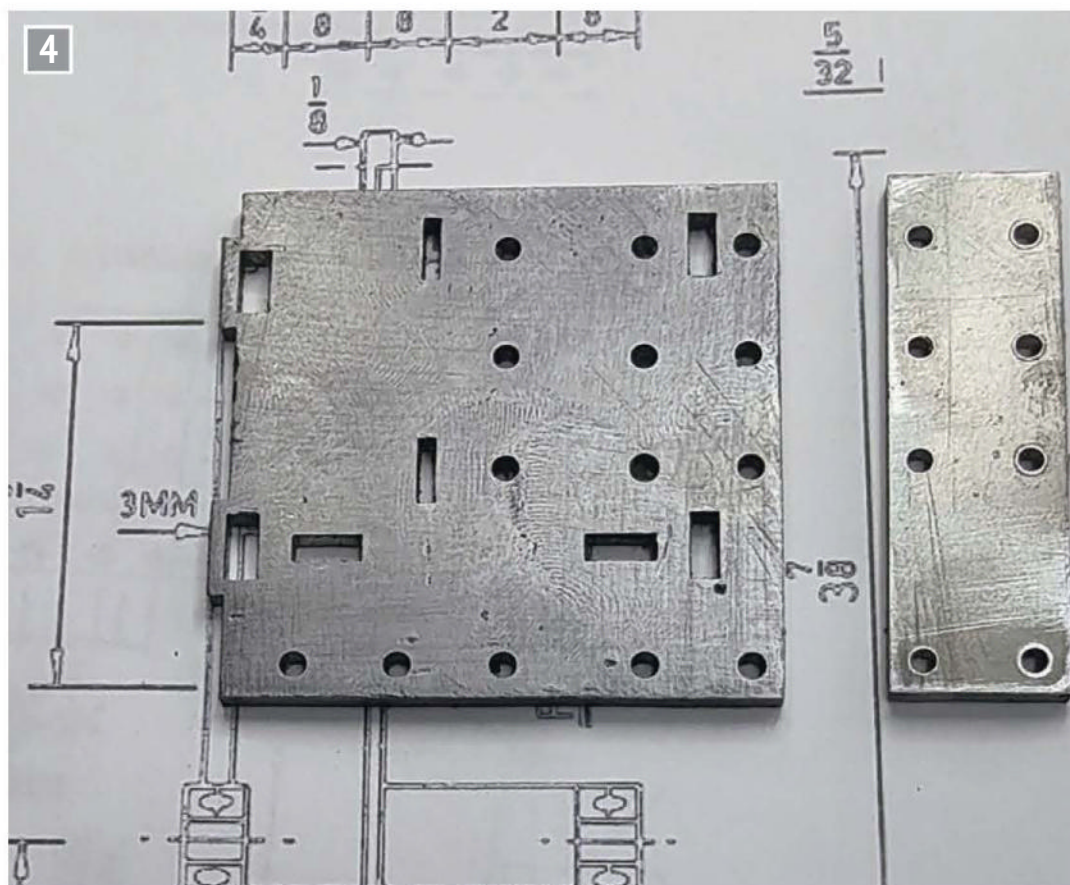
Yes, I'm back on the locomotive. It's hard to believe that the last time I worked on the locomotive itself was June 2022. The workshop still has some way to go but internally I have half of it powered and it's warm with a new infrared heater, good enough to continue with the main project while outside is a bit wet and cold.

The reverser on a Gresley Pacific is a fairly involved component and thus will take a number of parts to cover it in

detail. Don's drawing is really good and very close to the prototype but needing just a few details added to complete the picture. For those who are on the same road as myself, we are lucky to have plenty of very good photographs freely available on the A4 60007 Sir Nigel Gresley overhaul blog.

Photograph 1 is a particularly good image showing the general stand and there are plenty of others that will help greatly during the build of this part. The sanding valve seen

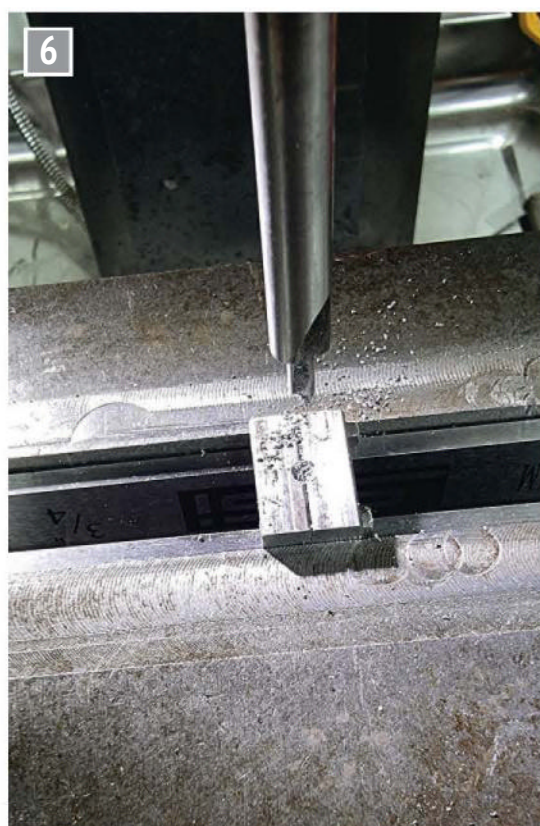
on the front of the stand is covered in Don's words (no drawing) but there is another oil cup that sits below this that feeds the two bearing caps below via copper tubes; these



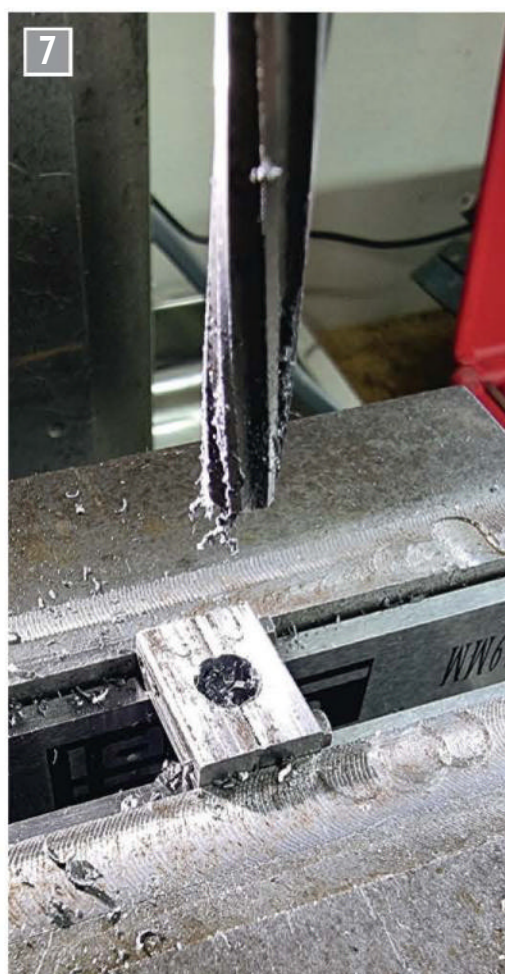
The first job was to drill the holes in the base plate - this needs to be done before brazing together.



Next job was to make the bearing caps which will eventually be silver soldered in place. I first got four $\frac{3}{4}$ inch lengths of $\frac{1}{4}$ inch square bar. These were overlength to begin with and were then drilled 1.8mm ready for tapping 8BA into the bottom halves fitted to the stand, the top halves then being opened up for clearance.



The parts were then bolted together and equalled in length ready for drilling the $\frac{1}{4}$ inch bore down the middle of the bearing block. Normal practice perhaps for this is to clock the parts in the four-jaw chuck and bore them on the lathe, I chose to do the job on the mill - it's a quicker set-up and for this particular job more than accurate enough.



Drilled and reamed $\frac{1}{4}$ inch.



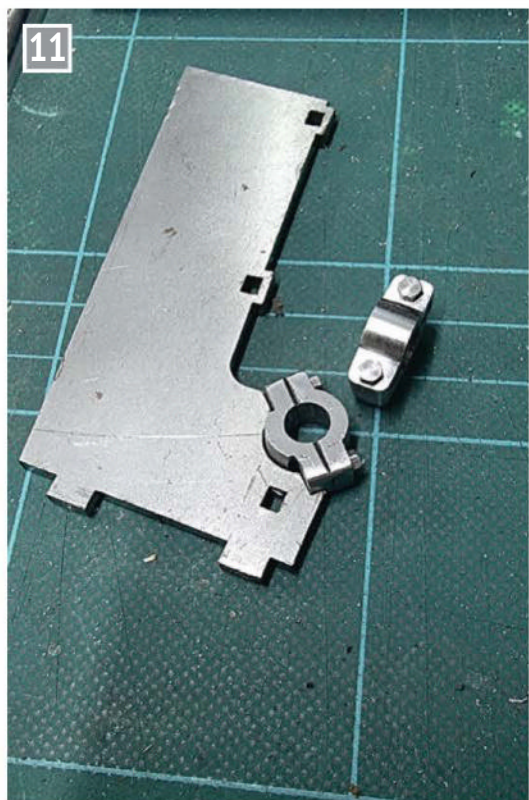
I then needed to profile the blocks to shape. First, I bolted the two assemblies together and held them securely on a pair of parallels in the machine vice. The bolts and the jaws gave enough support to machine the first of the block tabs down.



For the other side, I added a small tool clamp (needed a little ground off) and this time sat the blocks on top of the jaws to finish the machining.



It was then over to the trusty files for a little hand work, the final job involving a Dremel sanding drum to polish.



Here we see the blocks finished and assembled alongside one of the stand sides. I only needed to polish the top of the blocks as the bottoms only needed to fit into the scalloped recesses for silver soldering.



The last picture, for now, shows the parts worked on so far now dry-fitted together.

will be added later (the fixing bolts are visible).

Don's drawing is a very close version but he has left off the platform with supporting web which is seen on 60007 (on the left, with the camera resting on it). In my mind, he may have done this because, with the shelf plate fitted, it would be difficult if not impossible to access the 6 mounting bolts below. In Baldrick's words, I have a cunning plan to fit the shelf and still be able to reach the bolts below - more on this later.

Enough of the background - on to the model. As with many items on my model, I have used laser cut parts to save time - thanks again to John Baguley for doing the CAD work and Ed Parrott of Model Engineers Laser for doing the cutting. There will be more pictures than usual as it's easier that way to understand my process.

A few things to point out, you'll note that the top bearing mount, which is a separate part from the left side upright, has been drilled and temporarily bolted to it. Note also that the other, thinner side also has matching holes in it. These will be filled later. Also note that the bracket has a dog leg in it, only small at 1/16 inch but there nonetheless. I decided that the easiest way to do this accurately was to bolt the already formed bracket (scribed and folded in the vice) to the other side with a piece of 1/16 inch brass offcut sandwiched between, a bolt through the pivot holes for alignment, and then spot and drilled through to ensure that all would line up on final assembly. I then did the same to the shorter side upright that the bracket bolts to, basically using the thinner side piece to plot the holes in both the upright and the bracket that bolts to it. Both the pivot and the bearing caps will be reamed through again once everything is brazed up. The other thing done is profiling of the front vertical plate as in the original photograph.

●To be continued.

Hidden Gems

David Rollinson gains access to the off-site warehouse of a museum in Canada.



Dartmouth, Nova Scotia, is on the eastern shore of Halifax Harbour, a large ice-free body of water that was the birthplace of the Cunard shipping line and the departure point for trans-Atlantic convoys in both World Wars. Dartmouth faces the city of Halifax over on the western side of the harbour and the two communities have been connected by ferries since shortly after Dartmouth was established in 1749.

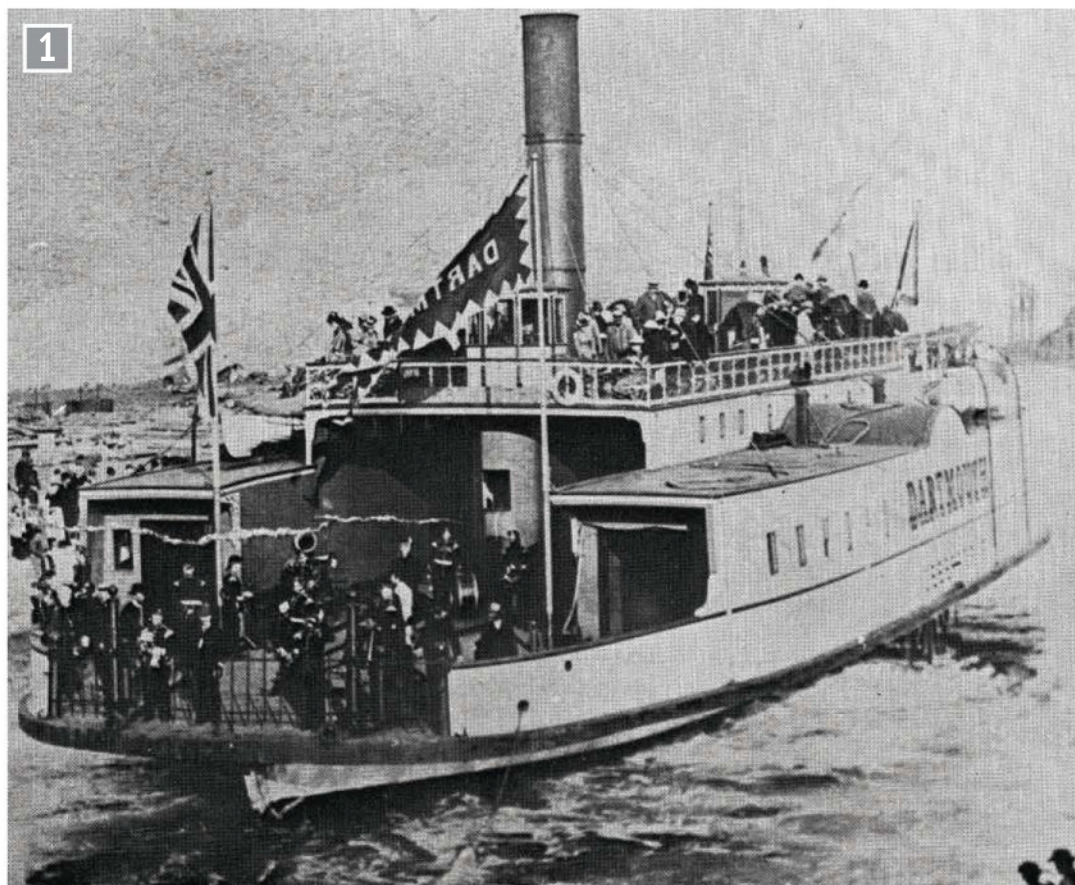
The initial ferry was a rowing boat but such was the rapid development of both communities that in 1816 a horse-powered ferry replaced the rowing boat. In 1830 the *Sir C Ogle*, the first steam-powered vessel built in Nova Scotia, was launched, crossing between Dartmouth and Halifax for sixty-four years. To meet a further increase in demand

a new ferry, the *Dartmouth*, joined the fleet in 1888. Built in Yarmouth, Nova Scotia, by the Burrell-Johnson Iron Company, the vessel was to be by far the most sophisticated of the several ferries in operation at the time.

Constructed of wood the *Dartmouth* (**photo 1**) was a double-ender, designed to allow foot and horse-drawn traffic to enter and exit with ease. Steam-powered, with a hull 140 feet long and 26 feet wide over her two paddle wheels, she was a sophisticated vessel for the time. Well fitted out with comfortable passenger accommodations, the electric lights on board were considered an improvement to the traditional kerosene (paraffin) lamps. The two coal-fired steel boilers and engine

were placed in the centre part of the hull. The engine was a horizontally inclined, inline, compound condensing type built by Burrell-Johnson in their foundry and engine works. Rated at 75 horsepower when running with 60 pounds of steam, the engine was fitted with a high-pressure cylinder of 22 inch bore and a low-pressure cylinder of 42 inch bore. The stroke was 60 inches. A surface condenser was used, the cold seawater of the harbour providing adequate cooling. The *Dartmouth* was scrapped in 1935.

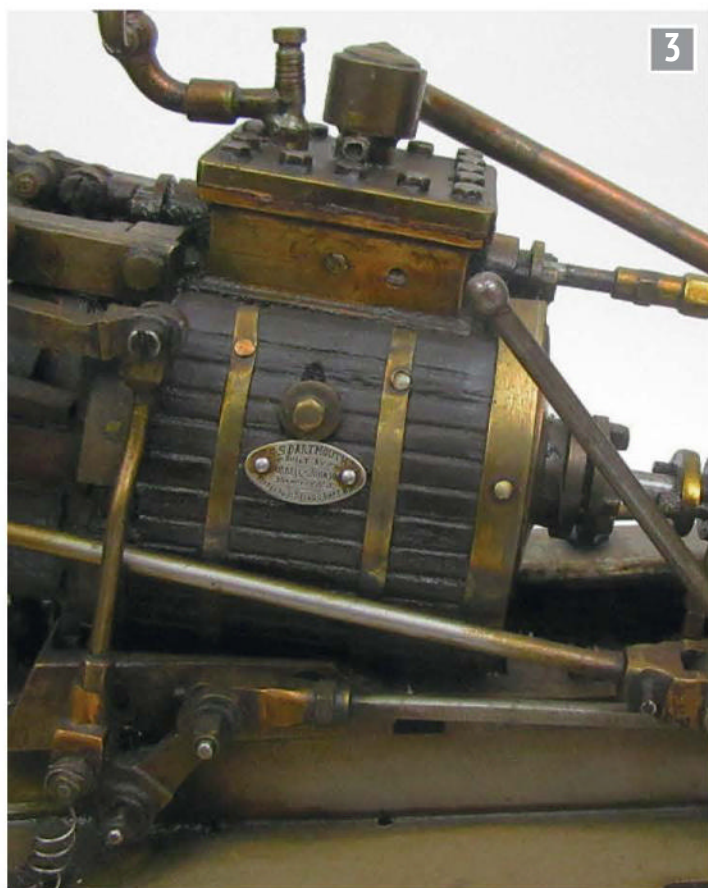
The Dartmouth Heritage Society operates a small museum in a Victorian house, which means that most of the museum's collection has to be placed in off-site storage. An invitation to visit the storage warehouse was



The ferry Dartmouth.



Dartmouth's paddle wheel engine.

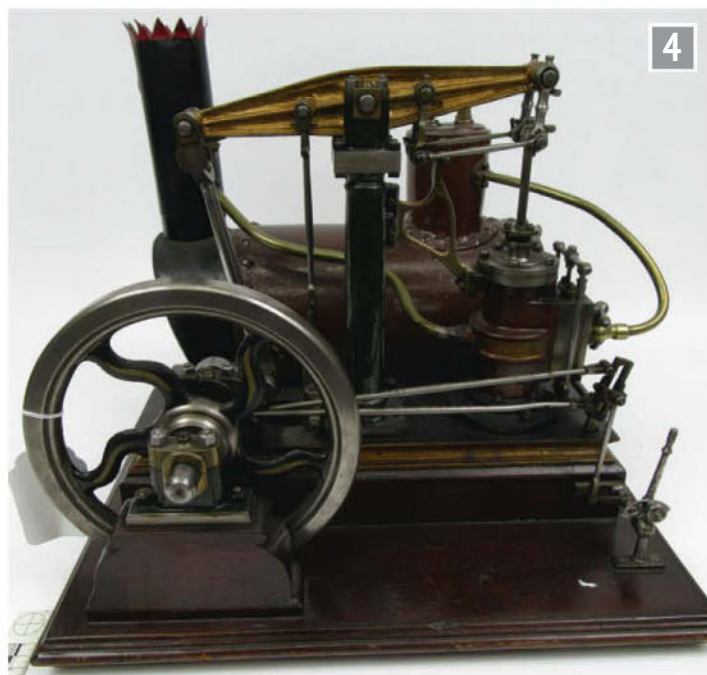


Paddle wheel engine low-pressure cylinder and maker's plaque.

readily accepted, especially as I had been told there were four 'interesting' steam engine models stored there.

The largest, and finest, of the four engines in the collection is a scale model of the paddlewheel engine that was fitted to the *Dartmouth*. Complete in every detail, the model (**photo 2**) sits on a heavy

brass base sixteen inches long and seven inches wide. The high-pressure cylinder is approximately 1 inch diameter and the low pressure approximately 1½ inches. The stroke is 1½ inches. The paddle wheels, with fixed paddles, are seven inches in diameter and fourteen inches wide to the outside of the wheels.



Single cylinder beam engine.

This model of an uncommon prototype ran smoothly ahead and astern when we applied some low-pressure air.

A small plaque (**photo 3**) placed on the wooden cladding of the low-pressure cylinder identifies the engine and states that it was built by 'D. Briggs Dartmouth'. I was sufficiently intrigued to see if I could find out more about Mr. Briggs and why he may have chosen to make the model. The research proved to be interesting and added a lot to my appreciation of the model.

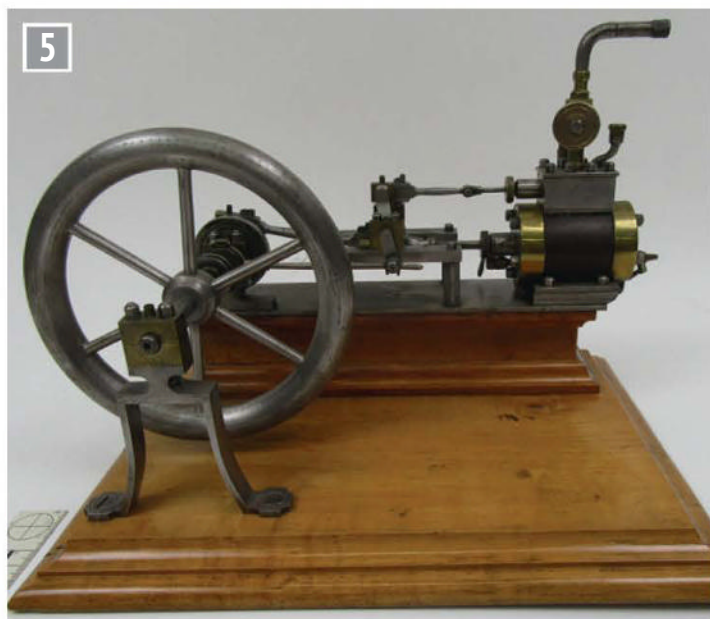
David Briggs was born in Duddleston, then on the outskirts of Birmingham, in 1884. In 1907 he was awarded a 'First Prize' at the National Exhibition in Birmingham. A soldier in the First World War, he was certainly resident in Canada in 1919. An engraver by training, he spent many years working for a jewellery company in Halifax, although it is not known when he arrived there. David died in 1974.

Frustratingly, research to date has not offered any clues to when the paddle wheeler engine was built or what plans or workshop resources David had for its construction. The current thought is that he would have travelled by ferry each day from his home in Dartmouth to work in Halifax before 1935

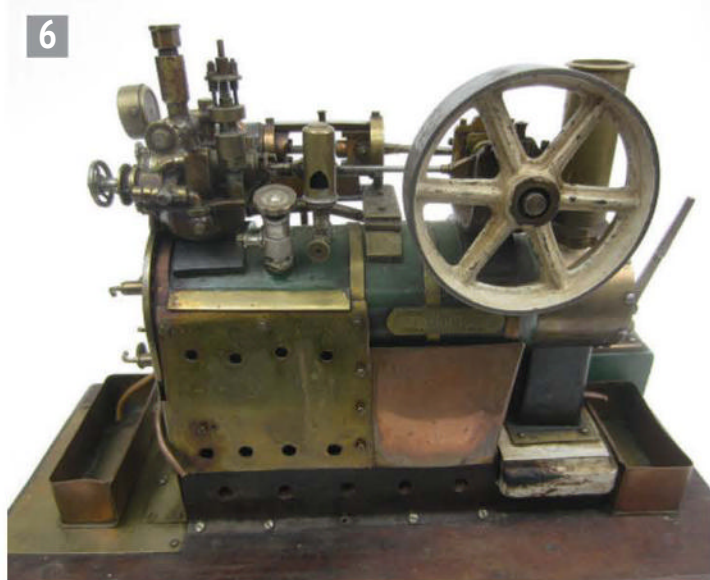
when the *Dartmouth* was taken out of service. He could have become familiar with the full-size engine on his daily trips across the harbour and, given the accuracy of the model, managed to obtain a set of engine drawings either from Burrell-Johnson or the ferry operating company.

The second model of interest in the collection also has a harbour ferry connection. It is a large single cylinder beam engine and boiler (**photo 4**) built by a gentleman called Charles Pearce, the one-time chief engineer of the *Dartmouth*! Born in Dartmouth in 1873, Charles retired in 1945 as the Chief Superintendent for the Ferry Commission and died in 1956. Unfortunately, there is no information on when the model was built. According to contemporary news reports Chief Engineer William Pearce was at the launching of *Dartmouth* in Yarmouth and was on board as the new vessel made its way along the Atlantic coast to Halifax, a trip it accomplished overnight.

The marine beam engine was an uncommon type in Atlantic Canada but Charles would have been familiar with them as he served as engineer on the *Annex 2*, a side wheel paddle ferry built in New York in 1878. It came to Halifax in



Single cylinder non-reversing engine by Mr. Briggs.



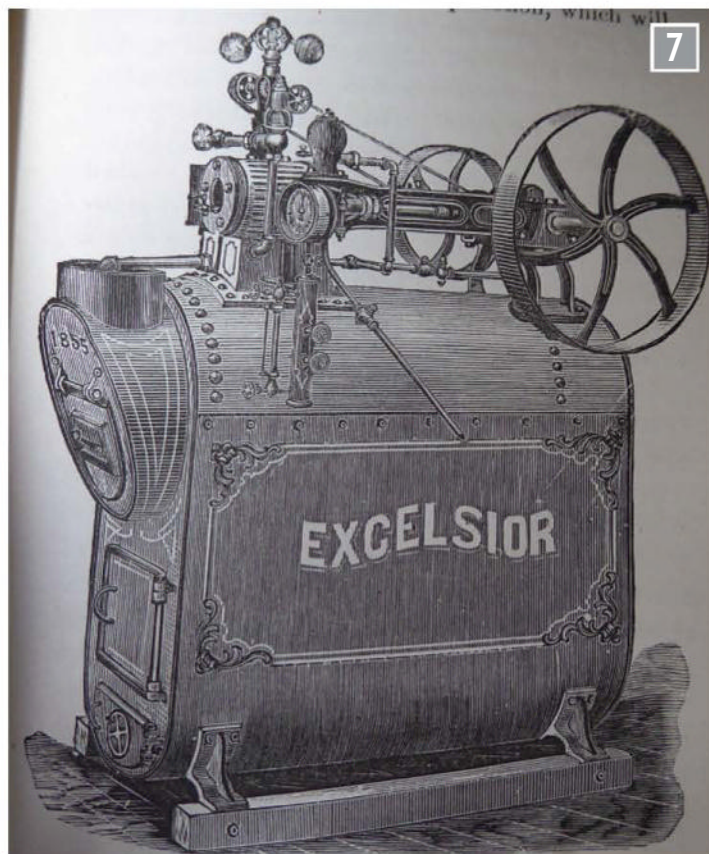
Overtyp engine Sparkplug.

1890. It was a typical, for the time, American 'walking beam' engine with a single nine-foot stroke and three-foot diameter cylinder driving two side paddle wheels. A distinctive feature of the boat was the diamond-shaped cast iron beam that was exposed above the superstructure until a small 'house' was built to provide some weather protection.

The beam engine and its heavy boiler sit on a base that is 14 inches long and 7 inches wide. The model features two cast columns supporting a solid, heavy, beam and flywheel, all characteristics of a land-based beam engine. However, one marine feature included

on the model is the simple reversing gear. On all paddle wheel vessels it was usual to provide a way of reversing the engines - essential for ferries that docked bow or stern. Provision to disengage each of the paddlewheels to provide more manoeuvrability was not usually included as the ferry drove into and reversed out of a purpose-made dock. With a boiler full of low-pressure compressed air the beam engine ran smoothly in both directions.

The remaining two engines in the collection were also of interest and were the work of Mr. Briggs. Whether they preceded or followed the



The 'Excelsior' dairy engine.

Dartmouth engine is not known. The single cylinder horizontal, non-reversing engine (photo 5) has a cylinder bore of 1 inch and a stroke of 2¼ inches. The steel flywheel, which may have begun life as a valve wheel, is 6 inches diameter. This is another large engine that measures 13 inches by 8 inches. The engine has sat for many years but a slight push on the flywheel and it took off, running smoothly at a tick-over speed or faster.

The fourth engine in the group (photo 6) is named Sparkplug (I would love to know why). I believe this type of arrangement was known as an 'overtyp' and is an unusual model. I found a similar engine (photo 7) in Edwards 1888 *The Practical Steam Engineers Guide*, where it was described as 'The Excelsior Dairy Engine' built by the Watertown (NY) Steam Engine Co.

The single cylinder engine sits on the top of a brass or copper spirit-fired boiler. The engine has a bore of approximately ¾ inch and a stroke of 2 inches. The flywheel is 3½ inches diameter.

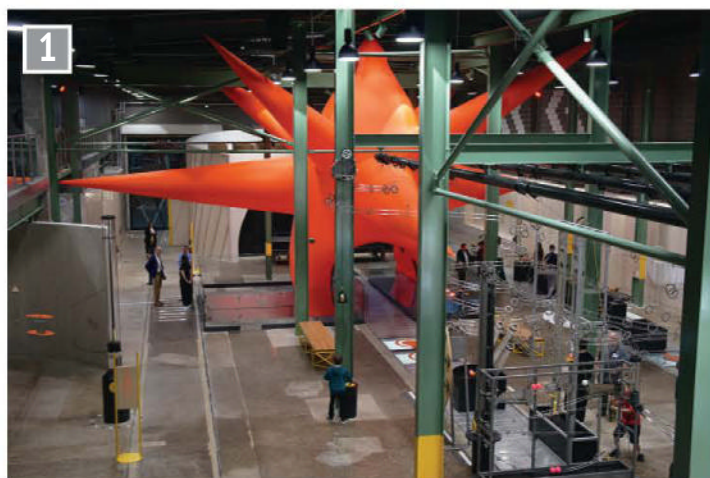
An interesting feature of the boiler is that it is fitted with a Bassett-Lowke pressure gauge. The little steam plant has boiler feed pumps, and ran smoothly under air. The museum staff, who were not familiar with steam technology, videoed each engine in operation for use in future interpretation.

Long-term readers of *Model Engineer*, and those with an interest in the history of 'model engineering', will be aware of the great changes that have taken place in the hobby over the last few decades. Machine tools and shop equipment, materials and supplies have made significant changes to the hobby since David Briggs and William Pearce worked away in their Dartmouth workshops. The engines they produced have all the hallmarks of an earlier era when 'scratch-building', which often included re-adaptive use and a less strict adherence to 'scale', was often the only way to make models that reflected engineering history.

ME

An Engineer's Day Out

Wonderlab at the National Railway Museum



Wonderlab at the Press launch. The large orange sculpture is called Mass. Readers understanding basic physics may be amused to find it is an inflatable. .

Roger Backhouse takes a look at the latest addition to the National Railway Museum.



Imagine Tate Modern, Willy Wonka's Chocolate Factory and a revival meeting without the hallelujahs. The July press launch of *Wonderlab: the Bramall Gallery* (photo 1) generated great excitement and the many hyped-up claims roused my inner sceptic but I must make an attempt at an objective assessment.

According to the NRM news release, Wonderlab 'features eighteen exciting hands-on interactive exhibits which aim to inspire and spark curiosity in visitors around the themes of railways and engineering. Aimed at families with children aged seven to 14 and school groups, the gallery is housed in the museum's 1,500 square metre former locomotive workshop ... Alongside the interactives, visitors will ... see live science shows and demonstrations inside the Weston Showspace and at a demonstration bar'. It cost £5m, raised from charitable

foundations and the Friends of the NRM.

I'd like to thank Andrew McLean (NRM Assistant Director), Clive Roberts (Professor of Railway Systems University of Birmingham), Gareth Dennis (track engineer and *Rail* magazine contributor), Brittany Noppe and Simon Baylis (NRM Press Office) for interviews and information.

Origins

Wonderlab was devised following a Royal Academy of Engineering 2014 report from the Centre for Real World Learning. 'How reframing engineering as a set of habits of mind creates new opportunities in education.' Wonderlab follows installations at the Science Museum in London and Bradford's National Science and Media Museum, suggesting this is a Science Museum Group project rather than an NRM initiative.

Although billed as an educational experience, there are admission charges. By early November, Wonderlab had attracted over 38,000 visitors, a good earner for the Museum and a possible motivation for setting it up. This was a period when museum attractions including the Station Hall and outdoor play area were closed, probably bringing more into Wonderlab. Modern museum displays are expensive and with demonstrators and explainers, Wonderlab is not cheap to run.

Design

Charlotte Kingston, Head of Design, Exhibitions and

Communications, National Railway Museum says "What has been done is ... take the spirit of the existing workshop and present it in a forward-facing, flexible way. The resulting space is more feminine, more enticing, more accessible. We've taken its extraordinary industrial heritage but with it a contemporary refresh that looks at the visitor-facing approach but also brings in the spirit of the engineering in the gallery." See **ref 1** to read more online and comments.

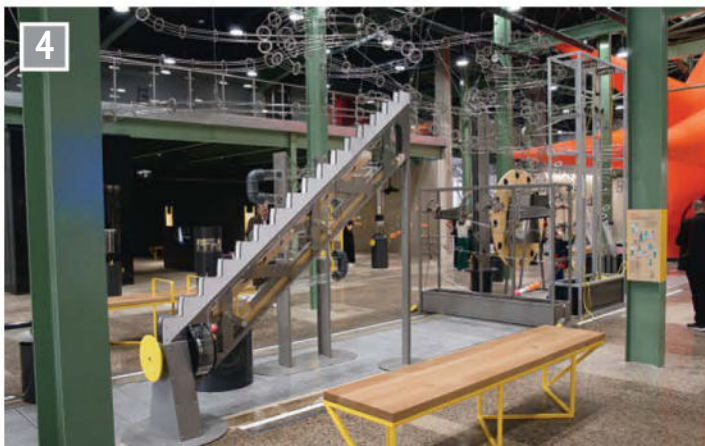
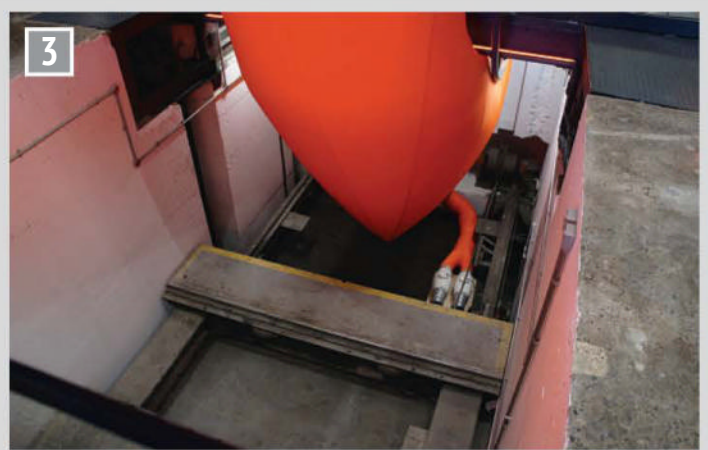
Architect Jose Esteves De Matos designed Wonderlab. He claims, "Inspired by its unique and rich railway surrounding and the gallery's previous life as an engineering locomotive workshop, our design explores the different forms of motion evoked by railway engineering, particularly the perception of relative motion in relation to static volumes, surfaces, textures and light."

Another press statement in similar vein is 'The Wallace Learning Space draws inspiration from the *Ellerman Lines* steam locomotive to create a play on scale where visitors 'metaphorically become the steam' that occupies the interior of the engine, providing a cut-away glimpse of its internal construction.... Enclosing the space is a cylindrical plywood Douglas fir envelope with an expressed rhythm like cog teeth.'

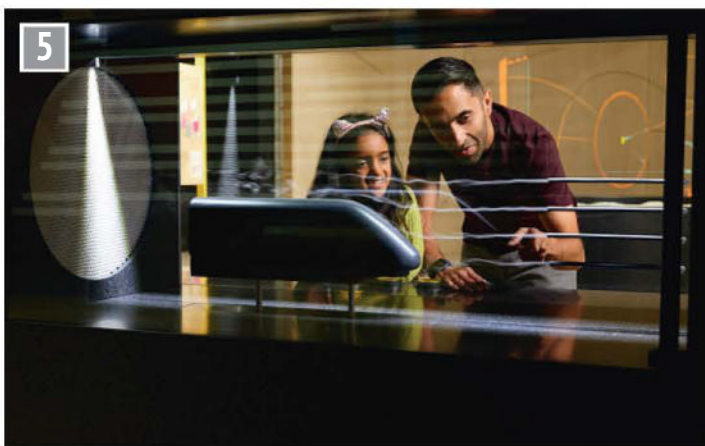
Pretentious language is bad enough but, sadly, that misuse of English is now normal for large museum or art gallery



Flying Scotsman and the wheel drop in the former workshop seen in 2012. The orange 'sculpture' Mass now occupies the wheel drop, taken July 2023. Which scene would inspire future engineers?



'The Great Machine' - a collection of machines that work together to move the balls in interesting ways. The notice suggests working as a team to power the machines and suggests 'solutions often come from the discoveries and innovations of others'.



The wind tunnel demonstration is effective in demonstrating streamlining effects - when it works. (Photo - SMG, Jody Kingzett 2023.)

displays. Evidence of previous workshop use has almost disappeared. The former gantry crane is bereft of chains and hooks. The wheel drop remains with a brief notice to say what it was though not what it did. Art installation, Mass now occupies the space though

visitors understanding basic physics may appreciate the irony that Mass is an inflatable (photos 2 and 3).

Dr. Ron Fitzgerald was involved in establishing Leeds Industrial Museum as Keeper of Technology. He argues that 'preservation of historically

significant technology is the primary concern of all industrial museums. Stimulating enthusiasm for science and technology by the understanding and the interpretation of the collection is the central role of such museums.

'To achieve this, it is vital that the organisational structure maintains unambiguous commitment to the long-term support of the museum's collection and its specialist staff rather than seeking to appease short-sighted political and socially inspired expedients'.

He notes that ignoring previous uses happens when architects rather than curators lead development adding 'a top quality museum designer is essential in terms of presenting complex and technically demanding subject matter but the designer should be the servant of the subject matter. Too many designers, like too many architects, simply see it as an opportunity to express their ego. The curator is usually not the best person to present the subject on the gallery floor as s/he is too close to it. The designer is the interpretive intermediary. The perfect partnership is a good designer and a good curator" '.

Activities

According to a museum news release, 'The exhibits focus on different elements of railways and engineering and encourages people to think like engineers and develop skills as

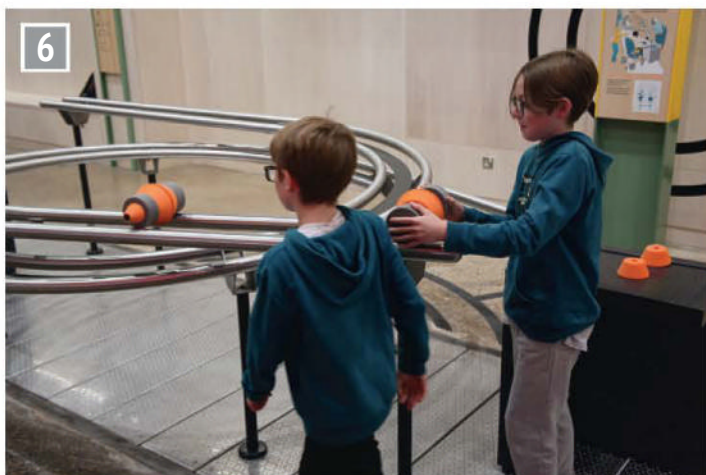
they design, build and test to produce different outcomes." Unfortunately there is little building activity possible, and even less design, though there are handles to turn, levers to pull and buttons to press. For younger children objects like blocks have play value and there is plenty else to touch and move.

No computer screens, a real plus, though a TV screen shows solarised images of visitors. Why? Gallery space can cope with large numbers.

The Willy Wonka's Chocolate Factory impression is heightened by the 'Great Machine' in the centre. Like other activities nearby demonstrating simple mechanics, children work together to move balls through small parts working in harmony (photo 4).

Activities have accompanying short messages e.g. 'creating and adapting plans to find creative solutions is part of thinking like an engineer', 'engineers often bring ideas together to make things work better' and 'few complex problems are resolved by one person'. All true but on visits I didn't notice children reading them.

Simplest and most effective are the wind tunnel activities. Press a button and an outline model of an A1 class locomotive appears. Vapour streams past showing airflow. Press another button and the outline of an A4 appears. Press again and a Shinkansen



Children from a York Primary School try out a demonstration on Press Launch day. It shows how coned wheels improve track riding.



Engineers enjoy Sandscapes, a technically ingenious simulation of a landscape with road and rail routes altered by moving the sand. Riley Roberts tries it out, helped by his father Professor Clive Roberts. (Photo used with permission.)

model appears, effectively showing streamlining effects (**photo 5**). Unfortunately, this wasn't working properly during a September revisit but worked again by November. In the adjacent display, you can stand in the wind and adjust your body position to modify resistance to air flow.

Nearby is a display demonstrating eddy currents. Move the magnet close to the tube to generate eddy currents and move a ball along a tube.

Professor Clive Roberts (Birmingham University) is an engineer who advised Wonderlab. He liked the activity showing how coned wheels perform on tracks. Children from a York primary school enjoyed that, demonstrating the way wheel profile affects riding - but only if it is explained and explainers are not always around (**photo 6**). It would have been better had real profile

tracks been used but perhaps that wasn't possible.

'Sandscapes' is an ingenious exhibit using computer technology. A landscape with roads and railways is projected on to a large sand tray. Shaping sand changes routes. Make a ridge and a tunnel appears and so on (**photo 7**). The question posed is 'how would your design decisions impact the environment?' Alas, Sandscapes does not deal with environmental protesters, bone headed politicians or price gouging construction companies. Some things are beyond engineering.

Sandscapes is enjoyable, but as a boy I made roads and tunnels on a heap of limestone dust from my father's home construction projects, an even better play experience. Unfortunately few children had (or have) that excellent play environment.



A token nod to civil engineering, use the blocks to make a bridge. Unfortunately it is difficult to make an arch bridge with the parts supplied.



Gareth Dennis rearranges blocks in Path Maker to take balls to their destinations. The message is 'try solving it in a different way'.

One corner has large 'interactive' blocks for children to move - but aren't such blocks always interactive? An earlier news release said the artist, Pippa Hale was inspired by colours and shapes found in the museum collection. Unfortunately they look like any other large blocks, symptomatic of overblown claims for Wonderlab, though the blocks have play value for younger children.

Another Wonderlab adviser, Gareth Dennis, a track engineer and *Rail* magazine contributor noted the NRM gives little attention to railway civil and track engineering. He liked a display where visitors build model bridges, trying different types (**photo 8**). In fairness to the Museum, displaying civil engineering in limited space is difficult though it could use civil engineering models. Sadly, Wonderlab ignores the

museum collection.

Another theme linked to a make-a-paper-object-fly demonstration is the importance of engineers testing and adapting designs.

In a nearby display where turning a handle electrolyses electricity into oxygen and hydrogen. These ignite to power a rocket.

Other demonstrations claim to show the importance of systems (**photo 9**). One suggests rearranging pieces to form a different path to help the ball reach the matching colour. Routefinder is a complex of tubes, with the message that engineers design systems of junctions and signals to make trains reach their destinations safely. All very well, but can't this be demonstrated with a real (or at least model) railway? Sensibly, the NRM provides a Brio train set in the



The message for Routefinder is to show that engineers design systems of junctions and signals to make trains reach their destinations safely.



The workshop as it was in 2005, 4472 to the right. Engineering authenticity compared to Wonderlab's synthetics.

Great Hall, an opportunity for children to make (not just use) systems. Why not expand that (photo 10)?

A simple display about friction demonstrated that effectively but I wondered about another display that claimed to show the importance of triangles. Time spent in snooker halls could give the same result.

I did learn about ferrofluids so visits weren't wasted. They contain tiny magnetic particles and are used to dampen vibrations and reduce friction. In the display they are attracted by magnets into curious shapes.

Demonstrations

Demonstrations are held daily in the Weston Showspace and the Wallace Learning Space, currently *How fire can make you move* and *Streamlined by design*. Whilst I didn't observe these fully, during a half term demo the presenter engaged well with children. Unfortunately my neighbour complained the one he attended was inaudible.

Wallace Learning Space uses a huge cast iron table from 1873, once used to mark out valve gear components at Swindon Works. Although the Press Office assured me information will be provided about this table nothing has appeared at the time of writing. It shows engineering ingenuity. Being cast iron it remained at a lower temperature than ambient in the workshop and so was fitted with steam heating coils in the cavity underneath to keep the table at the 'right' temperature.

History - the workshop and after.

The East German novelist Stefan Heym wrote; 'They cannot turn their face to the future who have not faced their past' and the workshop's fate raises questions about NRM priorities. According to Museum Director Judith McNichol, 'the care and attention taken to re-use features such as the crane and wheel drop is fantastic to see' - a statement that beggars belief. Were they kept only because they were too expensive to remove? Wonderlab has one minor reference to the former workshop, as if a family embarrassment not to be talked about.

Sir Peter (now Lord) Hendy described the workshop as full of 'redundant equipment' ignoring that such objects make up museum contents! Museum staff knew the workshop's importance, making it even harder to understand why it was closed to public view. Charlotte Kingston described it as 'having an incredibly rich heritage' and noted that 'it had one of the last working wheel drops in the country'.

Charlotte Kingston was concerned that only a few were allowed in to the workshop. Andrew McLean commented it appealed to visitors 'but only when there was something going on'. Yet a survey by the Association of Large Visitor Attractions rated the workshop gallery highly as visitors could see real railway engineering in action. No wonder one of

the most frequently asked questions at the Friends of the NRM desk was 'What's happened to the workshop?' (photo 11).

Eventually this 'rich heritage' was trashed, vandalism commensurate with Churchward's destruction of the broad gauge *North Star*. Was it beyond curatorial thinking to better present workshop activities? It's as if Howard Carter found Tutankhamen's tomb and then hid the contents to create a 'Boy Pharaoh' experience on the site.

I discussed the workshop with Andrew McLean. He said the decision to stop heavy overhauls was made in 2012. Most workshop activity was outsourced. There is now no head of engineering at the museum, though there is a Workshops and Traction Manager who oversees rail operations and workshops on both museum sites.

Andrew said new workshop facilities would help maintain exhibits using equipment previously in the workshop. The Conservation Team is now larger. Other machinery was advertised and fifteen large items donated, most to the Strathspey Railway. He said the museum was committed to improving the locomotive preparation bay (not an issue I'd raised).

He emphasised that Wonderlab is one of several changes expanding the NRM. These include a railway Futures Gallery, redisplaying the Great Hall, reconfiguring the Warehouse and South Yard

changes. Locomotion (Shildon) has a new building under construction and expanded workshop facilities visible to the public but unable to carry out heavy overhauls.

Engineering's place in the Railway Museum

The NRM website stresses it is an 'unrivalled collection of engineering brilliance' and Wonderlab's praiseworthy aim is to encourage young people into engineering and science subjects. But can they rise up the ladder? Former Heads of Engineering like Richard Gibbon (OBE, C.Eng, FIMechE) were members of the Museum Management Team, reflecting engineering's previous importance at the NRM. Andrew Gwynne's departure for the Llangollen Railway has removed one of few senior staff with a deep understanding of railways.

I asked if the Workshops and Traction Manager had any formal engineering qualifications and received a non answer from the Press Office. Unlike previous post holders the present Manager is not a member of the management team though the museum stated that 'The Workshops and Traction Team reports to the museum's senior management ... 'illustrating the Civil Service mentality of having specialists like engineers on tap but never on top'. Would that encourage young people into an engineering career?

A visitor's view

My neighbour, a retired engineer, visited Wonderlab with grandsons aged 10 and 13 who were disappointed, finding displays had little relationship to the museum. "Could have been anywhere" was his comment. They had been asked to buy an annual ticket, yet they exhausted possibilities in under an hour and weren't likely to return. He notes that Japanese museums arrange far better interactive displays so perhaps Science Museum Group could learn improved practice.



This display is supposed to show the importance of triangles. Whilst time playing billiards would achieve similar results, the significance of triangle strength is scarcely mentioned - a missed opportunity.



Webster-Bennett vertical boring machine built circa 1950 on the way to the Strathspey Railway. The final disposal of a once well equipped workshop that always interested visitors. This was used for boring locomotive axleboxes producing the so called 'Collett Wedge' which was important for good lubrication in a white metal axle box. Many famous locomotives including Green Arrow, Duchess of Hamilton, City of Truro and the LNWR Super D plus many others were done on the machine. Other machines like an Elliott vertical slotting machine came from the nearby carriage works and were a part of York's railway heritage. That too has gone.

Primary age children were absorbed by some exhibits when I visited but there is far less appeal for over 11s (Key Stage 3).

Missed opportunities

The NRM has great exhibits but rarely explains railways properly. Sectioned Merchant Navy locomotive, *Ellerman Lines* could show how a steam locomotive works. Instead there is a newish sign with a pointless picture of Barry scrapyard.

Reportedly 1300 engineers and scientists were involved in Wonderlab's design yet obvious engineering ideas are not developed. A display refers

to the use of triangles but gives no opportunity to test their inherent strength (**photo 12**). The bridge building display could have allowed children to try different methods, e.g. trying an arch bridge, not easy with the present blocks.

Engineering can be more creative than arts activities. Though hinted at in Wonderlab the creativity in engineering is downplayed. Wonderlab and the wider museum could make more of this.

Richard Swales is Chief Mechanical Engineer of the Sir Nigel Gresley Locomotive Company that rented the workshop running a Junior Volunteer Scheme for young

people aged 14-18. He says; "The juniors came from a variety of backgrounds and there was little or no previous engineering contact, yet, to the relief of their parents, many of them progressed to good engineering apprenticeships and careers with well-known companies.

"There is a gap in encouraging an interest in engineering for youngsters in their early teens, a time when they are ... making choices that will determine their future careers. The workshop could have complemented a Wonderlab located elsewhere in the museum and provided a unique means of giving young people hands-on experience of real railway engineering. This would have made it possible to reinforce that initial interest and would have provided a bridge across the gap. The NRM has missed a trick here and, instead, have only done half the job - the half that generates income for them".

Overview

Wonderlab has some individually good activities but it is unlikely many young people will take technology subjects as a result of a visit. Despite claims of 'referencing' the previous workshop, Wonderlab could be on an industrial estate outside Wednesbury and has shockingly little relevance to the museum except as a money maker. Grandiose statements about design ignore that synthetic has replaced authentic (**photo 13**).

The last word should go to Dr. Ron Fitzgerald: he reminds us that using real exhibits is a great success - the NRM's A4 Gathering in 2013 was tremendously popular. Yet he finds 'State owned museums have retreated from exploiting their... collections in a constructively stimulating way' and they 'compare badly against the best amateur museums such as workshops at Crich Tramway Museum, Anson Engine Museum and the Keighley and Worth Valley Railway'. He suggests all museums' professionals

should spend time seconded to one of these establishments. But will they?

Visiting the Museum

The NRM Station Hall is currently closed leaving the Great Hall and the Warehouse open. Both have significant exhibits but for a fuller experience I would suggest delaying a visit until fully reopened.

The NRM is very close to York Railway Station. There's car parking nearby at £10.00 and there's a road train from the city centre.

NRM entry is free. The website advises advance booking which seems unnecessary. Wonderlab admission charges: adult day ticket £9.00; children and concessions £7.20; over 60 £8.20. Annual tickets available. No family tickets.

Warning

Some exhibits use magnets so visitors with pacemakers could be affected.

Reference 1: Further reading

'How reframing engineering as a set of habits of mind creates new opportunities in education':

<https://raeng.org.uk/media/33ghjby1/professor-bill-lucas-centre-for-real-world-learning.pdf>

Client and architect justification for their work is explained in the links:

<https://architecturetoday.co.uk/de-matos-ryans-wonderlab-at-the-national-railway-museum/>

<https://www.architectsjournal.co.uk/buildings/de-matos-ryan-completes-wonderlab-gallery-at-national-railway-museum>

A friend showed me Facebook comments on the above. Few are complimentary.

Roger Backhouse formerly worked for London Play and writes about engineering heritage for *Model Engineer*.

A Five-Inch Gauge 0-4-0 Padarn Railway Tender Locomotive

PART 20

Luker builds a five inch gauge model of a Welsh slate quarry locomotive.



Continued from p.96
M.E.4733 December 29 2023



The machined and painted wheels of the tender as well as machined (for) press fit shafts.

The wheels and shafts

A little write-up of how I machined the *Fire Queen* wheels was given in Part 5 (M.E.4717 May 19 2023) but the drawings for the tender wheels were omitted; they can now be added to the drawing pack (fig 37). I generally machine all the wheels in one go, while I have the tooling set up and I'm in the 'machining groove' so to speak. The wheels then stand for a couple of months in a place of honour on my display shelf until they are needed. They look rather impressive with their cross and webbed spoke pattern, I think!

Similarly, the wheel shafts were machined in the same fashion as for the engine and, as this series isn't really aimed at the beginner, I'll refrain from going over the machining again in detail (photo 215).

Part 5 also gave a little insight into how I went about casting these wheels (photo 216), including where I positioned the riser and ingates as well as a nice picture of how the riser did its job. In these changing economic times and the rising cost of castings, it's well worth considering setting up a small foundry for those smaller model engineering castings. The alternative is CNC, if you like to fiddle with code and electronics.

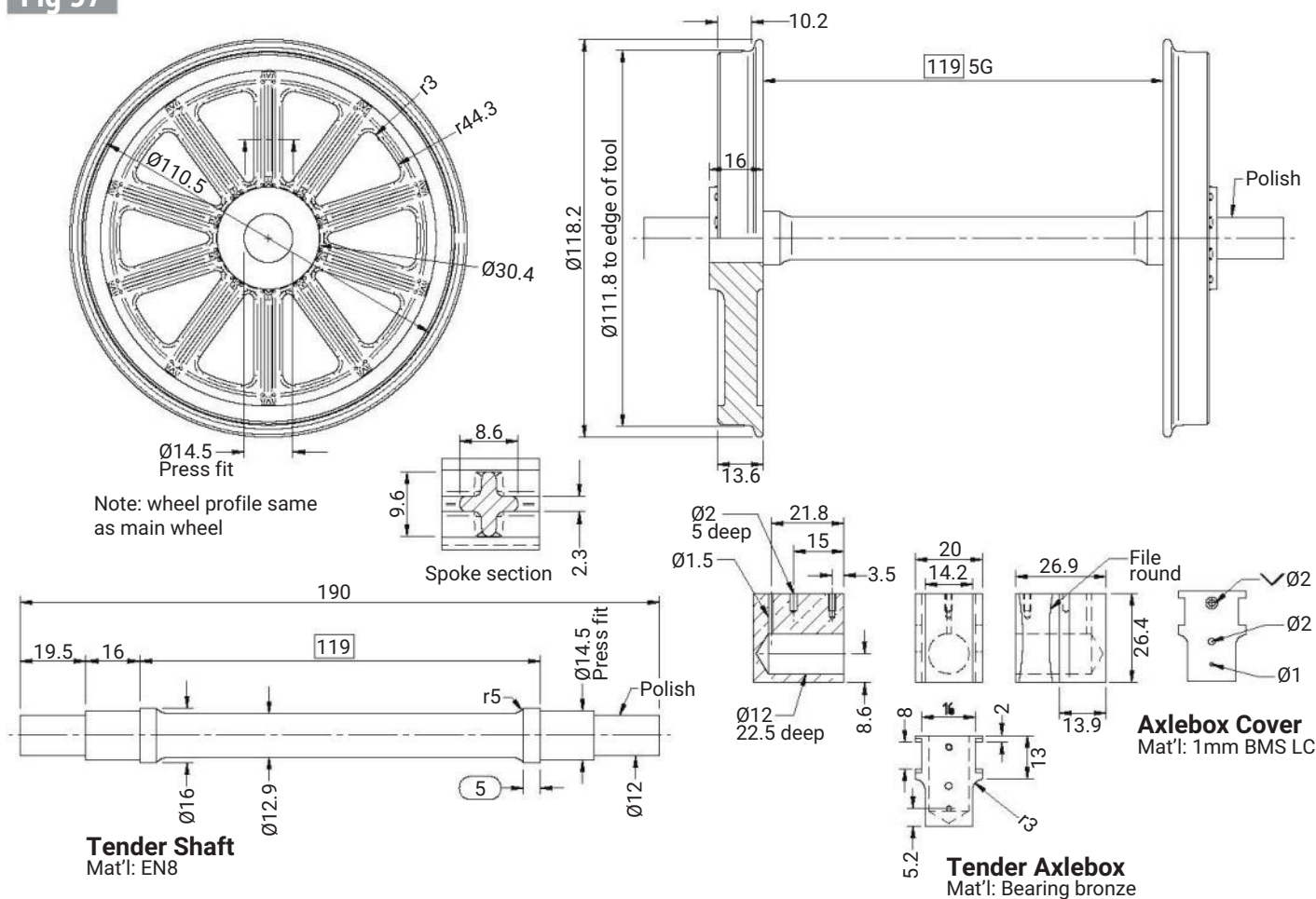
The spring assembly

The spring assembly was made rather stiff for such a small tender but perfect if a friendly giant was partially sitting on it to drive the locomotive

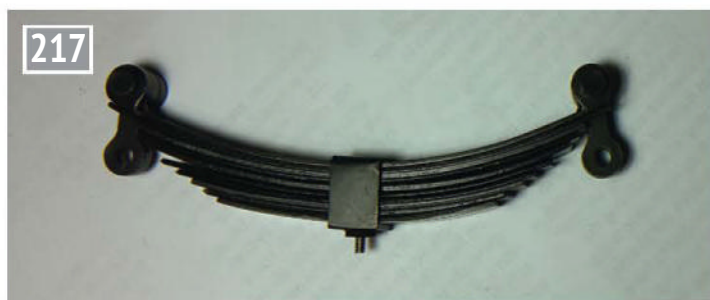


A set of Fire Queen engine and tender wheels as they came out of the sand.

Fig 37



The wheel assembly.



The completed spring assembly, chemically blackened, ready for fitment.

(photo 217). The top spring is always the most difficult to make, especially with slotted end eye loops.

The easiest and quickest way to make these top leaves is to solder the ends in place without destroying the temper of the spring material. The very old hack of soldering, with the majority of the spring pushed into a potato, has worked on many occasions in the past, so this method has become my preferred one (photo 218). To make life a little easier, the

ends of the leaf spring are purposefully kinked upwards and the machined cylinder held in place with a little scrap wire. This keeps the lot in place when soldering. Unfortunately, the potato was hurt in the process but this hurt was remedied by cutting a few good parts off and planting them in a sack for future soldering and pot roasts (photo 219 - such is my relationship with veggies that get immolated in the workshop).

This brings me to something that is always left out when



Soldering the round to the end of the top spring in a potato to prevent annealing the spring material. Notice the extra material for trimming and the piece of wire holding everything in place.

describing this method of soldering springs, and I can only think this oversight is done intentionally, probably due to the naughty nature of most technical people. This single piece of advice will



The potatoes recovering nicely from their burn wounds. Little do they know the fate that follows!

change your model engineering experience, so best write it down! Replace the potato before the chef makes the next roast! You're welcome...

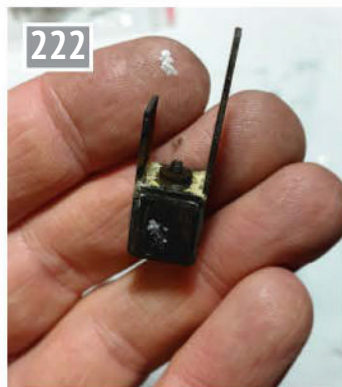
The extra material at the ends of the springs can be filed



Neatening the ends of the spring using radius guides and a little hand dexterity with the file.



Top leaf springs in various points of manufacture, with the scale plan view used to check the bend and eye position. This is more than accurate enough for spring assemblies. Note how the leaf spring extends under the eye, which ensures the geometry takes the load and not the silver soldered joint.

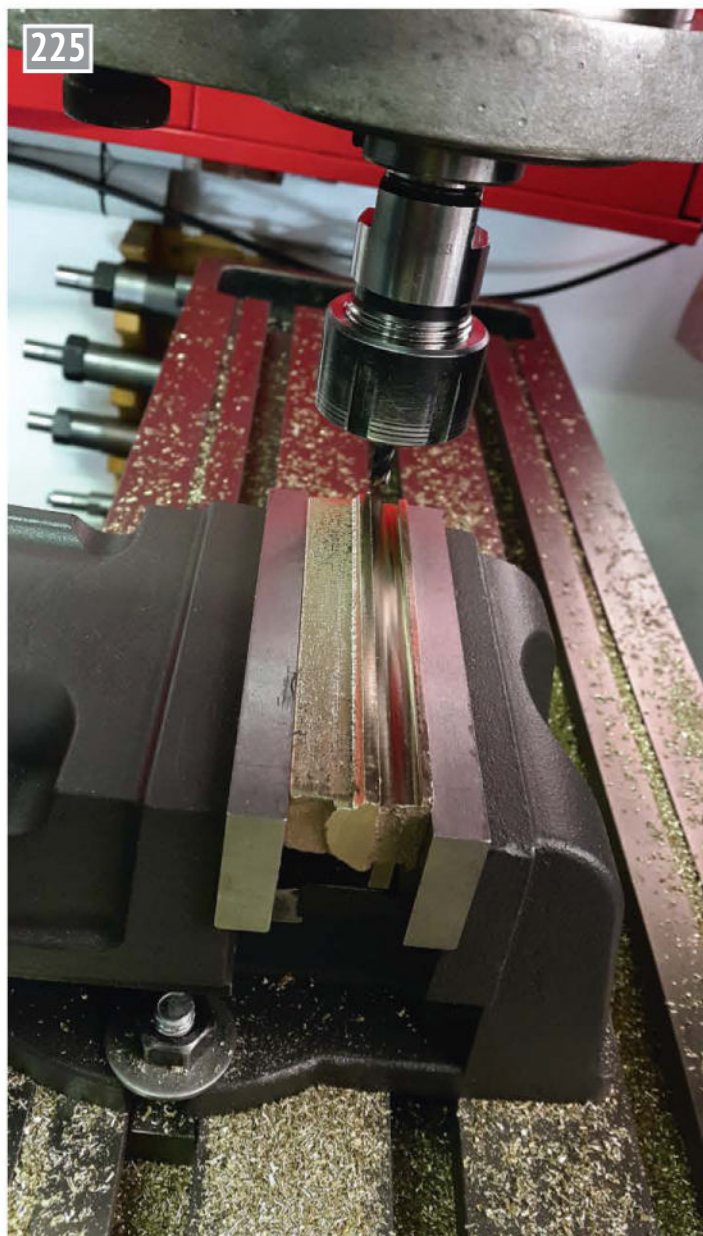


The soldered spring cradle with a little Tippet visible at the top corners to prevent the solder from taking to the spacing jig.

away using radius guides and a little hand-eye-file dexterity. If the screw is held in the vice as in **photo 220**, and not the guides, the file can be rolled with the spring blending the soldered ends very nicely. There does need to be spring material left under the cylinder; in that way the geometry holds more of the load than the actual silver soldered joint.



Final assembly of the springs will require the back of the pins to be punched to keep it in place.



The axleboxes were all cast in a single long pattern out of the new alumina bearing bronze. This simplifies, and speeds up, machining until they are split.

When making springs like this I seldom bother with accurately measuring up the assembly. There is always enough play or movement allowance in the design, both

the prototype and model, to take up minor differences between the spring sets. I do, however, like to print out a scale view of the top spring, including the ends, to check the



The completed axlebox assemblies all painted with the top plate fitted ready to go onto the frame assembly.

bend and ends. This is normally more than accurate enough (**photo 221**). Finally, the 3mm slot is machined using an end mill or a slitting saw depending on what is easiest with the tooling on hand.

The spring cradle is best made using folded plate soldered to a machined base. A spacer will hold everything together while soldering and a little Tippet on the corners will stop it from becoming part of the assembly for good (**photo 222**). Someone asked me the other day how I get such a jig out after soldering, in fact the question was more of a statement really and went a little like this: '...even if the solder doesn't take it will still be tight, no?' Well, yes the answer is no! I've never had a problem removing the spacer; in fact, the worst I've had to do was tap it out lightly. I surmise the differential contraction during cooling leaves enough play to loosen the assembly.

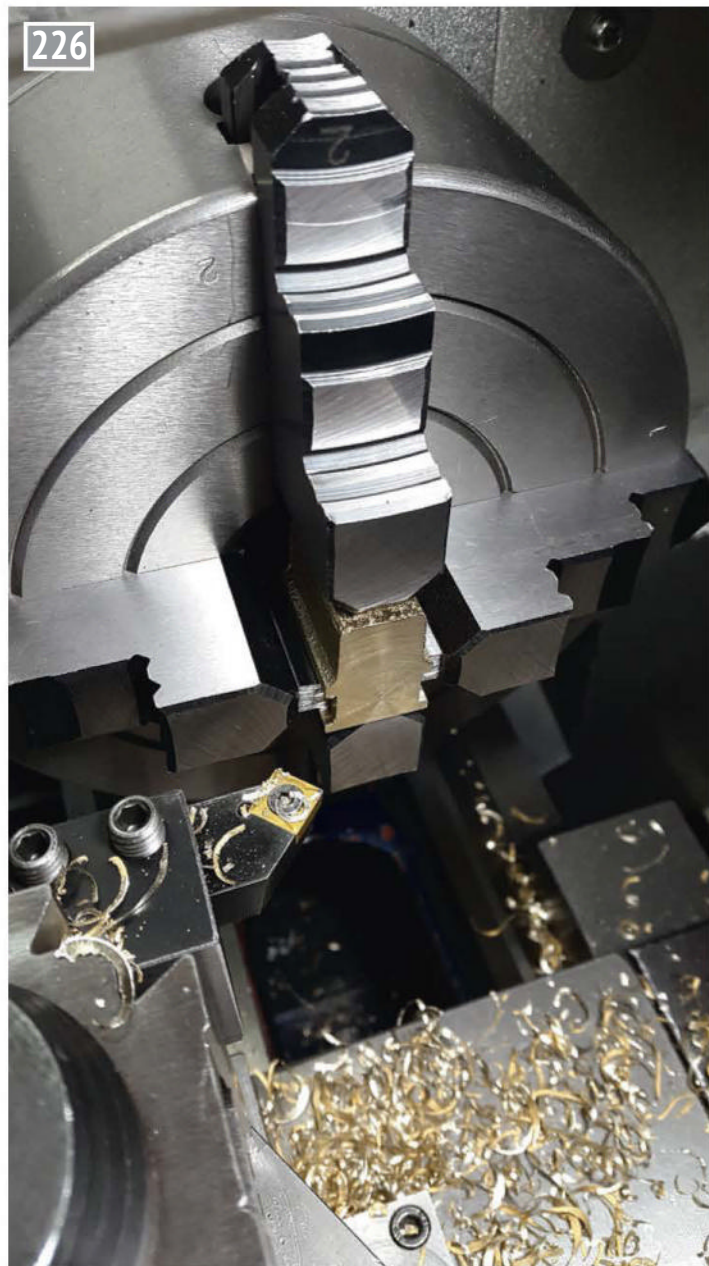
The M2 screw keeps the spring pack central and also locates the pack to the axlebox. The screw needs to extend at least 3mm out to clear the top plate of the axlebox and seat in the hole.

On final assembly of the springs the pins need to be held in place by either peening the back end or punching a mark on the circumference to fix them in place (**photo 223**). I prefer the punching method because it is easier to strip the assembly should it be required and the same pin can be reused. There is very little clearance behind the pins, as was the case with the large-scale tender.

Axleboxes

I've always enjoyed making axleboxes; they are quick to make and can be fitted to the

frame in no time which does a lot of good to the confidence levels knowing that parts are making their way to the



Trimming the axleboxes in the four-jaw chuck. Note the blocks in the horn block groove to prevent any damage to the side lips.



Checking the position of the spring cradle locating hole.



The spring assembly on the frame with the wheels fitted.

assembly (**photo 224**). I've recently had a conversation with one of the lads (building a design of mine) and realised some of the fundamentals I take for granted are sometimes overlooked by the builder.

The engine axleboxes were described in Part 2 (M.E.4714 April 7 2023), and the same casting methods and machining are followed, up until the axle hole. Part 2 was some time back, so a very quick recap is probably in order. The axleboxes were cast using my new alumina bronze mixture which has been a common theme throughout this series. This alloy allows the use of far more common scrap materials at the expense of, well nothing really. They are cast in a long block with the hornblock recesses (lengthways along the sides) machined in one go (**photo 225**). The boxes are then cut and trimmed to size using the four-jaw chuck in the lathe (**photo 226**). Next is the axle hole, which seemed to be the sticking point with the young lad. The conversation was focused on removing tolerance issues in the home workshop by careful consideration of machining order, but more importantly understanding the downstream effects of machining a certain way.

If the fixed jaw of the milling vice was clocked, then the hornblock groove would be parallel to the back of the axlebox. After splitting the main casting into the individual blocks this accuracy would be very

good (in fact more accurate than if each block was machined individually), so it is safe to use the back face as a reference point when machining the axle hole. The centre of the hole can be scribed using a sharp point scriber, some scrap pieces of steel packing and a gauge plate or piece of glass (good enough for our purposes). Then there's only two things to line up in the four-jaw chuck: the centre of the hole and the reference face, which needs to be perpendicular to the hole. The perpendicularity can be aligned using a DTI or the touch and engage method described previously and the punch mark can be aligned to a pointer in the tailstock (or wobbler if you want to be super accurate).

This all takes time but it's easy enough and here's the sticky point. If you drill the hole and it wanders, any reamer will follow suit, especially smaller reamers in bearing bronze. I personally prefer to drill the hole to depth and finish the hole off using a small boring bar, typically the last 0.5mm. Then you know the hole is straight and round. If all went well, the axleboxes can be fitted with the axles and they will turn freely in the frame assembly. Any tightness can be removed by finding the offending geometry and bringing it in line with a little hand dressing or polishing.

The location point for the spring cradle should be checked on the assembly with a piece of 3mm rod and a scriber (**photo 227**). The drawings give the designed dimension but this should be checked before drilling the hole.

That's the spring arrangement done and dusted (**photo 228**)! All that is left is the spring hanger bolt which is machined from annealed (black ones not the CrV variety) Allen keys, to take advantage of the high wear nature of the material and the small head to match the prototype perfectly!

● To be continued

We Visit EKP Supplies

**Martin
Evans**

visits
Barnstaple and finds more
nuts, screws and washers
than you can shake a
spanner at.



Most model engineers are familiar with EKP supplies, well-known as a supplier of machined nuts, screws, washers and other fastenings (www.ekpsupplies.com). Even if the name is not familiar, the products are as most of the fastenings we use in our hobby actually originate from EKP.

This year EKP celebrate their 30th anniversary so I took a trip to Barnstaple to visit them and see how far things have come over the last 30 years. Thirty years is in itself a major milestone but so is EKP's recent acquisition of Kennions, the oldest (I believe) model engineers' supplier in the UK.

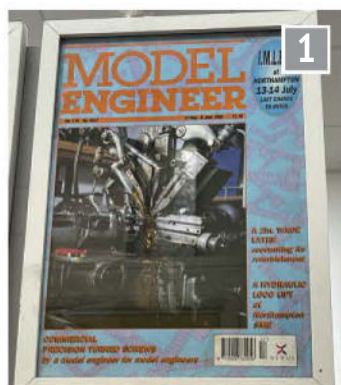
My visit comes nearly 28 years after a previous visit by my distinguished predecessors Ted Joliffe and Mike Chrisp,

when the company was only a couple of years old (**ref 1** and **photo 1**). Back in 1996 EKP were based in Old Coulsden, Surrey but the company now occupies its own, much larger, premises in Barnstaple. When Mike and Ted visited EKP, there were two machines at work but there are now more than 30 machines busily producing a variety of nuts, screws and washers so, as you can imagine, the workshop is rather noisy!

The company started more or less by accident. Alan Pocock, a keen model engineer, found the lead times for fasteners rather frustrating, as did his fellow club members at the Sutton MEC, so he decided to find other sources of supply, both for himself and for them. Some sizes of fastenings were

more difficult to source than others, with long lead times or requiring large orders and, at some point, the question was asked: "why not make them yourself, then?" – a rather flippant question, perhaps, but one that Alan took seriously. Before very long, he had purchased a Bechler 'Swiss Automatic' bar turning machine and was turning out his own fastenings, to his own benefit and also that of his fellow club members. The rest of us quickly benefitted too as the business grew.

Naturally enough, there was quite a learning curve to climb. These machines are complicated and require a high degree of skill to set up and run. Alan persevered over a period of three months or so and mastered the machine to the point that production could start. Other members of the family were co-opted to help run the business, including Alan's father John, a keen model engineer, wife Lyn and even youngsters Michael, Sarah and Helen, who often found themselves putting the slots into the tops of some of the screws. I asked about the name – guessing that the 'P' might be 'Pocock' – and was informed that 'EKP' are Lyn's initials. That, I suspect, indicates who the real boss is! A quarter of a century later, the family still form the core of the team (**photo 2**). Lyn, Helen and Dean ensure that the business runs smoothly (**photo 3**) while Alan, Michael and Alistair do the same for the machines (**photo 4**).



Model Engineer cover, May 17th 1996.



The EKP team – (left to right) Alistair, Dean, Michael, Lyn, Helen and Alan.



The front office and reception area – Dean, Lyn and Helen.



The source of all our nuts and screws.



Michael's 6 inch Burrell road roller.

I was then taken on a tour of the factory. The first thing to catch the eye (you can't really miss it...) is a 6 inch Burrell road roller (**photo 5**). This is being built by Michael who, like his father Alan and grandfather



Bar stock aspiring to greater things.

John, is a keen and prolific model engineer. It is being built using mainly fabrications rather than castings but this has been done in a very convincing fashion. It's going to be an unusual model when it



Expected items in the bagging area.



'Whatever size you want – we have it'.



Bar turning machine in action.

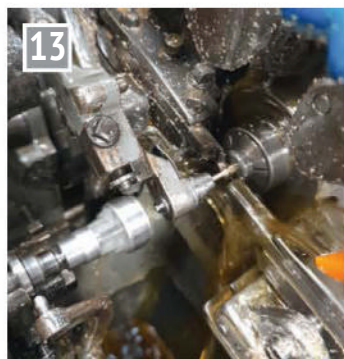
is finished as I don't think there are many of these around.

Next was the large supply of bar stock (**photo 6**) – soon to be turned (literally) into thousands of screws and nuts (**photo 7**). These then go into stock, stored in bulk in the stockroom but also in hundreds of drawers in the office

(about 2500 by my estimate – **photo 8**), containing almost every conceivable size of small fastenings. My attention was then drawn to one of the bar turning machines (**photo 9**). This looks complicated because – well – because it is complicated! It is controlled by a series of cams and stops



Discovering how it works – Michael explains, Alan observes.



An arm moves in to pick up the screw as it is parted off.

which all need to be setup very precisely. Michael, who is EKP's production manager, explained the operation of the machine to me (photo 10) and, if I could remember it all, I would give you the details. I can, though, provide a short account of how a screw is turned.

The bar, which comes in ten foot lengths, is fed through a collet in the headstock and the 'business end' is machined, including any countersink required (photo 11). The die is then brought in from the tailstock to machine the thread (photo 12). The die revolves a little faster than the bar, which causes the thread to be formed, and the die is then slowed down so that it unscrews itself from the bar. This way of doing it means that the bar can be turned at a constant speed rather than being stopped for threading to take place.



The arm presents the screw to the slitting saw.

An additional benefit is that the die does not need to be reversed – it is simply slowed down to withdraw it from the work. The countersunk screws being made need a slot so, in this case, the machine also performs this task. A collet swings in and grips the part machined screw while it is parted off (photo 13). The shape of the front of the next screw is formed at the same time. The collet then swings up to meet a slitting saw which cuts the slot (photo 14). The finished screw is then dropped into the delivery chute. If no slot is required then, obviously, the screw is simply parted off into the chute.

I was then taken to another machine to see 14BA steel washers being made. These



The 'business end' is turned, including the countersink.



The die moves in to form the thread.



There are 14BA washers somewhere in that stream of swarf and oil.

too (unexpectedly – to me at least) are machined rather than being stamped out. I suggested that there must be a lot of swarf generated, compared to the weight of washers. This is indeed the case and there was far more swarf coming down the delivery chute than washers (photo 15). The washers then have to be very carefully extracted from the swarf.

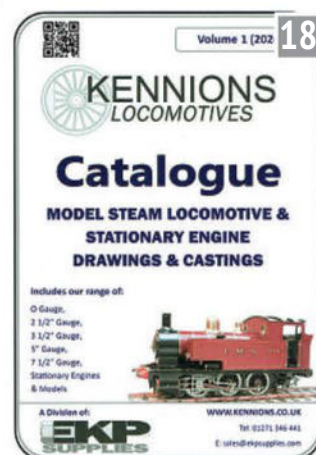
Small washers are not the only tiny fastenings produced by EKP. I was shown a variety of small screws made on these machines. Photograph 16 shows a selection, compared to a 10p coin. EKP also produce turned items to special order (photo 17 shows a few). These included, during the covid crisis, large quantities of fittings for ventilators at very short notice.



Some of the smaller items.



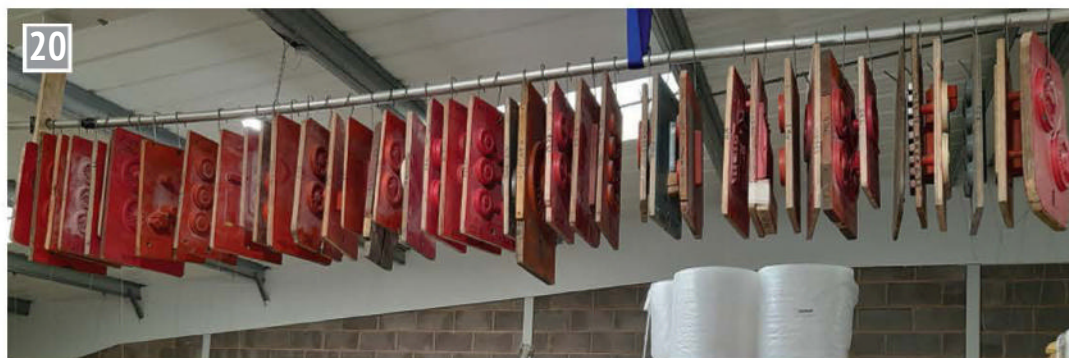
A few 'specials'.



The newly released Kennions catalogue.



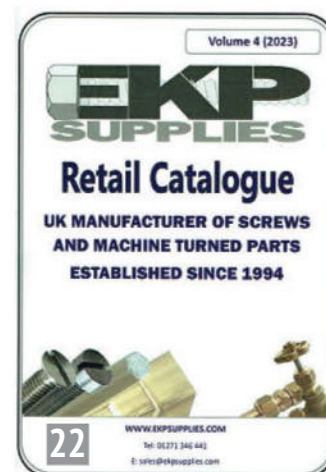
A selection of Kennions stock.



A collection of patterns.



Locomotive drawings.



The current EKP catalogue.

I was then taken upstairs to see the stock recently arrived from Kennions (www.kennions.co.uk). For me, this was like stepping back into history, having myself been a customer at Kennion's shop in Hertford and being handed a box of castings by Mrs Kennion. EKP's acquisition of Kennions, clearly, represents a major diversification of the business and, I believe, secures the future of a significant supplier of historically important locomotive castings and drawings. I was shown some of the stock (**photo 19**), as well as the collection of patterns (**photo 20**) and the historic collection of drawings (**photo 21**). EKP have now released their first Kennions catalogue (**photo 18**) so these old locomotive designs, by Charles Kennion, Keith Wilson, LBSC and others are now once more available.

EKP's latest catalogue is also available (see website or telephone 01271-346441). EKP holds stock of everything in the catalogue so there is no waiting for what you need, which, after all, was what started the company in the first place.

Photographs by the author and Jocelyn Fung.

ME

REFERENCES

- Ref 1.** Ted Jolliffe and Mike Chrisp, *We Visit EKP Supplies*, Model Engineer, 4017, May 17 1996

The View from Butterside Down Kicking Things Off

PART 2 – THE MILLION POUND PAPERWEIGHT

Steve Goodbody takes a random walk through model engineering.



Continued from p.101
M.E.4733 December 29 2023

Welcome once again to Butterside Down, our little corner of paradise, and please settle yourself into the comfy armchair on the observation deck of our modest home. It's a beautiful morning and I see that the ham-fisted family next door is preparing an *al fresco* breakfast in their back garden. Watch carefully as the sun rises, for it will soon reveal the church spire in the quaint little hamlet across the valley, *Toast Landing*, which is a lovely sight. Yes indeed, as the shadows shorten and our clumsy neighbours begin their meal, I confidently predict that we will soon behold *Toast Landing*, Butterside Down.

At this point, while our poor editor is surely regretting his unfortunate decision to embark on this experiment in transatlantic columnising - sorry Martin - let me thank you,

tenacious Reader, for joining us once again, for I am sure that you have other things to do, and I am certainly appreciative of your time, even if I secretly think you're a bit of a glutton for punishment. But then, as dedicated model engineers, aren't we all? And who am I to judge?

Now last time, if you recall, we discovered that, because of its short wavelength, bluer light is more energetic than redder light, despite appearances to the contrary, but that shorter wavelengths of light are sometimes more easily blocked and scattered than longer wavelengths. However, we also discovered that, to imprint more transistor circuits onto a silicon chip and satisfy Mr. Moore and his blasted law, we must use even shorter and more energetic *deep ultraviolet* wavelengths of laser light if we are to make smaller and

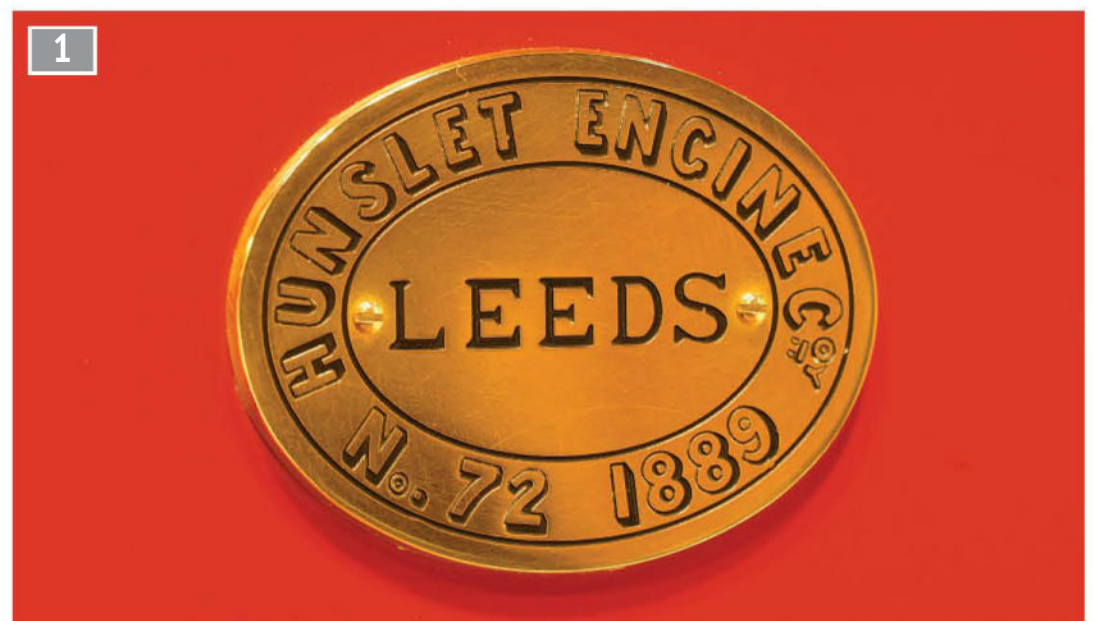
finer circuit images and that the high energy and easily scattered nature of that light would combine to present a real problem to the dedicated technologists involved.

And then, just like that, I closed my laptop, departed for supper and callously left things hanging without further explanation. I ask you, is that the act of a civilized columnist?

But I'm getting ready to correct the *faux pas*, so please forgive my past transgression and let's see if I can't begin to make things right.

A costly mistake

When printing tiny electronic circuits onto a silicon wafer, as when photo-etching a brass nameplate or printing a picture onto photographic paper, it is extremely important that the circuit's image is perfectly sharp, or the result will be an indistinguishable



An etched brass works plate, sharply defined, made by our Deputy Editor using a photo-etching process similar (in principle) to semiconductor photolithography.

2



A deep ultraviolet photolithography machine. It takes a big tool to make a small electronic circuit. (Photo credit: ASML N.V.)

and blurry waste of time (**photo 1**). And to achieve this, one of the main components in any semiconductor photolithography machine (**photo 2**) is a lens which, as with any other lens, is designed to gather, focus and direct the light to exactly where it is needed on the wafer's surface.

Now most of us, when we think of lenses, immediately think of a glass device because that is what we encounter most often in our cameras, magnifying glasses, telescopes and microscopes. However, it is possible to create a lens from almost any material, provided it is transparent to the wavelength of the light in question and is surrounded by a medium with a different refractive index, and our framed eyewear, otherwise known as *glasses*, but which these days should really be called *plastics*, prove the point rather well, don't they?

Anyway, the point is that glass is sometimes not the best material for a lens, and other materials are often better, cheaper or carry less risk of breakage, depending upon the specific application.

In the early part of the twenty-first century therefore,

and probably nowadays too but I really don't know because I've been out of the industry for quite a while, to gather and focus and direct the deep ultraviolet laser light in the right direction, the light's high energies and optical properties dictated that quartz, rather than glass, was the best material for the lens. However, quartz, when ground and polished to the levels of accuracy required for semiconductor photolithography, is not a cheap material and in those days a custom-made photolithography lens came with a price tag well in excess of a million pounds apiece. And as you can imagine, those lenses were treated with great reverence and care, and woe betide anyone who placed one at risk.

Anyway - and this is before I became involved in the project, so please don't blame me - the day eventually arrived when a beautifully ground and polished quartz lens was exposed to a deep ultraviolet laser beam for the first time and, as I understand it, everything went extremely well for fully three seconds, before the performance of that lens and the quality of the light beam,

took a considerable turn for the worse.

With much scratching of heads, the photolithography machine was eventually disassembled and the expensive lens carefully removed for inspection to see what was going on. However, detailed inspection was unnecessary, I am told, for once removed from its chamber the problem was obvious: the once crystal-clear surface of that fine quartz lens had been thoroughly and indelibly coated with a thin layer of a black substance, an undesirable additive in the photolithography process as I understand it. Evidently, in less than three seconds, a million-pound lens had been converted into an artefact suitable only as a desktop paperweight, if you didn't mind getting your papers a bit sooty.

Oops.

The smoking gun

Eventually, after the air had cleared and the red-faced scientists had scratched their heads, methane, the hydrocarbon consisting of one carbon atom happily attached to four hydrogen atoms and famously vented in large quantities from the posterior of

the average cow, was identified as the primary culprit.

Evidently, despite the atmosphere within the photolithography machine being carefully and precisely controlled for temperature and pressure, both factors which, just like our planet's atmosphere, affect the quality of the light travelling through, the third and equally critical factor - the composition of the atmosphere - clearly needed further work. In short, when exposed to the energetic laser light beam, the methane within the not-quite-pure-enough atmosphere had instantly decomposed into its elemental constituents, coating the lens in the resulting carbon and causing someone, thankfully not me, to receive a million-pound dressing-down. Clearly, further work was needed to avoid it happening again.

And that is when my little team of scientists and engineers became involved because we were, allegedly, experts in producing and maintaining ultra-pure and ultra-stable atmospheres and this seemed like a job right up our street.

●To be continued.

K.N. Harris Beam Engine

PART 1

Geoff Walker revisits a beam engine first described in *Model Engineer* in 1946.



Introduction - the 1946 KNH engine

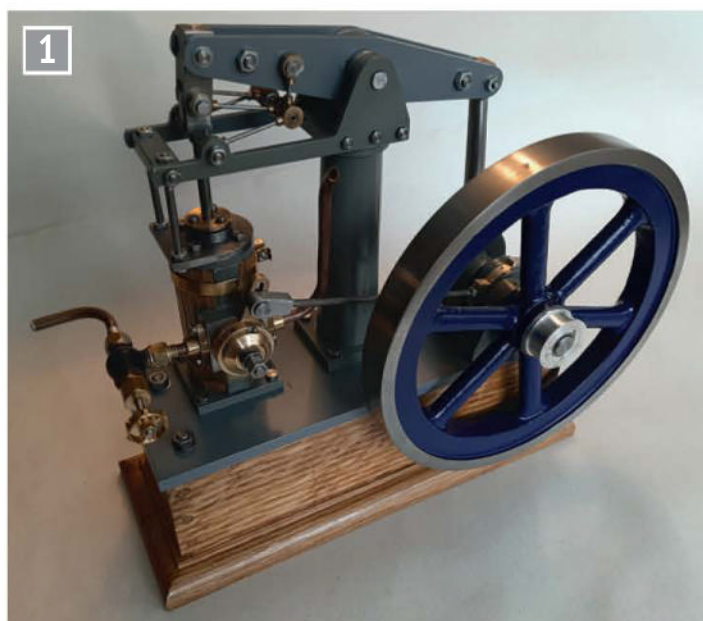
I would imagine that most model steam engine makers will be familiar with the post war K.N. Harris (KNH) design (**photo 1**) which is the subject of this article.

The design featured as an article in *Model Engineer* magazine and then in KNH's book *Model Stationary and Marine Steam Engines*, which was first published around the same time as the article. It was conceived as one of a series of beginners' engines. The design was therefore basic and eschewed the embellishments often found on a more advanced engine.

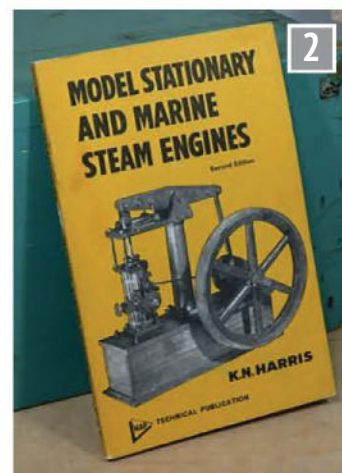
The book has the rear of the engine pictured on the front cover (**photo 2**) and has the only detailed drawings. For reference, when reading this article, the drawings can now

be found on the Internet if the book is unavailable.

A *Simple Beam Engine* by K.N. Harris is short two-page article from *Model Engineer* magazine issue 2337 (February 21 1946). There are two black and white photos, one from the rear and a rarely seen front view. The flywheel is cast iron and the only casting. Most of the rest is made from brass which includes the base, the column, the entablature and sides, the main crankshaft bearings and the beam. The cylinder is made from gun metal and the connecting rod is mild steel with gun metal ends. All the wooden parts, the base and the cylinder cladding, are mahogany. There are no split bearings in the design and all the lubrication points are just small holes which can be fed periodically with a drop of oil.



Rear view of the 2023 engine.



Front cover of the KNH book.

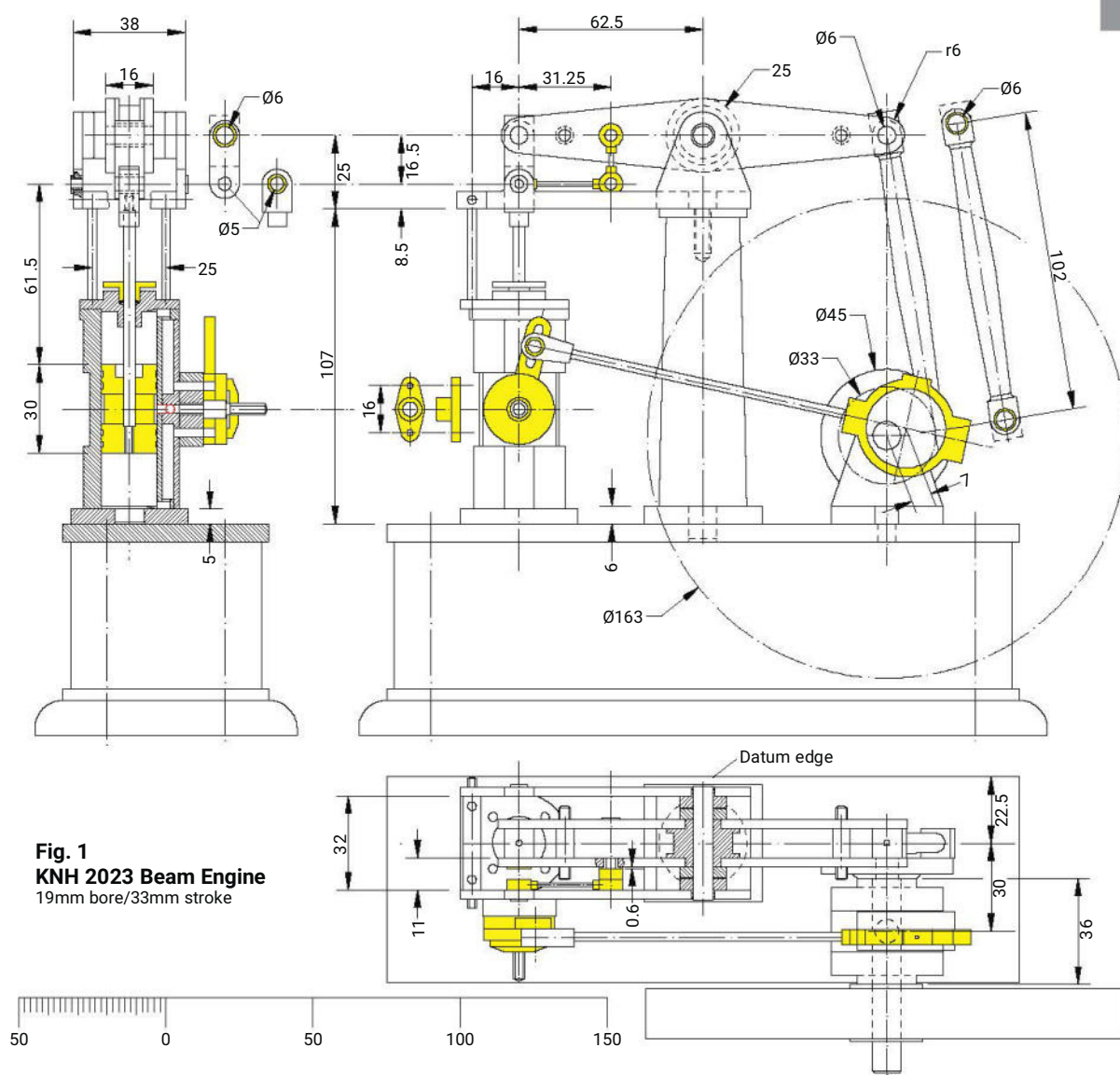
The cylinder has a $\frac{3}{4}$ inch bore and the engine has a stroke of $1 \frac{5}{16}$ inches. The beam end centres are 5 inches apart and the height from the base to the centre pivot is $5 \frac{1}{4}$ inches. The offset on the eccentric when scaled from the drawing is approximately $\frac{9}{32}$ inch. The four long links on the Watt linkage have $1 \frac{1}{4}$ inch centres and the two short links $\frac{21}{32}$ inch, the latter being half the stroke of the engine.

Two unusual features of the engine are the semi rotary valve and a separate auxiliary uniflow exhaust.

The valve is like a double acting oscillating cylinder arrangement turned the other way about. Unlike on a double acting oscillating cylinder engine, the valve events can be arranged and varied in much the same way as a they can with a slide valve.

An auxiliary uniflow exhaust is quite common on simple KNH designs. There are no details in the KNH book or article of how this was done

Fig 1



The K.N. Harris beam engine.

but I would imagine that this one was channelled into the primary exhaust. The exhaust would be at a midpoint in the cylinder (shown in red in **fig 1**) and is only fully open when the long piston is at TDC or BDC.

This article is essentially about my interpretation of his design with enough information in the form of concise text, drawings and photographs to enable a prospective build by an experienced or novice model engineer.

The 2023 KNH engine

I set out to make the engine, my first beam engine, as seen in photo 1, with many of the original features and only if I particularly disliked an aspect of design or construction

would I make any changes.

Figure 1 is a half-size metric orthographic drawing which gives the layout and positioning of the parts. None of the three views are complete and many details have been omitted for the sake of clarity. Key sizes have been added and there is a scale for less important ones. Details of other parts or sizes not included in the drawing will be given in other drawings, the text or photographs.

The materials used in the 2023 engine are largely different from the KNH design. The cylinder and top cover plate are cast iron as is the column, the main bearing block, the beam bearings, the eccentric and the flywheel. Mild steel is used for the base,

the base of the cylinder and column, the entablature, the side plates and its support stuts, the connecting rod, the crosshead and forked coupling and the crank disc. Silver steel is used for the crankshaft, the beam shaft, the piston rod, the valve pivot, most of the loose and fixed pivots and the watt linkage rods. The piston, the gland, all bearings in the crosshead/con rod, the eccentric sleeve, the Watt linkage ends and the valve parts are all made from brass but gun metal or bronze would be a better choice for all. The plinth and the cylinder cladding are oak. The flywheel was supplied by Kennions, model engineers and is the one used on their 'Rachel Wall Engine'.

The mild steel base has location holes drilled for the extended column spigot and for another short spigot to locate the bearing block. The cylinder can be positioned on assembly by allowing it to settle and then be fixed down in a natural position.

The tapered column is in three parts which includes the base and the entablature. The base is fixed to the column from the underside with 4 x 3mm countersunk head screws and the entablature with one 6mm hexagon head screw. The entablature is 32mm square and has an 8mm hole in the centre to allow for minor adjustment when setting its position on assembly.



The beam and piston rod couplings.

To help with accurate alignment the entablature sides should be shaped and drilled as one. The sides are fixed to the entablature with six 6BA screws. The cross bar for the vertical support stays is shouldered at both ends and threaded 3mm diameter. The bearings are cast iron, shouldered to fit, drilled/reamed 8mm and held in place with Loctite. The fixed pivot points for the Watt linkage have shouldered bushes fitted, each one drilled 3.1mm. Take great care with the alignment of the sides as even minor discrepancies will give problems when attaching the beam or the Watt linkage.

The beam is a simple arrangement with 3mm thick mild steel sides, again shaped and drilled as one. At the centre is a shouldered bush, drilled and reamed 8mm and held in place with small countersunk screws from each side. The two shouldered spacers are turned from 6mm bar down to 4mm and threaded for 4mm nuts. The end holes are 6mm diameter for the 6mm pivots which can be seen in **photo 3**. These pivots are drilled through for the 4mm diameter threaded peg, the two 6BA screws and two slim 8mm outside diameter washers. Two bushes each with a 3.1mm hole are fitted for the Watt vertical drop links. Note the depth of the flange, 0.6mm, which acts as a spacing distance for the link.

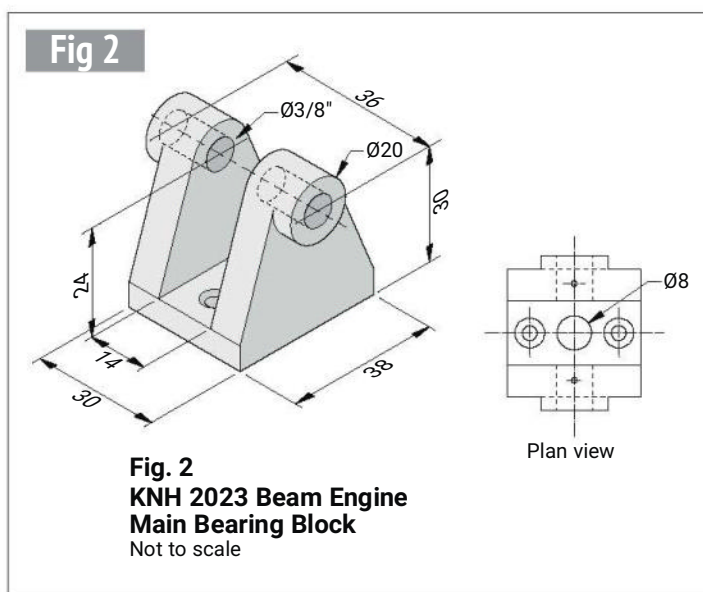
The Watt linkages are made with brass ends joined together by a 1/16 inch silver steel rod



The Watt linkages.



The main bearing assembly.



The main bearing block.

(**photo 4**). The ends are 8mm diameter with a 4mm hole and are each 3.6mm wide. They are cross drilled 2.5mm diameter for a shouldered 3mm diameter boss. The boss can be secured with Loctite or JB weld. The silver steel rods are secured with JB weld. The linkages will need to be assembled on simple jigs to ensure accurate hole spacing. The fixed and loose pivots on each side are turned from 6mm diameter steel, shouldered to 4mm for the linkage hole and 3mm for the beam and entablature side holes. The loose pivots on each side which carry all three links are made from 4mm silver steel and are secured with Loctite in the outer links. The crosshead link pin is made from 5mm silver steel shouldered at both ends to 4mm for the inner Watt linkages. Each linkage is held in place with a 6BA screw and washer (see photo 3). Wikipedia has a page 'parallel motion linkage' which has a linkage animation like the Watt linkage on the KNH engine. The descriptive geometry matches the geometry in the 1946 and the 2023 engine. If you are a novice model engineer this page is certainly worth reading as it's full of useful information. The main bearing block shown in **fig 2** and **photo 5** is made from one piece of cast iron with overall sizes 36mm long, 38mm wide and 40mm high. Prepare to size using the lathe and a four jaw chuck, turn the bosses on each end and drill/ream the bearing hole. Final shaping of the sides and slot can be done on a milling machine. Note the central 8mm hole which locates on a short spigot in the base.

● To be continued.

NEXT TIME

More on the remaining parts, more photographs and detailed drawings of the cylinder, the semi rotary valve and the eccentric and strap. Also details on the valve design, setting and timing.

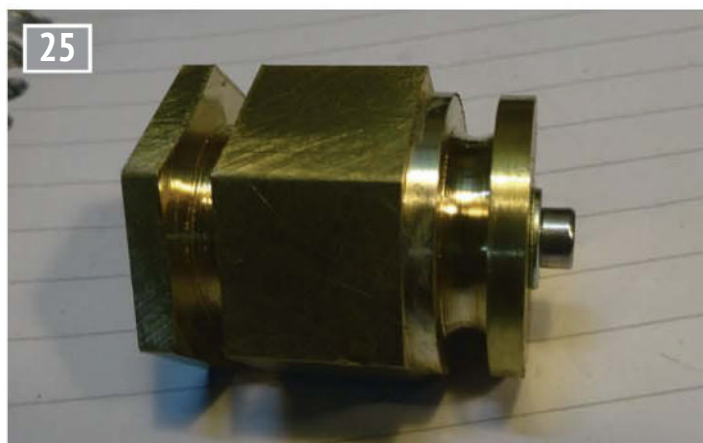
Biscuit Tin Steam Engine

PART 2

Tony Bird says you never know what you might find in a biscuit tin.



Continued from p.108
M.E.4733 December 29 2023



Pipe bending jig.

Pipe bending jig

It had been decided to hide as much as possible of the model's pipework in its wooden base and already one of each cylinder's steam/exhaust pipes went through the engine base plate. To fit the other steam/exhaust pipe to each cylinder and for it to go through the base plate it would have to be bent. The 5/32 inch K&S copper tube which is used for these pipes has a very thin wall and to stop it creasing while being bent a jig was made.

The jig is made in two pieces which when screwed together make a jig which has a slot with a radius at the bottom to suit the tube. The tube is a good fit in the slot of the jig and when in place the top of it is level with the outside of the jig. The reason the jig is constructed in two parts is that it makes it is easier to make and, if while being bent the pipe starts to get tight in the slot, the securing screw can be slacked a bit to ease the situation and tightened again when the bend is finished (photo 25).

In use the jig is held in a vice and the annealed copper tube bent around it, sometimes, as in this case being helped by a rod placed inside it (photo 26). The bent copper tube is cut to length and test fitted before being soldered into the cylinder at a later date.

Warm-up valve

With oscillating cylinder steam engines, if a conventional type of drain cock were fitted it would

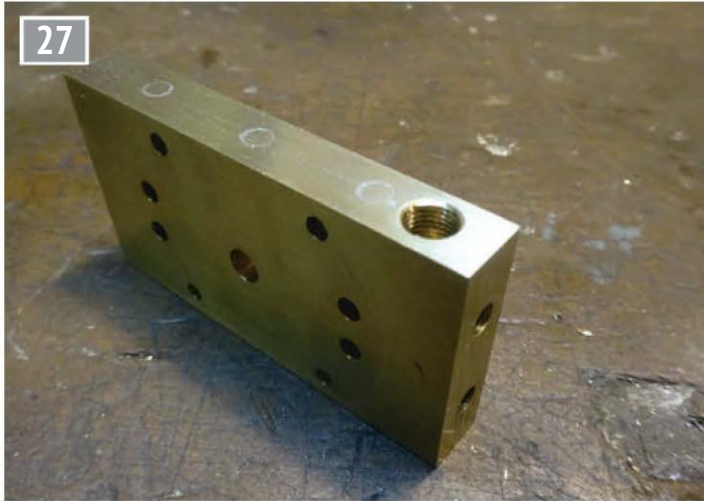
be difficult to operate. With model oscillating steam engines getting the cylinders warmed up, and getting rid of the condensed water and old steam oil in the system, can be quite messy. A way to heat the cylinders and remove most of the water and oil from the system, is to fit a warm-up valve.

This valve works best if it is arranged that the steam and exhaust pipes that are connected to the port block are near the end steam passageways that connect the steam ports together. The valve is then fitted at the opposite end of the steam passageway to the pipes. The valve, which is a simple stop valve, connects the two steam passageways in the port block together and is very similar in operation to the steam blow-down valves used on boilers.

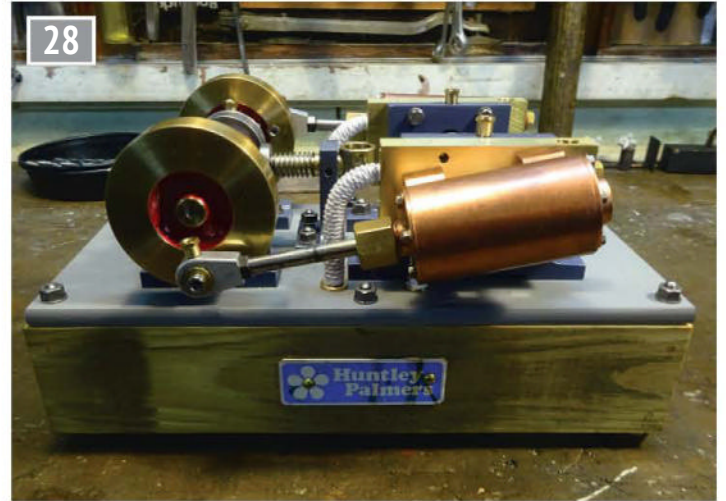
When the valve is opened and the steam turned on, the steam travels along one passageway and then into the other via the valve, so



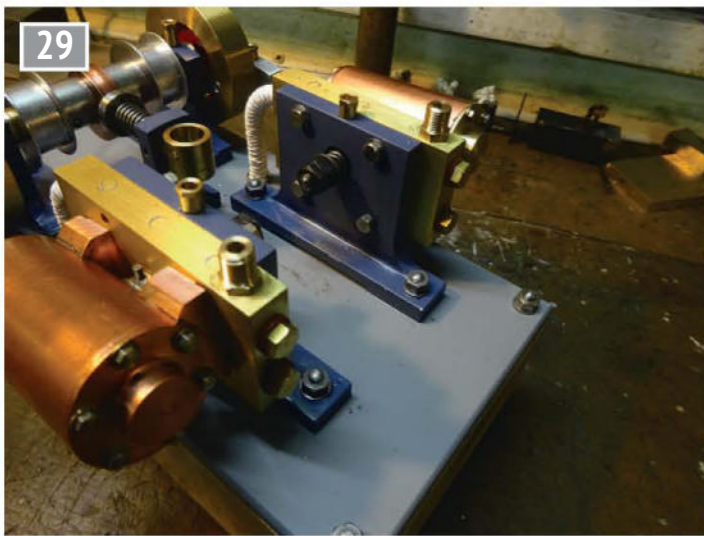
Pipe bending jig in use.



Port block drilled and tapped.



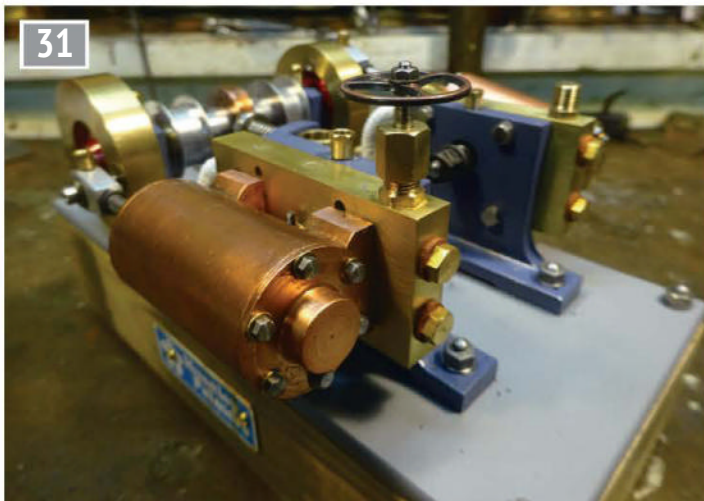
Port block back on engine.



Valve body fitted to the port block.



Starting valve handwheel.



Complete starting valve.



Mystery parts.

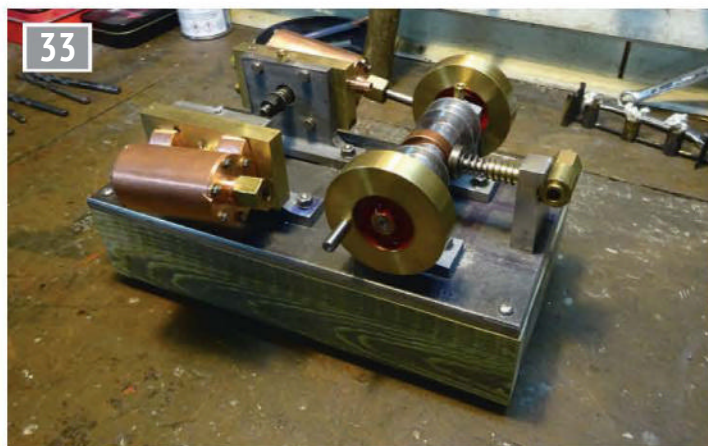
bypassing the cylinders before exhausting. This steam warms up the pipes and port block, removing condensation and old steam oil in the system on the way. The exhaust steam can then go into an oil separator to stop the oil

going into the atmosphere. When the port block is deemed warm enough, the valve can be closed and the engine should start to run without any hydraulic complications taking place. I have fitted this type of valve to many

oscillating steam engines with reasonable success.

To fit the warm-up valve to the Biscuit Tin Steam Engine a 5.7mm hole was drilled into the top steam passageway of the engine's port block and tapped $\frac{1}{4}$ inch x 40 tpi (**photo 27**).

A 2mm hole is drilled from the bottom of the top steam passageway into the top of the lower steam passageway. The top of this 2mm hole is drilled to 3.5mm for a depth of 2mm. As this was the last machining required on the port block, the



Mystery parts turn out to be a feed pump.



Modified feed pump.



Modified feed pump trial fitted.



Feed pump body sleeved.



Feed pump ball seating screwed in.

steam pipes were soldered in place and lagged, then the whole cylinder assembly was fitted on the engine base plate (**photo 28**).

What might be called the body of the warm-up valve consists of a length of 5/16 inch AF hexagonal rod 14mm long with a 6mm long 1/4 inch x 40 tpi section at each end, which leaves 2mm of hexagonal section at its centre. The valve body was drilled through and tapped 5BA and the now finished valve body was screwed into the port block (**photo 29**).

The valve spindle is 1/8 inch stainless steel, one end being threaded 5BA, a short section of this thread being machined away. The other end of the valve spindle is shouldered and threaded 8BA. All the hand wheels used on the model are die cast and were bought in a craft shop. An 8BA nut on a length of 8BA thread was mounted in a lathe chuck and a shoulder turned on the nut. Another nut similarly mounted on the thread had its height reduced by half. The hole in the hand wheel was drilled larger to fit on the shouldered nut.

Some high strength adhesive was used to hold the hand wheel to the nut. The same adhesive was used to hold this combination on the valve spindle and then the half nut was used to further lock it in place. The photograph shows the arrangement mounted, but not glued, on the length of the threaded rod used to turn the nuts (**photo 30**).

Gland nuts were made from 5/16 inch AF hexagonal brass rod, then the packing gland seal was made from a PTFE rod turned to fit inside the gland nut and drilled to fit the valve spindle.

A completed warm up valve in place on a port block is shown in **photo 31**.

Feed pump

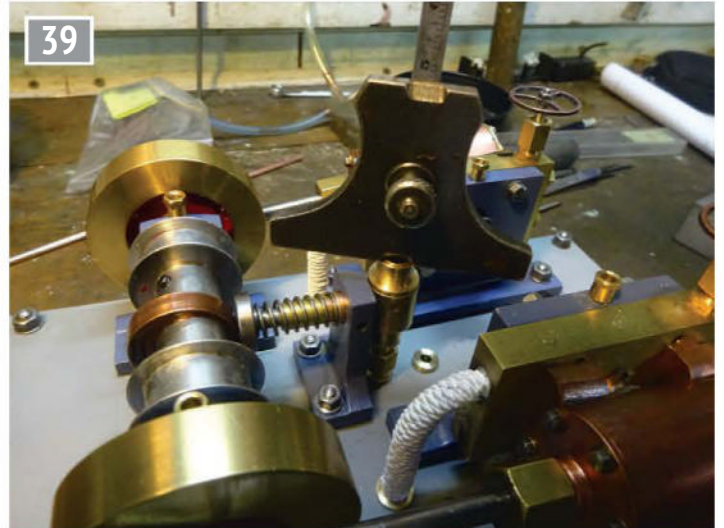
There was a mysterious assembly in the tin which had only been kept as one piece of it was painted the same colour as the cylinders (**photo 32**). Eventually, it was identified as a boiler feed water pump, which was powered by the eccentric on the axle. This pump used a

spring to keep part of the ram acting against the eccentric to make it move (**photo 33**). As the pump was incomplete, what remained of the pump's valve housing was removed and the valve body was drilled through (**photo 34**). The pump body and its attached cylinder were fitted to the same type of bracket that had been used to hold both the axle and the cylinders to the base plate. The pump was held in the bracket by a set screw going through one side of it (**photo 35**).

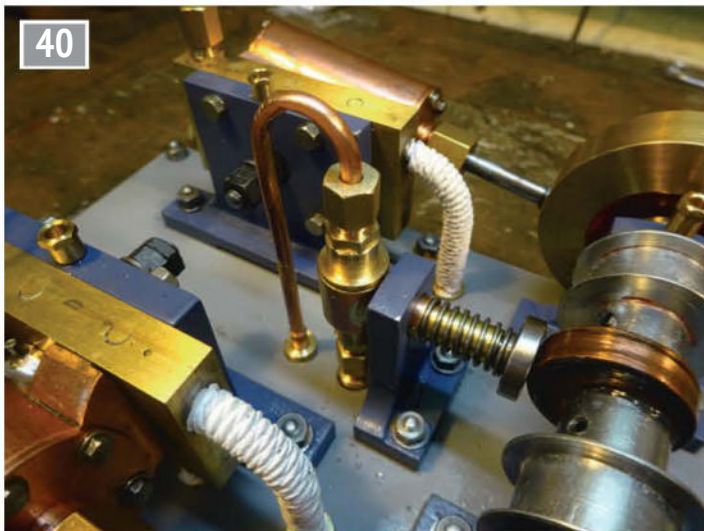
A shouldered sleeve threaded inside 1/4 inch x 40 tpi was made to fit into the original valve body, to hold two clack valves. The sleeve was held into the body using a high strength engineering adhesive (**photo 36**). After the sleeve was fitted, a hole was drilled through it using the pump cylinder as a guide. The centre seating for the ball valves was made as a threaded bush with one plain end, the other end having slots filed in it to allow water to pass. The slots filed in the bush were used to



Feed pump attached to bracket.



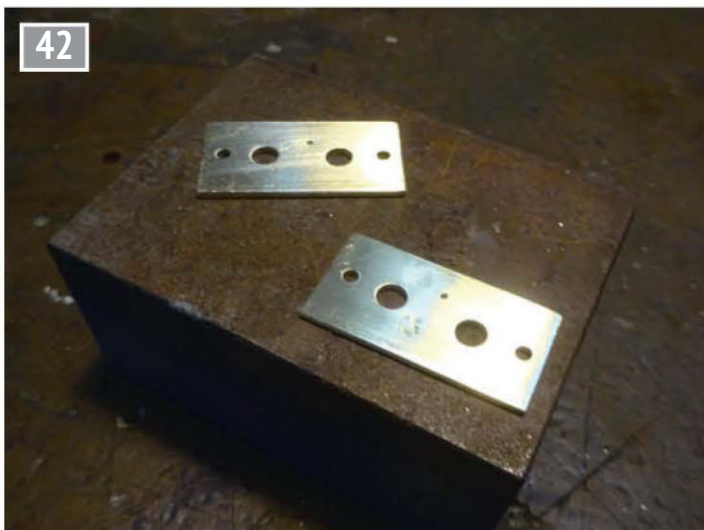
Measuring for the shoulder.



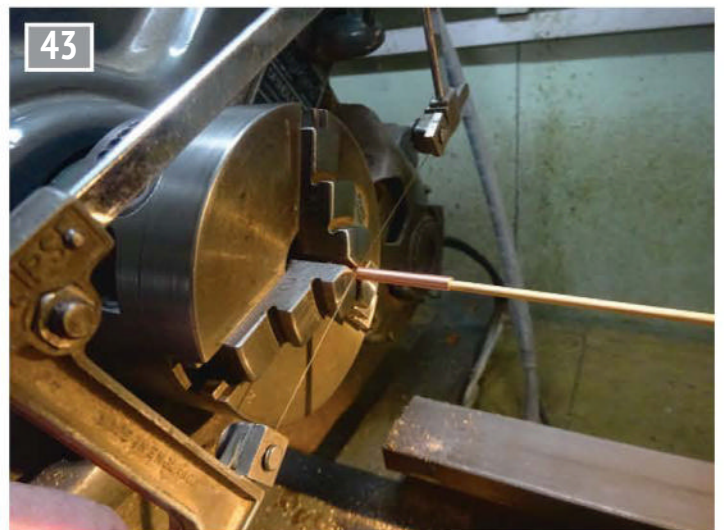
Feed pump finally fitted.



Pipe drilling jig.



Pipe union plates.



Cutting the pipe.

screw the bush into position in the pump body (**photo 37**). Again, after fitting, using the pump cylinder as a guide, a hole was drilled through the bush, the act of drilling this

hole securing the bush in the body. The now complete pump cylinder was attached to its bracket (**photo 38**).

The depth of thread on the pump union that went into

the pump body which would give the clack valves balls enough movement to work in the following fashion. The ball was placed on its seating in the pump and a

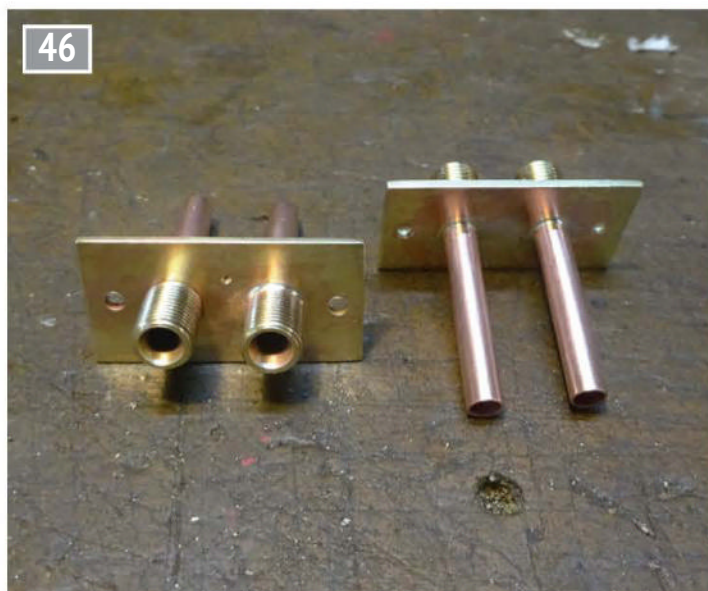
depth gauge used to measure the distance between the top of the pump body and the top of the ball, the result being used for the length of the threaded portion of the union that would



Pipe and union.



Unions soldered to the plate.



Finished pipe unions.



Feed pump connected.

screw into the pump body (**photo 39**). It had been found that when the hole was drilled through the union it created enough movement for the ball in the valve to work, the hole in the unions being the same as used for the centre ball seating. The size of this hole was calculated by dividing the diameter of the ball by 1.40, the result having been found to give a good seal.

A smaller version of the pipe bending jig used to bend the steam pipes for the port block was used to bend the pipe to fit into the top union of the pump and a nipple was soldered to the bent pipe. A shouldered bush was turned to go around the pipes where they went through the engine

base plate and the now complete water pump was fitted to the engine base plate (**photo 40**).

The pump was now tested - there had been thoughts that a pump with a 5/32 inch ram with only a 5/32 inch stroke would not work, but it did!

Unions to connect external steam and water pipes to the engine

Other than the drawings made to check dimensions needed to position the cylinders and axle, all the other parts were created with what at best can be described as dimensioned sketches.

There needed to be a means of connecting both steam and water pipes through the

wooden base to the engine, and one of said sketches was used in making a drilling and filing jig. This jig would be used to make a base plate for a pair of pipe unions that would be fitted into the wooden base so that external steam and water pipes could be fitted. **Photograph 41** shows the jig in use to drill holes for pipes to go through the wooden base. The same jig was used to file two brass plates to size and drill securing holes in them (**photo 42**).

The pipe for the unions was cut by measuring the required length out from a lathe chuck, placing a length of round wood inside it, and cutting it with a piercing saw held against the chuck while it was being

revolved by hand. The wood serves two purposes; it gives the saw blade something else to cut into as well as the thin wall K&S tubing and it reduces the chances of the blade breaking after cutting through the tube (**photo 43**). The pipes were fitted into a length of brass rod threaded 1/4 inch x 40 tpi (**photo 44**) and the pipes, threaded rod and base plate were then hard soldered together in one operation (**photo 45**). Here is the pair of finished unions (**photo 46**). The first set of unions for the water pump is screwed to the wooden base and connected to the pump with silicon tubes (**photo 47**).

●To be continued.

1934 McDonald Tractor

A working one-fourth scale model

PART 1

George Punter is drawn to another tractor project.



engine numbers. A chat with the owner revealed that both tractors had been bought from various parts of the country and now after all those years they had come back together again. Fortunately, the owner lives only seventeen kilometres from my home and he offered me an invitation to come down to his property at any time to gather information and take photographs. Having this sort of access is valuable and after a quick run around with a tape measure my mind was made up - this was to be my next model (**photos 1 - 4**).

May of 2019 was to prove to be an exciting time for me as I had dispatched my model Saunderson and Mills tractor back from the UK after the Model Engineering Exhibition being held at Doncaster (where it won the Duke of Edinburgh trophy – *Ed.*). It was great to catch up with friends old and new and to see a wide range of models on display and the trade stands. I returned home to Australia full of enthusiasm and ready to start the design and construction of the 'new' model tractor.

The model is of a 1934 McDonald Universal which

April 25th was to become a memorable day for me as it was the first time, I saw this tractor. I was attending a local field day where various stationary engines of varied sizes, shapes and makes were on view, together with a display of full-size tractors and an array of stalls all there for me to see and spend a very enjoyable day. When I attend this sort of event, I tend to look at objects and think to myself 'would that object make a good model?' and when I saw and heard this tractor the eyes lit up and the brain went into overdrive! The sound, that sound, how wonderful it was and - yes - it was blowing smoke rings just for the joy of

it. To my surprise there was not only one but two of the same type and both belonged to the same family and incidentally have consecutive



McDonald tractor – side view.



McDonald tractor – the other side.



McDonald tractor – flywheel and cooling fan.

when new had cost 535 pounds. A visit to the farm property revealed that this was one of about two hundred tractors in a private collection and was housed in two massive sheds each being 80 metres long and 30 metres wide.

The design of this Australian tractor has its roots based on that of the Lanz Bulldog and Rumley and a passing resemblance to the Field Marshall. The early design of this tractor had the cylinder pointing to the front of the machine but later this was reversed to give a better weight distribution and traction. The single cylinder two stroke semi diesel engine has a bore of 9¼ inches and a stroke of 11 inches and revs to 525 rpm at which it makes 30 hp. It is of the hot bulb type of ignition and uses direct injection into the cylinder head with air being drawn into the crankcase via reed valve.

Cooling is by water thermosyphon with air being drawn through the radiator by a side mounted fan driven by a belt from a pulley mounted behind the flywheel. The engine is lubricated by a total loss system but any excess oil that builds up in the crankcase is returned to the tank. The oil pump is driven by an extension arm from the injector pump and feeds oil to the main, big end bearings and to the cylinder/piston unit. The oil tank is placed above the cylinder head and has a sight glass to enable the driver to check that oil is being delivered to where it is needed. The engine is connected to the gearbox by a duplex chain, and it has three forward and one reverse

gear, that is unless the engine backfires and runs in the other direction in which case you then have three reverse and one forward gears!

McDonald made a variety of engines based on this design and they were used as stationary engines on farms and in industry. Small road rollers of the type used by local councils had this type of engine and the example shown was used in a family-owned sawmill for all its working life.

The process of gathering information on this machine consisted of taking more than 200 photographs and using a collection of measuring equipment that included a tape measure, stainless steel rules of various lengths, digital callipers, digital protractor, pencils, coloured pens and drawing books. The sketches were later scaled and made into working drawings using CAD (Fusion360).

The owner of the tractor had bought two copies of the McDonald Driver Owner's Manual and gave one copy to me to study as this had not only written information but also drawings and photographs of parts. The drawings were in the form of blueprints but by using the computer I was able to change them to black/white prints and then use a photo copier to scale them to the correct size. The vision of the finished project was there in my mind and now all I had to do was make it – if only it was that easy!

This project would challenge all my skills, knowledge, and machinery but that is what makes life interesting and

makes it worthwhile getting up in the morning. There are just not enough hours in the day. I normally start at 8am and work through to 'smoko' (morning tea) at 10.15am and then back in the shed until 12.30pm when it's time for lunch followed by a nanny nap. At 2pm its back in the shed until 3.30pm when the gentle call from the house tells me its afternoon teatime. Work continues until about 4.45pm and at that point the shed is locked up for the night and I head into the house feeling that I have had another good day at the office and have hopefully achieved my goals for the day. This routine runs at least five days a week and it is easy to see how the hours add up. The last tractor took over 4,000 hours to make and this project will take at least that long if not longer. At the end of the day, you may have only made a small part, or a process completed, but it's one step closer to the end and just think of the satisfaction there is in the making that part or process mastered. I have an old saying

pinned up in the workshop that says, 'Small things make perfection, but perfection is no small thing.' I am not sure where it came from but it reminds me to continue to strive for that elusive goal. I decided that the project would be split into two areas of work, the first was the chassis and the second would be the engine.

The visits to the farm continued in one-hour blocks as after about that amount of time I have had enough and have reached saturation point and I am also gasping for a cup of tea! My starting point was the rear wheels, followed in order by the front wheels, chassis, radiator, gearbox, driver end details and finally the engine. There were some parts that were not easy to measure due to their double curvature or difficulty of access and some were well coated with a mixture of oil and dirt and that just adds to the day out. Early on I made up a dummy engine from MDF. This was intended to be the pattern ready for casting but was later replaced. It did help to give me an idea of the size and shape that I would be dealing with. By this time, I had reached a point where I had two full sketch books of valuable information but the gathering of the information would be an ongoing part of the project. By then I had already started to process that material into CAD drawings, patterns, and three-dimensional parts and I felt that the journey had begun.

●To be continued.



McDonald tractor – front view.

Class 128 Parcels Van

Ivan Smith
completes
a model
begun nearly 30 years
ago.



This shows the author, well wrapped up, with temperatures just above zero checking out the basic operation of the unit.



Three months later the unit was complete except for internal details of the driver's cabs.

Ever since the formation of Stockholes Farm Miniature Railway Society we have always encouraged people, especially youngsters, to become involved in the hobby. Back in 1998 Thomas

Garlic, who was then 14 years old, joined the Society and expressed a wish to build a model based on a Diesel Multiple Unit (DMU). After discussion with Thomas I suggested that he could

consider building a parcels van. This would have the distinct benefit that the prototype consisted of one vehicle only. Further investigation revealed two possibilities: the Gloucester C&W Co. Class



This shows the centre section of the Class 128. The driver's seat is in the centre to enable the unit to easily driven in either direction. Also seen are some of the underfloor details including engine, battery box, cylinders etc.



This shows number 1 end with the engine exhaust pipes, corridor connection, windscreen wipers, buffer beam detail and working light. The light can be changed from white to red depending on the direction of travel.



Entertaining visitors is ideal with this unit. There is no need for a separate locomotive and carriage and additionally children sit inside the vehicle.

128 or the Cravens Class 129. Eventually the Class 128 was chosen. Some of the Class 128's were built with corridor connections with the engine exhausts passing either side of these vertically. These made two very distinctive features which could be incorporated into the model.

Thomas then used to visit regularly on Saturdays and commenced building the model and during the next few years had got it to the stage of a basic skeleton chassis and motorised bogie. I suppose I should add at this stage that we had no detailed drawings, simply a couple of line drawings at a scale of 4mm to the foot i.e. 'OO' and only a couple of photographs not showing much detail. These two classes of units were small in total numbers



This is a general view of the completed model. It was originally intended to make a pattern for the bogie detail but due to Covid restrictions we ended up fabricating these.

(10 Class 128's and 3 Class 129's) and appear to have been very camera shy. Additionally, there did not appear to be much published information on these vehicles and we did not have access to the internet at that time. We simply used the 7¼ Inch Gauge Society standard gauge wheel standards and worked upwards. We also made best use of material 'to hand' to help keep the cost down.

When the time came for Thomas to pursue higher education the model was passed onto another one of our members, Bob Measures, who continued with the build including motorising the second bogie. Unfortunately changes to his domestic circumstances meant that Bob was not in a position to continue with the build. As a consequence the model finally came back to Stockholes in 2016 and since then has been a Society project particularly for the Wednesday workshop evenings. A lot of members have been involved and it was nice to see all this effort coming to fruition. Unfortunately, in March 2020 Covid arrived on these shores and stopped all workshop activity for Society members. As a result of this, one of the projects my wife Barbara and I undertook over the last couple

of years, was to continue work on the Class 128 Parcels Van.

On Thursday 20th January, 2022 despite bitterly cold weather I was able to take out the undressed Class 128 Parcels Van to check out the basic functions before final assembly and lining out etc. (photo 1). It was operated on both our goods and old circuits. There was an issue with suspension, that I then cured, and we continued with the process of final painting, lining out and lettering. Why is it that I always appear to be testing locomotives when the temperature is hovering around zero?

By spring 2022 the Class 128 had been fully assembled, all painting and lettering had been completed and the unit could be considered operational. There is still some detailing in the drivers cabs to be completed, but this will have to wait until time permits (photos 2, 3 and 4).

A friend of ours has two young children and, as any parent with children of these ages will know, they are always looking for 'family entertainment' during the summer holidays. Pre-covid we would normally arrange a day for Karen and family to come to the railway, obviously run some trains, have a picnic and play some silly games. So,

after a two year break we were able to arrange a visit for Karen and family again. One of the models used was the recently completed Class 128 Parcels Van. This is ideal for when small children are passengers as it keeps their legs inside the carriage. The photograph shows myself driving with Erin and James (photo 5).

This model has had a very long gestation period but for all intents and purposes can be considered as part of the operational fleet (photo 6) - but one final frightening thought, I have been involved with this locomotive for a third of my life!

Since moving the parcels van out of the workshop and into the engine shed the space in the workshop has now been taken by 7¼ inch gauge Stanier 8F. This model has now progressed to the stage where it runs well on compressed air and recently it has been pushed around a section of the trackwork to check out frames, wheels etc. As with the Class 128 this is another model that has had a long and difficult gestation period but that is another story!

ME

LNER B1 Locomotive

PART 36 – BLOW DOWN VALVE AND VACUUM EXHAUST ELBOW

Doug Hewson

presents an authentic 5 inch gauge version of Thompson's B1 locomotive.



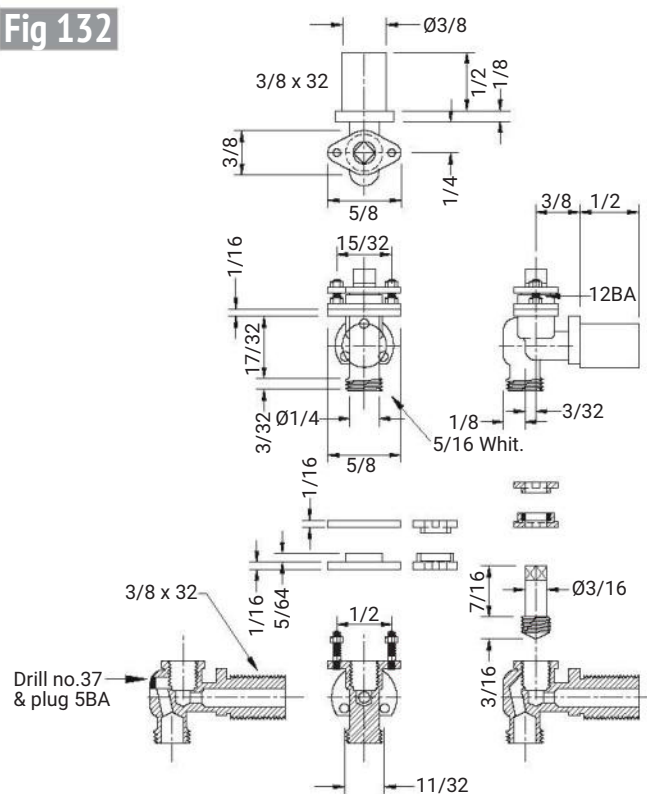
Continued from p.111,
M.E.4733, December 29 2023

As promised, I said I would like to get on with some more cab fittings, but this will be a bit of an assortment; some cab fittings and some external fittings.

First of all, we will tackle the blow down valve (**fig 132**) and I am sure that there is only the one on the left-hand side of the engine. I did make a lost wax casting for this, and it is for the B1, so I hope this is available from 'The Steam Workshop'. There is of course a little bit of machining to do on it. If you want it to work, then you will need to drill it and plug it where I have shown and make a proper stainless-steel valve to go inside it. There is a flange which needs cutting off the top and making into a separate part to fit on the top. It needs threading $\frac{3}{8}$ inch x 32 to screw into the boiler. This is shown in **photo 259**. We now come to the seal for the valve and to seal the valve there is a special little plate that has a $\frac{1}{32}$ inch 'O' ring in it and this is fixed on top with a couple of 12BA studs.

We will continue with the blower valve (**fig 133**). **Photograph 260** shows the blower valve fixing with a couple of 10BA studs. First

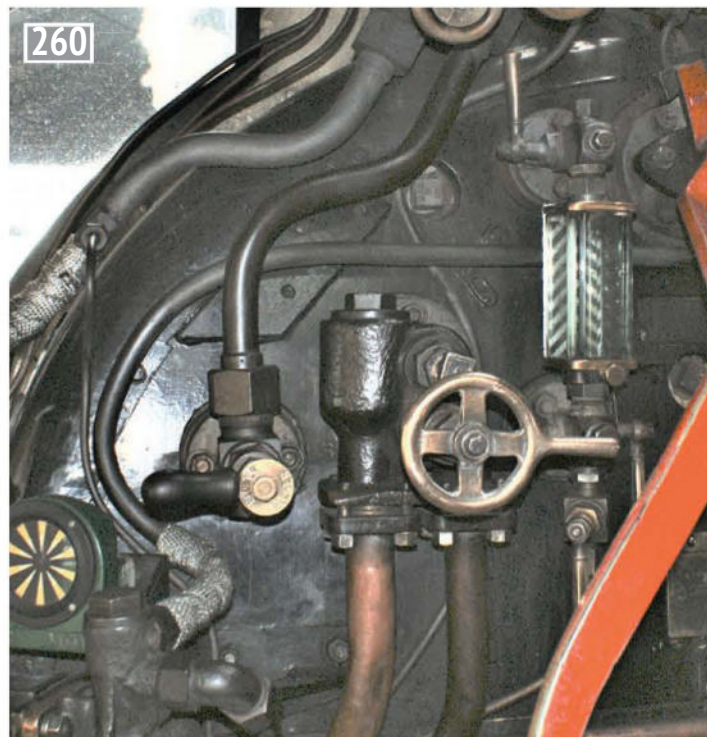
Fig 132



Blow down valve.

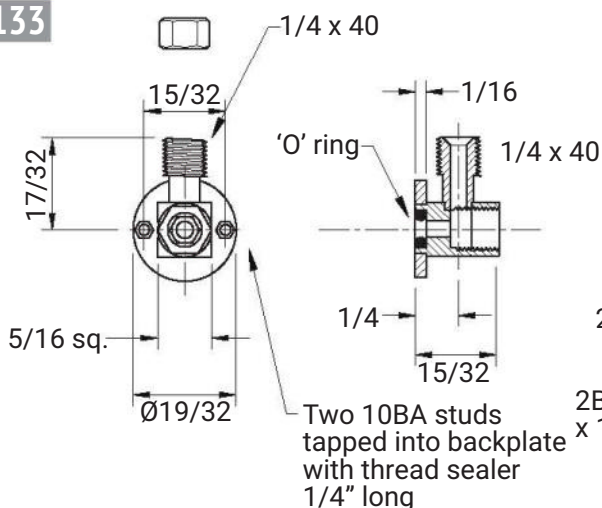


Full-size blow down valve.



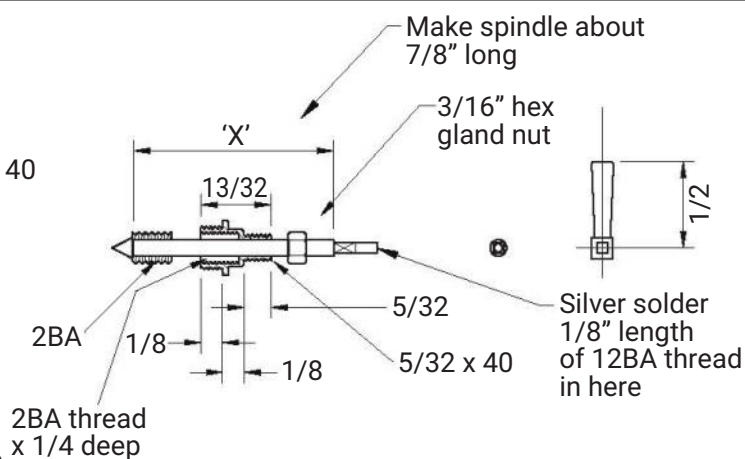
Blower valve.

Fig 133



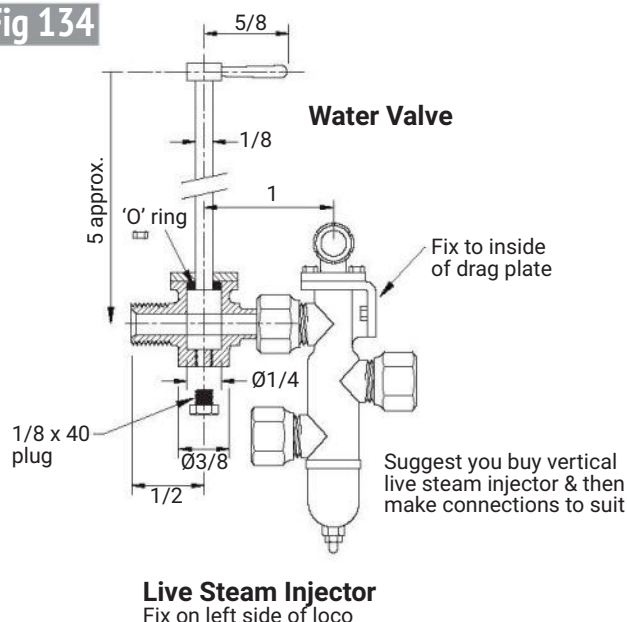
Blower Valve

Blower Valve
Mat'l: Brass with stainless spindle



Blower valve.

Fig 134



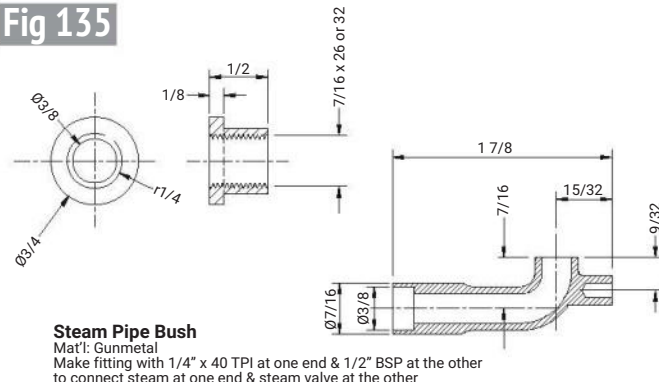
Live steam injector.

of all, the area around where the blower valve fits must be as smooth as possible. I have chosen to fit it with an 'O' ring which stands a little bit proud of the fitting (about 5 thou) so that if there is a little surface roughness it will not matter too much. This is a conventional valve in other respects but the spindle needs a 60 degree point on it to give a gradual opening. Other than that, I can't think of any more to say about it.

Now, I have drawn up a vertical injector (**fig 134**) and have sent the drawing to John Holroyd to see if he can

make anything which looks remotely similar. If he can't make anything like that, then all I can suggest is for you to make something similar and hide a plain No. 2 injector between the frames, out of sight, and pretend it isn't there. I have not tried to draw up an exhaust steam injector to suit a B1 but as it is well out of sight between the frames, I have drawn another vertical one for the right-hand side of the engine and also fit a similar arrangement to the left-hand side and that is the way I have drawn the pipework.

Fig 135



Steam pipe bush.

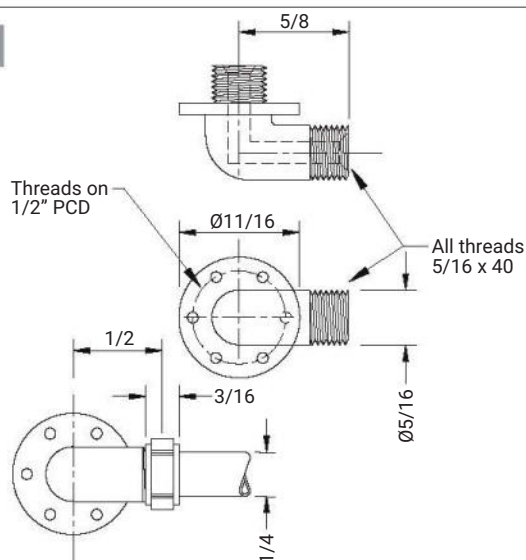
One thing which has not appeared yet is the steam pipe connections inside the boiler. One is the bush which fits in the front tube plate (**fig 135**) and the other thing is the fitting which fits on the other end of the main steam pipe, which I am hoping someone will make a casting for and that will need reaming out $\frac{3}{8}$ inch so that an 'O' ring will just slide in there once the pipe has been silver soldered into it. Once that is done you will have no problem lining up two lots of threads. This is the method I have used on all the engines I have designed.

Moving a little further back now, I have drawn up a link designed to go with a gas valve. They make a brilliant regulator and I thought that this was the best thing to ever come out on Winson's

establishment. If you can't find anything which suits, then there is room to fit a normal disc type regulator similar to a Stroudley one. They are a balanced regulator and are very smooth to operate. The first one we fitted we took the engine for its first run on our railway and as to gentleman had asked us the fit a steam chest pressure gauge, I said to him "Just watch that gauge and once it gets up to about 10 psi, don't jiggle your bottom about, just wait and the engine should just move off smoothly". That was all very well, but when the engine had no pressure showing on the gauge at all, the engine must have moved about 10 yards and it was so smooth I hadn't even noticed it was actually moving.

One thing that every B1 needs is the vacuum exhaust

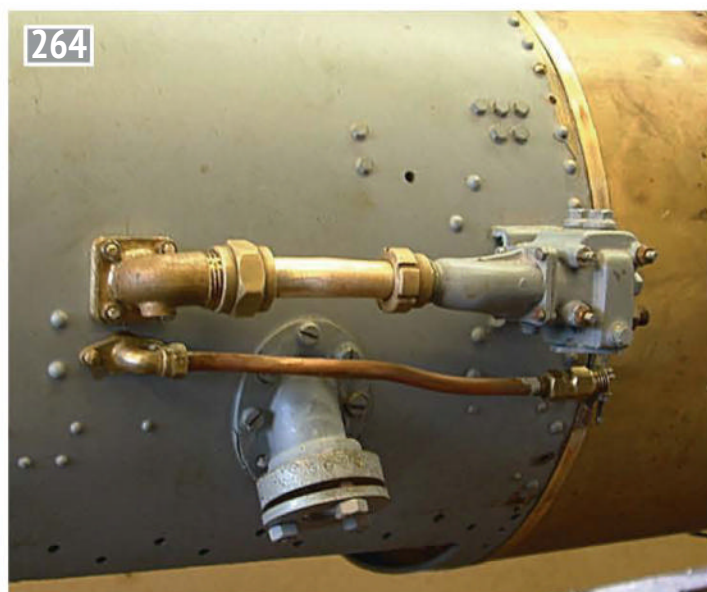
Fig 136



Vacuum Exhaust Elbow

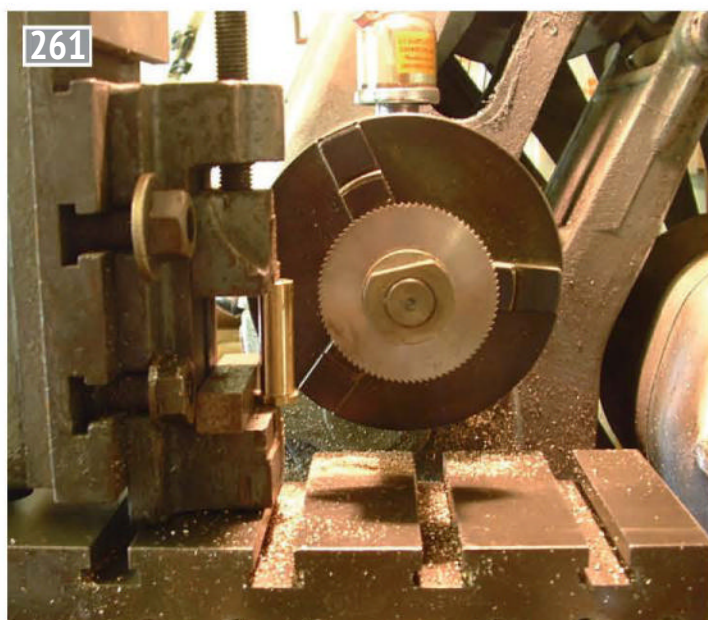
Vacuum exhaust elbow.

264



A 'C' nut on the author's 4MT.

261



Cutting the slots for a batch of 'C' nuts.

265



Casting set for the everlasting blow down valve.

266



Partially machined everlasting blow down valve.

267



Everlasting blow down valve nearing completion.

268



Completed everlasting blow down valve.

262



A complete set of 'C' nut slots.

263



A 'C' nut on the vacuum exhaust elbow on B1 61264 Impala.

elbow so that is the next drawing I have supplied (**fig 136**). You will need to make some 'C' nuts for the exhaust from the vacuum ejector and note that there is one each

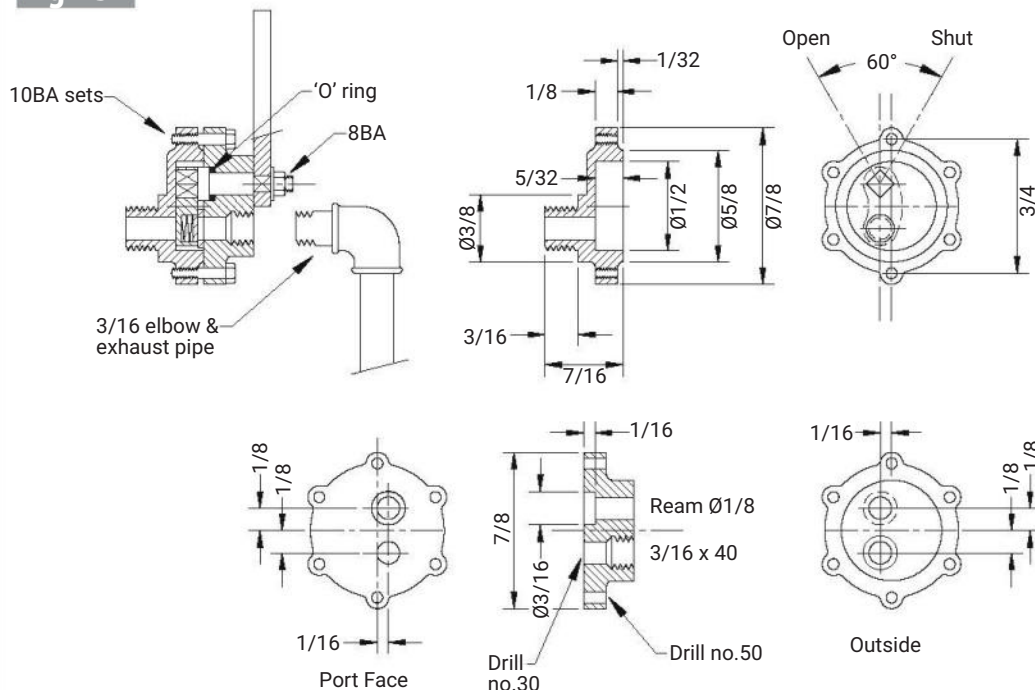
end. I made mine by using my vertical slide and a 1/16 inch circular saw in the lathe and tidied them up afterwards. I don't know why it had a hexagon nut at one end and a

'C' nut on the other end but that was how all 999 BR standards were! **Photograph 261** shows how I made the 'C' nuts for my 4MT by first of all by turning them down to the correct size

and then holding them in the vertical slide and using a 2½ inch x 1/16 inch slitting saw to cut the slots. **Photograph 262** shows the almost completed article. **Photograph 263** shows the 'C' nut on the B1 (61264) and **photo 264** shows the slightly different one on my own 4MT.

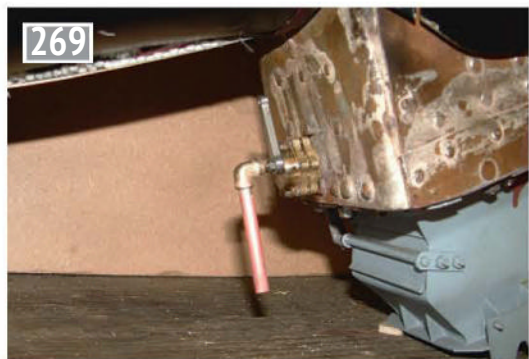
Now I don't know whether you want to make one of these but all the B1s have one and that is an everlasting blow down valve (**fig 137**). However, they do need to come with a Government Health Warning on the label. If you don't let the boiler pressure drop down below about 30psi it will give

Fig 137



Everlasting Blowdown Valve Casting Set

Everlasting blow down valve.



Everlasting blow down valve fitted to the author's 4MT.



Operating linkage for the blow down valve.



Blow down valve operating handle.

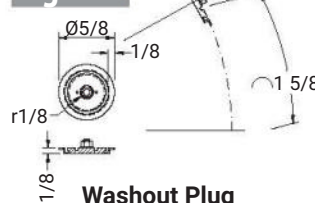


A close view of a washout plug.



Washout plugs on a full size B1.

Fig 138



Washout plug.

you rather a shock! My friend Ballan Baker wasn't aware of that when he first used his on his LNER K1 and he did get an awful shock as he wasn't aware of the warning as no one to our knowledge had ever fitted one before. The noise was earth shattering! I fitted one on my 4MT but Eddy had that pleasure!

Photograph 265 shows the lost wax casting set for the everlasting blowdown valve. **Photograph 266** shows the castings with the insides part machined and **photo 267** shows the castings with a bit more machining done on them. **Photograph 268** shows the blowdown all but completed now and **photo 269** shows the blowdown fitted to my 4MT ready to fit all the linkage. **Photograph 270** shows the linkage to the blowdown fitted under the boiler of the B1 and the black rod is the pull rod to operate the mechanism seen in the photograph. **Photograph 271** shows the handle.

Photograph 272 is to show off the washout plugs which I measured myself and unusually there are the same number on both sides of the engine. They can be represented by a plain round disc of 16swg plate but I have shown it as it is (**fig 138**). If you would like to make the little undercut, you will need to produce a very small boring tool. They are quite visible and they are flat. The 15 thou flange around the periphery is curved to fit round the boiler and this is shown in **photo 273**.

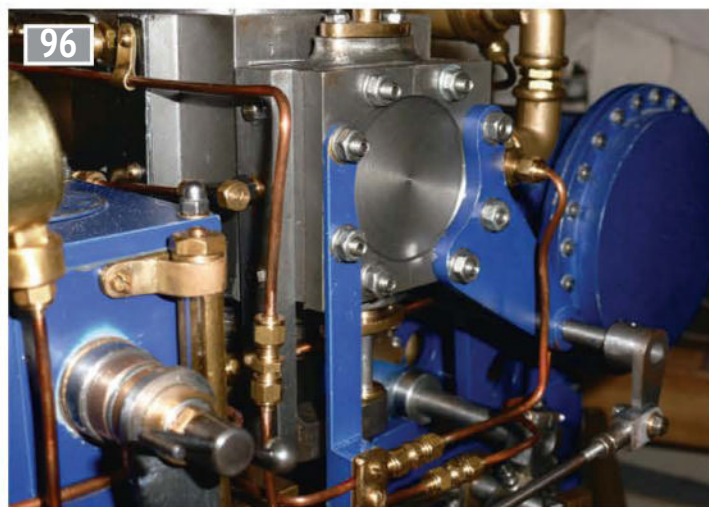
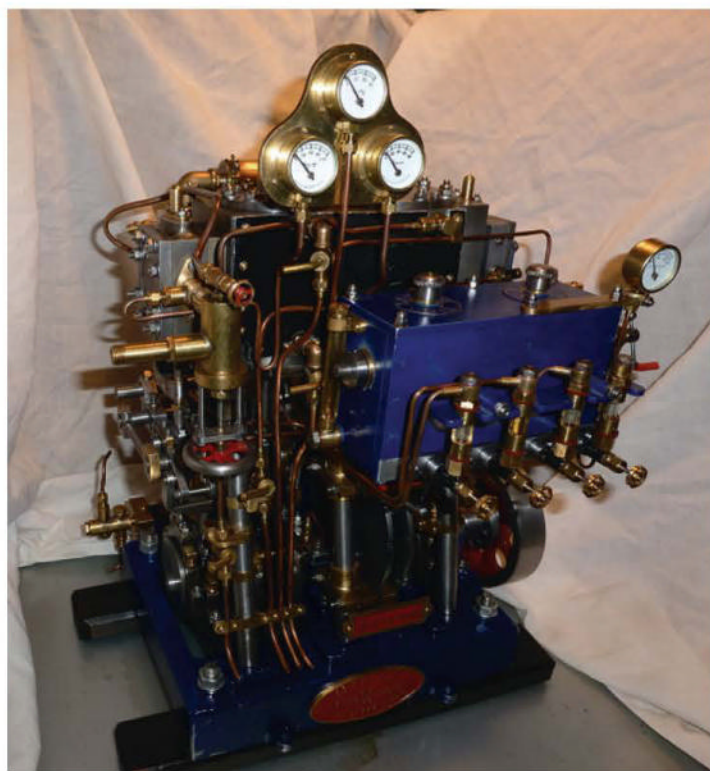
●To be continued.

NEXT TIME

The vacuum ejector.

HERCULES

A two cylinder compound condensing marine steam engine. PART 5



Low pressure valve chest.

Valve chests, covers and glands

These are all cast iron and made to the normally accepted design, just hollow rectangles of a size sufficient to accommodate the movement of the valves, with additional bosses at either end for the gland and guide (**photo 96**). At the base the valve rod passes through a conventional brass two stud gland working in a counter bored hole with a 5/16 x 3/16 inch O-ring.

I don't like designs that leave the end of the valve rod floating about in mid-air, so mine go right across the chamber and through a capped brass guide which seals the end. The end of the valve rod, where it works in the guide, has a flat milled along one side to avoid a pneumatic trap in the end of the closed guide.

The two chests were initially machined down to their basic

dimensions, allowing extra at either end for the gland bosses. The next job was to chain drill and then mill out the centres (**photos 97 and 98**).

There are 8 holes on each chest for the M4 studs and once these and the 3/16 inch holes for the valve rods were drilled, the gland bosses at either end could be finished with a ball ended cutter (**photo 99**).

Photograph 100 shows the valve rod gland and the low-pressure valve rod guide. Both it and the slightly larger high-pressure version are L-shaped steel sections secured to the sides of the chests with three fixings.

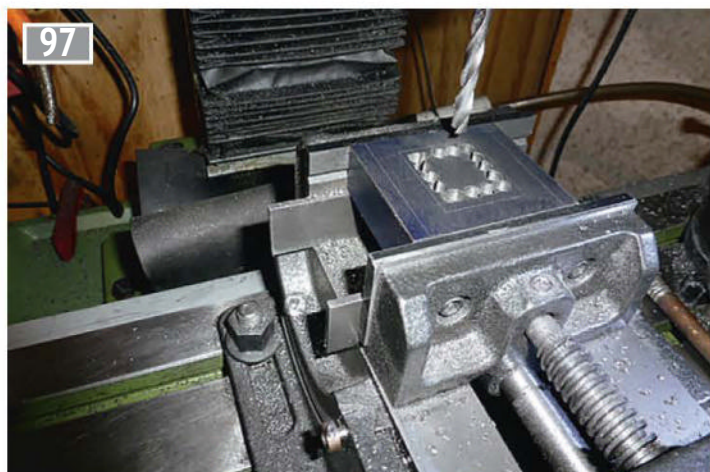
Top and bottom are 5BA hex screws and in the middle is a 1/4 inch diameter hollow brass bush fixed in a hole drilled right through the side of the chamber. This acts as a dowel for the guide but is tapped 3/16

Chris Walter

builds an engine described in *Model Engineer* 100 years ago.



Continued from p.79
M.E.4733 December 29 20235



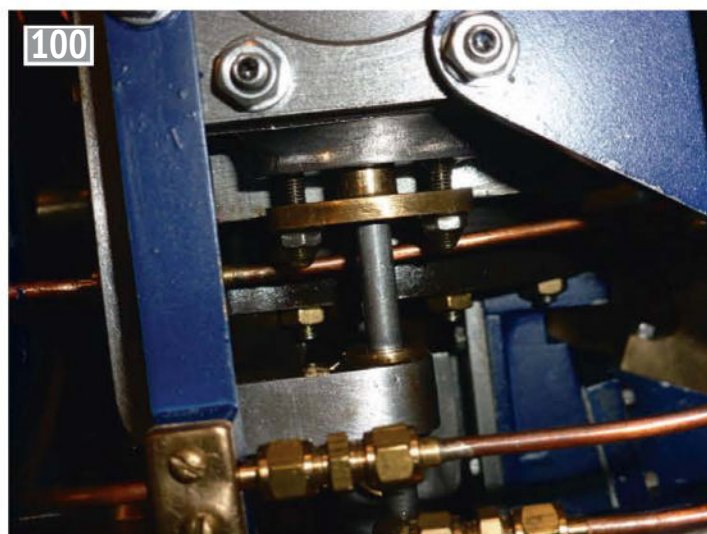
Chain drilling the valve cavity.



The two chests with the cavities milled out.



Milling the shape of the gland housing with a ball ended end mill.



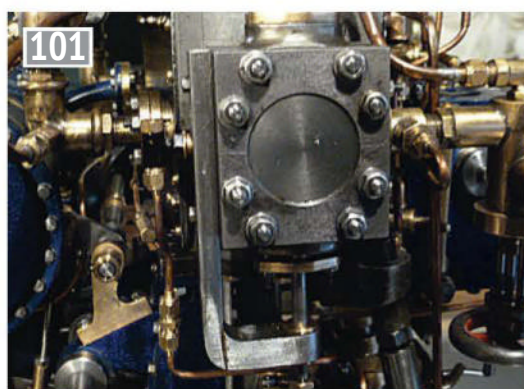
Valve rod gland.

inch x 40 to take the oil feed clack from the lubricator supply for the cylinders. The guides are L-shaped, the bottom arm extending and containing a bronze guide bush through which the valve rod passes (**photo 101**).

Both the valve rod glands and guides are fabricated in two parts from brass plate and rod silver soldered together (**photos 102 and 103**). After clamping to a piece of scrap the outline was finished on the mill and then with filing buttons in the bench vice (**photo 104**). The chest covers need no explanation, being just oblongs of $\frac{1}{4}$ inch thick cast iron. The fixing holes were drilled first and then used to spot through to the chests.

Valves

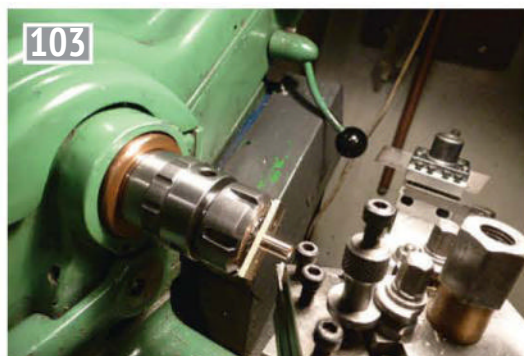
I had never before come across this design of slide valve and driving buckle. This was



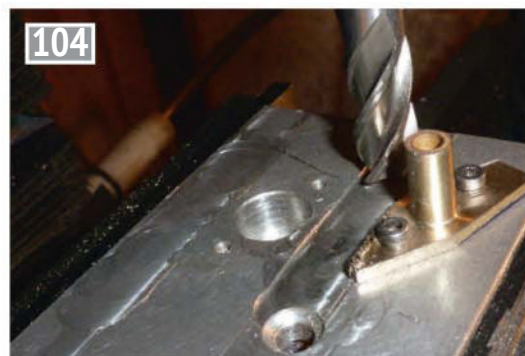
High pressure valve rod guide.



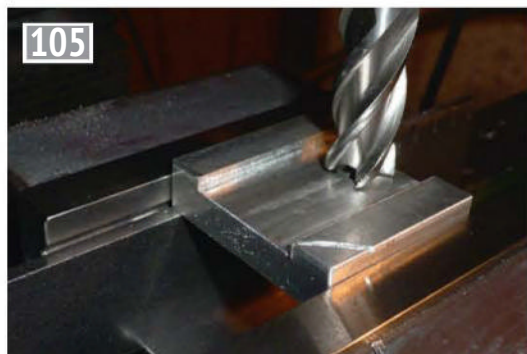
The two types of gland. The top cover with the sealed tube through the flange, and the bottom with the tube on one side to compress the O-ring or packing.



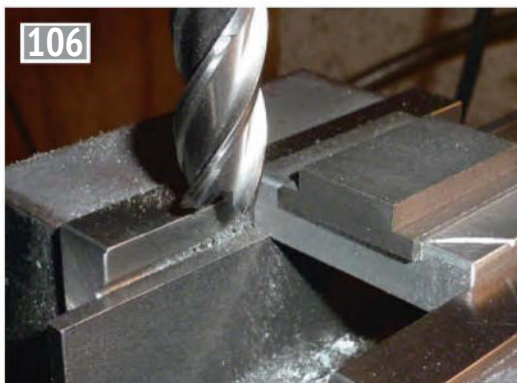
Cleaning up the tube after brazing.



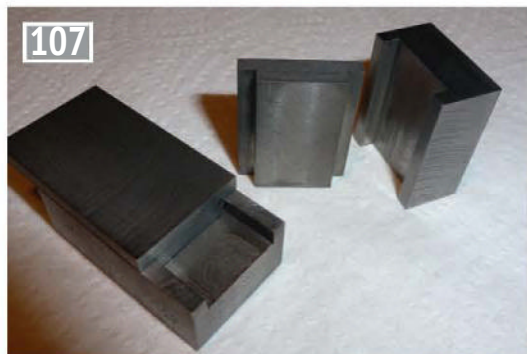
Profiling the flange.



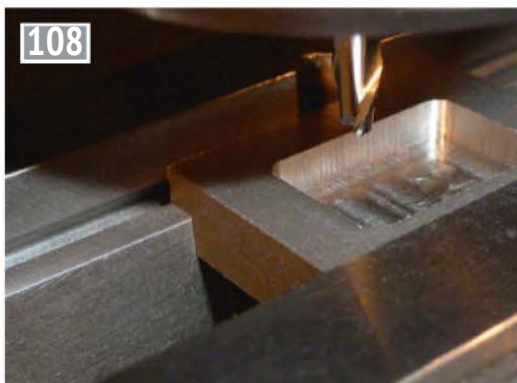
105 Milling the slot in an aluminium jig for holding the valves in the vice.



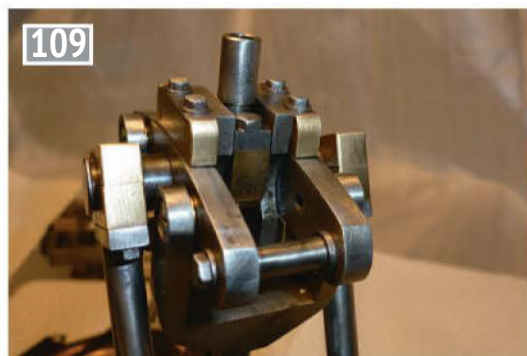
106 End milling the top face of a valve.



107 Completed sets of valves and carriers, before the square steam cavities are milled.



108 Milling out the steam cavity.



109 Close up of the link showing the bronze shoes held by the central cage which carries the fitting to the valve rod.



111 Cut-off adjuster with grab link bearings.



110 With the eccentric rods.

the one used in the original magazine article that I had found so I thought that I would give it a try.

The valve itself is just a square of cast iron with the oblong steam void milled away on its underside (photo 105).

Its upper side has a step milled at either end so that it fits smoothly into a rebate milled out of the bottom of a buckle made from a square the same size as the valve (photo 106). This has enough height to accommodate the valve rod,

to which it is clamped with two screws or bolts.

Milling these to a reasonable accuracy with the DRO was so much easier than all the previous occasions, when I have had to make them without (photos 107 and 108)!

Expansion links and cut off adjusters

I had chosen to have Stevenson valve gear but the variations to this gear by different manufacturers are almost endless, with both good and bad results. The more I read about this valve gear the more confused I seem to become - and its subtleties seem endless.

As far as the expansion links are concerned, I intended to copy the design used on a number of the VIC small cargo vessels ordered by the admiralty for use in the 2nd World War. A number of these vessels still exist and photos of the engines are to be found on the Internet. The links they use have a number of design features that I wanted to replicate.

However, having spent a considerable time designing and making them, when I came to fit them on the engine, I found it impossible. In full gear they conflicted with various bits of the structure - not by much, but enough to preclude any rescue ideas that I could think of. So much for forward planning, but if you have ever tried to plot on a drawing all the gyrations performed by components of Stephenson's gear, then perhaps I might be forgiven my errors. As they say 'Remember the six P's - Proper planning prevents a _____'?

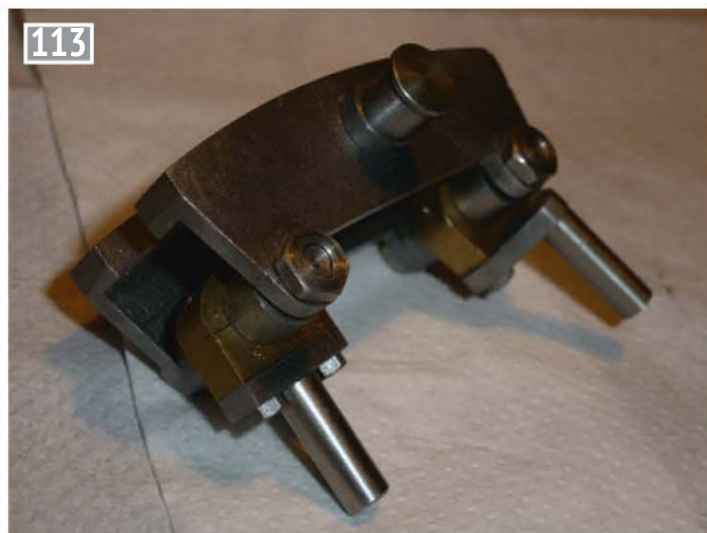
Having learned my lesson, the mk II version was started with as many of the previous ideas as could be managed, with a slightly smaller profile in mind (photos 109 and 110).

Manufacture was fairly straightforward, the only really fiddly bits being the eight bronze shoes that run on the outside of the links. Split bronze bearings on the ends of the drag links worked on the pivots in the centre of the outside of the links.

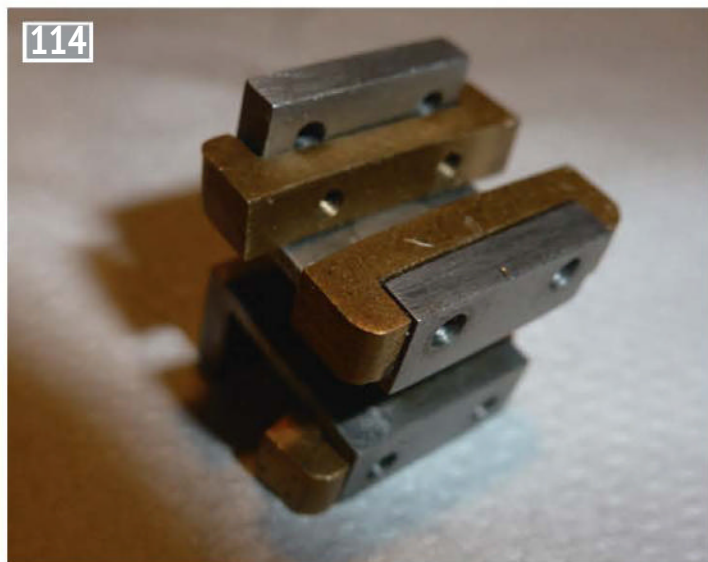
At the other end of the drag links are cut-off adjusters which take the place of the weighshaft levers. More favoured by the Royal Navy than the merchant marine, these devices allow adjustment of the throw imparted by



Cut-off adjuster components.



View of the original expansion links which I couldn't fit.



Central cage with bronze shoes.



Another view of the link.



A further view of the link.

the drag links, to fine tune the amount of cut-off to the valves. As most vessels spend 97% of their time in forward gear the positioning of the cut off adjuster is such that any alteration only effects forward gear and not reverse (**photos 111 and 112**).

Unlike my first attempt, this expansion link required forked ends to the eccentric rods, something I had wished to avoid. These are attached to either end of the links using small ball races, the only non-bush bearings used in the engine.

Rather than attempt to describe the differences between my two versions it will be better seen from the pictures (**photos 113 to 116**).

● To be continued.

Announcing LittleLEC 2024

Martin Cooper, North London SME, invites you to compete in this year's competition.



North London Society of Model Engineers welcomes you to participate in **LittleLEC 2024** at their Tyttenhanger Track Site, Colney Heath, Hertfordshire 8th and 9th June 2024.

Founded in 1944, North London SME has as its principal objectives the promotion and encouragement of model engineering and its related pastimes. Members of the Society have access to an unusually wide range of activities that include locomotives and railways in various scales and gauges. Slot cars, stationary steam, agricultural and road steam, boats and ship models are also catered for. For administrative convenience, the various interests are grouped into sections but every member has access to all Society activities. A monthly newsletter is published.

A permanent headquarters is maintained in Finchley, North London where the Society houses its library and meeting room as well as permanent layouts for slot cars, '0', '00' and North American 'H0' railways. Members with interests in marine, locomotive and workshop topics also meet here.

Raised and ground level railways, garden railways, and a boating lake are accommodated at the Society's site at Colney Heath, Hertfordshire which also has space for running agricultural and road vehicles.

Members interested in the construction and operation of miniature working steam or electric locomotives comprise the locomotive sections which



are currently the largest groups within the Society. Locomotives in 5 and 3½ inch gauges are run on an elevated track just over half mile in length. A short raised track, known affectionately as the *Cuckoo Line*, accommodates 5, 3½ and 2½ inch gauges while 7¼ and 5 inch gauge trains run on an extensive ground level railway. The LittleLEC competition will

be run on the long elevated 5 and 3½ inch gauge track.

LittleLEC 2024

Conceived by the late Peter Langridge of Guildford MES and first run in 2008 at Guildford's Stoke Park track, LittleLEC is scheduled to take place this year on Saturday and Sunday 8th and 9th June. A light-hearted competition for



LittleLEC



North London SME





locomotives with a dry weight of no more than 50lb, it will on this occasion be limited to locomotives of 5 and 3½ inch gauges. Sand will not be used and competitors will be discouraged from leaning on their locomotives to improve adhesion! Competitors are encouraged to use their own driving trucks but lightweight, free running trucks are available if required. Coal, oil and water will be supplied for the competition. A dynamometer car will not be used. Results will be determined by calculation from track constants and the total weight hauled during the run. More information about the competition is available on the LittleLEC website www.littlelec.co.uk

Entry forms are available from Martin Cooper acting on behalf of North London SME as LittleLEC Event Co-ordinator. Requests for entry forms should be made either by email to littlelec@gmes.org.uk (preferred) or by post to 49 Links Drive, Radlett, Hertfordshire WD7 8BD - please mark the envelope 'LittleLEC' and enclose a stamped, self-addressed envelope. Returned, completed entry applications will be acknowledged (preferably by email) and held until Wednesday 29th May, the deadline for final receipt of applications. A maximum of 18 entries will be accepted. In the event that more than 18 entries are received, a draw will be held during the evening of 29th

May and applicants notified accordingly.

LittleLEC is a two-day event during which each competitor has two runs, each of 20 minutes duration. On both Saturday and Sunday the first scheduled run will start at 9am. Results will be declared and presentations made on Sunday afternoon.

All competitors will receive a certificate recording their run. There will be a £50 cash First prize from the *Model Engineer* magazine and a £35 cash Second prize also from the *Model Engineer* magazine. The Third placed competitor will receive a cash prize of £20. An additional award may be made at the discretion of North London SME.

The winner will also be awarded the *Small Locomotive Challenge Trophy* to be retained for one year and returned for the next event. This trophy was kindly donated by Station Road Steam whose interest and support are appreciated and acknowledged.

Light refreshments and lunch will be available on both days of the event.

The location of the site is shown on the North London SME website www.nlsme.co.uk Its OS grid reference is TL 197 057 and for satnav users the post code for adjoining properties at Park Corner is AL4 0NJ. Please note that the

Society has no on-site facilities for overnight camping or caravans. Also, whilst on-site car parking is very limited, places will be reserved for competitors and organisers.

Entries should preferably use the application form, available as indicated above, but should in any case include the following information:

- * Your name
- * Your address
- * Your post code
- * Your telephone number(s)
- * Your e-mail address
- * Club or Society to which you belong
- * Locomotive and gauge
- * Locomotive dry weight (including tender if used)

Please also give a brief description / history of the locomotive and any specific details particular to it.

Please indicate your preference for running Saturday or Sunday, early or late in the day. Please note, however, we cannot guarantee to oblige your preference.

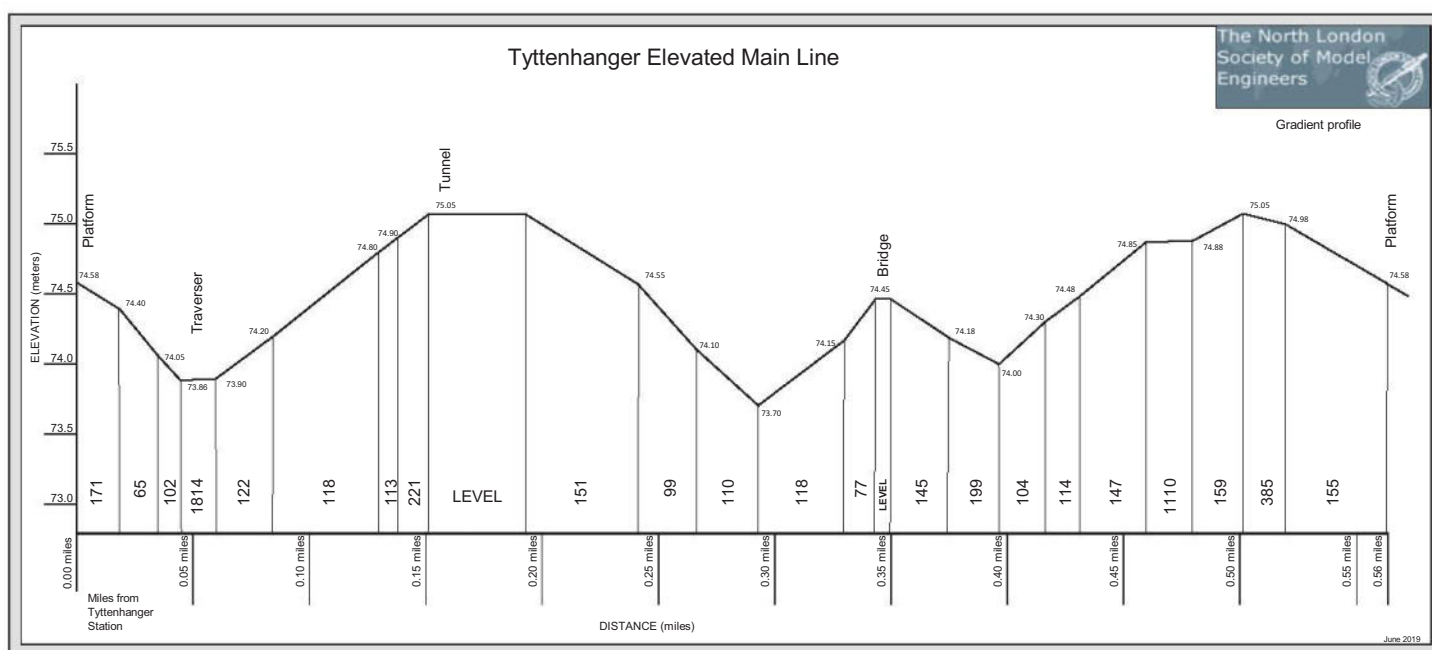
Please state if you require the use of a North London SME driving trolley.

Entries should be signed and returned to the organiser:

Martin Cooper, 49 Links Drive, Radlett, Hertfordshire WD7 8BD

07712-911325 littlelec@nlsme.co.uk

ME



Geoff Theasby reports on the latest news from the clubs.



For several weeks, I have begun each missive with few or no newsletters to review. This time I don't, Yippee! Whilst trying not to burden my faithful reader with the humble problems at Theasby Towers, my comments on the sparsity of incoming newsletters have been noticed. Allah has smiled upon me and I no longer have to compensate for the lack of length by making up with brevity. There still seems a strange reluctance to send me photos I have requested, but let's see what's in Geoff's treasure chest.

In this issue: a unique guard's van, a torsion meter, *Lion*, Al builds a steam engine? *Hiram Maxim*, a masterpiece, a beetle and a second career.

Erratum: I owe an apology to **Esk Valley MES** because in ME 4730, I suggested that 'Trains for Maggie's' was a continuing event. In fact it was a one year initiative, proposed by a member with connections to that charity. The Society's normal public running is on Sundays, which next year begins on Easter Sunday, 31st March.

W. www.eskvalleymes.org.uk
Steamview, November, from **Sydney Live Steam Locomotive Society**, opens with James Sanders commenting on how little information was available on the Internet, such as, in his case, what was available on the market for locomotives entire or in part. There are a few well known advertisers, who trade worldwide, but advertising is so expensive that it can be difficult to publicise a trader's

products or stock which is available. James had an offer to ID and/or buy a model of which he was a little doubtful. It turned out to be a 3.5 inch gauge D Class and very carefully made. All the parts were there, as far as he could tell. The Small Gauge Festival was well attended and worked well, despite the occasional shower. David Judex writes on a unique guard's van with a unique history. In order to gain his Higher Certificate on leaving school, he had to have a project. As he was railway obsessed and having taken up woodwork, the natural decision was for a form of vehicle like a guard's van. A passenger carriage would have been too long, in both physical size and in the time available. As the prototype vans had been simply made with butt joints rather than more sophisticated construction techniques, he copied the original design faithfully and wrote his reasons in the accompanying builder's notes, which eventually numbered 76 pages. In the end it wasn't quite ready on time but was awarded an average score. Unfortunately, a group of his teachers engaged in a dispute with the management and resigned. For several weeks he could make little progress, during which time he resolved to improve the faithfulness to the prototype. Interestingly, the body is not attached to the frames and can be lifted off. To inhibit a forced separation, a collision perhaps, the mounting bolts were left long, rather than nipped down. When it came to choose the colours, he decided

to use a clear varnish to show off the attractive Kauri wood he had used. To complete his education, it was entered in the school's exhibition of work and won! It also featured in Australian Model Engineer magazine (**photo 1**)

W. www.slsas.asn.au

In my newspaper *de jour*, I see that 'Rosie the riveter' has died, aged 104. Elinor Otto, one of the possible models for the WWII campaign to encourage aircraft production, was still riveting away until the age of 95. RIP all such women who did their bit.

PEEMS, Oct-Nov from **Pickering Experimental Engineers & Model Society** suggests that there may be another Harrogate show in 2024, hopefully without the snow. Winner of the Mike Sayers Trophy was David Proctor, with his optical torsion meter. It measures the twist in a moving shaft by comparing, on an oscilloscope screen, the relative positions of the waveforms on the screen, which are derived from the black and white markings on 'targets' attached to the motor and shaft, respectively. This can be measured as the shaft is rotating. A little maths means you can measure the torque and other variables. The runner up was Richard Gretton's 'tall clock', in a very contemporary blue and white transparent case. There was only one vote between them. Mike said that this was possibly the first time he had seen a competition entry which was of practical use.

Guildford Model Engineering Society sends *GMES News* for November. Geoff Burch, on 4 October, delivered part two of his talk after an interregnum of some 12 years since he gave part one. I hope everyone remembers that talk because there will soon be a short quiz... W. www.gmes.org.uk

Lionsheart, the Newsletter of the **Old Locomotive Committee**, warns us that the Committee's very existence is in doubt. Currently there is no chairman, secretary or treasurer. If there is no



David Judex's guard's van SLSLS. (Photo from Newsletter.)



Frank Rothwell's steam Land-Rover. (Photo courtesy of Frank Rothwell.)

treasurer to finance the website, it will disappear and access to all its records and information will not be easily available. John Hawley writes an appreciation of John Brandrick, without whom we, and the body of railway history it established, would be the poorer. In an update the following day, John Hawley suggests that he was prepared to fulfil one of the three positions (details embargoed *pro tem*).

I referred to a steam-powered Land-Rover in ME 4733 and now have a photograph for you. The gentleman concerned is Frank Rothwell, chairman of Oldham Athletic Football Club, and clearly a man of many talents. (photo 2).

W. www.lionlocomotive.org.uk

Stamford Model Engineering Society newsletter begins with editor, Joe Dobson trying out AI in ChatGPT on 'How to build a steam engine'. This it does quite well, although he did mention one howler in which it was suggested that the flywheel should be attached to the piston rod... (As the chairman of that enterprise has lately been sacked, I wonder who or what wrote his dismissal letter? - Geoff.)

A talk by Colin Furze centred on his tunnel, currently being constructed. He also described his car lift (in the basement) which lowers the vehicle out of sight and turns it, so it can be driven forwards out of the underground garage. Stuart Jordan writes on the Bennie Railplane. George Bennie had many ideas about flying and railways. One railcar had a large propeller to drive it. (No

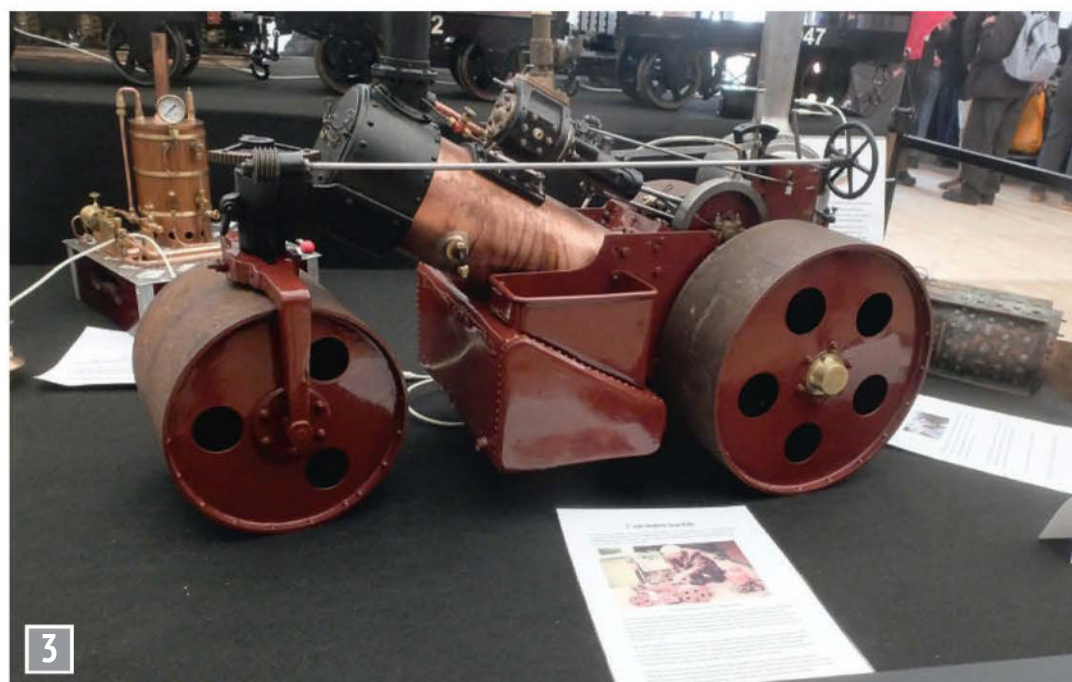
mention is made of the risky business of waiting on the station platform close to the propeller in motion.)

Welling & District Model Engineering Society newsletter Dec-Jan, opens with a picture of Chris Moulange, a long time member, who visited recently but sadly died only a few weeks later. He is pictured with the locomotive, *Maid of Kent*, he presented to the Society in

2018. It is named in his honour and numbered 1927, the year of his birth. Roy Cornell briefly describes Hiram Maxim's flying machines of 1894, proving that powered flight was possible - but they never achieved free flight although they never intended to. Tony Riley writes extensively on the Mechanical Horse. I enjoyed the article so much, I took time to read it thoroughly before continuing this narrative. Karrier of Huddersfield in 1929 designed and made a three wheeled commercial vehicle, the 'Colt'. The following year, a motor and detachable trailer concept was designed by an LMS engineer and produced by Karrier as the 'Cob'. This led to LNER asking Napier to find a replacement for their delivery horses, and they offered their design, which was sold to Scammell in 1934. Many companies used the vehicle and it was even used on aircraft carriers. 14,000 had been made when in 1948 the 'Scarab' was launched, updated in 1967 in the 'Townsmen', with its fibreglass cab. Unfortunately, legislation requiring brakes on all wheels saw the end in 1968. Over 100 of the various types are preserved.

W. www.wdmes.co.uk

This Wallis & Steevens Simplicity roller never caught on (photo 3).



Wallis & Steevens Simplicity roller, under the skin at MMEX.



Atkinson 'Borderer' at SY Transport Museum.



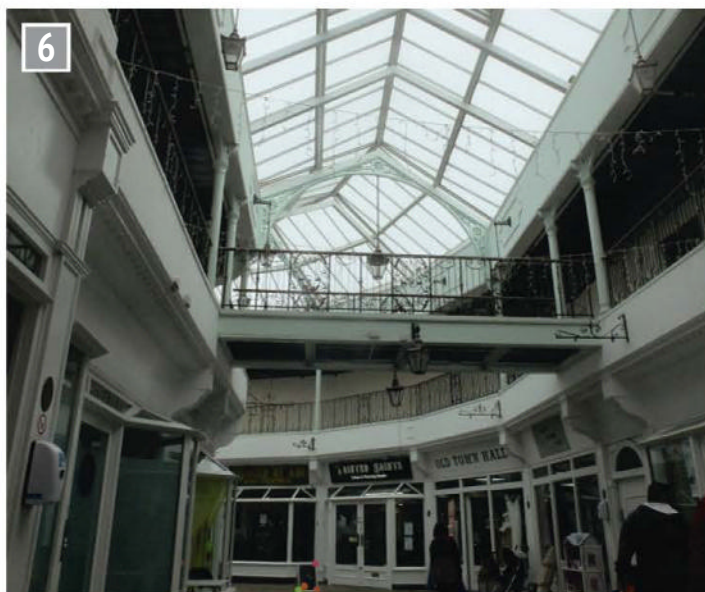
Baler at MMAX.

Raising Steam, autumn, from the **Steam Apprentice Club**, has a fine picture of an aptly named *The Masterpiece*, by Burrell, at Welling. The Club attended all three days of the Bedford rally, with their largest yet display, including Formula Mamod, *Lady Sylvia* and a well-used 'playpen'. The photo competition was won by Elliot, of an agricultural engine resting amongst the bluebells. *Victoria* has been out and about, starting with Amberley, then the Weald and Downland museum, followed by another rally in the same place, then Balls Cross and a road run, then back to Amberley. 14 year old Charlie helps on a 1911 Marshall, and was awarded the title, 'Apprentice'. He writes

three pages on his adventures this year. The Marshall owners, Chris and Laura, say Charlie is amazing and very keen. Laura says that his activities logbook had to be extended because he has been so busy. NTET, the National Traction Engine Trust, offers bursaries of up to £500, for individuals wishing to study some aspect of steam engineering. *Then and Now* looks at a 1913 Burrell Showmans engine, *Lightning II*, working hard at a funfair. Sold in 1956 to a haulier who could not use his motor wagons due to the Suez crisis, it found a short, second career.

W. www.ntet.co.uk

A 'Big Yellow Taxi' it is not. SY Transport Museum (photo 4).



Rotherham Old Town Hall, restored.

Worthing & District Society of Model Engineers' Newsletter opens with the chairman's new sedan chair, (sorry, small shed) being moved using bearers through the sides. Treasurer Martin Laker reports that the finances are in good order, which is not the case with the local council, apparently, says chairman, Kevan Ayling and the Society lease is to be reviewed in two years. Kevan writes of replacing a transparent roof panel in his workshop, thus plunging it into Stygian gloom. He had to fit LED battens which rectified the situation so he could resume his model making activities. Geoff Bashall had trouble painting his MN boiler bands and was most grateful for the YouTubers whose videos helped a great deal. A good cartoon, unattributed, shows people playing street golf between the potholes. John Fuller was involved in several electric car experiences in his employment starting with the Enfield 8000. The range was quoted as 40 miles but a 5 mile pub trip for lunch involved a walking-pace return journey. Next, a sodium sulphur battery was tested in a colleagues' car, but the heat produced made it impractical. Then came Clive Sinclair's C5, which John drove about the roads near his workplace, finding out at first-hand its idiosyncrasies. (Is that the right word?) The fuel cell driving electric motors concept

shows promise and can deal with several types of fuel. At the Society's recent auction, one member was bidding against himself and the auctioneer duly sold the item to the high bidder. W. www.worthingmodelengineers.co.uk

Unidentified baler, working at MMAX (photo 5).

The Gauge 3 Society, winter Newsletter, has Brian Torr rebuilding his garden railway. One unusual picture shows a derailed Britannia on its side. A real event at the club track turned into a little scene for a photograph. (Photo requested.) Close inspection shows a gentleman seemingly trying to push the locomotive back upright. Clive Burrows is building a true scale class 66, whilst Ian Harper has some advice for online sellers of valuable items.

W. www.gauge3.org.uk

The old Town Hall in Rotherham has been restored and is now a mini market: this was a Sunday (photo 6) - and if you have been, well, stop it!

And finally, the three wise men approached the stables and in the gloom, one tripped and cried out, "Jesus Christ" and came there forth out of the darkness, a voice, "That's a nice name, we were going to call him Henry."

ME

Club Diary

1 February 2024 – 25 March 2024

February

1 Sutton MEC

Bits and Pieces evening 20:00.
Contact: Paul Harding,
0208 254 9749

1 Warrington & District MES

Projects/natter night, St Mary
Magdalene Church, WA4 3AG,
20:00. See [www.wdmes.org.uk/](http://www.wdmes.org.uk/events)
events

4 Warrington & District MES

Running day at the club track.
See www.wdmes.org.uk/events

7 Bradford MES

Talk – Derek Rayner, 'Leeds
Engine Builders', Saltaire
Methodist Church, 19:45.
Contact: Russ Coppin,
07815 048999

11 Sutton MEC

Track Day from 13:00. Contact:
Paul Harding, 0208 254 9749

11 Warrington & District MES

Running day at the club track.
See www.wdmes.org.uk/events

15 Warrington & District MES

Talk: Michael Moore on
'East Lancs Railway', St Mary
Magdalene Church, WA4 3AG,
20:00. See [#### 18 Warrington & District MES](http://www.wdmes.org.uk/
events</p>
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Running day at the club track.
See www.wdmes.org.uk/events

21 Bristol SMEE

Talk: 'Meccano Model of
the USS Missouri', Begbrook
Social Club BS16 1HY,
19:30. Contact: secretary@
bristolmodelengineers.co.uk

25 Warrington & District MES

Running day at the club track.
See www.wdmes.org.uk/events

March

3 Warrington & District MES

Running day at the club track.
See www.wdmes.org.uk/events

6 Bradford MES

AGM, Saltaire Methodist
Church, 19:45. Contact: Russ
Coppin, 07815 048999

7 Sutton MEC

Bits and Pieces evening 20:00.
Contact: Paul Harding,
0208 254 9749

7 Warrington & District MES

Projects/natter night, St Mary
Magdalene Church, WA4 3AG,
20:00. See [#### 10 Sutton MEC](http://www.wdmes.org.uk/
events</p>
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Track Day from 13:00. Contact:
Paul Harding, 0208 254 9749

10 Warrington & District MES

Running day at the club track.
See www.wdmes.org.uk/events

17 Guildford MES

Open day, 14:00-17:00. See
www.gmes.org.uk

17 Warrington & District MES

Running day at the club track.
See www.wdmes.org.uk/events

20 Bristol SMEE

Talk: 'Goliath, a model
of a 1903 French tug
boat', Begbrook Social
Club BS16 1HY, 19:30.

Contact: secretary@
bristolmodelengineers.co.uk

21 Warrington & District MES

AGM. See [#### 22 Warrington & District MES](http://www.wdmes.org.uk/
events</p>
</div>
<div data-bbox=)

Running day at the club track.
See www.wdmes.org.uk/events

25 Sutton MEC

Afternoon run from 13:00.
Contact: Paul Harding,
0208 254 9749

NEXT ISSUE

We Visit Bournemouth

John Arrowsmith takes a trip to the seaside
and visits a 100-year old club.

Blackening

Graham Astbury explains the process of
blackening small steel parts.

Moving a Garrett

Building a four-inch traction engine is a
challenge. Werner Schleidt finds that moving
one around is even more so.

Guards

Calder Percival adds safety guards to his
milling machine.

LNER B1

Doug Hewson continues with the locomotive
fittings for a B1 by describing an 'everlasting'
blow down valve.



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Traction Engines and Locos in all sizes.
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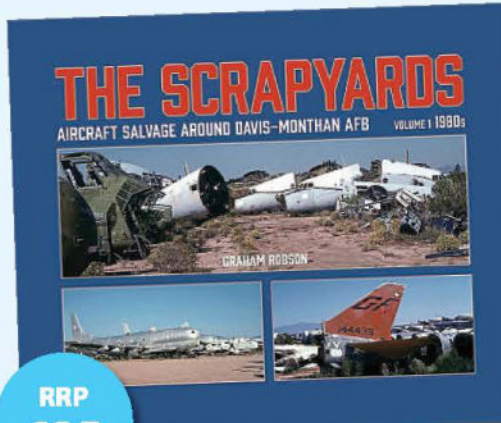




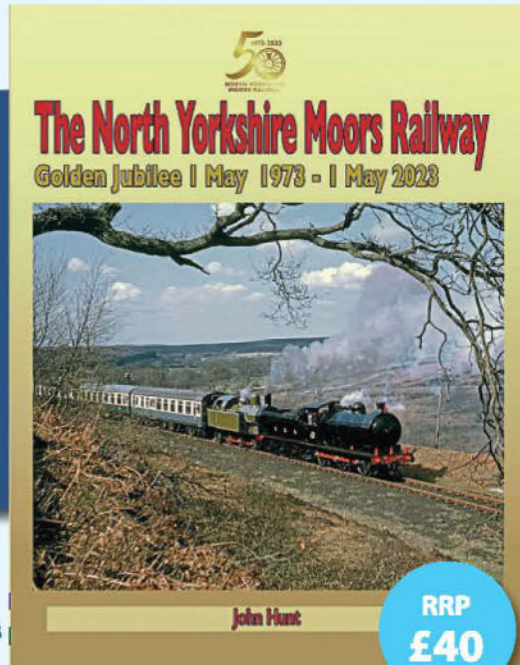
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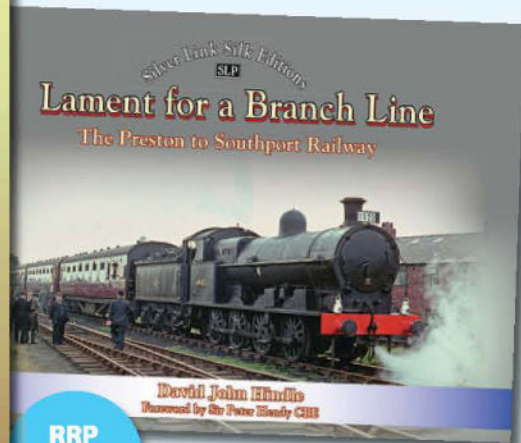
Use code 'FLASH20' at the checkout



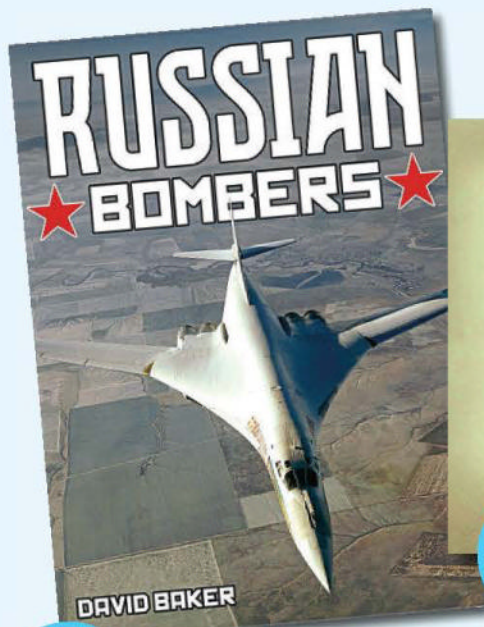
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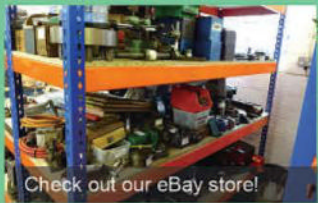
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homeandworkshopmachinery



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



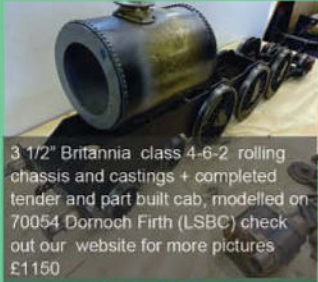
Stanley precision vice 55mm
Jaw New / New Zealand £195



Edwards 3ft / 40" guillotine 16 gauge + front
rests and back stops £950



Rishton milling machine + three
way DRO, spotless table! £4250



3 1/2" Britannia class 4-6-2 rolling
chassis and castings + completed
tender and part built cab, modelled on
70054 Dornoch Firth (LSBC) check out
our website for more pictures
£1150

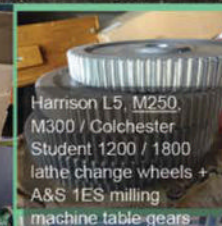


X-Y 12" x 6" table £525

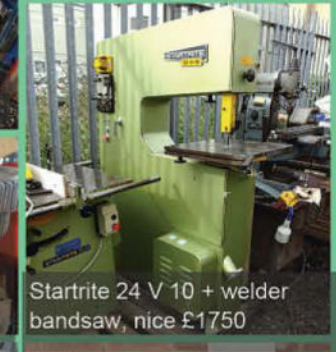


Happy Christmas to all!

MYFORD SUPER 7B CENTRE LATHE
OWNED BY DAVID PIDDINGTON £4950



Harrison L5 M250
M300 / Colchester
Student 1200 / 1800
lathe change wheels +
A&S 1ES milling
machine table gears



Startrite 24 V 10" + welder
bandsaw, nice £1750



Wadkin wood lathe 6" centre height x
32" centres + 14" rear face plate on
the rear end + 6 3/4" 3 jaw chuck
£1150



ART METAL LONDON
SW1 £150



Transwave 4HP & 5.5HP
Rotary converter £750 / £850



Just arrived!
Colchester Bantam 1600 lathe £1500



Ajax 6" hacksaw
repaired handle up/down £495



Meddings L1 MK V drilling machine
£2250



Myford Super 7 B lathe £3450



Creuson Morrisflex 240V
8" polisher buffers £825
each



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



Harrison Graduate wood lathe £1450



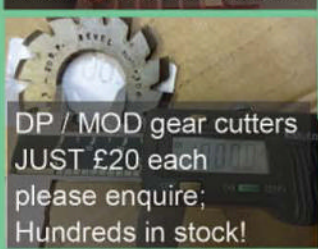
Clarke 917 vacuum former £495



Myford 3/4HP 240V resilient mount
motor configured to match a
Dewhurst reversing switch already
wired + instructions £226



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



DP / MOD gear cutters
JUST £20 each
please enquire;
Hundreds in stock!



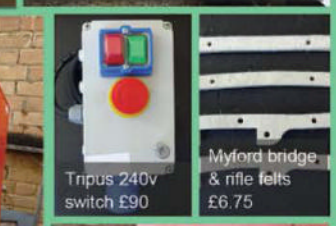
Boxford ME10A lathe + Tesla
Inverter, very nice example £3950



RJH Bison 10" pedestal grinder
complete with light £450



Tripus 240V
switch £90



Myford bridge
& rifle felts
£6.75



Norton Deep
throat No 6DB
fly-press
12" throat x 9"
height £950
FLYPRESS
PUNCHES
AVAILABLE



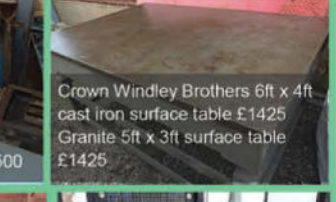
Smart and Brown Sabel lathe £950



Myford gearbox unused £1000



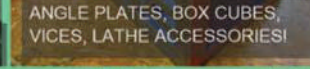
HME Hearth just arrived from
education 3PH / mains gas £500



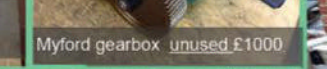
Crown Windley Brothers 6ft x 4ft
cast iron surface table £1425
Granite 5ft x 3ft surface table
£1425



Smart and Brown Sabel lathe £950



ANGLE PLATES, BOX CUBES,
VICES, LATHE ACCESSORIES!



Myford gearbox unused £1000



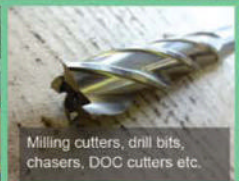
Harrison M300 lathe £3950



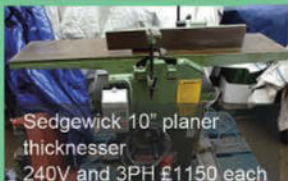
Cetec 2A vertical, horizontal
milling machine £1500



Neat cut and soluble
cutting oils £10 each



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



Sedgewick 10" planer
thicknesser
240V and 3PH £1150 each



RJH 6" bandfacer / finisher
1.5HP, 3PH quality £425

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